BASF Corporation
McIntosh, Alabama
EPA I.D. Number ALD 001 221 902

FACT SHEET

A draft renewal of the Alabama Hazardous Waste Management and Minimization Act (AHWMMA) permit has been prepared for the BASF Corporation facility. This hazardous waste facility is located in McIntosh, Alabama. This fact sheet has been prepared to briefly advise the public of the principal permitting, legal and policy issues of the draft permit.

I. PERMIT PROCESS

The purpose of the permitting process is to allow the State and the public to evaluate BASF Corporation's ability to comply with the hazardous waste management requirements of the AHWMMA, as amended. BASF Corporation must comply with hazardous waste management conditions set forth in the permit during the effective period of the permit.

II. PROCEDURES FOR REACHING A FINAL DECISION

The Alabama Department of Environmental Management (ADEM or Department) is proposing to issue BASF a permit renewal for the operating permit.

ADEM Admin. Code r. 335-14-8-.08(6)(b)1. requires that the public be given at least a 45-day comment period for each draft permit. The comment period will begin on September 29, 2023, which is the date of publication of the public notice in major local newspaper(s) of general circulation and will end on November 13, 2023. The public notice will also be broadcast over local radio station(s).

Any person interested in commenting on the application or draft permit must do so within the comment period discussed above.

All persons wishing to comment on any of the permit conditions or the permit application should submit their comments in writing to the Alabama Department of Environmental Management, Permits and Services Division, 1400 Coliseum Blvd. (zip 36110-2059), P.O. Box 301463 (zip 36130-1463) Montgomery, Alabama, ATTENTION: Mr. Russell A. Kelly.

ADEM will consider all written comments received during the comment period while making a permit decision for this facility. When the Department makes its final permit decision, notice will be given to the applicant and each person who has submitted written comments or requested notice of the final permit decision.

III. FACILITY DESCRIPTION

BASF, formerly known as Ciba Specialty Chemicals, occupies approximately 1500 acres within an industrial park along the Tombigbee River. BASF manufactures additives used in plastics and lubricants.

The facility's AHWMMA operating permit sets operating parameters in accordance with the ADEM Administrative Code to ensure the safe operation of the facility. The permit for this facility addresses the on-site hazardous waste disposal in the landvault and treatment in the boiler. Post-closure care for 7 closed landfill or surface impoundments addressing cover/cap maintenance and a leachate management system are included. A groundwater monitoring and corrective action program is also included to address groundwater contamination associated with the past operations of the closed units. The program currently includes a pump and treat system for the alluvial aquifer and an enhanced source control component for the Miocene aquifer.

Additional provisions have been included in the permit as a result of the changes made to AHWMMA to incorporate the requirements of the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA. These requirements are included in accordance with ADEM Admin. Code r. 335-14-5-.06(12), which addresses corrective action for Solid Waste Management Units (SWMUs). This rule requires a RCRA Facility Assessment (RFA) of all SWMUs to be conducted at the facility. An RFA for BASF Corporation has been completed and SWMUs have been identified.

IV. TECHNICAL CONTACT

Ben King
Engineering Services Section
Industrial Hazardous Waste Branch, Land Division
Alabama Department of Environmental Management
1400 Coliseum Blvd (zip 36110-2059)
P.O. Box 301463 (zip 36130-1463)
Montgomery, Alabama
(334) 394-4330
ben.king@adem.alabama.gov

ADEM
Alabama Department of Environmental Management

HAZARDOUS WASTE FACILITY PERMIT

PERMITTEE:	**BASF Corporation**
ADDRESS:	**1379 Ciba Road** **McIntosh, AL 36553**
EPA ID/PERMIT NUMBER:	**ALD 001 221 902**
UNITS PERMITTED:	**Storage in Tanks** **Treatment in Boiler** **Disposal in Landvault** **Post-Closure Care**
ISSUANCE DATE:	**<<Date>>**
EFFECTIVE DATE:	**<<Date>>**
EXPIRATION DATE:	**<<Date>>**

This Permit is issued pursuant with the Code of Alabama 1975, §§ 22-30-1-et. seq., as amended, and regulations adopted thereunder and the Hazardous Wastes Management and Minimization Act and in accordance with the plans and specifications and applications filed with the Department subject to the conditions appended hereto, all of which are considered a part of this Permit. This Permit shall be subject to all applicable laws of the State of Alabama, rules and regulations and orders of the Department of Environmental Management and shall be effective from the date of issuance.

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Alabama Department of Environmental Management

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
HAZARDOUS WASTE PERMIT

Permittee:	Permit Number:	ALD 001 221 902
	Identification Number:	ALD 001 221 902

OWNER:

BASF Corporation
100 Campus Drive
Florham Park, New Jersey 07932
Morris County

OPERATOR:

BASF Corporation
1379 Ciba Road
McIntosh, Alabama 36553

Pursuant to the Alabama Hazardous Wastes Management and Minimization Act (AHWMMA), Code of Alabama 1975, Section 22-30-1, et. seq., as amended, and attendant regulations promulgated thereunder by the Alabama Department of Environmental Management (ADEM or the Department), a permit is issued to BASF Corporation for the facility located in McIntosh, Alabama, at latitude N 31° 16' 37" and longitude W 88° 00' 16".

The Permittee must comply with all terms and conditions of this permit, which consists of the conditions set forth herein (including those in any attachments), and the regulations applicable to the Permittee's facility contained in Chapters 335-14-1, 335-14-2, 335-14-5, 335-14-8, and 335-14-9 of the ADEM Administrative Code of Regulations (hereinafter referred to as the "ADEM Admin. Code Rule"). Applicable regulations are those which are in effect on the date of issuance of this permit.

This permit is based on the assumption that the information submitted in the permit application attached to the Permittee's letter dated November 10, 2021, as modified by subsequent amendments dated September 1, 2022, March 21, 2023, and August 8, 2023 (hereby incorporated by reference and hereafter referred to as the Application) is accurate and that the facility will be constructed and operated as specified in the Application. Any inaccuracies found in this information could lead to the termination or modification of this permit in accordance with ADEM Admin. Code Rules 335-14-8-.04(2), 335-14-8-.04(3), and 335-14-8-.04(4) and could lead to potential enforcement action. The Permittee must inform ADEM of any deviation from or changes in the information provided in the Application that would affect the Permittee's ability to comply with the applicable regulations or permit conditions.

This permit is effective as of <<DATE>> and shall remain in effect until <<DATE>> unless revoked and reissued, or terminated under ADEM Admin. Code Rules 335-14-8-.04(2) and 335-14-8-.04(4) or continued in accordance with ADEM Admin. Code Rule 335-14-8-.05(2).

Alabama Department of Environmental Management — Date Signed

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Documents Incorporated By Reference:

Part A and Part B Permit Application submitted on November 10, 2021, as modified by subsequent amendments dated September 1, 2022, March 21, 2023, and August 8, 2023.

Remediation Plan – Former Production Areas 7 and 8, dated October 2015, as modified by subsequent amendments dated January 29, 2016.

Environmental Covenant for OU-3 Sand Cover, dated January 7, 2016.

Environmental Covenant for Groundwater under Parcels A and A-1, dated April 18, 2016.

The following CERCLA documents are incorporated to serve as documentation of the Corrective Measures Implementation plan for the site:

OU-1: Remedial Investigation/Feasibility Study (RI/FS) and Remedial Design (RD), OU-1 dated September 1989; Record of Decision (ROD), dated September 28, 1989.

OU-2: RI/FS, dated September 1991; ROD, dated September 30, 1991; RD, dated September 1996.

OU-3: RI/FS, dated August 1988; ROD, dated July 25, 1995; Final RI Addendum Report, dated July 1994; RD, dated October 1997: Explanation of Significant Differences (ESD), dated June 5, 2019.

OU-4: RI/FS, dated July 1992; ROD, dated July 14, 1992; RD OU-4 dated September 1996.

PART I

STANDARD FACILITY CONDITIONS

I.A. EFFECT OF PERMIT

Issuance of this permit does not authorize any injury to persons or property, any invasion of other private rights, or any infringement of state or local law or regulations. Compliance with the terms of this permit does not constitute a defense to any action brought under the AHWMMA, or any other law governing the protection of public health or the environment, for any imminent and substantial endangerment to human health, welfare, or the environment. (ADEM Admin. Code Rule 335-14-8-.01(4)).

I.B. SEVERABILITY

The provisions of this permit are severable and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

I.C. DUTIES AND REQUIREMENTS

1. Duty to Comply

The Permittee shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit. Any permit noncompliance, other than noncompliance authorized by an emergency permit, constitutes a violation of the AHWMMA, and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or denial of a permit renewal application.

2. Duty to Reapply

a. Operating Units

If the Permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Permittee must apply for and obtain a new permit. The application for a new permit must be submitted at least 180 calendar days before the expiration of this permit, as required by ADEM Admin. Code Rule 335-14-8-.03(1)(b)2.

b. SWMU Corrective Action Requirements

The Permittee must submit an application for a new permit for both post-closure and Solid Waste Management Unit (SWMU) corrective measures at least 180 calendar days before the expiration of this permit. The Permittee must reapply in order to fulfill the 30-year post-closure care period required by ADEM Admin. Code Rule 335-14-5-.07(8)(a)1. The Department may shorten or extend the post-closure care period applicable to the hazardous waste facility in accordance with ADEM Admin. Code Rules 335-14-5-.07(8)(a)2. and 335-14-8-.03(1)(b).

3. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

4. Duty to Mitigate

In the event of noncompliance with this permit, the Permittee shall take all reasonable steps to minimize releases to the environment, and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment.

5. Proper Operation and Maintenance

The Permittee shall, at all times, properly operate and maintain all facilities and systems of treatment, monitoring, and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance (O&M) includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this permit.

6. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause as specified in ADEM Admin. Code Rules 335-14-8-.04(2), 335-14-8-.04(3), and 335-14-8-.04(4). The filing of a request for a permit modification, revocation and reissuance, or termination, or the notification of planned changes or anticipated noncompliance on the part of the Permittee does not stay any permit condition.

7. Property Rights

Issuance of this permit does not convey any property rights of any sort, nor any exclusive privilege.

8. Duty to Provide Information

The Permittee shall furnish to the Department, within a reasonable time as determined by the Department, any relevant information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

9. Inspection and Entry

The Permittee shall allow duly designated officers and employees of the Department, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

a. Enter at reasonable times upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and,

d. Sample or monitor, at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the AHWMMA, any substances or parameters at any location. The Permittee shall have the opportunity to split samples during sampling.

10. Monitoring and Records

a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The method used to obtain a representative sample of the waste to be analyzed must be the appropriate method from ADEM Admin. Code Rule 335-14-2-Appendix I, or the methods specified in Waste Analysis Plan (WAP) Appendix B of the permit application. Laboratory methods must be those specified in Test Methods for Evaluating Solid Waste: Physical/Chemical Methods SW-846 (latest edition), Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020), Standard Methods for the Examination of Water and Wastewater (latest edition), the methods specified in Appendix B of the permit application, or an alternative method approved by ADEM. [ADEM Admin. Code Rule 335-14-8-.03(1)(j)1.]

b. The Permittee shall maintain, at the facility, records of all monitoring information including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, the certification required by ADEM Admin. Code Rule 335-14-5-.05(4)(b)9, records of all data used to prepare documents required by this permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the certification, application, sample, measurement, report or record, or until corrective action is completed, whichever date is later. This period may be extended by the Department at any time and is automatically extended during the course of any unresolved enforcement action regarding this facility. [ADEM Admin. Code Rules 335-14-5-.05(5)(b) and 335-14-8-.03(1)(j)2.]

c. The Permittee shall maintain, at the facility, records of all groundwater monitoring wells, piezometers, and associated groundwater surface elevations throughout the term of this permit. These records shall include the surveyed location, surveyed elevation, surveyed elevation reference point, total depth, screened interval, construction details, well log, and all other pertinent information for each well and piezometer.

d. Records for monitoring information shall include:

i. The date(s), exact place, and times of sampling or measurements;

ii. The names of individual(s) who performed the sampling or measurements;

iii. The date(s) analyses were performed;

iv. The names of individual(s) who performed the analyses;

v. The analytical techniques or methods used; and,

vi. The results of such analyses.

e. The following documents and information shall be maintained throughout the term of this permit at the Facility:

i. Complete copy of this permit and the permit application.

ii. Operating record as required by ADEM Admin. Code Rule 335-14-5-.05(4) and this permit.

iii. Copies of all plans, reports, inspection schedules, and inspection logs as required by ADEM Admin. Code Chapter 335-14-5 and this permit.

11. Signatory Requirements

All applications, reports or information required by this permit and submitted to the Department shall be signed and certified in accordance with ADEM Admin. Code Rules 335-14-8-.02(2) and 335-14-8-.03(1)(k).

12. Reporting Requirements

a. Planned Changes

The Permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility and any solid waste management units identified under Part VII of this permit.

b. Anticipated Noncompliance

The Permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements.

c. Transfer of Permits

This permit may be transferred to a new owner or operator only if it is modified or revoked and reissued pursuant to ADEM Admin. Code Rules 335-14-8-.04(1) or 335-14-8-.04(3)(a)1.(vii). Before transferring ownership or operation of the facility during the term of this permit, the Permittee shall notify the new owner or operator, in writing, of the requirements of ADEM Admin. Code Chapters 335-14-5 and 335-14-8 and this permit.

d. Monitoring Reports

Monitoring results shall be reported at the intervals specified elsewhere in this permit.

e. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted to the Department no later than 14 calendar days following each schedule date.

f. Twenty-Four Hour Reporting

i. The Permittee shall report to the Department any noncompliance with this permit that may endanger human health or the environment. Any such information shall be reported orally within 24 hours from the time the Permittee becomes aware of the circumstances. This report shall include, but is not limited to, the following:

(I) Information concerning the release of any hazardous waste which may endanger public drinking water supplies; and,

(II) Information concerning the release or discharge of any hazardous waste, or hazardous waste constituents, or of a fire or explosion at the facility, which could threaten the environment or human health outside the facility.

ii. The description of the occurrence and its cause shall include:

(I) Name, address, and telephone number of the owner or operator;

(II) Name, address, telephone number, and EPA Identification Number of the facility;

(III) Date, time, and type of incident;

(IV) Name and quantity of material(s) involved;

(V) The extent of injuries, if any;

(VI) An assessment of actual or potential hazards to the environment and human health outside the facility, where this is applicable; and,

(VII) Estimated quantity and disposition of recovered material that resulted from the accident.

iii. A written submission shall also be provided within 5 calendar days of the time that the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the periods of noncompliance (including exact dates and times); whether the noncompliance has been corrected, and if not, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

g. Other Noncompliance

The Permittee shall report to the Department all instances of noncompliance not otherwise required by Permit Conditions I.C.12.d., I.C.12.e., or I.C.12.f. at the time any other reports required by this permit are submitted. The reports shall contain the information required by Permit Condition I.C.12.f.

h. Other Information

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information. In addition, upon request, the Permittee shall furnish to the Department any information related to compliance with this permit.

13. Certification of Construction

The Permittee may not commence treatment, storage or disposal of hazardous waste or contaminated media at any new or modified portion of the facility until the Permittee has submitted to the Department, by certified mail or hand-delivery, a letter (together with the certification by the Construction Quality Assurance (CQA) officer required by ADEM Admin. Code Rule 335-14-5-.02(10)(d) and any other certifications required by this permit or ADEM Admin. Code Division 335-14 signed by the Permittee and an Alabama-registered Professional Engineer stating that the facility has been constructed or modified in compliance with this permit where appropriate; and,

a. The Department has inspected the modified or newly constructed facility and finds it is in compliance with the conditions of this permit; [ADEM Admin. Code Rule 335-14-8-.03(1)(1)2(ii)(I).] or

b. The Department has either waived the inspection or has not notified the Permittee, within 15 calendar days of the notification from the Permittee, of its intent to inspect. [ADEM Admin. Code Rule 335-14-8-.03(1)(1)2(ii)(II)]

14. The Permittee shall assure that all measures necessary to maintain and/or achieve compliance with all applicable requirements of ADEM Admin. Code Division 335-14 are taken during the active life of the facility, post-closure care period, corrective action period, and throughout the term of this permit.

15. If circumstances beyond the Permittee's control arise to prevent achievement of any deadline set forth by this permit, the Permittee may immediately, upon the occurrence thereof, request an extension by sending a written request to the Department explaining the need for the extension. The Department may, after consideration of the circumstances, grant the extension. Requests for extensions may require a permit modification pursuant to ADEM Admin. Code Rule 335-14-8-.04(2) or (3).

I.D. CONFIDENTIAL INFORMATION

The Permittee may claim confidential any information required to be submitted by this permit if the information is protected under the Code of Alabama 1975, §22-30-18, as amended. The term "trade secret" as used in §22-30-18 is defined in the Code of Alabama 1975, §22-30-2(12).

I.E. DEFINITIONS

For the purposes of this permit, terms used herein shall have the same meaning as those in ADEM Admin. Code Chapters 335-14-1, 335-14-2, 335-14-5, and 335-14-8, unless this permit specifically provides otherwise. Where terms are not defined in the regulations or this permit, a standard dictionary reference or the generally accepted scientific or industrial meaning of the term shall define the meaning associated with such terms.

"Area of concern" (AOC), for the purposes of this permit, includes any area having a probable release of a hazardous waste or hazardous constituent which is not from a solid waste management unit and is determined by the Department to pose a current or potential threat to human health or the environment. Such areas of concern may require investigations and remedial action as required under Section 3005(c)(3) of the Resource Conservation and Recovery Act and ADEM Admin. Code Rule 335-14-8-.03(3)(b)2. to ensure adequate protection of human health and the environment.

"Contamination", for the purposes of this permit, refers to the presence of any hazardous constituent in a concentration that exceeds the naturally occurring concentration of that constituent in the immediate vicinity of the facility (i.e., areas not affected by the facility).

"Corrective action", for the purposes of this permit, is the sum of all corrective measures necessary to protect human health and the environment for all releases of hazardous constituents from any SWMU at the facility, regardless of the time at which waste was placed in the unit, as required by ADEM Admin. Code Rules 335-14-5-.06(11) and/or 335-14-5-.06(12). Corrective measures may address releases to air, soils, surface water, or groundwater.

"Corrective measures", for the purposes of this permit, include all individual measures taken and/or necessary to remedy releases and to protect human health and the environment for all releases of hazardous waste or hazardous constituents from any SWMU at the facility, regardless of the time at which waste was placed in the unit, as required under ADEM Admin. Code Rule 335-14-5-.06(12). Corrective measures may address releases to air, soils, surface water, or groundwater. The sum of all individual corrective measures is known as corrective action.

"Extent of contamination", for the purposes of this permit, is defined as the horizontal and vertical areas in which the concentrations of hazardous constituents in the environmental media being investigated are above detection limits or background concentrations indicative of the region, whichever is appropriate as determined by the Department.

“Groundwater Protection Standard”, for the purposes of this permit, refers to a groundwater concentration limit which is established pursuant to ADEM Admin. Code Rule 335-14-5-.06(3).

“Hazardous constituents”, for the purposes of this permit, are those substances listed in ADEM Admin. Code Rule 335-14-2-Appendix VIII and/or ADEM Admin. Code Rule 335-14-5-Appendix IX and include hazardous constituents released from solid waste, hazardous waste, and hazardous waste constituents that are reaction by-products.

“Interim measures”, for the purposes of this permit, are actions necessary to minimize or prevent the further migration of contaminants and limit actual or potential human and environmental exposure to contaminants while long term corrective action remedies are evaluated and, if necessary, implemented.

“Land Disposal”, for the purposes of this permit, and ADEM Admin. Code Chapter 335-14-9 means placement in or on the land and includes, but is not limited to, placement in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, underground mine or cave, or concrete vault or bunker intended for disposal purposes.

“Landfill”, for the purposes of this permit, includes any disposal facility or part of a facility where hazardous waste is placed in or on the land and which is not a pile, a land treatment facility, a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground mine, a cave, or a corrective action management unit.

“Land Use Controls”, for the purposes of this permit, is as defined by ADEM Admin. Code Rule 335-15-1-.02.

“Method detection limit” (MDL), for the purposes of this permit, means the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte.

“Mixed waste”, for the purposes of this permit, means a solid waste that is a mixture of hazardous waste (as defined in ADEM Admin. Code Rule 335-14-2-.01(3)) and radioactive waste (as defined in 10 CFR 61.2). The radioactive component of mixed waste is subject to regulation by the Atomic Energy Act (AEA)/Nuclear Regulatory Commission (NRC). The non-radioactive chemically hazardous component of mixed waste is subject to regulation by the AHWMMA and ADEM Admin. Code Division 335-14.

“Miscellaneous unit”, for the purposes of this permit, means a hazardous waste management unit where hazardous waste is treated, stored, or disposed of and that is not a container, tank, surface impoundment, pile, land treatment unit, landfill, incinerator, boiler, industrial furnace, underground injection well with appropriate technical standards under 40 CFR Part 146, containment building, corrective action management unit, unit eligible for a research, development and demonstration permit under ADEM Admin. Code Rule 335-14-8-.06(4); or staging pile.

“Non-regulated waste”, for the purposes of this permit, means waste that is not otherwise regulated as RCRA listed and/or characteristic hazardous waste. In this case, non-regulated includes, but it not limited to, solid and universal waste, used oil, PCB, etc. Universal waste and used oil are subject to ADEM Admin. Code Chapter 335-14-11, Standards for Universal Waste

Management and ADEM Admin. Code Chapter 335-14-17, Standards for the Management of Used Oil, respectively.

“Operating day”, for the purposes of this permit, means any day on which hazardous waste is treated, stored, or disposed of in a unit. For example, each day that a hazardous waste storage unit contains hazardous waste is an operating day, as is each day that a disposal unit contains or receives hazardous waste, or each day that hazardous waste is treated in a treatment unit.

“Practical quantitation limits” (PQL), for the purposes of this permit, are the lowest concentrations of analytes in groundwater that can be reliably determined within specified limits of precision and accuracy by a given method under routine laboratory operating conditions, as listed in ADEM Admin. Code Rule 335-14-5-Appendix IX.

“Release”, for the purposes of this permit, includes any spilling, leaking, pouring, emitting, emptying, discharging, injecting, escaping, leaching, pumping, or disposing into the environment of any hazardous waste or hazardous constituent.

“Remediation waste” for the purpose of this permit includes all SWMUs and all media (including groundwater, surface water, soils, and sediments) and debris, which contain listed hazardous wastes or which themselves exhibit a hazardous waste characteristic, that are managed for the purpose of implementing corrective action requirements under ADEM Admin. Code Rule 335-14-5-.06(12) and RCRA Section 3008(h). For a given facility, remediation wastes may originate only from within the facility boundary, but may include waste managed in implementing RCRA Sections 3004(v) or 3008(h) for releases beyond the facility boundary.

“Solid waste”, for the purposes of this permit, means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded materials, including solid, liquid, semisolid, or contained gaseous materials resulting from industrial, commercial, mining, and agricultural operations, and from community activities. It does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 Stat. 880), or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923).

"Solid waste management unit" (SWMU), for the purposes of this permit, includes any unit that has been used for the treatment, storage or disposal of solid waste at any time, irrespective of whether the unit is or ever was intended for the management of solid waste. RCRA-regulated hazardous waste management units are also solid waste management units. SWMUs include areas that have been contaminated by routine and systematic releases of hazardous waste or hazardous constituents, excluding one-time accidental spills that are immediately remediated and cannot be linked to solid waste management activities (*e.g.*, product or process spills).

“Storm event”, for the purposes of this permit, is defined as a 1-year, 24-hour storm event or rainfall that measures 1 inch or greater in 1 hour or less. Rainfall measurements may be taken at the site, or the closest official weather monitoring station may be used.

“Temporary Unit” (TU), for the purposes of this permit, includes any temporary tanks and/or container storage areas used solely for treatment or storage of hazardous remediation wastes during specific remediation activities. Designated by the Department, such units must conform to specific standards and may only be in operation for a period of time as specified in this permit.

"Unit", for the purposes of this permit, includes any contiguous discernable area used for the management of hazardous waste (or non-hazardous waste in the case of a SWMU) and may include, but is not limited to, any landfill, surface impoundment, waste pile, land treatment unit, incinerator, injection well, tank, container storage area, septic tank, drain field, wastewater treatment unit, elementary neutralization unit, transfer station, recycling unit or the OB and OD units.

I.F. EXPIRATION AND CONTINUATION OF PERMIT

This permit and all conditions herein will remain in effect beyond this permit's expiration date if the Permittee has submitted a new application as required by Permit Condition I.C.2. and, through no fault of the Permittee, the Department has not issued a new permit (ADEM Admin. Code Rules 335-14-8-.05(1) and 335-14-8-.05(2)).

I.G. WASTE MINIMIZATION

1. Certification Requirements

   Pursuant to ADEM Admin. Code Rule 335-14-5-.05(4)(b)9, the Permittee must certify, no less often than annually, that:

   a. The Permittee has a program in place to reduce the volume and toxicity of hazardous waste to the degree determined by the Permittee to be economically practicable; and,

   b. The proposed method of treatment, storage, or disposal is the most practicable method available to the Permittee and that it minimizes the present and future threat to human health and the environment.

2. Recording Requirements

   a. The Permittee shall maintain copies of this certification in the facility operating record as required by ADEM Admin. Code Rule 335-14-5-.05(4)(b)9.

   b. The Waste minimization Program required under I.G.1. should at a minimum address the following topics:

      i. Identity of each hazardous waste stream and the source of generation.

      ii. Types and amount of hazardous waste that is generated at the facility.

      iii. Present and proposed method of treatment, storage, or disposal that is available to the Permittee.

      iv. Description of techniques implemented in the past for hazardous waste reduction and their effectiveness.

      v. An evaluation of technically and economically feasible hazardous waste reduction techniques.

vi. A program and schedule for implementing the selected hazardous waste reduction technique.

I.H. COST ESTIMATES

1. The Permittee shall maintain detailed written cost estimates, in current dollars, at the location specified in Permit Condition I.C.10.e. and on file with ADEM in accordance with ADEM Admin. Code Rules 335-14-5-.08(3), 335-14-5-.08(5), and 335-14-5-.08(10).

2. All cost estimates must be updated annually as required by ADEM Admin. Code Rules 335-14-5-.08(3)(b), 335-14-5-.08(5)(b), and 335-14-5-.08(10)(b).

3. The cost estimate shall be maintained and submitted in the form designated by the Department.

4. The Permittee must update the cost estimate no later than 30 calendar days after the Department has approved a modification to the Closure Plan, Post-Closure Plan, or Corrective Action Plan, or any other plan required or referenced by this permit, if the change in the plan results in an increase in the amount of the cost estimate.

I.I. FINANCIAL ASSURANCE

1. The Permittee shall demonstrate continuous compliance with ADEM Admin. Code Rule 335-14-5-.08 by providing documentation of financial assurance in at least the amount that equals or exceeds the cost estimate. Changes in financial assurance mechanisms must be approved by the Department.

2. The Permittee shall submit itemized statements for all capital expenditures and a complete, revised cost estimate to the Department when requesting approval for a reduction in the financial assurance mechanism.

I.J. PERMIT MODIFICATIONS

The Permittee shall request a permit modification whenever changes in operating plans or facility design affect any plan (*e.g.* groundwater monitoring, closure, post-closure, or corrective action) required or referenced by this permit. The Permittee must submit a written request for a permit modification, pursuant to the requirements of ADEM Admin. Code Rule 335-14-8-.04(2), at least 60 calendar days prior to the proposed change in facility design or operation.

I.K. REPORTS, NOTIFICATIONS, AND SUBMISSIONS TO THE DEPARTMENT

One hard copy and one electronic (an optical character recognition or text-searchable) copy of all reports, notifications, or other submissions that are required by this permit should be sent via certified mail or given to:

Chief, Land Division
Alabama Department of Environmental Management
P.O. Box 301463 (Zip 36130-1463)
1400 Coliseum Boulevard (Zip 36110-2059)
Montgomery, Alabama

and

Director, RCRA Division
USEPA Region 4
Atlanta Federal Center
61 Forsyth Street SW
Atlanta, Georgia 30303-3104

PART II

GENERAL FACILITY CONDITIONS

II.A. GENERAL WASTE ANALYSIS

1. The Permittee shall comply with all requirements set forth under ADEM Admin. Code Rule 335-14-5-.02(4) and shall follow the procedures in the WAP described in Appendix B of the permit application.

2. The Permittee shall utilize the methods specified in Appendix B of the permit application for the analysis of any of the wastes listed in Appendix B of the permit application. Modification of the WAP shall require a modification of this permit pursuant to ADEM Admin. Code Rule 335-14-8-.04(2).

3. The Permittee shall subject samples from incoming waste shipments to the fingerprint parameters identified in Appendix B of the permit application.

4. The Permittee shall classify waste as non-conforming when the receiving analysis does not match the information contained in the accompanying manifest, profile, and/or equivalent information described in Appendix B of the permit application.

5. Before storing, treating, or disposing of a hazardous waste stream, the Permittee shall obtain a detailed chemical and physical analysis of a representative sample of the waste, as described in Appendix B of the permit application.

II.B. SECURITY

1. The Permittee shall comply with the security provisions set forth under ADEM Admin. Code Rule 335-14-5-.02(5) and as described in Appendix C of the permit application.

2. In order to comply with ADEM Admin. Code Rule 335-14-5-.02(5), the hazardous waste storage areas of the facility shall remain fenced with at least a six-foot high chain link fence. The fence shall be kept in good condition. All entrances to the permitted hazardous waste management areas shall be closed and locked when security and/or operations personnel are not present.

3. The Permittee shall maintain signs along the perimeter fence of the permitted hazardous waste management areas. The signs shall read "Danger – Unauthorized Personnel Keep Out". At least one sign must be legible from a distance of at least 25 feet from any approach to each area (ADEM Admin. Code Rule 335-14-5-.02(5)(c)).

II.C. GENERAL INSPECTION REQUIREMENTS

1. The Permittee shall comply with all requirements of ADEM Admin. Code Rules 335-14-5-.02(6) and 335-14-5-.09(5),

2. The Permittee shall follow the inspection procedures and schedules, as described in Appendix D of the permit application.

3. The Permittee shall remedy any deterioration or malfunction (of equipment or structure(s)) discovered during any inspection as required by ADEM Admin. Code Rule 335-14-5-.02(6).

4. Records of inspections shall be maintained at the facility as required by ADEM Admin. Code Rule 335-14-5-.02(6).

II.D. PERSONNEL TRAINING

The Permittee shall conduct personnel training as required by ADEM Admin. Code Rule 335-14-5-.02(7). This training program shall follow the procedures and outline, described in Appendix E of the permit application. The Permittee shall maintain training documents and records at the facility as required by ADEM Admin. Code Rule 335-14-5-.02(7)(d) and (e).

II.E. GENERAL REQUIREMENTS FOR IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTE

1. The Permittee shall comply with all requirements for ignitable, reactive, or incompatible wastes set forth under ADEM Admin. Code Rule 335-14-5-.02(8).

2. "No Smoking" signs must be conspicuously placed wherever there is a potential hazard from ignitable waste.

II.F. LOCATION STANDARDS AND UNIT MAINTENANCE

1. The Permittee shall comply with all locations standards set forth under ADEM Admin. Code Rule 335-14-5-.02(9).

2. If changes are made to the design or operation of a hazardous waste management or treatment unit, these changes must receive approval by the Department before they are implemented, and may require permit modification pursuant to ADEM Admin. Code Rule 335-14-8-.04(2).

II.G. PREPAREDNESS AND PREVENTION

1. Required Equipment

   The Permittee shall comply with ADEM Admin. Code Rule 335-14-5-.03(3) and, at a minimum, shall equip the facility with the equipment set forth in the Contingency Plan, Appendix F of the permit application.

2. Testing and Maintenance of Equipment

   The Permittee shall test and maintain the equipment specified in the Contingency Plan, Appendix F of the permit application, as necessary to assure its proper operation in time of emergency as required by ADEM Admin. Code Rule 335-14-5-.03(4).

3. Access to Communication or Alarm System

   The Permittee shall maintain access to the communications or alarm system as required by ADEM Admin. Code Rule 335-14-5-.03(5).

4. Arrangements with Local Authorities

   The Permittee shall maintain arrangements with state and local authorities as required by ADEM Admin. Code Rule 335-14-5-.03(8). The Permittee shall develop and maintain a

Preparedness and Prevention Plan providing information on the type, approximate quantities and locations of hazardous wastes within the facility. The Plan shall be provided to state and local authorities in both written paper format and in appropriate electronic format that is most useful to emergency responders. Updated copies of the Plan shall be provided to reflect significant changes in operations (*e.g.*, significant changes in waste streams and/or volumes, facility design changes, etc.). A copy of the Plan and documentation that the Plan has been submitted to all local police departments, fire departments, hospitals and local emergency response teams that may be called upon to provide emergency services, shall be submitted to the Department within 45 calendar days from the effective date of this permit. If state or local officials refuse to enter into preparedness and prevention arrangements with the Permittee, the Permittee must document this refusal in the operating record.

5. Required Aisle Space

The Permittee shall maintain aisle space to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency (ADEM Admin. Code Rule 335-14-5-.03(6)).

II.H. CONTINGENCY PLAN

1. Implementation of Plan

The Permittee shall immediately carry out the provisions of the Contingency Plan, Appendix F of the permit application) and follow the emergency procedures as required by ADEM Admin. Code Rule 335-14-5-.04(2) whenever there is a fire, explosion, or release of hazardous waste or hazardous constituents which threatens or could threaten human health or the environment.

2. Copies of Plan

A copy of the Contingency Plan and all current revisions to the plan must be maintained at the facility and submitted to all local police departments, fire departments, hospitals, and state and local emergency response teams that may be called upon to provide emergency services, as described in Appendix F of the permit application, and as required by ADEM Admin. Code Rule 335-14-5-.04(4).

3. Amendments to Plan

The Permittee shall review and immediately amend, if necessary, the Contingency Plan, as required by ADEM Admin. Code Rule 335-14-5-.04(5).

4. Emergency Coordination

The Permittee shall comply with the requirements of ADEM Admin. Code Rule 335-14-5-.04(6) concerning the emergency coordinator as specified in the Contingency Plan, Appendix F of the permit application).

II.I. RECORDKEEPING AND REPORTING

1. Operating Record

The Permittee shall maintain a written operating record at the facility in accordance with ADEM Admin. Code Rule 335-14-5-.05(4).

2. Availability, Retention, and Disposition of Records

The Permittee shall comply with the Availability, Retention, and Disposition of Records at the facility in accordance with ADEM Admin. Code Rule 335-14-5-.05(5).

3. Biennial Report

The Permittee shall comply with the biennial report requirements of ADEM Admin. Code Rule 335-14-5-.05(6).

II.J. CLOSURE

1. Performance Standard

The Permittee shall close the permitted hazardous waste management areas, as required by ADEM Admin. Code Rules 335-14-5-.07(2), 335-14-5-.09(9), 335-14-5-.10(8), and in accordance with the Closure Plan, Appendix J of the permit application.

2. Amendment to Closure Plan

The Permittee shall amend the Closure Plan as required by ADEM Admin. Code Rule 335-14-5-.07(3)(c).

3. Notification of Closure

As required by ADEM Admin. Code Rule 335-14-5-.07(3)(d), the Permittee shall notify the Department at least 60 calendar days prior to the date closure activities are initiated at either unit.

4. Time Allowed for Closure

The Permittee shall comply with the requirements of ADEM Admin. Code Rule 335-14-5-.07(4). After receiving or treating the final volume of hazardous waste, the Permittee shall complete closure activities in accordance with the schedule specified in the Closure Plan, Appendix J of the permit application.

5. Disposal or Decontamination of Equipment, Structures, and Soils

The Permittee shall decontaminate or properly dispose of all facility equipment, structures, and soils as required by ADEM Admin. Code Rules 335-14-5-.07(5), unless otherwise specified in ADEM Admin. Code Rules 335-14-5-.09(9), 335-14-5-.10(8), 335-14-5-.11(9), 335-14-5-.12(9), 335-14-5-.13(11), 335-14-5-.14(11), 335-14-5-.19(1) through (3), 335-14-5-.23(6), 335-14-5-.24, or 335-14-5-.30(3) and as specified in the Closure Plan, Appendix J of the permit application.

6. Certification of Closure

The Permittee shall certify that each individual unit has been closed in accordance with the specification presented in the Closure Plan, Appendix J of the permit application, and as required by ADEM Admin. Code Rule 335-14-5-.07(6). The Permittee shall maintain copies of this closure certification in the facility operating record as required by ADEM Admin. Code Rule 335-14-5-.05(4).

II.K. POST-CLOSURE (Reserved – See Part VI of the Permit)

II.L. LAND DISPOSAL RESTRICTIONS

1. General Restrictions

ADEM Admin. Code Chapter 335-14-9 identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances in which an otherwise prohibited waste may continue to be placed on or in a land treatment, storage or disposal unit. The Permittee shall maintain compliance with the requirements of ADEM Admin. Code Chapter 335-14-9. Where the Permittee has applied for an extension, waiver, or variance under ADEM Admin. Code Chapter 335-14-9 the Permittee shall comply with all restrictions on land disposal under this Part once the effective date for the waste has been reached pending final approval of such a land disposal permit application.

2. Land Disposal Prohibitions and Treatment Standards

a. A restricted waste identified in ADEM Admin. Code Rule 335-14-9-.03 may not be placed in a land disposal unit without further treatment unless the requirements of ADEM Admin. Code Rules 335-14-9-.03 and/or .04 are met.

b. The storage of hazardous wastes restricted from land disposal under ADEM Admin. Code Chapter 335-14-9 is prohibited unless the requirements of ADEM Admin. Code Rule 335-14-9-.05 are met.

II.M. ORGANIC AIR EMISSION REQUIREMENTS

1. General Introduction

a. Process Vents and Equipment

Phase I Organic Air Emission Standards consist of ADEM Admin. Code Rules 335-14-5-.27 and 335-14-5-.28 for hazardous waste treatment, storage, and disposal (TSD) facilities. ADEM Admin. Code Rule 335-14-5-.27 contains emission standards for process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, and air or steam stripping operations that process hazardous waste with an annual average total organic concentration of at least ten (10) parts per million by weight (ppmw). ADEM Admin. Code Rule 335-14-5-.28 contains emission standards that address leaks from specific equipment (i.e., pumps, valves, compressors, etc.) containing or contacting hazardous waste with a total organic concentration of at least ten-percent by weight.

b. Tanks, Containers, Surface Impoundments and Miscellaneous Units

The Phase II Organic Emission Standards consist of ADEM Admin. Code Rule 335-14-5-.29 for hazardous waste treatment, storage, and disposal facilities, including certain hazardous waste generator standards for accumulating waste on-site in RCRA permit–exempt (90-day) tanks and containers. In general, under these standards air emission controls must be used for tanks, surface impoundments, containers, and miscellaneous units that contact hazardous waste containing an average organic concentration greater than 500 ppmw at the point of origination determined by the procedures outlined in ADEM Admin. Code Rule 335-14-5 .29.

2. Notification of New Units

a. Process Vents and Equipment

Prior to constructing any equipment with process vents subject to the requirements of ADEM Admin. Code Rule 335-14-5-.27, or installing any additional equipment subject to the requirements of ADEM Admin. Code Rule 335-14-5-.28, or prior to modifying the current process such that existing equipment previously not subject to the requirement of ADEM Admin. Code Rule 335-14-5-.28 the Permittee shall supply the specific Part B information required pursuant to ADEM Admin. Code Rules 335-14-8-.02(15) and 335-14-8-.02(16) as applicable, and shall obtain a permit modification in accordance with the requirements of ADEM Admin. Code Rule 334-14-8-.04(3) and Condition I.J of this permit.

b. Tanks, Containers, Surface Impoundments, Miscellaneous Units

Prior to installing any tank, container, surface impoundment or miscellaneous unit subject to ADEM Admin. Code Rule 335-14-5-.29, or modifying an existing process waste handling or tank or container such that the unit(s) will become subject to ADEM Admin. Code Rule 335-14-5-.29, the Permittee shall obtain a permit modification under ADEM Admin. Code Rule 335-14-8-.04(3), and provide specific Part B application information required under ADEM Admin. Code Rules 335-14-8-.02(5) –thru (8) and 335-14-8-.02(18), as applicable, with the modification request.

II.N. WASTE REJECTION NOTIFICATION (RESERVED)

II.O. MANIFEST SYSTEM (RESERVED)

II.P. LOADING OF OUTGOING WASTES VIA RAILCAR (RESERVED)

II.Q. CONSTRUCTION COMPLIANCE SCHEDULE FOR PROPOSED UNITS (RESERVED)

PART III

MANAGEMENT IN TANKS

III.A. PERMITTED OPERATIONS

The Permittee may operate the units and processes described in Table III.1. or Table III.2. of this permit, subject to the terms of this permit. Operation of any process or unit not listed in Table III.1. or Table III.2. of this permit, operation of any process in a unit or area other than that for which the process is listed, or exceedance of any capacity listed therein, for the treatment, storage, or disposal of hazardous waste is prohibited.

III.B. WASTE IDENTIFICATION

1. The Permittee may store the hazardous wastes listed in Appendix N of the permit application in tanks at the facility, subject to the terms of this permit. The storage or treatment of any hazardous waste not listed in Appendix N of the permit application is prohibited.

2. The Permittee shall not store or treat mixed waste in tanks at the facility.

III.C. STORAGE IN TANKS

1. The tank storage capacity is distributed among the various tanks and tank farms as shown in Table III.1. of this permit, and as described in Appendix N of the permit application. The maximum quantity of hazardous waste stored in each unit or containment area shall not exceed the capacity listed in Table III.1. of this permit.

2. The Permittee shall maintain and operate the tank storage areas in accordance with the procedures specified in Appendix N of the permit application and in ADEM Admin. Code Rule 335-14-5-.10.

3. The maximum combined quantity of hazardous and non-hazardous wastes stored in a given area shall not exceed ten times the capacity of the containment system for that area. The maximum combined quantity of hazardous and non-hazardous wastes stored in an individual tank in a given area shall not exceed the capacity of the containment system for that area.

III.D. TREATMENT IN TANKS (RESERVED)

III.E. INSTALLATION REQUIREMENTS

The tank system must be installed in accordance with Appendix N of the permit application and ADEM Admin. Code Rule 335-14-5-.10(3).

III.F. GENERAL OPERATING REQUIREMENTS

1. The Permittee shall comply with the tank-operating requirements of ADEM Admin. Code Rules 335-14-5-.02(6), 335-14-5-.10(2), 335-14-5-.10(5)(a), 335-14-5-.10(5)(b), 335-14-5-.10(5)(c), and 335-14-5-.10(6)(b).

2. Each tank will be labeled or marked with all appropriate EPA hazardous waste numbers associated with the hazardous waste(s) in the tank as specified in 335-14-2-.03 and 335-14-2-.04 (or other information that provides a clear indication of the type(s) of hazardous waste(s) in the tank and the hazard(s) associated with that waste).

III.G. SECONDARY CONTAINMENT REQUIREMENTS

The Permittee shall maintain the secondary containment systems for all storage and/or treatment tanks and for all ancillary equipment as specified in Appendix I and Appendix N of the permit application and in accordance with the requirements of ADEM Admin. Code Rule 335-14-5-.10(4).

III.H. INSPECTIONS

1. The Permittee shall inspect each tank system (to include the ancillary equipment and secondary containment) and the area surrounding each tank as specified in Appendix D of the permit application and in accordance with the requirements of ADEM Admin. Code Rule 335-14-5-.10(6).

2. The Permittee must document weekly in the operating record of the facility the results of inspection required by Condition III.H.1 of this permit.

III.I. RESPONSE TO LEAKS OR SPILLS

The Permittee shall comply with the requirements of ADEM Admin. Code Rule 335-14-5-.10(7).

III.J. SPECIAL REQUIREMENTS FOR IGNITABLE OR REACTIVE WASTES

The Permittee shall comply with the requirements specified in Section 7 of Appendix B of the permit application and in accordance with the requirements of ADEM Admin. Code Rule 335-14-5-.10(9).

III.K. SPECIAL REQUIREMENTS FOR INCOMPATIBLE WASTES

The Permittee shall comply with the requirements specified in Section 7 of Appendix B of the permit application and in accordance with the requirements of ADEM Admin. Code Rule 335-14-5-.10(10).

III.L. CLOSURE

1. Following the receipt of the final volume of hazardous waste, the Permittee shall close the tank in accordance with the Closure Plan contained in Appendix J of the permit application and in accordance with the requirements of ADEM Admin. Code Rule 335-14-5-.10(8).

2. If at closure not all contaminated soils can be practically removed or decontaminated, the Permittee shall close the tank as a landfill and perform post-closure care as specified in ADEM Admin. Code Rule 335-14-5-.10(8)(b).

TABLE III.1.

STORAGE IN TANKS

UNIT NAME	TANKS	PERMITTED STORAGE CAPACITY (units)	CONTAINMENT CAPACITY (units)	DESCRIPTION OF UNIT (Section[1])	LOCATION OF UNIT (Figure[1])
Boiler #7 Hazardous Waste Tanks	UT-V-813	31,000	69,902.73	Appendix N	Attachment A of Appendix I
	UT-V-814	31,000			
Total Tank Storage Capacity	-	62,000	69,902.73	-	-

1. Location in permit application containing description (text) or location (figure) of unit.

TABLE III.2 (RESERVED)

PART IV

MANAGEMENT IN BOILER #7

IV.A. PERMITTED OPERATIONS

The Permittee may operate the units and processes described in Table IV.1. of this permit, subject to the terms of this permit. Operation of any process or unit not listed in Table IV.1. of this permit, operation of any process in a unit or area other than that for which the process is listed, or exceedance of any capacity listed therein, for the treatment, storage, or disposal of hazardous waste is prohibited.

IV.B. WASTE IDENTIFICATION

1. The Permittee may treat the hazardous wastes listed in Section 2 of Appendix I of the permit application, subject to the terms of this permit. The storage or treatment of any hazardous waste not listed in Section 2 of Appendix I of the permit application is prohibited.

2. The Permittee shall not store or treat mixed waste in miscellaneous units at the facility.

IV.C. TREATMENT IN BOILER #7

1. The Permittee shall comply with the treatment process and capacity restrictions listed in Table IV.1. of this permit and Appendix I of the permit application.

2. The Permittee shall ensure all areas used for the treatment of waste are in good condition and are of sufficient structural integrity and composition to allow for the safe treatment of the waste(s) managed.

3. The Permittee shall not substitute dilution of hazardous wastes for treatment, except as allowed by ADEM Admin. Code Rule 335-14-9-.01(3).

4. The Permittee shall ensure that the treatment process(es) utilized complies with any and all regulatory requirements promulgated by ADEM and/or USEPA regarding the release of hazardous constituents to the environment.

5. The Permittee shall conduct the treatment process in accordance with the procedures specified in Appendix I of the permit application.

6. The Permittee shall not treat incompatible wastes or residues, other than as specifically described in Appendix B and Appendix I of the permit application, in the same containment area. Whenever incompatible wastes or residues are treated in the same containment area, either in the same or subsequent batches, the Permittee shall comply with Condition IV.G. of this permit.

7. The Permittee shall ensure that all chemical reactions have sufficiently occurred to prevent subsequent uncontrolled reactions before the process is stopped.

8. The Permittee shall manage all treatment residues in accordance with all applicable provisions of ADEM Admin. Code Divisions 335-13 and/or 335-14.

8. The Permittee shall manage the boiler in accordance with the 40 CFR 63 Subpart EEE Hazardous Waste Combustion MACT air emission standards and the Title V Air Permit No. 108-0003.

9. The Permittee shall monitor the incoming boiler feed in accordance with Section 4.1 of Appendix I of the permit application to ensure consistency with permitted emission levels, and that boiler design capacities are not exceeded.

10. The Permittee shall conduct startup and shutdown procedures for the boiler in accordance with Section 3.2.1 of Appendix I of the permit application and the Title V permit required operations plan.

11. The Permittee shall enter records of all treatment activities, including hazardous waste numbers and descriptions, quantities, method(s) of treatment, and date(s) of treatment, into the operating record for each batch of waste treated.

IV.D. CONTAINMENT

The Permittee shall maintain the containment systems of the Boiler #7 area in accordance with Section 3.1.4 of Appendix I of the permit application.

IV.E. INSPECTIONS

The Permittee shall inspect Boiler #7 area as specified in Appendix D and Appendix I of the permit application and as required by ADEM Admin. Code Rules 335-14-5-.02(6) and 335-14-7-.08.

IV.F. SPECIAL REQUIREMENTS FOR IGNITABLE OR REACTIVE WASTES

The Permittee shall comply with the requirements specified in Section 7 of Appendix B of the permit application and ADEM Admin. Code Rule 335-14-5-.02(8).

IV.G. SPECIAL REQUIREMENTS FOR INCOMPATIBLE WASTES

The Permittee shall comply with the requirements specified in Section 7 of Appendix B of the permit application and in accordance with the requirements of ADEM Admin. Code Rule 335-14-5-.02(8).

IV.H. CLOSURE

1. Following the receipt of the final volume of waste, the Permittee shall close Boiler #7 area in accordance with the requirements of the Closure Plan in Appendix J of the permit application, and ADEM Admin. Code Rules 335-14-5-.07(2) and 335-14-7-.08.

2. If at closure not all waste and contaminated structures and soils at a unit can be removed or decontaminated, the Permittee shall close Boiler #7 area as a landfill and perform post-closure care as specified in ADEM Admin. Code Rule 335-14-5-.14(11)

TABLE IV.1

TREATMENT IN BOILER UNITS

TREATMENT PROCESS (Code[1])	UNIT(S) PERMITTED	PERMITTED TREATMENT CAPACITY (Million BTU Per Hour)	CONTAINMENT CAPACITY (gallons)	DESCRIPTION OF UNIT/PROCESS (Section[2])	LOCATION OF UNIT/PROCESS (Figure[2])
T80	Boiler #7	143.7	101.66	Appendix I	Appendix I

1. Treatment process codes as defined in ADEM Admin. Code Rules 335-14-5-Appendix I.
2. Location in permit application containing description (text) or location (figure) of unit.

PART V

MANAGEMENT IN ABOVE GROUND LANDVAULT #2

V.A. PERMITTED OPERATIONS

The Permittee may operate the units and processes described in Table V.1. of this permit, subject to the terms of this permit. Operation of any process or unit not listed in Table V.1. of this permit, operation of any process in a unit or area other than that for which the process is listed, or exceedance of any capacity listed therein, for the treatment, storage, or disposal of hazardous waste is prohibited.

V.B. WASTE IDENTIFICATION

1. The Permittee may dispose of the hazardous wastes listed in Appendix H of the permit application in the landvault, subject to the terms of this permit. The disposal of any hazardous waste not listed in Appendix H of the permit application is prohibited.

2. The Permittee is prohibited from disposing of any hazardous waste in the landvault which does not meet all applicable treatment standards.

3. The Permittee shall not dispose of mixed waste in the landvault at the facility.

V.C. DISPOSAL IN LANDVAULTS

1. The Permittee shall comply with the landvault disposal capacity restrictions listed in Table V.1. of this permit.

2. The Permittee shall maintain and operate the landvault in accordance with the procedures specified in Appendix H of the permit application.

V.D. DESIGN AND OPERATING REQUIREMENTS

The Permittee shall operate the landvault as described in Appendix H of the permit application, and as required under ADEM Admin. Code Rule 335-14-5-.14(2). In addition, the Permittee shall design and operate the landvault in accordance with the following conditions:

1. The Permittee shall install two liners and associated leachate collection and removal systems (one above the primary liner and one between the liners) for each cell, in accordance with the design plans and reports contained in Section 3 of Appendix H of the permit application and as required by ADEM Admin. Code R. 335-14-5-.14(2)(b).

2. Collected leachate must be managed in accordance with the design plans and reports contained in Appendix H of the permit application.

3. The Permittee shall locate, construct, operate, and maintain the landvault as specified in Appendix H of the permit application, so as to prevent the migration of any hazardous constituent into the groundwater or surface water, at least as effectively as the liners and leachate collection and removal systems outlined in ADEM Admin. Code Rule 335-14-5-.14(2).

4. The Permittee shall construct, operate, and maintain the leachate collection and removal systems as described in Section 3 of Appendix H of the permit application.

   a. The Permittee shall not allow leachate to accumulate to a depth of more than one foot over the liner of each landvault cell, in accordance with the requirements of ADEM Admin. Code Rule 335-14-5-.14(2)(b)2. and as described in Appendix H of the permit application. The Permittee shall record the leachate level in each leachate collection sump and each leak detection sump at least once each week during the active life and closure period of each landfill unit.

   b. The Permittee shall operate the leak detection system in accordance with the requirements of ADEM Admin. Code Rule 335-14-5-.14(2)(b)3., 335-14-5-.14(2)(b)4., and 335-14-5-.14(2)(b)5., and as described in Appendix H of the permit application so as to minimize the head on the bottom liner of each landvault cell.

   c. The Permittee shall construct, operate, and maintain the pressure relief systems for the landvault as described in Appendix H of the permit application.

   d. The Permittee shall comply with the action leakage rate requirements of ADEM Admin. Code Rule 335-14-5-.14(3), for all future cell construction. The Permittee shall submit action leakage rates to the Department for approval prior to initiating construction activities.

   e. The Permittee shall record, at least once each week, the amount of liquids removed from each leachate collection sump and from each leak detection sump during the active life and closure period of each landvault unit. (ADEM Admin. Code Rule 335-14-5-.14(4)(c)).

5. The Permittee shall design, construct, operate, and maintain a run-on control system in accordance with the design plans, specifications and operating practices contained in Appendix H of the permit application and as required by ADEM Admin. Code Rule 335-14-5-.14(2)(c).

6. The Permittee shall design, construct, operate, and maintain a run-off management system in accordance with the design plans, specifications and operating practices contained in Appendix H of the permit application. (ADEM Admin. Code Rule 335-14-5-.14(2)(d)).

7. The Permittee shall prevent wind dispersal of hazardous wastes and hazardous constituents from the landvault as described in Appendix H of the permit application and as required by ADEM Admin. Code Rule 335-14-5-.14(2)(f).

8. All waste placed into the landvault shall be tested, prior to placement, in accordance with the Waste Analysis Plan as described in Appendix B of the permit application and ADEM Admin. Code Rule 335-14-5-.02(4).

9. The Permittee shall prepare a response action plan as required by ADEM Admin. Code R. 335-14-5-.14(5) prior to placing waste in future landvault cells. If the flow rate into the

leak detection system exceeds the action leakage rate set forth in Part V.D.4.d of this permit, the Permittee shall implement the response action plan. At a minimum, as required by ADEM Admin. Code Rule 335-14-5-.14(5), the Permittee must:

a. Notify the Department in writing of the exceedance within seven days of the determination;

b. Submit a preliminary written assessment to the Department within 14 days of the determination, as to the amount of liquids, likely sources of liquids, possible location, size, and cause of any leaks, and short-term actions taken and planned;

c. Determine to the extent practicable the location, size, and cause of any leak;.

d. Determine whether waste receipt should cease or be curtailed, whether any waste should be removed from the unit for inspection, repairs, or controls, and whether or not the unit should be closed;

e. Determine any other short-term and longer-term actions to be taken to mitigate or stop any leaks; and

f. Within 30 days after the notification that the action leakage rate has been exceeded, submit to the Department the results of the analyses specified in Conditions V.D.9.c., V.D.9.d., and V.D.9.e. of this permit, the results of actions taken, and actions planned. Monthly thereafter, as long as the flow rate in the leak detection system exceeds the action leakage rate, the Permittee must submit to the Department a written report summarizing the results of any remedial actions taken and actions planned;

g. The monthly report should include:

i. (I) Assess the source(s) of liquids and amounts by source;

(II) Conduct a fingerprint, hazardous constituent, or other analyses of the liquids in the leak detection system to identify the source(s) of liquids and possible location(s) of any leaks, and the hazard and mobility of the liquid; and

(III) Assess the seriousness of any leaks in terms of potential for escaping into the environment; or

ii. Document why the assessments required by Condition V.D.9.g.i. of this permit are not necessary.

10 . All precipitation which falls into a landvault and contacts hazardous waste or other disposed materials (e.g., non-hazardous waste, daily cover materials, etc.) must be managed as hazardous waste leachate (EPA Hazardous Waste Number F039). Any precipitation which is collected prior to contact with hazardous waste or other disposed materials may be managed in accordance with the applicable requirements of the Permittee's National Pollutant Discharge Elimination System (NPDES) discharge permit (Permit No AL0003093) issued by the Department. The Permittee may solidify, in-place

(on the surface), precipitation that comes in contact with landvault waste prior to it reaching the leachate detection sump, provided that dust emissions are controlled.

V.E. INSPECTION SCHEDULES

The Permittee shall inspect the landvault in accordance with the following conditions:

1. The Permittee shall inspect the liners and cover systems during construction and installation for uniformity, damage and imperfections (e.g., holes, cracks, thin spots or foreign materials). (ADEM Admin. Code Rule 335-14-5-.14(4)(a)).

2. The Permittee shall inspect all new landvault cells immediately after construction or installation for the following: (ADEM Admin. Code R. 335-14-5-.14(4)(a))

    a. Synthetic liners and covers must be inspected to ensure tight seams and joints and the absence of tears, excessive folds, punctures or blisters.

    b. Soil-based and admixed liners and covers must be inspected for imperfections including lenses, cracks, channels, root holes, or other structural non-uniformities that may cause an increase in the permeability of the liner or cover.

3. The Permittee shall inspect all constructed systems (e.g., bottom liners, sand windows, sidewall liners, etc.) immediately prior to covering to insure that the subject system has not been compromised (e.g., rips, tears, UV degradation, silting of sand or fabrics, etc.).

4. The Permittee shall inspect all landvaults (including the liner, leachate collection system, temporary covers, and final cover systems) in accordance with Appendix D of the permit application and Condition V.E.5. of this permit. (ADEM Admin. Code Rule 335-14-5-.02(6)).

5. The landvault must be inspected weekly and after storms to detect evidence of the following: (ADEM Admin. Code Rule 335-14-5-.14(4)(b))

    a. Deterioration, malfunctions, or improper operation of run-on and run-off systems;

    b. Proper functioning of wind dispersal control systems, where present; and

    c. The presence of leachate in, and proper functioning of, leachate collection and removal systems, , where present.

V.F. CELL LOCATION SURVEYING

The Permittee shall maintain the following items in the operating record as required by ADEM Admin. Code Rules 335-14-5-.05(4) and 335-14-5-.14(10):

1. A map with the exact location and dimensions (including depth and top and bottom elevations) of each cell with respect to permanently surveyed benchmarks; and

2. The types of waste in each cell and the approximate location of each hazardous waste shipment within each cell.

V.G. SPECIAL LANDVAULT PROVISIONS FOR IGNITABLE OR REACTIVE WASTES

The Permittee shall not place ignitable or reactive waste in any landvault cell, except as provided by ADEM Admin. Code Rule 335-14-5-.14(13).

V.H. SPECIAL LANDVAULT PROVISIONS FOR INCOMPATIBLE WASTES

The Permittee shall not place incompatible wastes, or incompatible wastes and materials, in the same landvault cell, except as provided by ADEM Admin. Code Rule 335-14-5-.14(14).

V.I. SPECIAL LANDVAULT PROVISIONS FOR HAZARDOUS WASTES RESTRICTED FROM LANDVAULT UNITS

1. The Permittee shall not place any hazardous waste(s) which is prohibited from land disposal, or which does not meet all applicable land disposal restrictions (LDR) treatment standards (as listed in ADEM Admin. Code Chapter 335-14-9 [40 CFR 268]), in any landvault cell.

2. The Permittee shall not dispose of any F020, F021, F022, F023, F026, F027, or F028 listed hazardous waste(s) in any landvault unit, except in a form (e.g., incineration residues) which meets all applicable requirements of ADEM Admin. Code Chapter 335-14-9, pursuant to ADEM Admin. Code Rule 335-14-5-.14(18).

V.J. SPECIAL LANDVAULT PROVISIONS FOR LIQUID WASTES

1. The Permittee shall not place bulk or non-containerized liquid wastes, or waste containing free liquids, in any landvault unit, in accordance with ADEM Admin. Code Rule 335-14-5-.14(15)(b). [Note: The application of non-contaminated water or leachate treated to F039 standards for dust control purposes within the landvault is not prohibited by this permit condition.]

2. The Permittee shall demonstrate the absence of free liquids in all containerized or bulk waste which is suspected (by the Permittee or the Department) to contain free liquids. This demonstration shall be made by the following test: "Method 9095 (Paint Filter Liquid Test)" as described in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods" (EPA Publication No. SW-846, as incorporated by reference in ADEM Admin. Code Rule 335-14-1-.02(2)).

3. Containers holding free liquids shall not be placed in any landvault unit unless the requirements of ADEM Admin. Code Rule 335-14-5-.14(15)(d) are met.

4. All sorbents used to treat free liquids (whether containerized or noncontainerized) to be disposed of in the landvault shall be non-biodegradable, and shall comply with the requirements of ADEM Admin. Code Rule 335-14-5-.14(15)(e).

5. The Permittee shall not dispose of any liquid which is not a hazardous waste in any landvault unit, except as provided in ADEM Admin. Code Rule 335-14-5-.14(15)(f).

V.K. SPECIAL LANDVAULT PROVISIONS FOR CONTAINERS

1. Except as provided in Condition V.K.3. of this permit, the Permittee shall not dispose of any containers in any landvault that are larger than ampules unless they are filled at least 90% full or are crushed, shredded or similarly reduced in volume to the maximum practical extent before placement in the landvault. (ADEM Admin. Code Rule 335-14-5-.14(16))

2. The Permittee shall not dispose of small containers of hazardous waste in overpacked drums (i.e., lab packs), except as provided by ADEM Admin. Code Rule 335-14-5-.14(17).

3. The Permittee may place empty containers in a landvault unit provided each such container is crushed to the maximum practical extent before burial, in accordance with the provisions of ADEM Admin. Code Rule 335-14-5-.14(16)(b).

V.L. RESERVED

V.M. REPORTING REQUIREMENTS

The Permittee shall submit written reports to the Department, within 60 days after the first anniversary of the effective date of this permit, and annually thereafter, which include:

1. All data collected in accordance with Conditions V.D.4.a. and V.D.4.e. of this permit;

2. The total tonnage, by major waste category (e.g., RCRA, TSCA, CERCLA, non-hazardous, etc.), of waste disposed each calendar month of the preceding year; and

3. The tabulated results of all leachate analyses conducted during the preceding year.

V.N. CLOSURE AND POST-CLOSURE CARE

The Permittee shall conduct closure and post-closure activities in accordance with the following conditions:

1. The Permittee shall close each landvault following the receipt of the final volume of hazardous waste and in accordance with the closure plan in Appendix J of the permit application and the requirements of ADEM Admin. Code Rules 335-14-5-.07 and 335-14-5-.14 (11). Until plant growth has been established on the cap(s), the topsoil shall be stabilized through chemical or physical means to prevent erosion.

2. The Permittee shall monitor and maintain each landvault in accordance with the post-closure plan in Appendix K of the permit application and ADEM Admin. Code R. 335-14-5-.07 [(8) through (11)] and 335-14-5-.14(11) and Part VI of this permit.

TABLE V.1.

DISPOSAL IN LANDVAULT

UNIT NAME	PERMITTED DISPOSAL CAPACITY (Cubic Yards)	DESCRIPTION OF UNIT (Section[1])	LOCATION OF UNIT (Figure[1])
Landvault #2	290,000	Appendix H	Appendix H
Total Landvault Disposal Capacity	290,000		

1. Location in permit application containing description (text) or location (figure) of unit.

PART VI

POST-CLOSURE CARE

VI.A. POST-CLOSURE CARE PERIOD

The post-closure care period shall extend for a period of thirty (30) years after the date of acceptance of certification of closure of the last operational unit at the facility, unless shortened or extended pursuant to ADEM Admin. Code Rule 335-14-5-.07(8). The post-closure care period shall automatically extend through the end of the compliance period specified in Condition IX.B.4. of this permit.

VI.B. POST-CLOSURE PROCEDURES AND USE OF PROPERTY

1. Post-Closure Activities

   The Permittee shall conduct post-closure care activities, in accordance with Appendix K of the permit application and as required by ADEM Admin. Code Rules 335-14-5-.07 and 335-14-5-.14(11)(d), for each hazardous waste management unit listed in Appendix K. Post-closure care shall commence upon the effective date of this permit, and shall continue throughout the post-closure care period.

2. Security

   The Permittee shall comply with the security provisions of ADEM Admin. Code Rule 335-14-5-.02(5) as described in Appendix C of the permit application.

3. Disturbance of Closed Unit(s)

   The Permittee shall not allow the disturbance of the integrity of the final cover, liners, any components of the containment system, or the function of the facility's monitoring systems during the post-closure care period for any unit identified in Table VI.1.

4. The Permittee shall:

   a. Maintain the integrity and effectiveness of the landfills' final cover, including making repairs to the cap, as necessary, to correct the effects of settling, subsidence, erosion, or other events;

   b. Maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of ADEM Admin. Code Rule 335-14-5-.06 and Part IX of this permit;

   c. Prevent run-on and run-off from eroding or otherwise damaging the final cover; and

   d. Protect and maintain surveyed benchmarks used in complying with the surveying and recordkeeping requirements of ADEM Admin. Code Rule 335-14-5-.14(10).

5. The Permittee shall operate and maintain the leachate collection, removal, and leak detection systems of all landfill units whose construction includes synthetic bottom liners (e.g., Landvaults #1 and #2) throughout the post-closure period, as required by ADEM Admin. Code Rule 335-14-5-.14(11)(d), and as described in Appendix H and Appendix K of the permit application.

   a. The Permittee shall not allow leachate to accumulate to a depth of more than one foot over the liner of each landfill cell, in accordance with the requirements of ADEM Admin. Code Rules 335-14-5-.14(2)(b)2. and 335-14-5-.14(11)(d), and as described in Appendix H and Appendix K of the permit application. Except as provided in Condition VI.B.5.d. of this permit, the Permittee shall record the leachate level in each leachate collection sump and each leak detection sump at least once each month during the post-closure care period of each landfill unit.

   b. The Permittee shall operate the leak detection system in accordance with the requirements of ADEM Admin. Code Rules 335-14-5-.14(2)(b)3., 335-14-5-.14(2)(b)4., 335-14-5-.14(2)(b)5., and 335-14-5-.14(11)(d), and as described in Appendix H and Appendix K of the permit application so as to minimize the head on the bottom liner of each landfill cell.

   c. The Permittee shall comply with the action leakage rate requirements of ADEM Admin. Code Rule 335-14-5-.14(3).

   d. After the certification of closure of a landfill unit has been accepted by the Department in accordance with ADEM Admin. Code Rule 335-14-5-.07(6), the Permittee shall record the amount of liquids removed from each leachate collection sump and leak detection sump at least once each month throughout the post-closure care period for each landfill unit. If the liquid levels in all sumps of a landfill unit stay below the pump operating levels, as defined in ADEM Admin. Code Rule 335-14-5-.14(4)(c)3, for two consecutive months, the amount of liquids in the sumps must be recorded at least quarterly. If the liquid levels in the sumps stay below the pump operating levels for two consecutive quarters, the amount of liquids in the sumps must be recorded at least semi-annually. If at any time during the post-closure care period the pump operating level is exceeded at a landfill unit on a quarterly or semi-annually recording schedule, the Permittee must return to monthly recording of amounts of liquids removed from each sump of that landfill unit until the liquid levels again stay below the pump operating level for two consecutive months, as required by ADEM Admin. Code Rule 335-14-5-.14(4)(c)2.

6. If the flow rate into the leak detection system exceeds the action leakage rate set forth in Part VI.B.5 of this permit, the Permittee shall implement the response action plan contained in Appendix H and Appendix K of the permit application. At a minimum, as required by ADEM Admin. Code Rule 335-14-5-.14(5), the Permittee must:

   a. Notify the Department in writing of the exceedance within seven (7) days of the determination;

b. Submit a preliminary written assessment to the Department within fourteen (14) days of the determination, as to the amount of liquids, likely source(s) of liquids, possible location, size, and cause of any leak(s), and short-term actions taken and planned;

c. Determine to the extent practicable the location, size, and cause of any leak;

d. Determine whether any waste should be removed from the unit for inspection, repairs, or controls;

e. Determine any other short-term and longer-term actions to be taken to mitigate or stop any leaks; and

f. Within 30 days after the notification that the action leakage rate has been exceeded, submit to the Department the results of the analyses specified in Conditions VI.B.6.c., VI.B.6.d., and VI.B.6.e. of this permit, the results of actions taken, and actions planned. Monthly thereafter, as long as the flow rate in the leak detection system exceeds the action leakage rate, the Permittee must submit to the Department a written report summarizing the results of any remedial actions taken and actions planned.

g. To make the leak and/or remediation determinations required by Conditions VI.B.6.c., VI.B.6.d., and VI.B.6.e. of this permit, the Permittee must:

i. (I) Assess the source(s) of liquids and amounts by source;

(II) Conduct a fingerprint, hazardous constituent, or other analyses of the liquids in the leak detection system to identify the source(s) of liquids and possible location(s) of any leaks, and the hazard and mobility of the liquid; and

(III) Assess the seriousness of any leaks in terms of potential for escaping into the environment; or

ii. Document why the assessments required by Condition VI.B.6.g.i. of this permit are not necessary

7. The Permittee shall conduct periodic evaluations of the landvault cover systems at the facility. The Permittee may consider periodic surveys, establishment of settlement plates, evaluation of aerial photographs, or other methods in the evaluation.

8. Reporting Requirements

The Permittee shall submit reports to the Department, within 60 days after the first anniversary of the effective date of this permit, and annually thereafter, which include:

a. All data collected in accordance with Conditions VI.B.5.a. and VI.B.5.d. of this permit;

b. All data collected in accordance with Condition VI.B.7. of this permit;

c. The tabulated results of all leachate analyses during the preceding year.

VI.C. INSPECTIONS

1. The Permittee shall inspect the components, structures, and equipment at the site in accordance with the inspection schedule as described in Appendix D of the permit application and as required by ADEM Admin. Code Rules 335-14-5-.02(6) and 335-14-5-.07.

2. Monitoring and Inspection

   The Permittee shall inspect the closed hazardous waste management units listed in Table VI.1. at least weekly and after storms to detect any evidence of deterioration or improper operation as described in Appendix D of the permit application and as required under ADEM Admin. Code Rules 335-14-5-.02(6), 335-14-5-.07 and 335-14-5-.14. The inspections shall specifically include evaluation of the following items:

   a. Integrity of the final cover (erosion, ponding, subsidence, cracking, etc.);

   b. All data collected in accordance with Condition VI.B.5.a, VI.B.5.b, and VI.B.7. of this permit;

   c. Run-on and run-off control system;

   d. Groundwater monitoring wells; and

   e. Survey benchmarks.

VI.D. NOTICES AND CERTIFICATION

1. No later than 60 days after certification of closure of each hazardous waste disposal unit, the owner or operator must submit to the local zoning authority, or the authority with jurisdiction over local land use, and to the Department a record of the type, location, and quantity of hazardous wastes disposed of within each cell or other disposal unit of the facility. For hazardous wastes disposed of before January 12, 1981, the owner or operator must identify the type, location, and quantity of the hazardous wastes to the best of his knowledge and in accordance with any records he has kept.

2. Within 60 days of certification of closure of the first hazardous waste disposal unit and within 60 days of certification of closure of the last hazardous waste disposal unit, the owner or operator must:

   a. Record, in accordance with State of Alabama law, a notation on the deed to the facility property or on some other instrument which is normally examined during title search that will in perpetuity notify any potential purchaser of the property that:

      i. The land has been used to manage hazardous wastes;

      ii. Its use is restricted under ADEM Admin. Code Rule 335-14-5-.07; and

iii. The survey plat and record of the type, location, and quantity of hazardous wastes disposed of within each cell or other hazardous waste disposal unit of the facility required by ADEM Admin. Code Rules 335-14-5-.07(7) and 335-14-5-.07(10)(a) have been filed with the local zoning authority or the authority with jurisdiction over local land use and with the Department; and

b. Submit a certification, signed by the owner or operator, that he has recorded the notation specified in Condition VI.D.2.a. of this permit, including a copy of the document in which the notation has been placed, to the Department.

3. If the owner or operator or any subsequent owner or operator of the land upon which a hazardous waste disposal unit is located wishes to remove hazardous wastes and hazardous waste residues, the liner, if any, or contaminated soils, he must request a modification to the post-closure permit in accordance with the applicable requirements in ADEM Admin. Code Chapter 335-14-8. The owner or operator must demonstrate that the removal of hazardous wastes will satisfy the criteria of ADEM Admin. Code Rule 335-14-5-07(8)(c). By removing hazardous waste, the owner or operator may become a generator of hazardous waste and must manage it in accordance with all applicable requirements of Division 14. If he/she is granted a permit modification or otherwise granted approval to conduct such removal activities, the owner or operator may request that the Director approve either.

a. The removal of the notation on the deed to the facility property or other instrument normally examined during title search; or

b. The addition of a notation to the deed or instrument indicating the removal of the hazardous waste.

TABLE VI.1.

POST-CLOSURE CARE UNITS

UNIT NAME	UNIT DESCRIPTION	CLOSED-IN-PLACE CAPACITY (Cubic Yards)	DESCRIPTION OF UNIT[2]	LOCATION OF UNIT (Northern and Easting Coordinates)
Landvault #1	Landvault	185,530[1]	Appendix K-Part II.C.	N23+12.00 E68+34.00[3]
Class "C" Landfill	Landfill	116,970[1,7]	Appendix K-Part II.A.1	N24+45.00 E73+77.00
Biological Sludge Landfill	Landfill	116,741[1,7]	Appendix K-Part II.A.2	N02+48.00 E46+17.00
Rectangular/Triangular Ponds	Pond	23,064[1,7,8]	Appendix K-Part II.A.3	N02+48.00 E46+17.00[4]
Sludge 1 - 4/5-day /10-day /Equalization Impoundments	Impoundment	733,419[1,7]	Appendix K-Part II.B.4 - 7	N22+68.00 E61+03.00[6]
Dilute / Diazinon Destruction Impoundments	Impoundment	534,825[1,7,8]	Appendix K-Part II.B.2 - 3	N07+00.00 E55+07.00[5]
GM-44 Impoundment	Impoundment	149,102[1,7,8]	Appendix K-Part II.B.1	N04+09.00 E32+15.00
Landvault #2	Landvault	290,000[9]	Appendix K – Part II.D.	N31+96, E71+80, E67+47 and N43+25

Footnote:

1 Total in-place capacity excludes cap (generally cap thickness is 3 to 4 ft).
2 Location of descriptive text and other pertinent data in the permit application.
3 Coordinates of the geographical center of the unit.
4 The Rectangular and Triangular Ponds were closed as a single unit.
5 The Diazinon Destruct and Dilute Impoundments were closed as a single unit.
6 Sludge Impoundments #1 through #4, the 5-day Impoundment, the 10-day Impoundment, and the Equalization Impoundment were closed as a single unit.
7 Closed in place capacities not available for the "Class C", Biological Sludge Landfills nor the Sludge Impoundments #1 through #4. The listed capacities were estimated.
8 Closed as "Contingency Closures" with all hazardous wastes removed from the unit.
9 Landvault #2 is still in operation. Please refer to Part V of the Permit.

PART VII

SOLID WASTE MANAGEMENT UNIT
AND AREAS OF CONCERN
IDENTIFICATION AND EVALUATION

VII.A. APPLICABILITY

The Conditions of this Part apply to:

1. The solid waste management units (SWMUs) and areas of concern (AOCs) identified in Table VII.1., which require investigation and/or remediation;

2. The SWMUs identified in Table VII.2., which require no further investigation under this permit at this time;

3. The SWMUs identified in Table VII.3., which require actions under other programs, such as Comprehensive Environmental Response Compensation and Liability Act (CERCLA), etc., and this permit;

4. The SWMUs/AOCs identified in Table VII.4, which require Interim Measures and/or Source Removal;

5. The SWMUs/AOCs identified in Table VII.6, which require a Corrective Measures Implementation (CMI) Plan.

6. Any additional SWMUs or AOCs discovered during the course of groundwater monitoring, field investigations, environmental audits, or other means; and,

7. Contamination beyond the facility boundary, if applicable. The Permittee shall implement corrective actions beyond the facility boundary where necessary to protect human health and the environment, unless the Permittee demonstrates to the satisfaction of the Department that, despite the Permittee's best efforts, as determined by the Department, the Permittee was unable to obtain the necessary permission to undertake such actions. The Permittee is not relieved of all responsibility to clean up a release that has migrated beyond the facility boundary where off-site access is denied. On-site measures to address such releases will be determined on a case-by-case basis. Assurance of financial responsibility for completion of such off-site corrective action will be required.

VII.B. NOTIFICATION AND ASSESSMENT REQUIREMENTS FOR NEWLY IDENTIFIED SWMUs AND AOCs

1. The Permittee shall notify the Department in writing, within 15 calendar days of discovery, of any additional AOC(s) as described under Permit Condition VII.A.6. The notification shall include, at a minimum, the location of the AOC(s) and all available information pertaining to the nature of the release (*e.g.*, media affected, hazardous constituents released, magnitude of release, etc.). If the Department determines that further investigation of an AOC is required, the permit will be modified in accordance with ADEM Admin. Code Rule 335-14-8-.04(2).

2. The Permittee shall notify the Department in writing, within 15 calendar days of discovery, of any additional SWMUs as described under Permit Condition VII.A.6.

3. The Permittee shall prepare and submit to the Department, within 90 calendar days of notification, a SWMU Assessment Report (SAR) for each SWMU identified under Permit Condition VII.B.2. At a minimum, the SAR shall provide the following information:

    a. Location of unit(s) on a topographic map of appropriate scale such as required under ADEM Admin. Code Rule 335-14-8-.02(5)(b)19.

    b. Designation of type and function of unit(s).

    c. General dimensions, capacities and structural description of unit(s) (supply any available plans/drawings).

    d. Dates that the unit(s) was operated.

    e. Specification of all wastes that have been managed at/in the unit(s) to the extent available. Include any available data on hazardous constituents in the wastes.

    f. All available information pertaining to any release of hazardous waste or hazardous constituents from such unit(s) (to include soil analyses, air, groundwater data, and/or surface water data).

4. Based on the results of the SAR, the Department shall determine the need for further investigations at the SWMUs covered in the SAR. If the Department determines that such investigations are needed, the Permittee shall initiate an investigation as outlined in Permit Condition VII.D.1. immediately upon receiving notification of the Department's determination.

VII.C. NOTIFICATION REQUIREMENTS FOR NEWLY DISCOVERED RELEASES AT PREVIOUSLY IDENTIFIED SWMUs or AOCs

1. The Permittee shall notify the Department in writing of any newly discovered release(s) of hazardous waste or hazardous constituents discovered during the course of groundwater monitoring, field investigations, environmental audits, or other means, within 15 calendar days of discovery. Such newly discovered releases may be from SWMUs or AOCs identified in Permit Condition VII.A.6. or SWMUs or AOCs identified in Permit Condition VII.A.2. for which further investigation was not required.

2. If the Department determines that further investigation of the SWMUs or AOCs is needed, the Permittee shall initiate an investigation as outlined in Permit Condition VII.D. immediately upon receiving notification of the Department's determination.

VII.D. RCRA FACILITY INVESTIGATION (RFI)

1. The Permittee must perform an RFI for any SWMU and AOC identified by the Department in accordance with Permit Conditions VII.A.1, VII.B.4, and VII.C.2.

2. The RFI must completely identify the concentration of hazardous constituents released from each SWMU and AOC and fully delineate the area where such hazardous constituents have come to be located.

3. The RFI must fully characterize the nature and extent of contamination released from each SWMU or AOC under investigation.

4. The RFI must be performed in a manner consistent with the most recent edition of the Alabama Environmental Investigation and Remediation Guidance (AEIRG).

5. Except as provided by Permit Condition VII.D.6., the RFI must be completed within 180 calendar days from the effective date of this permit or, for SWMUs or AOCs identified pursuant to Permit Conditions VII.B. and VII.C., within 180 calendar days from the receipt of notification from the Department that an RFI is required. If, prior to the effective date of this permit, the Department has approved a work plan that includes a schedule for completing the RFI, the RFI shall be completed in accordance with the approved schedule.

6. RFI Schedule of Compliance

    a. For RFIs expected to require greater than 180 calendar days to complete, the Permittee may submit a schedule of compliance subject to Departmental approval and/or modification.

    b. Submittal of an RFI Schedule of Compliance does not delay or otherwise postpone the Permittee's obligation to initiate the RFI.

    c. The Schedule of Compliance must include:

        i. A detailed narrative discussion which explains why the RFI cannot be completed within 180 days; and,

        ii. A detailed and chronological listing of milestones, with estimated durations, which provides sufficient information to track the progress of the investigation.

    d. The RFI Schedule of Compliance shall be reviewed by the Department in accordance with Permit Condition VII.G.

    e. The Permittee shall complete the RFI in accordance with the approved RFI Schedule of Compliance.

7. RFI Progress Reports

    a. For an RFI being conducted in accordance with the approved RFI Schedule of Compliance, the Permittee must submit progress reports on a monthly basis.

    b. The RFI Progress Reports must include:

        i. A description of the RFI activities completed during the reporting period;

ii. Summaries of any problems or potential problems encountered during the reporting period;

iii. Actions taken to rectify problems;

iv. Changes in relevant personnel;

v. Projected work for the next reporting period;

vi. Any proposed revisions to the RFI Schedule of Compliance. Modifications of the RFI Schedule of Compliance are subject to approval by the Department; and,

vii. A summary of any data collected during the reporting period, including:

A. The location of each sampling point identified on a site map; and

B. The concentration of each hazardous constituent detected at each sampling point;

c. Submittal of RFI Progress Reports, work plans, or other documents during the RFI does not alter the approved RFI Schedule of Compliance.

8. RFI Reports

a. The Permittee shall prepare and submit to the Department an RFI Report within 60 calendar days from the completion of investigation activities in accordance with the approved RFI Schedule of Compliance, if applicable.

b. The RFI Report must provide a detailed description of all required elements of the investigation as described in the most recent edition of the AEIRG.

c. The RFI Report shall be reviewed by the Department in accordance with Permit Condition VII.G.

VII.E. SELECTION OF CORRECTIVE MEASURES AND PERMIT MODIFICATION

1. The Permittee shall develop and submit to the Department a Corrective Measures Implementation (CMI) Plan for any areas of the Permittee's site where hazardous constituents have come to be located at concentrations exceeding those appropriate for the protection of human health and the environment. The CMI Plan must include all applicable elements of the proposed remedy pursuant to the most recent edition of the AEIRG.

2. The CMI Plan shall be submitted to the Department within 120 calendar days following the Permittee's submittal of the RFI Report indicating that hazardous constituents have come to be located at any area of the Permittee's facility, or beyond the facility, at concentrations exceeding those appropriate for the protection of human health and the environment, or within 120 calendar days following notification from the Department that a CMI Plan is required, whichever occurs earlier.

3. The CMI Plan shall be submitted along with a request for permit modification pursuant to ADEM Admin. Code Rule 335-14-8-.04(2), and shall include any applicable fees pursuant to ADEM Admin. Code Chapter 335-1-6. This modification will serve to incorporate the proposed final remedy, including all procedures necessary to implement and monitor the remedy, into this permit.

4. Within 60 calendar days after this Permit has been modified in accordance with Permit Condition VII.E.3., the Permittee shall demonstrate financial assurance for completing the approved remedy, except for federal and state facilities.

5. The Permittee shall submit to the Department the CMI Plan for the SWMUs/AOCs listed in Table VII.6 for review and approval within 120 calendar days from the effective date of this permit.

VII.F. INTERIM MEASURES (IM)

1. IM Work Plan(s)

   a. Upon notification by the Department, the Permittee shall prepare and submit an Interim Measures (IM) Work Plan for any SWMU or AOC that the Department determines is necessary. IM are necessary in order to minimize or prevent further migration of contaminants and limit human and environmental exposure to contaminants while long-term corrective measures are evaluated and, if necessary, implemented. The IM Work Plan shall be submitted within 30 calendar days of such notification and shall include the elements listed in Permit Condition VII.F.1.b. Such IM may be conducted concurrently with investigations required under the terms of this permit. The Permittee may initiate IM by submitting an IM Work Plan for approval and reporting in accordance with the requirements under Permit Condition VII.F.

   b. The IM Work Plan shall ensure that the IM are designed to mitigate any current or potential threat(s) to human health or the environment and is consistent with and integrated into any long-term solution at the facility. The IM Work Plan shall include the IM objectives, procedures for implementation (including any designs, plans, or specifications), and schedules for implementation.

   c. The IM Work Plan must be approved by the Department in writing prior to implementation. The Department shall specify the start date of the IM Work Plan schedule in the letter approving the IM Work Plan.

   d. The IM Report shall be reviewed by the Department in accordance with Permit Condition VII.G.

   e. The Permittee shall submit IM WPs for the SWMUs and AOCs listed in Table VII.4 of this permit to the Department for review and approval. The IM WPs shall be submitted within 180 days from the effective date of this permit.

2. IM Implementation

a. The Permittee shall implement the IM in accordance with the approved IM Work Plan.

b. The Permittee shall give notice to the Department as soon as possible of any planned changes, reductions or additions to the IM Work Plan.

c. Final approval of corrective action required under ADEM Admin. Code Rule 335-14-5-.06(12), which is achieved through IM, shall be in accordance with ADEM Admin. Code Rule 335-14-8-.04(2) and Permit Condition VII.E.

3. IM Reports

a. If the time required for completion of IM is greater than one year, the Permittee shall provide the Department with Progress Reports at intervals specified in the approved work plan. The Progress Reports shall, at a minimum, contain the following information:

i. A description of the portion of the IM completed;

ii. Summaries of any deviations from the IM Work Plan during the reporting period;

iii. Summaries of any problems or potential problems encountered during the reporting period;

iv. Projected work for the next reporting period; and

v. Copies of laboratory or monitoring data.

b. The Permittee shall prepare and submit the IM Report to the Department within 90 calendar days of completion of IM conducted under Permit Condition VII.F. The IM Report shall, at a minimum, contain the following information:

i. A description of IM implemented;

ii. Summaries of results;

iii. Summaries of all problems encountered;

iv. Summaries of accomplishments and/or effectiveness of IM; and

v. Copies of all relevant laboratory or monitoring data, etc., in accordance with Permit Condition I.C.10.

VII.G. SUBMITTALS

1. All work plans, reports, schedules, and other documents ("submittals") required by this permit shall be subject to approval by the Department to assure that such submittals and schedules are consistent with the requirements of this Permit and with applicable regulations and guidance. The Permittee shall revise all submittals and schedules as directed by the Department.

2. The Department will review all submittals in accordance with the conditions of this permit. The Department will notify the Permittee in writing of any submittal that is disapproved, and the basis therefore. If the Department disapproves a submittal, the Department shall (1) notify the Permittee in writing of the submittal's deficiencies and specify a due date for submission of a revised submittal, (2) revise the submittal and notify the Permittee of the revisions, or (3) conditionally approve the submittal and notify the Permittee of the conditions. Permit Condition VII.H. shall apply only to submittals that have been disapproved and revised by the Department, or that have been disapproved by the Department, then revised and resubmitted by the Permittee, and again disapproved by the Department.

3. All submittals shall be submitted within the time frame specified by the Department and in accordance with the approved schedule of compliance. Extensions of the due date for submittals may be granted by the Department based on the Permittee's demonstration that sufficient justification for the extension exists.

4. All submittals required by this permit shall be signed and certified in accordance with ADEM Admin. Code Rule 335-14-8-.02(2).

5. All submittals shall be provided by the Permittee in accordance with Permit Condition I.K.

VII.H. DISPUTE RESOLUTION

Notwithstanding any other provision in this permit, in the event the Permittee disagrees, in whole or in part, with the Department's revision of a submittal or disapproval of any revised submittal required by this Part, the following may, at the Permittee's discretion, apply:

1. In the event that the Permittee chooses to invoke the provisions of this section, the Permittee shall notify the Department in writing within 30 calendar days of receipt of the Department's revision of a submittal or disapproval of a revised submittal. Such notice shall set forth:

   a. The specific matters in dispute;

   b. The position the Permittee asserts should be adopted as consistent with the requirements of this permit;

   c. The basis for the Permittee's position; and

   d. Any matters considered necessary for the Department's determination.

2. The Department and the Permittee shall have an additional 30 calendar days from the Department's receipt of the notification provided for in Permit Condition VII.H.1. to meet or confer to resolve any disagreement.

3. In the event agreement is reached, the Permittee shall submit and implement the revised submittal in accordance with and within the time frame specified in such agreement.

4. If agreement is not reached within the 30-day period, the Department will notify the Permittee in writing of the decision on the dispute, and the Permittee shall comply with the terms and conditions of the Department's decision in the dispute. For the purposes of this provision in this permit, the responsibility for making this decision shall not be delegated below the Department's Land Division Chief.

5. With the exception of those conditions under dispute, the Permittee shall proceed to take any action required by those portions of the submission and of this permit that the Department determines are not affected by the dispute.

Table VII.1

The following Solid Waste Management Unit(s) (SWMU) and/or Area(s) of Concern (AOC) numbers and descriptions correspond with those noted in the RCRA Facility Assessment (RFA) Report. Where discrepancies exist, the permit will take precedence.

List of SWMUs and AOCs requiring a RCRA Facility Investigation (RFI):

SWMU/AOC NUMBER	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA
Not Applicable (NA)	(NA)	NA	NA

Table VII.2

The following Solid Waste Management Unit (SWMU) and/or Area of Concern (AOC) numbers and descriptions correspond with those noted in the RCRA Facility Assessment (RFA) Report. Where discrepancies exist, the permit will take precedence.

List of SWMUs and AOCs requiring no further action at this time:

SWMU/AOC NUMBER	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA
15B	Activated Carbon Treatment System	Unit manages leachate from Land Vault Nos. 1 & 2	NA
16	Container Storage Area	Unit closed with Incinerator #1	Soil, Groundwater
17	Rotary Kiln Incinerator #1	Unit closed in 1999	Air, Soil
18A-T	Rotary Kiln Incinerator #2	Unit Closed in 2006	Air, Soil
19	Tank Farm 1 (V-0700-07, V-1003)	Unit closed with Incinerator #1	Soil, Groundwater
20	Tank Farm 2 (V-1002, V-2499)	Unit closed with Incinerator #1	Soil, Groundwater
21	Tank Farm 3 (15-V-091, 15-V-092)	Unit closed with Incinerator #1	Soil, Groundwater
22A-E	Tank Farm 4 (15-V-202, 15-V-203, 15-V-204, 15-V-234, 15-V-205)	Unit closed with Incinerator #2	Soil, Groundwater
32	Warehouse No. 218	Unit managed pesticide residues and by-products	NA
34A-EE	Area 15 Waste Water Treatment System	Unit manages process unit waste waters, storm waters, and groundwater	NA
35A-C, F-M, O-R, T, V-BB	Main Wastewater Sumps	NA	NA
36	Air Curtain Incinerator (Area 15)	Unit managed wood pallets, wood construction debris, and wood generated from clearing	NA
37A	Former Underground Injection Well No. 1	Unit managed high salt content waste waters	NA

Table VII.2 Continued

SWMU/AOC NUMBER	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA
37B	Former Underground Injection Well No. 2	Unit managed high salt content waste waters	NA
38A-C, L-N, Q, U, V, Z-CC*	≤90 day hazardous waste storage tanks, containers and areas	NA	NA
38D, E, J, K, O, P, R, S, T, W, X, Y	≤90 day hazardous waste storage tanks, containers and areas	Units are no longer in use	NA
39A-C, K-M, Q-R, T, V, W, DD, FF, GG, II, KK, SS, TT*	Satellite Accumulation Areas	NA	NA
39D-J, N-P, S, U, X-CC, HH, JJ	Closed Satellite Accumulation Areas	Units are no longer in use	NA
40A-D, F-H, K	Waste Loading Areas	NA	NA
41A-F, N-Z	Wastewater Trenches and Sumps	NA	NA
43A-F	Area 14 Waste Water Treatment System	Unit managed wastewaters from Area 14	NA
44A, C-E*	Used Oil Storage Areas	NA	NA
44B	Fire Station/Building 1010 Used Oil Storage Tank (6-V-1)	NA	NA
45A*	Universal Waste Area/Building 113	Unit manages universal wastes	NA
46	Non-hazardous Waste Storage Area/Building 212	Unit manages non-hazardous wastes	NA
47	Huntsman Environmental Areas	Unit manages various plant wastes	NA

* BASF should manage these <90 Day Hazardous Waste Storage Tanks, Containers, and Areas as required by Division 14 of the ADEM Administrative Code.

Table VII.3

The following Solid Waste Management Unit(s) (SWMU) and/or Area(s) of Concern (AOC) numbers and descriptions correspond with those noted in the RCRA Facility Assessment (RFA) Report. Where discrepancies exist, the permit will take precedence.

List of SWMUs and AOCs requiring action under other programs, such as CERCLA, etc.:

SWMU/AOC NUMBER	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA
23	Original Effluent impoundment	Remediated pursuant to CERCLA	Soil, Groundwater
24	Waste Disposal Pit	Remediated pursuant to CERCLA	Soil, Groundwater
25	Tar Disposal Area	Remediated pursuant to CERCLA	Soil, Groundwater
26	Waste Disposal Pits	Remediated pursuant to CERCLA	Soil, Groundwater
27	Open Burn Area	Remediated pursuant to CERCLA	Soil, Groundwater
28	Temporary Trash Staging Areas	Remediated pursuant to CERCLA	Soil, Groundwater
29	Disposal Site South of the Class C Landfill	Remediated pursuant to CERCLA	Soil, Groundwater
30	Bluffline Area	Remediated pursuant to CERCLA	Soil, Groundwater
31	BHC Burial Area	Remediated pursuant to CERCLA	Soil, Groundwater
33	Trash Staging Area	Remediated pursuant to CERCLA	Soil, Groundwater
AOC A	Dilute Ditch	Remediated pursuant to CERCLA	Sediment, surface water
AOC C	Floodplain	Remediated pursuant to CERCLA	Sediment, Surface water

Table VII.4

The following Solid Waste Management Unit(s) (SWMU) and/or Area(s) of Concern (AOC) numbers and descriptions correspond with those noted in the RCRA Facility Assessment (RFA) Report. Where discrepancies exist, the permit will take precedence.

List of SWMUs and AOCs requiring Interim Measures (IM) and/or Source Removal:

SWMU/AOC NUMBER	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA
NA	NA	NA	NA

Table VII.5

The following Solid Waste Management Unit(s) (SWMU) and/or Area(s) of Concern (AOC) numbers and descriptions correspond with those noted in the RCRA Facility Assessment (RFA) Report. Where discrepancies exist, the permit will take precedence.

List of SWMUs and AOCs regulated by Parts I – VI, and IX of this permit:

SWMU/AOC NUMBER	SWMU/AOC NAME	POTENTIALLY AFFECTED MEDIA
1	Class C Landfill	Soil, Groundwater
2	Biological Sludge Landfill	Soil, Groundwater
3	Rectangular/ Triangular Pond	Soil, Groundwater
4	Sludge Impoundment # 1	Soil, Groundwater
5	Sludge Impoundment # 2	Soil, Groundwater
6	Sludge Impoundment # 3	Soil, Groundwater
7	Sludge Impoundment # 4	Soil, Groundwater
8	5-Day Impoundment	Soil, Groundwater
9	10-Day Impoundment	Soil, Groundwater
10	Equalization Impoundment	Soil, Groundwater
11	Dilute Impoundment	Soil, Groundwater
12	Diazinon Destruction Impoundment	Soil, Groundwater
13	GM-44 Impoundment	Soil, Groundwater
14	Aboveground Landvault #1	Soil, Groundwater
15A	Aboveground Landvault #2	Soil, Groundwater
AOC B*	Lower Dilute Ditch	Sediment, Surface Water

* BASF should inspect AOC B on a quarterly basis for integrity of the final cover, animal disturbance, and obstruction or impediment of drainage.

Table VII.6

The following Solid Waste Management Unit(s) (SWMU) and/or Area(s) of Concern (AOC) numbers and descriptions correspond with those noted in the RCRA Facility Assessment (RFA) Report. Where discrepancies exist, the permit will take precedence.

List of SWMUs and AOCs requiring a Corrective Measure Implementation (CMI) Plan:

SWMU/AOC NUMBER	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA
23	Original Effluent impoundment	Remediated pursuant to CERCLA	Soil, Groundwater
24	Waste Disposal Pit	Remediated pursuant to CERCLA	Soil, Groundwater
25	Tar Disposal Area	Remediated pursuant to CERCLA	Soil, Groundwater
26	Waste Disposal Pits	Remediated pursuant to CERCLA	Soil, Groundwater
27	Open Burn Area	Remediated pursuant to CERCLA	Soil, Groundwater
28	Temporary Trash Staging Areas	Remediated pursuant to CERCLA	Soil, Groundwater
29	Disposal Site South of the Class C Landfill	Remediated pursuant to CERCLA	Soil, Groundwater
30	Bluffline Area	Remediated pursuant to CERCLA	Soil, Groundwater
31	BHC Burial Area	Remediated pursuant to CERCLA	Soil, Groundwater
33	Trash Staging Area	Remediated pursuant to CERCLA	Soil, Groundwater
35D, N, S, U	Wastewater Sumps	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater

Table VII.6 Continued

SWMU/AOC NUMBER	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA
35E*	BS-8, Main Wastewater Sump	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
38F, G, H, I	≤ 90 Day Hazardous Waste Storage Containers and Areas	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
39EE	Satellite Accumulation Area	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
40E*	Area 8 Waste Loading Pad	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
40I, J	Waste Loading Areas	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
41G, H, J	Wastewater Trenches and Sumps	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
41I, K-M*	Wastewater Trenches and Sumps	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
42A-E	Wastewater Treatment System	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
AOC A	Dilute Ditch	Remediated pursuant to CERCLA	Sediment, surface water
AOC C	Floodplain	Remediated pursuant to CERCLA	Sediment, Surface water

* SWMUs were removed during site demolition activities conducted during the spring and summer of 2016.

PART VIII

CORRECTIVE MEASURES IMPLEMENTATION

VIII.A. APPLICABILITY

The conditions of this Part apply to SWMUs and AOCs identified in Table VIII.1.

VIII.B. GENERAL CONDITIONS

1. The Permittee is required to perform corrective measures for the SWMUs and AOCs identified in Condition VIII.A. The approved remedy for these defined units, waterway areas, or land parcels, includes any and all actions set forth in this permit and in the approved Interim Measures Plans, Corrective Measures Studies (CMSs), and Corrective Measures Implementation (CMI) Plans approved by the Department, as noted in Table VIII.1.

2. Remedial Cleanup Levels

   Upon approval, pursuant to Condition VIII.E., of the CMI Plan designating applicable cleanup level(s), the cleanup level(s) for the areas specific to the CMI Plan will be deemed to be a condition of this permit.

3. Groundwater Monitoring and Remediation

   Where required pursuant to Conditions VIII.B.1. and/or VIII.C. of this permit, the Permittee shall comply with the general groundwater monitoring requirements of Part IX of this permit.

4. Land Use Controls

   Where required pursuant to Conditions VIII.B.1 and VIII.C of this permit, the Permittee shall establish appropriate land use controls to achieve protection of human health and the environment. The Permittee shall comply with Conditions VIII.B.5 and VIII.B.6 of this permit when implementing corrective measures requiring land use controls. In the event an off-site property owner does not allow an environmental covenant to be imposed, the Permittee shall notify the Department within 14 calendar days of receipt of such written notification of the refusal by the off-site property owner. If the property owner does not provide a written refusal of the request to allow an environmental covenant to be imposed, the Permittee shall notify the Department within 14 calendar days of delivery of the request to the off-site property owner. In such cases, the Department may allow the Permittee to propose an alternate area-specific land use control subject to the Department's review and approval.

5. Survey Plat

   For corrective measures where residual concentrations of contaminants will remain in-place at levels greater than those appropriate for unrestricted land use, or for corrective measures that rely on land use controls, the Permittee must:

a. Within 90 calendar days following the effective date of a permit modification addressing remedy selection, submit to the local zoning authority, or the authority with jurisdiction over local land use, and to the Department, a survey plat indicating the location and dimensions of the SWMUs, AOCs, and capped or partially remediated areas with respect to permanently surveyed benchmarks, the locations of sampling points, and the concentrations of hazardous constituents detected. This plat must be prepared and certified by a professional land surveyor registered in the State of Alabama. The plat must be filed with the local zoning authority or the authority with jurisdiction over local land use and must contain a note, prominently displayed, which states the Permittee's obligation to limit the property to the specified restricted uses.

b. Maintain the survey plat as described in Condition VIII.B.5.a. of this permit and in the Record of Decision(s) for OU-1, OU-2, OU-3, and OU-4 until the Permittee has demonstrated, to the satisfaction of the Department, that the levels of hazardous constituents in all contaminated media are within limits appropriate for unrestricted land uses.

6. Environmental Covenant

No later than the submission of the survey plat required in Condition VIII.B.5, the Permittee must:

a. Record in the probate judges office of the county in which the property, or a portion thereof is located, an environmental covenant in accordance with ADEM Admin. Code Division 335-5 that will in perpetuity notify any potential purchaser of the property that:

i. The land is contaminated with hazardous constituents in concentrations that exceed unrestricted use standards;

ii. The use of the property is restricted by this permit for certain residential, municipal, or industrial purposes and may lead to an increased risk of exposure to hazardous constituents depending upon the activities initiated at the site. Such activities may yield an increased level of human health risk to the owner;

iii. The potential purchaser or entity that desires to work in the contaminated area should notify the Permittee before mobilizing to the area covered by the land use control.

b. Submit to the Department a certification, signed by the Permittee in accordance with Permit Condition I.C.11. that the environmental covenant specified in this part has been performed. This certification must include a copy of the document in which the notation has been placed.

c. Maintain the environmental covenant described in Permit Condition VIII.B.6. until the Permittee has demonstrated, to the satisfaction of the Department, that the levels of hazardous constituents in all contaminated media are within limits appropriate for unrestricted land uses.

7. Security

Security measures, where required by Conditions VIII.B.1 and/or VIII.C., of this permit, will be conducted in accordance with ADEM Admin. Code Rule 335-14-5-.02(5) and as prescribed in the approved CMI Plan.

8. Inspection

Where corrective measures addressed in Conditions VIII.B.1. include provisions to cap in place or partially remediate properties or land areas, whether owned or not owned by the Permittee, the Permittee shall specify inspection protocols on a scheduled basis to ensure continued integrity of the remedy and to ensure that land use remains appropriately restricted per the environmental covenant established pursuant to Permit Condition VIII.B.6. Inspection provisions shall be as prescribed in the approved CMI Plan.

VIII.C. AREA SPECIFIC CONDITIONS

The specific areas identified in this section have been designated by the US Environmental Protection Agency under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) program.

1. OU – 1: Contamination of the shallow (alluvial) groundwater aquifer.

a. Area Description

As defined in the 1989 ROD, contaminant plumes containing organics, such as solvents and production by-products, and inorganics, were identified in the part of BASF's Plant south of the developed areas, which include manufacturing and infrastructure facilities and waste management systems. The contaminant plumes were within BASF's south property boundary. Olin Corporation property adjoins BASF along the complete south property line. The alluvial aquifer begins at a nominal 50 feet below the land surface and extends to a depth of an additional nominal 50 feet.

b. Area Conditions

1. The Permittee shall maintain the groundwater extraction/treatment system described in Appendix L of the permit application and as required by Part IX of this permit.

2. The Permittee shall maintain all groundwater wells associated with the alluvial and Miocene aquifers monitoring program as described in Appendix L of the permit application and as required by Part IX of this permit.

3. The Permittee shall keep and maintain all monitoring, testing, and analytical data obtained in accordance with Permit Conditions IX.B., IX.C., IX.D., and IX.E. as required by Permit Condition I.C.10.

4. The Permittee shall continue to monitor and maintain records of the following parameters in addition to those outlined in Part IX of this permit.

a. System effluent volume,
b. Surface water discharge concentrations to the Tombigbee River; and

c. Corrective action well pumping rates.

2. OU -2: Contamination of soils at ten of eleven former waste management areas.

a. Area Description

Contamination of both surface and deeper soils was identified and characterized by the extensive site investigation which was performed according to CERCLA RI guidance. The facility property was investigated to locate all former waste management or waste impacted areas. The ten areas of contamination, which were collectively specified as OU-2, were generally east of the manufacturing portion of the plant. The predominant class of contaminants was commercial pesticides and the byproduct isomers and metabolites of these pesticide compounds. Contamination of the soil was the result of leaching from 10 hazardous waste management areas which included former waste storage piles, and in some cases, sub-surface disposal of solid waste materials.

The ten areas are described below:

1. SWMU 23 is a former wastewater impoundment currently filled-in with material from sandblasting activities. The waste at Area 1 was sludge containing pesticide residues, by-products, and intermediates from pesticide manufacturing.

2. SWMU 24 is a small, former disposal pit covered by fill located immediately east of Area 1. The pit contained wastes such as trash, pesticide residues, byproducts, and intermediates from pesticide manufacturing.

3. SWMU 25 is an area consisting of five discrete past waste management areas evidencing broad surficial contamination based on the field work conducted during the RI/FS. This unit was divided into five specific areas and a general area of contamination based on differences in color and type of the waste.

4. SWMU 26 consists of three isolated, shallow pits which are covered by clay fill. The pits contained pesticide residues and intermediates from pesticide manufacturing.

5. SWMU 27 is an area where open burning was formerly practiced. The area was covered by clay fill and contained trash, burned demolition debris, pesticide residues, byproducts, and intermediates from pesticide manufacturing.

6. SWMU 28 is the location of two adjacent former trash staging areas covered by clay fill. The site contained trash consisting of combustible refuse such as plastic, paper, cardboard, and rubber intermixed with manufactured pesticides and metals.

7. SWMU 29 is a former disposal pit covered with clay fill. The area contained drums, solid waste, jars, bulk solid wastes, and trash. The waste was comprised of pesticide residues, byproducts, and intermediates from pesticide manufacturing.

8. SWMU 31 is a chemical material burial area covered with clay fill. The area contained bulk pesticide byproducts, predominantly isomers of hexachlorocyclohexane (BHC), and residues.

9. SWMU 32 consists of a thin layer of waste partially covered by an existing storage warehouse. The area contained solid waste consisting of pesticide residues and byproducts. The waste was overlain by approximately eight feet of compacted clay fill. The ground surface is primarily covered with reinforced concrete.

10. SWMU 33 consists of intermixed soil and waste underlying the current trash staging area. The intermixed soil and waste consisted of pesticide byproducts and was overlain by approximately four feet of compacted clay fill. The surface is covered with reinforced concrete except for a small portion along the southern and eastern edges, which is bare ground.

b. Area Conditions

i. The Permittee shall inspect the vegetated areas and maintain the established vegetated cover in such a manner to not allow any disturbance of the integrity of the final cover, liners, any components of the containment system, or the function of the facility's monitoring systems. The inspections shall specifically include evaluation of the following items:

a. Integrity of the final cover (erosion, ponding, subsidence, cracking, etc.);

b. Growth and stabilization of vegetative cover;

c. Run-on and run-off control system;

d. Groundwater monitoring wells; and

e. Survey benchmarks.

ii. Institutional controls for land use and groundwater use restrictions; inspections of areas quarterly and after storms as described in Appendix D of the permit application.

iii. The Permittee shall maintain the final cover system as described in the Final Remedial Design Report of OU – 2.

iv. The Permittee shall submit to the Department a written report which compiles the quarterly inspection reports. The report shall be submitted within 180 calendar days after the issuance of this permit and on an annual basis thereafter. Copies of this report shall be kept at the facility in accordance with Permit Conditions I.C.10.c. and I.C.10.e.

3. OU-3: Contamination within the floodplain, the effluent ditch (previously called the lower portion of the dilute ditch) and areas in the Tombigbee River within close proximity to the Site.

a. Area Description

Contamination of surface soil and sediment in the floodplain was characterized by the site investigation. OU-3 consists of the effluent ditch and 370 acres of the Tombigbee River floodplain and the adjacent areas in the Tombigbee River. This area is separated from the rest of the facility by the bluff line. The source of contamination was primarily from the effluent ditch and runoff from the waste management areas. Additional characterization was performed in conjunction with the extensive ecological risk assessment phase preceding EPA's ROD, and during soil treatability studies conducted during the remedy evaluation phase. The principal contaminant of concern was DDT and its metabolites DDD and DDE (collectively known as DDTR).

b. Area Conditions

i. The Permittee shall maintain the operation and maintenance requirements for the floodplain area described in ROD as well as the Final design report for OU-3.

ii. The Permittee shall conduct annual fish sampling as described in most current version of the OU-3 Operation and Maintenance (O&M) plan, to evaluate the effectiveness of the remedial action completed in the area. At such time that the cleanup levels, as established in the OU-3 ROD, have been achieved and maintained for three consecutive years, the Permittee may request that the sampling frequency be reduced.

iii. The Permittee shall inspect the sand capped areas and maintain the established cover in such a manner to not allow any disturbance of the integrity of the final cover. The inspections shall specifically include evaluation of the following items:

a. Integrity of the final cover (erosion, subsidence, scouring, cracking, etc.);

b. Sediment deposition/erosion at each station;

c. Survey benchmarks, where necessary.

iv. The Permittee shall include information regarding the effectiveness of the OU-3 remedial action, which should include a compilation of the fish sampling results and cap inspections, annually.

4. OU-4: Contamination of soils in former waste management area designated as SWMU 30 (or bluff line area).

a. Area Description

Contamination of both surface and deeper soils was characterized by the site investigation. The bluff line area is located at the extreme east side of the BASF property, and is roughly bisected by an escarpment which separates the upland portion of the property from the floodplain of the Tombigbee River. An elevation change of approximately 45 feet occurs moving west to east across the site. The principal contaminants in the soil were pesticides, and additionally, commercial herbicides. Contamination of the soil resulted from past waste management practices such as open burning and solid waste disposal in subsurface pits.

b. Area Conditions

i. The Permittee shall inspect the vegetated areas and maintain the established vegetated cover in such a manner to not allow any disturbance of the integrity of the final cover, liners, any components of the containment system, or the function of the facility's monitoring systems. The inspections shall specifically include evaluation of the following items:

a. Integrity of the final cover (erosion, ponding, subsidence, cracking, etc.);

b. Growth and stabilization of vegetative cover;

c. Run-on and run-off control system;

d. Groundwater monitoring wells; and

e. Survey benchmarks.

ii. Institutional controls for land use and groundwater use restrictions; inspections of areas quarterly and after storms as described in Appendix D.

iii. The Permittee shall maintain the slurry wall as described in the Final Remedial Design Report of OU-4.

iv. The Permittee shall include information regarding the effectiveness of the slurry wall in the written report described in Section VIII.C.2.b.iv of this permit.

VIII.D. CORRECTIVE MEASURES IMPLEMENTATION (CMI) REPORTS

1. CMI Progress Reports

If the time required to complete implementation of a specific set of corrective measures, as described in the Department-approved CMI Plan, is greater than 180 calendar days, the Permittee shall provide ADEM with progress reports according to the schedule in the ADEM-approved CMI Plan. If no schedule has been approved as part of the associated plan, progress reports shall be submitted at least quarterly. The progress reports shall, at a minimum, contain the following information:

a. A description of the portion of CMI Plan completed;

b. Summaries of and deviations from the approved CMI Plan during the reporting period;

c. Summaries of current and potential problems, including recommended solutions and alternatives as well as corrective actions undertaken;

d. Any monitoring data (soil, air, dust, water) collected for any reason during the construction period for the purposes of monitoring potential for human and ecological exposure; and

e. Projected work for the next period and impacts to the approved schedule.

2. Final CMI Reports

Upon completion of construction of corrective measures systems, implementation of land use controls, interim removal actions, or other short-term activities required by this permit and/or the approved CMI Plan, the Permittee shall submit to the Department a Final CMI Report containing, at a minimum, the following:

a. A description of activities completed;

b. For cap and cover remedies, as-built construction drawings presenting the final in-place three-dimensional location of contaminated material. A plan view of the remediated areas shall be presented in addition to a cross section of the in-place capped areas;

c. Waste manifests indicating the handling of any excavated material that has been shipped off-site to a Department approved, certified landfill;

d. For remedies involving land use controls, a copy of the survey plat and environmental covenant required by Condition VIII.B. of this permit;

e. Monitoring data (soil, air, dust, water) collected for any reason during the construction period for the purposes of monitoring potential for human and ecological exposure; and

f. Certification, prepared in accordance with ADEM Admin. Code Rule 335-14-8-02 (2)(d) by the Permittee and an Alabama-registered Professional Engineer, that the corrective measures implementation phase (*i.e.*, construction) required by this permit is complete and that the approved system and/or facilities are ready for operation in accordance with the intended design (*i.e.,* CMI Plan).

3. Corrective Measures (CM) Effectiveness Reports

a. For corrective measures that have been fully implemented and where the corrective measures system(s) must operate for a period of time to achieve cleanup goals or levels, the Permittee shall submit CM Effectiveness Reports (addressing all Corrective Measures systems at the facility which are subject to this permit condition) annually ,unless otherwise approved by the Department, beginning 180 calendar days following the Department's approval of the Final CMI Report for the initial Corrective Measures system subject to this permit condition. The overall CM Effectiveness Reports shall include, at a minimum, the following information for each SWMU and/or AOC included in the report:

i. A detailed narrative presenting an evaluation of the effectiveness of the selected remedy;

ii. Summaries of compliance with and progress toward achieving cleanup goals;

iii. Any significant revisions, adjustments, or proposed modifications to the selected remedy;

iv. Tabulated environmental sampling and monitoring data including, but not limited to, groundwater quality, elevation data, and a graphical representation of all constituents detected during each sampling event from recovery wells, monitoring wells, drinking water wells, and other locations;

v. Chain of custody, field reports, and laboratory data sheets to include the date of collection, the date the sample was extracted, and the date of sample analysis for samples collected during the reporting period;

vi. Any monitoring data (soil, air, dust, water) collected for any reason during the post-construction period for the purposes of monitoring potential for human and ecological exposure;

vii. Isoconcentration maps depicting the distribution of parameters for each sampling event;

viii. Time versus concentration plots for each monitoring parameter for each recovery well and for each monitoring wells;

ix. Tabulated volumetric data on groundwater pumped and pumping rates (monthly and cumulative) for each recovery well;

x. Records of any groundwater recovery system operation time, including shutdown periods, not including any minor (less than 24 hours) shutdowns for repairs, maintenance, *etc.*;

xi. Potentiometric surface maps;

xii Description of land use during the reporting period at the designated area requiring corrective measures; and

xiii Findings of the Permittee's investigation into the continued effectiveness of land use controls per Condition VIII.B.

b. If at any time the Permittee determines that any remedy selection specified in Condition VIII.B. or VIII.C. of this permit no longer satisfies the applicable requirements of ADEM Admin. Code Rule 335-14-5-.06(12) or this permit for releases of hazardous waste or hazardous constituents originating from SWMUs or AOCs, the Permittee must, within 90 calendar days, submit an application for a permit modification, pursuant to Permit Condition I.J., to make any appropriate changes to the CMI Plan.

c. The application for changes in the CMI Plan, including changes in inspection and monitoring provisions of the CMI Plan, shall be submitted as an application for a permit modification pursuant to the requirements of ADEM Admin. Code Rule 335-14-8-.04.

4. Final Report of Corrective Measures

Within 90 calendar days following attainment of cleanup levels or goals as outlined in this Permit and the approved CMI Plan, the Permittee shall submit to the Department a Final Report of Corrective Measures (FRCM). The FRCM shall contain a certification by the Permittee and an independent professional engineer registered in the State of Alabama that all remedial measures required by this permit and the approved CMI Plan have been completed. The FRCM shall outline any procedures and schedules for dismantling of corrective measures systems, groundwater monitoring or recovery systems, removal of land use controls, and any other remedial systems or controls required by this permit or the approved CMI Plan.

Table VIII.1

The following Solid Waste Management Unit(s) (SWMU) and/or Area(s) of Concern (AOC) numbers and descriptions correspond with those noted in the RCRA Facility Assessment (RFA) Report. Where discrepancies exist, the permit will take precedence.

List of SWMUs and AOCs requiring Corrective Measures:

SWMU/AOC NUMBER	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA
23	Original Effluent impoundment	Remediated pursuant to CERCLA	Soil, Groundwater
24	Waste Disposal Pit	Remediated pursuant to CERCLA	Soil, Groundwater
25	Tar Disposal Area	Remediated pursuant to CERCLA	Soil, Groundwater
26	Waste Disposal Pits	Remediated pursuant to CERCLA	Soil, Groundwater
27	Open Burn Area	Remediated pursuant to CERCLA	Soil, Groundwater
28	Temporary Trash Staging Areas	Remediated pursuant to CERCLA	Soil, Groundwater
29	Disposal Site South of the Class C Landfill	Remediated pursuant to CERCLA	Soil, Groundwater
30	Bluffline Area	Remediated pursuant to CERCLA	Soil, Groundwater
31	BHC Burial Area	Remediated pursuant to CERCLA	Soil, Groundwater
33	Trash Staging Area	Remediated pursuant to CERCLA	Soil, Groundwater
35D, N, S, U	Wastewater Sumps	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater

Table VIII.1 Continued

35E*	BS-8, Main Wastewater Sump	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
38F, G, H, I	≤90 Day Hazardous Waste Storage Containers and Areas	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
39EE	Satellite Accumulation Area	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
40E*	Area 8 Waste Loading Pad	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
40I, J	Waste Loading Areas	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
41G, H, J	Wastewater Trenches and Sumps	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
41I, K-M*	Wastewater Trenches and Sumps	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
42A-E	Wastewater Treatment System	Remediation Plan for Former Production Areas 7 and 8	Soil, Groundwater
AOC A	Dilute Ditch	Remediated pursuant to CERCLA	Sediment, surface water
AOC C	Floodplain	Remediated pursuant to CERCLA	Sediment, Surface water

* SWMUs were removed during site demolition activities conducted during the spring and summer of 2016.

PART IX

GROUNDWATER MONITORING AND CORRECTIVE ACTION

IX.A. REQUIRED PROGRAM(S)

1. Groundwater monitoring shall consist of the General Groundwater Monitoring Program of Permit Condition IX.B., the Detection Monitoring Program contained in Permit Condition IX.C., the Compliance Monitoring Program contained in Permit Condition IX.D., and the Corrective Action Monitoring Program contained in Permit Condition IX.E.

2. The Permittee shall commence groundwater monitoring as required by this permit not later than 120 calendar days after the effective date of this permit.

IX.B. GENERAL GROUNDWATER MONITORING PROGRAM

1. Well Location, Installation and Construction

   The Permittee shall install and/or maintain a groundwater monitoring system to comply with the requirements of ADEM Admin. Code Rules 335-14-5-.06(8), 335-14-5-.06(9), 335-14-5-.06(10), and 335-14-5-.06(11) as applicable and as specified below:

   a. The Permittee shall maintain all groundwater monitoring wells at the facility as identified in Table IX.1. of this permit, at the locations specified on Figure L-1, Figure L-2a, and L-2b in Appendix L of the permit application and/or CMI Plan, and any other groundwater monitoring wells specified by Permit Condition IX.B.1.d. and IX.B.1.e.

      i. All groundwater monitoring wells shall be maintained and inspected in accordance with the plans and specifications presented in Appendix L of the permit application and/or CMI Plan and in accordance with ADEM Admin. Code Rule 335-14-5-.06.

      ii. A groundwater monitoring well shall not be removed from any monitoring program specified in this permit without an approved permit modification pursuant to Permit Condition I.J.

      iii. If a groundwater monitoring well is damaged, the Permittee shall immediately notify the Department in writing, which includes a description of the well repair activities to be conducted. The well repair procedures must be approved by the Department prior to implementation. Within 30 calendar days after the well is repaired, the Permittee shall submit a written notification to the Department that the well repair activities were conducted in accordance with the approved procedures.

      iv. If a groundwater monitoring well is deleted from the monitoring program(s) required by this permit in accordance with Permit Conditions IX.B.1.a. ii. and I.J., it shall be abandoned within 90 calendar days after deletion using procedures to be approved by the Department. Within 30 calendar days after the well is abandoned, the Permittee shall submit a written notification to the Department that the well abandonment activities were conducted in accordance with the approved procedures.

b. Groundwater monitoring wells OW-1, M-3, M-4, M-5, M-6, M-7, M-8, M-9, M-10, M-11, M-13, M-14, M-15, MD-2, MD-9, MD-11, MD-12 shall define the point of compliance for the entire facility, including all operating and closed units.

c. The Permittee shall maintain groundwater monitoring well(s) MD-1, MD-5, M-1, M-2, and MW-12A as the background monitoring well(s) for the entire facility as specified in Appendix L of the permit application.

d. The Permittee shall install and maintain additional groundwater monitoring wells as necessary to assess changes in the rate and extent of any plume of contamination or as otherwise deemed necessary to maintain compliance with ADEM Admin. Code Rules 335-14-5-.06(6), 335-14-5-.06(8), 335-14-5-.06(9), 335-14-5-.06(10), and 335-14-5-.06(11), as applicable. A plan in the form of a permit modification request specifying the design, location and installation of any additional monitoring wells should be submitted to the Department at least 90 calendar days prior to installation which, at a minimum, shall include:

   i. Well construction techniques including casing depths and proposed total depth of well(s);

   ii. Well development method(s);

   iii. A complete description of well construction materials;

   iv. A schedule of implementation for construction; and,

   v. Provisions for determining the lithologic characteristics, hydraulic conductivity, grain size distribution, and porosity for the applicable aquifer unit(s) at the location of the new well(s).

e. Reserved

f. Reserved

2. General Groundwater Monitoring Requirements

a. The Permittee shall determine the groundwater surface elevation from all monitoring wells listed in Table IX.1. of this permit at least semi-annually and each time a sampling event is conducted. The results of these determinations should be submitted in accordance with Permit Condition IX.B.6. Elevation data should be recorded and reported as mean sea level (MSL) and referenced to an appropriate national geodetic vertical datum (NGVD) benchmark.

b. The Permittee shall determine the groundwater flow rate and direction in the underlying aquifer(s) at least annually and submit the results in accordance with Permit Condition IX.B.6.

c. The Permittee shall determine background concentrations of hazardous constituents and other chemical parameters required to be monitored by this permit in accordance with Appendix L of the permit application and ADEM Admin. Code Rule 335-14-5-.06(8)(g).

3. Groundwater Protection Standard

a. The groundwater protection standard, as required under ADEM Admin. Code Rule 335-14-5-.06(3), shall consist of Table IX.3.A and Table IX.3.B of this permit which lists the hazardous constituents and their respective concentration limits.

b. The groundwater protection standard applies to all hazardous waste or hazardous constituent releases as deemed appropriate by the Department to protect human health and the environment.

4. Compliance Period

a. The compliance period, during which the groundwater protection standard specified in Permit Condition IX.B.3. applies, shall begin at the time of the first sampling event of the compliance monitoring program (Permit Condition IX.D.), or the corrective action monitoring program (Permit Condition IX.E.), whichever is earlier.

b. The compliance period shall continue (after beginning pursuant to Permit Condition IX.B.4.a.) until the groundwater protection standard as defined by Permit Condition IX.B.3.a. has not been exceeded for a period of three consecutive years.

c. If the Permittee is engaged in a corrective action program pursuant to Permit Condition IX.E., then the compliance period shall continue as required by ADEM Admin. Code Rule 335-14-5-.06(7)(c) until the groundwater protection standard has not been exceeded for a period of three consecutive years after corrective action has been terminated and this permit has been modified, in accordance with Permit Condition I.J., to implement a compliance monitoring program pursuant to Permit Condition IX.D. or a detection monitoring program pursuant to Permit Condition IX.C., as required by ADEM Admin. Code Rule 335-14-5-.06(11)(f).

5. Sampling and Analysis Procedures

The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the groundwater monitoring wells described in Permit Condition IX.B.1. to provide a reliable indication of the quality of the groundwater as required under ADEM Admin. Code Rules 335-14-5-.06(8)(d), (e), and (g):

a. Samples shall be collected, preserved, and shipped (when shipped off-site for analysis) in accordance with the procedures specified in Appendix B and Appendix L of the permit application.

b. Samples shall be analyzed according to the procedures specified in Appendix B and Appendix L of the permit application, the most recent edition of SW-846 or other appropriate methods approved by the Department. Analytical method detection limits shall be less than or equal to the groundwater protection standards specified in Table IX.3.A. or IX.3.B., unless otherwise approved in writing by the Department.

c. Samples shall be tracked and controlled using the chain-of-custody procedures specified in Appendix B and Appendix L of the permit application.

d. Statistical analyses used to evaluate the groundwater monitoring data shall be as described in Appendix L of the permit application and ADEM Admin. Code Rule 335-14-5-.06(8)(h).

e. All samples taken in accordance with this permit shall not be filtered prior to analysis.

6. Recordkeeping and Reporting

a. The Permittee shall keep and maintain all monitoring, testing, and analytical data obtained in accordance with Permit Conditions IX.B., IX.C., IX.D., and IX.E. as required by Permit Condition I.C.10.

b. The Permittee shall submit to the Department a written report to include all analytical sampling data, established background values, statistical evaluations, groundwater elevations, associated potentiometric maps, and the annual groundwater flow rate and direction determinations. The analytical method and the method detection limit (MDL) for each constituent must be integrated into all reports of analysis. The report shall be submitted within 60 calendar days after the first sampling event and on an annual basis thereafter. Copies of this report shall be kept at the facility in accordance with Permit Conditions I.C.10.c and I.C.10.e.

c. The Permittee shall submit progress reports to the Department describing implementation of groundwater monitoring and/or corrective action activities at the site as required by Part IX of this permit on a quarterly basis. The first progress report shall be submitted to the Department within 90 calendar days after the effective date of this permit. The progress reports shall continue until such time as the required monitoring and/or corrective action systems and activities required by this permit are fully constructed and operational. In the event that additional monitoring and/or corrective action requirements are imposed through a permit modification, in accordance with Permit Condition I.J., the quarterly reporting requirement shall resume, commencing upon the effective date of the permit modification and continuing until the required monitoring and/or corrective action systems and activities are again fully constructed and operational.

IX.C. DETECTION MONITORING PROGRAM (Reserved)

IX.D. COMPLIANCE MONITORING PROGRAM (Reserved)

IX.E. CORRECTIVE ACTION MONITORING PROGRAM

The requirements of this Condition are applicable to the entire facility. Except as specified otherwise in this permit, the Corrective Action Monitoring Program shall be implemented in accordance with Appendix L of the permit application and ADEM Admin. Code Rule 335-14-5-.06(11).

1. Monitoring Systems

   In addition to the point of compliance and background well monitoring systems identified in Permit Conditions IX.B.1.b. and IX.B.1.c., the Permittee shall:

   a. Maintain groundwater monitoring wells MD-3B, MD-6, MD-7, and MD-8 as boundary wells for the entire facility as specified in Table IX.1. of this permit and as shown on Figure L-1, Figure L-2a, and L-2b in Appendix L of the permit application.

   b. Maintain groundwater monitoring wells CA-4A, OW-2, OW-4, OW-6, M-12, MW-9A, MW-10A, and MD-4 as effectiveness wells as specified in Table IX.1. of this permit and as shown on Figure L-1, Figure L-2a, and L-2b in Appendix L of the permit application.

   c. Maintain wells PW-1, PW-2, PW-3, PW-6, PW-7, PW-8, PW-9, PW-10, and PW-11 as recovery wells as specified in Table IX.1. of this permit and as shown on Figure L-1, Figure L-2a, and L-2b in Appendix L of the permit application.

   d. Maintain wells CA-1, CA-2, and CA-3 as corrective action wells as specified in Table IX.1. of this permit and as shown on Figure L-1, Figure L-2a, and L-2b in Appendix L of the permit application

2. Corrective Action Program

   a. The Permittee shall conduct a Corrective Action Program, as described in Appendix L of the permit application, to remove or treat in place all hazardous constituents that exceed their respective groundwater protection standards as described in Table IX.3.A and Table IX.3.B of this permit at the point of compliance, between the point of compliance and the down-gradient facility property boundary, and beyond the facility boundary in accordance with ADEM Admin. Code Rule 335-14-5-.06(11)(e).

   b. Pursuant to ADEM Admin. Code Rules 335-14-5-.06(11)(c) and 335-14-5-.06(11)(e)3., the Permittee shall continue to implement the corrective action program as described in Appendix L of the permit application within 120 calendar days after the effective date of this permit.

   c. The Permittee shall handle/treat groundwater in accordance with Appendix L of the permit application and with the applicable requirements of NPDES permit number AL0003093, as issued by the Department.

3. Monitoring Requirements

In addition to the general groundwater monitoring requirements specified in Permit Condition IX.B.2., the Permittee shall:

a. Sample all background, point of compliance and effectiveness monitoring wells shown in Table IX.1. of this permit and analyze for the constituents listed in Table IX.2. of this permit on a semi-annual basis beginning within 120 calendar days of the effective date of this permit and continuing through the end of the compliance period.

b. Sample all background, point of compliance, effectiveness, and boundary monitoring wells shown in Table IX.1. of this permit and analyze for the constituents listed in Table IX.3.A and Table IX.3.B of this permit on an annual basis beginning within 120 calendar days of the effective date of this permit and continuing through the end of the compliance period.

c. Sample all background, point of compliance, effectiveness, and boundary monitoring wells shown in Table IX.1. of this permit and analyze for temperature (degrees F or C), specific conductance (Mhos/cm), and pH (standard units) each time the well is sampled. The data obtained should be submitted as raw data in the reports required by Permit Condition IX.B.6.

d. When evaluating the monitoring results to determine the effectiveness of the corrective measures, in accordance with Permit Condition IX.E.4., the Permittee shall:

i. Determine if the corrective action system effectively addresses the entire plume of contamination;

ii. Determine if the concentration of the hazardous constituents are decreasing (pH increasing or decreasing toward neutrality, as applicable) in the effectiveness wells specified in Permit Condition IX.E.1.;

iii. Determine if hazardous waste or hazardous constituents are being released into the environment; and

iv. Determine if hazardous constituents have been detected in the boundary wells specified in Permit Condition IX.E.1.

4. Reporting and Response Requirements

In addition to the recordkeeping and reporting requirements specified in Permit Condition IX.B.6.:

a. The Permittee shall report the effectiveness of the corrective action program annually, as required under ADEM Admin. Code Rule 335-14-5-.06(11)(g). These reports shall be submitted to the Department within 60 calendar days of each annual anniversary of this permit after corrective action is initiated and continue until corrective action is completed. The Permittee must provide data from groundwater monitoring along with an analysis of that data and any conclusions regarding the effectiveness of the program in accordance with Permit Condition IX.E.3.d. If the analysis of the data warrants any change to the corrective action program, the Permittee must include these revisions in the annual report which will be followed up within 90 calendar days with an application for permit modification in accordance with Permit Condition I.J.

b. If corrective action is terminated under Permit Condition IX.B.4.c., the Permittee must sample all background, point of compliance, effectiveness and boundary sampling locations for the compounds listed in ADEM Admin. Code Rule 335-14-5-Appendix IX. Based upon the sampling results, the Permittee may petition the Department, in accordance with Permit Condition I.J, for a permit modification to implement either a detection monitoring program or a compliance monitoring program.

TABLE IX.1.

MONITORING WELL DESIGNATIONS

WELL NUMBER	WELL TYPE *	WELL LATITUDE	WELL LONGITUDE	UNIT(S) MONITORED	WELL DEPTH (ft)	GROUND ELEVATION (ft. MSL)	TOP-OF-RISER ELEVATION (ft. MSL)	SCREENED INTERVAL (ft. MSL)	MONITORED ZONE
M-1	BKG	31° 17.236’	088° 00.531’	Entire Facility	76.5	55.65	42.62	29.66/40.34	Alluvial
M-2	BKG	31° 17.230’	087° 59.789’	Entire Facility	69.5	36.75	39.08	29.66/40.34	Alluvial
M-3	POC	31° 16.514’	087° 59.879’	Entire Facility	74.0	42.7	44.95	19.42/-43.82	Alluvial
M-4	POC	31° 16.523’	087° 59.680’	Entire Facility	57.0	28.95	29.73	24.71/-19.29	Alluvial
M-5	POC	31° 16.525’	087° 59.593’	Entire Facility	60.0	31.00	33.60	22.68/-21.32	Alluvial
M-6	POC	31° 16.537’	087° 59.383’	Entire Facility	61.0	36.55	38.38	21.26/-23.74	Alluvial
M-7	POC	31° 16.615’	087° 59.264’	Entire Facility	75.0	52.55	54.63	33.20/-16.80	Alluvial
M-8	POC	31° 16.666’	087° 59.228’	Entire Facility	80.0	52.15	52.91	32.80/5.56/ -6.20/-32.20	Alluvial
M-9	POC	31° 16.698’	087° 59 075’	Entire Facility	85.0	35.35	37.50	11.98/-42.62	Alluvial
MW-9A	EFF	31° 16.491’	087° 59.729’	Entire Facility	58.05	26.75	29.98	12.22/-28.25	Alluvial
M-10	POC	31° 16.785’	087° 58.994’	Entire Facility	89.0	33.48	35.42	14.94/-26.04/ - 31.04/-52.04	Alluvial
MW-1OA	EFF	31°16.486’	087° 59.511’	Entire Facility	54.80	30.15	32.88	18.32/-22.15	Alluvial
M-11	POC	31° 16.956’	087° 58.999’	Entire Facility	69.0	27.00	28.44	18.22/-52.86	Alluvial
M-12	EFF	31° 16.479’	087° 59.361’	Entire Facility	60.0	41.60	43.81	14.23/-12.79	Alluvial
MW-12A	BKG	31° 17.243’	087° 59.306"	Entire Facility	75.25	31.65	34.43	47.65/22.60/ 12.55/2.83	Alluvial
M-13	POC	31°16.998’	087° 59.043’	Entire Facility	68.74	29.05	31.10	56.89/2.04	Alluvial
M-14	POC	31° 17.110’	087° 59 050’	Entire Facility	56.55	27.45	30.42	48.03/3.23	Alluvial
M-15	POC	31° 17.202’	087° 59.042’	Entire Facility	53.80	28.05	31.31	43.66/3.90	Alluvial
OW-1	POC	31° 16.491’	088° 00.206’	Entire Facility	77.24	53.95	56.71	38.90/-21.10	Alluvial
OW-2	EFF	31° 16.442’	088° 00.142’	Entire Facility	85.66	51.60	52.58	28.89/-33.11	Alluvial
OW-4	EFF	31° 16.444’	088° OO.017’	Entire Facility	76.93	48.45	50.17	32.41/-27.59	Alluvial
OW-6	EFF	31° 16.392’	087° 59.741’	Entire Facility	7308	33.65	34.27	22.01/-22.99	Alluvial
CA-l	CAM	31° 16.249’	088° 00.076’	Entire Facility	88.54	49.90	53.69	17.8/-37.2	Alluvial
CA-2	CAM	31° 16.261’	087° 59.701’	Entire Facility	60.72	32.55	33.18	22.4/-27.6	Alluvial
CA-3	CAM	31° 16.377’	087° 59.431’	Entire Facility	55.61	35.15	37.74	20.9/-19.1	Alluvial
CA-4A	EFF	31° 16.512'	087° 59.194'	Entire Facility	53.42	14.30	17.49	4.21/-35.79	Alluvial
PW-1	RCY	31° 16.487’	087° 59.344’	Entire Facility	58.73	44.15	45.81	13.3/-11.9	Alluvial
PW-2	RCY	31° 16.474’	087° 59.556’	Entire Facility	56.64	30.75	32.59	17.2/-23.9	Alluvial
PW-3	RCY	31° 16.391’	087° 59.773’	Entire Facility	68.55	39.05	40.99	18.2/-26.8	Alluvial
PW-6	RCY	31° 16.370’	088° 00.075’	Entire Facility	95.33	48.45	50.42	20.8/-44.13	Alluvial
PW-7	RCY	31° 16.396’	088° 00.099’	Entire Facility	84.12	50.15	52.41	25.7/-36.24	Alluvial
PW-8	RCY	31° 16.382’	088° 00.265’	Entire Facility	94.0	52.25	53.60	24.9/-40.99	Alluvial
PW-9	RCY	31° 16.550’	087° 59317’	Entire Facility	62.93	43.65	45.48	9.7/-19.5	Alluvial
PW-10^	RCY	31° 16.429’	087° 59.758’	Entire Facility	63.05	41.15	43.47	31.15/-18.85	Alluvial
PW-11	IA-RCY	31° 16.611’	087° 59.206’	Entire Facility	91.73	34.50	36.29	-30/-55	Lower Alluvial
MD-1	BKG	31° 17.241’	088° 00.533’	Entire Facility	247.0	40.45	41.49	-186.15/-206.15	Miocene
MD-2	POC	31° 16.538’	087° 59.381’	Entire Facility	160.0	36.50	38.05	-99.15/-119.15	Miocene
MD-3B	BDY	31° 16.257’	088° 00.320’	Entire Facility	220.0	41.37	44.01	-158.631-178.63	Miocene
MD-4	EFF	31° 16.712’	087° 59.061’	Entire Facility	159.28	34.40	36.81	-76.10/-114.74	Miocene
MD-5	BKG	31° 17.038’	087° 59.363’	Entire Facility	177	39.79	42.31	-122.21/-137.21	Miocene
MD-6	BDY	31° 16.262’	087° 59.702’	Entire Facility	197.25	32.64	34.92	-149.61/-164.61	Miocene
MD-7	BDY	31° 16.240’	087° 59.456’	Entire Facility	160	32.79	35.61	-107.21/-127.21	Miocene
MD-8	BDY	31° 16.454’	087° 59.794’	Entire Facility	235	42.46	42.26	-215/-235	Miocene
MD-9	POC	31° 16.45’	087° 59.516’	Entire Facility	160	27.45	29.76	-112.55/-132	Miocene
MD-11	POC	31° 16.520’	087° 59.204’	Entire Facility	111	16.52	20.72	-65.94/-85.94	Miocene
MD-12	POC	31° 16.553’	087° 59.243’	Entire Facility	135	19.3	22.43	-95.8/-115.8	Miocene
MD-13	Offsite	31° 16.104’	087° 59.729’	Entire Facility	285	30.52	33.00	-199.48/-219.48	Miocene
MD-14	Offsite	31° 16.107’	087° 59.917’	Entire Facility	300	42.74	45.44	-156.77/-176.77	Miocene

* Well Type:

POC – Point of Compliance Wells (M-5, M-8, M-9, M-10, M-11, M-13, M-14, M-15 & OW-1 are monitored semi-annually for depth to groundwater data only).
EFF – Effectiveness Monitoring Wells
PGM – Piezometers and/or General Monitoring Wells
BKG – Background Wells (one BG well is sampled each year for each Aquifer on an annual rotation basis)
BDY – Boundary Monitoring Wells
RCY – Recovery Wells (excluding backup well PW-10) IA-RCY – Interim Action Recovery Well PW-11
CAM – Corrective Action Monitoring Wells Offsite – Offsite Miocene Monitoring Wells
^PW10 was shutdown on October 15, 2014 and now is used as a backup well when PW-3 is down for maintenance

TABLE IX.2

GROUNDWATER QUALITY MONITORING CONSTITUENTS*

HAZARDOUS CONSTITUENT	ZONE
Alpha-BHC	Alluvial
Benzene	Alluvial, Upper Miocene
Beta-BHC	Alluvial
Carbon Tetrachloride	Alluvial
Chlorobenzene	Alluvial, Upper Miocene
Delta-BHC	Alluvial

* The constituents listed herein are the subset of the Groundwater Protection Standard listed in Tables IX.3.A and IX.3.B for which monitoring is required and are analyzed semi-annually.

TABLE IX.3.A (Alluvial Aquifer)

GROUNDWATER PROTECTION STANDARD

HAZARDOUS CONSTITUENT	CONCENTRATION LIMIT (mg/L)
Alpha-BHC	0.0000072*
Arsenic	0.01
Benzene	0.005
Beta-BHC	0.000025*
Bis (2-Ethylhexyl) phthalate**	0.006
Carbon Tetrachloride	0.005
Chlorobenzene	0.1
Chloroform**	0.08
2-Chlorophenol	0.0091*
Chlorobenzilate**	0.00031*
Cobalt**	0.0006*
4,4-DDD	0.000032*
4,4 DDE	0.000046*
4,4-DDT	0.00023*
Delta-BHC	MDL
1,4 – Dichlorobenzene	0.075
1,1 - Dichloroethylene	0.007
1,2 - Diphenylhydrazine	0.000078*
Lead**	0.015
Lindane**	0.0002
Naphthalene	0.00012*
Nitrobenzene	0.00014*
1,2,4-Trimethylbenzene	0.0056*
Vanadium (Total)	0.0086*
Vinyl chloride	0.002

* Values are Tapwater values from the EPA Regional Screening Levels table. All other values are MCLs unless otherwise noted.

** Identifies the parameter(s) which are to be analyzed every five years; all other parameters are analyzed annually.

TABLE IX.3.B (Miocene Aquifer)

GROUNDWATER PROTECTION STANDARD

HAZARDOUS CONSTITUENT	CONCENTRATION LIMIT (mg/L)
Alpha-BHC	0.0000072*
Arsenic**	0.01
Benzene	0.005
Beta-BHC	0.000025*
Bis (2-Ethylhexyl) phthalate**	0.006
Carbon Tetrachloride	0.005
Chlorobenzene	0.1
Chloroform**	0.08
Chlorobenzilate**	0.00031*
4,4-DDD	0.000032*
4,4 DDE	0.000046*
4,4-DDT	0.00023*
Delta-BHC	MDL
1,4 – Dichlorobenzene**	0.075
1,2-Diphenylhydrazine	0.000078*
Lindane**	0.0002
Naphthalene	0.00012*
Strontium (Total)**	1.2*
Vanadium (Total)	0.0086*

* Values are Tapwater values from the EPA Regional Screening Levels table. All other values are MCLs unless otherwise noted.

** Identifies the parameter(s) which are to be analyzed every five years; all other parameters are analyzed annually.

PART X

SUMMARY OF DEADLINES

The summary information provided herein is intended only as a guide to the requirements of this permit. It is not intended to be all inclusive, nor is it intended to be used as a substitute for the full text of this permit.

PERMIT CONDITION	ITEM	DUE DATE
I.C.2.	Reapply for a renewal.	180 calendar days before the expiration of the current permit.
I.C.12.a.	Give notice to the Department of any planned physical alterations or additions to the permitted facility and any solid waste management units.	As soon as possible
I.C.12.f.	Report any noncompliance with this permit that may endanger human health or the environment.	Orally within 24 hours from the time the Permittee becomes aware of the circumstances. Written submission shall also be provided within 5 calendar days of the time that the Permittee becomes aware of the circumstances.
I.C.13	Submit the certification of construction.	Before the Permittee may commence treatment, storage or disposal of hazardous waste or contaminated media at any new or modified portion of the facility
I.G.	Waste Minimization Certification	Annually
I.H.	Update cost estimates.	Annually, as required by ADEM Admin. Code Rules 335-14-5-.08(3)(b), 335-14-5-.08(5)(b), and 335-14-5-.08(10)(b) and no later than 30 calendar days after the Department has approved a modification to the Closure Plan, Post-Closure Plan, or Corrective Action Plan, or any other plan required or referenced by this permit, if the change in the plan results in an increase in the amount of the cost estimate.
I.J.	Submit a written request for a permit modification pursuant to the requirements of ADEM Admin. Code Rule 335-14-8-.04(2).	At least 60 calendar days prior to a proposed change in facility design or operation.

PERMIT CONDITION	ITEM	DUE DATE
V.M.	Submit reports of all data collected pursuant to Permit conditions V.D.4.a and V.D.4.e, the total tonnage, by major waste category of waste disposed each calendar month of the preceding year, and for the first annual report only, the tabulated results of all leachate analyses conducted during the preceding year.	60 days after the first anniversary of the effective date of the Permit, and annually thereafter.
VI.B.8	Submit reports of all data collected pursuant to Permit conditions VI.B.5.a, VI.B.5.d., VI.B.7, and for the first annual report only, the tabulated results of all leachate analyses conducted during the preceding year.	60 days after the first anniversary of the effective date of the Permit, and annually thereafter.
VII.B.1.	Notify the Department, in writing, of the discovery of any additional AOCs.	Within 15 calendar days of discovery.
VII.B.2.	Notify the Department, in writing, of the discovery of any additional SWMUs.	Within 15 calendar days of discovery.
VII.B.3.	Submit a SWMU Assessment Report (SAR) for each SWMU identified under VII.B.2.	Within 90 calendar days of notification.
VII.C.1.	Notify the Department, in writing, of any newly discovered release(s) of hazardous waste or hazardous constituents from SWMUs or AOCs discovered during the course of groundwater monitoring, field investigations, environmental audits, or other means.	Within 15 calendar days of discovery.
VII.D.7.	Submit RFI progress reports.	Monthly basis beginning in the second month following the initiation of the RFI.
VII.D.8	Submit RFI Report.	Within 60 calendar days from the completion of investigation activities.

PERMIT CONDITION	ITEM	DUE DATE
VII.E.2	Submit CMI Plan.	Within 120 calendar days following the Permittee's submittal of the RFI Report indicating that hazardous constituents have come to be located at any area of the Permittee's facility, or beyond the facility, at concentrations exceeding those appropriate for the protection of human health and the environment, or within 120 calendar days following notification from the Department that a CMI Plan is required, whichever occurs earlier.
VII.E.4.	Demonstrate financial assurance for completing the approved remedy.	Within 60 calendar days after this Permit has been approved.
VII.F.1.	Submit IM Work Plan.	Within 30 calendar days upon notification by the Department.
VII.F.3.	Submit IM Report.	Within 90 calendar days of completion of IM.
VIII.B.5.a.	Submit to the local zoning authority, or the authority with jurisdiction over local land use, and to the Department, a survey plat indicating the location and dimensions of the SWMUs, AOCs, and capped or partially remediated areas with respect to permanently surveyed benchmarks, the locations of sampling points, and the concentrations of hazardous constituents detected.	Within 90 calendar days following the effective date of a permit modification addressing remedy selection.
VIII.B.6.a.	Record environmental covenant.	No later than the submission of the survey plat required in Condition VIII.B.5.
VIII.B.6.b.	Submit to the Department a certification that the environmental covenant has been performed.	No later than the submission of the plat required in Condition VIII.B.5.
VIII.D.3.	Begin Submitting Corrective Measures Effectiveness Reports	Annually beginning 180 calendar days following the Department's approval of the Final CMI Report.
VIII.D.4.	Submit a Final Report of Corrective Measures (FRCM).	Within 90 calendar days following attainment of cleanup levels or goals.

PERMIT CONDITION	ITEM	DUE DATE
IX.B.1.a.iii.	Notification of damaged groundwater monitoring wells.	Immediately notify the Department in writing, which includes a description of the well repair activities to be conducted. The well repair procedures must be approved by the Department prior to implementation. A repair report must be submitted within 30 calendar days of repair.
IX.B.1.d.	Install additional groundwater monitoring wells.	As necessary to assess changes in the rate and extent of any plume of contamination, or as otherwise deemed necessary. Note: a permit modification request must be submitted at least 90 calendar days prior to installation of additional groundwater monitoring well(s).
IX.B.2.a.	Determine groundwater surface elevation.	At least semi-annually and each time a well is sampled.
IX.B.2.b.	Determine groundwater flow rate and direction.	At least annually.
IX.B.6.b.	Submit groundwater monitoring report.	Within 60 calendar days of the first sampling event and annually thereafter.
IX.B.6.c.	Submit progress reports.	Within 90 calendar days after the effective date of this permit and quarterly thereafter. See permit condition for start/stop/resume provisions.
IX.E.2.b.	Implement corrective action plan	No later than 120 calendar days after the effective date of this permit.
IX.E.3.a.	Sample all background, point of compliance wells and effectiveness wells and analyze for the constituents listed in Table IX.2. of this permit.	Semi-annually beginning within 120 calendar days of the effective date of this permit.
IX.E.3.b.	Sample all background, point of compliance wells, effectiveness, and boundary wells and analyze for the constituents listed in Table IX.3.A and Table IX.3.B of this permit.	Annually beginning within 120 calendar days of the effective date of this permit.
IX.E.3.c.	Sample and analyze for temperature (degrees F or C), specific conductance (Mhos/cm), and pH (standard units), at all background and point of compliance monitoring well locations.	Each time the well is sampled.
IX.E.4.a.	Submit corrective action effectiveness reports.	Annually within 60 calendar days of each annual anniversary of this permit after corrective action is initiated and until corrective action is completed.

United States Environmental Protection Agency
RCRA SUBTITLE C SITE IDENTIFICATION FORM

1. Reason for Submittal (Select only one.)

☐	Obtaining or updating an EPA ID number for on-going regulated activities (Items 10-17 below) that will continue for a period of time.
☐	Submitting as a component of the Hazardous Waste Report for ___________ (Reporting Year)
	☐ Site was a TSD facility, a reverse distributor, and/or generator of ≥ 1,000 kg of non-acute hazardous waste, > 1 kg of acute hazardous waste, or > 100 kg of acute hazardous waste spill cleanup in **one or more months of the reporting year** (or State equivalent LQG regulations)
☐	Notifying that regulated activity is no longer occurring at this Site
☐	Obtaining or updating an EPA ID number for conducting Electronic Manifest Broker activities
☑	Submitting a new or revised Part A (permit) Form

2. Site EPA ID Number

A	L	D	0	0	1	2	2	1	9	0	2

3. Site Name

BASF Corporation

4. Site Location Address

Street Address	1379 Ciba Road		
City, Town, or Village	McIntosh	County	Washington
State	AL	Country	USA
Zip Code	36553		
Latitude	31.276127	Longitude	-88.007589
☐ Use Lat/Long as Primary Address			

5. Site Mailing Address ☑ Same as Location Street Address

Street Address		
City, Town, or Village		
State	Country	Zip Code

6. Site Land Type

☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other

7. North American Industry Classification System (NAICS) Code(s) for the Site (at least 5-digit codes)

A. (Primary) 325199	C. 325998
B. 325194	D.

EPA ID Number | A | L | D | 0 | 0 | 1 | 2 | 2 | 1 | 9 | 0 | 2 | OMB# 2050-0024; Expires 04/30/2024

8. Site Contact Information

☑ Same as Location Address

First Name Wayne	MI	Last Name Goldman
Title EHS Specialist		
Street Address		
City, Town, or Village		
State	Country	Zip Code
Email louis.goldman@basf.com		
Phone 251-436-2005	Ext	Fax

9. Legal Owner and Operator of the Site

A. Name of Site's Legal Owner

☐ Same as Location Address

Full Name BASF Corporation	Date Became Owner (mm/dd/yyyy) 4/20/2000

Owner Type ☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other		
Street Address 100 Park Ave		
City, Town, or Village Florham Park		
State NJ	Country USA	Zip Code 07932
Email		
Phone 973-245-6000	Ext	Fax
Comments		

B. Name of Site's Legal Operator

☑ Same as Location Address

Full Name Marcus Pezent	Date Became Operator (mm/dd/yyyy)

Operator Type ☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other		
Street Address		
City, Town, or Village		
State	Country	Zip Code
Email marcus.pezent@basf.com		
Phone 251-436-2000	Ext	Fax
Comments		

10. Type of Regulated Waste Activity (at your site)
Mark "Yes" or "No" for all current activities (as of the date submitting the form); complete any additional boxes as instructed.

A. Hazardous Waste Activities

☑ Y ☐ N	1. Generator of Hazardous Waste—If "Yes", mark only one of the following—a, b, c		
	☑	a. LQG	-Generates, in any calendar month, 1,000 kg/mo (2,200 lb/mo) or more of non-acute hazardous waste (includes quantities imported by importer site); or - Generates, in any calendar month, or accumulates at any time, more than 1 kg/mo (2.2 lb/mo) of acute hazardous waste; or - Generates, in any calendar month or accumulates at any time, more than 100 kg/mo (220 lb/mo) of acute hazardous spill cleanup material.
	☐	b. SQG	100 to 1,000 kg/mo (220-2,200 lb/mo) of non-acute hazardous waste and no more than 1 kg (2.2 lb) of acute hazardous waste and no more than 100 kg (220 lb) of any acute hazardous spill cleanup material.
	☐	c. VSQG	Less than or equal to 100 kg/mo (220 lb/mo) of non-acute hazardous waste.
☐ Y ☑ N	2. Short-Term Generator (generates from a short-term or one-time event and not from on-going processes). If "Yes", provide an explanation in the Comments section. *Note: If "Yes", you MUST indicate that you are a Generator of Hazardous Waste in Item 10.A.1 above.*		
☑ Y ☐ N	3. Treater, Storer or Disposer of Hazardous Waste—Note: Part B of a hazardous waste permit is required for these activities.		
☐ Y ☑ N	4. Receives Hazardous Waste from Off-site		
☐ Y ☑ N	5 Recycler of Hazardous Waste		
	☐	a. Recycler who stores prior to recycling	
	☐	b. Recycler who does not store prior to recycling	
☐ Y ☑ N	6. Exempt Boiler and/or Industrial Furnace—If "Yes", mark all that apply.		
	☐	a. Small Quantity On-site Burner Exemption	
	☐	b. Smelting, Melting, and Refining Furnace Exemption	

B. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g. D001, D003, F007, U112). Use an additional page if more spaces are needed.

D001	D003	D008	D009	D018	D022	D036
F002	F003	F005	F039	U037		

C. Waste Codes for State Regulated (non-Federal) Hazardous Wastes. Please list the waste codes of the State hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed.

11. Additional Regulated Waste Activities (NOTE: Refer to your State regulations to determine if a separate permit is required.)

A. Other Waste Activities

☐ Y ☑ N		1. Transporter of Hazardous Waste—If "Yes", mark all that apply.
	☐	a. Transporter
	☐	b. Transfer Facility (at your site)
☐ Y ☑ N		2. Underground Injection Control
☐ Y ☑ N		3. United States Importer of Hazardous Waste
☐ Y ☑ N		4. Recognized Trader—If "Yes", mark all that apply.
	☐	a. Importer
	☐	b. Exporter
☐ Y ☑ N		5. Importer/Exporter of Spent Lead-Acid Batteries (SLABs) under 40 CFR 266 Subpart G—If "Yes", mark all that apply.
	☐	a. Importer
	☐	b. Exporter

B. Universal Waste Activities

☐ Y ☑ N		1. Large Quantity Handler of Universal Waste (you accumulate 5,000 kg or more) - If "Yes" mark all that apply. Note: Refer to your State regulations to determine what is regulated.
	☐	a. Batteries
	☐	b. Pesticides
	☐	c. Mercury containing equipment
	☐	d. Lamps
	☐	e. Aerosol Cans
	☐	f. Other (specify) ________________
	☐	g. Other (specify) ________________
☐ Y ☑ N		2. Destination Facility for Universal Waste Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities

☐ Y ☑ N		1. Used Oil Transporter—If "Yes", mark all that apply.
	☐	a. Transporter
	☐	b. Transfer Facility (at your site)
☐ Y ☑ N		2. Used Oil Processor and/or Re-refiner—If "Yes", mark all that apply.
	☐	a. Processor
	☐	b. Re-refiner
☐ Y ☑ N		3. Off-Specification Used Oil Burner
☐ Y ☑ N		4. Used Oil Fuel Marketer—If "Yes", mark all that apply.
	☐	a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner
	☐	b. Marketer Who First Claims the Used Oil Meets the Specifications

D. Pharmaceutical Activities

☐ Y ☑ N		1. Operating under 40 CFR Part 266, Subpart P for the management of hazardous waste pharmaceuticals—if "Yes", mark only one. Note: See the item-by-item instructions for definitions of healthcare facility and reverse distributor.
	☐	a. Healthcare Facility
	☐	b. Reverse Distributor
☐ Y ☑ N		2. Withdrawing from operating under 40 CFR Part 266, Subpart P for the management of hazardous waste pharmaceuticals. Note: You may only withdraw if you are a healthcare facility that is a VSQG for all of your hazardous waste, including hazardous waste pharmaceuticals.

12. Eligible Academic Entities with Laboratories—Notification for opting into or withdrawing from managing laboratory hazardous wastes pursuant to 40 CFR Part 262, Subpart K.

☐ Y ☑ N		A. Opting into or currently operating under 40 CFR Part 262, Subpart K for the management of hazardous wastes in laboratories— If "Yes", mark all that apply. Note: See the item-by-item instructions for definitions of types of eligible academic entities.
	☐	1. College or University
	☐	2. Teaching Hospital that is owned by or has a formal written affiliation with a college or university
	☐	3. Non-profit Institute that is owned by or has a formal written affiliation with a college or university
☐ Y ☑ N		B. Withdrawing from 40 CFR Part 262, Subpart K for the management of hazardous wastes in laboratories.

13. Episodic Generation

☐ Y ☑ N	Are you an SQG or VSQG generating hazardous waste from a planned or unplanned episodic event, lasting no more than 60 days, that moves you to a higher generator category. If "Yes", you must fill out the Addendum for Episodic Generator.

14. LQG Consolidation of VSQG Hazardous Waste

☐ Y ☑ N	Are you an LQG notifying of consolidating VSQG Hazardous Waste Under the Control of the Same Person pursuant to 40 CFR 262.17(f)? If "Yes", you must fill out the Addendum for LQG Consolidation of VSQG hazardous waste.

15. Notification of LQG Site Closure for a Central Accumulation Area (CAA) (optional) OR Entire Facility (required)

☐ Y ☑ N	LQG Site Closure of a Central Accumulation Area (CAA) or Entire Facility.
	A. ☐ Central Accumulation Area (CAA) or ☐ Entire Facility
	B. Expected closure date: _____________ mm/dd/yyyy
	C. Requesting new closure date: _____________ mm/dd/yyyy
	D. Date closed : _____________ mm/dd/yyyy ☐ 1. In compliance with the closure performance standards 40 CFR 262.17(a)(8) ☐ 2. Not in compliance with the closure performance standards 40 CFR 262.17(a)(8)

16. Notification of Hazardous Secondary Material (HSM) Activity

☐ Y ☑ N	Are you notifying under 40 CFR 260.42 that you will begin managing, are managing, or will stop managing hazardous secondary material under 40 CFR 260.30, 40 CFR 261.4(a)(23), (24), (25), or (27)? If "Yes", you must fill out the Addendum to the Site Identification Form for Managing Hazardous Secondary Material.

17. Electronic Manifest Broker

☐ Y ☑ N	Are you notifying as a person, as defined in 40 CFR 260.10, electing to use the EPA electronic manifest system to obtain, complete, and transmit an electronic manifest under a contractual relationship with a hazardous waste generator?

18. Comments (include item number for each comment)

19. Certification I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. **Note: For the RCRA Hazardous Waste Part A permit Application, all owners and operators must sign (see 40 CFR 270.10(b) and 270.11).**

Signature of legal owner, operator or authorized representative Marcus C. Pezent	Date (mm/dd/yyyy) 11/08/2021
Printed Name (First, Middle Initial Last) Marcus C. Pezent	Title Site Director
Email marcus.pezent@basf.com	

Signature of legal owner, operator or authorized representative	Date (mm/dd/yyyy)
Printed Name (First, Middle Initial Last)	Title
Email	

EPA ID Number | A | L | D | 0 | 0 | 1 | 2 | 2 | 1 | 9 | 0 | 2 |

OMB# 2050-0024; Expires 04/30/2024

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT _______ (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description						
B. EPA Hazardous Waste Code(s)						
C. State Hazardous Waste Code(s)						
D. Source Code	Management Method (G25)		Country Code (G62)			
E. Form Code	F. Waste Minimization Code		G. Radioactive Mixed ☐Y ☐			
H. Quantity	UOM	Density		☐ bs/gal ☐sg		

2. **On-site Generation and Management of Hazardous Waste**

☐Y ☐N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☐ ☐N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

See attached 20-Feb-2020 Biennial Hazardous Waste Report RY2019

EPA ID Number | A | L | D | 0 | 0 | 1 | 2 | 2 | 1 | 9 | 0 | 2 |

OMB# 2050-0024; Expires 04/30/2024

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT

OFF-SITE IDENTIFICATION (OI) FORM

1. Site 1

A. EPA ID Number of Off-site Installation or Transporter

B. Name of Off-site Installation or Transporter

C. Handler Type (mark all that apply) ☐ Generator ☐ Transporter ☐ Receiving Facility

D. Address of Off-site Installation

Street Address

City, Town, or Village

State	Zip Code	Country

2. Site 2

A. EPA ID Number of Off-site Installation or Transporter

B. Name of Off-site Installation or Transporter

C. Handler Type (mark all that apply) ☐ Generator ☐ Transporter ☐ Receiving Facility

D. Address of Off-site Installation

Street Address

City, Town, or Village

State	Zip Code	Country

3. Site 3

A. EPA ID Number of Off-site Installation or Transporter

B. Name of Off-site Installation or Transporter

C. Handler Type (mark all that apply) ☐ Generator ☐ Transporter ☐ Receiving Facility

D. Address of Off-site Installation

Street Address

City, Town, or Village

State	Zip Code	Country

4. **Comments**

See attached 20-Feb-2020 Biennial Hazardous Waste Report RY2019

United States Environmental Protection Agency

HAZARDOUS WASTE PERMIT PART A FORM

1. Facility Permit Contact

First Name **Wayne**	MI	Last Name **Goldman**
Title **EHS Specialist**		
Email **louis.goldman@basf.com**		
Phone **251-436-2005**	Ext	Fax

2. Facility Permit Contact Mailing Address

Street Address **1379 Ciba Road**		
City, Town, or Village **McIntosh**		
State **AL**	Country **USA**	Zip Code **36553**

3. Facility Existence Date (mm/dd/yyyy)

9/30/1985

4. Other Environmental Permits

A. Permit Type	B. Permit Number												C. Description
N	A	L	0	0	0	3	0	9	3				NPDES Major Source Discharge Permit
P	1	0	8	-	0	0	0	3					Major Source Operating Permit,Title V Air
P	2	0	0	6	-	5	5	2					Water Supply Permit

5. Nature of Business

Chemical Manufacturing, including production of inductrial antioxidants and light stabilizers additives for paints and plastics.

6. Process Codes and Design Capacities

Line Number		A. Process Code			B. Process Design Capacity (1) Amount	B. Process Design Capacity (2) Unit of Measure	C. Process Total Number of Units	D. Unit Name
	1	S	0	2	533.788	G	001	
	2	D	8	0	290,000	Y	001	Land Vault #2 (SWMU15A)
	3	T	8	0	143.7	X	001	
	4	S	0	2	31,000	G	002	
	5	D	8	0	185,530	Y	001	Land Vault #1 (SWMU14)

7. Description of Hazardous Wastes (Enter codes for Items 7.A, 7.C and 7.D(1))

Line No.		A. EPA Hazardous Waste No.				B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes (1) Process Codes									D. Processes (2) Process Description (if code is not entered in 7.D1))

8. Map

Attach to this application a topographical map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all spring, rivers, and other surface water bodies in this map area. See instructions for precise requirements.

9. Facility Drawing

All existing facilities must include a scale drawing of the facility. See instructions for more detail.

10. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, and disposal areas; and sites of future storage, treatment, or disposal areas. See instructions for more detail.

11. Comments

6. Process Codes and Design Capacities - see attached continuation table for Line nmber 6 thru 12.

7. Description of Hazardous Wasete - see attached Table A-1

6. Process Codes and Design Capacities (continued)

Line Number		A. Process Code			B. Process Design Capacity (1) Amount	(2) Unit of Measure	C. Process Total Number of Units	D. Unit Name
	6	D	8	0	116,970	Y	001	Class C Landfill, SWMU-1
	7	D	8	0	116,741	Y	001	Biological Sludge Landfill, SWMU-2
	8	D	8	3	23,064	Y	001	Rectangular/Triangular Pond, SWMU-3
	9	D	8	3	733,419	Y	001	SWMUs 4 thru 10
1	0	D	8	3	534,825	Y	001	Diazinon/DD Ponds, SWMUs-11 & -12
1	1	D	8	3	149,102	Y	001	GM-44 Impoundment, SWMU-13
1	2	T	0	4	100.00	U	001	

Table A-1
Potential Hazardous Waste Constituents

Waste Code	Material	Waste Code	Material
D001	Ignitable	U002	Acetone
D004	Arsenic	U003	Acetonitrile
D005	Barium	U006	Acetyl Chloride
D006	Cadmium	U007	Acrylamide
D007	Chormium	U008	Acrylic Acid
D008	Lead	U009	Acrylonitrile
D009	Mercury	U012	Aniline
D010	Selenium	U019	Benzene
D011	Silver	U023	Benzotrichloride
D013	Lindane	U031	1-Butanol
D018	Benzene	U037	Chlorobenzene
D019	Carbon tetrachloride	U038	Chlorobenzilate
D021	Chlorobenzene	U041	1-Chloro-2,3-epoxypropane
D022	Chloroform	U044	Chloroform
D023	o-Cresol	U052	Cresols/Cresylic Acid
D024	m-Cresol	U056	Cyclohexane
D025	p-Cresol	U057	Cyclohexanone
D026	Cresol	U069	Di-n-butyl Phthalate
D027	1,4 Dichlorbenzene	U070	o-Dichlorobenzene
D028	1,2 Dichloroethane	U077	1,2-Dichloroethane
D030	2,4 Dinitrotoluene	U083	1,2-Dichloropropane
D034	Hexachloroethane	U088	Diethyl Phthalate
D035	Methyl Ethyl Ketone	U091	3,3'-Dimethoxybenzidine
D036	Nitrobenzene	U092	Dimethylamine
D038	Pyridine	U095	3,3'-Dimethylbenzidine
D039	Tetrachloroethylene	U103	Dimethyl Sulfate
D040	Trichloroethylene	U108	1,4 Dioxane
		U112	Ethyl Acetate
F001	Halogenated Solvent	U113	Ethyl Acrylate
F002	Halogenated Solvent	U122	Formaldehyde
F003	Non-Halogenated Solvent	U123	Formic Acid
F004	Non-Halogenated Solvent	U131	Hexachloroethane
F005	Non-Halogenated Solvent	U133	Hydrazine
F039	Multi-Source Leachate	U140	Isobutyl Alcohol
		U147	Maleic Anhydride
P005	Allyl Alcohol	U154	Methanol
P024	p-Chloroaniline	U156	Methyl Chlorocarbonate
P030	Cyanides	U159	Methyl Ethyl Ketone
P033	Cyanogen Chloride	U160	MEK Peroxide
P054	Ethylenimine	U161	Methyl Isobutyl Ketone
P063	Hydrogen Cyanide	U162	Methyl Methacrylate
		U165	Naphthalene
		U169	Nitrobenzene
		U188	Phenol
		U194	n-Propylamine
		U196	Pyridine
		U210	Perchloroethylene
		U211	Carbon Tetrachloride
		U213	Terahydrofuran
		U219	Thiourea
		U220	Toluene
		U226	1,1,1-Trichlorethane
		U228	Trichloroethylene
		U239	Xylene

BASF
We create chemistry

Certified Mail No. 7015 3430 0001 0156 6008

February 20, 2020

Austin Pierce, P.E.
ADEM – Land Division
P.O. Box 301463
Montgomery, AL 36130-1463

RE: Biennial Hazardous Waste Report RY2019

Dear Mr. Pierce,

Enclosed you will find the completed site ID, OI, & GM Forms for the 2019 Biennial Hazardous Waste Report for BASF Corporation's McIntosh Site (ALD001221902).

The total volume of waste generated in 2019 was 21,733 tons with ~12,636 tons of this being leachate from Landvault No. 1 and No. 2 produced by rainfall.

BASF is committed to the reduction in volume and toxicity of its wastes and has in place a waste minimization program, which focuses on reduction in the generation of hazardous and non-hazardous waste.

If you have any questions, please contact Muhammad Khan at (251) 436- 3942.

Sincerely,

Jason W. Slinkard
McIntosh Site Director

United States Environmental Protection Agency
RCRA SUBTITLE C SITE IDENTIFICATION FORM

1. Reason for Submittal (Select only one.)

☐	Obtaining or updating an EPA ID number for an on-going regulated activity that will continue for a period of time. (Includes HSM activity)
☑	Submitting as a component of the Hazardous Waste Report for 2019 (Reporting Year)
	☑ Site was a TSD facility and/or generator of > 1,000 kg of hazardous waste, > 1 kg of acute hazardous waste, or > 100 kg of acute hazardous waste spill cleanup in **one or more months of the reporting year** (or State equivalent LQG regulations)
☐	Notifying that regulated activity is no longer occurring at this Site
☐	Obtaining or updating an EPA ID number for conducting Electronic Manifest Broker activities
☐	Submitting a new or revised Part A Form

2. Site EPA ID Number

A	L	D	0	0	1	2	2	1	9	0	2

3. Site Name

BASF Corporation

4. Site Location Address

Street Address 1379 Ciba Road		
City, Town, or Village McIntosh		County Washington
State AL	Country USA	Zip Code 36553

5. Site Mailing Address ☑ Same as Location Address

Street Address		
City, Town, or Village		
State	Country	Zip Code

6. Site Land Type

☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other

7. North American Industry Classification System (NAICS) Code(s) for the Site (at least 5-digit codes)

A. (Primary) 325199	C. 325192
B. 325998	D.

8. Site Contact Information

☐ Same as Location Address

First Name Muhammad	MI F	Last Name Khan
Title EHS Team Leader		
Street Address 1379 Ciba Road		
City, Town, or Village McIntosh		
State AL	Country USA	Zip Code 36553
Email muhammad.khan@basf.com		
Phone 251-436-3942	Ext	Fax

9. Legal Owner and Operator of the Site

A. Name of Site's Legal Owner

☐ Same as Location Address

Full Name BASF Corporation	Date Became Owner (mm/dd/yyyy) 4/1/2009

Owner Type

☑ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other

Street Address 100 Park Avenue		
City, Town, or Village Florham Park		
State New Jersey	Country USA	Zip Code 07932
Email		
Phone	Ext	Fax
Comments		

B. Name of Site's Legal Operator

☑ Same as Location Address

Full Name	Date Became Operator (mm/dd/yyyy)

Operator Type

☐ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other

Street Address		
City, Town, or Village		
State	Country	Zip Code
Email		
Phone	Ext	Fax
Comments		

10. Type of Regulated Waste Activity (at your site)
Mark "Yes" or "No" for all current activities (as of the date submitting the form); complete any additional boxes as instructed.

A. Hazardous Waste Activities

☑ Y ☐ N		1. Generator of Hazardous Waste—If "Yes", mark only one of the following—a, b, c
☑	a. LQG	-Generates, in any calendar month (includes quantities imported by importer site) 1,000 kg/mo (2,200 lb/mo) or more of non-acute hazardous waste; or - Generates, in any calendar month, or accumulates at any time, more than 1 kg/mo (2.2 lb/mo) of acute hazardous waste; or - Generates, in any calendar month or accumulates at any time, more than 100 kg/mo (220 lb/mo) of acute hazardous spill cleanup material.
☐	b. SQG	100 to 1,000 kg/mo (220-2,200 lb/mo) of non-acute hazardous waste and no more than 1 kg (2.2 lb) of acute hazardous waste and no more than 100 kg (220 lb) of any acute hazardous spill cleanup material.
☐	c. VSQG	Less than or equal to 100 kg/mo (220 lb/mo) of non-acute hazardous waste.
If "Yes" above, indicate other generator activities in 2 and 3, as applicable.		
☐ Y ☑ N		2. Short-Term Generator (generates from a short-term or one-time event and not from on-going processes). If "Yes", provide an explanation in the Comments section.
☐ Y ☑ N		3. Mixed Waste (hazardous and radioactive) Generator
☐ Y ☑ N		4. Treater, Storer or Disposer of Hazardous Waste—Note: A hazardous waste Part B permit is required for these activities.
☐ Y ☑ N		5. Receives Hazardous Waste from Off-site
☐ Y ☑ N		6. Recycler of Hazardous Waste
☐		a. Recycler who stores prior to recycling
☐		b. Recycler who does not store prior to recycling
☐ Y ☑ N		7. Exempt Boiler and/or Industrial Furnace—If "Yes", mark all that apply.
☐		a. Small Quantity On-site Burner Exemption
☐		b. Smelting, Melting, and Refining Furnace Exemption

B. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g. D001, D003, F007, U112). Use an additional page if more spaces are needed.

D001	D022	F039				
D003	D036	U037				
D008	F002					
D009	F003					
D018	F005					

C. Waste Codes for State Regulated (non-Federal) Hazardous Wastes. Please list the waste codes of the State hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed.

11. Additional Regulated Waste Activities (NOTE: Refer to your State regulations to determine if a separate permit is required.)

A. Other Waste Activities

☐ Y ☑ N		1. Transporter of Hazardous Waste—If "Yes", mark all that apply.
	☐	a. Transporter
	☐	b. Transfer Facility (at your site)
☐ Y ☑ N		2. Underground Injection Control
☐ Y ☑ N		3. United States Importer of Hazardous Waste
☐ Y ☑ N		4. Recognized Trader—If "Yes", mark all that apply.
	☐	a. Importer
	☐	b. Exporter
☐ Y ☑ N		5. Importer/Exporter of Spent Lead-Acid Batteries (SLABs) under 40 CFR 266 Subpart G—If "Yes", mark all that apply.
	☐	a. Importer
	☐	b. Exporter

B. Universal Waste Activities

☐ Y ☑ N		1. Large Quantity Handler of Universal Waste (you accumulate 5,000 kg or more) - If "Yes" mark all that apply. Note: Refer to your State regulations to determine what is regulated.
	☐	a. Batteries
	☐	b. Pesticides
	☐	c. Mercury containing equipment
	☐	d. Lamps
	☐	e. Other (specify) ______________________
	☐	f. Other (specify) ______________________
	☐	g. Other (specify) ______________________
☐ Y ☑ N		2. Destination Facility for Universal Waste Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities

☐ Y ☑ N		1. Used Oil Transporter—If "Yes", mark all that apply.
	☐	a. Transporter
	☐	b. Transfer Facility (at your site)
☐ Y ☑ N		2. Used Oil Processor and/or Re-refiner—If "Yes", mark all that apply.
	☐	a. Processor
	☐	b. Re-refiner
☐ Y ☑ N		3. Off-Specification Used Oil Burner
☐ Y ☑ N		4. Used Oil Fuel Marketer—If "Yes", mark all that apply.
	☐	a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner
	☐	b. Marketer Who First Claims the Used Oil Meets the Specifications

12. Eligible Academic Entities with Laboratories—Notification for opting into or withdrawing from managing laboratory hazardous wastes pursuant to 40 CFR 262 Subpart K.

☐ Y ☑ N		A. Opting into or currently operating under 40 CFR 262 Subpart K for the management of hazardous wastes in laboratories—If "Yes", mark all that apply. Note: See the item-by-item instructions for definitions of types of eligible academic entities.
	☐	1. College or University
	☐	2. Teaching Hospital that is owned by or has a formal written affiliation with a college or university
	☐	3. Non-profit Institute that is owned by or has a formal written affiliation with a college or univer-
☐ Y ☑ N		B. Withdrawing from 40 CFR 262 Subpart K for the management of hazardous wastes in laboratories.

13. Episodic Generation

☐ Y ☑ N	Are you an SQG or VSQG generating hazardous waste from a planned or unplanned episodic event, lasting no more than 60 days, that moves you to a higher generator category. If "Yes", you must fill out the Addendum for Episodic Generator.

14. LQG Consolidation of VSQG Hazardous Waste

☐ Y ☑ N	Are you an LQG notifying of consolidating VSQG Hazardous Waste Under the Control of the Same Person pursuant to 40 CFR 262.17(f)? If "Yes", you must fill out the Addendum for LQG Consolidation of VSQGs hazardous waste.

15. Notification of LQG Site Closure for a Central Accumulation Area (CAA) (optional) OR Entire Facility (required)

☐ Y ☑ N	LQG Site Closure of a Central Accumulation Area (CAA) or Entire Facility.
	A. ☐ Central Accumulation Area (CAA) or ☐ Entire Facility
	B. Expected closure date: ____________ mm/dd/yyyy
	C. Requesting new closure date: ____________ mm/dd/yyyy
	D. Date closed : ____________ mm/dd/yyyy ☐ 1. In compliance with the closure performance standards 40 CFR 262.17(a)(8) ☐ 2. Not in compliance with the closure performance standards 40 CFR 262.17(a)(8)

16. Notification of Hazardous Secondary Material (HSM) Activity

☐ Y ☑ N	A. Are you notifying under 40 CFR 260.42 that you will begin managing, are managing, or will stop managing hazardous secondary material under 40 CFR 260.30, 40 CFR 261.4(a)(23), (24), or (27)? If "Yes", you must fill out the Addendum to the Site Identification Form for Managing Hazardous Secondary Material.
☐ Y ☑ N	B. Are you notifying under 40 CFR 260.43(a)(4)(iii) that the product of your recycling process has levels of hazardous constituents that are not comparable to or unable to be compared to a legitimate product or intermediate but that the recycling is still legitimate? If "Yes", you may provide explanation in Comments section. You must also document that your recycling is still legitimate and maintain that documentation on site.

17. Electronic Manifest Broker

☐ Y ☑ N	Are you notifying as a person, as defined in 40 CFR 260.10, electing to use the EPA electronic manifest system to obtain, complete, and transmit an electronic manifest under a contractual relationship with a hazardous waste generator?

EPA ID Number | A | L | D | 0 | 0 | 1 | 2 | 2 | 1 | 9 | 0 | 2 | OMB# 2050-0024; Expires 05/31/2020

18. Comments (include item number for each comment)

All U-Codes were from discarding of the laboratory quantity chemicals and standards.

19. Certification I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. **Note: For the RCRA Hazardous Waste Part A permit Application, all owners and operators must sign (see 40 CFR 270.10(b) and 270.11).**

Signature of legal owner, operator or authorized representative	Date (mm/dd/yyyy) 2/20/2020
Printed Name (First, Middle Initial Last) Jason Slinkard	Title Site Director
Email jason.slinkard@basf.com	

Signature of legal owner, operator or authorized representative	Date (mm/dd/yyyy)
Printed Name (First, Middle Initial Last)	Title
Email	

EPA ID Number | A | L | D | 0 | 0 | 1 | 2 | 2 | 1 | 9 | 0 | 2 | OMB# 2050-0024; Expires 05/31/2020

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT

OFF-SITE IDENTIFICATION (OI) FORM

1. Site 1

A. EPA ID Number of Off-site Installation or Transporter	ARD981057870
B. Name of Off-site Installation or Transporter	Rineco Chemical Industries
C. Handler Type (mark all that apply)	☐ Generator ☐ Transporter ☑ Receiving Facility
D. Address of Off-site Installation	
Street Address	1007 Vulcan Road
City, Town, or Village	Benton
State AR	Zip Code 72015 / Country *USA*

2. Site 2

A. EPA ID Number of Off-site Installation or Transporter	MSD077655876
B. Name of Off-site Installation or Transporter	Holcim US Inc.
C. Handler Type (mark all that apply)	☐ Generator ☐ Transporter ☑ Receiving Facility
D. Address of Off-site Installation	
Street Address	8677 Highway 45 Alt. South
City, Town, or Village	Artesia
State MS	Zip Code 39736 / Country *USA*

3. Site 3

A. EPA ID Number of Off-site Installation or Transporter	OHD980613541
B. Name of Off-site Installation or Transporter	Heritage Thermal Services
C. Handler Type (mark all that apply)	☐ Generator ☐ Transporter ☑ Receiving Facility
D. Address of Off-site Installation	
Street Address	1250 SAINT GEORGE ST UNIT 1
City, Town, or Village	East Liverpool
State OH	Zip Code 43920 / Country *USA*

4. **Comments**

EPA ID Number | A | L | D | 0 | 0 | 1 | 2 | 2 | 1 | 9 | 0 | 2 | OMB# 2050-0024; Expires 05/31/2020

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT

OFF-SITE IDENTIFICATION (OI) FORM

1. Site 1

A. EPA ID Number of Off-site Installation or Transporter	**IND093219012**
B. Name of Off-site Installation or Transporter	**Heritage Environmental Services**
C. Handler Type (mark all that apply)	☐ Generator ☐ Transporter ☑ Receiving Facility
D. Address of Off-site Installation	
Street Address	**7901 W MORRIS ST**
City, Town, or Village	**Indianapolis**
State **IN**	Zip Code **46231** · Country ***USA***

2. Site 2

A. EPA ID Number of Off-site Installation or Transporter	**IND058484114**
B. Name of Off-site Installation or Transporter	**Heritage Transport LLC**
C. Handler Type (mark all that apply)	☐ Generator ☑ Transporter ☐ Receiving Facility
D. Address of Off-site Installation	
Street Address	
City, Town, or Village	
State **IN**	Zip Code · Country ***USA***

3. Site 3

A. EPA ID Number of Off-site Installation or Transporter	**ALR000007237**
B. Name of Off-site Installation or Transporter	**Action Resources Incorporated**
C. Handler Type (mark all that apply)	☐ Generator ☑ Transporter ☐ Receiving Facility
D. Address of Off-site Installation	
Street Address	
City, Town, or Village	
State	Zip Code · Country

4. **Comments**

EPA ID Number | A | L | D | 0 | 0 | 1 | 2 | 2 | 1 | 9 | 0 | 2 |

OMB# 2050-0024; Expires 05/31/2020

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description **2,4 DTBP Cleanup**						
B. EPA Hazardous Waste Code(s)	**D002**					
C. State Hazardous Waste Code(s)						

D. Source Code **G32**		Management Method Code (Source Code G25 only)	
E. Form Code **002**		F. Waste Minimization Code **A**	
G. Quantity **2926**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	**H061**	**2926**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	Waste Aerosol Cans From Maintenance Activity					
B. EPA Hazardous Waste Code(s)	D001	D003				
C. State Hazardous Waste Code(s)						

D. Source Code G09		Management Method Code (Source Code G25 only) H040	
E. Form Code 801		F. Waste Minimization Code C	
G. Quantity 2565	UOM 1	Density 0.00	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.

Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.

Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	H061	2565
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	AQC Lab - LAB Retain Samples					
B. EPA Hazardous Waste Code(s)	D002					
C. State Hazardous Waste Code(s)						

D. Source Code G11		Management Method Code (Source Code G25 only)	
E. Form Code 409		F. Waste Minimization Code A	
G. Quantity 26	UOM 1	Density 0.00	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	H141	26
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

E Code > 409

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description **Lab Waste From AQC Lab**						
B. EPA Hazardous Waste Code(s)	**D001**	**D018**	**D022**	**F002**	**F003**	**F005**
C. State Hazardous Waste Code(s)						

D. Source Code **G09**		Management Method Code (Source Code G25 only)	
E. Form Code **219**		F. Waste Minimization Code **A**	
G. Quantity **4188**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	**H061**	**4188**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description **Area 1 Waste (Solids)**						
B. EPA Hazardous Waste Code(s)	**D001**	**F003**				
C. State Hazardous Waste Code(s)						
D. Source Code **G22**		Management Method Code (Source Code G25 only)				
E. Form Code **409**		F. Waste Minimization Code **A**				
G. Quantity **7520**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg			

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	**H061**	**7520**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description **Area 15 - Unused Material**						
B. EPA Hazardous Waste Code(s)	**D001**	**U037**				
C. State Hazardous Waste Code(s)						

D. Source Code **G11**	Management Method Code (Source Code G25 only)
E. Form Code **219**	F. Waste Minimization Code **A**
G. Quantity **1548** UOM **1**	Density **0.00** ☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	**H061**	**1548**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	**Area 20 Waste Solvents**					
B. EPA Hazardous Waste Code(s)	**D001**					
C. State Hazardous Waste Code(s)						
D. Source Code **G11**		Management Method Code (Source Code G25 only)				
E. Form Code **219**		F. Waste Minimization Code **A**				
G. Quantity **1845538**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg			

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.

Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.

Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
MSD077655876	**H061**	**1818458**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	**H061**	**27080**
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	**Irgafos Evaporator Waste**					
B. EPA Hazardous Waste Code(s)	**D001**	**F003**	**F005**			
C. State Hazardous Waste Code(s)						

D. Source Code **G09**		Management Method Code (Source Code G25 only)	
E. Form Code **219**		F. Waste Minimization Code **C**	
G. Quantity **5492695**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
MSD077655876	**H061**	**5492695**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	Waste Evaporator Bottoms from Irganox					
B. EPA Hazardous Waste Code(s)	D001	F003				
C. State Hazardous Waste Code(s)						

D. Source Code G09		Management Method Code (Source Code G25 only)	
E. Form Code 219		F. Waste Minimization Code C	
G. Quantity 664303	UOM 1	Density 0.00	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.

Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
MSD077655876	H061	664303
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	**Waste Evaporation Bottoms Containing Methyl Acrylate from Irganox**					
B. EPA Hazardous Waste Code(s)	**D001**	**F003**				
C. State Hazardous Waste Code(s)						

D. Source Code **G09**		Management Method Code (Source Code G25 only)	
E. Form Code **219**		F. Waste Minimization Code **C**	
G. Quantity **5531605**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
MSD077655876	**H061**	**5531605**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	Irganox Sump Cleanout					
B. EPA Hazardous Waste Code(s)	D001	F003				
C. State Hazardous Waste Code(s)						

D. Source Code G09		Management Method Code (Source Code G25 only)	
E. Form Code 219		F. Waste Minimization Code A	
G. Quantity 508	UOM 1	Density 0.00	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	H061	508
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	**Waste Methanol from Irganox**					
B. EPA Hazardous Waste Code(s)	**D001**	**F003**				
C. State Hazardous Waste Code(s)						
D. Source Code **G11**		Management Method Code (Source Code G25 only)				
E. Form Code **219**		F. Waste Minimization Code **C**				
G. Quantity **3219907**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg			

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
MSD077655876	**H061**	**3219907**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	**Leachate From Permitted Landvault # 1 & Landvault #2**					
B. EPA Hazardous Waste Code(s)	**F039**					
C. State Hazardous Waste Code(s)						

D. Source Code **G26**	Management Method Code (Source Code G25 only)
E. Form Code **119**	F. Waste Minimization Code **A**
G. Quantity **25271243** UOM **1**	Density **0.00** ☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.

Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☐ Y ☑ N A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.

Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

E Code > 119 Leachate from onsite landfill, It was calculated based on rainfall

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	Waste Solvents from Centrifuge Cleanout from Tinuvins Production					
B. EPA Hazardous Waste Code(s)	D001	F003				
C. State Hazardous Waste Code(s)						

D. Source Code G19		Management Method Code (Source Code G25 only)	
E. Form Code 219		F. Waste Minimization Code A	
G. Quantity 1019	UOM 1	Density 0.00	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	H061	1019
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

EPA ID Number | A | L | D | 0 | 0 | 1 | 2 | 2 | 1 | 9 | 0 | 2 |

OMB# 2050-0024; Expires 05/31/2020

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	**Old Equipment Disposal - Mercury Manometer**					
B. EPA Hazardous Waste Code(s)	**D009**					
C. State Hazardous Waste Code(s)						

D. Source Code **G32**		Management Method Code (Source Code G25 only)	
E. Form Code **002**		F. Waste Minimization Code **A**	
G. Quantity **25**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	**H141**	**25**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	**Paint and Oily Products**					
B. EPA Hazardous Waste Code(s)	**D001**					
C. State Hazardous Waste Code(s)						

D. Source Code **G11**		Management Method Code (Source Code G25 only)	
E. Form Code **219**		F. Waste Minimization Code **A**	
G. Quantity **1296**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	**H061**	**1296**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	Lab Waste From Synthesis and Tinuvins					
B. EPA Hazardous Waste Code(s)	D001	D002				
C. State Hazardous Waste Code(s)						

D. Source Code G22		Management Method Code (Source Code G25 only)	
E. Form Code 219		F. Waste Minimization Code A	
G. Quantity 5488	UOM 1	Density 0.00	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.

Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	H141	2105
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
OHD980613541	H040	3383
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	Irganox Evaporator Bottoms Cleanup					
B. EPA Hazardous Waste Code(s)	D001					
C. State Hazardous Waste Code(s)						

D. Source Code G32		Management Method Code (Source Code G25 only)	
E. Form Code 409		F. Waste Minimization Code A	
G. Quantity 3133	UOM 1	Density 0.00	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.

Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.

B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 1		
ARD981057870	H061	3133
Site 2		
Site 3		

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	Filters From Tinuvins Production					
B. EPA Hazardous Waste Code(s)	D001	D036	F003			
C. State Hazardous Waste Code(s)						

D. Source Code G09		Management Method Code (Source Code G25 only)	
E. Form Code 002		F. Waste Minimization Code A	
G. Quantity 6165	UOM 1	Density 0.00	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	H061	6165
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

E Code > 409

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	**Waste Flasher Bottoms from Tinuvins Production**					
B. EPA Hazardous Waste Code(s)	**D001**					
C. State Hazardous Waste Code(s)						

D. Source Code **G09**		Management Method Code (Source Code G25 only)	
E. Form Code **219**		F. Waste Minimization Code **A**	
G. Quantity **709467**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
MSD077655876	**H061**	**709467**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	**Waste Purifier Feed from Tinuvins Production**					
B. EPA Hazardous Waste Code(s)	**D001**	**F003**				
C. State Hazardous Waste Code(s)						

D. Source Code **G19**		Management Method Code (Source Code G25 only)	
E. Form Code **219**		F. Waste Minimization Code **A**	
G. Quantity **264176**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
MSD077655876	**H061**	**264176**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	Tinuvins Raw Material Waste					
B. EPA Hazardous Waste Code(s)	D002					
C. State Hazardous Waste Code(s)						
D. Source Code G11		Management Method Code (Source Code G25 only)				
E. Form Code 200		F. Waste Minimization Code A				
G. Quantity 23401	UOM 1	Density 0.00	☑ lbs/gal ☐ sg			

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
OHD980613541	H040	23401
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

E Code > 409

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	**Tinuvins Soda Lime Cleanup**					
B. EPA Hazardous Waste Code(s)	**D002**					
C. State Hazardous Waste Code(s)						

D. Source Code **G11**		Management Method Code (Source Code G25 only)	
E. Form Code **319**		F. Waste Minimization Code **A**	
G. Quantity **74**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.

Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
IND093219012	**H141**	**74**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	Tinuvins Sump Cleanout					
B. EPA Hazardous Waste Code(s)	D001	F001				
C. State Hazardous Waste Code(s)						

D. Source Code G19	Management Method Code (Source Code G25 only)
E. Form Code 219	F. Waste Minimization Code A
G. Quantity 975 | UOM 1	Density 0.00 | ☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	H061	975
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	**Waste Flammable From Tinuvins Production**					
B. EPA Hazardous Waste Code(s)	**D001**	**F003**	**D036**			
C. State Hazardous Waste Code(s)						

D. Source Code **G11**		Management Method Code (Source Code G25 only)	
E. Form Code **209**		F. Waste Minimization Code **A**	
G. Quantity **2027**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	**H061**	**2027**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

EPA ID Number | A | L | D | 0 | 0 | 1 | 2 | 2 | 1 | 9 | 0 | 2 |

OMB# 2050-0024; Expires 05/31/2020

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description **Waste Monoazo from Tinuvins Production**						
B. EPA Hazardous Waste Code(s)	**D001**	**D036**	**F003**			
C. State Hazardous Waste Code(s)						

D. Source Code **G19**		Management Method Code (Source Code G25 only)	
E. Form Code **119**		F. Waste Minimization Code **A**	
G. Quantity **399728**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
MSD077655876	**H061**	**399728**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description	**Waste Solid Monoazo From Tinuvins Production**					
B. EPA Hazardous Waste Code(s)	**D036**					
C. State Hazardous Waste Code(s)						
D. Source Code **G19**		Management Method Code (Source Code G25 only)				
E. Form Code **409**		F. Waste Minimization Code **A**				
G. Quantity **3925**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg			

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	**H061**	**3925**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

EPA ID Number	A	L	D	0	0	1	2	2	1	9	0	2

OMB# 2050-0024; Expires 05/31/2020

United States Environmental Protection Agency

HAZARDOUS WASTE REPORT 2019 (reporting cycle)

WASTE GENERATION AND MANAGEMENT (GM) FORM

1. **Waste Characteristics**

A. Waste Description **Waste Paint from Maintenance Activity**						
B. EPA Hazardous Waste Code(s)	**F002**	**D008**				
C. State Hazardous Waste Code(s)						

D. Source Code **G06**		Management Method Code (Source Code G25 only)	
E. Form Code **002**		F. Waste Minimization Code **A**	
G. Quantity **546**	UOM **1**	Density **0.00**	☑ lbs/gal ☐ sg

2. **On-site Generation and Management of Hazardous Waste**

☐ Y ☑ N	Was any of this waste that was generated at this facility treated, disposed, and/or recycled on-site? If yes, continue to On-site Process System 1.	
Process System 1	Management Method Code	Quantity
Process System 2	Management Method Code	Quantity

3. **Off-site Shipment of Hazardous Waste**

☑ Y ☐ N	A. Was any of this waste that was generated at this facility shipped off-site for treatment, disposal, or recycling? If yes, continue to Site 1.	
Site 1		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
ARD981057870	**H061**	**546**
Site 2		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped
Site 3		
B. EPA ID of facility to which waste was shipped	C. Management Method Code	D. Total Quantity Shipped

4. **Comments**

RCRA Part B Application

General Information Requirements

1.0 General

This section has been prepared to satisfy information requirements of the Alabama Administrative Code 335-14-8-.02(5)(b) by providing a general description of BASF's, McIntosh Site. This section includes information on the location of the facility and descriptions of adjacent areas. A site plan, topographic maps, color aerial photograph and a floodplain map are provided. A general description of facility activities, including waste management operations, traffic patterns and other relevant information is also presented. Detailed information on the waste management operations may be found in the attached appendices.

2.0 General Description of the Facility

BASF is a diversified chemical manufacturing company engaged principally in the discovery, development, manufacture and marketing of a wide variety of special-purpose chemicals and chemical products worldwide. The United States Corporate headquarters are located in Florham Park, New Jersey. The Site is a wholly-owned American subsidiary of BASF Corporation, which is the largest affiliate of BASF SE, Lufwigshafen, Germany. BASF employs approximately 110,000 people globally. The company maintains headquarter locations, administrative facilities, subsidiaries, regional sales offices, production plants and distribution centers throughout the United States. Of the BASF facilities located in the United States, the McIntosh, Alabama site is one of the largest.

The McIntosh Site occupies approximately 1500 acres and has approximately 300 BASF employees, as well as approximately 200 contract employees. Production at McIntosh began in 1952 with 32 employees manufacturing one product. The product line has expanded to include specialty chemicals that are utilized in a variety of household products, as well as additives used in industrial applications such as plastics and lubricants. The line of products produced at McIntosh will continue to change in response to market demands.

Hazardous wastes managed at the McIntosh Site are generated on-site and include "characteristic wastes", and "listed wastes", as defined in ADEM Admin. Code 335-14-2 (40 CFR 261) and listed in the Part A Application. Non-hazardous wastes amenable to biological treatment are treated in the above ground, NPDES-permitted treatment system. The active RCRA-permitted above ground landvault is permitted to receive wastewater treatment sludges and other ADEM approved solid waste (i.e., sand filter sand, Investigation-derived waste, concrete/dirt from excavation activities within the plant). A more detailed description of the wastes handled on-site is presented in the Waste Analysis Plan (Appendix B). BASF manages the wastes at the Treatment, Storage and Disposal (TSD) facility with one active above ground landvault (LV#2), two hazardous waste storage tanks (UT-V-813, UT-V-814), and one hazardous waste boiler (Boiler #7). Facilities closed under RCRA authority include landfills, surface impoundments, container storage, Incinerator #1 and Incinerator #2.

3.0 Location Information

3.1 Topographic Map Information

As noted above, the BASF McIntosh Site encompasses over 1500 acres. To provide sufficient aerial coverage, as well as the detail required by 335-14-8-.02, BASF has compiled topographic maps at different scales. BASF has combined two USGS 7.5 minute quadrangle maps, the McIntosh, AL quadrangle and the Ginhouse Island, AL quadrangle (Figure 3-1) to provide sufficient aerial coverage beyond the facility boundaries (i.e., 1000 feet) and adjacent land use.

A topographic map of the BASF property, with a 1 foot contour interval, is included as Figure 3-2. Figure 3-2 also shows the following information: 100-year floodplain; surface waters; legal boundaries; location of access controls; withdrawal wells (plant production and corrective action pumping wells); buildings and structures; location of hazardous waste management units (active and closed); intake and discharge structures; and, access and internal roads. An aerial photo of the site is provided in Figure 3-3. A wind rose of meteorological data collected during the 1988 site Remedial Investigation is included as Figure 3-4.

3.2 Floodplain Standard

BASF has obtained the current Flood Insurance Rate Map (1978) for Washington County, Alabama from the Federal Insurance Administration. The map shows that the TSD is not within the 100-year floodplain (refer to Figure 3-2) and is, therefore, not subject to the floodplain standard.

4.0 Traffic Patterns

Access to the BASF, McIntosh facility is from U.S. Highway 43 at McIntosh, Alabama onto either Industrial Road (Olin Road), Ciba Road, or Schneller Lane. Industrial Road intersects Highway 43 on the southern edge of town.

Figure 3-1. Site Location Map (USGS Quadrangle Maps)

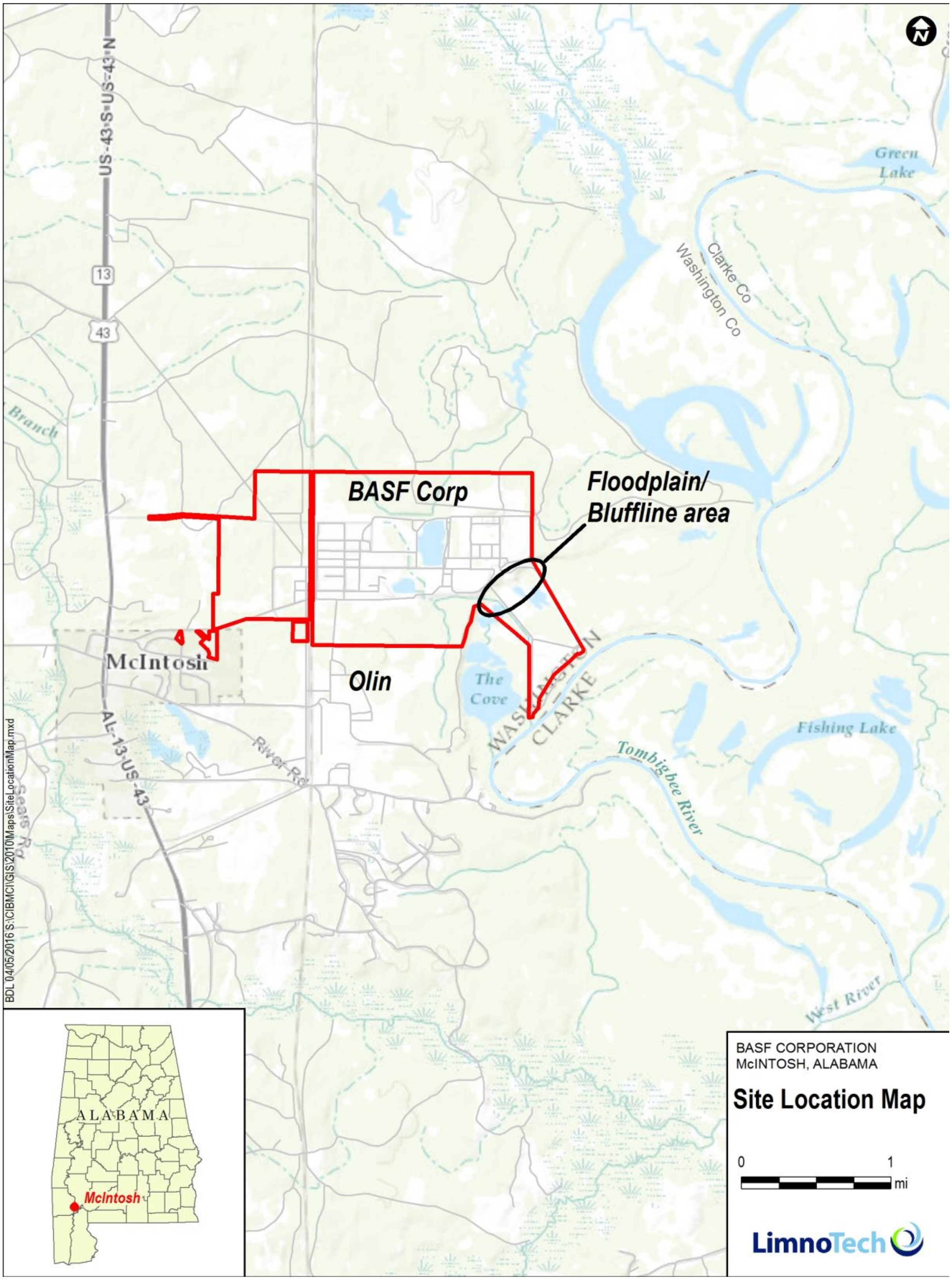


Figure 3-2. Site Feature and Topographic Map

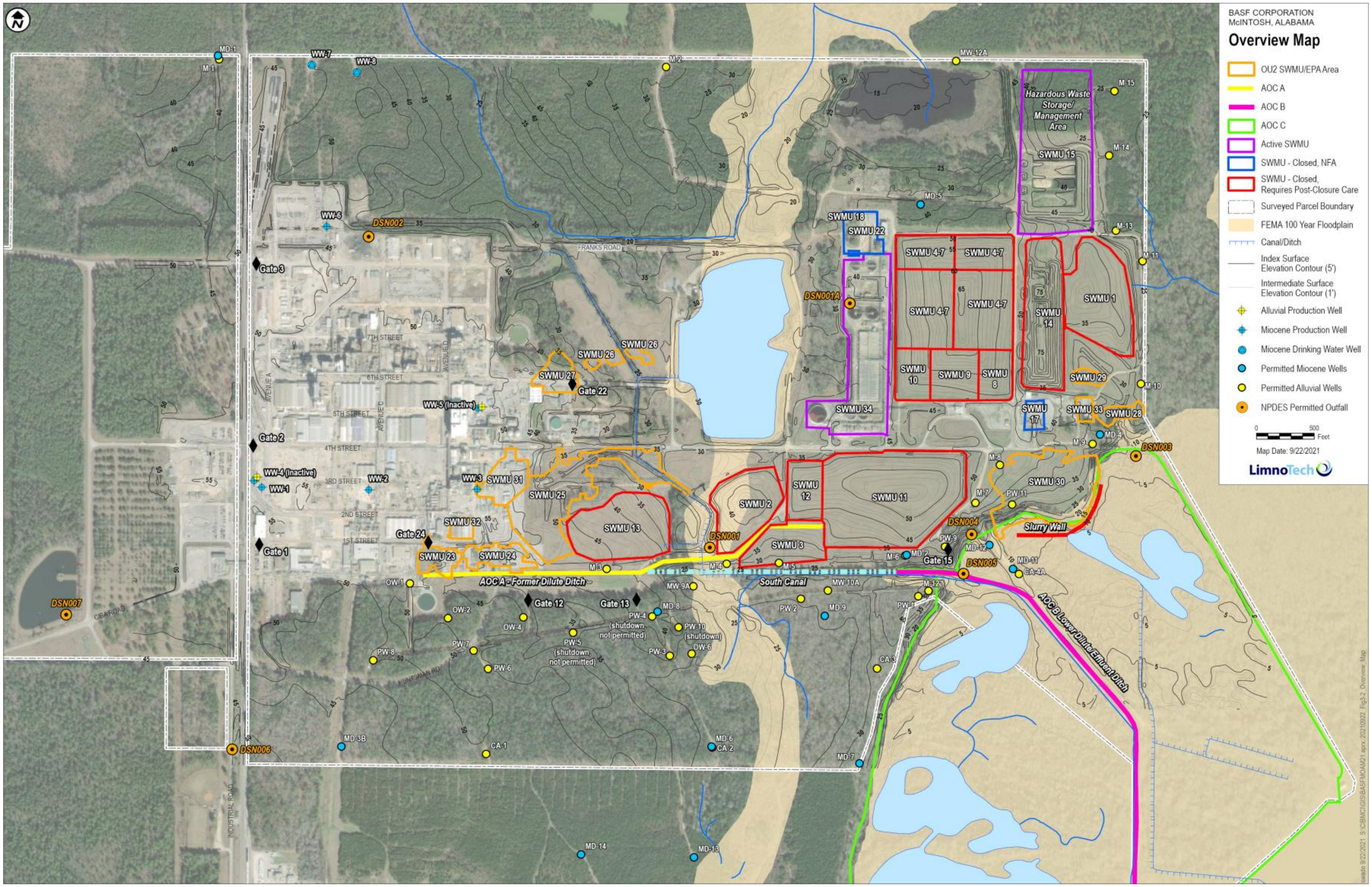
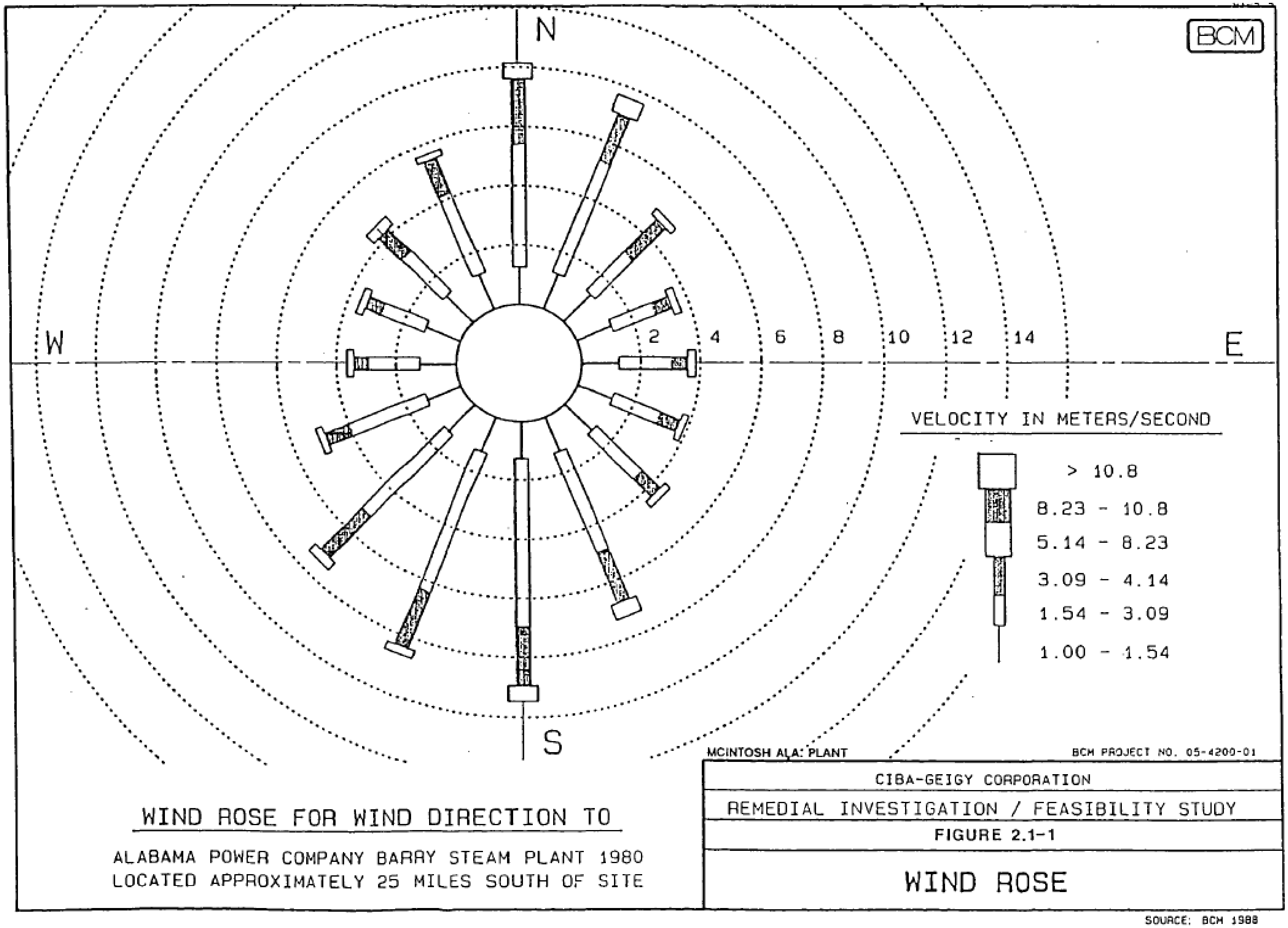


Figure 3-3. Site Aerial Photo

Figure 3-4. Wind Rose Diagram (Reference: Remedial Investigation/Feasibility study Report, BCM, August 1988).



Ciba Road, approximately one mile north of Industrial Road, intersects Highway 43 on the northern edge of town. Schneller Lane was constructed by BASF in 1991 to provide additional access approximately one-half mile north of Ciba Road. Industrial Road and Ciba Road join to form a by-pass loop around the town of McIntosh while providing access to the manufacturing facilities. Essentially all traffic on the loop is related to business at the two industrial sites.

Personal vehicles at the BASF site are confined to the designated parking areas outside the plant unless there is a specific job-related task that requires plant access. Within the plant, vehicular traffic consists mostly of small BASF-owned service trucks, forklifts, bicycles, occasional heavy construction equipment, front-end loaders, commercial tank trucks, commercial carriers and contractor vehicles. Nonhazardous plant refuse is collected from dumpsters, and other containers located throughout the plant, and transported to the TSD in trucks where it is sorted, compacted and prepared for off-site disposal. Figure 3-2 shows the roadway system in the manufacturing area and the TSD.

5.0 Traffic Control

Traffic is controlled by stop signs located throughout the manufacturing units and the TSD.

6.0 Access Road Surfacing

The loop comprised of Ciba Road and Industrial Road, servicing the McIntosh Site is an asphalt paved road constructed and maintained by Washington County, Alabama. Schneller Lane is an asphalt paved road constructed and maintained by BASF. Streets within the manufacturing area are constructed of reinforced concrete or asphalt over a compacted clay base. The main access road to the TSD from the manufacturing area is asphalt paving over a compacted clay base. Compacted clay roads located north and south of the manufacturing facility, and maintained for use in all weather conditions, provide secondary access to the TSD. Access to LV#2 is via compacted clay roadways maintained for use in all weather conditions. All roads in the TSD, both paved and unpaved, are constructed to satisfy ASHTO H20-44 standards to support a 40-ton loading.

7.0 Other Federal Laws

BASF has reviewed the federal laws listed in ADEM Admin. Code R 335-14-8-.01(3) (40 CFR 270.3) for potential applicability to this permit application. These federal laws include: the Wild and Scenic Rivers Act (16 U.S.C. 1273 et seq.), the National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.), the Endangered Species Act (16 U.S.C. 1531 et seq.), the Coastal Zone Management Act (16 U.S.C. 1451 et seq.), or the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.). BASF has determined that none of these laws apply to the re-issuance of a RCRA permit for the facility. The facility is not located on Indian lands.

BASF maintains National Pollutant Discharge Elimination System (NPDES) permits for point source and storm water discharges (Permit No. AL0003093). The first inch of storm water from the production facilities is captured in two storm water holding tanks and routed to the wastewater treatment plant. The current permit was issued August

21, 2017 and has a five-year duration (expires August 2022). The permit renewal application will be submitted in early 2022 for review by ADEM.

APPENDIX B

WASTE ANALYSIS PLAN

BASF McIntosh, AL

Revised July 2021

Revised July 2021

Waste Analysis Plan

1.0 General

BASF has prepared a Waste Analysis Plan (WAP) to ensure the environmentally sound handling of hazardous wastes in the TSDF and satisfy requirements of ADEM Admin. Code R 335-14-5-.02(4) (40 CFR 264.13). The WAP includes procedures for characterizing waste streams at the site sufficiently well to properly manage the wastes in the TSDF and Boiler #7 so to maintain permit compliance. The characterization includes information regarding the processes that generate the wastes, the hazardous characteristics, basis for hazard designation and laboratory analyses of key physical and chemical parameters. The WAP includes a brief facility description, waste characterization information and re-evaluation provisions, receipt and inspection procedures, sampling procedures, laboratory testing and analytical methods, and special requirements for ignitable and incompatible wastes.

2.0 Facility Description

BASF is a diversified chemical manufacturing company engaged principally in the manufacture and marketing of a wide variety of special-purpose chemicals and chemical products throughout the United States. The McIntosh site produces specialty chemicals that are used in a variety of household products, and antioxidants for plastics, lubricants and light stablizers. The line of products produced at the McIntosh site will continue to change in response to market demands.

Hazardous wastes managed at the McIntosh site are generated on-site and include "characteristic wastes" and "listed wastes", as defined by ADEM Admin. Code 335-14-2 (40 CFR 261). The EPA waste codes and estimates of quantities generated are listed in the Part A Application. Non-Hazardous wastes amenable to biological treatment are treated in the aboveground, NPDES-permitted waste water treatment system. Organic wastes will be burned in the RCRA-permitted hazardous waste Boiler #7. The RCRA-permitted above-ground landvault is permitted to receive both hazardous and non-hazardous waste water treatment sludges and other solid waste generated within the plant site. The RCRA-permitted Boiler, tank systems and landvault are discussed, in detail, elsewhere in the Permit.

3.0 Waste Characterization

The hazardous waste generators in the operating areas and the TSDF compile information to characterize the hazardous waste streams for purposes of waste management. The characterization includes an initial assessment of the status of the wastes under RCRA (i.e., hazardous or non-hazardous). If the waste is determined to be hazardous based on RCRA criteria, a further determination is made as to whether it is "characteristic" or "listed" hazardous. The decision matrix for waste designation/characterization and subsequent handling in the TSDF is presented in Figure 3-1. Corrosive (D002) or reactive (D003) wastes will not be managed at the TSDF. Only Ignitable, Spent Solvents (D001, F003) will be managed in the hazardous waste boiler. Once the hazardous status of the waste has been determined, the status is documented on forms developed by BASF specifically for this purpose. A separate certification form has been developed to document compliance with the Land Disposal Restrictions (LDR) requirements. Copies of the forms are available for inspection at the TSDF.

The procedure for designating the waste's hazardous or non-hazardous status is outlined below:

- Step 1: Determine if the waste is excluded under ADEM Admin. Code R 335-14-2-.01(4) (40 CFR 261.4), "Exclusions".

- Step 2: If the waste is not excluded, determine if the waste is listed as a hazardous waste under ADEM Admin. Code R 335-14-2-.04 (40 CFR 261 Subpart D), "Lists of Hazardous Wastes".

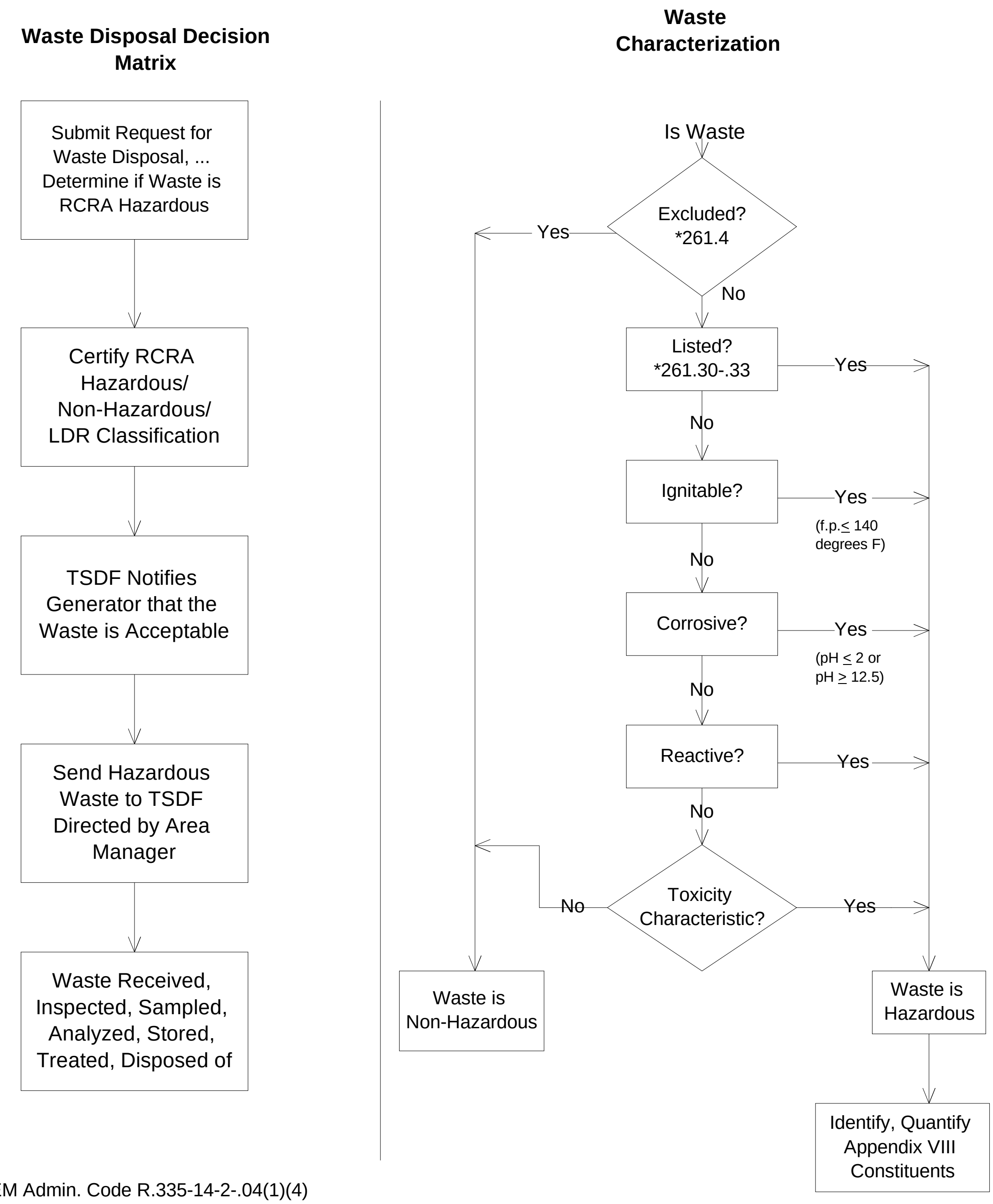
- Step 3: If the waste is not excluded or listed, determine if the waste is "characteristic" as defined in ADEM Admin. Code R 335-14-2-.03 (40 CFR 261 Subpart C), "Characteristics of Hazardous Wastes" by either:

  - Sampling and testing the waste according to methods specified in ADEM Admin. Code R 335-14-2 Appendices I through III (40 CFR 261Appendices I through III); or,

  - Applying process knowledge of the waste's component characteristics.

Figure 3-1

Waste Designation Handling Flow Diagrams



* ADEM Admin. Code R.335-14-2-.04(1)(4)

(f:\abc\RCRAPERM-98\B3F31_98)

Table 3-1
Waste Characterization

EPA Waste Code I.D.	Waste Description[1]	Basis for Hazard Designation
D001	Ignitable	* 261.21defines as ignitable a liquid waste with FP < 140ºF.
D004	Arsenic	**261.24 defines Toxicity Characteristic as a waste containing the corresponding metals and organic compounds in the extract.
D005	Barium	
D006	Cadmium	
D007	Chromium	
D008	Lead	
D009	Mercury	
D010	Selenium	
D011	Silver	
D013	Lindane	
D018	Benzene	
D019	Carbon tetrachloride	
D020	Chlordane	
D021	Chlorobenzene	
D022	Chloroform	
D023	o-Cresol	
D024	m-Cresol	
D025	p-Cresol	
D026	Cresol	
D027	1,4 Dichlorbenzene	
D028	1,2 Dichloroethane	
D030	2,4 Dinitrotoluene	
D034	Hexachloroethane	
D035	Methyl Ethyl Ketone	
D036	Nitrobenzene	
D038	Pyridine	
D039	Tetrachlorethylene	
D040	Trichloroethylene	
F001	Spent Halogenated Solvents used in Degreasing	***261.31 defines spent tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; and still bottoms from the recovery of these solvents used in degreasing operations as generic waste F001. Waste will be tested for corresponding spent halogenated solvent when received.
F002	Spent Halogenated Solvents and Still Bottoms from Solvent Recovery	*** 261.31 defines spent tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluorethane, ortho-dichlorobenzene, and trichlorofluoromethane; and the still bottoms form the recovery of these solvents as generic waste F002. Waste will be tested for corresponding spent halogenated solvent when received.
F003	Spent Non-Halogenated Solvents and Still Bottoms from Solvent Recovery	*** 261.31 defines spent xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol and still bottoms from the recovery of these solvents as generic waste F003. Waste will be tested for corresponding spent non-halogenated solvent when received.

Table 3-1

Waste Characterization
(continued)

EPA Waste Code I.D.	Waste Description[1]	Basis for Hazard Designation
F004	Spent Non-Halogenated Solvents and Still Bottoms from Solvent Recovery	*** 261.31 defines spent cresols and cresylic acid and nitrobenzene and the still bottoms from the recovery of these solvents as generic waste F004. Waste will be tested for corresponding non-halogenated solvent when received.
F005	Spent Non-Halogenated Solvents and Still Bottoms from Solvent Recovery	*** 261.31 defines toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane and the still bottoms from the recovery of these solvents as generic waste F005. Waste will be tested for corresponding spent non-halogenated solvent when received.
F039	Multi-Source Leachate	Derived from more than one hazardous waste code.
P005	Allyl Alcohol	For all the listed P- and U- substances, 261.33(e) and ADEM
P024	p-Chloroaniline	Admin. Code R.335-14-2-.04(4)(e) for P-wastes and
P030	Cyanides	261.33(f) and ADEM Admin. Code R 335-14-2-.04(f) for U-
P033	Cyanogen Chloride	wastes define these discarded commercial chemical
P054	Ethylenimine	products or intermediates as acute hazardous wastes
P063	Hydrogen Cyanide	(for P-substances) or as toxic wastes (for U-substances).
U002	Acetone	
U003	Acetonitrile	
U006	Acetyl Chloride	
U007	Acrylamide	
U008	Acrylic Acid	
U009	Acrylonitrile	
U012	Aniline	
U019	Benzene	
U023	Benzotrichloride	
U031	1- Butanol	
U037	Chlorobenzene	
U038	Chlorobenzilate	
U041	1-Chloro-2,3-Epoxypropane	
U044	Chloroform	
U052	Cresols/Cresylic Acid	
U056	Cyclohexane	
U057	Cyclohexanone	
U069	Di-n-Butyl Phthalate	
U070	o-Dichlorobenzene	
U077	1,2 Dichloroethane	
U083	1,2 Dichloropropane	
U088	Diethyl Phthalate	
U091	3,3'-Dimethoxybenzidine	
U092	Dimethylamine	
U095	3,3-Dimethylbenzidine	
U103	Dimethylsulfate	
U108	1,4 Dioxane	

Table 3-1

Waste Characterization
(continued)

EPA Waste Code I.D.	Waste Description[1]	Basis for Hazard Designation
U112	Ethyl Acetate	
U113	Ethyl Acrylate	
U122	Formaldehyde	
U123	Formic Acid	
U131	Hexachloroethane	
U133	Hydrazine	
U140	Isobutyl alcohol	
U147	Maleic Anhydride	
U154	Methanol	
U156	Methylchlorocarbonate	
U159	Methyl Ethyl Ketone	
U160	MEK Peroxide	
U161	Methyl Isobutyl Ketone	
U162	Methylmethacrylate	
U165	Naphthalene	
U169	Nitrobenzene	
U188	Phenol	
U194	n-Propylamine	
U196	Pyridine	
U210	Perchloroethylene	
U211	Carbon Tetrachloride	
U213	Tetrahydrofuran	
U219	Thiourea	
U220	Toluene	
U226	1,1,1-Trichloroethane	
U228	Trichloroethylene	
U239	Xylene	

[1]Those wastes listed above which are to be incinerated will be checked for one of the following: heat of combustion; % ash; % total chlorides; pH and compatibility in addition to the parameters listed.

* ADEM Admin. Code R. 335-14-2-.03(2)
** ADEM Admin. Code R. 335-14-2-.03(5)
*** ADEM Admin. Code R. 335-14-2-.04(2)

The information regarding the wastes managed in the TSDF is compiled on the electronic forms for Request for Disposal of Waste (RDW/WASTE PROFILE) or BASF Waste Profile sheets. The RDW/WASTE PROFILE/Waste Profile provides data on the process generating the waste, an estimate of the quantity to be generated for the year, waste composition, source and hazard characteristics. It also includes the rationale for waste designation and information required to maintain compliance with waste feed limitations to the incinerator. Specific information required for wastes to be treated at the boiler include includes:

- Heat of Combustion;
- Total Chlorides;
- pH and compatibility;
- Ash;
- Semi Volatiles;
- Metals

The RDW/Waste Profile is prepared by the generator and submitted to the TSDF along with the appropriate non-hazardous or hazardous designation forms for review against Permit restrictions. The generator provides documentation along with the RDW/Waste Profile that shows whether the waste or any of its constituents have any known incompatibilities. This documentation can be in the form of Safety Data Sheets (SDS), written reports, or other appropriate documentation. This data will be used to determine storage requirements for the waste at the McIntosh TSD facility. If the waste has been determined to be RCRA hazardous, the generator also prepares a certification regarding Land Disposal Restrictions (LDRs) that may be applicable. If the TSDF determines the information is complete and accurate, an RDW/Waste Profile number is assigned. In approving the RDW/Waste Profile, the TSDF reviews the documentation on incompatibilities for the waste and lists any segregation storage instructions in the Special Instructions section at the bottom of the RDW/Waste Profile form. Copies of the forms are returned to the generator and serve as a written notice that the waste is acceptable for handling in the TSDF. The original certifications are maintained at the TSDF. The RDW/Waste Profile number is subsequently used to track the wastes. Whenever a process or operation that generates a waste managed in the TSDF changes, new certifications are prepared. The RDW/Waste Profiles are renewed annually.

A waste will only be transported to the TSDF or Boiler #7 after it has received approval, as documented by the certifications. When a waste shipment is subsequently transported to the TSDF or Boiler #7, it is accompanied by a copy of the LDR certification with an original signature and the date it is shipped. Only hazardous wastes generated on-site will be managed at the TSDF or Boiler #7 unless the facility receives prior approval from ADEM.

4.0 Receipt and Inspection of Waste Shipments

Receipt control and acceptance procedures at the TSDF ensure that only permitted wastes that can be safely managed will be accepted. The generator contacts the Boiler area prior to transporting shipments to Boiler 7 to ensure that there are sufficient storage and treatment capacity available. Each shipment is accompanied by copies of the required forms approved by the area manager with the RDW/Waste Profile number assigned to the waste noted on the forms. The copies include original signatures and date of shipment. Waste shipments received at the TSDF are inspected and evaluated to verify that the documentation matches the wastes and that wastes are within the physical and chemical composition limits specified in the Permit. Waste shipments to the Boiler are inspected using the following procedures:

- Boiler area personnel compare the documents accompanying the shipment with information on the RDW/Waste Profile prepared for the waste and maintained at the Boiler area. The information is also compared with labels on the shipment describing the waste and listing the appropriate EPA waste codes. The generator is notified and the shipment may be returned if discrepancies are found.
- Once agreement between the waste shipment and the documentation is confirmed, a representative sample is collected from each bulk shipment and visually inspected for consistency with the waste description in the RDW/Waste Profile using physical attributes such as color, viscosity and physical state. The generator is notified and the shipment may be returned if discrepancies are found.
- A second sample is collected from each bulk shipment and tested for compatibility with other wastes, if any, contained in the receiving Boiler storage tank(s).
- If the composition identified on the RDW/Waste Profile does not agree with the analytical results the generator is contacted and the shipment may be rejected and returned to the generator. The generator is responsible for the subsequent management of the waste through an approved off-site TSDF.
- Bulk waste shipments that meet all acceptance criteria are transferred to permitted storage tanks at the boiler.

5.0 Sampling Procedures, Frequency and Analytical Methods

All waste sampling is conducted using procedures specified in "Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods" (SW-846, latest edition). Operating procedures maintained at the TSDF, and available for review, provide detailed instructions for personnel conducting sampling specified in the WAP.

As discussed above, representative samples are collected from bulk shipments of hazardous wastes transported to the Boiler area. Samples are also collected from liquid waste feeds to the boiler from the boiler storage tanks. Each shipment of waste designated for landfilling in the permitted hazardous waste landvault is evaluated for free liquids. The sampling requirements in the TSDF and sampling frequencies are listed below:

- Liquid waste feed to Boiler #7 are sampled weekly prior to being fed to Boiler #7 and analyzed for specific waste feed parameters as noted in Table 5-2;
- Liquid waste feed to Boiler #7 are sampled annually and analyzed for selected metals as specified in Table 5-2.

Sample analyses are performed using the appropriate SW-846 method, American Society for Testing and Materials (ASTM) method, alternate EPA-approved methods or alternate methods approved by ADEM. Table 5-1 lists the SW-846 and alternate approved analytical methods for wastes listed in the Part A Application. Table 5-2 summarizes the sampling program for the boiler feed, including sample matrix, sampling frequency, the analytical method used and the analysis/analyte.

Table 5-1

Analytical Method (Numbers)* For McIntosh Hazardous Wastes

Waste No.	Description	SW846 Method#
D001	Ignitable	(1010,1020)
D004	Arsenic	(6010, 7060,7061)
D005	Barium	(6010, 7080,7081)
D006	Cadmium	(6010, 7130,7131)
D007	Chromium	(6010, 7190,7191)
D008	Lead	(6010, 7420,7421)
D009	Mercury	(7470,7471)
D010	Selenium	(6010, 7740,7741)
D011	Silver	(6010, 7760,6010)
D013	Lindane	(8081,8121)
D018	Benzene	(8021,8260)
D019	Carbon Tetrachloride	(8021,8260)
D021	Chlorobenzene	(8021,8260)
D022	Chloroform	(8020,8260)
D023	o-Cresol	(8041,8270, 8410)
D024	m-Cresol	(8041,8270)
D025	p-Cresol	(8041,8270)
D026	Cresol	(8041,8270)
D027	1,4 Dichlorobenzene	(8021,8121,8270)
D028	1,2 Dichloroethane	(8010,8240)
D030	2,4 Dinitrotoluene	(8091,8270)
D034	Hexachloroethane	(8121, 8270, 8410)
D035	Methyl Ethyl Ketone	(8015,8260)
D036	Nitrobenzene	(8091,8270)
D038	Pyridine	(8015,82750)
D039	Tetrachlorethylene	(8021,8260)
D040	Trichloroethylene	(8021,8260)
F001	Halogenated Solvent	(8021,8121,8260)
F002	Halogenated Solvent	(8021,8121,8260)
F003	Non-Halogenated Solvent	(8260,8270)
F004	Non-Halogenated Solvent	(8270)
F005	Non-Halogenated Solvent	(8260, 8270)
F039	Multi-Source Leachate	(**)
P005	Allyl Alcohol	(8015,8260)
P024	p-Chloroaniline	(8410, 8270)
P030	Cyanides	(9010)
P033	Cyanogen Chloride	(9010)
P054	Ethylenimine	(8270)
P063	Hydrogen Cyanide	(9010)
U002	Acetone	(8015*,8260)
U003	Acetonitrile	(8015, 8260)
U006	Acetyl Chloride	(GC/FID DAI,8015)
U007	Acrylamide	(8032, 8316)
U008	Acrylic Acid	(GC/FID DAI)
U009	Acrylonitrile	(8031*,8260)
U012	Aniline	(8270)
U019	Benzene	(8021,8260)
U023	Benzotrichloride	(8121)

Table 5-1
Analytical Method (Numbers)* For McIntosh Hazardous Wastes
(continued)

Waste No.	Description	SW846 Method#
U031	1-Butanol	(8260)
U037	Chlorobenzene	(8021,8260)
U038	Chlorobenzilate	(9081,8270)
U041	1-Chloro-2,3-epoxypropane	(GC/FID DAI,8015)
U044	Chloroform	(8021, 8260)
U052	Cresols/Cresylic Acid	(8041)
U056	Cyclohexane	(8260)
U057	Cyclohexanone	(GC/FID DAI,8260,8315)
U069	Dibutyl Phthalate	(8061)
UO70	o-Dichlorobenzene	(8021,8270)
U077	1,2-Dichloroethane	(8020,8260)
U083	1,2-Dichloropropane	(8021,8260)
U088	Diethyl Phthalate	(8061,8270)
U091	3,3'-Dimethoxybenzidine	(8270,8325)
U092	Dimethylamine	(GC/FID DAI,8015)
U095	3,3' Dimethylbenzidine	(8270)
U103	Dimethyl Sulfate	(8250*)
U108	1,4-Dioxane	(8015, 8260)
U112	Ethyl Acetate	(8015,8260)
U113	Ethyl Acrylate	(GC/FID DAI,8240*)
U122	Formaldehyde	(8315)
U123	Formic Acid	(8250*)
U131	Hexachloroethane	(8121, 8260)
U133	Hydrazine	(8250*)
U140	Isobutyl Alcohol	(8015,8260)
U147	Maleic Anhydride	(8270)
U154	Methanol	(8240*)
U156	Methyl Chlorocarbonate	(GC/FID DAI)
U159	Methyl Ethyl Ketone	(8015,8260)
U160	MEK Peroxide	(GC-FID)
U161	Methyl Isobutyl Ketone	(8015, 8260)
U162	Methyl Methacrylate	(8260)
U165	Naphthalene	(8100,8270)
U169	Nitrobenzene	(8091,8270)
U188	Phenol	(8041,8270)
U194	1-Propanamine	(8250*)
U196	Pyridine	(8015,8260,8270)
U210	Perchloroethylene	(8010,8240)
U211	Carbon Tetrachloride	(8020,8260)
U213	Tetrahydrofuran	(GC/FID DAI)
U219	Thiourea	(8330*)
U220	Toluene	(8021,8260)
U226	1,1,1-Trichloroethane	(8021,8260)
U228	Trichloroethylene	(8021,8260)
U239	Xylene	(8021,8260)

Note: Method numbers followed by an asterisk (*) are SW-846 methods which do not specifically list the given chemical but are applicable to other similar compounds. GC/FID represents gas chromatographic analysis with flame ionization detector; ECD represents electron capture detector.

SW-846 is periodically revised to reflect new and improved analytical methods. BASF will utilize the most appropriate methods contained in the latest edition of SW-846 or alternate approved methods.

** Analytical methods for F039, Multi-Source Leachate are those associated with the individual wastes comprising the leachate.

Table 5-2

Hazardous Waste Boiler #7
Waste Analysis Sampling

Sample Matrix	Sampling Frequency	Analytical Method	Analysis/Analyte
Liquid	Tested Prior to being fed to Boiler #7	ASTM-D-4282-03	Ash
		ASTM-D-2196-86	
		ASTM-D-240-02	Heating Value (kc/gr)
		(1)	pH and compatible
	Annually	SW-846 Methods 6010, 7761, 7060, 7471, 7421, 7041, 7740, and 7841	SV Metals, Mercury, Chromium, HCl/CL2

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(1) BASF ashes the sample using SW-846 Method 5050, determines total inorganic chloride by a standard titrimetric method on an ash/water solution.

6.0 Land Disposal Restrictions

Wastes transported to the TSDF or Boiler #7 area are initially subjected to a review of the accompanying LDR notification form and other associated documentation. Discrepancies between the LDR notification and other documentation may result in rejecting a waste shipment unless additional clarifying information is provided by the generator. All information obtained to document LDR compliance is maintained at the TSDF.

BASF will analyze representative samples of treatment residues and waste water treatment sludges (if designated for placement in the landvault) quarterly to demonstrate compliance with the appropriate land disposal restrictions. The required LDR certification for sending biosludge from the waste water treatment system to Landvault No. 2 is made using the RCRA certification form. The wastes are recertified following the evaluation of the quarterly analytical results.

7.0 Ignitable and Incompatible Wastes

Special provisions have been made for handling ignitable and incompatible wastes. The safe handling of ignitable and incompatible wastes is accomplished through the use of clear operating procedures and engineering controls. No corrosive or reactive wastes are handled at the TSDF. The procedures and controls are outlined in the following paragraphs.

7.1 Ignitable Wastes

Ignitable wastes are stored in the feed/storage tanks at Boiler #7. Precautions to prevent ignition are listed below:

- The storage areas are posted with ample warning signs that read "No Smoking".
- No burning or welding is allowed except by special permit.
- Feed/storage tanks are protected by flame arresters.
- Electrical service for the storage area equipment conforms to 1-D-2 classification (NFPA).
- The tank spacing arrangement and retaining dike configuration comply with NFPA codes.
- All equipment is electrically grounded.

7.2 Incompatible Wastes

Each bulk shipment of waste shipped to the Boiler #7 area is tested for compatibility to ensure that incompatible wastes are not mixed in the Boiler #7 storage/feed tanks. Representative samples of the wastes are mixed at specified volumes in the on-site laboratory. The mixture is observed for visible reaction, foaming, precipitation, layering, temperature changes, gas evolution and other evidence of incompatibility. The waste is not transferred to a storage/feed tank until compatibility of the wastes is established.

APPENDIX C

SECURITY

BASF McIntosh, AL
(Nov-2021)

Security

1.0 General

ADEM Admin. Code R. 335-14-5-.02(5), 40 CFR 264.14

The BASF Corporation (BASF) manufacturing facility is a controlled access site. The readily accessible perimeter of the property is surrounded by fencing. Vehicular access to the plant is limited to the three roads approaching the site from the south off U.S. Highway 43 via the Industrial Park Road, from the west off U.S. Highway 43 via Ciba Road and from the north off U.S. Highway 43 via Schneller Lane to parking areas outside the fenced perimeter.

Security at BASF is maintained by a staff of trained security guards who monitor entry into and exit from the plant site and provides security measures within the plant premises. Other on-site manufacturing areas under non-BASF ownership have separate entrances controlled using gate guards and similar personnel tracking systems as BASF.

All BASF employees and contractors carry identification badges and enter the plant through entry access turnstiles using tracking systems on the badge. Only visitors with legitimate business interests are allowed beyond the lobbies. These visitors must review a safety orientation booklet, then are logged in and given a temporary "pass" to enter the plant only after the person(s) with whom they wish to conduct business have been notified. Entrances to the manufacturing facilities are controlled access, either via security guard-manned entrances or through using tracking system identification badges at turnstiles in office building lobby areas.

Security provisions for the active portions of the TSDF, as required by ADEM regulations, are discussed in the following sections.

2.0 24-Hour Surveillance System

ADEM Admin. Code R. 335-14-5-.02(5) (b) 1, 40 CFR 264.14(b)(1)

Only authorized personnel are allowed in the active portions of the TSDF areas at the McIntosh facility. Boiler #7 is monitored using surveillance cameras mounted at the main gate area which is due west of the Boiler area. Both areas have procedures regarding personnel sign-in and sign-out. Security monitors are located at the main gate, which is manned 24 hours a day, 7-days a week, 365 days a year. Random security checks are made of the TSD Facility by one of the site security guards at least once per shift.

3.0 Means to Control Entry

ADEM Admin. Code R. 335-14-5-.02(5) (b) 2, 40 CFR 264.14(b) (2) (ii)

As discussed previously, entry to the manufacturing facility is controlled by security guards stationed at the entrances or tracking system badges. Employees are identified and visitors must "log in" and remain in the escort of the party with whom they are conducting business throughout their stay.

Means to control entry to the Landvault No. 2 in the TSDF is achieved using six-foot high chain link fence and gated entrances. Gates providing access to the landvault are closed and locked when waste management activities are not being conducted.

4.0 Warning Signs

ADEM Admin. Code R. 335-14-5-.02(5) (c), 40 CFR 264.14(c)-

Warning signs, which are clearly legible from a distance of 25 feet, are posted at appropriate locations as follows:

Location	Markings
Boiler #7 and Hazardous Waste Tanks	Danger - Hazardous Waste Area Authorized Personnel Only No Smoking
Landvault No. 2 Entrances and Every 50 feet Along Perimeter	Danger - Hazardous Waste Area Authorized Personnel Only
Closed Units	Closed Facility Authorized Personnel Only

APPENDIX D

INSPECTIONS

BASF McIntosh, AL

Inspections

1.0 General

Regular inspections are conducted in the TSDF Landvault #2 and Boiler #7 areas for equipment malfunctions, structural deterioration, operator errors, and leaks or releases that could endanger human health or the environment. Regular inspections also are conducted of Operable Units 1, 2, 3 and 4. Items covered in the inspection schedule, along with the type of problems looked for and minimum inspection frequency, are presented in subsequent sections. These items are considered important because of their role in preventing, detecting and responding to human health or environmental hazards. Forms used to document the inspections will contain at a minimum information in Sections 2.0 through 9.0 below. Revisions of the forms are controlled by the Document and Data Control procedures in the Business Management System.

Except under rare circumstances, all unloading in the TSD facility is associated with, or takes place at the landvault (LV#2), and all unloading for Boiler #7 takes place at the Boiler unloading area just north of Boiler #7 adjacent to the Boiler Tank Farm. These areas are inspected daily and when in use.

The plant emergency alarm system, fire truck, first aid facility, and decontamination equipment are not under the direct responsibility of the TSDF facility, but are available through the various departments of the manufacturing facility. Weekly and monthly inspections are made by the Safety or Incident Commanders to ensure the availability of equipment and facilities.

Inspection results are recorded and kept with the inspection schedule at the TSD facility. Data include but are not limited to: date and time of inspection, name of inspector, notation of observations made, and the date and nature of repairs or corrective actions. These logs are kept for a minimum of 5 years from the date of inspection for Boiler #7, and for 3 years from the date of inspection for the Tanks and Landvault.

If inspections reveal that non-emergency maintenance is needed, repairs will be completed as soon as possible to preclude further damage and reduce the need for emergency repairs. If a hazard is imminent or has already occurred during the course of an inspection, or any time between inspections, remedial action will be taken immediately. The appropriate authorities will be notified per the Contingency Plan and corrective actions initiated. In the event of an emergency involving the release of hazardous constituents to the environment, efforts will be directed towards containing and removing the hazard, and subsequently decontaminating the affected area.

The inspection schedule is included in the initial personnel training and the annual review.

2.0 Emergency Alarms and Security Devices

Inspections of emergency alarms and security devices are outlined in the following table.

Equipment	Type or Problems	Inspection Frequency
Emergency Alarm	Inoperative	Weekly
Perimeter Property Access Gates	Unlocked or Unattended	Daily

3.0 Emergency Equipment

Inspection of emergency equipment is outlined in the following table.

Equipment	Type of Problems	Inspection Frequency
Industrial Absorbent	Out or low inventory	Monthly/after use
Absorbent Pads	Out or low inventory	Monthly/after use
Absorbent Boom	Out or low inventory	Monthly/after use
Portable Pumps	General condition and operability	Monthly
Emergency Lighting	Battery failure	Weekly
Emergency Supply Locker	Low inventory	Weekly/after use
Emergency Showers/eyewashes	Inoperative valves; Inadequate water Pressure	Weekly
Communication Devices	Inoperative	Daily
Fire Extinguishers	Low pressure Broken seal	Monthly/after use
Medical Equipment	Low Inventory	Monthly/after use
Fire Truck	General Condition and Operability	Monthly/after use
Decontamination Equipment	Low Inventory	Monthly/after use

4.0 Storage Tanks

Inspection of storage tanks is outlined in the table below and the tank condition assessment is described in the following paragraphs. Defects discovered during inspections will be addressed within 5 calendar days of discovery. If first efforts at repair are not successful, the repair will be completed as soon as possible, not to exceed 45 calendar days after detection, unless the tank must be emptied or temporarily removed from service.

Equipment	Type of Problems	Inspection Frequency
• Boiler #7 Waste Feed Lines • UT-V-813 • UT-V-814 • UT-V-815 (knockout pot) • Secondary Containment and liner • Ancillary equipment	Secondary Containment or liner cracked or drains open; Level indicators; Level/pump interlock; Leaking fittings on pumps or piping; Evidence of leaks due to puddles or wet spots; Corrosion/Erosion/CUI	Visual - Daily
Tank Condition Assessment External -	Shell thickness	Every Five (5) Years API-510

The rationale for conducting daily visual inspections is provided by 40 CFR Part 264.195(b) ADEM 14-5-.10(6)(b). The rationale for the five-year inspection frequency is based on operating experience for the tanks involved. This demonstrated service life and the frequency of tank condition assessments stated above will prevent hazards to human health and the environment.

4.1 Secondary Containment

Secondary containment for Tanks UT-V-813/814 consists of a concrete foundation poured over the existing concrete area slab and ringwall foundation. This system will prevent migration of wastes or accumulated liquid out of the system to the soil, groundwater, or surface water during the use of the tank system. Should any liquids accumulate within the foundation, they will be detected, collected, and removed. The concrete ringwall foundation and slabs are lined with a six mil (0.006 in) thick polyethylene membrane liner, which is compatible with the materials stored in the tanks contained within the concrete ringwall foundation. Additional information regarding tank foundation design can be found in the tank certification, included in Appendix N of the application.

4.2 Tank Condition Assessment

Since installation, the tanks have continued to be evaluated on a regular basis, with records maintained onsite. Additional evaluations of tank condition are conducted by Maintenance Personnel under the supervision of the Area maintenance Supervisor. These assessments may be made any time when routine, daily inspections indicate a potential problem, but at a minimum, according to the following schedule:

1. Shell thickness measurements will be made every five (5) years on all metal tanks at a maximum of 2 feet vertical intervals spaced approximately 120 degrees apart. These areas of measurement will be permanently marked so that subsequent measurements made in the same area will reflect actual deterioration rather than fluctuation in nominal tank thickness. The following inspection procedures will be followed:

   (a) Testing will be done by an individual trained in the use of ultra-sonic or equivalent measuring equipment.

   (b) At least 25% of all measurements will be taken within one inch of seam ("heat affected zone").

   (c) Measurements will be taken within one foot of the top and the bottom of the tank.

5.0 Landfills and Closed Facilities

Inspection of the landfills and closed facilities are outlined in the following table. Figure 1 shows the locations of the landfills and closed facilities requiring routine inspections.

Equipment	Type of Problems	Inspection Frequency
Run-on & Run-off Controls	Erosion Settlement Sinkholes Lack of Vegetation Drainage ditches clear and free of impediments	Quarterly Quarterly Quarterly Quarterly Quarterly ****and after storms**
Leachate Collection and Leak/Leakage Detection Systems	Leachate collection piping intact Leakage water (if present will require analysis)	Weekly Weekly*
Collection Sump	Sump pumps lubricated and operable Sump free of debris	Weekly Weekly & After Storms
Security	Perimeter fencing intact Wash pad clean & free of wastes Warning signs posted and legible Evidence of burrowing animals	Quarterly Weekly Quarterly Quarterly ****and after storms**
Gas Venting System Wells for French Drain (Class C Landfill)	Vent piping damage Well piping damage	Monthly ****and after storms** Monthly ****and after storms**
Dewatering Monitor Wells (Class C Landfill)	Well piping damage	Monthly

* Notify supervisor immediately if contaminants are detected.

6.0 Boiler #7

Inspection of Boiler #7 is outlined in the following table.

Equipment-Mechanical	Types of Problems	Inspection Frequency
Burner Box - Internal	Refractory Condition	Annual
Burner Box - External	Fugitive emissions, signs of tampering, spillage; Metal fatigue or cracks; Leaks or damage around seals; Hot spots; Inoperative guidance or visible damage to guidance; Jerky or incremental rotation	Daily - visual
Feed Lines to Burner	Fugitive emissions, signs of tampering, unusual vibrations or noise; Leaks; Inoperative conveyors; Spillage; Inoperative pumps	Daily - visual
Truck Unloading Area and Tank Farm	Leaks, fugitive emissions, signs of tampering, spillage; Damage to tanks; Loose connections/fittings	Daily - visual
Pumps	Spills, fugitive emissions, signs of tampering, unusual noise; Vibrations; Visible leaks; Air leaks; Bent shafts; Cracked casings; Loose connections or fittings	Daily - visual
Sumps	Leaks, fugitive emissions, signs of tampering, visible cracks in concrete base and curbs; Spillage; Liquid level	Daily and After Storms - visual
Pipe Racks	Fugitive emissions, signs of tampering, leaks; Spillage; Loose connections/fittings; Visible damage to pipes; Unusual noise or vibrations	Daily - visual
Emergency waste cutoff feed system and alarms	Operability	Weekly – function test

7.0 OU1 Permitted Extraction and Monitoring Wells

Permitted monitoring and groundwater extraction wells that require routine inspections are depicted in Figure 1, and include the following:

- Point-of-Compliance Wells for General Groundwater Monitoring: Alluvial Aquifer groundwater monitoring wells OW-l, M-3, M-4, M-5, M-6, M-7, M-8, M-9, M-10, M-11, M-13, M-14 and M-15, and Upper Miocene Aquifer groundwater monitoring wells MD-2, MD-9, MD-11 and MD-12, define the Point-of-Compliance for the entire facility, including all operating and closed units.

- Background Wells for General Groundwater Monitoring: Alluvial Aquifer groundwater monitoring wells M-1, M-2, and MW -12A and Upper Miocene Aquifer groundwater monitoring wells MD-1 and MD-5 are maintained as the Background monitoring wells for the entire facility.

- Boundary Wells for Corrective Action Monitoring: Upper Miocene Aquifer groundwater monitoring wells MD-3B, MD-6, MD-7 and MD-8 are maintained as Boundary wells for the entire facility.

- Effectiveness Wells for Corrective Action Monitoring: Alluvial Aquifer groundwater monitoring wells CA-4A, OW-2, OW-4, OW-6, M-12, MW-9A and MW -10A and Upper Miocene Aquifer groundwater monitoring well MD-4 are maintained as Effectiveness wells.

- Recovery Wells for Corrective Action: Alluvial Aquifer wells PW-1, PW-2, PW-3, PW-6, PW-7, PW-8, and PW-9 are maintained as Recovery wells.

- Recovery Well for Interim Corrective Action: Alluvial Aquifer well PW-11 is maintained as an Interim Action Recovery well.

- Corrective Action Wells for Corrective Action Monitoring: Alluvial Aquifer groundwater monitoring wells CA-l, CA-2 and CA-3 are maintained as Corrective Action wells.

- Offsite Wells for Monitoring Offsite Migration in the Miocene Aquifer: Miocene Aquifer monitoring wells MD-13 and MD-14 are maintained as Offsite Monitoring Wells. These are the only offsite wells in the monitoring program.

Monitoring wells are operated and maintained in a manner to prevent soil, surface water, and/or groundwater contamination. This requirement includes the installation of protective barriers around monitoring wells where necessary to prevent damage to the well from traffic or other causes or as required on a case-by-case basis by the Department. All monitoring wells have functional key or combination locks on the wellhead covers to prevent unauthorized access. All monitoring wells are assigned an identifying number by the facility, and such numbers are permanently affixed to the outer casing of each monitoring well.

All well caps, sample pumps, ground water seals, and area erosion around permitted monitoring wells and cell dewatering wells are inspected monthly (Recovery wells, post closure monitoring wells and corrective action wells as described in Appendix K of the current RCRA permit), at least quarterly (all other Permitted monitoring wells), and after storm events, for potential problems. The groundwater extraction system is operated continuously, with temporary well shutdowns that generally occur for less than one to three days for well treatments, and pump and/or motor replacements as needed.

BASF will inspect the vegetated areas and maintain the established vegetated cover in such a manner to not allow any disturbance of the integrity of any components of the containment system, or the function of the facility's monitoring systems. All well caps, sample pumps, ground water seals, and area around monitoring wells are inspected for potential problems. The casing of the monitoring wells is PVC with PVC caps or stainless steel, with stainless steel caps and an outer steel pipe protective casing, which is embedded through the concrete surface water seal. The wells should provide a long service life. However, it is expected that all caps and extraction well pumps will have to be replaced twice during the 30-year period and all outer casings painted every 5 years. The 6-inch guard posts will be painted every 5 years. Other maintenance activities include clearing a radius of 6 feet around each of the monitoring, sampling and purge wells. This includes keeping all well pad areas clean and visible.

Other extraction system maintenance activities include:

- Monthly inspections of the piping connecting the purge wells to the treatment system.

- Maintaining a clean and clear area along the ground water discharge line from the purge wells to the treatment system. This work can be done mechanically or with application of a pre-approved herbicide. The area to be maintained will extend two feet on either side of the pipe.

- Recovery well treatments to remove build-up of biological and chemical solids.

If a monitoring well becomes damaged, ADEM will be notified immediately in writing. The well must be repaired within 30 calendar days of damage, and the repair report will be submitted within 30 calendar days of repair.

8.0 OU2 and OU4 Remediated Areas

The purpose of regular inspection is to ensure the integrity of the remediated areas (refer to Figure 1). Inspections will also provide important information including recommendations for maintenance (as needed). Inspections shall be conducted quarterly, including after storms. OU2 and OU4 vegetated areas will be inspected, and the established vegetated cover will be maintained in such a manner to not allow any disturbance of the integrity of the final cover, liners, any component of the containment system, or the function of the facility's monitoring system. The OU2 final cover system shall be maintained as described in the *Final Remedial Design Report* for OU2. The OU4 slurry wall shall be maintained as described in the *Final Remedial Design Report* for OU4.

The inspections shall specifically include evaluation of the following items:

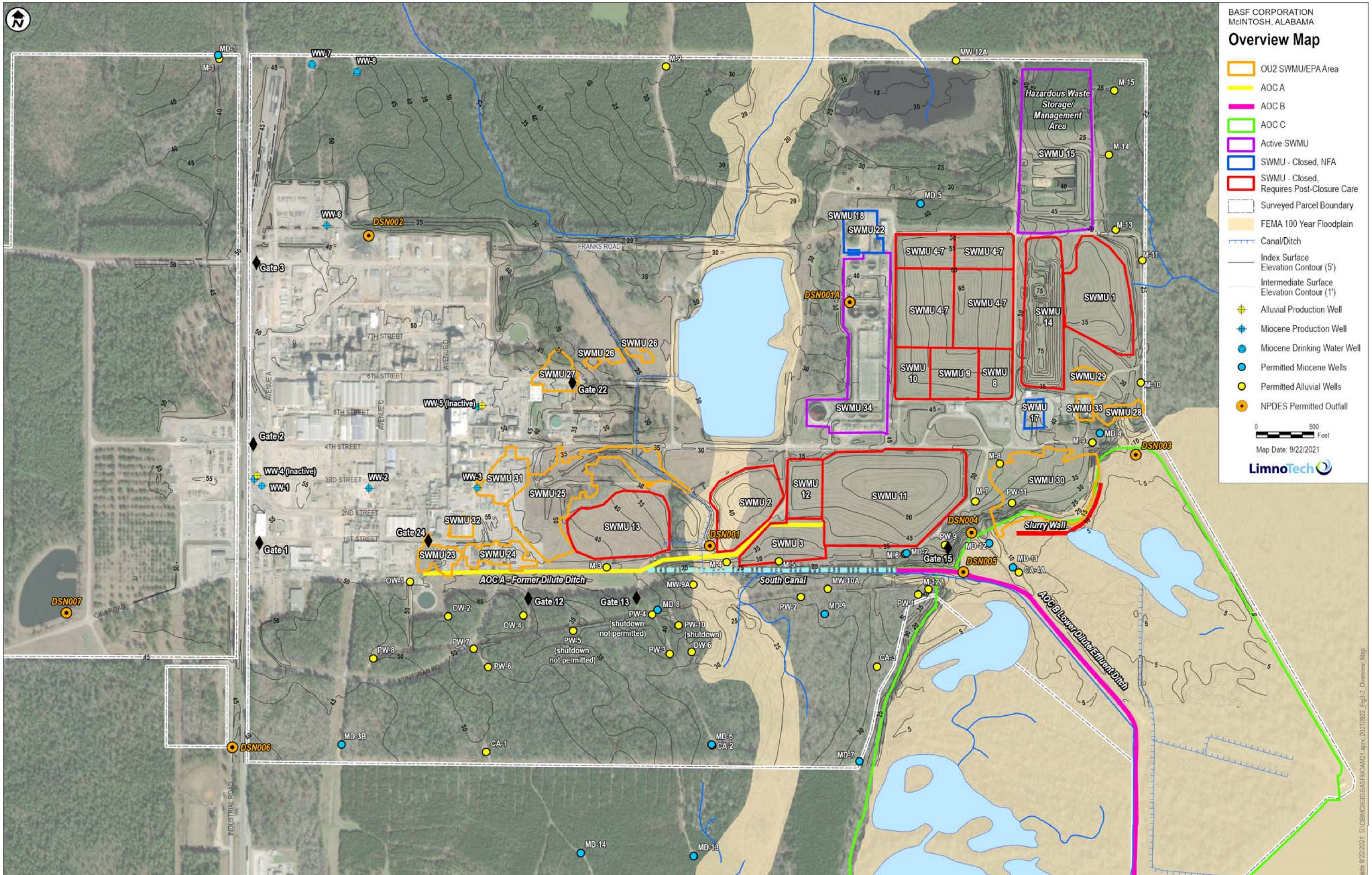
- Integrity of the final cover (erosion, ponding, subsidence, cracking, etc.)
- Growth and stabilization of vegetative cover,
- Run-on and run-off control system,
- Groundwater monitoring wells (see Section 5.0 above), and
- Survey benchmarks.

After each inspection activity, a full description will be recorded on an inspection log and filed on-site. Inspection activities will be conducted quarterly at a minimum, including after storm events, and will include careful assessment of the items specified above.

9.0 OU3 Floodplain

The bluffline area is inspected for erosion after major storm events.

Figure 1. Location map of SWMUs, CERLCA AOCs and remediated areas and RCRA permitted wells.



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APPENDIX E

PERSONNEL TRAINING

BASF McIntosh, AL

(Nov 2021)

Personnel Training

1.0 Introduction

To operate and maintain the facility safely and in compliance with ADEM Administrative Code 335-14-5-.02(7) (40 CFR 264.16), BASF has developed a training program designed to prepare personnel involved in hazardous waste management at the TSDF Landvault and operation of the hazardous waste tanks and boiler system. The information presented in the training program is contained in manuals specifically developed for the operations conducted in the TSDF, and in procedures for operation of the tanks and boiler system. These manuals include information covering the operation of the hazardous waste facilities, as well as health and safety, emergency procedures, requirements of the RCRA Permit, and requirements of other environmental permits.

Personnel newly assigned to hazardous waste areas are required to complete six (6) hours of classroom instruction and a minimum of fourteen (14) days of on-the-job training prior to assuming duties related to managing hazardous waste. Additional training and refresher training are provided as job responsibilities change and when performance indicates the need. All employees receive a refresher at least annually.

2.0 Relevance of Training to Job Positions

The training program is designed to provide training relevant to job positions involved in hazardous waste management. Operators are introduced to detailed process-specific training following 6 hours of classroom training and on-the-job training. Process-specific training includes a general overview of the process (e.g., Landvaults, Tanks, Boiler #7), the major equipment and system operation. Job-specific training is offered following successful completion of the process-specific training. Job-specific training focuses on the responsibilities and duties associated with a job in the TSDF, or in operation of the Tanks and Boiler #7.

3.0 Job Descriptions

40 CFR §264.16(d) requires BASF to maintain the job title for each position at the facility related to hazardous waste management and the name of the employee filling each job. Written job descriptions are maintained by the Human Resources Department. Employees permanently assigned to the TSDF and utility boiler areas, and directly involved with the handling of waste, may include, but are not limited to or required to be:

- The Area Manager,
- Production Engineers,
- Production Resource Coordinators, and
- Operator/Operations Technicians.

Day-to-day operation of the TSDF and boiler is the responsibility of the staff assigned to the area. They report to the Manager of Energy and Environmental Operations who reports to the Director of the Central Maintenance Group, who reports to the Plant Manager. Maintenance, electrical, and instrument (MEI) personnel work in the TSDF and boiler areas, but do not handle wastes. The duties and responsibilities for each position follow:

Job Title: Area Manager

<u>Position Responsibilities and Duties</u>

Responsible for the safe and economical operation of the TSDF in compliance with applicable Federal, State, and Plant policies and procedures, and local regulations. These responsibilities include:

- Staffing of the TSDF with adequately educated and trained personnel;
- Ensures compliance of the TSDF;
- Maintains close contact with the Environmental, Health and Safety group and keeps himself/herself informed about forthcoming environmental regulations;
- Keeps the TSDF and equipment in good working condition;
- Has environmentally proactive dialogues with the on-site waste generators including review and approval of the Process Waste Environmental Evaluation (PWEE) and the Request for Disposal of Waste (RDW);
- Reviews and/or approves Standard Operating Procedures and Work Instructions;
- Develops short-, intermediate- and long-term objectives for the TSDF;
- Prepares Operating and Capital Budgets;
- Initiates requests for Capital Projects;
- Exercises cost control and ensures compliance with the approved operating budgets;
- Coordinates engineering activities regarding the TSDF;
- Initiates, coordinates, and reviews treatment process improvements;
- Directs activities with the Environmental Technology Laboratory;
- Issues operating, progress and compliance reports for plant management; and
- Other duties, as may be required.

<u>Experience and Qualifications</u>

B. S. Degree in chemistry, chemical engineering or related science and a minimum of five years supervisory experience in chemical manufacturing operations.

Job Title: Plant Production Engineers

<u>Position Responsibilities and Duties</u>

Responsible for assisting the Area Manager in fulfilling his duties:

- Prepares operational and accounting reports prepares regulatory compliance reports;
- Provides technical review of operational data for conformance;
- Prepares standard operating procedures and work instructions;
- Issues purchase request for usage of treatment chemicals and supplies;
- Coordinates with Environmental Technology and Analytical Laboratories;
- Coordinates with on-site waste generators;
- Ensures proper segregation and disposal of waste;
- Manages operating records pertaining to hazardous waste as required by RCRA;
- Schedules and follows up on maintenance repair work;
- Ensures the operation is in compliance with standard operating procedures and work instructions;
- Follows up on lab analysis;
- Checks wastes receipts for conformance with RDWs;
- Maintains inventories of operating supplies, emergency supplies and wastes;
- Conducts and follows up on inspections of facilities with respect to RCRA Permit;
- Conducts both formal and informal training and on-the-job training of personnel;
- Fills in upon absence of Area Manager;
- Reports to Area Manager; and
- Other duties, as may be required

Experience and Qualifications

B. S. Degree in chemistry, chemical engineering or related science and/or 2 years supervisory experience in chemical manufacturing processes is desired.

Title: Production Resource Coordinator

Position Responsibilities and Duties:

Responsible for assisting the Area Manager in fulfilling his duties:

- Schedules and follows up on maintenance repair work;
- Follows up on status of various operating activities;
- Follows up on lab analysis;
- Conducts both formal and informal training and on-the-job training of personnel;
- Checks waste receipts for conformance with RDWs and oversees the segregation land disposal of wastes;
- Maintains inventories of operating supplies, emergency supplies and wastes;
- Conducts and follows up on inspections of facilities with respect to RCRA requirements;
- Coordinates testing of alarms, emergency equipment, and automatic feed cut off systems;

- Maintains records of current employee training, operation logs and inspection records;
- Prepares operational and accounting reports;
-
- Prepares regulatory compliance reports;
- Provides technical review of operational data for conformance;
- Prepares operation procedures;
- Issues purchase request for usage of treatment chemicals and supplies;
- Directs maintenance efforts;
- Coordinates with Environmental Technology and Analytical Laboratories;
- Coordinates with on-site waste generators;
- Manages operating records pertaining to hazardous waste as required by RCRA;
- Initiates and/or provides technical support for improvement projects;
- Fills in upon absence of Area Manager;
- Reports to Area Manager or Unit Maintenance Engineer; and
- Other duties, as may be required.

<u>Experience and Qualifications</u>

B. S. Degree in chemistry, chemical engineering or related science and/or 2 years supervisory experience in chemical manufacturing processes is desired.

Job Title: Operator/Operations Technician

<u>Position Responsibilities and Duties:</u>

Responsible for proper operation of all processes and related equipment in the waste facility subject to the direction of the Area Manager, Production Engineer, Production Resource Coordinator, or Shift Supervisor:

- Follows standard and emergency operating procedures for the various operations carried out in the TSDF or Boiler operation area;
- Makes appropriate entries in logs and operating status reports;
- Makes inspections of facilities with respect to RCRA and records results;
- Notifies TSDF supervision and/or other plant authorities as necessary in emergency situations;
- Takes emergency action on his own authority in accordance with established procedures;
- Notifies waste facility and/or other plant authorities of any malfunction or deterioration of equipment;
- Conducts job training; and
- Other duties, as may be required.

Experience and Qualifications

Must have the ability to read and write and the physical capability to perform the job of laborer. Must satisfactorily complete all Federal and State Regulatory training requirements and all other training specified by the Company.

Note 1

Job vacancies for the classification of operator/operations technician in the waste facilities would be posted for bidding by employees working in other areas of the plant site. Jobs are awarded to qualified employees on the basis of seniority. Employees awarded jobs in the waste facility are required to complete the training program for personnel involved in handling hazardous waste prior to being assigned unsupervised tasks.

Note 2

Personnel operating equipment involved in placing/compacting waste in the landfill will require a minimum of one (1) year experience relative to the equipment being operated.

Job Title: Unit Maintenance Engineer

Position Responsibilities and Duties:

Responsible for assisting the Area Manager in fulfilling his duties:

- Schedules and directs maintenance work;
- Conducts and follows up on inspections of facilities with respect to RCRA requirements where repair is indicated;
- Supervises maintenance and engineering efforts;
- Initiates requests for maintenance or capital funds;
- Prepares both mechanical and accounting reports; and
- Conducts both formal and informal training and on-the-job training of personnel other duties, as may be required.

Experience and Qualifications

B. S. Degree in chemistry, chemical, mechanical, or environmental engineering or related science with 2 years supervisory experience in chemical manufacturing and/or 5 years experience as a maintenance supervisor at the plant site.

Job Title: MEI Support Personnel

Position Responsibilities and Duties

Responsible for maintaining all processes and related equipment in the TSDF and boiler areas subject to the direction of the Area Manager and Unit Maintenance Engineer.

- Makes inspections and repairs of facility mechanical, electrical, or instrument equipment;

- Lubricates equipment;
- Operates/calibrates various test or control equipment ;
- Repairs electrical failures;
- Operates select equipment required for repairs;
- Conducts job training; and
- Other duties, as may be required.

Experience and Qualifications

Must have the ability to read and write and be qualified to perform the duties as assigned. Must satisfactorily complete all Federal and State Regulatory training requirements and all other training as specified by the Company.

4.0 Training Content

As noted in the introduction, the program developed at BASF for training employees assigned to work in the TSDF and boiler operations have been organized into process-specific and job specific training manuals. Additions and revisions are made as they become necessary, due to modifications of equipment, process improvements or changes mandated by law or regulation.

BASF has established a personnel training program, directed by a person trained in hazardous waste management procedures, and designed to provide employees with the information necessary to perform their job function in a safe and effective manner. The training program will be updated and revised as necessary to comply with the established guidelines of 40 CFR§ 264.16.

The training program is designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems. 40 CFR § 264.16 specifies the following training topics, where applicable:

- Procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment;
- Key parameters for automatic waste feed cutoff (AWFCO) systems;
- Communications or alarm systems;
- Response to fires or explosions;
- Response to groundwater contamination incidents; and
- Shutdown of operations.

All facility personnel managing hazardous waste will take part in an annual review of their initial and subsequent RCRA training, which will be updated as necessary to reflect current facility operations and procedures.

Table 4-1 summarizes the content of the RCRA training. In accordance with 40 CFR § 264.16(a)(3). Selected topics covered are discussed in the following sections.

TABLE 4-1
Training Program Outline

Topic	Content
Emergency equipment	Review of fire extinguisher, fixed fire protection systems
Communication and alarm systems	Review of emergency alarm systems, emergency radio and telephone system
Response to fire and explosion	Review of emergency procedures
Response to groundwater contamination	Review of procedures for containing, controlling, and mitigating spills
Monitoring equipment use and inspection	Review of continuous emissions monitoring systems and process monitors. Review of operating limits and automatic waste feed cutoff system.
Shutdown of operations	Review of boiler shutdown procedures

4.1 Health and Safety

Personnel are trained in the use of all types of personal equipment and supplies, the locations and use of emergency equipment and supplies, location and use of communication devices and the proper reporting of incidents, accidents, and injuries. They are made aware of the properties of all the various raw materials used in the area and instructed in the proper technique for their safe handling and use.

Personnel are made aware of the general classes and characteristics of chemicals and chemical wastes that can be hazardous to health and property. In this context, the terms "toxicity", "ignitibility", "corrosivity", and "reactivity" are generally defined. Personnel are trained in the use of "Data Sheets" to determine the properties of the various wastes so that the proper precautions are taken to avoid health and environmental hazards. In this regard the need for segregation of wastes is stressed along with the required precautions for storage and handling of the segregated waste.
All health hazards, known or suspected, involving wastes handled at the facility are discussed with employees. In these discussions, the absolute need for proper personal hygiene and housekeeping practices is heavily emphasized. Additionally, personnel and equipment decontamination means are fully explored.

4.2 Emergency Procedures

Personnel are instructed as to what constitutes an emergency and the proper initial response. They are trained in both "crash" shutdowns and "normal" shutdowns of all processes and equipment and in the orderly evacuation of the area. Additionally, they are made aware of the Spill Prevention Control and Countermeasures Plan (SPCC), and the Contingency Plan for the McIntosh site and their expected role in both plans. In this regard, the storage and use of emergency containment equipment are emphasized, along with decontamination methods for the affected area and the requirement for proper classification, treatment, storage, or disposal of any contaminated materials. The matter of groundwater contamination is explored, along with other potential environmental hazards. The value of inspection schedules is stressed in relation to prevention and/or timely detection of spills, releases, fires or other situations that may be hazardous to health and/or environment.

4.3 Standard Procedures

Personnel are introduced to RCRA with an overview of the regulations. Sections dealing with Treatment, Storage, and Disposal facilities are explored in the detail required commensurate with responsibilities to assure understanding and compliance. RCRA inspection, monitoring, and recordkeeping and reporting requirements, as well as key parameters of existing permits, are stressed as part of the general training for all personnel.

Operating procedures for various waste handling activities are designed to assure the safety of personnel, equipment, and the environment while handling waste in a timely, routine fashion. In this regard, hazards specific to the activity are addressed in the operating procedure for that particular activity. Likewise, RCRA requirements or prohibitions and key parameters of existing permits are included in the appropriate operating procedure. The absolute requirement for adherence to the operating procedures as written is stressed, and personnel are not allowed to assume a particular operating assignment until knowledge and proficiency in the various steps of that procedure have been acceptably demonstrated.

Equipment operators used in the landfill are made particularly aware of requirements relative to waste placement and equipment decontamination. Additionally, liner safeguards, and the consequences of loss of integrity of the liner system are explored in detail. This information, along with regulations pertaining to landfills, will be reviewed at least annually.

5.0 Training Qualifications

The training programs developed specifically for the TSDF are directed by the Area Manager through the Production Resource Coordinator and Production Engineers. They have received training in all areas of waste management employed at the McIntosh site. Records pertaining to their previous and ongoing training are kept at the McIntosh site.

6.0 Implementation of Training Program

All present personnel assigned to the TSDF have been trained in accordance with RCRA regulations at this time. All new personnel will complete this training program within six months of their assignment. No employee assigned to the area will be allowed to work unsupervised in any aspect of hazardous waste management prior to completion of his training program.

All employees are required to participate in an annual review of the training program and specifically study the following:

- Incidents occurring in the past year that warranted use of any emergency plan. The review focuses on events surrounding the situation(s), employee response, steps taken to prevent a recurrence, and the status of conditions since the last incident.
- Key permit parameters and particularly any changes in the permit regulations affecting the status of the waste facility. Areas giving rise to difficulty in maintaining compliance are discussed, along with the status of corrective actions taken.
- The status of standard operating procedures.
- The safety statistics relative to accident/injury for area personnel.
- Review of hazardous wastes being handled in the area (types, volumes, sources, and other information as contained in the biennial report to ADEM).

Records documenting job titles, job descriptions, names of employees, and completed training programs will be kept on site in the TSDF. These records will be kept until closure of the facility for current employees and for 3 years from the date of an individual employee's termination for former employees.

APPENDIX F

CONTINGENCY

BASF McIntosh, AL

Contingency Plan

1.0 Introduction

The information contained herein is submitted in accordance with the regulations contained in ADEM Administrative Code R 335-14-5-.04 and 40 CFR 264, Subpart D. The following topics are included:

1.0 General Information

2.0 Emergency Coordinators

3.0 Implementation of the Contingency Plan

4.0 Emergency Response and Evacuation Procedures

5.0 Emergency Equipment

6.0 Coordination Agreements

2.0 General Information

This contingency plan is for the Waste Treatment, Storage, and Disposal (TSD) Facility and Boiler #7 at the BASF Facility located in McIntosh, Alabama. BASF's TSD Facility consists of one (1) hazardous waste landvault and other inactive closed units. Boiler #7 is permitted to burn selected Hazardous Wastes generated on-site by the manufacturing operations. These wastes are stored in Tanks UT-V-813 and UT-V-814.A plot plan of the facility is shown in Figure 2-1.

The BASF McIntosh Plant is a manufacturer of synthetic organic chemicals which include antioxidants and light stabilizers. BASF Corporation, North America headquarters is located in Florham Park, New Jersey.

3.0 Emergency Coordinators

If an emergency situation develops at the TSD facility, hazardous waste tanks, or Boiler #7, it is immediately reported to an emergency coordinator (EC), also known as Incident Commanders (ICs), listed below. An IC is always on duty and can be reached via the main gate by calling extension 2222 or by two-way radio. The IC directs the emergency response team, which is complete on each operating shift. A list of ECs is presented as Table 3-1.

Figure 2-1. Facility Plot Plan

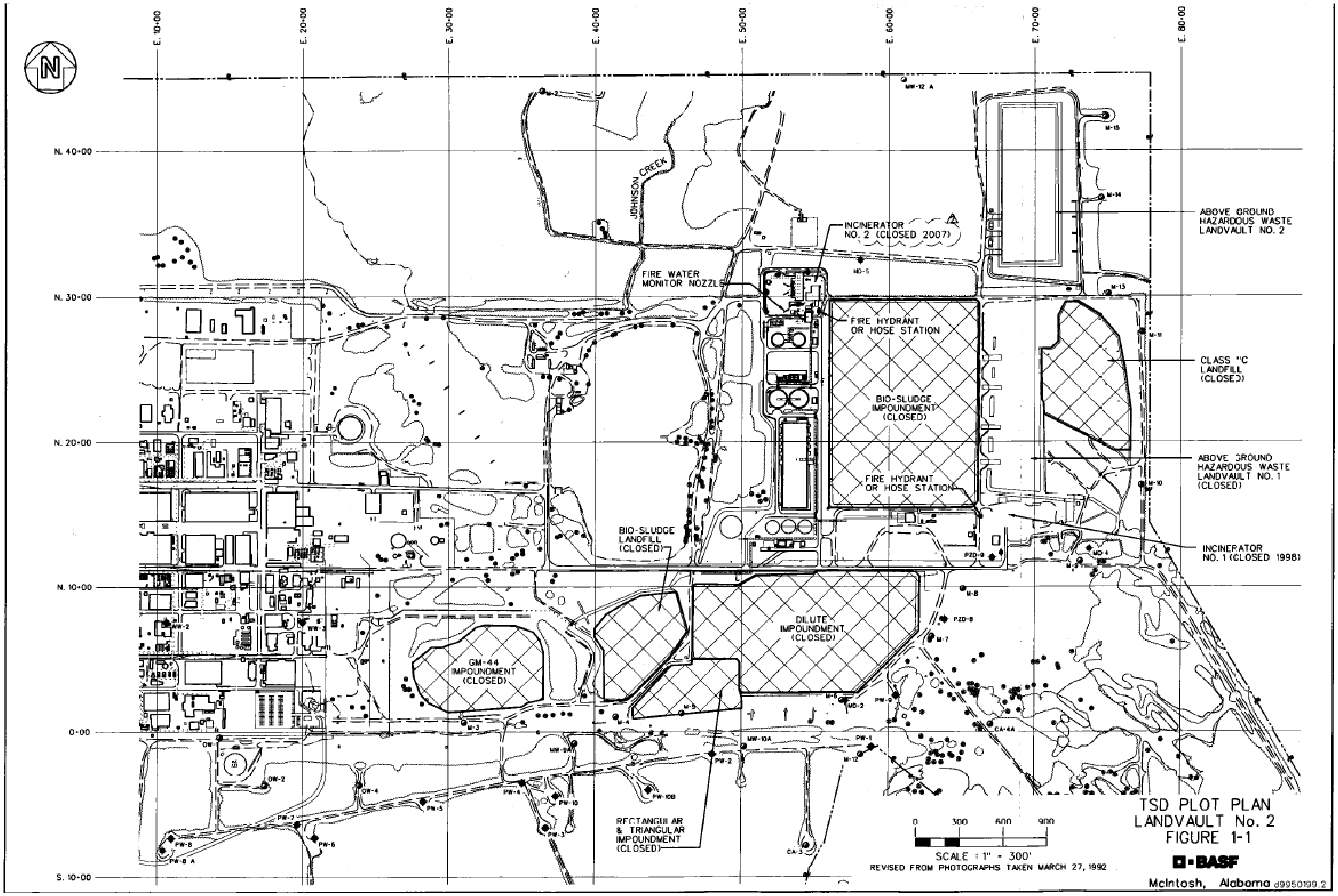


Table 3-1

BASF Emergency Coordinators

Name	Home Address	City	Home	Work
Travis Parden	5483 Wilmer Rd	Wilmer	251-944-7340	251-436-2102
Mike Kroll	7650C Iron Rush Rd.	Wilmer	251-599-4223	251-436-3508
Rick Capps	3385 Hardwood Dr.	Saraland	251-944-7345	
Ken Henderson	10270-B Boc Rd	Grand Bay	251-490-7232	
Charlie Moye	531 Hartley Rd	Saraland	251-679-6676	251-436-2601
John Simison	19750 N. Fifth Street	Citronelle	251-866-5086	251-436-2601

These ECs have received additional emergency training beyond regular plant emergency training, and have the authority to commit whatever resources are necessary to carry out the Contingency Plan. They will be relieved of the responsibility for any function as soon as the duty representative, or their supervisor, arrives at the plant, except that the IC will remain responsible for the operation of the emergency response team.

4.0 Implementation of the Contingency Plan

The decision to implement the contingency plan depends upon whether or not an imminent or actual incident could threaten human health or the environment. The EC has full authority to make this decision. Depending upon the degree of seriousness, the following potential emergencies might call for the implementation of the contingency plan:

Fire and/or Explosion

- A fire that could result in the release of toxic fumes;
- The fire spreads and could possibly ignite materials at other locations on site or could cause heat-induced explosions;
- The fire could spread to off-site areas;
- Use of water or water and chemical fire suppressant could result in contaminated run-off;
- An imminent danger exists that an explosion could occur, causing a safety hazard because of flying fragments or shock waves;
- An imminent danger exists that an explosion could ignite other hazardous waste at the facility;
- An imminent danger exists that an explosion could result in release of toxic material;
- An explosion has occurred;

Spills or Material Release

- The spill could result in release of flammable liquids or vapors, thus causing a fire or gas explosion hazard;
- The spill could cause the release of toxic liquids or fumes;
- The spill can be contained on-site, but the potential exists for groundwater contamination; and
- The spill cannot be contained on-site, resulting in off-site soil contamination and/or ground or surface water contamination.

Floods

- The potential exists for the contamination of surface ponds or navigable waterways.

Under the direction of the EC, the following general strategy will be taken by the facility personnel in response to fires, explosions, or an unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to the air, soil, or surface water at the facility (surface water includes that on or above the ground level).

Step 1: Stop and contain the release, diverting flows to auxiliary storage, shutting down the production unit, etc., as appropriate to the specific situation.

Step 2: Treat, store, and/or dispose of the recovered waste, contaminated soil or surface water, etc., as appropriate.

Step 3. Notify local, state, and, if necessary, the federal authorities.

According to 40 CFR Parts 302 and 355, spills of hazardous chemicals must be reported to the following agencies:

- **Washington County Emergency Management Agency (WCEMA)**

  Normal office hours, weekdays - 8:00 a.m. to 4:00 p.m. ..(251) 847-2423
  Washington County Sheriff ....(251) 847-2202
  Danny Overton, Director WCEMA ....(251) 581-0215 (cell)
  Alabama Emergency Management Agency..(205) 280-2200 or (800) 843-0699

- **Alabama Department of Environmental Management (Montgomery)**

  Normal office hours, weekdays - 8:00 a.m. to 5:00 p.m....(334) 271-7700

- **USEPA Region IV**
  Regional Administrator's Office......................................(404) 562-9900 or (800) 241-1754
  Superfund & Emergency Management Division ....(404) 562-8583
  24-Hour Spill Reporting Hotline ....(404) 562-8700

As a matter of convenience or practicality, ADEM's Field Office at Mobile can also be notified as follows:

- **Mobile Field Office (ADEM)**

  Normal office hours, weekdays - 8:00 a.m. to 5:00 p.m....(251) 450-3400
  Emergency Response After-Hours ....(800) 843-0699

  Alabama State Troopers...(251) 660-2300

- **National Response Center**

  24-Hour Oil or Chemical Spill Reporting Number ....(800) 424-8802

- **U.S. Coast Guard**

  Sector Mobile Primary Phone ....(251) 441-5720
  Sector Mobile Emergency Phone ....(251) 441-5976

5.0 Emergency Response and Evacuation Procedures

5.1 Notification

All operating employees are familiar with the fire alarm system. An employee who discovers either a materials release not readily controllable with equipment and materials at hand or a fire must activate the emergency system. The plant telephone system extension 2222 is used to notify key plant personnel about the situation and the recommended plan of action. An audible signal then activates the emergency response and indicates where the emergency is located.

5.2 Containment and Control

Upon arrival, the EC will assess the situation and notify the appropriate management, if needed. They will visually identify the nature, source, amount and extent of any release. If the released material cannot be readily identified, samples will be taken for chemical analysis. In the event of a fire, all ignition sources in the area will be eliminated.

The EC will assess any potential hazards to personnel or the environment and will take all necessary measures to contain any material release. Actions to prevent the recurrence or spread of fires, explosions or releases include: stopping processes and operations; collecting and containing released waste; and/or using a fire hose to keep any drums and trailers cool and wet to protect them from the danger of catching fire.

In addition, if the facility stops operations in response to an emergency, the EC will have valves, pipes, and other equipment monitored for leaks, pressure build-up, gas generation or ruptures, wherever this is appropriate.

If the accident is determined to lie within the company's emergency response capabilities, the EC will contact and deploy the necessary in-plant personnel. If the accident is beyond plant capabilities, the emergency coordinator will contact the appropriate agencies. A list of agencies and phone numbers can be found in section 4.0.

When the situation is under control, the EC will give an "all clear" on the audible signal. The EC will ensure that wastes which may be incompatible with the released material are not treated, stored or disposed of until clean-up procedures are completed.

5.3 Evacuation

Until evacuation is signaled, personnel not in the affected area remain at their assigned work areas. When the incident presents a hazard to human health evacuation of the area will be initiated. Evacuation is initiated only by the EC. Figure 5-1 shows the TSD evacuation routes. All personnel have been instructed in the evacuation procedure, which follows:

Step 1. The Evacuation Leader or designee tells the shift operators, "Emergency - prepare to evacuate the area or to Shelter-In-Place."

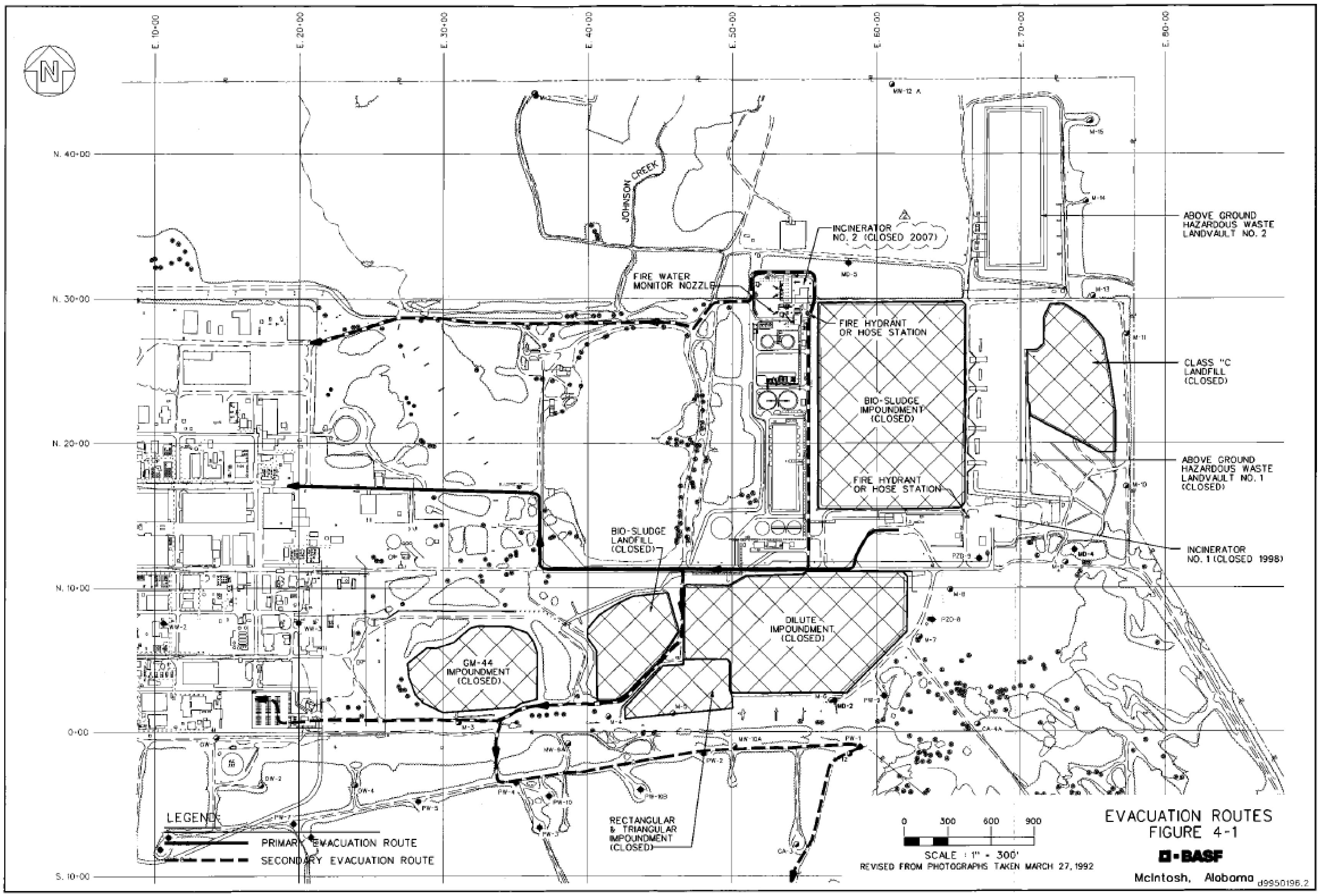
Step 2. Operating personnel carry out emergency shutdown procedures.

Step 3. All personnel go to the designated staging area, which is the training building and conference center or Shelter-In-Place at the A-15 Control Room building, or the Boiler control room in Utilities, when instructed to do so.

Step 4. Any injuries are reported to the evacuation leader or designee. All personnel remain in the appropriate area for further instructions.

Step 5. The evacuation leader or designee reports to the main gate that the evacuation or Shelter-In-Place is accomplished.

Figure 5-1. Evacuation Routes



If the EC determines that the facility has had a release, fire, or explosion which could threaten human health or the environment outside the facility (release of hazardous waste or hazardous waste constituents from the active portion of the facility is defined as such a threat), they must immediately notify the Alabama Emergency Management Agency, the National Response Center, and ADEM, and provide a report which includes:

- Name and telephone number of reporter;
- Name and address of facility;
- Time and type of incident (e.g., release, fire);
- Name and quantity of material(s) involved, to the extent known;
- The extent of injuries, if any; and
- The possible hazards to human health or the environment outside the facility.

If the EC determines that evacuation of local areas may be advisable, the local authorities will immediately be notified, and the IC will be available to help appropriate officials decide whether local areas should be evacuated.

List of Personnel Assigned to the Area
Area Manager
Production and Maintenance Supervisors/Engineers
Operator/Operations Technicians assigned to A, B, C and D shifts
I/E Support Personnel
Analyzer Technicians assigned to A,B,C and D shifts

Personnel responsibilities and job descriptions are presented in greater detail in "Personnel Training."

5.4 Follow-Up Actions

The emergency coordinator will ensure that all emergency equipment is restored to full operational status by the emergency response team prior to resumption of operations. They will also make sure that the cause of the emergency has been eliminated and that cleanup and restoration have progressed at least to the point of not jeopardizing the health and safety of the employees, and that EPA, state, and local authorities have been notified, before permitting resumption of the operations affected by the emergency. A written record will be prepared noting the time, date, and details of any incident that requires implementation of the contingency plan and it will be submitted to the ADEM Director within 15 days after the incident. The report must include:

- Name, address and telephone number of the operator;
- Name, address and telephone number of the facility;
- Date, time and type of incident (e.g., fire, explosion);

- Name and quantity of material(s) involved;
- The extent of injuries, if any;
- An assessment of actual or potential hazards to human health or the environment, where this is applicable; and
- Estimated quantity and disposition of recovered material that resulted from the incident.

6.0 Emergency Equipment

The location of emergency equipment is shown in Figure 6-1. The TSDF has three systems for fire protection. The Boiler #7 Tank Farm has an installed sprinkler system for fire protection. Fire extinguishers are located throughout the facility for immediate use. Fire hydrants are located strategically, and the plant owns and operates a pumper rated at 1000 gpm with two onboard tanks; one contains 500 gallons of water and the other 500 gallons of foam.

Fire extinguishers are either Multi-Purpose Dry Chemical (Type A, B & C) or Halon type. All extinguishers comply with National Fire Code standards for portable fire extinguishers and are inspected at least monthly.

Equipment for use in containing and cleaning up spilled wastes (oil dry, floating booms, and absorbent sheets) is stored in the remediation storage shed located in Area 15, and in Warehouse 212 near Boiler #7.

Emergency eyewash fountains and showers are located throughout the area as indicated in Figure 6-1. Each unit consists of a drench showerhead with a "panic bar"-operated, frost-proof valve, and similarly operated eyewash. The plant also owns, operates, and maintains a fully equipped ambulance with trained drivers for emergency transportation to the local hospitals.

Personnel protective equipment is kept in the safety locker outside of the Area 15 control room building, and outside of the Boiler area control room building. Table 6-1 lists the safety locker supplies, together with all the equipment outlined for use by this plan.

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Figure 6-1. Eyewash Stations, Safety Showers and Emergency Equipment

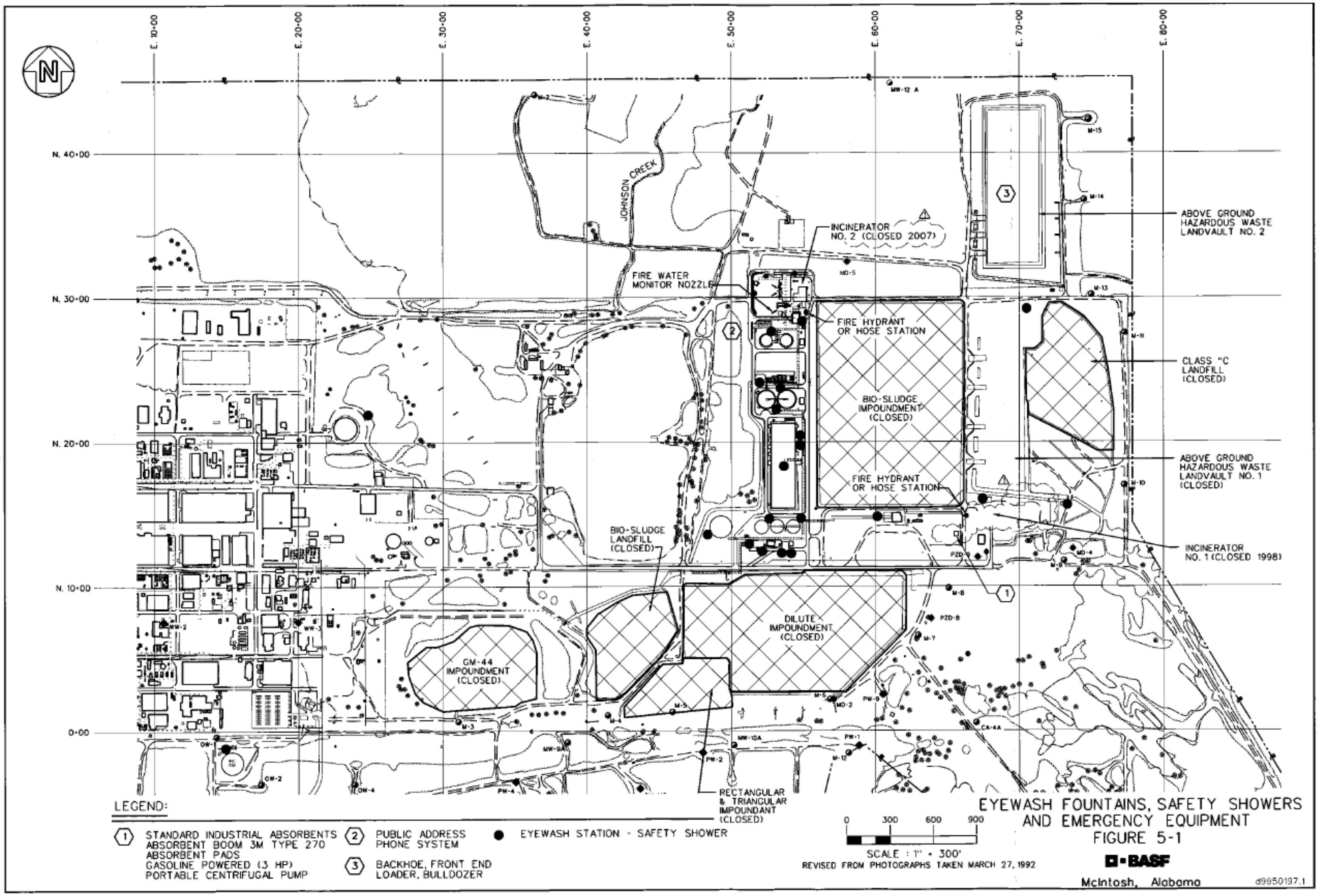

Table 6-1 **Materials and Equipment** **for Spill Containment and Clean-Up**		
Material(s)/Equipment	**Quantity**	**Substance Contained/ Absorbed/Cleaned Up**
Standard industrial absorbents (Oil-Dry)	50 lb. bags, five (5) minimum	For small spills or oil, solvents, aqueous materials; do not use for acids or caustics unless first neutralized
Absorbent boom 3M type 270	≥ 2	In water, most insoluble or slightly soluble organics; most materials on land; do not use for acids
55-gallon drums; steel	Variable	Most organics (steel); caustics, contaminated absorbent materials (lined steel)
Absorbent pads	3M type LSM (12" x 12") all-purpose industrial absorber; 3M type 151 (18" x 18") oil-type absorbent, ($\geq$ 50 pads)	In water, most insoluble or slightly insoluble organics; most materials on land; do not use for acids
Submersible pump	1	Can be used to remove diked liquids, etc.
Backhoe, front-end loader, bulldozer	At least one at the plant site	Used to build temporary dikes and for clean-up of residues, etc.
Plant telephone system		Used for routine and emergency communications; located throughout various offices
Personnel Protective Item		Replacement items are available from the plant safety department.
Coveralls	4 paper	
Aprons, rubberized	6	
Boots, neoprene	2 pair	
Face shield, acrylic	2	
Safety flagging, plastic	4	
Flashlight	2	
Goggles	4 pair	
Hand Cream	1 cans	
Lens Tissue	2 each	
Red Chemical suits	1 each	

7.0 Coordination Agreements

To ensure prompt treatment, arrangements have been made with physicians in Jackson, and Mobile, Alabama for emergency medical care of job-related injuries or illnesses. The physicians will be notified at their office during regular hours. After hours, Greater Mobile Urgent Care, Vaughn Jackson Hospital, Washington County Infirmary, University of South Alabama Medical Center, Mobile Infirmary, Providence Hospital or Springhill Memorial will be notified (including type and number of cases) to ensure the presence of a physician when the patient arrives. Area ambulance services have been contacted regarding their role in the event of an emergency.

Copies of the contingency plan have been given to the following local police, hospitals, and state and local emergency response teams. These organizations were asked to review the plan and comment on their actions in an emergency.

Police and Emergency Response Agencies:

McIntosh Police Department..(251) 944-2973
Washington County Sheriff ....(251) 847-2202
Alabama Highway Patrol..(251) 660-2300
Mobile County Emergency Management Agency .... (251) 460-8000
Washington County EMA..(251) 847-2668

Hospitals:

Vaughn Jackson Medical Center - Jackson ....(251) 246-9021
Greater Mobile Urgent Care- Saraland………………………(251) 633-0123 (Dial 5)
Washington County Hospital - Chatom ....(251) 847-2223
University of South Alabama Medical Center – Mobile ....(251) 471-7300
Springhill Memorial Hospital - Mobile....... (251) 460-5333 (ER) or (251) 344-9630 (Main)
Mobile Infirmary Medical Center ... (251) 431-2620 (ER) or (251) 435-2400 (Main)
Providence Hospital - Mobile .... (251) 266-1900 (ER) or (251) 633-1000 (Main)

APPENDIX G

SITE CHRONOLOGY

BASF McIntosh, AL

BASF McIntosh, AL Site Chronology

Event	Date
Incinerator #1 startup	1972
Initial discovery of problem or contamination	05/01/1979
Pre-NPL responses: Preliminary Assessment Site Inspection Hazard Ranking System Package Proposal to National Priorities List	 10/01/1982 03/05/1983 06/06/1983 09/08/1983
Final Listing on EPA National Priorities List	09/21/1984
Removal actions (ground water treatment)	1987
Remedial Investigation/Feasibility Study (RI/FS)	OU-1, 09/28/1989 OU-2, 09/30/1991 OU-3, 08/1988 OU-4, 07/14/1992
OU-3 Final RI Addendum Report	OU-3, 07/1994
ROD selecting the remedy is signed	OU-1, 09/28/1989 OU-2, 09/30/1991 OU-3, 07/25/1995 OU-4, 07/14/1992
Incinerator #2 startup	1992
ROD Amendments or ESDs	ESD for OU-4, 11/1993
Enforcement documents: RCRA Permit issued Administrative Order on Consent (site-wide) Consent Decree (site-wide) Consent Decree (OU-2), 1st addendum Consent Decree (OU-3) Consent Decree (OU-4)	 10/1985 03/31/1992 11/18/1992, 05/09/1994 & 10/11/1996 11/18/1992, 04/01/1994 06/19/1996 05/09/1994

Remedial design start	OU-1, 09/28/1989 OU-2, 05/26/1992 OU-3, 08/1996 OU-4, 07/12/1993
Environmental Covenants	OU-1 Alluvial Aquifer, 4-Feb-1993, Feb 2016 (Recorded April 18, 2016) OU-1 Miocene Aquifer, Feb 2016 OU-2, May 2001 OU-3 January 2016 OU-4, May 2001
RCRA Closures of SWMUs (refer also to Appendix M for description of SWMUs) *Indicates No Further Action required; other SWMUs closures require post-closure monitoring per Appendix K	#1: Class "C" Landfill (1987) #2: Biological Sludge Landfill (1987) Rectangular/Triangular Pond (1987) Sludge Impoundment No. 1 (1989) Sludge Impoundment No. 2 (1989) Sludge Impoundment No. 3 (1989) Sludge Impoundment No. 4 (1989) 5-Day Impoundment (1989) 10-Day Impoundment (1989) Equalization Impoundment (1989) Dilute Impoundment (1989) Diazinon Destruction Impoundment (1989) GM-44 Impoundment (1989) Aboveground Landvault No. 1 (1991) Aboveground Landvault No. 2 (active) Container Storage Area (1999)* Rotary Kiln Incinerator No. 1 (1999)* Rotary Kiln Incinerator No. 2 (2006)* Tank Farm 1 (V-0700-07, V-1003)* Tank Farm 2 (V-1002, V-2499)* Tank Farm 3 (15-V-091, 15-V-

	092)* Tank Farm 4 (15-V-202, 15-V-203,15-V-204, 15-V-234, 15-V-205) (2006)*
Remedial design complete and approved by EPA	OU-1, 09/28/1989 OU-2, 09/30/1996 OU-3, 10/1997 OU-4, 09/30/1996
Ciba-Geigy becomes Novartis	1996
Novartis becomes Ciba Specialty Chemicals Corporation (CSCC)	1997
Actual Remedial action	OU-1, 09/28/1989 • Approval of Groundwater Pump and Treat OU-2, 09/30/1996 • Excavation of contaminated soil and construction soil thermal treatment unit OU-3, 07/1998 • Sediment removal and thermal cleanup OU-4, 09/30/1996 • Slurry Wall installation
Construction start date (1st clean-up action initiated)	09/28/1989
Incinerator #1 shutdown	1998
OU-4 Slurry wall performance evaluation	March, 2000
Construction completion date	07/19/2000
Preliminary Close-out Report completed	07/19/2000
First Five Year Review	07/29/2001
OU-3 *Gambusia* monitoring conducted after initial remediation	1998-2003

OU-3 Post remedial monitoring report submitted	2004
Second Five Year Review	9/2006
Incinerator #2 Shutdown	3/2006
Final Closure certification (ADEM)	10/2007
OU-3 Explanation of Significant Differences	October 2008
OU-3 second remedy installed (sand cover)	October 2008
Ciba becomes part of BASF	April 2009
Initial *Gambusia* sampling after sand cover installation	6/2009
Continued Post-Construction Monitoring of *Gambusia*	2009-present
Post-construction Inspection of Sand Cover	July 28, 2010
OU-3 Monitoring, Inspection, and Maintenance Report	December 2010
Third Five Year Review	September 2011
OU-3 Remedial Action Report	September 2014
OU3 Environmental Covenant	January 2016
Draft RCRA Facility Assessment (RFA) Report	August 2016
Fourth Five Year Review	September 2016
RCRA Permit Renewed	May 2017
Installation of Interim Action Alluvial extraction well PW-11 BASF OU3 Explanation of Significant Differences	June 2019
USEPA-R5 Draft Optimization Reports for OUs 1, 2, 3 & 4	November 2019
Miocene Vertical Aquifer Sampling Investigation Report	January 2020

APPENDIX H

ABOVEGROUND LANDVAULT NO. 2

BASF McIntosh, AL

Aboveground Landvault No. 2

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Aboveground Landvault No. 2

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Aboveground Landvault No. 2

1.0 General

BASF currently operates a hazardous waste landvault, the Above Ground Hazardous Waste Landvault No. 2 (HWLV2), at the McIntosh facility for disposal of treated wastes. The waste disposed of at HWLV2 primarily consists of incinerator residues (ash, slag and refractory), hazardous and/or non-hazardous solids from the on-site water and waste water treatment systems, and fill for stabilization.

An engineering report describing the landvault design, construction, operation and maintenance has been prepared by GeoServices, Inc. of Norcross, Georgia as a supporting document to this permit application. The Engineering Report contains detailed specifications, calculations, drawings and assumptions to support the landvault design. Selective information pertinent to this permit application has been extracted from the Engineering Report to fulfill requirements of Alabama Department of Environmental Management (ADEM) Administrative Code R 335-14-5-.14 and 14-8-.02, as well as the United States Environmental Protection Agency (USEPA) regulations in 40 CFR 264 and 270.

1.1 Above Ground Landvault Concept

The Above Ground Hazardous Waste Landvault No. 2 (HWLV2) has been designed after careful consideration of regulatory requirements and Ciba's operational experience with the closed Above Ground Hazardous Waste Landvault No. 1 (HWLV1). The location of HWLV2 is shown on Figure 1-1. The above ground landvault concept includes two fundamental elements, including: (1) encapsulating the deposited wastes in an engineered system of synthetic and natural material barriers; and, (2) incorporating a leak detection system which is capable of detecting waste constituents before they migrate into the subsurface. The above ground landvault is essentially a sealed envelope consisting of composite liner floor systems supported by prepared foundations and surrounded by embankments. The landvault is covered by a composite cap system with permeability equal to the floor system.

The above ground landvault concept was initially applied at BASF, McIntosh in the design and construction of the HWLV1. HWLV1 was successfully operated at BASF from 1984 until final closure in 1991. The operational experience with the landvault has provided information which has been used to refine the design of HWLV2. The design improvements incorporated in the HWLV2 also include technological features which have only recently been developed.

The combination of experience and improved technology has resulted in a design which ensures the protection of human health and the environment. The landvault design meets or exceeds minimum technology requirements specified in the RCRA rules and EPA guidance.

A brief discussion of the principal design improvements incorporated in HWLV2 is presented below:

- The leachate collection and leak detection systems of adjacent cells are hydraulically isolated from each other by intercell berms. The hydraulic isolation of each berm compartmentalizes the landvault, allowing cell-by-cell monitoring of leachate flows and leak detection systems.

- The leachate collection and leak detection systems are constructed with a minimum slope of 2 percent in all directions. Sloping the systems in all directions provides improved fluid collection and removal characteristics over the previous single direction slope design.

- The compacted clay layer components of the cap and secondary liner are located immediately below the geomembranes. Positioning the clay below the geomembrane reduces the potential for damaging the synthetic liners during construction. Locating the compacted clay beneath the geomembrane in the secondary composite liner system isolates the clay from the leak detection system. Thus, moisture that may be released from the clay during consolidation under the waste load will not enter the leak detection system.

- The primary composite liner system on the floor of the landvault consists of an 80 mil HDPE geomembrane overlying a prefabricated bentonite mat. The prefabricated bentonite mat provides a secondary barrier acting to "heal" leaks that may develop in the flexible membrane liner.

- The HWLV2 is designed to minimize leachate collection and leak detection system pipe penetrations. Though the piping will effectively convey leachate, the reduced number of penetrations through the geomembrane decreases the potential for landvault leaks that may occur at penetrations.

1.2 Cell Description

The HWLV2 is approximately 600 feet wide and 1300 feet long, and occupies approximately 780,000 ft^2 (18 acres). The HWLV2 is divided into nine lined cells, as shown on Figure 1-2. Cells 1 and 9 are approximately 159 feet wide and 392 feet long and have an approximate lined plan area of 62,300 ft^2 (1.4 acres). Cells 2 through 8 are approximately 110 feet wide and 392 feet long and have an approximate lined plan area of 43,100 ft^2 (0.99 acre).

Figure 1-1. TSD Plot Plan, Land Vault #2

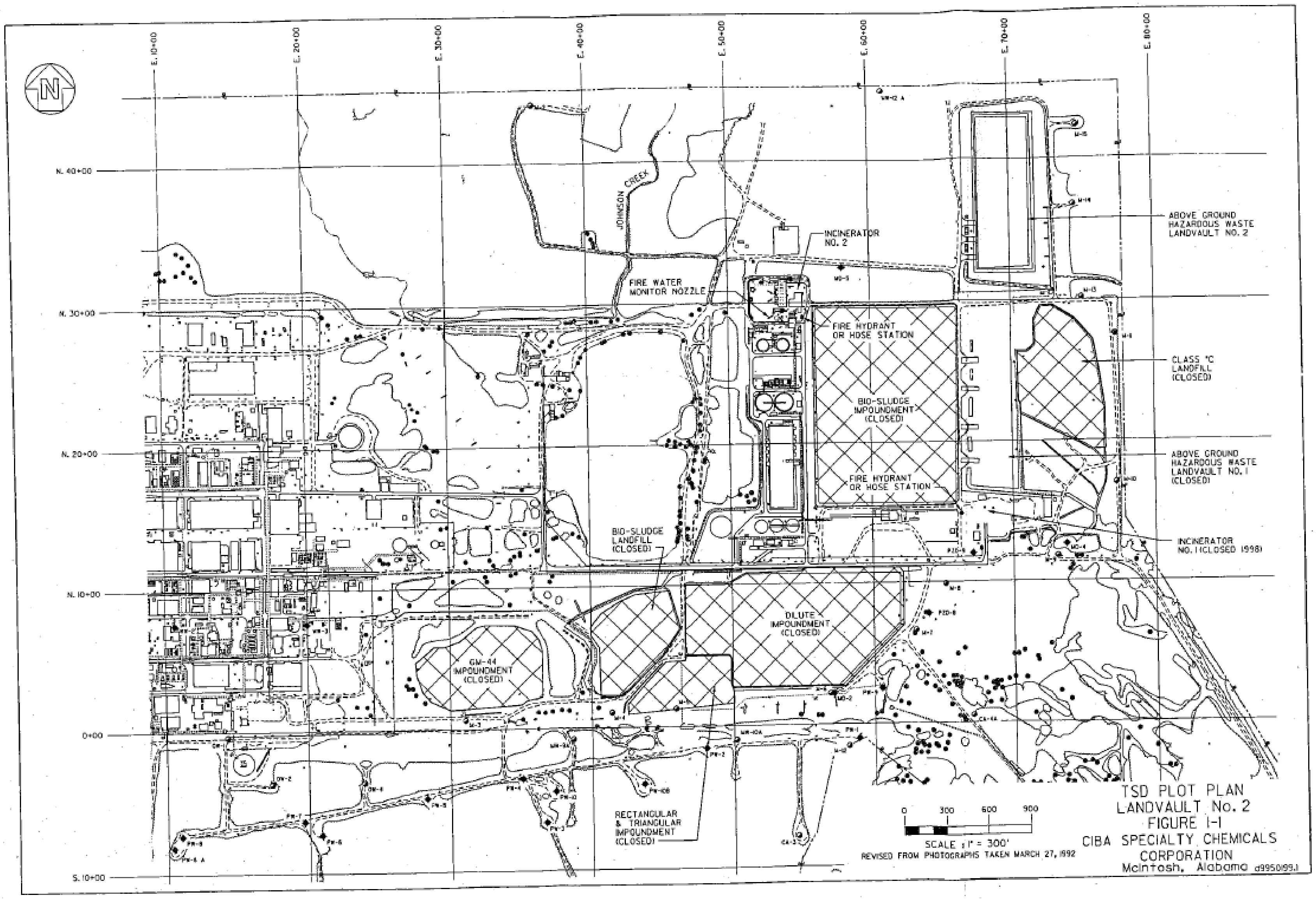
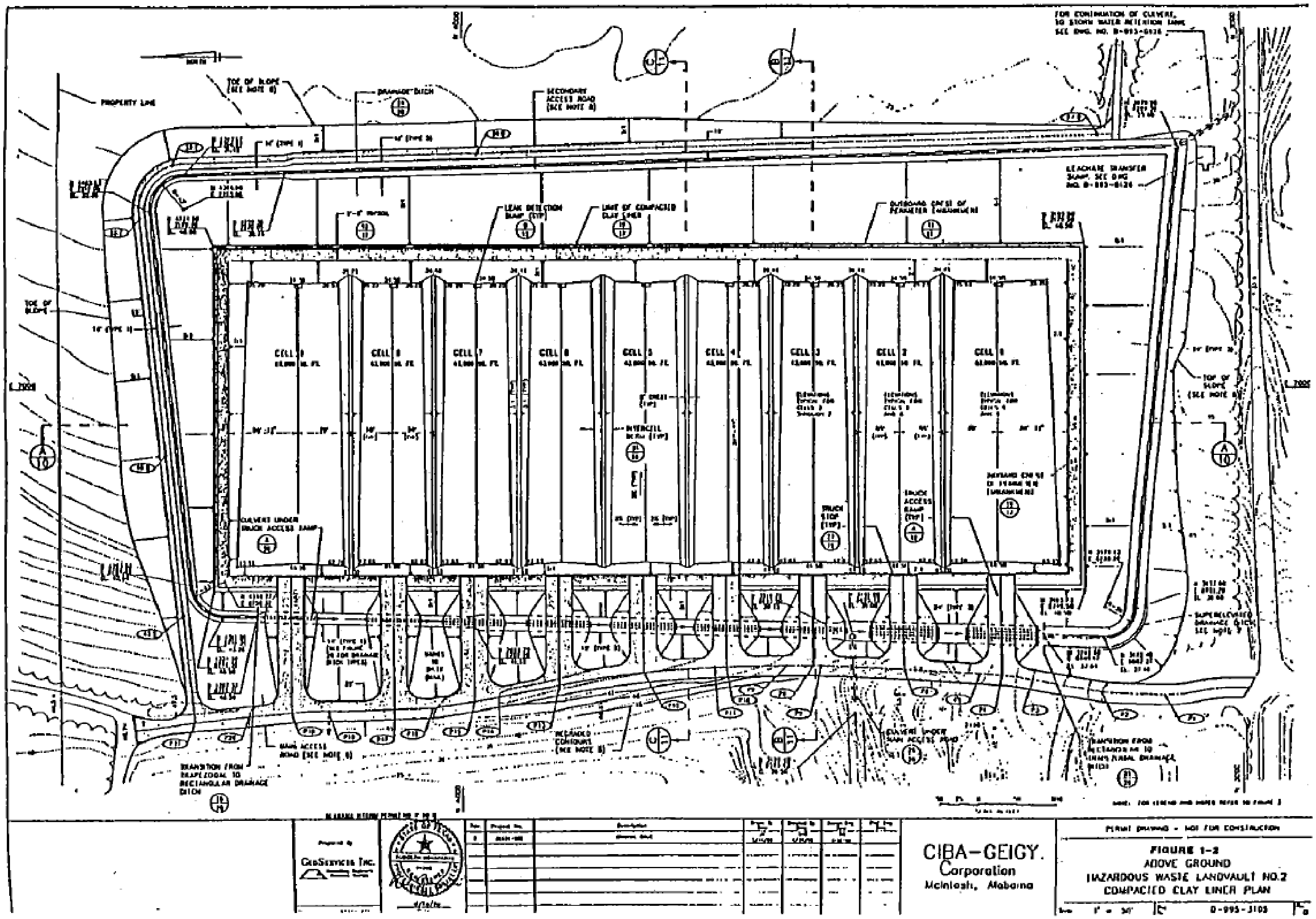


Figure 1-2. Above Ground hazardous Waste Landvault No. 2 Compacted Clay Liner Plan



The elevations of the bottom of the compacted clay component of the secondary liner range from approximately 31.5 to 38.5 ft above BASF datum. (BASF datum is 2.15 ft. below the National Geodetic Vertical Datum (NGVD) elevation.) All elevations are referenced to the BASF datum). The final cover elevations will range from 48.5 to 72.8 ft. The maximum height of the landfilled waste will be approximately 25.9 feet.

1.3 Expected Life

The HWLV2 is being constructed in three phases. Three cells were constructed in each phase beginning with Cells 1 through 3 on the southern end of the landvault, which were constructed in 1992 (Figure 1-3). Cells 4 through 6 and Cells 7 through 9 will be constructed and filled as Phase II and Phase III, respectively. Each construction phase will provide a volume of approximately 96,000 c.y. for a total landvault volume of approximately 290,000 c.y. Each additional phase in addition to phase #1 will have individual closures involving a single top encapsulation covering the three cells of each phase (Figure 1-4).

The landvault will have a projected active life exceeding 30 years considering the anticipated waste disposal rates.

2.0 Waste Description

2.1 Identification

BASF has been depositing wastes in HWLV2 including: sludges and residues from the on-site water and waste water treatment systems, cooling tower sludges, contaminated dirt and other excavation debris (i.e. concrete, etc). The stabilized sludge could be designated RCRA "hazardous" as a result of the "mixture rule". The sludges could be Toxicity Characteristic D004 through D043 wastes in addition to being hazardous waste as a result of the "derived from" and “mixture” rules. Table 2-1 lists the potential hazardous waste constituent name along with the EPA hazardous waste identification number associated with the sludges. BASF also places non-hazardous materials in HWLV2 for use in achieving required geotechnical characteristics.

Finally, BASF places solid residues from the sump used to manage leachate from both HWLV1 and HWLV2. The leachate management system, which includes the activated carbon treatment system, is a closed system in which solid residues cannot be removed on a regular basis. These residues include particles suspended in the leachate and spent carbon generated during replacement of the activated carbon. Periodically, BASF removes solids from the sump, dewaters the solids so to satisfy the requirements of the paint-filter test, and samples the solids to verify compliance with the land disposal restrictions. If all requirements are satisfied, the solids are placed in HWLV2.

Figure 1-3. Above Ground Hazardous Waste Landvault No. 2 Phase and Development Plan

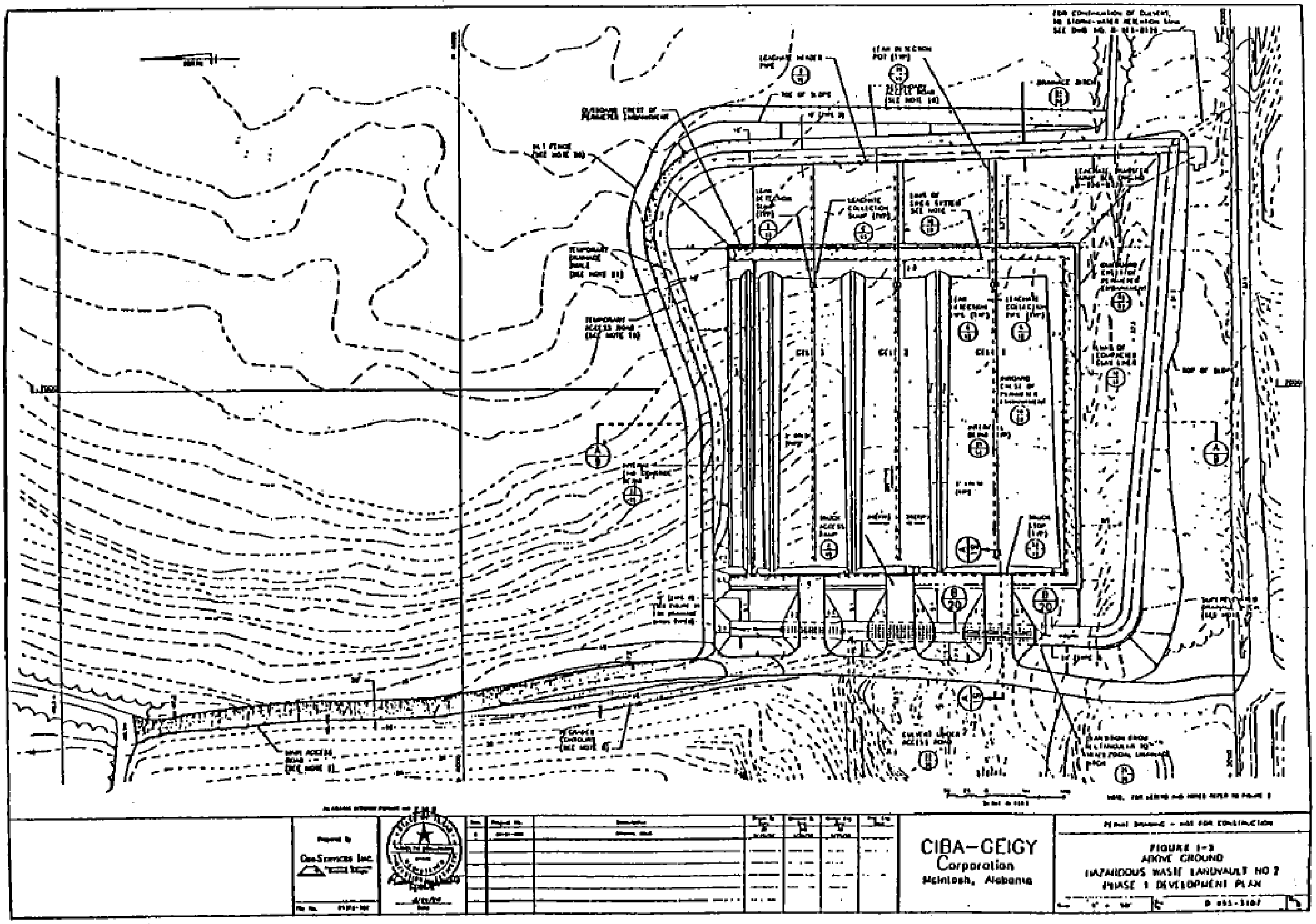


Figure 1-4. Above Ground Hazardous Waste Landvault No. 2 Section A-A Final Grading Plan.

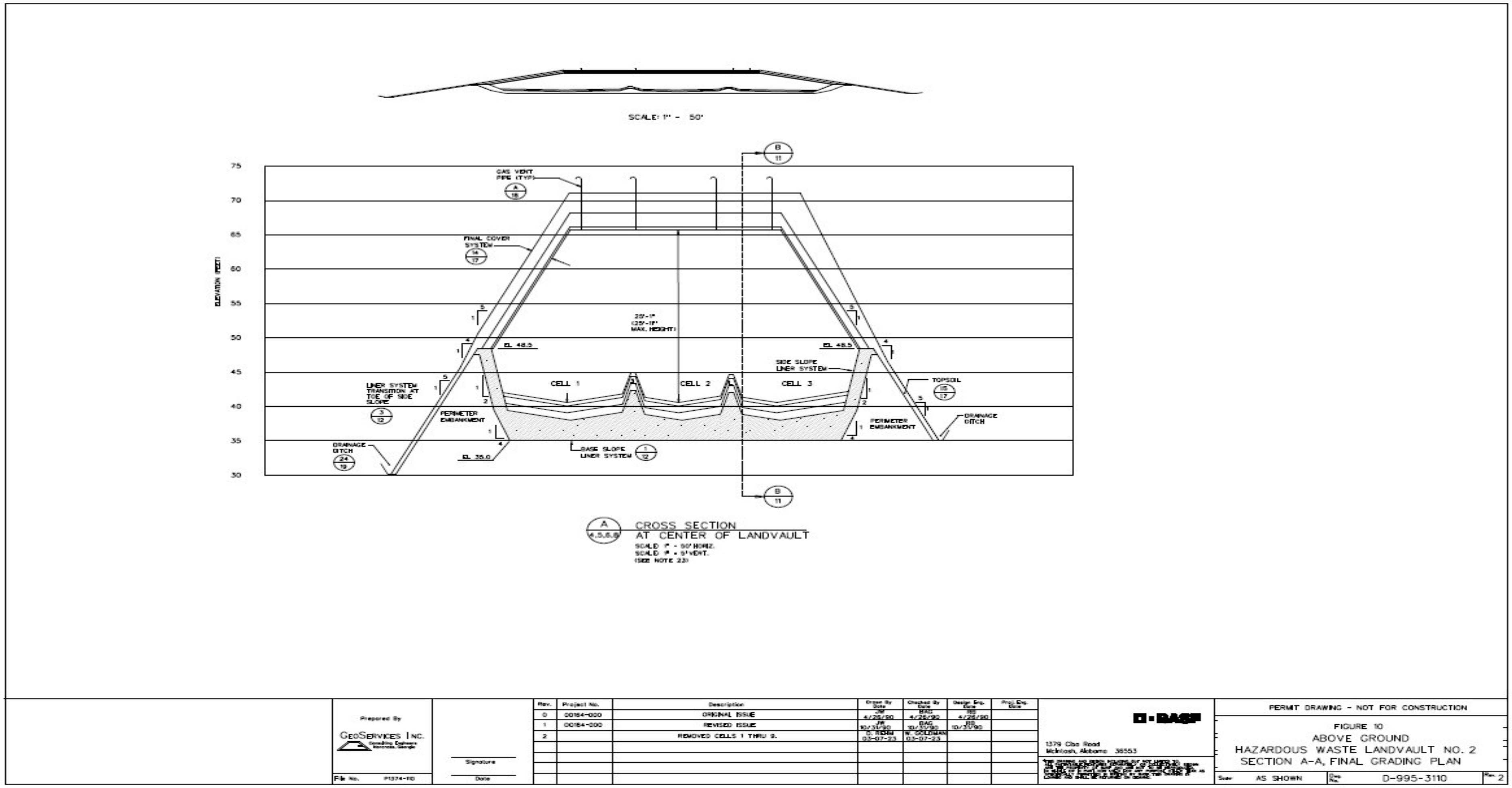


Table 2-1

Potential Hazardous Waste Constituents

Waste Code	Material	Waste Code	Material
D001	Ignitable	U019	Benzene
D004	Arsenic	U023	Benzotrichloride
D005	Barium	U031	1-Butanol
D006	Cadmium	U037	Chlorobenzene
D007	Chromium	U038	Chlorobenzilate
D008	Lead	U041	1-Chloro-2,3-epoxypropane
D009	Mercury	U044	Chloroform
D010	Selenium	U052	Cresols/Cresylic Acid
D011	Silver	U056	Cyclohexane
D013	Lindane	U057	Cyclohexanone
D018	Benzene	U069	Di-n-butyl Phthalate
D019	Carbon tetrachloride	U070	o-Dichlorobenzene
D020	Chlordane	U077	1,2-Dichloroethane
D021	Chlorobenzene	U083	1,2-Dichloropropane
D022	Chloroform	U088	Diethyl Phthalate
D023	o-Cresol	U091	3,3'-Dimethoxybenzidine
D024	m-Cresol	U092	Dimethylamine
D025	p-Cresol	U095	3,3'-Dimethylbenzidine
D026	Cresol	U103	Dimethyl Sulfate
D027	1,4 Dichlorbenzene	U108	1,4 Dioxane
D028	1,2 Dichloroethane	U112	Ethyl Acetate
D030	2,4 Dinitrotoluene	U113	Ethyl Acrylate
D034	Hexachloroethane	U122	Formaldehyde
D035	Methyl Ethyl Ketone	U123	Formic Acid
D036	Nitrobenzene	U131	Hexachloroethane
D038	Pyridine	U133	Hydrazine
D039	Tetrachloroethylene	U140	Isobutyl Alcohol
D040	Trichloroethylene	U147	Maleic Anhydride
F001	Halogenated Solvent	U154	Methanol
F002	Halogenated Solvent	U156	Methyl Chlorocarbonate
F003	Non-Halogenated Solvent	U159	Methyl Ethyl Ketone
F004	Non-Halogenated Solvent	U160	MEK Peroxide
F005	Non-Halogenated Solvent	U161	Methyl Isobutyl Ketone
F039	Multi-Source Leachate	U162	Methyl Methacrylate
P005	Allyl Alcohol	U165	Naphthalene
P024	p-Chloroaniline	U169	Nitrobenzene
P030	Cyanides	U188	Phenol
P033	Cyanogen Chloride	U194	n-Propylamine
P054	Ethylenimine	U196	Pyridine
P063	Hydrogen Cyanide	U210	Perchloroethylene
U002	Acetone	U211	Carbon Tetrachloride
U003	Acetonitrile	U213	Tetrahydrofuran
U006	Acetyl Chloride	U219	Thiourea
U007	Acrylamide	U220	Toluene
U008	Acrylic Acid	U226	1,1,1-Trichloroethane
U009	Acrylonitrile	U228	Trichloroethylene
U012	Aniline	U239	Xylene

2.2 Volume

BASF has evaluated current waste generation rates and projections for future rates considering planned manufacturing plant expansions. Based on the evaluation, BASF has projected annual waste disposal rates for the HWLV2. Based on current waste production levels more than 20,000,000 pounds of waste material could be placed in the landvault annually. This projection includes biological sludge (12.5% solids) that may be placed in the landvault.

Estimated monthly average, minimum, and maximum volumes of waste that may be landfilled are listed below:

- Average 100,000 lbs.
- Minimum 0 lbs.
- Maximum 2,000,000 lbs.

3.0 Liner System And Leachate Collection And Removal System

3.1 General

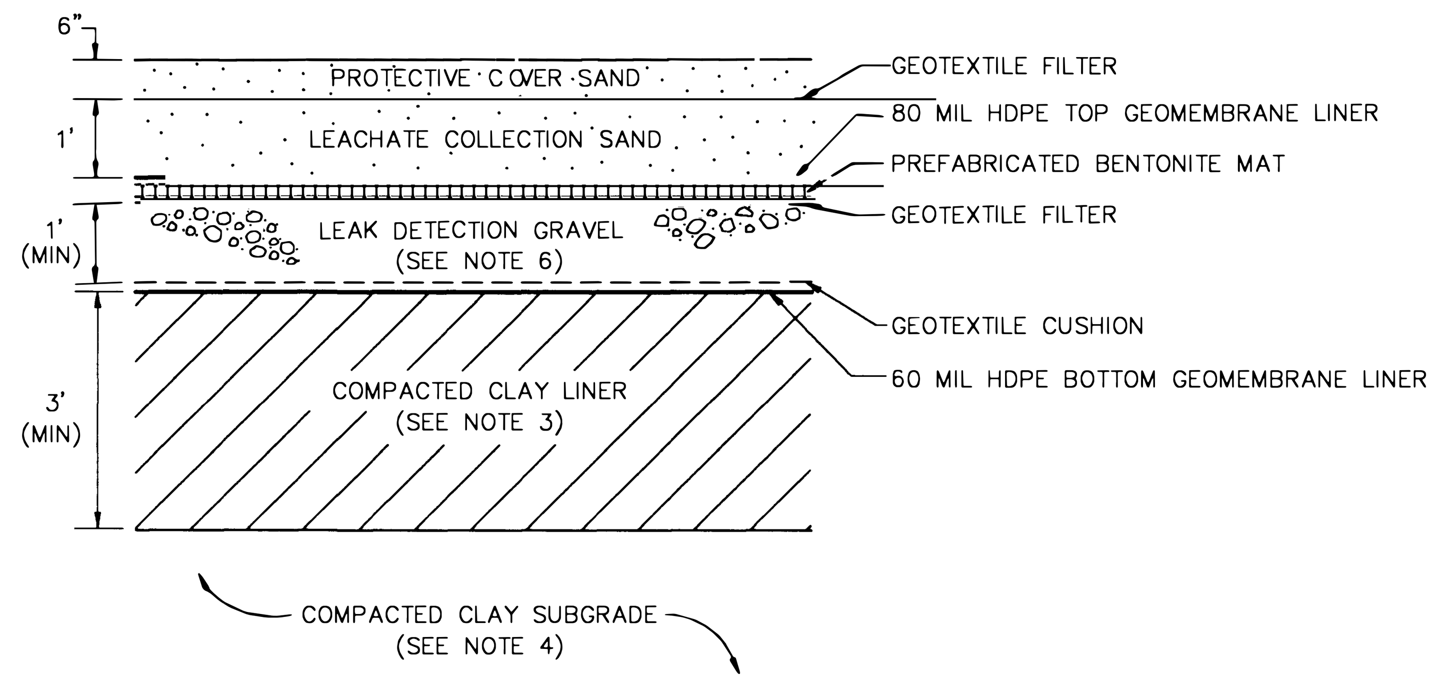
The HWLV2 is constructed with a double liner system. This liner system includes composite liners. There is a leachate collection system above the primary (top) liner and a leak detection collection system between the two liners. The landvault liner system details are shown on Figures 3-1 and 3-2. The HWLV2 liner system consists of three basic components: (1) the landvault floor; (2) sidewalls; and, (3) cover. The composition of each component is itemized below:

<u>Landvault Floor (From top to bottom)</u>

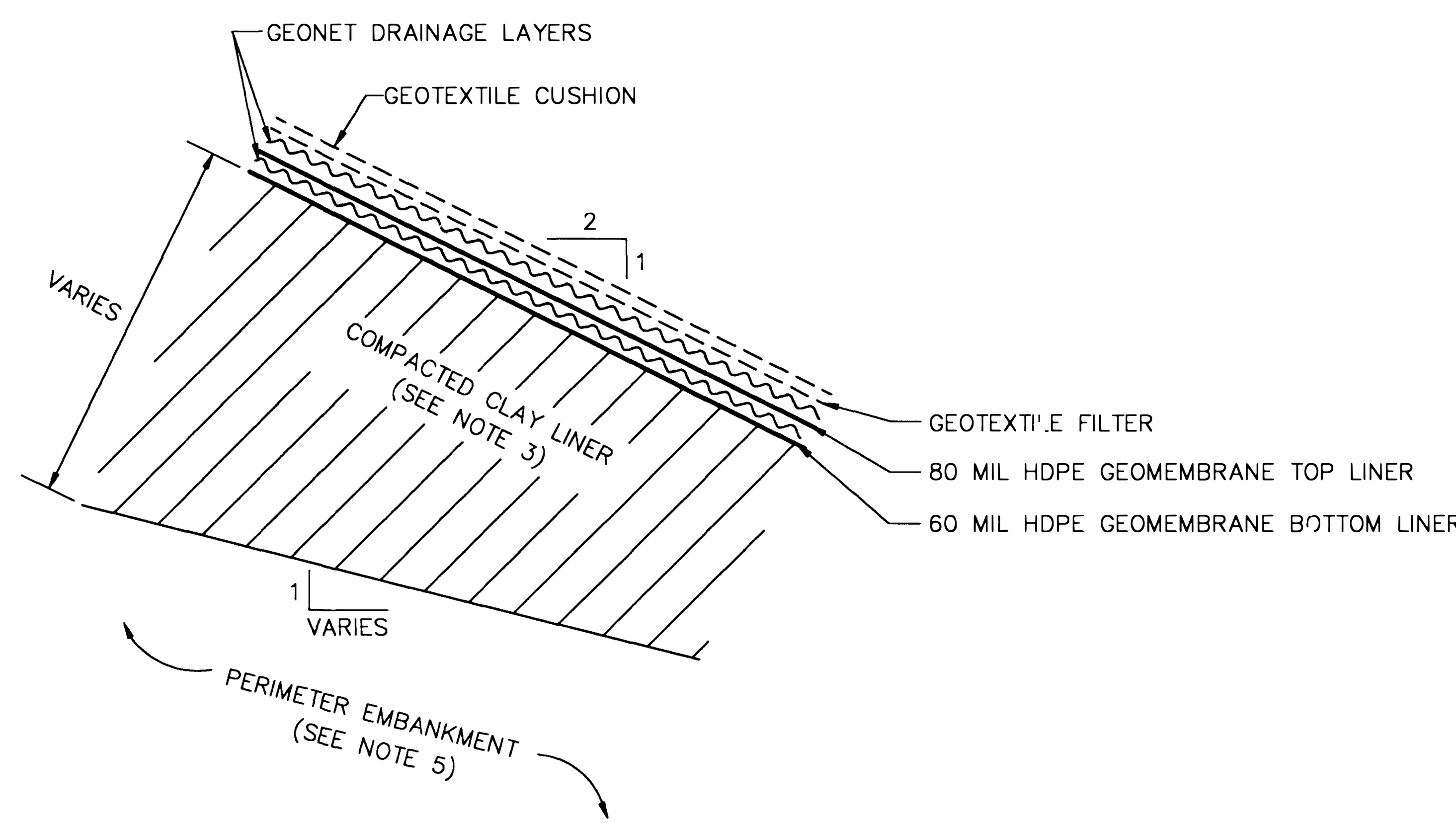
- 6-in (0.15-m) thick protective sand cover layer;
- 10 oz/yd^2 (340 g/m^2) non-woven geotextile filter layer;
- leachate collection system consisting of a 12 in. (0.3-m) thick leachate collection sand layer and a system of perforated collection pipes;
- 80-mil (2-mm) thick HDPE geomembrane primary liner;
- prefabricated bentonite mat;
- 10 oz/yd^2 (340 g/m^2) non-woven geotextile separator layer;
- leak detection system consisting of a 12- to 14-in. (0.3-m) thick leak detection gravel layer and a system of perforated collector pipes;
- 16 oz/yd^2 (540 g/m^2) non-woven geotextile cushion;
- 60-mil (1.5-mm) thick HDPE geomembrane secondary liner; and
- 3-ft (0.9-m) thick (minimum) low-permeability compacted clay liner.

The landvault floor liner system is constructed over a 24-inch thick (minimum) compacted clay foundation.

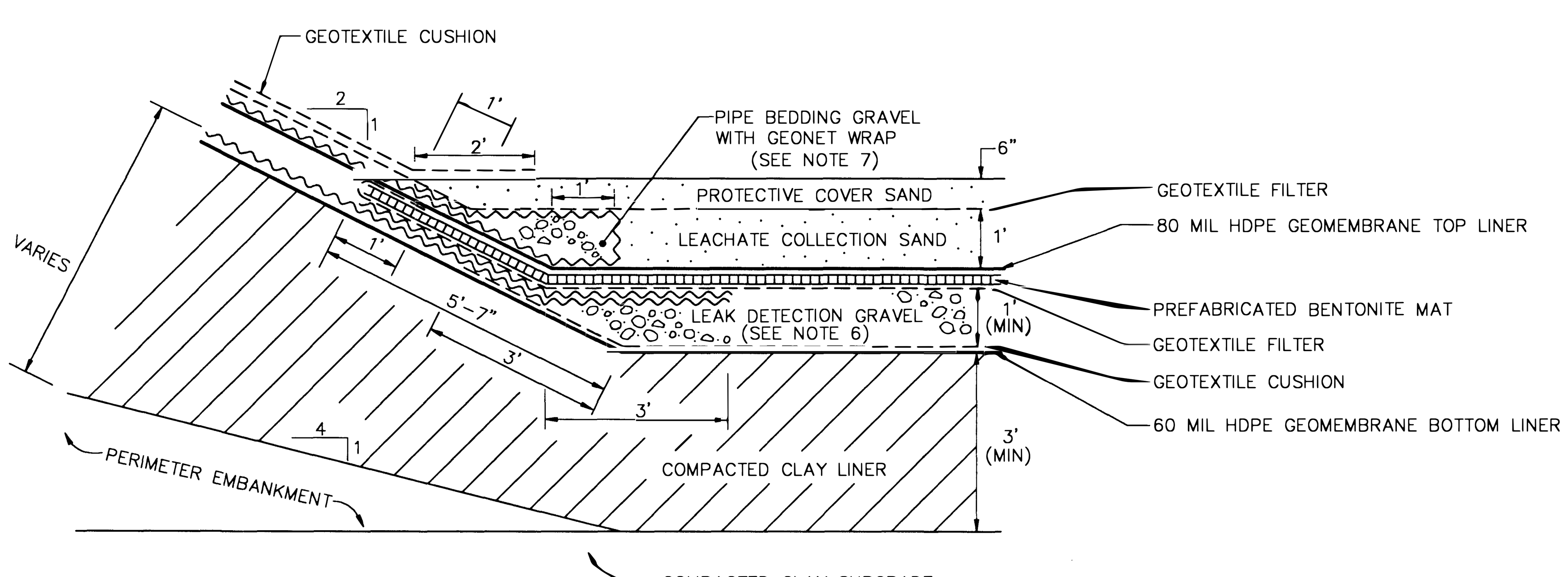
Figure 3-1. Above Ground Hazardous Waste Landfill No. 2 Liner System Details



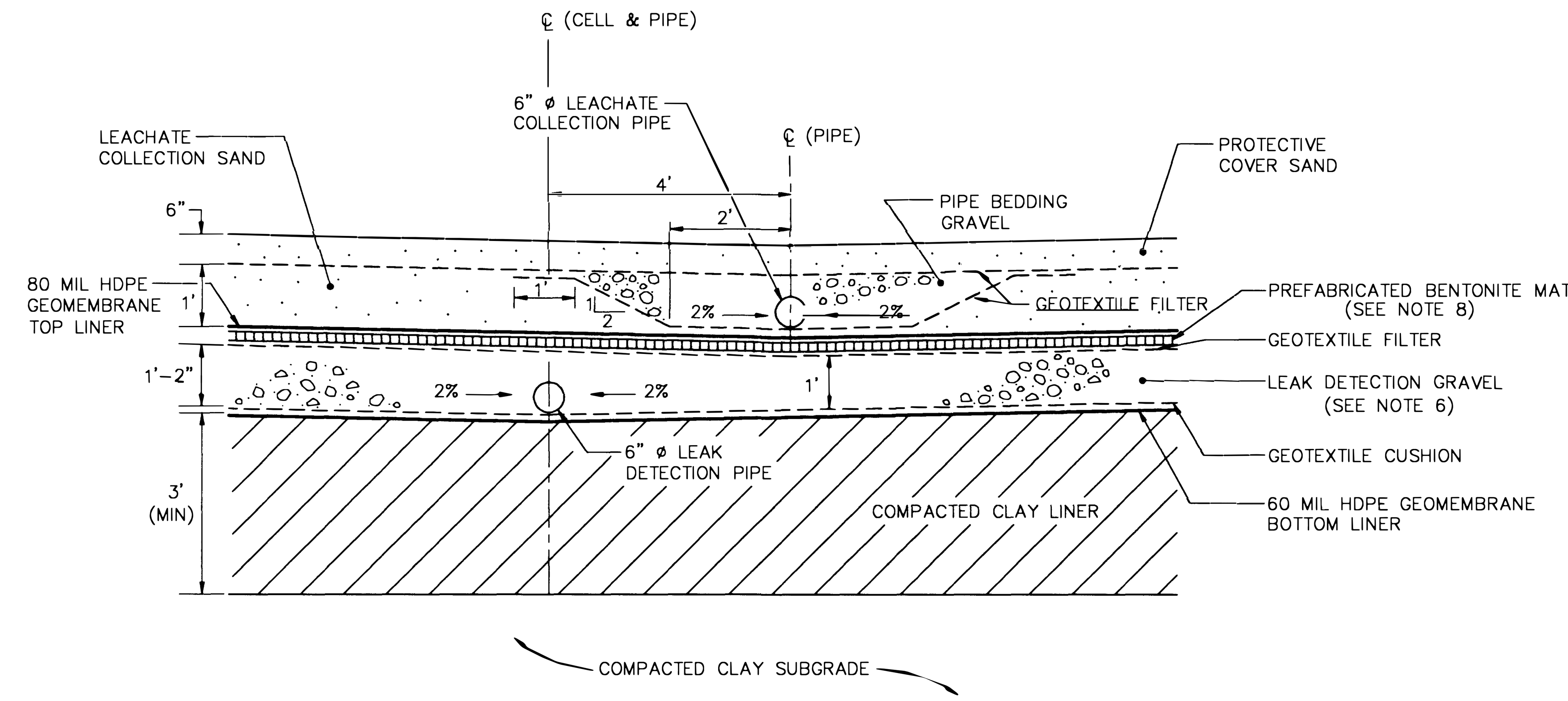
1 — 9,10,11 DETAIL
LINER SYSTEM ON BASE OF LANDVAULT
SCALE: 1" = 2' (SEE NOTE 1)



2 — 9,10 11,17 DETAIL
LINER SYSTEM ON SIDE SLOPE OF LANDVAULT
SCALE: 1" = 2' (SEE NOTE 1)



3 — 9,10,11 DETAIL
LINER SYSTEM TRANSITION AT TOE OF SIDE SLOPE
SCALE: 1" = 2' (SEE NOTE 1)



4 / 6 DETAIL
LEACHATE COLLECTION PIPE AND LEAK DETECTION PIPE
SCALE: 1" = 2' (SEE NOTE 1)

NOTES:

1. DETAILS ARE SHOWN TO THE SCALE NOTED EXCEPT FOR THE GEOSYNTHETICS; THESE ARE SHOWN WITH EXAGGERATED THICKNESS FOR CLARITY.

2. THE POTENTIAL MANUFACTURERS AND PRODUCTS DESCRIBED IN THE LINER SYSTEM AND COVER SYSTEM COMPONENT SCHEDULE MAY MEET THE DETAILED MATERIAL REQUIREMENTS OF THE PROJECT SPECIFICATIONS AND ARE LISTED HEREIN FOR CONVENIENCE ONLY. FOR ALL MATERIALS, IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO SHOW STRICT COMPLIANCE OF THE PRODUCTS WITH THE PROJECT SPECIFICATIONS. THE CONTRACTOR WILL BE REQUIRED TO PROVIDE QUALITY CONTROL CERTIFICATES THAT DEMONSTRATE STRICT COMPLIANCE.

3. THE COMPACTED CLAY LINER WILL BE PLACED IN 6 in. LIFTS AND COMPACTED TO AT LEAST 95% OF THE CLAY'S MAXIMUM DRY DENSITY, AS DETERMINED IN THE STANDARD PROCTOR COMPACTION TEST (ASTM D-698), AT A WATER CONTENT EQUAL TO OR GREATER THAN ITS' STANDARD PROCTOR OPTIMUM WATER CONTENT. THE MAXIMUM HYDRAULIC CONDUCTIVITY OF THE COMPACTED CLAY LINER WILL BE 1 X 10^{-7} cm/s. THE TOP SURFACE OF THE COMPACTED CLAY LINER WILL BE TREATED WITH PRAMITOL SOIL STERILANT, OR APPROVED EQUAL, APPLIED AT A RATE OF 20 lb/acre OR AS SPECIFIED BY THE MANUFACTURER.

4. WITHIN THE FOOTPRINT OF THE OUTBOARD LIMITS OF THE PERIMETER EMBANKMENT, THE IN-SITU NATIVE SOILS WILL BE EXCAVATED TO THE DEPTH OF MEDIUM TO STIFF CLAY, AS REQUIRED BY THE PROJECT SPECIFICATIONS. THE OVEREXCAVATED AREA WILL BE BACKFILLED TO THE GRADE OF THE BOTTOM OF THE COMPACTED CLAY LINER AND BOTTOM OF THE PERIMETER EMBANKMENT WITH A COMPACTED CLAY SUBGRADE MATERIAL MEETING THE PROJECT SPECIFICATIONS. THE CLAY SUBGRADE WILL BE PLACED IN 6 in. (COMPACTED THICKNESS) LIFTS AND COMPACTED TO AT LEAST 95% OF THE SUBGRADE SOIL'S MAXIMUM DRY DENSITY, AS DETERMINED BY THE STANDARD PROCTOR COMPACTION TEST (ASTM D-698), AT A WATER CONTENT GREATER THAN OR EQUAL TO ITS' STANDARD PROCTOR OPTIMUM WATER CONTENT.

5. THE PERIMETER EMBANKMENT WILL BE CONSTRUCTED USING EITHER COHESIVE OR GRANULAR FILL MATERIALS MEETING THE REQUIREMENTS OF THE PROJECT SPECIFICATIONS. COHESIVE FILL MATERIAL WILL BE COMPACTED TO AT LEAST 95% OF ITS' MAXIMUM DRY DENSITY AS MEASURED IN THE STANDARD PROCTOR COMPACTION TEST (ASTM D-698). GRANULAR FILL MATERIAL WILL BE COMPACTED TO A MINIMUM RELATIVE DENSITY OF 85% AS DETERMINED BY ASTM D-2049.

6. DUE TO THE 4 ft OFFSET BETWEEN THE LEACHATE COLLECTION AND LEAK DETECTION PIPES, THE THICKNESS OF THE LEAK DETECTION GRAVEL INCREASES FROM 1' TO 1'-2" BETWEEN THE CENTERLINES OF THE PIPES. THIS RESULTS IN A LEAK DETECTION GRAVEL THICKNESS OF 1' ON ONE SIDE OF THE BASE OF EACH LANDVAULT CELL AND 1'-2" ON THE OTHER SIDE.

7. THE PIPE BEDDING GRAVEL WITH GEONET WRAP WILL BE TIED INTO THE LEACHATE COLLECTION PIPE BEDDING GRAVEL THROUGH AN OPENING IN THE GEOTEXTILE FILTER LAYER THAT SEPERATES THE LEACHATE COLLECTION SAND FROM THE PIPE BEDDING GRAVEL.

8. THE PREFABRICATED BENTONITE MAT WILL BE PLACED IN AN UNHYDRATED STATE AND WILL BE KEPT IN AN UNHYDRATED STATE UNTIL THE LEACHATE COLLECTION SAND IS PLACED OVER IT.

LINER SYSTEM AND COVER SYSTEM COMPONENT SCHEDULE
(SEE NOTE 2)

GEOSYNTHETICS

COMPONENT	POTENTIAL MANUFACTURERS AND PRODUCTS
HDPE GEOMEMBRANE TOP LINER, HDPE GEOMEMBRANE CAP	GUNDLE LINING SYSTEMS, GUNDLINE HD80 NATIONAL SEAL CO., HDPE 80 MIL, POLY-FLEX, INC., HDPE 80 MIL, OR APPROVED EQUAL
HDPE GEOMEMBRANE BOTTOM LINER	GUNDLE LINING SYSTEMS, GUNDLINE HD60 NATIONAL SEAL CO., HDPE 60 MIL, POLY-FLEX, INC., HDPE 60 MIL, OR APPROVED EQUAL
GEONET DRAINAGE LAYER	NATIONAL SEAL CO., PN-3000, TENSAR CORP., DN-4, OR APPROVED EQUAL
GEOTEXTILE CUSHION	AMOCO FABRICS AND FIBERS CO., AMOCO 4516, POLYFELT INC., TS 1000, OR APPROVED EQUAL
GEOTEXTILE FILTER	AMOCO FABRICS AND FIBERS CO., AMOCO 4510, POLYFELT INC., TS 750, OR APPROVED EQUAL

PREFABRICATED BENTONITE MAT

COMPONENT	POTENTIAL MANUFACTURERS AND PRODUCTS
PREFABRICATED BENTONITE MAT	JAMES CLEM CORP., CLAYMAX OR APPROVED EQUAL ($k < 10^{-9}$ cm/s)

SOILS

COMPONENT	MATERIAL SPECIFICATION
PREFABRICATED BENTONITE MAT	JAMES CLEM CORP., CLAYMAX OR APPROVED EQUAL ($k < 10^{-9}$ cm/s)
COMPACTED CLAY LINER AND COMPACTED CLAY CAP	ON SITE OR IMPORTED CLAY • USCS CLASSIFICATION: CL OR CH • MAX LIQUID LIMIT = 70 • MIN PLASTICITY INDEX = 15 • MAX PARTICLE SIZE = 1/4 in. • HYDRAULIC CONDUCTIVITY: $k < 10^{-7}$ cm/s
LEACHATE COLLECTION SAND, PROTECTIVE COVER SAND, AND GAS VENTING SAND	NATURAL OR PROCESSED QUARTZ SAND • USCS CLASSIFICATION: SW OR SP • U.S. SIEVE NO. 200: < 1% PASSING • MAX PARTICLE SIZE = 3/8 in. • HYDRAULIC CONDUCTIVITY: $k > 1 \times 10^{-1}$ cm/s
LEAK DETECTION GRAVEL AND PIPE BEDDING GRAVEL	AASHTO NO. 8 AGGREGATE OR APPROVED EQUAL ($k > 1$ cm/s)
TOPSOIL	ON SITE OR IMPORTED SOIL • USDA CLASSIFICATION: UPPER 6 in. WILL BE SANDY LOAM. REMAINDER WILL BE SANDY LOAM, CLAY LOAM, OR SANDY CLAY LOAM, OR LOAM.

PIPES

COMPONENT	POTENTIAL MANUFACTURERS AND PRODUCTS
LEACHATE COLLECTION PIPE	PHILLIPS DRISCOPIPE INC., HDPE 6" ø SDR-13.5, OR APPROVED EQUAL
LEAK DETECTION PIPE	PHILLIPS DRISCOPIPE INC., HDPE 6" ø SDR-13.5, OR APPROVED EQUAL
COVER SYSTEM STORM-WATER COLLECTION AND DISCHARGE PIPES	PHILLIPS DRISCOPIPE INC., HDPE 3" ø SDR-13.5, OR APPROVED EQUAL
COVER SYSTEM GAS COLLECTION AND VENT PIPES	PHILLIPS DRISCOPIPE INC., HDPE 3" ø SDR-13.5, OR APPROVED EQUAL

Prepared By
GEOSERVICES INC.
Consulting Engineers
Norcross, Georgia

File No. P1374-112

ALABAMA REGISTERED No. 17793 PROFESSIONAL ENGINEER RUDOLPH BONAPARTE
Rudolph Bonaparte
Signature
6-11-1990
Date

Rev.	Project No.	Description	Drawn By Date	Checked By Date	Design Eng. Date	Proj. Eng. Date
0	00164-000	ORIGINAL ISSUE	DCS 4/26/90	BAG 4/26/90	RB 4/26/90	
1	00164-000	REVISED ISSUE (FOR CONSTRUCTION)	DCS 10/31/90	BAG 10/31/90	RB 10/31/90	W SCHEIL 4-3-91

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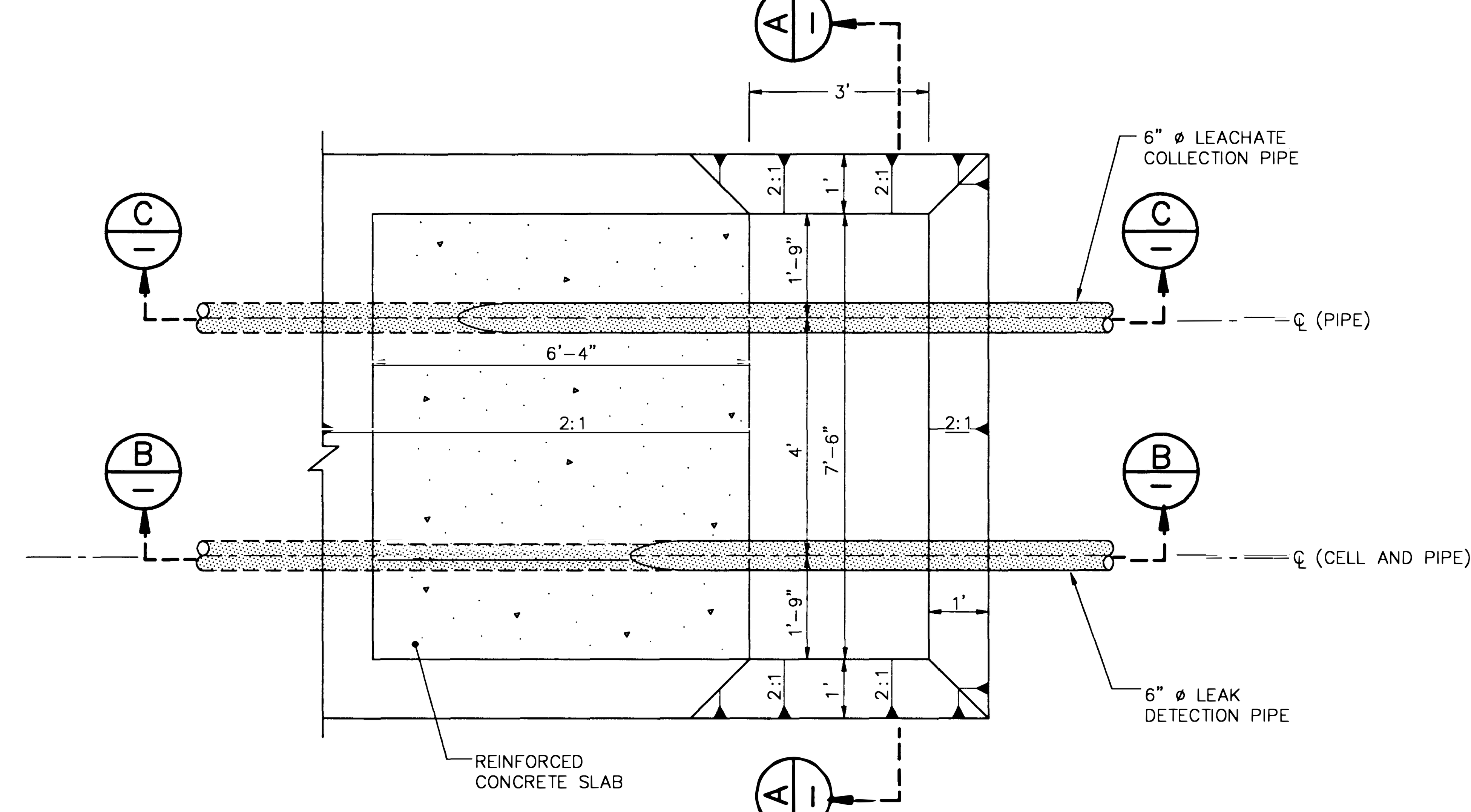
McIntosh, Alabama

FOR CONSTRUCTION

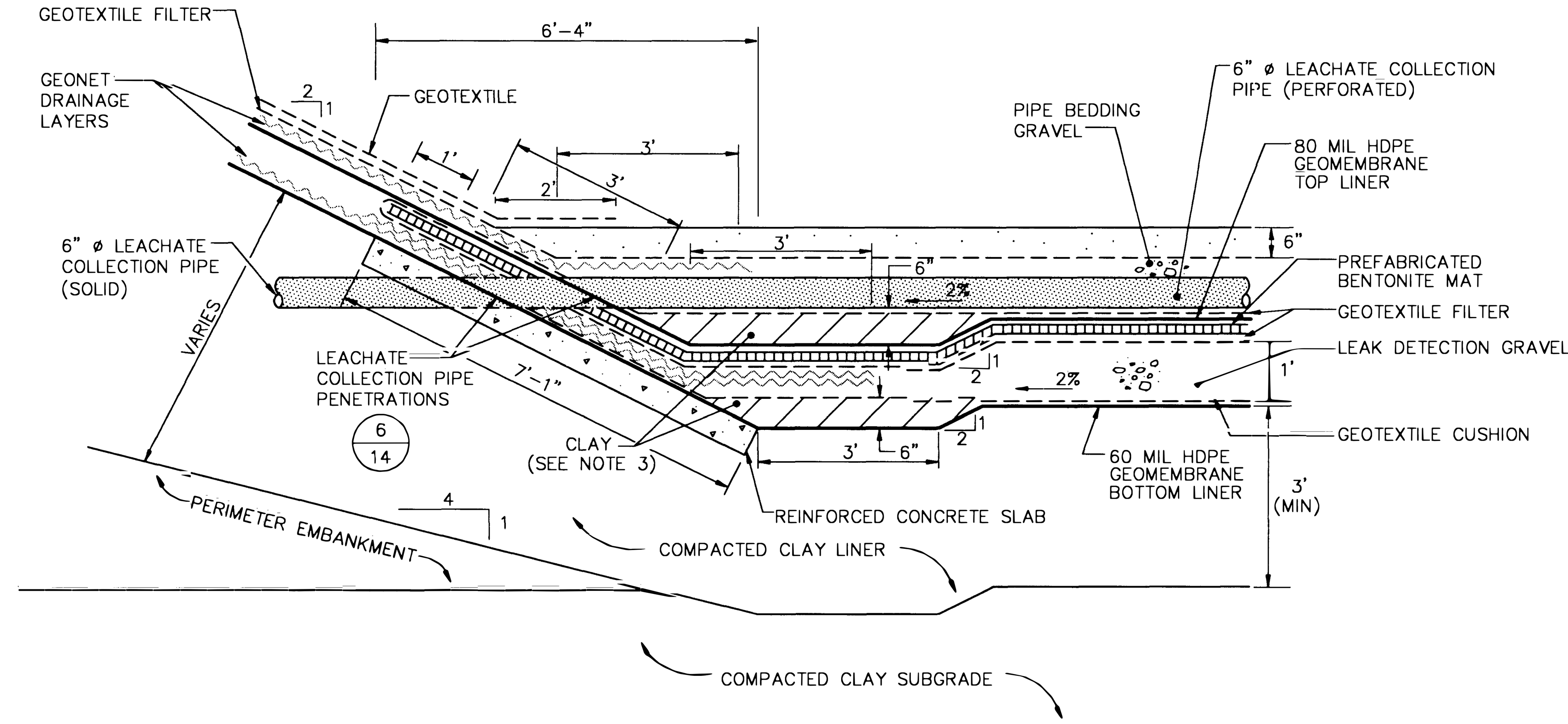
FIGURE 12
ABOVE GROUND
HAZARDOUS WASTE LANDVAULT NO. 2
LINER SYSTEM DETAILS

Scale: AS SHOWN | Dwg. No. D-995-3112 | Rev. 1

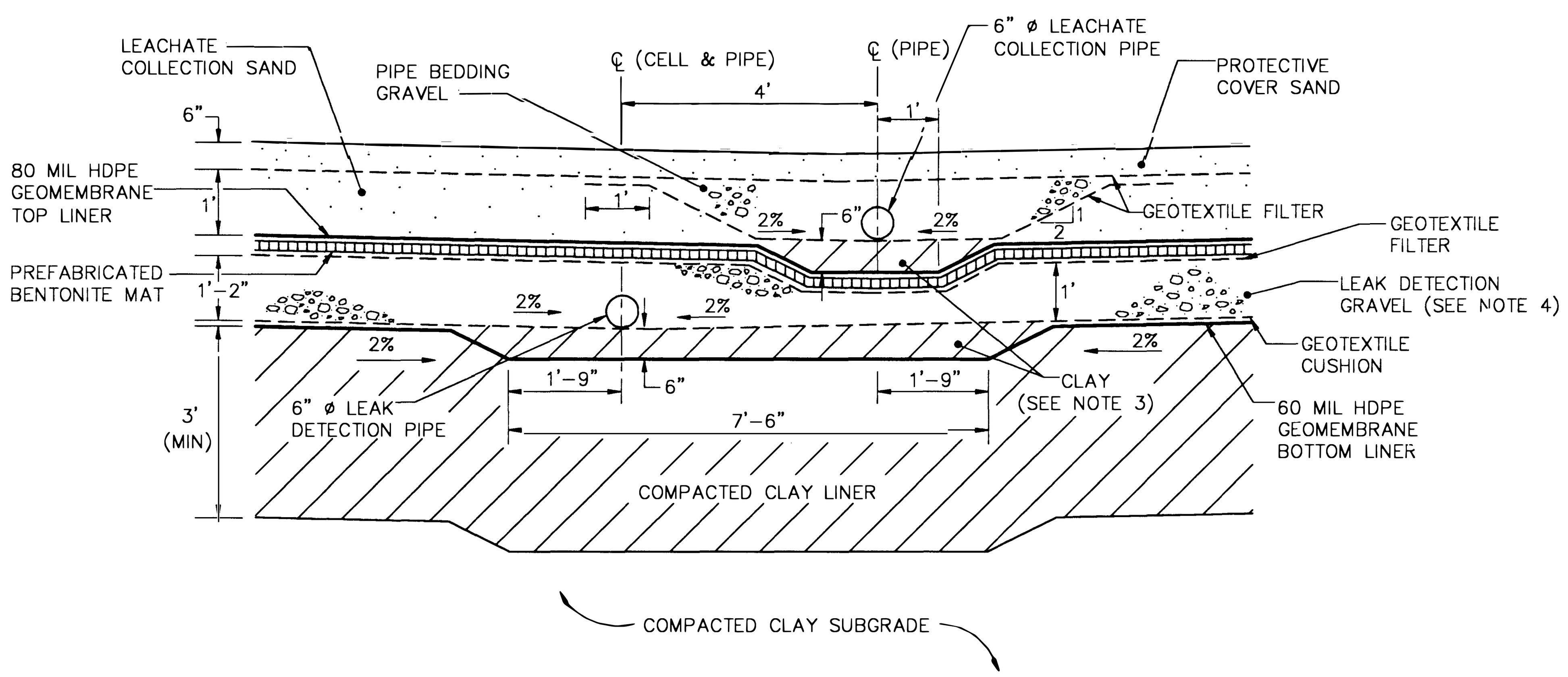
Figure 3-2. Above Ground Hazardous Waste Landvault No. 2 Leachate Collection/Detection Sump Details



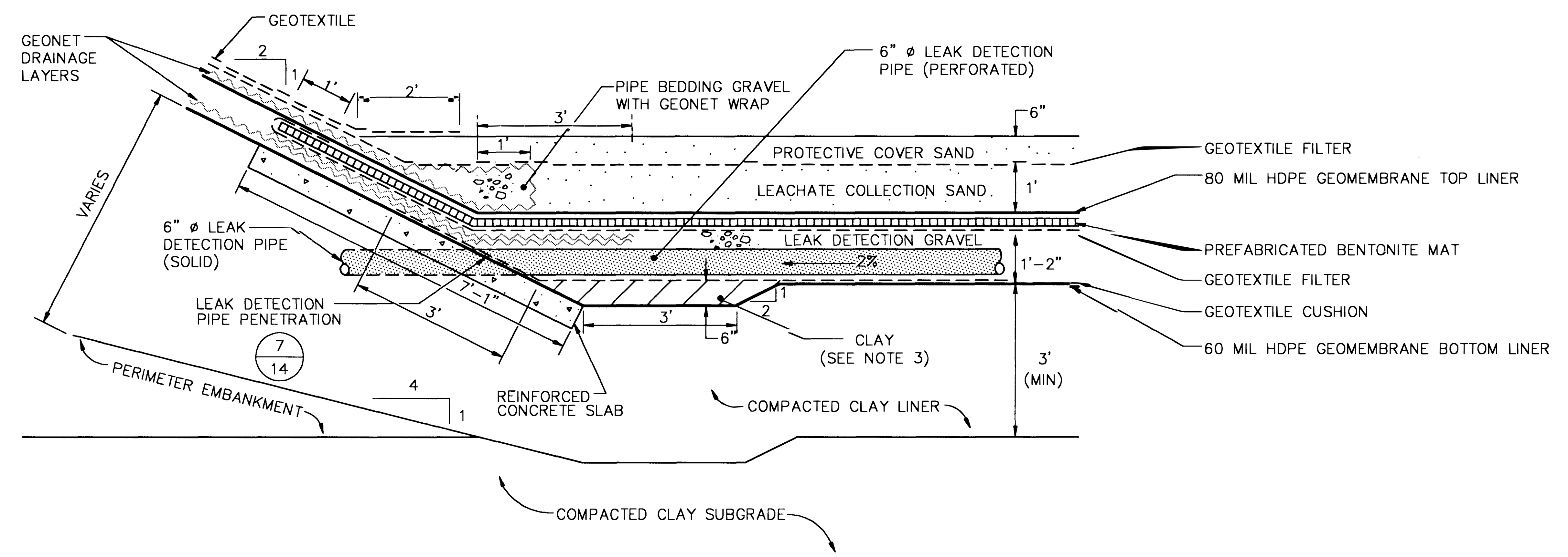
PLAN
LEAK DETECTION SUMP
SCALE: 1" = 2'



SECTION
LEACHATE COLLECTION SUMP
SCALE: 1" = 2' (SEE NOTE 1)



SECTION
LEACHATE COLLECTION/LEAK DETECTION SUMPS
SCALE: 1" = 2' (SEE NOTE 1)



SECTION
LEAK DETECTION SUMP
SCALE: 1" = 2' (SEE NOTE 1)

NOTES:

1. DETAILS ARE SHOWN TO THE SCALE NOTED EXCEPT FOR THE GEOSYNTHETICS; THESE ARE SHOWN WITH EXAGGERATED THICKNESS FOR CLARITY.
2. SEE FIGURE 12 FOR THE LINER SYSTEM COMPONENT SCHEDULE.
3. THE LEACHATE COLLECTION AND LEAK DETECTION SUMPS WILL BE FILLED WITH CLAY AS SHOWN. THE CLAY WILL BE LIGHTLY COMPACTED USING A HAND OPERATED TAMPER. PRECAUTIONS WILL BE TAKEN TO ENSURE THAT THE UNDERLYING GEOMEMBRANE IS NOT DAMAGED DURING COMPACTION. THE CLAY WILL BE HAND PACKED UNDER THE LEACHATE COLLECTION AND LEAK DETECTION PIPES. THE TOP SURFACE OF THE CLAY WILL BE LEVEL.
4. DUE TO THE 4 FOOT OFFSET BETWEEN THE LEACHATE COLLECTION AND LEAK DETECTION PIPES, THE THICKNESS OF THE LEAK DETECTION GRAVEL INCREASES FROM 1' TO 1'-2" BETWEEN THE CENTERLINES OF THE PIPES. THIS RESULTS IN A LEAK DETECTION GRAVEL THICKNESS OF 1' ON ONE SIDE OF THE BASE OF EACH LANDVAULT CELL AND 1'-2" ON THE OTHER SIDE.

Prepared By
GEOSERVICES INC.
Consulting Engineers
Norcross, Georgia

File No. P1374-113

Signature
6-11-1990
Date

Rev.	Project No.	Description	Drawn By Date	Checked By Date	Design Eng. Date	Proj. Eng. Date
0	00164-000	ORIGINAL ISSUE	DCS 4/26/90	BAG 4/26/90	RB 4/26/90	
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McIntosh, Alabama

FOR CONSTRUCTION

FIGURE 13
ABOVE GROUND
HAZARDOUS WASTE LANDVAULT NO. 2
LEACHATE COLLECTION/DETECTION SUMP DETAILS

Scale: AS SHOWN | Dwg. No. D-995-3113 | Rev. 1

Landvault Sidewalls (from top to bottom)

- 16 oz/yd^2 (540 g/m^2) non-woven geotextile cushion;
- 10 oz/yd^2 (340g/m^2) non-woven geotextile filter;
- geonet leachate collection layer (Nominal Thickness 5 mm);
- 80-mil (2-mm) thick HDPE geomembrane primary liner;
- geonet leak detection layer (Nominal Thickness 5 mm);
- 60-mil (2-mm) thick HDPE geomembrane secondary liner; and
- 3-ft (0.9-m) thick (minimum) low permeability compacted clay liner.

The side slope liner system is installed over compacted perimeter embankment soils.

Cover (from top to bottom)

- 3-ft (0.9-m) thick topsoil layer;
- 10 oz/yd^2 (340 g/m^2) non-woven geotextile filter;
- cover drainage system consisting of a geonet drainage layer (Nominal Thickness 5 mm) and a system of perforated collection pipes;
- 80-mil (2-mm) thick geomembrane liner;
- 2-ft (0.9-m) thick low permeability compacted clay liner;
- 10 oz/yd^2 (340 g/m^2) nonwoven geotextile filter layer;
- gas venting system consisting of a 6-in. (0.5-m) thick gas venting sand layer, a system of perforated collection pipes; and
- 10 oz/yd^2 (340 g/m^2) nonwoven geotextile filter layer.

Specifications for all the materials composing the liner system and the cover system are provided in the Engineering Report.

The liner system is constructed with a minimum inclination of 2 percent on the landvault floor and an inclination of 2 horizontal:1 vertical (2H:1V) on the landvault side slopes. The cover system will be sloped at 5H:1V to the crest of the landvault. The crest of the landvault is sloped at 3 percent to the east.

The base of the liner system is at a minimum elevation of 31.5 ft (9.6 m). The elevation is 7.15 ft (2.2 m) above the 100-year flood plain elevation of 24.35 ft (7.41 m) above BASF datum.

3.2 Liner Properties

The HWLV2 liner system consists of composite liners. The primary liner is composed of an 80 mil HDPE flexible membrane overlying a prefabricated bentonite mat. The secondary liner is composed of a 60 mil HDPE flexible membrane overlying a three foot (minimum) thick low-permeability clay. This combination of synthetic liner with clay liner has been demonstrated to provide improved performance over single clay liners with respect to leachate collection efficiency, leak detection capability and leakage (both into and out of the bottom liner). The following sections present information on the liner specifications and compatibility with the landfilled material. Supporting information, including design specifications and calculations, is included in the Engineering Report prepared by GeoServices, Inc.

3.2.1 Specifications

The following paragraphs present information in support of the capability of the selected liners to provide sufficient strength and low permeability to satisfy the regulatory and engineering requirements for the HWLV2. Areas discussed include resistance to tensile stresses, resistance to concentrated stresses, effect of temperature, and liner permeability. Liner specifications are listed in Table 3-1.

Resistance to Tensile Stresses

The maximum tensile strain in the liners resulting from differential settlement of foundation soils has been calculated to be 0.0002 percent. The maximum tensile strain induced by construction is less than 1 percent. The yield strain of the HDPE geomembranes selected for the HWLV2 was 10 percent. The specified liner material is therefore capable of withstanding tensile stresses which are anticipated in the HWLV2.

Resistance to Concentrated Stresses

Geomembranes used in the HWLV2 liner system will be subjected to concentrated stresses when they are in contact with stones, aggregate, concrete irregularities, steel battens used for connections to appurtenances, and construction equipment. Geomembrane properties coupled with elements of the liner system design and construction quality assurance (CQA) will effectively mitigate concentrated stresses that may be anticipated.

The primary liner on the side slopes is sandwiched between two geonet layers. Two layers of protective nonwoven geotextile are placed over the leachate collection geonet. The secondary geomembrane liner is sandwiched between a geonet layer on the top and compacted clay on the bottom (Figure 3-1). A thorough CQA ensures that the compacted clay liner will be free of gravel particles. The 80 mil primary liner on the landvault floor is sandwiched between eighteen inches of leachate collection sand on the top and a prefabricated bentonite mat on the bottom. The 60 mil secondary geomembrane liner is sandwiched between a geotextile cushion on the top and a compacted clay liner on the bottom.

Table 3-1

Required Property Values for HDPE Geomembranes

Properties	Qualifier	Units	Specified Value(1) 60 mil	80 mil	Test Method
Physical Properties					
Thickness	minimum	mils	60	80	ASTM D1593, Para.8.1.3
Specific Gravity	minimum	dimensionless	0.941	0.941	ASTM D792, Method A or ASTM D1505
Melt Flow Index	range	g/10 min	0.1-0.3	0.1-0.3	ASTM D1238, Condition E (190°C, 2.16 kg)
Mechanical Properties					
Tensile Properties (each direction)					
1. Force per unit width at yield[2]	minimum	lb/in	120	140	ASTM D638
2. Tensile strength[3] (force per unit width at break)	minimum	lb/in	180	240	ASTM D638
3. Elongation at yield	minimum	%	10	10	ASTM D638
4. Elongation at break	minimum	%	500	500	ASTM D638
5. Modulus of elasticity	minimum	ksi	80	80	ASTM D638
Tear Resistance	minimum	lb	30	40	ASTM D1004, Die C
Puncture Resistance	minimum	lb	60	70	FTMS 101C Method 2065

Table 3-1
(continued)

Required Property Values for HDPE Geomembranes

Properties	Qualifier	Units	Specified Value[1] 60 mil		80 mil	Test Method
Environmental Properties						
Low Temperature Brittleness	maximum	°F	-40		-40	ASTM D746, Procedure B
Carbon Black Content	range	%	2-3		2-3	ASTM D1603
Carbon Black Dispersion		dimensionless	A-1	or	A-2	ASTM D3015
Dimensional Stability (each direction)	maximum change	%	±3	or	±3	ASTM D1204 212°F, 15 min.
Resistance to Soil Burial						
1. Tensile strength at yield	maximum change	%	10		20	“
2. Tensile strength at break	maximum change	%	10		10	“
3. Elongation at yield	maximum change	%	10		10	“
4. Elongation at break	maximum change	%	10		10	“
5. Modulus of elasticity	maximum change	%	10		10	“
Environmental Stress Crack	minimum	hrs	500		500	ASTM D1693 (as modified in JSF Appendix A, Condition C at 100°C)

(1) For a specific geomembrane, only the column of values corresponding to the selected nominial thickness should appear under the heading “specified value”.
(2) The values correspond to a stress of 2,000 psi.
(3) The values given correspond to a stress of 3,750 psi.

Engineering calculations were performed to assess the potential for damage to the 60 mil secondary geomembrane liner by the overlying leak detection gravel. Calculations included in the Engineering Report demonstrate that the maximum puncture strength required for the secondary geomembrane liner to withstand concentrated stresses induced by a 0.5 inch diameter gravel under the weight of the overlying liner system, waste and cover system is 10 pounds. The 0.5 inch diameter gravel is the maximum particle size for the selected leak detection medium. The selected 60 mil and 80 mil HDPE membranes possess puncture strengths of 60 pounds and 70 pounds, respectively. The specified liner material is therefore capable of withstanding concentrated stresses anticipated from the overlying leak detection gravel.

A thorough CQA program was conducted throughout the construction phases. In constructing the leachate collection layer over the primary liner the first lift of sand was at least 12 inches thick and was spread with a low ground pressure dozer having a ground pressure less than 4 psi. Construction equipment was not allowed to drive on the geomembranes. Following placement of the 18 inches of sand over the primary liner, no equipment with a ground pressure exceeding 8 psi was allowed on the sand.

<u>Liner Permeability</u>

The HWLV2 liner system consists of composite liners. The primary liner is composed of an 80 mil HDPE flexible membrane overlaying a prefabricated bentonite mat. The prefabricated bentonite mat, manufactured with a hydraulic conductivity that will not exceed 1×10^{-9} cm/s, provides a secondary barrier acting to "heal" leaks which may develop in the geomembrane. The secondary liner is composed of a 60 mil HDPE flexible membrane overlaying a three foot (minimum) thick low-permeability clay. The low-permeability clay was constructed to achieve a hydraulic conductivity that will not exceed 1×10^{-7} cm/s. The equivalent hydraulic conductivity of the 60 mil and 80 mil HDPE flexible membranes is approximately 1×10^{-13} cm/s according to manufacturer's information and data derived from water vapor transmission rates.

3.2.2 Compatibility With Wastes

BASF conducted liner testing utilizing EPA Method 9090 from 1984 through 2003. BASF prepared a report entitled "Landvault Evaluation" which included the results of liner compatibility testing performed and assessed to date. That report was provided to ADEM on February 28, 1990. The tests indicated that the leachate is compatible with the liner material.

3.3 Leachate Collection and Removal System Properties

3.3.1 General

Components of the HWLV2 leachate collection and leak detection system include geotextiles, geonets, leachate collection and leak detection pipes, leachate collection sand, leak detection gravel and pipe bedding aggregate. This section describes the physical and mechanical properties of the leachate collection and leak detection system, including hydraulic considerations and material properties. Hydraulic considerations focus on the capability of the system to handle quantities of leachate generated. Material properties considerations focus on the capability of the selected materials to function under the pressures exerted by the overlying wastes and equipment, and resist chemical attack.

3.3.2 Physical and Mechanical Properties

Hydraulic Considerations

The leachate collection and removal system has been designed to expeditiously evacuate leachate from the landvault cells and minimize accumulation of leachate above the primary liner. The leachate collection piping system from individual cells is connected to a collection header that drains to the landvault sump. The sump is constructed of concrete, lined with HDPE and has an approximate 30,000 gallon capacity. The sump is designed with a leak detection system located between the HDPE and the concrete.

It is equipped with two pumps designed to pump 300 gallons per minute, each. This pumping rate is sufficient to manage the 25-year 24-hour return interval rainfall event. The leachate is pumped to the activated carbon treatment system.

In order to minimize the potential for leachate to accumulate to a depth greater than one foot in the cells, the minimum hydraulic conductivity of the sand leachate collection layer is 1×10^{-1} cm/s. The leachate depth accumulation on the primary liner was evaluated using the Hydrologic Evaluation of Landfill Performance (HELP) computer program. The HELP program calculated that the maximum leachate head will be 0.9 ft. based on leachate collection system hydrologic characteristics, considering climatic and meteorologic assumptions. The assumptions and calculations are included in Appendix E of the Engineering Report.

The leak detection system consists of a 12- to 14-inch thick washed AASHTO No. 8 gravel with a minimum hydraulic conductivity of 1 cm/s surrounding a system of perforated collector pipes. The perforated six-inch diameter HDPE collector pipes were installed with a 2 percent slope to ensure that any leachate entering the leak detection layer is conveyed to the leak detection "pots". The "pots" are valved clean-out ports designed for system inspection and draining, if required. Details of the leak detection system hydraulics are contained in the Engineering Report.

The leachate collection and leak detection system has been designed to minimize the potential for clogging. The geonet drainage layer is wrapped in pipe bedding gravel at the toe of the side slope, providing a smooth transition zone between the geonet drainage layer and the leachate collection sand (Figure 3-2). A geotextile filter was placed between the protective cover sand and the leachate collection sand on the floor of the landvault. Detailed design calculations for the geotextile filter presented in the Engineering Report indicate the filter has sufficient hydraulic conductivity (1 x 10^{-1} cm/s) and porosity (30 percent) to allow free flow of leachate and will not clog during the design life of the landvault. The leachate collection and leak detection piping were constructed with clean outs that allow periodic pipe flushing. The flushing eliminates the potential for biological growth in the piping.

<u>Materials Properties</u>

Geotextiles

The properties of the geotextiles were selected based upon survivability (the ability to withstand stresses exerted by construction equipment during installation), and durability (the ability to withstand stresses applied during the landvault design life and post-closure care period) considerations. These mechanical properties, including grab strength, puncture strength and tear strength are presented below (Table 3-2). Mechanical Property requirements are detailed in the Construction Specifications.

Table 3-2

Mechanical Properties of Geotextiles

Property	Requirements	Specified Quantities		Test Method
Function		**Filter**	**Cushion**	
Mass per unit area		10 oz/yd (340	16 oz/yd^2 (500 g/m^2)	
Grab strength	180 lb. (800 N)	230 lb. (1200 N)	320 lb. (2000 N)	ASTM D 4632
Tear strength	50 lb. (220 N)	90 lb. (330 N)	120 lb. (620 N)	ASTM D 4533
Puncture strength	80 lb. (380 N)	130 lb. (490 N)	140 lb. (800 N)	ASTM D 4833
Burst strength	290 psi (2000 kPa)	400 psi (3000 kPa)	450 psi (5000 kPa)	ASTM D 3786

Geonets

The effects of compressive stresses on the long-term functioning of the landvault geonets were evaluated and are contained in the Engineering Report. To account for compressive stresses, the geonet hydraulic transmissivity was established at a compressive stress equal to 1.5 times the maximum compressive stress the geonet will be subjected to in the landvault. The maximum compressive stress exerted on the geonet at the HWLV2 is due to the weight of the waste and cover system. This maximum stress is on order of 3000 psf (140 kPa). The specified geonet transmissivity was set at a compressive stress of 4500 psf (220 kPa) and a gradient of 0.45. This ensures that geonets used at the HWLV2 have adequate mechanical properties to function as drainage layers during the design life of the facility.

The tensile stress in the geonet placed on the 2H:1V landvault slopes is 1 lb./in. (0.2 kN/m). The specified tensile strength of 20 lb./in. (4 kN/m) for the selected HDPE geonet ensures that the geonet is capable of withstanding any tensile stresses which are anticipated in the HWLV2.

Piping

The 6 in. (15 cm) (nominal) diameter SDR (standard diameter ratio) 13.5 perforated HDPE leachate collection and leak detection pipes are designed to be structurally stable under the maximum anticipated stress during construction and operations. For the HWLV2, the maximum anticipated stress on the pipes would be caused by the weight of the liner system, waste and cover system. This calculated stress is 3000 psf (140 kN/m2). The capability of the piping to maintain structural stability under the calculated stress has been evaluated by comparing maximum anticipated ring deflection, ring compression (wall crushing) and deformation in the detailed pipe design calculations presented in the Engineering Report. The results of the calculations demonstrate that the specified pipes have a factor of safety of 4 against inadequate ring deflection, a factor of safety of 10 against wall crushing, and a factor of safety of 5 against inadequate longitudinal flexure. The specified piping is capable of maintaining structural stability under the calculated stresses anticipated in the HWLV2.

3.3.3 Chemical Resistance to Wastes

The geonets and piping specified for use in the leachate collection system and leak detection system will be manufactured of HDPE. The geotextiles considered for the HWLV2 will be manufactured of either polypropylene or polyester. The chemical compatibility testing of the HDPE liner material is discussed in Section 3.2.2.

3.4 Settlement and Stability

3.4.1 General

A comprehensive evaluation of foundation conditions was performed to assess the capability of the subsoil to provide support to the liner. The study also assessed resistance to pressure gradients above and below the liner to prevent failure of the liner due to settlement, compression or uplift. The assessment included a site investigation, laboratory testing and geotechnical computational analysis focusing on the subgrade, clay liner, perimeter embankment soils and wastes.

The site specific investigation consisted of drilling eight soil borings in the proposed landvault area and evaluating data from 12 other soil borings and wells in or adjacent to the landvault area. Soil mechanics tests were performed on selected soil samples recovered from the borings to determine physical characteristics of the subsurface soils in the landvault area. These tests included moisture content, atterberg limits, grain size analysis, shear strength, consolidation, specific gravity, unit weight and hydraulic conductivity.

Biological sludge represents a “worst case scenario” for purposes of geotechnical evaluation. Samples of biological sludge were collected from the HWLV1 for geotechnical evaluation. Samples of biological sludge were subjected to laboratory soil mechanics testing to determine the sludge physical properties. The tests included moisture content, standard laboratory Proctor compaction, hand vane shear on compacted specimens, atterberg limits, grain size analysis, triaxial compressive shear on remolded samples, consolidation on remolded samples, and specific gravity. Engineering studies indicate that the settlement and stability characteristics of incinerator residues, as they are managed at HWLV2, are substantially superior to biological sludge. Consequently, settlement and stability investigations focus on biological sludge.

The foundation and waste settlement and stability analyses were performed by Geotechnical Engineering - Testing, Inc. of Mobile, Alabama. Stability analyses of the clay liner and perimeter embankment slopes, the liner system, the cover system and the landvault following final closure were performed by GeoServices, Inc. of Norcross, Georgia. Details of the evaluation are included in the Engineering Report and are summarized in the following paragraphs.

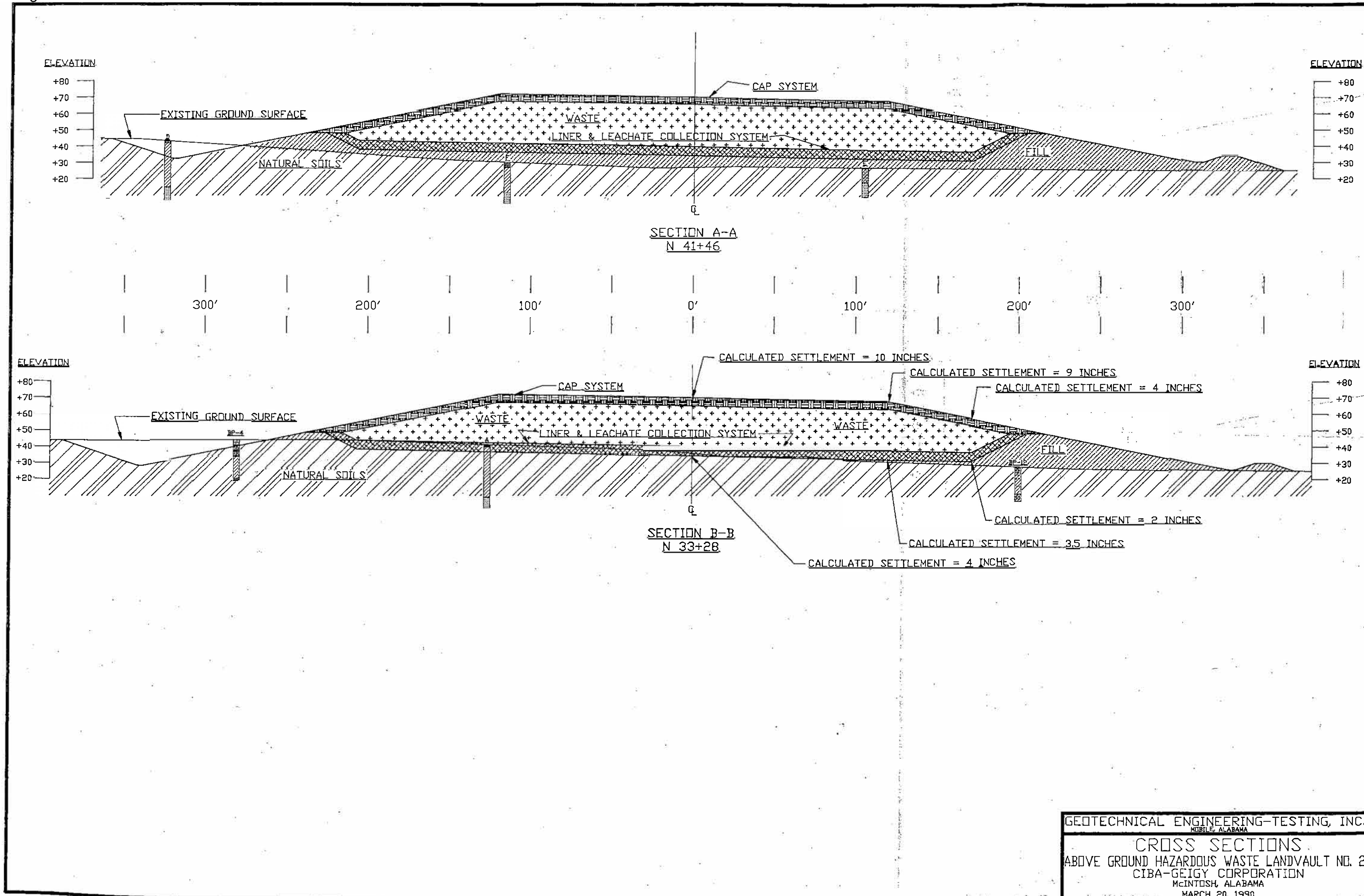
3.4.2 Settlement Potential

Geotechnical design parameters were selected to analyze the potential settlement of the HWLV2 foundation and wastes based on the soil boring and laboratory test data. Settlements at the bottom of the landvault structure have been computed for the anticipated landvault loadings. The computed settlement below the structure in the area where the top width slopes at 3 percent is approximately 3.5 to 4 inches. At the point under the slope approximately 60 feet from where the side slope and top meet (and where the containment berm begins), the computed foundation settlement is approximately 2 inches. The settlement approaches zero at the toe of the landvault slope structure. These computed settlements are noted on cross-sections B-B on Figure 3-3. The maximum computed differential settlement is 1.5 inches in approximately 60 feet, resulting in a slope change of 0.2 percent. This change in slope will flatten the leachate collection lines slightly, but should not be detrimental to the leachate collection system which is designed for 2 percent slopes.

Computations have been made for compression (settlement) of the treated sludge due to its own weight and that of the cap system. Settlement on the order of 6 inches has been computed for the 25.9 ft thick portion of the sludge. Where the sludge is approximately 13 ft thick (at the toe of the containment berm approximately 60 ft from the top of the slope), the computed settlement is approximately 2 inches. The settlement computation is for compacted sludge at a moisture content such that it will have a shearing strength of 500 psf or greater. When wetter compacted sludge having a shearing strength of approximately 250 psf is used, the computed settlements are about 8.5 and 3 inches for the interior and exterior points, respectively.

The total settlement of the top of the landvault, which will include the compression of the higher strength sludge (shear strength equal 500 psf) and foundation soils, will be of the order of 10 inches at the center, 9 inches where the slope meets the crest and 4 inches at the inside toe of the outside berm. These total settlements for the cap system are shown on the cross-section B-B on Figure 3-3. For the wetter sludge (shear strength equal to 250 psf), the corresponding total settlements of the top are 12.5 inches, 12 inches and 5 inches, respectively. These settlements should have no detrimental effect on the landvault structure. The greatest differential settlement will be on the 20 percent slope and the effect will be flattening that slope by about 0.7 to 1 percent for the dryer and wetter sludges, respectively.

Figure 3-3. Above Ground Hazardous Waste Landvault No. 2 Cross Sections



Time-settlement analyses indicate that the primary settlement will require 40 to 50 years for most of the settlement to be achieved. After that time period, some secondary settlement may occur. The measured coefficient of secondary compression indicates that the secondary consolidation for these materials is low to very low. Secondary compression, which may be anticipated after 40 to 50 years of primary compression, should be less than about 6 to 10 percent of the primary compression. This small amount of secondary compression for the landvault will not be a significant factor for the service of the structure.

3.4.3 Stability Analyses

The foundation stability of the landvault structure has been analyzed using the ordinary method of slices circular arc stability analyses. These analyses show the factor of safety with respect to a shearing failure of the foundation soils to be greater than 1.75 for the design condition and using a shear strength for the treated sludge of 500 psf. Using a shear strength of the treated sludge as low as 250 psf, the computed factor of safety with respect to a foundation shear failure is 1.65. The computed factors of safety are greater than is normally required for critical earthwork projects.

Stability analyses were performed for the clay liner and perimeter embankment slopes, the liner system, the cover system and the landvault after final closure. In performing the stability analyses, physical properties of the clay liner and perimeter embankment soils were assumed because the soils that were used in construction had not yet been selected. Short-term (undrained) and long-term (drained) soil strength was considered in evaluating the stability of the clay liner and perimeter embankment before waste placement. Long-term soil strength properties were considered in evaluating stability after waste placement.

The stability of the cover system was assessed using a two-part analysis equation with a factor of safety defined as the ratio of resisting forces and driving forces. The short-and long-term stability of the clay liner and perimeter embankment, as well as the long-term stability of the landvault after final closure, were evaluated using the computer program PCSTABL5 developed at Purdue University. The stability of the landvault was evaluated for circular failure surfaces using the modified Bishop method of slices, or non-circular, wedge-shape, failure surfaces using the simplified Janbu method of slices, as appropriate.

The clay liner and perimeter berm have a minimum slope stability factor of safety of 2.2 for the time period immediately after the clay liner is placed on the 2H:1V perimeter embankment side slopes. This factor of safety assumes the perimeter berm will be constructed on granular material. This factor of safety will be 1.7 if the perimeter berm is constructed of the same soil as the clay liner with an equivalent compactive effort. Under long-term conditions, the clay liner and perimeter berm have a minimum slope stability factor of safety of 1.8. The cover system has a minimum factor of safety of 1.5 on the 5H:1V final landvault slopes. The landvault has a minimum factor of safety of 1.4 after placement of final cover. The factors of safety calculated for the landvault were evaluated by GeoServices, Inc. That evaluation concluded that the calculated factors of safety indicate that the landvault components should be stable under both short-and long-term conditions.

3.5 Operating Procedures to Ensure Liner Effectiveness

3.5.1 Waste Unloading and Handling Procedures

<u>Waste Unloading</u>

Sludges and other material

Unloading for sludges and other material will use dump/roll-off or other similar equipment.

<u>Waste Placement</u>

Waste placement and handling procedures within a landvault cell have been developed considering prior experience in handling wastes, desired compaction and stability characteristics, and liner protection considerations. As discussed above, the vehicle transporting waste will dump the material onto a protective mat at the edge of the ramp to the active cell. Low ground pressure earth moving equipment will be used to pile the wastes in stockpiles of approximately 20 c.y. each. The activity will only be conducted during daylight hours and will be directed by trained personnel. The incinerator residues will only be placed in the landvault after a minimum of a one-foot thick layer of compacted clay or sludge has accumulated in the active cell. The sludges and other material will be mixed with clean, non-hazardous fill material to achieve the required compaction and stability characteristics.

Wastes will be spread in lifts in the cell and compacted by repeated passes of the compaction equipment. Thickness of the lifts varies from 2 to 4 inches to as much as 12 inches for sludges and depends on the quantity of wastes material to be spread and compacted. The sludge will be compacted to 95 percent of the maximum density as determined by the Standard Proctor Test (ASTMO 1557). One test will be performed for every 2500 square feet of compacted sludge (e.g., one test per 50 foot grid).

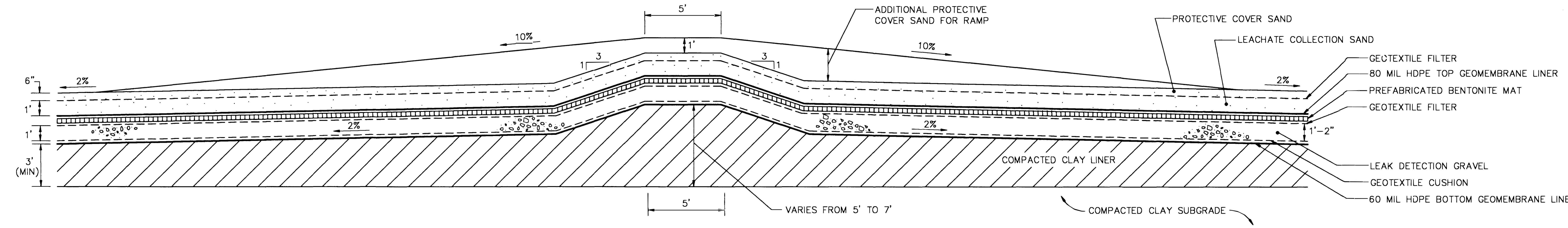
The surface of the compacted waste will be configured so as to minimize the potential for ponding during rainfall events. Precipitation falling onto the surface will be directed by means of contoured slopes and shallow swales to the leachate collection system. The precipitation will be evacuated expeditiously to minimize the accumulation of liquids on the liner system. The waste will be placed so that all precipitation falling into the cell limits is contained within the cell and directed to the leachate collection system.

3.5.2 Liner Protection

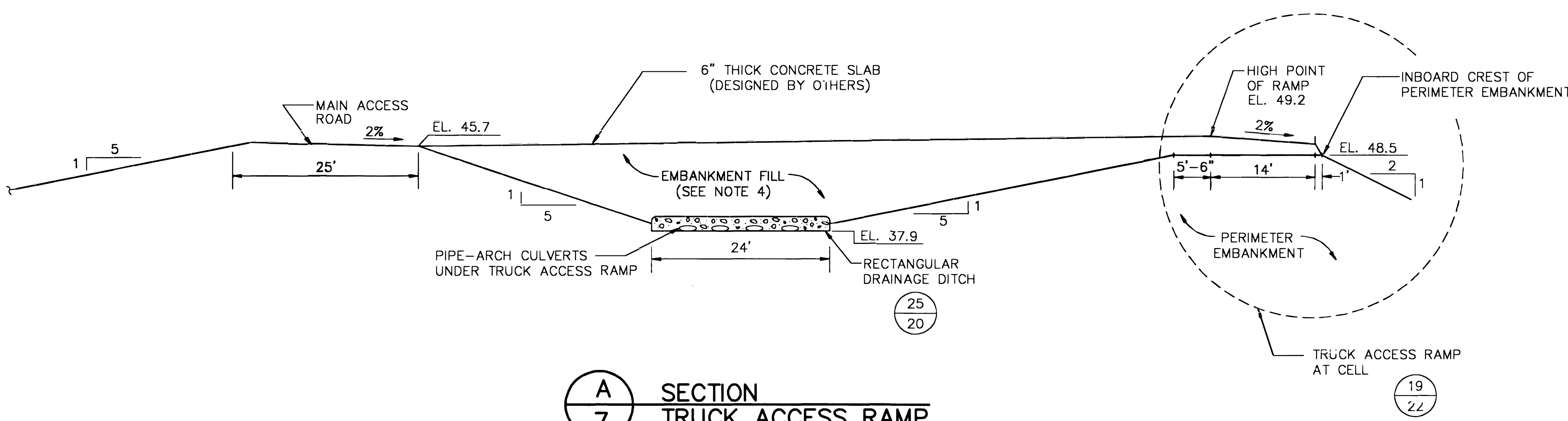
BASF has instituted engineering controls to supplement operational procedures and ensure liner protection. The flexible membrane liners below the 35 foot wide concrete access ramp are protected by a rubber-covered concrete filled geotextile mat which will absorb the working stresses of the landvault dozer as it removes the incinerator residues or sludge. The liner in the anchor trenches on the embankment are also protected from the unloading activities by concrete bumper guards. Figure 3-4 shows details of the concrete filled geotextile mat and truck access ramp.

Two layers of protective nonwoven geotextile have been placed over the leachate collection geonet on the landvault cell sidewalls. As a general policy the equipment is not operated closer than three feet from the cell sidewalls. If unusual circumstances dictate that the equipment must approach within three feet of the sidewalls, the activity will be conducted only during daylight hours and will be directed by trained personnel. The primary liner on the landvault floor is protected from accidental damage by the landvault dozer and other equipment by 12 inches of sand covered by a geotextile and another 6 inches of sand. Encountering the geotextile will alert the dozer operator that he has penetrated the first layer of sand and may be nearing the primary liner.

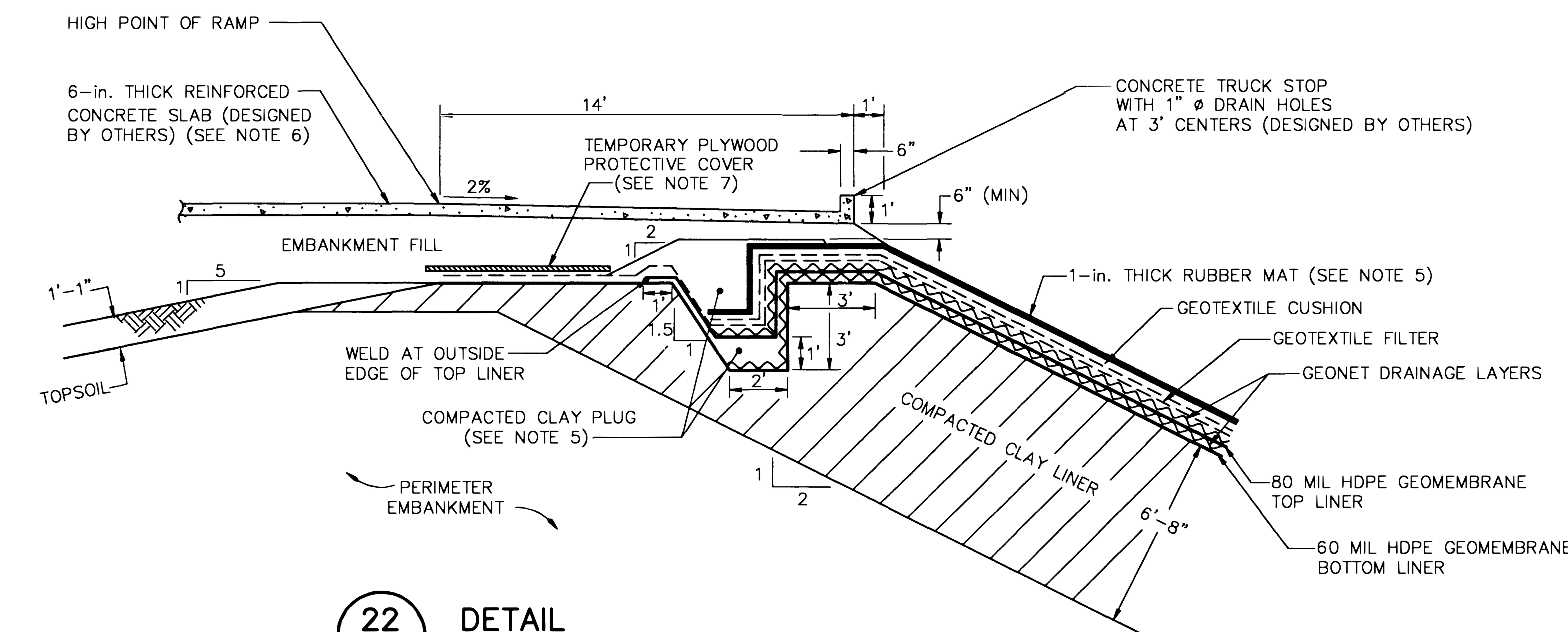
Liner maintenance will be performed on an as needed basis. Any damage to the liner that is discovered will be immediately repaired by extrusion welding of new material over the damaged area. The repair material will extend a minimum of four inches beyond the damaged area. The repairs will be performed by a technician approved by the liner manufacturer utilizing the proper tools and materials. The repairs will be certified and documented by an independent certifying Professional Engineer (P.E.).



21 / 5,6,7 DETAIL
INTERCELL BERM AND ACCESS RAMP BETWEEN CELLS
SCALE: 1" = 4' (SEE NOTES 1, 2, AND 3)



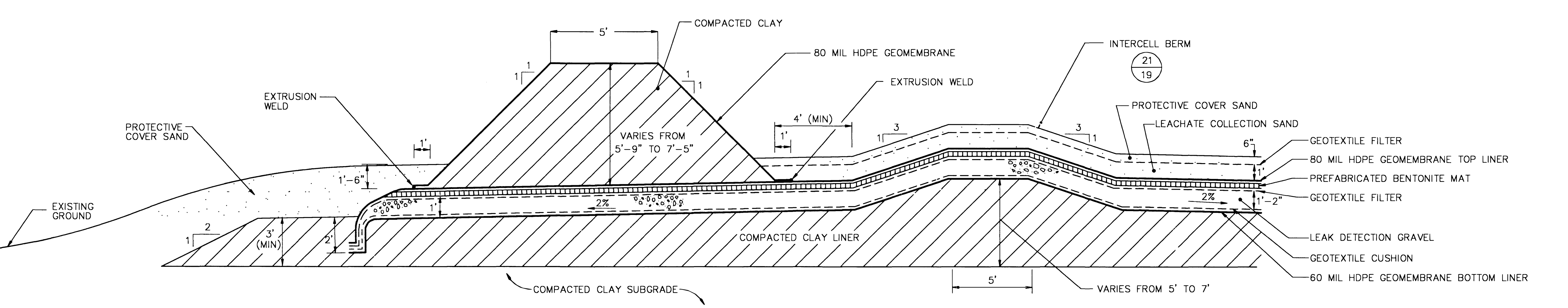
A / 7 SECTION
TRUCK ACCESS RAMP
SCALE: NTS



22 DETAIL
TRUCK ACCESS RAMP AT CELL
SCALE: 1" = 4' (SEE NOTES 1 AND 2)

NOTES:

1. DETAILS ARE SHOWN TO SCALE NOTED EXCEPT FOR THE GEOSYNTHETICS; THESE ARE SHOWN WITH EXAGGERATED THICKNESS FOR CLARITY.
2. SEE FIGURE 12 FOR THE LINER SYSTEM COMPONENT SCHEDULE.
3. THE ACCESS RAMP BETWEEN CELLS WILL BE 15 ft WIDE.
4. THE EMBANKMENT FILL WILL BE CONSTRUCTED OF THE SAME MATERIAL AS THE PERIMETER EMBANKMENT. COHESIVE FILL MATERIAL WILL BE COMPACTED TO AT LEAST 95% OF ITS MAXIMUM DENSITY AS MEASURED IN THE STANDARD PROCTOR TEST (ASTM D-698). GRANULAR FILL MATERIAL WILL BE COMPACTED TO A MINIMUM RELATIVE DENSITY OF 85% AS DETERMINED BY ASTM D-2049.
5. THE RUBBER MAT WILL BE LOCATED ON THE LANDVAULT SIDE SLOPE BENEATH THE 35 ft WIDE TRUCK ACCESS RAMP. THE RUBBER MAT WILL BE CENTERED BENEATH THE RAMP AND WILL BE 55 ft WIDE.
6. THE 15 ft LONG PORTION OF THE CONCRETE SLAB OVER THE COMPACTED CLAY LINER WILL BE REMOVED BEFORE A CELL IS CLOSED.
7. THE 20 ft WIDE ACCESS RAMP OVER THE INTERIM END CONTROL BERM AND INTO THE CELLS WILL BE CONSTRUCTED BY THE CONTRACTOR SIMILARLY TO THE ACCESS RAMP BETWEEN CELLS.
8. THE INTERIM END CONTROL BERM WILL BE REMOVED WITH USING THE FOLLOWING STEPS: (i) THE HDPE GEOMEMBRANE OVER THE INTERIM END CONTROL BERM WILL BE CUT AT THE INBOARD AND OUTBOARD TOES OF THE BERM AND REMOVED; (ii) THE COMPACTED CLAY BERM WILL BE REMOVED WITH A BACKHOE AND THEN SHOVELS; (iii) THE GEOSYNTHETICS ANCHORED IN THE COMPACTED CLAY AT THE OUTBOARD TOE OF THE BERM WILL BE CAREFULLY REMOVED FROM THE COMPACTED CLAY LINER LINER; AND (iv) THE GEOMEMBRANE TOP LINER WILL BE CUT ALONG THE SOUTH SIDE OF THE EXTRUSION WELD LOCATED 1 ft FROM THE INBOARD TOE OF THE BERM AND REMOVED; THE PREFABRICATED BENTONITE MAT WILL REMAIN IN ANY UNHYDRATED STATE UNTIL A NEW GEOMEMBRANE TOP LINER IS PLACED OVER IT. CONNECTIONS OF THE EXISTING GEOSYNTHETICS TO THE GEOSYNTHETICS OF A NEWLY CONSTRUCTED PHASE WILL BE DESCRIBED IN THE PROJECT SPECIFICATIONS.



23 / 7,9 DETAIL
INTERIM END CONTROL BERM
SCALE: 1" = 4' (SEE NOTES 1, 7, AND 8)

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6-11-1990
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File No. P1374-119

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McIntosh, Alabama

FOR CONSTRUCTION

FIGURE 19
ABOVE GROUND HAZARDOUS WASTE LANDVAULT NO. 2
ACCESS ROAD AND BERM DETAILS

Scale: AS SHOWN | Dwg. No. D-995-3119 | Rev. 1

3.5.3 Tracer Monitoring System

3.5.3.1 Introduction

BASF will continue to implement a tracer monitoring system utilizing lithium salts or other suitable tracers to provide a clear and easily interpreted indication of leakage at the earliest practical time. The maintenance of a pre-determined lithium level (approximately 1 ppm) in the landvault provides a unique tracer foreign to the environment of the landvault. The leak detection system "pots" are inspected weekly for presence of liquids. If liquids are present during the weekly inspections, the volume of liquid is documented and a sample collected and analyzed for lithium. The leakage rate is then evaluated and appropriate corrective action taken. Once lithium is detected, lithium salts will be replaced by another suitable tracer element. The following sections present the tracer monitoring system operational details and calculations.

3.5.3.2 Operational Details

- A charge of lithium salts is placed in each section of the landvault which is scheduled for filling. The quantity of lithium will be equivalent to a concentration of 1 ppm based on actual loading for the previous weeks operation.

- As needed an additional charge of lithium will be made to the active cell based on anticipated pounds of waste to be interred.

- The weekly charge will be corrected for lithium deficiencies. Discrepancies can occur between anticipated and actual pounds of waste interred, as recorded in the landvault distribution record.

The calculations of the above lithium charges and corrections will be made as shown on the lithium salt charge record and recorded in the lithium application logs.

Note: The anticipated loading of the lithium salts will cause the average concentrations of lithium in the fill to be well above 1 ppm. This is a deliberate action to compensate for losses caused by the time lag between lithium removal in the leachate and its replacement.

- As leachate is removed from the landvault the following protocols will be followed to replace the lithium removed, thereby maintaining the lithium concentration.

  1. Calculate leachate volume removed from landvault from the previous week. This information will be transferred to the lithium removal record.

  2. Obtain sample of leachate, stabilize with nitric acid and analyze for lithium concentration.

  3. The concentration of lithium will be recorded and the required replacement salt calculated. The replacement salt will be dispersed in the landvault in accordance with established procedures.

- Upon completion of each cell and before final closure is complete, a final charge of lithium salts will be placed on the waste pile before the membrane and final soil covers are installed. This final charge will be 10 percent of the total lithium previously charged. This will ensure maintenance of the lithium concentration when the residual leachate is removed.

Calculations

A = Total lbs of waste material (ash, slag, other materials, etc.) placed in HWLV2 since previous Lithium Chloride addition

B = Total gallons of HWLV2 leachate to sump since previous Lithium Chloride addition

C = Lithium Concentration in ppm, in composite leachate sample from previous week

D = Lithium Chloride in grams, lost in leachate.

$$D = B \times 8.345 \frac{lb}{gal} \times \frac{1}{1{,}000{,}000} \times C \times 453.9 \, {}^{g}\!/\!_{lb} \times \frac{6.109 \, gLiCl}{g}$$

E = Lithium Chloride charge for new material, A, to maintain 1 ppm lithium in HWLV2

$$E = A \times \frac{1}{1{,}000{,}000} \times 2779$$

F = Lithium Chloride Charge to HWLV2, in grams.

$$F = D + E$$

4.0 Control Of Run-On

The geometry of the HWLV2 precludes the necessity of additional run-on control devices. The embankments inherent in the landvault design eliminate the possibility of run-on into the cells at the facility.

5.0 Control Of Run-Off

Stormwater run-off from the HWLV2 is controlled by means of a perimeter embankment and concrete-lined surface water drainage ditch. The perimeter embankment and drainage ditch are constructed around the entire perimeter of the landvault (Figure 5-1).

The drainage ditch collects and conveys run-on towards the landvault and run-off from landvault cover slopes. The drainage ditch is designed based on the following criteria:

- sized to convey the peak flow from a 25-year storm; and,
- sized to convey the estimated surface-water run-on and run-off from the planned non-hazardous waste landvault, which will be located adjacent to the HWLV2.

Pipe-arch culverts are located along the ditch beneath truck access ramps and the main access road. The culverts are designed such that:

- flow capacity of the culverts will be sufficient to convey surface-water run off without creating an excessive backup of water at the entrance of the culvert;
- flexibility will be sufficient to accommodate small settlements of the underlying subgrade soils; and
- strength will be sufficient to withstand the load of traffic above the culvert.

Design calculations for the concrete-lined drainage ditch and culverts are contained in the Engineering Report.

Figure 5-1. Above Ground Hazardous Waste Landvault No. 2. Site Development Plan

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File No. P1374-104

ALABAMA REGISTERED No. 17793 PROFESSIONAL ENGINEER RUDOLPH BONAPARTE

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6-11-1990

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FIGURE 4
ABOVE GROUND
HAZARDOUS WASTE LANDVAULT NO. 2
SITE DEVELOPMENT PLAN

Scale: 1" = 100' | Dwg. No. D-995-3104 | Rev. 1

6.0 Management of Run-On/Run-Off Collection And Holding Facilities

Stormwater run-on and run-off at the HWLV2 includes surface water originating from the following areas:

- Run-off from the landvault embankment exterior side slopes.
- Run-off from future closed, grassed cell caps.
- Precipitation collected in non-active open cells where rain water and leachate have not mixed.

Stormwater from these areas is conveyed along a concrete-lined drainage ditch constructed around the entire perimeter of the landvault. The ditch is designed to collect and control the water volume resulting from a 25-year, 24-hour storm. The collected stormwater is then routed to the permitted outfall.

Stormwater falling within active landvault cells will be managed with the leachate collection and removal system. The leachate collection and removal system conveys the stormwater to the landvault sump. The sump, described in detail in Section 3.3.2, is equipped with two pumps with sufficient capacity to manage the 25-year, 24-hour return interval rainfall event. The leachate will be pumped to the activated carbon treatment system.

7.0 Wind Dispersal Controls

The wastes that will be placed in the landvault are primarily biological sludges. Methods for placing wastes in the landvault are described in detail in Section 3.5.1. These sludges are not subject to wind dispersal. In addition, once mixed and compacted, the mixture has physical characteristics similar to compacted clay and is not subject to wind dispersal.

8.0 Gas Collection System

The gas generation potential of waste water treatment sludges has been investigated using similar sludges to those generated at the McIntosh facility. The results of this investigation, discussed in the Permit Application for HWLV1, indicated that gas was not being generated by the sludge. In support of the study, BASF has periodically taken measurements at vents in closed cells at the HWLV1 and has detected no evidence of gas generation.

Nonetheless, a gas collection and venting system was designed for the HWLV2 to ensure that any gases which may be generated do not accumulate and undermine the integrity of the liner system. The gas collection system consists of a 6-inch thick sand layer surrounding a system of geotextile wrapped perforated 3-inch diameter

HDPE collection pipes. The collection pipes are located along the perimeter of the crest and are connected to vertical vents spaced 110 feet apart.

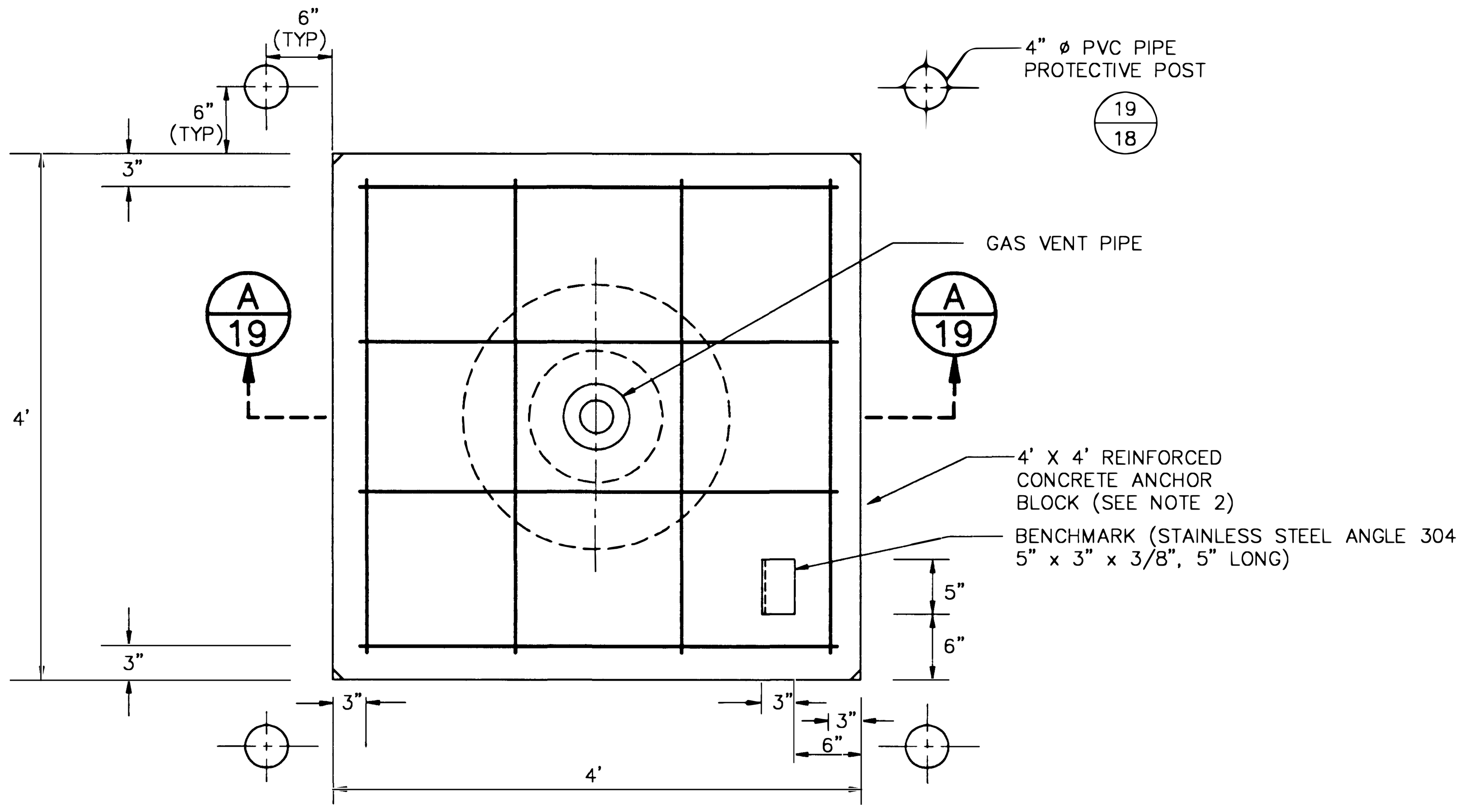
There are two vents located in landvault Cells 1 through 8. Cell No. 9 will have four vents. The gas vent pipe penetration through the HDPE cap liner is sealed with an 80 mil HDPE boot extrusion welded to the liner. The vent pipe is protected from damage during post-closure cover maintenance activities by a reinforced concrete anchor block and PVC pipe protective posts. Figure 8-1 illustrates the gas collection system design. Details of the system including calculations and design specifications are included in the Engineering Report.

9.0 Final Cover System

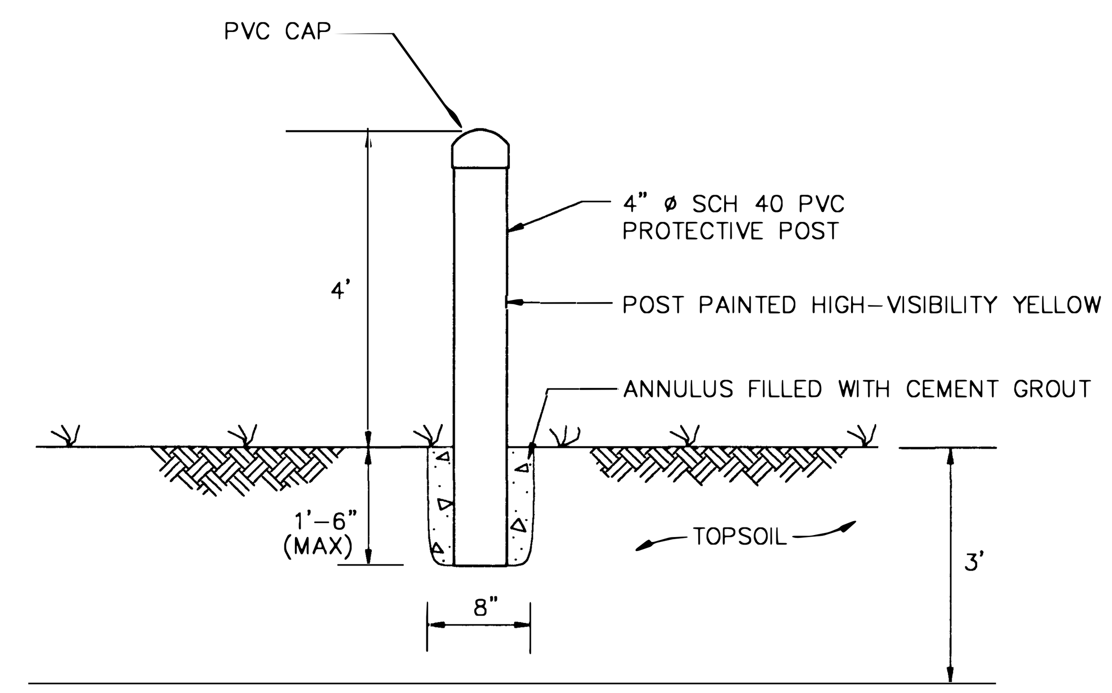
The cover system for the HWLV2 has been designed to prevent the infiltration of surface water into the landvault and minimize liquid migration and leachate formation. The cover system includes an uppermost vegetated layer to prevent erosion and promote evapotranspiration, an underlying drainage layer to convey percolation out of the cover, and a composite 80 mil geomembrane and low-permeability clay cap to prevent infiltration. A gas collection and venting system discussed in Section 8.0, underlies the composite cap. Each cover system element is listed below and illustrated in Figure 9-1:

- 3-ft (0.9-m) thick topsoil layer;
- 10 oz/yd^2 (340 g/m^2) nonwoven geotextile filter;
- cover drainage layer consisting of a 0.2 inch thick HDPE geonet;
- 80 mil (2-mm) thick geomembrane cap;
- 2-ft (0.9-m) thick low-permeability compacted clay liner; and,
- gas venting system consisting of a 6-inch (0.5-m) thick gas venting sand layer, a system of perforated collection pipes, and two gas vents per cell.

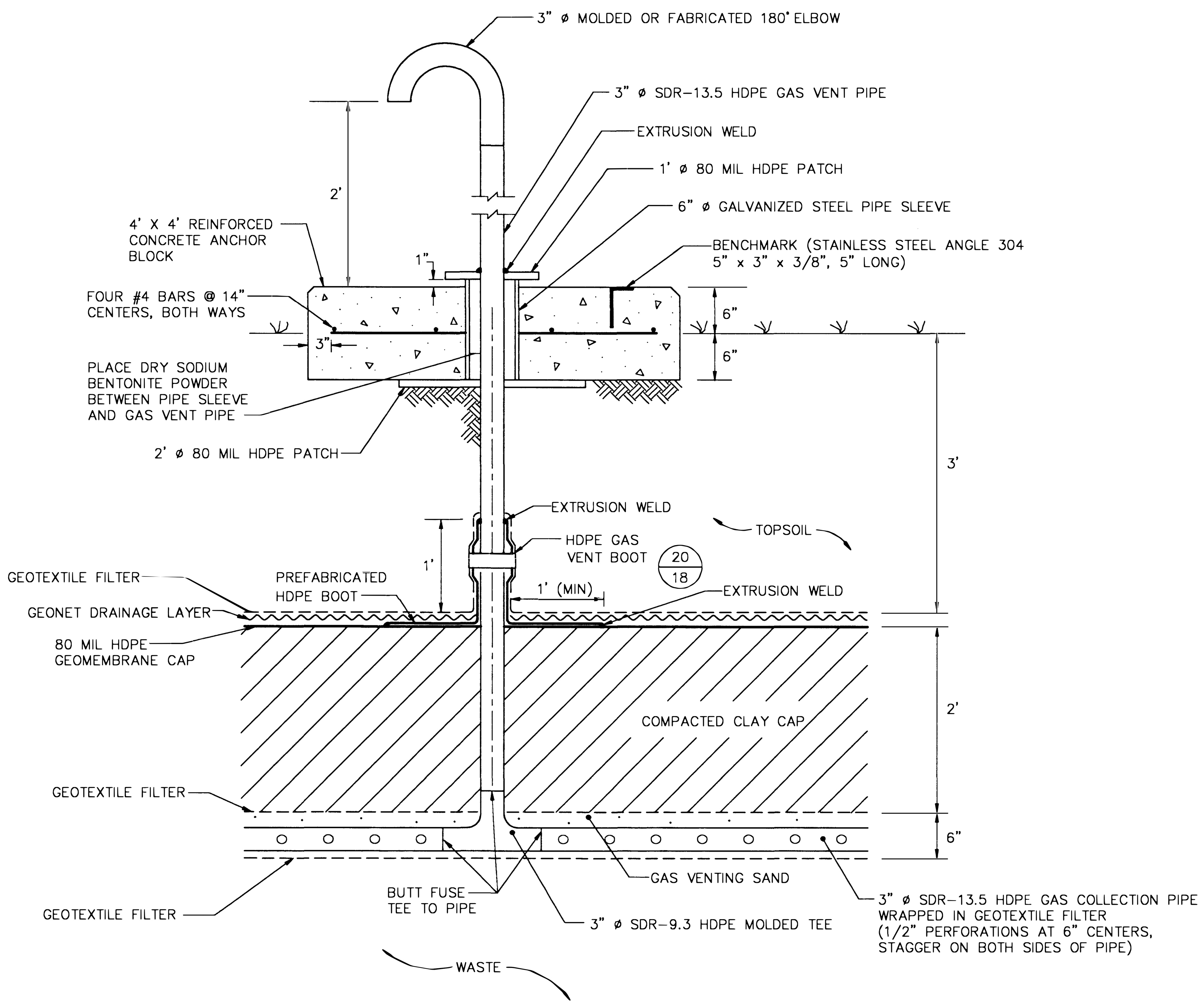
To minimize erosion, the maximum slopes of the HWLV2 cover system are 20 percent. The soil selected as topsoil has a moderately low erosion potential to limit the annual soil loss at the HWLV2 to 2 tons/acre. Calculations included in the Engineering Report demonstrate that the average annual soil loss at the HWLV2 will not exceed 2 tons/acre if the soil erodibility factor is 0.32 or less. The vegetative cover used is a low-maintenance, disease and insect resistant mix of grasses or other shallow rooting species that will effectively inhibit soil erosion on the cover system.



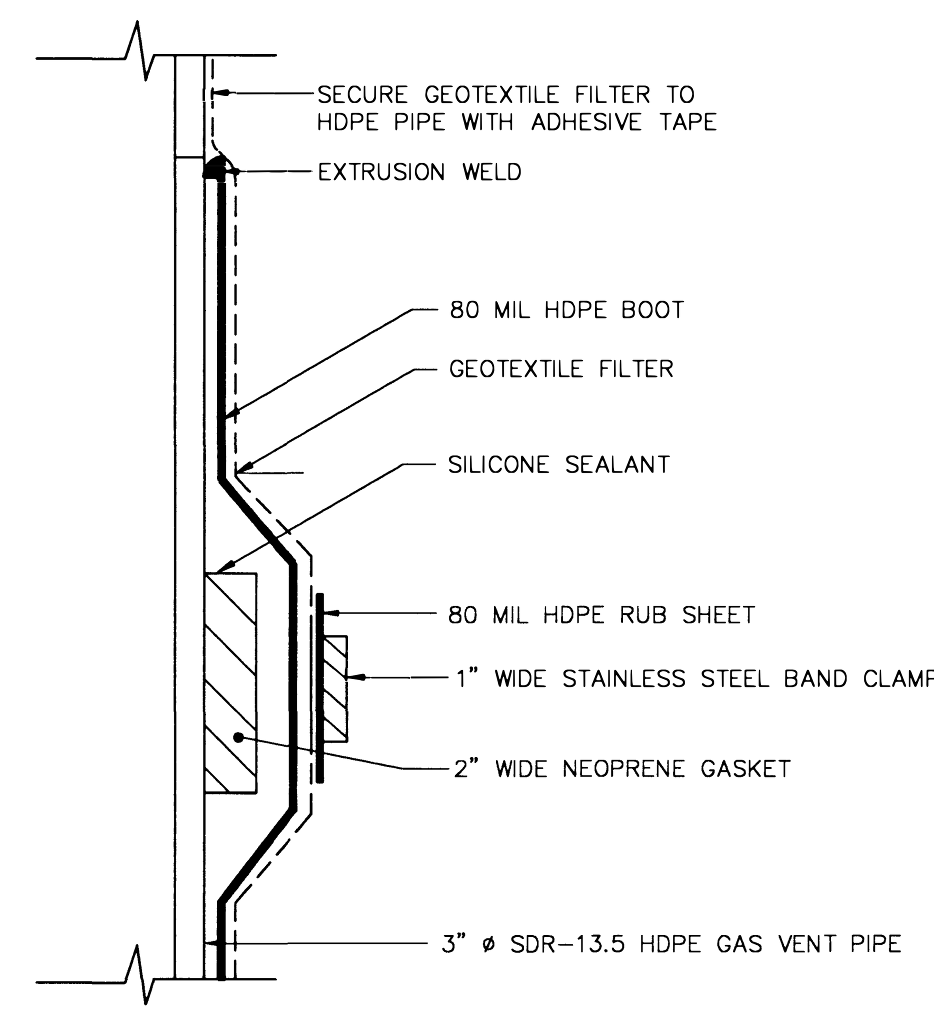
18 / – PLAN
GAS VENT PIPE AND ANCHOR BLOCK
SCALE: 1" = 1'



19 / – DETAIL
PVC PIPE PROTECTIVE POST
SCALE: 1"=2'



A / 8,9,11 SECTION
GAS VENT PIPE AND ANCHOR BLOCK
SCALE: 1" = 1' (SEE NOTE 1)



20 / – DETAIL
HDPE GAS VENT BOOT
SCALE: NTS

NOTES:
1. DETAILS ARE SHOWN TO SCALE NOTED EXCEPT FOR THE GEOSYNTHETICS; THESE ARE SHOWN WITH EXAGERATED THICKNESS FOR CLARITY.
2. THE CONCRETE FOR ANCHOR BLOCK WILL HAVE A MINIMUM 28–DAY COMPRESSIVE STRENGTH OF 3000 PSI.
3. SEE FIGURE 12 FOR THE COVER SYSTEM COMPONENT SCHEDULE.

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File No. P1374–118

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6-11-1990
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McIntosh, Alabama

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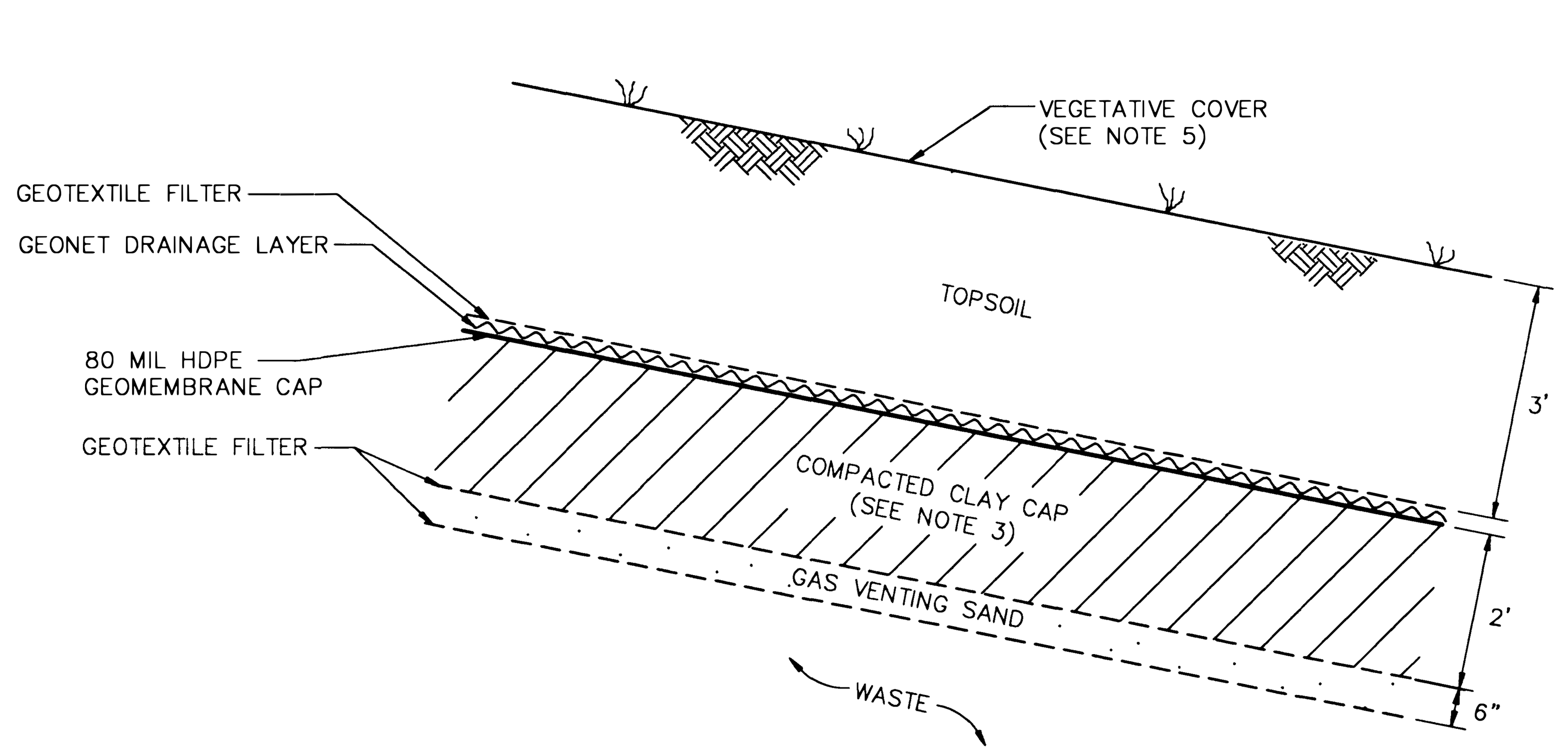
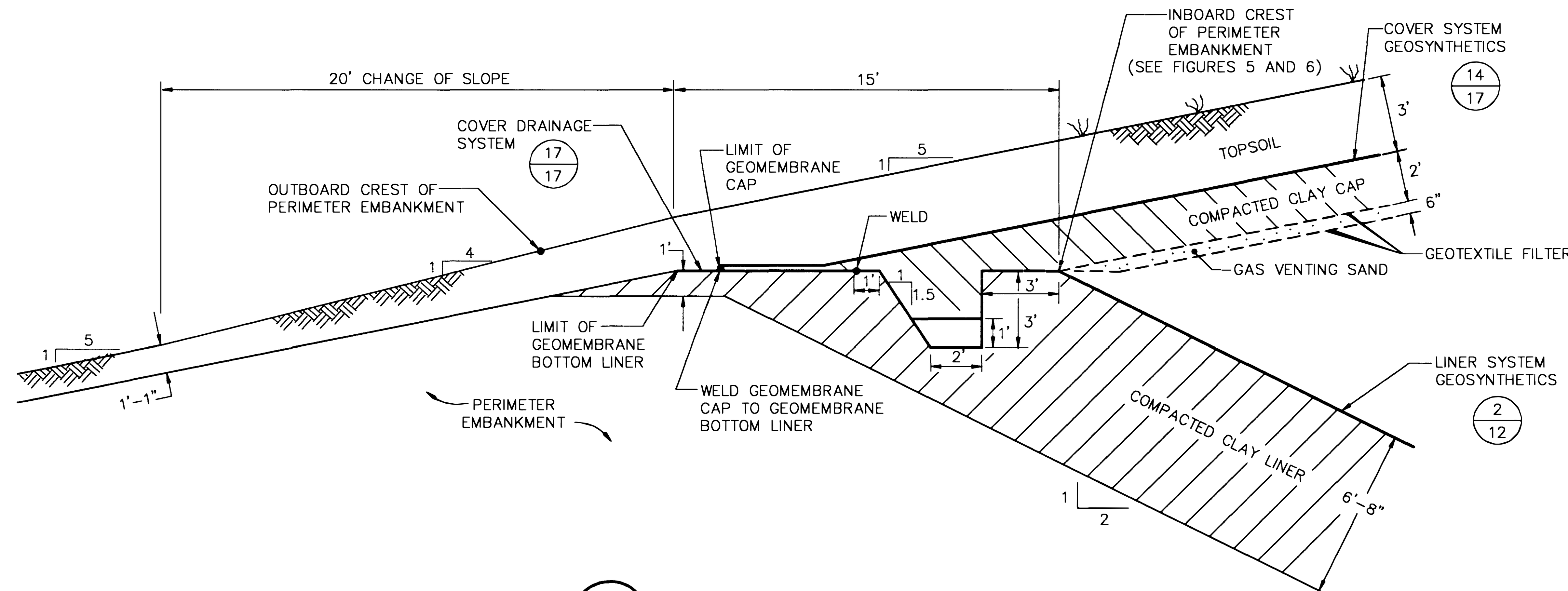
FIGURE 18
ABOVE GROUND
HAZARDOUS WASTE LANDVAULT NO. 2
GAS VENTING SYSTEM DETAILS

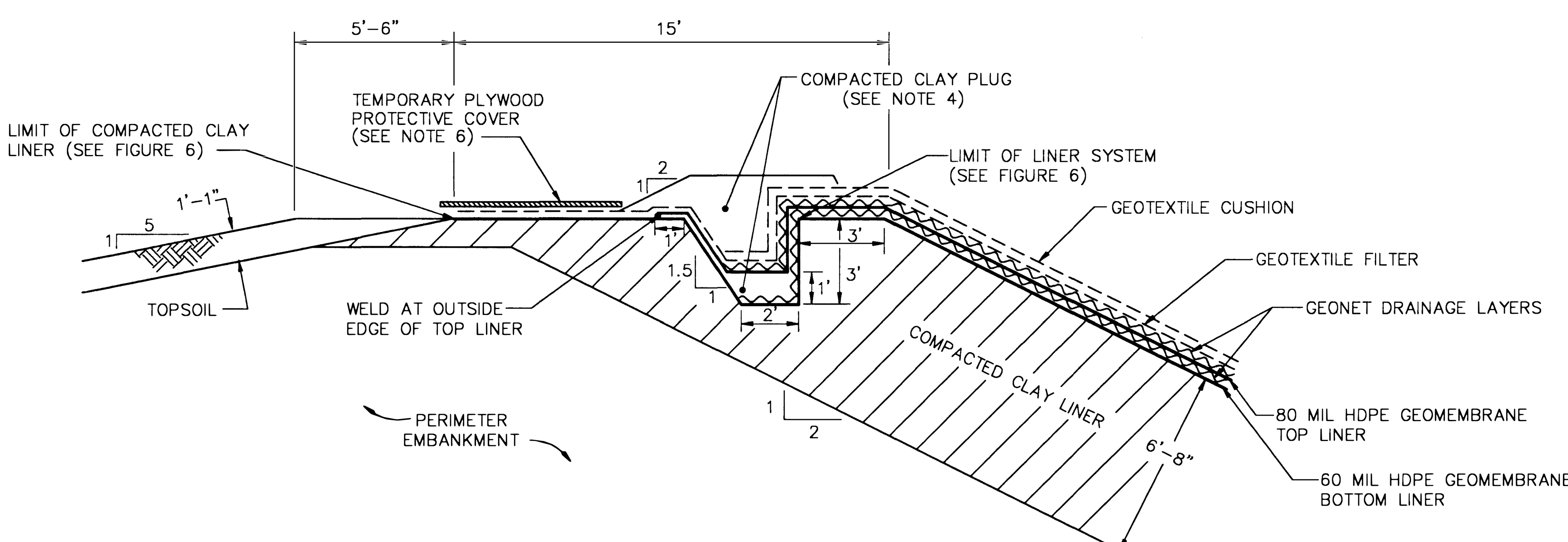
Scale: AS SHOWN | Dwg. No. D–995–3118 | Rev. 1



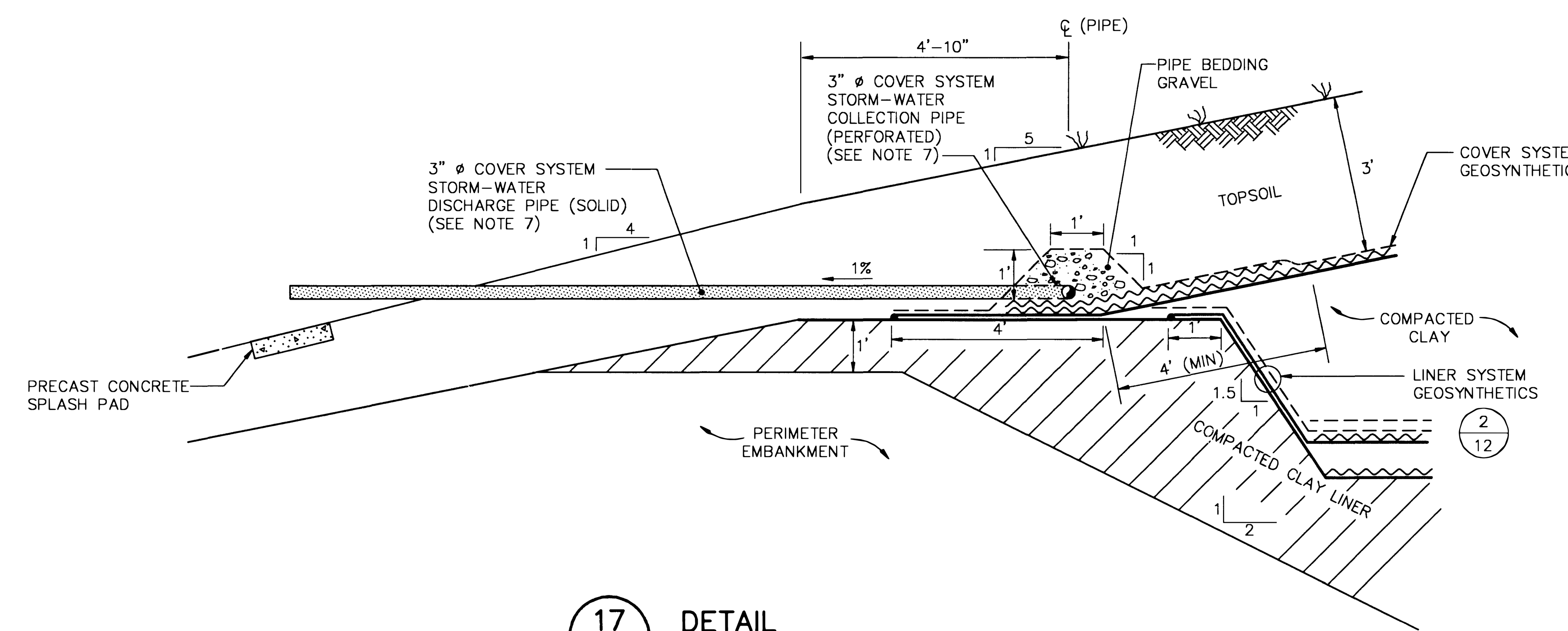
14 (9,10,11) DETAIL
FINAL COVER SYSTEM
SCALE: 1" = 2' (SEE NOTE 1)



15 (–) DETAIL
PERIMETER EMBANKMENT
SCALE: 1" = 4' (SEE NOTE 1)



16 (–) DETAIL
ANCHOR TRENCH DURING OPERATIONS
SCALE: 1" = 4' (SEE NOTE 1)



17 (–) DETAIL
COVER DRAINAGE SYSTEM
SCALE: 1" = 2' (SEE NOTE 1)

NOTES:

1. DETAILS ARE SHOWN TO THE SCALE NOTED EXCEPT FOR THE GEOSYNTHETICS; THESE ARE SHOWN WITH EXAGGERATED THICKNESS FOR CLARITY.
2. SEE FIGURE 12 FOR THE LINER SYSTEM AND COVER SYSTEM COMPONENT SCHEDULE.
3. THE CLAY CAP WILL BE COMPACTED IN 6-in. THICK LIFTS (COMPACTED THICKNESS) TO AT LEAST 95% OF THE CLAY'S MAXIMUM DRY DENSITY AS DETERMINED IN THE STANDARD PROCTOR COMPACTION TEST (ASTM D-698) AT A WATER CONTENT EQUAL TO OR GREATER THAN ITS' STANDARD PROCTOR OPTIMUM WATER CONTENT. THE MAXIMUM HYDRAULIC CONDUCTIVITY OF THE COMPACTED CLAY CAP WILL BE 1 X 10^{-7} cm/s. AT THE TOP OF THE LAND-VAULT, THE BOTTOM 6-in. THICK LIFT OF CLAY WILL BE COMPACTED USING TRACKED VEHICLES AND SMOOTH WHEEL ROLLERS TO ENSURE THAT PIPES IN THE GAS VENTING SAND ARE NOT DAMAGED. THE HYDRAULIC CONDUCTIVITY CRITERION FOR THIS BOTTOM LIFT WILL BE WAVED; HOWEVER, THE COMPACTION CRITERIA WILL BE MET. THE TOP SURFACE OF THE COMPACTED CLAY CAP WILL BE TREATED WITH PRAMITOL SOIL STERILANT, OR APPROVED EQUAL. APPLIED AT A RATE OF 20 lb/acre, OR AS SPECIFIED BY THE MANUFACTURER.
4. THE COMPACTED CLAY PLUG WILL BE CONSTRUCTED OF THE SAME MATERIAL AS THE CLAY LINER. THE CLAY WILL BE COMPACTED USING HAND-OPERATED EQUIPMENT TO AT LEAST 95% OF ITS MAXIMUM DRY DENSITY AS MEASURED IN THE STANDARD PROCTOR COMPACTION TEST (ASTM D-698) AT A WATER CONTENT EQUAL TO OR GREATER THAN ITS' STANDARD PROCTOR OPTIMUM.
5. THE REVEGETATION SEED MIXTURE WILL CONSIST OF BERMUDA GRASS, WHITE CLOVER AND CEREAL RYE, AS DESCRIBED IN THE PROJECT SPECIFICATIONS. A STRAW MAT WILL BE PLACED OVER THE SEED MIXTURE FOR EROSION CONTROL BEFORE VEGETATION IS ESTABLISHED. THE MAT WILL HAVE A MINIMUM WEIGHT OF 0.5 lb/yd^2.
6. AT THE TIME OF CONSTRUCTION OF THE COVER SYSTEM, THE PLYWOOD WILL BE REMOVED AND THE GEOTEXTILE FILTER WILL BE CUT AT THE EDGE OF THE COMPACTED CLAY PLUG. THE HDPE GEOMEMBRANE CAP WILL THEN BE CUT AT THE EDGE OF THE HDPE GEOMEMBRANE BOTTOM LINER.
7. THE COVER SYSTEM STORM-WATER COLLECTION PIPES WILL BE PLACED IN PIPE BEDDING GRAVEL AROUND THE PERIMETER OF THE LANDVAULT. THE COVER SYSTEM STORM-WATER DISCHARGE PIPES WILL BE PLACED TO INTERSECT THE COLLECTION PIPES AT APPROXIMATELY 50' INTERVALS AS SHOWN ON FIGURE 8. THE DIAMETER AND FREQUENCY OF COLLECTION PIPE PERFORATIONS WILL BE THE SAME AS FOR THE LEACHATE COLLECTION AND LEAK DETECTION PIPES SHOWN ON FIGURE 14.

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File No. P1374-117

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McIntosh, Alabama

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FIGURE 17
ABOVE GROUND
HAZARDOUS WASTE LANDVAULT NO. 2
COVER SYSTEM DETAILS

Scale: AS SHOWN | Dwg. No. D-995-3117 | Rev. 1

The composite cap is composed of an 80 mil thick HDPE geomembrane overlying a 2 foot thick low-permeability clay. The composite cap has a permeability equal to the permeability of the landvault secondary liner. The HDPE component has an equivalent hydraulic conductivity of approximately 1 x 10^{-13} cm/s. HDPE liner properties are discussed in Section 3.2 of this application. The low-permeability compacted clay is constructed with a maximum hydraulic conductivity of 1 x 10^{-7} cm/s. The low-permeability clay component provides support for the geomembrane and provides a secondary barrier against holes that may develop in the geomembrane. The minimum cover slope is 3 percent. The assessment of settlement potential performed by Geotechnical Engineering - Testing, Inc. indicated that the anticipated cover settlement will be negligible and no ponding should occur. Calculated tensile strains on the liner system caused by settlement and construction will induce negligible tensile stresses on the geomembrane cap. Calculations demonstrating that the cap system is capable of withstanding the anticipated stresses are contained in the Engineering Report.

10.0 Groundwater Protection

The groundwater monitoring/corrective action program as modified by this submittal and described in groundwater monitoring/corrective action plan ensures groundwater protection considerations are satisfied. BASF performed a hydrogeologic evaluation of the HWLV2 site to supplement the information collected in previous studies conducted at the facility. Three (3) temporary monitoring wells (MW-12, MW-13, MW-14) were installed at locations in the immediate vicinity of the HWLV2. Groundwater samples were collected from each of the temporary wells and analyzed for Appendix IX constituents to establish baseline conditions. The hydrogeologic information derived from the wells indicates that thickness of stratigraphic units and characteristics of geologic materials and water levels are consistent with information obtained in other areas of the facility. Groundwater flow is to the south-southeast. The hydrogeologic assessment resulted in installing one upgradient (MW-12A) and three downgradient (M-13, M-14, and M-15) monitoring wells around the HWLV2.

11.0 Closure

Closure of each cell and final closure of the landvault facility have been designed to satisfy the following criteria:

- Minimize long-term migration of liquids through the landvault;
- Require minimum maintenance;
- Promote drainage and minimize erosion;
- Accommodate settling and subsidence while maintaining cover integrity;
- Have permeability less than the bottom liner system.

Closure of the landvault is detailed in Closure Plan.

12.0 Post-Closure

Following final closure all applicable post-closure requirements will be complied with throughout the post-closure care period. These requirements include maintenance, monitoring, inspection and reporting as specified in ADEM Administrative Code R 335-14-5-.07 (40 CFR Section 264.310). Post-closure is detailed in Post-Closure Plan of the RCRA Permit.

APPENDIX I

HAZARDOUS WASTE BOILER #7

(revised September 2021)

Hazardous Waste Boiler #7

1.0 General

BASF operates a hazardous waste fueled boiler (Boiler #7) at the McIntosh TSDF. The boiler utilizes selected hazardous waste feed from tanks UT-V-813 and UT-V-814. This fuel primarily consists of methanol with trace organic constituents (AO and HALS streams), which were previously utilized in Boiler #6. BASF previously used Boiler #6 to manage these materials and recover their fuel value for many years. However, due to the reclassification of these waste streams as hazardous waste streams on March 30, 2015, BASF ceased using these materials as fuel. Boiler #7 was designed as a replacement for Boiler #6 and constructed to facilitate the continued use of these wastes as fuel to generate steam by heating water in a packaged boiler to produce steam. Boiler #7 is regulated as an Industrial Furnace in accordance with Alabama Administrative Code R 335-14-7-08 and 14-8-.02, for Industrial Furnace, as well as EPA 40 CFR 266 and 270. The Boiler's emissions are managed in accordance with a companion Title V air permit incorporating the Maximum Attainable Control Technology (MACT) requirements of 40 CFR Part 63, Subpart EEE for Hazardous Waste Combustors.

1.1 Boiler System Concept

Boiler #7 provides up to 130,000 lb/hr of 150 psig steam for process and infrastructure requirements, similar to other existing boilers at the facility. The unit is a package boiler that utilizes natural gas fuel, and the liquid waste fuel is as a supplemental fuel source. Up to 25% of the heat input to the boiler can be supplied from the waste fuel. When waste fuel is not available, the boiler will utilize only natural gas as fuel. The boiler produces 150 psig steam which is delivered to the plant via pipeline.

1.2 Boiler System Description

Major components of the boiler system include the package hazardous waste boiler, tanks UT-V-813 and UT-V-814 which are used to store the waste fuel prior to consumption, and ancillary equipment consisting of waste fuel piping and transfer pumps, vent piping, and a small knock-out pot (UT-V-815) to separate liquids in the vent system. Vents within the system are routed to Boiler #7 as an emission control. The tanks and associated ancillary equipment are discussed in Appendix N of this application. The boiler includes a steam header system, instrument control and automated monitoring system consisting of a flame protection PLC and a boiler control PLC with conventional instruments (i.e. temperature, pressure, flow, level) and screen displays. This system monitors and controls the entire boiler operation for the McIntosh facility. Figure I-1 illustrates the boiler system components. Figure I-2 (Attached) shows the locations.

As noted in Figure I-1, Boiler #7 was installed to replace Boiler #6. The tanks and associated equipment are existing components which were previously used to provide the same waste fuel to Boiler #6 when it was in operation. As noted above, BASF ceased usage of Boiler #6 for waste fuel combustion when the comparable fuel exemption was vacated in March 2015. Boiler #7 has been designed to replace Boiler #6, and has been designed to comply with applicable regulatory requirements.

1.3 Expected Life

Boiler #7 is expected to be in active service at the facility for more than 20 years (i.e, until at least 2035).

2.0 Boiler Feed Waste Description

2.1 Identification

The AO and HALS streams will comprise the bulk of the waste fuel utilized within the boiler. These two wastes are spent solvents which are classified as hazardous due to their Ignitability (D001), and methanol content (F003). The wastes contain considerable fuel value and otherwise do not contain significant concentrations of hazardous constituents. They were previously utilized as fuel within Boiler #6 in accordance with that unit's air permit for many years, and BASF has extensive operational experience in their management as a fuel.

These streams generally contain o-Xylene, Methanol, Cyclohexane, Tertiary Butyl Alcohol, n-octane, iso-octanols, and Irganox residuals. The typical concentrations are summarized Table 2-1.

Figure I-1
RCRA Tank System and Boiler #7
Process Flow Diagram

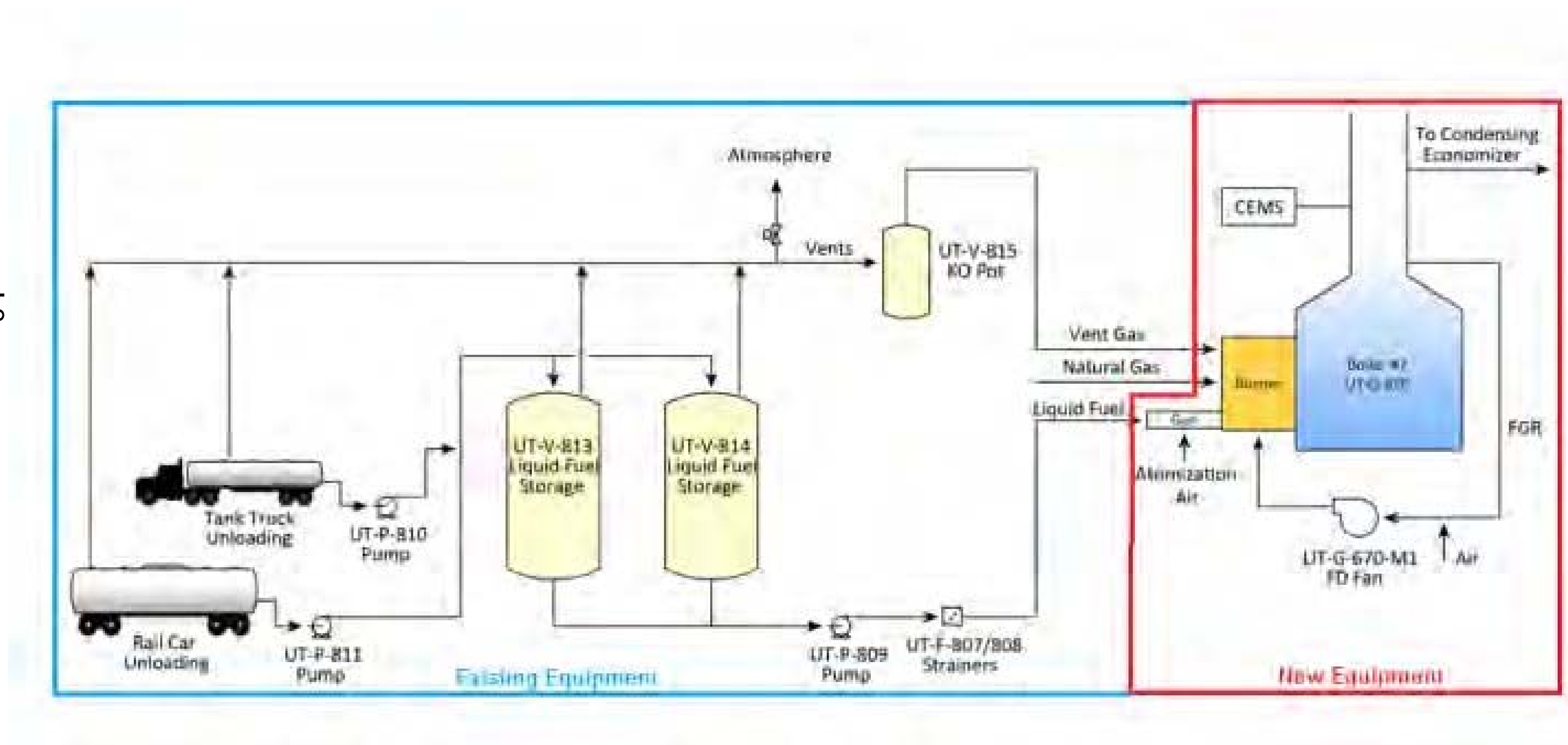


Table 2-1

Typical Waste Stream Components

Chemical Name	CASRN	RQ (lbs)	Min %	Max %
HALS Stream				
Xylene	1330-20-7	1000	1	45
Methanol	67-56-1	5000	0	10
Cyclohexane	110-82-7	1000	0	20
Tertiary Butyl Alcohol	75-65-0	100	10	20
n-octane	111-65-9	100	0	5
AO Stream				
Methanol	67-56-1	5000	20	70
Iso-octanols			0	10
Irganox products			0	20

Waste stream sampling of the two streams has also been completed. Both streams contain low concentrations of Aluminum, Barium, Chlorides, and Sulfur, however these compounds are considered negligible at these concentrations. Additionally, the material contains negligible ash content. Table 2-2, summarizes the results of waste sampling conducted in December 2014.

Further information regarding boiler feed constituents is included in the Title V Air Permitting Application. It is anticipated that the largely natural gas fuel will not produce any residues. The negligible feed ash residue and metals content of the liquid waste fuel negate the need for a residuals management plan or metals risk evaluation. Further information can be found in the Waste Analysis Plan (WAP), Appendix B.

2.2 Feed Volume

Boiler #7 has the capacity to accept 143.7 MMBTU/hr heat input capacity. The waste feed will only comprise up to approximately 25% of the heat input to the boiler. The remainder of the fuel used will be natural gas.

Table 2-2

Waste Stream Constituent Analysis Summary
December 2014

Parameter	Antioxidant Feed	HALS Feed
Total Fluorine (mg/kg)	< 1.0	< 1.0
Total Chloride (mg/kg)	< 1.0	3.6
Aluminum (mg/kg)	0.3	< 0.1
Antimony (mg/kg)	< 0.1	< 0.1
Barium (mg/kg)	0.4	0.6
Cadmium (mg/kg)	< 0.1	< 0.1
Chromium (mg/kg)	< 0.1	< 0.1
Cobalt (mg/kg)	< 0.1	< 0.1
Manganese (mg/kg)	< 0.1	< 0.1
Mercury (mg/kg)	< 0.001	< 0.001
Nickel (mg/kg)	< 0.1	< 0.1
Lead (mg/kg)	< 0.1	< 0.1
Selenium (mg/kg)	< 0.1	< 0.1
Nitrogen (mg/kg)	< 40	< 40
Sulfur (Wt%)	0.0271	0.0092
Ash (Wt%)	<0.001	<0.001
Heat of Combustion (BTU/lb)	12875	19483

2.3 Feed Management

Feed will be pumped to the Boiler from Hazardous Waste Storage Tanks UT-V-813 and UT-V-814 as needed to supplement the natural gas fuel. The waste feed will be periodically sampled in accordance with the Title V permit operational plan to document compliance with facility air emissions permit, and the system will be checked daily for leaks in accordance with the Inspection Plan contained in Appendix D. The unit will also be subject to the fugitive emission control requirements of the Title V permit. Information regarding the handling of hazardous waste, including incompatible wastes and safety precautions, are included in the WAP, included as Appendix B, and the Contingency Plan, included as Appendix F.

3.0 Boiler System Design

3.1 General

3.1.1 Boiler Properties

143.7 MMBTU/hr heat input capacity

130,000 lb/hr steam

99.99% DRE

Flame detectors for start-up

3.1.2 Specifications

The volume of waste burned in the boiler is expected to be, on average, 1,400 lb/hr over an annual average.

Boiler/Burner Critical Limits:

	Low	High
Atomization air pressure	45 psig	100 psig
Boiler feed water pressure	250 psig	525 psig
Boiler Drum pressure	---	350 psig
Combustion air pressure	2” w.c.	---
Flue gas Oxygen during Natural gas firing	0.5% O_2	---
Flue gas Oxygen during Liquid Fuel Firing	3.0% O_2	---
Liquid Fuel flow rate	5.5 gpm	22 gpm
Liquid Fuel pressure before control valve	70 psig	200 psig
Liquid fuel Heat of Combustion (Btu/lb)	8,000	19,600
Natural gas Flow (scfh)	13,000	137,000
Natural gas Flow, while burning liquid fuels (scfh)	27,500	---
Natural gas pressure (PSL/PSH)	8 psig	18 psig
Steam drum level (LWCO)	~ 26%	---
Steam flow rate	---	105,000 #/hr
Tank farm vent gas flow	41 scfm	600 scfm

3.1.3 Compatibility With Wastes

Assessment of waste properties and compatibility are addressed in the WAP, included as Appendix B. The waste characteristics of the HALS and AO waste streams has not changed, only the waste classification. As a result, the waste feed stream chemical and physical properties for the new Boiler are well known.

3.1.4 Secondary Containment

Information pertaining to secondary containment for the boiler and hazardous waste storage tanks area is summarized below:

- Burner containment consists of a curbed containment area with chemical resistant coating under the boiler burner.
  - Gross Containment Volume = 13.59 cf
  - Net Containment Volume = 101.66 gal
- Waste solvent tank farm containment consists of a diked tank farm with concrete base and walls with chemical resistant coating.
  - Waste solvent tank volume (ea) = 31,000.00 gal
  - Tank farm area = 3,153.38 sf
  - Avg wall height = 3.27 ft
  - Wall length = 253.50 ft
  - Top of wall elevation = 55.82
  - Top of slab HP (upgraded) =53.05
  - Top of slab LP (upgraded) = 52.05
  - Top of slab (approx avg)(upgraded) = 52.55
  - Gross Containment Volume =10,311.54 cf
  - Gross Containment Volume = 77,130.29 gal
  - Fdn and Misc Volume = 966.25 cf
  - Net Containment Volume = 69,902.73 gal
  - 25 year rainfall (24 hr) = 0.83 ft
  - 25 year rainfall volume (24 hr) = 19,656.04 gal
  - Required Containment Volume = 50,656.04 gal

3.2 Operating Procedures

3.2.1 Startup and Shutdown

The boiler will comply with Title V permit requirements for startup and shutdown. Detailed startup and shutdown procedures for the boiler are contained in the Title V permit required operations plan. In general, the startup procedure consists of beginning operations using only natural gas fuel. Once stable operations are established, the waste fuel will be phased into use. For shutdown, the procedure is reversed.

3.2.2 Operating Parameters

The operating conditions of Boiler #7 were designed to meet the requirements of the 40 CFR 63 Subpart EEE Hazardous Waste Combustion MACT, and are detailed in the air permit's operations plan. The boiler will not be operated outside of the permitted conditions.

3.2.3 Sampling

Periodic waste sampling will be conducted to verify the waste streams entering the Boiler meet the physical and chemical properties of feed streams outlined in the permit, and for which the Boiler was designed. This sampling will be done in accordance with the Title V permit operations plan, and the WAP. Additional sampling will be conducted, as necessary, to verify compatibility, and the physical and chemical properties are within the permit specifications.

3.2.4 Boiler Inspection

Regular inspections are conducted for equipment malfunctions, structural deterioration, operator errors, and leaks or releases that could endanger human health or the environment. Items included in the inspection schedule, inspection nature, and frequency are detailed in the Inspection Plan - Appendix D of this application. Additional monitoring requirements are also detailed within the Title V Air Permit.

3.2.5 Residues

Boiler residues are not anticipated due to the low ash and metals content present in the waste feed.

4.0 Manifest System, recordkeeping, and reporting

Internal manifests are used at the McIntosh Facility to track the movement of solid and hazardous waste disposed of on and off-site. The facility does not receive hazardous waste from off-site for disposal. Copies of all internal manifests are maintained on-site. BASF will maintain an operating record for the boiler which complies with the requirements of 40 CFR 264.73.

4.1 Monitoring Systems

The incoming Boiler #7 feed is monitored to ensure consistency with permitted emission levels, and that Boiler design capacities are not exceeded. Combustion conditions, such as liquid and total fuel feed rate, liquid fuel ash and chlorine content, combustion temperature, and flue gas flow rate, are also monitored to ensure Boiler specifications and permitted conditions are not exceeded. NO_2 and CO also are monitored using continuous emissions monitors. The monitoring equipment is included in the Inspection program and schedule, included in the Inspection Plan.

5.0 Closure

At closure, all hazardous waste and hazardous waste residues (including, but not limited to ash, scrubber waters, and scrubber sludges) will be removed from the boiler. Once the Boiler has been decontaminated, it will be decommissioned, and the area closed in a manner that minimizes the need for further maintenance and controls, and minimizes (or eliminates to the extent necessary to protect human health and the environment) post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere, and complies with the closure requirements of 40 CFR 266. A written plan detailing boiler closure and associated costs is included as Appendix J.

Post-Closure Care is not anticipated to be required for the Boilers after all closure requirements have been met.

6.0 Preparedness and Prevention

The facility was designed and constructed to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment. Further information regarding maintenance and operation of the facility, and security measures in place is included in Appendices C and D of the permit application, and the Boiler Standard Operating Procedures.

7.0 Contingency Plan and Emergency Procedures

Operation of Boiler #7 does not result in additional contingency and emergency requirements relative to other RCRA facility operations. In general, response to emergency or out of range conditions in the boiler is relatively straight forward. In the event that emergency conditions occur, hazardous waste feed to Boiler #7 will be cut off, and the boiler will be operated using natural gas fuel until proper operating conditions are restored. Provisions have been put in place regarding emergency response procedures and contingency planning at the BASF Facility, and are detailed in the Contingency Plan provided as Appendix F.

8.0 Closure/Post-Closure

The Facility has a closure plan in place which includes provisions for removing residual materials from the Boiler and financial requirements. At this time, clean closure of the Boiler is anticipated, and post-closure care will not be required. Further information regarding closure is included in the Closure Plan (Appendix J). Should an event occur which initiates the necessity of continuing post-closure care. A Post-Closure Plan will be developed in response to the event, and submitted to ADEM for approval.

9.0 Air Emission Standards for Equipment Leaks

The Boiler is intended to meet the Hazardous Waste MACT air emission standards, and is subject to Title V permitting. As noted in 40 CFR 266.100(b) and 40 CFR 264.1080(b)(7), hazardous waste units which are subject to management under an air permit are subject to the air permit emission control requirements in lieu of applicable 40 CFR 264 Subparts AA, BB, and CC requirements. Further information regarding these requirements is included in the Title V Air Permit leak detection and monitoring program procedures.

10.0 Security

The McIntosh facility is a controlled access site. The readily accessible perimeter of the property is surrounded by fencing. Vehicular access to the plant is limited to the three roads approaching the site from the south off U.S. Highway 43 via the Industrial Park Road, from the west off U.S. Highway 43 via Ciba Road and from the north off U.S. Highway 43 via Schneller Lane to parking areas outside the fenced perimeter. There is 24-hour surveillance at the facility, and controlled access at the gates. Additional information regarding facility security can be found in the Security Plan (Appendix C).

11.0 Personnel Training

BASF has developed a training program designed to prepare personnel to operate and maintain the facility safely. The information presented in the training program is contained in manuals specifically developed for the operations conducted at the facility. More information regarding the training program can be found in the Personnel Training Plan (Appendix E).

12.0 Location

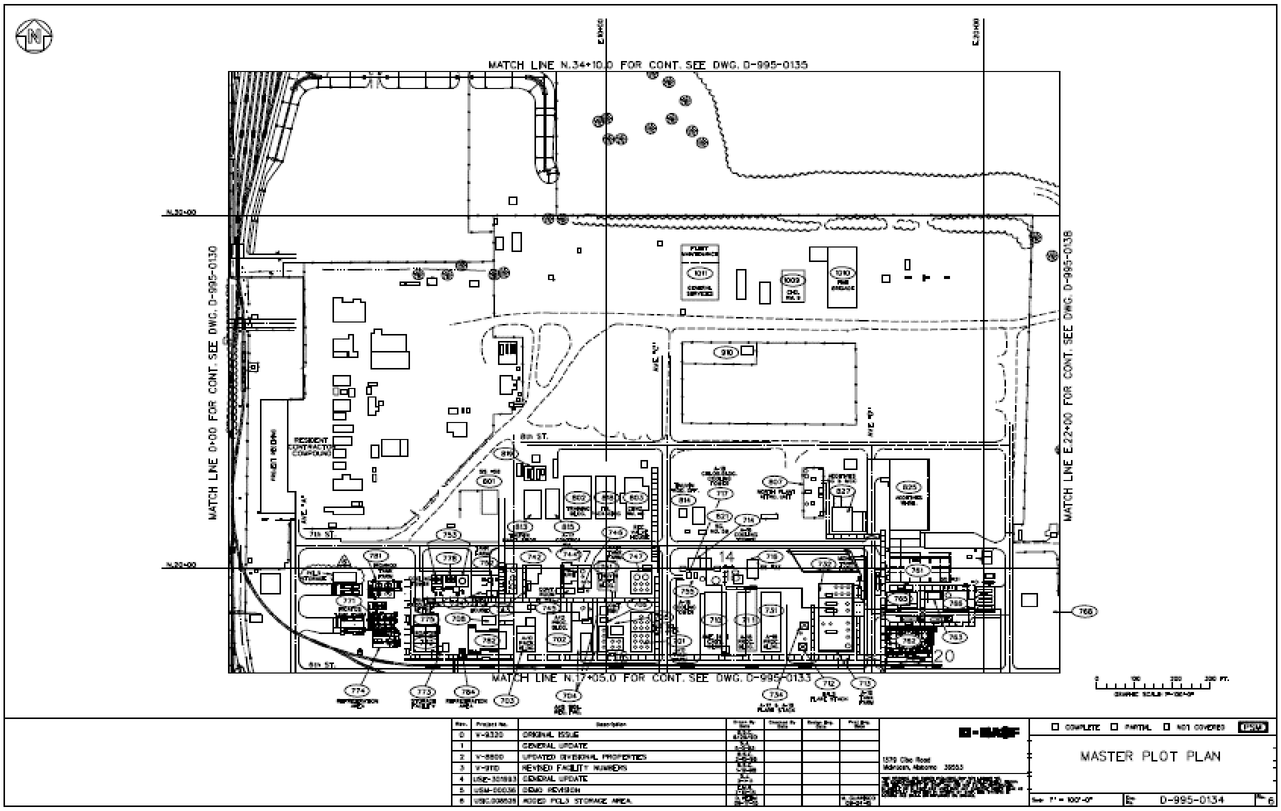
Alabama is not listed as a state of seismic concern. BASF has obtained the current Flood Insurance Rate Map (1978) for Washington County, Alabama from the Federal Insurance Administration, which shows that Boiler #7 is not within the 100-year floodplain and is, therefore, not subject to the floodplain standard.

Attachment A

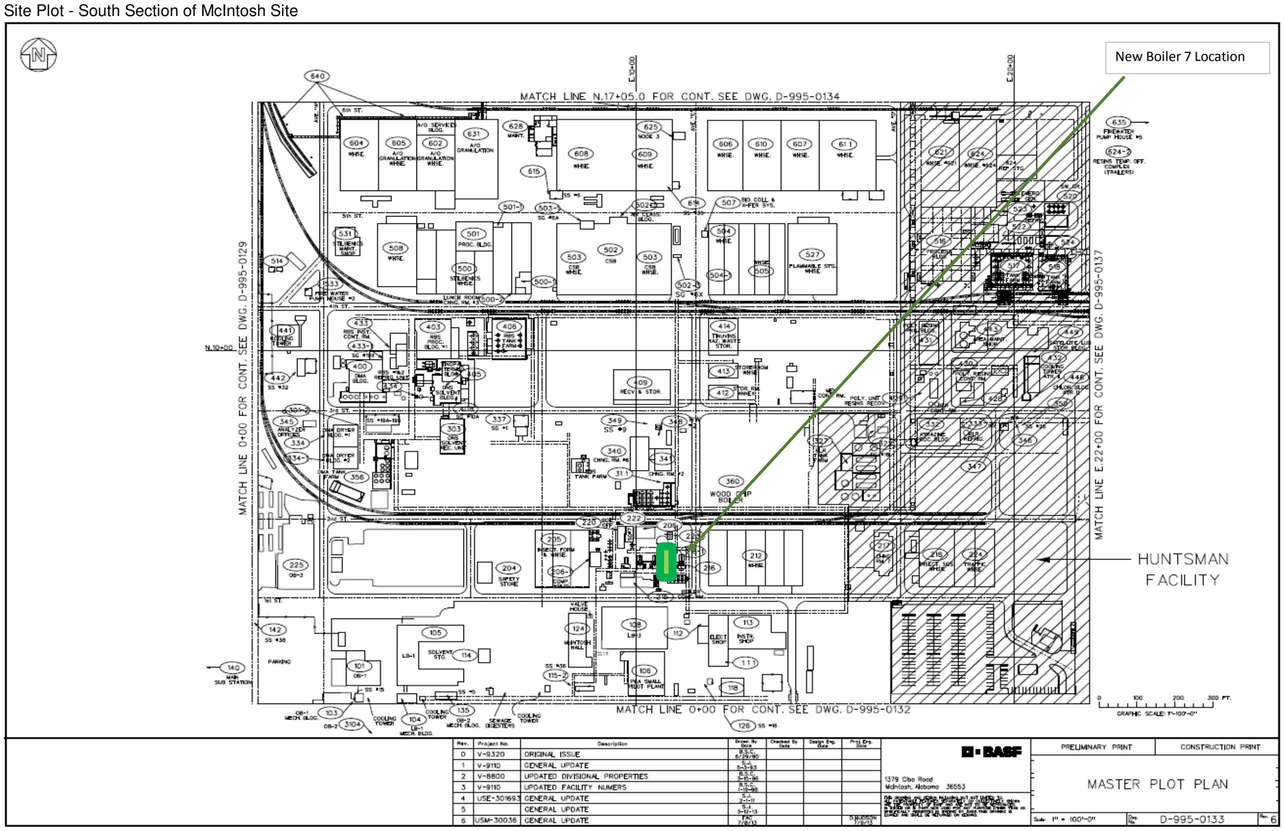
Tank System and Boiler #7

Area Diagram

Site Plot - North Section of McIntosh Site



Site Plot - South Section of McIntosh Site



Rev.	Project No.	Description	Drawn By Date	Checked By Date	Design Eng. Date	Proj. Eng. Date
A		ISSUED FOR INFORMATION	MCR 9/2/14			

BASF

1379 Ciba Road
McIntosh, Alabama 36553

C. G. NO.

PRELIMINARY PRINT | CONSTRUCTION PRINT

Figure I-2
Area Plot Plan
Boiler #7
BASF Corporation

Scale: 1"=20'-0" | Dwg. No. SK-141081-EN-PI-003 | Rev. A

APPENDIX J

CLOSURE PLAN

(Updated March 2023)

Table of Contents

1.0 **Assumptions**

- Closure of the TSDF will begin within 45 days of completing closure of the manufacturing facilities and no other waste (liquid or solid) will be received.
- All NPDES permit conditions will continue to be met.
- On-site above ground landfill capacity will be available prior to final closure of the TSDF.
- Prior to and during closure, the Closure and Post-Closure Plans and all revisions to the plans will be maintained in the EHS Department until the certificate of closure completion has been accepted.
- The expected life of the facility is 30 years, which would give a final closure date of 2035 for the TSDF.
- At final closure of the TSDF, the deed to the facility property will be modified so that it will in perpetuity notify any potential purchaser of the property that its use is restricted such that the integrity of the final cover, liner(s), or any other components of any containment system or the function of the facility's monitoring system will not be disturbed. In addition, the survey plot and record of the type, location, and quantity of hazardous wastes disposed of within each landfill cell or area of the facility will be filed with the local zoning authority or the authority with jurisdiction over local land use and with the EPA and ADEM.
- Closure activities will be completed within 180 days after receipt of the final volume of hazardous wastes, in accordance with ADEM Admin. Code r. 335-14-5-.07(4).

2.0 **Standard of Performance**

The standard by which this plan has been developed is based on minimizing the required maintenance effort during post closure care, and minimizing or eliminating any threat to the environment or human health during and after closure. This will be accomplished by: decontaminating all equipment (tanks, pumps, piping, boiler, etc.); decontaminating or disposing of all equipment and materials required to carry out the Closure Plan; and closing the landfill in accordance with regulation 40 CFR 264 Subpart N (See Closure of Landfill, Section 4.3).

Decontamination will be accomplished by washing the equipment with the appropriate cleaners, based on the wastes handled (See Decontamination, Section 7.5). The final volumes of either hazardous liquids or solids generated during closure of the tanks and the boiler which cannot be properly treated and disposed of on-site will be transported to an approved off-site TSDF. The Closure Plan will leave only the closed surface impoundments, landfill(s) and the ground water monitoring system, which will be covered by the Post-Closure Plan. The procedures of the Closure Plan cover only the applicable portions of 40 CFR 264, specifically the following:

- 264.197 and ADEM Admin. Code R. 335-14-6.10(8) Tanks
- 264.310 and ADEM Admin. Code R. 335-14-5-.14(11) Landfills
- 266.100 and ADEM Admin. Code R. 335-14-7-.08 Hazardous Waste Burned in Boilers and Industrial Furnaces.

There are no hazardous waste piles at the McIntosh Plant, therefore, 264.258 and ADEM Admin. Code R. 335-14-5-.12(9) do not apply.

There are no land treatment facilities at the McIntosh Plant, therefore, 264.280 and ADEM Admin. Code R. 335-14-5-.13(11) do not apply.

The surface impoundments at the McIntosh Plant have been closed and certified, therefore, 264.228 and ADEM Admin. Code R. 335-14-5-.11(9) no longer apply.

To conform to this standard, and to provide sufficient time to properly close the TSDF, a period of 270 days is required.

3.0 <u>Facility Description</u>

3.1 Storage/Accumulation

- Boiler #7 Storage Tanks (2)

3.2 Disposal

- Above Ground Hazardous Waste Landvault No. 2 (Landvault)

3.3 Treatment Processes

- Boiler #7 (1)
  1. Boiler #7 Liquid Fuel Burner (1)
  2. Forced Draft Air Inlet (1)
  3. Economizer (1)
  4. Boiler Stack (1)
  5. Sump (2)

3.4 Extent of Operation

3.4.1 Storage - Inventories

The maximum volume of hazardous liquid waste in inventory at any time during the life of this facility is as follows:

- UT-V-813 Waste Tank .... 31,000 gallons
- UT-V-814 Waste Tank .... 31,000 gallons

Total..62,000 gallons

3.4.2 Disposal Facilities

The maximum open area at any time during the life of the Landvault will be 146,000 square feet.

4.0 <u>Final Closure</u>

An outline of the Closure Plan is presented here to provide clarity. Detailed information concerning operational aspects of the Closure Plan is found in the following sub-paragraphs and in Section 7.0, Closure Specifications and Details. An implementation schedule is included in Section 8.0, Schedule.

To treat and dispose of the largest volumes of waste practical on-site, the order in which these facilities are closed becomes as important as the manner in which closure is accomplished. This outline is written in the general order in which activities will be accomplished, but it is not intended that this be interpreted as an exact sequence of events. Many activities will be accomplished simultaneously.

4.1 Disposal of Inventory

The first step will be to incinerate all waste inventory contained in the Boiler #7 Feed Tanks (UT-V-813 and UT-V-814), at the Boiler area.

4.2 Closure of Boiler #7

The closure of Boiler #7 will be accomplished through performing a series of steps designed to effectively decontaminate all components that are exposed to hazardous wastes. The closure process involves selective use of tanks and piping to circulate decontamination solution through the system, where practical. Where this approach is impractical, equipment will be dismantled and cleaned in a manner designed to effectively decontaminate the component. The closure of Boiler #7 will begin with the burning of all waste inventory remaining in the storage tanks (UT-V-813 and UT-V-814). Following the burning of the waste inventory, the tanks will be filled with water to provide an initial rinse. This initial decontamination water will be tested to verify non-hazardous waste status, and then routed to the on-site waste water treatment plant (WWTP) for proper treatment and disposal.

The two waste feed tanks and knockout pot (UT-V-815) will be decontaminated in accordance with the procedures outlined in Section 7.5. Decontamination solution will be mixed in tanks UT-V-813 and UT-V-814. The solution will be circulated through the piping and pumps and recirculated back to the tanks utilizing existing recycle lines.

Following the decontamination of tanks UT-V-813 and UT-V-814, UT-V-815 will be opened, and thoroughly washed/rinsed using a similar decontamination solution. The solutions from all tanks will be tested and then, if found acceptable to on-site waste water treatment system parameters, will be routed to the WWTP. If not acceptable, testing will continue, and appropriate measures will be taken to dispose of the water properly.

Once the equipment decontamination has been completed, the concrete pads and waste water collection sumps, including the sump serving the boiler/burner area, will be washed down with decontamination solution and rinsed with fresh water in accordance with Section 7.5. The solution and rinse water will be collected in the sumps and transferred through existing lines to the Waste Water Treatment System. Verification of decontamination will be in accordance with Section 7.5. The dikes surrounding the sumps will be breached to prevent rainwater accumulation. Any residual material (i.e. sediments) collected in the sumps will be removed, and evaluated prior to final disposal. All drain lines will be plugged at the sumps, and the sumps will then be infilled and capped in accordance with Section 7.3.

4.3 Closure of Landfill #2

To eliminate the large volume of stormwater that is collected on the open area of the landfill, the landfill will be closed at the earliest practical point. A cover will be placed over the landfill sump to prevent direct precipitation into the sump.

The last cell will be capped per approved landfill drawings. The cover will be seeded with the approved vegetation, and all previously closed cells which may require repairs due to erosion will be repaired, as well as any required re-seeding to promote healthy plant growth.

4.4 Closure of Final Equipment

Boiler #7

Concrete pads associated with truck unloading, and the liquid fuel burner containment area will be decontaminated in accordance with Section 7.2. Verification of decontamination will be in accordance with 7.5.

5.0 Partial Closure

To minimize the open area of the Land vault #2 and leachate containment and treatment, the Landvault will be closed phase by phase as it is filled, with the option for closure of a single phase instead of three phases. Cells 1 and 9 have a maximum area of 62,000 square feet each. Cells 2 through 8 have a maximum area of 43,000 square feet each. A cell will be closed when capacity is reached. ADEM will be notified at least 60 days before Landvault closure activities begin. The maximum open area at any time during the life of this facility will be approximately 3.4 acres (148,000 square feet). ADEM will also be notified at least 45 days prior to the beginning of closure activities of Boiler #7, the storage tanks and the container storage area.

6.0 Notifications

6.1 Notification on Amending Plan

If at any time during the life of this facility, an unforeseen change in the estimated volume, year of closure, the operating plans, or design effect the Closure Plan, a request to amend Closure Plan will be submitted within 60 days after the change.

Any request for permit modifications to change the operating plans or design of this facility will be accomplished with a request for modification of the Closure Plan.

6.2 Notification of Intent of Final Closure

The Director will be notified at least 60 days prior to the date expected to begin final closure. This date will be within 30 days of receiving the final volume of wastes generated from completion of closure of the manufacturing facilities.

7.0 Closure Specification and Details

7.1 Tanks

All tanks will be decontaminated along with the associated pumps and piping per the decontamination procedure in Section 7.5. After decontamination of the tanks, and final rinsing, the piping will be disconnected, the bottom drain valve removed, and the nozzle left open such that no water can accumulate in the vessel.

7.2 Concrete Pads

All other concrete pads and containment pads will be decontaminated by pressure-washing. A sample of the rinse water will be taken and tested per the verification of decontamination procedures in Section 7.5.

7.3 Sumps

After a sump is emptied of all contents, it will be backfilled in layers and compacted with air tools.

7.4 Soils

Clean Closure Criteria

To provide background data for evaluation, soil samples will be taken in the area near the upgradient compliance monitoring wells. These samples will be analyzed for the list of hazardous waste constituents managed at the TSDF based on review of the RDWs. This base data will be used for comparison with results from soil analysis conducted after closure. After obtaining samples by the appropriate ASTM sampling methodology, the samples will be analyzed for the waste constituent list. The soil will be considered clean if there is no detectable presence, or if there is no increase, in any detected levels, within the accuracy and precision of the required test procedure, over the background samples.

General Soil Sampling

The soil immediately adjacent to, and up to 5 feet from, the TSDF will be sampled and analyzed for the list of hazardous waste constituents managed at the TSDF, based on review of the RDWs. Four samples will be taken around each exposed side (2 at 2 feet and 2 at 5 feet from the TSDF). If no contamination is detected in comparison to the background data collected from soil samples taken from the area near the upgradient compliance groundwater wells, the soil will be considered clean. If results indicate contamination, the vertical and horizontal extent of the contamination will be determined, and the soil removed and placed in the landfill. This testing will include the areas adjacent to the:

Boiler #7

Concrete pads
Containment pads

7.5 Decontamination

Decontamination facilities will be established early in the closure activities. A solution of industrial cleaner will be used as the decontamination solution. Following decontamination, all items will be rinsed with water. All water drainage will be collected, and transferred to the biological wastewater treatment system. The used decontamination solution will be neutralized, and transferred to the wastewater treatment system.

Equipment subjected to the decontamination process will be free of all linings, coatings (other than paint), and encrustation of waste residues. Sandblasting or pressure-washing may be required to accomplish this level of cleaning. All sandblast material and removed linings will be collected and placed in the landfill. The decontamination treatment process and water rinsing will be repeated in cycles, until decontamination can be verified by the method specified in Section 7.5.4, below.

1. Decontamination in Place

   All tanks and associated pumps and piping, will be decontaminated in-place by either transferring decontamination solution from a holding tank, or making up new solution in the tank, and circulating with the tank's designated pumps. This equipment will be flushed with water after draining the decontamination solution, by refilling with water, circulating with the pumps, and draining the water.

   Each tank will be tested to verify that the decontamination process is complete according to Section 7.5.4, below.

2. Remove and Decontaminate

   Equipment, closure tools, structures, etc. which cannot be decontaminated in place will be transported to a decontamination area, cleaned, and treated by soaking in decontamination solution, water rinsing, and testing. Decontamination is verified according to Section 7.5.4, below.

3. Decontamination of Construction and Closure Equipment

An Equipment Decontamination Area (EDA) is available in the TSDF, and can be used for decontamination of all heavy equipment, and the various vehicles used in the closure operations. The EDA drains to a wastewater collection sump, which is pumped to the treatment plant.

Equipment requiring decontamination will be driven inside the EDA, where all parts of the vehicle that have been in contact with waste material (dump beds, undercarriages, wheels, tracks, blades, buckets, etc.) will be washed down with water and/or steam to remove loose material, washed with copious quantities of decontamination solution, and rinsed with water a minimum of 3 cycles. Vehicles with components that can hold liquid (frontend loader buckets, certain dump truck bodies) will be filled with decontamination solution and soaked, as opposed to the washing procedure. The decontamination treatment process and water rinsing will be repeated in cycles until decontamination can be verified by the method specified in Section 7.5.4, below. All exterior parts of equipment not in contact with waste material will be cleaned by a steam/water wash.

4. Verification of Decontamination

Following completion of a decontamination treatment cycle, the water from the final rinse step will be sampled and analyzed. The analysis will include all constituent waste codes associated with the material contained in the tanks since last being declared RCRA- empty. If constituents are not detected, the tanks and equipment will be declared decontaminated. If constituents are detected, the decontamination cycle will be repeated until no constituents are detected.

7.6 Miscellaneous

All power to the units will be disconnected at the motor control center as equipment is shut down. After completion of final closure, the power will be disconnected at the main feeder.

8.0 Schedule

Per ADEM Admin. Code r. 335-14-5-.07(3)(b)6, an Implementation Schedule for final closure of the TSDF is presented below. This schedule has been developed to allow conformance to the Standard of Performance described in Section 2.0, and to allow sufficient time to close the TSDF.

- **Closure of Boiler**: Initial notification plus closure- 60 days
- **Decontamination of Equipment**: 4 months

9.0 Security

Closure areas will be enclosed to limit access to authorized personnel. Both Landvaults have fences, which were installed during initial construction. These fences are maintained during operations, and should only require minimal attention at closure. The surface impoundment closure areas have fences equipped with access gates. The fences are 4 feet chain link installed around the perimeter of each area. The Landvault is surrounded by a 6 feet high fence.

10.0 Certification of Closure

In accordance with ADEM requirements, an independent registered professional engineer will be obtained during closure to certify that the facility has been closed in accordance with this plan. The certification by both BASF, and the registered professional engineer, will be submitted to the Director within 45 days of closure of each unit, and within 45 days of completion of final closure. It is anticipated that 3 inspections will be required to provide certification.

11.0 Closure/Post Closure Cost

BASF has prepared detailed closure and post-closure cost estimates for Landvault #2, and closure cost estimates for Boiler #7 and associated Tanks (Table 11.2), and has developed costs for corrective action and post-closure care activities for the site. These costs are summarized in Table 11.1 below. Detailed closure costs estimates for Boiler #7 and associated Tanks are provided in Tables 11.2 and 11-3, respectively.

Additional detailed closure, post-closure and corrective action cost estimate information, along with copies of relevant Certificates of Insurance, are provided in Attachment J-2 as follows:

- Landvault #2: Details for closure and post-closure cost estimates are included in accordance with ADEM Admin. Codes 335-14-5-.08(3) and (5), respectively.
- Closed SWMUS and Remediated Areas: Details for post-closure and corrective action cost estimates are included in accordance with ADEM Admin. Codes 335-14-5-.08(5) and (10), respectively.
- Certificates of Insurance for closure, post-closure and corrective action costs are included in accordance with ADEM Admin. Codes 335-14-5-.08(4), (6) and (110, respectively.
- Documentation of Sudden and Non-Sudden Liability insurance in accordance with ADEM Admin. Codes 335-14-5-.08(8)(a) and (b), respectively.

The costs are updated and reported to ADEM and USEPA on an annual basis. Cost estimates shall be adjusted annually by recalculating (if warranted) or multiplying by an inflation factor, and will be submitted to ADEM within 60 days prior to the anniversary date of the establishment of the financial instrument in accordance with ADEM Admin. Codes r. 335-14-5-.08(3)(b), 335-14-5-.08(5)(b), and 335-14-5-.08(10)(b). In accordance with ADEM Admin Code r. 335-14-5-.08(4)(d)7 and 335-14-5-.08(6)(d)7, the associated letter of credit amount shall be updated within 60 days after an increase of the cost estimates (60 days after issuance of the permit renewal).

TABLE 11-1

SUMMARY OF CLOSURE, POST-CLOSURE AND CORRECTIVE ACTION COSTS

Closure Costs

Landvault #2 (see Attachment J-2 for details)	$5,789,000 [1]
Boiler #7 (see Table 11-2 for details)	$581,746
Tanks UT-V-813/814 (see Table 11-3 for details)	$261,013
Total Closure Costs =	**$6,631,759**

Post-Closure Costs (see Attachment J-2 for details) [2]

Closed Units (30 years)	$2,856,763
Active Landvault #2 (30 years)	$2,339,295 [3]
Total Post-Closure Costs =	**$5,196,058**

Corrective Action Costs (20 years, see Attachment J-2 for details) $11,117,653 [4]

[1] May 2022 estimate
[2] Post-closure costs for Boiler #7 and Tanks UT-V-813/814 are not required if units are clean closed
[3] February 2023 estimate
[4] August 2022 estimate

TABLE 11-2

CLOSURE COSTS - BOILER #7 [1]

BASF Chemical
McIntosh, Alabama

Task		Estimated Quantity	Unit	Estimated Unit Cost	Cost
Mobilization / Demobilization		1	LS	$30,000	$30,000
Decontamination [2]					
A.	Steam/H2O Equipment + Cleaning	4	DAY	$10,000	$40,000
B.	Sampling and Analysis	10	EA	$1,200	$12,000
C.	Water Treatment	40,000	LB	$0.15	$6,000
Dismantling/Demolition of Structures					
A.	Labor and Equipment	30	DAY	$7,500	$225,000
B.	Offsite Disposal – refractory	49	TON	$650	$31,850
	Offsite Disposal – equipment	40	TON	$650	$26,000
C.	Transportation – refractory	3	LOAD	$1,500	$4,500
	Transportation – equipment	3	LOAD	$1,500	$4,500
Soil Remediation					
A.	Sample Collection	1	DAY	$5,000	$5,000
B.	Sampling and Analysis [3]	7	EA	$600	$4,200
C.	Excavation [4]	13	CY	$500	$6,500
D.	Backfill	17	CY	$15	$255
E.	Offsite Disposal	17	TON	$250	$4,250
F.	Transportation	1	LOAD	$1,500	$1,500
Closure Certification					
A.	Reporting	1	LS	$20,000	$20,000
B.	PE Oversight	1	%	20%	$84,311
				Subtotal:	$505,866
				15% Contingency:	$75,880
				Total [5]:	$581,746

Notes:
(1) Closure costs developed for Boiler #7 and emission control equipment
(2) Total area of containment slab is equal to 460 square feet
(3) Samples collected every 2500 square feet
(4) Estimated impacted soil to be 5% of total containment area and depth of 1 foot
(5) Costs noted are in 2023 dollars

TABLE 11-3

CLOSURE COSTS – STORAGE TANKS [1]

BASF Chemical
McIntosh, Alabama

Task	Estimated Quantity	Unit	Estimated Unit Cost	Cost
Mobilization / Demobilization	1	LS	$30,000	$30,000
Removal/Disposal of Final Inventory	46,500	LB	$0.15	$6,975
Decontamination [2]				
D. Steam/H2O Equipment + Cleaning	4	DAY	$10,000	$40,000
E. Sampling and Analysis	10	EA	$1,200	$12,000
F. Water Treatment	52,000	LB	$0.15	$7,800
Dismantling/Demolition of Structures				
D. Labor and Equipment	8	DAY	$7,500	$60,000
E. Offsite Disposal	29	TON	$145	$4,205
F. Transportation	2	LOAD	$1,500	$3,000
Soil Remediation (Containment Areas)				
G. Sample Collection	1	DAY	$5,000	$5,000
H. Sampling and Analysis [3]	10	EA	$600	$6,000
I. Excavation [4]	1	CY	$500	$500
J. Backfill	1	CY	$15	$15
K. Offsite Disposal	1	TON	$145	$145
L. Transportation	1	LOAD	$1,500	$1,500
Closure Certification				
C. Reporting	1	LS	$12,000	$12,000
D. PE Oversight	1	%	20%	$37,828
			Subtotal:	$226,968
			15% Contingency:	$34,045
			Total [5]:	$261,013

Notes:
(1) Closure costs developed for 2 storage tanks and associated aboveground piping
(2) Decontamination includes tanks and piping (634 sf) and containment areas (588 sf)
(3) 5 Soil samples collected per tank
(4) Estimated impacted soil to be 5% of total containment area and depth of 1 foot
(5) Costs noted are in 2023 dollars

Attachment J -1

Deed Notice

Notice in Deed

NOTICE OF EXISTENCE OF DISPOSAL FACILITY UNDER SEC. 122.25 (14) EPA REGULATIONS FOR OWNERS AND OPERATORS OF PERMITTED HAZARDOUS WASTE FACILITIES

STATE OF ALABAMA
COUNTY OF WASHINGTON

Notice is hereby given that a hazardous waste disposal facility as defined in Section 122.25 (14) of the Environmental Protection Agency Regulations for owners and operators of permitted hazardous waste facilities, is located on the property hereinafter described. Said property was conveyed to Geigy Chemical Company, Inc., the predecessor in title of Ciba Specialty Chemicals Corporation, by deeds from Tensaw Land & Timber Company, Inc., et al dated March 7, 1952 and recorded in Deed Book 92, page 483 et seq, (as to Parcel 1) and dated January 31, 1953 and recorded in Deed Book 96, page 471, et seq (as to Parcel 2), all in the Probate Records of Washington County, Alabama.

Said property is more completely described as:

Parcel 1:

Beginning at a point on the east right of way line of the Southern Railway which is 5146.10 feet northward from the intersection of said east right of way line and the township line between Township 3 North, Range 1 East, and Township 4 North, Range 1 East, St. Stephens Meridian, Alabama, and running thence east 5778.06 feet to a point; thence south 50 degrees 35 minutes east 2290.61 feet to a point; thence south 2774.70 feet, more or less, to a point on the north margin of the Tombigbee River; thence Eastwardly along said margin to a point that is 200 feet east of the aforesaid north and south line; thence north 7248.52 feet to a point; thence north 89 degrees 46 minutes west 7759.87 feet to a point on the east right of way line of the Southern Railway; thence South 00 degrees 14 minutes east along said east right of way line 3000 feet to the point of beginning, being a portion of Sections 36 and 37, Fractional Sections 35, 38, and 41, and private claim Sections 40 and 34; Township 4 North, Range 1 East, and containing 579.7 acres, more or less, in Washington County, Alabama.

Parcel 2:

Commencing at the point where the North boundary of Section 40, Township 4 North, Range 1 East intersects the east boundary of that certain tract of land heretofore conveyed to Geigy Chemical Company, Inc. by Tensaw Land and Timber Company, Inc. and Washington Lumber and Turpentine Company, Inc. by warranty deed dated March 7, 1952 and recorded in Deed Book 92, page 483 in the records of the office of Probate Judge of Washington County, Alabama, which point is south 78 degrees 5 minutes east 5,843.5 feet from the Northwest corner of said Section 40, run thence South along the aforesaid east boundary line of Geigy Chemical Company 714.7 feet to a point for the place of beginning of the lands herein described; run thence south 76 degrees 12 minutes east 1951.6 feet, more or less, to the low water mark on the north margin of the Tombigbee River; thence southwestwardly along said low water mark with the meanders of the river, until same is intersected by the aforesaid east boundary line of the Geigy Chemical Company; thence north along said east boundary line 70 feet, more or less, to the concrete monument; thence continuing north along said east boundary line 2,723.6 feet to the place of beginning, containing 63.79 acres, more or less.

A plat of the location of said disposal facility is on file with the Alabama Department of Environmental Management, Lands Division in Montgomery, and at the plant of Ciba Specialty Chemicals Corporation at McIntosh, Alabama, and may be viewed by any person having proper reason to do so.

IN WITNESS OF ALL OF WHICH, Ciba Specialty Chemicals Corporation has caused this notice to be executed by___________________________________, Manager of its McIntosh plant site on the______________________________________day of___________________,______________________________________.

____

Manager, McIntosh Site

STATE OF ALABAMA
COUNTY OF Washington

Before me, the undersigned Notary Public in and for said State and County, personally appeared_, whose name is signed to the foregoing Notice, and who is known to me, and acknowledged before me this day that, being informed of the contents of said Notice, he executed the same voluntarily on the day the same bears date.

Given under my hand and seal this____day of , _.

____

Notary Public

Attachment J -2

Site Corrective Action Costs (20 Years)

Closure Costs for LV#2

Post-Closure Costs for
Closed Units (30 Years)
and LV#2 (30 Years)

Financial Assurance
Certificates

(March 2023 update)

Site Corrective Action Cost Estimate:
20 Years

Corrective Action	Estimated Annual Cost	Estimated Total Cost
[1] Groundwater Monitoring	**$83,240**	**$1,664,808**
Lab analytical (semi-annual)	$3,830	$76,608
Lab analytical (annual)	$9,690	$193,800
Sampling Labor:	$13,440	$268,800
Depth to GW Data Collection (labor)	$1,280	$25,600
Data Analysis and Reporting:	$55,000	$1,100,000
[2] GW Extraction and Treatment	**$429,260**	**$8,585,205**
Utilities	$75,000	$1,500,000
Materials (not pumps/motors)	$67,180	$1,343,605
WWTP	$150,000	$3,000,000
COntractor Labor	$23,200	$464,000
Well Treatment (product)	$46,000	$920,000
Well Treatment (labor)	$32,000	$640,000
Pump/Motor Replacement (Parts)	$5,600	$112,000
Pump/Motor Replacement (labor)	$4,400	$88,000
Pump/Motor Replacement (site Labor)	$2,200	$44,000
Discharge Line Inspections (monthly)	$7,680	$153,600
Flow Meter Inspections (monthly)	$7,680	$153,600
Weekly flow adjustments	$8,320	$166,400
[3] RCRA Inpsections per Part VI	**$18,840**	**$376,800**
OU1 MWs (monthly)	$3,840	$76,800
Contractor Labor (data review, meetings)	$15,000	$300,000
[4] Agency Oversight	**$24,542**	**$490,840**
ADEM	$24,542	$490,840
Corrective Action Total Cost:	**$555,883**	**$11,117,653**

CLOSURE COSTS – LANDVAULT #2
BASF Chemical
McIntosh, Alabama

Task	Estimated Quantity	Unit	Estimated Unit Cost	Cost
sand layer	5,500	CY	$20.01	$110,055
clay layer	18,700	CY	$22.90	$428,230
topsoil	27,500	CY	$25.33	$696,438
gravel	107.8	CY	$89.35	$9,632
Landvault Cell 3 - Fill Dirt	105,600	CY	$17.37	$1,834,272
Landvault Cell 2 - Fill Dirt	39,600	CY	$17.37	$687,852
base geo filter	275,000	SF	$0.39	$105,930
middle geofilter	275,000	SF	$0.39	$105,930
HDPE liner 80 mil	275,000	SF	$1.28	$353,100
HDPE liner 80 mil (intercell)	81,400	SF	$1.28	$104,518
geo net	275,000	SF	$0.54	$147,125
top geofilter	275,000	SF	$0.39	$105,930
seed and mulch	275,000	SF	$0.11	$29,425
perforated HDPE drainage pipe 6"		1,540	LF	$78.19
	$120,413			
drainage pipe 6"	660	LF	$76.05	$50,193
misc	1.1	LF	$64,050	$70,455
Project Engineering	1.1	HR	$75,000	$82,500
Civil /Structural Engineering (excludes Detail Eng)	1.1	HR	$225,000	$247,500
Technical contingency	1	LT	$223,211	$223,211
Total				$5,512,708
5% Contingency				$275,635
Final Total (rounded)				**$5,789,000**

BASF Corporation (formerly Ciba Corporation)
USEPA I.D. Number ALD 001 221 902

Address: 1379 Ciba Road
Mcintosh
ALABAMA
36553

Contact: Wayne Goldman
(251) 436-2005

Comments:

Activity	Units		Post Closure Cost
Post Closure Care (Closed Area 15 RCRA SWMUs)	1		$2,856,763
			$2,856,763
		Additional Costs	$0.00
		Total Estimated Cost:	**$2,856,763**
		Post-Closure Period (years):	**30**
		Total Estimated Annual Cost:	**$95,225**

Facility: BASF Corporation
(formerly Ciba Corporation)

Unit: Unit 1

Jul-22

Surface Water and Liquid Samples (SA_07)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Base neutral & acid extractable	Liquid	$391.37	1	$782.74	0	$391.37
organics (SW 351 0/SW 8270)						
Cyanide (EPA 335.2)	Liquid	$53.21	1	$106.43	0	$53.21
Mercury, cold vapor (SW 7470) with prep	Liquid	$44.89	1	$89.78	0	44.888783
Metals (SW 601 0), per each metal	Both	$14.96	1	$29.92	0	$14.96
Organophosphorus pesticides (SW 3550/SW 8140/SW 8141)	Solid	$234.25	1	$468.50	0	$234.25
Pesticides/PCB's (SW 3510/SW 8080)	Liquid	$172.54	1	$345.08	0	$172.54
pH (EPA 150.1)	Liquid	$8.49		$16.97	0	$8.49
Purgeable organics (SW 3550/SW 8260)	Solid	$205.74		$411.47	0	$205.74
Specific conductance (EPA 120.1)	Liquid	$11.59		$23.19	0	$11.59
Sulfide (EPA 376.1)	Liquid	$28.34	1	$56.68	0	$28.34
TCLP (RCRA) (SW 1311)	Both	$620.22	1	1240.433967	0	$620.22
Total suspended solids (EPA 160.2)	Liquid	$13.87		$27.74	0	$13.87
Total organic carbon, TOC (EPA 415.1/415.2)	Liquid	$29.29		$58.57	0	$29.29
Totals:		**$1,828.75**		**$3,657.50**		**$1,828.75**

Actual 2022 semi-annual lab costs = $182.40 per sample (includes courier, MS/MSD, trip blank and duplicate sample costs)
Actual 2020 annual lab costs = $323.00 per sample (includes courier, MS/MSD, trip blank and duplicate sample costs)

Post-Closure Care Summary (PC_01-1)

		Comments
Removal of LV#1 Leachate (PC-02)	$10,773.00	see page 4 for detail
Site Security (PC-03)	$373,255.98	see page 5 for detail
Maintenance of Vegetative Cover (PC-04)	$1,370,609.21	see page 6 for detail
Maintenance and Inspection (PC-05)	$111,419.35	see page 7 for detail
Groundwater Monitoring(PC-06)	$287,979.00	see page 8 for detail
Deed Notation (PC-07)	$6,119.69	see page 9 for detail
Maintenance and Inspection of Asphalt Cover (PC-8)	$0.00	
Surface Emission Monitoring (PC-09)	$0.00	
Gas Extraction System and Perimeter Probe Monitoring (PC-10)	$0.00	
User Defined Cost (UD-01)	$0.00	
Subtotal of Post-Closure Costs	**$2,160,156.24**	
Percentage of Engineering Expenses	10	%
Engineering Expenses	$216,015.62	
Certification of Post-Closure (PC-11)	$4,463.78	see page 11 for detail
Subtotal	**$2,380,635.64**	
Percentage of Contingency Allowance	20	%
Contingency Allowance	$476,127.13	
TOTAL COST OF POST-CLOSURE CARE (RCRA closed SWMUs)	**$2,856,762.77**	

Facility: BASF Corporation
(formerly Ciba Corporation)

Unit: Unit 1

Jul-22

Post-Closure Care Rem. Of Leachate (PC_02-1)

			Comments
Volume of LV#1 leachate to be removed per removal event	5,250	gal per Event	Actual BASF data for LV#1
Number of LV#1 leachate removal events per year	12	Events per yr	
Volume of LV#1 leachate to be removed per year	63,000	gal per Year	
Cost to treat LV#1 leachate per gallon	$0.00057	per Gallon	Actual BASF WWTP costs
Cost per year for removal of LV#1 leachate	$35.91	per Year	
Number of years in the post-closure care period	30	Years	
BASF total cost for removal of LV#1 leachate	$1,077.30		
Multiplied 10-fold	$10,773.00		
TOTAL COST OF REMOVAL OF LV#1 LEACHATE	**$10,773.00**		

Notes: LV#1 leachate volumes and treatment costs are based on actual BASF data; the total BASF amount is increased with a 10-fold multiplier to cover the potential cost of a future third party owning/operating the site's WWTP.

Post Closure Care Site Security (PC_03-1)

FENCING

Length of fencing	18,289.0	ft
Labor, materials, and equipment cost per ft	$20.24	per ft
Cost to Fence Site	$370,233.99	

CORNER POSTS

Number of corner posts required	12	Posts
Cost per corner post	$138.59	per Post
Cost to Erect Corner Posts	$1,663.06	

GATES

Number of gates required	3	Gates
Labor, materials, and equipment cost per gate	$314.98	per Gate
Cost to Install Gates	$944.95	

REFLECTOR SIGNS

Number of signs required	4	Signs
Labor, materials, and equipment cost per sign	$103.49	per Sign
Cost to Install Signs	$413.98	
TOTAL COST OF SITE SECURITY	**$373,255.98**	

Post-Closure Care Maint. Of Veg. Cover (PC_04-1)

MOWING

Area of cover to be mowed (RCRA Closed SWMUs)	4,390,848.0	ft2
Convert area in ft to area in MSF (thousand square feet) 2	4,390.85	MSF
Labor and equipment cost per MSF	$1.92	per MSF
Cost of one mowing event	$8,419.80	per Event
Number of mowing events per year	4	Events per yr
Number of years in the post-closure care period	30	Years
Number of mowing events during the post-closure care period	120	Events
Cost to Mow for Post-Closure Care Period	$1,010,375.79	

FERTILIZING

Area of cover to be fertilized	4,390.85	MSF
Labor, materials, and equipment cost per MSF	$2.73	per MSF
Cost of one fertilizing event	$12,007.78	per Event
Number of fertilizing events per year	1	Events per yr
Number of years in the post-closure care period	30	Years
Number of fertilizing events during the post-closure care period	30	Events
Cost to Fertilize for the Post-Closure Care Period	$360,233.41	

WATERING

Area of cover to be watered	4,390.85	MSF
Labor and material cost per MSF	$22.05	per MSF
Cost of one watering event	$96,827.68	per Event
Number of watering events per year	0	Events per yr
Number of years in the post-closure care period	30	Years
Number of watering events during the post-closure care period	0	Events
Cost to Water for the Post-Closure Care Period	$0.00	
TOTAL COST OF MAINTENANCE OF VEGETATIVE COVER	**$1,370,609.21**	

Notes: Watering= N/A (occurs only rarely in exceptional drought years)

Post-Closure Care Rep. and Insp. Of Veg. Cover (PC_05-1)

			Comments
MAINTENANCE AND REPAIR OF FINAL COVER			
Cost of installing undifferentiated fill	$0.00		
Cost of installing clay layer	$0.00		
Cost of installing geomembrane	$0.00		
Cost of installing drainage layer	$0.00		
Cost of installing earthen layer	$0.00		
Cost of installing topsoil	$102,795.69	7.5% of page 6 total	Actual BASF costs <$100K for past 30 years
Cost of installing colloid clay layer	$0.00		
Total cost of installing final cover	$102,795.69		
Maintenance and repair factor	15	%	
Cost to Maintain and Repair Final Cover	$15,419.35		
POST-CLOSURE CARE INSPECTION			
Cost of conducting one inspection	$800.00	per Inspection	
Number of inspections per year	4	Inspections per Year	
Cost of conducting post-closure care inspections per year	$3,200.00	per Year	
Number of years in post-closure care period	30	Years	
Cost to Conduct Inspections Over the Post-Closure Care Period	$96,000.00		
TOTAL COST OF REPAIR AND INSPECTION	**$111,419.35**		

Notes: 1.F Only very minor topsoil patching has occurred over past 30 years for the RCRA closed SWMUs in Area 15; assume cost for topsoil patching is 10% of cost for maintenanceof vegetative cover (see Page 6)

Facility: BASF Corporation
(formerly Ciba Corporation) **Unit:** Unit 1 Jul-22

Post-Closure Care Groundwater Monit. (PC_06-1)

COLLECTION OF GROUNDWATER SAMPLES		Eleven Miocene wells (plus 2 duplicates) and 14 Alluvial wells (plus 1 duplicate) and PW-11 (1 voluntary) were sampled during the semi-annual event.
Number of semi-annual sampling locations	4	Point-of-Compliance monitoring wells
Number of annual sampling locations	5	Background and Point-of-Compliance monitoring wells
Choose the appropriate level of PPE		Protection Level C
Labor and equipment cost per work hour	$214.95	per Work Hour
Work rate to collect samples from one sampling location	3.75	Work hr per Location
Number of hours required to collect all samples	33.75	Work hrs per year
Cost to Collect Groundwater Samples per Year	$7,254.70	per Year (one semi-annual and one annual event)
ANALYSIS OF GROUNDWATER SAMPLES		
Cost to Analyze Groundwater Samples per Semi-Annual Event	$729.60	based on actual 2022 per sample costs - see detail on page 2
Cost to Analyze Groundwater Samples per Annual Event	$1,615.00	based on actual 2021 per sample costs - see detail on page 2
TOTAL GROUNDWATER MONITORING FOR POST-CLOSURE CARE PERIOD		
Cost of Sampling and Analysis of Groundwater for Post-Closure	$9,599.30	per Year (one semi-annual and one annual event)
Number of sampling events per year	1	Events per yr (one semi annual and one annual)
Number of years of groundwater monitoring during the post-closure care period	30	Years
TOTAL COST OF GROUNDWATER MONITORING	**$287,979.00**	

Notes: Based 2021 annual & 2022 semi-annual sampling requirements and includes actual per sample lab costs from 2022 semi-annual and 2021 annual events.

Post-Closure Care Deed Notation (PC_07-1)

Attorney fees	$1,619.92
Clerical and deed filing fees	$4,499.77
TOTAL COST OF DEED NOTATION	**$6,119.69**

Facility: BASF Corporation
(formerly Ciba Corporation) **Unit:** Unit 1 Jul-22

Post-Closure Care Surface Emission Monitoring (PC_09-1)

SURFACE EMISSION MONITORING

Area of landfill requiring surface emission monitoring	0	Acres
Labor and equipment cost per work hour	$37.69	per Work Hour
Work rate required to monitor one acre	0.5	Work hrs per Acre
Number of hours required to monitor entire area	0	Work hrs per Acre
Cost of monitoring per event	$0.00	per Event

MONITORING EVENTS

Number of monitoring events per year	1	Events per yr
Number of years during the post-closure care period	30	Years
TOTAL COST OF SURFACE EMISSION MONITORING	**$0.00**	

Certification of Completion of Post-Closure Care (PC_11-1)

Number of units requiring certification of completion of post-closure care	1	Units
Cost of certification of completion of post-closure care per unit	$4,463.78	per Unit
TOTAL COST OF CERTIFICATION OF POST-CLOSURE CARE	**$4,463.78**	

BASF Corporation Industrial Waste Landfill

LANDVAULT #2 POST-CLOSURE PLAN

FINANCIAL SCHEDULE "A"

($000)

	ITEM	TOTAL CLOSURE COSTS * Yr. (2011)	TOTAL POST-CLOSURE COSTS Yrs.(2012 -2041)	TOTAL CLOSURE/POST-CLOSURE COSTS Yrs.(2011 - 2041)
i	Soil Erosion and Sediment Control Plan	N/A	N/A	N/A
ii	Final Cover	$ -	N/A	$ -
iii	Final Cover Vegetation	$ -	N/A	$ -
iv	Maintenance Program for Final Cover and Final Cover Vegetation	N/A	$ 381,680	$ 381,680
v	Maintenance Program for Side Slopes	N/A	N/A	N/A
vi	Run On/Run Off Control Program	$ -	N/A	$ -
vii	Maintenance Program for Run On/Run Off Control System	N/A	$ 145,204	$ 145,204
viii	Groundwater Monitoring Wells	N/A	N/A	N/A
ix	Maintenance Program for Groundwater Monitoring Wells	N/A	$ 153,502	$ 153,502
x	Groundwater Monitoring In Accordance With NJAC 7:14A-1	N/A	$ 296,715	$ 296,715
xi	Methane Gas Venting or Evacuation System	$ -	N/A	$ -
xii	Maintenance Program for Methane Gas Venting or Evacuation System	N/A	$ 124,461	$ 124,461
xiii	Leachate Collection and/or Control System	$ -	N/A	$ -
xiv	Maintenance Program for Leachate Collection and/or Control System	N/A	$ 277,963	$ 277,963
xv	Facility Access Control System	N/A	N/A	N/A
xvi	Maintenance Program for Facility Access Control System	N/A	$ 340,534	$ 340,534
xvii	Measures to Conform the Site to Surrounding Area	N/A	N/A	N/A
xviii	Maintenance Program for Site Conformance Measures	N/A	N/A	N/A
xix (A)	Leachate Disposal (Closure)	$ -	N/A	$ -
(B)	Leachate Disposal (Post-Closure)	N/A	$ 33,190	$ 33,190
xx (A)	Permit Application, Property Acquisition (closure)	$ -	N/A	N/A
(B)	Permit Fees, Property Tax, Insurance (Post Closure)	N/A	$ 82,974	$ 82,974
xxi (A)	Engineering, Legal, Accounting and Administration (Closure)	$ -	N/A	$ -
(B)	Engineering, Legal, Accounting and Administration (Post-Closure)	N/A	$ 290,409	$ 290,409
('C)	10% Contingency	$ -	$ 212,663	$ 212,663
	TOTAL COSTS	$ -	$ 2,339,295	$ 2,339,295

BASF Corporation Industrial Waste Landfill

LV#2 POST-CLOSURE PLAN
FINANCIAL SCHEDULE "B"
($000)

	ITEM	LV#2 TOTAL POST-CLOSURE COSTS	YEAR #1	YEAR #2	YEAR #3	YEAR #4	YEAR #5	YEAR #6
i	Soil Erosion and Sediment Control Plan	N/A						
ii	Final Cover	N/A						
iii	Final Cover Vegetation	N/A						
iv	Maintenance Program for Final Cover and Final Cover Vegetation	$ 381,680	$ 9,200	$ 9,582	$ 9,765	$ 9,952	$ 10,142	$ 10,335
v	Maintenance Program for Side Slopes	N/A						
vi	Run On/Run Off Control Program	N/A						
vii	Maintenance Program for Run On/Run Off Control System	$ 145,204	$ 3,500	$ 3,645	$ 3,715	$ 3,786	$ 3,858	$ 3,932
viii	Groundwater Monitoring Wells	N/A						
ix	Maintenance Program for Groundwater Monitoring Wells	$ 153,502	$ 3,700	$ 3,854	$ 3,927	$ 4,002	$ 4,079	$ 4,157
x	Groundwater Monitoring In Accordance With NJAC 7:14A-1	$ 296,715	$ 7,152	$ 7,449	$ 7,591	$ 7,736	$ 7,884	$ 8,035
xi	Methane Gas Venting or Evacuation System	N/A						
xii	Maintenance Program for Methane Gas Venting or Evacuation System	$ 124,461	$ 3,000	$ 3,125	$ 3,184	$ 3,245	$ 3,307	$ 3,370
xiii	Leachate Collection and/or Control System	N/A						
xiv	Maintenance Program for Leachate Collection and/or Control System	$ 277,963	$ 6,700	$ 6,978	$ 7,112	$ 7,247	$ 7,386	$ 7,527
xv	Facility Access Control System	N/A						
xvi	Maintenance Program for Facility Access Control System	$ 340,534	$ 8,208	$ 8,549	$ 8,713	$ 8,879	$ 9,048	$ 9,221
xvii	Measures to Conform the Site to Surrounding Area	N/A						
xviii	Maintenance Program for Site Conformance Measures	N/A						
xix	(A) Leachate Disposal (Closure)	N/A						
	(B) Leachate Disposal (Post-Closure)	$ 33,190	$ 800	$ 833	$ 849	$ 865	$ 882	$ 899
xx	(A) Permit Application, Property Acquisition (closure)	N/A						
	(B) Permit Fees, Property Tax, Insurance (Post Closure)	$ 82,974	$ 2,000	$ 2,083	$ 2,123	$ 2,163	$ 2,205	$ 2,247
xxi	(A) Engineering, Legal, Accounting and Administration (Closure)	N/A						
	(B) Engineering, Legal, Accounting and Administration (Post-Closure)	$ 290,409	$ 7,000	$ 7,291	$ 7,430	$ 7,572	$ 7,717	$ 7,864
	(C) 10% Contingency	$ 212,663	$ 5,126	$ 5,339	$ 5,441	$ 5,545	$ 5,651	$ 5,759
	TOTAL COSTS	$ 2,339,295	$ 56,386	$ 58,729	$ 59,851	$ 60,994	$ 62,159	$ 63,346

BASF Corporation Industrial Waste Landfill

LV#2 POST-CLOSURE PLAN
FINANCIAL SCHEDULE "B"
($000)

	ITEM	YEAR #7	YEAR #8	YEAR #9	YEAR #10	YEAR #11	YEAR #12	YEAR #13	YEAR #14
i	Soil Erosion and Sediment Control Plan								
ii	Final Cover								
iii	Final Cover Vegetation								
iv	Maintenance Program for Final Cover and Final Cover Vegetation	$ 10,533	$ 10,734	$ 10,939	$ 11,148	$ 11,361	$ 11,833	$ 12,059	$ 12,289
v	Maintenance Program for Side Slopes								
vi	Run On/Run Off Control Program								
vii	Maintenance Program for Run On/Run Off Control System	$ 4,007	$ 4,084	$ 4,162	$ 4,241	$ 4,322	$ 4,502	$ 4,588	$ 4,675
viii	Groundwater Monitoring Wells								
ix	Maintenance Program for Groundwater Monitoring Wells	$ 4,236	$ 4,317	$ 4,399	$ 4,483	$ 4,569	$ 4,759	$ 4,850	$ 4,942
x	Groundwater Monitoring In Accordance With NJAC 7:14A-1	$ 8,188	$ 8,345	$ 8,504	$ 8,666	$ 8,832	$ 9,199	$ 9,374	$ 9,554
xi	Methane Gas Venting or Evacuation System								
xii	Maintenance Program for Methane Gas Venting or Evacuation System	$ 3,435	$ 3,500	$ 3,567	$ 3,635	$ 3,705	$ 3,859	$ 3,932	$ 4,007
xiii	Leachate Collection and/or Control System								
xiv	Maintenance Program for Leachate Collection and/or Control System	$ 7,671	$ 7,817	$ 7,966	$ 8,119	$ 8,274	$ 8,617	$ 8,782	$ 8,950
xv	Facility Access Control System								
xvi	Maintenance Program for Facility Access Control System	$ 9,397	$ 9,577	$ 9,760	$ 9,946	$ 10,136	$ 10,557	$ 10,759	$ 10,964
xvii	Measures to Conform the Site to Surrounding Area								
xviii	Maintenance Program for Site Conformance Measures								
xix (A)	Leachate Disposal (Closure)								
(B)	Leachate Disposal (Post-Closure)	$ 916	$ 933	$ 951	$ 969	$ 988	$ 1,029	$ 1,049	$ 1,069
xx (A)	Permit Application, Property Acquisition (closure)								
(B)	Permit Fees, Property Tax, Insurance (Post Closure)	$ 2,290	$ 2,333	$ 2,378	$ 2,423	$ 2,470	$ 2,572	$ 2,621	$ 2,672
xxi (A)	Engineering, Legal, Accounting and Administration (Closure)								
(B)	Engineering, Legal, Accounting and Administration (Post-Closure)	$ 8,014	$ 8,167	$ 8,323	$ 8,482	$ 8,644	$ 9,003	$ 9,175	$ 9,350
('C)	10% Contingency	$ 5,869	$ 5,981	$ 6,095	$ 6,211	$ 6,330	$ 6,593	$ 6,719	$ 6,847
	TOTAL COSTS	$ 64,555	$ 65,788	$ 67,045	$ 68,325	$ 69,630	$ 72,523	$ 73,908	$ 75,320

BASF Corporation Industrial Waste Landfill 1507D

LV#2 POST-CLOSURE PLAN

FINANCIAL SCHEDULE "B"

($000)

	ITEM	YEAR #15	YEAR #16	YEAR #17	YEAR #18	YEAR #19	YEAR #20	YEAR #21	YEAR #22
i	Soil Erosion and Sediment Control Plan								
ii	Final Cover								
iii	Final Cover Vegetation								
iv	Maintenance Program for Final Cover and Final Cover Vegetation	$ 12,524	$ 12,763	$ 13,007	$ 13,255	$ 13,508	$ 13,766	$ 14,029	$ 14,297
v	Maintenance Program for Side Slopes								
vi	Run On/Run Off Control Program								
vii	Maintenance Program for Run On/Run Off Control System	$ 4,765	$ 4,856	$ 4,948	$ 5,043	$ 5,139	$ 5,237	$ 5,337	$ 5,439
viii	Groundwater Monitoring Wells								
ix	Maintenance Program for Groundwater Monitoring Wells	$ 5,037	$ 5,133	$ 5,231	$ 5,331	$ 5,433	$ 5,536	$ 5,642	$ 5,750
x	Groundwater Monitoring In Accordance With NJAC 7:14A-1	$ 9,736	$ 9,922	$ 10,111	$ 10,304	$ 10,501	$ 10,702	$ 10,906	$ 11,115
xi	Methane Gas Venting or Evacuation System								
xii	Maintenance Program for Methane Gas Venting or Evacuation System	$ 4,084	$ 4,162	$ 4,241	$ 4,322	$ 4,405	$ 4,489	$ 4,575	$ 4,662
xiii	Leachate Collection and/or Control System								
xiv	Maintenance Program for Leachate Collection and/or Control System	$ 9,121	$ 9,295	$ 9,472	$ 9,653	$ 9,838	$ 10,025	$ 10,217	$ 10,412
xv	Facility Access Control System								
xvi	Maintenance Program for Facility Access Control System	$ 11,174	$ 11,387	$ 11,605	$ 11,826	$ 12,052	$ 12,282	$ 12,517	$ 12,756
xvii	Measures to Conform the Site to Surrounding Area								
xviii	Maintenance Program for Site Conformance Measures								
xix (A)	Leachate Disposal (Closure)								
(B)	Leachate Disposal (Post-Closure)	$ 1,089	$ 1,110	$ 1,131	$ 1,153	$ 1,175	$ 1,197	$ 1,220	$ 1,243
xx (A)	Permit Application, Property Acquisition (closure)								
(B)	Permit Fees, Property Tax, Insurance (Post Closure)	$ 2,723	$ 2,775	$ 2,828	$ 2,882	$ 2,937	$ 2,993	$ 3,050	$ 3,108
xxi (A)	Engineering, Legal, Accounting and Administration (Closure)								
(B)	Engineering, Legal, Accounting and Administration (Post-Closure)	$ 9,529	$ 9,711	$ 9,896	$ 10,085	$ 10,278	$ 10,474	$ 10,674	$ 10,878
('C)	10% Contingency	$ 6,978	$ 7,111	$ 7,247	$ 7,385	$ 7,527	$ 7,670	$ 7,817	$ 7,966
	TOTAL COSTS	$ 76,758	$ 78,224	$ 79,718	$ 81,240	$ 82,792	$ 84,373	$ 85,984	$ 87,627

BASF Corporation Industrial Waste Landfill 1507D

LV#2 POST-CLOSURE PLAN
FINANCIAL SCHEDULE "B"
($000)

	ITEM	YEAR #23	YEAR #24	YEAR #25	YEAR #26	YEAR #27	YEAR #28	YEAR #29	YEAR #30
i	Soil Erosion and Sediment Control Plan								
ii	Final Cover								
iii	Final Cover Vegetation								
iv	Maintenance Program for Final Cover and Final Cover Vegetation	$ 14,570	$ 14,848	$ 15,132	$ 15,421	$ 15,716	$ 16,016	$ 16,322	$ 16,633
v	Maintenance Program for Side Slopes								
vi	Run On/Run Off Control Program								
vii	Maintenance Program for Run On/Run Off Control System	$ 5,543	$ 5,649	$ 5,757	$ 5,867	$ 5,979	$ 6,093	$ 6,209	$ 6,328
viii	Groundwater Monitoring Wells								
ix	Maintenance Program for Groundwater Monitoring Wells	$ 5,860	$ 5,972	$ 6,086	$ 6,202	$ 6,320	$ 6,441	$ 6,564	$ 6,689
x	Groundwater Monitoring In Accordance With NJAC 7:14A-1	$ 11,327	$ 11,543	$ 11,764	$ 11,988	$ 12,217	$ 12,450	$ 12,688	$ 12,931
xi	Methane Gas Venting or Evacuation System								
xii	Maintenance Program for Methane Gas Venting or Evacuation System	$ 4,751	$ 4,842	$ 4,934	$ 5,029	$ 5,125	$ 5,223	$ 5,322	$ 5,424
xiii	Leachate Collection and/or Control System								
xiv	Maintenance Program for Leachate Collection and/or Control System	$ 10,611	$ 10,814	$ 11,020	$ 11,231	$ 11,445	$ 11,664	$ 11,886	$ 12,113
xv	Facility Access Control System								
xvi	Maintenance Program for Facility Access Control System	$ 12,999	$ 13,248	$ 13,501	$ 13,759	$ 14,021	$ 14,289	$ 14,562	$ 14,840
xvii	Measures to Conform the Site to Surrounding Area								
xviii	Maintenance Program for Site Conformance Measures								
xix (A)	Leachate Disposal (Closure)								
(B)	Leachate Disposal (Post-Closure)	$ 1,267	$ 1,291	$ 1,316	$ 1,341	$ 1,367	$ 1,393	$ 1,419	$ 1,446
xx (A)	Permit Application, Property Acquisition (closure)								
(B)	Permit Fees, Property Tax, Insurance (Post Closure)	$ 3,167	$ 3,228	$ 3,290	$ 3,352	$ 3,416	$ 3,482	$ 3,548	$ 3,616
xxi (A)	Engineering, Legal, Accounting and Administration (Closure)								
(B)	Engineering, Legal, Accounting and Administration (Post-Closure)	$ 11,086	$ 11,298	$ 11,514	$ 11,733	$ 11,958	$ 12,186	$ 12,419	$ 12,656
('C)	10% Contingency	$ 8,118	$ 8,273	$ 8,431	$ 8,592	$ 8,756	$ 8,924	$ 9,094	$ 9,268
	TOTAL COSTS	$ 89,300	$ 91,005	$ 92,743	$ 94,515	$ 96,320	$ 98,159	$ 100,034	$ 101,944

INTESA SANPAOLO

Intesa Sanpaolo S.p.A.

One William Street
New York, NY 10004

Tel (212) 607-3500
Fax (212) 607-3537
SWIFT BCITUS33

Page: 1/1 Place and date of issue: NEW YORK 03/17/2023 Date and place of expiry: 3/31/2024 NEW YORK	Irrevocable Letter of Credit L/C Number: 133290-793
Applicant: BASF CORPORATION 100 PARK AVENUE FLORHAM PARK, NJ 07932	Beneficiary: ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT PO BOX 301463 MONTGOMERY, AL 36130-1463 ATTN: MR. ABE OBERKOR

WE HEREBY AMEND OUR IRREVOCABLE STANDBY LETTER OF CREDIT NO. 133290-793 IN YOUR FAVOR AS FOLLOWS:

NO.1-CREDIT AMOUNT INCREASED BY US$ 707,393.00
BALANCE NOW TO READ AS US$22,945,470.00 (TWENTY TWO MILLION NINE HUNDRED FORTY FIVE THOUSAND FOUR HUNDRED SEVENTY AND 00/100 U.S. DOLLARS)

NO.2-DELETE THE FOLLOWING PARAGRAPH:
THIS STANDBY LETTER OF CREDIT IS TO COVER CLOSURE EXPENDITURES FOR AN AGGREGATE AMOUNT OF US$2,340,271.00 (TWO MILLION THREE HUNDRED FORTY THOUSAND TWO HUNDRED SEVENTY ONE US DOLLARS), POST-CLOSURE EXPENDITURES UP TO AN AGGREGATE AMOUNT OF US$3,835,952.00 (THREE MILLION EIGHT HUNDRED THIRTY FIVE THOUSAND NINE HUNDRED FIFTY TWO US DOLLARS), AND CORRECTIVE ACTION EXPENDITURES UP TO AN AGGREGATE AMOUNT OF US$16,061,854.00 (SIXTEEN MILLION SIXTY ONE THOUSAND EIGHT HUNDRED FIFTY FOUR US DOLLARS).

AND REPLACE WITH:
THIS STANDBY LETTER OF CREDIT IS TO COVER CLOSURE EXPENDITURES FOR AN AGGREGATE AMOUNT OF US$6,631,759.00 (SIX MILLION SIX HUNDRED THIRTY ONE THOUSAND SEVEN HUNDRED FIFTY NINE US DOLLARS), POST-CLOSURE EXPENDITURES UP TO AN AGGREGATE AMOUNT OF US$5,196,058.00 (FIVE MILLION ONE HUNDRED NINETY SIX THOUSAND FIFTY EIGHT US DOLLARS), AND CORRECTIVE ACTION EXPENDITURES UP TO AN AGGREGATE AMOUNT OF US$11,117,653.00 (ELEVEN MILLION ONE HUNDRED SEVENTEEN THOUSAND SIX HUNDRED FIFTY THREE US DOLLARS).

ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED.

KINDLY ACKNOWLEDGE RECEIPT BY MAIL.

Louis NG
ASSISTANT TREASURER

David L. Smith
Vice President

INTESA SANPAOLO

Intesa Sanpaolo S.p.A.

One William Street
New York, NY 10004

Tel (212) 607-3500
Fax (212) 607-3537
SWIFT BCITUS33

Page: 1/2 Place and date of issue: NEW YORK 3/28/2014 Date and place of expiry: 3/28/2015 NEW YORK	Irrevocable Letter of Credit L/C Number: 143082-793
Applicant: BASF CORPORATION 100 PARK AVENUE FLORHAM PARK, NJ 07932	Beneficiary: PROGRAM SUPPORT UNIT, LAND DIVISION ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT 1400 COLISEUM BOULEVARD MONTGOMERY, AL 36110-2059 ATTN: MR. ABE OBERKOR

DEAR SIR OR MADAM:

WE HEREBY ESTABLISH OUR IRREVOCABLE STANDBY LETTER OF CREDIT NO. 143082-793 IN THE FAVOR OF ANY AND ALL THIRD-PARTY LIABILITY CLAIMANTS, AT THE REQUEST AND FOR THE ACCOUNT OF BASF CORPORATION FOR THIRD-PARTY LIABILITY AWARDS OR SETTLEMENTS UP TO ONE MILLION U.S. DOLLARS (USD $1,000,000.00)_PER OCCURRENCE AND THE ANNUAL AGGREGATE AMOUNT OF TWO MILLION U.S. DOLLARS (USD $2,000,000.00), FOR SUDDEN ACCIDENTAL OCCURRENCES, AND/OR FOR THIRD-PARTY LIABILITY AWARDS OR SETTLEMENTS UP TO THE AMOUNT OF THREE MILLION U.S. DOLLARS (UASD $3,000,000.00) PER OCCURRENCE, AND THE ANNUAL AGGREGATE AMOUNT OF SIX MILLION U.S. DOLLARS (USD $6,000,000.00), FOR NONSUDDEN ACCIDENTAL OCCURRENCES AVAILABLE UPON PRESENTATION OF A SIGHT DRAFT BEARING REFERENCE TO THIS LETTER OF CREDIT NO. 143082-793, AND
(1)A SIGNED CERTIFICATE READING AS FOLLOWS:

CERTIFICATE OF VALID CLAIM

THE UNDERSIGNED, AS PARTIES, BASF CORPORATION AND (NAME AND ADDRESS OF THIRD PARTY CLAIMANT(S)), HEREBY CERTIFY THAT THE CLAIM OF BODILY INJURY AND/OR PROPERTY DAMAGE CAUSED BY A SUDDEN OR NONSUDDEN ACCIDENTAL OCCURRENCE ARISING FROM OPERATIONS OF BASF CORPORATION HAZARDOUS WASTE TREATMENT, STORAGE, OR DISPOSAL FACILITY SHOULD BE PAID IN THE AMOUNT OF USD$[INSERT AMOUNT].

WE HEREBY CERTIFY THAT THE CLAIM DOES NOT APPLY TO ANY OF THE FOLLOWING:

(A) BODILY INJURY OR PROPERTY DAMAGE FOR WHICH BASF CORPORATION IS OBLIGATED TO PAY DAMAGES BY REASON OF THE ASSUMPTION OF LIABILITY IN A CONTRACT OR AGREEMENT. THIS EXCLUSION DOES NOT APPLY TO LIABILITY FOR DAMAGES THAT BASF CORPORATION WOULD BE OBLIGATED TO PAY IN THE ABSENCE OF THE CONTRACT OR AGREEMENT.

(B) ANY OBLIGATION OF BASF CORPORATION UNDER A WORKERS' COMPENSATION, DISABILITY BENEFITS, OR UNEMPLOYMENT COMPENSATION LAW OR ANY SIMILAR LAW.

(C) BODILY INJURY TO:
(1) AN EMPLOYEE OF BASF CORPORATION ARISING FROM, AND IN THE COURSE OF, EMPLOYMENT BY BASF CORPORATION; OR

(2) THE SPOUSE, CHILD, PARENT, BROTHER OR SISTER OF THAT EMPLOYEE AS A CONSEQUENCE OF, OR ARISING FROM, AND IN THE COURSE OF EMPLOYMENT BY BASF CORPORATION. THIS EXCLUSION APPLIES:

(A)WHETHER BASF CORPORATION MAY BE LIABLE AS AN EMPLOYER OR IN ANY OTHER CAPACITY; AND

(B) TO ANY OBLIGATION TO SHARE DAMAGES WITH OR REPAY ANOTHER PERSON WHO MUST PAY DAMAGES BECAUSE OF THE INJURY TO PERSONS IDENTIFIED IN PARAGRAPHS (1) AND (2).

(D) BODILY INJURY OR PROPERTY DAMAGE ARISING OUT OF THE OWNERSHIP, MAINTENANCE, USE, OR ENTRUSTMENT TO OTHERS OF ANY AIRCRAFT, MOTOR VEHICLE OR WATERCRAFT.

(E) PROPERTY DAMAGE TO:
(1) ANY PROPERTY OWNED, RENTED, OR OCCUPIED BY BASF CORPORATION;
(2) PREMISES THAT ARE SOLD, GIVEN AWAY OR ABANDONED BY BASF CORPORATION IF THE PROPERTY DAMAGE ARISES OUT OF ANY PART OF THOSE PREMISES;

INTESA SANPAOLO

Intesa Sanpaolo S.p.A.
One William Street
New York, NY 10004

Tel (212) 607-3500
Fax (212) 607-3537
SWIFT BCITUS33

Page: 2/2 Place and date of issue: NEW YORK 3/28/2014 Date and place of expiry: 3/28/2015 NEW YORK	Irrevocable Letter of Credit L/C Number: 143082-793
Applicant: BASF CORPORATION 100 PARK AVENUE FLORHAM PARK, NJ 07932	Beneficiary: PROGRAM SUPPORT UNIT, LAND DIVISION ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT 1400 COLISEUM BOULEVARD MONTGOMERY, AL 36110-2059 ATTN: MR. ABE OBERKOR

(3) PROPERTY LOANED TO BASF CORPORATION;
(4) PERSONAL PROPERTY IN THE CARE, CUSTODY OR CONTROL OF BASF CORPORATION;
(5) THAT PARTICULAR PART OF REAL PROPERTY ON WHICH BASF CORPORATION OR ANY CONTRACTORS OR SUBCONTRACTORS WORKING DIRECTLY OR INDIRECTLY
ON BEHALF OF BASF CORPORATION ARE PERFORMING OPERATIONS, IF THE PROPERTY DAMAGE ARISES OUT OF THESE OPERATIONS.

[SIGNATURES]

BASF CORPORATION

[SIGNATURES]

(NAME OF CLAIMANT(S))

OR

(2)A VALID FINAL COURT ORDER ESTABLISHING A JUDGMENT AGAINST BASF CORPORATION FOR BODILY INJURY OR PROPERTY DAMAGE CAUSED BY SUDDEN OR NONSUDDEN ACCIDENTAL OCCURRENCES ARISING FROM THE OPERATION OF THE BASF CORPORATION'S FACILITY OR GROUP OF FACILITIES.

THIS LETTER OF CREDIT IS EFFECTIVE AS OF MARCH 28, 2014 AND SHALL EXPIRE ON MARCH 28, 2015, BUT SUCH EXPIRATION DATE SHALL BE AUTOMATICALLY EXTENDED FOR A PERIOD OF ONE YEAR ON MARCH 28, 2015 AND ON EACH SUCCESSIVE EXPIRATION DATE, UNLESS, AT LEAST 120 DAYS BEFORE THE CURRENT EXPIRATION DATE, WE NOTIFY YOU, ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT, AND BASF CORPORATION BY CERTIFIED MAIL THAT WE HAVE DECIDED NOT TO EXTEND THIS LETTER OF CREDIT BEYOND THE CURRENT EXPIRATION DATE.

WHENEVER THIS LETTER OF CREDIT IS DRAWN ON UNDER AND IN COMPLIANCE WITH THE TERMS OF THIS CREDIT, WE SHALL DULY HONOR SUCH DRAFT
UPON PRESENTATION TO US.

WE CERTIFY THAT THE WORDING OF THIS LETTER OF CREDIT IS IDENTICAL TO THE WORDING SPECIFIED IN 335-14-5-.08(12)(K) AS SUCH REGULATIONS WERE RULES WERE CONSTITUTED ON THE DATE SHOWN IMMEDIATELY BELOW.

THIS CREDIT IS SUBJECT TO THE MOST RECENT EDITION OF THE UNIFORM CUSTOMS AND PRACTICE FOR DOCUMENTARY CREDITS, PUBLISHED AND COPYRIGHTED BY THE INTERNATIONAL CHAMBER OF COMMERCE.

Louis NG
ASSISTANT TREASURER

Isabella Castrogiovanni
Vice President

DATE: MARCH 28, 2014

APPENDIX K

POST CLOSURE PLAN

BASF McIntosh, AL

(Revised September 2021)

Table of Contents

I. GENERAL

A. During post closure care the following official should be contacted:
BASF Senior Remediation Specialist

B. Post closure care will continue for 30 years or as amended by the Director.

C. At final closure, the deed to the Treatment Storage and Disposal Facility (TSDF) property will be modified so that it will in perpetuity notify any potential purchaser of the property that its use is restricted such that the integrity of the final cover, liner(s), or any other components of any containment system or the function of the facility's monitoring system will not be disturbed. In addition, the survey plot and record of the type, location, and quantity of hazardous wastes disposed of within each cell or area of the facility will be filed with the local zoning authority or the authority with jurisdiction over local land use and with the EPA and ADEM within 60 days after final closure.

II. EXTENT OF POST CLOSURE CARE

This Post Closure Plan is written to cover not only those facilities which will be closed during final closure, but includes facilities closed during interim status, partial closures as described in the Closure Plan, Section V, and final closure of individual units prior to final closure of the TSDF.

A. Closures During Interim Status

1. SWMU 1: Class "C" Landfill (closed 1987)

This is approximately a 7-acre site of individual 12 feet x 12 feet burial cells covered by a common cap. The site is bounded by coordinate N19+65 on the south, N29+29 on the north, E76+29 on the east, and E70+50 on the west. This landfill has no leak detection system, but is monitored by the ground water monitoring wells located east and south of this area in the direction of ground water travel.

2. SWMU 2: Biological Sludge Landfill (closed 1987)

This is approximately a 6.5-acre site. The southern end and eastern boundary of this landfill are defined by a dirt road. The site is bounded# by coordinate N2+30 on the south, N9+55 on the north, E46+15 on the east, and approximately E40+00 on the west. This landfill has no leak detection system, but is monitored by the ground water monitoring wells located east and south of this area in the direction of ground water travel.

3. SWMU 3: Rectangular/Triangular Pond (closed 1987)

This is approximately a 3-acre site. The closed ponds are located immediately south of the closed Biological Sludge Landfill and the closed Diazinon/Dilute Impoundments, however, they were closed as one facility. All hazardous waste were removed from the units.

B. Contingency Closures

All of the permitted surface impoundments (GM-44 Pond, Diazinon Destruct Pond, Dilute Pond, Equalization, 10-Day, 5-Day, and Sludge 1-4) are closed. These impoundments are included in post closure care. There is no leachate leak detection system associated with any of these impoundments.

1. SWMU 13: GM-44 Impoundment (closed 1989)

This is approximately a 9.0-acre site. All hazardous waste were removed from the units. The location is shown on the facility maps in the Contingency Plan.

2. SWMU 12: Diazinon Destruct Impoundment (closed 1989)

This is approximately a 3.0-acre site. All hazardous waste were removed from the units. The location is shown on the facility maps in the Contingency Plan.

3. SWMU 11: Dilute Impoundment (closed 1989)

This is approximately a 21.0-acre site. All hazardous waste were removed from the units. The location is shown on the facility maps in the Contingency Plan.

4. SWMU 10: Equalization Impoundment (closed 1989)

This is approximately a 2.5-acre site. All hazardous waste were removed from the units. The location is shown on the facility maps in the Contingency Plan.

5. SWMU 9: 10-Day (closed 1989)

This is approximately a 6.0-acre site. All hazardous waste were removed from the units. The location is shown on the facility maps in the Contingency Plan.

6. SWMU 8: 5-Day (closed 1989)

This is approximately a 2.5-acre site. All hazardous waste were removed from the units. The location is shown on the facility maps in the Contingency Plan.

7. SWMUs 4, 5, 6 and 7: Sludge Impoundments 1, 2, 3 and 4 (closed 1989)

   This is approximately one 26-acre site. The location is shown on the facility maps in the Contingency Plan.

C. Closed Individual Units

In addition to the closures during interim status, partial closures, and final closures of individual units it will be necessary to provide post closure care for the following facility:

SWMU 14: Above Ground Hazardous Waste Landvault No. 1 (closed 1991)

This is an above ground landvault with a leachate collection and leak detection system including a collection sump. This is a 20-acre site defined by the coordinates N15+50, N30+00, E66+00, and E74+00. There is a 6 feet chain link perimeter fence around this area with four access gates.

The landvault concept includes an engineered system of synthetic and natural material barriers. The aboveground landvault is essentially a sealed envelope consisting of composite liner floor systems supported by prepared foundations and surrounded by embankments. The landvault is covered by a composite cap system with a permeability equal to the floor system.

D. Final Closures

In addition to the closure during interim status, partial closures, and final closure of individual units, it will be necessary to provide post-closure care for the following facility closed during final closure.

SWMUs 15 A and B: Above Ground Hazardous Waste Landvault No. 2 (LV2)

This is an above ground landvault of approximately 18 acres (SWMU 15A) with a leachate collection and leak detection system including a collection sump. This is an 18-acre site defined by the coordinates N31+96, E71+80, E67+47 and N43+25. There is a six feet high chain link perimeter fence around this area with 11 access gates. The leachate collection piping system drains into the Land Vault Sump

(SWMU 35W). Stormwater falling within these active cells also drains into the land vault sump. The leachate (FO39) is pumped to an activated carbon treatment system (SWMU 15B) prior to being combined with treated effluent from the WWTP (SWMU 35).

III. GROUND WATER MONITORING

A. General

The ground water monitoring in the Alluvial Aquifer will be carried out during post closure the same as during the active life. At a minimum, samples will be taken once per year for ground water quality.

B. Ground Water Monitoring Wells

There are fully penetrating alluvial compliance wells installed on the site (3 upgradient/background and 13 downgradient). These wells have dedicated sample pumps installed with lockable well caps to maintain integrity of samples. The location and approximate well depths (relative to top of casing) are given in the table below.

Well No.	Depth (ft)	Coordinates (Latitude/Longitude)		
M-1	76.5	31 17.236 88 00.531		
M-2	69.5	31 17.230 87 59.789	#	#
MW-12A	75.25	31 17.243 87 59.306		
M-3	74.0	31 16.514 87 59.879		
M-4	57.0	31 16.523 87 59.680		
M-5^	60.0	31 16.525 87 59.593		
M-6	61.0	31 16.537 87 59.383		
M-7	75.0	31 16.615 87 59.264		
M-8^	80.0	31 16.666 87 59.228		
M-9^	85.0	31 16.698 87 59.0775		
M-10^	89.0	31 16.785 87 58.994		
M-11^	69.0	31 16.956 87 58.999		
M-13^	68.74	31 16.998 87 59.043		
M-14^	56.55	31 17.110 87 59.050		
M-15^	53.80	31 17.202 87 59.042		
OW-1^	77.24	31 16.491 88 00.206		

^ These wells are monitored for depth to groundwater data. All other wells are monitored for depth to groundwater data and groundwater quality data.

The three upgradient/background wells are M-1, M-2, and MW-12A. The remaining thirteen wells (M-3 through M-15 and OW1) are downgradient and they form a line for monitoring the ground water along the south and east periphery of the storage, treatment and disposal facilities.

There are three fully penetrating alluvial corrective action wells. The locations and depths are given in the table below.

Well No.	**Depth (ft)**	**Coordinates (lat. /long.)**	
CA-1	88.54	31 16.249	88 00.076
CA-2	60.72	31 16.261	87 59.701
CA-3	55.61	31 16.377	87 59.431

Any additional alluvial monitoring wells required in the future will be added to this section.

C. French Drain Monitoring – Class C Landfill

The French drain system will be examined through the post closure period. The system will be monitored utilizing an electronic water level indicator, or alternate water level measurement method, at each of the French drain collection points. If this initial inspection indicates the presence of water, the water will be removed utilizing a submersible well pump. The water will be treated in the activated carbon treatment system and discharged through the NPDES-permitted discharge point. The collection wells are monitored on a monthly basis and after storm events per the inspection schedule in Appendix D to ascertain the status of the French drain system.

IV. TECHNICAL SPECIFICATIONS

A. Cap/Cover Support

The cap and cover of impoundments closed according to the Closure Plan as a contingency closure and some of the interim status closures were backfilled with soil and compacted to 90% of the maximum dry density attainable by the Standard Proctor Density level of compaction effort. This backfilling and compaction provides adequate support for the cap and cover, and also provides minimum expected settlement.

The dewatered and stabilized sludge was placed in the Biotreatment and Sludge Impoundments in layers and compacted to meet or exceed the following minimum requirements: compressive shear strength of 500 psf, and compactive effort in the upper 3 feet of fill of 95% of the Standard Proctor Density.

The maximum fill depth of the stabilized material is approximately 25 feet with five feet of cap and cover. The settlement potential of the stabilized material has been estimated to be 4.9 inches. The minimum factor of safety based on a shear strength analysis was computed to be greater than 2.5. Differential settlement was computed to be 1 in 2,000 to 1 in 1,150 for the worst case condition. Differential settlement in concrete structures in the magnitude of 1 in 500 is considered satisfactory for building purposes, therefore the differential vertical movement of the closed impoundment should be satisfactory.

Above Ground Hazardous Waste Landvault No. 1, Above Ground Hazardous Waste Landvault No. 2, the Biological Sludge Landfill, the "Class C" Landfill, and the Biotreatment and Sludge Impoundment Closures gas venting system consists of a 6-inch layer of course grained sand located directly above the waste pile. Figure 1 illustrates the cap system for Above Ground Hazardous Waste Landvault No. 1. This sand layer will transmit any gases generated within the units to perforated HDPE piping along the cap peaks. This piping is connected to a riser which is sealed to the synthetic liner above the sand layer and extends 24 inches above the soil/clay cap. This riser is anchored in concrete and terminated with a 180° elbow.

B. Revegetation

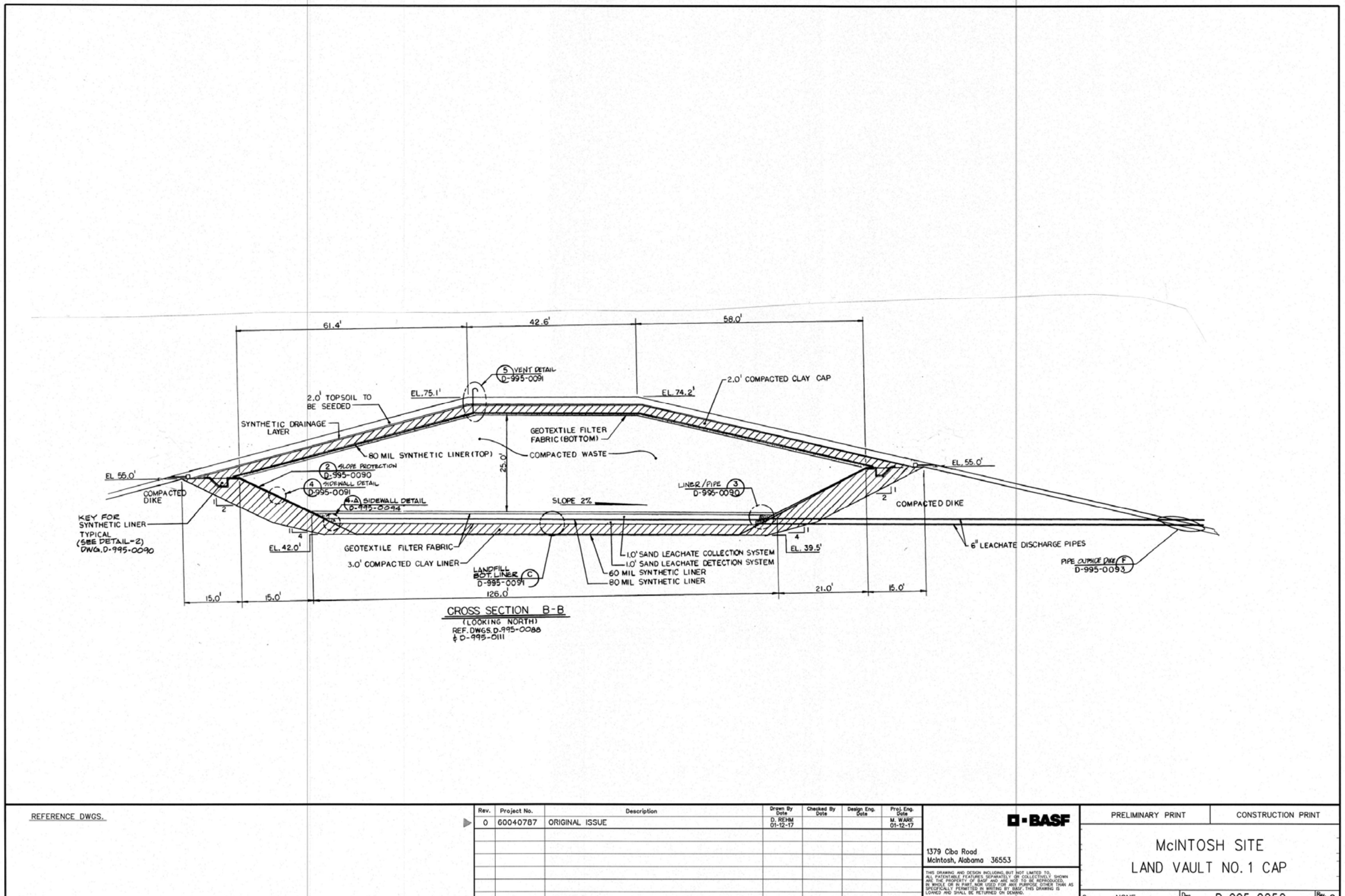
The revegetation cover was done using a low-maintenance disease and insect resistant mix of grasses or other shallow rooting species that would effectively inhibit soil erosion on the cover system.

The soil surface was left in a rough or furrowed condition perpendicular to the drainage contours to minimize water infiltration. The area was then fertilized with a commercial brand fertilizer at the manufacturer's recommended rate.

Areas that were revegetated were broadcast seeded with the specified seed mixture. After seeding, the areas were conditioned by raking or harrowing to provide proper seed coverage with soil.

All seeded areas were mulched with 2,000 to 3,000 pounds per acre of straw or hay, or 1,500 pounds per acre of cellulose wood fiber. When hay or straw was used, it was anchored with a straw crimper.

Figure 1. Landvault #1 Cap



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C. Leachate Piping

Piping shall consist of high-density polyethylene (HDPE) pipe with a dimension ratio (DR) of 13.5. The pipe shall meet the qualifications as required for Type III, Category 5, Class C, Grade P34 as specified in ASTM D-1248. The cell classification shall be PE 3343-C per ASTM D-3350. Perforated pipe shall be 4-inch nominal diameter and blank pipe shall be 6-inch nominal diameter. Associated fittings, elbows, tees, and angles shall be compatible and of an equal or greater strength and/or DR.

D. French Drain

The french drain system in the Class C Landfill (SWMU 1) is designed to collect and convey any residual groundwater that may remain in the encapsulated landfill following cell dewatering to strategically located collection wells. The french drain consists of a system including filter media, 6-inch diameter Schedule 10 316L stainless steel collection pipes. The french drain is installed on the landfill side of the containment wall at the surface of the stiff low permeability clay base so as to intercept any potential groundwater that may pass through the containment wall.

E. Cell Monitoring System

Post Closure Monitoring Points are installed at two locations at the Class C Landfill. The monitoring locations were selected based on interpretation of the subsurface configuration of the top of the stiff clay layer underlying the site. The locations are topographic low areas and would be accumulation zones if groundwater began seeping into the closed landfill cells.

V. MAINTENANCE

A. Inspection of Facility (as outlined in Appendix D)

Periodic inspections will be conducted to check for the following:

1. Wind erosion, water erosion, condition of vegetative cover, rodent damage, infestations, wind blown seeding of deep rooting growth, localized settling, and drought damage to the top cover of all capped and covered sites.

2. General settlement of the above-ground landvaults and the Class “C” landfill by measurement of the elevations of selected points utilizing established benchmarks.

3. Most of the adjacent land to the closed surface impoundments slopes away, however, it will be necessary to check for damage to drainage diversion along the north, west, and south sides of the Above Ground Hazardous Waste Landvaults, Class "C" Landfill and GM-44 Impoundment, as well as all associated ditches and/or culverts.

4. All well caps, sample pumps, ground water seals, and area erosion around permitted monitoring wells, french drain wells and cell dewatering wells for potential problems.

5. Condition of the cover over the landfill or landvault leachate collection sump for damage and/or general deterioration, as well as the sump and leachate collection piping for deterioration and potential leaks.

6. All security fencing for general deterioration such as oxidation, fence post integrity, gate hinges, and locks.

7. Gas vent risers for deterioration of piping, proper anchoring, clogging and free discharge.

The frequency of these inspections will be performed as outlined in *Appendix D: Inspections* of this permit application. All permitted monitoring wells, french drain wells, cell dewatering wells, and gas vent risers will be inspected monthly or after storm events as prescribed in Appendix D and Appendix J (Closure Plan), respectively. Permanent bench marks will be inspected once per year. Maintenance of each is described in Sections B through G below.

The level in the leachate collection sump at Landvault No. 2 was checked frequently at the beginning of the closure period to establish a pattern of reliability. The expected maximum accumulation of leachate was 100 galons per day (GPD) for each landvault at the beginning of post closure care. The sump should hold 34,500 gallons before over topping the sump walls.

Leachate was removed on a monthly basis and transported to an off-site TSD facility for treatment. The liquid levels were checked on a weekly basis until a stable predictable accumulation rate was demonstrated for three (3) months. The levels were then checked every other week for an additional three (3) months of stability. Since that time, the levels have been checked on a weekly basis and will be for the remaining period of post closure.

"Based on the topography of this area (very little ground higher in elevation than the closed areas), no serious damage or general settling was expected to occur in the top covers of the facilities in post-closure care, with the possible exception of damage caused by a severe storm in the early years of post-closure care. Since the measurements of settlement points began in 1991, only negligible settlement (less than 4 inches in 8 years) has been found in the Above-Ground Landvault No. 1 and the Class "C" Landfill".

Also based on the yearly climate little to no damage has been shown from frost or freeze.

B. Maintenance of Top Cover and Vegetation

Any erosion or settling that could hold water will require the addition of top soil to provide the repairs, along with re-seeding and fertilizing of the repaired area.

Repairs to any water diversion ditches will be made on a regular basis and repairs due to rodents on an as-needed basis.

Maintenance of the top cover and immediate surrounding area will be conducted as necessary to facilitate inspection of the cover.

Re-seeding, fertilizing and/or mulching will be on an as-needed basis determined by the inspections. It is expected that partial re-seeding will be needed yearly for the first six years and partial re-fertilization once every two years during the first six years. It is anticipated that a combination of factors could require 33% re-seeding and turf building on one occasion during the 30 year period.

C. Maintenance of Structures

All security fencing will be maintained on an as-needed basis per the inspection. It is expected that the fence will require replacement once during the 30 year period of post closure care.

It is expected that any structures requiring painting will need painting every 5 years. This would include the painting of galvanized protective casings of monitor wells.

D. Maintenance of Permitted Monitoring Wells

The casing of the monitoring wells is PVC with PVC caps or stainless steal with stainless steal caps and an outer steel pipe protective casing, which is embedded through the concrete surface water seal. The wells should provide a long service life. However, it is expected that all caps and pumps will have to be replaced twice during the 30-year period and all outer casings painted every 5 years. It may be necessary to replace one of the wells during the 30 year period (70 feet typical depth).

E. Maintenance of Gas Collection System

The gas vent risers are constructed of HDPE and are anchored in 3,000 psi concrete collars. The service life of the piping is 50 years but may require replacement prior to the end of the post closure period due to UV light deterioration and oxidation. The concrete collars will be inspected for cracks due to settlement and will be replaced on an as-needed basis.

F. Maintenance of French Drain Collection Wells

The casing of the collection well is 316L stainless steel with an outer protective casing of HDPE, which is embedded through the concrete surface water seal. It is expected that all caps and pumps will have to be replaced twice during the 30-year period and all outer casings replaced once. The 6-inch guard posts will be painted every 5 years, as needed.

G. Maintenance of Cell Monitoring Points

The casing of the collection well is 316L stainless steel with an outer protective casing of galvanized steel pipe which is embedded through the concrete surface water seal. It is expected that all caps and pumps will have to be replaced twice during the 30-year period and all outer casings replaced once. The 6-inch guard posts will be painted every 5 years, as needed.

VI. POST CLOSURE CERTIFICATION

BASF will submit a Post Closure Certification to the Director within 60 days of completion of the post closure care period. The certification will certify that the post closure care period for the hazardous waste disposal units was performed in accordance with the specifications in the Post Closure Plan. The certification will be signed by BASF and by an independent registered professional engineer.#

APPENDIX L

GROUNDWATER
CORRECTIVE ACTION PROGRAM

(updated August 2023)

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Groundwater Corrective Action Program

1.0 Introduction

1.1 General

Groundwater quality has been monitored at the McIntosh facility since 1981, consistent with RCRA mandates (refer to Attachment A for a list of key hydrogeological reports and relevant references). A Corrective Action Plan (Plan) was developed and implemented in 1985, as specified under 40 CFR 264.100 and ADEM Admin. Code R 335-14-5-.06(11),"Releases for Solid Waste Management Units", when contaminants were identified in the uppermost (i.e., Alluvial) aquifer. The Plan subsequently was included in the RCRA Permit issued in October 1985. The Plan has been the basis for Corrective Action required by the regulations and has been revised, as required, to address on-going evaluations of effectiveness. Details of the sampling program are provided in Attachment B, "Corrective Action Groundwater Monitoring Plan". The Plan addresses the contamination identified in the uppermost (Alluvial) aquifer and the underlying (Upper Miocene) aquifer separately, as described in the following subsections, to protect human health and the environment through preventing the migration of contaminants to receptors and controlling the sources of releases to the aquifer.

1.2 Objectives of Groundwater Corrective Action Program

1.2.1 Alluvial Aquifer

The Corrective Action for the Alluvial Aquifer focuses on addressing historical releases from solid waste management units, including landfills, surface impoundments and other historical waste management activities. The Plan focuses on:

- Preventing the migration of groundwater in the uppermost Alluvial Aquifer beyond the property boundary with Chemicals of Concern (COCs) at concentrations above applicable Groundwater Protection Standards (GWPS).

- Simultaneously identifying then addressing contamination source(s) contributing to the contamination.

Preventing further migration of contaminants detected in groundwater at the Site has been addressed by:

- Addressing sources that may be contributing to contamination of groundwater underlying the Site, and continued control of source contamination mass flux to the aquifer from the overlying formation. Historical source control measures consist of RCRA facilities closures, including surface water impoundments formerly used to treat or store wastewater and sludge, as well as two landfills, and removal activities conducted under the auspices of RCRA and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

- Maintaining an effective hydraulic control of contaminated Alluvial Aquifer groundwater using a line of interceptor pumping wells and slurry wall system.

- Ongoing evaluations and monitoring of the nature and extent of contamination.

- Additional monitoring as needed to demonstrate the effectiveness of the interceptor pumping well system and slurry wall.

- Additional controls described herein to address contaminant migration in the floodplain area, including risk-based Corrective Action.

1.2.2 Upper Miocene Aquifer

The Corrective Action for the Upper Miocene Aquifer, similar to the Plan for the Alluvial Aquifer, is designed to protect human health and the environment through preventing the migration of contaminants to receptors and controlling the sources of releases to the aquifer, as follows:

- Control of contaminant plume migration such that potential human health and environmental risks are addressed;

- Ongoing monitoring assessments of the effectiveness of the remedy.

- Further evaluations of the extent and distribution of chemicals of concern in Miocene Aquifer groundwater in areas where groundwater concentrations exceed performance standards.

- Expanding the monitoring network as needed to define extent and distribution of impacts to groundwater.

- Development of a risk-based Corrective Action Plan should future monitoring indicate groundwater concentrations of contaminants of concern continue to increase above groundwater protection levels at the property boundary.

- A risk assessment, with proposed institutional controls as needed, which may include revisions to groundwater performance standards through the development of Alternate Concentration Limits (ACLs).

- Ongoing evaluations of the potential for migration of contaminants from the Alluvial to Miocene Aquifers and corrective action, if necessary.

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2.0 Hydrogeological Characterization

2.1 General

Reports documenting various site investigation results and satisfying the hydrogeological characterization requirements in the regulations have been provided to ADEM and EPA Region IV. A list of key hydrogeological reports and relevant references is included as Attachment A of this appendix. A summary of the Site hydrogeology and the results of water quality investigations are presented in the following subsections.

2.2 General Hydrogeological Setting

The BASF McIntosh facility is situated on a low terrace immediately adjacent to the Tombigbee River floodplain. Pleistocene deposits range in thickness from 60 to 100 feet, and consist of a continuous surficial clay layer underlain by deposits of silt, gravel and clay. The surficial clay layer ranges in thickness from only a few feet to over 50 feet. The transition between the surficial clay and the underlying sand is characterized by sandy clay, sand and gravel. The Pleistocene deposits unconformably overlie more than 700 feet of alternating layers of Miocene age sand, gravels and clays.

2.3 General Characteristics of Alluvial Aquifer

The Alluvial Aquifer is composed of Recent and Pleistocene terrace and alluvial deposits. Under natural, semi-confined conditions, the saturated thickness of the Alluvial Aquifer ranges from less than 30 feet to over 50 feet. Recharge to the Alluvial Aquifer is primarily from rainfall, as well as infiltration from streams and the on-site River Water Reservoir (BCM, 1988).

The Alluvial Aquifer water level slopes gently to the south-southeast toward the Tombigbee River with a flow velocity ranging from approximately 0.5 to 0.6 ft/day toward the southeast in the uplands area above the bluff line and groundwater interception system. This general pattern is modified at the facility by local recharge by the River Water Reservoir, diversion of the aquifer by the CERCLA remediation slurry wall near the bluff line, and by the line of Corrective Action interceptor pumping wells located south of the waste management facilities.

An initial investigation report prepared titled, "An Evaluation of the Impact of Waste Disposal Operations on the Alluvial Aquifer with Recommendations for Remedial Action at the Ciba-Geigy Corporation Plant Site in McIntosh Alabama" (PELA, 1985), and provided to ADEM along with the Corrective Action Plan, includes a description of aquifer hydraulic characteristics and groundwater quality. P. E. LaMoreaux and Associates (PELA) performed specific conductance traverses in wells along the southern portion of the waste management facilities. The results of these traverses, and confirmed by subsequent chemical analyses, indicated the presence of a zone of contaminated groundwater in the Alluvial Aquifer. A groundwater interceptor pumping system consisting of ten fully-penetrating Alluvial pumping wells began operating in 1987 to intercept and remove contaminated groundwater identified in the Alluvial Aquifer. A more detailed discussion of the Corrective Action interceptor well system and the monitoring well system used to evaluate the Alluvial Aquifer is presented in subsequent sections.

2.4 General Characteristics of Miocene Clay

Geotechnical borings were conducted in support of remediation activities in the vicinity of the bluff line initially in 1989. Several of the borings penetrated the Miocene clay separating the Alluvial and Miocene Aquifers, and provided data on the relative thickness and permeability of the stratum. The data indicated that the thickness of the Miocene clay varies in the area of the bluff line and generally is thinner than in the manufacturing area and Treatment Storage and Disposal Facility (TSDF). The variation in thickness is a result of the erosion of the Miocene clay by the meandering and/or migration of the ancestral Tombigbee River within the confines of the flood plain. In March 1992, BASF submitted a final report, “Results of Aquifer Testing in the Vicinity of Site 8” (PELA, 1992), incorporating the geotechnical and hydraulic data collected. The report confirmed results from previous investigations, concluding that the Miocene clay was present throughout the bluff line and that the overlying Alluvial Aquifer and underlying Miocene Aquifer are hydraulically separate.

This information, and data collected during the installation of the CERCLA remediation slurry/diversion wall in 1996, indicates that the thickness of the Miocene clay varies from approximately 5 feet to 20 feet in the scoured area near the Bluff line, as compared to approximately 100 feet in the western portion of the property. The permeability of the Miocene clay, as determined from laboratory testing, ranges from 1.0×10^{-9} to 3.2×10^{-11} cm/sec.

Offsite investigations of the Miocene Aquifer were conducted in March 2012. The data from these investigations showed that the top of the Miocene clay was encountered at 48.5 ft and 75 ft below grade, and the thickness of the Miocene clay ranged from 116 ft to 128.5 ft at two offsite Miocene aquifer monitoring well locations (MD-13 and MD-14) that were installed approximately 800 ft south of the southern BASF property boundary (LimnoTech, 2012). The offsite boring data showed that the Miocene Clay interval consisted predominantly of very hard /stiff gray clay, with some very fine-to-fine and fine-to-medium sand lenses at the MD-14 location (LimnoTech, 2012).

2.5 General Characteristics of Miocene Aquifer

The Upper Miocene underlying the Site is a confined aquifer of sands and gravels capped by a clay layer. Recharge is from regional infiltration in outcrop areas up-dip in the northern part of Washington County (BCM, 1988). Results from site aquifer pumping tests and geotechnical investigations conducted in the late 1980’s/early 1990’s have indicated that the Alluvial and Upper Miocene aquifers are hydraulically separated at the McIntosh Site (PELA, 1992).

As part of the hydrogeological characterization, three Upper Miocene Aquifer wells were installed in early 1984 (MD-1, MD-2 and MD-3/3A). Aquifer tests were performed at that time which demonstrated that the Upper Miocene and Alluvial aquifers are physically and hydraulically separate. Subsequent water quality monitoring conducted in 1988 and 1989 provided data indicating that contamination was not present in the Miocene aquifer.

Subsequent water quality data from self-monitoring of the Upper Miocene Aquifer identified chlorobenzene in one Miocene well (i.e., MD-2) in 1993. Expanded groundwater sampling confirmed the presence of chlorobenzene in Miocene wells MD-2, PZD-8 and PZD-9, all located in and near the bluffline area. No other compounds were detected in Miocene Aquifer groundwater samples at that time.

BASF maintains two Miocene Aquifer drinking water wells (WW-7 and WW-8), located on the northern property boundary upgradient to the production area, and three production wells completed in the Miocene Aquifer for manufacturing process water (WW-1, WW-2 and WW-3). The two westernmost wells (WW-1 and WW-2) have been in alternating continuous operation for many years. Potentiometric surface maps provided to ADEM initially indicated that the contamination in the Miocene Aquifer was controlled through the on-site pumping of plant production wells. The use of the Miocene Aquifer production wells has been reduced significantly since manufacturing changes at the site in 2003.

Data from the Miocene Aquifer monitoring well system[1] through 2021, augmented by water level and pumping data from off-site, indicate:

- Regional influences produced by extensive groundwater extraction at the adjacent Olin Corporation Plant are a major determinant of groundwater flow in the Upper Miocene Aquifer.

- Pumping of on-site BASF production wells does not contain contamination in the Miocene Aquifer within property boundaries.

Therefore, historical data indicated that groundwater pumping at the Olin Corporation Plant is the primary influence on contaminant distribution within the Miocene Aquifer underlying the McIntosh Industrial Park, which includes both the BASF and Olin properties (CIBA, May 2002). However, in late 2020, nearby Olin Corporation began implementing plans to switch their production water supply from the Miocene Aquifer to the Alluvial Aquifer. When this transition is complete, the change is expected to have a significant impact on the regional direction of Upper Miocene Aquifer groundwater flow in the area.

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[1] A fourth Miocene Aquifer monitoring well (MD-4) was installed in November 1989. In July through December 1990, six Miocene Aquifer piezometers (PZMC-1, PZD-5, PZD-6, PZD-7, PZD-8 and PZD-9) and a Miocene Aquifer extraction well (MPW-1) were installed in the bluffline/floodplain area to further characterize the Upper Miocene Aquifer. Two additional onsite Upper Miocene monitoring wells (MD-5 and MD-6) were installed in May1998 , five onsite wells (MD-7 through MD-10 and MD-3B) were installed in June 2001, two onsite wells (MD-11 and MD-12) were installed in December 2006 and June 2008, respectively, and two offsite wells (MD-13 and MD-14) were installed in March 2012 to expand the well network and refine the state-of-the-knowledge on groundwater flow.

BASF is monitoring that change as part of their ongoing evaluations of the Miocene Aquifer.

3.0 Corrective Action Plan

3.1 General

BASF has instituted Corrective Action to protect human health and the environment through preventing the migration of contaminants to receptors and controlling the sources of releases to the aquifer. As summarized in Section 1 above, the Corrective Action Plan (Plan) incorporated into the RCRA Permit issued in 1985 outlined specific steps that would be taken to achieve program objectives. The Plan was revised in the January 31, 2006 RCRA Permit to incorporate Corrective Action for the Upper Miocene Aquifer.

The current status of each element of the Corrective Action Plan is presented in the following sections, which describe historical source control and related remedial measures and recent investigations that have been implemented for both the Alluvial and Miocene Aquifers.

3.2 Alluvial Aquifer Source Control and Related Remedial Measures

3.2.1 Historical Alluvial Aquifer Source Control Measures

The RCRA Permit issued in 1985 required removal and treatment of contaminated groundwater in the Alluvial aquifer at the Site. Corrective Action included the preparation of a Site Investigation Plan equivalent to a CERCLA Remedial Investigation/Feasibility Study (RI/FS) plan. The plan called for closing hazardous waste management facilities that may contribute to environmental contamination. Source control measures for the Alluvial Aquifer were initiated in 1987 and included:

- Closure of hazardous waste management facilities (1987 through 1989) and post closure monitoring in accordance with Appendix K of the RCRA Permit.

- Installation and operation of a groundwater pump and treat system (ongoing since 1987, including the installation in 2019 of a deep Alluvial Aquifer extraction well, PW-11, in the bluffline area and a test boring in 2023 for a proposed alternative bluffline area extraction well due to the low yield of PW-11).

- Installation of a new wastewater treatment system in 1988.

- Installation of a slurry wall in 1996 to intercept Alluvial Aquifer groundwater at the bluff line.

The groundwater extraction and treatment system and slurry wall are described more fully in the following subsections.

SWMU Closures. RCRA facilities that were closed in 1986 through 1989 included surface water impoundments used to treat or store wastewater and sludge, as well as two landfills. The RI/FS resulted in identifying four Operable Units (OUs) and two Areas of Contamination (AOC). OU1, the groundwater in the Alluvial Aquifer, is addressed both by RCRA and CERCLA. Figure L1 shows the location of closed RCRA facilities and CERCLA past waste management units within the BASF Site. Table L-1 summarizes the various Solid Waste Management Units (SWMUs) that were RCRA closed or remediated, along with other AOCs in accordance with the CERCLA Records of Decision for OU1, OU 2 and OU4.

The Permit identifies fifteen SWMUs (Numbered 1 through 15A) that are regulated by Permit Parts II (Post-Closure Care) and III (Groundwater Monitoring and Corrective Action). SWMU-1 through SWMU-14 were closed from 1987 through 1989 (refer to Table L-1). SWMUs-15A and 15B (Aboveground Landvault #2 and associated carbon treatment system, respectively) are still active and are regulated per Part V of the RCRA Permit. BASF currently operates the Above Ground Hazardous Waste Landvault No. 2 (HWLV2 or LV#2) for disposal of treated wastes.

The Permit also identifies seven other site SWMUs (numbered SWMU-16 through SWMU-22) that were closed in 1999 and 2006 and require no further action at this time (refer to Table L-1).

As summarized in Table L-1, SWMUs 1 through 14 that were closed (including interim status) under RCRA authority include:

- Class C Landfill (SWMU 1): Permitted by Alabama in 1973 and permitted under RCRA Interim Status regulations. Closure during RCRA interim status completed in 1987.

- Biological Sludge Landfill (SWMU 2): Permitted by Alabama in 1978 and later operated under RCRA Interim Status for disposal of dewatered sludge. Closure during RCRA interim status completed in 1987.

- Triangular Impoundment (SWMU 3): Constructed in the 1970's to decompose Diazinon residues and other process waste residues (BCM, 1988). Closure during RCRA interim status completed in 1987.

- Rectangular Impoundment (SWMU 3): Constructed east of the triangular impoundment in 1972-1973 to hold sludge from the Dilute Impoundment, BCM, 1988). The impoundment then was used for collection of other process solids and liquids (BCM, 1988). Closure during RCRA interim status in 1989.

- Biological Sludge Storage Impoundments (SWMUs 4, 5, 6 and 7): Constructed in 1973. Closure under RCRA in 1989.

- Wastewater Treatment Impoundments (SWMUs 8, 9 and 10): The biological treatment system (bio-system) was constructed in 1973. Closure under RCRA in 1989.

- Dilute Impoundment (SWMU 11): Constructed in 1965. Closure under RCRA in 1989.

- Diazinon Destruct Impoundment (SWMU 12): Constructed in 1965. The impoundment was closed under RCRA in 1989.

- GM-44 Impoundment (SWMU 13): Put into service in early 1970s. Constructed for GM-44 wastes high in nitrogen compounds. Closure under RCRA in 1989.

- Above Ground Landvault #1 (SWMU 14): Operated 1984 to 1991. Closure under RCRA in 1991.

Permitted Alluvial Aquifer Background (M-1, M-2 and MW-12A) and Point-of-Compliance[2] monitoring wells (M-3 through M-11, M-13 through M-15) are associated with a 30-year post-closure monitoring period for these units (refer to Appendix K of the RCRA Permit).

CERCLA Remediated Areas. Separate Remedial Investigations/ Feasibility Studies (RI/FS) were initiated, and Records of Decision (RODs) signed that specified remediation actions for each OU (refer to Table L-1):

- OU1 consists of Alluvial Aquifer (shallow) groundwater

- OU2 consists of ten of eleven former solid waste management units (i.e., SWMU-23 through SWMU-29 and SWMU-31 through SWMU-33), also known per CERCLA as remediated Areas 1 through 7, and 9 through 11;

- OU3 consists of portions of the local floodplain, including the lower portion of the dilute/effluent ditch, currently described in CERCLA documentation as the floodplain drainage ditch (also known as AOC-B) and areas of the adjoining Tombigbee floodplain (also known as AOC-C);

- OU4 consists of former SWMU-30, also known per CERCLA as remediated Area 8 or the bluff line site, and the upland portion of the dilute ditch currently described in CERCLA documentation as the Former Dilute Ditch (also known as AOC-A).

Remedial actions were completed for OU2 and OU4 in 1999 and included:

[2] Point-of-Compliance wells are in close proximity to a SWMU or can be used for sitewide monitoring.

- Excavation of contaminated soils and sludges until established cleanup goals were reached or until site-specific excavation limits were reached;
- On-site thermal treatment of approximately 240,000 cubic yards of contaminated soils and sludge;
- Use of treated soil and residual ash from the thermal treatment process that met Land Disposal Restriction treatment standards as backfill for the excavated areas;
- Installation of a slurry wall in 1996 along the base of the Bluffline Area, downgradient of OU4, to address deep soil contamination by diverting groundwater flow passing beneath OU4 into the capture zone created by the groundwater extraction system;
- Vegetation of the area and establishment of suitable vegetative cover; and
- Institutional controls and land and groundwater use restrictions are specified for the site. Institutional controls and covenants are in place that limit the site to industrial use only, prohibit the excavation of soils in the remediated areas of the site pursuant to the RODs for OUs 2, 3 and 4, and prohibits the extraction of groundwater from the Alluvial Aquifer (except for investigation or remediation purposes) and limits the use of the Miocene aquifer for drinking water purposes to the northern portion of the site.

Downgradient "Effectiveness Monitoring wells" are sampled at least semi-annually to evaluate the effectiveness of the groundwater extraction system and source removal activities.

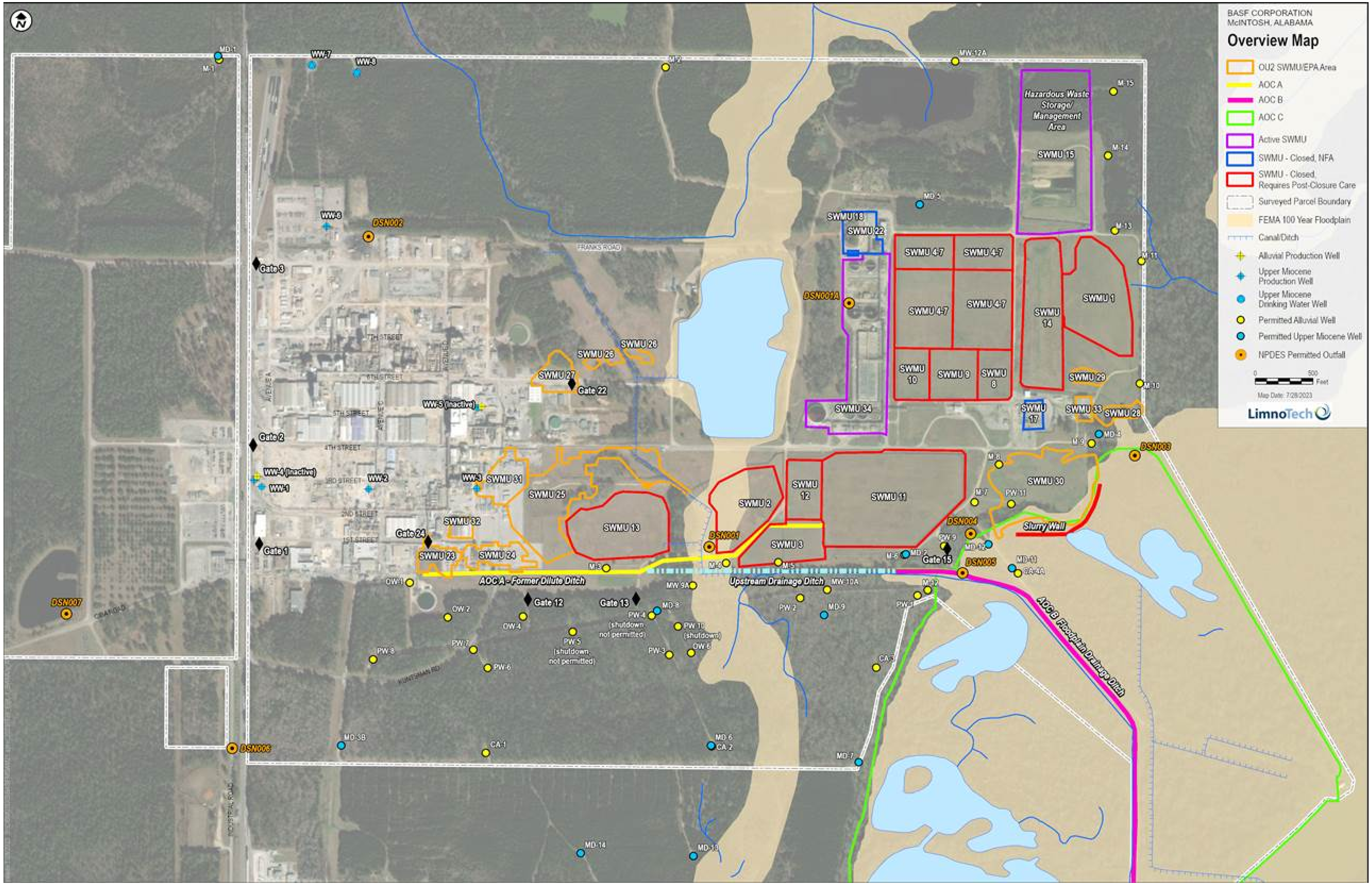

Figure L-1. Closed RCRA Facilities and CERCLA Remediated Areas (SWMUs, OUs and AOCs)

Table L-1. Closed RCRA Facilities and CERCLA SWMUs

Name	SWMU Number	AOC Designation	OU Number	Associated EPA Site Number	RCRA/CERCLA Status	Potentially Affected Media	Date Closed	2017 RCRA Permit Part Regulation
Alluvial Aquifer Groundwater			1		CERCLA: NFA per 1989 ROD RCRA: Corrective Actions/Corrective Measures	groundwater		III, VI
Class C landfill	1				Closed - Requires Post-Closure Care	soil, groundwater	1987	II, III, IV
Biological Sludge Landfill	2				Closed - Requires Post-Closure Care	soil, groundwater	1987	II, III, IV
Rectangular/Triangular Ponds	3				Closed - Requires Post-Closure Care	soil, groundwater	1987	II, III, IV
Sludge Impoundment #1	4				Closed as a unit- Requires Post-Closure Care	soil, groundwater	1989	II, III, IV
Sludge Impoundment #2	5					soil, groundwater	1989	II, III, IV
Sludge Impoundment #3	6					soil, groundwater	1989	II, III, IV
Sludge Impoundment #4	7					soil, groundwater	1989	II, III, IV
5-Day Impoundment	8					soil, groundwater	1989	II, III, IV
10-Day Impoundment	9					soil, groundwater	1989	II, III, IV
Equalization Impoundment	10					soil, groundwater	1989	II, III, IV
Dilute Impoundment	11				Closed as a unit - Requires Post-Closure Care	soil, groundwater	1989	II, III, IV
Diazinon Destruction Impoundment	12					soil, groundwater	1989	II, III, IV
GM-44 Impoundment	13				Closed - Requires Post-Closure Care	soil, groundwater	1989	II, III, IV
Aboveground Landvault #1	14				Closed - Requires Post-Closure Care	soil, groundwater	1991	II, III, IV
Aboveground Landvault #2	15A				Active	soil, groundwater		II, III, IV, V
Aboveground Landvault #2 activated carbon treatment system	15B				Active - NFA	NA		IV
Container Storage Area	16				Closed with Incinerator #1 - NFA	soil, groundwater	1999	IV
Rotary Kiln Incinerator #1	17				Clean Closed in 1999 - NFA	air, soil	1999	IV
Rotary Kiln Incinerator #2	18 A-T				Closed in 2006 - NFA	air, soil	2006	IV
Tank Farm 1 (V-0700-07, V-1003)	19				Closed with Incinerator #1 - NFA	soil, groundwater	1999	IV
Tank Farm 2 (V-1002, V-2499)	20				Closed with Incinerator #1 - NFA	soil, groundwater	1999	IV
Tank Farm 3 (15-V-091, 15-V-092)	21				Closed with Incinerator #1 - NFA	soil, groundwater	1999	IV
Tank Farm 4 (15-V-202, 15-V-203, 15-V-204, 15-V-234, 15-V-205)	22 A-E				Closed with Incinerator #2 - NFA	soil, groundwater	2006	IV
Original Effluent Impoundment	23		2	1	CERCLA -Remediated; Requires Corrective Measures	soil, groundwater	1999^	VI
Waste Disposal Pit	24		2	2	CERCLA -Remediated; Requires Corrective Measures	soil, groundwater	1999^	VI
Tar Disposal Area	25		2	3	CERCLA -Remediated; Requires Corrective Measures	soil, groundwater	1999^	VI
Waste Disposal Pits	26		2	4	CERCLA -Remediated; Requires Corrective Measures	soil, groundwater	1999^	VI
Open Burn Area	27		2	5	CERCLA -Remediated; Requires Corrective Measures	soil, groundwater	1999^	VI
Temporary Trash Staging Area	28		2	6	CERCLA -Remediated; Requires Corrective Measures	soil, groundwater	1999^	VI
Disposal Site South of Class C Landfill	29		2	7	CERCLA -Remediated; Requires Corrective Measures	soil, groundwater	1999^	VI
Bluffline Area	30		4	8	CERCLA -Remediated; Requires Corrective Measures	soil, groundwater	1999^	VI
BHC Burial Area	31		2	9	CERCLA -Remediated; Requires Corrective Measures	soil, groundwater	1999^	VI
Warehouse No. 218	32		2	10	NFA	soil, groundwater	1999^	IV
Trash Staging Area	33		2	11	CERCLA -Remediated; Requires Corrective Measures	soil, groundwater	1999^	VI
Area 15 Waste Water Treatment System	34 A-EE				NFA	NA		IV
Main Wastewater Sumps	35 A-C, F-M, O-R, T, V-BB				NFA	NA		IV
Air Curtain Incinerator (Area 15)	36				NFA	NA		IV
Former Underground Injection Well #1	37A				NFA	NA		IV
Former Underground Injection Well #2	37B				NFA	NA		IV
≤90 day hazardous waste storage tanks, containers and areas	38 A-C, L-N, Q, U, V, Z-CC*				NFA	NA		IV
≤90 day hazardous waste storage tanks, containers and areas	38D, E, J, K, O, P, R, S, T, W, X, Y				NFA (no longer in use)	NA		IV
Satellite accumultation areas	39 A-C, K-M, Q-R, T, V, W, DD, FF, GG, II, KK, SS, TT*				NFA	NA		IV
Closed Satellite accumultation areas	39 D-J, N-P, S, U, X-CC, HH, JJ				NFA (no longer in use)	NA		IV
Waste Loading Areas	40 A-D, F-H, K				NFA	NA		IV
Wastewater trenches and sumps	41 A-F, N-Z				NFA	NA		IV
Area 14 Waste Water Treatment System	43 A-F				NFA	NA		IV
Used oil storage areas	44A, C-E*				NFA	NA		IV
Fire station/Building 1010 Used Oil Storage Tank (6-V-1)	44B				NFA	NA		IV
Universal Waste Area/Building 113	45A*				NFA	NA		IV
Non-Hazardous Waste Storage Area/Building 212	46				NFA	NA		IV
Huntsman Environmental Areas	47				NFA	NA		IV
Wastewater Sumps (Former Production Areas 7 and 8)	35D, N, S, U				Requires Corrective Measures per Area 7 & 8 Remediation Plan	soil, groundwater		VI
BS-8, Main Wastewater Sump (Former Production Areas 7 and 8)	35E**				Requires Corrective Measures per Area 7 & 8 Remediation Plan	soil, groundwater		VI
<90 day hazardous waste storage containers and areas (Former Production Areas 7 and 8)	38F, G, H, I				Requires Corrective Measures per Area 7 & 8 Remediation Plan	soil, groundwater		VI
Satellite Accumulation Area (Former Production Areas 7 and 8)	39EE				Requires Corrective Measures per Area 7 & 8 Remediation Plan	soil, groundwater		VI
Former Production Area 8 Waste Loading Pad	40E**				Requires Corrective Measures per Area 7 & 8 Remediation Plan	soil, groundwater		VI
Waste Loading Areas (Former Production Areas 7 and 8)	40I, J				Requires Corrective Measures per Area 7 & 8 Remediation Plan	soil, groundwater		VI
Wastewater trenches and sumps (Former Production Areas 7 and 8)	41G, H, J				Requires Corrective Measures per Area 7 & 8 Remediation Plan	soil, groundwater		VI
Wastewater trenches and sumps (Former Production Areas 7 and 8)	41I, K-M**				Requires Corrective Measures per Area 7 & 8 Remediation Plan	soil, groundwater		VI
Wastewater Treatment System (Former Production Areas 7 and 8)	42A-E				Requires Corrective Measures per Area 7 & 8 Remediation Plan	soil, groundwater		VI
Former Dilute Ditch (upland portion)		A	4		CERCLA: Remediated RCRA: Requires Corrective Measures	sediment, surface water		VI
Floodplain Drainage Ditch (a/k/a Lower Dilute Ditch)		B	3		CERCLA -Remediated; Requires Post-Closure Care	sediment, surface water		II, III, IV
Floodplain		C	3		CERCLA -Remediated; Requires Corrective Measures	sediment, surface water		VI

NFA = No Further Action
^ Date of completion of CERCLA remedial actions
* The May 2017 RCRA permit notes that BASF should continue to manage these <90 Day Hazardous Waste Storage Tanks, Containers and Areas as required by Division 14 of the ADEM Administrative Code.
** SWMUs were removed during site demolition activities conducted during the spring and summer of 2016.

3.2.2 Alluvial Aquifer Pumping Well System

An interceptor pumping well system began operating in the summer of 1987 to capture contaminated groundwater in the Alluvial Aquifer south of the hazardous waste management facility and to prevent off-site migration. After groundwater is removed, it is conveyed to the National Pollution Discharge Elimination System (NPDES)-permitted wastewater treatment system through a network of above-ground piping. The treated water then is discharged through the permitted NPDES outfall to the Tombigbee River.

The Alluvial Aquifer interceptor pumping well system originally included ten wells designated PW-1, PW-2, PW-3, PW-4, PW-5, PW-6, PW-7, PW-8, PW-9 and PW-10; but now only seven of the original ten wells are currently in use.[3] Pumping wells PW-4, PW-5 and PW-10 were shut down in January 3, 2012, November 3, 2011 and October 15, 2014, respectively, following approval by ADEM. PW-10 is maintained as a backup well to PW-3 on the rare occasions when PW-3 might be shut down for extended periods for maintenance. New deep Alluvial Aquifer well PW-11 was installed in 2019 to address increasing chlorobenzene concentrations in bluffline/floodplain Effectiveness well CA-4A, however, the yield from PW-11 has been deemed too low to reverse groundwater flow at CA-4A.

Well locations are shown on Figures L-2a and b, which includes the locations of all RCRA-permitted and non-permitted extraction and monitoring wells for both the Alluvial and Miocene Aquifers. Additional non-RCRA-permitted monitoring wells are used to collect supplemental groundwater data at the site. A representative geologic transect of the Alluvial Aquifer interceptor/extraction wells is provided in Figure L-3. Well location information is provided in Attachment C.

The interceptor wells are pumped continuously to form overlapping cones of depression (composite cone) to create a continuous elongated trough trending east-west through the plume. This produces a hydraulic trough, which allows groundwater to flow into the trough from all directions, reversing the hydraulic gradient south of the wells and accelerating the southward flow of groundwater from the north. To establish effective horizontal and vertical hydraulic control over the movement of contaminants in the Alluvial Aquifer, the original ten pumping wells were installed to penetrate and screen the full saturated thickness of the Alluvial Aquifer (refer to Figure L-3). The design of PW-

[3] Former pumping wells PW-8A and PW-10B were designed as replacements for PW-8 and PW-10, respectively. PW-8A and PW-10B were removed from groundwater extraction service in June 2000 and August 2003, respectively, and wells PW-8 and PW-10 were restarted after BASF determined that the PW-8A and PW-10B well screens had collapsed. Although proposed for abandonment in the 2006 Permit Renewal Application, PW-8A and PW-10B were maintained for water level monitoring only at the request of ADEM prior to the 2011 Permit renewal. Monitoring data collected from PW-8A and PW-10B have been determined to be questionable, and sampling of these wells has discontinued per the 2011 RCRA Permit.

11 differs in that it screens the lower 25 feet of the very-fined grained Alluvial Aquifer interval in the bluffline area, which is not hydraulically connected to the upper Alluvial Aquifer interval that is intercepted by the original ten extraction wells. Depth to groundwater data are collected routinely from the permitted and non-permitted monitoring wells shown in Figure L-2a and 2b, respectively, and are used to evaluate the effectiveness of the Alluvial Aquifer groundwater extraction system. Figures L-4a and L-4b are groundwater surface elevation maps of the Alluvial Aquifer, showing the hydraulic trough created by the well system in January and August 2021, respectively. The January and August 2021 potentiometric surface maps for the underlying Upper Miocene Aquifer are provided in Figures L-5a and L-5b, respectively.

Permitted "Corrective Action Wells" CA-1, CA-2 and CA-3 are installed downgradient of the Alluvial Aquifer groundwater extraction system to evaluate the effectiveness of the capture zone in maintaining hydraulic control so that impacted Alluvial Aquifer groundwater does not migrate offsite with Contaminants of Concern (COCs) above GWPS.

3.2.3 Alluvial Aquifer Groundwater Treatment System

The groundwater extracted by the Alluvial Aquifer interceptor pumping well system is conveyed to the on-site NPDES-permitted activated sludge wastewater treatment system. An onsite above-ground biological wastewater treatment system has been operated since 1988 to biochemically treat wastewater from the manufacturing processes and groundwater extracted by the interceptor well system. The treatment process consists of equalization, biochemical oxidation using a jet aeration system and secondary clarification. Since January 1992, the facility also includes a sand filter system to reduce total suspended solids concentrations from the secondary clarifier overflows. The treatment system is described briefly in the following paragraph.

Groundwater extracted from the Alluvial Aquifer is conveyed through a pipeline to booster pumps and then to the aeration tanks. The groundwater is biologically treated in the aeration tanks. After a residence time of 0.75 days the treated effluent overflows to the secondary clarifiers. Two secondary clarifiers separate the biological sludge from the treated effluent. The secondary clarifier effluent flows by gravity to a holding tank and is pumped to the sand filter system. After passing through the sand filter system, the effluent is combined with once-through cooling water and discharged to the Tombigbee River.

3.2.4 Alluvial Aquifer Slurry Wall

In 1996, a slurry wall, located east of PW-9 and south-southeast of PW-11, was installed downgradient of Operable Unit Number 4 (OU4) to divert groundwater flowing beneath OU4 into the capture zone of interceptor pumping well PW-9. The locations of the slurry wall, PW-9 and PW-11 are shown on Figures L-1, L-2a and L-4a and b. Performance demonstrations of the slurry wall have been conducted, including: historic groundwater elevations; evaluations of Tombigbee River fluctuations and associated aquifer responses; implementation of several aquifer pumping tests; and evaluations of groundwater chemistry data.

3.2.5 Alluvial Aquifer Investigations Conducted During Last Permit Cycle

Activities conducted in the last permit cycle included:

- Additional investigations of the bluffline/floodplain area in 2018 to site and design a new Alluvial Aquifer extraction well.
- Design and installation of new deep Alluvial Aquifer extraction well PW-11 in the bluffline area in June 2019.
- Development of plans for hookup and automated operation of PW-11, which ultimately had to be aborted due to the very low yield of PW-11.
- Additional site investigations in 2021 through June 2023 to evaluate seasonal groundwater flow in the bluffline area and an alternative extraction well location.

Additional Bluffline/Floodplain Investigations (2017-2023). Since the renewal of the last permit, BASF staff have continued with monitoring and collecting groundwater elevation and water quality data from the Corrective Action Program wells installed in the Alluvial Aquifer, and with operation and maintenance of the groundwater recovery and treatment system. Since early 2007, chlorobenzene concentrations at CA-4A have increased to above 100 ug/l. Initially, the cause for this increase was thought to be related to a decrease in pumping efficiency at nearby Recovery well PW-9, with a resulting decrease in the easternmost extent of the Alluvial Aquifer groundwater capture zone. Consequently, in February 2010, BASF took steps to improve the efficiency of PW-9 through cleaning the well and associated plumbing, and by installing a new, higher capacity pump.

However, concentrations of chlorobenzene at CA-4A did not decrease over time as a result of these improvements. Re-evaluation of historical pumping test data suggested that CA-4A impacts might be located within a deep Alluvial Aquifer sand zone that is not hydraulically connected to PW-9.

A pumping test was conducted in September 2014 on existing monitoring well TPZ-7 to assess its location and capacity to reverse groundwater flow direction at CA-4A. The results of the pumping test demonstrated that lower Alluvial Aquifer sands in the vicinity of TPZ-7 and CA-4A are not hydraulically connected to the upper sands zone at the PW-9 location. In addition, groundwater flow reversal was achieved at the CA-4A location when pumping from TPZ-7 was less than or equal to 10 gpm. However, pumping at rates greater than approximately 10 gpm caused excessive drawdown in the well; therefore, it was determined that TPZ-7 was not a good candidate for a groundwater extraction well to address impacts at CA-4A.

BASF continued evaluations of this area during the 2017 through 2021 permit period and implemented appropriate corrective actions, as follows:

- In accordance with the ADEM approved 2016 Work Plan to address floodplain impacts, BASF initiated voluntary monitoring of downgradient non-permitted floodplain wells PZ-2 and PZ-15 to verify that impacts in floodplain groundwater are stable and do not extend to the Tombigbee River.

- BASF also initiated additional corrective actions in late 2018 through 2019 to address impacts detected at CA-4A, which included installing a new interim action low flow groundwater extraction well in the bluffline area (PW-11) that targets deep fine-grained Alluvial aquifer sands at the end of the slurry wall. These efforts were conducted in accordance with the Corrective Action Plan (CAP) that was developed to address Alluvial Aquifer impacts at CA-4A (LimnoTech, June 27, 2018), as approved by ADEM on July 12, 2018. The results of the PW-11 installation activities were reported to ADEM in January 2020 (LimnoTech, March 4, 2020 and April 2020).

- As of 2021, PW-11 was deemed a very low yield well (it dries up when pumped at 5 gpm) which is due to the very fine-grained, interbedded nature of the lower Alluvial Aquifer interval. It also appeared that the low yields at PW-11 might be due to residual drilling mud in the well even though it has been developed. Consequently, performance testing was not conducted formally at PW-11 and per the May 2020 ADEM approval letter, BASF planned to install PW-11 so that it could be pumped in a controlled cyclic manner until its performance could be assessed more fully over time (LimnoTech, March 4, 2020; ADEM, May 12, 2020).

- Following a delay of approximately 2 years due to Covid restrictions, in September 2021, BASF installed pressure transducers in 5 select nearby lower Alluvial Aquifer bluffline and floodplain monitoring wells (CA-4A, TPZ-4, TPZ-6, TPZ-7 and TPZ-11) to continuously monitor seasonal background groundwater levels in the vicinity of PW-11, and for future use in monitoring the effect of pumping from PW-11.

- On November 22, 2022, a screening level short-term pumping test was conducted in PW-11 to assess the maximum flow rate that could be achieved before dropping the groundwater level below the top of the well screen, and to observe the effect on groundwater levels in nearby continuously monitored wells (CA-4A, TPZ-4, TPZ-6, TPZ-7 and TPZ-11). PW-11 was pumped for approximately 1 hour and 40 minutes, at an initial flow rate of 5 gpm which decreased to 2.5 gpm by the end of the test period. Maximum drawdown in PW-11 was 60 ft. The groundwater level in PW-11 dropped below the top of the well screen when the discharge exceeded 2 gpm. No response was observed in the five continuously monitored observation wells throughout the test. When pumping stopped, the recovery of PW-11 was very slow and consistent with past observations (approximately 8 ft/hour).

- Based on the results of the November 22, 2022 short-term pumping test, BASF determined that PW-11 could not be pumped at a high enough flow rate to reverse groundwater flow direction at CA-4A.

- Initial groundwater sampling of PW-11 was conducted during the July 2019 and through the 2020 to 2022 annual RCRA groundwater sampling events and the February 2020 through January 2023 semi-annual groundwater sampling events to provide a baseline of pre-extraction groundwater concentrations. Chlorobenzene was detected in lower Alluvial Aquifer sands at PW-11 at concentrations of 2.6 mg/l in July 2019, 0.65 mg/l in January 2020, and 2.3 mg/l in July 2020, 1.3 mg/l in January 2021 and 3.5 mg/l in July 2021, which were of the same order of magnitude as chlorobenzene concentrations detected in downgradient effectiveness well CA-4A. In July 2022 and January 2023, chlorobenzene concentrations in PW-11 increased to 8.3 mg/l and 6.4 mg/l, respectively.

- Other compounds that were detected above GWPS in 2017 thru 2023 samples collected from CA-4A included arsenic, vanadium, benzene, naphthalene, 2-chlorophenol and 1,2-dphenylhydrazine. Other compounds that were detected above GWPS in the July 2019 through January 2023 groundwater samples from PW-11 included:

    - arsenic (0.013 mg/l in February 2020 only),

    - vanadium (0.035 mg/l in July 2019, 0.046 mg/l in July 2020, , 0.10 mg/l in July 2021 and 0.17 mg/l in July 2022),

    - 1,1-dichloroethene (0.025 mg/l in 2019 only),

    - 1,2,4-trimethylbenzene (0.025 mg/l in 2019, 0.042 mg/l in July 2021 and 0.20 mg/l in July 2022),

- 1,4-dichlorobenzene (0.089 mg/l in 2019 and 2020, 0.13 mg/l in July 2021, 0.47 mg/l in July 2022 and 0.23 mg/l in January 2023),
    - benzene (0.031 to 0.68 mg/l),
    - vinyl chloride (0.0094 mg/l to 0.064 mg/l),
    - chlorobenzilate (0.0016 mg/l in July 2021 and 0.0043 mg/l in July 2022),
    - naphthalene (0.00089 mg/l in July 2021 and 0.0035 mg/l in July 2022), and
    - 1,2-diphenylhydrazine as azobenzene (0.021 mg/l and 0.012 mg/l in July 2019 and July 2020).

- On May 25, 2023, during the mobilization for the Alluvial and Miocene VAS investigations near Miocene well MD-3B, BASF proactively installed a test boring (SB23-PW12test) to the east of TPZ-7 to assess this location for a candidate extraction well located further downgradient from the bluffline and off the western end of the slurry wall. Thin sands units were encountered in the lower Alluvial Aquifer in the test boring, comparable to those encountered at the TPZ-7 location, and samples of the sand units were collected for grain size analyses. The Miocene clay was encountered at 52.2 ft below grade. A groundwater sample was collected from just above the Miocene clay (49 to 52 ft below grade) and analyzed for select VOCs, SVOCs, pesticides and metals. Chlorobenzene was detected at a concentration of 3.2 mg/l. Other compounds that were detected above GWPS included benzene (0.061 mg/l), naphthalene (0.0036 mg/l), arsenic (0.019 mg/l), strontium (0.65 mg/l) and vanadium (0.041 mg/l). In addition, the drillers pumped the groundwater sample interval (screened with a temporary well screen) at a flow rate of approximately 10 gpm to assess the drawdown in the boring and responses in nearby continuously monitored wells. The drawdown in the test boring was 22.24 ft after 30 minutes of pumping, then the test was stopped. Several of the wells showed a response to the test boring activities, including CA-4A, TPZ-4, TPZ-7 and TPZ-11. BASF currently is evaluating the boring investigation data to assess this and options for a second candidate location for two new lower Alluvial Aquifer extraction wells, which will be presented to ADEM for approval in September 2023.

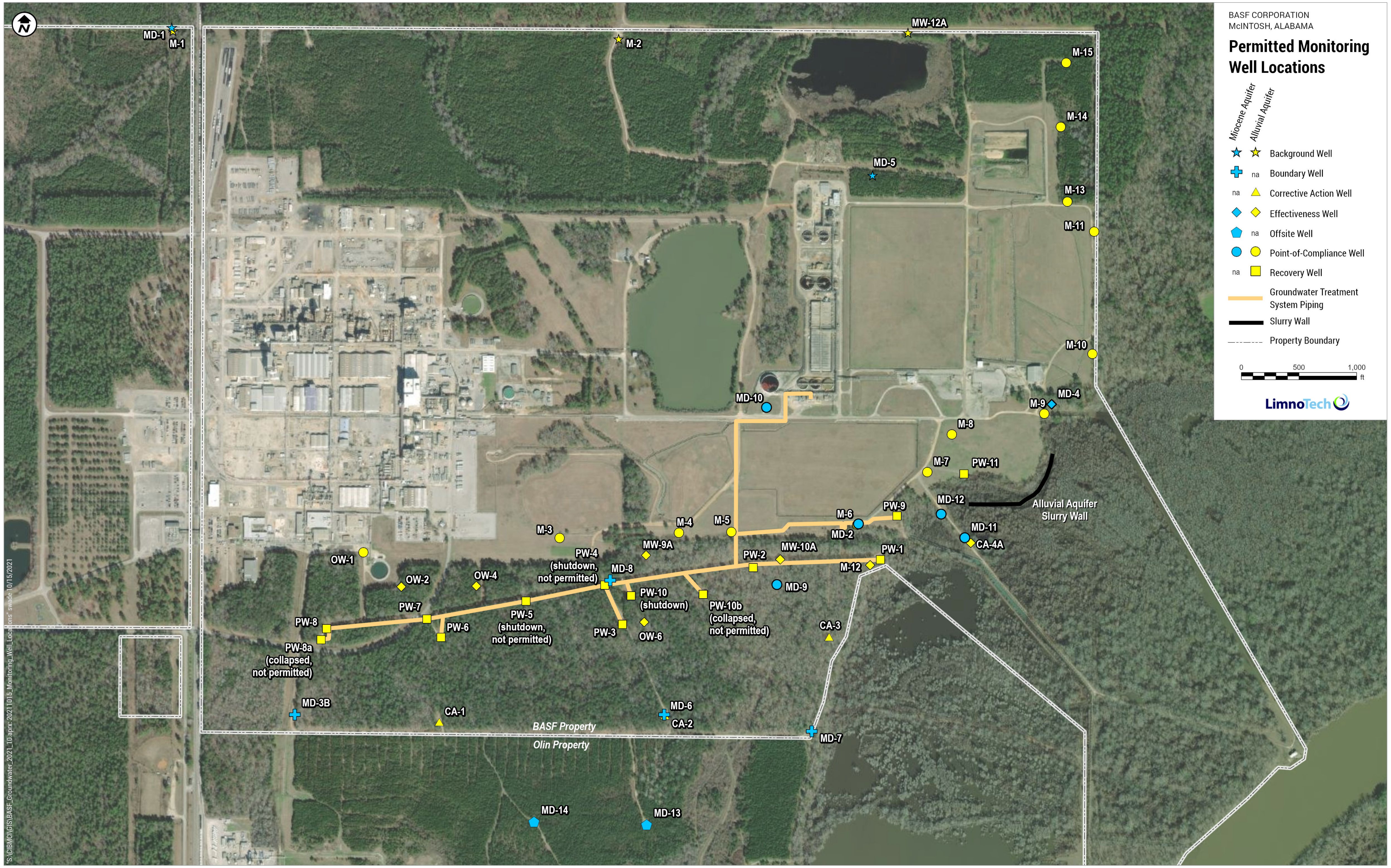

Figure L-2a. Location Map of RCRA Permitted Monitoring and Extraction Wells

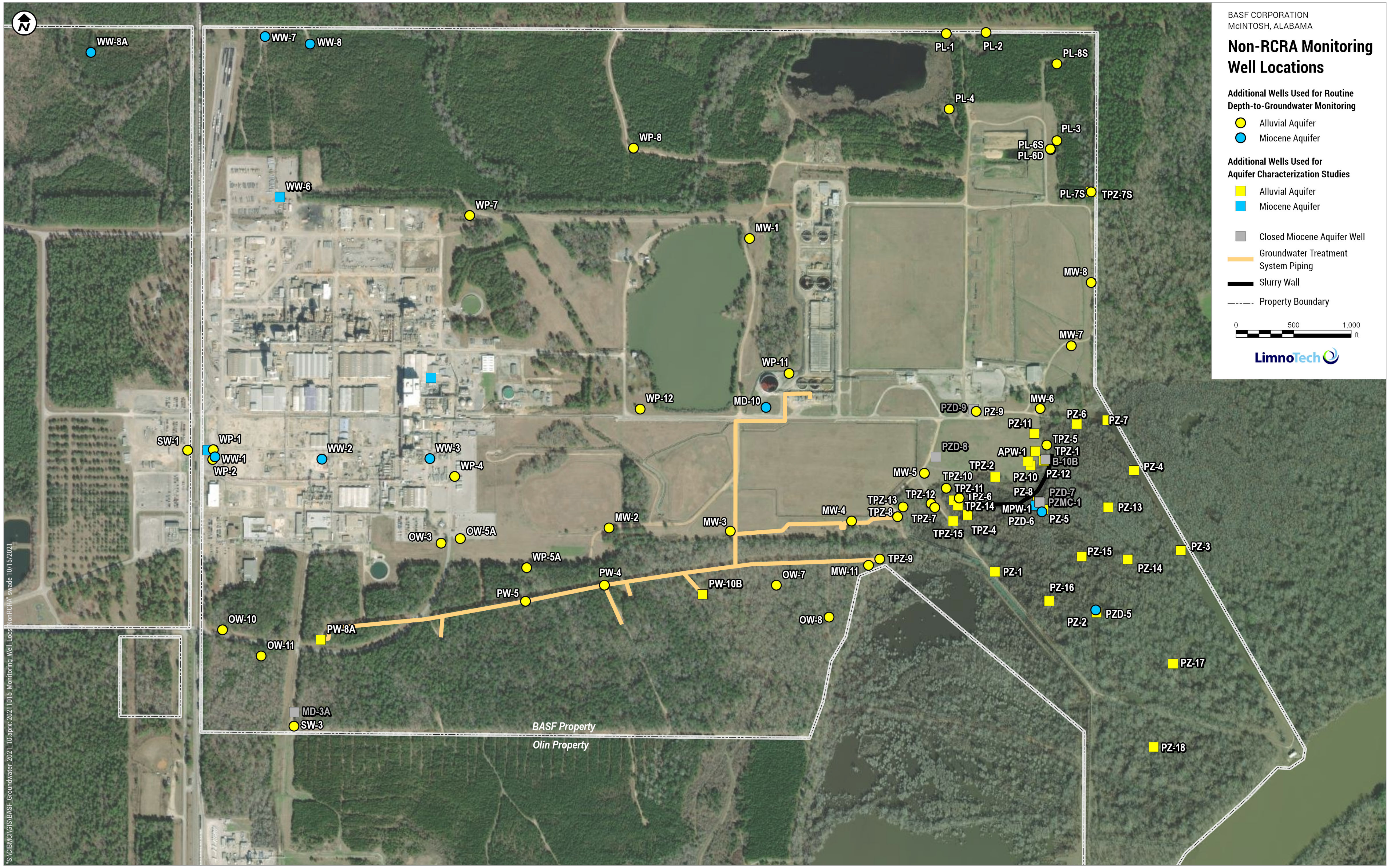

Figure L-2b. Location Map of Non-Permitted Monitoring Wells

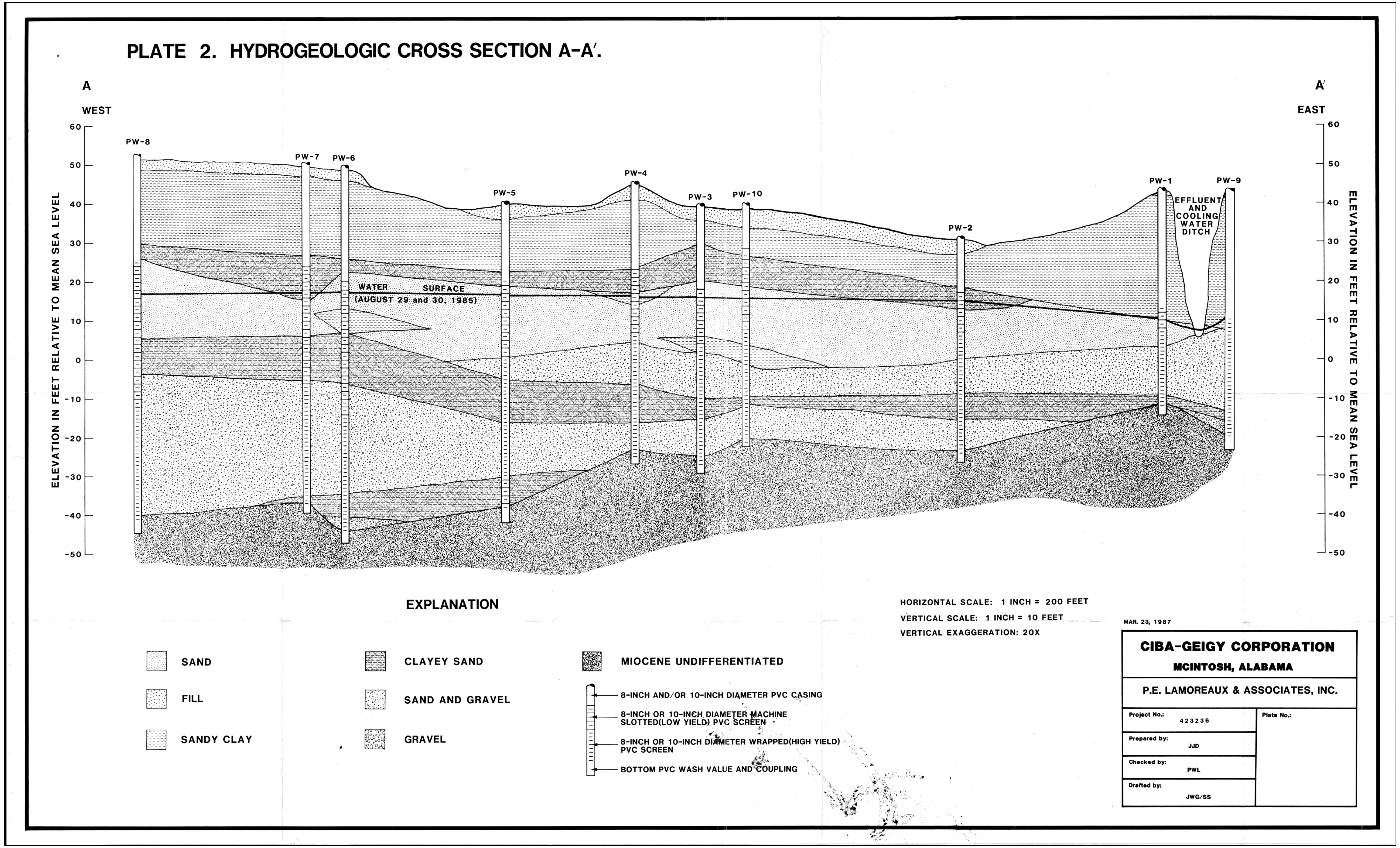

Figure L-3. West-East Geologic Profile of Original Alluvial Aquifer Groundwater Extraction System Wells (PELA, 1989)

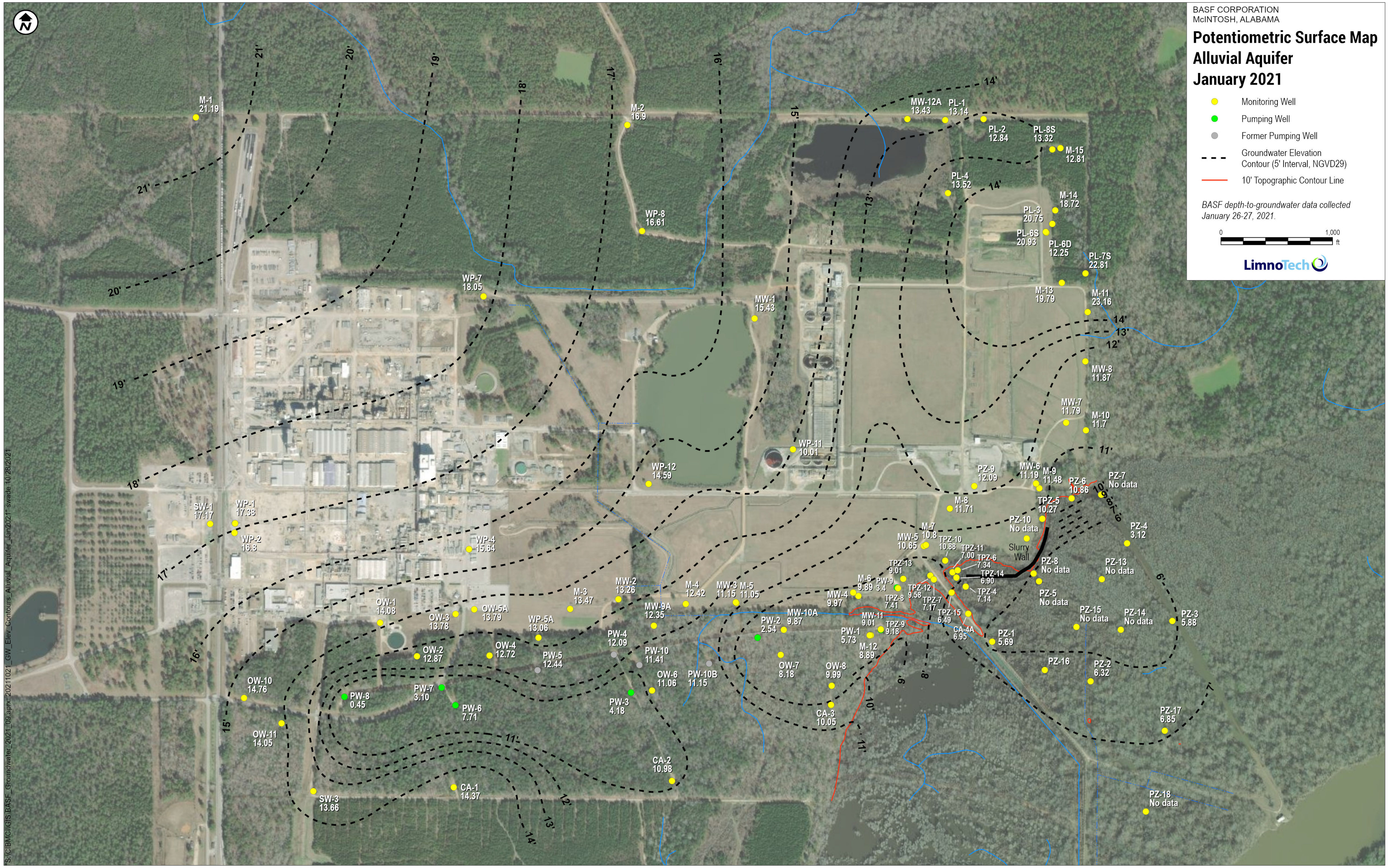

Figure L-4a. January 2021 Potentiometric Surface Map (Alluvial Aquifer)

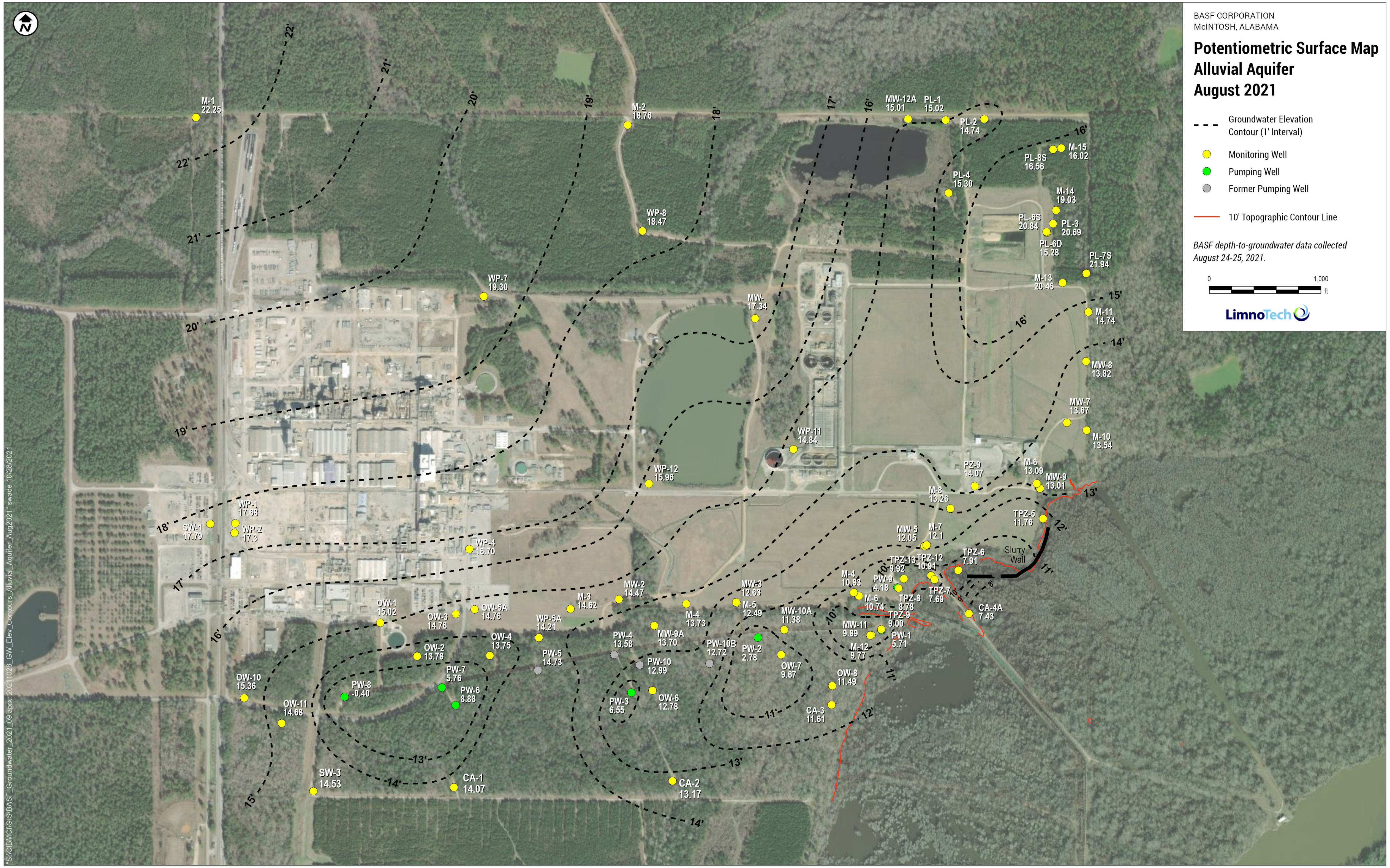

Figure L-4b. August 2021 Potentiometric Surface Map (Alluvial Aquifer)

Figure L-5a. January 2021 Potentiometric Surface Map (Upper Miocene Aquifer)

Figure L-5b. August 2021 Potentiometric Surface Map (Upper Miocene Aquifer)

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3.3 Upper Miocene Aquifer Source Control and Related Remedial Measures

3.3.1 Historical Miocene Aquifer Source Control Measures and Extent and Distribution Investigations

A characterization program of the Upper Miocene Aquifer was initiated in late 2000 to refine preliminary information on groundwater flow patterns and potential sources of contamination identified in the aquifer. An earlier investigation was conducted to assess the occurrence of chlorobenzene in the Upper Miocene Aquifer (PELA, 1998). That initial assessment, using only on-site water level data, concluded that pumping of Ciba plant production wells controlled the local flow paths in the Miocene Aquifer, and that the principal direction of groundwater flow was toward the plant manufacturing area.

However, data collected and evaluated since that report was prepared do not support these conclusions and resulted in subsequent, expanded, hydrogeologic investigations of the Miocene Aquifer. The expanded investigation of the Upper Miocene Aquifer was designed to produce a viable conceptual model, which would explain the hydrogeological data for the site and surrounding areas and provide a foundation for Corrective Action efforts (Ciba, May 2002). This investigation consisted of the following three sequential elements:

- Compiling a database of stratigraphy, water level and water quality on a local and regional scale.
- Conducting a field program to fill data gaps important to the interpretation of groundwater flow and contaminant transport dynamics.
- Computer modeling of groundwater flow and contaminant transport to corroborate the data-driven site conceptual model and for use as predictive tools.

The important attributes of the 2002 conceptual model relevant to the Corrective Action included the following observations and conclusions:

- The major component of contaminant mass flux to the Upper Miocene Aquifer is represented by leaky monitor wells that penetrated the Miocene clay in the bluff line area. Five wells (B-10B, PZD-7, PZD-8, PZD-9 and PZMC-1) that were installed between October 1989 and October 1990 are thought to represent the temporal origin of source. Consequently, as proposed in the 2006 Permit renewal, these wells were abandoned in November 2008 to eliminate mass flux from the Alluvial Aquifer to the Miocene Aquifer.

- Historical groundwater flow patterns in the Upper Miocene Aquifer have been heavily influenced by the Olin Corporation production center, as depicted in Figures L-5 a and b. Note that the January and August 2021 Miocene Aquifer potentiometric surfaces depicted in Figures L-5 a and b are consistent with ”typical” groundwater elevations modeled from 1989 through June 1995 pumping conditions (Figure 8 in CIBA, May 2002).[4]

- The potentiometric surface of the Upper Miocene Aquifer is sensitive to pumping rate. While the aquifer will rebound as production is reduced, excessive long-term draw down may induce salt-water intrusion.

- The extent and distribution of impacts detected in Miocene Aquifer groundwater correlates well with the conceptual model of source location, groundwater flow and time of release.

Source control and related measures for the Upper Miocene Aquifer were conducted from June 2007 through November 2008 as proposed in the 2005 Permit Renewal. These activities were based on the results of the assessment of groundwater flow and contaminant transport in the aquifer, as well as an evaluation of relevant Corrective Action alternatives (Ciba, 2002). The purpose of the source control measures proposed in the January 31, 2006 Permit was to reduce the mass flux of the site-related COCs to the Upper Miocene Aquifer such that the measurable concentrations across the site meet the performance standard established for each constituent. Source control activities were conducted in a stepwise manner, involving three components:

- In May-June 2007, a conservative non-toxic tracer (lithium) was injected into the Upper Miocene Aquifer at wells PZD-7, PZD-8, PZD-9, PZMC-1 and B10-B, to develop information on flow paths and dispersion. Lithium tracer was injected into each well at quantities assumed to be sufficient for detection at downgradient wells MD-11 and MD-12[5] and to identify the first arrival time. The details for tracer injection were provided in the Underground Injection Control (UIC) permit. Samples were collected from wells

[4] CIBA/BASF production wells WW-1 and WW-2 were removed from monitoring requirements with the 2006 permit. These wells had been added to the permit for groundwater monitoring when information indicated they influenced the contamination hydraulics in the Miocene Aquifer; however, COCs had not been detected in either well. Subsequent investigations indicated that the site production wells did not significantly influence flow paths, which instead are dominated by groundwater withdrawal on the adjacent Olin production site.

[5] Monitoring wells MD-11 and MD-12 were installed by SES and CH2M Hill on behalf of CIBA/BASF in December 2006 and June 2008, respectively, to evaluate the effectiveness of the proposed corrective action in the Upper Miocene Aquifer (i.e., well abandonment described above). Well installation reports are provided in "Report on Installation of Miocene Well MD-11 (SES, January 2007) and Installation of Miocene Aquifer Well MD-12 (CH2M Hill, June 25, 2008).

MD-11 and MD-12 and analyzed for lithium to assess dispersion within the aquifer. Although laboratory studies on the sensitivity and accuracy of the detection procedure were conducted prior to the determination of the injection amount, lithium was not detected in groundwater samples collected from MD-11 and MD-12.

- Select Miocene Aquifer monitoring wells scheduled for abandonment (B10-B, PZD-7, PZD-8, PZD-9 and PZMC-1, (refer to Figure 2b) were injected with a chemical oxidant to remediate localized chlorobenzene in Upper Miocene groundwater. CH2M Hill conducted the field activities on behalf of CIBA/BASF, which took place during two field mobilizations in June 2007 and September 2008. During the June 2007 injection program, hydrogen peroxide was injected into wells PZD-8 and B10-B. Due to the resulting excessive exothermic reactions in both wells, CH2M Hill was unable to complete the hydrogen peroxide injections as planned. Based on subsequent analyses of Miocene Aquifer groundwater samples, CH2M Hill concluded that the excessive off-gassing observed in B10-B and PZD-8 most likely resulted from the interaction of the injected peroxide with naturally occurring chemical species present in the soil matrix, such as naturally occurring minerals or organic compounds (i.e., humic acids or other soil organic matter). CH2M Hill concluded from a down-hole camera survey that the observed exothermic reaction was not caused by the accumulation of sediment, mineral deposits or organic matter inside PZD-8. CH2M Hill also concluded that neither the groundwater nor the lithium tracer were the catalyst for the exothermic reactions noted during the June 2007 field activities.

  Based on the results of the June 2007 injection program, CH2M Hill recommended the injection of an alternative reactive material (unactivated sodium persulfate) into PZD-7, PZD-9, PZMC-1 and B10-B, prior to their abandonment. Approximately 2600 gal, 1620 gal, 400 gal and 250 gal of 10% sodium persulfate solution were injected into the wells, respectively, during the week of September 8 through 11, 2008 (CIBA, October 1, 2008). During these injections, no adverse reactions or abnormal situations were observed (CIBA, October 1, 2008).

- Miocene Aquifer piezometers PZD-7, PZD-8, PZD-9, B10-B and PZMC-1(refer to Figure 2b) were abandoned by CH2M Hill on behalf of BASF in November 2008 because investigations concluded that improper construction of these wells likely was resulting in cross-contamination from the Alluvial Aquifer to the Miocene Aquifer. A Technical Memorandum documenting the well abandonment procedures was provided to ADEM in

December 2008 ("Abandonment of Bluff Line Area Monitoring Wells at the Ciba Corporation facility in McIntosh, Alabama", CH2M Hill, December 18, 2008).

- Monitoring well MD-3A (refer to Figure 2b) was abandoned in November 2008 because the screen location provided potentially suspect hydraulic and water quality data since its installation in the Miocene Aquifer in 1984. Well MD-3B was installed as a replacement in June 2001. A Technical Memorandum documenting the well abandonment procedures was provided to ADEM in December 2008 (CH2M Hill, December 18, 2008).

Activities conducted per the October 2011 RCRA Permit included expansion of the groundwater monitoring system and additional supplemental investigations of well MD-3B, as summarized below:

- Two vertically profiled offsite Miocene Aquifer monitoring wells (MD-13 and MD-14) were installed in accordance with Section III.B.1.e. of the October 2011 RCRA Permit. These wells were monitored on a quarterly basis for two years to establish baseline conditions, and have been monitored semi-annually starting July 2014. The data from these wells consistently indicate that contaminants of concern are not migrating offsite in Miocene Aquifer groundwater at concentrations at or above groundwater protection standards, with the exception of infrequent, low level detections of a vanadium and 1,2-diphenylhydrazine during the July 2017 through July 2021 monitoring period.

- Chlorobenzene concentrations in groundwater samples from Upper Miocene Aquifer Boundary well MD-3B have been detected in excess of the 0.100 mg/l GWPS since June 2009, but unexpectedly increased in January 2013 after appearing to reach a plateau since approximately April 2010. In April 2013, BASF requested a suspension of permitted groundwater quality sampling activities until the integrity of MD-3B could be determined (April 19, 2013 letter to Sonja Favors, ADEM). Borehole geophysical logging and video logging were conducted in MD-3B in late May 2013, but did not demonstrate any obvious compromise of the well casing. Screening level sampling with Passive Diffusion Bags (PDBs) set at various depths throughout the well screen and casing interval was conducted in September 2013 to assess the vertical distribution of VOC impacts. The results showed no impacts above the well screen interval, and a fairly uniform distribution of chlorobenzene throughout the 20 ft screen interval. Consequently, BASF resumed semi-annual and annual sampling of MD-3B in January 2014. Since then, chlorobenzene concentrations in MD-3B have ranged from 0.44 mg/l in July 2018 to 1.2 mg/l in July 2021.

3.3.2 Miocene Aquifer Investigations Conducted Since the Last Permit was Issued

Activities conducted during the May 2017 permit was issued included additional supplemental investigations of potential sources of Miocene Aquifer impacts, as described below:

- Well MD-3B is in close proximity to former well MD-3A (i.e., within 15 feet), which was abandoned in late 2008. The MD-3B chlorobenzene trend may result from one or more influences, including the late 2008 disturbance at MD-3A due to well abandonment activities, and/or the June and September 2007 in-situ chemical oxidation injections conducted in PZD-7, PZD-8, PZD-9, B10-B and PZMC-1 prior to their abandonment in late 2008. BASF also has been investigating the potential of Miocene groundwater impacts from carrydown during extent and distribution investigations of the OU2 and OU4 areas in the mid- to late-1990's.

- A plan for onsite investigations of possible sources to chlorobenzene impacts at Miocene Boundary well MD-3B was developed and submitted to ADEM for review (LimnoTech, 9-May-2018). ADEM approved the work plan on June 13, 2018 and field activities were implemented in early 2019, which included the installation, logging and sampling of four vertically profiled borings to depths of 220 feet to 250 feet below grade. The investigation results showed no clear indication of a significant chlorobenzene plume emanating from the former OU2 former Original Effluent Impoundment (remediated Area 1) or the former Waste Disposal Pit (remediated Area 2) that would account for current impacts detected at Miocene well MD-3B. The results were reported to ADEM in early January 2020 (LimnoTech, January 2, 2020).

- In its September 26, 2022 approval letter to the 2021 OU1 Comprehensive Annual Report, ADEM requested that BASF provide a schedule for Miocene investigation work activities near well MD-3B within 30 days of receipt of the letter. In BASF's October 21, 2022 response letter, the following tasks were proposed:

    - Continue monitoring site groundwater level fluctuations and Miocene groundwater flow direction relative to Olin production supply changes, including routine semi-annual depth to groundwater monitoring as required per the RCRA permit.

- Conduct Alluvial Aquifer source investigations near the former/closed monitoring well MD-3A location, consisting of vertical aquifer sampling (VAS) for VOC data at up to 5 locations, to determine if sufficient concentrations of chlorobenzene are present in the Alluvial Aquifer to account for impacts detected at MD-3B via a possible pathway at the former/closed MD-3A location.

- Supplement the 2019 Miocene VAS source investigation with one additional VAS boring located between extraction well PW-7 and MD-3B. Both the Alluvial and Miocene Aquifers would be vertically profiled for VOC data to further assess possible Miocene groundwater impacts associated with DNAPL that was detected in late 1990 at the PW-7 location.

- Submit a Work Plan for these Miocene investigation activities by November 23, 2022. Following ADEM approval, BASF would complete the associated fieldwork within 90 days and submit the findings within 60 days of receiving final laboratory reports.

* On November 17, 2022, BASF submitted a Work Plan to ADEM regarding the above activities. ADEM provided an approval letter to the Work Plan on February 22, 2023.

* Field activities were initiated by BASF during the last week of April 2023 and were completed on June 9, 2023. These activities included:

  - Proactive installation of pressure transducers in Miocene water supply wells WW-1, WW-2, WW-7 and WW-8, and Miocene monitoring wells MD-3B, MD-13 and MD-14 to continuously monitor groundwater levels and capture zones created by the BASF supply wells.

  - Installation of six vertically profiled Alluvial Aquifer temporary borings located downgradient of extraction wells PW-7 and PW-8 and upgradient of MD-3B. Groundwater samples were collected throughout the Alluvial Aquifer interval at 10 ft increments and were analyzed for select VOCs, SVOCs, pesticides and metals. In addition, a soil sample was collected from the top of the Miocene clay in each boring, and evaluated for the same list of analytes. During the boring installations, the soil cores were physically characterized to determine the presence of DNAPL from visual inspection, PID readings and field screening level testing with a hydrophobic dye based on PID and visual observations.

- Installation of one vertically profiled Miocene Aquifer temporary boring located downgradient of extraction wells PW-7 and PW-8 and upgradient of MD-3B. The Upper Miocene Aquifer was sampled at 10 ft increments to a depth of 250 ft below grade and groundwater samples were analyzed for select VOCs, SVOCs, pesticides and metals. Soil cores were physically characterized to determine the presence of DNAPL from visual inspection, PID readings and field screening level testing with a hydrophobic dye based on PID and visual observations.

- BASF currently is reviewing the 2023 investigation data for completeness and quality, and evaluating the data to assess the extent and distribution of Alluvial and Miocene Aquifer groundwater impacts relative to MD-3B. A report will be submitted in early September 2023, consistent with the 60-day timeframe in the approved November 2022 Work Plan. However, initial data evaluations show the following:

  - Upper Miocene Aquifer: Low concentrations of chlorobenzene (0.0012 mg/l to 0.011 mg/l) and chloroform (0.0015 mg/l to 0.010 mg/l) are distributed throughout the Upper Miocene Aquifer sampling interval (210 ft to 250 ft), that are comparable to those detected during the 2019 Miocene groundwater investigation. Strontium also was detected in all Upper Miocene groundwater samples, at concentrations that exceeded the 0.12 mg/l GWPS (0.27 mg/l to 0.84 mg/l). Arsenic was the only other compound that was detected in the Upper Miocene groundwater samples, but all concentrations were below the 0.010 mg/l GWPS (0.0018 mg/l to 0.0082 mg/l). Arsenic was not detected above the 0.0012 mg/l MDL in the shallowest groundwater sample.

  - Alluvial Aquifer: DNAPL was not detected from visual, PID or hydrophobic dye field testing in any of the Alluvial core samples. Twenty-seven groundwater samples were collected. Strontium was detected in all groundwater samples, with exceedances in two samples (0.22 mg/l and 0.18 mg/l). Arsenic was detected in 10 samples, with no exceedances of the 0.010 mg/l GWPS. Vanadium was detected in 10 samples, with exceedances of the 0.0086 mg/l GWPS in two samples (0.010 mg/l and 0.031 mg/l). Pesticides were detected at the three borings located closest to PW-7 and PW-8, with exceedances of A-BHC, B-BHC, and 4,4'-DDD in the groundwater samples collected from the boring located closest to PW-7. Chlorobenzene was not detected in the Alluvial Aquifer interval in the deep Upper Miocene boring, and also was not detected in the two Alluvial borings located due north of MD-3B. Exceedances of the 0.100 mg/l GWPS for chlorobenzene occur in three samples from two boring locations. The highest chlorobenzene concentrations were detected in the samples from the three borings located closest to PW-7: 3.3 mg/l and 0.490 mg/l were detected in the two shallowest samples from the boring located closest to PW-7 and then deeper concentrations were below the GWPS this location. In the boring location further to the south, chlorobenzene was detected only in the deepest sample collected from just above the Miocene clay, at a concentration of 0.190 mg/l. Benzene, 1,4-dichlorobenzene, carbon tetrachloride, naphthalene and nitrobenzene also were detected above GWPS in a few samples.

- BASF proposes to conduct additional source area hydrogeologic evaluations north and west of the PW-7 and PW-8 corridor following review of the 2023 investigation data to support siting of two new Alluvial Aquifer extraction wells, expected to be located north of PW-7. PW-7 currently accounts for over 95% of system mass removal of chlorobenzene, and DNAPL was observed in this well in the 1990s.

3.4 Monitoring Systems: Assessment of Nature and Extent of Groundwater Contamination

CIBA/BASF has evaluated the nature and extent of contamination in Alluvial Aquifer and Upper Miocene Aquifer groundwater since the early 1980's with an extensive system of monitoring wells and piezometers. This section provides summaries of:

- The Alluvial Aquifer and Miocene Aquifer site monitoring systems used for the Corrective Action Groundwater Monitoring Plan (Monitoring Plan).
- Current monitoring programs for the Alluvial and Miocene Aquifers.
- Nature and extent of groundwater contamination in the Alluvial and Upper Miocene Aquifers.

Well location and construction information is provided in Attachment C.

3.4.1 Alluvial Aquifer Monitoring System

The Monitoring Plan for the Alluvial Aquifer has served to characterize groundwater quality and provide a substantial database of analytical information for the McIntosh Site. Groundwater data has been collected regularly at select Point-of-Compliance monitoring wells, Background monitoring wells, Corrective Action monitoring wells, Effectiveness monitoring wells and select Pumping (Recovery) wells. The Corrective Action well network for the Alluvial Aquifer is depicted in Figure L-2a and includes:

- Three Upgradient (i.e., Background) monitoring wells M-1, M-2 and MW-12A. These are post-closure monitoring wells as described in Section III.B of Appendix K to the RCRA Permit. These wells are sampled annually on a rotational basis (i.e., each well is sampled once every three years).
- Point-of-Compliance monitoring wells M-3, M-4, M-6, and M-7 which are used for depth to groundwater and water quality monitoring, and wells OW-1, M-5, M-8, M-9, M-10, M-11, M-13, M-14 and M-15, which are used for depth to groundwater monitoring only. Note: these wells are listed in Section III.B of Appendix K (Post Closure Plan) to the RCRA Permit as post closure monitoring wells for those facilities listed in Section II of Appendix K, which will be closed during final closure, but includes facilities closed during interim status, partial closures as described in the Closure Plan, Section V., and final closure of individual units prior to final closure of the TSDF. Point-of-Compliance wells are in close proximity to a SWMU or can be used for sitewide monitoring.
- Recovery wells PW-1, PW-2, PW-3, PW-6, PW-7, PW-8, and PW-9[6], which are used for extraction of impacted shallow Alluvial

[6] Per the September 2014 request to ADEM, PW10 was shut down on October 15, 2014 and is used as a backup well to PW-3.

Aquifer groundwater downgradient of remediated areas and SWMUs.

- Interim Action Recovery well PW-11, which was installed in June 2019 and was designed to extract impacted bluffline-area deep Alluvial Aquifer groundwater that is not hydraulically connected to the original shallow Alluvial Aquifer groundwater extraction system. However, PW-11 demonstrates excessive drawdown when pumped above 2 gpm and does not provide a capture zone that reverses groundwater flow at downgradient effectiveness monitoring well CA-4A.

- Effectiveness monitoring wells OW-2, OW-4, OW-6, M-12, MW-9A, MW-10A and CA-4A, which are used to evaluate the effectiveness of the site remedies.

- Corrective Action[7] monitoring wells CA-1, CA-2 and CA-3 (located downgradient of Point-of-Compliance wells and Effectiveness wells.

Figure 2b shows the locations of additional non-permitted Alluvial Aquifer monitoring wells that have been used for various site investigations. These supplemental wells have been used for several aquifer characterization studies (i.e., pumping tests) and/or for routine depth to groundwater monitoring and/or voluntary groundwater quality monitoring (i.e., PZ-2 and PZ-15).

3.4.2 Miocene Aquifer Monitoring System

In accordance with the Corrective Action Monitoring Plan (Attachment B to this Appendix), groundwater data have been collected from the Miocene Aquifer on a regular basis from Point-of-Compliance monitoring wells, Boundary monitoring wells, Effectiveness monitoring wells, upgradient (i.e., Background) monitoring wells and offsite wells. The Corrective Action well network for the Miocene aquifer is depicted in Figures L-2a, 5a and 5b and includes:

- Point-of-Compliance monitoring wells MD-2, MD-9, MD-11 and MD-12.

- Boundary monitoring wells MD-3B, MD-6, MD-7 and MD-8.

- Effectiveness monitoring well MD-4.

- Background monitoring wells MD-1 and MD-5.

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[7] “Corrective Action” is a site-specific monitoring well designation and does not have a regulatory significance.

- Off-site wells MD-13 and MD-14.

Figure 2b shows the locations of additional non-RCRA-permitted Miocene Aquifer monitoring wells that have been used for various site investigations. These supplemental wells have been used for several aquifer characterization studies (i.e., pumping tests) and/or for routine depth to groundwater monitoring.

3.4.3 Monitoring Programs for Alluvial and Miocene Aquifers

The analytical program for Alluvial Aquifer Point-of-Compliance monitoring wells has included quarterly sampling and analysis for the Groundwater Protection Standard constituents, then semi-annual sampling beginning in 1998. In accordance with the RCRA permit modifications, the three background wells for the Alluvial Aquifer are sampled annually on a rotational basis for water quality data, and both Miocene Aquifer background wells are sampled annually. In addition, an expanded list of groundwater parameters is analyzed once every five years, concurrent with the annual sampling event. Compounds and wells that were sampled for the Alluvial Aquifer events from 1997 through 2021 are summarized in Attachment D.

The analytical program for Miocene Aquifer Point-of-Compliance monitoring wells has included quarterly sampling and analysis for the Groundwater Protection Standard constituents, and semi-annual sampling beginning in 2006. Additional quarterly sampling was conducted from April 2012 through April 2014 at the two offsite monitoring wells that were installed in March 2012 (MD-13 and MD-14). In addition, once every five years (concurrent with the annual sampling event) all permitted monitoring wells are sampled for an expanded list of groundwater parameters. Compounds and wells analyzed during the Miocene Aquifer sampling events conducted since 1996 are provided in Attachment D.

3.4.4 Nature and Extent of Groundwater Contamination in Alluvial Aquifer

As summarized in Tables L-2 and L-3, up to 197 Alluvial Aquifer groundwater samples were collected per analyte since the last Permit renewal, and were analyzed at least annually for 3 metals/inorganic compounds, 10 pesticide compounds, 8 volatile organic compounds (VOCs) and 4 semi-volatile organic compound (SVOCs). A subset of this list is analyzed semi-annually. A 5-year sampling event was conducted in July 2020, which included an additional 6 metals, 9 VOCs and 2 SVOCs. Tables L-2 and L-3 show the sampling frequency for each compound.

The organic and inorganic constituents **detected** in Alluvial Aquifer groundwater are summarized in Tables L-2 and L-3 for samples collected since the last permit renewal (July 2017 through July 2021 samples). The types of routinely monitored constituents that were **detected** in these samples include:

- Ten metals and cyanide.
- Nine manufactured organochlorine pesticides.
- Nine VOCs.
- Five SVOCs.

Exceedances of Maximum Contaminant Levels/groundwater protection criteria (MCLs/GWPS) occurred for a subset of all permitted compounds detected in Alluvial Aquifer groundwater samples collected from July 2017 through July 2021 (refer to Tables L-2 and L-3), including:

- Four metals - arsenic, vanadium, lead (only 2 exceedances), and cobalt (only 1 exceedance).
- Nine pesticides - Aldrin (only 1 exceedance), Alpha-BHC, Beta-BHC, Delta-BHC, Gamma-BHC (Lindane), 4,4'-DDT, 4,4'-DDD, 4,4'-DDE and chlorobenzilate (only 3 exceedances).
- Eight VOCS – chlorobenzene, carbon tetrachloride, benzene, chloroform (only 1 exceedance), 1,4-dichlorobenzene (only 1 exceednace), 1,1,-dichloroethylene, 1,2,4-trimethylbenzene, and vinyl choroide.
- Five SVOCs – 2-chlorophenol, naphthalene, 1,2-diphenylhydrazine, nitrobenzene and bis(2-ethylhexyl) phthalate.

Exceedances of GWPS in Alluvial Aquifer groundwater samples collected from July 2017 through July 2021 occurred **most frequently** for **two metals, three pesticides, and four VOCs**, as summarized below:

- **Arsenic (analyzed semi-annually):** 89 exceedances out of 158 detections from 196 samples, with a maximum detected concentration of 0.13 mg/l in a sample collected from OW-6 (GWPS = 0.010 mg/l). Arsenic was detected above the GWPS at 19 out of 28 total sampling locations.
- **Vanadium (analyzed semi-annually)**: 33 exceedances out of 55 detections from 132 samples, with a maximum detected concentration of 0.10 mg/l in a voluntary sample collected from

PW-11 (GWPS = 0.0036 mg/l). Vanadium was detected above the GWPS at 13 out of 28 total sampling locations.

- **Alpha-BHC (analyzed semi-annually)**: 76 exceedances out of 94 detections in 196 samples. Alpha-BHC was detected above the GWPS at 14 out of 28 total sampling locations.

- **Delta-BHC (analyzed semi-annually)**: 50 exceedances of the method detection limit (MDL) out of 50 detections in 196 samples (MDL is typically 0.0000046 mg/l). Delta-BHC was detected above the MDL at 12 out of 28 total sampling locations.

- **Beta-BHC (analyzed semi-annually)**: 72 exceedances out of 105 detections from 196 samples. Beta-BHC was detected above the GWPS at 17 out of 28 total sampling locations.

- **Chlorobenzene (analyzed semi-annually)**: 29 exceedances out of 86 detections from 197 samples, with a maximum detected concentration of 3.9 mg/l in a sample collected from CA-4A (GWPS=0.100 mg/l). Chlorobenzene was detected above the GWPS at 7 out of 28 total sampling locations.

- **Carbon tetrachloride (analyzed semi-annually)**: 26 exceedances out of 43 detections from 197 samples, with a maximum detected concentration of 0.081 mg/l in a sample collected from PW-8 (GWPS=0.005 mg/l). Carbon tetrachloride was detected above the GWPS at 6 out of 28 total sampling locations.

- **Benzene (analyzed semi-annually)**: 21 exceedances out of 53 detections from 197 samples, with a maximum detected concentration of 0.24 mg/l in a voluntary sample collected from PW-11 (GWPS=0.005 mg/l). Benzene was detected above the GWPS at 5 out of 28 total sampling locations.

- **Bis(2-ethylhexyl)phthalate (analyzed every 5-years)**: 21 exceedances out of 22 detections for 29 samples, with a maximum detected concentration of 0.095 mg/l in a sample collected from M-7 (GWPS=0.006 mg/l). Bis(2-ethylhexyl) phthalate was detected above the GWPS at 19 out of 27 total sampling locations. This compound was monitored only once every 5 years because it is a common laboratory contaminant and is prevalent in the environment due to its use in plastics such as PVC.

Table L-2 provides a summary of the number of July 2017 through July 2021 detections (highlighted in green) and exceedances (highlighted in yellow) by compound for the five permit well classifications, in order of upgradient to downgradient position relative to closed areas and remediated areas (refer to Figure L-2a):

- Background wells are upgradient of both closed and remediated areas.
- Point-of-Compliance wells generally are located immediately downgradient of closed units and upgradient of the Former Dilute Ditch/Upstream Drainage Ditch corridor.
- Effectiveness monitoring wells are generally located downgradient of remediated OU2 and OU4 areas and are generally on the south side of the Former Dilute Ditch/Upstream Drainage Ditch corridor and/or are near recovery wells.
- Recovery Wells are located downgradient of both the closed and remediated areas.
- Corrective Action wells are located downgradient of the Alluvial Aquifer groundwater extraction system. Three are located along the BASF southern property boundary (CA-1, CA-2 and CA-3).

Table L-3 includes a summary of the number of July 2017 through July 2021 detections and exceedances at each Alluvial Aquifer sampling location. The extent and distribution of detected compounds and those detected most frequently in excess of GWPS indicates the following:

- Alpha-BHC, Beta-BHC, Delta-BHC, arsenic and vanadium appear to be the most ubiquitous in Alluvial Aquifer groundwater samples. Exceedances of the arsenic and vanadium GWPS occur in all five well classifications, including Background and Corrective Action wells.
- Background well samples collected from M-1, M-2 and MW-12A during the July 2020 5-year sampling event had detectable concentrations of bis(2-ethylhexyl)phthalate in excess of the 0.006 mg/l GWPS. Vanadium was detected once at a concentration above the GWPS in the M-2 well. Three samples collected from Background well MW-12A had concentrations of arsenic in excess of the 0.010 mg/l GWPS during the monitoring period. Of the three background monitoring wells, MW-12A is located furthest to the east.
- Detections of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT occurred in approximately 39%, 24% and 17%, respectively, of the 132 samples collected for each compound), and one or more of these

three compounds were detected in all five well categories, including Background wells and Corrective Action wells. Floodplain Effectiveness well CA-4A was the only well that did not have any detections of 4,4'-DDD, 4,4'-DDE or 4,4'-DDT during the July 2017 through July 2021 sampling period. Exceedances of the GWPS for 4,4'-DDD, 4,4'-DDE and 4,4'-DDT occurred in approximately 23%, 28% and 52%, respectively, of the samples with detected concentrations of these compounds, and only in uplands Effectiveness well OW-2 and Recovery wells PW-1 and PW-7.

- Benzene, carbon tetrachloride and chlorobenzene were detected above GWPS in samples collected from Recovery and uplands Effectiveness monitoring well locations, and at floodplain Effectiveness well (CA-4A) for benzene and chlorobenzene. Well CA-4A is located off the extreme eastern side of the collection system, southeast PW-9, east of PW-1, and south of the western end of the slurry wall. Exceedances of compounds detected in CA-4A groundwater samples are being addressed with the installation of deep Alluvial Aquifer bluffline extraction well PW-11.

- Four of the five SVOCs that were detected during the July 2017 through July 2021 sampling period were detected relatively infrequently and at only a few locations, and with generally infrequent exceedances of the GWPS as summarized below:

  - **2-Chlorobenzene (analyzed annually).** 7 exceedances out of 18 detections from 132 samples, with a maximum detected concentration of 0.031 mg/l in a sample collected from CA-4A (GWPS=0.003 mg/l). 2-chlorophenol was detected above the GWPS at 2 of 28 total sampling locations (CA-4A and PW-7).

  - **Naphthalene (analyzed annually)**: 7 exceedances out of 11 detections from 132 samples, with a maximum detected concentration of 0.0018 mg/l in a sample collected from M-7 (GWPS=0.00062 mg/l). Naphthalene was detected above the GWPS at 4 out of 28 total sampling locations (M-7, CA-4A and voluntary bluffline/floodplain area wells PW-11 and PZ-15, all located downgradient of remediated areas).

  - **1,2-Diphenylhydrazine (analyzed annually)**: 24 exceedances out of 29 detections from 132 samples, with a maximum detected concentration of 0.021 mg/l in a sample collected from PW-11 (GWPS = 0.000084 mg/l). 1,2-Diphenylhydrazine was detected above the GWPS at 7 out of 28 total sampling locations (M-6, M-12, PW-1, PW-2, PW-9, voluntary well PW-11 and CA-4A, all located near the transition between the Upper and Lower ends of the Dilute/Effluent Ditch, where the bluffline transitions into floodplain).

- **Nitrobenzene (analyzed annually)**: 10 exceedances out of 17 detections from 132 samples, with a maximum detected concentration of 0.0029 mg/l in a sample collected from PW-7 (GWPS = 0.00034 mg/l). Nitrobenzene was detected above the GWPS at 3 out of 28 total sampling locations (PW-3, PW-6 and PW-7).

Time-trend graphs of relevant analytical data collected since 1987 depict changes in concentration versus time, and have been provided to ADEM in previous groundwater monitoring reports (submitted annually to ADEM). The graphs generally have shown substantial declines in Alluvial Aquifer constituent concentrations immediately following source control activities conducted in the late 1980's (i.e., landfill and surface impoundment closures). For most locations, the trend has gradually flattened and the data indicates generally minor, and sometimes seasonal, variation in constituent concentrations, characteristic of long-term groundwater remediation.

Time-trend graphs for seven most frequently detected compounds in Alluvial Aquifer groundwater samples collected since 2010 (arsenic, Alpha-BHC, Beta-BHC, Delta-BHC, chlorobenzene, carbon tetrachloride and benzene) are included as Attachment E. Maps of the July 2020 extent and distribution of compounds detected in Alluvial Aquifer groundwater at the site during the 5-Year sampling event are provided in Attachment F. The maps support the conclusions that the interceptor pumping well system is effectively containing contamination in shallow and deep Alluvial Aquifer groundwater located west of the bluffline area, and in shallow Alluvial Aquifer groundwater in the bluffline area.

Boring Logs and well construction diagrams are provided in Attachment G.

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Table L-2. Compounds Detected in Alluvial Aquifer Groundwater Samples from July 2017 through July 2021 by Permitted Well Group Classification.

PARAMETER	May 2017 Permit Sampling Frequency			BG Well Data (Jul-17 - Jan-21)			POC Well Data (Jul-17 - Jul-21)			Uplands Eff Well Data (Jul-17 - Jan-21)			CA-4A (Jul-17 - Jul-21)			CA1-CA3 Data (Jul-17 - Jul-21)			PW Data (Jul-17 - Jan-21)			PW-11 Data (Jul-19 - Jul-21)			Voluntary Floodplain Data (Jul-17 - Jul-21)			All Sampled Wells (Jul-17 - Jul-21)		
	Additional Analytes Every 5 Years	Annually	Semi-Annually	Total Samples	Total Detects	# Exceedances of GWPS	Total Samples	Total Detects	# Exceedances of GWPS	Total Samples	Total Detects	# Exceedances of GWPS	Total Samples	Total Detects	# Exceedances of GWPS	Total Samples	Total Detects	# Exceedances of GWPS	Total Samples	Total Detects	# Exceedances of GWPS	Total Samples	Total Detects	# Exceedances of GWPS	Total Samples	Total Detects	# Exceedances of GWPS	Total Samples	Total Detects	# Exceedances of GWPS
METALS (6020)																														
ARSENIC		x	x	8	3	3	40	32	13	60	45	38	9	9	7	30	25	5	38	33	19	5	5	1	6	6	3	196	158	89
LEAD		x		8	1	0	23	9	0	32	18	0	5	4	0	17	10	0	38	4	0	3	1	0	6	4	2	132	51	2
VANADIUM		x		8	1	1	23	15	9	32	12	6	5	5	5	17	3	1	38	20	7	3	3	3	6	6	1	132	65	33
BARIUM	x			3	3	0	5	5	0	6	6	0	1	1	0	4	4	0	7	7	0	1	1	0	2	0	0	29	27	0
CADMIUM	x			3	0	0	5	0	0	6	1	0	1	1	0	4	0	0	7	1	0	1	0	0	2	0	0	29	3	0
CHROMIUM	x			3	1	0	5	1	0	6	2	0	1	1	0	4	1	0	7	5	0	1	1	0	2	2	0	29	14	0
COBALT	x			3	3	0	5	5	0	6	6	1	1	0	0	4	4	0	7	7	0	1	0	0	2	2	0	29	27	1
STRONTIUM	x			3	3	0	5	5	0	6	6	0	1	1	0	4	4	0	7	7	0	1	1	0	2	2	0	29	29	0
THALLIUM	x			3	0	0	5	2	0	6	2	0	1	0	0	4	0	0	7	0	0	1	0	0	2	0	0	29	4	0
METALS (7470A)																														
Mercury^	x			3	0	0	5	0	0	6	2	0	1	0	0	4	1	0	7	1	0	1	0	0	2	0	0	29	4	0
GENERAL CHEMISTRY																														
Cyanide (Total)^	x			3	0	0	5	2	0	6	4	0	1	0	0	4	3	0	7	2	0	1	0	0	2	0	0	29	11	0
HERBICIDES/PESTICDES (8081B)																														
ALDRIN		x		8	0	0	23	1	0	32	0	0	5	0	0	17	0	0	38	0	0	3	0	0	6	1	1	132	2	1
ALPHA-BHC		x	x	8	0	0	40	24	17	60	39	33	9	0	0	30	0	0	38	31	26	5	0	0	6	0	0	196	94	76
BETA-BHC		x	x	8	0	0	40	27	19	60	45	32	9	3	1	30	0	0	38	28	20	5	1	0	6	1	0	196	105	72
DELTA-BHC		x	x	8	0	0	40	4	4	60	26	26	9	0	0	30	0	0	38	20	20	5	0	0	6	0	0	196	50	50
GAMMA-BHC (LINDANE)		x		8	0	0	23	11	0	32	8	4	5	0	0	17	0	0	38	23	0	3	0	0	6	0	0	132	42	4
4,4'-DDD		x		8	3	0	23	10	0	32	14	6	5	0	0	17	0	0	38	19	6	3	3	0	6	3	0	132	52	12
4,4'-DDE		x		8	0	0	23	2	0	32	9	6	5	0	0	17	1	0	38	17	3	3	0	0	6	3	0	132	32	9
4,4'-DDT		x		8	1	0	23	2	0	32	7	6	5	0	0	17	3	0	38	10	6	3	0	0	6	0	0	132	23	12
DIELDRIN		x		8	0	0	23	0	0	32	0	0	5	0	0	17	0	0	38	0	0	3	0	0	6	0	0	132	0	0
CHLOROBENZILATE		x		8	0	0	23	0	0	32	0	0	5	0	0	17	0	0	38	1	1	3	2	2	6	0	0	132	3	3
VOCs (8260C)																														
BENZENE		x	x	8	0	0	40	0	0	60	7	1	9	9	8	30	1	0	38	28	7	5	5	5	7	3	0	197	53	21
CARBON TETRACHLORIDE		x	x	8	0	0	40	4	0	60	18	6	9	0	0	30	0	0	38	21	20	5	0	0	7	0	0	197	43	26
CHLOROBENZENE		x	x	8	0	0	40	5	0	60	27	2	9	9	9	30	0	0	38	34	11	5	5	5	7	6	2	197	86	29
CHLOROFORM		x		8	0	0	23	17	1	32	15	0	5	0	0	17	0	0	38	23	0	3	1	0	7	0	0	133	56	1
1,4-DICHLOROBENZENE		x		8	0	0	23	0	0	32	7	0	5	0	0	17	0	0	38	26	0	3	3	3	7	2	0	133	38	3
1,1-DICHLOROETHYLENE		x		8	0	0	23	5	2	32	0	0	5	0	0	17	0	0	38	6	0	3	1	1	7	0	0	133	12	3
1,2,4-TRIMETHYLBENZENE		x		8	0	0	23	0	0	32	0	0	5	0	0	17	0	0	38	5	5	3	2	2	7	0	0	133	7	7
VINYL CHLORIDE		x		8	0	0	23	0	0	32	0	0	5	0	0	17	0	0	38	6	1	3	3	3	7	1	0	133	10	4
1,2-DICHLOROBENZENE	x			3	0	0	5	0	0	6	1	0	1	0	0	4	0	0	7	3	0	1	1	0	2	0	0	29	5	0
ACETONE	x			3	0	0	5	0	0	6	0	0	1	0	0	4	0	0	7	0	0	1	0	0	2	0	0	29	0	0
CHLOROETHANE	x			3	0	0	5	0	0	6	0	0	1	0	0	4	0	0	7	0	0	1	0	0	2	0	0	29	0	0
CHLOROPRENE	x			3	0	0	5	0	0	6	0	0	1	0	0	4	0	0	7	0	0	1	0	0	2	0	0	29	0	0
TRICHLOROETHYLENE	x			3	0	0	5	0	0	6	0	0	1	0	0	4	0	0	7	0	0	1	0	0	2	0	0	29	0	0
DICHLOROMETHANE/METHYLENE CHLORIDE	x			3	0	0	5	0	0	6	0	0	1	0	0	4	0	0	7	0	0	1	0	0	2	0	0	29	0	0
SVOCs-8270D																														
2-CHLOROPHENOL		x		8	0	0	23	0	0	32	0	0	5	5	5	17	0	0	38	10	2	3	2	0	6	1	0	132	18	7
NAPHTHALENE		x		8	0	0	23	1	1	32	0	0	5	5	4	17	0	0	38	2	0	3	2	1	6	1	1	132	11	7
NITROBENZENE		x		8	0	0	23	3	0	32	1	0	5	0	0	17	0	0	38	13	10	3	0	0	6	0	0	132	17	10
1,2-DIPHENYLHYDRAZINE		x		8	0	0	23	6	4	32	5	4	5	4	4	17	0	0	38	12	10	3	2	2	6	0	0	132	29	24
ANILINE	x			3	0	0	5	0	0	6	0	0	1	0	0	4	0	0	7	0	0	1	0	0	2	0	0	29	0	0
3,4-BENZOFLUORANTHENE	x			3	0	0	5	0	0	6	0	0	1	0	0	4	0	0	7	0	0	1	0	0	2	0	0	29	0	0
BENZO(K)FLUORANTHENE	x			3	0	0	5	0	0	6	0	0	1	0	0	4	0	0	7	0	0	1	0	0	2	0	0	29	0	0
BIS(2-ETHYLHEXYL)PHTHALATE	x			3	3	3	5	5	5	6	6	6	1	1	1	4	4	4	7	1	1	1	0	0	2	2	1	29	22	21

Indicates compound was detected < GWPS.

Indicates compound was detected > GWPS.

Table L-3. List of Compounds Detected in Alluvial Aquifer Groundwater Samples from July 2017 through July 2021 by Permitted Well Location.

ALLUVIAL AQUIFER: July 2017 through July 2021 Data												Number of Samples With Exceedances of GWPS by Alluvial Aquifer Monitoring Well Location (July 2017 through July 2021 Data)																											
												Background Wells			Point-of-Compliance				Effectiveness Wells							Recovery/Extraction Wells									Corrective Action Wells			Voluntary	
Detected Compound	Recommended Sampling Frequency for 2021 Permit Renewal^	2017-2021 5-Year Analyte*	2017-2021 Annual Analyte*	2017-2021 Semi-Annual Analyte*	Count of All 2017-2021 Analyses	Count of 2017-2021 Detections	Count of 2017-2021 GWPS Exceedances	Maximum Detected 2017-2021 Concentration (mg/l)	2017 RCRA Permit GWPS (mg/l)	2022 RCRA Permit GWPS (mg/l) ^^	# Locations with Exceedances/ Total Locations Sampled (2017-2021)	M-1	M-2	MW-12A	M-3	M-4	M-6	M-7	OW-2	OW-4	OW-6	M-12	MW-9A	MW-10A	CA-4A	PW-1	PW-2	PW-3	PW-6	PW-7	PW-8	PW-9	PW-10	PW-11	CA-1	CA-2	CA-3	PZ-2	PZ-15
METALS (6020)																																							
ARSENIC	move to annual		x	x	196	158	89	0.13	0.010	0.010	19/28	0	0	3	6	0	7	0	1	0	9	8	10	10	7	5	5	5	0	0	0	3	1	1	1	4	0	1	2
LEAD	move to 5-Year		x		132	51	2	0.17	0.015	0.015	2/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
VANADIUM			x		132	65	33	0.10	0.0036	0.0086^^	13/28	0	1	0	6	1	2	0	0	0	1	0	0	5	5	3	2	0	0	0	0	2	0	3	0	1	0	0	1
BARIUM	move to HOLD	x			29	27	0	0.98	2	2																													
CADMIUM	move to HOLD	x			29	3	0	0.00049	0.005	0.005																													
CHROMIUM	move to HOLD	x			29	14	0	0.0053	0.1	0.1																													
COBALT		x			29	27	1	0.15	0.073	0.0006^^	1/27	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
STRONTIUM	move to HOLD	x			29	29	0	0.67	2.2	1.2^^																													
THALLIUM	move to HOLD	x			29	4	0	0.00059	0.002	0.002																													
METALS (7470A)																																							
MERCURY	move to HOLD	x			29	4	0	0.00049	0.002	0.002																													
GENERAL CHEMISTRY																																							
CYANIDE	move to HOLD	x			29	11	0	0.026	0.2	0.2																													
HERBICIDES/PESTICDES (8081B)																																							
ALDRIN	move to HOLD		x		132	2	1	0.000012	0.000004	0.000004	1/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
ALPHA-BHC			x	x	196	94	76	0.001	0.000011	0.0000072^^	14/28	0	0	0	5	9	4	0	0	9	8	2	5	8	0	5	5	4	4	4	4	0	0	0	0	0	0	0	0
BETA-BHC			x	x	196	105	72	0.0058	0.000037	0.000025^^	17/28	0	0	0	10	5	3	1	0	9	8	2	10	3	1	2	5	5	3	3	1	0	1	0	0	0	0	0	0
DELTA-BHC			x	x	196	50	50	0.031	MDL	MDL	12/28	0	0	0	3	1	0	0	0	10	2	4	2	8	0	0	1	5	5	4	5	0	0	0	0	0	0	0	0
GAMMA-BHC (LINDANE)	move to 5-Year		x		132	42	4	0.00056	0.0002	0.0002	1/28	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4,4'-DDE			x		132	52	12	0.0074	0.0002	0.0000063^^	3/28	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	1	0	0	5	0	0	0	0	0	0	0	0	0
4,4'-DDD			x		132	32	9	0.074	0.00028	0.000046^^	3/28	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0
4,4'-DDT			x		132	23	12	0.13	0.0002	0.00023^^	3/28	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	1	0	0	5	0	0	0	0	0	0	0	0	0
DIELDRIN	move to HOLD		x		132	0	0	0	0.0000042	0.0000042																													
CHLOROBENZILATE	move to 5-Year		x		132	3	3	0.0016	0.00025	0.00025	2/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0
VOCs (8260C)																																							
BENZENE			x	x	197	53	21	0.24	0.005	0.005	5/28	0	0	0	0	0	0	0	1	0	0	0	0	0	8	0	0	0	0	6	1	0	0	5	0	0	0	0	0
CARBON TETRACHLORIDE			x	x	197	43	26	0.081	0.005	0.005	6/28	0	0	0	0	0	0	0	2	4	0	0	0	0	0	0	0	4	5	6	5	0	0	0	0	0	0	0	0
CHLOROBENZENE			x	x	197	86	29	3.9	0.100	0.100	7/28	0	0	0	0	0	0	0	2	0	0	0	0	0	9	0	0	0	1	6	4	0	0	5	0	0	0	0	2
CHLOROFORM	move to 5-Year		x		133	56	1	0.14	0.08	0.08	1/23				0			1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1,4-DICHLOROBENZENE			x		133	38	3	0.13	0.075	0.075	1/23				0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
1,1-DICHLOROETHYLENE			x		133	12	3	0.062	0.007	0.007	2/28	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
1,2,4-TRIMETHYLBENZENE			x		133	7	7	0.042	0.0012	0.0012	2/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	2	0	0	0	0	0
VINYL CHLORIDE			x		133	10	4	0.064	0.002	0.002	2/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	0
1,2-DICHLOROBENZENE	move to HOLD	x			29	5	0	0.015	0.600	0.600																													
ACETONE	move to HOLD	x			29	0	0	0	0.55	0.55																													
CHLOROETHANE	move to HOLD	x			29	0	0	0	0.0046	0.0046																													
CHLOROPRENE	move to HOLD	x			29	0	0	0	MDL	MDL																													
TRICHLOROETHYLENE	move to HOLD	x			29	0	0	0	0.005	0.005																													
DICHLOROMETHANE	move to HOLD	x			29	0	0	0	0.005	0.005																													
SVOCs-8270D																																							
2-CHLOROPHENOL			x		132	18	7	0.031	0.0030	0.0030	2/28	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	2	0	0	0	0	0	0	0	0	0
NAPHTHALENE			x		132	11	7	0.0018	0.00062	0.00012^^	4/28	0	0	0	0	0	0	1	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	1
NITROBENZENE			x		132	17	10	0.0029	0.00034	0.00014^^	3/28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	6	0	0	0	0	0	0	0	0	0
1,2-DIPHENYLHYDRAZINE			x		132	29	24	0.021	0.000084	0.000078^^	7/28	0	0	0	0	0	4	0	0	0	0	4	0	0	4	1	4	0	0	0	0	5	0	2	0	0	0	0	0
ANILINE	move to HOLD	x			29	0	0	0	0.012	0.012																													
3,4-BENZOFLUORANTHENE	move to HOLD	x			29	0	0	0	0.000092	0.000092																													
BENZO(K)FLUORANTHENE	move to HOLD	x			29	0	0	0	0.00092	0.00092																													
BIS(2-ETHYLHEXYL)PHTHALATE		x			29	22	21	0.095	0.006	0.006	19/27	1	1	1	1	1	2	1	1	1	1	1	1	1	1	0	0	0	0	0	1	0		0	1	1	2	1	0
											Number of Analytes With Exceedances by Location:	1	2	2	6	5	6	5	8	7	6	6	5	6	9	5	10	6	6	12	7	4	2	11	2	3	1	3	6

Bold Font: Analyte detected >GWPS

* Sampling frequency per May 2017 RCRA Permit

^ Recommended sampling frequency for 2021/22 Renewal:

^^ GWPS are Tapwater values from the EPA Regional Screening Levels table. All other GWPS are MCLs unless otherwise noted

3.4.5 Nature and Extent of Groundwater Contamination in Miocene Aquifer

As summarized by location and permit classification group in Tables L-4 and L-5, up to 126 Miocene Aquifer groundwater samples were collected per analyte since the last Permit renewal, and were analyzed at least annually for 3 metals/inorganic compounds, 10 pesticide compounds, 8 volatile organic compounds (VOCs) and 4 semi-volatile organic compound (SVOC). The organic and inorganic constituents **detected** in Miocene Aquifer groundwater are summarized for samples collected since the last permit renewal (July 2017 through July 2021 samples – refer to Table L-4). The types of constituents **detected** in these samples include:

- Eight metals and cyanide.
- Six manufactured organochlorine pesticides.
- Five VOCs.
- Four SVOCs.

Exceedances of GWPS/MCL occurred for a subset of all constituents detected in Miocene Aquifer groundwater samples from July 2017 through July 2021 (refer to Table L-4), including:

- Three metals – arsenic, vanadium and strontium
- One pesticide –Delta-BHC
- Two VOCS – chlorobenzene and benzene
- Three SVOCs – naphthalene, 2-diphenylhydrazine and bis(2-ethylhexyl)phthalate.

The frequencies and locations of exceedances of GWPS/MCLs in Miocene Aquifer groundwater samples are described by constituent below:

- **Arsenic (analyzed semi-annually):** 8 exceedances out of 52 detections from 126 samples, with a maximum detected concentration of 0.030 mg/l (GWPS = 0.010 mg/l). Thel eight exceedances were detected in 3 of 13 sampling locations (MD-1, MD-3B and MD-8).
- **Vanadium (analyzed annually):** 8 exceedances out of 29 detections from 75 samples, with a maximum detected concentration of 0.010 mg/l (GWPS = 0.0036 mg/l). The eight

exceedances were detected at 4 of 13 sampling locations (MD-2, MD-3B, MD-11 and MD-14).

- **Strontium (analyzed every 5-years):** 2 exceedances out of 15 detections from 15 samples, with a maximum detected concentration of 3.8 mg/l (GWPS = 2.2 mg/l). Both exceedances were detected in samples collected from one of 13 sampling locations (MD-3B).

- **Delta-BHC (analyzed annually).** 7 exceedances out of 7 detections from 126 samples, with a maximum detected concentration of 0.0000065 mg/l (GWPS = MDL). The 7 exceedances were detected at 2 of 13 locations(MD-6 and MD-9).

- **Chlorobenzene (analyzed semi-annually)**: 52 exceedances out of 95 detections from 126 samples, with a maximum detected concentration of 2.1 mg/l at MD-11 (GWPS=0.100 mg/l). The 52 exceedances were detected in samples collected from 5 of 13 locations (MD-2, MD-11, MD-12, MD-3B and MD-7).

- **Benzene (analyzed semi-annually)**: 12 exceedances out of 33 detections from 126 samples, with a maximum detected concentration of 0.012 mg/l at MD-2 (GWPS = 0.005 mg/l). The 12 exceedance were detected at 2 of 13 locations (MD-2 and MD-12).

- **Naphthalene (analyzed annually)**: One exceedance out of 4 detections from 75 samples, with a maximum detected concentration of 0.0052 mg/l (GWPS=0.00063 mg/l). This exceedance occurred at 1 of 13 sampling locations (MD-12).

- **1,2-Diphenylhydrazine (analyzed annually).** Six exceedances out of 9 detections from 75 samples, with a maximum detected concentration of 0.00022 mg/l (GWPS=0.000084 mg/l). These exceedances occurred at 4 of 13 sampling locations (MD-1, MD-7, MD-9 and MD-14).

- **Bis(2-ethylhexly)phthalate (analyzed every 5-years):** 15 exceedances out of 15 detections from 15 samples, with a maximum detected concentration of 0.045 mg/l (GWPS = 0.006 mg/l). These exceedance were detected at 13 of 13 sampling locations, including both Background monitoring wells (MD-1 and MD-5).

Table L-4. Inventory of Compounds Detected in Upper Miocene Aquifer Groundwater Samples from July 2017 through July 2021, Maximum Concentrations and Exceedances by Permitted Well Location.

PARAMETER	May 2017 Permit Sampling Frequency			BG Well Data (Jul-17 - Jan-21)			POC Well Data (Jul-17 - Jul-21)			EFF Well Data (Jul-17 - Jan-21)			BNDY Well Data (Jul-17 - Jul-21)			OFFSITE Data (Jul-17 - Jan-21)			All Sampled Wells (Jul-17 - Jul-21)		
	Additional Analytes Every 5 Years	Annually	Semi-Annually	Total Samples	Total Detects	# Exceedances of GWPS	Total Samples	Total Detects	# Exceedances of GWPS	Total Samples	Total Detects	# Exceedances of GWPS	Total Samples	Total Detects	# Exceedances of GWPS	Total Samples	Total Detects	# Exceedances of GWPS	Total Samples	Total Detects	# Exceedances of GWPS
METALS (6020)																					
ARSENIC		x	x	12	12	1	43	19	0	11	2	0	40	13	7	20	6	0	126	52	8
LEAD		x		12	1	0	23	4	0	6	1	0	24	0	0	10	1	0	75	7	0
VANADIUM		x		12	1	0	23	12	5	6	2	0	24	8	1	10	6	2	75	29	8
BARIUM	x			2	2	0	5	5	0	1	1	0	5	5	0	2	2	0	15	15	0
CADMIUM	x			2	0	0	5	0	0	1	0	0	5	0	0	2	2	0	15	0	0
CHROMIUM	x			2	1	0	5	1	0	1	1	0	5	1	0	2	0	0	15	4	0
COBALT	x			2	0	0	5	2	0	1	0	0	5	0	0	2	1	0	15	3	0
STRONTIUM	x			2	2	0	5	5	0	1	1	0	5	5	2	2	2	0	15	15	2
THALLIUM	x			2	1	0	5	2	0	1	1	0	5	0	0	2	0	0	15	4	0
METALS (7470A)																					
Mercury^	x			2	0	0	5	0	0	1	0	0	5	0	0	2	0	0	15	0	0
GENERAL CHEMISTRY																					
Cyanide (Total)^	x			2	0	0	5	1	0	1	0	0	5	0	0	2	0	0	15	1	0
HERBICIDES/PESTICDES (8081B)																					
ALDRIN		x		12	0	0	23	0	0	6	0	0	24	0	0	10	0	0	75	0	0
ALPHA-BHC		x	x	12	0	0	43	2	0	11	0	0	40	3	0	20	0	0	126	5	0
BETA-BHC		x	x	12	0	0	43	3	0	11	0	0	40	1	0	20	0	0	126	4	0
DELTA-BHC		x	x	12	0	0	43	3	3	11	0	0	40	4	4	20	0	0	126	7	7
GAMMA-BHC (LINDANE)		x		12	0	0	23	0	0	6	0	0	24	0	0	10	0	0	75	0	0
4,4'-DDD		x		12	1	0	23	0	0	6	1	0	24	0	0	10	0	0	75	2	0
4,4'-DDE		x		12	0	0	23	1	0	6	1	0	24	2	0	10	0	0	75	4	0
4,4'-DDT		x		12	2	0	23	1	0	6	1	0	24	2	0	10	1	0	75	7	0
DIELDRIN		x		12	0	0	23	0	0	6	0	0	24	0	0	10	0	0	75	0	0
CHLOROBENZILATE		x		12	0	0	23	0	0	6	0	0	24	0	0	10	0	0	75	0	0
VOCs (8260C)																					
BENZENE		x	x	12	0	0	43	26	12	11	0	0	40	7	0	20	0	0	126	33	12
CARBON TETRACHLORIDE		x	x	12	0	0	43	0	0	11	0	0	40	0	0	20	0	0	126	0	0
CHLOROBENZENE		x	x	12	0	0	43	43	32	11	1	0	40	31	20	20	20	0	126	95	52
CHLOROFORM		x		12	0	0	23	0	0	6	0	0	24	0	0	10	0	0	75	0	0
1,4-DICHLOROBENZENE		x		12	0	0	23	17	0	6	0	0	24	10	0	10	5	0	75	32	0
1,1-DICHLOROETHYLENE		x		12	0	0	23	0	0	6	0	0	24	0	0	10	0	0	75	0	0
1,2,4-TRIMETHYLBENZENE		x		12	0	0	23	0	0	6	0	0	24	0	0	10	0	0	75	0	0
VINYL CHLORIDE		x		12	0	0	23	2	0	6	0	0	24	0	0	10	0	0	75	2	0
1,2-DICHLOROBENZENE	x			2	0	0	5	0	0	1	0	0	5	1	0	2	1	0	15	2	0
ACETONE	x			2	0	0	5	0	0	1	0	0	5	0	0	2	0	0	15	0	0
CHLOROETHANE	x			2	0	0	5	0	0	1	0	0	5	0	0	2	0	0	15	0	0
CHLOROPRENE	x			2	0	0	5	0	0	1	0	0	5	0	0	2	0	0	15	0	0
TRICHLOROETHYLENE	x			2	0	0	5	0	0	1	0	0	5	0	0	2	0	0	15	0	0
DICHLOROMETHANE/METHYLENE CHLORIDE	x			2	0	0	5	0	0	1	0	0	5	0	0	2	0	0	15	0	0
SVOCs-8270D																					
2-CHLOROPHENOL		x		12	0	0	23	2	0	6	0	0	24	2	0	10	0	0	75	4	0
NAPHTHALENE		x		12	0	0	23	4	1	6	0	0	24	0	0	10	0	0	75	4	1
NITROBENZENE		x		12	0	0	23	0	0	6	0	0	24	0	0	10	0	0	75	0	0
1,2-DIPHENYLHYDRAZINE		x		12	1	1	23	2	2	6	1	0	24	2	1	10	3	2	75	9	6
ANILINE	x			2	0	0	5	0	0	1	0	0	5	0	0	2	0	0	15	0	0
3,4-BENZOFLUORANTHENE	x			2	0	0	5	0	0	1	0	0	5	0	0	2	0	0	15	0	0
BENZO(K)FLUORANTHENE	x			2	0	0	5	0	0	1	0	0	5	0	0	2	0	0	15	0	0
BIS(2-ETHYLHEXYL)PHTHALATE	x			2	2	2	5	5	5	1	1	1	5	5	5	2	2	2	15	15	15

(green)	Indicates compound was detected < GWPS.
(yellow)	Indicates compound was detected > GWPS.

Table L-5. Summary of Compounds Detected in Upper Miocene Aquifer Groundwater Samples from July 2017 through July 2021, Frequencies of Detections and Exceedances.

												Number of Samples With Exceedances of GWPS by Permitted Miocene Aquifer Monitoring Well Location (July 2017 through July 2021 Data)												
												Background		Point-of-Compliance				Effectiveness	Boundary				Offsite	
Detected Compound	Recommended Sampling Frequency for 2021 Permit Renewal^	2017-2021 5-Year Analyte*	2017-2021 Annual Analyte*	2017-2021 Semi Annual Analyte*	Count of All 2017-2021 Analyses	Count of 2017-2021 Detections	Count of 2017-2021 GWPS Exceedances	Maximum Detected 2017-2021 Concentration (mg/l)	2017 RCRA Permit GWPS (mg/l)	2022 RCRA Permit GWPS (mg/l)^^	# Locations with Exceedances/ Total Locations Sampled (2017-2021)	MD-1	MD-5	MD-2	MD-9	MD-11	MD-12	MD-4	MD-3B	MD-6	MD-7	MD-8	MD-13	MD-14
METALS (6020)																								
ARSENIC	move to 5-Year		x	x	126	52	**8**	**0.030**	0.010	0.010	3/13	**1**	0	0	0	0	0	0	**1**	0	0	**6**	0	0
LEAD	move to HOLD		x		75	7	0	0.0016	0.015	0.015														
VANADIUM			x		75	29	**8**	**0.010**	0.0036	0.0036	4/13	0	0	**1**	0	**4**	0	0	0	**1**	0	0	0	**2**
BARIUM	move to HOLD	x			15	15	0	0.32	2	2														
CADMIUM	move to HOLD	x			15	0	0	0	0.005	0.005														
CHROMIUM	move to HOLD	x			15	4	0	0.0024	0.1	0.1														
COBALT	move to HOLD	x			15	3	0	0.0057	0.073	0.0006^^														
STRONTIUM		x			15	15	**2**	**3.80**	2.2	1.2^^	1/13	0	0	0	0	0	0	0	**2**	0	0	0	0	0
THALLIUM	move to HOLD	x			15	4	0	0.00016	0.002	0.002														
METALS (7470A)																								
MERCURY	move to HOLD	x			15	0	0	0	0.002	0.002														
GENERAL CHEMISTRY																								
CYANIDE	move to HOLD	x			15	1	0	0.0058	0.2	0.2														
HERBICIDES/PESTICDES (8081B)																								
ALDRIN	move to HOLD		x		75	0	0	0	0.000004	0.000004														
ALPHA-BHC	move to annual		x	x	126	5	0	0.0000064	0.000011	0.0000072^^														
BETA-BHC	move to annual		x	x	126	4	0	0.0000092	0.000037	0.000025^^														
DELTA-BHC	move to annual		x	x	126	7	**7**	**0.0000065**	MDL	MDL	2/13	0	0	0	**3**	0	0	0	0	**4**	0	0	0	0
GAMMA-BHC (LINDANE)	move to 5-Year		x		75	0	0	0	0.0002	0.0002														
4,4'-DDD			x		75	2	0	0.00000063	0.0002	0.0000063^^														
4,4'-DDE			x		75	4	0	0.0000031	0.00028	0.000046^^														
4,4'-DDT			x		75	7	0	0.000025	0.0002	0.00023^^														
DIELDRIN	move to HOLD		x		75	0	0	0	0.0000042	0.0000042														
CHLOROBENZILATE	move to 5-Year		x		75	0	0	0	0.00025	0.00025														
VOCs (8260C)																								
BENZENE			x	x	126	33	**12**	**0.012**	0.005	0.005	2/13	0	0	**9**	0	0	**3**	0	0	0	0	0	0	0
CARBON TETRACHLORIDE	move to annual		x	x	126	0	0	0	0.005	0.005						**1**								
CHLOROBENZENE			x	x	126	95	**52**	**2.1**	0.100	0.100	5/13	0	0	**11**	0	**8**	**13**	0	**11**	0	**9**	0	0	0
CHLOROFORM	move to 5-Year		x		75	0	0	0	0.08	0.08														
1,4-DICHLOROBENZENE	move to 5-Year		x		75	32	0	0.018	0.075	0.075														
1,1-DICHLOROETHYLENE	move to HOLD		x		75	0	0	0	0.007	0.007														
1,2,4-TRIMETHYLBENZENE	move to HOLD		x		75	0	0	0	0.0012	0.0012														
VINYL CHLORIDE	move to HOLD		x		75	2	0	0.0017	0.002	0.002														
1,2-DICHLOROBENZENE	move to HOLD	x			15	2	0	0.0015	0.600	0.600														
ACETONE	move to HOLD	x			15	0	0	0	0.55	0.55														
CHLOROETHANE	move to HOLD	x			15	0	0	0	0.0046	0.0046														
CHLOROPRENE	move to HOLD	x			15	0	0	0	MDL	MDL														
TRICHLOROETHYLENE	move to HOLD	x			15	0	0	0	0.005	0.005														
DICHLOROMETHANE	move to HOLD	x			15	0	0	0	0.005	0.005														
SVOCs-8270D																								
2-CHLOROPHENOL	move to HOLD		x		75	4	0	0.0088	0.003	0.003														
NAPHTHALENE			x		75	4	**1**	**0.0052**	0.00062	0.00012^^	1/13	0	0	0	0	0	**1**	0	0	0	0	0	0	0
NITROBENZENE	move to HOLD		x		75	0	0	0	0.00034	0.00014^^														
1,2-DIPHENYLHYDRAZINE			x		75	9	**5**	**0.00022**	0.000084	0.000078^^	3/13	0	0	0	**2**	0	0	0	0	0	**1**	0	0	**2**
ANILINE	move to HOLD	x			15	0	0	0	0.012	0.012														
3,4-BENZOFLUORANTHENE	move to HOLD	x			15	0	0	0	0.000092	0.000092														
BENZO(K)FLUORANTHENE	move to HOLD	x			15	0	0	0	0.00092	0.00092														
BIS(2-ETHYLHEXYL)PHTHALATE		x			15	15	**15**	**0.045**	0.006	0.006	13/13	**1**	**1**	**1**	**2**	**1**	**1**	**1**	**2**	**1**	**1**	**1**	**1**	**1**
											Number of Analytes With Exceedances by Location:	1	1	3	3	3	4	1	3	2	3	1	1	2

Bold Font: Analyte detected >GWPS
* Sampling frequency per May 2017 RCRA Permit
^ Recommended sampling frequency for 2021/22 Renewal
^^ GWPS are Tapwater values from the EPA Regional Screening Levels table. All other GWPS are MCLs unless otherwise noted

Attachment E provides time-series graphs for detected compounds with exceedances in Miocene Aquifer groundwater samples collected from July 2017 through July 2021 (arsenic, vanadium, strontium, Delta-BHC, chlorobenzene, benzene, naphthalene, 1,2-diphenylhydrazine and bis(2-ethylhexyl)phthalate) are included as. Maps of the July 2020 extent and distribution of compounds detected in Miocene Aquifer groundwater at the site during the 5-Year sampling event are provided in Attachment F.

3.5 Proposed 2022 Groundwater Monitoring Constituents and Historical Groundwater Analytical Results (2005 through 2021) by RCRA Permit Period

3.5.1 Proposed 2022 Groundwater Monitoring Program and Associated Groundwater Protection Standards: Alluvial and Miocene Aquifers

Table L-6 below lists the twenty-four Groundwater Protection Standard constituents and associated standards that are proposed for the Alluvial Aquifer and Miocene Aquifers for the next permit cycle (starting Year 2022).

In support of the monitoring program proposed in Table L-6, Attachment D to this Appendix contains a summary of historical groundwater analytical results collected during the previous permitting periods and the most recent period (July 2017 through July 2021). The summary includes information on historical constituents detected, including the number of times detected and if it was detected above the GWPS to support recommendations for modifications to the May 2017 RCRA permit groundwater monitoring program.

Table L-6. Proposed Groundwater Monitoring Constituents for Next permit Period

Hazardous Constituent	GWPS (mg/L)	Semi-Annual Monitoring	Annual Monitoring	Additional Analytes Every 5-Years (starting 2025)
Arsenic	0.01		x (Alluvial only)	x (Miocene only)
Cobalt*	0.0006			x (Alluvial only)
Lead	0.015			x (Alluvial only)
Vanadium (Total)*	0.0086		x	
Strontium (Total)*	1.2			x (Miocene only)
Alpha-BHC*	0.0000072	x (Alluvial only)	x	
Beta-BHC*	0.000025	x (Alluvial only)	x	
Delta-BHC	MDL	x (Alluvial only)	x	
Lindane (gamma-BHC)	0.0002			x
4,4-DDD*	0.0000063		x	
4,4-DDE*	0.000046		x	
4,4-DDT*	0.00023		x	
Chlorobenzilate*	0.00031			x
Bis (2-Ethylhexyl) phthalate	0.006			x
Benzene	0.005	x	x	
Carbon Tetrachloride	0.005	x (Alluvial only)	x	
Chlorobenzene	0.1	x	x	
Chloroform	0.08			x
1,4-Dichlorobenzene	0.075		x (Alluvial only)	x
1,1-Dichloroethylene	0.007		x (Alluvial only)	
1,2,4-Trimethylbenzene*	0.0056		x (Alluvial only)	
Vinyl Chloride	0.002		x (Alluvial only)	
2-Chlorophenol*	0.0091		x (Alluvial only)	
1,2-Diphenylhydrazine (as azobenzene)*	0.000078		x	
Naphthalene*	0.00012		x	
Nitrobenzene*	0.00014		x (Alluvial only)	

GWPS = Groundwater Protection Standard
MDL = Method Detection Limit
*GWPS are Tapwater values from the EPA Regional Screening Levels table. All other GWPS are MCLs unless otherwise noted

3.5.2 Alternate Concentration Limits

The regulations (ADEM Admin. Code R 335-14-5-.06(5)b) recognize that in certain circumstances alternate concentration limits (ACLs) may be appropriate in lieu of background-based or MCL-based concentration limits. BASF believes that there is a potential for application of ACLs at the McIntosh Site.

ACLs might be developed for the upland area of the site through a risk-based assessment. BASF would consult with ADEM and develop the information necessary to establish final ACLs that will be protective of human health and the environment.

3.6 Assessment of the Corrective Action Program

The Corrective Action Program has evolved since the issuance of the Permit in February 2000, and since subsequent renewals of the permit in January 2006, October 2011 and May 2017. Investigations conducted since the issuance of the permit in 2000 primarily focused on the Miocene Aquifer. These investigations resulted in modification of the monitoring program for the Miocene aquifer, including abandonment of select wells. The 2006 Permit also included a revision of the Groundwater Protection Standard for both the Alluvial and Miocene Aquifers. The 2011 Permit contained provisions for a modified groundwater sampling program and to address offsite migration in the Miocene Aquifer. The 2017 permit refined the groundwater monitoring program for the Miocene aquifer and Alluvial Aquifer based on historical trends in detected compounds and the locations and frequencies of GWPS exceedances.

The following subsections provide an assessment of the existing Corrective Action Program for both the Alluvial and Miocene Aquifers.

3.6.1 Alluvial Aquifer Corrective Action Program Assessment

Pursuant to the RCRA Permit and as described in Section 3.2.2 above, in 1987, a groundwater pumping system was installed and began operating to intercept and remove contaminated groundwater from the shallow Alluvial Aquifer. Four Corrective Action monitoring wells, designated CA-1, CA-2, CA-3 and CA-4A, were installed along the southern boundary of the property to monitor the effectiveness of the pumping well system. Per the May 2017 RCRA permit, well CA-4A was reclassified as an Effectiveness monitoring well due to its location downgradient of the bluffline slurry wall. Point-of-Compliance wells were installed for post-closure monitoring of closure activities conducted in 1986 through 1991 for SWMUs identified in Table L-1 and depicted in Figure L-1 (refer to Section 3.2 above). Select Point-of-Compliance and all Corrective Action wells are sampled and analyzed semi-annually and annually to evaluate groundwater quality conditions and to assess the progress of the Corrective Action in restoring groundwater quality to acceptable standards. BASF provides a comprehensive annual report to ADEM, which includes semi-annual and annual groundwater monitoring data and a yearly update on the operations and effectiveness of the Alluvial Aquifer groundwater collection system and a summary of OU1, OU2 and OU4 inspection activities, as required per the May 2017 Permit.

Assessments of the results and status of over 30 years of post-closure monitoring of closed SWMUs and the effectiveness of the Alluvial Aquifer groundwater extraction/slurry wall system are described separately below.

Results and Status of Post-Closure Monitoring of Closed SWMUs. The 30 year anniversary for post closure monitoring occurred in 2017 for closed SWMUs 1 through 10, in 2019 for SWMUs 11, 12 and 13, and in 2021 for SWMU 14/LV#1 (refer to Table L-1). The results of July 2017 through July 2021 post-closure monitoring were evaluated for the set of Point-of-Compliance wells located on the northern side of the Former Dilute Ditch/AOC-A and Upstream Drainage Ditch corridor (M-3, M-4, M-6 and M-7). These results (refer to Figure L-1, Table L-3 and Appendices D, E and F) generally show infrequent exceedances of GWPS for only two metals (arsenic and vanadium) and five organic compounds (Alpha-BHC, Beta-BHC, Delta-BHC, chloroform and 1,1-dichloroethylene) in groundwater immediately adjacent to and downgradient to nearby closed units. Detections of Alpha-BHC, Beta-BHC and Delta-BHC are most frequent and almost always exceed GWPS at the M-3 location. Detections of arsenic are frequent and more consistently exceed the GWPS at the M-6 and M-3 locations. The origin of arsenic detections in Alluvial Aquifer groundwater is unknown. The higher frequency of arsenic and pesticides in M-6 and M-3 samples could be due to their locations near AOC-A and downgradient to CERCLA remediated Area 3, respectively. Exceedances of the vanadium GWPS were detected for all years at the M-3 location, much less frequently at the M-4 and M-6 locations and not at all at the M-7 location, and do not appear to be associated with the closed units.

The results of July 2017 through July 2021 post-closure groundwater monitoring were evaluated for the set of three Corrective Action wells located hydraulically downgradient of the Alluvial Aquifer groundwater extraction system and along the southern property boundary (CA-1, CA-2 and CA-3, as shown in Figure L-2a). These results show very infrequent exceedances of GWPS for only two metals (arsenic and vanadium) and infrequent detections with no exceedances of a few organic compounds in groundwater (refer to Tables L-2 and L-3). The source of the arsenic and vanadium detections in Corrective Action groundwater samples is unknown but does not appear to be associated with site production activities and may be naturally occurring.

Effectiveness of Alluvial Aquifer Extraction/Slurry Wall System. Regular evaluation of the system performance has established the effectiveness of the hydraulic barrier in preventing the migration of groundwater off-site, with the exception of chlorobenzene exceedances detected since early 2007 in groundwater samples collected from CA-4A. Chlorobenzene impacts in CA-4A have been detected above the 0.100 mg/l GWPS since 2009. As explained in Section 3.2.5 above, the cause for the increase in chlorobenzene concentrations in CA-4A groundwater samples suggest that by-pass of deep Alluvial Aquifer groundwater likely is occurring at the slurry wall. Shallow impacted Alluvial Aquifer groundwater from OU4 is being captured by PW-9. However, impacted groundwater from the lower part of the Alluvial Aquifer is not being captured by PW-9, as was demonstrated by data collected during a September 2014 pumping test in nearby floodplain well TPZ-7 (LimnoTech, December 23, 2014). As is the case with CA-4A, TPZ-7 is screened in the lower part of the Alluvial Aquifer.

To address groundwater impacts at CA-4A as approved by ADEM (ADEM, May 12, 2020), BASF currently is investigating potential locations for two new lower Alluvial Aquifer groundwater extraction wells to be located east of PW-9, including one further below the bluffline area, near monitoring well TPZ-7. PW-11, as installed, is a very low yield well (less than 5 gpm) due to the very fine-grained and interbedded nature of the deep Alluvial Aquifer sands units in the bluffline area and the possibility that residual drilling mud may still be in the well. BASF has determined that PW-11 currently will not provide enough yield to reverse groundwater flow direction at floodplain effectiveness monitoring well CA-4A.

3.6.2 Miocene Aquifer Corrective Action Program Assessment

Sufficient Miocene Aquifer groundwater quality data have been collected since source control activities were conducted in 2007 and 2008 to refine initial assessments of fate and transport trends in the Upper Miocene Aquifer. As summarized in Section 3.4.5 above and as shown in the time series graphs and extent and distribution maps provided in Attachments E and F, Upper Miocene Aquifer impacts consist primarily of chlorobenzene. The highest concentrations of chlorobenzene impacts in the Upper Miocene Aquifer have been observed at Boundary monitoring well MD-3B (located furthest downgradient of remediated Areas 1 and 2) and Point-of-Compliance wells MD-2, MD-11 and MD-12 (located in the bluffline area downgradient of remediated Area 8/OU4. Based on historical groundwater quality data and groundwater flow patterns, impacts detected in the Miocene Aquifer could have originated from these two historical source areas; however, 2019 investigations of the Miocene Aquifer showed no clear indication of a significant chlorobenzene plume emanating from the former OU2 former Original

Effluent Impoundment (remediated Area 1) or the former Waste Disposal Pit (remediated Area 2) that would account for current impacts detected at Miocene well MD-3B (refer to Section 3.3.2 above).

Easternmost Upper Miocene Aquifer Chlorobenzene Impacts (Area 8/OU4). In accordance with the October 2011 RCRA Permit, two offsite Miocene Aquifer monitoring wells were installed in March 2012 to assess the potential for offsite migration of groundwater impacts detected in the vicinity of the bluffline area. Chlorobenzene data from onsite wells MD-2, MD-3B, MD-11 and MD-12 and offsite wells MD-13 and MD-14 are the primary indicators of the effectiveness of source control measures implemented in 2007 and 2008. The expanded well network has provided over 9 years of water quality data to assess onsite and offsite groundwater flow patterns and contaminant transport trends in the Upper Miocene. These data indicate that the easternmost chlorobenzene impacts in the Upper Miocene Aquifer are stable and are not migrating offsite at concentrations above the 0.100 mg/l GWPS, for the following reasons:

- At Effectiveness monitoring well MD-4, chlorobenzene has only been detected twice since monitoring began in November 1996. These two detections occurred in January 2004 at a concentration of 0.008 mg/l, and in July 2020 at a concentration of 0.00067 J mg/l.

- As depicted in Figure L-6, Upper Miocene Aquifer chlorobenzene concentrations decrease significantly progressively downgradient from the Point-of-Compliance wells (MD-2, MD-9, MD-11 and MD-12), to the onsite Boundary wells (MD-3B, MD-6, MD-7 and MD-8) and to the offsite wells (MD-13 and MD-14).

- At Point-of-Compliance well MD-9, chlorobenzene has not been detected above 0.042 mg/l since monitoring began at this location in 2002. Chlorobenzene concentrations historically have been highest at Point -of-Compliance wells MD-2, MD-11 and MD-12, but fluctuating concentrations have been observed at all three locations (refer to Figure L-6 and time-series graphs in Attachment E):

- Chlorobenzene concentrations have exceeded the GWPS at one Boundary well (MD-7), but these concentrations have fluctuated between 0.15 mg/l to 0.34 mg/l for over seven years and do not show an increasing trend. Chlorobenzene concentrations at Boundary well MD-6 have consistently stayed below the GWPS since monitoring began in 1998, and have been predominantly non-detect at Boundary well MD-8 since monitoring began in 2002.

- Chlorobenzene concentrations at offsite wells MD-13 and MD-14 have consistently stayed below the GWPS since monitoring began in spring 2012.

The only other significant COC in the Upper Miocene Aquifer is arsenic. The time-series graphs for arsenic show that the arsenic GWPS (0.010 mg/l) has been exceeded most frequently at Boundary well MD-8, with two additional exceedances at Background well MD-1 in July 2019 and at Boundary well MD-3B in January 2020 (refer to Attachment E). The source of arsenic in Miocene groundwater samples is unknown, but may be naturally occurring.

BASF proposes continued monitoring of the Miocene Aquifer Corrective Action monitoring well system to confirm ongoing stability of chlorobenzene impacts. However, as noted above, the effects of Olin's ongoing transition from the Miocene Aquifer to the Alluvial Aquifer for their production supply water (initiated in late 2020) will influence future BASF actions regarding additional Miocene Aquifer investigations. When complete, this change is expected to have a significant impact on the regional direction of groundwater flow in the area. BASF is monitoring that change as part of their ongoing evaluations of the Miocene Aquifer via pressure transducers, installed in April 2023 in several onsite and offsite Miocene Aquifer production and monitoring wells to continuously monitoring groundwater levels over time.

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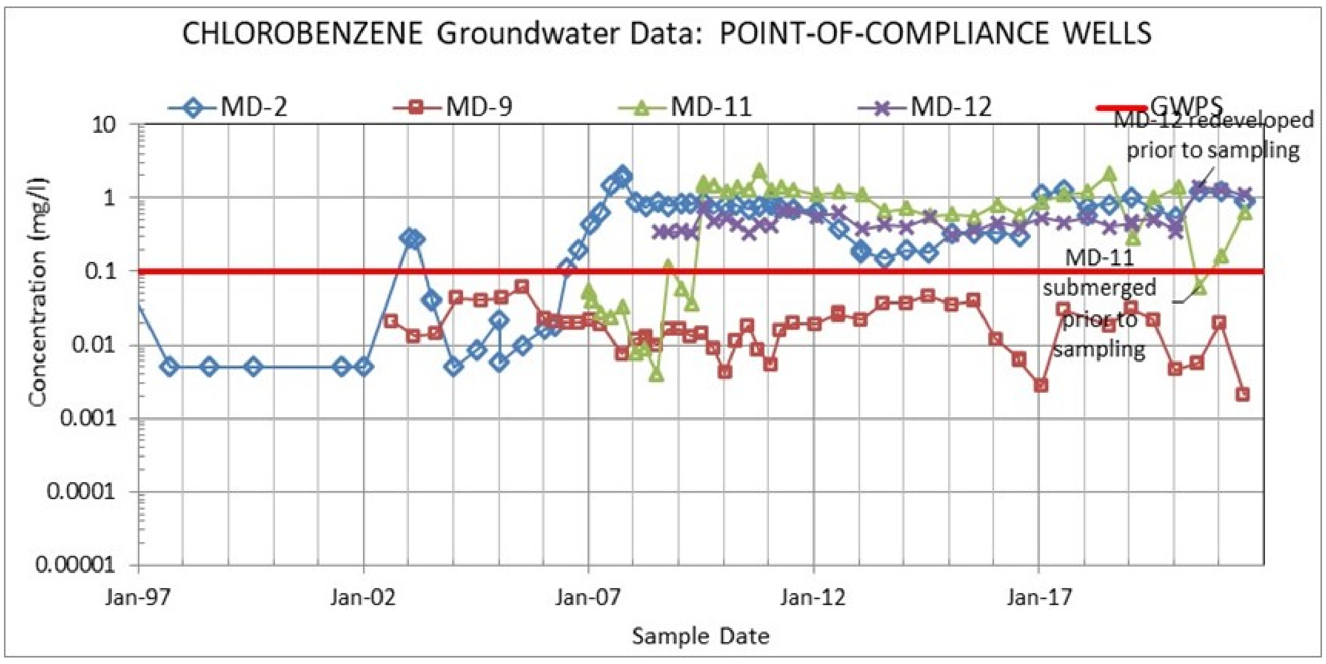

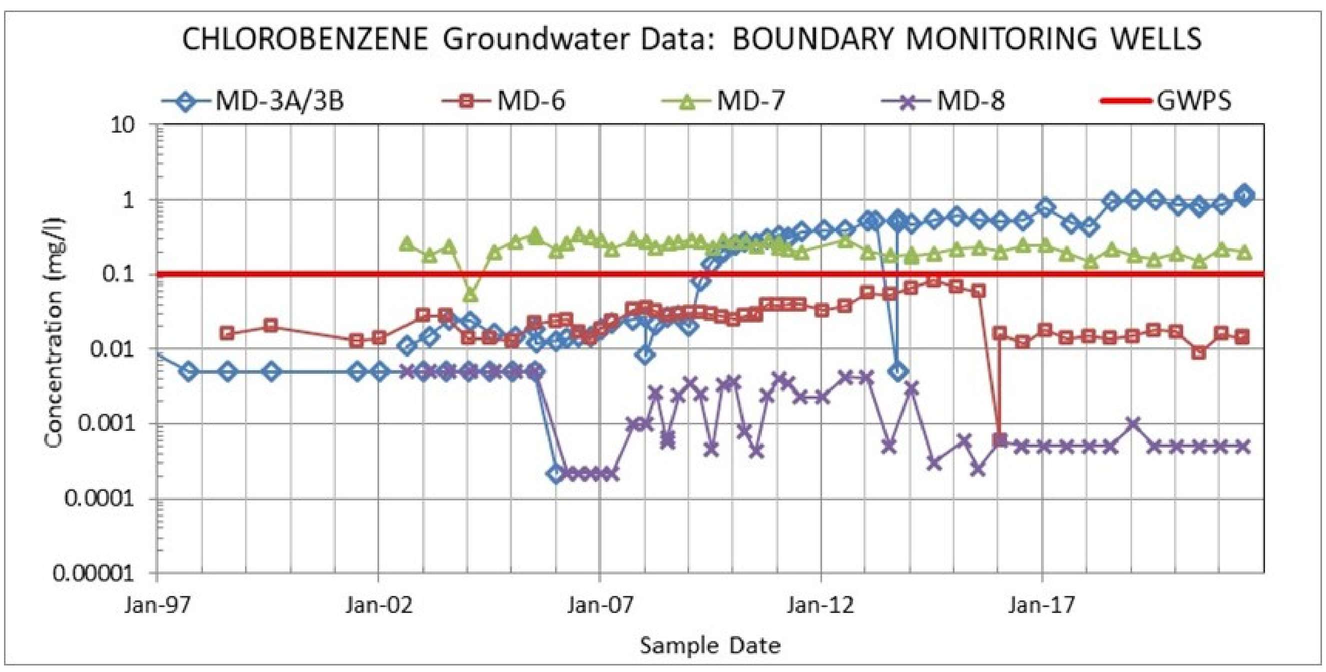

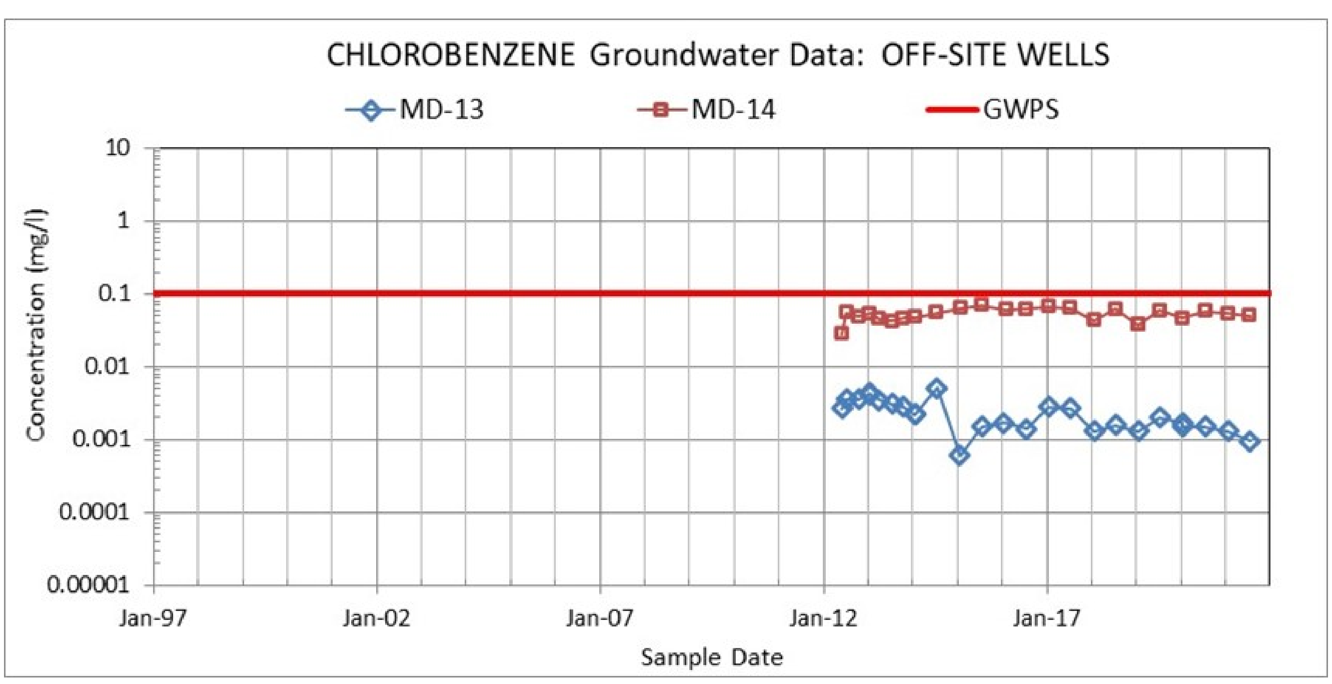

Figure L-6. Time-Series Graphs of Chlorobenzene Data for Upper Miocene Aquifer Monitoring Wells.

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Westernmost Upper Miocene Aquifer Chlorobenzene Impacts (Downgradient of Remediated Areas 1 and 2 in OU2). Chlorobenzene has been detected since January 2009 in steadily increasing concentrations at furthest downgradient Boundary monitoring well MD-3B (located approximately 5,300 ft from MD-2). The time elapsed between the start of detected chlorobenzene impacts at MD-2 (April 2006) and the start of detected chlorobenzene impacts at MD-3B (January 2009) is approximately 1,000 days. If an association exists between the impacts at MD-2 and MD-3B, then the data imply a contaminant transport rate of approximately 5.3 ft/day between MD-2 and MD-3A, which is significantly higher than the 0.8 ft/day groundwater velocity used for estimating contaminant transport in the Miocene aquifer for the modeling study (CIBA, May 2002). However, the modeling study focused on contaminant transport in wells located near the slurry wall area. Groundwater flow direction and velocity is strongly influenced by pumping from multiple Olin production supply wells, and historical groundwater velocities generally increased closer to the Olin pumping wells. However, Olin began reducing their withdrawals from the Miocene Aquifer in late 2020 after they installed two new Alluvial Aquifer production wells adjacent to the Tombigbee River. These changes are expected to significantly affect groundwater flow direction in the Miocene Aquifer and potentially reverse groundwater flow in the vicinity of MD-3B over time. Onsite advective flow rates that have been determined from 2012 through 2021 potentiometric surface map data for the Upper Miocene Aquifer range from approximately 0.98 ft/day to 2.1 ft/day.

As described in Section 3.2.2 above, a plan for onsite investigations of possible sources to chlorobenzene impacts at Miocene Boundary well MD-3B was developed and submitted to ADEM for review (LimnoTech, 9-May-2018). ADEM approved the work plan on June 13, 2018 and field activities were implemented in early 2019, which included the installation, logging and sampling of four vertically profiled borings to depths of 220 feet to 250 feet below grade. The investigation results showed no clear indication of a significant chlorobenzene plume emanating from the OU2 former Original Effluent Impoundment (remediated Area 1) or the former Waste Disposal Pit (remediated Area 2) that would account for current impacts detected at Miocene well MD-3B. A supplemental vertically profiled Miocene Aquifer boring was installed in May 2023 in accordance with the ADEM approved November 2022 Work Plan. The data from this boring are being evaluated but are comparable to the 2019 investigation results. BASF also will use the results from the 2023 investigation data to support additional hydrogeological evaluations north and west of the PW-7 and PW-8 corridor for siting two new Alluvial aquifer extraction wells, expected to be located north of PW-7, to enhance mass removal and further reduce COC mass loading from the Alluvial to the Miocene Aquifer.

BASF will continue monitoring chlorobenzene impacts in the vicinity of MD-3B in accordance with Permit requirements. Per the March 9, 2020 ADEM approval letter to the January 2, 2020 Miocene Aquifer investigation report, BASF has continued with field activities for the Miocene Aquifer in accordance with the approved May 9, 2018 and November 22, 2022 Work Plans. These activities include determining the necessity of installing an additional Miocene monitoring well located south of MD-3B, as well as the feasibility of successfully re-closing former Miocene monitoring well MD-3A and possibly closing MD-3B as potential corrective actions to initially address chlorobenzene impacts at MD-3B. However, Olin Corporations production water supply change is expected to have a significant impact on the regional direction of groundwater flow in the area; consequently, the need for or placement of additional Miocene Aquifer monitoring well(s) cannot be fully accessed at this time.

If feasible, re-closing the former MD-3A location would require over-drilling up to a depth of approximately 220 ft below grade. Abandonment of MD-3B may also be deemed necessary and also would involve over-drilling to a depth of approximately 220 ft below grade to ensure that the 50 ft sand pack interval above the top of the MD-3B well screen is removed. However, over-drilling to these depths involves substantial risks, including missing the original boring alignment and creating increased cross-contamination/carrydown potential.

3.7 Proposed Revisions to the Corrective Action Program

3.7.1 General

BASF will continue to sample and analyze permitted Alluvial and Upper Miocene wells semi-annually and annually per approved Permit requirements to evaluate groundwater quality conditions and assess the progress of the Corrective Action. BASF will continue to provide a comprehensive annual report to ADEM describing the results of the sampling program and an evaluation of the effectiveness of corrective measures at the site.

Groundwater elevation data will continue to be collected on a semi-annual basis from all permitted wells shown on Figure L-2a and for select supplemental non-permitted wells shown on Figure L-2b. BASF also is conducting continuous groundwater level monitoring in several Alluvial Aquifer floodplain/Bluffline wells and select Miocene Aquifer wells to determine the effect of seasonal influences and local withdrawals on the groundwater flow fields.

3.7.2 Alluvial Aquifer Corrective Action Program: Proposed Permit Revisions

Revisions proposed to the Alluvial Aquifer Corrective Action Program are based on the following considerations:

- The demonstrated long-term effectiveness of the Alluvial Aquifer groundwater interception and recovery system when properly maintained.
- Optimizing the performance of the extraction well system and data collection efforts.
- The number, frequency and locations of detected constituents in Alluvial Aquifer groundwater samples collected during the past permit cycle (refer to Attachment D and Tables L-2 and L-3).
- The number and frequency of these detected constituents in excess of groundwater protection criteria (refer to Tables L-2 and L-3).
- The extent and distribution of constituents detected above groundwater protection criteria.

Based on the information summarized in this document, BASF proposes the following modifications to the **Alluvial Aquifer Corrective Action** program (refer to Table L-7a):

1. Only a few metals and organic compounds are consistently detected in Alluvial Aquifer groundwater samples above GWPS. Consequently, BASF proposes to **change the sampling frequency of permitted Alluvial Aquifer monitoring parameters** as follows (refer to coded highlighting in Table L-3 and Attachment D for detailed information regarding frequencies of detections and exceedances by compound):

    1) **Move from 5-Year or annual monitoring list to HOLD list**: barium, cadmium, chromium, strontium, thallium, mercury, cyanide, 1,2-dichlorobenzene, acetone, chloroethane, chloroprene, trichloroethylene, dichloromethane, aldrin, dieldrin, aniline, benzo(b)fluoranthene, and benzo(k)fluoranthene. The justification for this recommendation is that all of these compounds are either rarely or never detected above GWPS, or have not been detected at all for at least the previous two permit cycles.

    2) **Change from semi-annual or annual to 5-Year monitoring**: lead, gamma-BHC (lindane), chlorobenzilate,

and chloroform. The justification for this recommendation is that all of these compounds are either consistently detected below GWPS, have not been detected at all for at least the previous two permit cycles, or have been detected infrequently and rarely above GWPS in the previous two permit cycles.

3) **Change from semi-annual to annual monitoring**: Arsenic. The justification for this recommendation is that arsenic is known to be naturally occurring in Gulf Coast groundwater[8], as suggested by USEPA in their November 2019 draft OU1/OU2/OU4 Optimization Review Report. Arsenic is frequently detected above GWPS in Alluvial Aquifer groundwater, including at background monitoring well MW-12A and Corrective Action wells CA-1 and CA-2 (which do not have exceedances of other chemicals of concern except for vanadium, another metal that may also be naturally occurring).

2. Complete evaluations of two alternative extraction well locations located further downgradient of PW-11 and closer to CA-4A impacts and thereafter install the additional extraction wells, with the following associated monitoring:

    1) Continue to assess the extent and distribution of Alluvial Aquifer impacts in the floodplain area using select accessible existing floodplain wells (PZ-2 and PZ-15) for routine voluntary monitoring during dry periods (likely late summer/early fall).

    2) Maintain ongoing continuous monitoring of groundwater levels in select existing floodplain monitoring wells located downgradient of PW-11, including CA-4A, to determine seasonal influences on the direction of groundwater flow and the capture zone developed from future new bluffline/floodplain extraction wells.

[8] Degnan, J.R., Lindsey, B.D., Levitt, J.P., Szabo, A, 2020. The relation of geogenic contaminants to groundwater age, aquifer hydrologic position, water type, and redox conditions in Atlantic and Gulf Coastal Plain aquifers, eastern and south-central USA, Science of the Total Environment 723 (2020) 137835.

Table L-7. Proposed Modifications to Corrective Action Program

ALLUVIAL AQUIFER		
Proposed Change	**Proposed Change Components**	**Justification/Comments**
[1] Change Parameter Sampling Frequency	**Move from 5-Yr or Annual sampling to HOLD List**: barium, cadmium, chromium, strontium, thallium, mercury, cyanide, 1,2-dichlorobenzene, acetone, chloroethane, chloroprene, trichloroethylene, dichloromethane, aldrin, dieldrin, aniline, benzo(b)fluoranthene, benzo(k)fluoranthene.	All of these compounds are either rarely or never detected above GWPS, or have not been detected at all for at least the previous two permit cycles.
	Move from Semi-Annual/Annual to 5-Yr List: lead, gamma-BHC (lindane), chlorobenzilate and chloroform.	All constituents are either consistently detected < GWPS, have not been detected at all for at least the previous two permit cycles, or have been detected infrequently and rarely > GWPS in the previous two permit cycles.
	Move from Semi-Annual to Annual List: arsenic	Arsenic is known to be naturally occurring in Gulf Coast groundwater, as suggested by USEPA in their November 2019 draft OU1/OU2/OU4 Optimization Review Report. Arsenic is frequently detected above GWPS in Alluvial Aquifer groundwater, including at background monitoring well MW-12A and Corrective Action wells CA-1 and CA-2 (which do not have exceedances of other chemicals of concern except for vanadium, another metal that may also be naturally occurring)
[2] Complete evaluations of two alternative extraction well locations located further downgradient of PW-11 and closer to CA-4A impacts.	Continue to assess the extent and distribution of Alluvial Aquifer impacts in the floodplain area using select accessible existing floodplain wells (PZ-2 and PZ-15) for routine voluntary monitoring during dry periods.	PZ-2 and PZ-15 generally have been accessible in summer or fall but not in 2021 due to excessive rainfall and high water levels in floodplain.
	Continuously monitoring of groundwater levels in select accessible existing floodplain monitoring wells located downgradient of PW-11, including CA-4A, to determine seasonal influences on the direction of groundwater flow and the capture zone developed from ~~a~~ future new bluffline/floodplain extraction wells.	Continuously monitored wells include non-permitted floodplain wells TPZ-4, TPZ-6, TPZ-7 and TPZ-11 and permiited well CA-4A (all are screened in lower Alluvial Aquifer sands)

UPPER MIOCENE AQUIFER		
Proposed Change	**Proposed Change Components**	**Justification/Comments**
[1] Change Parameter Sampling Frequency	**Move from 5-Yr or Annual sampling to HOLD List: excluding strontium,** same as Alluvial Aquifer parameter list recommendations plus cobalt, lead, 1,1,-dichloroethylene, 1,2,4-trimethylbenzene, vinyl chloride, 2-chlorophenol and nitrobenzene.	Same as Alluvial.
	Move from Semi-Annual/Annual to 5-Yr List: arsenic, gamma-BHC (lindane), chlorobenzilate, chloroform and 1,4-dichlorobenzene.	Same as Alluvial. In addition, arsenic is known to be naturally occurring in Gulf Coast groundwater; arsenic has been detected above the GWPS in background well MD-1.
	Move from Semi-Annual to Annual List: alpha-BHC, beta-BHC, delta-BHC and carbon tetrachloride	All compounds had few or no detections (i.e., carbon tetrachloride) in 2107 through 2021, plus alpha-BHC and beta-BHC had no exceedances during this monitoring period.
[2] Continue routine groundwater monitoring and continuous groundwater level monitoring in select Miocene Aquifer wells to assess potential regional influences from recent Olin production supply changes and continued stability of eastern plume.	Possible re-closure of former monitoring well MD-3A and/or closure of MD-3B if deemed feasible.	Over-drilling to 220 ft involves substantial risks, including missing original boring alignment and creating increased cross-contamination/carrydown potential.
	Possible installation of an additional downgradient Miocene Aquifer monitoring well(s).	Olin production water supply change is expected to have significant impact on regional direction of groundwater flow; so need for or placement of additional Miocene Aquifer monitoring well(s) cannot be fully accessed at this time.
[3] Install 2 new Alluvial Aquifer extraction wells, likely north of PW-7.	Use the results from the 2023 investigations to support additional hydrogeological evaluations north and west of the PW-7 & PW-8 corridor for siting the wells, to further reduce potential mass loading from the Alluvial to Miocene Aquifer.	PW-7 currently accounts for over 95% of system mass removal of chlorobenzene, and DNAPL was observed in this well in the 1990s.

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3.7.3 Proposed Permit Revisions: Miocene Aquifer Corrective Action Program.

Revisions proposed to the Miocene Aquifer Corrective Action Program are based on the following considerations:

- The number and frequency of historically detected compounds in Miocene Aquifer groundwater samples (refer to Attachment D).
- The number and frequency of these detected compounds in excess of groundwater protection criteria (refer to Tables L-4 and L-5).
- The extent and distribution of compounds detected above groundwater protection criteria on the easternmost and westernmost sides of the site.
- Time-series graphs of chlorobenzene trends in Point-of-Compliance, Boundary and Offsite monitoring wells, demonstrating plume stability on the easternmost side of the side near remediated Area 8/OU4 bluffline area.

BASF proposes the following modifications to the Upper Miocene Aquifer Corrective Action program (refer to Table L-7a):

1. Only a few metals and organic compounds are consistently detected in Upper Miocene Aquifer groundwater samples above GWPS. Consequently, BASF proposes to change the sampling frequency of permitted Upper Miocene Aquifer monitoring parameters as explained below and as summarized in Table L-7a.

    1) **Move from 5-Year or Annual monitoring list to HOLD list**: lead, barium, cadmium, chromium, cobalt, thallium, mercury, cyanide, 1,2-dichlorobenzene, 1,1-dichloroethylene, 1,2,4-trimethylbenzene,vinyl chloride, acetone, chloroethane, chloroprene, trichloroethylene, dichloromethane, aldrin, dieldrin, aniline, benzo(b)fluoranthene, benzo(k)fluoranthene, 2-chlorophenol and nitrobenzene. The justification for this recommendation is that all of these compoundsare either rarely or never detected above GWPS, or have not been detected at all for at least the previous two permit cycles.

    2) **Change from semi-annual or annual to 5-Year monitoring**: arsenic, gamma-BHC (lindane),

chlorobenzilate, chloroform, 1,4-dichlorobenzene. The justification for this recommendation is that all compounds are either consistently detected below GWPS, have not been detected at all for at least the previous two permit cycles, or have been detected infrequently and rarely above GWPS in the previous two permit cycles. In addition, arsenic is known to be naturally occurring in Gulf Coast groundwater; arsenic has been detected above the GWPS in background well MD-1.

3) **Change from semi-annual to annual monitoring**: Alpha-BHC, beta-BHC, delta-BHC and carbon tetrachloride. The justification for this recommendation is that all of these compounds had few or no detections (i.e., carbon tetrachloride) in 2107 through 2021, plus alpha-BHC and beta-BHC had no exceedances during this monitoring period.

2. Continue Miocene Aquifer groundwater quality and depth to groundwater data at all Permitted wells to monitor plume stability on the eastern side of the site, chlorobenzene impacts in Boundary well MD-3B on the western side of the site, and likely influence on regional groundwater flow field from Olin production water supply transition from Miocene Aquifer to Alluvial Aquifer. Maintain continuous groundwater level monitoring in Miocene supply wells WW-1, WW-2 and WW-8 and Miocene monitoring wells MD-3B, MD-13 and MD-14. Other investigation options may include the following if deemed feasible:

    1) Re-closing former Miocene monitoring well MD-3A and possibly closing MD-3B as potential corrective actions to initially address chlorobenzene impacts at MD-3B. Both options are risky because over-drilling to 220 feet could miss the original boring alignment and create increased cross-contamination/carrydown potential.

    2) Install one or more additional Miocene monitoring well(s) located downgradient of MD-3B, but the regional direction of groundwater flow may change due to Olin's ongoing production water supply transition from the Miocene Aquifer to the Alluvial Aquifer.

3. Use the results from the 2023 investigations to support additional hydrogeologic evaluations north and west of the PW-7 and PW-8 corridor for siting and subsequent installation of two new Alluvial Aquifer extraction wells, expected to be located north of PW-7, to

further reduce mass loading from the Alluvial to the Miocene Aquifer.

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Attachment A

Select References

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Selected References

Report Date	Report Title
May 1981	A Preliminary Evaluation of the Ground-Water Hydrology at the Ciba-Geigy Plant in McIntosh, Alabama, with Recommendations for Compliance with RCRA and State of Alabama Requirements on Ground Water Monitoring, P.E. LaMoreaux and Associates, Inc. (PELA)
November 23, 1981	Ground Water Monitoring Program and Outline of Ground Water Quality Assessment Program for Ciba-Geigy Corporation (MW1 - MW8), (PELA)
November 23, 1981	Monitor Well Installation for the Ciba-Geigy Plant in McIntosh, Alabama (MW1 - MW8), (PELA)
October 5, 1982	Installation of Three Ground-Water Monitor Wells and Determinations of Direction and Velocity of Ground-Water Movement (MW9 - MW11), (PELA)
January 27, 1984	Work Plan for Pumping Test at Ciba-Geigy, (PELA)
June 1984	A Hydrogeologic Evaluation of the Ciba-Geigy Corporation Plant Site at McIntosh, Alabama (WP1 - WP12, SW1 - SW3, MD1 - MD3), (PELA)
November 19, 1984	An Evaluation of the Impact of the Waste Disposal Operations on the Alluvial Aquifer with Recommendations for Remedial Action at the Ciba-Geigy Corporation Plant Site in McIntosh, Alabama (OW1 - OW9, PW1 - PW8, CA1 - CA4), (PELA)
April 16, 1986	Installation and Testing of Dewatering and Corrective Action Wells with a Dewatering Plan at the Ciba-Geigy Plant Site in McIntosh, Alabama, (PELA)
April 17, 1986	Drilling, Installation and Development of Observation Wells OW-10 and OW-11 at the Ciba-Geigy Plant Site in McIntosh, Alabama, (PELA)

Selected References

Report Date	Report Title
May 1, 1986	Effects of Pumping on the Detox and 40-Million Gallon Ponds, (PELA)
March 23, 1987	Installation and Testing of Dewatering Well PW10 at the Ciba-Geigy Site in McIntosh, Alabama, (PELA)
August 1988	Remedial Investigation/Feasibility Study, Remedial Investigation Report, Ciba-Geigy Corporation, McIntosh, AL (BCM).
January 25, 1989	Initiation of Pumping and Results of Testing for the Corrective Action Interceptor System at the Ciba-Geigy Plant Site in McIntosh, Alabama, (PELA)
March 15, 1990	Occurrence and Characteristics of the Miocene Clay in the Area of the Bluff Line (Site 8 of RI/FS), Ciba-Geigy Plant Site, McIntosh, Alabama, (PELA)
April 15, 1991	Hydrogeologic and Water Quality Assessment of the Flood Plain Area at the Ciba-Geigy Corporation Plant Site, McIntosh, Alabama (Interim Report), (PELA)
July 29, 1991	Results of Aquifer Testing in the Vicinity of Remediation Site 8, Ciba-Geigy Corporation, McIntosh, Alabama, (PELA)
November 20, 1991	Installation of Monitoring Wells near Land Vault No. 2 at the Ciba-Geigy Corporation Plant Site, McIntosh, Alabama, (PELA)
January 31, 1992	Results of Aquifer Testing in the Vicinity of Remediation Site 8, Ciba-Geigy Corporation, McIntosh, AL, Volumes I and II(PELA)
April 7, 1993	Letter Report on Evaluation of Shutdown of PW Interceptor (Corrective Action) System on February 10, 1993, (PELA)

Selected References

Report Date	Report Title
May 21, 1993	Hydrogeologic and Water Quality Assessment of the Flood Plain Area at the Ciba-Geigy Corporation Plant Site, McIntosh, Alabama (Final Report), (PELA)
January 21, 1994	Evaluation of Water-Level Measurements in the Alluvial Aquifer near Land Vault No. 2 at the Ciba-Geigy Corporation Plant Site, McIntosh, Alabama, (PELA)
January 9, 1998	Assessment of Corrective Action Pumping System Near Well PW-3 and Occurrence of Chlorobenzene in Wells Completed in the Upper Miocene Aquifer at the Ciba Specialty Chemicals Corporation Plant Site, McIntosh, Alabama, (PELA)
May 6, 2002	Assessment of Groundwater Flow and Contaminant Transport for the Upper Miocene Aquifer and Evaluation of Corrective Action Options, (Ciba Specialty Chemicals Corporation)
August 9, 2006	January – June 2006 Semi-Annual Status Report for PW Interceptor System (PELA)
January 2007	Report on Installation of Miocene Well MD-11 (SES)
October 12, 2007	Revised Summary of Miocene Corrective Action Field Activities and Proposed Modifications to the Current Work Plan, Ciba Specialty Chemicals, McIntosh, Alabama
April 2008	Alabama Risk-Based Corrective Action Guidance Manual - Revision 2(ADEM)
June 25, 2008	Installation of Miocene Aquifer Well MD-12 (CH2M-Hill)
Oct 1, 2008	Unactivated Sodium Persulfate Injection (CIBA)
Dec 18, 2008	Abandonment of Bluff Line Area Monitoring Wells at the Ciba Corporation Facility in McIntosh, Alabama (CH2M-Hill)

Selected References

Report Date	Report Title
August 21, 2009	January – June 2009 Semi-Annual Status Report for PW Interceptor System
March 16, 2010	July – December 2009 Semi-Annual Status Report for PW Interceptor System (PELA).
December 2010	Technical Memorandum/ADDENDUM to Appendix L of July 2010 Draft RCRA Permit Renewal: Results of November 9–17, 2010 Shutdown Test, Pumping Wells PW4 and PW5 (LimnoTech).
December 2010	OU-3 Monitoring, Inspection, and Maintenance Report (LimnoTech).
May 2011	2011 Second Qtr Miocene Ground Water Monitoring Report, EPA I. D. Number ALD001221902 (BASF).
August 11, 2011	January – June 2011 Semi-Annual Effectiveness Report for PW Interceptor System, BASF Corporation, McIntosh, AL (LimnoTech).
September 2011	July 2011 Annual Alluvial Aquifer/3rd Quarter Miocene Aquifer, Groundwater Monitoring Report, EPA I. D. Number ALD001221902 (BASF).
September 2011	2011 Monitoring of DDTr in Gambusia affinis, Operable Unit 3, Ciba-Geigy Superfund Site, McIntosh, Alabama (LimnoTech)
September 2011	Third Five Year Review (U.S. EPA).
October 5, 2011	Hazardous Waste Facility Permit, BASF Corporation, McIntosh, AL (ADEM).
January 24, 2012	Work Plan for Installation of Offsite Monitoring Wells, BASF Corporation, McIntosh, Alabama (LimnoTech).

Selected References

Report Date	Report Title
July 31, 2012	MD-13 and MD-14: Well Completion and Quarterly Micoene Aquifer Progress Reports (LimnoTech).
October 2012	Comprehensive Annual Report: Groundwater Monitoring and Corrective Action/Corrective Measures Effectiveness Reports for OU1 Alluvial and Miocene Aquifers and Inspection Reports for OU1, OU2 and OU4, BASF Corporation, McIntosh, Alabama (LimnoTech).
November 27, 2012	MD-13 and MD-14: Quarterly Micoene Aquifer Monitoring Report (October 2012), (LimnoTech).
March 13, 2013	MD-13 and MD-14: Quarterly Miocene Aquifer Monitoring Report (January 2013), (LimnoTech).
April 19, 2013	Request to Temporarily Suspend Sampling at Miocene Aquifer Boundary Well MD-3B, BASF McIntosh, Alabama - Hazardous Waste Facility Permit Number ALD 001 221 902; letter to Ms. Sonja Favors (ADEM), (LimnoTech).
May 1, 2013	MD-13 and MD-14: Quarterly Miocene Aquifer Monitoring Report (April 2013), (LimnoTech).
September 23, 2013	MD-13 and MD-14: Quarterly Miocene Aquifer Monitoring Report (July 2013), (LimnoTech).
November 13, 2013	MD-13 and MD-14: Quarterly Miocene Aquifer Monitoring Report (October 2013)(LimnoTech).
November 2013	Comprehensive Annual Report: Groundwater Monitoring and Corrective Action/Corrective Measures Effectiveness Reports for OU1 Alluvial and Miocene Aquifers and Inspection Reports for OU1, OU2 and OU4, BASF Corporation, McIntosh, Alabama (LimnoTech).

Selected References

Report Date	Report Title
March 14, 2014	MD-13 and MD-14: Quarterly Miocene Aquifer Monitoring Report (January 2014), (LimnoTech).
September 4, 2014	Assessment of influence of PW-10 shutdown on the Alluvial Aquifer extraction system, BASF McIntosh, AL (LimnoTech).
September 2011	OU-3 Remedial Action Report (LimnoTech).
September 19, 2014	Scope of Work for repairs to damaged Miocene Aquifer Point-of-Compliance monitoring well MD-11, BASF McIntosh, AL (LimnoTech).
October 8, 2014	Approval Letter Regarding LimnoTech September 19, 2014 Scope of Work for repairs to damaged Miocene Aquifer Point-of-Compliance monitoring well MD-11, BASF McIntosh, AL (Permit Number ALD 001 221 902), (ADEM).
October 9, 2014	Approval Letter Regarding LimnoTech September 4, 2014 Assessment of Influence of PW-10 Shutdown on Alluvial Aquifer Extraction System (ADEM).
October 9, 2014	Approval Letter Regarding MD-13 and MD-14 Quarterly Miocene Aquifer Monitoring (ADEM).
November 18, 2014	Report of Repairs to Damaged Miocene Aquifer Point-of-Compliance Monitoring Well MD-11 (LimnoTech).
December 23, 2014	TPZ-7 Alluvial Aquifer Pumping Test Report, BASF McIntosh, AL (LimnoTech).
January 2015	Comprehensive Annual Report: Groundwater Monitoring and Corrective Action/Corrective Measures Effectiveness Reports for OU1 Alluvial and Miocene Aquifers and Inspection Reports for OU1, OU2 and OU4, BASF Corporation, McIntosh, Alabama (LimnoTech).

Selected References

Report Date	Report Title
January 8, 2015	Letter regarding Report of Repairs, Damaged Miocene Aquifer Point-of-Compliance Monitoring Well MD-11 (ADEM).
February 26, 2015	Scope of Work for OU2 Erosion Repairs in Huntsman License Area at the BASF McIntosh, AL Plant (LimnoTech).
January 2016	Comprehensive Annual Report: Groundwater Monitoring and Corrective Action/Corrective Measures Effectiveness Reports for OU1 Alluvial and Miocene Aquifers and Inspection Reports for OU1, OU2 and OU4, BASF Corporation, McIntosh, Alabama (LimnoTech).
January 7, 2016	OU3 Environmental Covenant (BASF).
March 22, 2016	Comprehensive Annual Report, Review Comments, BASF Corporation, McIntosh, Washington County, Alabama, US EPA ID Number ALD 001 221 902 (ADEM).
April 18, 2016	Groundwater Environmental Covenant (Alluvial and Miocene Aquifer) (BASF).
April 29, 2016	Work Plan to Address Impacted Groundwater at Floodplain Well CA-4A, BASF McIntosh, AL (US EPA ID Number ALD 001 221 902) (LimnoTech).
May 25, 2016	Regarding Work Plan to Address Impacted Groundwater at Floodplain Well CA-4A, BASF Corporation, McIntosh, Washington County, Alabama, US EPA ID Number ALD 001 221 902 (ADEM).
August 2016	Draft RCRA Facility Assessment (RFA) Report (U.S. EPA)
September 2016	Fourth Five-Year Review Report for Ciba-Geigy Corp. (McIntosh Plant), ALD001221902, McIntosh, Washington County, Alabama (U.S. EPA).

Selected References

Report Date	Report Title
January 2017	Comprehensive Annual Report: Groundwater Monitoring and Corrective Action/Corrective Measures Effectiveness Reports for OU1 Alluvial and Miocene Aquifers and Inspection Reports for OU1, OU2 and OU4, BASF Corporation, McIntosh, Alabama (LimnoTech).
March 17, 2017	Comprehensive Annual Report, Review Comments, BASF Corporation, McIntosh, Washington County, Alabama, US EPA ID Number ALD 001 221 902 (ADEM).
May 10, 2017	Hazardous Waste Facility Permit, BASF Corporation, McIntosh, AL (ADEM).
May 10, 2017	Preliminary Investigation Report to Address Impacted Groundwater at Well CA-4A, BASF McIntosh, AL (US EPA ID Number ALD 001 221 902) (LimnoTech).
June 1, 2017	Approval letter to Preliminary Investigation Report to Address Impacted Groundwater at CA-4A, BASF Corporation, McIntosh, Washington County, Alabama, USEPA ID Number ALD 001 221 902 (ADEM).
September 2017	Groundwater Sampling Plan Alluvial Aquifer: PFOA, for Operable Unit 1 of the BASF (former Ciba-Geigy) McIntosh, AL Superfund Site (LimnoTech).
February 2018	2017 Comprehensive Annual Report: Groundwater Monitoring and Corrective Action/Corrective Measures Effectiveness Reports for OU1 Alluvial and Miocene Aquifers and Inspection Reports for OU1, OU2 and OU4, BASF Corporation, McIntosh, Alabama (LimnoTech).
April 5, 2018	Comprehensive Annual Report, Review Comments, BASF Corporation, McIntosh, Washington County, Alabama, USEPA ID Number ALD 001 221 902 (ADEM).

Selected References

Report Date	Report Title
May 9, 2018	Work Plan for Additional Onsite Miocene Aquifer Investigations, BASF McIntosh, AL (US EPA ID Number ALD 001 221 902) (LimnoTech).
July 12, 2018	Approval letter to Plan for Corrective Actions for the Chlorobenzene Impacts at and near Alluvial Well CA-4A, BASF Corporation, McIntosh, Washington County, Alabama, USEPA ID Number ALD 001 221 902 (ADEM).
June 13, 2018	Approval letter to Work Plan for Additional Onsite Miocene Aquifer Investigations, BASF Corporation, McIntosh, Washington County, Alabama, USEPA ID Number ALD 001 221 902 (ADEM).
June 27, 2018	Plan for Corrective Actions for the Chlorobenzene Impacts at and near Alluvial Well CA-4A, BASF McIntosh, AL (US EPA ID Number ALD 001 221 902) (LimnoTech).
February 2019	2018 Comprehensive Annual Report: Groundwater Monitoring and Corrective Action/Corrective Measures Effectiveness Reports for OU1 Alluvial and Miocene Aquifers and Inspection Reports for OU1, OU2 and OU4, BASF Corporation, McIntosh, Alabama (LimnoTech).
April 12, 2019	Comprehensive Annual Report, Review Comments, BASF Corporation, McIntosh, Washington County, Alabama, USEPA ID Number ALD 001 221 902 (ADEM).
June 2019	BASF OU3 Explanation of Significant Differences
November 2019	Optimization Review Report, Remedial Process Optimization Study, Ciba-Geigy Corp (McIntosh Plant), Operable Units 1, 2, and 4, McIntosh, Washington County, Alabama, EPA Region 4. Draft Final Report (U.S.EPA).

Selected References

Report Date	Report Title
January 2, 2020	Vertical Aquifer Sampling (VAS) Investigations of Miocene Aquifer Groundwater to Address Chlorobenzene Impacts at Monitoring Wells MD-3B, MD-2 and MD-11, BASF McIntosh, AL (US EPA ID Number ALD 001 221 902) (LimnoTech).
March 9, 2020	Approval letter to January 2, 2020 Vertical Aquifer Sampling (VAS) Investigation of Miocene Aquifer Groundwater Report, BASF Corporation, McIntosh, Washington County, Alabama, USEPA ID Number ALD 001 221 902 (ADEM).
March 31, 2020	Installation of Interim Action Extraction Well PW-11: Corrective Actions for Chlorobenzene Impacts at and near Alluvial Well CA-4A, BASF McIntosh, AL (US EPA ID Number ALD 001 221 902) (LimnoTech).
April 2020	2019 Comprehensive Annual Report: Groundwater Monitoring and Corrective Action/Corrective Measures Effectiveness Reports for OU1 Alluvial and Miocene Aquifers and Inspection Reports for OU1, OU2 and OU4, BASF Corporation, McIntosh, Alabama (LimnoTech).
April 20, 2020	2019 Comprehensive Annual Report, Review Comments, BASF Corporation, McIntosh, Washington County, Alabama, USEPA ID Number ALD 001 221 902 (ADEM).
May 12, 2020	Approval letter to March 31, 2020 Installation of Interim Action Extraction Well PW-11 Report, BASF Corporation, McIntosh, Washington County, Alabama, USEPA ID Number ALD 001 221 902 (ADEM).
March 2021	2020 Comprehensive Annual Report: Groundwater Monitoring and Corrective Action/Corrective Measures Effectiveness Reports for OU1 Alluvial and Miocene Aquifers and Inspection Reports for OU1, OU2 and OU4, BASF Corporation, McIntosh, Alabama (LimnoTech).

Selected References

Report Date	Report Title
April 12, 2021	2020 Comprehensive Annual Report, Review Comments, BASF Corporation, McIntosh, Washington County, Alabama, USEPA ID Number ALD 001 221 902 (ADEM).
June 2021	REVISED 2019 Data Gap Study, Ciba-Geigy McIntosh Superfund Site – Operable Unit 3 (OU3) (LimnoTech)
October 13, 2021	Draft Quality Assurance Project Plan, Ciba-Geigy Superfund Site Operable Unit 3 (LimnoTech).

Attachment B

Corrective Action
Groundwater Monitoring Plan
(updated ~~August 2022~~February 2023)

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Attachment B

Corrective Action
Groundwater Monitoring Plan

(Feb 2023 revision)

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Corrective Action Groundwater Monitoring Plan

1.0 General

BASF has conducted groundwater sampling and analysis at the McIntosh facility since 1981. Chemicals identified in the groundwater resulted in developing and implementing a Corrective Action Plan in 1985, as specified under 40 CFR 264.100 and ADEM Admin. Code R 335-14-5-.06(11). BASF developed this Corrective Action Groundwater Monitoring Plan (Monitoring Plan) to function as the field sampling and analysis plan for the routine Permit-specified groundwater monitoring program. The Monitoring Plan has been developed to support the requirements under Compliance and Corrective Action monitoring and will be effective in demonstrating compliance with the Groundwater Protection Standard.

The Monitoring Plan includes quality assurance and quality control procedures described in "Test Methods for Evaluating Solid Waste" (SW-846, latest edition) related to field sampling activities. Laboratory-specific quality assurance and quality control procedures are incorporated into the laboratory quality assurance/quality control manuals and are not addressed in this document.

This Monitoring Plan is submitted as a part of the RCRA Permit application to be subsequently referenced in the Permit pursuant to 40 CFR 264.97 and ADEM Admin. Code R 335-14-5-.06(8). The Monitoring Plan is supported by site-specific, detailed standard operating procedures describing sampling protocols and sample handling. These standard operating procedures are maintained at the McIntosh site's Environmental Technology Laboratory.

The Monitoring Plan addresses the pertinent aspects of the field sampling program, including:

- Sampling Objectives;
- Sampling Network, Scheduling and Analytical Program;
- Pre-sampling Activities;
- Sample Collection;
- Field Analyses;
- Sample Preservation and Handling;
- Record-keeping and Document Control;
- Analytical Procedures;
- Quality Assurance/Quality Control;
- Evaluation of Data Quality; and,
- Health and Safety.

Each of these elements is discussed in the following sections.

2.0 Sampling Objectives

The groundwater sampling and analysis performed at the BASF McIntosh site, and addressed by this Monitoring Plan, satisfies requirements of the Point-of-Compliance and Corrective Action monitoring. The overall objective of the sampling program is to produce analytical results of sufficient quality to allow an evaluation of the effectiveness of the programs. The Monitoring Plan has been formulated to provide data that are scientifically valid, defensible and of known precision and accuracy. The overall objective will be met by employing sampling and analysis procedures selected to minimize variance in the results produced from the sampling process. The specific objectives of the sampling are listed below:

- Monitor the groundwater in the Alluvial Aquifer to determine compliance with applicable groundwater protection standards; and,
- Generate groundwater quality and water level data in the Alluvial and Upper Miocene Aquifers to allow an evaluation of the effectiveness of the Corrective Action program.

3.0 Groundwater Sampling

3.1 Well Network

Alluvial Aquifer Well Network

A network of 36 wells (both monitoring and pumping wells) provides groundwater data in the program. Attachment C to 2011 RCRA Permit Appendix L provides specific information for each well including horizontal and vertical datum. The wells are shown on Figure 3-1 and described below:

- Up-gradient/background wells M-1, M-2 and MW-12A[1];
- Point-of-Compliance wells OW-1*, M-3, M-4, M-5*, M-6, M-7, M-8*, M-9*, M-10*, M-11*, M-13*, M-14* and M-15*[2];
- Down-gradient evaluation/Effectiveness wells CA-4A, OW-2, OW-4, OW-6, M-12, MW-9A and MW-10A (Note: Beginning in 2017, CA-4A was reclassified as an Effectiveness monitoring well rather than a Corrective Action well);

[1] Beginning in summer 2017, Alluvial Background wells M-1, M-2 and MW-12A are sampled for water quality data on a rotational basis once per year (i.e., one background well is sampled every three years).

[2] Beginning in summer 2017, POC wells OW-1, M-5, M-8, M-9, M-10, M-11, M-13, M-14, and M-15 (noted with an asterisk) are used for semi-annual depth to groundwater monitoring only and not for water quality monitoring.

- Corrective Action monitoring wells CA-1, CA-2 and CA-3. and,
- Corrective Action pumping wells PW-1, PW-2, PW-3 (shutdown), PW-4 (shutdown), PW-5, PW-6, PW-7, PW-8, PW-9 and PW-10 (NOTE: PW-10 is shutdown and used only as a backup well when PW-3 is down for extended servicing periods).
- Interim Action pumping well PW-11, which was installed in June 2019 to address deep Alluvial Aquifer groundwater impacts in the bluffline area that are not hydraulically connected to the shallow portions of the Alluvial Aquifer.

Miocene Aquifer Well Network

A network of thirteen wells provides data for the program. The wells are shown on Figure 3-2 and described below:

- Onsite up-gradient wells MD-1 and MD-5
- Onsite monitoring wells MD-2, MD-3B, MD-4, MD-6, MD-7, MD-8, MD-9, MD-11 and MD-12.
- Offsite monitoring wells: MD-13 and MD-14.

Wells MD-1 and MD-5 monitor up-gradient conditions based on regional and local groundwater flow patterns in the Miocene aquifer. Wells MD-2, MD-9, MD-11 and MD-12 define the Point of Compliance wells for the Upper Miocene aquifer. MD-4 Is defined as an effectiveness monitoring well while wells MD-3B, MD-6, MD-7, MD-8 are defined as boundary monitoring wells based on the RCRA Permit Table III.1. Offsite Miocene monitoring wells MD-13 and MD-14 were installed in March 2012 in accordance with 2011 RCRA Permit Section III.B.1.e.

Groundwater samples are collected from monitoring wells with dedicated down-well bladder pumps (e.g., Well Wizard© or similar bladder pump system). The Alluvial Aquifer up-gradient, point-of-compliance and down-gradient evaluation monitoring wells and Miocene monitoring wells are equipped with in-place dedicated bladder pump systems.

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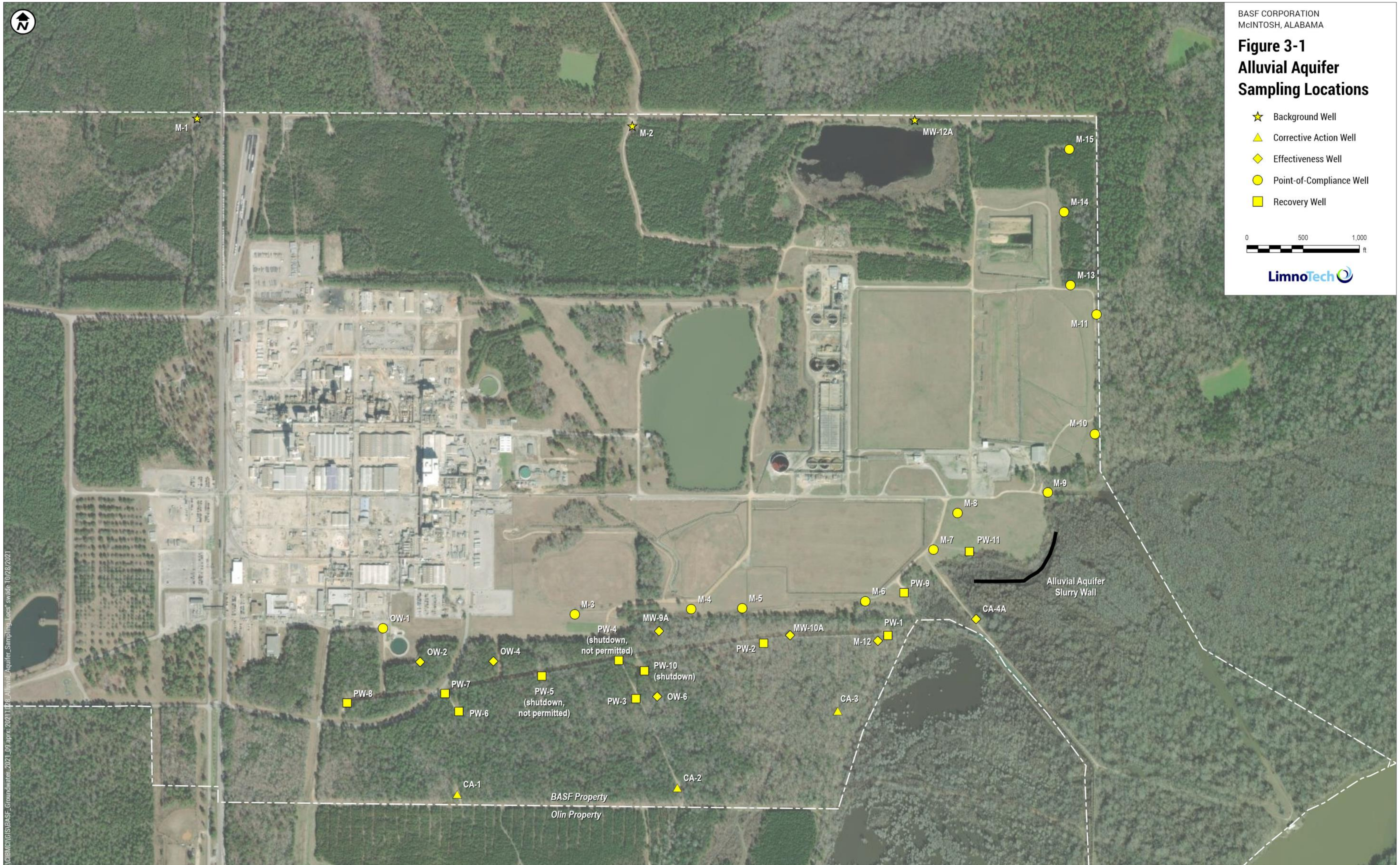

Revised February 2023

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3.2 Sampling Schedule and Analytical Program

Groundwater data will be collected on a semi-annual basis (i.e., January and July) or as required by ADEM. As specified in RCRA Permit Section III.B.2.a, groundwater surface elevation shall be determined at least semi-annually for all wells listed in Table III.1 of the Permit, and each time a sampling event is conducted. Semi-annual data collection will include water level readings and field water quality data measurements for select wells (i.e., specific conductance, pH potential, oxidation-reduction potential and temperature), as well as sampling for laboratory analysis of analytes identified for each aquifer. Table 3-1 lists the analytical parameters that will be collected semi-annually for the Alluvial and Miocene Aquifers, respectively, in accordance with RCRA Permit Appendix L. Additional analytes will be collected annually and every five years in accordance with RCRA Permit Appendix L, as outlined in Table 3-2. The frequency of those analyses for each well (i.e., semi-annual or annual, etc.) also is provided in Table 3-2. Background monitoring wells for the Alluvial and Miocene Aquifers are sampled for water quality data annually (i.e., in July), with one of three Alluvial Background well sampled per year on a rotational basis. Active Alluvial Aquifer extraction wells are only required to be sampled every five years per the RCRCA Permit, but by convention are sampled annually (i.e., during the July event).

Table 3-1

Analytical Parameters for Semi-Annual, Annual and 5-Year Sampling Events
Alluvial and Miocene Aquifers

Analyte/Analytical Method	Parameter	Alluvial Aquifer Sampling Frequency	Miocene Aquifer Sampling Frequency
Metals/6020[1]	Arsenic	Annual	5-Year
	Cobalt	5-Year	n/a
	Lead	5-Year	n/a
	Strontium	n/a	5-Year
	Vanadium	Annual	Annual
VOCs/8260C[1]	Benzene	Semi-annual	Semi-annual
	Carbon Tetrachloride	Semi-Annual	Annual
	Chlorobenzene	Semi-Annual	Semi-Annual
	Choroform	5-Year	5-Year
	1,4-Dichlorobenzene	Annual	5-Year
	1,1-Dichloroethene	Annual	n/a
	1,2,4-Trimethylbenzene	Annual	n/a
	Vinyl Chloride	Annual	n/a
Pesticides/8081B[1]	Alpha-BHC	Semi-Annual	Annual
	Beta-BHC	Semi-Annual	Annual
	Delta-BHC	Semi-Annual	Annual
	4,4'DDD	Annual	Annual
	4,4'-DDE	Annual	Annual
	4,4'-DDT	Annual	Annual
	Gamma-BHC	5-Year	5-Year
	Chlorobenzilate	5-Year	5-Year
PAHs-SVOCs/8270D[1]	1,2-Diphenylhydrazine	Annual	Annual
	Naphthalene	Annual	Annual
	Nitrobenzene	Annual	n/a
	2-Chlorophenol	Annual	n/a
	Bis(2-ethylhexyl) phthalate	5-Year	5-Year
General Water Quality[2]	pH	Semi-Annual	Semi-Annual
	Temperature	Semi-Annual	Semi-Annual
	Specific Conductance	Semi-Annual	Semi-Annual

n/a Not Applicable because parameter was moved to HOLD list for designated Aquifer

[1] Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, latest edition

[2] Measured concurrently with a calibrated field sonde

Table 3-2. Analytical Parameters and Frequency of Sampling by Well Location (per Appendix L of RCRA Permit)

Hazardous Constituent^	GW Protection Standard (mg/l)	Background Concentration (mg/l)^^		Proposed for 2021 RCRA Permit App L: Semi Annual	Annual	5-Years
Metals		Alluvial	Miocene			
Arsenic	0.010	0.006	0.008		x (Alluvial only)	x (Miocene only)
Cobalt	0.0006^^^	0.008	0.004			x (Alluvial only)
Lead	0.015	0.003	0.002			x (Alluvial only)
Strontium	1.2^^^	0.591	0.140			x (Miocene only)
Vanadium	0.0086^^^	0.006	0.007		x	
Pesticides						
Alpha-BHC	0.0000072^^^	na	na	x (Alluvial only)	x	
Beta-BHC	0.000025^^^	na	na	x (Alluvial only)	x	
Delta-BHC	MDL	na	na	x (Alluvial only)	x	
Lindane (gamma-BHC)	0.0002	na	na			x
Chlorobenzilate	0.00031^^^	na	na			x
4,4-DDD	0.0000063^^^	na	na		x	
4,4-DDT	0.00023^^^	na	na		x	
4,4-DDE	0.000046^^^	na	na		x	
VOCs						
Carbon Tetrachloride	0.005	na	na	x (Alluvial only)	x	
Benzene	0.005	na	na	x	x	
Chlorobenzene	0.1	na	na	x	x	
Chloroform	0.08	na	na			x
1,4 - Dichlorobenzene	0.075	na	na		x (Alluvial only)	x
1,1-Dichloroethene	0.007	na	na		x (Alluvial only)	
1,2,4-Trimethylbenzene	0.0056^^^	na	na		x (Alluvial only)	
Vinyl Chloride	0.002	na	na		x (Alluvial only)	
PAH/SVOC						
1,2-Diphenylhydrazine	0.000078^^^	na	na		x	
Naphthalene	0.00012^^^	na	na		x	
Nitrobenzene	0.00014^^^	na	na		x (Alluvial only)	
2-Chlorophenol	0.091^^^	na	na		x (Alluvial only)	
Bis(2-ethylhexyl)phthalate	0.006	na	na			x
General Groundwater Quality/Other						
Temperature						
Ph						
Conductivity						
Depth to Groundwater						

Hazardous Constituent^	BKG#					POC^																
Metals	M-1	M-2	MW-12A	MD-1	MD-5	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-13	M-14	M-15	OW-1	MD-2	MD-9	MD-11	MD-12
Arsenic	a	a	a	5	5	a	a		a	a									5	5	5	5
Cobalt	5	5	5			5	5		5	5												
Lead	5	5	5			5	5		5	5												
Strontium				5	5														5	5	5	5
Vanadium	a	a	a	a	a	a	a		a	a									a	a	a	a
Pesticides																						
Alpha-BHC	a	a	a	a	a	sa	sa		sa	sa									a	a	a	a
Beta-BHC	a	a	a	a	a	sa	sa		sa	sa									a	a	a	a
Delta-BHC	a	a	a	a	a	sa	sa		sa	sa									a	a	a	a
Lindane (gamma-BHC)	5	5	5	5	5	5	5		5	5									5	5	5	5
Chlorobenzilate	5	5	5	5	5	5	5		5	5									5	5	5	5
4,4-DDD	a	a	a	a	a	a	a		a	a									a	a	a	a
4,4-DDT	a	a	a	a	a	a	a		a	a									a	a	a	a
4,4-DDE	a	a	a	a	a	a	a		a	a									a	a	a	a
VOCs																						
Carbon Tetrachloride	a	a	a	a	a	sa	sa		sa	sa									a	a	a	a
Benzene	a	a	a	a	a	sa	sa		sa	sa									sa	sa	sa	sa
Chlorobenzene	a	a	a	a	a	sa	sa		sa	sa									sa	sa	sa	sa
Chloroform	5	5	5	5	5	5	5		5	5									5	5	5	5
1,4 - Dichlorobenzene	a	a	a	5	5	a	a		a	a									5	5	5	5
1,1-Dichloroethene	a	a	a			a	a		a	a												
1,2,4-Trimethylbenzene	a	a	a			a	a		a	a												
Vinyl Chloride	a	a	a			a	a		a	a												
PAH/SVOC																						
1,2-Diphenylhydrazine	a	a	a	a.	a	a	a		a	a									a	a	a	a
Naphthalene	a	a	a	a.	a	a	a		a	a									a	a	a	a
Nitrobenzene	a	a	a			a	a		a	a												
2-Chlorophenol	a	a	a			a	a		a	a												
Bis(2-ethylhexyl)phthalate	5	5	5	5	5	5	5		5	5									5	5	5	5
General Groundwater Quality/Other																						
Temperature	a	a	a	a	a	sa	sa		sa	sa									sa	sa	sa	sa
Ph	a	a	a	a	a	sa	sa		sa	sa									sa	sa	sa	sa
Conductivity	a	a	a	a	a	sa	sa		sa	sa									sa	sa	sa	sa
Depth to Groundwater	sa	sa	sa	sa	sa	sa	sa		sa	sa									sa	sa	sa	sa

Hazardous Constituent^	BDY				EFF								CA		
Metals	MD-3B	MD-6	MD-7	MD-8	MW-9A	MW-10A	M-12	OW-2	OW-4	OW-6	CA-4A	MD-4	CA-1	CA-2	CA-3
Arsenic	5	5	5	5	a	a	a	a	a	a	a	5	a	a	a
Cobalt					5	5	5	5	5	5	5		5	5	5
Lead					5	5	5	5	5	5	5		5	5	5
Strontium	5	5	5	5								5			
Vanadium	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
Pesticides															
Alpha-BHC	a	a	a	a	sa	sa	sa	sa	sa	sa	sa	a	sa	sa	sa
Beta-BHC	a	a	a	a	sa	sa	sa	sa	sa	sa	sa	a	sa	sa	sa
Delta-BHC	a	a	a	a	sa	sa	sa	sa	sa	sa	sa	a	sa	sa	sa
Lindane (gamma-BHC)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Chlorobenzilate	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4,4-DDD	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
4,4-DDT	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
4,4-DDE	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
VOCs															
Carbon Tetrachloride	a	a	a	a	sa	sa	sa	sa	sa	sa	sa	a	sa	sa	sa
Benzene	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa
Chlorobenzene	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa
Chloroform	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
1,4 - Dichlorobenzene	5	5	5	5	a	a	a	a	a	a	a	5	a	a	a
1,1-Dichloroethene					a	a	a	a	a	a	a		a	a	a
1,2,4-Trimethylbenzene					a	a	a	a	a	a	a		a	a	a
Vinyl Chloride					a	a	a	a	a	a	a		a	a	a
PAH/SVOC															
1,2-Diphenylhydrazine	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
Naphthalene	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
Nitrobenzene					a	a	a	a	a	a	a		a	a	a
2-Chlorophenol					a	a	a	a	a	a	a		a	a	a
Bis(2-ethylhexyl)phthalate	5	5	5	5	5	5	5	5	5	5	5		5	5	5
General Groundwater Quality/Other															
Temperature	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa
Ph	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa
Conductivity	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa
Depth to Groundwater	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa	sa

Hazardous Constituent^	REC									OFFSITE	
Metals	PW-1	PW-2	PW-3	PW-6	PW-7	PW-8	PW-9	PW-10**	PW-11	MD-13	MD-14
Arsenic	5	5	5	5	5	5	5		a	5	5
Cobalt	5	5	5	5	5	5	5		5		
Lead	5	5	5	5	5	5	5		5		
Strontium									5	5	5
Vanadium	5	5	5	5	5	5	5		a	a	a
Pesticides											
Alpha-BHC	5	5	5	5	5	5	5		sa	a	a
Beta-BHC	5	5	5	5	5	5	5		sa	a	a
Delta-BHC	5	5	5	5	5	5	5		sa	a	a
Lindane (gamma-BHC)	5	5	5	5	5	5	5		5	5	5
Chlorobenzilate	5	5	5	5	5	5	5		5	5	5
4,4-DDD	5	5	5	5	5	5	5		a	a	a
4,4-DDT	5	5	5	5	5	5	5		a	a	a
4,4-DDE	5	5	5	5	5	5	5		a	a	a
VOCs											
Carbon Tetrachloride	5	5	5	5	5	5	5		sa	a	a
Benzene	5	5	5	5	5	5	5		sa	sa	sa
Chlorobenzene	5	5	5	5	5	5	5		sa	sa	sa
Chloroform	5	5	5	5	5	5	5		5	5	5
1,4 - Dichlorobenzene	5	5	5	5	5	5	5		a	5	5
1,1-Dichloroethene	5	5	5	5	5	5	5		a		
1,2,4-Trimethylbenzene	5	5	5	5	5	5	5		a		
Vinyl Chloride	5	5	5	5	5	5	5		a		
PAH/SVOC											
1,2-Diphenylhydrazine	5	5	5	5	5	5	5		a	a	a
Naphthalene	5	5	5	5	5	5	5		a	a	a
Nitrobenzene	5	5	5	5	5	5	5		a		
2-Chlorophenol	5	5	5	5	5	5	5		a		
Bis(2-ethylhexyl)phthalate	5	5	5	5	5	5	5		5	5	5
General Groundwater Quality/Other											
Temperature	5	5	5	5	5	5	5		sa	sa	sa
Ph	5	5	5	5	5	5	5		sa	sa	sa
Conductivity	5	5	5	5	5	5	5		sa	sa	sa
Depth to Groundwater	sa	sa	sa	sa	sa	sa	sa		sa	sa	sa

Permitted Alluvial wells

Permitted Miocene wells

a: annual sampling

sa: semi-annual sampling

5: sampled every 5-years (last 5-year event occurred in July 2020)

na: not applicable

\# Alluvial BG wells M-1, M-2 and MW-12A sampled once per year on a rotational basis (i.e., one well is sampled every three years)

^ POC wells wells OW-1, M-5, M-8, M-9, M-10, M-11, M-13, M-14, and M-15 are used for semi-annual depth to groundwater monitoring only and not for water quality monitoring.

^^ Background concentrations for metals were calculated using groundwater data from Alluvial and Miocene Aquifer background monitoring wells for sampling years 1998 through 2011 (mean values for each aquifer).

^^^ EPA Regional Screening Levels (RSLs) for Tap Water (May 2016); all other GWPS are MCLs

** PW10 was shutdown on October 15, 2014 and is only used as a backup well to PW-3 when PW-3 is shutdown for extended maintenance periods.

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3.3 Pre-sampling Preparation

The laboratories that will perform the routine analyses will be notified prior to initiating the scheduled sampling activity to ensure that laboratory capacity is adequate and that any special requirements are met. The laboratories will be provided information on the analyses, the number of samples, and the sampling and shipping schedule. The laboratory will initiate chain-of-custody procedures and provide sampling containers and shipping shuttles appropriate for the analyses. All equipment to be utilized during the sampling effort, including field analytical equipment, protective clothing and safety equipment, will be checked for adequacy, serviceability and calibrated (as necessary) prior to conducting the sampling. All sampling team members will be familiar with the sampling program, and record-keeping requirements. Record-keeping procedures and document control are outlined in subsequent sections.

3.4 Groundwater Sample Collection

BASF has developed detailed site-specific standard operating procedures for collecting groundwater data and handling samples. The procedures are written with sufficient detail to allow a sampling team to efficiently collect and handle the samples and produce reliable data. These procedures are periodically reviewed and updated to reflect improved methodologies. The standard operating procedures include equipment inventories and provisions for equipment calibration and maintenance. The procedures are consistent with protocols outlined in SW-846 (latest edition) and "RCRA Ground-Water Monitoring: Draft Technical Guidance" (1992). The standard operating procedures are maintained at the Site and will be made available for review upon request. Pertinent elements of the standard operating procedures for sampling are described below:

- Prior to initiating the well sampling, the sampling team measures the static water level in the well. The measurements in the monitoring wells and alluvial interceptor pumping wells are made with an electric water level indicator with a precision of 0.01 feet.

- Purging at the continuously pumping wells is not required. Flow from the well is nonetheless recorded. All groundwater removed from the Alluvial Aquifer interceptor pumping wells and monitoring wells during the sampling is collected in tanks and disposed of in the NPDES-permitted waste water treatment system.

Monitor Wells Equipped with Dedicated Samplers:

- Monitoring wells are sampled using low-flow (minimal drawdown) sampling procedures and dedicated bladder pump systems driven by portable air compressors, or compressed gas cylinders and portable controllers. Flow rate is controlled at less than 0.5L/m. The purged water is periodically monitored for pH, specific conductance, temperature and oxidation-reduction (redox) potential, along with depth to groundwater monitoring to evaluate drawdown during purging and sampling activties. Purging ceases when minimal variance in the measurements indicates stable conditions or at 1 hour of purging, whichever is first. Three successive readings should be within $\pm$0.1 s.u. for pH, $\pm$3% for conductivity and $\pm$10 mv for redox potential. When stable conditions have been attained, four replicate measurements of each water quality parameter are made and recorded in the logbook.
- Samples for laboratory analysis are collected following well purging. Samples for purgeable organic compounds (i.e., VOC's) are collected first. The groundwater is sampled by pumping the water directly into laboratory-supplied precleaned sampling containers appropriate for the analysis. Sample preservatives, if required, are placed in the containers at the laboratory. The containers are then labeled and placed in a cooler with ice.
- Following sampling, the sampling team measures static water in the well prior to replacing and locking the cap. The samples are then transported to the Environmental Technology Laboratory and packaged for off-site shipment or placed in a secure cooler.

- Samples that are shipped to off-site laboratories are placed in shipping containers supplied by the laboratory and packed with water ice and/or "blue ice", as recommended. The chain-of-custody is then placed in the shipping container and the container is sealed. Samples are shipped by overnight carrier or transported directly by courier.

3.5 Field Analyses

Field analyses are limited to pH, specific conductance, redox potential and temperature. These analyses are conducted during low-flow (minimal drawdown) procedures to determine when groundwater representative of the aquifer is available for sampling. These indicator parameter measurements are also used along with the results of the Groundwater Protection Standard analyses to assess water quality changes.

The field analyses are performed with standard laboratory electronic instruments designed for measurement of aqueous samples. Standard operating procedures maintained at the on-site laboratory describe the equipment, calibration requirements and instrument operation.

3.6 Sample Preservation and Handling

Groundwater samples will be preserved and handled according to procedures presented in SW-846, latest edition or alternate EPA-approved procedures. Sample container materials are those specified by the laboratory conducting the analyses, along with the aforementioned preservation/holding time procedures. Standard operating procedures maintained at the on-site laboratory, and available for review, include specific instructions for sample preservation and handling.

3.7 Record-keeping and Document Control

A chronological record of sampling activities is maintained in individual, dedicated, paginated field/laboratory logbooks or electronically, in the field. When logbooks are used, each completed page of the logbook is signed and dated by the field personnel on a daily basis. The logbooks contain relevant information regarding the sampling and sample handling, including:

- Well location and identification;
- Sampling date and time;
- Water quality data (i.e., pH, specific conductance, redox potential and temperature, if appropriate));
- Water level before and after sampling (if appropriate);
- Pumping rate used to purge the well (if appropriate);
- Weather conditions; and,
- Other relevant information.

All groundwater samples submitted for analysis to an off-site laboratory will be accompanied by a chain-of-custody record to establish the documentation necessary to trace sample possession from the time of collection to final laboratory analysis. The chain-of-custody includes custody receipt/relinquish signature areas and, typically, laboratory request sections. The record format varies by laboratory but includes the information regarding samples, requested analysis and custody specified by SW-846. Chain-of-custody will be initiated by the laboratory under routine sampling conditions.

Chain-of-custody for internal analyses is documented in the field logbook or on the electronic field log. The sampling team notes all relevant information, including sample identification, time of sampling, date of sampling, required analysis and the sampler's name. The sampling team ships or otherwise transports the samples to the laboratory. At the laboratory, the samples are relinquished and logged into a bound, paginated laboratory notebook.

3.8 Analytical Procedures

The analytical procedures selected for the groundwater samples are contained in SW-846 ", Standard Methods for the Examination of Water and Wastewater" (latest editions) and "Methods for the Chemical Analysis of Water and Wastes" (EPA 600/4-79-020). The analytical methods for each parameter and target analyte are listed in Table 3-1 (Section 3.2). If the SW-846, or other standard methods, are modified, the modified procedure will be documented in a standard operating procedure maintained at the laboratory and available for review. Alternate SW-846 methods may be used if the results of the alternate methods are as effective, or superior to, the methods listed in the tables in detecting and quantifying the target constituents.

The reporting limits (RL) and method detection limits (MDL) reported by a laboratory may vary as a result of sample matrix effects or dilution requirements resulting from concentrations of targeted constituents beyond the analytical instrument range. The reporting limits established by the laboratory are the lowest concentrations achievable by the laboratory consistent with the appropriate SW-846 or other EPA-approved analytical method. The MDL generally is lower than the RL and is a statistical calculation. The MDL is below the point of calibration, so results reported down to the MDL must be qualified as estimated values and, as such, carry a "J" qualifier designation. The Alabama Department of Environmental Management (ADEM) requires MDLs to be at least as low as the Groundwater Protection Standard (GWPS) for each laboratory analyte.

3.9 Quality Assurance/Quality Control

The groundwater monitoring program includes provisions for collecting field quality assurance samples to aid in evaluating the analytical results reported by laboratories. The field quality assurance samples include trip blanks, field blanks and field duplicates. Equipment rinsates are not required in the program because the sampling is accomplished with dedicated sampling systems.

Trip blanks consist of analyte-free water taken from the laboratory to the sampling site and returned to the laboratory unopened. A trip blank is used to document contamination attributable to shipping and field handling procedures.

Field blanks consist of analyte-free water taken from the laboratory to the sampling site, where the water is transferred to another sampling container. A field blank is used to document contamination attributable to ambient conditions and to assess potential sample container contamination.

Field duplicates are independent samples collected simultaneously at a well, stored in separate containers and analyzed independently. Field duplicates are used to document the precision of the sampling and analysis process.

Trip blanks and field blanks are typically collected for volatile compounds. Field blanks are not routinely collected but may be collected for specific projects. Approximately one quality assurance blank (e.g., duplicate) is collected for every ten well samples submitted to the laboratory (i.e., ten percent).

3.10 Data Evaluation

The data generated by the monitoring program are evaluated for acceptable quality by conducting a rigorous review of the laboratory quality control information supplied with the analytical report. The laboratory report includes information regarding the acceptability of the data based on control limits and control procedures established by the laboratory and consistent with SW-846. The analytical data also are evaluated using results of the field quality assurance sampling, as discussed above. The data are also evaluated in time-series graphs. When reported analytical results do not satisfy the acceptance criteria or are otherwise suspect, the data is labeled as questionable and corrective action is taken. Corrective action may result in modifying sampling and sample handling procedures, or analytical methods presented in this document, or resampling.

3.11 Health and Safety

The following procedures will be utilized to maintain safe sampling practices and minimize the exposure of the sampling personnel to potentially hazardous substances:

- Sampling personnel will wear nitrile rubber gloves during sampling. New gloves will be worn during each well sampling;
- Level D personal protective equipment (PPE) will generally be worn during sampling;
- Level C respiratory protection will be available at all times (organic vapor/acid mist cartridges); and,

- When transferring groundwater to a sample container, the transfers will not be conducted immediately below the person's breathing zone or near the eyes.

Attachment C

Monitoring Well Location Information

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MONITORING WELL LOCATION INFORMATION

WELL NUMBER	WELL TYPE*	WELL LATITUDE	WELL LONGITUDE	UNIT(S) MONITORED	WELL DEPTH (ft)	GROUND ELEVATION (ft.MSL)	TOP-OF-RISER ELEVATION (ft.MSL)	SCREENED INTERVAL (ft. MSL)	MONITORED ZONE
M-1	BKG	31° 17.236’	088° 00.531’	Entire Facility	76.5	55.65	42.62	29.66/40.34	Alluvial
M-2	BKG	31° 17.230’	087° 59.789’	Entire Facility	69.5	36.75	39.08	29.66/40.34	Alluvial
M-3	POC	31° 16.514’	087° 59.879’	Entire Facility	74.0	42.7	44.95	19.42/-43.82	Alluvial
M-4	POC	31° 16.523’	087° 59.680’	Entire Facility	57.0	28.95	29.73	24.71/-19.29	Alluvial
M-6	POC	31° 16.537’	087° 59.383’	Entire Facility	61.0	36.55	38.38	21.26/-23.74	Alluvial
M-7	POC	31° 16.615’	087° 59.264’	Entire Facility	75.0	52.55	54.63	33.20/-16.80	Alluvial
MW-9A	EFF	31° 16.491’	087° 59.729’	Entire Facility	58.05	26.75	29.98	12.22/-28.25	Alluvial
MW-1OA	EFF	31°16.486’	087° 59.511’	Entire Facility	54.80	30.15	32.88	18.32/-22.15	Alluvial
M-12	EFF	31° 16.479’	087° 59.361’	Entire Facility	60.0	41.60	43.81	14.23/-12.79	Alluvial
MW-12A	BKG	31° 17.243’	087° 59.306"	Entire Facility	75.25	31.65	34.43	47.65/22.60/ 12.55/2.83	Alluvial
OW-2	EFF	31° 16.442’	088° 00.142’	Entire Facility	85.66	51.60	52.58	28.89/-33.11	Alluvial
OW-4	EFF	31° 16.444’	088° OO.017’	Entire Facility	76.93	48.45	50.17	32.41/-27.59	Alluvial
OW-6	EFF	31° 16.392’	087° 59.741’	Entire Facility	7308	33.65	34.27	22.01/-22.99	Alluvial
CA-l	CAM	31° 16.249’	088° 00.076’	Entire Facility	88.54	49.90	53.69	17.8/-37.2	Alluvial
CA-2	CAM	31° 16.261’	087° 59.701’	Entire Facility	60.72	32.55	33.18	22.4/-27.6	Alluvial
CA-3	CAM	31° 16.377’	087° 59.431’	Entire Facility	55.61	35.15	37.74	20.9/-19.1	Alluvial
CA-4A	EFF	31° 16.512'	087° 59.194'	Entire Facility	53.42	14.30	17.49	4.21/-35.79	Alluvial
PW-1	RCY	31° 16.487’	087° 59.344’	Entire Facility	58.73	44.15	45.81	13.3/-11.9	Alluvial
PW-2	RCY	31° 16.474’	087° 59.556’	Entire Facility	56.64	30.75	32.59	17.2/-23.9	Alluvial
PW-3	RCY	31° 16.391’	087° 59.773’	Entire Facility	68.55	39.05	40.99	18.2/-26.8	Alluvial
PW-6	RCY	31° 16.370’	088° 00.075’	Entire Facility	95.33	48.45	50.42	20.8/-44.13	Alluvial
PW-7	RCY	31° 16.396’	088° 00.099’	Entire Facility	84.12	50.15	52.41	25.7/-36.24	Alluvial
PW-8	RCY	31° 16.382’	088° 00.265’	Entire Facility	94.0	52.25	53.60	24.9/-40.99	Alluvial
PW-9	RCY	31° 16.550’	087° 59317’	Entire Facility	62.93	43.65	45.48	9.7/-19.5	Alluvial
PW-10^	RCY	31° 16.429’	087° 59.758’	Entire Facility	63.05	41.15	43.47	31.15/-18.85	Alluvial
PW-11	IA-RCY	31° 16.611’	087° 59.206’	Entire Facility	91.73	34.50	36.29	-30/-55	Lower Alluvial
MD-1	BKG	31° 17.241’	088° 00.533’	Entire Facility	247.0	40.45	41.49	-186.15/-206.15	Miocene
MD-2	POC	31° 16.538’	087° 59.381’	Entire Facility	160.0	36.50	38.05	-99.15/-119.15	Miocene
MD-3B	BDY	31° 16.257’	088° 00.320’	Entire Facility	220.0	41.37	44.01	-158.631-178.63	Miocene
MD-4	EFF	31° 16.712’	087° 59.061’	Entire Facility	159.28	34.40	36.81	-76.10/-114.74	Miocene
MD-5	BKG	31° 17.038’	087° 59.363’	Entire Facility	177	39.79	42.31	-122.21/-137.21	Miocene
MD-6	BDY	31° 16.262’	087° 59.702’	Entire Facility	197.25	32.64	34.92	-149.61/-164.61	Miocene
MD-7	BDY	31° 16.240’	087° 59.456’	Entire Facility	160	32.79	35.61	-107.21/-127.21	Miocene
MD-8	BDY	31° 16.454’	087° 59.794’	Entire Facility	235	42.46	42.26	-215/-235	Miocene
MD-9	POC	31° 16.45’	087° 59.516’	Entire Facility	160	27.45	29.76	-112.55/-132	Miocene
MD-11	POC	31° 16.520’	087° 59.204’	Entire Facility	111	16.52	20.72	-65.94/-85.94	Miocene
MD-12	POC	31° 16.553’	087° 59.243’	Entire Facility	135	19.3	22.43	-95.8/-115.8	Miocene
MD-13	Offsite	31° 16.104’	087° 59.729’	Entire Facility	285	30.52	33.00	-199.48/-219.48	Miocene
MD-14	Offsite	31° 16.107’	087° 59.917’	Entire Facility	300	42.74	45.44	-156.77/-176.77	Miocene

* Well Type:
POC – Point of Compliance Wells (M-5, M-8, M-9, M-10, M-11, M-13, M-14, M-15 & OW-1 are monitored semi-annually for depth to groundwater data only).
EFF – Effectiveness Monitoring Wells
PGM – Piezometers and/or General Monitoring Wells
BKG – Background Wells (one BG well is sampled each year for each Aquifer on an annual rotation basis)
BDY – Boundary Monitoring Wells
RCY – Recovery Wells (excluding backup well PW-10)
IA-RCY – Interim Action Recovery Well PW-11
CAM – Corrective Action Monitoring Wells
Offsite – Offsite Miocene Monitoring Wells
^PW10 was shutdown on October 15, 2014 and now is used as a backup well when PW-3 is down for maintenance

Attachment D

Summary of Historical Groundwater Analyses
(Frequencies of Analytes Detected and Exceedances of Groundwater Protection Standards)
(updated August 2022)

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Comprehensive BASF McIntosh Analyte List		Jan 1996 - Apr 2010 Analytes, Frequency of Detections & Exceedances						July 2011 - Jan 2016 Analytes, Frequency of Detections & Exceedances			July 2017 - July 2021 Analytes, Frequency of Detections & Exceedances, & Recommedations for 2022 RCRA Permit List				
Historical Analyte	**CASRN**	**1997-2005 Alluvial Analyte List**	**1997-2005 Alluvial Detections**	**1997-2005 Alluvial Exceedances**	**2006-2010 Alluvial Analyte List**	**2006-2010 Alluvial Detections**	**2006-2010 Alluvial Exceedances**	**Oct 2011 Permit: Alluvial Analyte List**	**Jul 2011-Jan 2016 Alluvial Detections/# Samples**	**Jul 2011-Jan 2016 Alluvial Exceedances/# Detections**	**May 2017 Permit: Alluvial Analyte List**	**Jul 2017-July 2021 Alluvial Detections/ # Samples**	**Jul 2017-Jul 2021 Alluvial Exceedances/ # Detections**	**Recommendations for Alluvial Analyte List - 2022 Permit**	**Justification**
ARSENIC	7440-38-2	x	225/518	100/225	x	180/337	50/180	x	246/318	125/246	x	158/196	89/158	move from semi-annual to annual	Known to be naturally occurring in Gulf Coast groundwater. Frequently detected above GWPS in Alluvial Aquifer GW, including BG well MW-12A & CA wells CA-1 & CA-2 (which don't exceedances of other COCs except for Va (also may also be naturally occurring)
LEAD	7439-92-1	x	17/356	3/17	x	74/338	5/74	x	153/318	9/153	x	51/132	2/51	move from annual to 5-years	infrequent detections and exceedances in 1997-2021 (2017-2021 exceedances occurred in voluntary floodplain wells)
VANADIUM	7440-62-2	x	1/32	0/1	x	31/39	0/31	x	37/37	15/37	x	65/132	33/65		
BARIUM	7440-39-3	x	335/356	0/335	x	162/164	0/162	x	189/189	0/189	x	27/29	0/27	move from 5-Years to HOLD	no history of exceedances
CADMIUM	7440-43-9	x	2/356	2/2	x	19/164	0/19	x	17/189	0/17	x	3/29	0/3	move from 5-Years to HOLD	infrequent detections; no exceedances in 2006-2010 and 2011-2021
CHROMIUM	7440-47-3	x	13/356	2/13	x	63/337	1/63	x	110/189	0/110	x	14/29	0/14	move from 5-Years to HOLD	only one excedance in 2005-2010 permit cycle, none in 2011-2021
COBALT	7440-48-4	x	62/184	0/62	x	214/297	0/214	x	71/76	3/71	x	27/29	1/27		
STRONTIUM	7440-24-6	x	339/339	0/339	x	158/164	0/158	x	76/76	0/76	x	29/29	0/29	move from 5-Years to HOLD	No exceedances in 1997-2021
THALLIUM	7440-28-0	x	10/184	10/10	x	8/295	8/8	x	15/318	0/15	x	4/29	0/4	move from 5-Years to HOLD	infrequent detections, no exceedances 1997-2021
MERCURY	7439-97-6	x	14/356	1/14	x	66/339	0/66	x	50/189	0/50	x	4/29	0/4	move from 5-Years to HOLD	infrequent detections, no exceedances 2011-2021
CYANIDE	57-12-5	x	0/272	0/0	x	15/125	0/15	x	10/188	0/10	x	11/29	0/11	move from 5-Years to HOLD	infrequent detections, no exceedances 1997-2021
ALDRIN	309-00-2	x	0/6								x	2/132	1/2	move from annual to HOLD	Infreqeunt detection and only one exceedance in 2017-2021 (in voluntary floodplain well PZ-15)
ALPHA-BHC	319-84-6	x	251/678	205/251	x	105/337	84/105	x	99/293	91/99	x	94/196	76/94		
BETA-BHC	319-85-7	x	119/363	119/119	x	99/337	95/99	x	94/293	76/94	x	105/196	72/105		
DELTA-BHC	319-86-8	x	95/362	29/95	x	82/337	10/82	x	79/293	79/79	x	50/196	50/50		
GAMMA-BHC (LINDANE)	58-89-9	x	93/678	45/93	x	45/337	13/45	x	27/293	5/27	x	42/132	4/42	move from annual to every 5-Years	Infrequent detections 2006-2021, few exceedances in 2017-2021 in OW-4 only at <3x GWPS)
4,4'-DDD	72-54-8	x	14/190	8/14	x	19/297	11/19	x	29/293	13/29	x	52/132	12/52		
4,4'-DDE	72-55-9	x	0/5	0/0	x	7/173	2/7	x	21/293	13/21	x	32/132	9/32		
4,4'-DDT	50-29-3	x	25/364	20/25	x	27/337	13/27	x	32/293	14/32	x	23/132	12/23		
DIELDRIN	60-57-1	x	0/6								x	0/132	0/0	move from annual to HOLD	No detections in 2017-2021
CHLOROBENZILATE	510-15-6	x	6/185	6/6	x	5/297	5/5	x	9/289	5/9	x	3/132	3/3	move from annual to every 5-years	infrequent detections and exceedances in 1997-2021
BENZENE	71-43-2	x	79/674	76/79	x	77/338	27/77	x	50/323	17/50	x	53/197	21/53		
CARBON TETRACHLORIDE	56-23-5	x	27/280	26/27	x	65/298	44/65	x	59/323	33/59	x	43/197	26/43		
CHLOROBENZENE	108-90-7	x	216/676	103/216	x	149/344	40/149	x	104/323	36/104	x	86/197	29/86		
CHLOROFORM	67-66-3	x	138/676	13/138	x	115/338	4/115	x	88/323	0/88	x	56/133	1/56	move from annual to every 5-Years	No exceedances 2011-2016, only one in 2017-2021 (@ M-7 & <2x GWPS)
1,4-DICHLOROBENZENE	106-46-7	x	30/281	4/30	x	69/298	4/69	x	67/358	0/67	x	38/133	3/38		
1,1-DICHLOROETHYLENE	75-35-4	x	0/8	0/0	x	15/124	4/15	x	25/318	5/25	x	12/133	3/12		
1,2,4-TRIMETHYLBENZENE	95-63-6	x	0/185	0/0	x	3/124	2/3	x	6/194	5/6	x	7/133	7/7		
VINYL CHLORIDE	75-01-4	x	0/6								x	10/133	4/10		
1,2-DICHLOROBENZENE	95-50-1	x	4/128	0/4	x	5/39	0/5	x	31/187	0/31	x	5/29	0/5	move from 5-yr to HOLD	No detections in 2017-2021
ACETONE	67-64-1	x	0/38	0/0	x	0/39	0/0	x	27/79	0/27	x	0/29	0/0	move from 5-yr to HOLD	No detections in 2017-2021
CHLOROETHANE	75-00-3	x	0/454	0/0	x	4/338	0/4	x	2/323	0/2	x	0/29	0/0	move from 5-yr to HOLD	No detections in 2017-2021
CHLOROPRENE	126-99-8	x	0/186	0/0	x	0/124	0/0	x	0/194	0/0	x	0/29	0/0	move from 5-yr to HOLD	No detections in 1996-2021
DICHLOROMETHANE	75-09-2	x	1/201	1/1	x	0/39	0/0	x	2/79	2/2	x	0/29	0/0	move from 5-yr to HOLD	No detections in 1997-2021
TRICHLOROETHYLENE	79-01-6	x	0/448	0/0	x	1/164	1/1	x	2/194	0/2	x	0/29	0/0	move from 5-yr to HOLD	No exceedances 2011-2016; no detections 2017-2021
2-CHLOROPHENOL	95-57-8										x	18/132	7/18		
NAPHTHALENE	91-20-3	x	12/351	4/12	x	30/297	7/30	x	34/395	6/34	x	11/132	7/11		
NITROBENZENE	98-95-3	x	2/273	2/2	x	5/124	5/5	x	3/190	3/3	x	17/132	10/17		
1,2-DIPHENYLHYDRAZINE	122-66-7	x	2/183	2/2	x	2/124	2/2	x	6/190	6/6	x	29/132	24/29		
ANILINE	62-53-3	x	0/272	0/0	x	1/124	1/1	x	0/163	0/0	x	0/29	0/0	move from 5-Years to HOLD	No detections in 2017-2021
3,4-BENZOFLUORANTHENE	205-99-2	x	2/185	2/2	x	1/124	1/1	x	0/226	0/0	x	0/29	0/0	move from 5-Years to HOLD	No detections in 2017-2021
BENZO(K)FLUORANTHENE	207-08-9	x	3/185	0/3	x	20/124	0/20	x	0/226	0/0	x	0/29	0/0	move from 5-Years to HOLD	No detections in 2017-2022
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7							x	29/37	28/29	x	22/29	21/22		
1,2-TRANS-DICHLOROETHYLENE	156-60-5	x	0/191	0/0	x	0/170	0/0	x	1/239	0/1					
2-BUTANONE (MEK)	78-93-3	x	0/354	0/0	x	0/124	0/0	x	0/79	0/0					
CARBON DISULFIDE	75-15-0	x	0/280	0/0	x	0/124	0/0	x	0/79	0/0					
CIS-1,2-DICHLOROETHENE	156-59-2	x	0/191	0/0	x	0/176	0/0	x	5/239	0/5					
m&p-Xylene	108-38-3	x	0/69	0/0	x	0/42	no criterion	x	1/79	1/1					
METHYLBENZENE	108-88-3	x	3/528	0/3	x	11/164	0/11	x	0/79	0/0					
N-NITROSODIPHENYLAMINE	86-30-6	x	0/183	0/0	x	1/124	0/1	x	0/76	0/0					
PHENOL	108-95-2	x	1/346	0/1	x	2/124	0/2	x	0/76	0/0					
SELENIUM	7782-49-2	x	4/356	0/4	x	12/164	0/12	x	33/76	0/33					
SILVER	7440-22-4	x	0/356	0/0	x	3/164	0/3	x	0/76	0/0					
ZINC	7440-66-6	x	9/32	0/9	x	36/39	0/36	x	32/37	0/32					
1,2-DICHLOROETHYLENE	540-59-0				x	0/125	no criterion								
1,3-dimethylbenzene	136777-61-2	x	0/116	0/0	x	0/54	0/0								
2,4,5-TP SILVEX	93-72-1	x	0/201	0/0	x	0/39	0/0								
2,4,6-TRIBROMOPHENOL	118-79-6				x	39/39	no criterion								
2-FLUOROBIPHENYL	321-60-8				x	78/78	no criterion								
2-FLUOROPHENOL	367-12-4				x	39/39	no criterion								
ALDICARB	116-06-3	x	0/126	0/0	x	0/39	0/0								
DCB DECACHLOROBIPHENYL	2051-24-3				x	39/39	no criterion								
DI-N-OCTYL PHTHALATE	117-84-0	x	17/122	16/17	x	29/39	29/29								
ENDRIN	72-20-8	x	0/212	0/0	x	0/39	0/0								
LITHIUM	7439-93-2				x	not analyzed	not analyzed								
STYRENE (MONOMER)	100-42-5	x	0/38	0/0	x	0/39	0/0								
Total organic halides	59473-04-0	x	150/187	no criterion	x	1/1	no criterion								
1,1,1,2-TETRACHLOROETHANE	630-20-6	x	0/6												
1,1,1-TRICHLOROETHANE	71-55-6	x	0/6												
1,1,2,2-TETRACHLOROETHANE	79-34-5	x	0/6												
1,1,2-TRICHLOROETHANE	79-00-5	x	0/6												
1,1-DICHLOROETHANE	75-34-3	x	1/6	no criterion											
1,2,3-Trichlorobenzene	87-61-6														
1,2,3-TRICHLOROPROPANE	96-18-4	x	0/6												
1,2,4-TRICHLOROBENZENE	120-82-1														
1,2-DIBROMO-3-CHLOROPROPANE (DBCP)	96-12-8	x	0/6												
1,2-DIBROMOETHANE (EDB)	106-93-4	x	0/6												
1,2-DICHLOROETHANE	107-06-2	x	0/6												
1,2-DICHLOROPROPANE	78-87-5	x	0/6												

Comprehensive BASF McIntosh Analyte List		Jan 1996 - Apr 2010 Analytes, Frequency of Detections & Exceedances						July 2011 - Jan 2016 Analytes, Frequency of Detections & Exceedances			July 2017 - July 2021 Analytes, Frequency of Detections & Exceedances, & Recommedations for 2022 RCRA Permit List				
Historical Analyte	CASRN	1997-2005 Alluvial Analyte List	1997-2005 Alluvial Detections	1997-2005 Alluvial Exceedances	2006-2010 Alluvial Analyte List	2006-2010 Alluvial Detections	2006-2010 Alluvial Exceedances	Oct 2011 Permit: Alluvial Analyte List	Jul 2011-Jan 2016 Alluvial Detections/# Samples	Jul 2011-Jan 2016 Alluvial Exceedances/# Detections	May 2017 Permit: Alluvial Analyte List	Jul 2017-July 2021 Alluvial Detections/ # Samples	Jul 2017-Jul 2021 Alluvial Exceedances/ # Detections	Recommendations for Alluvial Analyte List - 2022 Permit	Justification
1,3,5-Trimethylbenzene	108-67-8														
M-DICHLOROBENZENE	541-73-1	x	0/90												
1,3-Dichloropropane	142-28-9														
1-Chlorobutane	109-69-3														
2,4,5-TRICHLOROPHENOL	95-95-4														
2,4,6-TRICHLOROPHENOL	88-06-2														
2,4-DICHLOROPHENOL	120-83-2														
2,4-DIMETHYLPHENOL	105-67-9														
2,4-DINITROPHENOL	51-28-5														
2,4-DINITROTOLUENE	121-14-2														
2,6-DINITROTOLUENE	606-20-2														
2-CHLOROETHYL VINYL ETHER	110-75-8														
2-CHLORONAPHTHALENE	91-58-7														
2-Chlorotoluene	95-49-8														
METHYL N-BUTYL KETONE	591-78-6	x	0/6												
2-METHYLNAPHTHALENE	91-57-6														
M/P-CRESOL	95-48-7	x	0/163												
2-NITROANILINE	88-74-4														
2-NITROPHENOL	88-75-5														
3,3`-DICHLOROBENZIDINE	91-94-1														
3-NITROANILINE	99-09-2														
4,6-DINITRO-2-METHYLPHENOL	534-52-1														
4-BROMOPHENYL PHENYL ETHER	101-55-3														
P-CHLORO-M-CRESOL	59-50-7														
P-CHLOROANILINE	106-47-8														
4-CHLOROPHENYL PHENYL ETHER	7005-72-3														
4-Chlorotoluene	106-43-4														
4-METHYL-2-PENTANONE (MIBK)	108-10-1	x	0/6												
3-Methylphenol/4-Methylphenol (m&p-Cresol)	106-44-5														
P-NITROANILINE	100-01-6														
4-NITROPHENOL	100-02-7														
ACENAPHTHENE	83-32-9														
ACENAPHTHYLENE	208-96-8														
ACROLEIN	107-02-8	x	0/6												
ACRYLONITRILE	107-13-1	x	0/6												
ANTHRACENE	120-12-7														
BENZIDINE	92-87-5														
BENZO(A)ANTHRACENE	56-55-3														
BENZO(A)PYRENE	50-32-8														
BENZO(G,H,I)PERYLENE	191-24-2														
Benzoic acid	65-85-0														
BENZYL ALCOHOL	100-51-6														
BERYLLIUM															
BIS(2-CHLOROETHOXY)METHANE	111-91-1														
BIS(2-CHLOROETHYL)ETHER	111-44-4														
BIS(2-CHLORO-1-METHYLETHYL)ETHER	108-60-1														
Bromobenzene	108-86-1														
Bromochloromethane	74-97-5	x	0/6												
BROMODICHLOROMETHANE	75-27-4	x	0/6												
TRIBROMOMETHANE	75-25-2	x	0/6												
BROMOMETHANE	74-83-9	x	0/6												
BENZYL BUTYL PHTHALATE	85-68-7														
CHLOROMETHANE	74-87-3	x	0/6												
ALLYL CHLORIDE	107-05-1	x	0/1												
1,2-BENZPHENANTHRACENE	218-01-9														
CIS-1,3-DICHLOROPROPENE	10061-01-5	x	0/6												
DIBENZO(A,H)ANTHRACENE	53-70-3														
DIBENZOFURAN	132-64-9														
CHLORODIBROMOMETHANE	124-48-1	x	0/6												
CFC-12	75-71-8	x	0/6												
DIETHYL PHTHALATE	84-66-2														
Diethyl ether	60-29-7														
DIMETHYL PHTHALATE	131-11-3														
DI-N-BUTYL PHTHALATE	84-74-2														
Di-n-octylphthalate	117-84-0														
ENDOSULFAN I	959-98-8	x	0/6												
ENDOSULFAN II	33213-65-9	x	0/6												
ENDOSULFAN SULFATE	1031-07-8	x	0/6												
ENDRIN ALDEHYDE	7421-93-4	x	0/6												
ETHYL METHACRYLATE	97-63-2	x	0/1												
ETHYLBENZENE	100-41-4	x	0/6												
FLUORANTHENE	206-44-0														
FLUORENE	86-73-7														
HEPTACHLOR	76-44-8	x	0/106												
HEPTACHLOR EPOXIDE	1024-57-3	x	0/6												
HEXACHLOROBENZENE	118-74-1														
HEXACHLORO-1,3-BUTADIENE	87-68-3														
HEXACHLOROCYCLOPENTADIENE	77-47-4														
HEXACHLOROETHANE	67-72-1	x	0/5												
INDENO(1,2,3-CD)PYRENE	193-39-5														
IODOMETHANE	74-88-4	x	0/1												

Comprehensive BASF McIntosh Analyte List		Jan 1996 - Apr 2010 Analytes, Frequency of Detections & Exceedances						July 2011 - Jan 2016 Analytes, Frequency of Detections & Exceedances			July 2017 - July 2021 Analytes, Frequency of Detections & Exceedances, & Recommedations for 2022 RCRA Permit List				
Historical Analyte	**CASRN**	**1997-2005 Alluvial Analyte List**	**1997-2005 Alluvial Detections**	**1997-2005 Alluvial Exceedances**	**2006-2010 Alluvial Analyte List**	**2006-2010 Alluvial Detections**	**2006-2010 Alluvial Exceedances**	**Oct 2011 Permit: Alluvial Analyte List**	**Jul 2011-Jan 2016 Alluvial Detections/# Samples**	**Jul 2011-Jan 2016 Alluvial Exceedances/# Detections**	**May 2017 Permit: Alluvial Analyte List**	**Jul 2017-July 2021 Alluvial Detections/ # Samples**	**Jul 2017-Jul 2021 Alluvial Exceedances/ # Detections**	**Recommendations for Alluvial Analyte List - 2022 Permit**	**Justification**
3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	78-59-1														
Isopropylbenzene	98-82-8														
METHYLACRYLONITRILE	126-98-7	x	0/1												
Methylacrylate	96-33-3														
METHYL METHACRYLATE	80-62-6	x	0/1												
DIBROMOMETHANE	74-95-3	x	0/6												
Methyl t-butyl ether (MTBE)	1634-04-4														
n-Butylbenzene	104-51-8														
METHANAMINE, N-METHYL-N-NITROSO	62-75-9														
N-NITROSODI-N-PROPYLAMINE	621-64-7														
n-Propylbenzene	103-65-1														
o-Xylene	95-47-6														
PENTACHLOROETHANE	76-01-7	x	0/1												
PENTACHLOROPHENOL	87-86-5														
PHENANTHRENE	85-01-8														
4-Isopropyltoluene	99-87-6														
ETHYL CYANIDE	107-12-0	x	0/1												
PYRENE	129-00-0														
sec-Butylbenzene	135-98-8														
tert-Butylbenzene	98-06-6														
TETRACHLOROETHENE	127-18-4	x	0/6												
Tetrahydrofuran	109-99-9														
CAMPHECHLOR	8001-35-2	x	0/169												
TRANS-1,3-DICHLOROPROPENE	10061-02-6	x	0/6												
TRANS-1,4-DICHLOROBUTENE	110-57-6	x	0/1												
CFC-11	75-69-4	x	0/6												
XYLENE	1330-20-7	x	0/6												
Chloroacetonitrile	107-14-2														
VINYL ACETATE	108-05-4	x	0/1												
DIPHENYLAMINE	122-39-4	x	0/41												
CIS-DICHLOROETHYLENE	159-59-2														
TERPHENYL-D14	1718-51-0														
2,4-DICHLOROPHENYLACETIC ACID	19719-28-9														
2-Nitropropane	2-NITRO														
2,4'-DDE	3424-82-6														
NITROBENZENE-D5	4165-60-0														
PHENOL-D5	4165-62-2														
ISODRIN	465-73-6	x	0/1												
alpha-Chlordane	5103-71-9	x	0/1												
gamma-Chlordane	5103-74-2	x	0/1												
2,4'-DDD	53-19-0														
Endrin ketone	53494-70-5	x	0/5												
2,2-Dichloropropane	590-20-7														
M&P CRESOLS	65794-96-9	x	0/163												
1,1,1-TRICHLORO-2,2-BIS (P-METHOXPHENYL)-ETHANE	72-43-5	x	0/174												
ACETONITRILE	75-05-8	x	0/6												
2-METHYL-1-PROPANOL	78-83-1	x	0/1												
2,4'-DDT	789-02-6														
2,4-D	94-75-7	x	0/163												

Comprehensive BASF McIntosh Analyte List		January 1996 through April 2010 Analytes, Frequency of Detections and Exceedances						July 2011 - Jan 2016 Analytes, Frequency of Detections & Exceedances			July 2017 - July 2021 Analytes, Frequency of Detections & Exceedances, & Recommedations for 2022 RCRA Permit List				
Historical Analyte	CASRN	1996-2005 Miocene Analye List	1996-2005 Miocene Detections	1996-2005 Miocene Exceedances	2006-2010 Miocene Analyte List	2006-2010 Miocene Detections/# samples	2006-2010 Miocene Exceedances/# Detects	Oct 2011 Permit: Miocene Analyte List	Jul 2011-Jan 2016 Miocene Detections/# Samples	Jul 2011-Jan 2016 Miocene Exceedances/# Detects	May 2017 Permit: Miocene Analyte List	Jul 2017-Jul 2021 Miocene Detections/ # Samples	Jul 2017-Jul 2021 Miocene Exceedances/ # Detects	Recommend for Miocene Analyte List - 2022 Permit	Justification
ARSENIC	7440-38-2	x	4/88	0/4	x	65/217	15/65	x	65/131	9/65	x	52/126	8/52	move from Annual to 5-Year	few exceedances and may be naturally occurring
LEAD	7439-92-1	x	0/88	0/0	x	21/217	2/21	x	18/85	0/18	x	7/75	0/7	move from Annual to HOLD	infrequent detections, no exceedances 2011-2021
VANADIUM	7440-62-2	x	0/14	0/0	x	13/13	0/13	x	13/14	3/13	x	29/75	8/29		
BARIUM	7440-39-3	x	69/88	1/69	x	54/57	11/54	x	60/60	0/60	x	15/15	0/15	move from 5-Year to HOLD	no exceedances since 2011
CADMIUM	7440-43-9	x	0/88	0/0	x	8/57	2/8	x	0/60	0/0	x	0/15	0/0	move from 5-Year to HOLD	no detections in 2011-2021
CHROMIUM	7440-47-3	x	1/88	0/1	x	51/217	1/51	x	31/60	0/31	x	4/15	0/4	move from 5-Year to HOLD	no excedances in 2011-2021
COBALT	7440-48-4	x	0/47	0/0	x	27/204	0/27	x	11/27	0/11	x	3/15	0/3	move from 5-Year to HOLD	no excedances in 1996-2022
STRONTIUM	7440-24-6	x	88/88	0/88	x	57/57	0/57	x	27/27	2/27	x	15/15	2/15		
THALLIUM	7440-28-0	x	1/47	0/1	x	6/204	6/6	x	1/85	0/1	x	4/15	0/4	move from 5-Year to HOLD	infrequent detections, no exceedances 2011-2021
MERCURY	7439-97-6	x	1/88	0/1	x	26/217	0/26	x	9/60	0/9	x	0/15	0/0	move from 5-Year to HOLD	infrequent detections, no exceedances 1996-2016, no detections 2017-2021
CYANIDE	57-12-5	x	1/63	0/1	x	16/44	0/16	x	3/60	0/3	x	1/15	0/1	move from 5-Year to HOLD	infrequent detections, no exceedances 1996-2021
ALDRIN	309-00-2										x	0/75	0/0	move from Annual to HOLD	no detections 2017-2021
ALPHA-BHC	319-84-6	x	0/98	0/0	x	1/217	0/1	x	6/131	3/6	x	5/126	0/5	move from semi-annual to annual	few detections and no exceedances 2017-2021
BETA-BHC	319-85-7	x	0/88	0/0	x	2/217	2/2	x	4/131	2/4	x	4/126	0/4	move from semi-annual to annual	few detections and no exceedances 2017-2021
DELTA-BHC	319-86-8	x	0/88	0/0	x	5/217	1/5	x	16/131	14/16	x	7/126	7/7	move from semi-annual to annual	few detections 2017-2021
GAMMA-BHC (LINDANE)	58-89-9	x	0/98	0/0	x	4/217	0/4	x	0/131	0/0	x	0/75	0/0	move from annual to 5-Year	not detected 2011-2021
4,4'-DDD	72-54-8	x	0/47	0/0	x	4/204	0/4	x	1/131	0/1	x	2/75	0/2		
4,4'-DDE	72-55-9				x	0/160	0/0	x	0/131	0/0	x	4/75	0/4		
4,4'-DDT	50-29-3	x	0/88	0/0	x	3/212	0/3	x	5/131	0/5	x	7/75	0/7		
DIELDRIN	60-57-1										x	0/75	0/0	move from Annual to HOLD	not detected 2017-2021
CHLOROBENZILATE	510-15-6	x	0/47	0/0	x	4/204	4/4	x	1/131	0/1	x	0/75	0/0	move from annual to 5-Year	not detected 2017-2021
BENZENE	71-43-2	x	0/147	0/0	x	44/220	20/44	x	36/131	6/36	x	33/126	12/33		
CARBON TETRACHLORIDE	56-23-5	x	0/86	0/0	x	0/207	0/0	x	1/131	1/1	x	0/126	0/0	move from semi-annual to annual	not detected 2017-2021
CHLOROBENZENE	108-90-7	x	72/159	22/72	x	152/221	64/152	x	99/129	51/99	x	95/126	52/95		
CHLOROFORM	67-66-3	x	0/147	0/0	x	6/220	0/6	x	2/124	0/2	x	0/75	0/0	move from Annual to 5-Year	not detected 2017-2021
1,4-DICHLOROBENZENE	106-46-7	x	6/109	0/6	x	84/207	0/84	x	68/131	0/68	x	32/75	0/32	move from Annual to 5-Year	no exceednaces 1997-2021
1,1-DICHLOROETHYLENE	75-35-4	x	0/21	0/0	x	8/44	0/8	x	4/131	0/4	x	0/75	0/0	move from Annual to HOLD	Very infrequent detections <GWPS 2006-2016, not detected 2017-2021
1,2,4-TRIMETHYLBENZENE	95-63-6	x	0/70	0/0	x	0/44	0/0	x	0/60	0/0	x	0/75	0/0	move from Annual to HOLD	not detected 1996-2021
VINYL CHLORIDE	75-01-4	x	0/8								x	2/75	0/2	move from Annual to HOLD	infrequent detections, no exceedances 2017-2021
1,2-DICHLOROBENZENE	95-50-1	x	3/43	0/3	x	3/13	0/3	x	21/53	0/21	x	2/15	0/2	move from 5-Year to HOLD	infrequent detections, no exceedances 2017-2022
ACETONE	67-64-1	x	0/27	0/0	x	0/13	0/0	x	5/14	0/5	x	0/15	0/0	move from 5-Year to HOLD	not detected 2017-2021
CHLOROETHANE	75-00-3	x	0/147	0/0	x	2/220	0/2	x	0/131	0/0	x	0/15	0/0	move from 5-Year to HOLD	infrequent detections, no exceedances 1996-2010; not detected 2011-2021
CHLOROPRENE	67-64-1	x	0/62	0/0	x	0/44	0/0	x	0/67	0/0	x	0/15	0/0	move from 5-Year to HOLD	No detections in 1996-2021
DICHLOROMETHANE	75-09-2	x	0/43	0/0	x	0/13	0/0	x	1/14	0/1	x	0/15	0/0	move from 5-Year to HOLD	Rarely detected, no exceedances 1996-2021
TRICHLOROETHYLENE	79-01-6	x	0/147	0/0	x	0/57	0/0	x	1/60	0/1	x	0/15	0/0	move from 5-Year to HOLD	not detected 1996-2010; one detect < GWPS in 2011-2021
2-CHLOROPHENOL	95-57-8	x	0/6								x	4/75	0/4	move from Annual to HOLD	infrequent detections, no exceedances 2017-2021
NAPHTHALENE	91-20-3	x	4/73	0/4	x	27/204	9/27	x	22/131	9/22	x	4/75	1/4		
NITROBENZENE	98-95-3	x	0/71	0/0	x	3/44	3/3	x	0/60	0/0	x	0/75	0/0	move from Annual to HOLD	No detections 2011-2021
1,2-DIPHENYLHYDRAZINE	122-66-7	x	0/47	0/0	x	2/44	2/2	x	0/60	0/0	x	9/75	6/9		
ANILINE	62-53-3	x	0/47	0/0	x	2/44	2/2	x	0/60	0/0	x	0/15	0/0	move from 5-Year to HOLD	not detected 2011-2021
3,4-BENZOFLUORANTHENE	205-99-2	x	0/55	0/0	x	2/44	1/2	x	0/60	0/0	x	0/15	0/0	move from 5-Year to HOLD	not detected Jul 2011-2021
BENZO(K)FLUORANTHENE	207-08-9	x	0/55	0/0	x	7/44	0/7	x	0/60	0/0	x	0/15	0/0	move from 5-Year to HOLD	infrequent detections, no exceedances 1996-2010; not detected 2011-2021
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7							x	12/14	11/12	x	15/15	15/15		
1,2-TRANS-DICHLOROETHYLENE	156-60-5	x	0/70	0/0	x	1/103	0/1	x	5/78	0/5					
2-BUTANONE (MEK)	78-93-3	x	0/86	0/0	x	0/44	0/0	x	0/27	0/0					
CARBON DISULFIDE	75-15-0	x	0/86	0/0	x	2/44	0/2	x	0/27	0/0					
CIS-1,2-DICHLOROETHENE	156-59-2	x	0/80	0/0	x	1/110	0/1	x	7/80	0/7					
m&p-Xylene	108-38-3	x	0/24	0/0	x	0/19	no criterion	x	0/27	0/0					
METHYLBENZENE	108-88-3	x	0/147	0/0	x	5/55	0/5	x	0/27	0/0					
N-NITROSODIPHENYLAMINE	86-30-6	x	0/53	0/0	x	2/44	0/2	x	0/27	0/0					
PHENOL	108-95-2	x	0/63	0/0	x	2/44	0/2	x	0/27	0/0					
SELENIUM	7782-49-2	x	1/88	0/1	x	2/57	0/2	x	4/27	0/4					
SILVER	7440-22-4	x	0/88	0/0	x	0/57	0/0	x	0/27	0/0					
ZINC	7440-66-6	x	0/14	0/0	x	10/13	0/10	x	6/14	0/6					
1,2-DICHLOROETHYLENE	540-59-0				x	6/98	no criterion								
1,3-dimethylbenzene	136777-61-2	x	0/46	0/0	x	0/25	0/0								
2,4,5-TP SILVEX	93-72-1	x	0/30	0/0	x	0/13	0/0								
2,4,6-TRIBROMOPHENOL	118-79-6				x	13/13	no criterion								
2-FLUOROBIPHENYL	321-60-8				x	26/26	no criterion								
2-FLUOROPHENOL	367-12-4				x	13/13	no criterion								
ALDICARB	116-06-3	x	0/26	0/0	x	0/13	0/0								
DCB DECACHLOROBIPHENYL	2051-24-3				x	13/13	no criterion								
DI-N-OCTYL PHTHALATE	117-84-0	x	15/30	15/15	x	12/13	12/12								
ENDRIN	72-20-8	x	0/24	0/0	x	0/13	0/0								
LITHIUM	7439-93-2				x	2/4	no criterion								
STYRENE (MONOMER)	100-42-5	x	0/27	0/0	x	0/13	0/0								
Total organic halides	59473-04-0	x	10/13	no MCL	x	not analyzed	no criterion								
1,1,1,2-TETRACHLOROETHANE	630-20-6	x	0/8												
1,1,1-TRICHLOROETHANE	71-55-6	x	0/8												
1,1,2,2-TETRACHLOROETHANE	79-34-5	x	0/8												
1,1,2-TRICHLOROETHANE	79-00-5	x	0/8												
1,1-DICHLOROETHANE	75-34-3	x	0/8												
1,2,3-Trichlorobenzene	87-61-6	x	0/8												
1,2,3-TRICHLOROPROPANE	96-18-4	x	0/8												
1,2,4-TRICHLOROBENZENE	120-82-1	x	0/14												
1,2-DIBROMO-3-CHLOROPROPANE (DBCP)	96-12-8	x	0/8												
1,2-DIBROMOETHANE (EDB)	106-93-4	x	0/8												

Comprehensive BASF McIntosh Analyte List		January 1996 through April 2010 Analytes, Frequency of Detections and Exceedances						July 2011 - Jan 2016 Analytes, Frequency of Detections & Exceedances			July 2017 - July 2021 Analytes, Frequency of Detections & Exceedances, & Recommedations for 2022 RCRA Permit List				
Historical Analyte	CASRN	1996-2005 Miocene Analye List	1996-2005 Miocene Detections	1996-2005 Miocene Exceedances	2006-2010 Miocene Analye List	2006-2010 Miocene Detections/# samples	2006-2010 Miocene Exceedances/# Detects	Oct 2011 Permit: Miocene Analyte List	Jul 2011-Jan 2016 Miocene Detections/# Samples	Jul 2011-Jan 2016 Miocene Exceedances/# Detects	May 2017 Permit: Miocene Analyte List	Jul 2017-Jul 2021 Miocene Detections/ # Samples	Jul 2017-Jul 2021 Miocene Exceedances/ # Detects	Recommend for Miocene Analyte List - 2022 Permit	Justification
1,2-DICHLOROETHANE	107-06-2	x	0/8												
1,2-DICHLOROPROPANE	78-87-5	x	0/8												
1,3,5-Trimethylbenzene	108-67-8	x	0/8												
M-DICHLOROBENZENE	541-73-1	x	0/24												
1,3-Dichloropropane	142-28-9	x	0/8												
1-Chlorobutane	109-69-3	x	0/8												
2,4,5-TRICHLOROPHENOL	95-95-4	x	0/6												
2,4,6-TRICHLOROPHENOL	88-06-2	x	0/6												
2,4-DICHLOROPHENOL	120-83-2	x	0/6												
2,4-DIMETHYLPHENOL	105-67-9	x	0/6												
2,4-DINITROPHENOL	51-28-5	x	0/6												
2,4-DINITROTOLUENE	121-14-2	x	0/6												
2,6-DINITROTOLUENE	606-20-2	x	0/6												
2-CHLOROETHYL VINYL ETHER	110-75-8														
2-CHLORONAPHTHALENE	91-58-7	x	0/6												
2-Chlorotoluene	95-49-8	x	0/8												
METHYL N-BUTYL KETONE	591-78-6	x	0/8												
2-METHYLNAPHTHALENE	91-57-6	x	0/6												
M/P-CRESOL	95-48-7	x	0/16												
2-NITROANILINE	88-74-4	x	0/6												
2-NITROPHENOL	88-75-5	x	0/6												
3,3`-DICHLOROBENZIDINE	91-94-1	x	0/6												
3-NITROANILINE	99-09-2	x	0/6												
4,6-DINITRO-2-METHYLPHENOL	534-52-1	x	0/6												
4-BROMOPHENYL PHENYL ETHER	101-55-3	x	0/6												
P-CHLORO-M-CRESOL	59-50-7	x	0/6												
P-CHLOROANILINE	106-47-8	x	0/6												
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	x	0/6												
4-Chlorotoluene	106-43-4	x	0/8												
4-METHYL-2-PENTANONE (MIBK)	108-10-1	x	0/8												
3-Methylphenol/4-Methylphenol (m&p-Cresol)	106-44-5	x	0/6												
P-NITROANILINE	100-01-6	x	0/6												
4-NITROPHENOL	100-02-7	x	0/6												
ACENAPHTHENE	83-32-9	x	0/6												
ACENAPHTHYLENE	208-96-8	x	0/6												
ACROLEIN	107-02-8														
ACRYLONITRILE	107-13-1	x	0/8												
ANTHRACENE	120-12-7	x	0/6												
BENZIDINE	92-87-5	x	0/6												
BENZO(A)ANTHRACENE	56-55-3	x	0/6												
BENZO(A)PYRENE	50-32-8	x	0/6												
BENZO(G,H,I)PERYLENE	191-24-2	x	0/6												
Benzoic acid	65-85-0	x	0/6												
BENZYL ALCOHOL	100-51-6	x	0/6												
BERYLLIUM															
BIS(2-CHLOROETHOXY)METHANE	111-91-1	x	0/6												
BIS(2-CHLOROETHYL)ETHER	111-44-4	x	0/6												
BIS(2-CHLORO-1-METHYLETHYL)ETHER	108-60-1	x	0/6												
Bromobenzene	108-86-1	x	0/8												
Bromochloromethane	74-97-5	x	0/8												
BROMODICHLOROMETHANE	75-27-4	x	0/8												
TRIBROMOMETHANE	75-25-2	x	0/8												
BROMOMETHANE	74-83-9	x	0/8												
BENZYL BUTYL PHTHALATE	85-68-7	x	0/6												
CHLOROMETHANE	74-87-3	x	0/8												
ALLYL CHLORIDE	107-05-1	x	0/8												
1,2-BENZPHENANTHRACENE	218-01-9	x	0/6												
CIS-1,3-DICHLOROPROPENE	10061-01-5	x	0/8												
DIBENZO(A,H)ANTHRACENE	53-70-3	x	0/6												
DIBENZOFURAN	132-64-9	x	0/6												
CHLORODIBROMOMETHANE	124-48-1	x	0/8												
CFC-12	75-71-8	x	0/8												
DIETHYL PHTHALATE	84-66-2	x	0/6												
Diethyl ether	60-29-7	x	0/8												
DIMETHYL PHTHALATE	131-11-3	x	0/6												
DI-N-BUTYL PHTHALATE	84-74-2	x	0/6												
Di-n-octylphthalate	117-84-0	x	0/6												
ENDOSULFAN I	959-98-8														
ENDOSULFAN II	33213-65-9														
ENDOSULFAN SULFATE	1031-07-8														
ENDRIN ALDEHYDE	7421-93-4														
ETHYL METHACRYLATE	97-63-2	x	0/8												
ETHYLBENZENE	100-41-4	x	0/8												
FLUORANTHENE	206-44-0	x	0/6												
FLUORENE	86-73-7	x	0/6												
HEPTACHLOR	76-44-8	x	0/10												
HEPTACHLOR EPOXIDE	1024-57-3														

Comprehensive BASF McIntosh Analyte List		January 1996 through April 2010 Analytes, Frequency of Detections and Exceedances						July 2011 - Jan 2016 Analytes, Frequency of Detections & Exceedances			July 2017 - July 2021 Analytes, Frequency of Detections & Exceedances, & Recommedations for 2022 RCRA Permit List				
Historical Analyte	CASRN	1996-2005 Miocene Analye List	1996-2005 Miocene Detections	1996-2005 Miocene Exceedances	2006-2010 Miocene Analye List	2006-2010 Miocene Detections/# samples	2006-2010 Miocene Exceedances/# Detects	Oct 2011 Permit: Miocene Analyte List	Jul 2011-Jan 2016 Miocene Detections/# Samples	Jul 2011-Jan 2016 Miocene Exceedances/# Detects	May 2017 Permit: Miocene Analyte List	Jul 2017-Jul 2021 Miocene Detections/ # Samples	Jul 2017-Jul 2021 Miocene Exceedances/ # Detects	Recommend for Miocene Analyte List - 2022 Permit	Justification
HEXACHLOROBENZENE	118-74-1	x	0/6												
HEXACHLORO-1,3-BUTADIENE	87-68-3	x	0/14												
HEXACHLOROCYCLOPENTADIENE	77-47-4	x	0/6												
HEXACHLOROETHANE	67-72-1	x	0/14												
INDENO(1,2,3-CD)PYRENE	193-39-5	x	0/6												
IODOMETHANE	74-88-4														
3,5,5-TRIMETHYL-2-CYCLOHEXENE-1-ONE	78-59-1	x	0/6												
Isopropylbenzene	98-82-8	x	0/8												
METHYLACRYLONITRILE	126-98-7	x	0/8												
Methylacrylate	96-33-3	x	0/8												
METHYL METHACRYLATE	80-62-6	x	0/8												
DIBROMOMETHANE	74-95-3	x	0/8												
Methyl t-butyl ether (MTBE)	1634-04-4	x	0/8												
n-Butylbenzene	104-51-8	x	0/8												
METHANAMINE, N-METHYL-N-NITROSO	62-75-9	x	0/6												
N-NITROSODI-N-PROPYLAMINE	621-64-7	x	0/6												
n-Propylbenzene	103-65-1	x	0/8												
o-Xylene	95-47-6	x	0/8												
PENTACHLOROETHANE	76-01-7	x	0/8												
PENTACHLOROPHENOL	87-86-5	x	0/6												
PHENANTHRENE	85-01-8	x	0/6												
4-Isopropyltoluene	99-87-6	x	0/8												
ETHYL CYANIDE	107-12-0	x	0/8												
PYRENE	129-00-0	x	0/6												
sec-Butylbenzene	135-98-8	x	0/8												
tert-Butylbenzene	98-06-6	x	0/8												
TETRACHLOROETHENE	127-18-4	x	0/8												
Tetrahydrofuran	109-99-9	x	0/8												
CAMPHECHLOR	8001-35-2	x	0/10												
TRANS-1,3-DICHLOROPROPENE	10061-02-6	x	0/8												
TRANS-1,4-DICHLOROBUTENE	110-57-6	x	0/8												
CFC-11	75-69-4	x	0/8												
XYLENE	1330-20-7														
Chloroacetonitrile	107-14-2	x	0/8												
VINYL ACETATE	108-05-4														
DIPHENYLAMINE	122-39-4	x	0/12												
CIS-DICHLOROETHYLENE	159-59-2														
TERPHENYL-D14	1718-51-0														
2,4-DICHLOROPHENYLACETIC ACID	19719-28-9														
2-Nitropropane	2-NITRO	x	0/8												
2,4'-DDE	3424-82-6														
NITROBENZENE-D5	4165-60-0														
PHENOL-D5	4165-62-2														
ISODRIN	465-73-6														
alpha-Chlordane	5103-71-9														
gamma-Chlordane	5103-74-2														
2,4'-DDD	53-19-0														
Endrin ketone	53494-70-5														
2,2-Dichloropropane	590-20-7	x	0/8												
M&P CRESOLS	65794-96-9	x	0/10												
1,1,1-TRICHLORO-2,2-BIS (P-METHOXPHENYL)-ETHANE	72-43-5	x	0/10												
ACETONITRILE	75-05-8														
2-METHYL-1-PROPANOL	78-83-1														
2,4'-DDT	789-02-6														
2,4-D	94-75-7	x	0/16												

Attachment E

Time Trend Analyses of Select Detected Compounds
Alluvial Aquifer and Upper Miocene Aquifer Groundwater Data

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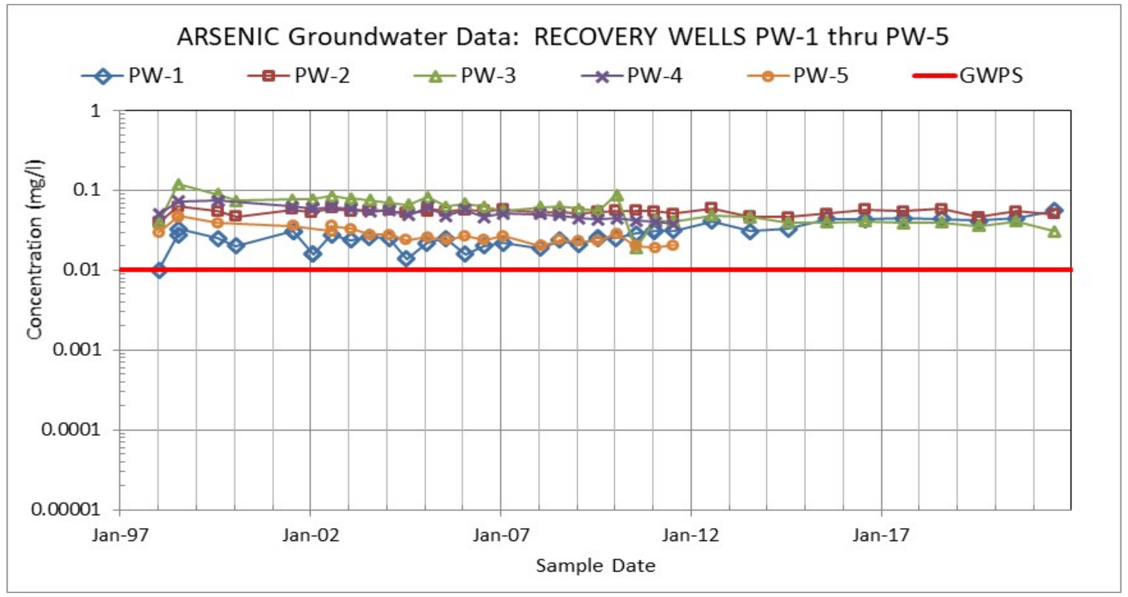
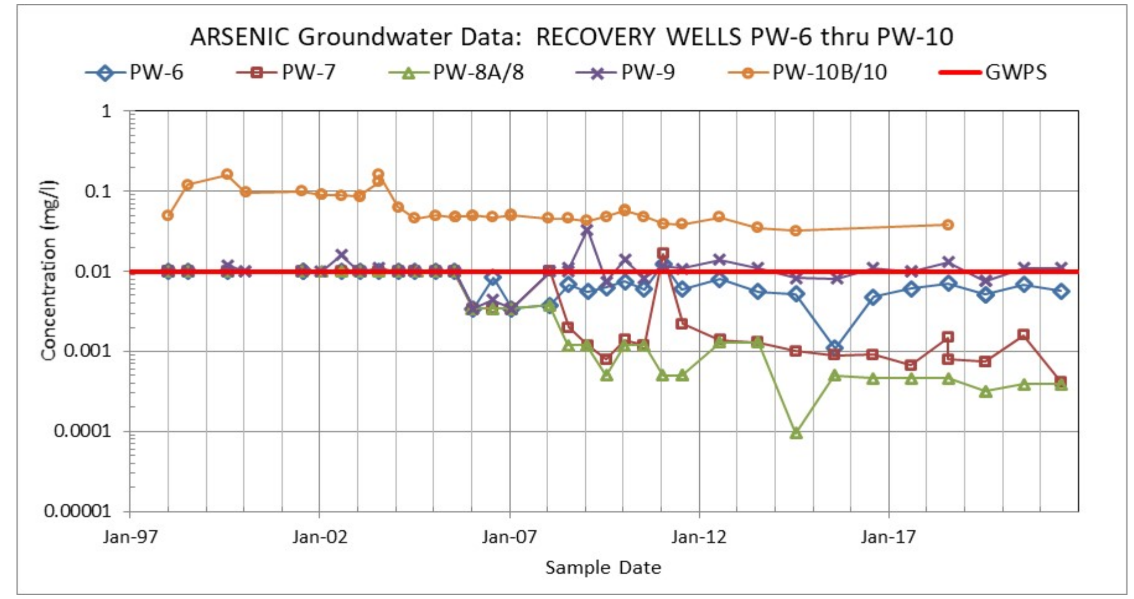
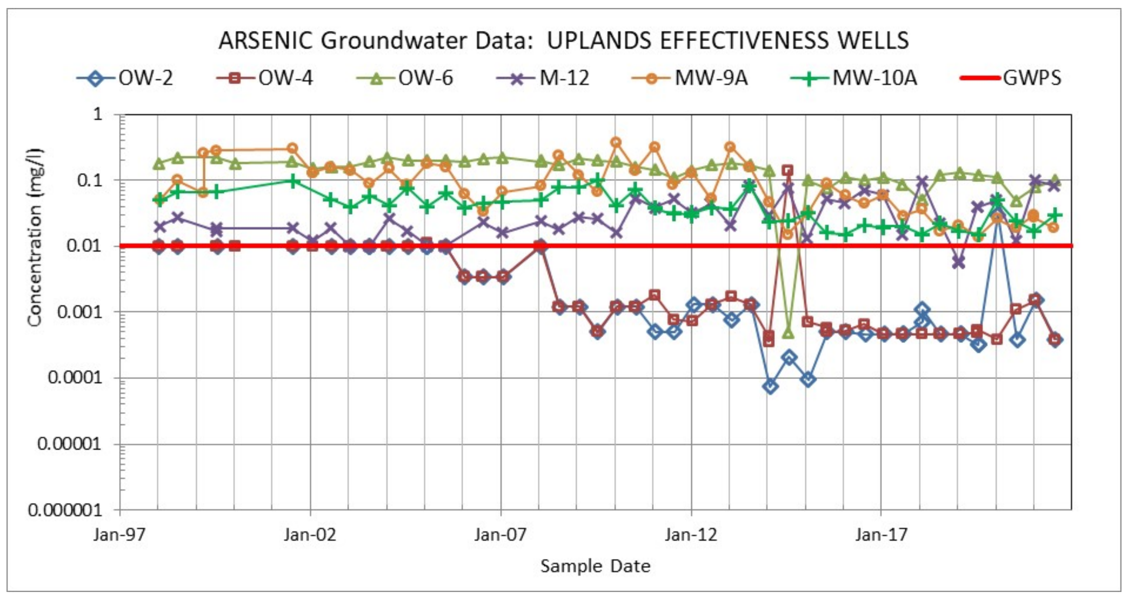
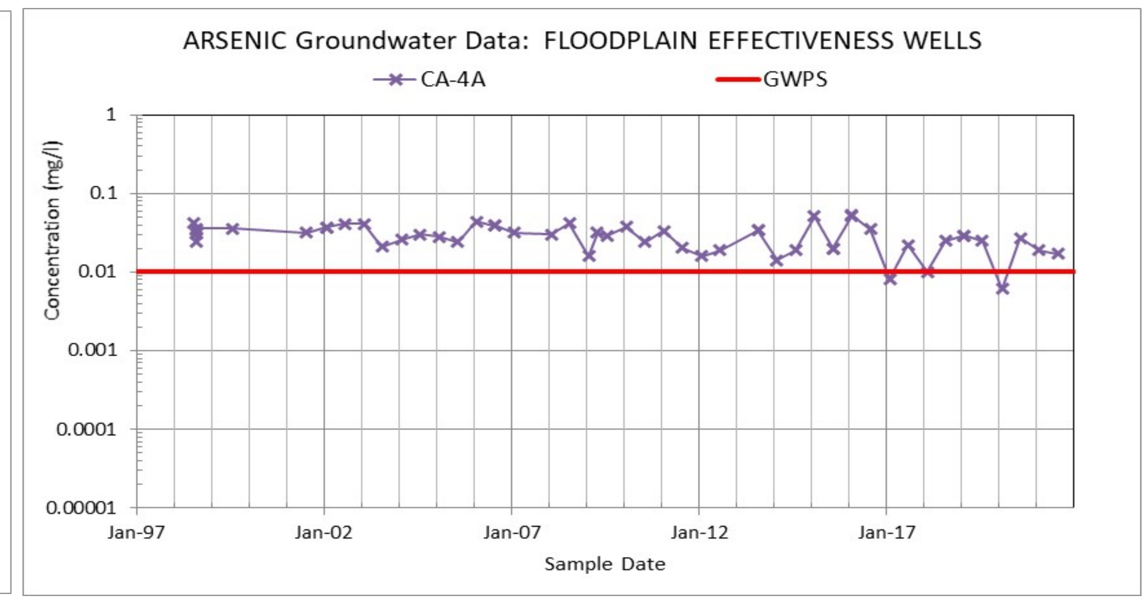
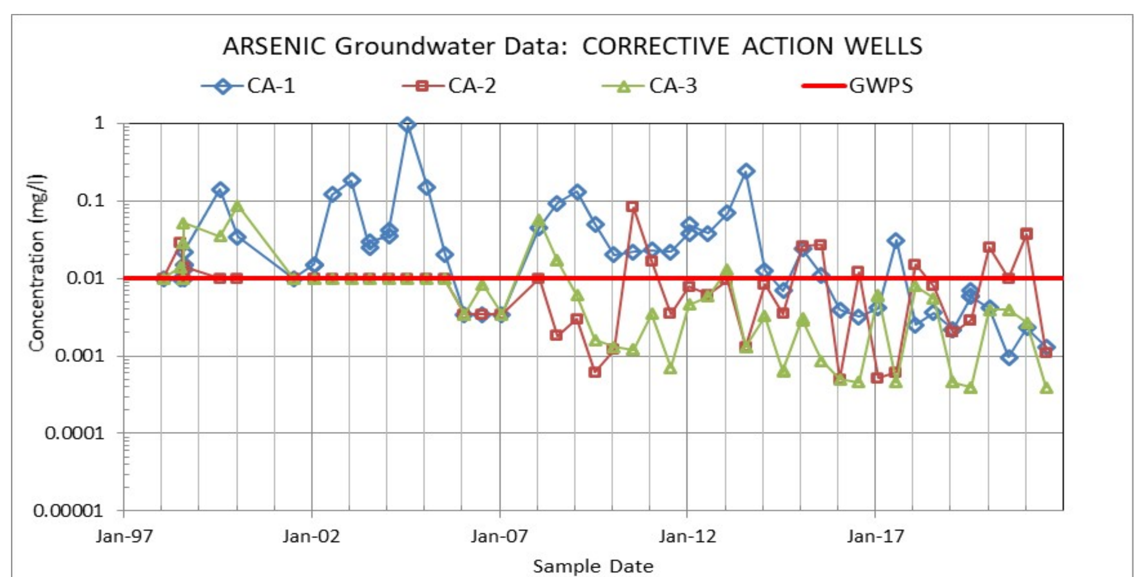
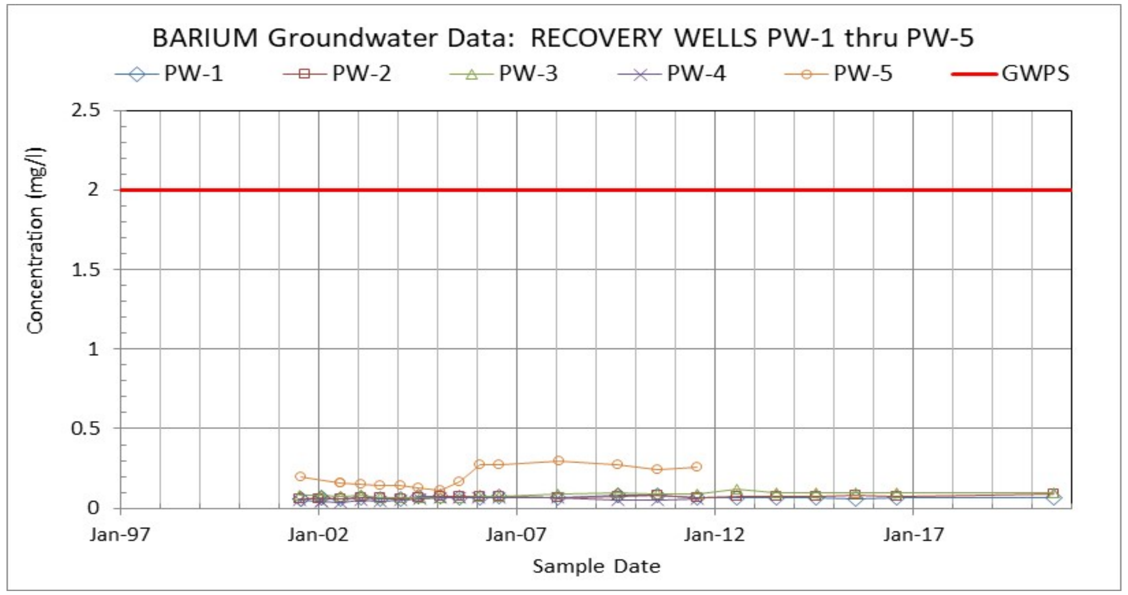

ARSENIC Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

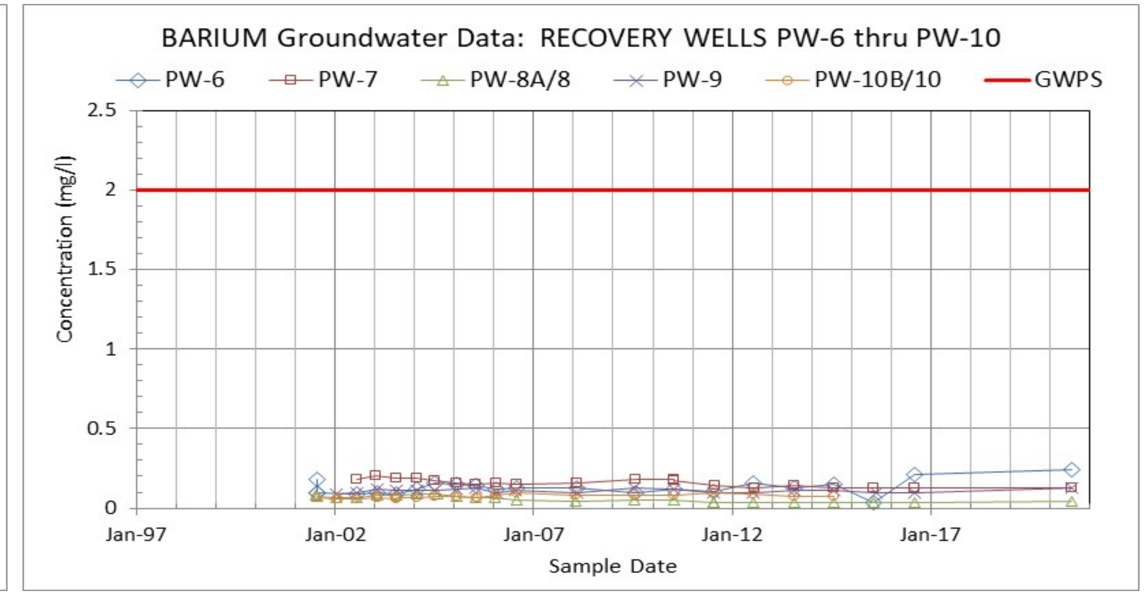

ARSENIC Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

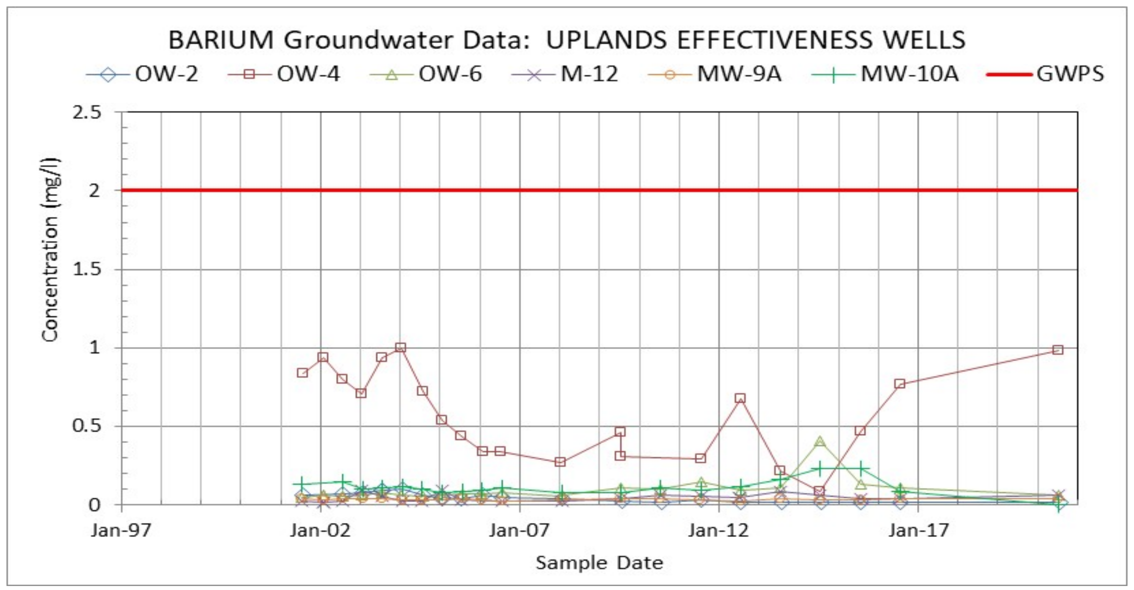

ARSENIC Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
0.000001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

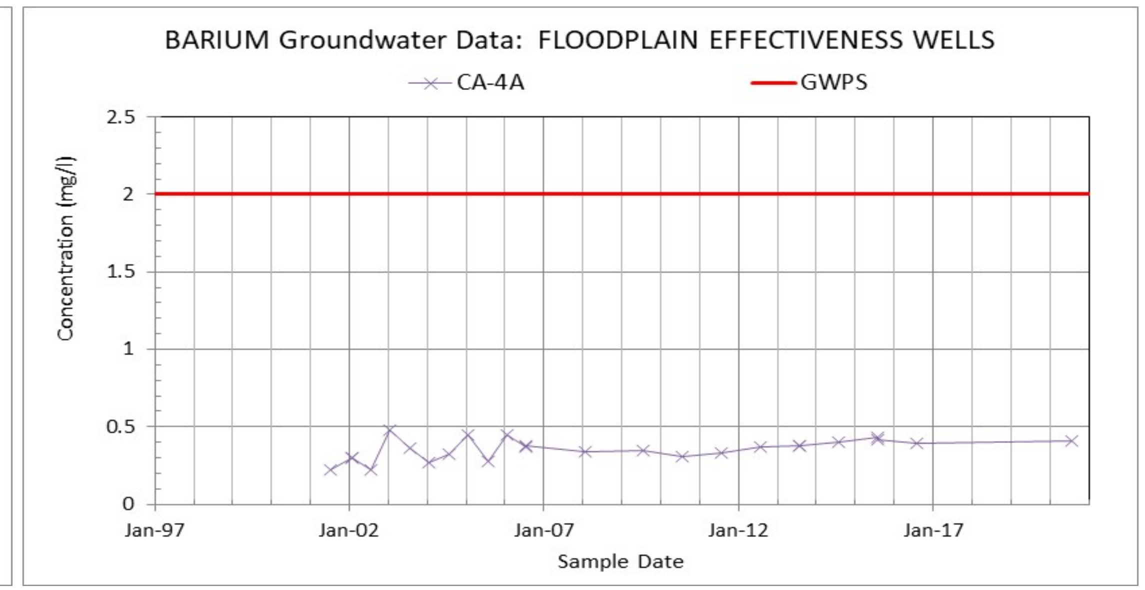

ARSENIC Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

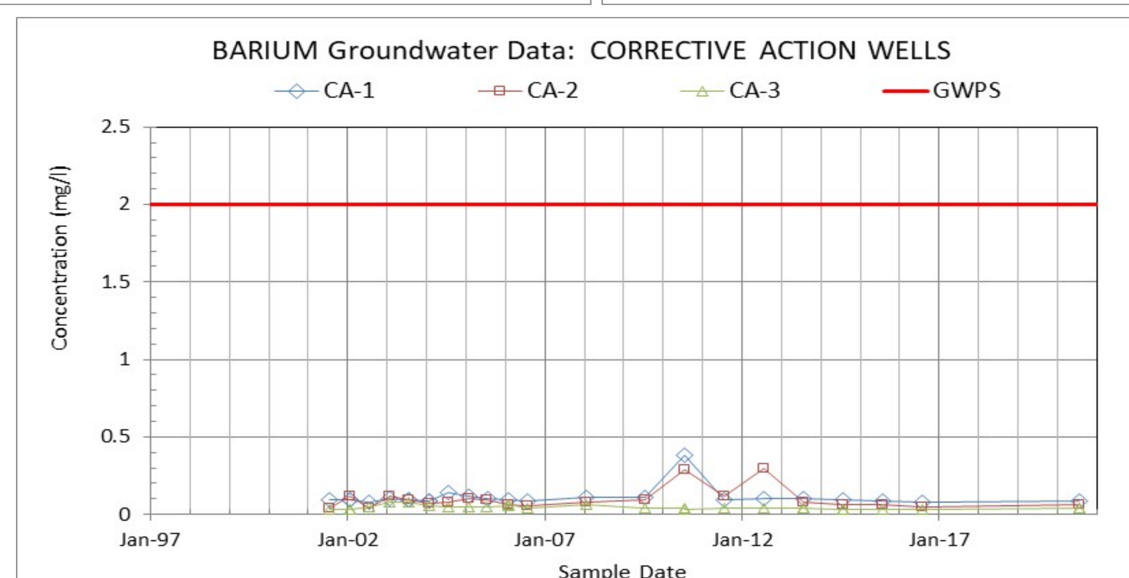

ARSENIC Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

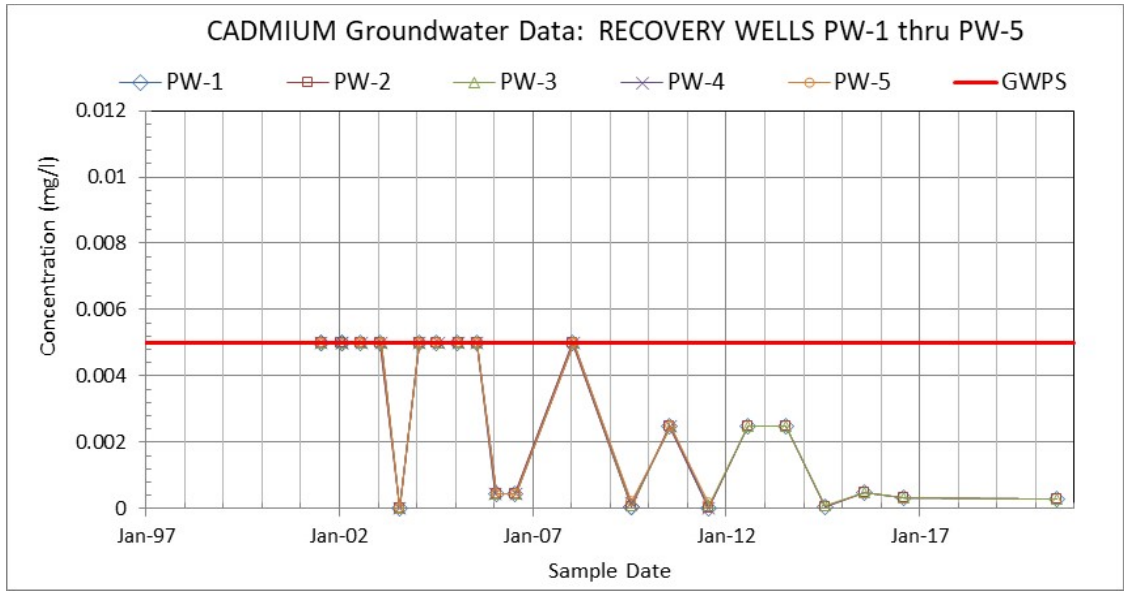

BARIUM Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
2.5
2
1.5
1
0.5
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

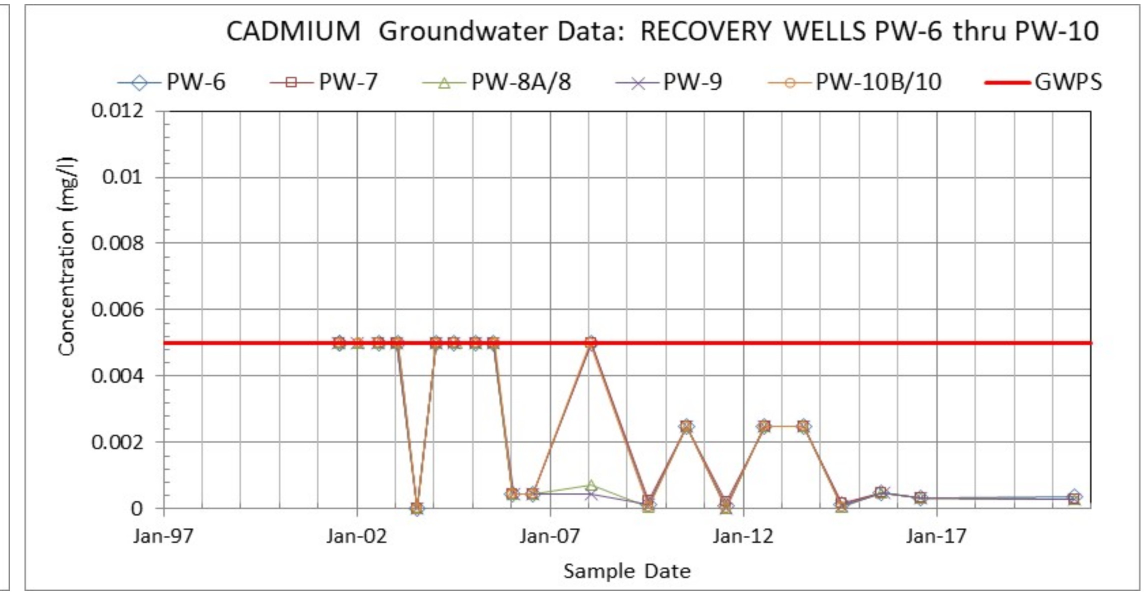

BARIUM Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
2.5
2
1.5
1
0.5
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

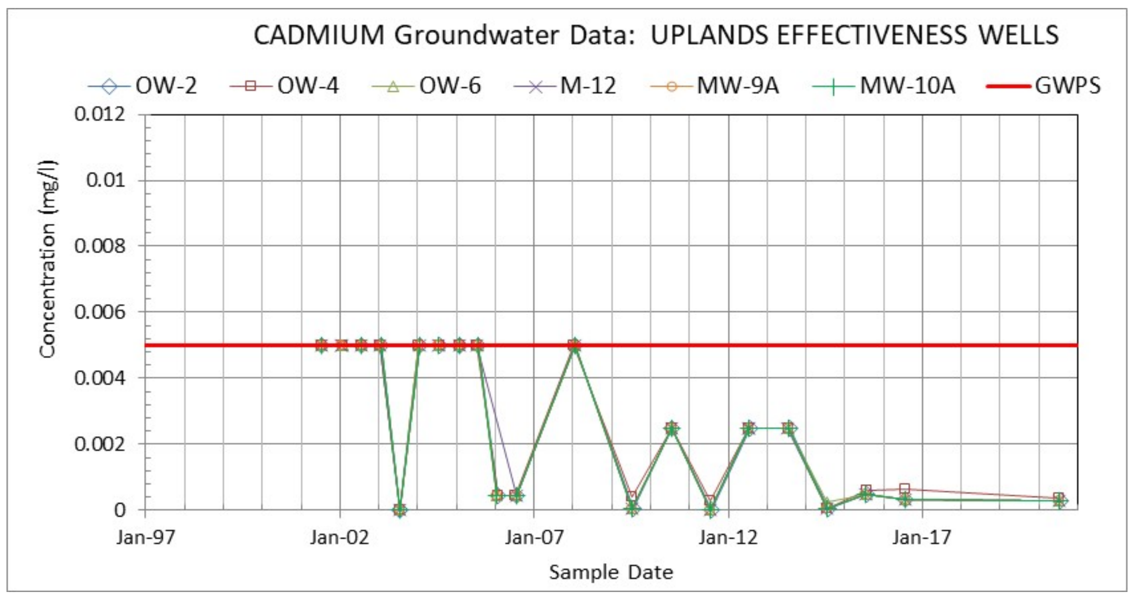

BARIUM Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
2.5
2
1.5
1
0.5
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

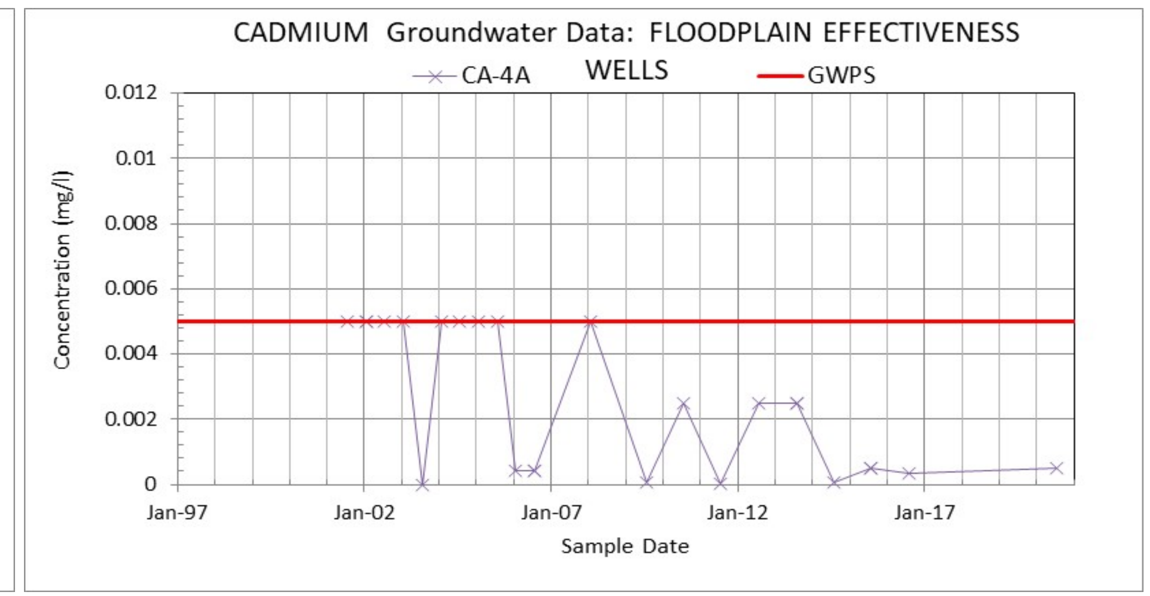

BARIUM Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
2.5
2
1.5
1
0.5
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

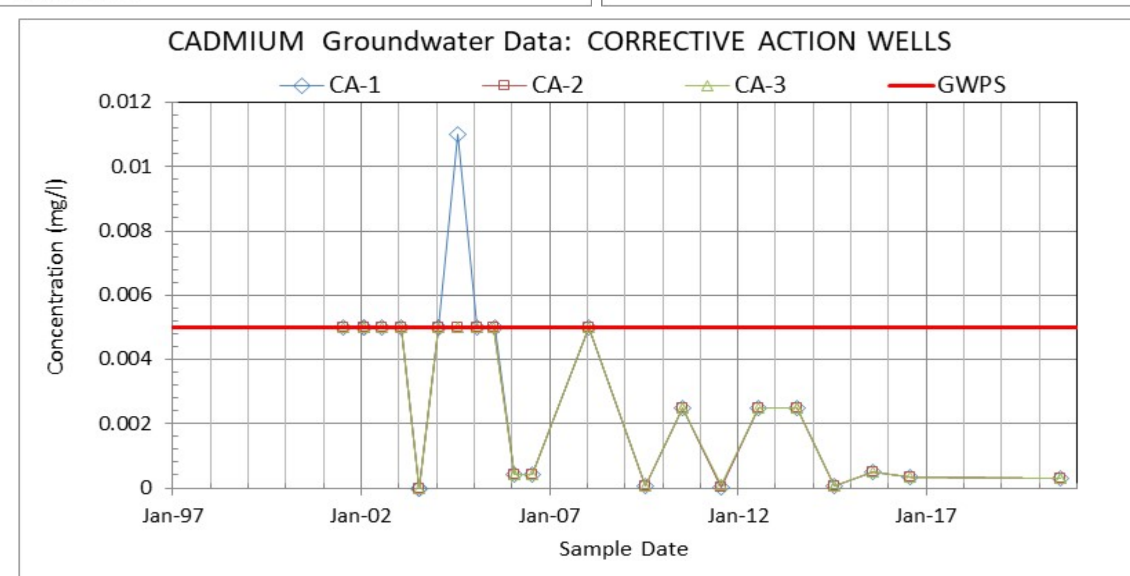

BARIUM Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
2.5
2
1.5
1
0.5
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

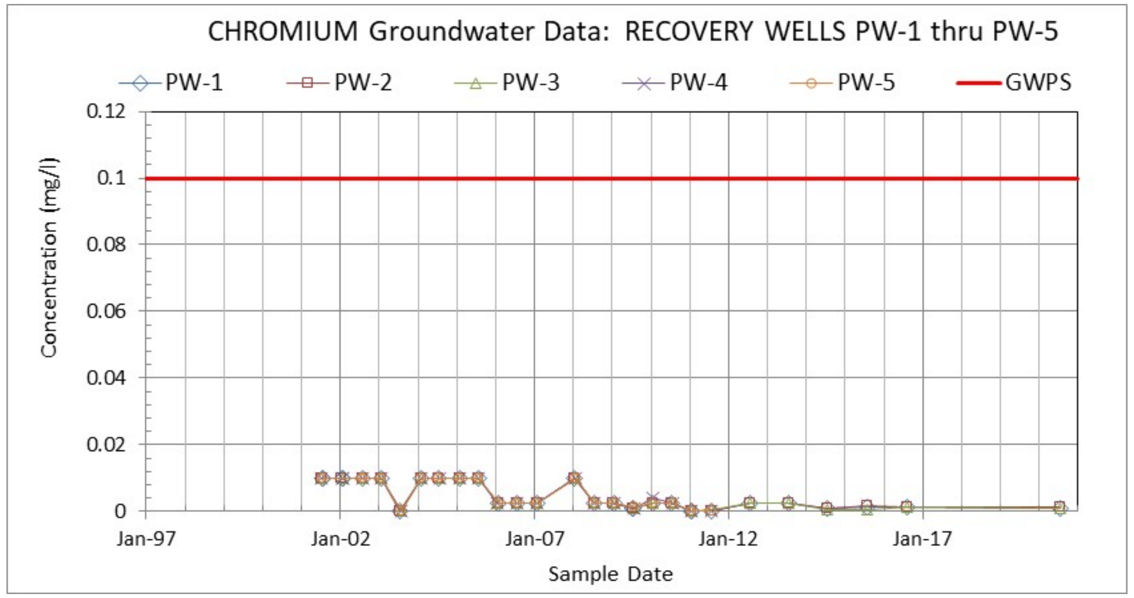

CADMIUM Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
0.012
0.01
0.008
0.006
0.004
0.002
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

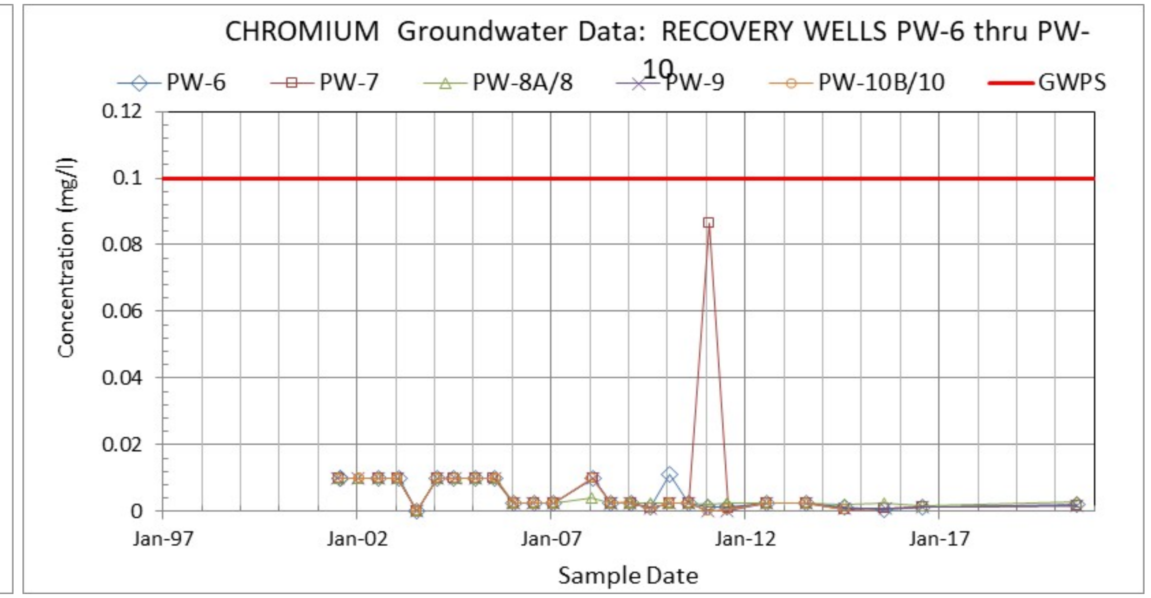

CADMIUM Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
0.012
0.01
0.008
0.006
0.004
0.002
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

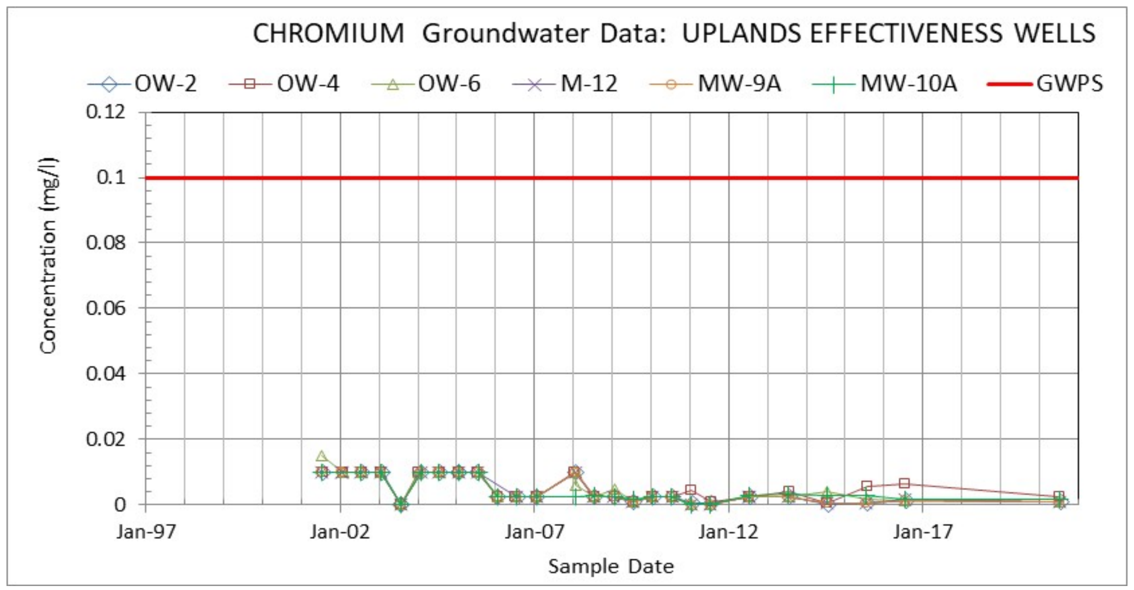

CADMIUM Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
0.012
0.01
0.008
0.006
0.004
0.002
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

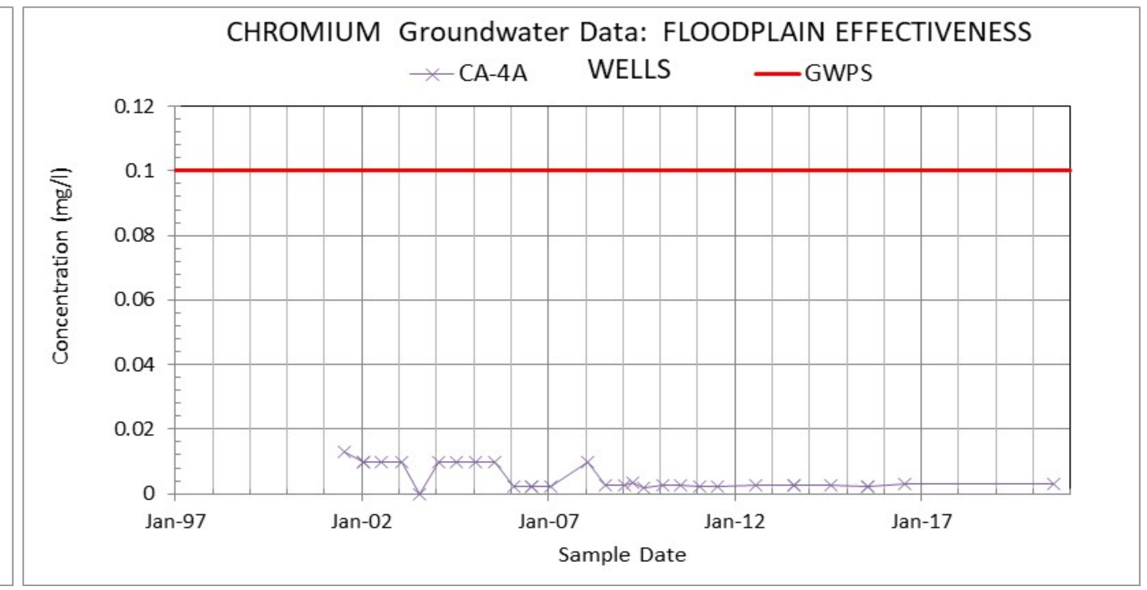

CADMIUM Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
0.012
0.01
0.008
0.006
0.004
0.002
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

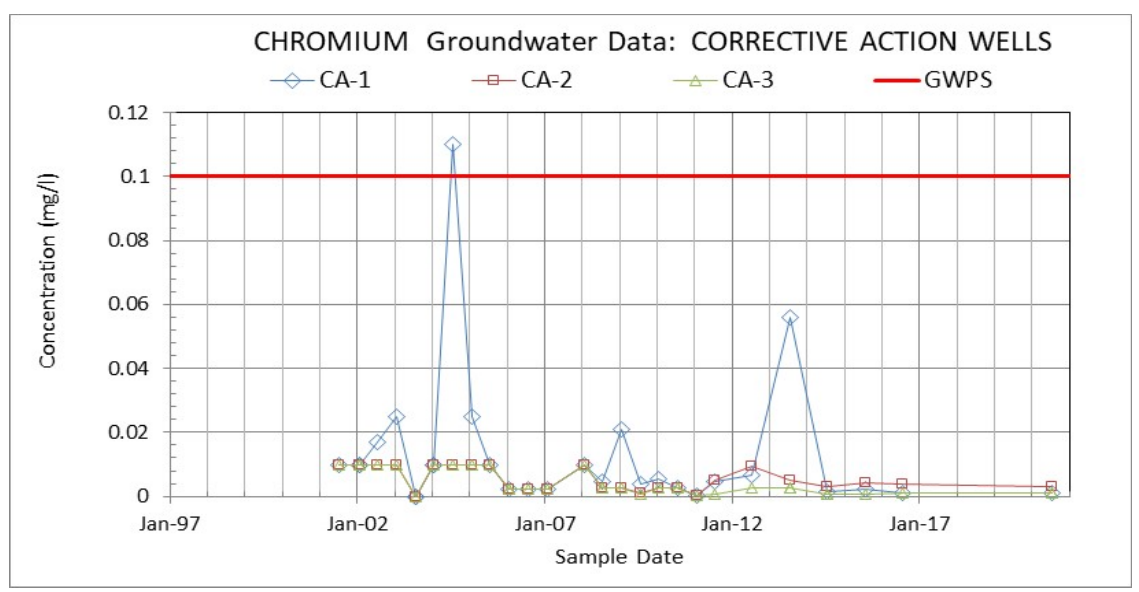

CADMIUM Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
0.012
0.01
0.008
0.006
0.004
0.002
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

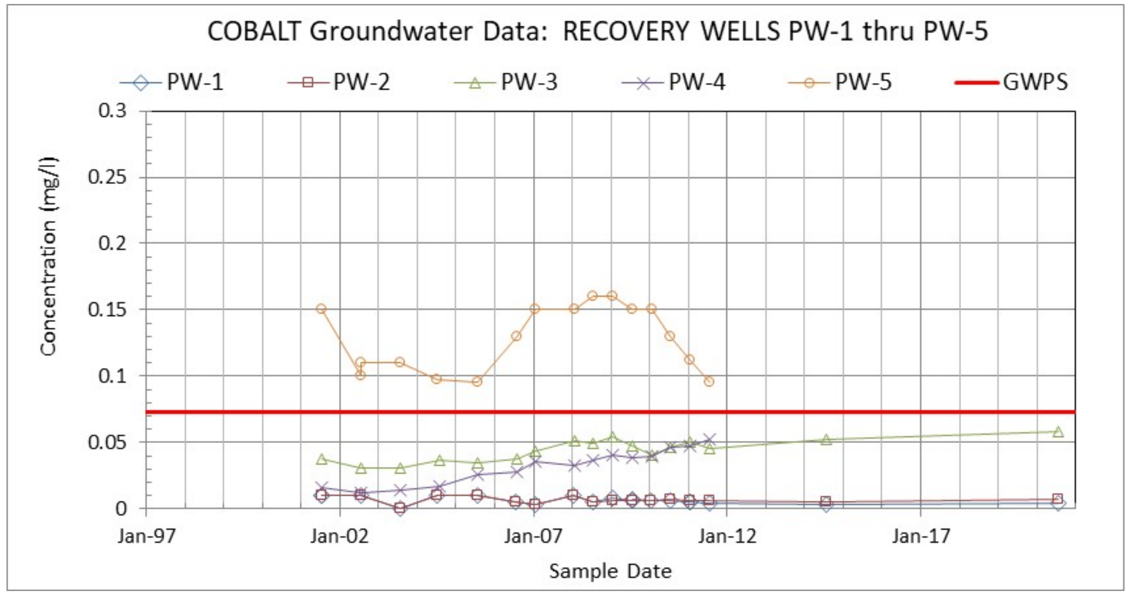

CHROMIUM Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

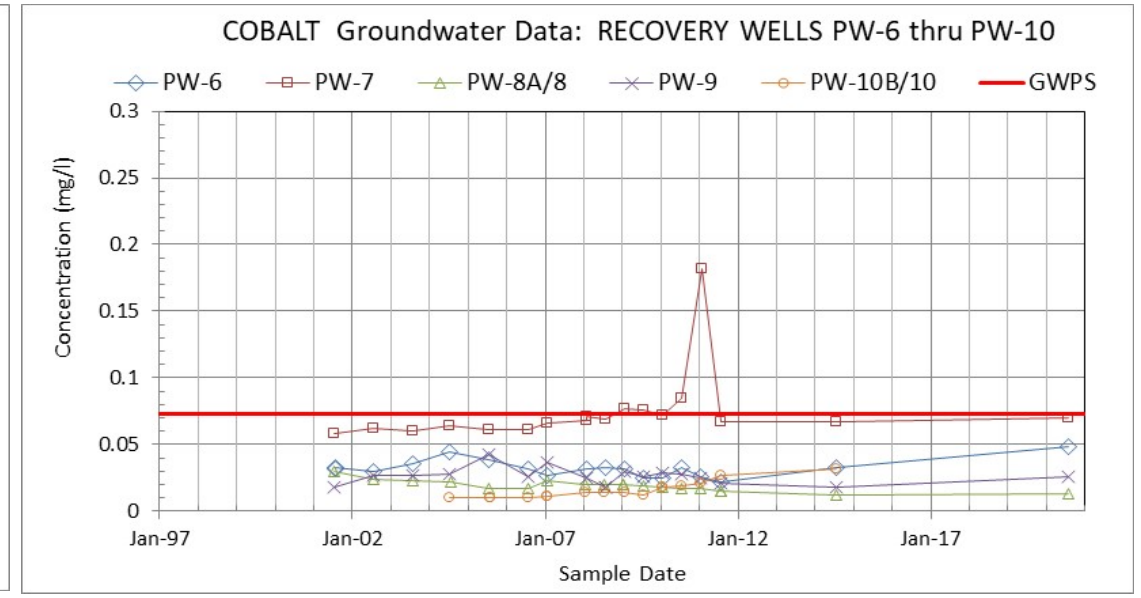

CHROMIUM Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

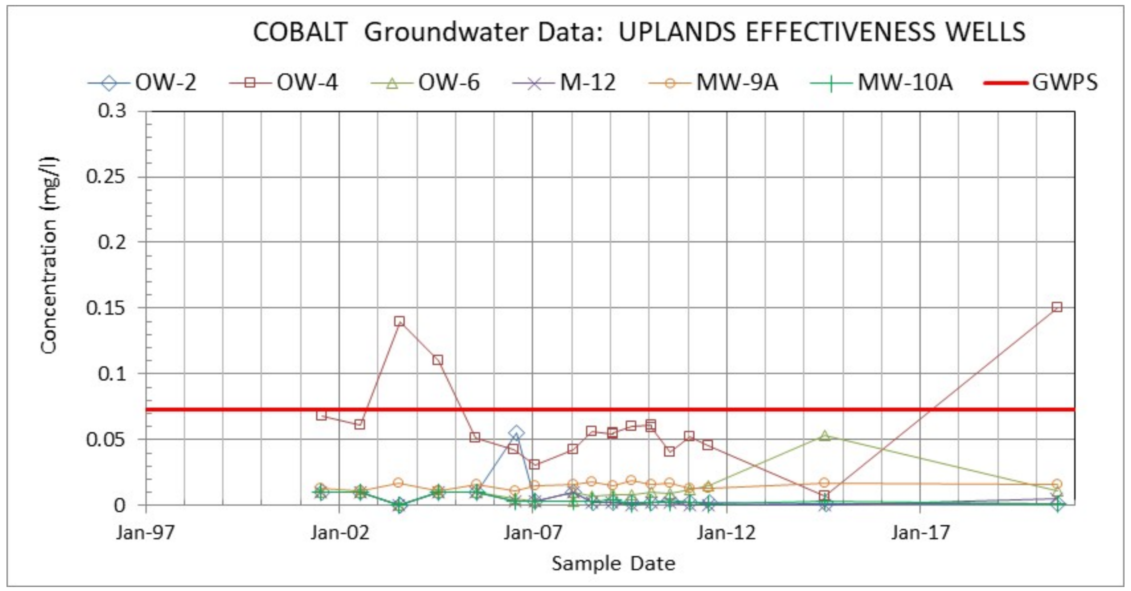

CHROMIUM Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

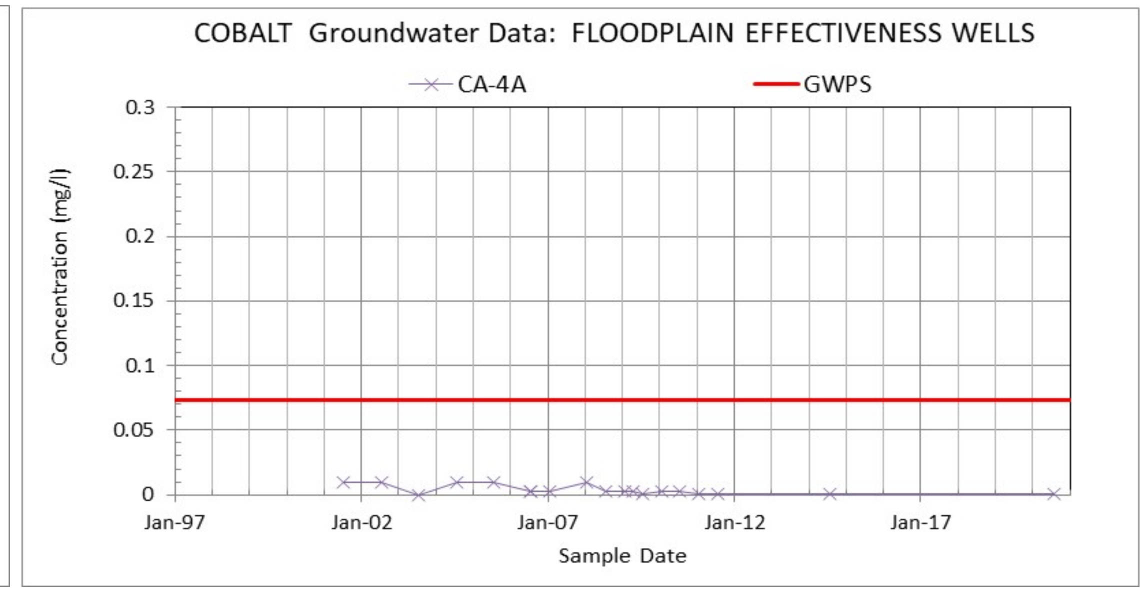

CHROMIUM Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

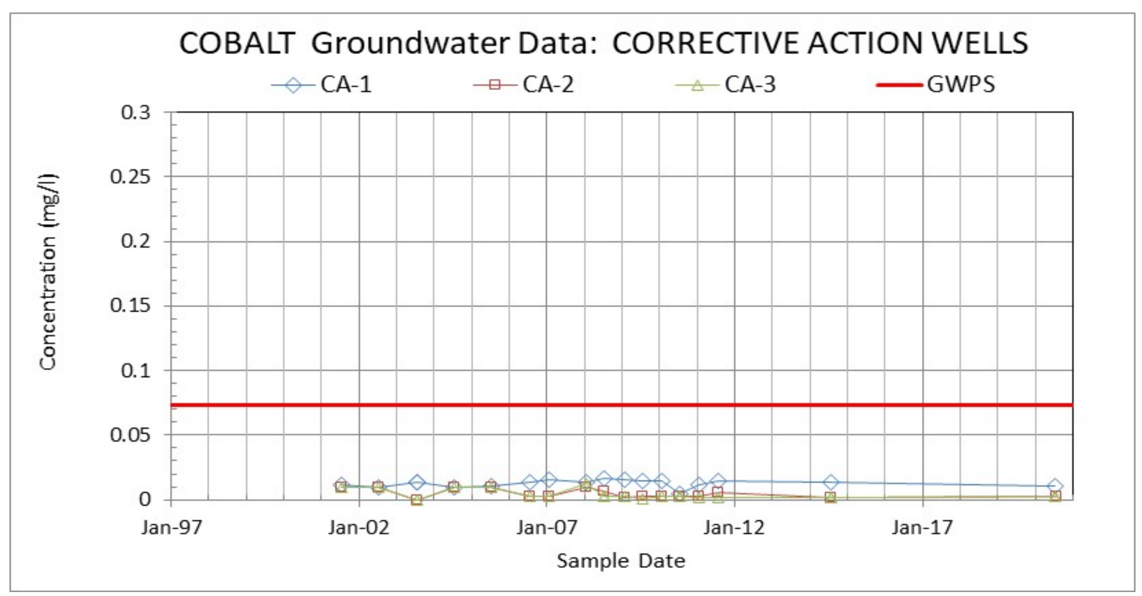

CHROMIUM Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

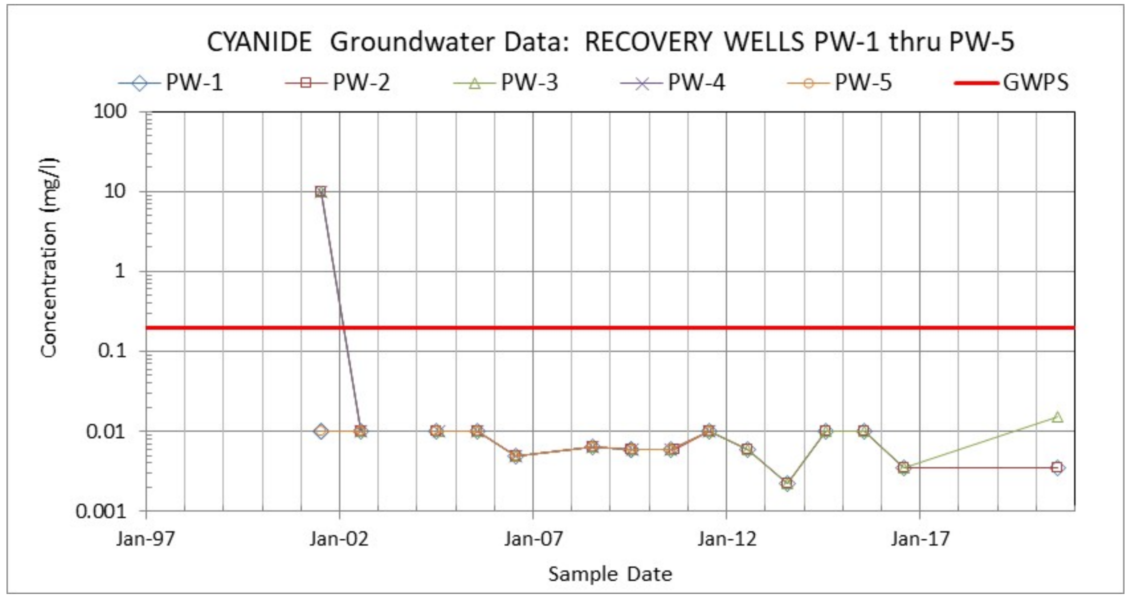

COBALT Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
0.3
0.25
0.2
0.15
0.1
0.05
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

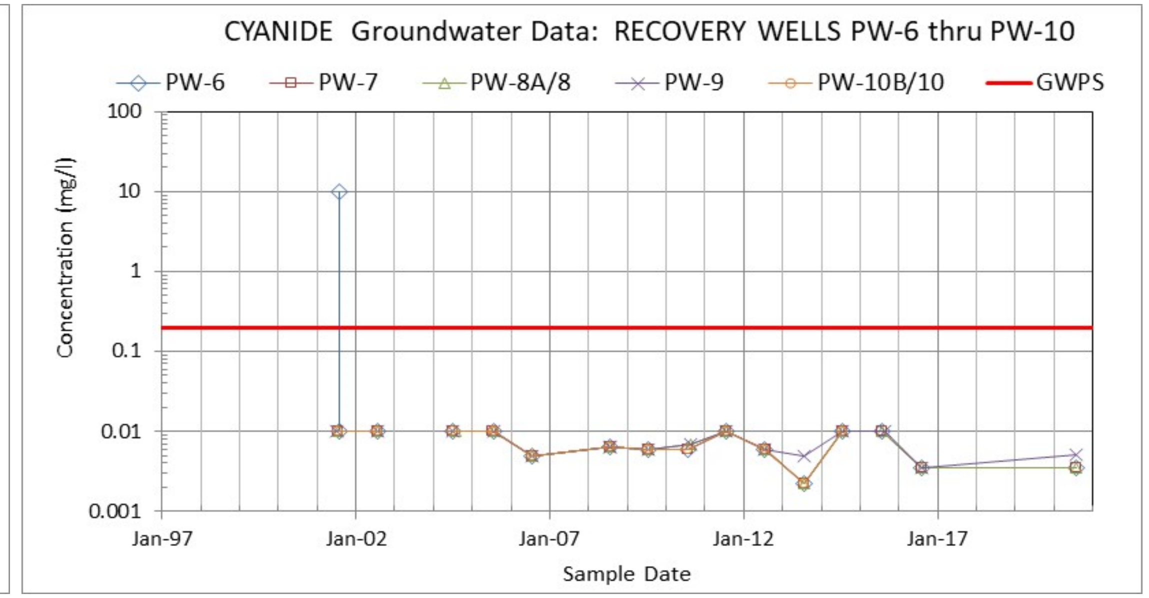

COBALT Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
0.3
0.25
0.2
0.15
0.1
0.05
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

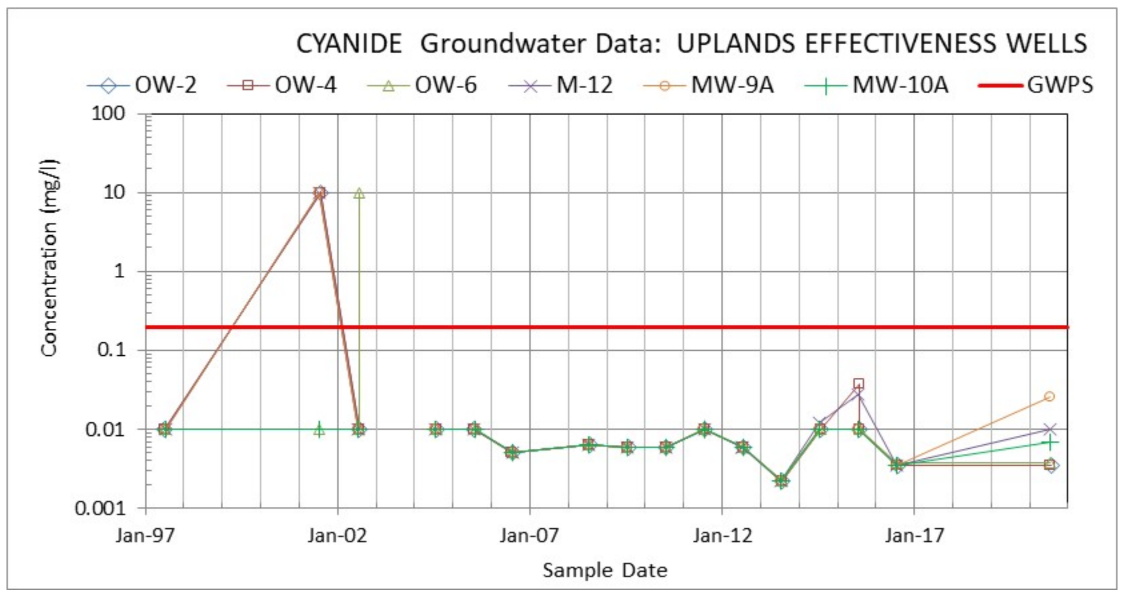

COBALT Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
0.3
0.25
0.2
0.15
0.1
0.05
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

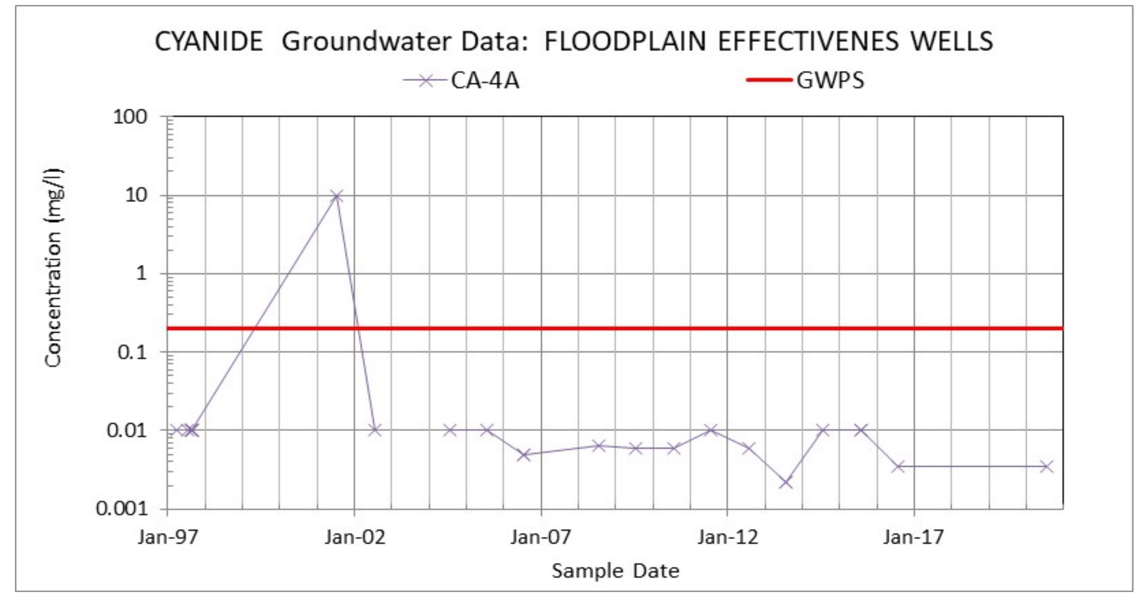

COBALT Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
0.3
0.25
0.2
0.15
0.1
0.05
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

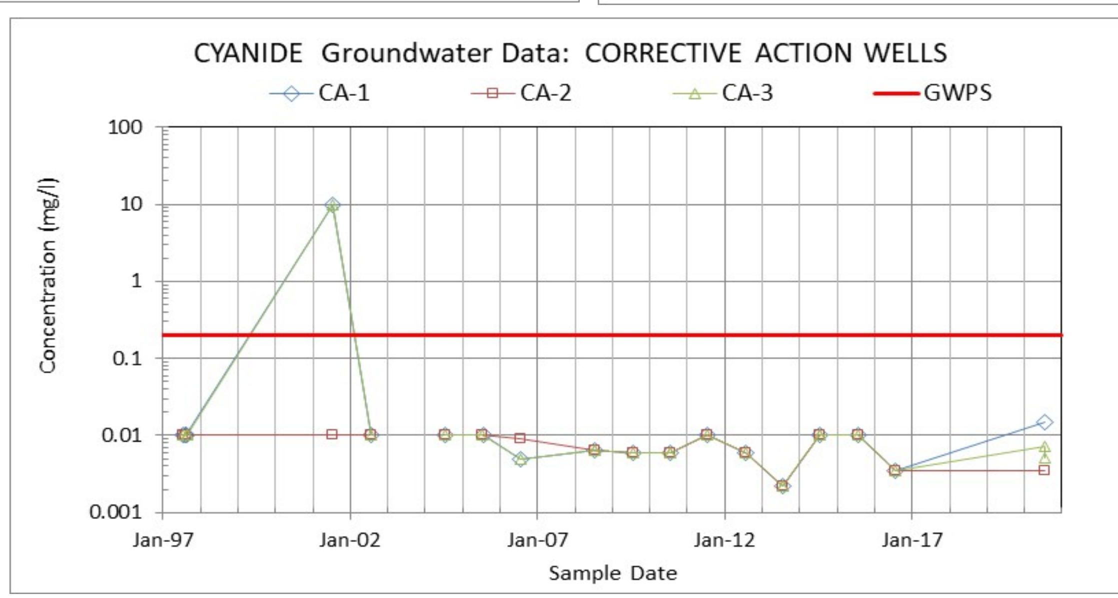

COBALT Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
0.3
0.25
0.2
0.15
0.1
0.05
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

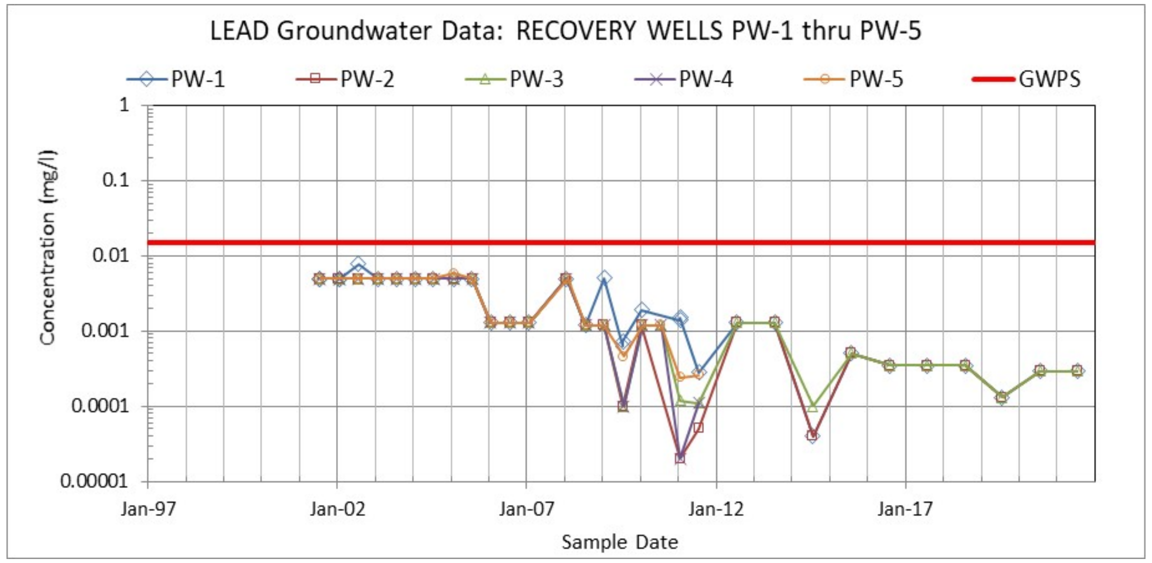

CYANIDE Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
100
10
1
0.1
0.01
0.001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

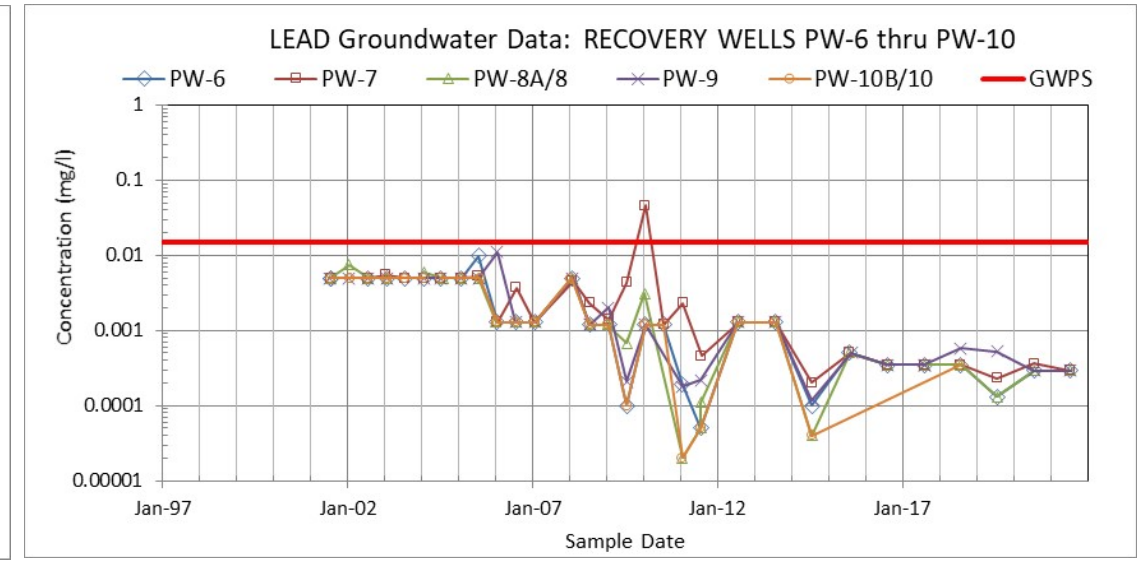

CYANIDE Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
100
10
1
0.1
0.01
0.001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

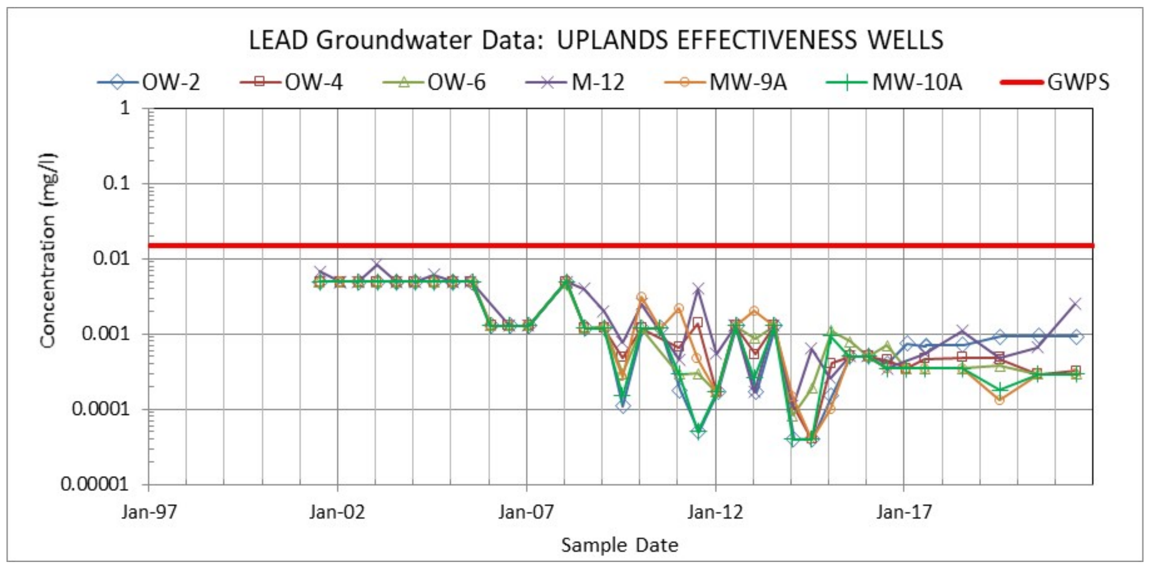

CYANIDE Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
100
10
1
0.1
0.01
0.001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

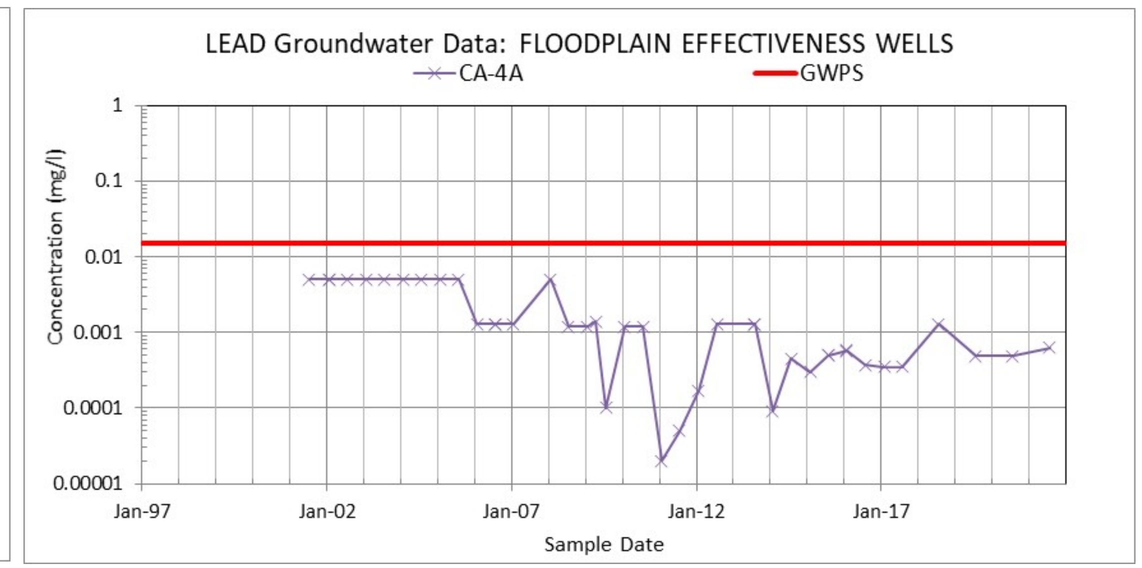

CYANIDE Groundwater Data: FLOODPLAIN EFFECTIVENES WELLS
CA-4A
GWPS
Concentration (mg/l)
100
10
1
0.1
0.01
0.001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

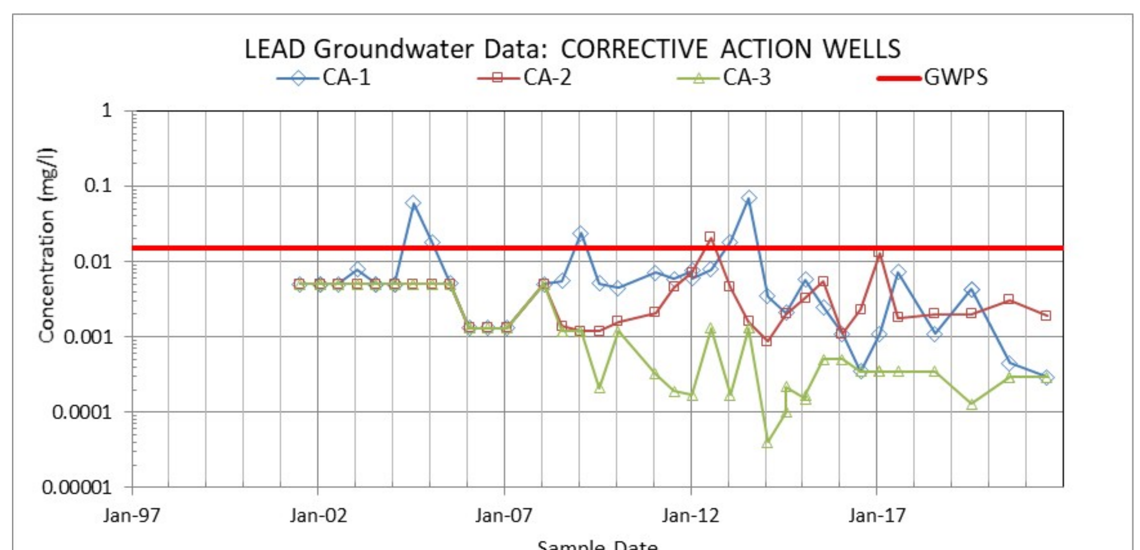

CYANIDE Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
100
10
1
0.1
0.01
0.001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

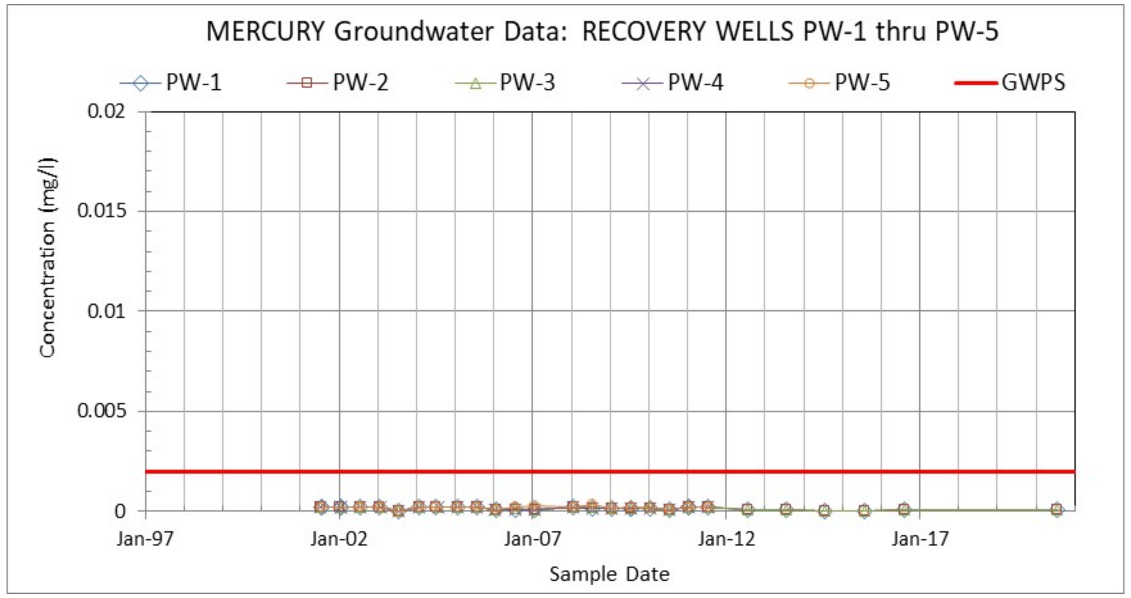

LEAD Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

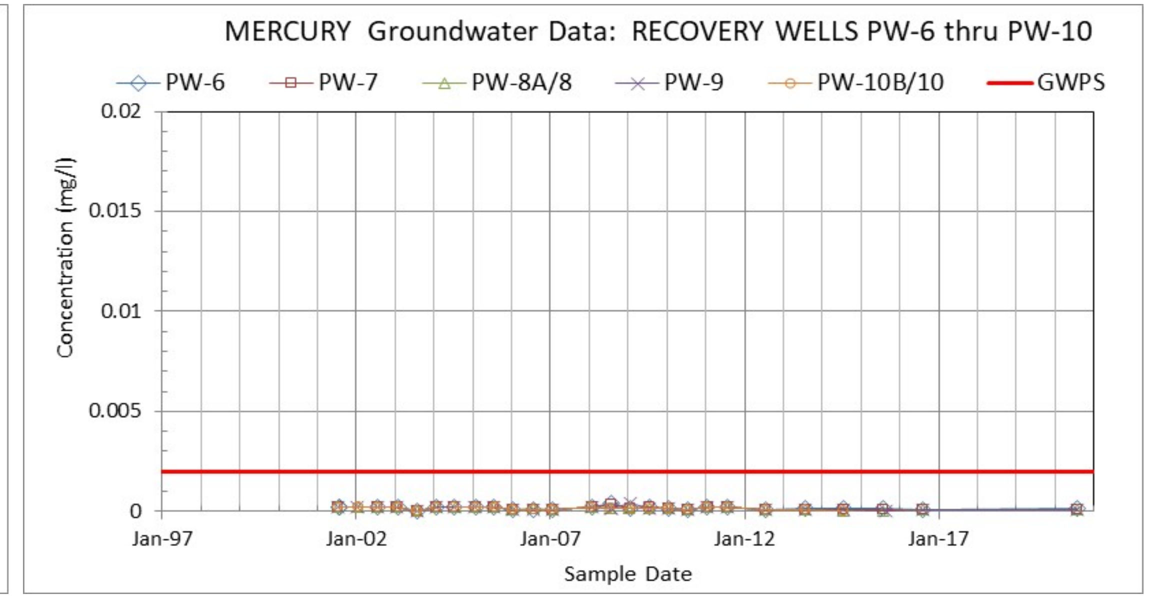

LEAD Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

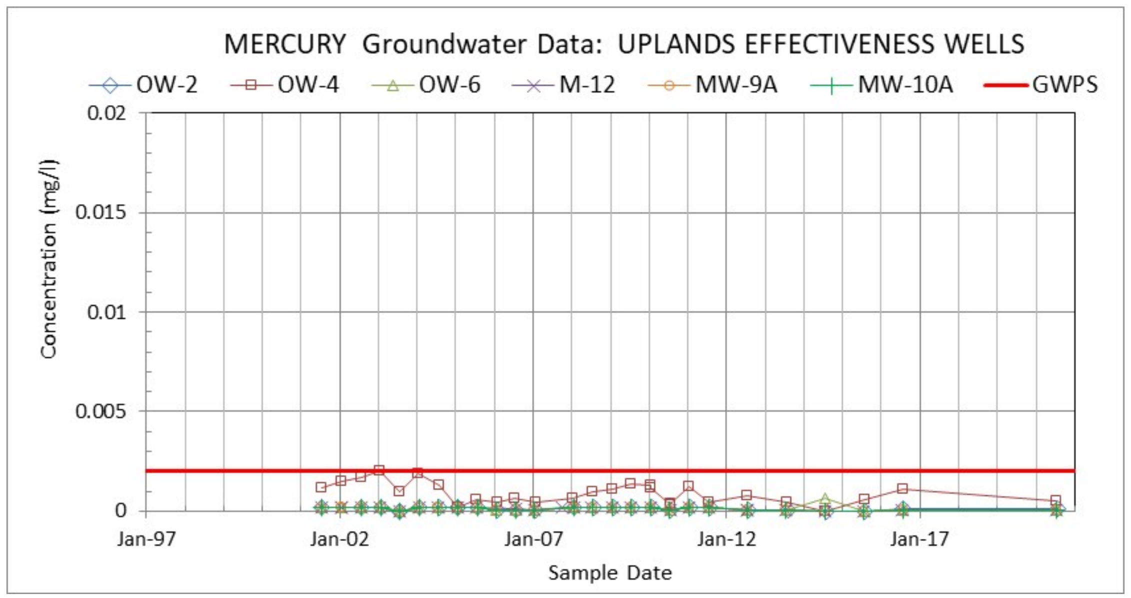

LEAD Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

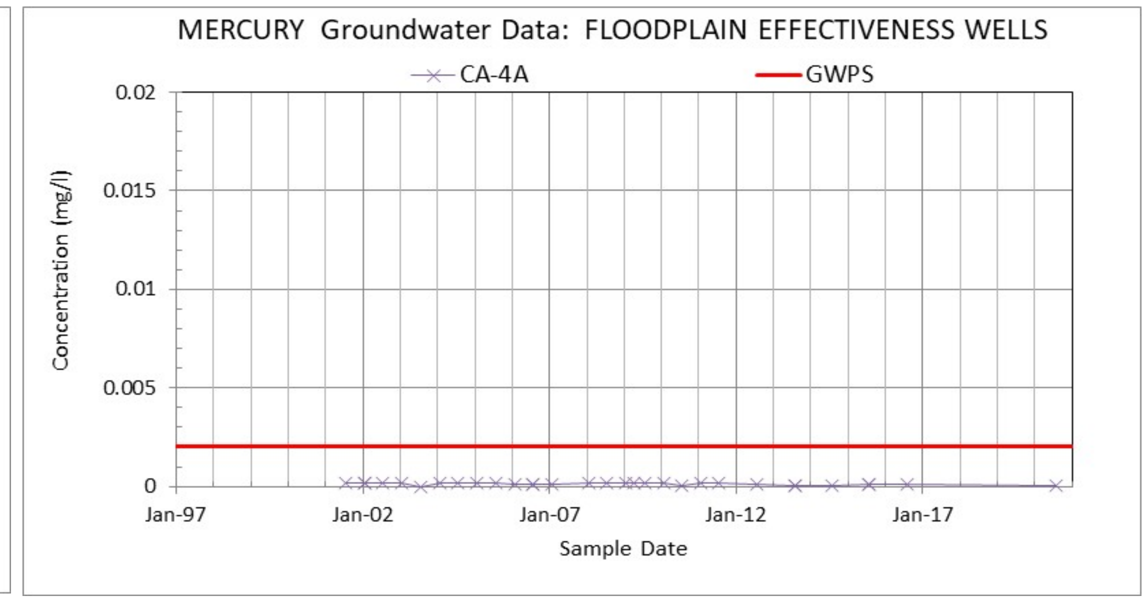

LEAD Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

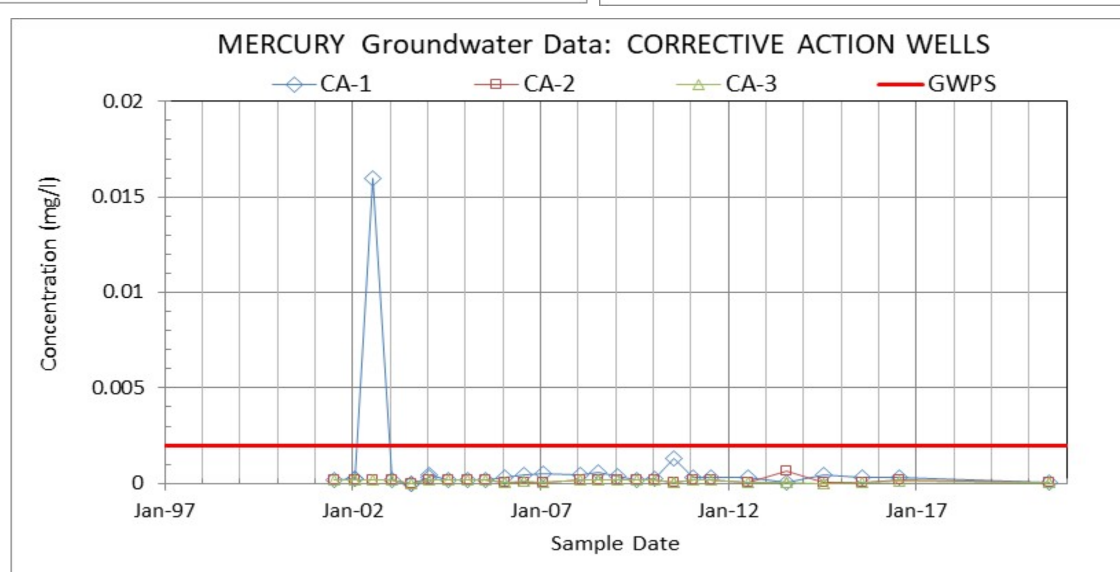

LEAD Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

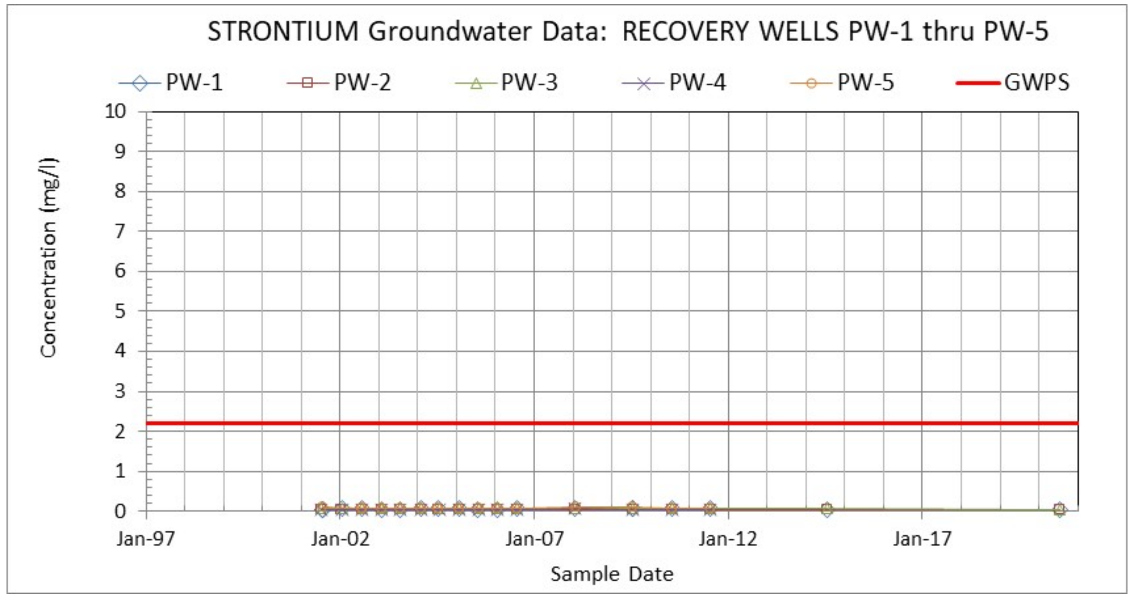

MERCURY Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

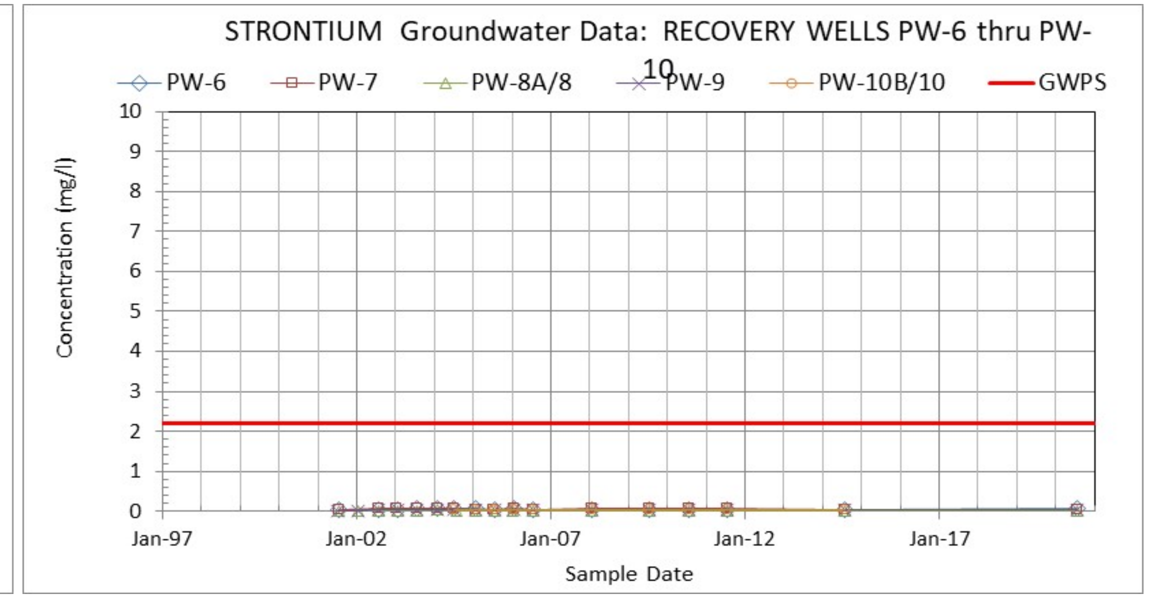

MERCURY Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

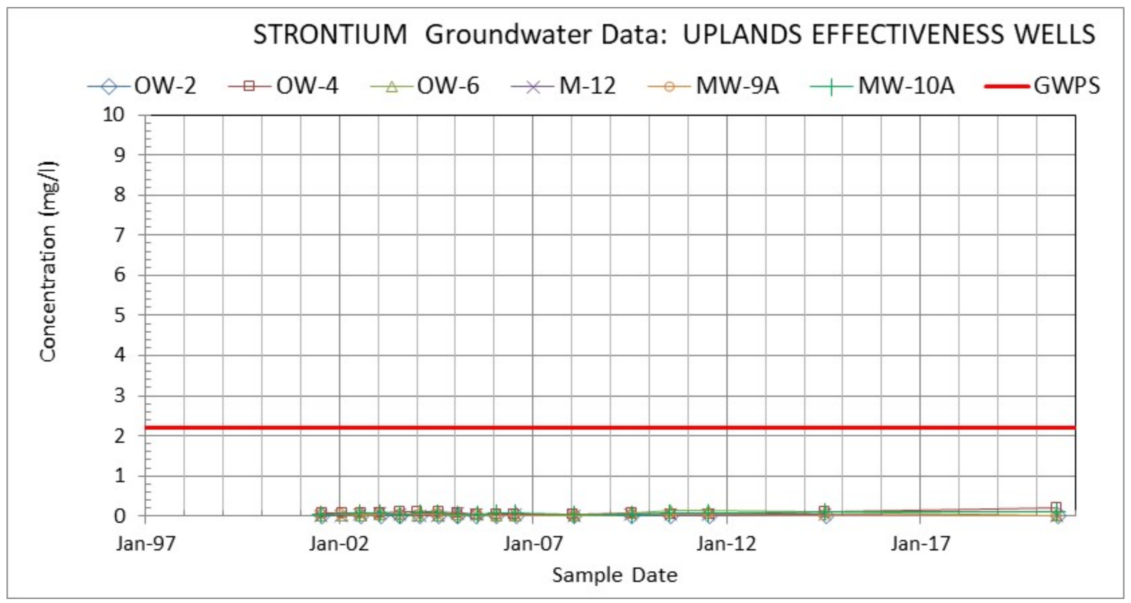

MERCURY Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

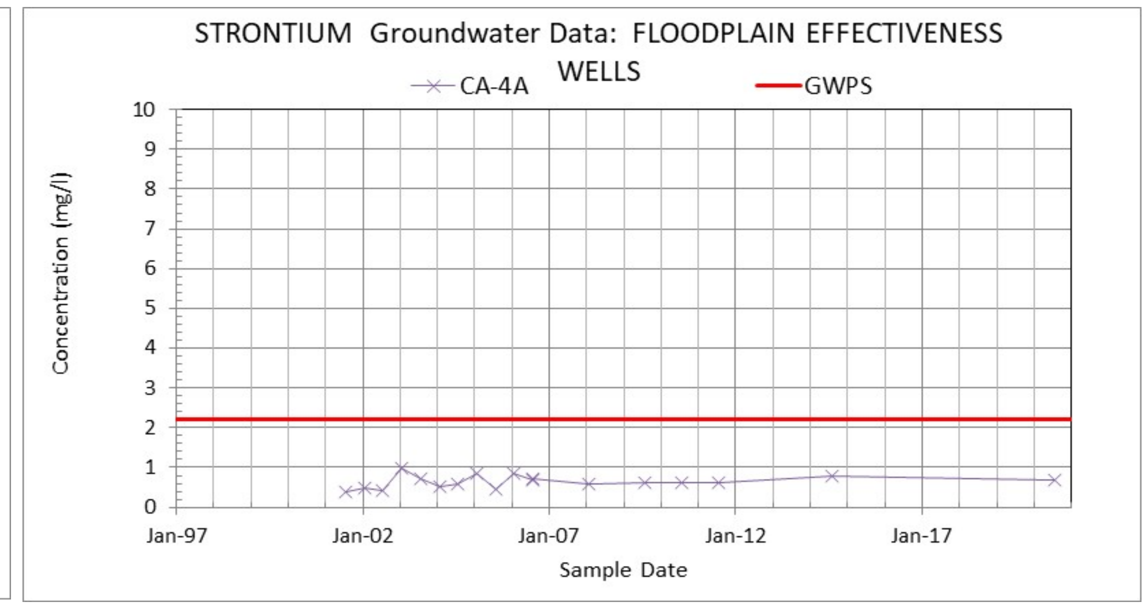

MERCURY Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

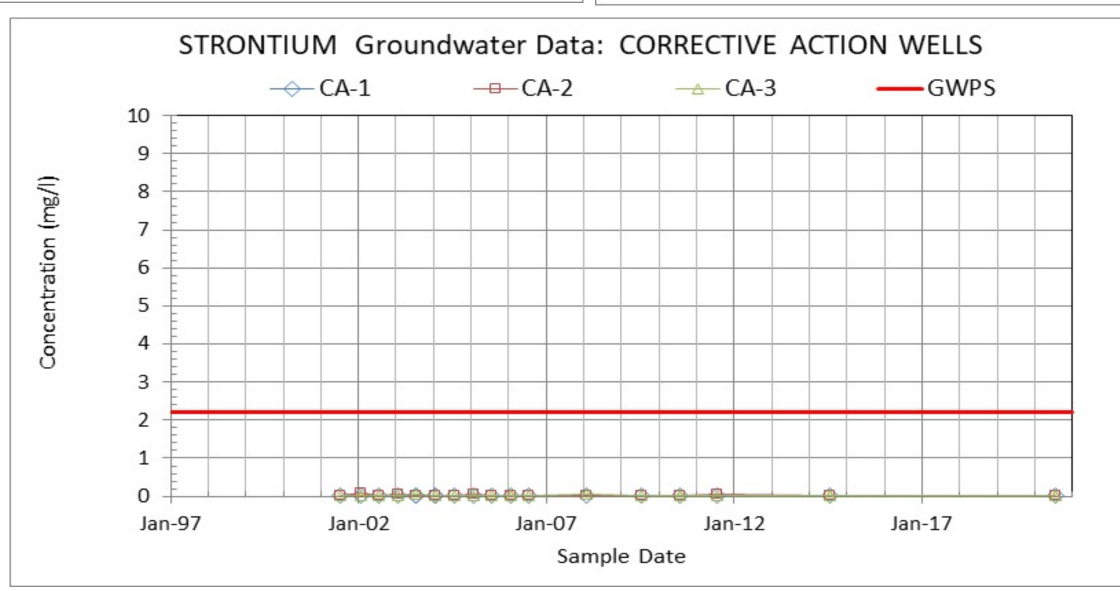

MERCURY Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

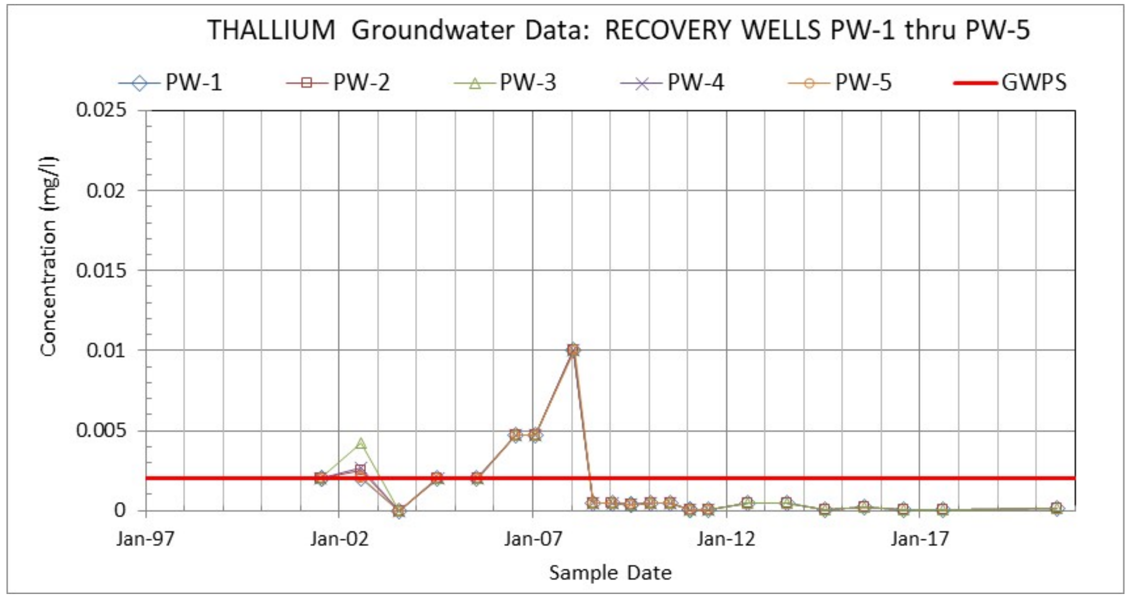

STRONTIUM Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

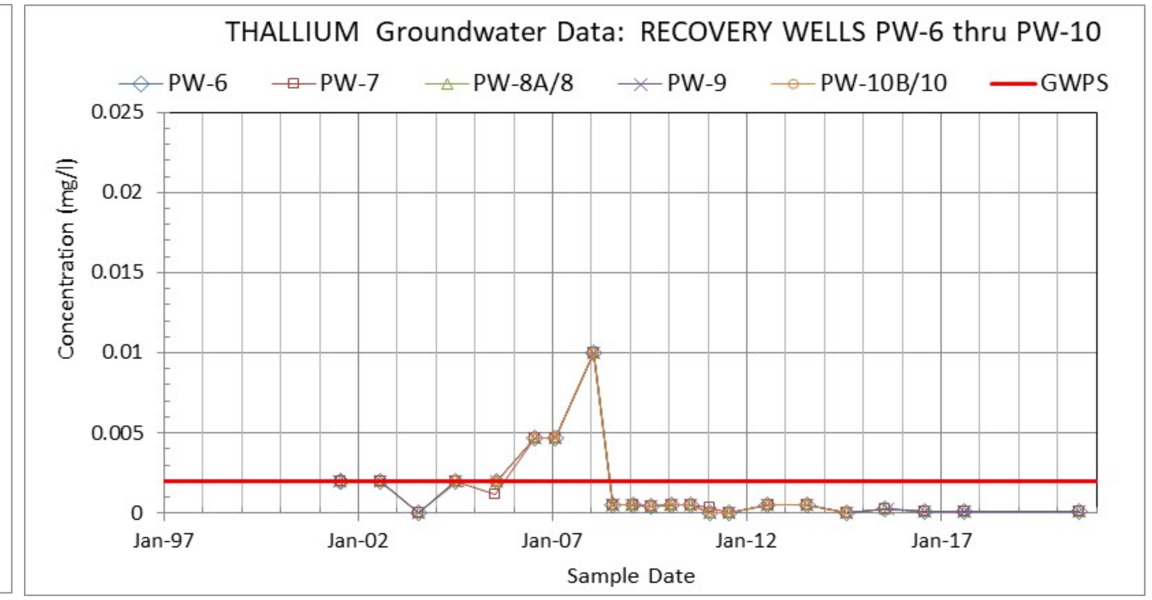

STRONTIUM Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

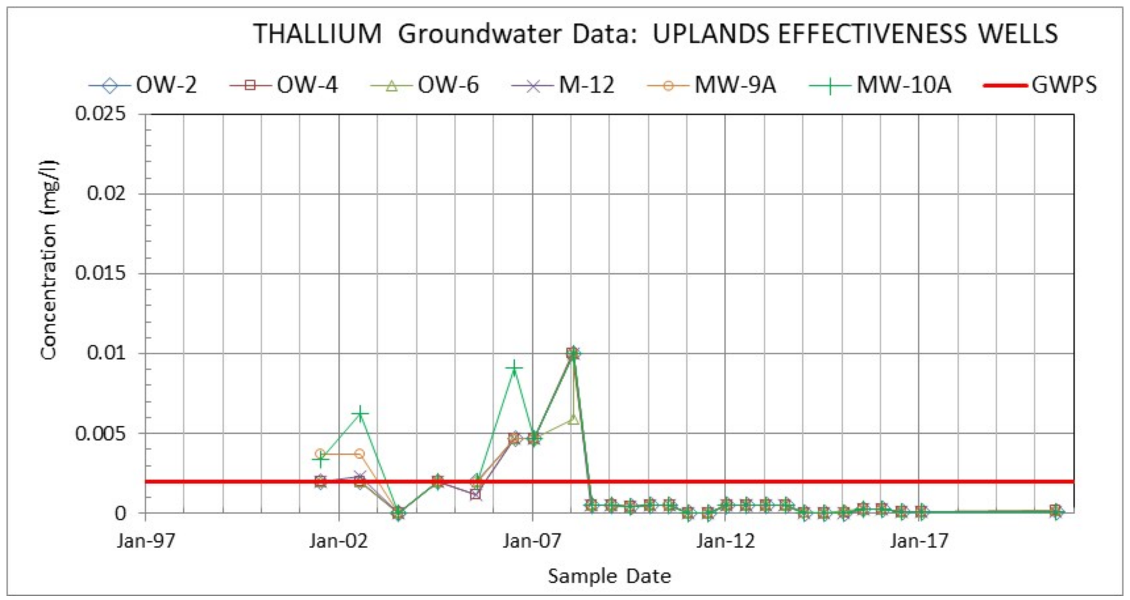

STRONTIUM Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

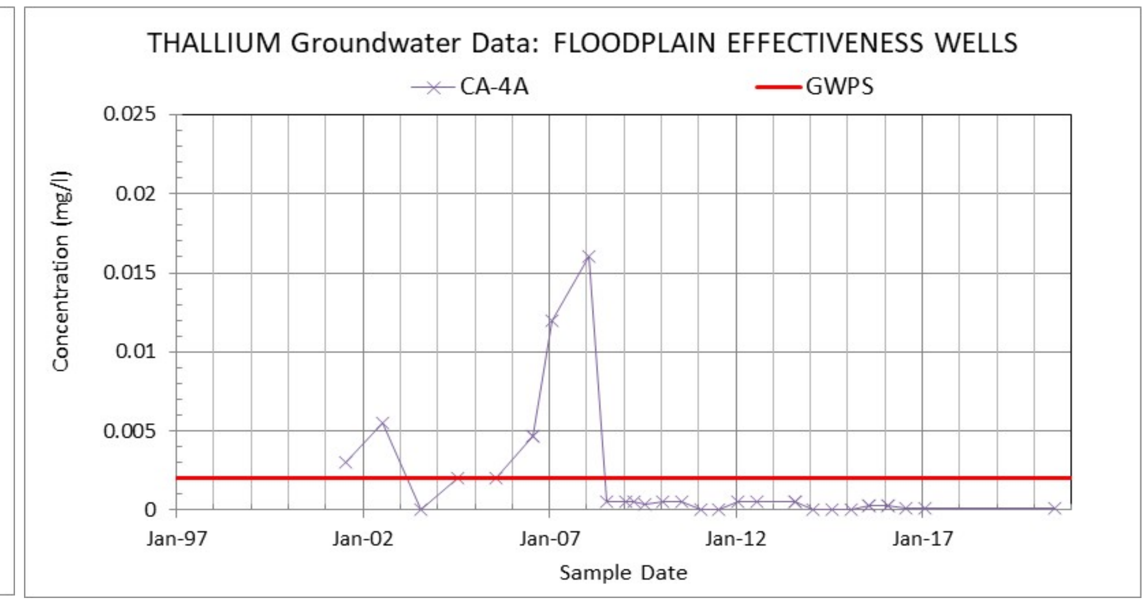

STRONTIUM Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

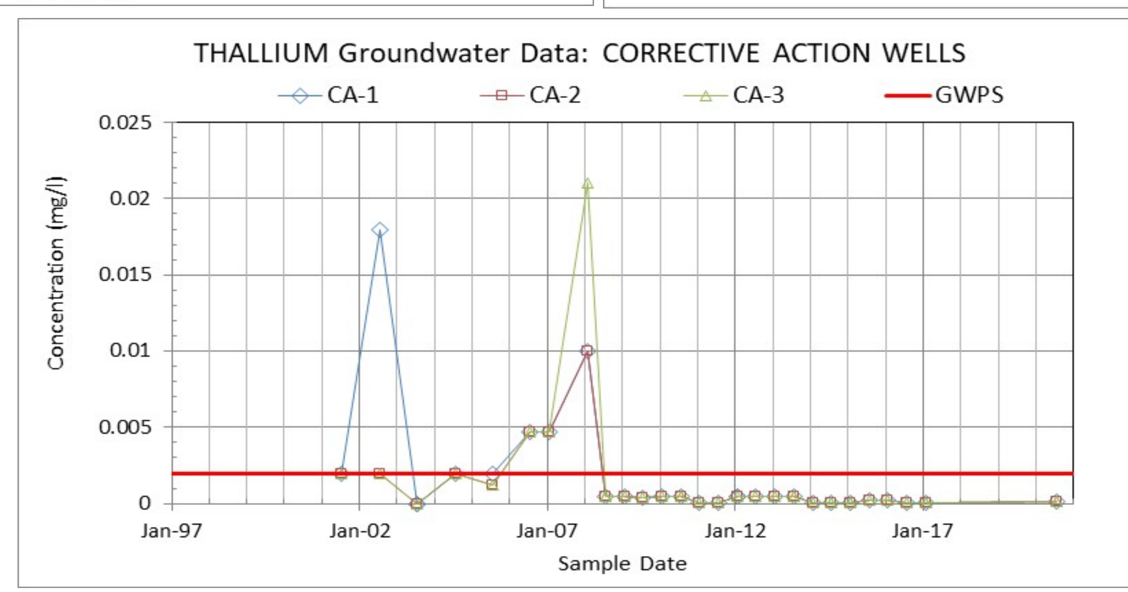

STRONTIUM Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

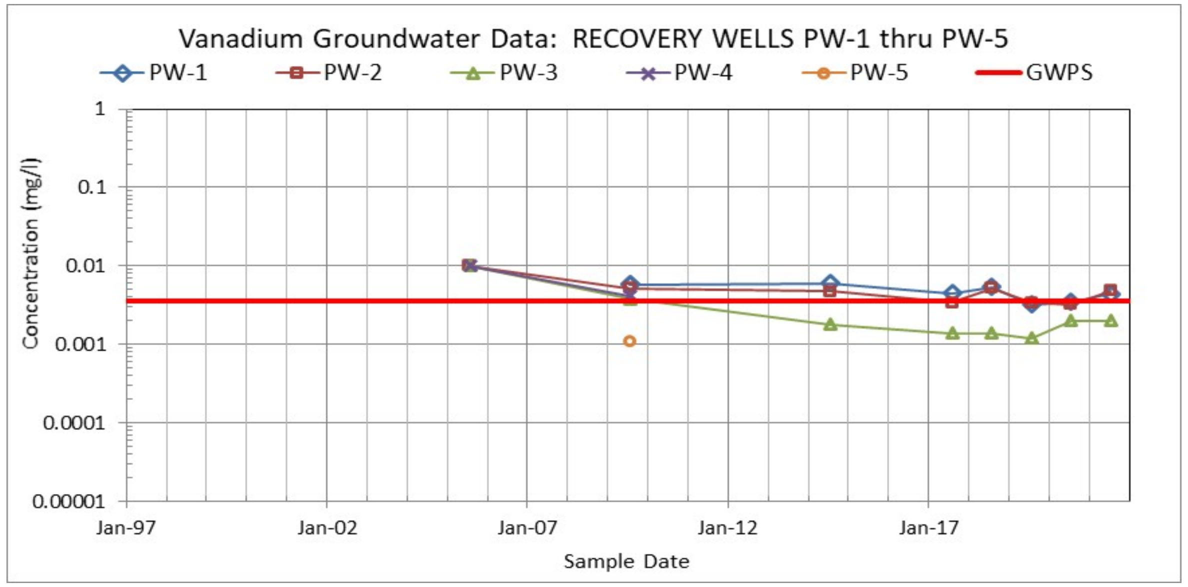

THALLIUM Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
0.025
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

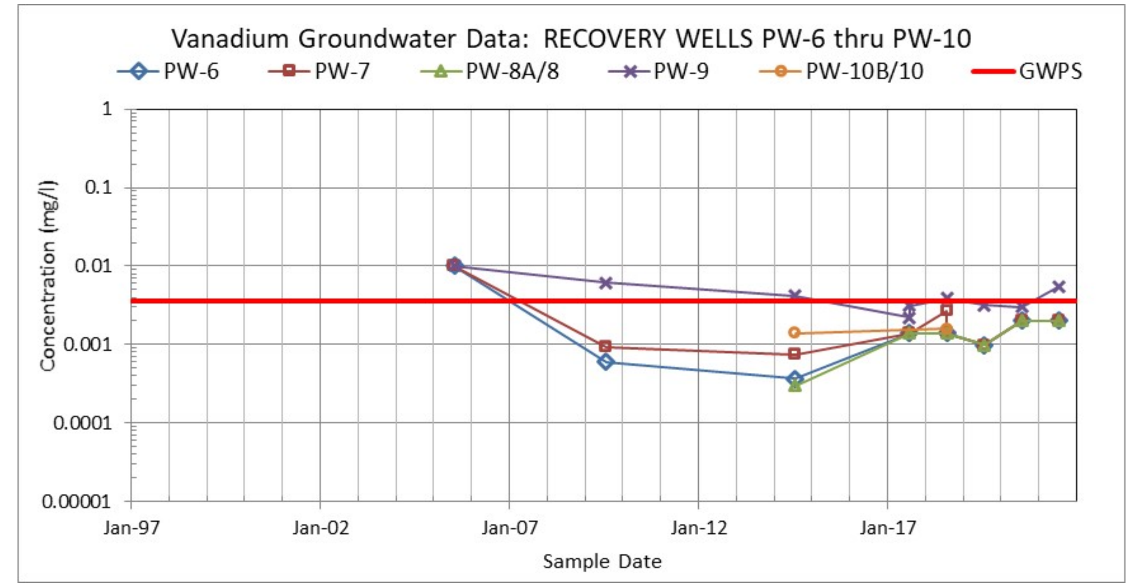

THALLIUM Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
0.025
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

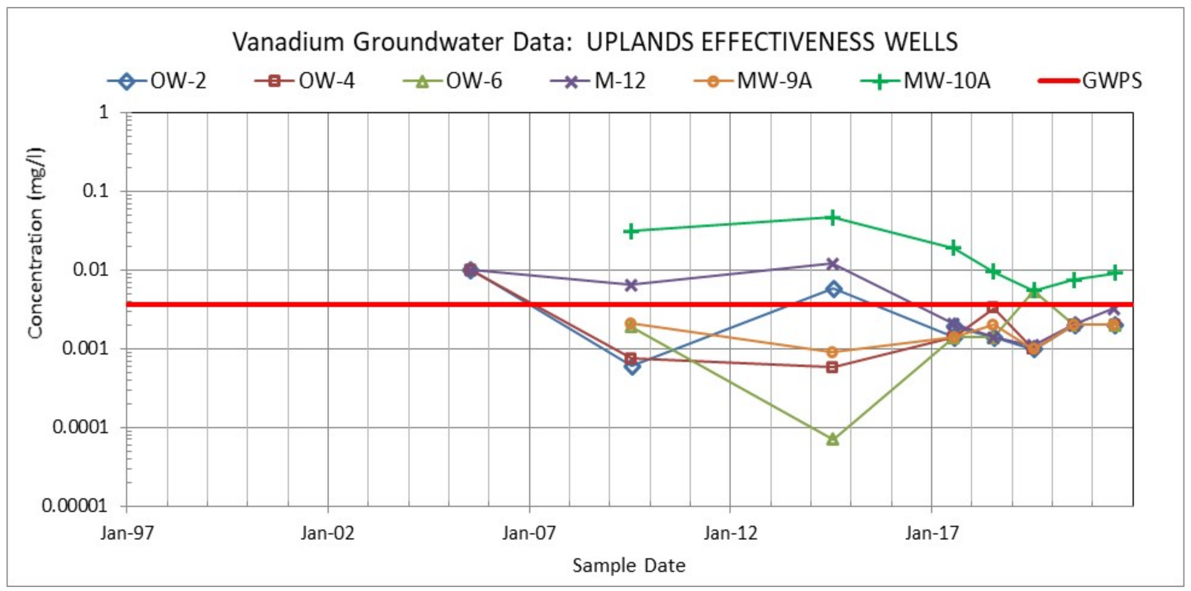

THALLIUM Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
0.025
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

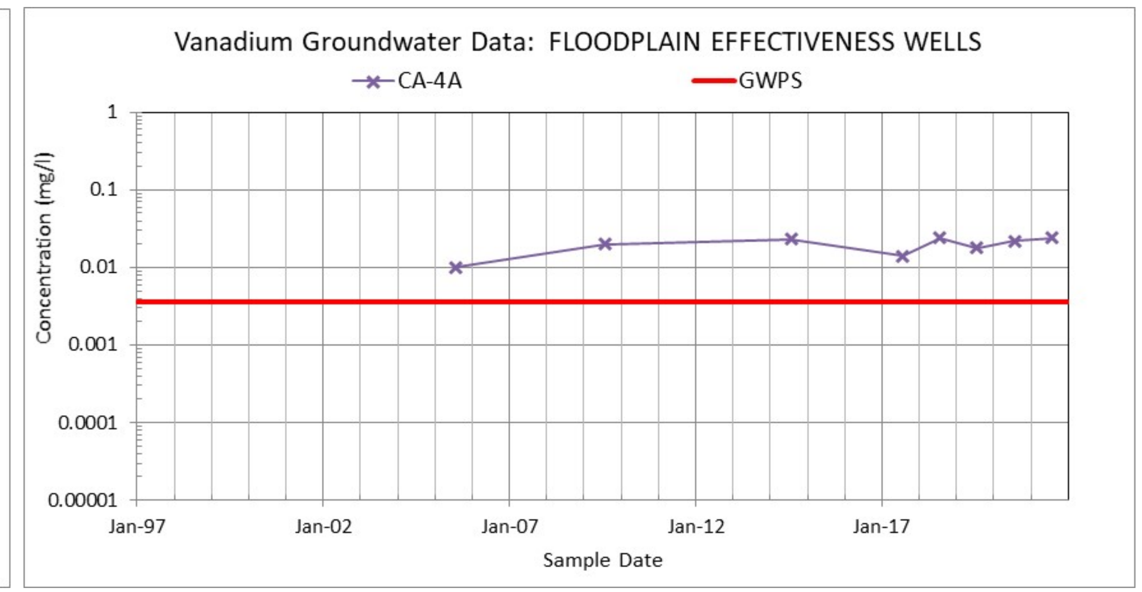

THALLIUM Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
0.025
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

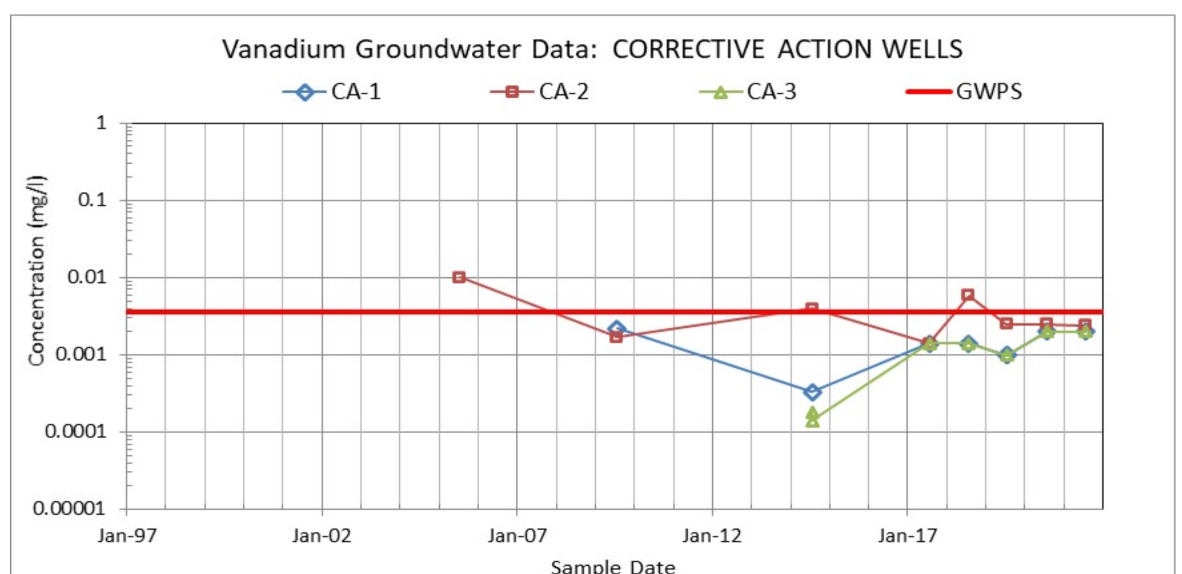

THALLIUM Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
0.025
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

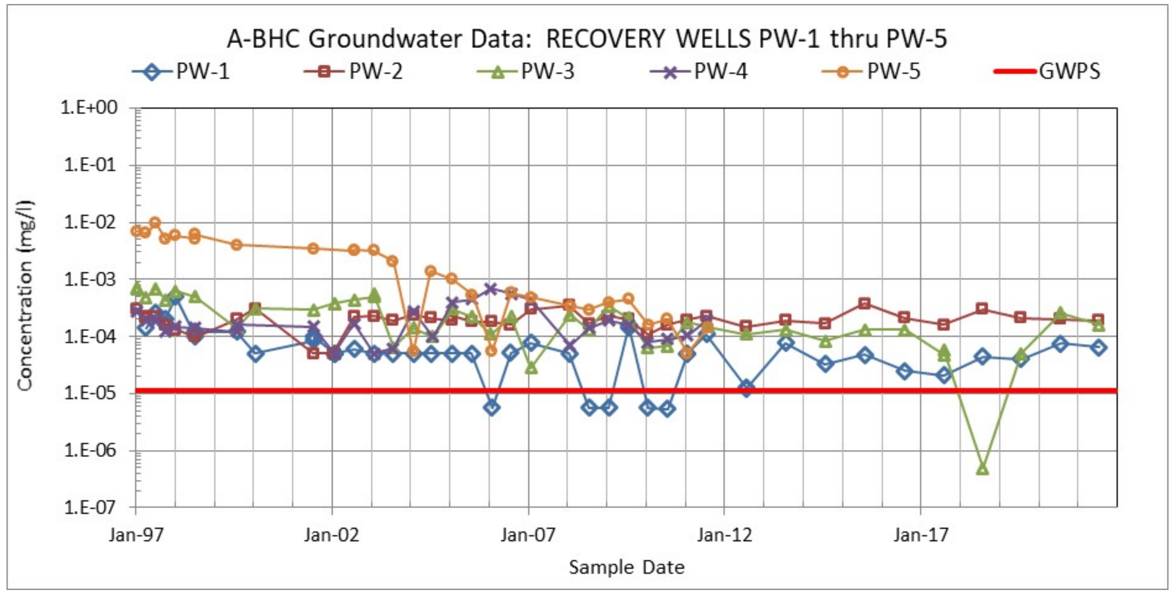

Vanadium Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

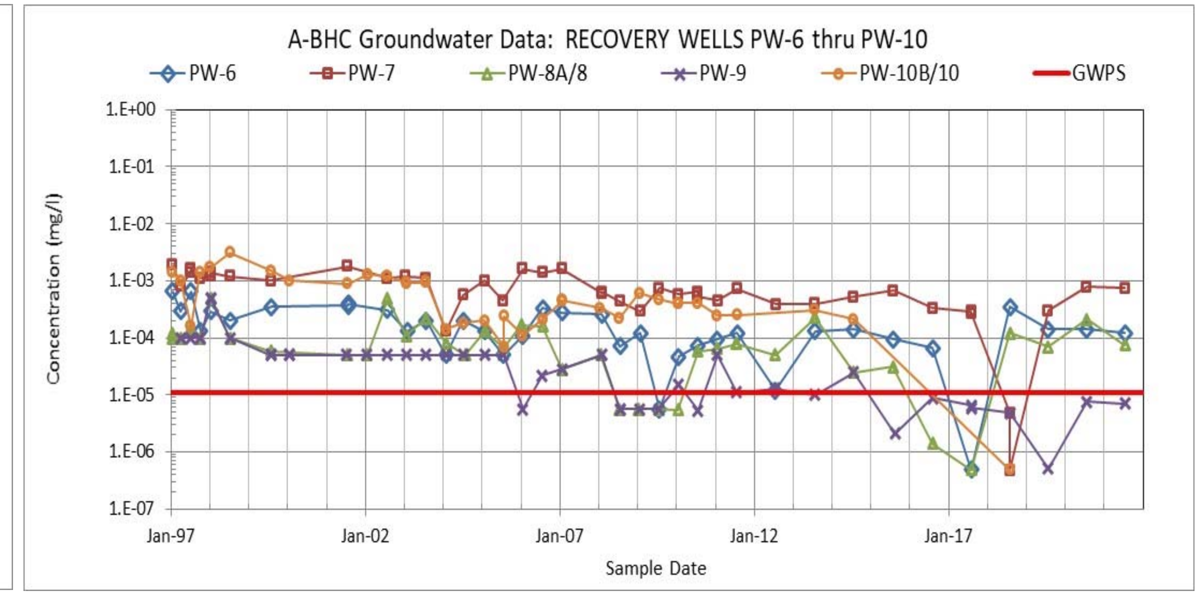

Vanadium Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

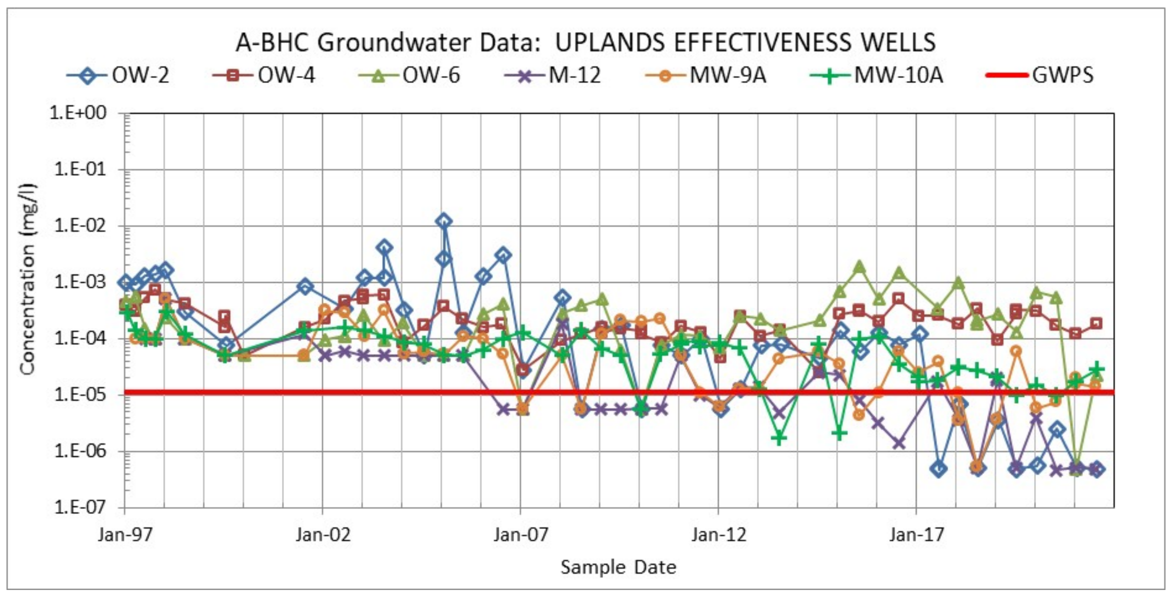

Vanadium Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

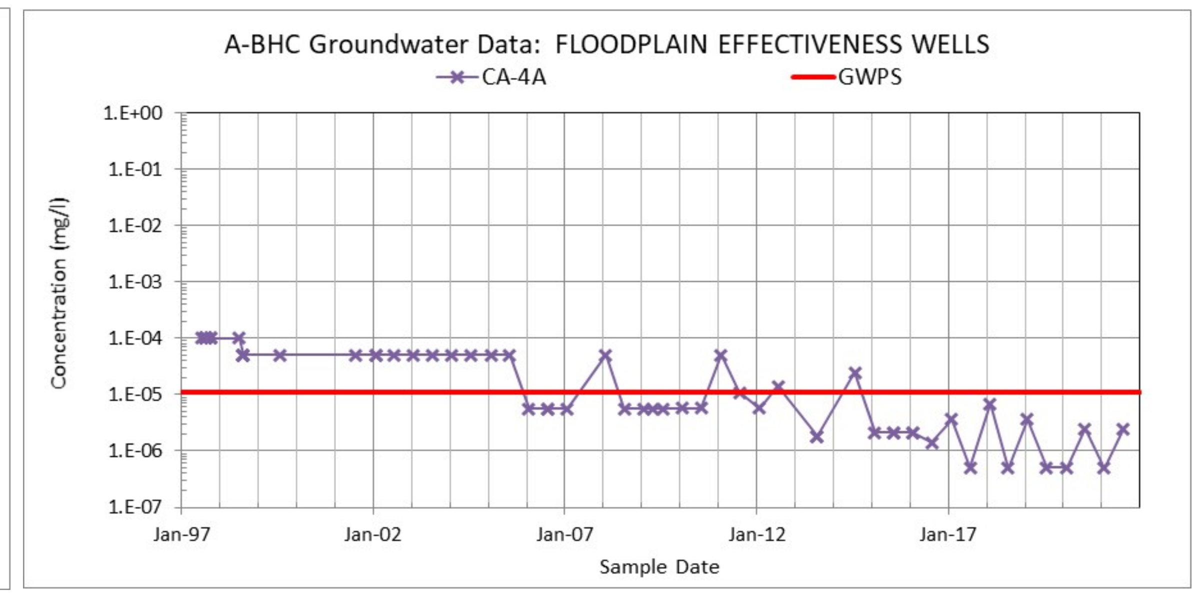

Vanadium Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

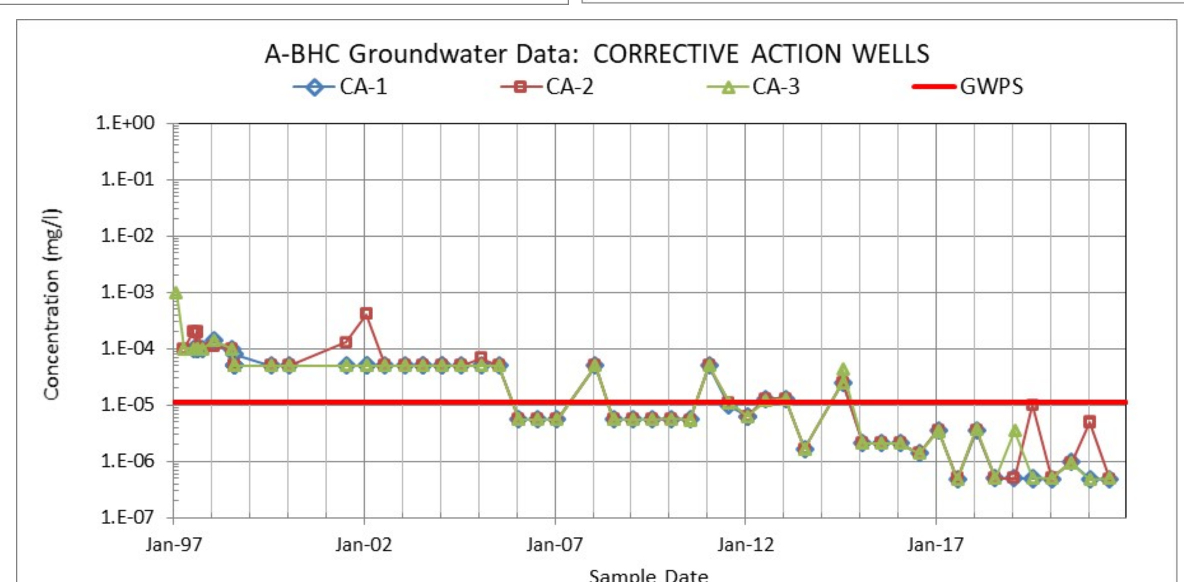

Vanadium Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

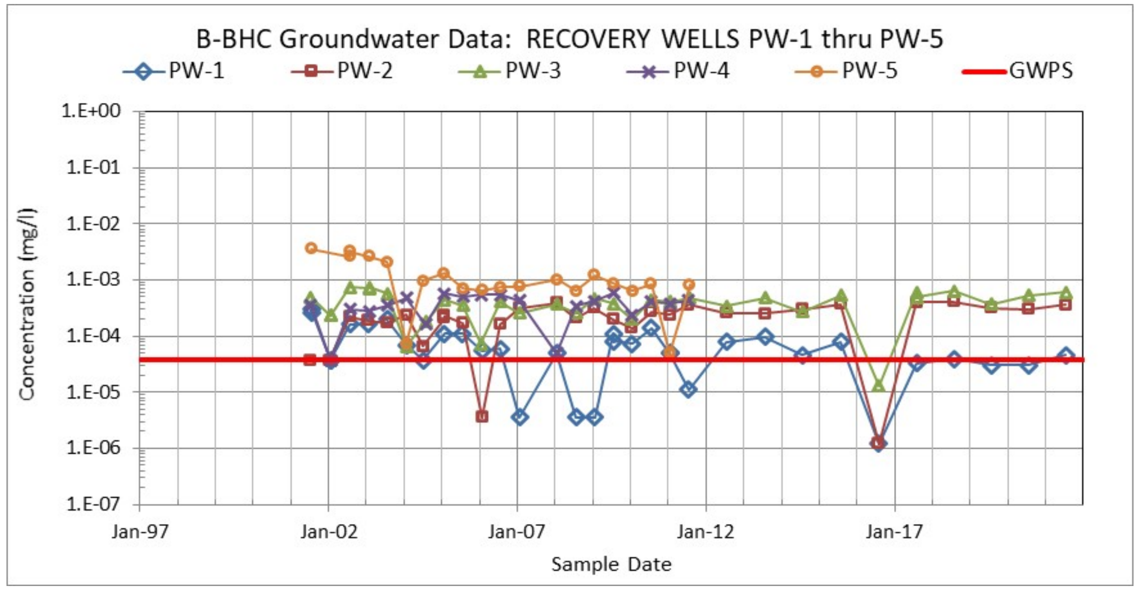

A-BHC Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

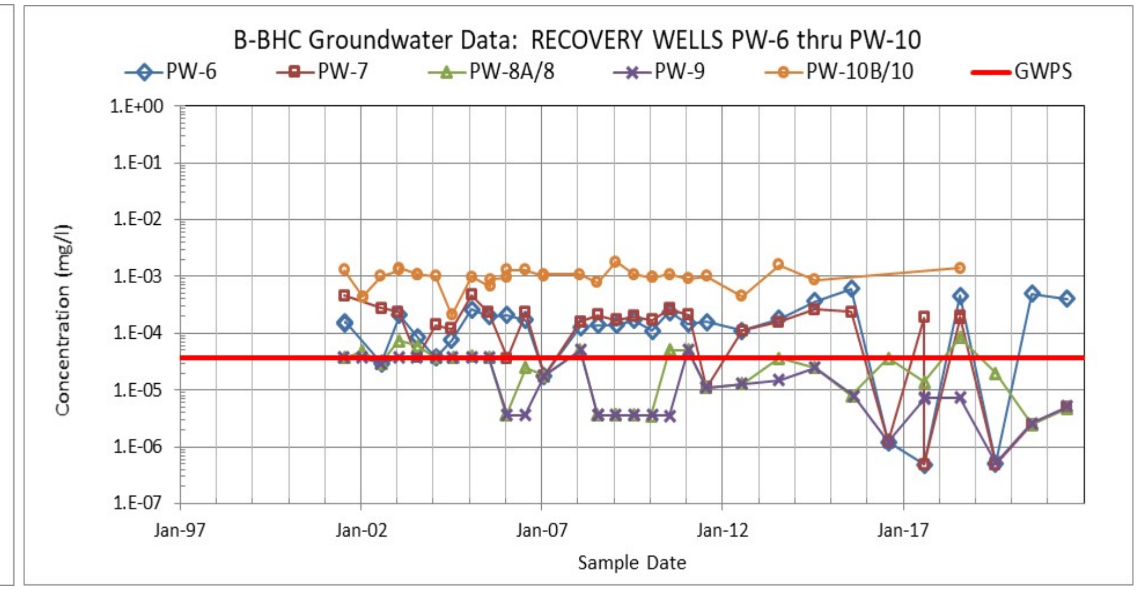

A-BHC Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

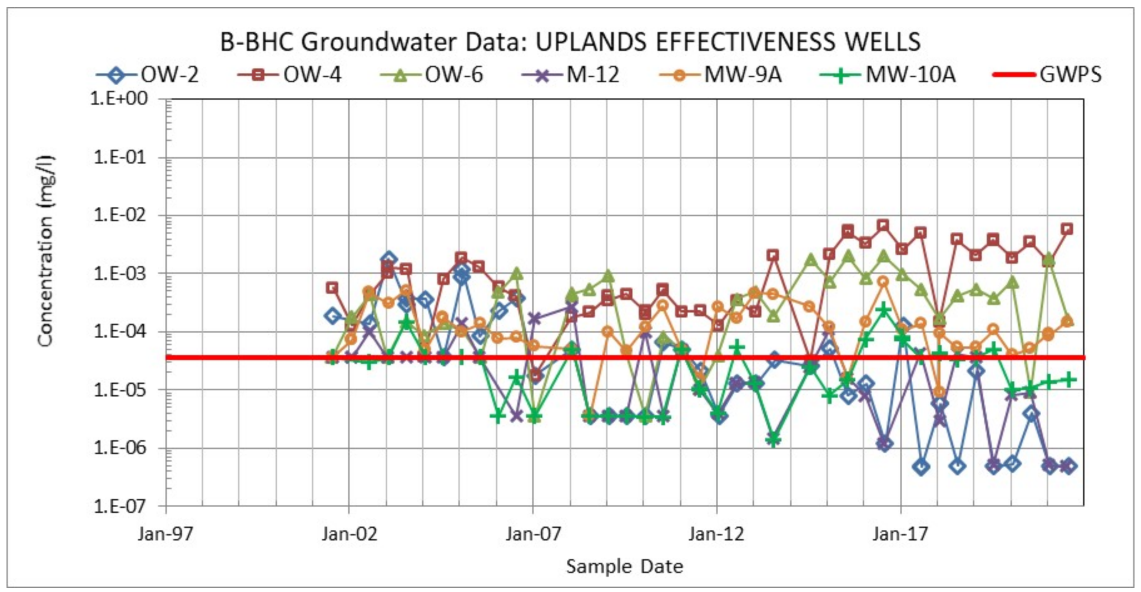

A-BHC Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

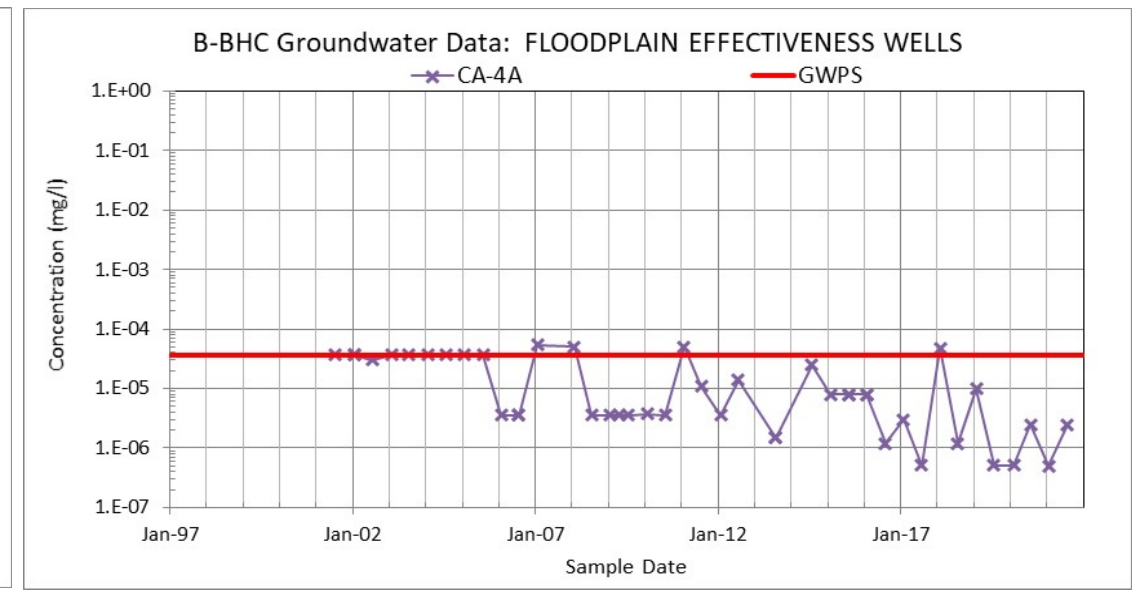

A-BHC Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

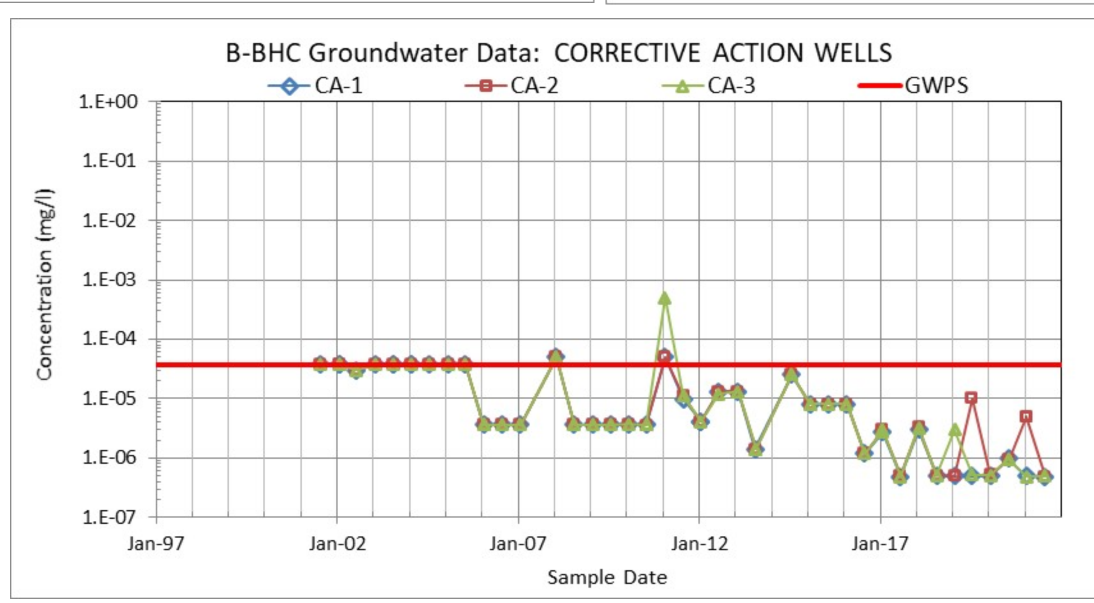

A-BHC Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

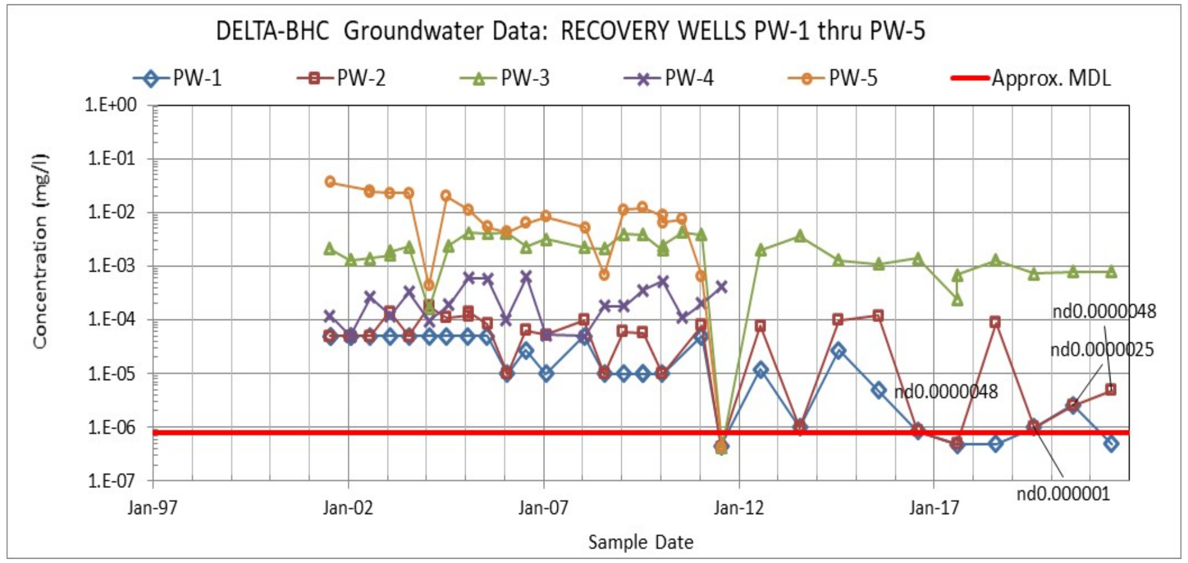

B-BHC Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
Sample Date

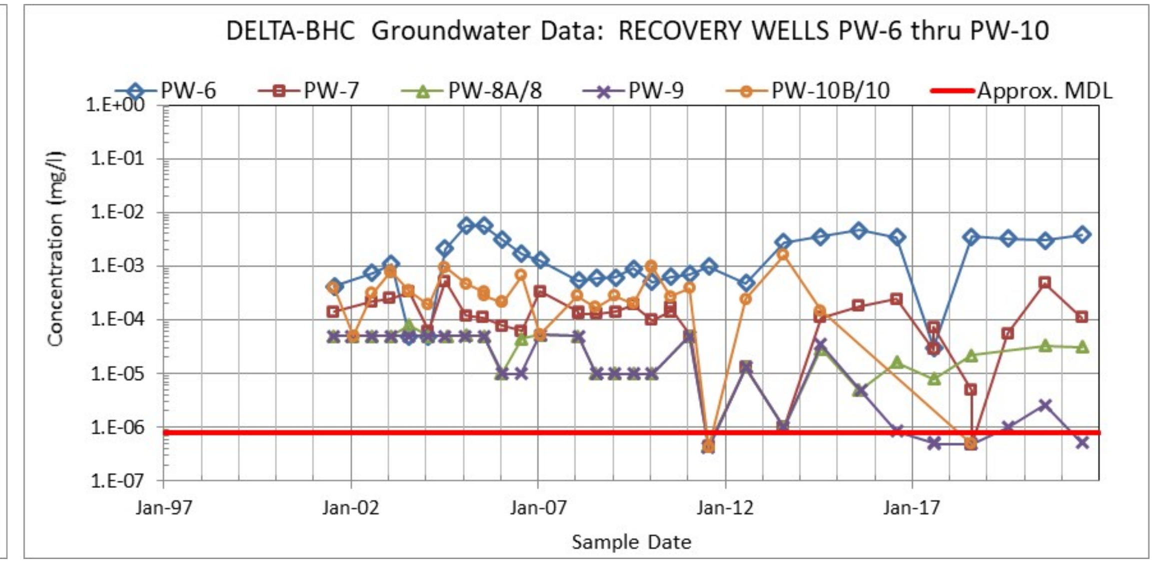

B-BHC Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
Sample Date

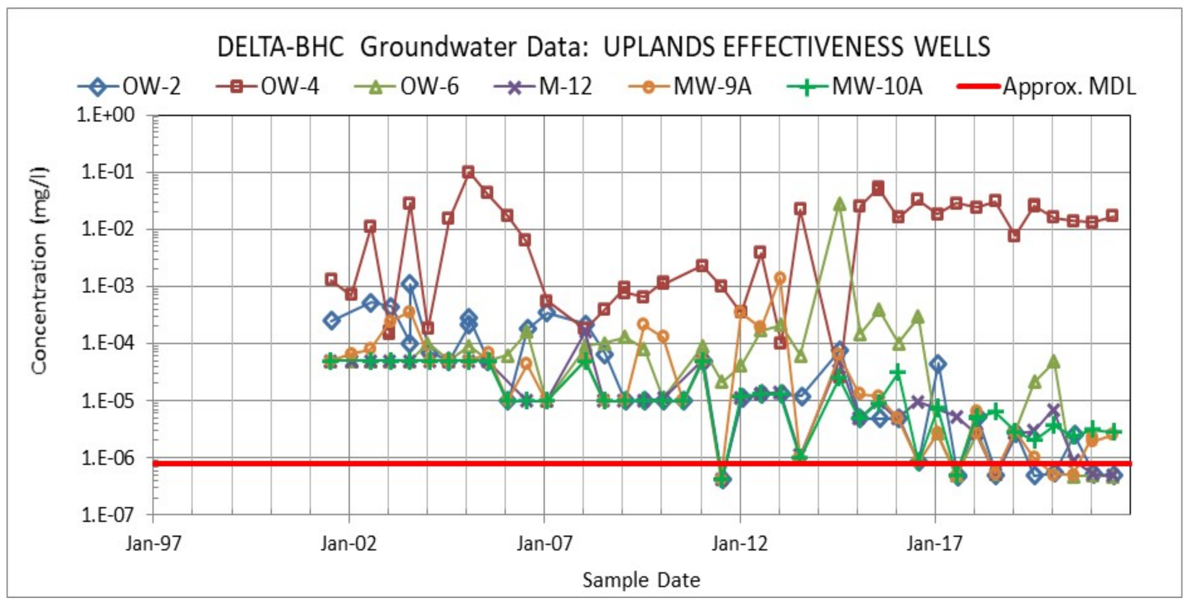

B-BHC Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
Sample Date

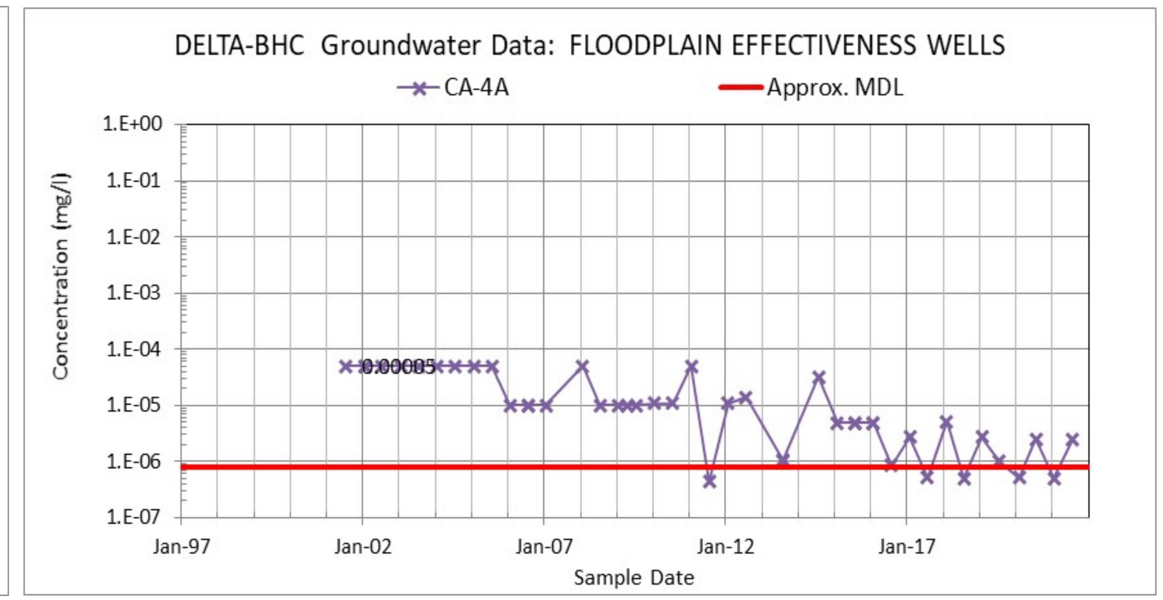

B-BHC Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
Sample Date

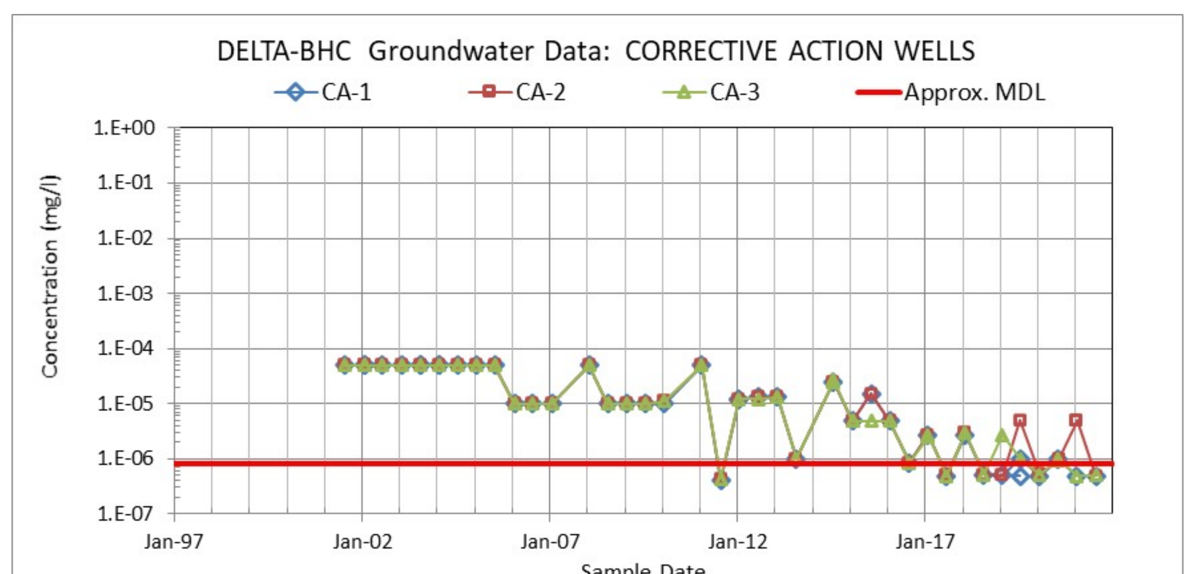

B-BHC Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
Sample Date

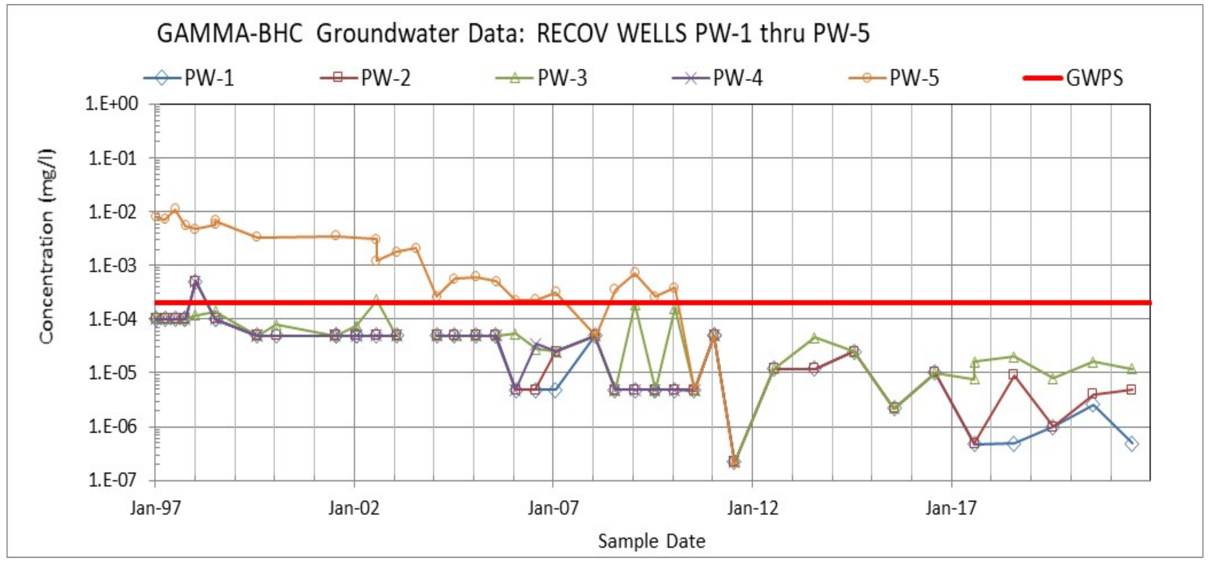

DELTA-BHC Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
Approx. MDL
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date
nd0.0000048
nd0.0000025
nd0.0000048
nd0.000001

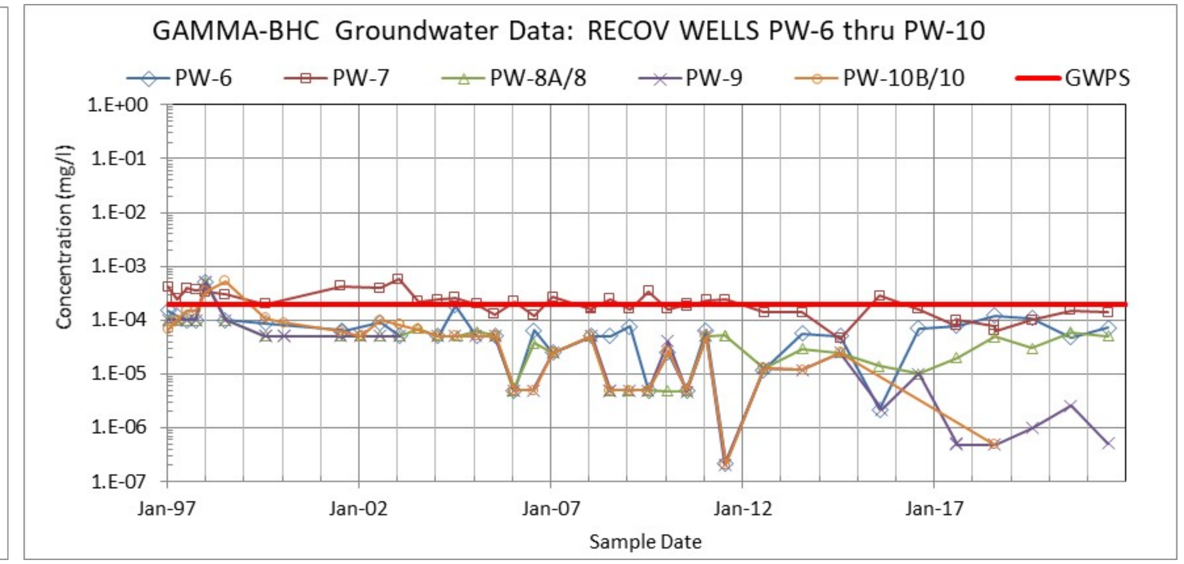

DELTA-BHC Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
Approx. MDL
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

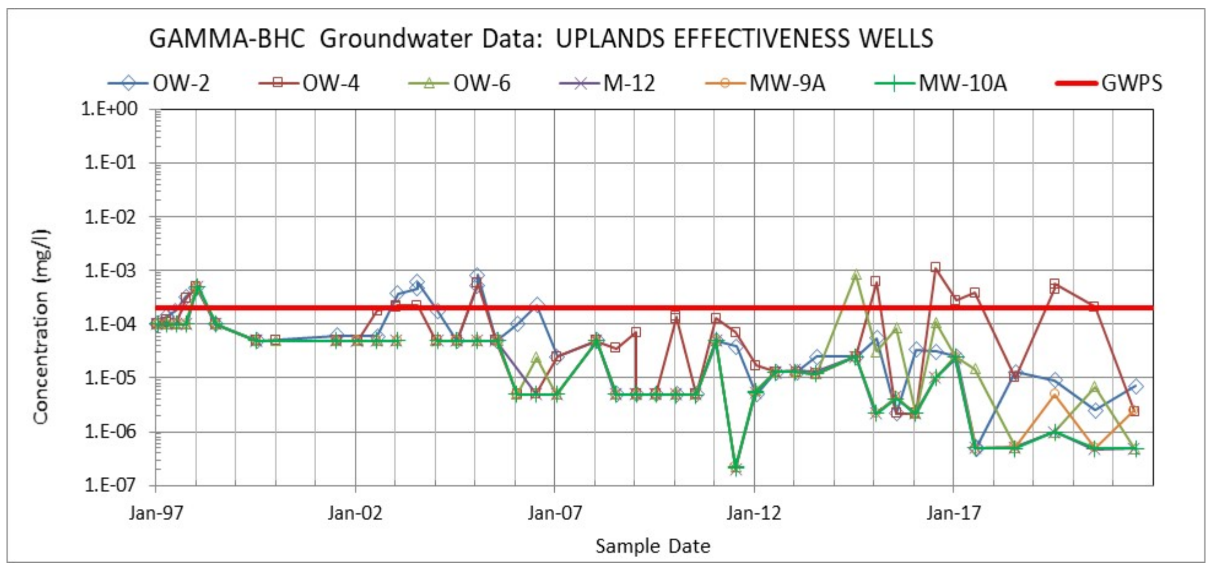

DELTA-BHC Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
Approx. MDL
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

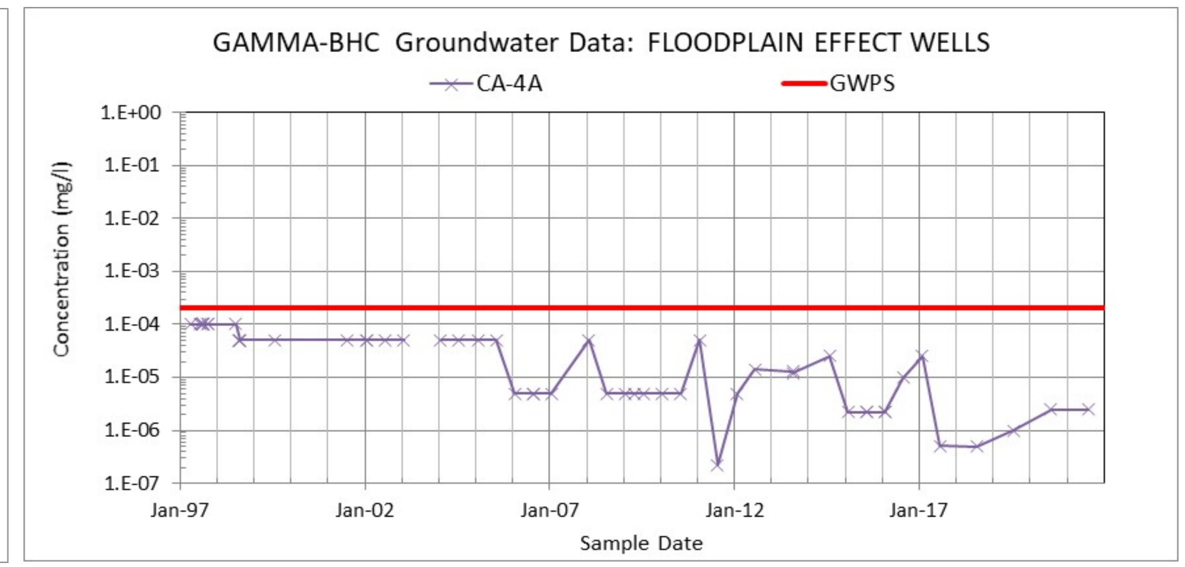

DELTA-BHC Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
Approx. MDL
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
0.00005
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

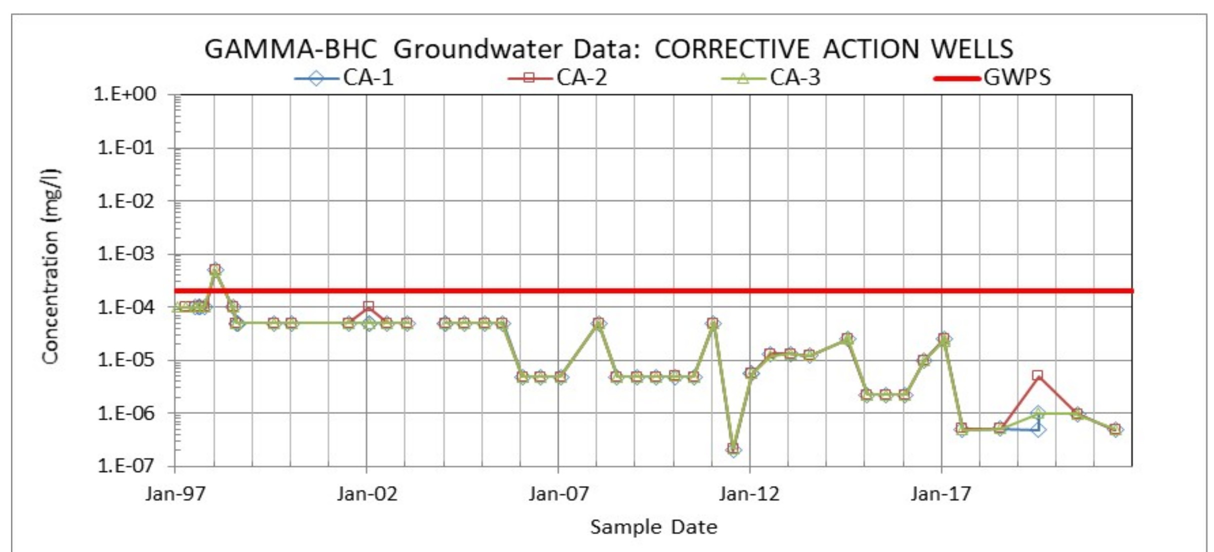

DELTA-BHC Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
Approx. MDL
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

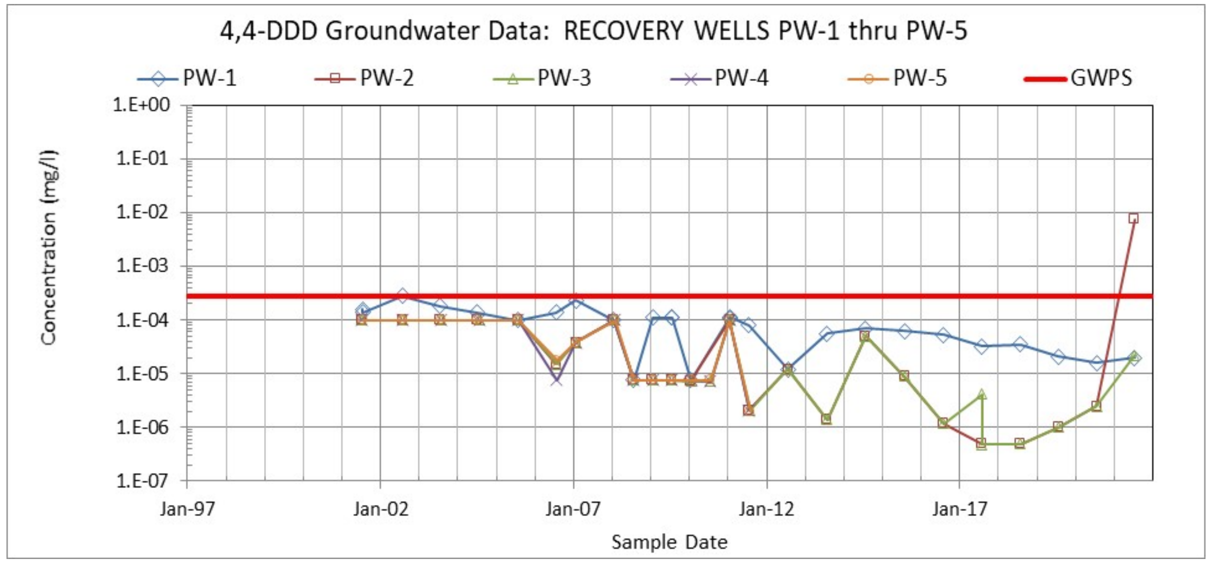

GAMMA-BHC Groundwater Data: RECOV WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

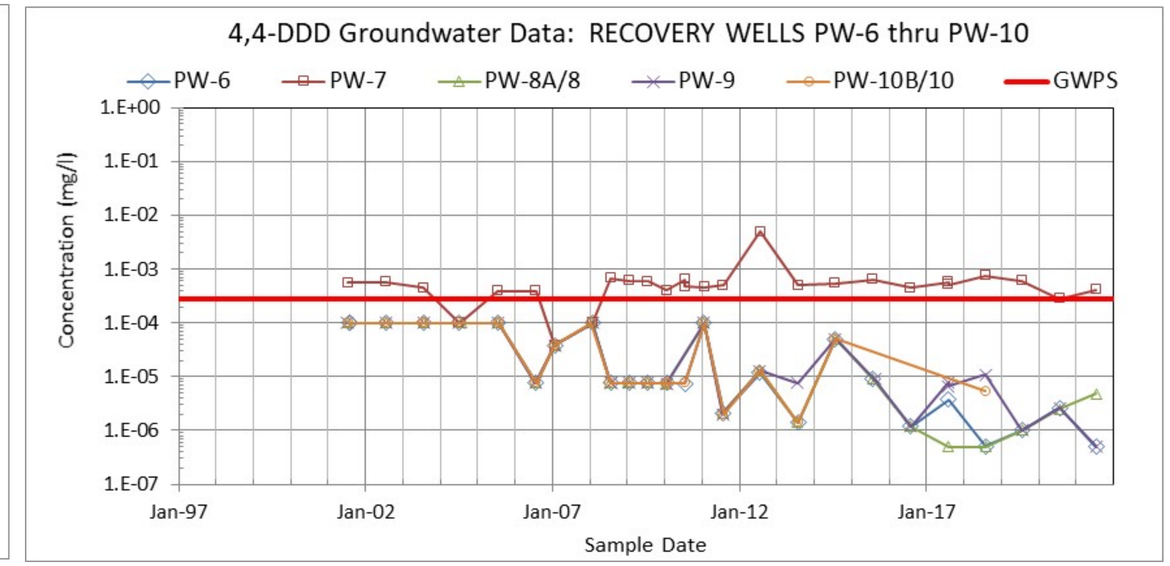

GAMMA-BHC Groundwater Data: RECOV WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

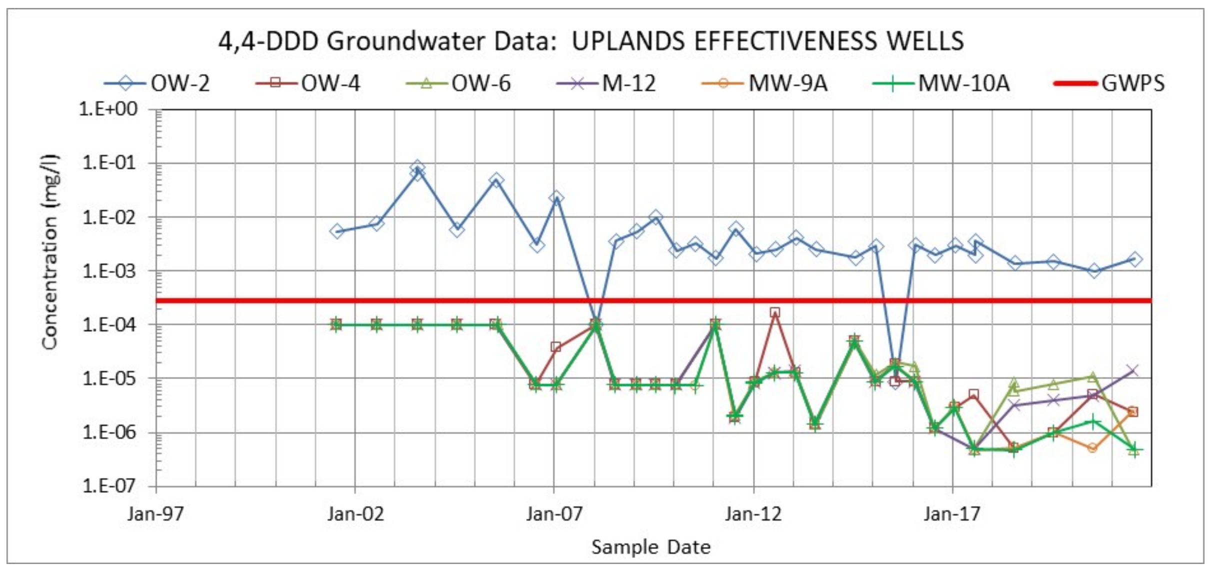

GAMMA-BHC Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

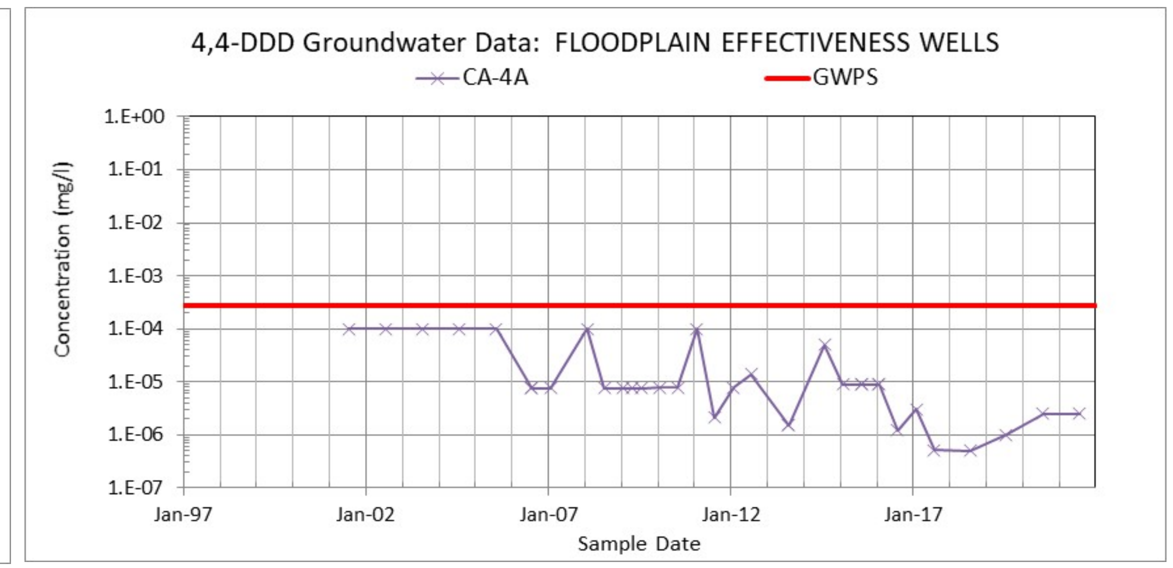

GAMMA-BHC Groundwater Data: FLOODPLAIN EFFECT WELLS
CA-4A
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

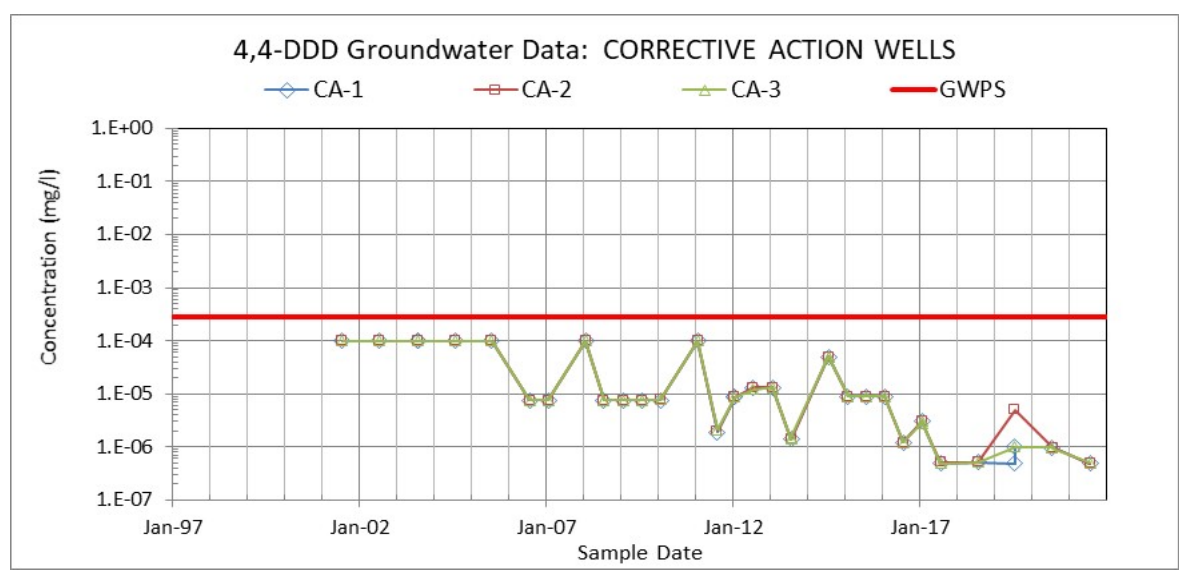

GAMMA-BHC Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

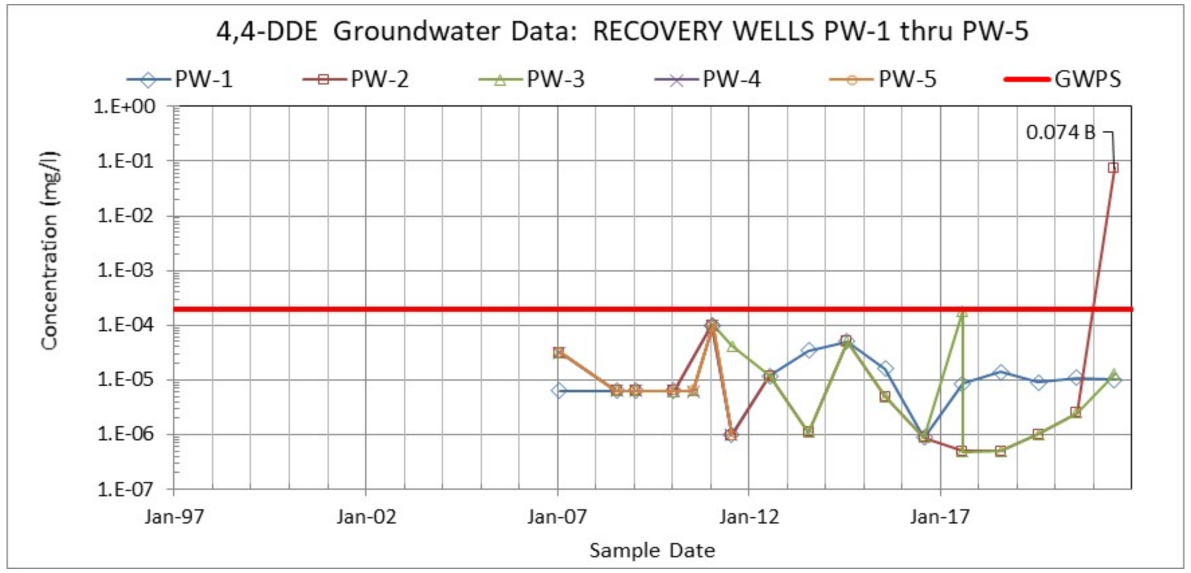

4,4-DDD Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

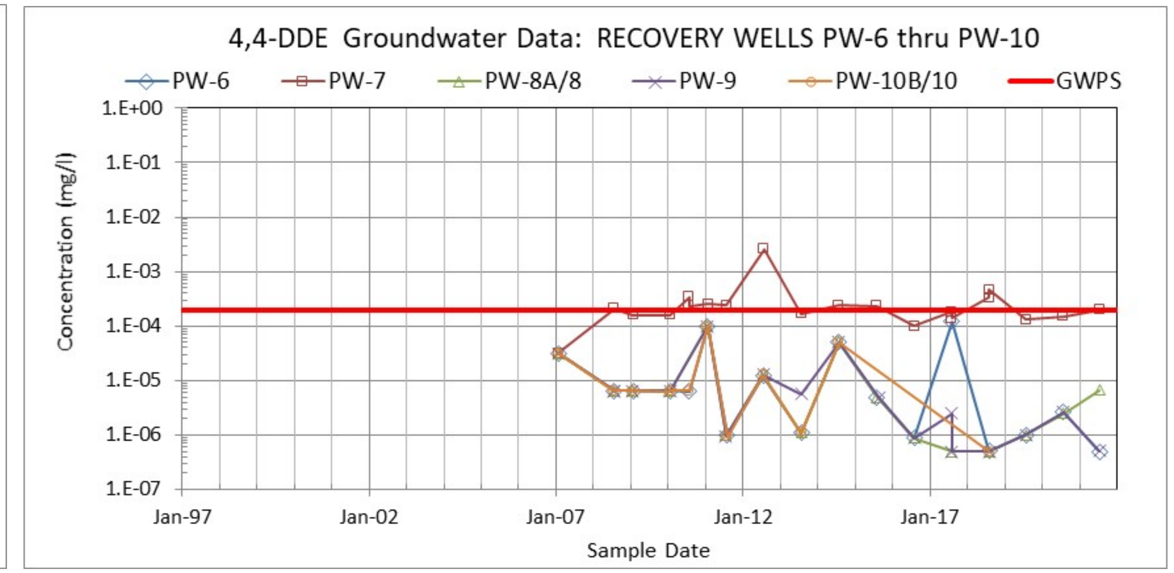

4,4-DDD Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

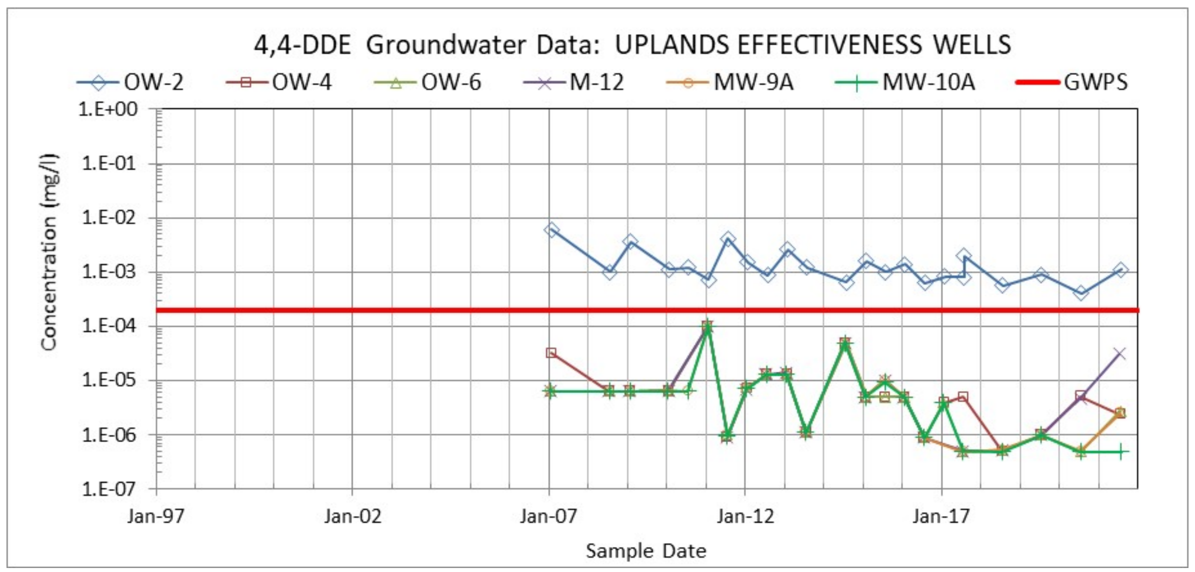

4,4-DDD Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

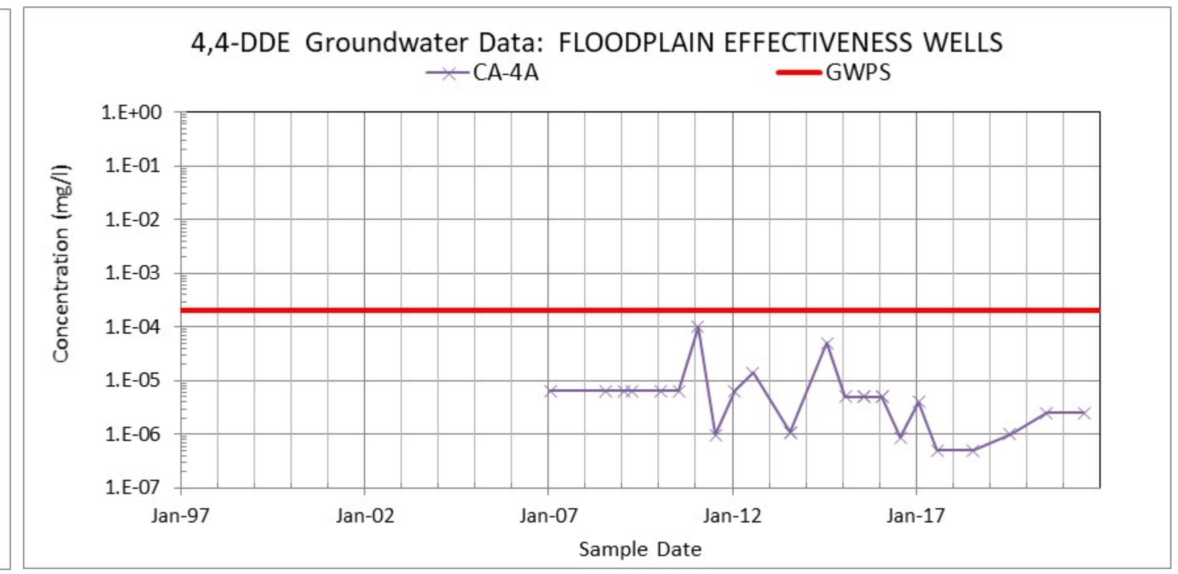

4,4-DDD Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

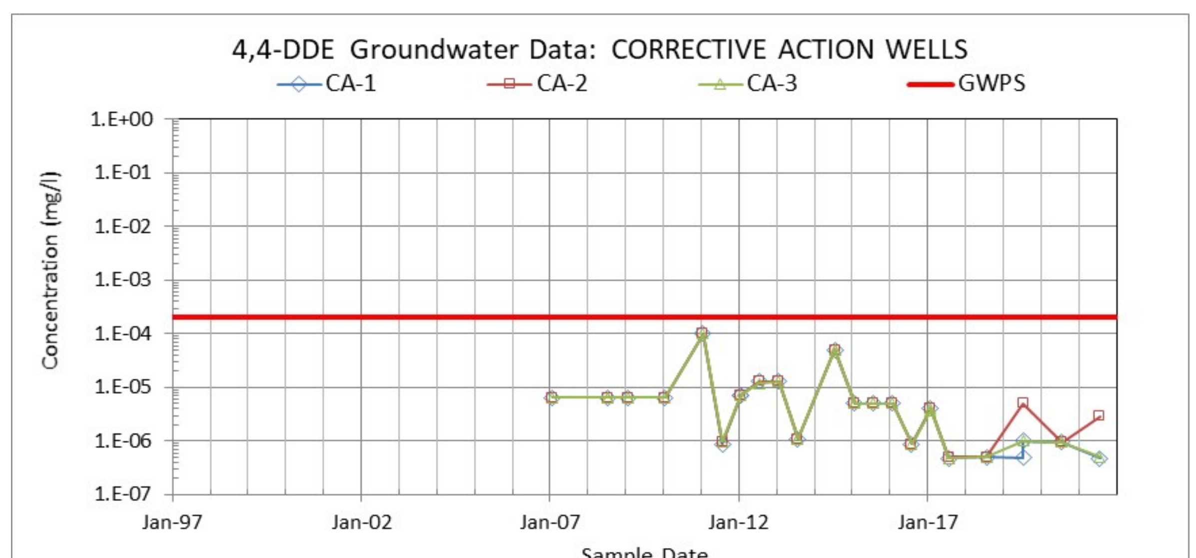

4,4-DDD Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

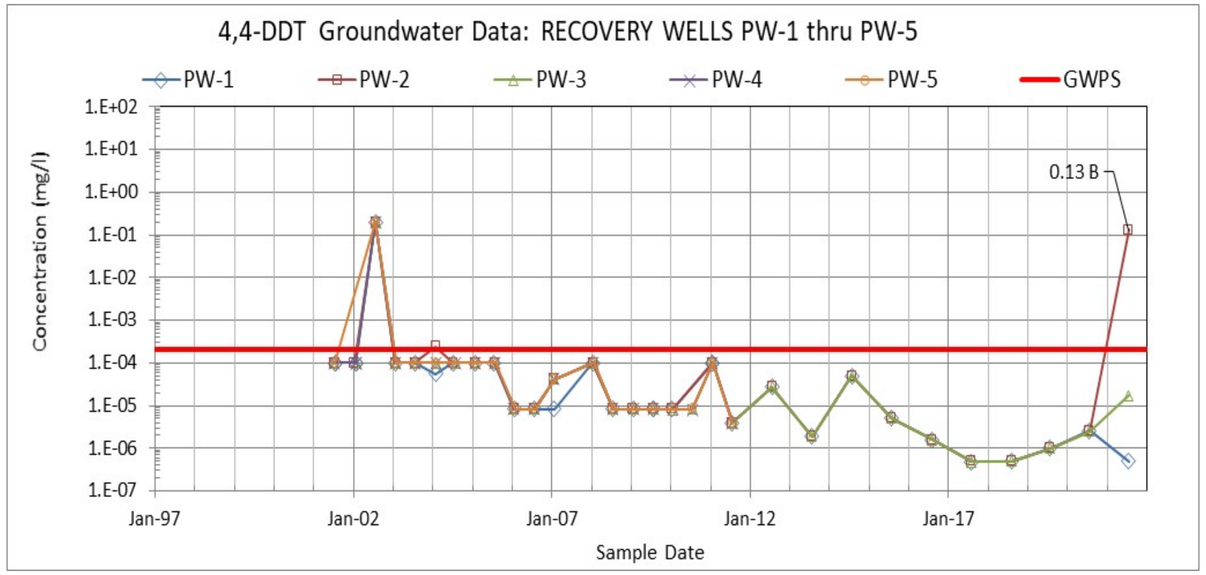

4,4-DDE Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
0.074 B
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

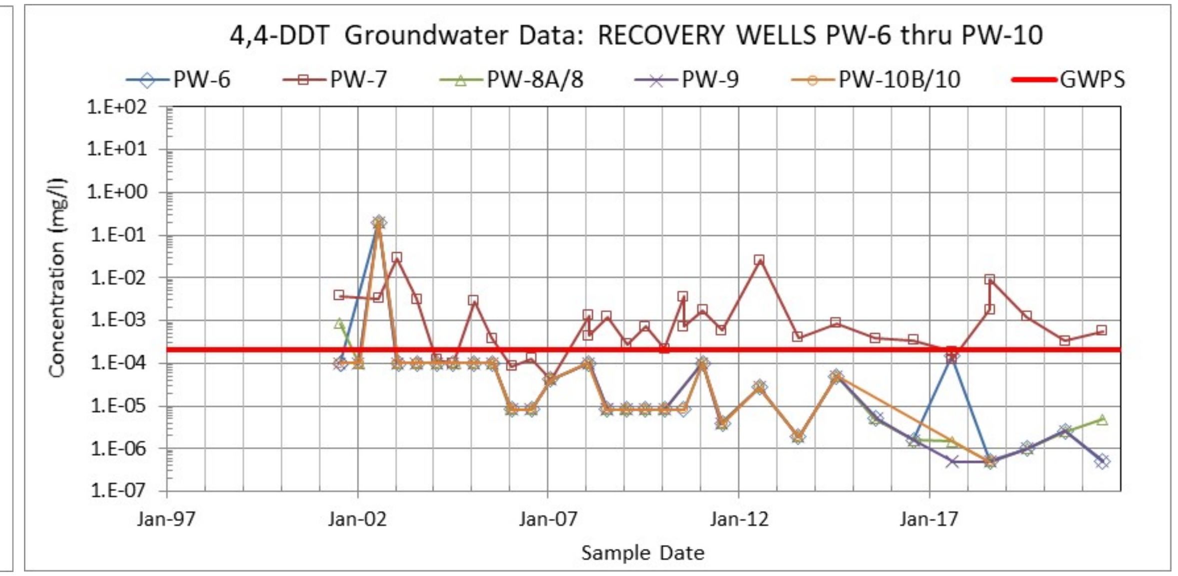

4,4-DDE Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

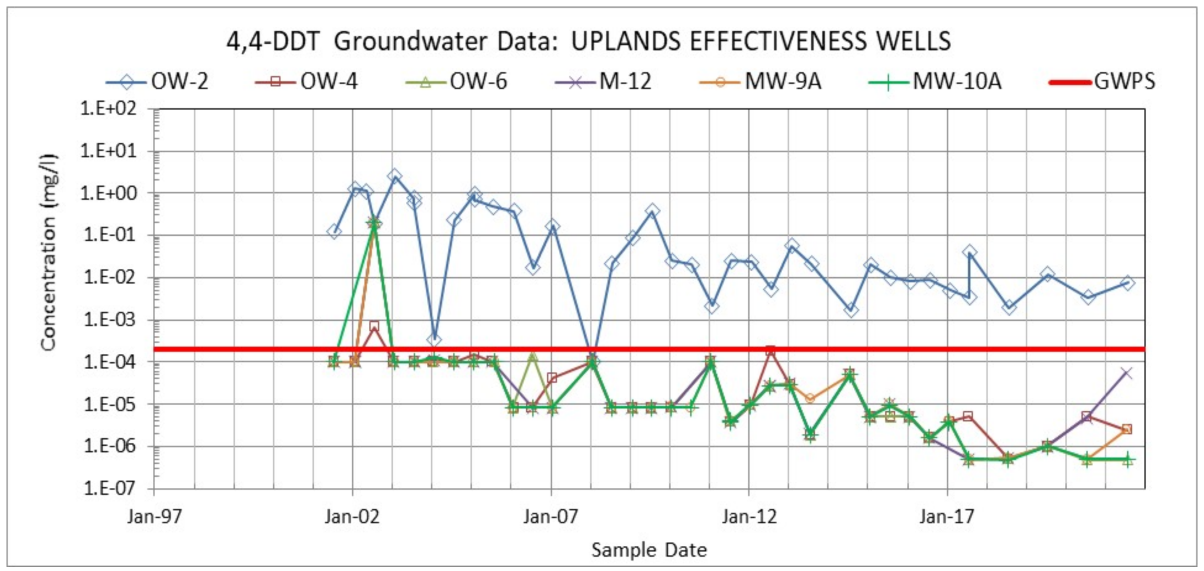

4,4-DDE Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

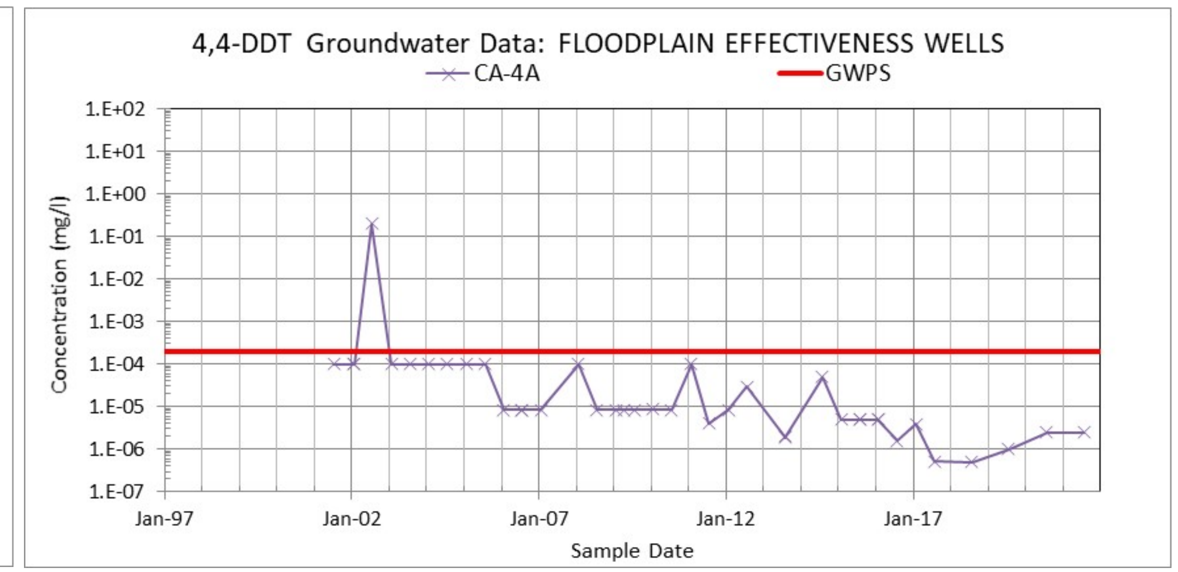

4,4-DDE Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

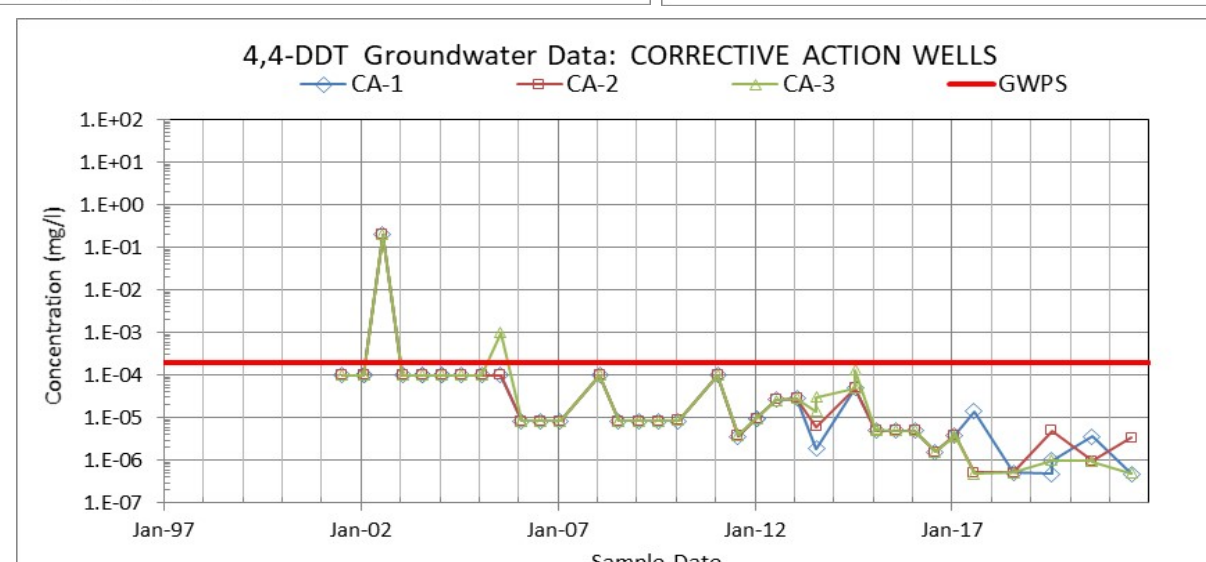

4,4-DDE Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

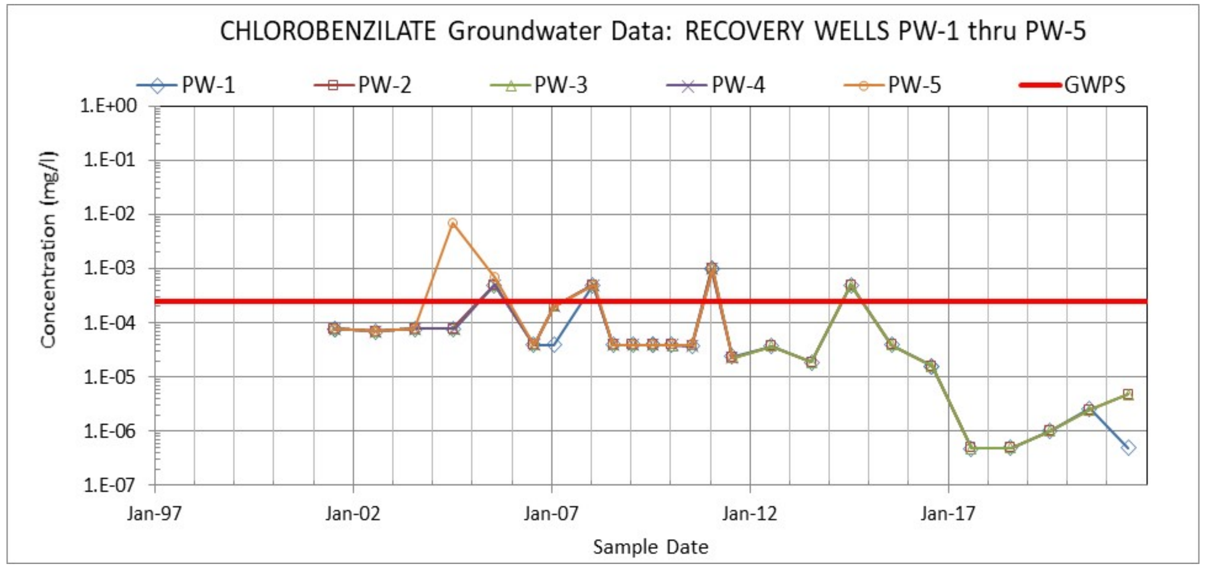

4,4-DDT Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
0.13 B
1.E+02
1.E+01
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

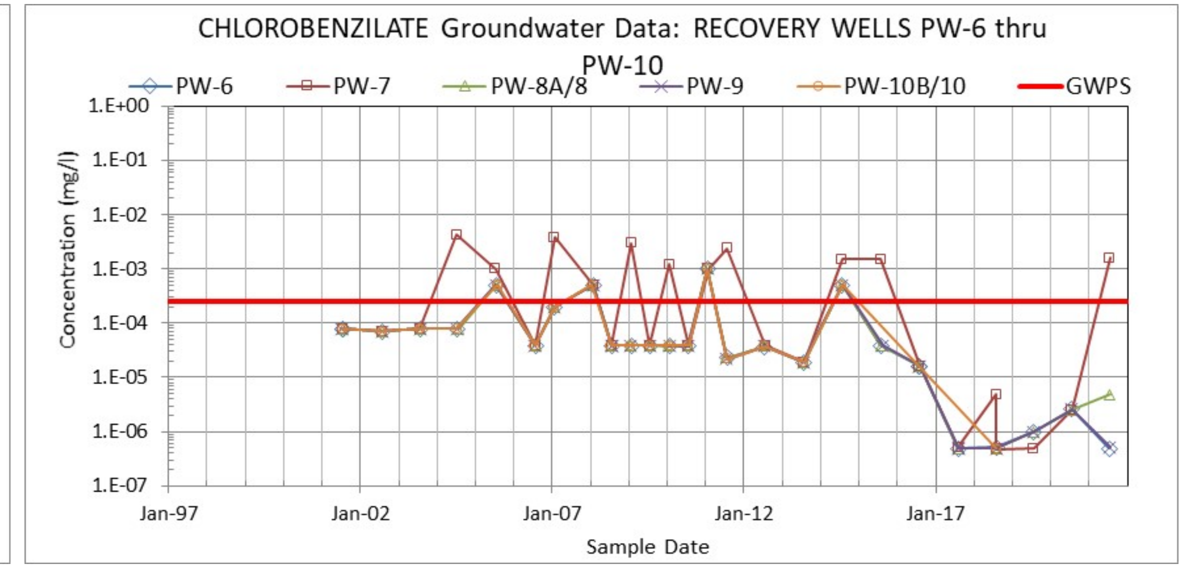

4,4-DDT Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
1.E+02
1.E+01
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

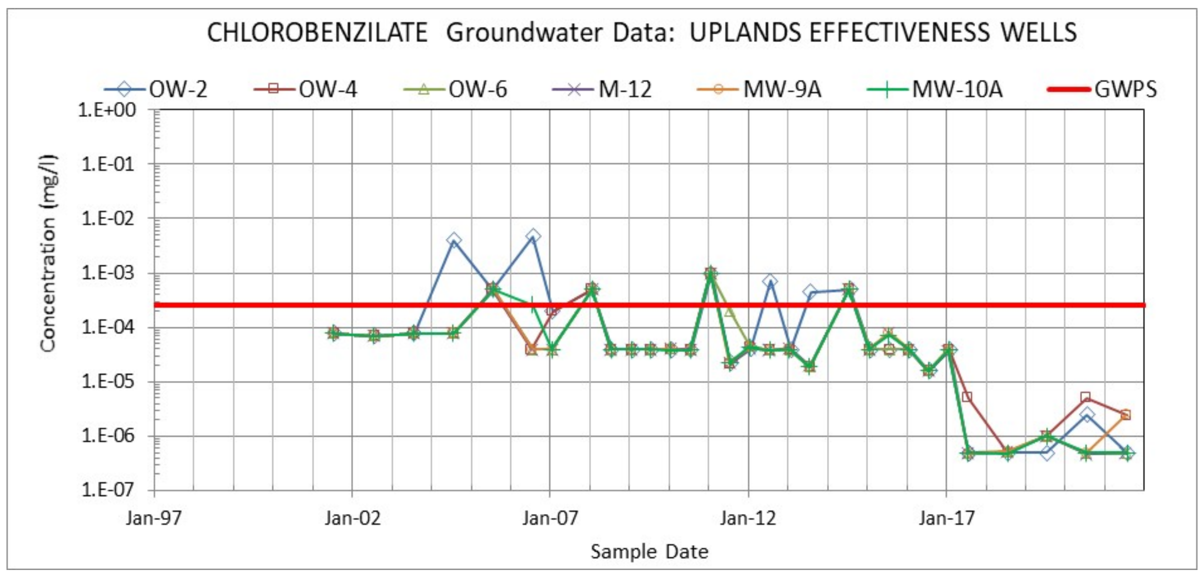

4,4-DDT Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
1.E+02
1.E+01
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

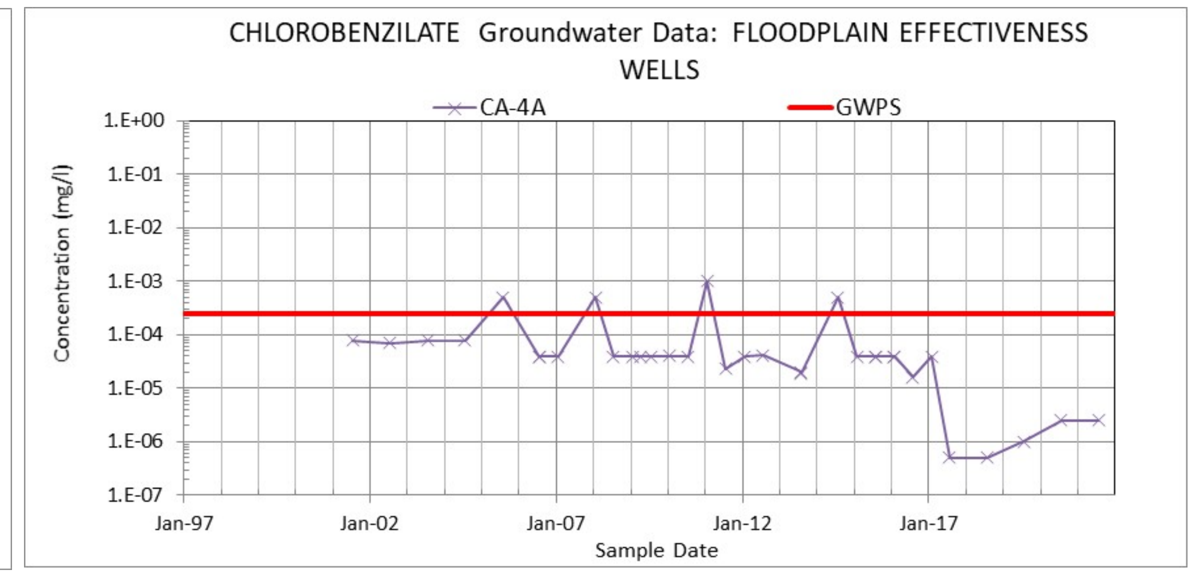

4,4-DDT Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
1.E+02
1.E+01
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

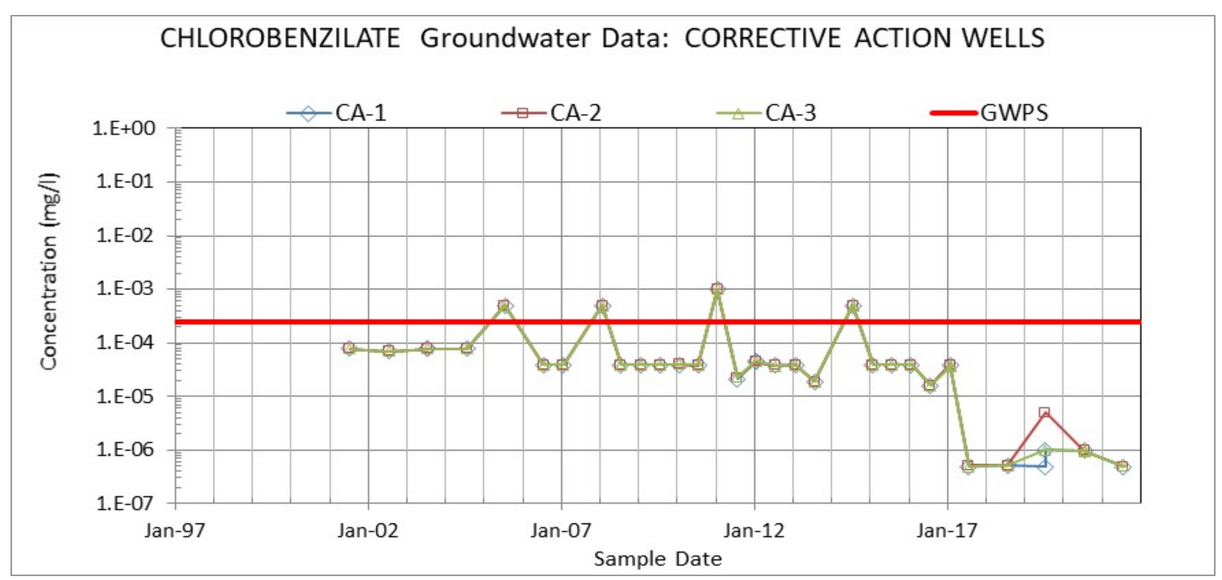

4,4-DDT Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
1.E+02
1.E+01
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

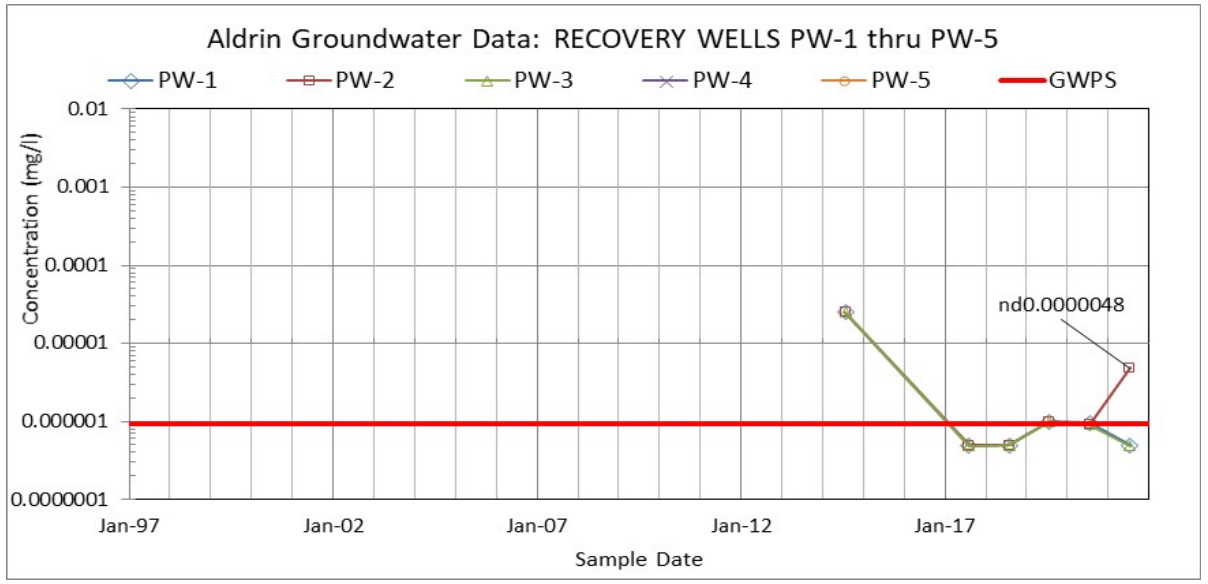

CHLOROBENZILATE Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
Sample Date

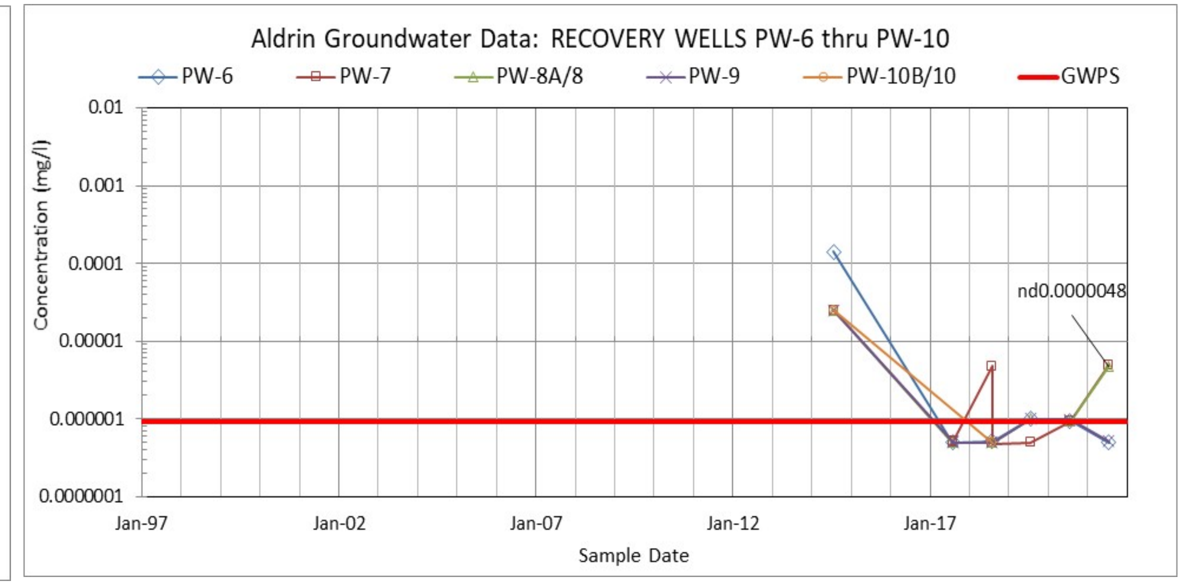

CHLOROBENZILATE Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
Sample Date

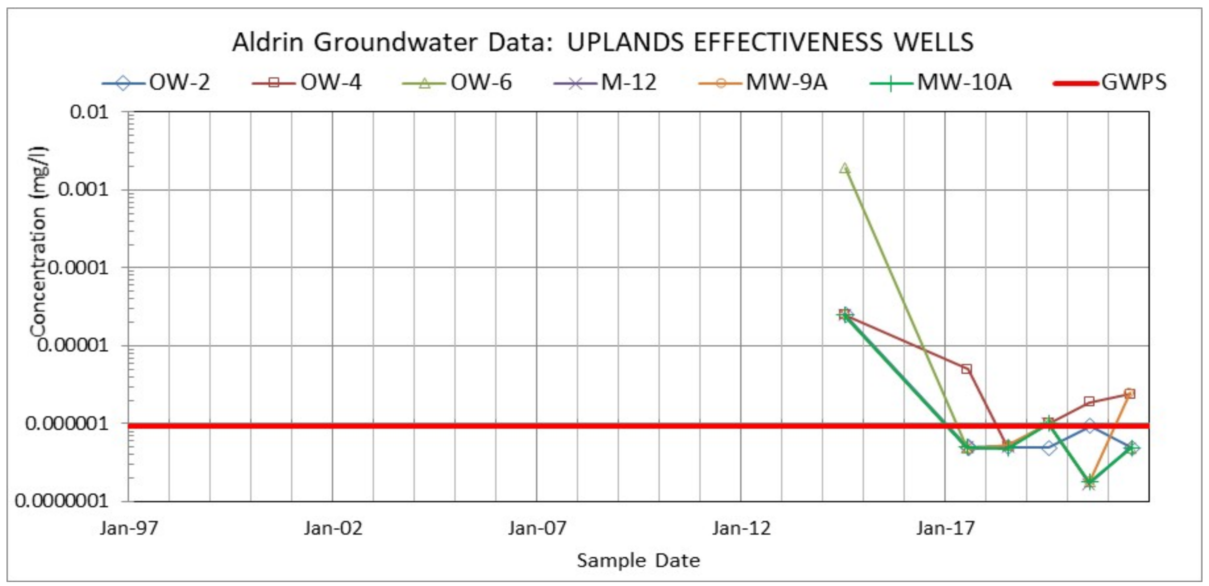

CHLOROBENZILATE Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
Sample Date

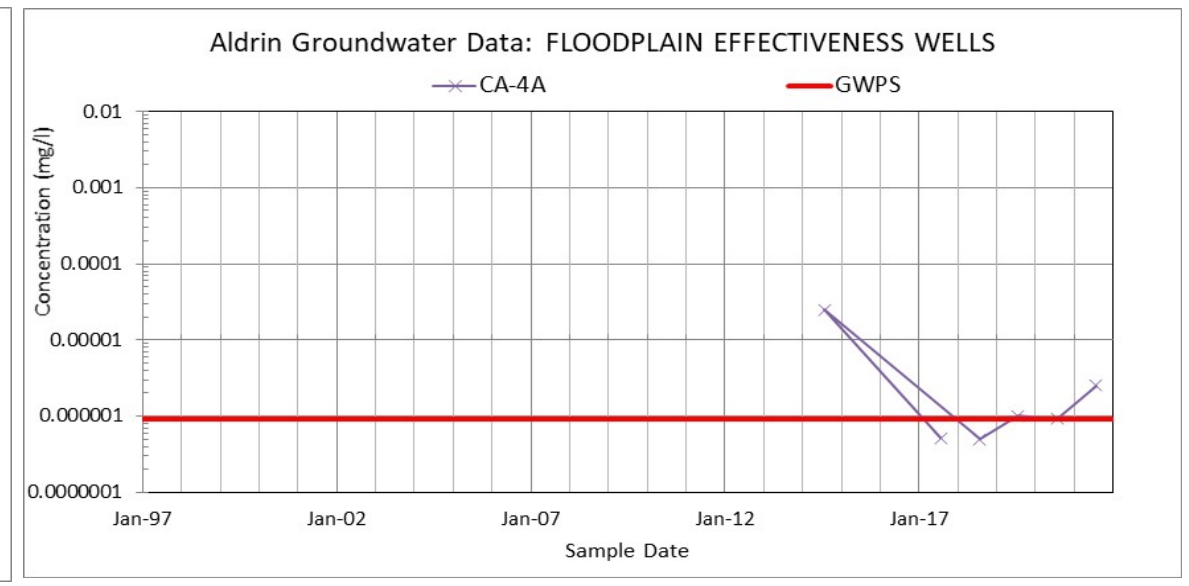

CHLOROBENZILATE Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
Sample Date

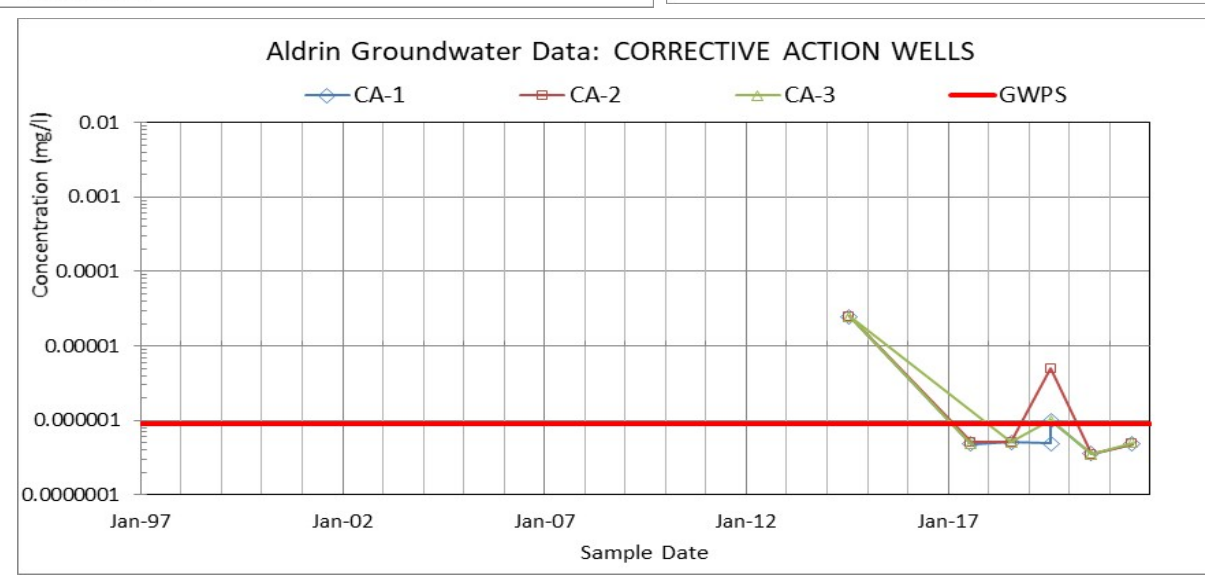

CHLOROBENZILATE Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
Sample Date

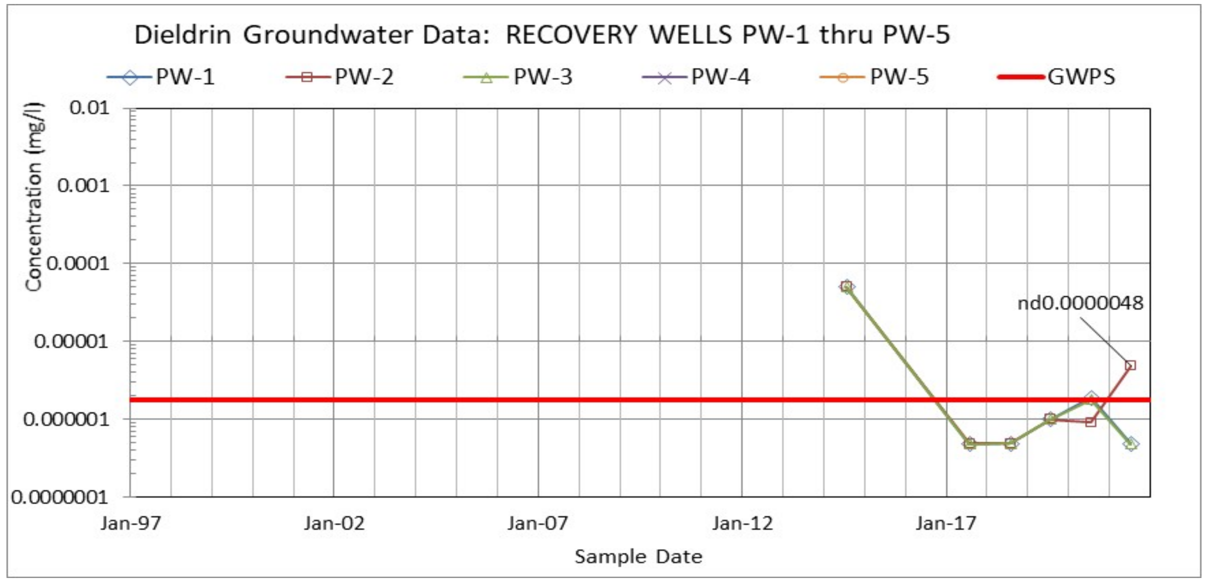

Aldrin Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
nd0.0000048
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

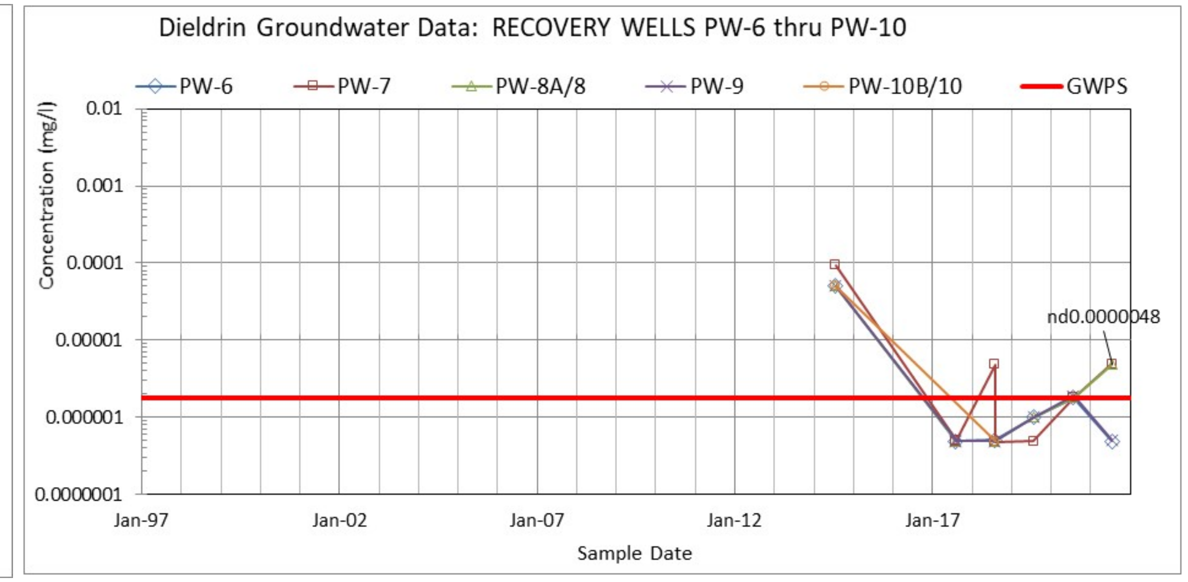

Aldrin Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
nd0.0000048
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

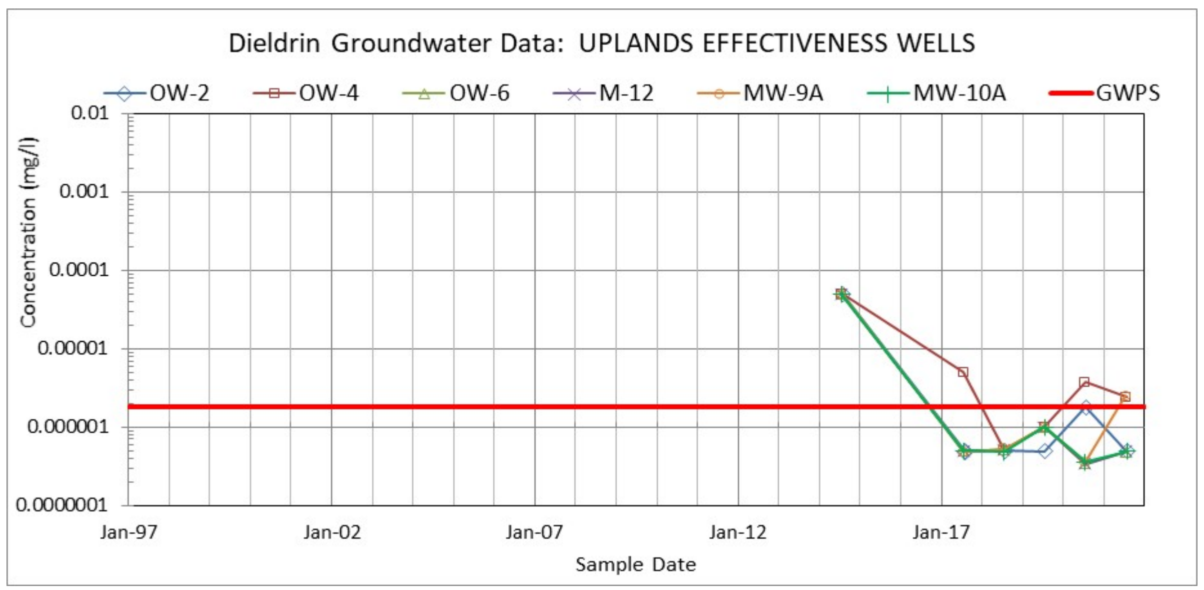

Aldrin Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

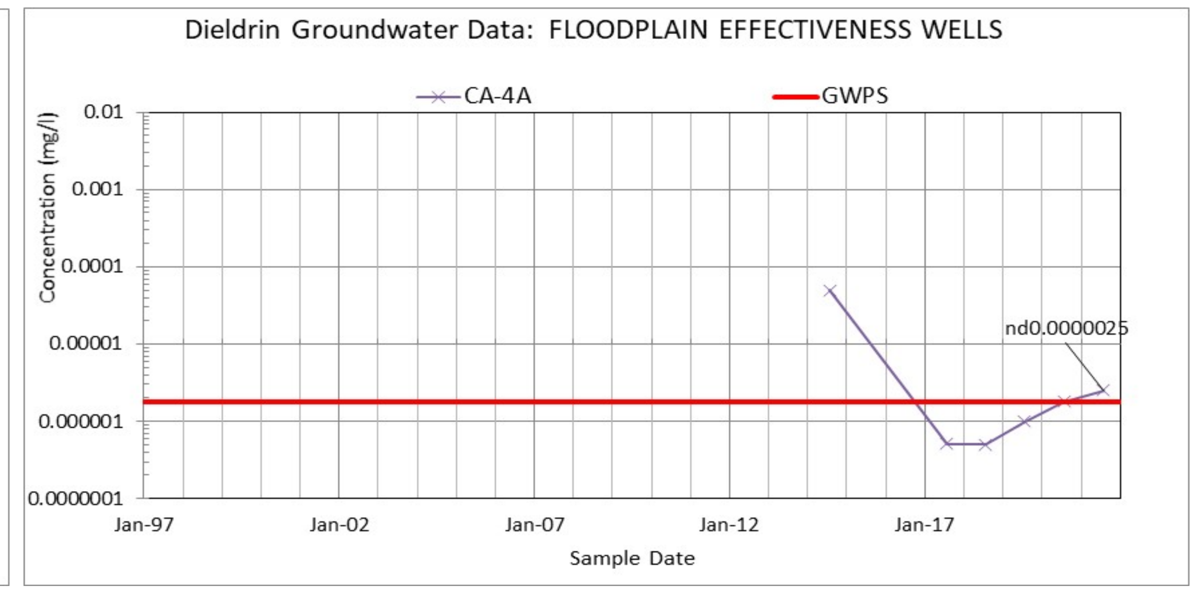

Aldrin Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

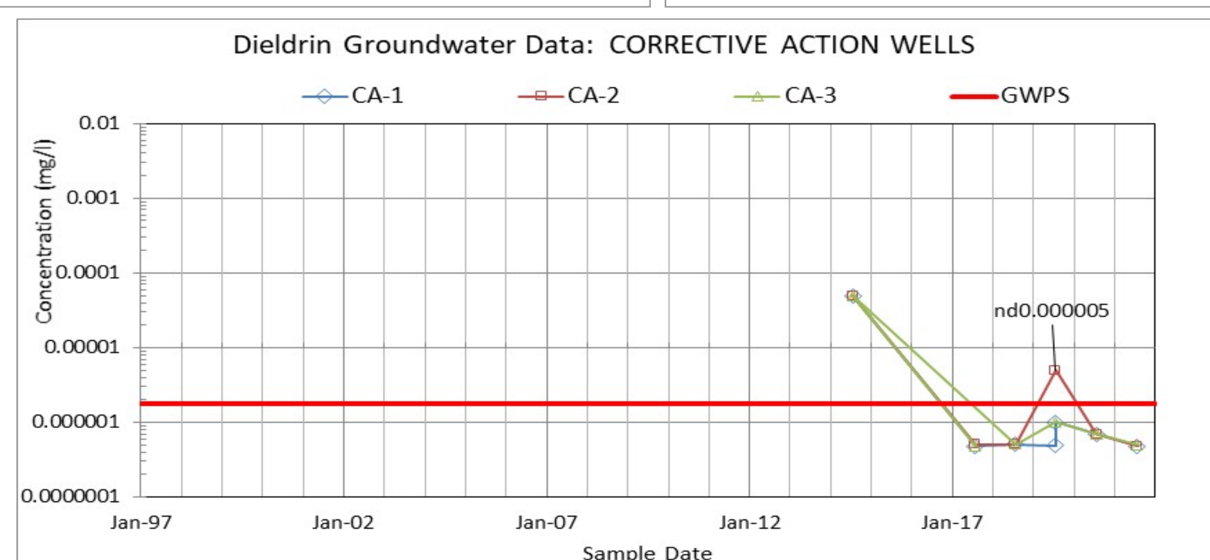

Aldrin Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

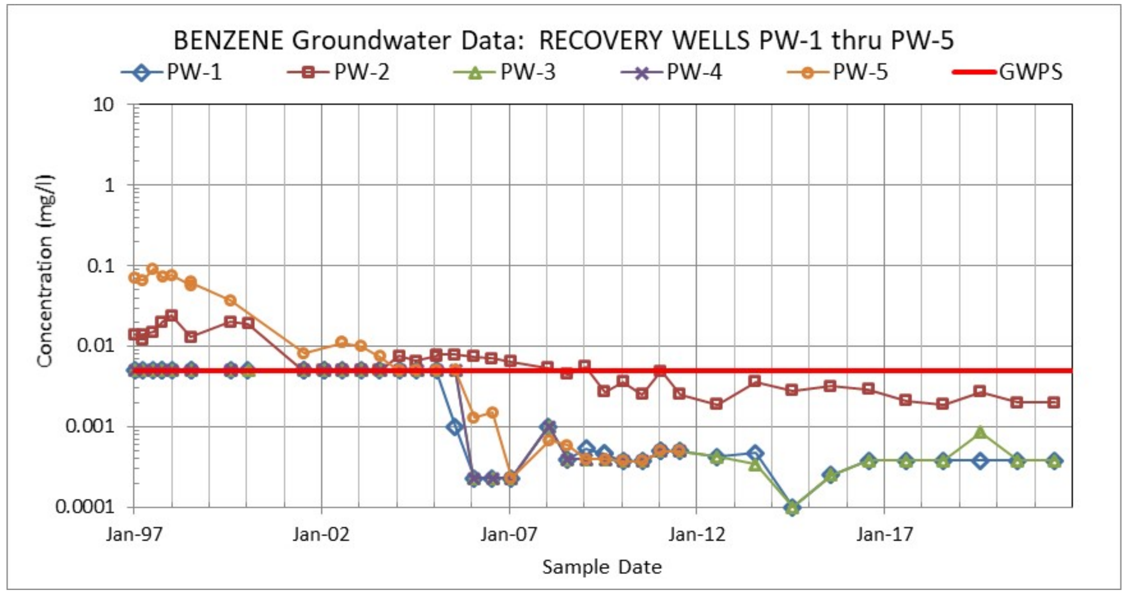

Dieldrin Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
nd0.0000048
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

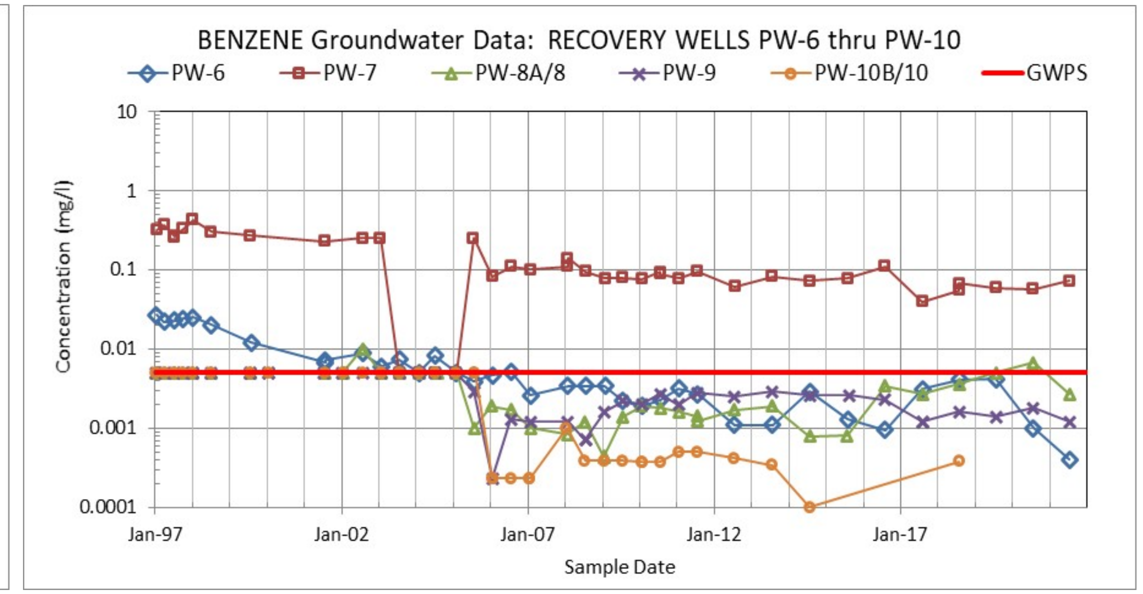

Dieldrin Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
nd0.0000048
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

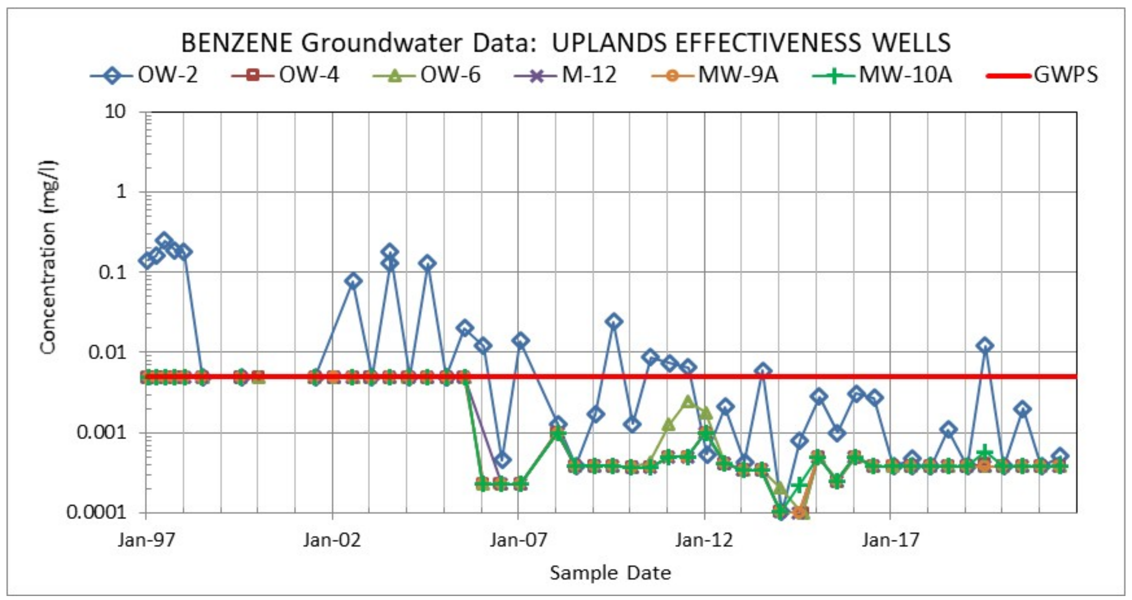

Dieldrin Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

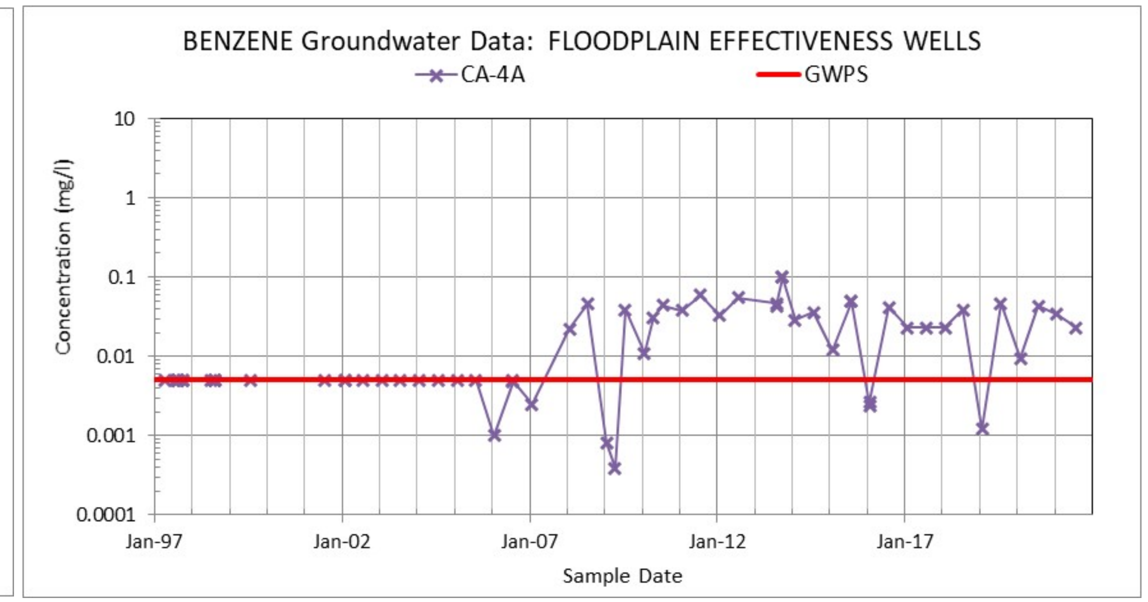

Dieldrin Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
nd0.0000025
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

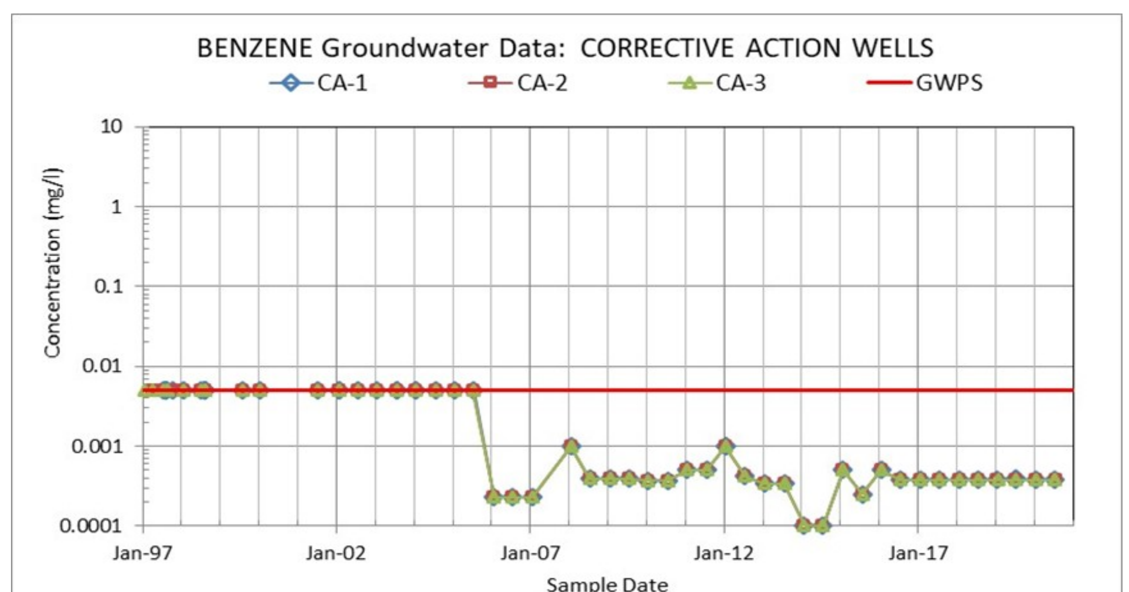

Dieldrin Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
nd0.000005
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

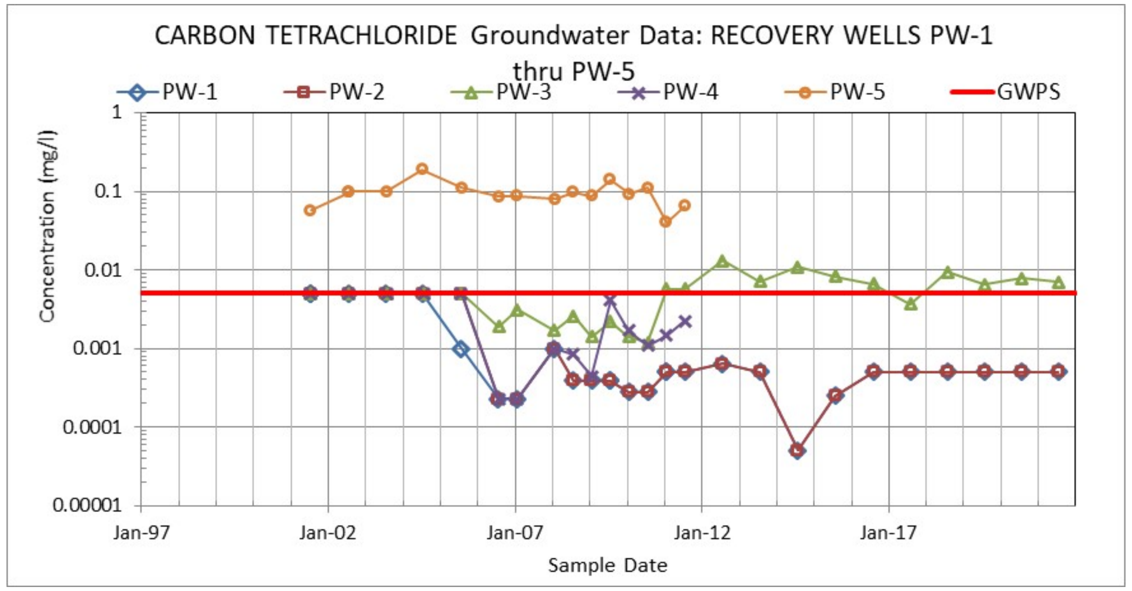

BENZENE Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
10
1
0.1
0.01
0.001
0.0001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

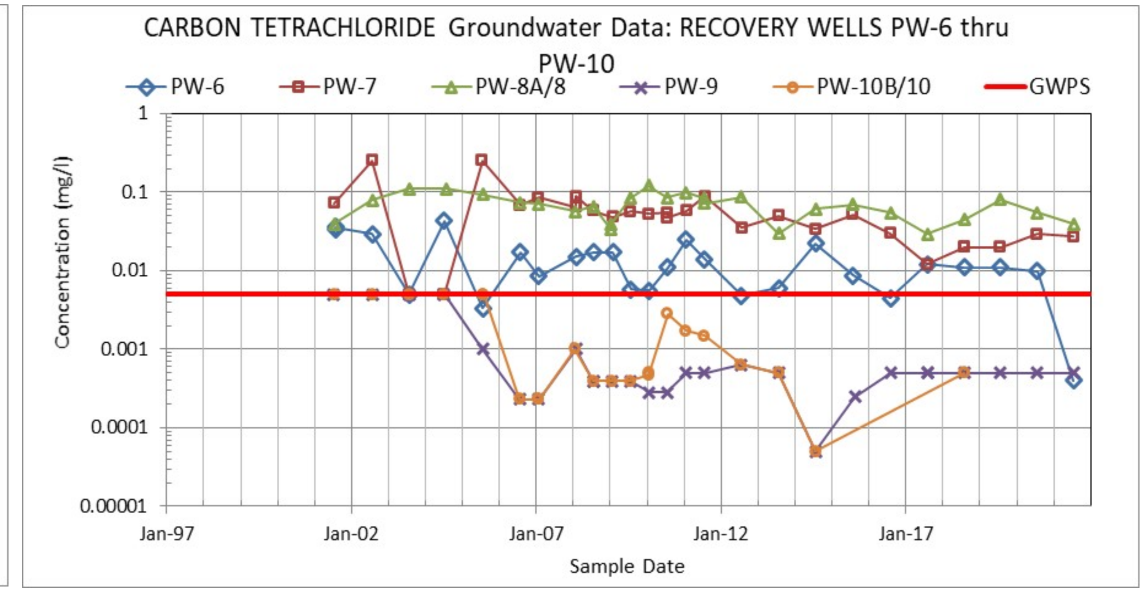

BENZENE Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
10
1
0.1
0.01
0.001
0.0001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

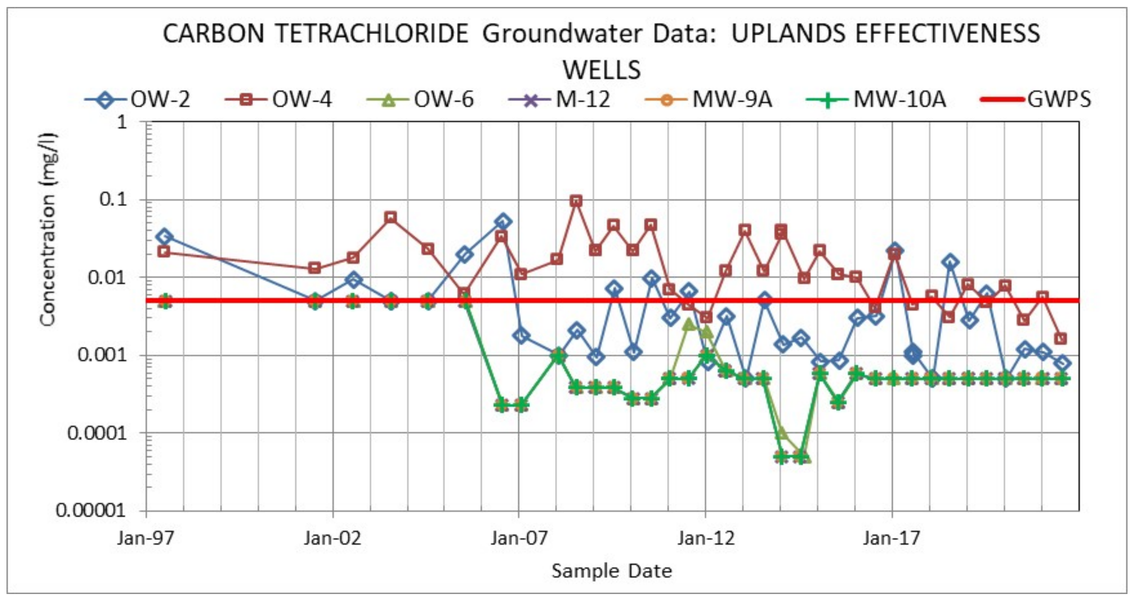

BENZENE Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
10
1
0.1
0.01
0.001
0.0001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

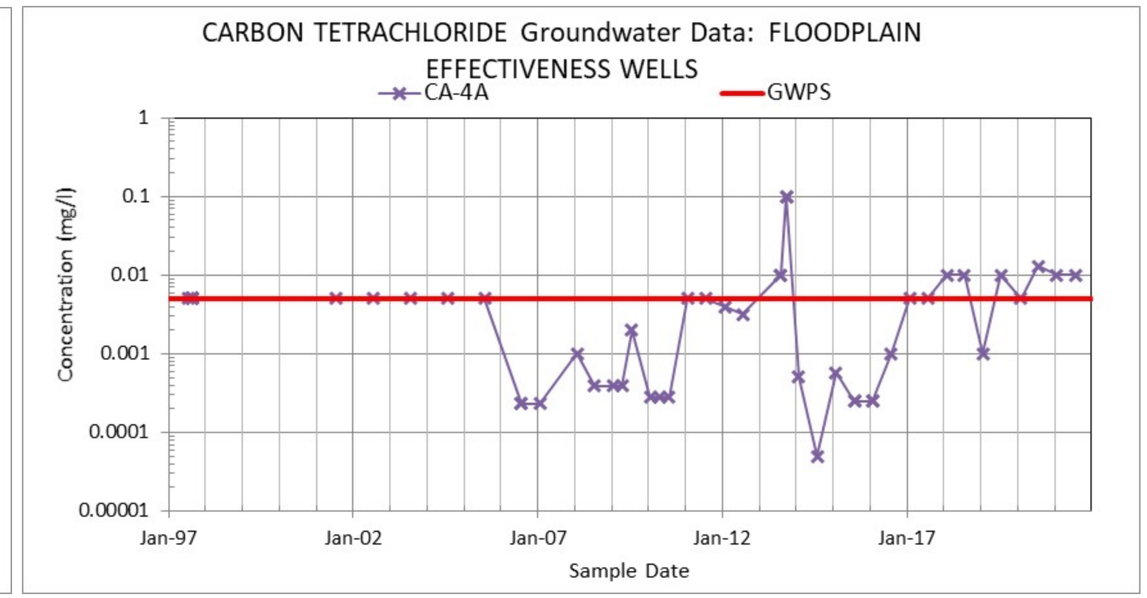

BENZENE Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
10
1
0.1
0.01
0.001
0.0001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

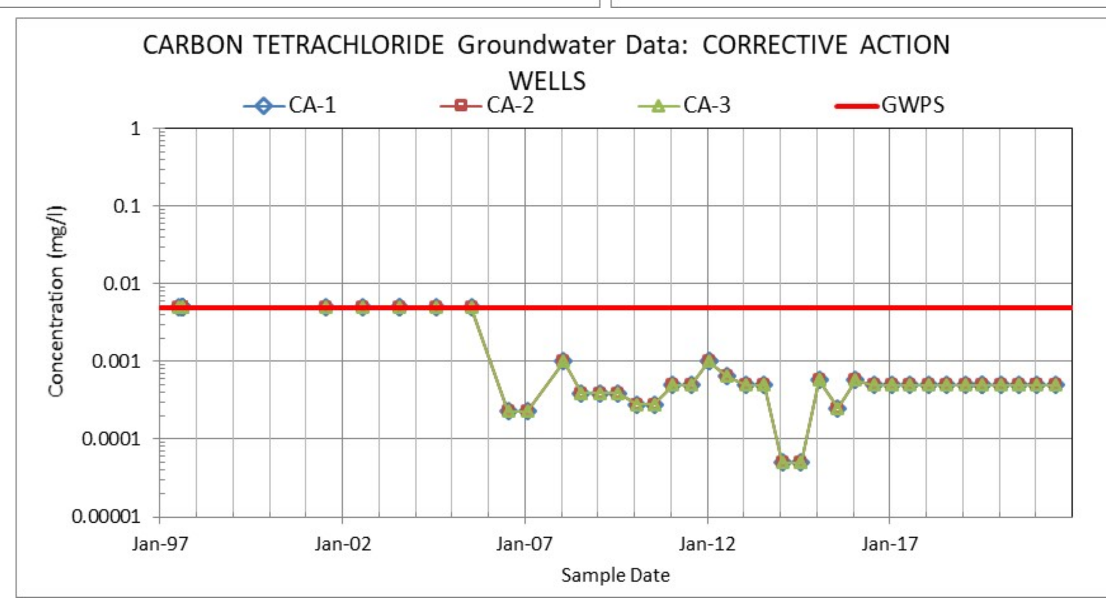

BENZENE Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
10
1
0.1
0.01
0.001
0.0001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

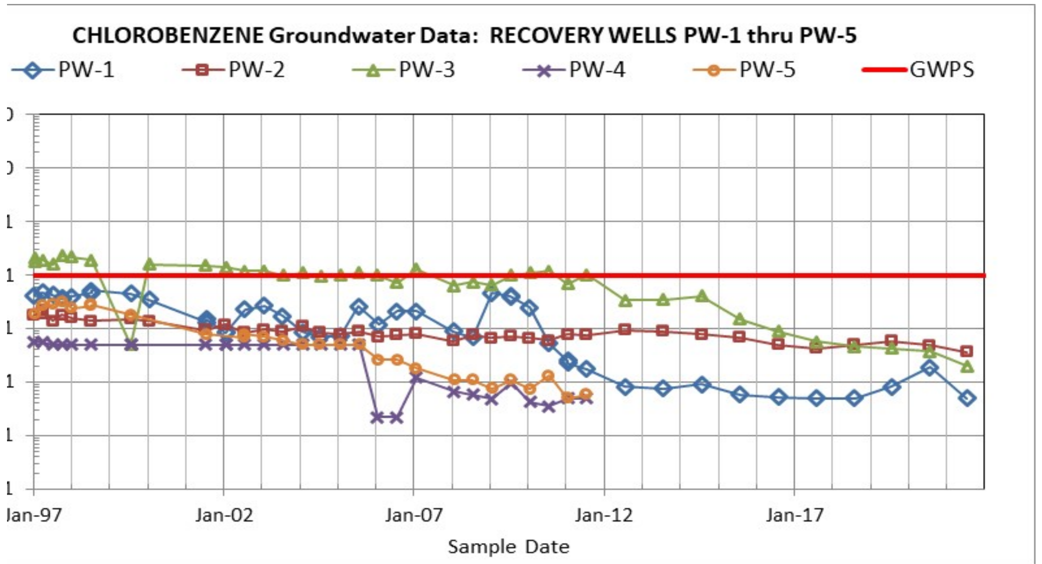

CARBON TETRACHLORIDE Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
Sample Date

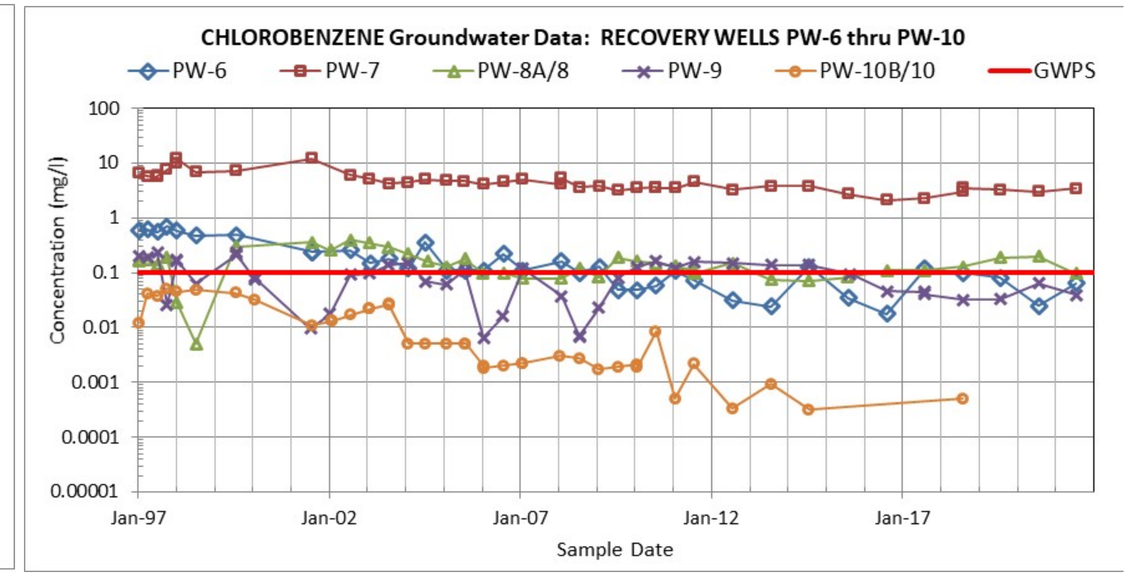

CARBON TETRACHLORIDE Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
Sample Date

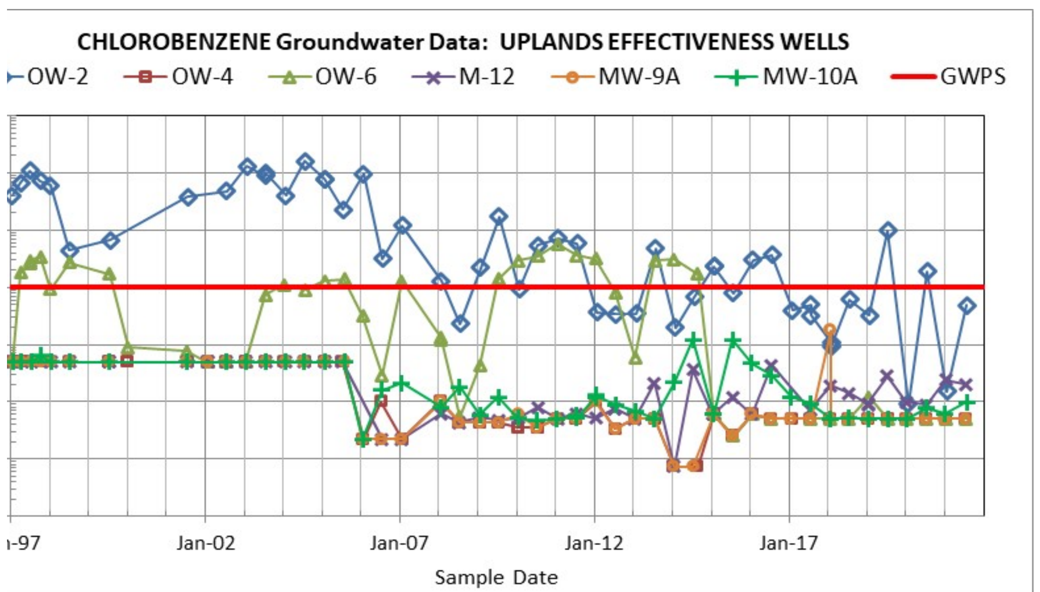

CARBON TETRACHLORIDE Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
Sample Date

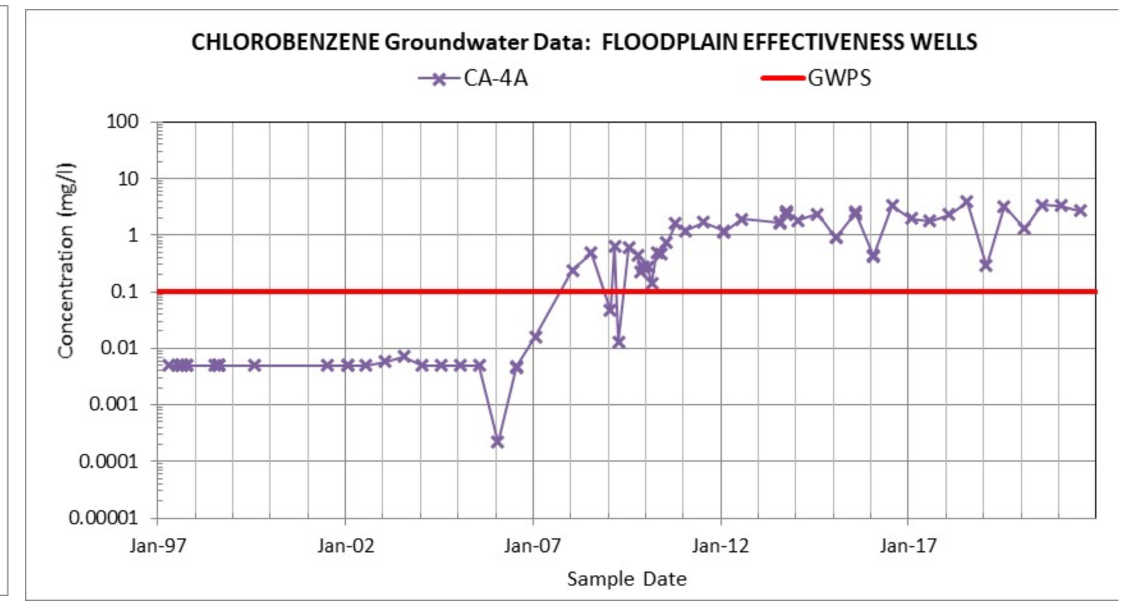

CARBON TETRACHLORIDE Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
Sample Date

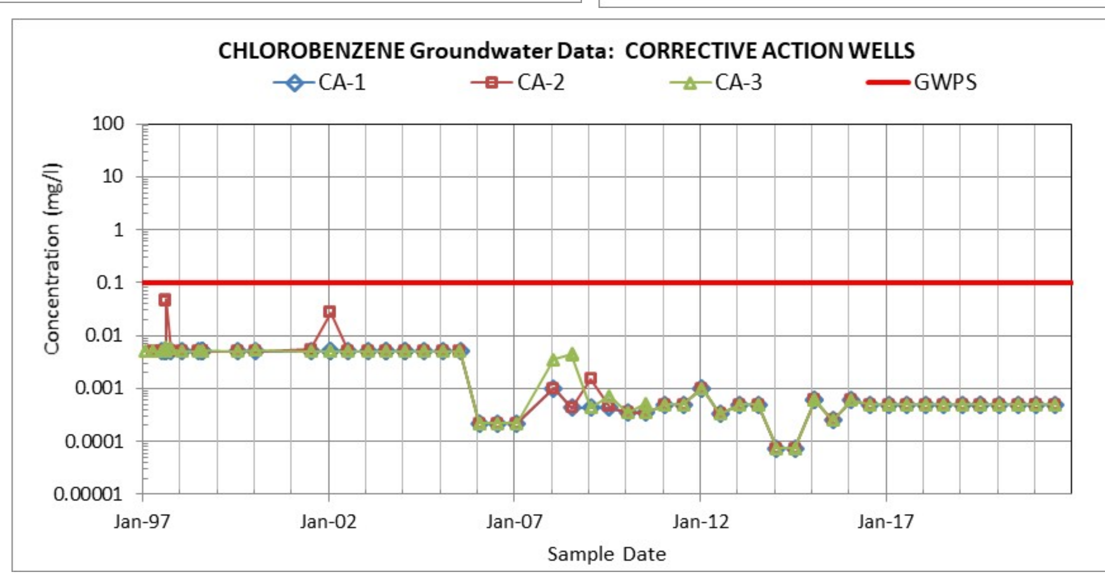

CARBON TETRACHLORIDE Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
Sample Date

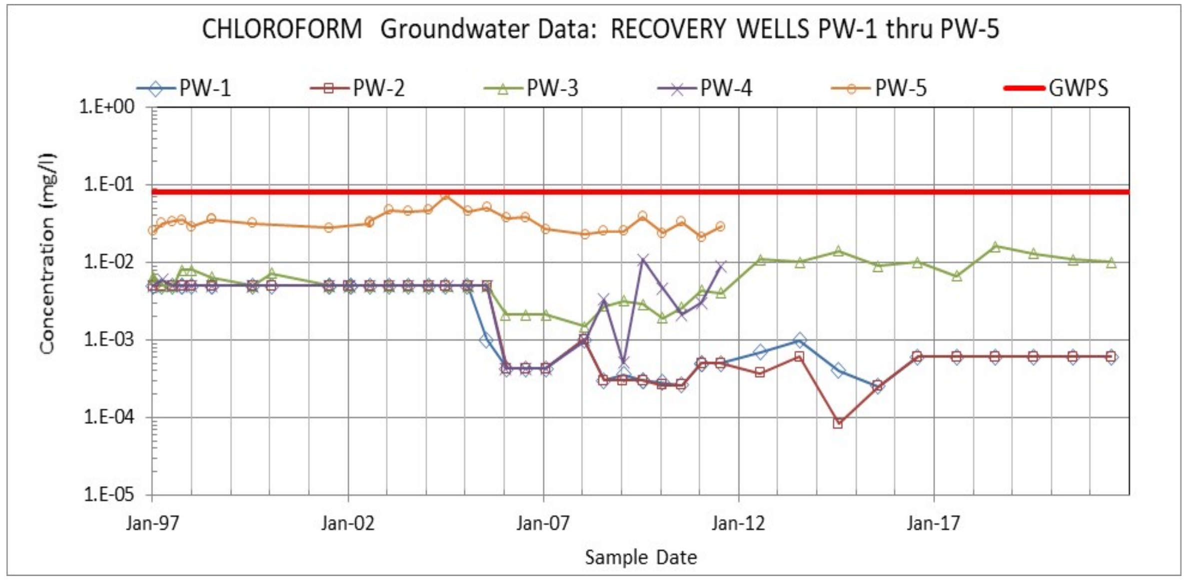

CHLOROBENZENE Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

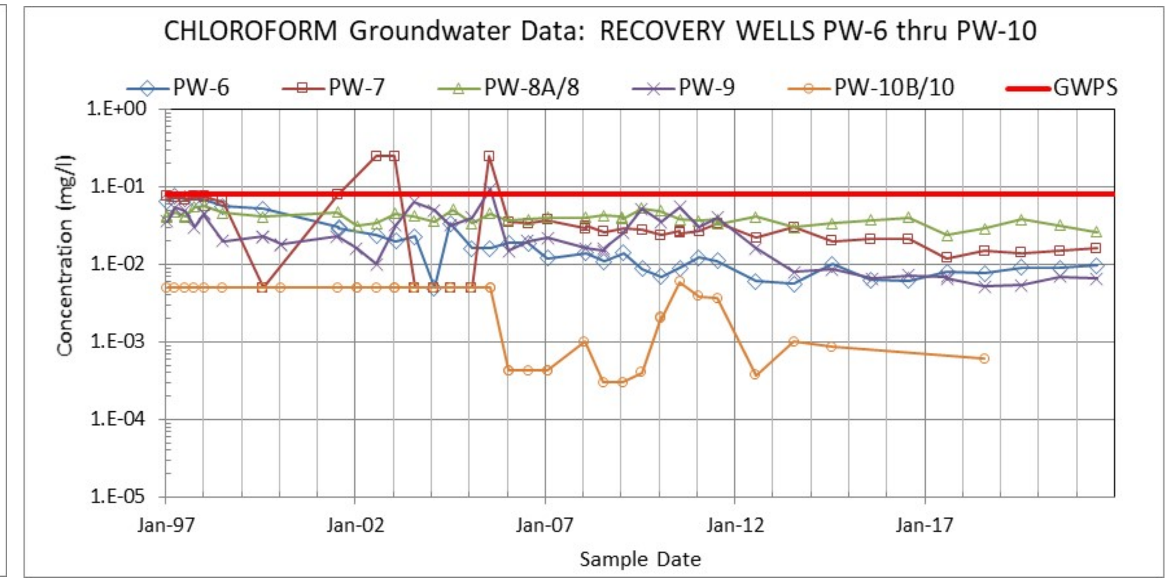

CHLOROBENZENE Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
100
10
1
0.1
0.01
0.001
0.0001
0.00001
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

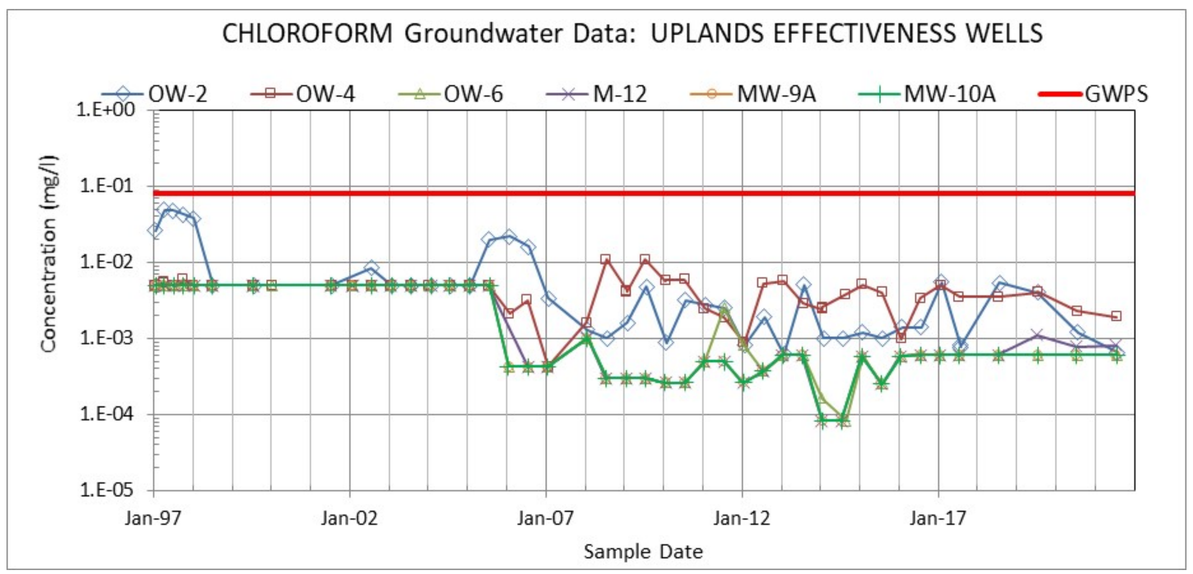

CHLOROBENZENE Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

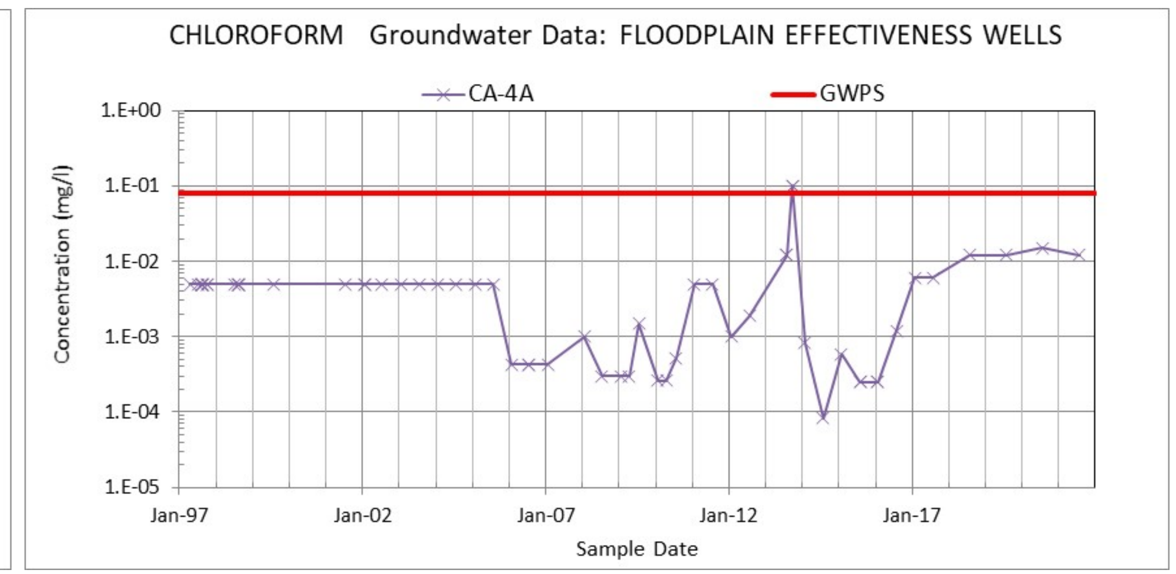

CHLOROBENZENE Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
100
10
1
0.1
0.01
0.001
0.0001
0.00001
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

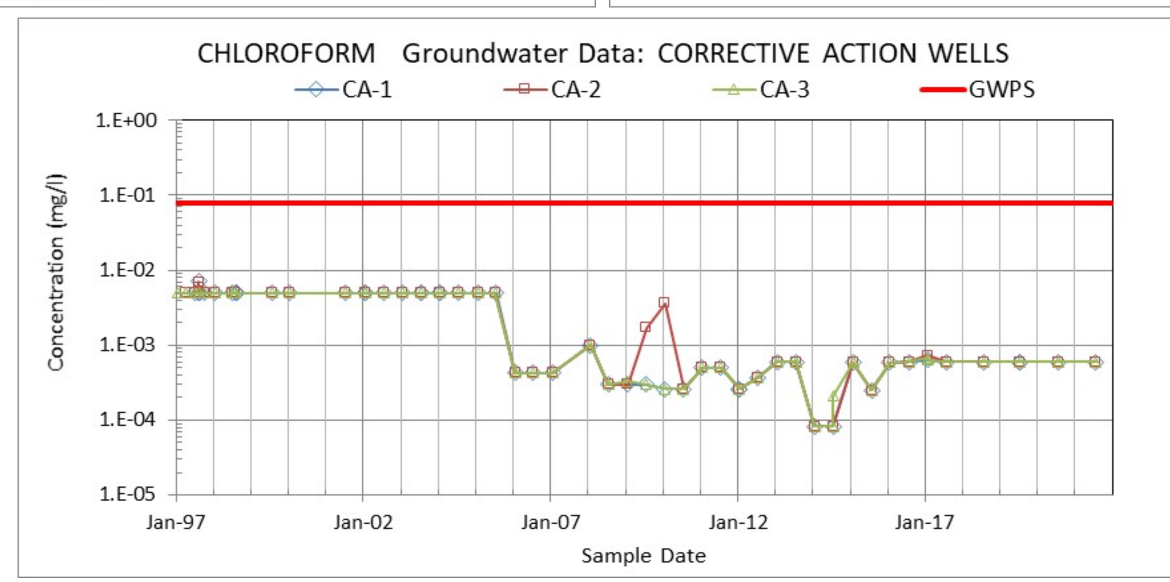

CHLOROBENZENE Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
100
10
1
0.1
0.01
0.001
0.0001
0.00001
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

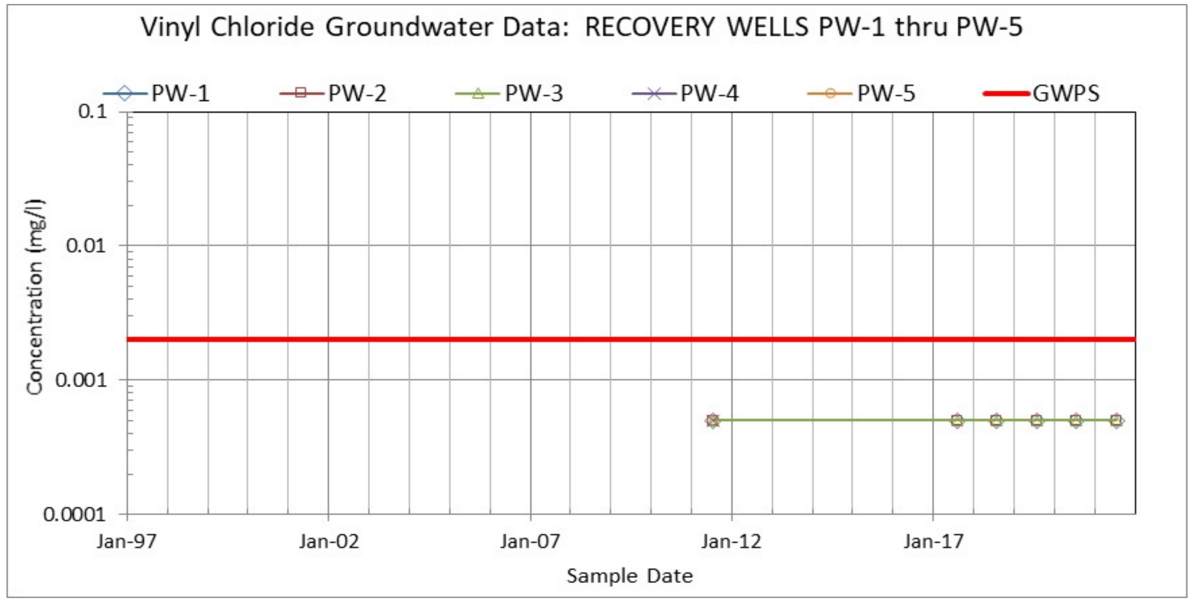

CHLOROFORM Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

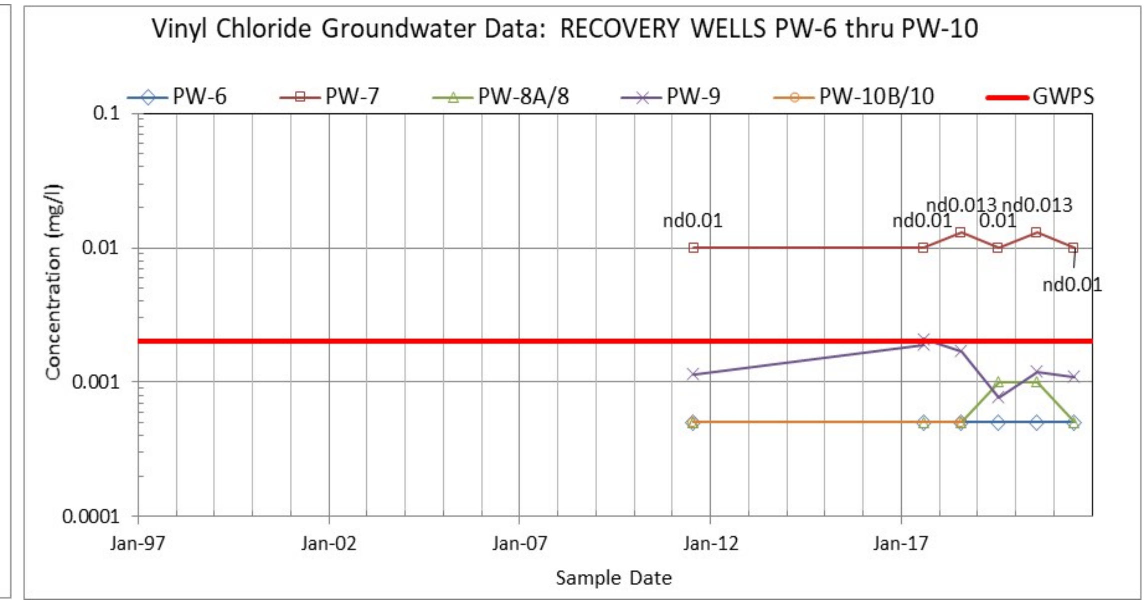

CHLOROFORM Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

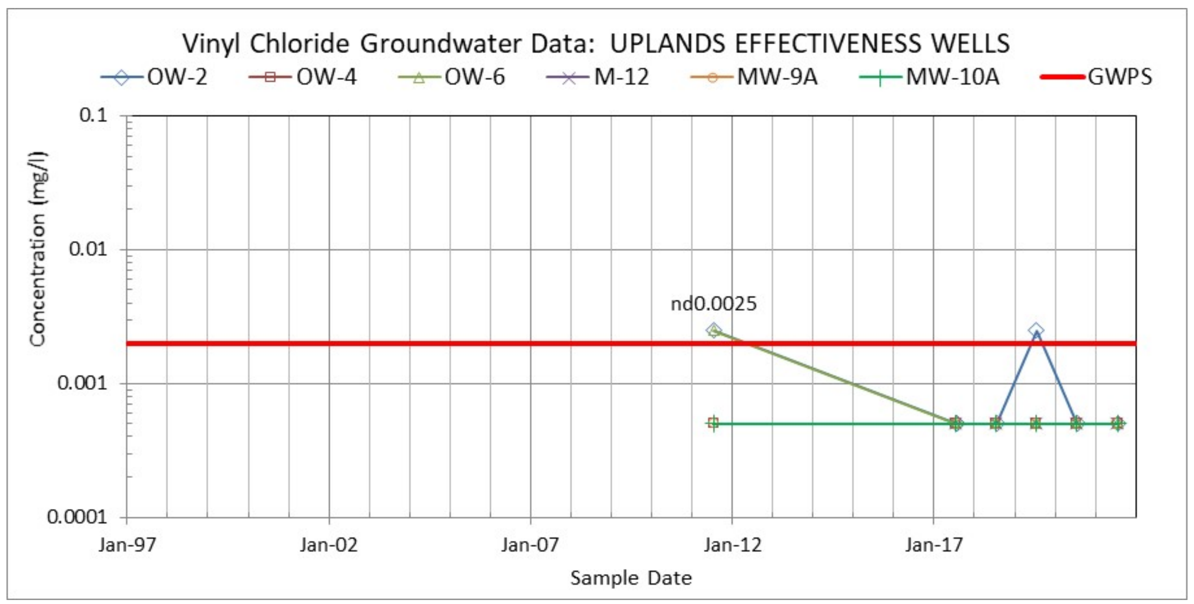

CHLOROFORM Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

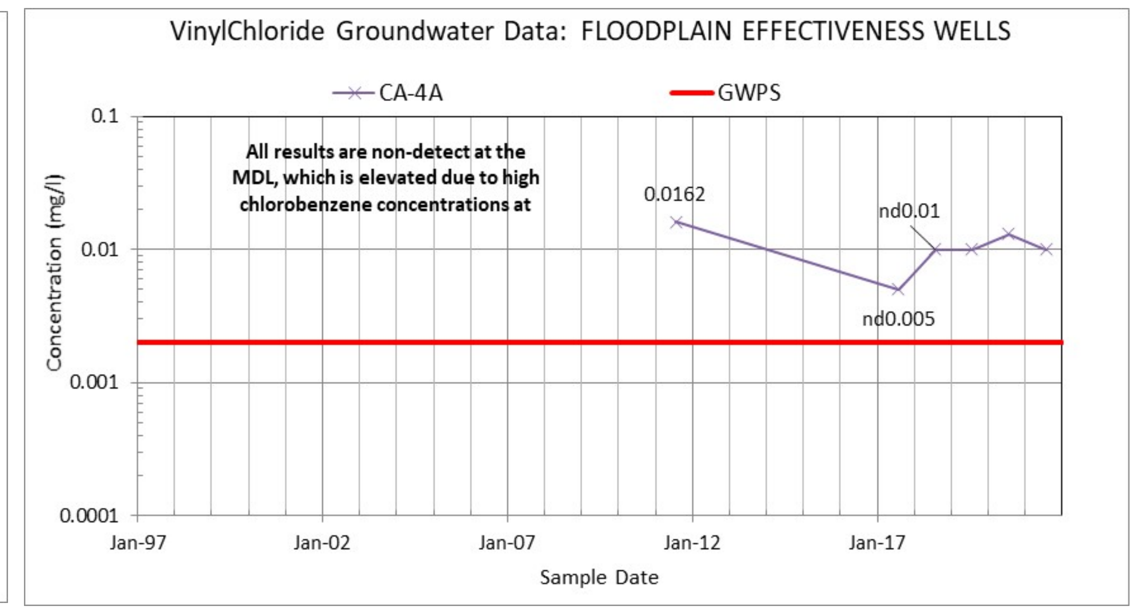

CHLOROFORM Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

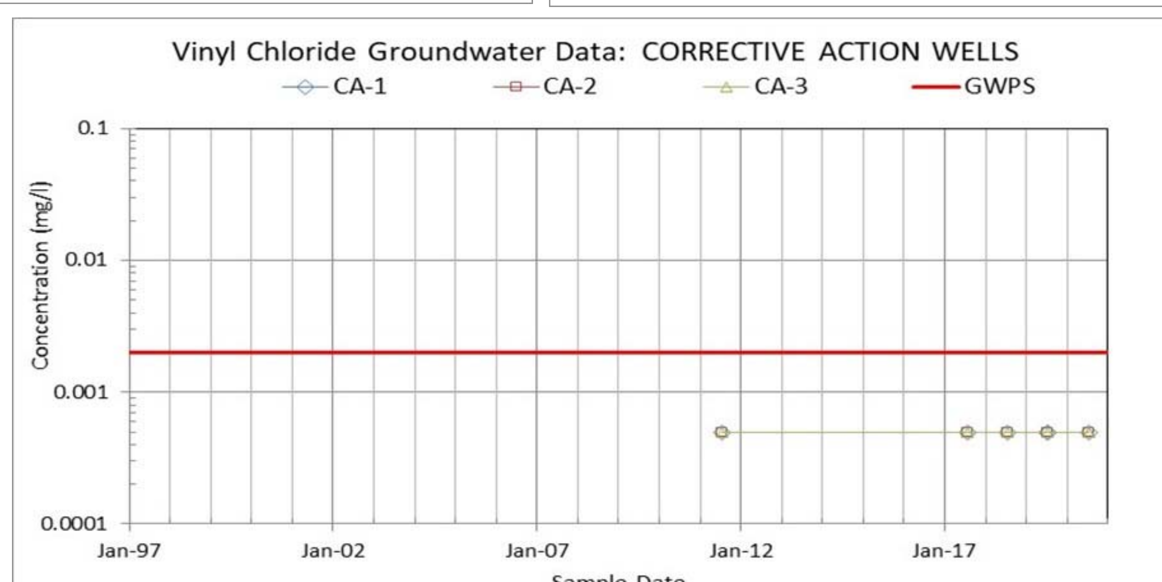

CHLOROFORM Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

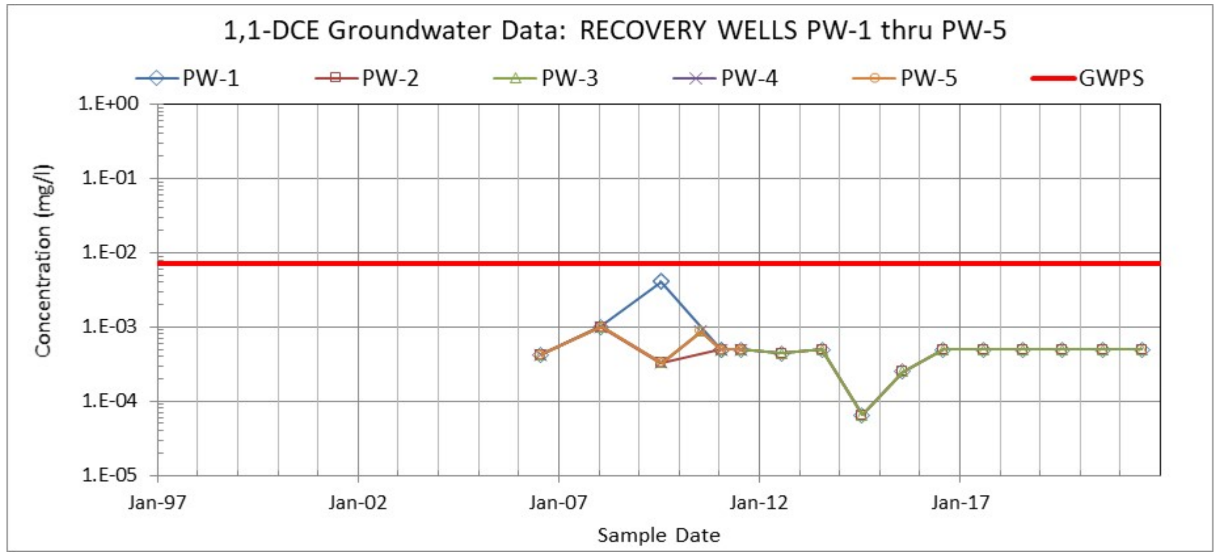

Vinyl Chloride Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
0.1
0.01
0.001
0.0001
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

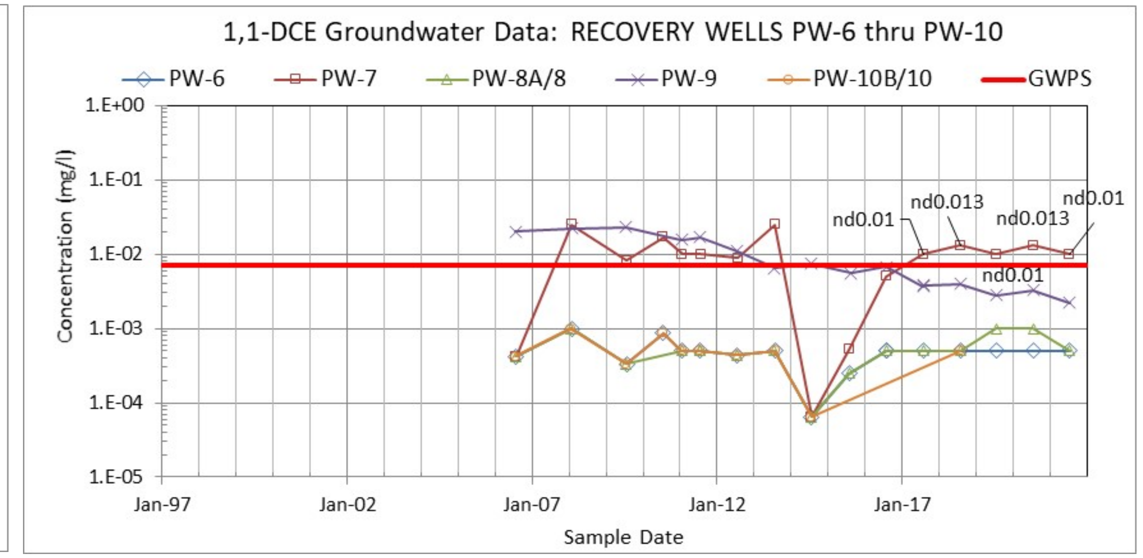

Vinyl Chloride Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
0.1
0.01
0.001
0.0001
Concentration (mg/l)
nd0.01
nd0.01
nd0.013
0.01
nd0.013
nd0.01
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

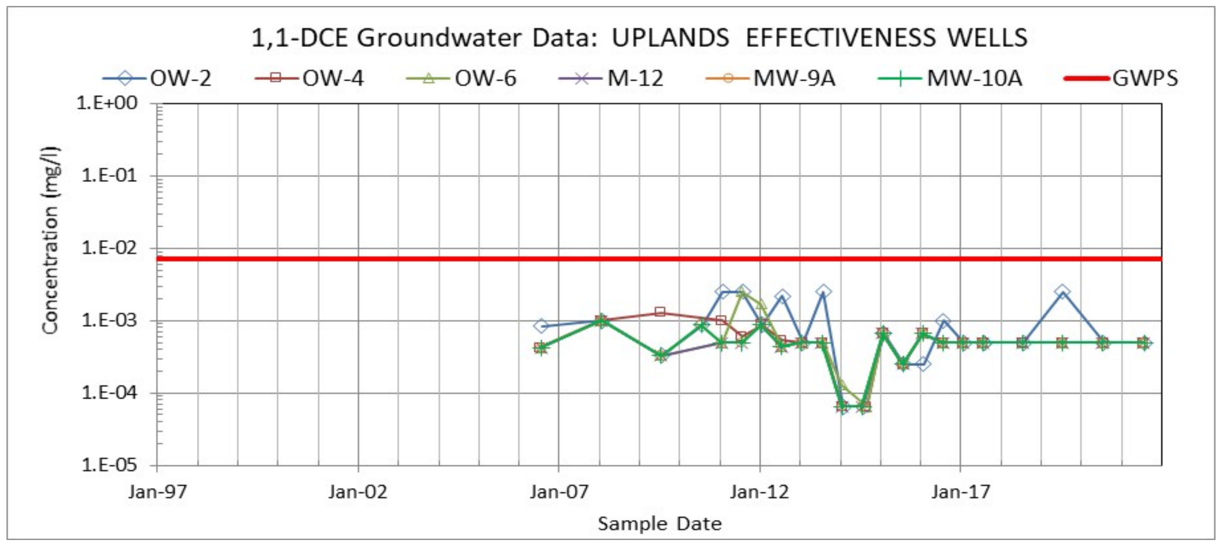

Vinyl Chloride Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
0.1
0.01
0.001
0.0001
Concentration (mg/l)
nd0.0025
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

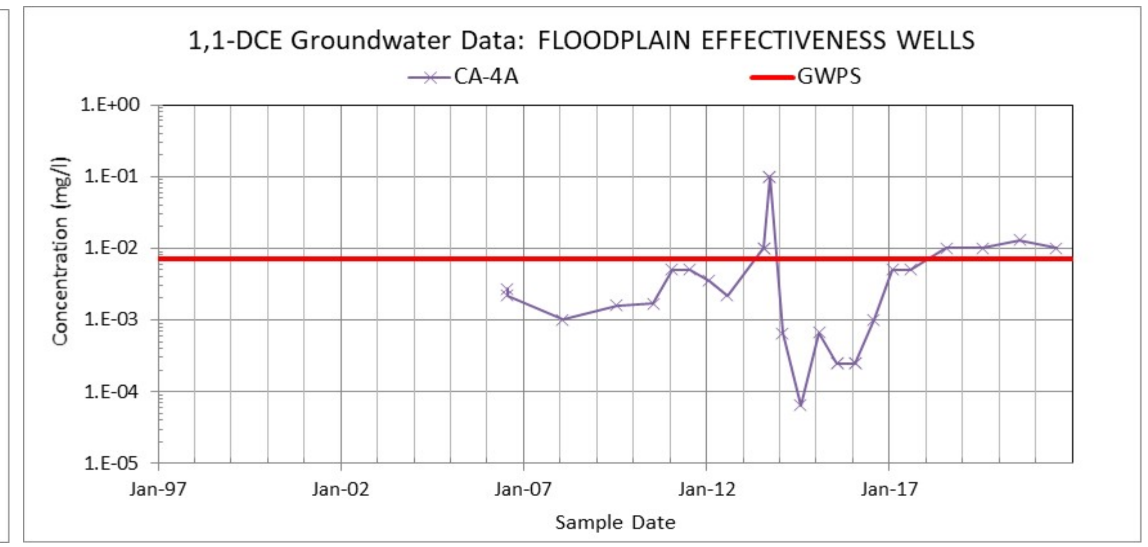

VinylChloride Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
0.1
0.01
0.001
0.0001
Concentration (mg/l)
All results are non-detect at the MDL, which is elevated due to high chlorobenzene concentrations at
0.0162
nd0.01
nd0.005
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

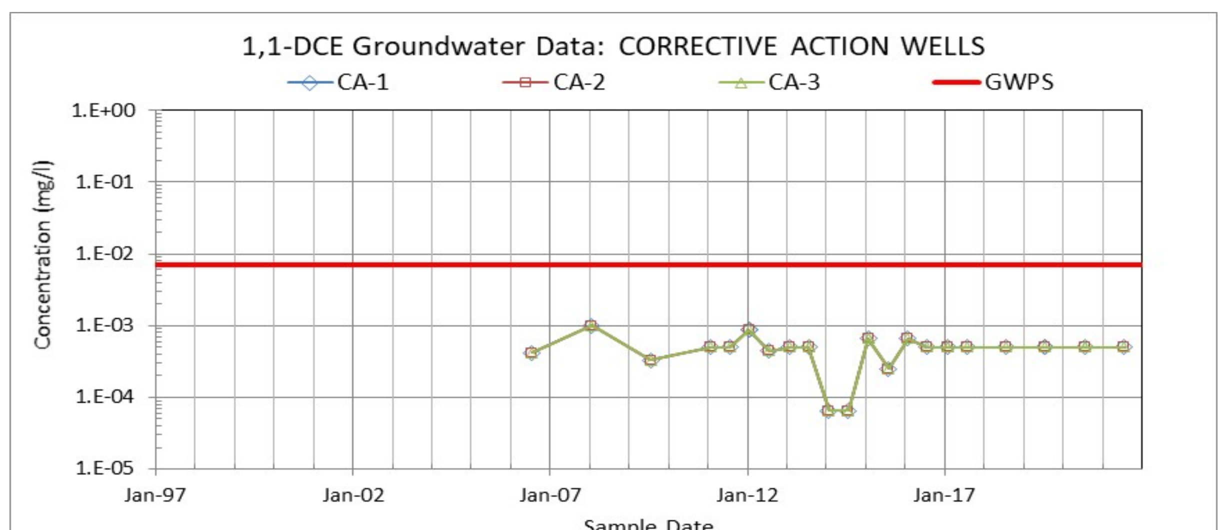

Vinyl Chloride Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
0.1
0.01
0.001
0.0001
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

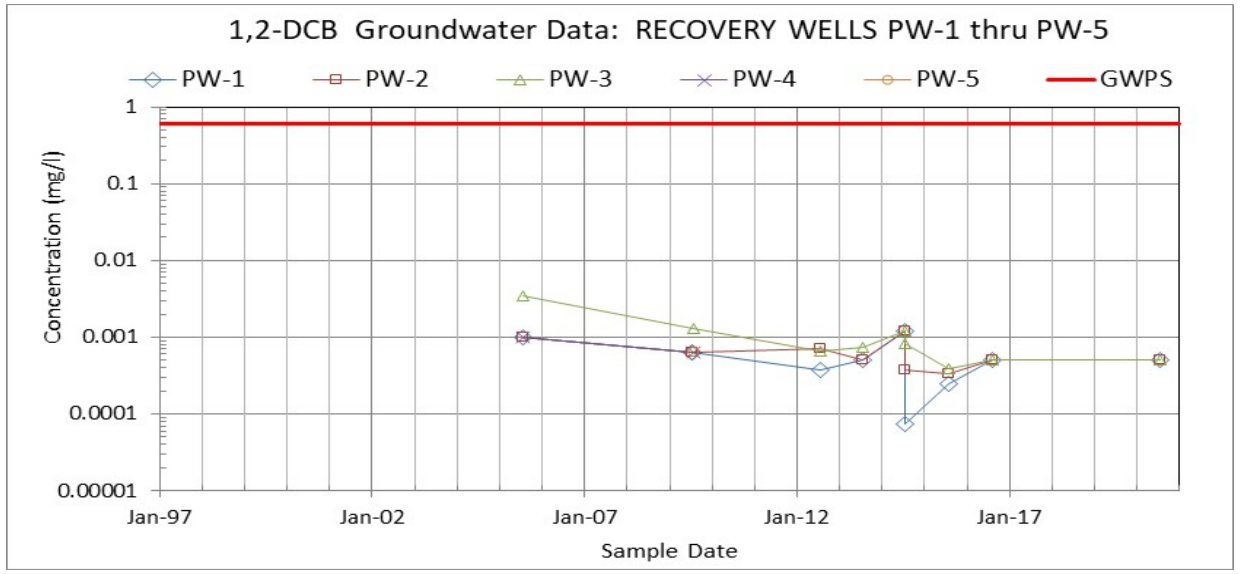

1,1-DCE Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

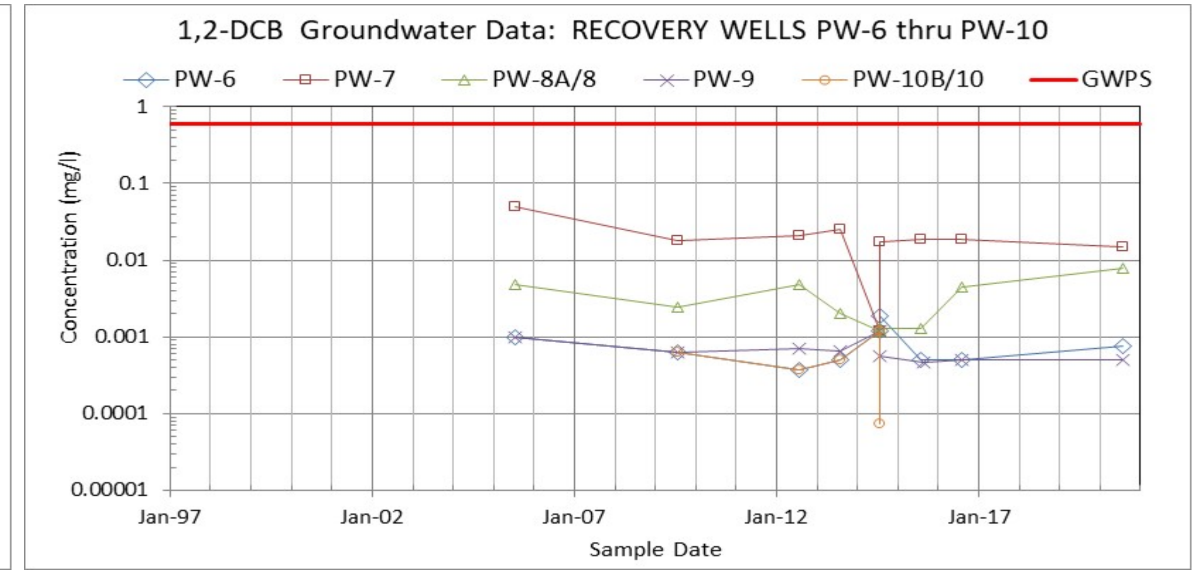

1,1-DCE Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
nd0.01
nd0.013
nd0.013
nd0.01
nd0.01
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

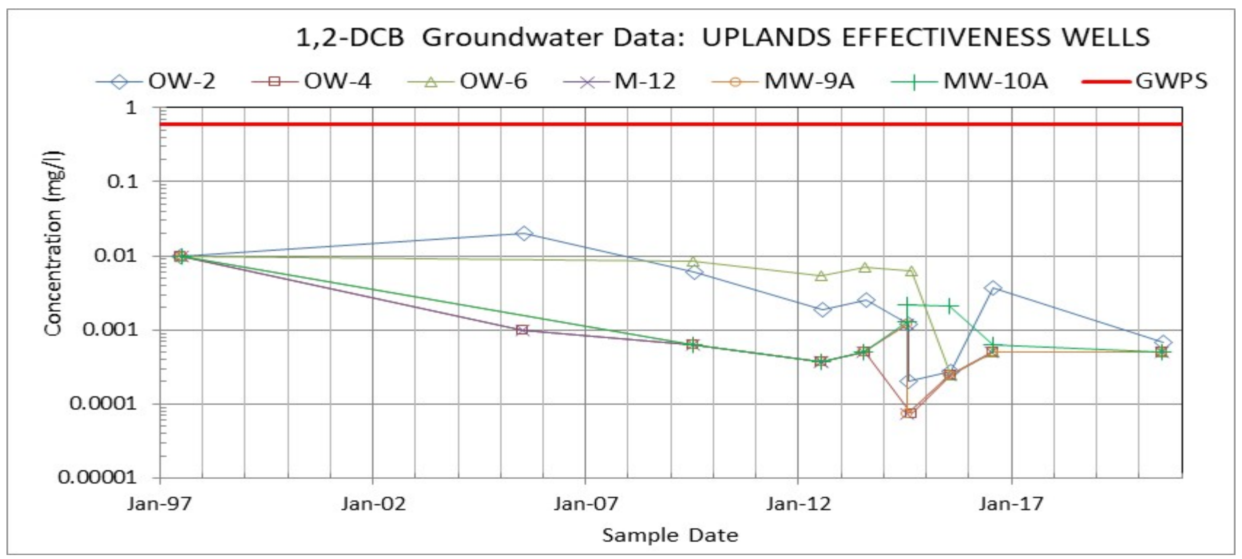

1,1-DCE Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

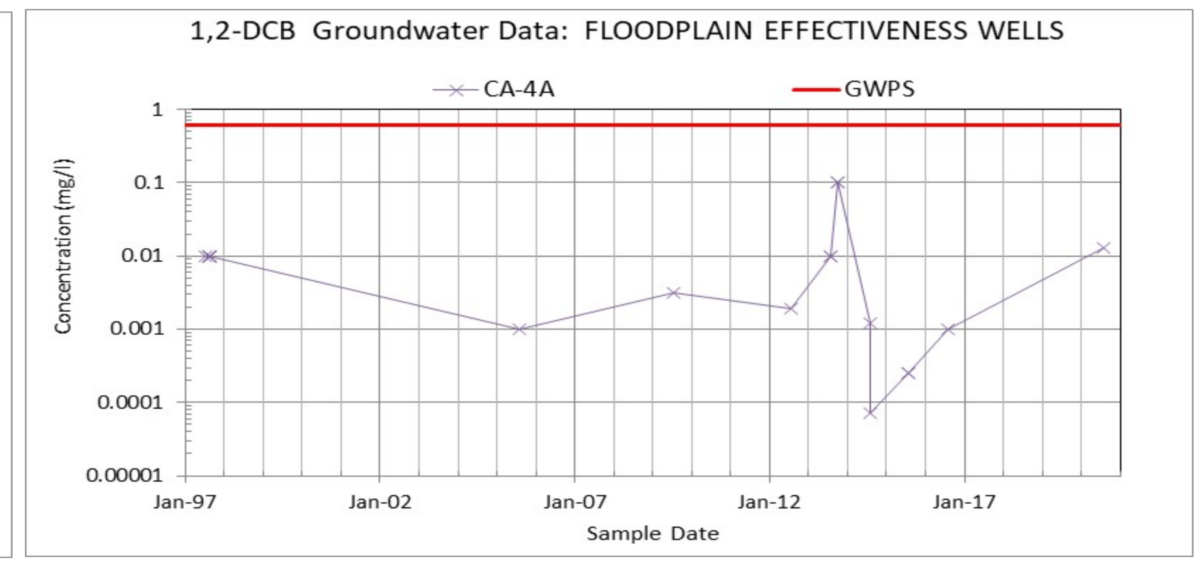

1,1-DCE Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

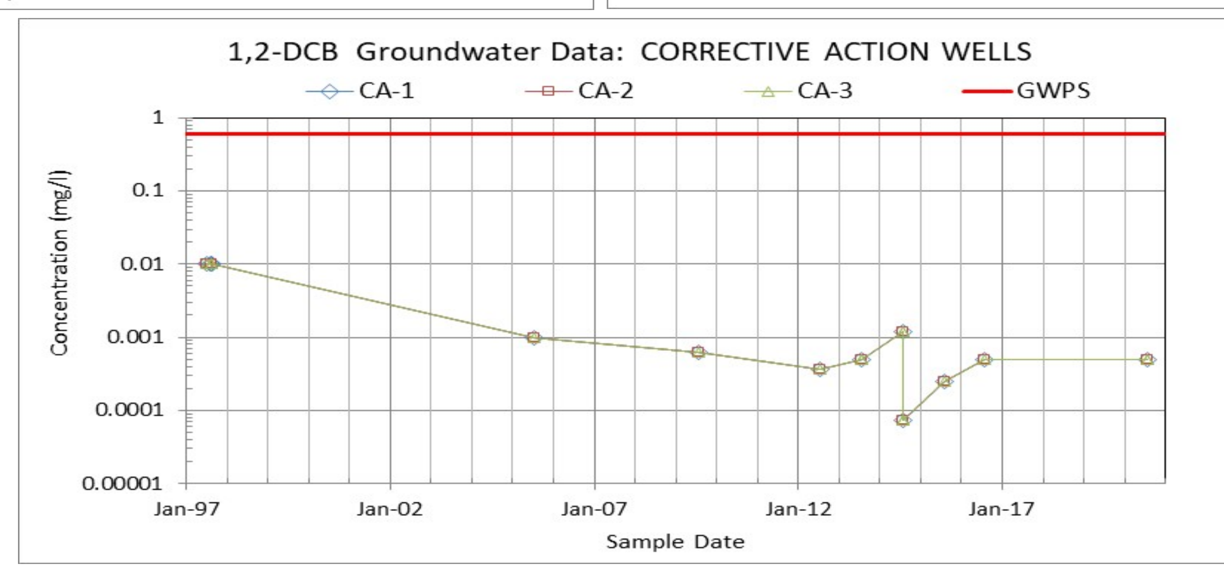

1,1-DCE Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

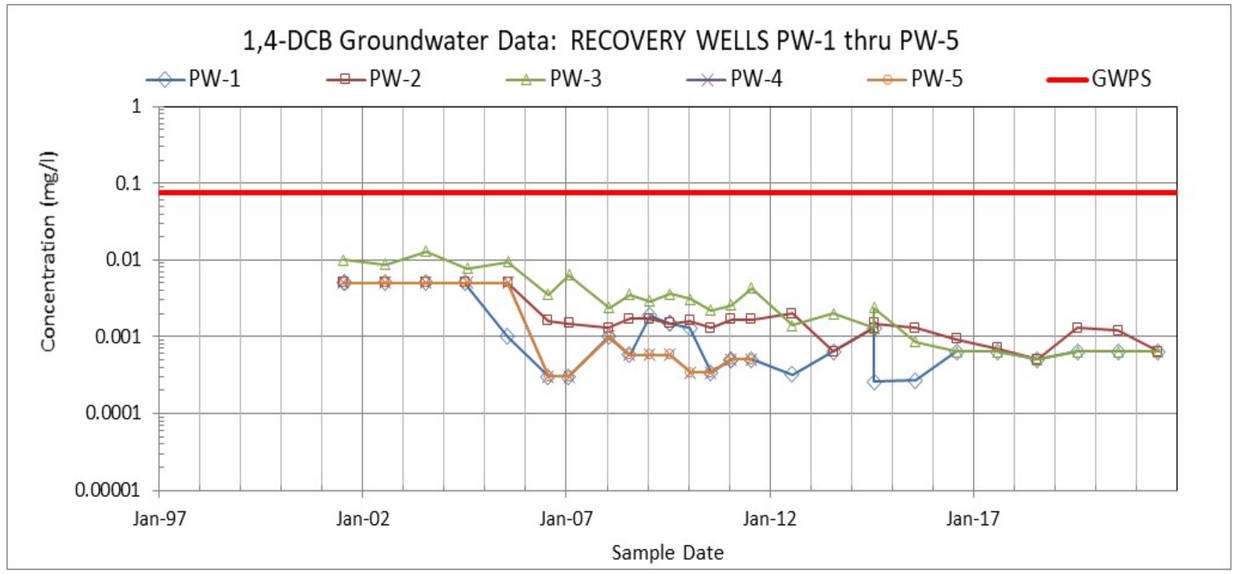

1,2-DCB Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

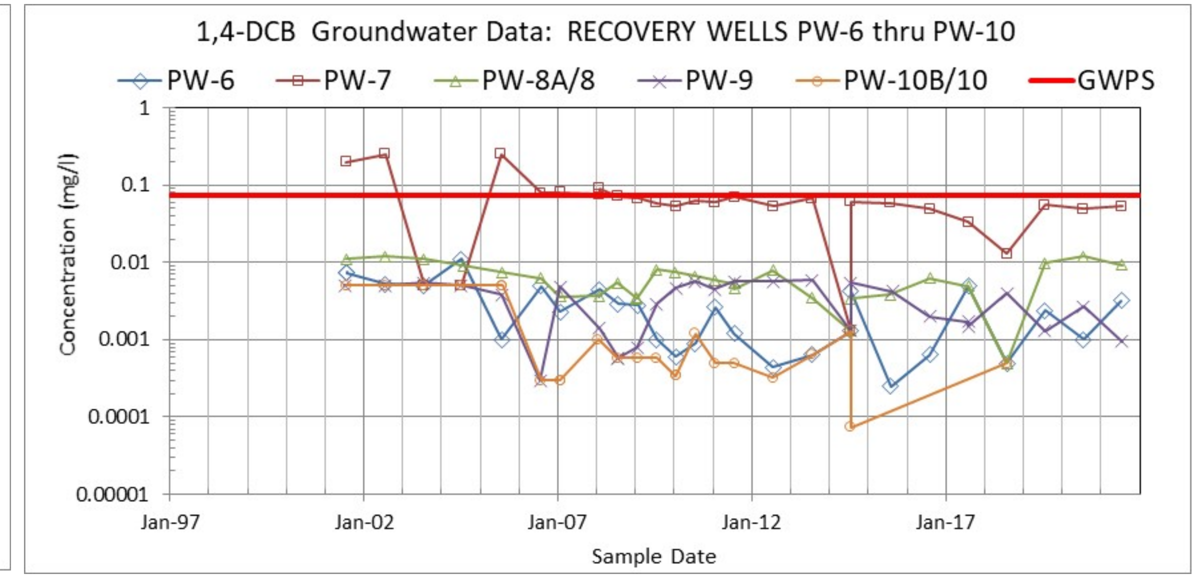

1,2-DCB Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

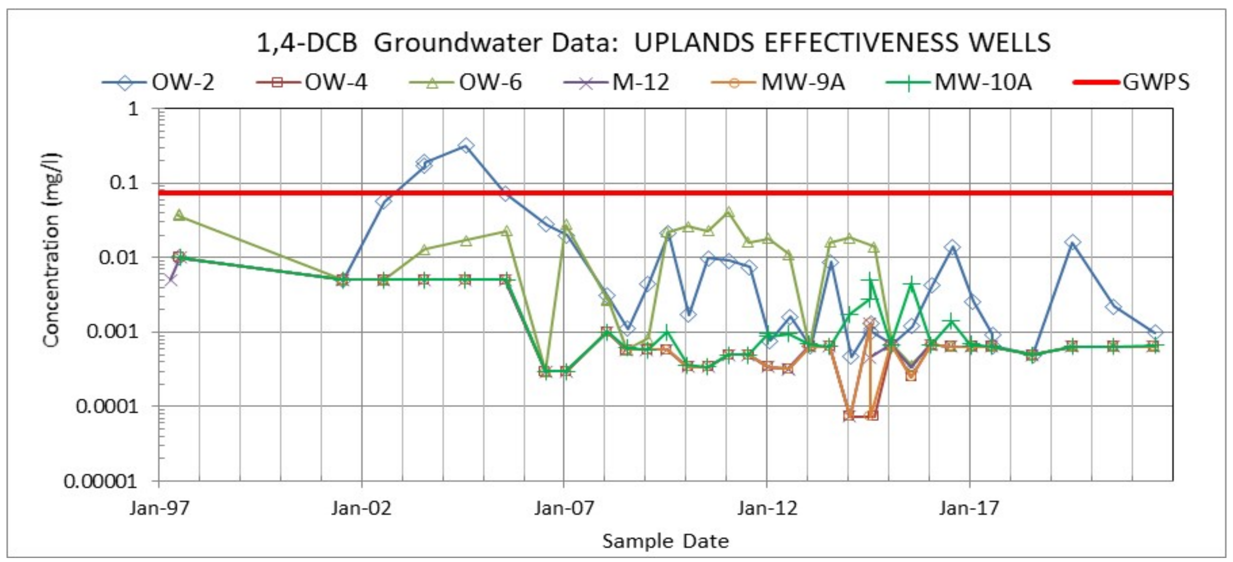

1,2-DCB Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

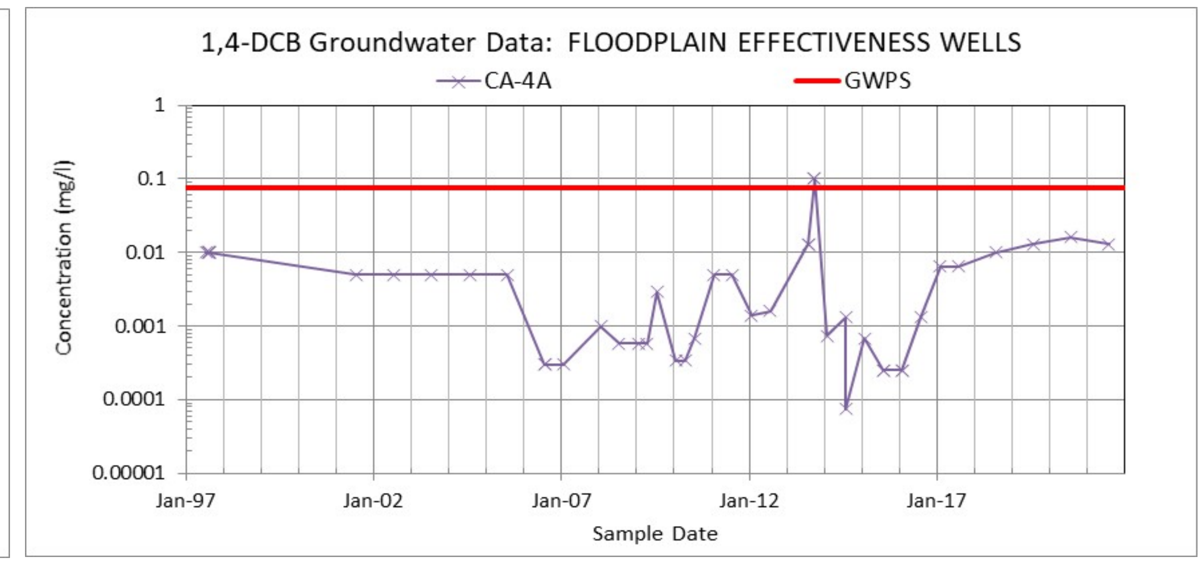

1,2-DCB Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

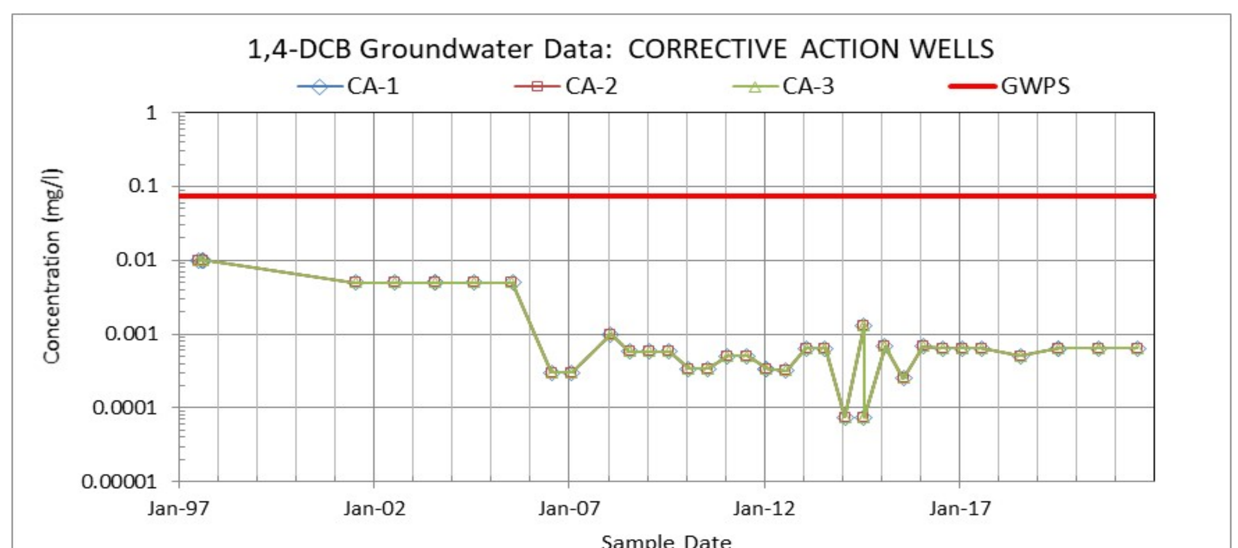

1,2-DCB Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

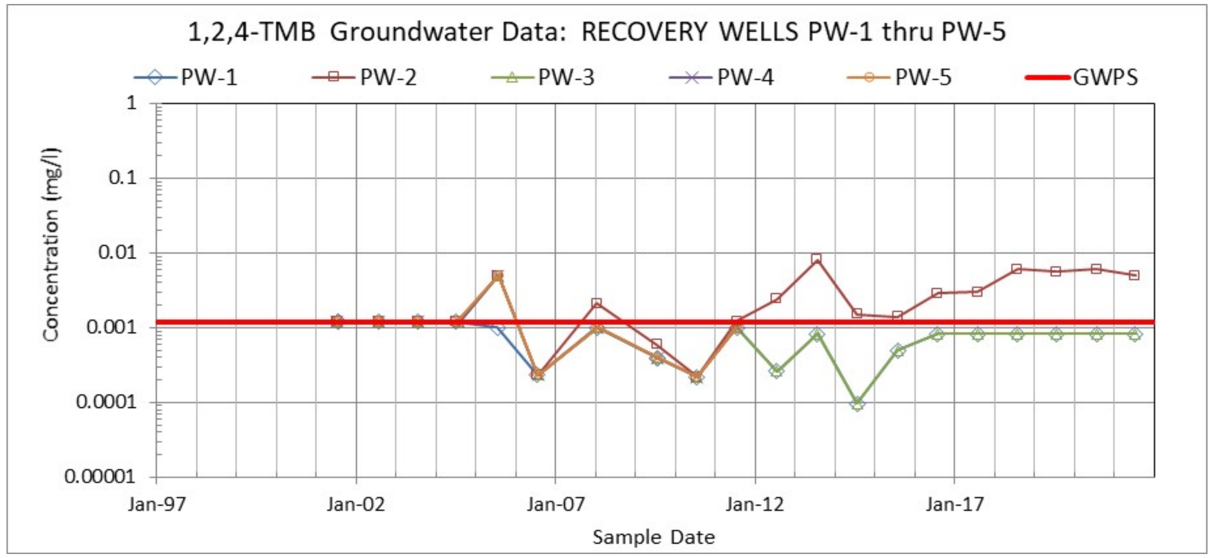

1,4-DCB Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

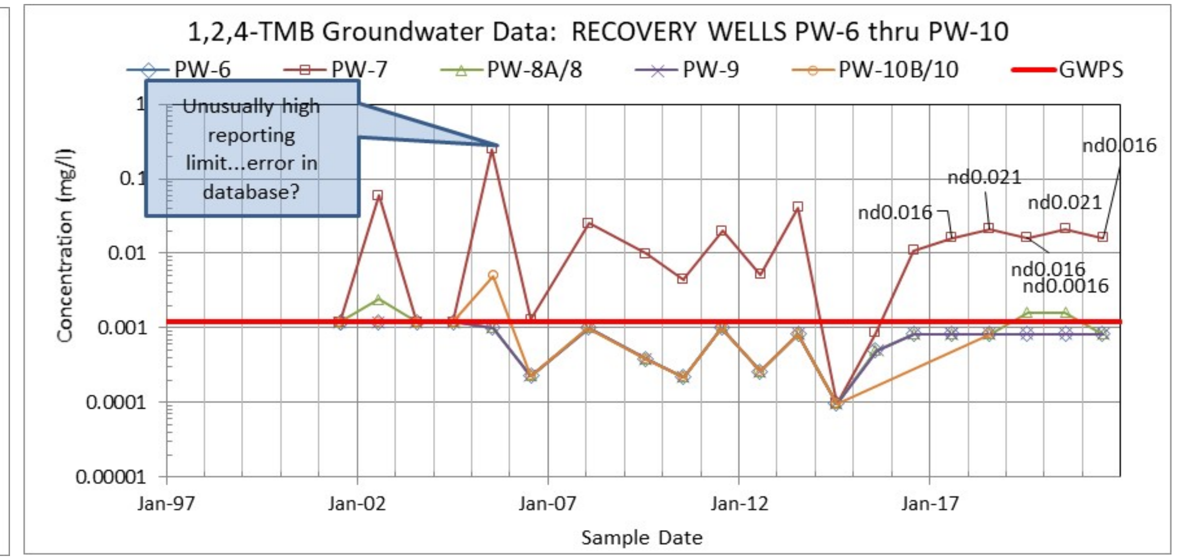

1,4-DCB Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

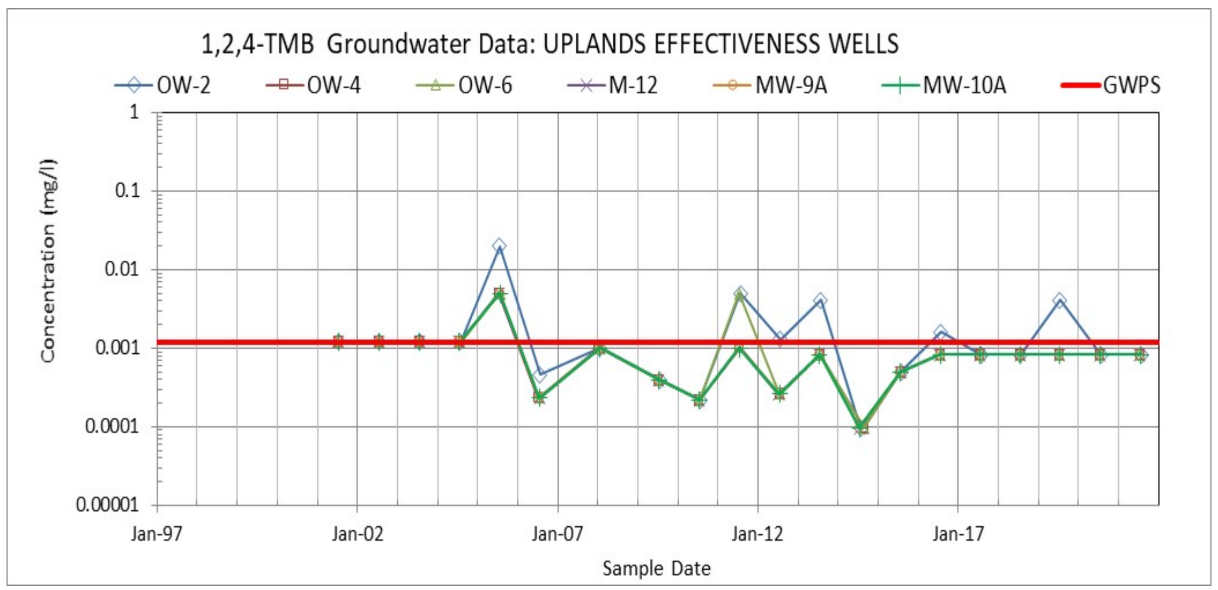

1,4-DCB Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

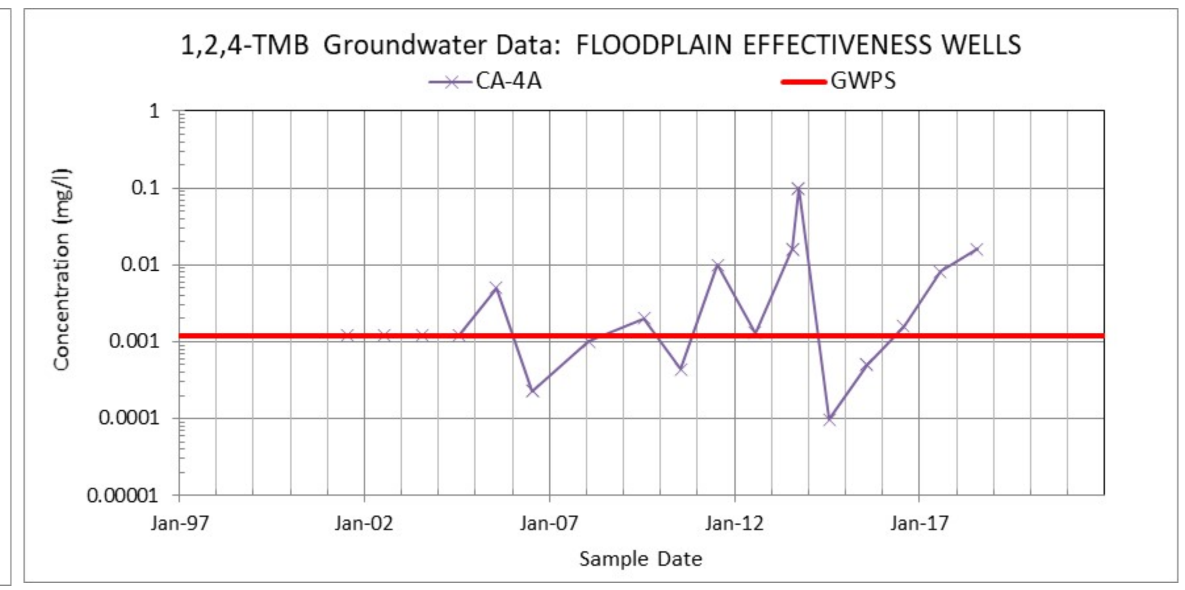

1,4-DCB Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

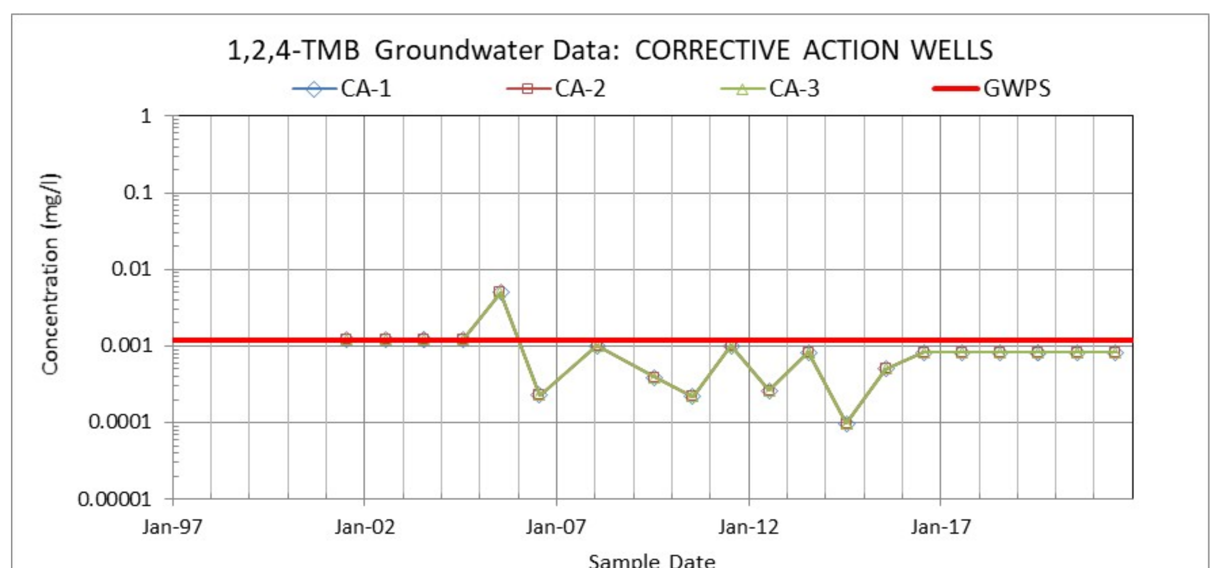

1,4-DCB Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

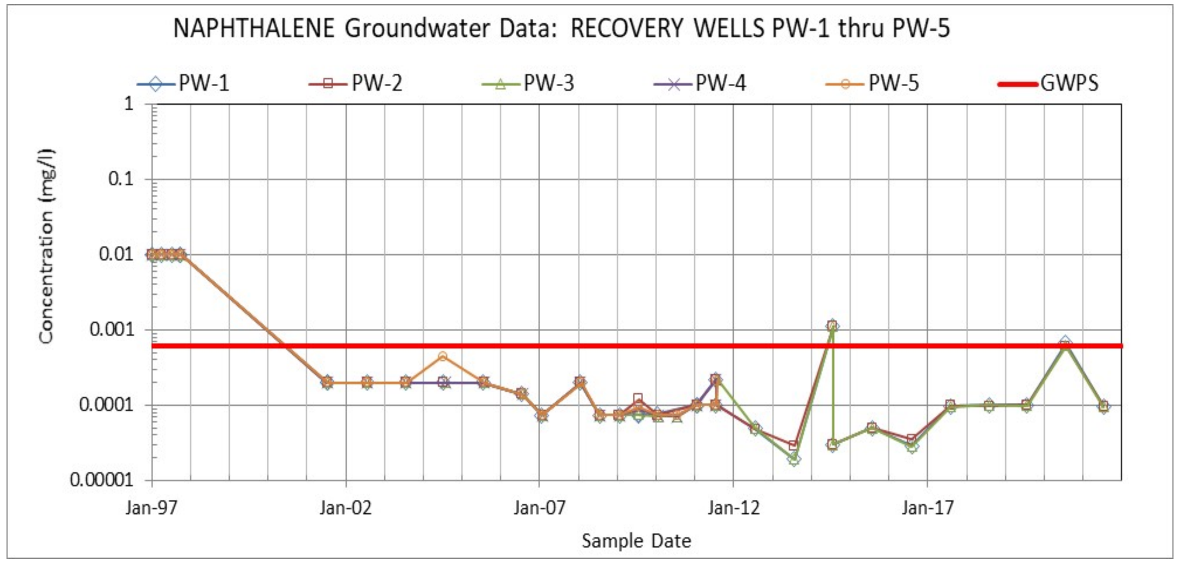

1,2,4-TMB Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

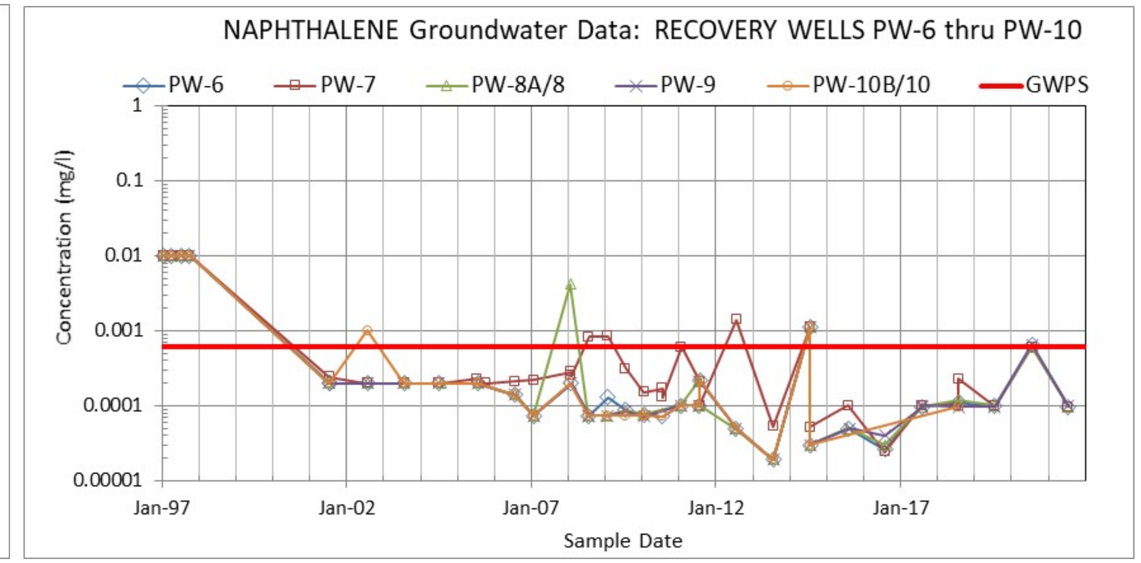

1,2,4-TMB Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Unusually high reporting limit...error in database?
nd0.016
nd0.021
nd0.016
nd0.021
nd0.016
nd0.0016
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

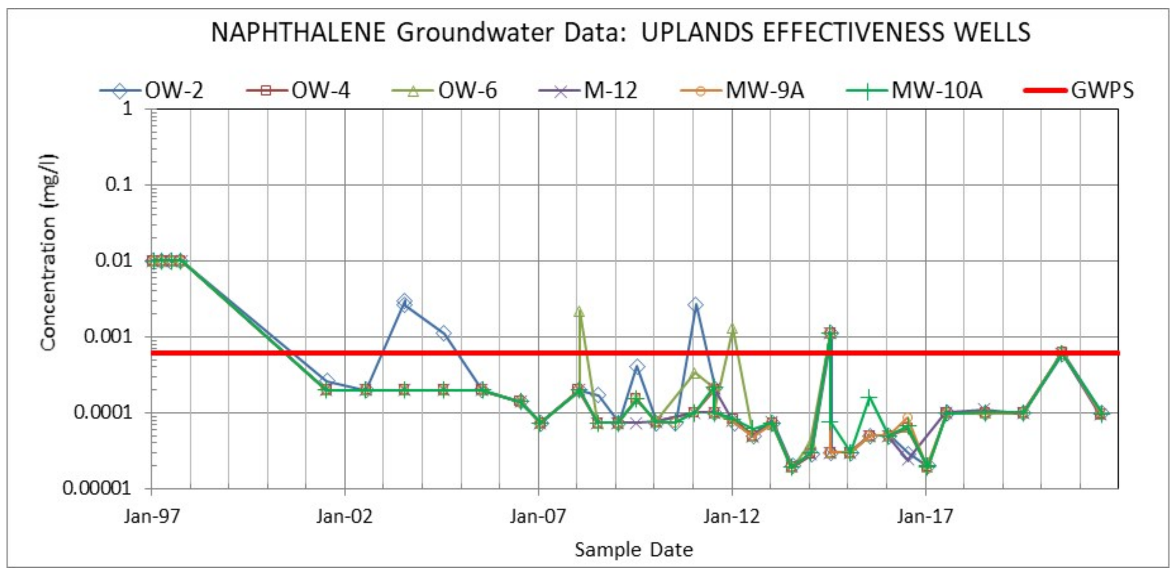

1,2,4-TMB Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

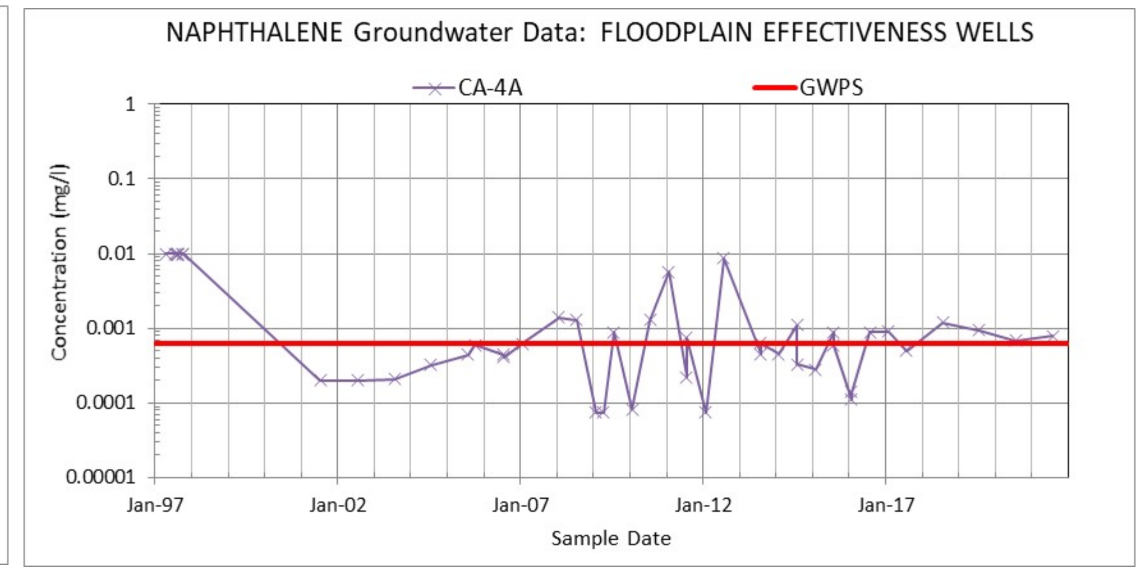

1,2,4-TMB Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

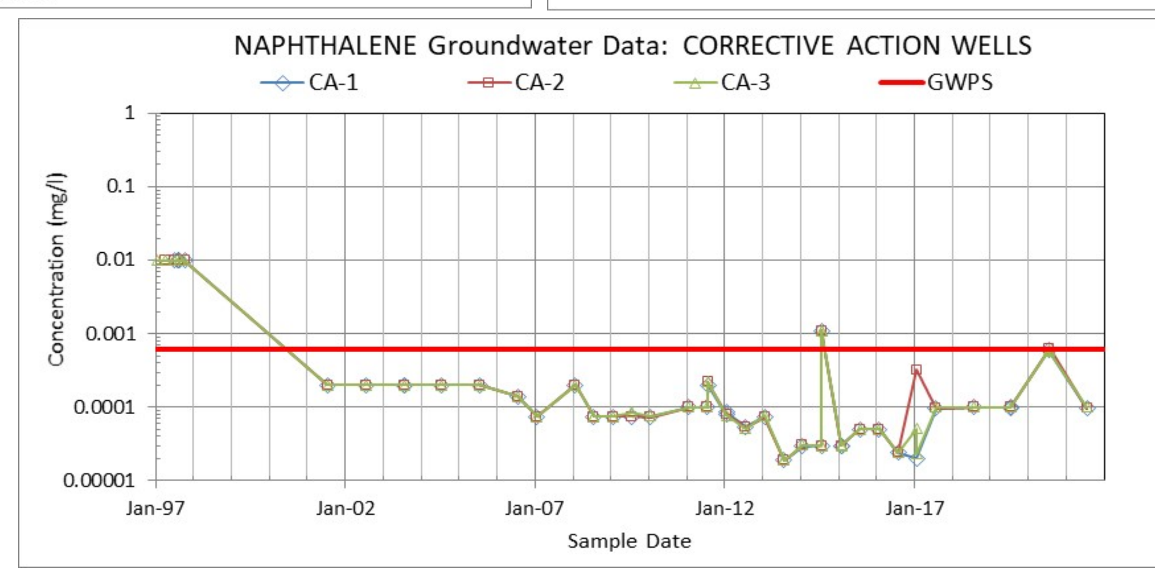

1,2,4-TMB Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

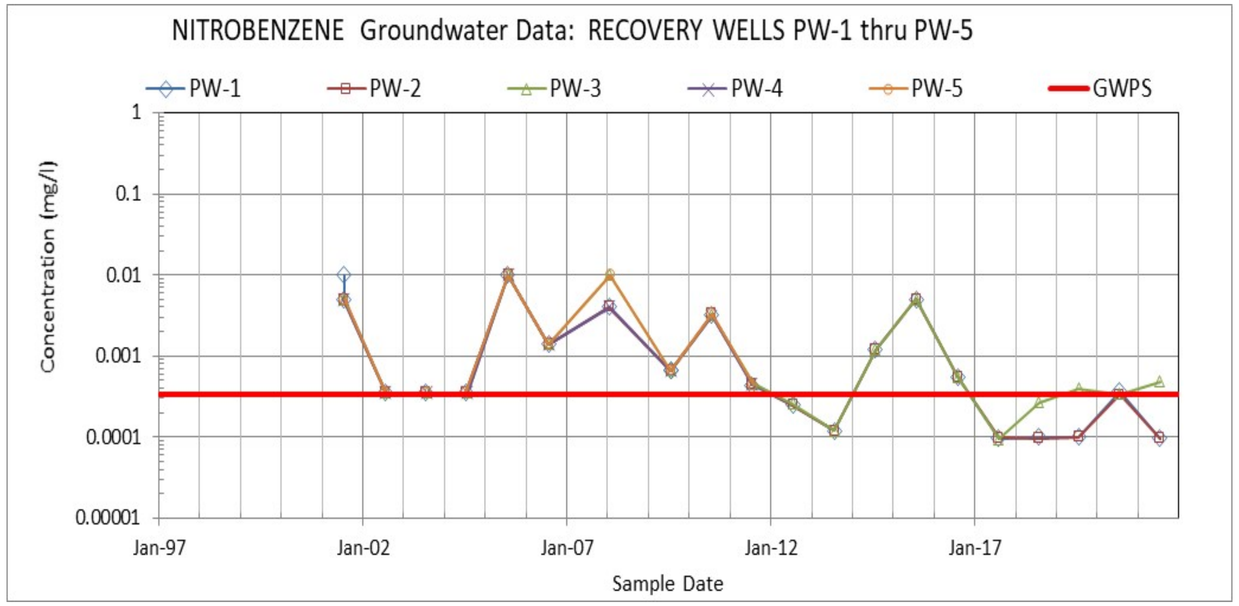

NAPHTHALENE Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

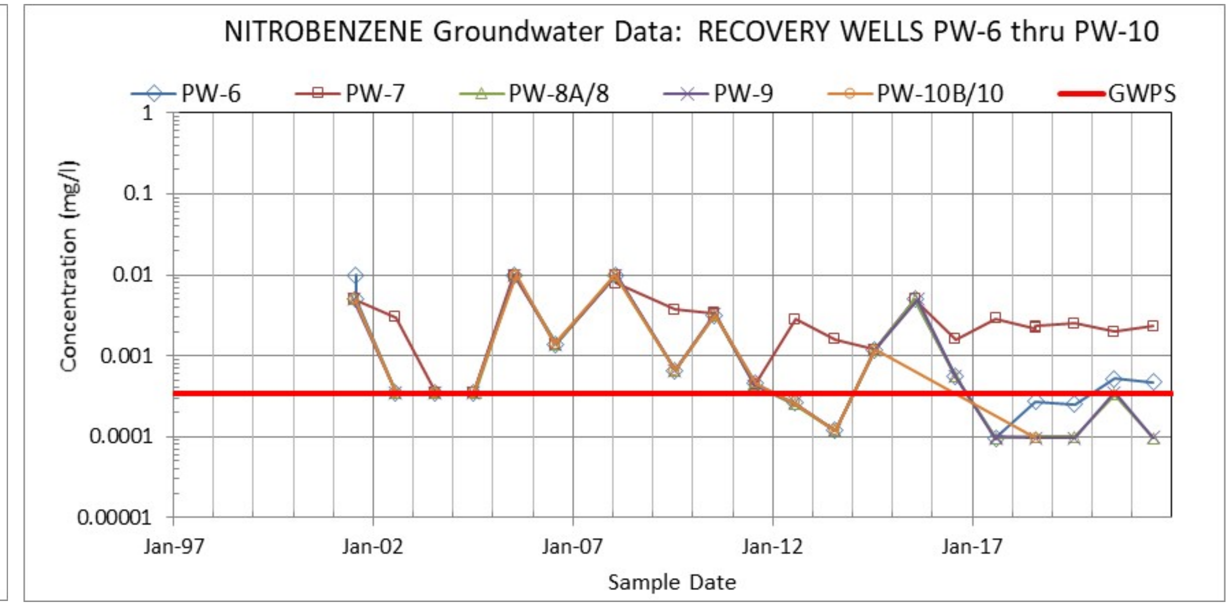

NAPHTHALENE Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

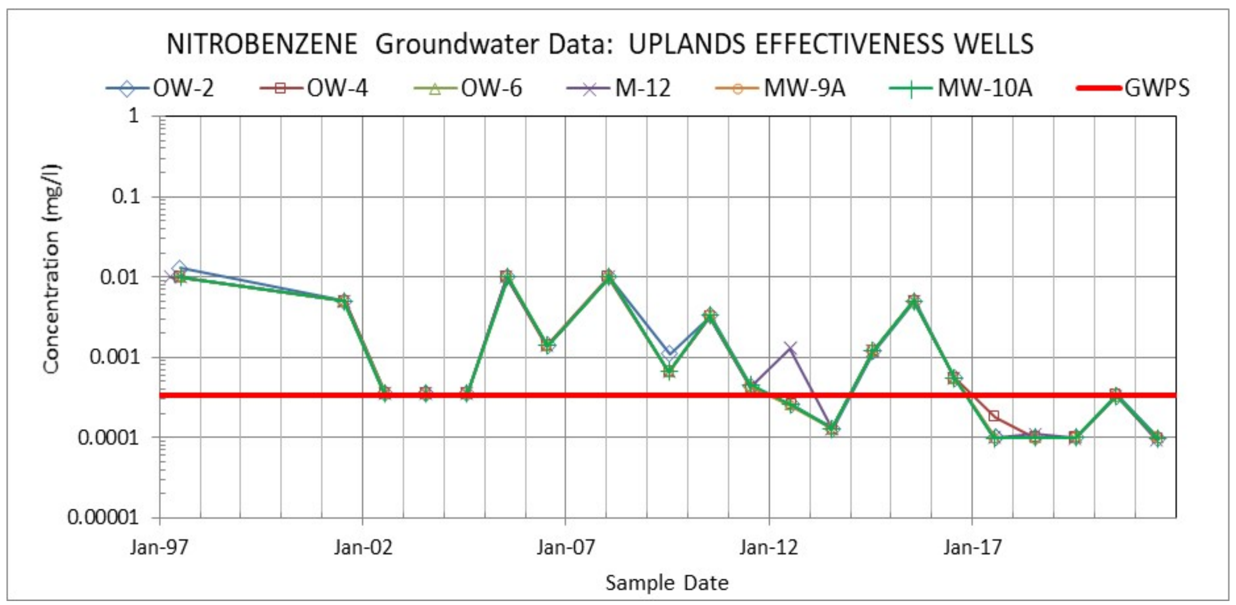

NAPHTHALENE Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

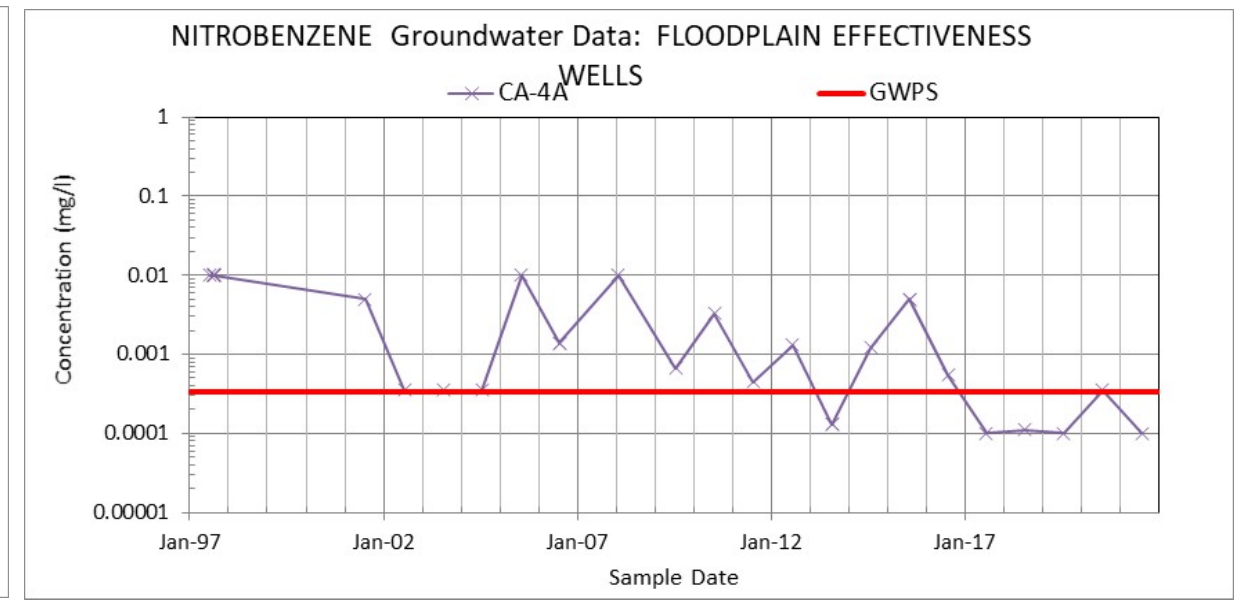

NAPHTHALENE Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

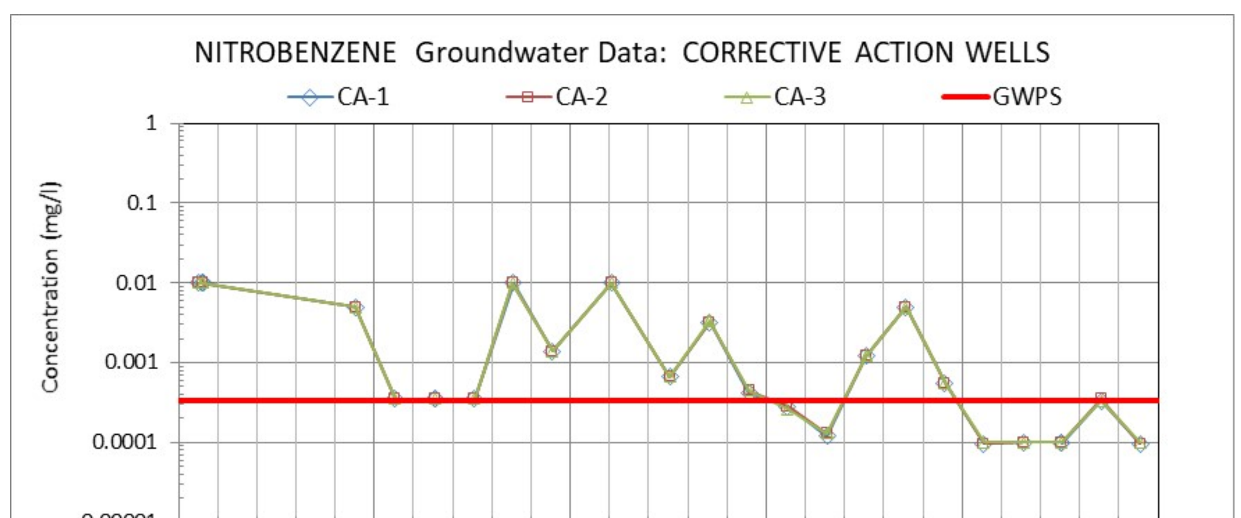

NAPHTHALENE Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

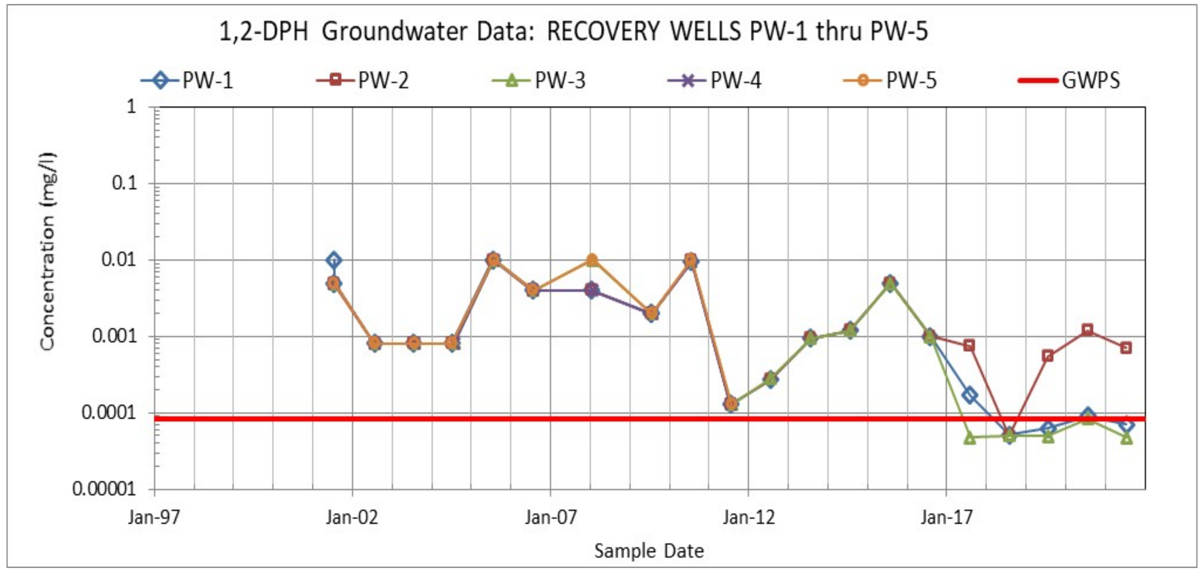

NITROBENZENE Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
Sample Date

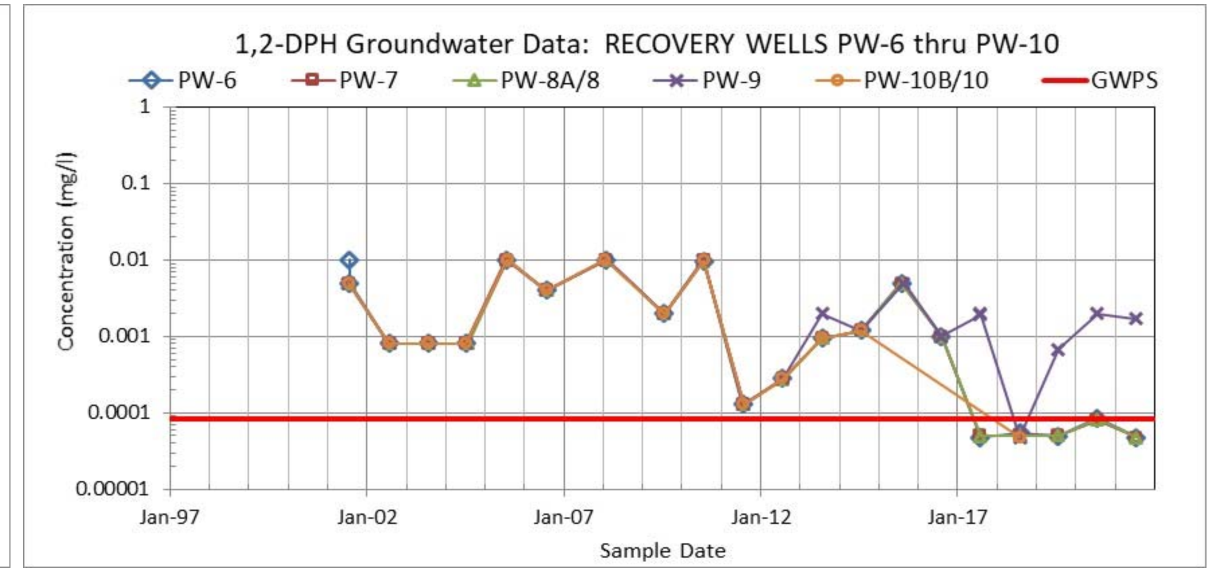

NITROBENZENE Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
Sample Date

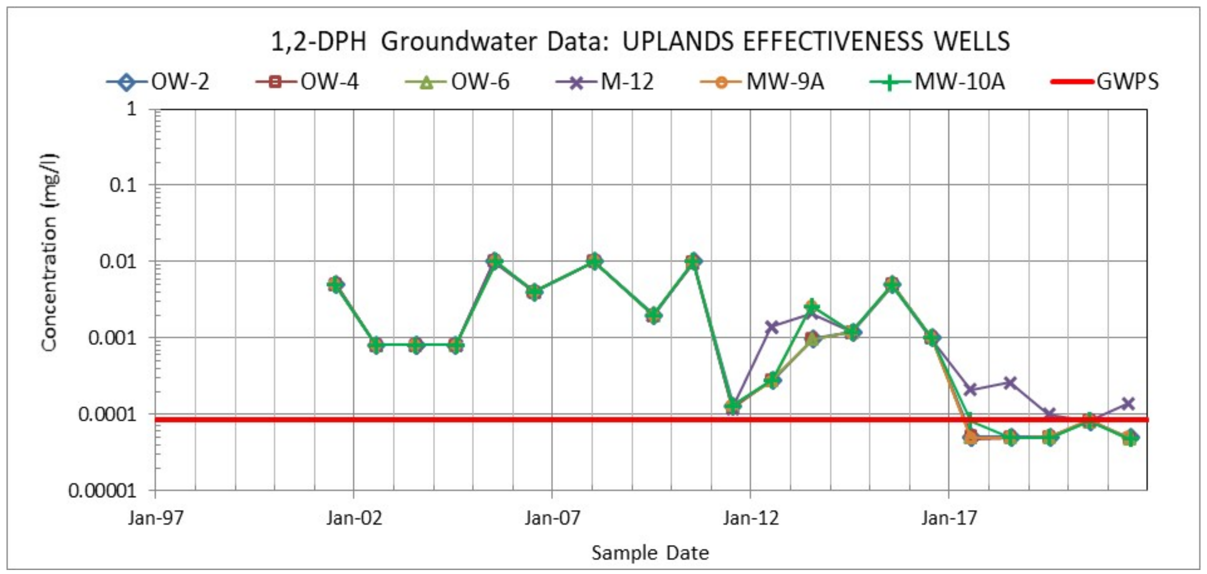

NITROBENZENE Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
Sample Date

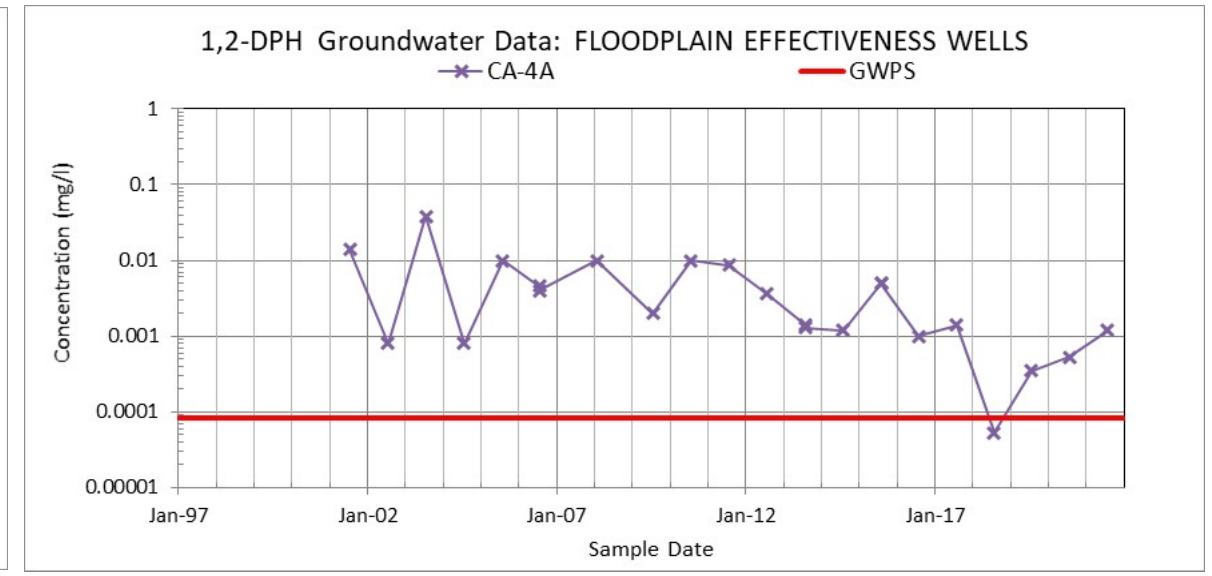

NITROBENZENE Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
Sample Date

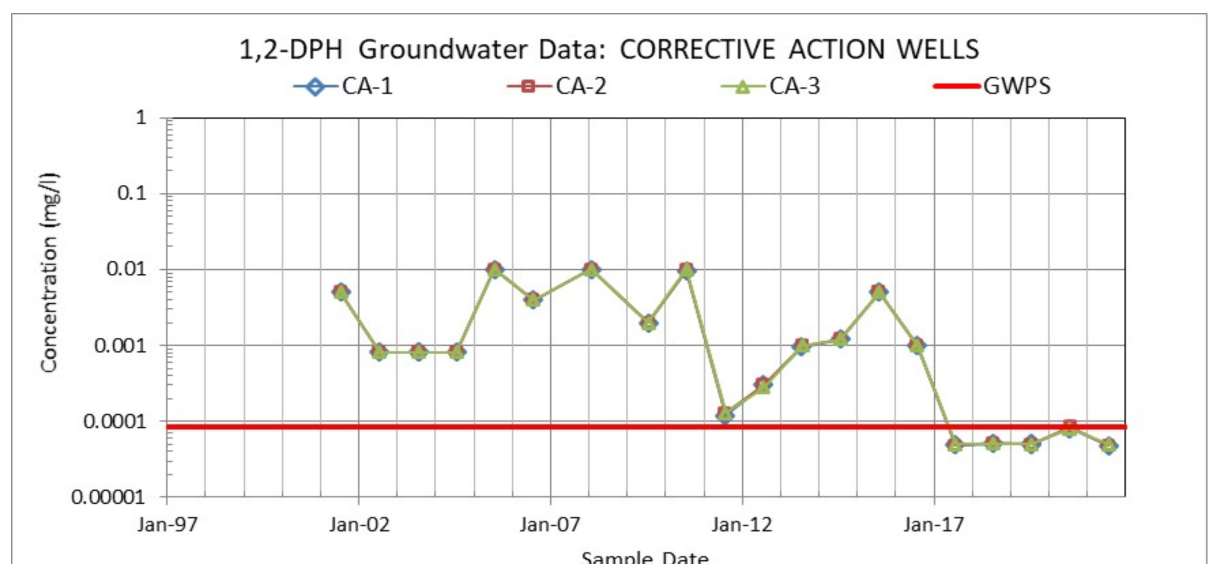

NITROBENZENE Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)

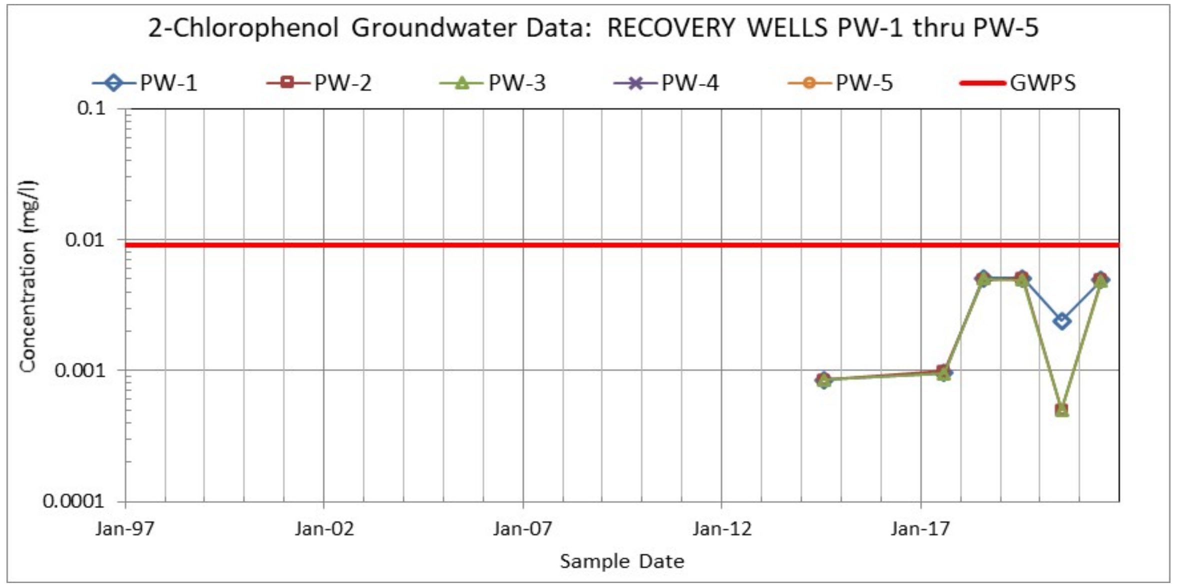

1,2-DPH Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

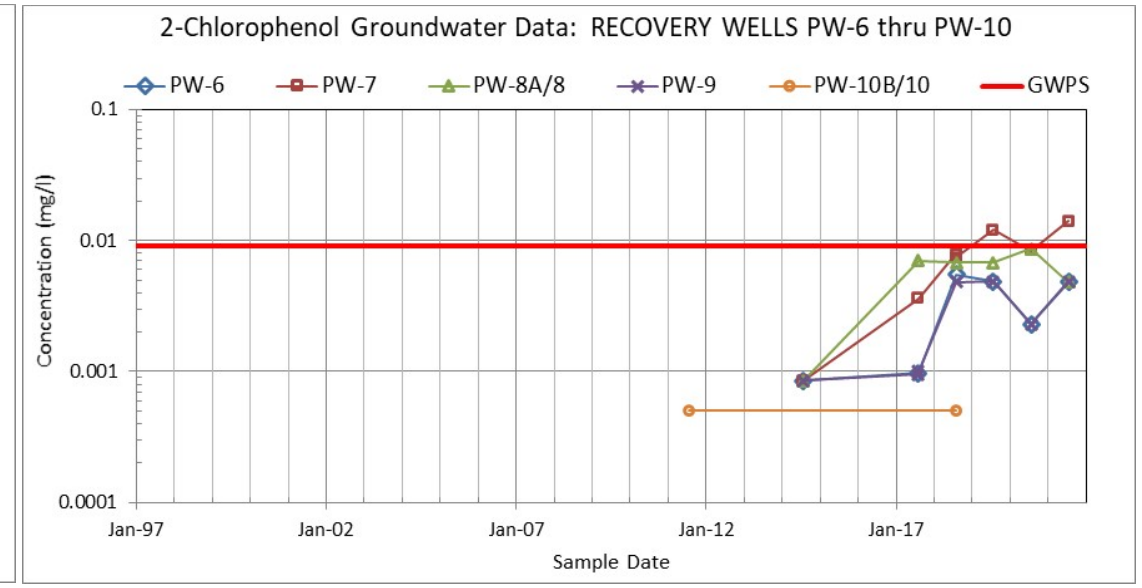

1,2-DPH Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

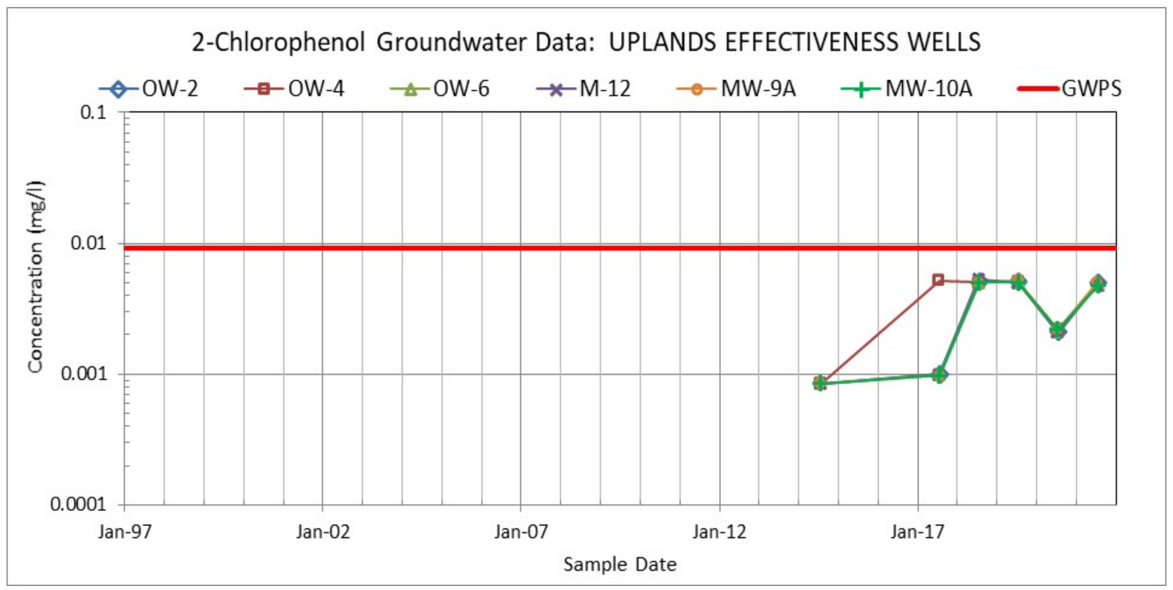

1,2-DPH Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

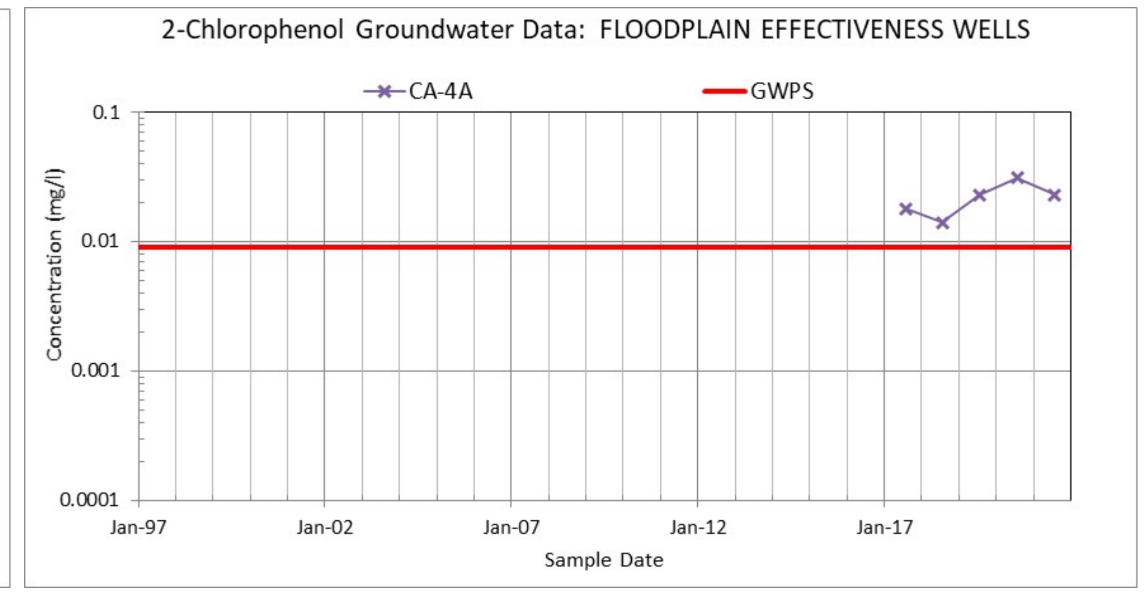

1,2-DPH Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

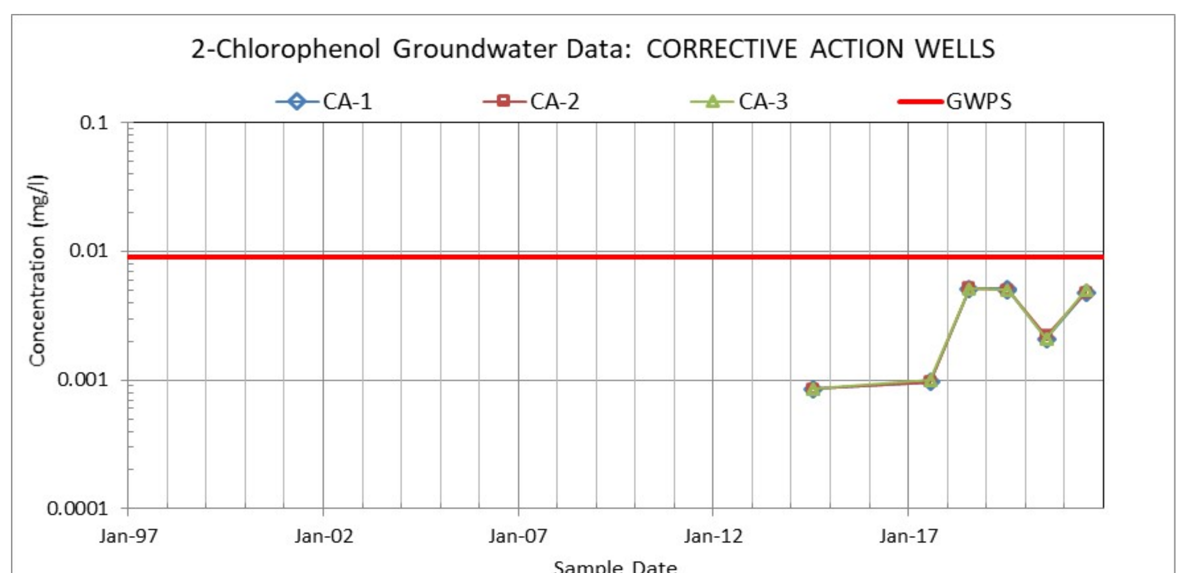

1,2-DPH Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

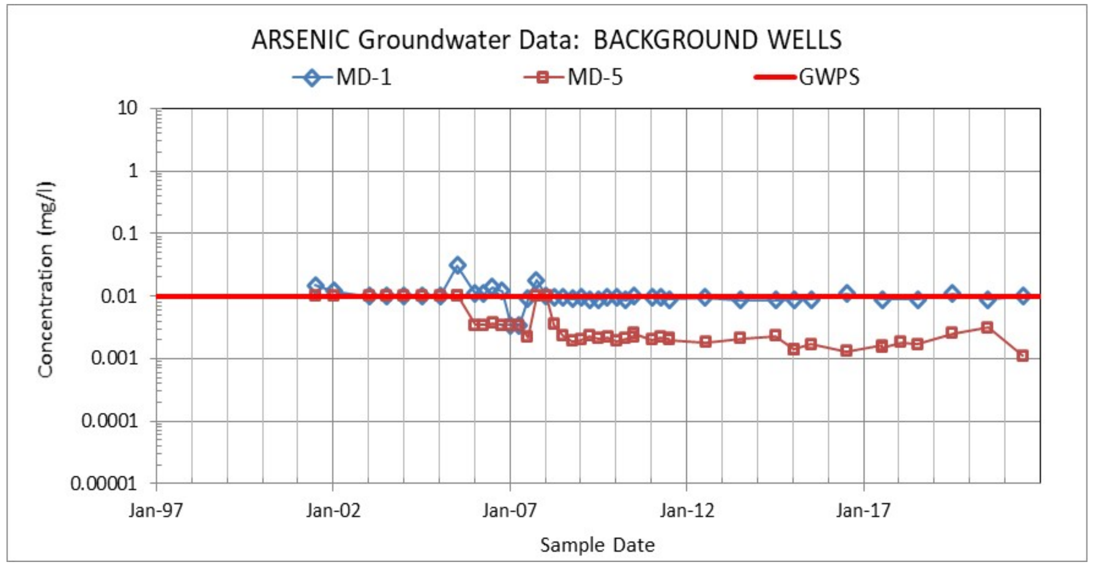

2-Chlorophenol Groundwater Data: RECOVERY WELLS PW-1 thru PW-5
PW-1
PW-2
PW-3
PW-4
PW-5
GWPS
0.1
0.01
0.001
0.0001
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

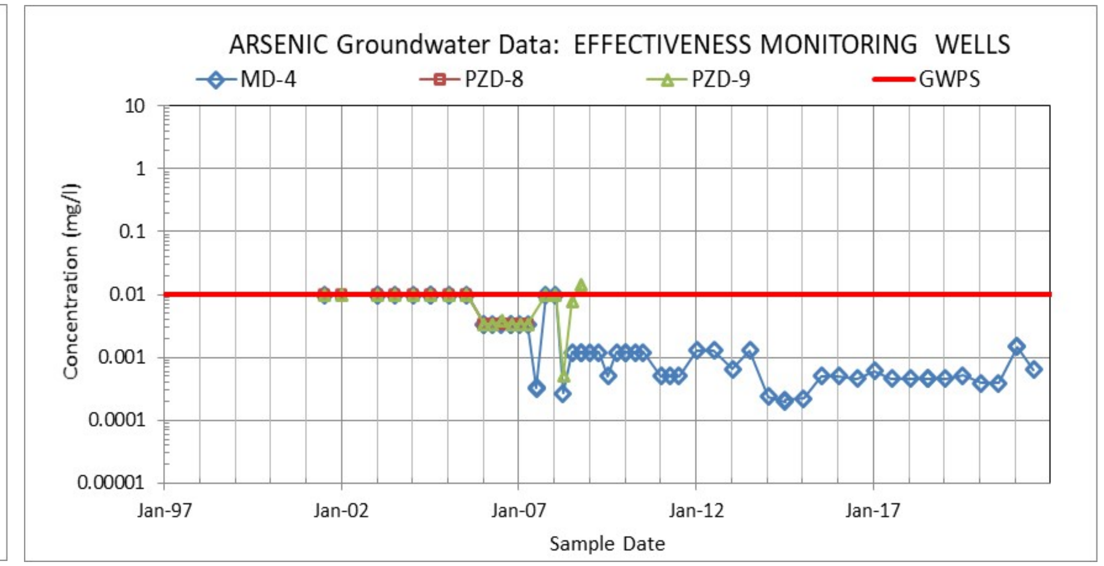

2-Chlorophenol Groundwater Data: RECOVERY WELLS PW-6 thru PW-10
PW-6
PW-7
PW-8A/8
PW-9
PW-10B/10
GWPS
0.1
0.01
0.001
0.0001
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

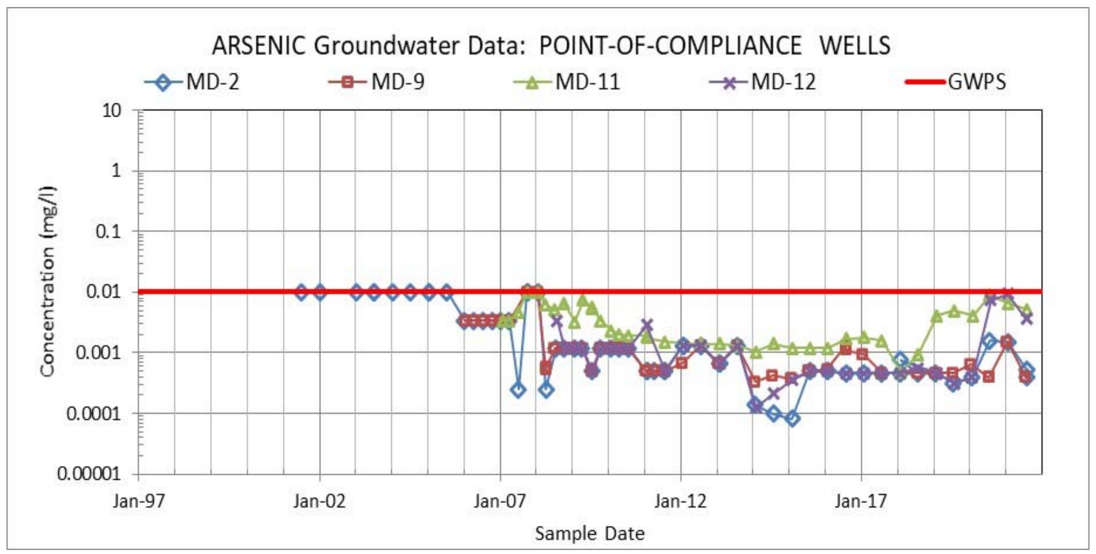

2-Chlorophenol Groundwater Data: UPLANDS EFFECTIVENESS WELLS
OW-2
OW-4
OW-6
M-12
MW-9A
MW-10A
GWPS
0.1
0.01
0.001
0.0001
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

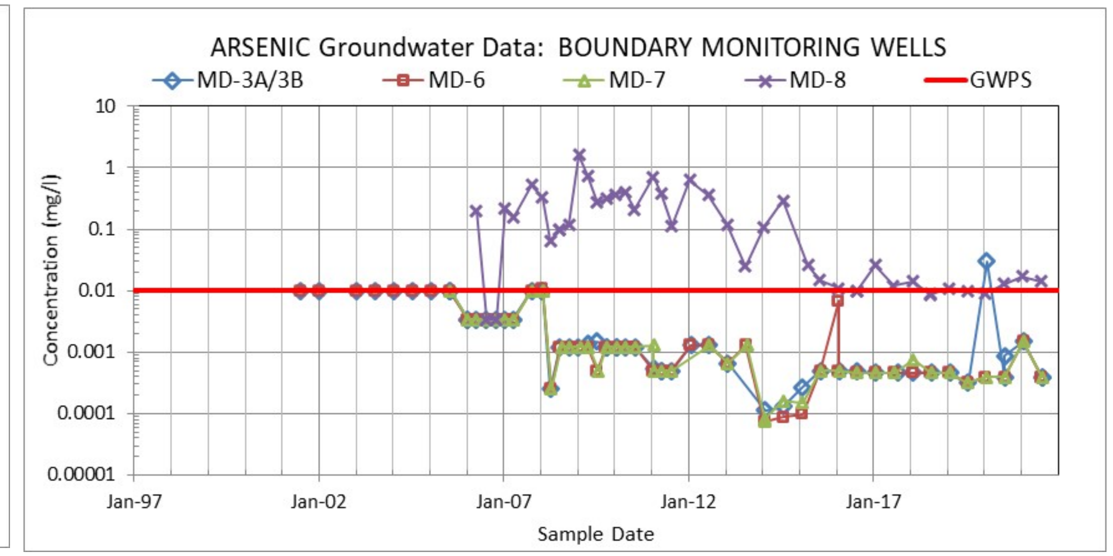

2-Chlorophenol Groundwater Data: FLOODPLAIN EFFECTIVENESS WELLS
CA-4A
GWPS
0.1
0.01
0.001
0.0001
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

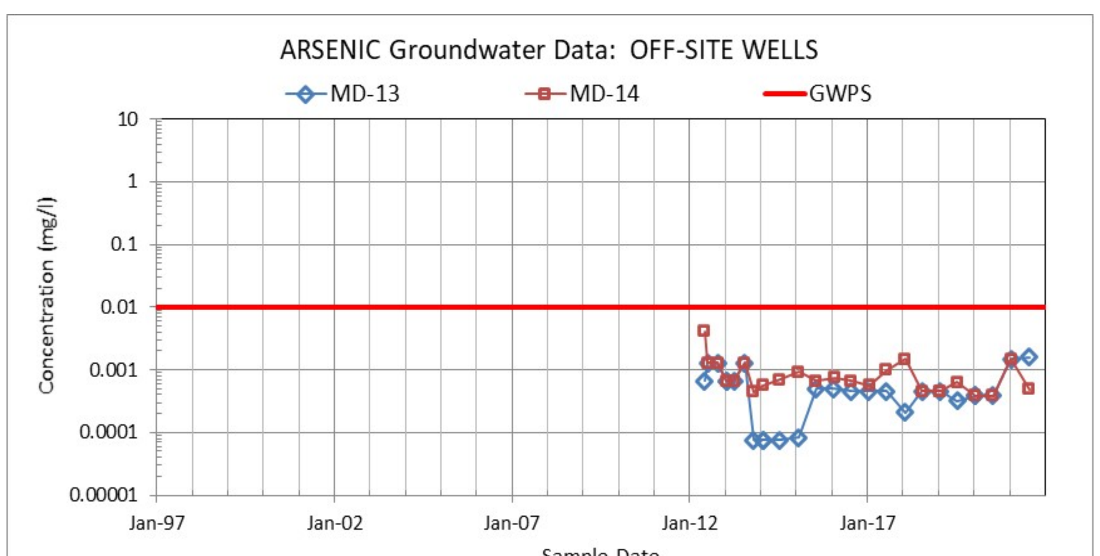

2-Chlorophenol Groundwater Data: CORRECTIVE ACTION WELLS
CA-1
CA-2
CA-3
GWPS
0.1
0.01
0.001
0.0001
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

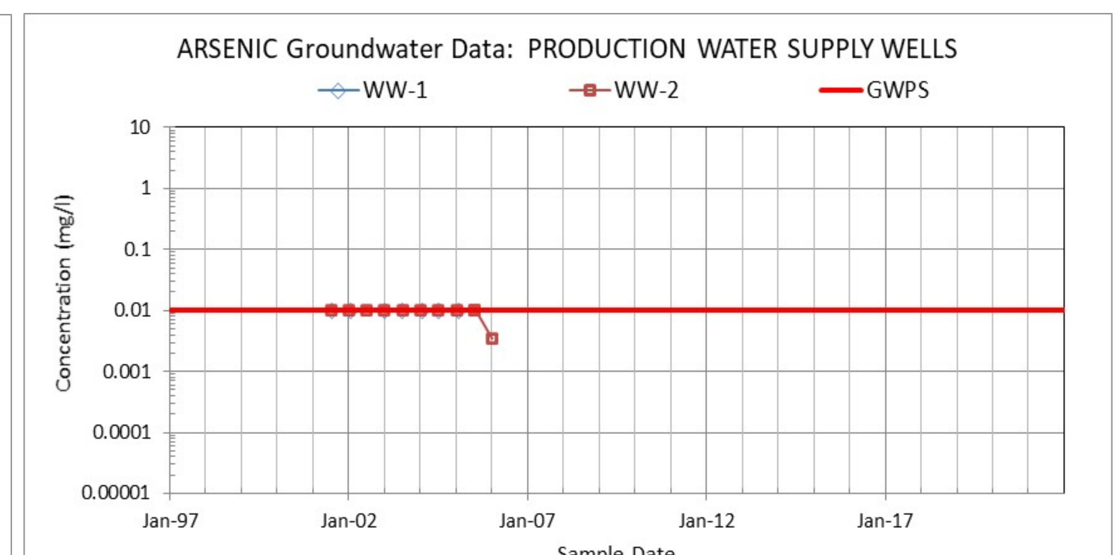

ARSENIC Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
10
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

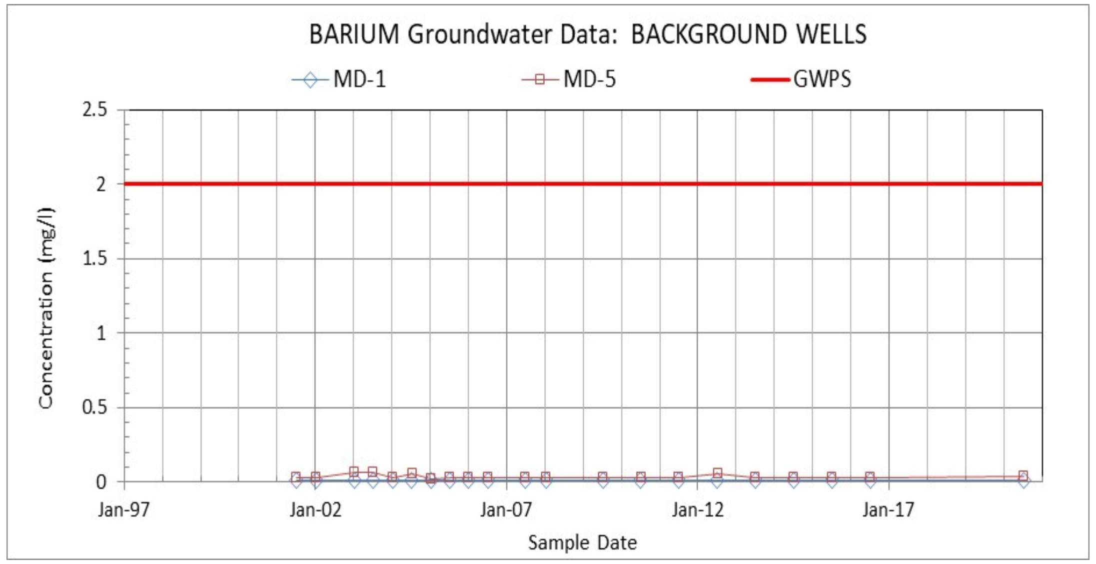

ARSENIC Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
10
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

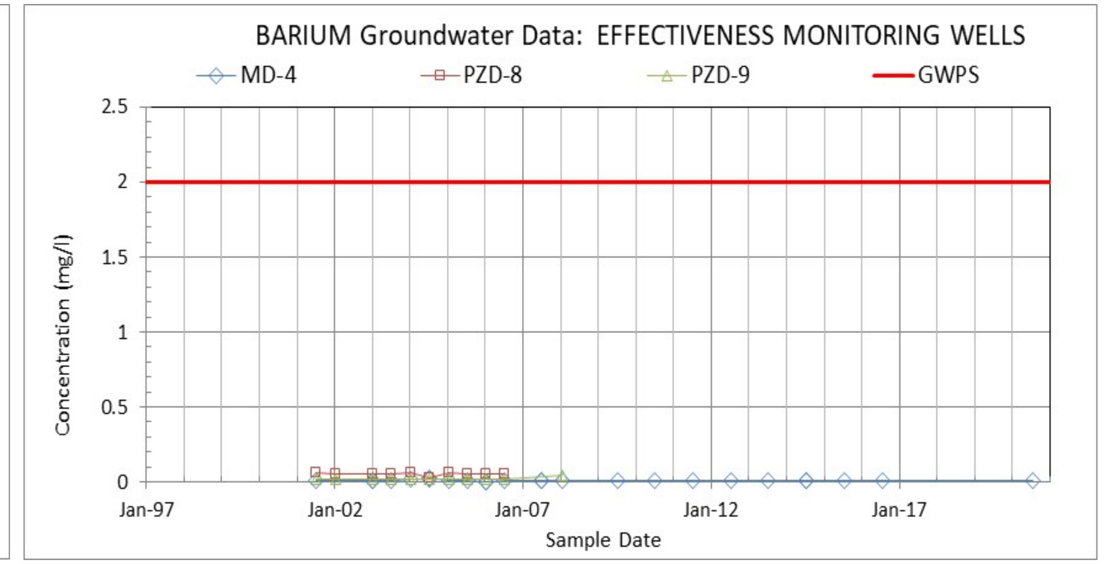

ARSENIC Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
10
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

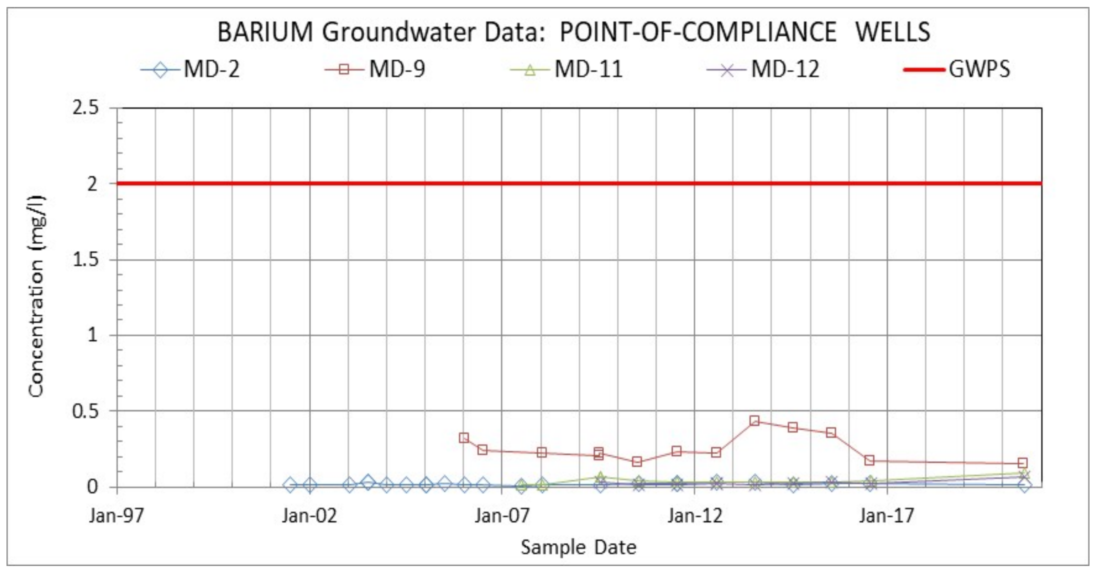

ARSENIC Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
10
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

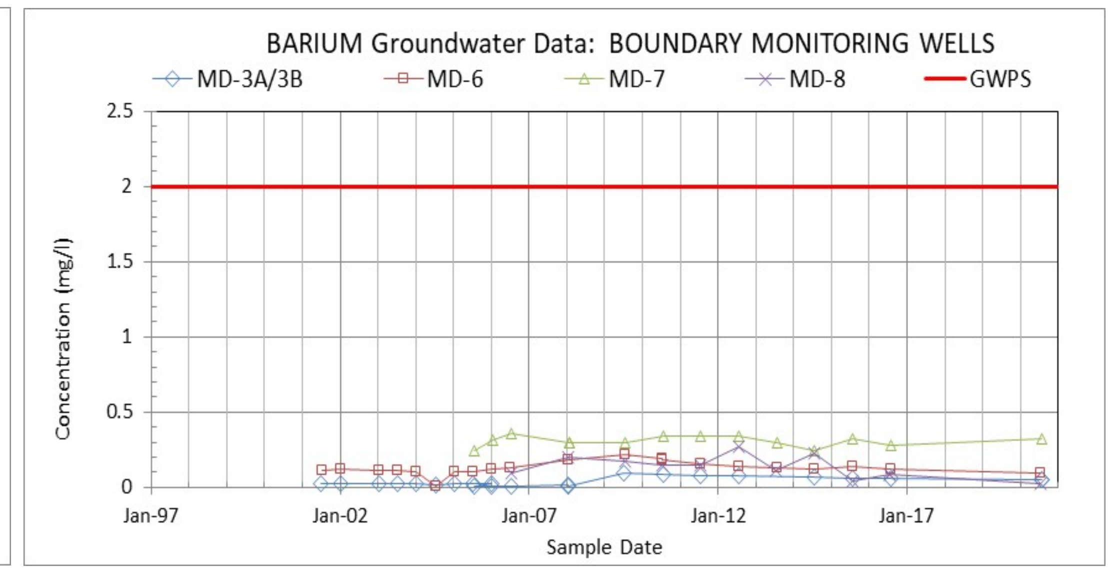

ARSENIC Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
10
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

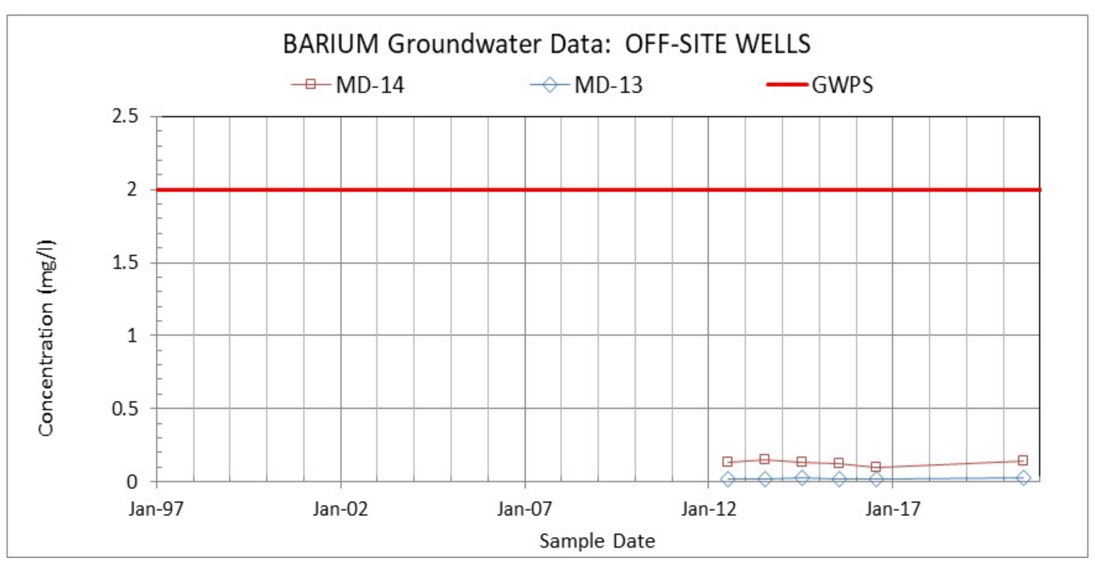

ARSENIC Groundwater Data: PRODUCTION WATER SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
10
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

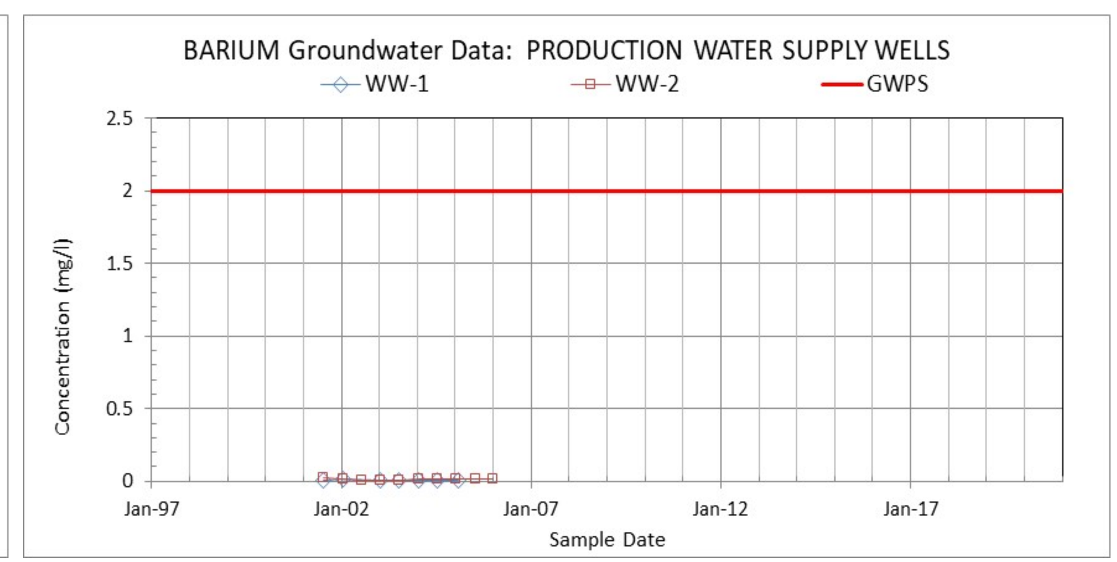

BARIUM Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
Sample Date
2.5
2
1.5
1
0.5
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

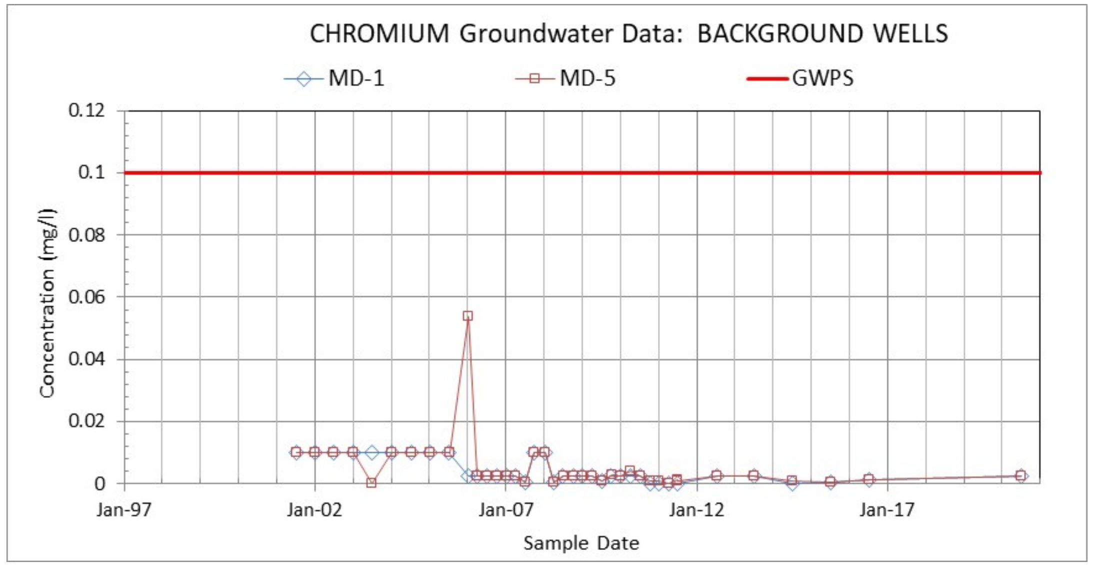

BARIUM Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

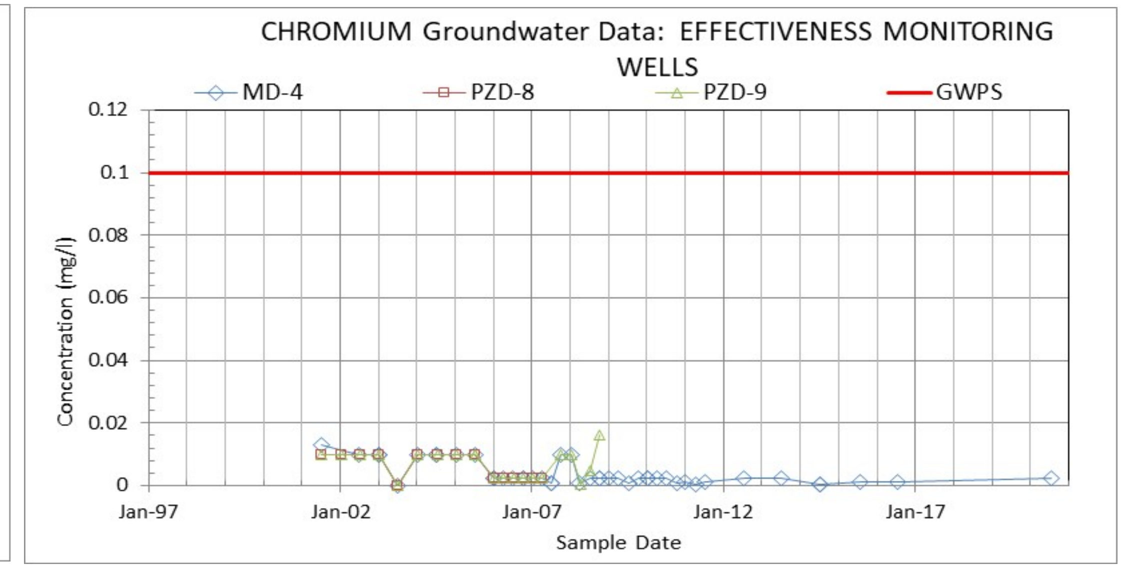

BARIUM Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

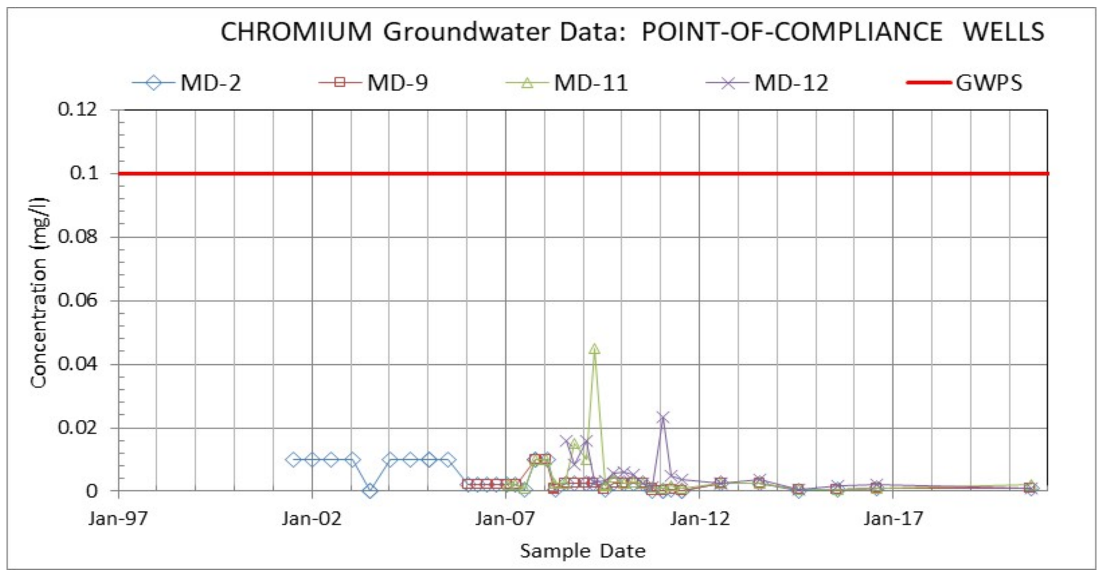

BARIUM Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

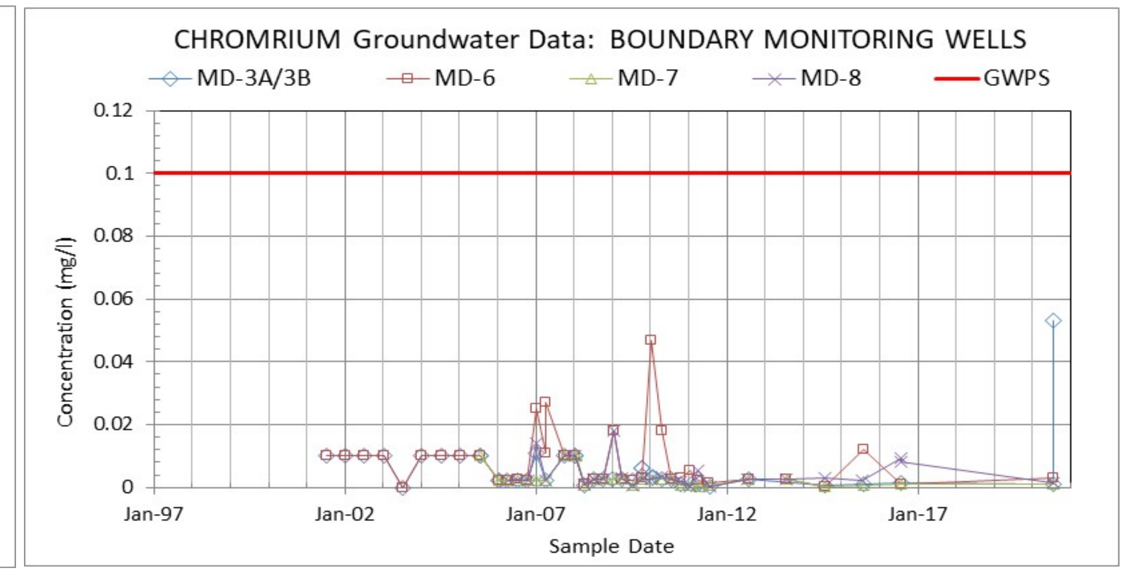

BARIUM Groundwater Data: OFF-SITE WELLS
MD-14
MD-13
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

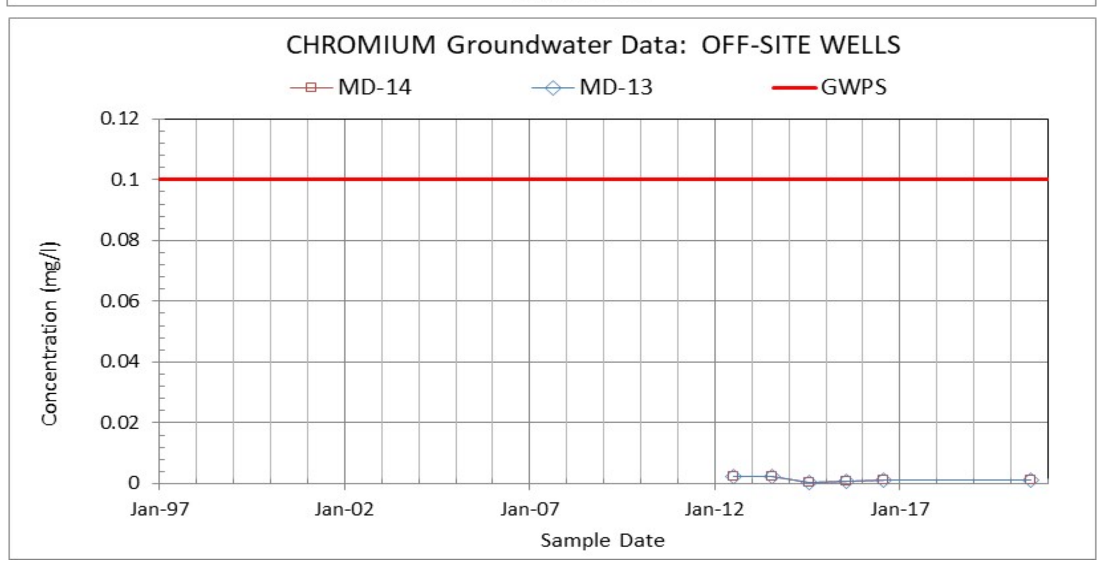

BARIUM Groundwater Data: PRODUCTION WATER SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

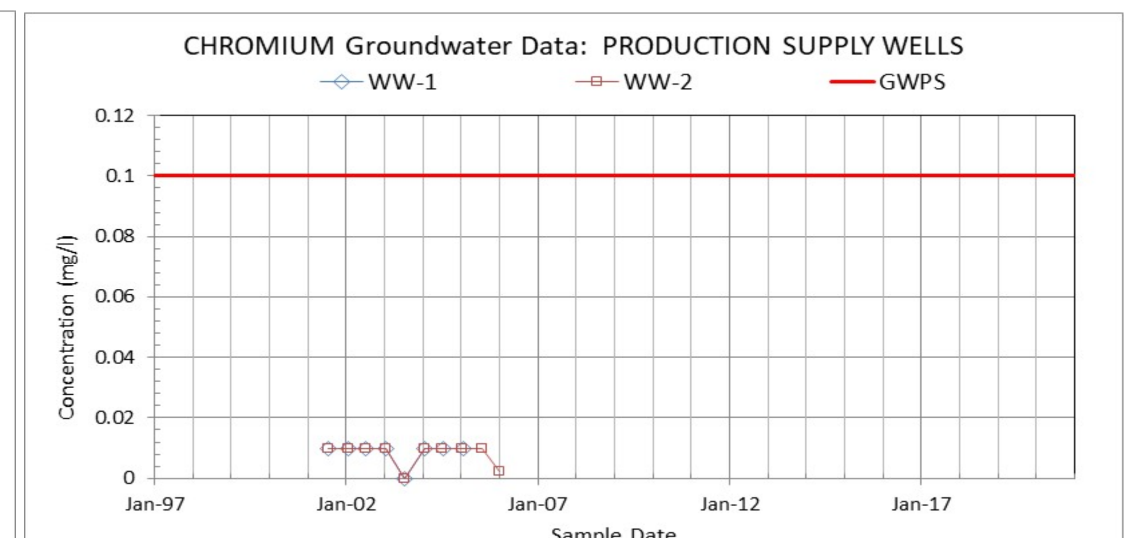

CHROMIUM Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

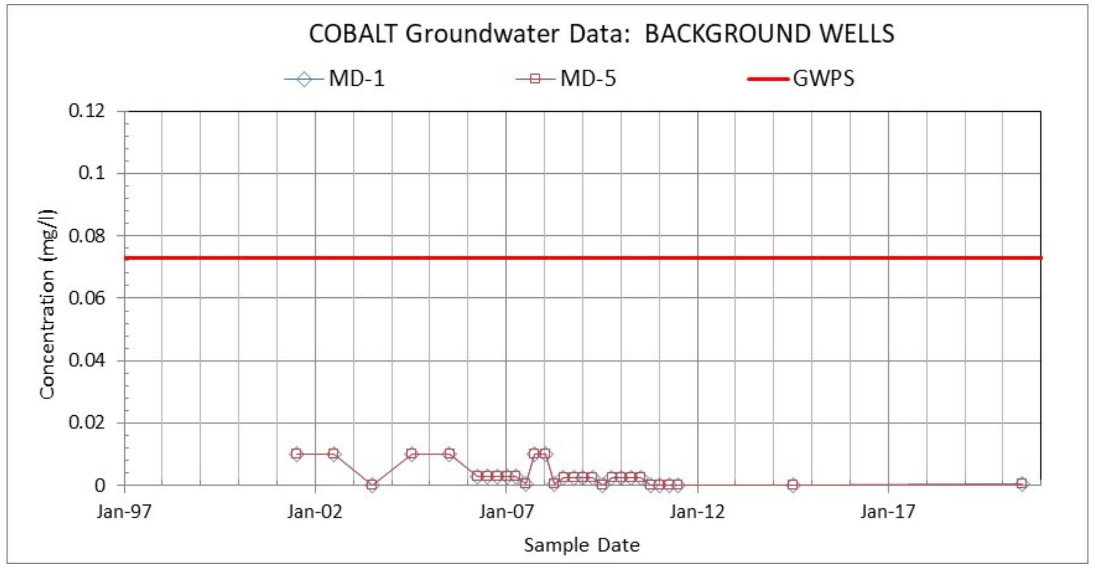

CHROMIUM Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

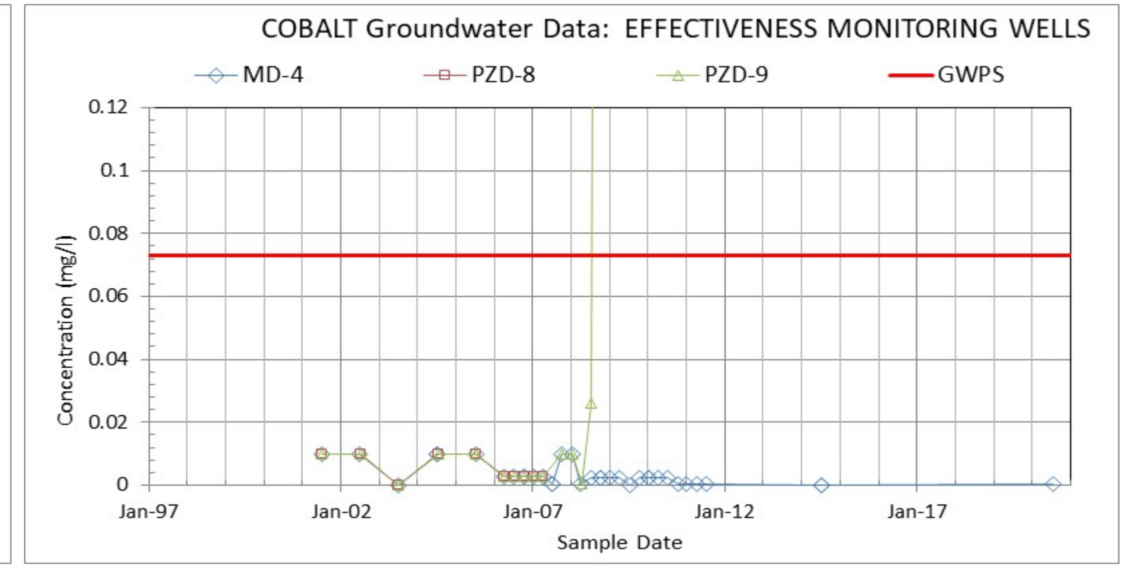

CHROMIUM Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

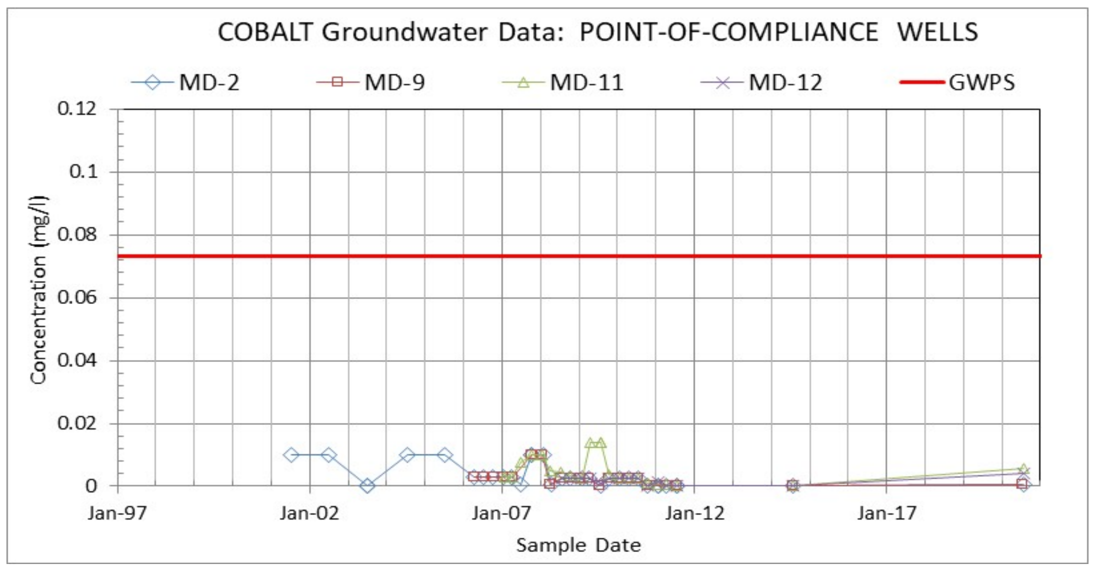

CHROMRIUM Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

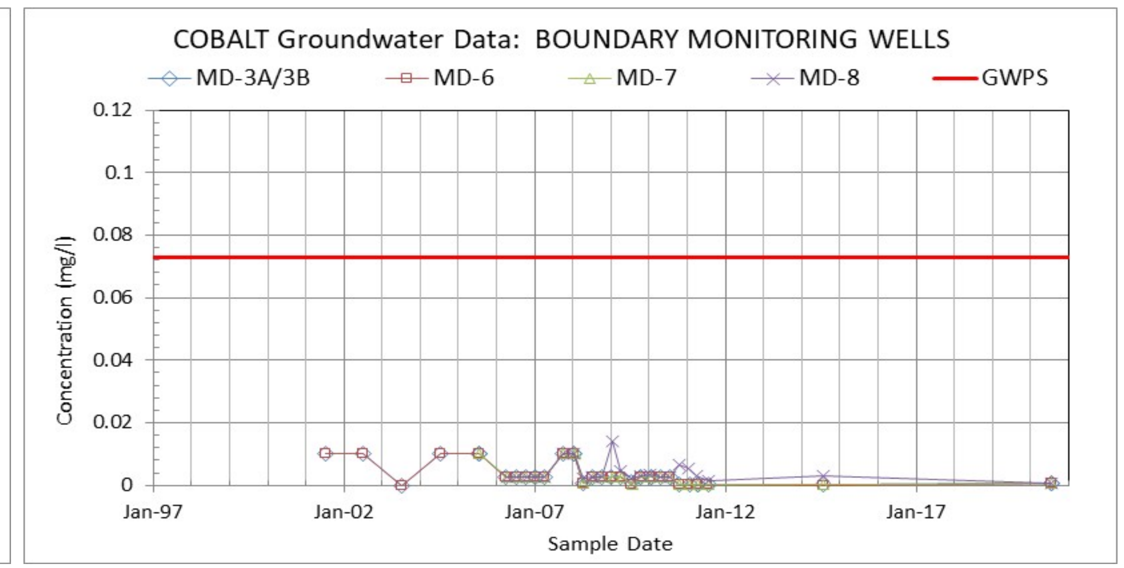

CHROMIUM Groundwater Data: OFF-SITE WELLS
MD-14
MD-13
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

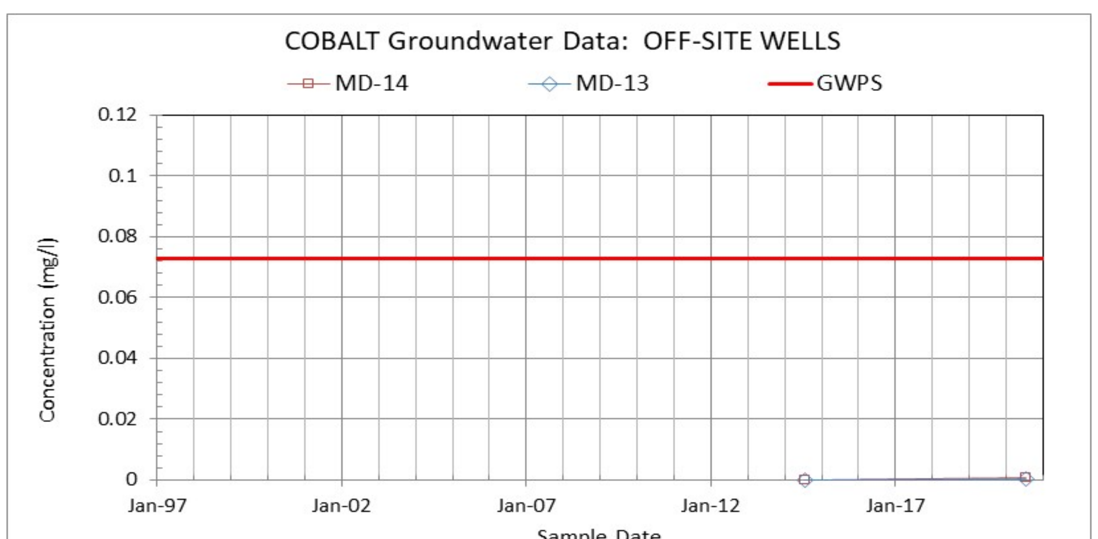

CHROMIUM Groundwater Data: PRODUCTION SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

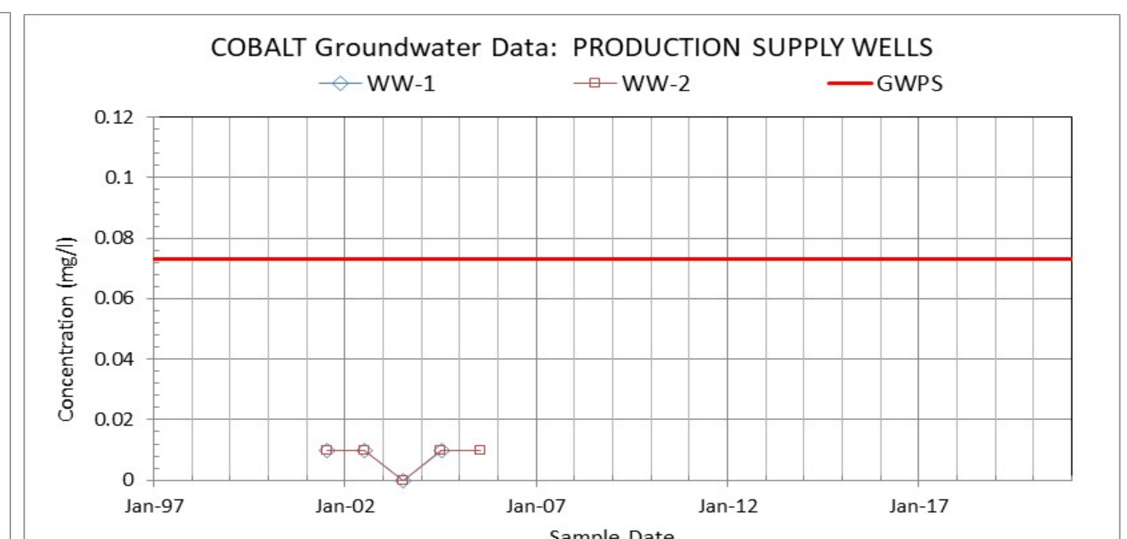

COBALT Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

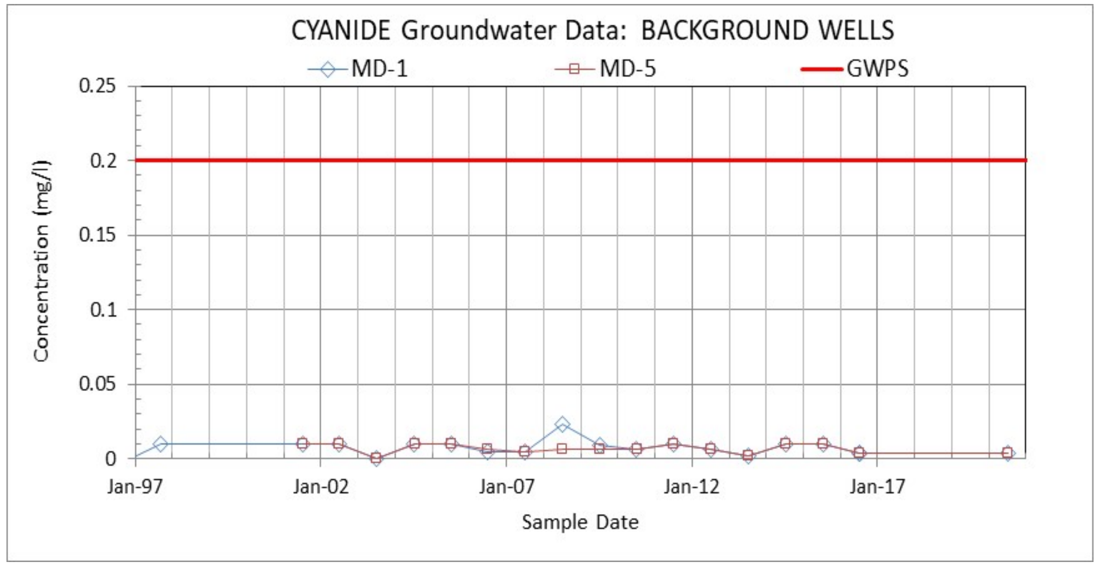

COBALT Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

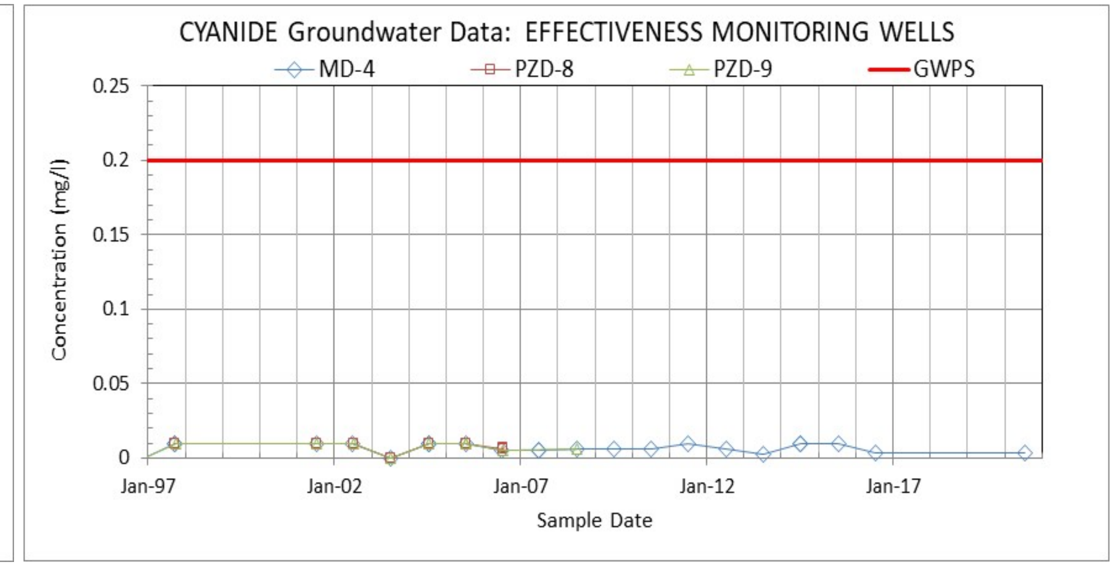

COBALT Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

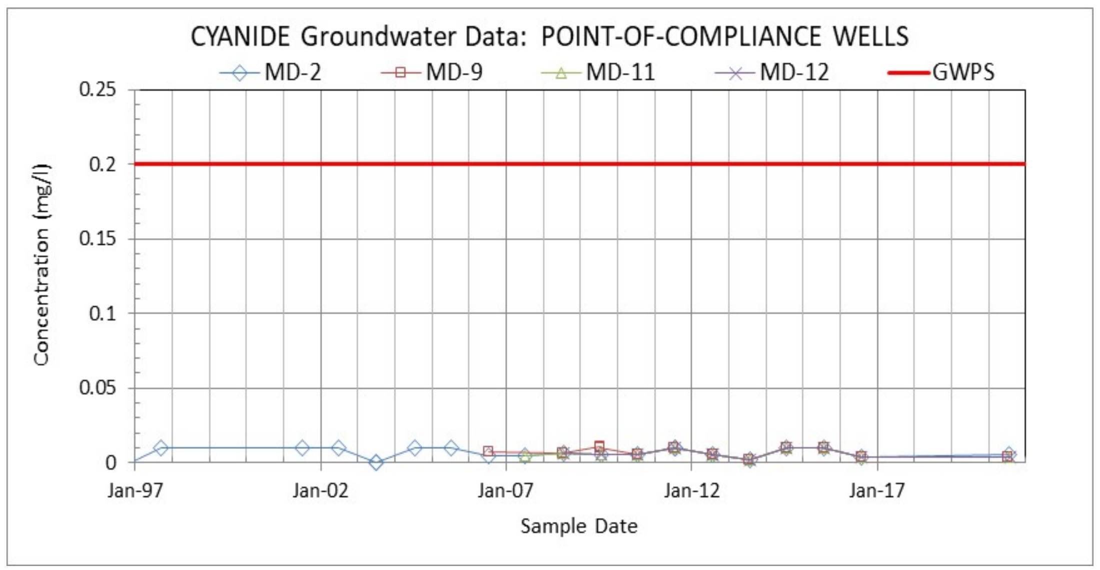

COBALT Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

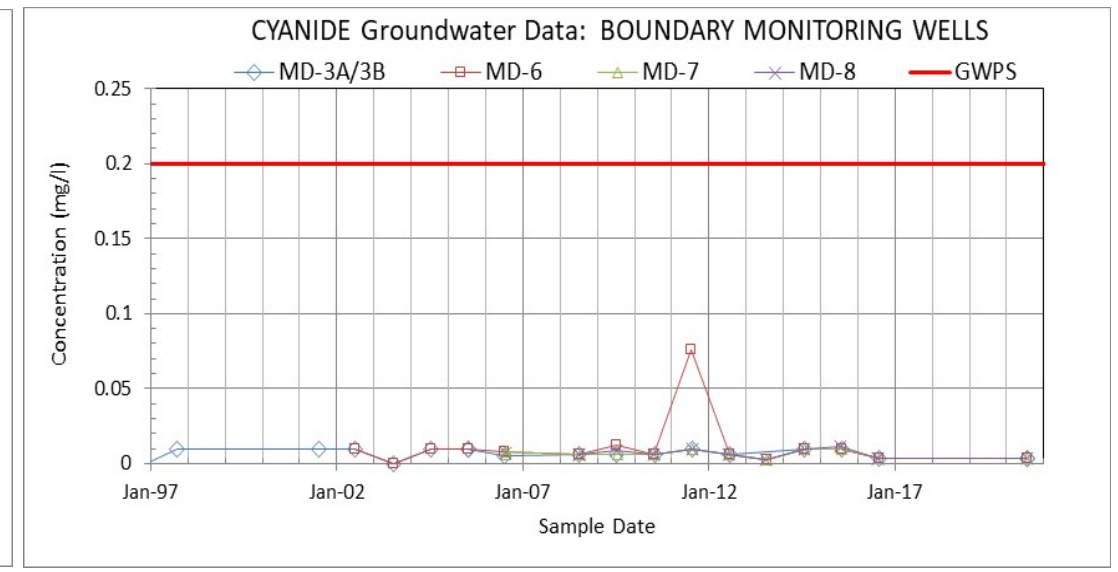

COBALT Groundwater Data: OFF-SITE WELLS
MD-14
MD-13
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

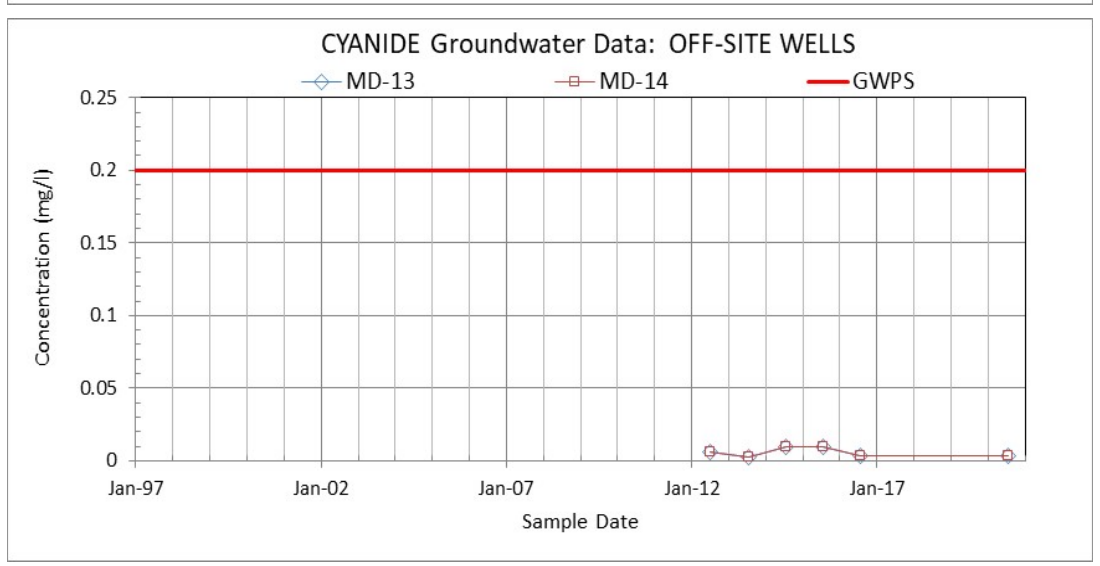

COBALT Groundwater Data: PRODUCTION SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

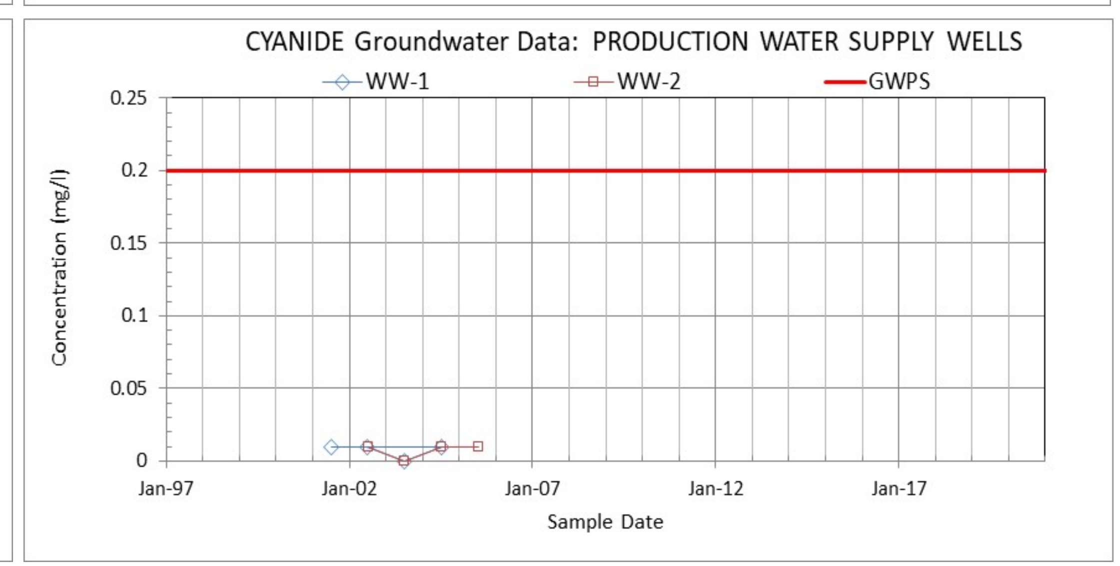

CYANIDE Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
Sample Date
0.25
0.2
0.15
0.1
0.05
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

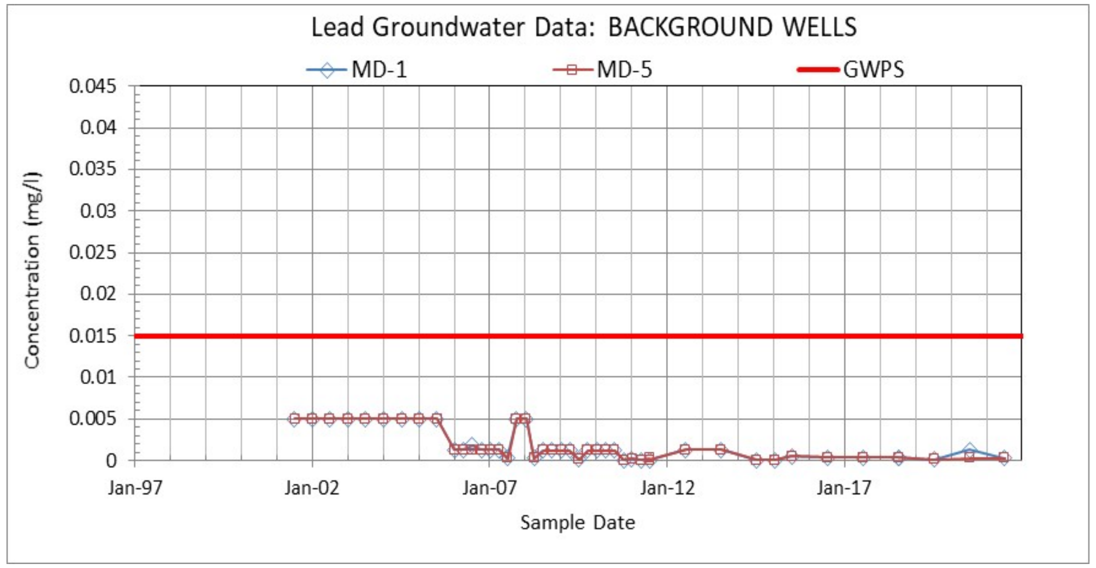

CYANIDE Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
Sample Date
0.25
0.2
0.15
0.1
0.05
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

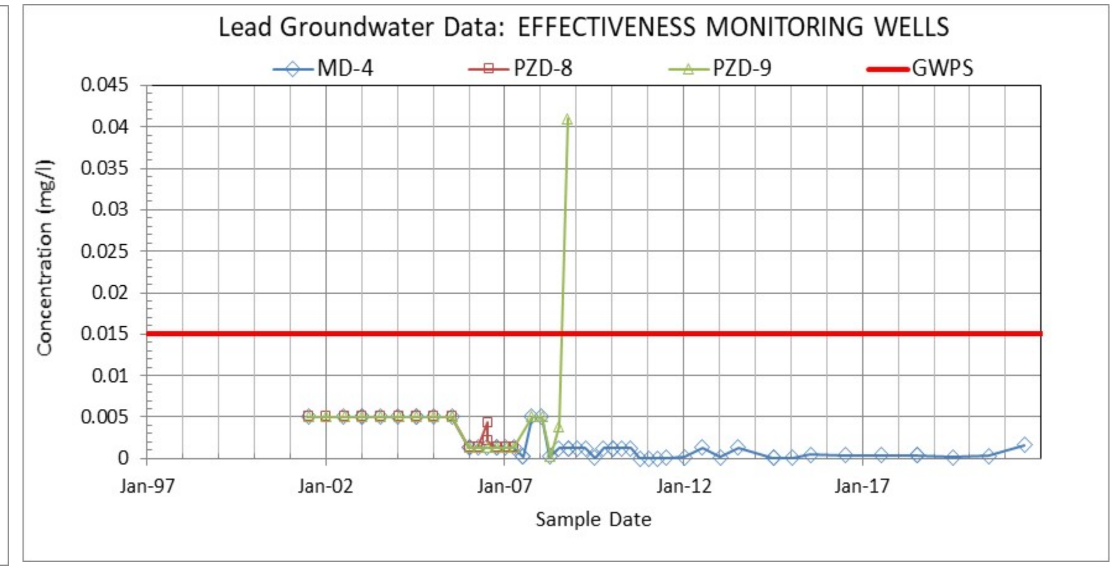

CYANIDE Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
Sample Date
0.25
0.2
0.15
0.1
0.05
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

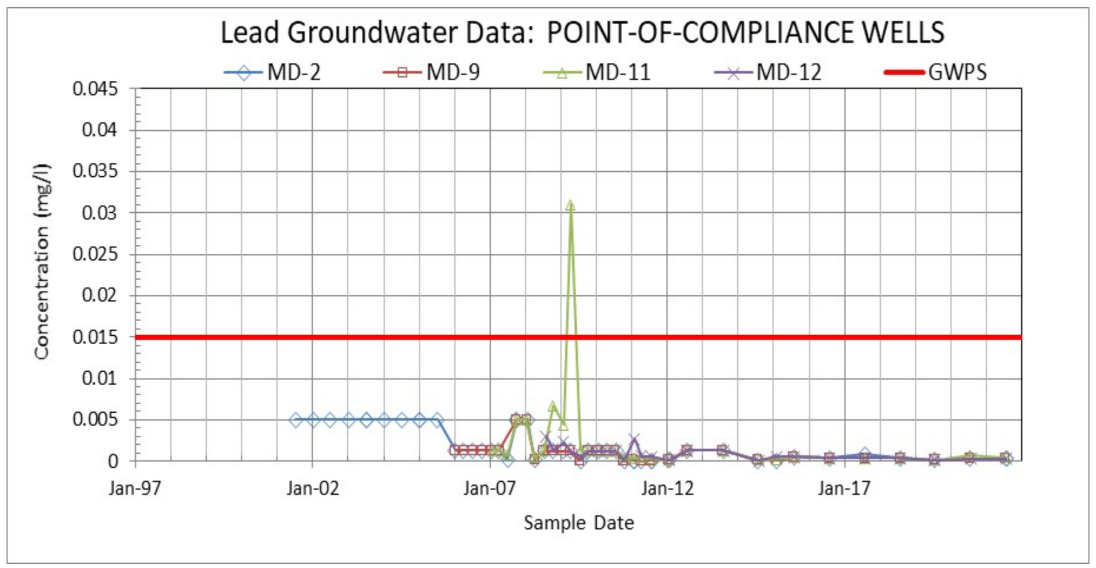

CYANIDE Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
Sample Date
0.25
0.2
0.15
0.1
0.05
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

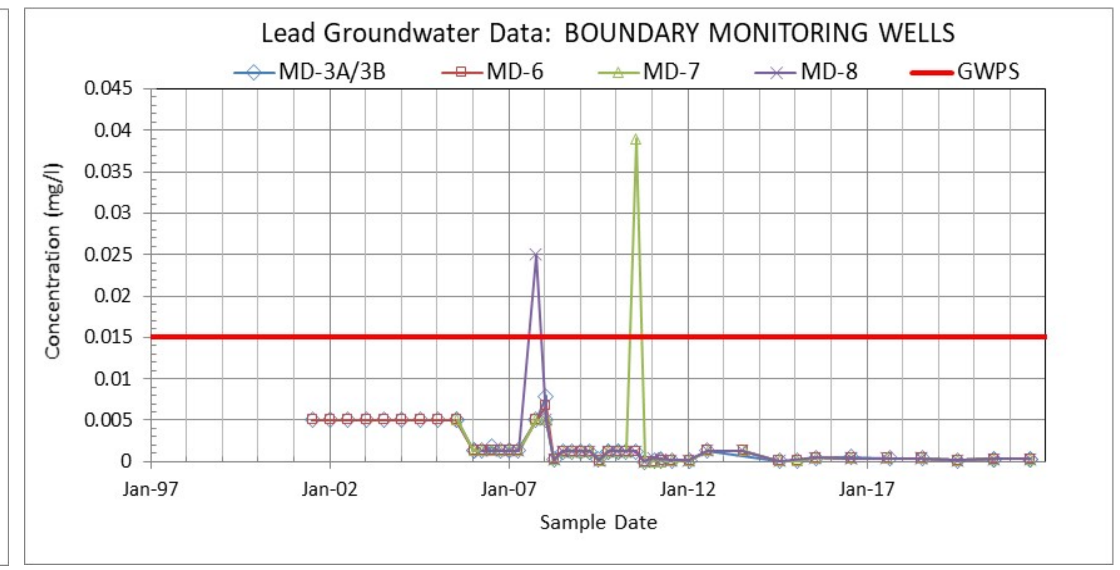

CYANIDE Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
Sample Date
0.25
0.2
0.15
0.1
0.05
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

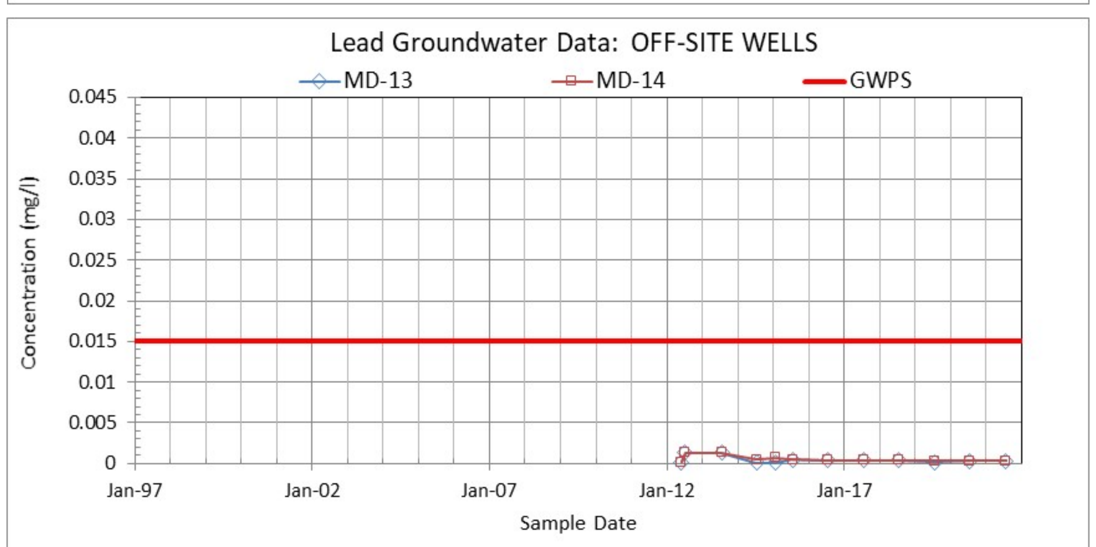

CYANIDE Groundwater Data: PRODUCTION WATER SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
Sample Date
0.25
0.2
0.15
0.1
0.05
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

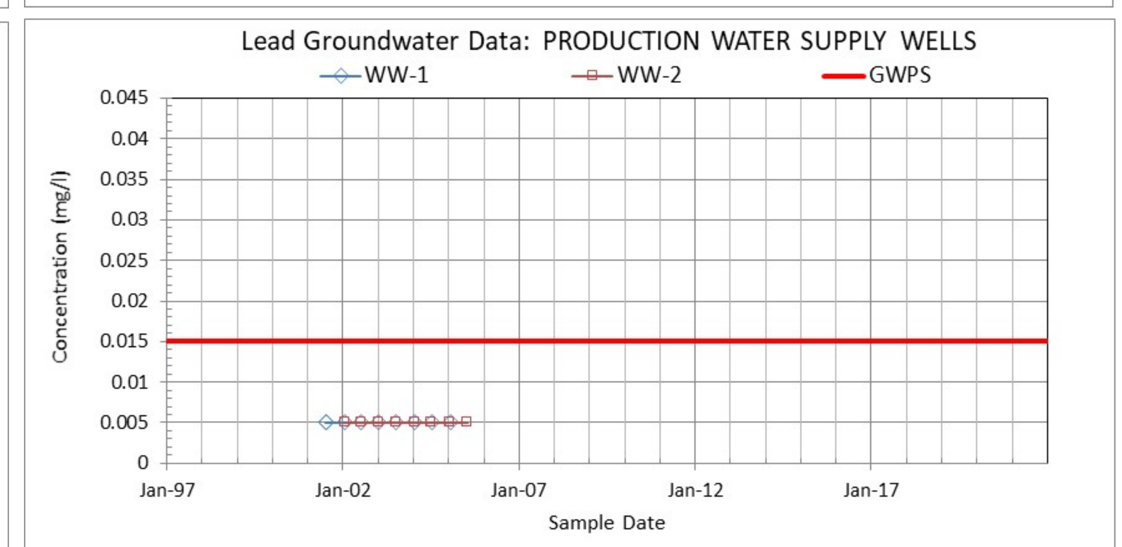

Lead Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

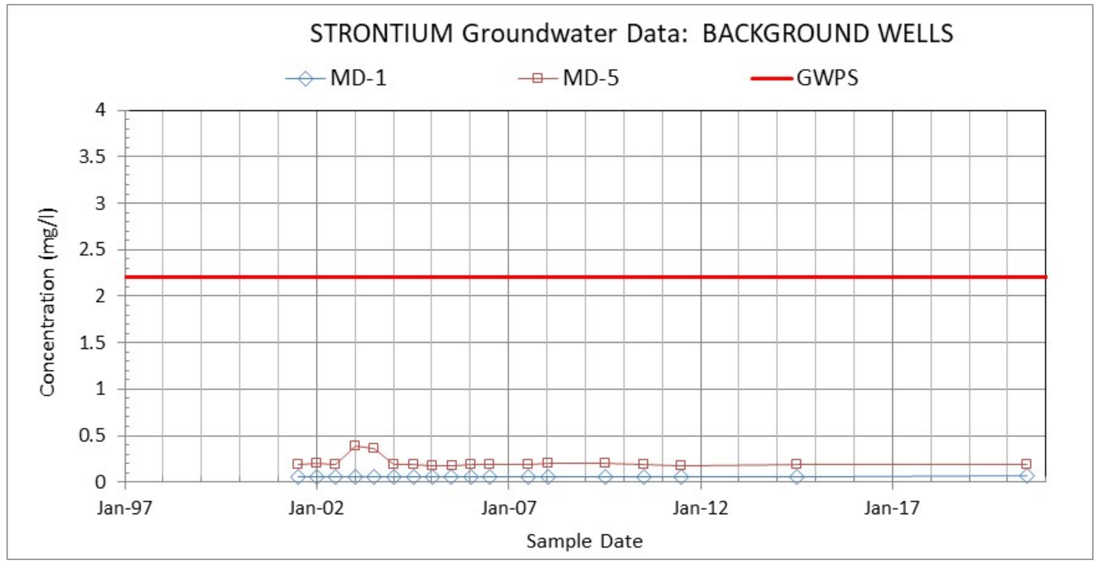

Lead Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

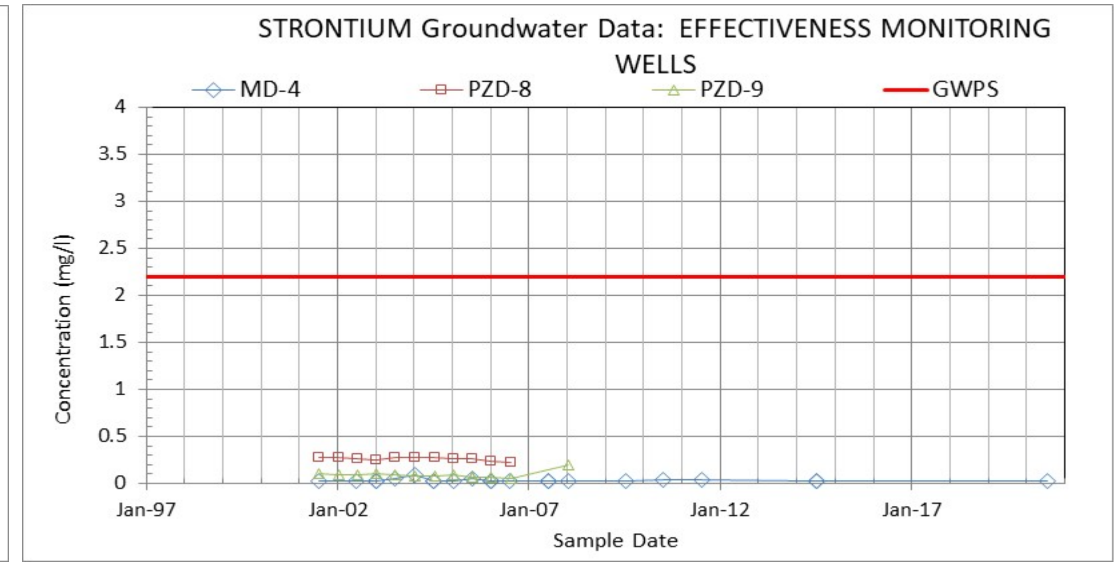

Lead Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

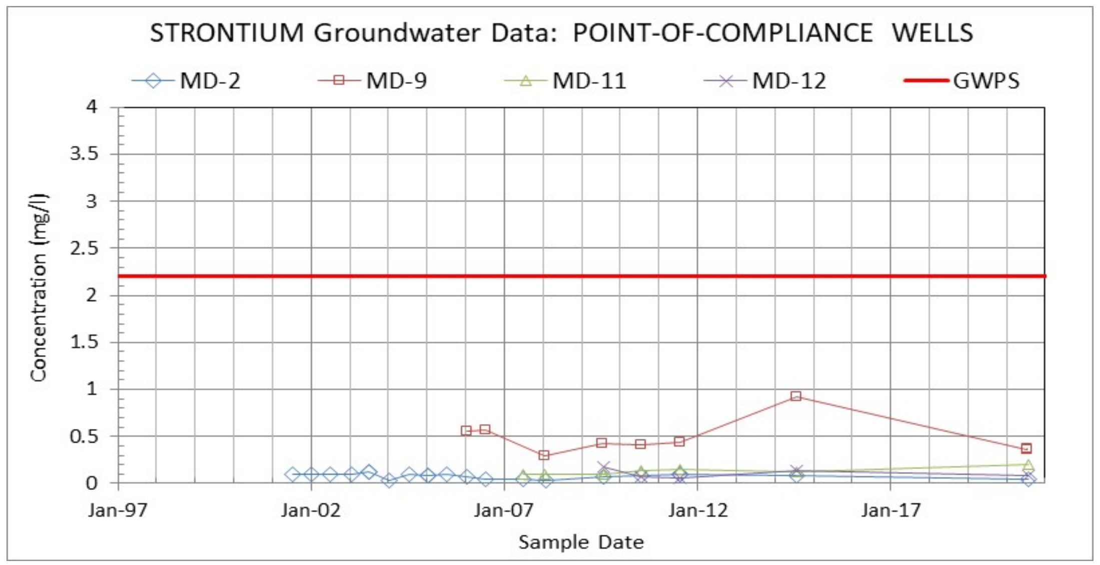

Lead Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

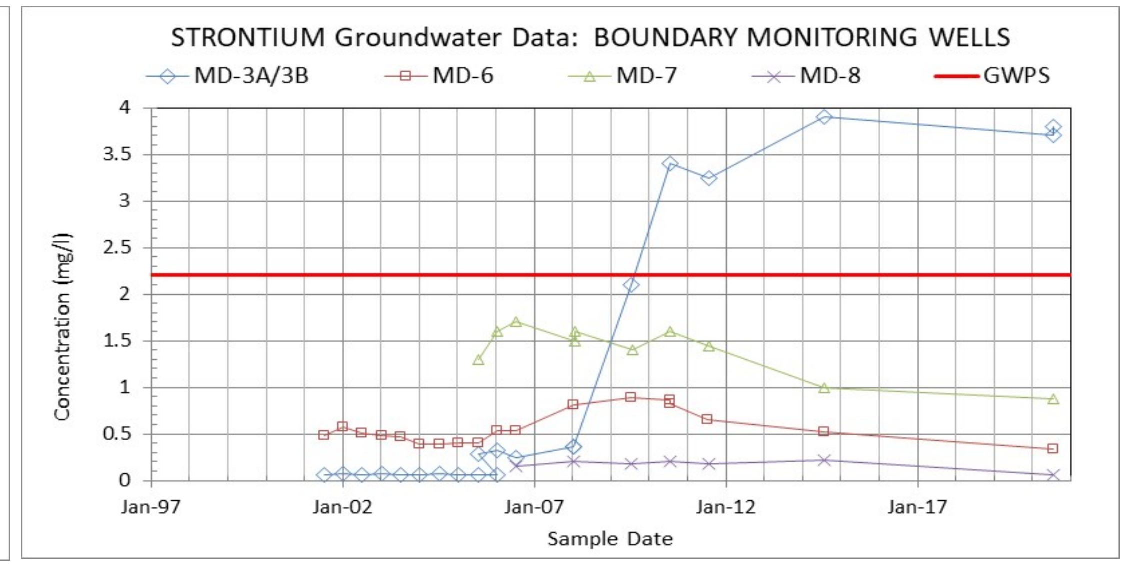

Lead Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

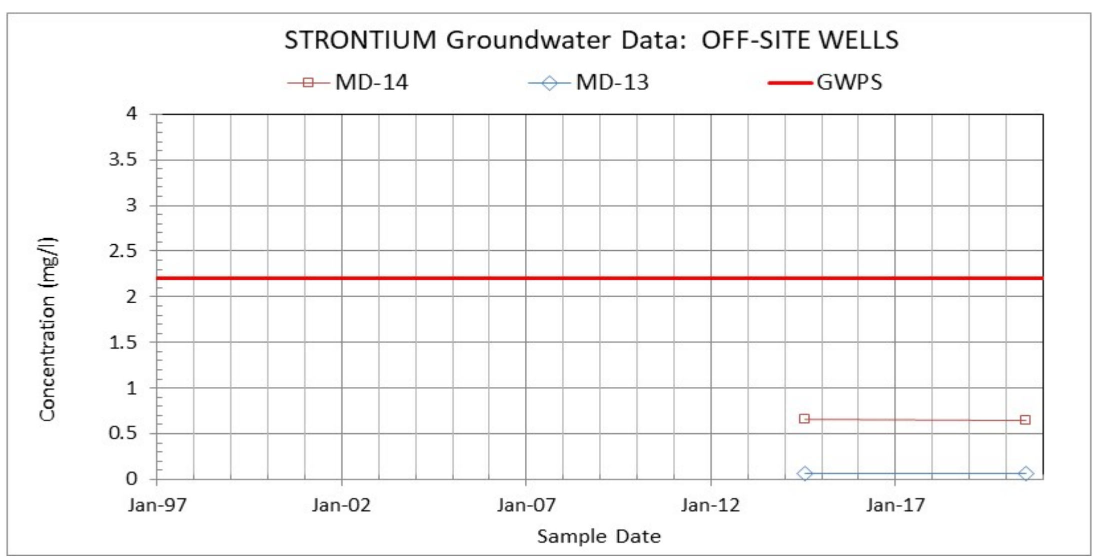

Lead Groundwater Data: PRODUCTION WATER SUPPLY WELLS
WW-1
WW-2
GWPS
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

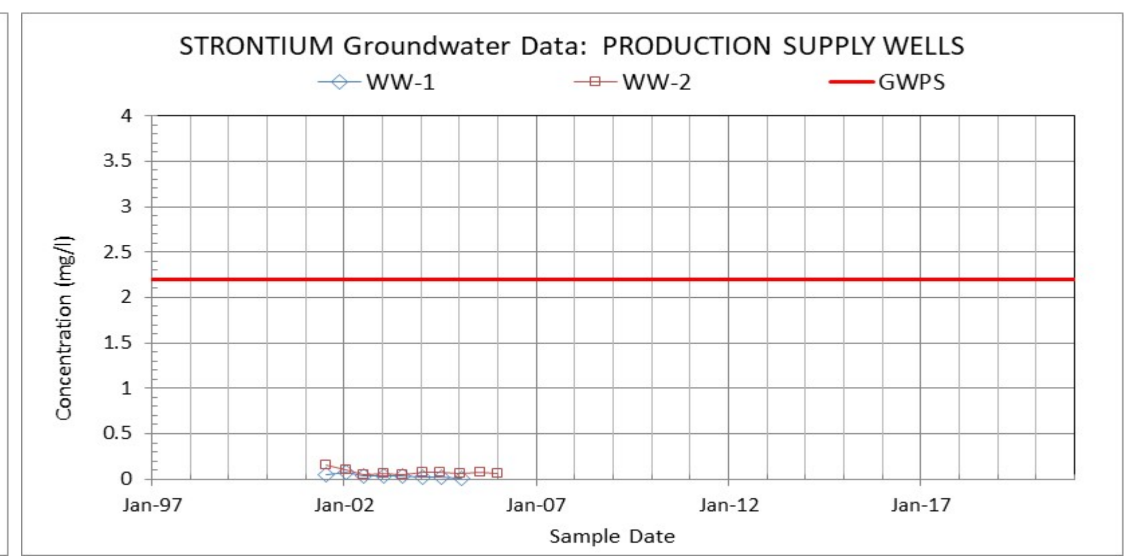

STRONTIUM Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

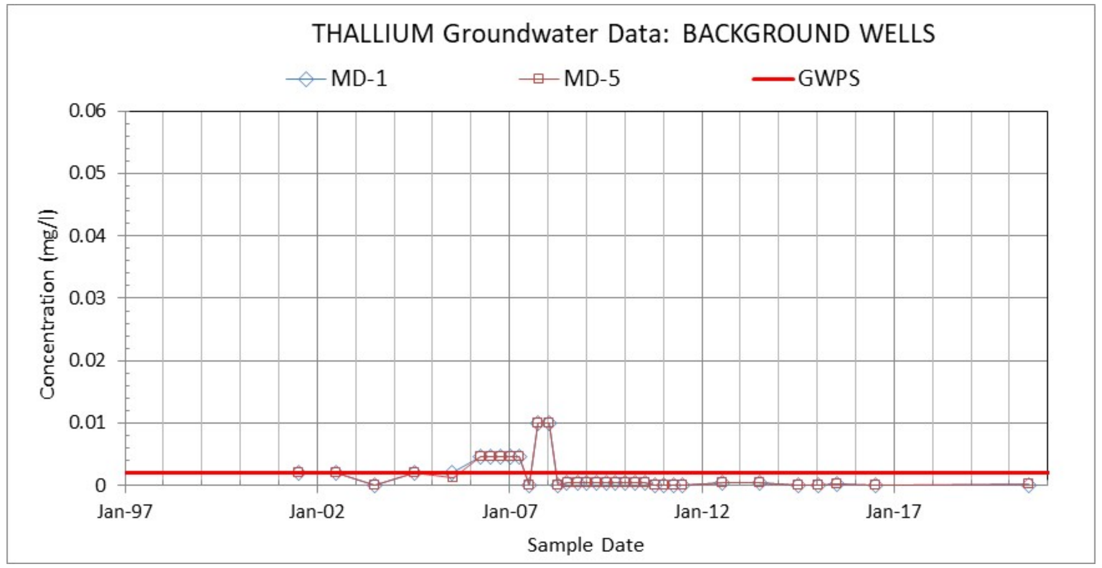

STRONTIUM Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

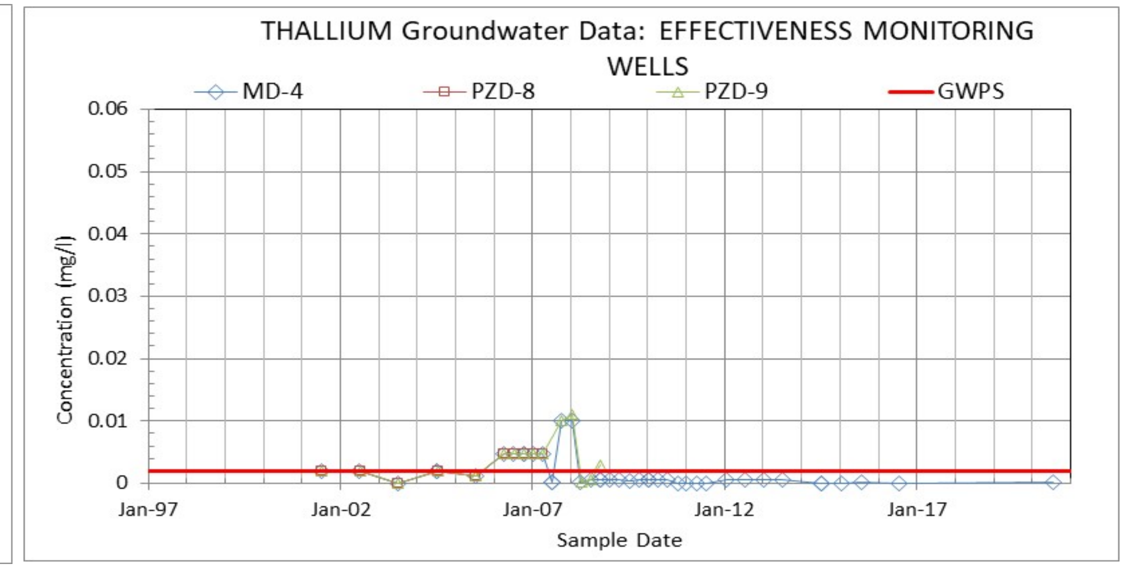

STRONTIUM Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

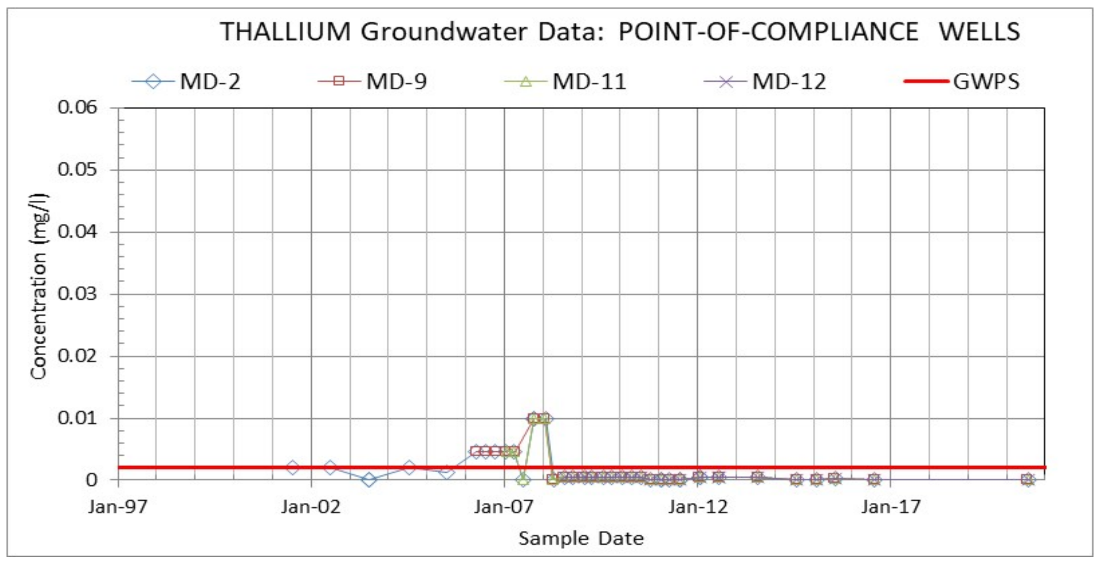

STRONTIUM Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

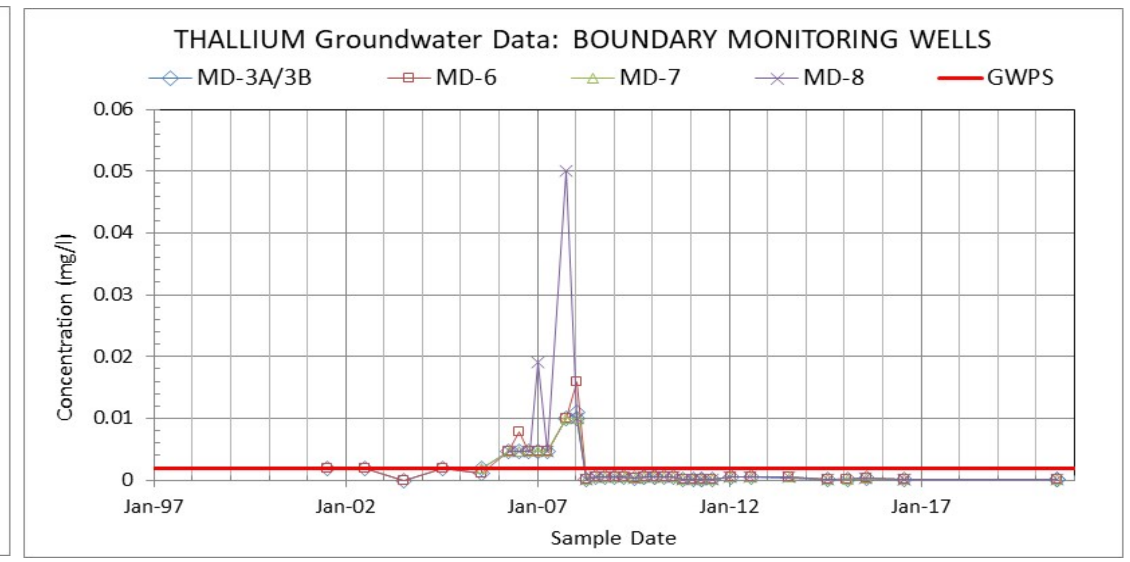

STRONTIUM Groundwater Data: OFF-SITE WELLS
MD-14
MD-13
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

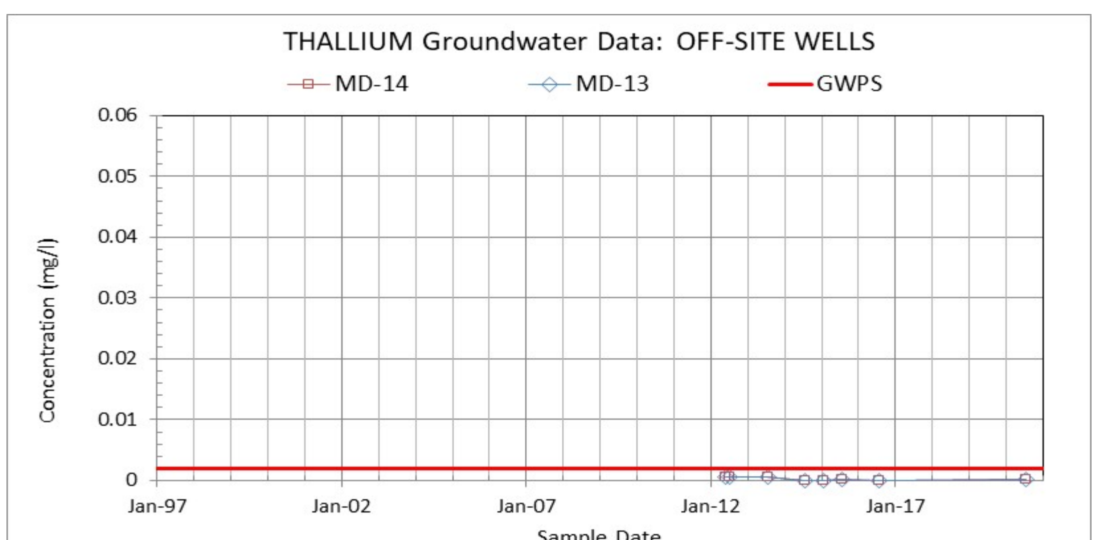

STRONTIUM Groundwater Data: PRODUCTION SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
Sample Date
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17

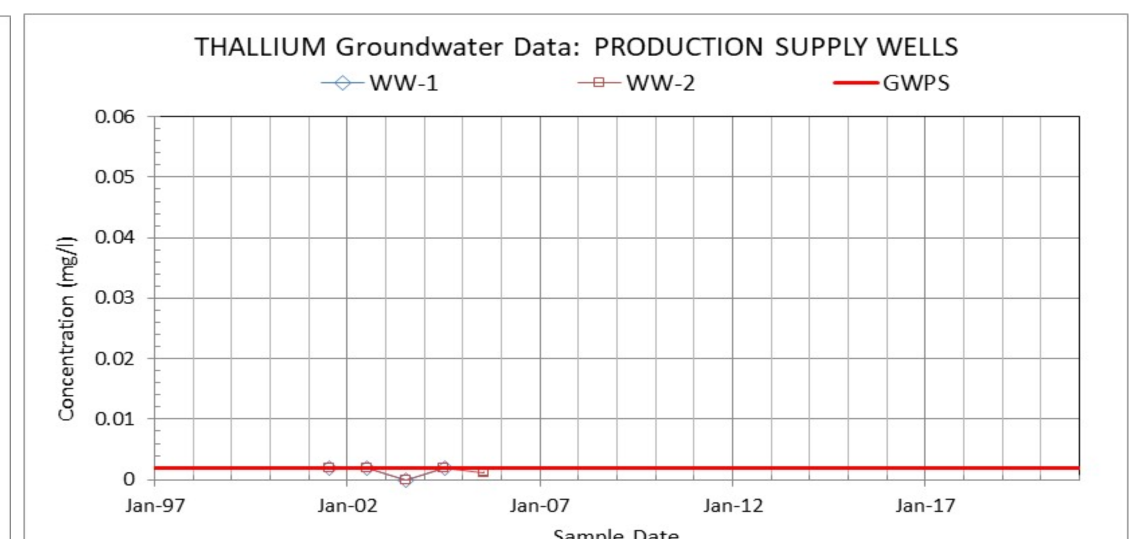

THALLIUM Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
Sample Date

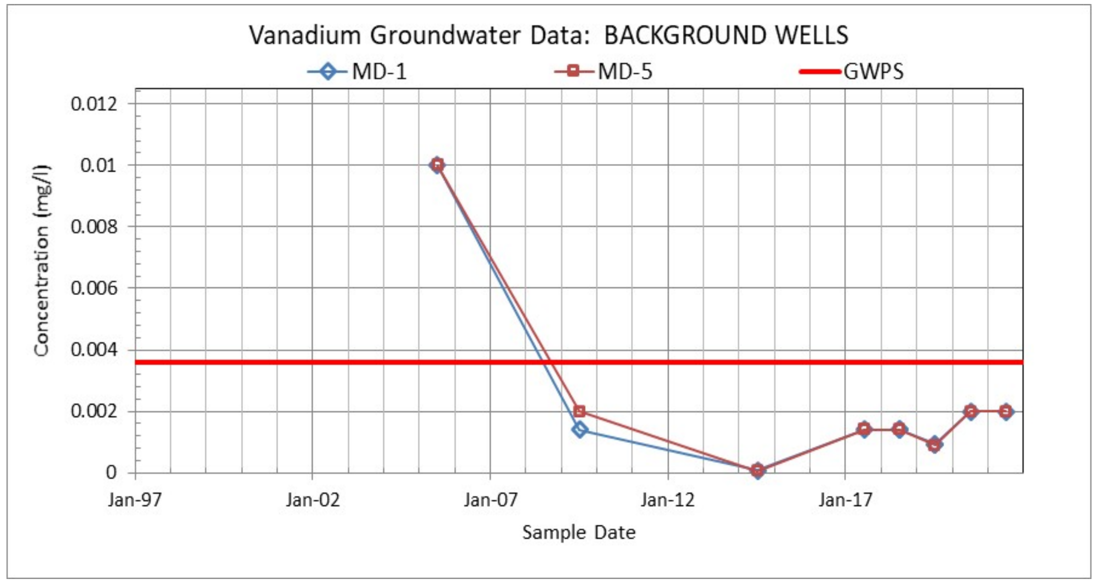

THALLIUM Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
Sample Date

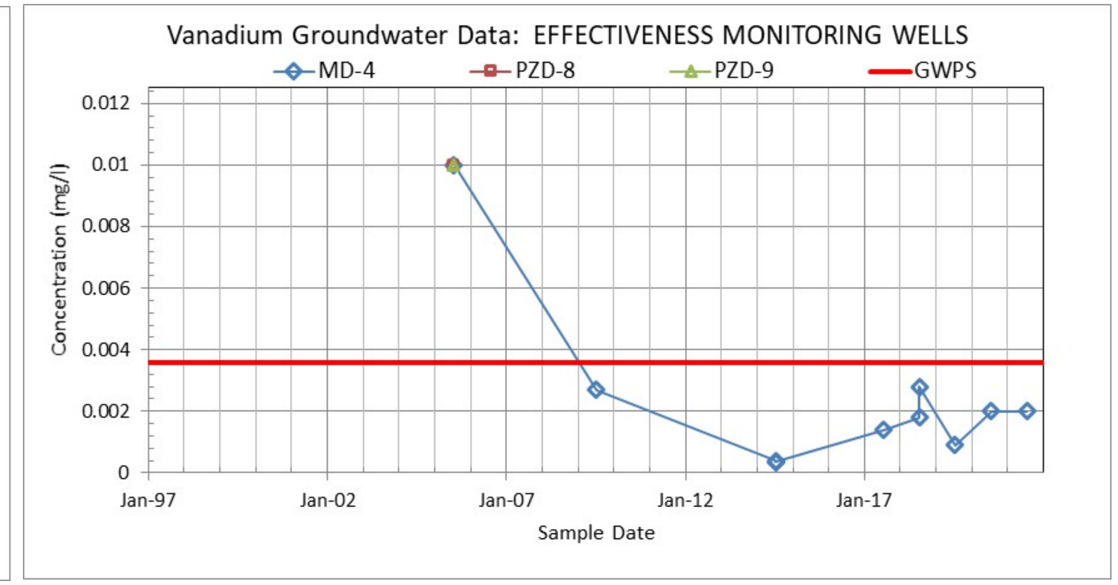

THALLIUM Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
Sample Date

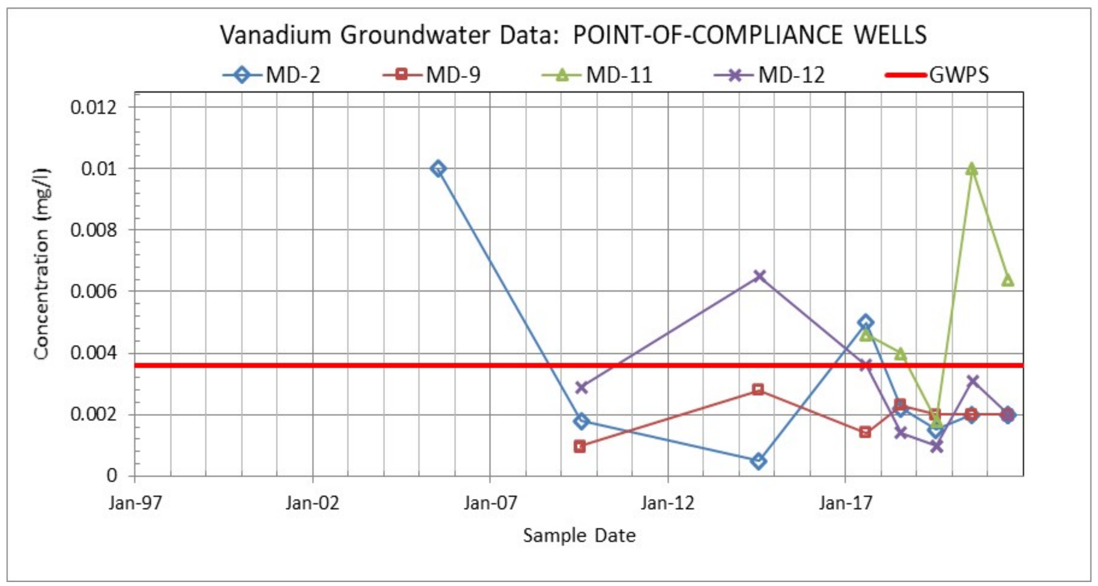

THALLIUM Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
Sample Date

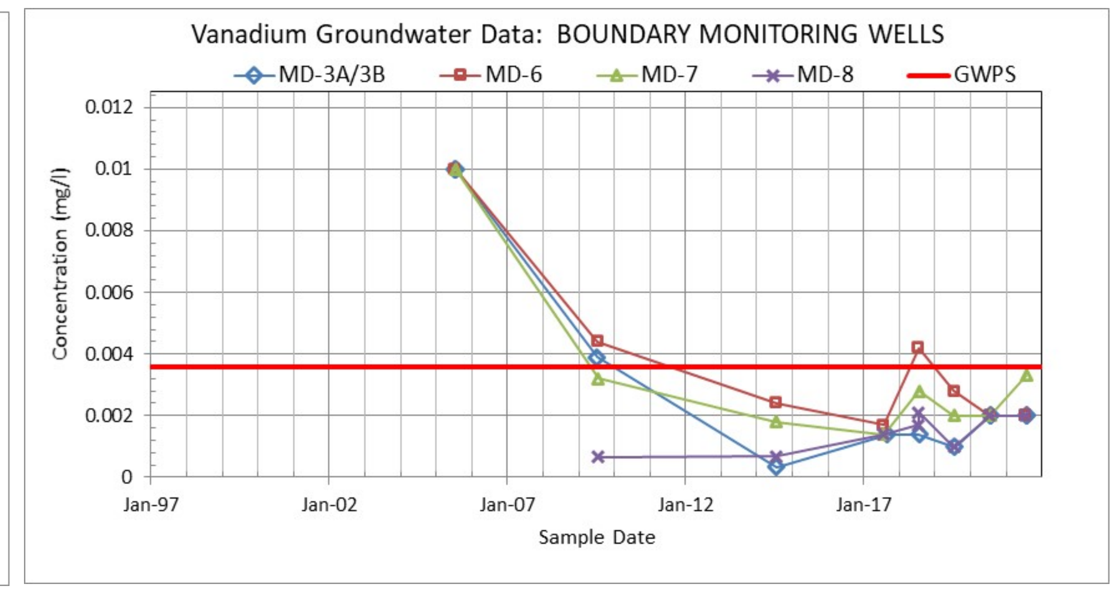

THALLIUM Groundwater Data: OFF-SITE WELLS
MD-14
MD-13
GWPS
Concentration (mg/l)
Sample Date

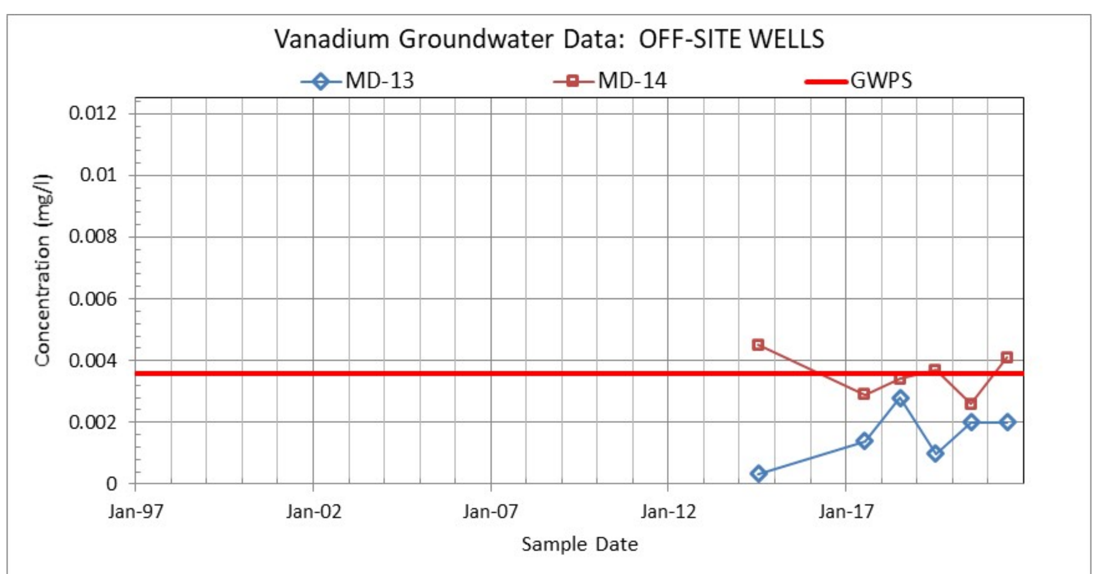

THALLIUM Groundwater Data: PRODUCTION SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
Sample Date

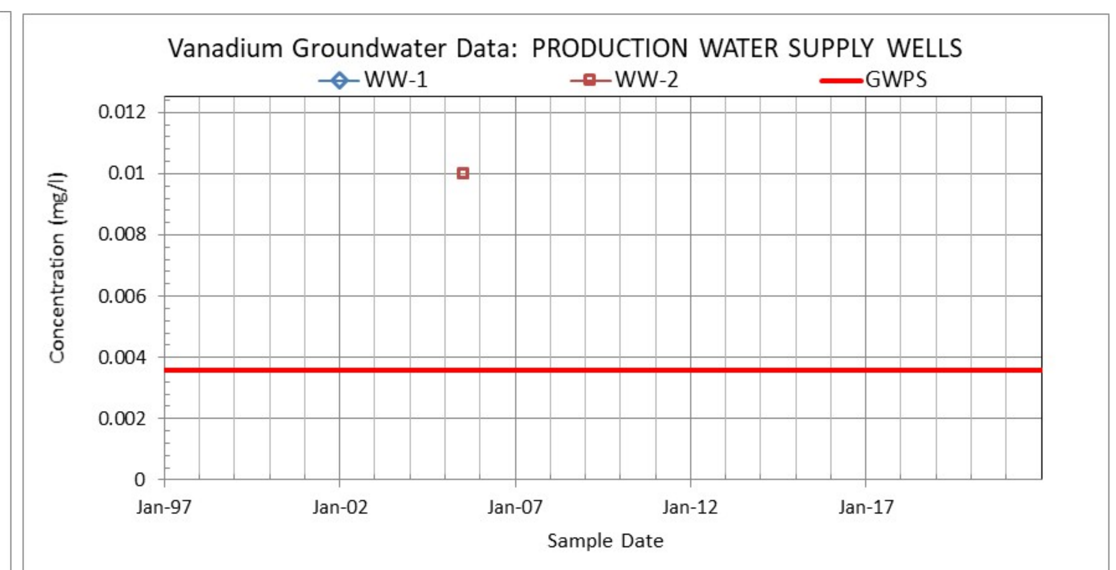

Vanadium Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
0.012
0.01
0.008
0.006
0.004
0.002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

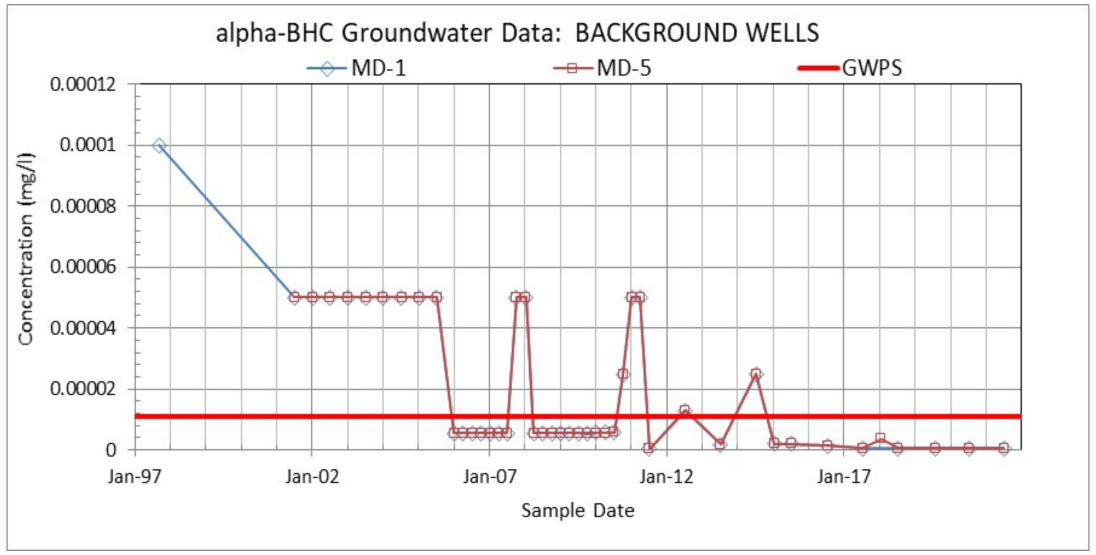

Vanadium Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
0.012
0.01
0.008
0.006
0.004
0.002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

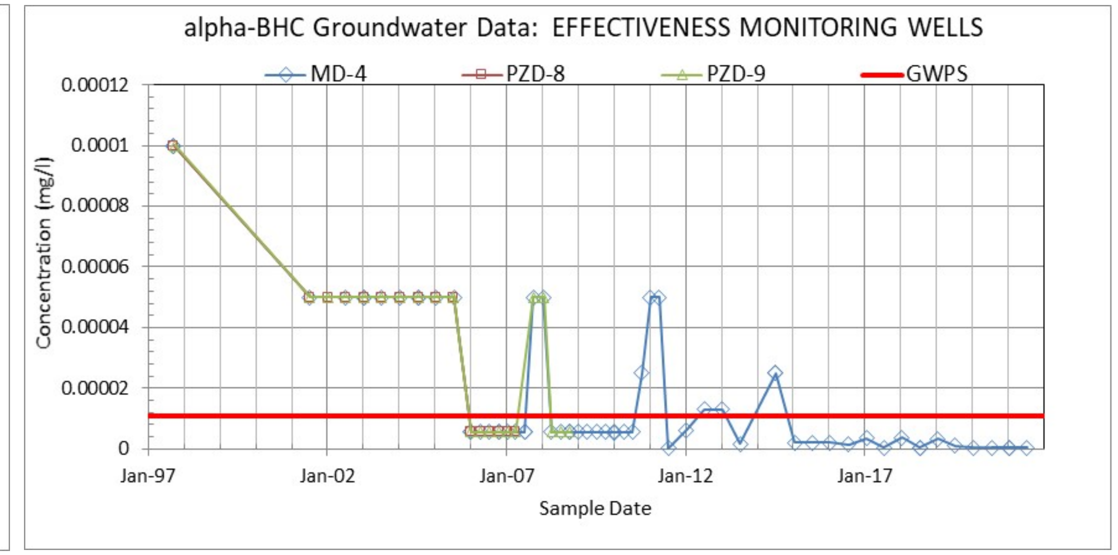

Vanadium Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
0.012
0.01
0.008
0.006
0.004
0.002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

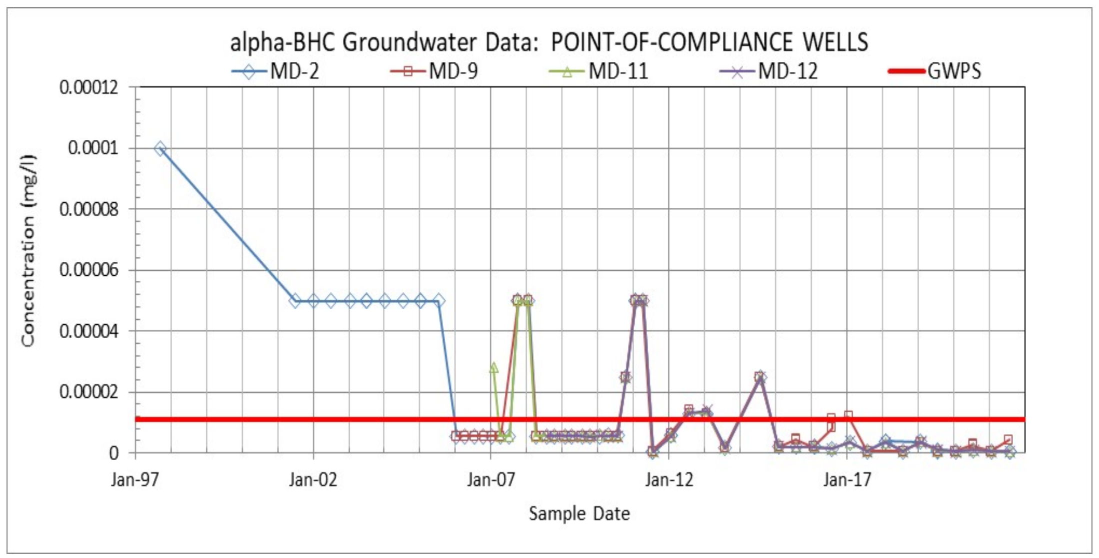

Vanadium Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
0.012
0.01
0.008
0.006
0.004
0.002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

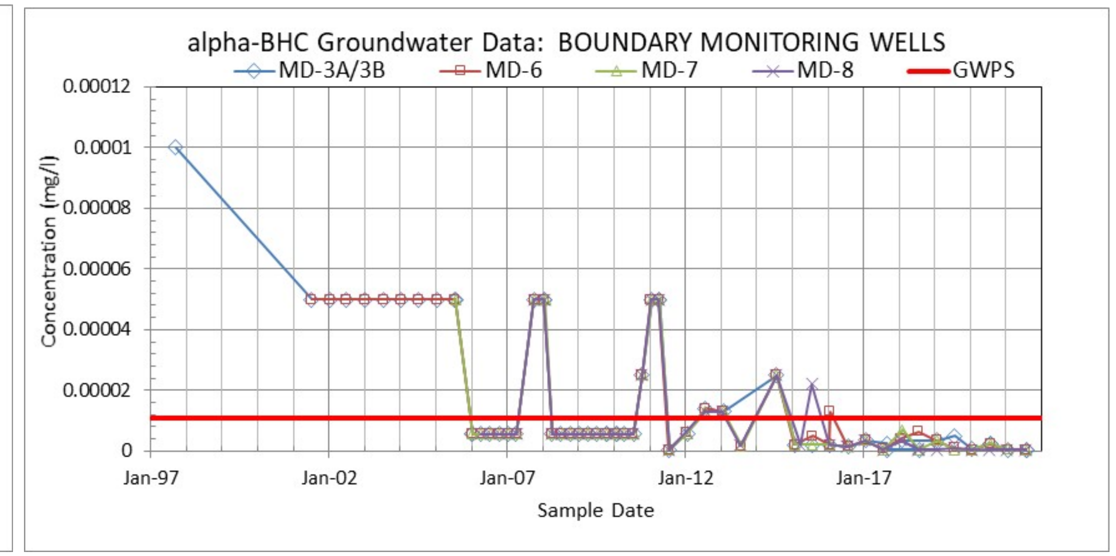

Vanadium Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
0.012
0.01
0.008
0.006
0.004
0.002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

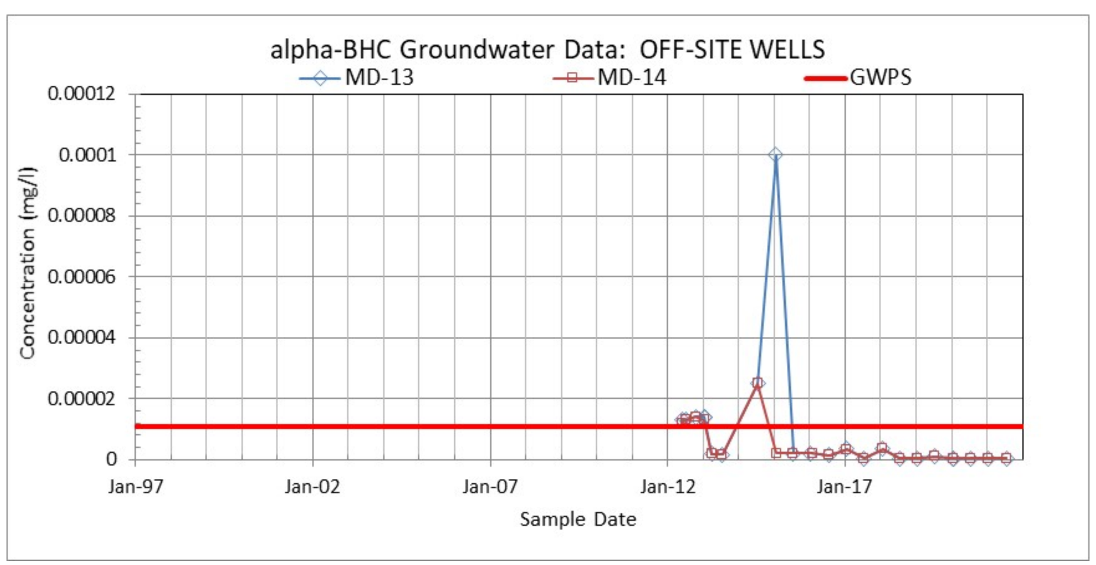

Vanadium Groundwater Data: PRODUCTION WATER SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
0.012
0.01
0.008
0.006
0.004
0.002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

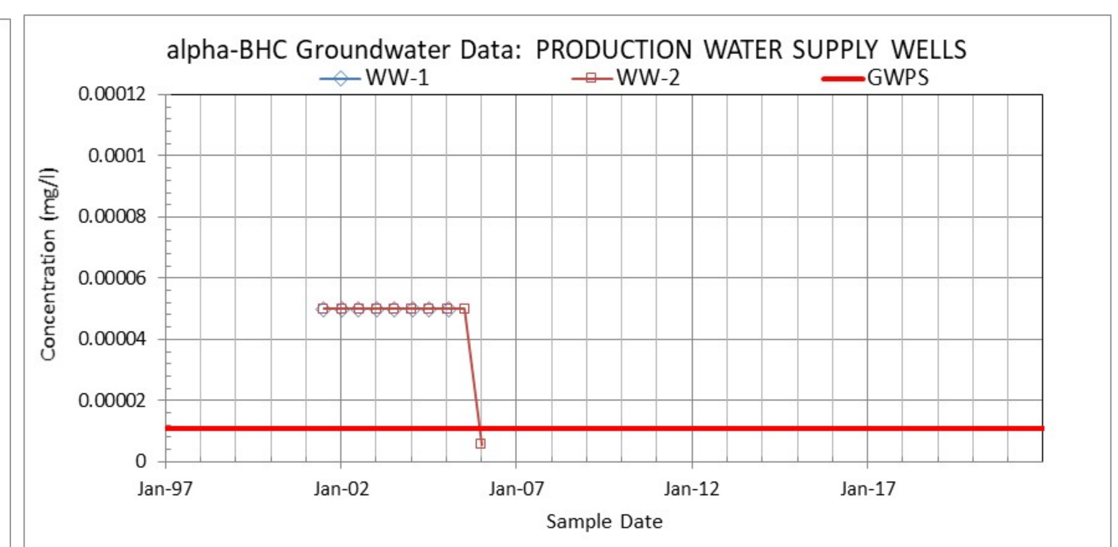

alpha-BHC Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
0.00012
0.0001
0.00008
0.00006
0.00004
0.00002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

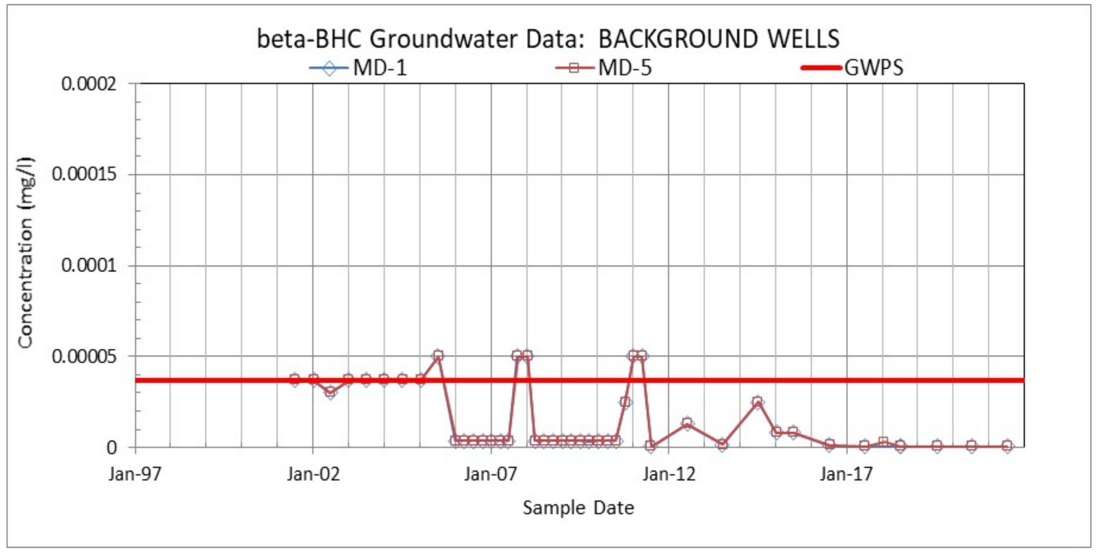

alpha-BHC Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
0.00012
0.0001
0.00008
0.00006
0.00004
0.00002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

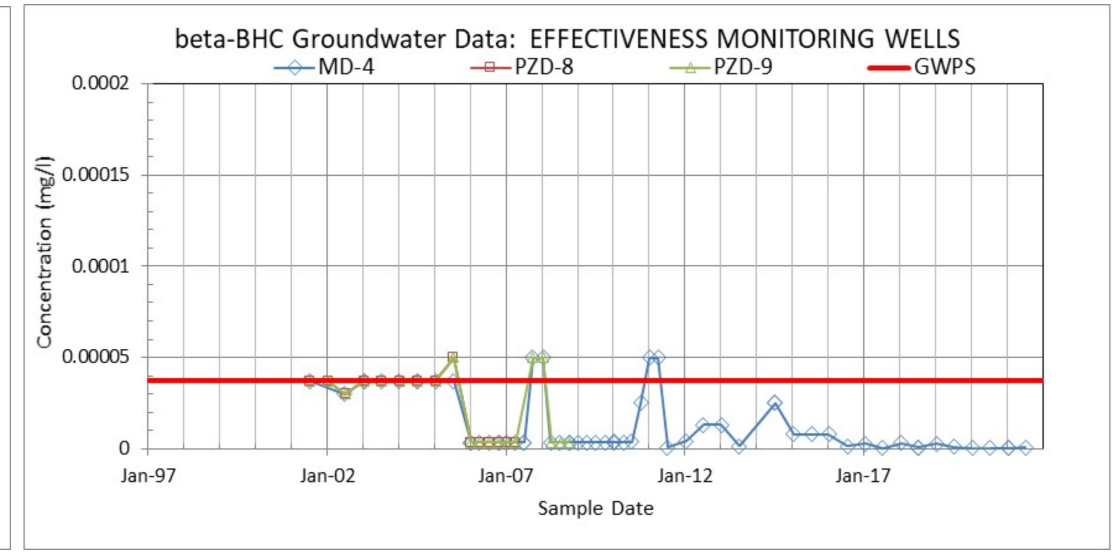

alpha-BHC Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
0.00012
0.0001
0.00008
0.00006
0.00004
0.00002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

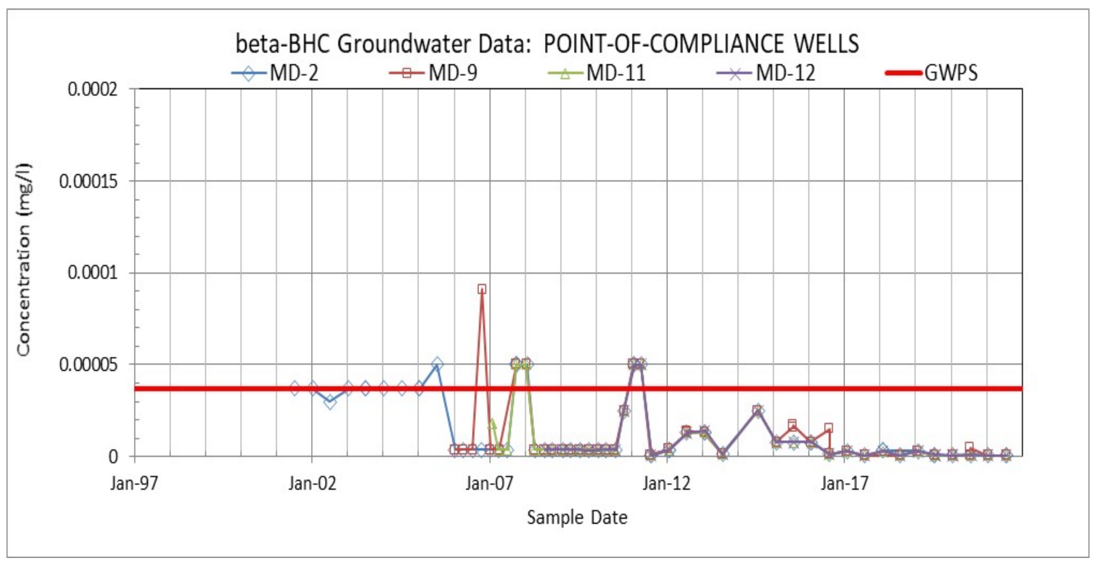

alpha-BHC Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
0.00012
0.0001
0.00008
0.00006
0.00004
0.00002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

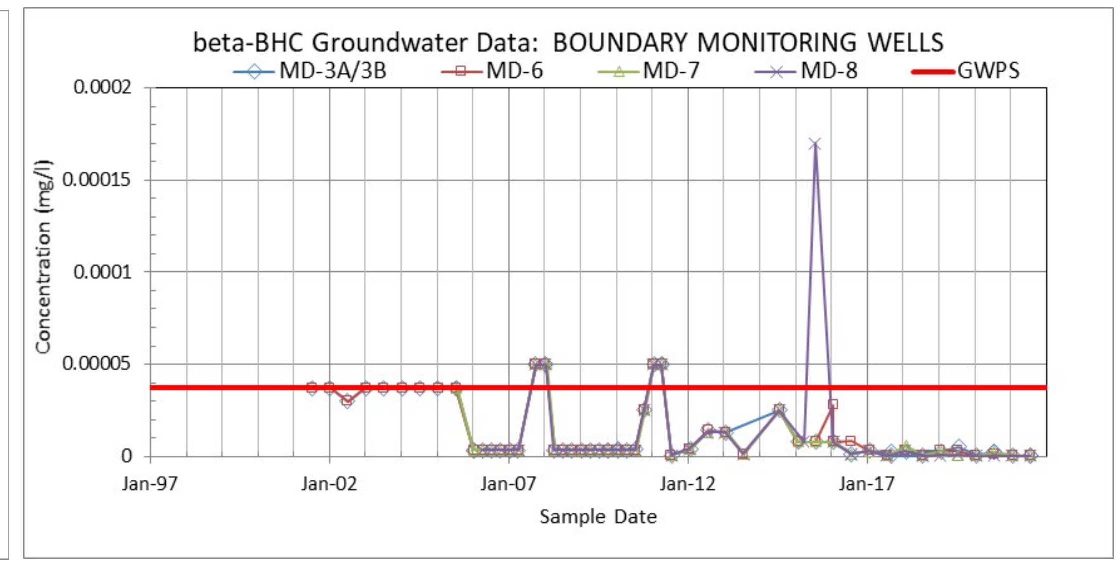

alpha-BHC Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
0.00012
0.0001
0.00008
0.00006
0.00004
0.00002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

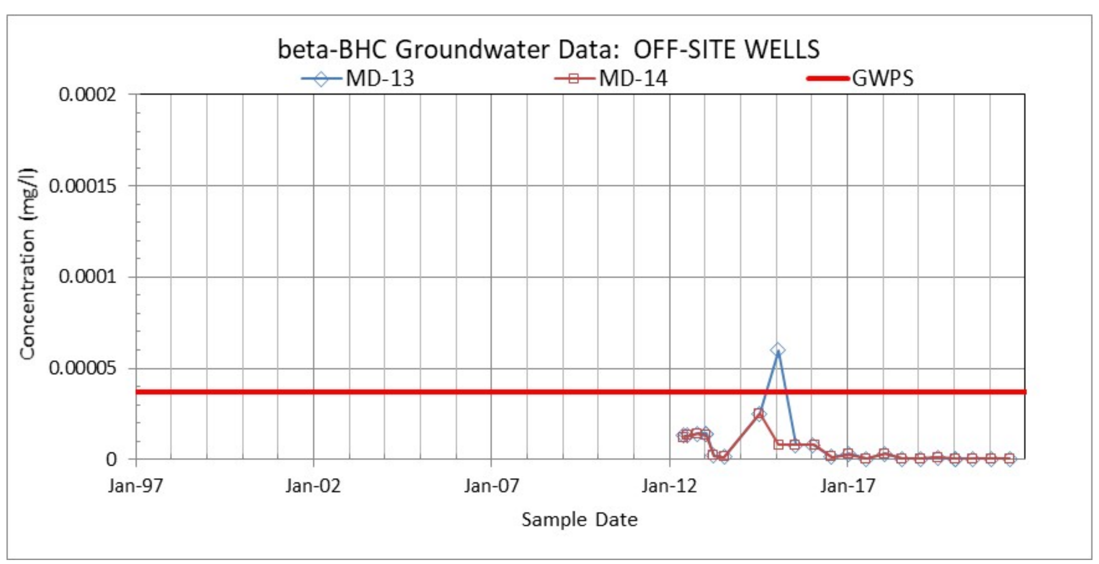

alpha-BHC Groundwater Data: PRODUCTION WATER SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
0.00012
0.0001
0.00008
0.00006
0.00004
0.00002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

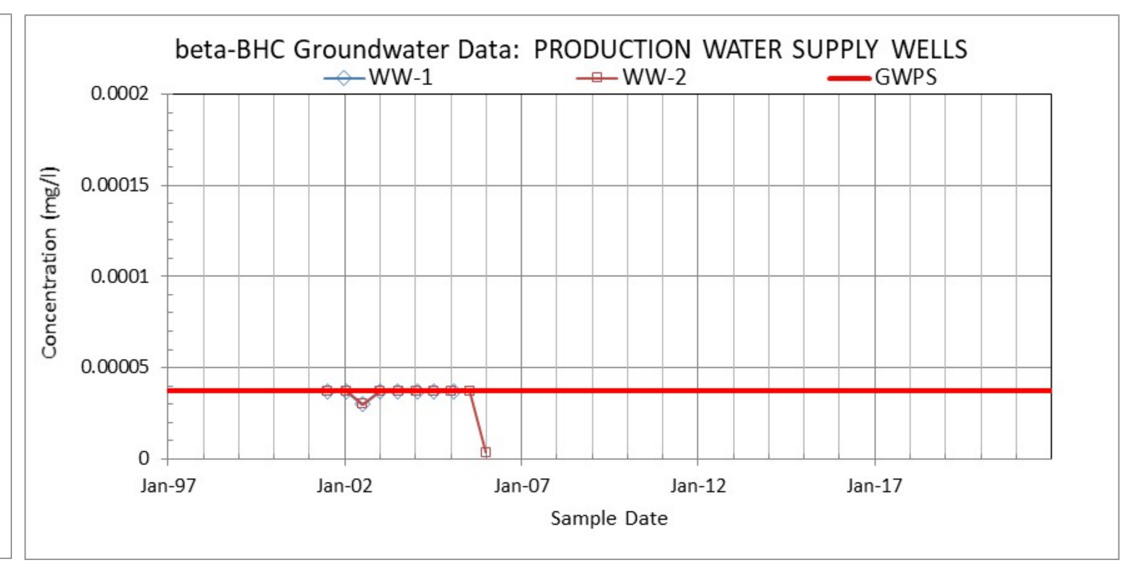

beta-BHC Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
0.0002
0.00015
0.0001
0.00005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

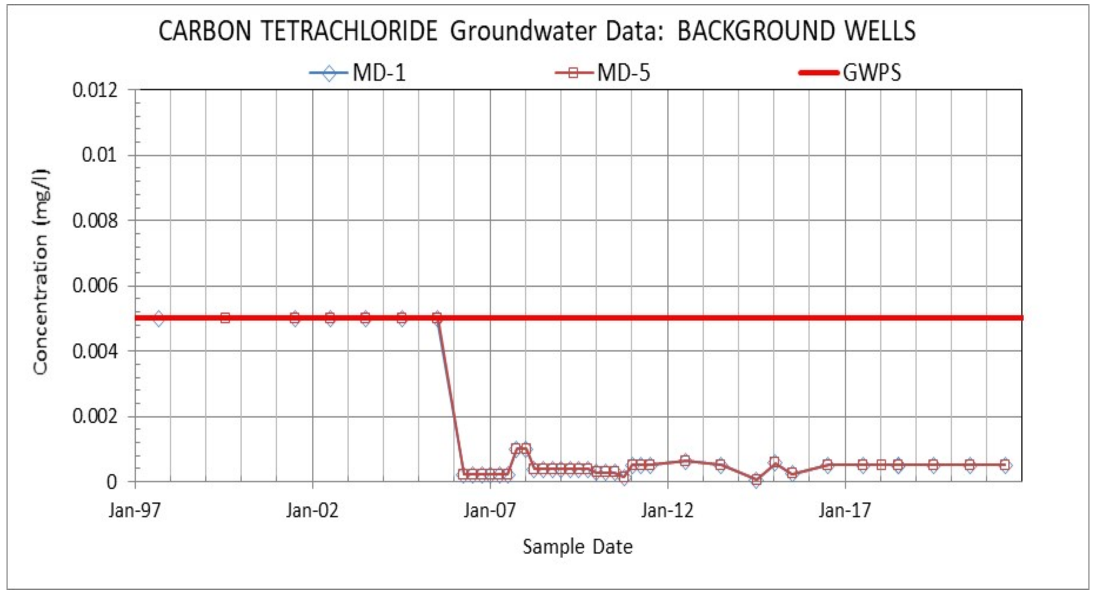

beta-BHC Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
0.0002
0.00015
0.0001
0.00005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

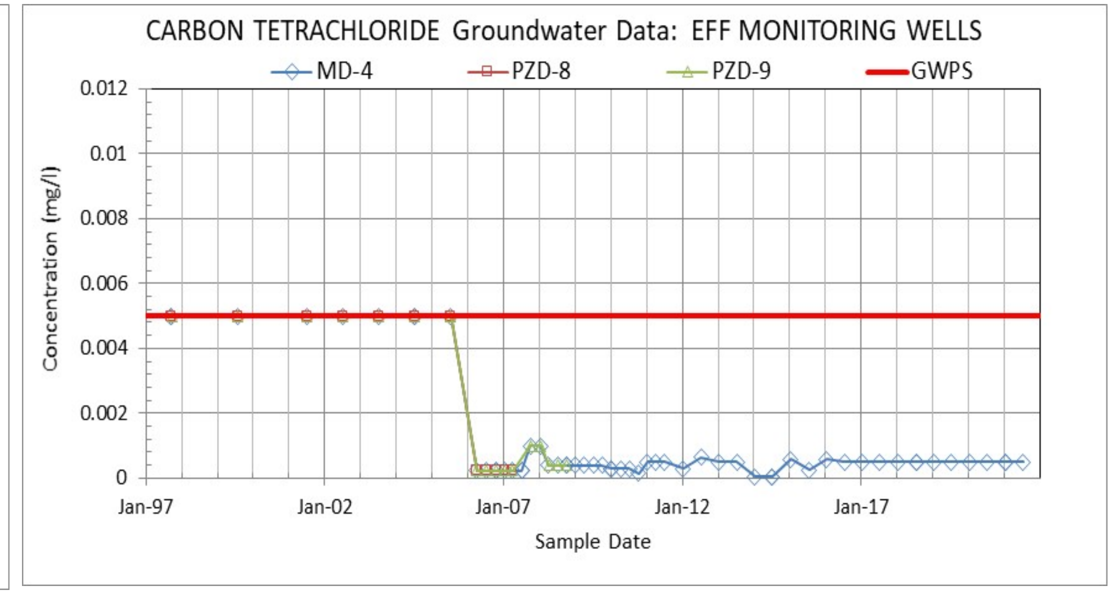

beta-BHC Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
0.0002
0.00015
0.0001
0.00005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

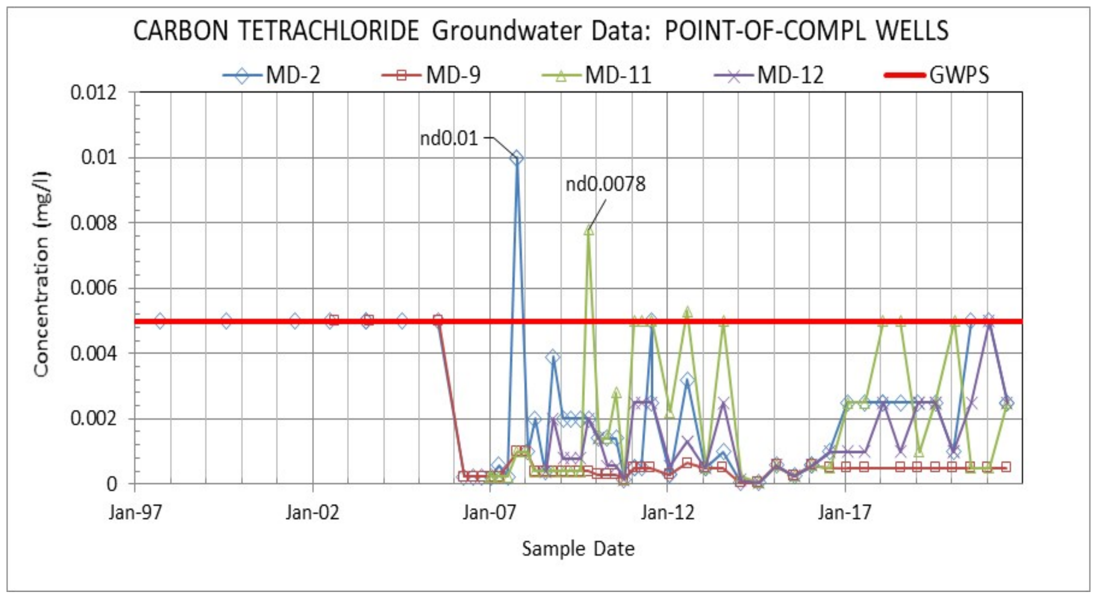

beta-BHC Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
0.0002
0.00015
0.0001
0.00005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

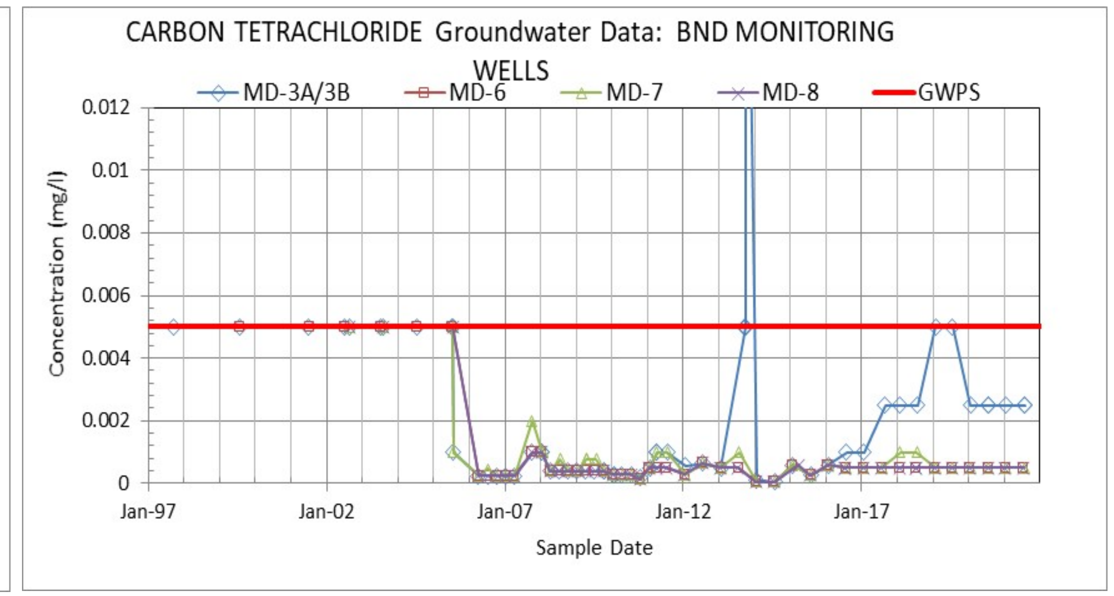

beta-BHC Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
0.0002
0.00015
0.0001
0.00005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

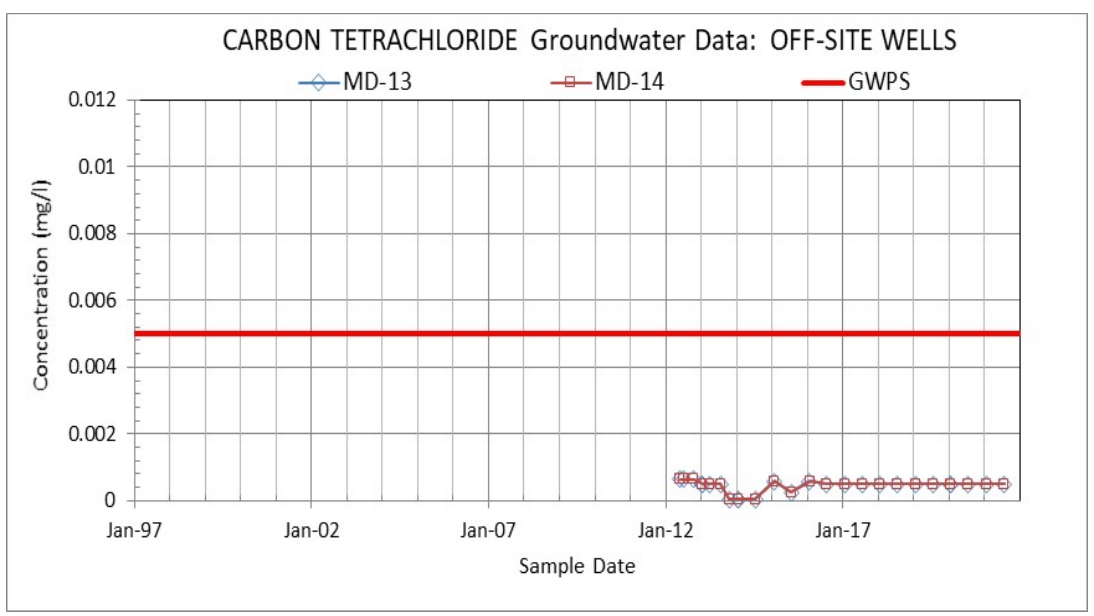

beta-BHC Groundwater Data: PRODUCTION WATER SUPPLY WELLS
WW-1
WW-2
GWPS
0.0002
0.00015
0.0001
0.00005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

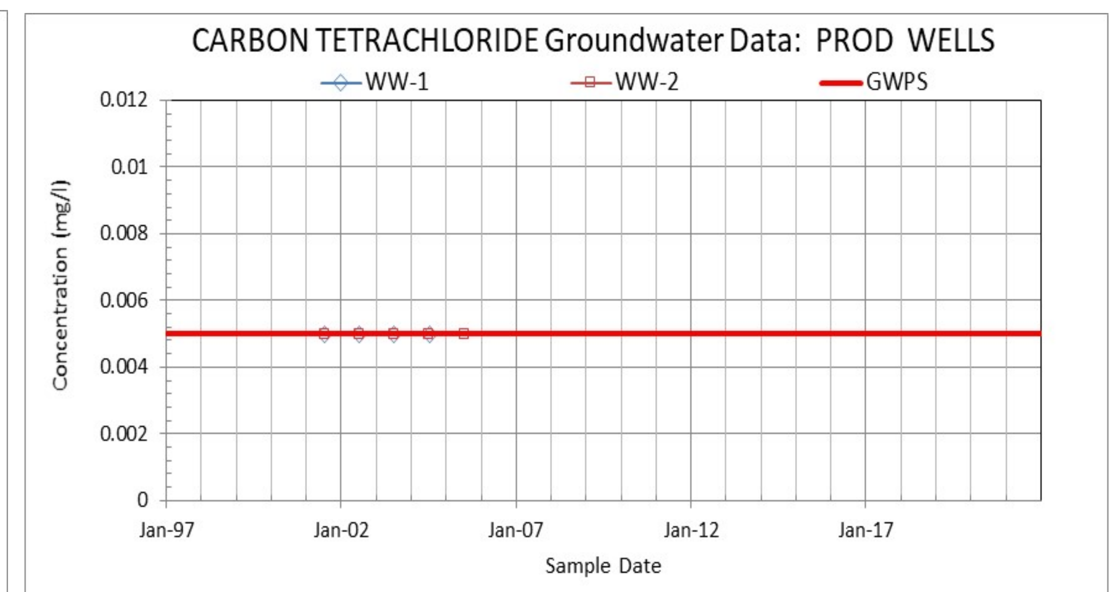

CARBON TETRACHLORIDE Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
Sample Date

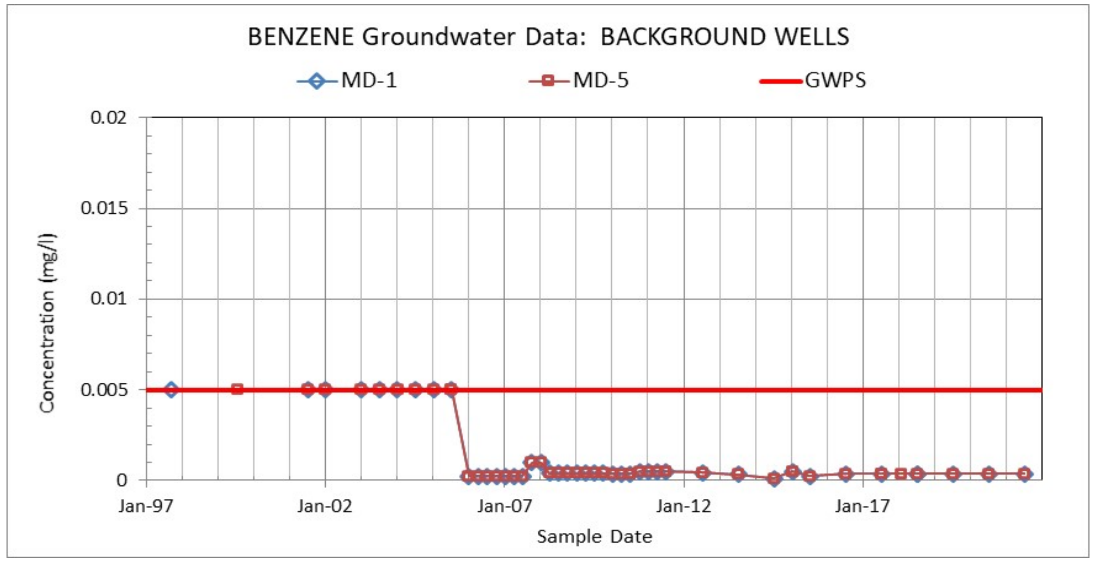

CARBON TETRACHLORIDE Groundwater Data: EFF MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
Sample Date

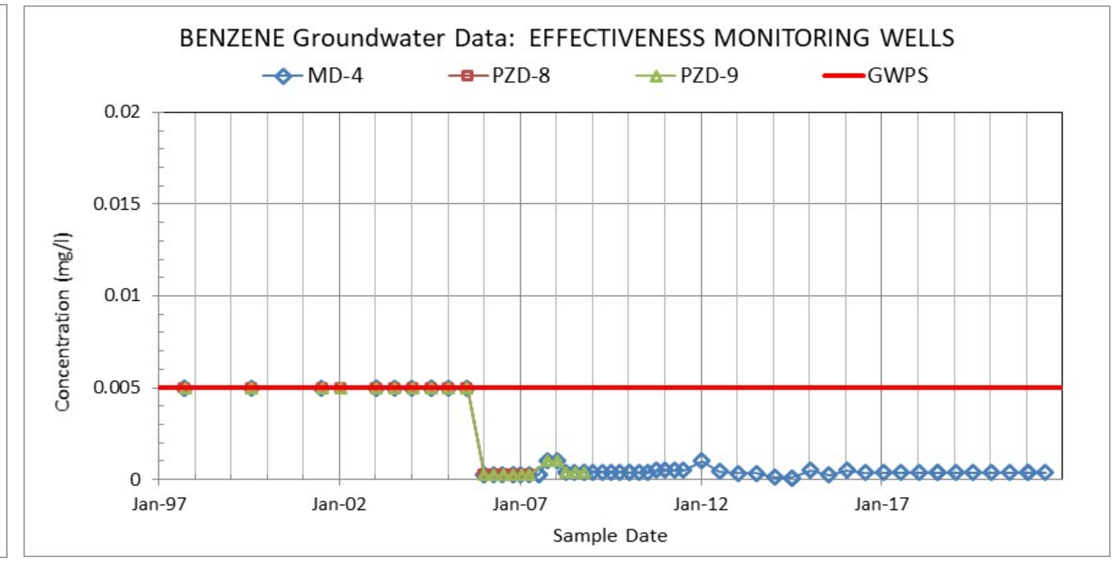

CARBON TETRACHLORIDE Groundwater Data: POINT-OF-COMPL WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
nd0.01
nd0.0078
Concentration (mg/l)
Sample Date

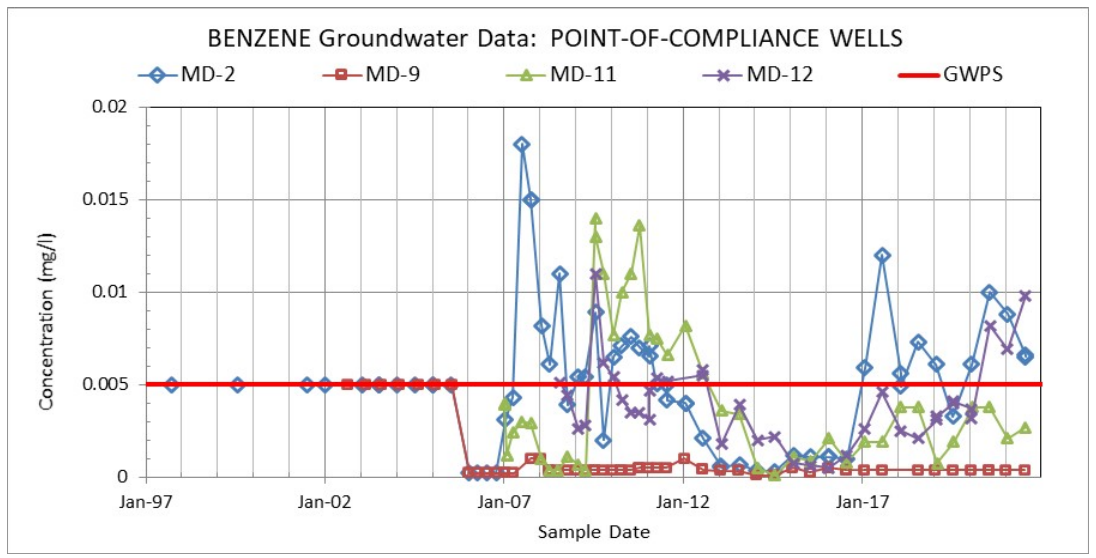

CARBON TETRACHLORIDE Groundwater Data: BND MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
Sample Date

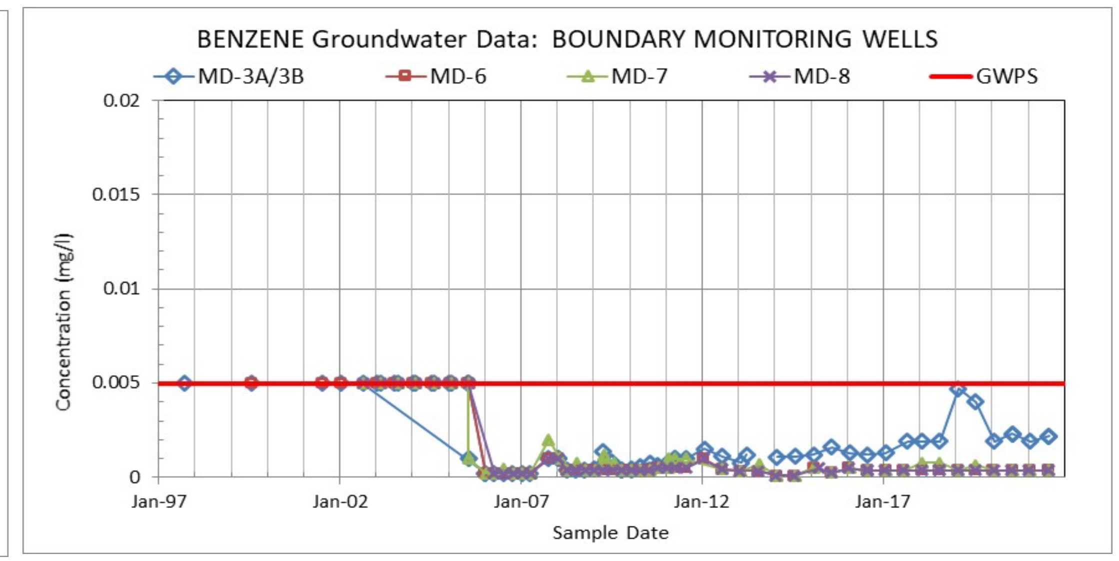

CARBON TETRACHLORIDE Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
Sample Date

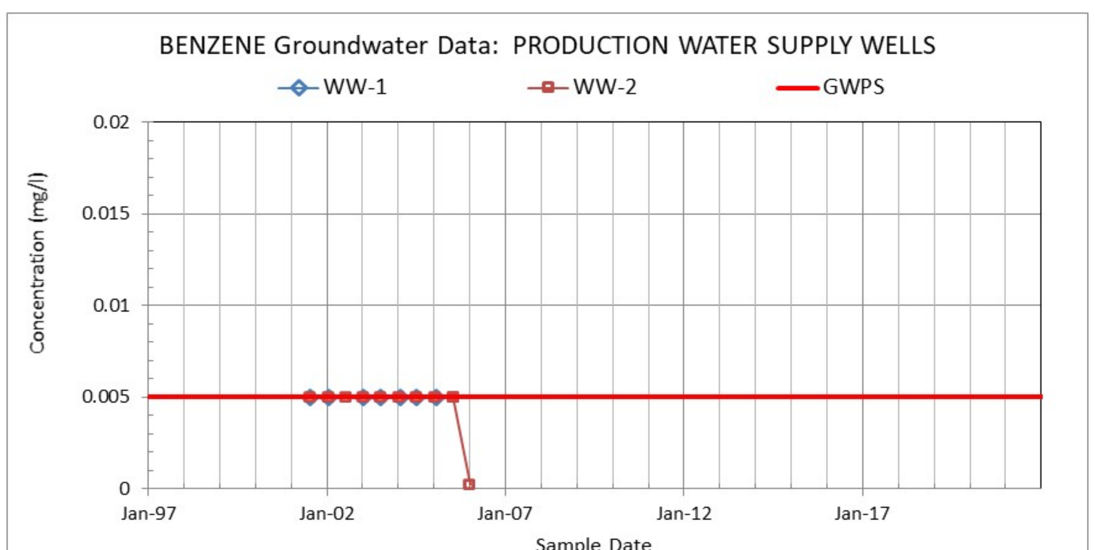

CARBON TETRACHLORIDE Groundwater Data: PROD WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
Sample Date

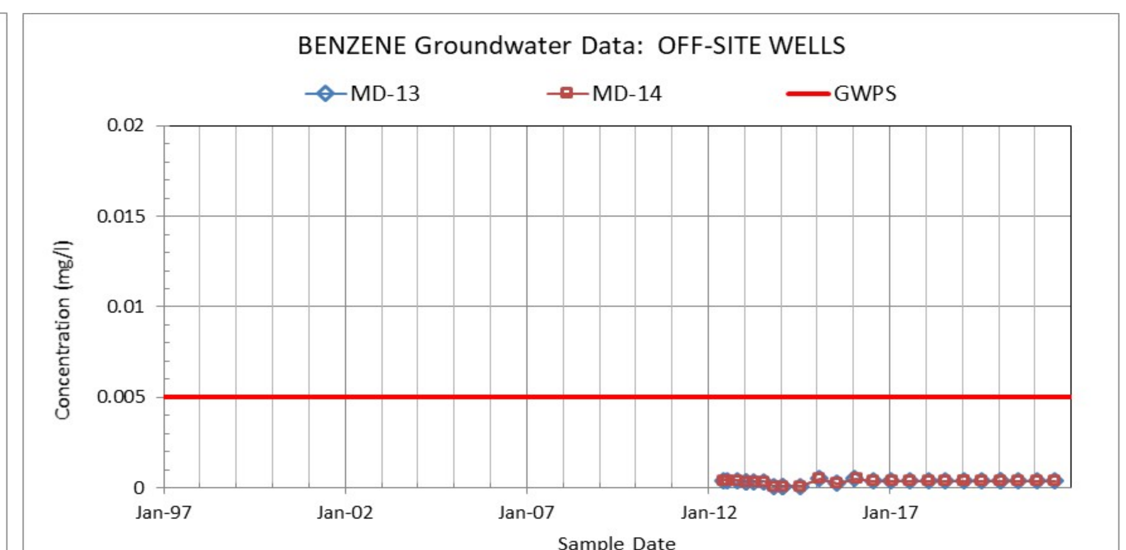

BENZENE Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

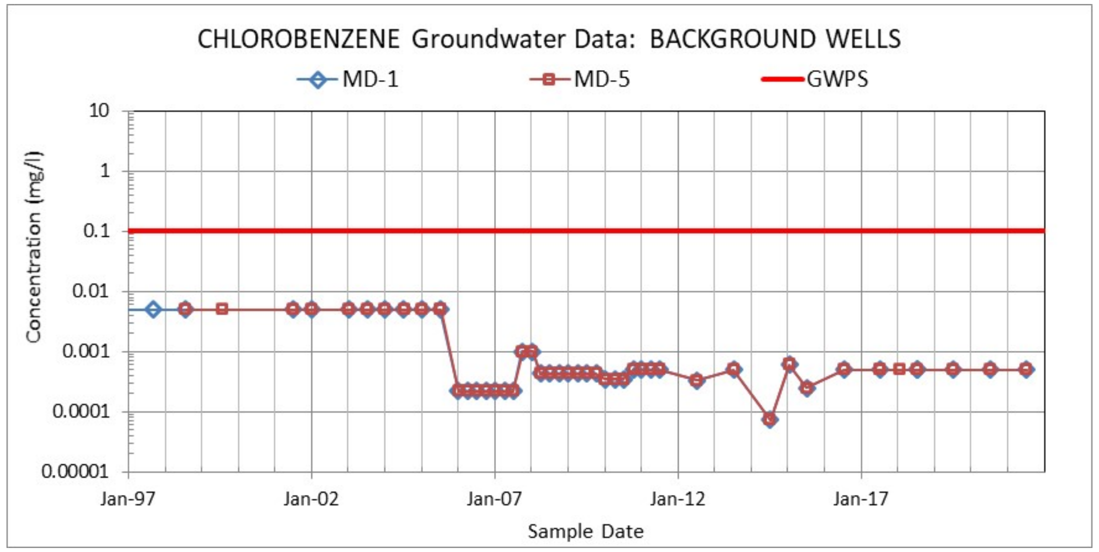

BENZENE Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

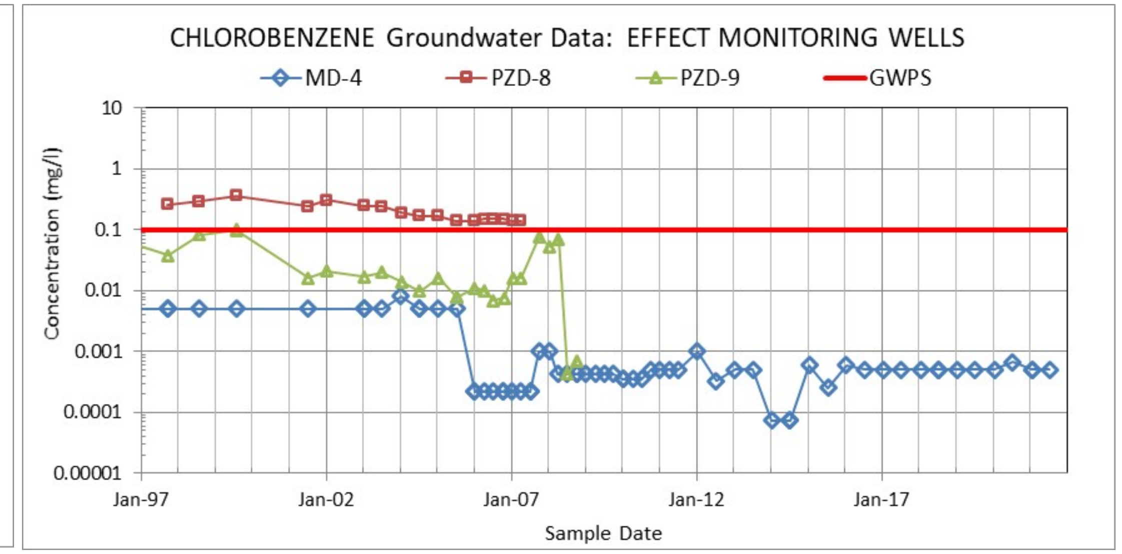

BENZENE Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

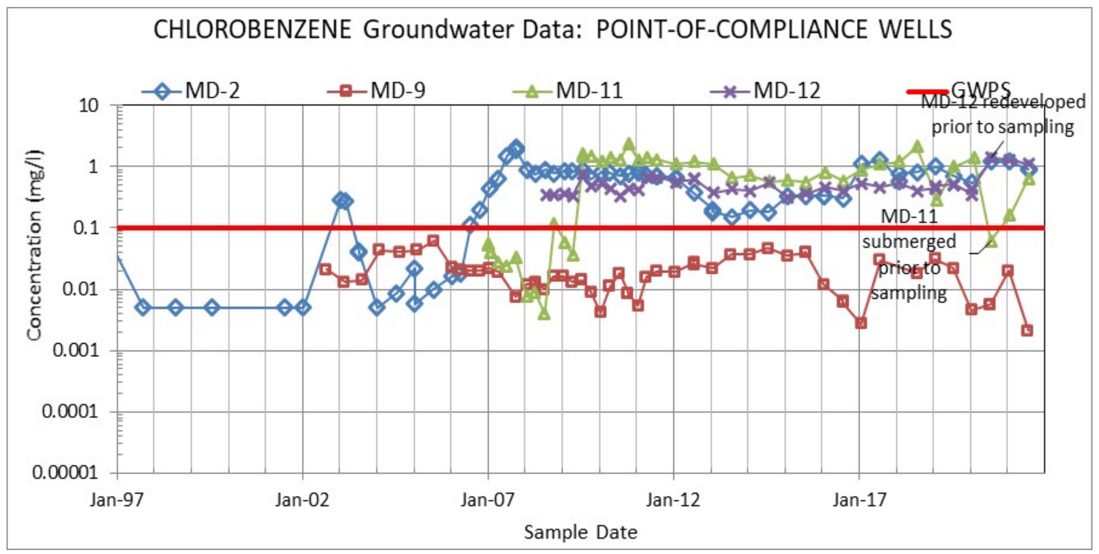

BENZENE Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

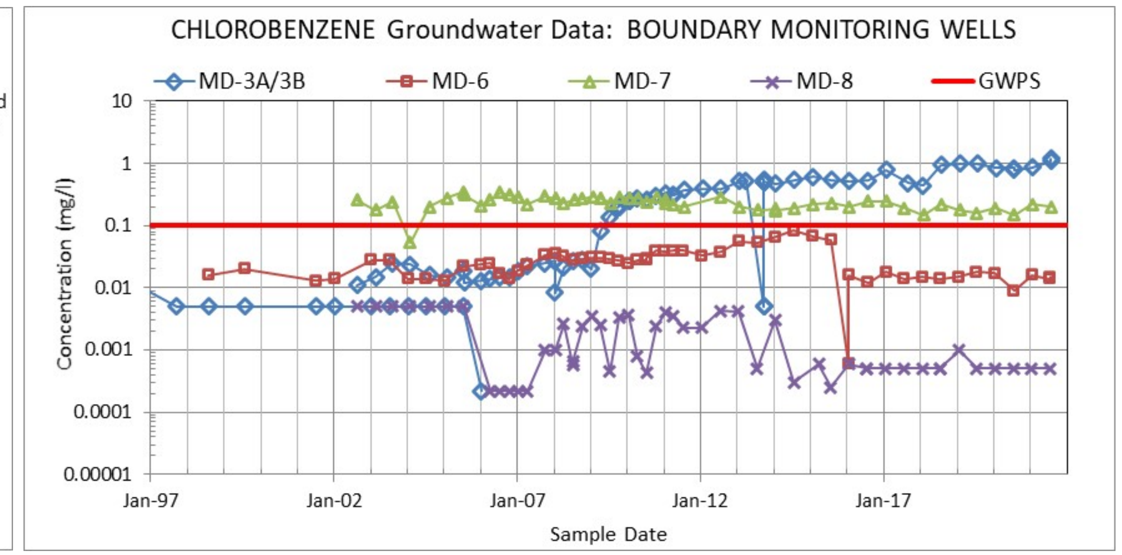

BENZENE Groundwater Data: PRODUCTION WATER SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

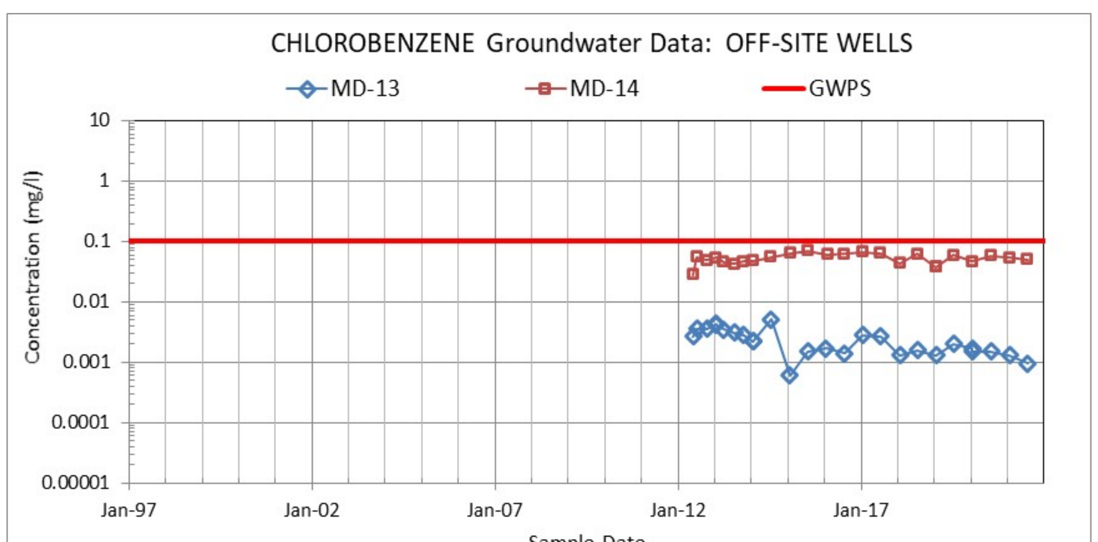

BENZENE Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
0.02
0.015
0.01
0.005
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

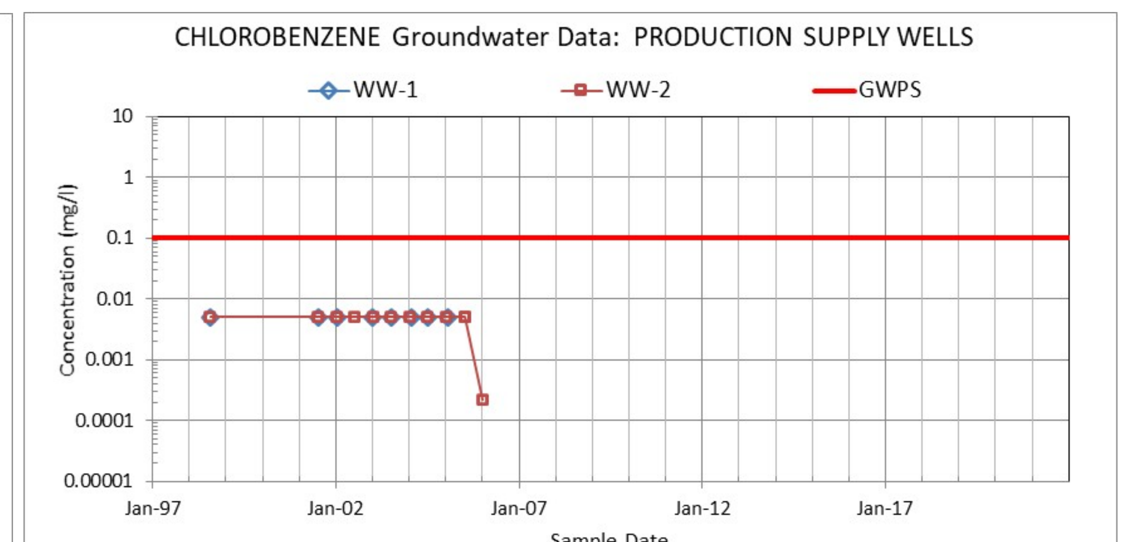

CHLOROBENZENE Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
Sample Date

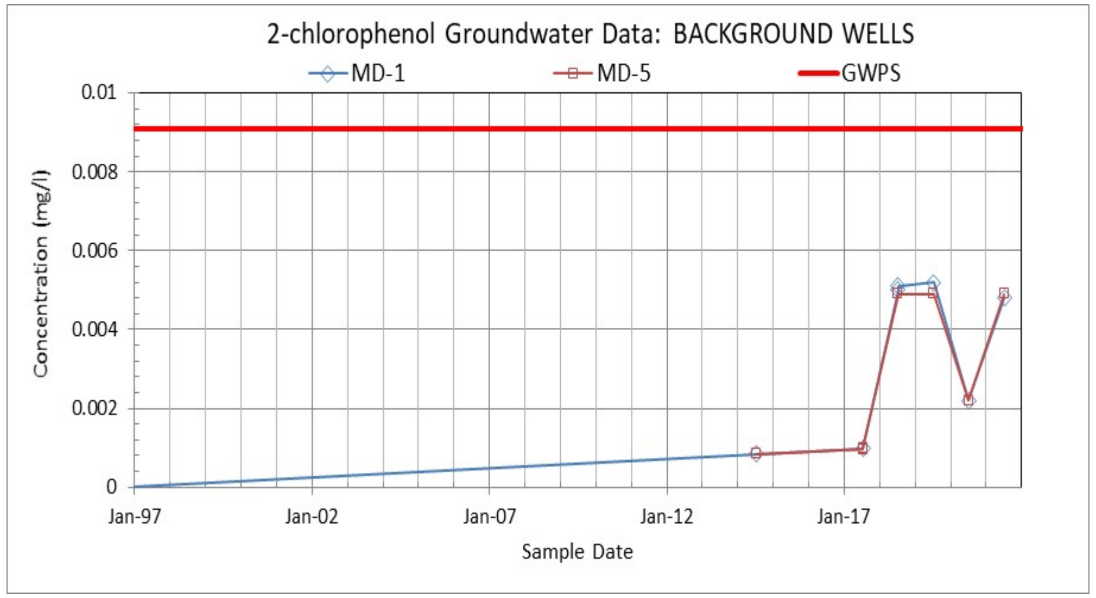

CHLOROBENZENE Groundwater Data: EFFECT MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
Sample Date

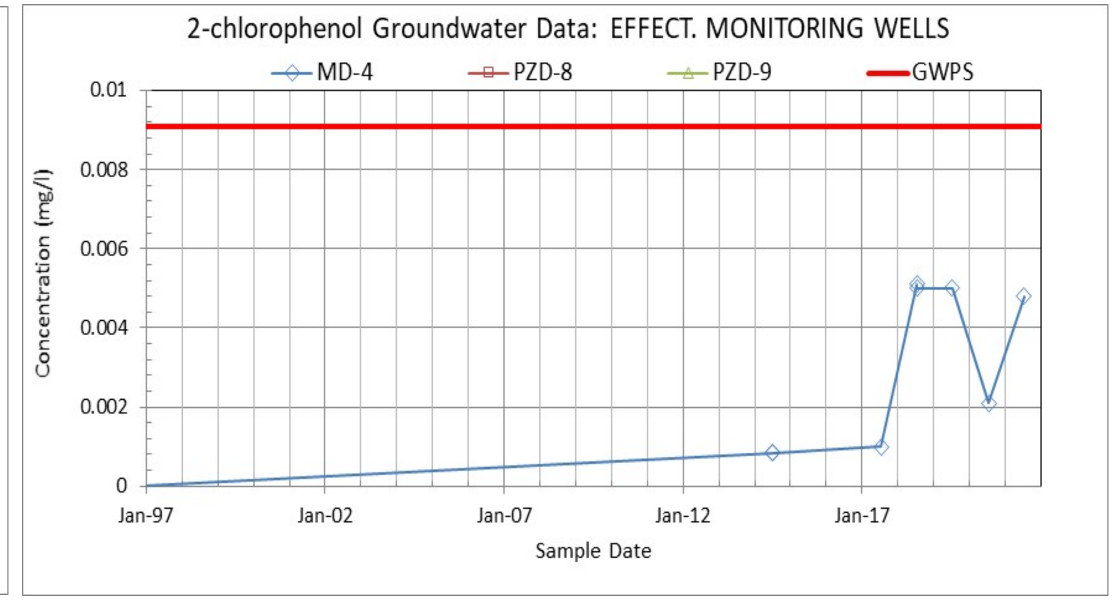

CHLOROBENZENE Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
MD-12 redeveloped prior to sampling
MD-11 submerged prior to sampling
Concentration (mg/l)
Sample Date

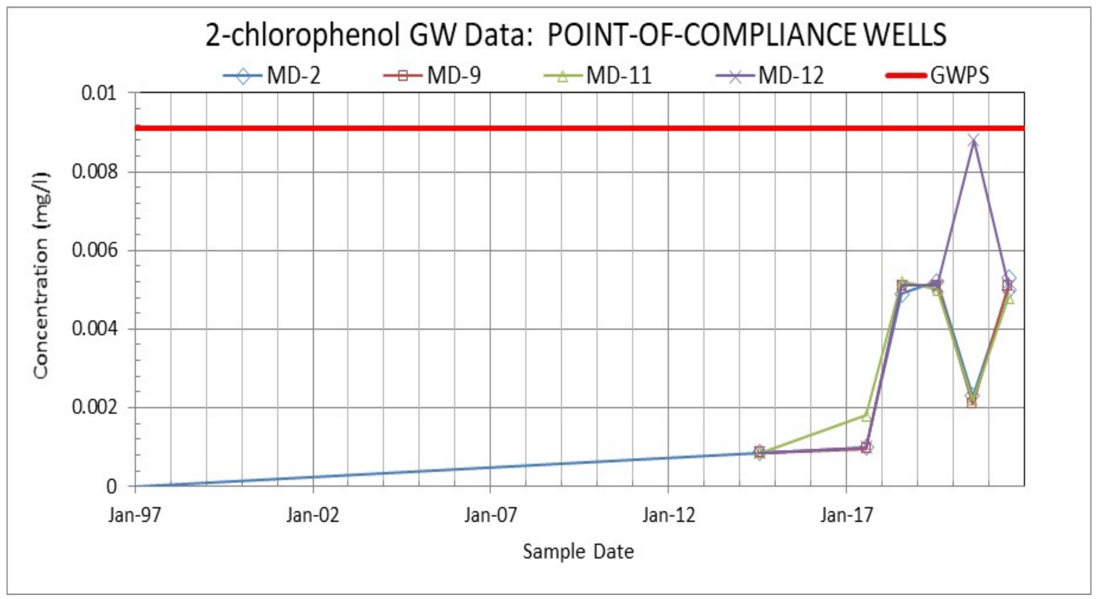

CHLOROBENZENE Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
Sample Date

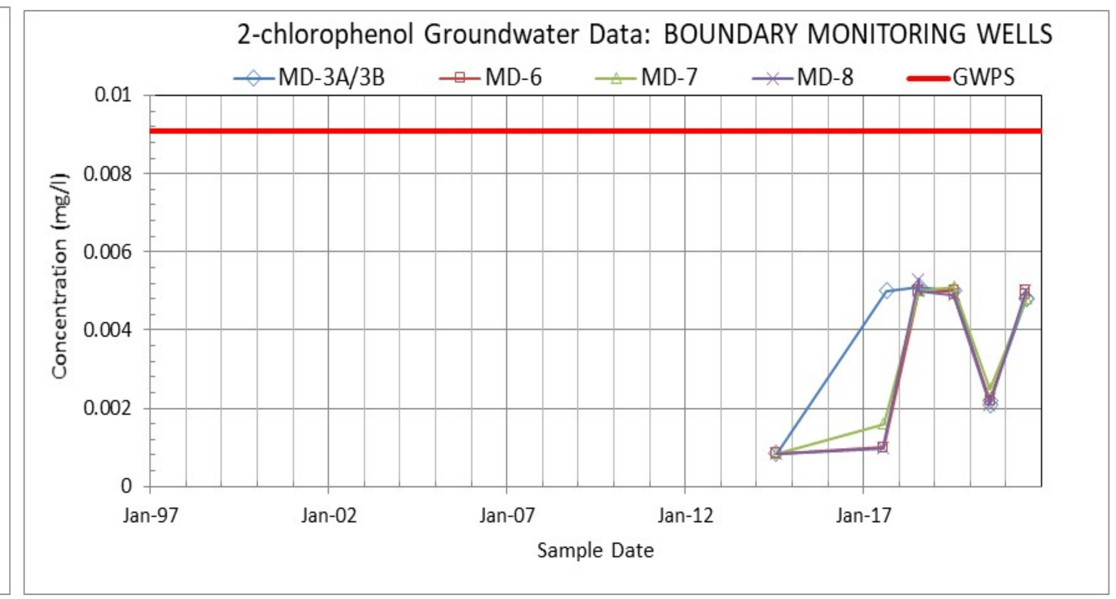

CHLOROBENZENE Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
Sample Date

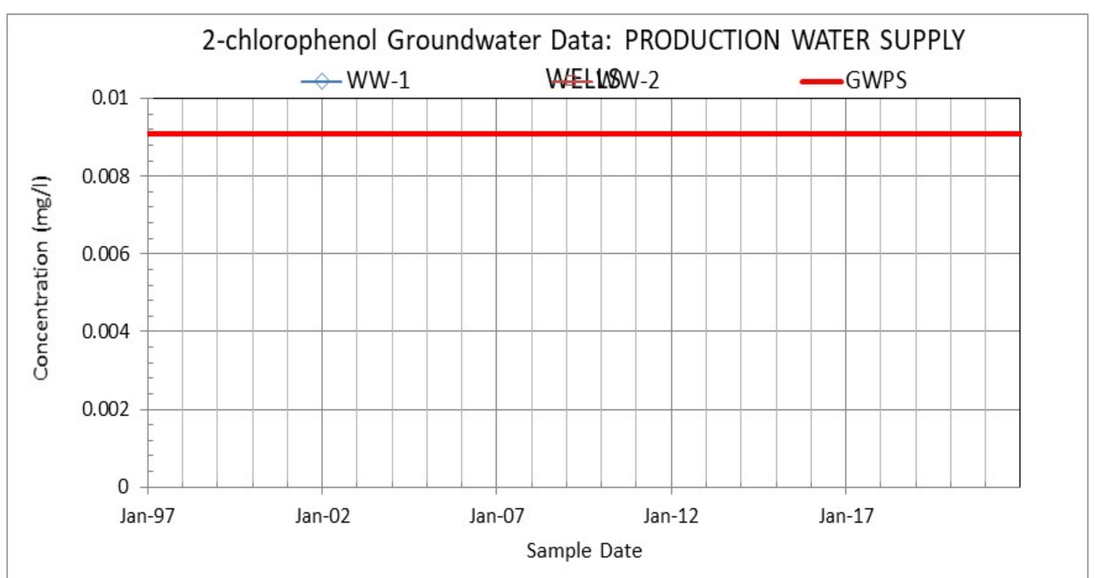

CHLOROBENZENE Groundwater Data: PRODUCTION SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
Sample Date

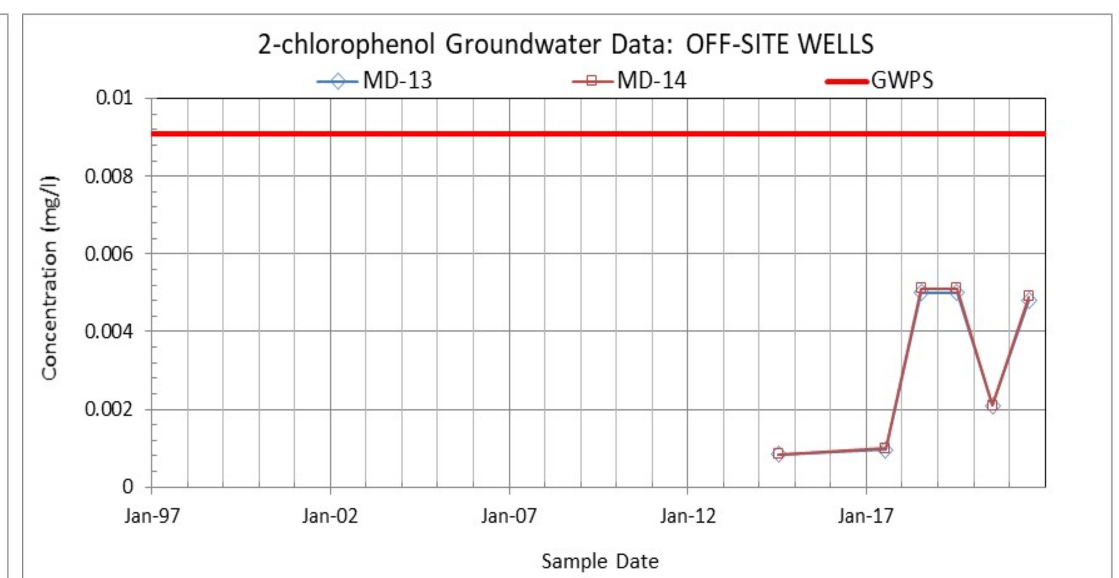

2-chlorophenol Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
Sample Date

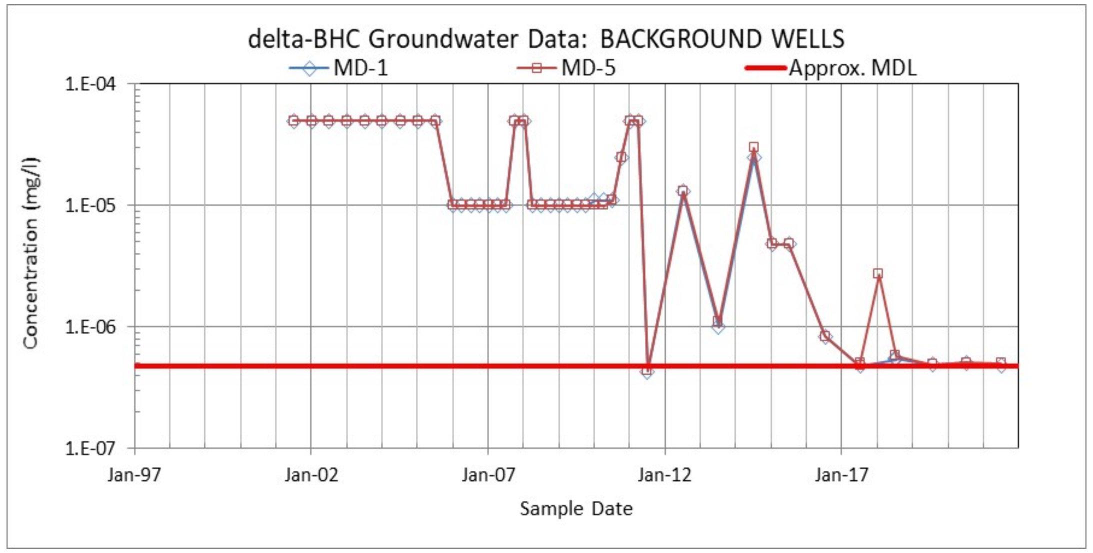

2-chlorophenol Groundwater Data: EFFECT. MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
Sample Date

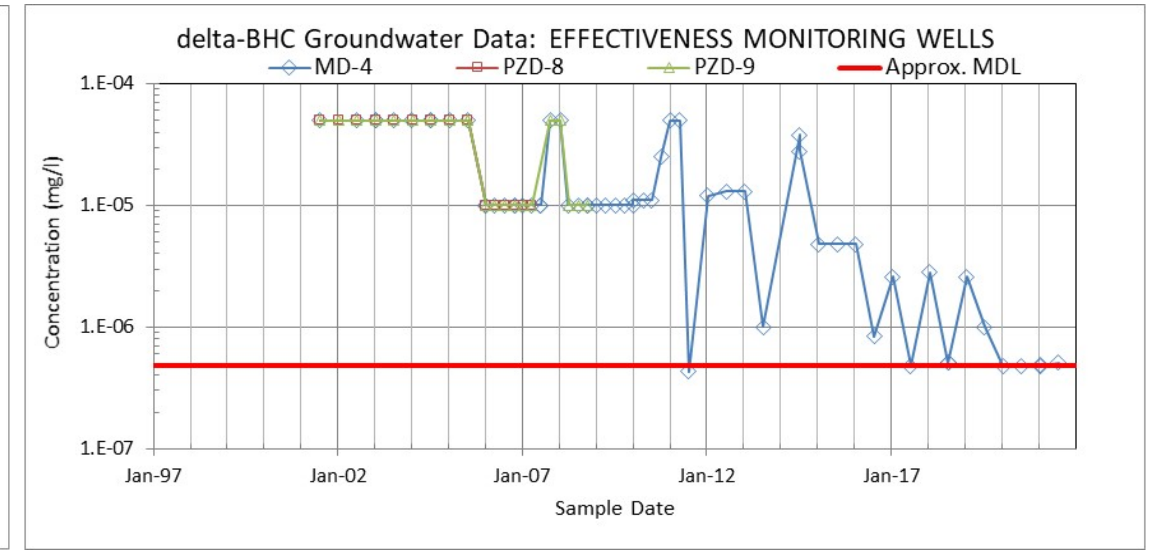

2-chlorophenol GW Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
Sample Date

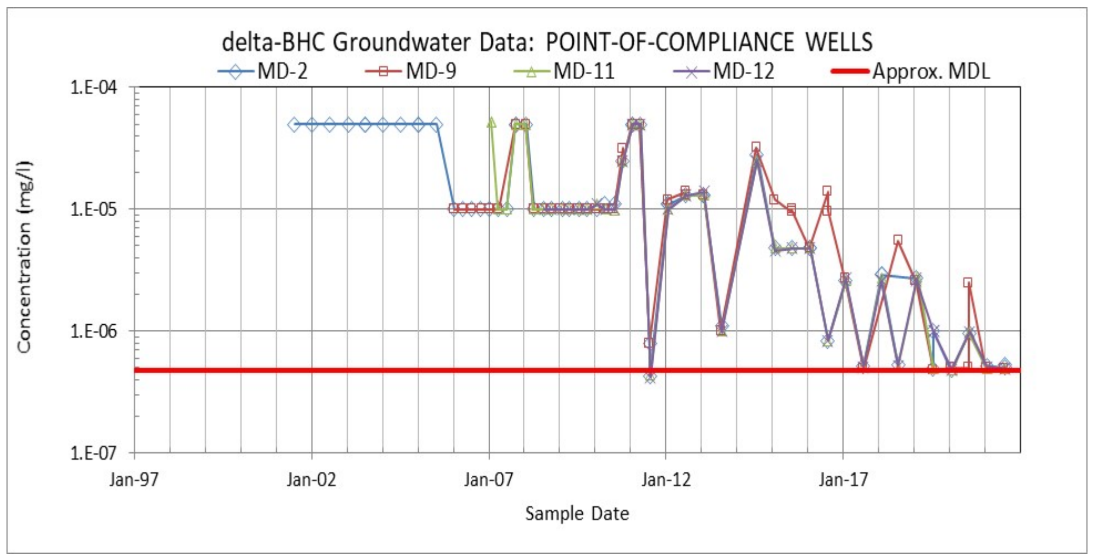

2-chlorophenol Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
Sample Date

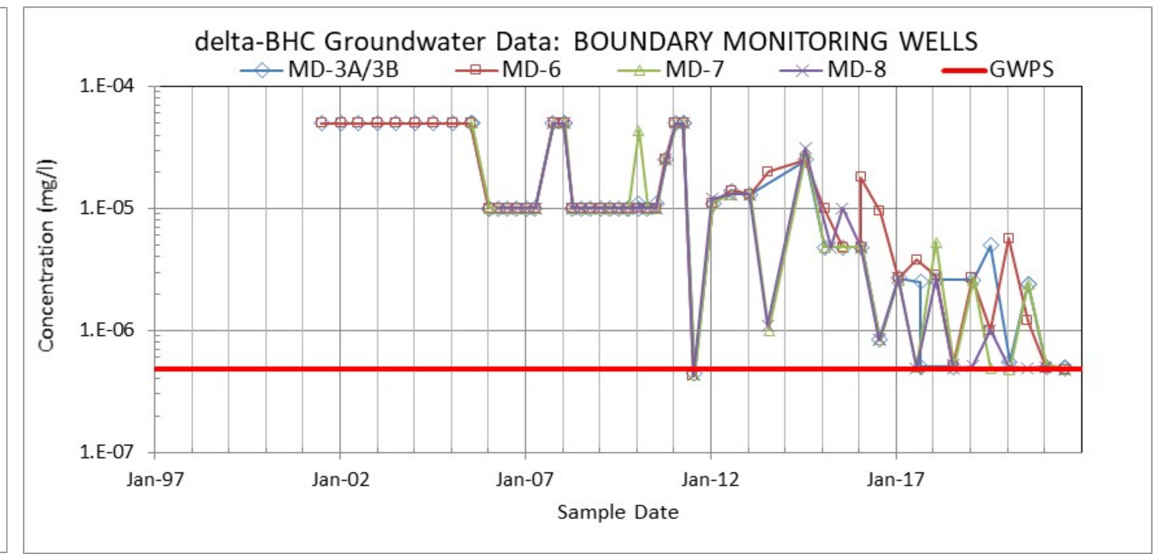

2-chlorophenol Groundwater Data: PRODUCTION WATER SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
Sample Date

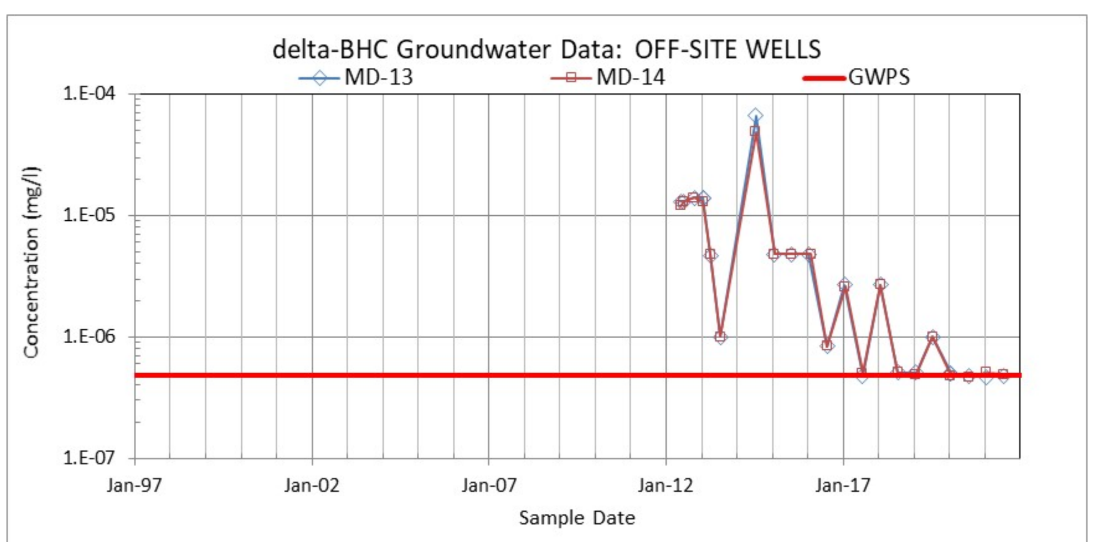

2-chlorophenol Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
Sample Date

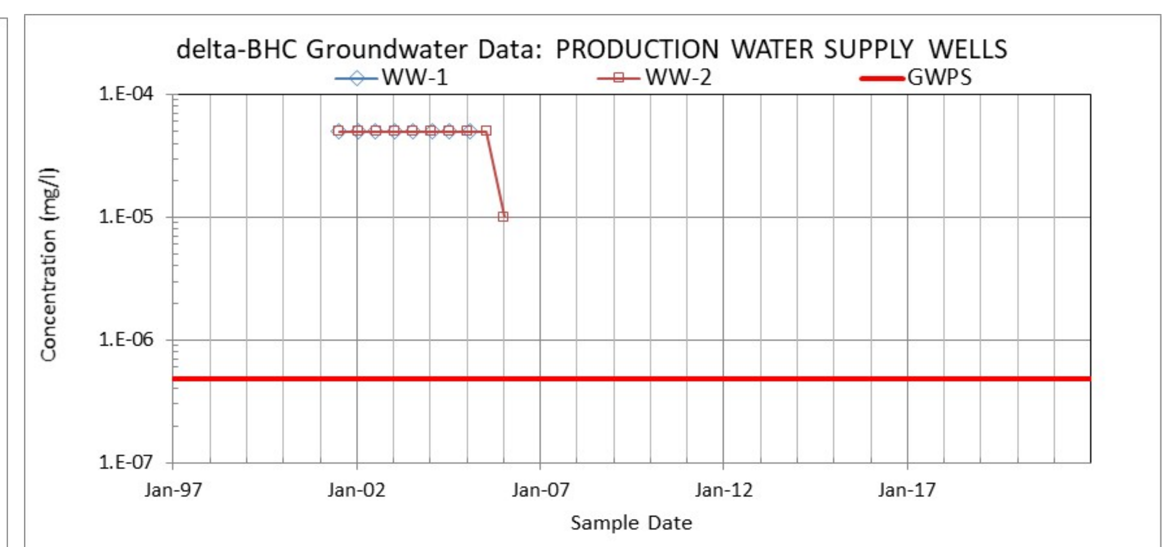

delta-BHC Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
Approx. MDL
Concentration (mg/l)
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

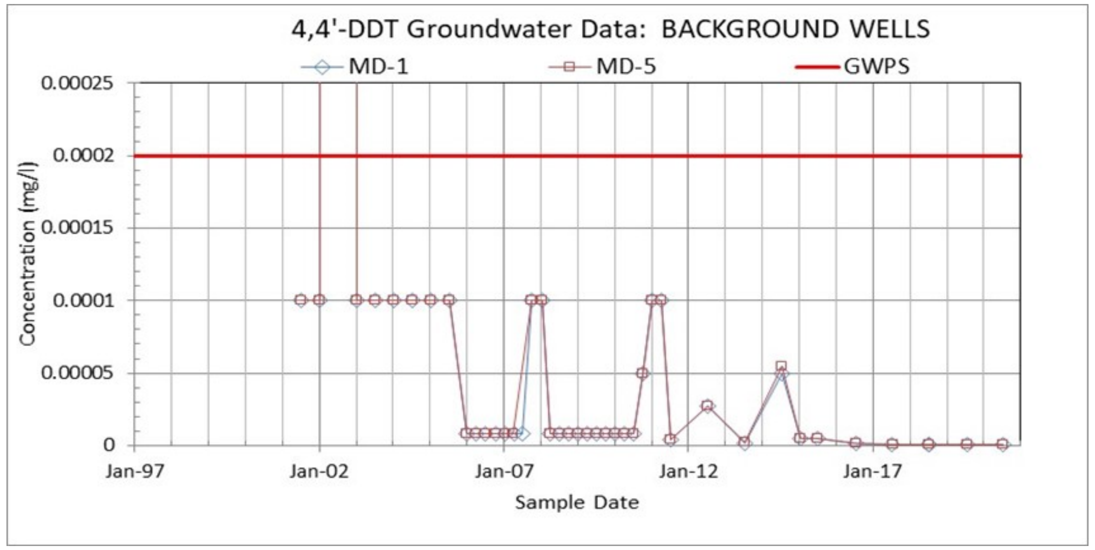

delta-BHC Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
Approx. MDL
Concentration (mg/l)
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

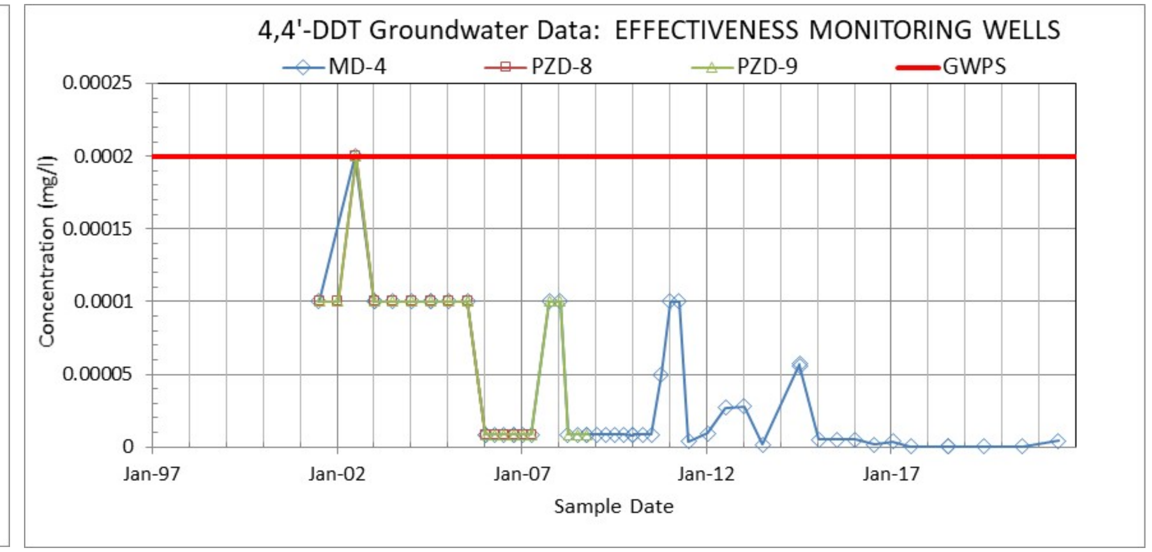

delta-BHC Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
Approx. MDL
Concentration (mg/l)
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

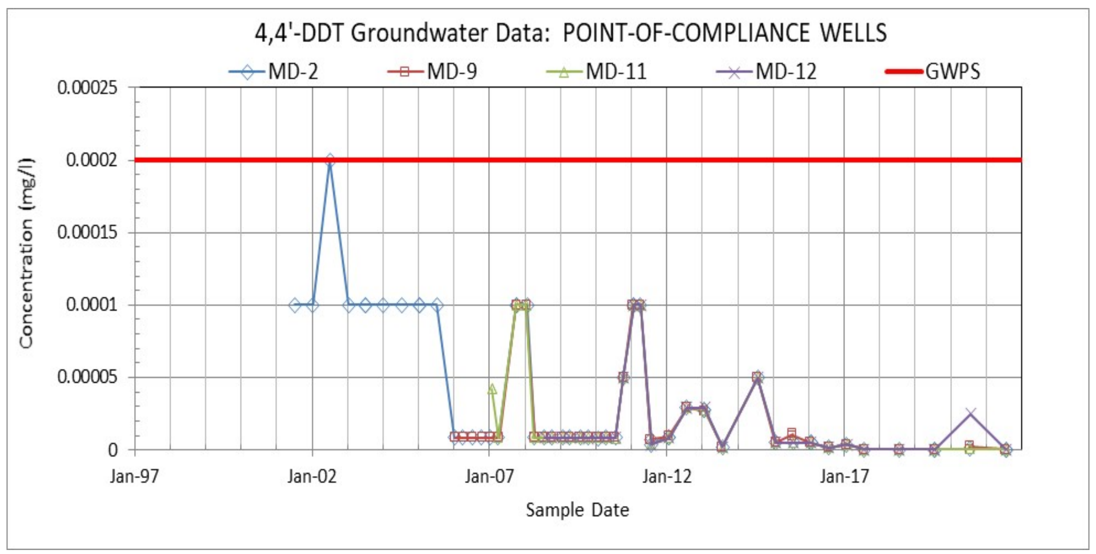

delta-BHC Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

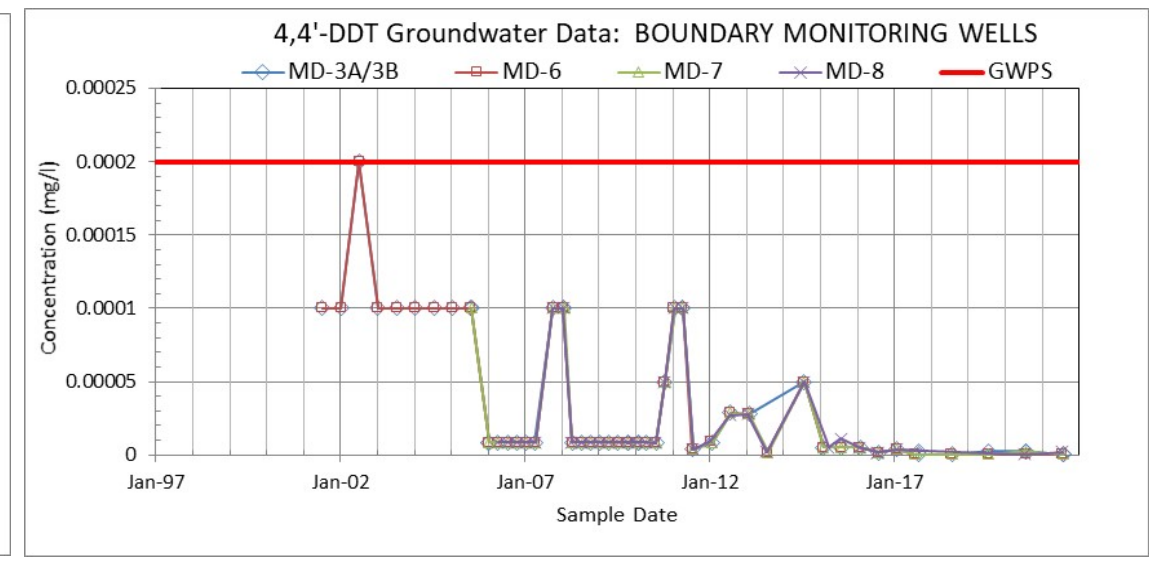

delta-BHC Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

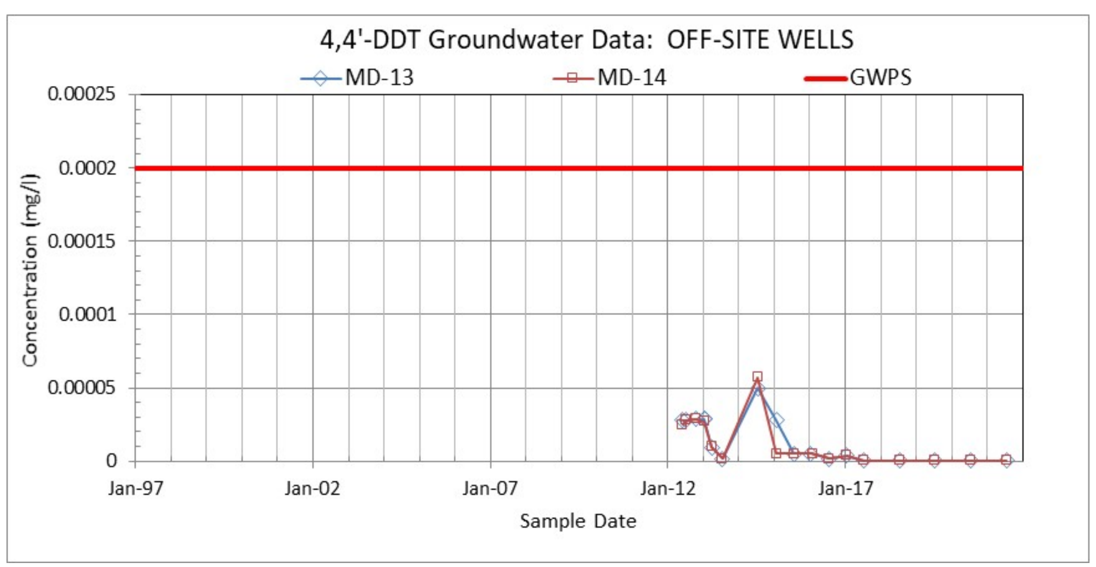

delta-BHC Groundwater Data: PRODUCTION WATER SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
1.E-04
1.E-05
1.E-06
1.E-07
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

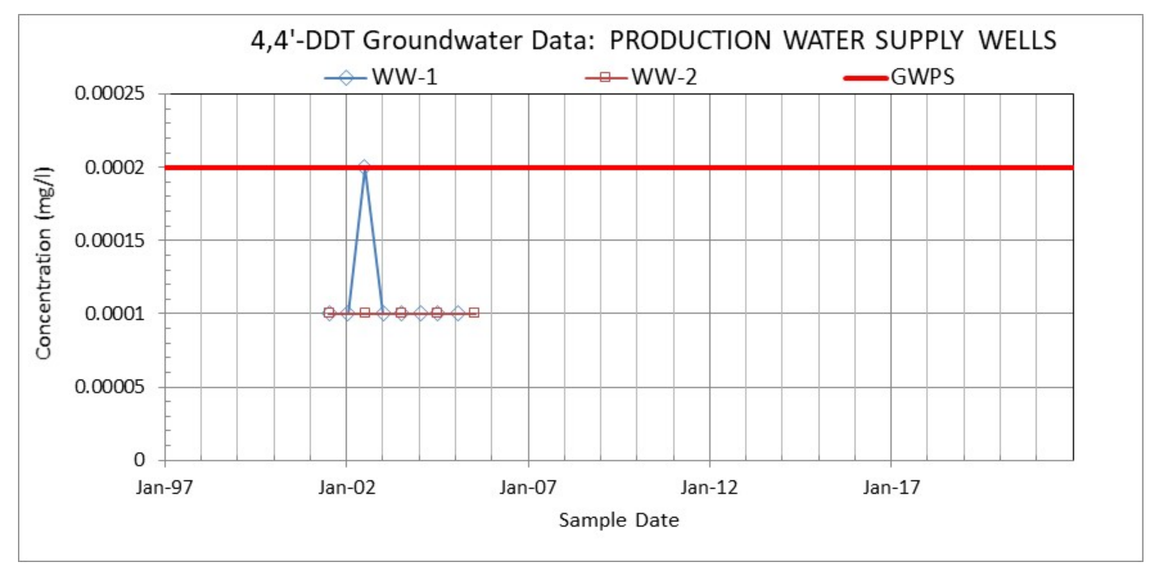

4,4'-DDT Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
0.00025
0.0002
0.00015
0.0001
0.00005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

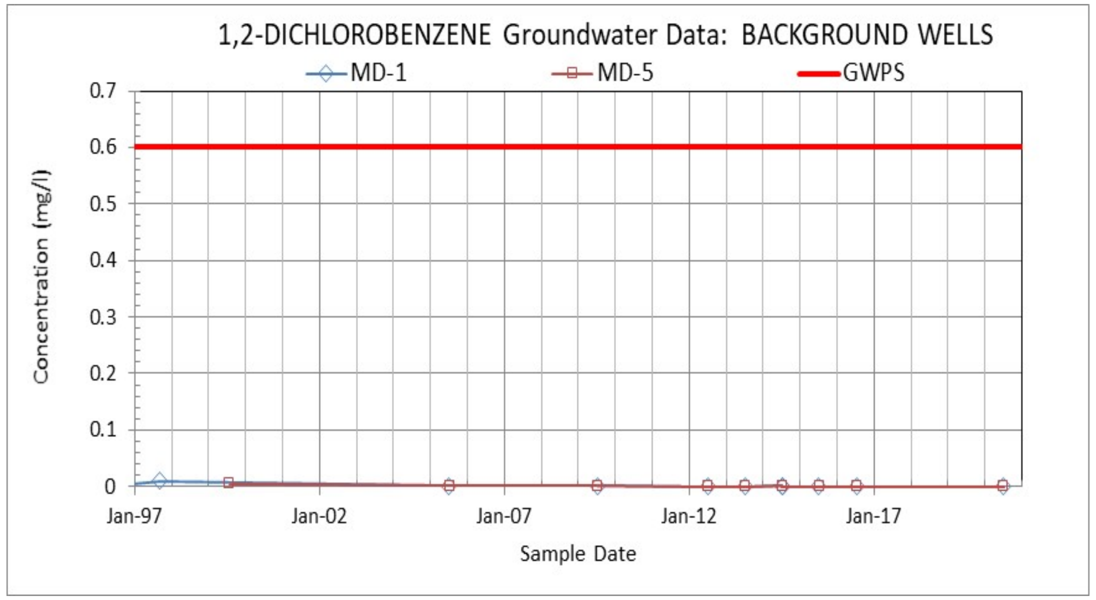

4,4'-DDT Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
0.00025
0.0002
0.00015
0.0001
0.00005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

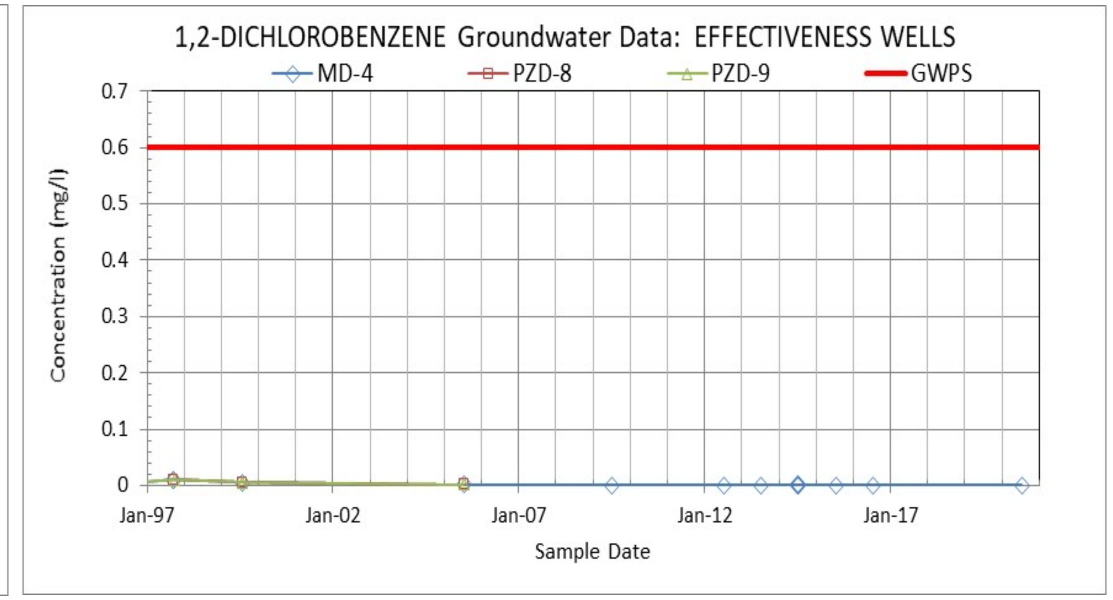

4,4'-DDT Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
0.00025
0.0002
0.00015
0.0001
0.00005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

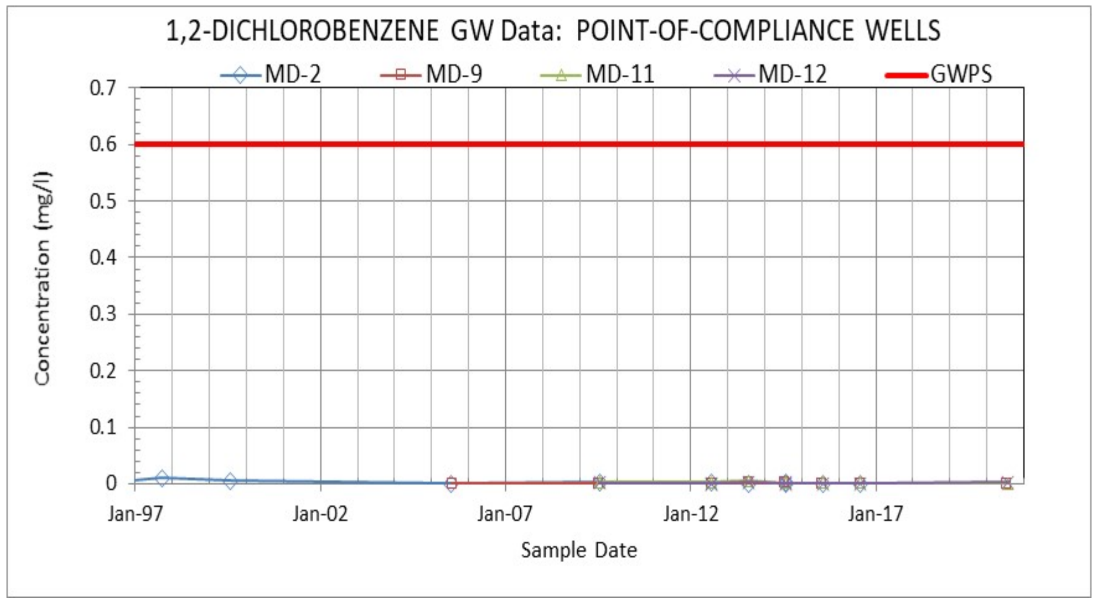

4,4'-DDT Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
0.00025
0.0002
0.00015
0.0001
0.00005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

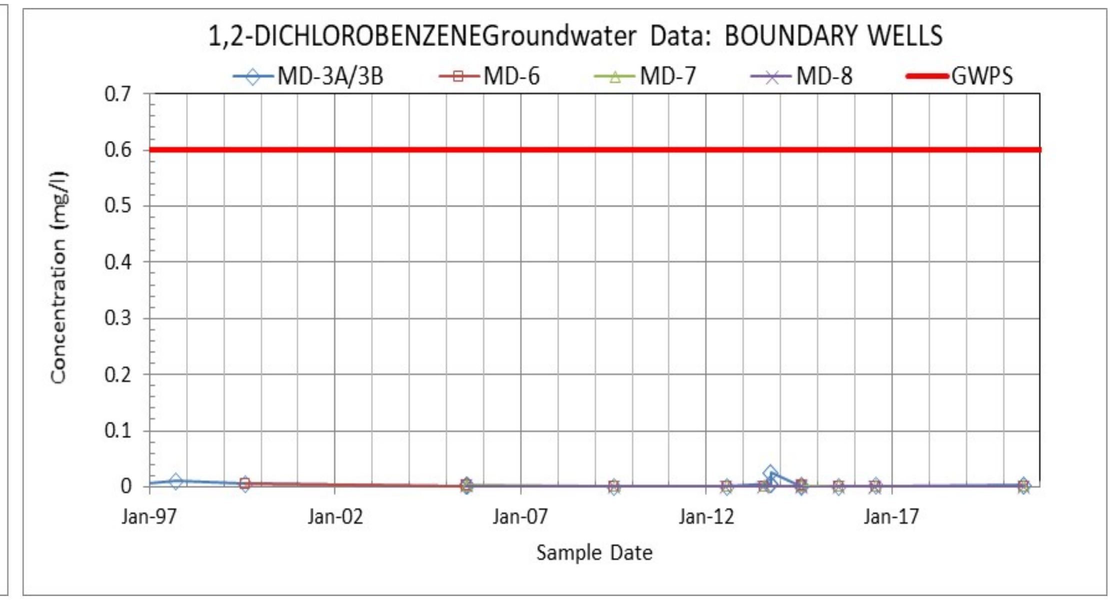

4,4'-DDT Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
0.00025
0.0002
0.00015
0.0001
0.00005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

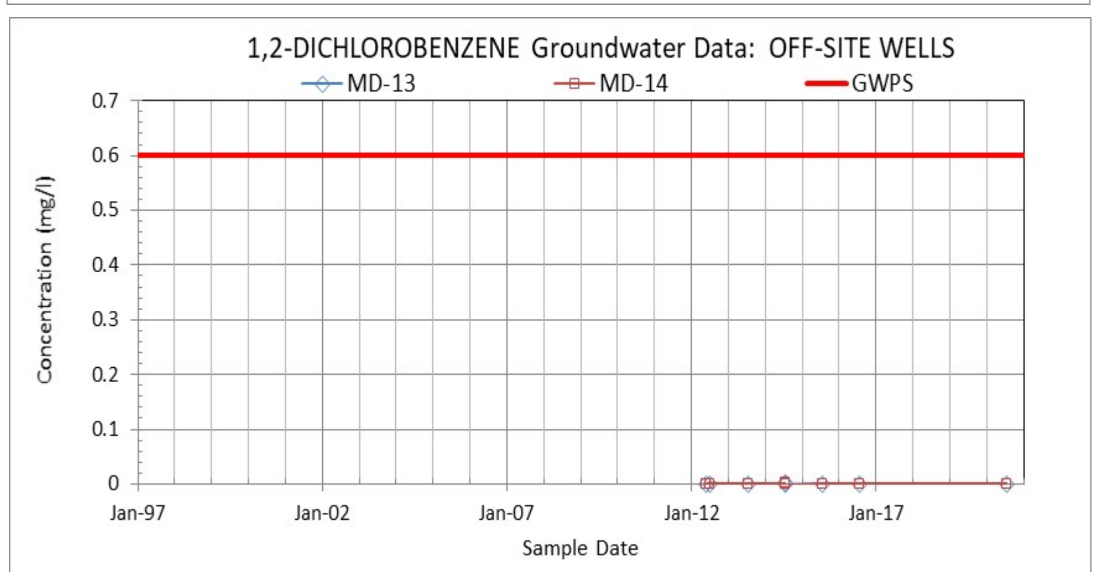

4,4'-DDT Groundwater Data: PRODUCTION WATER SUPPLY WELLS
WW-1
WW-2
GWPS
0.00025
0.0002
0.00015
0.0001
0.00005
0
Concentration (mg/l)
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

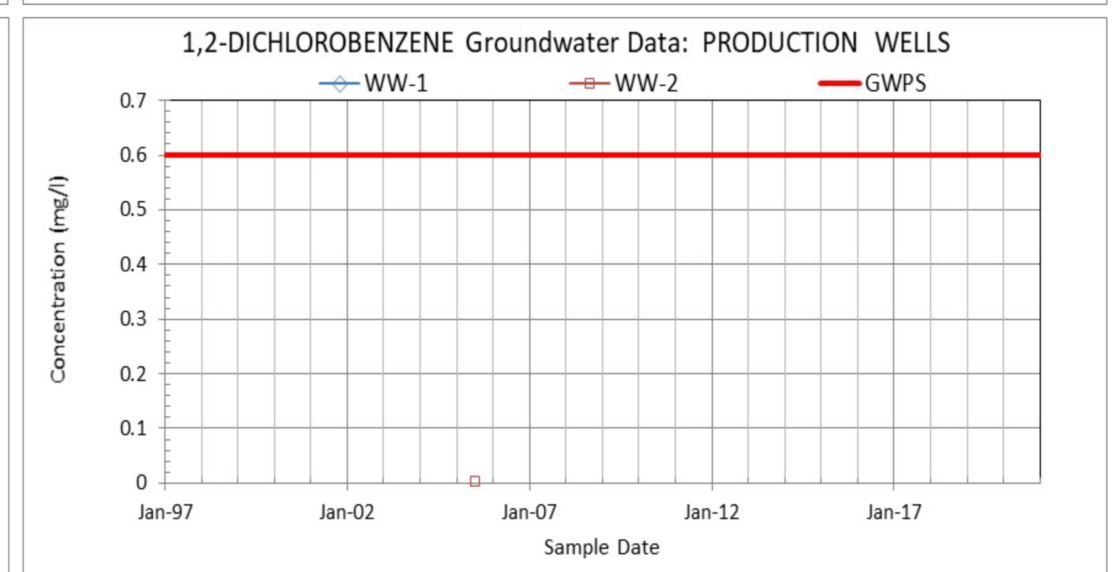

1,2-DICHLOROBENZENE Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

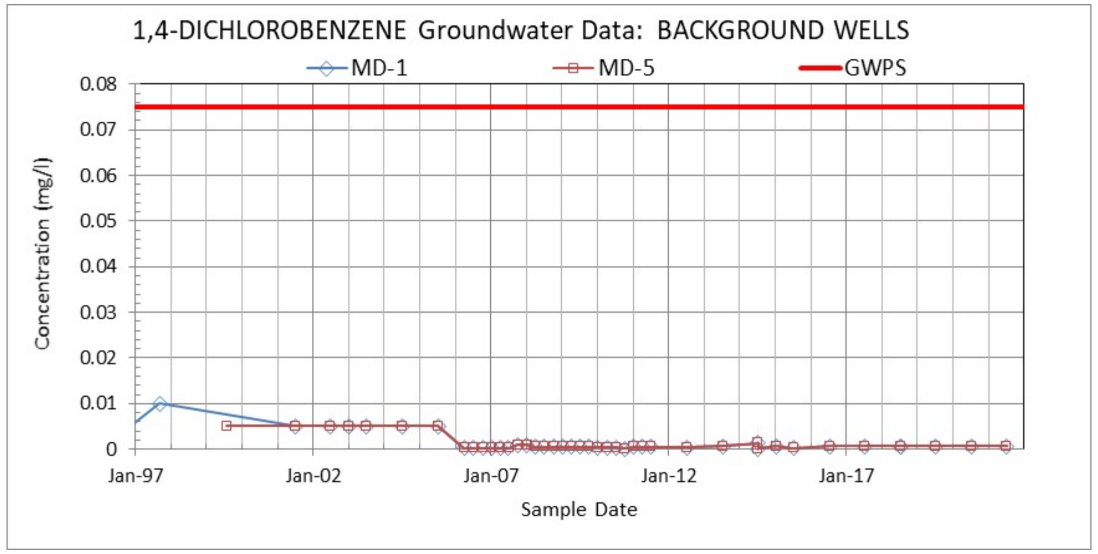

1,2-DICHLOROBENZENE Groundwater Data: EFFECTIVENESS WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

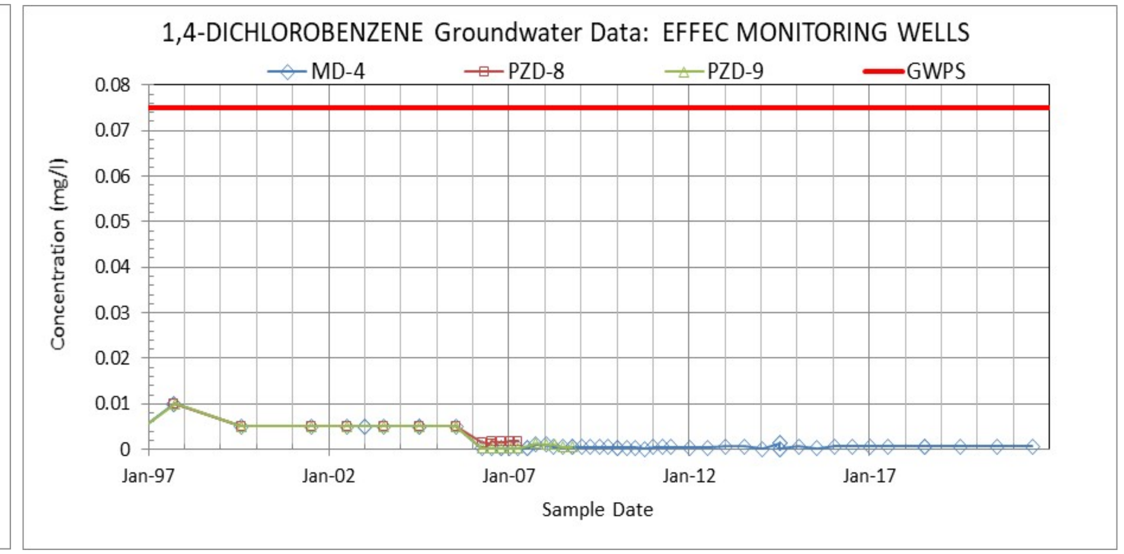

1,2-DICHLOROBENZENE GW Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

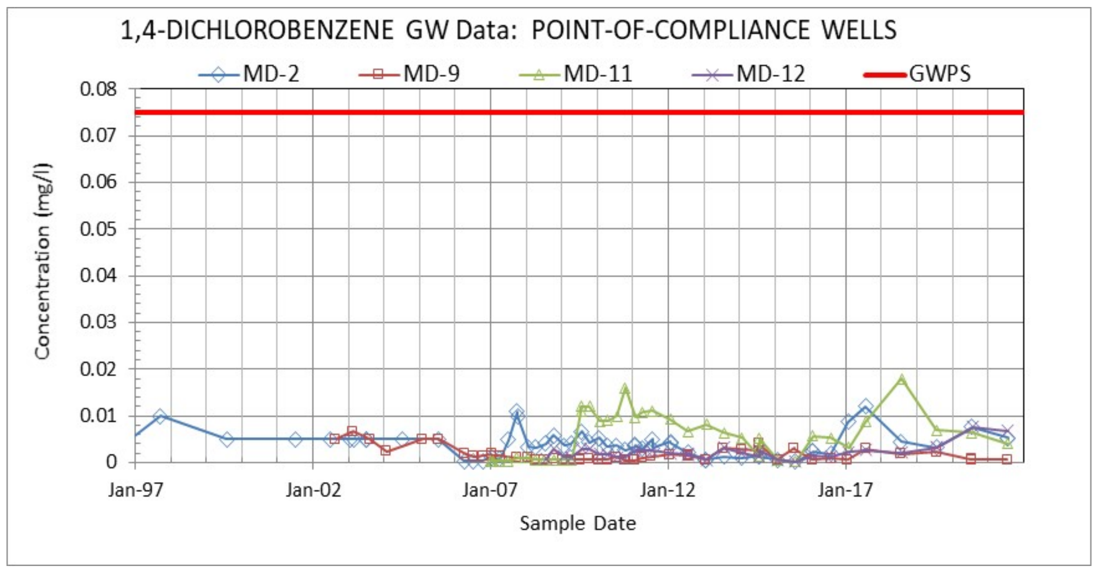

1,2-DICHLOROBENZENEGroundwater Data: BOUNDARY WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

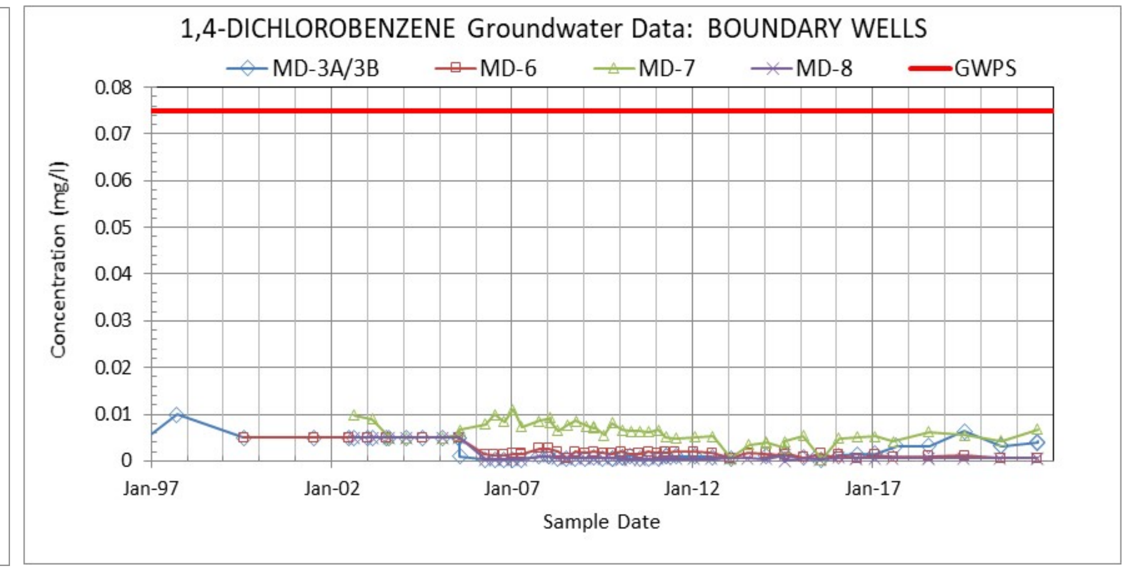

1,2-DICHLOROBENZENE Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

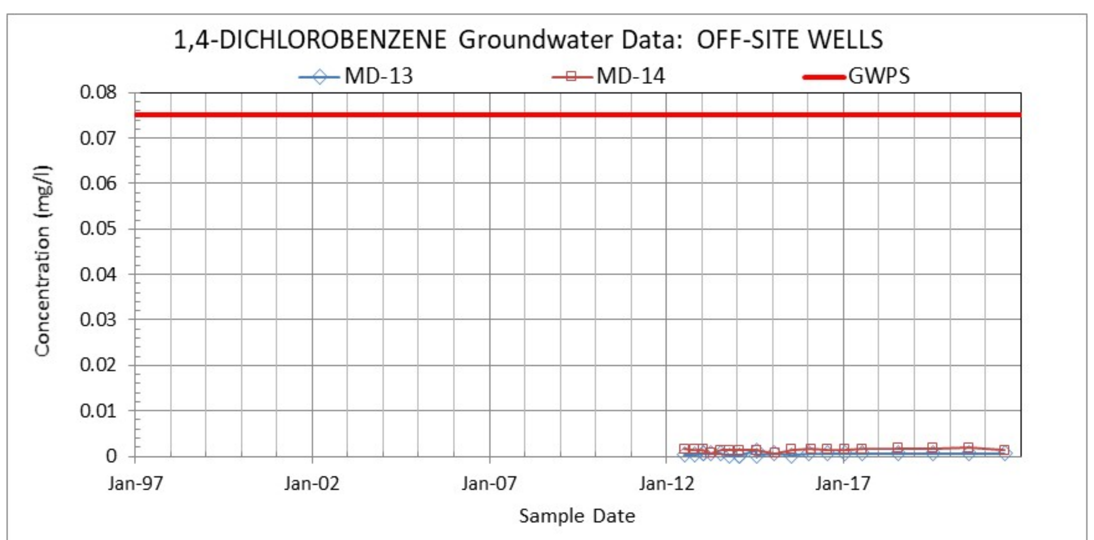

1,2-DICHLOROBENZENE Groundwater Data: PRODUCTION WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

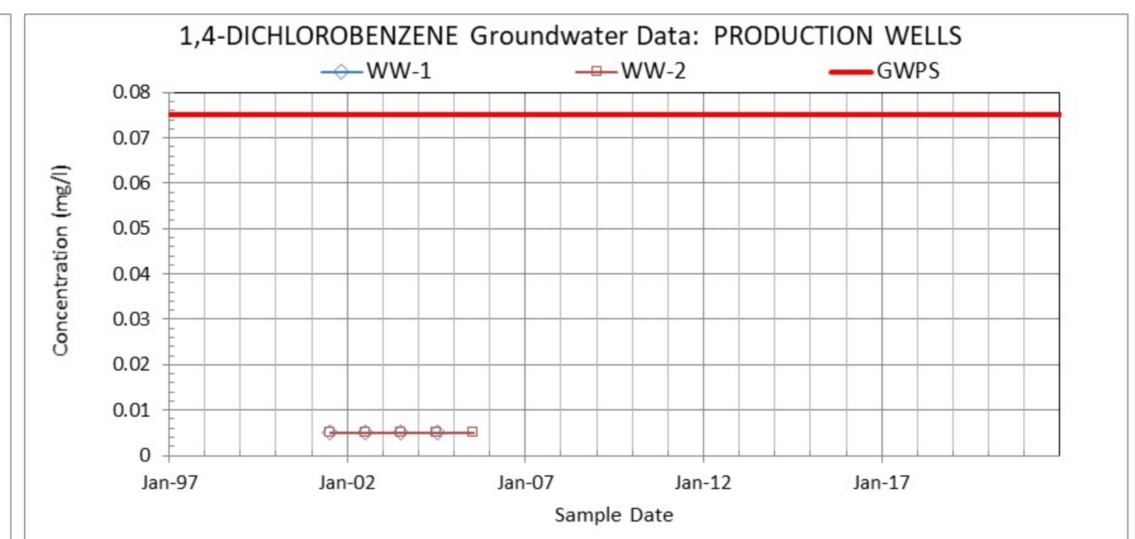

1,4-DICHLOROBENZENE Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

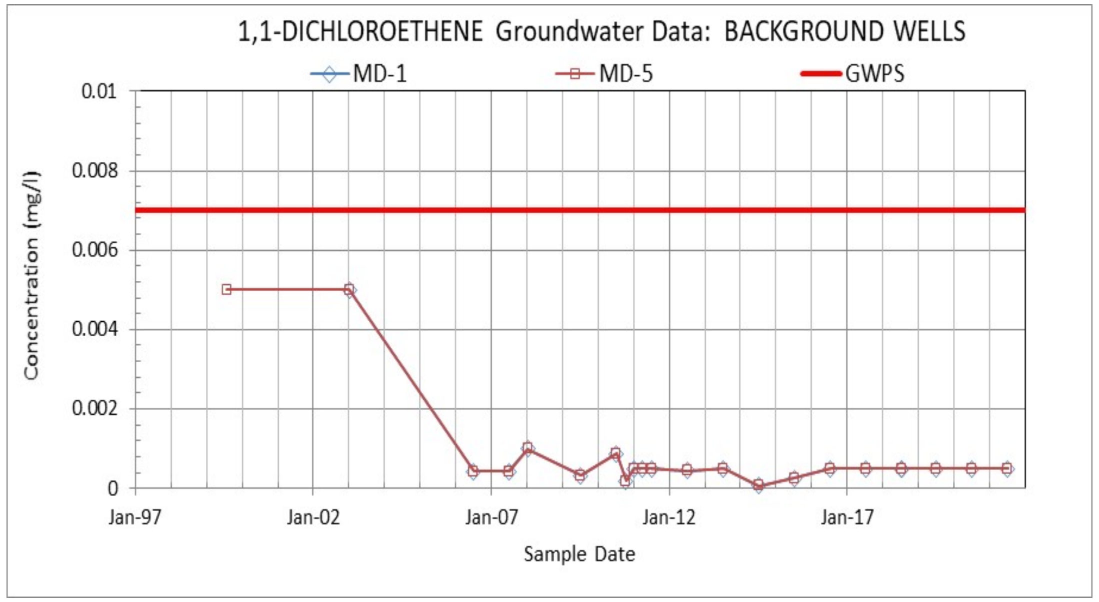

1,4-DICHLOROBENZENE Groundwater Data: EFFEC MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

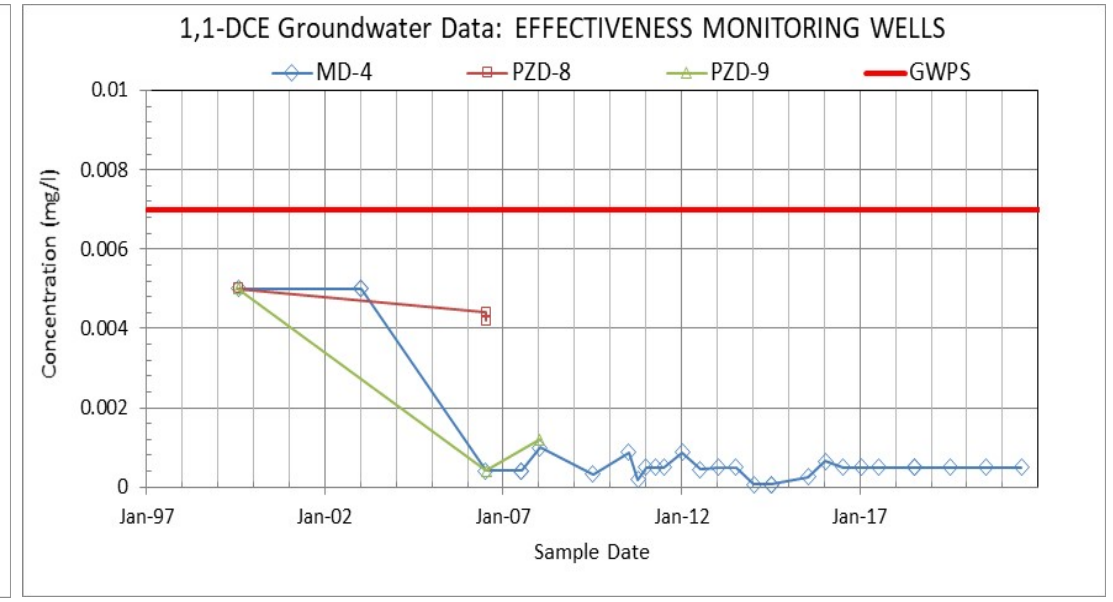

1,4-DICHLOROBENZENE GW Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

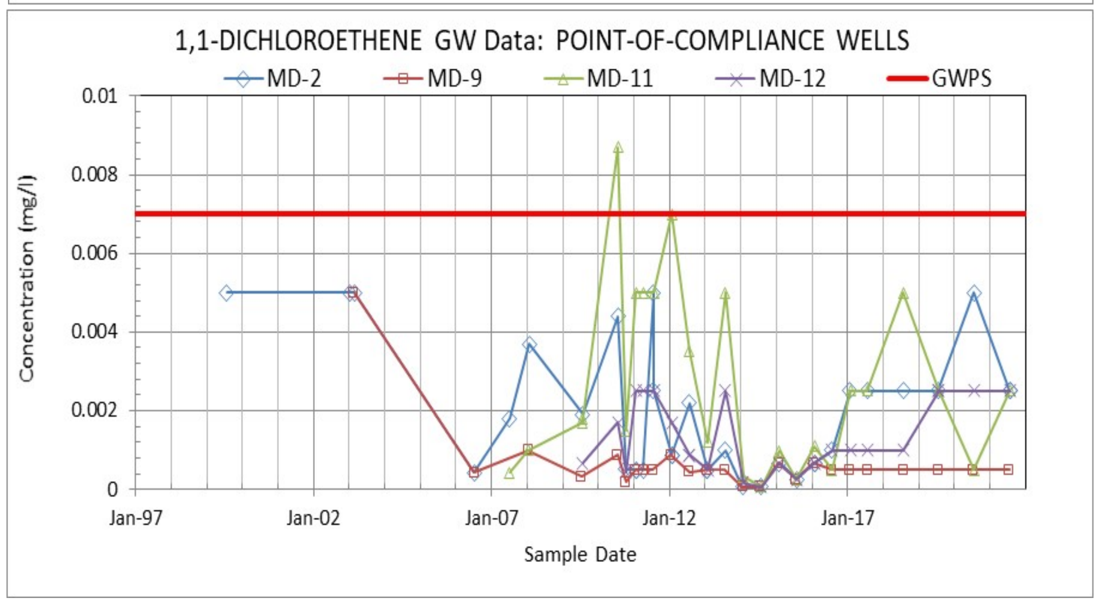

1,4-DICHLOROBENZENE Groundwater Data: BOUNDARY WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

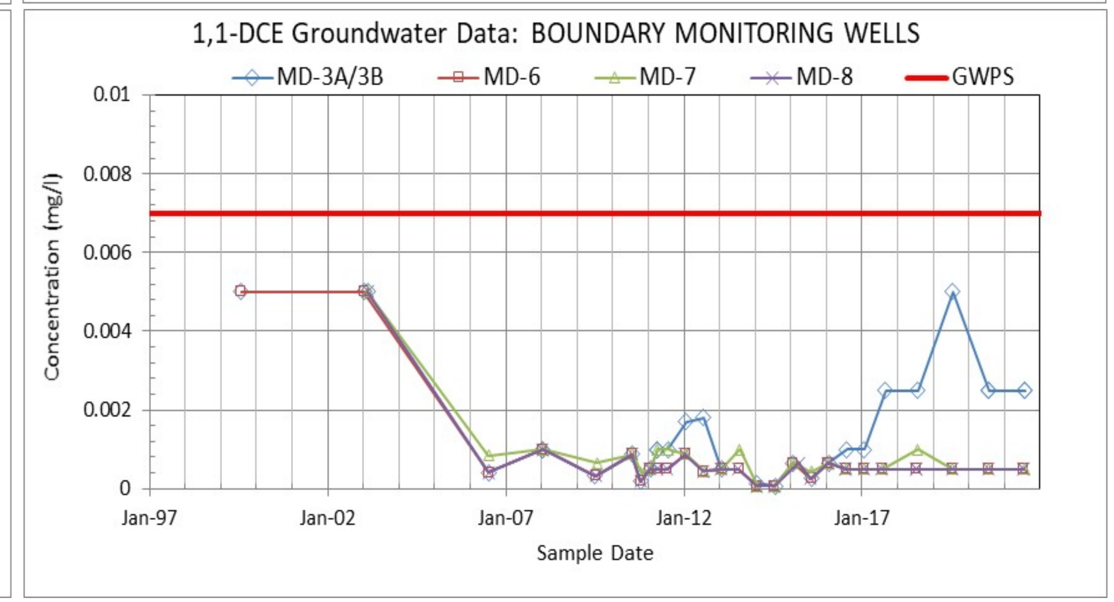

1,4-DICHLOROBENZENE Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

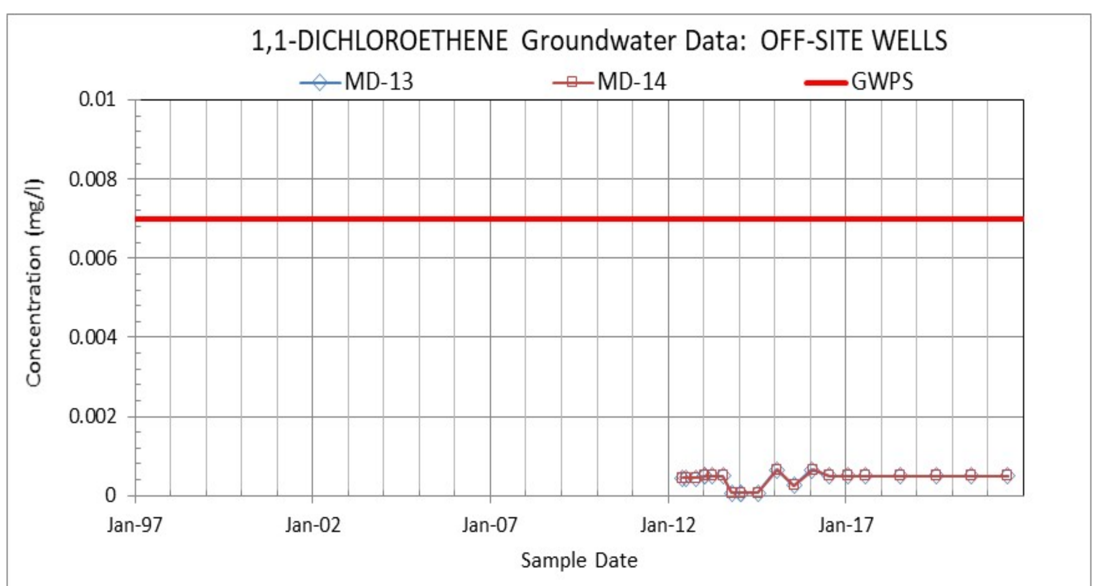

1,4-DICHLOROBENZENE Groundwater Data: PRODUCTION WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

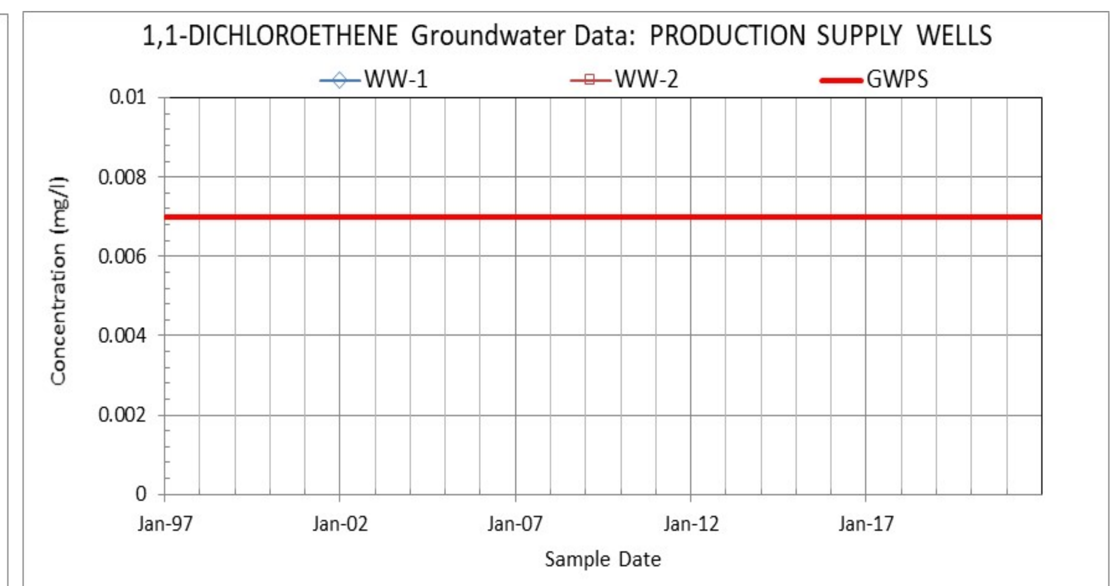

1,1-DICHLOROETHENE Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
0.01
0.008
0.006
0.004
0.002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

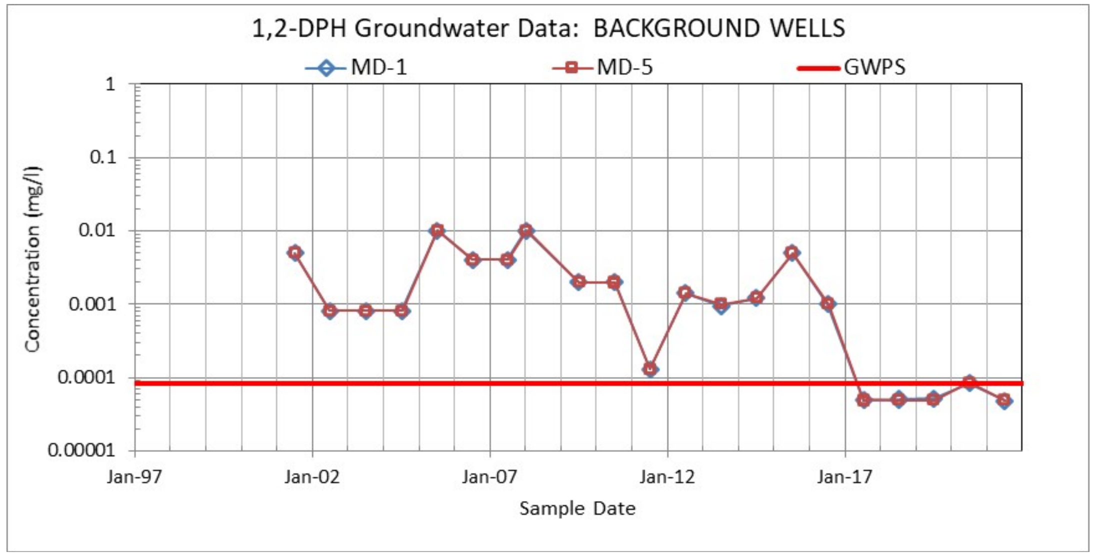

1,1-DCE Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
0.01
0.008
0.006
0.004
0.002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

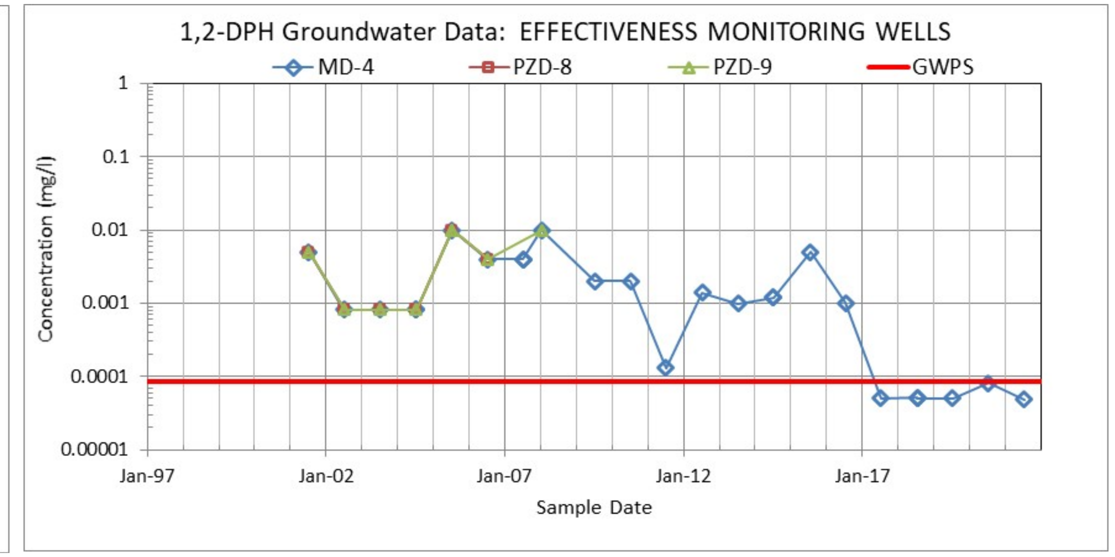

1,1-DICHLOROETHENE GW Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
0.01
0.008
0.006
0.004
0.002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

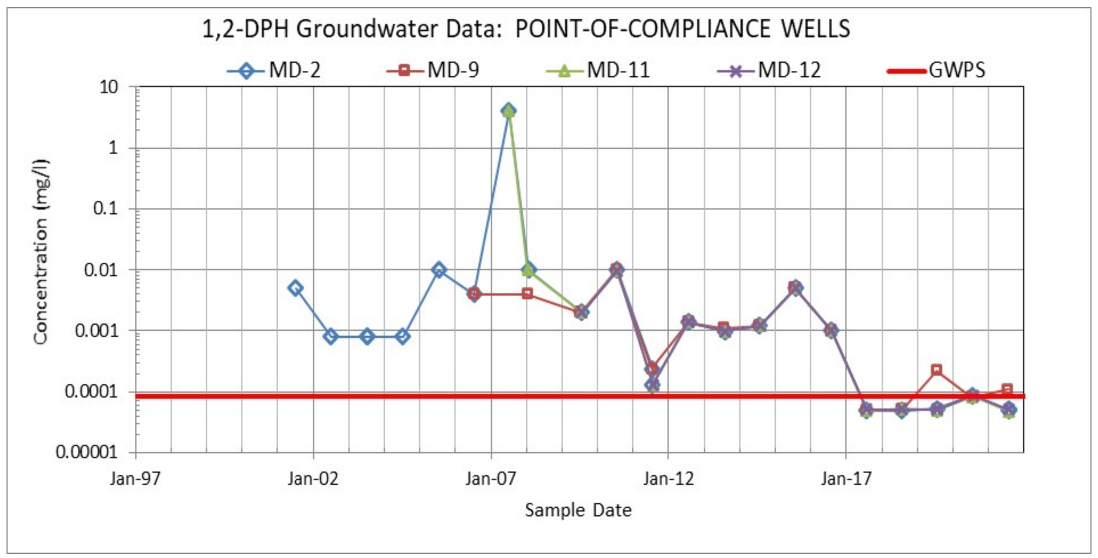

1,1-DCE Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
0.01
0.008
0.006
0.004
0.002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

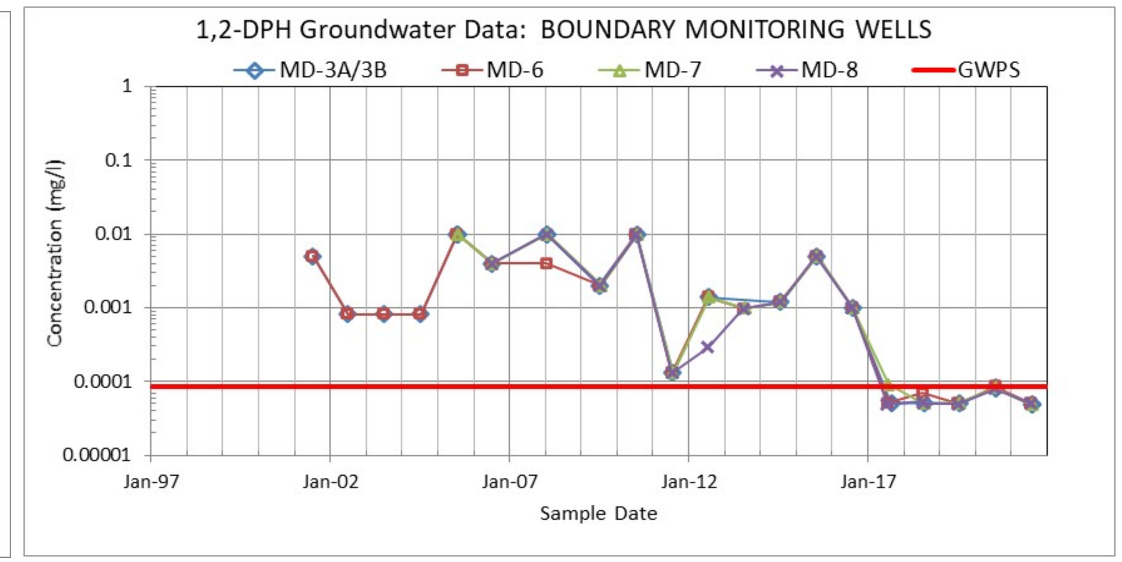

1,1-DICHLOROETHENE Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
0.01
0.008
0.006
0.004
0.002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

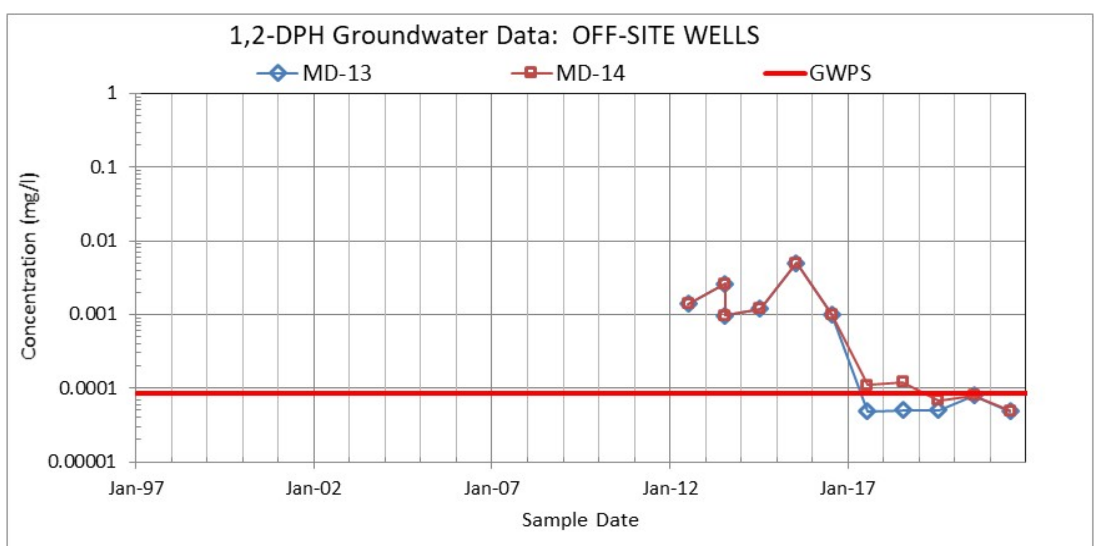

1,1-DICHLOROETHENE Groundwater Data: PRODUCTION SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
0.01
0.008
0.006
0.004
0.002
0
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

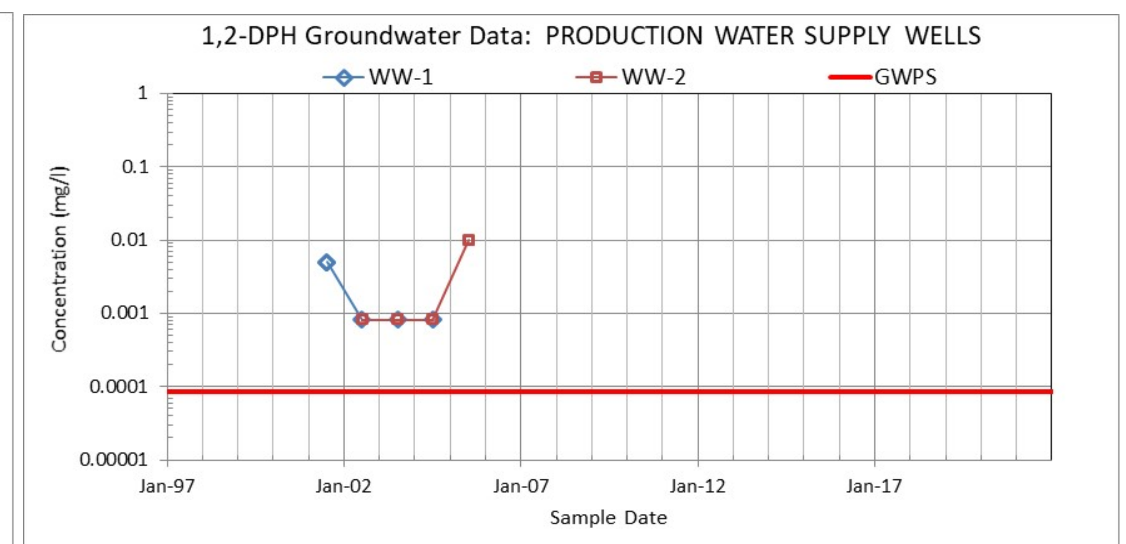

1,2-DPH Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

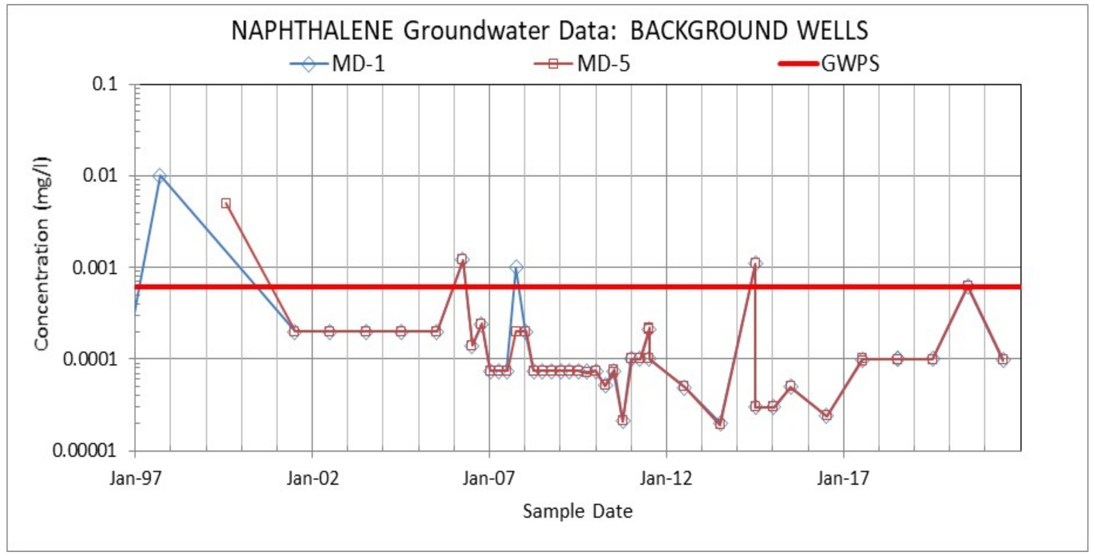

1,2-DPH Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

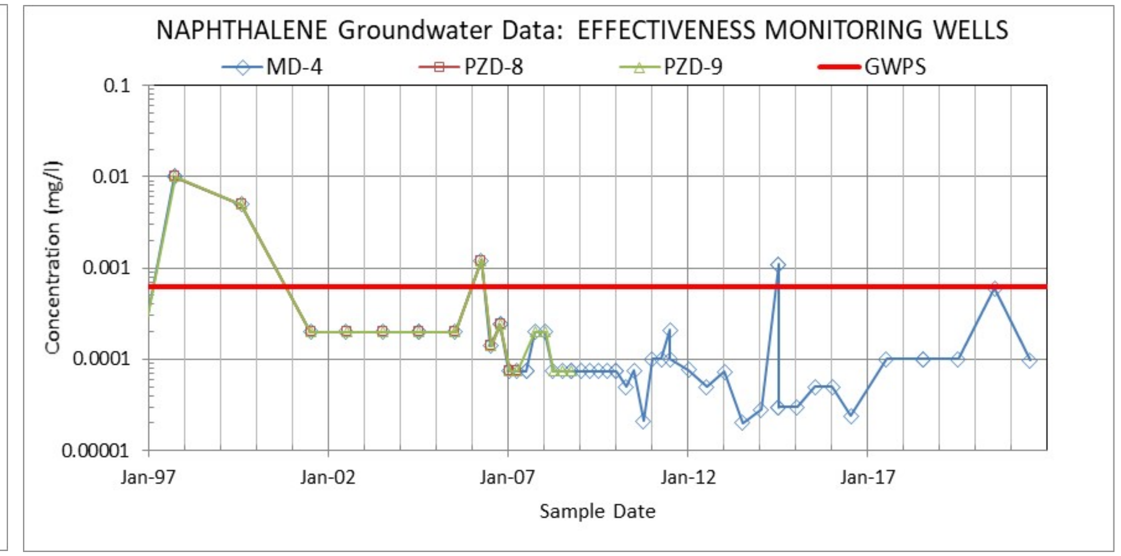

1,2-DPH Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
10
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

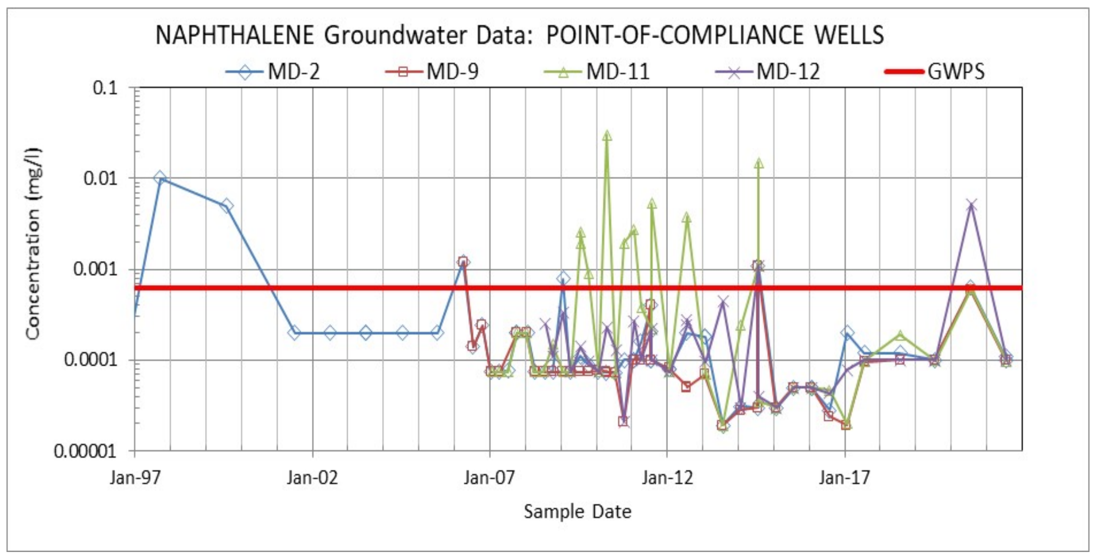

1,2-DPH Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

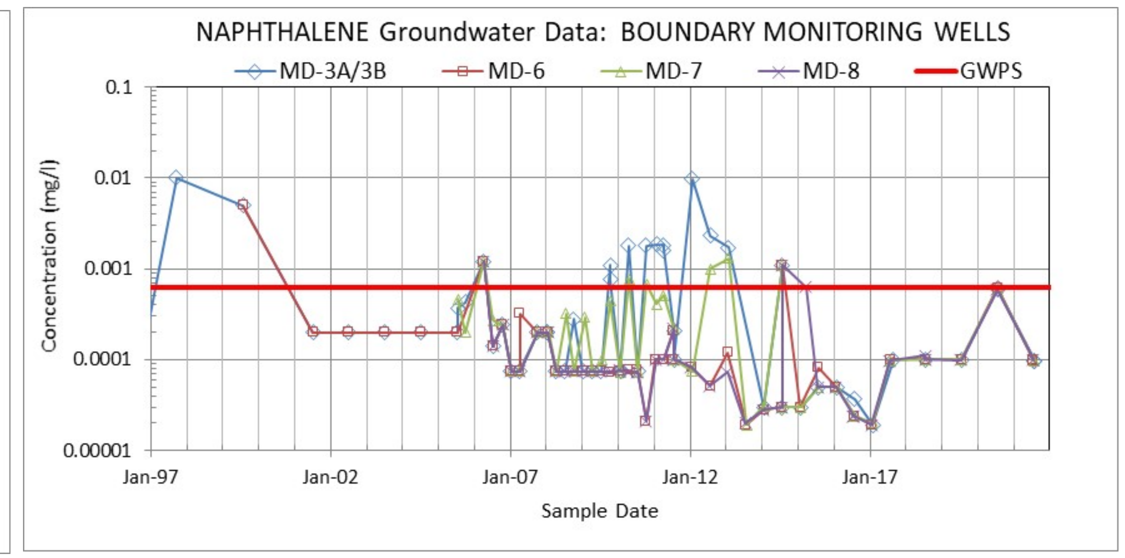

1,2-DPH Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

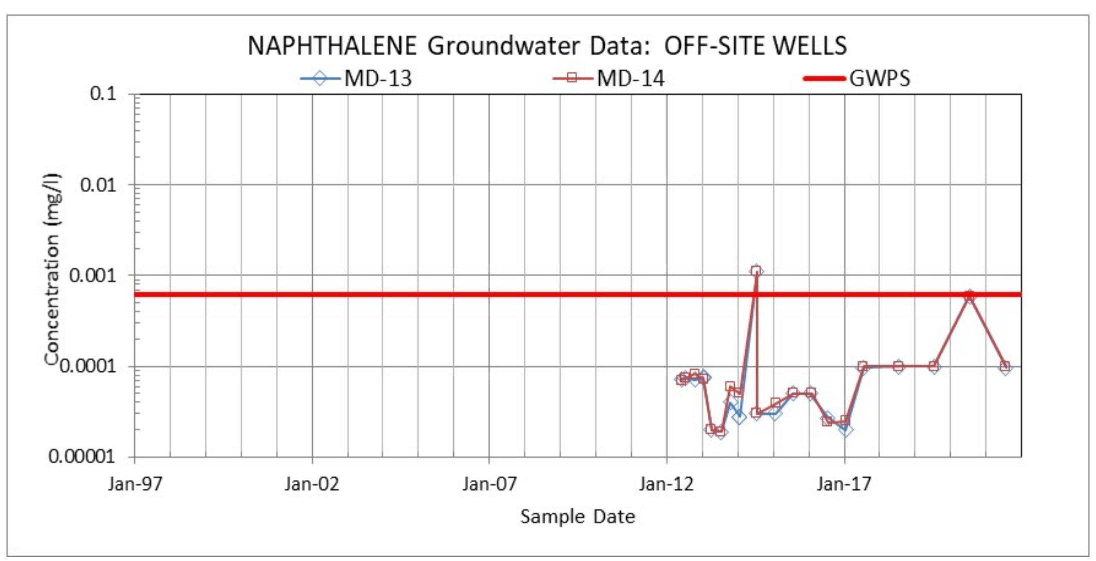

1,2-DPH Groundwater Data: PRODUCTION WATER SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
1
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

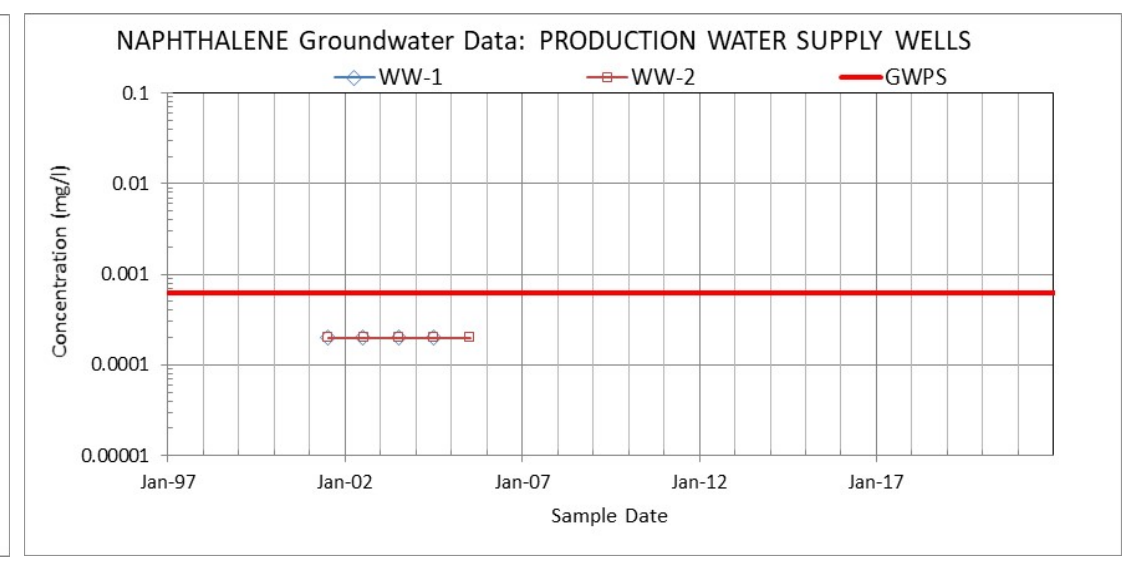

NAPHTHALENE Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

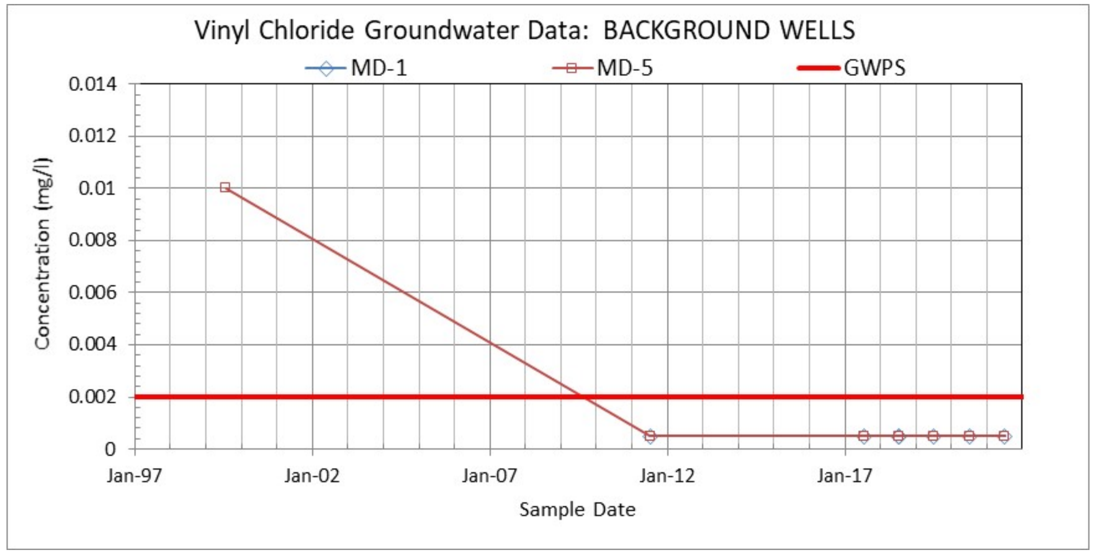

NAPHTHALENE Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

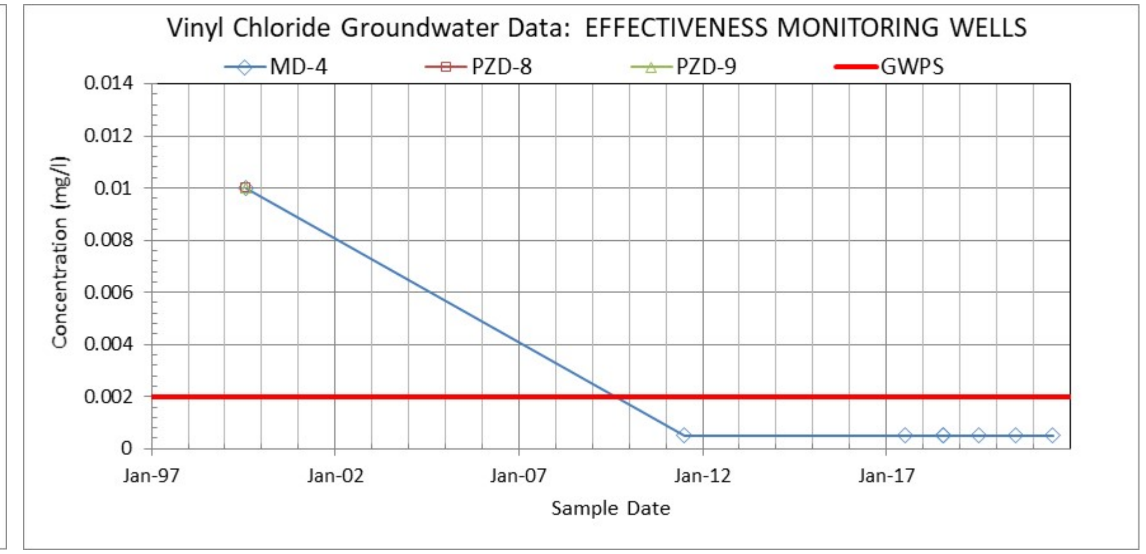

NAPHTHALENE Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
Concentration (mg/l)
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

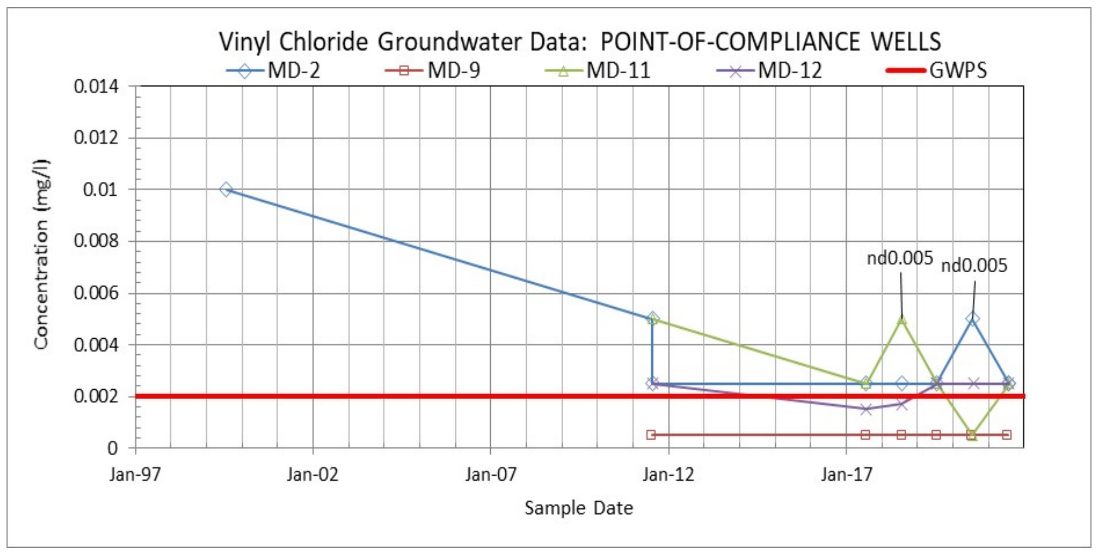

NAPHTHALENE Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
Concentration (mg/l)
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

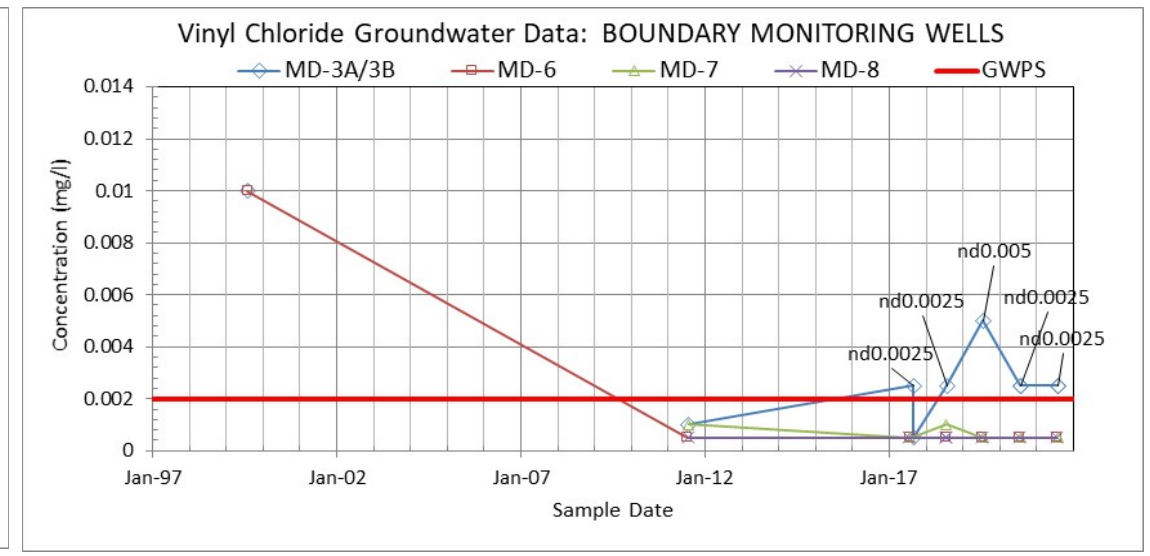

NAPHTHALENE Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

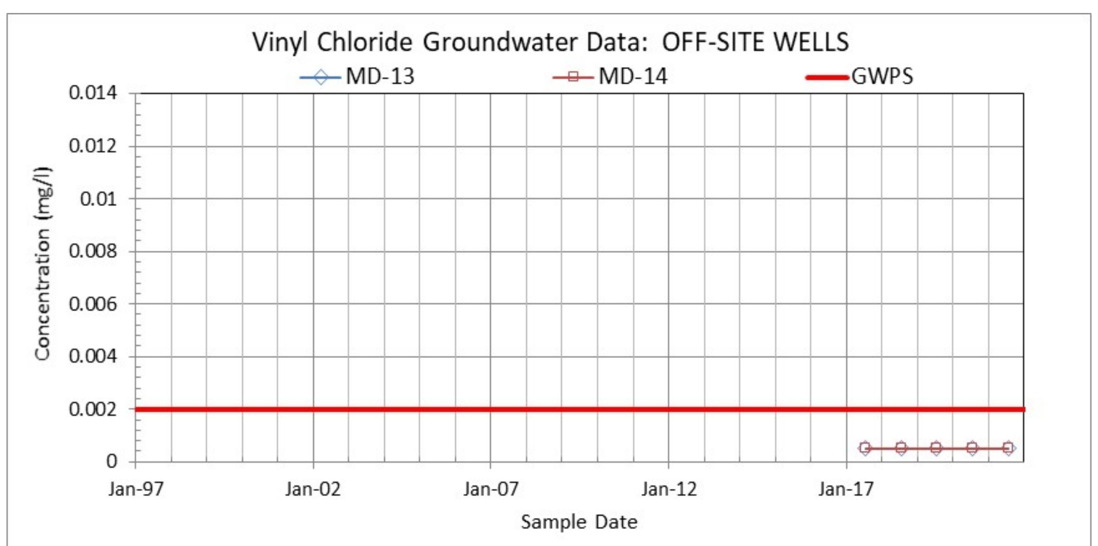

NAPHTHALENE Groundwater Data: PRODUCTION WATER SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
0.1
0.01
0.001
0.0001
0.00001
Jan-97
Jan-02
Jan-07
Jan-12
Jan-17
Sample Date

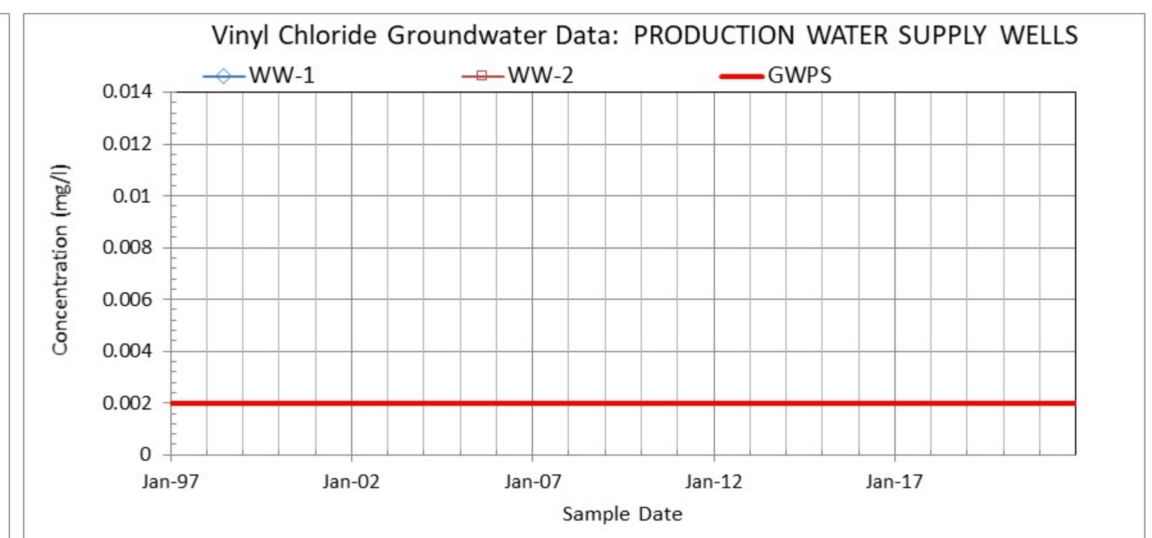

Vinyl Chloride Groundwater Data: BACKGROUND WELLS
MD-1
MD-5
GWPS
Concentration (mg/l)
Sample Date


Vinyl Chloride Groundwater Data: EFFECTIVENESS MONITORING WELLS
MD-4
PZD-8
PZD-9
GWPS
Concentration (mg/l)
Sample Date


Vinyl Chloride Groundwater Data: POINT-OF-COMPLIANCE WELLS
MD-2
MD-9
MD-11
MD-12
GWPS
nd0.005
nd0.005
Concentration (mg/l)
Sample Date


Vinyl Chloride Groundwater Data: BOUNDARY MONITORING WELLS
MD-3A/3B
MD-6
MD-7
MD-8
GWPS
nd0.005
nd0.0025
nd0.0025
nd0.0025
nd0.0025
Concentration (mg/l)
Sample Date

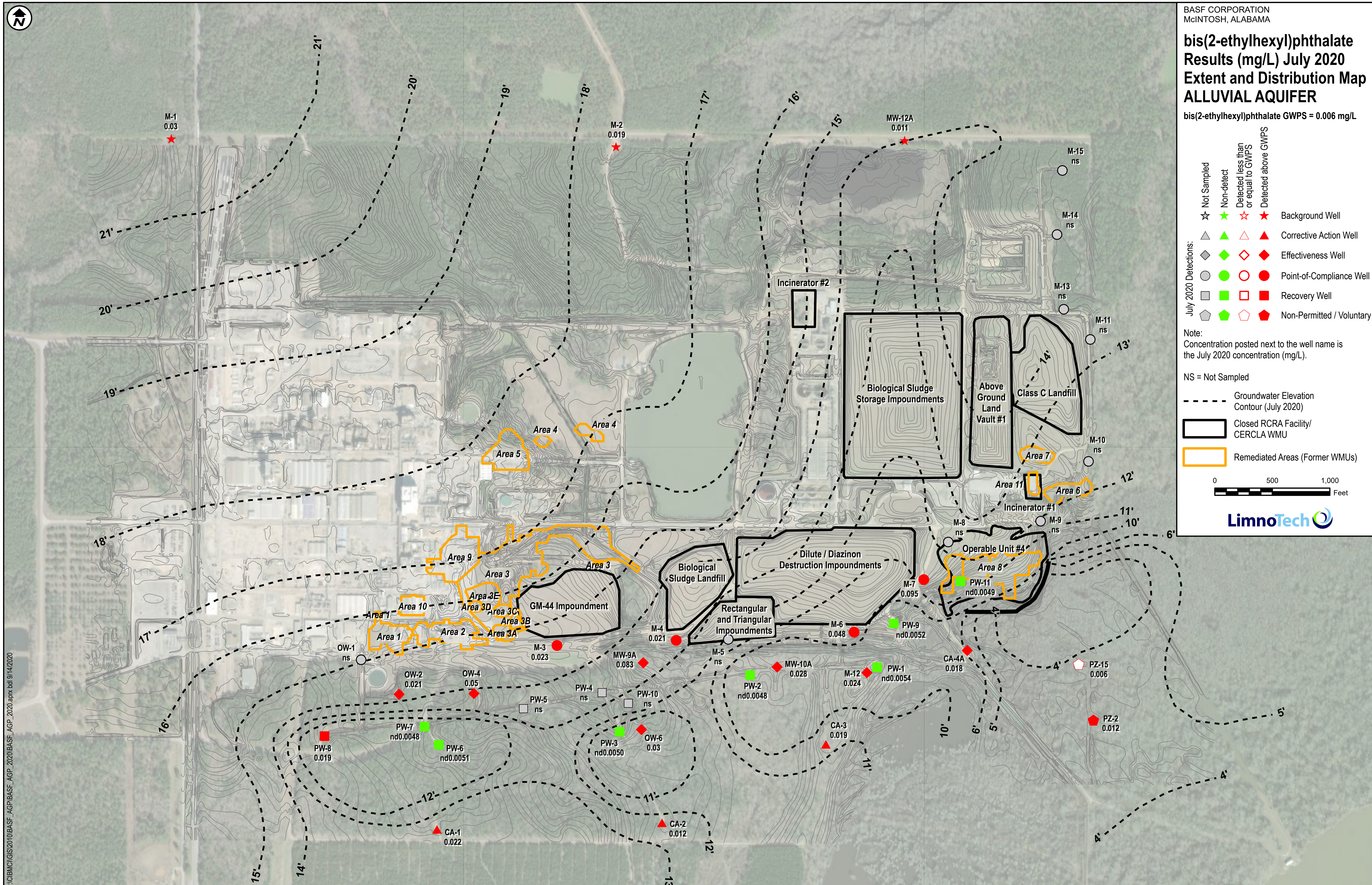

Vinyl Chloride Groundwater Data: OFF-SITE WELLS
MD-13
MD-14
GWPS
Concentration (mg/l)
Sample Date


Vinyl Chloride Groundwater Data: PRODUCTION WATER SUPPLY WELLS
WW-1
WW-2
GWPS
Concentration (mg/l)
Sample Date

Attachment F

Extent and Distribution Maps of Detected Compounds in Alluvial Aquifer and Upper Miocene Aquifer Groundwater (July 2020, 5-Year Sampling Data)

This page is blank to facilitate double-sided printing.



BASF CORPORATION
McINTOSH, ALABAMA
bis(2-ethylhexyl)phthalate
Results (mg/L) July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
bis(2-ethylhexyl)phthalate GWPS = 0.006 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1
0.03
M-2
0.019
MW-12A
0.011
M-15
ns
M-14
ns
M-13
ns
M-11
ns
M-10
ns
M-9
ns
M-8
ns
M-7
0.095
PW-11
nd0.0049
PW-9
nd0.0052
M-6
0.048
M-4
0.021
M-5
ns
M-3
0.023
OW-1
ns
OW-2
0.021
OW-4
0.05
MW-9A
0.083
MW-10A
0.028
M-12
0.024
PW-1
nd0.0054
PW-2
nd0.0048
CA-4A
0.018
PZ-15
0.006
PZ-2
0.012
PW-4
ns
PW-10
ns
PW-5
ns
PW-7
nd0.0048
PW-6
nd0.0051
PW-8
0.019
PW-3
nd0.0050
OW-6
0.03
CA-3
0.019
CA-1
0.022
CA-2
0.012
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Operable Unit #4
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
N
S:\CBMC\GIS\2010\BASF_AGP\BASF_AGP_2020\BASF_AGP_2020.aprx bdl 9/14/2020

BASF CORPORATION
McINTOSH, ALABAMA

1,1-DCE Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER

1,1-DCE GWPS = 0.007 mg/L

July 2020 Detections:

	Not Sampled	Non-detect	Detected less than or equal to GWPS	Detected above GWPS
Background Well	☆	★	☆	★
Corrective Action Well	△	▲	△	▲
Effectiveness Well	◆	◆	◇	◆
Point-of-Compliance Well	●	●	○	●
Recovery Well	■	■	□	■
Non-Permitted / Voluntary	⬟	⬟	⬠	⬟

Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).

NS = Not Sampled

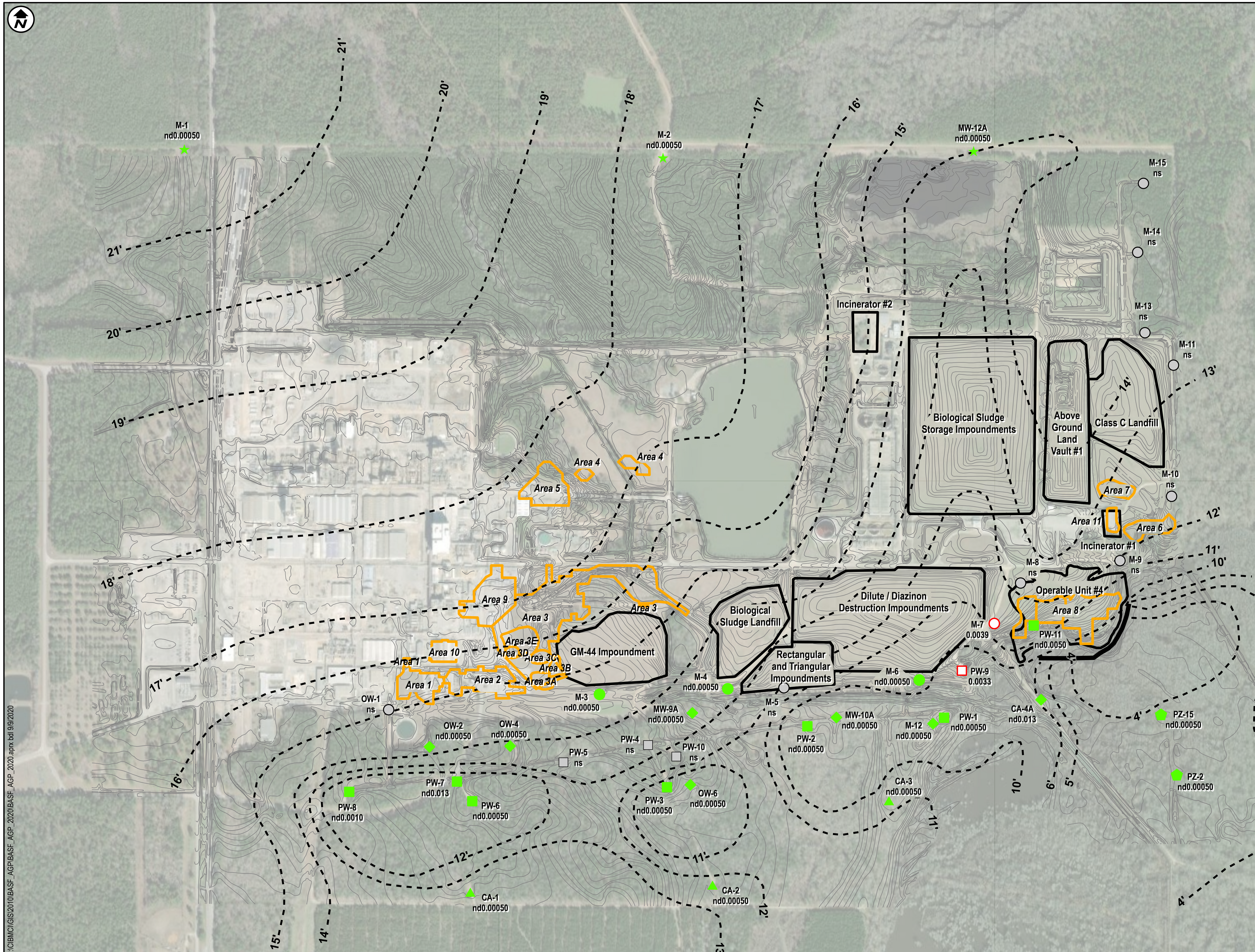
Groundwater Elevation Contour (July 2020)

Closed RCRA Facility/ CERCLA WMU

Remediated Areas (Former WMUs)

0 500 1,000 Feet

LimnoTech



BASF CORPORATION
McINTOSH, ALABAMA

1,2,4-Trimethylbenzene Results (mg/L) July 2020 Extent and Distribution Map ALLUVIAL AQUIFER

1,2,4-Trimethylbenzene GWPS = 0.0012 mg/L

July 2020 Detections:

	Not Sampled	Non-detect	Detected less than or equal to GWPS	Detected above GWPS
Background Well	☆	★	☆	★
Corrective Action Well	△	▲	△	▲
Effectiveness Well	◇	◆	◇	◆
Point-of-Compliance Well	○	●	○	●
Recovery Well	□	■	□	■
Non-Permitted / Voluntary	⬠	⬟	⬠	⬟

Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).

NS = Not Sampled

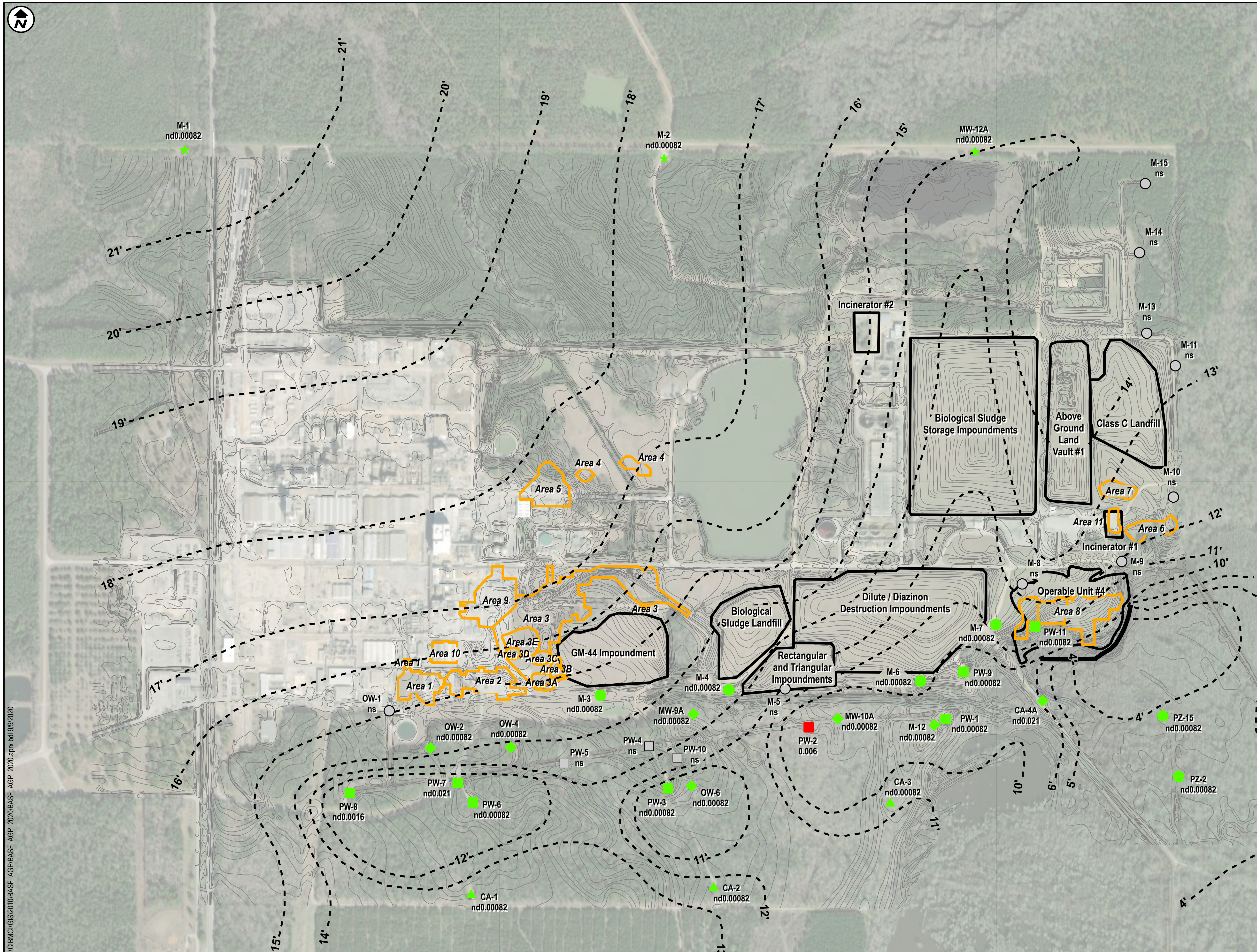
Groundwater Elevation Contour (July 2020)

Closed RCRA Facility/ CERCLA WMU

Remediated Areas (Former WMUs)

0 500 1,000 Feet

LimnoTech



BASF CORPORATION
McINTOSH, ALABAMA

1,2-Dichlorobenzene Results (mg/L) July 2020 Extent and Distribution Map ALLUVIAL AQUIFER

1,2-Dichlorobenzene GWPS = 0.6 mg/L

July 2020 Detections: Not Sampled / Non-detect / Detected less than or equal to GWPS / Detected above GWPS

- Background Well
- Corrective Action Well
- Effectiveness Well
- Point-of-Compliance Well
- Recovery Well
- Non-Permitted / Voluntary

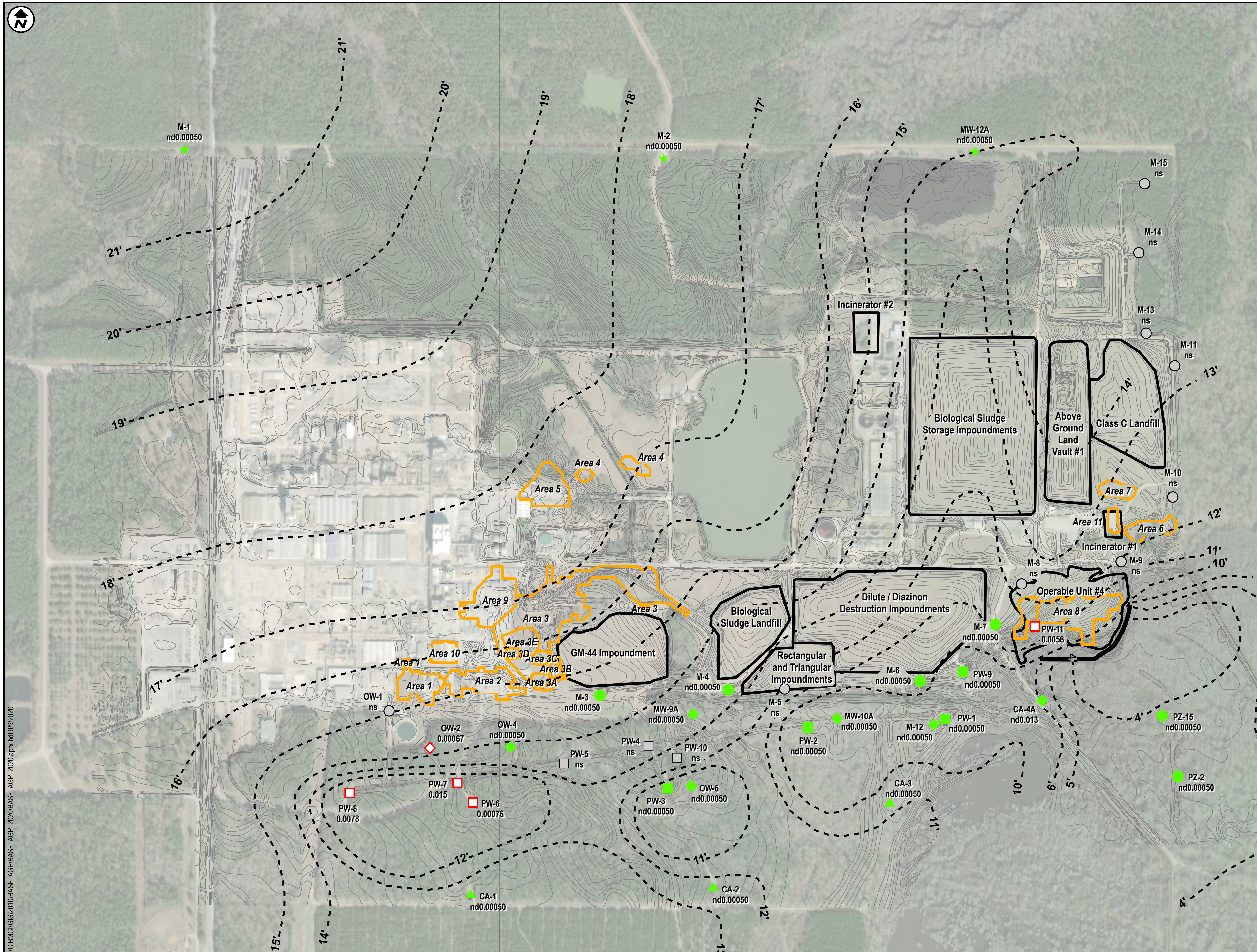
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).

NS = Not Sampled

- Groundwater Elevation Contour (July 2020)
- Closed RCRA Facility/ CERCLA WMU
- Remediated Areas (Former WMUs)

0 500 1,000 Feet

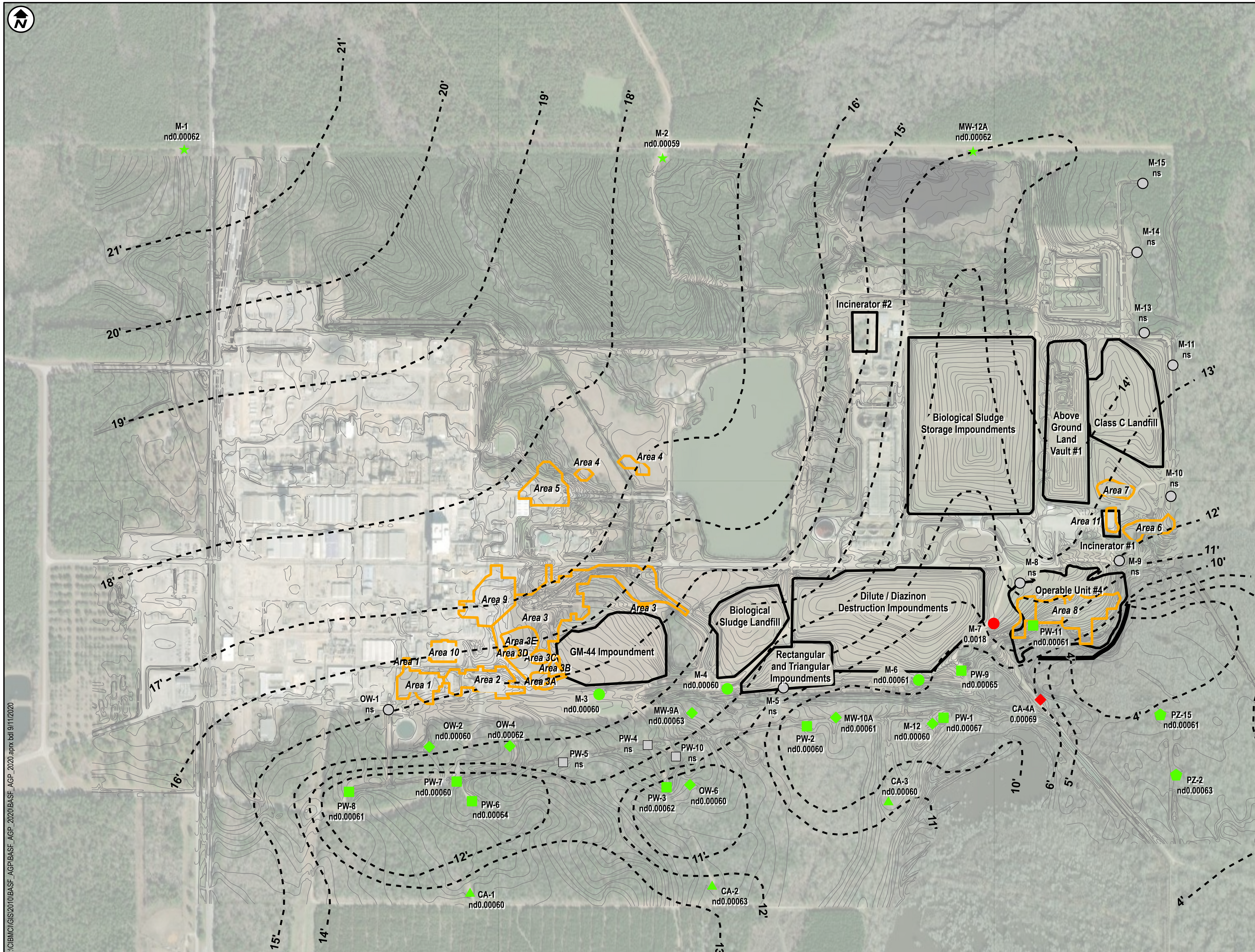
LimnoTech



BASF CORPORATION
McINTOSH, ALABAMA

1,2-Diphenylhydrazine Results (mg/L) July 2020 Extent and Distribution Map ALLUVIAL AQUIFER

1,2-Diphenylhydrazine GWPS = 0.000084 mg/L



Not Sampled | Non-detect | Detected less than or equal to GWPS | Detected above GWPS

July 2020 Detections:

Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary

Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).

NS = Not Sampled

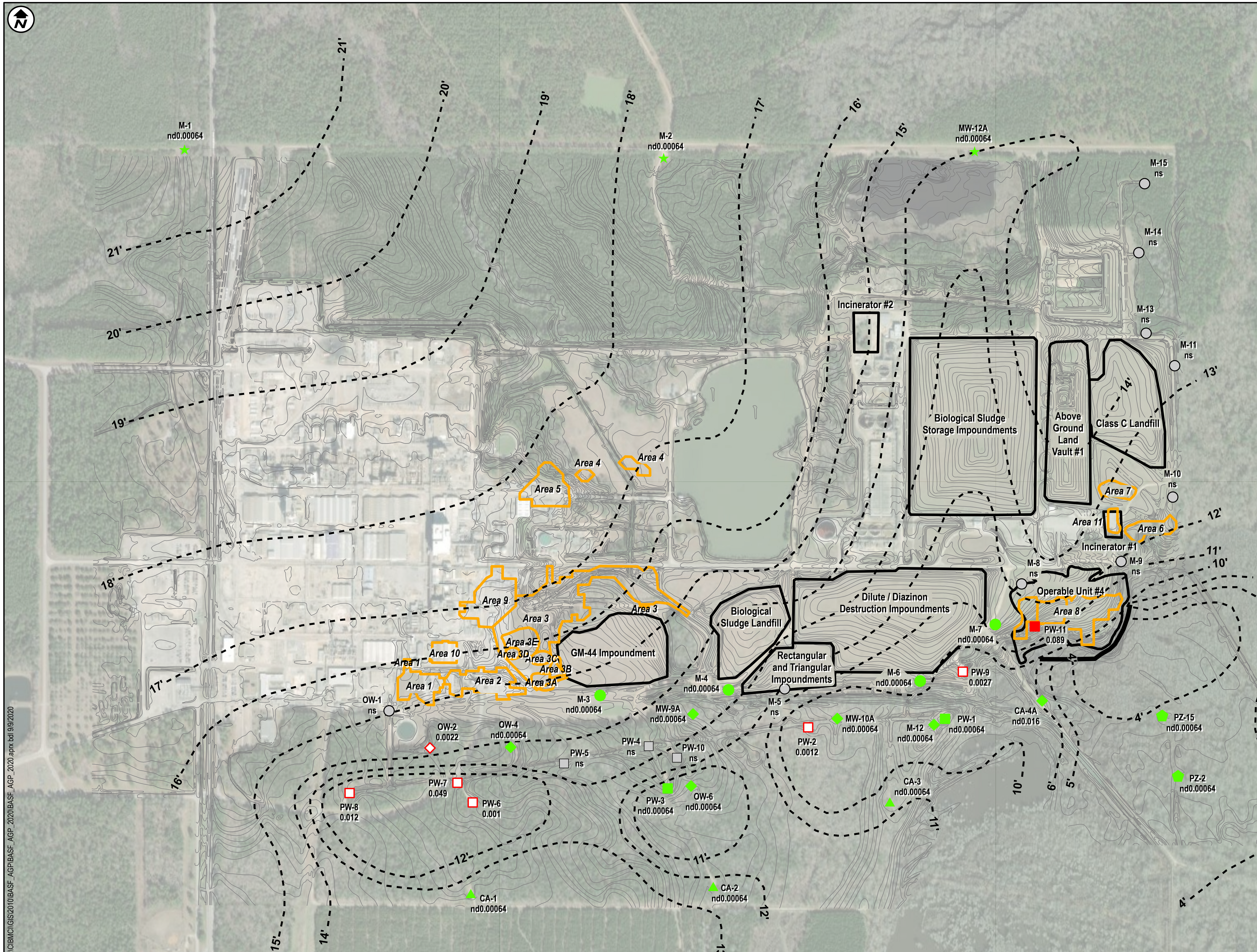
Groundwater Elevation Contour (July 2020)

Closed RCRA Facility/ CERCLA WMU

Remediated Areas (Former WMUs)

0 500 1,000 Feet

LimnoTech



BASF CORPORATION
McINTOSH, ALABAMA

1,4-Dichlorobenzene Results (mg/L) July 2020 Extent and Distribution Map ALLUVIAL AQUIFER

1,4-Dichlorobenzene GWPS = 0.075 mg/L

July 2020 Detections:

	Not Sampled	Non-detect	Detected less than or equal to GWPS	Detected above GWPS
Background Well	☆	★	☆	★
Corrective Action Well	△	▲	△	▲
Effectiveness Well	◇	◆	◇	◆
Point-of-Compliance Well	○	●	○	●
Recovery Well	□	■	□	■
Non-Permitted / Voluntary	⬠	⬟	⬠	⬟

Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).

NS = Not Sampled

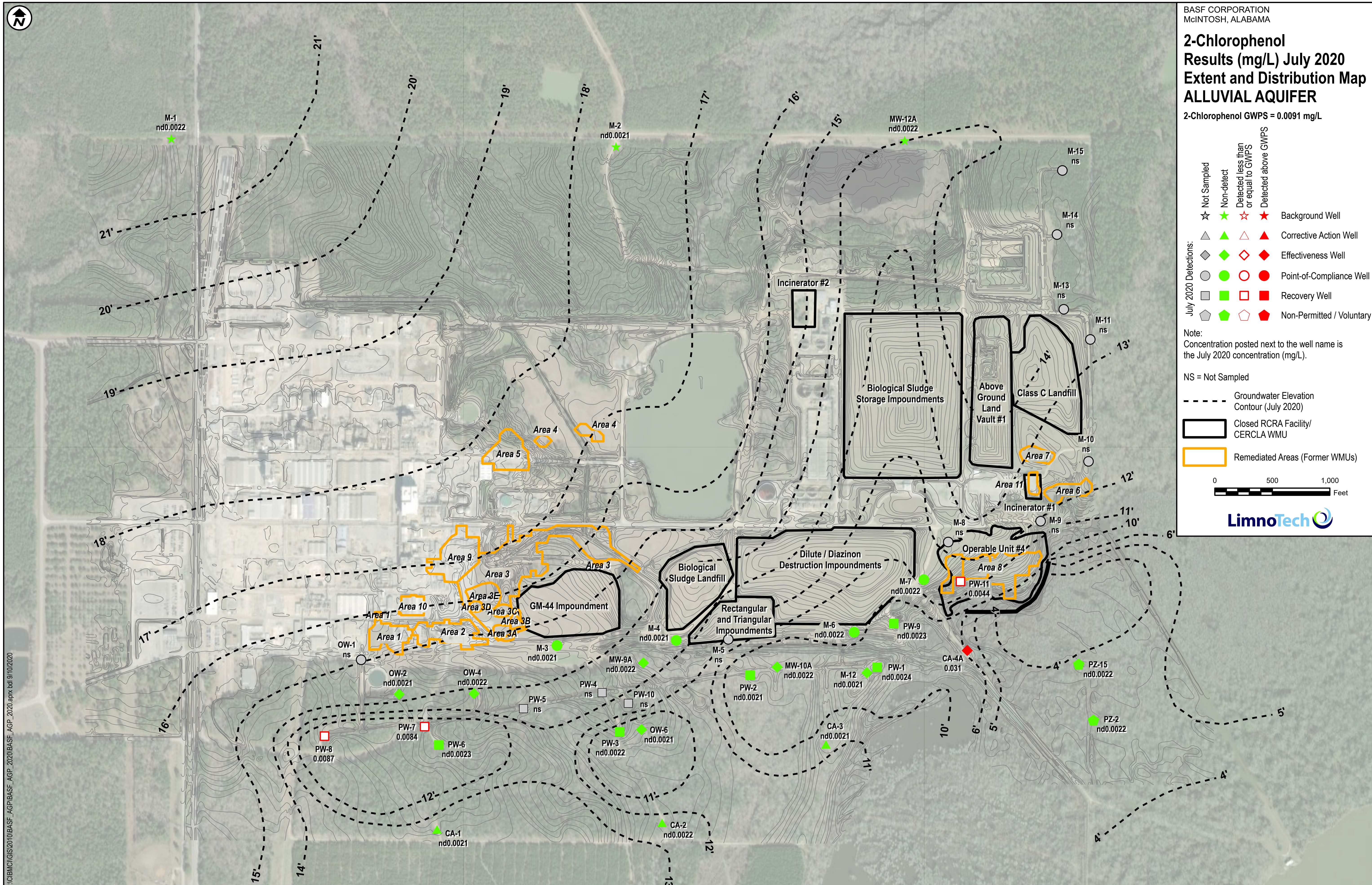
Groundwater Elevation Contour (July 2020)

Closed RCRA Facility/ CERCLA WMU

Remediated Areas (Former WMUs)

0 500 1,000 Feet

LimnoTech



BASF CORPORATION
McINTOSH, ALABAMA
2-Chlorophenol
Results (mg/L) July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
2-Chlorophenol GWPS = 0.0091 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1
nd0.0022
M-2
nd0.0021
MW-12A
nd0.0022
M-15
ns
M-14
ns
M-13
ns
M-11
ns
M-10
ns
M-9
ns
M-8
ns
M-7
nd0.0022
PW-11
0.0044
M-6
nd0.0022
PW-9
nd0.0023
M-5
ns
M-4
nd0.0021
M-3
nd0.0021
OW-1
ns
OW-2
nd0.0021
OW-4
nd0.0022
MW-9A
nd0.0022
MW-10A
nd0.0022
M-12
nd0.0021
PW-1
nd0.0024
CA-4A
0.031
PZ-15
nd0.0022
PZ-2
nd0.0022
PW-2
nd0.0021
PW-4
ns
PW-10
ns
PW-5
ns
PW-3
nd0.0022
OW-6
nd0.0021
CA-3
nd0.0021
PW-7
0.0084
PW-8
0.0087
PW-6
nd0.0023
CA-1
nd0.0021
CA-2
nd0.0022
Incinerator #2
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Incinerator #1
Operable Unit #4
Area 8
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 3
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
Area 9
Area 10
Area 1
Area 2
Area 4
Area 5
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
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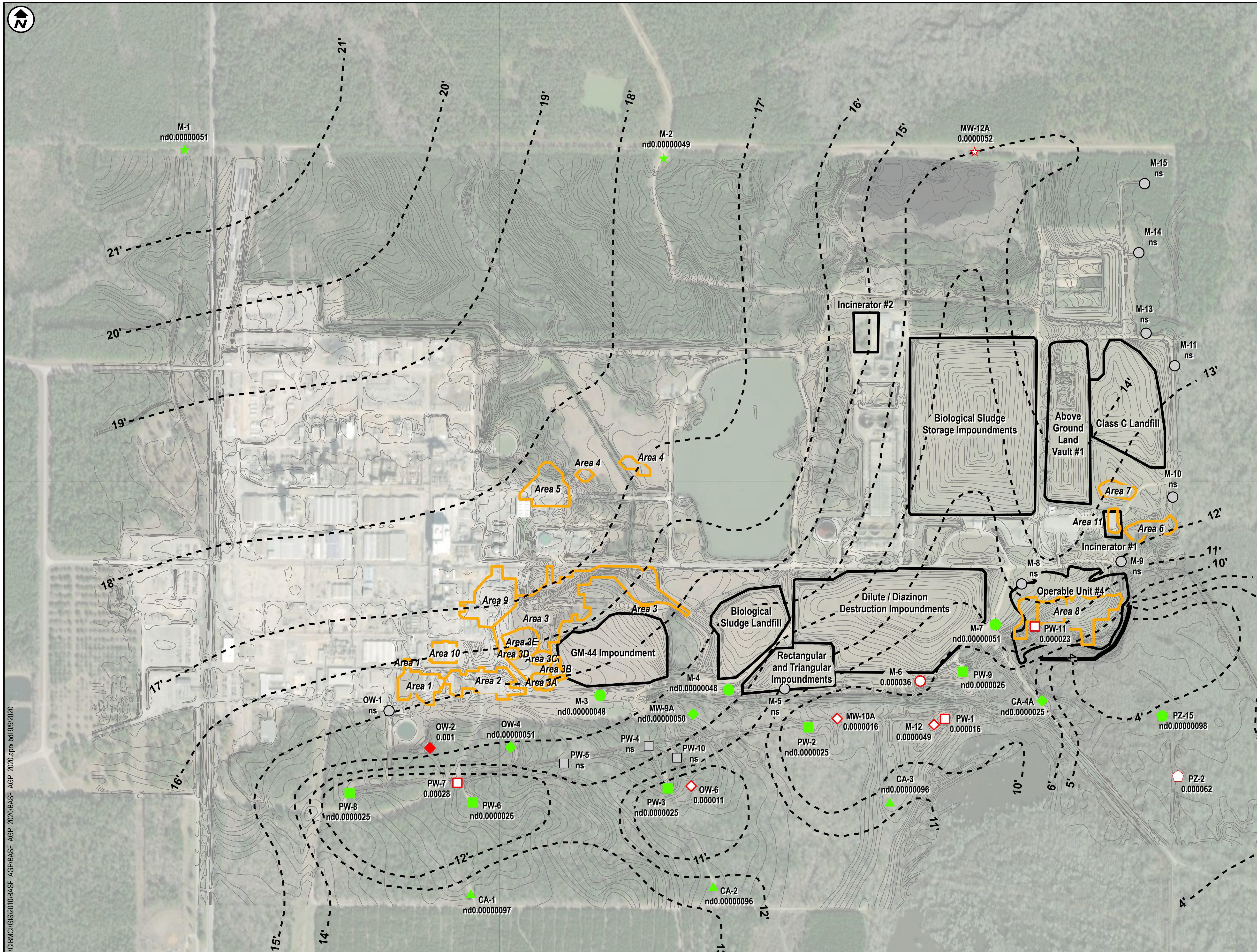


BASF CORPORATION
McINTOSH, ALABAMA

4,4'-DDD Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER

4,4'-DDD GWPS = 0.00028 mg/L

July 2020 Detections:

	Not Sampled	Non-detect	Detected less than or equal to GWPS	Detected above GWPS
Background Well	☆	★	☆	★
Corrective Action Well	△	▲	△	▲
Effectiveness Well	◆	◆	◇	◆
Point-of-Compliance Well	●	●	○	●
Recovery Well	■	■	□	■
Non-Permitted / Voluntary	⬟	⬟	⬠	⬟

Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).

NS = Not Sampled

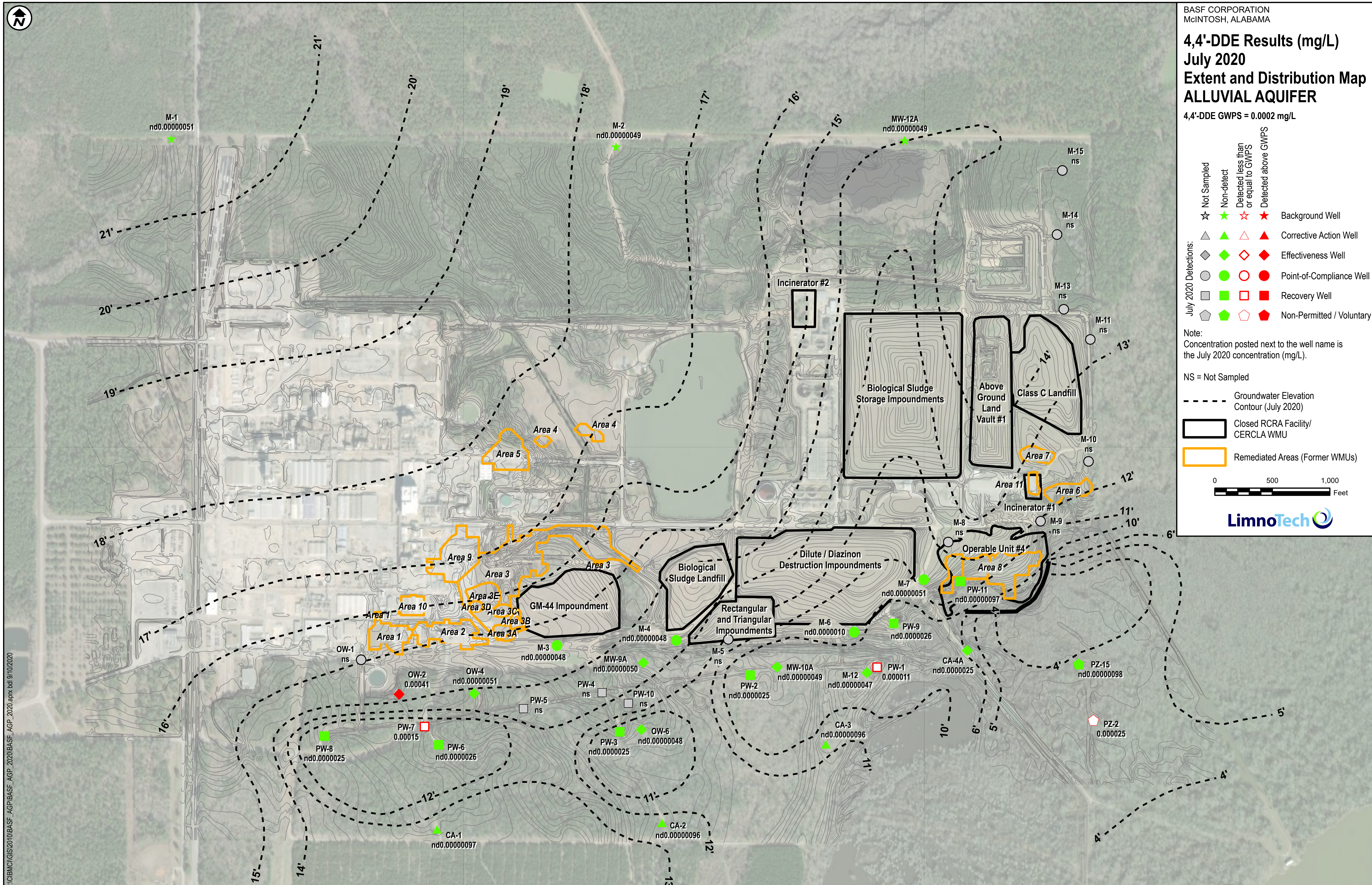
Groundwater Elevation Contour (July 2020)

Closed RCRA Facility/ CERCLA WMU

Remediated Areas (Former WMUs)

0 500 1,000 Feet

LimnoTech


BASF CORPORATION
McINTOSH, ALABAMA
4,4'-DDE Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
4,4'-DDE GWPS = 0.0002 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1 nd0.00000051
M-2 nd0.00000049
MW-12A nd0.00000049
M-15 ns
M-14 ns
M-13 ns
M-11 ns
M-10 ns
M-9 ns
M-8 ns
M-7 nd0.00000051
PW-11 nd0.00000097
M-6 nd0.0000010
PW-9 nd0.0000026
M-5 ns
M-4 nd0.00000048
M-3 nd0.00000048
OW-1 ns
OW-2 0.00041
OW-4 nd0.00000051
MW-9A nd0.00000050
MW-10A nd0.00000049
M-12 nd0.00000047
PW-1 0.000011
CA-4A nd0.00000025
PZ-15 nd0.00000098
PZ-2 0.000025
PW-2 nd0.0000025
PW-4 ns
PW-10 ns
PW-5 ns
PW-7 0.00015
PW-8 nd0.0000025
PW-6 nd0.0000026
PW-3 nd0.0000025
OW-6 nd0.00000048
CA-3 nd0.00000096
CA-1 nd0.00000097
CA-2 nd0.00000096
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Operable Unit #4
Area 8
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 9
Area 10
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
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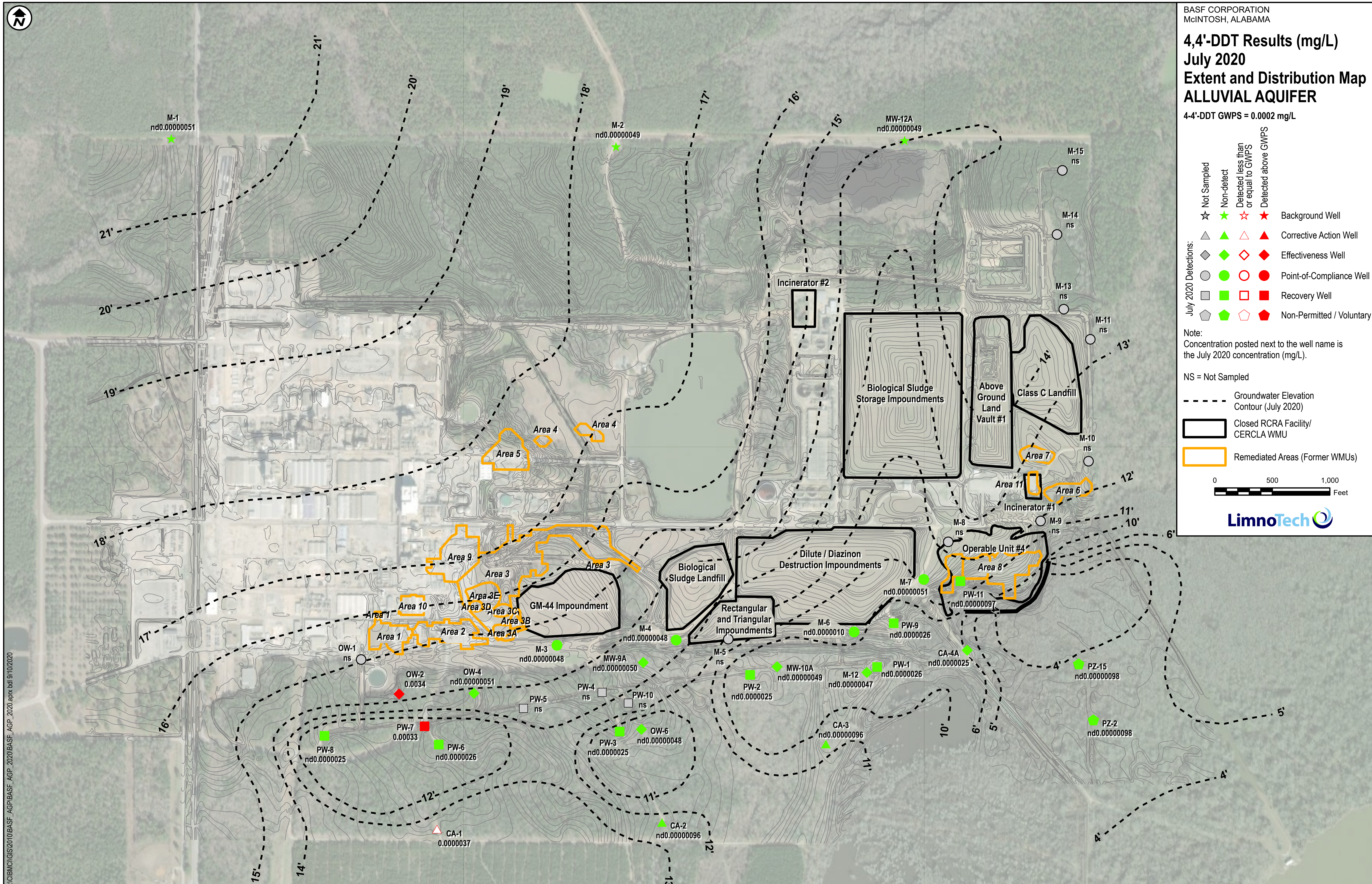
BASF CORPORATION
McINTOSH, ALABAMA
4,4'-DDT Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
4-4'-DDT GWPS = 0.0002 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1
nd0.00000051
M-2
nd0.00000049
MW-12A
nd0.00000049
M-15
ns
M-14
ns
M-13
ns
M-11
ns
M-10
ns
M-9
ns
M-8
ns
M-7
nd0.00000051
PW-11
nd0.00000097
M-6
nd0.0000010
PW-9
nd0.0000026
CA-4A
nd0.0000025
PZ-15
nd0.00000098
PZ-2
nd0.00000098
PW-1
nd0.0000026
M-12
nd0.00000047
MW-10A
nd0.00000049
PW-2
nd0.0000025
M-5
ns
M-4
nd0.00000048
MW-9A
nd0.00000050
M-3
nd0.00000048
OW-1
ns
OW-2
0.0034
OW-4
nd0.00000051
PW-4
ns
PW-10
ns
PW-5
ns
PW-7
0.00033
PW-8
nd0.0000025
PW-6
nd0.0000026
PW-3
nd0.0000025
OW-6
nd0.00000048
CA-3
nd0.00000096
CA-2
nd0.00000096
CA-1
0.0000037
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Operable Unit #4
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 1
Area 1
Area 2
Area 3
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 4
Area 5
Area 6
Area 7
Area 8
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Area 10
Area 11
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16'
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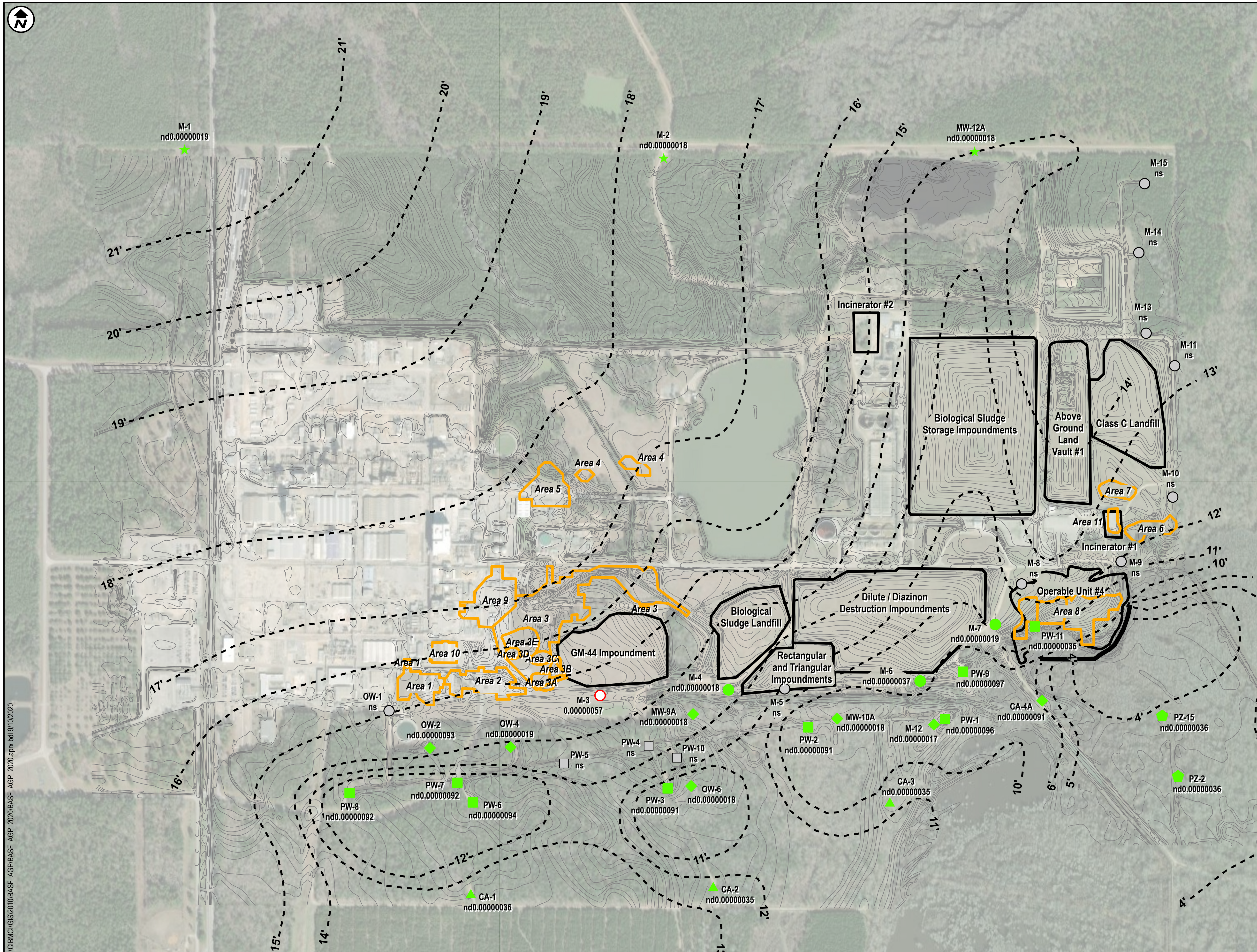


BASF CORPORATION
McINTOSH, ALABAMA

Aldrin Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER

Aldrin GWPS = 0.00000092 mg/L

July 2020 Detections:

	Not Sampled	Non-detect	Detected less than or equal to GWPS	Detected above GWPS
Background Well	☆	★	☆	★
Corrective Action Well	△	▲	△	▲
Effectiveness Well	◇	◆	◇	◆
Point-of-Compliance Well	○	●	○	●
Recovery Well	□	■	□	■
Non-Permitted / Voluntary	⬠	⬟	⬠	⬟

Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).

NS = Not Sampled

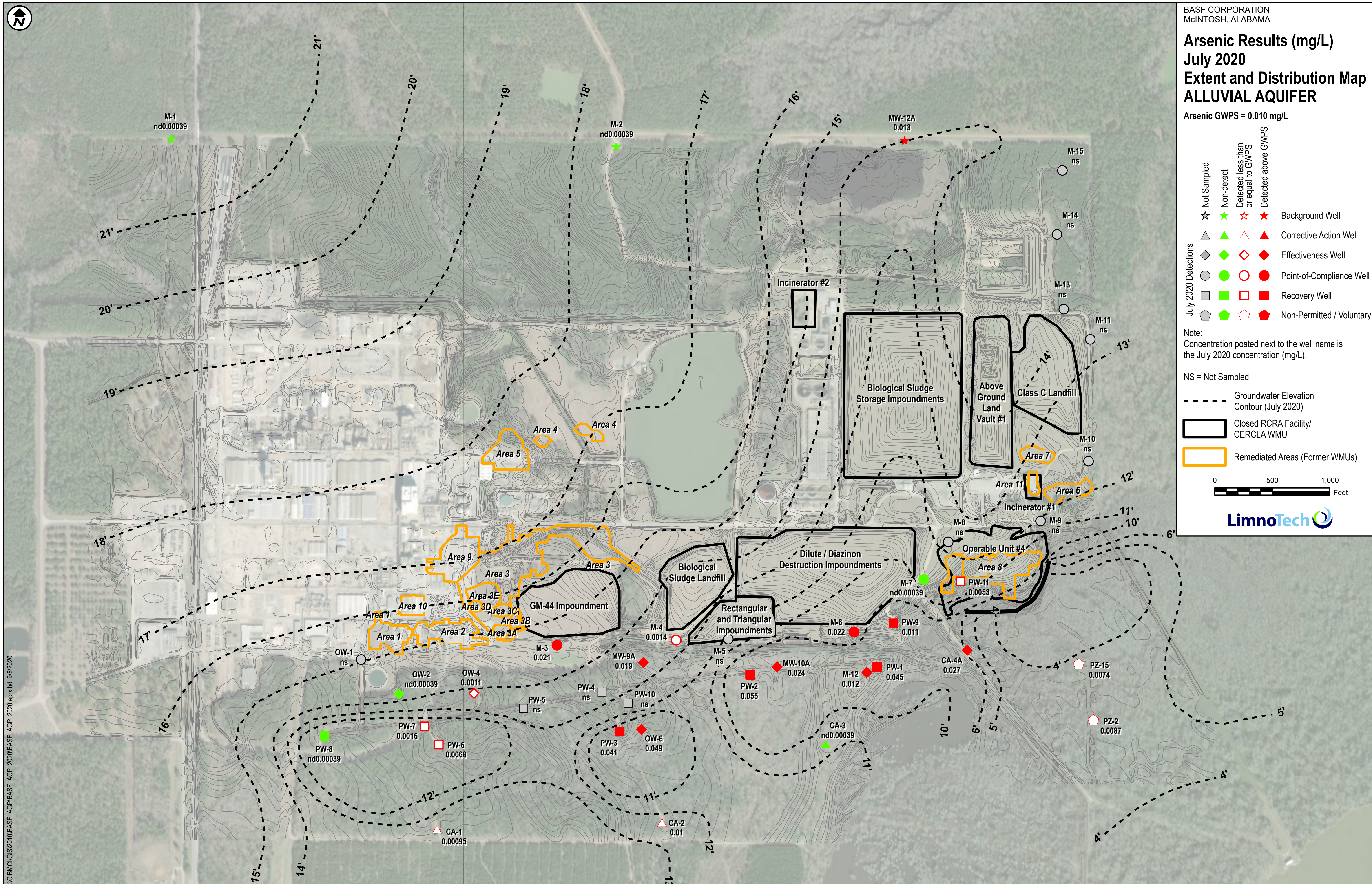
Groundwater Elevation Contour (July 2020)

Closed RCRA Facility/ CERCLA WMU

Remediated Areas (Former WMUs)

0 500 1,000 Feet

LimnoTech



BASF CORPORATION
McINTOSH, ALABAMA
Arsenic Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Arsenic GWPS = 0.010 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1 nd0.00039
M-2 nd0.00039
MW-12A 0.013
M-15 ns
M-14 ns
M-13 ns
M-11 ns
M-10 ns
M-9 ns
M-8 ns
M-7 nd0.00039
PW-11 0.0053
PW-9 0.011
M-6 0.022
M-5 ns
M-4 0.0014
M-3 0.021
MW-9A 0.019
MW-10A 0.024
PW-2 0.055
M-12 0.012
PW-1 0.045
CA-4A 0.027
PZ-15 0.0074
PZ-2 0.0087
CA-3 nd0.00039
PW-3 0.041
OW-6 0.049
PW-4 ns
PW-10 ns
PW-5 ns
OW-1 ns
OW-2 nd0.00039
OW-4 0.0011
PW-7 0.0016
PW-6 0.0068
PW-8 nd0.00039
CA-1 0.00095
CA-2 0.01
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Operable Unit #4
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
21'
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16'
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14'
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4'
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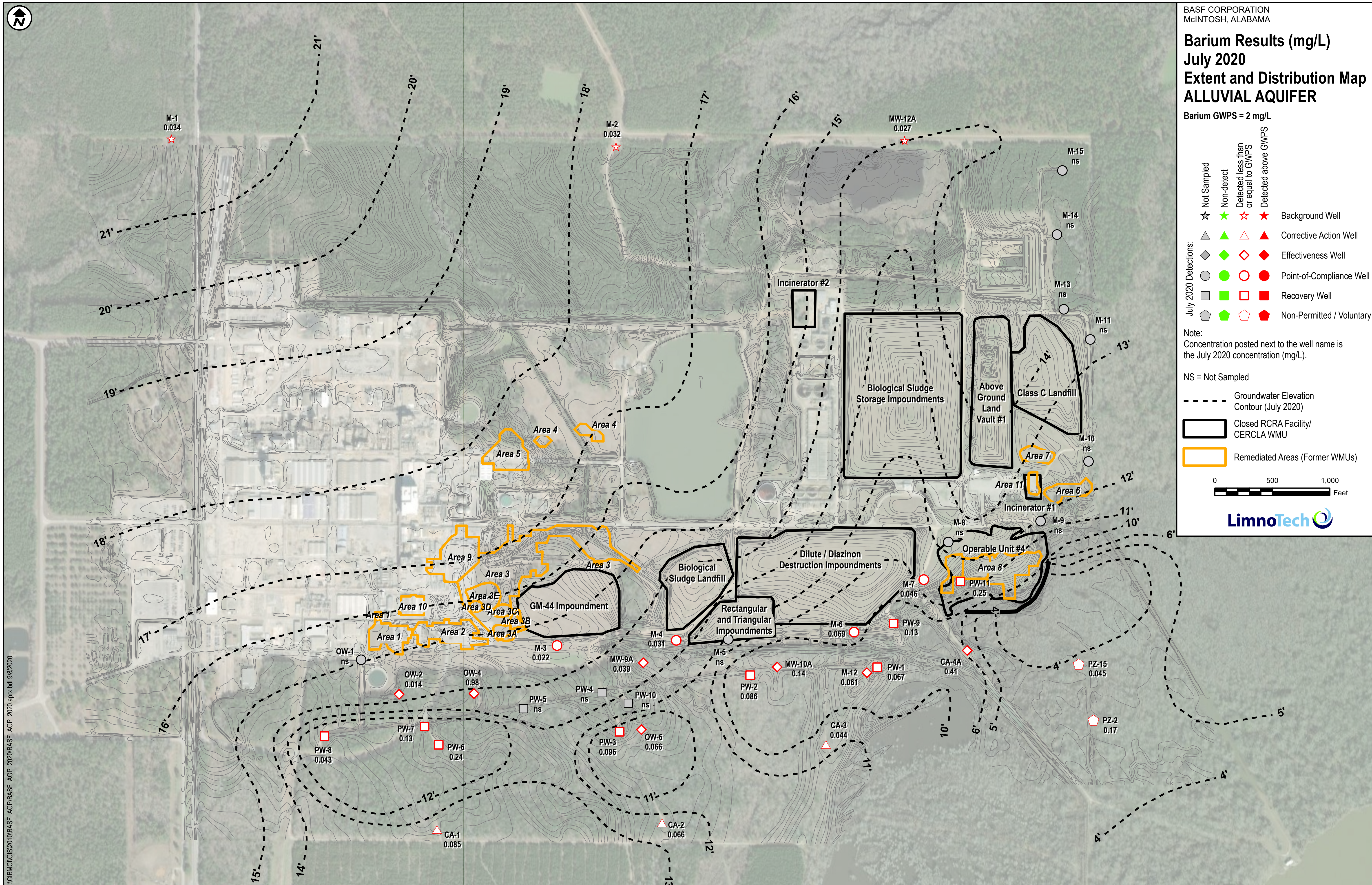
BASF CORPORATION
McINTOSH, ALABAMA
Barium Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Barium GWPS = 2 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1 0.034
M-2 0.032
MW-12A 0.027
M-15 ns
M-14 ns
M-13 ns
M-11 ns
M-10 ns
M-9 ns
M-8 ns
M-7 0.046
PW-11 0.25
PW-9 0.13
M-6 0.069
M-5 ns
M-4 0.031
M-3 0.022
OW-1 ns
OW-2 0.014
OW-4 0.98
PW-5 ns
PW-4 ns
PW-10 ns
MW-9A 0.039
MW-10A 0.14
M-12 0.061
PW-1 0.067
PW-2 0.086
CA-4A 0.41
PZ-15 0.045
PZ-2 0.17
CA-3 0.044
PW-3 0.096
OW-6 0.066
PW-7 0.13
PW-6 0.24
PW-8 0.043
CA-1 0.085
CA-2 0.066
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Operable Unit #4
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
21'
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19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
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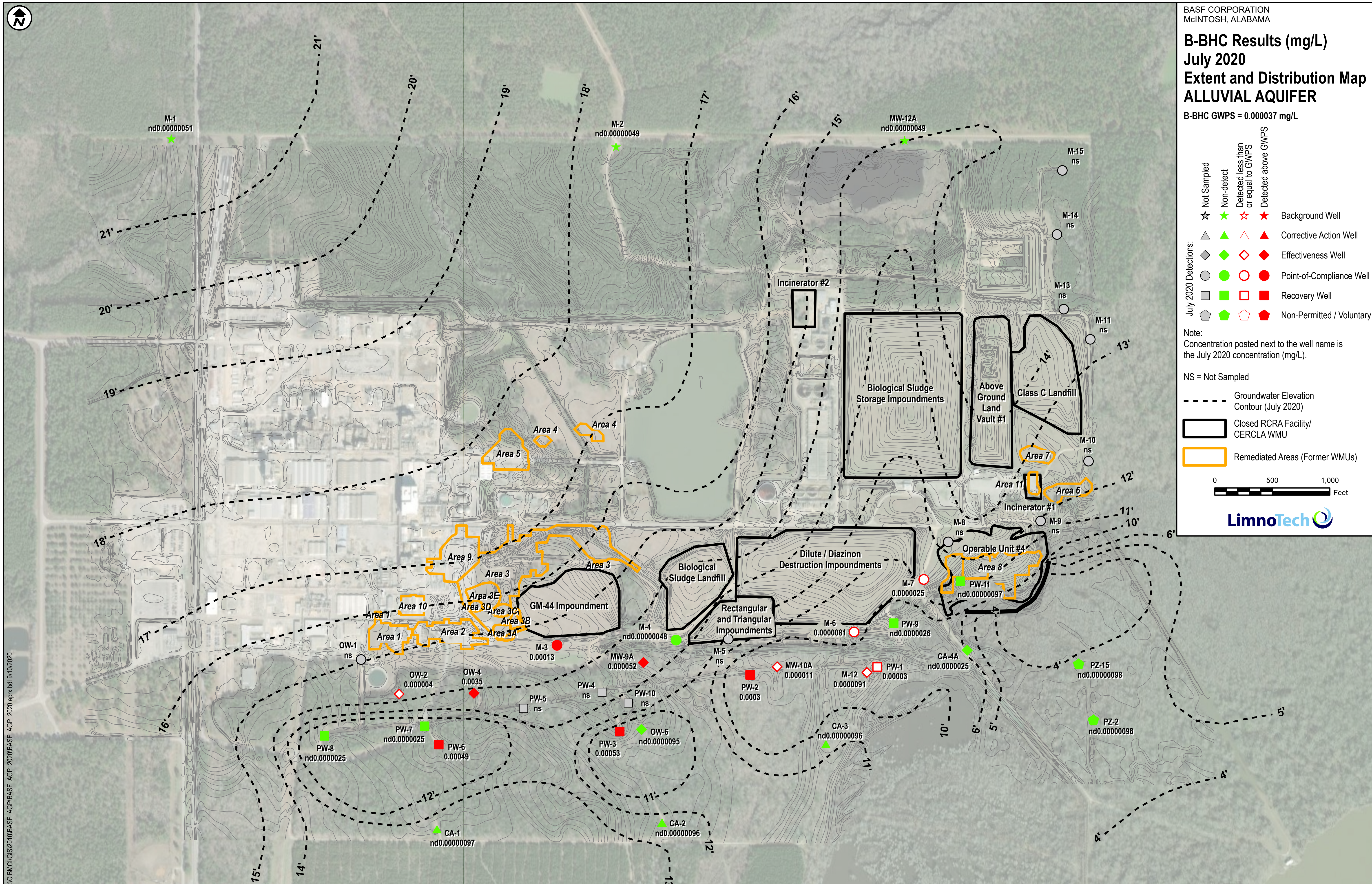
BASF CORPORATION
McINTOSH, ALABAMA
B-BHC Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
B-BHC GWPS = 0.000037 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1 nd0.00000051
M-2 nd0.00000049
MW-12A nd0.00000049
M-15 ns
M-14 ns
M-13 ns
M-11 ns
M-10 ns
M-9 ns
M-8 ns
M-7 0.0000025
M-6 0.0000081
M-5 ns
M-4 nd0.00000048
M-3 0.00013
OW-1 ns
OW-2 0.000004
OW-4 0.0035
MW-9A 0.000052
MW-10A 0.000011
M-12 0.0000091
PW-1 0.00003
PW-2 0.0003
PW-3 0.00053
PW-4 ns
PW-5 ns
PW-6 0.00049
PW-7 nd0.0000025
PW-8 nd0.0000025
PW-9 nd0.0000026
PW-10 ns
PW-11 nd0.00000097
OW-6 nd0.0000095
CA-1 nd0.00000097
CA-2 nd0.00000096
CA-3 nd0.00000096
CA-4A nd0.0000025
PZ-15 nd0.00000098
PZ-2 nd0.00000098
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Operable Unit #4
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
21'
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17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
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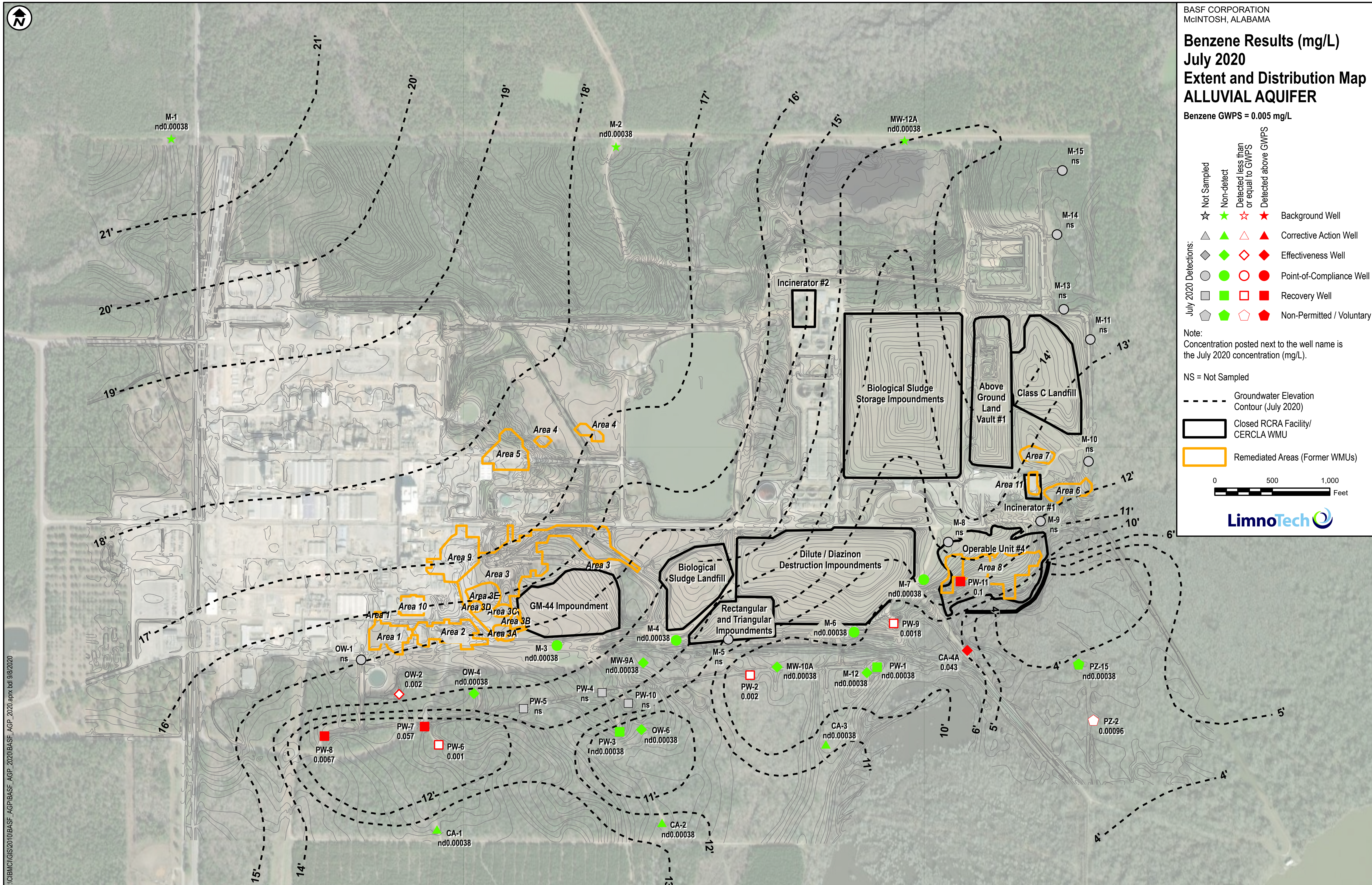
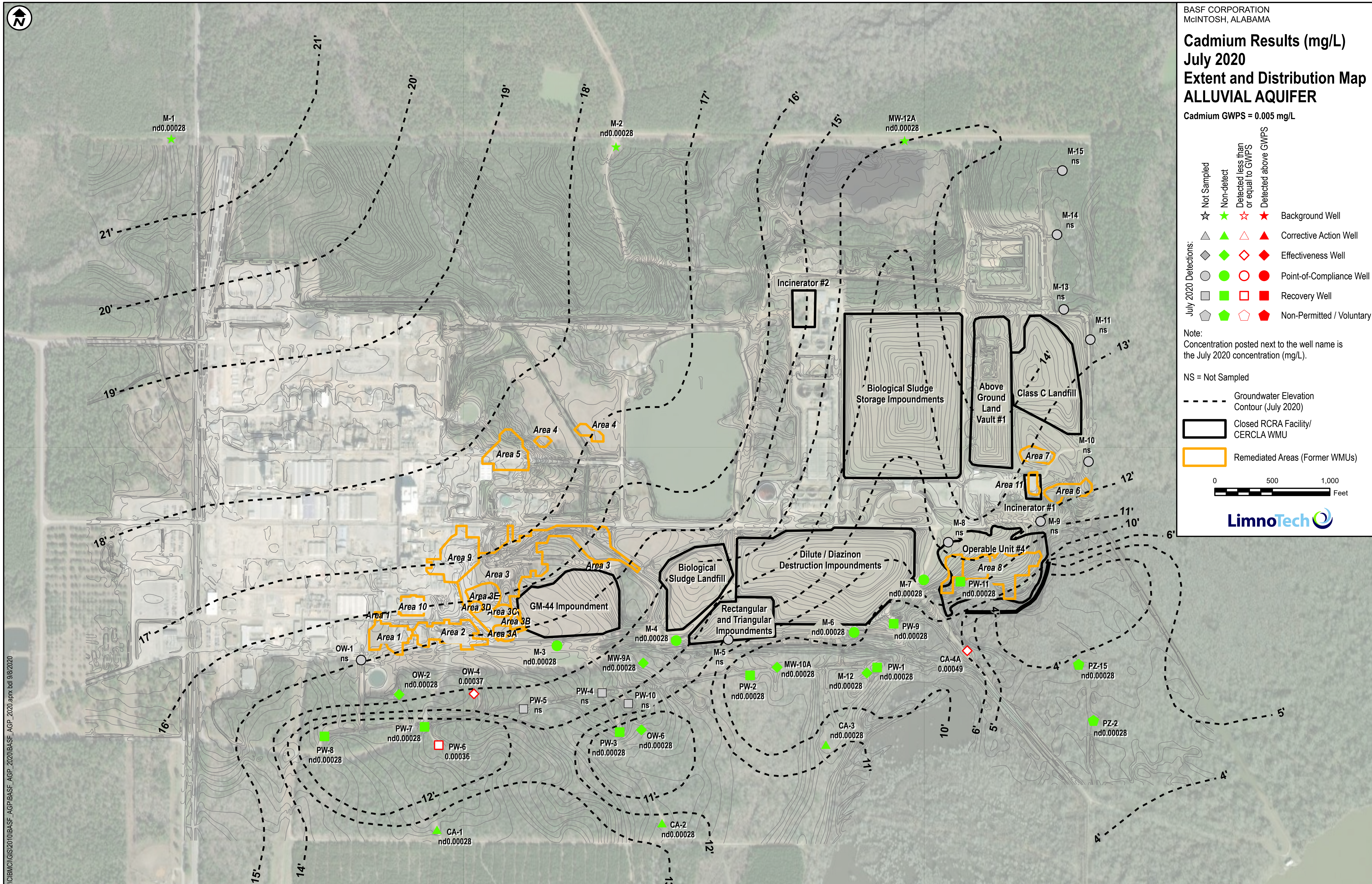
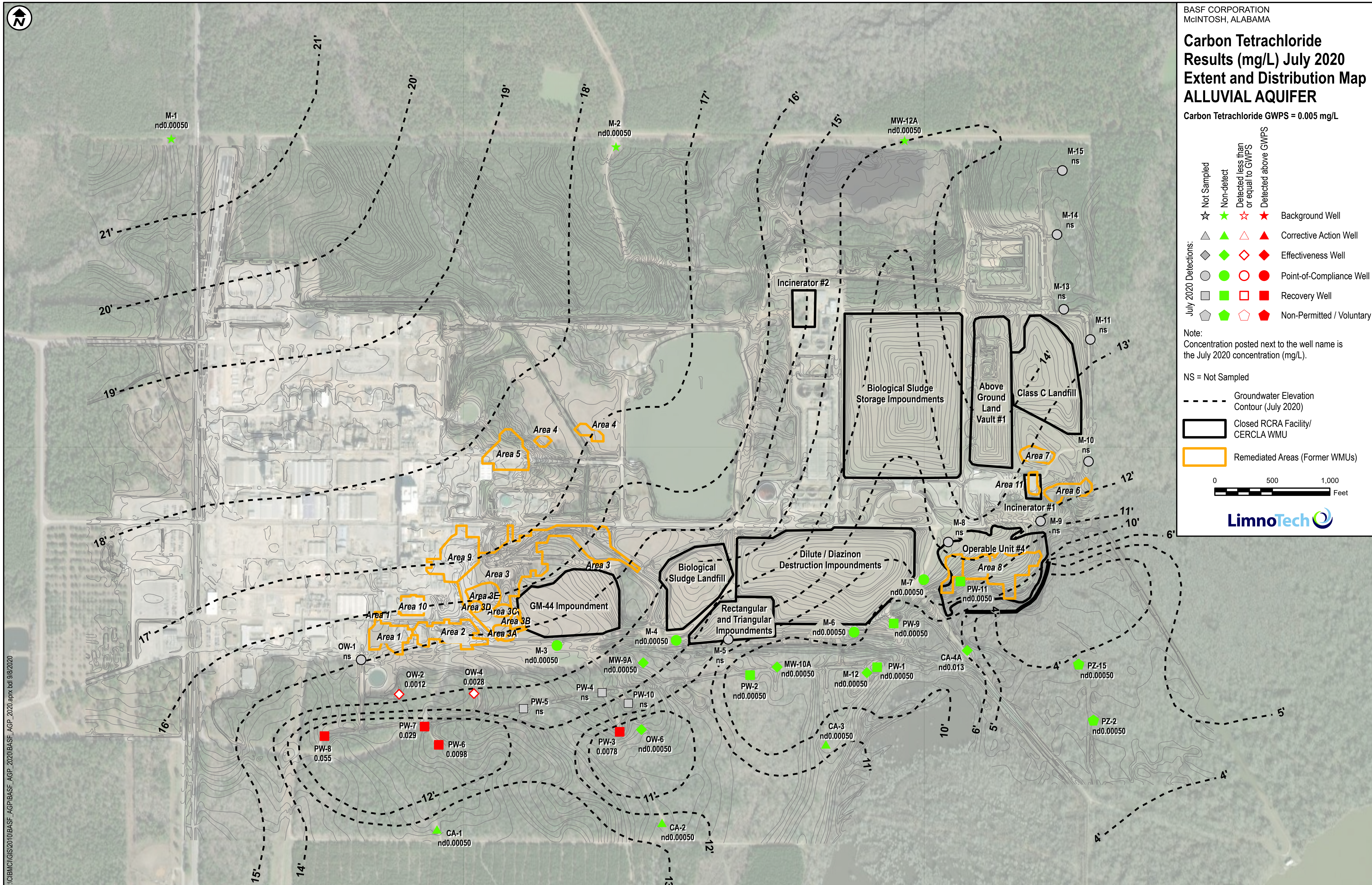

BASF CORPORATION
McINTOSH, ALABAMA
Benzene Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Benzene GWPS = 0.005 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1 nd0.00038
M-2 nd0.00038
MW-12A nd0.00038
M-15 ns
M-14 ns
M-13 ns
M-11 ns
M-10 ns
M-9 ns
M-8 ns
M-7 nd0.00038
PW-11 0.1
M-6 nd0.00038
PW-9 0.0018
CA-4A 0.043
PZ-15 nd0.00038
PZ-2 0.00096
M-4 nd0.00038
M-5 ns
M-3 nd0.00038
MW-9A nd0.00038
MW-10A nd0.00038
M-12 nd0.00038
PW-1 nd0.00038
PW-2 0.002
OW-1 ns
OW-2 0.002
OW-4 nd0.00038
PW-4 ns
PW-10 ns
PW-5 ns
PW-7 0.057
PW-6 0.001
PW-8 0.0067
PW-3 nd0.00038
OW-6 nd0.00038
CA-3 nd0.00038
CA-1 nd0.00038
CA-2 nd0.00038
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Operable Unit #4
Area 8
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 9
Area 10
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
S:\CBMC\GIS\2010\BASF_AGP\BASF_AGP_2020\BASF_AGP_2020.aprx bdl 9/8/2020


BASF CORPORATION
McINTOSH, ALABAMA
Cadmium Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Cadmium GWPS = 0.005 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1
nd0.00028
M-2
nd0.00028
MW-12A
nd0.00028
M-15
ns
M-14
ns
M-13
ns
M-11
ns
M-10
ns
M-9
ns
M-8
ns
M-7
nd0.00028
PW-11
nd0.00028
PW-9
nd0.00028
M-6
nd0.00028
M-5
ns
M-4
nd0.00028
M-3
nd0.00028
MW-9A
nd0.00028
MW-10A
nd0.00028
PW-2
nd0.00028
M-12
nd0.00028
PW-1
nd0.00028
CA-4A
0.00049
PZ-15
nd0.00028
PZ-2
nd0.00028
CA-3
nd0.00028
OW-1
ns
OW-2
nd0.00028
OW-4
0.00037
PW-4
ns
PW-5
ns
PW-10
ns
PW-3
nd0.00028
OW-6
nd0.00028
PW-7
nd0.00028
PW-6
0.00036
PW-8
nd0.00028
CA-1
nd0.00028
CA-2
nd0.00028
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
GM-44 Impoundment
Operable Unit #4
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
S:\CBMCI\GIS\2010\BASF_AGP\BASF_AGP_2020\BASF_AGP_2020.aprx bdl 9/8/2020


BASF CORPORATION
McINTOSH, ALABAMA
Carbon Tetrachloride Results (mg/L) July 2020 Extent and Distribution Map ALLUVIAL AQUIFER
Carbon Tetrachloride GWPS = 0.005 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1 nd0.00050
M-2 nd0.00050
MW-12A nd0.00050
M-15 ns
M-14 ns
M-13 ns
M-11 ns
M-10 ns
M-9 ns
M-8 ns
M-7 nd0.00050
PW-11 nd0.00050
M-6 nd0.00050
PW-9 nd0.00050
M-5 ns
M-4 nd0.00050
M-3 nd0.00050
OW-1 ns
OW-2 0.0012
OW-4 0.0028
MW-9A nd0.00050
MW-10A nd0.00050
M-12 nd0.00050
PW-1 nd0.00050
CA-4A nd0.013
PZ-15 nd0.00050
PZ-2 nd0.00050
PW-2 nd0.00050
PW-4 ns
PW-10 ns
PW-5 ns
PW-7 0.029
PW-6 0.0098
PW-8 0.055
PW-3 0.0078
OW-6 nd0.00050
CA-3 nd0.00050
CA-1 nd0.00050
CA-2 nd0.00050
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Operable Unit #4
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
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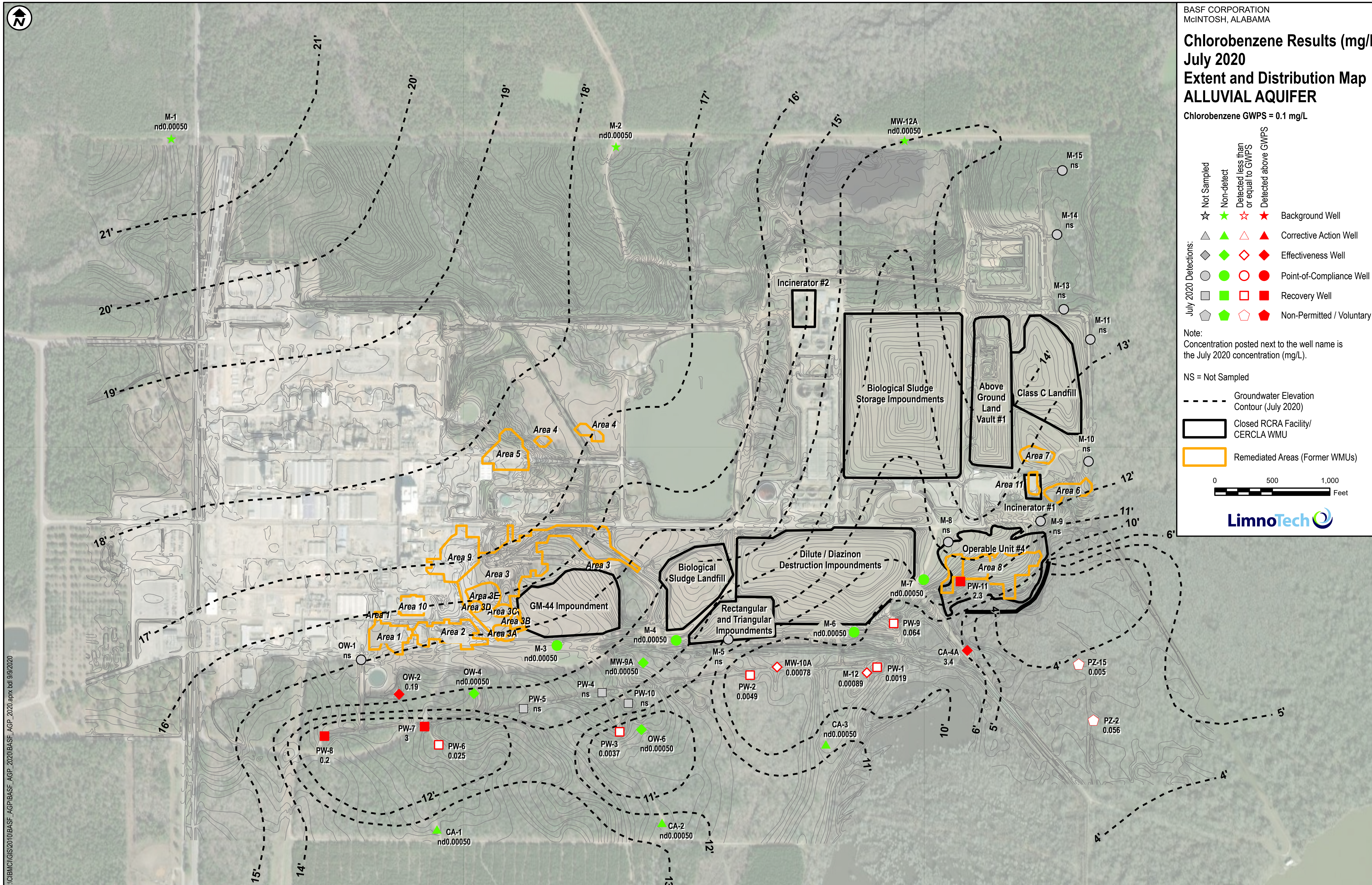
BASF CORPORATION
McINTOSH, ALABAMA
Chlorobenzene Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Chlorobenzene GWPS = 0.1 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1
nd0.00050
M-2
nd0.00050
MW-12A
nd0.00050
M-15
ns
M-14
ns
M-13
ns
M-11
ns
M-10
ns
M-9
ns
M-8
ns
M-7
nd0.00050
PW-11
2.3
M-6
nd0.00050
PW-9
0.064
M-5
ns
M-4
nd0.00050
M-3
nd0.00050
OW-1
ns
OW-2
0.19
OW-4
nd0.00050
MW-9A
nd0.00050
PW-4
ns
PW-10
ns
PW-5
ns
PW-7
3
PW-6
0.025
PW-8
0.2
PW-3
0.0037
OW-6
nd0.00050
PW-2
0.0049
MW-10A
0.00078
M-12
0.00089
PW-1
0.0019
CA-4A
3.4
CA-3
nd0.00050
PZ-15
0.005
PZ-2
0.056
CA-1
nd0.00050
CA-2
nd0.00050
Incinerator #2
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Incinerator #1
Operable Unit #4
Area 8
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 4
Area 5
Area 9
Area 3
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
Area 10
Area 1
Area 2
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
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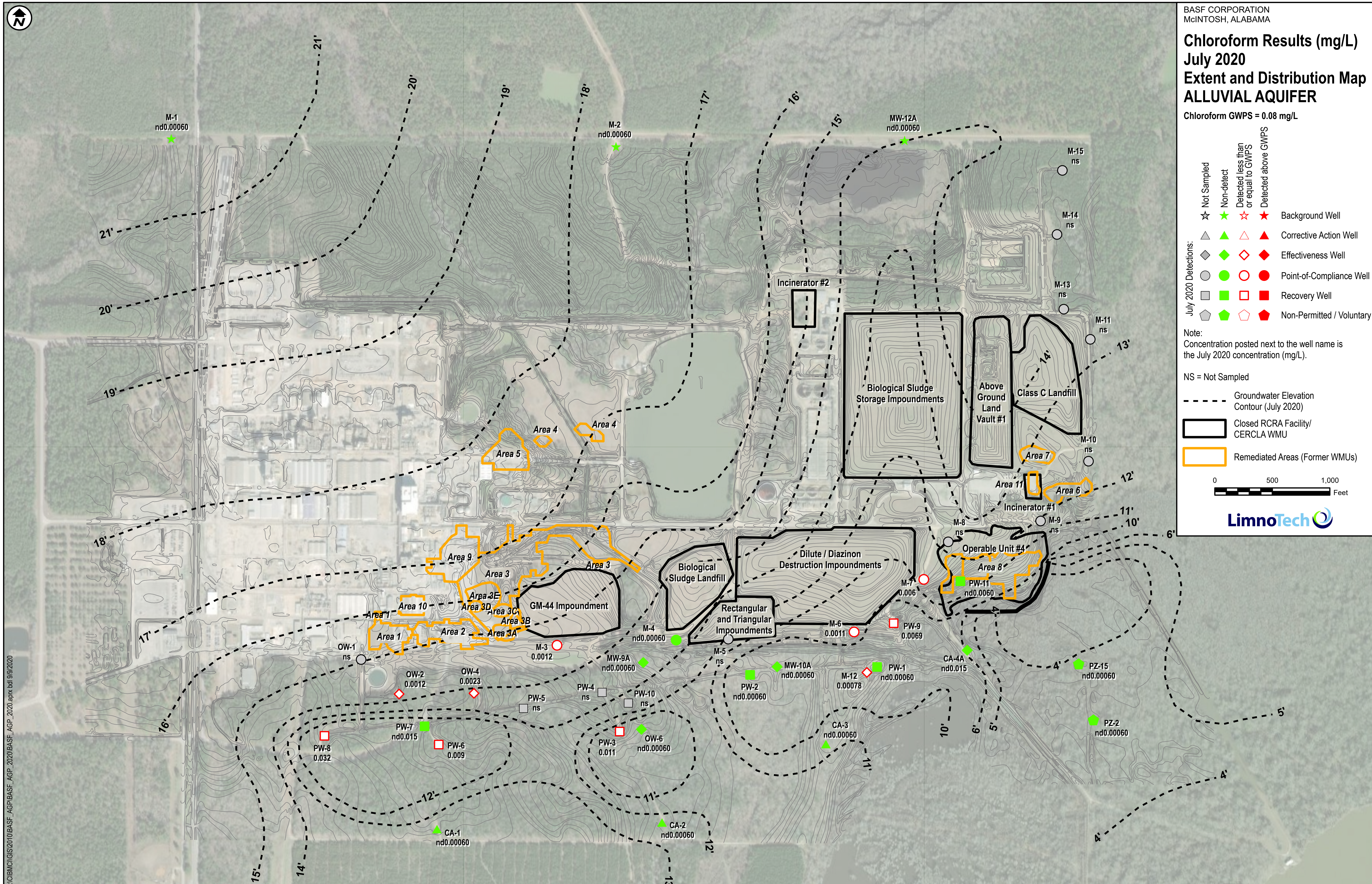
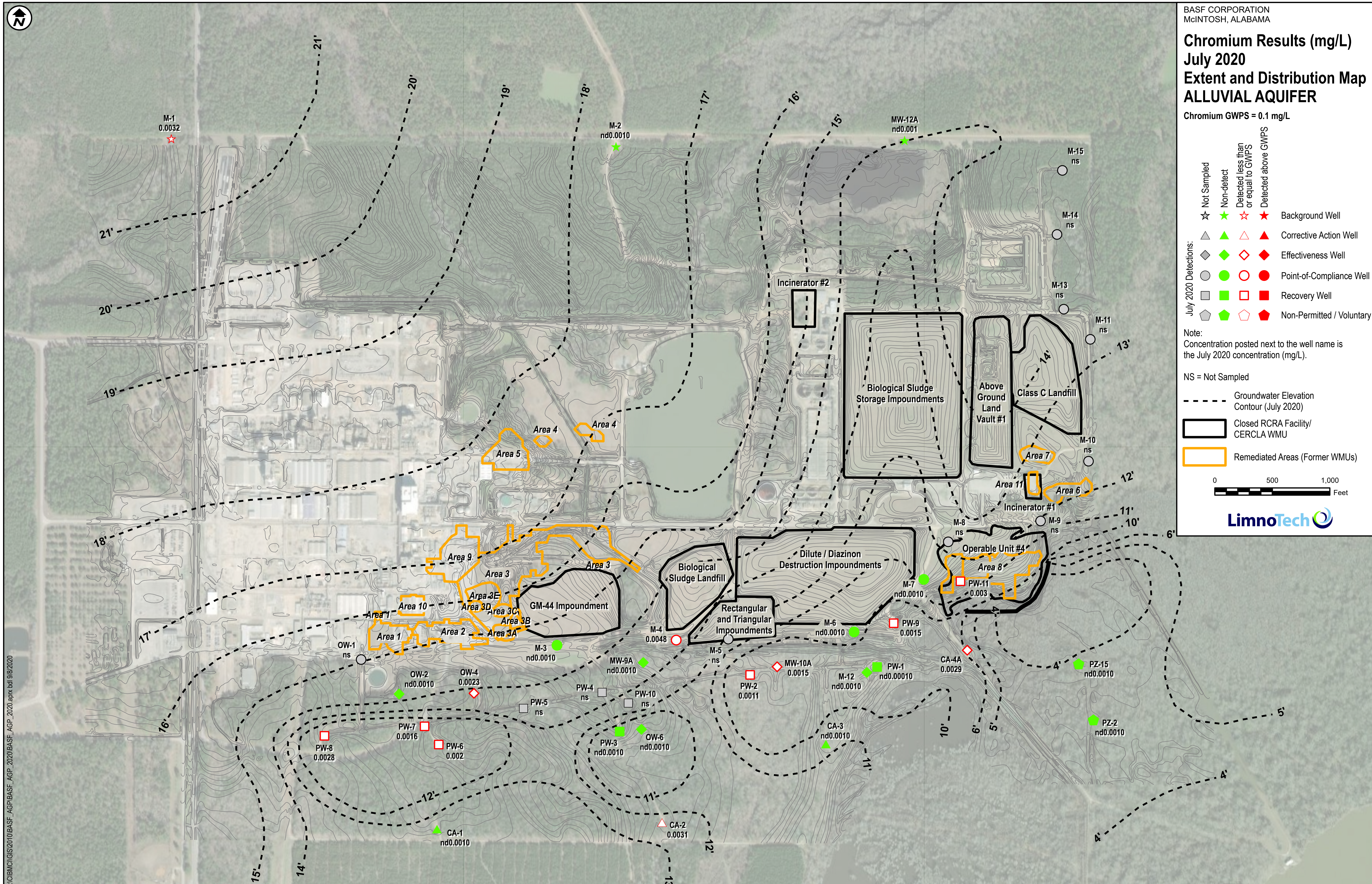

BASF CORPORATION
McINTOSH, ALABAMA
Chloroform Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Chloroform GWPS = 0.08 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1 nd0.00060
M-2 nd0.00060
MW-12A nd0.00060
M-15 ns
M-14 ns
M-13 ns
M-11 ns
M-10 ns
M-9 ns
M-8 ns
M-7 0.006
M-6 0.0011
M-5 ns
M-4 nd0.00060
M-3 0.0012
OW-1 ns
OW-2 0.0012
OW-4 0.0023
OW-6 nd0.00060
MW-9A nd0.00060
MW-10A nd0.00060
M-12 0.00078
PW-1 nd0.00060
PW-2 nd0.00060
PW-3 0.011
PW-4 ns
PW-5 ns
PW-6 0.009
PW-7 nd0.015
PW-8 0.032
PW-9 0.0069
PW-10 ns
PW-11 nd0.0060
CA-1 nd0.00060
CA-2 nd0.00060
CA-3 nd0.00060
CA-4A nd0.015
PZ-15 nd0.00060
PZ-2 nd0.00060
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
GM-44 Impoundment
Operable Unit #4
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
S:\CBMC\GIS\2010\BASF_AGP\BASF_AGP_2020\BASF_AGP_2020.aprx bdl 9/9/2020



BASF CORPORATION
McINTOSH, ALABAMA
Chromium Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Chromium GWPS = 0.1 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1
0.0032
M-2
nd0.0010
MW-12A
nd0.001
M-15
ns
M-14
ns
M-13
ns
M-11
ns
M-10
ns
M-9
ns
M-8
ns
M-7
nd0.0010
PW-11
0.003
M-6
nd0.0010
PW-9
0.0015
M-4
0.0048
M-5
ns
M-3
nd0.0010
OW-1
ns
OW-2
nd0.0010
OW-4
0.0023
MW-9A
nd0.0010
MW-10A
0.0015
PW-2
0.0011
M-12
nd0.0010
PW-1
nd0.00010
CA-4A
0.0029
PZ-15
nd0.0010
PZ-2
nd0.0010
PW-4
ns
PW-10
ns
PW-5
ns
PW-7
0.0016
PW-8
0.0028
PW-6
0.002
PW-3
nd0.0010
OW-6
nd0.0010
CA-3
nd0.0010
CA-1
nd0.0010
CA-2
0.0031
Incinerator #2
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Incinerator #1
Operable Unit #4
Area 8
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 4
Area 4
Area 5
Area 9
Area 3
Area 3
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
Area 10
Area 1
Area 1
Area 2
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
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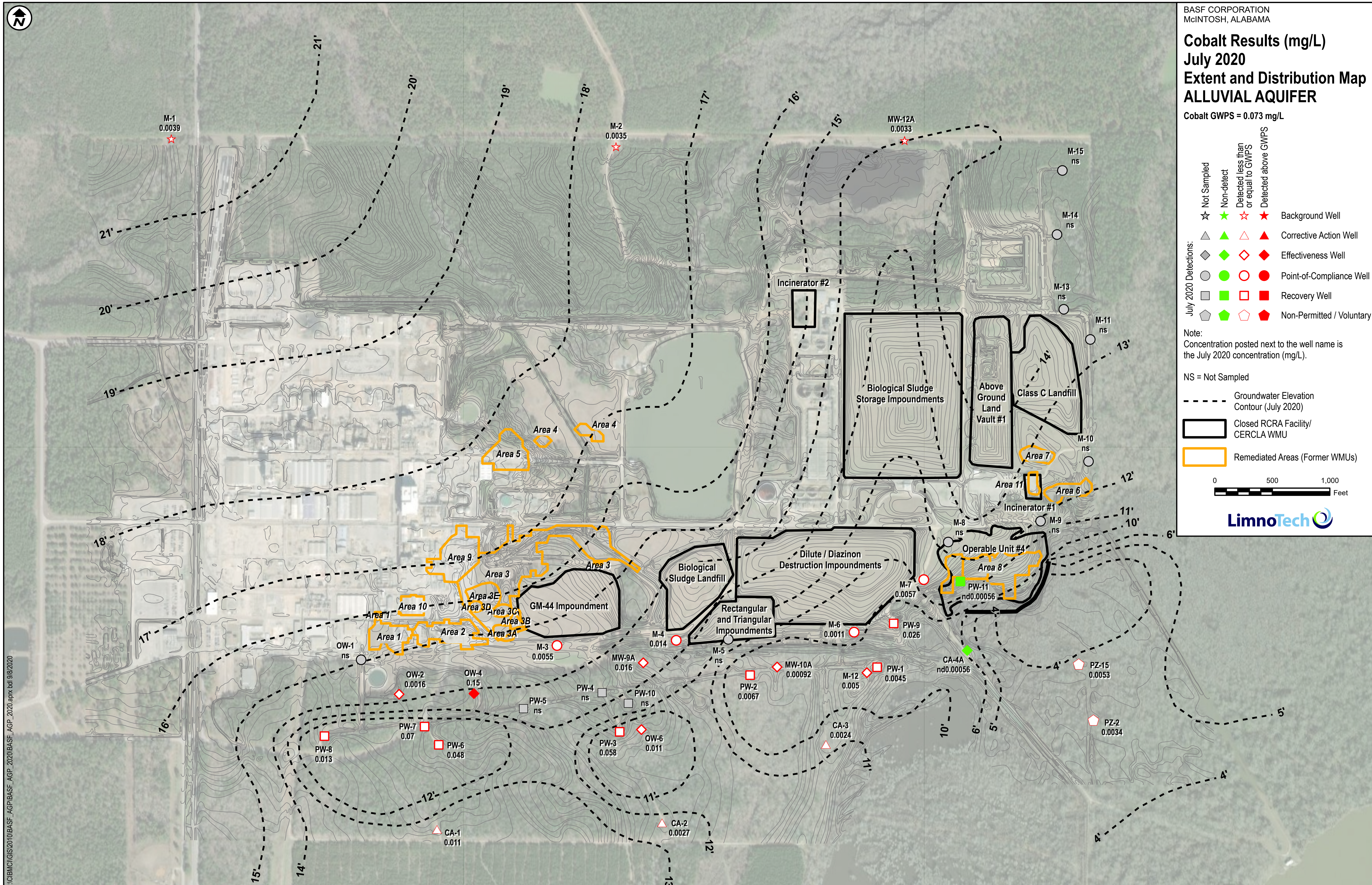
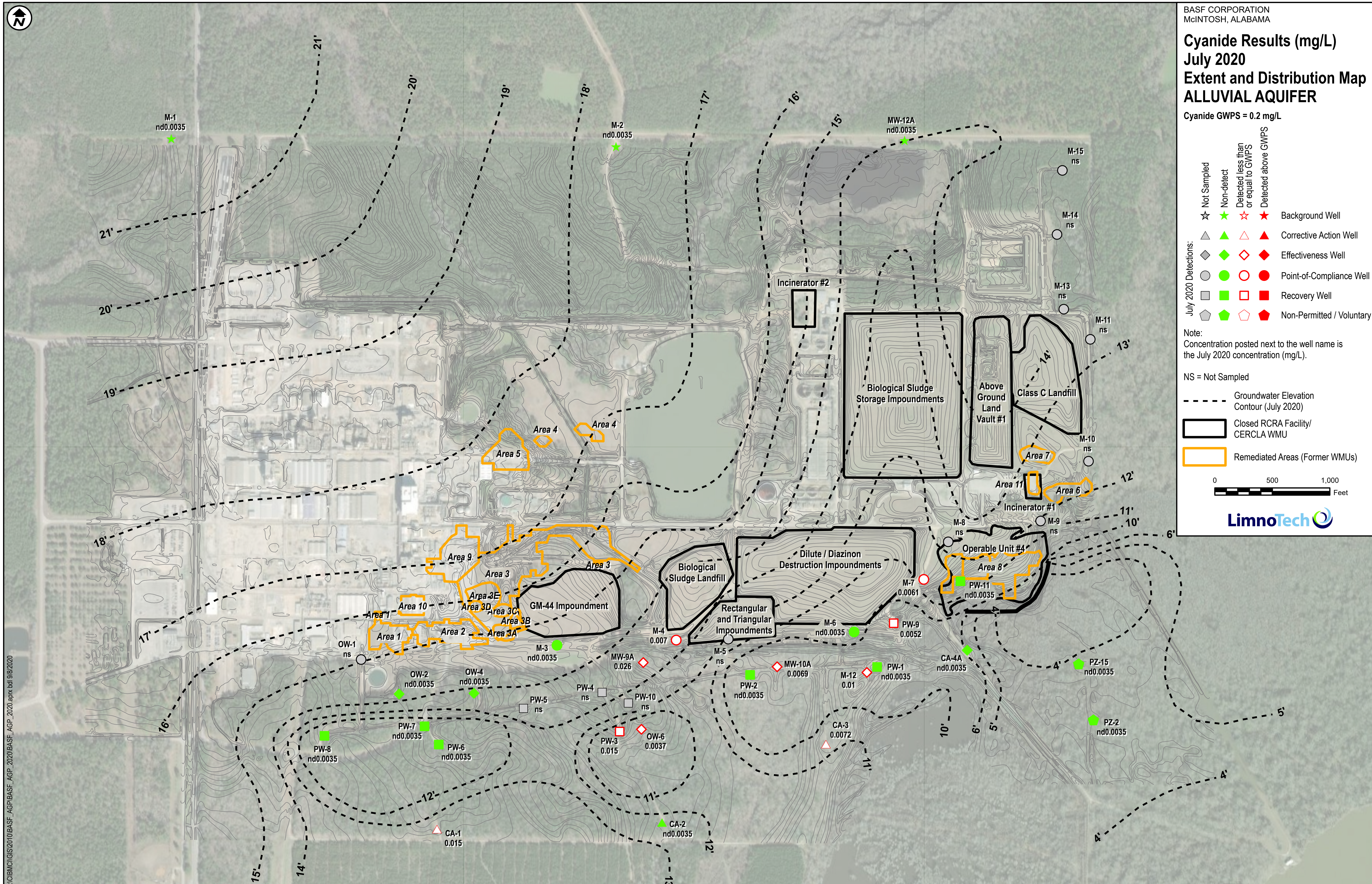


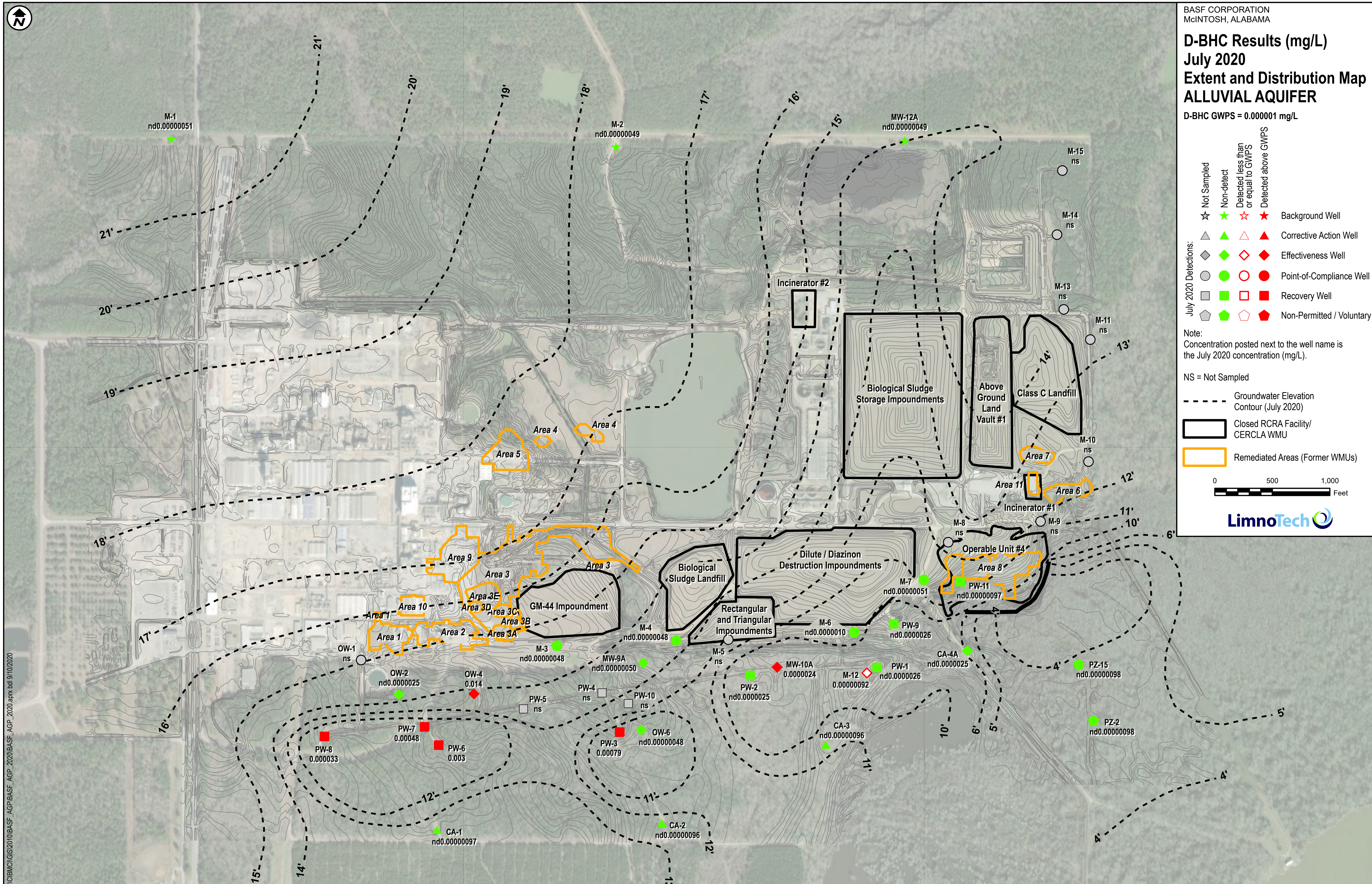
BASF CORPORATION
McINTOSH, ALABAMA
Cobalt Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Cobalt GWPS = 0.073 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1
0.0039
M-2
0.0035
MW-12A
0.0033
M-15
ns
M-14
ns
M-13
ns
M-11
ns
M-10
ns
M-9
ns
M-8
ns
M-7
0.0057
PW-11
nd0.00056
PW-9
0.026
M-6
0.0011
M-5
ns
M-4
0.014
M-3
0.0055
OW-1
ns
OW-2
0.0016
OW-4
0.15
MW-9A
0.016
MW-10A
0.00092
M-12
0.005
PW-1
0.0045
PW-2
0.0067
PW-4
ns
PW-10
ns
PW-5
ns
PW-7
0.07
PW-6
0.048
PW-8
0.013
PW-3
0.058
OW-6
0.011
CA-4A
nd0.00056
CA-3
0.0024
CA-2
0.0027
CA-1
0.011
PZ-15
0.0053
PZ-2
0.0034
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Operable Unit #4
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
S:\CBMC\GIS\2010\BASF_AGP\BASF_AGP_2020\BASF_AGP_2020.aprx bdl 9/8/2020

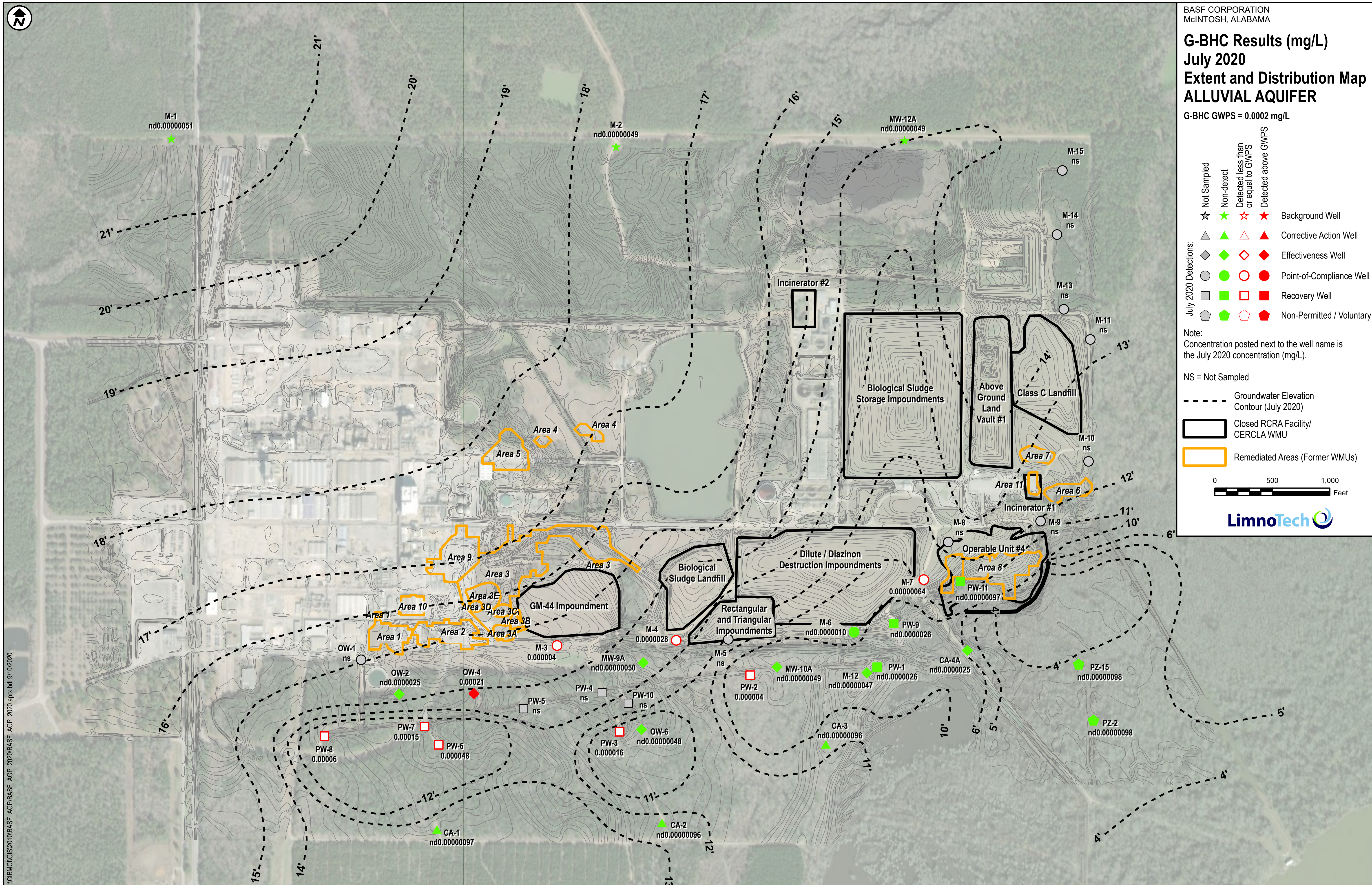

BASF CORPORATION
McINTOSH, ALABAMA
Cyanide Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Cyanide GWPS = 0.2 mg/L
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
July 2020 Detections:
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1 nd0.0035
M-2 nd0.0035
MW-12A nd0.0035
M-15 ns
M-14 ns
M-13 ns
M-11 ns
M-10 ns
M-9 ns
M-8 ns
M-7 0.0061
M-6 nd0.0035
M-5 ns
M-4 0.007
M-3 nd0.0035
OW-1 ns
OW-2 nd0.0035
OW-4 nd0.0035
OW-6 0.0037
MW-9A 0.026
MW-10A 0.0069
M-12 0.01
PW-1 nd0.0035
PW-2 nd0.0035
PW-3 0.015
PW-4 ns
PW-5 ns
PW-6 nd0.0035
PW-7 nd0.0035
PW-8 nd0.0035
PW-9 0.0052
PW-10 ns
PW-11 nd0.0035
CA-1 0.015
CA-2 nd0.0035
CA-3 0.0072
CA-4A nd0.0035
PZ-15 nd0.0035
PZ-2 nd0.0035
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
GM-44 Impoundment
Operable Unit #4
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
S:\CBMC\GIS\2010BASF_AGP\BASF_AGP_2020\BASF_AGP_2020.aprx bdl 9/8/2020

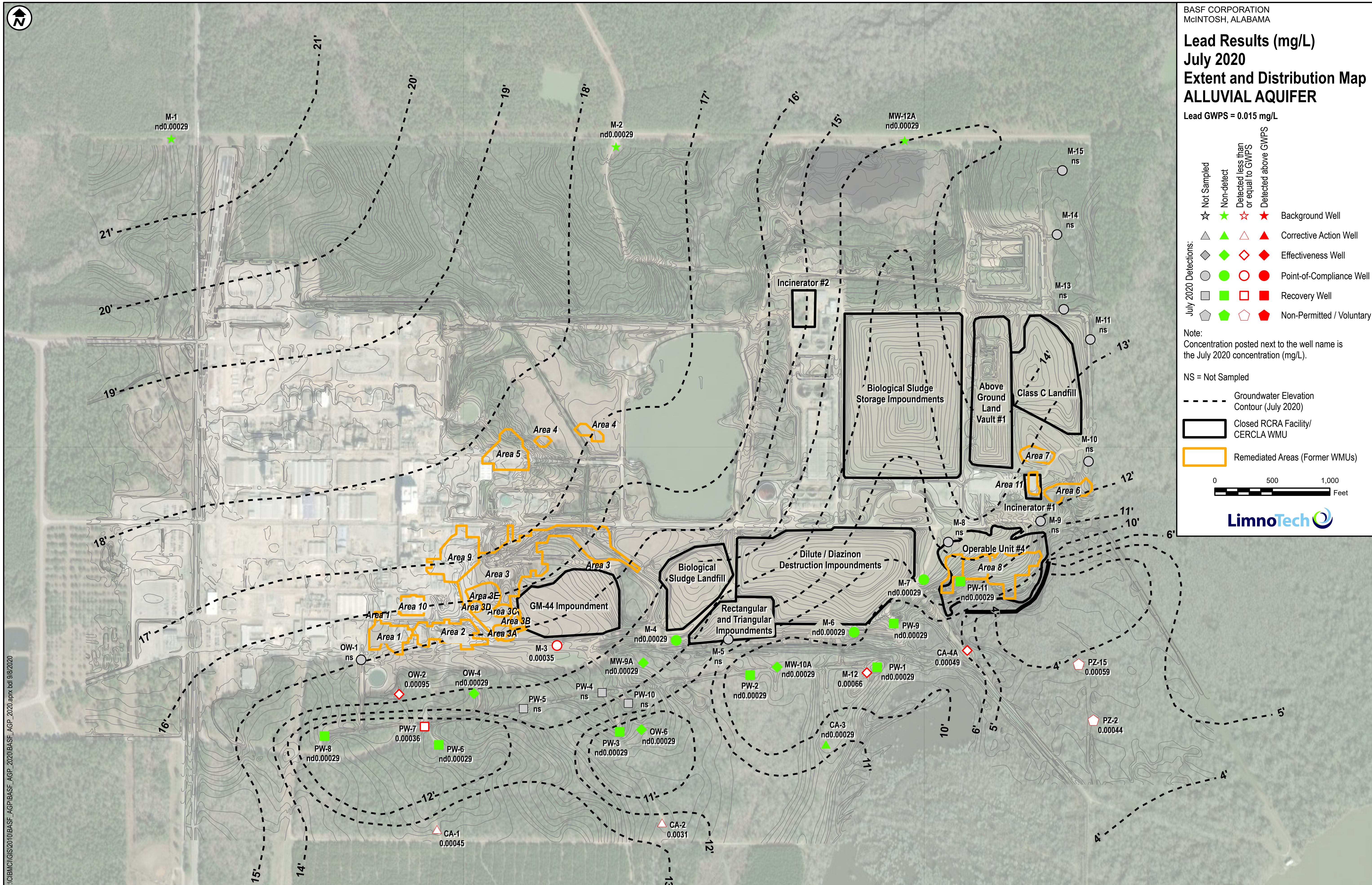
BASF CORPORATION
McINTOSH, ALABAMA

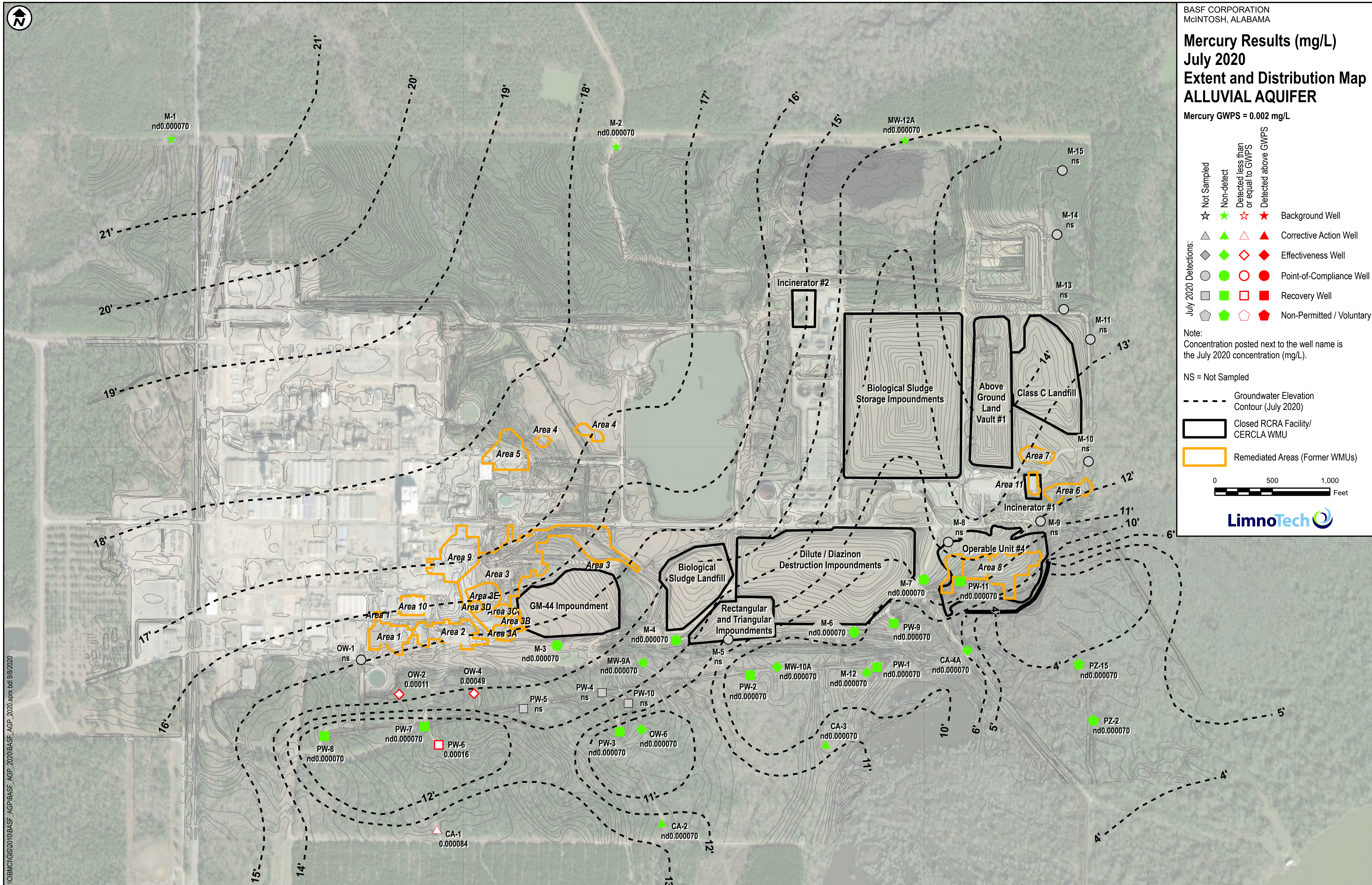
D-BHC Results (mg/L) July 2020 Extent and Distribution Map ALLUVIAL AQUIFER

D-BHC GWPS = 0.000001 mg/L




BASF CORPORATION
McINTOSH, ALABAMA
G-BHC Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
G-BHC GWPS = 0.0002 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1
nd0.00000051
M-2
nd0.00000049
MW-12A
nd0.00000049
M-15
ns
M-14
ns
M-13
ns
M-11
ns
M-10
ns
M-9
ns
M-8
ns
M-7
0.00000064
PW-11
nd0.00000097
M-6
nd0.0000010
PW-9
nd0.0000026
M-4
0.0000028
M-3
0.000004
M-5
ns
OW-1
ns
OW-2
nd0.0000025
OW-4
0.00021
MW-9A
nd0.00000050
MW-10A
nd0.00000049
M-12
nd0.00000047
PW-1
nd0.0000026
CA-4A
nd0.0000025
PZ-15
nd0.00000098
PZ-2
nd0.00000098
PW-4
ns
PW-10
ns
PW-5
ns
PW-2
0.000004
PW-7
0.00015
PW-6
0.000048
PW-8
0.00006
PW-3
0.000016
OW-6
nd0.0000048
CA-3
nd0.00000096
CA-1
nd0.00000097
CA-2
nd0.00000096
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Operable Unit #4
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
S:\CBMC\GIS\2010\BASF_AGP\BASF_AGP_2020\BASF_AGP_2020.aprx bdl 9/10/2020


BASF CORPORATION
McINTOSH, ALABAMA
Lead Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Lead GWPS = 0.015 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1
nd0.00029
M-2
nd0.00029
MW-12A
nd0.00029
M-15
ns
M-14
ns
M-13
ns
M-11
ns
M-10
ns
M-9
ns
M-8
ns
M-7
nd0.00029
PW-11
nd0.00029
M-6
nd0.00029
PW-9
nd0.00029
M-5
ns
M-4
nd0.00029
M-3
0.00035
OW-1
ns
OW-2
0.00095
OW-4
nd0.00029
MW-9A
nd0.00029
PW-4
ns
PW-10
ns
PW-5
ns
PW-7
0.00036
PW-8
nd0.00029
PW-6
nd0.00029
PW-3
nd0.00029
OW-6
nd0.00029
PW-2
nd0.00029
MW-10A
nd0.00029
M-12
0.00066
PW-1
nd0.00029
CA-4A
0.00049
CA-3
nd0.00029
PZ-15
0.00059
PZ-2
0.00044
CA-1
0.00045
CA-2
0.0031
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 4
Area 5
Area 7
Area 11
Area 6
Area 9
Area 3
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
Area 10
Area 1
Area 2
Area 8
GM-44 Impoundment
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
Operable Unit #4
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
S:\CBMC\GIS\2010\BASF_AGP\BASF_AGP_2020\BASF_AGP_2020.aprx bdl 9/8/2020


BASF CORPORATION
McINTOSH, ALABAMA
Mercury Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Mercury GWPS = 0.002 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1
nd0.000070
M-2
nd0.000070
MW-12A
nd0.000070
M-15
ns
M-14
ns
M-13
ns
M-11
ns
M-10
ns
M-9
ns
M-8
ns
M-7
nd0.000070
PW-11
nd0.000070
PW-9
nd0.000070
M-6
nd0.000070
M-5
ns
M-4
nd0.000070
M-3
nd0.000070
OW-1
ns
OW-2
0.00011
OW-4
0.00049
MW-9A
nd0.000070
PW-4
ns
PW-10
ns
PW-5
ns
PW-2
nd0.000070
MW-10A
nd0.000070
M-12
nd0.000070
PW-1
nd0.000070
CA-4A
nd0.000070
PZ-15
nd0.000070
PZ-2
nd0.000070
CA-3
nd0.000070
PW-3
nd0.000070
OW-6
nd0.000070
PW-7
nd0.000070
PW-6
0.00016
PW-8
nd0.000070
CA-1
0.000084
CA-2
nd0.000070
Incinerator #2
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Incinerator #1
Operable Unit #4
Area 8
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 4
Area 4
Area 5
Area 9
Area 3
Area 3
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
Area 10
Area 1
Area 1
Area 2
21'
21'
20'
20'
19'
19'
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15'
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12'
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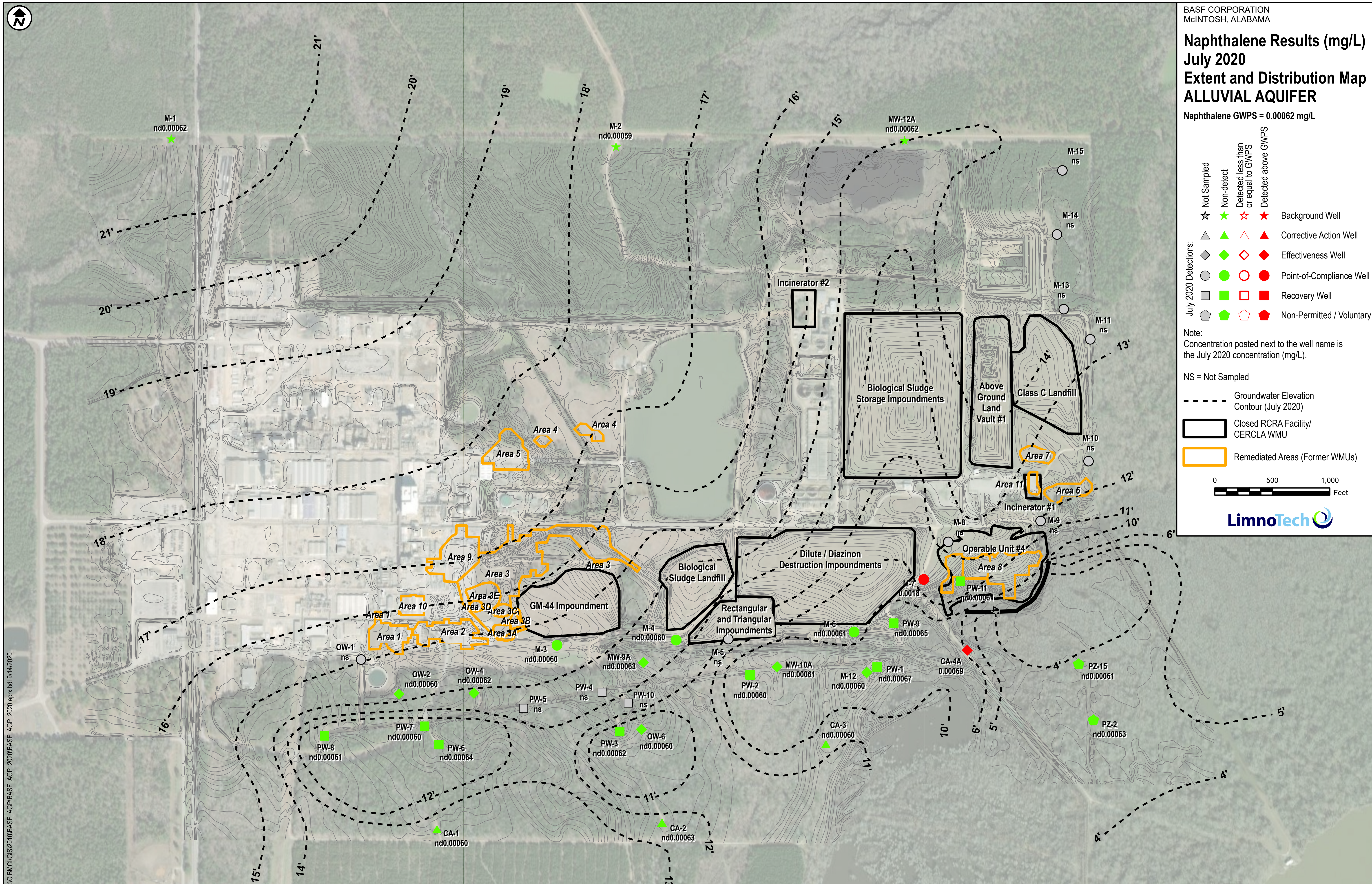
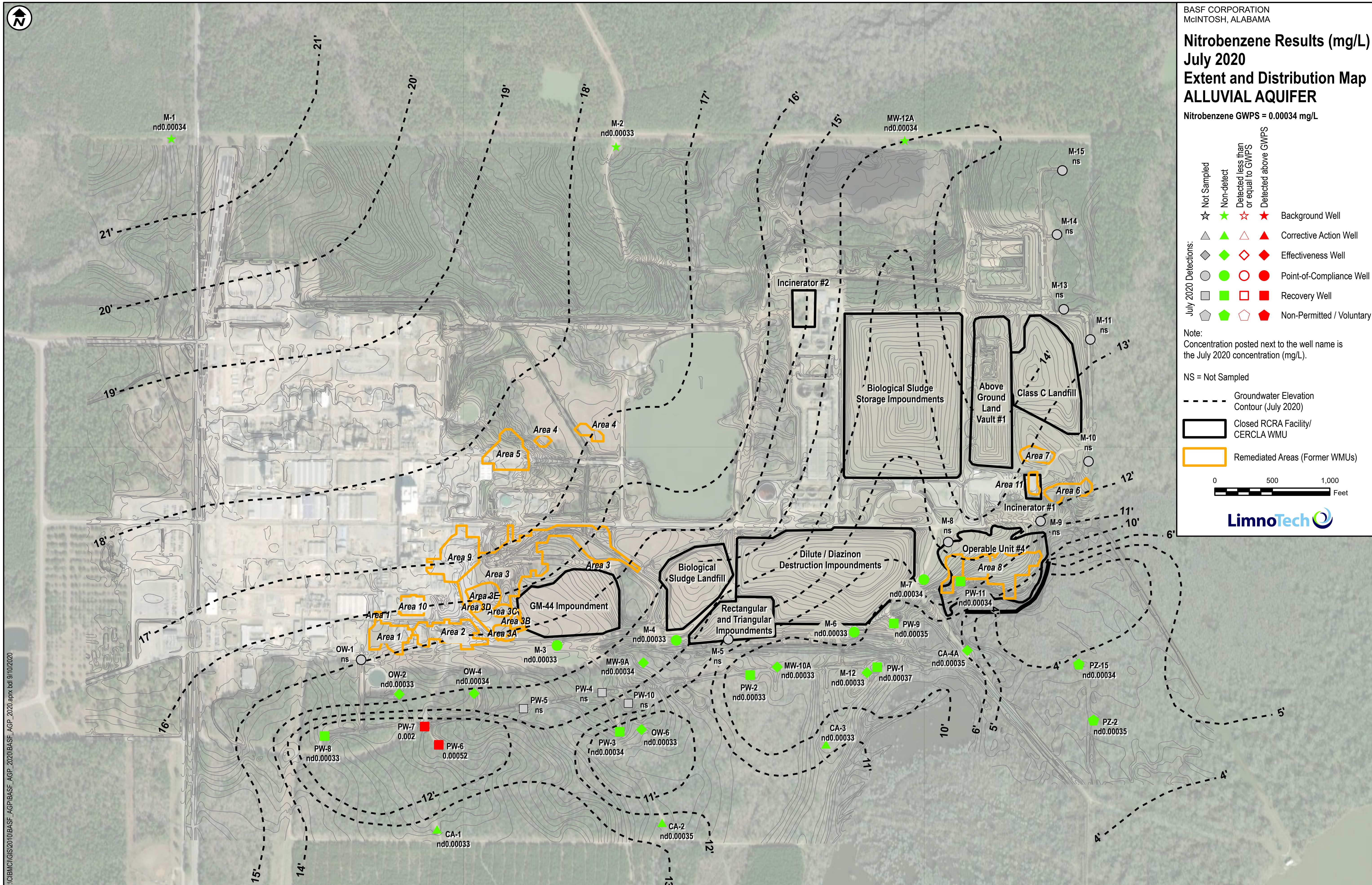
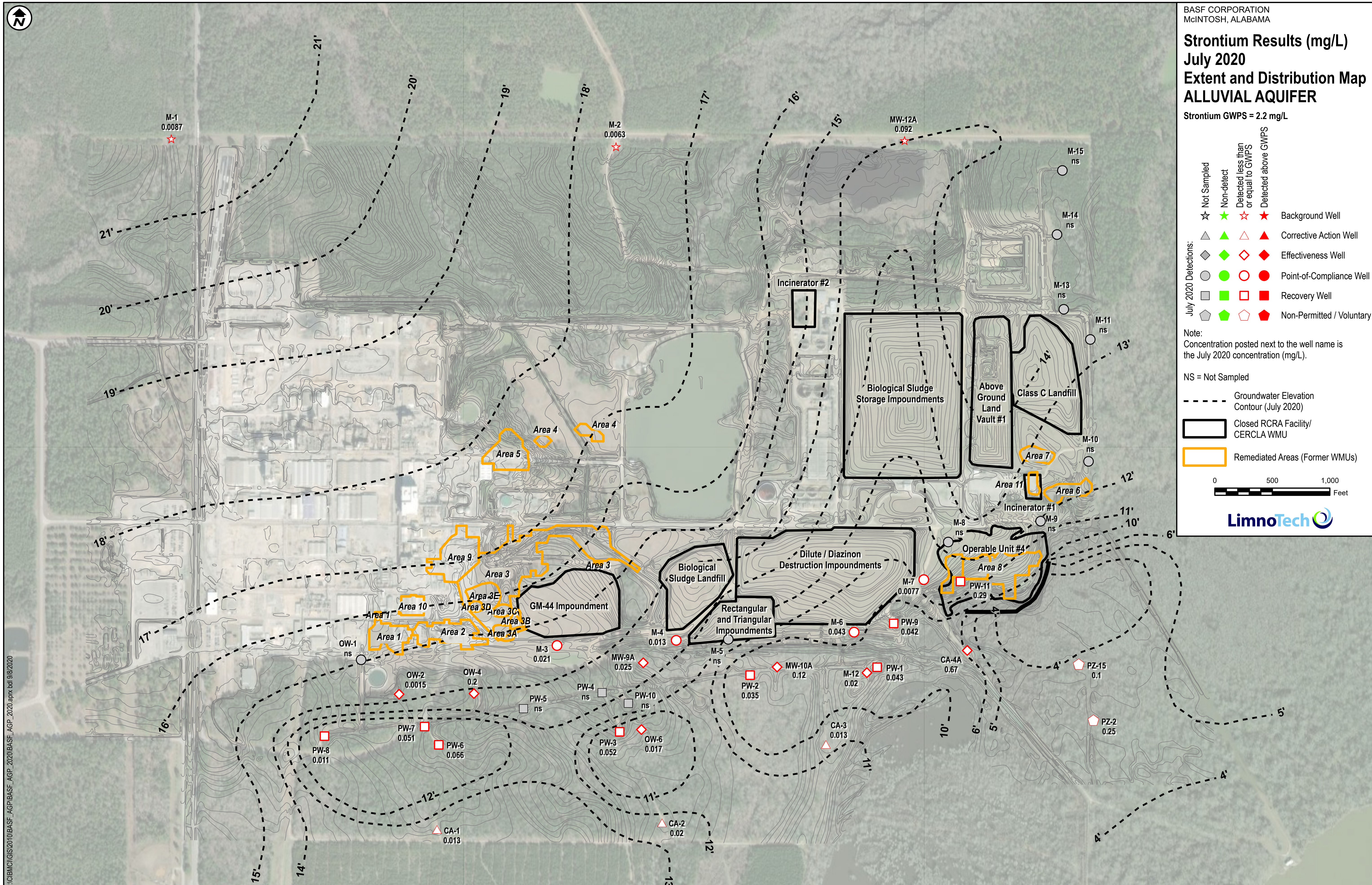
11'
11'
11'
10'
10'
6'
6'
5'
5'
4'
4'
4'
S:\CBMC\GIS\2010BASF_AGP\BASF_AGP_2020\BASF_AGP_2020.aprx bdl 9/8/2020



BASF CORPORATION
McINTOSH, ALABAMA
Naphthalene Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Naphthalene GWPS = 0.00062 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1
nd0.00062
M-2
nd0.00059
MW-12A
nd0.00062
M-15
ns
M-14
ns
M-13
ns
M-11
ns
M-10
ns
M-9
ns
M-8
ns
M-7
0.0018
PW-11
nd0.00061
PW-9
nd0.00065
M-6
nd0.00061
M-5
ns
M-4
nd0.00060
M-3
nd0.00060
OW-1
ns
OW-2
nd0.00060
OW-4
nd0.00062
MW-9A
nd0.00063
PW-4
ns
PW-5
ns
PW-10
ns
PW-2
nd0.00060
MW-10A
nd0.00061
M-12
nd0.00060
PW-1
nd0.00067
CA-4A
0.00069
PZ-15
nd0.00061
PZ-2
nd0.00063
CA-3
nd0.00060
PW-3
nd0.00062
OW-6
nd0.00060
PW-7
nd0.00060
PW-6
nd0.00064
PW-8
nd0.00061
CA-1
nd0.00060
CA-2
nd0.00063
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Operable Unit #4
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
S:\CBMC\GIS\2010\BASF_AGP\BASF_AGP_2020\BASF_AGP_2020.aprx bdl 9/14/2020


BASF CORPORATION
McINTOSH, ALABAMA
Nitrobenzene Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Nitrobenzene GWPS = 0.00034 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1
nd0.00034
M-2
nd0.00033
MW-12A
nd0.00034
M-15
ns
M-14
ns
M-13
ns
M-11
ns
M-10
ns
M-9
ns
M-8
ns
M-7
nd0.00034
PW-11
nd0.00034
M-6
nd0.00033
PW-9
nd0.00035
M-4
nd0.00033
M-5
ns
M-3
nd0.00033
OW-1
ns
OW-2
nd0.00033
OW-4
nd0.00034
MW-9A
nd0.00034
PW-4
ns
PW-10
ns
PW-5
ns
PW-7
0.002
PW-6
0.00052
PW-8
nd0.00033
PW-3
nd0.00034
OW-6
nd0.00033
PW-2
nd0.00033
MW-10A
nd0.00033
M-12
nd0.00033
PW-1
nd0.00037
CA-4A
nd0.00035
CA-3
nd0.00033
CA-1
nd0.00033
CA-2
nd0.00035
PZ-15
nd0.00034
PZ-2
nd0.00035
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Operable Unit #4
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
S:\CBMC\GIS\2010BASF_AGP\BASF_AGP_2020\BASF_AGP_2020.aprx bdl 9/10/2020


BASF CORPORATION
McINTOSH, ALABAMA
Strontium Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Strontium GWPS = 2.2 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1
0.0087
M-2
0.0063
MW-12A
0.092
M-15
ns
M-14
ns
M-13
ns
M-11
ns
M-10
ns
M-9
ns
M-8
ns
M-7
0.0077
M-6
0.043
M-5
ns
M-4
0.013
M-3
0.021
OW-1
ns
OW-2
0.0015
OW-4
0.2
OW-6
0.017
MW-9A
0.025
MW-10A
0.12
M-12
0.02
PW-1
0.043
PW-2
0.035
PW-3
0.052
PW-4
ns
PW-5
ns
PW-6
0.066
PW-7
0.051
PW-8
0.011
PW-9
0.042
PW-10
ns
PW-11
0.29
CA-1
0.013
CA-2
0.02
CA-3
0.013
CA-4A
0.67
PZ-15
0.1
PZ-2
0.25
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Operable Unit #4
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 1
Area 1
Area 2
Area 3
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
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4'
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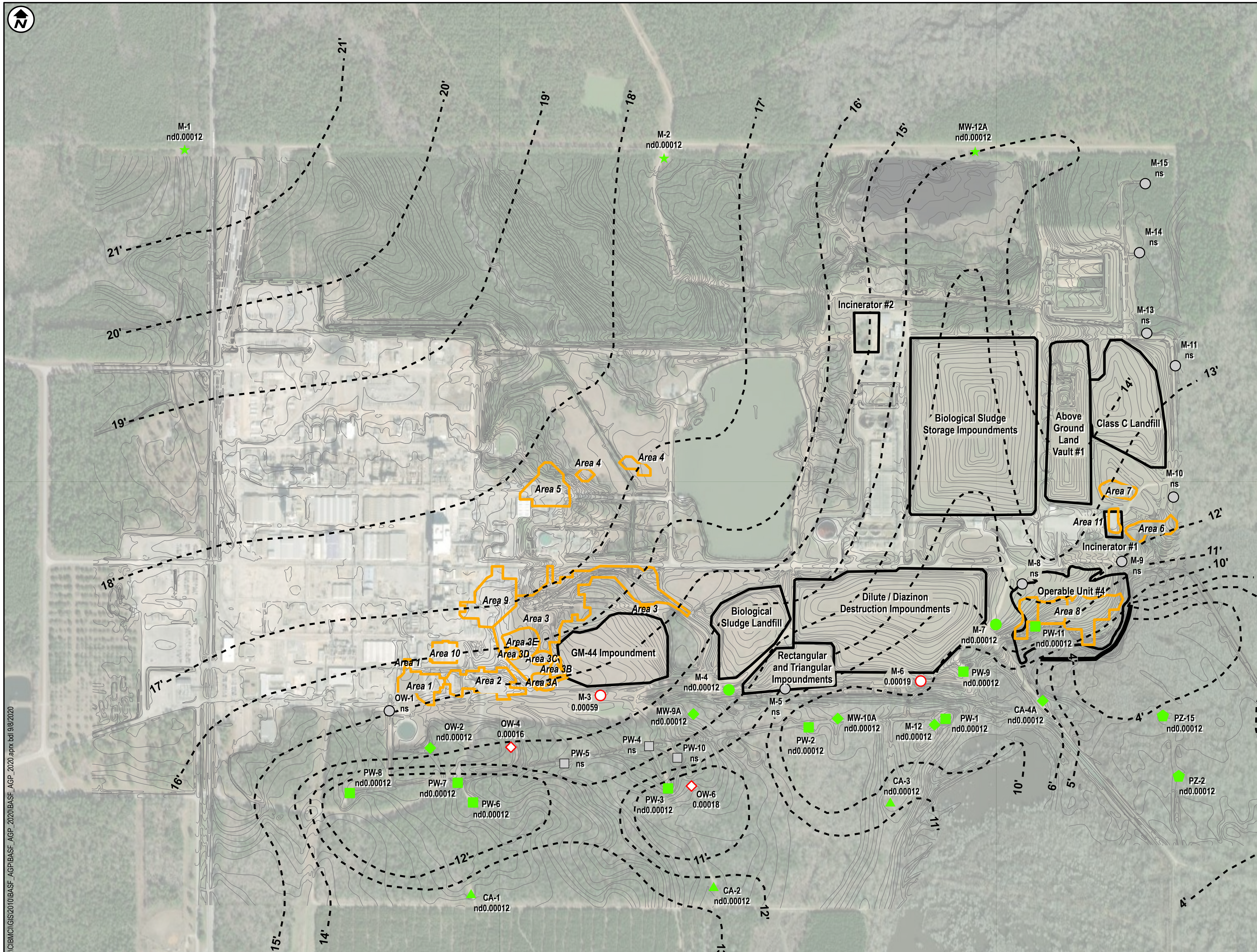


BASF CORPORATION
McINTOSH, ALABAMA

Thallium Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER

Thallium GWPS = 0.002 mg/L

July 2020 Detections:

	Not Sampled	Non-detect	Detected less than or equal to GWPS	Detected above GWPS
Background Well	☆	★	☆	★
Corrective Action Well	△	▲	△	▲
Effectiveness Well	◇	◆	◇	◆
Point-of-Compliance Well	○	●	○	●
Recovery Well	□	■	□	■
Non-Permitted / Voluntary	⬠	⬟	⬠	⬟

Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).

NS = Not Sampled

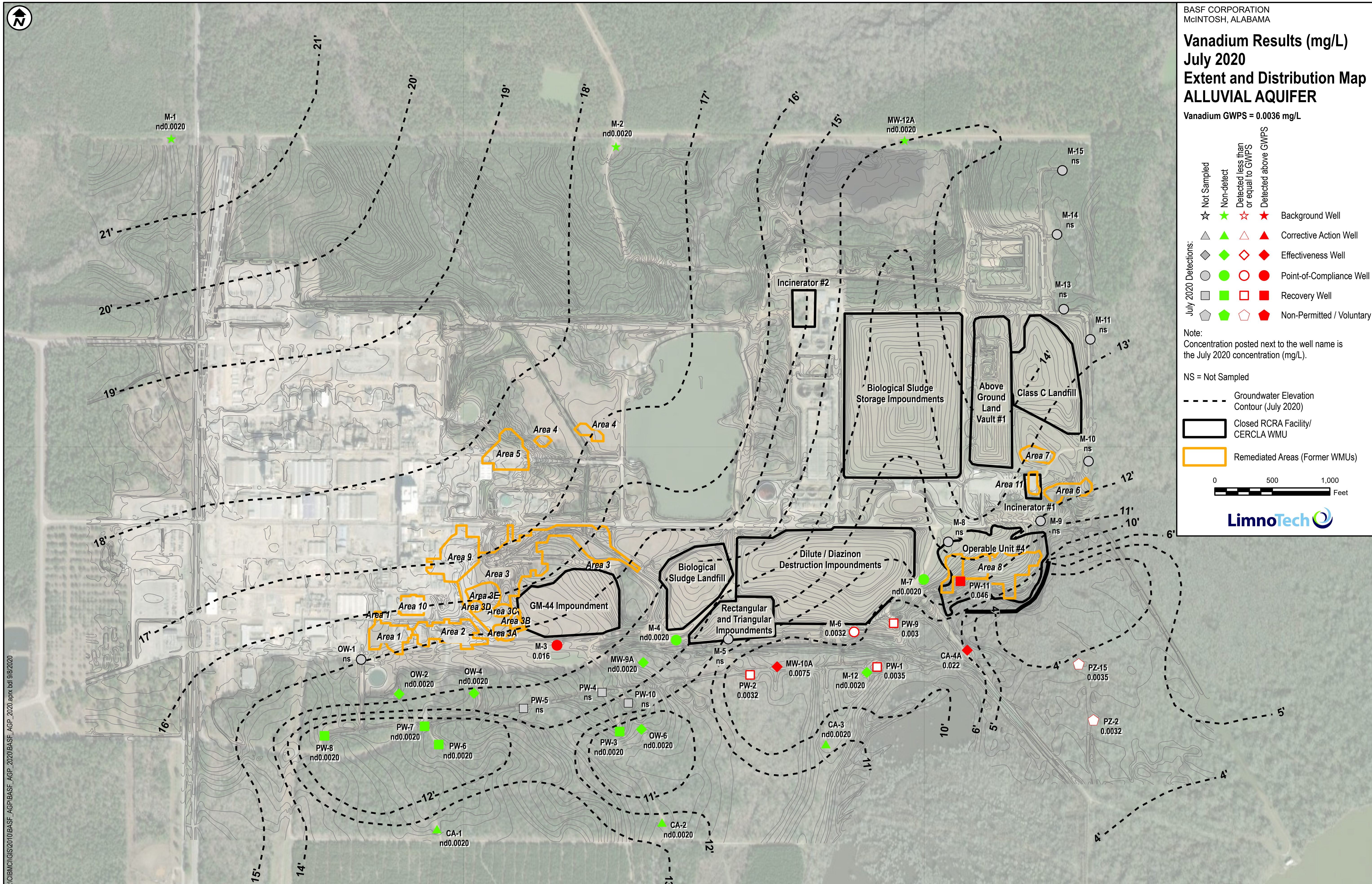
Groundwater Elevation Contour (July 2020)

Closed RCRA Facility/ CERCLA WMU

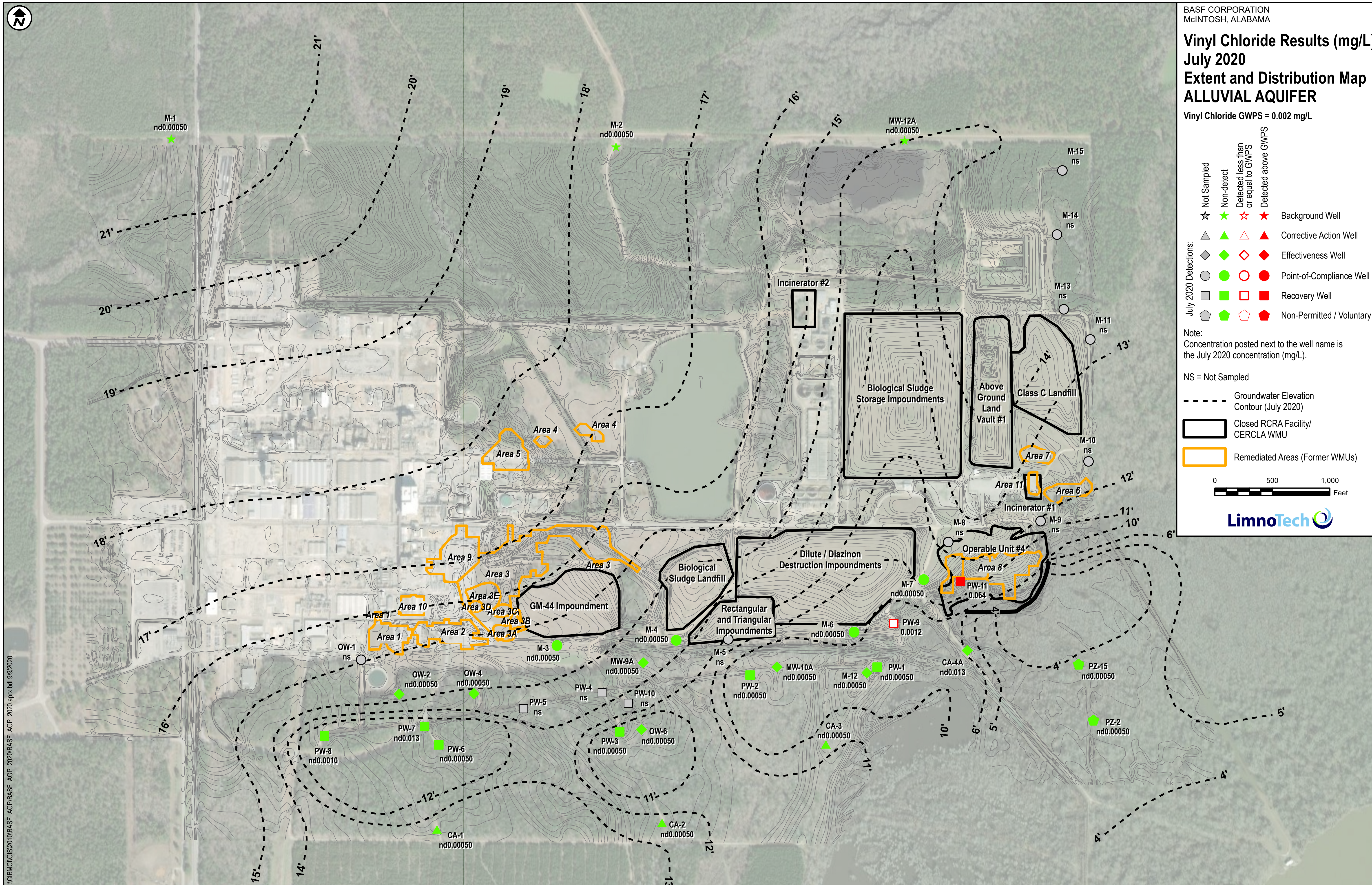
Remediated Areas (Former WMUs)

0 500 1,000 Feet

LimnoTech



BASF CORPORATION
McINTOSH, ALABAMA
Vanadium Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Vanadium GWPS = 0.0036 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
M-1 nd0.0020
M-2 nd0.0020
MW-12A nd0.0020
M-15 ns
M-14 ns
M-13 ns
M-11 ns
M-10 ns
M-9 ns
M-8 ns
M-7 nd0.0020
PW-11 0.046
M-6 0.0032
PW-9 0.003
CA-4A 0.022
PZ-15 0.0035
PZ-2 0.0032
PW-1 0.0035
M-12 nd0.0020
MW-10A 0.0075
PW-2 0.0032
M-5 ns
M-4 nd0.0020
MW-9A nd0.0020
M-3 0.016
OW-1 ns
OW-2 nd0.0020
OW-4 nd0.0020
PW-4 ns
PW-10 ns
PW-5 ns
PW-7 nd0.0020
PW-8 nd0.0020
PW-6 nd0.0020
PW-3 nd0.0020
OW-6 nd0.0020
CA-3 nd0.0020
CA-1 nd0.0020
CA-2 nd0.0020
Incinerator #2
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Incinerator #1
Operable Unit #4
Area 8
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 4
Area 4
Area 5
Area 9
Area 3
Area 3
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
Area 10
Area 1
Area 1
Area 2
21'
20'
19'
18'
17'
16'
15'
14'
13'
12'
11'
10'
6'
5'
4'
S:\CBMC\GIS\2010\BASF_AGP\BASF_AGP_2020\BASF_AGP_2020.aprx bd 9/8/2020


BASF CORPORATION
McINTOSH, ALABAMA
Vinyl Chloride Results (mg/L)
July 2020
Extent and Distribution Map
ALLUVIAL AQUIFER
Vinyl Chloride GWPS = 0.002 mg/L
July 2020 Detections:
Not Sampled
Non-detect
Detected less than or equal to GWPS
Detected above GWPS
Background Well
Corrective Action Well
Effectiveness Well
Point-of-Compliance Well
Recovery Well
Non-Permitted / Voluntary
Note:
Concentration posted next to the well name is the July 2020 concentration (mg/L).
NS = Not Sampled
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/ CERCLA WMU
Remediated Areas (Former WMUs)
0 500 1,000
Feet
LimnoTech
M-1 nd0.00050
M-2 nd0.00050
MW-12A nd0.00050
M-15 ns
M-14 ns
M-13 ns
M-11 ns
M-10 ns
M-9 ns
M-8 ns
M-7 nd0.00050
PW-11 0.064
PW-9 0.0012
M-6 nd0.00050
M-5 ns
M-4 nd0.00050
M-3 nd0.00050
OW-1 ns
OW-2 nd0.00050
OW-4 nd0.00050
MW-9A nd0.00050
MW-10A nd0.00050
M-12 nd0.00050
PW-1 nd0.00050
PW-2 nd0.00050
PW-4 ns
PW-5 ns
PW-10 ns
PW-3 nd0.00050
OW-6 nd0.00050
PW-7 nd0.013
PW-6 nd0.00050
PW-8 nd0.0010
CA-1 nd0.00050
CA-2 nd0.00050
CA-3 nd0.00050
CA-4A nd0.013
PZ-15 nd0.00050
PZ-2 nd0.00050
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Operable Unit #4
Area 8
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 9
Area 10
21'
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19'
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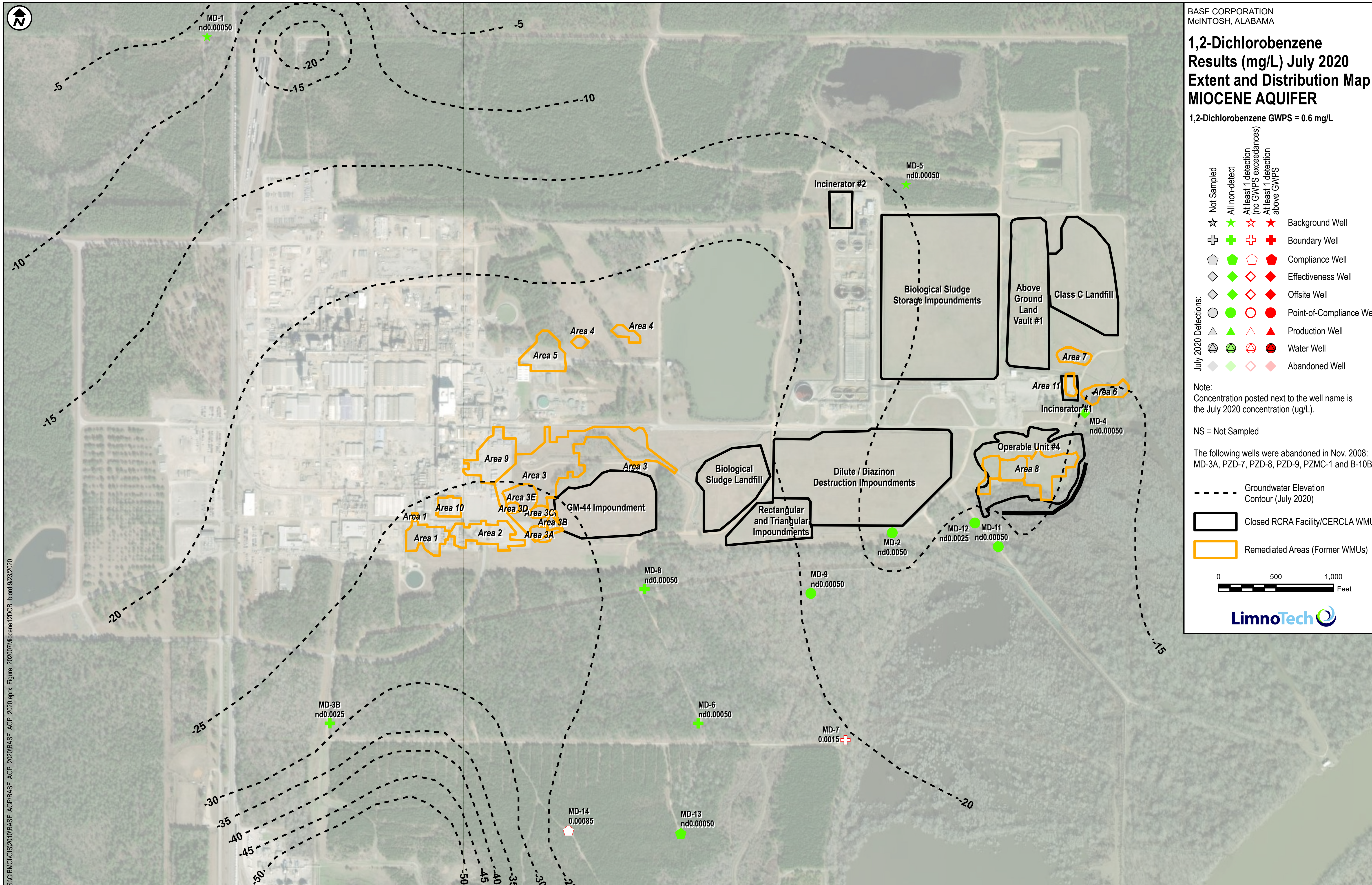

BASF CORPORATION
McINTOSH, ALABAMA
1,2-Dichlorobenzene Results (mg/L) July 2020 Extent and Distribution Map
MIOCENE AQUIFER
1,2-Dichlorobenzene GWPS = 0.6 mg/L
July 2020 Detections:
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
nd0.00050
MD-5
nd0.00050
Incinerator #2
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 4
Area 4
Area 5
Area 7
Area 11
Area 6
Incinerator #1
MD-4
nd0.00050
Operable Unit #4
Area 8
Area 9
Area 3
Area 3
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
GM-44 Impoundment
Rectangular and Triangular Impoundments
Area 10
Area 1
Area 1
Area 2
MD-2
nd0.0050
MD-12
nd0.0025
MD-11
nd0.00050
MD-8
nd0.00050
MD-9
nd0.00050
MD-3B
nd0.0025
MD-6
nd0.00050
MD-7
0.0015
MD-14
0.00085
MD-13
nd0.00050
-5
-5
-10
-10
-15
-15
-15
-20
-20
-20
-25
-25
-30
-30
-35
-35
-40
-40
-45
-45
-50
-50
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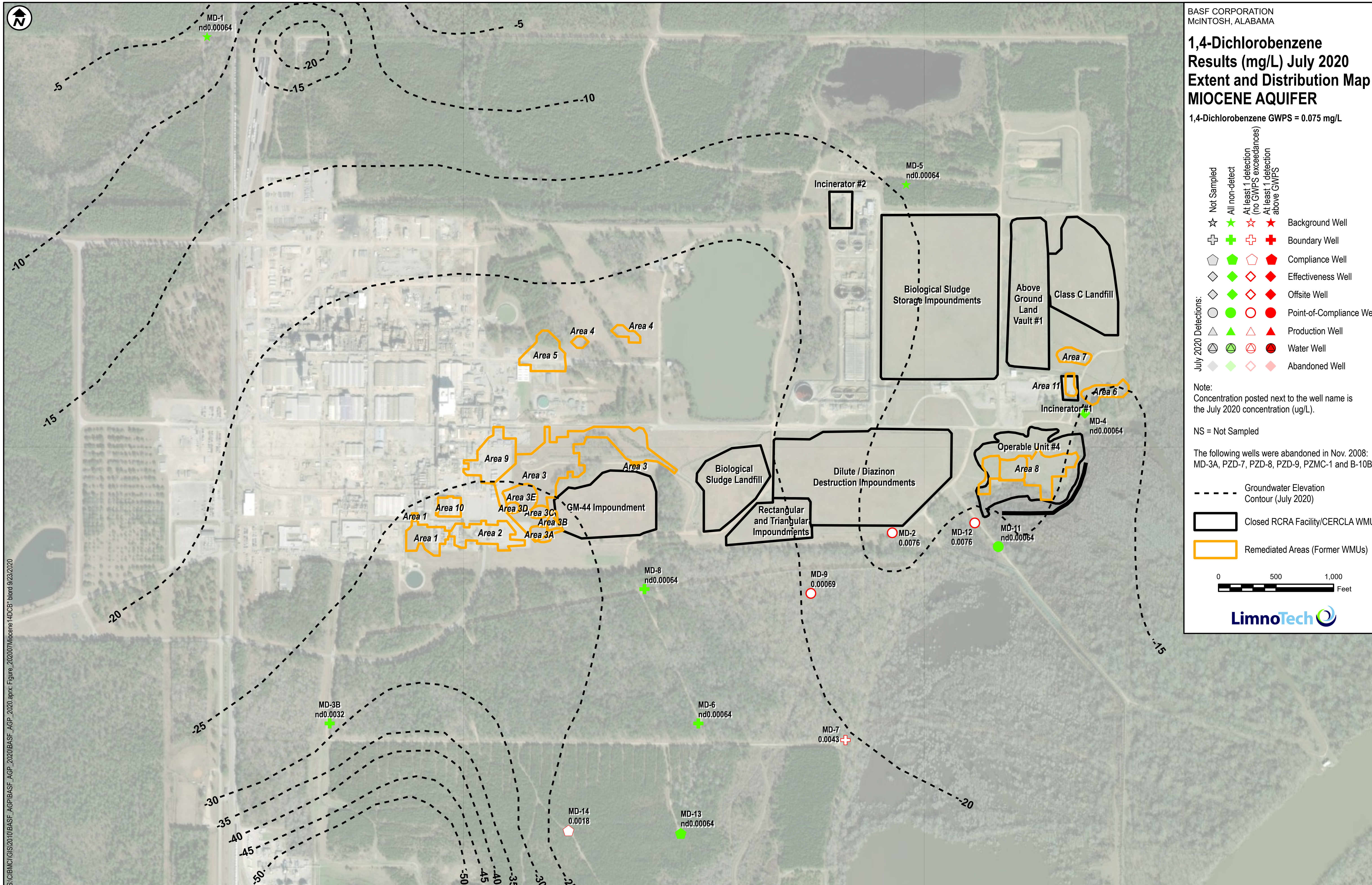

BASF CORPORATION
McINTOSH, ALABAMA
1,4-Dichlorobenzene
Results (mg/L) July 2020
Extent and Distribution Map
MIOCENE AQUIFER
1,4-Dichlorobenzene GWPS = 0.075 mg/L
July 2020 Detections:
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
nd0.00064
MD-5
nd0.00064
MD-4
nd0.00064
MD-2
0.0076
MD-12
0.0076
MD-11
nd0.00064
MD-8
nd0.00064
MD-9
0.00069
MD-3B
nd0.0032
MD-6
nd0.00064
MD-7
0.0043
MD-14
0.0018
MD-13
nd0.00064
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Operable Unit #4
Area 8
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 3
Area 4
Area 4
Area 5
Area 9
Area 3
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
Area 10
Area 1
Area 1
Area 2
-5
-5
-10
-10
-15
-15
-20
-20
-20
-25
-25
-30
-30
-35
-35
-40
-40
-45
-45
-50
-50
-15
-20
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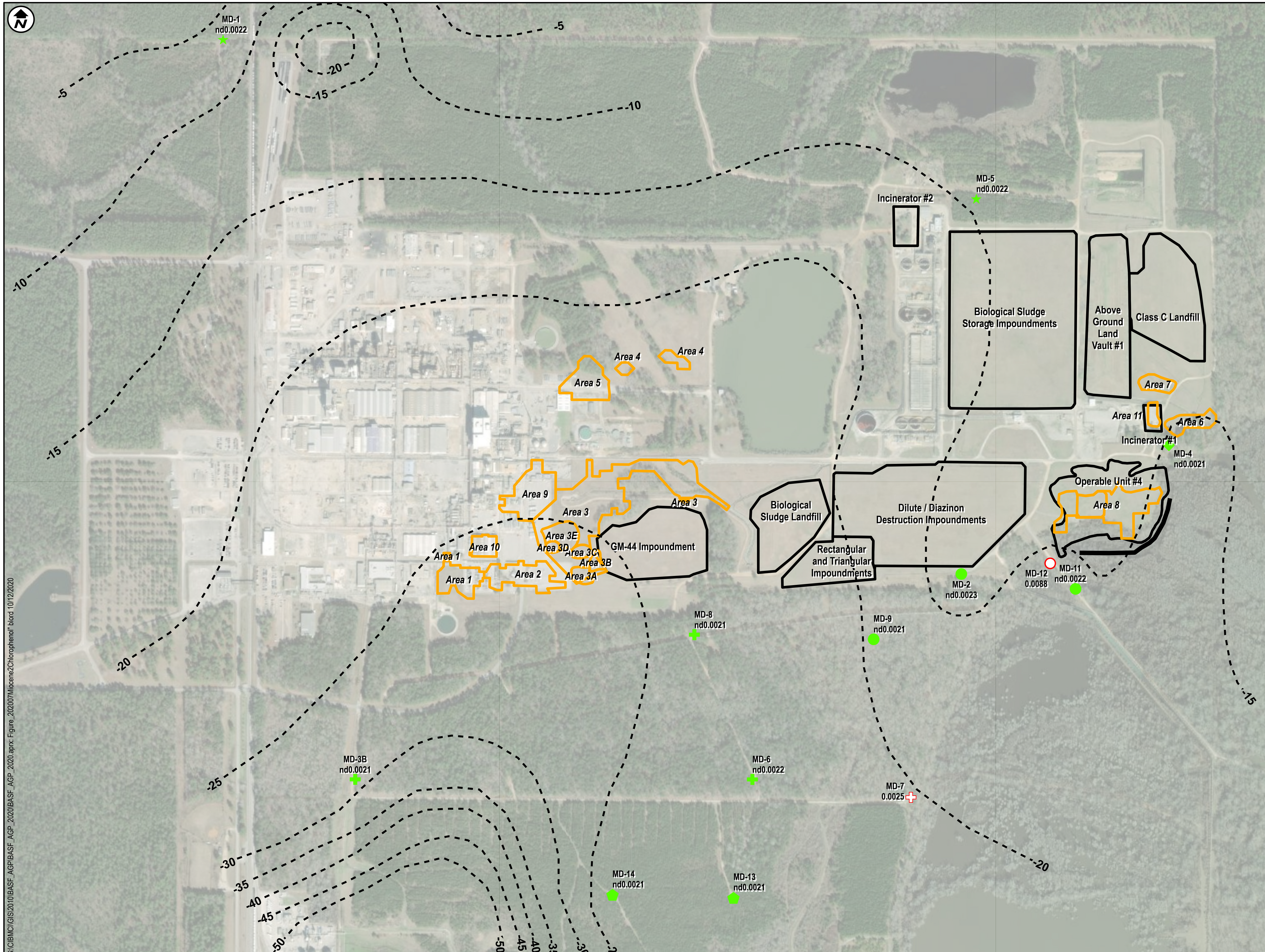


BASF CORPORATION
McINTOSH, ALABAMA

2-Chlorophenol Results (mg/L) July 2020 Extent and Distribution Map MIOCENE AQUIFER

2-Chlorophenol GWPS = 0.0091 mg/L

July 2020 Detections:

	Not Sampled	All non-detect	At least 1 detection (no GWPS exceedances)	At least 1 detection above GWPS
Background Well				
Boundary Well				
Compliance Well				
Effectiveness Well				
Offsite Well				
Point-of-Compliance Well				
Production Well				
Water Well				
Abandoned Well				

Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).

NS = Not Sampled

The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B

Groundwater Elevation Contour (July 2020)

Closed RCRA Facility/CERCLA WMU

Remediated Areas (Former WMUs)

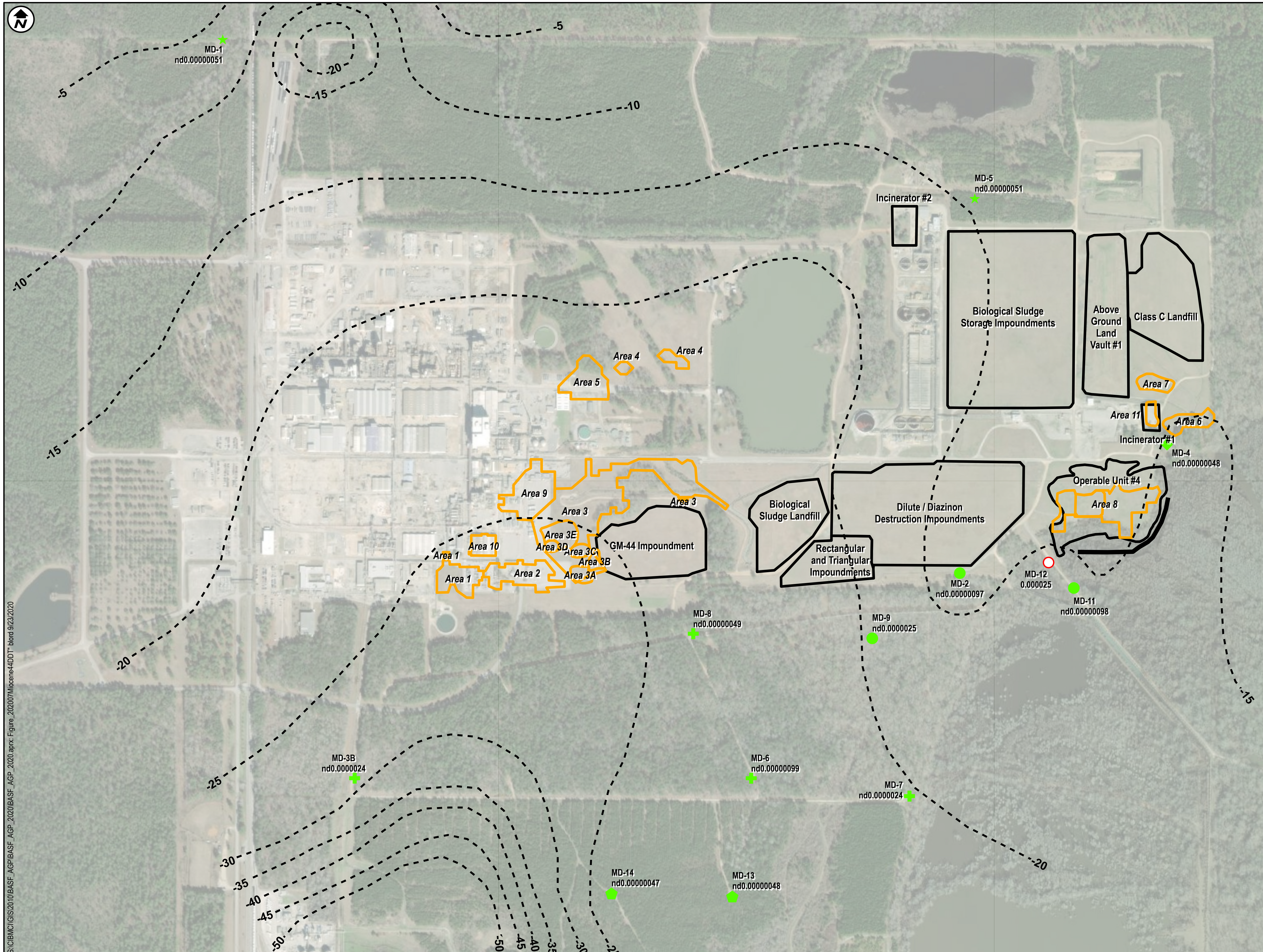
0 500 1,000 Feet

LimnoTech

BASF CORPORATION
McINTOSH, ALABAMA

4,4'-DDT Results (mg/L)
July 2020
Extent and Distribution Map
MIOCENE AQUIFER

4,4'-DDT GWPS = 0.0002 mg/L



July 2020 Detections:

Not Sampled	All non-detect	At least 1 detection (no GWPS exceedances)	At least 1 detection above GWPS	
☆	★	☆	★	Background Well
✚	✚	✚	✚	Boundary Well
⬠	⬟	⬠	⬟	Compliance Well
◇	◆	◇	◆	Effectiveness Well
◇	◆	◇	◆	Offsite Well
○	●	○	●	Point-of-Compliance Well
△	▲	△	▲	Production Well
△	△	△	△	Water Well
◆	◆	◇	◆	Abandoned Well

Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).

NS = Not Sampled

The following wells were abandoned in Nov. 2008:
MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B

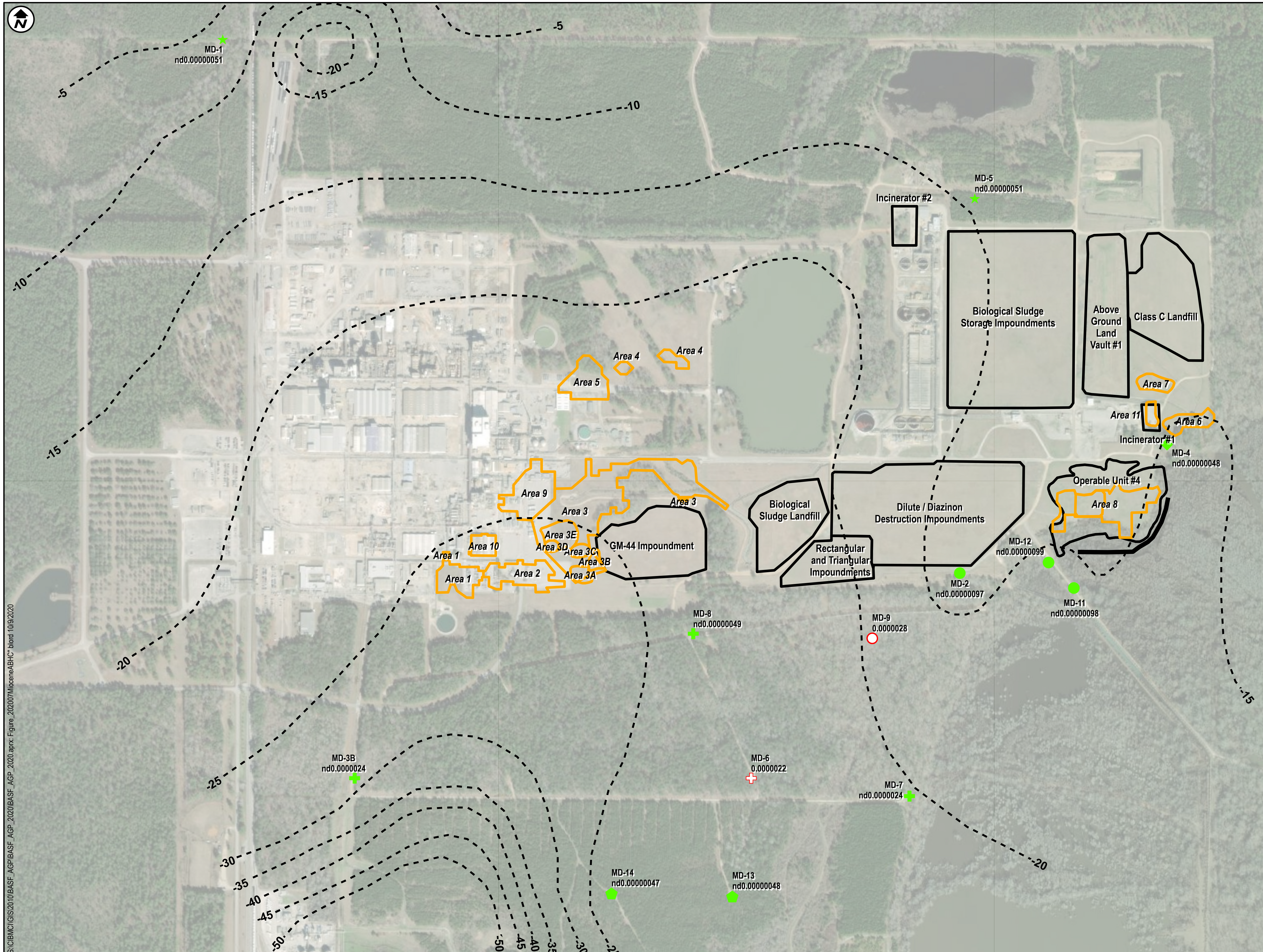
Groundwater Elevation Contour (July 2020)

Closed RCRA Facility/CERCLA WMU

Remediated Areas (Former WMUs)

0 500 1,000
Feet

LimnoTech



BASF CORPORATION
McINTOSH, ALABAMA

alpha-BHC Results (mg/L) July 2020 Extent and Distribution Map MIOCENE AQUIFER

Alpha-BHC GWPS = 0.000011 mg/L

July 2020 Detections:

	Not Sampled	All non-detect	At least 1 detection (no GWPS exceedances)	At least 1 detection above GWPS
Background Well				
Boundary Well				
Compliance Well				
Effectiveness Well				
Offsite Well				
Point-of-Compliance Well				
Production Well				
Water Well				
Abandoned Well				

Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).

NS = Not Sampled

The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B

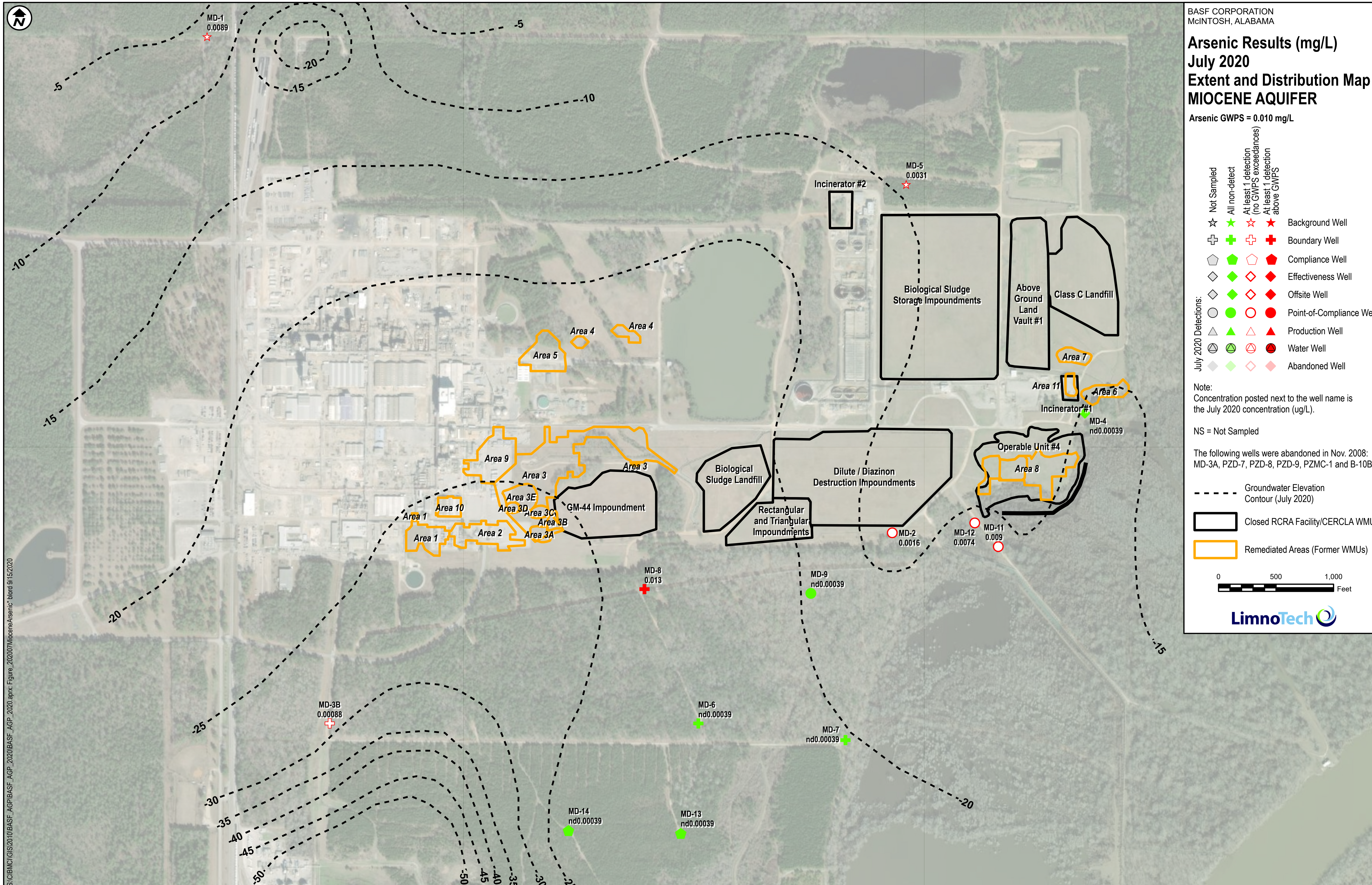
Groundwater Elevation Contour (July 2020)

Closed RCRA Facility/CERCLA WMU

Remediated Areas (Former WMUs)

0 500 1,000 Feet

LimnoTech



BASF CORPORATION
McINTOSH, ALABAMA
Arsenic Results (mg/L)
July 2020
Extent and Distribution Map
MIOCENE AQUIFER
Arsenic GWPS = 0.010 mg/L
July 2020 Detections:
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
0.0089
MD-5
0.0031
MD-4
nd0.00039
MD-2
0.0016
MD-12
0.0074
MD-11
0.009
MD-8
0.013
MD-9
nd0.00039
MD-3B
0.00088
MD-6
nd0.00039
MD-7
nd0.00039
MD-14
nd0.00039
MD-13
nd0.00039
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
GM-44 Impoundment
Operable Unit #4
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
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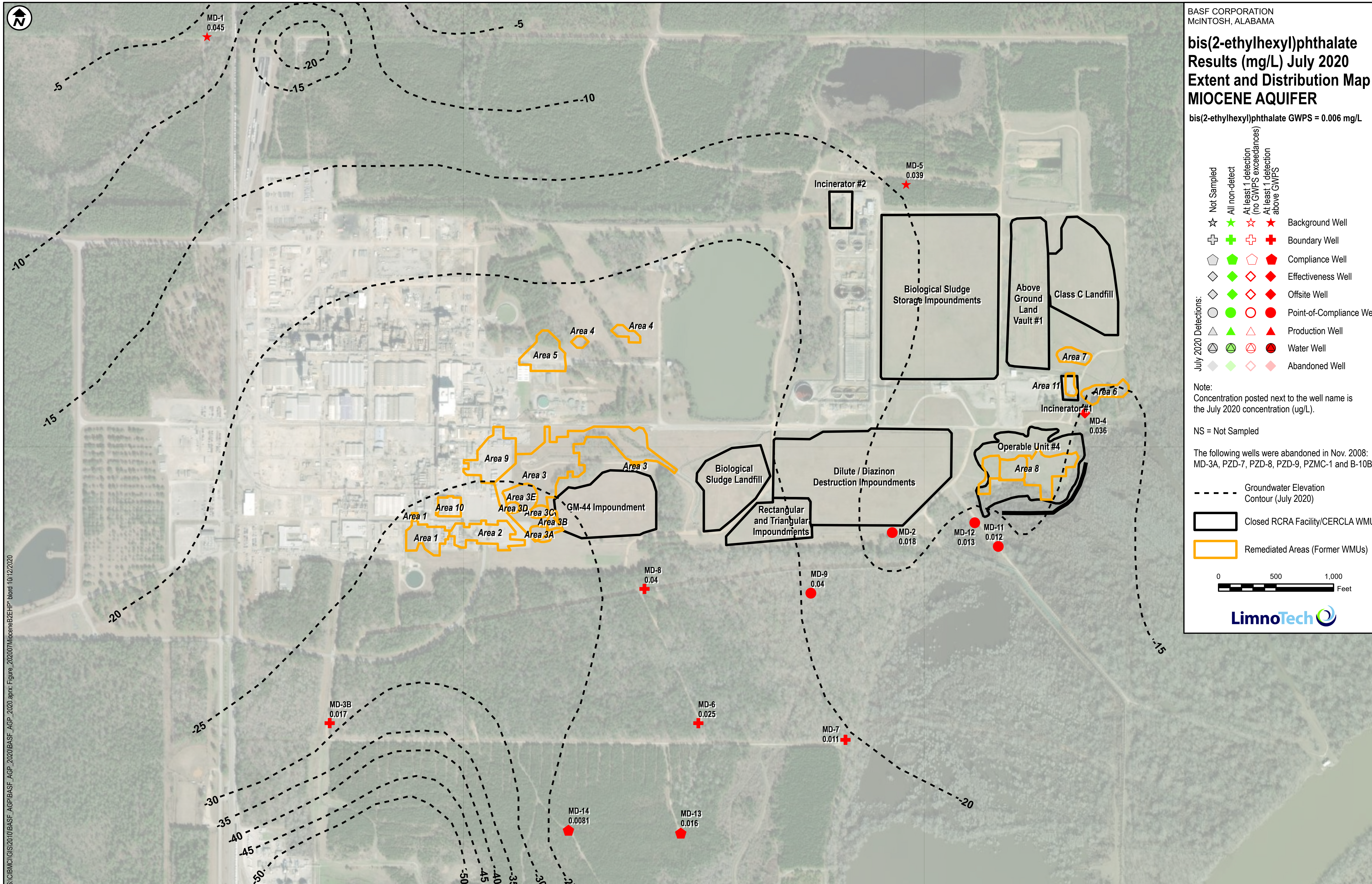
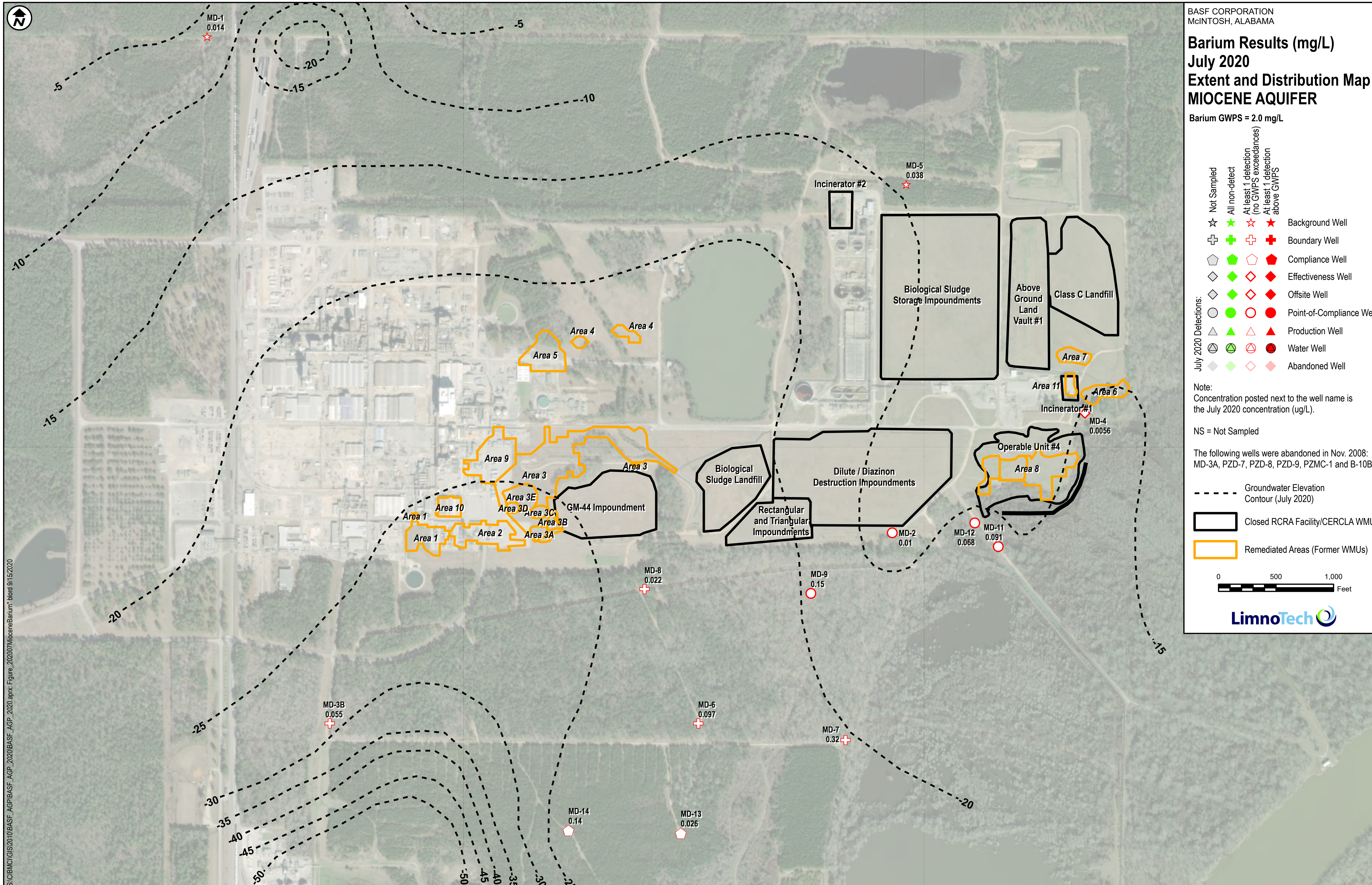


BASF CORPORATION
McINTOSH, ALABAMA
bis(2-ethylhexyl)phthalate Results (mg/L) July 2020 Extent and Distribution Map MIOCENE AQUIFER
bis(2-ethylhexyl)phthalate GWPS = 0.006 mg/L
July 2020 Detections:
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
0.045
MD-5
0.039
MD-4
0.036
MD-2
0.018
MD-12
0.013
MD-11
0.012
MD-8
0.04
MD-9
0.04
MD-3B
0.017
MD-6
0.025
MD-7
0.011
MD-14
0.0081
MD-13
0.016
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Operable Unit #4
Area 8
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 9
Area 10
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50


BASF CORPORATION
McINTOSH, ALABAMA
Barium Results (mg/L)
July 2020
Extent and Distribution Map
MIOCENE AQUIFER
Barium GWPS = 2.0 mg/L
July 2020 Detections:
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
0.014
MD-5
0.038
MD-4
0.0056
MD-2
0.01
MD-12
0.068
MD-11
0.091
MD-8
0.022
MD-9
0.15
MD-3B
0.055
MD-6
0.097
MD-7
0.32
MD-14
0.14
MD-13
0.026
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
Operable Unit #4
GM-44 Impoundment
Biological Sludge Landfill
Rectangular and Triangular Impoundments
Dilute / Diazinon Destruction Impoundments
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
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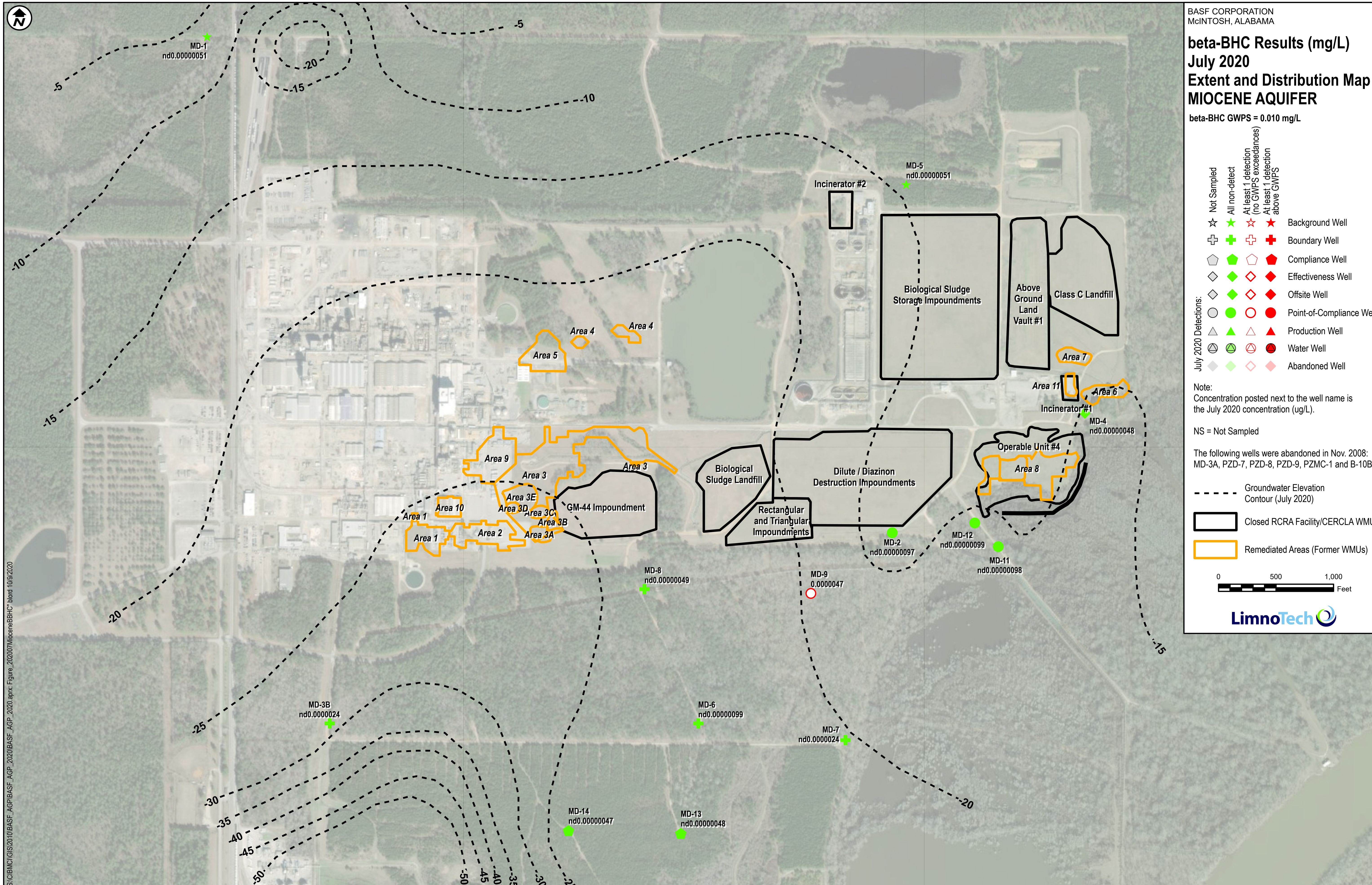

BASF CORPORATION
McINTOSH, ALABAMA
beta-BHC Results (mg/L)
July 2020
Extent and Distribution Map
MIOCENE AQUIFER
beta-BHC GWPS = 0.010 mg/L
July 2020 Detections:
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
nd0.00000051
MD-5
nd0.00000051
MD-4
nd0.00000048
MD-2
nd0.00000097
MD-12
nd0.00000099
MD-11
nd0.00000098
MD-8
nd0.00000049
MD-9
0.0000047
MD-3B
nd0.0000024
MD-6
nd0.00000099
MD-7
nd0.0000024
MD-14
nd0.00000047
MD-13
nd0.00000048
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Operable Unit #4
Area 8
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 4
Area 4
Area 5
Area 9
Area 3
Area 3
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
Area 10
Area 1
Area 1
Area 2
-5
-5
-10
-10
-15
-15
-15
-20
-20
-20
-20
-25
-25
-30
-30
-35
-35
-40
-40
-45
-45
-50
-50
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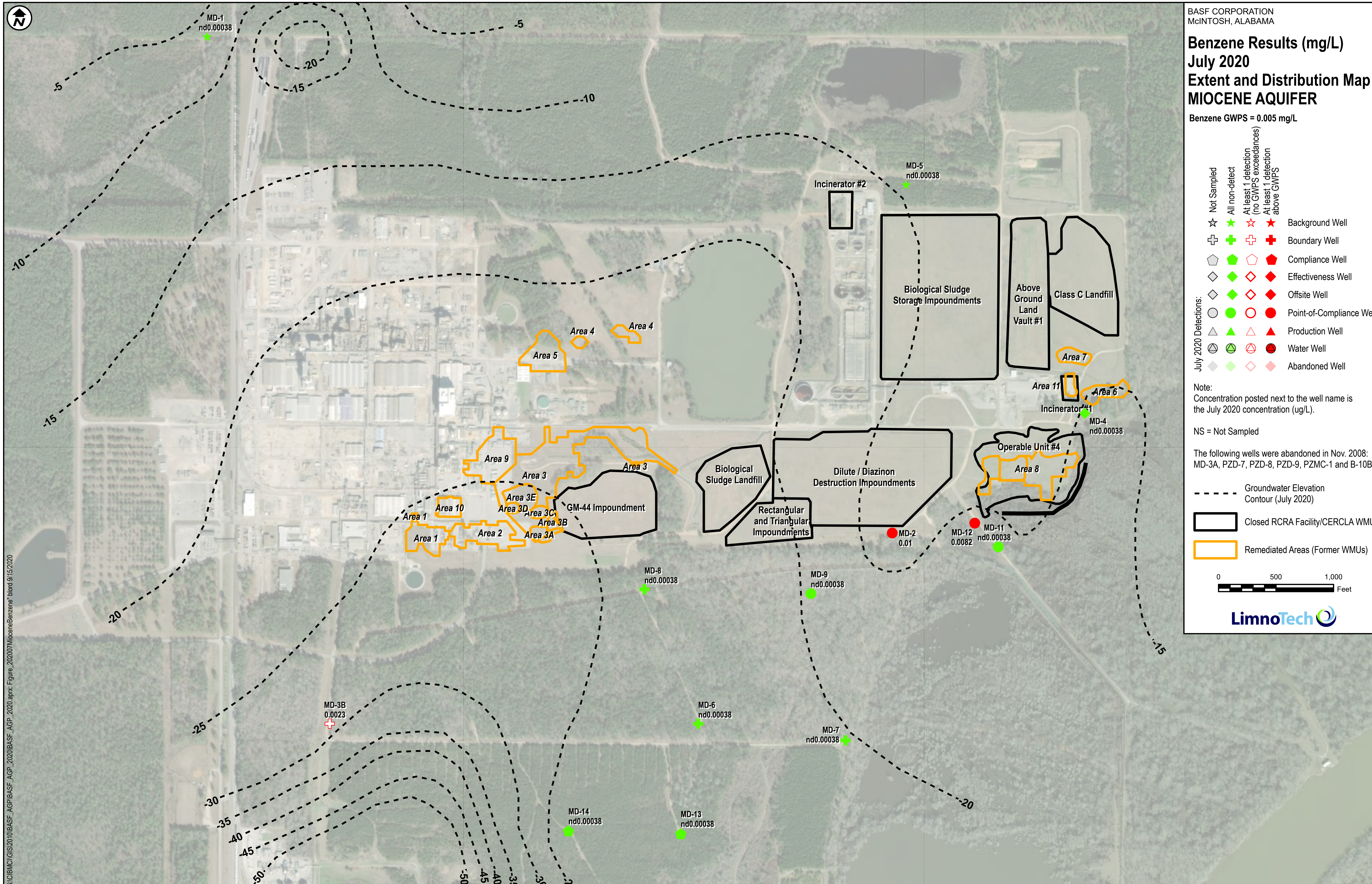
BASF CORPORATION
McINTOSH, ALABAMA
Benzene Results (mg/L)
July 2020
Extent and Distribution Map
MIOCENE AQUIFER
Benzene GWPS = 0.005 mg/L
July 2020 Detections:
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
nd0.00038
MD-5
nd0.00038
MD-4
nd0.00038
MD-2
0.01
MD-12
0.0082
MD-11
nd0.00038
MD-8
nd0.00038
MD-9
nd0.00038
MD-3B
0.0023
MD-6
nd0.00038
MD-7
nd0.00038
MD-14
nd0.00038
MD-13
nd0.00038
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Operable Unit #4
Area 8
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 3
Area 4
Area 5
Area 9
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
Area 10
Area 1
Area 2
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
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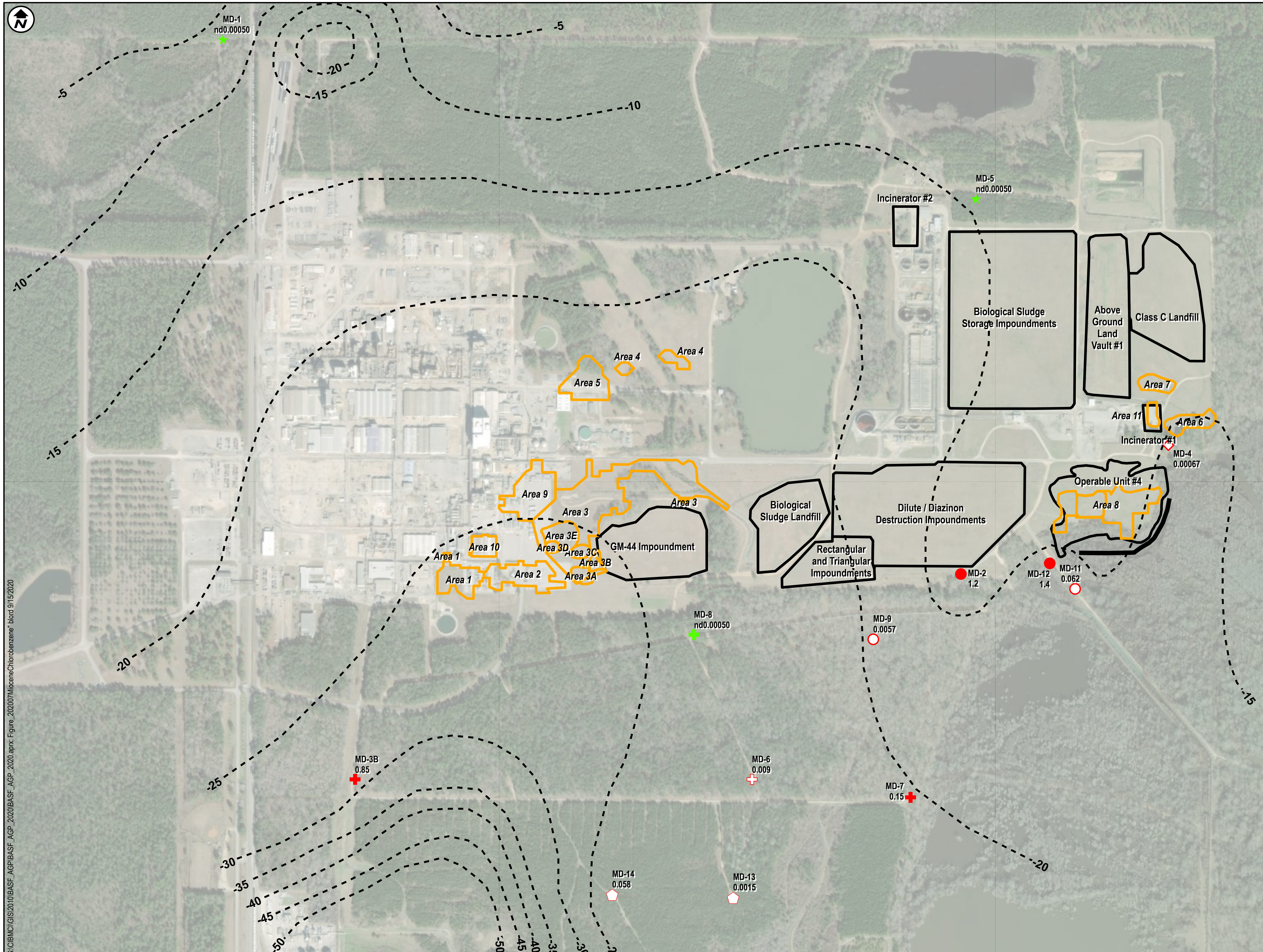


BASF CORPORATION
McINTOSH, ALABAMA

Chlorobenzene Results (mg/L) July 2020 Extent and Distribution Map MIOCENE AQUIFER

Chlorobenzene GWPS = 0.1 mg/L

July 2020 Detections:

	Not Sampled	All non-detect	At least 1 detection (no GWPS exceedances)	At least 1 detection above GWPS
Background Well	☆	★	☆	★
Boundary Well	✚	✚	✚	✚
Compliance Well	⬠	⬠	⬠	⬠
Effectiveness Well	◇	◆	◇	◆
Offsite Well	◇	◆	◇	◆
Point-of-Compliance Well	○	●	○	●
Production Well	△	▲	△	▲
Water Well	△	△	△	△
Abandoned Well	◆	◆	◇	◆

Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).

NS = Not Sampled

The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B

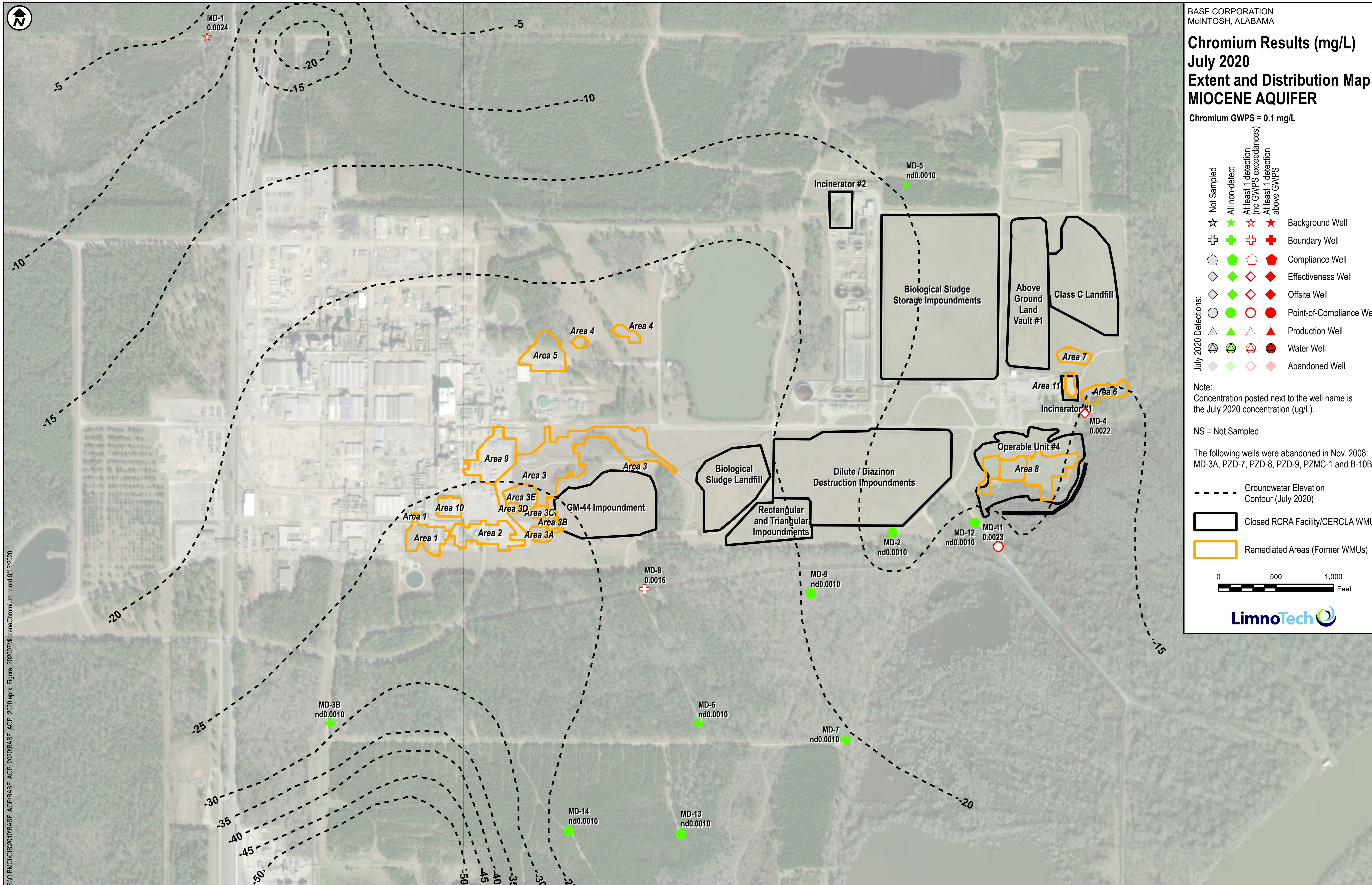
Groundwater Elevation Contour (July 2020)

Closed RCRA Facility/CERCLA WMU

Remediated Areas (Former WMUs)

0 500 1,000 Feet

LimnoTech


BASF CORPORATION
McINTOSH, ALABAMA
Chromium Results (mg/L)
July 2020
Extent and Distribution Map
MIOCENE AQUIFER
Chromium GWPS = 0.1 mg/L
July 2020 Detections:
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
0.0024
MD-5
nd0.0010
MD-4
0.0022
MD-11
0.0023
MD-12
nd0.0010
MD-2
nd0.0010
MD-9
nd0.0010
MD-8
0.0016
MD-3B
nd0.0010
MD-6
nd0.0010
MD-7
nd0.0010
MD-14
nd0.0010
MD-13
nd0.0010
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Operable Unit #4
Area 8
Dilute / Diazinon Destruction Impoundments
Biological Sludge Landfill
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 3
Area 9
Area 5
Area 4
Area 4
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
Area 10
Area 1
Area 1
Area 2
-5
-5
-10
-10
-15
-15
-15
-20
-20
-20
-25
-25
-30
-30
-35
-35
-40
-40
-45
-45
-50
-50
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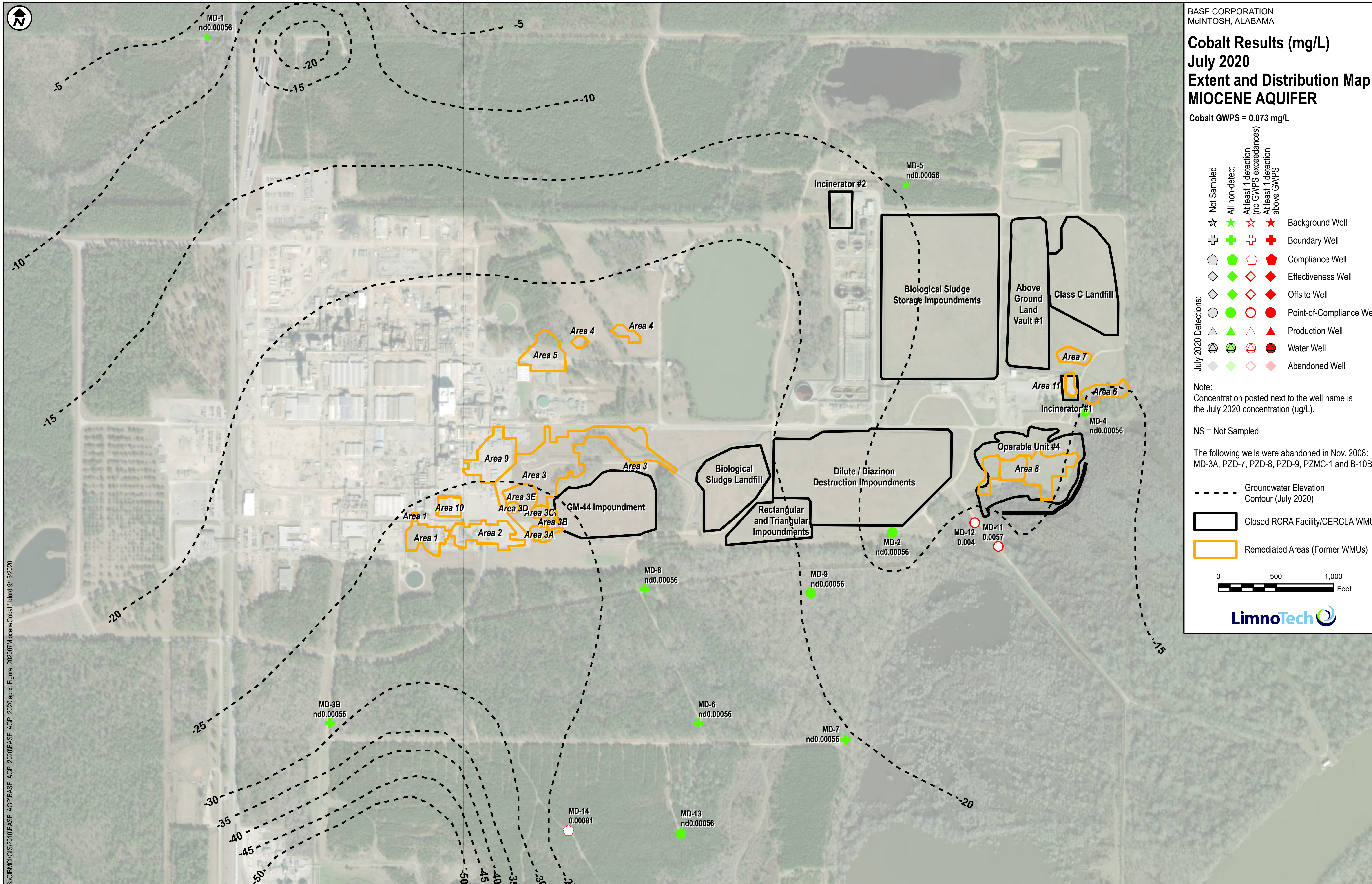
BASF CORPORATION
McINTOSH, ALABAMA
Cobalt Results (mg/L)
July 2020
Extent and Distribution Map
MIOCENE AQUIFER
Cobalt GWPS = 0.073 mg/L
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
July 2020 Detections:
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
nd0.00056
MD-5
nd0.00056
MD-4
nd0.00056
MD-2
nd0.00056
MD-12
0.004
MD-11
0.0057
MD-8
nd0.00056
MD-9
nd0.00056
MD-3B
nd0.00056
MD-6
nd0.00056
MD-7
nd0.00056
MD-14
0.00081
MD-13
nd0.00056
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Operable Unit #4
Area 8
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 3
Area 4
Area 5
Area 9
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
Area 10
Area 1
Area 2
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
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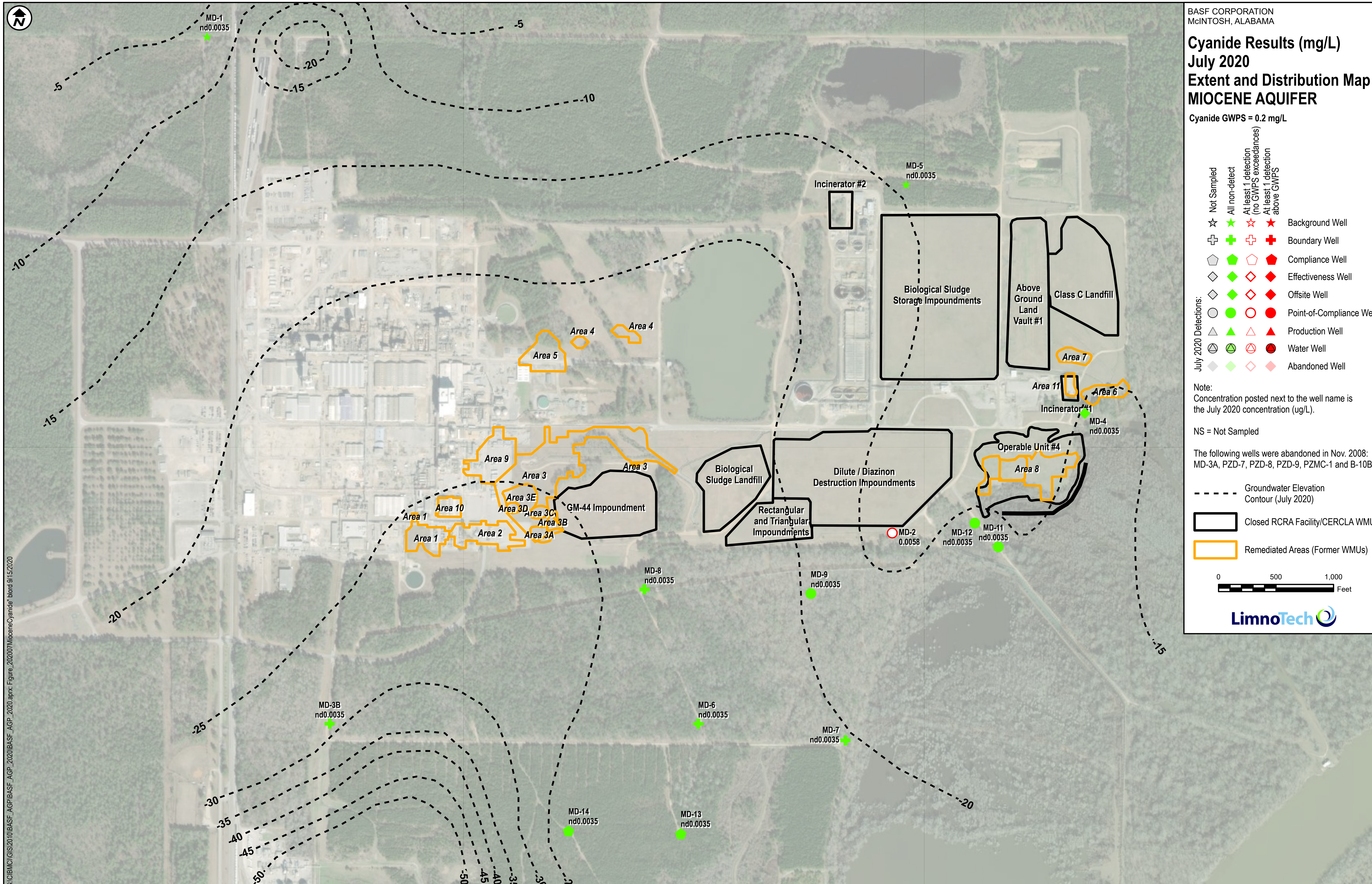
BASF CORPORATION
McINTOSH, ALABAMA
Cyanide Results (mg/L)
July 2020
Extent and Distribution Map
MIOCENE AQUIFER
Cyanide GWPS = 0.2 mg/L
July 2020 Detections:
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
nd0.0035
MD-5
nd0.0035
MD-4
nd0.0035
MD-2
0.0058
MD-12
nd0.0035
MD-11
nd0.0035
MD-8
nd0.0035
MD-9
nd0.0035
MD-3B
nd0.0035
MD-6
nd0.0035
MD-7
nd0.0035
MD-14
nd0.0035
MD-13
nd0.0035
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Operable Unit #4
Area 8
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 9
Area 10
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
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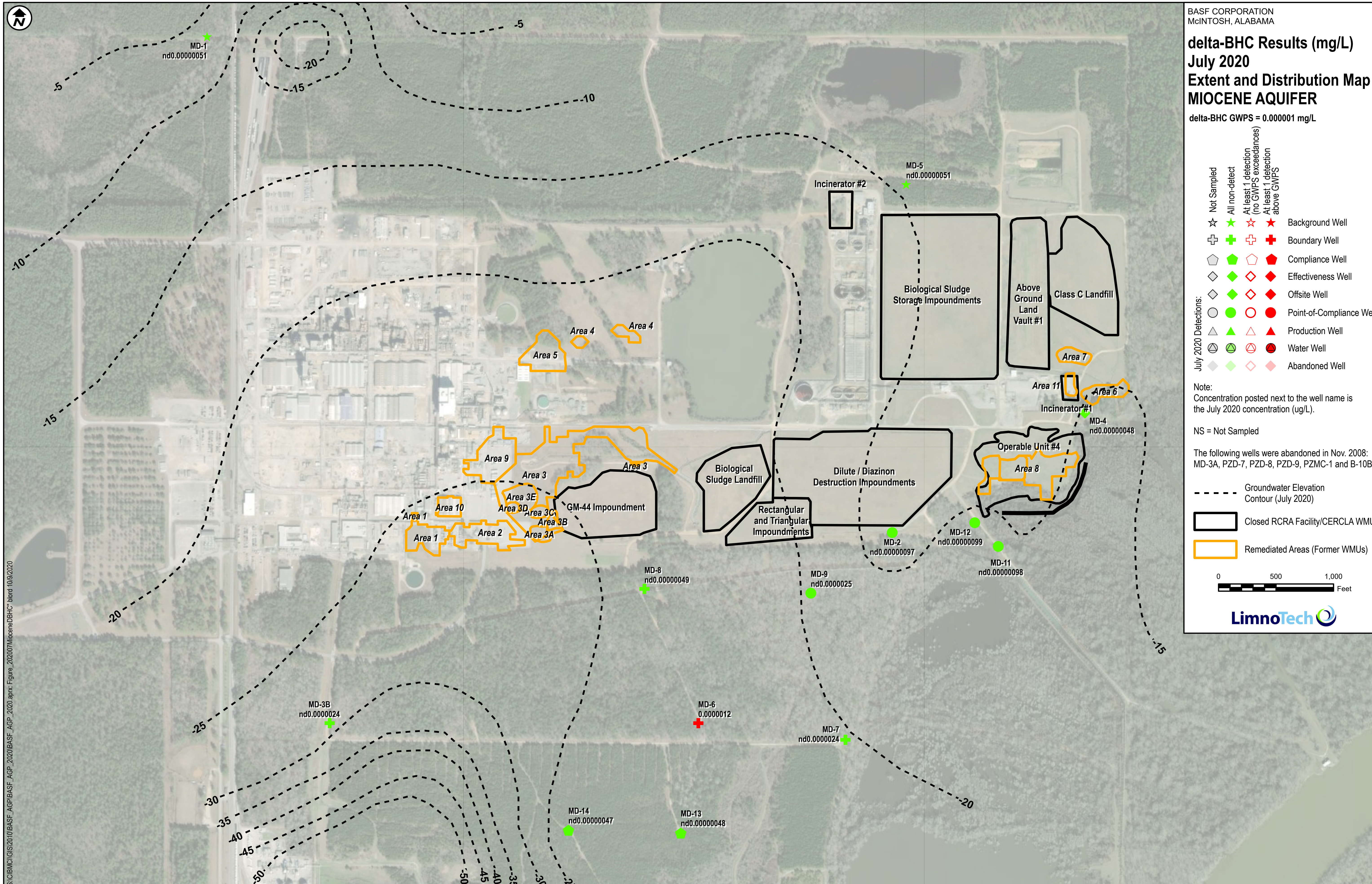

BASF CORPORATION
McINTOSH, ALABAMA
delta-BHC Results (mg/L)
July 2020
Extent and Distribution Map
MIOCENE AQUIFER
delta-BHC GWPS = 0.000001 mg/L
July 2020 Detections:
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
nd0.00000051
MD-5
nd0.00000051
MD-4
nd0.00000048
MD-2
nd0.00000097
MD-12
nd0.00000099
MD-11
nd0.00000098
MD-8
nd0.00000049
MD-9
nd0.0000025
MD-3B
nd0.0000024
MD-6
0.0000012
MD-7
nd0.0000024
MD-14
nd0.00000047
MD-13
nd0.00000048
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
GM-44 Impoundment
Biological Sludge Landfill
Rectangular and Triangular Impoundments
Dilute / Diazinon Destruction Impoundments
Operable Unit #4
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
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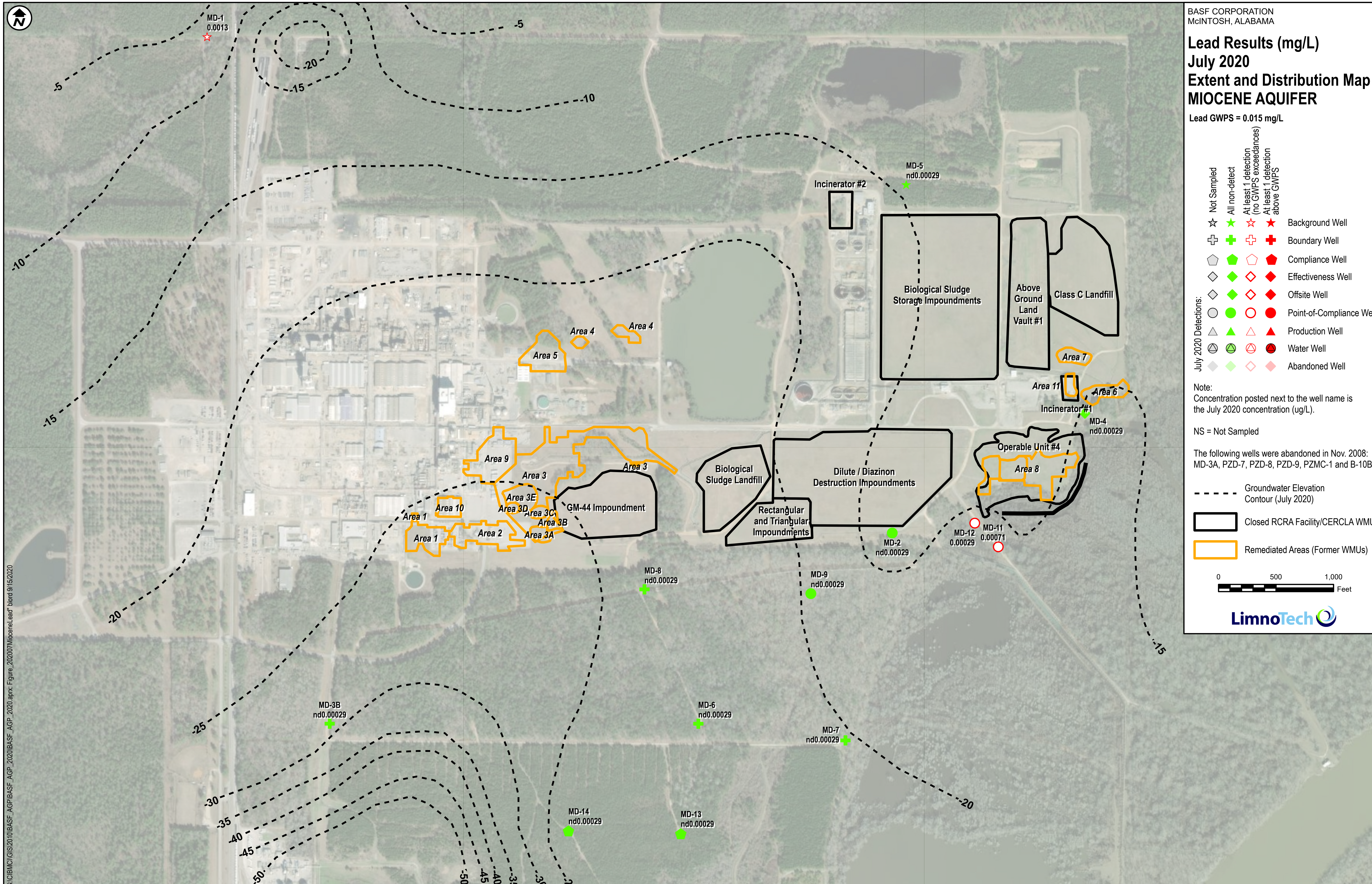

BASF CORPORATION
McINTOSH, ALABAMA
Lead Results (mg/L)
July 2020
Extent and Distribution Map
MIOCENE AQUIFER
Lead GWPS = 0.015 mg/L
July 2020 Detections:
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
0.0013
MD-5
nd0.00029
MD-4
nd0.00029
MD-2
nd0.00029
MD-12
0.00029
MD-11
0.00071
MD-8
nd0.00029
MD-9
nd0.00029
MD-3B
nd0.00029
MD-6
nd0.00029
MD-7
nd0.00029
MD-14
nd0.00029
MD-13
nd0.00029
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 4
Area 4
Area 5
Area 7
Area 11
Area 6
Operable Unit #4
Area 8
Area 9
Area 3
Area 3
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
Area 10
Area 1
Area 1
Area 2
GM-44 Impoundment
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
-5
-5
-10
-10
-15
-15
-15
-20
-20
-20
-25
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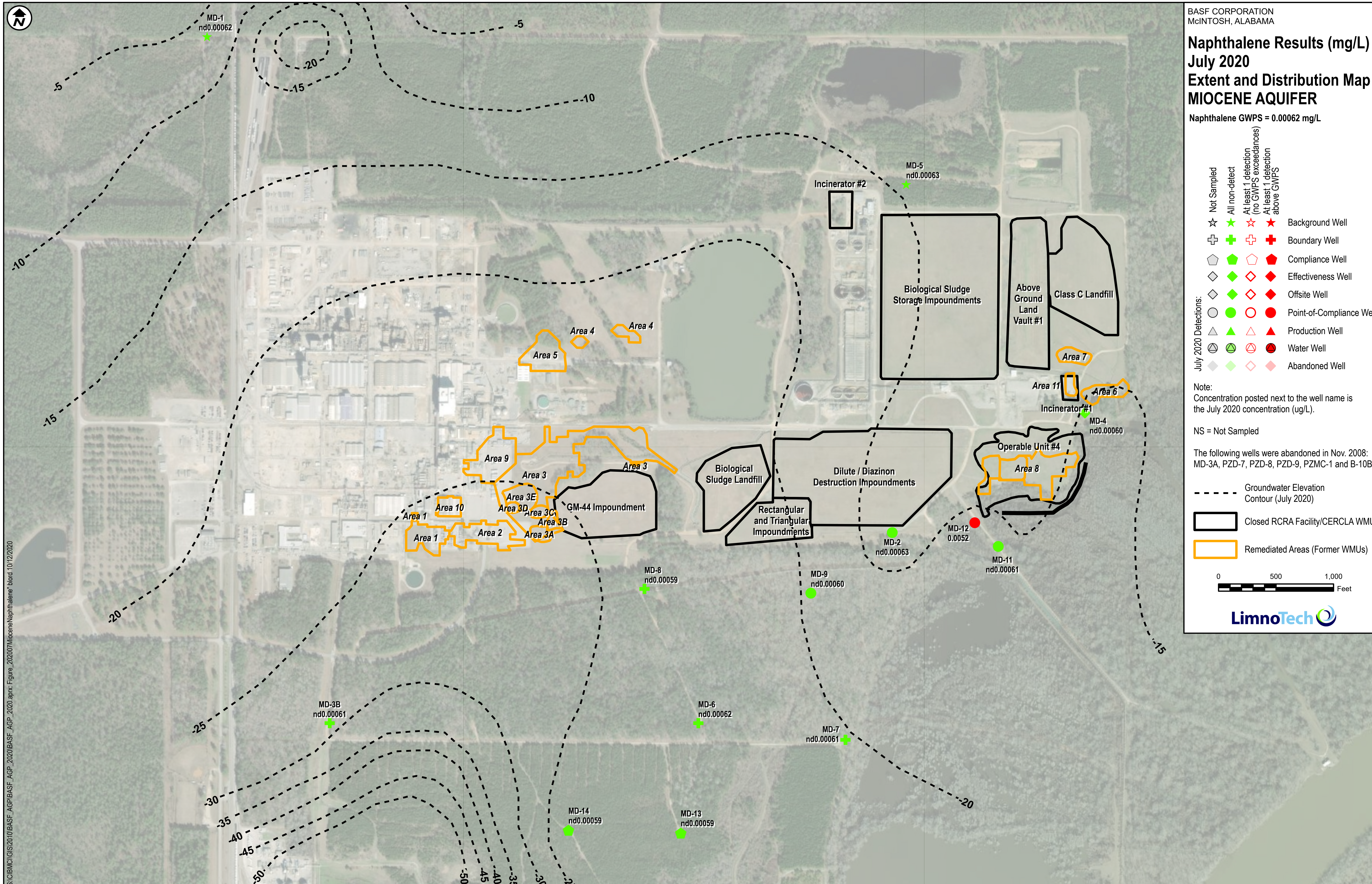
-45
-45
-50
-50



BASF CORPORATION
McINTOSH, ALABAMA
Naphthalene Results (mg/L)
July 2020
Extent and Distribution Map
MIOCENE AQUIFER
Naphthalene GWPS = 0.00062 mg/L
July 2020 Detections:
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
nd0.00062
MD-5
nd0.00063
MD-4
nd0.00060
MD-2
nd0.00063
MD-12
0.0052
MD-11
nd0.00061
MD-8
nd0.00059
MD-9
nd0.00060
MD-3B
nd0.00061
MD-6
nd0.00062
MD-7
nd0.00061
MD-14
nd0.00059
MD-13
nd0.00059
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Operable Unit #4
Area 8
Area 4
Area 4
Area 5
Area 9
Area 3
Area 3
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
Area 10
Area 1
Area 1
Area 2
GM-44 Impoundment
Biological Sludge Landfill
Rectangular and Triangular Impoundments
Dilute / Diazinon Destruction Impoundments
-5
-5
-10
-10
-15
-15
-15
-20
-20
-20
-25
-25
-30
-30
-35
-35
-40
-40
-45
-45
-50
-50
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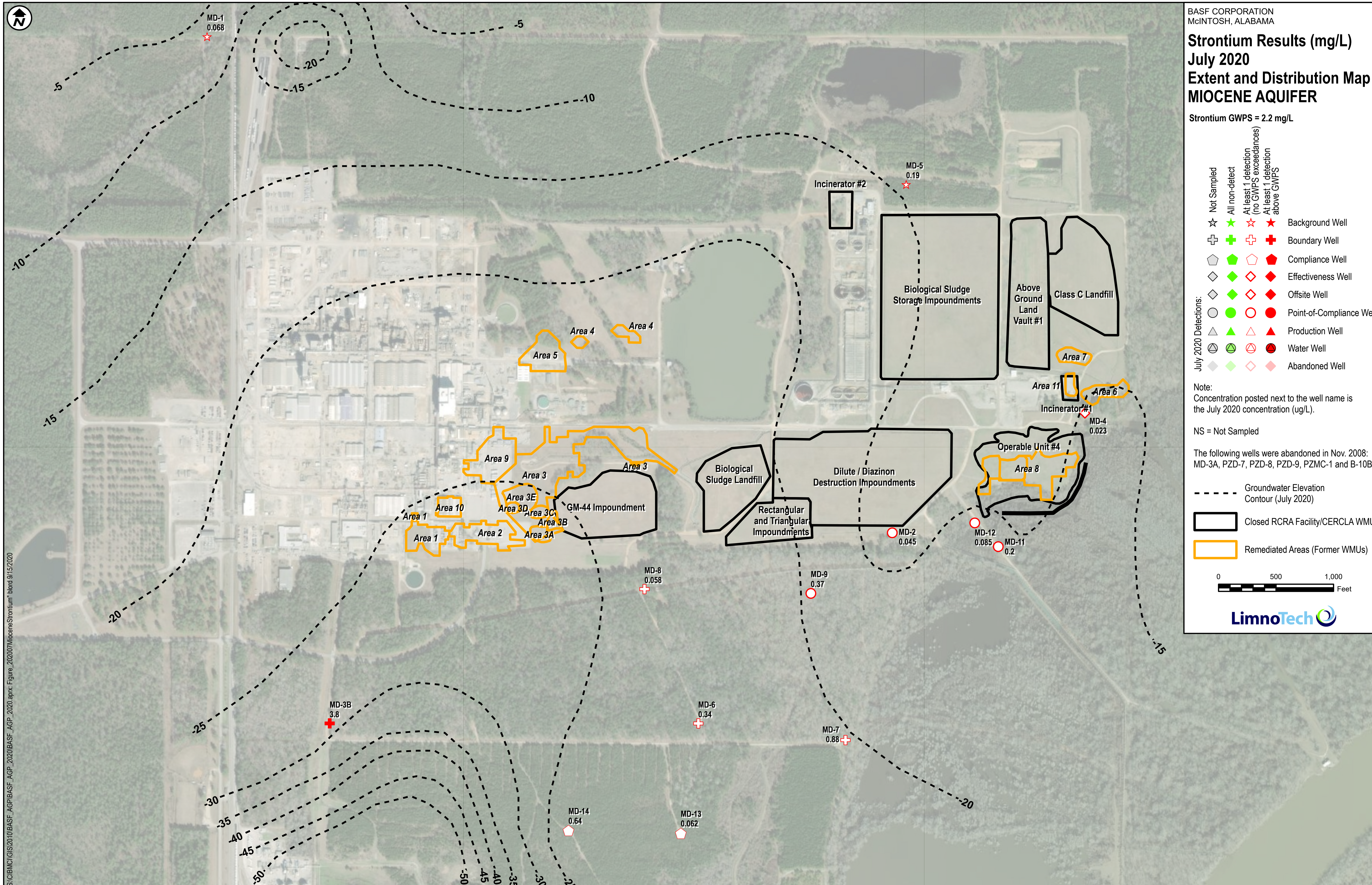

BASF CORPORATION
McINTOSH, ALABAMA
Strontium Results (mg/L)
July 2020
Extent and Distribution Map
MIOCENE AQUIFER
Strontium GWPS = 2.2 mg/L
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
July 2020 Detections:
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
0.068
MD-5
0.19
MD-4
0.023
MD-2
0.045
MD-12
0.085
MD-11
0.2
MD-8
0.058
MD-9
0.37
MD-3B
3.8
MD-6
0.34
MD-7
0.88
MD-14
0.64
MD-13
0.062
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Operable Unit #4
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
GM-44 Impoundment
Area 1
Area 2
Area 3
Area 3A
Area 3B
Area 3C
Area 3D
Area 3E
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
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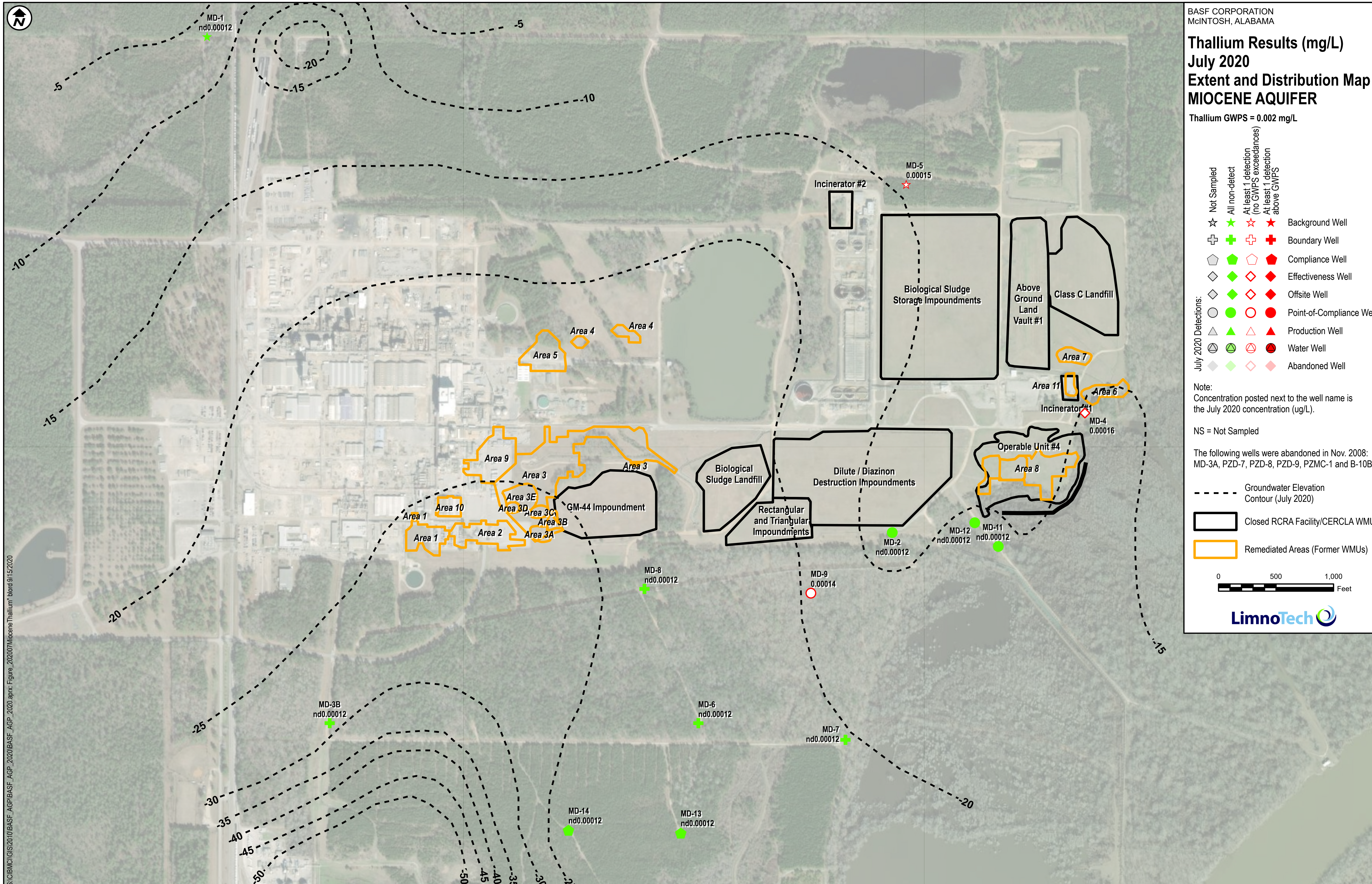

BASF CORPORATION
McINTOSH, ALABAMA
Thallium Results (mg/L)
July 2020
Extent and Distribution Map
MIOCENE AQUIFER
Thallium GWPS = 0.002 mg/L
July 2020 Detections:
Not Sampled
All non-detect
At least 1 detection (no GWPS exceedances)
At least 1 detection above GWPS
Background Well
Boundary Well
Compliance Well
Effectiveness Well
Offsite Well
Point-of-Compliance Well
Production Well
Water Well
Abandoned Well
Note:
Concentration posted next to the well name is the July 2020 concentration (ug/L).
NS = Not Sampled
The following wells were abandoned in Nov. 2008: MD-3A, PZD-7, PZD-8, PZD-9, PZMC-1 and B-10B
Groundwater Elevation Contour (July 2020)
Closed RCRA Facility/CERCLA WMU
Remediated Areas (Former WMUs)
0
500
1,000
Feet
LimnoTech
MD-1
nd0.00012
MD-5
0.00015
MD-4
0.00016
MD-2
nd0.00012
MD-12
nd0.00012
MD-11
nd0.00012
MD-8
nd0.00012
MD-9
0.00014
MD-3B
nd0.00012
MD-6
nd0.00012
MD-7
nd0.00012
MD-14
nd0.00012
MD-13
nd0.00012
Incinerator #2
Incinerator #1
Biological Sludge Storage Impoundments
Above Ground Land Vault #1
Class C Landfill
Area 7
Area 11
Area 6
Operable Unit #4
Area 8
Area 4
Area 4
Area 5
Area 9
Area 3
Area 3
Area 3E
Area 3D
Area 3C
Area 3B
Area 3A
Area 10
Area 1
Area 1
Area 2
GM-44 Impoundment
Biological Sludge Landfill
Dilute / Diazinon Destruction Impoundments
Rectangular and Triangular Impoundments
-5
-5
-10
-10
-15
-15
-20
-20
-20
-25
-25
-30
-30
-35
-35
-40
-40
-45
-45
-50
-50
-15
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Attachment G

Boring Logs and Well Construction Diagrams

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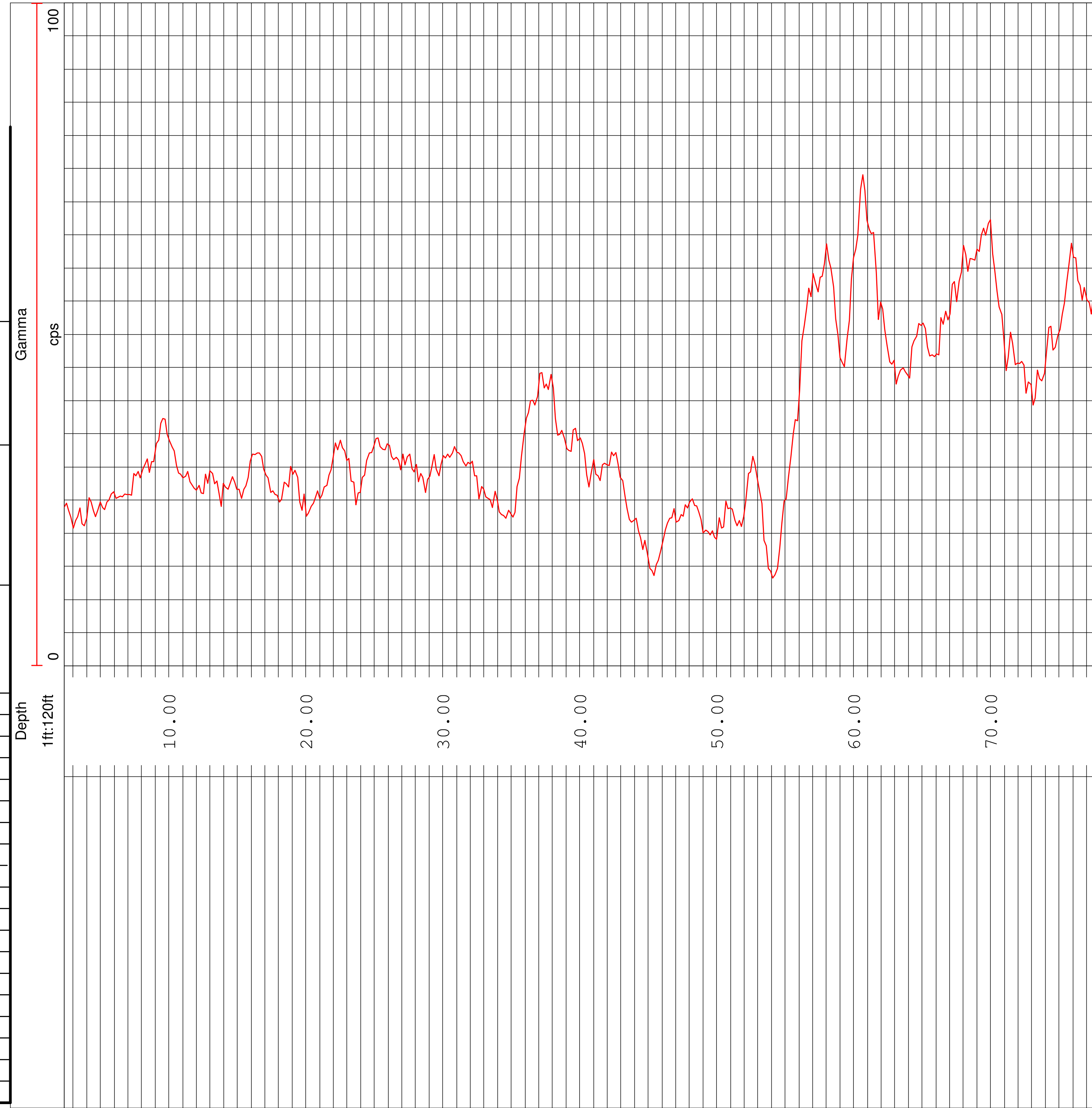
GRINER DRILLING SERVICE

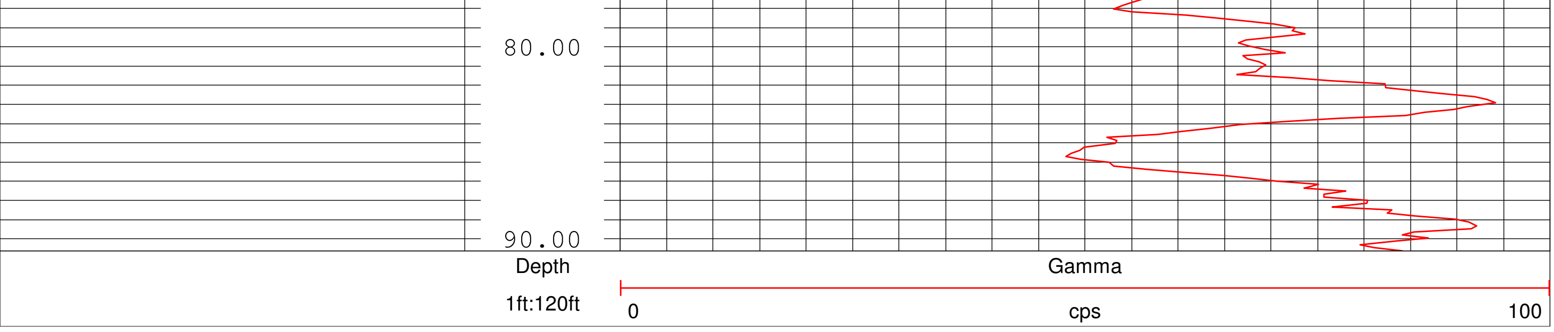
GRINER DRILLING SERVICE Inc.
COLUMBIA, MISS. (800) 221-4098
MOBILE, ALA. (800) 592-9355
RAYNE, LA. (888) 840-6747

CO BASF
WELL PW-11
FLD
CTY MCINTOSH
STE
FILING No

COMPANY	BASF		
WELL ID	PW-11		
FIELD			
COUNTRY		STATE	ALABAMA
LOCATION			OTHER SERVICES
SEC	TWP	RGE	
PERMANENT DATUM		ELEVATION	K.B.
LOG MEAS. FROM	G/L	ABOVE PERM. DATUM	D.F.
DRILLING MEAS. FROM			G.L.
DATE	JUNE 14, 2019	TYPE FLUID IN HOLE	GEL
RUN No	ONE	SALINITY	
TYPE LOG	GAMMA	DENSITY	
DEPTH-DRILLER	95 FT.	LEVEL	
DEPTH-LOGGER	92 FT.	MAX. REC. TEMP.	
BTM LOGGED INTERVAL	92 FT.	LONGITUDE	N 31 16'36.8
TOP LOGGED INTERVAL	2.80 FT.	LATITUDE	W 087 59'12.1
OPERATING RIG TIME			
RECORDED BY	MIKE GRINER		
WITNESSED BY			

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO




80.00
90.00
Depth
1ft:120ft
Gamma
0
cps
100

PELA

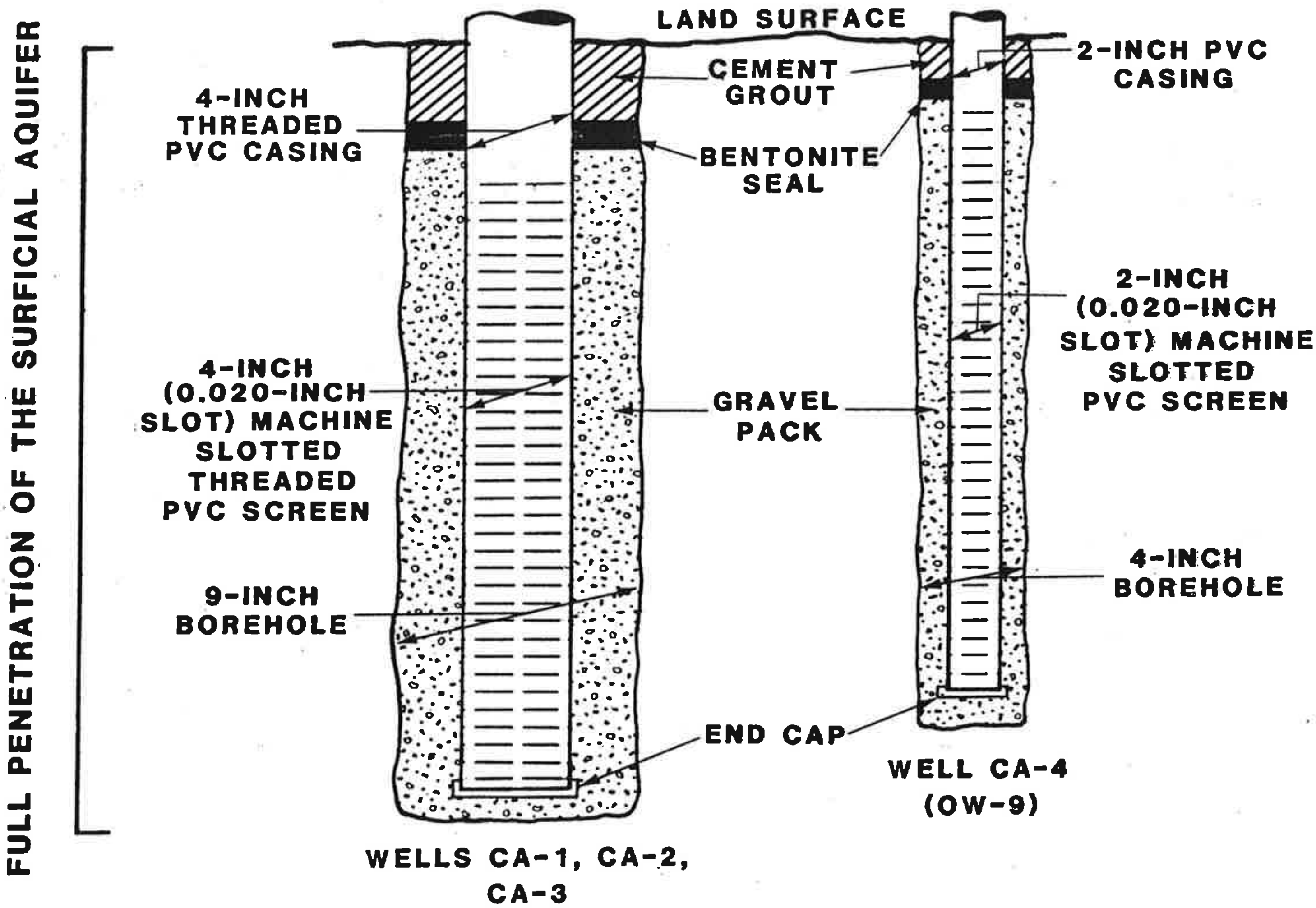
LITHOLOGIC LOG

WELL NUMBER: CA-1
OWNER: Ciba-Geigy Corporation
LOCATION: McIntosh, Alabama
DATE DRILLED: August 24, 1985
PELA GEOLOGIST: A. F. Patton

Interval (feet BLS)	Description
0 - 5.0	Clay, moderate yellowish-brown (10YR 5/4) mottled with moderate reddish-brown (10R 4/6), medium dark gray (N4) to light olive gray (5Y 6/1), slightly sandy, wood fragments.
5.0 - 10.0	Clay, dark yellowish-orange (10YR 6/6) to light brown (5YR 6/6) to grayish-orange (10YR 7/4) mottled with light gray (N7) and moderate reddish-brown (10R 4/6), moderate reddish-brown is silt rich, other is slightly silty, trace of 4 mm gravel.
10.0 - 15.0	Clay, grayish-orange (10YR 7/4) to yellowish-gray (5Y 7/2) with trace of moderate reddish-brown (10R 4/6), moderate reddish-brown is silt rich, rest is clean.
15.0 - 20.0	Clay, yellowish-gray (5Y 7/2) to grayish-orange (10YR 7/4) mottled with moderate reddish-brown (10R 4/6), silty, trace of 5 mm gravel.
20.0 - 25.0	As above.
25.0 - 30.0	As above.
30.0 - 35.0	Clay, yellowish-gray (5Y 7/2), clean, firm.
35.0 - 40.0	Clay, yellowish-gray (5Y 7/2), dusky yellow (5Y 6/4), moderate olive brown (5Y 4/4), olive gray (5Y 3/2), moderate reddish-brown (10R 4/6), silty, trace 5 mm gravel.
40.0 - 45.0	Clay, yellowish-gray (5Y 7/2), dusky yellow (5Y 6/4), moderate yellow (5Y 7/6), silty, trace gravel.

LITHOLOGIC LOG
CA-1 (continued)

Interval (feet BLS)	Description
45.0 - 48.0	Sandy clay, yellowish-gray (5Y 8/1) to medium dark gray (N4) to moderate reddish-brown (10R 4/6), sand fine- to medium-grained, subrounded to subangular, light brown (5YR 5/6).
48.0 - 55.0	Sand, light brown (5YR 5/6) to white to clear, fine- to medium-grained, subangular to subrounded, quartz, trace of yellowish-gray (5Y 7/2) clay.
55.0 - 60.0	Sand, light brown (5YR 5/6) to white to smoky to clear, quartz, medium- to coarse-grained, subangular.
60.0 - 65.0	As above, with trace of yellowish-gray (5Y 7/2) clay.
65.0 - 70.0	Sand, as above, with some 2 to 3 mm quartz sand.
70.0 - 75.0	As above.
75.0 - 80.0	Sand and gravel, quartz, medium-grained to 3 mm in diameter, subangular to subrounded, gravel is multi-colored, trace of light gray (N7) to yellowish-gray (5Y 8/1) clay.
80.0 - 85.0	Gravel and sand, as above, with gravel increasing in size (10 mm in diameter) and percent, subrounded to rounded, multicolored.
85.0 - 90.0	Clay, light gray (N7), some gravel up to 10 mm in diameter (probably from uphole).
90.0 - 95.0	As above.
95.0	Total depth.



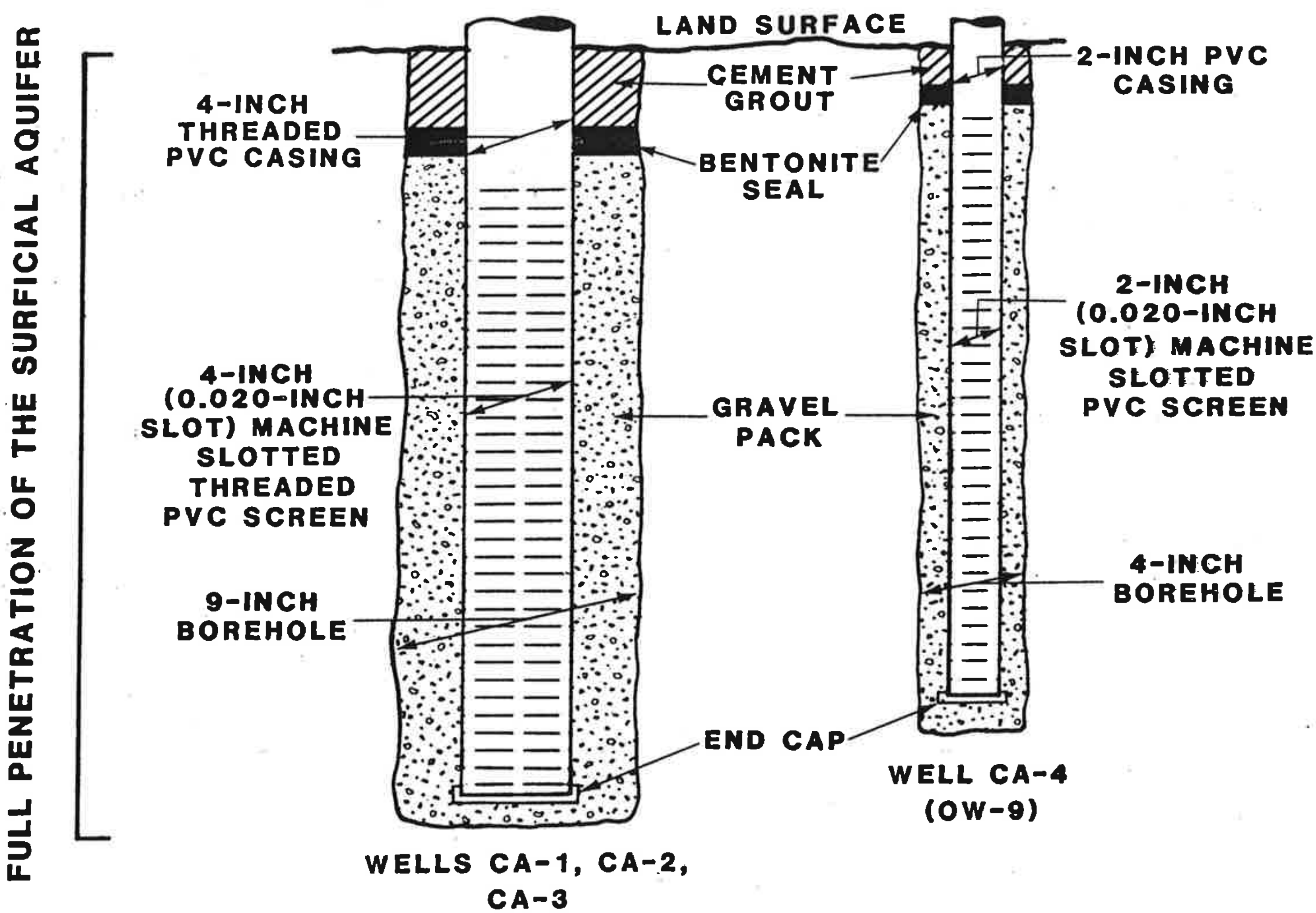
Prepared by:
P.E. LAMOREAUX & ASSOCIATES, IN(

FIGURE 3. GENERALIZED WELL CONSTRUCTION DIAGRAMS FOR CORRECTIVE ACTION MONITORING WELLS (SEE TABLE 1 FOR SCREEN LENGTHS).

LITHOLOGIC LOG

WELL NUMBER:	CA-2
OWNER:	Ciba-Geigy Corporation
LOCATION:	McIntosh, Alabama
DATE DRILLED:	August 24, 1985
PELA GEOLOGIST:	A. F. Patton

Interval (feet BLS)	Description
0 - 5.0	Clay, grayish-orange (10YR 7/4), silty, with a trace of olive gray (5Y 4/1) and moderate reddish-brown (10R 4/6).
5.0 - 10.0	Clay, yellowish-gray (5Y 8/1) to grayish-orange (10YR 7/4) mottled with moderate reddish-brown (10R 4/6), slightly silty.
10.0 - 15.0	Clayey silt, very pale orange (10YR 8/2) to yellowish-gray (5Y 7/2) mottled with moderate reddish-brown (10R 4/6).
15.0 - 20.0	As above.
20.0 - 26.0	Sand, quartz, clear to smoky, medium-grained, subangular to subrounded, well sorted, clean.
26.0 - 32.0	Sand, as above, with trace of silt.
32.0 - 40.0	Sand, as above, clean.
40.0 - 45.0	Sand and gravel, quartz, subangular to subrounded, clear to white to smoky, gravel up to 5 mm in diameter.
45.0 - 50.0	As above, very coarse-grained sand becoming more abundant.
50.0 - 55.0	Sand and gravel, as above, with trace of clay, dark yellowish-orange (10YR 6/6) and yellowish-gray (5Y 7/2).
55.0 - 58.0	Clay, grayish-orange (10YR 7/4) and medium light gray (N6), silty with sand and gravel (probably from uphole), clay content increasing with depth.
58.0 - 63.0	Clay, as above.
63.0	Total depth.



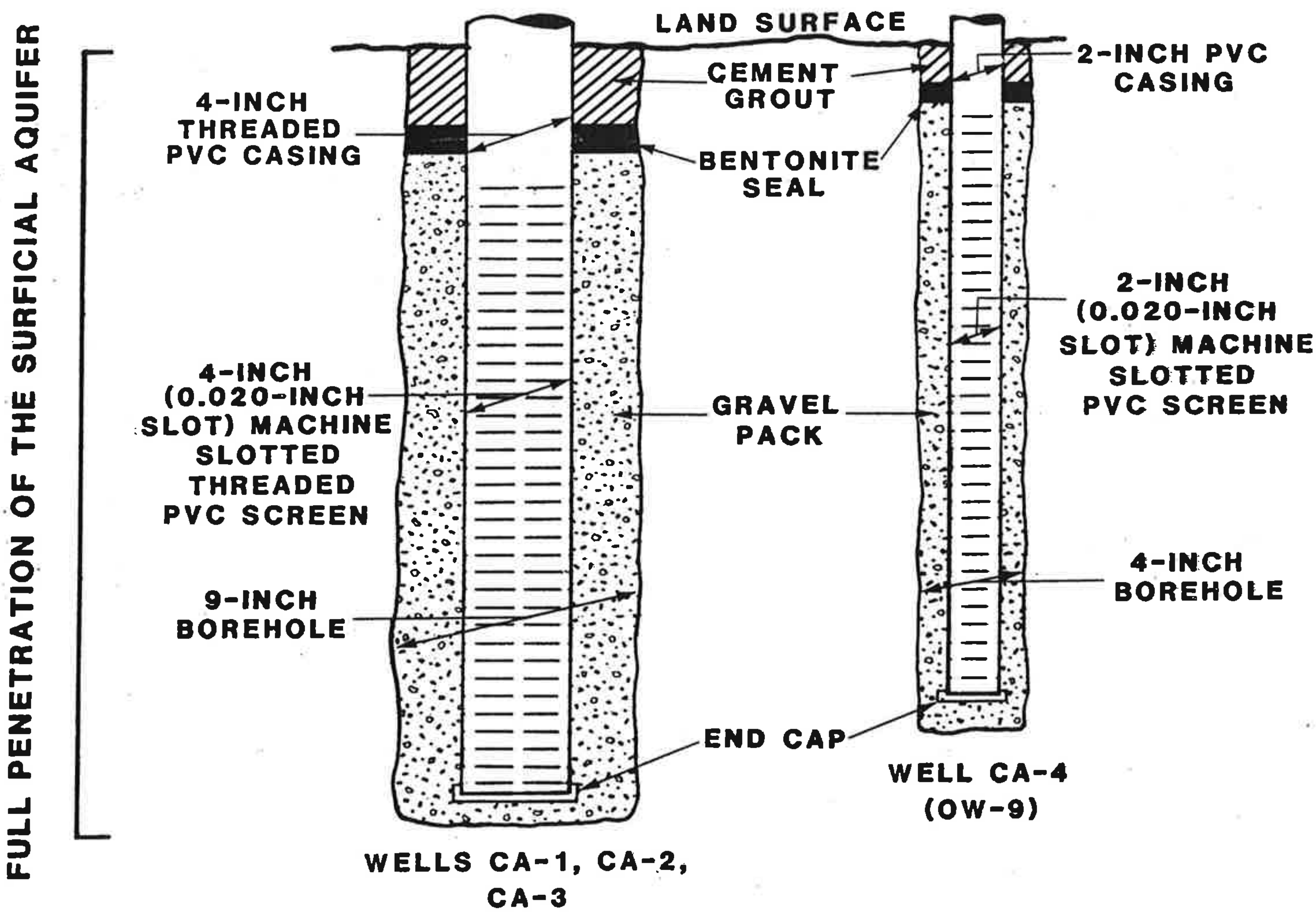
Prepared by:
P.E. LAMOREAUX & ASSOCIATES, IN

FIGURE 3. GENERALIZED WELL CONSTRUCTION DIAGRAMS FOR CORRECTIVE ACTION MONITORING WELLS (SEE TABLE 1 FOR SCREEN LENGTHS).

LITHOLOGIC LOG

WELL NUMBER: CA-3
OWNER: Ciba-Geigy Corporation
LOCATION: McIntosh, Alabama
DATE DRILLED: August 25, 1985
PELA GEOLOGIST: A. F. Patton

Interval (feet BLS)	Description
0 - 2.5	Fill, sandy clay to clay, grayish-orange (10YR 7/4) with some dusky yellowish-brown (10YR 2/2) and light brown (5YR 6/4), sandy and silty.
2.5 - 13.0	Clay, yellowish-gray (5Y 7/2) to grayish-orange (10YR 7/4), trace moderate reddish-brown (10R 4/6), silty.
13.0 - 15.5	Sandy clay, yellowish-gray (5Y 7/2) to grayish-orange (10YR 7/4), abundant medium-grained, subrounded to subangular, quartz sand.
15.5 - 18.0	Clayey sand, clear, smoky, white, fine- to medium-grained, subangular to subrounded, trace clay, yellowish-gray (5Y 7/2) to grayish-orange (10YR 7/4).
18.0 - 25.0	Sand, clear, white, smoky, medium- to coarse-grained, subangular to subrounded.
25.0 - 35.0	Sand, clear, white, smoky, medium- to coarse-grained, subangular to subrounded.
35.0 - 43.0	Slightly clayey sand, white, clean, smoky, coarse- to very-coarse-grained, subangular, trace gravel up to 3 mm in diameter.
43.0 - 47.0	Sand and gravel, white, clean, multicolored, very-coarse-grained sand, gravel up to 6 mm in diameter, subangular.
47.0 - 52.0	Sandy clay, yellowish-gray (5Y 7/2) to grayish-orange (10YR 7/4), silty, some coarse-grained sand.
52.0 - 55.7	Clay, yellowish-gray (5Y 7/2) to grayish-orange (10YR 7/4), silty.
55.7	Total depth.



Prepared by:
P.E. LAMOREAUX & ASSOCIATES, IN(

FIGURE 3. GENERALIZED WELL CONSTRUCTION DIAGRAMS FOR CORRECTIVE ACTION MONITORING WELLS (SEE TABLE 1 FOR SCREEN LENGTHS).

Attachment B Introduction

During the week of December 17, 2018, initial investigations were conducted of the bluffline area to support the design of the PW-11 deep Alluvial Aquifer extraction well. Test borings were installed in the bluffline area at the Test Area #1 and Test Area #2 areas shown in Figure B-1 using continuous logging direct push technologies to verify subsurface conditions and to collect additional information for PW-11 extraction well design.

The results from the December 2018 bluffline investigations showed that Test Area #1 is a good location to install the PW-11 extraction well to address deep Alluvial Aquifer groundwater impacts. In Test Area #1, the test boring data showed that there are several impacted sands lenses within an overall fine-grained zone within the lower Alluvial Aquifer.

Summary of Field Activities

Cullen O'Brien (LimnoTech) conducted field oversite during all aspects of the investigation. Walker-Hill (Foxworth, MS) was subcontracted by LimnoTech to install the test borings using a Model 2060 CPT Geoprobe track mounted rig.

Cone Penetrometer Test (CPT) borings were installed at four locations in the two target areas to continuously delineate soil stratigraphy from grade to the top of the Miocene Clay unit by recording relative soil resistance to a probe that was advanced vertically through the ground. Two additional boreholes were advanced adjacent to two of the CPT test borings (TB18-1B and TB18-2) to map the dissolved phase presence and relative magnitude of volatile organic compounds (VOCs) with depth using a Membrane Interface Probe (MIP) equipped with a membrane probe[1], a trunk-line and three gas-phase detectors: Photo-Ionization Detector (PID), Flame Ionization Detector (FID) and Halogen Specific Detector (XSD)[2].

The testing procedure for the MIP system included two other sensors that continuously log soil Electrical Conductivity (EC) and relative formation permeability with a Hydraulic Profiling Tool (HPT). The HPT measures the pressure required to inject a flow of clean water into the soil as the probe is advanced through the subsurface. The information from the CPT and combined MIP/HPT/EC logs assists with locating permeable zones and potential contaminant flow paths in deep Alluvial sands intervals, which were the target of this investigation.

CPT Borings

Three clustered CPT borings (TB18-1, TB18-1A and TB18-1B) were installed in Test Area #1, which is situated near the treeline at the southern edge of the OU4 cover, approximately 600 feet due north of floodplain monitoring well CA-4A (refer to Figure B-1). Because of excessive tilt at a

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[1] The membrane probe is heated and semi-permeable. A continuous nitrogen carrier gas allows subsurface VOCs to diffuse across the membrane into the gas stream and be carried to the PID, FID and XSD gas phase detectors located at the surface.

[2] The **PID** lamp used in this investigation responds to all molecules whose ionization potential is below 10.8 eV. This includes aromatic hydrocarbons and molecules with carbon double bonds (chlorobenzene, PCE, TCE).
The **FID** responds to molecules with a carbon-hydrogen bond, which includes most VOCs that combust in the H_2 flame. The FID is sensitive to mass (not concentration).
The **XSD** responds only to halogenated (Cl^-, Br^-, Fl^-) VOCs.

depth of approximately 85 feet below grade at the TB18-1 location, offset borings TB18-1A and TB18-1B were drilled approximately 2 feet and 4 feet east of TB18-1. Test boring TB18-1A could only be drilled to approximately 8.5 feet because of a subsurface obstruction. Test Boring TB18-1B was drilled to 96 feet below grade (approximately 10 feet into the top of the Miocene clay unit).

One CPT boring (TB18-2) was installed approximately 180 feet east of Test Area #1.

MIP/HPT/EC Borings

Offset borings were drilled within 10 feet of the TB18-1B and TB18-2 CPT borings to collect MIP/HPT/EC data. The MIP PID and XSD were calibrated to two chlorobenzene standards with concentrations of 1 mg/l and 5 mg/l based on historical chlorobenzene concentrations that have been detected in bluffline and floodplain area Alluvial Aquifer groundwater samples.

Boring Completion, Decontamination and Waste Management Activities

All CPT and MIP/HPT/EC test borings were backfilled with grout from approximately 85 feet bgl (due to formation cave in) to surface upon completion of the logging activities. All downhole equipment was properly decontaminated after use at each boring. All generated wastewater was contained and disposed at the onsite WWTP.

No soil waste was generated during this investigation and no repairs to the OU4 bluffline grass cover were required at this time because there was fairly minimal disturbance of the cover during the investigation activities. The OU4 cover will be repaired as needed following PW-11 well installation, performance testing and access road installation activities.

Results of Field Activities

Table B-1 summarizes the location coordinates, total depths and field investigations conducted at each test location. The CPT logs are provided in Attachment B-1. The combination MIP/HPT/EC logs are provided in Attachment B-2.

The surface elevation at the test boring locations is approximately 34 feet Mean Sea Level (MSL). The data from the CPT borings were compared to historical site boring information and show that the Miocene Clay was encountered at two locations: TB18-1B at approximately 86 feet below grade (approximately -52 feet MSL) and TB18-2 at approximately 96 feet below grade (approximately -62 feet MSL). Historical boring log data show that the top of the Miocene clay occurs at the approximate elevations summarized in Table B-2 at nearby bluffline and floodplain area remedial investigation borings and monitoring wells.

The CPT data show that the top of the Miocene clay in Test Area #1 is approximately 0 to 14 feet deeper than at the TPZ-10, TPZ-7, MD-11, CA-4A TPZ-4, TPZ-6 and TPZ-11 locations. All of these historical locations are situated near the western end of the slurry wall where deep Alluvial Aquifer impacts appear to be by-passing the current groundwater collection system.

The CPT and MIP/HPT/EC information obtained from the Test Area #1 and #2 locations show that the lower portion of the Alluvial Aquifer consists primarily of finer grained soils (clays and silty clays) that are interbedded with a few sand lenses with thicknesses of approximately 3 feet or less. Again, this information is consistent with historical soil boring data, which includes physical samples coupled with continuous gamma log data. In general, the geology and hydrogeology of the two test areas are interpreted as follows:

- The upper portion of the Alluvial Aquifer (i.e., that portion that is in hydraulic communication with the current groundwater extraction system) is located above approximately 55 ft (-21 ft MSL) and 50 ft (-16 ft MSL) in the TB18-1B and TB18-2 borings, respectively. This interpretation is supported by a significant increase in pressure at 57 ft and 51 ft in the offset boring HPT logs for TB18-1B and TB18-2, respectively. Note: the elevation of the bottom of the Alluvial Aquifer at extraction well PW-9 is approximately -19 ft MSL.
- At location TB18-1B, the CPT/HPT logs indicates lower Alluvial Aquifer sands lenses with relatively higher hydraulic conductivity within a tight finer grained sequence at depth intervals of 62.5-64 ft, 66-68 ft, 72-75 ft and 85.5-87 ft (refer to yellow highlighted intervals in the annotated logs shown in Figure B-2). The HPT logs in the lower portion of the Alluvial Aquifer show flow increases at these depth intervals (with or without significant pressure drops), which generally correspond to the sand lenses identified from the offset boring CPT log.
- Further to the east at the TB18-2 location, lower Alluvial Aquifer sand lenses are indicated at depth intervals of 51-55 ft, 63-66 ft, 72-74 ft and 89-90 ft. based on HPT flow increases in these zones (refer to Figure B-3).
- The PID data provide a semi-qualitative indication of relative chlorinated solvent concentrations in groundwater for compounds with ionization potentials below 10.8 electron volts (eV).There appears to be more PID activity in the lower Alluvial Aquifer at the TB18-1B location (i.e., between 58 ft and 85 ft) than at the TB18-2 location. However, there is more FID activity in the lower Alluvial Aquifer at the TB18-2 location (i.e., between 74 ft and 86 ft) than at the TB18-1B location. At the TB18-2 location, both the PID and FID responses are highest in the upper portion of the Alluvial Aquifer. The FID log for the TB18-1B location has the highest responses in the upper portion of the Alluvial Aquifer. FID responses may be associated with detections of methane gas, which also may be diluting the PID responses.
- The XSD log at the TB-2 location shows the highest relative response in the upper portion of the Alluvial Aquifer. However, at the TB18-1B location, the highest XSD responses were logged below 87 ft (i.e., within the Miocene Clay). This suggested that non-aqueous phase liquid (NAPL) might be present within the Miocene Clay at the location, and, if present, that the NAPL composition would have an electron potential above 10.8 eV because there is no corresponding response in the PID curve. However, the presence of DNPL in the Miocene Clay at this location was not confirmed with physical samples and applicable analyses subsequently collected and performed during the June 2019 PW-11 installation activities.

Location and Design of PW-11 Extraction Well

Based on the geologic and hydrogeologic information obtained from the December 2018 bluffline test boring data, Test Area #1 near TB18-1B was selected as the optimum location for a deep Alluvial Aquifer extraction well for the following reasons:

- The top of the Miocene clay is consistent with nearby floodplain wells that show impacts in deep Alluvial Aquifer sand lenses;

- Several deep Alluvial Aquifer sand lenses are apparent in the CPT/MIP/HPT/EC data logs for TB18-1B that correlate to impacted deep impacted Alluvial Aquifer sands at the CA-4A, TPZ-7, TPZ-6 and TPZ-11 locations (see yellow highlighted intervals on annotated CPT/MIP/HPT/EC logs in Figure B-2).
- The Test #1 location is close to the western end of the slurry wall where deep Alluvial Aquifer impacts are suspected to be by-passing the hydraulic influence of the current groundwater collection system;
- Test Area #1 is situated at an elevation above the floodplain (approximately 34 ft MSL) to avoid impacts from flooding of the Tombigbee River (high flood stage elevation is approximately 20 ft MSL);
- Test Area #1 is located is fairly close proximity to existing roads, so that the PW-11 access road length can be minimized.

Figure B-1. December 2018 Bluffline Investigation Areas and Test Borings for CPT/MIP/HPT/EC.

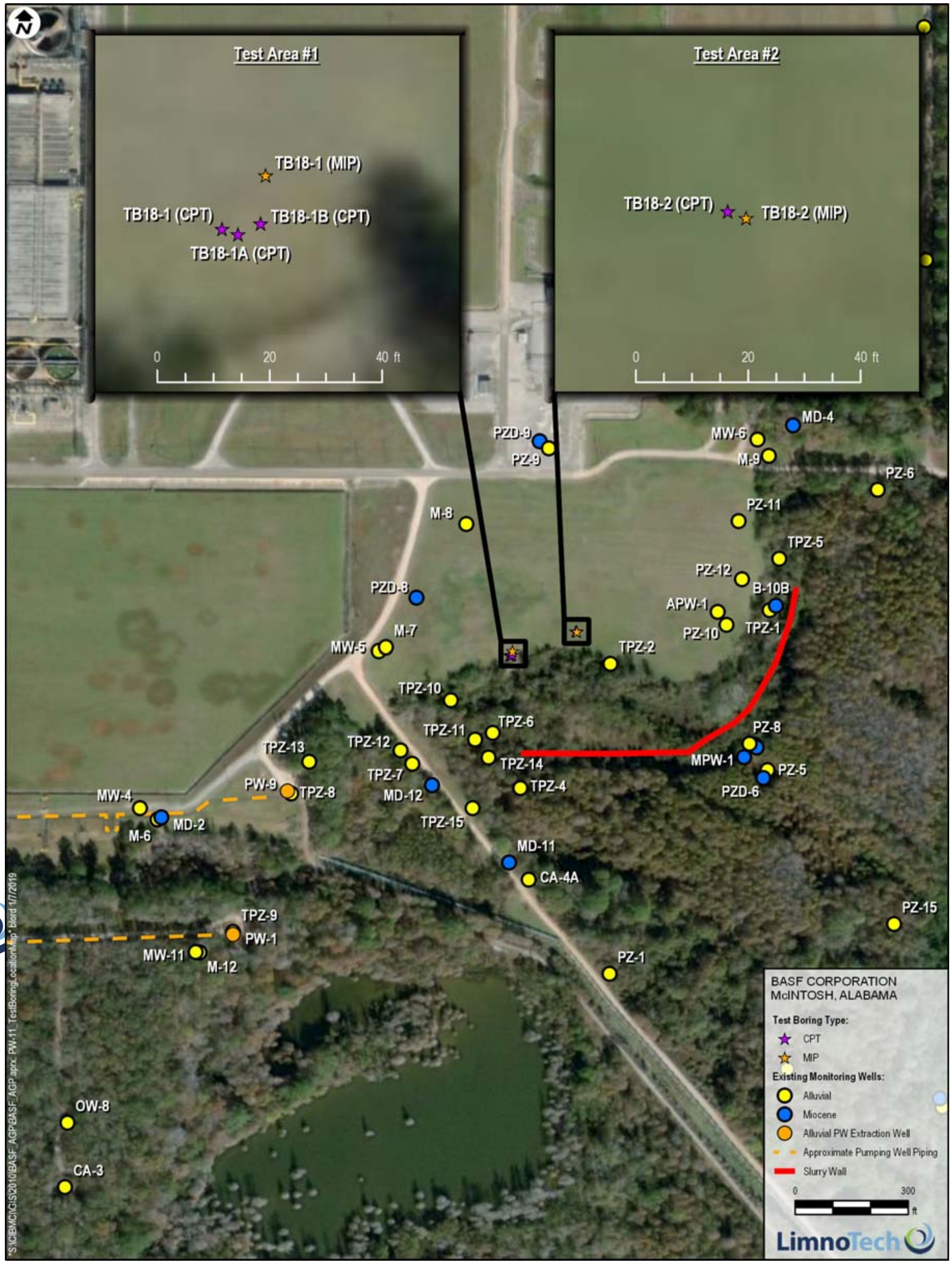


Table B-1. December 2018 Bluffline Investigation Test Boring Information.

Test Boring Name	X-coordinate^^	Y-coordinate^^	Estimated Surface Elevation (ft MSL)^	CPT Total Depth (ft below grade)	MIP/HPT/EC Total Depth (ft below grade)	Approx. Top Miocene (ft below grade)	Comments
TB18-1	406070.881	3460703.588	34	85	n/a	n/a	Terminated early due to increasing rod tilt with depth
TB18-1A	406071.7469	3460703.308	34	9	n/a	n/a	Offset to TB18-1 (~2 ft to east); hit obstruction @ 9 ft
TB18-1B	406072.9737/ 406073.2491	3460703.885/ 3460706.495	34	96	101	86	Offset to TB18-1A (~2 ft to east)
TB18-2	406124.499/ 406125.4957	3460722.321/ 3460721.961	34	100	96	96	Hit refusal @ 96 ft in MIP/HPT/EC boring

^ Surface elevations were estimated from available site topographic information

^^ first coordinate is for CPT boring; second coordinate is for MIP boring
n/a = not applicable

Table B-2. Estimates of Top of Miocene Clay Elevation in TB18-1B, TB18-2 and Select Nearby Historical Bluffline and Floodplain Soil Borings and Monitoring Wells.

Boring/MW Name	Top Miocene Clay Elevation (feet MSL)	Boring/Well Classification
CA-4A	-36	RCRA permitted Alluvial Effectiveness monitoring well
MD-11	-41	RCRA permitted Miocene Point-of-Compliance monitoring well
TPZ-7	-42	Non-permitted Alluvial floodplain monitoring well
TPZ-10	>-47	Non-permitted Alluvial floodplain monitoring well
TPZ-4 and M-90^	-50	Non-permitted Alluvial floodplain monitoring well and Miocene RI/FS soil boring
TPZ-6	-51	Non-permitted Alluvial floodplain monitoring well
TPZ-11	-52	Non-permitted Alluvial floodplain monitoring well
TB18-1B	**-52**	**December 2018 Test Area #1 CPT/MIP/HPT/EC boring**
M-91^	-53	Miocene RI/FS soil boring
PZ-10 and APW-1	-54	Non-permitted Alluvial floodplain monitoring well and pumping test well
S8-B5 and M-92^	-55	Miocene RI/FS soil borings
TB18-2	**-62**	**December 2018 Test Area #2 CPT/MIP/HPT/EC boring**

^ Soil borings S8-B5, M-90, M-91 and M-92 were drilled during 1988-1990 remedial investigation/feasibility study (RI/FS) activities.

Figure B-2. December 2018 CPT logs for original TB18-1B borehole location (tested to ~96 ft) and MIP/HPT/EC logs in offset borehole (tested to ~101 ft).

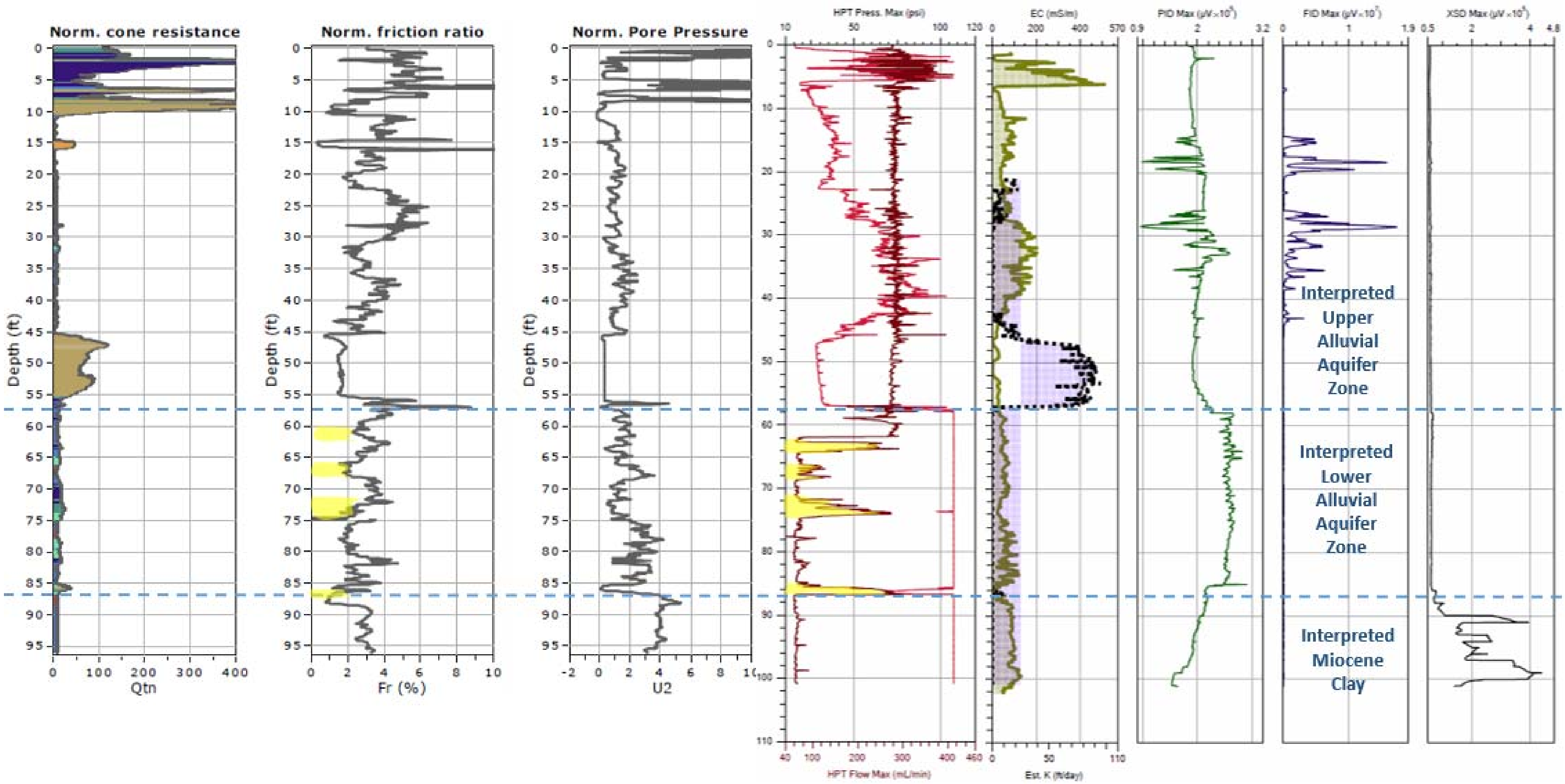
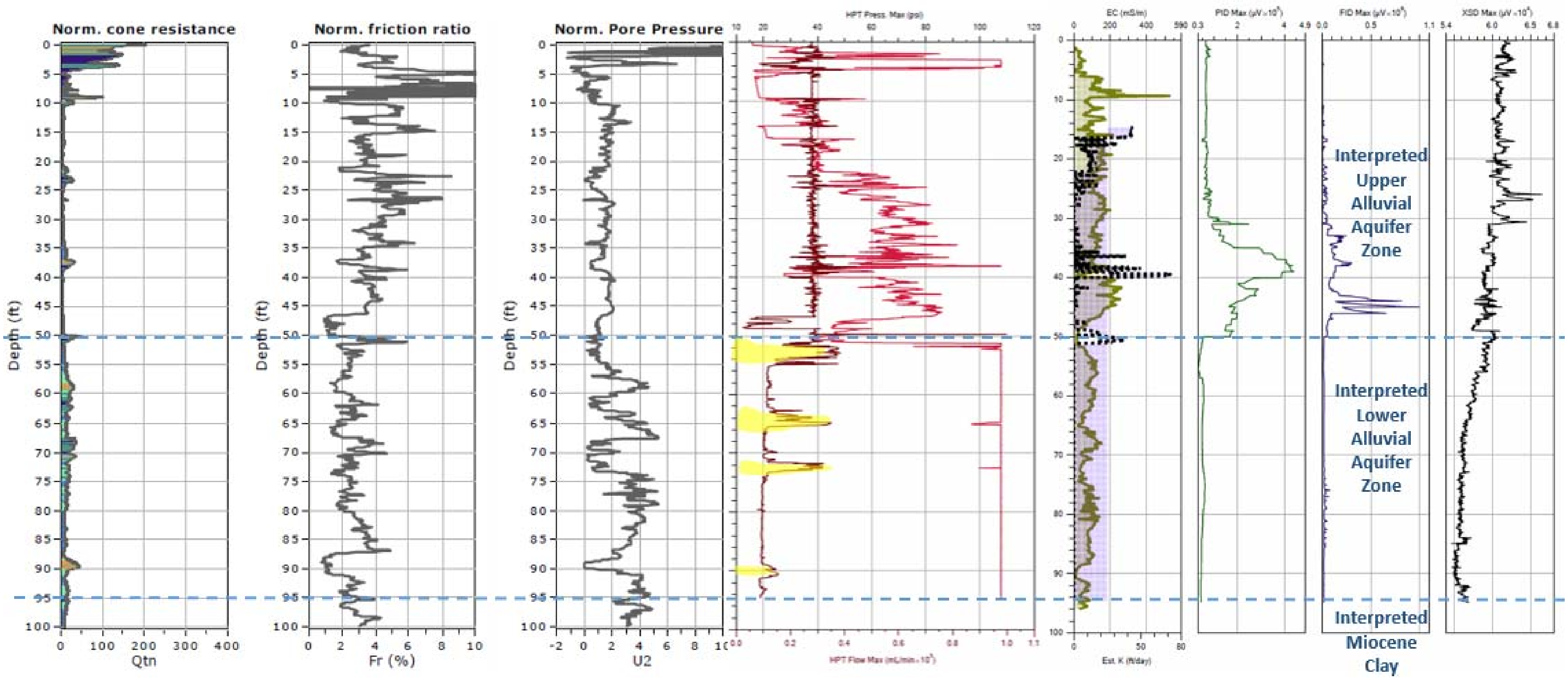


Figure B-3. December 2018 CPT logs for original TB18-2 borehole location (tested to ~100 ft) and MIP/HPT/EC logs in offset borehole (tested to ~ 95 ft where refusal occurred).



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Attachment B-1: Dec 2018 Bluffline Area PW-11 Test Boring Data: CPT

Attachment B: Summary of December 2018 Preliminary PW-11 Test Boring Investigations

Attachment B-2: Dec 2018 Bluffline Area PW-11 Test Boring Data: MIP/HPT/EC

Attachment B: Summary of December 2018 Preliminary PW-11 Test Boring Investigations

PELA

LITHOLOGIC DESCRIPTION, SW-2 (M-1)

OWNER: Ciba-Geigy Corporation

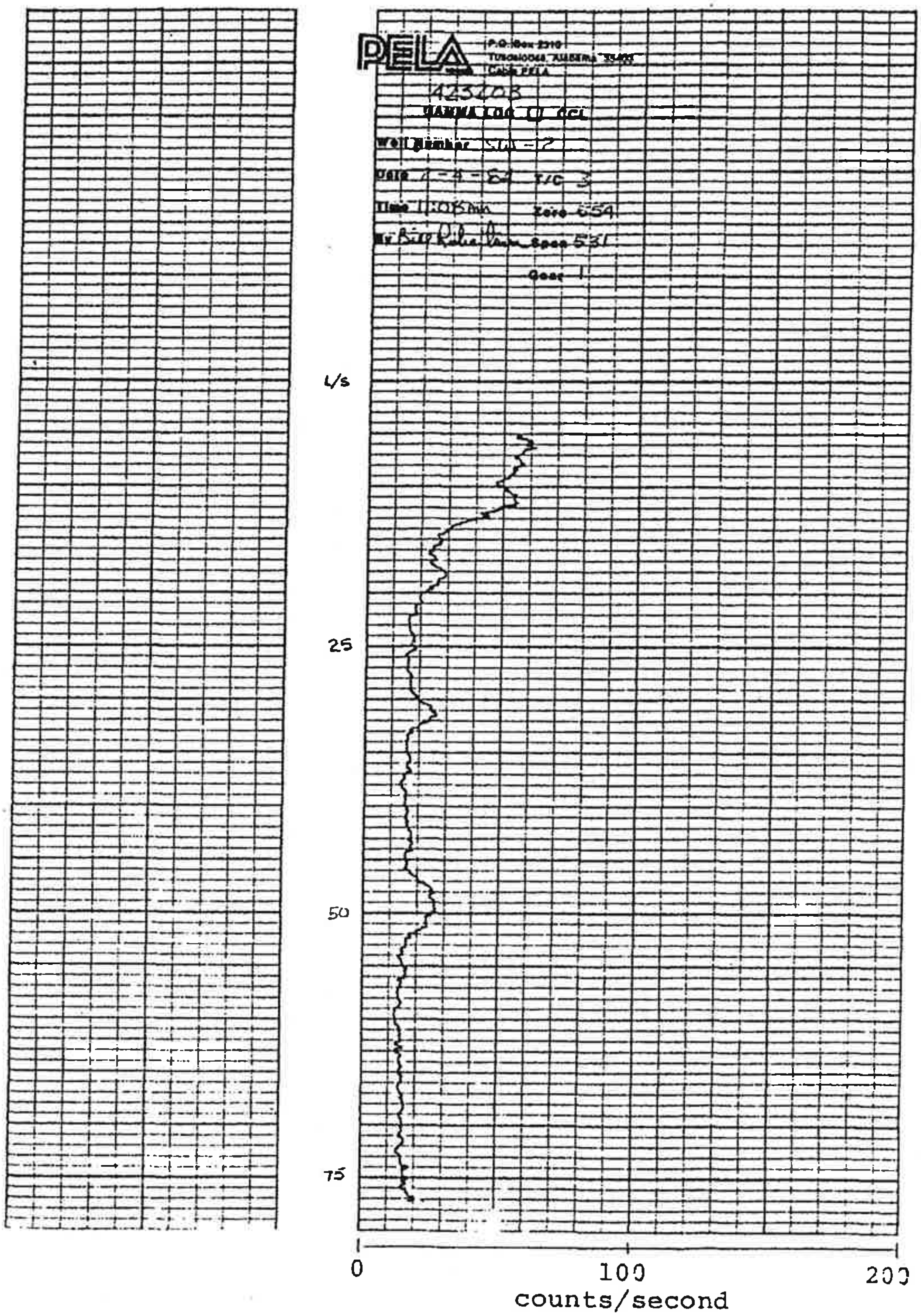
DATE DRILLED: February 3-4, 1984

PELA GEOLOGIST: Dan O. Madison, Jr.

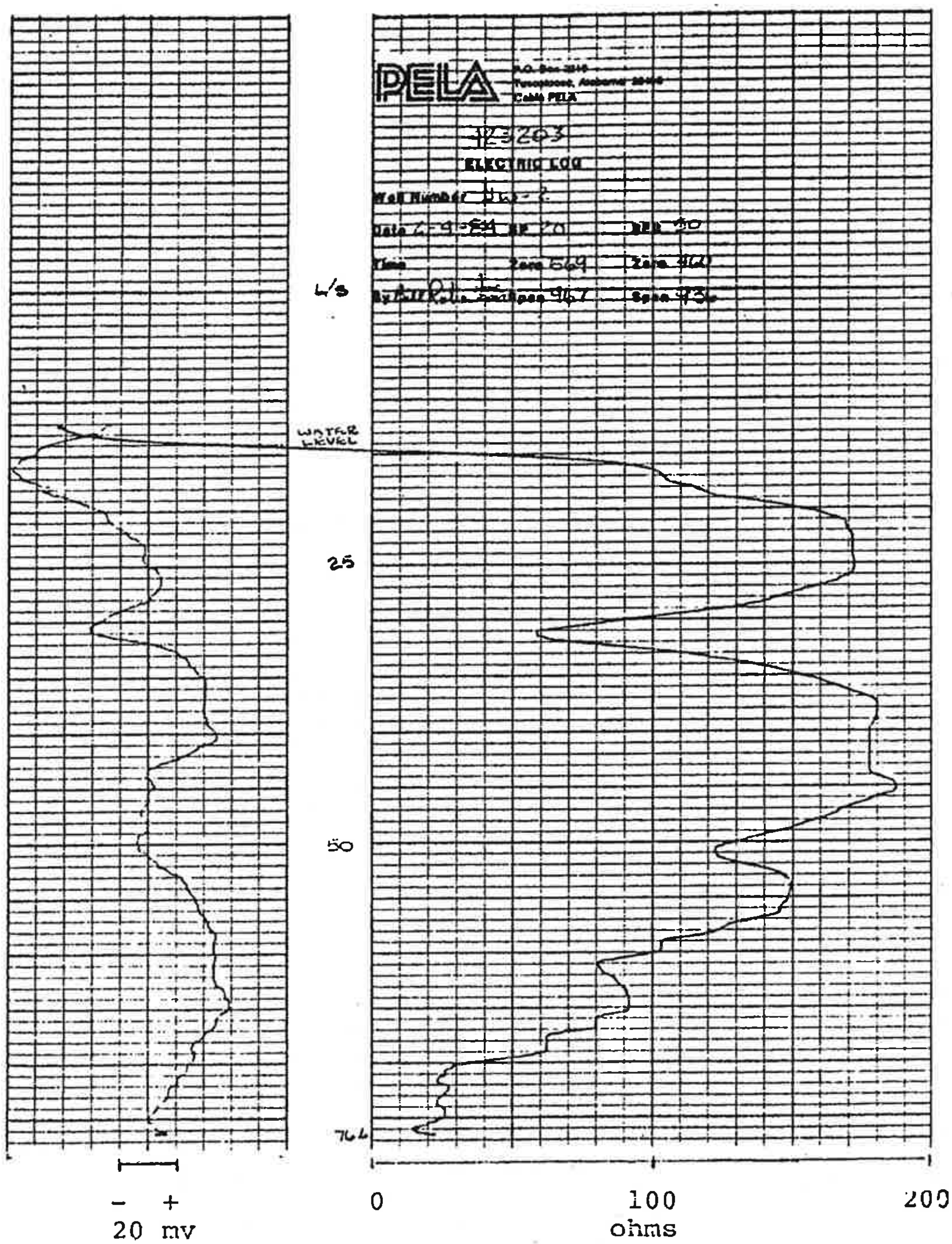
Depth (in feet)	Description
0 - 5.0	Clay, dark-yellowish-orange and moderate reddish-brown, silty.
5.0 - 10.0	Clay, dark-yellowish-orange and moderate reddish-brown with minor yellowish-gray, silty, stiff.
10.0 - 13.5	Clay, yellowish-gray with minor dark-yellowish-orange and moderate reddish-brown, silty, stiff.
13.5 - 25.0	Sand, dark-yellowish-orange, clear quartz, medium-grained, subrounded.
25.0 - 30.0	Sand, dark-yellowish-orange, clear quartz, medium-grained, some coarse-grained, subrounded.
30.0 - 35.0	Sand, pale-yellowish-orange, clear quartz, medium-grained, subrounded.
35.0 - 45.0	Sand, grayish-orange to pale-yellowish-orange, clear quartz, medium-grained with some coarse-grained, trace of gravel, quartz and chert, 5 mm in diameter, trace of clay, yellowish-gray, sandy.
45.0 - 50.0	Sand, grayish-orange, clear quartz, coarse- to very coarse-grained, subrounded, some gravel, quartz and chert, very coarse-grained to 4 mm in diameter, minor clay, yellowish-gray, sandy.
50.0 - 55.0	Sand, grayish-orange, clear quartz, coarse- to very coarse-grained, some medium-grained, abundant gravel, quartz and chert, 3 to 10 mm in diameter, rounded, abundant clay, yellowish-gray, sandy.
55.0 - 60.0	Sand, grayish-orange, clear quartz, coarse- to very coarse-grained, subrounded, abundant gravel, clear and white quartz and dark-yellowish-orange chert, 3 to 12 mm in diameter.
60.0 - 70.0	Sand and gravel, grayish-orange, clear quartz, coarse- to very coarse-grained, subrounded, gravel, same as above, finer, 3 to 5 mm in diameter.

SW-2 (M-1) (continued)

Depth (in feet)	Description
70.0 - 75.0	Sand, grayish-orange, clear quartz, coarse-grained, some very coarse- and medium-grained, subrounded.
75.0 - 77.0	Sand, grayish-orange, clear quartz, medium- to very coarse-grained, subrounded, abundant gravel, clear to white quartz and dark-yellowish-orange chert, 3 mm in diameter.
77.0 - 80.0	Clay, light-gray, sandy, clear quartz, medium-grained.
80.0	TOTAL DEPTH.



Gamma log for SW-2 (M-1): 5-77 feet below land surface



Electric log for SW-2 (M-1): 15-76 feet below land surface

PELA

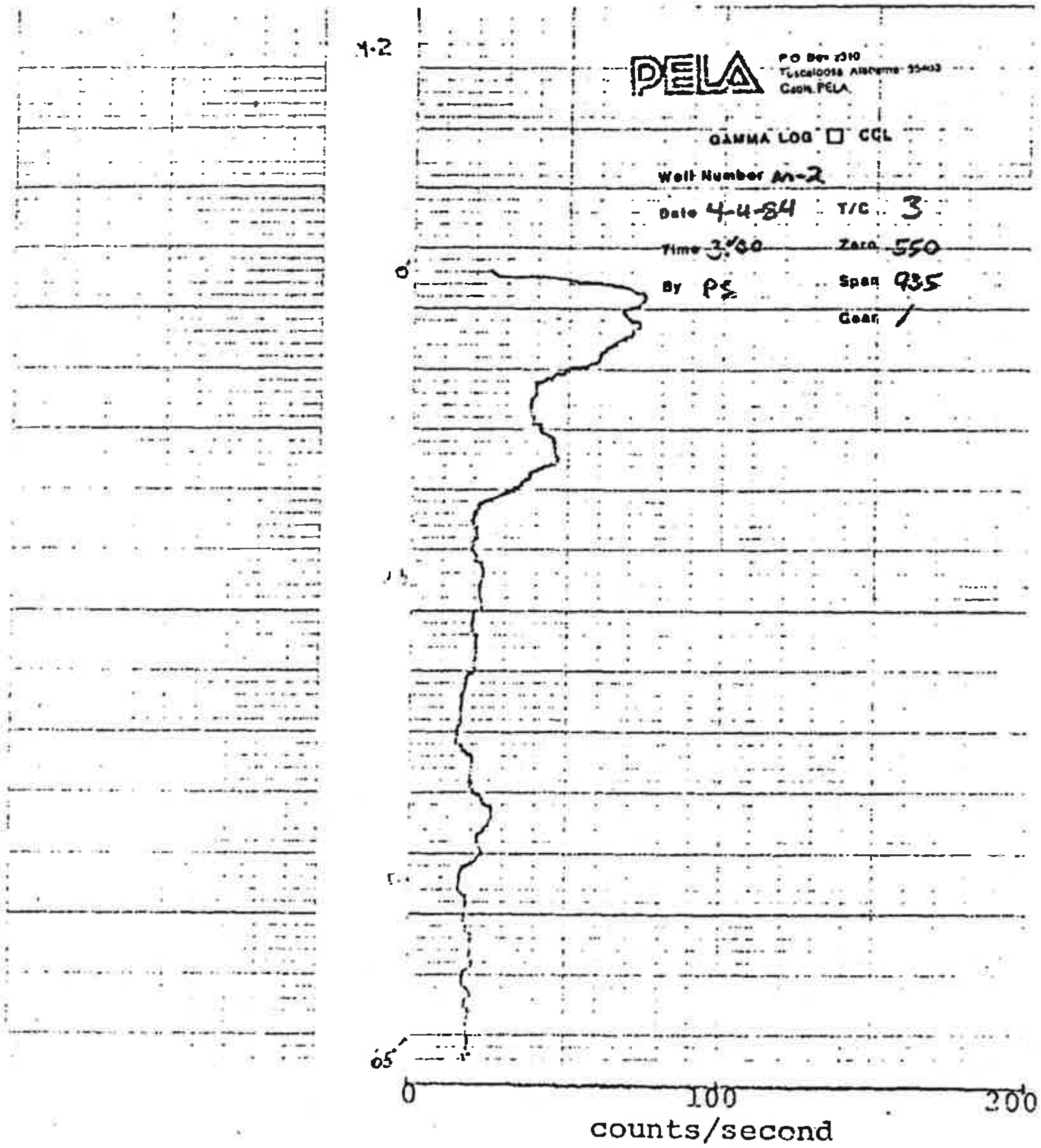
LITHOLOGIC DESCRIPTION, M-2

OWNER:	Ciba-Geigy Corporation
DATE DRILLED:	April 3, 1984
PELA GEOLOGISTS:	Philip Stroud, Janet Smith

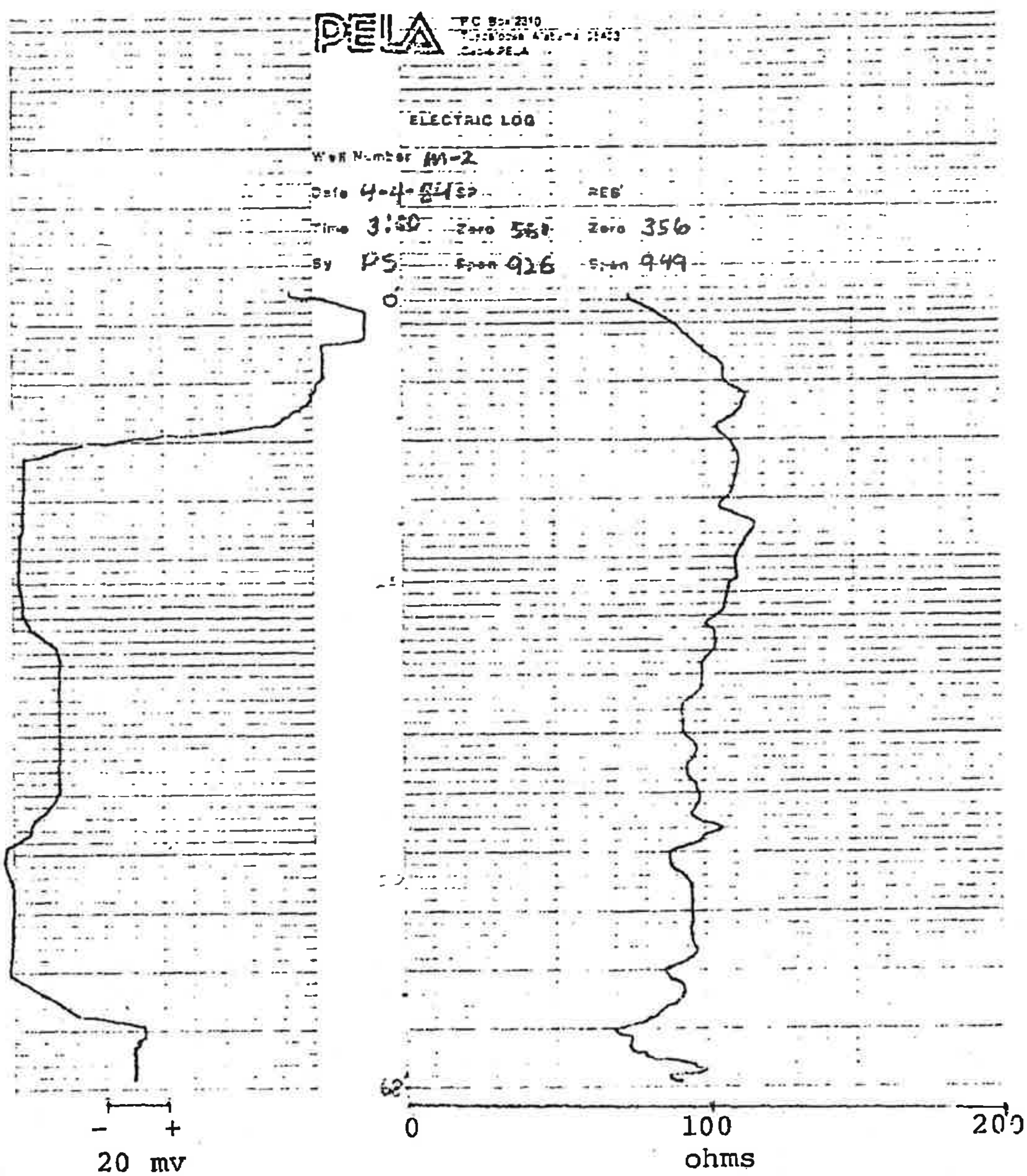
Depth (in feet)	Description
0 - 4.0	Clay, dark-yellowish-orange with moderate-reddish-brown, stiff.
4.0 - 5.0	Clay, same as above, with minor amount of sand, fine-grained, angular, quartz.
5.0 - 7.5	Clay, same as above.
7.5 - 10.0	Clay, medium-light-gray, with moderate-reddish-brown and yellowish-brown streaks, stiff, minor sand, very fine-grained quartz.
10.0 - 15.0	Clay, light-olive-gray with moderate-reddish-brown streaks, stiff, minor sand, dark-yellowish-orange, medium-grained, subangular, quartz.
15.0 - 18.0	Clay, same as above, with sand increasing.
18.0 - 25.0	Sand, dark-yellowish-orange, medium- to coarse-grained, subangular quartz with gravel, 5 mm to 1 cm in diameter.
25.0 - 30.0	Sand, same as above.
30.0 - 35.0	Sand, same as above.
35.0 - 40.0	Sand, dark-yellowish-brown to clear, fine- to medium-grained, moderately poorly sorted, minor pebbles, 2 to 4 mm in diameter.
40.0 - 45.0	Gravel, quartz, and varicolored rock fragments, 2 to 12 mm in diameter, subrounded, very-coarse- to coarse-grained sand, dark-yellowish-orange to clear quartz, subangular to subrounded.
45.0 - 50.0	Gravel, same as above, very-coarse-grained sand more abundant.
50.0 - 55.0	Gravel, same as above.
55.0 - 60.0	Gravel, same as above.

M-2 (continued)

Depth (in feet)	Description
60.0 - 65.0	Sand, dark-yellowish-orange to clear quartz, very-coarse- to medium-grained, subangular to subrounded, poorly sorted, clay, light-olive-gray, stiff.
65.0 - 69.5	Clay, light-olive-gray, stiff.
69.5	TOTAL DEPTH.



Gamma log for M-2: 0-65 feet below surface



Electric log for M-2: 0-68 feet below land surface

PELA

LITHOLOGIC DESCRIPTION, M-3

OWNER: Ciba-Geigy Corporation

DATE DRILLED: April 9, 1984

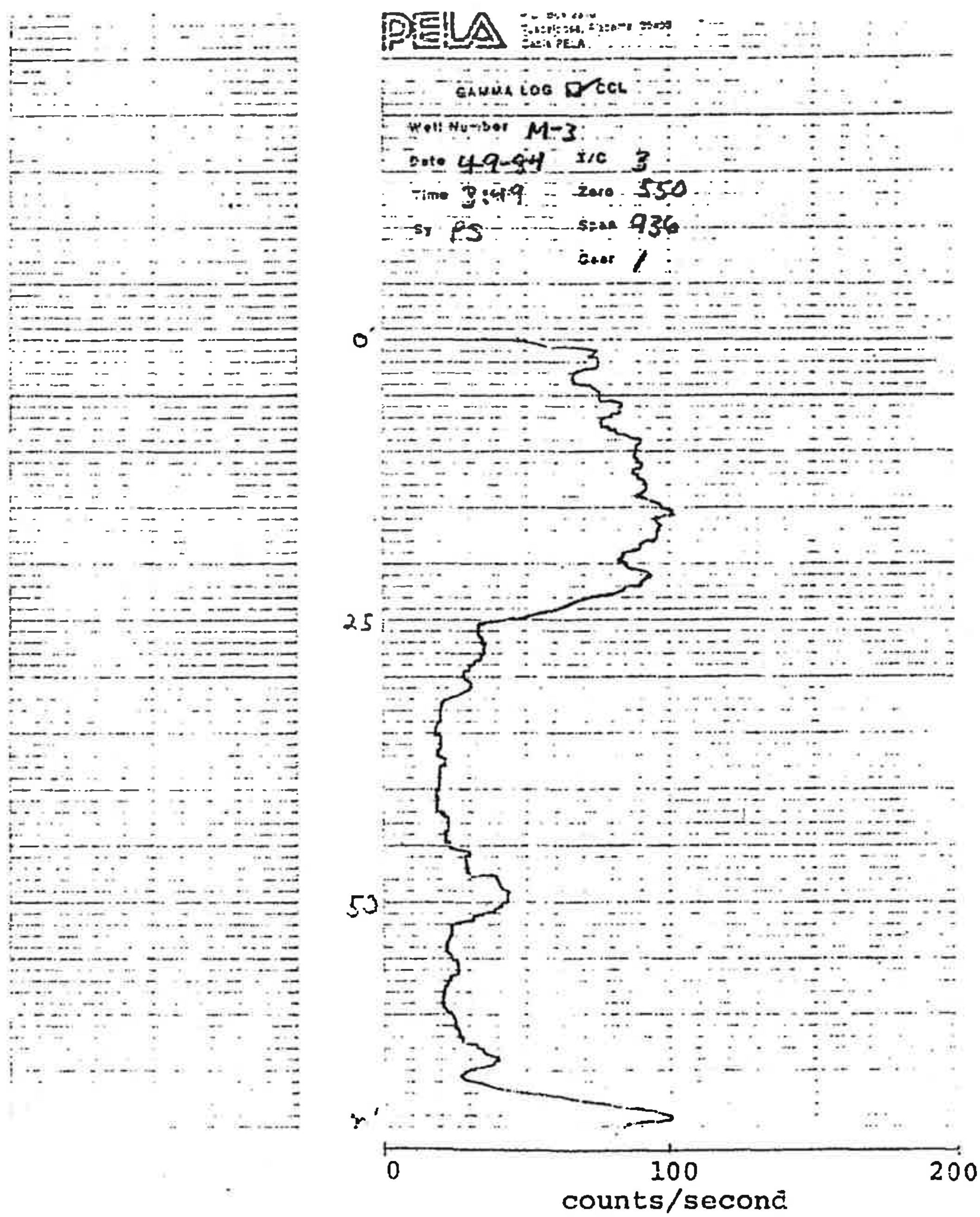
PELA GEOLOGISTS: J. Mark Tanner, Philip Stroud, Jeff deGraffenried, Jr.

Depth (in feet)	Description
0 - 5.0	Clay, mottled moderate-reddish-brown/gray, organics, road shells, stiff.
5.0 - 10.0	Clay, as above, grading to light-olive-gray with depth, abundant organics, small amount of very-coarse-grained quartz gravel.
10.0 - 14.0	Clay, yellowish-gray to gray, stiff.
14.0 - 15.0	Clay, same as above, with small amount of fine-grained, subangular quartz sand, organics.
15.0 - 17.0	Clay, yellowish-gray, stiff, trace of fine-grained, subangular quartz sand and iron stained silt.
17.0 - 20.0	Clay, yellowish-gray, stiff, fine-grained sand, subangular to subrounded, well sorted quartz.
20.0 - 24.0	Clay, light-olive-gray, stiff, fine- to very-fine-grained sand, angular, well sorted quartz.
24.0 - 30.0	Clay, olive-gray to grayish-orange, soft, coarse- to very-coarse-grained sand, subrounded to rounded, well sorted quartz.
30.0 - 35.0	Sand, grayish-orange, medium- to very-coarse-grained, angular to subrounded, well sorted, minor gravel, and clay streaks.
35.0 - 40.0	Sand, grayish-orange, angular to subrounded, medium- to very-coarse-grained, predominately quartz with minor gravel, 5 to 10 mm in diameter.
40.0 - 45.0	Sand, same as above.
45.0 - 50.0	Sand, same as above, with light-gray clay lenses.
50.0 - 55.0	Sand, same as above.
55.0 - 60.0	Sand, same as above.

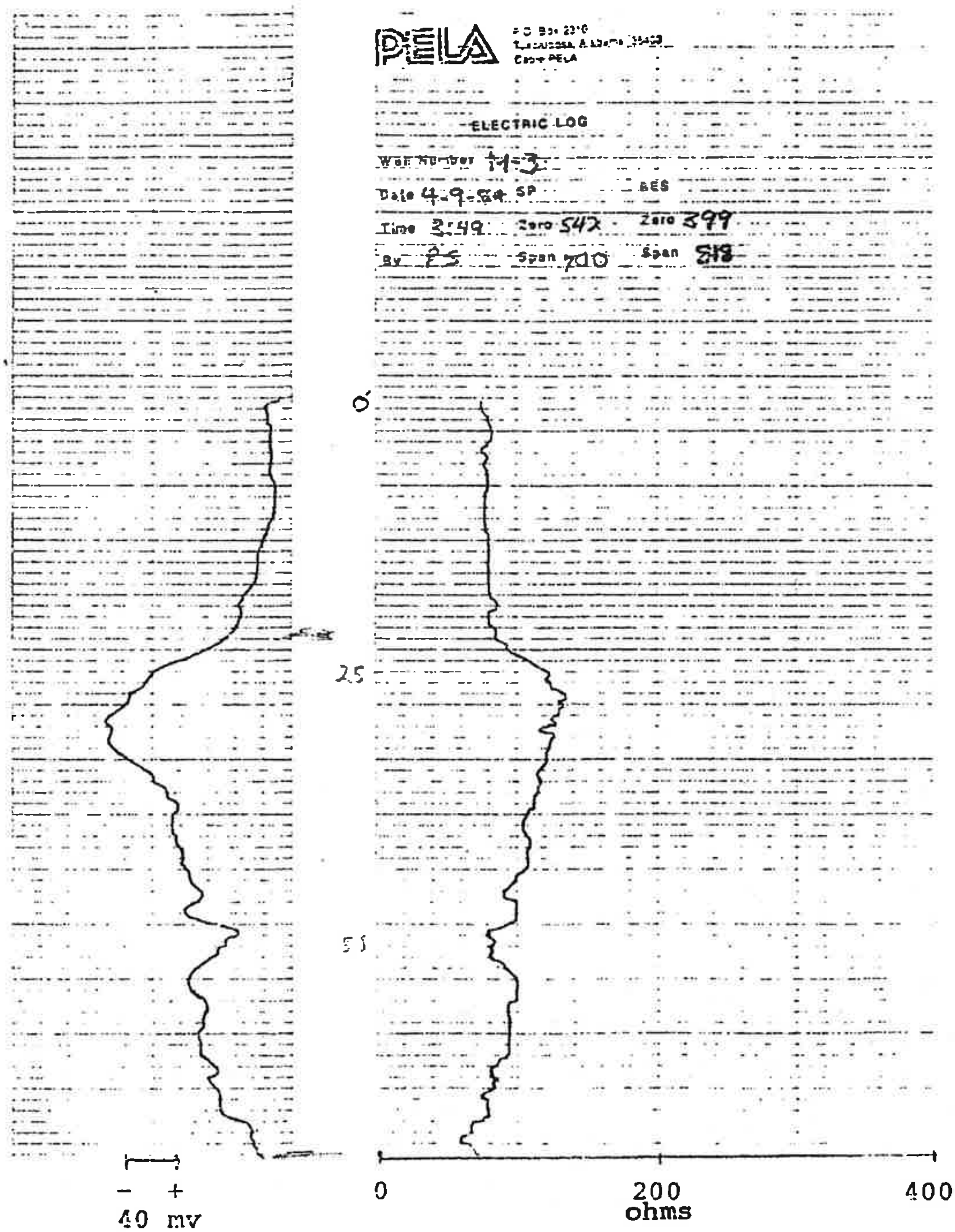
PELA

M-3 (continued)

Depth (in feet)	Description
60.0 - 65.0	Sand, predominately fine-grained, subangular to subrounded, quartz.
65.0 - 67.5	Sand, same as above, more fine-grained with depth.
67.5 - 70.0	Clay, dark-yellowish-orange, soft, slightly silty.
70.0 - 74.0	Clay, yellowish-gray, moderately stiff, abundant organics, small amount of yellowish-orange, soft, silty clay.
74.0	TOTAL DEPTH.



Gamma log for M-3: 0-70 feet below land surface



Electric log for M-3: 0-73 feet below land surface

PELA

LITHOLOGIC DESCRIPTION, M-4

OWNER: Ciba-Geigy Corporation

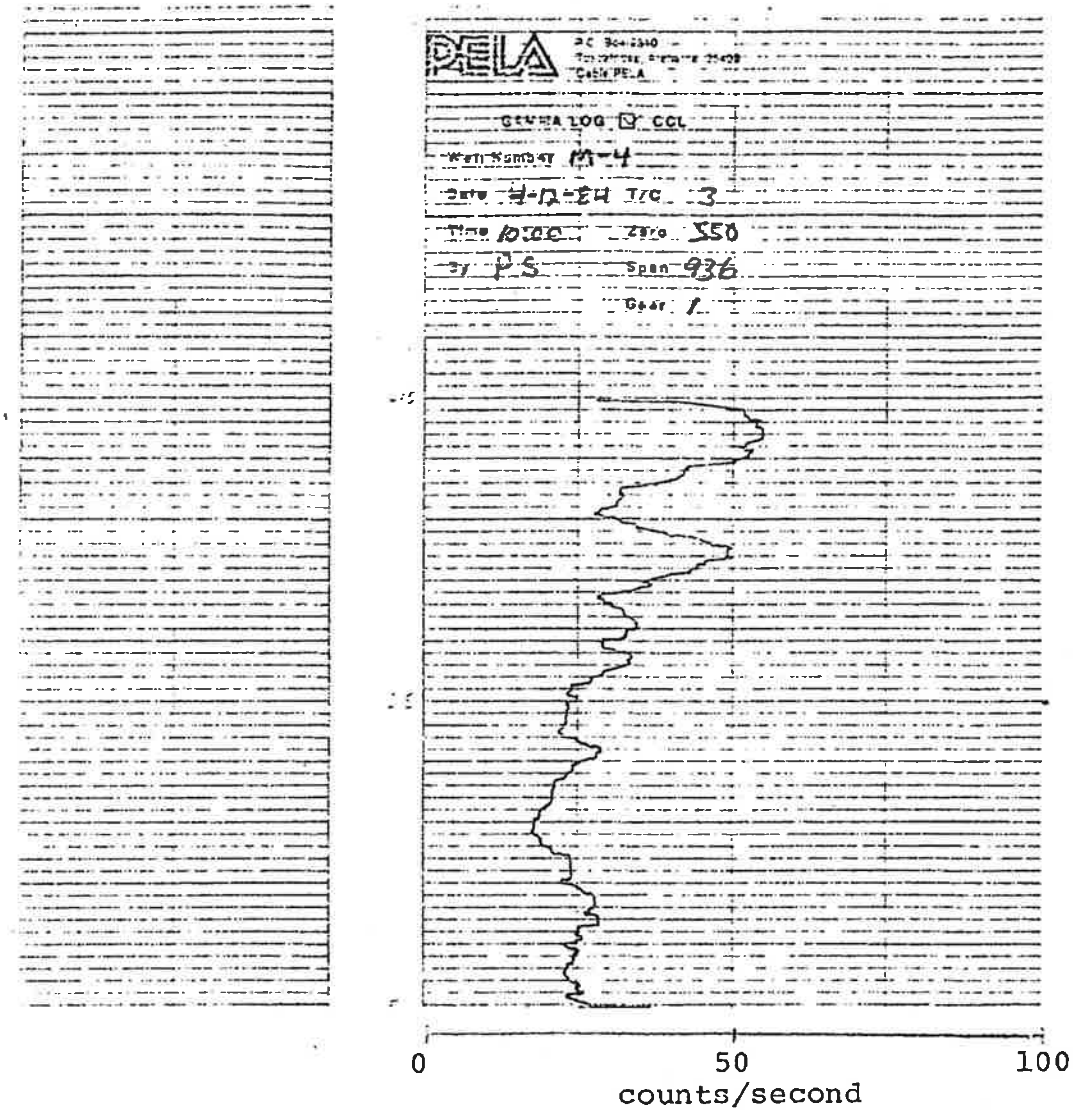
DATE DRILLED: April 11-12, 1984

PELA GEOLOGISTS: J. Mark Tanner, Philip Stroud, Jeff deGraffenried, Jr.

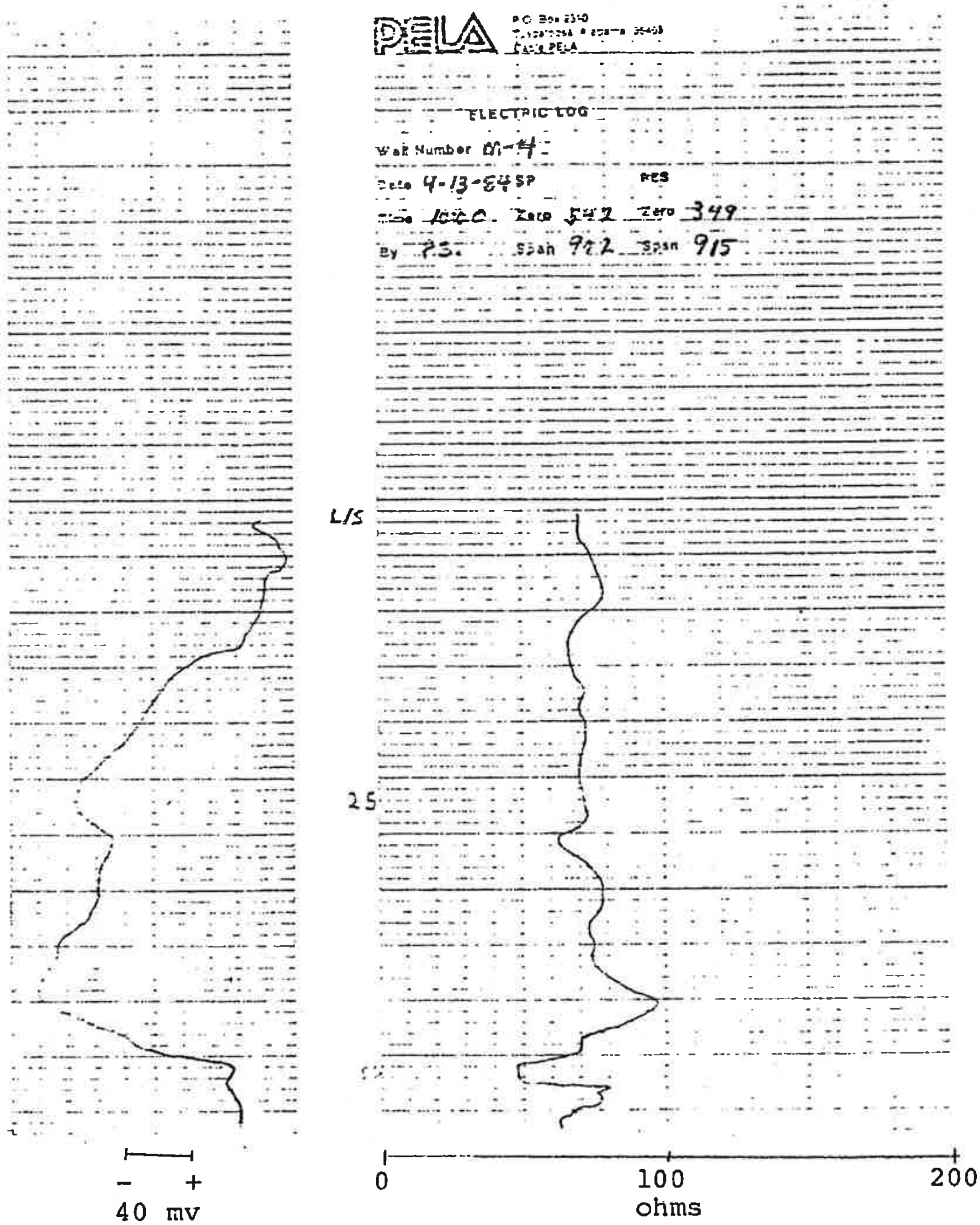
Depth (in feet)	Description
0 - 2.5	Clay, light-brown, soft, silty, trace of fine-grained, quartzose sand.
2.5 - 4.6	Clay, light-brown, soft, silty, trace of fine-grained, quartzose sand.
4.6 - 5.6	Clay, yellowish-gray to dark-yellowish-orange, silty.
5.6 - 6.0	Clay, light-brown to dark-yellowish-orange, very silty.
6.0 - 10.0	Silt, light-olive-gray, with fine- to medium-grained, subangular quartz sand.
10.0 - 15.0	Clay, mottled moderate-reddish-brown with yellowish-gray, stiff, sandy, fine- to medium-grained, subangular, quartzose.
15.0 - 18.5	Clay, light-gray, stiff, slightly sandy, fine-grained, subangular, quartzose.
18.5 - 19.7	Clay, same as above, with pea size quartz gravel.
19.7 - 24.5	Clay, light-gray, hard, with pea size quartz gravel.
24.5 - 27.0	Sand, grayish-orange, fine- to coarse-grained, subrounded to subangular, with pea size quartzose gravel and thin light-gray clay lenses.
27.0 - 30.0	Sand, same as above.
30.0 - 35.0	Sand, same as above.
35.0 - 40.0	Sand, same as above, with abundant gravel and thin clay lenses.
40.0 - 45.0	Sand, grayish-orange, fine- to coarse-grained, angular to subangular, well sorted, with abundant pea size gravel.
45.0 - 49.8	Sand, same as above.

M-4 (continued)

Depth (in feet)	Description
49.8 - 55.0	Clay, light-gray to pinkish-gray, sandy, fine-grained, quartzose, some small gravel.
55.0 - 57.0	Clay, same as above, becoming more silty.
57.0	TOTAL DEPTH.



Gamma log for M-4: 0-50 feet below land surface



Electric log for M-4: 0-54.5 feet below land surface

PELA

LITHOLOGIC DESCRIPTION, M-5

OWNER: Ciba-Geigy Corporation

DATE DRILLED: April 13, 1984

PELA GEOLOGISTS: J. Mark Tanner, Philip Stroud, Jeff deGraffenried, Jr.

Depth (in feet)	Description
0 - 3.0	Clay, moderate-yellowish-orange to dark-reddish-brown, silty, sandy, stiff, sand is very-fine-grained, angular to subangular, quartzose.
3.0 - 7.0	Silt, light-gray to moderate-reddish-brown, clayey, sandy, sand is fine-grained, subrounded, quartzose.
7.0 - 10.0	Sand, light-brown, subrounded to subangular, medium-grained, silty.
10.0 - 19.0	Sand, light-gray to light-brown, fine- to medium-grained, subangular, clayey.
19.0 - 25.0	Sand, light-gray to medium-brown, fine- to coarse-grained, subangular, well sorted quartzose with some gravel, clayey.
25.0 - 30.0	Sand, same as above.
30.0 - 40.0	Sand, same as above, with clay lenses, medium-gray, soft.
40.0 - 50.0	Sand, same as above, with abundant gravel, 1.3 to 2.5 cm in diameter.
50.0 - 53.0	Sand, same as above.
53.0 - 55.0	Clay, medium-dark-gray, very stiff, some sand and gravel.
55.0 - 60.0	Clay, light-gray, silty, trace of sand, medium- to coarse-grained, very angular, quartzose.
60.0	TOTAL DEPTH.

PELA

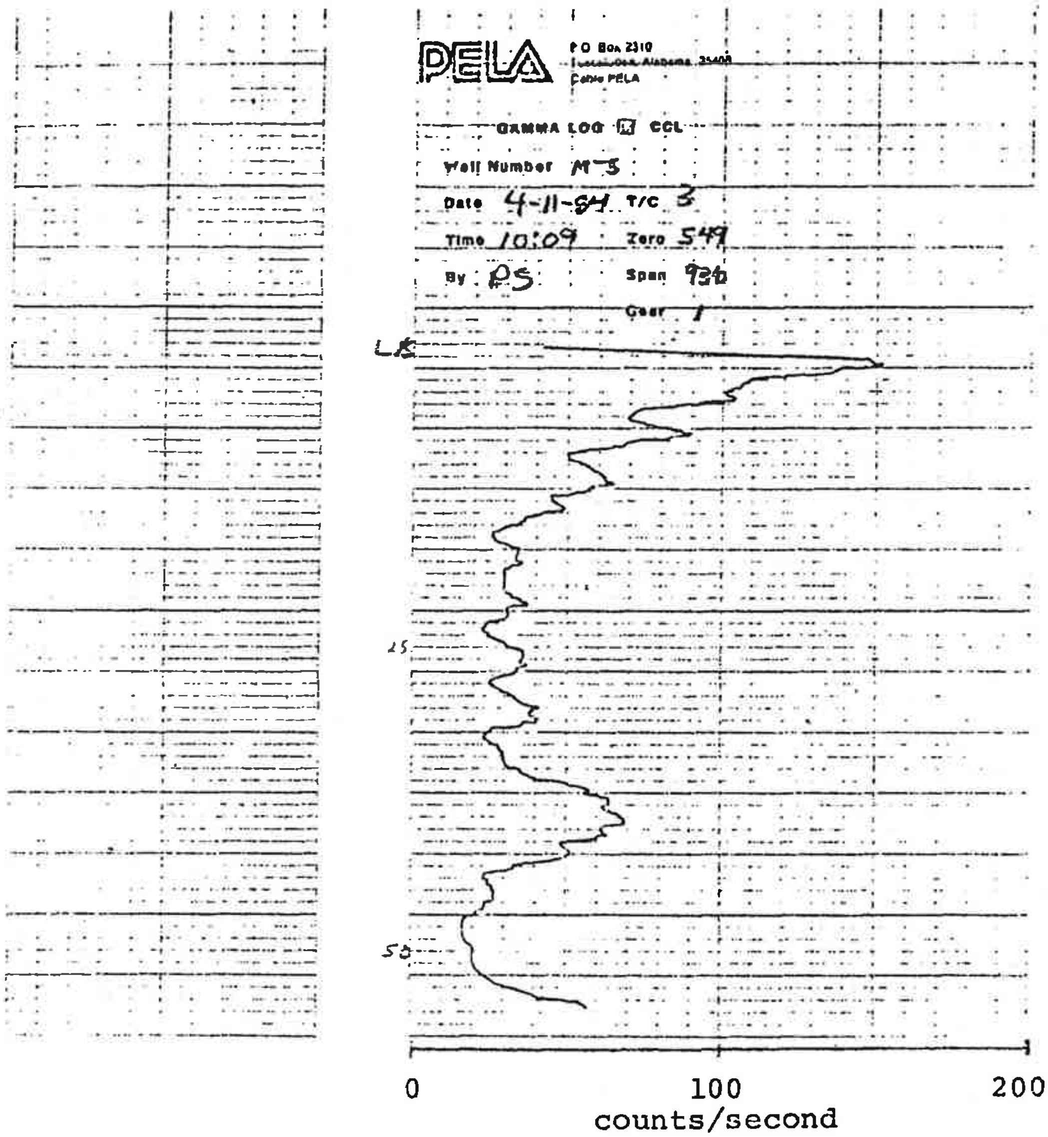
LITHOLOGIC DESCRIPTION, M-6

OWNER: Ciba-Geigy Corporation

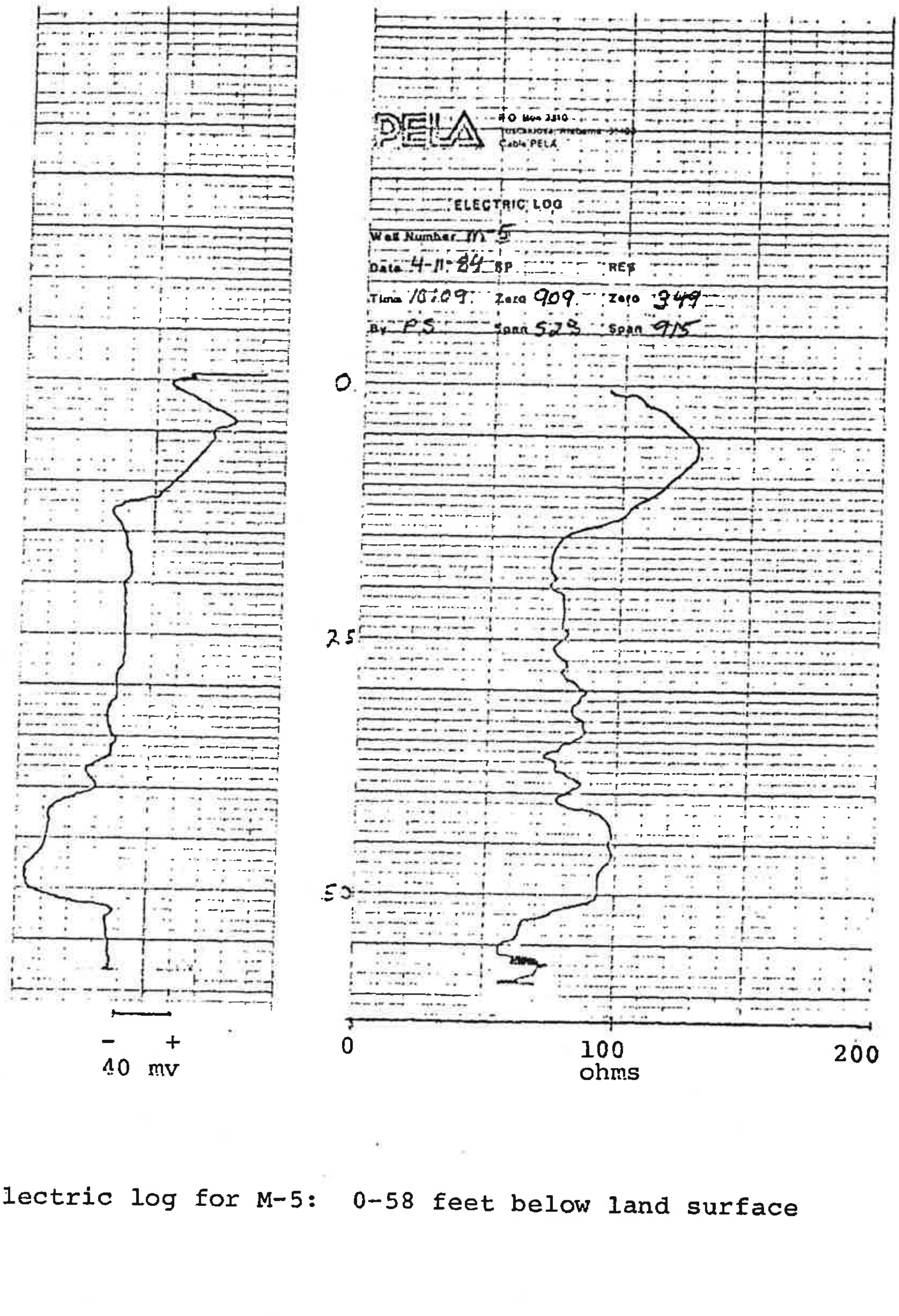
DATE DRILLED: April 3, 1984

PELA GEOLOGISTS: Philip Stroud, Janet Smith

Depth (in feet)	Description
0 - 5.0	Clay, moderate-reddish-brown with streaks of grayish-orange-pink, stiff.
5.0 - 10.0	Clay, moderate-reddish-brown and medium-bluish-gray, stiff.
10.0 - 12.0	Clay, same as above.
12.0 - 15.0	Clay, grayish-green with minor amount of moderate-reddish-brown, stiff.
15.0 - 17.0	Clay, same as above.
17.0 - 20.0	Sand, light-brown, clear quartz, very-coarse-grained, slightly clayey.
20.0 - 25.0	Sand, same as above, very-coarse- to medium-grained.
25.0 - 30.0	Sand, same as above.
30.0 - 35.0	Sand, white and yellowish-red pebbles, very angular.
35.0 - 40.0	Sand, same as above, with some pea size gravel.
40.0 - 45.0	Sand, dark-yellowish-orange to clear quartz, subrounded to angular, slightly clayey.
45.0 - 50.0	Sand, pale-yellowish-orange, white feldspar and clear quartz fragments, subrounded to subangular, coarse-grained, poorly sorted, 4 mm in diameter.
50.0 - 55.5	Sand, same as above, very-coarse-grained, 2 to 4 mm in diameter.
55.5 - 59.0	Sand, same as above, with pea size gravel, 4 to 9 mm in diameter, some clay lenses, yellowish-gray to bluish-gray, stiff.
59.0 - 61.0	Clay, yellowish-gray to light-olive-gray, stiff.
61.0	TOTAL DEPTH.



Gamma log for M-5: 0-55 feet below land surface



Electric log for M-5: 0-58 feet below land surface

PELA

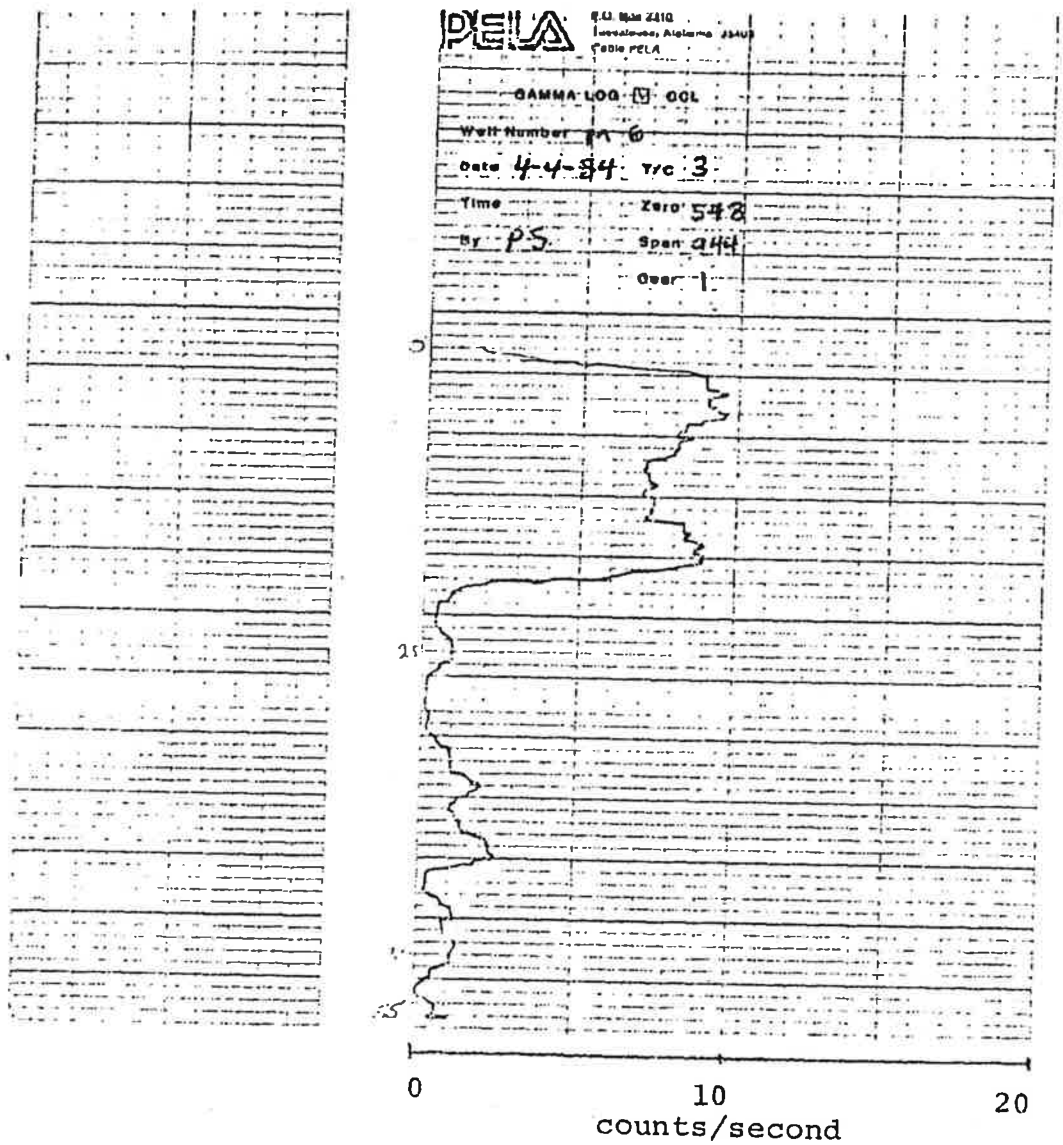
LITHOLOGIC DESCRIPTION, M-6

OWNER: Ciba-Geigy Corporation

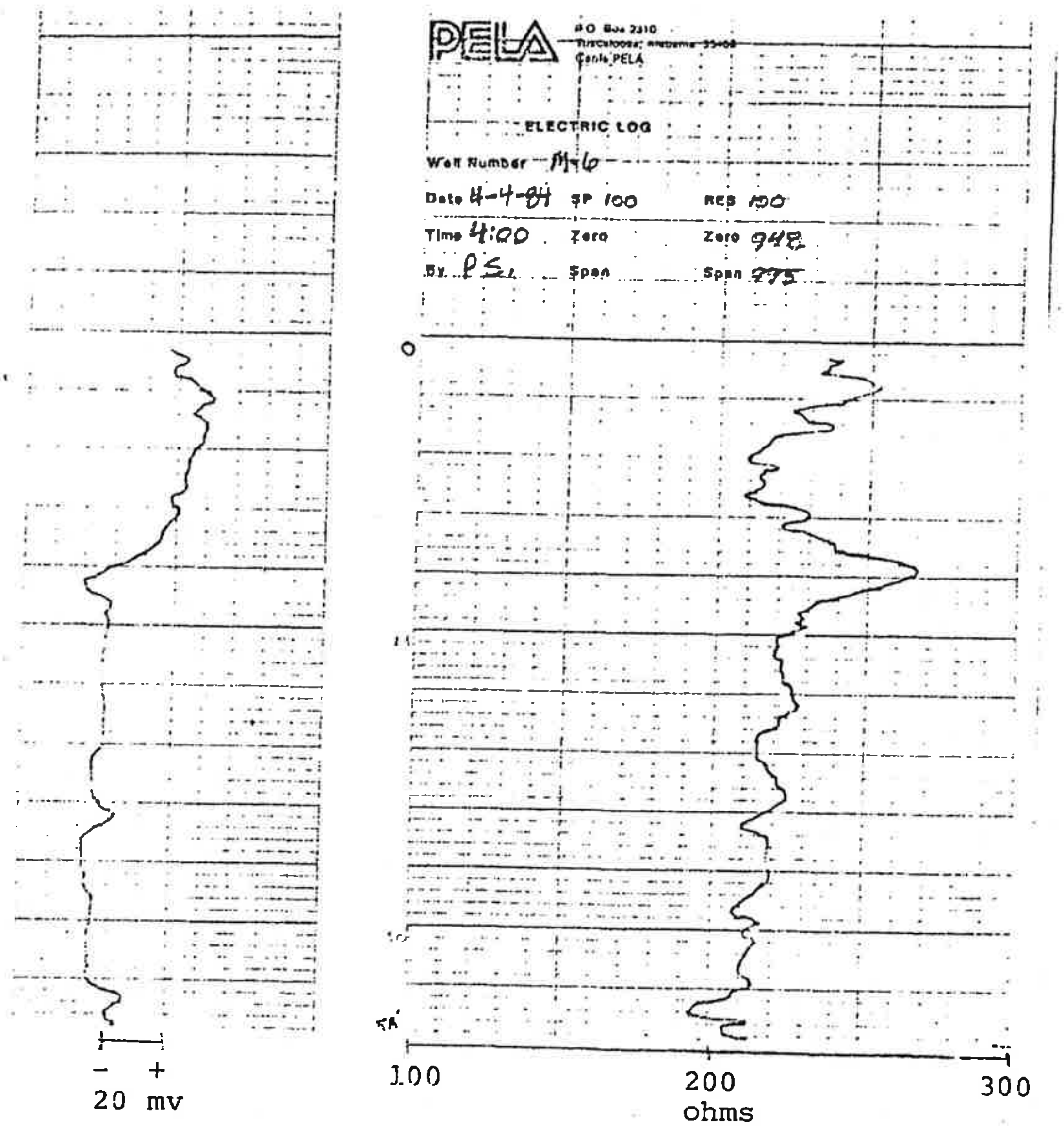
DATE DRILLED: April 3, 1984

PELA GEOLOGISTS: Philip Stroud, Janet Smith

Depth (in feet)	Description
0 - 5.0	Clay, moderate-reddish-brown with streaks of grayish-orange-pink, stiff.
5.0 - 10.0	Clay, moderate-reddish-brown and medium-bluish-gray, stiff.
10.0 - 12.0	Clay, same as above.
12.0 - 15.0	Clay, grayish-green with minor amount of moderate-reddish-brown, stiff.
15.0 - 17.0	Clay, same as above.
17.0 - 20.0	Sand, light-brown, clear quartz, very-coarse-grained, slightly clayey.
20.0 - 25.0	Sand, same as above, very-coarse- to medium-grained.
25.0 - 30.0	Sand, same as above.
30.0 - 35.0	Sand, white and yellowish-red pebbles, very angular.
35.0 - 40.0	Sand, same as above, with some pea size gravel.
40.0 - 45.0	Sand, dark-yellowish-orange to clear quartz, subrounded to angular, slightly clayey.
45.0 - 50.0	Sand, pale-yellowish-orange, white feldspar and clear quartz fragments, subrounded to subangular, coarse-grained, poorly sorted, 4 mm in diameter.
50.0 - 55.5	Sand, same as above, very-coarse-grained, 2 to 4 mm in diameter.
55.5 - 59.0	Sand, same as above, with pea size gravel, 4 to 9 mm in diameter, some clay lenses, yellowish-gray to bluish-gray, stiff.
59.0 - 61.0	Clay, yellowish-gray to light-olive-gray, stiff.
61.0	TOTAL DEPTH.



Gamma log for M-6: 0-55 feet below land surface



Electric log for M-6: 0-58[1] below land surface

PELA

LITHOLOGIC DESCRIPTION, M-8

OWNER: Ciba-Geigy Corporation

DATE DRILLED: April 11, 1984

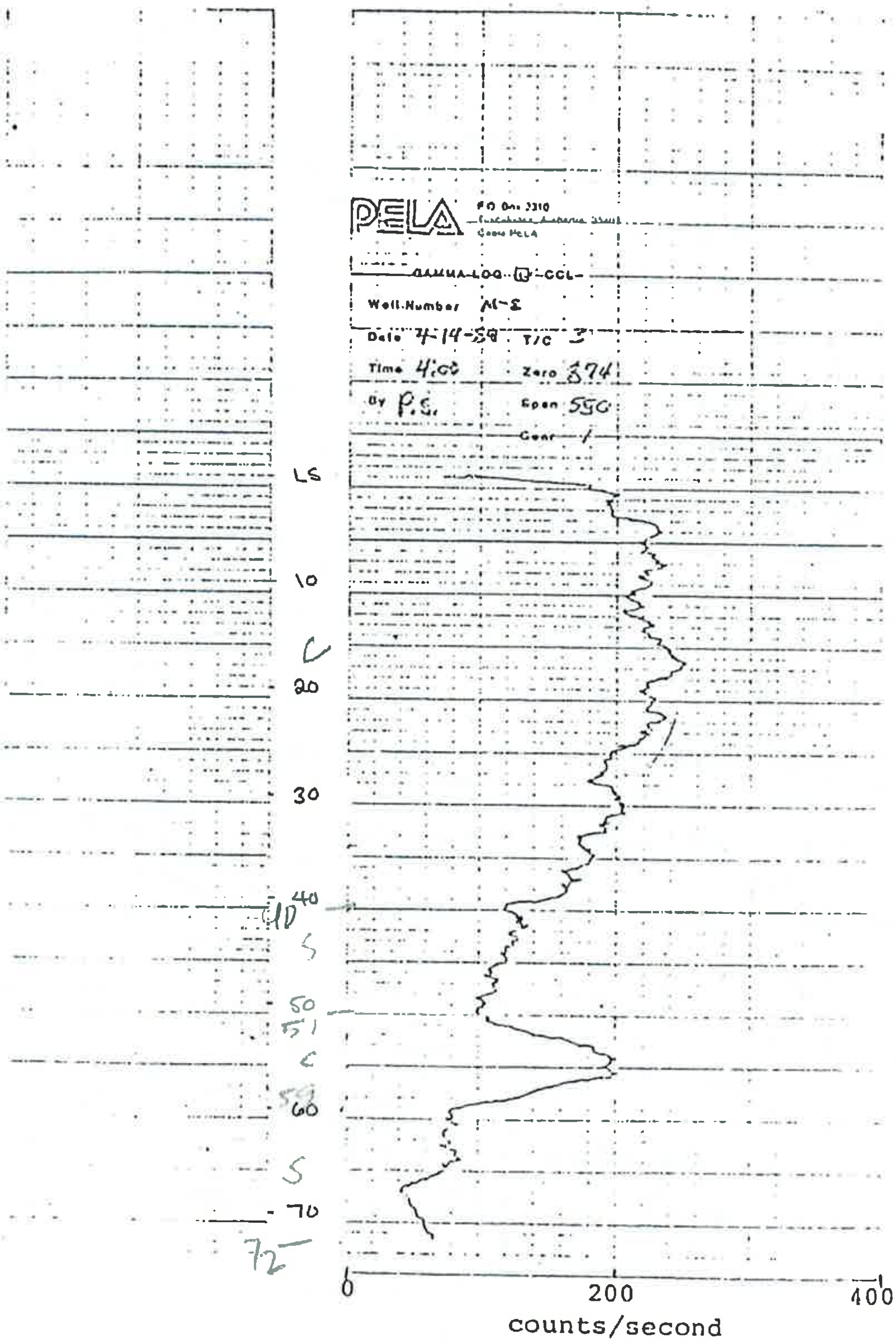
PELA GEOLOGISTS: J. Mark Tanner, Philip Stroud, Jeff deGraffenried, Jr.

Depth (in feet)	Description
0 - 5.0	Clay, mottled moderate-red with olive-gray, stiff, minor sand, fine- to medium-grained, quartzose.
5.0 - 10.0	Clay, same as above, increasing in gray with depth.
10.0 - 15.0	Clay, olive-gray with tinge of moderate-red, minor sand, very-fine-grained, subangular to subrounded, clear to white quartz.
15.0 - 20.0	Clay, same as above, with increasing moderate-red streaks.
20.0 - 26.0	Clay, same as above.
26.0 - 30.0	Clay, same as above, with fine-grained, angular to subrounded quartzose sand.
30.0 - 35.0	Sand, very-fine-grained, subangular to subrounded, quartzose.
35.0 - 40.0	Sand, fine- to coarse-grained, angular, clear to white quartz.
40.0 - 45.0	Sand, same as above, with pebbles present.
45.0 - 50.0	Sand, same as above.
50.0 - 57.0	Sand, same as above.
57.0 - 59.0	Clay, dark-olive-gray, moderately stiff.
59.0 - 60.0	Sand, fine- to coarse-grained, angular, clear to white quartz, with pebbles present.
60.0 - 65.0	Sand, same as above.
65.0 - 70.0	Sand, same as above.
70.0 - 74.5	Sand, same as above, with gravel, 2 to 6 mm in diameter, multicolored, subangular to subrounded.

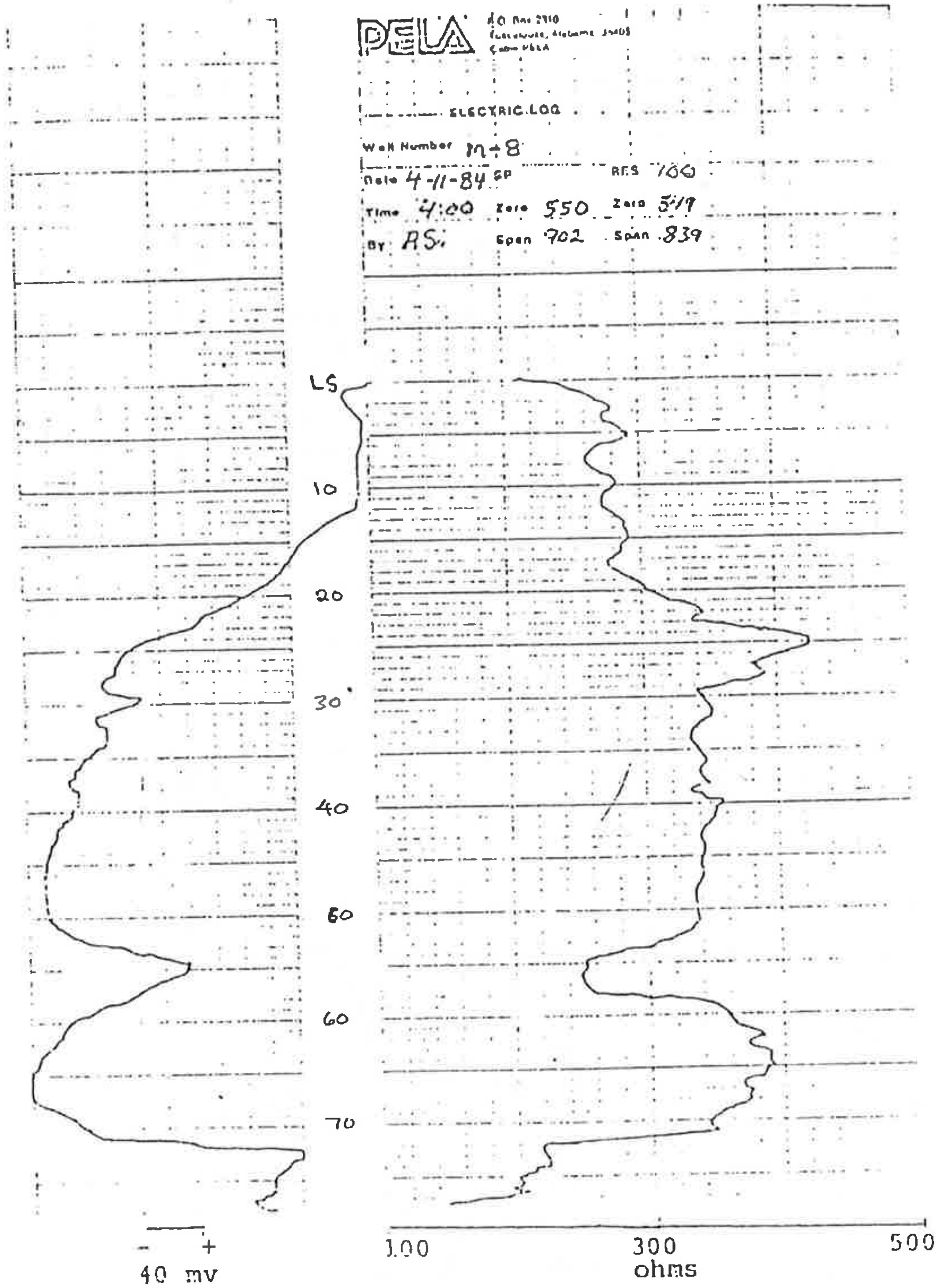
M-8 (continued)

Depth (in feet)	Description
74.5 - 80.0	Clay, light-olive-gray, stiff.
80.0	TOTAL DEPTH.

M-8



Gamma log for M-8: 0-72 feet below land surface



Electric log for M-8: 0-80 feet below land surface

PELA

LITHOLOGIC DESCRIPTION, M-9

OWNER: Ciba-Geigy Corporation

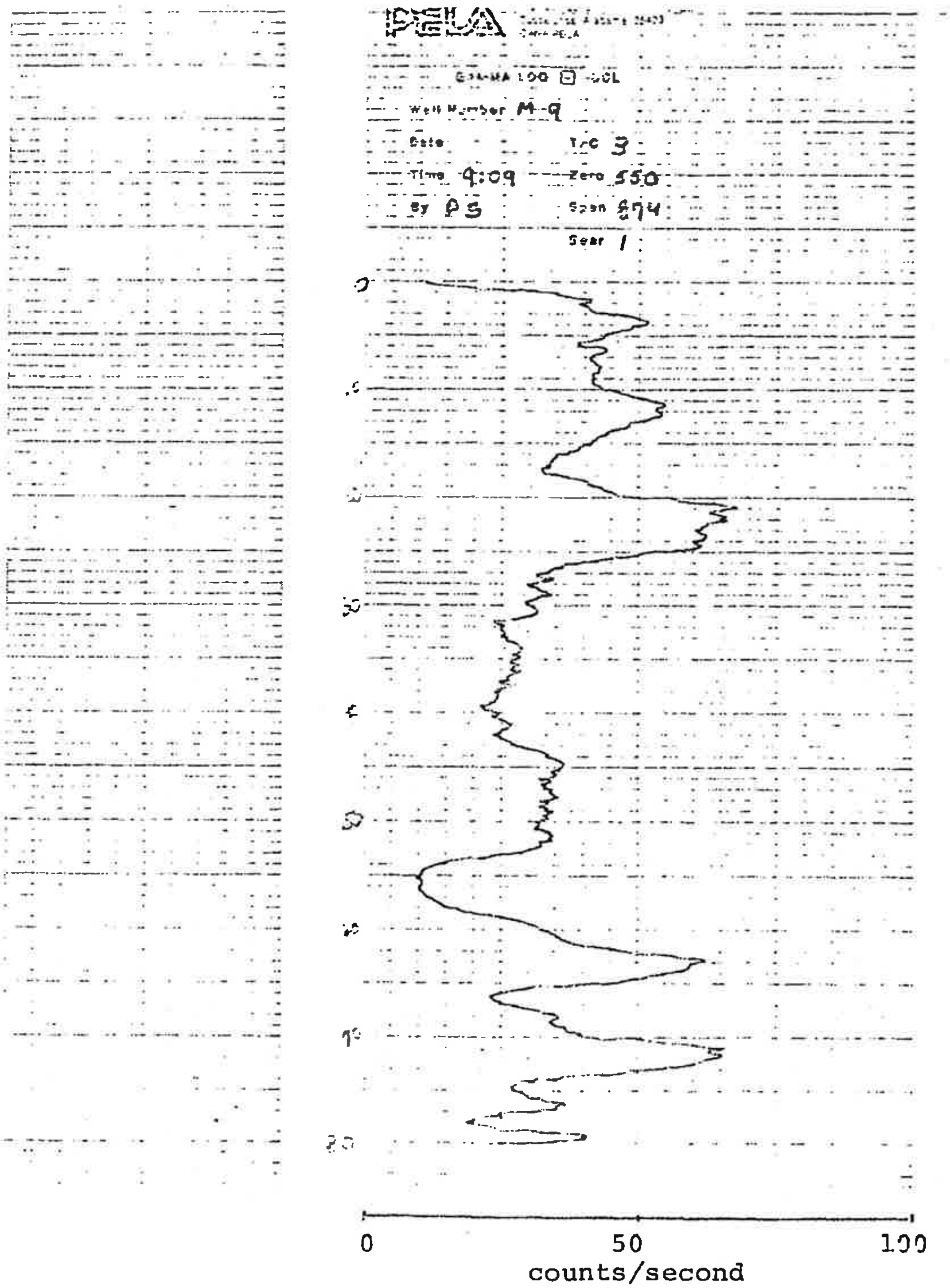
DATE DRILLED: April 5-6, 1984

PELA GEOLOGISTS: Philip Stroud, Janet Smith

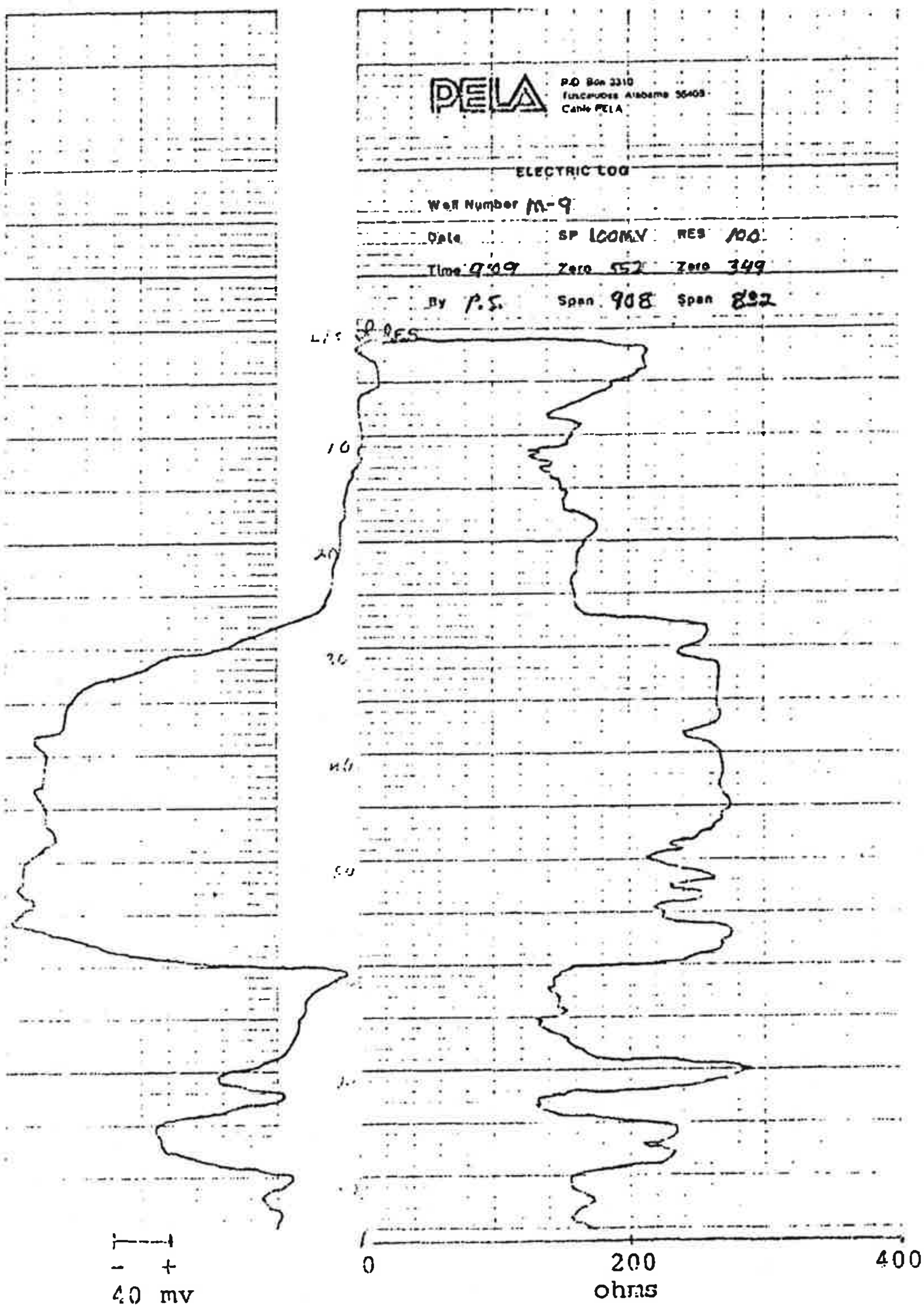
Depth (in feet)	Description
0 - 5.0	Clay, light-olive-gray, with moderate-reddish-brown streaks, stiff.
5.0 - 10.0	Clay, same as above, minor sand, fine-grained, subangular, quartz.
10.0 - 15.0	Clay, same as above.
15.0 - 17.5	Clay, same as above.
17.5 - 20.0	Clay, light-olive-gray, moderately stiff, sandy, dark-yellowish-orange, medium-grained, subangular, quartz.
20.0 - 25.0	Clay, light-olive-gray, stiff, sandy, dark-yellowish-orange, fine-grained, subangular.
25.0 - 26.0	Clay, same as above, moderately stiff.
26.0 - 30.0	Sand, dark-yellowish-orange, fine-grained, clayey, light-olive-gray, soft.
30.0 - 35.0	Sand, dark-yellowish-orange, coarse-grained, subangular to angular, quartz.
35.0 - 40.0	Sand, dark-yellowish-orange, coarse-grained, subangular, quartz, chert, and mafic rock fragments.
40.0 - 45.0	Sand, same as above.
45.0 - 50.0	Sand, dark yellowish orange, fine- to coarse-grained, subangular, quartz, minor rock fragments.
50.0 - 55.0	Sand, same as above, gravely.
55.0 - 60.0	Sand, dark-yellowish-orange, coarse- to very-coarse-grained, quartz, minor rock fragments, gravely, 6 mm in diameter.
60.0 - 64.0	Clay, dark-olive-gray, stiff, sandy, dark-yellowish-orange, coarse-grained, subangular, quartz.

M-9 (continued)

Depth (in feet)	Description
64.0 - 65.0	Sand, dark-yellowish-orange, fine-grained, subangular, quartz, clayey, dark-olive-gray, stiff, minor wood fragments.
65.0 - 70.0	Clay, olive-gray, stiff.
70.0 - 73.0	Clay, as above, with gravel, 2 to 6 mm in diameter, quartz, wood fragments.
73.0 - 74.5	Clay, very-dark-olive-gray.
74.5 - 75.0	Sand, coarse- to very-coarse-grained, subangular, quartz, gravely, 2 to 10 mm in diameter.
75.0 - 79.0	Sand, same as above.
79.0 - 85.0	Clay, dark-olive-gray, moderately stiff, minor wood fragments.
85.0	TOTAL DEPTH.



Gamma log for M-9: 0-80 feet below land surface



Electric log for M-9: 0-84 feet below land surface

PELA

LITHOLOGIC DESCRIPTION, M-10

OWNER: Ciba-Geigy Corporation

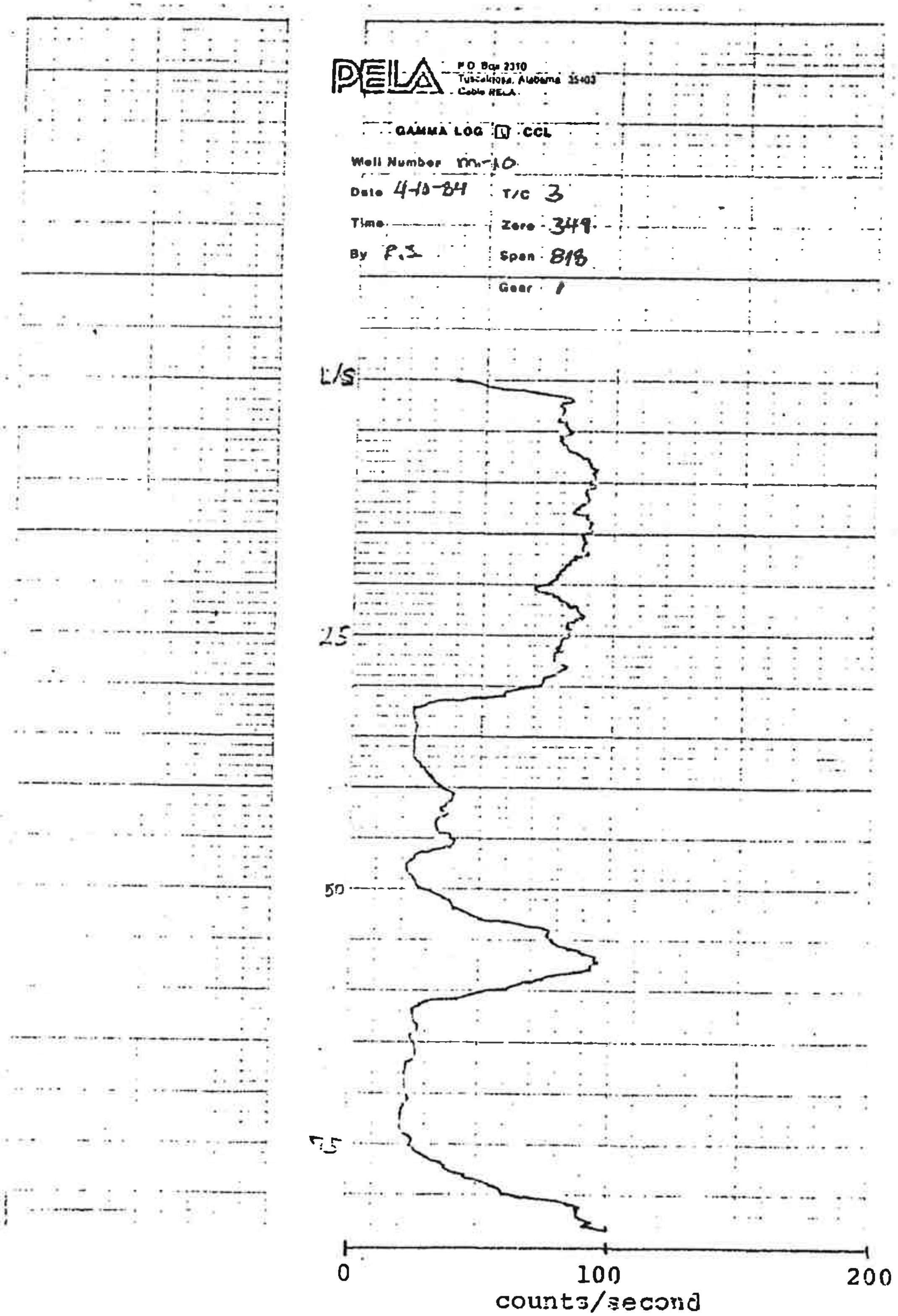
DATE DRILLED: April 10, 1984

PELA GEOLOGISTS: J. Mark Tanner, Jeff deGraffenried, Jr.

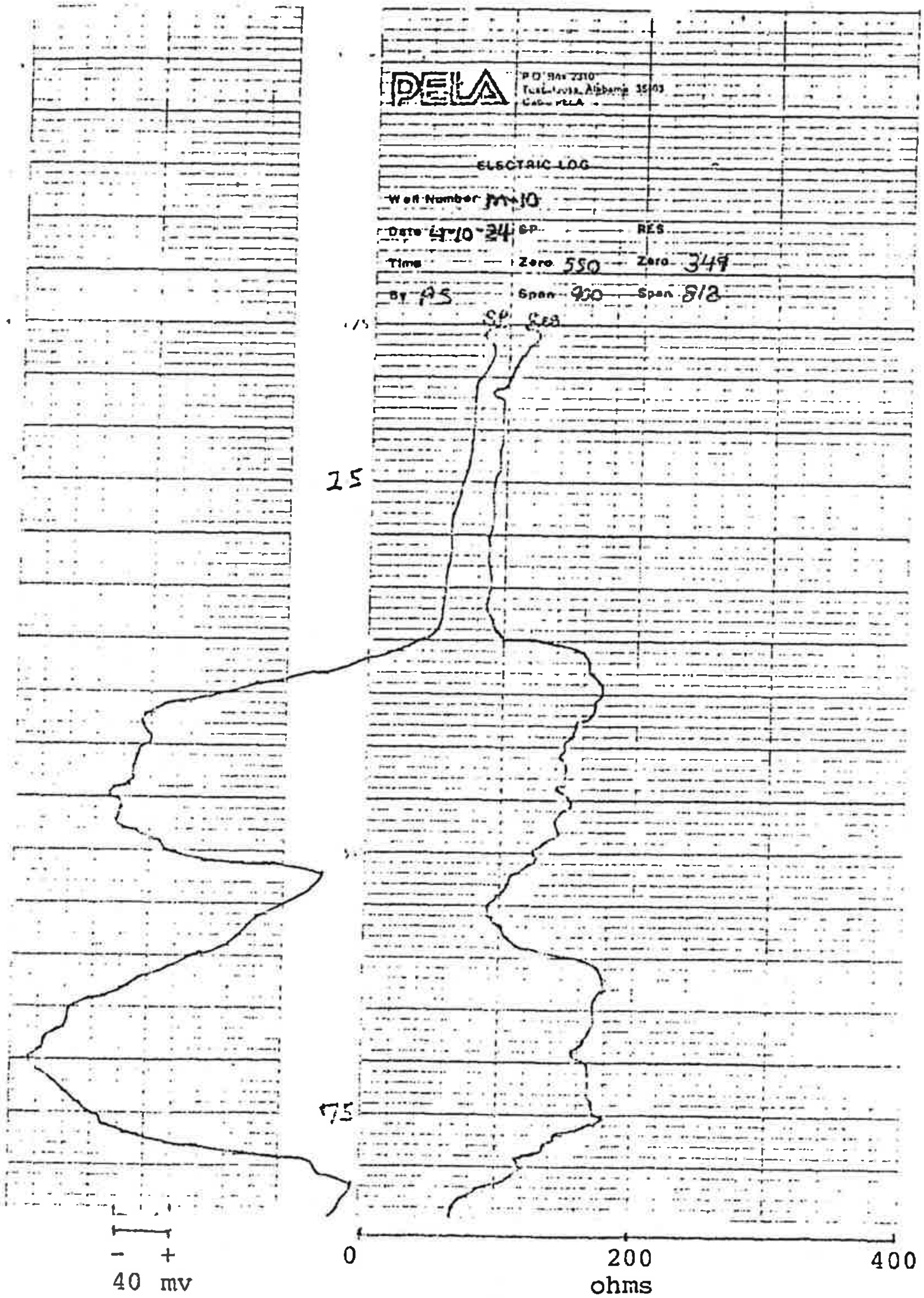
Depth (in feet)	Description
0 - 5.0	Clay, mottled reddish-orange and light-olive-gray, increasing silt with depth, very stiff, bioturbation.
5.0 - 10.0	Clay, light-olive-gray, stiff, slightly sandy and silty with iron stains.
10.0 - 15.0	Clay, light-olive-gray, stiff, some red streaks, increasing amount of coarse-grained, angular quartz and silt.
15.0 - 20.0	Sand, very-coarse-grained, angular to subangular, quartz.
20.0 - 23.0	Clay, light-olive-gray, stiff, trace of fine-grained sand.
23.0 - 30.0	Clay, same as above.
30.0 - 36.0	Sand, medium- to very-coarse-grained, subangular, minor clay.
36.0 - 40.0	Sand, dark-yellowish-orange, medium- to very-coarse-grained, angular, quartz, gravel, pea size quartzose.
40.0 - 45.0	Sand, same as above.
45.0 - 47.0	Sand, dark-yellowish-orange, medium- to very-coarse-grained, subrounded to subangular, quartzose, pea size gravel.
47.0 - 50.0	Sand, same as above, with some olive-gray and dark-reddish-brown clay lenses.
50.0 - 56.0	Sand, same as above.
56.0 - 60.0	Sand, grayish-orange, fine- to very-coarse-grained, pea size gravel, with abundant dark-olive-gray clay.
60.0 - 64.0	Clay, dark-olive-gray, stiff, with sand, fine- to medium-grained, angular, quartzose, gravel, yellowish-orange.
64.0 - 70.0	Sand, coarse- to very-coarse-grained, subangular to subrounded, quartzose, pea size gravel and clay, light-olive-gray, moderately stiff.

M-10 (continued)

Depth (in feet)	Description
70.0 - 75.0	Sand, same as above, with fine-grained, subangular, poorly sorted, quartzose.
75.0 - 80.0	Sand, same as above, grading into fine- to very-fine-grained, quartzose.
80.0 - 82.0	Clay, mottled moderate-reddish-brown and dark-olive-green, moderately stiff, with very-fine- to fine-grained, quartzose sand.
82.0 - 83.0	Sand, very-fine- to fine-grained, subangular to sub-rounded, well sorted (Beech type), quartzose.
83.0 - 86.0	Sand, same as above, with more clay.
86.0 - 89.0	Clay, medium-gray, slightly sandy, fine-grained, quartz-ose.
89.0	TOTAL DEPTH.



Gamma log for M-10: 0-84 feet below land surface



Electric log for M-10: 0-85 feet below land surface

PELA

LITHOLOGIC DESCRIPTION, M-11

OWNER: Ciba-Geigy Corporation

DATE DRILLED: April 10, 1984

PELA GEOLOGISTS: J. Mark Tanner, Philip Stroud, Jeff deGraffenried, Jr.

Depth (in feet)	Description
0 - 5.0	Clay, mottled olive-gray and moderate-red, moderately stiff.
5.0 - 6.0	Clay, same as above.
6.0 - 10.0	Clay, same as above, sand, medium- to fine-grained, subangular to subrounded, quartzose.
10.0 - 15.0	Sand, fine- to medium-grained, subangular, quartzose, clayey.
15.0 - 20.0	Sand, same as above, less clay.
20.0 - 25.0	Sand, medium- to coarse-grained, angular to subrounded, clear quartz.
25.0 - 30.0	Sand, clear to yellow, fine- to very-coarse-grained, quartzose, pebbles, olive-gray clay lenses.
30.0 - 35.0	Sand, same as above.
35.0 - 40.0	Sand, very-fine- to medium-grained, angular to subangular, clear quartz.
40.0 - 45.0	Sand, same as above.
45.0 - 49.0	Sand, same as above.
49.0 - 51.0	Clay, dark-olive-gray to bluish-gray, moderately stiff.
51.0 - 55.0	Sand, very-fine- to medium-grained, angular to subangular, clear quartz.
55.0 - 60.0	Sand, same as above.
60.0 - 64.0	Sand, same as above.
64.0 - 69.0	Clay, olive-gray to bluish-gray, stiff.
69.0	TOTAL DEPTH.

WELL CONSTRUCTION FORM

DRILLING DATA

Well ID M-11 Project Number 492350

Project Name Ciba-Geigy New Land Vault (re-development of well)

Location Ciba-Geigy Corporation
McIntosh, Alabama

Supervised by Michael Johnson

Date of Boring ______ Date Well Completed ______

Drilling Company ______

Driller ______

Drilling Method ______

Bit Diameter ______ Hollow Stem I.D. ______ O.D. ______

Hours Drilled ______ Downtime ______

Decontamination Procedure ______

Sample Collection Procedure ______

Estimated % Recovery ______

MATERIALS

Casing Material ______ Type ______

Screen Material ______ Type ______

Casing (in.) O.D. ______ I.D. ______ ______ to ______ ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls

Total Casing (ft.) ______

Screen (in.) O.D. ______ I.D. ______ ______ to ______ ftbls

Slot Size ______ Total Screen (ft.) ______

Length of Cap ______ Sump (ft.) ______

Centralizer Material ______ Length (in.) ______

Sand Pack Mtrl./Sz. ______

Lbs./Sacks Used ______

Grout Material ______

Amt. Cement ______ Type Cement ______

Amt. Powdered Bentonite ______ Amt. Bentonite Pellets ______

Tremie Used ______ Pump for Grout Used ______

Cement Plug ______

Length of Protective Casing (ft.) ______

DEVELOPMENT

Development Method Submersible pump Total Hours 21 (pump, slug & surge)

Date and Time Started 10/30/91 09:16

Date and Time Completed 11/1/91 10:32

Esti. Gallons 14,500 Esti. Yield (gpm) 68

Static WL (ftbtoc) 14.91

Color/Turbidity: Start grayish-orange Finish Clear

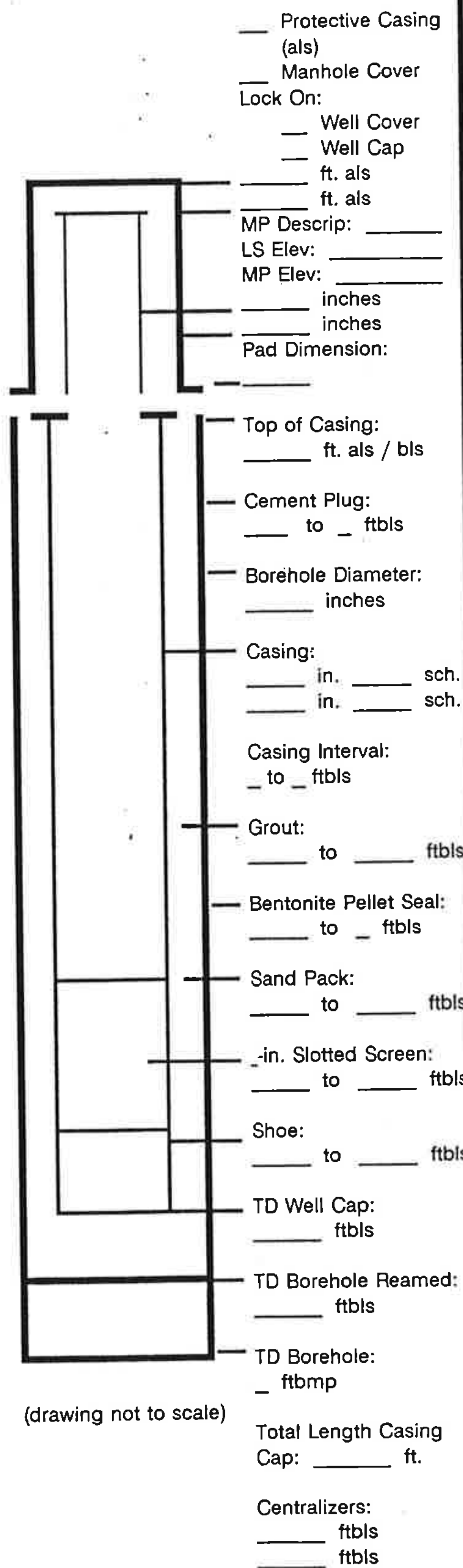
Drawdown (ft.) 22.16 Time to Recovery 1.5 hours

Final: pH 5.07 SC 65 T 21.5° C Eh ______

Sand None Odor None

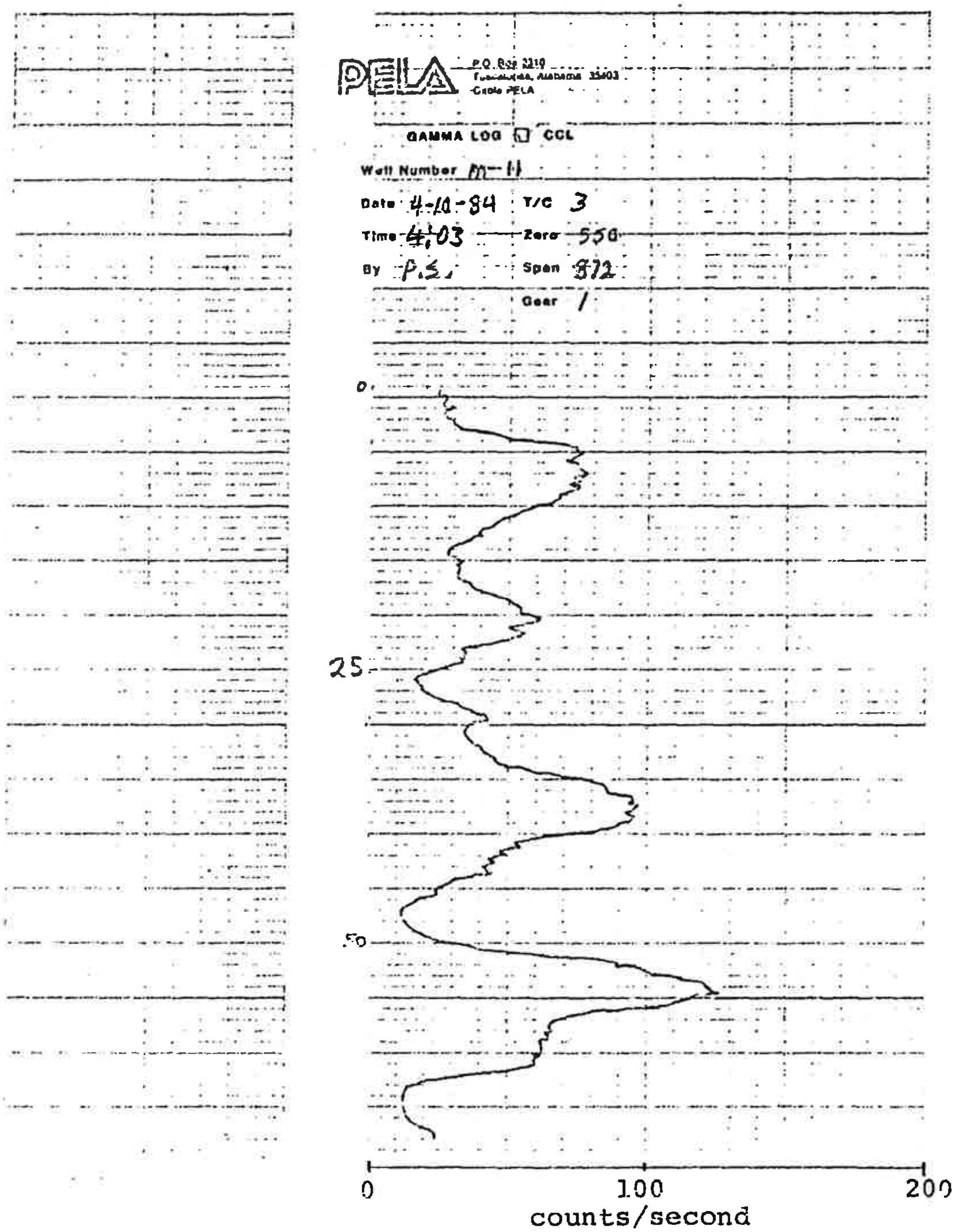
Water Discharged to Waste treatment plant

REMARKS ______

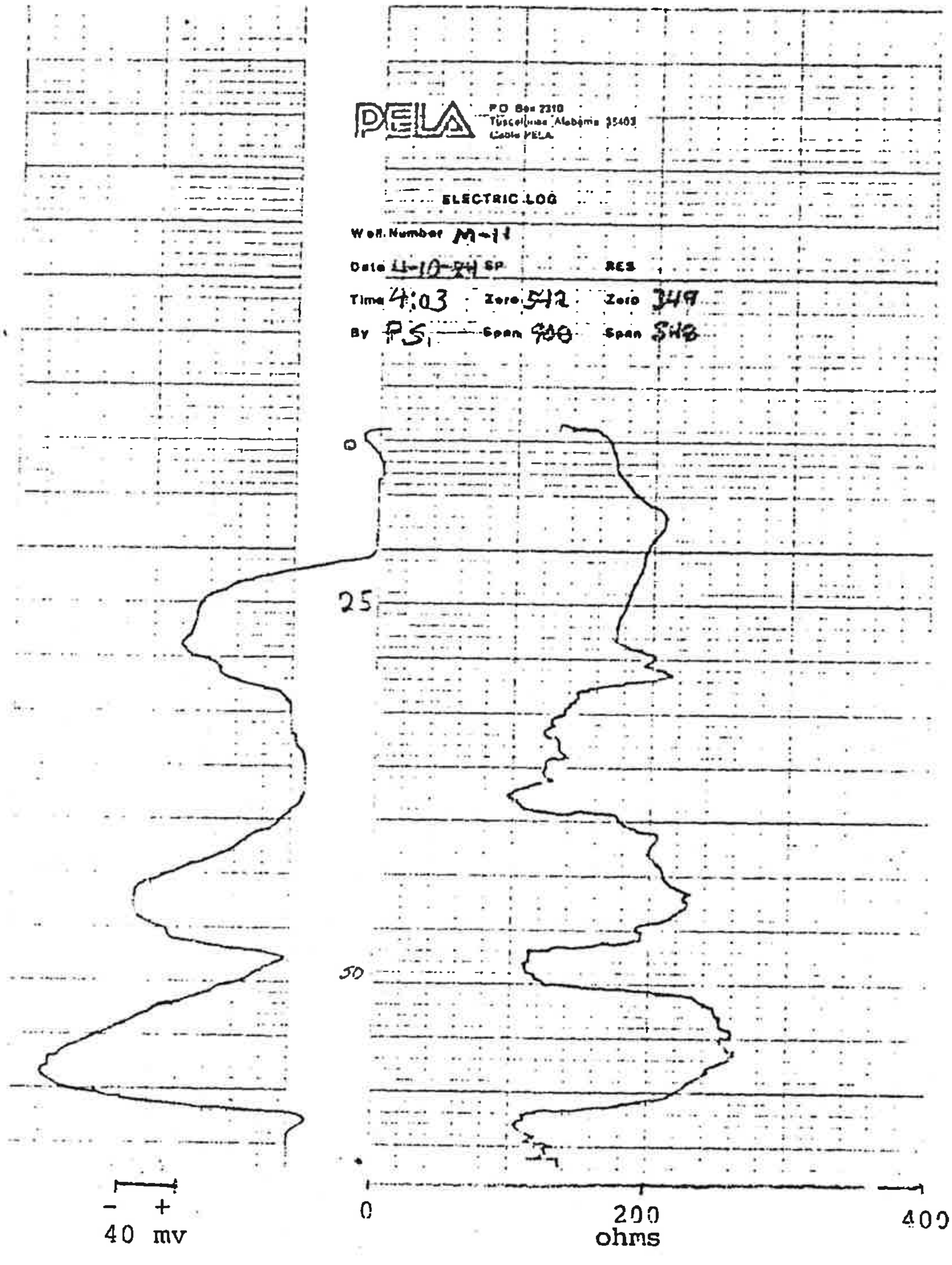


(drawing not to scale)

P. E. LaMoreaux & Associates, Inc. (PELA)



Gamma log for M-11: 0-68 feet below land surface



Electric log for M-11: 0-68 feet below land surface

PELA

LITHOLOGIC DESCRIPTION, M-12

OWNER: Ciba-Geigy Corporation

DATE DRILLED: April 17, 1984

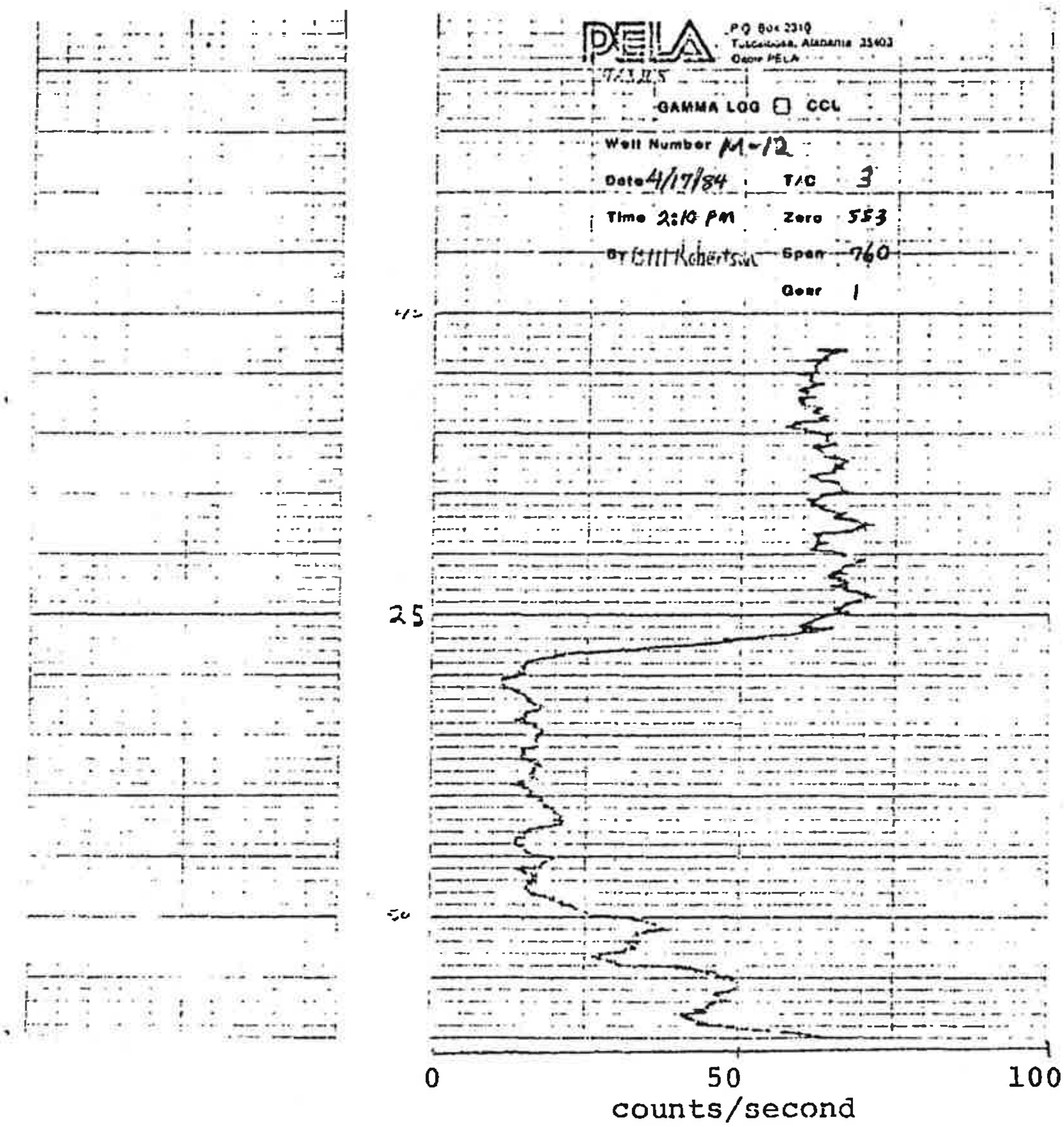
PELA GEOLOGISTS: Jeff deGraffenried, Jr.

Depth (in feet)	Description
0 - 3.0	Clay, light-yellowish-brown, stiff, silty, trace of sand, fine-grained, subangular, quartzose.
3.0 - 5.0	Clay, same as above, grading into mottled reddish-orange with light-olive-gray, trace of sand, very-coarse-grained, subangular, quartzose.
5.0 - 10.0	Clay, same as above, trace of sand, subrounded to subangular, quartzose.
10.0 - 11.5	Clay, increasing sand, coarse- to very-coarse-grained, subangular to rounded, quartzose.
11.5 - 12.5	Clay, with gravel, pea size, subangular, quartzose.
12.5 - 14.0	Clay, light-olive-gray, stiff, silt, trace of sand.
14.0 - 15.0	Clay, same as above, sandy, fine- to very-coarse-grained, subrounded to subangular, quartzose.
15.0 - 20.0	Clay, yellowish-gray to light-olive-gray, stiff, silty, small amount of sand, medium-grained, quartzose, micaceous.
20.0 - 25.0	Clay, same as above.
25.0 - 28.0	Clay, same as above.
28.0 - 30.0	Sand, fine- to very-coarse-grained, subangular to moderately rounded, quartzose, small amount of gravel, rounded to subangular, quartzose, clay matrix.
30.0 - 35.0	Sand, same as above.
35.0 - 40.0	Sand, same as above.
40.0 - 45.0	Sand, fine-grained, moderately rounded, subangular, quartzose.
45.0 - 50.0	Sand, same as above, some gravel, subangular, 5 to 10 mm in diameter, quartzose.

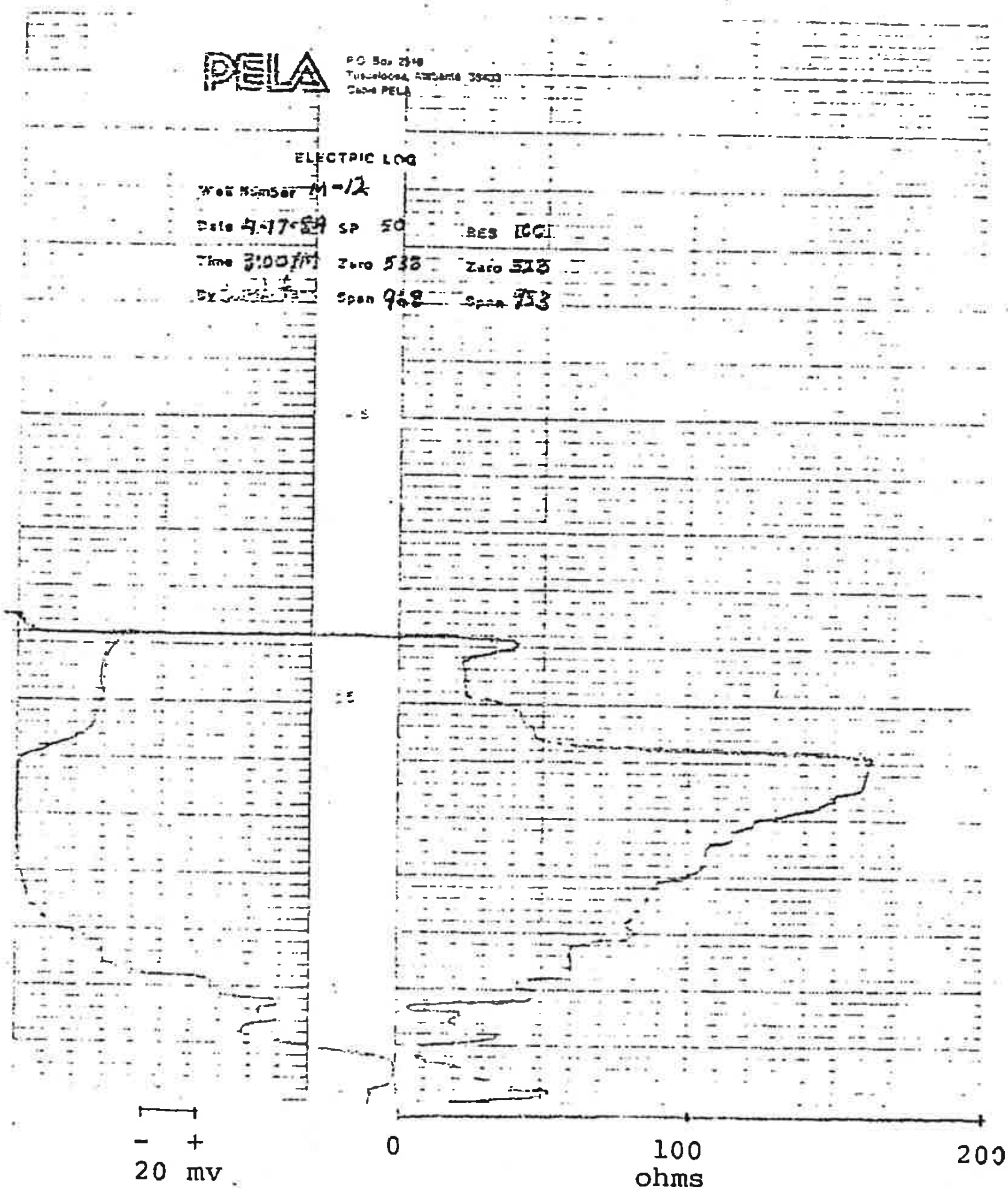
PELA

M-12 (continued)

Depth (in feet)	Description
50.0 - 54.0	Sand, same as above.
54.0 - 57.0	Clay, dark-olive-gray, moderately stiff, very-fine- to fine-grained quartz sand and rounded to subrounded gravel.
57.0 - 60.0	Clay, mottled medium- to light-gray with light-olive-green, stiff. small amount of sand, fine- to coarse-grained, quartz.
60.0	TOTAL DEPTH.



Gamma log for M-12: 0-60 feet below land surface



Electric log for M-12: 19-60 feet below land surface

PELA

BORING AND WELL CONSTRUCTION LOG

NO: M-13
DRILLER: TET, Inc.
DATE DRILLED: July 17-24, 1991
DRILLING METHOD: Mud Rotary
TOTAL DEPTH BOREHOLE (FT): 72.0
MP ELEVATION (FT): 31.10

LOCATION: Ciba-Geigy Corporation
McIntosh, Alabama
E 7499.16, N 3018.83
DATE INSTALLED: July 24, 1991
BOREHOLE DIAMETER (IN): 5.0 and 8.0
LS ELEVATION (FT): 29.17

TOTAL DEPTH WELL (FT): 68.4 BLS
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 9.09

DATE AND TIME: 9/17/91; 14:44
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
5.0				
10.0	9.5 - 10.5	Clay: predominantly dark yellowish-orange (10YR 6/6) mottled with up to 40% light bluish-gray (5B 7/1), silty, brittle, stiff in parts, slightly plastic.	(6,11,12) 66	1.5
15.0				
20.0	19.5 - 20.5	Clay: light bluish-gray (5B 7/1) mottled with 20% moderate reddish-brown (10R 4/6), firm, slight to medium plasticity, (19.5 to 19.6 ft.). Sand: grayish-orange (10YR 7/4), fine-grained, subrounded, well sorted, unconsolidated, quartz, massive bedding, (19.6 to 20.0 ft.), sharp contact at base. Sand: dark yellowish-orange (10YR 6/6), very fine- to medium-grained, subangular to rounded, poorly sorted, unconsolidated, quartz, massive bedding, (20.0 to 20.4 ft.). Clayey sand: medium light gray (N6), very fine-grained, subrounded, moderately well sorted, quartz, brittle, slightly plastic (20.4 to 20.5 ft.).	(6,10,10) 66	1.0
25.0				
30.0	29.5 - 30.6	Clayey silt: olive gray (5Y 3/2), slightly plastic, very brittle, arenaceous with very fine-grained quartz, trace of wood fragments.	(5,6,5) 73	0
35.0				
40.0				

REMARKS: PELA Reference No. 492343

PELA

BORING AND WELL CONSTRUCTION LOG

NO: M-13
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: TET, Inc.
DATE DRILLED: July 17-24, 1991
COORDINATES: E 7499.16, N 3018.83
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 24, 1991
TOTAL DEPTH BOREHOLE (FT): 72.0
BOREHOLE DIAMETER (IN): 5.0 and 8.0
MP ELEVATION (FT): 31.10
LS ELEVATION (FT): 29.17
TOTAL DEPTH WELL (FT): 68.4 BLS
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 9.09
DATE AND TIME: 9/17/91; 14:44
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
40.0 / 45.0	39.0 - 41.0	Clay: predominantly medium-gray (N5) with tinting of brownish-gray (5YR 4/1) to light bluish-gray (5B 7/1), soft to moderately firm, medium plasticity where argillaceous, brittle where arenaceous, sand lenses present with fine-grained, round to subrounded, well sorted, quartz, slightly plastic, abundant plant detritus and wood fragments up to 3 cm in length, 5% mottling of moderately reddish-brown (10R 4/6) at base with pale yellowish-orange (10YR 8/6), plant material up to 2 mm in length.	(2,2,13) 100	0
50.0 / 55.0	49.5 - 51.0	Sandy clay: with gravel, light bluish-gray (5B 7/1), moderately firm, slightly plastic, fine- to coarse-grained, angular to subrounded, poorly sorted, quartz, predominantly clear to frosted quartz, subrounded, poorly sorted gravel up to 3 cm in diameter (49.5 to 50.2 ft.). Clay: medium bluish-gray (5B 5/1), firm to moderately stiff, slightly to moderately plastic.	(2,3,5) 100	0
60.0 / 62.5	59.5 - 60.9	Clay: medium light gray (N6), soft, highly plastic, arenaceous with very fine-grained quartz (59.5 to 59.9 ft.). Sand: with gravel, medium light gray (N6) to grayish-orange (10YR 7/4), fine- to coarse-grained, angular to subrounded, poorly sorted, unconsolidated quartz, argillaceous in part, subrounded, poorly sorted gravel up to 2.5 cm in diameter, massive bedding, (59.9 to 60.9 ft.).	(19,26,19) 93	0
65.0	64.5 - 65.4	Sand: pale yellowish-brown (10YR 6/2), fine- to medium-grained, subrounded, moderately well sorted, unconsolidated quartz; subrounded, moderately sorted gravel up to 1 cm in diameter decreasing in size with depth, color change to medium light gray (N6) from 65.2 to 65.4 ft., trace of trough cross stratification.	(15,20,30) 60	0
67.5	69.5 - 71.0	Clay, light gray (N7) with light bluish-gray (5B 7/1) tint, stiff, dense, slightly plastic, arenaceous with fine- to medium-grained, subangular to angular, moderately sorted quartz with 5% mottling of light olive brown (5Y 5/6) in top 0.1 foot of sample.	(19,28,40) 100	0
80.0	72.0	Total depth of pilot hole. Reamed to 72.0 BLS.		

REMARKS: PELA Reference No. 492343
Note: driller indicates clay at 67.0 feet.

(WP5.1, 9/20/91) 13-D:\492300\M-13.LOG

WELL CONSTRUCTION FORM

DRILLING DATA

Well ID M-13 Project Number 492343
Project Name Ciba-Geigy
Location McIntosh, Alabama
N 3018.83, E 7499.16
Supervised by Mike Johnson (PELA)
Date of Boring 7/17 - 24/91 Date Well Completed 7/24/91
Drilling Company TET, Inc.
Driller Charlie Weston
Drilling Method Mud rotary
Bit Diameter 8.0 Hollow Stem I.D. ______ O.D. ______
Hours Drilled 5.5 Downtime 0
Decontamination Procedure Steam cleaning

Sample Collection Procedure Split spoon / 10' centers

Estimated % Recovery 75

MATERIALS

Casing Material Stainless steel Type ASTM-A-312, Sch. .405
Screen Material Stainless steel Type #304

	O.D.	I.D.	From	to	To	
Casing (in.)		4.0	+1.93	to	13.35	ftbls
(in.)		4.0	52.75	to	62.77	ftbls
(in.)				to		ftbls

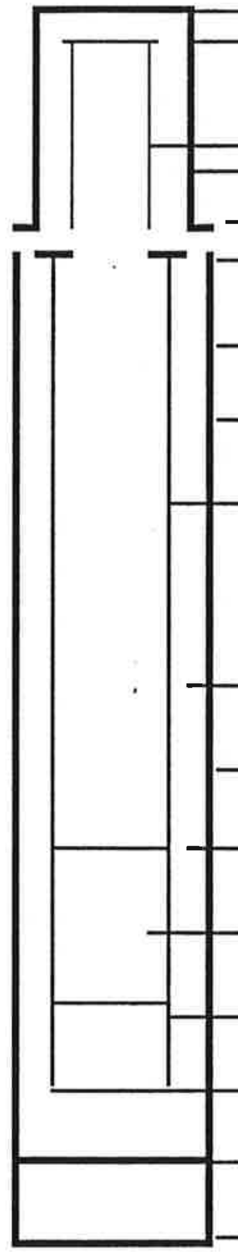
Total Casing (ft.) 15.28
Screen (in.) O.D. ______ I.D. 4.0 13.35 to 68.20 ftbls
Slot Size 0.020* and 0.010-in. Total Screen (ft.) 54.85
Length of Cap 0.20 Sump (ft.) cap
Centralizer Material Stainless steel Length (in.) @ 1 ft. (adjustable)
Sand Pack Mtrl./Sz. Colorado Silica 6/20
Lbs./Sacks Used 1350 lbs.
Grout Material Cement/Bentonite
Amt. Cement 140 lbs. Type Cement Portland Type I
Amt. Powdered Bentonite 3 lbs. Amt. Bentonite Pellets 70 lbs.
Tremie Used Yes Pump for Grout Used Yes
Cement Plug
Length of Protective Casing (ft.) 2.76 ft. als

DEVELOPMENT

Development Method Submersible pump Total Hours 5
Date and Time Started 7/31/91 09:39
Date and Time Completed 8/1/91 09:24
Esti. Gallons 3230 Esti. Yield (gpm) 18
Static WL (ftbtoc) 6.10
Color/Turbidity: Start light olive gray Finish clear
Drawdown (ft.) 11.7 max. Time to Recovery 3-4 min.
Final: pH 4.65 SC 60 T 20.5° C Eh ______
Sand none Odor none
Water Discharged to Treatment facility

REMARKS * 0.020-inch slot screen from 13.35 to 18.41 ft. bls

X Protective Casing (als)
__ Manhole Cover
Lock On:
X Well Cover
__ Well Cap



(drawing not to scale)

2.76 ft. als
1.93 ft. als
MP Descrip: TOC
LS Elev: 27.02
MP Elev: 28.95
4.0 inches
8.0 inches
Pad Dimension: 3' x 3' x 0.6'

Top of Casing: 1.93 ft. als

Cement Plug: ____ to ____ ftbls

Borehole Diameter: 8.0 inches

Casing: 4.0 in. 0.405 sch.
____ in. ____ sch.

Casing Interval: +1.93 to 13.35 ftbls

Grout: +0.4 to 7.0 ftbls

Bentonite Pellet Seal: 7.0 to 12.0 ftbls

Sand Pack: 12.0 to 68.0 ftbls

*0.01-in.Slotted Screen: 18.41 to 68.20 ftbls

Cap/Sump: 68.2 to 68.4 ftbls

TD Well Cap: 68.4 ftbls

TD Borehole Reamed: 70.5 ftbls

TD Borehole: 72.0 ftbls

Total Length Casing Cap: 70.33 ft.

Centralizers:
27.0 ftbls
37.0 ftbls
47.0 ftbls
57.0 ftbls
67.0 ftbls

P. E. LaMoreaux & Associates, Inc. (PELA)

WELL CONSTRUCTION FORM

DRILLING DATA

Well ID M-13 Project Number 492349
Project Name Ciba-Geigy New Land Vault (re-development of well)
Location Ciba-Geigy Corporation
McIntosh, Alabama
Supervised by D. Green
Date of Boring ______ Date Well Completed ______
Drilling Company ______
Driller ______
Drilling Method ______
Bit Diameter ______ Hollow Stem I.D. ______ O.D. ______
Hours Drilled ______ Downtime ______
Decontamination Procedure ______
Sample Collection Procedure ______
Estimated % Recovery ______

MATERIALS

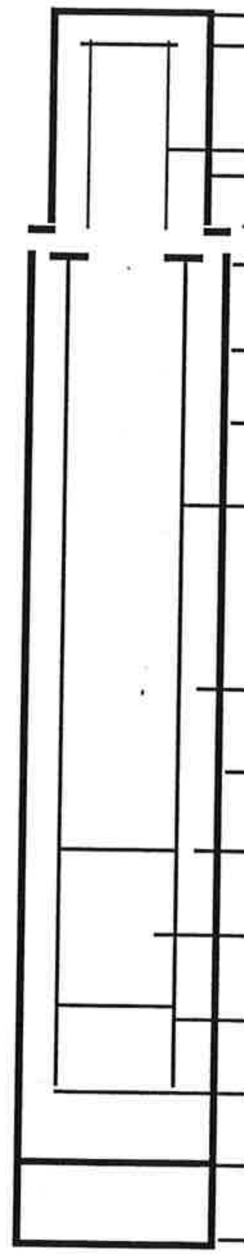
Casing Material ______ Type ______
Screen Material ______ Type ______
Casing (in.) O.D. ______ I.D. ______ ______ to ______ ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
Total Casing (ft.) ______
Screen (in.) O.D. ______ I.D. ______ ______ to ______ ftbls
Slot Size ______ Total Screen (ft.) ______
Length of Cap ______ Sump (ft.) ______
Centralizer Material ______ Length (in.) ______
Sand Pack Mtrl./Sz. ______
Lbs./Sacks Used ______
Grout Material ______
Amt. Cement ______ Type Cement ______
Amt. Powdered Bentonite ______ Amt. Bentonite Pellets ______
Tremie Used ______ Pump for Grout Used ______
Cement Plug ______
Length of Protective Casing (ft.) ______

DEVELOPMENT

Development Method Submersible pump Total Hours 2.6
Date and Time Started 10/04/91 08:51
Date and Time Completed 10/04/91 13:17
Esti. Gallons 10,000 Esti. Yield (gpm) 100
Static WL (ftbtoc) 10.99
Color/Turbidity: Start grayish-orange Finish Slightly cloudy
Drawdown (ft.) 25.26 Time to Recovery ______
Final: pH 5.47 SC 595 T 20.6° C Eh 182
Sand Trace silt Odor None
Water Discharged to Waste treatment plant

REMARKS Well was originally developed on 8/1/91

__ Protective Casing (als)
__ Manhole Cover
Lock On:
__ Well Cover
__ Well Cap



______ ft. als
______ ft. als
MP Descrip: ______
LS Elev: ______
MP Elev: ______
______ inches
______ inches
Pad Dimension: ______
Top of Casing: ______ ft. als / bls
Cement Plug: ____ to _ ftbls
Borehole Diameter: ______ inches
Casing: ____ in. ____ sch.
____ in. ____ sch.
Casing Interval: _ to _ ftbls
Grout: ____ to ____ ftbls
Bentonite Pellet Seal: ____ to _ ftbls
Sand Pack: ____ to ____ ftbls
_-in. Slotted Screen: ____ to ____ ftbls
Shoe: ____ to ____ ftbls
TD Well Cap: ______ ftbls
TD Borehole Reamed: ______ ftbls
TD Borehole: _ ftbmp
(drawing not to scale)
Total Length Casing Cap: ______ ft.
Centralizers:
______ ftbls
______ ftbls

P. E. LaMoreaux & Associates, Inc. (PELA)

PELA

BORING AND WELL CONSTRUCTION LOG

NO: M-14

LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama

DRILLER: TET, Inc.

DATE DRILLED: July 17-23, 1991

COORDINATES: E 7449.83, N 3675.57

DRILLING METHOD: Mud Rotary

DATE INSTALLED: July 23, 1991

TOTAL DEPTH BOREHOLE (FT): 66.0

BOREHOLE DIAMETER (IN): 5.0 and 8.0

MP ELEVATION (FT): 30.27

LS ELEVATION (FT): 27.80

TOTAL DEPTH WELL (FT): 55.0 BLS

WATER LEVEL DURING DRILLING (FT BLS):

WATER LEVEL AFTER DEVELOPMENT (FT BLS): 7.92

DATE AND TIME: 9/17/91; 14:39

PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
4.0				
8.0				
	9.5 - 10.6	Sandy Clay: dark yellowish-orange (10YR 6/6), brittle, slightly plastic, very fine-grained, subrounded, well sorted, quartz, (9.5 to 9.7 feet). Clayey Sand: predominantly light gray (N7), brittle, slightly plastic, very fine- to fine-grained, subrounded, well sorted, quartz, (9.7 to 9.9 feet), trace of cross bedding. Clay: moderately reddish-orange (10R 6/6), soft, medium plasticity, (9.9 to 10.2 feet). Clayey Sand: dark yellowish-orange (10YR 6/6), brittle, slightly plastic, very fine-grained, rounded to subrounded, well sorted, quartz, (10.2 to 10.6 feet).	(5,8,6,) 73	0.4
12.0				
16.0				
	19.5 - 20.4	Sand: very light gray (N8), very fine- to medium-grained, subrounded, moderately well sorted, unconsolidated, quartz, massive bedding, (19.5 to 20.1 feet). Clay: light gray (N7) to medium light gray (N6), soft, medium plasticity, arenaceous with very fine-grained quartz, (20.1 to 20.4 feet).	(3,5,6) 60	0
20.0				
24.0				
28.0				
	29.5 - 31.0	Clay: light bluish-gray (5B 7/1), soft, medium plasticity, with 5-10% mottling of dusky yellow (5Y 6/4), wood fragments in upper 0.1 foot of sample.	(2,3,4) 100	0
32.0				

REMARKS: PELA Reference No. 492343

(WP51, 9/20/91) 13-D:\492300\M-14.LOG

PELA

BORING AND WELL CONSTRUCTION LOG

NO: M-14
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: TET, Inc.
DATE DRILLED: July 17-23, 1991
COORDINATES: E 7449.83, N 3675.57
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 23, 1991
TOTAL DEPTH BOREHOLE (FT): 66.0
BOREHOLE DIAMETER (IN): 5.0 and 8.0
MP ELEVATION (FT): 30.27
LS ELEVATION (FT): 27.80
TOTAL DEPTH WELL (FT): 55.0 BLS
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 7.92
DATE AND TIME: 9/17/91; 14:39
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
32.0				
36.0				
40.0	39.5 - 40.2	Clay: light bluish-gray (5B 7/1), 5-10% mottling of dusky yellow (5Y 6/4), soft, medium plasticity (39.5 to 39.7 ft.). Sand: grayish-orange (10YR 7/4), graded bedding, fining towards base, coarse-grained, subangular to subrounded, moderately sorted, quartz; trace of subangular, moderately well sorted quartz gravel up to 3 mm in diameter; fine-grained, subrounded, well sorted, quartz at base.	(3,10,19) 46	0
44.0				
48.0	49.5 - 50.3	Sand: pale yellowish-brown (10YR 6/2), very fine- to fine-grained, subrounded, well sorted, unconsolidated, quartz, massive bedding, (45.5 to 49.9 ft.). Sand: with gravel, grayish-orange (10YR 7/4), fine- to coarse-grained, subrounded to subangular, moderately to poorly sorted, unconsolidated, quartz with subangular to subrounded, poorly sorted, quartz gravel coarsening with depth from 2 mm to 20 mm in diameter at base.	(16,26,26) 53	0
52.0				
56.0				
60.0	59.5 - 60.5	Sand: with gravel, fine- to coarse-grained, subangular, moderately sorted, unconsolidated, quartz, with 80% subangular to subrounded, poorly sorted, quartz gravel from 2-18 mm in diameter, possible fallback, (59.5 to 59.9 ft.).	(8,8,7) 67	0
64.0				

REMARKS: PELA Reference No. 492343

(WP51, 9/20/91) 13-D:\492300\M-14.LOG

P.E.LaMoreaux & Associates

PELA

BORING AND WELL CONSTRUCTION LOG

NO: M-14
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: TET, Inc.
DATE DRILLED: July 17-23, 1991
COORDINATES: E 7449.83, N 3675.57
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 23, 1991
TOTAL DEPTH BOREHOLE (FT): 66.0
BOREHOLE DIAMETER (IN): 5.0 and 8.0
MP ELEVATION (FT): 30.27
LS ELEVATION (FT): 27.80
TOTAL DEPTH WELL (FT): 55.0 BLS
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 7.92
DATE AND TIME: 9/17/91; 14:39
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
64.0	64.5 - 66.0	Sandy Clay: light bluish-gray (5B 7/1) with up to 5% mottling of light orangish-brown (5Y 5/6), firm to stiff in part, slightly plastic, very fine-grained quartz.	(10,15,17) 100	0
	66.0	Total depth pilot hole, reamed to 57.5 BLS.		
68.0				
72.0				
76.0				
80.0				
84.0				
88.0				
92.0				
96.0				

REMARKS: PELA Reference No. 492343

(WP51, 9/20/91) 13-D:\492300\M-14.LOG

P.E. LaMoreaux & Associates

WELL CONSTRUCTION FORM

DRILLING DATA

Well ID M-14 Project Number 492343
Project Name Ciba-Geigy
Location McIntosh, Alabama
N 3675.57, E 7449.83
Supervised by Mike Johnson (PELA)
Date of Boring 7/17-23/91 Date Well Completed 7/23/91
Drilling Company TET, Inc.
Driller Charlie Weston
Drilling Method Mud rotary
Bit Diameter 8.0 Hollow Stem I.D. ____ O.D. ____
Hours Drilled 6.5 Downtime 0
Decontamination Procedure Steam cleaning

Sample Collection Procedure Split spoon / 10' centers

Estimated % Recovery 75

MATERIALS

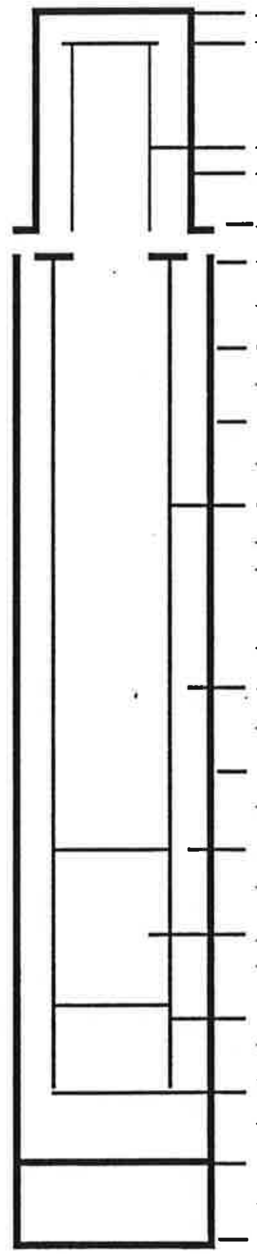
Casing Material Stainless steel Type ASTM-A-312, Sch. .405
Screen Material Stainless steel Type #304
Casing (in.) O.D. ____ I.D. 4.0 +3.07 to 9.99 ftbls
(in.) O.D. ____ I.D. ____ ____ to ____ ftbls
(in.) O.D. ____ I.D. ____ ____ to ____ ftbls
Total Casing (ft.) 13.66
Screen (in.) O.D. ____ I.D. 4.0 9.99 to ____ ftbls
Slot Size 0.020* and 0.010-in. Total Screen (ft.) 44.80
Length of Cap 0.20 Sump (ft.) cap
Centralizer Material Stainless steel Length (in.) @ 1 ft. (adjustable)
Sand Pack Mtrl./Sz. Colorado Silica 6/20
Lbs./Sacks Used 1300 lbs.
Grout Material Cement/Bentonite
Amt. Cement 30 lbs. Type Cement Portland Type I
Amt. Powdered Bentonite 1 lb. Amt. Bentonite Pellets 95 lbs.
Tremie Used Yes Pump for Grout Used Yes
Cement Plug
Length of Protective Casing (ft.) 3.73 ft. als

DEVELOPMENT

Development Method Submersible pump Total Hours 3.75
Date and Time Started 8/1/91 17:02
Date and Time Completed 8/2/91 16:04
Esti. Gallons 3600 Esti. Yield (gpm) 17.6
Static WL (ftbtoc) 6.66
Color/Turbidity: Start grayish-orange Finish clear
Drawdown (ft.) 11.8 max. Time to Recovery ____
Final: pH 5.54 SC 40 T 21.0° C Eh ____
Sand none Odor none
Water Discharged to Treatment facility

REMARKS * 0.020-inch slot screen from 9.99 to 15.01 ft. bls

X Protective Casing (als)
__ Manhole Cover
Lock On:
X Well Cover
__ Well Cap
3.73 ft. als / bls
3.07 ft. als / bls
MP Descrip: TOC
LS Elev: 25.05
MP Elev: 28.12
4.0 inches
8.0 inches
Pad Dimension: 3' x 3' x 0.6'



(drawing not to scale)

Top of Casing: 3.07 ft. als
Cement Plug: ____ to ____ ftbls
Borehole Diameter: 8.0 inches
Casing: 4.0 in. .405 sch.
____ in. ____ sch.
Casing Interval: +3.07 to 9.99 ftbls
Grout: +0.6 to 3.0 ftbls
Bentonite Pellet Seal: 3.0 to 8.0 ftbls
Sand Pack: 8.0 to 55.0 ftbls
*0.01-in. Slotted Screen: 15.01 to 54.79 ftbls
Cap/Sump: 54.79 to 54.99 ftbls
TD Well Cap: 54.99 ftbls
TD Borehole Reamed: 57.5 ftbls
TD Borehole: 66.0 ftbls
Total Length Casing Cap: 58.06 ft.
Centralizers:
24.0 ftbls
34.0 ftbls
44.0 ftbls
54.0 ftbls

P. E. LaMoreaux & Associates, Inc. (PELA)

WELL CONSTRUCTION FORM

DRILLING DATA

Well ID M-14 Project Number 492349

Project Name Ciba-Geigy New Land Vault (re-development of well)

Location Ciba-Geigy Corporation
McIntosh, Alabama

Supervised by D. Green

Date of Boring ______ Date Well Completed ______

Drilling Company ______

Driller ______

Drilling Method ______

Bit Diameter ______ Hollow Stem I.D. ______ O.D. ______

Hours Drilled ______ Downtime ______

Decontamination Procedure ______

Sample Collection Procedure ______

Estimated % Recovery ______

MATERIALS

Casing Material ______ Type ______

Screen Material ______ Type ______

Casing (in.) O.D. ______ I.D. ______ ______ to ______ ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls

Total Casing (ft.) ______

Screen (in.) O.D. ______ I.D. ______ ______ to ______ ftbls

Slot Size ______ Total Screen (ft.) ______

Length of Cap ______ Sump (ft.) ______

Centralizer Material ______ Length (in.) ______

Sand Pack Mtrl./Sz. ______

Lbs./Sacks Used ______

Grout Material ______

Amt. Cement ______ Type Cement ______

Amt. Powdered Bentonite ______ Amt. Bentonite Pellets ______

Tremie Used ______ Pump for Grout Used ______

Cement Plug ______

Length of Protective Casing (ft.) ______

DEVELOPMENT

Development Method Submersible pump Total Hours 1.5

Date and Time Started 10/04/91 14:37

Date and Time Completed 10/04/91 18:46

Esti. Gallons 8,000 Esti. Yield (gpm) 100

Static WL (ftbtoc) 6.93

Color/Turbidity: Start pale yellowish-brown Finish Very slightly cloudy

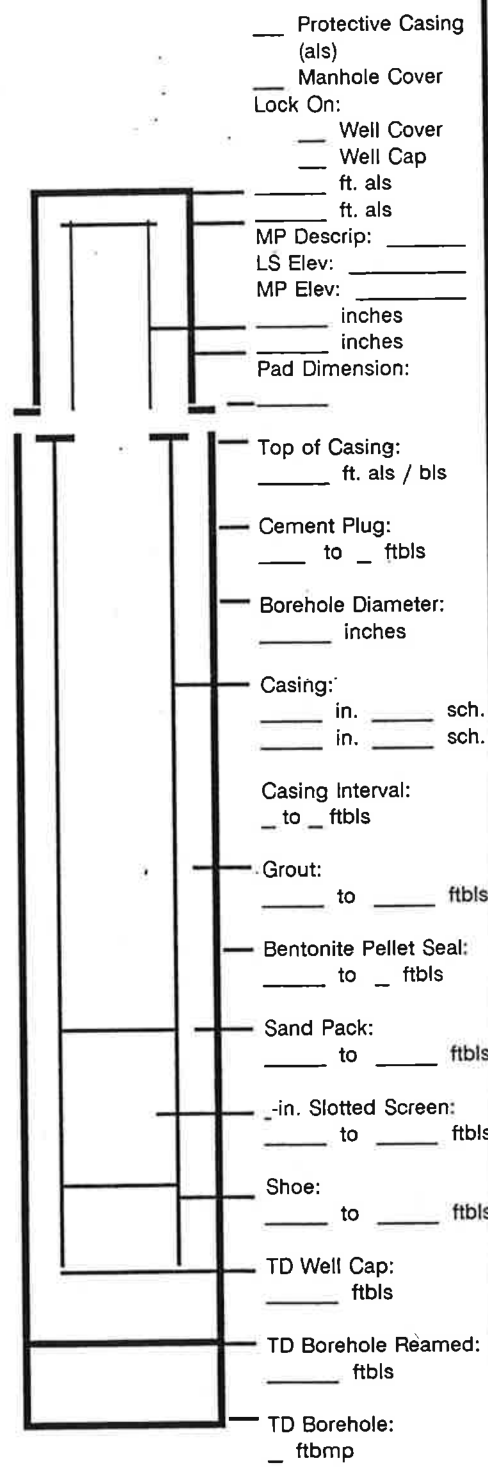
Drawdown (ft.) 24.23 Time to Recovery ______

Final: pH 5.07 SC 450 T 20.2° C Eh 246

Sand None Odor None

Water Discharged to Waste treatment plant

REMARKS Well was originally developed on 8/2/91.



(drawing not to scale)

Total Length Casing Cap: ______ ft.

Centralizers:
______ ftbls
______ ftbls

P. E. LaMoreaux & Associates, Inc. (PELA)

WELL CONSTRUCTION FORM

DRILLING DATA

Well ID M-14 Project Number 492350
Project Name Ciba-Geigy New Land Vault (re-development of well)
Location Ciba-Geigy Corporation
McIntosh, Alabama
Supervised by John Y. Rudd
Date of Boring ______ Date Well Completed ______
Drilling Company ______
Driller ______
Drilling Method ______
Bit Diameter ______ Hollow Stem I.D. ______ O.D. ______
Hours Drilled ______ Downtime ______
Decontamination Procedure ______

Sample Collection Procedure ______

Estimated % Recovery ______

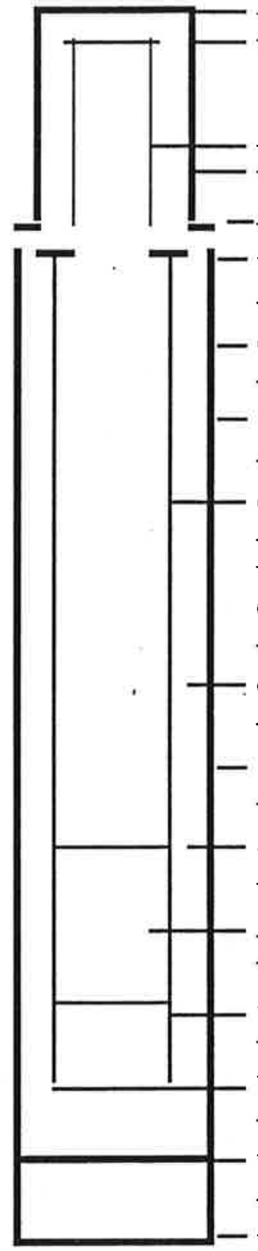
MATERIALS

Casing Material ______ Type ______
Screen Material ______ Type ______
Casing (in.) O.D. ______ I.D. ______ ______ to ______ ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
Total Casing (ft.) ______
Screen (in.) O.D. ______ I.D. ______ ______ to ______ ftbls
Slot Size ______ Total Screen (ft.) ______
Length of Cap ______ Sump (ft.) ______
Centralizer Material ______ Length (in.) ______
Sand Pack Mtrl./Sz. ______
Lbs./Sacks Used ______
Grout Material ______
Amt. Cement ______ Type Cement ______
Amt. Powdered Bentonite ______ Amt. Bentonite Pellets ______
Tremie Used ______ Pump for Grout Used ______
Cement Plug ______
Length of Protective Casing (ft.) ______

DEVELOPMENT

Development Method Submersible pump Total Hours 1 hr.
Date and Time Started 10/31/91 11:15
Date and Time Completed 10/31/91 12:15
Esti. Gallons 1,600 Esti. Yield (gpm) 100
Static WL (ftbtoc) 16.95
Color/Turbidity: Start very pale yellow Finish Moderately clear
Drawdown (ft.) 11:53 Time to Recovery 1.5 hours
Final: pH 4.44 SC 30 T 23.0° C Eh ______
Sand None Odor None
Water Discharged to Waste treatment plant

REMARKS ______



(drawing not to scale)

___ Protective Casing (als)
___ Manhole Cover
Lock On:
___ Well Cover
___ Well Cap
______ ft. als
______ ft. als
MP Descrip: ______
LS Elev: ______
MP Elev: ______
______ inches
______ inches
Pad Dimension:
______

Top of Casing:
______ ft. als / bls

Cement Plug:
____ to _ ftbls

Borehole Diameter:
______ inches

Casing:
_____ in. _____ sch.
_____ in. _____ sch.

Casing Interval:
_ to _ ftbls

Grout:
_____ to _____ ftbls

Bentonite Pellet Seal:
_____ to _ ftbls

Sand Pack:
_____ to _____ ftbls

_-in. Slotted Screen:
_____ to _____ ftbls

Shoe:
_____ to _____ ftbls

TD Well Cap:
______ ftbls

TD Borehole Reamed:
______ ftbls

TD Borehole:
_ ftbmp

Total Length Casing Cap: ______ ft.

Centralizers:
______ ftbls
______ ftbls

P. E. LaMoreaux & Associates, Inc. (PELA)

PELA

BORING AND WELL CONSTRUCTION LOG

NO: M-15
DRILLER: TET, Inc.
DATE DRILLED: July 19-22, 1991
DRILLING METHOD: Mud Rotary
TOTAL DEPTH BOREHOLE (FT): 63.0
MP ELEVATION (FT): 31.27
LOCATION: Ciba-Geigy Corporation McIntosh, Alabama
COORDINATES: E 7478.28, N 4229.15
DATE INSTALLED: July 22, 1991
BOREHOLE DIAMETER (IN): 5.0 and 8.0
LS ELEVATION (FT): 28.22
TOTAL DEPTH WELL (FT): 50.2 BLS
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 13.11
DATE AND TIME: 9/17/91; 14:33
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
4.0				
8.0				
	9.5 - 10.5	Clay: pale yellowish-brown (10YR 6/2) with <5% mottling of dark yellowish-orange (10YR 6/6), firm to moderately stiff, dense in part, slightly plastic, arenaceous at base.	(3,6,10) 67	0.8
12.0				
16.0				
	19.5 - 20.5	Sand: grayish-orange (10YR 7/4), very fine- to medium-grained, rounded to subrounded, moderately sorted, unconsolidated, quartz, (19.5 to 20.0 ft.). Sand: white (N9), very fine- to fine-grained, subrounded, well sorted, unconsolidated, clear quartz, trace of planar cross bedding, (20.0 to 20.5 ft.). Sand: grayish-orange (10YR 7/4), very fine- to fine-grained, subrounded, well sorted, unconsolidated, quartz, (20.25 to 20.5 ft.).	(10,11,12) 67	0
20.0				
24.0				
28.0				
32.0				

REMARKS: PELA Reference No. 492343

PELA

BORING AND WELL CONSTRUCTION LOG

NO: M-15
DRILLER: TET, Inc.
DATE DRILLED: July 19-22, 1991
DRILLING METHOD: Mud Rotary
TOTAL DEPTH BOREHOLE (FT): 63.0
MP ELEVATION (FT): 31.27
LOCATION: Ciba-Geigy Corporation McIntosh, Alabama
COORDINATES: E 7478.28, N 4229.15
DATE INSTALLED: July 22, 1991
BOREHOLE DIAMETER (IN): 5.0 and 8.0
LS ELEVATION (FT): 28.22
TOTAL DEPTH WELL (FT): 50.2 BLS
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 13.11
DATE AND TIME: 9/17/91; 14:33
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
32.0				
36.0				
40.0	39.5 - 40.5	Clay: medium gray (N5) with tinting of olive gray (5Y 3/2), very soft, high plasticity, very fine-grained sand lens <1 mm in thickness near base.	(W=18) 67	0
44.0				
48.0	49.5 - 50.4	Sand: with gravel, dark yellowish-orange (10YR 6/6), fine- to coarse-grained, subrounded to subangular, poorly sorted, unconsolidated, clear to yellowish,frosted quartz, subrounded, moderately sorted, varicolored quartz, and chert gravel up to 3 mm in diameter, (49.5 to 49.7 ft.) Sand: with gravel, pale yellowish-brown (10YR 6/2), fine- to coarse-grained, subangular to subrounded, poorly sorted, clear to yellowish, frosted quartz; angular to subrounded, poorly sorted, varicolored chert and quartz gravel up to 1.5 cm in diameter (49.7 to 50.4 ft.), massive bedding.	(7,25,28) 60	0
52.0				
56.0				
60.0	59.5 - 61.0	Clay: predominately moderate reddish-brown (10R 4/6) mottled with up to 50% pale reddish-purple (5RP 6/2) and light bluish-gray (5B 7/1), stiff, dense, slightly plastic.	(7,11,19) 100	0
64.0	63.0	Total depth of pilot hole. Reamed to 52.5 BLS.		

REMARKS: PELA Reference No. 492343
W = weight of hammer
Note: Driller indicates clay at 56 feet.

WELL CONSTRUCTION FORM

DRILLING DATA

Well ID: M-15 — Project Number: 492343
Project Name: Ciba-Geigy
Location: McIntosh, Alabama
N 4229.15, E 7478.28
Supervised by: Mike Johnson (PELA)
Date of Boring: 7/18-22/91 — Date Well Completed: 7/22/91
Drilling Company: TET, Inc.
Driller: Charlie Weston
Drilling Method: Mud rotary
Bit Diameter: 8.0 — Hollow Stem I.D.: ____ — O.D.: ____
Hours Drilled: 4.5 — Downtime: 3 hrs.
Decontamination Procedure: Steam cleaning

Sample Collection Procedure: Split spoon / 10' centers

Estimated % Recovery: 75

MATERIALS

Casing Material: Stainless steel — Type: ASTM-A-312, Sch. .405
Screen Material: Stainless steel — Type: #304

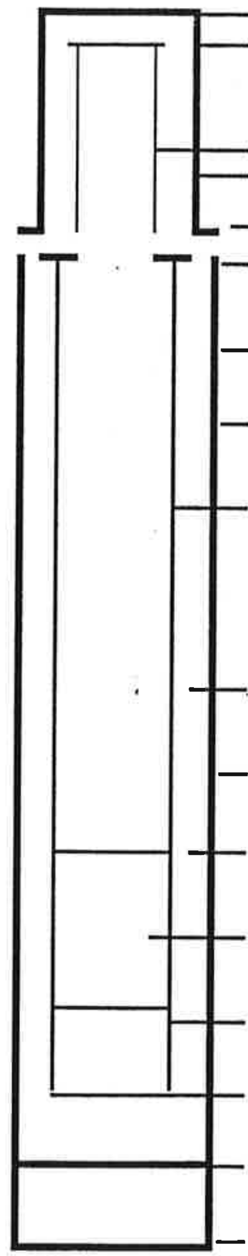
Casing	(in.) O.D.	I.D.	From	to	To	Unit
Casing		4.0	+3.70	to	10.08	ftbls
				to		ftbls
				to		ftbls

Total Casing (ft.): 13.78
Screen (in.) O.D.: ____ I.D.: ____ 10.08 to 49.84 ftbls
Slot Size: 0.010-inch — Total Screen (ft.): 39.76
Length of Cap: 0.20 — Sump (ft.): cap
Centralizer Material: Stainless steel — Length (in.): @ 1 ft. (adjustable)
Sand Pack Mtrl./Sz.: Colorado Silica 6/20
Lbs./Sacks Used: 950 lbs.
Grout Material: Cement/Bentonite
Amt. Cement: 40 — Type Cement: Portland Type I
Amt. Powdered Bentonite: 1 lb. — Amt. Bentonite Pellets: 95 lbs.
Tremie Used: Yes — Pump for Grout Used: Yes
Cement Plug: ____
Length of Protective Casing (ft.): 4.71 ft. als

DEVELOPMENT

Development Method: Submersible pump — Total Hours: 4.5
Date and Time Started: 8/2/91 12:32
Date and Time Completed: 8/5/91 10:24
Esti. Gallons: 5000 — Esti. Yield (gpm): 16.6
Static WL (ftbtoc): 13.28
Color/Turbidity: Start: grayish-orange — Finish: clear
Drawdown (ft.): 8.3 — Time to Recovery: ____
Final: pH 5.58 — SC 40 — T 20.5° C — Eh ____
Sand: none — Odor: none
Water Discharged to: Treatment facility

REMARKS



P. E. LaMoreaux & Associates, Inc. (PELA)

WELL CONSTRUCTION FORM

LING DATA

ID M-15 — Project Number 492349
oject Name Ciba-Geigy New Land Vault (re-development of well)
ocation Ciba-Geigy Corporation
McIntosh, Alabama
Supervised by D. Green
Date of Boring ____ Date Well Completed ____
Drilling Company ____
Driller ____
Drilling Method ____
Bit Diameter ____ Hollow Stem I.D. ____ O.D. ____
Hours Drilled ____ Downtime ____
Decontamination Procedure ____
Sample Collection Procedure ____
Estimated % Recovery ____

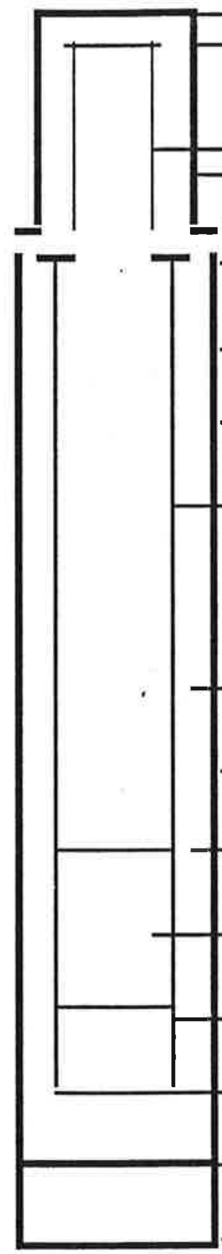
MATERIALS

Casing Material ____ Type ____
Screen Material ____ Type ____
Casing (in.) O.D. ____ I.D. ____ ____ to ____ ftbls
(in.) O.D. ____ I.D. ____ ____ to ____ ftbls
(in.) O.D. ____ I.D. ____ ____ to ____ ftbls
Total Casing (ft.) ____
Screen (in.) O.D. ____ I.D. ____ ____ to ____ ftbls
Slot Size ____ Total Screen (ft.) ____
Length of Cap ____ Sump (ft.) ____
Centralizer Material ____ Length (in.) ____
Sand Pack Mtrl./Sz. ____
Lbs./Sacks Used ____
Grout Material ____
Amt. Cement ____ Type Cement ____
Amt. Powdered Bentonite ____ Amt. Bentonite Pellets ____
Tremie Used ____ Pump for Grout Used ____
Cement Plug ____
Length of Protective Casing (ft.) ____

DEVELOPMENT

Development Method Submersible pump Total Hours 2.0
Date and Time Started 10/03/91 15:10
Date and Time Completed 01/03/91 18:26
Esti. Gallons 8,000 Esti. Yield (gpm) 100
Static WL (ftbtoc) 17.15
Color/Turbidity: Start pale yellowish-brown Finish Very slightly cloudy
Drawdown (ft.) 21.19 Time to Recovery 23 min.
Final: pH 4.81 SC 419 T 21.3° C Eh 218
Sand None Odor None
Water Discharged to Waste treatment plant

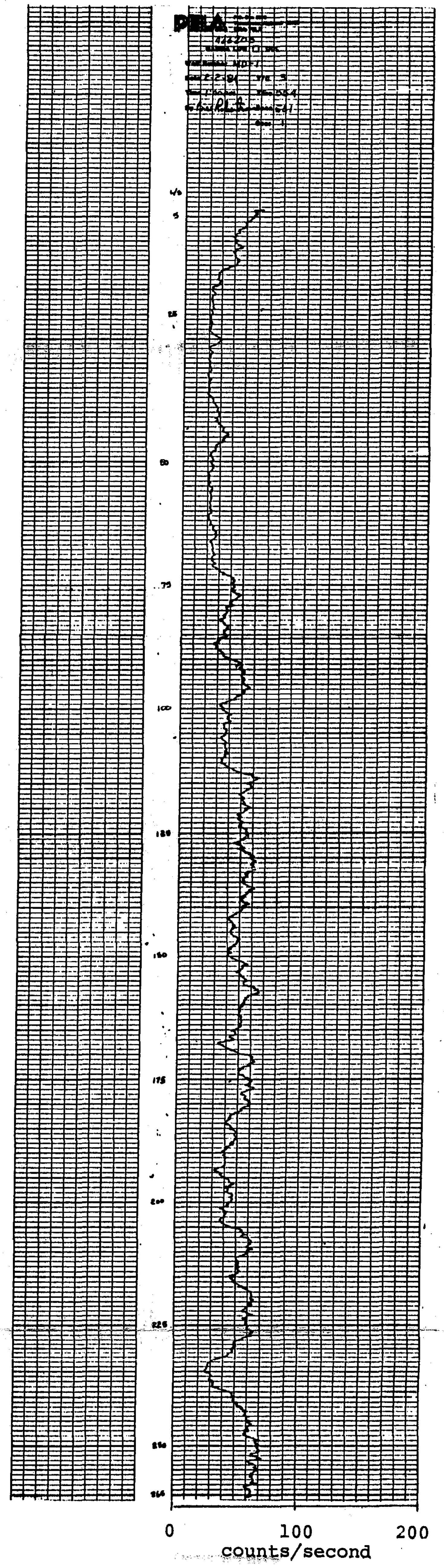
REMARKS Well was originally developed on 8/5/91.



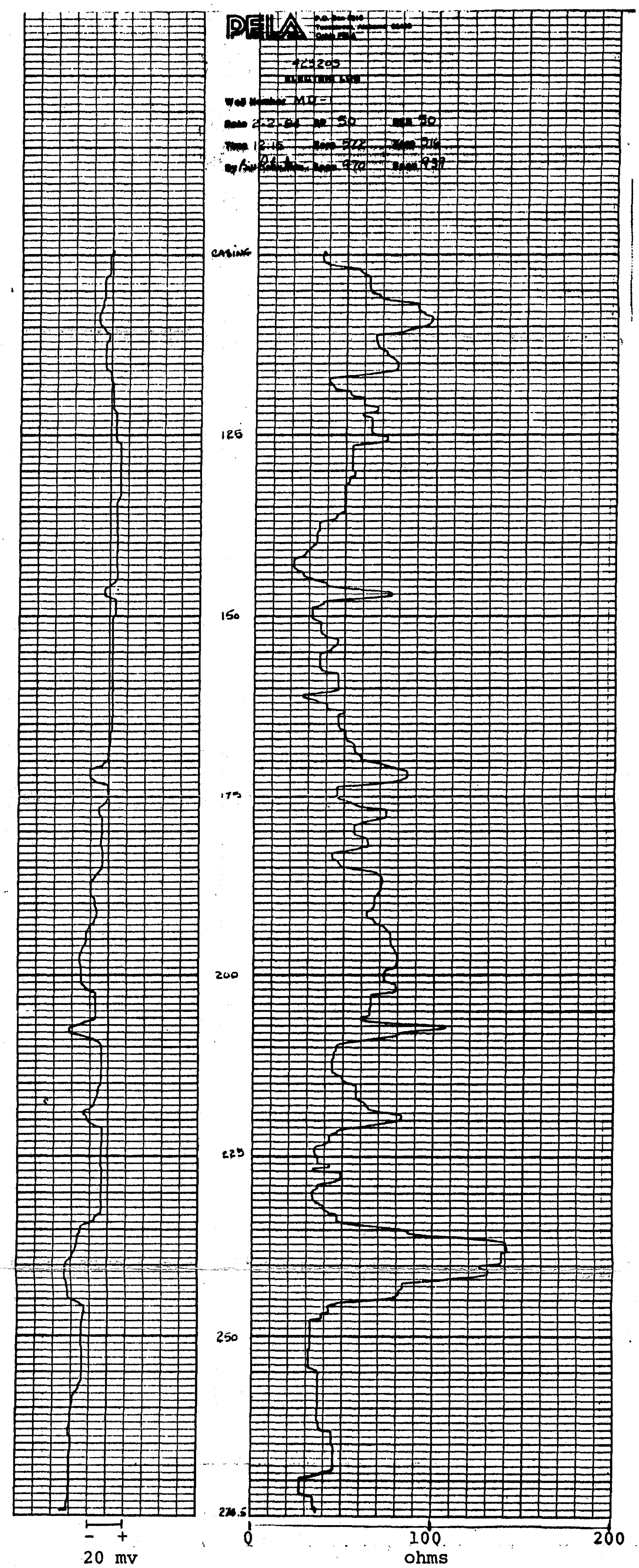
(drawing not to scale)

____ Protective Casing (als)
____ Manhole Cover
Lock On:
____ Well Cover
____ Well Cap
____ ft. als
____ ft. als
MP Descrip: ____
LS Elev: ____
MP Elev: ____
____ inches
____ inches
Pad Dimension: ____
Top of Casing: ____ ft. als / bls
Cement Plug: ____ to ____ ftbls
Borehole Diameter: ____ inches
Casing: ____ in. ____ sch. ____ in. ____ sch.
Casing Interval: ____ to ____ ftbls
Grout: ____ to ____ ftbls
Bentonite Pellet Seal: ____ to ____ ftbls
Sand Pack: ____ to ____ ftbls
____-in. Slotted Screen: ____ to ____ ftbls
Shoe: ____ to ____ ftbls
TD Well Cap: ____ ftbls
TD Borehole Reamed: ____ ftbls
TD Borehole: ____ ftbmp
Total Length Casing Cap: ____ ft.
Centralizers: ____ ftbls ____ ftbls

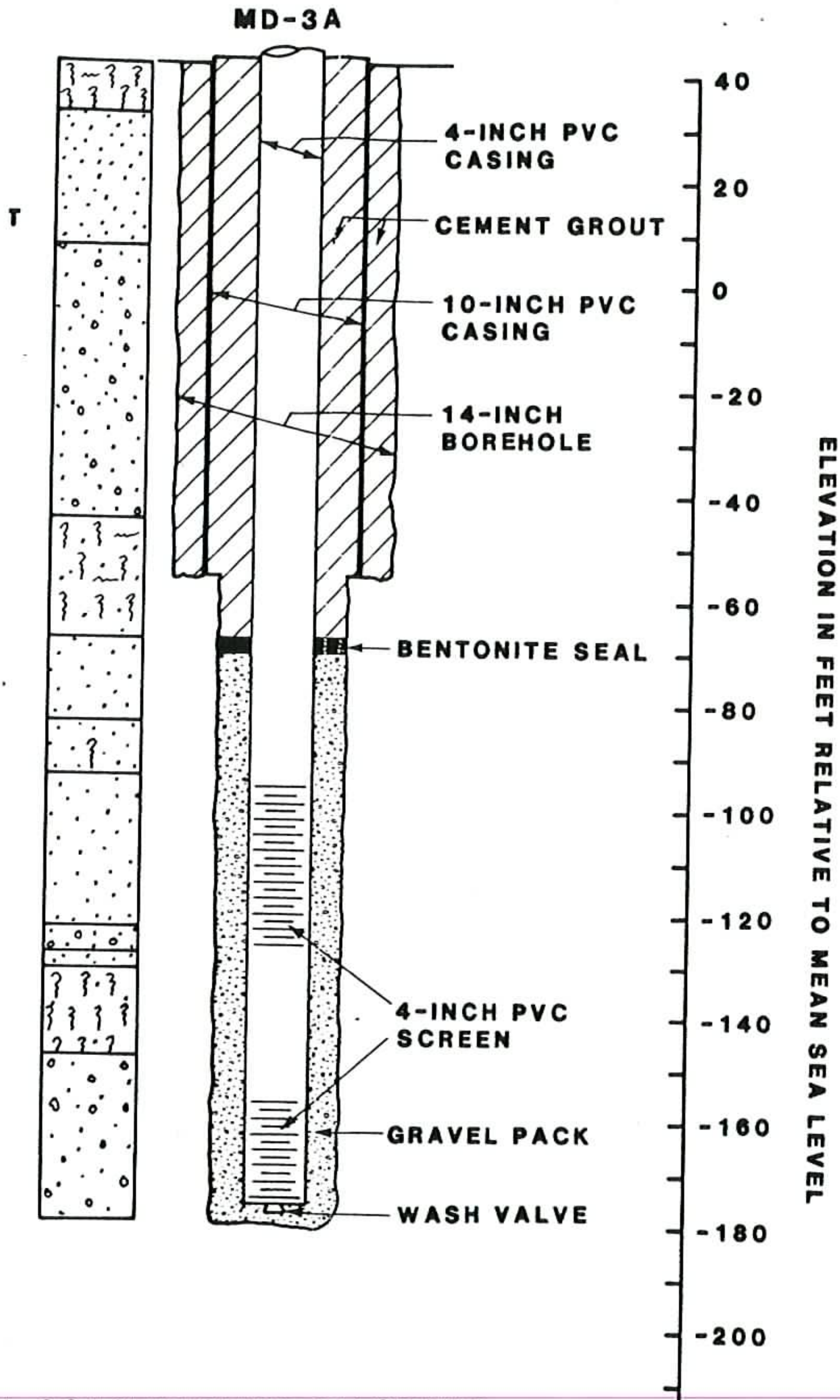
P. E. LaMoreaux & Associates, Inc. (PELA)



Gamma log for MD-1: 4-265 feet below land surface

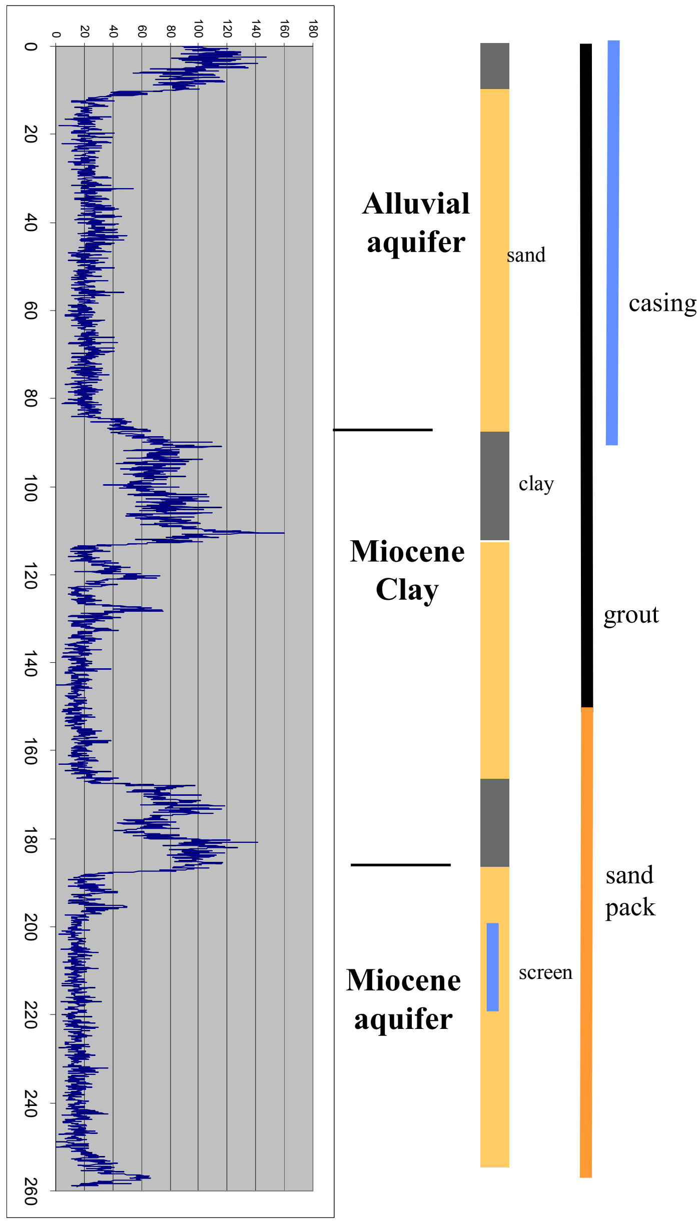


Electric log for MD-1: 100-274.5 feet below land surface



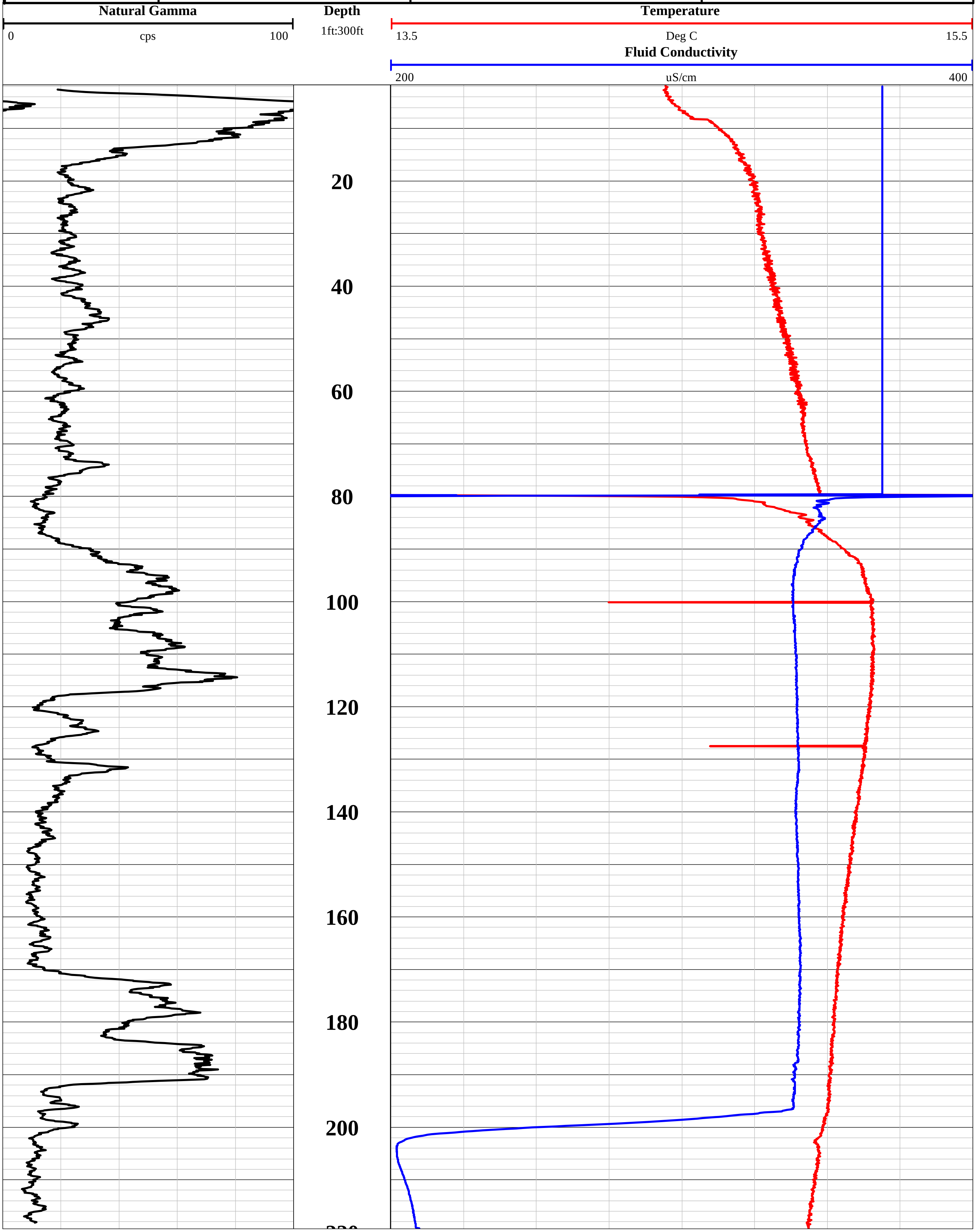
.L CONSTRUCTION DIAGRAMS
I WELLS MD-1, MD-2, AND MD-3A.

Prepared by:
P.E. LaMoreaux & Associates



MD-3B details, showing the gamma log on the left, the interpreted stratigraphy in the middle, and construction details on the right.

Natural Gamma, Temperature & Fluid Conductivity		COLOG Main Office
COMPANY: Limno Tech	PROJECT: BASF	810 Quail Street, Suite E, Lakewood, CO 80215
DATE LOGGED: May 29, 2013	WELL: MD-3B	Phone: (303) 279-0171, Fax: (303) 278-0135
		www.colog.com



WELL CONSTRUCTION FORM

DRILLING DATA

Well ID: MD-4
Project Number: 492320
Project Name: Ciba-Geigy, Occurrence of Miocene Clay
Location: McIntosh, Alabama

Supervised by: D. S. Green
Date of Boring: 11/3/89
Date Well Completed: 11/13/89
Drilling Company: Geotechnical Engineering-Testing, Inc.
Driller: Charles Havard
Drilling Method: Mud Rotary
Bit Diameter: 12"/7"
Hollow Stem I.D.:
O.D.:
Hours Drilled:
Downtime:
Decontamination Procedure: Steam cleaning

Sample Collection Procedure: Split spoon at 5-foot intervals and shelby tube
Estimated % Recovery:

MATERIALS

Casing Material: PVC
Type: Schedule 40
Screen Material: Stainless steel
Type: 304

	O.D.	I.D.	From	To	
Casing (in.)	8-1/2	7-15/16	LS	83.0	ftbls
(in.)	4-1/2	4	2.5 ftals	110.5	ftbls
(in.)					ftbls

Total Casing (ft.): 83

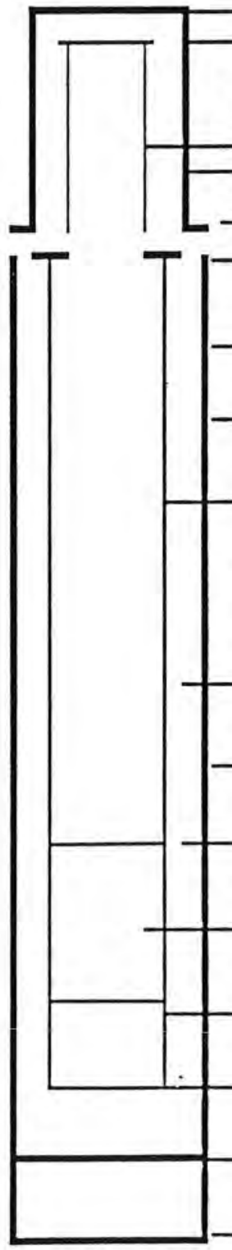
	O.D.	I.D.	From	To	
Screen (in.)	4-1/2	4	110.50	149.14	ftbls

Slot Size: .010 inch
Total Screen (ft.): 38.64
Length of Cap: 0.14 ft.
Sump (ft.):
Centralizer Material:
Length (in.):
Sand Pack Mtrl./Sz.: 6/20
Lbs./Sacks Used: 10.5 sacks
Grout Material: Cement/Bentonite Slurry
Amt. Cement:
Type Cement: Neat
Amt. Powdered Bentonite:
Lbs. Bentonite Pellets: 50
Tremie Used: 1.5" PVC
Pump for Grout Used:
Cement Plug:
Length of Protective Casing (ft.):

DEVELOPMENT

Development Method: Submersible pump
Total Hours: 3-1/4
Date and Time Started: 11/15/89 @ 13:15
Date and Time Completed: 11/15/89 @ 16:30
Esti. Gallons: 9,350
Esti. Yield (gpm):
Static WL (ftbtoc): 46.73
Color/Turbidity: Start: gray-yellow
Finish: slightly cloudy
Drawdown (ft.): 1.5
Time to Recovery:
Final: pH 6.74
SC 720
T 21
Eh --
Sand: None
Odor: --
Water Discharged to: Treatment facility

REMARKS:



(drawing not to scale)

_ Protective Casing (als)
_ Manhole Cover
Lock On:
_ Well Cover
X Well Cap
_ ft. als
_ ft. als
MP Descrip: TOC
LS Elev: 34.65'
MP Elev: 37.15'
4 inches
8 inches
Pad Dimension:

Top of Casing: 2.5 ft. als / bls
Cement Plug: _ to _ ftbls
Borehole Diameter: 12 inches
Casing: 8 in. 40 sch.; ___ in. __ sch.
Casing Interval: LS to 83 ftbls
Grout: LS to 95 ftbls
Bentonite Pellet Seal: 95 to 98.5 ftbls
Sand Pack: 98.5 to 165 ftbls
.010-in. Slotted Screen: 110.5 to 149.14 ftbls
Cap/Sump: ___ to ___ ftbls
TD Well Cap: ___ ftbls
TD Borehole Reamed: ___ ftbls
TD Borehole: 165 ftbmp
Total Length Casing Cap: ___ ft.
Centralizers: ___ ftbls; ___ ftbls

P. E. LaMoreaux & Associates, Inc. (PELA)

(WP 5.1, 1/31/92) 13D:\492300\WCF.MD4

PELA P.O. Box 22[illegible] Tuscaloosa, Alabama 35403 Cable PELA

492320

GAMMA LOG ☐ CCL

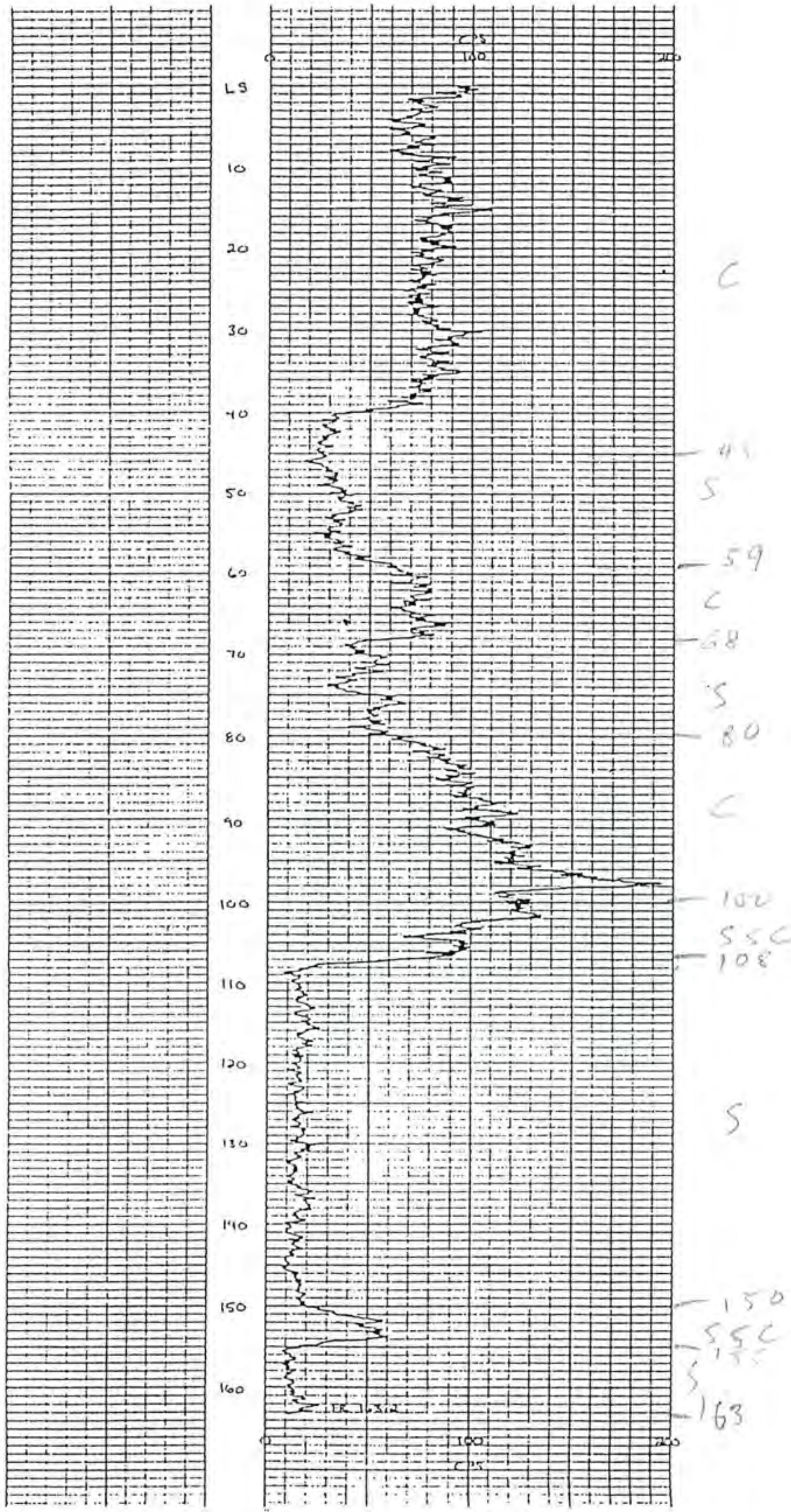
Well Number MD-4

Date 11-9-89 T/C 1

Time 15:45 HRS Zero 539

By D.Green Span 646

Gear 15 FPM



PELA P.O. Box 2310
Tuscaloosa, Alabama 35403
Cable PELA

492320

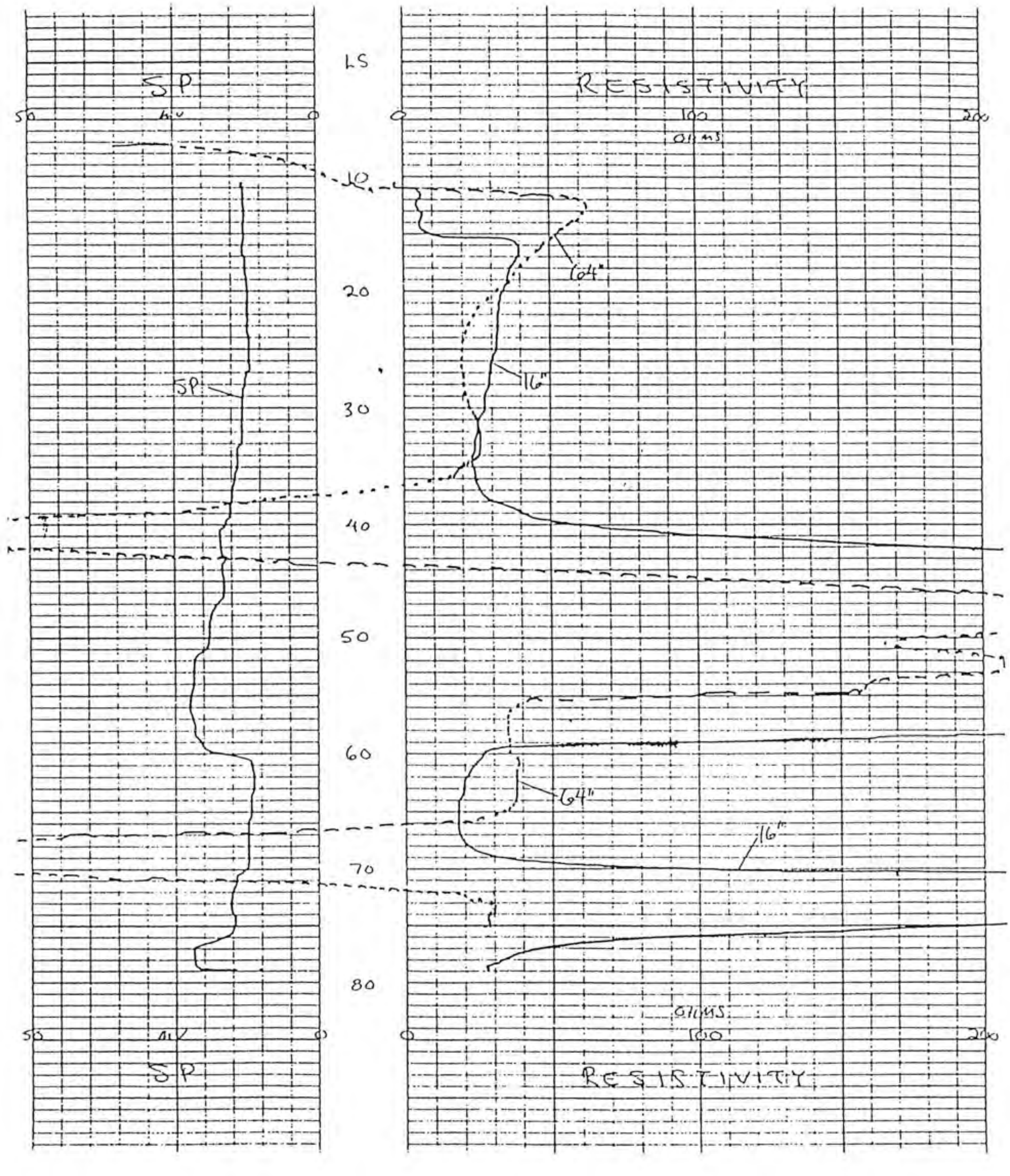
ELECTRIC LOG

Well Number MD-4

Date 11-3-89 SP RES 16" 64"

Time 15:40 HRS Zero 680 Zero 596 552

By D. Green Span 922 Span 787 806



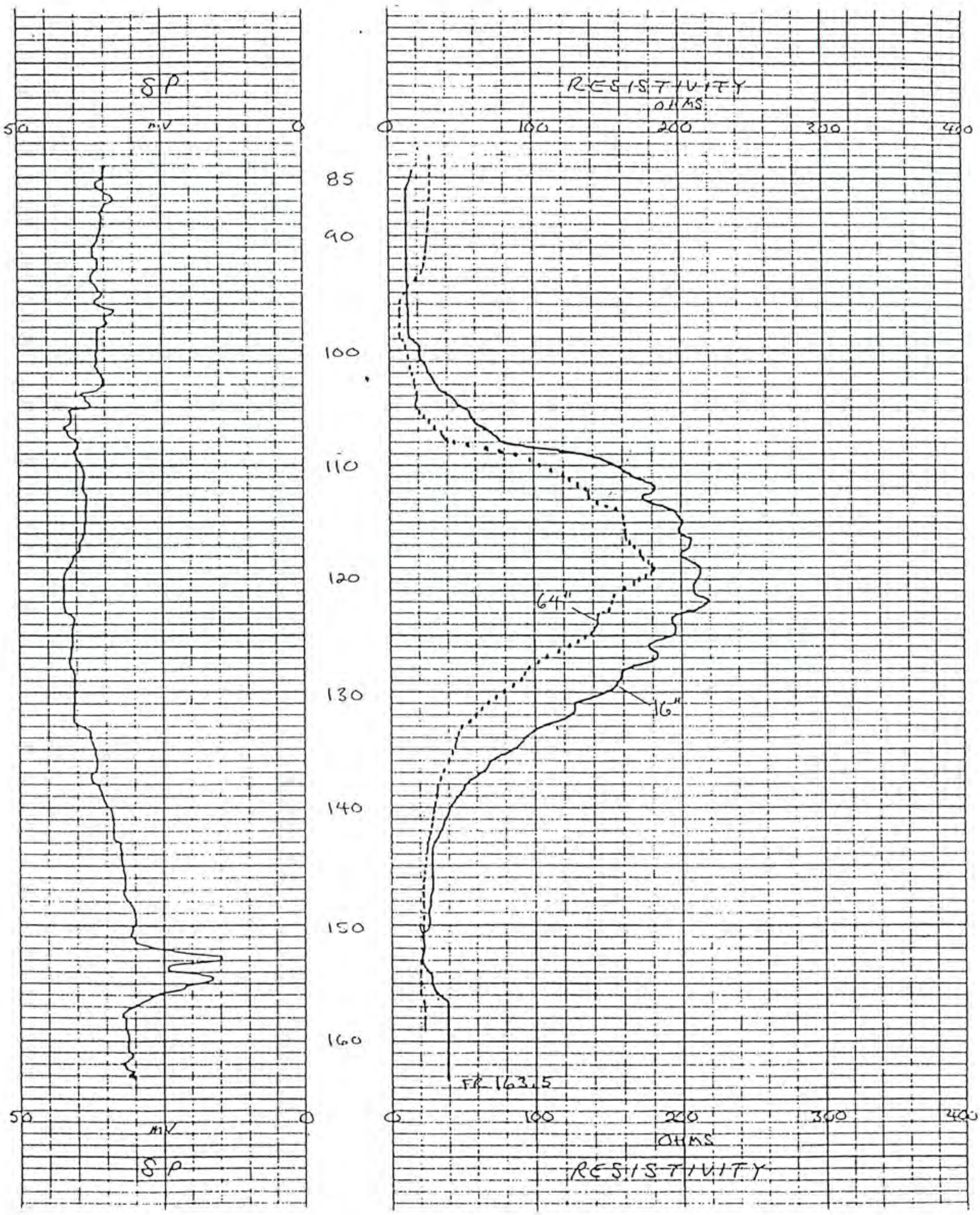
PELA
P.O. Box 2310
Tuscaloosa, Alabama 35403
Call PELA

492320

ELECTRIC LOG

Well Number MD-4

Date 11-9-89	SP		RES 16"	64"
Time 16:15 HRS	Zero 741		Zero 538	550
By D. Green	Span 932		Span 777	782



PELA

LITHOLOGIC DESCRIPTION OF SPLIT-SPOON SAMPLES FROM BORING

NO: MD-4 LOCATION: Ciba-Geigy Corporation
DRILLER: Geotechnical Engineering-Testing, Inc. McIntosh, Alabama
DRILLING METHOD: Split spoon, mud rotary N 12+53.46, E 73+78.14
DATE DRILLED: 11/3/89 - 11/9/89 DATE INSTALLED:
TOTAL DEPTH BOREHOLE (FT): 165.0 BOREHOLE DIAMETER (IN): 7.0
MP ELEVATION (FT AMSL): LS ELEVATION (FT AMSL): 34.65
TOTAL DEPTH WELL (FT):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE/TIME:
PELA REP: D. S. Green

DESCRIPTION/OBSERVATIONS

Depth (feet BLS)	Interval Recovered (feet)	Description/Observations	Interval (feet)/ Blows per 6 Inches	TIP Reading (PPM)
5.0	3.5 - 4.0	Clay, dark yellowish-orange (10YR 6/6) mottled with light gray (N 7), firm.	3.5 - 5.0 (3-5-7)	0 - 0.5
10.0	8.5 - 9.5	Clay, dark reddish-brown (10R 3/4) mottled with light gray (N 7), firm, slightly plastic.	8.5 - 10.0 (1-2-7)	0 - 0.5
15.0	13.5 - 14.8	Clay, dark yellowish-orange (10YR 6/6) and light gray (N 7), occasional dark reddish-brown (10R 3/4) mottle, firm, slightly silty.	13.5 - 15.0 (2-6-7)	0
20.0	18.5 - 19.7	Clay, light gray (N 7) mottled in part with light brown (5YR 5/6), firm.	18.5 - 20.0 (3-4-6)	0
25.0	23.5 - 24.7	Clay, light brown (5YR 5/6) to moderate yellowish-brown (10YR 5/4), mottled with light gray (N 7), trace silt and sand, very-fine-grained, subrounded, poorly sorted.	23.5 - 25.0 (3-4-6)	0
30.0	28.5 - 29.6	Clay, light gray (N 7) mottled with dark yellowish-orange (10YR 6/6) and minor dark reddish-brown (10R 3/4), firm. sandy, with very-fine- to fine-grained, subrounded, poorly sorted quartz.	28.5 - 30.0 (3-4-5)	0
35.0	33.5 - 34.9	Clay, light gray (N 7) and dark yellowish-orange (10YR 6/6), minor dark reddish-brown (10R 3/4), firm, trace dark gray, sandy as above, increasingly sandy with depth.	33.5 - 35.0 (2-4-6)	0

REMARKS: PELA Reference No. 492320

PELA

LITHOLOGIC DESCRIPTION OF SPLIT-SPOON SAMPLES FROM BORING

NO: MD-4 (continued) LOCATION: Ciba-Geigy Corporation
DRILLER: Geotechnical Engineering-Testing, Inc. McIntosh, Alabama
DRILLING METHOD: Split spoon, mud rotary N 12+53.46, E 73+78.14
DATE DRILLED: 11/3/89 - 11/9/89 DATE INSTALLED:
TOTAL DEPTH BOREHOLE (FT): 165.0 BOREHOLE DIAMETER (IN): 7.0
MP ELEVATION (FT AMSL): LS ELEVATION (FT AMSL): 34.65
TOTAL DEPTH WELL (FT):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE/TIME:
PELA REP: D. S. Green

DESCRIPTION/OBSERVATIONS

Depth (feet BLS)	Interval Recovered (feet)	Description/Observations	Interval (feet)/ Blows per 6 Inches	TIP Reading (PPM)
35.0				
40.0	38.5 - 40.0	Clay, olive gray (5Y 3/2), soft, plastic, silty, approximately homogeneous.	38.5 - 40.0 (1-1-1)	0
45.0	43.5 - 43.9	Clay, as above.	43.5 - 45.0 (9-18-18)	0
50.0	48.5 - 48.7	Sand, pale yellowish-orange (10YR 8/6), medium- to coarse-grained, subrounded to rounded, moderately sorted quartz.	48.5 - 50.0 (6-14-20)	0
55.0	53.5 - 54.0	Sand and gravel, very pale orange (10YR 8/2), medium- to coarse-grained, subrounded to rounded, moderately sorted, predominantly quartz, minor chert, with 30% gravel to 3 cm, poorly sorted.	53.5 - 55.0 (11-13-17)	0
60.0	58.5 - 58.8	Gravel, variegated color, predominantly very pale orange (10YR 8/2), to 25 mm, subangular to subrounded, poorly sorted, with 20% sand as above, greenish-black chert.	58.5 - 60.0 (12-14-13)	0
65.0	63.5 - 64.8	Clay, olive gray (5Y 3/2), firm, very silty, sandy with very fine grains, subangular to subrounded, poorly to moderately sorted quartz, very sandy in part.	63.5 - 65.0 (2-3-3)	0
70.0	68.5 - 69.0	Sand and gravel, dark yellowish-orange (10YR 6/6) to moderate yellowish-brown (10YR 5/4), medium- to coarse-grained, subangular to subrounded, moderately sorted quartz, with 30% gravel to 30 mm, subrounded, poorly sorted, light brown (5YR 5/6) quartzite pebbles.	68.5 - 70.0 (11-17-23)	0

REMARKS: PELA Reference No. 492320

PELA

LITHOLOGIC DESCRIPTION OF SPLIT-SPOON SAMPLES FROM BORING

NO: MD-4 (continued) LOCATION: Ciba-Geigy Corporation

DRILLER: Geotechnical Engineering-Testing, Inc. McIntosh, Alabama

DRILLING METHOD: Split spoon, mud rotary N 12+53.46, E 73+78.14

DATE DRILLED: 11/3/89 - 11/9/89 DATE INSTALLED: _____

TOTAL DEPTH BOREHOLE (FT): 165.0 BOREHOLE DIAMETER (IN): 7.0

MP ELEVATION (FT AMSL): _____ LS ELEVATION (FT AMSL): 34.65

TOTAL DEPTH WELL (FT): _____

WATER LEVEL AFTER DEVELOPMENT (FT BLS): _____

DATE/TIME: _____

PELA REP: D. S. Green

DESCRIPTION/OBSERVATIONS

Depth (feet BLS)	Interval Recovered (feet)	Description/Observations	Interval (feet)/ Blows per 6 Inches	TIP Reading (PPM)
70.0				
75.0	73.5 - 74.2	Sand, yellowish-gray (5Y 8/1), medium-grained, subrounded, moderately sorted quartz, relatively clean.	73.5 - 75.0 (9-25-30)	0
80.0	78.5	No recovery.	78.5 - 80.0 (6-7-6)	-
	80.0 - 80.2	Sand, light gray (N 7), fine- to medium-grained, subangular to subrounded, poorly sorted quartz, very argillaceous with light gray (N 7) clay.	80.0 - 81.0 (4-9)	0
85.0	82.0 (bottom of Shelby tube)	Clay, light olive gray (5Y 6/1) to light brownish-gray (5YR 6/1), mottled in part with dark reddish-brown (10R 3/4), firm, sandy in part with very-fine-grained, subangular to subrounded, poorly sorted quartz, plastic.	81.0 - 83.0 Push Shelby tube 1.0	0
90.0	86.2	Clay, olive gray (5Y 4/1) to medium dark gray (N 4), very firm, slightly plastic, homogeneous.	85.0 - 87.0 Push Shelby tube 1.2	0
95.0	90.0 +	Clay, brownish-gray (5YR 4/1), trace greenish-gray (5GY 6/1), very firm, trace sand, very-fine- to fine-grained, subangular to subrounded, poorly sorted, silty.	90.0 - 92.0 Push Shelby tube < 0.5	0
100.0	95.0 - 97.0	Clay, olive gray (5Y 4/1) to light gray (N 7), trace greenish-gray (5GY 6/1), very firm, trace sand as above.	95.0 - 97.0 Push Shelby tube 0 2.0	0
105.0	100.0 - 102.0	Sand, light gray (N 7) to greenish-gray (5GY 6/1), very-fine-grained, subrounded, moderately sorted quartz, silty, very argillaceous, 5% black mineral.	100.0 - 102.0 Push Shelby tube 2.0	0

REMARKS: PELA Reference No. 492320

PELA

LITHOLOGIC DESCRIPTION OF SPLIT-SPOON SAMPLES FROM BORING

NO: MD-4 (continued)
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama, N 12+53.46, E 73+78.14
DRILLER: Geotechnical Engineering-Testing, Inc.
DRILLING METHOD: Split spoon, mud rotary
DATE DRILLED: 11/3/89 - 11/9/89
DATE INSTALLED:
TOTAL DEPTH BOREHOLE (FT): 165.0
BOREHOLE DIAMETER (IN): 7.0
MP ELEVATION (FT AMSL):
LS ELEVATION (FT AMSL): 34.65
TOTAL DEPTH WELL (FT):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE/TIME:
PELA REP: D. S. Green

DESCRIPTION/OBSERVATIONS

Depth (feet BLS)	Interval Recovered (feet)	Description/Observations	Interval (feet)/ Blows per 6 Inches	TIP Reading (PPM)
105.0	105.0 - 105.2	Sand, greenish-gray (5GY 6/1), very-fine-grained, subangular to subrounded, moderately sorted quartz, very argillaceous, silty, trace black mineral, firm.	105.0 - 107.0 (7-8-11-17)	0
	105.2 - 105.7	Sand, greenish-gray (5GY 6/1), fine- to medium-grained, subangular to subrounded, moderately sorted quartz, 5% dark grains, slightly argillaceous, more unconsolidated than above.		
110.0	110.0 - 110.8	Sand, medium bluish-gray (5B 5/1) to greenish-gray (5GY 6/1), very-fine- to medium-grained, subangular to subrounded, poorly sorted quartz, with <20% gravel to 10 mm maximum, subrounded, poorly sorted, argillaceous, firm.	110.0 - 112.0 (3-11-33-24)	0
	110.8 - 111.0	Sand, light olive gray (5Y 6/1), fine- to medium-grained, subrounded, moderately sorted quartz, trace black mineral.		
115.0	115.0 - 115.8	Sand, yellowish-gray (5Y 7/2) to light olive gray (5Y 6/1), medium- to coarse-grained, subrounded, moderately sorted, with 15% greenish-black (5G 2/1) to black (N 1) chert grains, clean.	115.0 - 117.0 (11-11-15-28)	0
120.0	120.0 - 120.5	Sand, as above, with trace gravel to 7 mm.	120.0 - 122.0 (3-11-17-20)	0
125.0	125.0 - 125.7	Sand, yellowish-gray (5Y 7/2) to very light gray (N 8), medium- to very-coarse-grained, subangular to subrounded, moderately sorted quartz, clean, trace brownish-black grains.	125.0 - 127.0 (6-26-40-46)	0
130.0	130.0 - 131.0	Sand, as above, except medium- to coarse-grained.	130.0 - 132.0 (7-27-34-44)	0
135.0				

REMARKS: PELA Reference No. 492320

PELA

LITHOLOGIC DESCRIPTION OF SPLIT-SPOON SAMPLES FROM BORING

NO: MD-4 (continued)
LOCATION: Ciba-Geigy Corporation
McIntosh, Alabama
N 12+53.46, E 73+78.14
DRILLER: Geotechnical Engineering-Testing, Inc.
DRILLING METHOD: Split spoon, mud rotary
DATE DRILLED: 11/3/89 - 11/9/89
DATE INSTALLED:
TOTAL DEPTH BOREHOLE (FT): 165.0
BOREHOLE DIAMETER (IN): 7.0
MP ELEVATION (FT AMSL):
LS ELEVATION (FT AMSL): 34.65
TOTAL DEPTH WELL (FT):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE/TIME:
PELA REP: D. S. Green

DESCRIPTION/OBSERVATIONS

Depth (feet BLS)	Interval Recovered (feet)	Description/Observations	Interval (feet)/ Blows per 6 Inches	TIP Reading (PPM)
135.0	135.0 - 135.8	Sand, as above (130.0' to 131.0').	135.0 - 137.0 (4-16-24-30)	0
140.0	140.0 - 140.8	Sand, yellowish-gray (5Y 7/2) to very light gray (N 8), medium- to coarse-grained, predominantly coarse-grained, subangular to subrounded, moderately sorted quartz, clean, trace gravel (chert pebbles) to 5 mm.	140.0 - 142.0 (6-12-16-23)	0
145.0	145.0 - 145.5	Sand, as above.	145.0 - 147.0 (10-15-15-26)	0
150.0	150.0 - 150.7	Sand, yellowish-gray (5Y 7/2) to light gray (N 7), very-coarse-grained, subangular to subrounded, moderately sorted quartz, 10% medium gray and black (N 1) grains.	150.0 - 152.0 (7-9-15-25)	0
155.0	155.0 - 155.2	Clay, olive gray (5Y 3/2), plastic, sandy with very-fine-grained, subangular to subrounded, poorly sorted quartz.	155.0 - 157.0 (7-14-19-21)	0
	155.2 - 156.0	Sand, olive gray (5Y 4/1), very-fine- to medium-grained, subangular to subrounded, poorly to moderately sorted quartz, argillaceous, with moderate brown (5YR 4/4) to dusky brown (5YR 2/2) organic material, occasional 1- to 3-mm layers.		
160.0	160.0 - 160.2	Sand, yellowish-gray (5Y 7/2) to light gray (N 7), medium- to very-coarse-grained, subangular to subrounded, moderately sorted quartz, with organic material.	160.0 - 162.0 (11-24-50-50/4)	0
	160.2 - 160.3	Gravel, variegated colors, white (N 9) to dark gray (N 3), pale yellowish-orange (10YR 8/6) chert, 4 to 10 mm, subangular to subrounded, poorly sorted.		

REMARKS: PELA Reference No. 492320

PELA

LITHOLOGIC DESCRIPTION OF SPLIT-SPOON SAMPLES FROM BORING

NO: MD-4 (continued)
LOCATION: Ciba-Geigy Corporation
McIntosh, Alabama
N 12+53.46, E 73+78.14
DRILLER: Geotechnical Engineering-Testing, Inc.
DRILLING METHOD: Split spoon, mud rotary
DATE DRILLED: 11/3/89 - 11/9/89
DATE INSTALLED:
TOTAL DEPTH BOREHOLE (FT): 165.0
BOREHOLE DIAMETER (IN): 7.0
MP ELEVATION (FT AMSL):
LS ELEVATION (FT AMSL): 34.65
TOTAL DEPTH WELL (FT):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE/TIME:
PELA REP: D. S. Green

DESCRIPTION/OBSERVATIONS

Depth (feet BLS)	Interval Recovered (feet)	Description/Observations	Interval (feet)/ Blows per 6 Inches	TIP Reading (PPM)
160.0	160.3 - 161.0	Sand, yellowish-gray (5Y 7/2) to light gray (N 7), coarse-grained, subangular to subrounded, moderately sorted, <10% dark chert grains, clean.		
165.0				
170.0				
175.0				
180.0				
185.0				
190.0				
195.0				

REMARKS: PELA Reference No. 492320

WP-14d:\492300' Log_MD-4.BWC, 1/12/90, #6

P.E. LaMoreaux & Associates

Drilling/Boring Log

Project: CIBA Miocene Well Installations
Project No.: 7596 Logged by: Robert Spencer
Well/Boring Location: E5803.5, N3245.63
Drilling Method: Mud rotary
Depth to Groundwater:
Elevations - Ground Surface: 38.3 ft CPG
Driller: Kelly Environmental
Remarks:

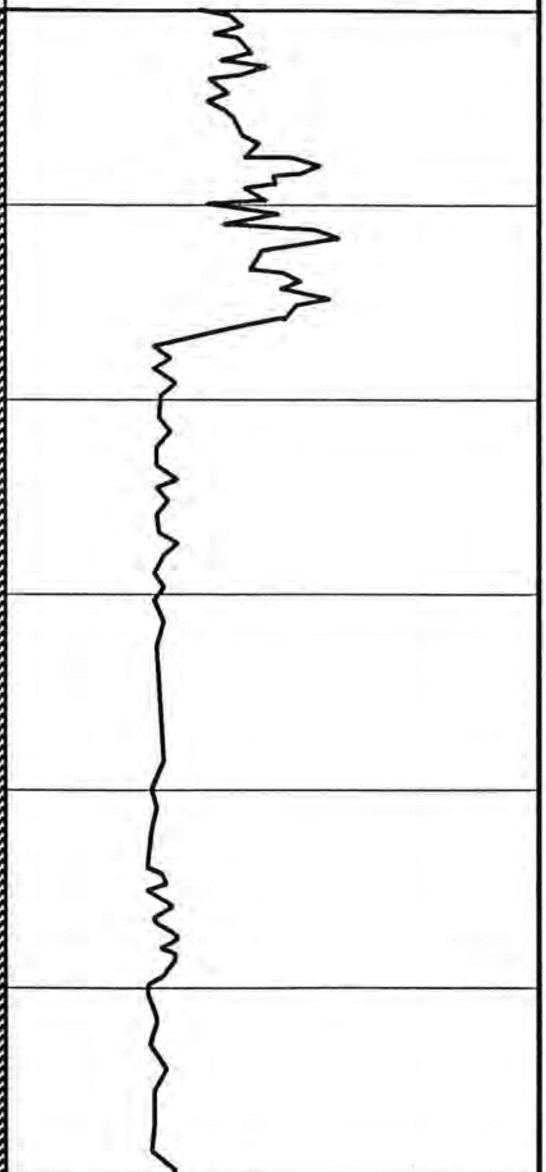
Well/Boring: MD-5
Date: May 8-15, 1998

Sands-SW, SP
Silts-ML, MH
Clays-CL, CH
Organic soils-PT
Gravels, GW, GP
Sands w/ fines-SM, SC

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description
		5,7,9 13	SILTY CLAY (CL) -Gray w/ orange mottling, firm.
10		8,16 35,41	SILTY CLAY (CL) -Same w/ less mottling.
		16,27 50	SILTY CLAY (CL) - Same, very stiff.
20			SAND (SM) Tan, med-fine, some silt.
			SAND (SP) -Lt. Brown, medium grained.
30		18,32 36,39	SAND, (SP) Same
		50,36 48	SAND (SP) - Tan, med. grained.
40			SAND (SP) Lt. orange, med. - coarse
		15,31 28,40	CLAYEY GRAVEL (GC) 2 " SAND (SP) Med. - coarse
50			SAND (SW) Coarse - v. coarse, little to no fines.
			SAND (SW) Same.

Graphical Logs: Strata | Well Construction

Gamma Log
Counts per Second



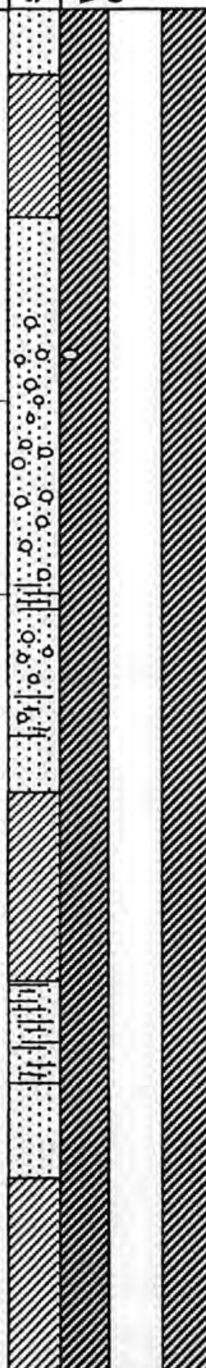
ERM-SOUTHEAST — Drilling/Boring Log

Project: **CIBA Miocene Well Installations**
Project No.: 7596

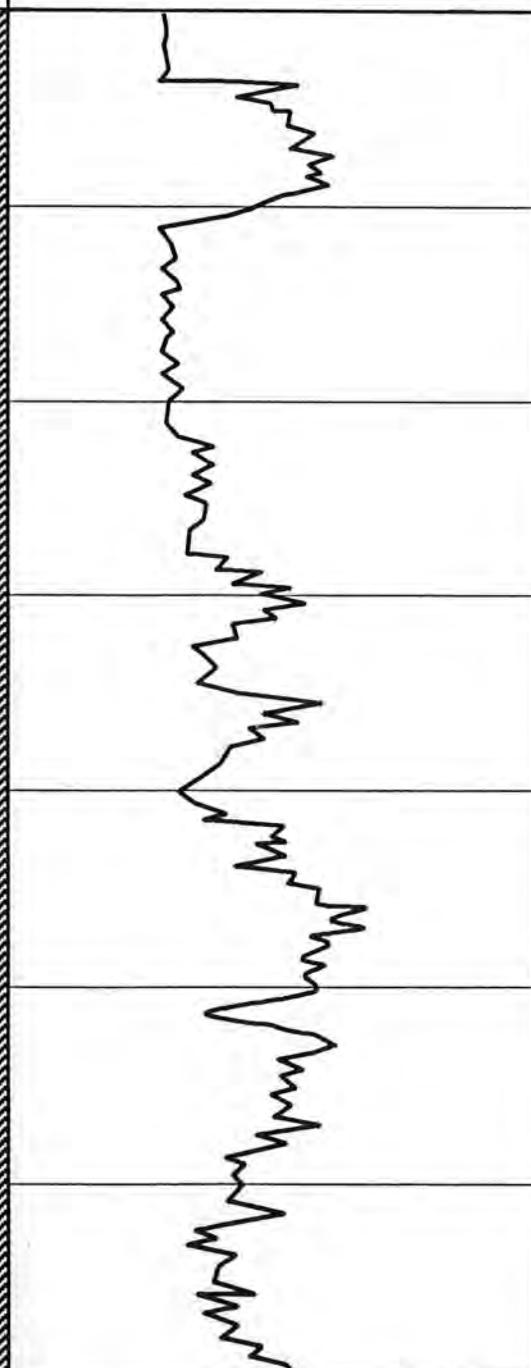
Well/Boring: **MD-5**
Logged by: Robert Spencer

Depth, Ft-BGS	Blows	Lithologic Description
60		SAND (SW)-Coarse - med w/ some fine gravel. Driller hit hard material @ 63'.
	3, 3, 3,9	CLAY (CL) Dark gray, silty.
70	6,15, 20,17	SAND (SW) Lt. Grayish tan, med. grained
		GRAVEL (GW) Coarse.
80		GRAVEL (GW)
		GRAVEL (GW)
90		GRAVEL (GW)
		GRAVEL (GW)
100	7,8, 10, 12	CLAY (CL) Gray, blue-gray, silty. Miocene.
	4,5,5	
110	12,43 18,17	CLAYEY SAND (SC) 12" Blue-gray, silty. SILTY CLAY (CL) 6" Brown-gray @ 111 ft.
120	10,14 27,20	CLAY (CL) - Gray w/ reddish brown mottling near top, V. stiff, dry.
130		

Graphical Logs: Strata / Well Construction



Gamma Log
Counts per Second

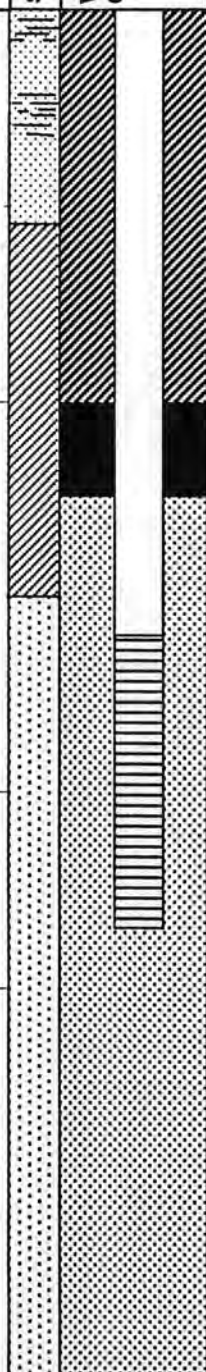


Project: **CIBA Miocene Well Installations**
Project No.: 7596

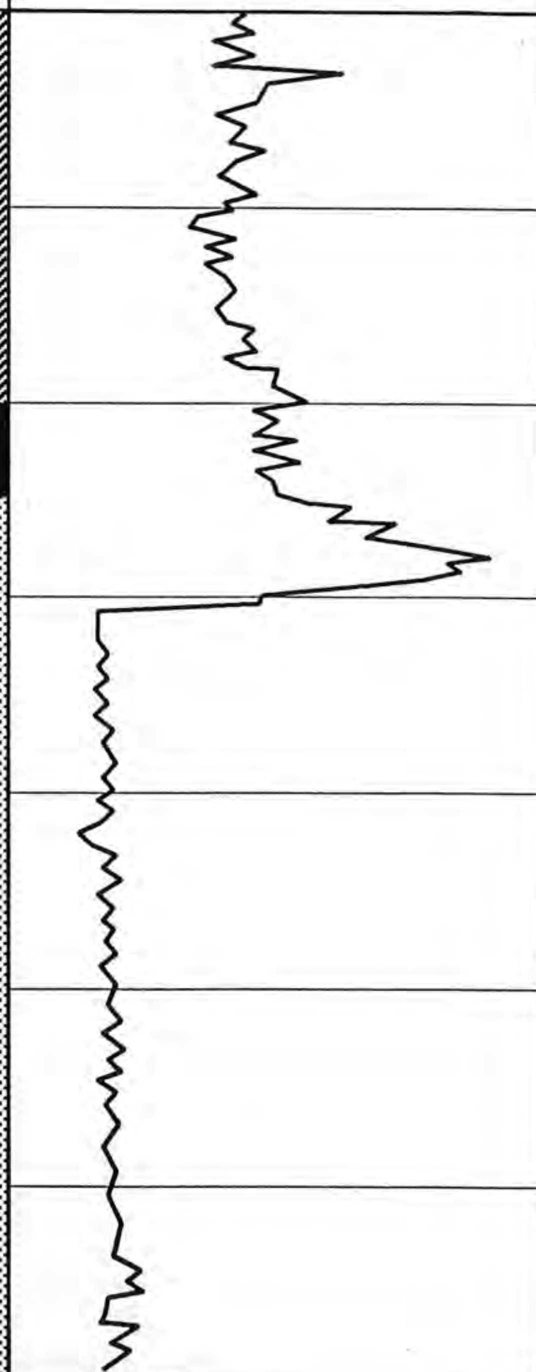
Well/Boring: **MD-5**
Logged by: Robert Spencer

Depth, Ft-BGS	Blows	Lithologic Description
130	11,14 18,23	CLAY (CL) Same
140	12,15 17,20	CLAY (CL)-Gray w/ some sl. sandy clay @ bottom of sample.
150	5,7 7,12	SILTY CLAY (CL) Blueish gray, minor sand.
		SILTY CLAY (CL) Same.
160	18,26 38	SAND (SW) Gray, med. Grained, w/ 3% opaques.
		SAND (SW) Gray, fine grained w/ lignite.
170		SAND (SW) Gray, med. Grained, w/ abundant lignite. SAND (SW) Gray, med. - fine grained.
180		SAND (SW) Gray, coarse grained.
		SAND (SW) Gray, coarse grained.
190		SAND (SW) Gray, coarse grained.
		SAND (SW) Gray, medium grained.
200		

Graphical Logs: Strata; Well Construction

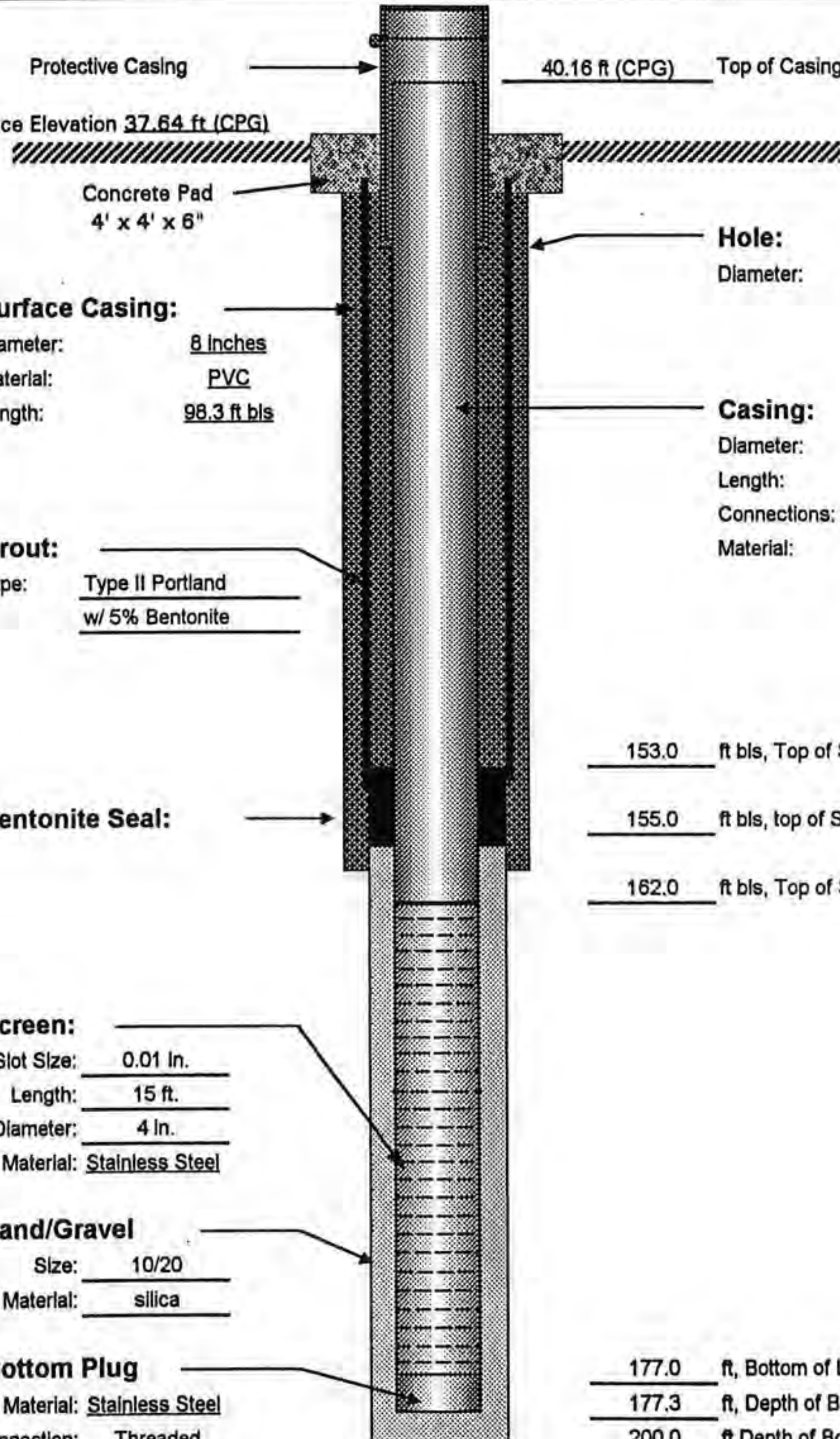


Gamma Log
Counts per Second



ERM | **Monitoring Well Schematic**

Project:	CIBA Specialty Chemicals - Miocene well installations	Well/Boring No.:	MD-5
Project No.:	7084	Drilling Supervisor:	Mark Kelly
Boring Location:	E5803.50, N3245.63	Date(s):	May 8-15, 1998
Drilling Method:	Mud Rotary	Drilling Contractor:	Kelly Environmental



Protective Casing

40.16 ft (CPG) Top of Casing Elevation

Ground Surface Elevation 37.64 ft (CPG)

NOT TO SCALE

Concrete Pad
4' x 4' x 6"

Hole:
Diameter: 12 inches

Surface Casing:
Diameter: 8 inches
Material: PVC
Length: 98.3 ft bls

Casing:
Diameter: 4 inches
Length: 165 feet (BTOC)
Connections: threaded
Material: Stainless Steel

Grout:
Type: Type II Portland w/ 5% Bentonite

153.0 ft bls, Top of Seal

Bentonite Seal:

155.0 ft bls, top of Sand

162.0 ft bls, Top of Screen

Screen:
Slot Size: 0.01 in.
Length: 15 ft.
Diameter: 4 in.
Material: Stainless Steel

Sand/Gravel
Size: 10/20
Material: silica

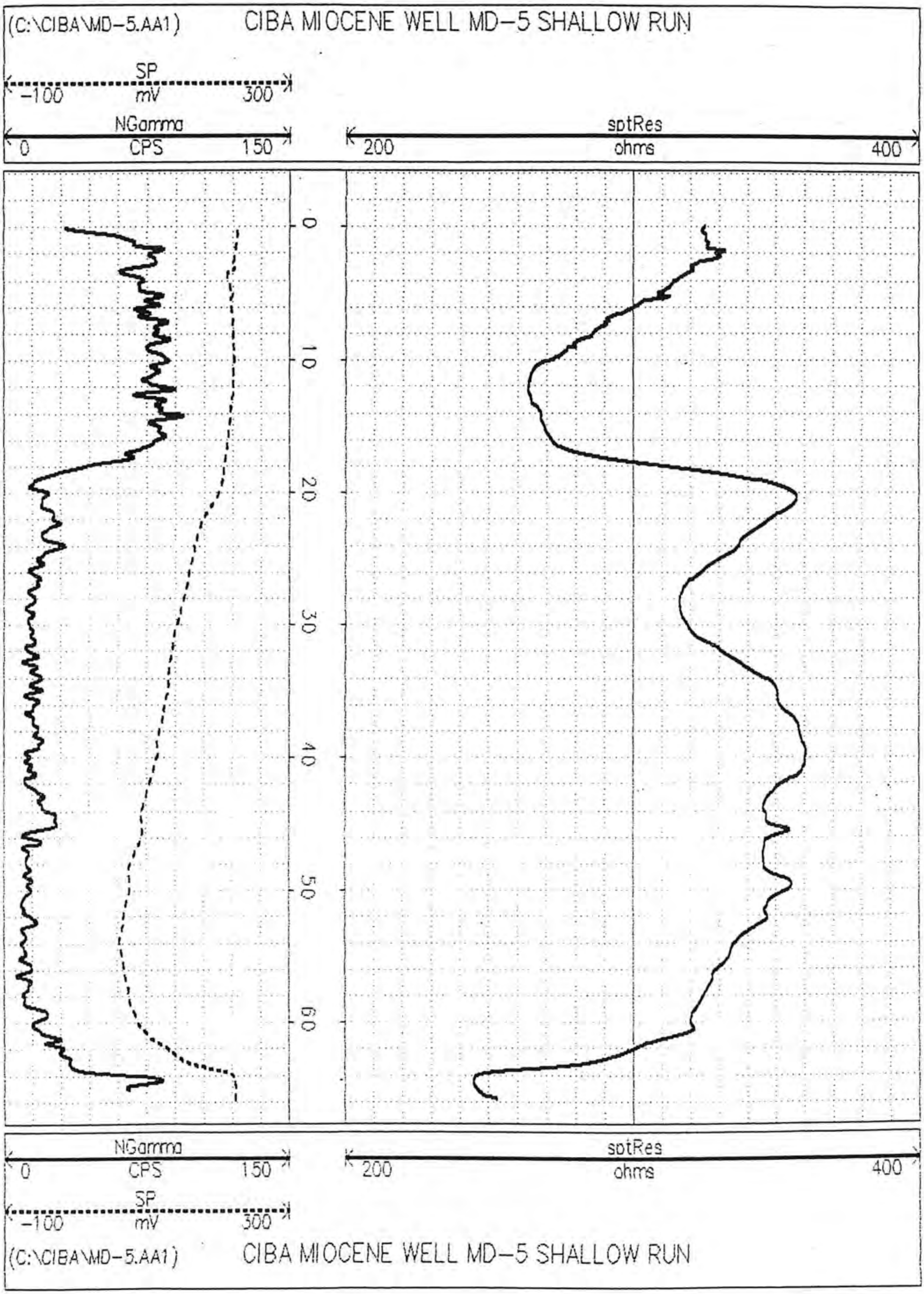
Bottom Plug
Material: Stainless Steel
Connection: Threaded

177.0 ft, Bottom of Lower Screen
177.3 ft, Depth of Bottom Plug
200.0 ft,Depth of Boring

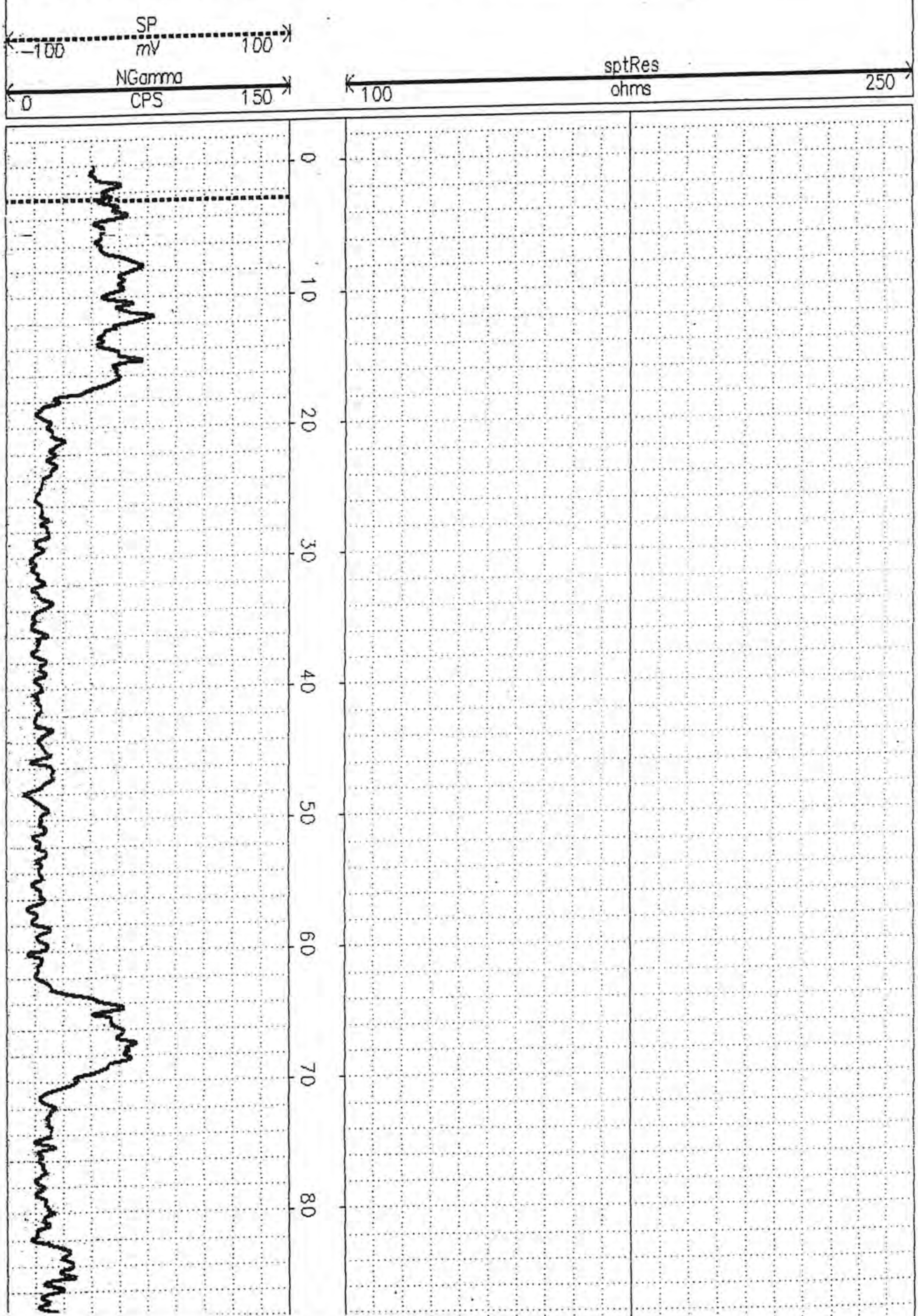
Depth from Surface

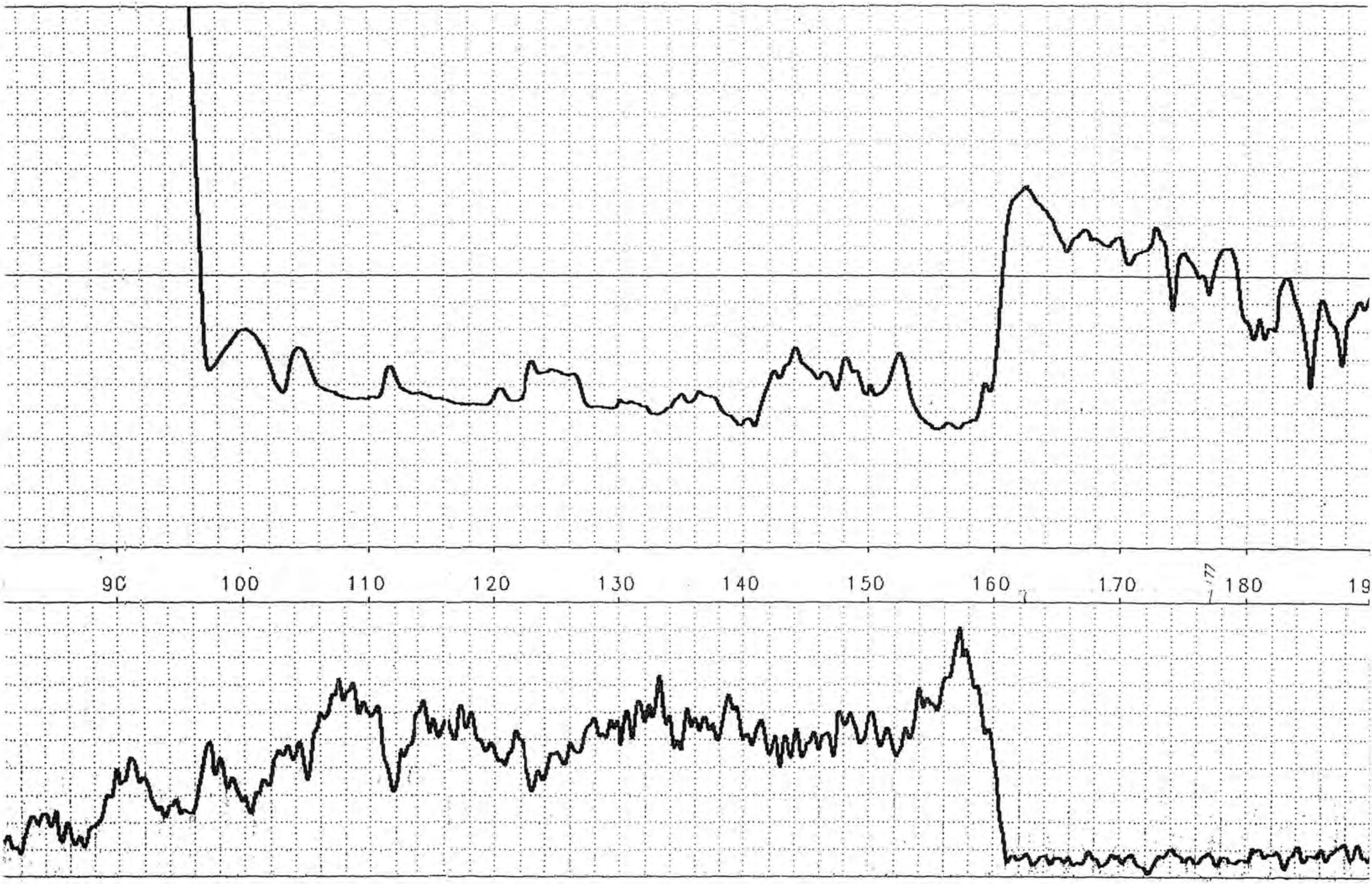
Comments: CPG = Ciba Plant Grid which is 2.15 ft below USGS datum.

Feb-98

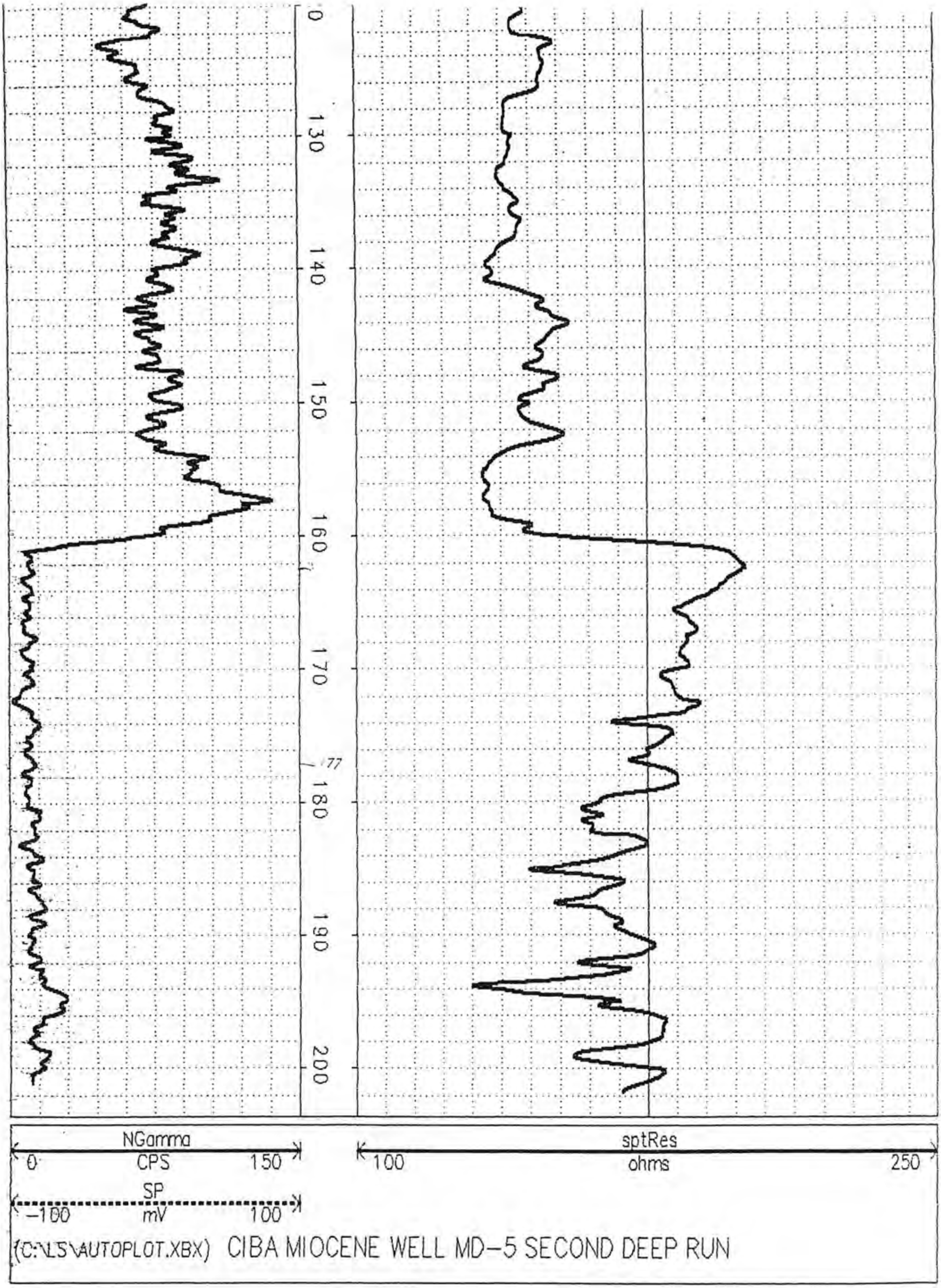

(C:\CIBA\MD-5.AA1)
CIBA MIOCENE WELL MD-5 SHALLOW RUN
SP
-100 mV 300
NGamma
0 CPS 150
sptRes
200 ohms 400
0
10
20
30
40
50
60
NGamma
0 CPS 150
sptRes
200 ohms 400
SP
-100 mV 300
(C:\CIBA\MD-5.AA1)
CIBA MIOCENE WELL MD-5 SHALLOW RUN

(C:\LS\AUTOPLOT.XBX) CIBA MIOCENE WELL MD-5 SECOND DEEP RUN





9C
100
110
120
130
140
150
160
170
180
19



0
130
140
150
160
170
177
180
190
200
NGamma
0
CPS
150
SP
-100
mV
100
sptRes
100
ohms
250
(C:\LS\AUTOPLOT.XBX) CIBA MIOCENE WELL MD-5 SECOND DEEP RUN

ERM-SOUTHEAST

Drilling/Boring Log

Project: CIBA Miocene Well Installations

Sheet 1 of 4

Project No.: 7596 Logged by: Robert Spencer

Well/Boring: MD-6

Well/Boring Location: E4034.83, N-1457.85

Date: May 4-8, 1998

Drilling Method: Mud rotary

Depth to Groundwater:

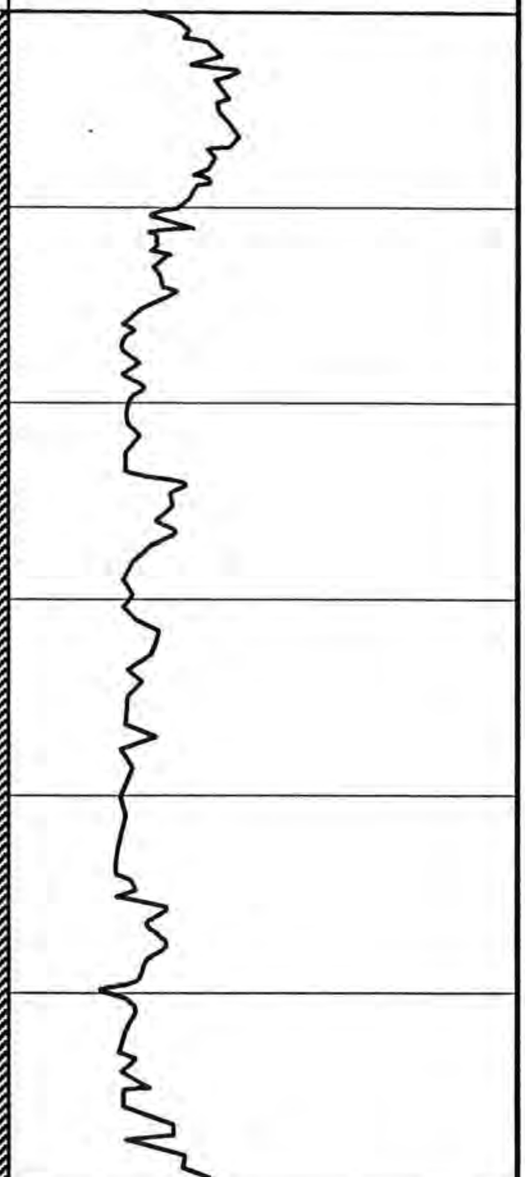
Elevations - Ground Surface: 30.49 ft. CPG

Driller: Kelly Environmental

Remarks:

Legend		Legend	
Sands-SW, SP		Gravels, GW, GP	
Silts-ML, MH		Sands w/ fines-SM, SC	
Clays-CL, CH			
Organic soils-PT			

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log
		3,3,3 2	SILTY CLAY (CL) -Gray w/ orange mottling, firm.			
10		13,15 14,17	SANDY CLAY (CL) - Gray w/ orange mottling. Sand is v. fine.			
		16,16 22,20	SILTY SANDY CLAY (CL) 4" SAND (SM) - Med. Grain, lt. tan.			
20			SAND (SM) Tan, med-fine, some silt.			
			SAND (SP) -Same, Clayey zone @ 20-20.5 ft. Gray w/orange mottling.			
30			SAND, (SP) Same w/ minor clay stringers.			
			SAND (SP) - Same, coarse to med. grained.			
40			SAND (SP)			
			SAND (SP) Med. - coarse w/ some lignite.			
50			SAND (SW) Coarse - v. coarse, w/ gravel.			
		9,10 15,22	SILTY SAND (SM) V. fine, orange, densley packed w/ some silt.			



ERM-SOUTHEAST

Drilling/Boring Log

Project: CIBA Miocene Well Installations
Project No.: 7596

Well/Boring: MD-6
Logged By: Robert Spencer

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log Counts per Second
60		2,2, 3,5	CLAY (CL)- Dark gray, stiff Driller hit hard material @ 58'. CLAY (CL) Dark gray, stiff. Some minor sand in matrix.			
		3, 3, 3,9				
70			CLAY (CL) Gray w/ some coarse sand. Occas. Orange streaks. CLAY (CL) Gray w/ some greenish streaks, some sand.			
80		9, 19, 20,27	SILTY CLAY (CL) Same w/ occ. Sandy streak.			
		8,10 13,14	SAME			
90		9,11 15,18	Same but clay is more massively bedded.			
		11,18, 13, 15	CLAY (CL) Same			
100		11,13, 18, 19	SILTY CLAY (CL) Blueish green/gray w/ brown mottling.			
			SILTY CLAY (CL) Same, little change.			
110		4,5,5 12,43 18,17	CLAY (CL) Gray w/ brown streaks w/ some silt and sand.			
120		10,14 27,20	SILTY CLAY (CL) - Blur-green w/ brown streaks.			
130						

ERM-SOUTHEAST — Drilling/Boring Log

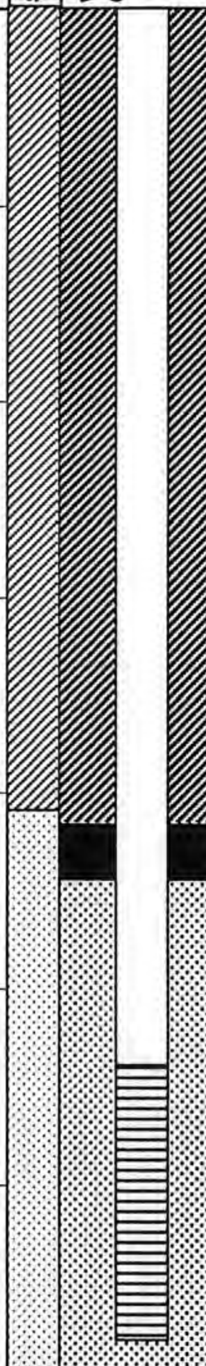
Sheet 3 of 4

Project: **CIBA Miocene Well Installations**
Project No.: 7596

Well/Boring: **MD-6**
Logged By: Robert Spencer

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description
130		10,15 20,23	SILTY CLAY (CL) Same
		11,16 22,25	SAME w/ increasing sand.
140		13,15 19,21	SILTY CLAY (CL)-Gray, firm w/ some sl. Purple silty streakes.
		7,9 9,14	SAME
150		5,8 10,14	SILTY CLAY (CL) gray w/ v. minor fine sand.
			SILTY CLAY (CL) Same.
160		18,26 38	SILTY CLAY (CL) Gray, w/ noticeable v. fine sand in matrix.
			SANDY CLAY (CL) Gray.
170			SANDY CLAY (CL) Gray.
			SAND (SW) Gray, med. Grained w/ lignite.
180			SAND (SW) Gray, med. - coarse grained.
			SAND (SW) Gray, coarse grained.
190			SAND (SW) Gray, coarse grained.
			SAND (SW) Gray, medium grained.
200			

Graphical Logs — Strata / Well Construction



Gamma Log Counts per Second

Project: CIBA Miocene Well Installations
Project No.: 7596

Well/Boring: MD-6
Logged By: Robert Spencer

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log Counts per Second
200			Sand (SW)-Gray,med. - coarse.			
			SAME- Collected wash sample			
210			SAND (SW) Gray, med. - coarse. Collected wash sample. Boring terminated at 215 feet.			
220						

ERM — **Monitoring Well Schematic**

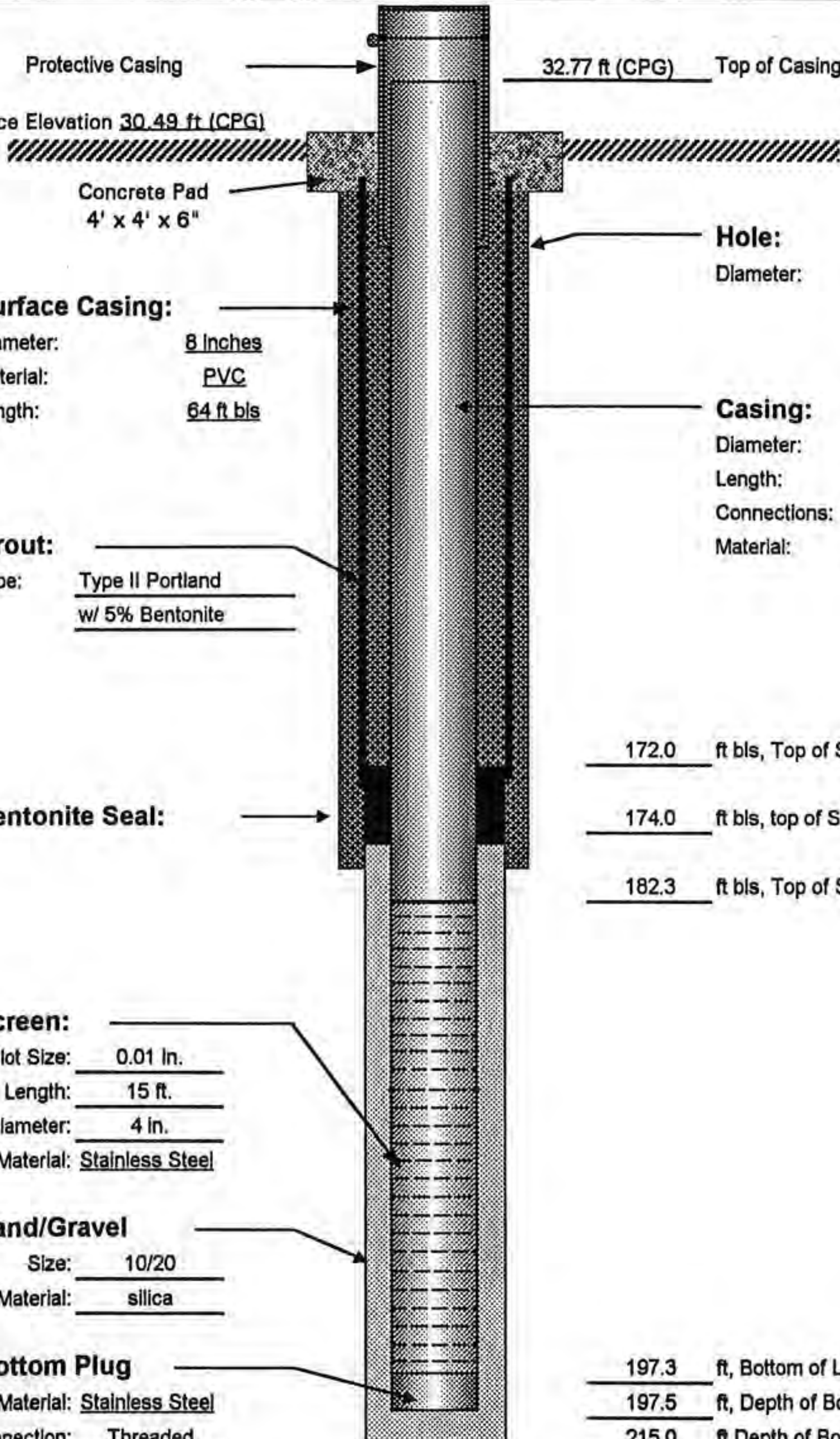
Project:	CIBA Specialty Chemicals - Miocene well installations	Well/Boring No.:	MD-6
Project No.:	7596	Drilling Supervisor:	Mark Kelly
Boring Location:	E4034.83, N-1457.85	Date(s):	May 4-8, 1998
Drilling Method:	Mud Rotary	Drilling Contractor:	Kelly Environmental

Protective Casing

32.77 ft (CPG) Top of Casing Elevation

Ground Surface Elevation 30.49 ft (CPG)

NOT TO SCALE



Concrete Pad
4' x 4' x 6"

Hole:
Diameter: 12 inches

Surface Casing:
Diameter: 8 inches
Material: PVC
Length: 64 ft bls

Casing:
Diameter: 4 inches
Length: 185 feet (BTOC)
Connections: threaded
Material: Stainless Steel

Grout:
Type: Type II Portland
w/ 5% Bentonite

172.0 ft bls, Top of Seal

Bentonite Seal:

174.0 ft bls, top of Sand

182.3 ft bls, Top of Screen

Screen:
Slot Size: 0.01 in.
Length: 15 ft.
Diameter: 4 in.
Material: Stainless Steel

Sand/Gravel
Size: 10/20
Material: silica

Bottom Plug
Material: Stainless Steel
Connection: Threaded

197.3 ft, Bottom of Lower Screen
197.5 ft, Depth of Bottom Plug
215.0 ft,Depth of Boring

Depth from Surface

Comments: CPG = Ciba Plant Grid which is 2.15 ft below USGS datum.

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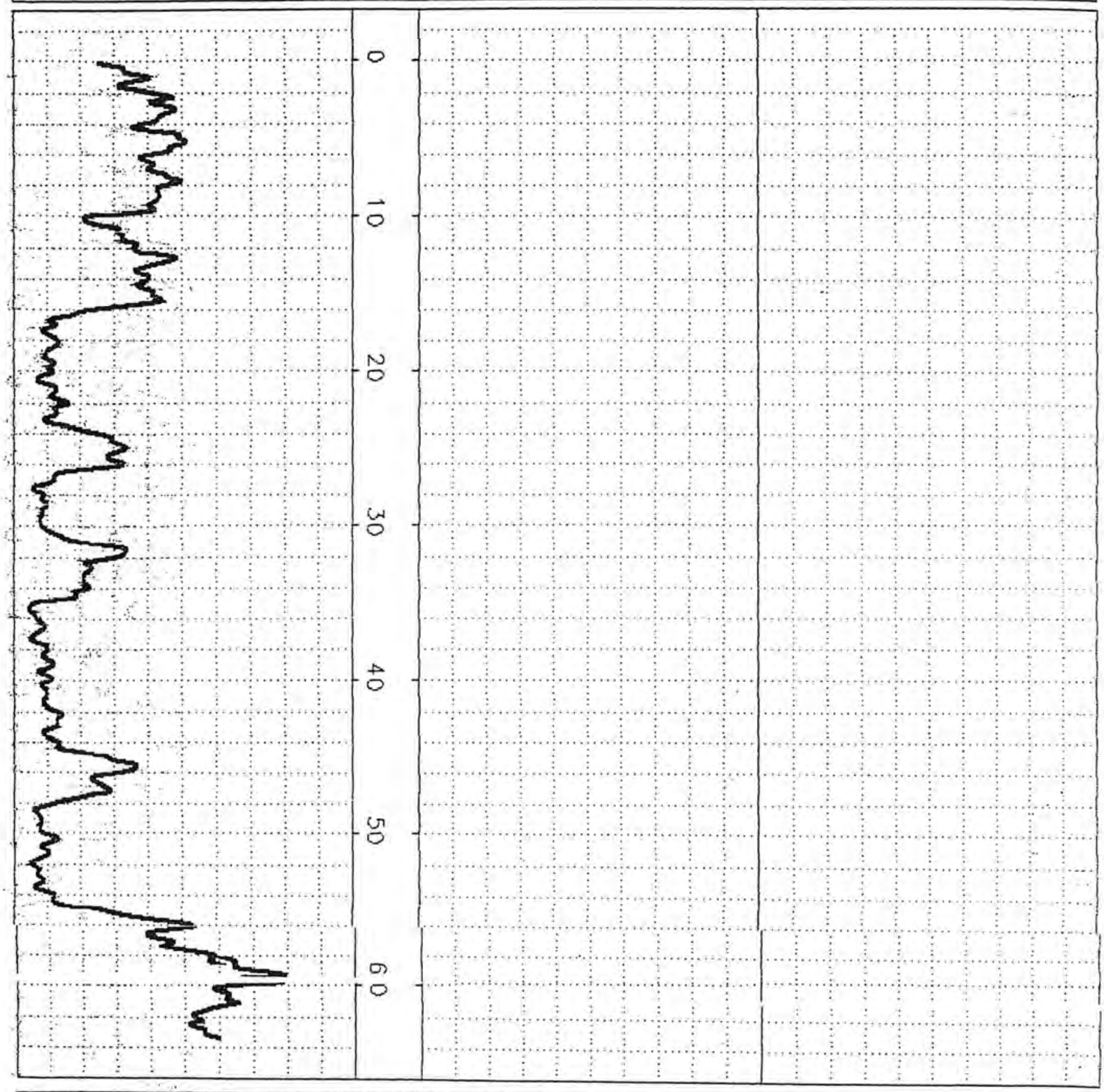
(C:\CIBA\MD6.GBO) GAMMA LOG FOR MD-6 ALLUVIAL AQUIFER

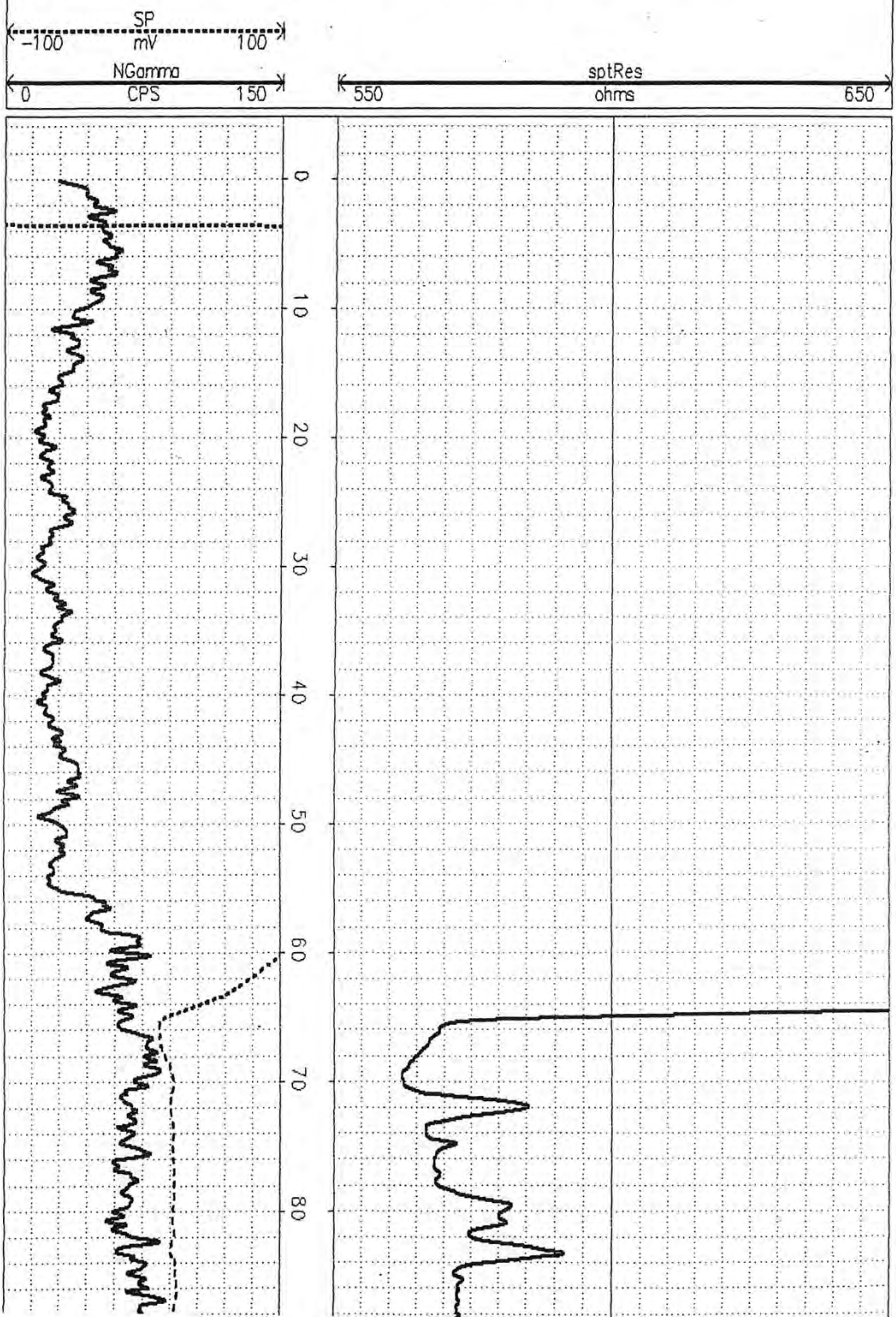
NGamma
0 CPS 150

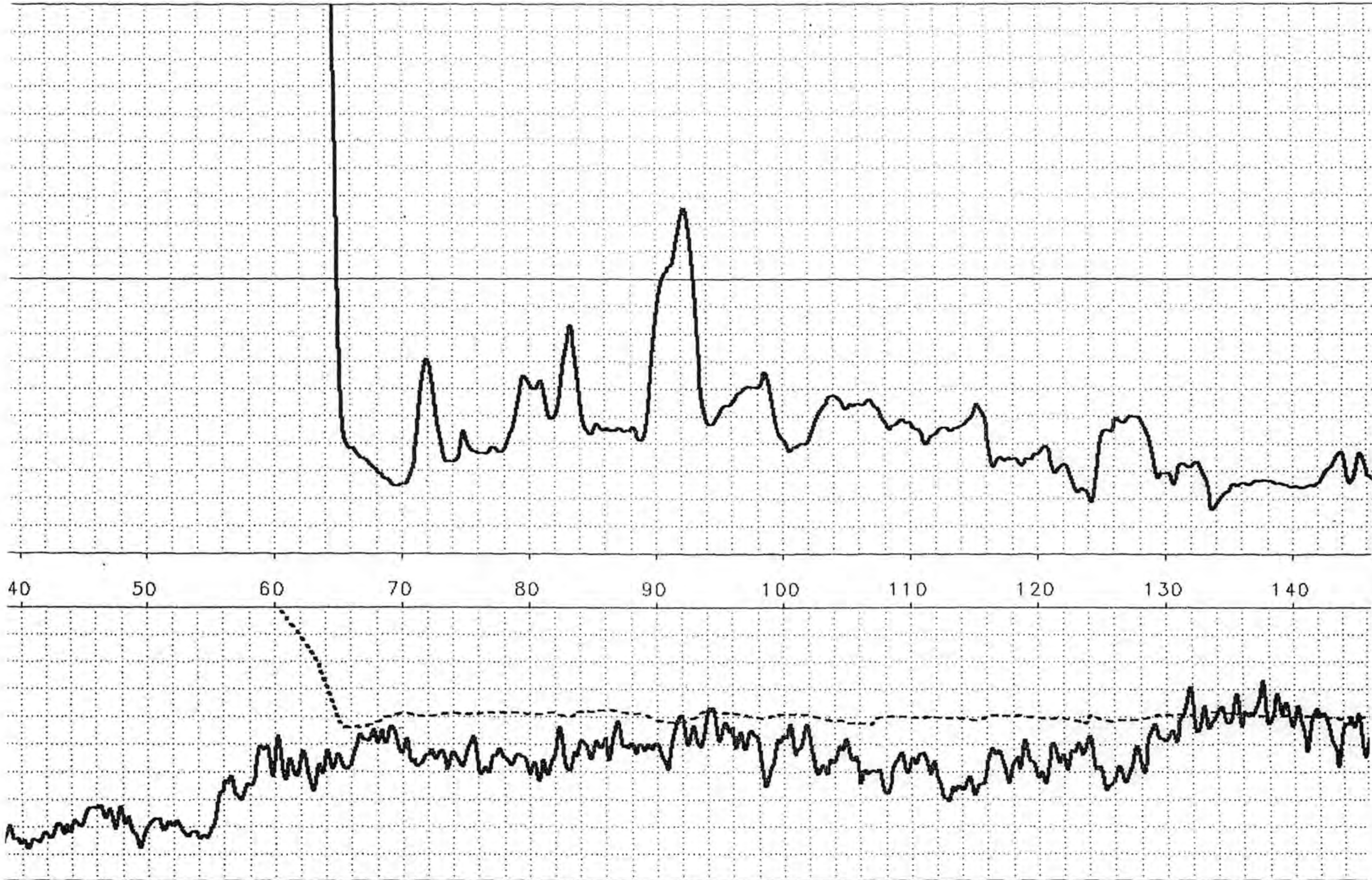


NGamma
0 CPS 150

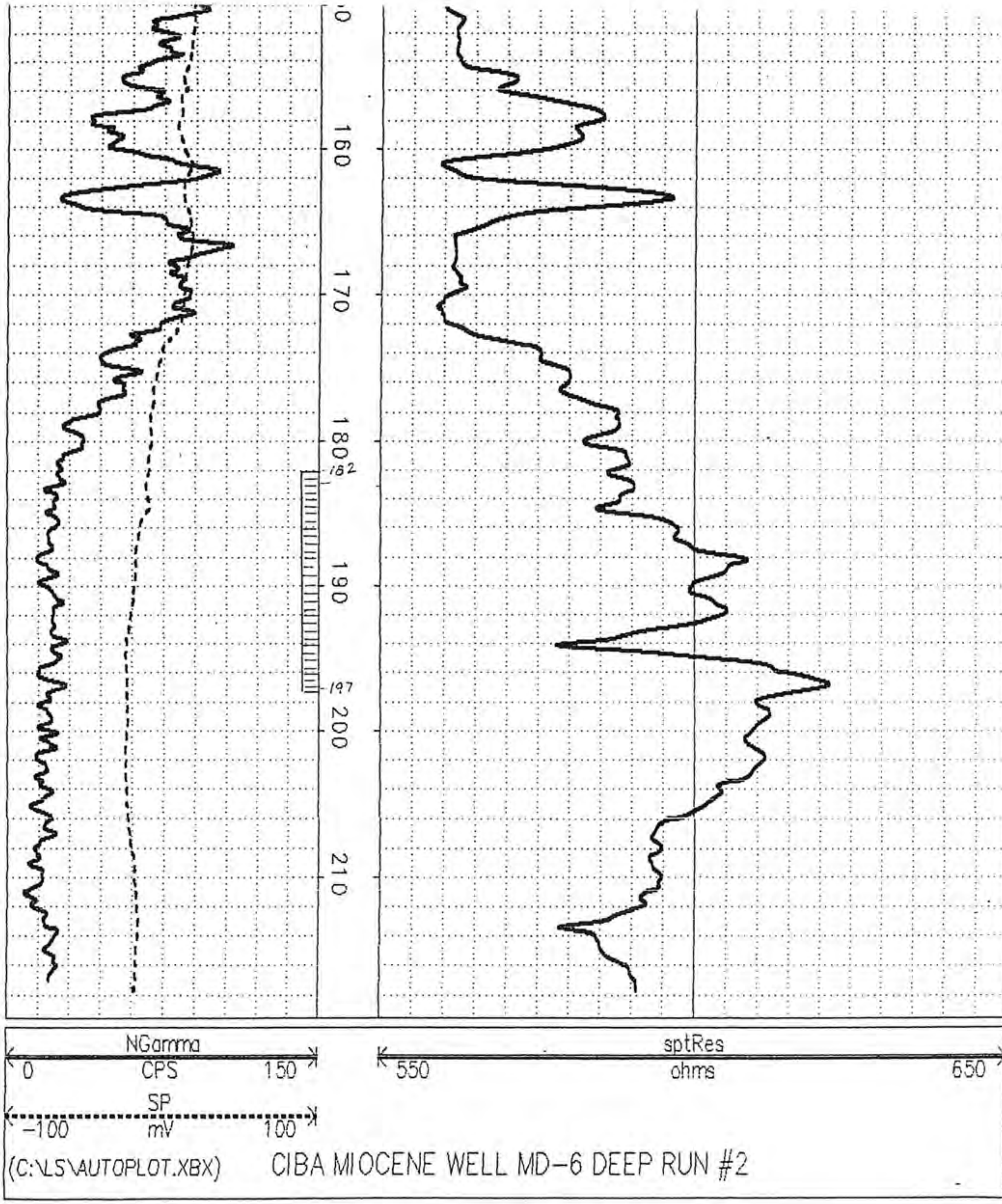
(C:\CIBA\MD6.GBO) GAMMA LOG FOR MD-6 ALLUVIAL AQUIFER

(C:\LS\AUTOPLOT.XBX) CIBA MIOCENE WELL MD-6 DEEP RUN #2





40
50
60
70
80
90
100
110
120
130
140


160
170
180
182
190
197
200
210
NGamma
0
CPS
150
SP
-100
mV
100
sptRes
550
ohms
650
(C:\LS\AUTOPLOT.XBX)
CIBA MIOCENE WELL MD-6 DEEP RUN #2

ERM-SOUTHEAST — Drilling/Boring Log

Project: CIBA Miocene Well Installations

Sheet 1 of 4

Project No.: 7740 Logged by: Casey Crow

Well/Boring: **MD-7**

Well/Boring Location:

Date: June 6-11, 2001

Drilling Method: Mud rotary

Depth to Groundwater:

Elevations - Ground Surface:

Driller: Griner Drilling Service

Remarks: TOC Elevation:

Legend			
Sands-SW, SP		Gravels, GW, GP	
Silts-ML, MH		Sands w/ fines-SM, SC	
Clays-CL, CH			
Organic soils-PT			

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log Counts per Second (0 – 75 – 150)
10						
20						
30						
40						
50						

ERM-SOUTHEAST — Drilling/Boring Log

Project: CIBA Miocene Well Installations
Project No.: 7740

Well/Boring: **MD-7**
Logged By: Casey Crow

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log Counts per Second (0 – 75 – 150)
60		14, 35, 44. 48	CLAY (CH) Olive gray, hard clay, no large particles, Fe staining.			
70		28, 38, 49. 49	CLAY (CL) Olive gray, hard clay w/ some silty particles			
80		30, 47, 61, 72	CLAY (CL) Blueish gray Very stiff clay, some Fe streaking			
90		21, 26, 38, 62	CLAY (CL) Bluish-gray, stiff clay			
100		35, 38, 51, 77	CLAY (CL) Same, little change.			
110			CLAY (CL) light gray color, very stiff			
120		21, 44, 44, 49	CLAY (CL) Olive gray, hard clay			
130						

Project: CIBA Miocene Well Installations
Project No.: 7740

Well/Boring: **MD-7**
Logged By: Casey Crow

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log, Counts per Second (0 – 75 – 150)
130		16, 21, 28, 36	SAND (SM) Light gray, fine grained, medium dense, no odor, some clayey silt mixed in with sand.			311-141
140		25, 51, 100	No recovery, only 1' of penetration			140-160
150		44, 54, 86, 90	SAND (SW) Light gray, coarse sand			
160						
170						
180						
190						
200						

ERM-SOUTHEAST

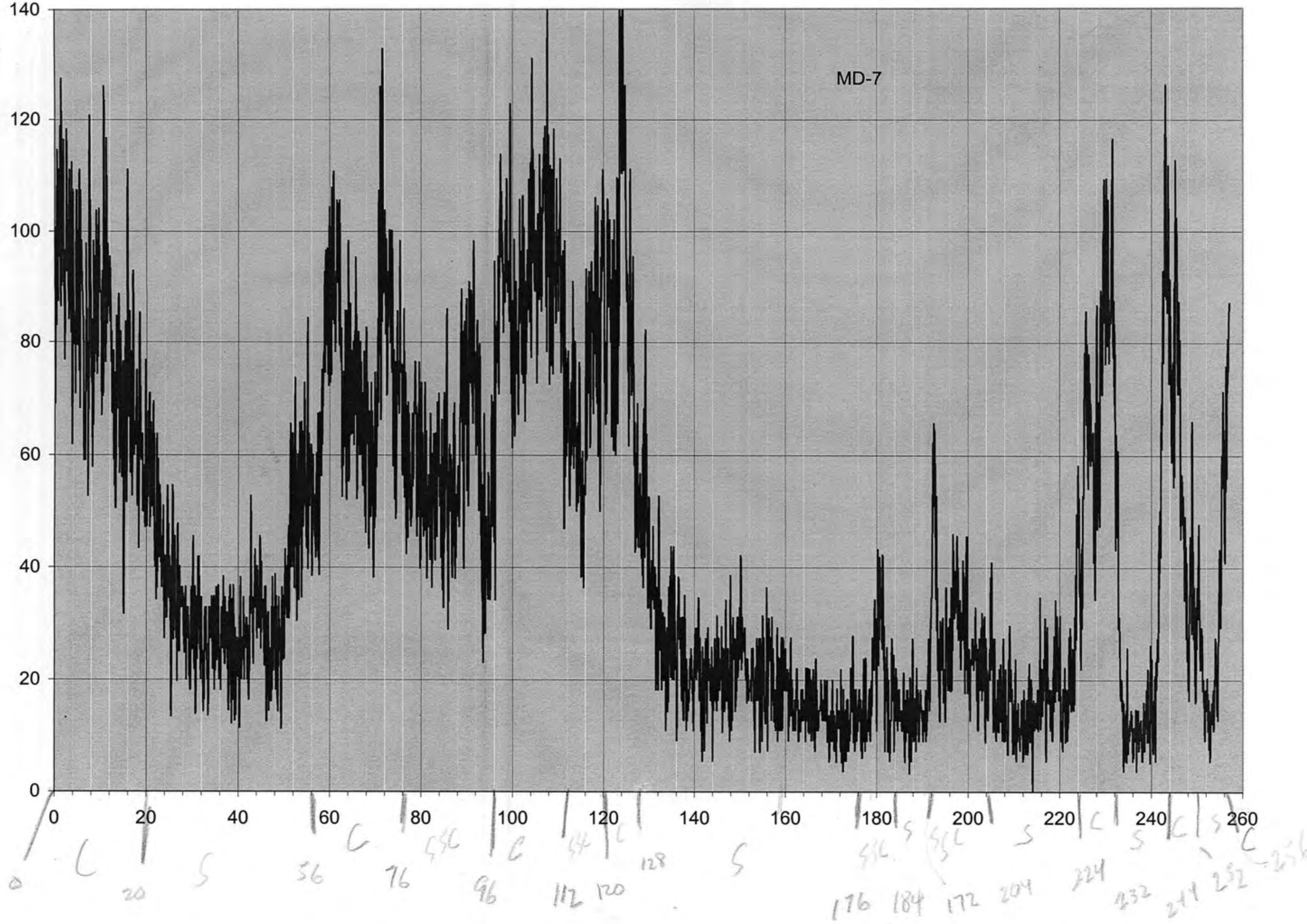
Drilling/Boring Log

Project: CIBA Miocene Well Installations
Project No.: 7740

Well/Boring: **MD-7**
Logged By: Casey Crow

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log Counts per Second (0 – 75 – 150)
200						
210						
220						
230						
240						
250						

TOT. Depth = 256
Screen 155-179
GSE = 30.8



ERM — **Monitoring Well Schematic**

Project: CIBA Specialty Chemicals - Miocene well installations — Well/Boring No.: **MD-7**

Project No.: 7740 — Drilling Supervisor: Jerry Beach

Boring Location: — Date(s): June 6-11, 2001

Drilling Method: Mud Rotary — Drilling Contractor: Griner

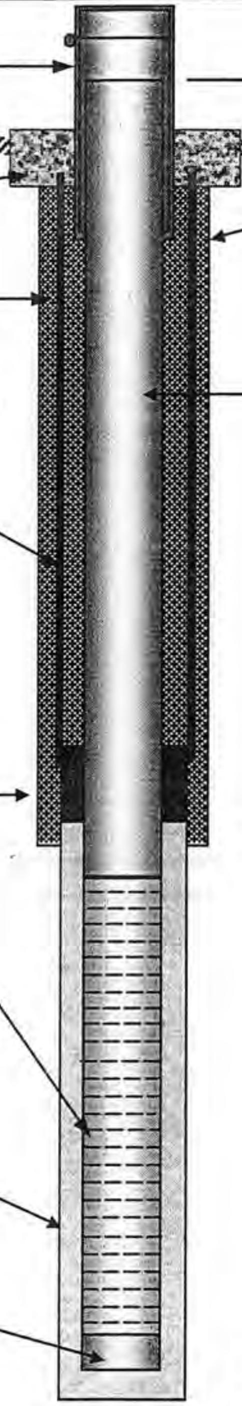
Protective Casing

Top of Casing Elevation

Ground Surface Elevation

NOT TO SCALE

Concrete Pad
4' x 4' x 6"



Hole:
Diameter: 12 inches

Surface Casing:
Diameter: 8 inches
Material: PVC
Length: 58 feet bls

Casing:
Diameter: 4 inches
Length: 140 feet (BOC)
Connections: threaded
Material: PVC

Grout:
Type: Bentonite

Bentonite Seal:

90.0 ft bls, top of Sand

140.0 ft bls, Top of Screen

Screen:
Slot Size: 0.01 in.
Length: 20 ft.
Diameter: 4 in.
Material: PVC

Sand/Gravel
Size: 20/40
Material: silica

Bottom Plug
Material: PVC
Connection: Threaded

160.0 ft, Bottom of Lower Screen

160.3 ft, Depth of Bottom Plug

260.0 ft,Depth of Boring

Depth from Surface

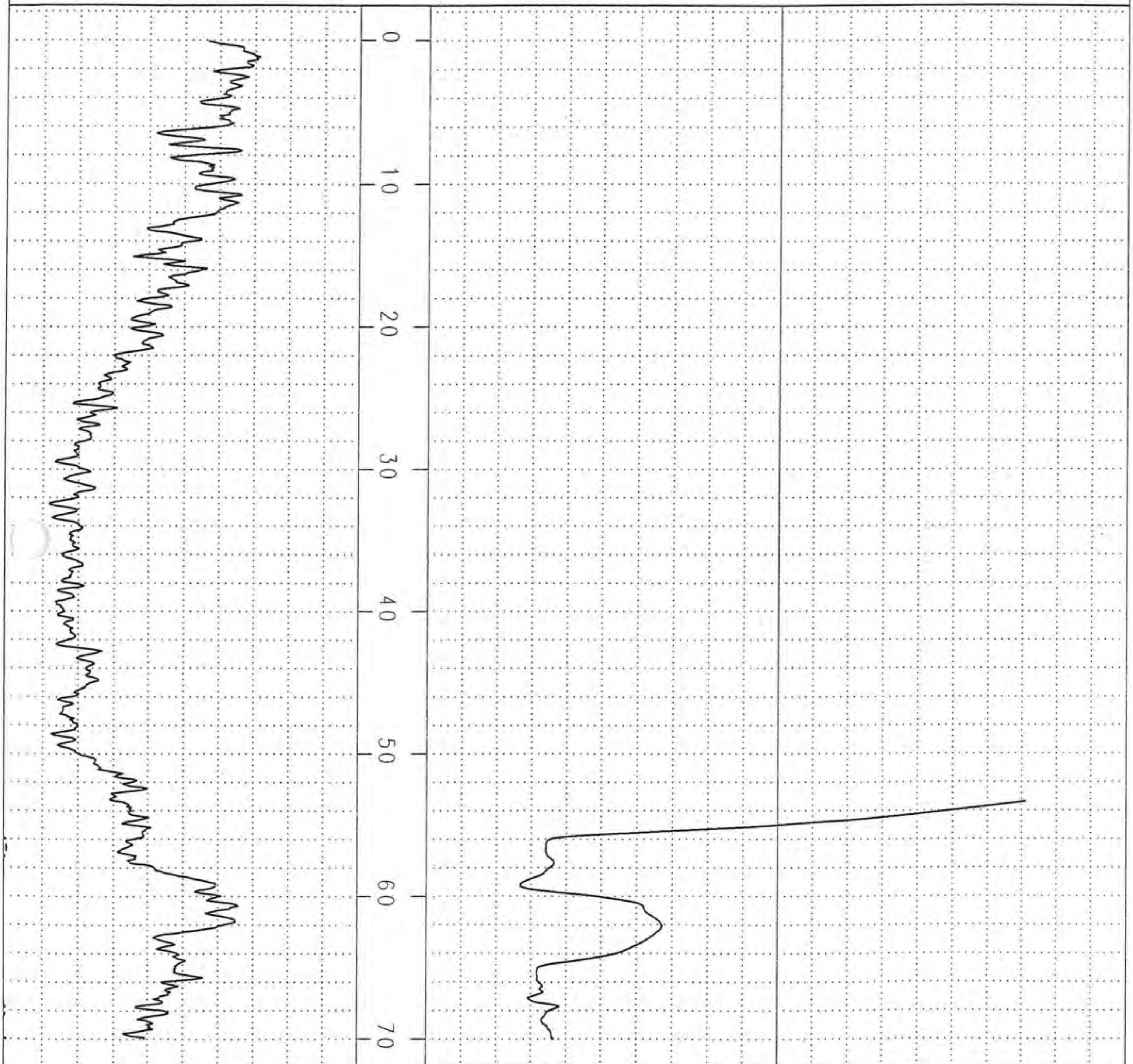
Comments: CPG = Ciba Plant Grid which is 2.15 ft below USGS datum.

(C: LS AUTOPLOT.XBX) MD-7

SP
0 mV 100

NGamma
0 CPS 150

sptRes
175 ohms 375

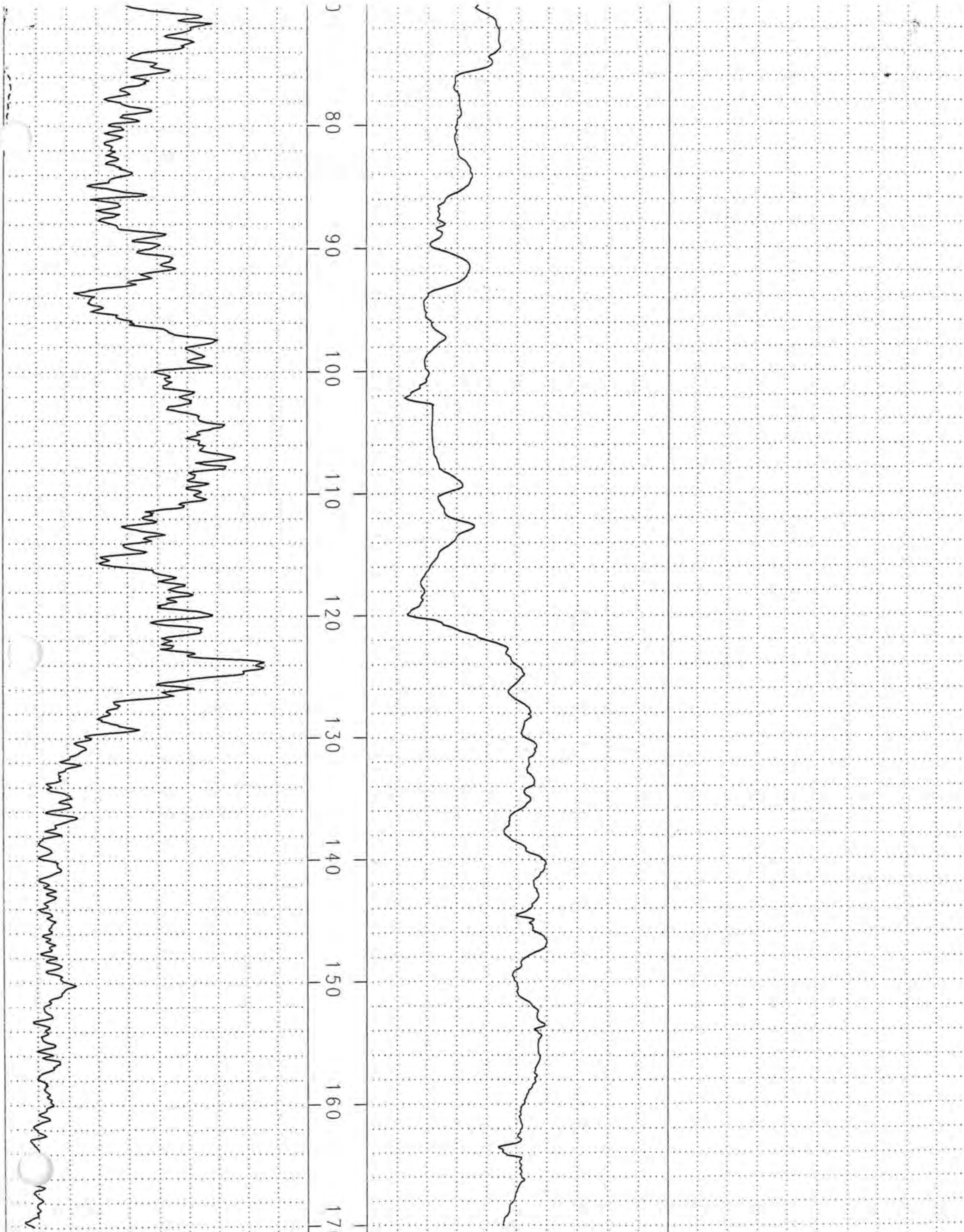


NGamma
0 CPS 150

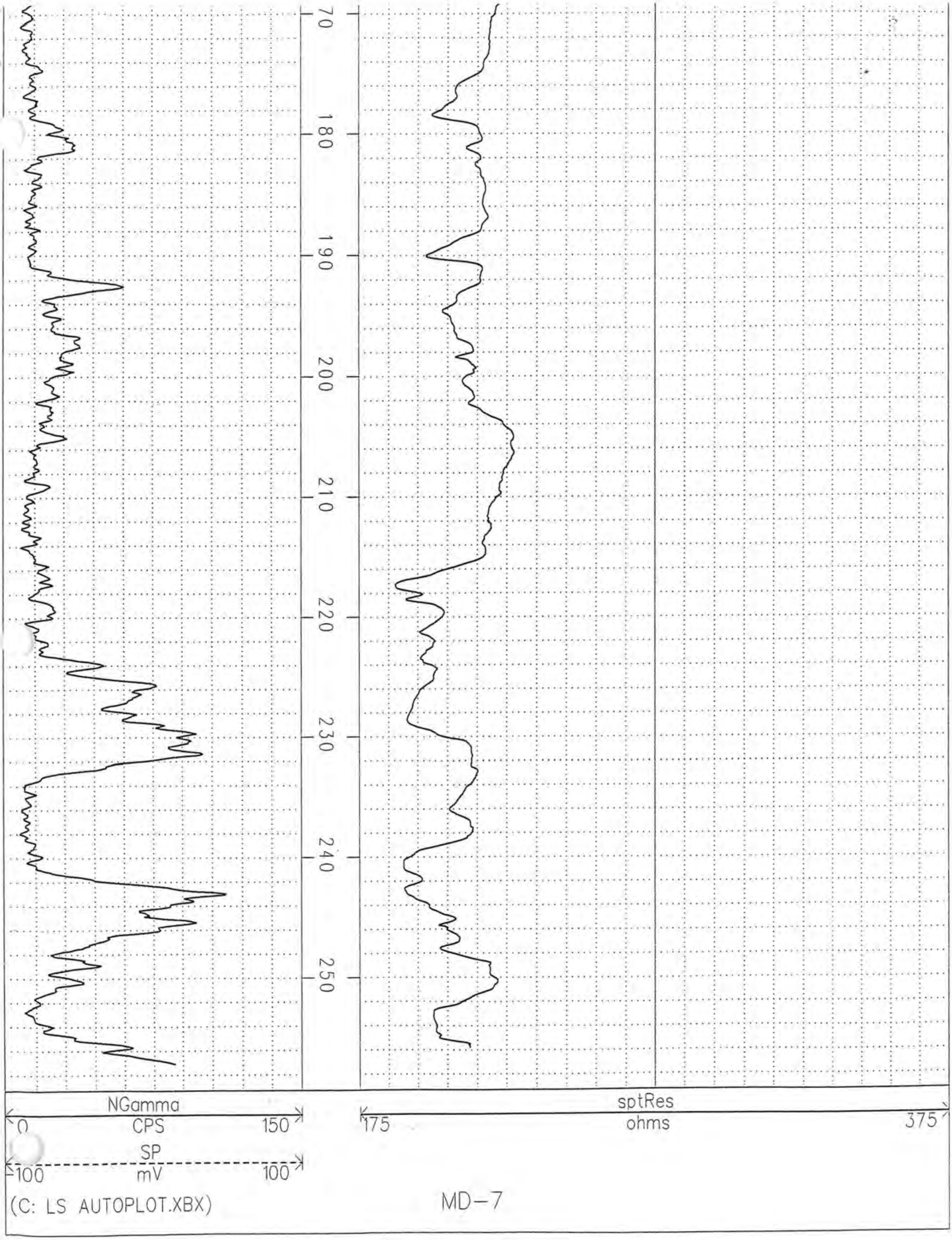
sptRes
175 ohms 375

SP
-100 mV 100

(C: LS AUTOPLOT.XBX) MD-7



MD-7


170
180
190
200
210
220
230
240
250
NGamma
0
CPS
150
SP
-100
mV
100
sptRes
175
ohms
375
(C: LS AUTOPLOT.XBX)
MD-7

ERM-SOUTHEAST — Drilling/Boring Log

Project: CIBA Miocene Well Installations
Project No.: 7740 Logged by: Casey Crow
Well/Boring Location:
Drilling Method: Mud rotary
Depth to Groundwater:
Elevations - Ground Surface:
Driller: Griner Drilling Service
Remarks:

Well/Boring: MD-8
Date: June 18-20, 2001

Legend			
Sands-SW, SP		Gravels, GW, GP	
Silts-ML, MH		Sands w/ fines-SM, SC	
Clays-CL, CH			
Organic soils-PT			

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log Counts per Second (0 – 75 – 150)
10						
20						
30						
40						
50						

Project: CIBA Miocene Well Installations
Project No.: 7740

Well/Boring: **MD-8**
Logged By: Casey Crow

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log (Counts per Second) 0 – 75 – 150
60						
70		15, 48, 44. 70	CLAYEY SAND (SC) Light gray, fine sand			
80		12, 22, 28, 32	CLAY (CL) Olive gray, hard clay w/ reddish brown streaking			
90		12, 17, 26, 40	CLAY (CL) Olive gray, Stiff clay			
100		13, 24, 40, 51	CLAY (CL) Olive gray w/ some Fe deposits			
110		19, 41, 39, 50	CLAY (CL) Same			
120		12, 24, 22, 37	SILTY CLAY (ML) Olive gray, soft clay			
130						

ERM-SOUTHEAST — Drilling/Boring Log

Project: CIBA Miocene Well Installations
Project No.: 7740

Well/Boring: **MD-8**
Logged By: Casey Crow

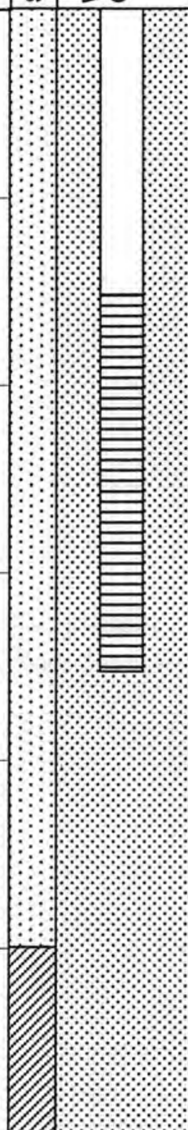
Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log (Counts per Second) 0 – 75 – 150
130		16, 22, 19, 33	SILTY CLAY (ML) Bluish gray w/ some reddish brown staining			
140		28, 51, 100	CLAY (CL) Hard clay w/ no penetration after 1'			
150		19, 37, 50, 61	CLAY (CL) same			
160						
170						
180						
190						
200						

ERM-SOUTHEAST **Drilling/Boring Log**

Project: CIBA Miocene Well Installations
Project No.: 7740

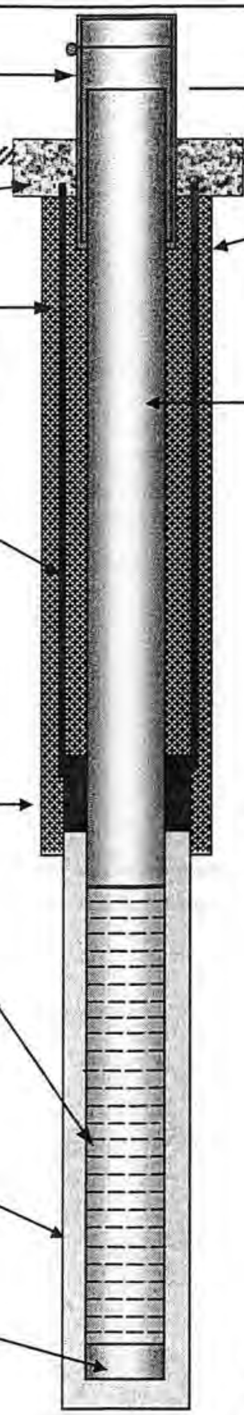
Well/Boring: **MD-8**
Logged By: Casey Crow

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log (Counts per Second) 0 – 75 – 150
200						
210						
220						
230						
240						
250						
260						



ERM **Monitoring Well Schematic**

Project: CIBA Specialty Chemicals - Miocene well installations | Well/Boring No.: **MD-8**
Project No.: 7740 | Drilling Supervisor: Jerry Beach
Boring Location: | Date(s): June 18-20, 2001
Drilling Method: Mud Rotary | Drilling Contractor: Griner



Protective Casing

Top of Casing Elevation

Ground Surface Elevation

NOT TO SCALE

Concrete Pad
4' x 4' x 6"

Hole:
Diameter: 12 inches

Surface Casing:
Diameter: 8 inches
Material: PVC
Length: 70 ft bls

Casing:
Diameter: 4 inches
Length: 215 feet (BTOC)
Connections: threaded
Material: PVC

Grout:
Type: Bentonite

Bentonite Seal:

172 ft bls, top of Sand

215.0 ft bls, Top of Screen

Screen:
Slot Size: 0.01 in.
Length: 20 ft.
Diameter: 4 in.
Material: PVC

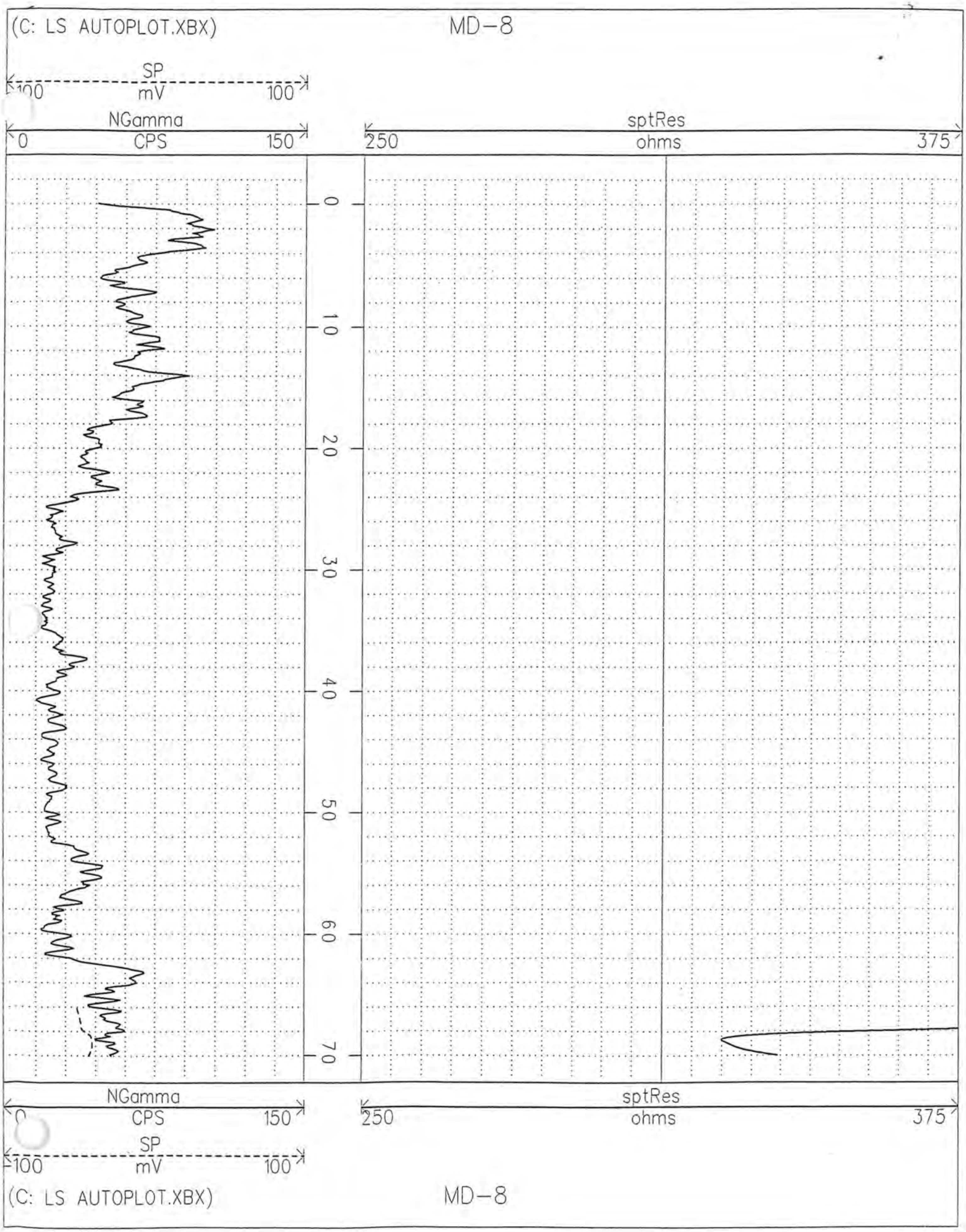
Sand/Gravel
Size: 20/40
Material: silica

Bottom Plug
Material: PVC
Connection: Threaded

235.0 ft, Bottom of Lower Screen
235.3 ft, Depth of Bottom Plug
260.0 ft, Depth of Boring

Depth from Surface

s: CPG = Ciba Plant Grid which is 2.15 ft below USGS datum.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MD-8
SP
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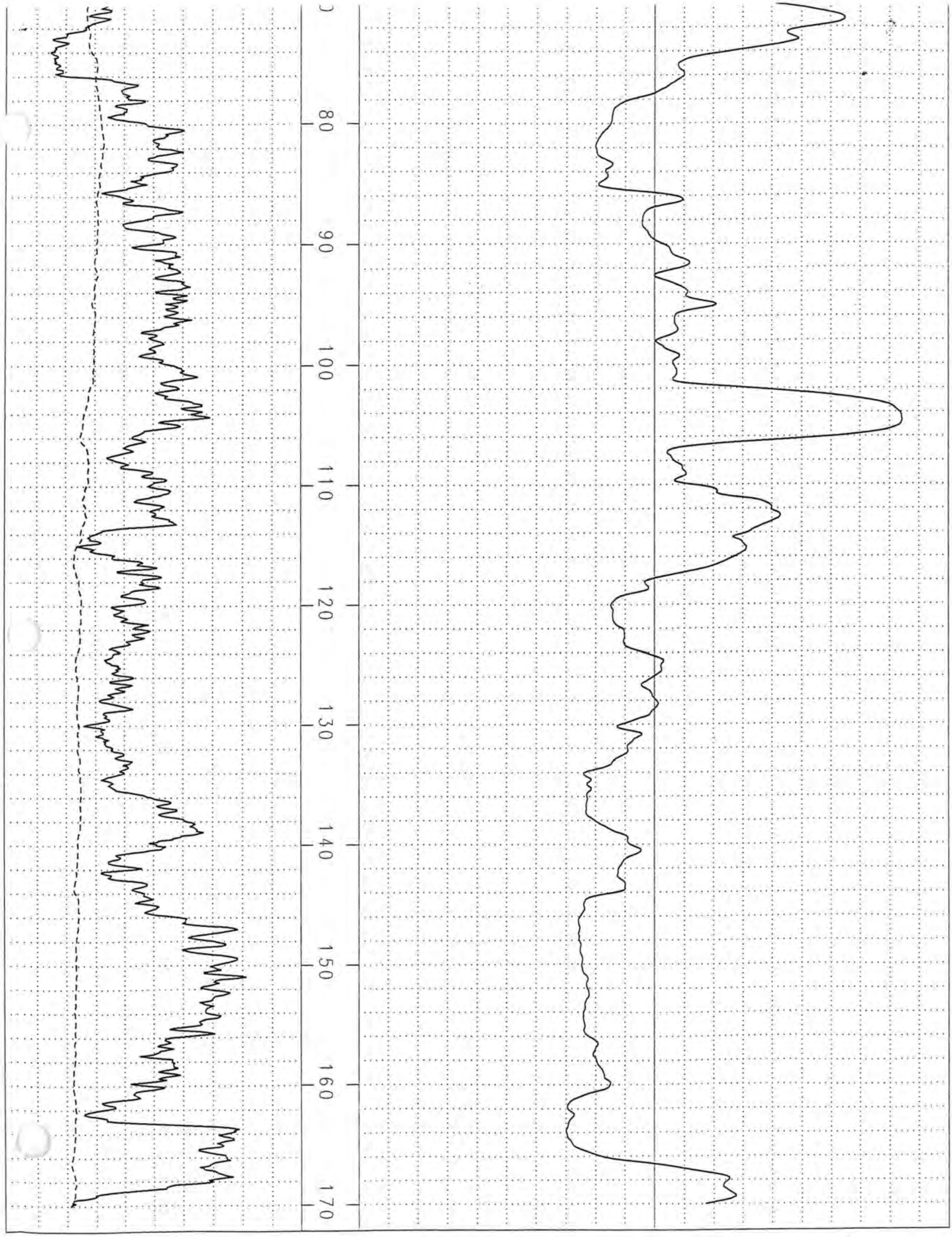
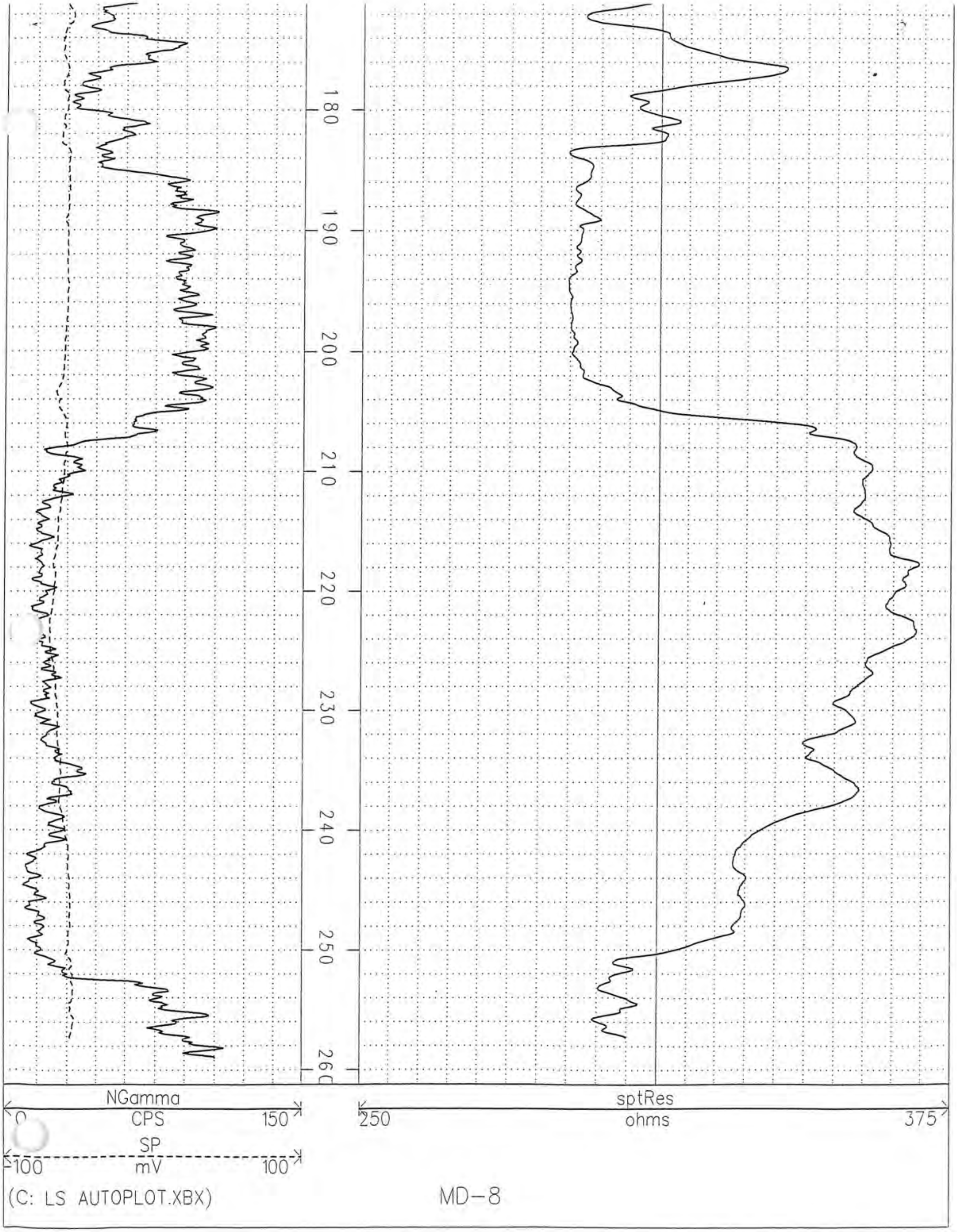
NGamma
0 CPS 150
sptRes
250 ohms 375
0
10
20
30
40
50
60
70
NGamma
0 CPS 150
sptRes
250 ohms 375
SP
-100 mV 100
(C: LS AUTOPLOT.XBX)
MD-8

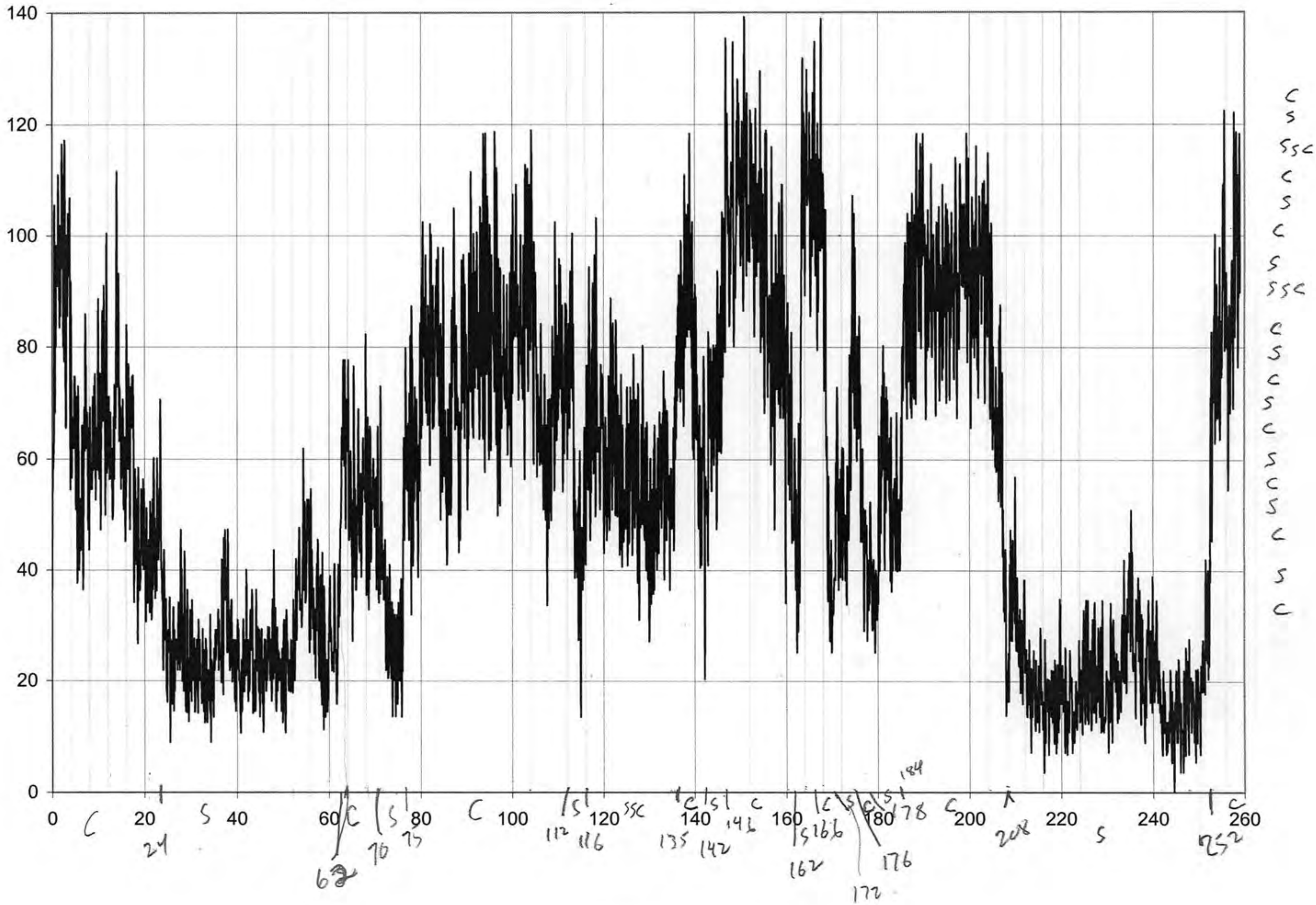


MD-8


180
190
200
210
220
230
240
250
260
NGamma
0
CPS
150
SP
-100
mV
100
sptRes
250
ohms
375
(C: LS AUTOPLOT.XBX)
MD-8

~ coord ≈ 3680
-340

MD-8



ERM-SOUTHEAST — Drilling/Boring Log

Project: CIBA Miocene Well Installations
Sheet 1 of 4
Project No.: 7740 Logged by: Casey Crow
Well/Boring: **MD-9**
Well/Boring Location:
Date: May 30-June 5, 2001
Drilling Method: Mud rotary
Depth to Groundwater:
Elevations - Ground Surface:
Driller: Griner Drilling Service
Remarks:

Sands-SW, SP		Gravels, GW, GP	
Silts-ML, MH		Sands w/ fines-SM, SC	
Clays-CL, CH			
Organic soils-PT			

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log Counts per Second (0 – 75 – 150)
10						
20						
30						
40						
50						
			Clay (CH)- light grey clay with some sandy particles, no odor			

ERM-SOUTHEAST **Drilling/Boring Log**

Project: CIBA Miocene Well Installations
Project No.: 7740

Well/Boring: **MD-9**
Logged by: Casey Crow

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log Counts per Second (0 – 75 – 150)
60		9, 13, 21. 30	CLAY (CL) Light gray, with 3" yellowish orange sand layer.			
		14, 16, 27. 39	SILTY CLAY (CL) light brown with some sand.			
70		15, 22, 22. 36	CLAY(CH) Light gray with some dark brown streaks.			
		9, 16, 22. 27	Same as above			
80		11, 17, 26. 30	CLAY (CL) Light gray, soft clay w/ some silt			
		11, 16, 17. 24	CLAY (CL) Light gray, hard clay			
90		18, 37, 44. 48	SILTY CLAY (ML) Light gray, soft clay w/ dense sand at bottom.			
		12, 28, 40. 52	SILTY SAND (SM) Light gray, very dense.			
100		21, 32, 42, 58	CLAY (CL) Olive gray, hard clay w/ a pinkish tint			
		16, 30, 43, 45	CLAY (CL) Light gray, hard clay			
110		17, 32, 49. 53	CLAYEY SAND (SC) Light gray, hard clay			
			SILTY CLAY(ML) Soft clay w/ some sand			
120		10,14 27.20	SILTY SAND (SM) Light gray, well rounded			
			SILTY SAND (SM) Light gray, well rounded particles			
130						

Project: CIBA Miocene Well Installations
Project No.: 7740

Well/Boring: **MD-9**
Logged by: Casey Crow

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log (Counts per Second) 0 – 75 – 150
130		63, 150, 300, 207	SILTY SAND (SM) 50% recovery of spoon sample			
		27, 39, 43, 66	SAND (SW) Coarse sand, angular w/ some pebbles			
140		43, 68, 82, 84	SAND (SW) Light brown, coarse sand w/ some pebbles.			
150		38, 59, 73, 150	SAND (SW) Coarse sand w/ some pebbles, subrounded, no odor			
160						
170						
180						
190						
200						

ERM-SOUTHEAST **Drilling/Boring Log**

Sheet 4 of 4

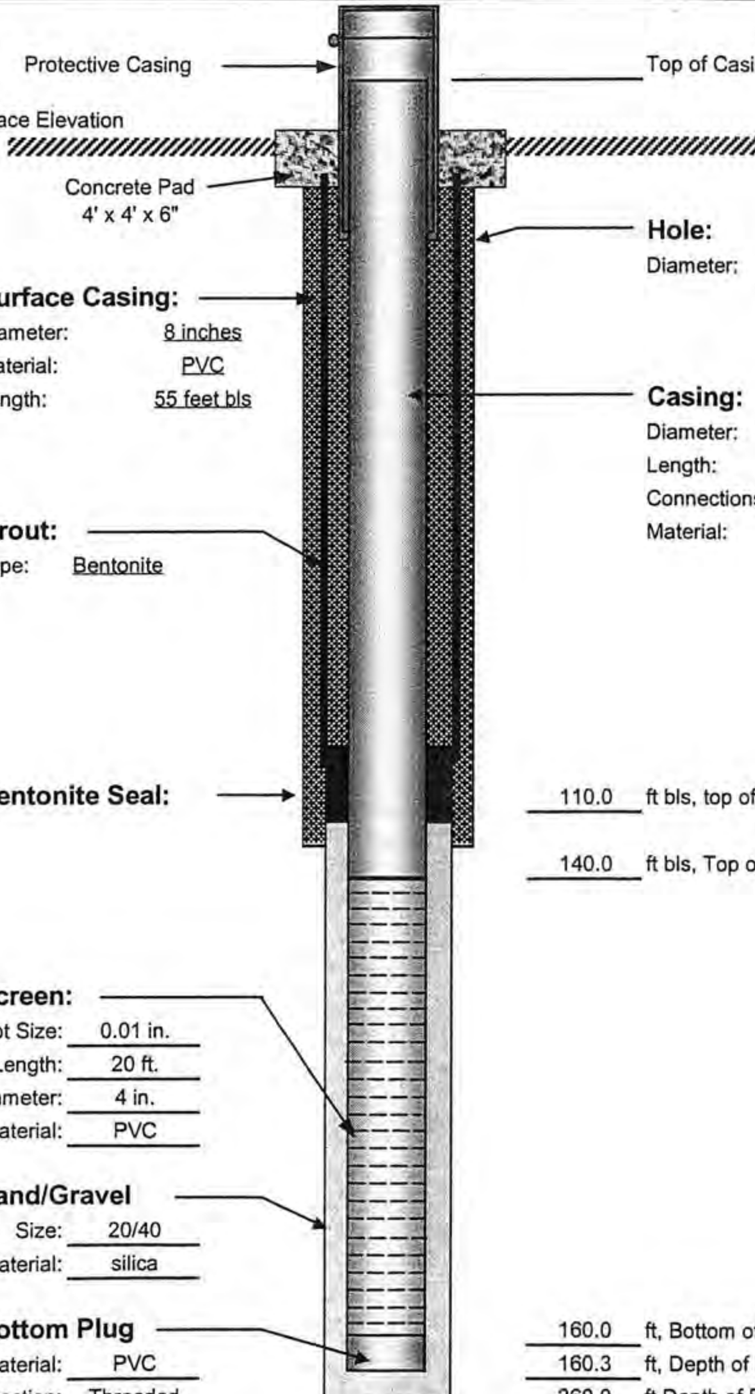
Project: CIBA Miocene Well Installations
Project No.: 7740

Well/Boring: **MD-9**
Logged By: Casey Crow

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log Counts per Second
200						
210						
220						
240						
260						

ERM | **Monitoring Well Schematic**

Project: CIBA Specialty Chemicals - Miocene well installations	Well/Boring No.: **MD-9**
Project No.: 7740	Drilling Supervisor: Jerry Beach
Boring Location: E4034.83, N-1457.85	Date(s): May 30 - June 5, 2001
Drilling Method: Mud Rotary	Drilling Contractor: Griner



Protective Casing

Top of Casing Elevation

Ground Surface Elevation

NOT TO SCALE

Concrete Pad
4' x 4' x 6"

Hole:
Diameter: 12 inches

Surface Casing:
Diameter: 8 inches
Material: PVC
Length: 55 feet bls

Casing:
Diameter: 4 inches
Length: 140 feet (BOC)
Connections: threaded
Material: PVC

Grout:
Type: Bentonite

Bentonite Seal:

110.0 ft bls, top of Sand

140.0 ft bls, Top of Screen

Screen:
Slot Size: 0.01 in.
Length: 20 ft.
Diameter: 4 in.
Material: PVC

Sand/Gravel
Size: 20/40
Material: silica

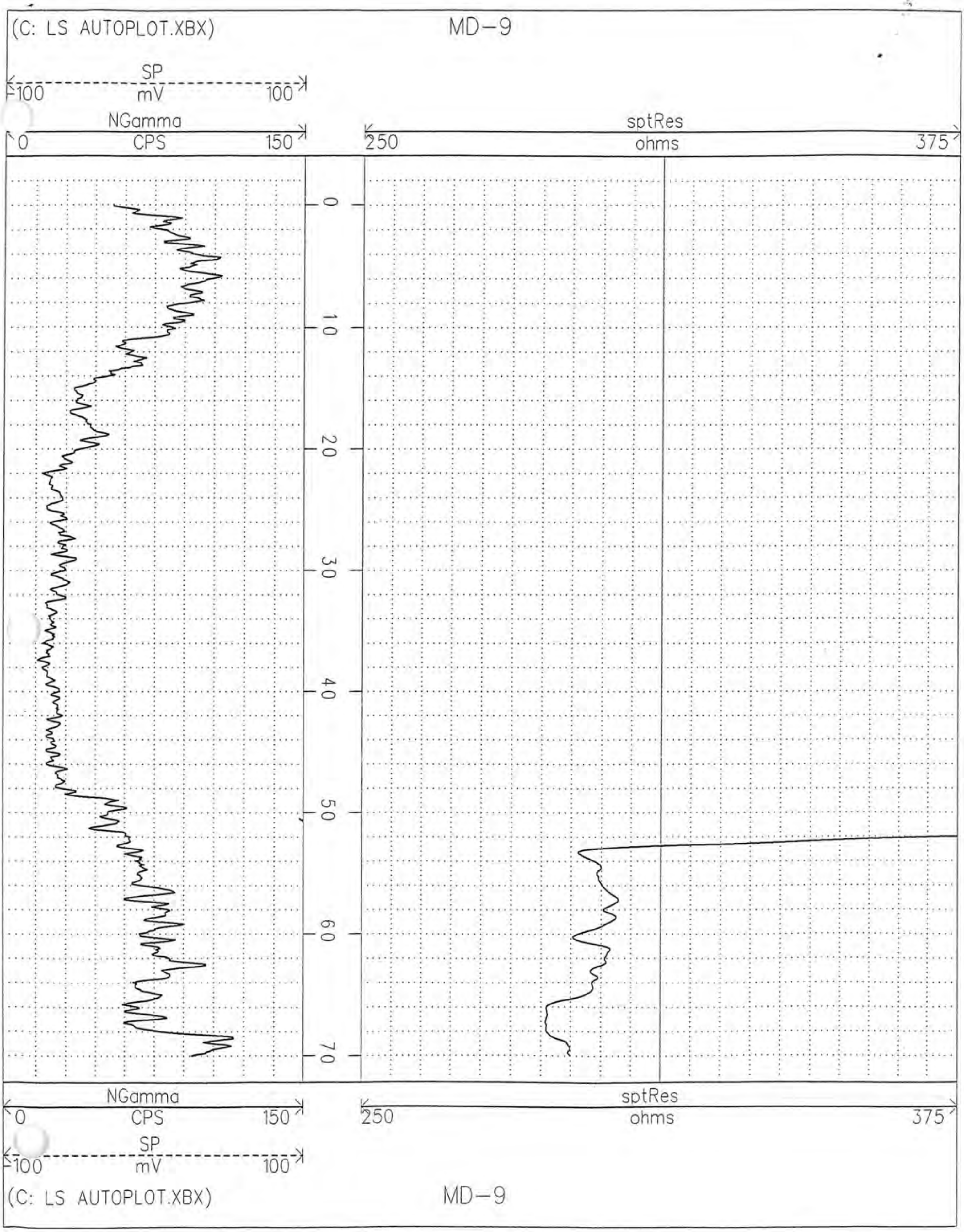
Bottom Plug
Material: PVC
Connection: Threaded

160.0 ft, Bottom of Lower Screen
160.3 ft, Depth of Bottom Plug
260.0 ft,Depth of Boring

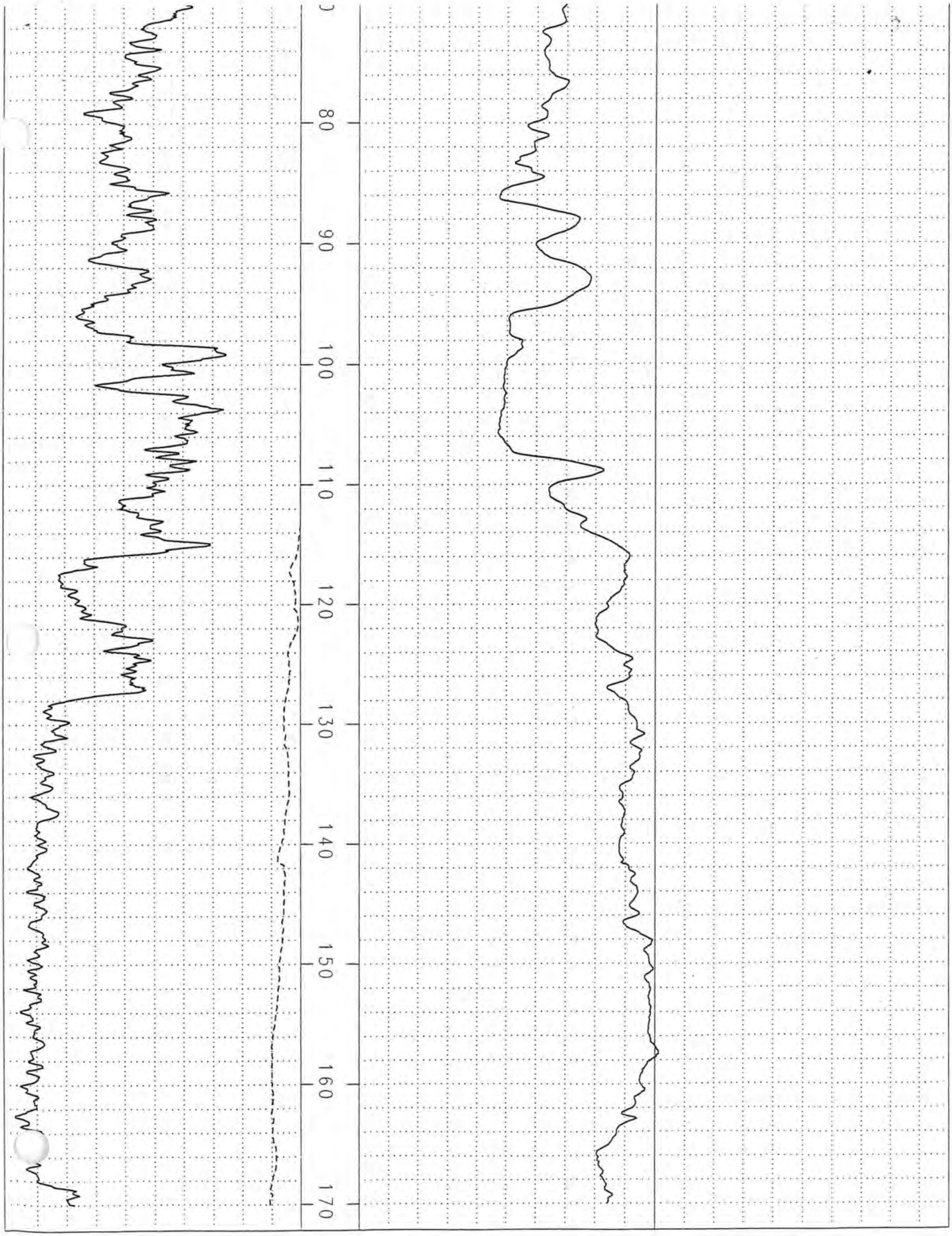
Depth from Surface

Comments: CPG = Ciba Plant Grid which is 2.15 ft below USGS datum.

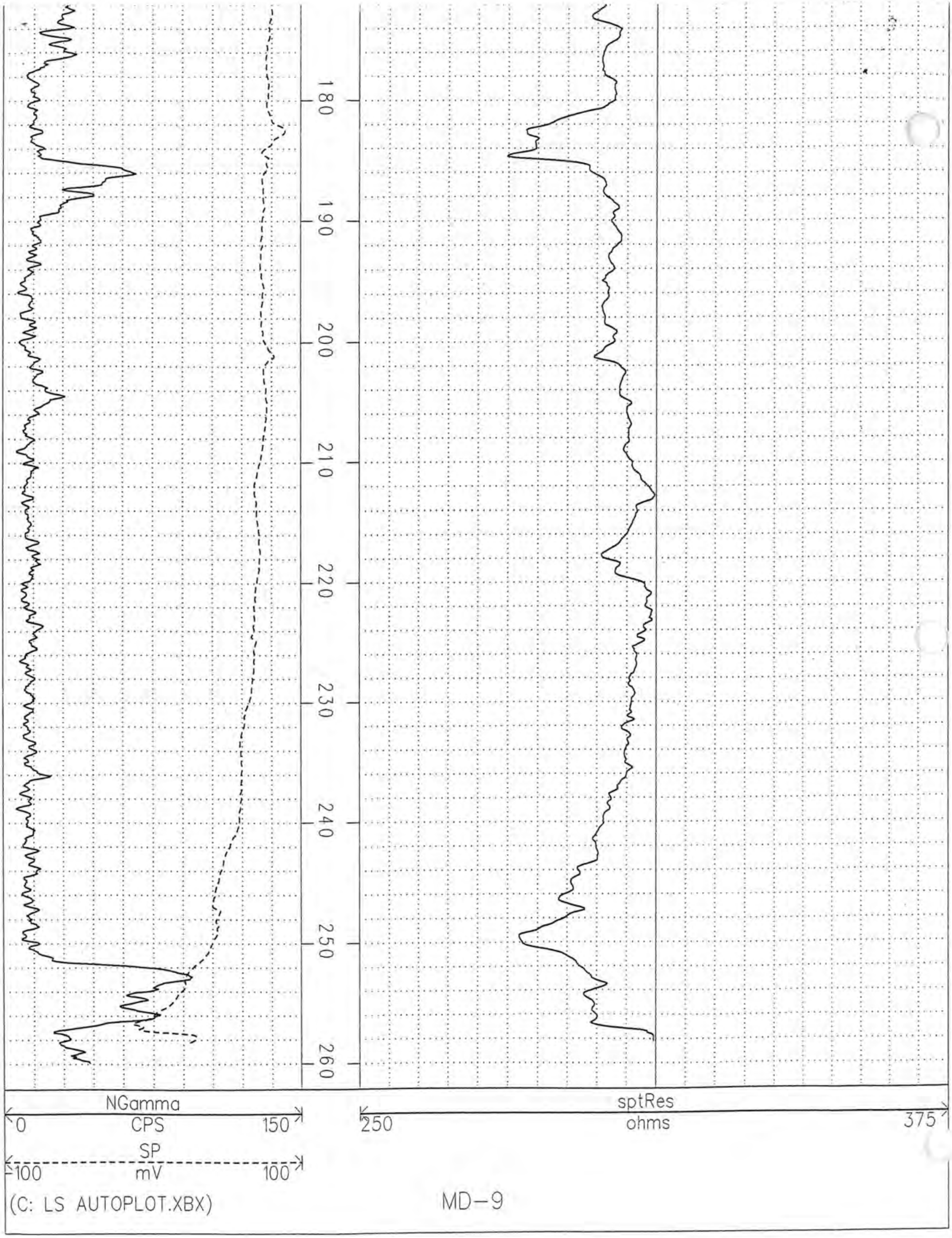
Feb-98



(C: LS AUTOPLOT.XBX)
MD-9
SP
-100 mV 100
NGamma
0 CPS 150
sptRes
250 ohms 375
0
10
20
30
40
50
60
70
NGamma
0 CPS 150
sptRes
250 ohms 375
SP
-100 mV 100
(C: LS AUTOPLOT.XBX)
MD-9

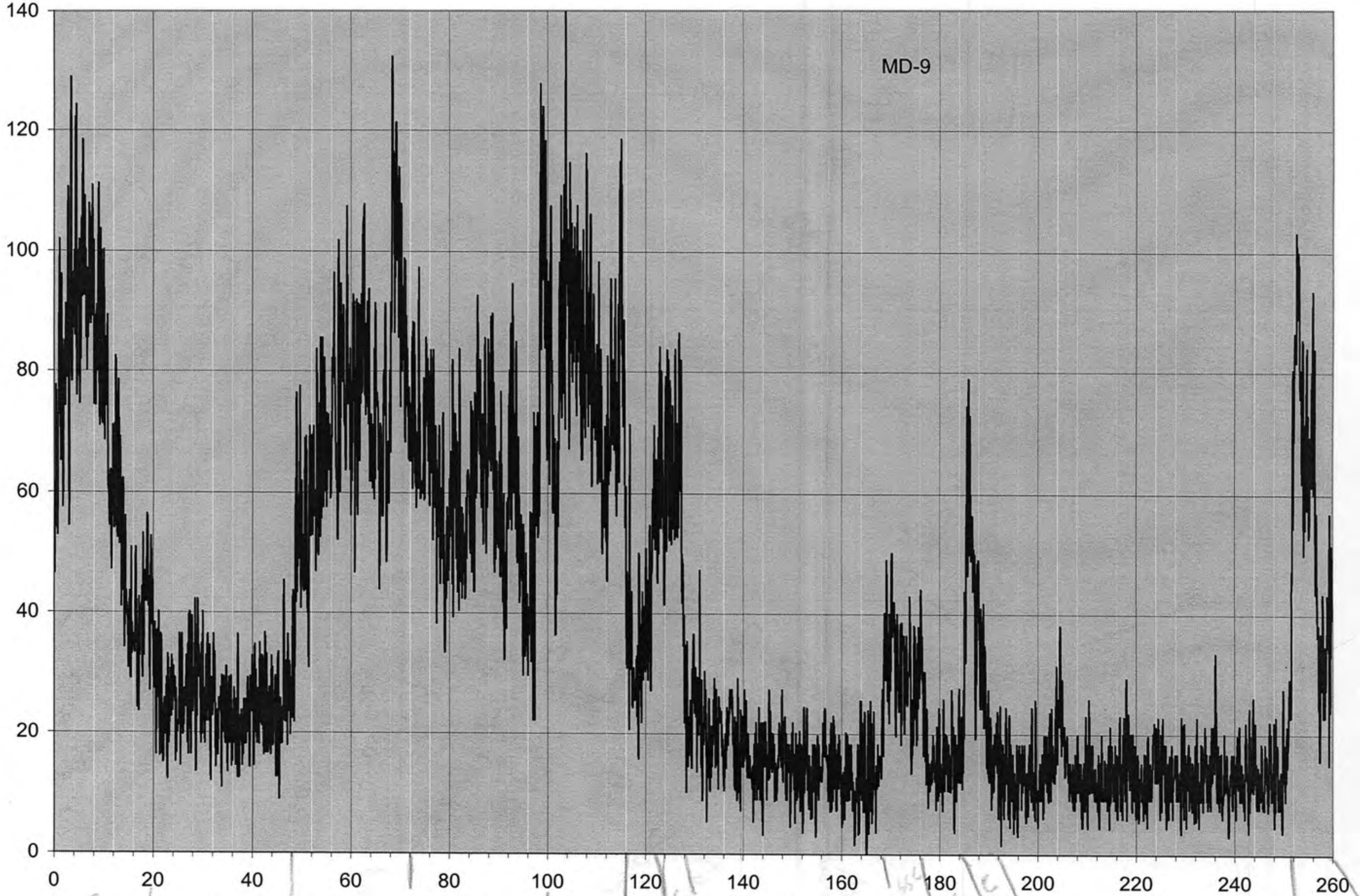


MD-9


180
190
200
210
220
230
240
250
260
NGamma
0
CPS
150
SP
-100
mV
100
sptRes
250
ohms
375
(C: LS AUTOPLOT.XBX)
MD-9

TOT Depth
260

TOT Depth
Screen
GSE = 24.2



C 20 S 48 C 72 SSC 100 C 116 S 124 C 128 S 168 176 S 184 C 191 252 C 260

ERM-SOUTHEAST — Drilling/Boring Log

Project: CIBA Miocene Well Installations

Sheet 1 of 4

Project No.: 7740 Logged by: Casey Crow

Well/Boring: **MD-10**

Well/Boring Location:

Date: June 13-15, 2001

Drilling Method: Mud rotary

Depth to Groundwater:

Elevations - Ground Surface:

Driller: Griner Drilling Service

Remarks:

Legend		
Sands-SW, SP		Gravels, GW, GP
Silts-ML, MH		Sands w/ fines-SM, SC
Clays-CL, CH		
Organic soils-PT		

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log, Counts per Second (0 – 75 – 150)
10						
20						
30						
40						
50						

ERM-SOUTHEAST — Drilling/Boring Log

Sheet 2 of 4

Project: CIBA Miocene Well Installations
Project No.: 7740

Well/Boring: **MD-10**
Logged By: Casey Crow

Depth, Ft-BGS	Blows	Lithologic Description
60		
70	22, 32, 53. 57	CLAY (CL) Olive gray, hard clay, some silt, no odor or staining.
80	14, 24, 36, 45	SILTY CLAY (CL) Olive gray w/ Fe deposits
90	9- 100	no penetration, 1' recovery, stiff clay Olive gray, bottom 2" had soft clay with some pebbles and shell mixture
100	22, 35, 54, 68	SANDY CLAY (CL) Olive gray, no odor, medium dense sand.
110	19, 28, 45, 65	CLAYEY SAND (SC) Olive gray, fine sand, some moisture, no odor, medium dense sand.
120	25, 35, 31, 46	CLAY (CL) Dark gray, hard clay w/ reddish brown streaking
130		

Graphical Logs: Strata, Well Construction

Gamma Log
Counts per Second
0 75 150

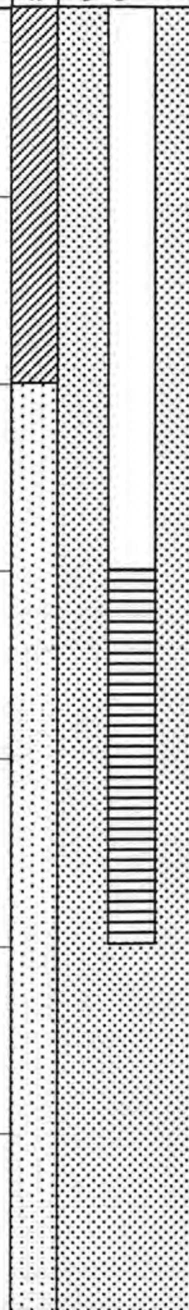
ERM-SOUTHEAST — Drilling/Boring Log

Project: CIBA Miocene Well Installations
Project No.: 7740

Well/Boring: **MD-10**
Logged By: Casey Crow

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description
130	■	9, 26, 27, 38	CLAY (CL) Dark gray, hard clay w/ reddish brown streaking
140	■	20, 28, 42, 42	CLAY (CL) Hard clay w/ a 3" layer of sandy clay @ about 141'
150	■	150, 152,	GRAVEL (GP) Pebbles w/ some sand, 50% recovery.
160			
170			
180			
190			
200			

Graphical Logs: Strata, Well Construction



Gamma Log
Counts per Second
0 75 150

Note: Not all portions of this form are applicable to all projects ####

ERM-SOUTHEAST **Drilling/Boring Log**

Project: CIBA Miocene Well Installations
Project No.: 7740

Well/Boring: **MD-10**
Logged By: Casey Crow

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log Counts per Second (0 – 75 – 150)
200						
210						
220						
230						
240						
250						

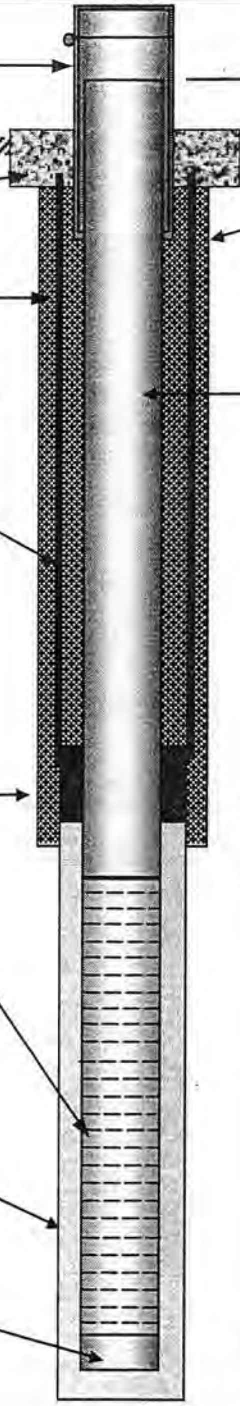
ERM **Monitoring Well Schematic**

Project: CIBA Specialty Chemicals - Miocene well installations Well/Boring No.: **MD-10**

Project No.: 7740 Drilling Supervisor: Jerry Beach

Boring Location: Date(s): June 12-15, 2001

Drilling Method: Mud Rotary Drilling Contractor: Griner



Protective Casing

Top of Casing Elevation

Ground Surface Elevation

NOT TO SCALE

Concrete Pad
4' x 4' x 6"

Hole:
Diameter: 12 inches

Surface Casing:
Diameter: 8 inches
Material: PVC
Length: 70 feet bls

Casing:
Diameter: 4 inches
Length: 160 feet (BOC)
Connections: threaded
Material: PVC

Grout:
Type: Bentonite

Bentonite Seal:

100.0 ft bls, top of Sand

160.0 ft bls, Top of Screen

Screen:
Slot Size: 0.01 in.
Length: 20 ft.
Diameter: 4 in.
Material: PVC

Sand/Gravel
Size: 20/40
Material: silica

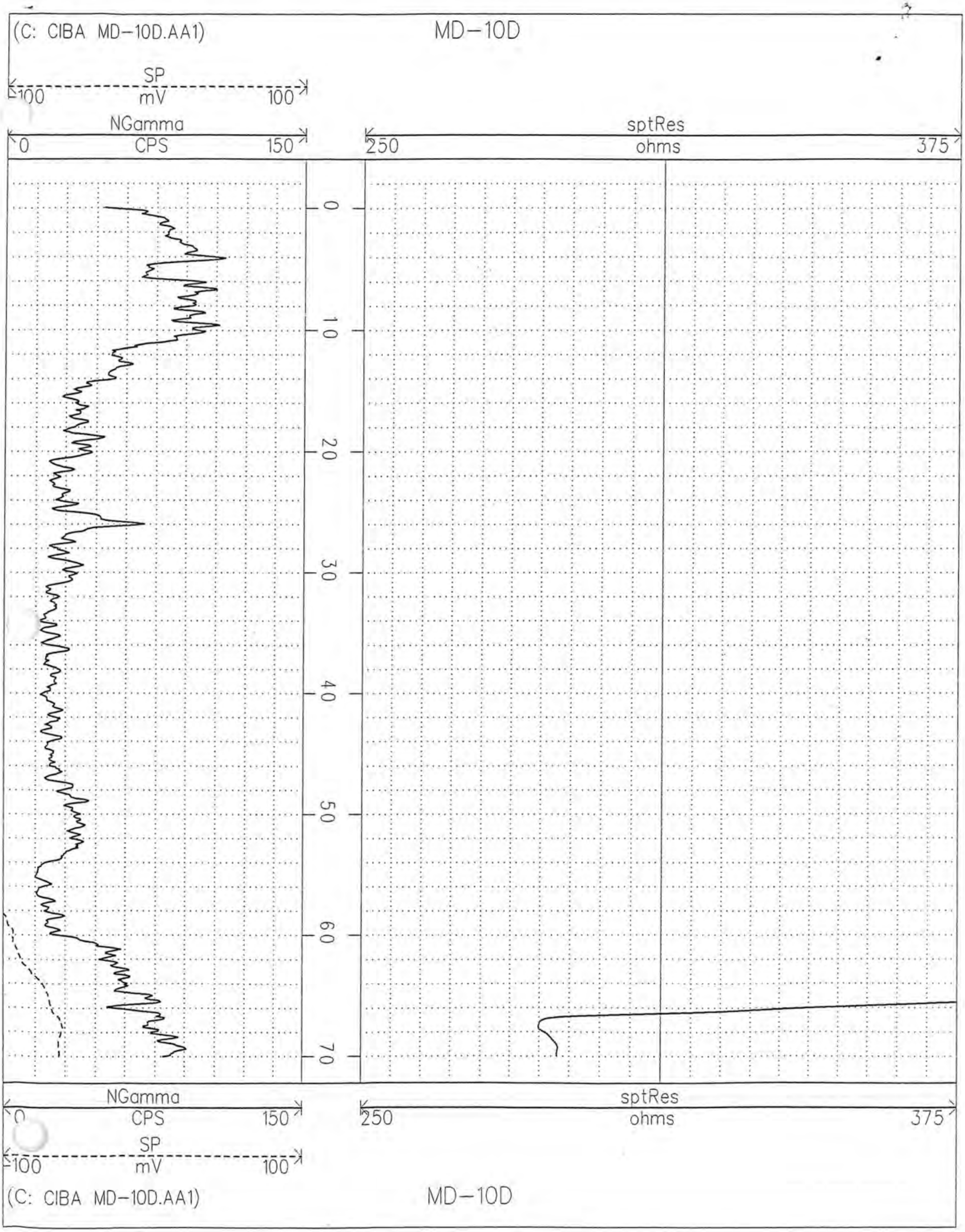
Bottom Plug
Material: PVC
Connection: Threaded

180.0 ft, Bottom of Lower Screen
180.3 ft, Depth of Bottom Plug
260.0 ft,Depth of Boring

Depth from Surface

Comments: CPG = Ciba Plant Grid which is 2.15 ft below USGS datum.

Feb-98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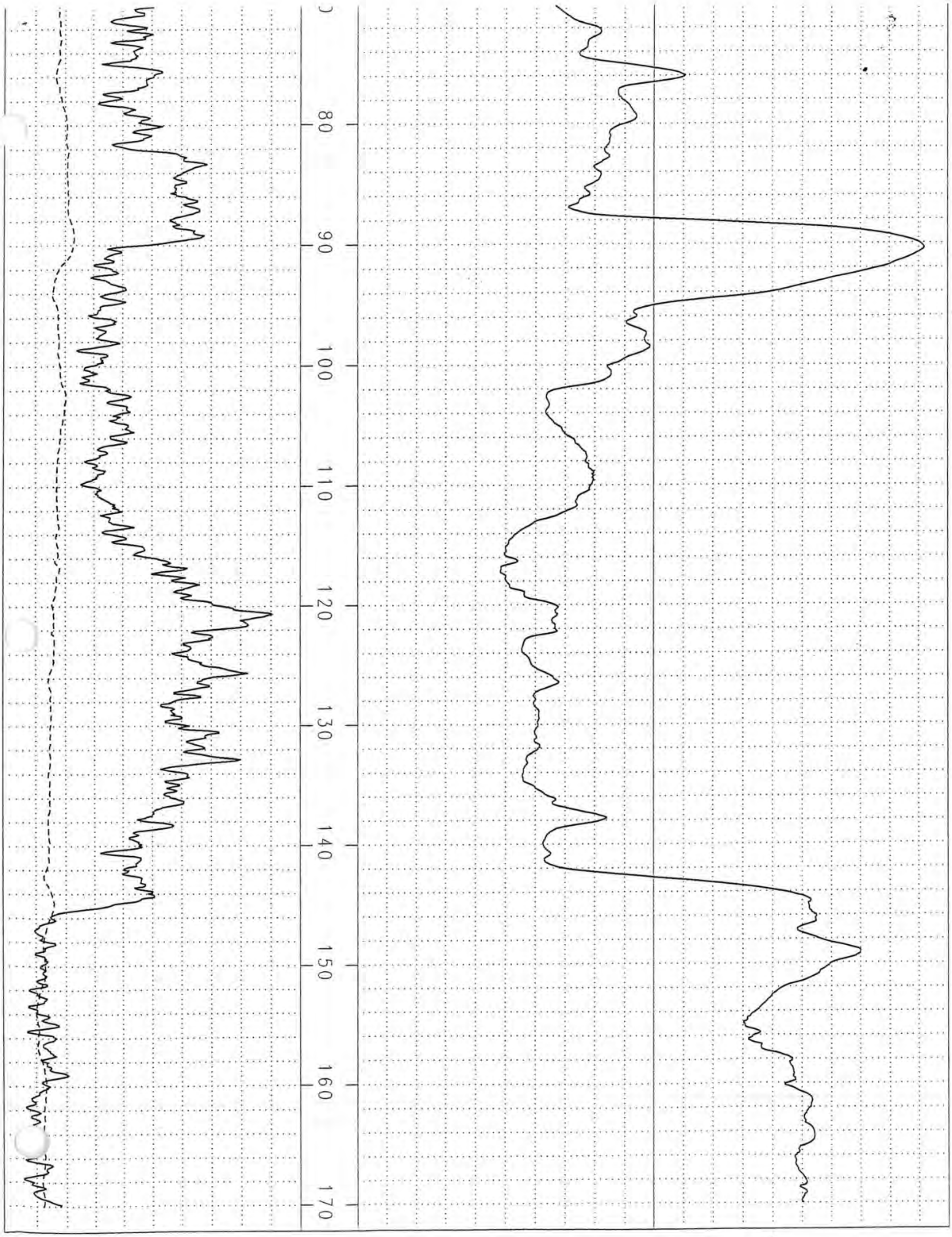
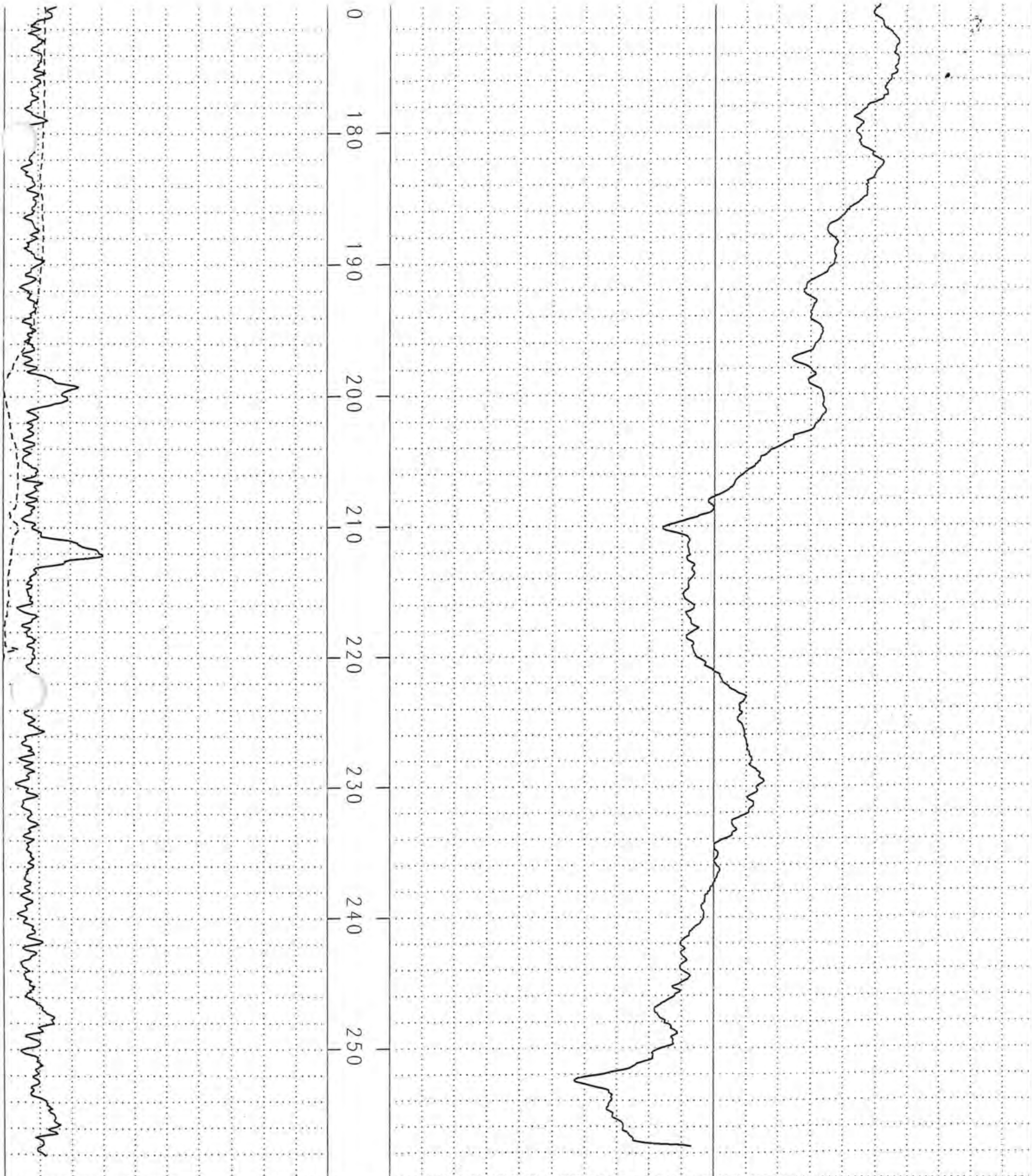
NGamma
0 CPS 150
sptRes
250 ohms 375
0
10
20
30
40
50
60
70
NGamma
0 CPS 150
sptRes
250 ohms 375
SP
-100 mV 100
(C: CIBA MD-10D.AA1)
MD-10D



MD-10

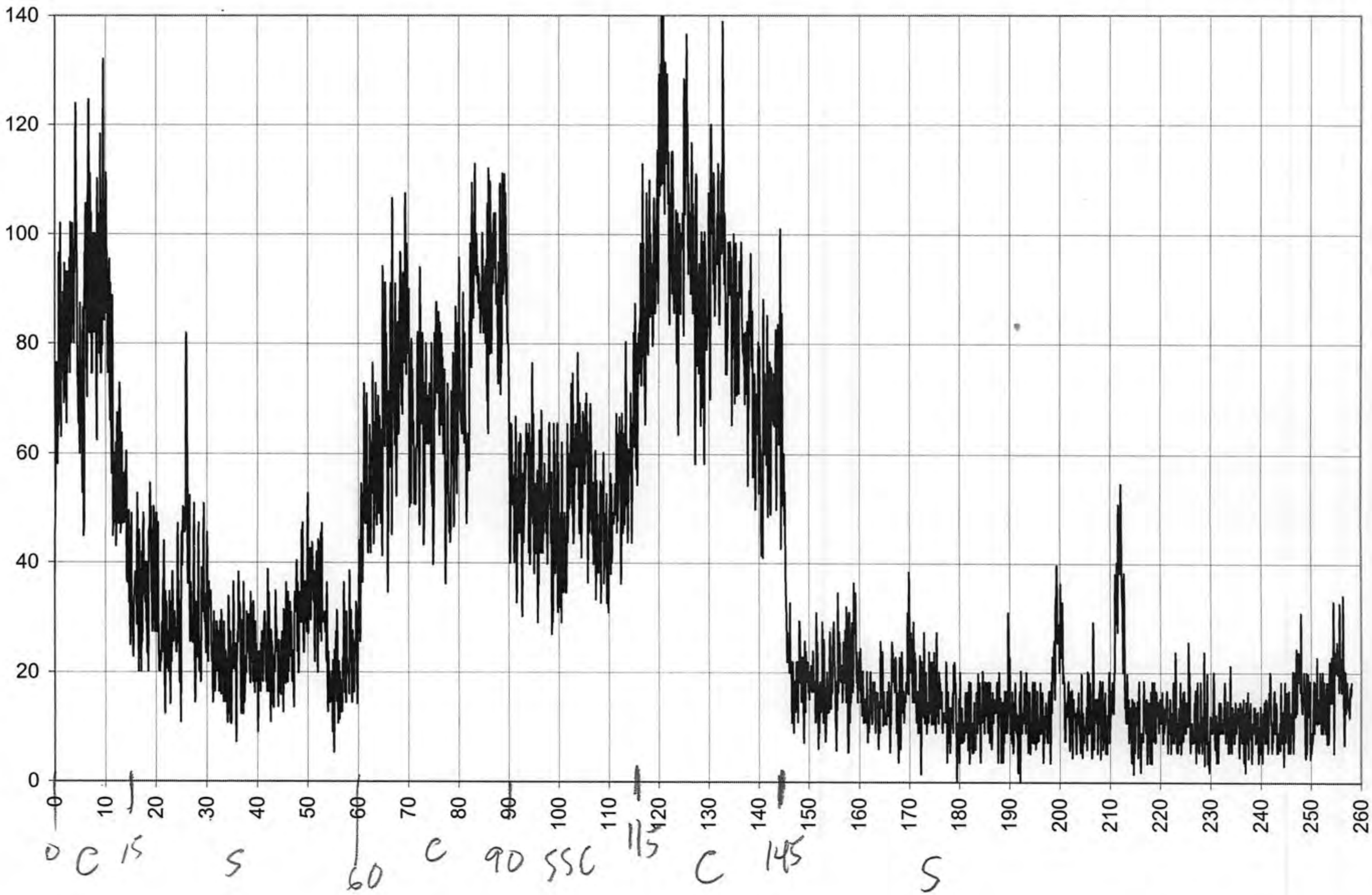


NGamma
CPS
0 150
SP
-100 mV 100
(C: CIBA MD-10D.AA1)

sptRes
ohms
250 375

MD-10D

MD-10



140
120
100
80
60
40
20
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30
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70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
0 C 15 S 60 C 90 SSC 115 C 145 S

CH2MHILL

PROJECT NUMBER: 359218.02.01	BORING NUMBER: MD-12 Sheet: 1 of 6

SOIL BORING LOG

PROJECT: Ciba Miocene Corrective Action LOCATION: Ciba - McIntosh, Alabama
ELEVATION: TBD DRILLING CONTRACTOR: WDC
DRILLING METHOD AND EQUIPMENT: Supersonic II - 4" Core Barrel 6" and 8" Override Casing
WATER LEVELS: 38.85' BTOC 6/4/08 START: 6/2/08 1435 FINISH: 6/3/08 0930 LOGGER: B. Snodsmith (AL PG #1071)

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Ground Surface	
0					**Sand with Clay** Brown and reddish brown, fine to medium quartz sand, subangular, up to 15% fines, moist to wet	
5					**Fat Clay** Brown, minor mottling-dark gray, brownish red, highly plastic, trace organics-wood/roots, soft	
10					- becoming more light gray with depth	
15					- increasing organics - 10-15% trace gravel	
					Organic Clay Fat clay, highly plastic, soft, dark gray to dark brown, highly organic-up to 50% wood, roots-up to 1 1/2" in diameter	
					Peat Dark brown, primarily organic material, undecomposed, wood/roots up to 80%	
20					**Fat Clay with Organics** Same as above but decreasing organics with depth	
					- organics <10%	
25						

CH2MHILL

PROJECT NUMBER: 359218.02.01	BORING NUMBER: MD-12 Sheet: 2 of 6

SOIL BORING LOG

PROJECT: Ciba Miocene Corrective Action **LOCATION:** Ciba - McIntosh, Alabama
ELEVATION: TBD **DRILLING CONTRACTOR:** WDC
DRILLING METHOD AND EQUIPMENT: Supersonic II - 4" Core Barrel 6" and 8" Override Casing
WATER LEVELS: 38.85' BTOC 6/4/08 **START:** 6/2/08 1435 **FINISH:** 6/3/08 0930 **LOGGER:** B. Snodsmith (AL PG #1071)

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Fat Clay with Sand Gray to dark gray, highly plastic, soft, sand-fine grained quartz, up to 15% organics-<10%, wood/roots	
					Same as above but sand 45% at 27.0-27.5'	
30					**Clayey Sand** Gray to dark gray, fine grain quartz, loose, trace glauconite, trace organics, fines-up to 30%	
					- large pieces of wood present	
					- grades between Clayey Sand and Sandy Clay as above	
35					**Clayey Sand** Dark greenish gray, fine to medium grained, quartz, loose, fines-up to 35%, trace organics	
					Fat Clay Dark gray, highly plasticity, firm	
40					- fines and clay interbeds decreasing in frequency	
					Sand with Clay Same as above but up to 15% clay	
45					- 6" clay bed as above	
					- 6" clay interbed as above	
50						

CH2MHILL

PROJECT NUMBER: 359218.02.01	BORING NUMBER: MD-12 Sheet: 3 of 6

SOIL BORING LOG

PROJECT: Ciba Miocene Corrective Action **LOCATION:** Ciba - McIntosh, Alabama
ELEVATION: TBD **DRILLING CONTRACTOR:** WDC
DRILLING METHOD AND EQUIPMENT: Supersonic II - 4" Core Barrel 6" and 8" Override Casing
WATER LEVELS: 38.85' BTOC 6/4/08 **START:** 6/2/08 1435 **FINISH:** 6/3/08 0930 **LOGGER:** B. Snodsmith (AL PG #1071)

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					- 6" clay interbed	
					3" highly organic sand	
55					**Clayey Sand** Same as above but up to 35% sand	
60					**Clay** Lean, gray, some brownish-red, tan mottling, very stiff to hard, dense	
					- minor Clayey Sand to Sandy Clay stringers, <1" thick throughout	
65						
70					**Clayey Sand** Gray, fine-grained, quartz, loose to firm, clay-up to 30%	
					Lean Clay (CL) Mottled brownish red, tan, light gray, very stiff to hard, dense	
75						

CH2MHILL

PROJECT NUMBER: 359218.02.01	BORING NUMBER: MD-12 Sheet: 4 of 6

SOIL BORING LOG

PROJECT: Ciba Miocene Corrective Action **LOCATION:** Ciba - McIntosh, Alabama
ELEVATION: TBD **DRILLING CONTRACTOR:** WDC
DRILLING METHOD AND EQUIPMENT: Supersonic II - 4" Core Barrel 6" and 8" Override Casing
WATER LEVELS: 38.85' BTOC 6/4/08 **START:** 6/2/08 1435 **FINISH:** 6/3/08 0930 **LOGGER:** B. Snodsmith (AL PG #1071)

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: NUMBER AND TYPE	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Clayey Gravel Gray to reddish brown, angular to subangular, shell fragments, up to 2" diameter, 20%-fine sand, 30%-clay	
					Clay with Sand Mottle reddish brown, tan, light gray, dense, very stiff to hard, up to 15% fine sand	
80					- becoming more sandy with depth, more gray/reddish brown mottling	
					Sandy Clay Same as above but sand increase to 40%	
85						- drive 8" temporary isolation casing to 85.0' bgs
					Sandy Clay Same but sand-fine, up to 30%, dark gray	
90					**Sandy Clay** Same as 86.0', begin at 89.0' bgs	
					Sandy Clay to Clayey Sand 3" thick, light gray, quartz sand, fine grained, up to 60% sand	
					Sand with Clay Light gray, fine to medium grained, quartz, minor shell fragments, loose, up to 10% fines	
95					**Clayey Sand** Light gray to gray, fine to medium grained, firm, up to 30% fines	6/2/08 - stop for day at 95.0' bgs
					Sand Grades from tan to mottled-tan, reddish tan, to gray, fine to medium grained, quartz, subangular to subround, few clay balls present-<10%, loose	continue on 6/3/08
100					**Clayey Sand** 6.0-12.0' zone grades in and out of sand	

CH2MHILL

PROJECT NUMBER: 359218.02.01	BORING NUMBER: MD-12 Sheet: 5 of 6

SOIL BORING LOG

PROJECT: Ciba Miocene Corrective Action **LOCATION:** Ciba - McIntosh, Alabama
ELEVATION: TBD **DRILLING CONTRACTOR:** WDC
DRILLING METHOD AND EQUIPMENT: Supersonic II - 4" Core Barrel 6" and 8" Override Casing
WATER LEVELS: 38.85' BTOC 6/4/08 **START:** 6/2/08 1435 **FINISH:** 6/3/08 0930 **LOGGER:** B. Snodsmith (AL PG #1071)

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: NUMBER AND TYPE	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Sand Light gray, fine to medium grained, quartz, subangular to subround, loose, few fines, trace feldspar and hematite sand grains	
105						
					- slightly more coarse - primarily medium grained sand - 108.0-110.0' bgs	
110					- fine to medium grained as 100.0'	
115					- trace shell fragments, up to 1/4" diameter	
120						
125						

CH2MHILL

PROJECT NUMBER: 359218.02.01	BORING NUMBER: MD-12 Sheet: 6 of 6

SOIL BORING LOG

PROJECT: Ciba Miocene Corrective Action **LOCATION:** Ciba - McIntosh, Alabama
ELEVATION: TBD **DRILLING CONTRACTOR:** WDC
DRILLING METHOD AND EQUIPMENT: Supersonic II - 4" Core Barrel 6" and 8" Override Casing
WATER LEVELS: 38.85' BTOC 6/4/08 **START:** 6/2/08 1435 **FINISH:** 6/3/08 0930 **LOGGER:** B. Snodsmith (AL PG #1071)

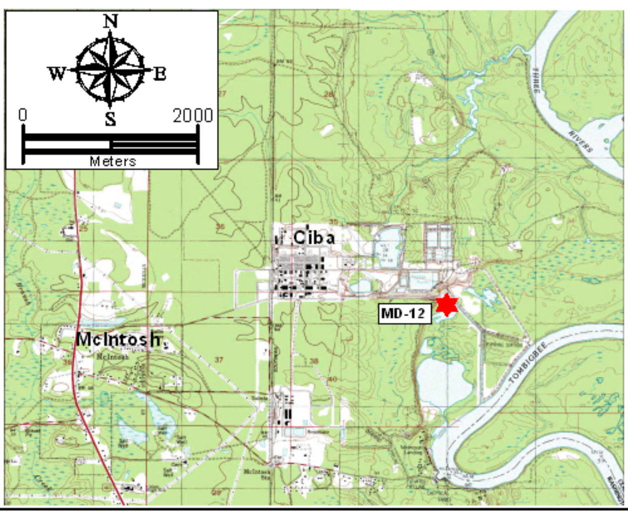
DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: NUMBER AND TYPE	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
					Sand Gray, fine to medium grained, well sorted, subangular to subrounded, loose, few fines - <10% trace, gravel-quartz, up to 1/2" diamter, subround, trace pyrite cemented sand/gravel	
130					3" thick - primarily sand as above but clay balls (approximately 15%) and gravel - up to 1" diameter present	
					Sand with Gravel Gray, medium grained, well sorted, quartz, subangular to subround, loose, few fines <10%, gravel-quartz, up to 1" diameter, subround, 10-15%	
135					End of boring at 135.0' performed gamma log	MD-12 Construction: Screen: 20.0', 0.010 Inch Slot Schedule 40 PVC 115.0-135.0' bgs Sand: 12/20 grade washed quartz 113-135 ft bgs Bentonite: 111.0-115.0' bgs Grout: 0-111.0' bgs Above grade completion
140						
145						
150						

Brown, Burdine & Associates, LLC
Environmental & Geological Consultants

90 NW Beal Parkway, Suite A-2
Fort Walton Beach, Florida
PH: 850-243-0072 FAX 850-243-0045

GEOPHYSICAL LOG

Owner: Ciba McIntosh
Client: WDC Exploration & Wells
Well I.D.: MD-12 Boring
County: Washington County
State: Alabama
Section: 33 **Township:** 4N **Range:** 1E
GPS Coordinates: N31° 16' 32.95" x W87° 59' 14.94"
(NAD83) UTM 16 406,007E x 3,460,595N



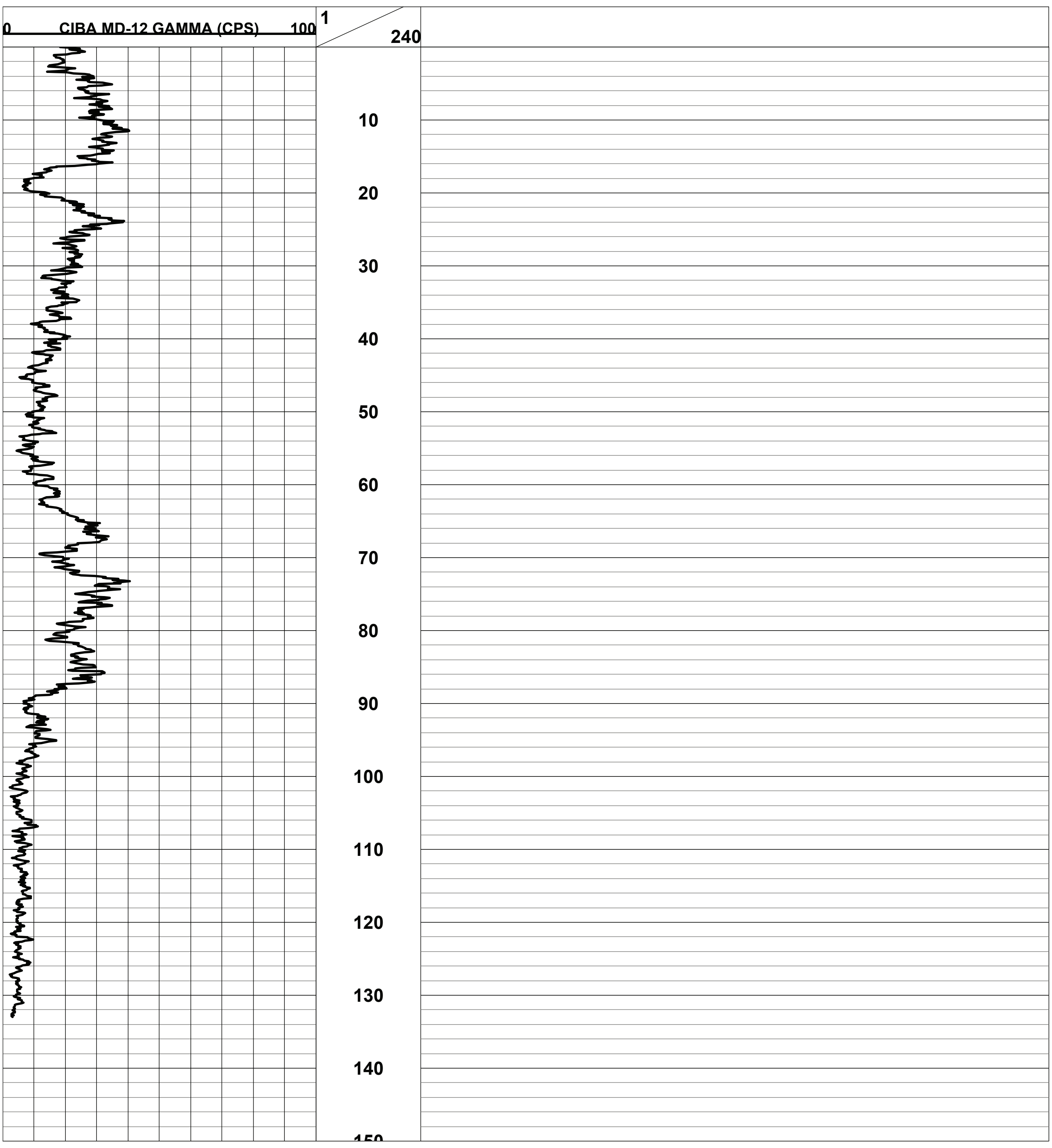
Location Description:

From intersection of State Rd (SR) 43 and Ciba Road Road (McIntosh, AL); follow Ciba Road 1.4 miles to Ciba entrance; MD-12 is located along Tombigbee River.

Logging Date:	04-Jun-2008	
Permanent Datum:	Ground Level, approx. +10 ft NGVD	
Logs Measured From:	Ground Level	
Drilling Measured From:	Ground Level	
Services:	Run 1: Gamma Only	
	Run 2: Gamma Only QC Run (0-50 ft)	
Depth Driller:	~135 ft bls	
Depth Logger:	133.40 ft bls	
Bottom Logged Interval:	133.00 ft bls	
Top Logged Interval:	0.0 ft bls	
Logger Depth Error:	Run 1: 0.0	Run 2: 0.0
Witnessed By:	Blake Snodsmith (CH2M Hill)	
Logged By:	Richard Burdine, PG (AL #1012): reviewed by Jeff Brown, PG (AL #762)	

Hole Conditions*		
	Drilling Method	Rotosonic
	Casing 1	Temporary 7 5/8" Steel to 85 feet bls*
	Casing 2	Temporary 5 7/8 " Steel to 135 feet bls*
	Open hole 1	---
	Open hole 2	---
	Salinity:	---
	Density:	---
	Level:	Partially water-filled casing

Equipment:	Mount Sopris 4MXC-1000 Winch with 1000 meters of 1/8" (0.125mm) single conductor cable
	Mount Sopris MGX II Console
	Mount Sopris probes:
	2PGA-1000: Natural Gamma, SP, Single Point Resistance
	2PEA-1000 8/16/32/64" Normal Resistivity
	2SFA-1000 Temperature-Fluid Resistivity
	2PCA-1000 Caliper
	MSLog - Log Acquisition Software & WellCad V2.5
Notes / Remarks:	* Per conversation with driller
	GPS coordinates by hand-held GPS unit
	API Gamma ~ CPS Gamma x 1.3
	Drilling



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LOG OF BORING MD-13

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

(installed on adjacent OLIN property)

Date Started : 03/21/12
Date Completed : 03/28/12
Drilling Method : Sonic
Drilling Contractor : Major Drilling
Logged By : C. Behnke

Total Depth : 285'
Depth to water (bgs) : ~21'

Well: MD-13
Elev.:

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	DESCRIPTION
0		12'/15'	0.0 / 0.1	moist		Topsoil, organic matter. (0.2')
					CL	Orange / gray firm CLAY. (6')
					CL	Gray CLAY with orange mottling. (1.2')
					SP	Gray / brown very fine SAND, trace clay. (0.8')
					SP	Gray / brown very fine SAND, some orange mottling present. (1.8')
					SP	Gray fine SAND with some very fine sand. (2')
						No Recovery
15		5.4'/20'	0.0 / 0.0		SP	Same as above, some black streaks in sand. (0.9')
				wet	ML	Brown SILT with clay. (1.0')
				moist	SP	Gray / white fine SAND. (1.9')
					SP	Light brown fine SAND. (0.8')
					SP	Brown / orange fine SAND with clay, trace fine gravel and silt. (8")
						No Recovery
35		18.3'/20'	0.0 / 0.0		SW	Gray / brown fine to medium SAND, trace coarse SAND. (8')
				wet	SP	Brown / orange medium SAND, some coarse sand and fine gravel. (4.5')
					SP	Orange coarse SAND with medium sand and fine gravel. (1.2')
				moist	CL	

Riser
Steel Casing
Cement Grout

LOG OF BORING MD-13

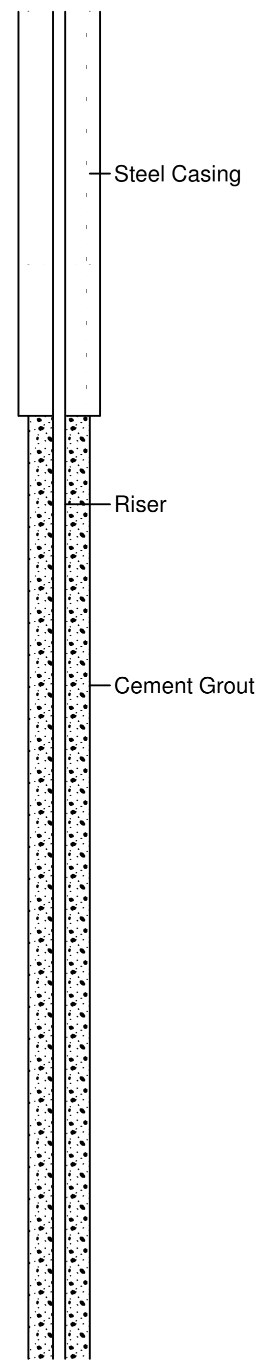
BASF
1379 Ciba Road
McIntosh, Alabama, 36553

(installed on adjacent OLIN property)

Date Started	: 03/21/12	Total Depth	: 285'
Date Completed	: 03/28/12	Depth to water (bgs)	: ~21'
Drilling Method	: Sonic		
Drilling Contractor	: Major Drilling		
Logged By	: C. Behnke		

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	DESCRIPTION
50		18.3'/20'	0.0 / 0.0	moist	CL	
						Gray very fine to fine SAND, orange layers visible. (0.5')
					CL	Hard gray CLAY. (0.8')
						No Recovery
55		16.6/10'	0.0 / 0.0		CL	Blue / gray to brown firm CLAY. (5.5')
60					CL/SP	Gray very fine SAND. (0.1')
						Gray CLAY and very fine SAND. (0.7')
					CL	Firm gray / blue CLAY, trace silt. (3.7')
65		20'/20'	0.0 / 0.0	moist	CL	Gray CLAY, some very fine sand. Penetrometer= 2.25. (6.1')
70					CL	Brown / gray stiff CLAY. Penetrometer= >4.5. (8.6')
75						
80					CL	Gray stiff CLAY. Penetrometer= 4.0. (4.6')
					CL/SP	Gray stiff very fine SAND/CLAY. (0.7')
85		5.6'/5'	0.0 / 0.0		CL	Gray firm CLAY with very fine sand. Penetrometer= 2.25. (1.5')
					CL	Hard gray / brown CLAY. Penetrometer= 4.5. (3.5')
90		8.8'/5'	0.0 / 0.0		CL	Very hard gray / brown CLAY. Penetrometer= 4.5. (5')
95		20'/20'	0.0 / 0.0		CL	Very hard blue / gray CLAY, some brown streaks within clay. Penetrometer= >4.5. (20')
100						

Well: MD-13
Elev.:



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LOG OF BORING MD-13

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

(installed on adjacent OLIN property)

Date Started	: 03/21/12				
Date Completed	: 03/28/12		Total Depth	: 285'	
Drilling Method	: Sonic		Depth to water (bgs)	: ~21'	
Drilling Contractor	: Major Drilling				
Logged By	: C. Behnke				

Well: MD-13
Elev.:

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	DESCRIPTION
100–115		20'/20'	0.0 / 0.0		CL	
115–120		12'/10'	0.0 / 0.0		CL	Blue / gray soft CLAY with fine to very fine sand. (5')
120–125					CL	Blue / gray very hard CLAY with brown streaks. (5')
125–128.4		21.3'/20'	0.0 / 0.0	moist	CL	Blue-gray / brown hard CLAY. Penetrometer= 3.5. (3.4')
128.4–138.4					CL	Blue-gray / red hard CLAY. Penetrometer= 3.75. (10')
138.4–142.7					CL	Very hard gray CLAY. Penetrometer= >4.5. (4.3')
142.7–143.9					CL	Softer gray clay with very fine sand. Penetrometer= 2.25. (1.3')
143.9–145					CL	Very hard gray CLAY. Penetrometer= >4.5. (1.1')
145–150		20'/20'	0.0 / 0.0		CL	Blue-gray soft CLAY with brown streaking. (16')

Depth scale: 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150

Well construction: Riser; Cement Grout

LOG OF BORING MD-13

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BASF
1379 Ciba Road
McIntosh, Alabama, 36553

(installed on adjacent OLIN property)

Date Started : 03/21/12
Date Completed : 03/28/12
Drilling Method : Sonic
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Logged By : C. Behnke

Total Depth : 285'
Depth to water (bgs) : ~21'

Well: MD-13
Elev.:

Depth in Feet: 150, 155, 160, 165, 170, 175, 180, 185, 190, 195, 200

Sample Type	Recovery (in.)	PID (ppm)	Moisture Content
	20'/20'	0.0 / 0.0	moist
	15'/20'	0.1 / 0.2	
Attempted GW Sample 185'-189' no yield	13.4'/15'	0.0 / 0.0	wet
GW Sample 192'-194'			moist

USCS	DESCRIPTION
CL	
CL	Blue-gray soft CLAY with some fine to very fine sand. (4')
CL	Gray CLAY, moderate stiffness. (3')
CL/ML	Gray CLAY/SILT with fine sand. (3.1')
ML	Gray SILT with fine to very fine sand, trace clay. (0.8')
CL	Gray CLAY with silt and fine to very fine sand. (0.8')
CL/ML	Gray CLAY/SILT with fine to very fine sand. (1.9')
ML	Gray SILT with fine to very fine sand, trace clay. (2.4')
SP	Gray fine SAND, trace silt. (1.8')
	Gray very fine SAND, hard packed. (0.5')
SP	Gray fine to very fine SAND. (0.7')
	No Recovery.
SP	Light brown fine to medium SAND. (2.5')
SP	Gray fine to medium SAND, trace silt and fine gravel. (9.9')
CL	Firm gray CLAY, trace very fine SAND. (1')
	No Recovery

Riser

Cement Grout

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LOG OF BORING MD-13

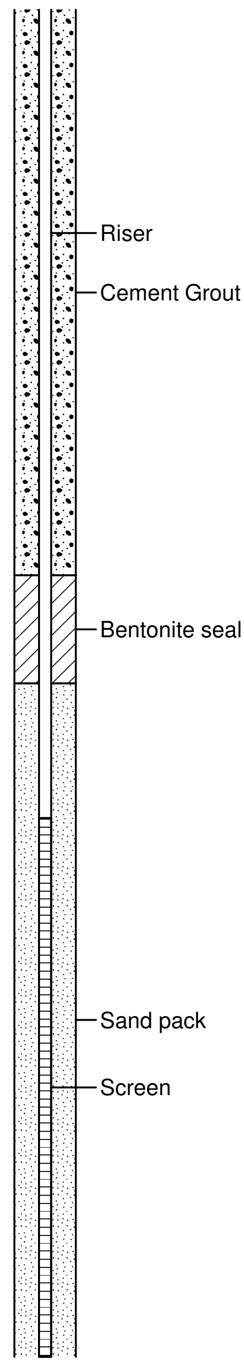
BASF
1379 Ciba Road
McIntosh, Alabama, 36553

(installed on adjacent OLIN property)

Date Started	: 03/21/12	Total Depth	: 285'
Date Completed	: 03/28/12	Depth to water (bgs)	: ~21'
Drilling Method	: Sonic		
Drilling Contractor	: Major Drilling		
Logged By	: C. Behnke		

Well: MD-13
Elev.:

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	DESCRIPTION
200–205		7.3'/5'	0.0 / 0.0	moist	CL	Blue-gray hard CLAY with very fine sand. (5')
205–215		12.2'/10'	0.0 / 0.0	moist	CL	Blue-gray CLAY with very fine sand and silt. (1.1')
					SP	Blue-gray very fine, tight SAND with silt and clay. (1.7')
					SP	Blue-gray CLAY. (0.4')
					CL	Blue-gray very fine to fine sand. (0.7')
					ML/CL	Gray firm CLAY. (1.9')
					CL	Gray SILT/CLAY. (1')
						Firm gray CLAY. (3.3')
215–230		11'/15'	0.0 / 0.0	wet	SP	Dark gray fine SAND. (0.9')
					SP	Light gray medium SAND, some fine sand. (5.5')
					GP	Fine GRAVEL with medium to coarse sand and silt. (1.6')
						No Recovery.
						No Recovery
230–245	GW Sample 230'-234'	14'/15'	0.0 / 0.9	wet	SW	Fine to medium SAND, trace coarse sand and fine gravel, trace silt. (8')
						No Recovery.
	GW Sample 245'-247'					No Recovery
245–250		14.3'/15'	0.0 / 0.0	wet	SP	Light gray fine to medium SAND. (14')



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LOG OF BORING MD-13

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BASF
1379 Ciba Road
McIntosh, Alabama, 36553

(installed on adjacent OLIN property)

Date Started	: 03/21/12	Total Depth	: 285'
Date Completed	: 03/28/12	Depth to water (bgs)	: ~21'
Drilling Method	: Sonic		
Drilling Contractor	: Major Drilling		
Logged By	: C. Behnke		

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	DESCRIPTION
250–255		14.3'/15'	0.0 / 0.0	wet	SP	
				moist		Gray CLAY / very fine SAND with fine gravel. (0.3')
260						No Recovery
		12.2'/15'	0.0 / 0.0	wet	SP	Gray fine to medium SAND with silt. (4.8')
265					CL	Gray CLAY, penetrometer= 1.5. (0.8')
					SP	Gray coarse SAND with some medium sand. (2.2')
				moist	CL	Soft gray CLAY with black organic matter, very fine sand and fine gravel. (0.8')
						Gray very fine to fine SAND. (0.2')
270					CL	Hard gray CLAY, penetrometer= >4.5. (2')
					CL	Very hard gray/red CLAY, penetrometer= >4.5. (1.4')
						No Recovery
275–285		10'/10'	0.0 / 0.0	moist/dry	CL	Very hard gray / red CLAY, penetrometer= >4.5. (10')

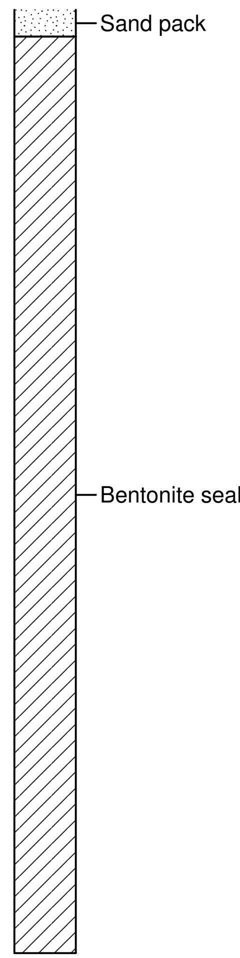
End of Boring

6" steel casing set from 65' below grade to surface to isolate overlying aquifer.

Screened from 230' to 250' using 2" 10-slot PVC. 2" PVC riser from 230 to surface. Bentonite chips added from 285' to 251'. Sand pack installed from 251' to 225'. Bentonite chips (hydrated) from 225' to 221' with cement grout from 221' to surface.

2" schedule 80 PVC riser with pro-top set 2.85' above grade with (4) concrete filled bumper posts set around the well.

Well: MD-13
Elev.:



LOG OF BORING MD-14

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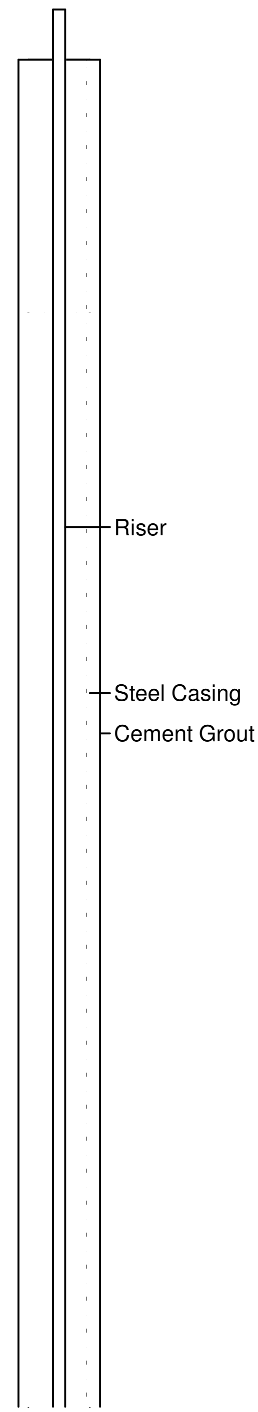
BASF
1379 Ciba Road
McIntosh, Alabama, 36553

(installed on adjacent OLIN property)

Date Started	: 03/5/12
Date Completed	: 03/20/12
Drilling Method	: Sonic
Drilling Contractor	: Major Drilling
Logged By	: C. Behnke
Total Depth	: 300'
Depth to water (bgs)	: ~15'

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
0		7.4'/15'	0.0 / 0.0	dry/moist	CL		Stiff gray CLAY with orange mottling. Penetrometer= 3.75. (4.6')
5				moist	CL		Slightly softer gray CLAY with orange mottling. Penetrometer= 2.75. (1.8')
					CL		Gray CLAY with fine gray sand. Penetrometer=2.0. (1')
10							No Recovery
15		7.5'/20'	0.0 / 0.2	wet	SW		Light brown fine to coarse SAND, some gray CLAY present. (1.3')
				moist	SW		Light brown fine to coarse SAND. (0.7')
				moist/dry	SP		Light brown to white medium SAND with some black grains. (3.5')
20					SP		Very light brown to white medium SAND. (2')
25							No Recovery
30							
35		20'/20'	0.0 / 0.0	moist	SP		Medium to coarse light brown SAND. (3.5')
					SP		Same as above with some fine gravel. (0.9')
40					SP		Very light brown to white medium SAND. (1.1')
					SP		Very light brown to white very fine SAND. (1')
45					SP		Very light brown to white medium SAND. (7.5')
50					SP		Soft gray CLAY with some orange mottling. (0.1')

Well: MD-14
Elev.:



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LOG OF BORING MD-14

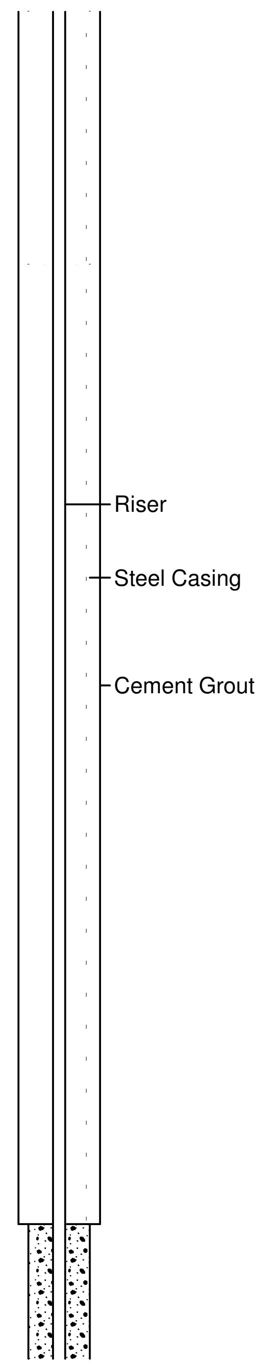
BASF
1379 Ciba Road
McIntosh, Alabama, 36553

(installed on adjacent OLIN property)

Date Started	: 03/5/12		
Date Completed	: 03/20/12	Total Depth	: 300'
Drilling Method	: Sonic	Depth to water (bgs)	: ~15'
Drilling Contractor	: Major Drilling		
Logged By	: C. Behnke		

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
50		20'/20'	0.0 / 0.0	moist	SP		
55		20'/20'	0.0 / 0.0	moist	SP		Very light brown to white medium to coarse SAND. Some fine rounded gravel present. (6')
60			0.0 / 0.9		SP		Brown medium SAND with angular coarse sand. Rounded fine gravel from 64' to 67.5'. (6.5')
65					CL		Stiff gray CLAY. (0.7')
					SP/CL		Brown/gray medium SAND with clay. (3.2')
70					SP		Gray very fine SAND with some clay. (4')
75		20'/20'	0.0 / 0.0	moist/dry	CL		Very hard gray CLAY, penetrometer= >4.5. (14')
80							
85				moist	CL		Soft gray CLAY with very fine sand. Penetrometer= <1.0. (0.5')
90				moist/dry	CL		Very hard gray CLAY, penetrometer= >4.5. (5')
							Very fine gray SAND with gray clay. (0.2')
95		20'/20'	0.3 / 0.3	moist	CL		Very hard CLAY, trace very fine sand. Penetrometer= >4.5. (0.3')
							Stiff gray CLAY, very hard. (9.4')
100							

Well: MD-14
Elev.:



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LOG OF BORING MD-14

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

(installed on adjacent OLIN property)

Date Started	: 03/5/12		
Date Completed	: 03/20/12	Total Depth	: 300'
Drilling Method	: Sonic	Depth to water (bgs)	: ~15'
Drilling Contractor	: Major Drilling		
Logged By	: C. Behnke		

Well: MD-14
Elev.:

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
100		20'/20'	0.3 / 0.3	moist	CL		
105					SP		Gray very fine to fine SAND, trace to some clay present. (6.2')
110					CL		Gray stiff CLAY with very fine to fine sand. (4.4')
115		18'/20'	0.0 / 0.0	wet	SP		Gray very fine to fine SAND, trace gray clay. (4')
120				wet/moist	SP		Gray fine to medium SAND. (4')
							Gray very fine SAND. (0.5')
125					SP		Gray fine to medium SAND. (2.2')
				moist			Brown fine to medium SAND. (0.2')
130					CL		Hard gray CLAY with fine to very fine, 0.1' sand layers @127.8, 129' and 131'. (7.1')
							No Recovery
135		10'/10'	0.0 / 0.0		CL		Blue/green stiff CLAY, trace fine sand with some brown streaks. Penetrometer= >4.5. (2.7')
					CL		Brown stiff CLAY with red streaks. Penetrometer= >4.5. (2')
140					CL		Gray/brown stiff CLAY, penetrometer= 4.0. (4.2')
					CL		Brown fine to medium SAND, wet. (0.1')
145		10'/10'	0.0 / 0.0	moist	CL		Gray/brown/green hard CLAY, penetrometer= >4.5. (1')
					CL		Blue/gray CLAY, trace very fine sand. Penetrometer= 3.75. (2')
150					CL		Hard blue/gray CLAY with brown streaking. Penetrometer= 4.25. (2')

Riser

Cement Grout

04-23-2012 S:\CIBMCI\2012\Boring Logs\MD-14.BOR

LOG OF BORING MD-14

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

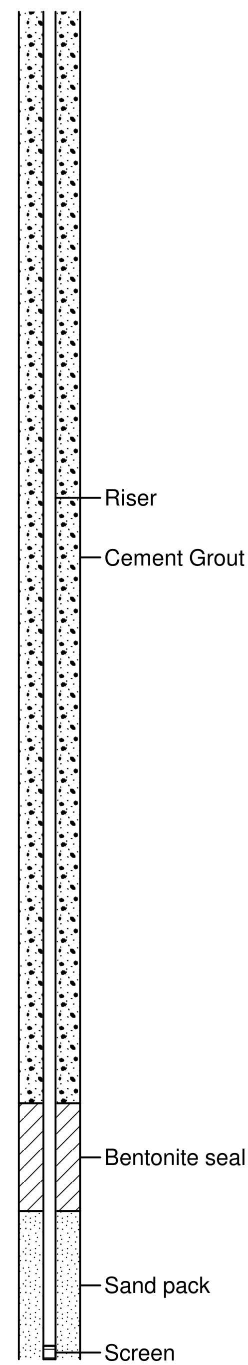
(installed on adjacent OLIN property)

Date Started : 03/5/12
Date Completed : 03/20/12
Drilling Method : Sonic
Drilling Contractor : Major Drilling
Logged By : C. Behnke

Total Depth : 300'
Depth to water (bgs) : ~15'

Well: MD-14
Elev.:

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	DESCRIPTION
150–155		10'/10'	0.0 / 0.0	moist	CL	
155–160		5'/10'	0.0 / 0.0	moist/dry	CL	Gray/red CLAY, same as above. (5')
160–165						No Recovery
165–175		10'/10'			CL	Very hard gray CLAY. (10')
175–185		10'/10'			CL	Blue/gray very hard CLAY with red and brown streaks. Penetrometer= >4.5. (10')
185–189.5		10'/10'	0.1 / 0.1	moist	CL	Same CLAY as above. (4.5')
189.5–191.3					CL	Blue/gray CLAY with very fine to fine sand. (1.8')
191.3–195				wet	SP	Blue/gray very fine SAND, trace fine sand and clay. (3.7')
195–200	GW Sample 195'-200'	14'/15'	0.3 / 1.5		SP	Gray/brown fine to very fine SAND, trace clay. (6')



LOG OF BORING MD-14

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BASF
1379 Ciba Road
McIntosh, Alabama, 36553

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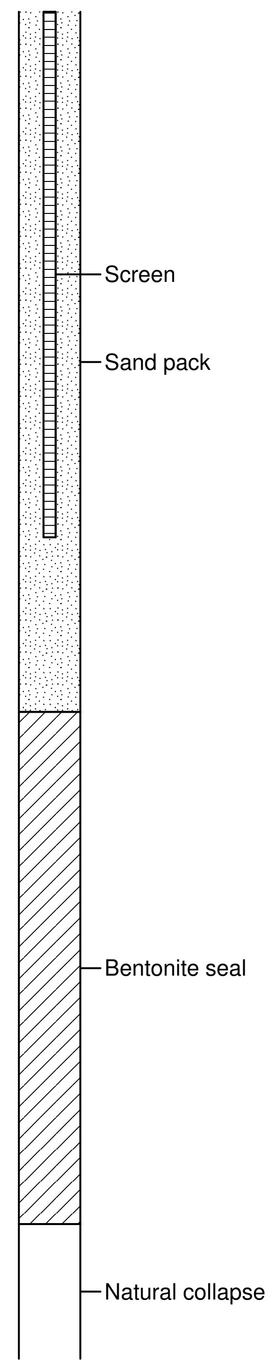
Drilling Method	: Sonic
Drilling Contractor	: Major Drilling
Logged By	: C. Behnke
Total Depth	: 300'
Depth to water (bgs)	: ~15'

Well: MD-14
Elev.:

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	DESCRIPTION
200		14'/15'			SP	
200–210		14'/15'	0.3 / 0.3		SP	Gray fine to very fine SAND. (8')
210–222.6	GW Sample 210'-215'	15'/15'	0.0 / 0.0		SP	Gray fine to medium SAND. (12.6')
222.6		15'/15'	0.0 / 0.0			Gray fine to medium SAND with fine gravel. (0.5')
223–225		15'/15'	0.0 / 0.0	moist	CL	Hard gray/green CLAY with very fine sand. Penetrometer= 4.0. (1.9')
225–230		15'/15'	0.0 / 0.0			Gray fine to medium SAND, carrydown. (4.8')
230–232		15'/15'	0.0 / 0.0	moist/dry	CL	Hard gray CLAY, trace very fine SAND. (2.1')
232		15'/15'	0.0 / 0.0	moist/dry		Gray very fine SAND. (0.05')
232–233		15'/15'	0.0 / 0.0	moist/dry	CL	Hard gray CLAY, trace very fine sand. (1.2')
233–236		15'/15'	0.0 / 0.0	moist	SP	Blue/gray very fine, very tight SAND with clay. (2.65')
236–238		15'/15'	0.0 / 0.0	moist	CL	Blue/gray hard CLAY with brown and orange streaks. (2.1')
238		15'/15'	0.0 / 0.0	moist/wet		Dark gray soft CLAY with very fine sand. (0.3')
239		15'/15'	0.0 / 0.0	moist	CL	Hard dark gray CLAY. (0.2')
240		15'/15'	0.0 / 0.1		CL	Dark gray very fine SAND with soft clay. (0.4')
241		15'/15'	0.0 / 0.1	wet	SP	Dark gray CLAY, moderate stiffness. (1.2')
242–243		15'/15'	0.0 / 0.1	wet	SP	Firm gray/brown CLAY. (0.8')
244–246		15'/15'	0.0 / 0.1	wet	ML/SP	Fine to coarse gray SAND with fine gravel, trace clay and silt. (1.0')
246		15'/15'	0.0 / 0.1	wet		Firm, moist gray CLAY with very fine sand. (0.3')
247–250		15'/15'	0.0 / 0.1	wet	SP	Gray fine SAND. (1.6')
250		15'/15'	0.0 / 0.1	wet		Brown, moist firm CLAY. (0.4')



LOG OF BORING MD-14

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

(installed on adjacent OLIN property)

Date Started	: 03/5/12				
Date Completed	: 03/20/12	Total Depth	: 300'		
Drilling Method	: Sonic	Depth to water (bgs)	: ~15'		
Drilling Contractor	: Major Drilling				
Logged By	: C. Behnke				

Well: MD-14
Elev.:

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
250–255		15'/15'	0.0 / 0.1	wet	SP		
255–270	GW Sample 255'-260'	0'/15'					No Recovery. Rig chatter from 260' to 270', possibly a gravel zone. Upon removal of sample barrel, we measured down to the bottom of the borehole. A void space extends beyond the end of the bit to 276.5'.
270–276.5	GW Sample 270'	9.5'/15'	0.2 / 1.0				Void Space.
276.5–285				wet	SP		Gray fine SAND, trace silt and medium sand. Initially there was no recovery, then we raised the sample barrel to the beginning of the interval and re-advanced it to 285'. (9.5')
285–300	GW Sample 285'-288'	11.6'/15'	0.2 / 0.8		SP		Gray fine SAND, trace medium sand and silt. (11.6')

Natural collapse

LimnoTech
Water | Environment | Scientists | Engineers

LOG OF BORING MD-14

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

(installed on adjacent OLIN property)

Date Started	: 03/5/12		
Date Completed	: 03/20/12	Total Depth	: 300'
Drilling Method	: Sonic	Depth to water (bgs)	: ~15'
Drilling Contractor	: Major Drilling		
Logged By	: C. Behnke		

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION	Well: MD-14 Elev.:
300							End of Boring. 6" steel casing set from 95' below grade to surface to isolate overlying aquifer. Natural collapse from 300' to 245' below grade. Set 2" PVC 10-slot screen from 199.5 to 219.5'. Added bentonite chips from 245' to 226', then sand pack from 226' to 194.5'. Bentonite chips (hydrated) from 194.5' to 190.5', with cement grout from 190.5' to surface. 2" schedule 80 PVC riser with pro-top set 3' above grade with (4) concrete filled bumper posts set around the well.	
305								
310								
315								
320								
325								
330								
335								
340								
345								
350								

WELL LOG, WELL NO. MW-1

Owner: Ciba-Geigy

Well Location: McIntosh, Alabama

Date Started: 10/13/81
Completed: 10/15/81

Depth (in feet)	Description
0 - 5	Silty clay, stiff, mottled, light brown, light gray, moderately red.
5 - 10	As above.
10 - 15	Sand, loose, grayish orange, well sorted, medium grained.
15 - 20	Sand, loose, multicolored, poorly sorted, very coarse grained - coarse grained.
20 - 35	Sand, loose, light brown, poorly sorted, medium grained - coarse grained.

WELL LOG, WELL NO. MW - 2

Owner: Ciba-Geigy

Well Location: McIntosh, Alabama

Date Started: 10/13/81
Completed: 10/20/81

Depth (in feet)	Description
0 - 5	Silty clay, stiff, medium yellowish brown, sandy in parts.
5 - 10	Silty clay, stiff, medium brown, some black carbonaceous material.
10 - 15	Silty clay, stiff, light brown, light gray, some black carbonaceous material.
15 - 20	Silty clay, stiff, mottled, light brown, light gray, moderately red.
20 - 25	Sand, loose, light brown, well sorted, medium grained.
25 - 30	Sand, loose, light brown, poorly sorted, fine grained - coarse grained.
30 - 38	Sand, loose, pale yellowish brown, medium grained - very coarse grained.

WELL LOG, WELL NO. MW - 3

Owner: Ciba-Geigy

Well Location: McIntosh, Alabama

Date Started: 10/13/81
Completed: 10/21/81

Depth (in feet)	Description
0 - 5	Clayey siltstone, stiff, mottled, light brown, light gray, moderate red, very silty, sandy in parts.
5 - 10	Clayey siltstone, stiff, mottled, light brown, light gray, moderate red, very silty, sandy in parts.
10 - 15	Sand, loose, grayish orange, well sorted, medium grained.
15 - 20	Sand, loose, grayish orange, well sorted, medium grained.
20 - 22	Sand, loose, pale yellowish brown, poorly sorted, medium grained - coarse grained.
22 - 25	Sand, loose, multicolored, very coarse grained, with some clay.
25 - 30	Sand, loose, pale yellowish brown, poorly sorted, medium grained - very coarse grained.
30 - 35	Sand, loose, pale yellowish brown, well sorted, medium grained.
35 - 40	Sand, loose, pale yellowish brown, poorly sorted, medium grained - coarse grained.

WELL LOG, WELL NO. MW-4

Owner: Ciba-Geigy

Well Location: McIntosh, Alabama

Date Started: 10/13/81
Completed: 10/22/81

Depth (in feet)	Description
0 - 5	Silty clay, stiff, mottled, light gray, light brown moderate red.
5 - 10	Silty clay, stiff, mottled, light gray, light brown moderate red.
10 - 15	Silty clay, stiff, light gray, light brown.
15 - 20	Silty clay, stiff, light gray, light brown, very silty, sandy in part.
20 - 25	Sand, loose, light brown, well sorted, coarse grained to very coarse grained.
25 - 30	Sand, loose, light brown, coarse grained.
30 - 35	Sand, loose, pale yellowish brown, poorly sorted, fine to medium grained.
35 - 40	Sand, loose, pale yellowish brown, fine grained.

WELL LOG, WELL NO. MW - 5

Owner: Ciba-Geigy

Well Location: McIntosh, Alabama

Date Started: 10/14/81
Completed: 10/22/81

Depth (in feet)	Description
0 - 5	Silty clay, stiff, mottled, light brown, light gray, moderately red.
5 - 10	Silty clay, stiff, mottled, light brown, light gray, moderately red.
10 - 15	Silty clay, stiff, mottled, light brown, light gray, moderately red.
15 - 20	Silty clay, stiff, mottled, light brown, light gray, moderately red.
20 - 25	Silty clay, stiff, mottled, light brown, light gray, moderately red.
25 - 30	Silty clay, stiff, mottled, light brown, light gray, moderately red.
30 - 35	Clayey, siltsone, stiff, mottled, light brown, light gray, moderately red.
35 - 40	Sand, loose, light brown, well sorted, fine grained.
40 - 45	Sand, loose, light brown, poorly sorted, fine - medium grained.
45 - 50	Sand, loose, light brown, poorly sorted, fine - very coarse grained.

WELL LOG, WELL NO. MW - 6

Owner: Ciba-Geigy

Well Location: McIntosh, Alabama

Date Started: 10/14/81
Completed: 10/23/81

Depth (in feet)	Description
0 - 5	Silty clay, stiff, mottled, light brown, light gray, moderate red.
5 - 10	Silty clay, stiff, mottled, light brown, light gray, moderate red.
10 - 15	Silty clay, stiff, mottled, light brown, light gray, moderate red.
15 - 19	Silty clay, stiff, mottled, light brown, light gray, moderate red.
19 - 25	Silty clay, stiff, dark yellowish brown, light gray.
25 - 30	Silty clay, stiff, dark yellowish brown, light gray.
30 - 35	Sand, loose, light brown, fine - medium grained, coarse grained in parts.
35 - 40	Sand, loose, light brown, fine - medium grained, coarse grained in parts.
40 - 45	Sand, loose, light brown, fine - medium grained, coarse grained in parts.
45 - 50	Sand, loose, light brown, fine - medium grained, coarse grained in parts.

WELL LOG, WELL NO. MW - 7

Owner: Ciba-Geigy

Well Location: McIntosh, Alabama

Date Started: 10/14/81
Completed: 10/23/81

Depth (in feet)	Description
0 - 5	Silty clay, stiff, mottled, light gray, light brown, moderate red.
5 - 10	Silty clay, stiff, mottled, light gray, light brown, moderate red.
10 - 15	Silty clay, stiff, mottled, light gray, light brown, moderate red.
15 - 19	Silty clay, stiff, mottled, light gray, light brown, moderate red.
19 - 25	Silty clay, stiff, mottled, light brown, light gray, very silty.
25 - 30	Silty clay, stiff, mottled, dark yellowish brown, light gray, very silty.
30 - 35	Sand, loose, olive gray, poorly sorted, fine - medium grained.
35 - 40	Sand, loose, light brown, poorly sorted, fine - medium grained.
40 - 45	Sand, loose, light brown, poorly sorted, fine - medium grained.
45 - 50	Sand, loose, light brown, poorly sorted, fine - medium grained.

WELL LOG, WELL NO. MW - 8

Owner: Ciba-Geigy

Well Location: McIntosh, Alabama

Date Started: 10/14/81
Completed: 10/26/81

Depth (in feet)	Description
0 - 5	Silty clay, stiff, mottled, light gray, light brown, moderately red, some organics.
5 - 10	As above.
10 - 15	Silty clay, stiff, mottled, light gray, light brown.
15 - 19	As above.
19 - 25	As above and very silty.
25 - 30	Sand, loose, light brown, well sorted, very coarse grained.
30 - 35	Sand, loose, light gray, poorly sorted, fine grained - coarse grained, abundant phosphate.
35 - 40	Sand, loose, light brown, poorly sorted, fine grained - coarse grained, trace phosphate.
45 - 45	As above.

LITHOLOGIC LOG

Well MW-9

Owner: Ciba Geigy
Well Location: McIntosh, Alabama
Date Started: 8/4/82
Date Completed: 8/4/82

Depth (in feet)	Description
0 - 5	Silty clay, mottled, light brown, light gray, moderately red.
5 - 10	80 percent silty clay as above; 20 percent sand, loose, well sorted, fine grained.
10 - 15	Sand, loose, multicolored, poorly sorted, fine to medium grained.
15 - 20	As above.
20 - 25	As above.
25 - 30	Sand, loose, multicolored, well sorted, medium grained.

Total Depth: 30 feet.

MW9, MW-10, MW-11

June 30, 1982

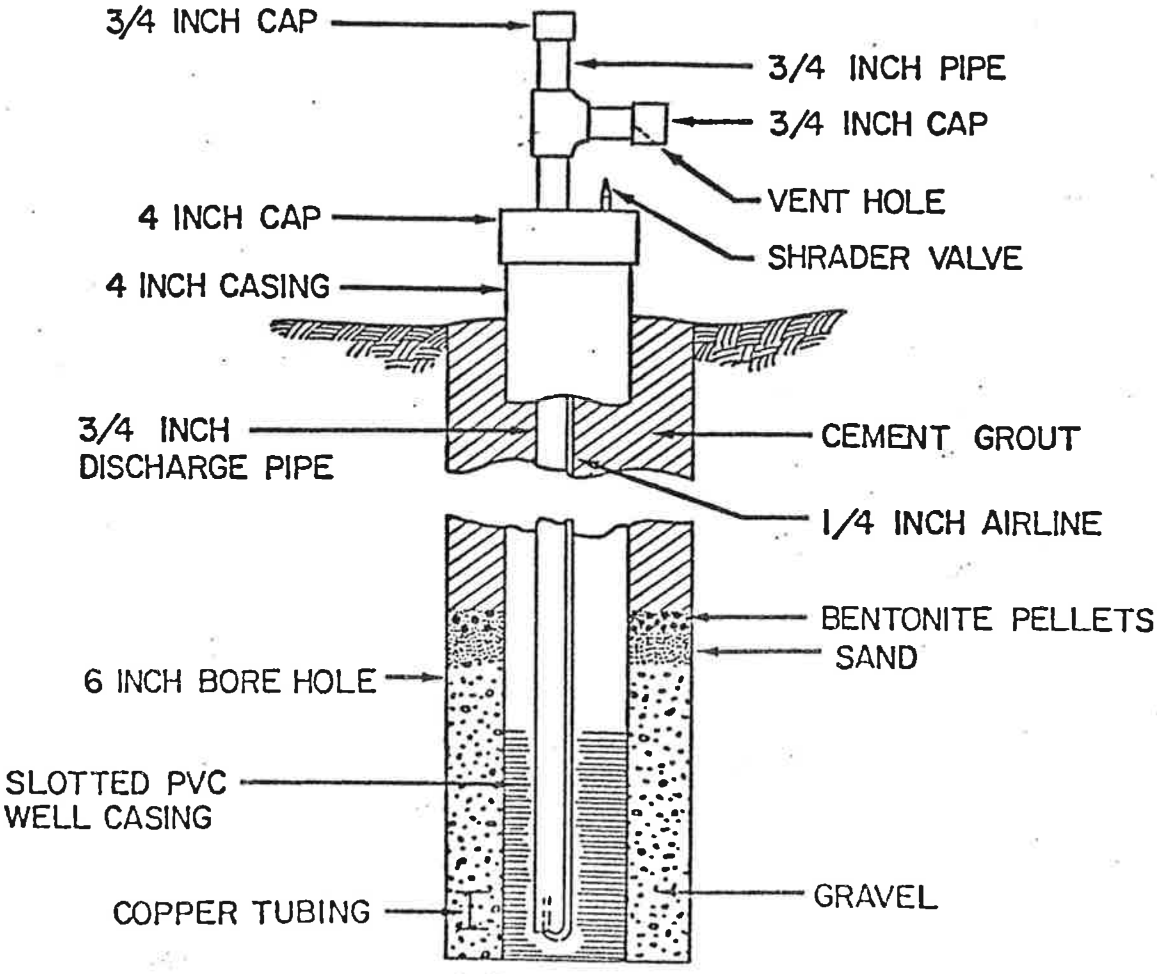


Figure 5. Generalized Diagram of the Airlift Sampling Device.

June 30, 1982

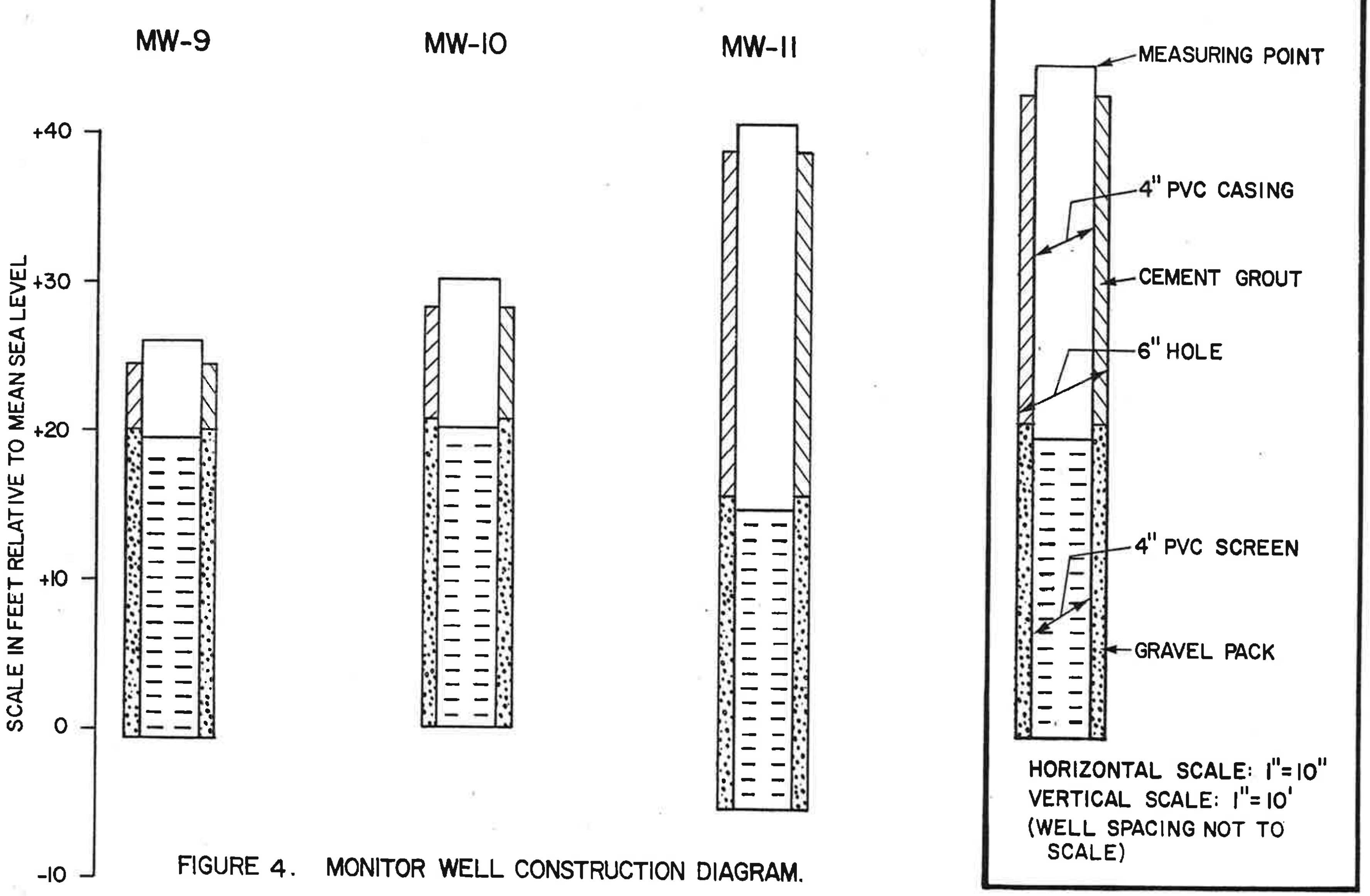


FIGURE 4. MONITOR WELL CONSTRUCTION DIAGRAM.

PELA

BORING AND WELL CONSTRUCTION LOG

NO: MW-10A
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering & Testing
DATE DRILLED: 7/5/89
PELA REP: M. Mumtaz Azmeh
DRILLING METHOD: Mud Rotary
DATE INSTALLED: 7/6/89
TOTAL DEPTH BOREHOLE: 52.9 feet
BOREHOLE DIAMETER: 8.0 inches
MP ELEVATION: 32.80 (USGS datum)
LS ELEVATION: 30.1 (USGS datum)

TOTAL DEPTH (WELL): 52.9 feet
WATER LEVEL DURING DRILLING (BLS): 21.32 feet
WATER LEVEL AFTER DEVELOPMENT (BLS): 21.38 feet

DESCRIPTION/OBSERVATIONS

Depth (ft BLS)	Interval (ft)	Description
0	0 - 4.5	Silty clay with roots.
5	4.5 - 6.0	Clay, light brown (5YR5/6) to light gray (N7), dense, plastic. At 4.9 feet sandy clay, dark yellowish-orange (10YR6/6) to light gray (N7), medium to fine grained, subrounded, poorly sorted.
10	8.5 - 10.0	8.5 to 9.2 feet clay, light brown (5YR5/6) to light gray (N7), dense, plastic. At 9.2 to 10.0 feet sand, light brown (5YR6/4) with interbedded clay 2 to 5 mm thick, light gray (N7). Sand, medium grained, poorly sorted.
15	13.5 - 15.0	13.5 to 14.6 feet clay, light brown (5YR5/6) to light gray (N7), dense, plastic. 13.9 to 14.6 feet clay. 14.6 to 15.0 feet sand, grayish-orange (10YR7/4), coarse grained, subrounded, poorly sorted.
20	18.5 - 20.0	Sand, yellowish-gray (5Y7/2), coarse grained, subrounded, poorly sorted.
25	23.5 - 25.0	23.5 to 24.2 feet, as above. 24.2 to 24.4 feet clay, light brown (5YR5/6) to light gray (N7), dense, plastic. 24.2 to 27.0 feet sand and gravel, grayish-orange (10YR7/4), coarse gained, subrounded, poorly sorted.
30	28.5 - 30.0	28.5 to 33.0 feet sand, grayish-orange (10YR7/4), fine to coarse grained, subrounded, poorly sorted with up to 10% gravel (maximum diameter 1 inch). Black organic matter at 29.5 to 29.6 feet.
35	33.5 - 35.0	Sand with gravel (10% gravel, maximum size 1 inch). Sand, grayish-orange (10YR7/4), coarse grained, subrounded, poorly sorted. Gravel, varied colored, angular, poorly sorted, with some streaks of sand, light gray (N7).
40	38.5 - 40.0	38.5 to 39.6 feet sandy clay with gravel (10% gravel, maximum size 1/2 inch). Clay, gray (N7) (40% sand), friable. Sand, varied colored, coarse, subrounded, poorly sorted.

REMARKS: PELA Reference No. 492316

PELA

BORING AND WELL CONSTRUCTION LOG

NO: MW-10A (continued)
LOCATION: Ciba-Geigy Corporation
McIntosh, Alabama
DRILLER: Geotechnical Engineering & Testing
DATE DRILLED: 7/5/89
PELA REP: M. Mumtaz Azmeh
DRILLING METHOD: Mud Rotary
DATE INSTALLED: 7/6/89
TOTAL DEPTH BOREHOLE: 52.9 feet
BOREHOLE DIAMETER: 8.0 inches
MP ELEVATION: 32.80 (USGS datum)
LS ELEVATION: 30.1 (USGS datum)

TOTAL DEPTH (WELL): 52.9 feet
WATER LEVEL DURING DRILLING (BLS): 21.32 feet
WATER LEVEL AFTER DEVELOPMENT (BLS): 21.38 feet

DESCRIPTION/OBSERVATIONS

Depth (ft BLS)	Interval (ft)	Description
40		predominantly quartz. 39.6 to 40.0 feet sand with gravel (10% gravel), dark yellowish-orange (10RY6/6), coarse, subrounded, poorly sorted.
	43.5 - 45.0	Clayey sand, light gray (N7). Sand, coarse, subrounded, poorly sorted, light gray (N7) to light brown (5YR5/6), one or two pebbles up to 1 inch, varied colored, subrounded.
45		
	48.5 - 50.0	Sand with gravel (10% gravel up to 3/4 inch). Sand, yellowish-gray (5Y7/2), coarse, subrounded, poorly sorted. Gravel, varied colored, subrounded, poorly sorted.
50		51.0 feet thin 1/4-inch bed of very dark brown semi-consolidated sand and interbedded clay and silty clay, light gray (N7), dense, plastic.
	53.5 - 55.0	Clay, slightly sandy, gray (N7), with clay, light brown (5YR5/6), very dense, plastic, consistent. Top of Miocene clay at 51.0 feet.
55	55.0	Total depth.
60		
65		
70		
75		
80		

REMARKS: PELA Reference No. 492316

WELL CONSTRUCTION FORM

DRILLING DATA

Well ID MW-10A Project Number 492316
Project Name Installation of monitoring wells MW-9A and MW-10A
Location Ciba-Geigy Corporation
McIntosh, Alabama
Supervised by M. Mumtaz Azmeh
Date of Boring 7/5/89 Date Well Completed 7/6/89
Drilling Company Geotechnical Engineering & Testing
Driller Steve Wittington
Drilling Method Mud rotary
Bit Diameter 4 in./8 in. Hollow Stem I.D. ____ O.D. ____
Hours Drilled ____ Downtime ____
Decontamination Procedure Steam/detergent

Sample Collection Procedure Split spoon, 2 in. OD, 1-1/2 in. ID

Estimated % Recovery 67%

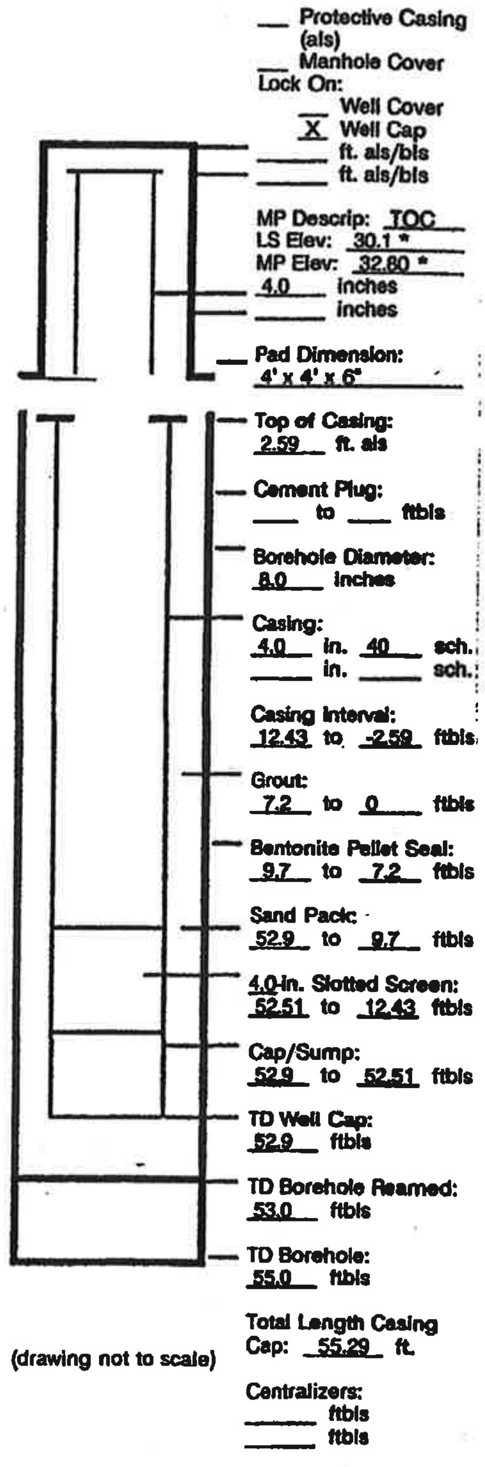
MATERIALS

Casing Material PVC Type Schedule 40
Screen Material PVC Type Schedule 40
Casing (in.) O.D. 4.0 I.D. ____ 12.43 to -2.59 ftbls
(in.) O.D. ____ I.D. ____ ____ to ____ ftbls
(in.) O.D. ____ I.D. ____ ____ to ____ ftbls
Total Casing (ft.) 15.02
Screen (in.) O.D. 4.0 I.D. ____ 52.3 to 11.83 ftbls
Slot Size 0.015 in. Total Screen (ft.) 40.47 including cap
Length of Cap 0.39 ft. Sump (ft.) ____
Centralizer Material None Length (in.) ____
Sand Pack Mtrl./Sz. Pearl River coarse sand and fine sand
Lbs./Sacks Used 1,075 lbs./21.5 sacks
Grout Material Cement and powdered bentonite
Amt. Cement 200 lbs. Type Cement Portland
Amt. Powdered Bentonite 4 lbs. Lbs. Bentonite Pellets 62
Tremie Used 1 in. Pump for Grout Used Centrifugal
Cement Plug ____
Length of Protective Casing (ft.) None

DEVELOPMENT

Development Method Submersible pump Total Hours 7 hrs. 8 min.
Date and Time Started 7/8/89, 11:03 a.m.
Date and Time Completed 7/8/89, 7:27 p.m.
Esti. Gallons 3,300 Esti. Yield (gpm) 5.5 to 6.7
Static WL (ftbtoc) 23.91
Color/Turbidity: Start Dark yell. orange Finish Clear
Drawdown (ft.) 9.0 Time to Recovery ____
Final: pH 5.81 SC 3,430 T 24.0°C Eh -021
Sand None observed at end Odor Strong
Water Discharged to Tanker

REMARKS * USGS datum



P. E. LaMoreaux & Associates, Inc. (PELA)

LITHOLOGIC LOG

Well MW-11

Owner:	Ciba Geigy
Well Location:	McIntosh, Alabama
Date Started:	8/5/82
Date Completed:	8/5/82

Depth (in feet)	Description
0 - 5	Silty clay, stiff, mottled, light brown, light gray, moderate red.
5 - 10	As above.
10 - 15	As above.
15 - 20	As above.
20 - 25	80 percent clay as above;
	20 percent sand, multicolored, well sorted, fine grained.
25 - 30	Sand, loose, multicolored, poorly sorted, rounded, very coarse, medium grained.
30 - 35	As above.
35 - 40	Sand, loose, multicolored, poorly sorted, rounded, very coarse - medium grained, pebbles in part.
40 - 45	As above.
45 - 50	Sand, loose, multicolored, poorly sorted, medium grained, gravel in part.

Total Depth: 50 feet

MW9, MW-10, MW-11

June 30, 1982

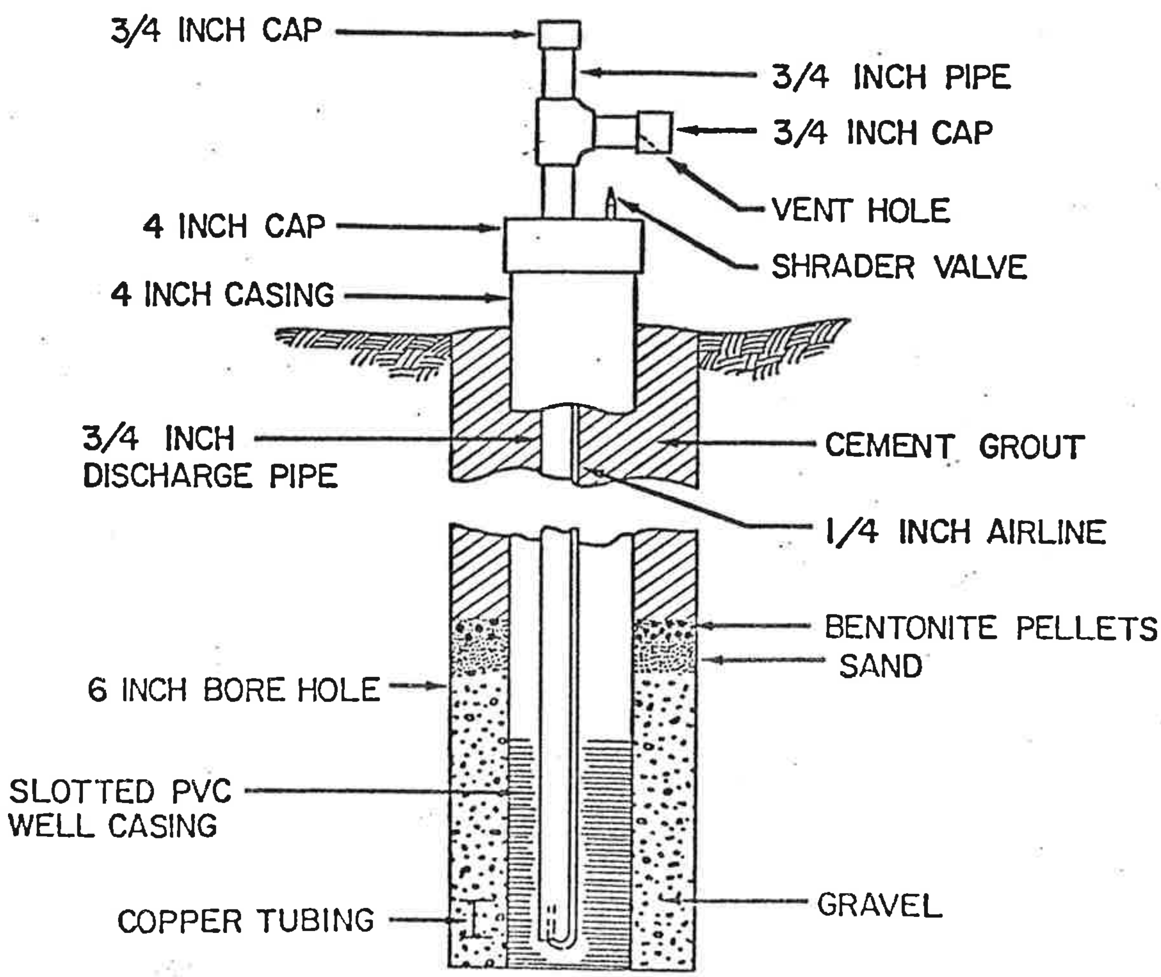


Figure 5. Generalized Diagram of the Airlift Sampling Device.

June 30, 1982

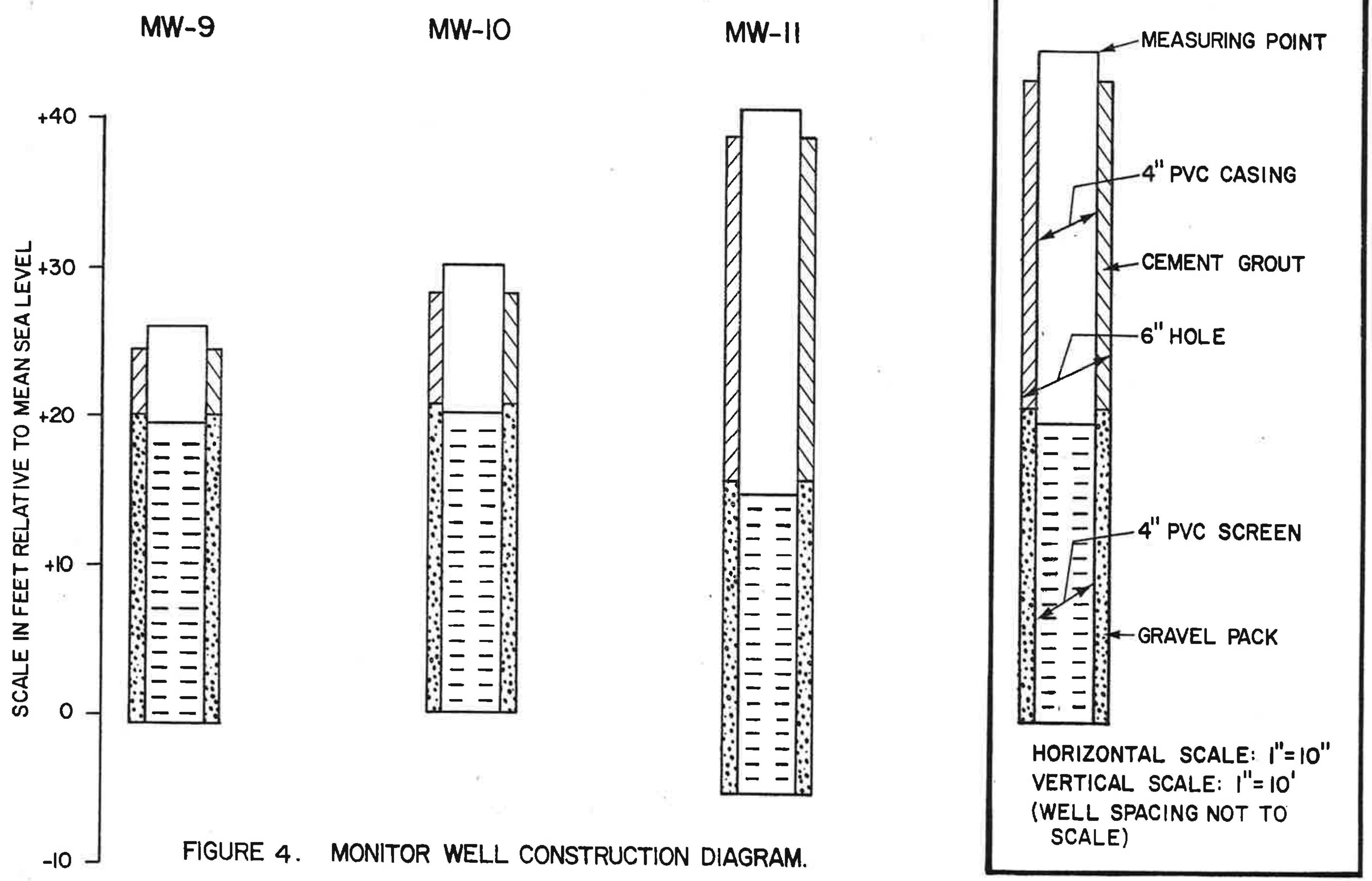


FIGURE 4. MONITOR WELL CONSTRUCTION DIAGRAM.

PELA

BORING AND WELL CONSTRUCTION LOG

NO: MW-12A
LOCATION: Ciba-Geigy Corporation McIntosh, Alabama
DRILLER: TET, Inc.
DATE DRILLED: July 15-19, 1991
COORDINATES: E 6100.62, N 4482.38
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 20, 1991
TOTAL DEPTH BOREHOLE (FT): 80.5
BOREHOLE DIAMETER (IN): 4.0 and 8.0
MP ELEVATION (FT): 34.48
LS ELEVATION (FT): 32.35
TOTAL DEPTH WELL (FT): 72.7 BLS
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 17.97
DATE AND TIME: 9/17/91; 14:49
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 inches Percent Recovery	PID Survey (PPM)
0				
2.5				
5.0	4.0 - 4.5	Clay: predominantly dark yellowish-orange (10YR 6/6), mottled with up to 40% light gray (N7), moderately firm, slightly plastic, dry.	(P) 100	0
7.5				
10.0	9.0 - 10.0	Clay: dark yellowish-orange (10YR 6/6), mottled with up to 60% light gray (N7), moderately firm, slightly plastic, dry.	(5,8,11) 67	0
12.5				
15.0				
17.5				
20.0	19.0 - 20.3	Clay: light gray (N7), mottled with up to 20% dark yellowish-orange (10YR 6/6), firm to slightly stiff, slightly plastic.	(4,6,10) 86	0

REMARKS: PELA Reference No. 492343
P = pushed sampler into clay

(WP5.1, 9/20/91) 13-D:\492300\MW12A.LOG

P.E. LaMoreaux & Associates

PELA

BORING AND WELL CONSTRUCTION LOG

NO: MW-12A
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: TET, Inc.
DATE DRILLED: July 15-19, 1991
COORDINATES: E 6100.62, N 4482.38
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 20, 1991
TOTAL DEPTH BOREHOLE (FT): 80.5
BOREHOLE DIAMETER (IN): 4.0 and 8.0
MP ELEVATION (FT): 34.48
LS ELEVATION (FT): 32.35
TOTAL DEPTH WELL (FT): 72.7 BLS
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 17.97
DATE AND TIME: 9/17/91; 14:49
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
22.5				
25.0				
27.5				
30.0	29.0 - 29.25	Clay: light gray (N7), mottled with up to 10% dark yellowish-orange (10YR 6/6), firm to slightly stiff, slightly plastic in top 0.2 foot of sample. Sand: grayish-orange (10YR 7/4), very fine- to fine-grained, subangular, moderately sorted, unconsolidated, quartz, (29.20 to 29.25 ft.).	(11) 50	0
32.5				
35.0				
37.5				
40.0	39.0 - 39.6	Sand: grayish-orange (10YR 7/4), medium-grained, subrounded, moderately well sorted, unconsolidated, quartz, massive bedding, with 2-3 mm of horizontally layered, fine-grained, subrounded sand with abundant black (N1), very fine-grained minerals, in top 0.3 foot.	(13,24,20) 36	0.25
42.5				

REMARKS: PELA Reference No. 492343

PELA

BORING AND WELL CONSTRUCTION LOG

NO: MW-12A
DRILLER: TET, Inc.
DATE DRILLED: July 15-19, 1991
DRILLING METHOD: Mud Rotary
TOTAL DEPTH BOREHOLE (FT): 80.5
MP ELEVATION (FT): 34.48
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
COORDINATES: E 6100.62, N 4482.38
DATE INSTALLED: July 20, 1991
BOREHOLE DIAMETER (IN): 4.0 and 8.0
LS ELEVATION (FT): 32.35
TOTAL DEPTH WELL (FT): 72.7 BLS
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 17.97
DATE AND TIME:
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
45.0				
47.5				
	49.0 - 50.0	Sand: grayish-orange (10YR 7/4), very fine- to medium-grained, subangular to subrounded, poorly sorted, silty, slightly argillaceous (top 0.2 foot of sample). Clay: light gray (N7) mottled with moderate yellowish-brown (10YR 5/4), firm, slightly plastic (49.2 to 49.3 ft.). Sand: with gravel, grayish-orange (10YR 7/4), very fine to medium-grained, subangular to subrounded, poorly sorted, silty, argillaceous in part, 40-50% varicolored, subangular to subrounded, poorly sorted gravel up to 2 cm in diameter.	(27,21,27) 67	0
50.0				
52.5				
55.0				
57.5				
	59.0 - 60.0	Clay: medium bluish-gray (5B 5/1), soft, medium plasticity, dry to slightly moist.	(5,4,9) 67	0
60.0				
62.5				
65.0				

REMARKS: PELA Reference No. 492343

PELA

BORING AND WELL CONSTRUCTION LOG

NO: MW-12A
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: TET, Inc.
DATE DRILLED: July 15-19, 1991
COORDINATES: E 6100.62, N 4482.38
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 20, 1991
TOTAL DEPTH BOREHOLE (FT): 80.5
BOREHOLE DIAMETER (IN): 4.0 and 8.0
MP ELEVATION (FT): 34.48
LS ELEVATION (FT): 32.35
TOTAL DEPTH WELL (FT): 72.7 BLS
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 17.97
DATE AND TIME:
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
67.5				
	69.0 - 69.9	Clay: medium bluish-gray (5B 5/1), soft, medium plasticity, dry to slightly moist, (top 0.35 foot sample). Sand: with gravel, yellowish-gray (5Y 7/2), medium- to coarse-grained, subrounded to subangular, moderately sorted, unconsolidated, quartz; varicolored, subrounded, moderately sorted quartz gravel up to 1.5 cm in diameter, trace of chert, (bottom 0.55 foot of sample).	(22,19,26) 60	0
70.0				
72.5				
75.0				
77.5				
	79.0 - 80.2	Sandy clay: light bluish-gray (5B 7/1), brittle, stiff in part, slightly plastic; base of sample mottled with up to 20% dark yellowish-orange (10YR 6/6), very fine- to fine-grained, subrounded, well sorted, unconsolidated sand.	(10,11,14) 80	0
80.0				
	80.2	Total depth pilot hole, reamed to 78.0.		
82.5				
85.0				
87.5				

REMARKS: PELA Reference No. 492343
Note: Driller indicates clay at 77.0 feet BLS.

(WP5.1, 9/20/91) 13-D:\492300\MW12A.LOG

WELL CONSTRUCTION FORM

DRILLING DATA

Well ID: MW-12A — Project Number: 492343
Project Name: Ciba-Geigy
Location: McIntosh, Alabama
N 4482.38, E 6100.62
Supervised by: Mike Johnson (PELA)
Date of Boring: 7/15 - 20/91 — Date Well Completed: 7/22/91
Drilling Company: TET, Inc.
Driller: Charlie Weston
Drilling Method: Mud rotary
Bit Diameter: 8.0 — Hollow Stem I.D. ____ O.D. ____
Hours Drilled: 9 — Downtime: est. 6
Decontamination Procedure: Steam cleaning

Sample Collection Procedure: Split spoon / 10' centers

Estimated % Recovery: 75

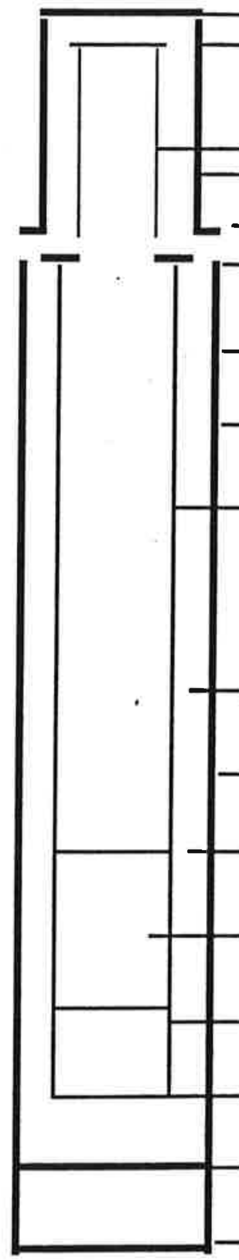
MATERIALS

Casing Material: Stainless steel — Type: ASTM-A-312, Sch. .405
Screen Material: Stainless steel — Type: #304
Casing (in.) O.D. ____ I.D. 4.0 — +2.73 to 27.67 ftbls
(in.) O.D. ____ I.D. 4.0 — 52.72 to 62.77 ftbls
(in.) O.D. ____ I.D. ____ — ____ to ____ ftbls
Total Casing (ft.): 30.40 + 10.05 (blank)*
Screen (in.) O.D. ____ I.D. 4.0 — 27.67 to 72.49 ftbls*
Slot Size: 0.020** and 0.010-in. — Total Screen (ft.): 34.77
Length of Cap: 0.20 ft. — Sump (ft.): cap
Centralizer Material: Stainless steel — Length (in.): @ 1 ft. (adjustable)
Sand Pack Mtrl./Sz.: Colorado Silica 6/20
Lbs./Sacks Used: 1300 lbs.
Grout Material: Cement/Bentonite
Amt. Cement: 400 lbs. — Type Cement: Portland Type I
Amt. Powdered Bentonite: 10 lbs. — Amt. Bentonite Pellets: 75 lbs.
Tremie Used: Yes — Pump for Grout Used: Yes
Cement Plug: ____
Length of Protective Casing (ft.): 3.22 ft. als

DEVELOPMENT

Development Method: Submersible pump — Total Hours: 4
Date and Time Started: 8/1/91 11:26
Date and Time Completed: 8/1/91 15:53
Esti. Gallons: 3,000 — Esti. Yield (gpm): 17.2
Static WL (ftbtoc): 18.93
Color/Turbidity: Start: light olive gray — Finish: clear
Drawdown (ft.): 6.7 max. — Time to Recovery: 3-4 min.
Final: pH 5.38 — SC 55 — T 21.0° C — Eh ____
Sand: none — Odor: none
Water Discharged to: Treatment facility

REMARKS * 10.05' blank from 52.75 to 62.77 ft. bls
** 0.020-inch slot screen from 27.67 to 32.68 ft. bls



X Protective Casing (als)
__ Manhole Cover
Lock On:
X Well Cover
__ Well Cap
3.22 ft. als / bls
2.73 ft. als / bls
MP Descrip: TOC
LS Elev: 29.60
MP Elev: 32.33
4.0 inches
8.0 inches
Pad Dimension: 3' x 3' x 0.6'

Top of Casing: 2.73 ft. als

Cement Plug: ____ to ____ ftbls

Borehole Diameter: 8.0 inches

Casing: 4.0 in. .405 sch.
____ in. ____ sch.

Casing Interval:
+2.73 to 27.67 ftbls
52.72 to 62.77 ftbls

Grout: +0.7 to 21.0 ftbls

Bentonite Pellet Seal: 21.0 to 26.0 ftbls

Sand Pack: 26.0 to 72.5 ftbls

**0.01-in.Slotted Screen:
32.68 to 52.72 ftbls
62.77 to 72.49 ftbls

Cap/Sump: 72.49 to 72.69 ftbls

TD Well Cap: 72.69 ftbls

TD Borehole Reamed: 78.0 ftbls

TD Borehole: 80.5 ftbls

(drawing not to scale)

Total Length Casing Cap: 75.42 ft.

Centralizers:
31.0 ftbls
51.0 ftbls
71.0 ftbls

P. E. LaMoreaux & Associates, Inc. (PELA)

WELL CONSTRUCTION FORM

DRILLING DATA

Well ID M-12A Project Number 492349

Project Name Ciba-Geigy New Land Vault (re-development of well)

Location Ciba-Geigy Corporation
McIntosh, Alabama

Supervised by D. Green

Date of Boring ______ Date Well Completed ______

Drilling Company ______

Driller ______

Drilling Method ______

Bit Diameter ______ Hollow Stem I.D. ______ O.D. ______

Hours Drilled ______ Downtime ______

Decontamination Procedure ______

Sample Collection Procedure ______

Estimated % Recovery ______

MATERIALS

Casing Material ______ Type ______

Screen Material ______ Type ______

Casing (in.) O.D. ______ I.D. ______ ______ to ______ ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls

Total Casing (ft.) ______

Screen (in.) O.D. ______ I.D. ______ ______ to ______ ftbls

Slot Size ______ Total Screen (ft.) ______

Length of Cap ______ Sump (ft.) ______

Centralizer Material ______ Length (in.) ______

Sand Pack Mtrl./Sz. ______

Lbs./Sacks Used ______

Grout Material ______

Amt. Cement ______ Type Cement ______

Amt. Powdered Bentonite ______ Amt. Bentonite Pellets ______

Tremie Used ______ Pump for Grout Used ______

Cement Plug ______

Length of Protective Casing (ft.) ______

DEVELOPMENT

Development Method Submersible pump Total Hours 2.1

Date and Time Started 10/03/91 08:55

Date and Time Completed 10/03/91 13:22

Esti. Gallons 8,000 Esti. Yield (gpm) 100

Static WL (ftbtoc) 20.98

Color/Turbidity: Start grayish-orange Finish very slightly cloudy

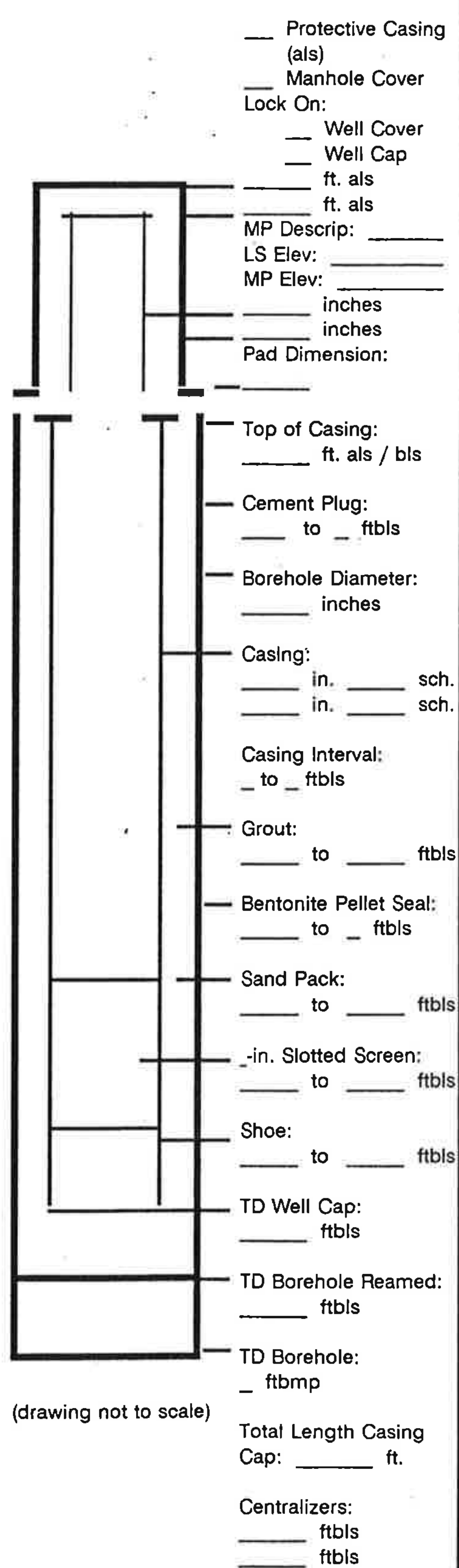
Drawdown (ft.) 10.83 Time to Recovery ______

Final: pH 5.53 SC 610 T 21.4° C Eh 179

Sand None Odor None

Water Discharged to Waste treatment plant

REMARKS Well was originally developed on 8/1/91.



(drawing not to scale)

P. E. LaMoreaux & Associates, Inc. (PELA)

LITHOLOGIC DESCRIPTION

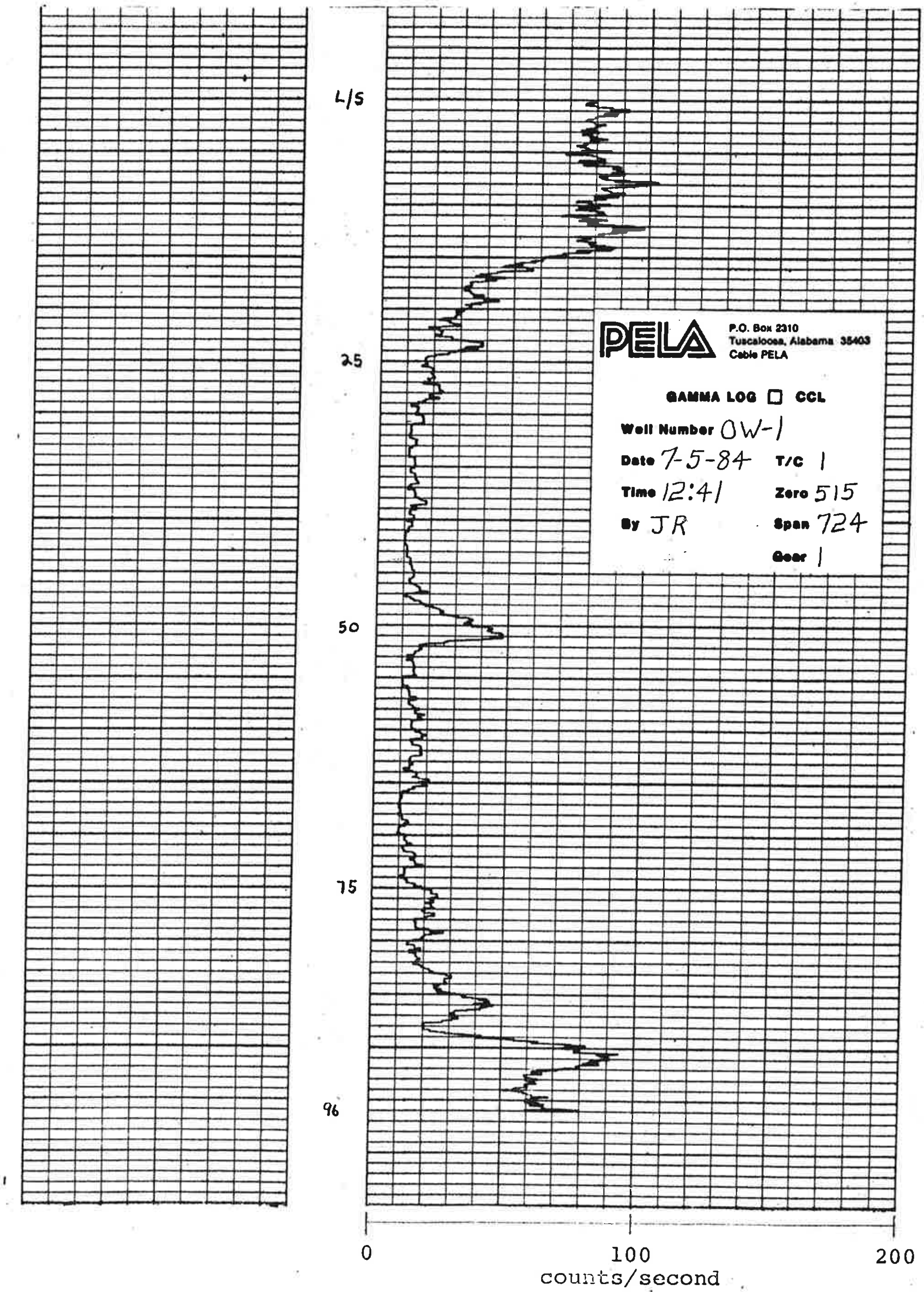
Observation Well OW-1

OWNER:	Ciba-Geigy Corporation
DATE DRILLED:	July 6, 1984
DATE COMPLETED:	July 6, 1984
PELA GEOLOGIST(S):	J. Robinson/P. Lambert

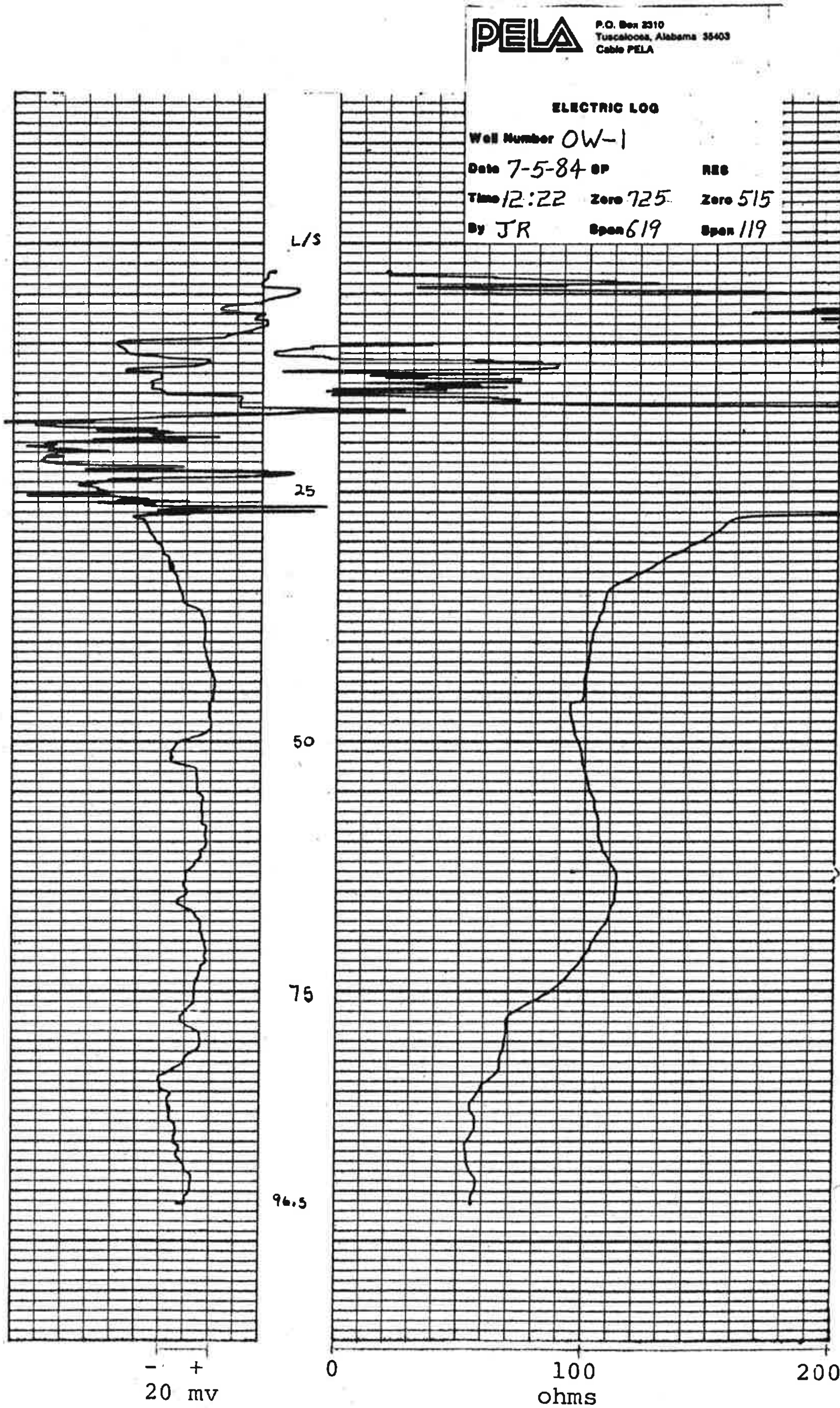
Depth (in feet)	Description
0 - 5.0	Clay, moderate-reddish-orange, sandy; sand, fine-grained, rounded to subrounded.
5.0 - 15.0	Clay, moderate-reddish-brown to moderate-orange-pink, sandy.
15.0 - 25.0	Sand, grayish-orange, fine-grained, rounded; trace of clay, moderate-reddish-brown to moderate-orange-pink, sandy.
25.0 - 45.0	Sand, grayish-orange to moderate-yellowish-brown, medium-grained, rounded to subrounded; clay, moderate-reddish-brown to moderate-orange-pink, sandy, decreasing with depth.
45.0 - 50.0	Sand, grayish-orange to moderate-yellowish-brown, medium-grained, rounded to subrounded; gravel up to 0.6 cm in diameter; clay, pale-yellowish-orange, sandy.
50.0 - 55.0	Sand, grayish-orange to moderate-yellowish-brown, medium-grained, rounded to subrounded; clay, pale-yellowish-orange, sandy; gravel up to 1.5 cm in diameter.
55.0 - 60.0	Sand, grayish-orange to moderate-yellowish-brown, medium-grained, rounded to subrounded; clay, pale-yellowish-orange, sandy; gravel up to 2.0 cm in diameter.
60.0 - 65.0	Sand, grayish-orange to moderate-yellowish-brown, medium-grained, rounded to subrounded; clay, pale-yellowish-orange, sandy; gravel up to 1.2 cm in diameter.

Observation Well OW-1 -- continued

Depth (in feet)	Description
65.0 - 70.0	Sand, grayish-orange to moderate-yellowish-brown, medium-grained, rounded to subrounded; clay, pale-yellowish-orange, sandy; gravel up to 2.0 cm in diameter.
70.0 - 75.0	Sand, grayish-orange to dark-yellowish-orange, medium-grained, rounded to subrounded; clay, grayish-orange-pink to moderate-orange-pink.
75.0 - 90.0	Sand, grayish-orange to dark-yellowish-orange, medium-grained, rounded to subrounded; gravel up to 0.5 cm in diameter; clay, grayish-orange-pink to moderate-orange-pink, increasing with depth.
90.0 - 96.0	Clay, light-bluish-gray and moderate-reddish-brown.
96.0	Total Depth.



Gamma log for OW-1: 0 to 96.0 feet below land surface



Electric log for OW-1: 15-96.5 feet below land surface

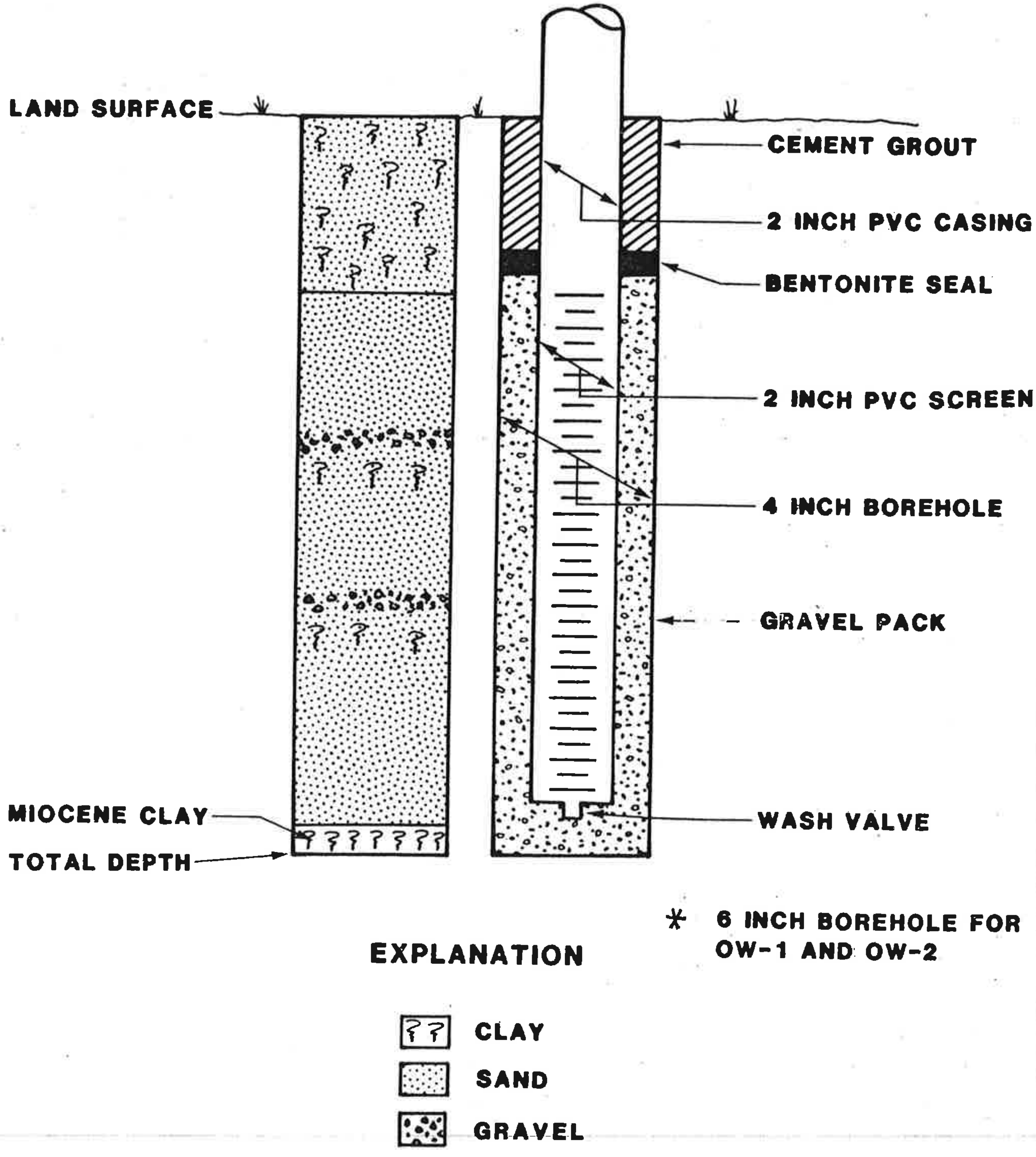


FIGURE 2. GENERALIZED LITHOLOGIC LOG AND WELL CONSTRUCTION DIAGRAM FOR OBSERVATION WELLS OW-1 THROUGH OW-9. *

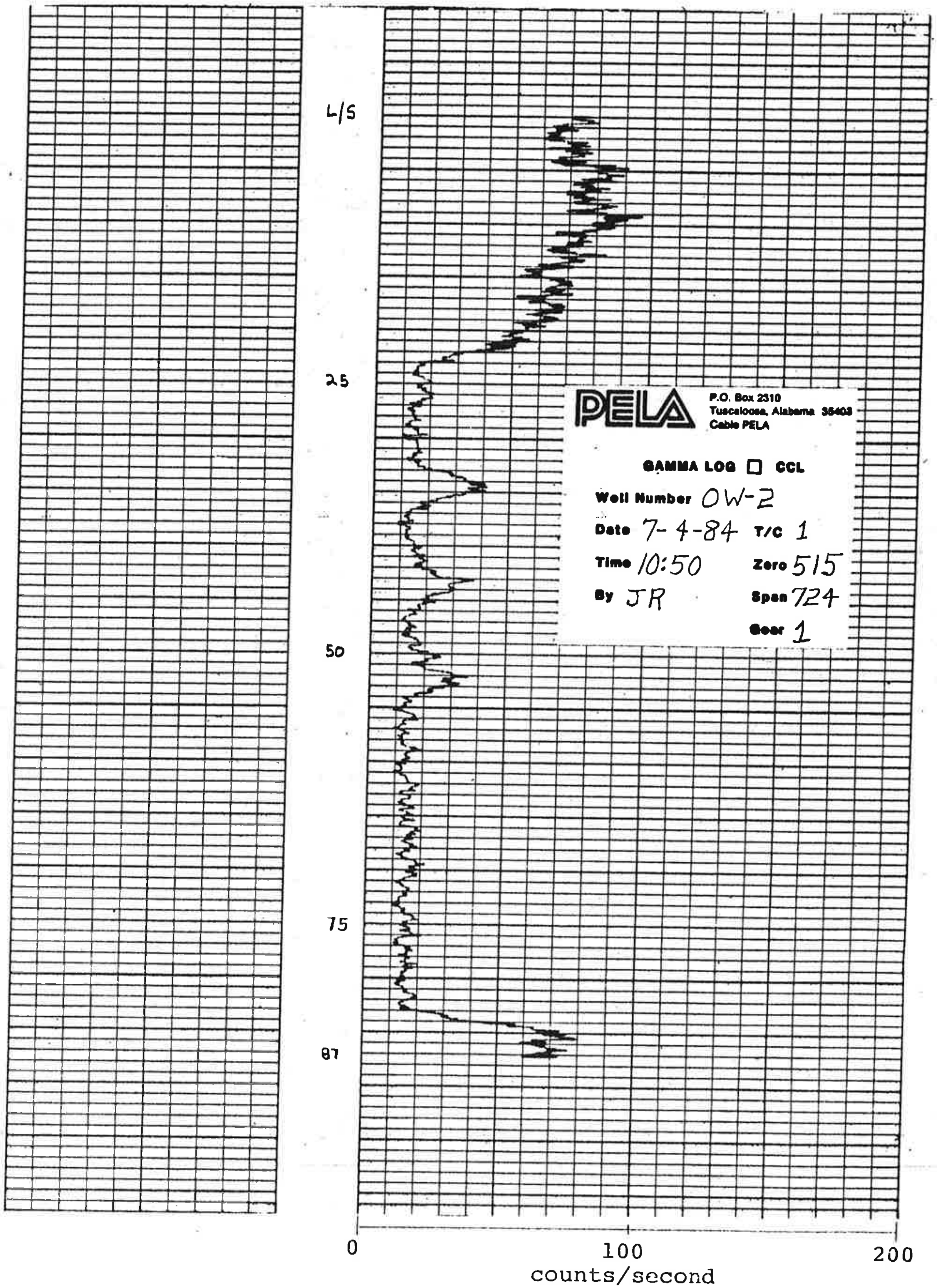
PELA

LITHOLOGIC DESCRIPTION

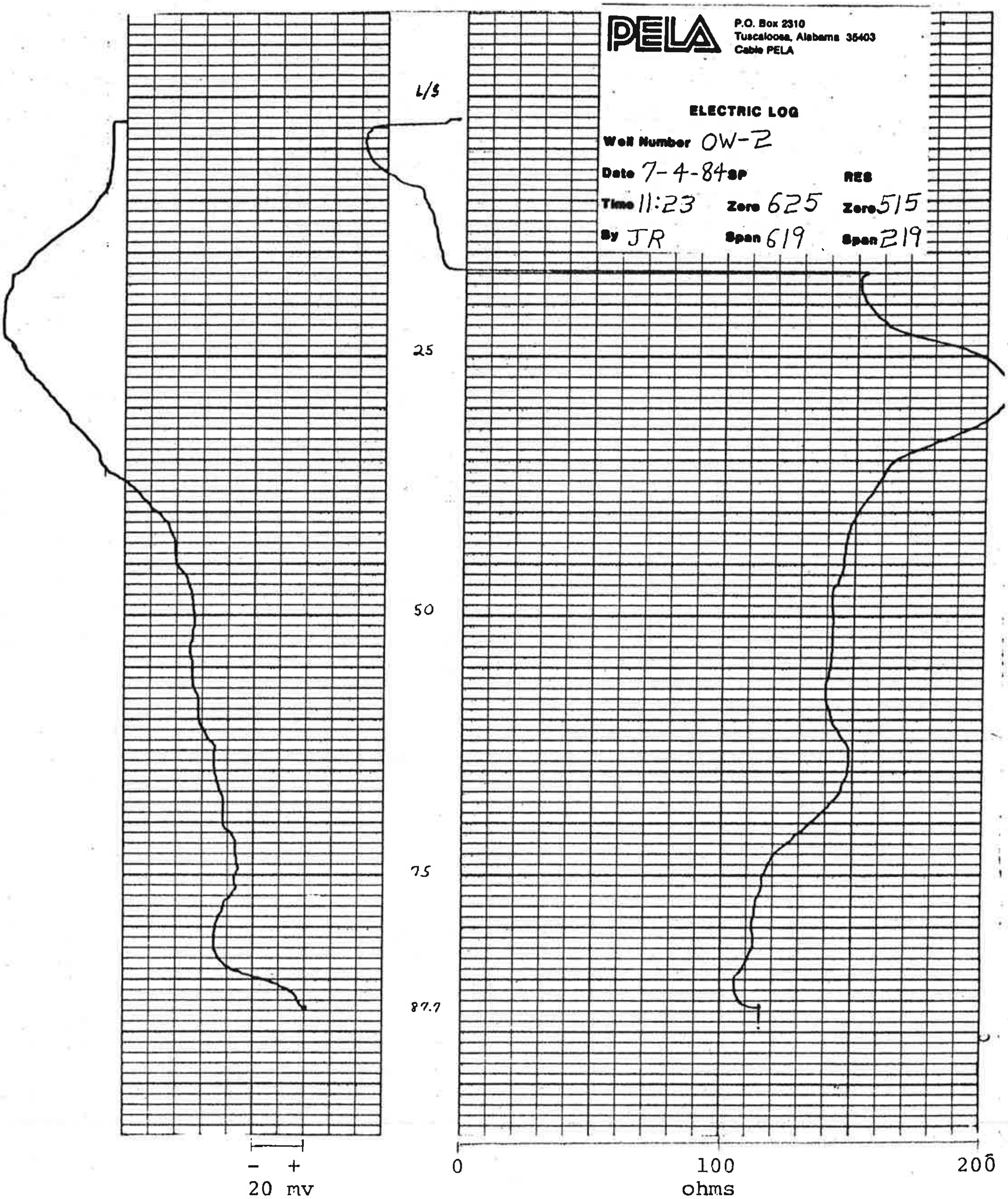
Observation Well OW-2

OWNER:	Ciba-Geigy Corporation
DATE DRILLED:	July 4, 1984
DATE COMPLETED:	July 4, 1984
PELA GEOLOGIST(S):	P. Lambert/T. Beeson

Depth (in feet)	Description
0 - 5.0	Clay, moderate-reddish-brown to dark-yellowish-orange, sandy.
5.0 - 10.0	Clay, moderate-yellowish-brown to dark-yellowish-orange, sandy.
10.0 - 15.0	Clay, moderate-reddish-brown to dark-yellowish-orange, sandy.
15.0 - 22.0	Clay, dark-yellowish-orange to grayish-orange with moderate-yellowish-brown streaks, sandy.
22.0 - 30.0	Sand, dark-yellowish-orange, fine- to medium-grained, rounded to subrounded.
30.0 - 40.0	Sand, dark-yellowish-orange, fine- to medium-grained, rounded to subrounded with clay layers, dark-yellowish-orange, sandy.
40.0 - 50.0	Sand, dark-yellowish-orange, fine- to medium-grained, rounded to subrounded; gravel up to 0.7 cm in diameter.
50.0 - 60.0	Sand, grayish-orange, medium- to very-coarse-grained, rounded to subangular.
60.0 - 75.0	Sand, grayish-orange, medium- to coarse-grained, rounded to subangular.
75.0 - 80.0	Sand, grayish-orange, medium- to coarse-grained, rounded to subangular; clay, very-pale-orange.
80.0 - 83.0	Sand, grayish-orange, medium- to coarse-grained, rounded to subangular; gravel up to 0.7 cm in diameter.
83.0 - 90.0	Clay, light-bluish-gray.
90.0	Total Depth.



Gamma log for OW-2: 0 to 87.0 feet below land surface



Electric log for OW-2: 16.7 to 87.7 feet below land surface

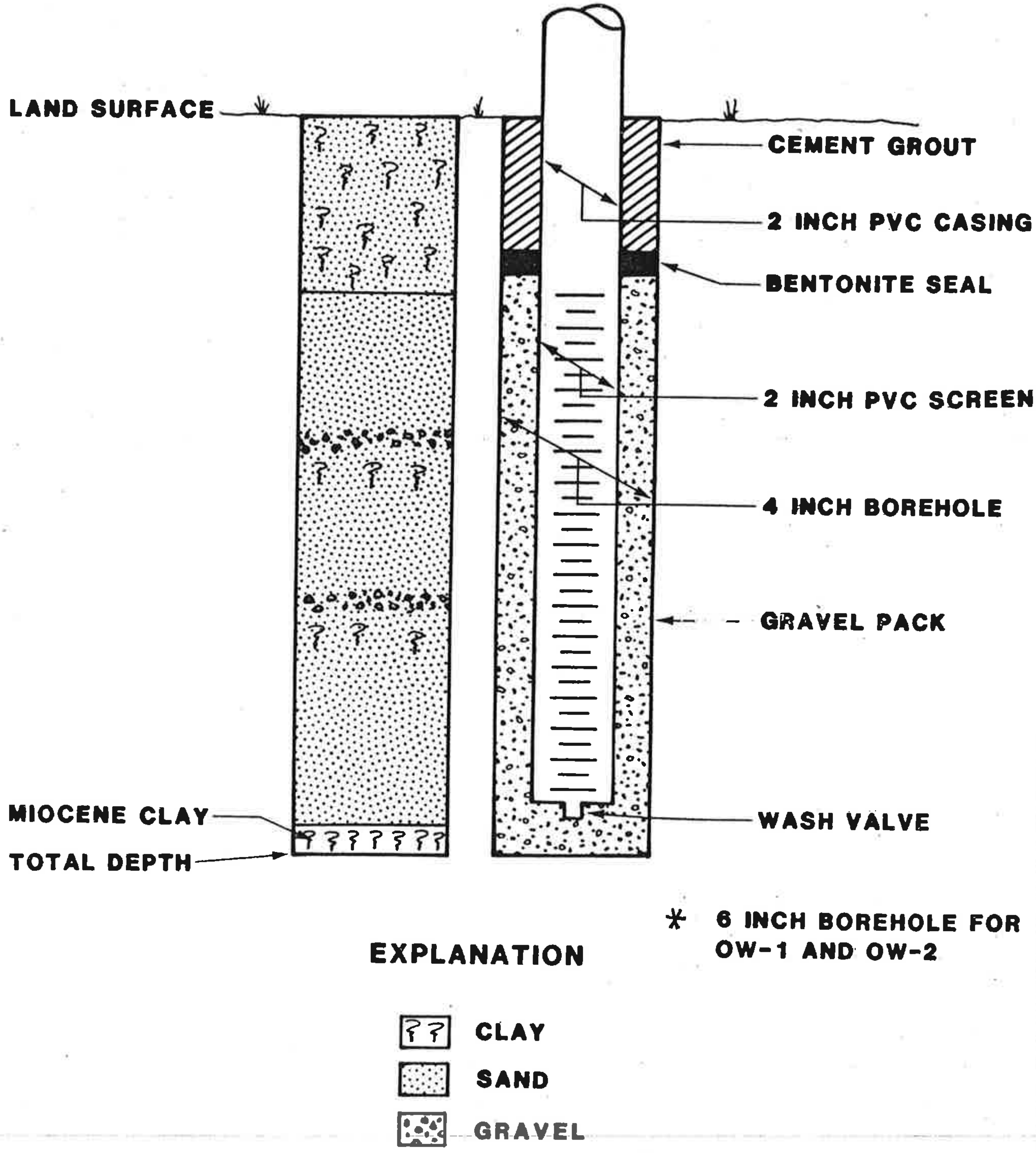


FIGURE 2. GENERALIZED LITHOLOGIC LOG AND WELL CONSTRUCTION DIAGRAM FOR OBSERVATION WELLS OW-1 THROUGH OW-9. *

LITHOLOGIC DESCRIPTION

Observation Well OW-3

OWNER: Ciba-Geigy Corporation

DATE DRILLED: July 6, 1984

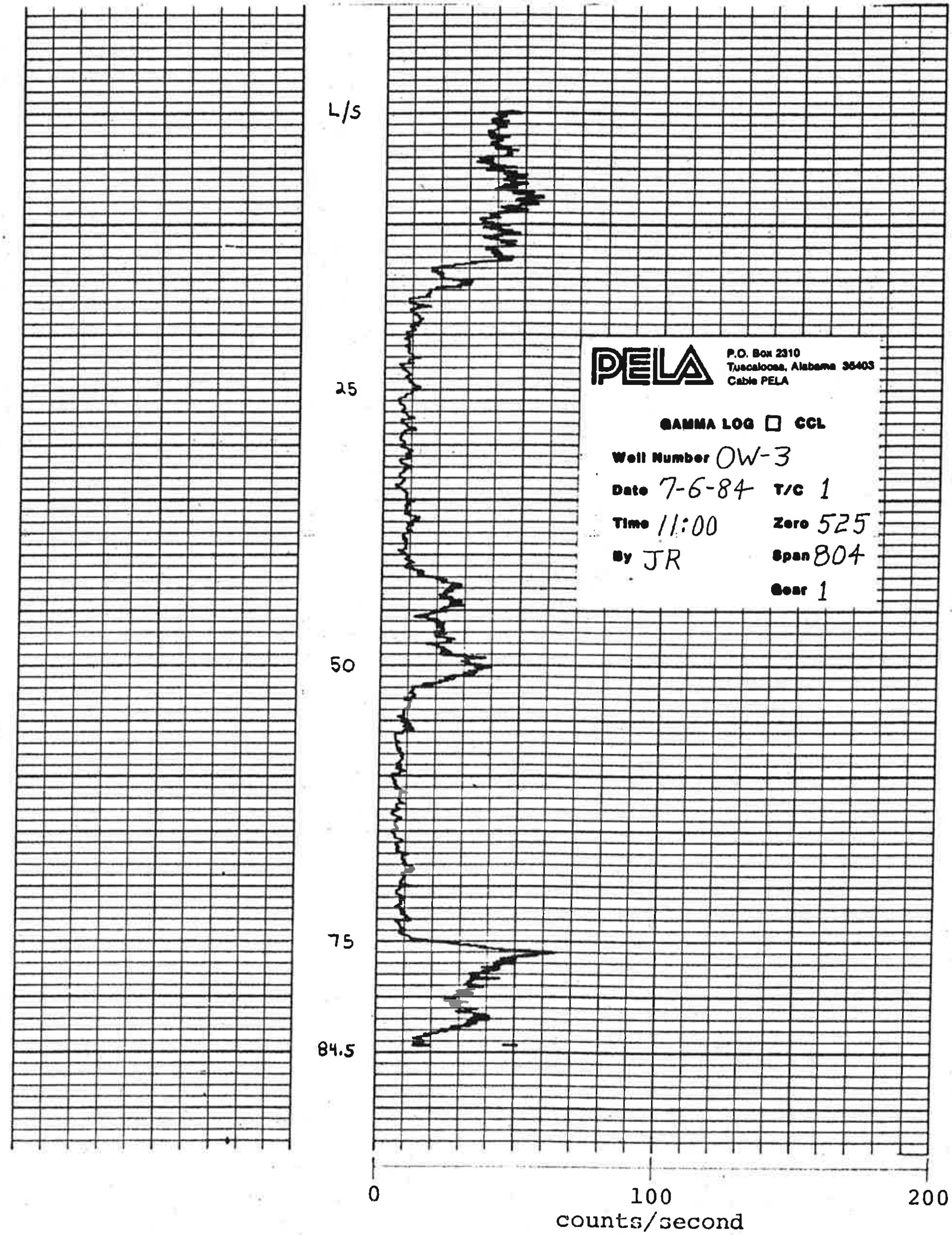
DATE COMPLETED: July 6, 1984

PELA GEOLOGIST(S): T. Beeson

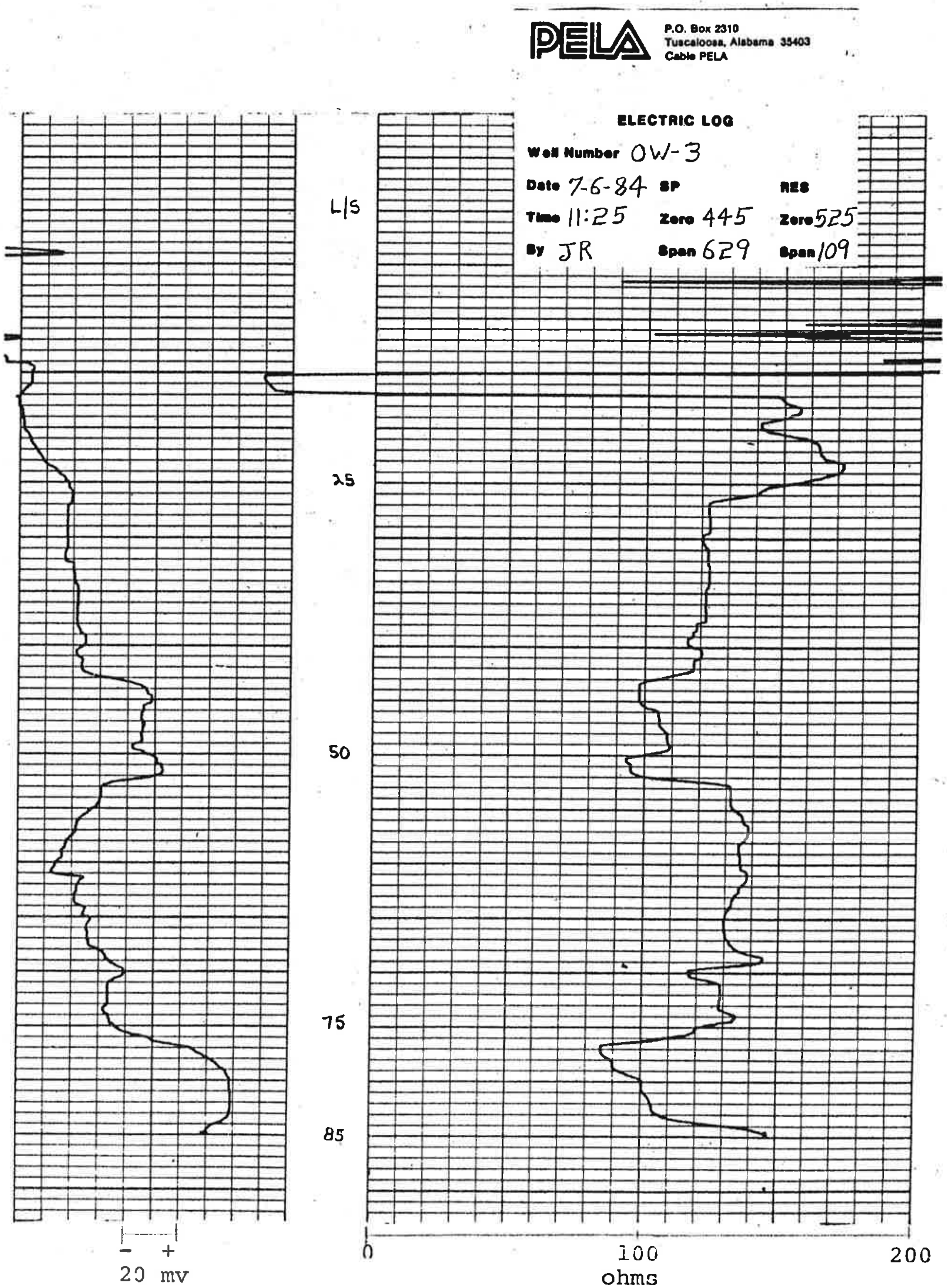
Depth (in feet)	Description
0 - 13.0	Clay, medium-light-gray and light-brown, sandy, sand increasing with depth.
13.0 - 15.0	Sand, grayish-orange to pale-yellowish-brown, fine- to medium-grained, rounded to subrounded.
15.0 - 30.0	Sand, pale-yellowish-brown, fine- to medium-grained, rounded to subrounded.
30.0 - 35.0	Sand, pale-yellowish-brown, fine- to medium-grained, some very-coarse, rounded to subrounded.
35.0 - 40.0	Sand, pale-yellowish-brown, fine- to medium-grained, some very-coarse, rounded to subrounded; clay, yellowish-gray, soft; gravel, multicolored, less than than 0.5 cm in diameter, well-rounded.
40.0 - 45.0	Sand, pale-yellowish-brown, fine- to medium-grained, some very coarse, rounded to subrounded; clay, yellowish-gray, very sandy; trace of clay, light-brown, sandy; gravel, multicolored, less than 2.0 cm in diameter, rounded to subangular.
45.0 - 60.0	Sand, pale-yellowish-brown, fine- to medium-grained, some very coarse, rounded to subrounded; clay, yellowish-gray, very sandy; trace of clay, light-brown, sandy; gravel, multicolored, less than 2.0 in diameter, rounded to subangular, coarser than above; pebbles, up to 2.0 cm in diameter.
60.0 - 70.0	Sand, pale-yellowish-brown, fine- to medium-grained, some very coarse, rounded to subrounded; gravel, multicolored, up to 0.5 cm in diameter, rounded to subangular; trace of clay, yellowish-gray, very sandy; trace of clay, light-brown, sandy.

Observation Well OW-3 -- continued

Depth (in feet)	Description
70.0 - 75.0	Gravel, multicolored, up to 1.5 cm in diameter, rounded to subangular; sand, pale-yellowish-brown, fine- to medium-grained, rounded to subrounded; trace of clay, yellowish-gray, sandy.
75.0 - 83.0	Clay, light-bluish, gray, sandy, soft; trace of sand, pale-yellowish-brown, fine- to medium grained, rounded to subrounded; trace of clay, yellowish-gray, sandy.
83.0	Total Depth.



Gamma log for OW-3: 0-84.5 feet below land surface



Electric log for OW-3: 16.8 to 85.0 feet below land surface

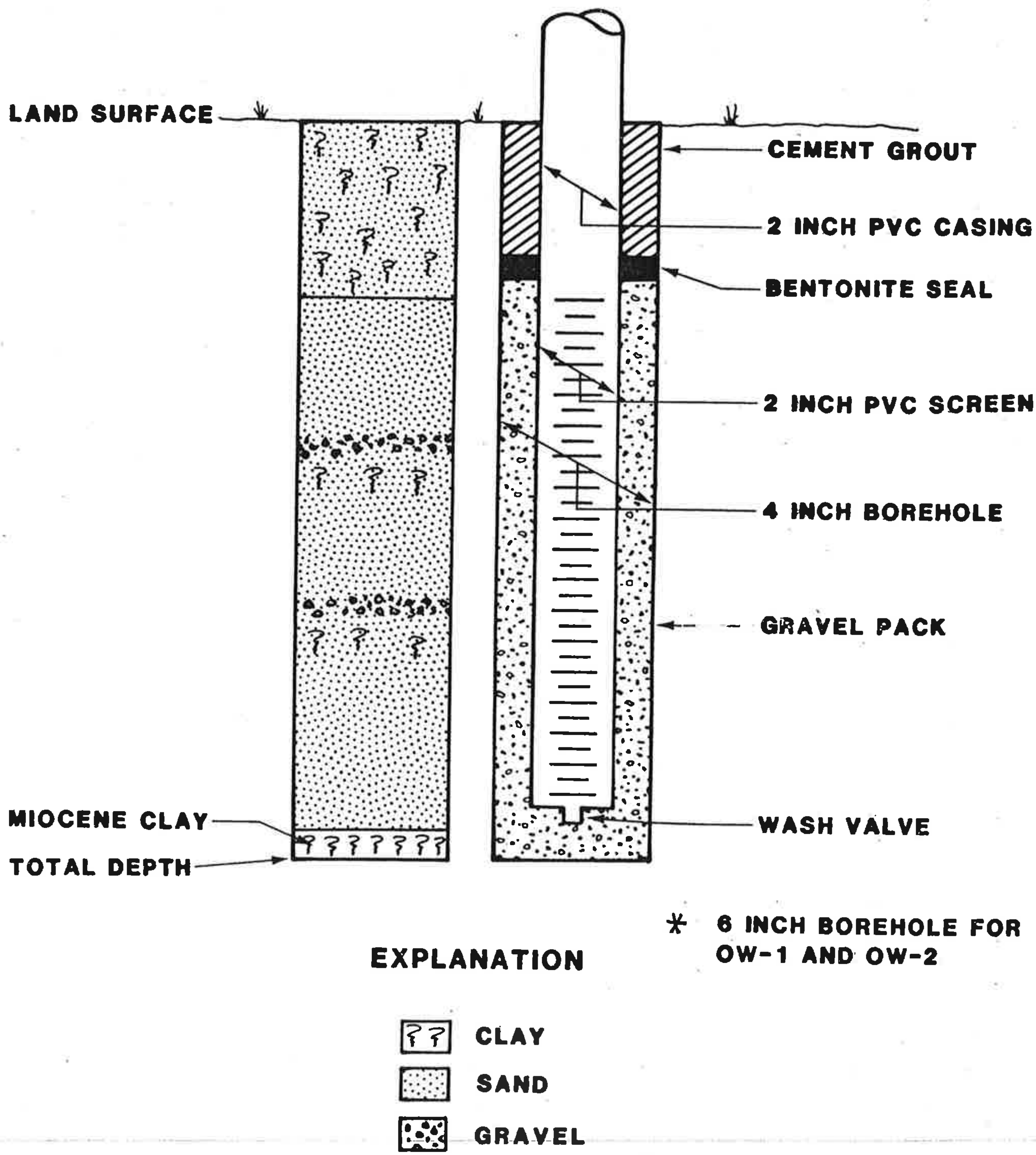


FIGURE 2. GENERALIZED LITHOLOGIC LOG AND WELL CONSTRUCTION DIAGRAM FOR OBSERVATION WELLS OW-1 THROUGH OW-9. *

LITHOLOGIC DESCRIPTION

Observation Well OW-4

OWNER: Ciba-Geigy Corporation

DATE DRILLED: July 3, 1984

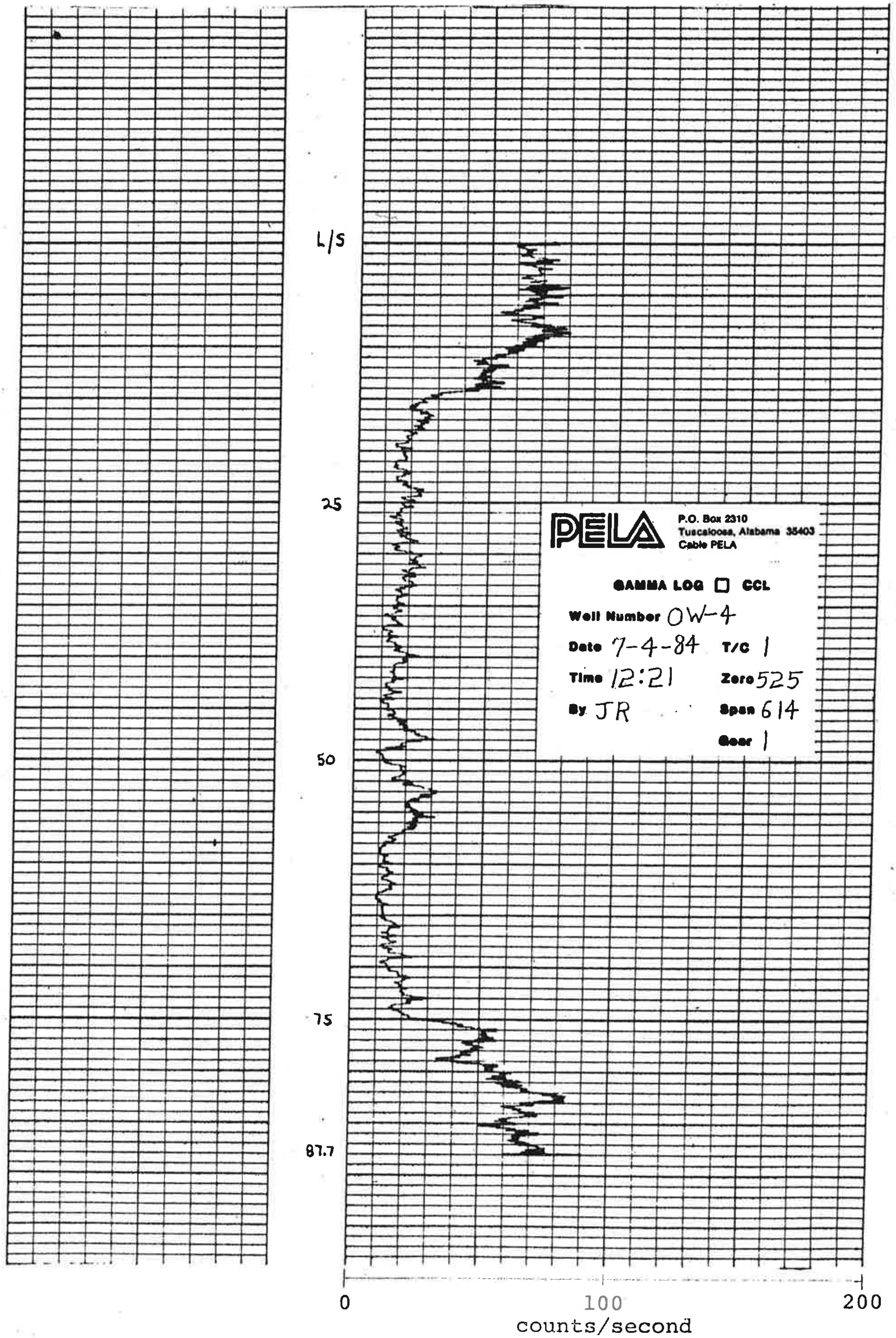
DATE COMPLETED: July 3, 1984

PELA GEOLOGIST(S): P. Lambert/T. Beeson

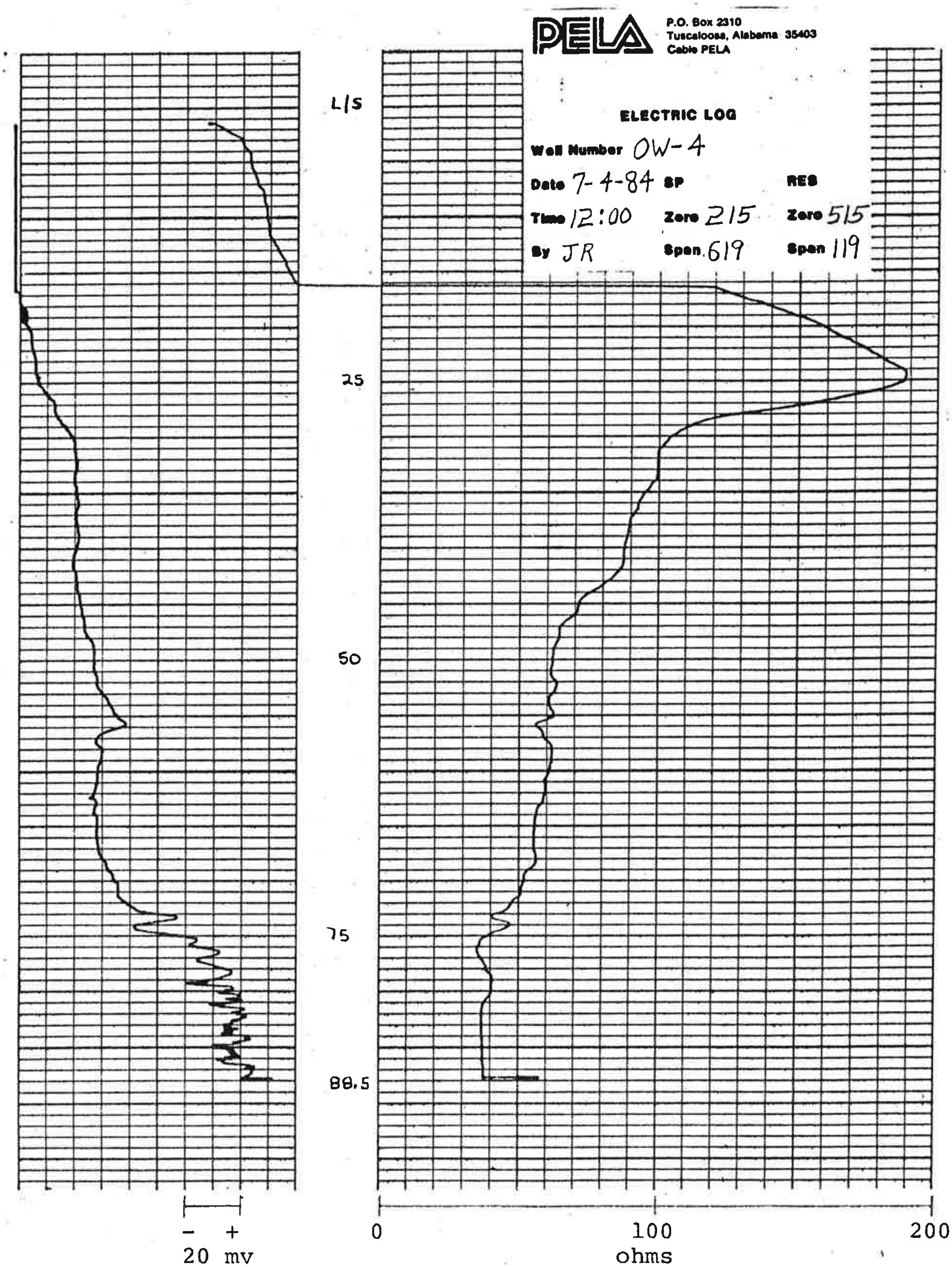
Depth (in feet)	Description
0 - 12.0	Clay, moderate-reddish-brown to dark-yellowish-orange, sandy.
12.0 - 20.0	Sand, dark-yellowish-orange, fine- to medium-grained, rounded to subrounded; trace of clay, light-brown.
20.0 - 25.0	Sand, dark-yellowish-orange, fine- to medium-grained, rounded to subrounded; clay, light-brown to moderate-reddish-brown.
25.0 - 30.0	Sand, dark-yellowish-orange, fine- to medium-grained, rounded to subrounded; less clay than above.
30.0 - 35.0	Sand, grayish-orange, medium- to very-coarse-grained, rounded to subrounded; trace of gravel, fine; trace of clay, very-pale-orange.
35.0 - 40.0	Sand, grayish-orange, medium- to very-coarse-grained, rounded to subangular; some gravel up to 1.0 cm in diameter.
40.0 - 45.0	Sand, grayish-orange, medium- to very-coarse-grained, rounded to subrounded; some gravel up to 0.5 cm in diameter; trace of clay, very-pale-orange, soft.
45.0 - 50.0	Sand, grayish-orange, medium- to very-coarse-grained, rounded to subrounded; gravel up to 1.0 cm in diameter.
50.0 - 60.0	Sand, grayish-orange, medium- to very-coarse-grained, rounded to subrounded; gravel up to 0.7 cm in diameter.
60.0 - 70.0	Sand, grayish-orange, fine- to medium-grained; some quartz pebbles up to 0.3 cm in diameter.

Observation Well OW-4 -- continued

Depth (in feet)	Description
70.0 - 75.0	Sand, grayish-orange, medium- to very-coarse-grained, rounded to subrounded; gravel up to 2.0 cm in diameter.
75.0 - 80.0	Sand, grayish-orange, medium- to very-coarse-grained, rounded to subrounded; gravel up to 3.0 cm in diameter, rounded to subangular; clay, very-pale-orange.
80.0 - 87.0	Sand, grayish-orange, medium- to very-coarse-grained, rounded to subrounded; gravel up to 1.5 cm in diameter; clay, yellowish-gray.
87.0	Total Depth.



Gamma log for OW-4: 0 to 87.7 feet below land surface



Electric log for OW-4: 16 to 88.5 feet below land surface

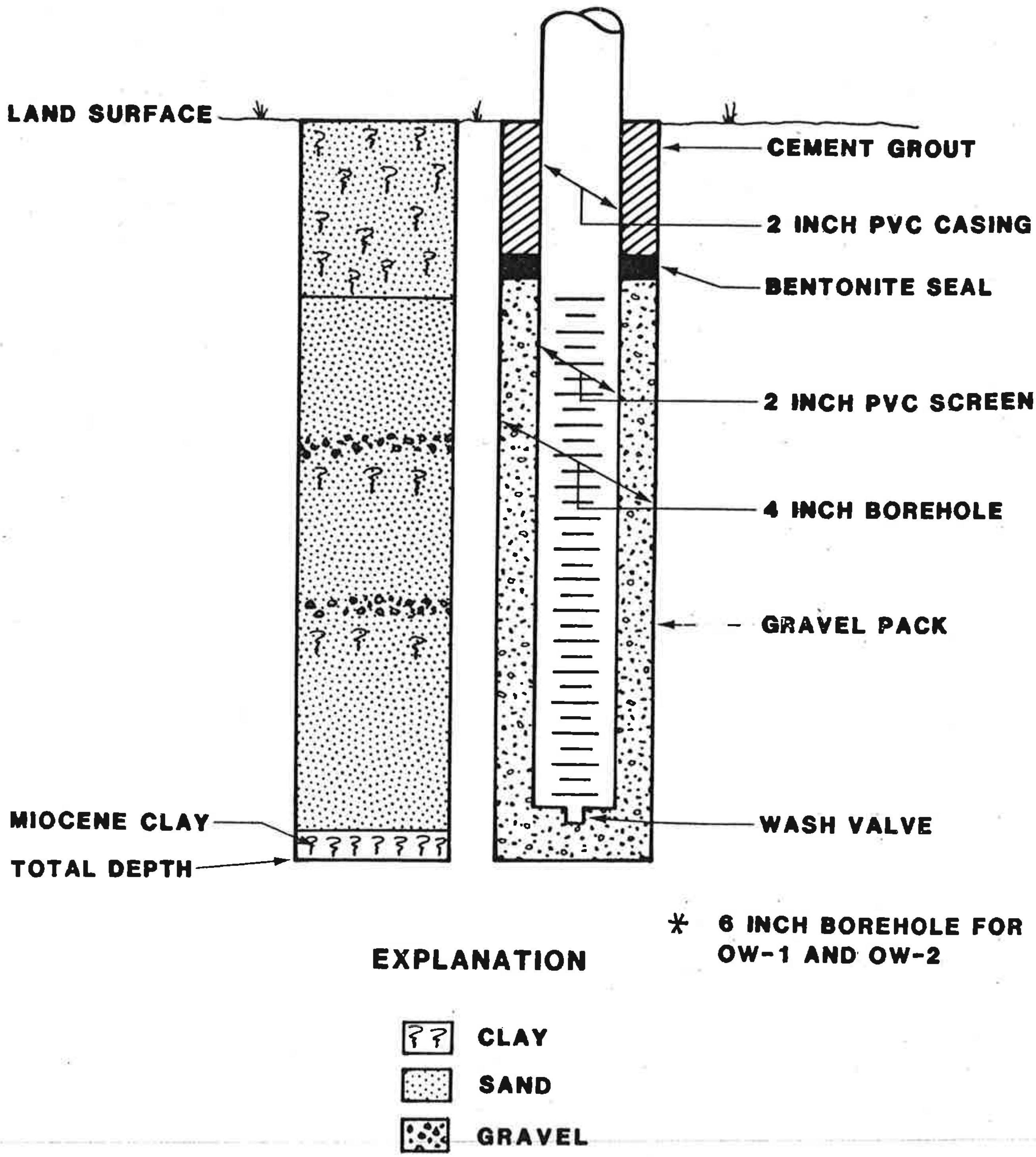


FIGURE 2. GENERALIZED LITHOLOGIC LOG AND WELL CONSTRUCTION DIAGRAM FOR OBSERVATION WELLS OW-1 THROUGH OW-9. *

PELA

LITHOLOGIC DESCRIPTION

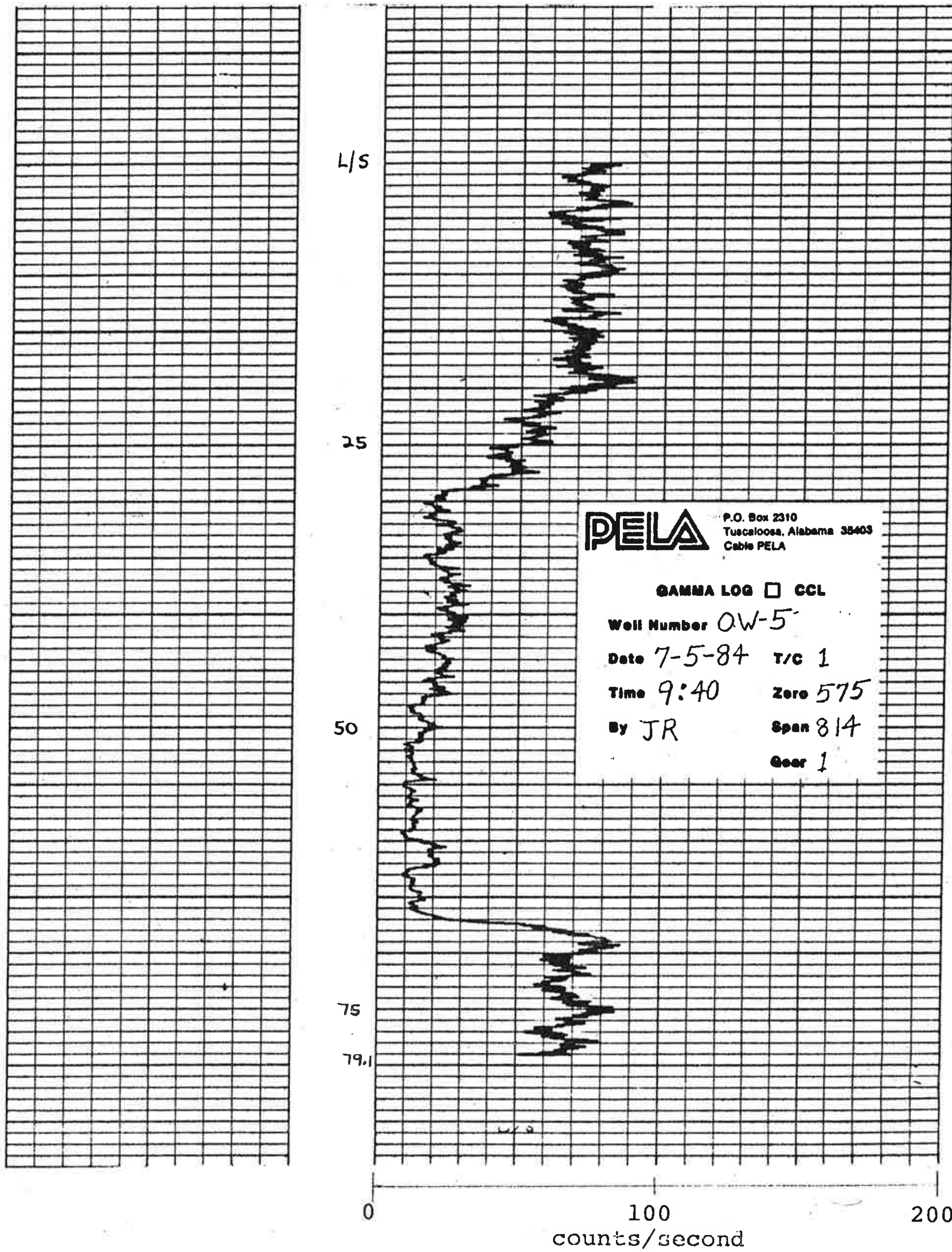
Observation Well OW-5

OWNER:	Ciba-Geigy Corporation
DATE DRILLED:	July 5, 1984
DATE COMPLETED:	July 5, 1984
PELA GEOLOGIST(S):	J. Dow/T. Beeson

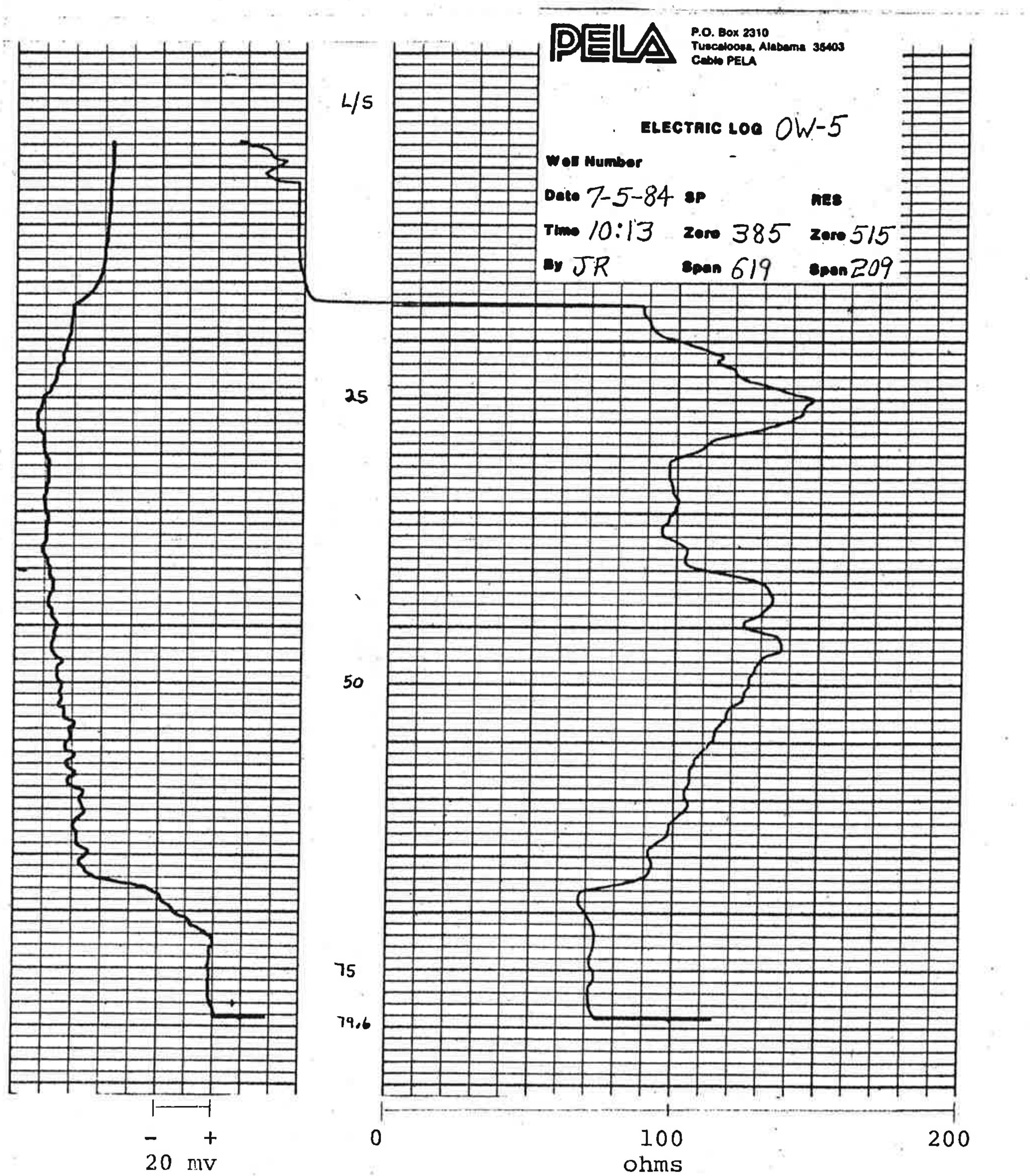
Depth (in feet)	Description
0 - 5.0	Clay, moderate-reddish-brown to moderate-yellowish-brown, sandy.
5.0 - 10.0	Clay, moderate-reddish-orange to yellowish-gray.
10.0 - 15.0	Clay, moderate-reddish-orange to yellowish-gray with trace of clay, yellowish-brown, sandy.
15.0 - 20.0	Clay, moderate-reddish-orange to yellowish-gray with trace of clay, yellowish-brown, sandier;, with sand fine- to medium-grained, rounded to subrounded.
20.0 - 24.0	Clay, yellowish-gray, sandy.
24.0 - 35.0	Sand, yellowish-gray, fine-grained, rounded to subrounded.
35.0 - 40.0	Sand, yellowish-gray, fine-grained, rounded to subrounded; some clay, yellowish-gray.
40.0 - 45.0	Sand, yellowish-gray, fine- to medium-grained, rounded to subrounded.
45.0 - 50.0	Sand, yellowish-gray, fine- to coarse-grained, rounded to subrounded; gravel, multicolored, up to 1.5 cm in diameter, rounded to subangular; trace of clay, yellowish-gray.
50.0 - 55.0	Sand, yellowish-gray, fine- to coarse-grained, rounded to subrounded; less gravel than above; trace of clay, yellowish-brown to light-brown.

Observation Well OW-5 -- continued

Depth (in feet)	Description
55.0 - 60.0	Sand, yellowish-gray, fine- to coarse-grained, rounded to subrounded; trace of gravel, multicolored, up to 0.8 cm in diameter; trace of clay, yellowish-brown to light-brown.
60.0 - 65.0	Sand, yellowish-gray, fine- to coarse-grained, rounded to subrounded; less gravel than above; clay, yellowish-brown to light-brown, less than above, some clay, light-olive-gray, sandy.
65.0 - 67.0	Sand, yellowish-gray, fine- to coarse-grained, rounded to subrounded.
67.0 - 80.0	Clay, light-bluish-gray with light brown streaks; trace of clay, dark-gray.
80.0	Total Depth.



Gamma log for OW-5: 0 to 79.1 feet below land surface



Electric log for OW-5: 16.5 to 79.6 feet below land surface

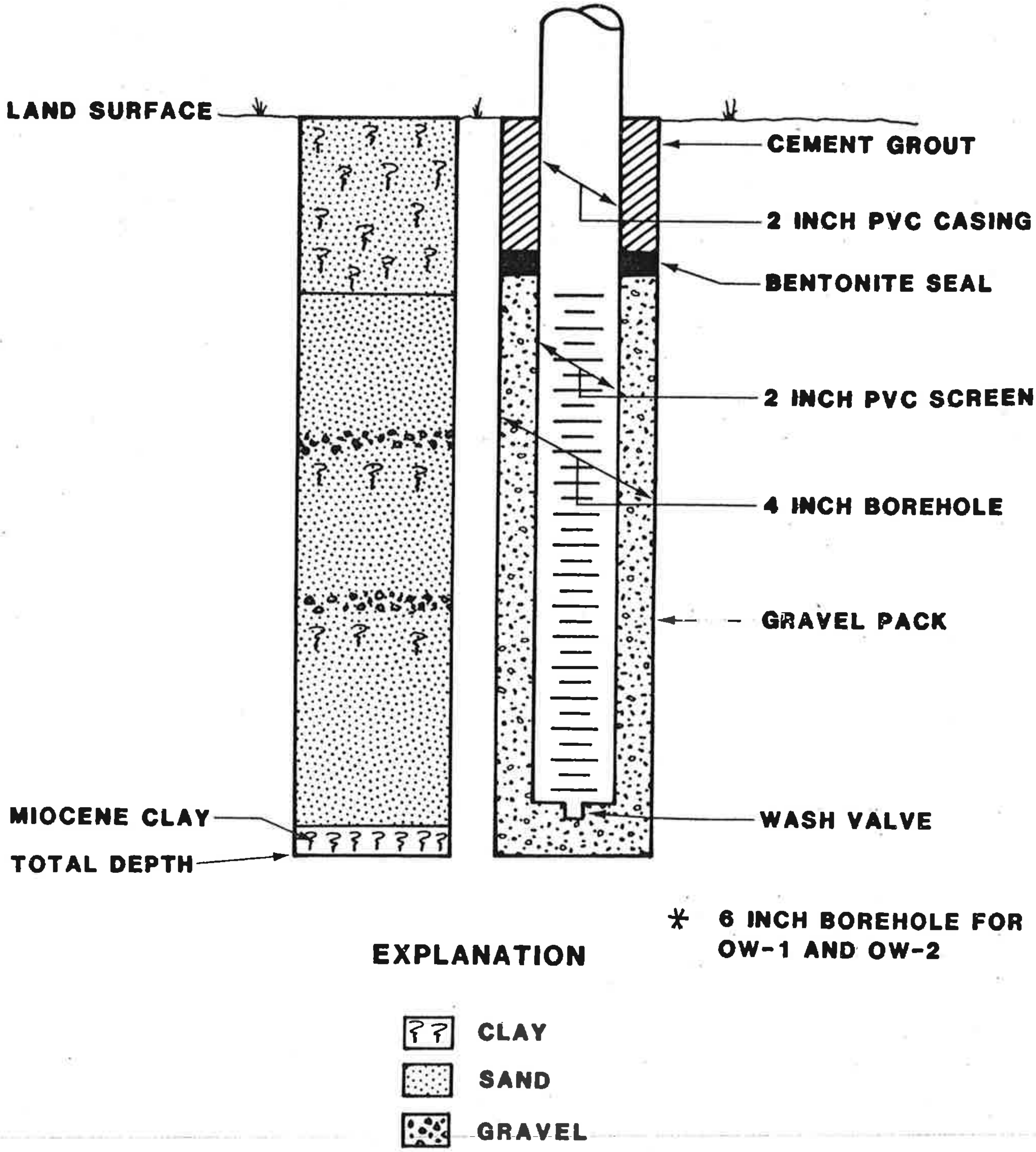


FIGURE 2. GENERALIZED LITHOLOGIC LOG AND WELL CONSTRUCTION DIAGRAM FOR OBSERVATION WELLS OW-1 THROUGH OW-9. *

PELA

LITHOLOGIC DESCRIPTION

Observation Well OW-6

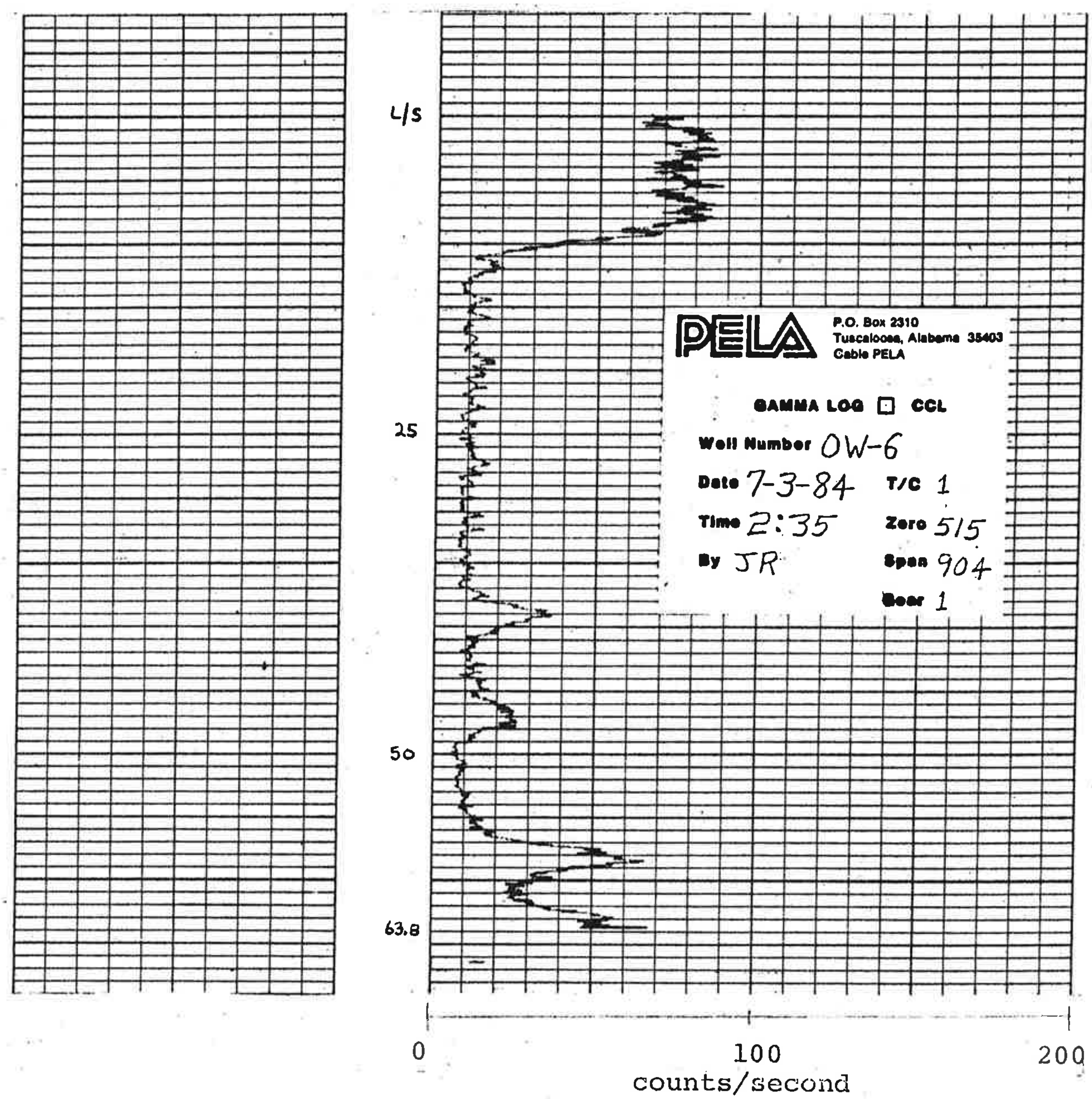
OWNER: Ciba-Geigy Corporation

DATE DRILLED: July 3, 1984

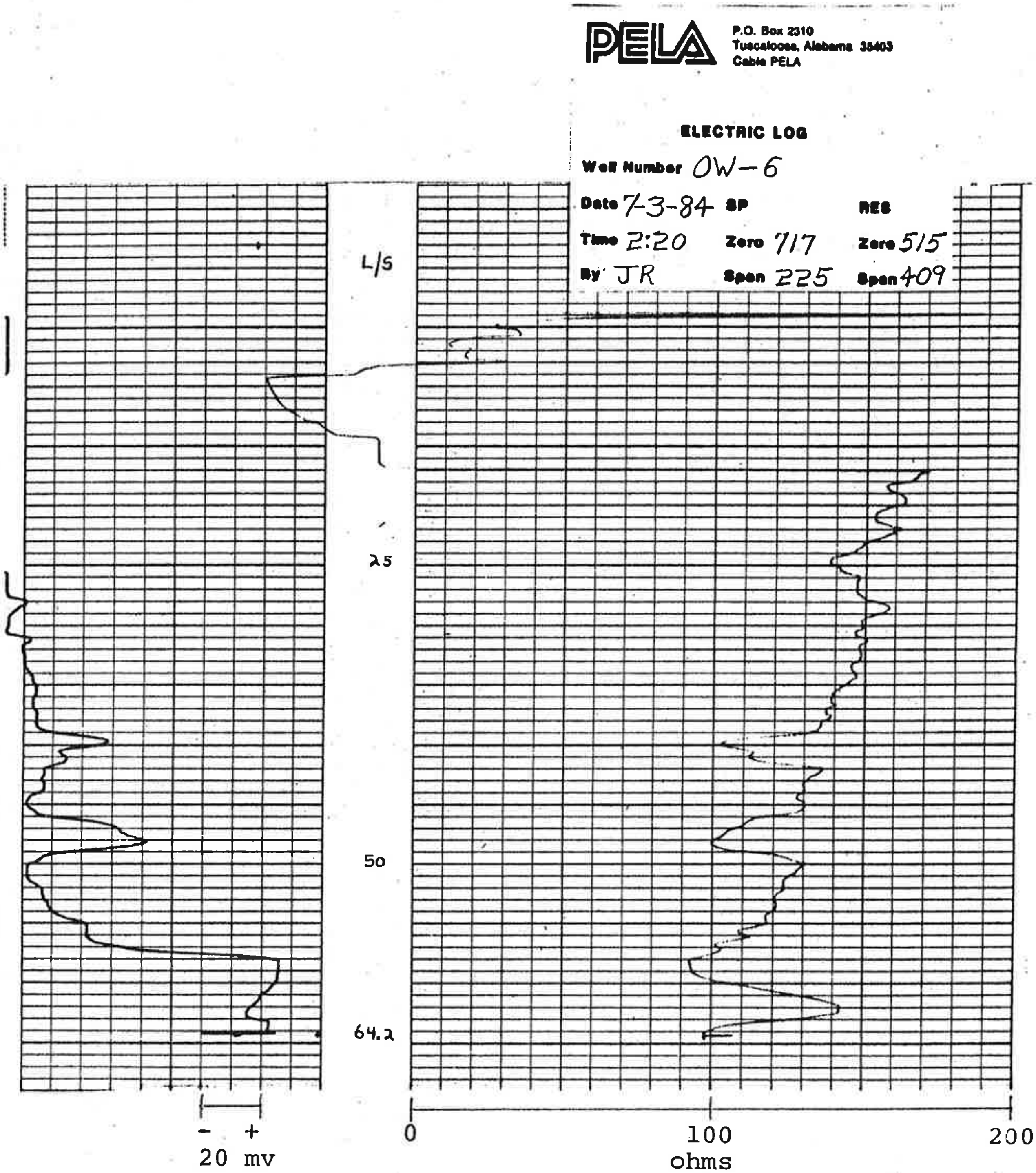
DATE COMPLETED: July 3, 1984

PELA GEOLOGIST(S): J. Robinson/T. Beeson

Depth (in feet)	Description
0 - 5.0	Clay, grayish-orange- to moderate-red, sandy; trace limonite nodules 0.2 cm in diameter.
5.0 - 11.0	Clay, grayish-orange to light-gray to light-brown, sandy, stiff.
11.0 - 20.0	Sand, yellowish-gray, medium- to coarse-grained, rounded to subrounded; some gravel up to 0.5 cm in diameter.
20.0 - 25.0	Sand, yellowish-gray, medium-to coarse-grained, rounded to subrounded; some gravel up to 0.5 cm in diameter.
25.0 - 35.0	Sand, grayish-orange, medium-grained, rounded to subrounded.
35.0 - 45.0	Sand, yellowish-gray, medium-grained, rounded to subrounded; some gravel up to 0.7 cm in diameter.
45.0 - 50.0	Sand, pinkish-gray, coarse- to very-coarse-grained, subrounded to subangular.
50.0 - 57.0	Sand, pinkish-gray, coarse- to very-coarse-grained, subrounded to subangular; trace of gravel up to 1 cm in diameter.
57.0 - 65.0	Clay, light-gray, sandy, soft.
65.0 - 69.0	Clay, light-bluish-gray to light-gray, sandy, firm,.
69.0	Total Depth.



Gamma log for OW-6: 0 to 64.6 feet below land surface



Electric log for OW-6: 17 to 64.2 feet below land surface

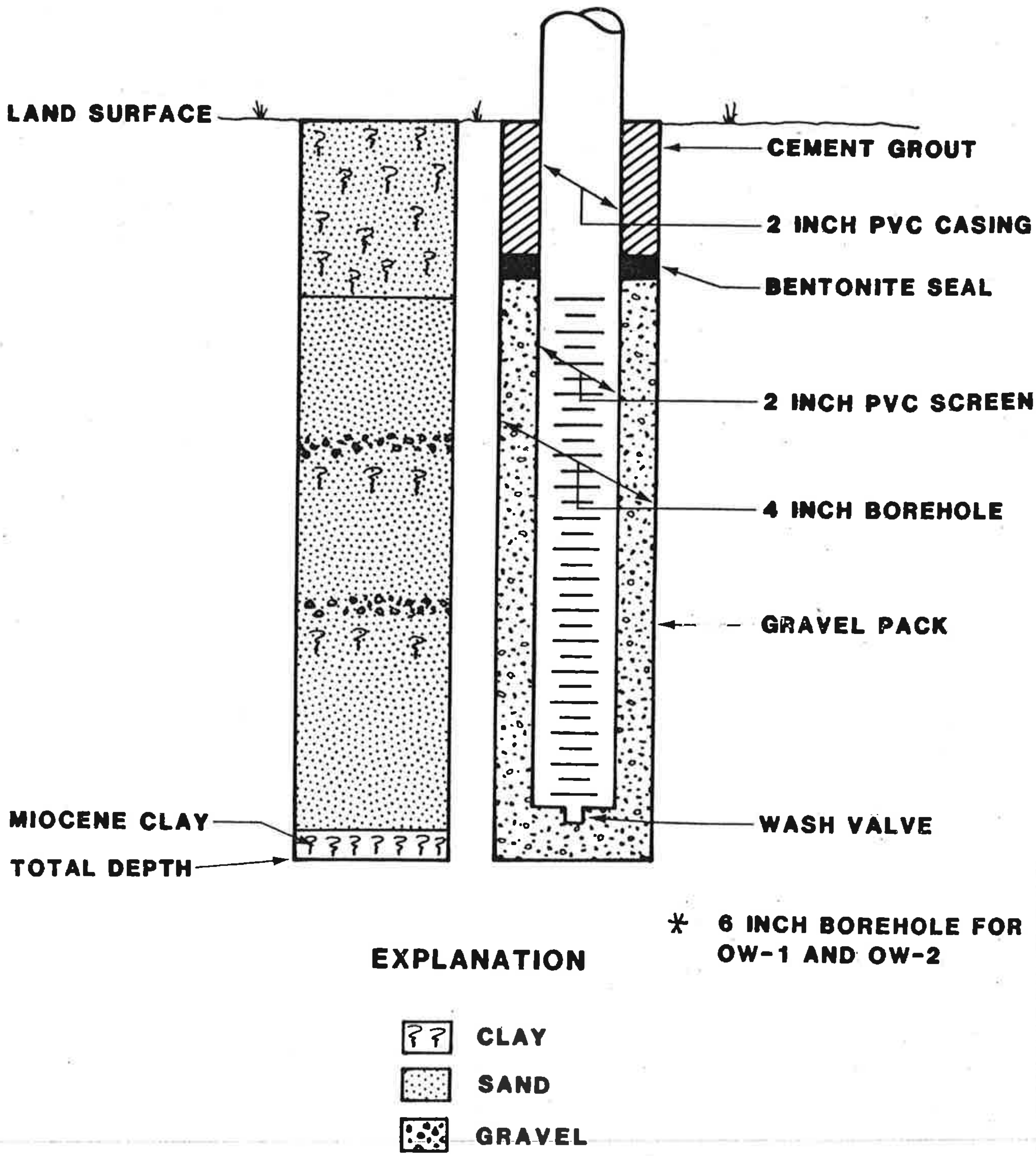


FIGURE 2. GENERALIZED LITHOLOGIC LOG AND WELL CONSTRUCTION DIAGRAM FOR OBSERVATION WELLS OW-1 THROUGH OW-9. *

PELA

LITHOLOGIC DESCRIPTION

Observation Well OW-7

OWNER: Ciba-Geigy Corporation

DATE DRILLED: July 3, 1984

DATE COMPLETED: July 3, 1984

PELA GEOLOGIST(S): J. Robinson/T. Beeson

Depth (in feet)	Description
0 - 5.0	Clay, light-brown and medium-light-gray, sandy, soft.
5.0 - 11.0	Clay, light-brownish-gray to light-gray, sandy.
11.0 - 15.0	Sand, pale-yellowish-brown, fine- to medium-grained, rounded to subrounded.
15.0 - 20.0	Sand, pale-yellowish-brown, fine- to medium-grained, rounded to subrounded, trace of clay, light-brown.
20.0 - 25.0	Sand, pinkish-gray to yellowish-gray, medium- to very-coarse-grained; pebbles, less than 1 cm in diameter, white- to moderate-reddish-brown.
25.0 - 30.0	Sand, pinkish-gray to yellowish-gray, medium- to very-coarse-grained with more coarse grains than above; pebbles up to 1 cm in diameter.
30.0 - 35.0	Sand, pale-yellowish-brown, medium- to very-coarse-grained; pebbles, fewer than above; clay, some medium-light-gray.
35.0 - 40.0	Sand, pale-yellowish-brown, medium- to very-coarse-grained; gravel, rounded to subrounded; pebbles, multi-colored, up to 1 cm in diameter; clay, light-gray, sandy.
40.0 - 45.0	Sand, pale-yellowish-brown, medium- to very-coarse-grained; gravel, rounded to subrounded; clay, less than above.
45.0 - 47.0	Sand, pale-yellowish-brown, medium- to very-coarse-grained; gravel, rounded to subrounded.

silty sand

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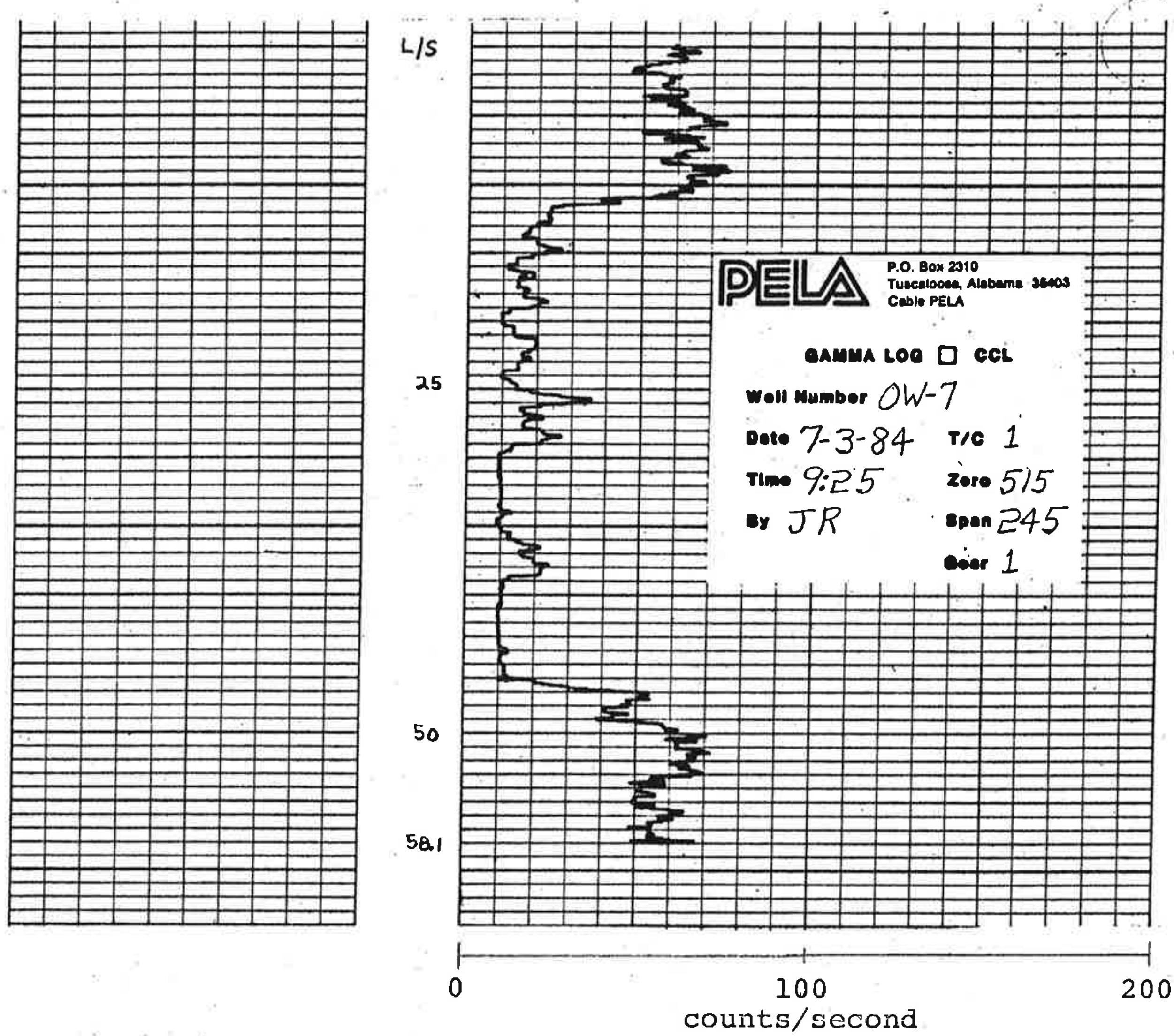
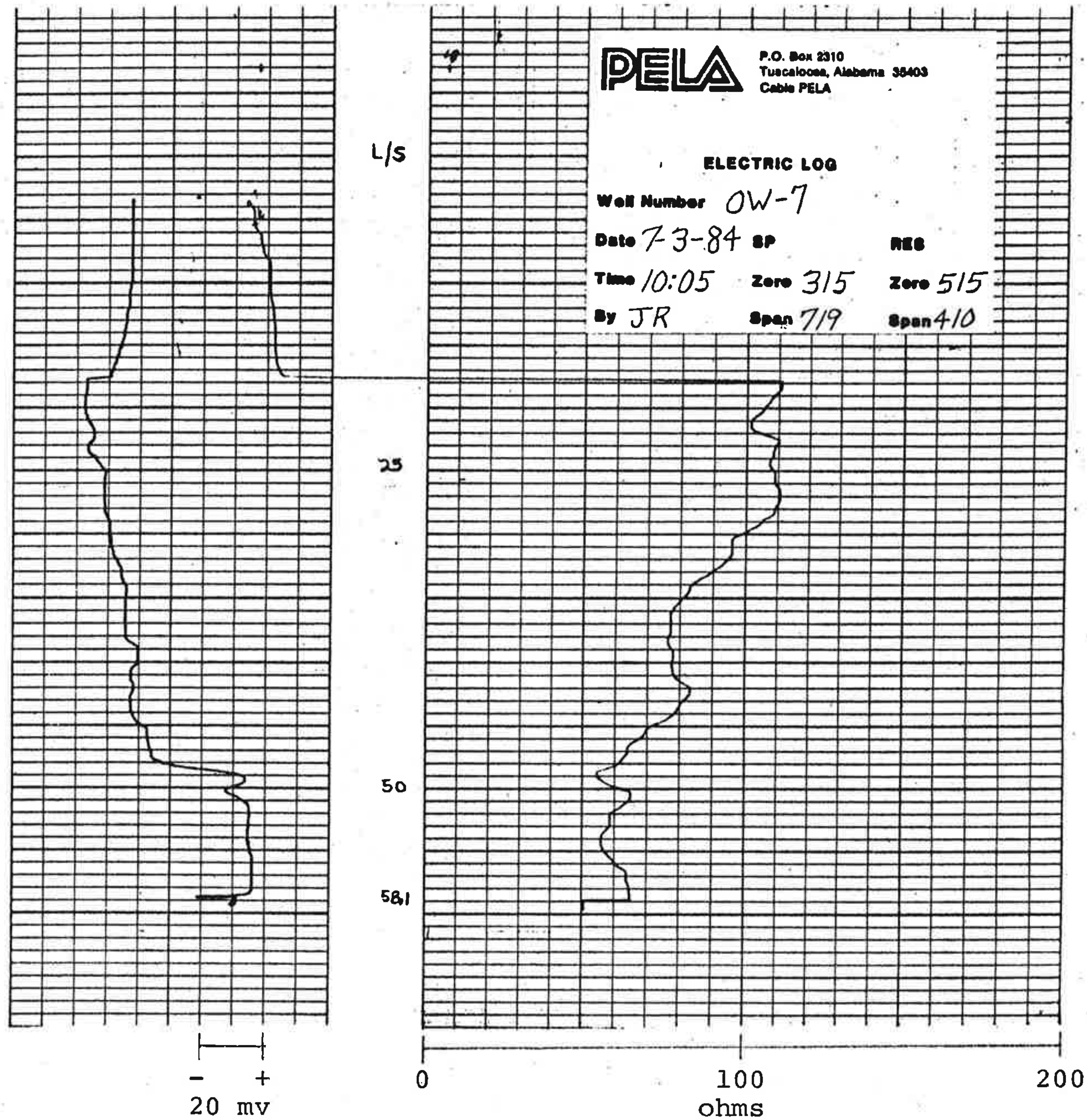
Observation Well OW-7 -- continued

Depth (in feet)	Description
47.0 - 50.0	Clay, pale-olive to dark-yellowish-orange, sandy.
50.0 - 55.0	Sand, pale-yellowish-brown, medium- to very-coarse-grained; gravel, less than above; clay, light-gray to moderate-reddish-brown, sandy.
55.0 - 60.0	Clay, light-gray to moderate-reddish-brown, sandy.
60.0	Total Depth.



Gamma log for OW-7 : 0 to 58.1 feet below land surface



Electric log for OW-7: 17.5 to 59 feet below land surface

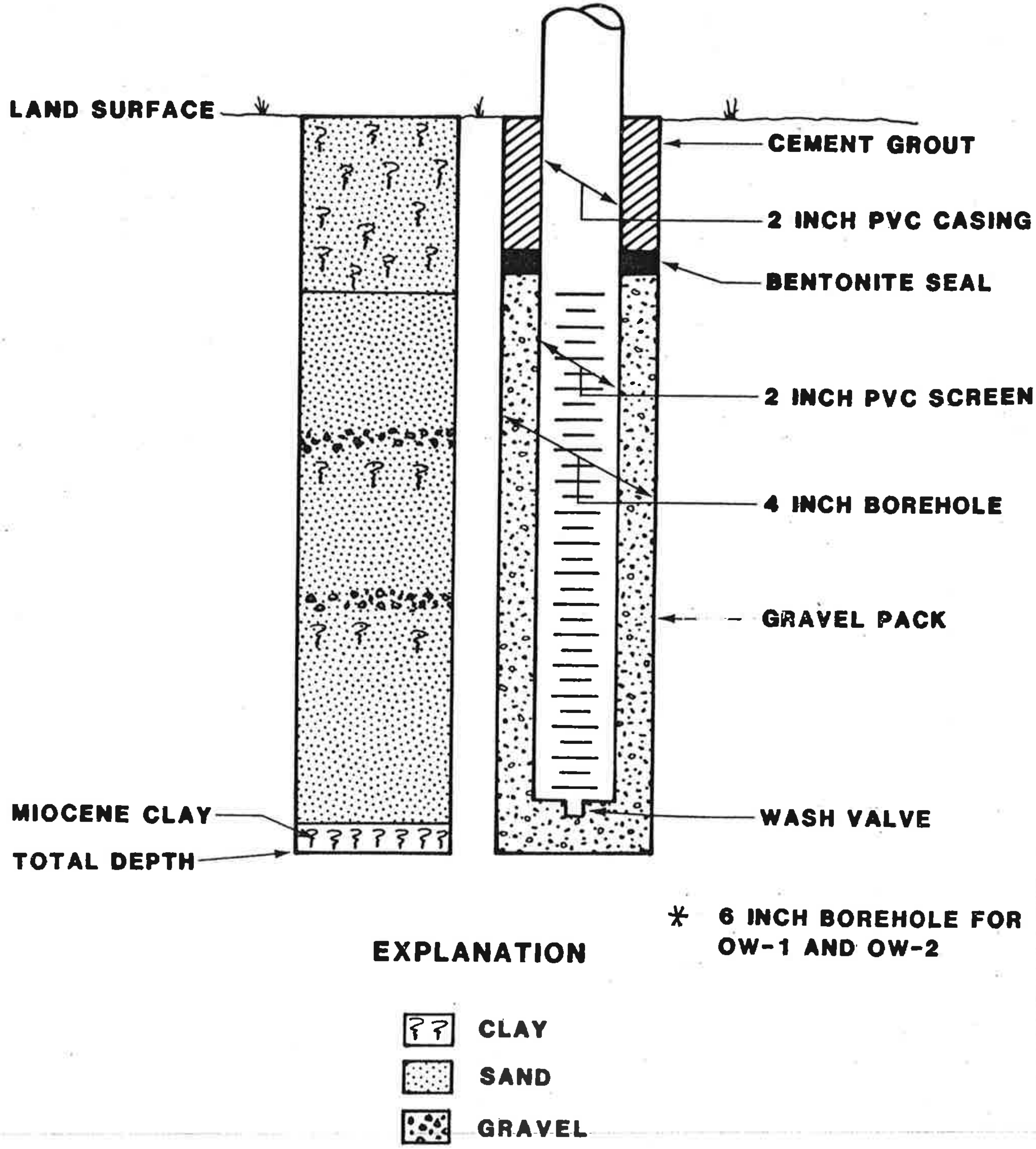


FIGURE 2. GENERALIZED LITHOLOGIC LOG AND WELL CONSTRUCTION DIAGRAM FOR OBSERVATION WELLS OW-1 THROUGH OW-9. *

PELA

LITHOLOGIC DESCRIPTION

Observation Well OW-8

OWNER: Ciba-Geigy Corporation

DATE DRILLED: June 27, 1984

DATE COMPLETED: July 2, 1984

PELA GEOLOGIST(S): D. Madison, Jr./J. Robinson/T. Beeson

Depth (in feet)	Description
0 - 5.0	Clay, sandy, reddish-brown and grayish-orange.
5.0 - 10.0	Clay, sandy, pale-yellowish to grayish-orange and moderate-reddish-brown.
10.0 - 15.0	Clay, grayish-orange; sand, abundant, medium-grained, subangular to subrounded.
15.0 - 19.0	Clay, grayish-orange to dark-yellowish-orange; sand, abundant, medium-grained, subangular to subrounded.
19.0 - 25.0	Sand, grayish-orange, medium-grained, subrounded to subangular.
25.0 - 30.0	Sand, very-pale-orange to grayish-orange, medium-grained, subrounded to subangular.
30.0 - 40.0	Sand, grayish-orange, medium- to course-grained, subrounded to subangular.
40.0 - 48.0	Sand, yellowish-gray, coarse-grained, subrounded to subangular; gravel up to 1.5 cm in diameter.
48.0 - 58.0	Clay, sandy, light-bluish-gray and moderate-reddish-brown, stiff.
58.0	Total Depth.

Silty Sand

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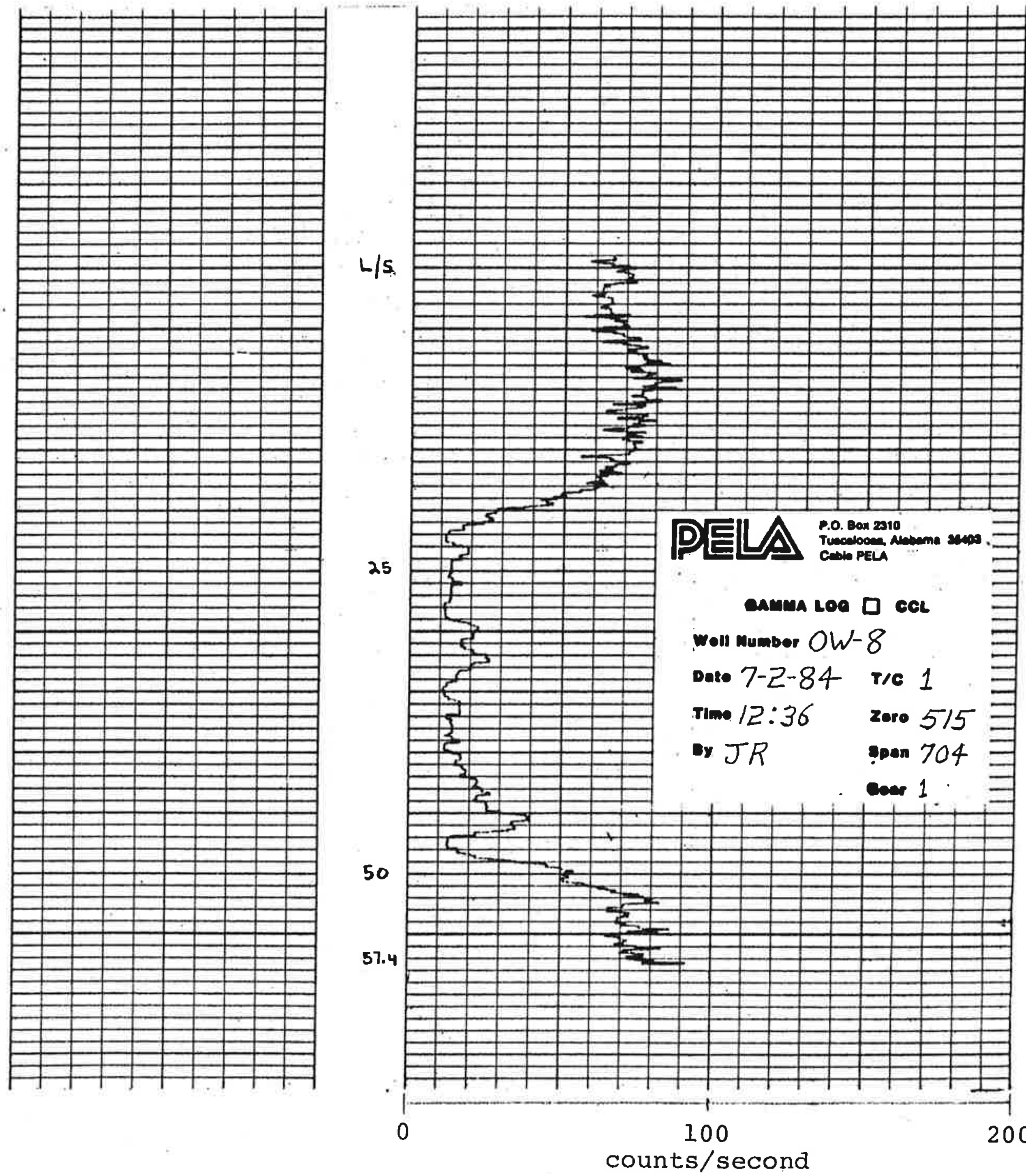
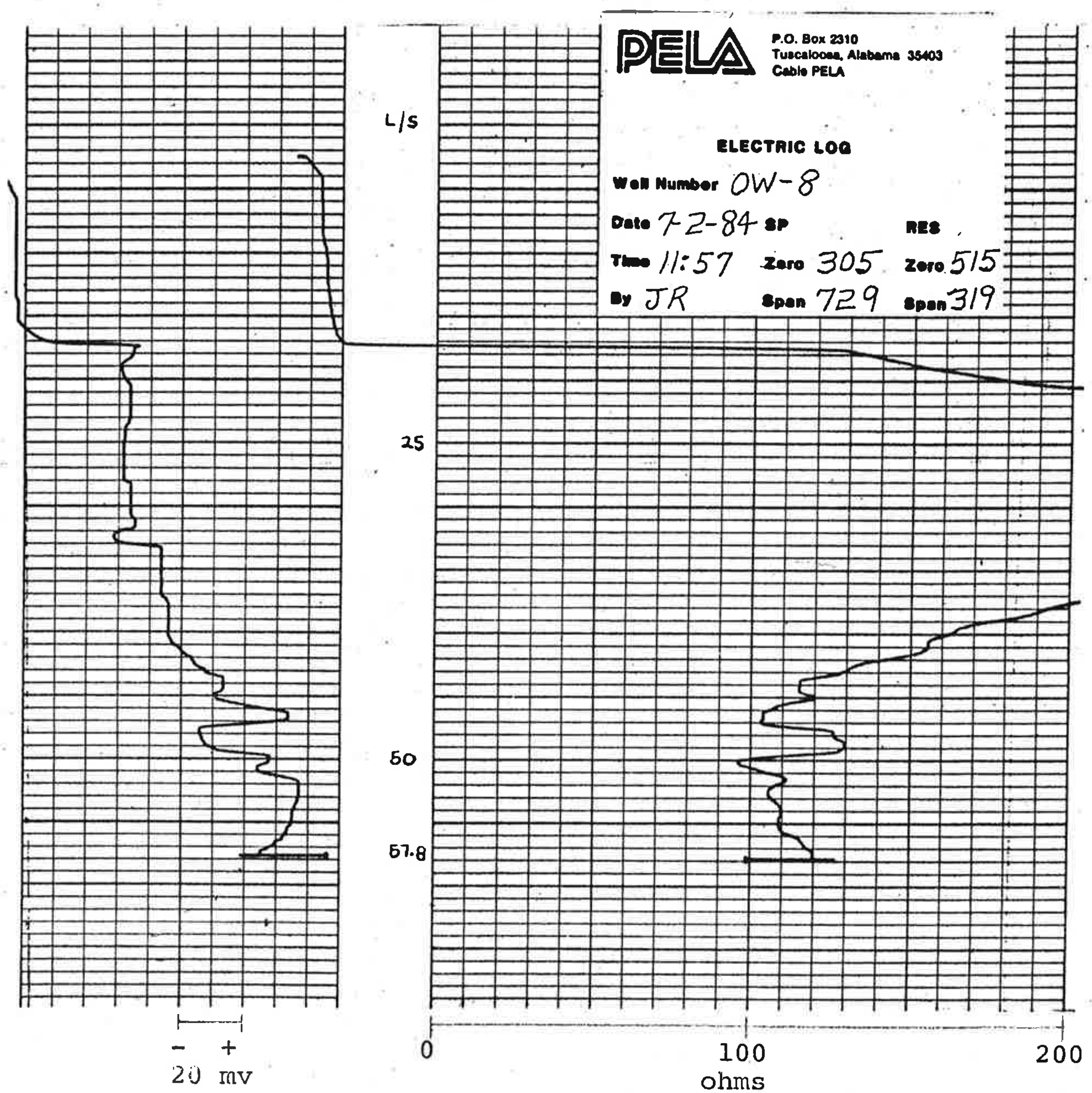
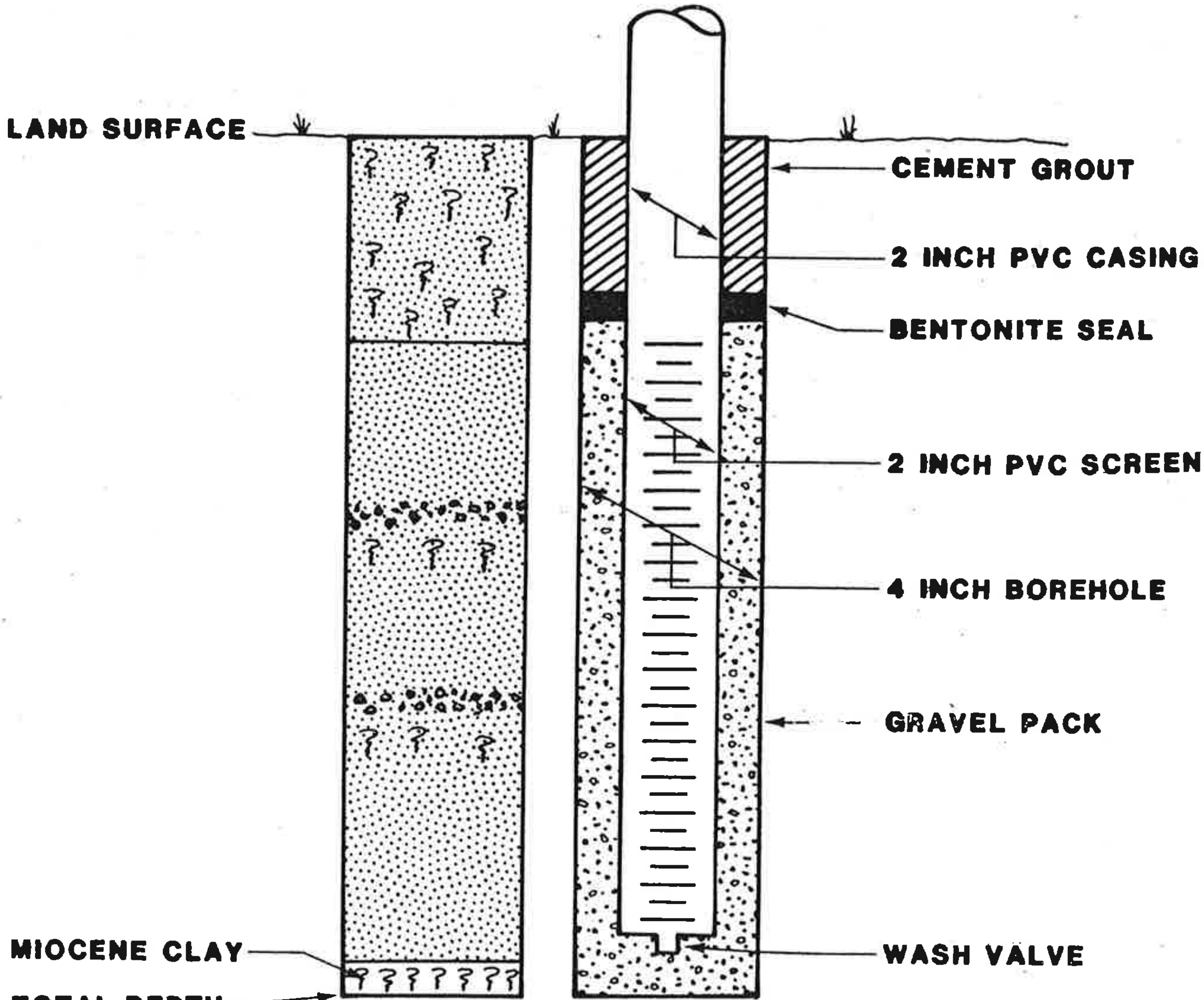


Gamma log for OW-8: 0-57.4 feet below land surface



Electric log for OW-8: 17.3-57.8 feet below land surface



* 6 INCH BOREHOLE FOR OW-1 AND OW-2

EXPLANATION

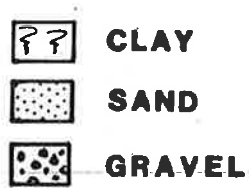


FIGURE 2. GENERALIZED LITHOLOGIC LOG AND WELL CONSTRUCTION DIAGRAM FOR OBSERVATION WELLS OW-1 THROUGH OW-9. *

PELA

LITHOLOGIC DESCRIPTION

Observation Well OW-9 / CA-4

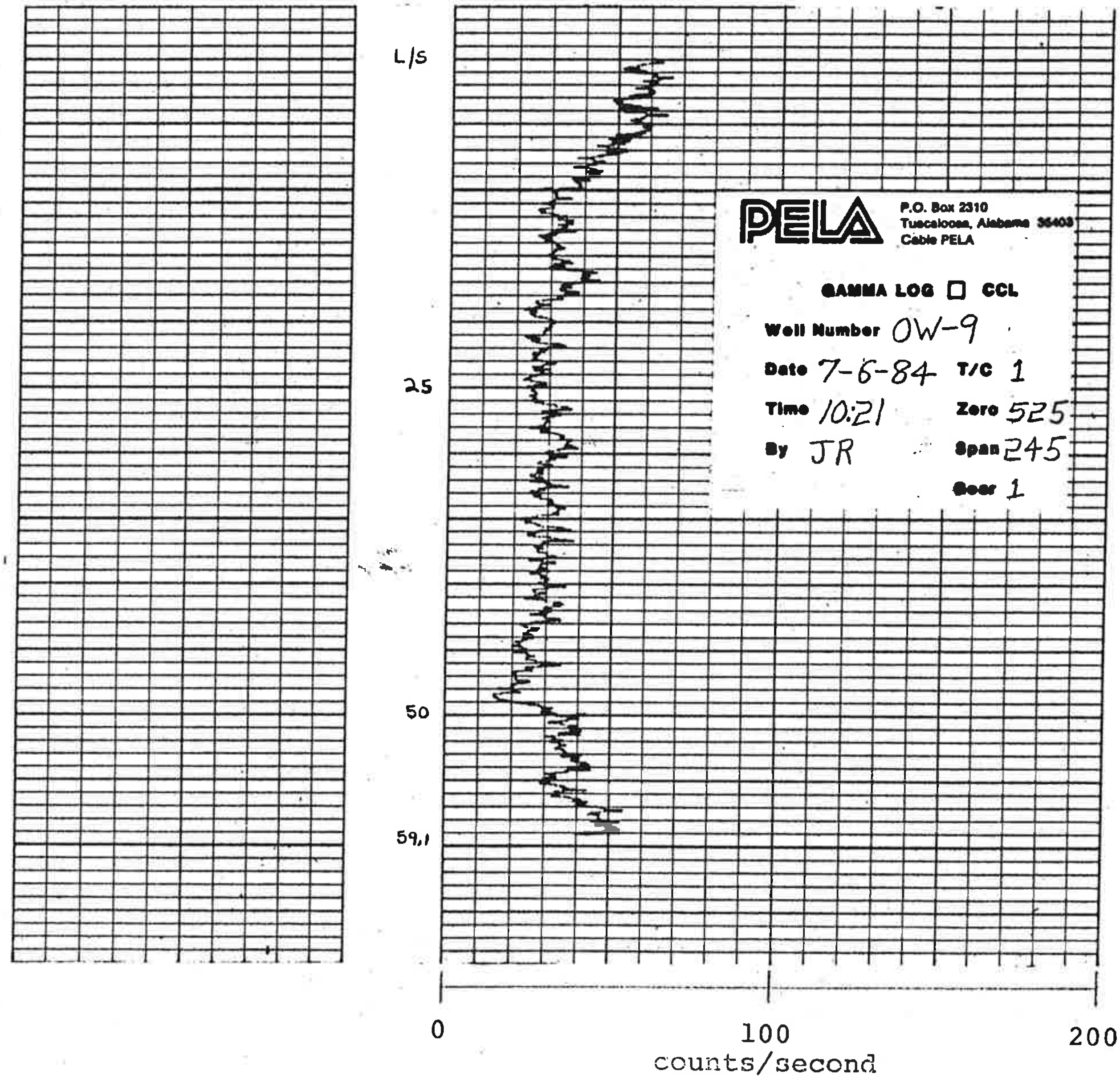
OWNER: Ciba-Geigy Corporation

DATE DRILLED: July 6, 1984

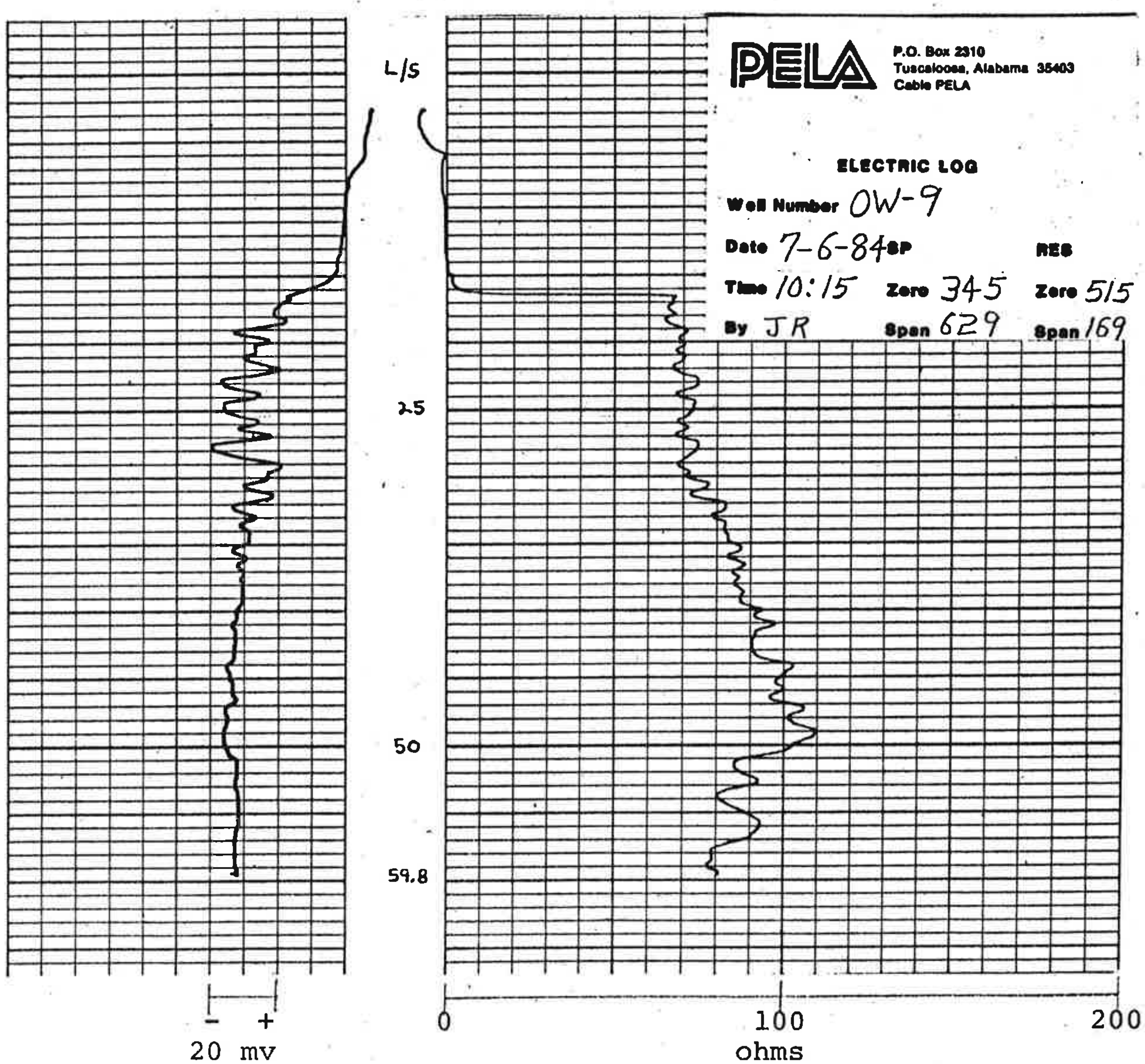
DATE COMPLETED: July 6, 1984

PELA GEOLOGIST(S): J. Robinson/P. Lambert

Depth (in feet)	Description
0 - 5.0	Clay, moderate-reddish-orange, sandy; shells from road bed.
5.0 - 10.0	Clay, moderate-reddish-orange and medium-bluish-gray, sandy.
10.0 - 15.0	Sand, light-olive-gray, silty, fine-grained; clay, moderate-reddish-orange and medium-bluish-gray, sandy.
15.0 - 35.0	Sand, light-olive-gray, silty, fine- to medium-grained, rounded to subrounded; abundant mica flakes; clay, moderate-reddish-orange and medium-bluish-gray, sandy.
35.0 - 46.0	Sand, light-olive-gray, silty, fine- to medium-grained, rounded to subrounded; clay, medium-bluish-gray and moderate-reddish-orange, decreases with depth.
46.0 - 50.0	Clay, medium-bluish-gray, soft.
50.0 - 60.0	Clay, greenish-gray to light-greenish-gray, sandy.
60.0	Total Depth.



Gamma log for OW-9: 0-39.1 feet below land surface



Electric log for OW-9: 16.2 to 59.8 feet below land surface

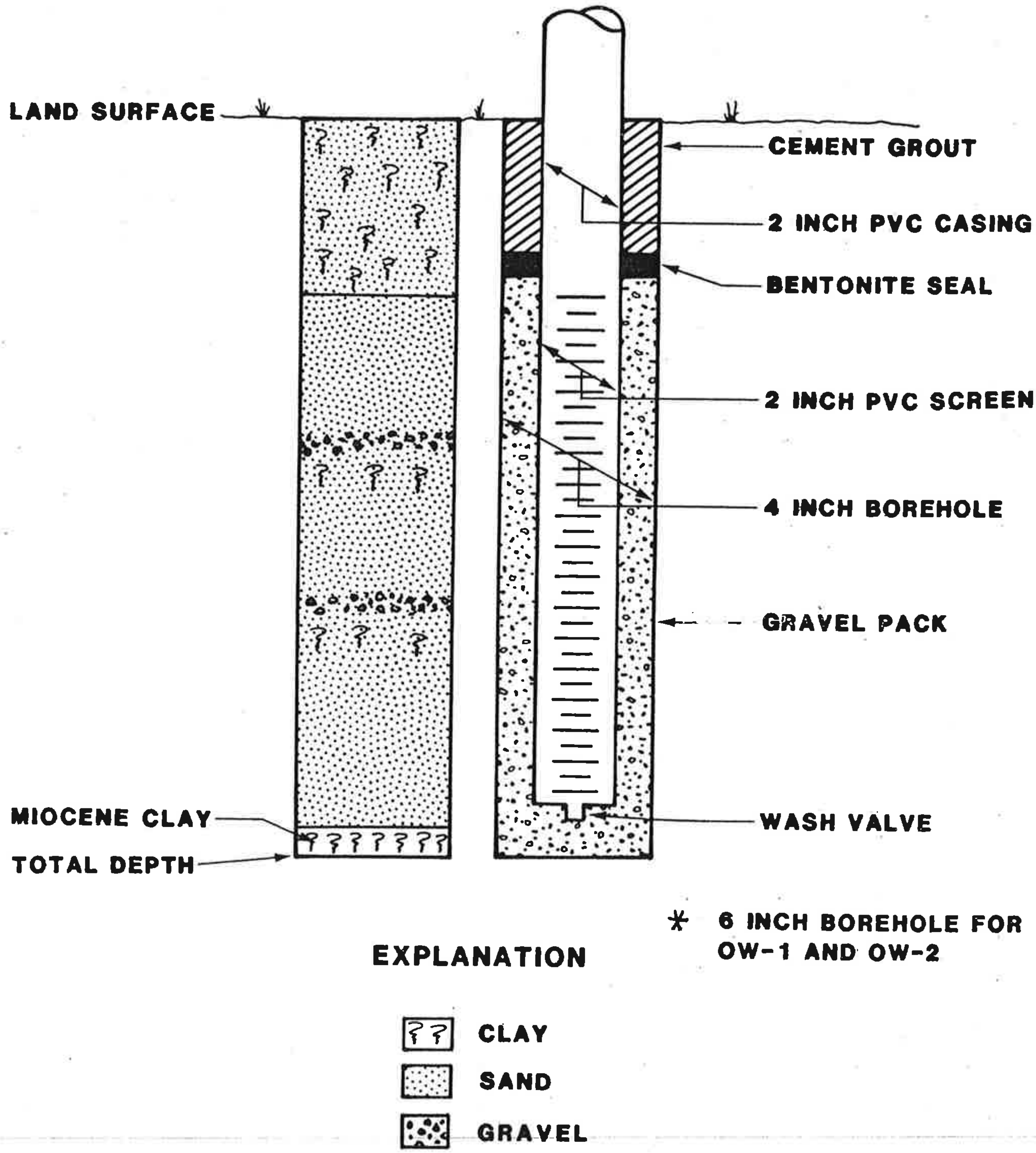


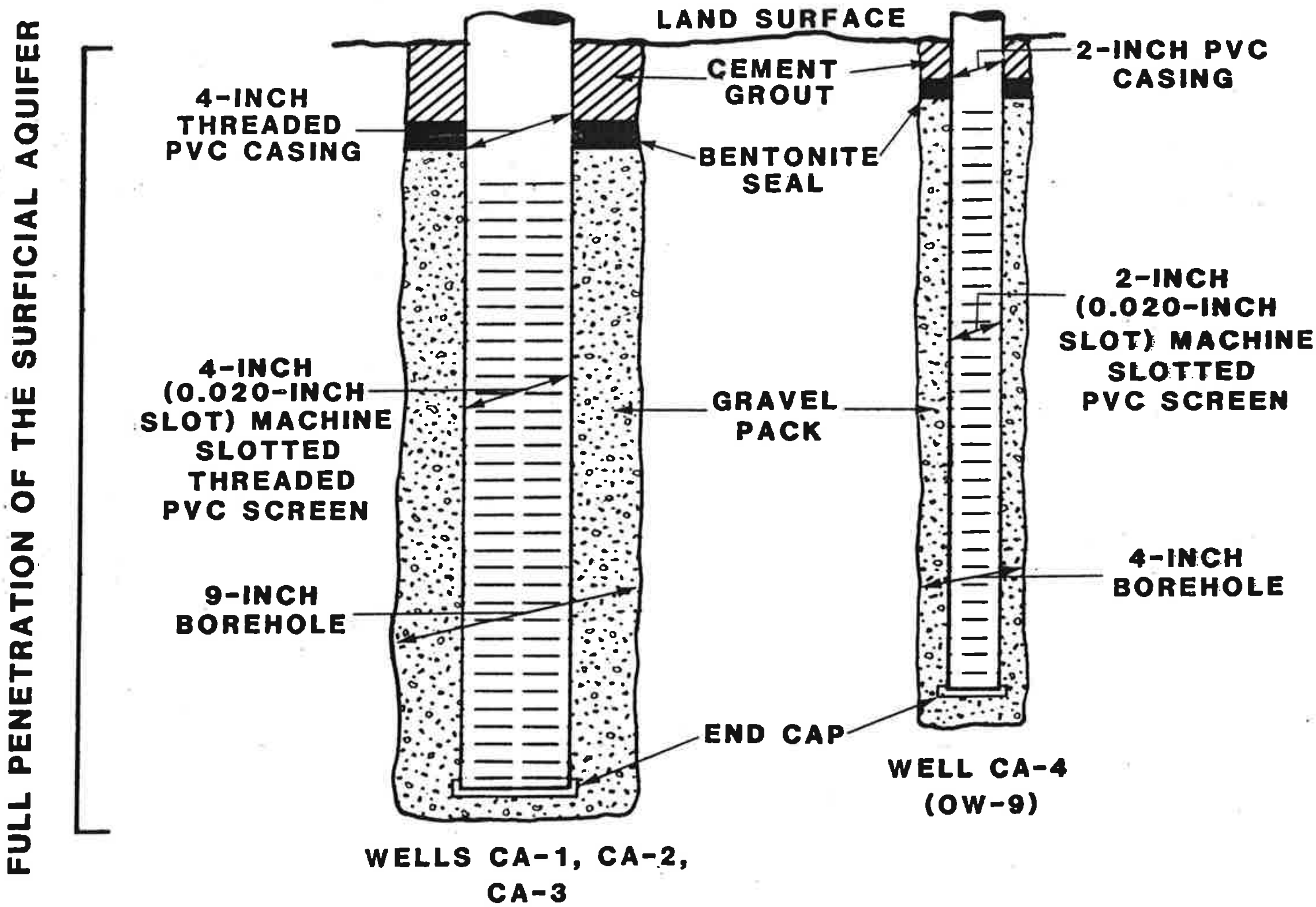
FIGURE 2. GENERALIZED LITHOLOGIC LOG AND WELL CONSTRUCTION DIAGRAM FOR OBSERVATION WELLS OW-1 THROUGH OW-9. *

LITHOLOGIC DESCRIPTION

Observation Well OW-9 / CA-4

OWNER:	Ciba-Geigy Corporation
DATE DRILLED:	July 6, 1984
DATE COMPLETED:	July 6, 1984
PELA GEOLOGIST(S):	J. Robinson/P. Lambert

Depth (in feet)	Description
0 - 5.0	Clay, moderate-reddish-orange, sandy; shells from road bed.
5.0 - 10.0	Clay, moderate-reddish-orange and medium-bluish-gray, sandy.
10.0 - 15.0	Sand, light-olive-gray, silty, fine-grained; clay, moderate-reddish-orange and medium-bluish-gray, sandy.
15.0 - 35.0	Sand, light-olive-gray, silty, fine- to medium-grained, rounded to subrounded; abundant mica flakes; clay, moderate-reddish-orange and medium-bluish-gray, sandy.
35.0 - 46.0	Sand, light-olive-gray, silty, fine- to medium-grained, rounded to subrounded; clay, medium-bluish-gray and moderate-reddish-orange, decreases with depth.
46.0 - 50.0	Clay, medium-bluish-gray, soft.
50.0 - 60.0	Clay, greenish-gray to light-greenish-gray, sandy.
60.0	Total Depth.



Prepared by:
P.E. LAMOREAUX & ASSOCIATES, IN(

FIGURE 3. GENERALIZED WELL CONSTRUCTION DIAGRAMS FOR CORRECTIVE ACTION MONITORING WELLS (SEE TABLE 1 FOR SCREEN LENGTHS).

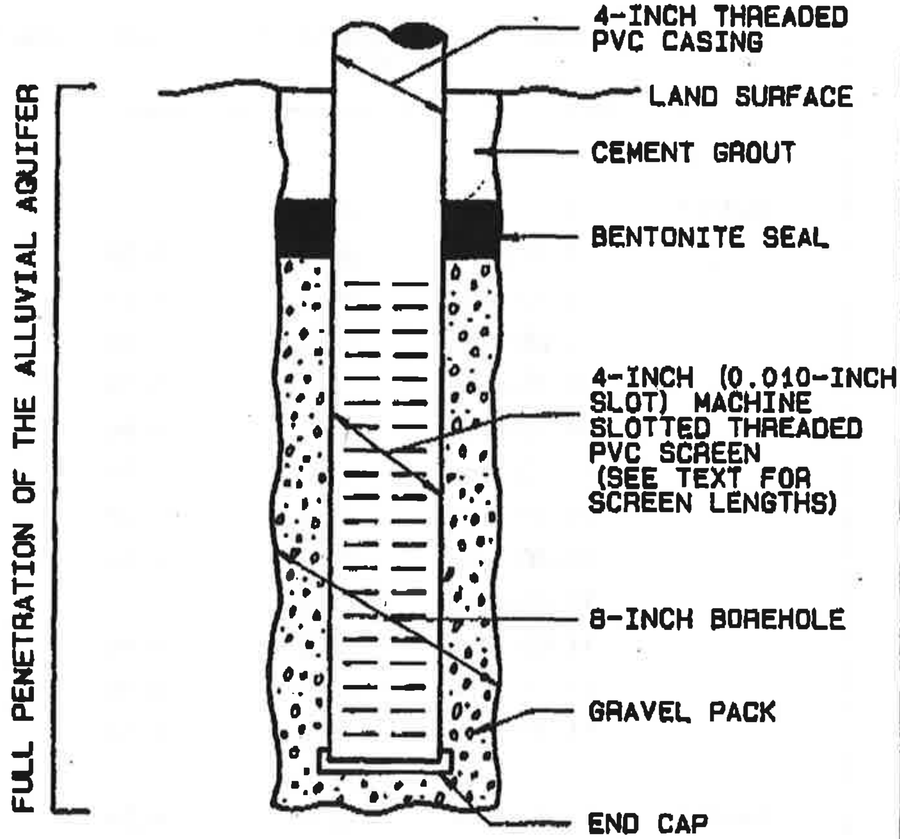


FIGURE 2. GENERALIZED WELL CONSTRUCTION DIAGRAM FOR OBSERVATION WELLS OW-10 AND OW-11

APRIL 17, 19[illegible]

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

PELA

LITHOLOGIC DESCRIPTION
Observation Well OW-10

OWNER: Ciba-Geigy Corporation
DATE DRILLED: April 2, 1986
DATE COMPLETED: April 2, 1986
PELA GEOLOGISTS: A. Patton/S. Godfrey

Depth (in feet below land surface)	Description
0 - 2.0	Fill material, sand, coarse-grained; clear quartz gravel up to 0.7 cm in diameter; grayish-orange, 10YR 7/4.
2.0 - 5.0	Clay and sand, dark yellowish-orange, 10YR 6/6 to grayish-orange, 10YR 7/4 mottled with some moderate reddish-brown, 10R 4/6 and light gray, N7.
5.0 - 10.0	Clay, very light gray N8 with some dark yellowish-orange, 10YR 6/6, clean, soft.
10.0 - 15.0	Clay, grayish-orange, 10YR 7/4, clean, soft with abundant moderate reddish-brown, 10R 4/6 silt-rich clay.
15.0 - 20.0	Clay as above, moderate reddish-brown, 10R 4/6 content decreasing.
20.0 - 25.0	Clay and sand; clay is light gray, N7, and rich in moderate reddish-brown silt, 10R 4/6; trace of sand, clear, very fine-grained, subrounded to subangular.
25.0 - 30.0	Clay and sand; clay is light gray, N7, and rich in moderate reddish-brown silt, 10R 4/6; trace of sand, clear, very fine-grained, subrounded to subangular.
30.0 - 35.0	Clay and sand; clay is light gray, N7, and rich in moderate reddish-brown silt, 10R 4/6; trace of sand, clear, very fine-grained, subrounded to subangular.
35.0 - 40.0	Sand, clear, medium-grained, subrounded to rounded, well sorted, clean.
40.0 - 45.0	Sand, clear, medium-grained, subrounded to rounded, well sorted, clean; trace mica.

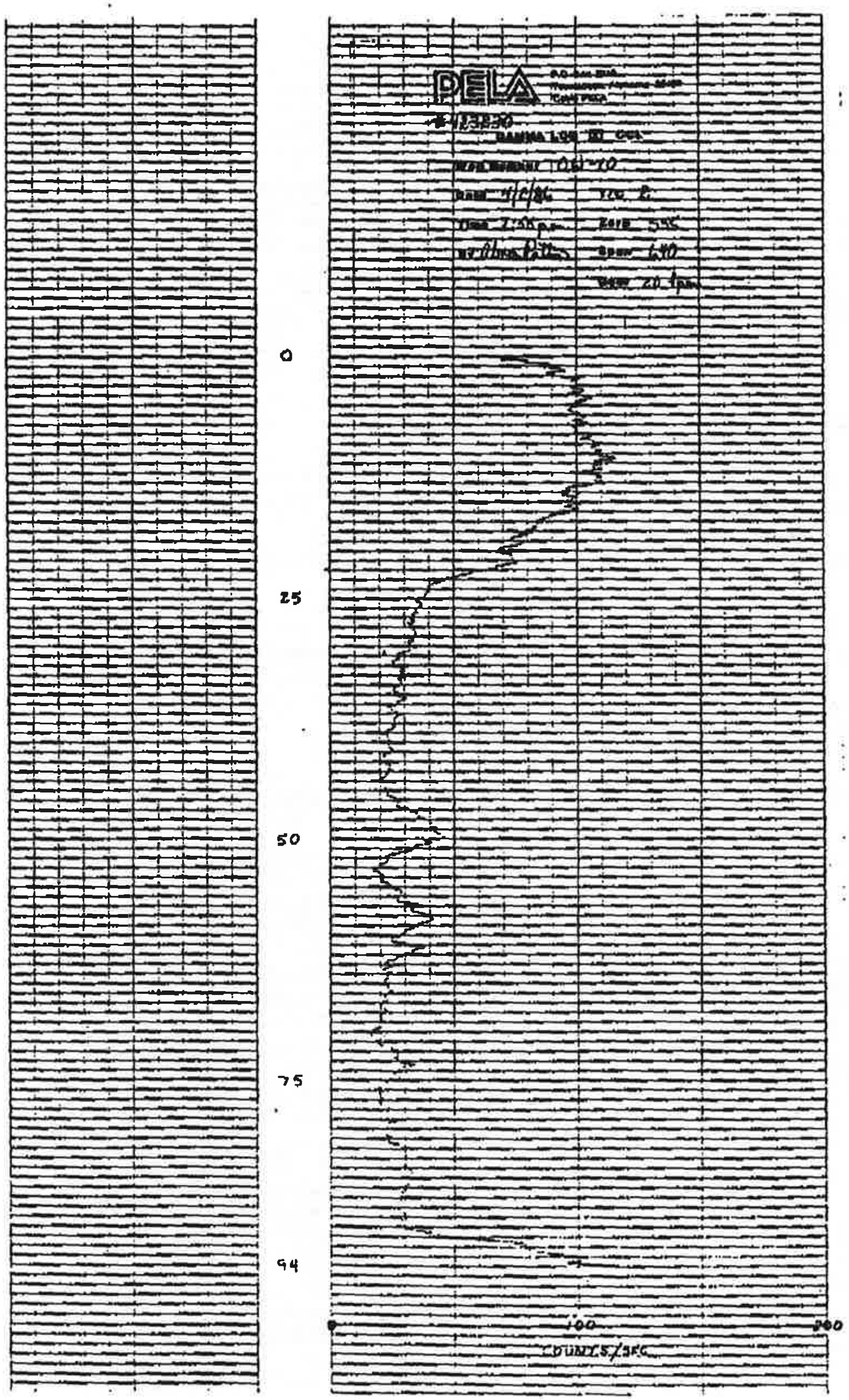
JC24/vs/#1

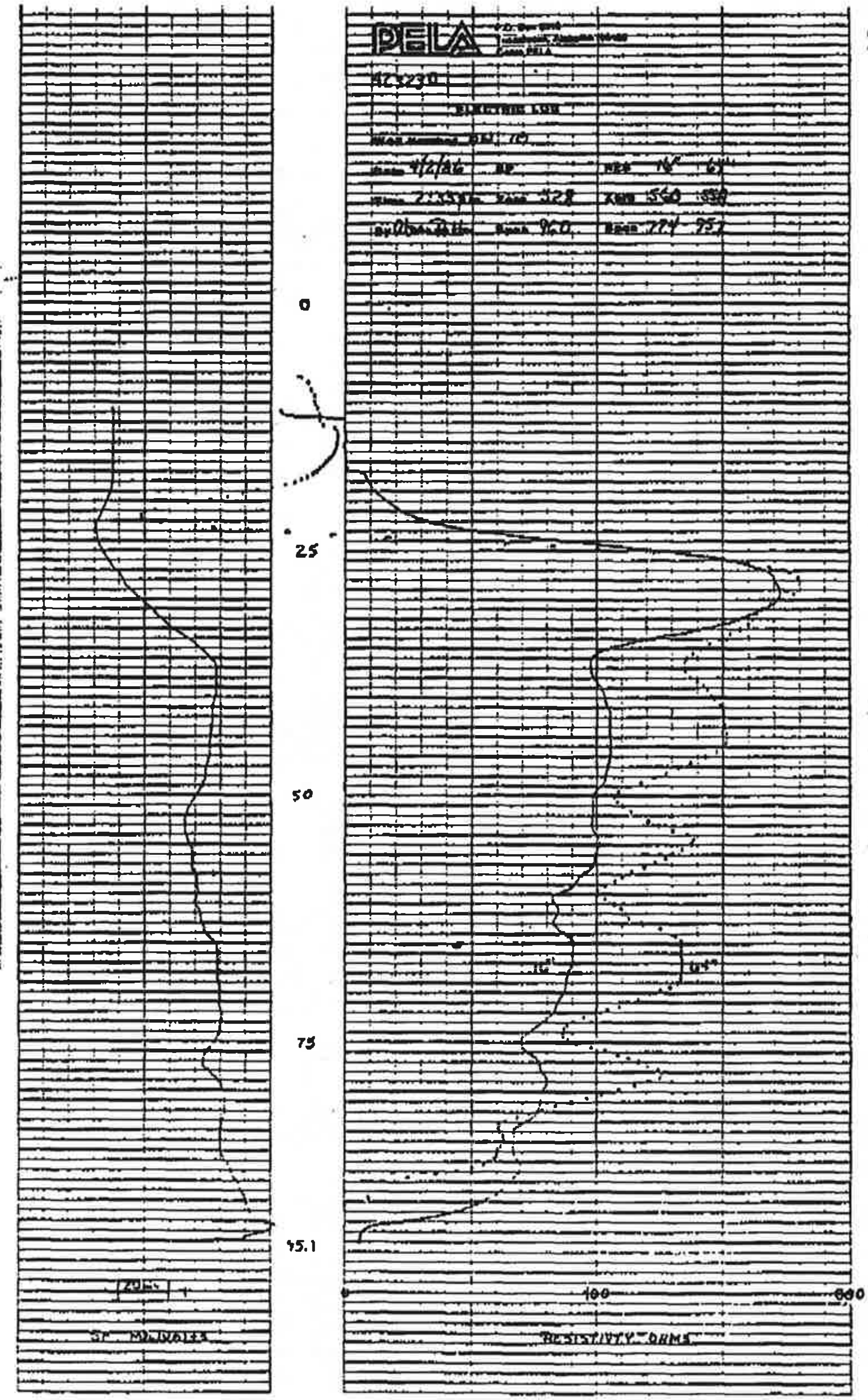
PELA

LITHOLOGIC DESCRIPTION
Observation Well OW-10
(continued)

OWNER:	Ciba-Geigy Corporation
DATE DRILLED:	April 2, 1986
DATE COMPLETED:	April 2, 1986
PELA GEOLOGISTS:	A. Patton/S. Godfrey

Depth (in feet below land surface)	Description
45.0 - 50.0	Sand, clear, medium-grained, subrounded to rounded, well sorted, clean; trace mica.
50.0 - 55.0	Sand, clear, medium-grained with trace of coarse-grained, clean, subangular to subrounded, clear quartz sand; trace mica.
55.0 - 60.0	Sand, clear, medium- to coarse-grained, subangular to subrounded quartz, clean; trace mica.
60.0 - 65.0	Sand, clear, varicolored, medium- to coarse-grained, subangular to subrounded quartz; trace 3 mm-diameter gravel.
65.0 - 70.0	Sand as above, slight increase in gravel content.
70.0 - 75.0	Sand with minor gravel, as above.
75.0 - 80.0	Sand, clear, coarse-grained, subangular; abundant 2-3 mm varicolored gravel.
80.0 - 85.0	Sand, clear, coarse-grained; abundant varicolored gravel up to 10 mm diameter.
85.0 - 90.0	Quartz gravel, varicolored, subrounded, up to 20 mm diameter.
90.0 - 95.0	Quartz gravel, varicolored, subrounded, up to 10 mm diameter.
95.0 - 97.0	Clay, light gray, N7, to light olive gray, 5Y 6/1, soft to hard.
97.0	Total depth


DELA
0
25
50
75
94
0
100
200
COUNTS/SEC



PELA
0
25
50
75
0
100
SP
RESISTIVITY OHMS

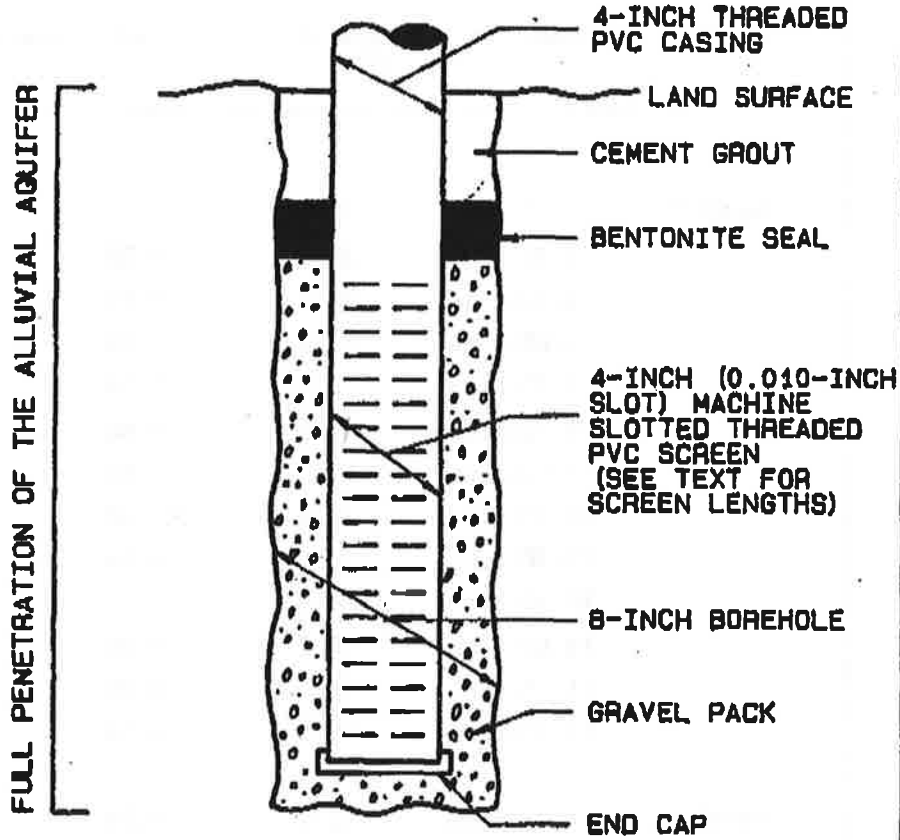


FIGURE 2. GENERALIZED WELL CONSTRUCTION DIAGRAM FOR OBSERVATION WELLS OW-10 AND OW-11

APRIL 17, 1985

Prepared by:
P.E. LAMOREAUX & ASSOCIATES, INC.

LITHOLOGIC DESCRIPTION
Observation Well OW-11

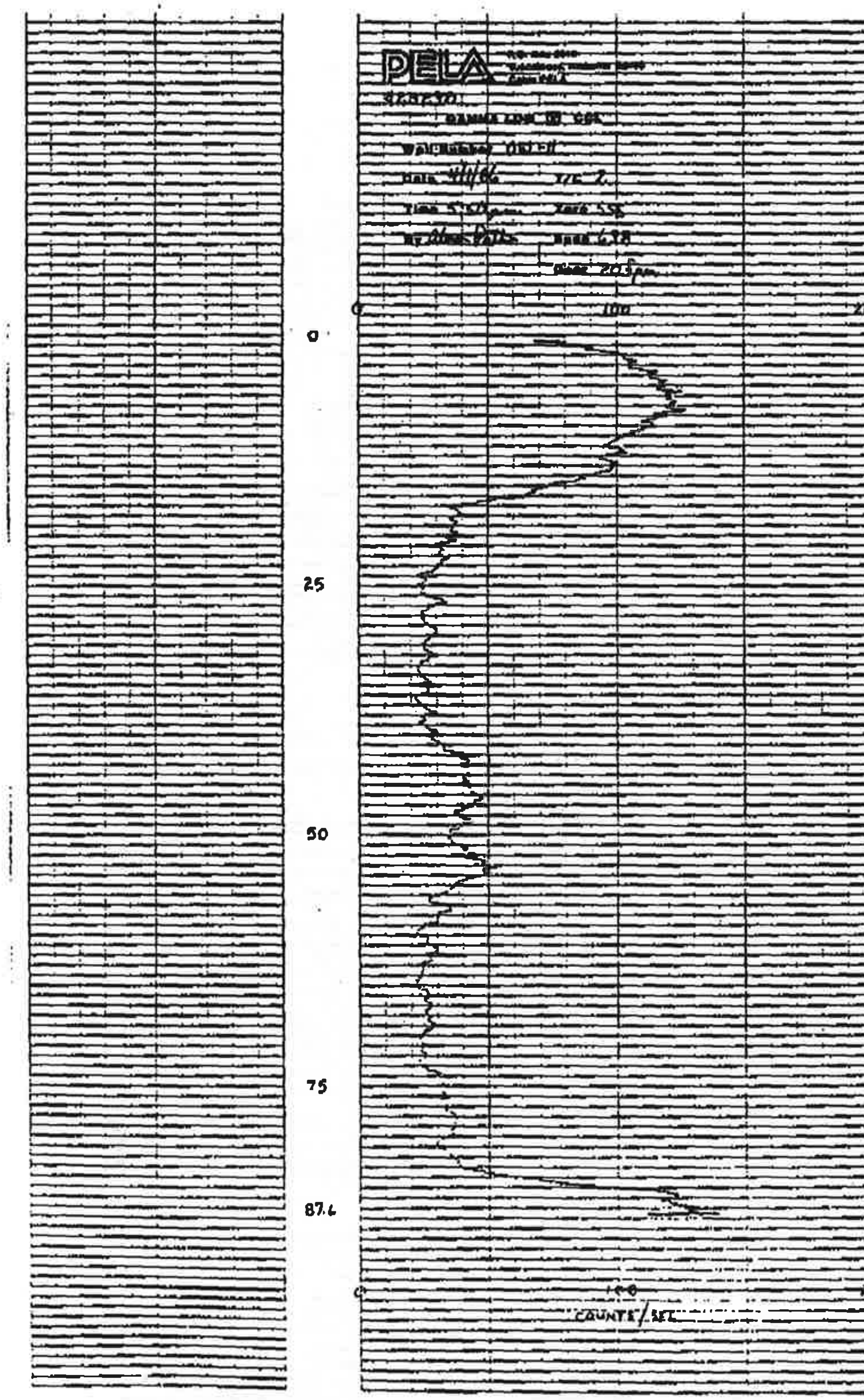
OWNER:	Ciba-Geigy Corporation
DATE DRILLED:	April 1, 1986
DATE COMPLETED:	April 1, 1986
PELA GEOLOGISTS:	A. Patton/S. Godfrey

Depth (in feet below land surface)	Description
0 - 2.0	Fill material, sand and gravel.
2.0 - 5.0	Silt, very fine-grained, olive-gray to olive-black.
5.0 - 10.0	Clay, moderate yellow-brown, 10YR 5/4, to light gray to moderate reddish-brown, 10R 4/6.
10.0 - 15.0	Clay, yellow-gray, 5Y 7/2, with some moderate reddish-brown, 10R 4/6.
15.0 - 20.0	Clay, yellow-gray, 5Y 7/2, with some moderate reddish-brown, 10R 4/6.
20.0 - 25.0	Clay as above with very fine-grained sand, clear, subangular to subrounded, well sorted.
25.0 - 30.0	Sand, fine to medium-grained clear quartz, subangular to subrounded.
30.0 - 35.0	Sand, fine to medium-grained clear quartz, subangular to subrounded.
35.0 - 40.0	Sand, medium-grained, well-sorted clear quartz, subangular to subrounded.
40.0 - 45.0	Sand, clear quartz, medium- to coarse-grained, subangular to subrounded.
45.0 - 50.0	Sand, clear quartz, medium- to coarse-grained, subangular to subrounded.
50.0 - 55.0	Sand, clear quartz, coarse-grained, subangular to subrounded, well sorted.

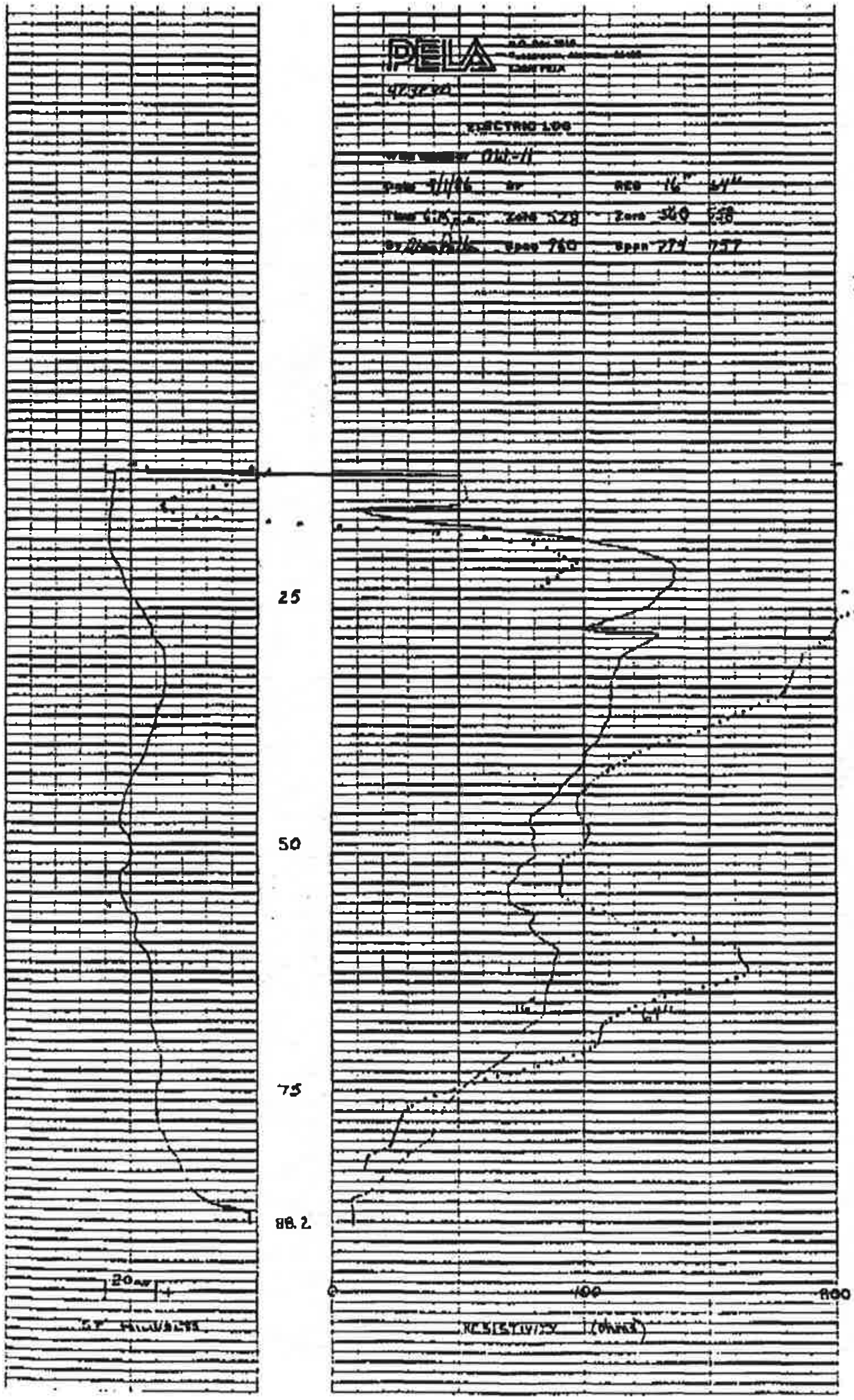
LITHOLOGIC DESCRIPTION
Observation Well OW-11
(continued)

OWNER: Ciba-Geigy Corporation
DATE DRILLED: April 1, 1986
DATE COMPLETED: April 1, 1986
PELA GEOLOGISTS: A. Patton/S. Godfrey

Depth (in feet below land surface)	Description
55.0 - 60.0	Sand, clear quartz, coarse- to very coarse-grained, subangular to subrounded; trace 3 mm. quartz gravel.
60.0 - 65.0	Gravel and sand; gravel up to 7 mm. diameter; sand is coarse- to very coarse-grained as above, trace light gray sandy clay.
65.0 - 70.0	Gravel, 3 mm to 10 mm diameter, quartz and chert; sand, coarse-grained; trace of light gray clay.
70.0 - 75.0	Gravel, up to 15 mm diameter; sand as above.
75.0 - 80.0	Gravel, quartz, rounded, up to 15 mm diameter, varicolored.
80.0 - 85.0	Gravel, quartz, rounded, up to 15 mm diameter, varicolored.
85.0 - 90.0	Clay, light gray to light greenish gray with gravel as above.
90.0	Total depth



PELA
GAMMA LOG
0
100
200
0
25
50
75
87.6
0
100
200
COUNTS/SEC


PELA
ELECTRIC LOG
OW-11
Date 9/1/86
SP
RES 16" 64"
Zero 528
Zero 560 558
Span 760
Span 774 757
25
50
75
88.2
16"
64"
20mv
0
100
200
S.P. MILLIVOLTS
RESISTIVITY (ohms)

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PL-1
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 25, 1991
COORDINATES: 6454.00E, 4478.00N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 27, 1991
TOTAL DEPTH BOREHOLE (FT): 85.0
BOREHOLE DIAMETER (IN): 4.0 and 8.0
MP ELEVATION (FT NGVD): 34.48
LS ELEVATION (FT NGVD): 31.75
TOTAL DEPTH WELL (FT BLS): 65.9
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 28.67
DATE AND TIME: November 6, 1991; 15:30 hrs
PELA REP(S): M.R. Burston

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches (Percent Recovery)	PID Survey (PPM)
0.0				
5.0	3.0 - 3.8	Clay: light gray (N 7), mottled with 5% - 10% moderate red (5YR 4/6), dry, moderately stiff, sandy to 40% very fine-grained quartz sand, quartz, slightly plastic.	4, 7, 8, 9 (40%)	0
10.0	8.0 - 9.3	Clay: light olive gray (5Y 6/1), mottled with <5% moderate red (5YR 4/6), mottling associated with fine-grained sandy zones and quartz pebbles to 1/2 cm, dry, plastic, stiff.	5, 5, 7, 9 (65%)	0
15.0	13.0 - 14.8	Clay: light olive gray (5Y 6/1), mottled with 15% - 20% brown (5YR 5/6), mottling associated with silty to fine sand, dry, plastic, moderately stiff.	6, 7, 7, 14 (90%)	9
20.0	18.0 - 19.7	Clay to Sandy Clay: light olive gray (5Y 6/1), mottled with 20% light brown (5YR 5/6), brown increases with depth to 60%, fine- to very fine-grained quartz sand, subangular, moderately sorted, increasing sand with depth, dry.	5, 9, 15, 14 (85%)	0.7
25.0	23.0 - 25.0	Clay: light olive gray (5Y 6/1), mottled with light brown (5YR 5/6), 10% mottling in very fine-grained sand, stiff, dry, plastic.	5, 7, 12, 12 (100%)	0.5
30.0	28.0 - 30.0	Clay: light olive gray (5Y 6/1), mottled with light brown (5YR 5/6), little to no sand, dry, moderately stiff, slightly plastic, wood fragments.	5, 7, 9, 9 (100%)	0.1
35.0	33.0 - 35.0	Clay: as in interval 28.0' - 30.0' to 33.7', with some fine sand beds to 1 cm. 33.7' - 33.0' Clay: medium gray (N 5), sandy, trace pine bark (?), very slightly stiff, slightly plastic, dry.	3, 4, 5, 6 (100%)	0
40.0	38.0	Sand: no recovery.	11, 14, 12, 8 (0)	--

REMARKS: PELA Reference No. 492350

#1 (WP5.1 11/13/91) 14d:\492300\LOG-PL.01

P.E. LaMoreaux & Associates

BORING AND WELL CONSTRUCTION LOG

NO: PL-1
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 25, 1991
COORDINATES: 6454.00E, 4478.00N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 27, 1991
TOTAL DEPTH BOREHOLE (FT): 85.0
BOREHOLE DIAMETER (IN): 4.0 and 8.0
MP ELEVATION (FT NGVD): 34.48
LS ELEVATION (FT NGVD): 31.75
TOTAL DEPTH WELL (FT BLS): 65.9
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 28.67
DATE AND TIME: November 6, 1991; 15:30 hrs
PELA REP(S): M.R. Burston

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches (Percent Recovery)	PID Survey (PPM)
40.0				
	43.0 - 44.6	43.0' - 44.2' Clayey Sand: medium dark gray (N 4), fine- to very fine-grained, quartz, subangular, moderately sorted. 44.2' - 45.0' Sand: dark yellowish-orange (10YR 6/6), quartz, 98%, fine- to medium-grained, subrounded, moderately to poorly sorted, wet.	7, 5, 4, 14 (80%)	0
45.0				
	48.0 - 50.0	Sand: pale yellowish-orange (10YR 8/6), medium- to coarse-grained, subangular to subrounded, moderately to well sorted, wet, unconsolidated, 95% massive quartz, 5% chert.	18, 40, 50/6"	0
50.0				
	53.0 - 53.8	Sand: pale yellowish-orange (10YR 8/6) to dark yellowish-orange (10YR 6/6), medium- to coarse-grained, moderately sorted, rounded to subrounded, 1 cm light gray (N 7) clay ball at 53.2', 1 cm quartz pebble at 53.2', sand has scattered pebbles to 3 mm, massive bedding upper 0.2', slightly finer at base.	14, 12, 20, 25 (40%)	
55.0				
	58.0 - 58.9	58.0' - 58.2' Sandy Gravel: white, quartz gravel to 1", rounded to well rounded. 58.2' - 60.0' Sand and Gravel: clayey, pale yellowish-orange (10YR 8/6), sand is fine- to medium-grained, quartz, subangular, moderately sorted, chert, massive gravel to 6 mm, quartz, rounded to subangular, poorly sorted, interval poorly sorted overall.	8, 20, 20, 20 (45%)	
60.0				
65.0				
	63.0 - 63.7	Sand and Gravel: as in interval 58.0' - 60.0', gravel slightly more angular.	17, 33, 46, 50/6" (35%)	
	68.0 - 69.6	Clayey Fine Sand: greenish-gray (5G 6/1), fine- to very fine-grained, subangular, well sorted, moist, slightly plastic, mottled with light olive brown (5Y 5/6).	12, 14, 15, 14 (80%)	
70.0				
	73.0 - 73.7	Clayey Sand to Sandy Clay: light bluish-gray (5B 7/1), clayey sand with irregular random patches of clay, fine- to very fine-grained, subangular, moderately sorted, quartz, slightly stiff, very slightly plastic, mottled with light olive brown (5Y 5/6) 10%, decreases with depth, damp.	17, 33, 46 50/5" (35%)	
75.0				
	78.0 - 79.9	Clayey Sand: as in interval 73.0' - 75.0'.	15, 24, 35, 32 (95%)	
80.0				

REMARKS: PELA Reference No. 492350

BORING AND WELL CONSTRUCTION LOG

NO: PL-1
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 25, 1991
COORDINATES: 6454.00E, 4478.00N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 27, 1991
TOTAL DEPTH BOREHOLE (FT): 85.0
BOREHOLE DIAMETER (IN): 4.0 and 8.0
MP ELEVATION (FT NGVD): 34.48
LS ELEVATION (FT NGVD): 31.75
TOTAL DEPTH WELL (FT BLS): 65.9
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 28.67
DATE AND TIME: November 6, 1991; 15:30 hrs
PELA REP(S): M.R. Burston

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches (Percent Recovery)	PID Survey (PPM)
80.0				
	83.0 - 84.9	Clay: medium bluish-gray (5B 5/1), mottled with dark yellowish-brown (10YR 4/2), stiff, dry, rare laminae of very fine-grained, quartz sand, subangular, well sorted.	9, 14, 22, 18 (95%)	
85.0	85.0	Total depth.		
90.0				
95.0				
100.0				
105.0				
110.0				
115.0				
120.0				

REMARKS: PELA Reference No. 492350

#3 (WP5.1 11/13/91) 14d:\492300\LOG-PL.01

WELL CONSTRUCTION FORM

DRILLING DATA

Well ID PL-1 Project Number 492350
Project Name Ciba-Geigy New Land Vault
Location Ciba-Geigy Corporation
McIntosh, Alabama
Supervised by Mike Burston
Date of Boring 10/25/91 Date Well Completed 10/27/91
Drilling Company Geotechnical Engineering-Testing
Driller Scot McNeil
Drilling Method Mud Rotary
Bit Diameter 4.0"/8.0" Hollow Stem I.D. ______ O.D. ______
Hours Drilled 9.5 Downtime None during pilot & reaming
Decontamination Procedure Steam cleaning

Sample Collection Procedure Split spoon (24 inches)

Estimated % Recovery ~75%

MATERIALS

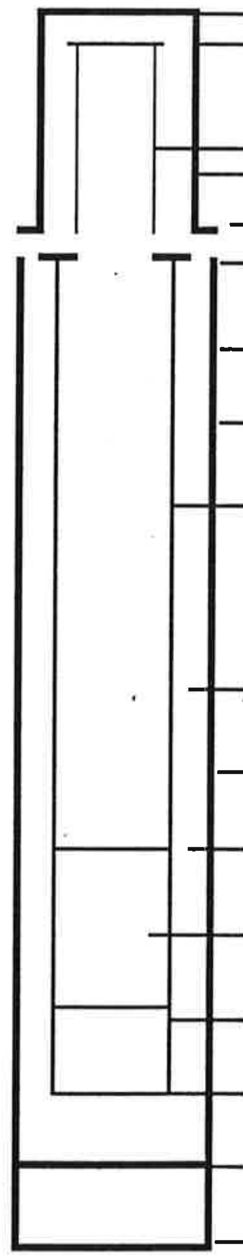
Casing Material PVC Type Schedule 40
Screen Material PVC Type Schedule 40
Casing (in.) O.D. 4.5 I.D. 4.0 +2.01 to 35.83 ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
Total Casing (ft.) 37.84
Screen (in.) O.D. 4.5 I.D. 4.0 35.83 to 65.42 ftbls
Slot Size 0.010-inch Total Screen (ft.) 29.59
Length of Cap 0.35 Sump (ft.) 0.09
Centralizer Material None Length (in.) ______
Sand Pack Mtrl./Sz. Pebble Technology, Inc., 6/20
Lbs./Sacks Used 845 lbs + 25 lbs. fine sand (Lighthouse)
Grout Material Cement / bentonite slurry
Amt. Cement 280 lbs. Type Cement Portland Type I
Amt. Powdered Bentonite 6 Amt. Bentonite Pellets 125
Tremie Used Yes Pump for Grout Used Yes
Cement Plug ______
Length of Protective Casing (ft.) 5.0 ft. total length

DEVELOPMENT

Development Method Submersible pump Total Hours 4
Date and Time Started 11/30/91 13:20
Date and Time Completed 11/31/91 09:38
Esti. Gallons 17,400 Esti. Yield (gpm) 100
Static WL (ftbtoc) 25.92
Color/Turbidity: Start Dark yellowish-orange Finish Clear
Drawdown (ft.) 12.5 Time to Recovery 45 minutes
Final: pH 4.95 SC 31 T 21.0° C Eh ______
Sand None Odor None
Water Discharged to Waste treatment facility

REMARKS Pilot hole sealed with Volclay grout from 67.0-84.9 ft. bls

X Protective Casing (als)
__ Manhole Cover
Lock On:
X Well Cover
__ Well Cap



(drawing not to scale)

______ ft. als
2.01 ft. als
MP Descrip: TOC
LS Elev: 41.23
MP Elev: 43.24
4.0 inches
6.0 inches
Pad Dimension: 4.0' x 4.0' x 0.5'

Top of Casing: 2.01 ft. als

Cement Plug: ____ to _ ftbls

Borehole Diameter: 8.0 inches

Casing: 4.0 in. 40 sch.
______ in. ______ sch.

Casing Interval: +2.01 to 35.83 ftbls

Grout: 0 to 23.0 ftbls

Bentonite Pellet Seal: 23.0 to 39.9 ftbls

Sand Pack: 24.9 to 67.0 ftbls

.010-in. Slotted Screen: 35.83 to 65.42 ftbls

Cap/Sump: 65.42 to 65.86 ftbls

TD Well Cap: 65.86 ftbls

TD Borehole Reamed: 67.0 ftbls

TD Borehole: 84.9 ftbmp

Total Length Casing Cap: 67.87 ft.

Centralizers:
______ ftbls
______ ftbls

P. E. LaMoreaux & Associates, Inc. (PELA)

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PL-2
DRILLER: Geotechnical Engineering-Testing
DATE DRILLED: October 23-24, 1991
DRILLING METHOD: Mud Rotary
TOTAL DEPTH BOREHOLE (FT): 95.0
MP ELEVATION (FT NGVD): 45.78

LOCATION: Ciba-Geigy Corporation
McIntosh, Alabama
COORDINATES: 7429.59 E, 3560.49 N
DATE INSTALLED: October 25, 1991
BOREHOLE DIAMETER (IN): 4.0 / 8.0 (ream)
LS ELEVATION (FT NGVD): 42.75

TOTAL DEPTH WELL (FT BLS): 69.8
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 29.84

DATE AND TIME: 11/06/91, 15:42 HRS.
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches (Percent Recovery)	PID Survey (PPM)
0				
2.5	3.0 - 4.6	Clay, light gray (N7) mottled with up to 25% moderate reddish-brown (10R 4/6), silt inclusions, firm to moderately stiff, slightly plastic, dry, slight trace of granular quartz.	5,10,11,14 (80%)	0.0
5.0				
7.5	8.0 - 9.8	Clay, very light gray (N8) mottled with 40-50% moderate reddish-brown (10R 4/6), firm, slightly plastic, dry; silt and very fine-grained quartz content up to 5-10% in parts.	4,8,15,24 (90%)	0.3
10.0				
12.5	13.0 - 14.9	Clay, very light gray (N8) mottled with moderate reddish-brown (10R 4/6), firm, slightly plastic, dry; silt and very fine-grained quartz content up to 5-10% in parts, trace of organic impressions.	11,7,18,20 (95%)	0.0
15.0				
17.5	18.0 - 20.0	Clay, light gray (N7) with tinting of light olive gray (5Y 6/1) and up to 40% mottling of dark yellowish-orange (10YR 6/6) silt inclusions, firm to moderately stiff, slightly plastic.	9,12,19,20 (100%)	0.1
20.0				

REMARKS: PELA Reference No. 492350 - New Land Vault

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PL-2
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing
DATE DRILLED: October 23-24, 1991
COORDINATES: 7429.59 E, 3560.49 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1991
TOTAL DEPTH BOREHOLE (FT): 95.0
BOREHOLE DIAMETER (IN): 4.0 / 8.0 (ream)
MP ELEVATION (FT NGVD): 45.78
LS ELEVATION (FT NGVD): 42.75
TOTAL DEPTH WELL (FT BLS): 69.80
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 29.84
DATE AND TIME: 11/06/91, 15:42 HRS.
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches (Percent Recovery)	PID Survey (PPM)
0				
22.5	23.0 - 25.0	Clay, light gray (N7) with tinting of light bluish-gray (5B 7/1), mottled with moderate reddish-brown (10R 4/6), silt grading to dark yellowish-orange (10YR 6/6) with depth, firm to moderately stiff, slightly plastic, silty in mottled areas, trace of very fine-grained quartz.	10,14,18,24 (100%)	0.5
25.0				
27.5	28.0 - 30.0	Clay, light gray (N7) with tinting of light bluish-gray (5B 7/1) mottled with dark yellowish-orange (10YR 6/6) and <5% of moderate reddish-brown (10R 4/6), firm to moderately stiff, slightly plastic, silty in mottled areas, trace of very fine-grained quartz.	15,20,23,25 (100%)	0.2
30.0				
32.5	33.0 - 35.0	Clay, predominantly dark yellowish-orange (10YR 6/6) with up to 35% mottling of light gray (N7), firm to moderately stiff, slightly plastic (33.0-34.3 ft). Clay, light gray (N7), no mottling, firm with increase in plasticity (34.3-34.9 ft). Clayey sand, moderate gray (N5), fine-grained, subrounded, moderately well sorted, clear to frosted quartz, slightly argillaceous at base (34.90-35.0 ft).	8,11,15,18 (100%)	0.0 Sand 0.4 Clayey Sand
35.0				
37.5	38.0 - 38.5	Sand, very pale orange (10YR 8/2), very fine- to fine-grained, subrounded to subangular, well sorted, unconsolidated, clear to frosted quartz, trace of cross bedding, 2 mm thick layer of yellowish-gray (5Y 7/2) clay at 38.5 ft, moderately soft with moderate plasticity.	20,36,50,Refusal (50%)	0.2
40.0				

REMARKS: PELA Reference No. 492350 - New Land Vault

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PL-2
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing
DATE DRILLED: October 23-24, 1991
COORDINATES: 7429.59 E, 3560.49 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1991
TOTAL DEPTH BOREHOLE (FT): 95.0
BOREHOLE DIAMETER (IN): 4.0 / 8.0 (ream)
MP ELEVATION (FT NGVD): 45.78
LS ELEVATION (FT NGVD): 42.75
TOTAL DEPTH WELL (FT BLS): 69.8
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 29.84
DATE AND TIME: 11/06/91, 15:42 HRS.
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches (Percent Recovery)	PID Survey (PPM)
0				
42.5	43.0 - 44.2	Sand, very pale orange (10YR 8/2), very fine- to fine-grained, subrounded to subangular, well sorted, unconsolidated, clear to frosted quartz (43.0-44.1). Clay, predominantly moderate reddish-brown (10R 4/6) with mottling of light gray (N7), moderately firm, slightly plastic (44.1-44.2).	19,20,27,24 (60%)	0.0
45.0				
47.5	48.0 - 48.9	Sand, very pale orange (10YR 8/2), fine- to medium-grained, subrounded to subangular, moderately well sorted, clear to frosted quartz, coarsening with depth to medium- to coarse-grained, angular to subrounded, moderately sorted, quartz, light gray (N7) to moderate reddish-brown (10R 4/6) clay including 1-2 mm in thickness, subrounded, moderately sorted quartz and chert gravel up to 3 mm in diameter at base, trace of cross-bedding, fine-grained sand (48.0-48.7).	10,19,18,18 (45%)	0.1
50.0				
52.5	53.0 - 53.6	Sand, very pale orange (10YR 8/2), fine- to medium-grained, subrounded, moderately well sorted, clear to frosted quartz, trace of gravel <1 mm in diameter (53.0-53.3). Clay, light brown (5YR 5/6), firm to slightly stiff, slightly plastic (53.3-53.4 ft). Sand with gravel, very pale orange (10YR 8/2), medium-grained, subrounded, well sorted, clear to frosted quartz, subrounded, moderately soft quartz gravel up to 3 cm in diameter.	8,10,13,13 (30%)	0.7
55.0				
57.5	58.0 - 58.9	Sand with gravel, very pale orange (10YR 8/2), medium- to coarse-grained, angular to subrounded, moderately sorted, clear to frosted quartz, massive bedding of gravel from 58.2 to 58.5 ft, subrounded, moderately sorted ranging from 1 mm to 2 cm in diameter, vari-colored quartz and chert.	23,50,Refusal (45%)	0.2
60.0				

REMARKS: PELA Reference No. 492350 - New Land Vault

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PL-2
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing
DATE DRILLED: October 23-24, 1991
COORDINATES: 7429.59 E, 3560.49 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1991
TOTAL DEPTH BOREHOLE (FT): 95.0
BOREHOLE DIAMETER (IN): 4.0 / 8.0 (ream)
MP ELEVATION (FT NGVD): 45.78
LS ELEVATION (FT NGVD): 42.75
TOTAL DEPTH WELL (FT BLS): 69.8
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 29.84
DATE AND TIME: 11/06/91, 15:42 HRS.
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches (Percent Recovery)	PID Survey (PPM)
0				
62.5	63.0 - 64.1	Sand with gravel, very pale orange (10YR 8/2), medium- to coarse-grained, subrounded to angular, moderately sorted, clear to frosted quartz, varicolored, subangular to rounded, poorly sorted, quartz and chert gravel from 21 mm to 3 cm in diameter, fining with depth.	40,45,34,35 (55%)	0.3
65.0				
67.5	68.0 - 68.6	Clay, dark yellowish-orange (10YR 6/6), firm to brittle where silty, slightly plastic (68.0-68.3 ft). Clay, light bluish-gray (5B 7/1), firm, slightly plastic, arenaceous with very fine-grained quartz, dry (68.3 to 68.6 ft).	9,16,17,8 (30%)	0.0
70.0				
72.5	73.0 - 74.2	Clay, light bluish-gray (5B 7/1) mottled with up to 10% light olive brown (5Y 5/6), slightly stiff, slightly brittle in parts, arenaceous with very fine-grained quartz.	8,11,11,15 (60%)	0.1
75.0				
77.5	78.0 - 80.0	Clay, light bluish-gray (5B 7/1) mottled with up to 10% light olive brown (5Y 5/6), slightly stiff, slightly brittle in parts, arenaceous with very fine-grained quartz (78.0-79.0). Clay, medium light gray (N6) with tinting of pale reddish-purple (5RP 6/2), firm to moderately stiff at base, slightly plastic (79.0-80.0 ft).	8,13,7,14 (100%)	0.1
80.0				

REMARKS: PELA Reference No. 492350 - New Land Vault

BORING AND WELL CONSTRUCTION LOG

NO: PL-2
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing
DATE DRILLED: October 23-24, 1991
COORDINATES: 7429.59 E, 3560.49 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1991
TOTAL DEPTH BOREHOLE (FT): 95.0
BOREHOLE DIAMETER (IN): 4.0 / 8.0 (ream)
MP ELEVATION (FT NGVD): 45.78
LS ELEVATION (FT NGVD): 42.75
TOTAL DEPTH WELL (FT BLS): 69.8
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 29.84
DATE AND TIME: 11/06/91, 15:42 HRS.
PELA REP(S): Michael Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches (Percent Recovery)	PID Survey (PPM)
0				
82.5	83.0 - 85.0	Clay, moderate dark gray (N4), moderately stiff, slightly plastic, horizontal bedding banded with black (N1) stringers of silt (83.0-84.4 ft). Sand, pinkish-gray (5YR 8/1), fine- to medium-grained, subrounded, well sorted, unconsolidated quartz (84.4 to 84.5 ft). Clay, as above becoming arenaceous at base, inclusions of organic detritus up to 2-3 mm in diameter.	7,9,12,20 (100%)	0.7
85.0				
87.5	88.0 - 90.0	Sandy clay, medium dark gray (N4), moderately firm, slightly plastic, arenaceous with very fine-grained quartz (88.0-88.9 ft). Clay, moderately light gray (N6), moderately stiff, slightly plastic, slight trace of very fine quartz (88.9-90.0 ft).	7,12,14,22 (100%)	0.0
90.0				
92.5	93.0 - 95.0	Clay, light bluish gray (5B 7/1), moderately stiff, brittle, slightly plastic, highly arenaceous with very fine quartz (93.0-93.8 ft). Clay, light bluish-gray (5B 7/1), stiff, moderately arenaceous, slightly plastic, trace very fine quartz, mottled with 5% moderate reddish-brown (10R 4/6) (93.8-95.0).	32,36,42,50 (100%)	0.0
95.0	95.0	Total depth (with split spoon)		
97.5				
100.0				

REMARKS: PELA Reference No. 492350 - New Land Vault

WELL CONSTRUCTION FORM

DRILLING DATA

Well ID PL-2 Project Number 492350
Project Name Ciba-Geigy New Land Vault
Location Ciba-Geigy Corporation
McIntosh, Alabama
Supervised by Michael Johnson
Date of Boring 10/23-24/91 Date Well Completed 10/25/91
Drilling Company Geotechnical Engineering-Testing
Driller Steve Whittington
Drilling Method Mud Rotary
Bit Diameter 4.0"/8.0" Hollow Stem I.D. ______ O.D. ______
Hours Drilled 16 Downtime None
Decontamination Procedure Steam cleaning

Sample Collection Procedure Split spoon (24 inches)

Estimated % Recovery ~75%

MATERIALS

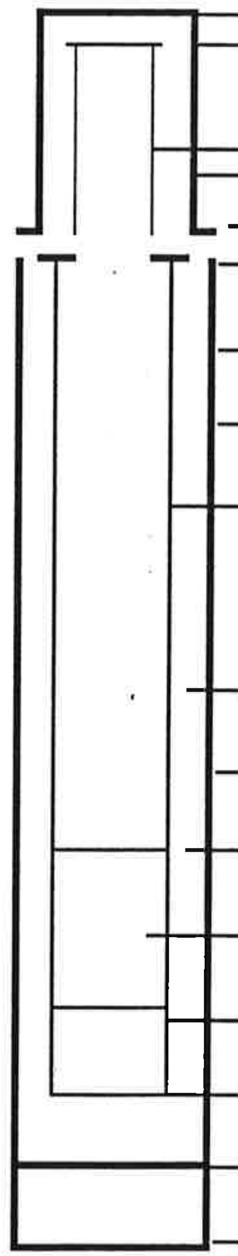
Casing Material PVC Type Schedule 40
Screen Material PVC Type Schedule 40
Casing (in.) O.D. 4.5 I.D. 4.0 +3.03 to 34.75 ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
Total Casing (ft.) 37.78
Screen (in.) O.D. 4.5 I.D. 4.0 34.75 to 69.14 ftbls
Slot Size 0.010-inch Total Screen (ft.) 34.39
Length of Cap 0.33 Sump (ft.) 0.33
Centralizer Material None Length (in.) ______
Sand Pack Mtrl./Sz. Pebble Technology, Inc., 6/20
Lbs./Sacks Used 840 lbs.
Grout Material Cement / bentonite slurry
Amt. Cement 375 Type Cement Portland Type I
Amt. Powdered Bentonite 8 lbs. Amt. Bentonite Pellets 50 lbs.
Tremie Used Yes Pump for Grout Used Yes
Cement Plug ______
Length of Protective Casing (ft.) 5.0 ft. total length

DEVELOPMENT

Development Method Submersible pump Total Hours 6.5
Date and Time Started 10/29/91 14.25
Date and Time Completed 10/30/91 10:07
Esti. Gallons 10,200 Esti. Yield (gpm) 100
Static WL (ftbtoc) 33.86
Color/Turbidity: Start grayish-orange Finish clear
Drawdown (ft.) 7.81 Time to Recovery 45 min.
Final: pH 4.60 SC 30 T 19.7° C Eh ______
Sand none Odor none
Water Discharged to Waste treatment facility

REMARKS Pilot hole sealed with Volclay grout from 73.0 to 95.0 ft. bls.

X Protective Casing (als)
__ Manhole Cover
Lock On:
X Well Cover
__ Well Cap



______ ft. als
+3.03 ft. als
MP Descrip: TOC
LS Elev: 42.75
MP Elev: 45.78
4.0 inches
6.0 inches
Pad Dimension: 4.0' x 4.0' x 0.5'
Top of Casing: 5.18 ft. als
Cement Plug: ____ to _ ftbls
Borehole Diameter: 8.0 inches
Casing: 4.0 in. 40 sch.
_____ in. _____ sch.
Casing Interval: +3.03 to 34.75 ftbls
Grout: 0 to 27.5 ftbls
Bentonite Pellet Seal: 27.5 to 31.5 ftbls
Sand Pack: 31.5 to 73.0 ftbls
.010-in. Slotted Screen: 34.75 to 69.14 ftbls
Cap/Sump: 69.14 to 69.80 ftbls
TD Well Cap: 69.80 ftbls
TD Borehole Reamed: 73.0 ftbls
TD Borehole: 95.0 ftbmp
Total Length Casing Cap: 72.83 ft.
Centralizers:
_____ ftbls
_____ ftbls

(drawing not to scale)

P. E. LaMoreaux & Associates, Inc. (PELA)

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PL-3
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 21, 1991
COORDINATES: 7429.59E, 3560.49N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 22, 1991
TOTAL DEPTH BOREHOLE (FT): 65.0
BOREHOLE DIAMETER (IN): 4.0 and 8.0
MP ELEVATION (FT NGVD): 29.84
LS ELEVATION (FT NGVD): 42.75
TOTAL DEPTH WELL (FT BLS): 54.8
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 13.47
DATE AND TIME: November 6, 1991; 15:59 hrs
PELA REP(S): M.R. Burston

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches (Percent Recovery)	PID Survey (PPM)
0.0				
5.0	3.5 - 5.3	Sand: light brown (5YR 5/6) to light gray (N 7), fine- to very fine-grained, subrounded to subangular, massively bedded, clayey quartz, mottled with above 70%:30% light gray to light brown, slightly plastic, dry.	3, 3, 5, 9 (90%)	0
10.0	8.5 - 9.3	Sand: as in interval 3.5' - 5.0', slightly clayey with depth, dry.	1, 9, 14, 17 (90%)	0
15.0	13.5 - 14.9	Sand: very pale orange (10YR 8/2), medium- to fine-grained, subangular to subrounded, predominantly subrounded, well sorted, quartz, massive, unconsolidated, wet, possibly drilling fluid.	11, 18, 33, 34 (70%)	0
20.0	18.5 - 19.9	18.5' - 19.2' Sand: light brown (5YR 5/6) mottled 30% - 40% with medium gray (N 5), medium- to coarse-grained, rounded, moderately sorted, sandy-clay to clayey-sand, dry, massive. 19.2' - 19.5' Clay: medium dark gray (N 4), plastic, stiff. 24.5' - 25.0' Sand: medium dark gray (N 4), fine-grained, well sorted, subangular, quartz.	9, 6, 7, 10 (70%)	0
25.0	23.5 - 25.2	Sand: medium dark gray (N 4), fine- to very fine-grained, moderately to well sorted, subangular, trace wood fragments, moist, slightly clayey.	6, 5, 6, 1 (85%)	0
30.0	28.5 - 32.4	28.5' - 29.4' Sand: greenish-gray (5GY 6/1), fine- to medium-grained, moderately to poorly sorted, coarser grains rounded to subrounded, finer grains subrounded, angular, massive, slightly clayey, slightly plastic, moist, trace wood fragments (stems). 29.4' - 30.0' Clay: light gray (N 7) with tint of greenish-gray (5GFY 6/1), silty, slightly stiff, moderately plastic.	2, 2, 5, 5 (95%)	0
35.0	33.5 - 35.3	33.5' - 34.9' Clay: light olive gray (5Y 6/1) mottled with 20% moderate reddish-brown (10R 4/6), trace decomposed organic material, stiff, moderately plastic. 34.9' - 35.0' Sand: medium dark gray (N 4), medium-grained, well rounded, well sorted, quartz, wet.	5, 5, 8, 2 (90%)	0
40.0				

REMARKS: PELA Reference No. 492350

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PL-3

LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama

DRILLER: Geotechnical Engineering-Testing, Inc.

DATE DRILLED: October 21, 1991

COORDINATES: 7429.59E, 3560.49N

DRILLING METHOD: Mud Rotary

DATE INSTALLED: October 22, 1991

TOTAL DEPTH BOREHOLE (FT): 65.0

BOREHOLE DIAMETER (IN): 4.0 and 8.0

MP ELEVATION (FT NGVD): 29.84

LS ELEVATION (FT NGVD): 42.75

TOTAL DEPTH WELL (FT BLS): 54.8

WATER LEVEL DURING DRILLING (FT BLS):

WATER LEVEL AFTER DEVELOPMENT (FT BLS): 13.47

DATE AND TIME: November 6, 1991; 15:59

PELA REP(S): M.R. Burston

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches (Percent Recovery)	PID Survey (PPM)
40.0	38.5 - 39.3	Sand: yellowish-gray (5Y 8/1), medium- to coarse-grained, subrounded, moderately sorted, quartz, wet, massive.	37, 50/6" (40%)	0
	43.5 - 44.7	Sand: as in interval 38.5' - 40.0', one pebble 1" x 0.5", quartz or chert.	16, 27, 43, 50/5" (60%)	0.1
45.0				
	48.5 - 49.8	48.5' - 49.2' Sand and Gravel: very pale orange (10YR 8/2), sand is fine- to medium grained, subrounded, moderately sorted, wet; slightly, clayey, gravel to 5 mm, quartz, rounded to subrounded. 49.2' - 50.0' Sand: light brown (5YR 5/6), medium-grained, subrounded, moderately sorted, wet, massive, quartz.	15, 37, 50/4" (65%)	0
50.0				
	53.5 - 54.4	Sand and Gravel: gravel becoming coarser, mostly well rounded, as in interval 48.5' - 49.2'.	40, 50/6" (45%)	0.1
55.0				
	58.5 - 59.2	Clay: light bluish-gray (5B 7/1) mottled with 10% light olive brown (5Y 5/6), stiff, dry, slightly plastic.	10, 16, 20, 27 (35%)	0
60.0				
	63.0 - 64.5	Clay: pale purple (5P 6/2) with 40% moderate reddish-brown (10R 4/6), stiff, plastic, moist.	11, 15, 20, 30 (75%)	0
65.0	65.0	Total depth.		
70.0				
75.0				
80.0				

REMARKS: PELA Reference No. 492350

#5 (WP5.1 11/13/91) 14d:\492300\LOG-PL.01

WELL CONSTRUCTION FORM

DRILLING DATA

Well ID PL-3 Project Number 492350
Project Name Ciba-Geigy New Land Vault
Location Ciba-Geigy Corporation
McIntosh, Alabama
Supervised by Michael Johnson
Date of Boring 10/21-22/91 Date Well Completed 10/23/91
Drilling Company Geotechnical Engineering-Testing
Driller Steve Whittington
Drilling Method Mud Rotary
Bit Diameter 4.0"/8.0" Hollow Stem I.D. ______ O.D. ______
Hours Drilled 8.5 Downtime 45 minutes
Decontamination Procedure Steam cleaning

Sample Collection Procedure Split spoon (24 inches)

Estimated % Recovery ~75%

MATERIALS

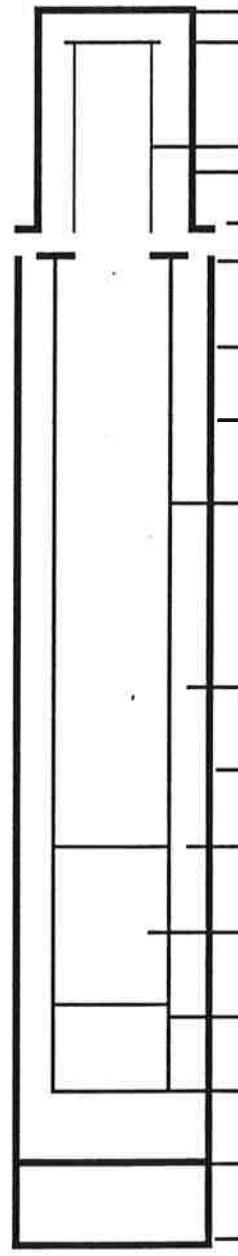
Casing Material PVC Type Schedule 40
Screen Material PVC Type Schedule 40
Casing (in.) O.D. 4.5 I.D. 4.0 +3.39 to 6.89 ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
Total Casing (ft.) 18.11 + 10.88
Screen (in.) O.D. 4.5 I.D. 4.0 34.29 to 53.78 ftbls
Slot Size 0.010-inch Total Screen (ft.) 19.39 + 9.39
Length of Cap 0.33 Sump (ft.) 0.66
Centralizer Material None Length (in.) ______
Sand Pack Mtrl./Sz. Pebble Technology, Inc., 6/20
Lbs./Sacks Used 1,220 lbs.
Grout Material Cement / bentonite slurry
Amt. Cement 20 lbs. Type Cement Portland Type I
Amt. Powdered Bentonite 1 lb. Amt. Bentonite Pellets 50 lbs.
Tremie Used No Pump for Grout Used No
Cement Plug ______
Length of Protective Casing (ft.) 5.0 ft. total length

DEVELOPMENT

Development Method Submersible pump Total Hours 3.4
Date and Time Started 10/26/91 16:42
Date and Time Completed 10/27/91 12:07
Esti. Gallons 20,500 Esti. Yield (gpm) 101
Static WL (ftbtoc) 17.12
Color/Turbidity: Start grayish-orange Finish clear
Drawdown (ft.) 6.23 Time to Recovery 42 min.
Final: pH 5.22 SC 35 T 19.5° C Eh ______
Sand none Odor none
Water Discharged to Waste treatment facility

REMARKS Pilot hole sealed with Volclay grout from 73.0 to 95.0 ft. bls.

X Protective Casing (als)
__ Manhole Cover
Lock On:
X Well Cover
__ Well Cap



______ ft. als
3.39 ft. als
MP Descrip: TOC
LS Elev: 26.45
MP Elev: 29.84
4.0 inches
6.0 inches
Pad Dimension: 4.0' x 4.0' x 0.5'

Top of Casing: 3.39 ft. als

Cement Plug: ____ to __ ftbls

Borehole Diameter: 8.0 inches

Casing:
4.0 in. 40 sch.
____ in. ____ sch.

Casing Interval:
+3.39 to 6.89 ftbls
16.28 to 34.39 ftbls

Grout: 0 to 2.5 ftbls

Bentonite Pellet Seal: 2.5 to 5.5 ftbls

Sand Pack: 5.5 to 55.5 ftbls

.010 -in. Slotted Screen:
6.89 to 16.28 ftbls
34.39 to 53.78 ftbls

Cap/Sump: 53.78 to 54.77 ftbls

TD Well Cap: 54.77 ftbls

TD Borehole Reamed: 55.5 ftbls

TD Borehole: 64.5 ftbmp

(drawing not to scale)

Total Length Casing Cap: 58.16 ft.

Centralizers:
______ ftbls
______ ftbls

P. E. LaMoreaux & Associates, Inc. (PELA)

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PL-4
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 22, 1991
DRILLING METHOD: Mud Rotary
TOTAL DEPTH BOREHOLE (FT): 75.0
MP ELEVATION (FT NGVD): 30.78

LOCATION: Ciba-Geigy Corporation McIntosh, Alabama
COORDINATES: 6458.65E, 3814.63N
DATE INSTALLED: October 24, 1991
BOREHOLE DIAMETER (IN): 4.0 and 8.0
LS ELEVATION (FT NGVD): 27.55

TOTAL DEPTH WELL (FT BLS): 72.0
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS): 14.39

DATE AND TIME: November 6, 1991
PELA REP(S): M.R. Burston

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches (Percent Recovery)	PID Survey (PPM)
0.0				
	3.0 - 4.6	Clay: light olive gray (5Y 6/1) mottled with 20% moderate brown (5YR 4/4), slightly sandy, slightly plastic, moderately stiff, nearly dry.	3, 6, 8, 13 (80%)	0
5.0				
	8.0 - 9.8	Clay: as in interval 3.0' - 5.0', moderate brown slightly more abundant (30%).	4, 6, 9, 10 (90%	0
10.0				
	13.0 - 14.6	Clay: light bluish-gray (5B 7/1) to light olive gray (5Y 6/1) mottled 10% - 20% with moderate brown (5YR 4/4), moderately stiff, plastic to slightly plastic, nearly dry.	4, 6, 10, 11 (80%)	0
15.0				
	18.0 - 19.3	18.0' - 18.2' Clay: as in interval 13.0' - 15.0'. 18.2' - 19.0' Sand: yellowish-gray (5Y 7/2), fine-grained, subrounded, well sorted, quartz, carbonized wood (charcoal ?), wet. 19.0' - 19.3' Sand: dark yellowish-orange (10R 6/6), fine-grained, subangular, moderately sorted, quartz, moist.	3, 4, 3, 8 (65%)	0
20.0				
	23.0 - 24.2	Sand: yellowish-gray (5Y 7/2), fine- to medium-grained, subrounded to subangular, well sorted, 98% quartz, 2% dark minerals (magnetite, ilmenite ?), wet.	11, 8, 8, 11 (60%)	0
25.0				
	28.0 - 28.8	Sand: dusky yellow (5Y 6/4), medium- to coarse-grained, moderately to well sorted, mostly rounded, rare subangular, 99% quartz, trace iron stained 1 to 2 mm subhorizontal bands, massive.	10, 15, 17, 17 (40%)	0.1
30.0				
	33.0 - 33.9	Sand: as in interval 28.0' - 30.0', scattered quartz pebbles to 7 mm, subrounded.	13, 17, 22, 31 (45%)	0
35.0				
	38.0 - 39.2	Sand: as in interval 33.0' - 35.0', fining down to fine-grained sand, quartz, gravel in upper 0.3 foot, pebbles rounded to 1.5".	10, 14, 17, 19 (60%)	0.2
40.0				

REMARKS: PELA Reference No. 492350

#6 (WP5.1 11/13/91) 14d:\492300\LOG-PL01

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PL-4

LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama

DRILLER: Geotechnical Engineering-Testing, Inc.

DATE DRILLED: October 22, 1991

COORDINATES: 6458.65E, 3814.63N

DRILLING METHOD: Mud Rotary

DATE INSTALLED: October 24, 1991

TOTAL DEPTH BOREHOLE (FT): 75.0

BOREHOLE DIAMETER (IN): 4.0 and 8.0

MP ELEVATION (FT NGVD): 30.78

LS ELEVATION (FT NGVD): 27.55

TOTAL DEPTH WELL (FT BLS): 72.0

WATER LEVEL DURING DRILLING (FT BLS):

WATER LEVEL AFTER DEVELOPMENT (FT BLS): 14.39

DATE AND TIME: November 6, 1991

PELA REP(S): M.R. Burston

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches (Percent Recovery)	PID Survey (PPM)
40.0				
	43.0 - 43.8	43.0' - 43.2' Sand and Gravel: pale yellowish-orange (10YR 8/6), sand, fine- to coarse-grained, subangular to subrounded, poorly sorted, wet, gravel to 1", angular to subrounded.	18, 17, 25, 25 (40%)	0
45.0		43.2' - 45.0' Sand: pale yellowish-orange (10YR 8/6), fine- to coarse-grained, angular to subrounded, poorly sorted, wet, 90% quartz, 10% chert.		
50.0	48.0 - 48.8	Sand with some Gravel: gravel near top, subrounded to 1", finer with depth, sand is pale yellowish-orange (10YR 8/6), medium-grained, subrounded, moderately sorted, becoming fine-grained, well sorted with depth, 98% quartz, 2% chert, scarce quartz pebbles to 1 cm with depth.	11, 19, 28, 32 (40%)	0.1
55.0	53.0 - 54.0	Sand and Gravel: as in interval 48.0' - 50.0' to 53.2'. 53.2' - 55.0' Sand: grayish-olive (10Y 4/2), darker with depth, medium-grained, fine-grained with depth, moderately sorted, becoming well sorted, subangular, possibly glauconitic peloids, 98% quartz, 2% chert, trace black material (wood ?), massive, wet.	9, 2, 28, 38 (50%)	0
60.0	58.0 - 58.7	Sand: pale yellowish-orange (10YR 8/6), medium-grained, subrounded, moderately sorted, 95% quartz, 5% chert, minor gravel to 1", angular, trace pebbles, massive, wet.	18, 23, 34, 31 (35%)	0
65.0	63.0 - 64.0	Sand: very pale orange (10YR 8/2), coarse- to fine-grained, subangular, poorly sorted, 90% quartz, 10% chert, minor gravel to 1", minor pebbles to <1 cm.	9, 12, 17, 13 (50%)	0.3
70.0	68.0 - 69.0	Sand: varicolored, fine- to very coarse-grained, rounded to subangular, poorly sorted, gravel from 1 mm to 2 cm, grayish-orange (10YR 7/4), subrounded to subangular, poorly sorted, unconsolidated, quartz, massive bedding.	12, 12, 13, 22 (50%)	0
75.0	73.0 - 74.9	Clay: light bluish-gray (5B 7/1) with mottling of 5% pale red purple (5RP 6/2), 10% moderate reddish-brown (10R 4/6), and 10% light olive brown (5Y 5/6), stiff, slightly plastic, moist, slightly silty.	4, 6, 10, 15 (95%)	0
	75.0	Total depth.	3, 4, 5, 10 (0%)	-
80.0				

REMARKS: PELA Reference No. 492350

WELL CONSTRUCTION FORM

DRILLING DATA

Well ID PL-4 Project Number 492350
Project Name Ciba-Geigy New Land Vault
Location Ciba-Geigy Corporation
McIntosh, Alabama
Supervised by Mike Burston
Date of Boring 10/22-24/91 Date Well Completed 10/25/91
Drilling Company Geotechnical Engineering-Testing
Driller Scot McNeil
Drilling Method Mud Rotary
Bit Diameter 4.0"/10.0" Hollow Stem I.D. ____ O.D. ____
Hours Drilled 14.5 Downtime 1.5 hours
Decontamination Procedure Steam cleaning

Sample Collection Procedure Split spoon (24 inches)

Estimated % Recovery ~75%

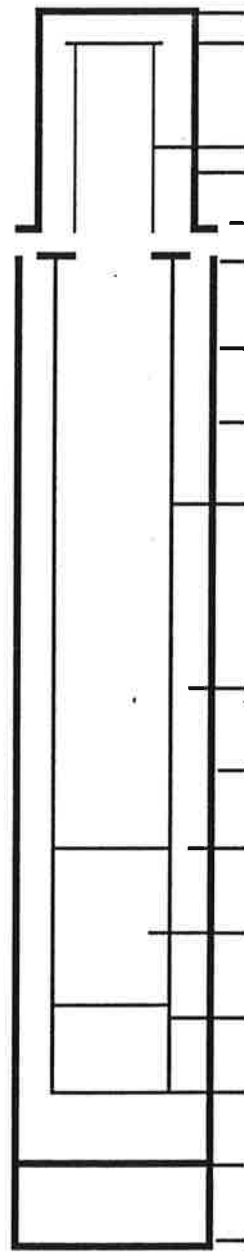
MATERIALS

Casing Material PVC Type Schedule 40
Screen Material PVC Type Schedule 40
Casing (in.) O.D. 4.5 I.D. 4.0 +3.23 to 17.13 ftbls
(in.) O.D. ____ I.D. ____ ____ to ____ ftbls
(in.) O.D. ____ I.D. ____ ____ to ____ ftbls
Total Casing (ft.) 20.36
Screen (in.) O.D. 4.5 I.D. 4.0 17.13 to 71.41 ftbls
Slot Size 0.010-inch Total Screen (ft.) 54.28
Length of Cap 0.61 Sump (ft.) 0.34
Centralizer Material none Length (in.) ____
Sand Pack Mtrl./Sz. Pebble Technology, Inc., 6/20
Lbs./Sacks Used 2915 lbs.
Grout Material Cement / bentonite slurry
Amt. Cement 470 Type Cement Portland Type I
Amt. Powdered Bentonite 10 lbs. Amt. Bentonite Pellets 200 lbs.
Tremie Used Yes Pump for Grout Used Yes
Cement Plug ____
Length of Protective Casing (ft.) 5.0 ft. total length

DEVELOPMENT

Development Method Submersible pump Total Hours 6.75
Date and Time Started 10/29/91 08:45
Date and Time Completed 10/29/91 15:39
Esti. Gallons 16,000 Esti. Yield (gpm) 102
Static WL (ftbtoc) 17.58
Color/Turbidity: Start grayish-orange Finish very slightly cloudy
Drawdown (ft.) 7.25 Time to Recovery 45 minutes
Final: pH 5.42 SC 40 T 20.5° C Eh ____
Sand none Odor none
Water Discharged to Waste treatment facility

REMARKS Pilot hole sealed with Volclay grout from 73.6 to 77.0 ft. bls



(drawing not to scale)

X Protective Casing (als)
__ Manhole Cover
Lock On:
X Well Cover
__ Well Cap
____ ft. als
3.23 ft. als
MP Descrip: TOC
LS Elev: 27.55
MP Elev: 30.78
4.0 inches
6.0 inches
Pad Dimension:
4.0' x 4.0' x 0.5'

Top of Casing: 3.23 ft. als

Cement Plug: ____ to __ ftbls

Borehole Diameter: 10.0 inches

Casing: 4.0 in. 40 sch.
____ in. ____ sch.

Casing Interval: 3.23 to 17.13 ftbls

Grout: 0 to 10.3 ftbls

Bentonite Pellet Seal: 10.3 to 13.4 ftbls

Sand Pack: 13.4 to 73.6 ftbls

.010-in. Slotted Screen: 17.13 to 71.41 ftbls

Cap/Sump: 71.41 to 72.36 ftbls

TD Well Cap: 72.36 ftbls

TD Borehole Reamed: 73.6 ftbls

TD Borehole: 77.0 ftbmp

Total Length Casing Cap: 75.59 ft.

Centralizers:
____ ftbls
____ ftbls

P. E. LaMoreaux & Associates, Inc. (PELA)

PLATE 2. HYDROGEOLOGIC CROSS SECTION A-A′.

EXPLANATION

- SAND
- FILL
- SANDY CLAY
- CLAYEY SAND
- SAND AND GRAVEL
- GRAVEL
- MIOCENE UNDIFFERENTIATED

HORIZONTAL SCALE: 1 INCH = 200 FEET
VERTICAL SCALE: 1 INCH = 10 FEET
VERTICAL EXAGGERATION: 20X

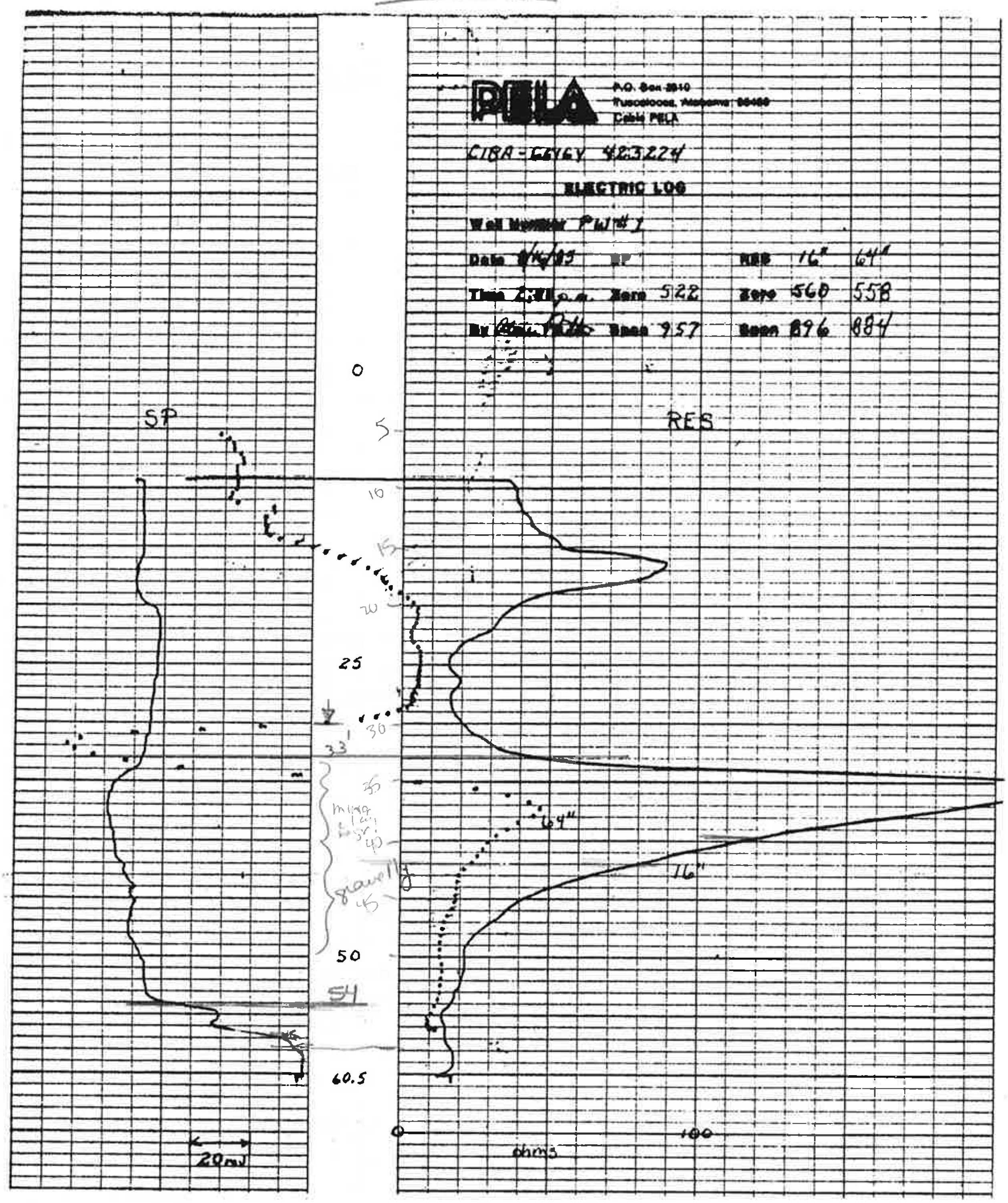
MAR. 23, 1987

CIBA-GEIGY CORPORATION
MCINTOSH, ALABAMA

P.E. LAMOREAUX & ASSOCIATES, INC.

Project No.: 423236	Plate No.:
Prepared by: JJD	
Checked by: PWL	
Drafted by: JWG/SS	

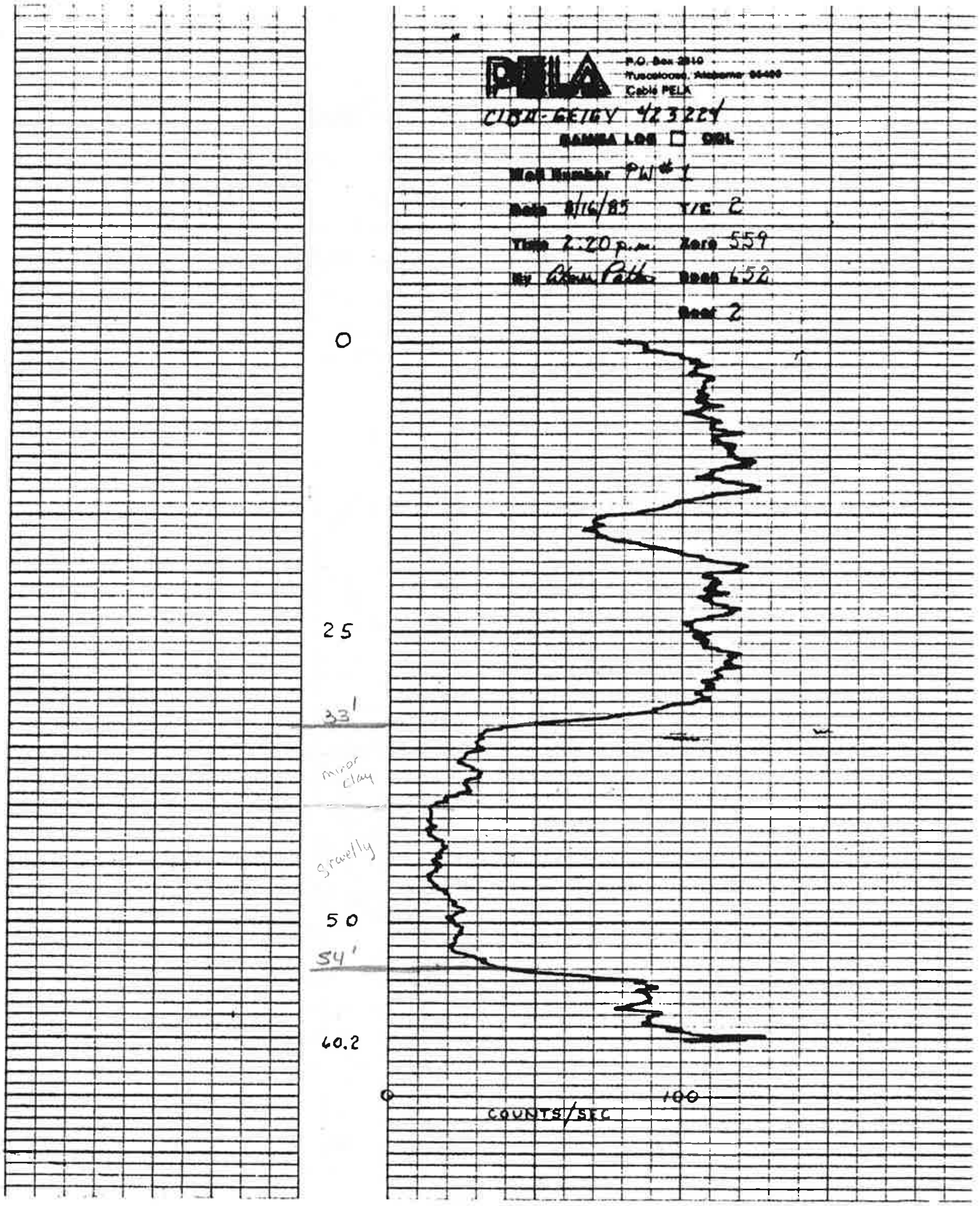
e' log PW-1



Electric log for well PW-1

0 to 60.5 feet below land surface

γ-log PW1



Gamma log for well PW-1

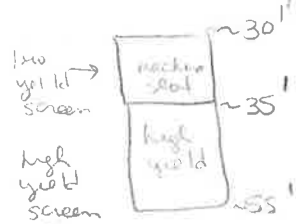
0 to 60.2 feet below land surface

PELA

LITHOLOGIC LOG

WELL NUMBER: PW-1
OWNER: Ciba-Geigy Corporation
LOCATION: McIntosh, Alabama
DATE DRILLED: August 16, 1985
PELA GEOLOGISTS: M. D. Wilder and A. F. Patton

Interval (feet BLS)	Description
0 - 2.5	Fill material. Clay, moderate reddish-brown (10R 4/6) to dark reddish-brown (10R 3/4) and moderate olive brown (5Y 4/4) to light olive gray (5Y 5/2); sandy, clear quartz, medium- to very-coarse-grained, subangular to subrounded and gravel up to 3 cm in diameter, subangular to subrounded.
2.5 - 5.0	Clay, medium light gray to medium gray with moderate reddish-brown (10R 4/6) stain, sandy, clear quartz, very-fine- to coarse-grained, subangular to subrounded.
5.0 - 10.0	As above, coarse-grained sand decreasing in content.
10.0 - 13.0	As above, clay stiffer with more moderate reddish-brown stain (10R 4/6), sandy, very-fine-grained clear quartz, subangular to subrounded.
13.0 - 17.0	As above, sand content increasing.
17.0 - 20.0	As above, sand content decreasing.
20.0 - 25.0	As above.
25.0 - 30.0	Clay, very light gray to light gray with minor moderate reddish-brown (10R 4/6) stain, slightly sandy, clear quartz, very-fine- to fine-grained, subangular to subrounded.
30.0 - 33.0	Clay, very light gray to light gray with minor moderate reddish-brown (10R 4/6) stain, sand content increasing, clear quartz, fine-grained, subangular to subrounded.
33.0 - 40.0	Sand, clear quartz, fine- to very-coarse-grained, subangular to subrounded, very minor clay, very light gray to light gray with minor moderate reddish-brown (10R 4/6) stain (from above?).



8" PVC
16 slot
screen

P.E. LaMoreaux & Associates

LITHOLOGIC LOG
PW-1 (continued)

Interval (feet BLS)	Description
40.0 - 45.0	Sand, clear quartz, fine- to very-coarse-grained, subangular to subrounded, gravel granules and pebbles 2 to 8 mm in diameter, clear quartz and opaque.
45.0 - 50.0	As above, gravel content increasing, minor clay, light gray with moderate reddish-brown (10R 4/6) stain.
50.0 - 54.0	Sand, clear quartz, fine- to very-coarse-grained, subangular to subrounded, clayey, light gray to medium light gray with minor moderate-reddish brown (10R 4/6) stain, and minor gravel, 2 to 4 mm in diameter.
54.0 - 55.0	Clay, as above, very sandy, clear quartz, medium- to coarse-grained, subangular to subrounded.
55.0 - 60.0	Clay, yellowish-gray (5Y 8/1) to light olive gray (5Y 6/1) and very light gray to light gray, slightly sandy, clear quartz, very-fine-grained, subangular to subrounded.
60.0 - 62.0	Clay, very light gray to light gray with minor moderate reddish-brown (10R 4/6) stain and greenish-gray (5G 6/1), sandy, clear quartz, very-fine- to medium-grained, subangular to subrounded.
62.0	Total depth.

PELA

LITHOLOGIC LOG

WELL NUMBER:	PW-2
OWNER:	Ciba-Geigy Corporation
LOCATION:	McIntosh, Alabama
DATE DRILLED:	August 21, 1985
PELA GEOLOGIST:	A. F. Patton

Interval (feet BLS)	Description
0 - 3.0	Fill material, silt, moderate yellowish-brown (10YR 5/4), slightly sandy, very-fine-grained quartz, some wood fragments.
3.0 - 12.0	Clay, moderate yellowish-brown (10YR 5/4), trace very-fine-grained quartz sand.
12.0 - 18.0	Silt, light olive gray (5Y 6/1) to light brown (5YR 5/1) to moderate yellowish-brown (10YR 5/4), slightly sandy, very-fine-grained quartz, increasing sand content with depth.
18.0 - 25.0	Sand, clear to pale yellowish-orange (10YR 8/6) to white, medium- to very-coarse-grained, some 4 mm gravel, subrounded to subangular, becoming coarser grained with depth, slightly silty.
25.0 - 35.0	Sand, clear to pale yellowish-orange (10YR 8/6) to white, medium- to very-coarse-grained, some 4 mm gravel, subrounded to subangular, becoming coarser grained with depth.
35.0 - 39.0	Gravel, very pale orange (10YR 8/2) to pale yellowish-orange (10YR 8/6) to moderate reddish-orange (10R 6/6) to greenish-black (5G 2/1), up to 10 mm in diameter, subrounded quartz.
39.0 - 46.0	Slightly clayey sand, clear to smoky white, coarse-grained, subangular to subrounded quartz, traces of mottled light olive gray (5Y 6/1) to moderate reddish-brown (10R 4/6) clay.
46.0 - 52.0	Gravel, clear to smoky, white, pale yellowish-orange (10YR 8/6), olive gray (5Y 3/2), 5 mm in diameter and down to very coarse-grained sand, subangular to subrounded, traces medium light gray (N6) clay.

LITHOLOGIC LOG
PW-2 (continued)

Interval (feet BLS)	Description
52.0 - 70.0	Clay, very light gray (N8) to light gray (N7) to yellowish-gray (5Y 8/1), gravel and very coarse-grained quartz sand throughout, subangular to subrounded.
70.0	Total depth.

LITHOLOGIC LOG

WELL NUMBER:	PW-3
OWNER:	Ciba-Geigy Corporation
LOCATION:	McIntosh, Alabama
DATE DRILLED:	August 19, 1985
PELA GEOLOGIST:	A. F. Patton

Interval (feet BLS)	Description
0 - 2.5	Sandy/silty clay, moderate yellowish-brown (10YR 5/4), trace gravel up to 0.5 cm in diameter.
2.5 - 5.0	Silty clay, moderate yellowish-brown (10YR 5/4) and moderate reddish-brown (10R 4/6), trace fine-grained sand.
5.0 - 10.0	As above with some grayish-orange (10YR 7/4) clay.
10.0 - 20.0	Clayey sand, grayish-orange (10YR 7/4), moderate yellowish-brown (10YR 5/4) and moderate reddish-brown (10R 4/6). Sand is fine-grained, clear quartz, subrounded to subangular.
20.0 - 25.0	Very sandy clay/clayey sand, clay as above, sand as above.
25.0 - 30.0	Sand, clear quartz, subrounded to subangular, fine-grained, well sorted, trace dark minerals and clay as above.
30.0 - 34.0	As above, less clay.
34.0 - 38.0	Sand as above with some clay, medium light gray (N6) to yellowish-gray (5Y 8/1) and moderate reddish-brown (10R 4/6), with some sand as above.
38.0 - 47.0	Sand, clear quartz, medium- to coarse-grained, subangular to subrounded, moderately sorted, some clay as above.
47.0 - 50.0	Sand, clear quartz, medium- to very-coarse-grained, medium- to coarse-grained sand as above, very-coarse-grained sand multicolored, subangular to subrounded, increasing in clay.

LITHOLOGIC LOG
PW-3 (continued)

Interval (feet BLS)	Description
50.0 - 55.0	Clayey sand/very sandy clay, sand is medium-grained, clear quartz, subrounded to subangular, moderately sorted; clay is light gray (N7) to light olive gray (5Y 6/1).
55.0 - 61.0	Sand, gravel and clay, fine-to coarse-grained, sand is clear quartz as above, very-coarse-grained sand and fine-grained gravel is multicolored, subangular to subrounded up to 0.5 cm; clay is light olive gray (5Y 6/1) and moderate reddish-brown (10R 4/6).
61.0 - 63.0	Gravel as above, slightly coarser than above and very-coarse-grained sand as above.
63.0 - 75.0	Clay, light gray (N7) and moderate reddish-brown (10R 4/6).
75.0 - 80.0	Clay-sand, fine-to medium-grained as above, clay as above, more clay.
80.0 - 83.0	As above, less sand.
83.0	Total depth.

PELA

LITHOLOGIC LOG

WELL NUMBER: PW-4
OWNER: Ciba-Geigy Corporation
LOCATION: McIntosh, Alabama
DATE DRILLED: August 22, 1985
PELA GEOLOGIST: A. F. Patton

Interval (feet BLS)	Description
0 - 2.5	Silt, moderate yellowish-brown (10YR 5/4), firm, slightly sandy (fill material).
2.5 - 5.0	Clay, dark yellowish-orange (10YR 6/6), pale yellowish-orange (10YR 8/6), pale yellowish-brown (10YR 6/2), silty, soft, tree roots.
5.0 - 10.0	Clay, dark yellowish-orange (10YR 6/6), light olive gray (5Y 5/2) mottled with moderate reddish-orange (10R 6/6).
10.0 - 15.0	Clay, dark yellowish-orange (10YR 6/6), very pale orange (10YR 8/2), light olive gray (5Y 5/2) mottled with moderate reddish-brown (10R 4/6), slightly sandy, quartz, coarse-grained, subangular, well sorted.
15.0 - 22.0	Clay, pale yellowish-orange (10YR 8/6) to yellowish-gray (5Y 7/2) mottled with moderate reddish-brown (10R 4/6), gray clay is firmer than orange clay, slightly sandy.
22.0 - 28.0	Sand, clear, white, smoky, coarse- to medium-grained, subrounded, carbonaceous particles abundant.
28.0 - 30.0	Clay, yellowish-gray (5Y 7/2) mottled with moderate reddish-brown (10R 4/6).
30.0 - 35.0	Sand, clear, white, smoky, iron stained, medium- to very-coarse-grained, quartz, subrounded to subangular, some heavy minerals and carbonaceous particles present.
35.0 - 40.0	As above.
40.0 - 45.0	Sand as above, with trace of 5 mm quartz gravel and yellowish-gray (5Y 7/2) clay mottled with moderate reddish-brown (10R 4/6).
45.0 - 50.0	As above.

PELA

LITHOLOGIC LOG
PW-4 (continued)

Interval (feet BLS)	Description
50.0 - 55.0	Gravel and sand with clay blebs, gravel is 4 mm in diameter, quartz, subrounded to subangular, clear, white, grayish-yellow, light olive gray, sand is fine- to medium-grained, subrounded, clear quartz, clay is light gray (N6) and soft.
55.0 - 60.0	As above.
60.0 - 67.0	As above, less clay.
67.0 - 74.6	Clay, grayish-orange (10YR 7/4) to yellowish-gray (5Y 7/2) with some sand and gravel, gravel up to 10 mm in diameter, quartz, clear to white to smoky.
74.6	Total depth.

PELA

LITHOLOGIC LOG

WELL NUMBER: PW-5
OWNER: Ciba-Geigy Corporation
LOCATION: McIntosh, Alabama
DATE DRILLED: August 14, 1985
PELA GEOLOGISTS: M. D. Wilder and A. F. Patton

Interval (feet BLS)	Description
0 - 2.5	Clay, moderate brown (5YR 4/4) to moderate yellowish-brown (10YR 5/4) sand and clay (fill material).
2.5 - 5.0	Clay, moderate yellowish-brown (10YR 5/4) to moderate brown (5YR 4/4) and moderate reddish-brown (10R 4/6) stained clay and minor silt and abundant organic material, twigs etc. up to 2 inches long.
5.0 - 10.0	Clay, dark yellowish-orange (10YR 6/6) to light brown (5YR 5/6) to moderate brown (5YR 4/4) and light gray with moderate reddish-brown (10R 4/6) stain, very minor very-fine-grained sand, subangular to subrounded, and organics (twigs) fall in.
10.0 - 15.0	Clay, light gray with moderate reddish-brown (10R 4/6) stain, very minor very-fine-grained sand, subangular to subrounded clear quartz.
15.0 - 17.0	Sandy clay, clay is as above, sand content is increasingly very-fine-grained, clear, quartz, subrounded to subangular, abundant black organics.
17.0 - 20.0	Slightly clayey sand, very-fine-grained clear quartz, subrounded to subangular, abundant black organics, clay is light gray with moderate reddish-brown (10R 4/6) stain.
20.0 - 25.0	Sand, clear quartz, very-fine-grained, subrounded to subangular, abundant black organics.
25.0 - 30.0	Sand, clear quartz, very-fine-grained, subrounded to subangular, abundant black organics.
30.0 - 35.0	Sand, clear quartz, very-fine- to fine-grained, subrounded to subangular, driller's remark: "tight sand at 31 feet."

LITHOLOGIC LOG
PW-5 (continued)

Interval (feet BLS)	Description
35.0 - 40.0	Sand, clear quartz to opaque to very pale orange (10YR 8/2) and black and moderate reddish-brown (10R 4/6), fine- to medium-grained, subrounded to subangular.
40.0 - 45.0	Sand, clear and opaque quartz, medium- to very-coarse-grained with some 2 to 4 mm gravel, poorly sorted, subangular clay trace, light gray stained with moderate reddish-brown.
45.0 - 50.0	Clayey sand and gravel, quartz, subangular, opaque and multicolored, coarse- to very-coarse-grained to 6 mm in diameter, clay is light gray with moderate reddish-brown (10R 4/6) stains.
50.0 - 55.0	Clayey sand and gravel as above, with clay content increasing slightly and gravel content decreasing slightly.
55.0 - 60.0	Sand and gravel, quartz, opaque and multicolored, coarse- to very-coarse-grained to 6 mm in diameter, gravel content increasing.
60.0 - 65.0	Sand and gravel, quartz, clear opaque to milky to black, medium- to very-coarse-grained to 4 mm in diameter, poorly sorted, black organics fairly abundant.
65.0 - 70.0	Slightly clayey sand and gravel, quartz, clear to opaque, poorly sorted, medium- to very-coarse-grained with trace of gravel, subangular to subrounded, clay content is increasing, light gray with moderate reddish-brown (10R 4/6) stain.
70.0 - 75.0	Clayey sand and gravel, quartz, clear to milky to black, medium-grained to 10 mm in diameter, subangular, clay is light gray, clay content is increasing.
75.0 - 77.0	Very clayey sand, quartz, clear, medium- to very-coarse-grained, subangular, gravel trace, clay is light gray with minor moderate reddish-brown (10R 4/6) stain.
77.0 - 80.0	Sandy clay, light gray with moderate reddish-brown (10R 4/6) stain, sand is quartz, medium- to very-coarse-grained, clear, subangular, trace gravel.

LITHOLOGIC LOG
PW-5 (continued)

Interval (feet BLS)	Description
80.0 - 85.0	Slightly sandy clay, light gray with moderate reddish-brown (10R 4/6) stain, sand is fine- to very-coarse-grained, clear, quartz, subangular to subrounded, gravel trace, up to 6 mm in diameter.
85.0 - 90.0	Clay, light gray with moderate reddish-brown (10R 4/6) stain with trace of sand as above.
90.0	Total depth.

PELA

LITHOLOGIC LOG

WELL NUMBER:	PW-6
OWNER:	Ciba-Geigy Corporation
LOCATION:	McIntosh, Alabama
DATE DRILLED:	August 12, 1985
PELA GEOLOGIST:	M. D. Wilder

Interval (feet BLS)	Description
0 - 2.5	Fill, clayey sand and gravel, dark yellowish-orange (10YR 6/6) to moderate brown (5YR 4/4), up to 4 mm in diameter.
2.5 - 10.0	Slightly sandy clay, moderate yellowish-brown (10YR 5/4) to dark yellowish-brown (10YR 4/2) to light brown (5YR 5/6), light gray (N7), some black organics, traces of sand, moderate reddish-brown (10R 4/6), very-fine-grained, subrounded quartz.
10.0 - 19.0	Slightly sandy clay, moderate yellowish-brown (10YR 5/4) to dark yellowish-brown (10YR 4/2) to light brown (5YR 5/6), light gray (N7), some black organics, traces of sand, moderate reddish-brown (10R 4/6), very-fine-grained, subrounded quartz.
19.0 - 22.5	Sandy clay, light gray (N7), moderate reddish-brown (10R 4/6) stain, traces black organics, some fine-grained quartz sand.
22.5 - 25.0	Slightly clayey sand, light gray (N7), moderate yellowish-brown (10YR 5/4), fine-grained, subrounded, some black organics.
25.0 - 36.0	Sand, dark yellowish-orange (10YR 6/6) to moderate yellowish-brown (10YR 5/4), light brown (5YR 5/6), sand, fine-grained, clear quartz, some black organics present.
36.0 - 41.0	Clayey sand and gravel, sand as above, clay dark yellowish-orange (10YR 6/6) to moderate yellowish-brown (10YR 5/4) and light brown (5YR 5/6), also clay stain of moderate reddish-brown (10R 4/6) on light gray variegated clay, very sandy.

LITHOLOGIC LOG
PW-6 (continued)

Interval (feet BLS)	Description
41.0 - 54.0	Gravel and sand, fine- to medium-grained and up to 6 mm in diameter, opaque to clear, minor clay, light gray with moderate reddish-brown (10R 4/6) stain, some black organics present.
54.0 - 60.0	Sand and gravel, medium-grained to 3 mm in diameter gravel, opaque to clear, some black organics present.
60.0 - 70.0	Gravel and sand, medium-grained to 4 mm in diameter gravel, opaque to clear, some black organics present.
70.0 - 73.0	Gravel and sand, medium-grained to 4 mm in diameter gravel, opaque to clear, some black organics present.
78.0 - 83.0	Gravel and sand, medium-grained to 4 mm in diameter gravel, opaque to clear, some black organics present.
83.0 - 89.0	Clayey sand and gravel, sand and gravel as above, clay light gray, black organics throughout.
89.0 - 92.0	As above, decreasing clay.
92.0 - 93.3	Clay, light gray, slightly sandy, with black organics present.
93.3	Pilot hole depth.
97.0	Reamed depth.

PELA

LITHOLOGIC LOG

WELL NUMBER:	PW-7
OWNER:	Ciba-Geigy Corporation
LOCATION:	McIntosh, Alabama
DATE DRILLED:	August 14, 1985
PELA GEOLOGISTS:	M. D. Wilder and A. F. Patton

Interval (feet BLS)	Description
0 - 2.5	Fill, clay, light brown (5YR 5/6) and olive gray (5Y 3/2), sandy, fine- to medium-grained, clear quartz, subangular to subrounded.
2.5 - 5.0	Clay, light gray (N7) and moderate reddish-brown (10R 4/6), sandy, clear quartz, fine- to coarse-grained, subangular to subrounded, black organics.
5.0 - 10.0	As above, sand content decreasing with depth.
10.0 - 15.0	As above, slightly sandy.
15.0 - 22.0	Clay, stiff, slightly sandy as above, very-fine-grained.
22.0 - 23.0	Clay, as above, sand content increasing.
23.0 - 31.0	Sand, clear quartz, fine- to coarse-grained, subangular to subrounded, very clayey, light gray (N7) and moderate reddish-brown (10R 4/6), clay content decreasing with depth to 28 feet below land surface then increasing to 31 feet below land surface.
31.0 - 34.5	Clay, light gray (N7) and moderate reddish-brown (10R 4/6) mottling, very sandy, clear quartz, fine- to medium-grained, subangular to subrounded.
34.5 - 43.0	Sand, clear quartz, fine- to coarse-grained, subangular to subrounded, clayey, light gray (N7) with moderate reddish-brown (10R 4/6) mottling, clay content decreasing to 36 feet below land surface, clean sand from 36 to 42 feet below land surface then clay content increasing from 42 to 43 feet below land surface.
43.0 - 45.0	Clay, light gray (N7) and moderate reddish-brown (10R 4/6), very sandy, clear quartz, very-fine- to coarse-grained, subangular to subrounded.

PELA

LITHOLOGIC LOG
PW-7 (continued)

Interval (feet BLS)	Description
45.0 - 50.0	Sand, clear quartz, fine- to medium-grained, subangular to subrounded, slightly clayey, light gray (N7) and moderate reddish-brown (10R 4/6), clay content decreasing from 45 to 46 feet below land surface, clean sand from 46 to 48 feet below land surface, clay content increasing from 48 to 50 below land surface.
50.0 - 52.0	Sand, clear quartz, fine- to medium-grained, subangular to subrounded, clayey, light gray (N7) and moderate reddish-brown (10R 4/6) mottling.
52.0 - 55.0	Sand, clear quartz, fine- to very-coarse-grained, subangular to subrounded, clayey, as above.
55.0 - 65.0	Sand and gravel, clear quartz sand, medium- to very-coarse-grained, subangular to subrounded, clear and opaque gravel granule sized (2 to 4 mm in diameter), gravel content increasing with depth.
65.0 - 70.0	Sand and gravel, clear quartz sand, medium- to very-coarse-grained, subangular to subrounded, clear and opaque gravel granule sized (2 to 4 mm in diameter), gravel content increasing with depth.
70.0 - 73.0	Sand and gravel, clear quartz sand, medium- to very-coarse-grained, subangular to subrounded, clear and opaque gravel granule sized (2 to 4 mm in diameter), gravel content increasing with depth, slightly clayey interval.
73.0 - 80.0	Sand and gravel, clear quartz sand, medium- to very-coarse-grained, subangular to subrounded, clear and opaque gravel granule sized (2 to 4 mm in diameter), gravel content increasing with depth.
80.0 - 85.0	Sand and gravel, clear quartz sand, medium- to very-coarse-grained, subangular to subrounded, clear and opaque gravel granule sized (2 to 4 mm in diameter), gravel content increasing with depth.
85.0 - 86.0	Sand and gravel, sand medium- to very-coarse-grained, light gray (N7) and moderate reddish-brown (10R 4/6), subangular to subrounded, gravel, clear and opaque, 2 to 4 mm in diameter, very clayey, light gray (N7) and moderate reddish-brown (10R 4/6).

LITHOLOGIC LOG
PW-7 (continued)

Interval (feet BLS)	Description
86.0 - 95.0	Clay, stiff, light gray (N7) to moderate light gray (N6), sandy, clear quartz, fine- to medium-grained, subangular to subrounded.
95.0	Total depth.

PELA

LITHOLOGIC LOG

WELL NUMBER: PW-8
OWNER: Ciba-Geigy Corporation
LOCATION: McIntosh, Alabama
DATE DRILLED: August 6-7, 1985
PELA GEOLOGIST: A. F. Patton
PELA ENGINEER: J. J. Dow

Interval (feet BLS)	Description
0 - 1.75	Fill, clay, moderate reddish-brown (10R 4/6) with subrounded gravel up to 1.5 inches in diameter, trace fine- to medium-grained quartz sand, sand is subrounded to subangular.
1.75- 2.5	Top soil - clay, olive black (5Y 2/1), slightly silty.
2.5 - 5.0	Clay, moderate reddish-brown (10R 4/6) with trace of medium- to coarse-grained quartz sand, sand is subrounded to subangular.
5.0 - 10.0	Clay as above with increasing sand content with depth, light gray (N6) mottling.
10.0 - 15.0	Clay, as above, with mottling, sand increasing with depth.
15.0 - 21.0	Clay, as above, sand increasing with depth.
21.0 - 25.0	Sand, light brown (5YR 5/6), fine- to medium-grained quartz, subrounded to subangular, trace of moderate reddish-brown (10R 5/6) clay.
25.0 - 30.0	Sand, as above, without clay.
30.0 - 35.0	Sand, as above.
35.0 - 40.0	Sand, as above.
40.0 - 47.0	Sand, light brown (5YR 5/6), fine- to coarse-grained quartz, subrounded to subangular, trace of very-coarse-grained sand and small gravel.

PELA

LITHOLOGIC LOG
PW-8 (continued)

Interval (feet BLS)	Description
47.0 - 53.0	Sand, light brown (5YR 5/6), fine- to coarse-grained quartz, minor amount of light olive gray (5Y 6/1) sandy clay.
53.0 - 55.0	Sand, as above, with less clay.
55.0 - 59.0	Gravel, varicolored quartz, subrounded to subangular, up to 0.5 inch in diameter.
59.0 - 63.0	Gravel, as above, minor amounts of yellowish-gray (5Y 7/2) sandy clay.
63.0 - 70.0	Gravel, varicolored quartz, subrounded to subangular, up to 0.,5 inch in diameter, some very coarse-grained quartz sand.
70.0 - 75.0	Gravel, as above, but finer up to 0.3 inch in diameter.
75.0 - 80.0	Gravel, as above, with moderate amounts of coarse-grained sand, varicolored, subrounded to subangular.
80.0 - 85.0	Gravel, as above.
85.0 - 90.0	Gravel, as above, with trace of light gray (N7) sandy clay.
90.0 - 93.0	Gravel, as above.
93.0 - 97.8	Sandy clay, light gray (N7) to very light gray (N8), sand is fine- to medium-grained, subrounded to subangular.
97.8	Total depth.

LITHOLOGIC LOG

WELL NUMBER: PW-9
OWNER: Ciba-Geigy Corporation
LOCATION: McIntosh, Alabama
DATE DRILLED: August 23, 1985
PELA GEOLOGIST: A. F. Patton

Interval (feet BLS)	Description
0 - 2.5	Clay, light brown (5YR 5/6) mottled with light gray (N7) to very pale orange (10YR 8/2) and some dark reddish-brown (10R 3/4), slightly silty.
2.5 - 5.0	Clay, yellowish-gray (5Y 8/1) to dark yellowish-orange (10YR 6/6), slightly silty.
5.0 - 10.0	Clay, light olive gray (5Y 6/1) with some dark yellowish-orange (10YR 6/6), slightly sandy to very clean and firm.
10.0 - 15.0	Clay, as above, slightly silty.
15.0 - 20.0	Clay, as above, light olive gray (5Y 6/1), slightly silty, stiff, some dark yellowish-orange which is richer in silt.
20.0 - 30.0	Clay, as above, dark yellowish-orange (10YR 6/6) is becoming more abundant.
30.0 - 35.0	Clay, light olive gray (5Y 6/1), some dark yellowish-orange (10YR 6/6) which is richer in silt.
35.0 - 38.0	Clay, medium gray (N5) with some yellowish-gray (5Y 8/1) and yellowish-gray (5Y 8/1).
38.0 - 45.0	Sand and gravel, medium-grained to 3 mm gravel, quartz, clear, white, smoky, subrounded to subangular, clay trace.
45.0 - 50.0	As above.
50.0 - 55.0	Sand, medium-grained, well sorted, subrounded to subangular, trace of gravel, quartz, clear to smoky to white.
55.0 - 58.0	Sand, quartz, medium- to coarse-grained to 2 mm gravel, subangular, trace of light olive gray (5Y 5/2) clay.

PELA

LITHOLOGIC LOG
PW-9 (continued)

Interval (feet BLS)	Description
58.0 - 61.0	Gravel, quartz, 6 mm and down, clear, white, light brown, smoky, trace light olive gray (5Y 5/2) clay.
61.0 - 68.0	Clay, medium gray (N5) with some dark yellowish-orange (10YR 6/6) and some very light gray (N8), trace of 3 mm gravel and medium-grained quartz sand.
68.0	Total depth.

PELA

LITHOLOGIC LOG

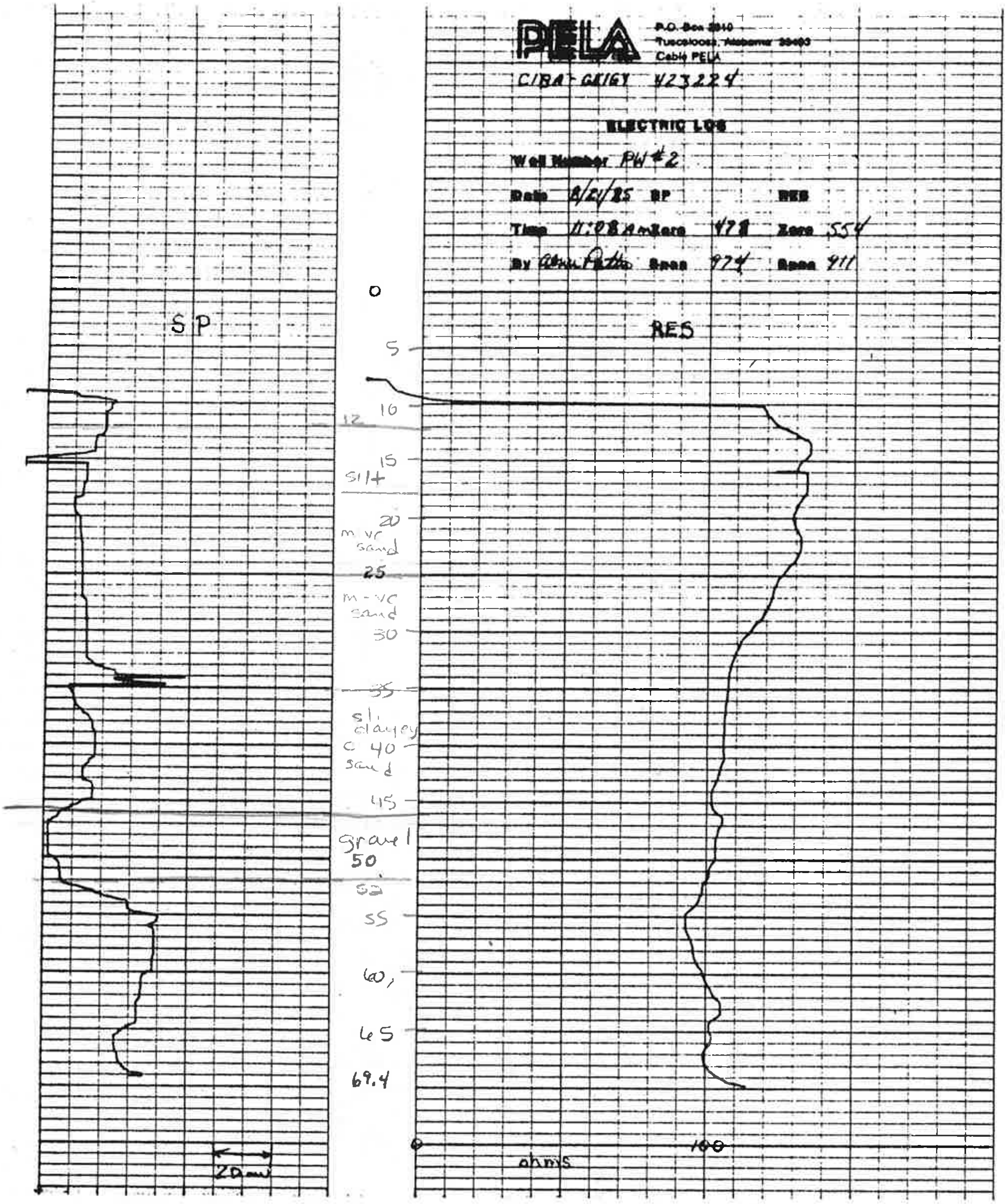
WELL NUMBER:	PW-10
OWNER:	Ciba-Geigy Corporation
LOCATION:	McIntosh, Alabama
DATE DRILLED:	October 27, 1986
PELA GEOLOGIST:	S. C. Godfrey
LAND SURFACE ELEVATION:	38.90 feet above land surface

Interval (feet BLS)	Description
0 - 5.0	Fill material and light brown clay (5YR5/6); trace very-coarse-grained sand; organic detritus.
5.0 - 10.0	Clay, light brown (5YR5/6), with trace very-coarse-grained sand.
10.0 - 12.0	Clay, light brown (5YR5/6), as above with streaks of yellowish-gray clay (5Y8/1); trace medium- to very-coarse-grained sand.
12.0 - 25.0	Sand, light brown (5YR5/6) and pinkish-gray (5YR8/1), fine- to very-fine-grained, subangular to subrounded; trace clay.
25.0 - 30.0	Sand, grayish-orange (10YR7/4), medium- to coarse-grained, subrounded; trace pinkish-gray clay (5YR8/1); trace black sand.
30.0 - 35.0	Sand, grayish-orange (10YR7/4), medium-grained, subrounded; trace black sand.
35.0 - 40.0	Sand, grayish-yellow (5Y8/4), coarse-grained, subrounded to subangular; trace light gray clay (N7) and moderate reddish-brown clay (10R4/6); trace black fine-grained sand.
40.0 - 45.0	Sand, grayish-yellow (5Y8/4), medium- to coarse-grained; trace moderate reddish-brown clay (10R4/6) and black fine-grained sand.
45.0 - 50.0	Sand, grayish-yellow (5Y8/4), medium- to coarse-grained, subrounded; trace dark very-coarse-grained sand; trace black fine-grained sand.

LITHOLOGIC LOG
PW-10 (continued)

Interval (feet BLS)	Description
50.0 - 55.0	Sand, grayish-yellow (5Y8/4), as above; trace varicolored very-coarse-grained sand and gravel up to 4 mm; trace black fine-grained sand.
55.0 - 59.0	Sand, grayish-yellow (5Y8/4), coarse-grained, subrounded; trace varicolored very-coarse-grained sand; trace black fine-grained sand.
59.0 - 65.0	Clay, light gray to greenish-gray (5G6/1) with abundant sand, grayish-orange (10YR7/4), very-coarse-grained to 5 mm gravel, subrounded, varicolored; trace black sand.
65.0 - 80.0	As above, decreasing sand content.
80.0	Total depth.

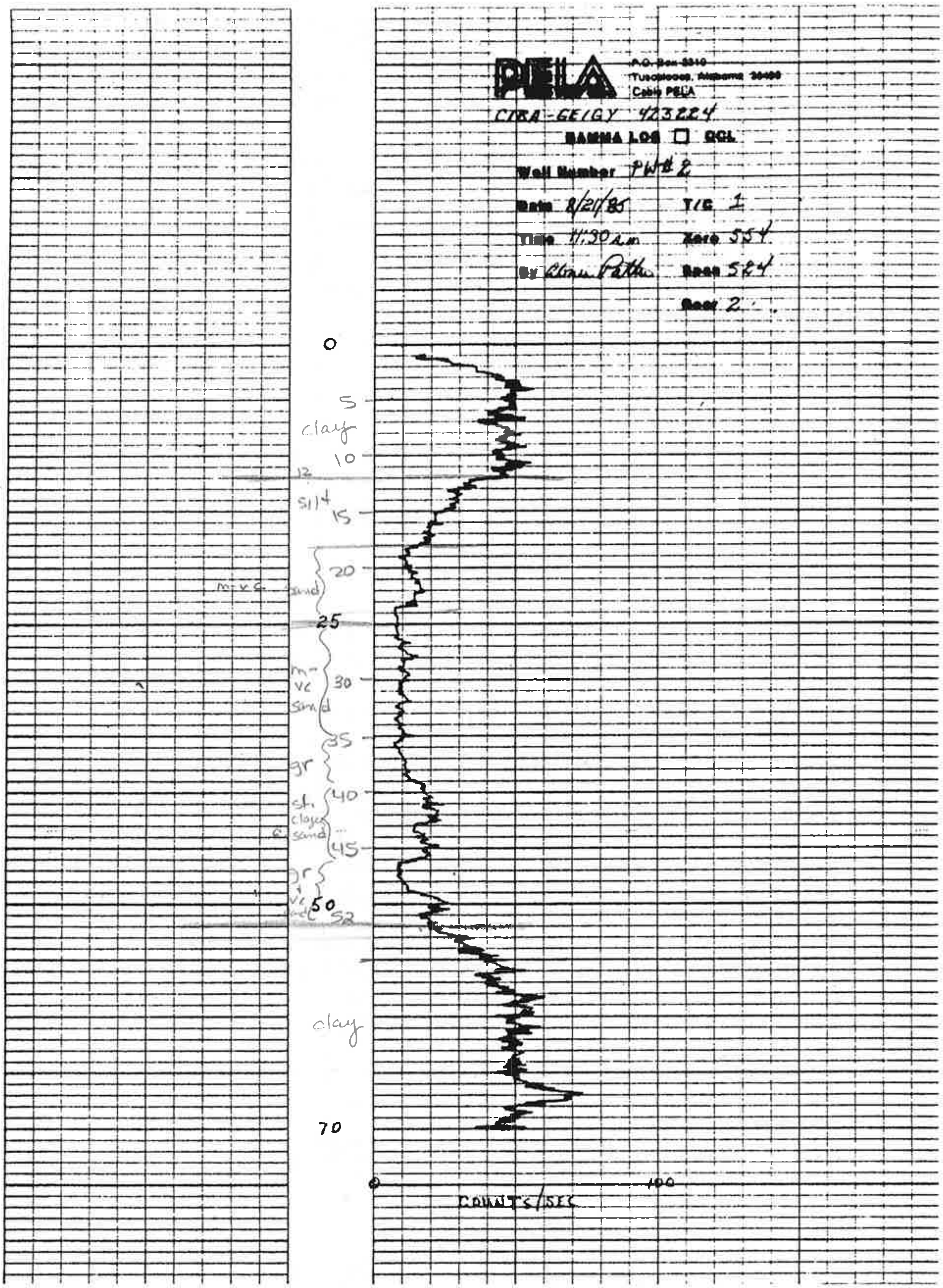
e- log PW2



Electric log for well PW-2

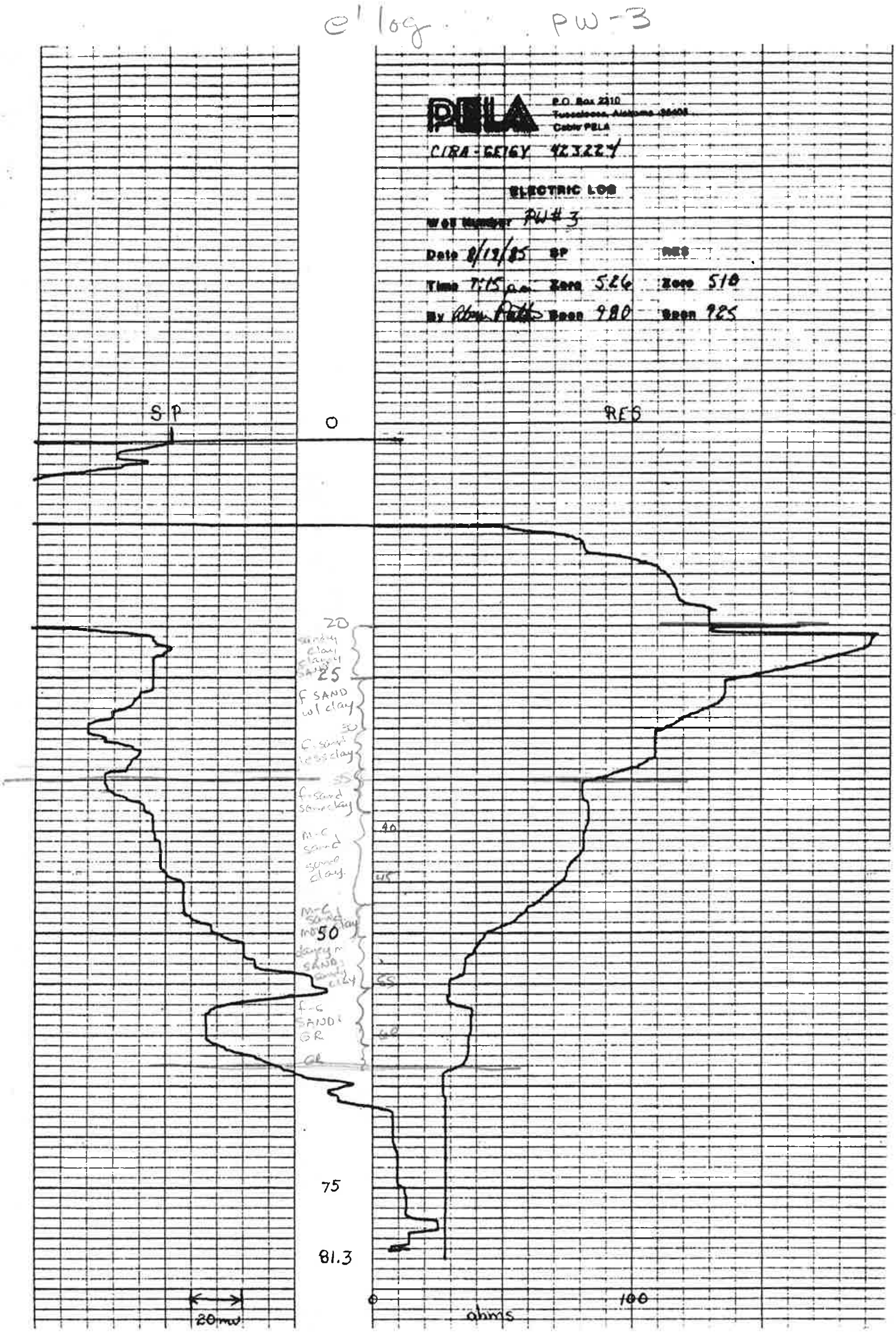
0 to 69.4 feet below land surface

γ-log PW-2



Gamma log for well PW-2

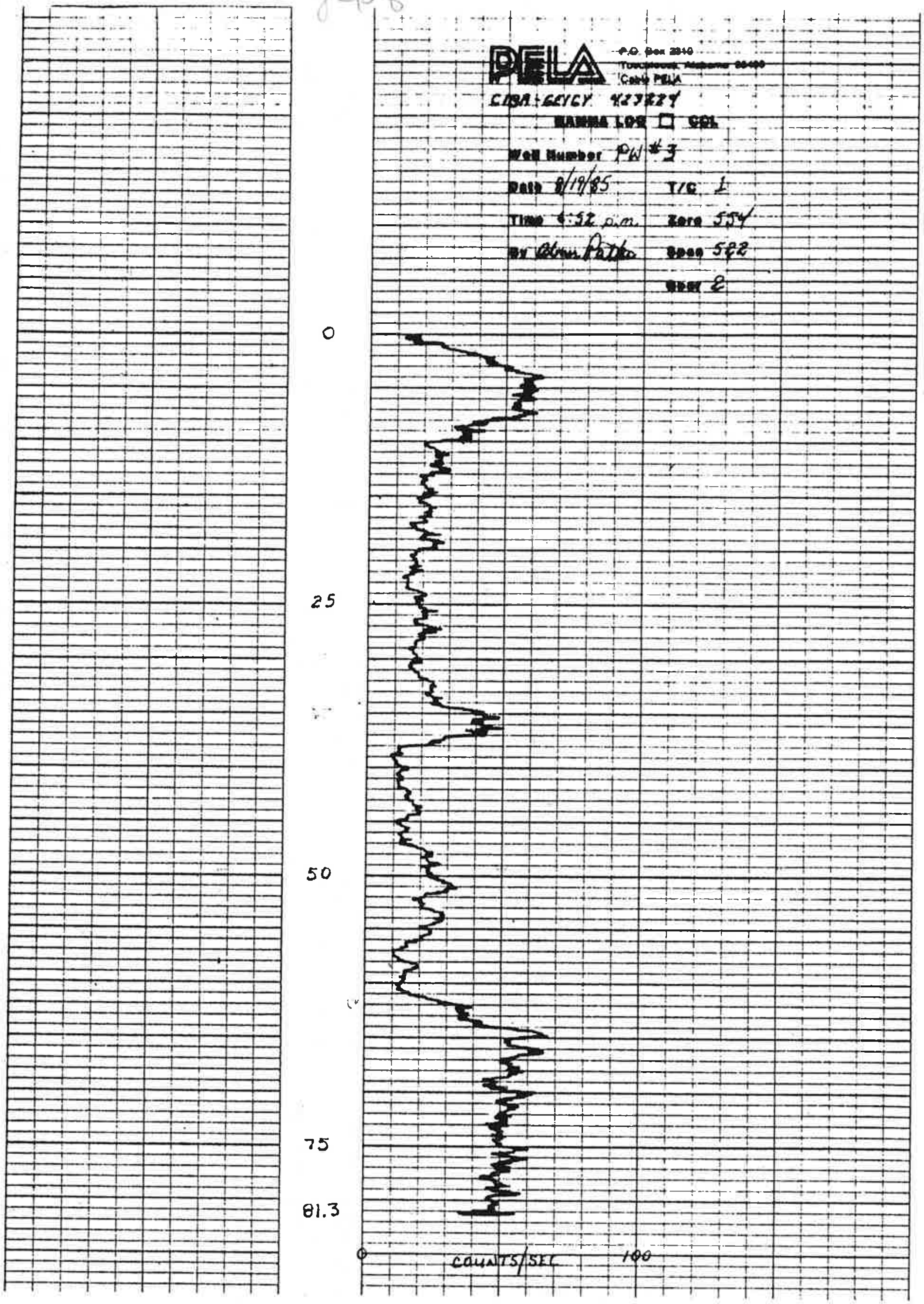
0 to 70 feet below land surface



Electric log for well PW-3

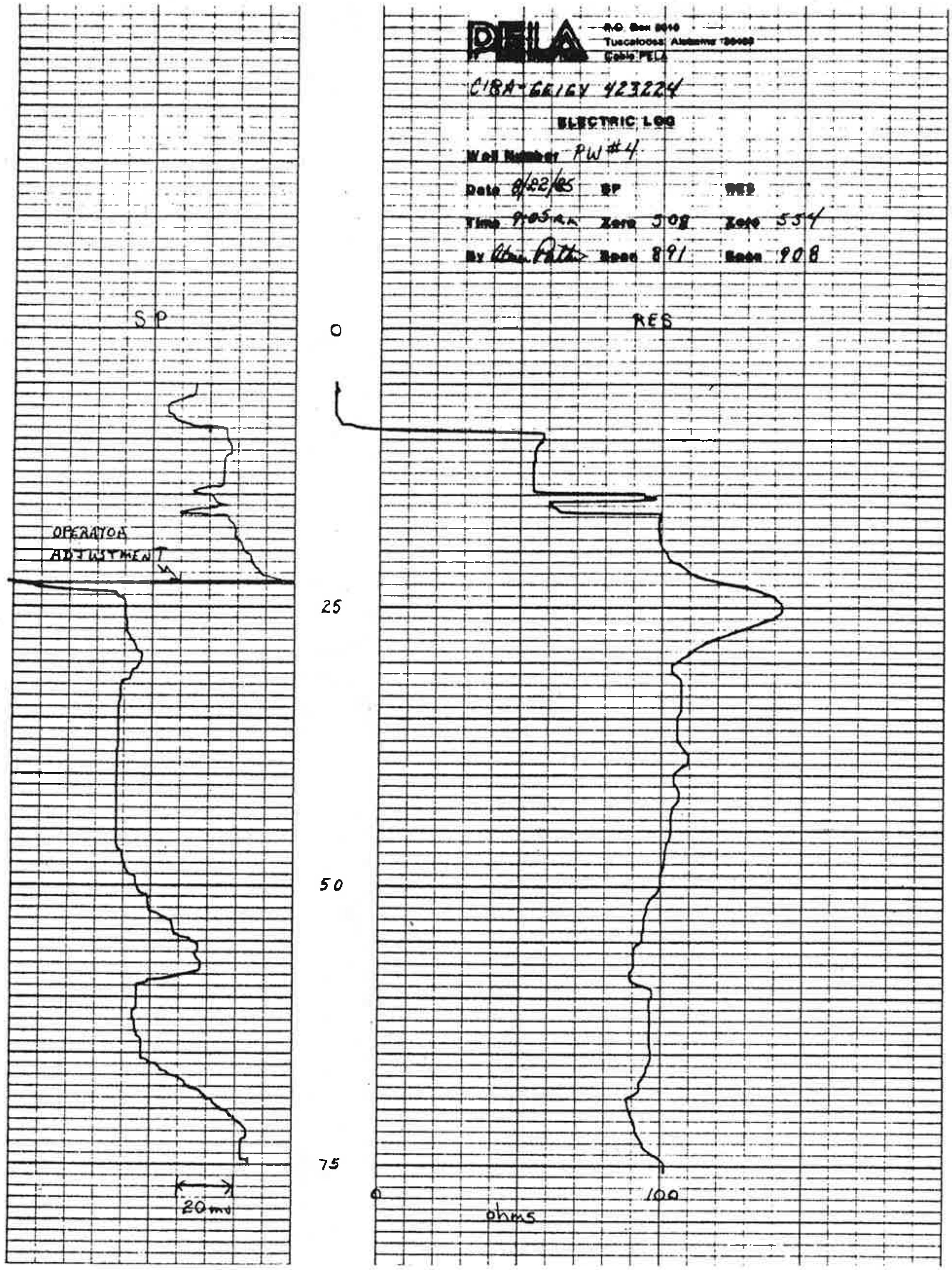
0 to 81.3 feet below land surface

X-108



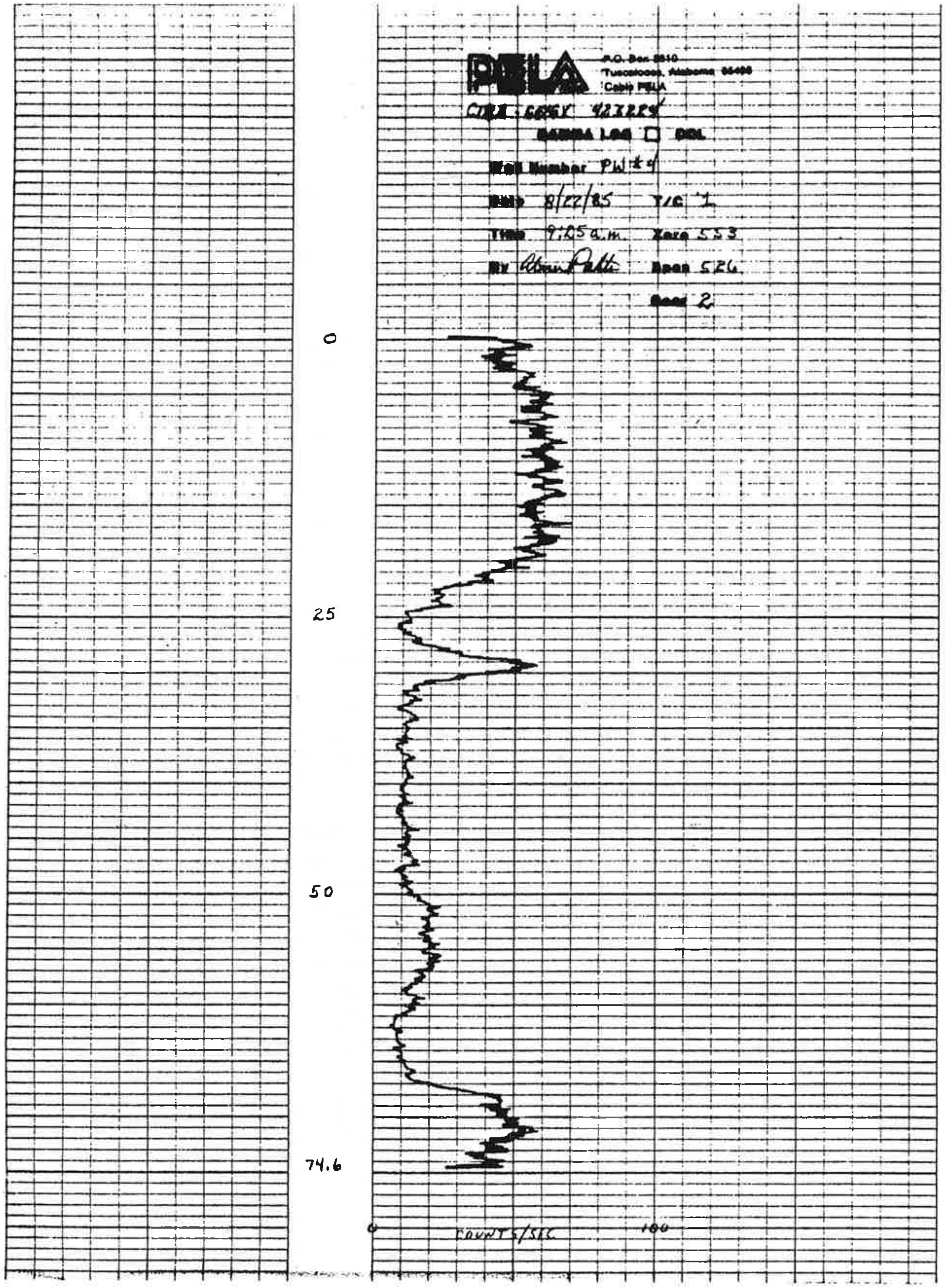
Gamma log for well PW-3

0 to 81.3 feet below land surface



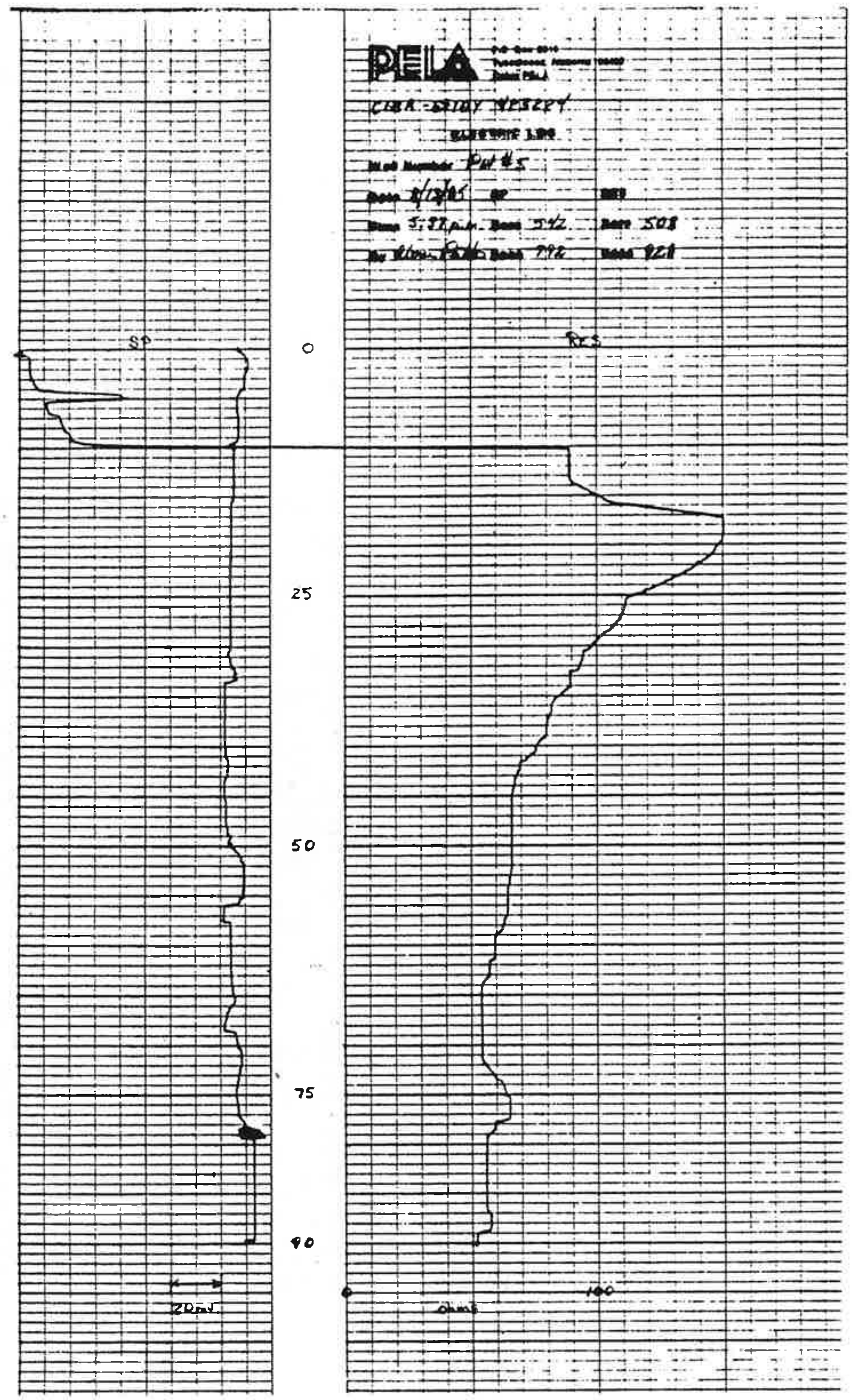
Electric log for well PW-4

0 to 75 feet below land surface



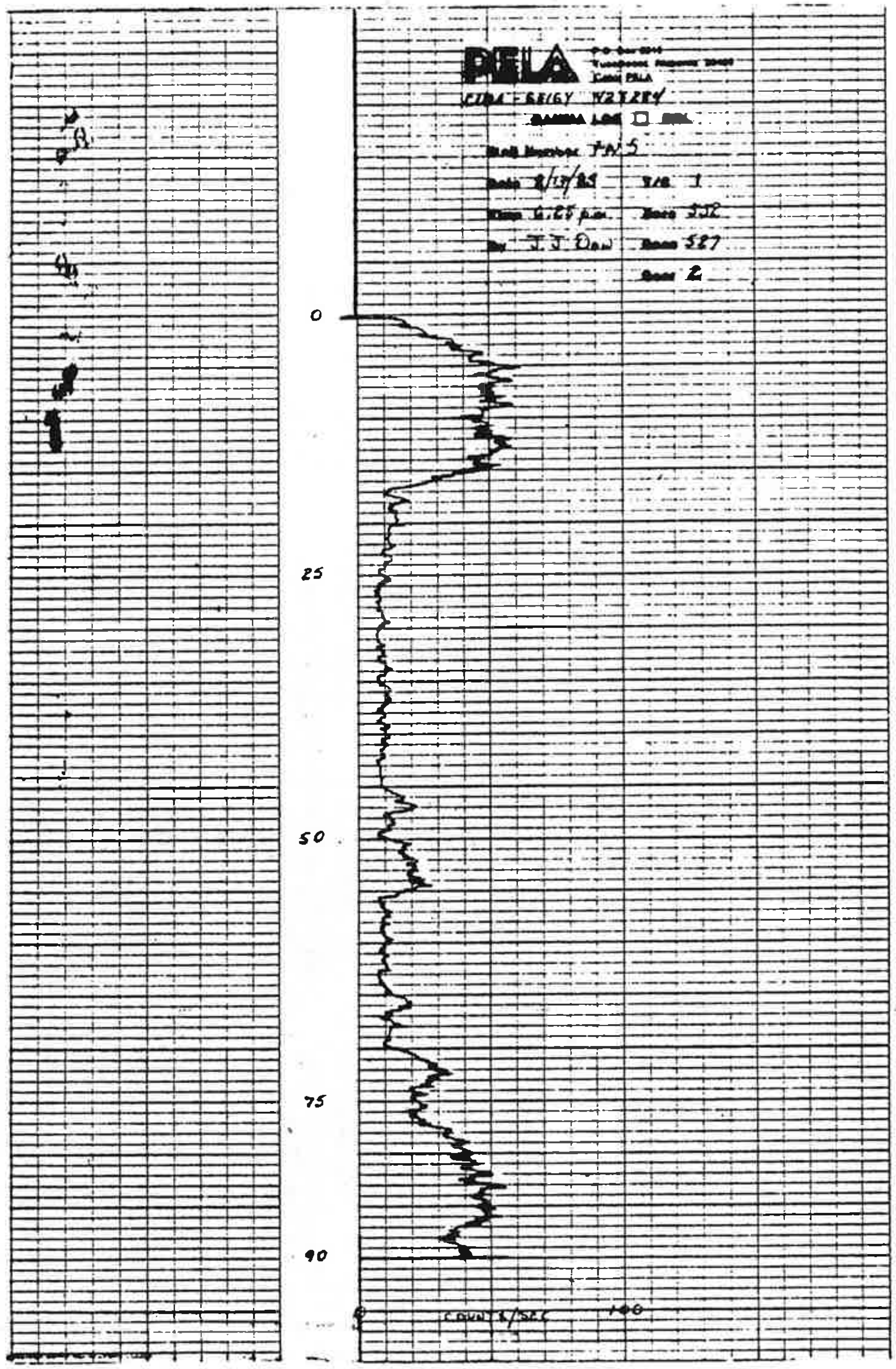
Gamma log for well PW-4

0 to 74.6 feet below land surface



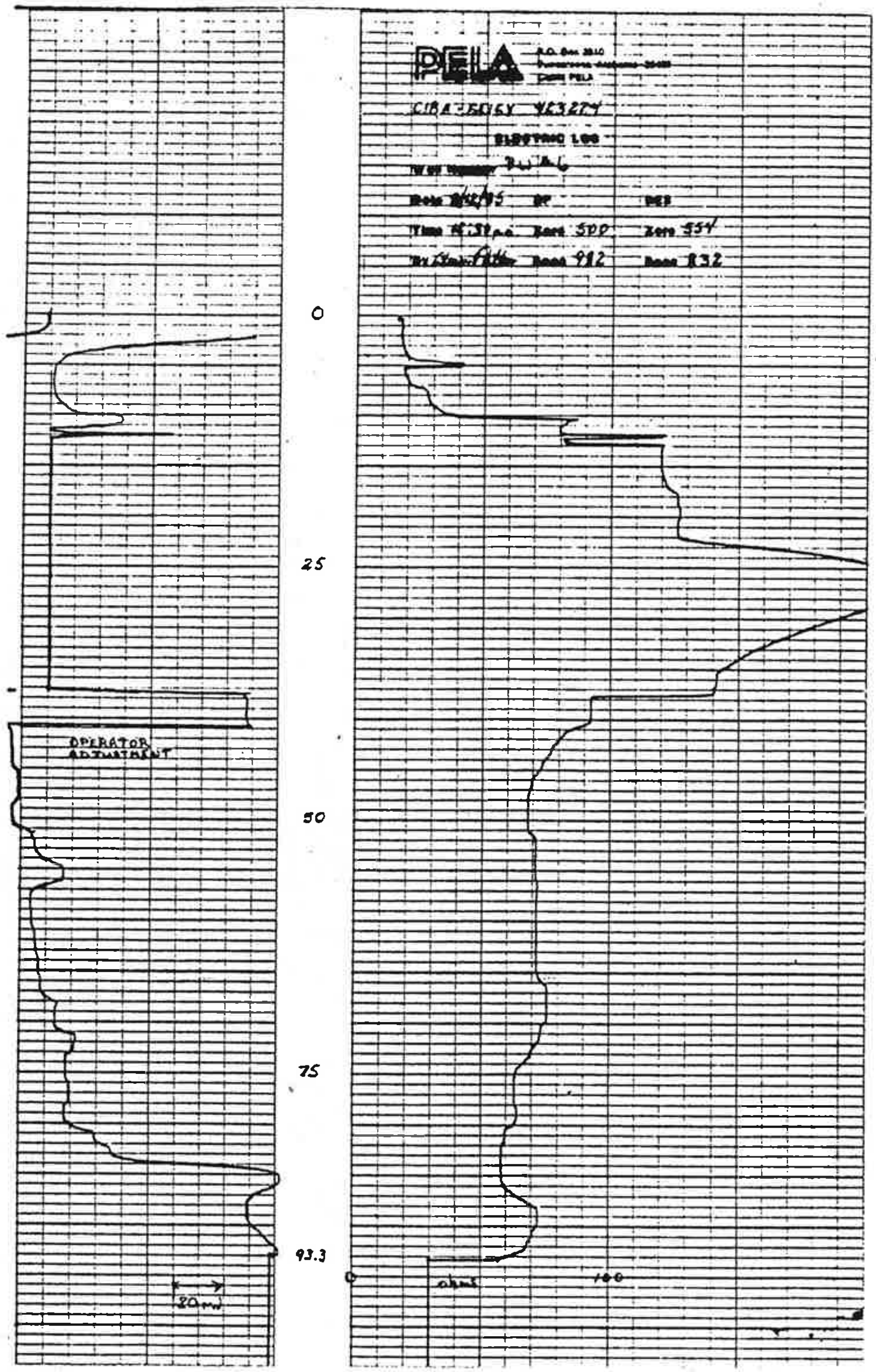
Electric log for well PW-5

0 to 90 feet below land surface



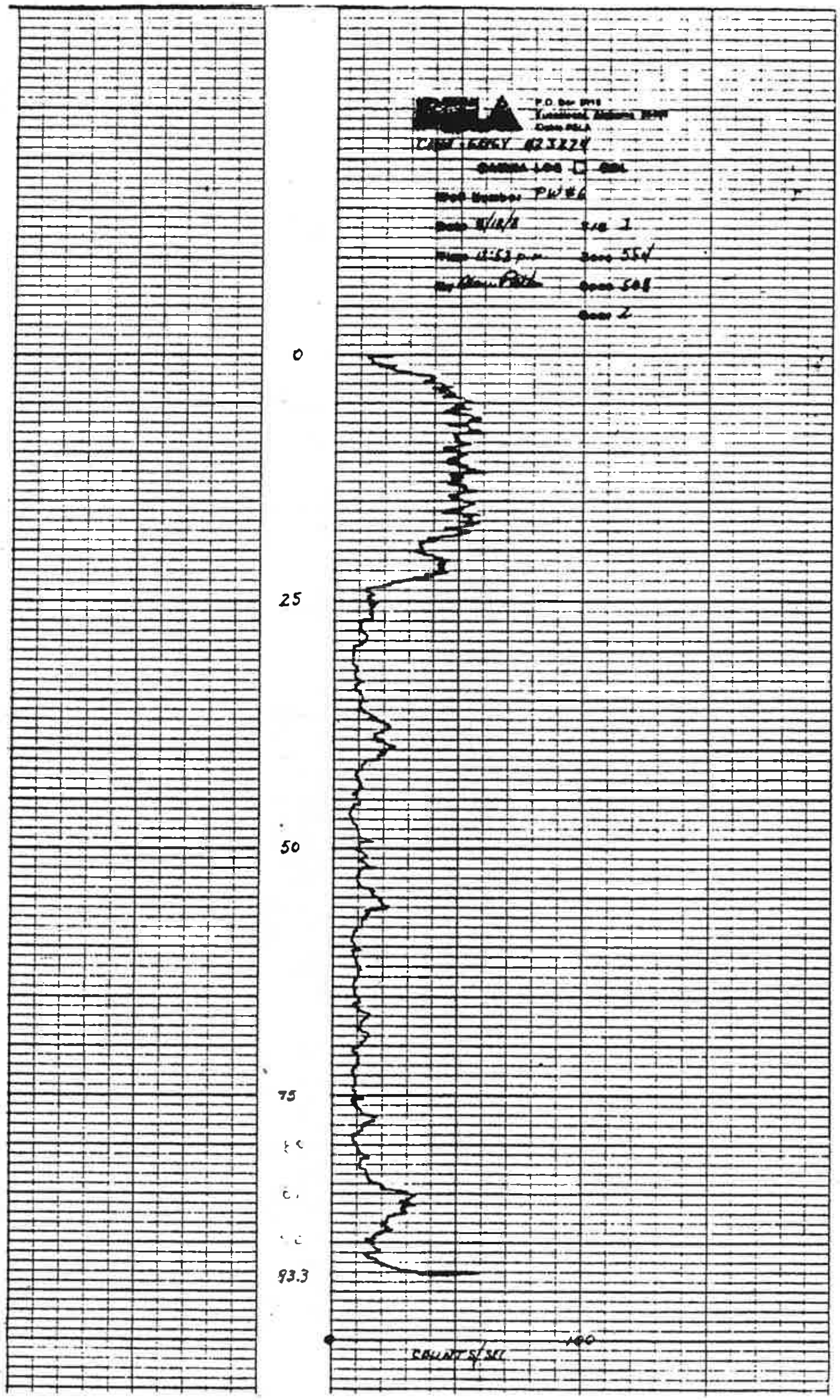
Gamma log for well PW-5

0 to 90 feet below land surface



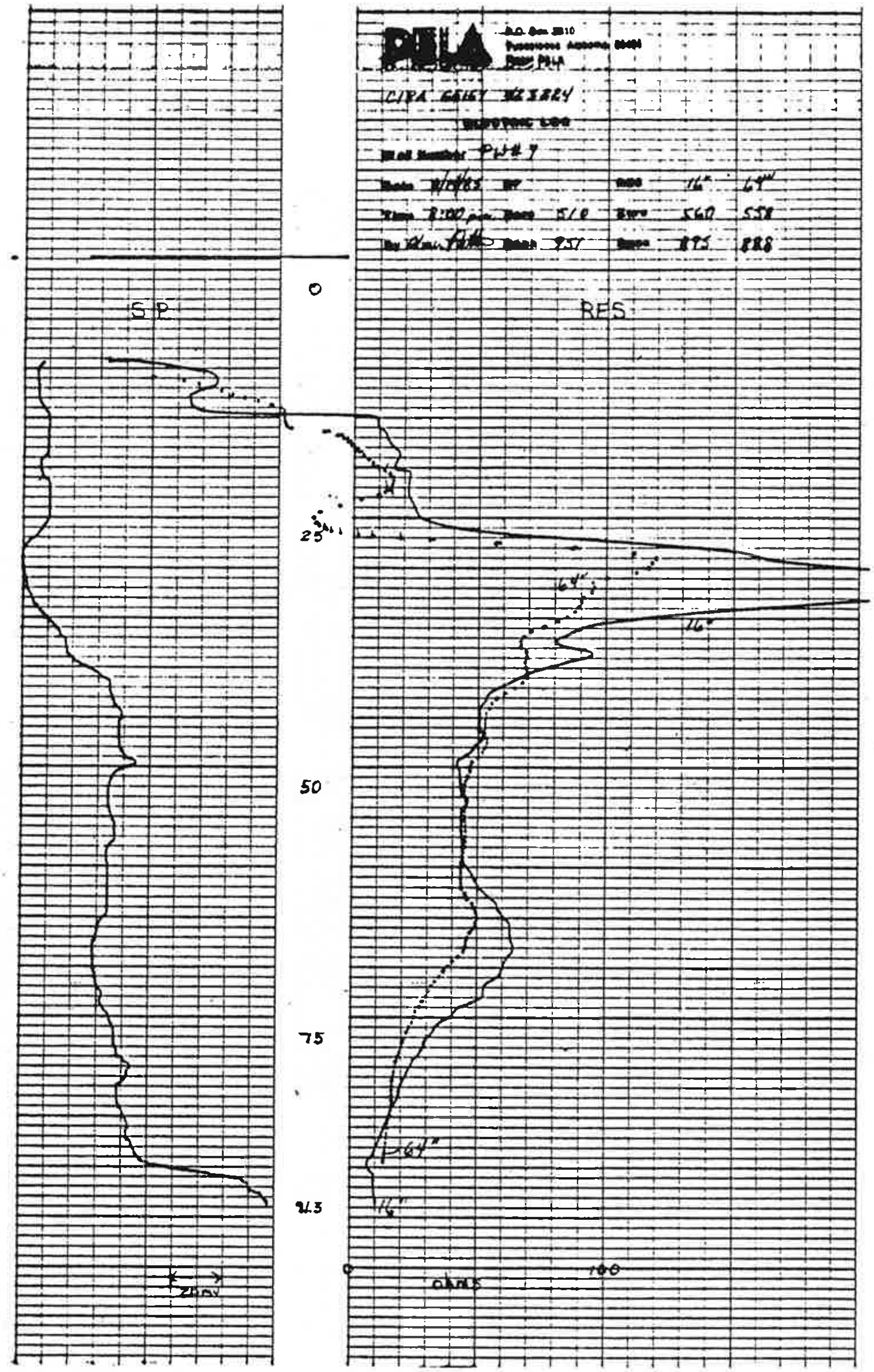
Electric log for well PW-6

0 to 93.3 feet below land surface



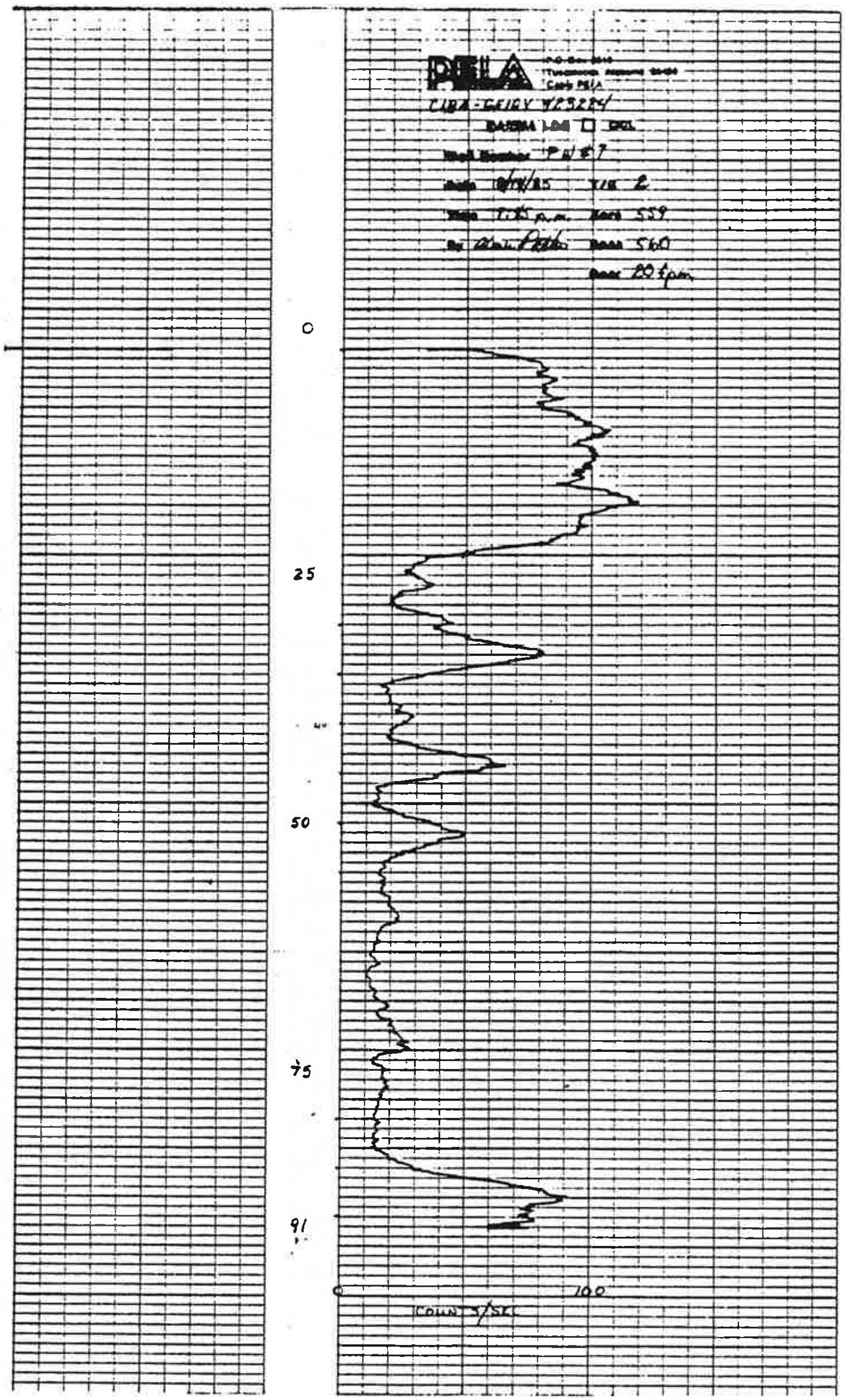
Gamma log for well PW-6

0 to 93.3 feet below land surface



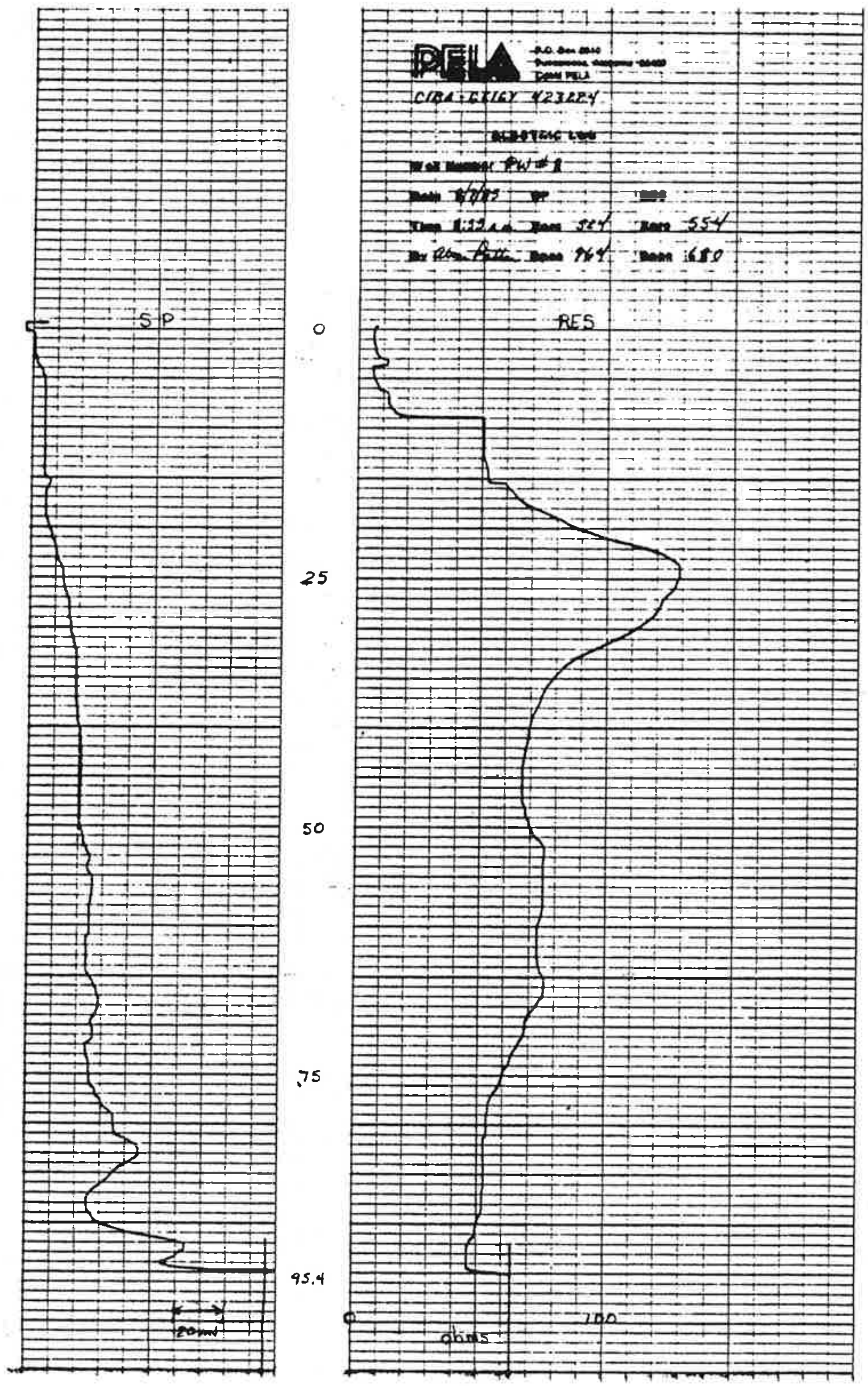
Electric log for well PW-7

0 to 91.3 feet below land surface



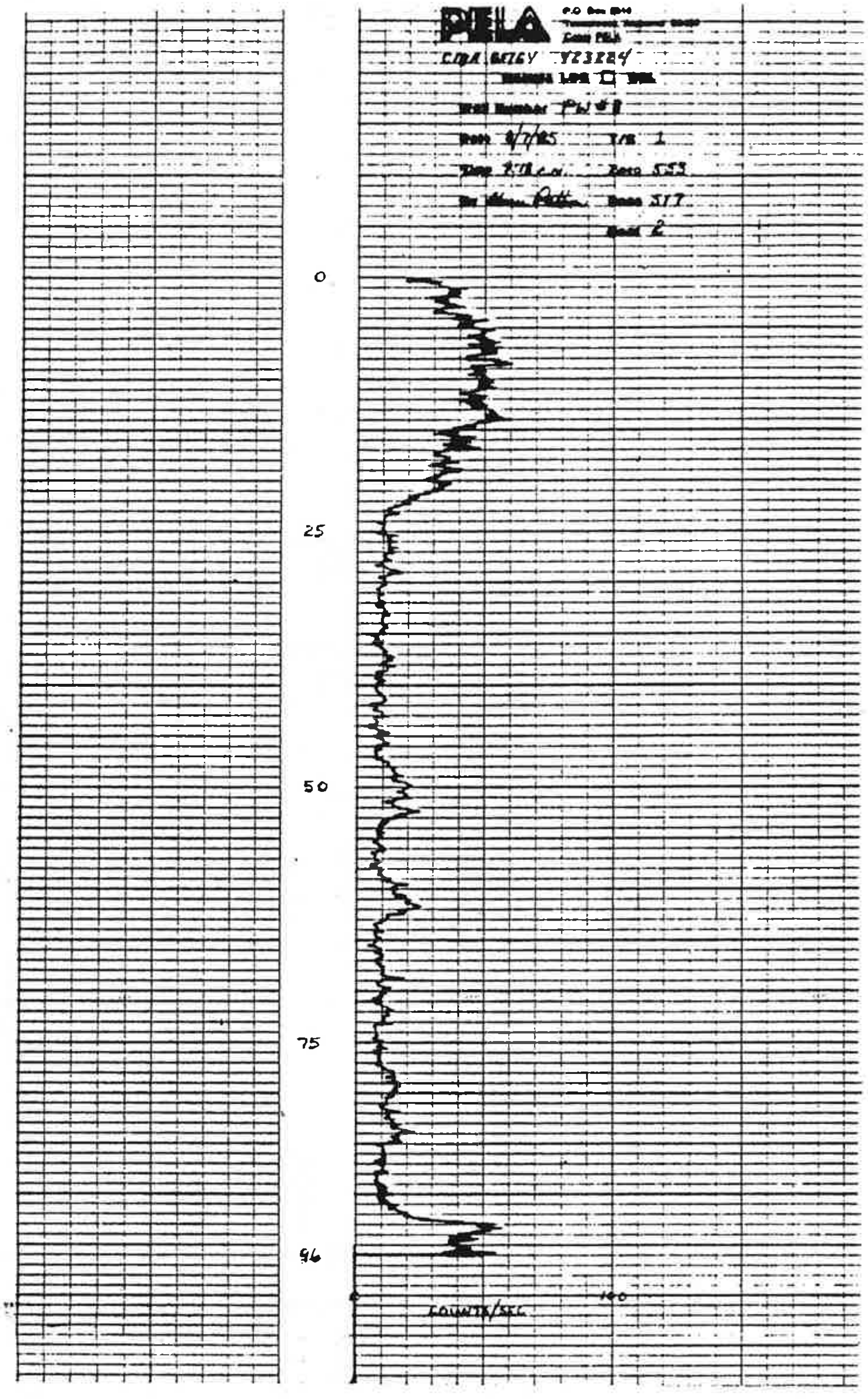
Gamma log for well PW-7

0 to 91 feet below land surface



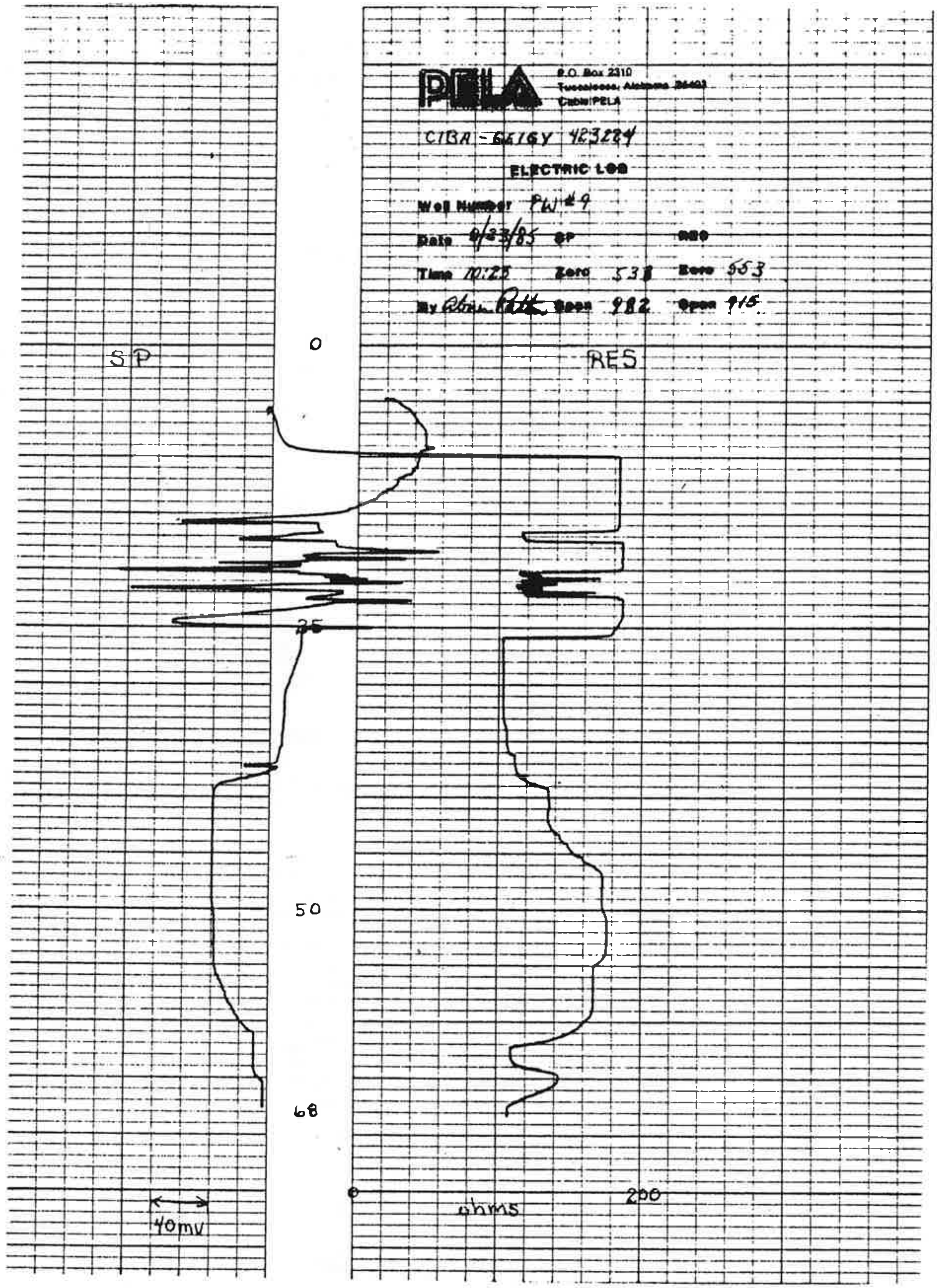
Electric log for well PW-8

0 to 95.4 feet below land surface



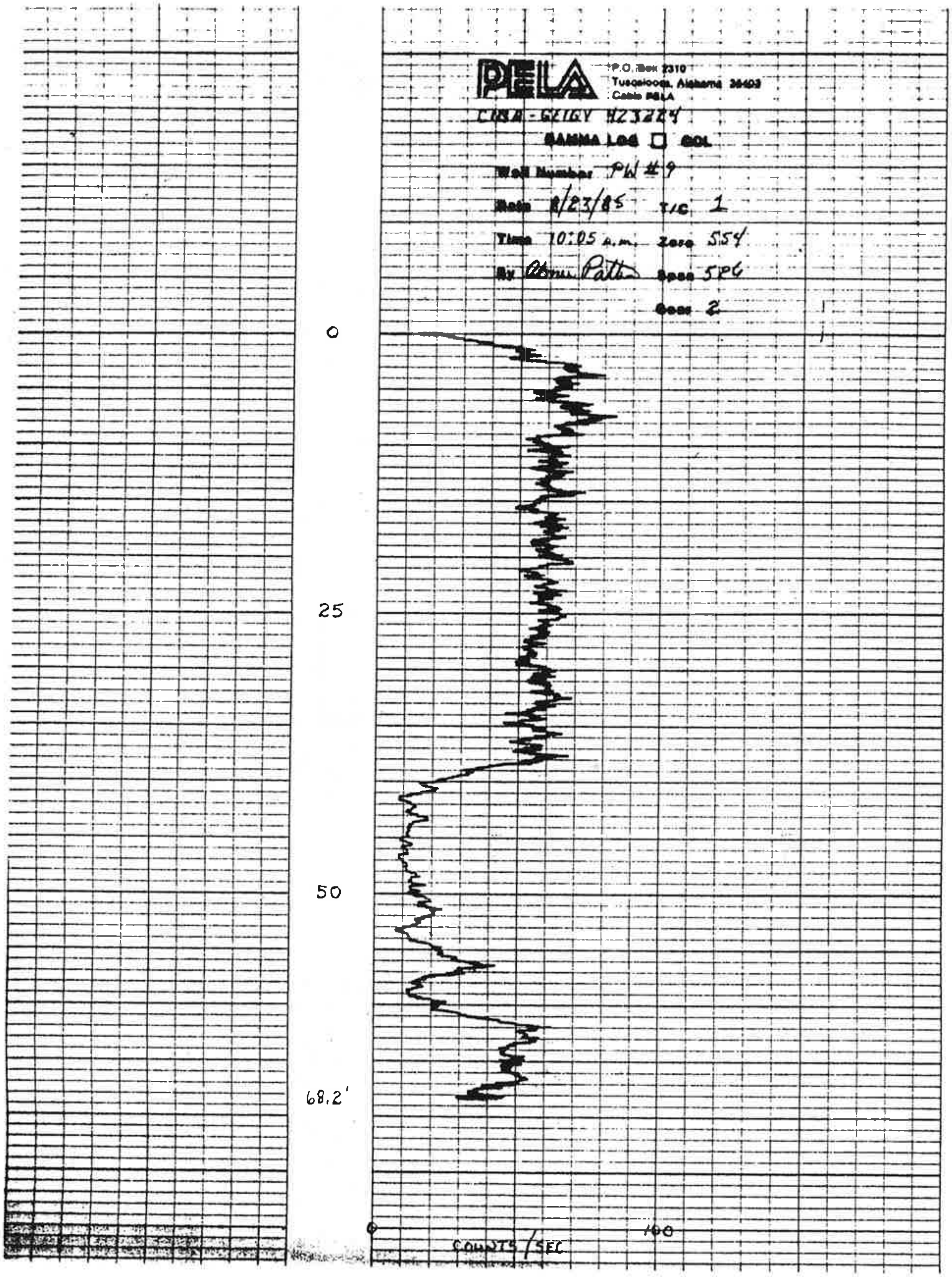
Gamma log for well PW-8

0 to 96 feet below land surface



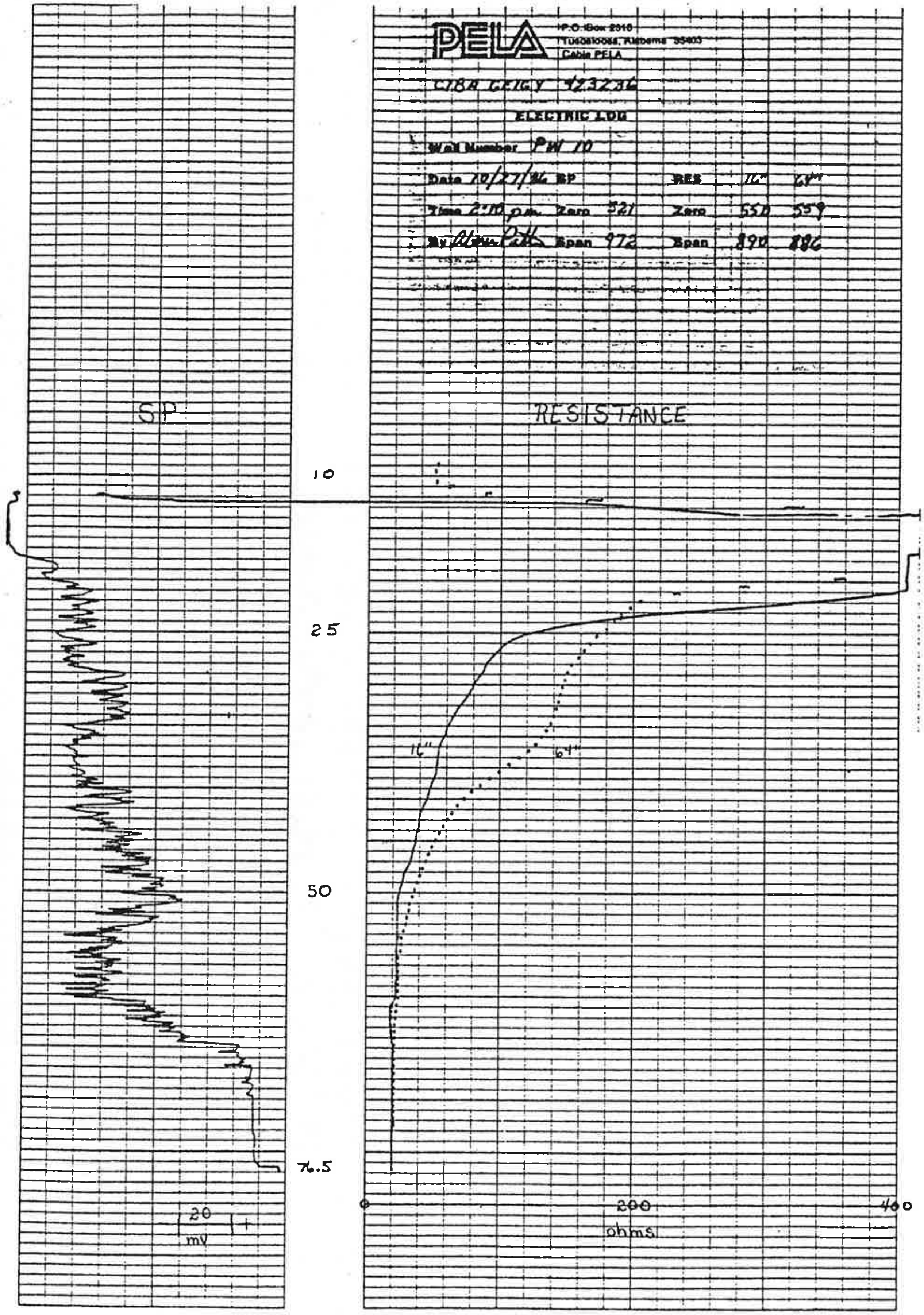
Electric log for well PW-9

0 to 68 feet below land surface

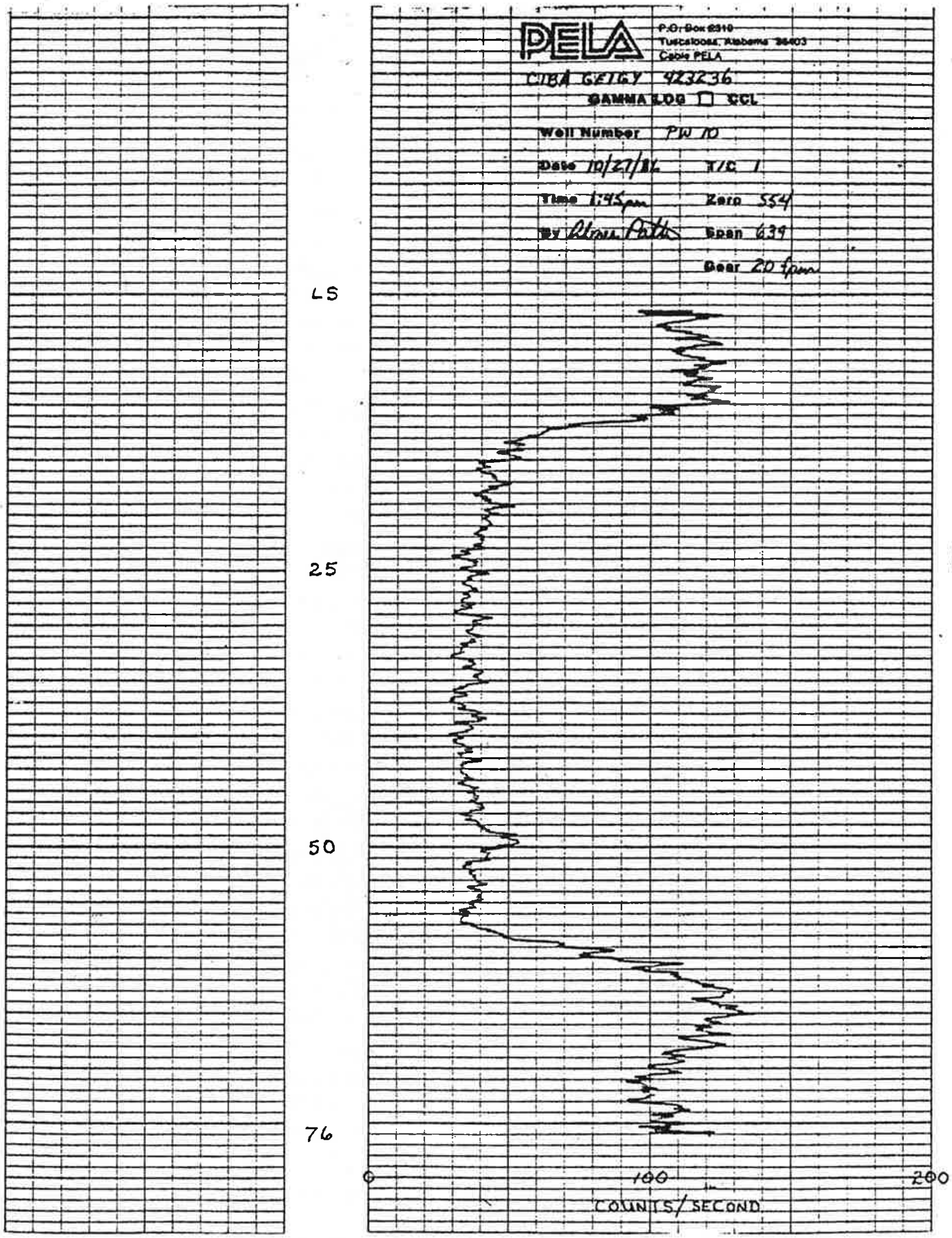


Gamma log for well PW-9

0 to 68.2 feet below land surface



Electric log for well PW-10
0 to 76.5 feet below land surface



Gamma log for well PW-10
0 to 76.0 feet below land surface

LOG OF BORING PW-11

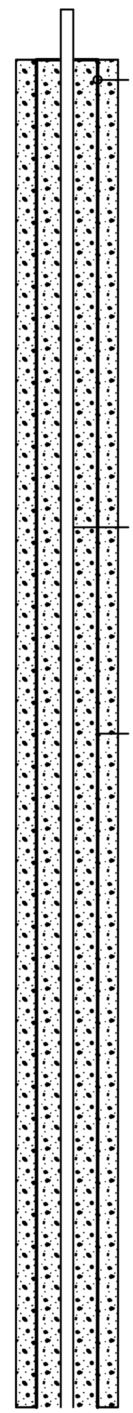
LimnoTech — Water Environment | Scientists Engineers

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

Date Started	: 06/10/19		
Date Completed	: 06/17/19	Total Depth	: 92'
Drilling Method	: Geoprobe / Mud Rotary	Depth to water (bgs)	:
Drilling Contractor	: Walker Hill		
Logged By	: C. O'Brien		

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
0							A schedule 80 PVC bell end surface casing was installed and grouted to a depth of 36.5' prior to installation of the well. The PVC has a 1" wall thickness, O.D.= 16", I.D.= 14". The surface casing consisted of two 20 ft bell end sections that were coupled and secured with stainless steel screws. Blind drill to 36'.
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Well: PW-11
Elev.:



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Water Environment | Scientists Engineers

LOG OF BORING PW-11

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

Date Started	: 06/10/19		
Date Completed	: 06/17/19	Total Depth	: 92'
Drilling Method	: Geoprobe / Mud Rotary	Depth to water (bgs)	:
Drilling Contractor	: Walker Hill		
Logged By	: C. O'Brien		

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION	Well: PW-11 Elev.:
10							Blind drill to 36' (continued).	
11								
12								
13								10" SS Riser
14								
15								Cement grout
16								
17								
18								
19								
20								

LimnoTech
Water Environment | Scientists Engineers

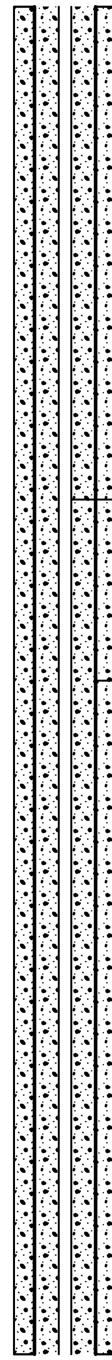
LOG OF BORING PW-11

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

Date Started	: 06/10/19		
Date Completed	: 06/17/19	Total Depth	: 92'
Drilling Method	: Geoprobe / Mud Rotary	Depth to water (bgs)	:
Drilling Contractor	: Walker Hill		
Logged By	: C. O'Brien		

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
20							Blind drill to 36' (continued).
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

Well: PW-11
Elev.:



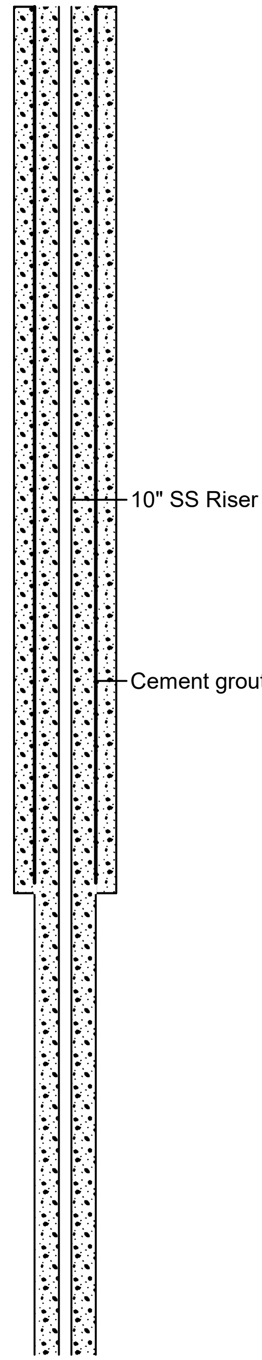
LOG OF BORING PW-11

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

Date Started	: 06/10/19		
Date Completed	: 06/17/19	Total Depth	: 92'
Drilling Method	: Geoprobe / Mud Rotary	Depth to water (bgs)	:
Drilling Contractor	: Walker Hill		
Logged By	: C. O'Brien		

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
30							Blind drill to 36' (continued).
36		1.7'/4.0	0	moist	CL		Brown soft silty CLAY with trace sand and organics. (1")
				moist	CL		Dark brown soft CLAY with organics and woody debris. (12")
37				wet	SP		Gray fine to medium SAND. (7")
							No Recovery. Saturated sands are hydrolocking the DT-22 tooling, switching to "macrocore".
40							

Well: PW-11
Elev.:



LimnoTech
Water | Scientists
Environment | Engineers

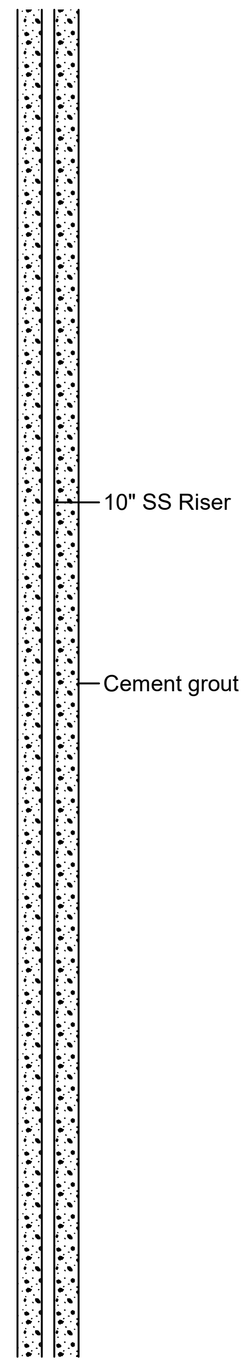
LOG OF BORING PW-11

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

Date Started	: 06/10/19		
Date Completed	: 06/17/19	Total Depth	: 92'
Drilling Method	: Geoprobe / Mud Rotary	Depth to water (bgs)	:
Drilling Contractor	: Walker Hill		
Logged By	: C. O'Brien		

Well: PW-11
Elev.:

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	DESCRIPTION
40			0	wet (40–47.9)		Brown silty fine to medium SAND. (1")
41		2.3'/4.0' (40–44)	2		SP	Tan fine to coarse SAND. (22")
42			1 <10		SP	Brown fine to coarse SAND with some orange mottling. (4")
						Brown silty fine to medium SAND, trace orange silt. Mottling present. (1")
43						No Recovery.
44		1.0'/4.0' (44–48)	15	wet	SP	Gray fine to coarse SAND, some orange mottling. (4")
			2		SP	Gray fine to coarse SAND with gravel. (4")
45			0 (45–48.7)		SP	Brown fine to coarse SAND, some organics. Fine interbedded soft grey clay layers present. (4")
46						No Recovery
48				moist	CL	Gray soft, plastic CLAY. (8")
49			1 0	wet	SP	Gray fine to coarse SAND. (5")
						Gray, moist, soft silty CLAY. (1")
50			~25		SP	Gray fine to coarse SAND. (14")



LOG OF BORING PW-11

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

Date Started : 06/10/19
Date Completed : 06/17/19
Drilling Method : Geoprobe / Mud Rotary
Drilling Contractor : Walker Hill
Logged By : C. O'Brien
Total Depth : 92'
Depth to water (bgs) :

Well: PW-11
Elev.:

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	DESCRIPTION
50					SP	
						No Recovery
51						
52			~25	wet	SP	Gray fine to coarse SAND. (16")
53				moist		Moist, gray silty fine to coarse SAND. (1")
			<10	wet	SP	Gray fine to medium SAND. (8")
54		2.6'/4.0'	~20	wet	SP	Brown fine to medium SAND. (7")
55						No Recovery.
56			3	wet	SP	Gray fine to coarse SAND. (2")
			0	wet		Brown fine to coarse SAND. (1")
57			0	dry	ML	Brown firm clayey SILT with gray mottling. (13")
58		2.6'/4.0'	0	dry	CL	Gray firm silty CLAY with orange mottling. (14")
59						No Recovery.
60						

Well construction: Cement grout; 10" SS Riser; Bentonite pellets (hydrated); Sand pack (30/70)

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LOG OF BORING PW-11

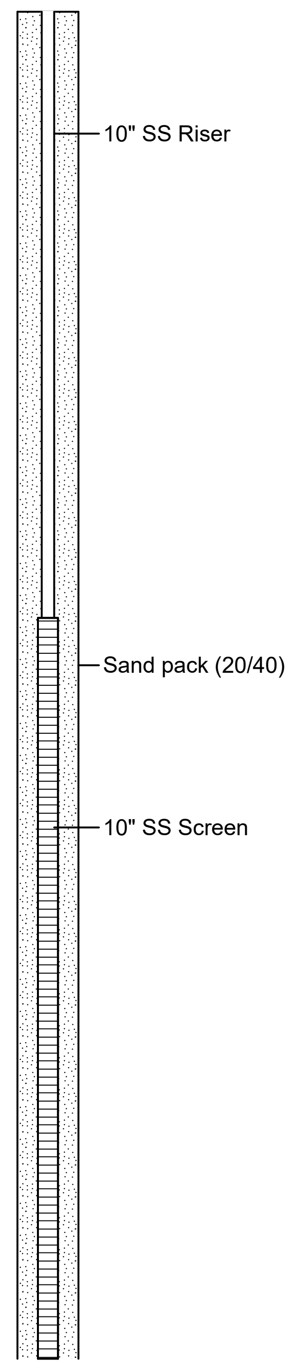
LimnoTech — Water Environment | Scientists Engineers

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

Date Started	: 06/10/19		
Date Completed	: 06/17/19	Total Depth	: 92'
Drilling Method	: Geoprobe / Mud Rotary	Depth to water (bgs)	:
Drilling Contractor	: Walker Hill		
Logged By	: C. O'Brien		

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
60–64		4.0'/4.0'	0	moist	CL		Gray firm fine to medium sandy CLAY with trace silt. Orange and black mottling present. (48")
64–67.1		3.1'/4.0'	0	moist	CL		Gray firm fine to medium sandy CLAY with dark brown mottling. (37")
67.1–68							No Recovery.
68–69.5		4.0'/4.0'	0	moist	CL		Gray firm fine to medium sandy CLAY. Orange mottling and some fine to medium sand present. (18")
69.5–70			0	moist	CL		Very plastic gray CLAY with orange mottling. (12")

Well: PW-11
Elev.:



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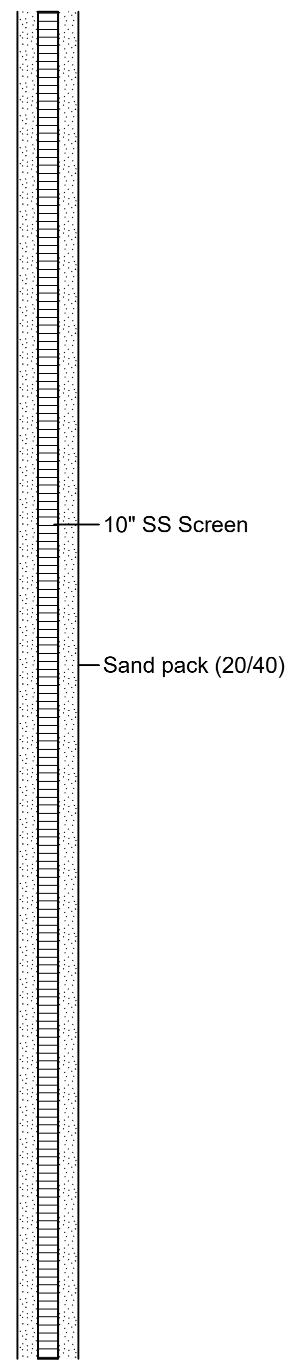
LOG OF BORING PW-11

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

Date Started : 06/10/19
Date Completed : 06/17/19
Drilling Method : Geoprobe / Mud Rotary
Drilling Contractor : Walker Hill
Logged By : C. O'Brien
Total Depth : 92'
Depth to water (bgs) :

Well: PW-11
Elev.:

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	DESCRIPTION
70		4.0'/4.0'	0	moist	CL	
71			0	moist	CL	Gray firm fine to medium sandy CLAY, some orange mottling. (6")
			0	moist	CL	Very firm, gray fine to medium sandy CLAY, some orange mottling. (6")
72		3.7'/4.0'	0	moist		Gray fine to medium clayey SAND. (1")
			0	moist	CL	Gray, firm fine to medium sandy CLAY. (5")
73			0	wet	CL	Gray, soft fine to medium sandy CLAY. (11")
74			0	wet	CL	Gray, soft silty CLAY with fine to medium sand and orange mottling. (16")
75			0	moist	CL	Gray soft fine to medium sandy CLAY with orange mottling. (10")
						No Recovery.
76–80		3.6'/4.0'	3	moist	CL/ML	Gray firm fine to medium sandy CLAY and SILT. (44")
						No Recovery.



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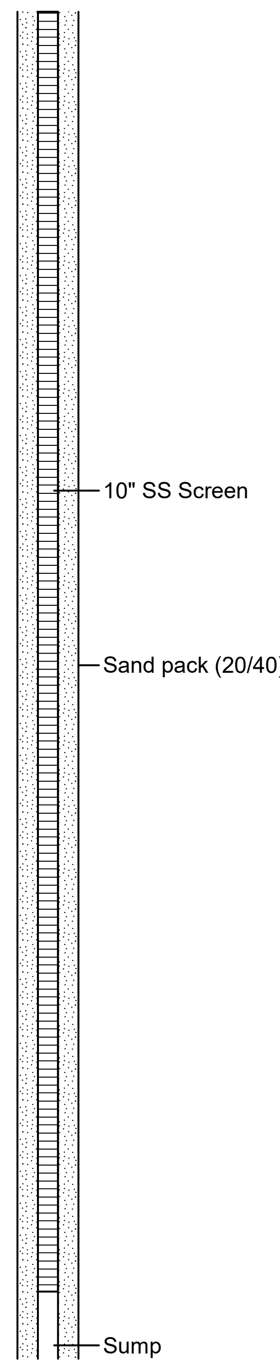
LOG OF BORING PW-11

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

Date Started : 06/10/19
Date Completed : 06/17/19
Drilling Method : Geoprobe / Mud Rotary
Drilling Contractor : Walker Hill
Logged By : C. O'Brien
Total Depth : 92'
Depth to water (bgs) :

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
80		3.7'/4.0' (80'-84')	0	moist			Firm gray CLAY. (1")
			0	moist			Soft gray fine to medium sandy CLAY with some sand seams. (1")
			0	moist	ML		Soft gray fine to medium sandy SILT with clay. (2")
			0	moist	CL		Firm gray plastic CLAY. (7")
81			0	wet	CL		Gray soft fine to medium sandy CLAY with silt and clay seams. (8")
82			0	moist	CL		Gray firm fine to medium sandy CLAY. (12")
83			0	moist	CL		Gray, firm, plastic silty CLAY. (11")
			0	moist			Brown firm CLAY. (1")
							No Recovery.
84–86		3.1'/4.0' (84'-88')	0	moist	CL		Gray, firm, plastic, fine to medium sandy CLAY. (32")
87				moist	CL		Gray, soft fine to medium sandy CLAY. (5")
			0	wet	SW		Gray fine to coarse silty SAND with clay seams. (6")
							No Recovery.
88–90	Soil Sample (88'-90')	4.2'/3.0'	0 to 2		CL		Gray very hard, plastic CLAY. Some orange and black mottling present. (36")

Well: PW-11
Elev.:



LOG OF BORING PW-11

BASF
1379 Ciba Road
McIntosh, Alabama, 36553

Date Started	: 06/10/19		
Date Completed	: 06/17/19	Total Depth	: 92'
Drilling Method	: Geoprobe / Mud Rotary	Depth to water (bgs)	:
Drilling Contractor	: Walker Hill		
Logged By	: C. O'Brien		

Well: PW-11
Elev.:

Depth in Feet	Sample Type	Recovery (in.)	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
90–91		4.2'/3.0'	0 to 2		CL		
91–92							Sump interval not logged. (12")

Sand pack (20/40)
Sump

End of Boring

Lithology was identified prior to well installation using a Geoprobe DPT rig.

Sump installed below screen from 89.5' to 92'. Screened from 64.5' to 89.5' using 10", 0.008"-slot stainless steel screen.
10" stainless steel riser from 64.5' to surface.
Sand pack (20/40 sand mix) installed from 91' to 60'. 30/70 sand mix installed from 60' to 58'.
Bentonite pellets (hydrated for 4 hours prior to grouting) added from 58' to 54'.
Cement grout from 54' to surface.

Depth scale: 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZ-2
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: June 21-26, 1990
DRILLING METHOD: Mud Rotary
TOTAL DEPTH BOREHOLE (FT): 71.0
MP ELEVATION (FT): 10.93 NGVD

LOCATION: Ciba-Geigy Corporation
McIntosh, Alabama

DATE INSTALLED: June 21-26, 1990
BOREHOLE DIAMETER (IN): 10.0
LS ELEVATION (FT): 6.76 NGVD

TOTAL DEPTH WELL (FT): 66.5
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME: July 4, 1990 - 16:58
PELA REP(S): N.E. Moss

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
2.5	2.0 - 3.2	Clay, mottled pale yellowish-brown (10YR 6/2) and light brown (5YR 5/6), plastic, moist, organic material, sandy with fine- to coarse-grained, subrounded quartz.	(2, 1, 1, 2) 60	0
5.0				
7.5	7.0 - 7.3	Silt, medium gray (N 5), slightly clayey, moist, sandy with fine- to coarse-grained quartz.	(1, 2, 1, 1) 25	0
	7.3 - 7.5	Sand, medium light gray (N 6), very fine- to fine-grained, subrounded quartz, well sorted, silty, moist.		
10.0				
12.5	12.0 - 12.8	Clay, light olive gray (5Y 6/1) to dark olive gray (5Y 4/1), very plastic, silty, with 0.05 foot sand seam at 12.1 feet BLS, very fine- to fine-grained, subrounded quartz, well sorted.	(1, 1, 1, 1) 40	0
15.0				
17.5	17.0 - 17.6	Sand, greenish-gray (5GY 6/1) to dark greenish-gray (5GY 4/1), very fine- to medium-grained (mostly fine-grained), subrounded quartz, well sorted, slightly silty, very moist.	(2, 3, 5, 7) 30	0
20.0				

REMARKS: PELA Reference No. 492328

#4 (4/15/91) 13-D:\492300\Log-Blow.PZ1

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZ-2
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: June 21-26, 1990
DRILLING METHOD: Mud Rotary
TOTAL DEPTH BOREHOLE (FT): 71.0
MP ELEVATION (FT): 10.93 NGVD

LOCATION: Ciba-Geigy Corporation
McIntosh, Alabama

DATE INSTALLED: June 21-26, 1990
BOREHOLE DIAMETER (IN): 10.0
LS ELEVATION (FT): 6.76 NGVD

TOTAL DEPTH WELL (FT): 66.5
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):

DATE AND TIME: July 4, 1990 - 16:58
PELA REP(S): N.E. Moss

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
20.0				
22.5	22.0 - 22.95	Sand, greenish-gray (5GY 6/1) to dark greenish-gray (5GY 4/1), very fine- to medium-grained (mostly fine-grained), subrounded quartz, well sorted, slightly silty, very moist.	(2, 3, 4, 7) 48	0
25.0				
27.5	27.0 - 27.85	Sand, yellowish-gray (5Y 8/1), medium- to coarse-grained, subrounded quartz, trace fine gravel, moderately to poorly sorted, very moist.	(8, 10, 6, 10) 43	0
30.0				
32.5	32.0 - 33.0	Sand, as in interval 27.0 - 27.85 feet, with 15% gravel and black (N 1) silt stringers.	(3, 2, 7, 22) 50	0
35.0				
37.5	37.0 - 38.0	Sand, as in interval 27.0 - 27.85 feet, with 15% gravel.	(7, 8, 13, 15) 50	0
40.0				

REMARKS: PELA Reference No. 492328

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZ-2

DRILLER: Geotechnical Engineering-Testing, Inc.

DATE DRILLED: June 21-26, 1990

DRILLING METHOD: Mud Rotary

TOTAL DEPTH BOREHOLE (FT): 71.0

MP ELEVATION (FT): 10.93 NGVD

LOCATION: Ciba-Geigy Corporation McIntosh, Alabama

DATE INSTALLED: June 21-26, 1990

BOREHOLE DIAMETER (IN): 10.0

LS ELEVATION (FT): 6.76 NGVD

TOTAL DEPTH WELL (FT): 66.5

WATER LEVEL DURING DRILLING (FT BLS):

WATER LEVEL AFTER DEVELOPMENT (FT BLS):

DATE AND TIME: July 4, 1990 - 16:58

PELA REP(S): N.E. Moss

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
40.0				
42.5	42.0 - 42.9	Sand, as in interval 27.0 - 27.85 feet, becoming light gray (N 7), fine- to medium-grained, subrounded quartz, moderately well sorted, with trace dark grains.	(10, 35, 31, 19) 45	0
45.0				
47.5	47.0 - 48.8	Silt, medium light gray (N 6) to medium gray (N 5), clayey in part, slightly sandy with very fine-grained quartz, moist.	(3, 3, 2, 5) 90	0
50.0				
52.5	52.0 - 53.4	Sand, yellowish-gray (5Y 8/1) to light olive gray (5Y 6/1), very fine- to fine-grained, subrounded quartz, well sorted, moist.	(12, 11, 16, 30) 70	0
55.0				
57.5	57.0 - 58.1	Sand, as in interval 52.0 - 53.4 feet, yellowish-gray (5Y 8/1), with moderate brown (5YR 4/4) staining, and woody material.	(14, 14, 17, 34) 63	0
60.0				

REMARKS: PELA Reference No. 492328

#6 (4/15/91) 13-D:\492300\Log-Blow.PZ1

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZ-2
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: June 21-26, 1990
DRILLING METHOD: Mud Rotary
TOTAL DEPTH BOREHOLE (FT): 71.0
MP ELEVATION (FT): 10.93 NGVD

LOCATION: Ciba-Geigy Corporation
McIntosh, Alabama

DATE INSTALLED: June 21-26, 1990
BOREHOLE DIAMETER (IN): 10.0
LS ELEVATION (FT): 6.76 NGVD

TOTAL DEPTH WELL (FT): 66.5
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):

DATE AND TIME: July 4, 1990 - 16:58
PELA REP(S): N.E. Moss

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
60.0				
62.5	62.0 - 64.0	Clay, light gray (N 7), very silty, sandy with fine-grained quartz, slightly plastic, moist.	(4, 8, 9, 12) 100	0
65.0				
67.5	67.0 - 69.0	Clay, medium light gray (N 6) to medium gray (N 5), mottled moderate red (5R 4/6), very stiff, dry.	(9, 16, 20, 26) 100	0
	69.0 - 71.0	Clay, as in interval 67.0 - 69.0 feet, slightly sandy toward base.	(8, 12, 19, 24) 100	0
70.0				
	71.0	Total depth.		
72.5				
75.0				
77.5				
80.0				

REMARKS: PELA Reference No. 492328

#7 (4/15/91) 13-D:\492300\Log-Blow.PZ1

P.E.LaMoreaux & Associates

PIEZOMETER CONSTRUCTION FORM

DRILLING DATA

Well ID PZ-2 Project Number 492328
Project Name Ciba-Geigy - Flood Plain Assessment
Location McIntosh, Alabama

Supervised by Neil E. Moss
Date of Boring 6/12/90 Date Well Completed 6/27/90
Drilling Company Geotechnical Engineering - Testing, Inc.
Driller Charles Havard
Drilling Method Mud Rotary
Bit Diameter 12" Hollow Stem I.D. ____ O.D. ____
Hours Drilled ____ Downtime ____
Decontamination Procedure Three Steam Cleaning Rinses

Sample Collection Procedure 24" split spoon at 5 foot intervals
Estimated % Recovery 50 - 100 percent

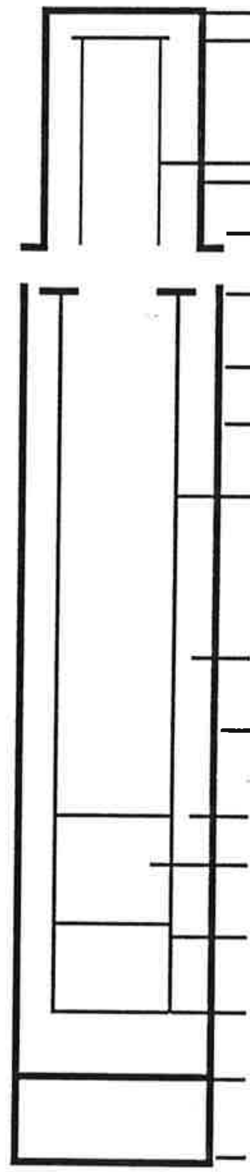
MATERIALS

Casing Material PVC Type Schedule 40
Screen Material PVC Type Schedule 40
Casing (in.) O.D. 4.5 I.D. 4.0 LS to 16.5 ftbls
(in.) O.D. ____ I.D. ____ ____ to ____ ftbls
(in.) O.D. ____ I.D. ____ ____ to ____ ftbls
Total Casing (ft.) 20.43
Screen (in.) O.D. 4.5 I.D. 4.0 ____ to ____ ftbls
Slot Size .010 inch Total Screen (ft.) 50.0
Length of Cap 0.54 foot Sump (ft.) ____
Centralizer Material ____ Length (in.) ____
Sand Pack Mtrl./Sz. Cosby Carmichael Silica Sand/Rad Blast No. 2
Lbs./Sacks Used 90/80 sacks 90/1 sack
Grout Material Cement/Bentonite Slurry
Amt. Cement 4 sacks Type Cement Portland
Amt. Powdered Bentonite 1/2 Lbs.Bentonite Pellets 100
Tremie Used 1 1/2" Pump for Grout Used Grout Machine
Cement Plug ____
Length of Protective Casing (ft.) ____

DEVELOPMENT

Development Method Submersible P. Total Hours 5
Date and Time Started 7/4/90 12:00
Date and Time Completed 7/4/90 16:58
Esti. Gallons 2,000 Esti. Yield (gpm) 5 gpm
Static WL (ftbtoc) 9.17
Color/Turbidity: Start brownish-gray Finish Clear
Drawdown (ft.) ____ Time to Recovery ____
Final: pH 5.95 SC 407 mmhosT 20.6°C Eh ____
Sand ____ Odor ____
Water Discharged to 1,000 gallon holding tank

REMARKS ____



___ Protective Casing (als)
___ Manhole Cover
Lock On:
___ Well Cover
x Well Cap
____ ft. als / bls
____ ft. als / bls

MP Descrip: TOC
LS Elev: ____
MP Elev: ____
____ inches
____ inches

Pad Dimension: ____

Top of Casing: ____ ft. als

Cement Plug: ____ to ____ ftbls

Borehole Diameter: 10 inches

Casing: 4.0 in. 40 sch. ____ in. ____ sch.

Casing Interval: LS to 16.5 ftbls

Grout: LS to 13.5 ftbls

Bentonite Pellet Seal: 13.5 to 16.5 ftbls

Sand Pack: 16.5 to 67 ftbls

.010 -in. Slotted Screen: 16.5 to 66.5 ftbls

Cap/Sump: 66.5 to 67.0 ftbls

TD Well Cap: 67.0 ftbls

TD Borehole Reamed: 67.0 ftbls

TD Borehole: 71.5 ftbls

Total Length Casing Cap: 70.5 ft.

Centralizers: ____ ftbls ____ ftbls

(drawing not to scale)

P. E. LaMoreaux & Associates, Inc. (PELA)

PELA

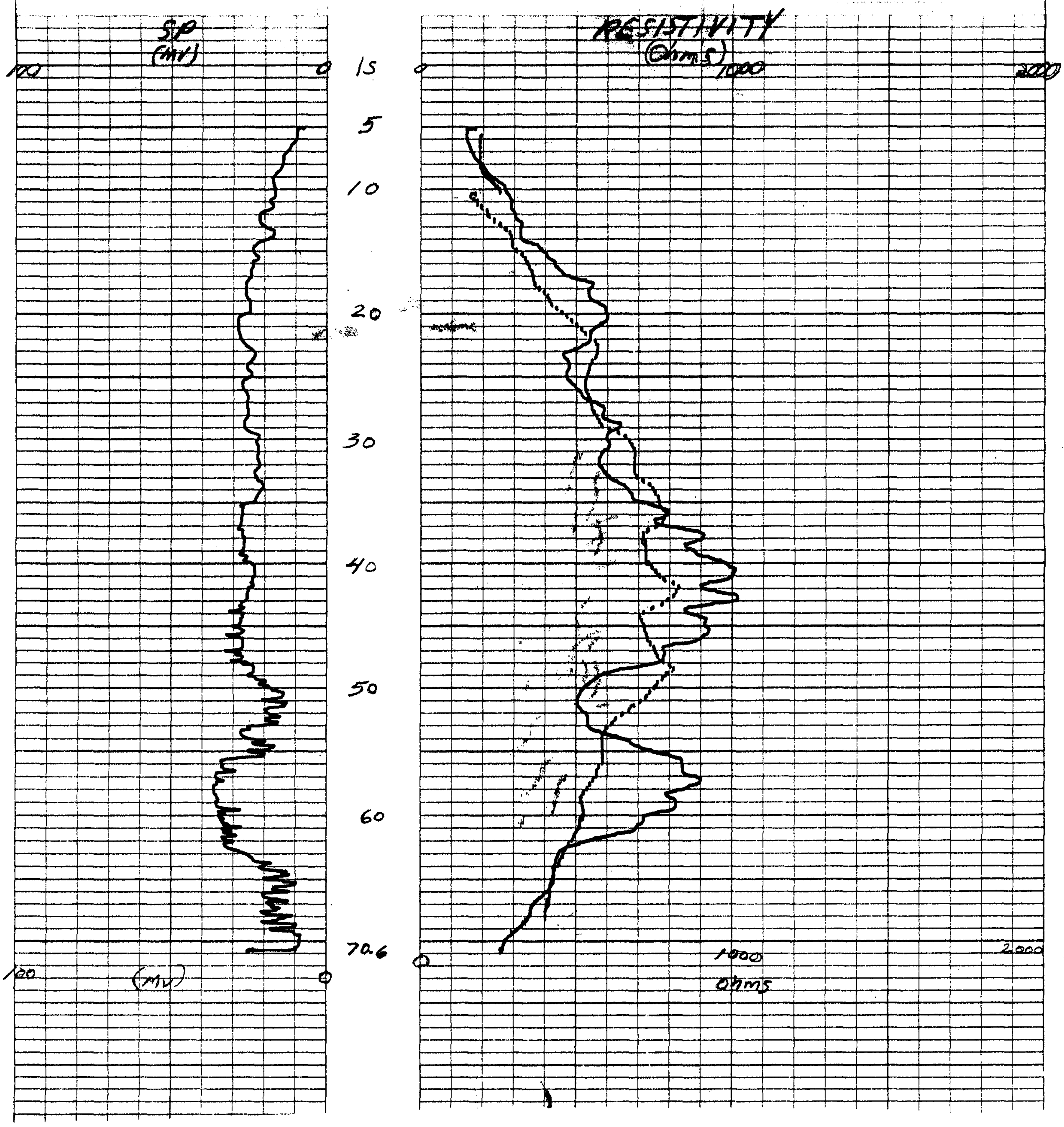
P.O. Box 2310
Tuscaloosa, Alabama 35403
Cable PELA

492328

ELECTRIC LOG

Well Number PZ-2

Date 6-21-90	SP	RES 16" 64"
Time 15:30	Zero 577	Zero 554 552
By NEM	Span 940	Span 896 889



PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZ-9
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 24 & 25, 1990
COORDINATES: E 6725.50, N 1189.55
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1990
TOTAL DEPTH BOREHOLE (FT): 92.5
BOREHOLE DIAMETER (IN): 10.0
MP ELEVATION (FT): 50.53 NGVD
LS ELEVATION (FT): 48.03 NGVD
TOTAL DEPTH WELL (FT):
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME:
PELA REP(S): M. F. Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
2.5	3.0 - 4.1	Clay, light olive brown (5Y 5/6) with up to 20 percent mottling with dark yellowish-orange (10YR 6/6), medium to light gray (N7) in part, soft, medium plasticity, slightly silty.	(6, 5, 5, 8) 100	0.7
5.0				
7.5	8.0 - 8.5	Clay, dark yellowish-orange (10YR6/6) with up to 20 percent mottling of light gray (N7) and olive black (5Y 2/1), moderately firm, slightly plastic, slightly silty, trace of moderate reddish-brown (10R 4/6).	(4, 5, 7, 11) 100	0.4
10.0				
12.5	13.0 - 15.0	Clay, light gray (N7) with up to 30 percent mottling of dark yellowish-brown (10YR 5/4) and moderate reddish-brown (10R 4/6), stiff, moderately dense, slightly plastic.	(10, 14, 18, 21) 100	0.4
15.0				
17.5	18.0 - 20.0	Clay, light gray (N7) with up to 25 percent mottling of dark yellowish-orange (10YR 6/6), moderately firm, slightly plastic, silty in part.	(10, 15, 11, 19) 100	0.8
20.0				

REMARKS: PELA Reference No. 492328
[1/] W = weight of hammer.

#4 (4/11/91) 13-D:\492300\Log-Blow.PZ2

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZ-9
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 24 & 25, 1990
COORDINATES: E 6725.50, N 1189.55
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1990
TOTAL DEPTH BOREHOLE (FT): 92.5
BOREHOLE DIAMETER (IN): 10.0
MP ELEVATION (FT): 50.53 NGVD
LS ELEVATION (FT): 48.03 NGVD
TOTAL DEPTH WELL (FT):
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME:
PELA REP(S): M. F. Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
22.5	23.0 - 25.0	Clay, light gray (N7) with up to 10 percent mottling of dark yellowish-orange (10YR 6/6), moderately firm, slightly plastic, slightly silty; grading to silty clay, light gray (N7), with up to 80 percent mottling of dark, yellowish-orange (10YR 6/6) at 34 feet.	(4, 8, 10, 13) 100	0.6
25.0				
27.5	28.0 - 30.0	Clay, light gray (N7) with up to 10 percent mottling of dark yellowish-orange (10YR 6/6), moderately firm, slightly plastic, slightly silty; grading to silty clay, light gray (N7), with up to 80 percent mottling of dark, yellowish-orange (10YR 6/6) at 34 feet.	(6, 11, 13, 17) 100	1.2
30.0				
32.5	33.0 - 35.0	Clay, light gray (N7) with up to 10 percent mottling of dark yellowish-orange (10YR 6/6), moderately firm, slightly plastic, slightly silty; grading to silty clay, light gray (N7) with up to 80 percent mottling of dark, yellowish-orange (10YR 6/6) at 34 feet.	(4, 6, 11, 13) 100	3.9
35.0				
37.5	38.0 - 40.0	Clay, medium gray (N5), very soft and sticky, medium to high plasticity, moderate to abundant plant fossils up to 1.5 cm in lengthy goethite/limonite with olive gray (5Y 4/1) tint of clay.	(1, 2, 4, 5) 100	2.1
40.0				

REMARKS: PELA Reference No. 492328
[1/] W = weight of hammer.

#5 (4/11/91) 13-D:\492300\Log-Blow.PZ2

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZ-9
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 24 & 25, 1990
COORDINATES: E 6725.50, N 1189.55
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1990
TOTAL DEPTH BOREHOLE (FT): 92.5
BOREHOLE DIAMETER (IN): 10.0
MP ELEVATION (FT): 50.53 NGVD
LS ELEVATION (FT): 48.03 NGVD
TOTAL DEPTH WELL (FT):
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME:
PELA REP(S): M. F. Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
42.5	43.0 - 45.0	Clay, medium dark gray (N4), grading to olive gray (5Y 4/1) with depth, 50 feet, sticky, medium to high plasticity, traces of olive black (5Y 2/1) silt lenses up to 2 mm thick.	(1, 3, 5, 6) 100	1.0
45.0				
47.5	48.0 - 49.0	Sand, grayish-orange (10YR 7/4), fine- to medium-grain subrounded to subangular, moderately well sorted; quarts, trace of iron oxide nodules up to 1 cm in diameter.	(35, 55, 60, 50) 50	0.5
50.0				
52.5				
55.0				
57.5	58.0 - 58.75	Sand with gravel, grayish-orange (10YR 7/4), fine- to medium-grain subrounded to subangular moderately well sorted; quartz and chert.	(25, 75, 57, 50) 100	2.2
60.0				

REMARKS: PELA Reference No. 492328
[1/] W = weight of hammer.

#6 (4/11/91) 13-D:\492300\Log-Blow.PZ2

P.E. LaMoreaux & Associates

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZ-9
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 24 & 25, 1990
DRILLING METHOD: Mud Rotary
TOTAL DEPTH BOREHOLE (FT): 92.5
MP ELEVATION (FT): 50.53 NGVD
LOCATION: Ciba-Geigy Corporation McIntosh, Alabama
COORDINATES: E 6725.50, N 1189.55
DATE INSTALLED: October 25, 1990
BOREHOLE DIAMETER (IN): 10.0
LS ELEVATION (FT): 48.03 NGVD
TOTAL DEPTH WELL (FT):
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME:
PELA REP(S): M. F. Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
62.5	63.0 - 63.75	Sand with gravel, grayish-orange (10YR 7/4), fine- to medium-grained, subangular to subrounded, well-sorted; quartz, subrounded, moderately sorted, multi-colored chert and quartz gravel up to 0.5 cm in diameter.	(35, 43, 51, 48) 100	2.2
65.0				
67.5	68.0 - 68.6	Sand with gravel, grayish-orange (10YR 7/4), medium- to coarse-grained, angular to subrounded, moderately sorted; quartz and chert gravel up to 1.25 cm in diameter.	(19, 28, 30, 29) 100	0.2
70.0				
72.5	73,0 - 75.0	Sandy clay, greenish-gray (5G 6/1) with pinkish-gray (5YR 8/1) lenses up to 0.5 cm in thickness; very fine-grained quartz grains, moderately firm, slightly dense, slightly plastic, micaceous.	(13, 13, 12, 11) 100	0.4
75.0				
77.5	78.0 - 80.00	Clay, light bluish-gray (5B 7/1), very fine-grained quartz grains, moderately firm to brittle.	(9, 15, 21, 23) 100	0.8
80.0				

REMARKS: PELA Reference No. 492328
[1/] W = weight of hammer.

#7 (4/11/91) 13-D:\492300\Log-Blow.PZ2

P.E. LaMoreaux & Associates

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZ-9
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 24 & 25, 1990
DRILLING METHOD: Mud Rotary
TOTAL DEPTH BOREHOLE (FT): 92.5
MP ELEVATION (FT): 50.53 NGVD

LOCATION: Ciba-Geigy Corporation
McIntosh, Alabama
COORDINATES: E 6725.50, N 1189.55
DATE INSTALLED: October 25, 1990
BOREHOLE DIAMETER (IN): 10.0
LS ELEVATION (FT): 48.03 NGVD

TOTAL DEPTH WELL (FT):
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):

DATE AND TIME:
PELA REP(S): M. F. Johnson

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
82.5	83.0 - 85.00	Sandy clay, light bluish-gray (5B 7/1) with 5 percent to 10 percent mottling with light olive brown (5Y 5/6), very fine-grained quartz, firm to slightly stiff, dense in part, slightly plastic.	(15, 12, 9, 11) 100	0.3
85.0				
87.5	88.0 - 92.5	Sandy clay, AA from 88 to 88.5 feet. Clay, light bluish gray (5B 7/1) with up to 20 percent mottling of light olive brown (5Y 5/6), stiff, dense, slightly plastic, very fine-grained quartz lenses up to 2 mm in thickness.	(8, 11, 11, 19)	0.1
90.0				
92.5				
95.0				
97.5				
100.0				

REMARKS: PELA Reference No. 492328
1/ W = weight of hammer.

#8 (4/11/91) 13-D:\492300\Log-Blow.PZ2

P.E. LaMoreaux & Associates

PIEZOMETER CONSTRUCTION FORM

DRILLING DATA

Well ID PZ-9 Project Number 492328
Project Name Ciba-Geigy - Flood Plain Assessment
Location McIntosh, Alabama

Supervised by Mike Johnson
Date of Boring 10/24/90 Date Well Completed 10/25/90
Drilling Company Geotechnical Engineering-Testing, Inc.
Driller
Drilling Method Mud Rotary
Bit Diameter 12-inch Hollow Stem I.D. ____ O.D. ____
Hours Drilled ____ Downtime ____
Decontamination Procedure Three steam cleaning rinses

Sample Collection Procedure 24" split spoon at 5 foot intervals and Shelby Tubes
Estimated % Recovery 50 - 100 percent

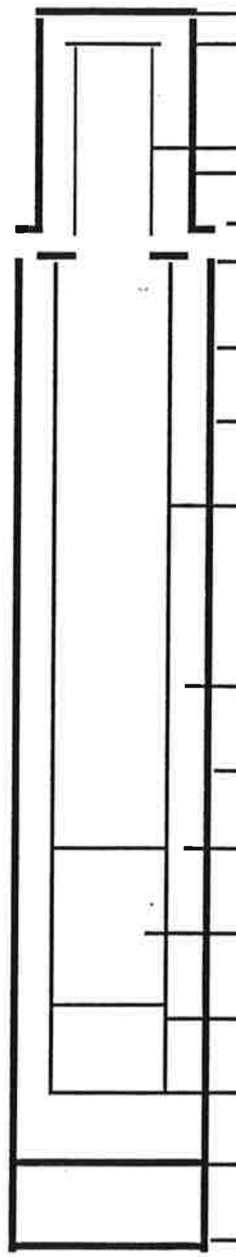
MATERIALS

Casing Material SS Type ____
Screen Material SS Type ____
Casing (in.) O.D. 4.5 I.D. 4.0 LS to 44.5 ftbls
(in.) O.D. ____ I.D. ____ ____ to ____ ftbls
(in.) O.D. ____ I.D. ____ ____ to ____ ftbls
Total Casing (ft.) ____
Screen (in.) O.D. 4.5 I.D. 4.0 44.5 to 67 ftbls
Slot Size .010 inch Total Screen (ft.) 22.5
Length of Cap 0.54 wash valve Sump (ft.) ____
Centralizer Material ____ Length (in.) ____
Sand Pack Mtrl./Sz. 6/20 and Rad Blast No. 2
Lbs./Sacks Used ____
Grout Material Cement/Bentonite Slurry
Amt. Cement ____ Type Cement Portland
Amt. Powdered Bentonite ____ Amt. Bentonite Pellets ____
Tremie Used ____ Pump for Grout Used ____
Cement Plug ____
Length of Protective Casing (ft.) ____

DEVELOPMENT

Development Method Airlift/Submersible P. Total Hours 8.5
Date and Time Started 10/31/90 12:40
Date and Time Completed 11/1/90 11:57
Esti. Gallons 2,400 Esti. Yield (gpm) 5
Static WL (ftbtoc) 37.8
Color/Turbidity: Start yellow/translucent Finish clear
Drawdown (ft.) 4 Time to Recovery ____
Final: pH 5.03 SC 115 T 19.6 C Eh ____
Sand None Odor None
Water Discharged to 1,000 gallon holding tank

REMARKS ____



(drawing not to scale)

__ Protective Casing (als)
__ Manhole Cover
Lock On:
__ Well Cover
X Well Cap
____ ft. als / bls
____ ft. als / bls
MP Descrip: TOC
LS Elev: 48.03 NGVD
MP Elev: 50.53 NGVD
4 inches
____ inches
Pad Dimension: ____

Top of Casing: ____ ft. als / bls
Cement Plug: ____ to ____ ftbls
Borehole Diameter: 10 inches
Casing: 4 in. ____ sch. / ____ in. ____ sch.
Casing Interval: LS to 44.5 ftbls
Grout: LS to 40 ftbls
Bentonite Pellet Seal: 40.0 to 44.9 ftbls
Sand Pack: 44.0 to 68.0 ftbls
.010-in. Slotted Screen: 44.5 to 67.0 ftbls
Cap/Sump: 67 to 67.54 ftbls
TD Well Cap: 67.54 ftbls
TD Borehole Reamed: 67 ftbls
TD Borehole: 92.5 ftbls
Total Length Casing Cap: ____ ft.
Centralizers: ____ ftbls / ____ ftbls

P. E. LaMoreaux & Associates, Inc. (PELA)

(4/12/91) 13-d:\492300\PZ9.WCF

PELA
P.O. Box 2310
Tuscaloosa, Alabama 35403
Cable PELA

GAMMA LOG ☐ CCL

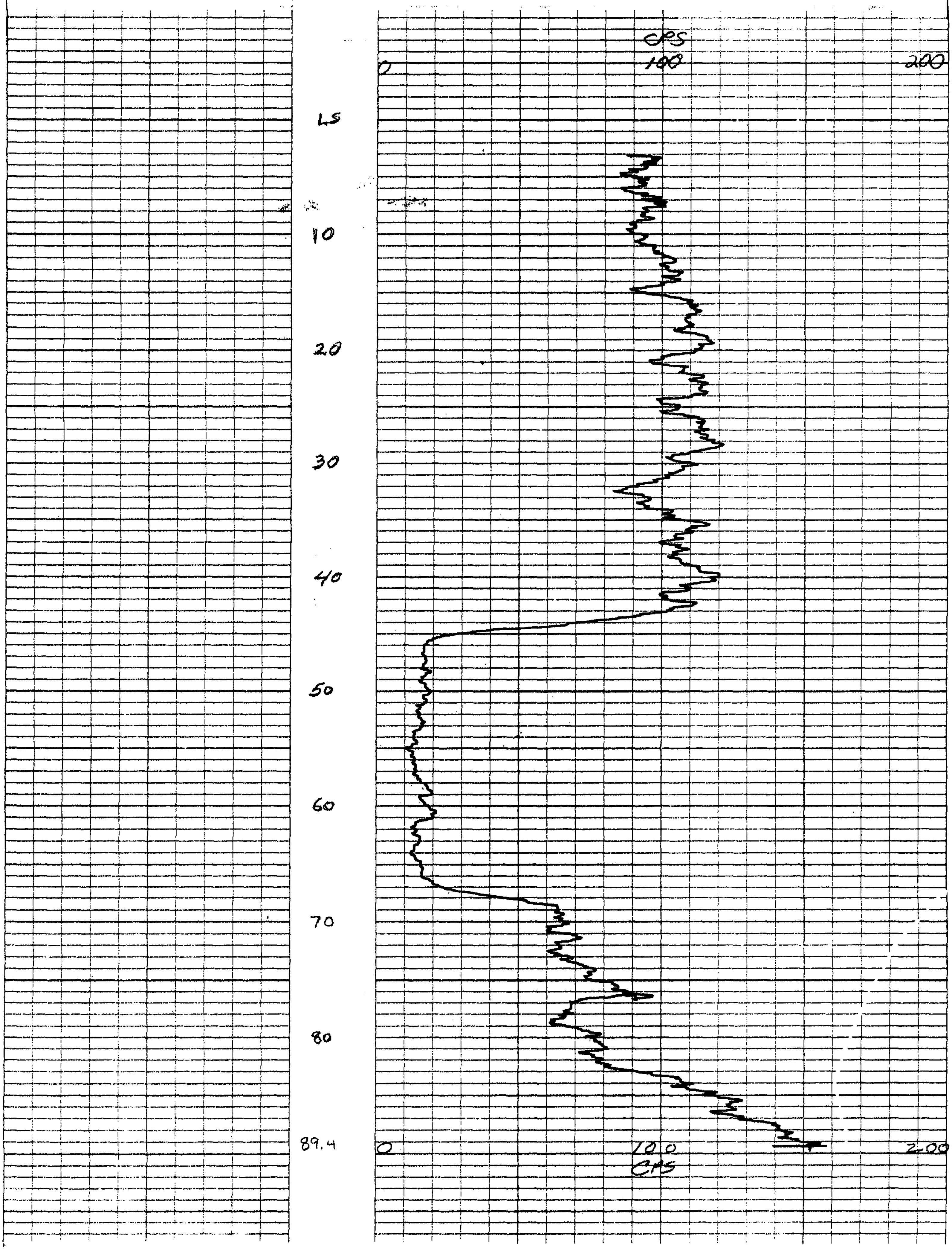
Well Number PZ-9

Date 10/25/90 T/C 2

Time 08:45 Zero 554

By MEM Span 648

Gear 15FPM



PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZ-15

DRILLER: Geotechnical Engineering-Testing, Inc.

DATE DRILLED: December 6, 1990

DRILLING METHOD: Mud Rotary

TOTAL DEPTH BOREHOLE (FT): 66.5

MP ELEVATION (FT): N/A

LOCATION: Ciba-Geigy Corporation McIntosh, Alabama

COORDINATES: E 7640.00, N -75.00

DATE INSTALLED: December 7, 1990

BOREHOLE DIAMETER (IN): 10.0

LS ELEVATION (FT): 4.30 NGVD

TOTAL DEPTH WELL (FT):

WATER LEVEL DURING DRILLING (FT BLS):

WATER LEVEL AFTER DEVELOPMENT (FT BLS):

DATE AND TIME:

PELA REP(S): R. A. Gardner

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
2.5				
	3.5 - 5.0	Clay, light gray (N7) with mottled light brown (5Y 5/6), very soft.	(1, 1, 2) 97	
5.0				
7.5				
	8.5 - 10.0	Clayey sand, light olive gray (5Y 6/1), very fine- to fine-grained, wet.	(1, 1, W) 97	
10.0				
12.5				
	13.5 - 15.0	Clayey sand, light olive gray (5Y 6/1), very fine- to fine-grained, wet.	(1, 1, 2)	
15.0				
17.5				
	18.5 - 20.0	Sand, greenish-gray (5GY 6/1), fine- to medium-grained, angular to subangular, wet.	(3, 3, 3) 40	
20.0				

REMARKS: PELA Reference No. 492338

#1 (4/15/91) 13-D:\492300\Log-Blow.PZ3

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZ-15
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: December 6, 1990
DRILLING METHOD: Mud Rotary
TOTAL DEPTH BOREHOLE (FT): 66.5
MP ELEVATION (FT): N/A

LOCATION: Ciba-Geigy Corporation
McIntosh, Alabama
COORDINATES: E 7640.00, N -75.00
DATE INSTALLED: December 7, 1990
BOREHOLE DIAMETER (IN): 10.0
LS ELEVATION (FT): 4.30 NGVD

TOTAL DEPTH WELL (FT):
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):

DATE AND TIME:
PELA REP(S): R. A. Gardner

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
22.5				
	23.5 - 25.0	Sand, greenish-gray (5GY 6/1), fine- to medium-grained, angular to subangular, wet.	(2, 3, 5) 40	
25.0				
27.5				
	28.5 - 30.0	Sand and gravel, light gray (N7), medium- to coarse-grained, subrounded to rounded; 1.5 inches wet.	(3, 14, 23) 45	
30.0				
32.5				
	33.5 - 35.0	Up to 34.75', sand and gravel, greenish-gray (5GY 6/1), rounded to subrounded, medium- to coarse-grained; from 34.75-35.0' quartz sand, very light gray (N8), medium to coarse, subandular to subrounded, wet.	(20, 24, 18)	
35.0				
37.5				
	38.5 - 40.0	Quartz sand, very light gray (N8), medium- to coarse-grained, subangular to subrounded, wet.	(6, 8, 17)	
40.0				

REMARKS: PELA Reference No. 492338

#2 (4/15/91) 13-D:\492300\Log-Blow.PZ3

P.E. LaMoreaux & Associates

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZ-15
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: December 6, 1990
DRILLING METHOD: Mud Rotary
TOTAL DEPTH BOREHOLE (FT): 66.5
MP ELEVATION (FT): N/A
LOCATION: Ciba-Geigy Corporation McIntosh, Alabama
COORDINATES: E 7640.00, N -75.00
DATE INSTALLED: December 7, 1990
BOREHOLE DIAMETER (IN): 10.0
LS ELEVATION (FT): 4.30 NGVD
TOTAL DEPTH WELL (FT):
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME:
PELA REP(S): R. A. Gardner

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
42.5				
	43.5 - 45.0	Quartz sand, very light gray (N8), medium- to coarse-grained, subangular to subrounded, clean, wet.	(6, 8, 12) 35	
45.0				
47.5				
	48.5 - 50.0	Clayey sand, yellowish-gray (5Y 7/2), fine- to medium-grained, angular to subangular.	(3, 4, 3) 10	
50.0	50.0 - 51.5	Sand, light gray (N7), fine- to medium-grained, angular to subangular, thin layer of organic material.	(7, 11, 15) 50	
52.5				
55.0	55.0 - 56.5	Sand, light gray (N7) angular to subangular, fine- to medim-grained with up to 10 percent coarse sand and gravel.	(4, 8, 14) 20	
57.5				
60.0				

REMARKS: PELA Reference No. 492338

#3 (4/15/91) 13-D:\492300\Log-Blow.PZ3

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZ-15
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: December 6, 1990
DRILLING METHOD: Mud Rotary
TOTAL DEPTH BOREHOLE (FT): 66.5
MP ELEVATION (FT): N/A

LOCATION: Ciba-Geigy Corporation
McIntosh, Alabama
COORDINATES: E 7640.00, N -75.00
DATE INSTALLED: December 7, 1990
BOREHOLE DIAMETER (IN): 10.0
LS ELEVATION (FT): 4.30 NGVD

TOTAL DEPTH WELL (FT):
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME:
PELA REP(S): R. A. Gardner

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
	61.5 - 63.0	Sand and gravel, light gray (N7), fine- to coarse-grained, angular to subangular.	(12, 9, 8) 20	
62.5				
65.0	65.0 - 66.5	Clay, medium to light gray (N6), stiff.	(5, 7, 11) 50	
67.5				
70.0				
72.5				
75.0				
77.5				
80.0				

REMARKS: PELA Reference No. 492338

#4 (4/15/91) 13-D:\492300\Log-Blow.PZ3

P.E. LaMoreaux & Associates

PIEZOMETER CONSTRUCTION FORM

DRILLING DATA

Well ID PZ-15 Project Number 492328
Project Name Ciba-Geigy - Flood Plain Assessment
Location McIntosh, Alabama

Supervised by R. A. Gardner
Date of Boring 12/6/90 Date Well Completed 12/10/90
Drilling Company Geotechnical Engineering-Testing, Inc.
Driller ______
Drilling Method Mud Rotary
Bit Diameter 12-inch Hollow Stem I.D. ______ O.D. ______
Hours Drilled ______ Downtime ______
Decontamination Procedure Three steam cleaning rinses

Sample Collection Procedure 24" split spoon at 5 foot intervals and Shelby Tubes
Estimated % Recovery 10 - 97 percent

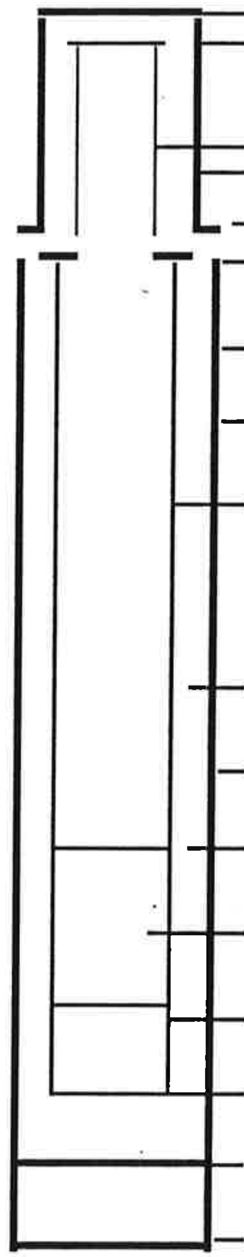
MATERIALS

Casing Material PVC Type Schedule 40
Screen Material PVC Type Schedule 40
Casing (in.) O.D. 4.5 I.D. 4.0 LS to 14.7 ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
(in.) O.D. ______ I.D. ______ ______ to ______ ftbls
Total Casing (ft.) ______
Screen (in.) O.D. 4.5 I.D. 4.0 14.7 to 49.7 ftbls
Slot Size .010 inch Total Screen (ft.) 35
Length of Cap 0.54 wash valve Sump (ft.) ______
Centralizer Material ______ Length (in.) ______
Sand Pack Mtrl./Sz. 6/20 and Rad Blast No. 2
Lbs./Sacks Used ______
Grout Material Cement/Bentonite Slurry
Amt. Cement ______ Type Cement Portland
Amt. Powdered Bentonite ______ Amt. Bentonite Pellets ______
Tremie Used ______ Pump for Grout Used ______
Cement Plug ______
Length of Protective Casing (ft.) ______

DEVELOPMENT

Development Method Submersible P. Total Hours 3
Date and Time Started 12/14/90 08:01
Date and Time Completed 12/14/90 10:54
Esti. Gallons 840 Esti. Yield (gpm) 5.26
Static WL (ftbtoc) ______
Color/Turbidity: Start very Cloudy Finish clear
Drawdown (ft.) ______ Time to Recovery ______
Final: pH 6.34 SC 650 T 23°C Eh ______
Sand None Odor None
Water Discharged to 1,000 gallon holding tank

REMARKS ______



(drawing not to scale)

___ Protective Casing (als)
___ Manhole Cover
Lock On:
___ Well Cover
X Well Cap
______ ft. als / bls
______ ft. als / bls
MP Descrip: TOC
LS Elev: 4.3
MP Elev: N/A
4 inches
______ inches
Pad Dimension: ______

Top of Casing: ______ ft. als / bls

Cement Plug: ____ to ____ ftbls

Borehole Diameter: 8 inches

Casing: 4 in. 40 sch.
______ in. ______ sch.

Casing Interval: LS to 14.7 ftbls

Grout: LS to 8.0 ftbls

Bentonite Pellet Seal: 8 to 11 ftbls

Sand Pack: 11 to 72.0 ftbls

.010-in. Slotted Screen: 14.7 to 49.7 ftbls

Cap/Sump: 49.7 to 50.24 ftbls

TD Well Cap: 50.24 ftbls

TD Borehole Reamed: 50.2 ftbls

TD Borehole: 69 ftbls

Total Length Casing Cap: ______ ft.

Centralizers:
______ ftbls
______ ftbls

P. E. LaMoreaux & Associates, Inc. (PELA)

(4/12/91) 13-d:\492300\PZ15.WCF

PELA
P.O. Box 2310
Tuscaloosa, Alabama 35403
Cable PELA

GAMMA LOG ☐ CCL

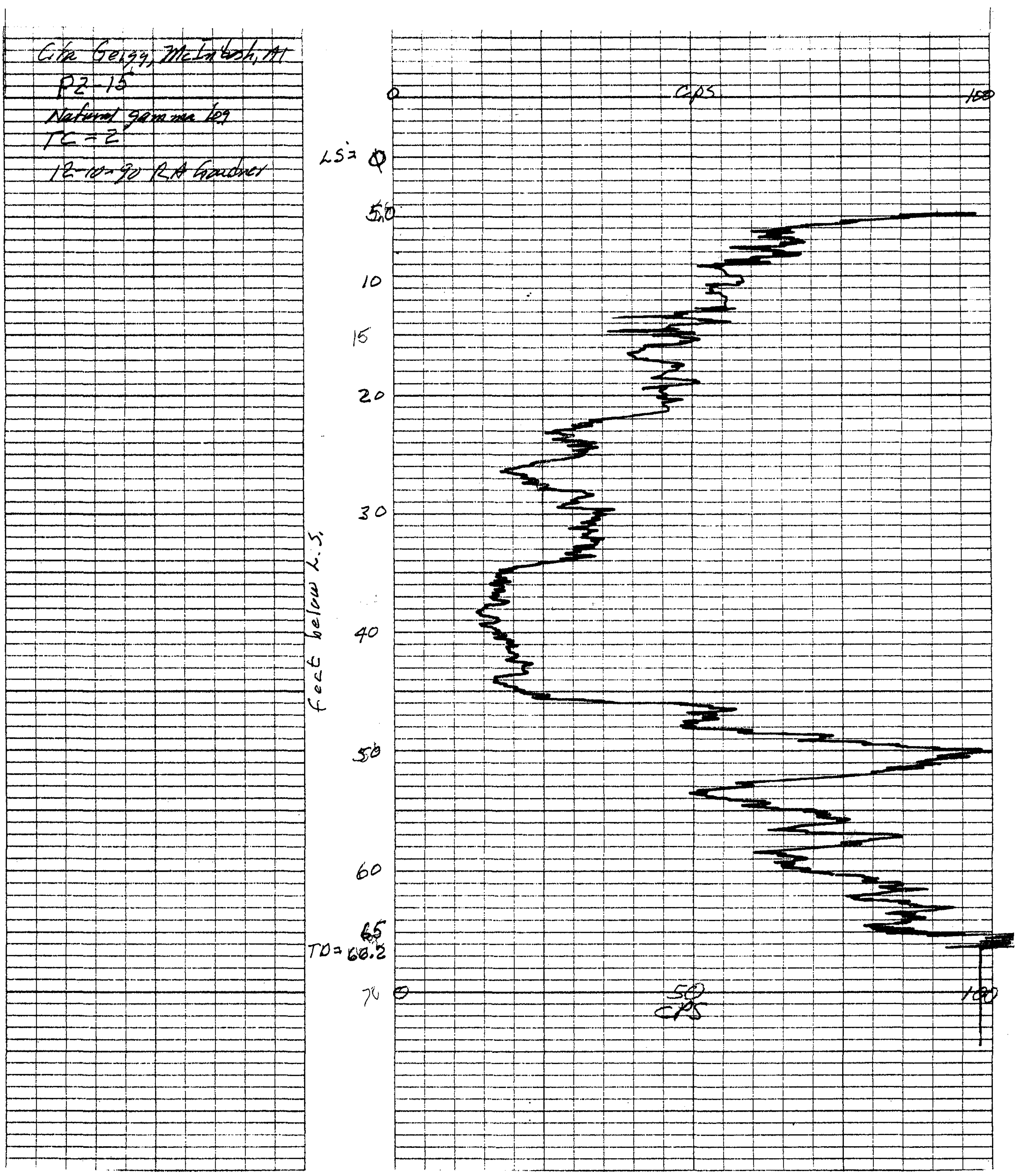
Well Number PZ-15

Date 12/10/90 T/C 2

Time 11:55 Zero 548

By RAG Span 828

Gear 12FPM

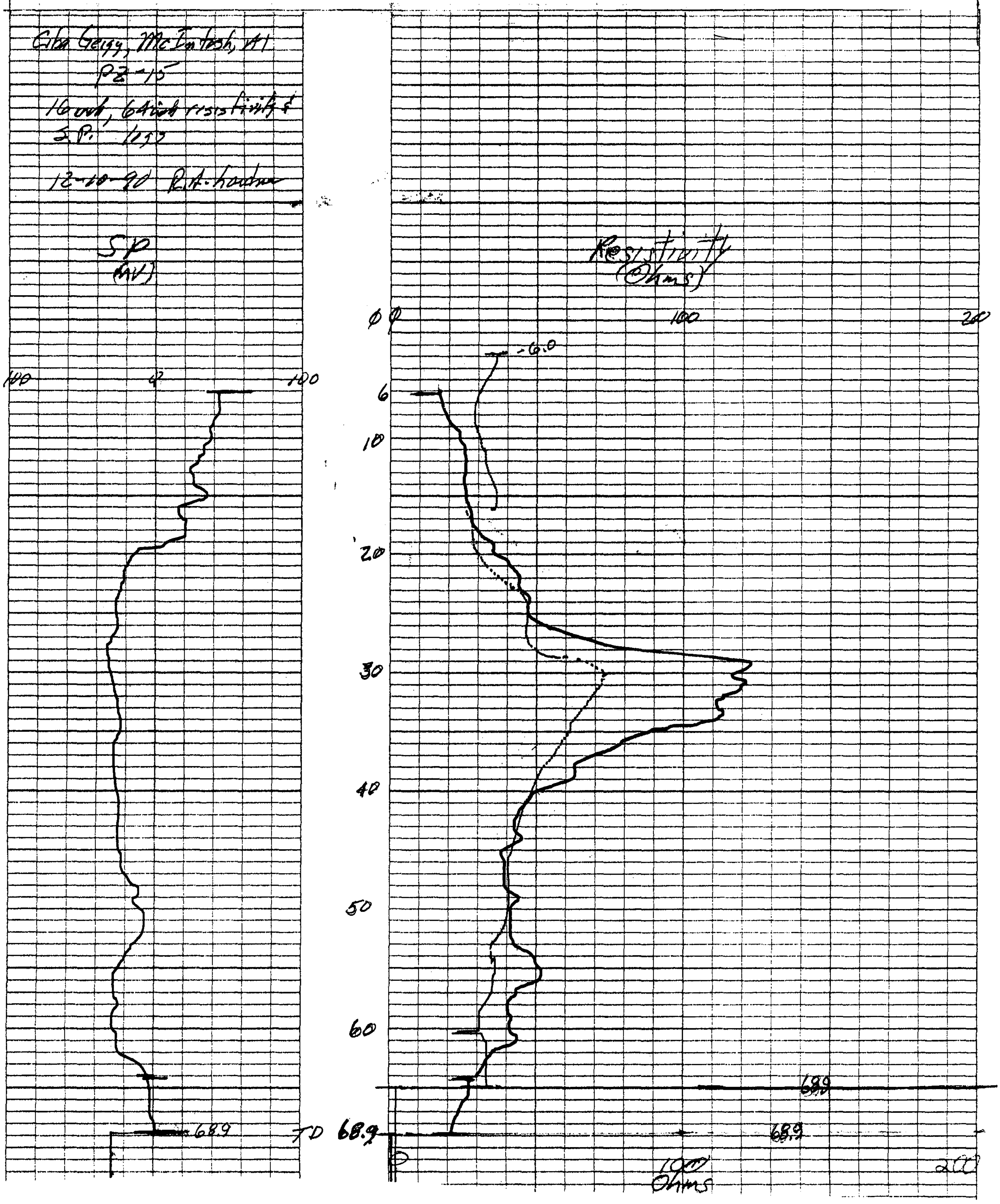


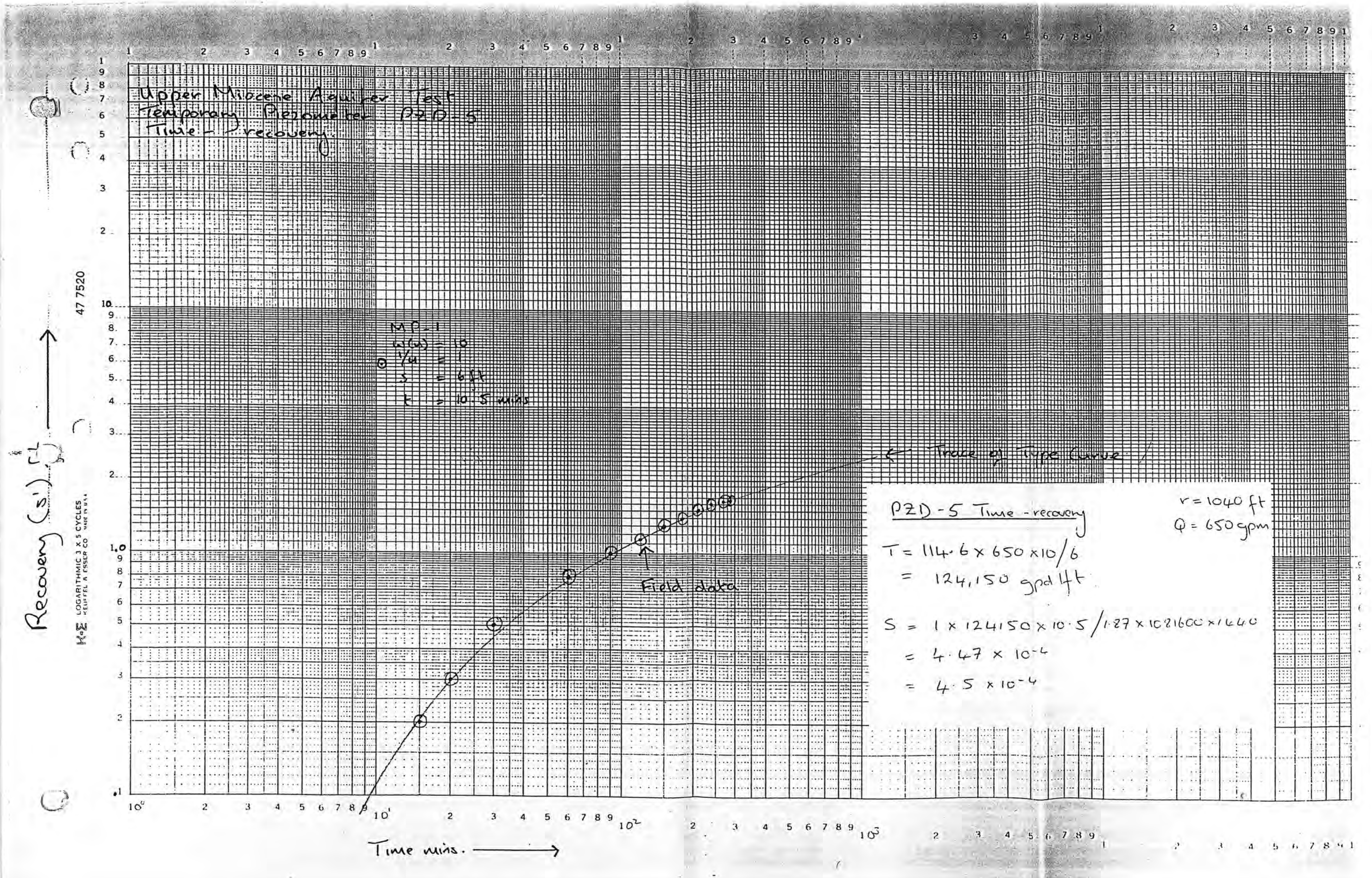
PELA
P.O. Box 2310
Tuscaloosa, Alabama 35403
Cable PELA

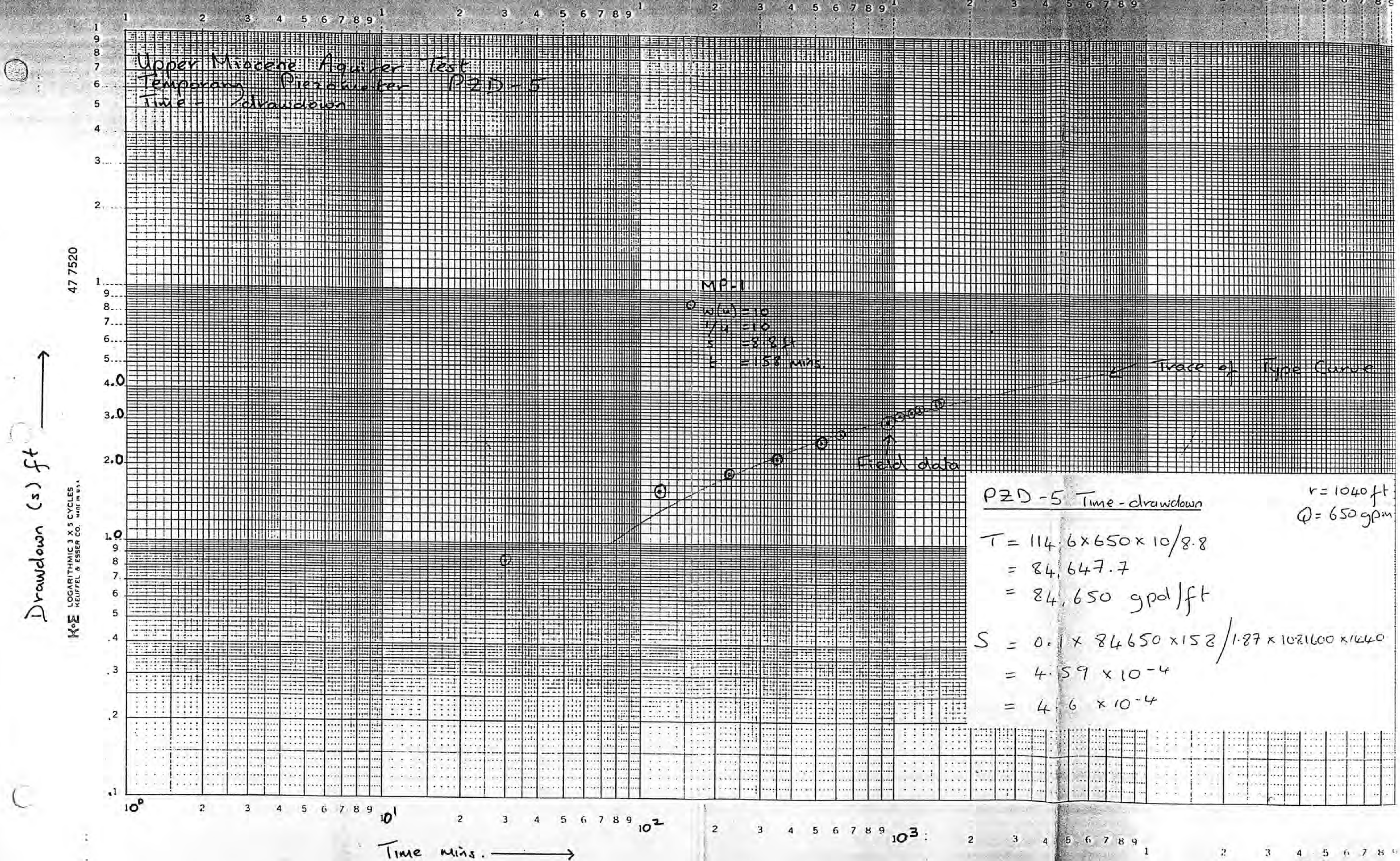
ELECTRIC LOG

Well Number PZ-15

Date 12/10/90	SP	RES	16"	64"
Time 14:30	Zero 478	Zero	582	552
By RAG	Span 936	Span	898	883




Upper Miocene Aquifer Test
Temporary Piezometer PZD-5
Time - recovery
MP-1
W(u) = 10
1/u = 1
s = 6 ft
t = 10.5 mins
Trace of Type Curve
Field data
PZD-5 Time-recovery
r = 1040 ft
Q = 650 gpm
T = 114.6 × 650 × 10/6
= 124,150 gpd/ft
S = 1 × 124150 × 10.5/1.87 × 1081600 × 1440
= 4.47 × 10^-4
= 4.5 × 10^-4
Recovery (s') ft
Time mins.
K&E LOGARITHMIC 3 X 5 CYCLES KEUFFEL & ESSER CO. MADE IN U.S.A.
47 7520


Upper Miocene Aquifer Test
Temporary Piezometer PZD-5
Time - drawdown
MP-1
W(u) = 1.0
1/u = 1.0
s = 8.8 ft
t = 158 mins.
Trace of Type Curve
Field data
PZD-5 Time-drawdown
r = 1040 ft
Q = 650 gpm
T = 114.6 × 650 × 1.0 / 8.8
= 84,647.7
= 84,650 gpd/ft
S = 0.1 × 84650 × 158 / 1.87 × 1081600 × 1440
= 4.59 × 10^-4
= 4.6 × 10^-4
Drawdown (s) ft
Time mins.
K+E LOGARITHMIC 3 X 5 CYCLES KEUFFEL & ESSER CO. MADE IN U.S.A.
47 7520

PELA

P.O. Box 2310
Tuscaloosa, Alabama 35403
Cable PELA

492328

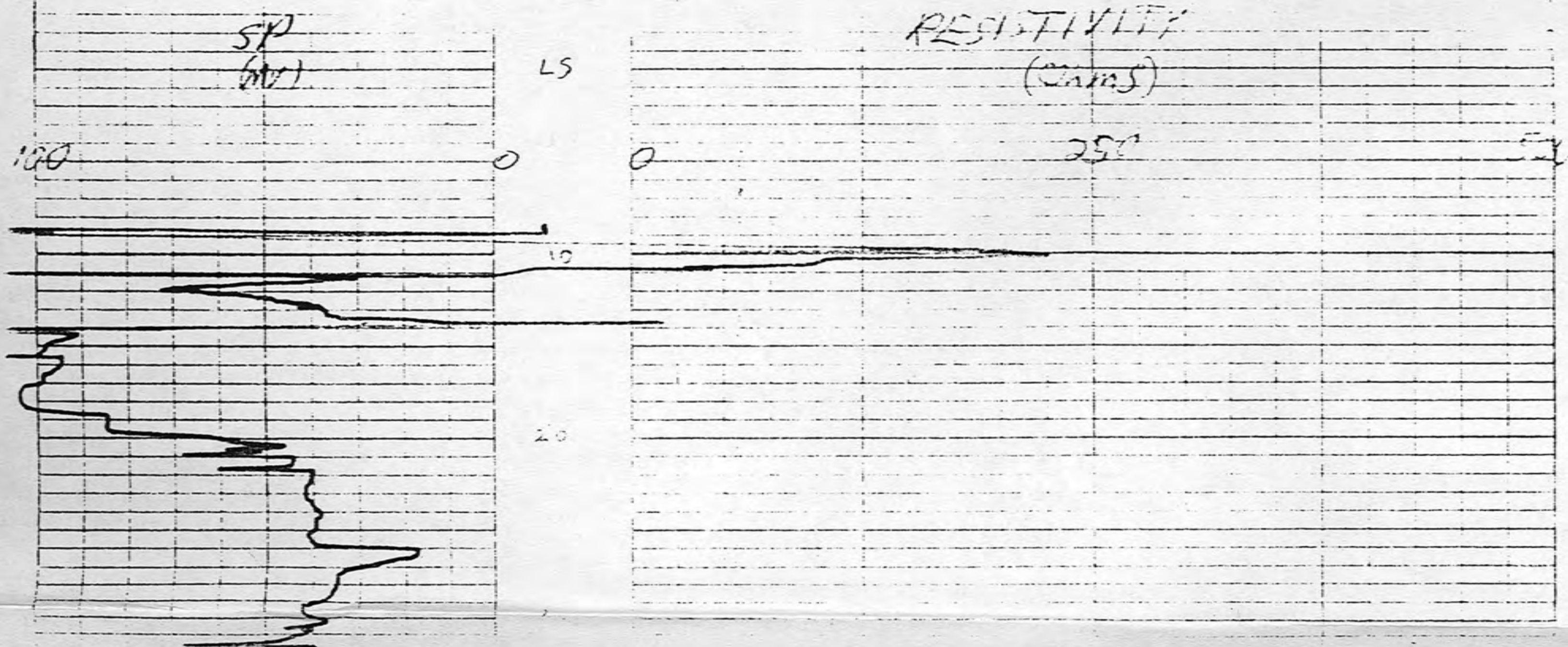
ELECTRIC LOG

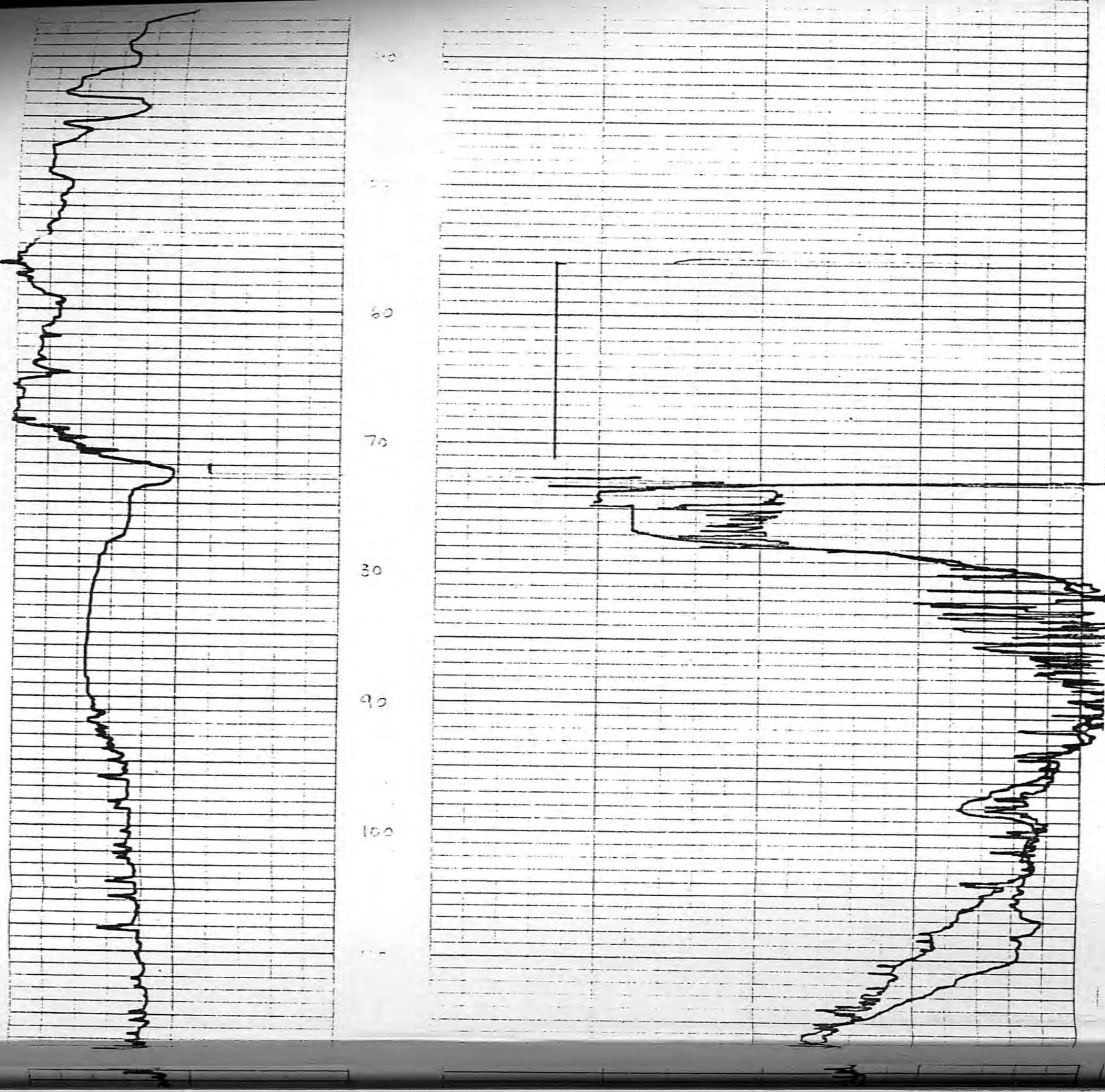
Well Number PZD-5

Date 7-12-90 SP RES 16" 64"

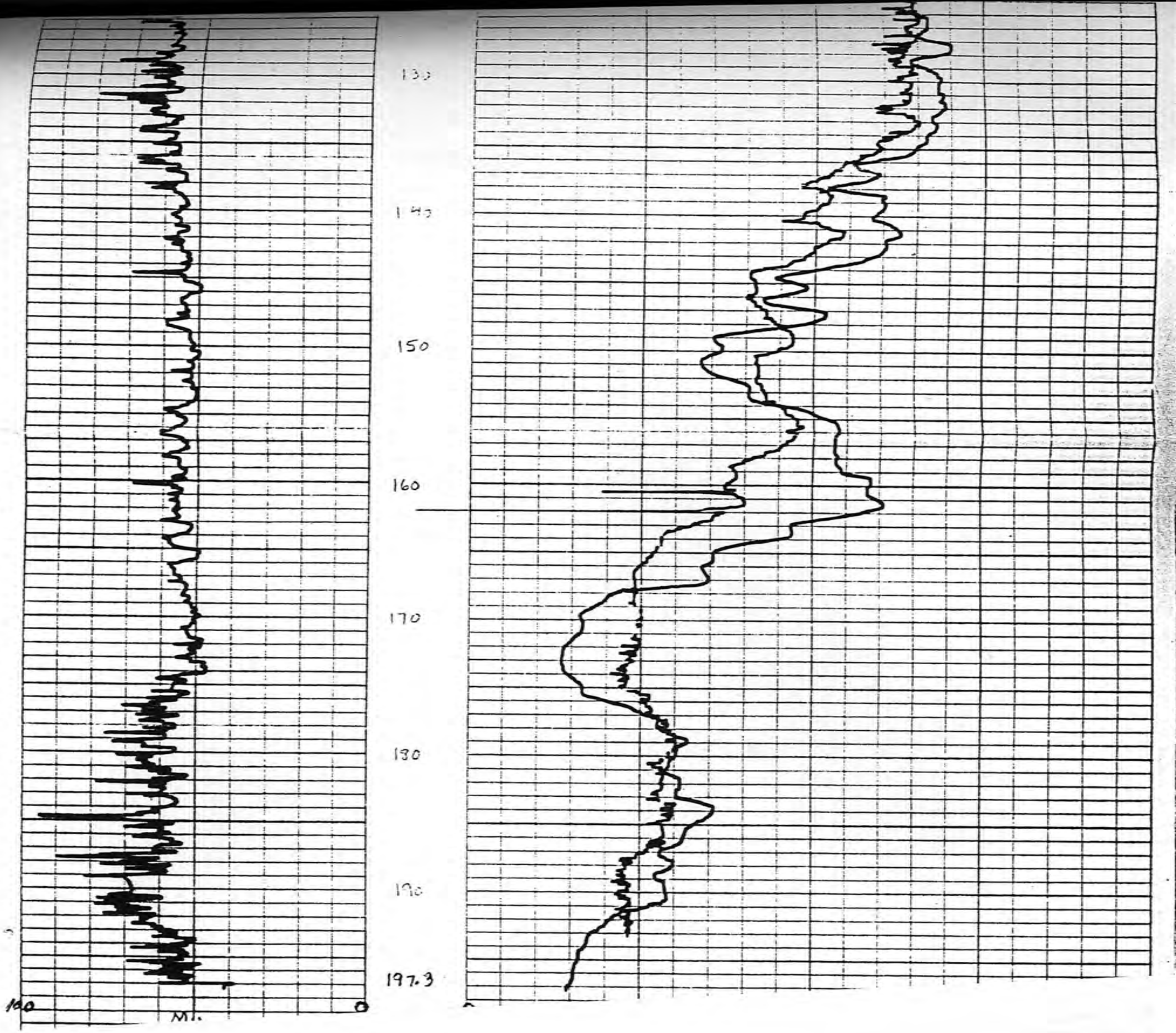
Time 11:50 Zero 568 Zero 550 552

By NEM Span 938 Span 1000 1000





60
70
90
100



150
160
170
180
190
197.3
100
MI.
0

PELA

P.O. Box 2310
Tuscaloosa, Alabama 35403
Cable PELA

492328

GAMMA LOG ☐ CCL

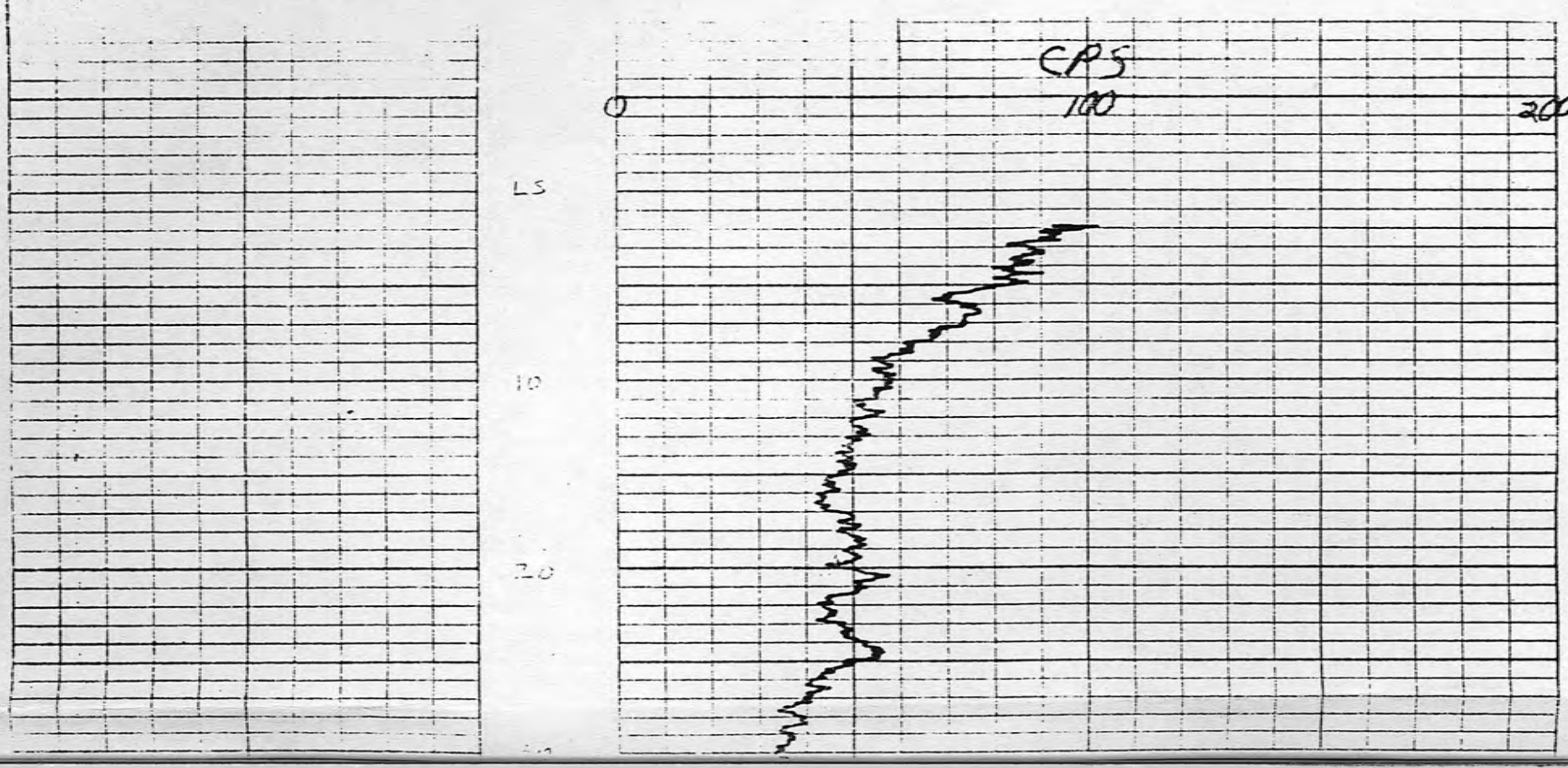
Well Number PZD-5

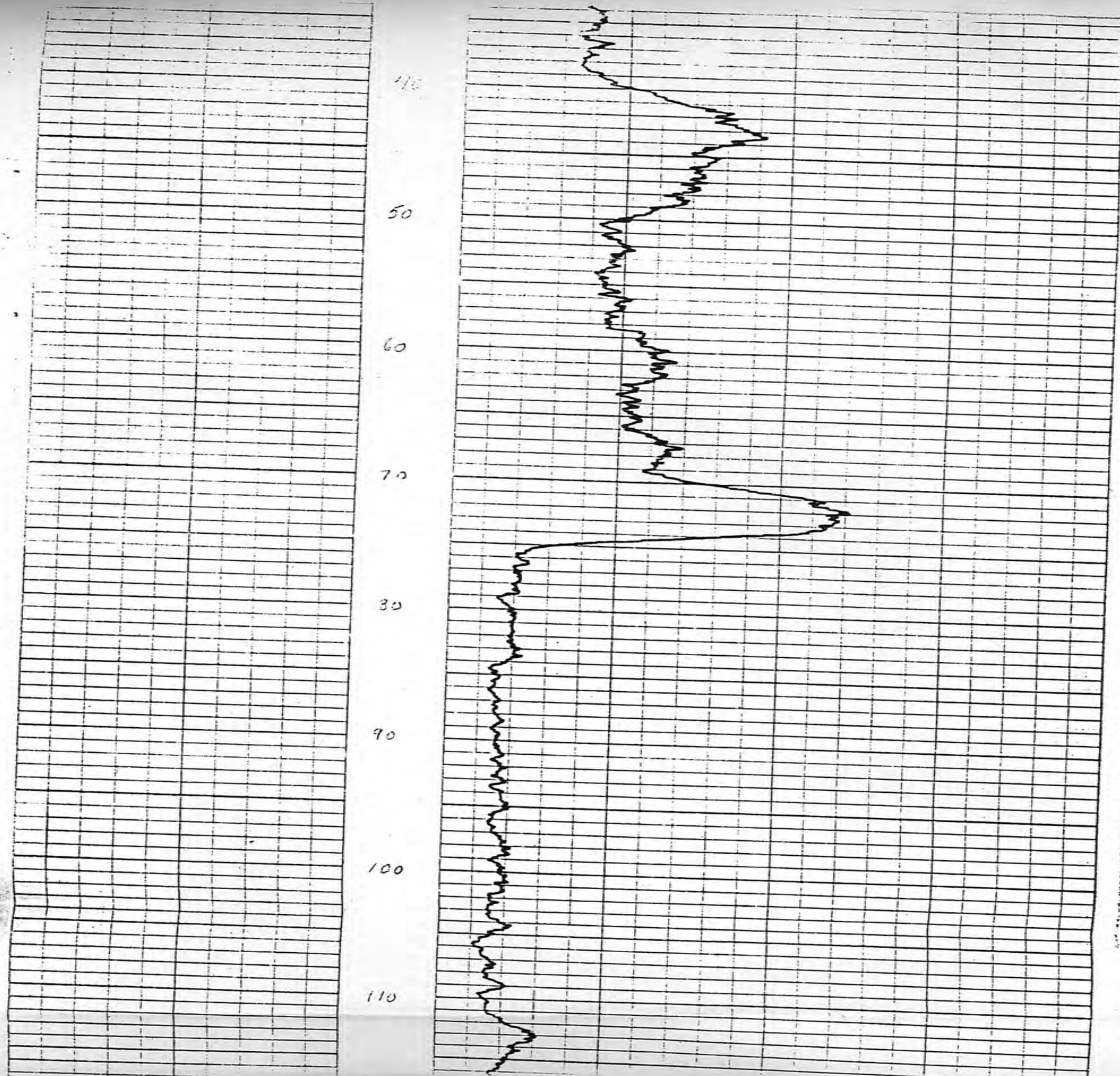
Date 7-12-90 T/C 2

Time 15:00 Zero 544

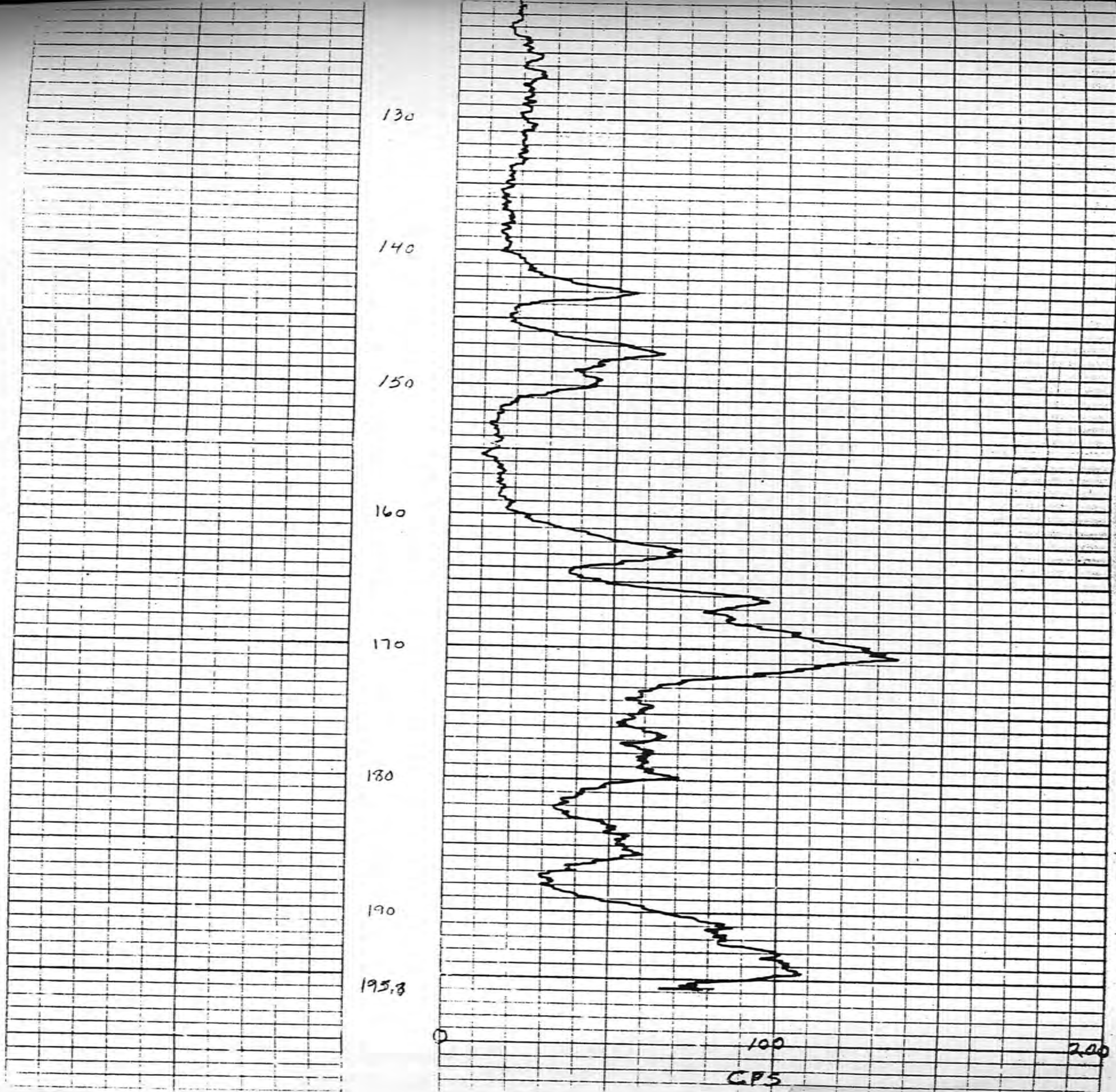
By NEM Span 484

Gear 20FPM





40
50
60
70
80
90
100
110


130
140
150
160
170
180
190
195.8
0
100
200
CPS

PIEZOMETER CONSTRUCTION FORM

DRILLING DATA

Well ID PZD-5 Project Number 492344
Project Name Ciba-Geigy - Flood Plain Assessment
Location McIntosh, Alabama

Supervised by N. E. Moss
Date of Boring 6/12/90 Date Well Completed 7/17/90
Drilling Company Geotechnical Engineering-Testing, Inc.
Driller
Drilling Method Mud Rotary
Bit Diameter 8" Hollow Stem I.D. O.D.
Hours Drilled Downtime
Decontamination Procedure Three steam cleaning rinses

Sample Collection Procedure 24" split spoon at 5 foot intervals and Shelby Tubes
Estimated % Recovery

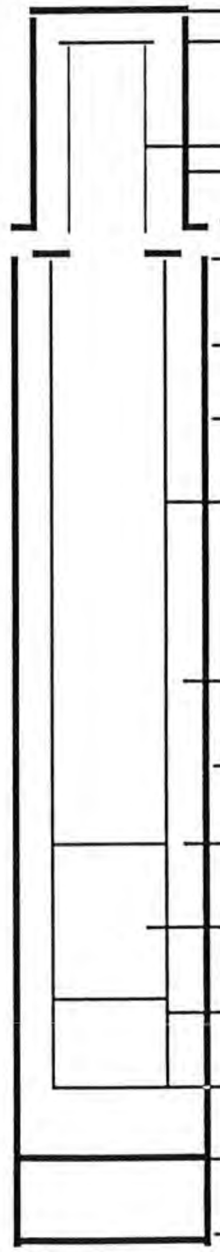
MATERIALS

Casing Material SS Type
Screen Material SS Type
Casing (in.) O.D. 4.5 I.D. 4.0 LS to 75 ftbls
(in.) O.D. I.D. to ftbls
(in.) O.D. I.D. to ftbls
Total Casing (ft.)
Screen (in.) O.D. 4.5 I.D. 4.0 75 to 160 ftbls
Slot Size .010 inch Total Screen (ft.) 85
Length of Cap 0.54 wash valve Sump (ft.)
Centralizer Material Length (in.)
Sand Pack Mtrl./Sz. 6/20 and Rad Blast No. 2
Lbs./Sacks Used
Grout Material Cement/Bentonite Slurry
Amt. Cement Type Cement Portland
Amt. Powdered Bentonite Amt. Bentonite Pellets
Tremie Used Pump for Grout Used
Cement Plug
Length of Protective Casing (ft.)

DEVELOPMENT

Development Method Airlift/Submersible Pump Total Hours 16.5
Date and Time Started 7/25/90 09:03
Date and Time Completed 7/26/90 15:25
Esti. Gallons 6,000 Esti. Yield (gpm) 40
Static WL (ftbtoc) 23.27
Color/Turbidity: Start yellowish-gray/milky Finish clear
Drawdown (ft.) Time to Recovery
Final: pH 7.71 SC 610 T 22.1° C Eh
Sand Odor
Water Discharged to 1,000 gallon holding tank

REMARKS



__ Protective Casing (als)
__ Manhole Cover
Lock On:
__ Well Cover
X Well Cap
____ ft. als / bls
____ ft. als / bls
MP Descrip: TOC
LS Elev: 6.51 NGVD
MP Elev: 31.10 NGVD
4 inches
____ inches
Pad Dimension:

Top of Casing: ____ ft. als / bls
Cement Plug: ____ to ____ ftbls
Borehole Diameter: 8 inches
Casing: 4 in. ____ sch.; ____ in. ____ sch.
Casing Interval: LS to 75 ftbls
Grout: LS to 68 ftbls
Bentonite Pellet Seal: 68 to 74 ftbls
Sand Pack: 74 to 165 ftbls
.010-in. Slotted Screen: 75 to 160 ftbls
Cap/Sump: 155.5 to 160 ftbls
TD Well Cap: 160 ftbls
TD Borehole Reamed: 160 ftbls
TD Borehole: 200 ftbls
Total Length Casing Cap: ____ ft.
Centralizers: ____ ftbls; ____ ftbls

P. E. LaMoreaux & Associates, Inc. (PELA)

WP 5.1, 7/5/91, 13-D:\492300\PZD5.WCF

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-5
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: June 12 - July 19, 1990
COORDINATES: 7772.66 E, -528.51 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 19, 1990
TOTAL DEPTH BOREHOLE (FT): 200.0
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT): 9.33 NGVD
LS ELEVATION (FT): 6.38 NGVD
TOTAL DEPTH WELL (FT): 160.0
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME: July 18, 1990 - 15:13
PELA REP(S): N.E. Moss

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
2.5	2.0 - 3.5	Clay: greenish-gray (5GY 6/1) to dark greenish-gray (5GY 4/1), slightly plastic, moist, silty, trace sand.	(W,[1/] 2, 2, 3) 75	0
5.0				
7.5	7.0 - 8.0	Clay: greenish-gray (5GY 6/1), slightly plastic, moist, with sand, very fine- to fine-grained quartz, subangular to subrounded.	(2, 1, 2, 2) 50	0
10.0				
12.5	12.0 - 12.3	Clay: dark yellowish-brown (10YR 4/4), mottled greenish-gray (5GY 6/1), stiff, silty, trace fine-grained sand.	(2, 2, 2, 2) 15	0
15.0				
17.5	17.0 - 17.3 17.3 - 17.5	Clay: as in interval 12.0 - 12.3 feet. Sand: greenish-gray (5GY 6/1) to dark greenish-gray (5GY 4/1), very fine- to medium-grained (mostly fine-grained) quartz, subangular to subrounded, moderately well sorted, slightly clayey, wet.	(2, 2, 4, 5) 25	0
20.0				

REMARKS: PELA Reference No. 492344
[1/] W = weight of hammer.

#14, 7/5/91, 13-D:\492300\Log-Blow.PZ1

BORING AND WELL CONSTRUCTION LOG

NO: PZD-5
LOCATION: Ciba-Geigy Corporation
DRILLER: Geotechnical Engineering-Testing, Inc.
McIntosh, Alabama
DATE DRILLED: June 12 - July 19, 1990
COORDINATES: 7772.66 E, -528.51 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 19, 1990
TOTAL DEPTH BOREHOLE (FT): 200.0
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT): 9.33 NGVD
LS ELEVATION (FT): 6.38 NGVD
TOTAL DEPTH WELL (FT): 160.0
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME: July 18, 1990 - 15:13
PELA REP(S): N.E. Moss

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
20.0				
22.5	22.0 - 22.5	Sand: as in interval 17.3 - 17.5 feet.	(4, 2, 2, 2) 25	0
25.0				
27.5	27.0 - 27.4	Gravel: varicolored, very fine- to coarse-grained, subrounded chert and quartz; with sand: brownish-gray (5YR 4/1), fine- to very coarse-grained quartz, poorly sorted.	(5, 5, 2, 3) 20	0
30.0				
32.5	32.0 - 32.4	Gravel: as in interval 27.0 - 27.4 feet.	(15, 12, 12, 13) 35	0
	32.4 - 32.7	Sand: very light gray (N 8), fine- to coarse-grained quartz, subrounded, moist.		
35.0				
37.5	37.0 - 37.3	Sand: light gray (N 7) to light brownish-gray (5YR 6/1), fine-grained, subrounded quartz.	(8, 12, 10, 9) 25	0
	37.3 - 37.5	Gravel: light brownish-gray (5YR 6/1), fine-grained, subrounded chert, clayey with fine- to coarse-grained, subrounded quartz sand, clayey.		
40.0				

REMARKS: PELA Reference No. 492344

#15, 7/5/91, 13-D:\492300\Log-Blow.PZ1

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-5
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: June 12 - July 19, 1990
COORDINATES: 7772.66 E, -528.51 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 19, 1990
TOTAL DEPTH BOREHOLE (FT): 200.0
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT): 9.33 NGVD
LS ELEVATION (FT): 6.38 NGVD
TOTAL DEPTH WELL (FT): 160.0
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME: July 18, 1990 - 15:13
PELA REP(S): N.E. Moss

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
40.0				
42.5	42.0 - 42.5	Sand: very light gray (N 5), fine- to medium-grained, subrounded quartz, trace gravel, moist.	(12, 9, 8, 10) 75	0
	42.5 - 43.5	Silt: light gray (N 7) to medium light gray (N 6), slightly clayey, moist, with very fine-grained quartz sand.		
45.0				
47.5	47.0 - 48.8	Silt: as in interval 42.5 - 43.5 feet.	(3, 3, 5, 7) 90	0
50.0				
52.5	52.0 - 53.4	Sand: light olive gray (5Y 6/1), very fine- to medium-grained (mostly fine-grained), subrounded quartz, moderately well sorted, slightly clayey, moist.	(25, 45, 70) 94	0
55.0				
57.5	57.0 - 57.5	Sand: yellowish-gray (5Y 7/2) to light gray (N 7), with black (N 1) staining, fine- to very coarse-grained, subrounded quartz, poorly sorted, trace fine gravel, moist.	(12, 17, 25, 35) 25	0
60.0				

REMARKS: PELA Reference No. 492344

#16, 7/5/91, 13-D:\492300\Log-Blow.PZ1

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-5
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: June 12 - July 19, 1990
COORDINATES: 7772.66 E, -528.51 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 19, 1990
TOTAL DEPTH BOREHOLE (FT): 200.0
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT): 9.33 NGVD
LS ELEVATION (FT): 6.38 NGVD
TOTAL DEPTH WELL (FT): 160.0
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME: July 18, 1990 - 15:13
PELA REP(S): N.E. Moss

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
60.0				
62.5	62.0 - 62.8	Sand: medium dark gray (N 4), fine- to coarse-grained (mostly medium-grained), subrounded quartz, moderately well sorted, moist.	(4, 5, 14, 25) 40	0
65.0				
67.5	67.0 - 67.5	Sand: medium light gray (N 6), fine- to medium-grained, subrounded quartz, moderately well sorted, very clayey.	(5, 6, 8, 10) 25	0
	67.5 - 68.8	Clay: light gray (N 7) to light olive gray (5Y 6/1), very stiff, slightly sandy.	Shelby tube samples 69.0 - 71.0 70.0 - 72.0 71.5 - 73.1 74.0 - 75.6 76.0 - 77.5	
70.0				
72.5				
75.0				
77.5	77.5 - 78.5	Sand: yellowish-gray (5Y 8/1), fine- to very coarse-grained, subangular quartz with black and orange grains, poorly sorted, with fine-grained, subangular to subrounded gravel, moist.	(8, 20, 40, 69) 50	0
80.0				

REMARKS: PELA Reference No. 492344

#17, 1/29/92, 13-D:\492300\Log-Blow.PZ1

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-5
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: June 12 - July 19, 1990
COORDINATES: 7772.66 E, -528.51 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 19, 1990
TOTAL DEPTH BOREHOLE (FT): 200.0
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT): 9.33 NGVD
LS ELEVATION (FT): 6.38 NGVD
TOTAL DEPTH WELL (FT): 160.0
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME: July 18, 1990 - 15:13
PELA REP(S): N.E. Moss

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
80.0				
82.5	82.0 - 82.9	Gravel: light gray (N 7), fine- to medium-grained, subangular to subrounded chert and quartz, with sand, fine- to coarse-grained, subangular to subrounded quartz, poorly sorted, wet.	(24, 66, 50/1) 84	0
85.0				
87.5	87.0 - 87.7	Gravel: as in interval 82.0 - 82.9 feet.	(31, 40, 50/4) 100	0
	87.7 - 88.3	Sand: very light gray (N 8) to yellowish-gray (5Y 8/1), fine- to medium-grained, subrounded quartz, some black and orange grains, moderately well sorted, very moist.		
90.0				
92.5	92.0 - 92.4	Sand: as in interval 87.7 - 88.3 feet.	(29, 40, 50/3) 100	0
	92.4 - 92.7	Gravel: varicolored, fine-grained, subrounded chert and quartz.		
	92.7 - 93.4	Sand: as in interval 87.7 - 88.3 feet, trace gravel.		
95.0				
97.5	97.0 - 97.6	Sand: as in interval 87.7 - 88.3, 0.01-foot thick layer black (N 1) silt at base.	(21, 48, 50) 100	0
	97.6 - 98.5	Sand: light brownish-gray (5YR 6/1), fine- to coarse-grained, subrounded quartz, some yellow, orange, and dark grains, moderately well sorted, moist.		
100.0				

REMARKS: PELA Reference No. 492344

#18, 7/5/91, 13-D:\492300\Log-Blow.PZ1

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-5
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: June 12 - July 19, 1990
COORDINATES: 7772.66 E, -528.51 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 19, 1990
TOTAL DEPTH BOREHOLE (FT): 200.0
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT): 9.33 NGVD
LS ELEVATION (FT): 6.38 NGVD
TOTAL DEPTH WELL (FT): 160.0
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME: July 18, 1990 - 15:13
PELA REP(S): N.E. Moss

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
100.0				
102.5	102.0 - 103.5	Sand: as in interval 97.6 - 98.5 feet, with trace fine- to medium-grained, subrounded, gravel.	(30, 75, 100) 100	0
105.0				
107.5	107.0 - 108.0	Sand: light gray (N 7) to yellowish-gray (5Y 8/1), fine- to very coarse-grained, angular to subrounded quartz, some orange and dark grains with fine- to medium-grained, subrounded gravel at top, moist.	(60, 95) 100	0
110.0				
112.5	112.0 - 113.3	Sand: as in interval 107.0 - 108.0 feet.	(35, 60, 50/4) 100	0
115.0				
117.5	117.0 - 117.8	Sand: yellowish-gray (5Y 8/1), very fine- to fine-grained, subrounded quartz, well sorted, wet.	(42, 100) 90	0
120.0				

REMARKS: PELA Reference No. 492344

#19, 7/5/91, 13-D:\492300\Log-Blow.PZ1

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-5
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: June 12 - July 19, 1990
COORDINATES: 7772.66 E, -528.51 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 19, 1990
TOTAL DEPTH BOREHOLE (FT): 200.0
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT): 9.33 NGVD
LS ELEVATION (FT): 6.38 NGVD
TOTAL DEPTH WELL (FT): 160.0
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME: July 18, 1990 - 15:13
PELA REP(S): N.E. Moss

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
120.0				
122.5	122.0 - 122.8	Sand: as in interval 117.0 - 117.8 feet, trace organic silt.	(33, 80) 80	0
125.0				
127.5	127.0 - 127.3	Sand: as in interval 117.0 - 117.8 feet.	(60, 70) 30	0
130.0				
132.5	133.0 - 133.5	Sand: as in interval 117.0 - 117.8 feet, trace fine gravel.	(144) 100	0
135.0				
137.5	138.0 - 138.7	Sand: yellowish-gray (5Y 8/1) to light brownish-gray (5YR 6/1), fine- to very coarse-grained, subangular to subrounded quartz with some dark grains; and gravel, varicolored, fine-grained, subrounded chert and quartz, poorly sorted, moist.	(35, 39, 31, 40) 45	0
140.0				

REMARKS: PELA Reference No. 492344

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-5
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: June 12 - July 19, 1990
COORDINATES: 7772.66 E, -528.51 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 19, 1990
TOTAL DEPTH BOREHOLE (FT): 200.0
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT): 9.33 NGVD
LS ELEVATION (FT): 6.38 NGVD
TOTAL DEPTH WELL (FT): 160.0
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME: July 18, 1990 - 15:13
PELA REP(S): N.E. Moss

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
140.0				
142.5	143.0 - 144.1	Silt: light olive gray (5Y 6/1), sandy, fine- to coarse-grained, subangular to subrounded quartz, clayey, stiff, trace fine-grained gravel.	(18, 34, 50/4) 84	0
145.0				
147.5	148.0 - 148.7 148.7 - 148.8	Sand: as in interval 138.0 - 138.7 feet. Clay: light olive gray (5Y 6/1), silty, sandy, with very fine- to fine-grained quartz.	(35, 35, 50/3) 45	0
150.0				
152.5	153.0 - 153.8	Sand: yellowish-gray (5Y 8/1) to light brownish-gray (5YR 6/1), very fine- to very coarse-grained (mostly fine- to medium-grained), angular to subrounded quartz, trace dark grains, moderately to poorly sorted, with organic (woody) material, wet.	(36, 75) 80	0
155.0				
157.5	158.0 - 158.6	Sand: yellowish-gray (5Y 8/1), medium- to very coarse-grained, subangular to subrounded quartz, some dark grains, with gravel, varicolored, fine-grained, subrounded, poorly sorted, very moist.	(40, 75) 60	0
160.0				

REMARKS: PELA Reference No. 492344

#21, 7/5/91, 13-D:\492300\Log-Blow.PZ1

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-5
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: June 12 - July 19, 1990
COORDINATES: 7772.66 E, -528.51 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: July 19, 1990
TOTAL DEPTH BOREHOLE (FT): 200.0
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT): 9.33 NGVD
LS ELEVATION (FT): 6.38 NGVD
TOTAL DEPTH WELL (FT): 160.0
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME: July 18, 1990 - 15:13
PELA REP(S): N.E. Moss

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
160.0				
162.5				
	163.0 - 163.5	Sand: medium light gray (N 6) to light olive gray (5Y 6/1), fine- to coarse-grained, subangular to subrounded quartz, moderately sorted, very clayey.	(W[1/],40,100/0.4) 70	0
	163.5 - 164.4	Sand: medium light gray (N 6) to light olive gray (5Y 6/1), very fine- to fine-grained, subrounded quartz, well sorted, slightly silty, wet.		
165.0				
167.5				
	168.0 - 168.5	Clay: greenish-gray (5GY 6/1) to dark greenish-gray (5GY 4/1), very stiff, homogeneous.	(10,15,20,31) 50	0
	168.5 - 170.0	Silt: greenish-gray (5GY 6/1) to dark greenish-gray (5GY 4/1), slightly clayey, with very fine-grained sand, micaceous.		
170.0				
172.5				
	173.0 - 173.6	Clay: as in interval 168.0 - 168.5 feet.	(W,W,60,50) 100	0
	173.6 - 175.0	Silt: as in interval 168.5 - 170.0 feet, becoming very fine-grained sand toward base.		
175.0				
177.5				
	178.0 - 179.5	Silt: as in interval 168.5 - 170.0 feet.	(7,18,38) 100	0
180.0				

REMARKS: PELA Reference No. 492344
[1/] W = weight of hammer.

#22, 7/5/91, 13-D:\492300\Log-Blow.PZ1

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-5 LOCATION: Ciba-Geigy Corporation
DRILLER: Geotechnical Engineering-Testing, Inc. McIntosh, Alabama
DATE DRILLED: June 12 - July 19, 1990 COORDINATES: 7772.66 E, -528.51 N
DRILLING METHOD: Mud Rotary DATE INSTALLED: July 19, 1990
TOTAL DEPTH BOREHOLE (FT): 200.0 BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT): 9.33 NGVD LS ELEVATION (FT): 6.38 NGVD
TOTAL DEPTH WELL (FT): 160.0
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME: July 18, 1990 - 15:13 PELA REP(S): N.E. Moss

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
180.0				
182.5	183.0 - 183.5	Sand: yellowish-gray (5Y 8/1) to light olive gray (5Y 6/1), very fine- to fine-grained, subangular to subrounded quartz, some dark grains, silty, trace gravel.	(35, 47) 50	0
185.0				
187.5	188.0 - 188.5	Sand: as in interval 183.0 - 183.5 feet, finer-grained.	(28, 48, 50) 30	0
190.0				
192.5	193.0 - 195.0	Clay: dark greenish-gray (5GY 4/1) to medium gray (N 5), stiff in part, very sandy, fine-grained quartz, slightly moist.	(28, 21, 21, 35) 100	0
195.0				
197.5	198.0 - 200.0	Sand: greenish-gray (5GY 4/1) to medium light gray (N 6), fine-grained, subrounded quartz, very clayey, moist.	(18, 26, 40, 64) 100	0
200.0	200.0	Total depth.		

REMARKS: PELA Reference No. 492344

#23, 7/5/91, 13-D:\492300\Log-Blow.PZ1

PIEZOMETER CONSTRUCTION FORM

DRILLING DATA

Well ID PZD-6 Project Number 492344

Project Name Ciba-Geigy - Flood Plain Assessment

Location McIntosh, Alabama

Supervised by M. F. Johnson and R. A. Gardner

Date of Boring 10/3/90 Date Well Completed 10/23/90

Drilling Company Geotechnical Engineering-Testing, Inc.

Driller ______

Drilling Method Mud Rotary

Bit Diameter 8" Hollow Stem I.D. ______ O.D. ______

Hours Drilled ______ Downtime ______

Decontamination Procedure Three steam cleaning rinses

Sample Collection Procedure 24" split spoon at 5 foot intervals and Shelby Tubes

Estimated % Recovery 35 - 100 percent

MATERIALS

Casing Material PVC Type Schedule 40

Screen Material PVC Type Schedule 40

Casing (in.) O.D. 4.5 I.D. 4.0 LS to 71.8 ftbls

(in.) O.D. ______ I.D. ______ ______ to ______ ftbls

(in.) O.D. ______ I.D. ______ ______ to ______ ftbls

Total Casing (ft.) ______

Screen (in.) O.D. 4.5 I.D. 4.0 71.8 to 181.8 ftbls

Slot Size .010 inch Total Screen (ft.) 110

Length of Cap 0.54 wash valve Sump (ft.) ______

Centralizer Material ______ Length (in.) ______

Sand Pack Mtrl./Sz. 6/20 and Rad Blast No. 2

Lbs./Sacks Used ______

Grout Material Cement/Bentonite Slurry

Amt. Cement 1.5 sacks Type Cement Portland

Amt. Powdered Bentonite ______ Amt. Bentonite Pellets ______

Tremie Used ______ Pump for Grout Used ______

Cement Plug ______

Length of Protective Casing (ft.) ______

DEVELOPMENT

Development Method Airlift/Submersible Pump Total Hours 12.5

Date and Time Started 10/27/90 11:54

Date and Time Completed 10/29/90 16:57

Esti. Gallons 9,500 Esti. Yield (gpm) 40

Static WL (ftbtoc) 24.6

Color/Turbidity: Start brownish-yellow/cloudy Finish almost clear

Drawdown (ft.) 1 - 2 Time to Recovery ______

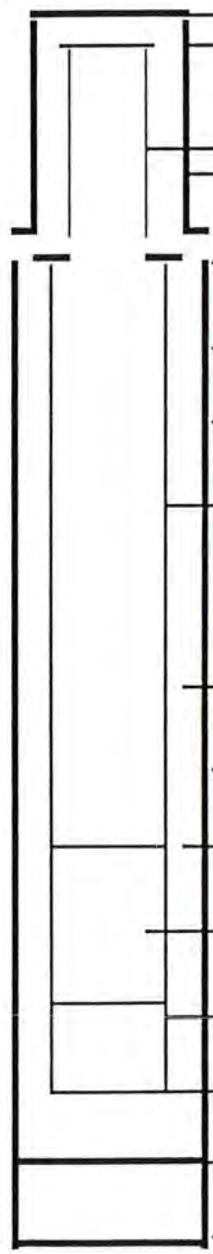
Final: pH 7.06 SC 580 T 19.1° C Eh ______

Sand none Odor none

Water Discharged to 1,000 gallon holding tank

REMARKS

______



(drawing not to scale)

__ Protective Casing (als)
__ Manhole Cover
Lock On:
__ Well Cover
X Well Cap
______ ft. als / bls
______ ft. als / bls
MP Descrip: TOC
LS Elev: 4.82 NGVD
MP Elev: 40.25 NGVD
4 inches
______ inches
Pad Dimension: ______

Top of Casing: ______ ft. als / bls

Cement Plug: ______ to ______ ftbls

Borehole Diameter: 8 inches

Casing: 4 in. 40 sch.
______ in. ______ sch.

Casing Interval: LS to 71.8 ftbls

Grout: LS to 70.8 ftbls

Bentonite Pellet Seal: ______ to ______ ftbls

Sand Pack: 70.8 to 182.5 ftbls

.010-in. Slotted Screen: 71.8 to 181.8 ftbls

Cap/Sump: 182 to 182.5 ftbls

TD Well Cap: 182.5 ftbls

TD Borehole Reamed: 182.5 ftbls

TD Borehole: 207 ftbls

Total Length Casing Cap: ______ ft.

Centralizers:
______ ftbls
______ ftbls

P. E. LaMoreaux & Associates, Inc. (PELA)

WP 5.1, 7/5/91, 13-D:\492300\PZD6.WCF

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-6
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 3-24, 1990
COORDINATES: 7301.84 E, 318.45 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1990
TOTAL DEPTH BOREHOLE (FT): 207
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT):
LS ELEVATION (FT): 4.82 NGVD
TOTAL DEPTH WELL (FT): 182.49
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME:
PELA REP(S): M. F. Johnson, R. A. Gardner

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
2.5	3.0 - 5.0	Clay: moderate yellowish-brown (10YR 5/4), high plasticity, moist, grading to medium gray (N5) with depth, soft in part, wood fragments.	(2, 1, 2, 1) 50	1
5.0				
7.5	8.0 - 10.0	Clay: medium gray (N5), plastic, very soft, moist, light olive gray (5Y 5/2) tint.	(W, W, W, W) 100	0
10.0				
12.5	13.0 - 15.0	Clay: medium gray (N5) to light olive gray (5Y 5/2), slightly plastic with very fine-grained quartz, silty, micaceous, moist.	(W, W, W, W) 100	0
15.0				
17.5	18.0 - 20.0	Clay: as in interval 13.0 - 15.0, becoming sandy with very fine- to fine-grained, subrounded quartz, well sorted.	(1, 1, 1, 1) 100	0
20.0				

REMARKS: PELA Reference No. 492344

#1, 7/5/91, 13-D:\492300\Log-Blow.PZ6

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-6
LOCATION: Ciba-Geigy Corporation McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 3-24, 1990
COORDINATES: 7301.84 E, 318.45 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1990
TOTAL DEPTH BOREHOLE (FT): 207
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT):
LS ELEVATION (FT): 4.82 NGVD
TOTAL DEPTH WELL (FT): 182.49
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME:
PELA REP(S): M. F. Johnson and R. A. Gardner

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
22.5	23.0 - 25.0	Sand: light olive gray (5Y 5/2), very fine- to medium-grained, subangular to subrounded, moderately sorted quartz, micaceous, slightly argillaceous.	(W, 3, 2, 2) 50	0
25.0				
27.5	28.0 - 30.0	Sand, dark greenish-gray (5G 4/1), very fine- to medium-grained, subangular to subrounded, moderately sorted quartz, clayey, micaceous.	(1, 3, 6, 4) 50	0
30.0				
32.5	33.0 - 35.0	Top 7 inches - Sand: dusky-yellow (5Y 6/4) to yellowish-gray (5Y 7/2), medium- to coarse-grained becoming finer with depth; gravel, varicolored, up to 5 cm in diameter, subrounded to rounded quartz and chert. Bottom 7 inches - Sand: very light gray (N8) , very fine- to fine-grained, subrounded, well sorted quartz, no gravel.	(12, 14, 20, 28) 58	0
35.0				
37.5	38.0 - 40.0	Sand: very light gray (N8), very fine- to fine-grained, subrounded, well sorted quartz: top 8 inches slightly argillaceous and grading to dark yellowish-orange (10YR 6/6) clay mottled with dark yellowish-brown (10YR 4/2), silty. Next 4 inches - Clay: light gray (N7), medium plasticity, dense in part, mottled with dark yellowish-brown (10YR 4/2), silt.	(16, 12, 12, 9) 63	0
40.0				

REMARKS: PELA Reference No. 492344

#2, 7/5/91, 13-D:\492300\Log-Blow.PZ6

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-6
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 3-24, 1990
COORDINATES: 7301.84 E, 318.45 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1990
TOTAL DEPTH BOREHOLE (FT): 207
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT):
LS ELEVATION (FT): 4.82 NGVD
TOTAL DEPTH WELL (FT): 182.49
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME:
PELA REP(S): M. F. Johnson, R. A. Gardner

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
0				
42.5	43.0 - 45.0	Top 6 inches - Clay: light gray (N7), mottled dark yellowish-brown (10YR 4/2), medium plasticity, dense in part, silty. Lower 18 inches - Clay: light gray (N7), sandy, very fine- to fine-grained quartz, slight plasticity.	(8, 7, 11, 15) 100	0
45.0				
47.5	48.0 - 50.0	No recovery.	(7, 13, 15, 22) 0	
50.0				
52.5	53.0 - 55.0	Clay: light gray (N7), mottled moderate reddish-brown (10R 4/6), sandy, very stiff.	(13, 15, 30, 40) 95	0
55.0				
57.5	58.0 - 60.0	Clay: as in interval 53.0 - 55.0 feet, less sandy.	(11, 16, 27, 40) 90	0
60.0				

REMARKS: PELA Reference No. 492344

#3, 7/5/91, 13-D:\492300\Log-Blow.PZ6

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-6
LOCATION: Ciba-Geigy Corporation McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 3-24, 1990
COORDINATES: 7301.84 E, 318.45 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1990
TOTAL DEPTH BOREHOLE (FT): 207
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT):
LS ELEVATION (FT): 4.82 NGVD
TOTAL DEPTH WELL (FT): 182.49
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME:
PELA REP(S): M. F. Johnson and R. A. Gardner

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
60.0				
62.5	63.0 - 65.0	Clay: as in interval 53.0 - 55.0 feet.	(10, 19, 22, 25) 100	0
65.0				
67.5	68.0 - 70.0	Clay: as in interval 53.0 - 55.0 feet, very sandy.	(13, 17, 24, 25) 100	0
70.0				
72.5	73.0 - 75.0	Sand: very light gray (N8), fine- to medium-grained, angular to subangular quartz.	(15, 13, 15, 23) 100	0
75.0	75.0 - 80.0	(Cuttings) Sand: as in interval 73.0 - 75.0 feet.		
77.5				
80.0	80.0 - 90.0	(Cuttings) Sand: light gray (N8), rounded to subrounded, abundant black grains.		

REMARKS: PELA Reference No. 492344

#4, 7/5/91, 13-D:\492300\Log-Blow.PZ6

P.E. LaMoreaux & Associates

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-6
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 3-24, 1990
COORDINATES: 7301.84 E, 318.45 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1990
TOTAL DEPTH BOREHOLE (FT): 207
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT):
LS ELEVATION (FT): 4.82 NGVD
TOTAL DEPTH WELL (FT): 182.49
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME:
PELA REP(S): M. F. Johnson and R. A. Gardner

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
80.0				
85.0				
90.0	90.0 - 100.0	(Cuttings) Sand: light gray (N8), fine- to coarse-grained, subrounded to rounded, abundant black grains.		
95.0				
100.0	100.0 - 103.0	(Cuttings) Sand: as in interval 90 - 100 feet.		
	103.0 - 104.0	Sand: very light gray (N8), fine- to coarse-grained, rounded to subrounded quartz, trace gravel.	(30, 50) 65	0
105.0	104.0 - 110.0	(Cuttings) Sand: very light gray (N8), fine- to medium-grained.		
110.0	110.0 - 120.0	(Cuttings) Sand: as in interval 104.0 - 110.0 feet, abundant wood fragments.		
115.0				
120.0				

REMARKS: PELA Reference No. 492344

#5, 7/5/91, 13-D:\492300\Log-Blow.PZ6

P.E. LaMoreaux & Associates

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-6
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 3-24, 1990
COORDINATES: 7301.84 E, 318.45 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1990
TOTAL DEPTH BOREHOLE (FT): 207
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT):
LS ELEVATION (FT): 4.82 NGVD
TOTAL DEPTH WELL (FT): 182.49
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME:
PELA REP(S): M. F. Johnson and R. A. Gardner

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
120.0	120.0 - 130.0	(Cuttings) Sand: as in interval 110.0 - 120.0 feet.		
125.0				
130.0	130.0 - 133.0	(Cuttings) Sand: as in interval 110.0 - 120.0 feet.		
	133.0 - 133.75	Sand: medium light gray (N6), fine- to coarse-grained, rounded to subrounded quartz, trace gravel.	(25, 50) 100	0
135.0	133.75 - 140.0	(Cuttings) Sand: light gray (N7), fine- to coarse-grained, rounded to subrounded, abundant wood fragments.		
140.0	140.0 - 150.0	(Cuttings) Sand: as in interval 133.75 - 140.0 feet.		
145.0				
150.0	150.0 - 160.0	(Cuttings) Sand: light gray (N7), medium- to coarse-grained, rounded to subrounded; fine gravel.		
155.0				
160.0				

REMARKS: PELA Reference No. 492344

#6, 7/5/91, 13-D:\492300\Log-Blow.PZ6

PELA

BORING AND WELL CONSTRUCTION LOG

NO: PZD-6
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 3-24, 1990
COORDINATES: 7301.84 E, 318.45 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1990
TOTAL DEPTH BOREHOLE (FT): 207
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT):
LS ELEVATION (FT): 4.82 NGVD
TOTAL DEPTH WELL (FT): 182.49
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME:
PELA REP(S): M. F. Johnson and R. A. Gardner

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
160.0	160.0 - 163.0	(Cuttings) Sand: as in interval 150.0 - 160.0 feet.		
	163.0 - 164.5	Sand: light gray (N7), medium- to coarse-grained, subrounded to rounded, quartz, with gravel up to 0.25 inch in diameter.	(10, 40, 50) 35	0
165.0	164.5 - 168.0	(Cuttings) Sand: as in interval 163.0 - 164.5 feet.		
	168.0 - 174.0	(Cuttings) Sand: as in interval 163.0 - 164.5 feet.		
170.0				
	174.0 - 175.0	(Cuttings) Clay: light olive gray (5Y 6/1), sandy.		
175.0	175.0 - 178.0	(Cuttings) Sand: medium light gray (N6), medium- to coarse-grained, rounded to subrounded.		
	178.0 - 186.0	(Cuttings) Sand: as in interval 175.0 - 178.0 feet.		
180.0				
185.0				
	186.0 - 186.5	(Cuttings) Clay: light olive gray (5Y 6/1), sandy, stiff.		
190.0				
195.0				
200.0				

REMARKS: PELA Reference No. 492344

PELA

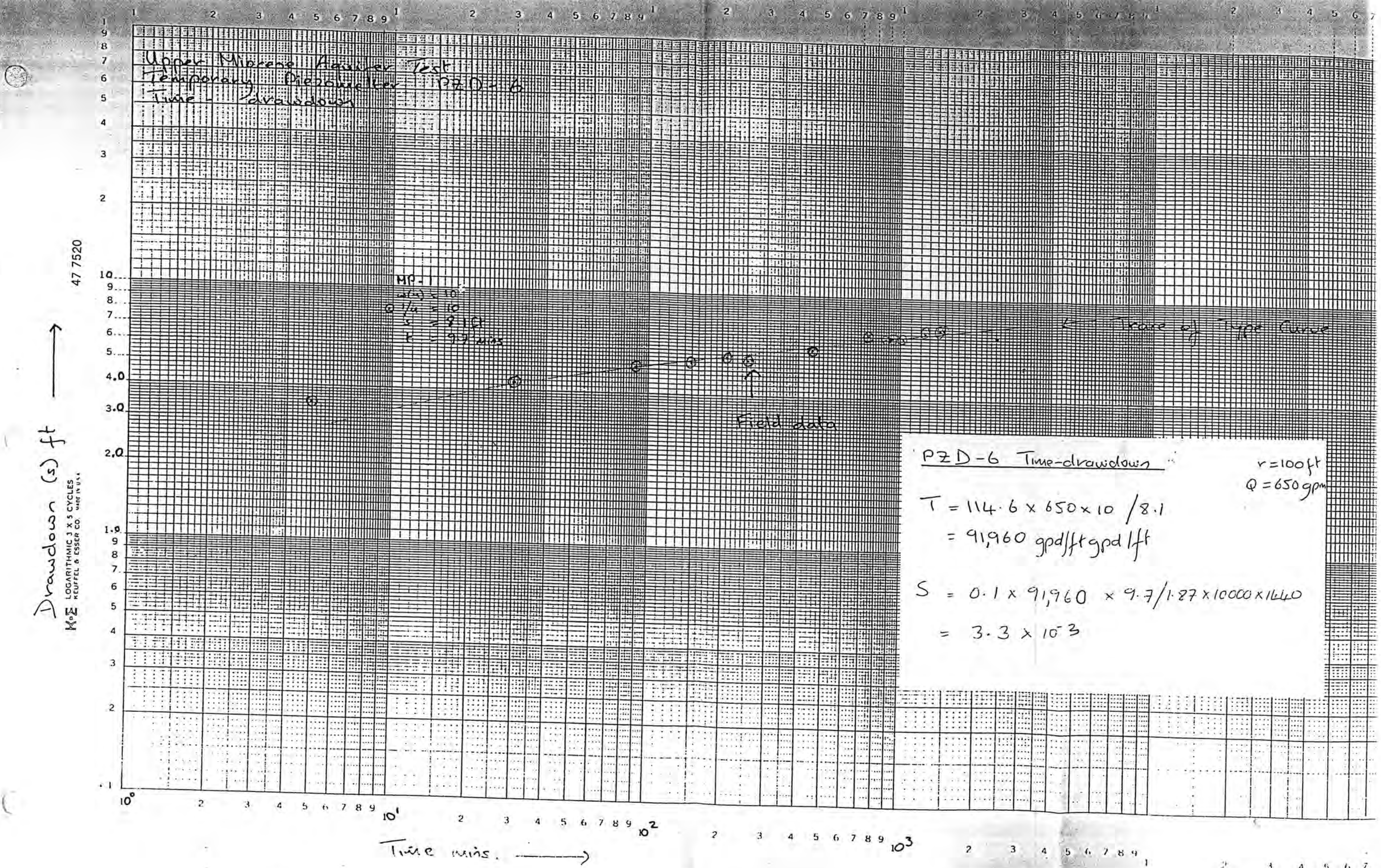
BORING AND WELL CONSTRUCTION LOG

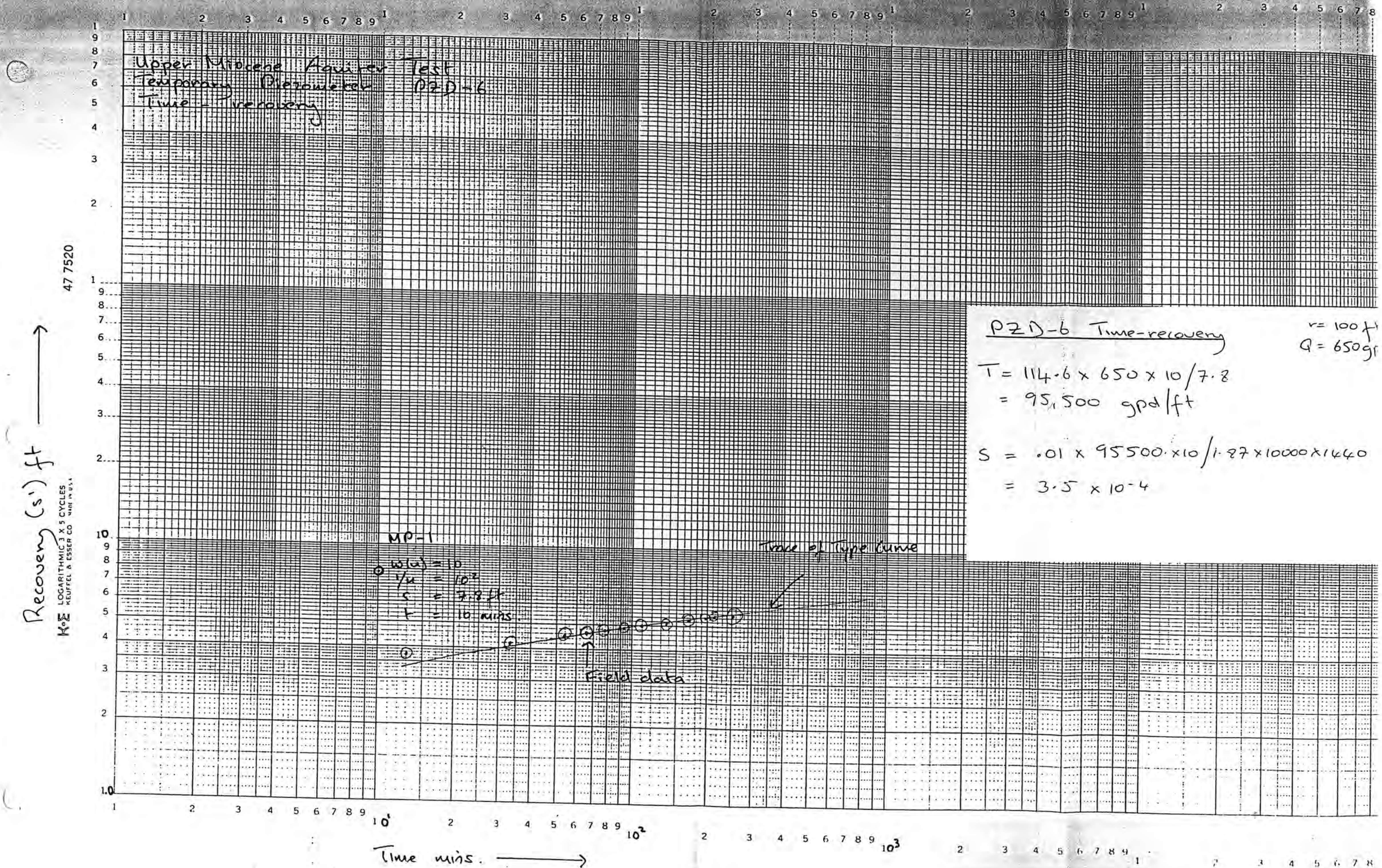
NO: PZD-6
LOCATION: Ciba-Geigy Corporation, McIntosh, Alabama
DRILLER: Geotechnical Engineering-Testing, Inc.
DATE DRILLED: October 3-24, 1990
COORDINATES: 7301.84 E, 318.45 N
DRILLING METHOD: Mud Rotary
DATE INSTALLED: October 25, 1990
TOTAL DEPTH BOREHOLE (FT): 207
BOREHOLE DIAMETER (IN): 14/7
MP ELEVATION (FT):
LS ELEVATION (FT): 4.82 NGVD
TOTAL DEPTH WELL (FT): 182.49
WATER LEVEL DURING DRILLING (FT BLS):
WATER LEVEL AFTER DEVELOPMENT (FT BLS):
DATE AND TIME:
PELA REP(S): M. F. Johnson and R. A. Gardner

Depth (feet BLS)	Sample Interval (feet)	Description/Observations	Blows Per 6 Inches Percent Recovery	PID Survey (PPM)
200.0				
205.0				
	207.0	Total depth.		
210.0				
215.0				
220.0				
225.0				
230.0				
235.0				
240.0				

REMARKS: PELA Reference No. 492344

#8, 7/5/91, 13-D:\492300\Log-Blow.PZ6


Upper Miocene Aquifer Test
Temporary Piezometer PZD-6
Time - drawdown
MP-1
W(u) = 10
1/u = 10
s = 8.1 ft
t = 9.7 mins
Trace of Type Curve
Field data
PZD-6 Time-drawdown
r = 100 ft
Q = 650 gpm
T = 114.6 x 650 x 10 / 8.1
= 91,960 gpd/ft gpd/ft
S = 0.1 x 91,960 x 9.7 / 1.87 x 10000 x 1440
= 3.3 x 10⁻³
Drawdown (s) ft
Time mins.
K&E LOGARITHMIC 3 X 5 CYCLES KEUFFEL & ESSER CO. MADE IN U.S.A.
47 7520


Upper Miocene Aquifer Test
Temporary Piezometer PZD-6
Time - recovery
MP-1
W(u) = 10
1/u = 10^2
s = 7.8 ft
t = 10 mins.
Trace of Type Curve
Field data
PZD-6 Time-recovery
r = 100 ft
Q = 650 gpm
T = 114.6 x 650 x 10/7.8
= 95,500 gpd/ft
S = .01 x 95500 x 10/1.87 x 10000 x 1440
= 3.5 x 10^-4
Recovery (s') ft
Time mins.
K+E LOGARITHMIC 3 X 5 CYCLES KEUFFEL & ESSER CO. MADE IN U.S.A.
47 7520

PELA

P.O. Box 2310
Tuscaloosa, Alabama 35403
Cable PELA

530902

GAMMA LOG ☐ CCL

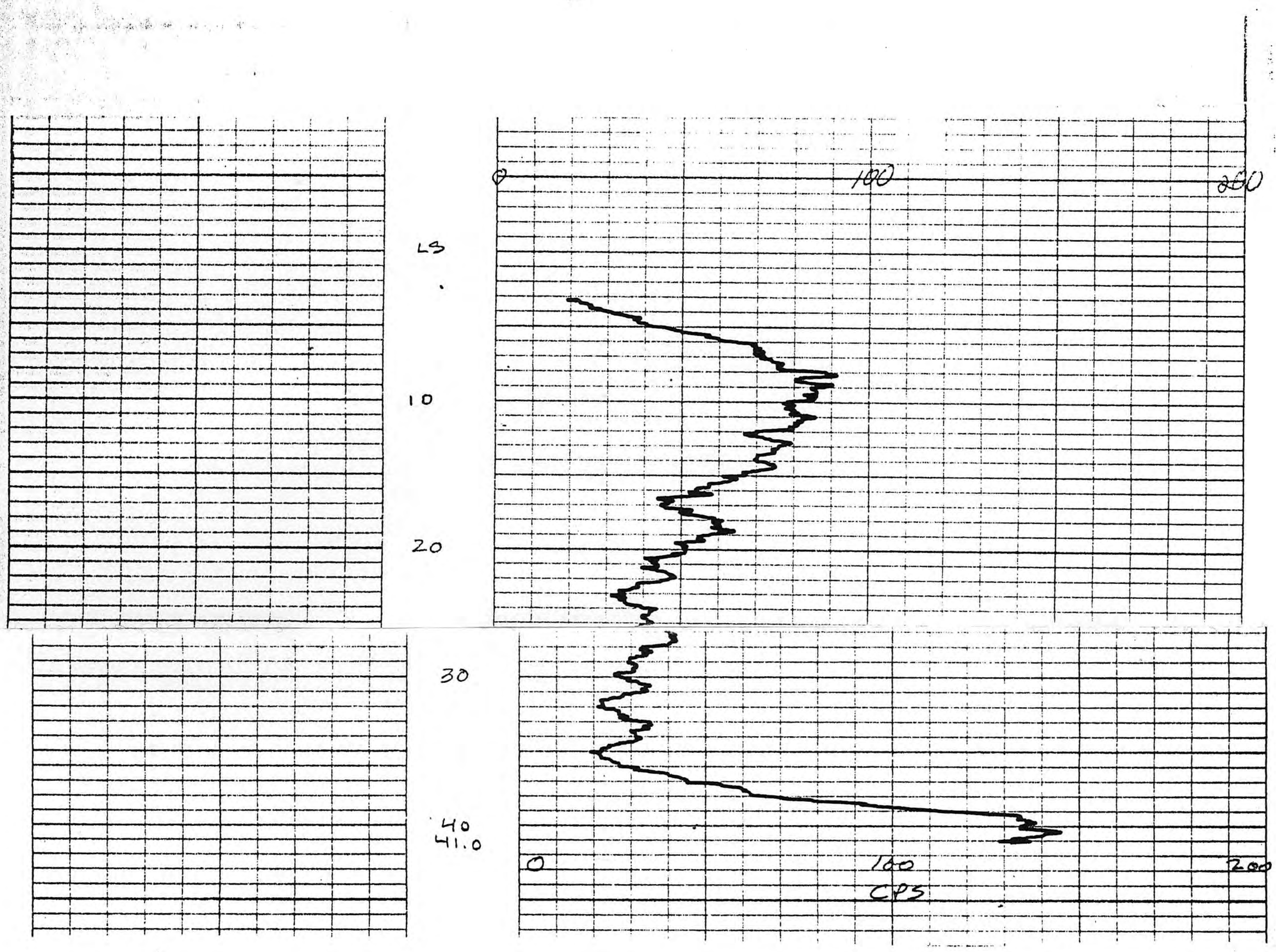
Well Number PZD-6 (Alluvial Section)

Date 10/3/90 T/C 2

Time 16:20 Zero 554

By NEM Span 648

Gear 12FPM



PELA

P.O. Box 2310
Tuscaloosa, Alabama 35403
Cable PELA

GAMMA LOG ☐ CCL

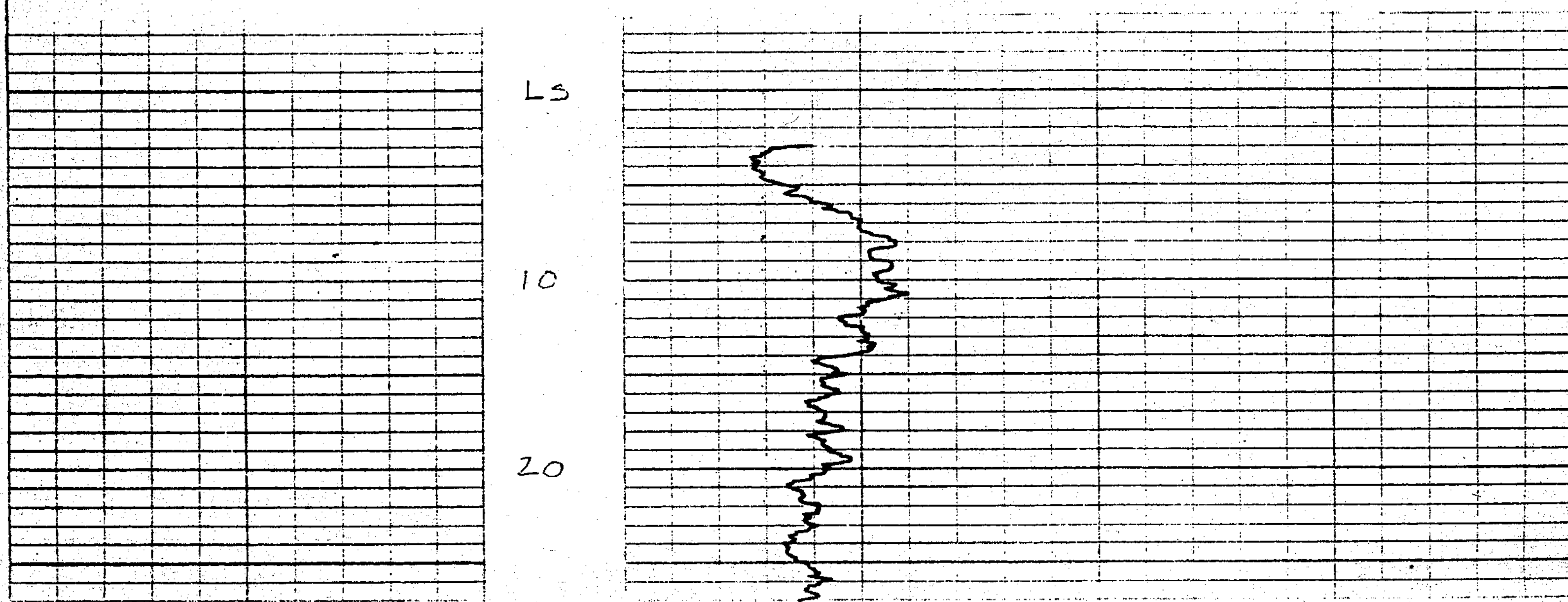
Well Number PZD-6

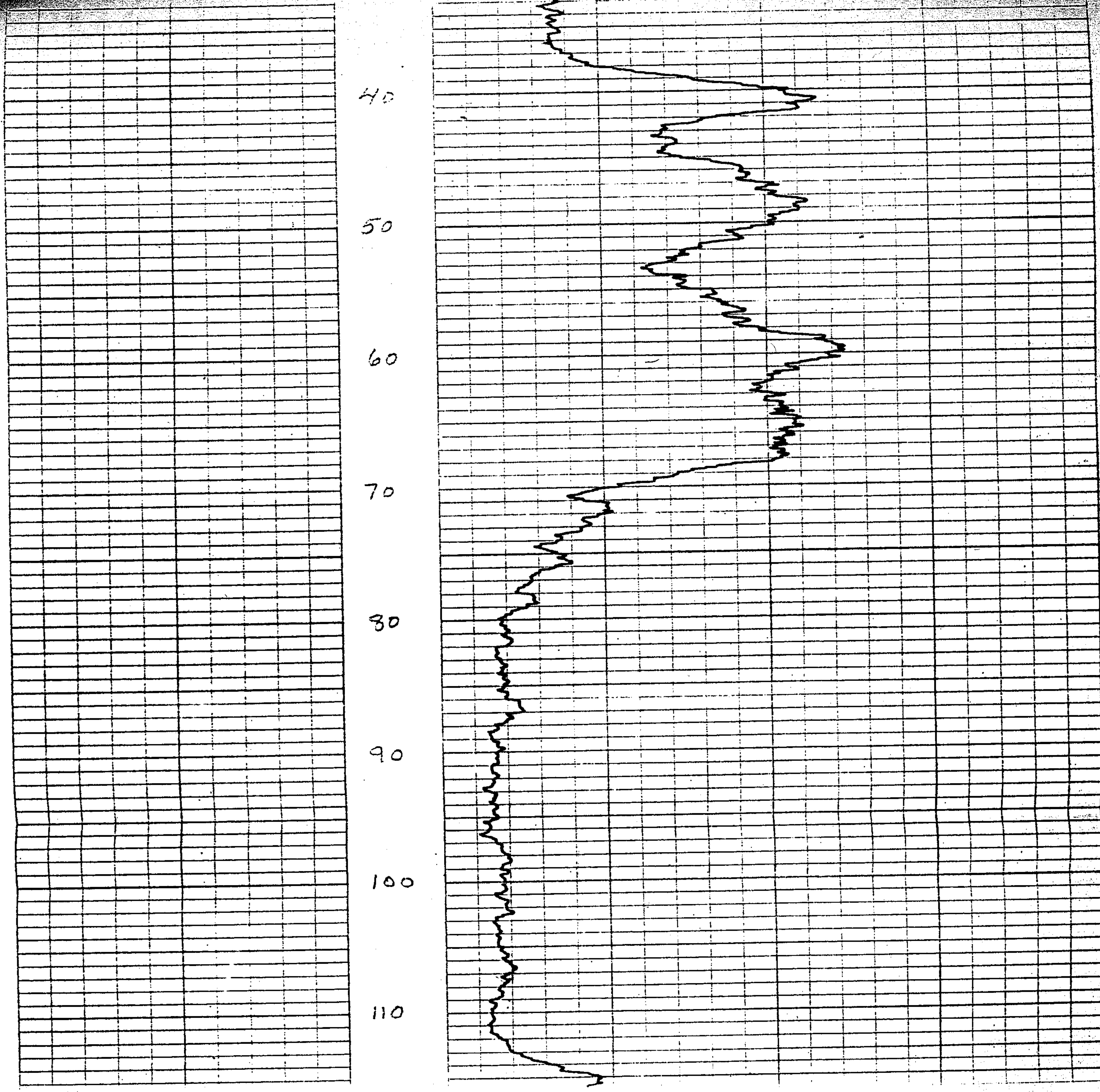
Date 10/23/90 T/C 2

Time 11:04 Zero 554

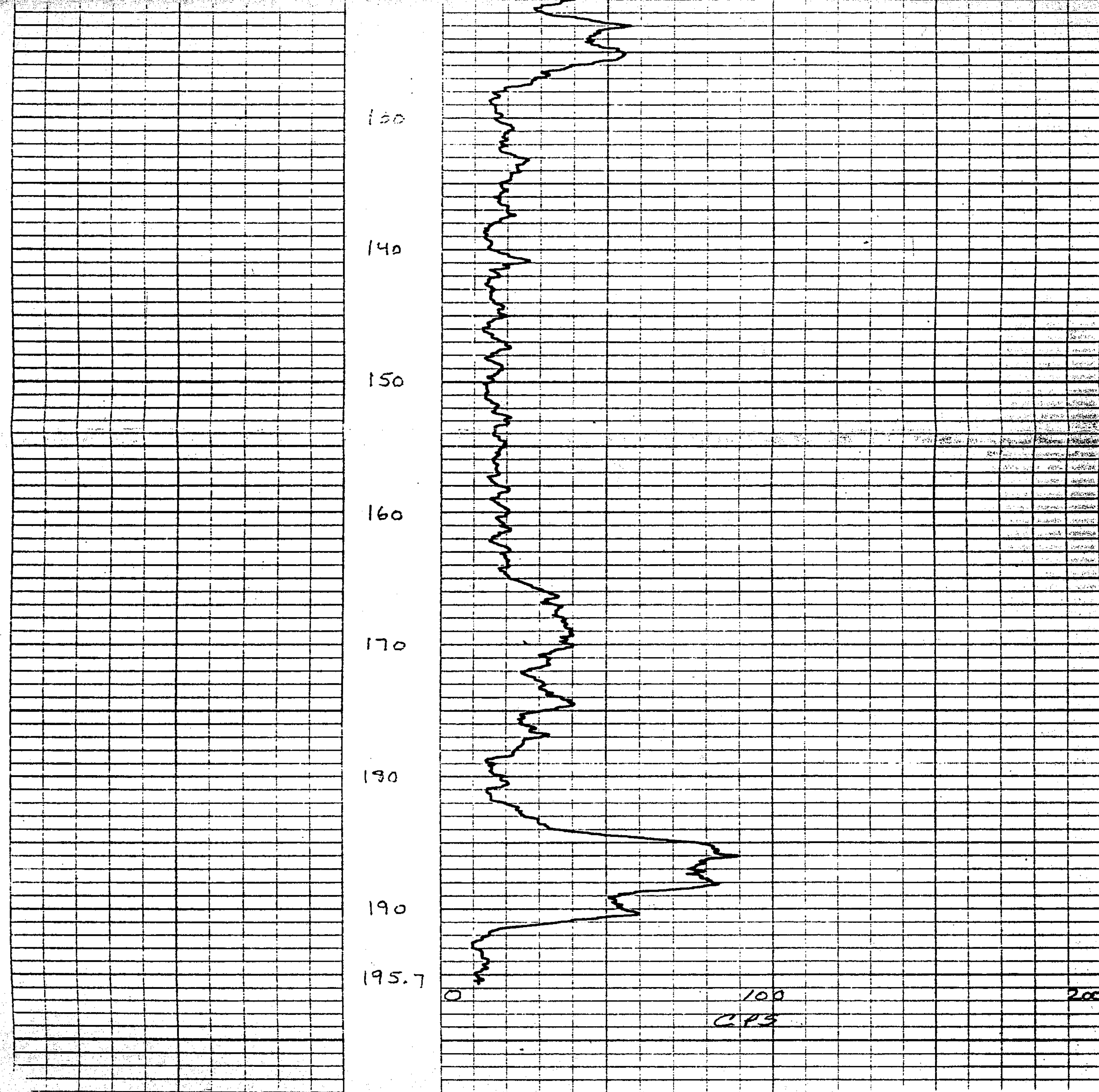
By NEM Span 648

Gear 15FPM





40
50
60
70
80
90
100
110



130
140
150
160
170
180
190
195.7
0
100
200
CPS

PELA P.O. Box 2310
Tuscaloosa, Alabama 35403
Cable PELA

GAMMA LOG ☐ CCL

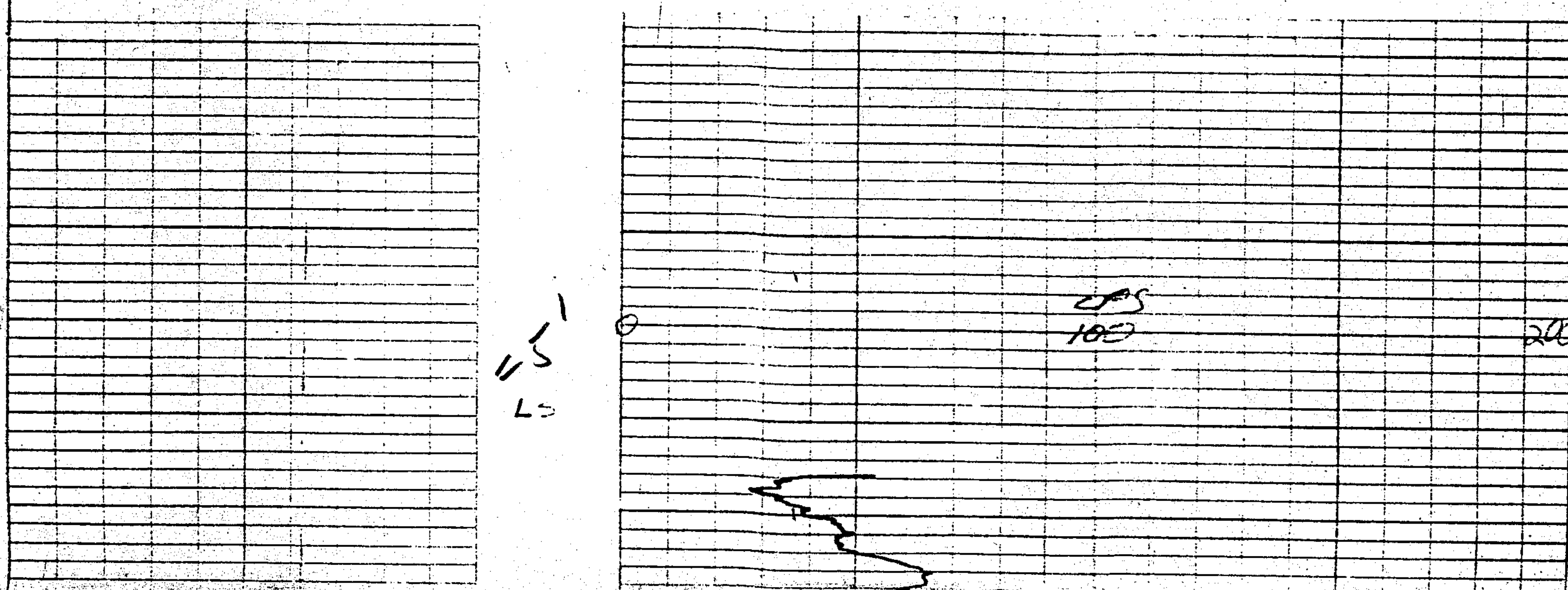
Well Number PZD-6

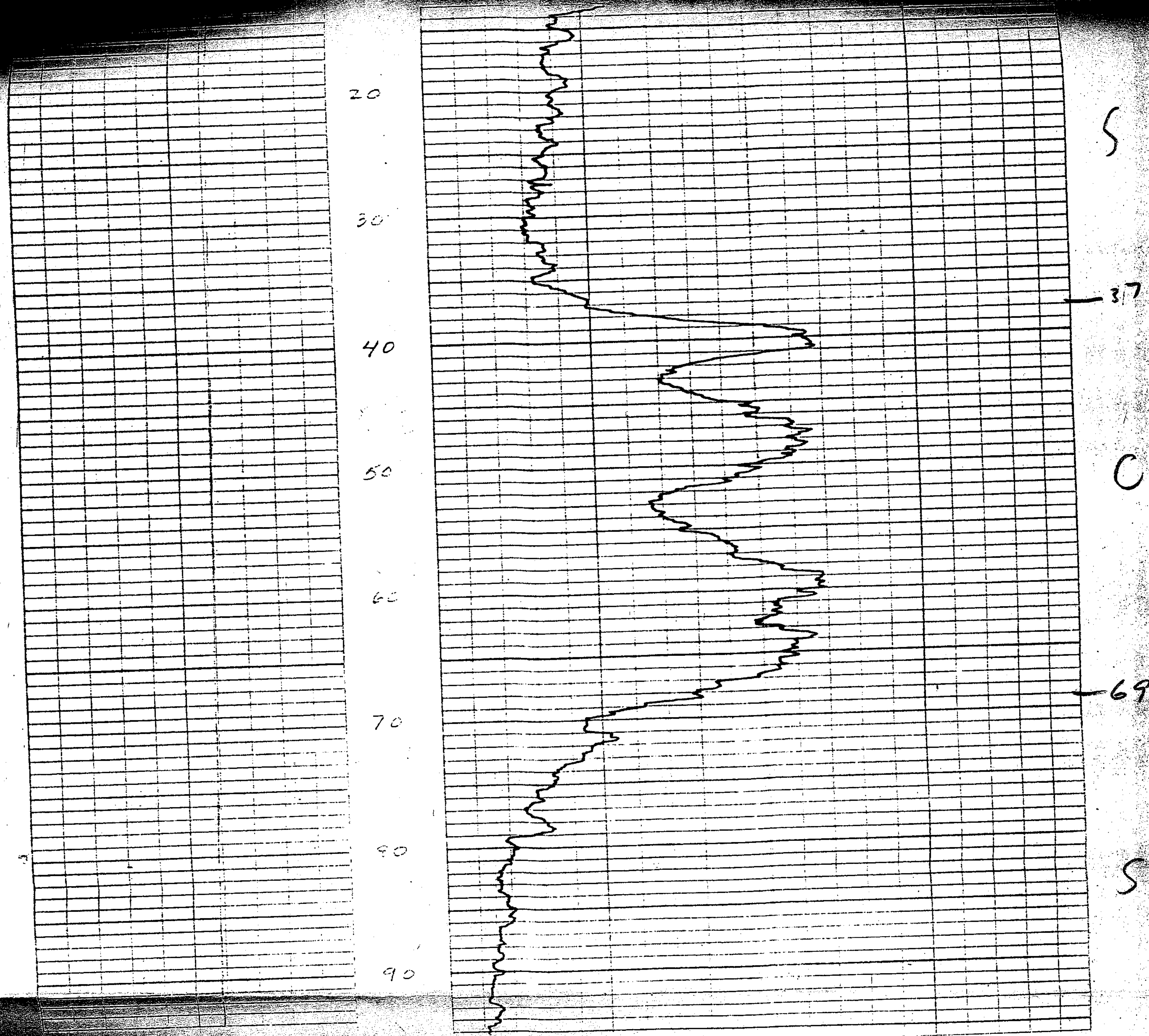
Date 10/20/90 T/C 2

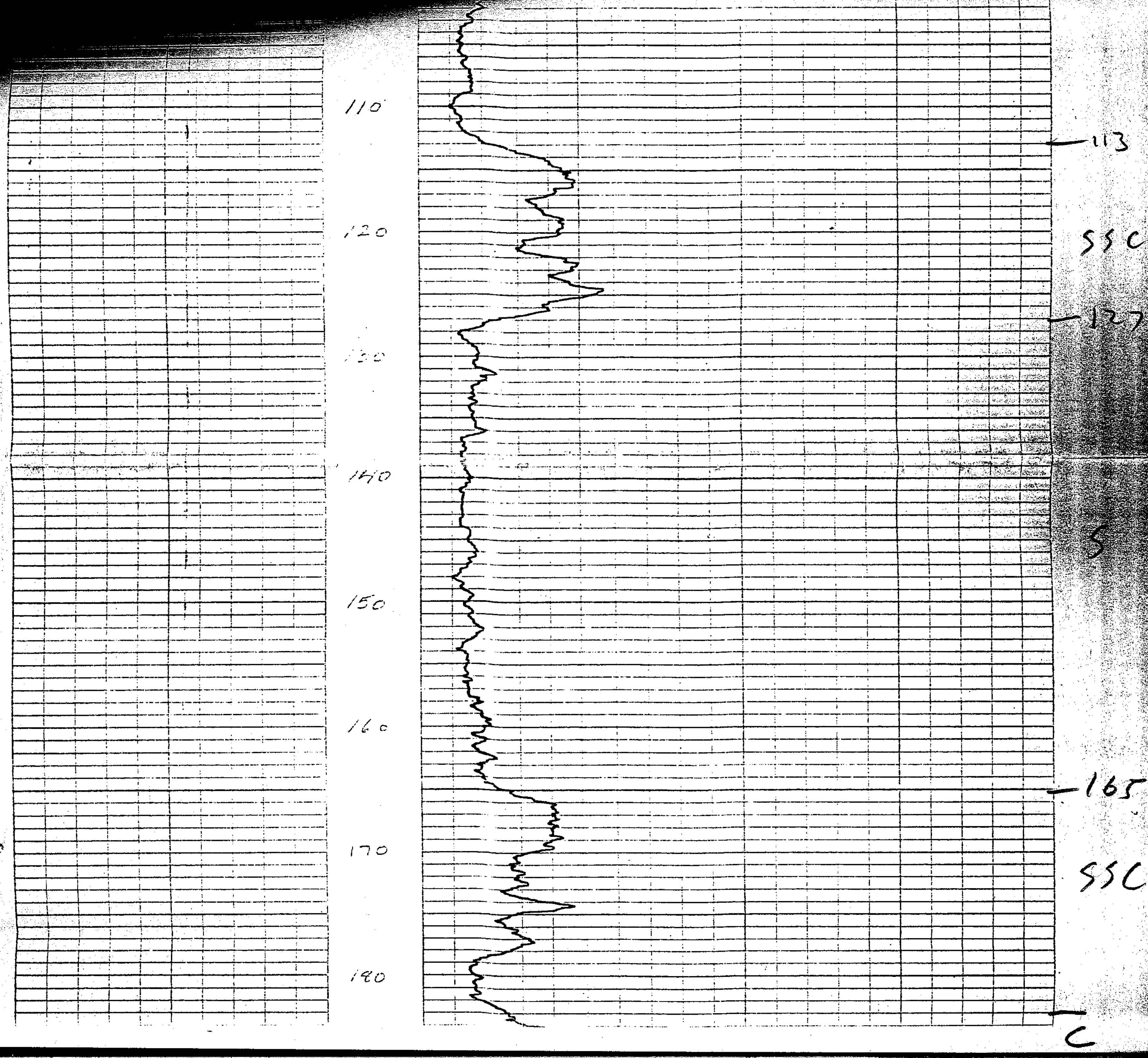
Time 14:45 Zero 554

By NEM Span 646

Gear 15FPM




20
30
40
50
60
70
90
S
37
C
69
S


110
120
130
140
150
160
170
180
113
SSC
127
S
165
SSC
C

PELA
P.O. Box 2310
Tuscaloosa, Alabama 35403
Cable PELA

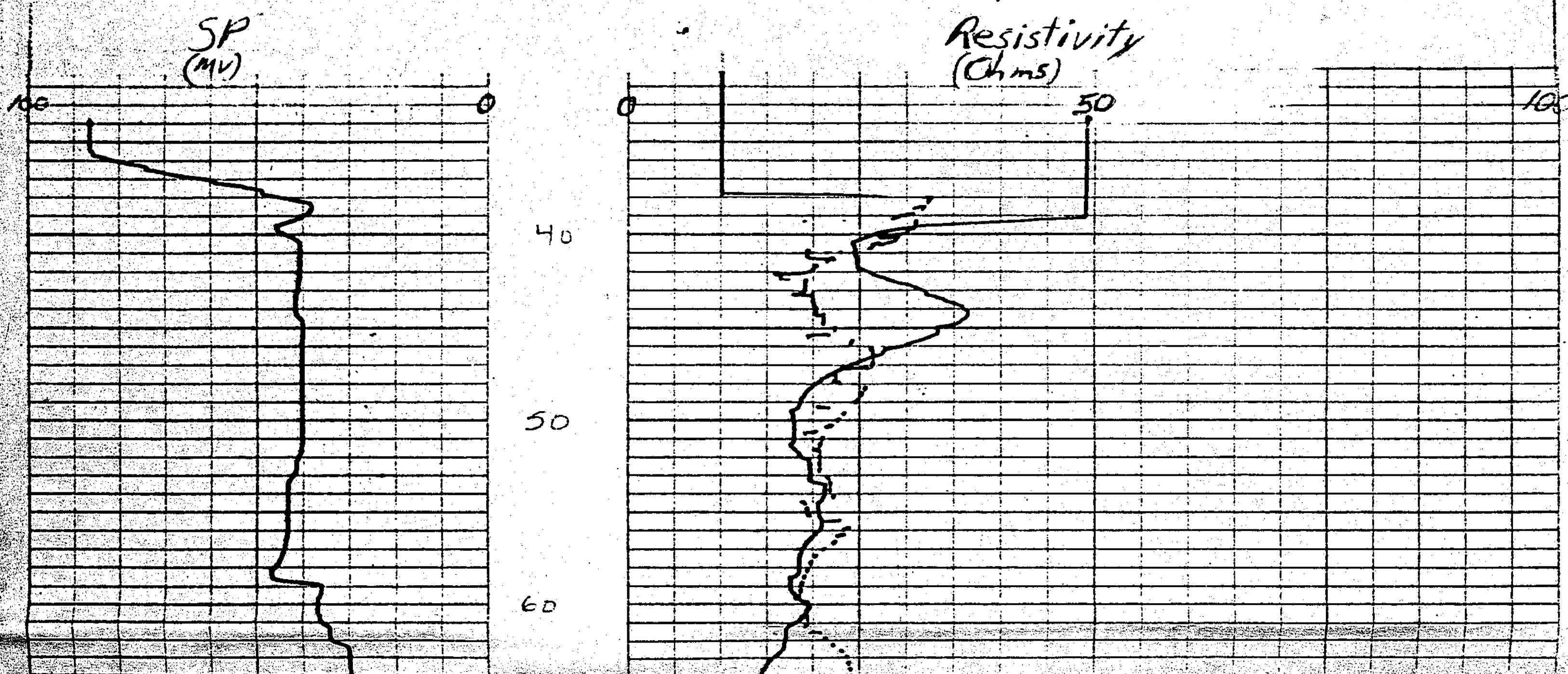
530902

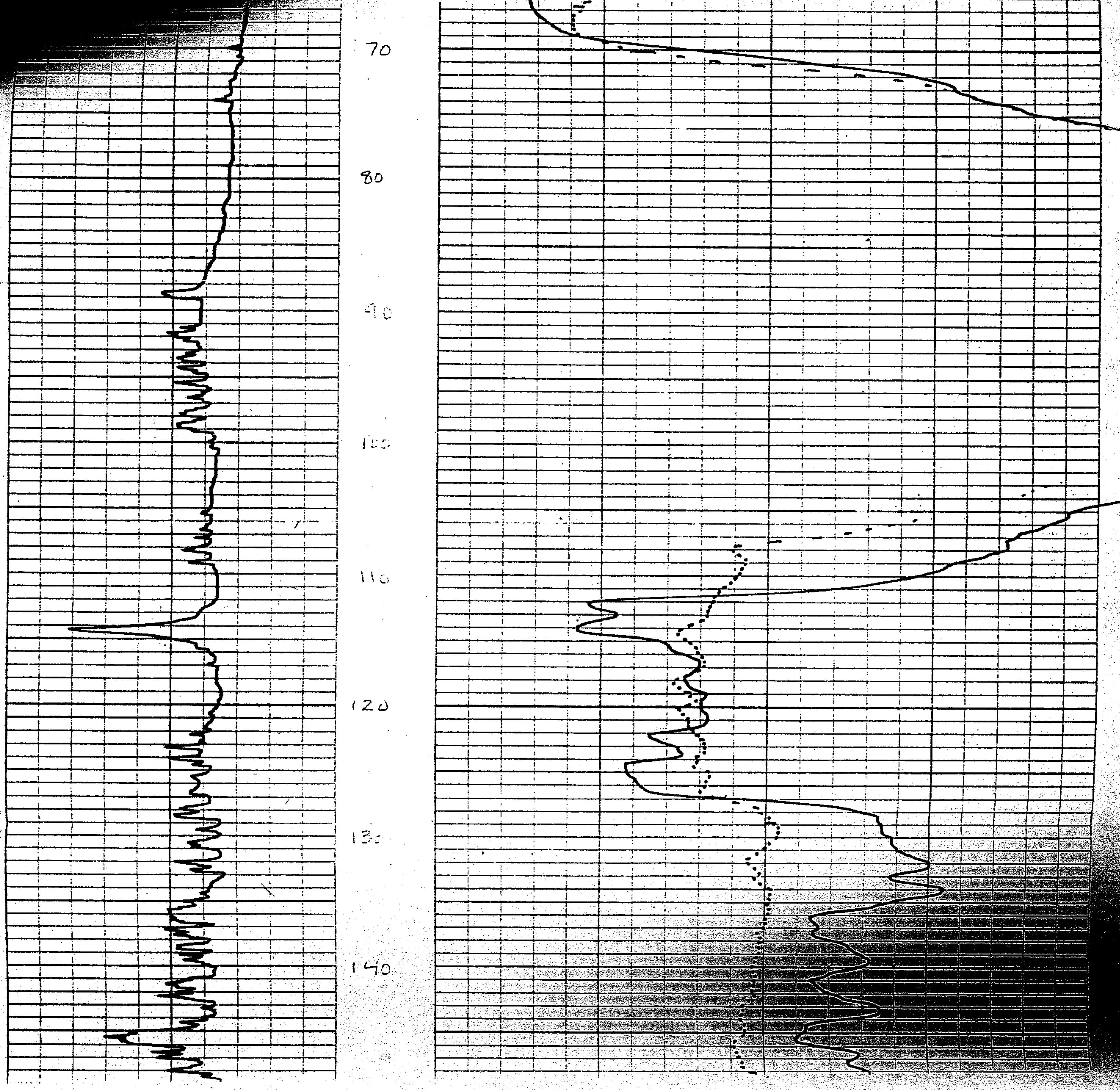
ELECTRIC LOG

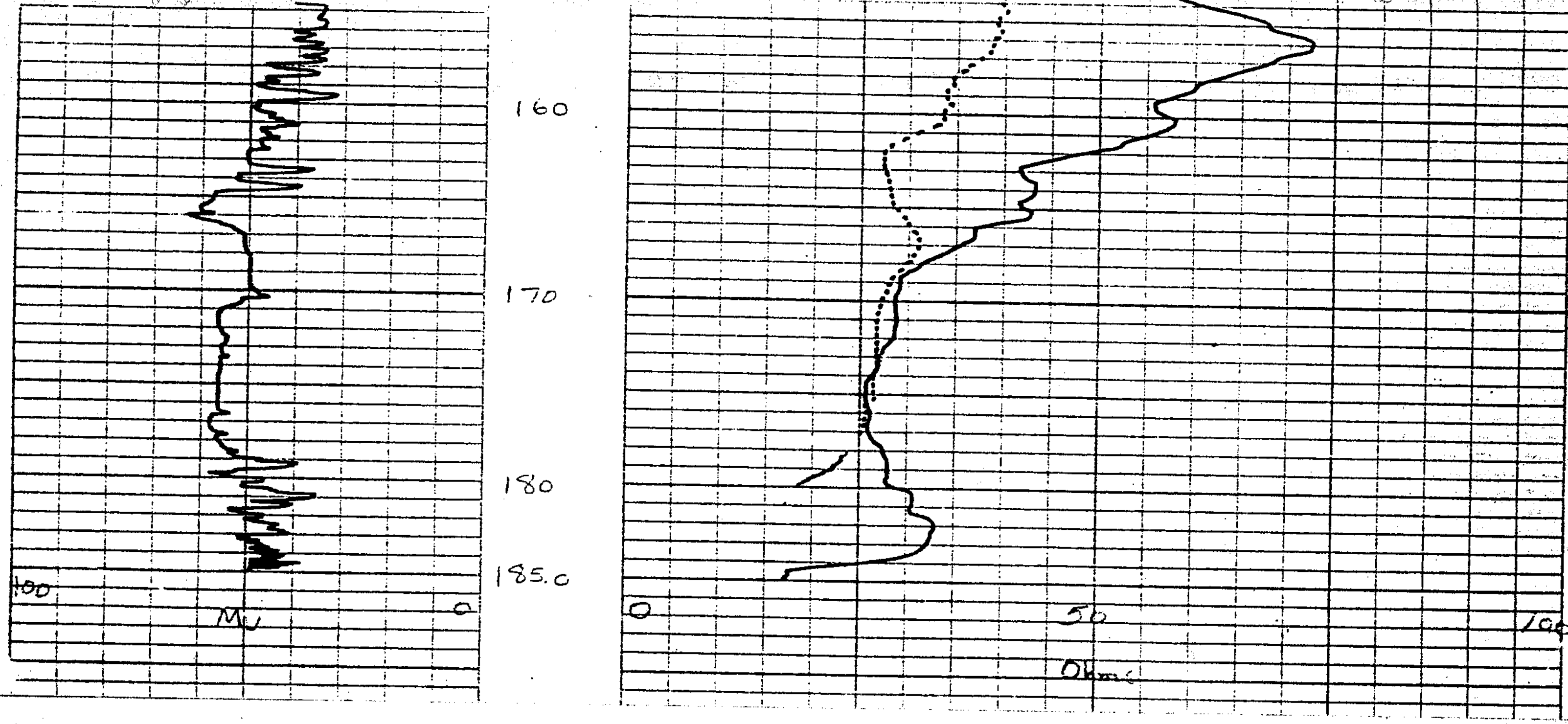
Well Number PZD-6

Date 10/20/90	SP	RES 16" 64"
Time 15:15	Zero 555	Zero 554 551
By NEM	Span 946	Span 889 878

Gear: 15 FPM




70
80
90
100
110
120
130
140


160
170
180
185.0
100
Mv
0
0
50
100
Ohms

PELA
P.O. Box 2310
Tuscaloosa, Alabama 35403
Cable PELA

5309102

ELECTRIC LOG

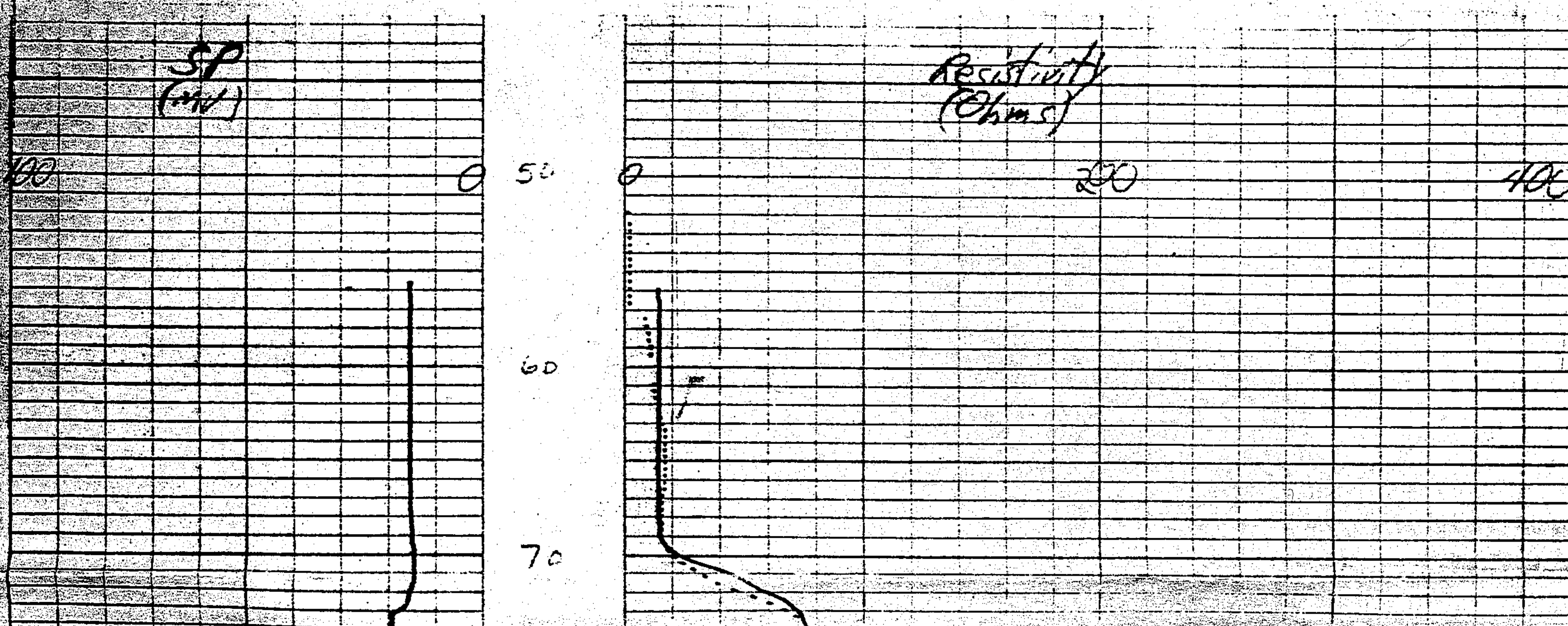
Well Number PZP-6

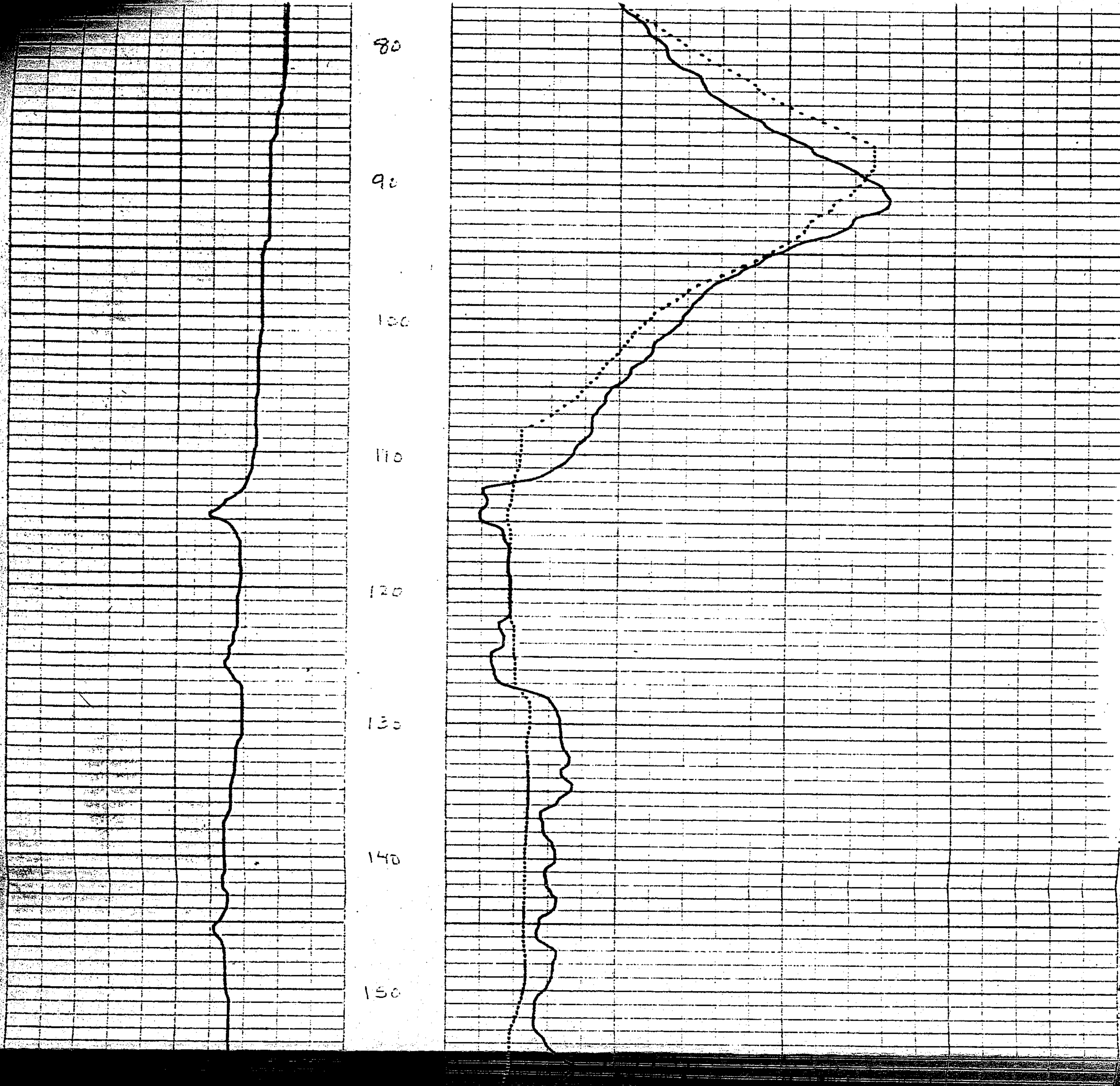
Date 10/23/90 SP RES 16" 64"

Time 11:33 Zero 576 Zero 554 551

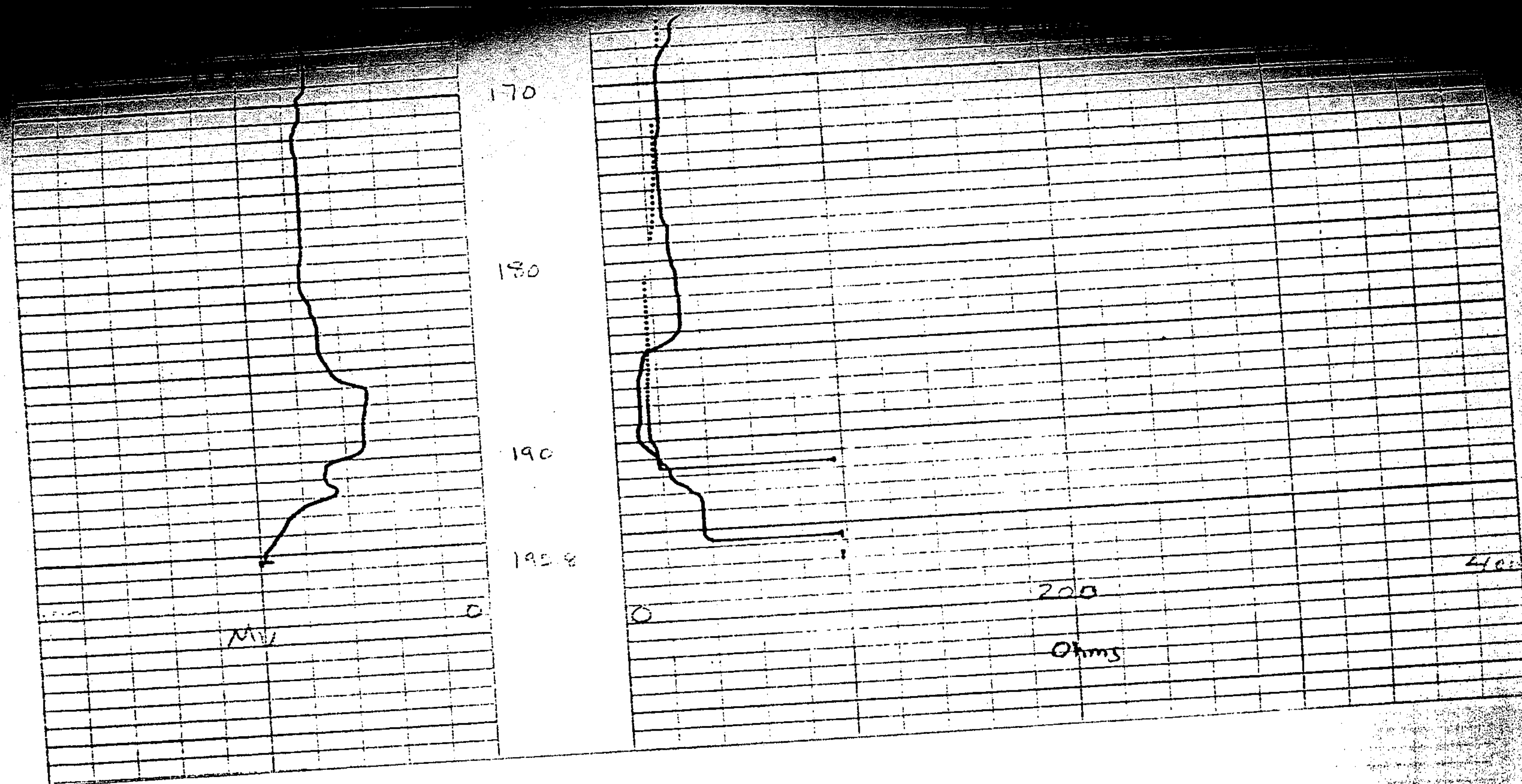
By NEM Span 934 Span 890 880

Gear: 15 FPM





80
90
100
110
120
130
140
150



170
180
190
195.8
0
Mv
0
200
Ohms

LOG OF BORING SBMIO19-1

LimnoTech — Water Environment | Scientists Engineers

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 3/26/19		
Date Completed	: 4/2/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.273959, -88.002422

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
0–2		8.5'/10'			moist	SP		Light to dark brown SAND with clay. (24")
2–8					moist	CL		Brown / orange CLAY, some sand and silt. (72")
8–10								No Recovery
10–17		10'/10'			moist	CL		Firm orange / gray streaked CLAY. (84")
17–19						ML		Orange / gray SILT with clay, trace fine sand. (24")
19–20						ML/SP		Orange / gray SILT and fine SAND, trace clay. (12")
20–24		6.0'/10'			moist	CL		Orange / gray sandy CLAY. (48")
24–25.5						CL		Firm orange / gray CLAY. (18")
25.5–26.5						SP		Light brown fine to medium SAND. (12")
26.5–30								No Recovery

07-08-2019 S:\CIBMC\OU1\Miocene_Investigations\2019_VAS_Investigation\VAS_Boring_Logs\SBMIO19-1.BOR

LimnoTech
Water Environment | Scientists Engineers

LOG OF BORING SBMIO19-1

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 3/26/19		
Date Completed	: 4/2/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.273959, -88.002422

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
30–32.5		3.0'/10' (30–40)			wet (30–40)	SP		Light brown fine to medium SAND. (30")
32.5–33						SP		White medium to coarse SAND. (6")
33–40								No Recovery
40–43		9.0'/10' (40–50)			wet (40–50)	SP		Orange fine to medium SAND. (36")
43–46						SP		Light brown fine to medium SAND. (36")
46–49						SW		Light brown / orange fine to medium SAND with some coarse sand, trace subrounded fine gravel. (36")
49–50								No Recovery
50–52		5.0'/10' (50–60)			wet (50–60)	SW		Orange fine to coarse SAND. (24")
52–52.4						SP		Light brown to orange fine SAND. (5")
52.4–53						SP		Same as above with clay and fine gravel. (7")
53–55						SP		Light brown fine to medium SAND. (24")
55–60								No Recovery

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LOG OF BORING SBMIO19-1

LimnoTech
Water Environment | Scientists Engineers

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 3/26/19		
Date Completed	: 4/2/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.273959, -88.002422

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
60–70		8.0'/10'			wet	SP		Light gray fine to medium SAND. Trace fine subrounded gravel. (120")
70–75.5		8.0'/10'			wet	SP		Same as above, increasing gravel content. (66")
75.5–77.5						GP		Fine to medium GRAVEL and coarse SAND with medium sand. (24")
77.5–78						SP		Brown / orange medium to coarse SAND with fine gravel. (6")
78–80								No Recovery
80–84		9.6'/10'			wet	GP/SP		Fine to medium brown GRAVEL and coarse SAND. (48")
84–89.6					moist	CL		Hard gray CLAY. (6")
89.6–90								No Recovery

LOG OF BORING SBMIO19-1

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 3/26/19		
Date Completed	: 4/2/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.273959, -88.002422

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
90–100		10'/10'			moist	CL		Gray stiff CLAY. Some orange streaking from 95' to 100'. (120")
100–110		10'/10'			moist/dry	CL		Gray / red hard CLAY. (120")
110–120		10'/10'			moist	CL		Gray / blue firm-stiff CLAY. (120")

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Water Environment | Scientists Engineers

LOG OF BORING SBMIO19-1

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 3/26/19		
Date Completed	: 4/2/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.273959, -88.002422

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
120–122		10'/10' (120–130)			moist	ML		Stiff blue/gray SILT with clay. (24")
122–126						CL		Hard blue / gray CLAY with silt. (48")
126–128						ML		Stiff blue / gray SILT with clay. (24")
128–130						CL		Same CLAY as above. (24")
130–134.5		10'/10' (130–140)			moist/dry	CL		Blue / gray CLAY with some silt. (54")
134.5–135.2						ML		Blue / gray SILT with some clay. (8")
135.2–139						CL		Blue / gray CLAY, trace silt. (46")
139–140						ML		Blue / gray SILT, trace very fine sand and clay. (12")
140–141		10'/10' (140–150)				CL/ML		Green-blue CLAY / SILT. (12")
141–142.5						ML		Green / blue SILT with very fine sand and clay. (18")
142.5–145						CL		Green / blue CLAY with brown streaking. (30")
145–150						ML/SP		Very hard, crumbly green / blue SILT / v.f. SAND and CLAY. (60")

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LOG OF BORING SBMIO19-1

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 3/26/19		
Date Completed	: 4/2/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.273959, -88.002422

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	DESCRIPTION
150–156		10'/10' (150–160)			moist/dry	ML/SP	Same as above. (72")
156–156.5					moist	ML/SP	Green-blue SILT and very fine SAND, trace clay. (6")
156.5–156.7							Gray very fine to fine SAND. (2")
156.7–160					dry/moist	CL	Hard blue/green CLAY with silt and very fine sand. (40")
160–160.5		10'/10' (160–170)			moist	SP	Greenish fine to very fine SAND. (6")
160.5–167.7					dry/moist	CL	Hard blue-green CLAY, trace silt. (86")
167.7–168.5					moist	SP	Blue-gray very fine to medium SAND. (10")
168.5–170					dry/moist	CL	Blue-gray CLAY. (18")
170–179.5		10'/10' (170–180)			moist	CL	Blue/gray CLAY with orange streaks. (114")
179.5–180						SP	Hard packed, gray, very fine to fine SAND. (6")

LOG OF BORING SBMIO19-1

LimnoTech — Water Environment | Scientists Engineers

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 3/26/19		
Date Completed	: 4/2/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.273959, -88.002422

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	DESCRIPTION
180–183.5		10'/10' (180–190)	GW Sample @182'		moist	SP	Same SAND as above. (42")
183.5–185					moist	ML	Gray SILT with very fine sand. (18")
185–190					dry	CL	Gray hard CLAY with silt. Some brown streaking present. (60")
190–194		10'/10' (190–200)			moist	CL	Gray CLAY, trace silt. (48")
194–195.5					wet	SP	Gray fine SAND with silt. (18")
195.5–198			Attempted GW Sample 196'-200' (no yield)		moist	ML/SP	Green / gray SILT and fine to very fine SAND. (30")
198–198.4					wet	SP	Gray fine SAND. (5")
198.4–198.7					moist		Green / gray SILT and fine SAND. (4")
198.7–199					wet	SP	Gray fine SAND. (4")
199–200					moist	ML/SP	Gray/green SILT and fine SAND. (12")
200–204		10'/10' (200–210)			moist	ML	Blue/green SILT with fine sand and clay. (48")
204–207.7					moist/dry		Hard brown CLAY with gray streaks. (44")
207.7–208					moist		Gray fine SAND. (4")
208–210							No Recovery

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LOG OF BORING SBMIO19-1

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 3/26/19		
Date Completed	: 4/2/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.273959, -88.002422

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
210–220		10'/10'			moist/dry	CL		Hard gray CLAY. (120")
220–222		6.0'/10'			moist	CL		Gray CLAY, slightly softer than above. (24")
222–225.5					moist/wet	SP		Gray fine to very fine SAND. (42")
225.5–226					wet	SP/GP		Gray fine SAND with fine gravel. Lower 2' of run was noticably harder drilling. (6")
226–230								No Recovery
230–235.7		6.0'/10'	GW Sample @235'		wet	SP/GP		Gray fine SAND with fine gravel. (68")
235.7–236						OM		Organic matter, looks like wood fragments. (4")
236–240								No Recovery

LimnoTech
Water Environment | Scientists Engineers

LOG OF BORING SBMIO19-1

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 3/26/19		
Date Completed	: 4/2/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.273959, -88.002422

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
240–246		6.0'/10'			wet	SP/GP		Gray fine to medium SAND with fine gravel. (72")
246–250			GW Sample @ 250'					No Recovery
250								End of Boring All casings were removed and boring was grouted with a tremie pipe to ground surface using cement grout. No PID measurements are reported at this location due to instrument malfunction.

Depth scale: 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270

LOG OF BORING SBMIO19-2

LimnoTech — Water Environment | Scientists Engineers

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/8/19		
Date Completed	: 4/10/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.270813, -88.001378

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
0–3		4.0'/5.0'		0.0	moist	ML/SP		Brown SAND/SILT/CLAY. (36")
3–4					wet	ML		Gray SILT, very loose. (12")
4–5								No Recovery
5–5.5		4.0'/5.0'		0.0	wet	ML		Gray SILT with some sand. (6")
5.5–9					moist	CL		Brown/gray CLAY with orange mottling. Silt and fine sand present. (42")
9–10								No Recovery
10–15		5.0'/10'		0.0	moist	CL		Same soft CLAY as above with silt and fine sand. (60")
15–20								No Recovery
20–30		10'/10'		0.0	moist	CL		Fat gray CLAY. (120")

LOG OF BORING SBMIO19-2

LimnoTech — Water Environment | Scientists Engineers

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/8/19		
Date Completed	: 4/10/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.270813, -88.001378

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	DESCRIPTION
30		7.5'/10'		0.0	moist	CL	Same CLAY as above. (18")
						CL	Same CLAY with fine gravel. (1")
							Fat gray CLAY. (8")
						SW	Gray medium SAND. (14")
							Soft gray CLAY. (4")
						SP	Gray fine to medium SAND. (8")
							Gray CLAY with silt and fine sand. (1")
						SP	Gray fine to medium SAND. (13")
						CL	Gray/orange CLAY with silt and fine sand. (22")
							No Recovery
40		6.6'/10'				CL	Gray CLAY with silt and fine sand. Compressed organic layer at ~42'. (24")
						SP/ML	Orange fine SAND/SILT with some clay. (10")
						SP	Gray fine to medium SAND. (11")
						SW	Burnt orange medium SAND, very compacted. (10")
						SP	Brown fine to coarse SAND. (24")
							Burnt orange medium SAND, compacted. (1")
							No Recovery
50		5.7'/10'		0.0	wet	SP	Orange fine to medium SAND with some coarse sand. (19")
					wet	SP	Light gray/tan fine to medium SAND, trace coarse sand. (49")
							No Recovery
60							

LOG OF BORING SBMIO19-2

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/8/19		
Date Completed	: 4/10/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.270813, -88.001378

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	DESCRIPTION
60–62.4		5.6'/10'		0.0	wet	SP/GP	Light brown/gray fine to medium SAND, fine gravel mixed in from 61.5' to 62.4'. (29")
62.4–63.4					wet	SP	Light orange fine to medium SAND. (12")
63.4–65.6					wet	SP	Light gray / tan fine to medium SAND, trace coarse sand. (26")
65.6–70					wet		No Recovery
70–74		9.0'/10'		0.0	wet	SP	Same as above. (48")
74–79					wet	SP/GP	Tan medium to coarse SAND and fine GRAVEL. Trace fine sand. (60")
79–80					wet		No Recovery
80–83.7		7.0'/10'		0.1	wet	SP/GP	Same as above, increasing orange color from 82' to 83.7'. (44")
83.7–84.8				9.3	moist	CL	Gray / brown firm CLAY. (13")
84.8–87				0.1	wet	ML/SP	Gray SILT / fine SAND. (26")
87–90							No Recovery

LOG OF BORING SBMIO19-2

LimnoTech — Water Environment | Scientists Engineers

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/8/19		
Date Completed	: 4/10/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.270813, -88.001378

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
90–97		8.7'/10'		0.0	wet	SP		Gray fine SAND, trace silt'. (79")
97					moist	CL		Firm gray CLAY. (7")
97.5–99					wet	ML		Gray SILT with clay and fine sand. (18")
99–100								No Recovery
100–104		10'/10'		0.0	moist/dry	CL		Hard blue/gray CLAY with brown streaking. (48")
104–108.4					moist	CL		Softer blue gray CLAY with silt and fine sand. (53")
108.4–110					moist/dry	CL		Hard blue/gray CLAY with brown streaking. (19")
110–111		10'/10'		0.0	moist	ML		Light gray SILT with clay and fine sand. (12")
111–117					moist/dry	CL		Hard gray / blue CLAY with brown streaks. (72")
117–118					moist	ML/CL		Gray SILT / CLAY. (12")
118–120					moist/wet	SP		Gray very fine SAND with silt, trace clay. (24")

LOG OF BORING SBMIO19-2

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BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/8/19
Date Completed	: 4/10/19
Drilling Method	: Sonic
Drilling Contractor	: Walker Hill
Logged By	: CB
Total Logged Depth	: 250'
Water Depth	: n/a
Ground Elevation	:
Lat/Long	: 31.270813, -88.001378

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
120–125		10'/10' (120–130)		0.0	dry	CL		Gray CLAY with brown streaking. Silt and very fine sand in clay. (60")
125–130				0.0	dry/moist	ML/SP		Gray SILT and very fine SAND, some clay. (60")
130–132.3		10'/10' (130–140)		0.0	moist	ML/SP		Same as above. (28")
132.3–134					moist/dry	CL		Gray CLAY with silt and fine sand. (20")
134–140					dry	CL		Gray hard CLAY with some silt and fine sand. (72")
140–147		10'/10' (140–150)		0.0	moist	ML		Blue / gray SILT with fine sand and clay. (84")
147–150					moist	CL		Gray CLAY with brown streaking, some silt but much less than above. (36")

LOG OF BORING SBMIO19-2

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/8/19		
Date Completed	: 4/10/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.270813, -88.001378

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	DESCRIPTION
150–160		10'/10'		0.0	moist	CL	Hard gray CLAY with red and brown streaks. (72")
160							Tan fine SAND. (4")
160–170		10'/10'		0.0	dry	CL	Very hard gray CLAY, with brown and red streaking. Increasing red color from 166' to 170'. (116")
170–172.4		10'/10'		0.0	dry	ML/CL	Blue/gray SILT/CLAY. (29")
172.4–178.6					dry	CL	Hard blue / gray CLAY with silt and fine sand. (6")
178.6–179.4					dry/moist	SP/ML	Very tight gray fine to very fine SAND and SILT. (10")
179.4–180					dry/moist	ML/CL	Blue / gray SILT/CLAY with brown streaks. (7")

LOG OF BORING SBMIO19-2

LimnoTech
Water Environment | Scientists Engineers

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/8/19		
Date Completed	: 4/10/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.270813, -88.001378

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	DESCRIPTION
180–181		10'/10' (180–190)		0.0	dry/moist	ML/CL	Blue / gray SILT/CLAY. (12")
181–181.8					dry	SP	Blue / gray fine to very fine SAND with silt and clay. (10")
181.8–190					dry	CL	Very hard gray CLAY with red / brown mottling. (98")
190–194.5		10'/10' (190–200)		0.0	moist	CL	Gray CLAY, softer than above. (54")
194.5–196.8					dry	CL	Very hard gray CLAY. (28")
196.8–198.7					dry	ML/SP	Hard packed gray SILT / SAND with clay. (23")
198.7–200					wet	SP	Gray very fine to medium SAND. (5")
200–207		7.0'/10' (200–210)	GW Sample (205'-207')	0.0	wet	SP	Gray fine to medium SAND, some coarse sand and fine gravel. Trace silt present. (84")
207–210					wet		No Recovery

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LOG OF BORING SBMIO19-2

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/8/19		
Date Completed	: 4/10/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.270813, -88.001378

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	DESCRIPTION
210–212.5		2.5'/10'		0.0	wet	SP	Gray fine to medium SAND, trace silt, coarse sand and fine gravel. (30")
212.5–220			GW Sample (218'-220')		wet		No Recovery
220–224.6		4.6'/10'		0.0	wet	SP	Gray fine to coarse SAND with some fine gravel, trace silt and clay. (55")
224.6–230					wet		No Recovery
230–238.5		6.0'/10'	GW Sample (230'-232')	0.0	wet	SP	Gray medium to coarse SAND with fine gravel. Trace fine sand, silt and clay. (102")
238.5–240			GW Sample (238'-240')		moist/dry	CL	Hard gray CLAY. (18")

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LOG OF BORING SBMIO19-2

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/8/19		
Date Completed	: 4/10/19	Total Logged Depth	: 250'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.270813, -88.001378

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
240–250		10'/10'		0.0	moist/dry	CL		Gray hard CLAY, red streaking near 250'. (120")
250								End of Boring All casings were removed and boring was grouted with a tremie pipe to ground surface using cement grout.

LOG OF BORING SBMIO19-3

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BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/17/19		
Date Completed	: 5/2/19	Total Logged Depth	: 210'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.271049, -88.005296

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
0								Blind Drill to 60'.
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
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30								

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LOG OF BORING SBMIO19-3

LimnoTech — Water Environment | Scientists Engineers

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/17/19		
Date Completed	: 5/2/19	Total Logged Depth	: 210'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.271049, -88.005296

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
30								Blind drill to 60' (continued).
31								
32								
33								
34								
35								
36								
37								
38								
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60								

LOG OF BORING SBMIO19-3

LimnoTech
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BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/17/19		
Date Completed	: 5/2/19	Total Logged Depth	: 210'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.271049, -88.005296

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
60–62		7.0'/10' (60–70)		0.0	wet (60–83.5)	SP		Light brown fine to medium SAND, trace coarse sand and fine gravel. (24")
62–65.4				0.0		SP		Light brown fine to coarse SAND, trace fine gravel. (41")
65.4–67				0.0		SP		Light brown medium to coarse SAND. Some fine gravel and trace fine sand. (19")
67–70								No Recovery
70–73.6		9.0'/10' (70–80)		0.0		SP		Light brown medium to coarse SAND, trace fine gravel and fine sand. (43")
73.6–78				0.0		SP/GP		Brown/orange medium to coarse SAND and fine gravel. (53")
78–79				0.0		SP/GP		Orange coarse SAND and fine GRAVEL, trace medium sand. (12")
79–80								No Recovery
80–81.6		5.7'/10' (80–90)		0.0		SP		Brown fine to medium SAND, some coarse sand and fine gravel. (19")
81.6–83.2						SP		Brown fine to coarse SAND with fine gravel. (19")
83.2–85.7				0.0	moist	CL		Hard gray CLAY with silty seam at 84.6'. (30")
85.7–90								No Recovery

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LOG OF BORING SBMIO19-3

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/17/19		
Date Completed	: 5/2/19	Total Logged Depth	: 210'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.271049, -88.005296

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
90–120								Blind drill from 90' to 120'. Driller suggests that soil is clay (based on resistance).

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LOG OF BORING SBMIO19-3

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/17/19		
Date Completed	: 5/2/19	Total Logged Depth	: 210'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.271049, -88.005296

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
120								Blind drill from 120' to 150'. Driller suggests soil is sand, based on resistance.
121								
122								
123								
124								
125			GW Sample (125'-127')					
126								
127								
128								
129								
130								
131								
132								
133								
134								
135								
136								
137								
138								
139								
140								
141			GW Sample (141'-143')					
142								
143								
144								
145								
146			GW Sample (146'-148')					
147								
148								
149								
150								

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LOG OF BORING SBMIO19-3

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/17/19		
Date Completed	: 5/2/19	Total Logged Depth	: 210'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.271049, -88.005296

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
150								Blind drill from 150' to 200'. Driller suggests soil is clay, based on resistance.
151								
152								
153								
154								
155								
156								
157								
158								
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164								
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178								
179								
180								

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LOG OF BORING SBMIO19-3

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/17/19		
Date Completed	: 5/2/19	Total Logged Depth	: 210'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.271049, -88.005296

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
180–200								Blind drill (continued).
200–210		10'/10'	GW Sample (206'-208')	0.0	wet	SP		Gray fine to medium SAND. (120")

LOG OF BORING SBMIO19-3

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 4/17/19		
Date Completed	: 5/2/19	Total Logged Depth	: 210'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.271049, -88.005296

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
210–220			GW Sample (@220')					Interval not logged. Push ahead probe used to collect water sample at bottom of this interval.
220								End of Boring All casings were removed and boring was grouted with a tremie pipe to ground surface using cement grout.

Depth scale: 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240

LOG OF BORING SBMIO19-4

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 5/3/19		
Date Completed	: 5/9/19	Total Logged Depth	: 230'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.27278, -88.00464

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
0–30								Blind drill to 90'.

BASF 1379 Ciba Rd. McIntosh, AL, 36553		
Date Started : 5/3/19		
Date Completed : 5/9/19	Total Logged Depth : 230'	
Drilling Method : Sonic	Water Depth : n/a	
Drilling Contractor : Walker Hill	Ground Elevation :	
Logged By : CB	Lat/Long : 31.27278, -88.00464	

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
30								Blind drill to 90' (continued).
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								
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60								

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BASF 1379 Ciba Rd. McIntosh, AL, 36553	Date Started : 5/3/19 Date Completed : 5/9/19 Drilling Method : Sonic Drilling Contractor : Walker Hill Logged By : CB		Total Logged Depth : 230' Water Depth : n/a Ground Elevation : Lat/Long : 31.27278, -88.00464

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
60								Blind drill to 90' (continued).
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								
71								
72								
73								
74								
75								
76								
77								
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79								
80								
81								
82								
83								
84								
85								
86								
87								
88								
89								
90								

LOG OF BORING SBMIO19-4

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 5/3/19		
Date Completed	: 5/9/19	Total Logged Depth	: 230'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.27278, -88.00464

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
90–92.5		10'/10'		0.0 (92)	wet	SP		Brown fine to medium SAND with some coarse sand and fine gravel. (30")
92.5–100				2.9 (93), 2.0 (96), 0.0 (99.5)	moist	CL		Gray medium soft CLAY. (90")
100–120								Blind drill to 190'

LOG OF BORING SBMIO19-4

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 5/3/19		
Date Completed	: 5/9/19	Total Logged Depth	: 230'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.27278, -88.00464

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
120								Blind drill to 190' (continued).
121								
122								
123								
124								
125								
126								
127								
128								
129								
130								
131								
132								
133								
134								
135								
136								
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145								
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147								
148								
149								
150								

LOG OF BORING SBMIO19-4

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 5/3/19		
Date Completed	: 5/9/19	Total Logged Depth	: 230'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.27278, -88.00464

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
150								Blind drill to 190' (continued).
151								
152								
153								
154								
155								
156								
157								
158								
159								
160								
161								
162								
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179								
180								

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LOG OF BORING SBMIO19-4

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 5/3/19		
Date Completed	: 5/9/19	Total Logged Depth	: 230'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.27278, -88.00464

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
180–190								Blind drill to 190' (continued).
190–193		10'/10' (190–200)		0.0	moist	ML		Gray soft SILT with fine sand and clay. (36")
193–194					moist	CL		Gray medium soft CLAY with silt and some fine sand. (12")
194–197.5					moist	CL		Brown firm CLAY. (42")
197.5–199.4					moist	SP		Gray very fine to fine SAND with some silt and clay. (23")
199.4–200					dry	CL		Hard gray/red CLAY. (7")
200–201.7		9.5'/10' (200–210)		0.0	moist	ML/SP		Hard packed blue/gray SILT/SAND/CLAY. (20")
201.7–205.4				1.8	wet	SP		Blue/gray fine SAND with silt. (44")
205.4–207.5				3.2	dry	CL		Hard gray CLAY. (25")
207.5–209.5				1.9	dry	CL		Hard brown/gray CLAY. (24")
209.5–210								No Recovery

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LOG OF BORING SBMIO19-4

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 5/3/19		
Date Completed	: 5/9/19	Total Logged Depth	: 230'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.27278, -88.00464

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	DESCRIPTION
210–217.5		10'/10' (210–220)		0.0	moist/dry	CL	Hard blue/gray CLAY with red and brown streaking. (90")
217.5–220					moist/dry	CL	Hard blue/gray CLAY. (30")
220–222		7.0'/10' (220–230)		0.0 (220–230)	moist (220–224.5)	CL	Gray firm CLAY, trace silt. (24")
222–222.3							Gray fine to very fine SAND and SILT. (4")
222.3–223.3						CL	Gray medium soft CLAY. (12")
223.3–224.3						SP	Gray fine to very fine SAND with silt. (12")
224.3–224.7						CL	Gray medium soft CLAY. (5")
224.7–230					wet	SP	Gray fine to medium SAND, some coarse sand and gravel. (64")
230–240							Interval not logged. Push ahead probe used to collect groundwater sample from this interval.

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LOG OF BORING SBMIO19-4

BASF
1379 Ciba Rd.
McIntosh, AL, 36553

Date Started	: 5/3/19		
Date Completed	: 5/9/19	Total Logged Depth	: 230'
Drilling Method	: Sonic	Water Depth	: n/a
Drilling Contractor	: Walker Hill	Ground Elevation	:
Logged By	: CB	Lat/Long	: 31.27278, -88.00464

Depth in Feet	Surf. Elev.	Recovery (in.)	Sample Type	PID (ppm)	Moisture Content	USCS	GRAPHIC	DESCRIPTION
240–242			GW Sample (240'-242')					
242								End of Boring All casings were removed and boring was grouted with a tremie pipe to ground surface using cement grout.

Depth scale: 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270

07-08-2019 S:\CIBMC\OU1\Miocene_Investigations\2019_VAS_Investigation\VAS_Boring_Logs\SBMIO19-4.BOF

LITHOLOGIC DESCRIPTION, SW-1

OWNER: Ciba-Geigy Corporation

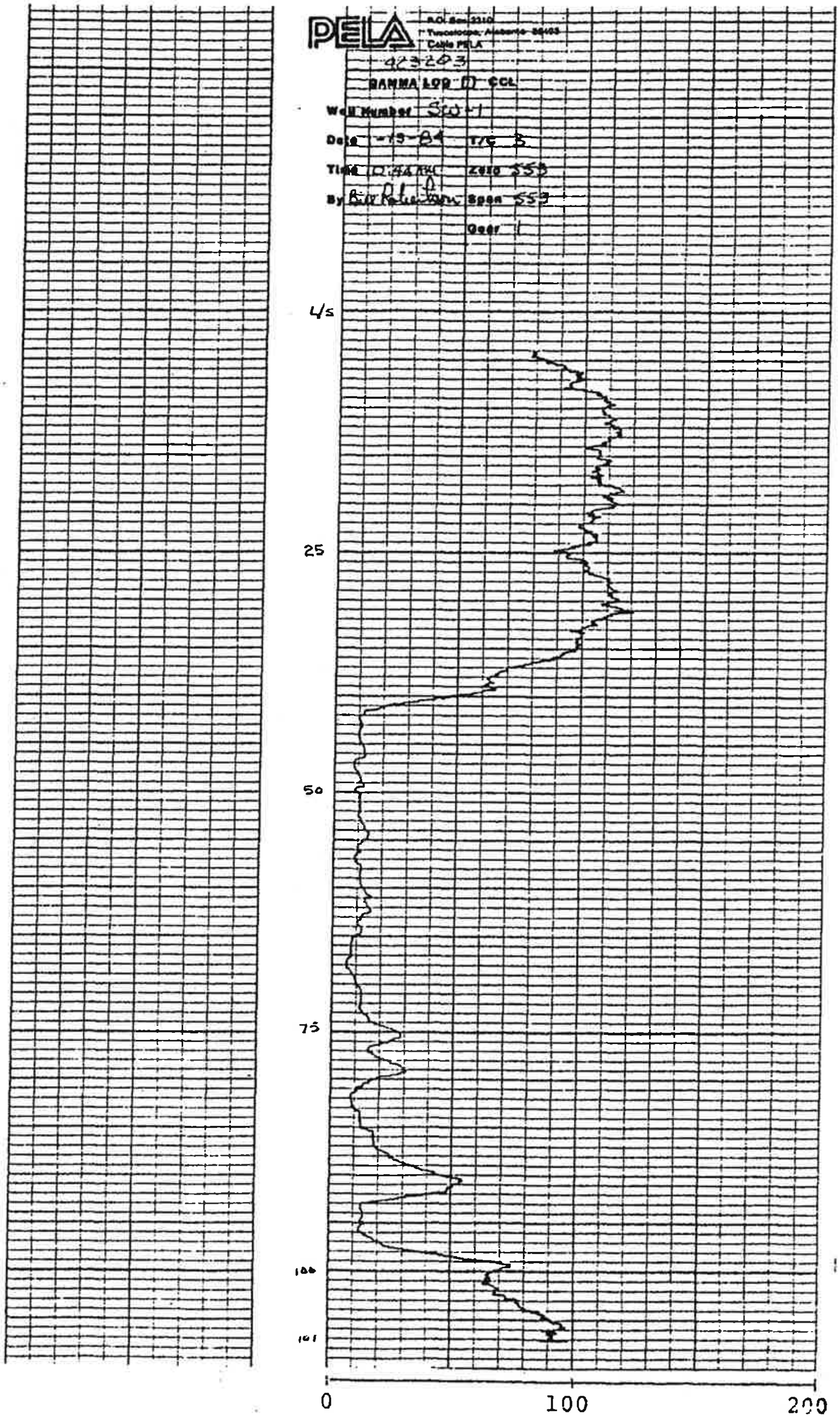
DATE DRILLED: January 12-21, 1984

PELA GEOLOGIST: Dan O. Madison, Jr.

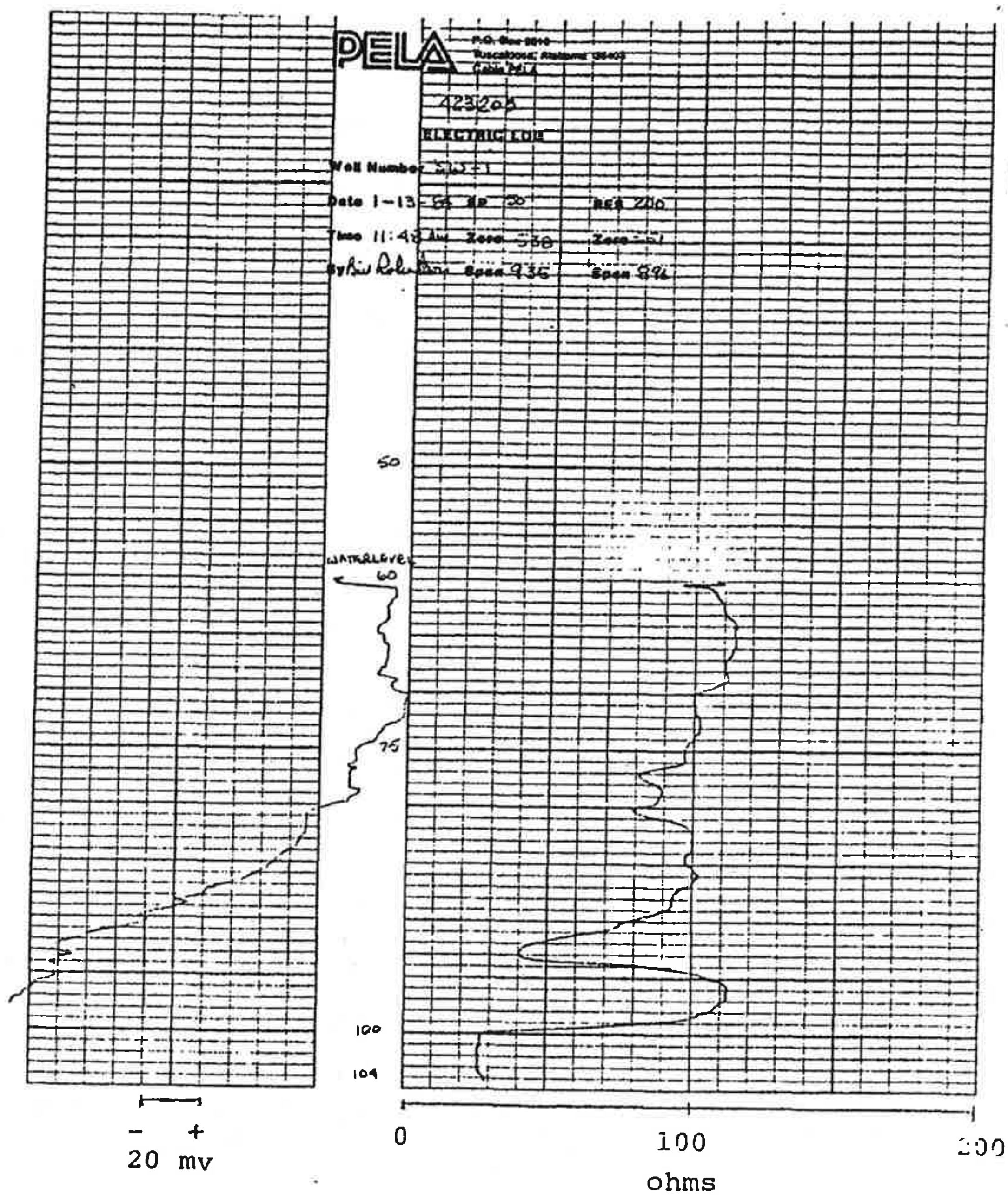
Depth (in feet)	Description
0 - 2.0	Clay, dark-yellowish-brown, very sandy, clear quartz, medium-grained, subrounded.
2.0 - 10.0	Clay, yellowish-gray, light-brown and dark-yellowish-orange, silty, stiff.
10.0 - 30.0	Clay, yellowish-gray with minor moderate reddish-brown and dark-yellowish-orange, silty, stiff.
30.0 - 41.0	Clay, yellowish-gray, trace dark-yellowish-orange and moderate reddish-brown, silty, stiff.
41.0 - 45.0	Sand, grayish-orange, clear quartz, medium-grained, rounded, minor dark-yellowish-orange chert grains, coarse-grained, trace of dark opaque grains, fine-grained.
45.0 - 55.0	Sand, grayish-orange, clear quartz, medium- to coarse-grained, subrounded, trace of dark opaque grains, fine-grained.
55.0 - 60.0	Sand, grayish-orange, clear quartz, medium- to coarse-grained, some very coarse-grained, subrounded, abundant gravel, clear to white quartz and colored opaque, 5 to 10 mm in diameter, rounded.
60.0 - 67.0	Sand and gravel, yellowish-gray to grayish-orange, clear quartz, coarse- to very coarse-grained, subrounded, gravel, same as above.
67.0 - 70.0	Sand, yellowish-gray to grayish-orange, clear quartz, medium- to very coarse-grained, trace of chert grains, trace of gravel, as above.
70.0 - 75.0	Sand, yellowish-gray to grayish-orange, clear quartz, coarse-grained, subangular to subrounded, trace of dark opaque grains, fine-grained.
75.0 - 80.0	Sand, yellowish-gray to very pale-orange, clear quartz, medium- to coarse-grained, some very coarse-grained, subrounded, minor chert grains, dark-yellowish-orange, medium- to coarse-grained, minor clay, light-gray, abundant gravel 75.0 to 76.5 feet, clear to white quartz

SW-1 (continued)

Depth (in feet)	Description
	and chert, dark-yellowish-orange, 3 to 12 mm in diameter, angular to rounded, minor clay.
80.0 - 90.0	Sand, yellowish-gray and very pale-orange, clear quartz, coarse-grained, subangular to subrounded, minor gravel, as above, minor clay, as above.
90.0 - 94.0	Sand, yellowish-gray and grayish-orange, coarse-grained, some medium-grained, minor chert grains, dark-yellowish-orange, medium- to coarse-grained, very clayey, light-gray.
94.0 - 98.0	Sand, yellowish-gray, clear quartz and minor dark-yellowish-orange chert, coarse- to very coarse-grained, angular to subrounded.
98.0 -105.0	Clay, light-gray and dark-yellowish-orange, silty, stiff.
105.0	TOTAL DEPTH.



Gamma log for SW-1: 4-107 feet below land surface



Electric log for SW-1: 60-104 feet below land surface

PELA

LITHOLOGIC DESCRIPTION, SW-3

OWNER: Ciba-Geigy Corporation

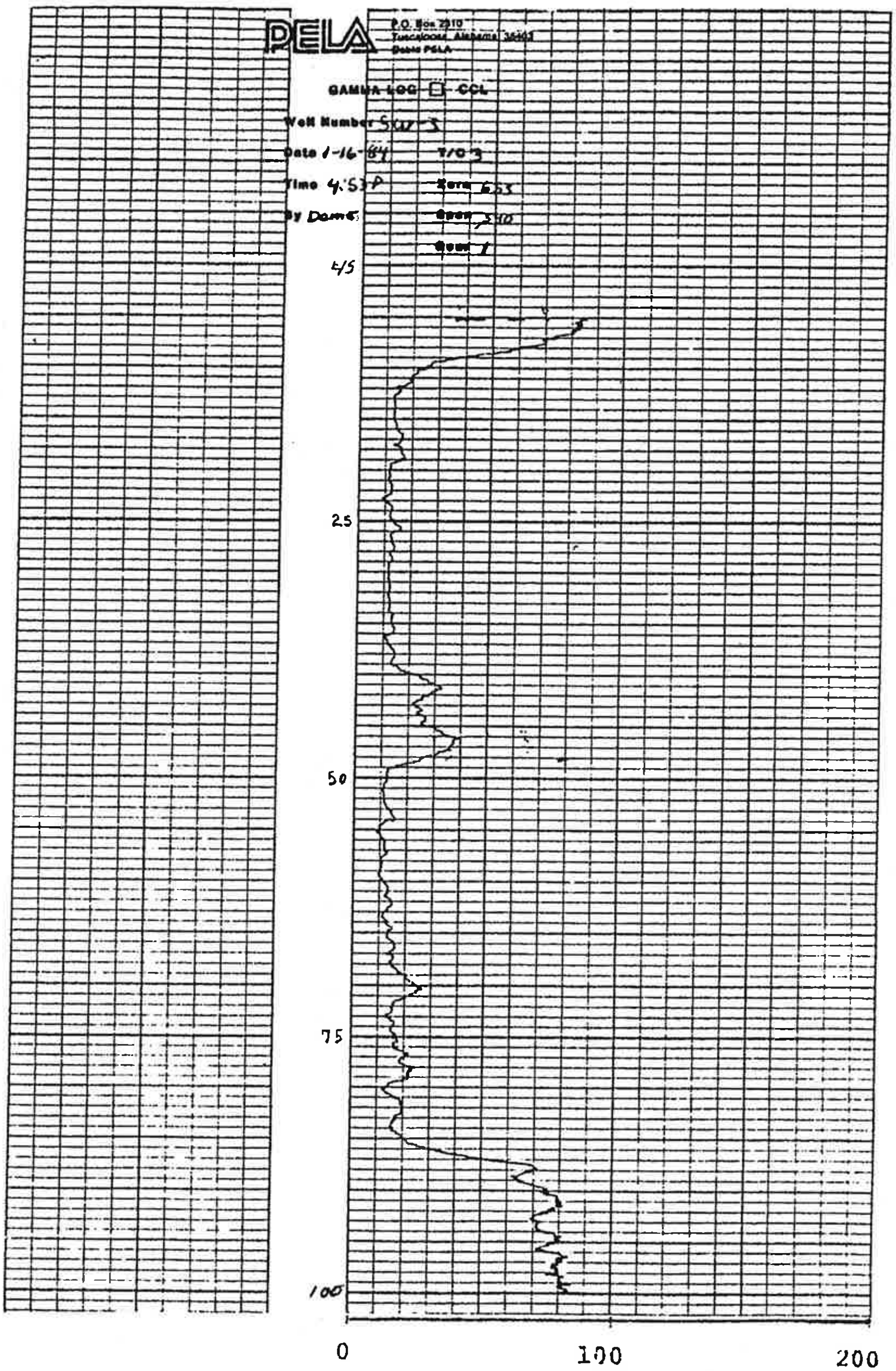
DATE DRILLED: January 29-30, 1984

PELA GEOLOGIST: Tom Schneider

Depth (in feet)	Description
0 - 5.0	Clay, grayish-orange with minor yellowish-gray, soft.
5.0 - 9.0	Clay, grayish-orange with minor yellowish-gray, stiff.
9.0 - 14.0	Sand, light-brown, clear quartz, medium-grained, subangular, clayey.
14.0 - 30.0	Sand, dark-yellowish-orange, clear to white quartz, medium-grained, subangular.
30.0 - 35.0	Sand, yellowish-gray, clear quartz, medium- to very coarse-grained, subangular.
35.0 - 40.0	Sand, same as above, minor gravel, quartz and chert, 2 to 10 mm in diameter.
40.0 - 45.0	Sand and gravel, yellowish-gray, sand, clear quartz, fine- to coarse-grained, subangular to subrounded, gravel, varicolored opaque, 2 to 10 mm in diameter, slightly clayey and silty.
45.0 - 50.0	Sand and gravel, yellowish-gray, sand, clear quartz, fine- to coarse-grained, subangular, gravel, as above, 2 to 15 mm in diameter, clayey.
50.0 - 55.0	Sand, yellowish-gray, clear to white quartz, medium- to coarse-grained, subrounded, abundant gravel, quartz and varicolored opaque, 2 to 6 mm in diameter.
55.0 - 60.0	Sand and gravel, yellowish-gray, sand, clear quartz, fine- to very coarse-grained, subangular, gravel, quartz and varicolored opaque, 2 to 17 mm in diameter, subrounded.
60.0 - 65.0	Sand and gravel, as above, gravel, 2 to 20 mm in diameter.
65.0 - 70.0	Sand and gravel, as above, gravel, 2 to 10 mm in diameter.
70.0 - 75.0	Sand and gravel, as above, gravel, 10 to 15 mm in diameter.

SW-3 (continued)

Depth (in feet)	Description
75.0 - 87.0	Sand and gravel, grayish-orange, clear quartz, medium- to very coarse-grained, subangular, gravel, as above, 2 to 30 mm in diameter.
87.0 -100.0	Clay, yellowish-gray, silty, minor sand, clear quartz, fine-grained. Drills very slowly.
100.0	TOTAL DEPTH.



Gamma log for SW-3: 5-100 feet below land surface

ERM-SOUTHEAST

Drilling/Boring Log

Project: CIBA Site OU No. 4 Slurry wall wells

Project No.:6174 Logged by: Robert Spencer

Well/Boring Location: North end of slurry wall

Well/Boring: TPZ-5

Date: 21-Aug-97

Drilling Method: Mud rotary

Depth to Groundwater:

Elevations - Ground Surface:

Driller: Geotechnical Endineering

Remarks:

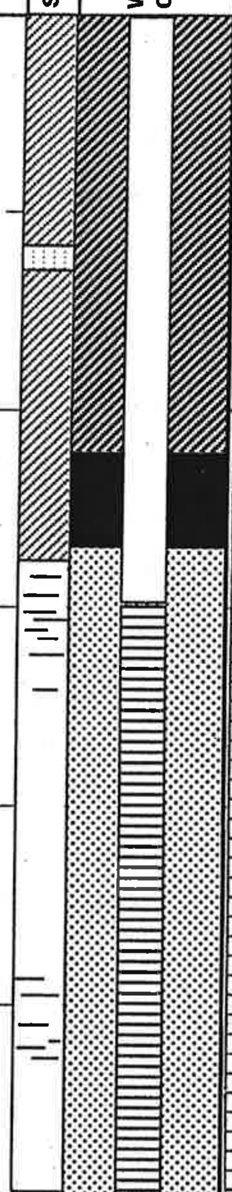
Legend		Legend	
Sands-SW, SP		Gravels, GW, GP	
Silts-ML, MH		Sands w/ fines-SM, SC	
Clays-CL, CH			
Organic soils-PT			

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description
10		1,1, 1	SANDY CLAY (CL) - Gray with red mottling.
20		2,2, 2	SILTY CLAY (CL) - Gray, no chemical odors.
30		2,2, 3	SAND (SW) Gray, medium to fine, little silt.
40		5,6, 5	SAND (SP) - Gray, med. to fine grained.
50		4,5, 5	SAND (SP) -Lt brown slightly silty.

Graphical Logs

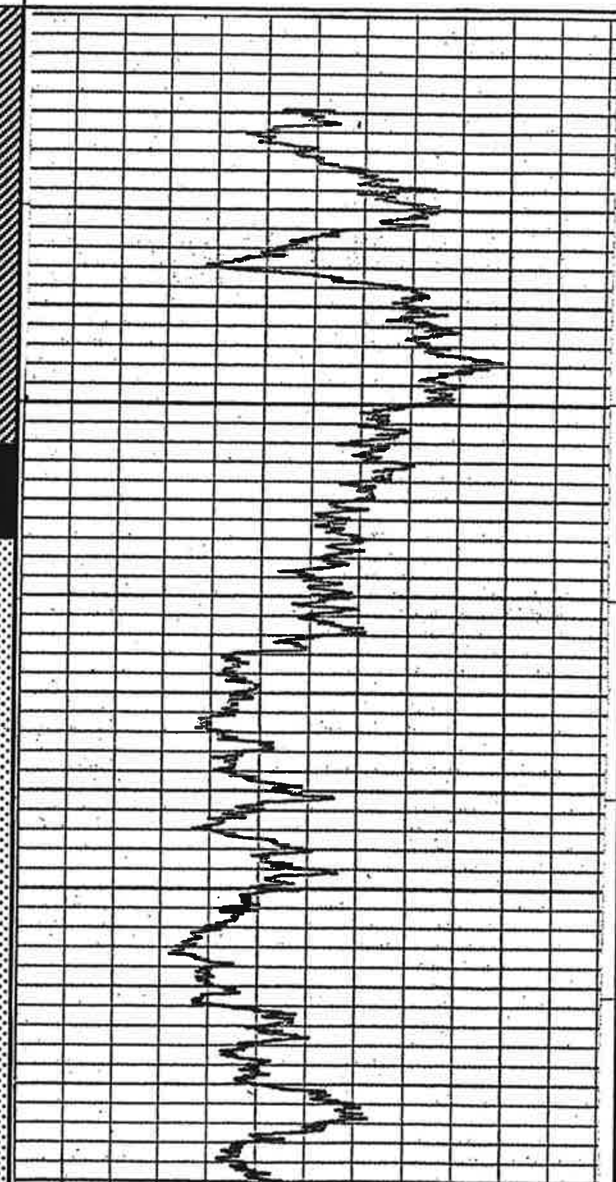
Strata

Well Construction



Gamma Log

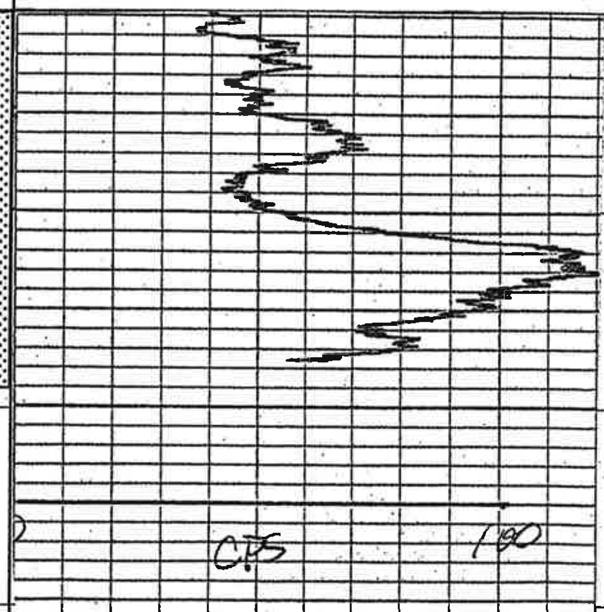
Counts per Second



Project:	CIBA Site OU No. 4 Slurry wall wells	Well/Boring:	TPZ-5
Project No.:	6174	Logged By:	Robert Spencer

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction
60	■	5,6, 10	Sandy Gravel (GP)- Yellow orange.		
70	■	9,11,6	CLAYEY SAND (CL)- Hard, grayish blue. Miocene. Boring terminated at 70 feet.		
80					

Gamma Log
Counts per Second



ERM

Monitoring Well Schematic

Project: CIBA Site OU No. 4 Slurry wall wells

Well/Boring No.: TPZ-5

Project No.: 6174

Drilling Supervisor: Robert H. Spencer

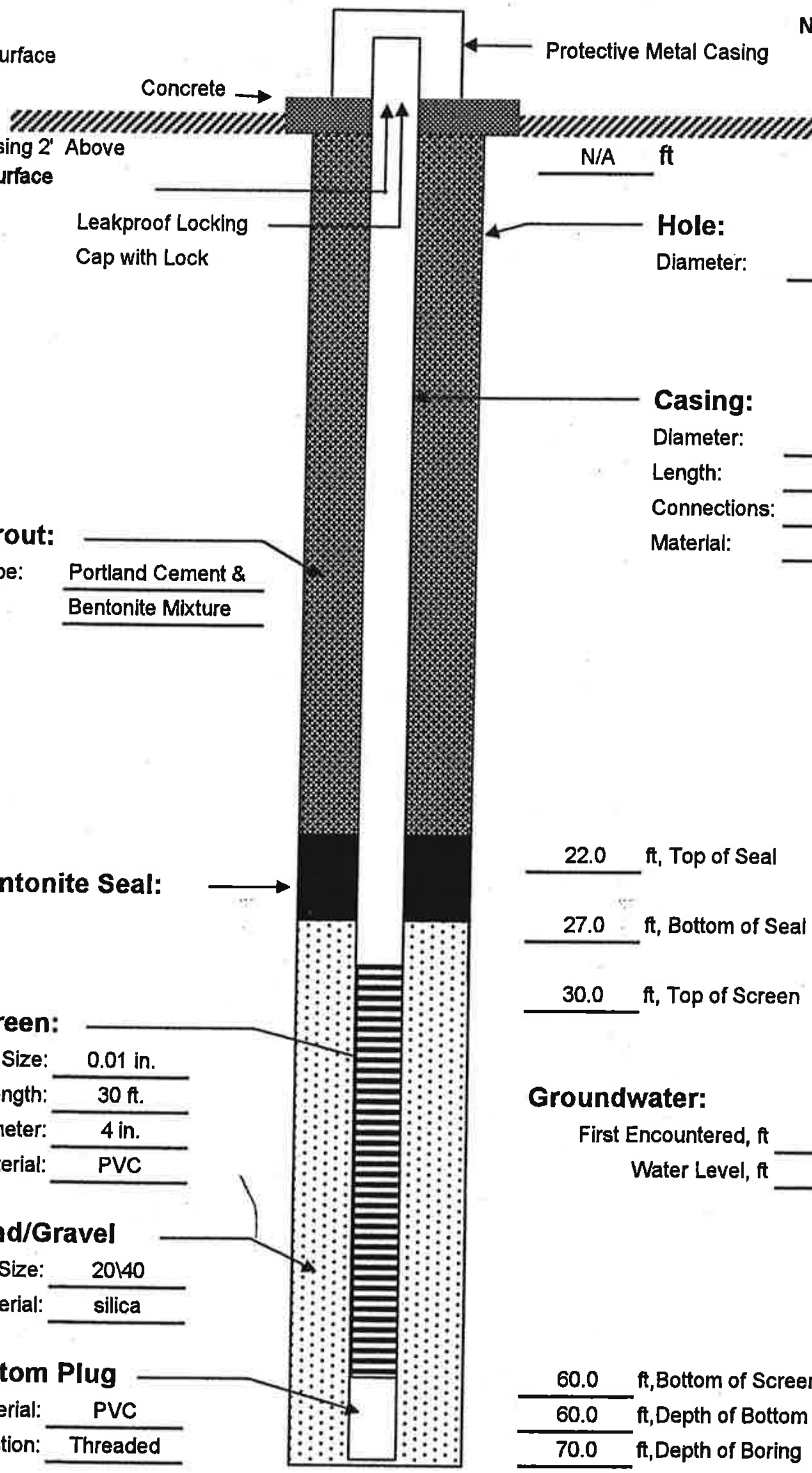
Boring Location: North end of slurry wall

Date(s): 21-Aug-97

Drilling Method: Mud Rotary

Drilling Contractor: Geotechnical Engineering

NOT TO SCALE



Hole:

Diameter: 8 in.

Casing:

Diameter: 4 inch
Length: 30 feet
Connections: threaded
Material: PVC

Grout:

Type: Portland Cement & Bentonite Mixture

Bentonite Seal:

22.0 ft, Top of Seal
27.0 ft, Bottom of Seal
30.0 ft, Top of Screen

Screen:

Slot Size: 0.01 in.
Length: 30 ft.
Diameter: 4 in.
Material: PVC

Groundwater:

First Encountered, ft
Water Level, ft

Sand/Gravel

Size: 20\40
Material: silica

Bottom Plug

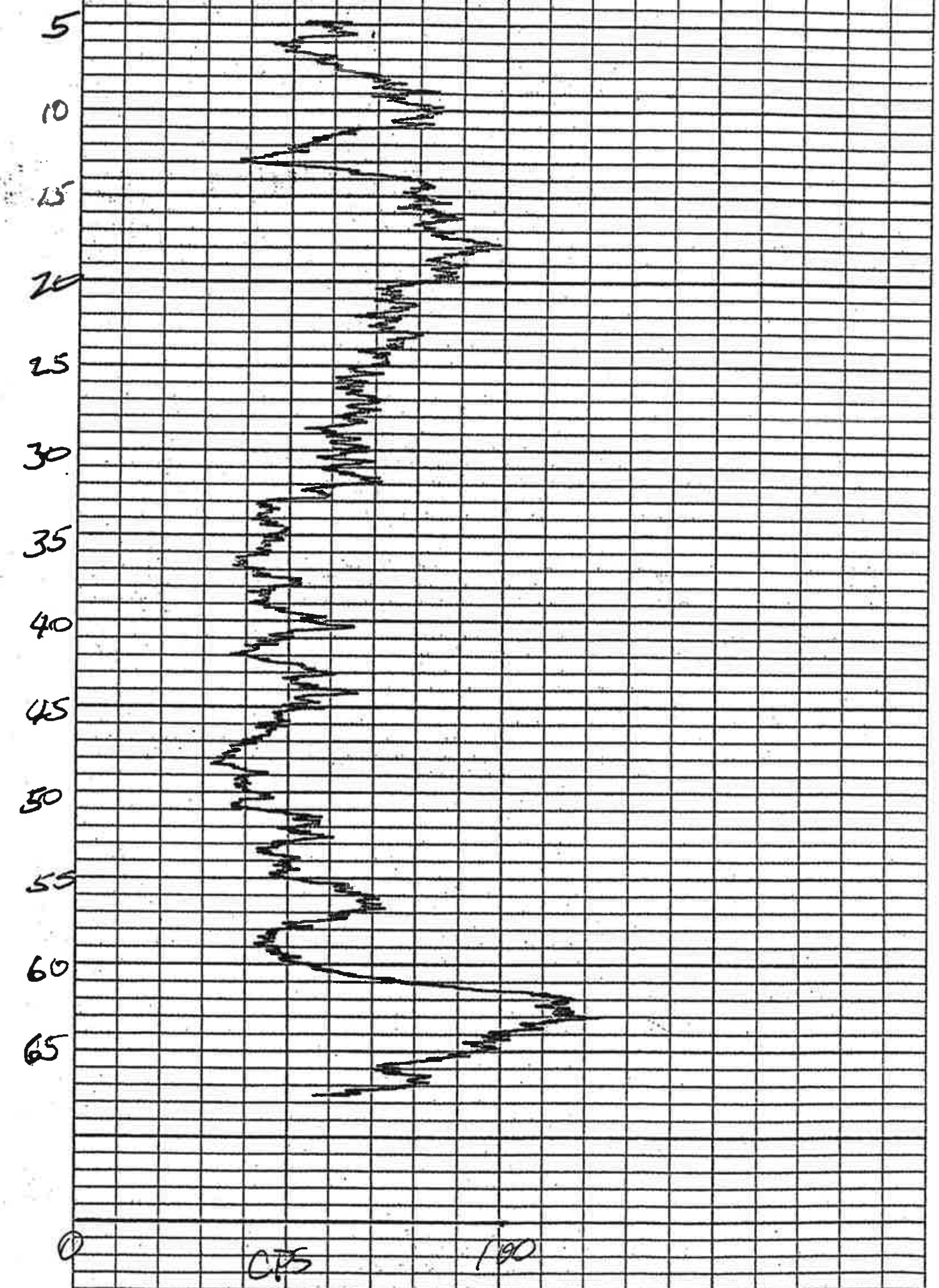
Material: PVC
Connection: Threaded

60.0 ft, Bottom of Screen
60.0 ft, Depth of Bottom Plug
70.0 ft, Depth of Boring

Depth from Surface

Comments:

C13A
8-21-97
TPZ-5



ERM

Monitoring Well Schematic

Project: CIBA Site OU No. 4 Slurry wall wells

Well/Boring No.: TPZ-6

Project No.: 6174

Drilling Supervisor: Robert H. Spencer

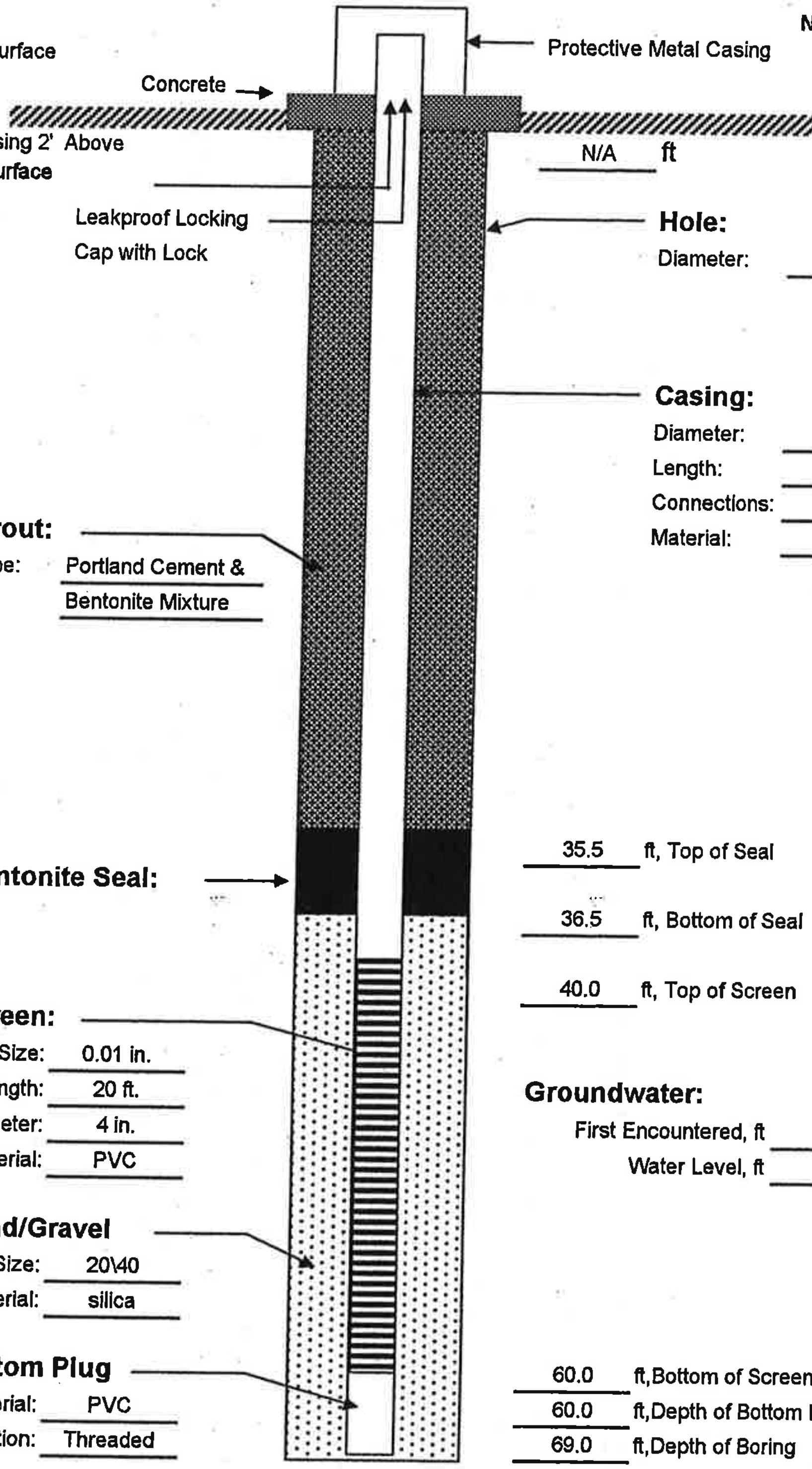
Boring Location: West end of slurry wall

Date(s): 08/26-27/1997

Drilling Method: Mud Rotary

Drilling Contractor: Geotechnical Engineering

NOT TO SCALE



Existing Surface

Concrete

Protective Metal Casing

Top of Casing 2' Above Existing Surface: N/A ft

Leakproof Locking Cap with Lock

Hole:

Diameter: 8 in.

Casing:

Diameter: 4 inch

Length: 40 feet

Connections: threaded

Material: PVC

Grout:

Type: Portland Cement & Bentonite Mixture

Bentonite Seal:

35.5 ft, Top of Seal

36.5 ft, Bottom of Seal

40.0 ft, Top of Screen

Screen:

Slot Size: 0.01 in.

Length: 20 ft.

Diameter: 4 in.

Material: PVC

Groundwater:

First Encountered, ft

Water Level, ft

Sand/Gravel

Size: 20\40

Material: silica

Bottom Plug

Material: PVC

Connection: Threaded

60.0 ft, Bottom of Screen

60.0 ft, Depth of Bottom Plug

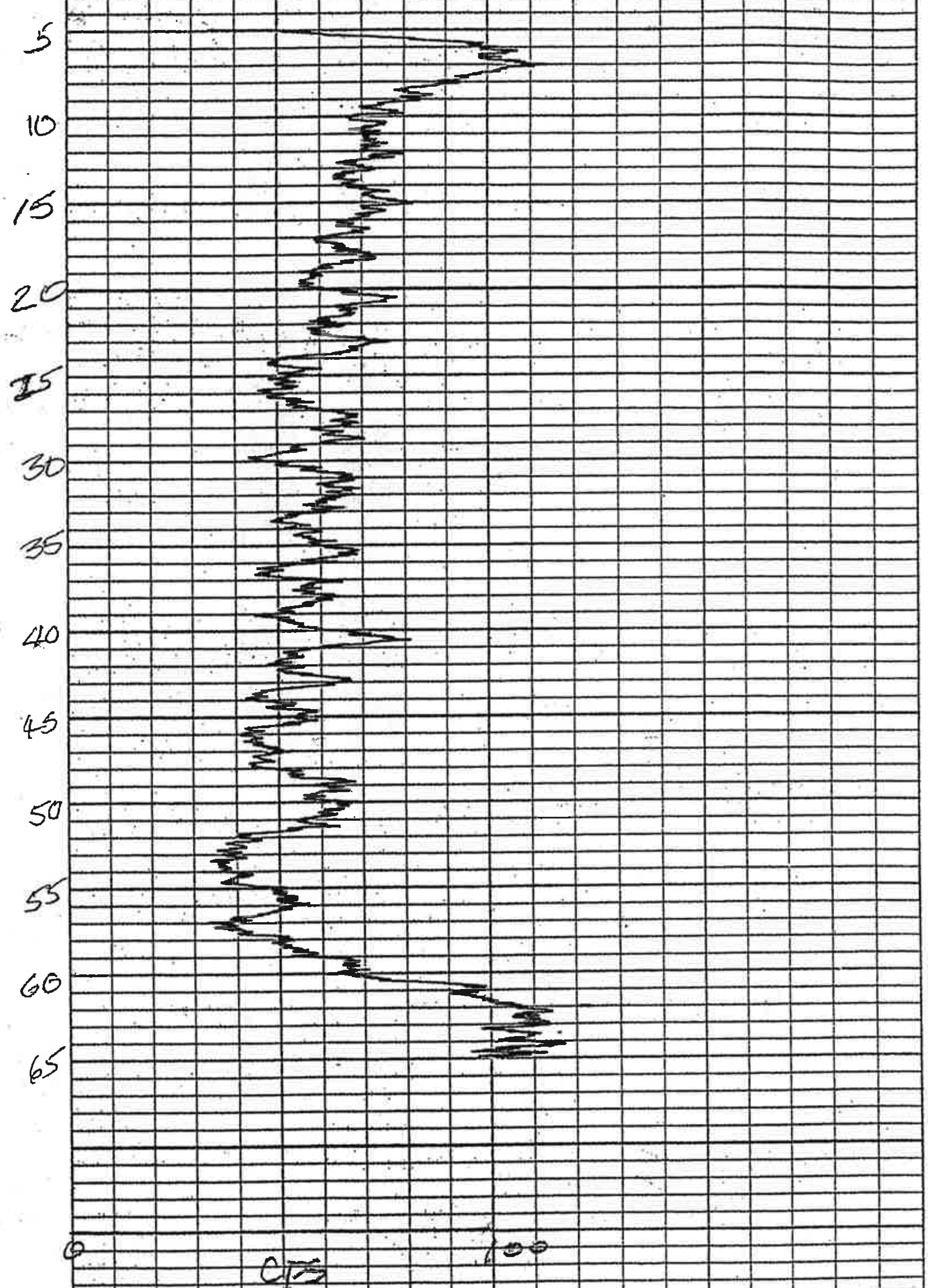
69.0 ft, Depth of Boring

Depth from Surface

Comments:

8-21-97
TP Z6

NATURAL GAMMA



ERM-SOUTHEAST

Drilling/Boring Log

Project: CIBA Site OU No. 4 Slurry wall wells

Project No.:6174 Logged by: Robert Spencer

Well/Boring Location: West end of slurry wall

Drilling Method: Mud rotary

Depth to Groundwater:

Elevations - Ground Surface:

Driller: Geotechnical Endineering

Remarks:

Well/Boring: TPZ-6

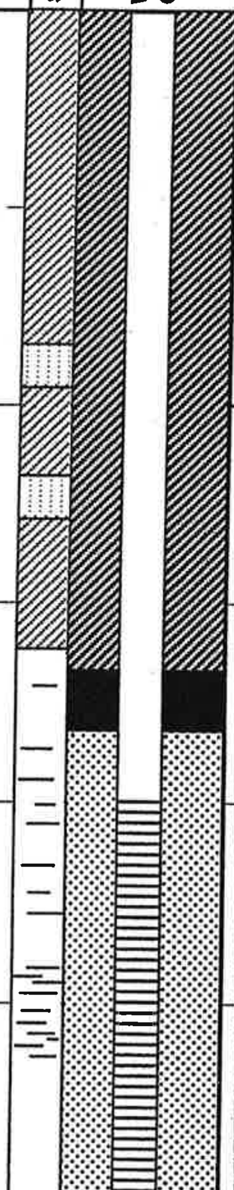
Date: August 26-27, 1997

Sands-SW, SP		Gravels, GW, GP	
Silts-ML, MH		Sands w/ fines-SM, SC	
Clays-CL, CH			
Organic soils-PT			

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description
10		1,1, 1	SILTY CLAY (CL) -Dark gray, soft. No discernable chemical odors.
20		2,3, 4	SAND (SP) - Gray, medium to fine, no chemical odors.
30		2,2, 5	CLAYEY SAND (SC) with Sandy Clay stringers-Gray.
40		5,4, 5	SAND (SP) - Gray, med. to fine grained.
50		5,5, 7	SAND (SP) -Gray w/ clay seam.

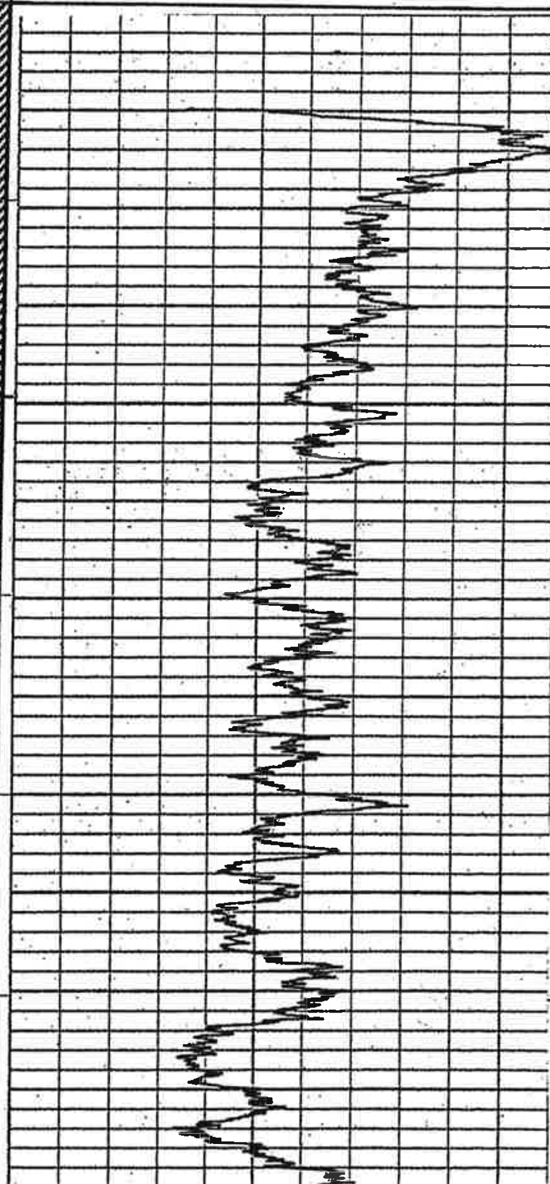
Graphical Logs

Strata | Well Construction



Gamma Log

Counts per Second

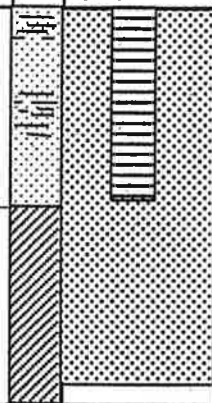


Project: CIBA Site OU No. 4 Slurry wall wells
Project No.: 6174

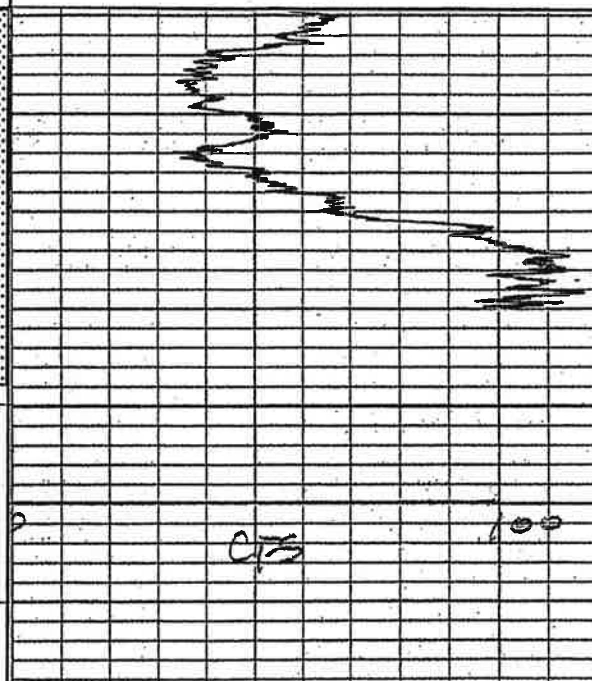
Well/Boring: TPZ-6
Logged By: Robert Spencer

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description
60		5,5, 8	Sand (SW)-Gray, med. grain.
70		8,14, 17	CLAY (CL)-Hard, sl. silty, grayish blue w/ red mottling. Miocene. Boring terminated at 69 feet.
80			

Graphical Logs: Strata, Well Construction



Gamma Log
Counts per Second



ERM-SOUTHEAST

Drilling/Boring Log

Project: CIBA Site OU No. 4 Slurry wall wells

Project No.:6174 Logged by: Robert Spencer

Well/Boring Location: West end of slurry wall

Drilling Method: Mud rotary

Depth to Groundwater:

Elevations - Ground Surface:

Driller: Geotechnical Endineering

Remarks:

Well/Boring: TPZ-7

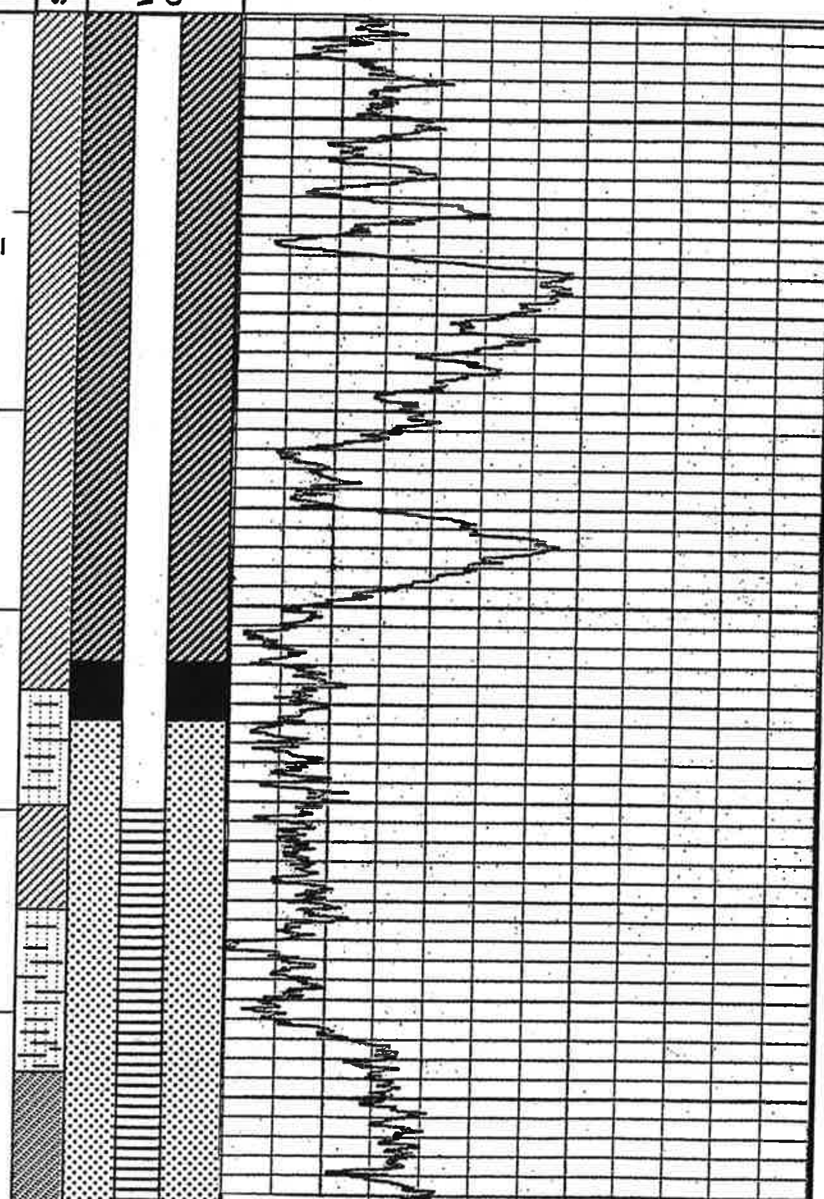
Date: August 18-20, 1997

Legend	
Sands-SW, SP	Gravels, GW, GP
Silts-ML, MH	Sands w/ fines-SM, SC
Clays-CL, CH	
Organic soils-PT	

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description
10		1,2, 3	SILTY CLAY (CL) -w/ minor sand. Gray w/ some orange mottling. No discernable chemical odors.
20		2,3, 4	No sample retieved.
30		1,2, 3	SILTY CLAY (CL) as above w/ increased mottling.
40		3,4, 5	SILTY SAND (SM) - Gray, fine to v. fine grained.
50		5, 8, 11	CLAYEY SAND (CL) -Gray w/ brown mottling.

Graphical Logs: Strata, Well Construction

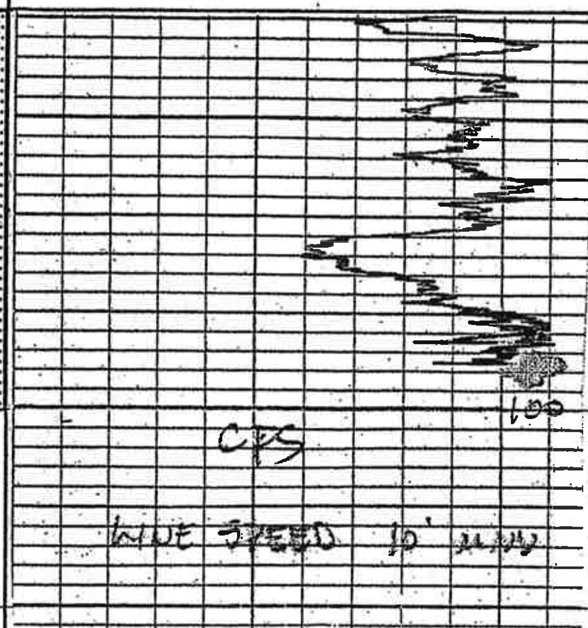
Gamma Log
Counts per Second



Project: CIBA Site OU No. 4 Slurry wall wells
Project No.: 6174

Well/Boring: TPZ-7
Logged By: Robert Spencer

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log Counts per Second
60		5,7, 8	Clayey Sand (SC)- Grayw/ brown mottling.			
70		10,1 516	SILTY SANDY CLAY (CL)-Gray to gray-green,- Miocene. Boring terminated at 70 feet.			
80						

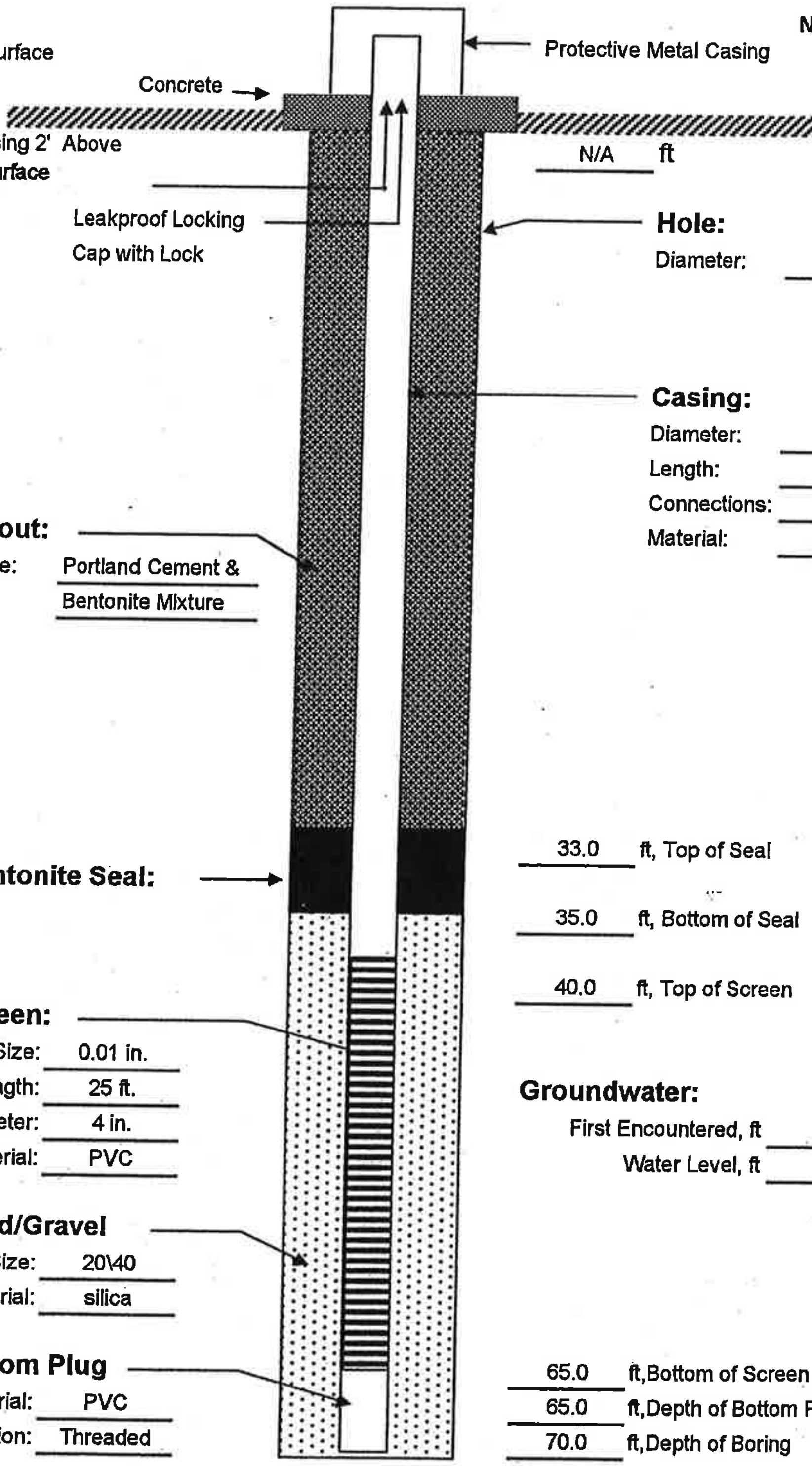


ERM

Monitoring Well Schematic

Project:	CIBA Site OU No. 4 Slurry wall wells	Well/Boring No.:	TPZ-7
Project No.:	6174	Drilling Supervisor:	Robert H. Spencer
Boring Location:	West end of slurry wall	Date(s):	08/18-20/1997
Drilling Method:	Mud Rotary	Drilling Contractor:	Geotechnical Engineering

NOT TO SCALE



Existing Surface

Concrete

Protective Metal Casing

Top of Casing 2' Above Existing Surface

N/A ft

Leakproof Locking Cap with Lock

Hole:
Diameter: 8 in.

Casing:
Diameter: 4 inch
Length: 40 feet
Connections: threaded
Material: PVC

Grout:
Type: Portland Cement & Bentonite Mixture

Bentonite Seal:

33.0 ft, Top of Seal

35.0 ft, Bottom of Seal

40.0 ft, Top of Screen

Screen:
Slot Size: 0.01 in.
Length: 25 ft.
Diameter: 4 in.
Material: PVC

Groundwater:
First Encountered, ft
Water Level, ft

Sand/Gravel
Size: 20\40
Material: silica

Bottom Plug
Material: PVC
Connection: Threaded

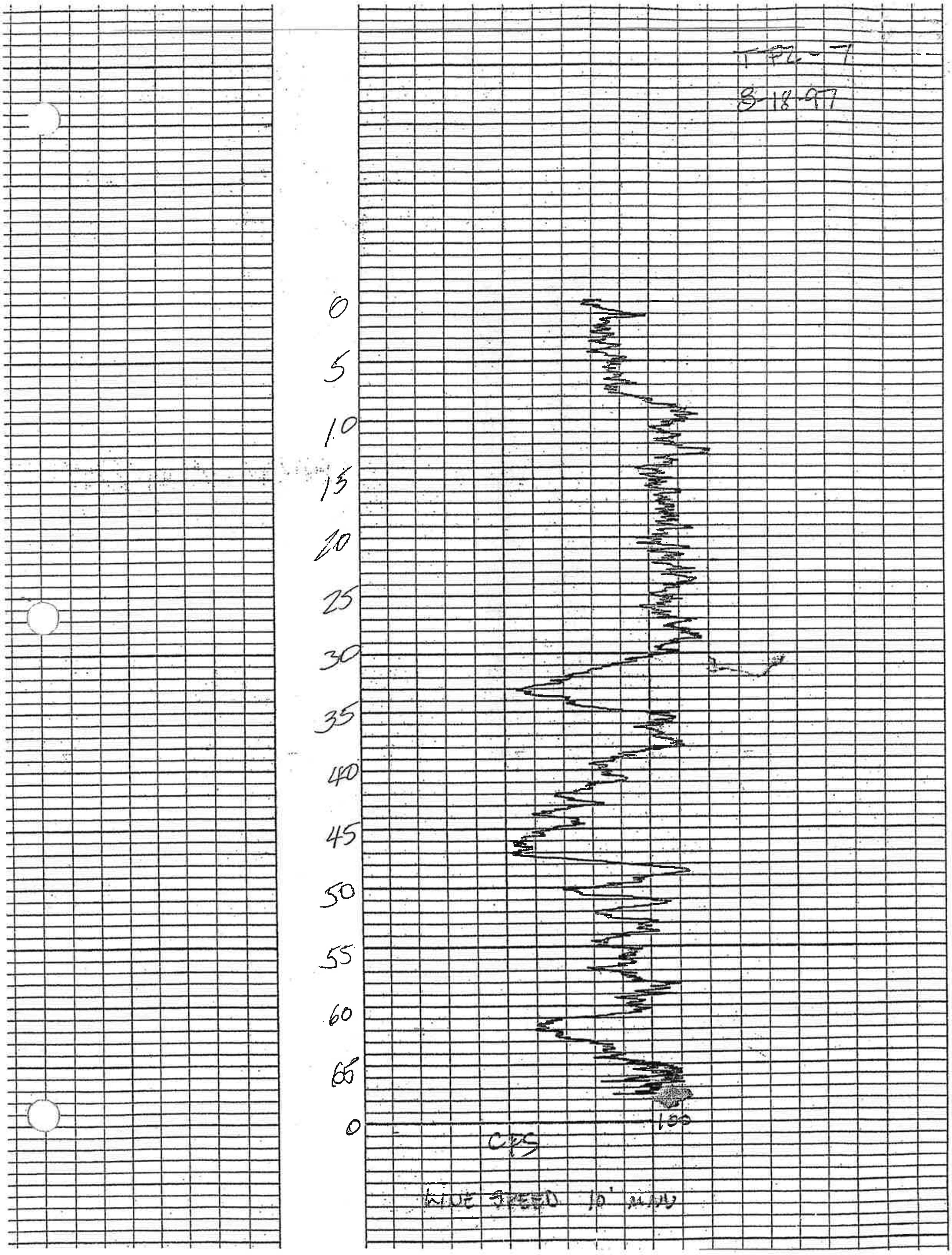
65.0 ft,Bottom of Screen

65.0 ft,Depth of Bottom Plug

70.0 ft,Depth of Boring

Depth from Surface

Comments:


TPZ-7
8-18-97
0
5
10
15
20
25
30
35
40
45
50
55
60
65
0
100
CPS
LINE SPEED 10' MIN

ERM-SOUTHEAST

Drilling/Boring Log

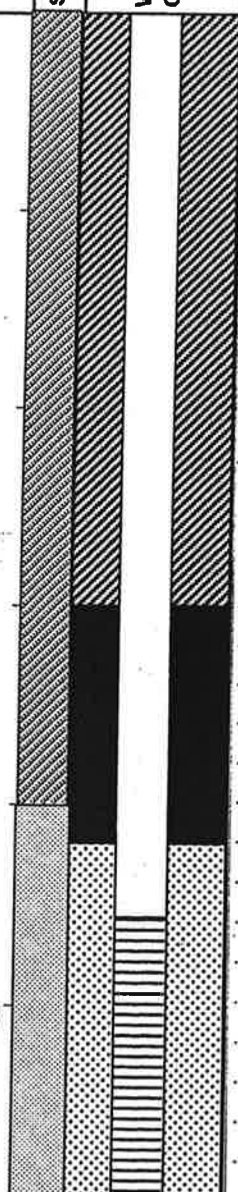
Project: CIBA Site OU No. 4 Slurry wall wells
Project No.: 8595 Logged by: RHS
Well/Boring Location: 10' from PW-9
Drilling Method: Hollow Stem
Depth to Groundwater:
Elevations - Ground Surface:
Driller: Geotechnical Engineering
Remarks: No Split Spoon samples taken. Piezometer drilled to 65' Lithology from soil cuttings

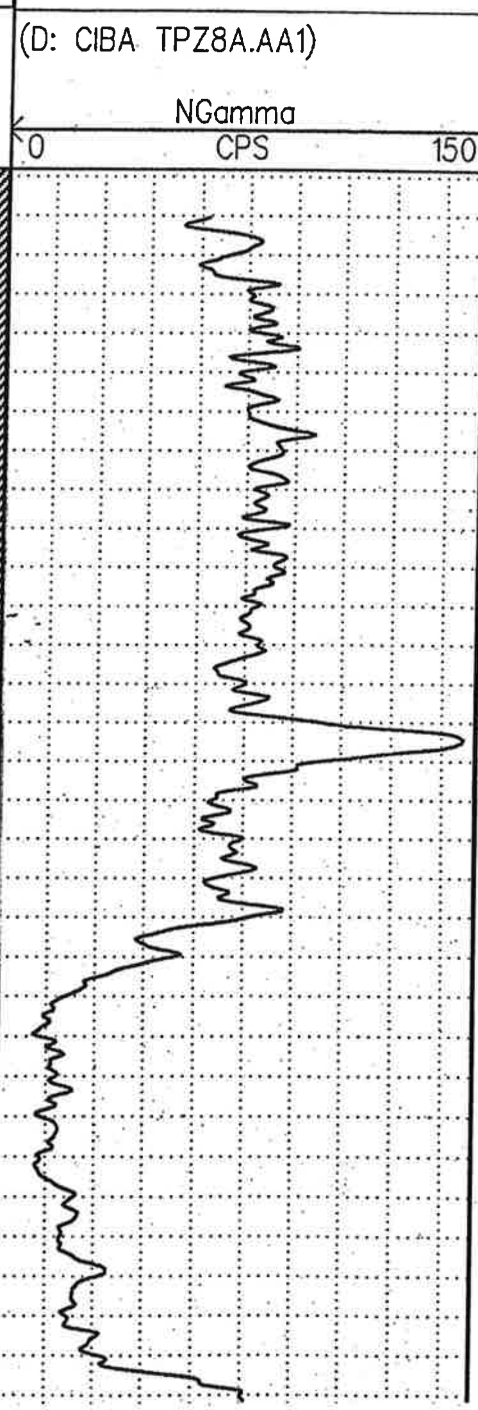
Well/Boring: TPZ-8
Date: March 8, 1999

Legend	Legend
Sands-SW, SP	Gravels, GW, GP
Silts-ML, MH	Sands w/ fines-SM, SC
Clays-CL, CH	
Organic soils-PT	

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description
10			SILTY CLAY(CL) yellowish orange
20			
30			SILTY CLAY(CL) same as above
40			
50			SAND(SP) fine to medium grained

Graphical Logs: Strata; Well Construction





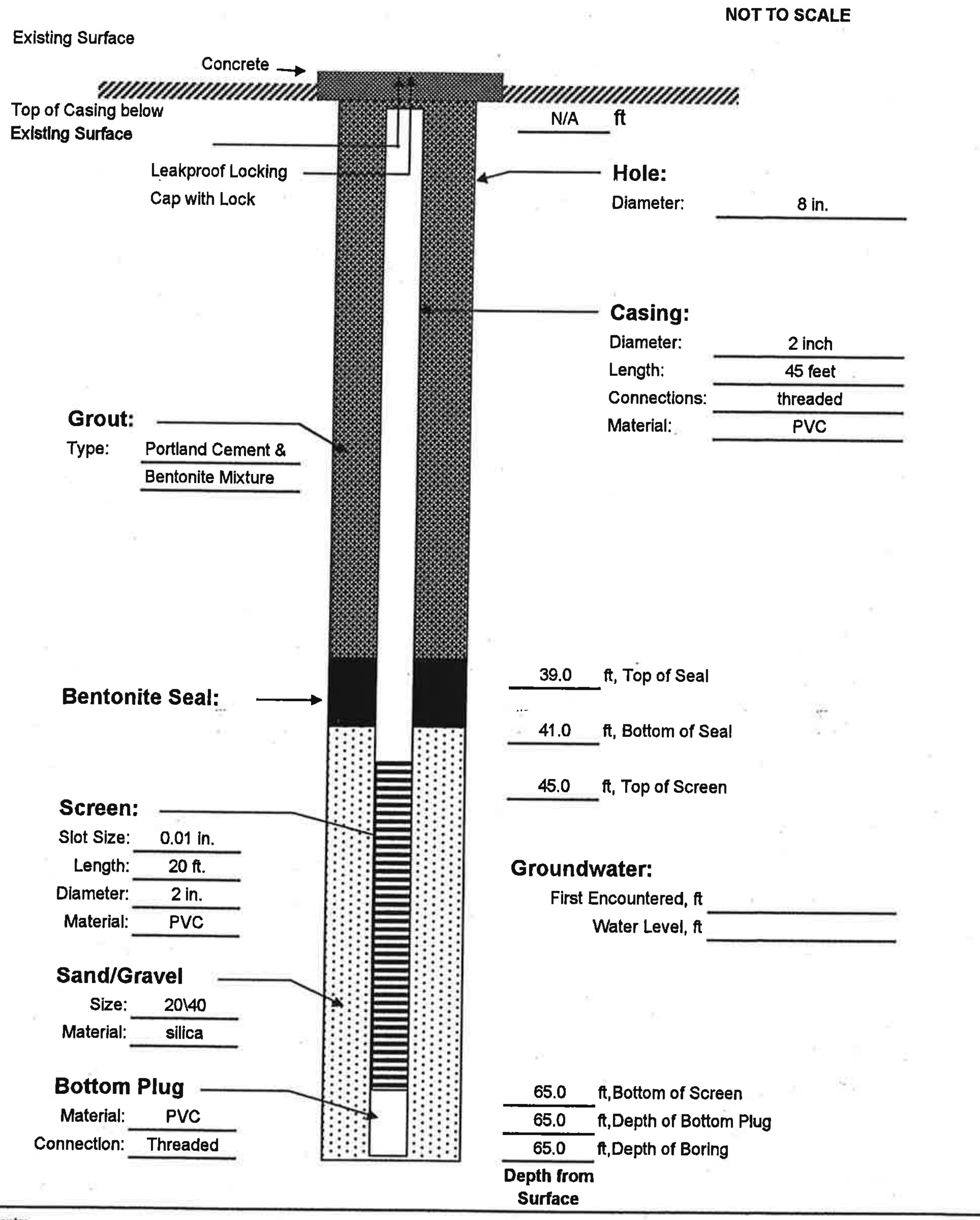
Project: CIBA site OU No. 4 Slurry wall wells
Project No.: 8595

Well/Boring: **TPZ-8**
Logged By: Robert Spencer

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Well Construction Details
			SAND(SP) same as above			Total Depth-65' BGS
70						

ERM **Monitoring Well Schematic**

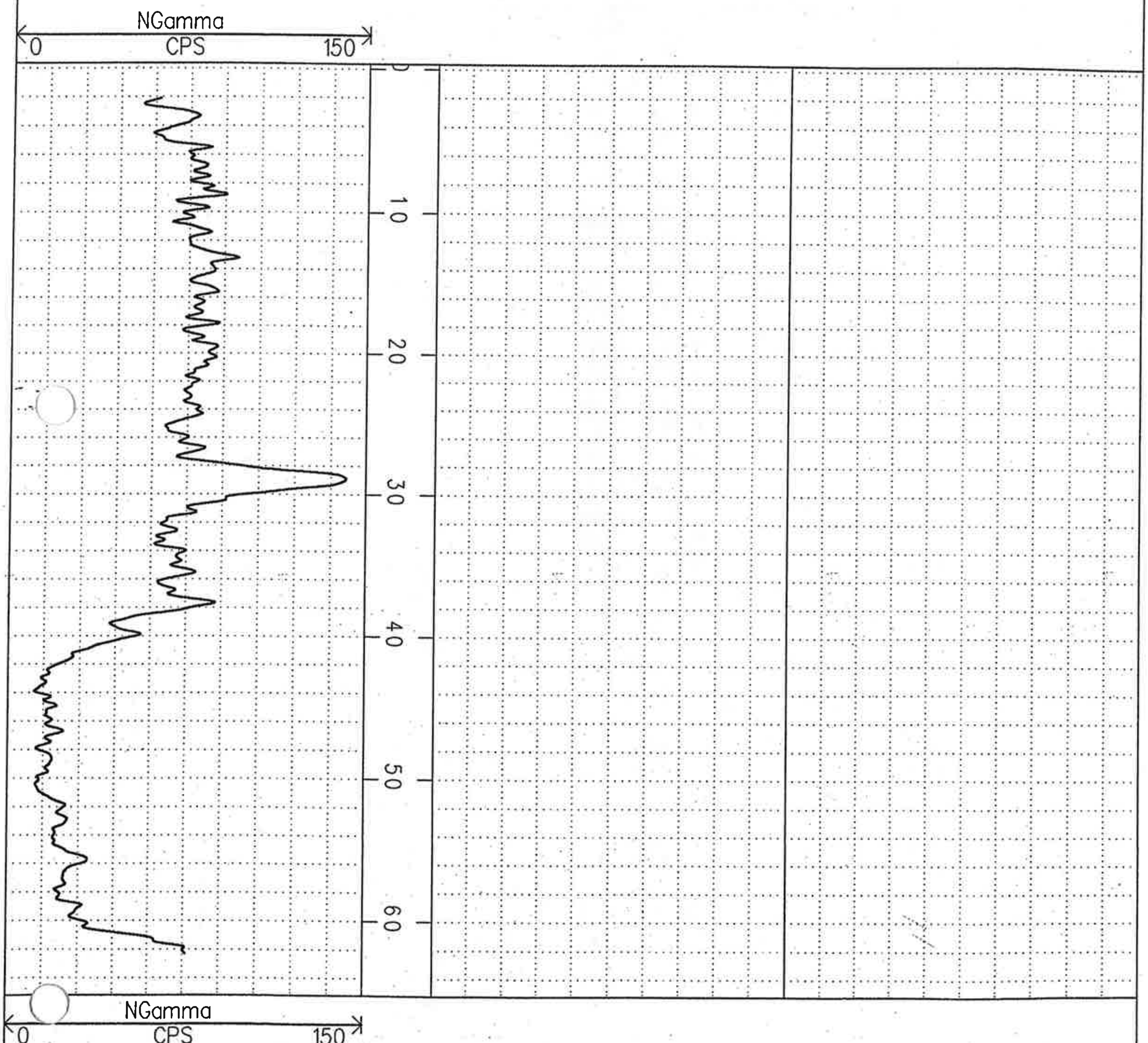
Project: CIBA Site OU No. 4 Slurry wall wells
Well/Boring No.: TPZ-8
Project No.: 8598
Drilling Supervisor: Robert H. Spencer
Boring Location: 10' N of PW-9
Date(s): 08-Mar-99
Drilling Method: Hollow Stem
Drilling Contractor: Geotechnical Engineering



Comments:

(D: CIBA TPZ8A.AA1)

TPZ8



(D: CIBA TPZ8A.AA1)

TPZ8

ERM-SOUTHEAST

Drilling/Boring Log

Project: CIBA Site OU No. 4 Slurry wall wells

Project No.: 8595 Logged by: RHS

Well/Boring: TPZ-9

Well/Boring Location: 10' from PW-1

Date: March 9, 1999

Drilling Method: Hollow Stem

Depth to Groundwater:

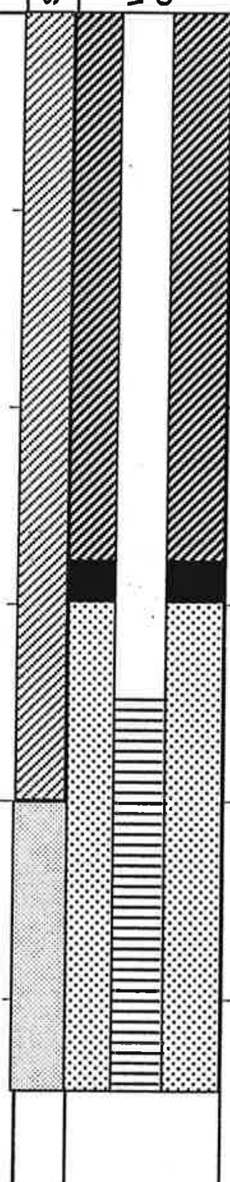
Elevations - Ground Surface:

Driller: Geotechnical Engineering

Remarks: Lithology from soil cuttings. Boring drilled to 55' and screened according to gamma logs

Legend			
Sands-SW, SP		Gravels, GW, GP	
Silts-ML, MH		Sands w/ fines-SM, SC	
Clays-CL, CH			
Organic soils-PT			

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata / Well Construction	Gamma Log Counts per second
0–40			SILTY CLAY(CL) Reddish brown		No GAMMA LOG. SEE PW-1 LOG
40–55			SAND(SP) fine to medium grained		

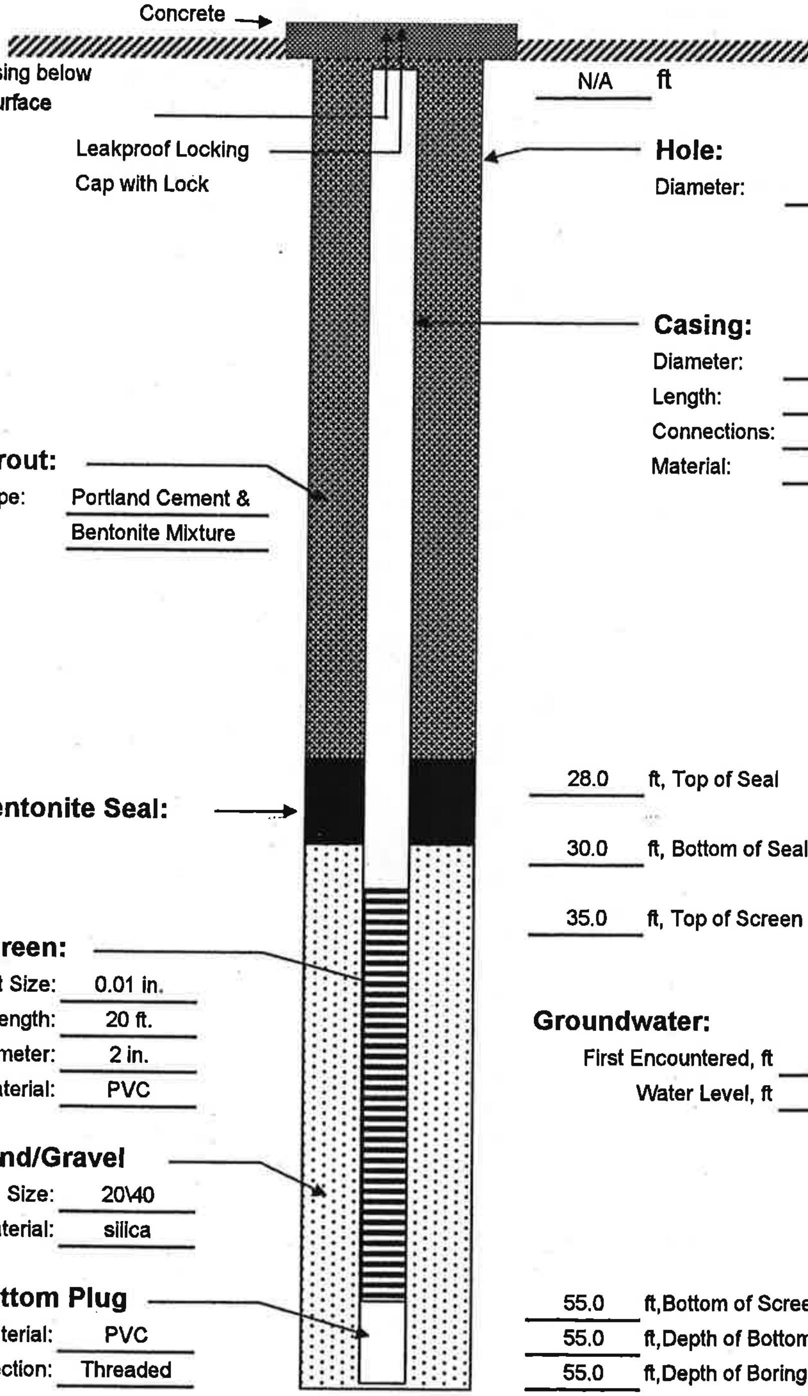


Depth scale: 10, 20, 30, 40, 50

ERM | **Monitoring Well Schematic**

Project:	CIBA Site OU No. 4 Slurry wall wells	Well/Boring No.:	TPZ-9
Project No.:	8598	Drilling Supervisor:	Robert H. Spencer
Boring Location:	10' E of PW-1	Date(s):	09-Mar-99
Drilling Method:	Hollow Stem	Drilling Contractor:	Geotechnical Engineering

NOT TO SCALE



Existing Surface

Concrete

Top of Casing below Existing Surface: N/A ft

Leakproof Locking Cap with Lock

Hole:
Diameter: 8 in.

Casing:
Diameter: 2 inch
Length: 35 feet
Connections: threaded
Material: PVC

Grout:
Type: Portland Cement & Bentonite Mixture

Bentonite Seal:

28.0 ft, Top of Seal
30.0 ft, Bottom of Seal
35.0 ft, Top of Screen

Screen:
Slot Size: 0.01 in.
Length: 20 ft.
Diameter: 2 in.
Material: PVC

Groundwater:
First Encountered, ft
Water Level, ft

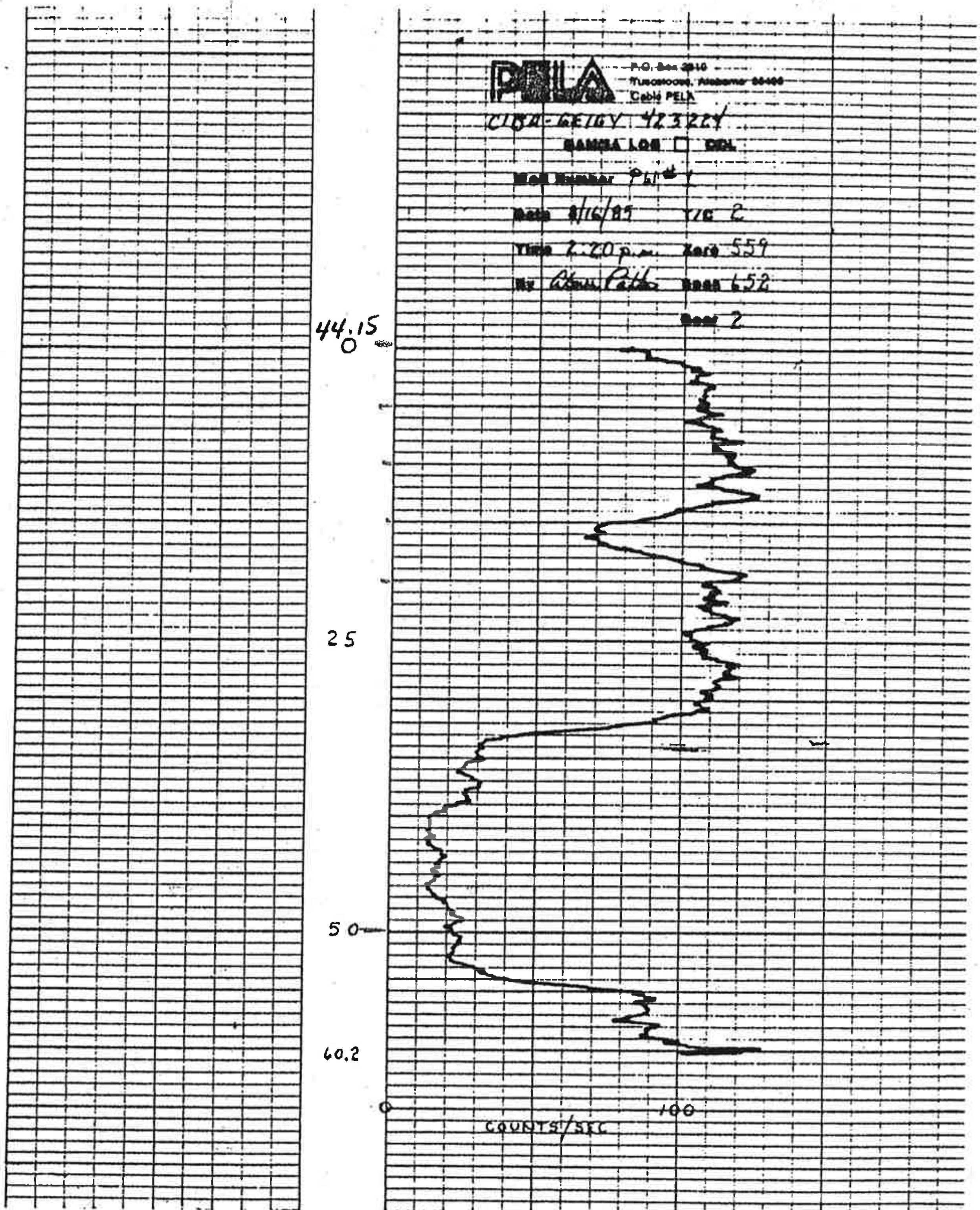
Sand/Gravel
Size: 20\40
Material: silica

Bottom Plug
Material: PVC
Connection: Threaded

55.0 ft,Bottom of Screen
55.0 ft,Depth of Bottom Plug
55.0 ft,Depth of Boring

Depth from Surface

Comments:



3'83

Gamma log for well PW-1

0 to 60.2 feet below land surface

ERM-SOUTHEAST — **Drilling/Boring Log**

Sheet 1 of 2

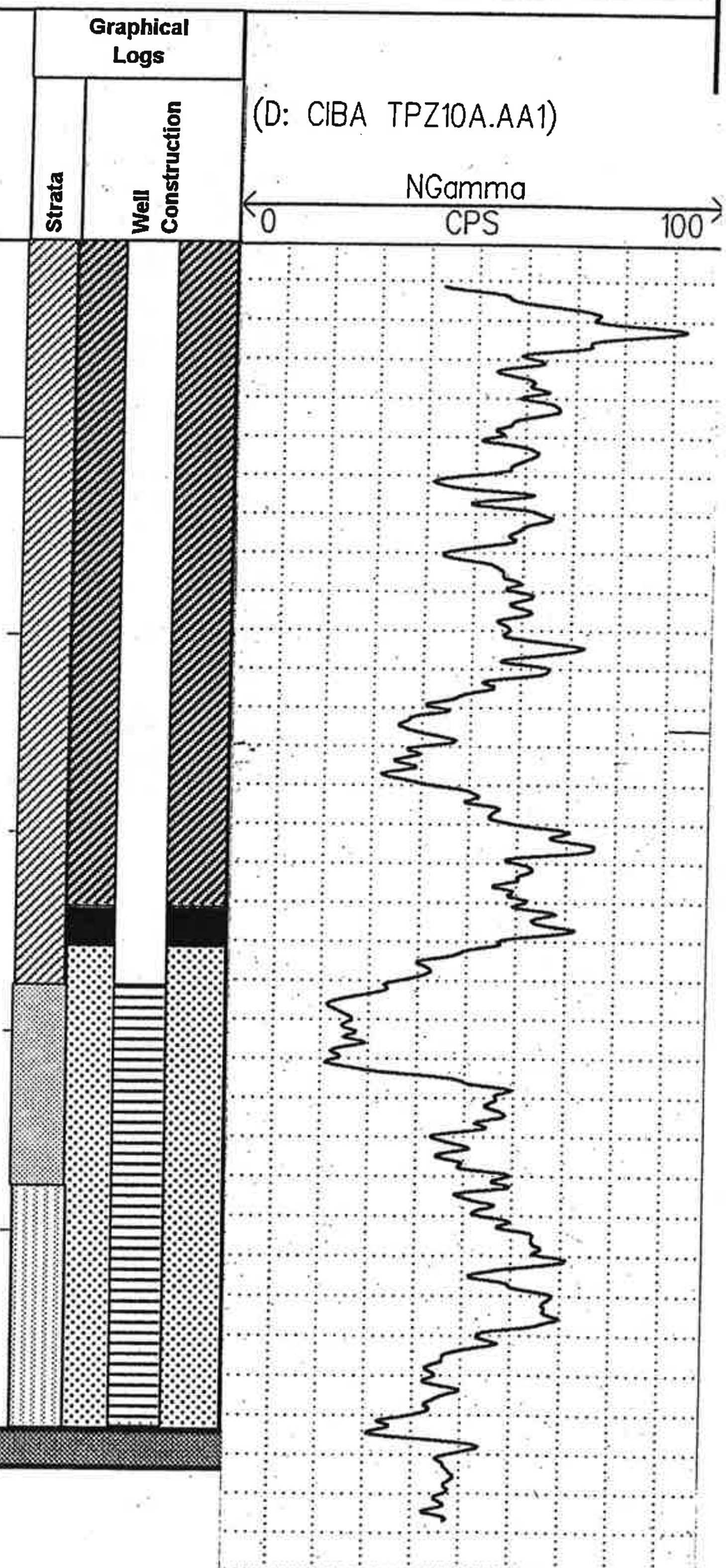
Project: CIBA site OU No. 4 Slurry wall wells
Project No.: 8595 Logged by: RHS
Well/Boring Location: 10' from PW-9
Drilling Method: Hollow Stem
Depth to Groundwater:
Elevations - Ground Surface:
Driller: Geotechnical Engineering
Remarks:

Well/Boring: TPZ-10
Date: June 7, 1999

Sands-SW, SP
Silts-ML, MH
Clays-CL, CH
Organic soils-PT
Gravels, GW, GP
Sands w/ fines-SM, SC

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description
			SILTY CLAY(CL)
10			
			SILTY CLAY (CL)
20			
30			SILTY CLAY(CL) Dark brown to gray, w/roots, leaves, trace of fine sand
40			SAND, fine, tan
50			SANDY SILT, bluish grey, fine grained sand, orange mottling

Graphical Logs: Strata, Well Construction



ERM — # Monitoring Well Schematic

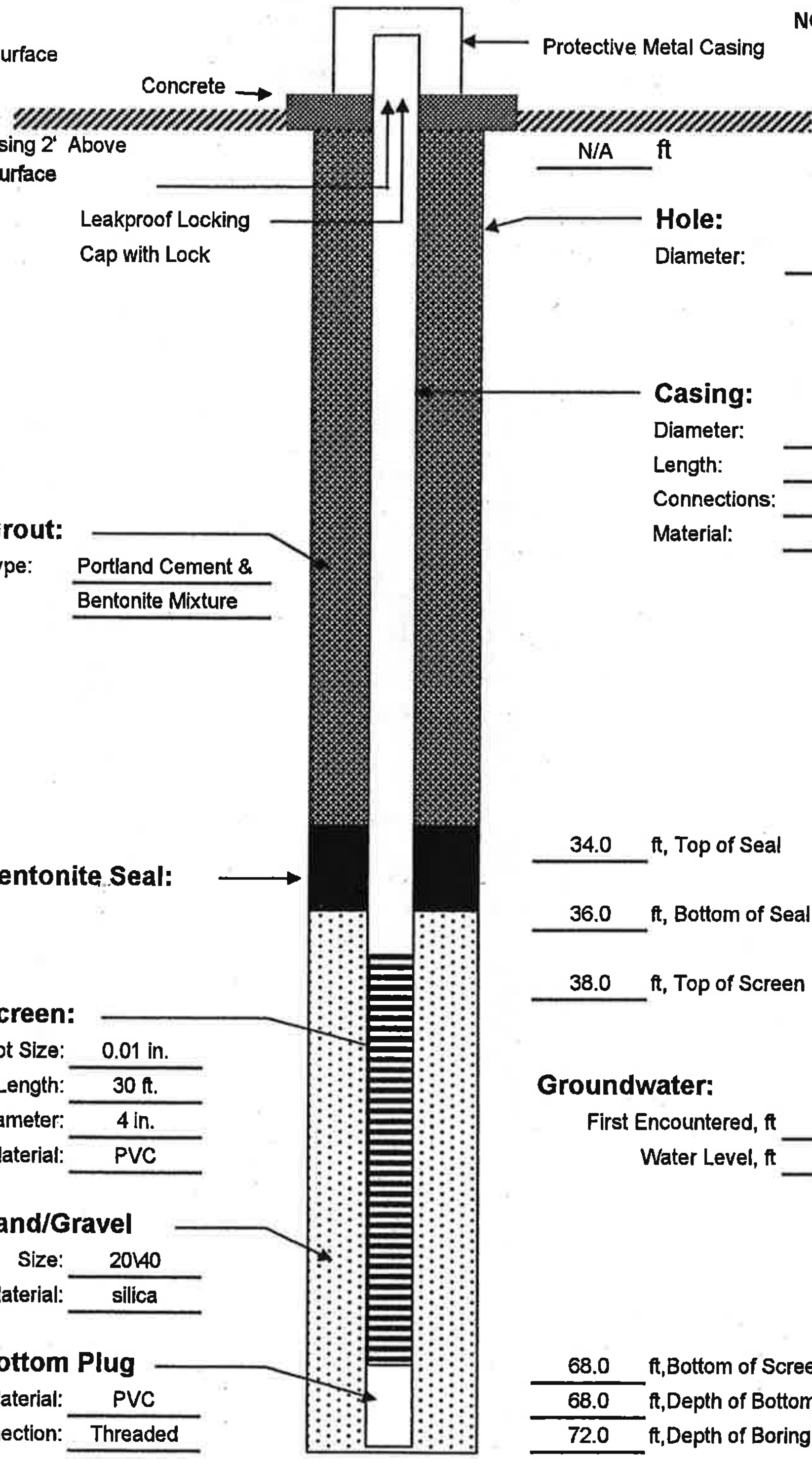
Project: CIBA Site OU No. 4 Slurry wall wells | Well/Boring No.: TPZ-10

Project No.: 8595 | Drilling Supervisor: Robert H. Spencer

Boring Location: West of TPZ-6 on bluffline | Date(s): 07-Jun-99

Drilling Method: Mud Rotary | Drilling Contractor: Geotechnical Engineering

NOT TO SCALE



Hole:
Diameter: 8 in.

Casing:
Diameter: 4 inch
Length: 38 feet
Connections: threaded
Material: PVC

Grout:
Type: Portland Cement & Bentonite Mixture

Bentonite Seal:

34.0 ft, Top of Seal
36.0 ft, Bottom of Seal
38.0 ft, Top of Screen

Screen:
Slot Size: 0.01 in.
Length: 30 ft.
Diameter: 4 in.
Material: PVC

Groundwater:
First Encountered, ft
Water Level, ft

Sand/Gravel
Size: 20\40
Material: silica

Bottom Plug
Material: PVC
Connection: Threaded

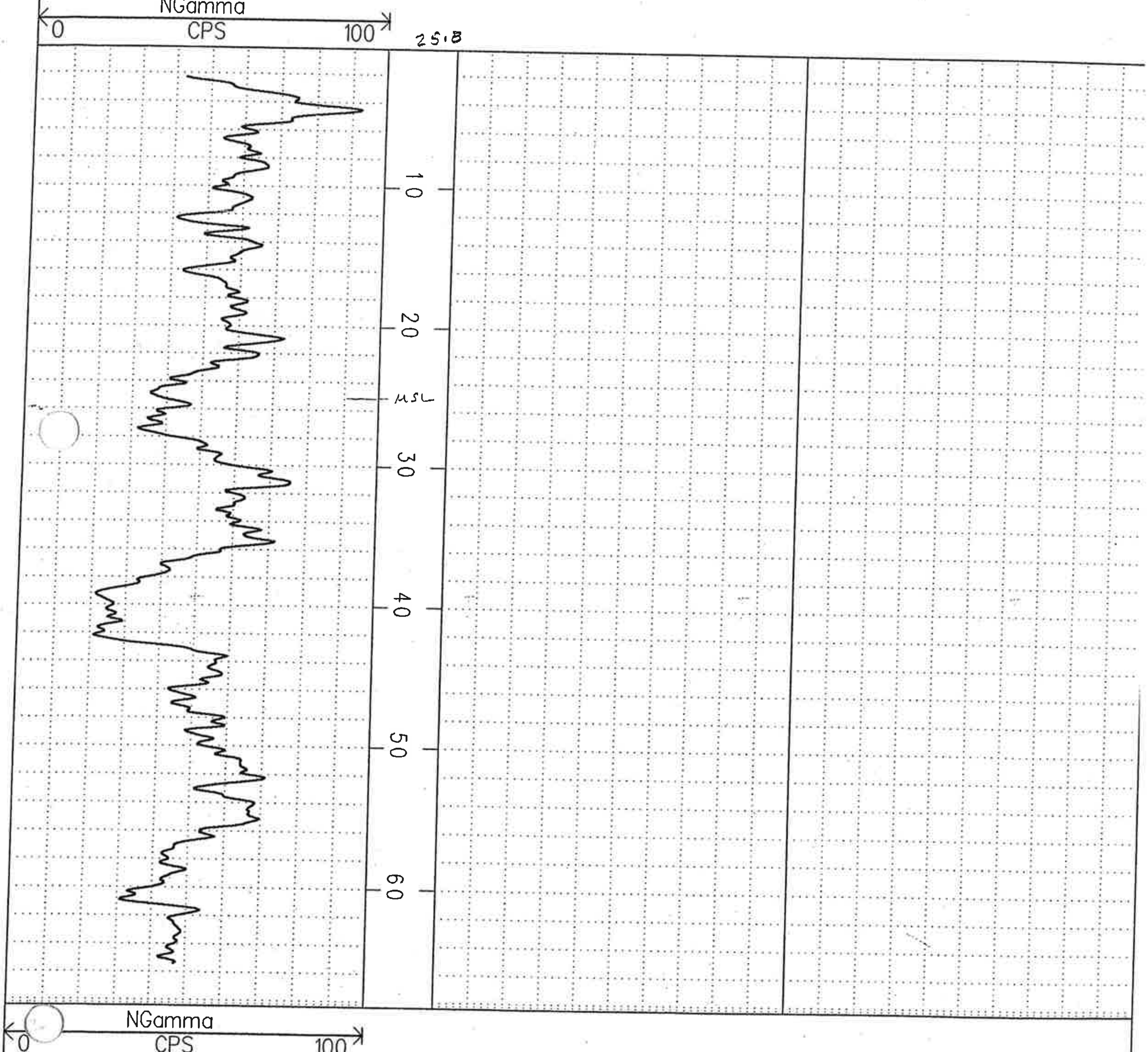
68.0 ft, Bottom of Screen
68.0 ft, Depth of Bottom Plug
72.0 ft, Depth of Boring

Depth from Surface

Comments:

(D: CIBA TPZ10A.AA1)

TPZ10



(D: CIBA TPZ10A.AA1)

TPZ10

Project: CIBA Site OU No. 4 Slurry wall wells

Project No.: 8595 Logged by: RHS

Well/Boring: TPZ-12

Well/Boring Location: 50' NW of TPZ-7

Date: July 21, 1999

Drilling Method: Hollow Stem

Depth to Groundwater:

Elevations - Ground Surface:

Driller: Geotechnical Engineering

Remarks: No Split Spoon samples taken. Piezometer drilled to 45'. Lithology based on TPZ-7 log

Legend			
Sands-SW, SP		Gravels, GW, GP	
Silts-ML, MH		Sands w/ fines-SM, SC	
Clays-CL, CH			
Organic soils-PT			

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log Counts per second
						SEE SEPARATE LOG
5			SILTY CLAY (CL) with minor sand. Gray with some orange mottling.			
10						
15			SILTY CLAY (CL) same as above			
20						
25						

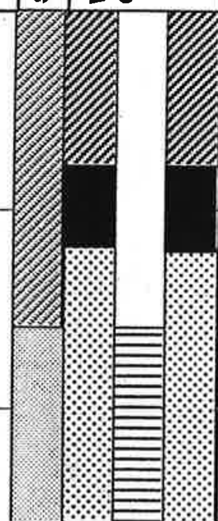
ERM-SOUTHEAST **Drilling/Boring Log**

Sheet 2 of 2

Project: CIBA site OU No. 4 Slurry wall wells
Project No.: 8595

Well/Boring: **TPZ-12**
Logged By: Robert Spencer

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description	Graphical Logs: Strata	Graphical Logs: Well Construction	Gamma Log
			SILTY CLAY (CL) same as above			
35						
			SILTY SAND (SM) grey, fine to v. fine grained.			
40						
45						



ERM

Monitoring Well Schematic

Project: CIBA Site OU No. 4 Slurry wall wells

Well/Boring No.: TPZ-12

Project No.: 8595

Drilling Supervisor: Robert H. Spencer

Boring Location: 50' NW of TPZ-7

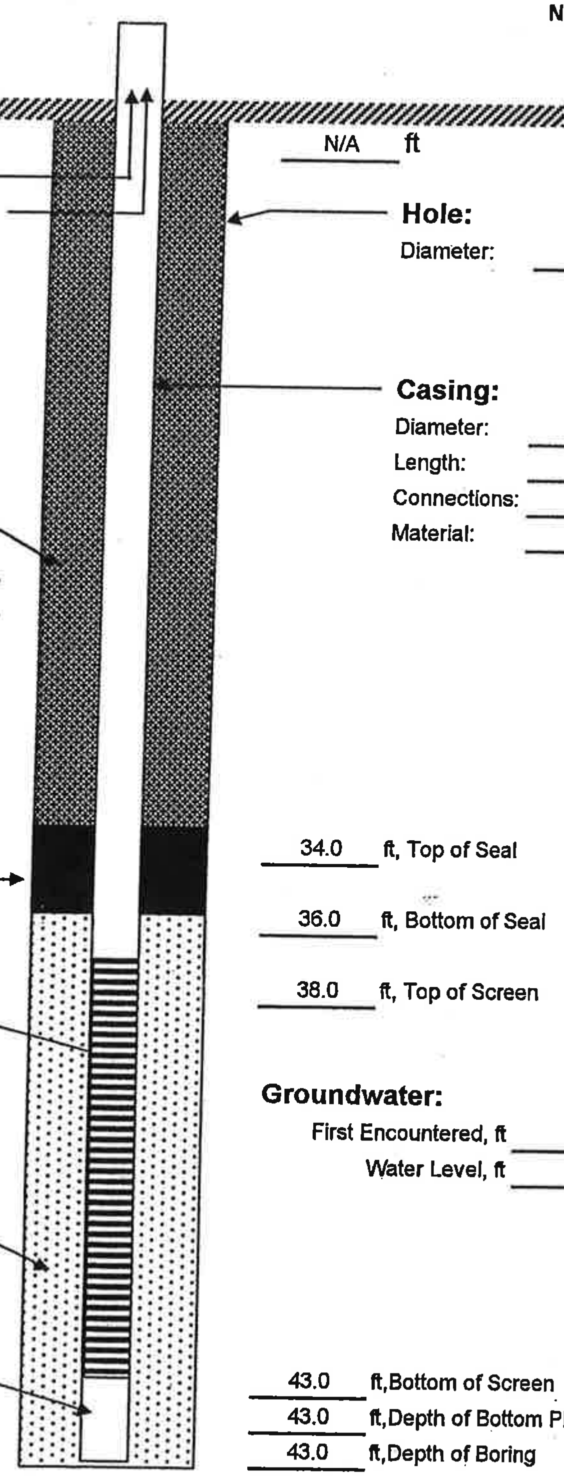
Date(s): 21-Jul-99

Drilling Method: Hollow Stem

Drilling Contractor: Geotechnical Engineering

NOT TO SCALE

Existing Surface



Top of Casing Above Existing Surface: N/A ft

Leakproof Locking Cap with Lock

Hole:
Diameter: 8 in.

Casing:
Diameter: 2 inch
Length: 38 feet
Connections: threaded
Material: PVC

Grout:
Type: Portland Cement & Bentonite Mixture

Bentonite Seal:

34.0 ft, Top of Seal

36.0 ft, Bottom of Seal

38.0 ft, Top of Screen

Screen:
Slot Size: 0.01 in.
Length: 5 ft.
Diameter: 2 in.
Material: PVC

Groundwater:
First Encountered, ft
Water Level, ft

Sand/Gravel
Size: 20\40
Material: silica

Bottom Plug
Material: PVC
Connection: Threaded

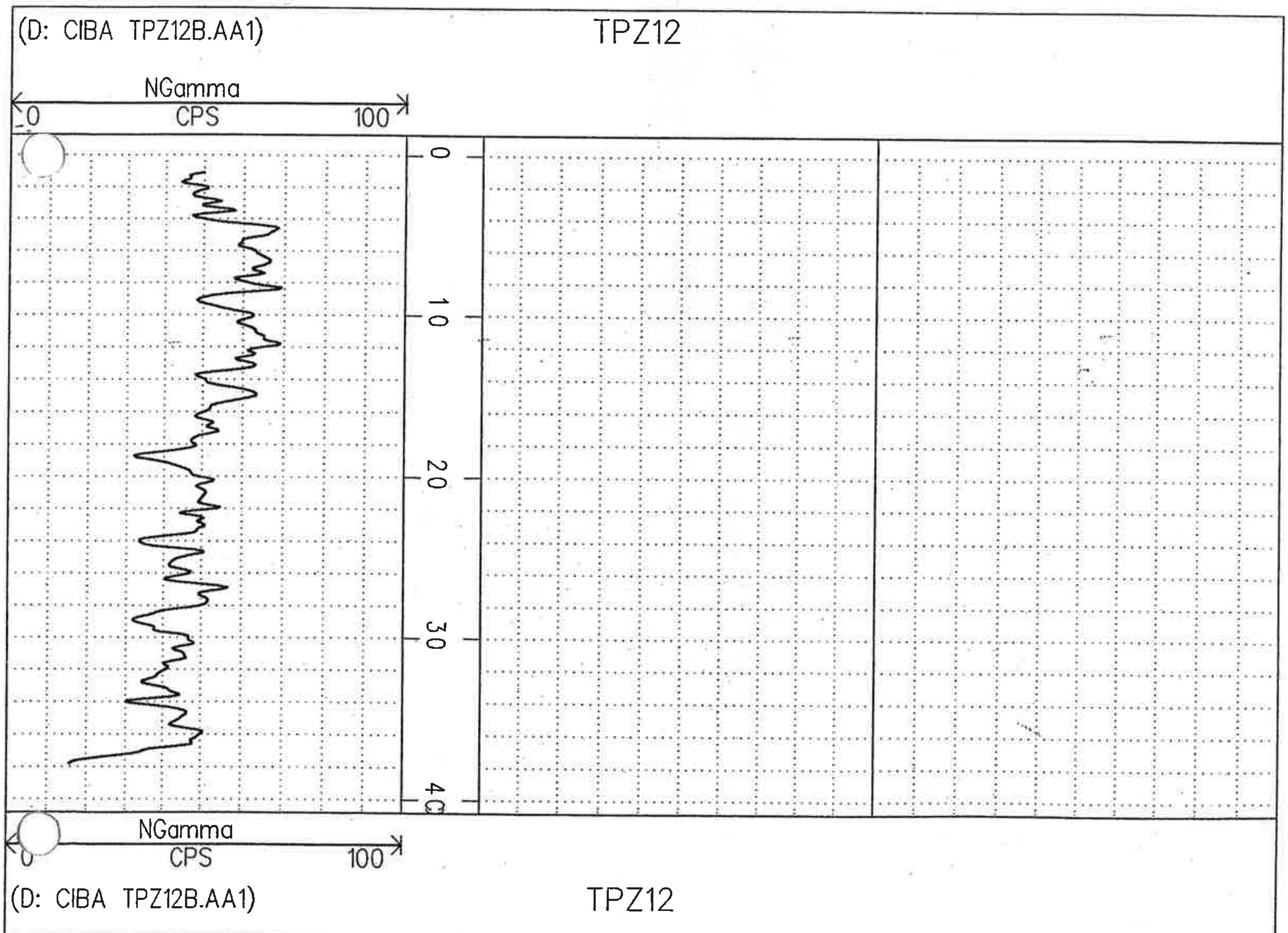
43.0 ft,Bottom of Screen

43.0 ft,Depth of Bottom Plug

43.0 ft,Depth of Boring

Depth from Surface

Comments:


(D: CIBA TPZ12B.AA1)
TPZ12
NGamma
CPS
0
100
0
10
20
30
40
NGamma
CPS
0
100
(D: CIBA TPZ12B.AA1)
TPZ12

ERM-SOUTHEAST

Drilling/Boring Log

Project: CIBA site OU No. 4 Slurry wall wells

Sheet 1 of 1

Project No.: 8595 Logged by: RHS

Well/Boring: TPZ-13

Well/Boring Location: 100' from PW-9

Date: July 22, 1999

Drilling Method: Hollow Stem

Depth to Groundwater:

Elevations - Ground Surface:

Driller: Geotechnical Engineering

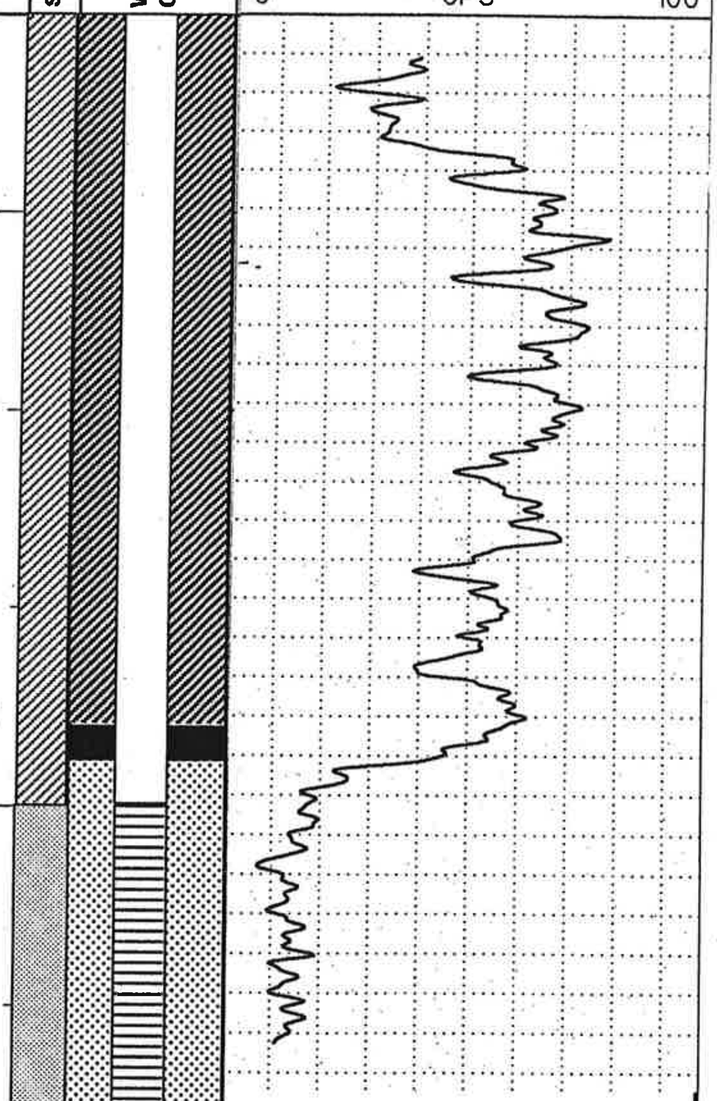
Remarks: No Split Spoon samples taken. Piezometer drilled to 55' Lithology from soil cuttings

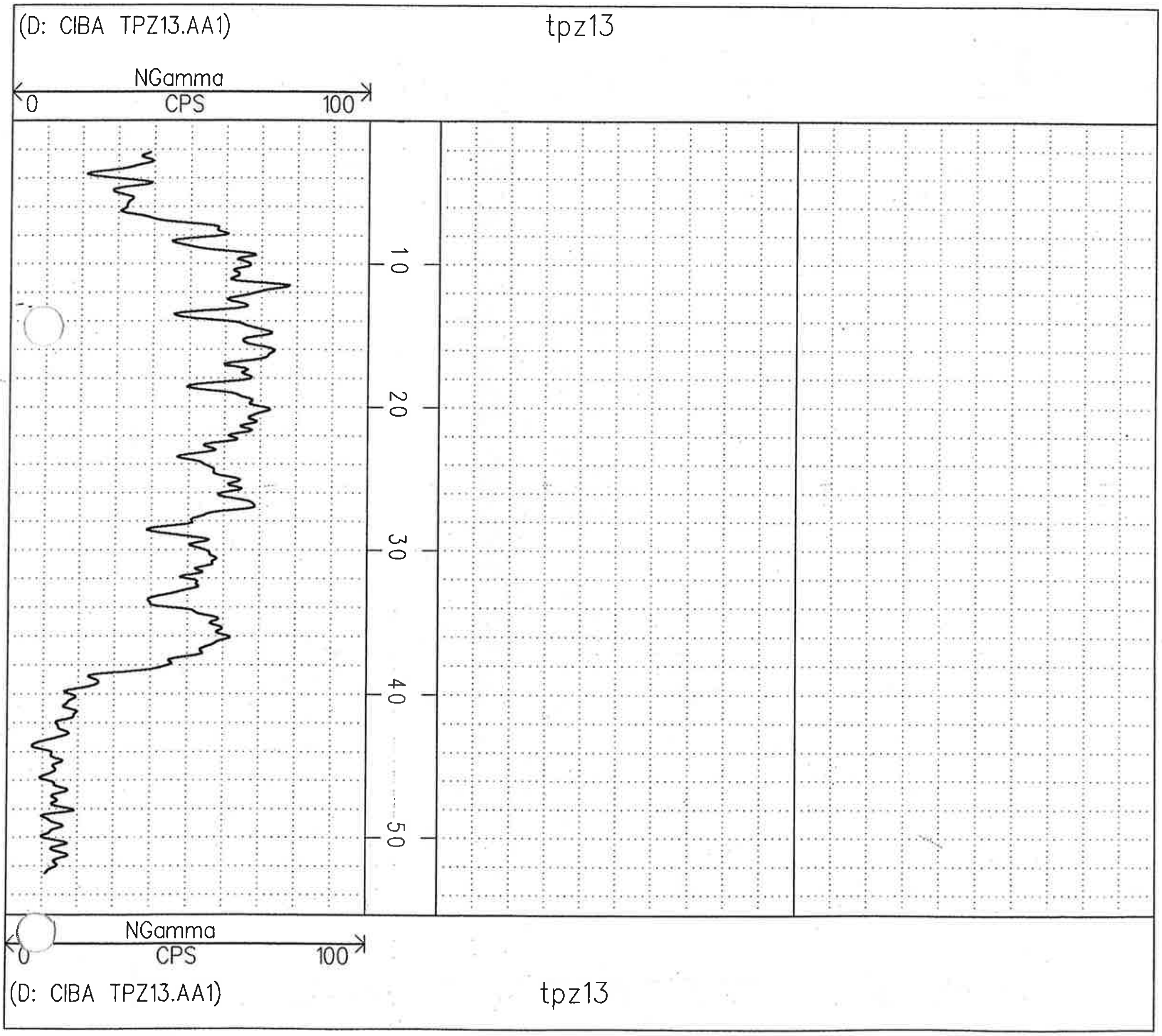
Legend		Legend	
Sands-SW, SP		Gravels, GW, GP	
Silts-ML, MH		Sands w/ fines-SM, SC	
Clays-CL, CH			
Organic soils-PT			

Depth, Ft-BGS	Sample Location	Blows	Lithologic Description
			SILTY CLAY
10			
			SILTY CLAY
20			
			SILTY CLAY
30			
40			
			SAND(SP)
50			

Graphical Logs

Strata | Well Construction





(D: CIBA TPZ13.AA1)
tpz13
NGamma
0
CPS
100
10
20
30
40
50
NGamma
0
CPS
100
(D: CIBA TPZ13.AA1)
tpz13

PELA

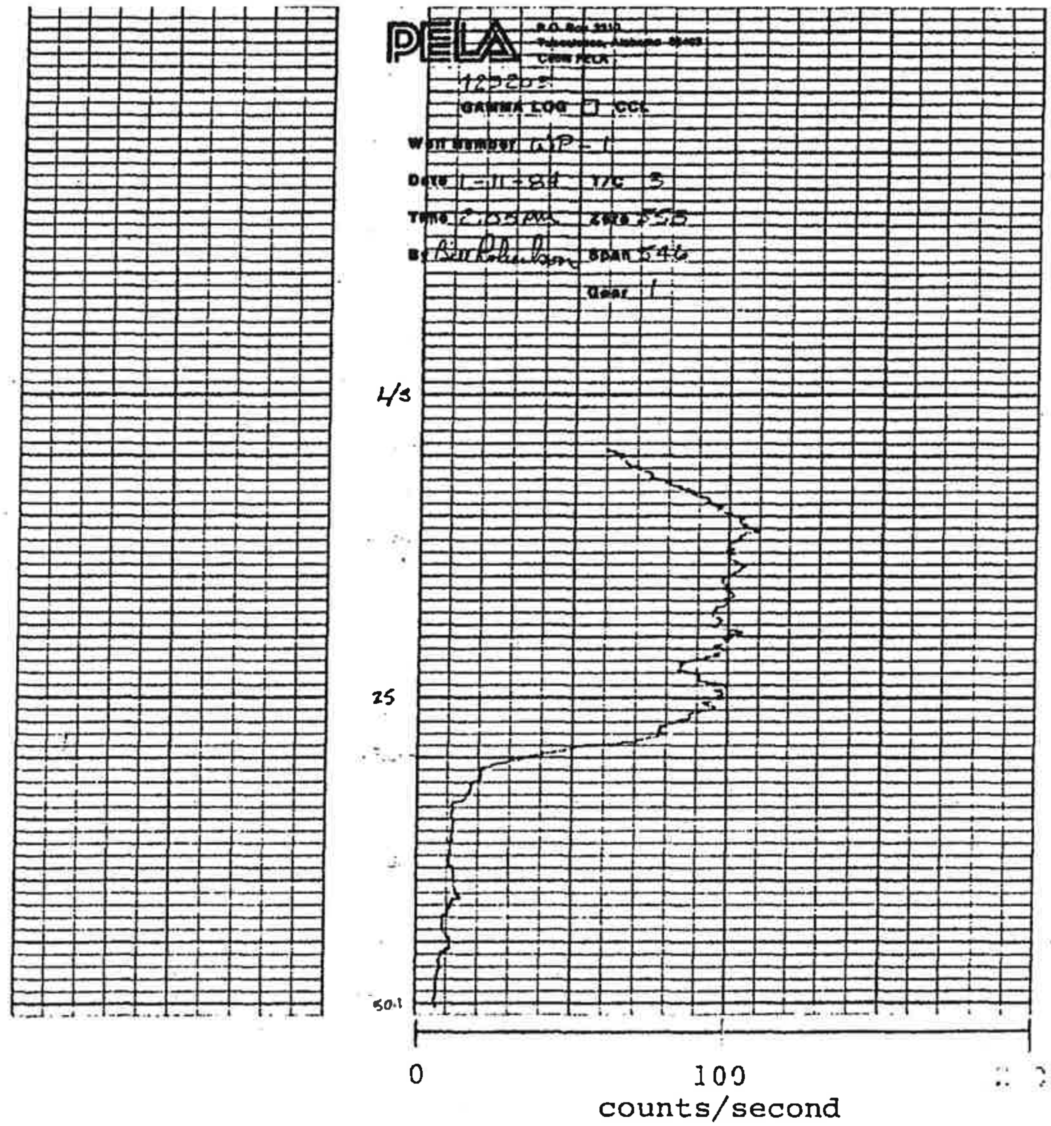
LITHOLOGIC DESCRIPTION, WP-1

OWNER: Ciba-Geigy Corporation

DATE DRILLED: January 11, 1984

PELA GEOLOGIST: Tom Schneider

Depth (in feet)	Description
0 - 5.0	Clay, olive-gray with minor moderate reddish-brown.
5.0 - 10.0	Clay, moderate yellowish-brown with minor olive-gray, moderately stiff.
10.0 - 15.0	Clay, yellowish-gray with minor moderate reddish-brown, stiff.
15.0 - 17.5	Clay, same as above.
17.5 - 20.0	Clay, yellowish-gray with moderate reddish-brown, stiff.
20.0 - 24.0	Clay, yellowish-gray with minor dark-yellowish-orange.
24.0 - 28.0	Clay, same as above, moderately stiff.
28.0 - 30.0	Clay, grayish-orange, sandy, white quartz, fine-grained, subangular.
30.0 - 33.0	Sand, grayish-orange, white quartz, fine-grained, subangular, clayey.
33.0 - 40.0	Sand, light-brown, clear to white quartz, fine-grained, subangular.
40.0 - 50.0	Sand, grayish-orange, quartz, medium-grained, subangular.
50.0	TOTAL DEPTH.



Gamma log for WP-1: 4-50.1 feet below land surface

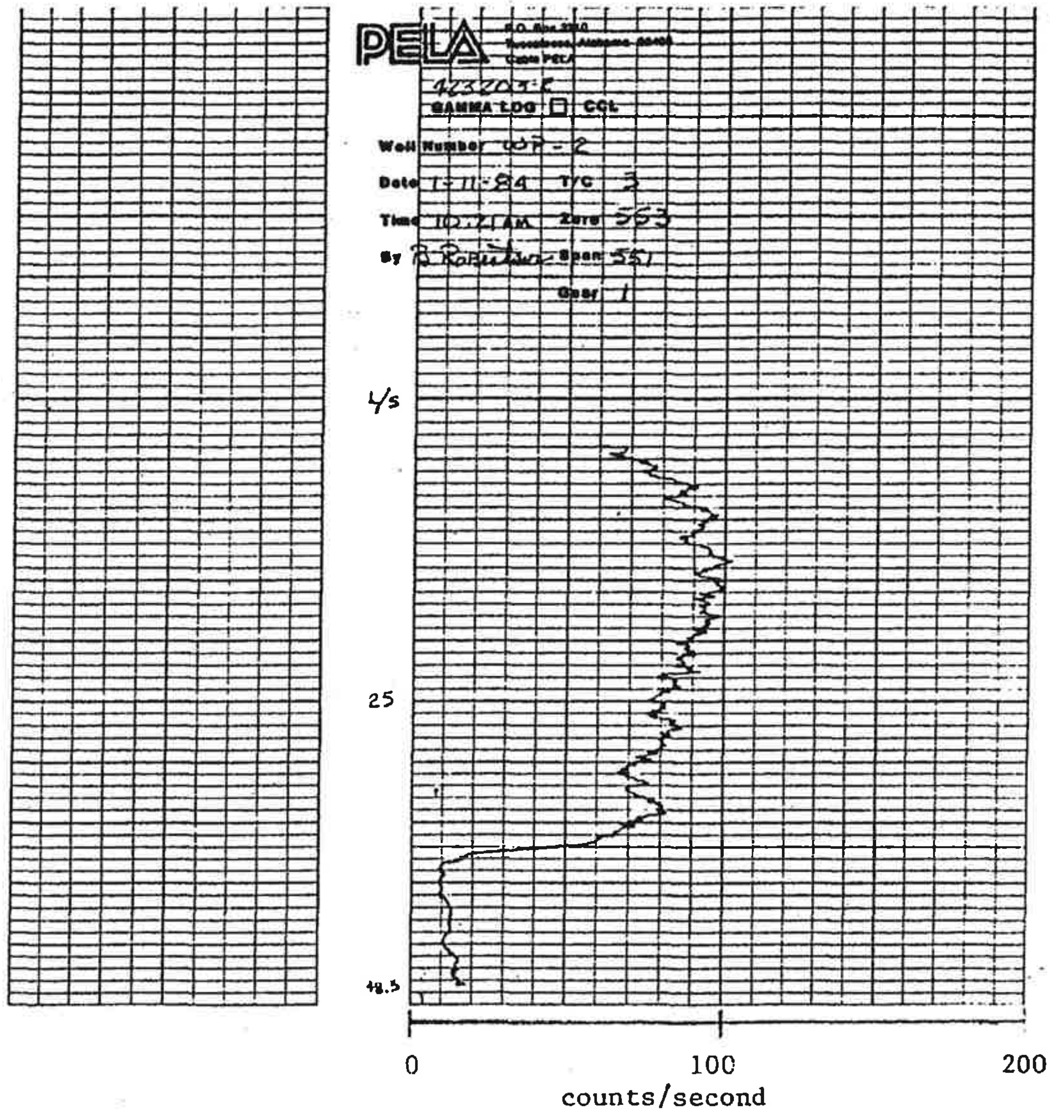
LITHOLOGIC DESCRIPTION, WP-2

OWNER: Ciba-Geigy Corporation

DATE DRILLED: January 10-11, 1984

PELA GEOLOGIST: Tom Schneider

Depth (in feet)	Description
0 - 5.0	Clay, grayish-orange, stiff.
5.0 - 10.0	Clay, grayish-orange with minor yellowish-gray, stiff.
10.0 - 15.0	Clay, yellowish-gray with minor light-brown, stiff.
15.0 - 20.0	Clay, same as above.
20.0 - 25.0	Clay, grayish-orange with minor yellowish-gray.
25.0 - 32.0	Clay, same as above, minor sand, fine-grained.
32.0 - 33.0	Sand, yellowish-gray, clear quartz, fine-grained, subangular, clayey.
33.0 - 40.0	Sand, same as above, slightly clayey.
40.0 - 50.0	Sand, light-brown, clear quartz, medium-grained, subangular, very minor dark opaque grains, fine-grained.
50.0	TOTAL DEPTH.



Gamma Log for WP-2: 4-48.3 feet below land surface.

PELA

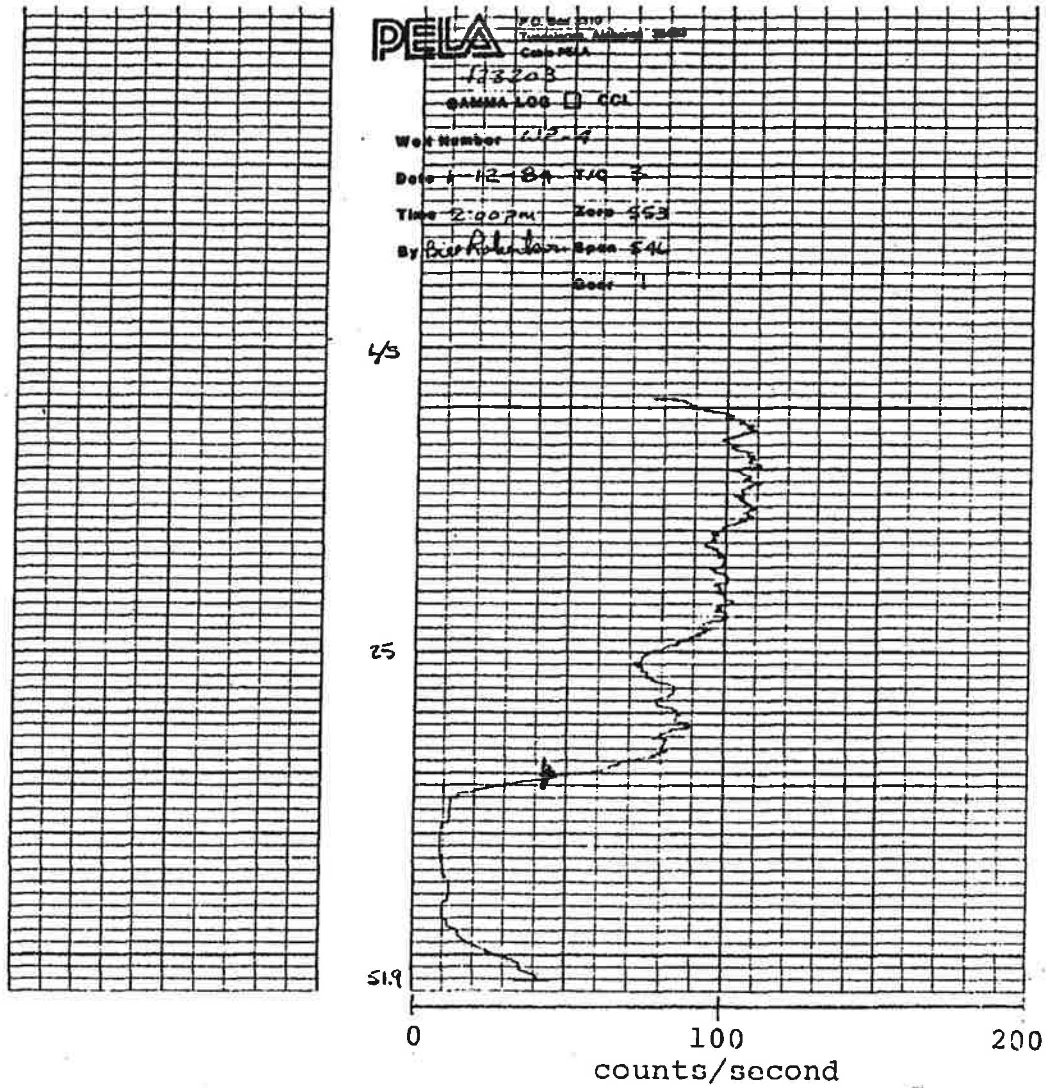
LITHOLOGIC DESCRIPTION, WP-4

OWNER: Ciba-Geigy Corporation

DATE DRILLED: January 12, 1984

PELA GEOLOGIST: Dan O. Madison, Jr.; Tom Schneider

Depth (in feet)	Description
0 - 1.0	Clay, light-gray with light-brown, soft, silty.
1.0 - 4.0	Clay, yellowish-gray with light-brown to moderate reddish-brown, stiff.
4.0 - 9.0	Clay, yellowish-gray with moderate reddish-brown, stiff.
9.0 - 14.0	Clay, yellowish-gray with dark-yellowish-orange and minor moderate reddish-brown, stiff.
14.0 - 19.0	Clay, yellowish-gray with minor dark-yellowish-orange, stiff.
19.0 - 24.0	Clay, moderate yellowish-brown and yellowish-gray, stiff.
24.0 - 28.0	Clay, yellowish-gray and grayish-orange.
28.0 - 29.0	Clay, dark-yellowish-orange.
29.0 - 31.0	Clay, grayish-orange, soft.
31.0 - 35.0	Clay, yellowish-gray, moderately stiff.
35.0 - 38.0	Clay, yellowish-gray, sandy, quartz, fine- to medium-grained.
38.0 - 39.0	Sand, moderate yellowish-brown, clear quartz, medium-grained, subangular.
39.0 - 44.0	Sand, grayish-orange, clear quartz, medium- to coarse-grained, subangular, some clayey lenses, minor gravel, quartz and chert, 2 to 5 mm in diameter.
44.0 - 49.0	Sand, same as above, minor gravel 2 to 10 mm in diameter.
49.0 - 54.0	Sand, light-brown, clear and pinkish quartz, medium- to coarse-grained, subangular, minor gravel, quartz, chert, and varicolored rock fragments, 2 to 20 mm in diameter, subrounded.
54.0	TOTAL DEPTH.



Gamma log for WP-4: 4-51.9 feet below land surface

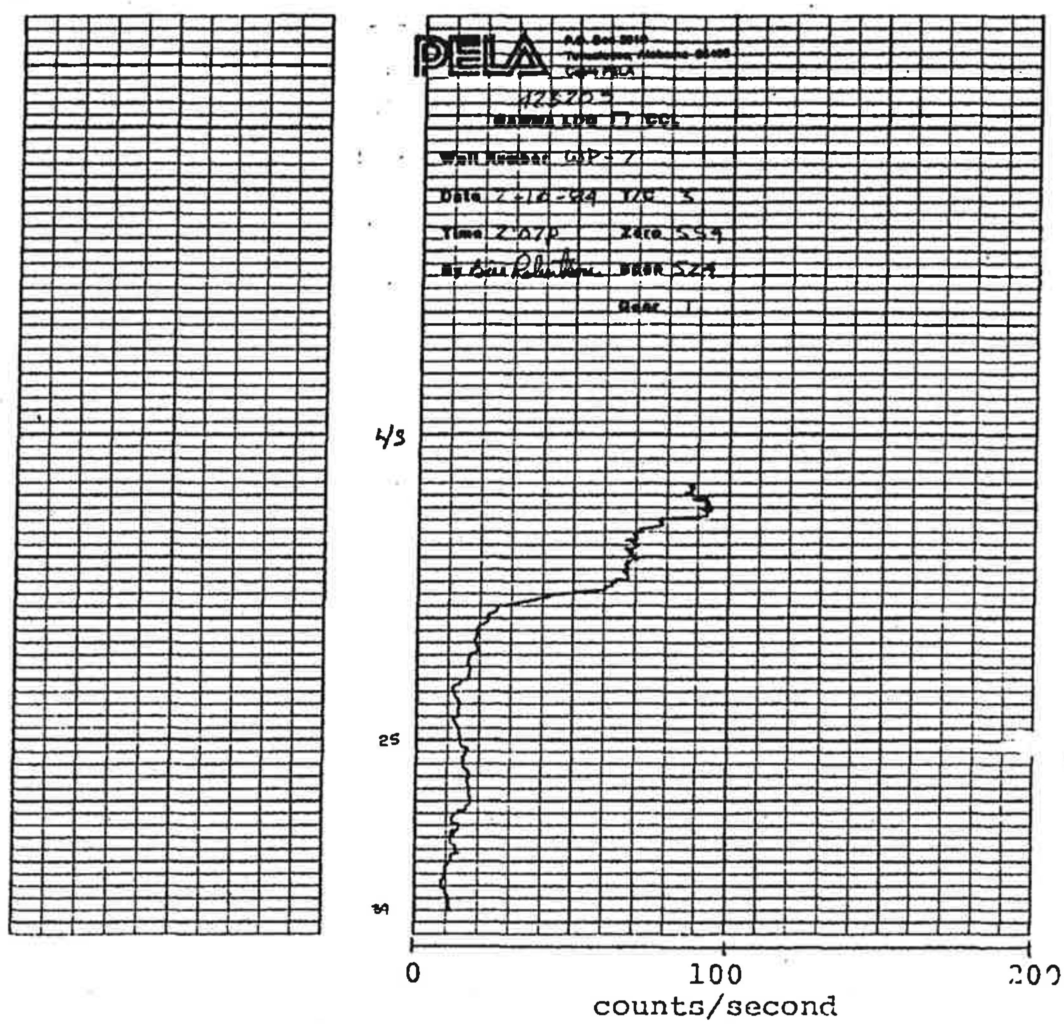
LITHOLOGIC DESCRIPTION, WP-7

OWNER: Ciba-Geigy Corporation

DATE DRILLED: January 10, 1984

PELA GEOLOGIST: Dan O. Madison, Jr.

Depth (in feet)	Description
0 - 4.5	Sand, moderate yellowish-brown to light-brown, clear quartz, medium-grained, subangular, very clayey.
4.5 - 13.0	Clay, yellowish-gray with moderate reddish-brown, silty, stiff.
13.0 - 19.0	Sand, grayish-orange to very pale-orange, clear quartz, medium-grained, few coarse-grained, subrounded, trace of dark opaque grains, fine-grained.
19.0 - 24.0	Sand, pale-yellowish-orange to grayish-orange, clear quartz, coarse-grained, subrounded, trace of dark opaque grains, fine-grained, slightly clayey.
24.0 - 34.0	Sand, grayish-orange, clear quartz, medium- to coarse-grained, subrounded, trace of dark opaque grains, fine-grained, minor gravel, clear to varicolored quartz and chert, 2 to 8 mm in diameter, rounded, more abundant with depth.
34.0 - 39.0	Sand, grayish-orange, clear quartz, medium- to coarse-grained, subrounded, gravel, as above, less abundant.
39.0 - 44.0	Sand, same as above, minor gravel, as above, clayey 40.0 to 41.0 feet.
44.0	TOTAL DEPTH.



Gamma log for WP-7: 4-39 feet below land surface

PELA

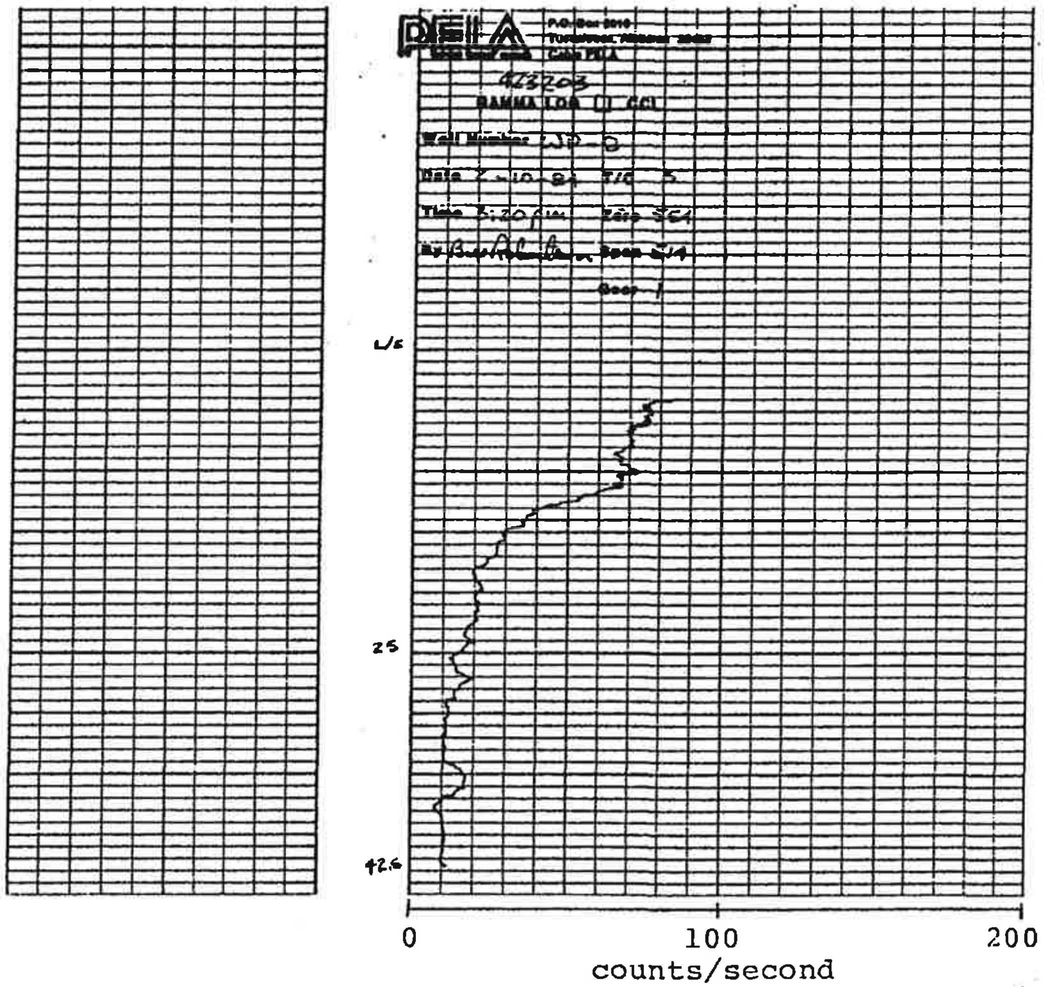
LITHOLOGIC DESCRIPTION, WP-8

OWNER: Ciba-Geigy Corporation

DATE DRILLED: January 9, 1984

PELA GEOLOGIST: Dan O. Madison, Jr.

Depth (in feet)	Description
0 - 5.0	Clay, light-brown and yellowish-gray, stiff, silty, trace of sand, quartz, fine-grained.
5.0 - 10.0	Clay, yellowish-gray, some moderate reddish-brown and dark-yellowish-orange, stiff, plastic, silty.
10.0 - 16.5	Clay, yellowish-gray, trace of moderate reddish-brown, sandy, clear quartz, medium-grained, rounded, stiff, few thin sand lenses.
16.5 - 20.0	Sand, dark-yellowish-orange, clear quartz, medium-grained, rounded, trace of dark opaque grains, fine-grained, trace of mica, white, coarse-grained.
20.0 - 25.0	Sand, as above, trace of coarse grains, trace of clay, yellowish-gray.
25.0 - 30.0	Sand, dark-yellowish-orange, clear quartz, medium-grained, few coarse-grained, rounded, minor orange opaque grins, medium-grained, minor dark opaque grains, fine-grained, slightly clayey.
30.0 - 35.0	Sand and gravel, grayish-orange, sand, clear quartz, coarse- to very coarse-grained, rounded, subangular to subrounded, minor dark-yellowish-orange grains, gravel, less abundant than sand, clear to white quartz, rounded to subrounded, 2 to 10 mm in diameter, minor chert, moderate yellowish-brown to dark-yellowish-orange, 2 to 10 mm in diameter, rounded.
35.0 - 40.0	Sand, grayish-orange, clear quartz, coarse-grained, some very coarse-grained, subrounded, trace of gravel, as above, very slightly clayey, some gravel, as above, 5 to 10 mm in diameter.
40.0 - 45.0	Sand, as above, trace of gravel, as above.
45.0	TOTAL DEPTH.



Gamma log for WP-8: 4-42.5 feet below land surface

PELA

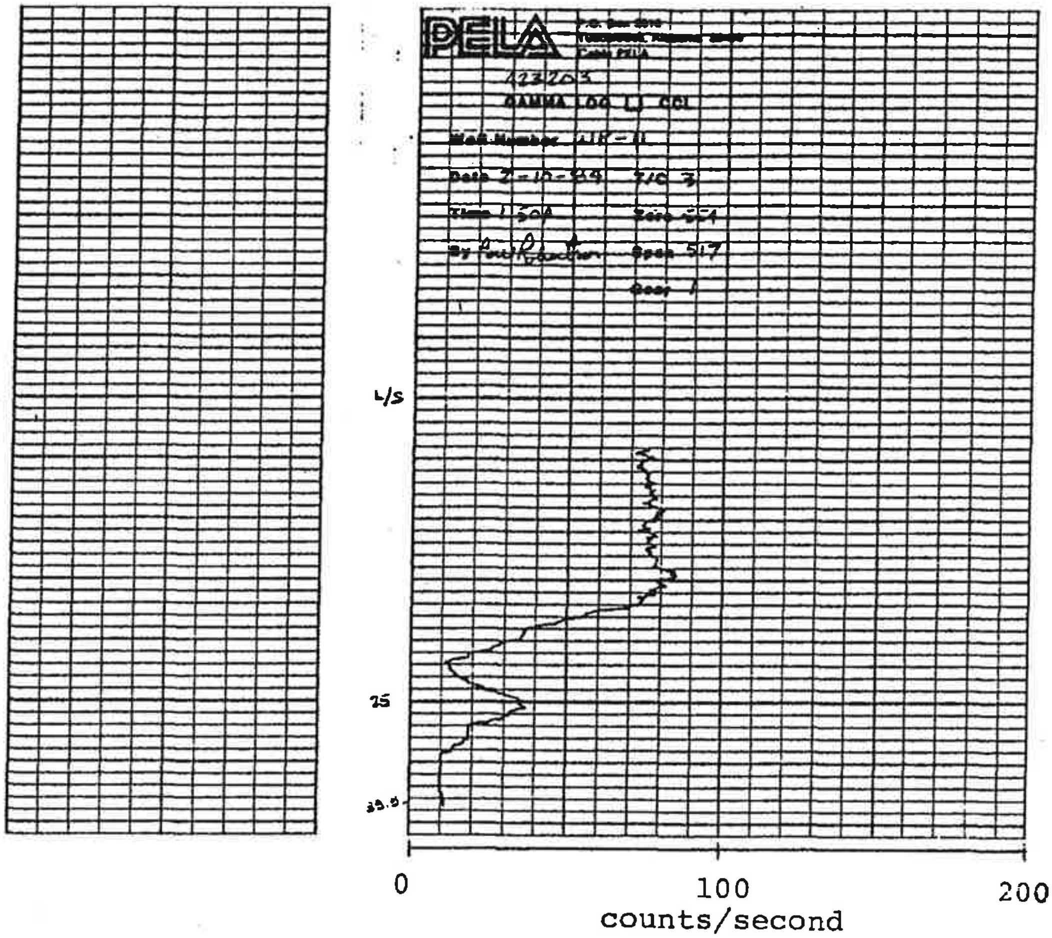
LITHOLOGIC DESCRIPTION, WP-11

OWNER: Ciba-Geigy Corporation

DATE DRILLED: January 9, 1984

PELA GEOLOGIST: Dan O. Madison, Jr.

Depth (in feet)	Description
0 - 5.0	Clay, pale-reddish-brown and greenish-gray, silty, trace of sand, clear quartz, fine-grained.
5.0 - 10.0	Clay, yellowish-gray, minor pale-reddish-brown and dark-yellowish-orange, very stiff.
10.0 - 18.0	Clay, yellowish-gray with minor grayish-orange and pale-reddish-brown, very stiff, trace of sand, clear quartz, medium-grained.
18.0 - 24.0	Sand, yellowish-gray, clear quartz, medium-grained, subrounded, trace of dark opaque grains, fine-grained.
24.0 - 29.0	Sand, same as above, slightly clayey, clay lens 27.0 - 28.0 feet, yellowish-gray and dark-yellowish-orange, sandy, clear quartz, medium-grained, rounded.
29.0 - 35.0	Sand, yellowish-gray, clear quartz, medium- to coarse-grained, rounded, minor gravel, clear to white quartz and dark-yellowish-orange chert, 2 to 4 mm in diameter.
35.0	TOTAL DEPTH.



Gamma log for WP-11: 4-33.5 feet below land surface

PELA

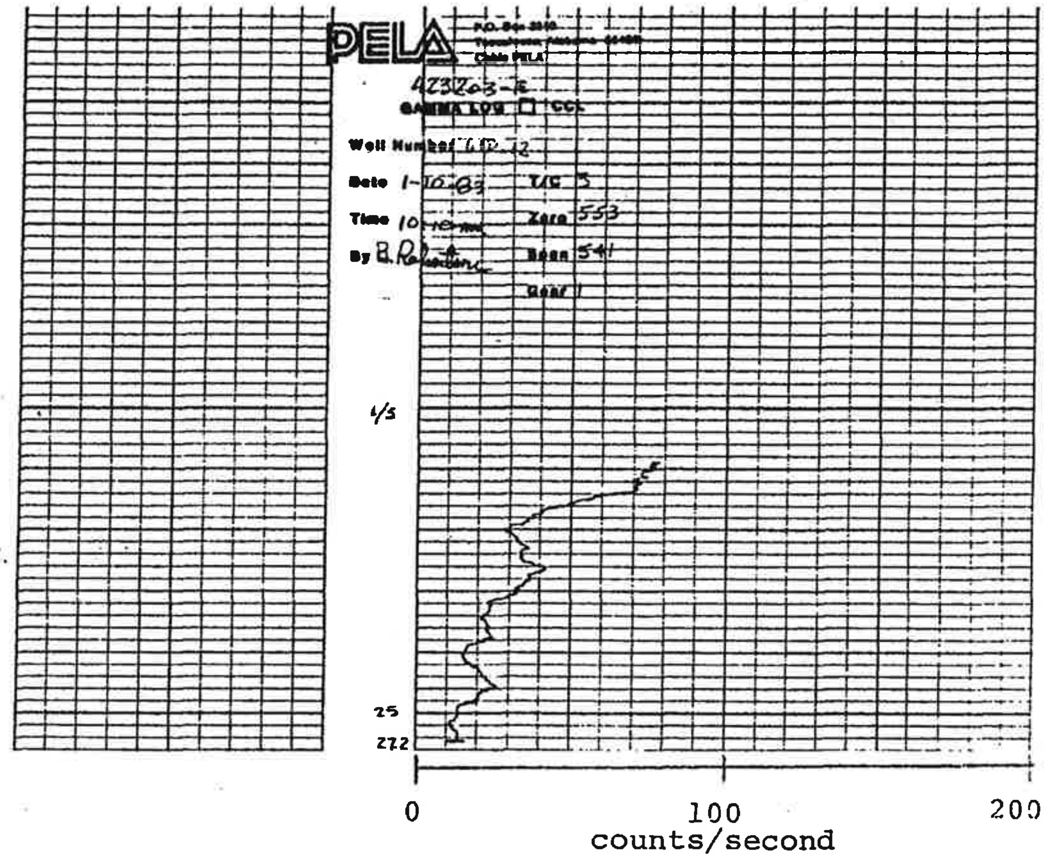
LITHOLOGIC DESCRIPTION, WP-12

OWNER: Ciba-Geigy Corporation

DATE DRILLED: January 10, 1984

PELA GEOLOGIST: Tom Schneider

Depth (in feet)	Description
0 - 8.0	Clay, light-brown and minor yellowish-gray, soft.
8.0 - 10.0	Clay, yellowish-gray.
10.0 - 15.0	Clay, grayish-orange.
15.0 - 20.0	Clay, grayish-orange and minor yellowish-gray, sandy, clear quartz, fine-grained, subangular.
20.0 - 25.0	Sand, grayish-orange, clear quartz, fine- to medium-grained, subrounded, very minor dark opaque grains, fine-grained, clayey in part.
25.0 - 30.0	Sand, same as above, with gravel, clear to white quartz, grayish-orange chert, 2 to 4 mm in diameter.
30.0	TOTAL DEPTH.

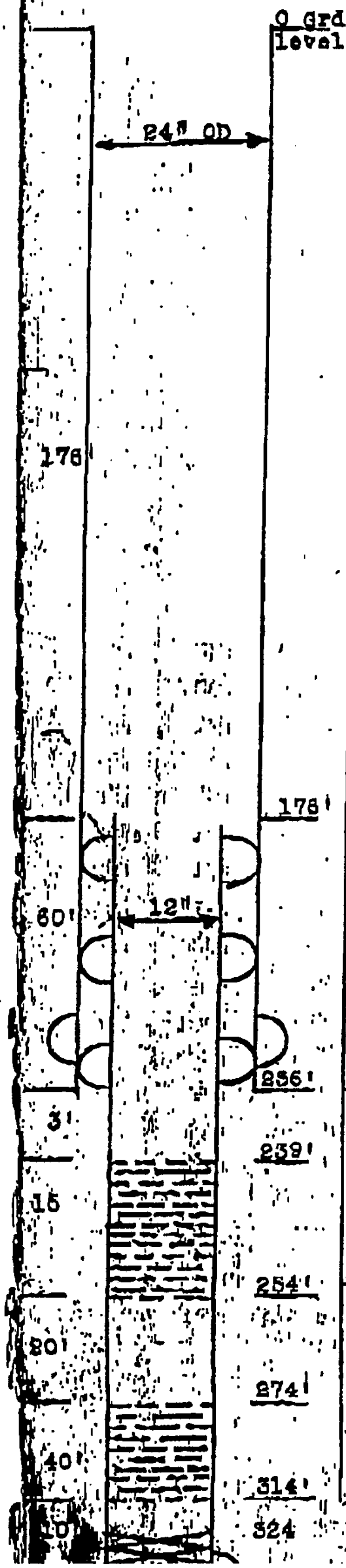


Gamma log for WP-12: 4-27.2 feet below land surface

Well #1

ALL MEASUREMENTS TAKEN FROM (GROUND) (TOP OF FOUNDATION) (TOP OF CASING) (TOP BASE PLATE)

DRAWING OF THE WELL



WELL DATA

STARTED WELL April 1 1952 AND COMPLETED May 9 1952
TOTAL DEPTH 324' ELEVATION ? STATIC WATER LEVEL 44'10"
LENGTH SURFACE CASING ____ SIZE ____ THICKNESS ____
CEMENTED WITH ____ SACKS CEMENT TYPE PACKER ____
LENGTH WELL CASING 236' SIZE 24" WEIGHT 79.05
CEMENTED WITH 236 SACKS CEMENT TYPE PACKER ____
INNER CASING LENGTH 83' SIZE 12" WEIGHT 43.77
WITH 5 Sets GUIDES LOCATED ____ TYPE BACKOFF LHFFJ
LEAD SEAL N BACKPRESSURE VALVE Long LA GUIDE ____
WELL STRAINER MAKE Layne SIZE 12" LENGTH 55' OPENING # 8
TYPE MATERIAL Stainless WITH Welded CONNECTIONS
SIZE HOLE DRILLED FOR SURFACE CASING ____ WITH ____
SIZE HOLE DRILLED FOR WELL CASING 30" WITH ____
SIZE HOLE DRILLED FOR STRAINER 36" WITH ____
YARDS OF GRAVEL USED 25 Yds HOW PLACED Poured pipe
HOW WAS WELL DEVELOPED Agitated with air
NOTES ____
RIG USED Layne Central, Skid DRILLER K.B. Duckworth

PUMP RECORD

SERIAL NUMBER 24635 MAKE Layne TYPE FOUNDATION Concrete
LENGTH COLUMN 100' SIZE 10"x2½"x1 11/16 T&C @ 10' LENGTHS
BOWL SIZE 15" TYPE DRHC STAGES 4 MATERIAL IMPELLER Brz
MATERIAL BOWL CI WITH Open PORTS AND ____ SHAFT
SUCTION SIZE 10" LENGTH 30' SUCTION STRAINER N
IS PUMP SEALED HOW No WHERE ____ WITH WHAT ____
LUBRICATOR TYPE Solidacid SIZE 2 Qt. VOLTAGE 440
LENGTH OF AIRLINE 117'9" SIZE ¼" TYPE MATERIAL Galv Pipe
AIR RELEASE VALVE TYPE No SIZE ____
SIZE SURFACE DISCHARGE 1½" TYPE Flg. DAYTON COUPLING No
PRESSURE GUAGE Yes SIZE PULLEY ____ SPEED ____
NOTES ____
RIG USED TO SET PUMP Pump truck INSTALLER R.E. Duckworth
DATE PUMP INSTALLED Aug 19, 52 DATE IN OPERATION Aug 14 1952

MOTOR

MAKE U.S. HP 75 FRAME 505-7 PHASE 3 CYCLE 60 VOLT 440
SPEED 1200 STYLE CFU SERIAL NUMBER 925206
TOP BEARING ____ BOTTOM BEARING ____ RATCHET ____
STARTER ____ PRESSURE SWITCH ____ FLOAT ____

GEAR

MAKE ____ STYLE ____ SIZE ____ RATIO ____ NO. ____
SIZE PULLEY ____ TYPE MOTOR FRAME ____

ENGINE

MAKE ____ STYLE ____ HP ____ SERIAL NUMBER ____
SPEED ____ SIZE PULLEY ____ FOUNDATION ____
TYPE FUEL TANK ____ MAKE MAG ____ NO. ____
MAKE STARTER ____ NO. ____ TYPE FUEL ____
MAKE FLEXIBLE SHAFT ____ SIZE ____ LENGTH ____ BELT LENGTH ____

GENERAL

PURPOSE FOR WHICH THIS WATER IS USED Chemical Plant
TEMPERATURE ____ IS WATER CLEAR ____ CAPACITY ____
SAND No HARDNESS ____ PH ____ IRON ____ NACL ____
TYPE TREATMENT USED ____
IS THERE A DERRICK OVER THE WELL No HEIGHT ____ TYPE ____
CAN TRUCK OR RIG EASILY GET TO WELL Yes
PUMP HOUSE No SIZE HATCH ____

CONTRACT NO. 3431 - 100

OUR WELL NO. 1 THEIR WELL NO. 1 IN TEST HOLE NO. 1
LOCATION OF THE WELL East side of property
INSTALLED FOR Ciba- Geigy ~~Chemical Company~~ Corporation
ADDRESS: CITY McIntosh COUNTY Washington

YEAR

WELL #1

FORMATION LOG OF THE WELL OR TEST HOLE

STARTED TEST HOLE April 15 1952 FINISHED April 16 1952 TEST HOLE NUMBER 1
LOCATION East side of plant SEC. ___ TS. ___ RANGE ___ ELEVATION ___

	TOTAL DEPTH	THICKNESS EACH STRATUM	FORMATION
	3'		Top soil
	27'	24'	Hard clay
	64'	37'	Sandy clay
	94'	30'	Coarse sand
-43	96'	2'	Clay & gravel
-149	202	106'	Clay
-159	212'	10'	Fine packed sand
-184	237'	25'	Clay
-202	255'	18'	Packed sand coarse
-215	268'	13'	Clay
-231	284'	16'	Packed sand
-253	306'	22'	Packed sand
-262	315'	9'	Packed sand
-275	328'	13'	Soft sand & clay
	354'	26'	Fine sand & clay
	376'	22'	Hard blue clay

MUD PIT SIZE ___ FT. X ___ FT. ___ X ___ FT. DEEP
TYPE BIT USED TO CUT SAND ___
SIZE OF TEST HOLE THROUGH SAND ___
TYPE OF BIT USED TO CUT UPPER FORMATIONS ___ SIZE ___
TYPE MUD PUMP USED ___
DRILLING PRESSURE IN SAND ___
TYPE OF MUD USED Service drilling clay
NOTES: ___

TEST DATA

	PRELIMINARY TEST	FINAL TEST
STATIC WATER LEVEL	40'	
PUMPED G. P. M.	1033	
PRESSURE, POUNDS	Test pump	
DRAWDOWN	18.5'	
G. P. F. D.	55	
GUARANTEED G. P. M.	1000	
GUARANTEED PRESSURE	110'	
DATE OF TEST	May 9, 1952	

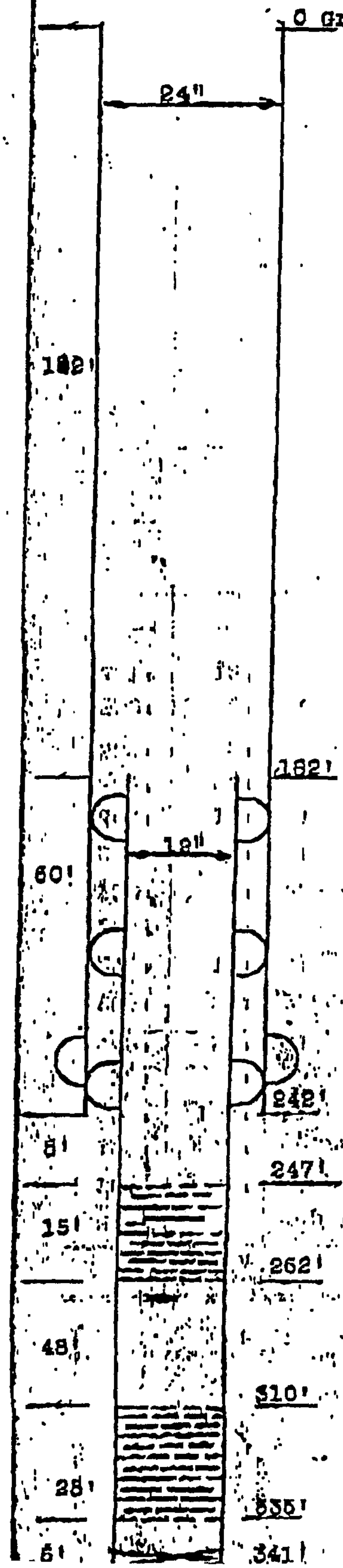
REMARKS

DRILLER K.B. Duckworth
FIELD SUP'T. M.T. Long

Well #2

ALL MEASUREMENTS TAKEN FROM (GROUND) (TOP OF FOUNDATION) (TOP OF CASING) (TOP BASE PLATE)

DRAWING OF THE WELL



WELL DATA

STARTED WELL May 15 1952 AND COMPLETED June 18 1952
TOTAL DEPTH 341' ELEVATION ____ STATIC WATER LEVEL 44'6"
LENGTH SURFACE CASING ____ SIZE ____ THICKNESS ____
CEMENTED WITH ____ SACKS CEMENT TYPE PACKER ____
LENGTH WELL CASING 242' SIZE 24" WEIGHT 79.05
CEMENTED WITH 242 SACKS CEMENT TYPE PACKER ____
INNER CASING LENGTH 113' SIZE 12" WEIGHT 43.77
WITH x GUIDES LOCATED ____ TYPE BACKOFF ____
LEAD SEAL ____ BACKPRESSURE VALVE Long L.A GUIDE ____
WELL STRAINER MAKE Layne SIZE 12" LENGTH 40' OPENING #8
TYPE MATERIAL Stainless WITH Welded CONNECTIONS
SIZE HOLE DRILLED FOR SURFACE CASING ____ WITH ____
SIZE HOLE DRILLED FOR WELL CASING 30" WITH ____
SIZE HOLE DRILLED FOR STRAINER 36" WITH ____
YARDS OF GRAVEL USED 25 HOW PLACED Poured
HOW WAS WELL DEVELOPED Agitated with air
NOTES:

RIG USED Layne Central, Skid rig DRILLER K.B.Duckworth

PUMP RECORD

SERIAL NUMBER 24634 MAKE Layne TYPE FOUNDATION Concrete
LENGTH COLUMN 100' SIZE 10 x 2½" x 1 11/16 TAC @ 10' LENGTHS
BOWL SIZE 15 TYPE DRHC STAGES 4 MATERIAL IMPELLER BRZ
MATERIAL BOWL C.I. WITH Open PORTS AND ____ SHAFT
SUCTION SIZE 10" LENGTH 30' SUCTION STRAINER No
IS PUMP SEALED HOW No WHERE ____ WITH WHAT ____
LUBRICATOR TYPE Solinoid SIZE 2 Qt. VOLTAGE 440
LENGTH OF AIRLINE 225'9" SIZE ¼" TYPE MATERIAL Galv pipe
AIR RELEASE VALVE TYPE No SIZE ____
SIZE SURFACE DISCHARGE 10" TYPE Flg DAYTON COUPLING No
PRESSURE GUAGE Yes SIZE PULLEY ____ SPEED ____
NOTES

RIG USED TO SET PUMP Pump truck INSTALLER R.E.Duckworth
DATE PUMP INSTALLED Aug. 14 1952 DATE IN OPERATION Aug 15 1952

MOTOR

MAKE U.S. HP 75 FRAME 505-7 PHASE 3 CYCLE 60 VOLT 440
SPEED 1200 STYLE ____ SERIAL NUMBER 925150
TOP BEARING ____ BOTTOM BEARING ____ RATCHET ____
STARTER ____ PRESSURE SWITCH ____ FLOAT ____

GEAR

MAKE ____ STYLE ____ SIZE ____ RATIO ____ NO. ____
SIZE PULLEY ____ TYPE MOTOR FRAME ____

ENGINE

MAKE ____ STYLE ____ HP ____ SERIAL NUMBER ____
SPEED ____ SIZE PULLEY ____ FOUNDATION ____
TYPE FUEL TANK ____ MAKE MAG ____ NO. ____
MAKE STARTER ____ NO. ____ TYPE FUEL ____
MAKE FLEXIBLE SHAFT ____ SIZE ____ LENGTH ____ BELT LENGTH ____

GENERAL

PURPOSE FOR WHICH THIS WATER IS USED Chemical Plant
TEMPERATURE ____ IS WATER CLEAR Not yet CAPACITY ____
SAND No HARDNESS ____ PH ____ IRON ____ NaCl ____
TYPE TREATMENT USED ____
IS THERE A DERRICK OVER THE WELL No HEIGHT ____ TYPE ____
CAN TRUCK OR RIG EASILY GET TO WELL Yes
PUMP HOUSE No SIZE HATCH ____

CONTRACT NO. 3431 - 100

OUR WELL NO. 2 THEIR WELL NO. 2 IN TEST HOLE NO. ____
LOCATION OF THE WELL West side of plant property
INSTALLED FOR Ciba Geigy ~~Chemical Company~~ Corporation (Brown & Root
ADDRESS CITY McIntosh COUNTY Washington STATE
YEAR

Well #2

242 / 55 / -187   213 / 55 / 158   334 / 56 / -278   332 / 56 / -176   339 / 56 / -183

FORMATION LOG OF THE WELL OR TEST HOLE

STARTED TEST HOLE May 21 19 52 FINISHED May 21 19 52 TEST HOLE NUMBER # 1 For Well 2
LOCATION West Side of Plant property SEC. ___ TS ___ RANGE ___ ELEVATION ___

	TOTAL DEPTH	THICKNESS EACH STRATUM	FORMATION
2	3'		Top Soil
-30	26'	23'	Clay
-46	102'	76'	Coarse yellow sand & gravel
-152	208'	106'	Clay
-158	213'	5'	Soft sand
-187	242'	29'	Clay
-208	263'	21'	Packed sand
-220	276'	13'	Clay
-229	285'	9'	Coarse soft sand
-232	288'	3'	Packed sand
-243	299'	11'	Clay
-253	309'	10'	Fine sand
-276	332'	23'	Packed sand coarse
-278	334'	2'	Clay
-283	339'	5'	Soft sand coarse
-295	351'	12'	Red clay

MUD PIT SIZE ___ FT. X ___ FT. X ___ FT. DEEP
TYPE BIT USED TO CUT SAND ___
SIZE OF TEST HOLE THROUGH SAND ___
TYPE OF BIT USED TO CUT UPPER FORMATIONS ___ SIZE ___
TYPE MUD PUMP USED Service drilling clay
DRILLING PRESSURE IN SAND ___
TYPE OF MUD USED ___
NOTES: ___

TEST DATA

	PRELIMINARY TEST	FINAL TEST
STATIC WATER LEVEL	44'6"	
PUMPED G. P. M.		
PRESSURE, POUNDS		
DRAWDOWN		
G. P. F. D.		
GUARANTEED G. P. M.		
GUARANTEED PRESSURE		
DATE OF TEST		

No test

REMARKS

DRILLER K.B.Duckworth
FIELD SUP'T M.T.Long

264
53
213
213
55
158

Well #3

86
55
25

FORMATION LOG OF THE WELL OR TEST HOLE

STARTED TEST HOLE __________ 19___ FINISHED __________ 19___ TEST HOLE NUMBER __________
LOCATION __________ SEC.______ TS______ RANGE______ ELEVATION______

	TOTAL DEPTH	THICKNESS EACH STRATUM	FORMATION
	-	31'	Clay
-3	58'	27'	Soft Sandy Clay
-25	80'	22'	Coarse Sand & Gravel
-78	133'	53'	White Clay
-116	171'	38'	Sandy Clay
-158	213'	42'	Clay
-177	232'	19'	Sand & Stks of Clay
-180	235'	3'	Clay
-192	247'	12'	Packed Sand
-213	268'	21'	Clay
-219	274'	6'	Sand & Soft Muddy Stks
-235	290'	16'	Packed Sand
-256	311'	21'	Packed Sand
-261	316'	5'	Soft Sand
-271	326'	10'	Packed Sand
-281	336'	10'	Sand & Clay

TOTAL DEPTH	THICKNESS EACH STRATUM	FORMATION

MUD PIT SIZE ______ FT. X ______ FT. ______ X ______ FT. DEEP
TYPE BIT USED TO CUT SAND ______
SIZE OF TEST HOLE THROUGH SAND ______
TYPE OF BIT USED TO CUT UPPER FORMATIONS ______ SIZE ______
TYPE MUD PUMP USED ______
DRILLING PRESSURE IN SAND ______
TYPE OF MUD USED ______
NOTES:

TEST DATA

	PRELIMINARY TEST	FINAL TEST
STATIC WATER LEVEL	78'	
PUMPED G. P. M.	1500	
PRESSURE, POUNDS		
DRAWDOWN	30.03	
G. P. F. D.		
GUARANTEED G. P. M.		
GUARANTEED PRESSURE		
DATE OF TEST	12-12-56	

REMARKS

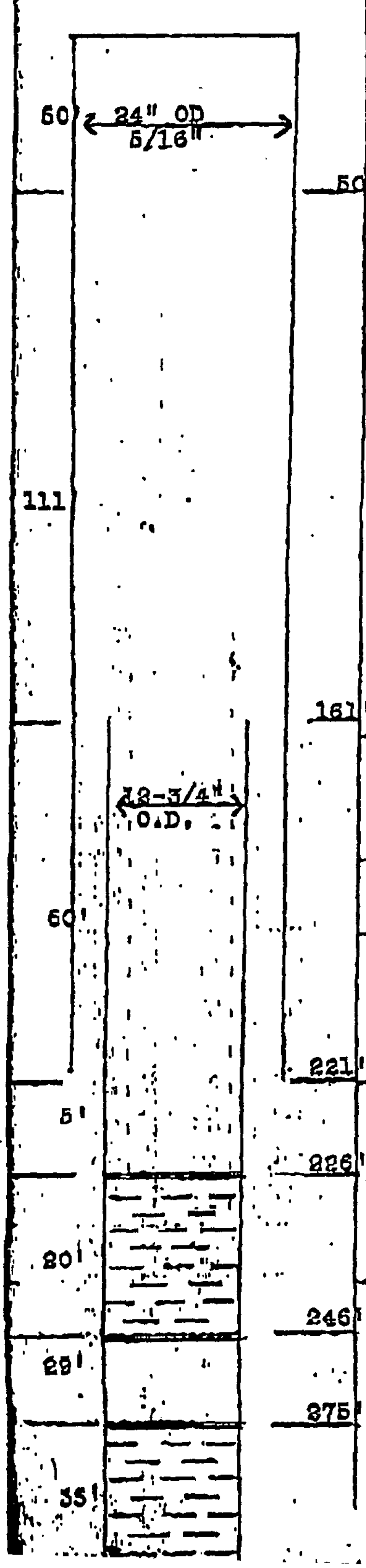
DRILLER K. B. Duckworth
FIELD SUPT. M. T. Long.

UN-15-98 MON 9:43 AM CIBA SPECIALTY CHEMICALS P. 6
AUG.28.1997 10:25AM LAYNE CHRISTENSEN CO NO.939 P.8/13

WELL #3

ALL MEASUREMENTS TAKEN FROM (GROUND) (TOP OF FOUNDATION) (TOP OF CASING) (TOP BASE PLATE)

DRAWING OF THE WELL



WELL DATA

STARTED WELL 11-27 19 57 AND COMPLETED 12-8 19 57
TOTAL DEPTH 320' ELEVATION ____ STATIC WATER LEVEL 50'
LENGTH SURFACE CASING ____ SIZE ____ THICKNESS ____
CEMENTED WITH ____ SACKS CEMENT TYPE PACKER ____
LENGTH WELL CASING 221' SIZE 24" WEIGHT 5/16"
CEMENTED WITH 350 SACKS CEMENT TYPE PACKER ____
INNER CASING LENGTH 104' SIZE 12-3/4" WEIGHT ____
WITH x GUIDES LOCATED ____ TYPE BACKOFF ____
LEAD SEAL ____ BACKPRESSURE VALVE ____ GUIDE ____
WELL STRAINER MAKE Layne SIZE 12" LENGTH 55' OPENING ____
TYPE MATERIAL Stainless WITH ____ CONNECTIONS ---
SIZE HOLE DRILLED FOR SURFACE CASING ____ WITH ____
SIZE HOLE DRILLED FOR WELL CASING 30" WITH ____
SIZE HOLE DRILLED FOR STRAINER ____ WITH ____
YARDS OF GRAVEL USED 1 car HOW PLACED ____
HOW WAS WELL DEVELOPED ____
NOTES: ____

RIG USED Skid DRILLER K. B. Duckworth

PUMP RECORD

SERIAL NUMBER 36126 MAKE Layne TYPE FOUNDATION ____
LENGTH COLUMN 140' SIZE 10 x 2-1/2" x 1-11/16 TYPE Oil @ 10' LENGTHS
BOWL SIZE 18" TYPE DBHC STAGES 5 MATERIAL IMPELLER Bronze
MATERIAL BOWL C.I. WITH Open PORTS AND ____ SHAFT
SUCTION SIZE 10" LENGTH 30' SUCTION STRAINER No
IS PUMP SEALED HOW No WHERE ____ WITH WHAT ____
LUBRICATOR TYPE Elec. SIZE 2 Qts. VOLTAGE 440
LENGTH OF AIRLINE 160' SIZE 1/4" TYPE MATERIAL Galv. Pipe
AIR RELEASE VALVE TYPE None SIZE ____
SIZE SURFACE DISCHARGE 10" TYPE Flngd DAYTON COUPLING No
PRESSURE GUAGE ____ SIZE PULLEY ____ SPEED ____
NOTES ____

RIG USED TO SET PUMP ____ INSTALLER K. B. Duckworth
DATE PUMP INSTALLED 3/4 19 57 DATE IN OPERATION 3/4 19 57

MOTOR

MAKE G.E. HP 75 FRAME 505P PHASE 3 CYCLE 60 VOLT 440
SPEED ____ STYLE 5K505XC4A SERIAL NUMBER VNJ 828051
TOP BEARING ____ BOTTOM BEARING ____ RATCHET ____
STARTER ____ PRESSURE SWITCH ____ FLOAT ____

GEAR

MAKE ____ STYLE ____ SIZE ____ RATIO ____ NO. ____
SIZE PULLEY ____ TYPE MOTOR FRAME ____

ENGINE

MAKE ____ STYLE ____ HP ____ SERIAL NUMBER ____
SPEED ____ SIZE PULLEY ____ FOUNDATION ____
TYPE FUEL TANK ____ MAKE MAG ____ NO. ____
MAKE STARTER ____ NO. ____ TYPE FUEL ____
MAKE FLEXIBLE SHAFT ____ SIZE ____ LENGTH ____ BELT LENGTH ____

GENERAL

PURPOSE FOR WHICH THIS WATER IS USED Domestic
TEMPERATURE ____ IS WATER CLEAR ____ CAPACITY ____
SAND ____ HARDNESS ____ PH ____ IRON ____ NaCL ____
TYPE TREATMENT USED ____
IS THERE A DERRICK OVER THE WELL ____ HEIGHT ____ TYPE ____
CAN TRUCK OR RIG EASILY GET TO WELL ____
PUMP HOUSE ____ SIZE HATCH ____

CONTRACT NO. 6427 - 100

OUR WELL NO 3 THEIR WELL NO. 3 IN TEST HOLE NO. ____

LOCATION OF THE WELL Outside Back Gate

INSTALLED FOR Ciba-Geigy ~~Chemical Company~~ Corporation

ADDRESS CITY McIntosh COUNTY ____ STATE ____

YEAR 19__

Well #7

FORMATION LOG OF THE WELL OR TEST HOLE

STARTED TEST HOLE 12-16 19 89 FINISHED 1-23 19 90 TEST HOLE NUMBER 7-02
LOCATION ¼ mile outside fence on Northside SEC. ____ TS. ____ RANGE ____ ELEVATION ____

TOTAL DEPTH	THICKNESS EACH STRATUM	FORMATION
19	19	Clay
40	21	Yellow Sand
44	4	Sandy Clay
80	36	Sand & Gravel
100	20	Hard Cut Clay
125	25	Sand, Little Clay
128	3	Clay
130	2	Sandy Clay
146	16	Clay
148	2	Sandy Clay
171	23	Clay & Sand streaks
178	7	Clay
188	10	Sandy Clay
238	50	Clay
240	2	Sandy Clay
275	35	Sand
321	46	Sand, Little Clay
343	22	Fine sand, Little Clay

TOTAL DEPTH	THICKNESS EACH STRATUM	FORMATION

MUD PIT SIZE ____ FT. X ____ FT. ____ X ____ FT. DEEP
TYPE BIT USED TO CUT SAND ____
SIZE OF TEST HOLE THROUGH SAND ____
TYPE OF BIT USED TO CUT UPPER FORMATIONS ____ SIZE ____
TYPE MUD PUMP USED ____
DRILLING PRESSURE IN SAND ____
TYPE OF MUD USED ____
NOTES: ____

TEST DATA

	PRELIMINARY TEST	FINAL TEST
STATIC WATER LEVEL	57'	
PUMPED G. P. M.	606	
PRESSURE. POUNDS		
DRAWDOWN	14'	
G. P. F. D.	36.14	
GUARANTEED G. P. M.		
GUARANTEED PRESSURE	92 psi	
DATE OF TEST	2-13-90	

REMARKS

DRILLER James A. Armstrong
FIELD SUPT. Jim Calhoun

WATER WELL
CONTRACTORS

GRINER DRILLING SERVICE INC.

PUMP SALES
AND SERVICE

CIBA SPECIALITY CHEMICALS

WW8

GAMMA

GEOPHYSICAL LOGS

Date:6/26/98
Elevation: 48'
Location: ~350' east of WW 7
Section: 38
Township: 4 North
Range: 1 East

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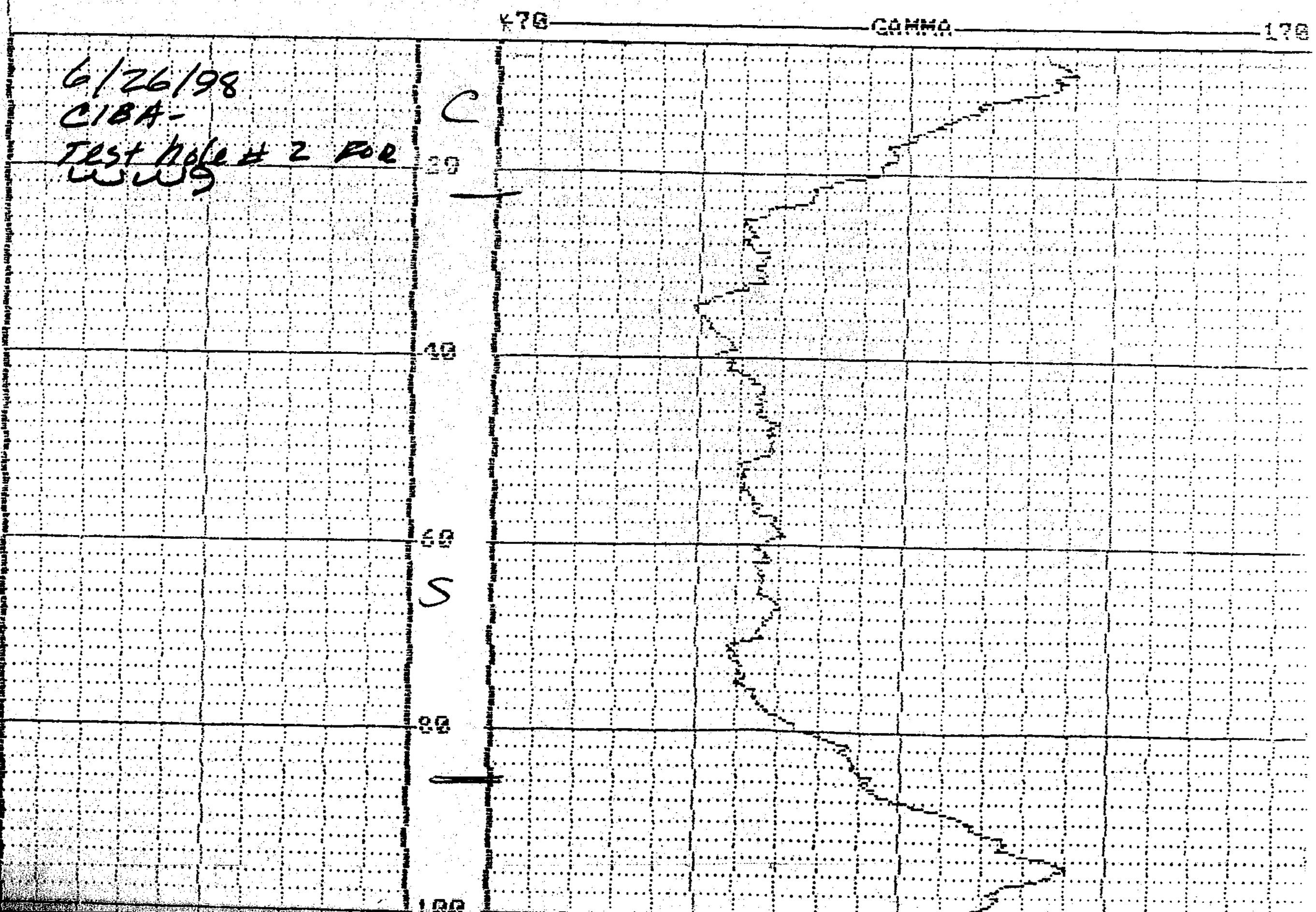

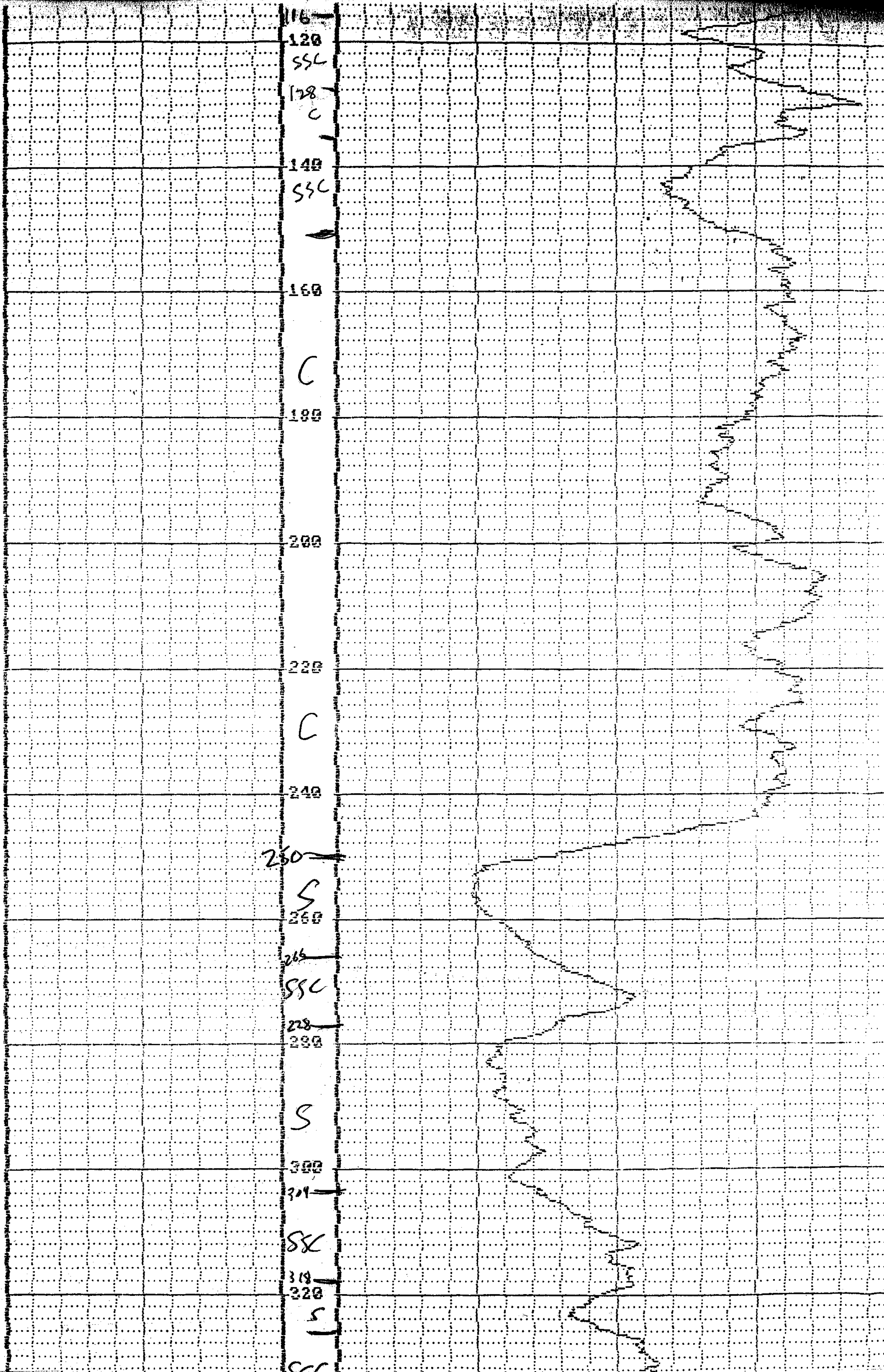
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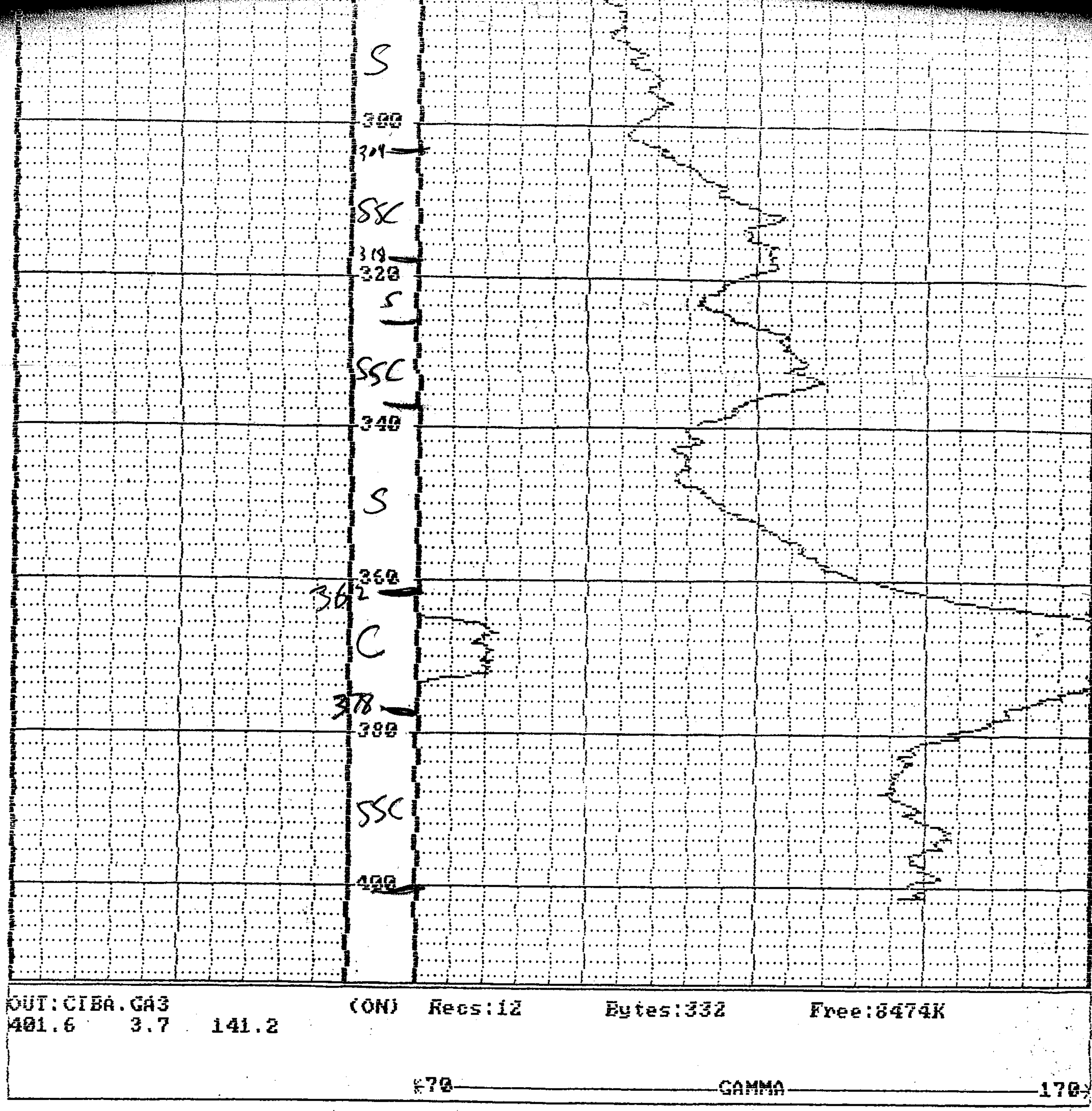
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401.6 3.7 141.2
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Bytes:332
Free:8474K
70
GAMMA
170

WATER WELL
CONTRACTORS

GRINER DRILLING SERVICE INC.

PUMP SALES
AND SERVICE

May 7, 1999

Ciba Specialty Chemicals
P.O. Box 113
McIntosh, AL 36553

Attn: Mr. Joe Harper Fax 436-4078

RE: Well Construction Recommendations for WW8

Dear Mr. Harper:

This is to confirm our conversation regarding the construction of the new WW8 Production Well. This production well will be constructed in the same zones as the test well.

We would like to recommend installing 16" casing to a depth of 238' and cement in place.

40 feet of 10" 0.025" slot well screens will be set from 248' to 268' (20') and from 274' to 294' (20'). A 6 ' of 10" stainless steel blank will be installed between the two screened sections.

10" Stainless Steel Inner Casing will be installed from 248' to 178' (60' lapped up inside the casing).

The gravel pack will be a Southern Filter Media 10-20 pack.

Please review this recommendation and if all meets your approval we will proceed with ordering material. If you have any questions or if I can be of any further assistance please give me a call.

Sincerely,

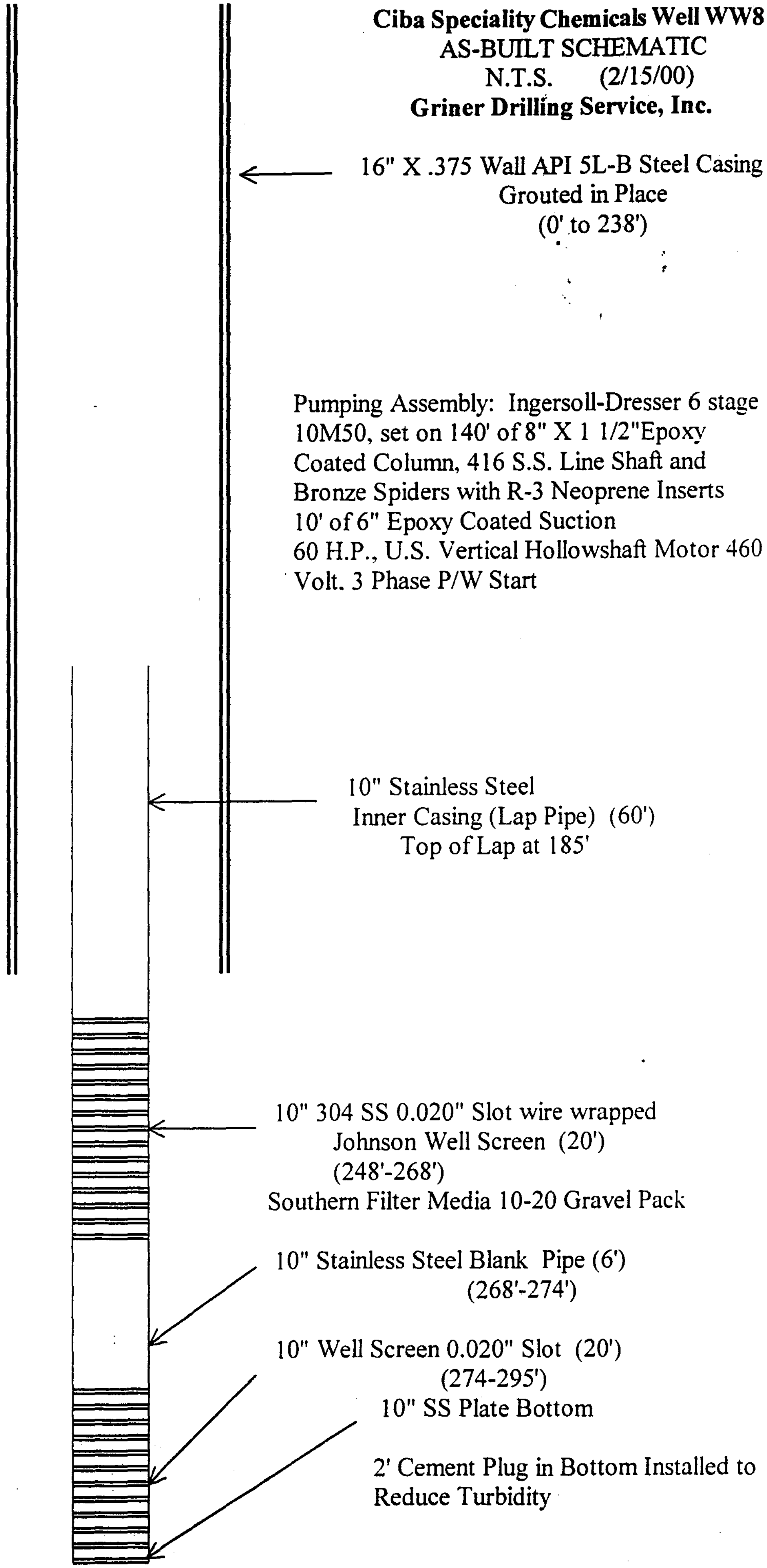
Griner Drilling Service, Inc

Sparky Wilson

Sparky Wilson

P.O. BOX 7469 • SPANISH FORT, ALABAMA 36577-7469
11100 HIGHWAY 31 N. • SPANISH FORT, ALABAMA 36527
PHONE: (334) 621-WELL(9355) • FAX: (334) 626-PUMP(7867)

Ciba Speciality Chemicals Well WW8
AS-BUILT SCHEMATIC
N.T.S. (2/15/00)
Griner Drilling Service, Inc.



REPORT OF DRILLED WELL

GRINER DRILLING SERVICE	155	11100 HWY 31 N.	36527	2/15/00
DRILLING CONTRACTOR	License Number	Address	Zip Code	Date

CIBA SPECIALTY CHEM.	P.O. BOX 113, MCINTOSH, AL	36553
PROPERTY OWNER	Address (mailing)	Zip Code

INSIDE PLANT, MCINTOSH	WASHINGTON	38		4N	1E
WELL LOCATION	County	Section	¼ Section	Township	Range ---or:

Distance and direction from nearest town, community, road junction or other reference point

WELL WILL BE USED FOR: [ ] Private supply [ ] Public supply [XXX] Industrial supply [ ] Test well [ ] Irrigation Other:

4/99 Estimated starting date

Drilling method: (check) Cable tool; Rotary XXX; Jetted; Bored; Other:

16 X 10 Diameter of well

300' Estimated depth

SPARKY WILSON — Sparky Wilson
SIGNATURE of Drilling Contractor

Total Depth 295'

Completion Date 2/15/00

Interval	Description of cuttings	Interval	Description of cuttings
0			
2	TOP SOIL		
26	MULTI-COLORED CLAY		
58	COARSE SAND & GRAVEL		
73	GRAVEL & SAND		
86	SAND & GRAVEL		
118	SANDY CLAY		
134	SAND		
145	SANDY CLAY		
246	CLAY		
271	SAND		
274	SANDY CLAY		
297	SAND		
314	SAND W/ CLAY STKS.		
360	SAND W/ CLAY & GRAVEL		
378	CLAY		

*For deeper well please attach continuation sheet.

Completion date: report depths below ground level

Pump
Type: [X] Turb. [ ] Subm. [ ] Jet [ ] Cyl:: Other:
Intake depth 155' H.P. 75 Yield 750 gpm

Capacity
Tested by: [X] pumping [ ] air lift [ ] bailer [ ] none
Measured Static Water Level 83.42' ft.
Measured pumping level 103.09 ft. after 24 hrs. pumping 750 gpm
Development time prior to testing 48 hrs.

Finish
[ ] Open hole [X] Screened [ ] Slotted pipe [ ] Gravel pk.
Interval(s) screened: 248' to 268' ft.; 274' to 294'; to ft.
Packer(s) set at and ft.
Screen: diam. 10"; Size openings .022

Casing

Interval cased	Diam. (Inches)	*Type pipe	*Type couplings	Interval grouted
240'	16"	W		0-240'

*Couplings: Threaded & Coupled (T&C) Welded (W) Threaded & coupled & welded (TC&W)

Other:

*Pipe: Black; PVC; Galv.; Other: SS & BLANK (XX)

Quality
Water analysis obtained? (check) [X] No [ ] Bacteriological [ ] Chemical

Analysis by: [ ] Ala Geol. Surv. [ ] U.S. Geol. Surv. [ ] Ala Health Dept. [ ] Private lab.

Signed: SPARKY WILSON Sparky Wilson

.020,000 mg/l
.019,000 mg/l

ADEM Form 60 1/83

GRINER DRILLING SERVICE, INC.
Telephone 334-621-9355
PO Box 7469
Spanish Fort, AL 36577

FORMATION LOG FOR: **CIBA WW9**

ADDRESS: **McINTOSH, AL**

TEST HOLE LOCATION: **400' East of WW7 on North Side of Plant**

TEST HOLE NO. **WW9-01**

FORMATION AND TEST HOLE INFORMATION

Total Depth	Thickness Each Stratum	Formation	Remarks
2	2	TOP SOIL	
26	24	MULTI-COLORED, HARD CLAY	
58	32	COARSE SAND AND LARGE PEA GRAVEL	
73	15	PEA GRAVEL AND CLAY	
86	13	SAND AND PEA GRAVEL	
90	4	SANDY CLAY	
98	8	CLAY	
104	6	SAND WITH LITTLE CLAY	
110	6	CLAY, SANDY	
126	16	SAND WITH LITTLE CLAY STREAKS	
164	38	SANDY CLAY	
246	82	FIRM CLAY WITH SANDY STREAKS	
248	2	SAND	
271	23	PACKED SAND	
274	3	SANDY CLAY	
294	20	PACKED SAND	
297	3	SAND	
310	13	SAND WITH CLAY STREAKS	
314	4	CLAY, SANDY	
330	16	SAND WITH CLAY AND GRAVEL	
341	11	CLAY AND PEA GRAVEL	
360	19	SANDY CLAY AND GRAVEL	
378	18	CLAY	
		BOTTOM	

Date Started: Date Completed: 4/28/98

Field Engineer: Jim Calhoun Driller: Daniel Herrington

WATER WELL CONTRACTORS

GRINER DRILLING SERVICE INC.

PUMP SALES AND SERVICE

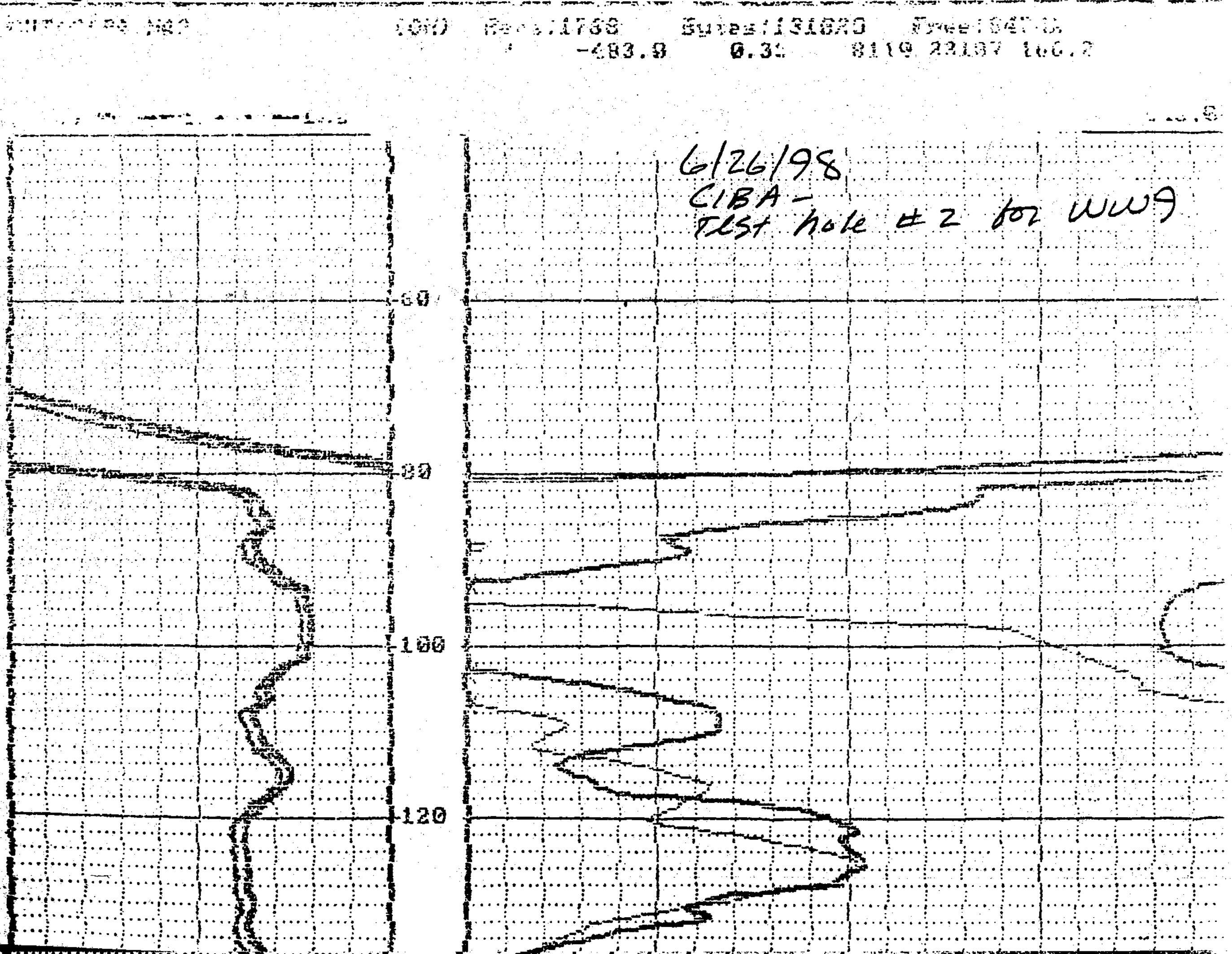
CIBA SPECIALITY CHEMICALS

WW8

RESISTIVITY

GEOPHYSICAL LOGS

Date:6/26/98
Elevation: 48'
Location: ~350' east of WW 7
Section: 38
Township: 4 North
Range: 1 East



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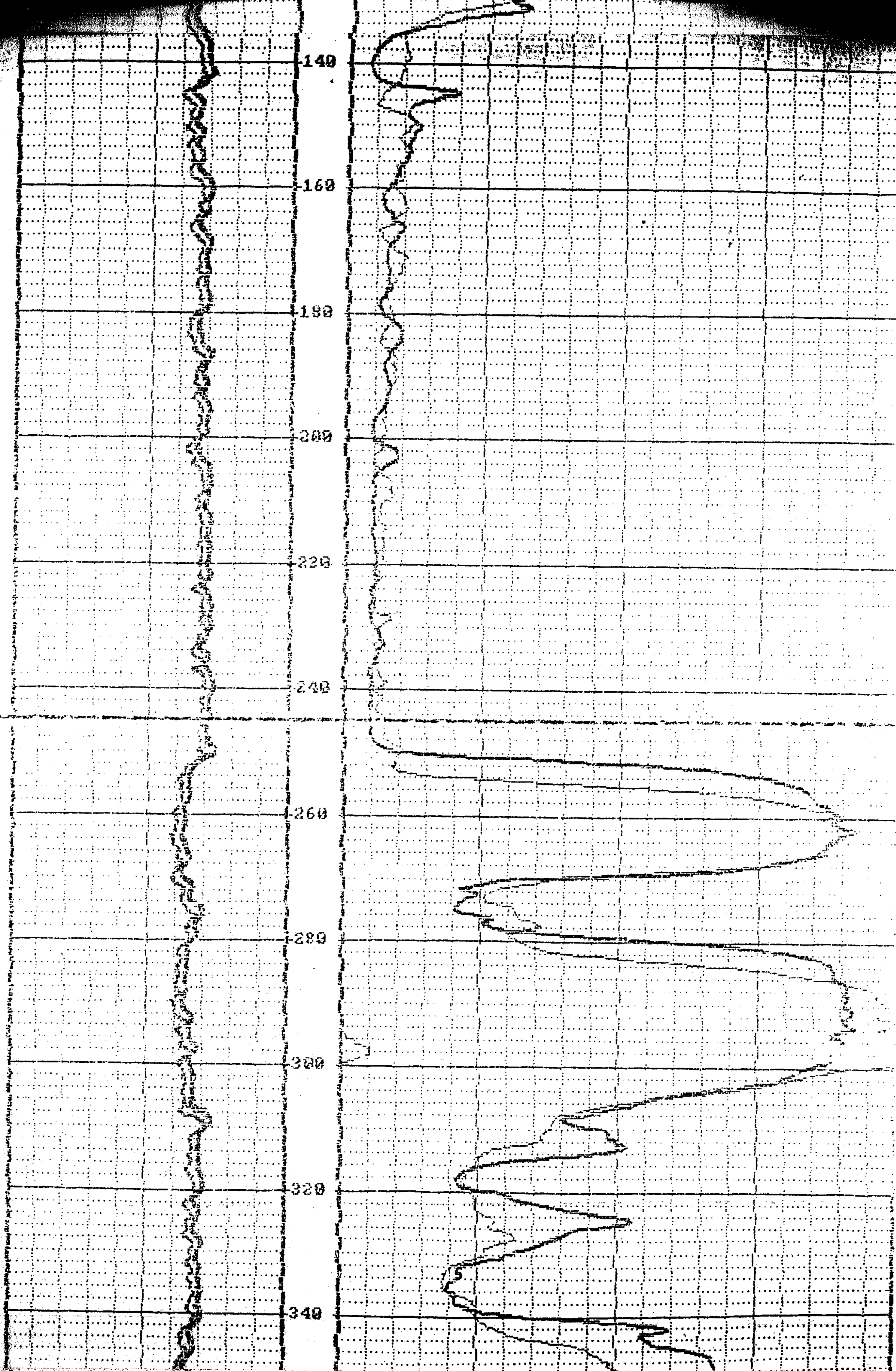

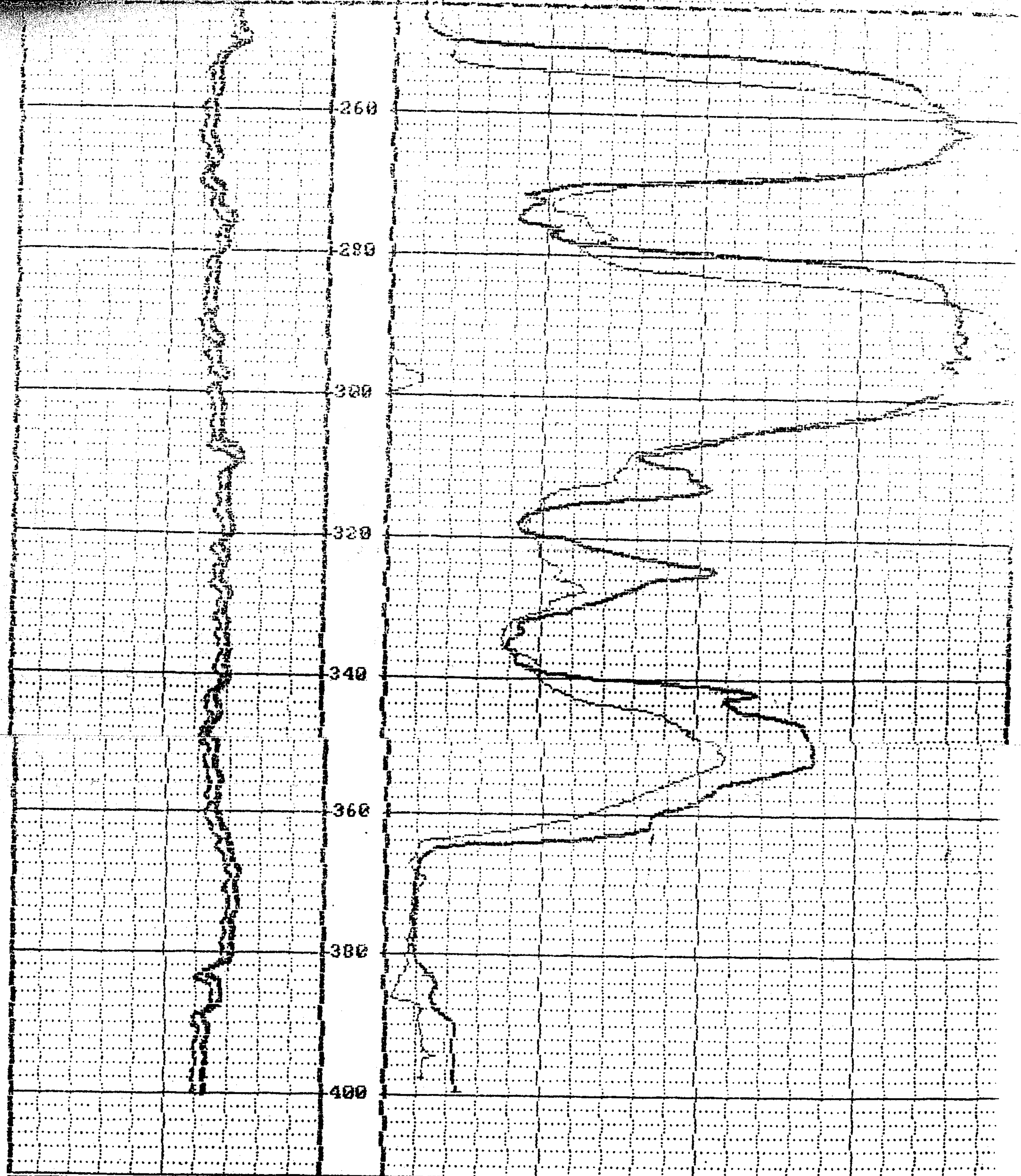

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-100.0 SP 100.0 -15.0 N64 245.0

APPENDIX M

SUMMARY OF
SOLID WASTE MANAGEMENT UNITS

BASF McIntosh, AL

(September 2021)

(September 2021)

Table 1

List of Units
Regulated by the State's Portion of the RCRA Permit for Post-Closure Care*

SWMU No.	Description
1	Class "C" Landfill
2	Biological Sludge Landfill
3	Rectangular/Triangular Pond
4	Sludge Impoundment No. 1
5	Sludge Impoundment No. 2
6	Sludge Impoundment No. 3
7	Sludge Impoundment No. 4
8	5-Day Impoundment
9	10-Day Impoundment
10	Equalization Impoundment
11	Dilute Impoundment
12	Diazinon Destruction Impoundment
13	GM-44 Impoundment
14	Aboveground Landvault No. 1
15A	Aboveground Landvault No. 2
AOC-B^	Lower Dilute Ditch

*SWMUs 1 through 14 are post closure units.
^ BASF should continue to inspect AOC B on a quarterly basis for integrity of the final cover, run-on and run-off control, animal disturbance, obstruction or impediment of drainage, intact fence, and proper warning signs.

Table 2
List of Solid Waste Management Units Requiring No Further Action

15B	Activated Carbon Treatment System
16	Container Storage Area; unit closed with Incinerator #1
17	Rotary Kiln Incinerator No. 1; unit closed in 1999
18A-T	Rotary Kiln Incinerator No. 2; unit closed in 2006
19	Tank Farm 1 (V-0700-07, V-1003); unit closed with Incinerator #1
20	Tank Farm 2 (V-1002, V-2499); unit closed with Incinerator #1
21	Tank Farm 3 (15-V-091, 15-V-092); unit closed with Incinerator #1
22A-E	Tank Farm 4 (15-V-202, 15-V-203, 15-V-204, 15-V-234, 15-V-205); unit closed with Incinerator #2
32	Warehouse No. 218; unit closed 1999
34A-EE	Area 15 Waste Water Treatment System; unit manages process unit waste waters, storm waters, and groundwater
35A-C, F-M, O-R, T, V-BB	Main Wastewater Sumps
36	Air Curtain Incinerator (Area 15); unit managed wood pallets, wood construction debris, and wood generated from clearing
37A	Former Underground Injection Well No. 1; unit managed high salt content waste waters
37B	Former Underground Injection Well No. 2; unit managed high salt content waste waters
38A-C, L-N, Q, U, V, Z-CC*	≤90 day hazardous waste storage tanks, containers and areas
38D, E, J, K, O, P, R, S, T, W, X, Y	≤90 day hazardous waste storage tanks, containers and areas; no longer in use
39A-C, K-M, Q-R, T, V, W, DD, FF,-GG, II, KK, SS, TT*	Satellite Accumulation Areas
39D-J, N-P, S, U, X-CC, HH, and JJ	Closed Satellite Accumulation Areas; no longer in use
40A-D, F-H, K	Waste Loading Areas
41A-F, N-Z	Wastewater Trenches and Sumps
43A-F	Area 14 Waste Water Treatment System; unit managed wastewaters from Area 14
44A, C-E*	Used Oil Storage Areas
44B	Fire Station/Building 1010 Used Oil Storage Tank (6-V-1)
45A*	Unit manages universal wastes
46	Non-hazardous Waste Storage Area/Building 212
47	Huntsman Environmental Areas

* BASF should continue to manage these <90 Day Hazardous Waste Storage Tanks, Containers, and Areas as required by Division 14 of the ADEM Administrative Code.

Table 3

List of Units requiring RFI[1] and/or corrective measures investigation

SWMU No. CERCLA Site No. CERCLA OU	Description

[1] There are no required RFI activities at this time.

APPENDIX N

HAZARDOUS WASTE STORAGE TANKS

(Updated November 2021)

Hazardous Waste Storage Tanks

1.0 General

BASF operates two (2) Hazardous Waste Tanks (Tanks), UT-V-813 and UT-V-814, which store hazardous waste feed for Natural Gas/Hazardous Waste Boiler #7 (Boiler #7). The hazardous waste feed is produced by the AO and HALS units, and is delivered to UT-V-813 and UT-V-814 by tanker car prior to being used as feed for Boiler #7.

Tanks UT-V-813 and UT-V-814 are existing vessels which have been re-designated for hazardous waste service. Prior to the vacator of the RCRA comparable fuels exclusion in April 2015, they were used to supply the same feed materials from the AO and HALS units as comparable fuels to Boiler #6. That activity was suspended when the exclusion was vacated. Consequently, there was no change to the waste materials stored in these tanks, only to the waste designation (non-hazardous to hazardous).

In addition to the Tanks, the tank system includes waste fuel piping and transfer pumps, vent piping, and a small knock-out pot (UT-V-815) to separate liquids in the vent system. Most of this equipment was previously utilized to feed the waste fuels to Boiler #6 prior to its decommissioning. The only change made to the tank system components as part of re-designating it for hazardous waste service with Boiler #7 was the addition of short runs of piping to connect the waste feed line and vents from the Tanks to Boiler #7.

2.0 Wastes Stored

Waste fuels produced by the AO and HALS units stored in tanks at the TSDF are not classified as reactive or incompatible, they are classified as hazardous due to their Ignitability (D001), and methanol content (F003). The wastes contain considerable fuel value, and are utilized within the boiler to provide steam for facility activities. Table 2-1 lists the hazardous constituent names along with the EPA hazardous waste identification numbers associated with wastes that can potentially be stored in tanks at the Boiler area. The hazardous waste streams stored in the tanks are routinely sampled for compatibility, per the Waste Analysis Plan (WAP), included as Appendix B. As the wastes are produced by industrial processes, the composition is stable and little variation in the waste characterization is typical.

Table 2-1 Potential Hazardous Waste Constituents	
Waste Code	**Material**
D001	Ignitable
F003	Spent Solvents (Methanol, Xylene, Cyclohexane, Octane, T-BuOH)

3.0 <u>Facility Siting</u>

The Tanks are fixed-roof, above ground tanks located on the perimeter of, and isolated from, the general boiler facilities. The tanks have a capacity of 31,000 gallons each and are used to store waste fuels prior to energy recovery in Boiler #7. The Tanks have been evaluated per American Petroleum Institute standards (API 650) for atmospheric vessels and have been deemed suitable for service by an Alabama Registered Professional Engineer. The materials of construction were selected based upon waste stream compatibility. The Tanks are located approximately 1000 feet from the nearest property boundary, and have greater than 3 feet of separation between each vessel. The current tank placement exceeds the buffer zone requirements of NEPA 30 Flammable and Combustible Liquids Code for stable liquids (operating pressure 2.5 psig or less) for a vertical tank with emergency relief venting, such as these.

The Tanks are located within a concrete secondary containment which meets the requirements of ADEM Admin. Code R 335-14-5-.10(4) and capable of containing 100% of the capacity of the tank during a 24-yr 24-hr storm event. The existing foundation consists of 12 to 18 inches of concrete (sloping floor) below surrounding grade, with walls approximately 24 inches high. Concrete cold joints are constructed with polyvinylchloride waterstops, selected to be compatible with, and resistant to, the chemicals contained within the tanks. The concrete is lined with a six mil (0.006 inch) thick polyethylene membrane liner.

Within the containment area there were structures for tanks which have been removed. These structures were demolished to existing grade as part of the preparation of the Tank area for hazardous waste service, and an additional 6 inches of concrete was added to the existing containment area. Joints where new concrete met the existing tank foundations were sealed with a sealant which is resistant to the materials stored in the Tanks. Further information regarding secondary containment and tank foundation construction can be found in the Tank Certification document, included as Attachment A to this Appendix.

In the case of a release to secondary containment which could potentially endanger human health or the environment, the release will be removed from secondary containment, and the tank will be removed from service as soon as practicable, or within 24-hours. The tank will be inspected and/or repaired prior to being placed back into service, and recertified by an engineer if material repairs were required. Additional details of the procedures, personnel, and reporting of a release are outlined in the Contingency Plan, included as Appendix F to the RCRA Permit.

4.0 Inspection

Upon initial installation for use with Boiler #6, the Tanks were inspected, and repaired where necessary to comply with technical and regulatory requirements. In their designation in service with Boiler #7, the Tanks are inspected at regular intervals to verify mechanical integrity, as outlined in the Inspection Plan, Appendix D. Daily visual inspections verify that leaks are not present from the Tanks or associated equipment, and every 5 years an API-510 External Visual Inspection and Ultrasonic Thickness Examination is performed. Annual inspections, in accordance with Air Emissions requirements, are also detailed in the Inspection Plan. The WAP, included as Appendix B, outlines the sampling performed on the waste streams to verify compatibility, and compliance with permit parameters. The materials stored in the Tanks will continue to be the AO and HALS waste streams, which have historically been stored in the Tanks without adverse effect to structural integrity.

Prior to designation as hazardous waste tanks in service with Boiler #7, the Tanks were evaluated in accordance with R 335-14-5-.10(3) for new tank systems. Further information regarding the Tank assessment can be found in the Tank Certification document, included as Attachment A to this Appendix.

5.0 Tank Description/Function

Historical inspection document for the Tanks are provided in Attachment A. The Tanks have a capacity of 31,000 gallons each, and are used to store the ignitable waste produced on-site, prior to energy recovery in Boiler #7. The Tanks were constructed of materials selected based on waste stream compatibility, identified as part of the initial waste stream characterization. The Tanks are existing tanks but they have been repurposed to hazardous waste service in 2015/2016. The waste streams historically stored in the Tanks have not changed, only the hazardous waste designation. Waste stream components are confirmed with periodic waste stream sampling during operation, as outlined in the WAP.

The equipment described in sections 5.1 through 5.3 are associated with Boiler #7. Tank design and operating information is listed in Table 5-1. Tank shell and bottom thickness, per ultrasonic examinations, are listed in Table 5-2. Process flow diagrams of the tank systems and an engineer's certification provided in accordance with R 335-14-5-.10(3)(a) are included in Attachment B of this appendix.

5.1 Tank UT-V-813

UT-V-813 is a 31,000 gallon, 304 L SS waste feed tank used to store spent solvents and other liquid waste at the Boiler area. Spent solvents are transported from locations in the main plant in tank trailers with capacities ranging from 5000 to 7500 gallons, and are transferred to UT-V-813 through UT-P-810, an emissions controlled pumping system. There also exists a rail car station, with pump UT-P-811 set up to fill the tank, however this rail car station is not in active use. In the event this station goes into service, the materials transferred would be sampled in a manner similar to existing waste stream sampling to ensure compatibility with existing Air Emissions regulatory requirements. After storage in UT-V-813, the boiler feed is routed through a suction-piping manifold to transfer pump UT-P-809, and strainers UT-F-807 and UT-F-808 prior to being direct to Boiler #7 for burning.

The tank is nitrogen padded and equipped with a liquid feed dip pipe to prevent sparks resulting from static electricity generated by falling liquids. The nitrogen padding is also used to prevent explosive mixtures in the gas phase of the tank. A pressure regulator furnishes nitrogen at two inches water pressure.

To prevent the Tanks from overfilling, the Tanks are equipped with a high level detector, and a high level switch that is interlocked to automatically shut-off the inlet block valve to the tank when the tank becomes full. The pump feeding the tank is also interlocked to shut-off, to prevent dead-heading. The tank is provided with a sample point at the discharge of the pump, and a sample valve on the influent line to the tank. The tank is anchored to a concrete pad foundation, with 8, 1-in diameter anchor bolts. The foundation is a nearly 2-ft thick concrete pedestal which was doweled into the existing concrete area slab.

For emission control, each tank breather vent (PCV set at 3.5 psig) and depressurization lines from the unloading operations are piped into a common header. This header feeds through a knockout pot (UT-V-815, 600 gal, 316SS) to the vapor lance venting to the Boiler #7 burner. Air emissions for Tank UT-V-813 meet the requirements of 335-14-5-.28 Subpart BB, and are addressed within the facility's air permit requirements.

The Tanks and all associated ancillary equipment are located in a covered and partially walled secondary containment system to provide retention of wind blown rainwater and tank spills. The liquids unloading and tank farm area floor is sloped to carry rainwater, area washdown, and tank trailer spillage to the unloading area sump, and tank farm sump. Liquids contained in the sump are pumped to the Waste Water Treatment System.

5.2 Tank UT-V-814

UT-V-814 is a 31,000 gallon, 304 L SS waste feed tank used to store spent solvents and other liquid waste at the Boiler area. Spent solvents are transported from locations in the main plant in tank trailers with capacities ranging from 5000 to 7500 gallons, and are transferred to UT-V-814 through UT-P-810, an emissions controlled pumping system. There also exists a rail car station, with pump UT-P-811 set up to fill the Tank, however this rail car station is not in active use. In the event this station goes into service, the materials transferred would be sampled in a manner similar to existing waste stream sampling to ensure compatibility with existing Air Emissions regulatory requirements. After storage in UT-V-813, the waste boiler feed is routed through a suction-piping manifold to transfer pump

UT-P-809, and strainers UT-F-807 and UT-F-808, prior to being directed to Boiler #7 for burning.

The storage tank is nitrogen padded and equipped with a liquid feed dip pipe to prevent sparks resulting from static electricity generated by falling liquids. The nitrogen padding is also used to prevent explosive mixtures in the gas phase of the tank. A pressure regulator furnishes nitrogen at two inches water pressure.

To prevent overfilling, the tank is equipped with a high level detector, and a high level switch which is interlocked to automatically shut-off the inlet block valve to the tank when the tank becomes full. The pump feeding the tank is also interlocked to shut-off to prevent dead-heading. The tank is provided with a sample point at the discharge of the pump, and a sample valve on the influent line to the tank. The tank is anchored to a concrete pad foundation with 8, 1-in diameter bolts. The foundation is a nearly 2-ft thick concrete pedestal which was doweled into the existing concrete area slab.

For emission control each tank breather vent (PCV set at 3.5 psig), and depressurization lines from the unloading operations, are piped into a common header. This header feeds through a knockout pot (UT-V-815, 600 gal, 316SS) to the vapor lance venting to the Boiler #7 burner. Air emissions for Tank UT-V-814 meet the requirements of 335-14-5-.28 Subpart BB, and are addressed under Facility/Permit No. 108-0003, Section 18.Based on the waste stream profiles for the AO and HALS hazardous waste streams, the tanks are not subject to RCRA Air Emission standards due to low (< 500 ppmw) Volatile Organic (VO) concentrations.

The tank and all associated ancillary equipment are located in the covered and partially walled secondary containment system to provide retention of wind blown rainwater and tank spills. The liquids unloading and tank farm area floor is sloped to carry rainwater, area washdown, and tank trailer spillage to the unloading area sump and tank farm sump. Liquids contained in the sump will be managed according to the site BMP.

Table 5-1

Tank and Auxiliary Equipment Design and Operating Information

Vessel No.	Design Standard	Construction Material	Size (Feet)		Gallons	Capacity Pressure	pH Range	Operating Temperature
			Dia	Hgt				
UT-V-813	API 650	304 L SS	12	36	31,000	5 psig	4-10	Ambient
UT-V-814	API 650	304 L SS	12	36	31,000	5 psig	4-10	Ambient
UT-V-815 (Ancillary Equipment)	ASME	316 L SS	3.5	8	600	15 psig	4-10	Ambient

Table 5-2

Tank Thickness Information

Vessel No.	Nominal Baseline (inches)		Measurement from Inspection (inches) (06/18/2014)		Difference	
	Shell	Bottom	Shell	Bottom	Shell	Bottom
UT-V-813	0.250 & 0.187	0.250	0.265 & 0.190	0.231	+0.015 & +0.003	-0.019
UT-V-814	0.260	0.236				

5.3 Ancillary Equipment

The Tanks are filled primarily from tanker trucks, which collect waste material from the AO and HALS units, for storage. There is also a rail car loading station, which has the potential to be put into service, but which is not anticipated to be put into service at this time. After storage in the Tanks, material is pumped to the Boiler #7 burner for energy recovery. Pressure relief valves on the Tanks route vapors from the Tanks to UT-V-815, a knock-out pot connected to the Tanks, where natural gas vapors are collected and directed to Boiler #7 for energy recovery, reducing air emissions. In case of an emergency there is an additional pressure relief valve that vents to atmosphere to prevent pressure buildup. A list of ancillary equipment is included in Table 5-3, below. A figure depicting the overall process flow is included in Attachment B.

Table 5-3

Ancillary Equipment Listing

Equipment Name.	Equipment Type
UT-P-810	Pump
UT-P-811	Pump
UT-P-809	Pump
UT-V-815	Knock Out Pot
UT-F-807	Strainer
UT-F-808	Strainer

6.0 <u>Air Emissions</u>

Air emissions for the Tanks are addressed under Facility/Permit No. 108-0003, Section 18, per R 335-14-29(c)(1) and 40 CFR 264.1080(b)(7). The air pollutant emissions from the tanks will be controlled with the air permit requirements. The maximum organic vapor pressure for the hazardous waste to be stored in Tanks UT-V-813/814 is 3.5 psig. Vapor from the tanks is collected in ancillary equipment UT-V-815 prior to control at Boiler #7. Pumps, valves, and sampling lines are periodically inspected per the Inspection Plan to identify leaks and schedule them for repair.

Attachment A

Tank System
Engineers Certifications

Environmental Resources Management

775 North University Blvd.
Suite 280
Mobile, Alabama 36608
(251) 706-8600
(888) 788-5994 (fax)

December 21, 2015

Mr. Maurice Ware
EHS Team Leader
BASF Corporation
1379 Ciba Road
McIntosh, AL 36553

RE: Hazardous Waste Tanks Certification

Mr. Ware:

Environmental Resources Management (ERM) is pleased to provide this written integrity evaluation and certification for the two tanks, UT-V-813 and UT-V-814 that will be placed into hazardous waste service. This certification, required by Alabama Administrative Code (AAC) §335-14-5-.10., addresses:

- design standards,
- waste characteristics,
- foundation design and anchoring,
- structural analysis,
- tightness testing, and
- ancillary equipment support.

Tank exteriors (not including tops) plus attached piping and pumps were observed by ERM on November 24, 2015. Historical documentation of tank evaluations and inspections along with waste characteristic information were provided from BASF files.

Based upon ERM's on-site observations and document review, the tanks comply with AAC §335-14-5-.10(3) requirements for new hazardous waste tanks. The tanks have sufficient structural integrity and are acceptable for storage of D001 and F003 hazardous wastes produced by BASF consisting of methanol, xylene, cyclohexane, octane, and t-butyl alcohol spent solvents designated for combustion in Boiler #7. The detailed certification accompanies this letter.

If you have any questions or require additional information, please call us at 251-706-8600.

Sincerely,
Environmental Resources Management

William K. Roberson
electronic

William K. Roberson
Senior Consulting Engineer

Attachment: Hazardous Waste Tanks Evaluation and Certification

2015\0268481\994ltr.doc

HAZARDOUS WASTE TANKS EVALUATION AND CERTIFICATION

BASF
McIntosh, Alabama

BACKGROUND

BASF, McIntosh, Alabama will be placing two existing storage tanks, numbers UT-V-813 and UT-V-814 into hazardous waste service in the near future. The two tanks are located in Tank Farm Facility 311.

The tanks have been used historically to store a mixture of Irganox Methanol Waste – CF (referred to locally as AO {Anti-Oxidant} Methanol CF) and Hindered Amine Light Stabilizers (HALS) Waste Solvents, which was fed to an on-site boiler (No. 6) and burned for energy recovery. Though this fuel qualified for a hazardous waste code, D001/F003, it was excluded from hazardous waste regulation under the comparable fuels exclusion. The "Comparable Fuels Rule" was vacated by the court in June 2014. In March 2015, the vacation went into effect and the material will now be collected and burned in a new boiler (No. 7) now that it is classified as hazardous waste. Operation of the two tanks will remain as it was historically. Only the regulatory classification of the contents stored in the tanks has changed.

BASF is preparing a hazardous waste permit modification for future storage and burning of AO Methanol CF/HALS Waste Solvents as hazardous waste. The two storage tanks will be subject to hazardous waste rules in Alabama Administrative Code (AAC) §335-14-5-.10 Tank Systems. Although the tanks are existing structures and have historically managed material chemically identical to what is now classified as hazardous waste material, they have not previously been designated for hazardous waste storage. As a new regulatory unit, the tanks are subject to the new tank standards in §335-14-5-.10. §335-14-5-.10(3) requires certification by a Professional Engineer that tanks designated for hazardous waste storage use are appropriately designed, configured, and have sufficient structural integrity for storage of hazardous waste. This Attachment documents evaluation of the storage tanks relative to the regulatory requirements of §335-14-5-.10, and certifies their acceptability for hazardous waste service.

CERTIFICATION ELEMENTS

Each element in the certification requirements from AAC §335-14-5-.10(3) are addressed below.

335-14-5-.10(3) Design and Installation of New Tank System Components

UT-V-813 and UT-V-814 are identical tanks. The two tanks are 12 feet outside diameter with 36-foot straight shells constructed of welded 304L stainless steel plate. The bottom twelve feet of the tank shell is constructed in two courses from $^1/_4$–inch-thick plate and the top four courses (from 12 feet to 36 feet of the tank vertical height) are constructed of $^3/_{16}$-inch plate. The bottom head is formed from $^1/_4$–inch 304L plate and welded to the tank shell. The top head is formed from $^3/_{16}$–inch 304L plate welded to the tank shell. The tanks are supported on 65-inch high carbon steel skirts. The nominal capacity of each tank is 31,000 gallons.

The tanks were originally constructed in 1994, and they were moved to the McIntosh site in 2004. At that time, radiography and liquid penetrant observations of all seam welds were performed. The inspection identified some welds that required repair. All unacceptable welds were removed by grinding and the seams were re-welded by gas tungsten arc welding to correct the identified deficiencies.

335-14-5-.10(3)(a)1. – Design Standards

Records of the standard to which the tanks were constructed in 1994 are not available. A structural evaluation of the two tanks was performed under the assumption that the tanks were fabricated according to American Petroleum Institute Standard 650 (API-650). The evaluation was completed in April 2004 by F&J Fearn Engineering, Inc. (F&J Fearn) and is provided in Attachment 1. The evaluation documents that tank construction conforms to API-650 design for vessels in similar service.

335-14-5-.10(3)(a)2. – Waste Characteristics

The waste in the tanks is composed of a mixture of AO Methanol CF and HALS Waste Solvents. Waste profiles for each of the materials are included in Attachment 2. Analyses of the AO Methanol CF material from 2014 show it to be composed of primarily methanol, with lesser amounts of water, octanols, isopropanol, and butanol. The flash point of the mixture is less than 140 degrees Fahrenheit. The specific gravity of the mixture is approximately 0.9. One sample of the mixture had a pH of 7.43 standard units.

The AO Methanol CF/HALS Waste Solvents mixture is classified as hazardous waste due to ignitability (D001). It is also a listed hazardous waste because of the presence of methanol (F003).

Type 304L stainless steel should provide excellent corrosion resistance from the components in the waste liquid mixture.

335-14-5-.10(3)(a)3. – Corrosion Factors Affecting Tanks in Contact with Soil

These tanks are supported on steel skirts, which are supported on a concrete base. No parts of the hazardous waste tanks contact soil. These factors are not applicable.

335-14-5-.10(3)(a)4. – Protection of Underground Tanks Potentially Affected by Vehicular Traffic

These are not underground tanks. This consideration is not applicable.

335-14-5-.10(3)(a)5. – Design Considerations

335-14-5-.10(3)(a)5.(i) – Tank Foundation Adequacy

Tank UT-V-814 is bolted to a concrete ringwall/cap constructed over an existing concrete ringwall foundation. The original ringwall foundation consisted of a 1-foot thick by 4-foot high reinforced concrete ring wall with compacted pit-run gravel in the center. A detail of the original ringwall foundation is shown in Drawing C-1002 in Attachment 3. This original ringwall foundation was overtopped by a concrete cap and sides when the concrete pad foundation for UT-V-813 was poured. Eight one-inch-diameter embedded anchor bolts were installed for UT-V-814 when the new foundation was poured. The foundation for UT-V-813 is a 1′-11″ thick concrete pedestal that was doweled into the existing concrete area slab. Eight one-inch-diameter anchor bolts for UT-V-813 were embedded in the new pedestal. This modified foundation for Tanks UT-V-813 and 814 is shown in Drawing C-311-0006 rev 1 in Attachment 3.

F & J Fearn's structural analysis of the two tanks performed in April 2004 included calculation of tank anchoring requirements. The structural analysis noted no deficiency with tank anchoring. A copy of the structural analysis is included in Attachment 1.

335-14-5-.10(3)(a)5.(ii) – Anchoring to Prevent Flotation

The tanks are not located in a saturated zone and are constructed as elevated vessels above the containment area floor. Flotation is not a relevant consideration in this configuration.

335-14-5-.10(3)(a)5.(iii) – Withstand Effects of Frost Heave

According to the National Oceanic and Atmospheric Administration (NOAA) Manual NOS NGS 1 *Geodetic Bench Marks*, the extreme frost depth for McIntosh, Alabama is approximately 0.09 meters (approximately 3.5 inches). Frost heave would not be expected to affect concrete foundations at this location and there is no visual indication of any foundation dislocation in the area of the tanks.

335-14-5-.10(3)(b) – Qualified Inspection Before Placing in Hazardous Waste Service for: 1) weld breaks, 2) punctures, 3) protective coating scrapes, 4) cracks, 5) corrosion, 6) other structural damage or construction/installation inadequacies

F & J Fearn performed a structural analysis of the two tanks in April 2004 before they were placed in AO Methanol CF/HALS Waste Solvents service. This analysis recommended installation of additional stiffeners at the top head to shell junction and bottom head to shell/skirt junction. These stiffeners were installed as recommended. No other deficiencies were documented in the structural analysis. A copy of F & J Fearn's analysis is included in Attachment 1.

Kellogg Brown & Root performed an inspection and certification of repairs performed on both tanks after weld seams were repaired in 2004. This inspection, performed in July 2004, included a baseline ultrasonic evaluation of both tanks. Kellogg Brown & Root performed subsequent visual and ultrasonic inspection of the two tanks in June 2012. The corrosion rate for the tanks calculated in 2012 translated to an "indefinite" life for the tanks in the current service. Copies of the 2004 and 2012 inspection are included in Attachment 4.

335-14-5-.10(3)(c) – Underground Tank Backfill Considerations

The tanks were not installed underground, so these considerations are not applicable.

335-14-5-.10(3)(d) – Tightness Testing

After the 2004 weld seam repair and tank modifications, UT-V-813 was hydrostatically tested to eight pounds per square inch (psi). Pressure was held for one hour and no pressure decline was observed on the tank pressure gauge and no leaks were observed. UT-V-814 was hydrostatically tested with a surcharge pressure to 25 psi and the pressure was held for one hour. No decline was observed on the tank pressure gauge and no leaks were observed.

The tanks and ancillary piping have been in service since 2004 and routine leak inspections have been performed. No leaking from the tanks or ancillary piping has been documented.

335-14-5-.10(3)(e) – Ancillary Equipment Support

Piping and pumps to be in hazardous waste service were observed during ERM's November 24, 2015 site visit. Pumps are bolted to concrete pedestals. Piping, which is flanged stainless steel, is routed aboveground and supported according to good engineering practice. No piping was observed to be sagging and no indications of pipe leaks were observed.

335-14-5-.10(3)(f) – Corrosion Protection

This requirement references §335-14-5-.10(3)(a)3., which is applicable to underground storage tanks. UT-V-813 and 814 are not underground tanks. Nevertheless, ultrasonic testing on the tanks indicates that the stainless steel tank shells and piping should have unlimited life in this application with respect to corrosion. Minimal to no measurable reduction in shell thicknesses were documented by the testing program.

335-14-5-.10(3)(g) – Tank Certification Bases and Suitability Certification

BASF maintains records of tank design, analysis, and inspection in its facility files. The certification of adequacy for hazardous waste service is provided on page 5 of this addendum.

Certification Statement

The tank system consisting of Tanks UT-V-813 and UT-V-814, plus ancillary piping and equipment, at the BASF, McIntosh, Alabama Facility have sufficient structural integrity and are acceptable for the storing and transferring of hazardous waste.

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Name: William K. Roberson

Signature: William K. Roberson

Date: 12-21-2015

ALABAMA REGISTERED 13722 PROFESSIONAL ENGINEER WILLIAM K. ROBERSON

Tank Mechanical Integrity Analysis

Attachment 1

December 2015
Project No. 0268481

Environmental Resources Management – Southwest, Inc.
775 North University Blvd., Suite 280
Mobile, Alabama 36608
(251) 706-8600

F & J Fearn Engineering, Inc.

Engineering Consultant
6104 Appaloosa Drive Mobile, AL 36693 (205) 666-4616

April 25, 2004

CIBA Purchase Order No. X0802851-2286

EXECUTIVE SUMMARY

The following report is an evaluation of the mechanical integrity of two items 31,000 gallon capacity.

The evaluation was requested to assist CIBA in verifying the areas are within the safety and production requirements that CIBA Specialty Chemical Incorporated requires. The scope of work for this report is to specify the tank modifications required to achieve a maximum allowable pressure 5 Psig at 200'F.

- Conclusion:

Tanks are adequate for 5 Psig internal and 3 oz external pressure at 200'F with no corrosion allowance. Please see the tank summary sheet included in this report.

- Comments:
  - a) The eight anchor bolts will see a load of 10,914 pounds each at maximum wind loading. (pg.7 of calc's)
  - b) The top head to shell junction requires the addition of an external stiffener FB 3.5"x0.75" rolled the hard way. This stiffener is an integral part of the tanks pressure rating. (see pg.4 of calc's for placement)
  - c) The bottom head to shell / skirt junction requires the addition of an external stiffener FB 4.5" x 1.25" rolled the hard way. This stiffener is an integral part of the tanks pressure rating. (see pg.8 of the calc's for placement and weld size)
  - d) The tanks shall be hydrostatically tested in the vertical position full of water plus 8 psig.

Thank you for the opportunity to be of service to CIBA Specialty Chemicals.

Sincerely,

Frank E. Fearn

Frank E. Fearn P.E.
CEO
F & J Fearn Engineering Incorporated

ALABAMA REGISTERED NO. 13,444 PROFESSIONAL ENGINEER FRANK E. FEARN

FE Fearn 4/25/04

C:\mydocuments\F&J1077

F & J Fearn Engineering Incorporated
3330A Dog River Road
Theodore, Alabama 36582
1-251-443-8097

FOR

CIBA Specialty Chemicals Corp.
Geigy Road P.O. BOX 113
MCIntosh, Alabama 36553-5303

Mechanical Evaluation of Items Two 31,000 gallon tanks

CIBA Purchase Order No. X0802851-2286

Report Completion Date: April 25, 2004

April 25,2004

F & J Fearn Engineering Incorporated
3330A Dog River Road
Theodore, Alabama 36582
1-334-443-8097

CIBA Specialty Chemicals Inc. P.O.# X0802851-2286

TABLE OF CONTENTS

April 25, 2004

F & J Fearn Engineering Incorporated
3330A Dog River Road
Theodore, Alabama 36582
1-334-443-8097

CIBA Specialty Chemicals Inc. P.O.# X0802851-2286

SCOPE OF WORK

- Based on drawings, Ciba Specialty Chemical inspection report and verbal communication provide calculations and conclusions concerning the maximum pressure / vacuum rating of two 31,000 gallon tanks.

- Using the above information provide a report that will serve as the technical backup for the decisions made.

QUALIFICATION AND ASSUMPTIONS

- The equipment involved is assumed to be of API 650 acceptable industrial fabricating and welding quality.

- This analysis is based on good Engineering practice and judgement coupled with a working knowledge of pressure retaining equipment and their modes of failure.

- The areas of the tanks and vessels that were not accessible due to insulation or access are assumed to be of the same integrity and condition as the areas that were viewed.

April 25, 2004

F & J Fearn Engineering Incorporated
3330A Dog River Road
Theodore, Alabama 36582
1-334-443-8097

CIBA SPECIALTY CHEMICALS PURCHASE ORDER NO. X0802851-2286

CODES AND REFERENCES

THE FOLLOWING CALCULATIONS AND RECOMMENDATIONS MADE REGARDING THE TANKS SPECIFIED IN THE SCOPE OF WORK ARE BASED ON THE FOLLOWING CODES, REFERENCES AND GOOD ENGINEERING PRACTICE.

- AMERICAN PETROLEUM INSTITUTE (API)

  API-620 DESIGN AND CONSTRUCTION OF LARGE, WELDED LOW-PRESSURE STORAGE TANKS. EIGHT EDITION, JUNE 1990.

  API-650 WELDED STEEL TANKS FOR OIL STORAGE. EIGHT EDITION, NOVEMBER 1988..

  API-510 PRESSURE VESSEL INSPECTION CODE. SIXTH EDITION, JUNE 1989.

- AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

  ASME BOILER AND PRESSURE VESSEL CODE SECTION VIII DIVISION I 1992 EDITION INCLUDING 1992 ADDENDA

- AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

  ANSI/ASCE 7-88 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES. NOVEMBER 1990 EDITION.

- UNIFORM BUILDING CODE 1982 EDITION.

- AMERICAN INSTITUTE OF STEEL CONSTRUCTORS (AISC) MANUAL OF STEEL CONSTRUCTION, EIGHT EDITION 1980.

- HENRY H. BEDNAR, P.E. PRESSURE VESSEL DESIGN HANDBOOK 1981 EDITION.

- ROARK FORMULAS FOR STRESS & STRAIN. WARREN C. YOUNG SIXTH EDITION 1989.

- PROCESS EQUIPMENT DESIGN. BROWNELL & YOUNG, 1959 EDITION.

Ciba Specialty Chemicals Incorporated

EQUIPMENT SUMMARY SHEET

TANK ITEM NO.: ?? FA# ??

TANK SIZE : 12'OD BY 36'-0" STRAIGHT SIDE on 65" skirt.

MATERIAL OF CONSTRUCTION: VESSEL- SA-240-304L

VESSEL CONTENTS:

CODE MANUFACTURED UNDER: API-650

VESSEL MANUFACTURER: Roben Mfg.Co. Lakewood NJ Built 1993.

MAXIMUM ALLOWABLE DESIGN:
TANK: 5 PSIG AT 200'F
3 OZ/IN2 VACUUM AT 200'F.

RELIEF VALVE PSV SETTING: ???? OZ.

VESSEL CORROSION RATE: Appears Zero(changing service)

LIFE EXPECTANCY: 15 years plus

NEXT SCHEDULED INSPECTION: April 12, 2014

VESSEL MATERIAL THICKNESSES

PART	NEW THICKNESS	MINIMUM THICKNESS REQUIRED *	CORROSION ALLOWANCE
TOP HEAD	0.1875"	0.1875"	0.0"
SHELL	0.1875"	0.1875"	0.0"
SHELL	0.25"	0.25"	0.0"
BOTTOM HEAD	0.25"	0.23"	0.0"

NOZZLE CORROSION ALLOWANCES ARE ZERO.

* WHEN THIS TANK REACHES ITS MINIMUM THICKNESS THE TANK SHOULD BE INVESTIGATED IN DETAIL TO DETERMINE THE NEXT COURSE OF ACTION.

** THE TOP HEAD TO SHELL JUNCTION STIFFENER FB3.5"x0.75" IS INTEGRAL TO THE PRESSURE CONTAINING ABILITY OF THE TANK.

*** THE BOTTOM HEAD TO SHELL JUNCTION STIFFENER FB4.5"x1.25" IS INTEGRAL TO THE PRESSURE CONTAINING ABILITY OF THE TANK.

The Eight Anchor Bolts will see a 10,914lb load during maximum wind loading.

F&J FEARN ENGINEERING INC. P.O.# X0802851-2286 April 25, 2004

t-thick
w24 flg&d head (Roof & shell)
Lift Lugs
MW Reinf.

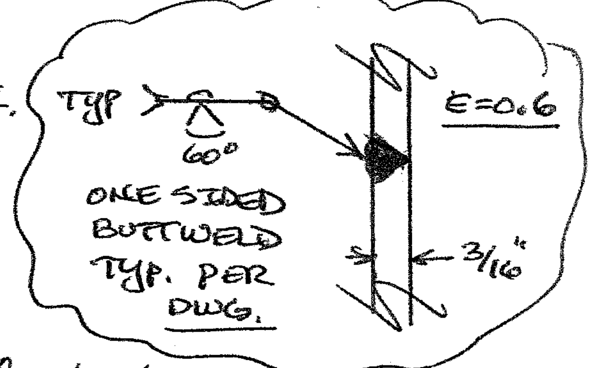
CIBA SPECIALTY

PO# X0802851

Given: 144" OD x 36'-0" WS/WS tank on a skirt with a cone roof (knuckle & ~~full pen~~ Butt. weld), standard F&D Bottom head with 65 5/8" skirt, and Eight anchor ($1\frac{1}{4}$" ϕ hole) chairs. Manufactured by ROBERT in 1993. <u>NO</u> code (SEE DRAWING) Material 304L SS @ 350°F

Scope: Determine the maximum internal and external pressure the tank is capable of.

Ref. API 650 & ASME VIII DIV. I.



SOLUTION –

Specific Gravity = 1.0

Use ASME VIII DIV. I for all but the top head there use API 650 & 620.

- Bottom Head – STD F&D w/ 144" IDR & $2\frac{1}{4}$" IKR $\frac{1}{4}$" nom

$$M = \frac{1}{4}\left(3 + \sqrt{\frac{144}{2.25}}\right) = 2.75 \qquad LH = 37' \times .433 = 16\,psi \quad (17.6)$$

(101)

$$P_{max} = \frac{2(16{,}250\,psi)\overset{(1)}{(.7)}\overset{(0.25)}{(.1875)}}{2.75(144) - \underset{(0.25)}{(.1875}(2.75 - .2))} - \overset{(17.6)}{16} = \overset{2.95}{\cancel{4.55\,PSIG}}$$

SEE pg 8

NO CORROSION & FULL RT

∴ Need UT READINGS, RT OF SHELL LONG SEAM & Head seam intersection + 6" shot on head to shell seam.

CIBA SPECIALTY

F&J 1077-2004

4/7/04

Shell @ BTL -

$$t_{req} = \frac{(16\,psig + 4\,psig)(72")}{16{,}250\,psi(.6) + .4(20\,psig)} = \boxed{0.148"} \therefore \tfrac{1}{4}" \text{ ok!}$$

17.6 5 22.6 0.167"

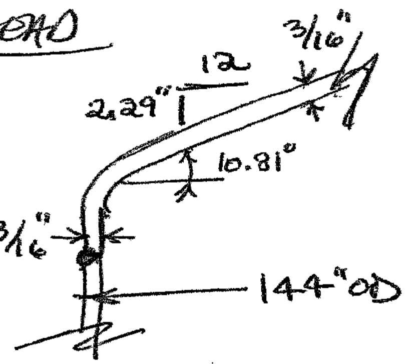
Shell @ 12' above BTL - LH = 25 * .433 ≅ 11 psi

11.9 x1.1

$$t_{req} = \frac{(11\,psi + 4)(72")}{16250(.6) + .4(\cancel{1}5)} = \boxed{0.11"} \therefore \tfrac{3}{16}" \text{ ok!}$$

11.9 5 16.9 0.125

Top HEAD



Internal - API 620 $\alpha = 90° - 10.8° = \underline{79.2°}$

$$R_2 = \frac{(144")(.5)}{\cos(79.2°)} = 384.24"$$

$$W = \left[\frac{(146")^2\pi}{4}\right] * (.1875") * .29\,\#/in^3 = \underline{910\,Lb}$$

$\underline{F = 0}$ $\underline{P = 4\,psig}$ (5) $A_t = \frac{(144 - .375)^2\pi}{4} = \underline{16{,}201\,in^2}$

$$T_1 = \left[\frac{144(.5)}{2\cos(79.2°)}\right]\left[4 - \left(\frac{910\,Lb}{16{,}201\,in^2}\right)\right] = \boxed{758\,\#/in}$$

5 950

(Cont)

Top Head Cont.

Per 3.10.3.2

$$t_{req} = \frac{\cancel{758}\ 950\ \#/in}{18{,}750\,psi\,(.7)} = \boxed{\cancel{0.06''}}\ 0.072''$$

EXTERNAL PER API 650 (3.10.5)

$$EXT'L + DL + LL = \left[\left(\frac{3\ oz/in^2}{16\ oz/lb}\right)144\frac{in^2}{ft^2}\right] + \left[.1875'' * 144 * .29\right] + 25$$

$$= \underline{59.83\,psf}$$

$$t_{min} = \left[\frac{12'}{400\,(\sin(10.8°))}\right]\left[\sqrt{\frac{59.83}{45}}\right] = \boxed{0.1845''}$$

@ 3oz EXT'L

TOP HEAD TO SHELL JUNCTION (API 650 - 3.10.5.2)

$$A_{req} = \frac{(12)^2\left(\frac{59.83}{45}\right)}{3000\,(\sin(10.8°))} = \boxed{0.341\,in^2}$$

API 650 (F.1)

$$A_{req} = \frac{(12)^2\left[\cancel{4}\ 5\left(\frac{34 * 12}{14.7}\right) - 8(.1875)\right]}{30{,}800\,\tan(10.8°)} = \boxed{\cancel{2.69\,in^2}}\ 3.36$$

API 620 3.12.4.2

$$R_2 = \frac{72}{\sin 10.8} = \underline{384.24''} \qquad R_c = 72'' \qquad \alpha = 79.2°$$

$$W_h = 0.6\sqrt{384.24(.1875'')} = \underline{5.09''} \qquad W_c = 0.6\sqrt{72''(.1875'')} = \underline{2.2''}$$

CIBA SPECIALTY

API 620 cont.

$T_1 = \underline{758 \text{ \#/in}}$ (950) $\quad T_2 = \dfrac{4\,(5)\,(144 \times .5)}{\cos(79.2°)} = \underline{1537 \text{ \#/in}}$ (1921) $\quad T_{2s} = 4\,(5)\,(72) = 288 \text{ \#/in}$ (360)

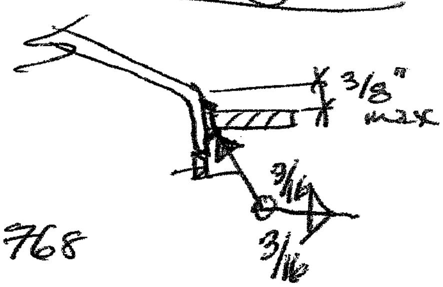
$\therefore Q = 1537$ (1921) $\text{\#/in}(5.09") + 288$ (360) $\text{\#/in}(2.2") - [758$ (950) $\text{\#/in}(72")(\sin(79.2°))]$

$\boxed{\therefore Q = -45{,}152 \text{ Lb}}$ (−56,619) (−56,619)

$A_{req} = \dfrac{-45{,}152 \text{ Lb}}{15{,}000 \text{ psi}} = \boxed{3.01 \text{ in}^2}$ (3.78)

Area Available $= 5.09"(.1875") + 2.2\text{in}(.1875") = \boxed{1.37 \text{ in}^2}$

$\therefore$ Need to add 3.0 (3.78) $- 1.37 = \boxed{1.63 \text{ in}^2}$ (2.41) $\quad$ FB $3\frac{1}{2}" \times \frac{1}{2}"$ (3/4") tt60



SHELL EXTERNAL – ASME VIII DIV I.

$L/D_o = \dfrac{440"}{144"} = 3.06 \qquad D_o/t = \dfrac{144}{.1875} = 768$

$\therefore A = 0.000023 \qquad E \approx 25.9 \times 10^6 \text{ psi}$

$P_a = \dfrac{2(0.000023)(25.9 \times 10^6)}{3(768)} = 0.517 \text{ psi}$ or $\underline{8.3 \text{ oz}}$

WIND LOADING UBC 1997

$P = C_e C_q q_s I_w \qquad$ Base wind speed = 100 mph

$q_s = 25.6$ PSF (table 16-F), $C_e = 1.37$ Exp C (table 16-G)

$C_q = 0.8$ (table 16-H), $I_w = 1.0$ (table E16-K)

(cont.)

CIBA SPECIALTY

F&J1077-2004

4/10/04

WIND CONT.

$\therefore P = (1.37)(.8)(25.6)(1) = \underline{28.1 \text{ PSF}}$

Moment @ 3/16 to 1/4" transition = $(13.5\text{ft})(27\text{ft})(13.5')(28.1) =$ (Deff above the first term)

$\boxed{\therefore M = 138{,}273 \text{ ftLb}}$

Moment @ BTL $= (13.5')(39\text{ft})(19.5')(28.1) =$

$\boxed{\therefore \text{Moment} = 288{,}496 \text{ ftLb}}$

Moment @ Base $= (13.5')(45')(22.5')(28.1) =$

$\boxed{\therefore \text{Moment} = 384{,}092 \text{ ftLb}}$

Tank Weight

Top head –		=	910Lb (Pg 2)
3/16" shell –	$144(\pi)(.1875)(.29)(24\times12)$	=	7,084 Lb
1/4" shell –	$144(\pi)(.25)(.29)(12\times12)$	=	4,723 Lb
Btm Head –	$\left[(144(1.11))^2\pi/4\right](.25)(.29)$	=	1,455 Lb
Nozzles –		≅	500 Lb
Skirt –	$144(\pi)(.375)(.284)(65.625)$	=	3162 Lb
Basering & comp. –	$(150)\pi(.625)(.284)(6)+8(30)$	=	742 Lb
Ladder –		≅	1800 Lb
Liquid @ SG 1 –	≅ 32,500 gal × 8.34 × 1.1	=	271,050 Lb (298,155)

219631 → Σ 291,426 Lb

CIBA SPECIALTY

Wind loading calc.

@ 3/16 to 1/4" shell

$$\text{wind} - \frac{138{,}273 \text{ ftLb} (12)}{\pi (72")^2} = 101.9 \#/\text{IN} \qquad DL = \frac{(910 + 7084 + \overset{\text{ladder}}{960} + \overset{\text{Nozz}}{250})}{\pi (144)}$$

$\therefore DL = 20.3 \text{ Lb/IN}$

$$LL = \frac{\frac{(12)^2 \pi}{4} (25 \text{ PSF})}{\pi (144)} = 6.25 \#/\text{IN} \qquad P = \frac{4 \text{ PSIG} (72")}{2} = 144 \#/\text{IN}$$

@ BTL

$$\text{wind} = \frac{288{,}496 \text{ ftLb} (12)}{\pi (72)^2} = 212.6 \#/\text{IN} \qquad DL = \frac{910 + 7084 + 1800 + 500 + 4723}{\pi (144)}$$

$LL = 6.25 \#/\text{IN}$ $\quad P = 144 \#/\text{IN}$ $\quad \therefore DL = 33.2 \#/\text{IN}$

@ Base

$$\text{wind} = \frac{384{,}092 \text{ ftLb} (12)}{\pi (72)^2} = 283 \#/\text{IN} \qquad DL = \frac{20{,}376 \text{ Lb}}{\pi (144)} = 45 \#/\text{IN}$$

$$LL = 6.25 + \frac{\overset{298{,}155}{271{,}050 \#}}{\pi (144)} = \overset{665.3}{605.4} \#/\text{IN}$$

Allowable Compressive stress:

SS 3/16" $\quad A = \dfrac{.125}{72/.1875} = 0.00033 \quad \therefore B = 4{,}500 \text{ psi}$

SS 1/4" $\quad A = \dfrac{.125}{72/.25} = 0.00043 \quad \therefore B = 5{,}100 \text{ psi}$

CS 3/8" $\quad A = \dfrac{.125}{72/.375} = 0.00065 \quad \therefore B = 9{,}500 \text{ psi}$

Wind load Cont.

	Allow. Ten.	Allow Comp.	Σ Ten.	Σ Comp	
@ 3/16" to 1/4 →	1,828 #/in	844 #/in	223 #/in	129 #/in	ok!
@ BTL	2,438 #/in	1,275 #/in	323 #/in	252 #/in	ok!
@ Base	3997 #/in	3,563 #/in	238 #/in	933 #/in 993.3	ok!

Anchor Bolts $\simeq \dfrac{\overset{238-45}{238\ \#/in}(\pi)(144)}{8} = \overset{10,914}{\boxed{13,459\ Lb/bolt}}$

Shell Manway –

- Reinf pad is ok!
- $P = \overset{5}{4}\,psig + 35 * .433 = \overset{*ltl\ \ 21.7}{19.2\,psig}$
- Blind treq $= 23\frac{1}{4}" \sqrt{\dfrac{(.3)(\overset{21.7}{19.2}\,psig)}{\underset{16,700}{16,250\,psi}}} = \overset{0.459"}{\boxed{0.4377"}}$ 7/16" ok!

Bolting – $\dfrac{\frac{(23.25)^2\pi}{4}(\overset{21.7}{19.2}) + (0.5 * 23.25 * \pi * 1600)}{28(.302\ in^2/bolt)} = \overset{8000}{7,874\,psi}$ ok!

Roof Mech is ok!

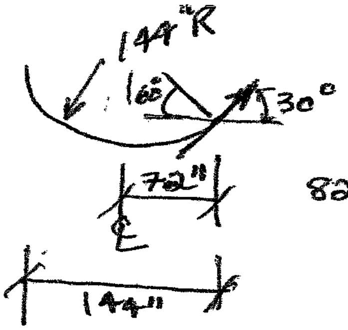
Bottom Head Design cont.

A templet of the bottom head showed a very large knuckle radius. (Appears 80"r). An inspection of the bottom head knuckle showed NO signs of buckling or deformation. therefore the following theoretical analysis is applicable.

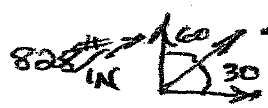
Roark Table 28 case 3a
(Sixth Edition)

$$q = 5psi + (37 * .433 * 1.1) \approx \underline{23psiG}$$

$$\sigma_1 = \sigma_2 = \frac{23psiG(144)}{2(0.23")} = \underline{7,200psi} \quad \underline{ok!}$$



$$7200psi(.23) = \underline{1,656 \#/in}$$



$$1656\#/in(\cos(30°)) = \boxed{1,434\#/in}$$

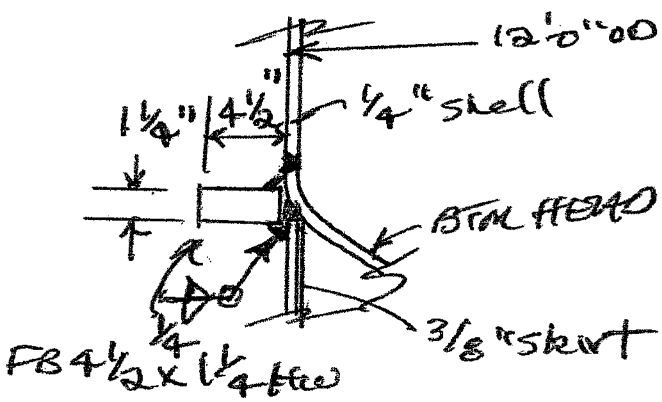
Roark table 34 case 8

$$I_{req} = \frac{1434\#/in(72")^3}{3(26 \times 10^6)} = \boxed{6.94 in^4} \qquad I = \frac{bd^3}{12}$$

$$\therefore \text{ for } 1\tfrac{1}{4}" \text{ thick } d = \sqrt[3]{\frac{6.9(12)}{1.25}} = \boxed{4.05 in} \quad \therefore \text{ USE}$$

FB 4½ x 1¼

CONTINUOUS BUTTWELDS FULL PENETRATION



Hydro SG Δ
1.3(5) + 1.6
≅ 8 psiG in vertical position full H_2O

Waste Profiles

Attachment 2

December 2015
Project No. 0268481

Environmental Resources Management – Southwest, Inc.
775 North University Blvd., Suite 280
Mobile, Alabama 36608
(251) 706-8600

Waste Profile Sheet

Waste Name: HALS Waste Solvents   Waste Code: D001/F003

Section A General Information

Generator Information:

Site/Unit: McIntosh/ Light Stabilizers Unit   Date: 8/1/14
Contact: Rickey Giles   Last Revision: 8/1/14

Waste Information

Generator's Common Name and Description: HALS Waste Solvents
Location (Point(s) of Generation) : HALS Unit (Area 20)
Process Description: (How was the waste generated?) Organic Chemical Manufacturing
Waste Generation Rate: 35,000-45,000 gals **Quantity (lbs., gals, drums, etc.)** Per: month **Rate (shift, week, one-time, etc.)**

Storage Information:

Storage Location: HALS Unit
Container Type: 2- 15,000 gal storage tank and tank trucks

Section B Physical Properties and Composition

Physical Properties:

Color:	clear/light yellow	Odor:	Yes
Number of Phases:	1	Odor Threshold	Mild
Physical State (stp):	liquid	Vapor Press	MmHg @
Viscosity (cps):		Boiling Point	
Melting Point:		Flash Point	74-140 F
Density	.95	NACE Rate	
Aqueous – pH	Exact:	Nonaqueous	
Aqueous – pH	Range:	N/A	

Composition:

Ensure All EPCRA 313 compounds are listed

Chemical Name	CASRN	RQ (lbs.)	Min %	Max %
o-Xylene	1330-20-7	1000	1	45
Methanol	67-56-1	5000	0	10
Cyclohexane	110-82-7	1000	0	20
Tertiary Butyl Alcohol	75-65-0	100	10	20
n-octane	111-65-9	100	0	5

Section C Regulatory Determination

Solid Waste Determination:

- ☐ Material is not a Solid Waste. Stop here and go to Conclusions
- ☒ The waste is a Solid waste specify regulation 40 CFR 261

Exclusions:

- ☒ Material is not excluded
- ☐ The waste is exempted from regulation by 40 CFR 261.4(a) – Recycle Chart
- ☐ The waste is exempted from regulation by other clause – specify regulation:

Waste Profile Sheet

Process Waste:

☐ This waste is not a process waste:
☒ This waste is a process waste:
☒ Non-specific sources (including solvent use). List applicable F codes: F003
☐ Specific sources as defined in 40 CFR 262. List applicable K codes:
☐ The waste is a process waste, but is not listed as an F or K code.

Product Waste:

☒ The waste is **not** a listed discarded commercial chemical product with a sole active ingredient
☐ The waste is a discarded commercial chemical product with a sole active ingredient
List applicable U code:
List applicable P code:

Characteristically Hazardous Wastes

☐ The waste does **not** exhibits any of characteristics of a Hazardous Waste:
☒ The waste exhibits one of the following characteristics:
☒ D001 – Ignitability (High TOC)
☐ D002 – Corrosivity
☐ D003 – Reactivity
☐ D004 - D0043 – Toxicity
(List all Toxicity D codes and concentrations):

Code: Concentration:	Code: Concentration:	Code: Concentration:	Code: Concentration:
Code: Concentration:	Code: Concentration:	Code: Concentration:	Code: Concentration:
Code: Concentration:	Code: Concentration:	Code: Concentration:	Code: Concentration:

Characteristic determination by:

☐ TCLP
☐ Total Metals
☒ By Knowledge

Conclusion & Determination

☐ The material is **NOT** a RCRA Hazardous Waste.
☒ The material is a RCRA Hazardous Waste.
Rationale (if needed):

Embed Analytical Reports and or MSDS

☐ By analysis: attach copy of the lab summary.
☒ By knowledge. Provide brief description: Organic chemical manufacturing process used to produce Light stabilizer products
☒ The material is a State Hazardous Waste. List Codes: D001, F003

Section D Land Disposal Restrictions (LDR)

☐ The material was NOT a RCRA hazardous Waste at the point of generation. LDR does not apply.
☒ The material is/was a RCRA hazardous Waste at the point of generation. List ALL applicable waste codes:

Waste Code	Constituent	Waste Water Std	Non Waste Water Std	Treatment Technology / Standard	Significa nt (Y/N)
D001			cmbst		
F003			cmbst		

Waste Profile Sheet

LDR One Time Notification

- ☐ This material was, at point of generation, a hazardous waste and has been managed under one of the exclusions outlined in 40 CFR 268(a)(7). This document is to serve as a one time notification to file.

Universal Treatment Standards

- ☐ The waste is not a characteristic waste, UTS does not apply
- ☒ The waste is a high TOC D001, UTS does not apply
- ☐ The waste is characteristically hazardous and is subject to UTS for the underlying hazardous constituents listed here:

Chemical Name	Concentration	Wastewater Standard	Non-Wastewater Standard

- ☐ By analysis: attach copy of the lab summary.
- ☐ By knowledge: provide brief description of knowledge:

Section E Reportable Quantity Determination

Calculate the mixture RQ for each constituent to determine the RQ requirements.
Constituent RQ / Constituent % = Mixture RQ

Constituent	Constituent RQ	Constituent %	Mixture RQ
NA			

Section F RCRA Air Emissions Applicability

- ☐ Subpart CC Applicable.
  VOC Concentration:
  Storage Type
  - ☐ DOT container Level 1
  - ☐ DOT container Level 2
  - ☐ Storage Tank provide tank number
- ☐ Subpart BB Applicability
  Describe applicability:
- ☐ Subpart AA Applicable.
  VOC Concentration:
  Type of Recycle Unit Operation (i.e. still, distillation column etc.)
- ☐ RCRA Air Emissions not applicable

Waste Profile Sheet

Section G Shipping Information:

- ☒ EPA Hazardous Waste (If it is a hazardous waste it is a DOT hazardous material)
- ☒ State Hazardous Waste (List codes): D001, F003
- ☐ State Non-Hazardous Waste (List codes):
- ☒ DOT hazardous material

For DOT Hazardous materials:

DOT Shipping Name: Waste Flammable Liquid, N.O.S(O-xylene, cyclohexane, methanol, t-butanol, methanol)
DOT Hazard Class: 3
DOT Identification Number (UN/NA): 1993
DOT Package Group: III
Reportable Quantity (lbs.): Calc for constiuent level or 100
☒ DOT Approved Package
DOT Hazard Marking or Label: flammable

DOT Notes:

Section H Miscellaneous Information

Transporter 1

Name: Action Resources
Contact: Phone: (251) 443-5352

Transporter 2

Name:
Contact: Phone:

TSD 1 Information:

TSD Facility Name:Rineco Approval Number:
Location:Benton, Arkansas
Contact: Number:

TSD 2 Information:

TSD Facility Name:Geocycle/Holcim Approval Number:
Location:Artesia, Ms
Contact: Number:

TSD 3 Information:

TSD Facility Name: Approval Number:
Location:
Contact: Number:

TSD 4 Information:

TSD Facility Name: Approval Number:
Location:
Contact: Number:

TSD 5 Information:

TSD Facility Name: Approval Number:
Location:
Contact: Number:

Section I Additional Analytical Data

Metals mg/Kg

Arsenic (As)	0.00	Mercury (Hg)	0.00		0.00
Barium (Ba)	0.00	Nickel (Ni)	0.00		0.00
Cadmium (Cr)	0.00	Selenium (Se)	0.00		0.00
Chromium (Cr)	0.00	Silver (Ag)	0.00		0.00
Copper (Cu)	0.00	Zinc (Zn)	0.00		0.00
Lead (Pb)	0.00	Thalium (Tl)	0.00		0.00

Other Properties various units

Chlorine	0.00	BTUs	0		0.00
Bromine	0.00		0.00		0.00
Halides	0.00 .		0.00		0.00

Organics & Other Constituents mg/Kg

	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00

TSD Notes

☐ This material is a hazardous waste. Sate and Federal law requires properly handling. Make certain that you have:

1. Packaged the material in the proper container:
2. Closed and secured all container openings
3. Placed the hazardous label on the container
4. Dated the container
5. Moved the container to the proper location
6. Notified Site EHS Hub Personnel

☐ This material is not a hazardous waste. Make certain that you:

1. Packaged the material in the proper container
2. Closed and secured all container openings
3. Placed the non-hazardous label on the container
4. Placed appropriate OSHA HAZCOM Label on container
5. Moved the container to the proper location
6. Notified Site EHS Hub Personnel

Example Label Text

Waste Profile Sheet

Waste Name: AO Methanol CF   Waste Code: D001/F003

Section A General Information

Generator Information:

Site/Unit: McIntosh/ Antioxidants Unit   Date: 8/1/14
Contact: Anthony Clark   Last Revision: 8/1/14

Waste Information

Generator's Common Name and Description: Irganox Methanol Waste- CF
Location (Point(s) of Generation) : Irganox Unit
Process Description: (How was the waste generated?) Organic Chemical Manufacturing
Waste Generation Rate: 60,000-70,000 gals **Quantity (lbs., gals, drums, etc.)** Per: month **Rate (shift, week, one-time, etc.)**

Storage Information:

Storage Location: Irgafos Unit
Container Type: 3-15,000 gal storage tank and tank trucks

Section B Physical Properties and Composition

Physical Properties:

Color:	clear/light yellow	Odor:	Yes
Number of Phases:	1	Odor Threshold	Mild
Physical State (stp):	liquid	Vapor Press	MmHg @
Viscosity (cps):		Boiling Point	
Melting Point:		Flash Point	74-140 F
Density	.95	NACE Rate	
Aqueous – pH	Exact:	Nonaqueous	
Aqueous – pH	Range:	NA	

Composition:

Ensure All EPCRA 313 compounds are listed

Chemical Name	CASRN	RQ (lbs.)	Min %	Max %
Methanol		5000	20	70
Iso-octanols			0	10
Irganox products			0	20

Section C Regulatory Determination

Solid Waste Determination:

- ☐ Material is not a Solid Waste. Stop here and go to Conclusions
- ☒ The waste is a Solid waste specify regulation 40 CFR 261

Exclusions:

- ☒ Material is not excluded
- ☐ The waste is exempted from regulation by 40 CFR 261.4(a) – Recycle Chart
- ☐ The waste is exempted from regulation by other clause – specify regulation:

Waste Profile Sheet

Process Waste:

- ☐ This waste is not a process waste:
- ☒ This waste is a process waste:
  - ☒ Non-specific sources (including solvent use). List applicable F codes: F003
  - ☐ Specific sources as defined in 40 CFR 262. List applicable K codes:
- ☐ The waste is a process waste, but is not listed as an F or K code.

Product Waste:

- ☒ The waste is **not** a listed discarded commercial chemical product with a sole active ingredient
- ☐ The waste is a discarded commercial chemical product with a sole active ingredient
  List applicable U code:
  List applicable P code:

Characteristically Hazardous Wastes

- ☐ The waste does **not** exhibits any of characteristics of a Hazardous Waste:
- ☒ The waste exhibits one of the following characteristics:
  - ☒ D001 – Ignitability (High TOC)
  - ☐ D002 – Corrosivity
  - ☐ D003 – Reactivity
  - ☐ D004 - D0043 – Toxicity

(List all Toxicity D codes and concentrations):

Code: Concentration:	Code: Concentration:	Code: Concentration:	Code: Concentration:
Code: Concentration:	Code: Concentration:	Code: Concentration:	Code: Concentration:
Code: Concentration:	Code: Concentration:	Code: Concentration:	Code: Concentration:

Characteristic determination by:

- ☐ TCLP
- ☐ Total Metals
- ☒ By Knowledge

Conclusion & Determination

- ☐ The material is **NOT** a RCRA Hazardous Waste.
- ☒ The material is a RCRA Hazardous Waste.

Rationale (if needed):

Embed Analytical Reports and or MSDS

- ☐ By analysis: attach copy of the lab summary.
- ☒ By knowledge. Provide brief description:
- ☒ The material is a State Hazardous Waste. List Codes: D001, F003, F005

Section D Land Disposal Restrictions (LDR)

- ☐ The material was NOT a RCRA hazardous Waste at the point of generation. LDR does not apply.
- ☒ The material is/was a RCRA hazardous Waste at the point of generation. List ALL applicable waste codes:

Waste Code	Constituent	Waste Water Std	Non Waste Water Std	Treatment Technology / Standard	Significa nt (Y/N)
D001			cmbst		
F003			cmbst		

LDR One Time Notification

- ☐ This material was, at point of generation, a hazardous waste and has been managed under one of the exclusions outlined in 40 CFR 268(a)(7). This document is to serve as a one time notification to file.

Universal Treatment Standards

- ☐ The waste is not a characteristic waste, UTS does not apply
- ☒ The waste is a high TOC D001, UTS does not apply
- ☐ The waste is characteristically hazardous and is subject to UTS for the underlying hazardous constituents listed here:

Chemical Name	Concentration	Wastewater Standard	Non-Wastewater Standard

- ☐ By analysis: attach copy of the lab summary.
- ☐ By knowledge: provide brief description of knowledge:

Section E Reportable Quantity Determination

Calculate the mixture RQ for each constituent to determine the RQ requirements.
Constituent RQ / Constituent % = Mixture RQ

Constituent	Constituent RQ	Constituent %	Mixture RQ
NA			

Section F RCRA Air Emissions Applicability

- ☐ Subpart CC Applicable.
  VOC Concentration:
  Storage Type
  - ☐ DOT container Level 1
  - ☐ DOT container Level 2
  - ☐ Storage Tank provide tank number
- ☐ Subpart BB Applicability
  Describe applicability:
- ☐ Subpart AA Applicable.
  VOC Concentration:
  Type of Recycle Unit Operation (i.e. still, distillation column etc.)
- ☐ RCRA Air Emissions not applicable

Waste Profile Sheet

Section G Shipping Information:

- ☒ EPA Hazardous Waste (If it is a hazardous waste it is a DOT hazardous material)
- ☒ State Hazardous Waste (List codes): D001, F003
- ☐ State Non-Hazardous Waste (List codes):
- ☒ DOT hazardous material

For DOT Hazardous materials:

DOT Shipping Name: Waste Flammable Liquid, N.O.S(Methanol)
DOT Hazard Class: 3
DOT Identification Number (UN/NA): 1993
DOT Package Group: II
Reportable Quantity (lbs.): 100
☒ DOT Approved Package
DOT Hazard Marking or Label:

DOT Notes:

Section H Miscellaneous Information

Transporter 1

Name: Action Resources
Contact: Phone: (251) 443-5352

Transporter 2

Name:
Contact: Phone:

TSD 1 Information:

TSD Facility Name:Rineco Approval Number:
Location:Benton, Arkansas
Contact: Number:

TSD 2 Information:

TSD Facility Name:Geocycle/Holcim Approval Number:
Location:Artesia, Ms
Contact: Number:

TSD 3 Information:

TSD Facility Name: Approval Number:
Location:
Contact: Number:

TSD 4 Information:

TSD Facility Name: Approval Number:
Location:
Contact: Number:

TSD 5 Information:

TSD Facility Name: Approval Number:
Location:
Contact: Number:

Section I Additional Analytical Data

Metals mg/Kg

Arsenic (As)	0.00	Mercury (Hg)	0.00		0.00
Barium (Ba)	0.00	Nickel (Ni)	0.00		0.00
Cadmium (Cr)	0.00	Selenium (Se)	0.00		0.00
Chromium (Cr)	0.00	Silver (Ag)	0.00		0.00
Copper (Cu)	0.00	Zinc (Zn)	0.00		0.00
Lead (Pb)	0.00	Thalium (Tl)	0.00		0.00

Waste Profile Sheet

Other Properties various units

Chlorine	0.00	BTUs	0		0.00
Bromine	0.00		0.00		0.00
Halides	0.00 .		0.00		0.00

Organics & Other Constituents mg/Kg

	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00
	0.00		0.00

TSD Notes

☐ This material is a hazardous waste. Sate and Federal law requires properly handling. Make certain that you have:

1. Packaged the material in the proper container:
2. Closed and secured all container openings
3. Placed the hazardous label on the container
4. Dated the container
5. Moved the container to the proper location
6. Notified Site EHS Hub Personnel

☐ This material is not a hazardous waste. Make certain that you:

1. Packaged the material in the proper container
2. Closed and secured all container openings
3. Placed the non-hazardous label on the container
4. Placed appropriate OSHA HAZCOM Label on container
5. Moved the container to the proper location
6. Notified Site EHS Hub Personnel

Example Label Text

Tank Foundation Drawings

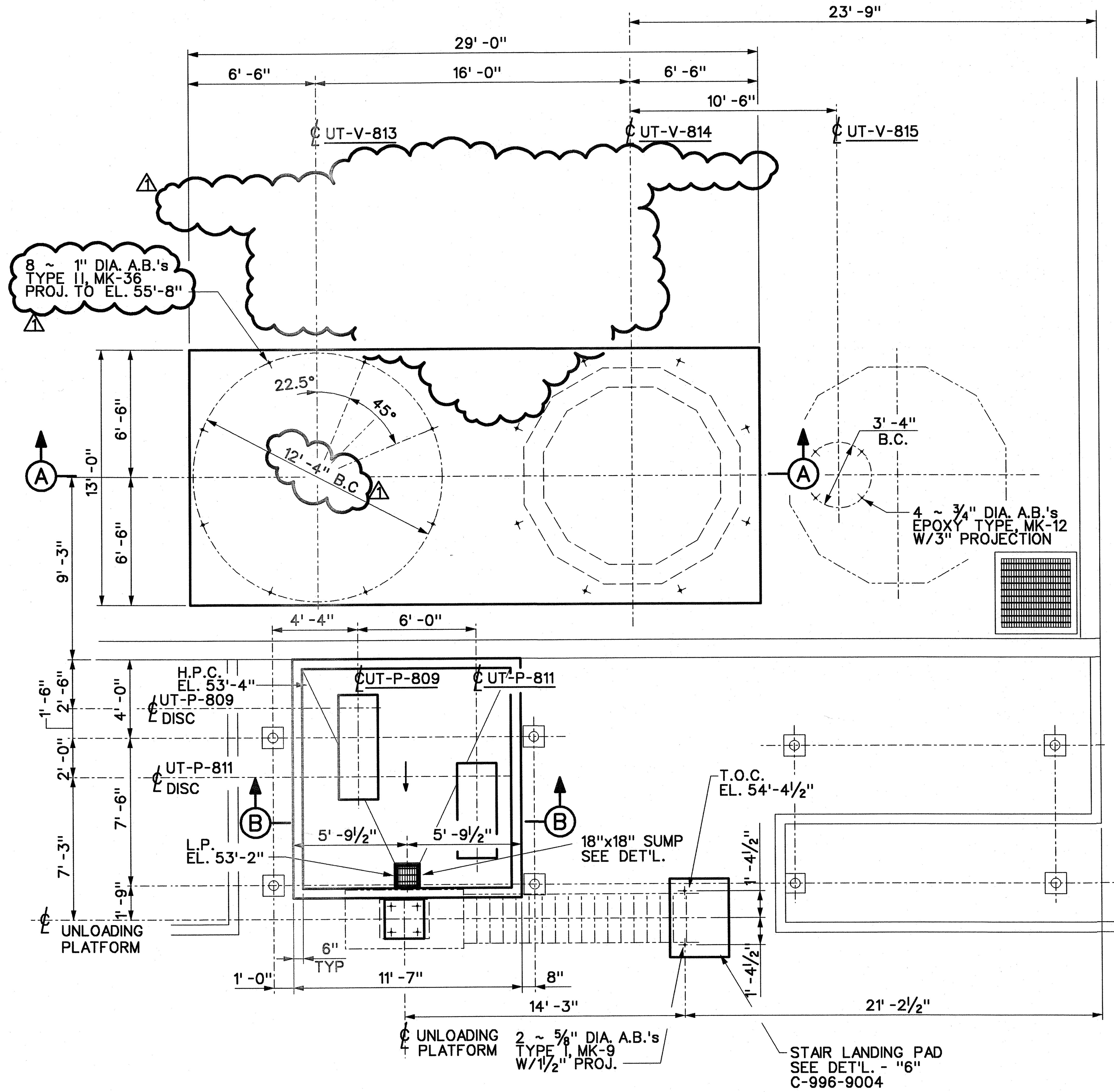
Attachment 3

December 2015
Project No. 0268481

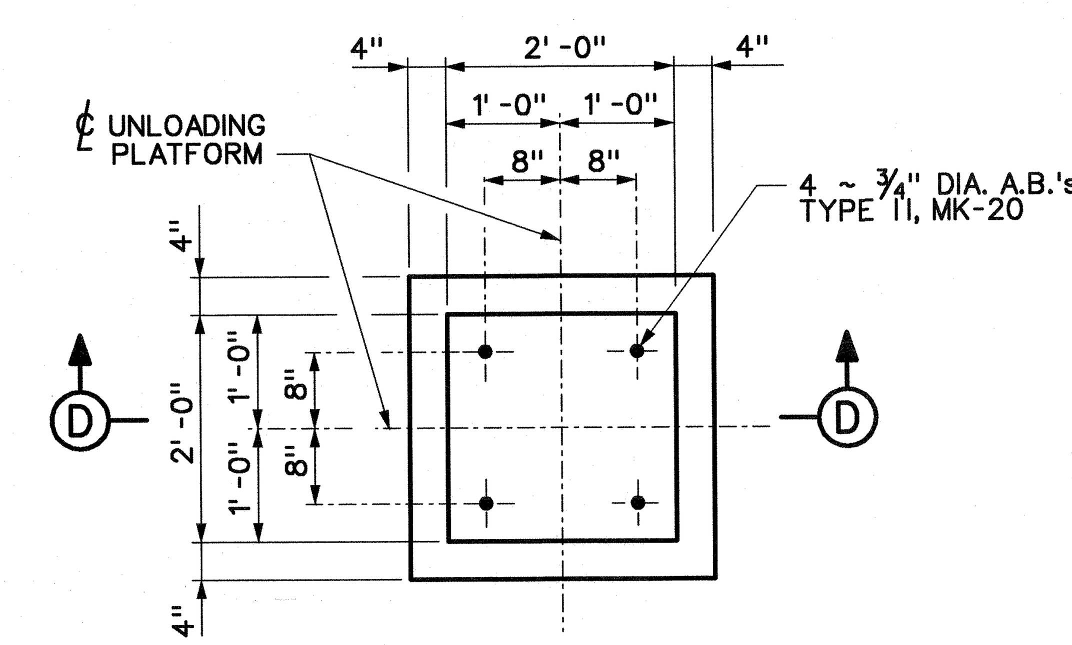
Environmental Resources Management – Southwest, Inc.
775 North University Blvd., Suite 280
Mobile, Alabama 36608
(251) 706-8600

NOTES:

1.) FOR CONCRETE GENERAL NOTES SEE DWG. C-996-9001

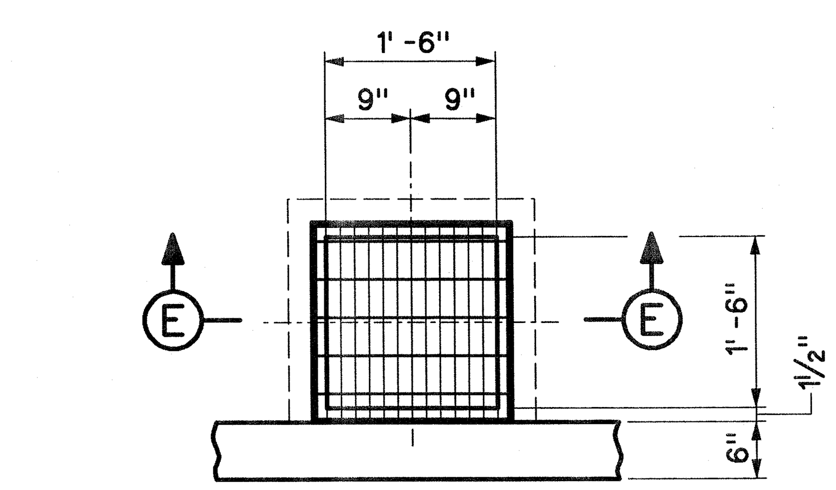


PARTIAL PLAN



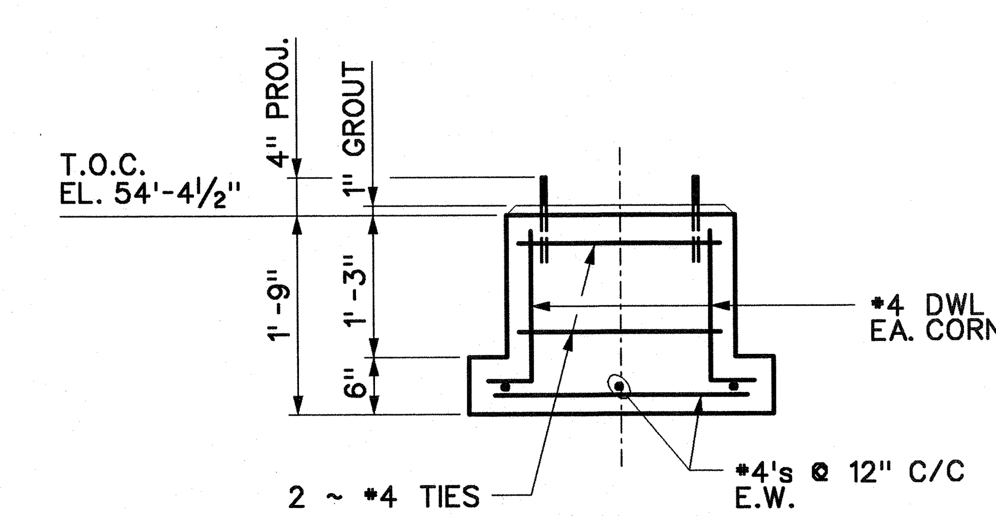
UNLOADING PLATFORM SUPPORT PLAN

SCALE: 3/4" = 1'-0"



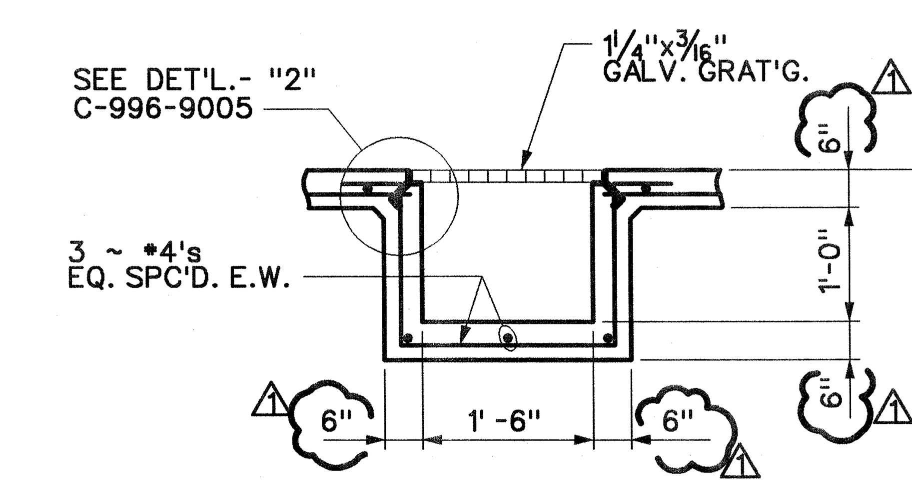
SUMP DETAIL - PLAN

SCALE: 3/4" = 1'-0"



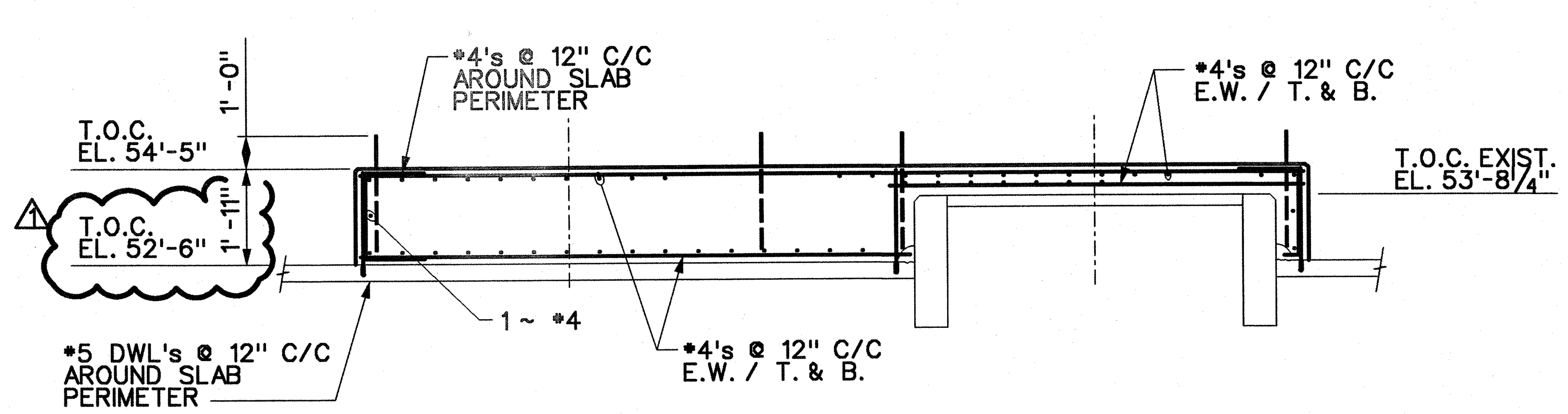
SECTION D-D

SCALE: 3/4" = 1'-0"

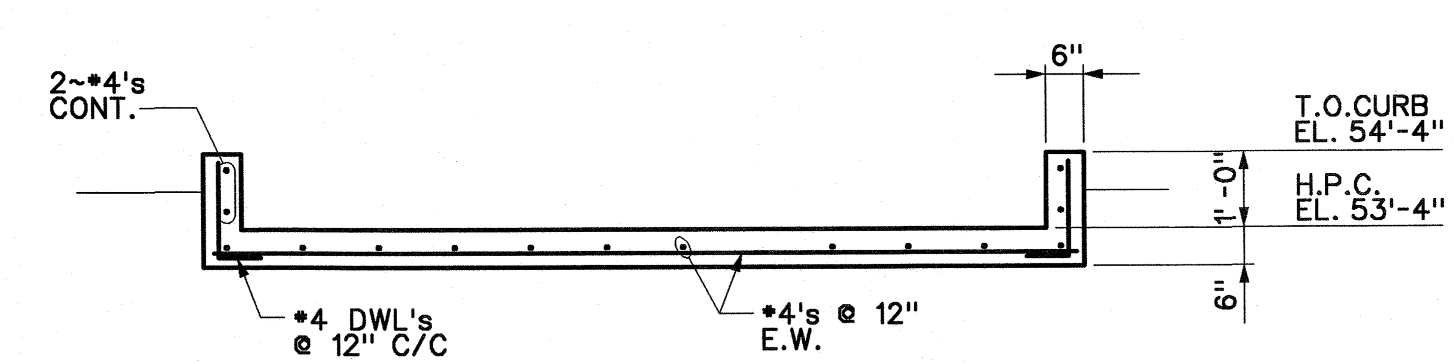


SECTION E-E

SCALE: 3/4" = 1'-0"



SECTION A-A



SECTION B-B

SCALE: 1/2" = 1'-0"

0 5 10 15 FT
GRAPHIC SCALE: 1/4"=1'-0"

REFERENCE DWG'S.

C-311-0007 BOILER AREA TANK FARM - PUMP FOUNDATIONS - SCHEDULE & DETAILS
S-311-0002 BOILER AREA TANK FARM - COMPARABLE FUELS - UT-V-813 & 814 ACCESS

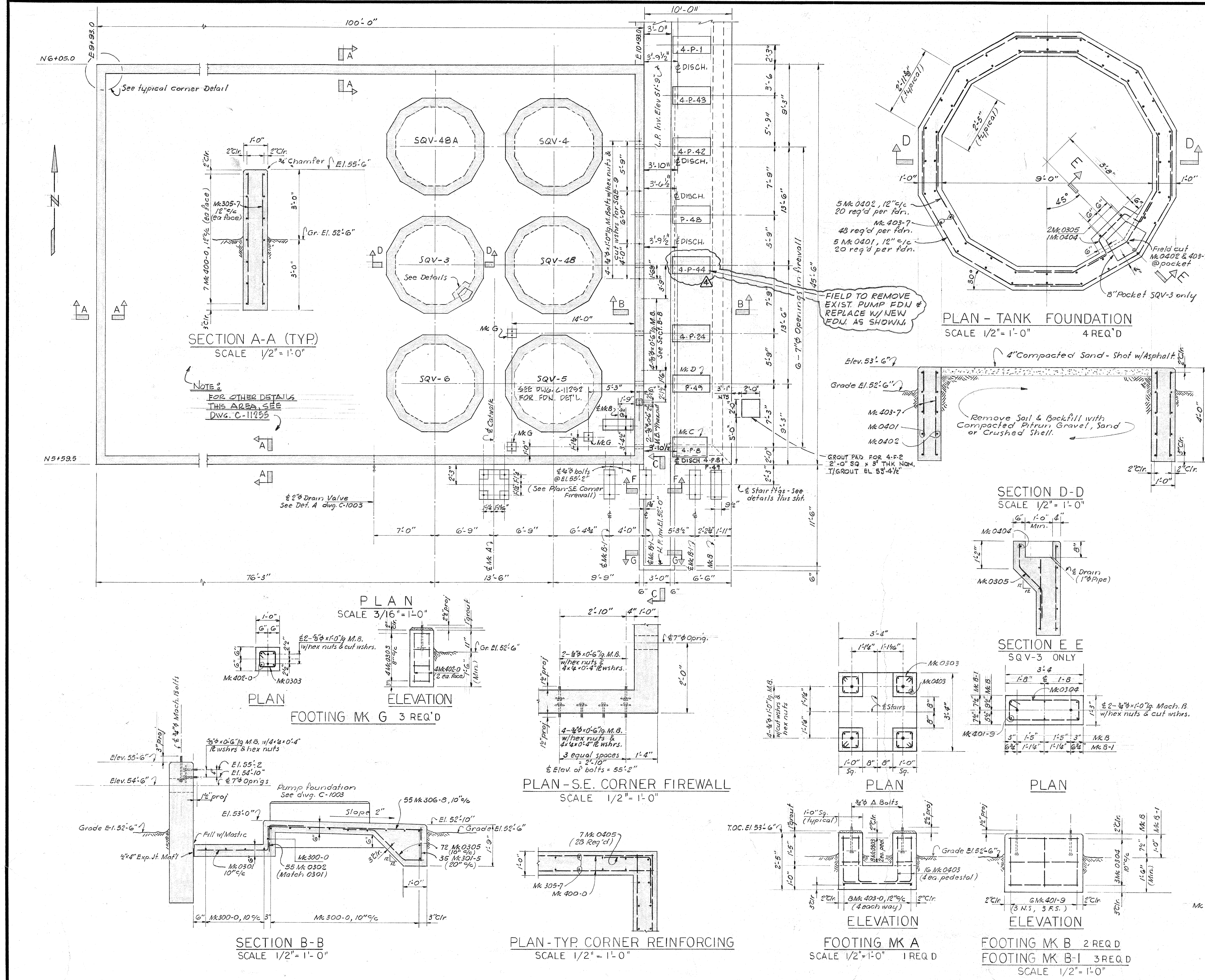
Rev.	Project No.	Description	Drawn By Date	Checked By Date	Design Eng. Date	Proj. Eng. Date
0	M0498301	ORIGINAL ISSUE (FOR CONSTRUCTION)	S.J. 4-27-04	JIH 5-11-04	HARPER 5-11-04	
1	M0498301	DELETED SECT. C-C, REV'D B.C., BOLT LG. & T.O.C. EL.	S.J. 5-26-04	JIH 6-7-04	Harper 6-7-04	6/9/04

Ciba Specialty Chemicals
Ciba
Geigy Road, P.O. Box 113
McIntosh, Alabama 36553

PRELIMINARY PRINT | CONSTRUCTION PRINT

BOILER AREA TANK FARM
COMPARABLE FUEL STG
FDN. PLANS, SECTIONS & DETAILS

Scale: 1/4" = 1'-0" U.N.O. Dwg. No. C-311-0006 Rev. 1



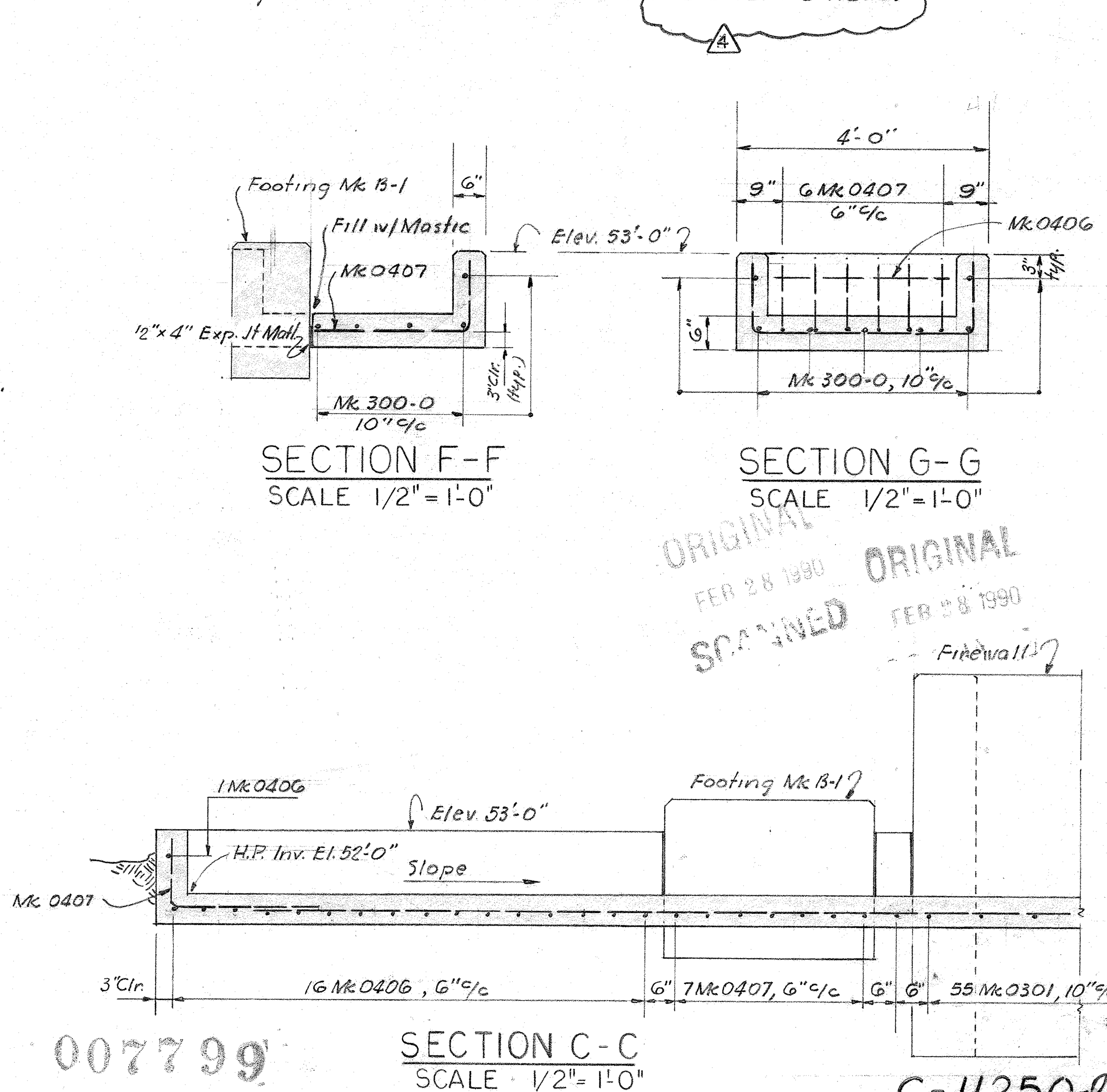
REINFORCING SCHEDULE

TYPE I · TYPE II · TYPE III · TYPE IV · TYPE V · TYPE VI

MARK	Nº	SIZE	TYPE	DIMENSION OUT TO OUT a	b	c	d	LENGTH 1 BAR	TOTAL LENGTH	LOCATION
300-0		#3		Random Lengths					750'	Slab
301-5	35		Str.					1-5	50'	Slab
305-7	590		Str.					5-7	3292'	Firewall
306-8	55		Str.					6-8	367	Slab
0301	55		I	3-0	1-0			3-11	216'	Trench
0302	55		I	1-0	1-0			1-11	106'	Trench
0303	20		IV	0-8	0-8			3-0	60'	Mk A & Mk G
0304	15		IV	3-0	0-11			8-2	123'	Mk B & B-1
0305	74		V	1-6	1-10	0-9		4-1	296'	Edge Slab & Tank Fdn.
0306	12		IV	2-0	1-7			7-6	90'	Pump Fdns dwg: C-1003
0307	2	#3	IV	1-10	2-0			8-0	32'	" " " "
400-0		#4	Str.	Random lengths					4074	Firewall
401-9	30							1-9	53'	Mk B & B-1
402-0	27							2-0	54'	Ftg. Mk G - this sheet Pump fdns dwg C-1003
403-0	8							3-0	24'	Mk A
403-7	192							3-7	688'	Tank Fdn
403-10	9		Str.					3-10	35'	Pump Fdn. dwg. C-1003
0401	80		II	2-10				11-5	914'	Tank Fdn.
0402	80		II	2-6½				10-1	807'	Tank Fdn.
0403	16		I	2-0	0-7			2-6	40'	Mk A
0404	1		III	1-0	1-0	1-3		4-11	5'	Tank Fdn Pocket
0405	28		I	2-0	2-0			3-11	110'	Corner Firewall
0406	16		VI	1-0	3-6			5-4	89'	Trench
0407	7		I	1-0	2-4			3-3	43'	Trench
0408	18		I	1-2	1-2			2-3	31'	Pump fdns dwg C-1003
0409	6	#4	I	0-6	1-0			1-5	8'	" " " "

Prefix all bar marks this schedule with letters T. F.

Note: For Pump Fdns. & Bill of Material see THIS DWG. & C-11250. 4



ORIGINAL FEB 28 1990 SCANNED

ORIGINAL FEB 28 1990

007799

C-11250-R4

NOTES

1. Concrete shall test 2500 psi minimum compressive strength at 28 days
2. Foundations to extend into firm soil regardless of depth shown on dwg.
3. Reinforcing bars to be intermediate grade, deformed new billet steel meeting ASTM A-15 (latest), with deformations meeting ASTM A-305 (latest)
4. All bar bends and placement to conform to ACI Manual of Standard Practice for Detailing Conc. Struct.
5. All bar splices to be 20 bar diameters and as noted.

REVISIONS · BY · DATE
4 ADDED 4-P-44; PROJ. # 72524-015.
DR. BY: G. CHAVERS 3-14-88
CHK'D BY: J.H.Wood 3-16-88
DES. ENG: MAI 3-16-88
PROJ. ENG: [signature] 3-16-88
APP'D BY: [signature] 3-16-88

REVISIONS · BY · DATE
3 MODIFIED FDN. SQV-5
PROJ #62514-057 BY: SJ 1-9-87
CHK'D: MAI 1-13-87 P.E.: [signature] 1/13/87
APP'D: T. MOORE 1-14-87

BROWN-BILT

BROWN & ROOT, INC.
ENGINEERS AND CONSTRUCTORS
HOUSTON, TEXAS

DRAWN BY:	CHK'D BY:	APPROVED	SCALE:
Anderson DATE 10-17-57	G.V.H. DATE 10-22-57	[signature]	As Shown

TITLE OF DRAWING: TANK FARM FIREWALL & TANK FOUNDATIONS

NAME OF OWNER: GEIGY CHEMICAL CO. INC.

LOCATION OF PROJECT: Mc INTOSH ALABAMA

CONTRACT NO. 1055

DRAWING NO. C-1002

SHEET 3/1 OF

Tank Ultrasonic Inspection Reports

Attachment 4

December 2015
Project No. 0268481

Environmental Resources Management – Southwest, Inc.
775 North University Blvd., Suite 280
Mobile, Alabama 36608
(251) 706-8600

CIBA SPECIALTY CHEMICALS
McINTOSH, ALABAMA PLANT

D.O.I.	7/15/2004	**MFR. S/N**	93101-3
EQUIP.	UTV-813	**W.O.#**	232798
D.O.M.	1994	**CAPACITY**	31,000 GALLONS
MFR.	ROBEN MFG.	**M.O.C.**	304 STAINLESS

Per your request K.B.R. QA/QC Department has witnessed repairs & performed an API 653 Internal & External Visual Inspection with Ultrasonic Thickness Readings. Non Destructive testing was also performed on this vessel in the form of Liquid Penetrant testing on nozzles added & Radiography was performed on the tank long seams and girth seams. Unacceptable indications found in the vessel weld seams were removed by grinding and rewelded using GTAW. The repairs made on the vessel welds were tested again by Radiography & found to be acceptable. After all work was completed Hydrostatic Testing was performed on the tank @ 25 P.S.I. as measured on the gauge at the bottom of the tank. The pressure was held for 1 hour with no noticeable loss of gauge pressure or leakage detected. The API 653 Inspection performed on the tank should be considered the baseline information because no previous thickness readings or records were located. Overall the internal and external condition of the tank appeared good with no shipping damages noted. Also, all stiffner rings & welded grating & ladder brackets were visually inspected and found to be of good workmanship. The work on this tank was performed by qualified personel using approved materials and procedures and done in accordance with all the applicable requirements of API Standard 653, 2ND Edition, Addendum 3 Revision, Dated December 1998. Enclosed in this report you will find other more specific information regarding this project. If there are any questions related to this inspection or the reporting of the results please contact:

Alan Harville
K.B.R. QA/QC
Manager

Russell Yancy
K.B.R. QA/QC
Inspector

KELLOGG BROWN & ROOT
CERTIFICATION FOR TANK REPAIRED TO API 653

We hereby certify that the tank repaired at *CIBA SPECIALTY CHEMICAL-MCINTOSH, AL.*
and described as follows:

93101-3	*UTV-813*	*36'*	*1994*	*FIXED*
Serial No.	*Owner's No.*	*Height*	*ORIGINAL D.O.M.*	*Floating or Fixed Roof*

was repaired, inspected, and tested in accordance with all applicable requirements of API Standard 653,

2ND Edition, *ADDENDUM 3* Revision, Dated *DECEMBER 1998* (including all material supplied

by the repair organization).

Description Of Repair *ALL LONG SEAMS AND GIRTH SEAMS ON THE TANK WERE GROUND OUT AND REWELDED USING GTAW. THE WELD SEAMS WERE EXAMINED VISUALLY AND SPOT XRAY WAS PERFORMED BY "MQS/COOPER HEAT". ALSO, FOUR EA. NOZZLES WERE ADDED TO THE ROOF AND ONE NOZZLE WAS ADDED TO THE SKIRT. VISUAL AND LIQUID PENETRANT TESTING WAS PERFORMED ON THE ROOT PASSES AND FINAL WELDS OF THE NOZZLES WITH NO RELEVANT INDICATIONS NOTED. STIFFNER RINGS WERE ADDED AT THE TOP & BOTTOM OF THE TANK SHELL AND ALL CLIPS AND BRACKETS NECESSARY FOR LADDERS & GRATINGS WERE ALSO ATTACHED BY WELDING. ALL ATTACHMENT WELDS WERE VISUALLY ACCEPTABLE. THE SKIRT OF THE TANK WAS SANDBLASTED AND PAINTED. NOTE: ALL NOZZLES WERE BACKWELDED. WHEN ALL WORK WAS COMPLETED ON THE TANK THE VESSEL WAS FILLED WITH WATER AND HYDROSTATICALLY TESTED @ 8 P.S.I. (AS MEASURED AT THE TOP OF THE TANK), AND HELD FOR 1 HOUR WITH NO NOTICEABLE LOSS OF GAUGE PRESSURE OR VISUAL SIGNS OF LEAKAGE.*

KELLOGG BROWN & ROOT
Repair Organization

ALAN HARVILLE/
Authorized Representative

07-15-04
Date

KBR

PRESSURE VESSEL INTERNAL INSPECTION CHECKLIST

PLANT: UTILITIES **INSPECTOR:** RUSSELL YANCY

EQUIPMENT NO. UTV-813 **DESCRIPTION:** FUEL OIL STORAGE TANK

DATE OF INSPECTION: 07-15-04 **API-510 INSPECTOR CERTIFICATION NO** 22100

ITEM	INSPECTION CRITERIA	ASSESSMENT		
	☐ CHECK IF PARTIAL INSPECTION PERFORMED [1] ☐ CHECK IF CUI INSPECTION PERFORMED [2]			
	INDICATE IF OTHER NDE TYPES USED, DESCRIBE UNDER COMMENTS PT [X] MT ☐ RT ☐ UT [X]			
	☐ CHECK IF PRESSURE TEST PERFORMED (COMPLETE PRESSURE TEST RECORD FORM)			
	INTERNAL SURFACE OF VESSEL	**OK**	**DEFECTIVE**	**NA**
1	SHELL AND TRANSITION CONE (IF APPLICABLE)	X	SEE NOTES	
2	LOWER HEAD (NORTH OR WEST HEAD IF HORIZONTAL)	X		
3	UPPER HEAD (SOUTH OR EAST HEAD IF HORIZONTAL)	X	SEE NOTES	
4	INTERMEDIATE HEADS (IF APPLICABLE)			X
5	NOZZLES AND MANWAYS INCLUDING ATTACHMENT WELDS	X		
6	SMALL PIPING CONNECTIONS INCLUDING ATTACHMENT WELDS	X		
7	AREAS NEXT TO SOURCES OF EROSION (SPARGERS,VORTEX,IMPINGM)			X
8	LIQUID / GAS OR LIQUID / LIQUID INTERFACE (S)	X		
9	AREAS ADJACENT TO EXTERNAL ATTACHMENTS (SKIRT,SADDLES etc.)	X		
	VESSEL INTERNALS			
10	TRAY SUPPORT RINGS INCLUDING ATTACHMENT WELDS			X
11	TRAYS AND ASSOCIATED HARDWARE			X
12	DOWNCOMERS AND ASSOCIATED HARDWARE			X
13	BAFFLES AND ASSOCIATED HARDWARE			X
14	SPARGERS INCLUDING ATTACHMENT WELDS			X
15	VORTEX BREAKERS INCLUDING ATTACHMENT WELDS			X
16	DEMISTER SCREENS AND ASSOCIATED HARDWARE			X
16A	AGITATOR BLADES AND ASSOCIATED HARDWARE			X
	MISCELLANEOUS COMPONENTS			
17	THERMOWELLS & OTHER PRESSURE RETAINING INSTRUMENTATION		NOT INSTALLED	X
18	FLANGE FACES (WHERE OPEN FOR INSPECTION)	X		
19	INTERNAL COATINGS OR LININGS			X
20	**DIP PIPES, GUIDES** AND ASSOCIATED HARDWARE	X		

NOTES:

1 IF PARTIAL INSPECTION IS PERFORMED, INDICATE THE EXTENT OF THE INSPECTION UNDER COMMENTS OR RECORD "NI" FOR NOT INSPECTED UNDER FAULT CODE.

2 AREAS OF CORROSION, PITTING, CRACKING OR OTHER NOTED PROBLEMS SHALL BE MAPPED OUT AND BROUGHT TO THE ATTENTION OF THE PLANT ENGINEER FOR FURTHER EVALUATION.

KBR

INSPECTION COMMENTS

PLANT: UTILITIES **INSPECTOR:** RUSSELL YANCY

EQUIPMENT NO. UTV-813 **DESCRIPTION:** FUEL OIL STORAGE TANK

DATE OF INSPECTION: 07-15-04 **API-510 INSPECTOR CERTIFICATION NC** 22100

ITEM	COMMENTS: (REFERENCE ITEM NO. WHERE APPROPRIATE)
1 & 3	ALL GIRTH AND LONG SEAMS OF THE SHELL AS WELL AS ALL NOZZLE WELDS HAVE BEEN BACK
	WELDED. NO PITTING OR CORROSION WAS SEEN IN THE VESSEL.
RECOMMENDATIONS:	
	NONE
WORK PERFORMED	
	API 510 INTERNAL VISUAL INSPECTION AND LIQUID PENETRANT TESTING OF NOZZLE BACKWELDS.
	ALSO, VISUAL INSPECTION WAS PERFORMED ON ALL REWORKED SEAM WELDS.

TYPE	LAST INSPECTION	INTERVAL (MONTHS)	REMARKS:
INTERNAL	NA	NA	"BASELINE INSPECTION-CHANGE OF SERVICE"
EXTERNAL	↓	↓	
UT			FULL LENGTH DIP PIPE LOCATED IN NOZZLE "E"
CUI			
OTHER	N/A	N/A	AREAS OPPOSITE EXTERNALLY WELDED ATTACHMENTS APPEAR GOOD.

SUMMARY OF INSPECTION:

OVERALL THE INTERNAL CONDITION OF THIS TANK APPEARS GOOD. THERE WAS NO SIGNS OF PITTING OR CORROSION NOTED. THE REWORKED WELD SEAMS ARE OF GOOD QUALITY. ALL NOZZLES ARE BACKWELDED. NO BAFFLES OR VORTEX BREAKER IN THIS TANK. THIS VESSEL DOES HAVE ONE FULL LENGTH DIP PIPE.

INSPECTION PERFORMED BY: ______________________ DATE: 07-15-04

REVIEWED BY: ______________________ DATE: 07-22-04

KBR CONTROLLED DOCUMENT

KBR

PRESSURE VESSEL EXTERNAL INSPECTION CHECKLIST

PLANT: UTILITIES **INSPECTOR:** RUSSELL YANCY

EQUIPMENT NO. UTV-813 **DESCRIPTION:** FUEL OIL STORAGE TANK

DATE OF INSPECTION: 07-15-04 **API-510 INSPECTOR CERTIFICATION NO** 22100

ITEM	INSPECTION CRITERIA	ASSESSMENT		
	ADDITIONAL INSPECTION REQUIRED ☐CUI ☐CUF ☐OTHER (describe)			
	☐ CHECK IF PARTIAL INSPECTION PERFORMED [1] ☐ CHECK IF CUI INSPECTION PERFORMED [2]			
	INDICATE IF OTHER NDE TYPES USED, DESCRIBE UNDER COMMENTS PT [X] MT ☐ RT ☐ UT [X]			
	☐ CHECK IF PRESSURE TEST PERFORMED (COMPLETE PRESSURE TEST RECORD FORM)			
	EXTERNAL SURFACE OF VESSEL	**OK**	**DEFECTIVE**	**NA**
1	SHELL AND TRANSITION CONE (IF APPLICABLE)	X	SEE NOTES	
2	LOWER HEAD (NORTH OR WEST HEAD IF HORIZONTAL)	X		
3	UPPER HEAD (SOUTH OR EAST HEAD IF HORIZONTAL)	X	SEE NOTES	
4	INTERMEDIATE HEADS (IF APPLICABLE)			X
5	NOZZLES AND MANWAYS INCLUDING REINFORCEMENT PADS	X		
6	SMALL PIPING CONNECTIONS INCLUDING GUSSETS			X
7	PLATFORM LADDER OR OTHER ATTACHMENT WELDS TO VESSEL	X		
8	LIFTING LUGS / TRUNIONS	X		
9	INSULATION SUPPORTS / VACUUM RINGS	X		
10	**SKIRT** / SUPPORT LEGS	X	SEE NOTES	
11	INSULATION / WEATHERPROOFING / INSULATION TYPE?			X
	AUXILIARY COMPONENTS ASSOCIATED WITH VESSEL			
12	PLATFORMS AND HANDRAILS		NOT INSTALLED	X
13	LADDERS		NOT INSTALLED	X
14	STAIRWAYS		NOT INSTALLED	X
15	PIPE SUPPORTS, GUIDES AND BRACES	X		
16	OTHER FLANGES AND ASSOCIATED HARDWARE	X		
17	READABLE NAMEPLATE (REQUIRED FOR ASME VESSELS)	X		
18	FOUNDATION		NOT INSTALLED	X
19	FOUNDATION BOLTS		NOT INSTALLED	X
20	FIREPROOFING / TYPE		NOT INSTALLED	X
21	SAFETY VALVE AND ASSOCIATED PIPING		NOT INSTALLED	X
	INSTRUMENTATION AND ASSOCIATED HARDWARE			
22	LEVEL GAUGES		NOT INSTALLED	
23	PRESSURE INDICATING GAUGES / INSTRUMENTS		NOT INSTALLED	
24	THERMOWELLS AND TEMPERATURE INDICATING INSTRUMENTS		NOT INSTALLED	
25	OTHER PRESSURE CONTAINING INSTRUMENTS (DESCRIBE)			X
26	ELECTRICAL GROUNDING		NOT INSTALLED	

NOTES:

1. IF PARTIAL INSPECTION IS PERFORMED, INDICATE THE EXTENT OF THE INSPECTION UNDER COMMENTS OR RECORD "NI" FOR NOT INSPECTED.
2. INSULATED EQU. WITH AN OPERATING TEMPERATURE OF <25 degs F. Or >300 degs F. NEED NOT BE STRIPPED FOR "CUI" INSPECTION IS REQUIRED.
3. AREAS OF CORROSION, PITTING, CRACKING OR OTHER NOTED PROBLEMS SHALL BE MAPPED OUT AND BROUGHT TO THE ATTENTION OF THE PLANT ENGINEER FOR FURTHER EVALUATION.

KBR CONTROLLED DOCUMENT

Excel:API-510 "EXTERNAL" Insp Checklist

ITEM	COMMENTS: (REFERENCE ITEM NO. WHERE APPROPRIATE)
1	OVERALL THE SHELL BASE MATERIALS ARE IN GOOD CONDITION EXTERNALLY. NO SIGN OF PITTING OR
	CORROSION IS PRESENT. SPOT RADIOGRAPHY WAS PERFORMED ON THE WELD SEAMS BECAUSE XRAY

KBR

PRESSURE VESSEL EXTERNAL INSPECTION CHECKLIST

PLANT: UTILITIES **INSPECTOR:** RUSSELL YANCY

EQUIPMENT NO. UTV-813 **DESCRIPTION:** FUEL OIL STORAGE TANK

DATE OF INSPECTION: 07-15-04 **API-510 INSPECTOR CERTIFICATION NC** 22100

	WAS NOT ORIGINALLY PERFORMED. PER CIBA REQUEST AND ENGINEERING CALCULATIONS THE TANK
	WOULD NEED TO MEET CODE REQUIREMENTS FOR A SLIGHT PRESSURE RATING. THE WELDS WERE FOUND TO
	BE UNACCEPTABLE BY XRAY SO K.B.R. WELDERS GROUND THE GIRTH AND LONG SEAMS OUT THEN REWELDED
	THEM USING GTAW. AFTER REWELDING THE SEAMS PASSED THE RADIOGRAPHY REQUIREMENTS. ALSO, ALL
	CLIPS AND BRACKETS REQUIRED FOR LADDERS AND GRATINGS WERE ATTACHED BY WELDING AND FOUND TO
	BE VISUALLY ACCEPTABLE. STIFFENER/VACUUM RINGS WERE ADDED AT THE TOP AND BOTTOM OF THE SHELL.
	THE STIFFNER RING WELDS WERE ALSO FOUND TO BE VISUALLY ACCEPTABLE.
3	FOUR EACH NOZZLES WERE ADDED IN THE TOP HEAD OF THE TANK. THESE NOZZLES WERE ALL BACKWELDED
	AND LIQUID PENETRANT TESTING WAS PERFORMED ON THE ROOT PASSES AND FINAL WELDS WITH NO
	RELEVANT INDICATIONS NOTED.
10	THE SKIRT FOR THE TANK WAS NOTED WITH MINOR CORROSION ON THE BOTTOM MOUNTING FLANGE
	BUT HAS BEEN SANDBLASTED AND PAINTED.
RECOMMENDATIONS:	
1, 3 & 10	NO RECOMMENDATIONS FOR THE TANK AT THIS TIME. ITEMS LISTED ABOVE ARE FOR ENGINEERING
	INFORMATION.

WORK PERFORMED

API 510 EXTERNAL VISUAL INSPECTION AND ULTRASONIC THICKNESS EXAMINATION OF NOZZLES, SHELL & HEADS. ALSO, LIQUID PENETRANT TESTING WAS PERFORMED ON THE NOZZLE WELDS. CLIP, BRACKET & STIFFENER RING WELDS WERE VISUALLY INSPECTED AND FOUN TO BE ACCEPTABLE.

TYPE	LAST INSPECTION	INTERVAL (MONTHS)	REMARKS:
INTERNAL	NA	NA	"BASELINE INSPECTION-CHANGE OF SERVICE"
EXTERNAL	↓	↓	
UT	↓	↓	
CUI	↓	↓	
OTHER	N/A	N/A	

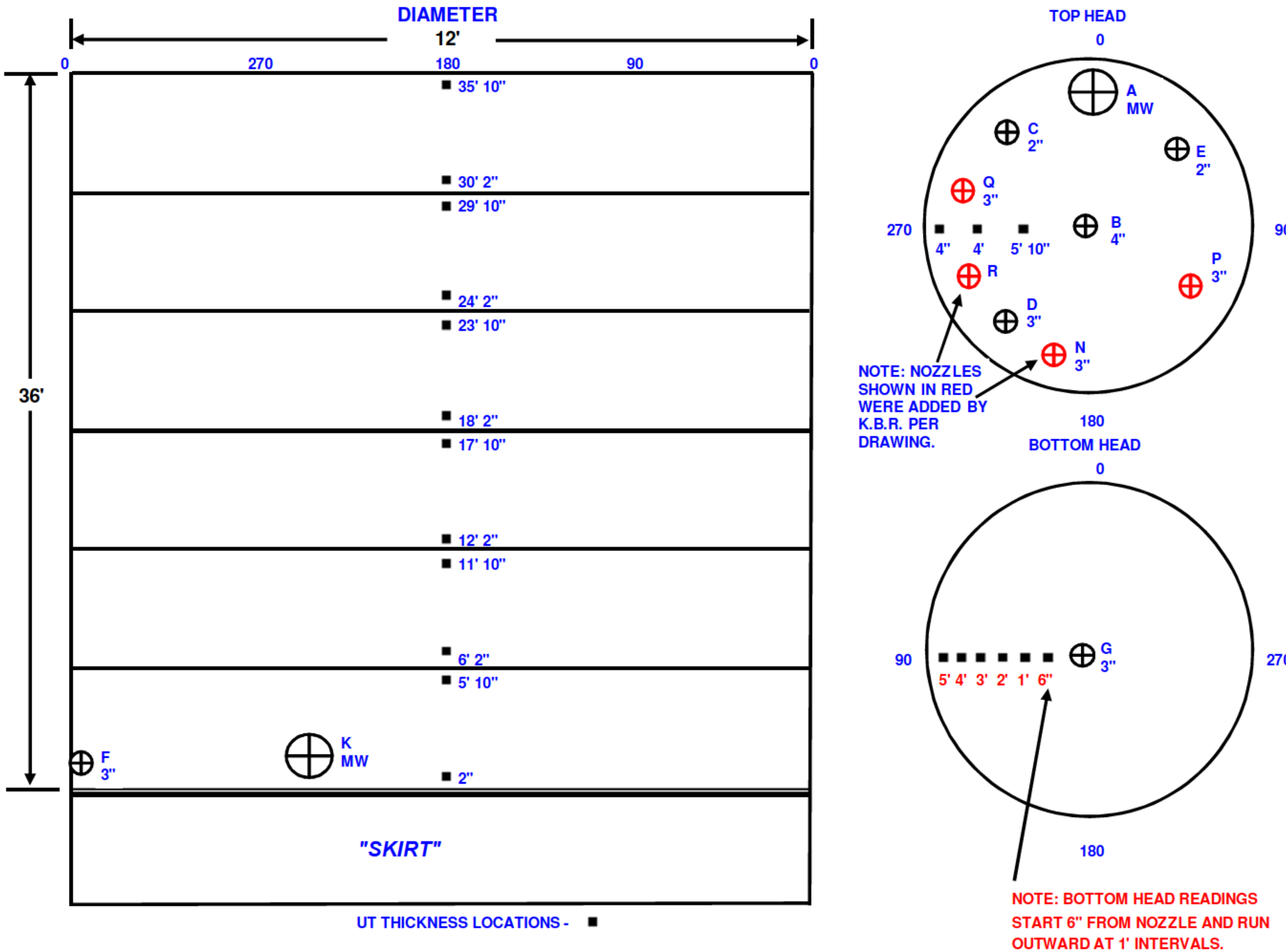
SUMMARY OF INSPECTION:

OVERALL THE EXTERNAL CONDITION OF THE TANK IS GOOD. NOZZLE ADDITIONS IN THE TOP HEAD AND SKIRT ARE COMPLETED AS WELL AS THE WELDING OF THE SUPPORT RINGS AND GRATING,STAIRWAY & LADDER BRACKETS.

INSPECTION PERFORMED BY: ______________________ DATE: 07-15-04

REVIEWED BY: ______________________ DATE: 07-22-04

KBR CONTROLLED DOCUMENT



KELLOGG BROWN & ROOT QA/QC DEPARTMENT	VESSEL NO./DESCRIPTION:	*UTV-813 (OLD# 43)*	TECHNICIAN:	*RUSS YANCY*
	FUEL OIL STORAGE TANK		DATE:	*7/15/2004*

Ciba Specialty Chemicals Corporation USA	**KBR**
QUALITY RECORD DOCUMENT	VESSEL INSPECTION PROCEDURE FORM:
REVISION: DATE: **07-15-04** TOTAL PAGES:	EQUIPMENT TITLE **NEW SERVICE-FUEL OIL STORAGE TANK** EQUIPMENT NO.: **UTV-813 (OLD #43)** FIXED ASSET NO.: **NOT YET ASSIGNED**

Vertical Vessel UT Data Sheet

1.0 ULTRASONIC THICKNESS READINGS (TOP HEAD)

CORROSION ALLOWANCE =
MINIMUM THICKNESS =
NOMINAL THICKNESS =

	O°		90°		180°		270°	
	actual	previous	actual	previous	actual	previous	actual	previous
4"	0.194	NA	0.187	NA	0.190	NA	0.187	NA
4'	0.188	↓	0.187	↓	0.189	↓	0.187	↓
5' 10"	0.186	↓	0.187	↓	0.188	↓	0.188	↓

COMMENTS:

2.0 ULTRASONIC THICKNESS READINGS (SHELL)

CORROSION ALLOWANCE =
MINIMUM THICKNESS =
NOMINAL THICKNESS =

	O°		90°		180°		270°	
	actual	previous	actual	previous	actual	previous	actual	previous
2"	0.265	NA	0.265	NA	0.269	NA	0.268	NA
5' 10"	0.267	↓	0.267	↓	0.267	↓	0.270	↓
6' 2"	0.274	↓	0.274	↓	0.266	↓	0.269	↓
11' 10"	0.268	↓	0.270	↓	0.266	↓	0.264	↓
12' 2"	0.193	↓	0.192	↓	0.191	↓	0.190	↓
17' 10"	0.194	↓	0.193	↓	0.194	↓	0.194	↓
18' 2"	0.189	↓	0.191	↓	0.192	↓	0.191	↓
23' 10"	0.195	↓	0.195	↓	0.190	↓	0.190	↓
24' 2"	0.189	↓	0.189	↓	0.191	↓	0.191	↓
29' 10"	0.187	↓	0.188	↓	0.189	↓	0.190	↓
30' 2"	0.187	↓	0.189	↓	0.191	↓	0.192	↓
35' 10"	0.189	NA	0.191	NA	0.192	NA	0.193	NA

COMMENTS:

3.0 ULTRASONIC THICKNESS READINGS (BOTTOM HEAD)

CORROSION ALLOWANCE =
MINIMUM THICKNESS =
NOMINAL THICKNESS =

	O°		90°		180°		270°	
	actual	previous	actual	previous	actual	previous	actual	previous
6"	0.236	NA	0.232	NA	0.232	NA	0.232	NA
1'	0.230	↓	0.233	↓	0.230	↓	0.231	↓
2'	0.232	↓	0.232	↓	0.232	↓	0.233	↓
3'	0.235	↓	0.233	↓	0.237	↓	0.235	↓
4'	0.238	↓	0.239	↓	0.238	↓	0.236	↓
5'	0.244	NA	0.246	NA	0.244	NA	0.245	NA

COMMENTS:

***READINGS ON THE BOTTOM HEAD ARE TAKEN FROM THE CENTER NOZZLE OUTWARD.**

Ciba Specialty Chemicals Corporation USA	KBR
QUALITY RECORD DOCUMENT	VESSEL INSPECTION PROCEDURE FORM:
REVISION: DATE: 07-15-04 TOTAL PAGES:	EQUIPMENT TITL NEW SERVICE-FUEL OIL STORAGE TANK EQUIPMENT NO.: UTV-813 (OLD #43) FIXED ASSET NO. NOT YET ASSIGNED

ULTRASONIC THICKNESS READINGS (NOZZLES)

		O°		90°		180°		270°		TOP		BOTTOM		NOMINAL	12.5% DEVIATION
NOZZLE	SIZE	actual	previous	actual	previous	actual	previous	actual	previous	actual	previous	actual	previous		
B	4"	0.217	NA	0.219	NA	0.218	NA	0.229	NA		NA		NA	0.237	0.207
A	20"	0.270		0.266		0.272		0.272						0.250	0.218
E	2"	0.142		0.142		0.142		0.144						0.154	0.134
P	3"	0.203		0.201		0.203		0.201						0.216	0.189
N	3"	0.200		0.201		0.200		0.199						0.216	0.189
D	3"	0.198		0.199		0.196		0.197						0.216	0.189
R	4"	0.218		0.217		0.216		0.215						0.237	0.207
Q	3"	0.201		0.200		0.199		0.201						0.216	0.189
C	2"	0.141		0.142		0.145		0.142						0.154	0.134
F	3"	0.205		0.201		0.204		0.205						0.216	0.189
K	20"	0.253		0.253		0.262		0.254						0.250	0.218
G	3"	0.206	NA	0.207	NA	0.205	NA	0.203	NA		NA		NA	0.216	0.189

COMMENTS:

KELLOGG BROWN & ROOT

ULTRASONIC EXAMINATION REPORT

Nuclear ☐ Non-Nuclear ☑

To:	CIBA			From:	K.B.R. QA/QC DEPARTMENT		
Project:	UTV-813 (OLD #43)			Date:	7/15/2004		
Item Info	Weld ☐	Structural ☐	Casting ☐	Machinery ☐	Machine Parts ☐	Pipe ☐	N/A ☑ Other:
	Non-Weld ☑	Plate ☑	Pipe ☑	Bar ☐	Casting ☐	Machine Parts ☐	N/A ☐ Other: NOZZLES SHELL & HEADS
Material Info	Size: 36' X 12'	No of Pieces: 1	Type of Base Material: STAINLESS	Type of Filler Material: NA	Weld	Smooth ☐	As Welded ☐ N/A ☑
Location	WORK PERFORMED AT THE K.B.R. PIPE SHOP			System	NEW SERVICE-FUEL OIL STORAGE TANK		
Acceptance Standards	ASME BPVC SEC VIII DIV I			Procedure	NT-131-13.01-1		
Type of Inspection	Soundness ☐	Thickness ☑	Bond ☐	Pulse Echo ☐	Angle-Beam ☐	Other:	
Transducer	Single Crystal ☐	Dual Crystal ☑	Flat ☑	Concave ☐	Convex ☐	Couplant	
Frequency: 5.0 MHZ	Size: 3/8"	Angle: 0°	Step Wedge ☑ Tube Wedge ☐	Material: STAINLESS	Thickness Range: .100-.500	Serial #: A15833	SONOTECH ULTRAGEL II
UT Equipment/Model-Serial #		PANAMETRIC 36DL+ 97033711		Reference Summary			
Result of Inspection:							
PLEASE SEE ATTACHED DATA							
				See Attachment ☑			
Requested By: LUCIO FONDA		Reported By: ROBERT HOLMES		NDT Supervisor ALAN HARVILLE		Accept ☑	Customer Specifications ☑ Reject ☐

KELLOGG BROWN & ROOT

LIQUID PENETRANT EXAMINATION REPORT

Nuclear ☐ Non-Nuclear ☑

To:	CIBA	From:	K.B.R. QA/QC Department
Project:	UTV-813 (OLD #43)	CIBA WO #:	232798
PO #:	NA	Date:	7/15/2004

Item: Weld ☑ Structural ☐ Casting ☐ Machinery ☐ Machine Parts ☐ Pipe ☑ N/A ☐ Other:

Non-Weld ☑ Plate ☑ Pipe ☐ Bar ☐ Casting ☐ Machine Parts ☐ N/A ☐ Other:

Material Info	Size:	No of Pieces	Type of Base Materlal	Type of Filler Material	Weld
	36' X 12'	1	304 S.S.	ER308/308L	Smooth ☐ As Welded ☑ N/A ☐

Location	WORK PERFORMED AT THE K.B.R. PIPE SHOP	System	NEW SERVICE-FUEL OIL STORAGE TANK
Acceptance Standards	ASME BPVC SEC VIII DIV I	Procedure	NT-131-12.01-2

Type of Inspection: Initial ☐ Plate Edge ☐ In Process ☐ 7 Day ☐ Back Gouge ☐ Final ☑ Root Pass ☐

Repair ☑ 24 Hour ☐ Other: NOZZLES ADDED TO THE TOP HEAD/ROOF OF THE TANK.

Color Contrast ☑ Flourescent Procedure ☐ Penetrant/Test Surface Temperature: 85 DEG. FAR. See Attachment ☑

Pre-Test Cleansing Method/Solution	Penetrant Application Method/Penetrant	Dwell Time	Developing Time	Developer Application Method/Developer
SPRAY & WIPE/SKC-S	BRUSH/SKL-SP	12 MIN.	12 MIN.	SPRAY/SKD-S2

Penetrant Removal Method/Remover	Post Cleaning Method/Solution	Emulsifier Application Method/Emulsifier	Emulsification Time
DRY,MOIST,DRY WIPE/SKC-S	SPRAY & WIPE/SKC-S	N/A	N/A

Result of Inspection:	Reference Summary
NO RELEVANT INDICATIONS WERE NOTED IN THE COMPLETED NOZZLE WELDS.	PENETRANT TESTING WAS PERFORMED ON ALL WELDS ASSOCIATED WITH THE NOZZLES ADDED.

Requested By:	Reported By:	NDT Supervisor	Customer Specifications ☑
LUCIO FONDA	RUSSELL YANCY	ALAN HARVILLE	Accept ☑ Reject ☐

CIBA SPECIALTY CHEMICALS
McINTOSH, ALABAMA PLANT

D.O.I.	7/15/2004	**MFR. S/N**	93101-2
EQUIP.	UTV-814	**W.O.#**	232798
D.O.M.	1994	**CAPACITY**	31,000 GALLONS
MFR.	ROBEN MFG.	**M.O.C.**	304 STAINLESS

Per your request K.B.R. QA/QC Department has witnessed repairs & performed an API 653 Internal & External Visual Inspection with Ultrasonic Thickness Readings. Non Destructive testing was also performed on this vessel in the form of Liquid Penetrant testing on nozzles added & Radiography was performed on the tank long seams and girth seams. Unacceptable indications found in the vessel weld seams were removed by grinding and rewelded using GTAW. The repairs made on the vessel welds were tested again by Radiography & found to be acceptable. After all work was completed Hydrostatic Testing was performed on the tank @ 25 P.S.I. as measured on the gauge at the bottom of the tank. The pressure was held for 1 hour with no noticeable loss of gauge pressure or leakage detected. The API 653 Inspection performed on the tank should be considered the baseline information because no previous thickness readings or records were located. Overall the internal and external condition of the tank appeared good with no shipping damages noted. Also, all stiffner rings & welded grating & ladder brackets were visually inspected and found to be of good workmanship. The work on this tank was performed by qualified personel using approved materials and procedures and done in accordance with all the applicable requirements of API Standard 653, 2ND Edition, Addendum 3 Revision, Dated December 1998. Enclosed in this report you will find other more specific information regarding this project. If there are any questions related to this inspection or the reporting of the results please contact:

Alan Harville
K.B.R. QA/QC
Manager

Russell Yancy
K.B.R. QA/QC
Inspector

KELLOGG BROWN & ROOT
CERTIFICATION FOR TANK REPAIRED TO API 653

We hereby certify that the tank repaired at **CIBA SPECIALTY CHEMICAL-MCINTOSH, AL.**
and descr bed as follows:

93101-2	UTV-814	36'	1994	FIXED
Serial No.	*Owner's No.*	*Height*	*ORIGINAL D.O.M.*	*Floating or Fixed Roof*

was repaired, inspected, and tested in accordance with all applicable requirements of API Standard 653,

2ND Edition, **ADDENDUM 3** Revision, Dated **DECEMBER 1998** (including all material supplied by the repair organization).

Description Of Repair: ALL LONG SEAMS AND GIRTH SEAMS ON THE TANK WERE GROUND OUT AND REWELDED USING GTAW. THE WELD SEAMS WERE EXAMINED VISUALLY AND SPOT XRAY WAS PERFORMED BY "MQS/COOPER HEAT". ALSO, FOUR EA. NOZZLES WERE ADDED TO THE ROOF AND ONE NOZZLE WAS ADDED TO THE SKIRT. VISUAL AND LIQUID PENETRANT TESTING WAS PERFORMED ON THE ROOT PASSES AND FINAL WELDS OF THE NOZZLES WITH NO RELEVANT INDICATIONS NOTED. STIFFNER RINGS WERE ADDED AT THE TOP & BOTTOM OF THE TANK SHELL AND ALL CLIPS AND BRACKETS NECESSARY FOR LADDERS & GRATINGS WERE ALSO ATTACHED BY WELDING. ALL ATTACHMENT WELDS WERE VISUALLY ACCEPTABLE. THE SKIRT OF THE TANK WAS SANDBLASTED AND PAINTED. NOTE: ALL NOZZLES WERE BACKWELDED. WHEN ALL WORK WAS COMPLETED ON THE TANK THE VESSEL WAS FILLED WITH WATER AND HYDROSTATICALLY TESTED @ 8 P.S.I. (AS MEASURED AT THE TOP OF THE TANK), AND HELD FOR 1 HOUR WITH NO NOTICEABLE LOSS OF GAUGE PRESSURE OR VISUAL SIGNS OF LEAKAGE.

KELLOGG BROWN & ROOT
Repair Organization

ALAN HARVILLE/
Authorized Representative

07-15-04
Date

KBR

PRESSURE VESSEL INTERNAL INSPECTION CHECKLIST

PLANT: UTILITIES **INSPECTOR:** RUSSELL YANCY

EQUIPMENT NO. UTV-814 **DESCRIPTION:** FUEL OIL STORAGE TANK

DATE OF INSPECTION: 07-15-04 **API-510 INSPECTOR CERTIFICATION NO** 22100

ITEM	INSPECTION CRITERIA	ASSESSMENT		
	☐ CHECK IF PARTIAL INSPECTION PERFORMED [1] ☐ CHECK IF CUI INSPECTION PERFORMED [2]			
	INDICATE IF OTHER NDE TYPES USED, DESCRIBE UNDER COMMENTS PT [X] MT ☐ RT ☐ UT [X]			
	☐ CHECK IF PRESSURE TEST PERFORMED (COMPLETE PRESSURE TEST RECORD FORM)			
	INTERNAL SURFACE OF VESSEL	**OK**	**DEFECTIVE**	**NA**
1	SHELL AND TRANSITION CONE (IF APPLICABLE)	X	SEE NOTES	
2	LOWER HEAD (NORTH OR WEST HEAD IF HORIZONTAL)	X		
3	UPPER HEAD (SOUTH OR EAST HEAD IF HORIZONTAL)	X	SEE NOTES	
4	INTERMEDIATE HEADS (IF APPLICABLE)			X
5	NOZZLES AND MANWAYS INCLUDING ATTACHMENT WELDS	X		
6	SMALL PIPING CONNECTIONS INCLUDING ATTACHMENT WELDS	X		
7	AREAS NEXT TO SOURCES OF EROSION (SPARGERS,VORTEX,IMPINGM)			X
8	LIQUID / GAS OR LIQUID / LIQUID INTERFACE (S)	X		
9	AREAS ADJACENT TO EXTERNAL ATTACHMENTS (SKIRT,SADDLES etc.)	X		
	VESSEL INTERNALS			
10	TRAY SUPPORT RINGS INCLUDING ATTACHMENT WELDS			X
11	TRAYS AND ASSOCIATED HARDWARE			X
12	DOWNCOMERS AND ASSOCIATED HARDWARE			X
13	BAFFLES AND ASSOCIATED HARDWARE			X
14	SPARGERS INCLUDING ATTACHMENT WELDS			X
15	VORTEX BREAKERS INCLUDING ATTACHMENT WELDS			X
16	DEMISTER SCREENS AND ASSOCIATED HARDWARE			X
16A	AGITATOR BLADES AND ASSOCIATED HARDWARE			X
	MISCELLANEOUS COMPONENTS			
17	THERMOWELLS & OTHER PRESSURE RETAINING INSTRUMENTATION		NOT INSTALLED	X
18	FLANGE FACES (WHERE OPEN FOR INSPECTION)	X		
19	INTERNAL COATINGS OR LININGS			X
20	**DIP PIPES, GUIDES** AND ASSOCIATED HARDWARE	X		

NOTES:

1. IF PARTIAL INSPECTION IS PERFORMED, INDICATE THE EXTENT OF THE INSPECTION UNDER COMMENTS OR RECORD "NI" FOR NOT INSPECTED UNDER FAULT CODE.
2. AREAS OF CORROSION, PITTING, CRACKING OR OTHER NOTED PROBLEMS SHALL BE MAPPED OUT AND BROUGHT TO THE ATTENTION OF THE PLANT ENGINEER FOR FURTHER EVALUATION.

KBR

INSPECTION COMMENTS

PLANT: UTILITIES **INSPECTOR:** RUSSELL YANCY

EQUIPMENT NO. UTV-814 **DESCRIPTION:** FUEL OIL STORAGE TANK

DATE OF INSPECTION: 07-15-04 **API-510 INSPECTOR CERTIFICATION NO** 22100

ITEM	COMMENTS: (REFERENCE ITEM NO. WHERE APPROPRIATE)
1 & 3	ALL GIRTH AND LONG SEAMS OF THE SHELL AS WELL AS ALL NOZZLE WELDS HAVE BEEN BACK
	WELDED. NO PITTING OR CORROSION WAS SEEN IN THE VESSEL.

RECOMMENDATIONS:

NONE

WORK PERFORMED

API 510 INTERNAL VISUAL INSPECTION AND LIQUID PENETRANT TESTING OF NOZZLE BACKWELDS.
ALSO, VISUAL INSPECTION WAS PERFORMED ON ALL REWORKED SEAM WELDS.

TYPE	LAST INSPECTION	INTERVAL (MONTHS)	REMARKS:
INTERNAL	NA	NA	"BASELINE INSPECTION-CHANGE OF SERVICE"
EXTERNAL			
UT			FULL LENGTH DIP PIPE LOCATED IN NOZZLE "E"
CUI			
OTHER	N/A	N/A	AREAS OPPOSITE EXTERNALLY WELDED ATTACHMENTS APPEAR GOOD.

SUMMARY OF INSPECTION:

OVERALL THE INTERNAL CONDITION OF THIS TANK APPEARS GOOD. THERE WAS NO SIGNS OF PITTING OR
CORROSION NOTED. THE REWORKED WELD SEAMS ARE OF GOOD QUALITY. ALL NOZZLES ARE BACKWELDED.
NO BAFFLES OR VORTEX BREAKER IN THIS TANK. THIS VESSEL DOES HAVE ONE FULL LENGTH DIP PIPE.

INSPECTION PERFORMED BY: DATE: 07-15-04

REVIEWED BY: DATE: 07-22-04

KBR CONTROLLED DOCUMENT

KBR

PRESSURE VESSEL EXTERNAL INSPECTION CHECKLIST

PLANT: UTILITIES **INSPECTOR:** RUSSELL YANCY

EQUIPMENT NO. UTV-814 **DESCRIPTION:** FUEL OIL STORAGE TANK

DATE OF INSPECTION: 07-15-04 **API-510 INSPECTOR CERTIFICATION NO** 22100

ITEM	INSPECTION CRITERIA	ASSESSMENT		
	ADDITIONAL INSPECTION REQUIRED ☐CUI ☐CUF ☐OTHER (describe)			
	☐ CHECK IF PARTIAL INSPECTION PERFORMED [1] ☐ CHECK IF CUI INSPECTION PERFORMED [2]			
	INDICATE IF OTHER NDE TYPES USED, DESCRIBE UNDER COMMENTS PT [X] MT ☐ RT ☐ UT [X]			
	☐ CHECK IF PRESSURE TEST PERFORMED (COMPLETE PRESSURE TEST RECORD FORM)			
	EXTERNAL SURFACE OF VESSEL	**OK**	**DEFECTIVE**	**NA**
1	SHELL AND TRANSITION CONE (IF APPLICABLE)	X	SEE NOTES	
2	LOWER HEAD (NORTH OR WEST HEAD IF HORIZONTAL)	X		
3	UPPER HEAD (SOUTH OR EAST HEAD IF HORIZONTAL)	X		
4	INTERMEDIATE HEADS (IF APPLICABLE)			X
5	NOZZLES AND MANWAYS INCLUDING REINFORCEMENT PADS	X		
6	SMALL PIPING CONNECTIONS INCLUDING GUSSETS			X
7	PLATFORM LADDER OR OTHER ATTACHMENT WELDS TO VESSEL	X		
8	LIFTING LUGS / TRUNIONS	X		
9	INSULATION SUPPORTS / VACUUM RINGS	X		
10	**SKIRT** / SUPPORT LEGS	X		
11	INSULATION / WEATHERPROOFING / INSULATION TYPE?			X
	AUXILIARY COMPONENTS ASSOCIATED WITH VESSEL			
12	PLATFORMS AND HANDRAILS		NOT INSTALLED	X
13	LADDERS		NOT INSTALLED	X
14	STAIRWAYS		NOT INSTALLED	X
15	PIPE SUPPORTS, GUIDES AND BRACES	X		
16	OTHER FLANGES AND ASSOCIATED HARDWARE	X		
17	READABLE NAMEPLATE (REQUIRED FOR ASME VESSELS)	X		
18	FOUNDATION		NOT INSTALLED	X
19	FOUNDATION BOLTS		NOT INSTALLED	X
20	FIREPROOFING / TYPE		NOT INSTALLED	X
21	SAFETY VALVE AND ASSOCIATED PIPING		NOT INSTALLED	X
	INSTRUMENTATION AND ASSOCIATED HARDWARE			
22	LEVEL GAUGES		NOT INSTALLED	
23	PRESSURE INDICATING GAUGES / INSTRUMENTS		NOT INSTALLED	
24	THERMOWELLS AND TEMPERATURE INDICATING INSTRUMENTS		NOT INSTALLED	
25	OTHER PRESSURE CONTAINING INSTRUMENTS (DESCRIBE)			X
26	ELECTRICAL GROUNDING		NOT INSTALLED	

NOTES:

1. IF PARTIAL INSPECTION IS PERFORMED, INDICATE THE EXTENT OF THE INSPECTION UNDER COMMENTS OR RECORD "NI" FOR NOT INSPECTED.
2. INSULATED EQU. WITH AN OPERATING TEMPERATURE OF <25 degs F. Or >300 degs F. NEED NOT BE STRIPPED FOR "CUI" INSPECTION IS REQUIRED.
3. AREAS OF CORROSION, PITTING, CRACKING OR OTHER NOTED PROBLEMS SHALL BE MAPPED OUT AND BROUGHT TO THE ATTENTION OF THE PLANT ENGINEER FOR FURTHER EVALUATION.

KBR CONTROLLED DOCUMENT

ITEM	COMMENTS: (REFERENCE ITEM NO. WHERE APPROPRIATE)
1	OVERALL THE SHELL BASE MATERIALS ARE IN GOOD CONDITION EXTERNALLY. NO SIGN OF PITTING OR
	CORROSION IS PRESENT. SPOT RADIOGRAPHY WAS PERFORMED ON THE WELD SEAMS BECAUSE XRAY

KBR

PRESSURE VESSEL EXTERNAL INSPECTION CHECKLIST

PLANT: UTILITIES **INSPECTOR:** RUSSELL YANCY

EQUIPMENT NO. UTV-814 **DESCRIPTION:** FUEL OIL STORAGE TANK

DATE OF INSPECTION: 07-15-04 **API-510 INSPECTOR CERTIFICATION NO** 22100

	WAS NOT ORIGINALLY PERFORMED. PER CIBA REQUEST AND ENGINEERING CALCULATIONS THE TANK
	WOULD NEED TO MEET CODE REQUIREMENTS FOR A SLIGHT PRESSURE RATING. THE WELDS WERE FOUND TO
	BE UNACCEPTABLE BY XRAY SO K.B.R. WELDERS GROUND THE GIRTH AND LONG SEAMS OUT THEN REWELDED
	THEM USING GTAW. AFTER REWELDING THE SEAMS PASSED THE RADIOGRAPHY REQUIREMENTS. ALSO, ALL
	CLIPS AND BRACKETS REQUIRED FOR LADDERS AND GRATINGS WERE ATTACHED BY WELDING AND FOUND TO
	BE VISUALLY ACCEPTABLE. STIFFENER/VACUUM RINGS WERE ADDED AT THE TOP AND BOTTOM OF THE SHELL.
	THE STIFFNER RING WELDS WERE ALSO FOUND TO BE VISUALLY ACCEPTABLE.
3	FOUR EACH NOZZLES WERE ADDED IN THE TOP HEAD OF THE TANK. THESE NOZZLES WERE ALL BACKWELDED
	AND LIQUID PENETRANT TESTING WAS PERFORMED ON THE ROOT PASSES AND FINAL WELDS WITH NO
	RELEVANT INDICATIONS NOTED.
10	THE SKIRT FOR THE TANK WAS NOTED WITH MINOR CORROSION ON THE BOTTOM MOUNTING FLANGE
	BUT HAS BEEN SANDBLASTED AND PAINTED.
RECOMMENDATIONS:	
1, 3 & 10	NO RECOMMENDATIONS FOR THE TANK AT THIS TIME. ITEMS LISTED ABOVE ARE FOR ENGINEERING
	INFORMATION.

WORK PERFORMED

API 510 EXTERNAL VISUAL INSPECTION AND ULTRASONIC THICKNESS EXAMINATION
OF NOZZLES, SHELL & HEADS. ALSO, LIQUID PENETRANT TESTING WAS PERFORMED ON
THE NOZZLE WELDS. CLIP, BRACKET & STIFFENER RING WELDS WERE VISUALLY INSPECTED AND FOUN
TO BE ACCEPTABLE.

TYPE	LAST INSPECTION	INTERVAL (MONTHS)	REMARKS:
INTERNAL	NA	NA	"BASELINE INSPECTION-CHANGE OF SERVICE"
EXTERNAL	↓	↓	
UT	↓	↓	
CUI	↓	↓	
OTHER	N/A	N/A	

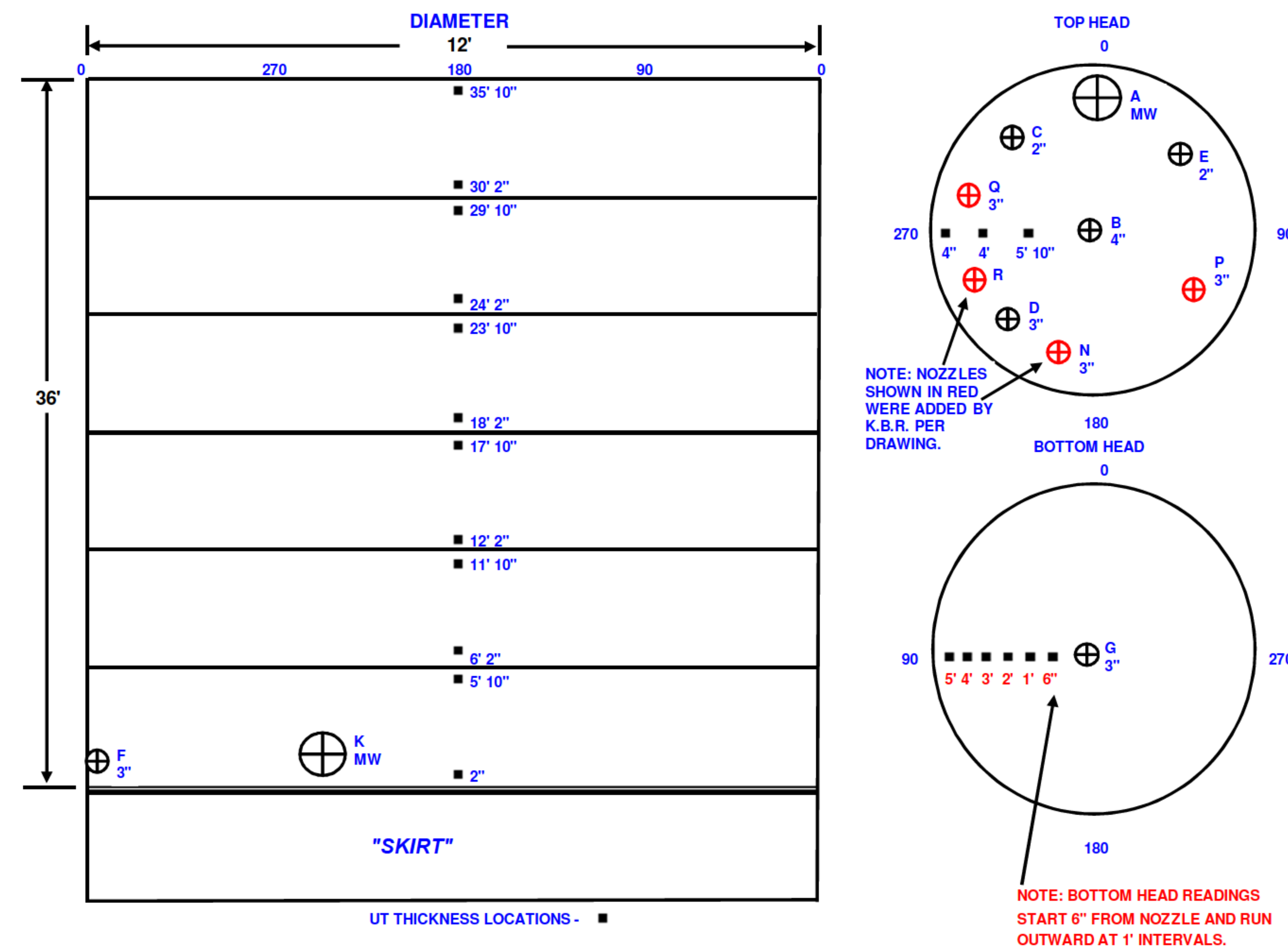
SUMMARY OF INSPECTION:

OVERALL THE EXTERNAL CONDITION OF THE TANK IS GOOD. NOZZLE ADDITIONS IN THE TOP HEAD AND SKIRT ARE
COMPLETED AS WELL AS THE WELDING OF THE SUPPORT RINGS AND GRATING,STAIRWAY & LADDER BRACKETS.

INSPECTION PERFORMED BY: ________ DATE: 07-15-04

REVIEWED BY: ________ DATE: 07-22-04

KBR CONTROLLED DOCUMENT



KELLOGG BROWN & ROOT QA/QC DEPARTMENT	VESSEL NO./DESCRIPTION:	*UTV-814 (OLD# 44)*	TECHNICIAN:	*RUSS YANCY*
	FUEL OIL STORAGE TANK		DATE:	*7/15/2004*

Ciba Specialty Chemicals Corporation USA	KBR
QUALITY RECORD DOCUMENT	VESSEL INSPECTION PROCEDURE FORM:
REVISION: DATE: 07-15-04 TOTAL PAGES:	EQUIPMENT TITLE NEW SERVICE-FUEL OIL STORAGE TANK EQUIPMENT NO.: UTV-814 (OLD #44) FIXED ASSET NO.: NOT YET ASSIGNED

Vertical Vessel UT Data Sheet

1.0 ULTRASONIC THICKNESS READINGS (TOP HEAD)

CORROSION ALLOWANCE =
MINIMUM THICKNESS =
NOMINAL THICKNESS =

	O°		90°		180°		270°	
	actual	previous	actual	previous	actual	previous	actual	previous
4"	0.188	NA	0.187	NA	0.191	NA	0.193	NA
4'	0.188	↓	0.187	↓	0.189	↓	0.187	↓
5' 10"	0.189	↓	0.188	↓	0.189	↓	0.188	↓

COMMENTS:

2.0 ULTRASONIC THICKNESS READINGS (SHELL)

CORROSION ALLOWANCE =
MINIMUM THICKNESS =
NOMINAL THICKNESS =

	O°		90°		180°		270°	
	actual	previous	actual	previous	actual	previous	actual	previous
2"	0.278	NA	0.284	NA	0.268	NA	0.273	NA
5' 10"	0.276	↓	0.282	↓	0.280	↓	0.282	↓
6' 2"	0.280	↓	0.284	↓	0.276	↓	0.275	↓
11' 10"	0.276	↓	0.276	↓	0.274	↓	0.275	↓
12' 2"	0.190	↓	0.191	↓	0.192	↓	0.190	↓
17' 10"	0.187	↓	0.187	↓	0.192	↓	0.191	↓
18' 2"	0.190	↓	0.193	↓	0.193	↓	0.192	↓
23' 10"	0.189	↓	0.192	↓	0.192	↓	0.190	↓
24' 2"	0.187	↓	0.190	↓	0.193	↓	0.192	↓
29' 10"	0.186	↓	0.188	↓	0.192	↓	0.192	↓
30' 2"	0.189	↓	0.191	↓	0.192	↓	0.190	↓
35' 10"	0.188	NA	0.191	NA	0.192	NA	0.190	NA

COMMENTS:

3.0 ULTRASONIC THICKNESS READINGS (BOTTOM HEAD)

CORROSION ALLOWANCE =
MINIMUM THICKNESS =
NOMINAL THICKNESS =

	O°		90°		180°		270°	
	actual	previous	actual	previous	actual	previous	actual	previous
6"	0.232	NA	0.229	NA	0.228	NA	0.232	NA
1'	0.231	↓	0.230	↓	0.231	↓	0.231	↓
2'	0.237	↓	0.232	↓	0.232	↓	0.234	↓
3'	0.239	↓	0.234	↓	0.235	↓	0.236	↓
4'	0.245	↓	0.237	↓	0.239	↓	0.239	↓
5'	0.248	NA	0.242	NA	0.245	NA	0.246	NA

COMMENTS:

***READINGS ON THE BOTTOM HEAD ARE TAKEN FROM THE CENTER NOZZLE OUTWARD.**

Ciba Specialty Chemicals Corporation USA	**KBR**	
QUALITY RECORD DOCUMENT	VESSEL INSPECTION PROCEDURE FORM:	
REVISION: DATE: **07-15-04** TOTAL PAGES:	EQUIPMENT TITL **NEW SERVICE-FUEL OIL STORAGE TANK** EQUIPMENT NO.: **UTV-814 (OLD #44)** FIXED ASSET NO. **NOT YET ASSIGNED**	

ULTRASONIC THICKNESS READINGS (NOZZLES)

		O°		90°		180°		270°		TOP		BOTTOM		NOMINAL	12.5% DEVIATION
NOZZLE	SIZE	actual	previous	actual	previous	actual	previous	actual	previous	actual	previous	actual	previous		
B	**4"**	**0.218**	**NA**	**0.217**	**NA**	**0.225**	**NA**	**0.217**	**NA**		**NA**		**NA**	**0.237**	**0.207**
A	**20"**	**0.270**		**0.266**		**0.267**		**0.271**						**0.250**	**0.218**
E	**2"**	**0.142**		**0.142**		**0.141**		**0.142**						**0.154**	**0.134**
P	**3"**	**0.200**		**0.197**		**0.196**		**0.197**						**0.216**	**0.189**
N	**3"**	**0.196**		**0.200**		**0.202**		**0.203**						**0.216**	**0.189**
D	**3"**	**0.202**		**0.195**		**0.213**		**0.214**						**0.216**	**0.189**
R	**4"**	**0.216**		**0.216**		**0.212**		**0.215**						**0.237**	**0.207**
Q	**3"**	**0.199**		**0.201**		**0.199**		**0.200**						**0.216**	**0.189**
C	**2"**	**0.139**		**0.142**		**0.140**		**0.140**						**0.154**	**0.134**
F	**3"**	**0.207**		**0.205**		**0.210**		**0.206**						**0.216**	**0.189**
K	**20"**	**0.254**		**0.253**		**0.252**		**0.254**						**0.250**	**0.218**
G	**3"**	**0.202**	**NA**	**0.202**	**NA**	**0.201**	**NA**	**0.201**	**NA**		**NA**		**NA**	**0.216**	**0.189**

COMMENTS:

KELLOGG BROWN & ROOT

ULTRASONIC EXAMINATION REPORT

Nuclear ☐ Non-Nuclear ☑

To:	CIBA	From:	K.B.R. QA/QC DEPARTMENT
Project:	UTV-814 (OLD #44)	Date:	7/15/2004

Item Info

Weld ☐ Structural ☐ Casting ☐ Machinery ☐ Machine Parts ☐ Pipe ☐ N/A ☐ Other:

Non-Weld ☑ Plate ☑ Pipe ☑ Bar ☐ Casting ☐ Machine Parts ☐ N/A ☐ Other: NOZZLES SHELL & HEADS

Material Info	Size:	No of Pieces	Type of Base Material	Type of Filler Material	Weld	
	36' X 12'	1	STAINLESS	NA		Smooth ☐ As Welded ☐ N/A ☑

Location	WORK PERFORMED AT THE K.B.R. PIPE SHOP	System	NEW SERVICE-FUEL OIL STORAGE TANK
Acceptance Standards	ASME BPVC SEC VIII DIV I	Procedure	NT-131-13.01-1

Type of Inspection: Soundness ☐ Thickness ☑ Bond ☐ Pulse Echo ☐ Angle-Beam ☐ Other:

Transducer: Single Crystal ☐ Dual Crystal ☑ Flat ☑ Concave ☐ Convex ☐

Frequency	Size	Angle		Material	Thickness Range	Serial #	Couplant
5.0 MHZ	3/8"	0°	Step Wedge ☑ Tube Wedge ☐	STAINLESS	.100-.500	A15833	SONOTECH ULTRAGEL II

UT Equipment/Model-Serial #: PANAMETRIC 36DL+ 97033711

Reference Summary

See Attachment ☑

Result of Inspection:

PLEASE SEE ATTACHED DATA

Requested By:	Reported By:	NDT Supervisor	
LUCIO FONDA	ROBERT HOLMES	ALAN HARVILLE	Accept ☑ Customer Specifications ☑ Reject ☐

KELLOGG BROWN & ROOT

LIQUID PENETRANT EXAMINATION REPORT

Nuclear ☐ Non-Nuclear ☑

To:	CIBA	From:	K.B.R. QA/QC Department
Project:	UTV-814 (OLD #44)	CIBA WO #:	232798
PO #:	NA	Date:	7/15/2004

Item

Weld ☑ Structural ☐ Casting ☐ Machinery ☐ Machine Parts ☐ Pipe ☑ N/A ☐ Other:

Non-Weld ☑ Plate ☑ Pipe ☐ Bar ☐ Casting ☐ Machine Parts ☐ N/A ☐ Other:

Material Info	Size:	No of Pieces	Type of Base Materlal	Type of Filler Material	Weld	
	36' X 12'	1	304 S.S.	ER308/308L		Smooth ☐ As Welded ☑ N/A ☐

Location	WORK PERFORMED AT THE K.B.R. PIPE SHOP	System	NEW SERVICE-FUEL OIL STORAGE TANK
Acceptance Standards	ASME BPVC SEC VIII DIV I	Procedure	NT-131-12.01-2

Type of Inspection

Initial ☐ Plate Edge ☐ In Process ☐ 7 Day ☐ Back Gouge ☐ Final ☑ Root Pass ☐

Repair ☑ 24 Hour ☐ Other: NOZZLES ADDED TO THE TOP HEAD/ROOF OF THE TANK.

Color Contrast ☑ Flourescent Procedure ☐ Penetrant/Test Surface Temperature: 85 DEG. FAR. See Attachment ☑

Pre-Test Cleansing Method/Solution	Penetrant Application Method/Penetrant	Dwell Time	Developing Time	Developer Application Method/Developer
SPRAY & WIPE/SKC-S	BRUSH/SKL-SP	12 MIN.	12 MIN.	SPRAY/SKD-S2

Penetrant Removal Method/Remover	Post Cleaning Method/Solution	Emulsifier Application Method/Emulsifier	Emulsification Time
DRY,MOIST,DRY WIPE/SKC-S	SPRAY & WIPE/SKC-S	N/A	N/A

Result of Inspection:	Reference Summary
NO RELEVANT INDICATIONS WERE NOTED IN THE COMPLETED NOZZLE WELDS.	PENETRANT TESTING WAS PERFORMED ON ALL WELDS ASSOCIATED WITH THE NOZZLES ADDED.

Requested By:	Reported By:	NDT Supervisor	Customer Specifications ☑
LUCIO FONDA	RUSSELL YANCY	ALAN HARVILLE	Accept ☑ Reject ☐

BASF

McINTOSH, ALABAMA PLANT

D.O.I.	6/6/2012	**MFR. S/N**	93101-3
EQUIP.	UTV-813	**W.O.#**	804813433
D.O.M.	1994	**CAPACITY**	31,000 GALLONS
MFR.	ROBEN MFG.	**M.O.C.**	304 STAINLESS

Per your request K.B.R. QA/QC Department has performed an API 510 External visual Inspection with Ultrasonic Thickness Readings on UTV-813, Fuel oil Storage Tank. Overall the external condition of the vessel is good with only minor findings noted. There was no signs of leakage or external corrosion features found at the time of this inspection. Enclosed in this report you will find other more specific information regarding this project. If there are any questions related to this inspection or the reporting of the results please contact:

Russell Yancy
K.B.R. QA/QC
API 510 #22100

VESSEL INSPECTION FREQUENCY WORKSHEET

per API 510 - Pressure Vessel Inspection Code Guidelines

(Section 4 - 7th edition, 3/92; supplement 1, 9/93; supplement 2)

Date: 6/6/2012 Name: RUSSELL YANCY

Focused Factory: UTILITIES Production Unit: UTILITIES

Equip. Name: FUEL OIL STORAGE TANK

Equip. # : UTV-813 F.A. #: UNKNOWN

Orig. Thickness- shell:	1/4" & 3/16"	nominal	Min. Design Thickness- shell:	N/A	
(U-1 data sht.) - head:	3/16"	top (min.)	(ASME Sec. VIII Calc.) - head:	N/A	top
	1/4"	bot (min.)		N/A	bot

Corr. Allow: 6/6/2012 Mat'l of Constr. 304 STAINLESS STEEL

Inspection Date: 6/6/2012 Previous Inspection Date: 7/15/2004

Type of Inspection: API 510 EXTERNAL VISUAL INSPECTION & ULTRASONIC THICKNESS EXAM.

> Visual external inspections every 5 years or at the same interval as the internal or external UT inspection, whichever is less.

> The interval between internal and external UT inspections shall not exceed one half the corrosion-rate or 10 years whichever is less. If remaining life is less than 4 years, inspection interval is remaining life (up tp 2 years max.)

> Corrosion rate less than 0.005"/yr.- and external UT inspection can be performed in lieu of an internal inspection.

> Corrosion rate is greater than 0.005"/yr. - use the remaining life formula.

Corrosion Rate (in. / yr.) = $t_{previous} - t_{actual}$ / (yrs. between $t_{previous}$ and t_{actual})

Remaining Life (yrs.) = $t_{actual} - t_{minimum}$ / corrosion rate

t_{actual} = thickness measured at the same time of inspection for a given loaction (min. thickness).

$t_{previous}$ = thickness at the same location of t_{actual} measured during a previous inspection (min. thickness).

$t_{minimum}$ = minimum design thickness (see top of sheet).

	t actual	t previous	yrs. between inspections	Corrosion Rate	Remaining Life
shell	0.189	0.191	8.0	0.000250	INDEFINITE
head (top)	0.192	0.194	8.0	0.000250	INDEFINITE
head (bot)	0.231	0.232	8.0	0.000125	INDEFINITE

Next: External Inspection 6/6/2017

Internal Inspection PER BASF MI PROCEDURE MC-P-MC-100

Comments:

OVERALL THIS VESSEL APPEARS IN GOOD CONDITION WITH NO LEAKAGE OR EXTERNAL CORROSION FEATURES NOTED.

KBR

PRESSURE VESSEL EXTERNAL INSPECTION CHECKLIST

PLANT: UTILITIES **INSPECTOR:** RUSSELL YANCY

EQUIPMENT NO. UTV-813 **DESCRIPTION:** FUEL OIL STORAGE TANK

DATE OF INSPECTION: 6/6/2012 **API-510 INSPECTOR CERTIFICATION NO** 22100

ITEM	INSPECTION CRITERIA	OK	DEFECTIVE	NA
	ADDITIONAL INSPECTION REQUIRED ☐ CUI ☐ CUF ☐ OTHER (describe)			
	[X] CHECK IF PARTIAL INSPECTION PERFORMED [1] ☐ CHECK IF CUI INSPECTION PERFORMED [2]			
	INDICATE IF OTHER NDE TYPES USED, DESCRIBE UNDER COMMENTS PT ☐ MT ☐ RT ☐ UT [X]			
	☐ CHECK IF PRESSURE TEST PERFORMED (COMPLETE PRESSURE TEST RECORD FORM)			
	EXTERNAL SURFACE OF VESSEL	**OK**	**DEFECTIVE**	**NA**
1	SHELL AND TRANSITION CONE (IF APPLICABLE)	X	SEE NOTES	
2	LOWER HEAD (NORTH OR WEST HEAD IF HORIZONTAL)	X		
3	UPPER HEAD (SOUTH OR EAST HEAD IF HORIZONTAL)	X	SEE NOTES	
4	INTERMEDIATE HEADS (IF APPLICABLE)			X
5	NOZZLES AND MANWAYS INCLUDING REINFORCEMENT PADS	X		
6	SMALL PIPING CONNECTIONS INCLUDING GUSSETS			X
7	PLATFORM LADDER OR OTHER ATTACHMENT WELDS TO VESSEL	X		
8	LIFTING LUGS / TRUNIONS	X		
9	INSULATION SUPPORTS / VACUUM RINGS	X		
10	**SKIRT** / SUPPORT LEGS	X	SEE NOTES	
11	INSULATION / WEATHERPROOFING / INSULATION TYPE?			X
	AUXILIARY COMPONENTS ASSOCIATED WITH VESSEL			
12	PLATFORMS AND HANDRAILS	X		
13	LADDERS	X		
14	STAIRWAYS			X
15	PIPE SUPPORTS, GUIDES AND BRACES	X		
16	OTHER FLANGES AND ASSOCIATED HARDWARE	X		
17	READABLE NAMEPLATE (REQUIRED FOR ASME VESSELS)	X		
18	FOUNDATION	X		
19	FOUNDATION BOLTS	X		
20	FIREPROOFING / TYPE	X	SPRINKLERS	
21	SAFETY VALVE AND ASSOCIATED PIPING	X		
	INSTRUMENTATION AND ASSOCIATED HARDWARE			
22	LEVEL GAUGES	X		
23	PRESSURE INDICATING GAUGES / INSTRUMENTS	X		
24	THERMOWELLS AND TEMPERATURE INDICATING INSTRUMENTS	X		
25	OTHER PRESSURE CONTAINING INSTRUMENTS (DESCRIBE)			X
26	ELECTRICAL GROUNDING	X		

NOTES:

1. IF PARTIAL INSPECTION IS PERFORMED, INDICATE THE EXTENT OF THE INSPECTION UNDER COMMENTS OR RECORD "NI" FOR NOT INSPECTED.
2. INSULATED EQU. WITH AN OPERATING TEMPERATURE OF <25 degs F. Or >300 degs F. NEED NOT BE STRIPPED FOR "CUI" INSPECTION IS REQUIRED.
3. AREAS OF CORROSION, PITTING, CRACKING OR OTHER NOTED PROBLEMS SHALL BE MAPPED OUT AND BROUGHT TO THE ATTENTION OF THE PLANT ENGINEER FOR FURTHER EVALUATION.

KBR CONTROLLED DOCUMENT

Excel:API-510 "EXTERNAL" Insp Checklist

ITEM	COMMENTS: (REFERENCE ITEM NO. WHERE APPROPRIATE)
1	OVERALL THE SHELL BASE MATERIALS ARE IN GOOD CONDITION EXTERNALLY. NO SIGN OF PITTING OR
	CORROSION IS PRESENT.

KBR

PRESSURE VESSEL EXTERNAL INSPECTION CHECKLIST

PLANT: UTILITIES **INSPECTOR:** RUSSELL YANCY

EQUIPMENT NO. UTV-813 **DESCRIPTION:** FUEL OIL STORAGE TANK

DATE OF INSPECTION: 6/6/2012 **API-510 INSPECTOR CERTIFICATION NO** 22100

3	SOME MINOR STAINS ON THE BASE MATERIALS WITH MINOR RUSTING ON THE HANDRAILS.
10	THE SKIRT APPEARS IN GOOD CONDITION. NO VISIBLE DISTORTIONS ON THE BOTTOM HEAD.
RECOMMENDATIONS:	
1, 3 & 10	NO RECOMMENDATIONS FOR THE TANK AT THIS TIME. ITEMS LISTED ABOVE ARE FOR ENGINEERING
	INFORMATION.

WORK PERFORMED

API 510 EXTERNAL VISUAL INSPECTION WITH AN ULTRASONIC THICKNESS EXAMINATION

TYPE	LAST INSPECTION	INTERVAL (MONTHS)	REMARKS:
INTERNAL	7/15/04	94	
EXTERNAL	7/15/04	94	NONE
UT	7/15/04	94	
CUI	N/A	N/A	
OTHER	N/A	N/A	

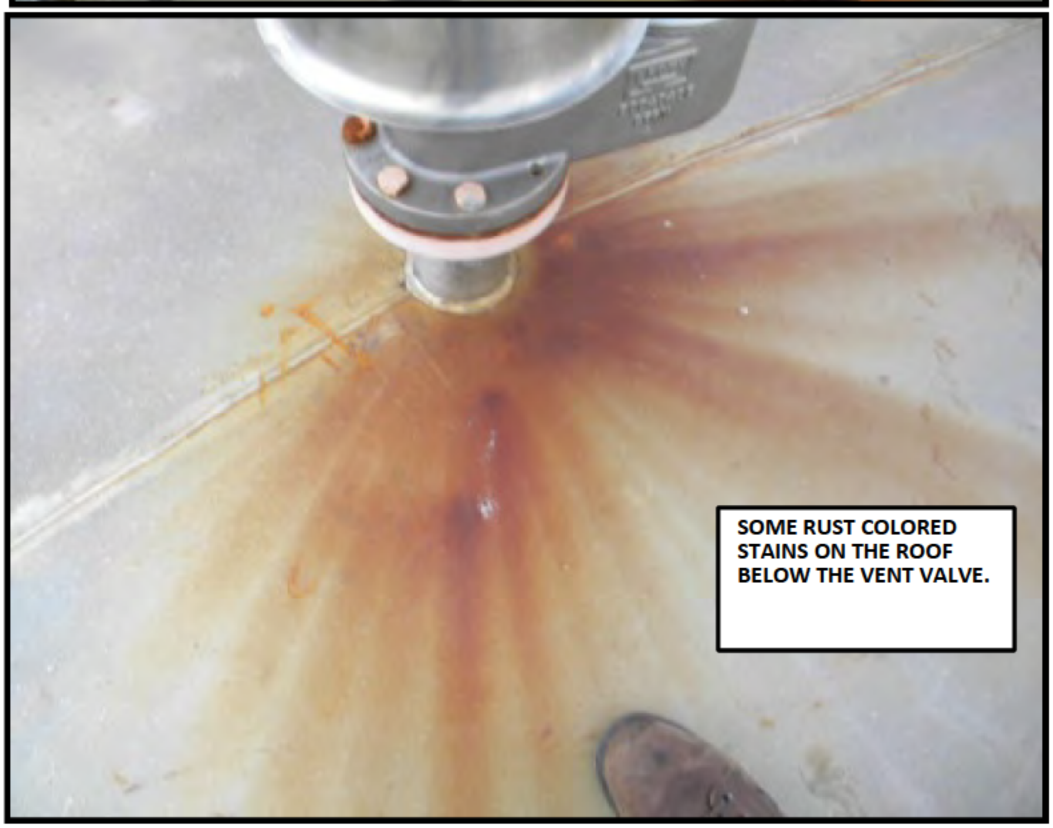
SUMMARY OF INSPECTION:

OVERALL THE CONDITION OF THE TANK APPEARS SOUND. SOME MINOR RUSTING NOTED ON THE HANDRAILS AND SOME RUST COLORED STAINING ON THE BASE MATERIALS BUT NO EXTERNAL PITTING OR OTHER CORROSIVE FEATURES AT THIS TIME. NO SIGN OF LEAKAGE.

INSPECTION PERFORMED BY: ______________________ DATE: 6/6/2012

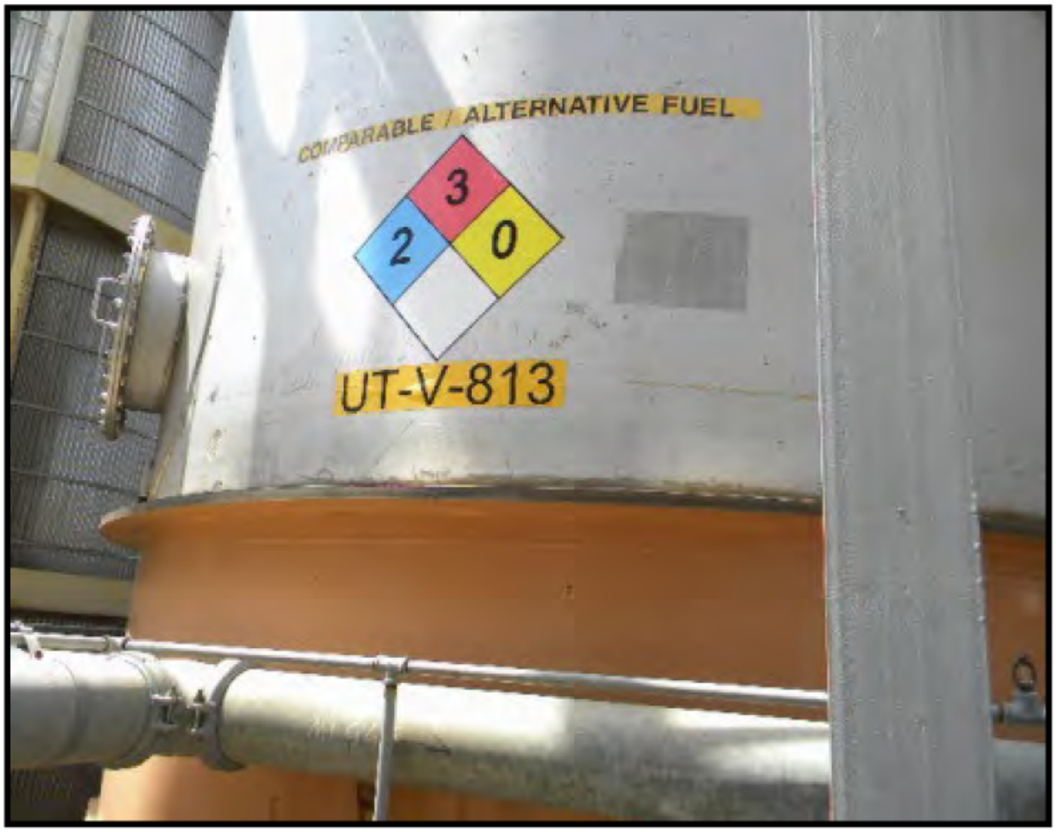
REVIEWED BY: ______________________ DATE: ______________

KBR CONTROLLED DOCUMENT



SOME RUST COLORED STAINS ON THE ROOF BELOW THE VENT VALVE.

THE PRESSURE GAUGE WAS ABOVE THE HIGH END RANGE


COMPARABLE / ALTERNATIVE FUEL
3
2
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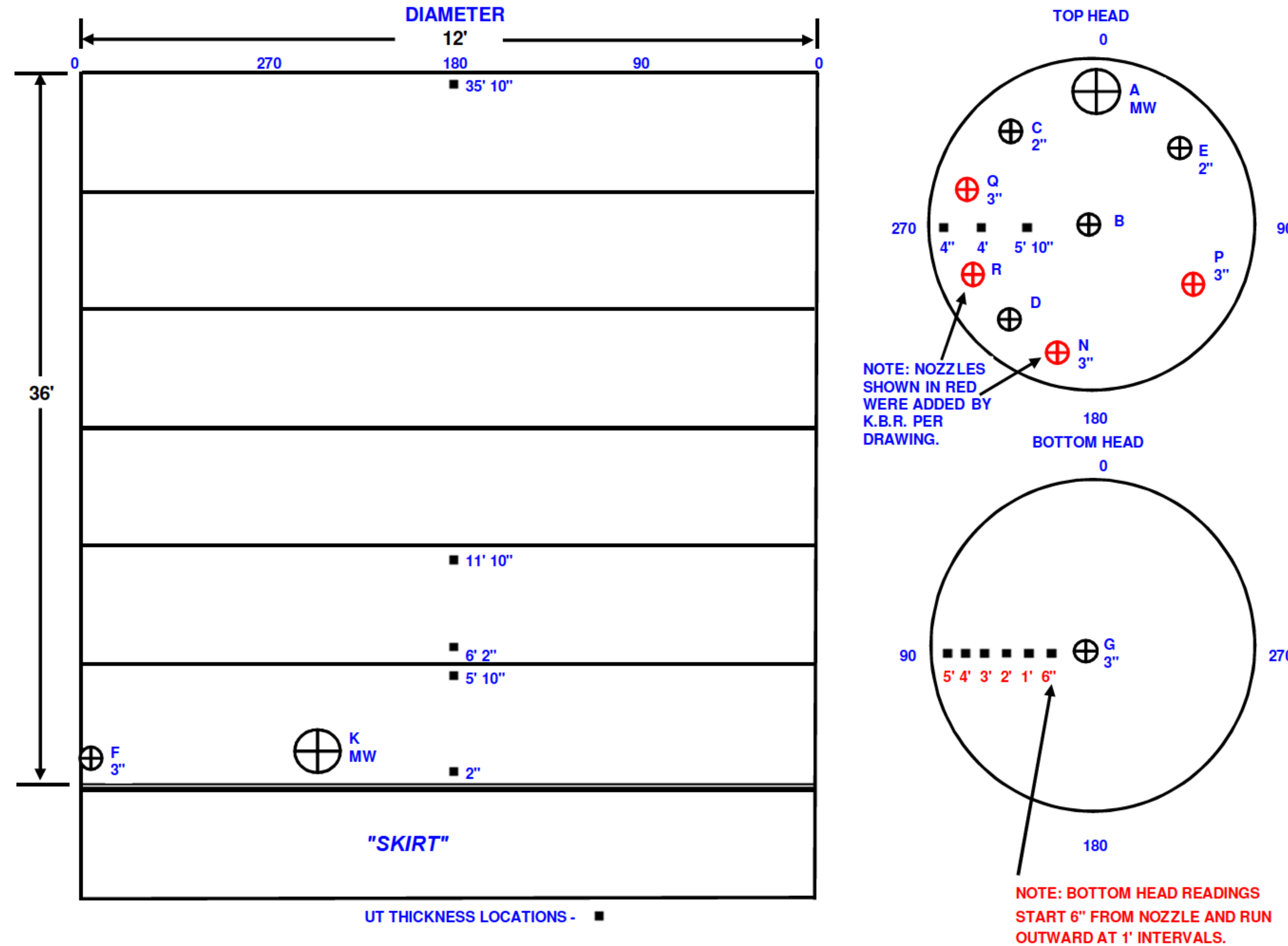
UT-V-813



KELLOGG BROWN & ROOT QA/QC DEPARTMENT	VESSEL NO./DESCRIPTION: *UTV-813 (OLD# 43)*	TECHNICIAN: *RUSS YANCY*
	FUEL OIL STORAGE TANK	DATE: *6/6/2012*

BASF McINTOSH, ALABAMA PLANT	KBR	
QUALITY RECORD DOCUMENT	VESSEL INSPECTION PROCEDURE FORM:	
REVISION:	EQUIPMENT TITLE	NEW SERVICE-FUEL OIL STORAGE TANK
DATE: 6/6/2012	EQUIPMENT NO.:	UTV-813 (OLD #43)
TOTAL PAGES:	FIXED ASSET NO.:	NOT YET ASSIGNED

Vertical Vessel UT Data Sheet

1.0 ULTRASONIC THICKNESS READINGS (TOP HEAD)

CORROSION ALLOWANCE =
MINIMUM THICKNESS =
NOMINAL THICKNESS =

	NORTH O°		EAST 90°		SOUTH 180°		WEST 270°	
	actual	previous	actual	previous	actual	previous	actual	previous
4"	0.192	0.194	0.187	0.187	0.190	0.190	0.188	0.187
4'	0.190	0.188	0.186	0.187	0.190	0.189	0.187	0.187
5' 10"	0.189	0.186	0.187	0.187	0.188	0.188	0.188	0.188

COMMENTS:

2.0 ULTRASONIC THICKNESS READINGS (SHELL)

CORROSION ALLOWANCE =
MINIMUM THICKNESS =
NOMINAL THICKNESS =

	NORTH O°		EAST 90°		SOUTH 180°		WEST 270°	
	actual	previous	actual	previous	actual	previous	actual	previous
2"	0.265	0.265	0.265	0.265	0.268	0.269	0.266	0.268
5' 10"	0.266	0.267	0.266	0.267	0.267	0.267	0.269	0.270
6' 2"	0.273	0.274	0.274	0.274	0.266	0.266	0.268	0.269
11' 10"	0.267	0.268	0.270	0.270	0.265	0.266	0.264	0.264
35' 10"	0.190	0.189	0.189	0.191	0.190	0.192	0.191	0.193

COMMENTS:

3.0 ULTRASONIC THICKNESS READINGS (BOTTOM HEAD)

CORROSION ALLOWANCE =
MINIMUM THICKNESS =
NOMINAL THICKNESS =

	NORTH O°		EAST 90°		SOUTH 180°		WEST 270°	
	actual	previous	actual	previous	actual	previous	actual	previous
6"	0.235	0.236	0.232	0.232	0.231	0.232	0.232	0.232
1'	0.230	0.230	0.233	0.233	0.230	0.230	0.231	0.231
2'	0.231	0.232	0.232	0.232	0.232	0.232	0.233	0.233
3'	0.234	0.235	0.232	0.233	0.236	0.237	0.235	0.235
4'	0.237	0.238	0.239	0.239	0.238	0.238	0.236	0.236
5'	0.244	0.244	0.245	0.246	0.243	0.244	0.245	0.245

COMMENTS:

*READINGS ON THE BOTTOM HEAD ARE TAKEN FROM THE CENTER NOZZLE OUTWARD.

BASF McINTOSH, ALABAMA PLANT	KBR
QUALITY RECORD DOCUMENT	VESSEL INSPECTION PROCEDURE FORM:
REVISION: DATE: 6/6/2012 TOTAL PAGES:	EQUIPMENT TITL NEW SERVICE-FUEL OIL STORAGE TANK EQUIPMENT NO.: UTV-813 (OLD #43) FIXED ASSET NO. NOT YET ASSIGNED

ULTRASONIC THICKNESS READINGS (NOZZLES)

		NORTH 0°		EAST 90°		SOUTH 180°		WEST 270°		TOP		BOTTOM		NOMINAL	12.5% DEVIATION
NOZZLE	SIZE	actual	previous	actual	previous	actual	previous	actual	previous	actual	previous	actual	previous		
B	4"	0.216	0.217	0.220	0.219	0.218	0.218	0.225	0.229					0.237	0.207
A	20"	0.269	0.270	0.266	0.266	0.270	0.272	0.272	0.272					0.250	0.218
E	2"	0.143	0.142	0.144	0.142	0.142	0.142	0.143	0.144					0.154	0.134
P	3"	0.197	0.203	0.203	0.201	0.202	0.203	0.202	0.201					0.216	0.189
N	3"	0.200	0.200	0.201	0.201	0.200	0.200	0.200	0.199					0.216	0.189
D	3"	0.195	0.198	0.200	0.199	0.195	0.196	0.195	0.197					0.216	0.189
R	4"	0.218	0.218	0.214	0.217	0.216	0.216	0.213	0.215					0.237	0.207
Q	3"	0.204	0.201	0.198	0.200	0.196	0.199	0.202	0.201					0.216	0.189
C	2"	0.145	0.141	0.143	0.142	0.143	0.145	0.142	0.142					0.154	0.134
F	3"	NA	0.205	0.204	0.201	NA	0.204	0.204	0.205	0.206		0.203		0.216	0.189
K	20"	0.252	0.253	0.252	0.253	0.262	0.262	0.253	0.254					0.250	0.218
G	3"	NA	0.206	NA	0.207	NA	0.205	NA	0.203					0.216	0.189

COMMENTS:

KELLOGG BROWN & ROOT

ULTRASONIC EXAMINATION REPORT

Nuclear ☐ Non-Nuclear ☑

To:	BASF	From:	K.B.R. QA/QC DEPARTMENT
Project:	UTV-813 (OLD #43)	Date:	6/6/2012

Item Info	Weld ☐	Structural ☐	Casting ☐	Machinery ☐	Machine Parts ☐	Pipe ☐	N/A ☑	Other:
	Non-Weld ☑	Plate ☑	Pipe ☑	Bar ☐	Casting ☐	Machine Parts ☐	N/A ☐	Other: NOZZLES SHELL & HEADS

Material Info	Size: 36' X 12'	No of Pieces: 1 EA.	Type of Base Material: 304 S.S.	Type of Filler Material: NA	Weld	Smooth ☐	As Welded ☐	N/A ☑

Location	NORTH OF BOILERS	System	NEW SERVICE-FUEL OIL STORAGE TANK
Acceptance Standards	ASME BPVC SEC VIII DIV I	Procedure	NT-131-13.01-1

Type of Inspection	Soundness ☐	Thickness ☑	Bond ☐	Pulse Echo ☐	Angle-Beam ☐	Other:
Transducer	Single Crystal ☐	Dual Crystal ☑	Flat ☑	Concave ☐	Convex ☐	Couplant

Frequency	Size	Angle	Step Wedge ☑ / Tube Wedge ☐	Material	Thickness Range	Serial #	Couplant
5.0 MHZ	3/8"	0°		STAINLESS	.100-.500	A15833	SONOTECH ULTRAGEL II

UT Equipment/Model-Serial # PANAMETRIC 36DL+ 97033711	Reference Summary
Result of Inspection:	
PLEASE SEE ATTACHED DATA	
	See Attachment ☑

Requested By: RICHARD ODOM/KEN SMITH	Reported By: RUSSELL YANCY	NDT Supervisor RUSSELL YANCY	Customer Specifications ☑ Accept ☑ Reject ☐

BASF

McINTOSH, ALABAMA PLANT

D.O.I.	6/6/2012	MFR. S/N	93101-2
EQUIP.	UTV-814	W.O.#	804813432
D.O.M.	1994	CAPACITY	31,000 GALLONS
MFR.	ROBEN MFG.	M.O.C.	304 STAINLESS

Per your request K.B.R. QA/QC Department has performed an API 510 External visual Inspection with Ultrasonic Thickness Readings on UTV-814, Fuel oil Storage Tank. Overall the external condition of the vessel is good with only minor findings noted. There was no signs of leakage or external corrosion features found at the time of this inspection. Enclosed in this report you will find other more specific information regarding this project. If there are any questions related to this inspection or the reporting of the results please contact:

Russell Yancy
K.B.R. QA/QC
API 510 #22100

VESSEL INSPECTION FREQUENCY WORKSHEET

per API 510 - Pressure Vessel Inspection Code Guidelines

(Section 4 - 7th edition, 3/92; supplement 1, 9/93; supplement 2)

Date:	6/6/2012	Name:	RUSSELL YANCY
Focused Factory:	UTILITIES	Production Unit:	UTILITIES
Equip. Name:	FUEL OIL STORAGE TANK		
Equip. # :	UTV-814	F.A. #:	UNKNOWN
Orig. Thickness- shell:	1/4" & 3/16" nominal	Min. Design Thickness- shell:	N/A
(U-1 data sht.) - head:	3/16" top (min.)	(ASME Sec. VIII Calc.) - head:	N/A top
	1/4" bot (min.)		N/A bot
Corr. Allow:	6/6/2012	Mat'l of Constr.	304 STAINLESS STEEL

Inspection Date: 6/6/2012 Previous Inspection Date: 7/15/2004

Type of Inspection: API 510 EXTERNAL VISUAL INSPECTION & ULTRASONIC THICKNESS EXAM.

> Visual external inspections every 5 years or at the same interval as the internal or external UT inspection, whichever is less.

> The interval between internal and external UT inspections shall not exceed one half the corrosion-rate or 10 years whichever is less. If remaining life is less than 4 years, inspection interval is remaining life (up tp 2 years max.)

> Corrosion rate less than 0.005"/yr.- and external UT inspection can be performed in lieu of an internal inspection.

> Corrosion rate is greater than 0.005"/yr. - use the remaining life formula.

Corrosion Rate (in. / yr.) = $t_{previous} - t_{actual}$ / (yrs. between $t_{previous}$ and t_{actual})

Remaining Life (yrs.) = $t_{actual} - t_{minimum}$ / corrosion rate

t_{actual} = thickness measured at the same time of inspection for a given loaction (min. thickness).

$t_{previous}$ = thickness at the same location of t_{actual} measured during a previous inspection (min. thickness).

$t_{minimum}$ = minimum design thickness (see top of sheet).

	t_{actual}	$t_{previous}$	yrs. between inspections	Corrosion Rate	Remaining Life
shell	0.271	0.273	8.0	0.000250	INDEFINITE
head (top)	0.191	0.193	8.0	0.000250	INDEFINITE
head (bot)	0.231	0.232	8.0	0.000125	INDEFINITE

Next: **External Inspection** 6/6/2017

Internal Inspection PER BASF MI PROCEDURE MC-P-MC-100

Comments:

OVERALL THIS VESSEL APPEARS IN GOOD CONDITION WITH NO LEAKAGE OR EXTERNAL CORROSION FEATURES NOTED.


COMPARABLE / ALTERNATIVE FUEL
3
2
0
UT-V-814

KBR

PRESSURE VESSEL EXTERNAL INSPECTION CHECKLIST

PLANT: UTILITIES **INSPECTOR:** RUSSELL YANCY

EQUIPMENT NO. UTV-814 **DESCRIPTION:** FUEL OIL STORAGE TANK

DATE OF INSPECTION: 6/6/2012 **API-510 INSPECTOR CERTIFICATION NO** 22100

ITEM	INSPECTION CRITERIA	OK	DEFECTIVE	NA
	ADDITIONAL INSPECTION REQUIRED ☐ CUI ☐ CUF ☐ OTHER (describe)			
	[X] CHECK IF PARTIAL INSPECTION PERFORMED [1] ☐ CHECK IF CUI INSPECTION PERFORMED [2]			
	INDICATE IF OTHER NDE TYPES USED, DESCRIBE UNDER COMMENTS PT ☐ MT ☐ RT ☐ UT [X]			
	☐ CHECK IF PRESSURE TEST PERFORMED (COMPLETE PRESSURE TEST RECORD FORM)			
	EXTERNAL SURFACE OF VESSEL	**OK**	**DEFECTIVE**	**NA**
1	SHELL AND TRANSITION CONE (IF APPLICABLE)	X	SEE NOTES	
2	LOWER HEAD (NORTH OR WEST HEAD IF HORIZONTAL)	X		
3	UPPER HEAD (SOUTH OR EAST HEAD IF HORIZONTAL)	X	SEE NOTES	
4	INTERMEDIATE HEADS (IF APPLICABLE)			X
5	NOZZLES AND MANWAYS INCLUDING REINFORCEMENT PADS	X		
6	SMALL PIPING CONNECTIONS INCLUDING GUSSETS			X
7	PLATFORM LADDER OR OTHER ATTACHMENT WELDS TO VESSEL	X		
8	LIFTING LUGS / TRUNIONS	X		
9	INSULATION SUPPORTS / VACUUM RINGS	X		
10	**SKIRT** / SUPPORT LEGS	X	SEE NOTES	
11	INSULATION / WEATHERPROOFING / INSULATION TYPE?			X
	AUXILIARY COMPONENTS ASSOCIATED WITH VESSEL			
12	PLATFORMS AND HANDRAILS	X		
13	LADDERS	X		
14	STAIRWAYS			X
15	PIPE SUPPORTS, GUIDES AND BRACES	X		
16	OTHER FLANGES AND ASSOCIATED HARDWARE	X		
17	READABLE NAMEPLATE (REQUIRED FOR ASME VESSELS)	X		
18	FOUNDATION	X		
19	FOUNDATION BOLTS	X		
20	FIREPROOFING / TYPE	X	SPRINKLERS	
21	SAFETY VALVE AND ASSOCIATED PIPING	X		
	INSTRUMENTATION AND ASSOCIATED HARDWARE			
22	LEVEL GAUGES	X		
23	PRESSURE INDICATING GAUGES / INSTRUMENTS	X		
24	THERMOWELLS AND TEMPERATURE INDICATING INSTRUMENTS	X		
25	OTHER PRESSURE CONTAINING INSTRUMENTS (DESCRIBE)			X
26	ELECTRICAL GROUNDING	X		

NOTES:

1. IF PARTIAL INSPECTION IS PERFORMED, INDICATE THE EXTENT OF THE INSPECTION UNDER COMMENTS OR RECORD "NI" FOR NOT INSPECTED.
2. INSULATED EQU. WITH AN OPERATING TEMPERATURE OF <25 degs F. Or >300 degs F. NEED NOT BE STRIPPED FOR "CUI" INSPECTION IS REQUIRED.
3. AREAS OF CORROSION, PITTING, CRACKING OR OTHER NOTED PROBLEMS SHALL BE MAPPED OUT AND BROUGHT TO THE ATTENTION OF THE PLANT ENGINEER FOR FURTHER EVALUATION.

KBR CONTROLLED DOCUMENT

Excel:API-510 "EXTERNAL" Insp. Checklist

ITEM	COMMENTS: (REFERENCE ITEM NO. WHERE APPROPRIATE)
1	OVERALL THE SHELL BASE MATERIALS ARE IN GOOD CONDITION EXTERNALLY. NO SIGN OF PITTING OR
	CORROSION IS PRESENT.

KBR

PRESSURE VESSEL EXTERNAL INSPECTION CHECKLIST

PLANT: UTILITIES **INSPECTOR:** RUSSELL YANCY

EQUIPMENT NO. UTV-814 **DESCRIPTION:** FUEL OIL STORAGE TANK

DATE OF INSPECTION: 6/6/2012 **API-510 INSPECTOR CERTIFICATION NO** 22100

3	SOME MINOR STAINS ON THE BASE MATERIALS WITH MINOR RUSTING ON THE HANDRAILS.
10	THE SKIRT APPEARS IN GOOD CONDITION. NO VISIBLE DISTORTIONS ON THE BOTTOM HEAD.
RECOMMENDATIONS:	
1, 3 & 10	NO RECOMMENDATIONS FOR THE TANK AT THIS TIME. ITEMS LISTED ABOVE ARE FOR ENGINEERING
	INFORMATION.
WORK PERFORMED	
API 510 EXTERNAL VISUAL INSPECTION WITH AN ULTRASONIC THICKNESS EXAMINATION	

TYPE	LAST INSPECTION	INTERVAL (MONTHS)	REMARKS:
INTERNAL	7/15/04	94	
EXTERNAL	7/15/04	94	NONE
UT	7/15/04	94	
CUI	N/A	N/A	
OTHER	N/A	N/A	

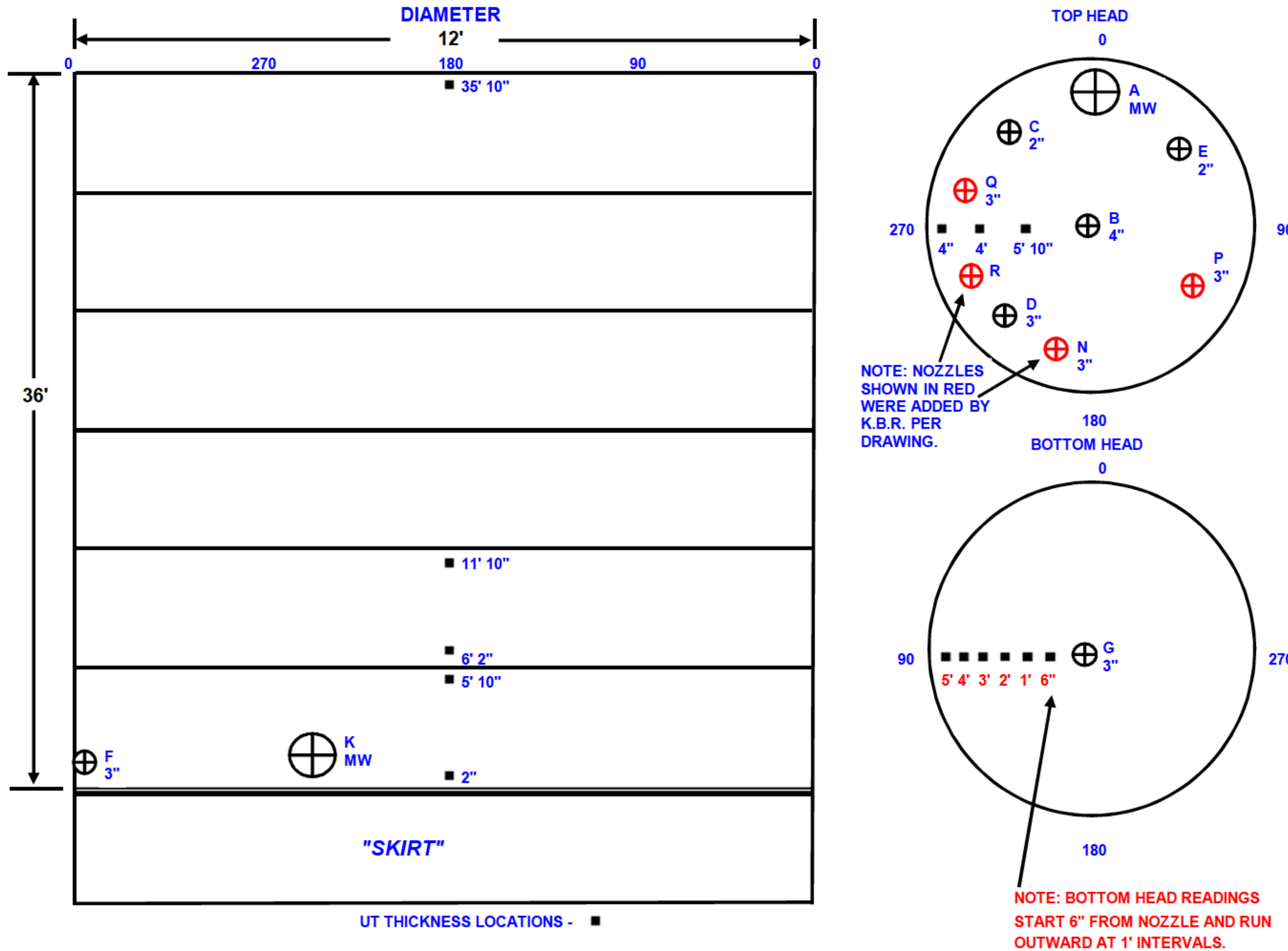
SUMMARY OF INSPECTION:

OVERALL THE CONDITION OF THE TANK APPEARS SOUND. SOME MINOR RUSTING NOTED ON THE HANDRAILS AND SOME RUST COLORED STAINING ON THE BASE MATERIALS BUT NO EXTERNAL PITTING OR OTHER CORROSIVE FEATURES AT THIS TIME. NO SIGN OF LEAKAGE.

INSPECTION PERFORMED BY: ______________________ DATE: 6/6/2012

REVIEWED BY: ______________________ DATE: ______________

KBR CONTROLLED DOCUMENT



KELLOGG BROWN & ROOT QA/QC DEPARTMENT	VESSEL NO./DESCRIPTION:	*UTV-814 (OLD# 44)*	TECHNICIAN:	*RUSS YANCY*
	FUEL OIL STORAGE TANK		DATE:	*6/6/2012*

BASF McINTOSH, ALABAMA PLANT	KBR	
QUALITY RECORD DOCUMENT	VESSEL INSPECTION PROCEDURE FORM:	
REVISION:	EQUIPMENT TITLE	NEW SERVICE-FUEL OIL STORAGE TANK
DATE: 6/6/2012	EQUIPMENT NO.:	UTV-814 (OLD #44)
TOTAL PAGES:	FIXED ASSET NO.:	NOT YET ASSIGNED

Vertical Vessel UT Data Sheet

1.0 ULTRASONIC THICKNESS READINGS (TOP HEAD)

CORROSION ALLOWANCE =
MINIMUM THICKNESS =
NOMINAL THICKNESS =

	NORTH O°		EAST 90°		SOUTH 180°		WEST 270°	
	actual	previous	actual	previous	actual	previous	actual	previous
4"	0.187	0.188	0.187	0.187	0.191	0.191	0.191	0.193
4'	0.189	0.188	0.188	0.187	0.189	0.189	0.189	0.187
5' 10"	0.188	0.189	0.187	0.188	0.190	0.189	0.188	0.188

COMMENTS:

2.0 ULTRASONIC THICKNESS READINGS (SHELL)

CORROSION ALLOWANCE =
MINIMUM THICKNESS =
NOMINAL THICKNESS =

	NORTH O°		EAST 90°		SOUTH 180°		WEST 270°	
	actual	previous	actual	previous	actual	previous	actual	previous
2"	0.281	0.278	0.284	0.284	0.270	0.268	0.271	0.273
5' 10"	0.275	0.276	0.282	0.282	0.279	0.280	0.281	0.282
6' 2"	0.279	0.280	0.284	0.284	0.276	0.276	0.274	0.275
11' 10"	0.276	0.276	0.275	0.276	0.274	0.274	0.275	0.275
35' 10"	0.188	0.188	0.193	0.191	0.192	0.192	0.190	0.190

COMMENTS:

3.0 ULTRASONIC THICKNESS READINGS (BOTTOM HEAD)

CORROSION ALLOWANCE =
MINIMUM THICKNESS =
NOMINAL THICKNESS =

	NORTH O°		EAST 90°		SOUTH 180°		WEST 270°	
	actual	previous	actual	previous	actual	previous	actual	previous
6"	0.231	0.232	0.230	0.229	0.228	0.228	0.231	0.232
1'	0.231	0.231	0.230	0.230	0.231	0.231	0.231	0.231
2'	0.236	0.237	0.232	0.232	0.232	0.232	0.234	0.234
3'	0.239	0.239	0.233	0.234	0.234	0.235	0.236	0.236
4'	0.244	0.245	0.237	0.237	0.238	0.239	0.238	0.239
5'	0.247	0.248	0.242	0.242	0.244	0.245	0.245	0.246

COMMENTS:

*READINGS ON THE BOTTOM HEAD ARE TAKEN FROM THE CENTER NOZZLE OUTWARD.

BASF McINTOSH, ALABAMA PLANT	KBR	
QUALITY RECORD DOCUMENT	VESSEL INSPECTION PROCEDURE FORM:	
REVISION: DATE: 6/6/2012 TOTAL PAGES:	EQUIPMENT TITLI NEW SERVICE-FUEL OIL STORAGE TANK EQUIPMENT NO.: UTV-814 (OLD #44) FIXED ASSET NO. NOT YET ASSIGNED	

ULTRASONIC THICKNESS READINGS (NOZZLES)

		NORTH 0°		EAST 90°		SOUTH 180°		WEST 270°		TOP		BOTTOM		NOMINAL	12.5% DEVIATION
NOZZLE	SIZE	actual	previous	actual	previous	actual	previous	actual	previous	actual	previous	actual	previous		
B	4"	0.224	0.218	0.217	0.217	0.218	0.225	0.216	0.217					0.237	0.207
A	20"	0.270	0.270	0.272	0.266	0.272	0.267	0.265	0.271					0.250	0.218
E	2"	0.143	0.142	0.145	0.142	0.143	0.141	0.145	0.142					0.154	0.134
P	3"	0.199	0.200	0.203	0.197	0.202	0.196	0.200	0.197					0.216	0.189
N	3"	0.195	0.196	0.195	0.200	0.201	0.202	0.202	0.203					0.216	0.189
D	3"	0.200	0.202	0.200	0.195	0.198	0.213	0.199	0.214					0.216	0.189
R	4"	0.216	0.216	0.216	0.216	0.217	0.212	0.215	0.215					0.237	0.207
Q	3"	0.202	0.199	0.207	0.201	0.200	0.199	0.198	0.200					0.216	0.189
C	2"	0.145	0.139	0.146	0.142	0.145	0.140	0.143	0.140					0.154	0.134
F	3"	N/A	0.207	0.205	0.205	N/A	0.210	0.205	0.206	0.206		0.205		0.216	0.189
K	20"	0.254	0.254	0.253	0.253	0.252	0.252	0.253	0.254					0.250	0.218
G	3"	N/A	0.202	N/A	0.202	N/A	0.201	N/A	0.201					0.216	0.189

COMMENTS:

KELLOGG BROWN & ROOT

ULTRASONIC EXAMINATION REPORT

Nuclear ☐ Non-Nuclear ☑

To:	BASF	From:	K.B.R. QA/QC DEPARTMENT
Project:	UTV-814 (OLD #44)	Date:	6/6/2012

Item Info

Weld ☐ Structural ☐ Casting ☐ Machinery ☐ Machine Parts ☐ Pipe ☐ N/A ☐ Other:

Non-Weld ☑ Plate ☑ Pipe ☑ Bar ☐ Casting ☐ Machine Parts ☐ N/A ☐ Other: NOZZLES SHELL & HEADS

Material Info	Size:	No of Pieces	Type of Base Material	Type of Filler Material	Weld	
	36' X 12'	1EA.	304 S.S.	NA		Smooth ☐ As Welded ☐ N/A ☑

Location	NORTH OF BOILERS	System	NEW SERVICE-FUEL OIL STORAGE TANK
Acceptance Standards	ASME BPVC SEC VIII DIV I	Procedure	NT-131-13.01-1

Type of Inspection: Soundness ☐ Thickness ☑ Bond ☐ Pulse Echo ☐ Angle-Beam ☐ Other:

Transducer: Single Crystal ☐ Dual Crystal ☑ Flat ☑ Concave ☐ Convex ☐

Frequency	Size	Angle		Material	Thickness Range	Serial #	Couplant
5.0 MHZ	3/8"	0°	Step Wedge ☑ Tube Wedge ☐	STAINLESS	.100-.500	A15833	SONOTECH ULTRAGEL II

UT Equipment/Model-Serial #: PANAMETRIC 36DL+ 97033711

Reference Summary

Result of Inspection:

PLEASE SEE ATTACHED DATA

See Attachment ☑

Requested By:	Reported By:	NDT Supervisor	
RICHARD ODOM/KEN SMITH	RUSSELL YANCY	RUSSELL YANCY	Accept ☑ Reject ☐ Customer Specifications ☑

Attachment B

Tank System
Process Flow Diagram

RCRA Tank System and Boiler #7
Process Flow Diagram