



GCD RESOURCES, LLC

QUAPAW, OKLAHOMA

EPA ID # OKD007158454

POST-CLOSURE PERMIT

TO MAINTAIN AND MONITOR

A

CLOSED HAZARDOUS WASTE FACILITY

ISSUED BY

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

Month __, 2020

GCD RESOURCES, LLC

FACT SHEET

Potential Permit Conditions for the renewal of a Resource Conservation and Recovery Act (RCRA) Post-Closure Permit. This is a Tier II Permit Action.

Type of Proposed Action:	Renewal RCRA Post-Closure Permit
Type of Facility:	Closed Hazardous Waste Surface Impoundment
Facility Name:	GCD Resources, LLC.
EPA ID Number:	OKD007158454
Location:	3225 South 625 Road, Quapaw, OK
Legal Description:	The South Half (S/2) of Section 24, Township 29 North, Range 23 East.
Geographic Location:	Latitude: 36° 58' 35" North Longitude: 94° 46' 4" West
Land Owner:	GCD Resources, LLC 3225 South 625 Road Quapaw, Oklahoma 74363
Facility Operator:	GCD Resources, LLC Greg Evans, Managing Member 3225 South 625 Road Quapaw, Oklahoma 74363 (918) 673-2511
Comment Period:	45 days from the date of publication

Basis of the Draft Permit

On July 13, 2018, GCD Resources, LLC (GCD) submitted to the Oklahoma Department of Environmental Quality (DEQ) Land Protection Division a RCRA Post-Closure Permit Renewal Application for monitoring and maintaining a closed hazardous waste surface impoundment facility. After review, DEQ has determined that it is appropriate to approve the application and issue a new Post-Closure Permit.

The basic requirements of the Oklahoma Hazardous Waste Management Act (OHWMA); the Oklahoma Administrative Code Hazardous Waste Management Regulations (OAC 252:205) as amended; the Federal Resource Conservation and Recovery Act (RCRA), and the Federal Hazardous Waste Regulations have been met, and DEQ has prepared the proposed permit conditions.

The Post-Closure Permit potential conditions were developed by DEQ and incorporate applicable conditions from OAC 252:205 and Title 40 of the Code of Federal Regulations (40 CFR) Part 270, additional conditions to enhance compliance with OAC 252:205, 40 CFR Parts 260-279, and such other conditions as required to achieve environmentally sound hazardous waste management.

The administrative record supporting the potential permit conditions consists of the Part B application, additional supporting documentation, the draft permit, and this Fact Sheet. The administrative record will be supplemented with any comments received during the public comment period.

Information Resources

Copies of the proposed draft permit conditions, this Fact Sheet, and the Part B application are available for review during normal business hours at the locations listed below:

Quapaw Post Office
601 Main Street
Quapaw, OK 74363
(918) 674-2511

Oklahoma Department of Environmental Quality
<https://www.deq.ok.gov/land-protection-division/permit-public-participation-process/>

Telephone inquiries may be directed to:

Hillary Young, Chief Engineer
Land Protection Division, DEQ (405) 702-5100

Greg Evans, Managing Member
GCD Resources, LLC (918) 673-2511

Comment Period and Procedures

Persons wishing to comment on the proposed Permit conditions may submit their comments in writing to the agency at the address listed below. DEQ will consider and formally respond to all relevant comments in the issuance of a final Permit decision. Comments should be directed to the appropriateness of the Permit decision and the Permit conditions, and should be of a factual nature. All comments must be received at the agency no later than forty-five (45) days after publication of the Notice of Draft Permit.

Hillary Young
Chief Engineer
Land Protection Division
Oklahoma Department of Environmental Quality
707 North Robinson
P.O. Box 1677
Oklahoma City, Oklahoma 73101-1677

The applicable comment and public hearing procedures may be found in OAC 252:4 and 40 CFR Part 124.

Public Meeting

Pursuant to 40 CFR Part 124 and the Uniform Permitting Act, Title 27A of Oklahoma Statutes, Section 2-14-303, interested parties may request a public meeting on the draft Permit. The request must be in writing and submitted prior to the closing date of the comment period which expires forty-five (45) days from the date of publication. Persons wishing to request a public meeting should submit their request and/or comments in writing to Hillary Young, Chief Engineer, Land Protection Division at the above address no later than forty-five (45) days after publication.

Notice of Final Determination

DEQ will notify the applicant and each person who has submitted written comments or requested notice of the final Permit decision. Within thirty (30) days after a RCRA Permit decision has been issued, any person who filed comments on the draft Permit or participated in the public meeting/hearing may petition the Executive Director of DEQ to review any condition of the Permit decision. The petition shall include a statement of the reasons supporting that review, including a demonstration that any issues being raised were raised during the public comment period, and when appropriate, a showing that the condition in question is based on a finding of fact or conclusion of law which is clearly erroneous, or an exercise of discretion or important policy consideration which DEQ should review. A petition to DEQ is a prerequisite to judicial review under OAC 252:205-3-2 which incorporates 40 CFR 124.19 and should be directed to the address listed below:

Scott Thompson, Executive Director
Department of Environmental Quality
707 North Robinson
Oklahoma City, Oklahoma 73101-1677

If no comments are received during the comment period, the Permit will become final and effective immediately upon issuance.

**RCRA POST-CLOSURE PERMIT
FOR A HAZARDOUS WASTE MANAGEMENT FACILITY**

Permittee: GCD Resources, LLC
Quapaw, Oklahoma

Permit Number: 007158454-PC **Effective Date:** Month XX, 2020
EPA ID Number: OKD007158454 **Expiration Date:** Month XX, 2030

Pursuant to the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (42 U.S.C. §§ 6901 *et seq.*, commonly known as RCRA), including the Hazardous and Solid Waste Amendments of 1984 (HSWA), and regulations promulgated thereunder by the U.S. Environmental Protection Agency (EPA) and the Oklahoma Department of Environmental Quality (DEQ) pursuant to the Oklahoma Hazardous Waste Management Act (OHWMA) 27A O.S. §§ 2-7-101 *et seq.*, as amended, a RCRA Post-Closure Permit to monitor and maintain a closed hazardous waste land disposal facility is reissued by DEQ to GCD Resources, LLC (GCD). The facility is located in Quapaw within the south half (S/2) of Section 24, Township 29 North, Range 23 East, Ottawa County, Oklahoma.

The RCRA Post-Closure Permit is for monitoring and maintaining a closed hazardous waste surface impoundment facility. The facility has operated under multiple operators and is now owned and operated by GCD (hereafter called the Permittee).

The Permittee must comply with all terms and conditions of this Permit. The Permit consists of the conditions contained herein (including those in any attachments), the applicable standards and general facility conditions developed in accordance with the OHWMA, and the provisions contained in 40 CFR Part 260 through 266, 268, 270, 279 and 124, as specified in the Permit. Applicable State and Federal regulations are those which are in effect on the date of issuance of this Permit, in accordance with 40 CFR 270.32(c).

This Permit is based on the assumption that all information submitted in the application attached to the Permittee's letter dated July 12, 2018, is accurate, and that the facility will be maintained as specified in the application.

Any inaccuracies found in the submitted information may be grounds for termination, revocation and reissuance, or modification of this Permit in accordance with 40 CFR 270.41, 270.42, and 270.43 and for enforcement action.

This Permit is effective as of Month XX, 2020, and shall remain in effect until Month XX, 2030, unless revoked and reissued under 40 CFR 270.41, terminated under 40 CFR 270.43, or continued in accordance with 40 CFR 270.51(a).

Issued by the Oklahoma Department of Environmental Quality this ___th day of Month, 2020.

Hillary Young, P.E., Chief Engineer
Land Protection Division
Oklahoma Department of Environmental Quality

Kelly Dixon, Director
Land Protection Division
Oklahoma Department of Environmental Quality

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SECTION I - GENERAL PERMIT CONDITIONS

A. GENERAL

The Permittee shall monitor and maintain the facility in compliance with the provisions of the Oklahoma Hazardous Waste Management Act (OHWMA), 27A O.S. §§ 2-7-101 *et seq.*, the Oklahoma Administrative Code (OAC) 252:205, the Federal Resource Conservation and Recovery Act (RCRA), the Hazardous and Solid Waste Amendments of 1984 (HSWA), and the approved permit application as further modified through permit conditions set herein.

B. BASIS OF PERMIT

This permit is granted based on the information submitted and the design criteria presented in the application. Any inaccuracies found in this information could provide cause for the termination or modification of this permit, and for enforcement action. The Permittee is to inform the Land Protection Division (LPD) of the Department of Environmental Quality (DEQ) of any deviation from or changes in the design or maintenance of the facility which could affect the Permittee's ability to comply with the applicable regulations or permit conditions.

C. INCORPORATION BY REFERENCE

All the referenced Code of Federal Regulations (40 CFR) Parts 124, 260 through 264, 266, 268, and 270 as specified in the permit are, unless otherwise stated, incorporated in their entirety by OAC 252:205-3-1 through OAC 252:205-3-6.

D. DEFINITIONS

For purposes of this permit and the special conditions pursuant to the Hazardous and Solid Waste Amendments to RCRA, terms used herein shall have the same meaning as those in 40 CFR Parts 124, 260, 261, 264, 266, 268, and 270; and OAC 252:205-1-2 and OAC 252:205-3-4; unless this permit specifically provides otherwise. Where terms are not defined in the Oklahoma Administrative Code or the permit, the meaning associated with such terms shall be defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

“Action Levels” means health and environmental-based levels of constituent concentrations determined by DEQ to be indicators for protection of human health and the environment.

“Area of Concern” (AOC) means any discernable unit or area which, in the opinion of DEQ, may have received solid or hazardous waste, or waste containing hazardous constituents at any time. DEQ may require investigation of the unit as if it were a SWMU. If shown to be a SWMU by the investigation, the AOC must be reported by the Permittee as a newly identified SWMU. If the AOC is shown not to be a SWMU by the investigation, DEQ may determine that no further action is necessary and notify the Permittee in writing.

“**CMS**” means Corrective Measures Study.

“**DEQ**” means the Oklahoma Department of Environmental Quality.

“**Director**” means the Executive Director of DEQ, or his/her designee or authorized representative.

“**Division Director**” means the Director of the Land Protection Division of DEQ, or his/her designee or authorized representative.

“**EPA**” means the United States Environmental Protection Agency.

“**Facility**” means all contiguous property under the control of the owner or operator seeking a permit under Subtitle C of RCRA.

“**HSWA**” means the 1984 Hazardous and Solid Waste Amendments to RCRA.

“**Hazardous Constituent**” means any constituent identified in Appendix VIII of 40 CFR Part 261, or any constituent identified in Appendix IX of 40 CFR Part 264.

“**Hazardous Waste**” as defined in 40 CFR 261.3, means a solid waste or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. The term hazardous waste includes hazardous constituent.

“**Land Protection Division**” (**LPD**) means the Land Protection Division of DEQ.

“**Permit**” means the full permit, Resource Conservation and Recovery Act and special conditions pursuant to the 1984 Hazardous and Solid Waste Amendments to RCRA.

“**Permittee**” means GCD Resources, LLC, EPA ID # OKD007158454.

“**RCRA**” means the Resource Conservation and Recovery Act of 1980, as amended by HSWA in 1984.

“**RFA**” means RCRA Facility Assessment.

“**RFI**” means RCRA Facility Investigation.

“**Regional Administrator**” means the Regional Administrator of EPA Region VI, or his/her designee or authorized representative.

“**Release**” means any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous waste (including hazardous constituents) into the environment (including the abandonment or discarding of barrels, containers, and other closed

receptacles containing hazardous waste or hazardous constituents). RCRA Section 3004(u) corrective action authority does not routinely reevaluate permitted releases.

“Solid Waste Management” means the systematic administration of activities, which provide for the collection, source separation, storage, transportation, transfer, processing, treatment, and disposal of solid waste.

“Solid Waste Management Unit” (SWMU) means any discernable unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely or systematically released. The definition includes regulated units (i.e. landfills, surface impoundments, waste piles and land treatment units), but does not include passive leakage or one-time spills from production areas and units in which wastes have not been managed (e.g. product storage areas).

If, subsequent to the issuance of this permit, regulations are promulgated which redefine any of the above terms, DEQ may, at its discretion, apply the new definitions to this permit by modifying the permit in accordance with 40 CFR 270.41.

E. EFFECT OF PERMIT

The Permittee is required to monitor and maintain the closed surface impoundment in accordance with the conditions of this permit. Any treatment, storage or disposal of hazardous waste not authorized in this permit is prohibited, unless exempted from permit requirements. Subject to 40 CFR 270.4, compliance with this permit generally constitutes compliance, for purposes of enforcement, with Subtitle C of RCRA. Issuance of this permit does not convey any property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of state or local laws or regulations. Compliance with the terms of this permit does not constitute a defense to any order issued or any action brought under OHWMA; Sections 3008(a), 3008(h), 3013, or 7003 of RCRA; Sections 104, 106(a) or 107 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 9601 et seq., commonly known as CERCLA), or any other law providing for protection of public health or the environment from an imminent or substantial endangerment. [40 CFR 270.4 and 270.30(g)]

F. PERMIT ACTIONS

1. Permit Modification, Revocation and Reissuance, and Termination

This permit may be modified, revoked and reissued, or terminated for cause, as specified in 40 CFR 270.41, 270.42, and 270.43. 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 the applicability or enforceability of any permit condition. [40 CFR 270.4(a), 270.30(f)]

2. Permit Renewal

This permit may be renewed as specified in 40 CFR 270.30(b) and permit condition I.H.2. Review of any application for a permit renewal shall consider improvements in the state of control and measurement technology, as well as changes in applicable regulations. [40 CFR 270.30(b), HSWA Sec. 212]

3. Permit Expiration

Pursuant to 40 CFR 270.50, this permit shall be effective for a fixed term not to exceed ten years. This permit and all conditions herein will remain in effect beyond the permit's expiration date if the Permittee has submitted a timely, complete application (see 40 CFR 270.10, 270.13 through 270.29) and if, through no fault of the Permittee, DEQ has not issued a new permit, as set forth in 40 CFR 270.51. Permits continued under this section remain fully effective and enforceable. When the Permittee is not in compliance with the conditions of the expiring or expired permit, DEQ may choose to do any one or more of the following:

- a. Initiate enforcement action based upon the permit which has been continued;
- b. Issue a notice of intent to deny the new permit under 40 CFR Sec. 124.6. If the permit is denied, the owner or operator would then be required to cease the activities authorized by the continued permit or be subject to enforcement action for operating without a permit;
- c. Issue a new permit under 40 CFR Part 124 with appropriate conditions; or
- d. Take other actions authorized by applicable regulations.

4. Transfer of Permits

This permit is not transferable to any person, except after notice to DEQ. DEQ may require modification or revocation and reissuance of the permit pursuant to 40 CFR 270.40. Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator in writing of the requirements of 40 CFR Parts 264 and 270 and this permit. [40 CFR 264.12(c) and 270.30(1)(3)]

G. 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. [40 CFR 124.16(a)]

H. 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 that noncompliance is authorized by an emergency permit. Any permit noncompliance, other than noncompliance authorized by an emergency permit, constitutes a violation of OHWMA and RCRA and is grounds for enforcement action; for termination, revocation and reissuance or modification of the permit; or for denial of a permit renewal application. [40 CFR 270.30(a)]

2. Duty to Reapply

If the Permittee wishes to continue an activity allowed by this permit after the expiration date of this permit, the Permittee shall submit a complete application for a new permit at least 180 days prior to permit expiration. [40 CFR 270.10(h) and 270.30(b)]

3. Permit Expiration

Refer to Permit Condition I.F.3.

4. 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. [40 CFR 270.30(c)]

5. 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. [40 CFR 270.30(d)]

6. Proper Operation and Maintenance

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment 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 includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance/quality control procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this permit. [40 CFR 270.30(e)]

7. Duty to Provide Information

The Permittee shall furnish to DEQ, within a reasonable time, any relevant information which DEQ 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 DEQ, upon request, copies of records required to be kept by this permit. [40 CFR 270.30(h)]

8. Inspection and Entry

Pursuant to 40 CFR 270.30(i), the Permittee shall allow DEQ, 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 RCRA, any substances or parameters at any location.

9. 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 Appendix I of 40 CFR Part 261 or an equivalent method approved by DEQ. Laboratory methods must be those specified in Test Methods for Evaluating Solid Waste: Physical/Chemical Methods SW-846, Standard Methods of Wastewater Analysis, or an equivalent method. [40 CFR 270.30(j)(1)]
- b. The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports and records required by this permit, the certification required by 40 CFR 264.73(b)(9), and records of all data used to complete the application for this permit for a period

of at least 3 years from the date of the sample, measurement, report, record, certification, or application. These periods may be extended by request of DEQ at any time and are automatically extended during the course of any unresolved enforcement action regarding this facility. The Permittee shall maintain records from all groundwater monitoring wells and associated ground-water surface elevations for the active life of the facility, and for the post-closure care period as well. [40 CFR 270.30(j)(2)]

- c. Pursuant to 40 CFR 270.30(j)(3), records of monitoring information shall specify:
- i. The date(s), exact place, and times of sampling or measurements;
 - ii. The individual(s) who performed the sampling or measurements;
 - iii. The date(s) analyses were performed;
 - iv. The individual(s) who performed the analyses;
 - v. The analytical techniques or methods used; and
 - vi. The results of such analyses.

10. Reporting Planned Changes

The Permittee shall give notice to DEQ, as soon as possible, of any planned physical alterations or additions to the permitted facility. [40 CFR 270.30(l)(1)]

11. Reporting Anticipated Noncompliance

The Permittee shall give advance notice to DEQ of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. [40 CFR 270.30(l)(2)]

12. Transfer of Permits

Refer to Permit Condition I.F.4.

13. Monitoring Reports

Monitoring and reporting shall be conducted in accordance with the applicable parts of this permit. [40 CFR 270.30(1)(4)] The Permittee shall report the results within sixty (60) days of receipt of the results of sample analyses from the analytical laboratory.

14. Hazardous Waste Reporting [OAC 252:205-13-1 and 40 CFR 270.30(1)(6)]

- a. Upon release of materials that are or become hazardous waste whether by spillage, leakage, or discharge to soils or to air or to surface or ground waters (outside the limits of a discharge permit), or by other means, and which could threaten human health or the environment, the owner or operator shall

immediately notify DEQ and take all necessary action to contain, remediate, and mitigate hazards from the release. [OAC 252:205-13-1(a)]

- b. The description of the occurrence and its cause shall include:
 - i. Name, address, and telephone number of the owner or operator;
 - ii. Name, address, and telephone number of the facility;
 - iii. Date, time, and type of incident;
 - iv. Name and quantity of materials 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 incident.

- c. A written submission shall also be provided within five (5) days of the time the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period(s) 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. DEQ may waive the five-day written notice requirement in favor of a written report within fifteen (15) days.

15. Compliance Schedules

Reports of compliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than fourteen (14) days following each schedule date. [40 CFR 270.30(1)(5)]

16. Other Noncompliance

The Permittee shall report all other instances of noncompliance, not otherwise required to be reported above, at the time monitoring reports are submitted. The reports shall contain the information listed in Permit Condition I.H.14. [40 CFR 270.30(1)(10)]

17. Other Information

Whenever the Permittee becomes aware that it failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to DEQ, the Permittee shall promptly submit such facts or information. [40 CFR 270.30(1)(11)]

I. SIGNATORY REQUIREMENT

All applications, reports, or information submitted to or requested by DEQ, a designee, or authorized representative, shall be signed and certified in accordance with 40 CFR 270.11 and 270.30(k).

J. REPORTS, NOTIFICATIONS, AND SUBMISSIONS TO DEQ

All reports, notifications, or other submissions which are required by this permit to be sent or given to DEQ should be sent by certified mail or hand-delivered to the address below:

Chief Engineer
Oklahoma Department of Environmental Quality
Land Protection Division
707 N. Robinson, P.O. Box 1677
Oklahoma City, Oklahoma 73101-1677
Telephone Number (405) 702-5100

Reports, notifications and/or submissions may be provided via email. It is the responsibility of the permittee to ensure any electronically submitted reports were received by the Chief Engineer.

K. CONFIDENTIAL INFORMATION

In accordance with 40 CFR 270.12 and OAC 252:4-1-5(d), any information claimed confidential by the Permittee must be substantiated on submission. DEQ will make a determination on the claim and notify the Permittee within a reasonable time. If no claim is made at the time of the submission, EPA and DEQ may make the information available to the public without further notice. Any claim asserted and approved by DEQ will be treated in accordance with the procedures in 40 CFR Part 2 (Public Information). Claims of confidentiality for the name and address of any permit applicant or Permittee will be denied.

L. DOCUMENTS TO BE MAINTAINED AT THE FACILITY

The Permittee shall maintain at the facility or facility offices, until post-closure is completed and certified by an independent, registered professional engineer, the following documents and all amendments, revisions and modifications to these documents:

1. Waste analysis, as required by 40 CFR 264.13 (See Permit Attachment 1).
2. Inspection schedules, as required by 40 CFR 264.15(b)(1) and (2) and this permit (See Permit Attachment 2).
3. Post-Closure Plan, as required by 40 CFR 264.118(a) and this permit (See Permit Attachment 3).
4. The latest adjusted cost estimate for facility post-closure as required by 40 CFR 264.144(d) and this permit (See Permit Attachment 4).

5. Sampling And Analysis Plan (See Permit Attachment 6).
6. All other documents required by Section I, Permit Condition H.9.

DRAFT

SECTION II - GENERAL FACILITY CONDITIONS

A. DESIGN AND OPERATION OF FACILITY

The Permittee shall monitor and maintain the facility to minimize the possibility of a fire, explosion, or any unplanned, sudden or non-sudden release of hazardous waste constituents to air, soil, groundwater, or surface water which could threaten human health or the environment as required by 40 CFR 264.31.

B. REQUIRED NOTICES

The Permittee shall not receive hazardous waste from an off-site or foreign source.

C. GENERAL WASTE ANALYSIS

The Permittee shall follow the waste analysis procedures required by 40 CFR 264.13. The Permittee shall conduct analysis in accordance with Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, EPA Publication SW-846, or equivalent methods approved by DEQ. At a minimum, the Permittee shall maintain proper functional instruments, use approved sampling and analytical methods, verify the validity of sampling and analytical procedures, and perform correct calculations. If the Permittee uses a contract laboratory to perform analyses, then the Permittee shall inform the laboratory in writing that it must operate under the waste analysis conditions set forth in this permit.

D. SECURITY

The Permittee shall comply with the security provisions of 40 CFR 264.14(b)(2) and (c) and the security procedures found in Permit Attachment 2.

E. GENERAL INSPECTION REQUIREMENTS

The Permittee shall follow the inspection schedule set out in Permit Attachment 2. The Permittee shall remedy any deterioration or malfunction discovered by an inspection, as required by 40 CFR 264.15(c). Records of inspections shall be kept a minimum of three (3) years, as required by 40 CFR 264.15(d).

F. PERSONNEL TRAINING

The Permittee shall conduct personnel training, as required by 40 CFR 264.16. The Permittee shall maintain training documents and records for current and former employees at least three (3) years after the last date worked by that employee, as required by 40 CFR 264.16(d) and (e).

G. PREPAREDNESS AND PREVENTION

1. Required Equipment: At a minimum, the Permittee shall maintain at the facility the equipment as required by.
2. Testing and Maintenance of Equipment: The Permittee shall test and maintain the equipment specified in 40 CFR 264.32, as necessary, to assure its proper operation in time of emergency, as required by 40 CFR 264.33.
3. Access to Communications or Alarm System: The Permittee shall maintain access to the communications or alarm system, as required by 40 CFR 264.34.
4. Arrangements with Local Authorities: The Permittee shall maintain arrangements with state and local authorities, as required by 40 CFR 264.37. 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.

H. GENERAL POST-CLOSURE REQUIREMENTS

1. Post-Closure Care Period: The Permittee shall continue post-closure care for the closed unit. The facility shall be maintained in accordance with 40 CFR 264.117 and the Post-Closure Plan found in Permit Attachment 3.
2. Post-Closure Security: The Permittee shall maintain security at the facility during the post-closure care period in accordance with the Post-Closure Plan and 40 CFR 264.117(b).
3. Amendment to Post-Closure Plan: The Permittee shall amend the Post-Closure Plan in accordance with 40 CFR 264.118(d), whenever necessary.
4. Post-Closure Notices: The Permittee shall request and obtain a permit modification prior to post-closure removal of hazardous wastes, hazardous waste residues, liners, or contaminated soils, in accordance with 40 CFR 264.119(c).

I. COST ESTIMATE FOR FACILITY POST-CLOSURE

1. The Permittee's most recent post-closure cost estimate, prepared in accordance with 40 CFR 264.144, is specified in Permit Attachment 4.
2. The Permittee must revise the post-closure cost estimate whenever there is change in the post-closure plan.

J. FINANCIAL ASSURANCE FOR FACILITY POST-CLOSURE

The Permittee shall demonstrate continuous compliance with 40 CFR 264.145, by providing documentation of financial assurance, as required by 40 CFR 264.151 in at least the amount of the

cost estimates required by Permit Condition II.I. Changes in financial assurance mechanisms must be approved by DEQ pursuant to 40 CFR 264.145 or 264.149.

K. INCAPACITY OF OWNERS OR OPERATORS, GUARANTORS, OR FINANCIAL INSTITUTIONS

The Permittee shall comply with 40 CFR 264.148, whenever necessary.

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SECTION III - POST-CLOSURE CARE

A. SECTION HIGHLIGHTS

1. The Permittee is authorized and required to maintain and monitor the surface impoundment, closed in place as a landfill, subject to the terms and conditions of this permit. The hazardous waste contained in the unit was primarily hydrochloric acid containing arsenic acid. On an intermittent basis, selenium, antimony, zinc, gallium, germanium and ammonium fluoride traces may have been released to the unit prior to closure. At closure, all liquid waste and sludge was solidified and subjected to the paint filter liquids test. The contaminated soils were stabilized in place (EPA Waste Codes D004, D010 and F003) until the material passed the paint filter test and all free liquids were eliminated.
2. The Permittee shall continue corrective action and groundwater monitoring for the closed unit according to this permit and approved corrective action plan until the corrective action levels or risk based contaminant levels are achieved.

B. POST-CLOSURE PROCEDURES AND USE OF PROPERTY

1. The Permittee shall conduct post-closure care for the hazardous waste management unit listed above, to begin after completion of closure of the unit and continue for 30 years after that date, except that the 30-year post-closure care period may be shortened by DEQ upon application and demonstration that the facility is secure, or may be extended by DEQ if found to be necessary to protect human health and the environment. [40 CFR 264.117(a)]
2. The Permittee shall maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of 40 CFR Part 264 Subpart F during the post-closure period. [40 CFR 264.117(a)(1)]
3. The Permittee shall comply with all security requirements, as specified in 40 CFR 264.117(b).
4. The Permittee shall not allow any use of the closed unit which will disturb the integrity of the final cover, liners, containment system, or the function of the facility's monitoring systems during the post-closure care period. [40 CFR 264.117(c)]
5. The Permittee must conduct all post-closure care activities in accordance with the provisions of the Post-Closure Plan. [40 CFR 264.117(d) and 264.118(b)]
6. The Permittee shall comply with the requirements for landfills, as follows: [40 CFR 264.310(b)]

- a. Maintain the integrity and effectiveness of the final cover, including making repairs to the cap, as necessary, to correct the effects of settling, subsidence, erosion, or other events;
- b. Prevent run-on and run-off from eroding or otherwise damaging the final cover; and
- c. Protect and maintain surveyed benchmarks used in complying with the surveying and recordkeeping requirements of 40 CFR 264.309.

C. INSPECTIONS

The Permittee shall inspect the components, structures, and equipment at the site in accordance with the Inspection Schedule, Permit Attachment 2. [40 CFR 264.117(a)(1)(ii)]

D. NOTICES AND CERTIFICATION

1. If the permittee or any subsequent owner or operator of the land upon which the hazardous waste disposal unit is located, wishes to remove hazardous wastes and hazardous waste residues, the liner, if any, or contaminated soils, then it shall request a modification to this post-closure permit in accordance with the applicable requirements in 40 CFR Parts 124 and 270. The Permittee or any subsequent owner or operator of the land shall demonstrate that the removal of hazardous wastes will satisfy the criteria of 40 CFR 264.117(c). [40 CFR 264.119(c)]
2. No later than sixty (60) days after completion of the established post-closure care period for the hazardous waste disposal unit, the Permittee shall submit to DEQ, by registered mail, a certification that the post-closure care for the hazardous waste disposal unit was performed in accordance with the specifications in the approved Post-Closure Plan. The certification must be signed by the Permittee and an independent, registered professional engineer. [40 CFR 264.120]

E. FINANCIAL ASSURANCE

The Permittee shall maintain financial assurance during the post-closure period and comply with all applicable requirements of 40 CFR Part 264, Subpart H. [40 CFR 264.145]

F. POST-CLOSURE PERMIT MODIFICATIONS

The Permittee must request a permit modification to authorize a change in the approved Post-Closure Plan. This request must be in accordance with applicable requirements of 40 CFR Parts 124 and 270. The Permittee shall request a permit modification whenever changes in operating plans or facility design affect the approved Post-Closure Plan. The Permittee must submit a written request for a permit modification at least sixty (60) days prior to the proposed change in

facility design or operation, or no later than sixty (60) days after an unexpected event has occurred which has affected the Post-Closure Plan. [40 CFR 264.118(d)]

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SECTION IV – GROUNDWATER MONITORING AND CORRECTIVE ACTIONS

A. SECTION HIGHLIGHTS

A land disposal unit that received hazardous waste after July 26, 1982, must comply with the requirements of 40 CFR 264.91 through 264.100 for purposes of detecting, characterizing and responding to releases to the uppermost aquifer. The financial responsibility requirements of 40 CFR 264.101 apply to all regulated units. [40 CFR 264.90(a)(2)]

The facility (closed surface impoundment) is in the compliance and corrective action phase of groundwater monitoring. Any replacement and/or new monitoring wells, if required, will be in the initial background testing phase of monitoring for the first year after well installation.

B. REQUIRED PROGRAMS

The Permittee must develop, conduct and maintain applicable groundwater monitoring and response programs for the closed unit to:

1. Detect any release of the hazardous waste constituents from the regulated unit at the compliance point in the uppermost aquifer in accordance with 40 CFR 264.98.
2. Institute a compliance monitoring program in accordance with 40 CFR 264.99, whenever hazardous constituents are detected at the compliance point. Detected is defined as statistically significant evidence of contamination as described in 40 CFR 264.98(f), or an exceedance of the permitted action levels. [40 CFR 264.91(a)(2)]
3. Institute a corrective action program under 40 CFR 264.100, whenever either the groundwater protection standard under 40 CFR 264.92 is exceeded or the hazardous constituents exceed the background concentration for that constituent at the point of compliance or the actions levels are exceeded. Exceeded is defined as statistically significant evidence of increased contamination as described in 40 CFR 264.99(d), or the confirmed exceedance of action levels. [40 CFR 264.91(a)(2)]
4. The Permittee must comply with conditions specified in the facility permit that are designed to ensure that hazardous constituents in Permit Condition IV.D and 40 CFR 264.93 detected in groundwater from the regulated unit do not exceed the concentration limits in 40 CFR 264.94 or permitted actions levels in the uppermost aquifer underlying the waste management area. [40 CFR 264.92]

C. WELL LOCATION, INSTALLATION AND CONSTRUCTION

1. Monitoring Wells

The Permittee shall maintain groundwater monitoring wells at the locations specified in the permit application.

2. Well Maintenance

The Permittee shall maintain the monitoring wells identified in Permit Attachment 5 in accordance with the detailed plans and specifications presented in the recommended practices established by the RCRA Groundwater Monitoring Technical Enforcement Guidance Document (TEGD) published by the United States Environmental Protection Agency.

D. INDICATOR PARAMETERS AND MONITORING CONSTITUENTS

1. The Permittee shall monitor the groundwater beneath the landfill unit for the parameters identified in Table 2 of this section.
2. If there is indication of a statistically significant increase as described in Permit Condition IV.B.3 or increase above action levels listed in Table 1 of this section, the Permittee must follow the procedures outlined in Permit Condition IV.I.2.

E. SAMPLING AND ANALYSIS PROCEDURES

The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the groundwater monitoring wells as described in the permit application.

1. Sample Collection

Samples shall be collected using the techniques described in the Permittee's Sampling and Analysis Plan, Permit Attachment 6.

2. Preservation and Shipping

Samples shall be preserved and shipped (when shipped off-site for analysis) in accordance with the procedures specified in the Permittee's Sampling and Analysis Plan.

3. Sample Analysis

Samples shall be analyzed in accordance with the procedures specified in the Permittee's Sampling and Analysis Plan. Samples shall be tracked and controlled using the specified chain-of-custody procedures.

F. ELEVATION OF THE GROUNDWATER SURFACE

1. Groundwater Elevation

The Permittee shall determine the elevation of the groundwater surface at each well each time the groundwater is sampled. [40 CFR 264.97(f)]

2. Groundwater Elevation Recording

The Permittee shall record the surveyed elevation of the monitoring well(s) when installed (with as-built drawings). The total depth of the well and the elevations of the groundwater surface, the top of casing, ground surface and/or open apron elevation, and the protective casing shall be supplied to DEQ as obtained.

G. STATISTICAL PROCEDURES

1. After each groundwater monitoring event, the Permittee must determine if there is any evidence of a statistically significant increase for any inorganic constituent in the groundwater beneath the unit. The statistical method used to evaluate the groundwater monitoring data shall be appropriate for the distribution of inorganic constituents detected. GCD shall perform statistical analysis by using the method described in the application or other approved method. [40 CFR 264.97(i)]
2. Groundwater monitoring data, including actual levels of constituents and statistical analyses, shall be maintained in the facility operating record for the active life of the unit, including any post-closure maintenance period. [40 CFR 264.97(j)]

H. MONITORING PROGRAM AND DATA EVALUATION

1. Groundwater Quality Determination

The Permittee shall determine groundwater quality at each monitoring well annually during the post-closure care period for the land disposal unit. [40 CFR 264.98(d)]
The Permittee shall express the groundwater quality at each monitoring well in a form necessary for the determination of statistically significant increases. [40 CFR 264.97(h)]

2. Groundwater Flow Rate

The Permittee shall determine the groundwater flow rate and direction in the uppermost aquifer and prepare potentiometric and isoconcentration maps annually. [40 CFR 264.98(e)]

3. Statistical Increase

The Permittee shall determine whether there is a statistically significant increase over the background values for each parameter each time groundwater quality is determined at the compliance point. In determining whether such an increase has occurred, the Permittee must compare the groundwater quality at each monitoring well to the background value in accordance with the statistical procedures specified in Permit Condition IV.G. [40 CFR 264.98(f)]

4. Report Submittal

The Permittee shall perform, and submit to DEQ for review, the evaluations described in Permit Condition IV.F and IV.G within sixty (60) days of receipt of the results of sample analyses. [40 CFR 264.98(f)(2)]

I. RECORDKEEPING AND REPORTING

1. Operating Record

The Permittee shall enter all monitoring, testing, and analytical data obtained in accordance with Permit Condition IV.E, F, and G into the operating record.

2. Releases Above Background or Action Levels

If applicable, and if the Permittee determines there is a statistically significant increase above the background values for the parameters in Table 2 of this section, the Permittee shall:

- a. Notify DEQ in writing within seven (7) days. The notification must indicate which parameters or constituents have shown statistically significant increases, in which wells. [40 CFR 264.98(g)(1)]
- b. Immediately sample the groundwater in all wells and determine the concentration of all constituents identified in Permit Condition IV.D.2. [40 CFR 264.98(g)(2)]
- c. For any constituent found in the analysis pursuant to Permit Condition IV.I.2.b above, the Permittee may resample within one month and repeat the analysis for those compounds detected. If the results from this second analysis confirm the initial results, then these constituents will form the basis for compliance monitoring. If the Permittee does not resample for the compounds identified in IV.I.2.b above, the hazardous constituents found during the initial analysis will form the basis for compliance monitoring. [40 CFR 264.98(g)(3)]
- d. Within ninety (90) days, submit to DEQ an application for a permit modification to modify the compliance monitoring program. [40 CFR 264.98(g)(4)] The application must include the following:
 - i. An identification of the concentration of each constituent found in the groundwater at each monitoring well at the compliance point. [40 CFR 264.98(g)(4)(i)]
 - ii. Any proposed changes to the facility groundwater monitoring system necessary to meet the requirements of compliance monitoring as described in 40 CFR 264.99. [40 CFR 264.98(g)(4)(ii)]

- iii. Any proposed changes to the monitoring frequency, sampling and analysis procedures or methods, statistical procedures or action levels used at the facility necessary to meet the requirements of compliance monitoring as described in 40 CFR 264.99. [40 CFR 264.98(g)(4)(iii)]
- iv. For each hazardous constituent found at the compliance point, a proposed concentration limit, or a notice of intent to seek an alternate concentration limit for a hazardous constituent. [40 CFR 264.98(g)(4)(iv)]
- e. Within 180 days, submit to DEQ the following items in accordance with 40 CFR 264.98(g)(5):
 - i. All of the data necessary to justify an alternate concentration limit (ACL); and/or
 - ii. An engineering feasibility plan for a corrective action program necessary to meet the requirements of 40 CFR 264.100.

J. REQUEST FOR PERMIT MODIFICATION

If the Permittee or DEQ determines that the groundwater monitoring program no longer satisfies the requirements of the regulations, the Permittee must, within ninety (90) days of the determination, submit an application for a permit modification to make any appropriate changes to the program which will satisfy the regulations. [40 CFR 264.98(h)]

K. CORRECTIVE ACTION PROGRAM

1. Required Program

The Permittee shall continue to implement the corrective action program for the closed surface impoundment to ensure that the closed unit is in compliance with the groundwater protection standard under 40 CFR 264.92 and Table 1 of this section. [40 CFR 264.100(a)]

2. Monitoring Wells

- a. The Permittee shall maintain and monitor the monitoring wells to demonstrate the effectiveness of the corrective action program at the locations specified in Permit Attachment 5. [40 CFR 264.100(d)]
- b. The Permittee shall monitor the wells at the point of compliance and those wells between the point of compliance and the facility boundary in accordance with permit condition IV.H, IV.I and Permit Attachment 5.

3. Groundwater Protection Standard

The Permittee shall conduct the corrective action program to remove or treat in place any hazardous constituents that exceed the concentration limits under permit condition IV.K.1 in groundwater. [40 CFR 264.100(e)]

4. Corrective Actions

a. The Permittee shall conduct the corrective action program to remove and treat the hazardous constituents that exceed the groundwater protection standard between the compliance point and the downgradient property boundary in accordance with the procedures specified in the permit application and 40 CFR 264.100(e).

b. An alternate concentration limit may be established for any hazardous constituent upon a request by the Permittee by providing the information required by 40 CFR 264.94(b).

c. The Permittee shall continue the corrective actions until the groundwater protection standard is met. If the groundwater protection standard is not exceeded for three consecutive years, the Permittee may terminate the corrective action measures and shall begin detection monitoring. [40 CFR 264.100(f)]

5. Reporting Requirement

The Permittee shall report, in writing, annually on the effectiveness of the corrective action program. [40 CFR 264.100(g)]

6. Permit Modification

If the Permittee or DEQ determines that the corrective action program no longer satisfies the regulatory requirements, then the Permittee must submit a permit modification application within 90 days of the determination to make any appropriate changes to the program. [40 CFR 264.100(h)]

7. Oversight

The Permittee shall seek approval of the deliverables from DEQ.

Table 1
Groundwater Protection Standard

Constituent	Action Level (mg/l)	Basis
Antimony	0.006	MCL
Arsenic	0.01	MCL
Barium	2.0	MCL
Cadmium	0.005	MCL
Chloride	250	SMCL
Cobalt	0.006	Regional Screening Level
Chromium	0.1	MCL
Fluoride	4.0	MCL
Lead	0.015	MCL
Manganese	0.05	SMCL
Mercury	0.002	MCL
Nickel	0.14	OWRB
pH	6.5 - 8.5 (standard units)	SMCL
Selenium	0.05	MCL
Sodium	390.66	Upper background limit
Specific Conductance	2962 (µmhos/cm)	Upper background limit
Sulfate	250	SMCL
Zinc	5	SMCL

Note: For groundwater monitoring, all of the above shall be considered hazardous constituents.

MCLs for additional constituents, when promulgated, will become groundwater protection standard.

MCL Maximum Contaminant Level
SMCL Secondary MCL

Table 2
Constituents and Parameters to be Analyzed for Applicable Groundwater Monitoring

Wells	Analytes	Frequency
BG-01 (Background Well)	As, Ba, Cd, Cl-, Co, Cr, F-, Hg, Mn, Na, Ni, Pb, Sb, Se, SO4, Zn, pH, SC Static Water Elevation	Annual Each sampling event
RP-1, RP-2, RP-3 and RP-4 (Slurry Wall Wells)	As, Ba, Cd, Cl-, Co, Cr, F-, Hg, Mn, Na, Ni, Pb, Sb, Se, SO4, Zn, pH, SC Static Water Elevation	Annual Each sampling event
RM-101, RM-102, RM102b and RM-103 (Remedial Action Wells)	Cd, Mn, pH, SC Static Water Elevation	Annual Each sampling event

Abbreviations:

As/Arsenic
Na/Sodium
Ba/Barium
Ni/Nickel
Cd/Cadmium
Pb/Lead
Cl-/Chloride
Sb/Antimony
Co/Cobalt

Se/Selenium
Cr/Chromium
SO4/Sulfate
F-/Fluoride
Zn/Zinc
Hg/Mercury
pH/pH
Mn/Manganese
SC/Specific Conductance

SECTION V – SPECIAL CONDITIONS PURSUANT TO THE 1984 HAZARDOUS AND SOLID WASTE AMENDMENTS (HSWA)

A. STANDARD CONDITIONS

1. Dust Suppression

Pursuant to 40 CFR 266.23(b), and the Toxic Substances Control Act, the Permittee shall not use waste or used oil or any other material which is contaminated with dioxin, polychlorinated biphenyls (PCBs), or any other hazardous waste (other than a waste identified solely on the basis of ignitability), for dust suppression or road treatment.

2. Permit Modification

a. DEQ Initiated Modifications

If at any time for any of the reasons specified in 40 CFR 270.41, DEQ determines that modification of this permit is necessary, DEQ may initiate permit modification proceedings in accordance with the regulations set forth at 40 CFR 270.41.

b. Permittee Initiated Modifications

The Permittee may, where appropriate, initiate permit modifications in accordance with the regulations set forth at 40 CFR 270.42. The Permittee shall follow all applicable requirements and procedures as specified in 40 CFR 270.42 in initiating such proceedings.

c. Modification of Corrective Action Schedules of Compliance (CASC)

The Permittee shall adhere to CASCs developed for newly identified and previously identified SWMUs covered by this permit. If at any time the Permittee determines that such schedules cannot be met, the Permittee shall, within fifteen (15) days of such determination, notify DEQ and submit a request for a permit modification under 40 CFR 270.42, with justification as to why the CASC cannot be met.

3. Permit Review

This permit will be reviewed by DEQ five (5) years after the date of permit issuance and may be modified as necessary. Nothing in this section shall preclude DEQ from reviewing and modifying the permit at any time during its term.

4. Compliance with Permit

Compliance with a RCRA permit during its term constitutes compliance, for purposes of enforcement, with subtitle C of RCRA except for those requirements not included in the permit which:

- a. Become effective by statute;
- b. Are promulgated under 40 CFR 268 restricting the placement of hazardous wastes in or on the land; or
- c. Are promulgated under 40 CFR 264 regarding leak detection systems for new and replacement surface impoundment, waste pile, and landfill units, and lateral expansions of surface impoundment, waste pile, and landfill units. The leak detection system requirements include double liners, construction quality assurance (CQA) programs, monitoring action leakage rates, and response action plans, and will be implemented through the procedures of 40 CFR 270.42 Class 1 permit modifications.

5. Information Submittal

Failure to comply with any condition of the permit, including information submittal, constitutes a violation of the permit and is grounds for enforcement action, permit amendment, termination, revocation, suspension, or denial of permit renewal application. Falsification of any submitted information is grounds for termination of this permit (40 CFR 270.43).

The Permittee shall ensure that all plans, reports, notifications, and other submissions to DEQ required in this permit are signed and certified in accordance with 40 CFR 270.11. One (1) hard copy and one (1) electronic copy of each of these plans, reports, notifications or other submissions shall be submitted to DEQ by Certified Mail or hand delivered to the address listed below:

Oklahoma Department of Environmental Quality
Land Protection Division
707 N. Robinson
P.O. Box 1677
Oklahoma City, Oklahoma 73101-1677

Reports, notifications and/or submissions may be provided via email. It is the responsibility of the permittee to ensure any electronically submitted reports were received by DEQ.

6. Plans and Schedules Incorporation Into Permit

All plans and schedules required by this permit are, upon approval by DEQ, incorporated into this permit by reference and become an enforceable part of this

permit. Since required items are essential elements of this permit, failure to submit any of the required items or submission of inadequate or insufficient information may subject the Permittee to enforcement action under Section 3008 of RCRA which may include fines, suspension, or revocation of the permit.

Any noncompliance with approved plans and schedules shall be termed noncompliance with this permit. Written requests for extensions of due dates for submittals may be granted by DEQ.

If DEQ determines that actions beyond those provided for, or changes to what is stated herein, are warranted, DEQ may modify this permit.

7. Data Retention

All raw data, such as laboratory reports, drilling logs, bench-scale or pilot-scale data, and other supporting information gathered or generated during activities undertaken pursuant to this permit shall be maintained at the facility during the term of this permit, including any reissued permits.

8. Management of Wastes

All solid wastes which are managed pursuant to a remedial measure taken under the corrective action process or as an interim measure addressing a release or the threat of a release from a solid waste management unit shall be managed in a manner protective of human health and the environment and in compliance with all applicable Federal, State and local requirements. Approval of units for managing wastes and conditions for operating the units, if approved, shall be granted through the permitting process.

B. CORRECTIVE ACTION

Corrective Action for Releases: Section 3004(u) of RCRA, as amended by HSWA, and 40 CFR 264.101, require that permits issued after November 8, 1984, address corrective action for releases of hazardous waste or hazardous constituents from any SWMU at the facility, regardless of when the waste was placed in the unit.

If the need for further investigation of known SWMUs or newly discovered SWMUs is determined in the future, the Permittee shall apply for a permit modification as required by 40 CFR 270.42 or DEQ may modify the permit pursuant to 40 CFR 270.41.

C. NOTIFICATION REQUIREMENTS FOR AND ASSESSMENT OF NEWLY-IDENTIFIED SWMUs AND POTENTIAL AOCs

1. The Permittee shall notify DEQ, in writing, of any newly-identified SWMU(s) and potential AOCs (i.e., a unit or area not specifically identified during the

RFA), discovered in the course of groundwater monitoring, field investigations, environmental audits, or other means, no later than thirty (30) calendar days after discovery. The permittee shall also notify DEQ of any newly-constructed land-based SWMUs (including but not limited to, surface impoundments, waste piles, landfills, land treatment units) and newly-constructed SWMUs where any release of hazardous constituents may be difficult to identify (e.g., underground storage tanks) no later than thirty (30) days after construction. The notification shall include the following items, to the extent available:

- a. The location of the newly-identified SWMU or potential AOC on the topographic map required under 40 CFR Section 270.14(b)(19). Indicate all existing units (in relation to other SWMUs);
 - b. The type and function of the unit;
 - c. The general dimensions, capacities, and structural description of the unit (supply any available drawings);
 - d. The period during which the unit was operated;
 - e. The specifics, to the extent available, on all wastes that have been or are being managed at the SWMU or potential AOC; and
 - f. Results of any sampling and analysis required for the purpose of determining whether releases of hazardous waste including hazardous constituents have occurred, are occurring, or are likely to occur from the SWMU or whether the AOC should be considered a SWMU.
2. Based on the results of this notification, DEQ will designate the newly-identified AOC(s). Based on the results of this notification or investigation conducted, DEQ will determine the need for further investigations or corrective measures at any newly-identified SWMU(s) or AOC(s). If DEQ determines that such investigations are needed, DEQ may require the Permittee to prepare a plan for such investigations. The permit will be modified to incorporate the investigation requirements for the newly-identified AOC(s) or SWMU(s).

D. NOTIFICATION REQUIREMENTS FOR NEWLY-DISCOVERED RELEASES AT SWMU(s) AND AOC(s)

The permittee shall notify DEQ in writing, no later than fifteen (15) calendar days after discovery, of any release(s) from a SWMU or AOC of hazardous waste or hazardous constituents discovered during the course of groundwater monitoring, field investigation, environmental auditing, or other means. Such newly-discovered releases may be from newly-identified SWMUs or AOCs, newly-constructed SWMUs, or from SWMUs or AOCs for which, based on the findings of the RFA, completed RFI, or investigation of an

AOC(s), DEQ had previously determined no further investigation was necessary. The notification shall include information concerning actual and/or potential impacts beyond the facility boundary and on human health and the environment, if available at the time of the notification. DEQ may require further investigation and/or interim measures for the newly-identified release(s), and may require the Permittee to prepare a plan for the investigation and/or interim measure. The Permit will be modified to incorporate the investigation, if required.

E. INTERIM MEASURES

1. If during the course of any activity initiated under this permit, DEQ determines that a release or potential release of hazardous constituents from a SWMU poses a threat to human health and the environment, DEQ may require interim measures. DEQ shall determine the specific measure(s) or require the Permittee to propose a measure(s). The interim measure(s) may include a permit modification, a schedule for implementation, and a written plan. DEQ shall notify the Permittee in writing of the requirement to perform interim measures. DEQ may modify this Permit to incorporate interim measures into the Permit.
2. The Permittee may propose interim measures at any time. The proposal shall include a written plan and a schedule for implementation. Depending upon the nature of the interim measure, a permit modification may not be required.
3. The following factors will be considered by DEQ in determining the need for interim measures and the need for permit modification:
 - a. Time required to develop and implement a final remedy;
 - b. Actual and potential exposure to human and environmental receptors;
 - c. Actual and potential contamination of drinking water supplies and sensitive ecosystems;
 - d. The potential for further degradation of the medium in the absence of interim measures;
 - e. Presence of hazardous wastes in containers that may pose a threat of release;
 - f. Presence and concentration of hazardous waste including hazardous constituents in soil that have the potential to migrate to groundwater or surface water;
 - g. Weather conditions that may affect the current levels of contamination;
 - h. Risks of fire, explosion, or accident; and

- i. Other situations that may pose threats to human health and the environment.

F. RFI WORKPLAN

In the event that the Permittee discovers SWMUs or AOCs that require investigation, the permit shall be modified to include the requirements for an RFI Workplan in this section.

G. RFI IMPLEMENTATION

Upon receipt of written approval from DEQ for the RFI Workplan, the Permittee shall implement the RFI according to the schedules and in accordance with the approved RFI Workplan and the following:

1. The Permittee shall notify DEQ prior to any field sampling, field testing, or field monitoring activity required by this permit to give DEQ personnel the opportunity to observe investigation procedures and/or split samples.
2. Deviations from the approved RFI Workplan which are necessary during implementation of the investigations must be approved by DEQ and fully documented and described in the progress reports and in the RFI Final Report.

H. RFI FINAL REPORT AND SUMMARY

In the event that the Permittee identifies additional SWMUs or AOCs, this permit may be modified to include requirements for an RFI Final Report and Summary.

I. RFI SCOPE OF WORK

In the event that the Permittee identifies additional SWMUs or AOCs, this permit may be modified to include requirements for an RFI Scope of Work.

J. DETERMINATION OF NO FURTHER ACTION

1. Should an RFI be required, the Permittee may, based on the results of the RFI and/or other relevant information, submit an application to DEQ for a Class III permit modification under 40 CFR 270.42(c) to terminate the RFI/CMS process for a specific unit. This permit modification application must contain information demonstrating that there are no releases of hazardous waste including hazardous constituents from a particular SWMU at the Facility that pose a threat to human health and/or the environment, as well as additional information required in 40 CFR 270.42(c).

If, based upon review of the Permittee's request for a permit modification, the results of the RFI, and other information, including comments received during any public comment period required for Class III permit modifications, DEQ determines that releases or suspected releases which were investigated either are non-existent or do not pose a threat to human health and/or the environment, DEQ may grant the requested modification.

2. If necessary to protect human health or the environment, a determination of no further action shall not preclude DEQ from requiring continued or periodic monitoring of air, soil, groundwater, or surface water, when site-specific circumstances indicate that releases of hazardous waste or hazardous constituents are likely to occur.
3. A determination of no further action shall not preclude DEQ from requiring further investigations, studies, or remediation at a later date, if new information or subsequent analysis indicates a release or likelihood of a release from a SWMU at the Facility that is likely to pose a threat to human health or the environment. In such a case, DEQ shall initiate a modification to the permit.

K. CORRECTIVE MEASURES STUDY (CMS) PLAN

In the event that CMS work is required, this permit shall be modified to include requirements for a CMS Plan.

L. CMS IMPLEMENTATION

In the event that CMS work is required, this permit shall be modified to include requirements for CMS implementation.

M. CMS FINAL REPORT AND SUMMARY

In the event that the Permittee identifies additional SWMUs or AOCs, this permit may be modified to include requirements for a CMS Final Report and Summary.

N. CORRECTIVE MEASURE (REMEDY) SELECTION AND IMPLEMENTATION

In the event that the Permittee is required to perform additional corrective measures, this permit may be modified to include corrective measure selection and implementation requirements.

**GCD RESOURCES, LLC
QUAPAW, OKLAHOMA**

PERMIT ATTACHMENT 1

WASTE ANALYSIS

**NOTE: ALL PAGES FOR THE ATTACHMENTS ARE
TAKEN FROM THE PERMIT APPLICATION AND PAGE
NUMBERS MAY NOT BE IN SEQUENCE.**

SECTION C

WASTE CHARACTERISTICS

This section describes the chemical and physical nature of the hazardous wastes placed in the closed surface impoundment at the Electro-Optic Materials Department facility as well as Waste Analysis Plan for sampling, testing, and evaluating the wastes to assure that sufficient information is available for their safe handling. The information submitted is in accordance with the requirements of 40 CFR §270.14(b)(2) and 270.21(a) and 264.13(a).

The impoundment was closed as a single cell. The wastes sampled included:

- | | |
|----------------------|--------------------|
| (1) Untreated Liquid | (3) Treated Sludge |
| (2) Soils | (4) Treated Liquid |

Sampling was done in accordance with the following schedule:

Date: 10/11/91
 Revision No.: 0
 C

EAGLE-PICHER EOM
 IMPOUNDMENT CLOSURE
 SAMPLING & TESTING SCHEDULE

<u>MATERIAL</u>	<u>SAMPLE SIZE</u>	<u>NUMBER SAMPLES</u>	<u>FREQUENCY</u>	<u>LOCATION</u>	<u>COLLECTION METHOD</u>	<u>TESTS AND ANALYSES</u>
SOIL	200 Grams	One/location	One	8 Locations A Thru H	Thief/Auger/ Split Spoon	NMD Totals-List 1
TREATED SLUDGE	200 Grams	One/Location	One	8 Locations 1 Thru 8	Trier	28 Day Core EP TOX - List 2 Paint Filter Test Penetrometer
UNTREATED LIQUID	One Liter	Two	Per Two Weeks	Random	Dipper	Totals - List 2
TREATED LIQUID	200 Grams	Two	Per Week	Random	Trier	28 Day Cure EP Tox - List 2 Paint Filter Test Penetrometer
Chloride Sodium Lead		Zinc Total Organic Halogen Specific Conductance		Cadmium Chloride Manganese Total Organic Halides Total Organic Carbon	<u>List 1</u>	<u>List 2</u>
						Selenium Sodium Zinc pH Specific Conductance

C-1 CHEMICAL AND PHYSICAL ANALYSES

The chemical processes at this facility involve the primary and secondary refining of germanium and gallium, the chemical and metallurgical refining of germanium and gallium materials, the growth of single crystal silicon, the production of natural boron and the production of lithium hydroxide. The majority of the hazardous wastes are generated by the germanium, gallium, and lithium processing units. The wastes are compatible and were mixed and neutralized in a central system. The germanium and gallium units generate hydrochloric acid waste and process neutralization water. The lithium unit generates dilute hydrochloric acid waste and/or dilute sodium hydroxide waste. During the years the surface impoundment was used, the combined wastes were neutralized with lime to pH 7 in a batch process. The neutralized slurry contained approximately 15% solids and 85% water and contained metals such as selenium, arsenic, and antimony. This slurry was then pumped to the surface impoundment.

On an intermittent basis, methanol, zinc, gallium, germanium, and ammonium fluoride traces may have been released to the pond. The neutralized lime slurry contained the following percentages by weight: eight (8) percent to ten (10) percent calcium; fifteen (15) to twenty-five (25) percent chloride; zero (0) to five (5) percent iron; zero (0) to ten (10) percent sodium; and zero (0) to ten (10) percent magnesium and the balance is water. The other components included, by weight, zero (0) to 1.3 percent arsenic; zero (0) to ten (10) percent fluoride; zero (0) to one (1) percent antimony, and zero (0) to one and one-half (1.5) percent selenium. Other elements are minor trace amounts.

The quantities of methanol released to the impoundment are unknown. In recent years, methanol was distilled on-site and reused. Currently, the spent methanol is transported off-site for disposal.

C-1(a) Liquid Wastes

In preparation for closure, the liquid wastes were sampled in accordance with the approved closure plan.

In accordance with the Sampling and Testing Schedule, five samples of untreated liquid were collected and analyzed.

The parameters included Total Levels for the following: Cadmium, Chloride, Manganese, Total Organic Halides, Total Organic Carbon, Selenium, Sodium, Zinc, pH, and Specific Conductance.

The first sample was collected January 24, 1990 and the final sample was collected March 22, 1990.

The results are summarized as follows:

<u>Parameter</u>	<u>Minimum Levels & Date of Occurrence</u>	<u>Maximum Levels & Date of Occurrence</u>
Cadmium	LT 0.005 mg/l January 24, 1990	0.31 mg/l February 6, 1990
Chloride	15,760 mg/l March 22, 1990	146,300 mg/l February 6, 1990
Manganese	LT 0.01 mg/l January 24, 1990	13.1 mg/l February 6, 1990
Total Organic Halides	0.069 mg/l March 22, 1990	6.658 mg/l January 24, 1990
Total Organic Carbon	24.6 mg/l March 22, 1990	330.1 mg/l February 6, 1990
Selenium	0.23 mg/l March 22, 1990	0.76 mg/l February 21, 1990
Sodium	4.9 mg/l January 24, 1990	9,530 mg/l February 6, 1990

<u>Parameter</u>	<u>Minimum Levels & Date of Occurrence</u>	<u>Maximum Levels & Date of Occurrence</u>
Zinc	0.22 mg/l March 22, 1990	5.76 mg/l February 6, 1990
pH	6.9 January 24, 1990	8.7 March 22, 1990
Specific Conductance	55,900 umhos March 22, 1990	292,611 umhos February 6, 1990

The Sodium level of 4.9 mg/l recorded on January 24, 1990 is not realistic. The laboratory was questioned and did confirm the reported level. The level nearest the 4.9 mg/l was 2068 mg/l reported on March 22, 1990.

The laboratory reports for the January 24, 1990 sampling event follow:

EAGLE-PICHER INDUSTRIES, Inc.

Quapaw Plant
QUAPAW, OKLAHOMA

LABORATORY REPORT

DATE 1-24-90

	H ₂ O	GE		pH	sp cond	
		%	G/L			
PW-12490				6.9	262	712 μ mhos

REMARKS

POND H₂O

CHEMIST Green Evans

Received: 01/24/90

01/29/90 16:13:01

REPORT Eagle-Picher Industries, Inc.

TO Electro Optical Materials

P.O. Box 737

Quapaw, Oklahoma 74363

ATTEN Jim Meyer

ATTEN Nancy Magness

PHONE 800-331-3144 or 918-540-1507

CLIENT EP EOM

SAMPLES 9

CONTACT BOB PERRIN

COMPANY Eagle-Picher Industries, Inc.

FACILITY Specialty Materials Division

Electro Optical Materials

WORK ID Waste Pond Water

TAKEN 11/14/89

TRANS Hand Carried

TYPE Solid & Liquid

P.O. #

INVOICE under separate cover

SAMPLE IDENTIFICATION

- 01 12490-PW-1 Metals
- 02 12490-PW-2 Quad Metals
- 03 12490-PW-3 Chloride
- 04 12490-PW-4-A TOX
- 04 12490-PW-4-B TOX
- 04 12490-PW-4-C TOX
- 04 12490-PW-4-D TOX
- 05 12490-PW-5-A TOC
- 05 12490-PW-5-B TOC
- 05 12490-PW-5-C TOC
- 05 12490-PW-5-D TOC
- 06 Method Blank
- 07 Matrix Spike
- 08 Matrix Spike Duplicate
- 09 MS/MSD RPOX

TEST CODES and NAMES used on this report

- CD OA Total Cadmium OA Data
- CD TOT Total Cadmium by ICP/AES
- CL Chloride by IC
- CL OA Chloride OA Data
- MN OA Total Manganese OA Data
- MN TOT Total Manganese by ICP/AES
- NA OA Total Sodium OA Data
- NA TOT Total Sodium by ICP/AES
- SE OA Total Selenium OA Data
- SE TOT Total Selenium by ICP/AES
- TOC Total Organic Carbon
- TOC OA Total Organic Carbon OA
- TOX Total Organic Halides
- TOX OA Total Organic Halides OA
- ZN OA Total Zinc OA Data
- ZN TOT Total Zinc by ICP/AES

Bob Perrin

CERTIFIED BY

SAMPLE ID 12490-PW-1 Metals SAMPLE # 01 FRACTIONS: A
Date & Time Collected 01/24/90 14:20:00 Category _____

CD_TOT <.005 MW_TOT <.01 NA_TOT 4.9
mg/L mg/L mg/L

SAMPLE ID 12490-PW-2 Quad Metals SAMPLE # 02 FRACTIONS: A,B,C,D
Date & Time Collected 01/24/90 14:20:00 Category _____

SE_TOT .51 SE_TOT .56 SE_TOT .53 SE_TOT .48 ZN_TOT 3.64 ZN_TOT 3.84
mg/L mg/L mg/L mg/L mg/L mg/L

ZN_TOT 3.82 ZN_TOT 3.48
mg/L mg/L

$\bar{X}_{Se} = 0.52$
 $\bar{X}_{Zn} = 3.70$

SAMPLE ID 12490-PW-3 Chloride SAMPLE # 03 FRACTIONS: A
Date & Time Collected 01/24/90 14:20:00 Category _____

CL 102000
mg/L

SAMPLE ID 12490-PW-4-A TOX SAMPLE # 04 FRACTIONS: A
Date & Time Collected 01/24/90 14:20:00 Category _____

TOX 5400
ppb

SAMPLE ID 12490-PW-4-B TOX SAMPLE # 04 FRACTIONS: B
Date & Time Collected 01/24/90 14:20:00 Category _____

TOX 6840
ppb

SAMPLE ID 12490-PW-4-C TOX SAMPLE # 04 FRACTIONS: C
Date & Time Collected 01/24/90 14:20:00 Category _____

TOX 6410
ppb

SAMPLE ID 12490-PW-4-D TOX SAMPLE # 04 FRACTIONS: D
Date & Time Collected 01/24/90 14:20:00 Category _____

TOX 7980
ppb $\bar{X} = 6.658 \text{ mg/l}$

SAMPLE ID 12490-PW-5-A TOC SAMPLE # 05 FRACTIONS: A
Date & Time Collected 01/24/90 14:20:00 Category _____

TOC 291.1

ppm

Received: 01/24/90

Results by Sample

SAMPLE ID 12490-PW-5-B TOC SAMPLE # 05 FRACTIONS: B
 Date & Time Collected 01/24/90 14:20:00 Category _____
 TOC 283.9
 ppm

SAMPLE ID 12490-PW-5-C TOC SAMPLE # 05 FRACTIONS: C
 Date & Time Collected 01/24/90 14:20:00 Category _____
 TOC 287.7
 ppm

SAMPLE ID 12490-PW-5-D TOC SAMPLE # 05 FRACTIONS: D
 Date & Time Collected 01/24/90 14:20:00 Category _____
 TOC 284.5
 ppm $\bar{X} = 286.8$

SAMPLE ID Method Blank SAMPLE # 06 FRACTIONS: A
 Date & Time Collected not specified Category _____
 CD_QA <.005 CL_QA <0.26 MH_QA <.01 NA_QA <1.0 SE_QA <.25 TOC_QA 1.249
 mg/L mg/L mg/L mg/L mg/L ppm
 TOX_QA <50.0 ZN_QA <.02
 ppb mg/L

SAMPLE ID Matrix Spike SAMPLE # 07 FRACTIONS: A
 Date & Time Collected not specified Category _____
 CD_QA 80.2 CL_QA 88.2 MH_QA 78.2 NA_QA n/a SE_QA 50.4 TOC_QA 92.5
 X X X X X X
 TOX_QA 76.2 ZN_QA 59.6
 X X

SAMPLE ID Matrix Spike Duplicate SAMPLE # 08 FRACTIONS: A
 Date & Time Collected not specified Category _____
 CD_QA 74.2 CL_QA 91.8 MH_QA 64.6 NA_QA n/a SE_QA 54.6 TOC_QA 99.4
 X X X X X X
 TOX_QA 74.6 ZN_QA 102.0
 X X

SAMPLE ID HS/MSD RPD% SAMPLE # 09 FRACTIONS: A
 Date & Time Collected not specified Category _____
 CD_QA 7.8 CL_QA 4.0 MH_QA 19.0 NA_QA n/a SE_QA 8.0 TOC_QA 7.2

TOX_QA	2.1	ZN_QA	52.5
	X		X

C-1(b) Surface Impoundment Soils

In accordance with the approved closure plan, the soils in the impoundment were sampled and analyzed.

Sampling of the soils was scheduled for eight locations selected randomly from the intersections determined by superimposing a 100 foot grid on the project area. These sampling locations are designated by the letters "A" through "H" on the enclosed drawing, Figure C-1.

Three of the locations were in the northern one-third of the impoundment. Sampling of the soils was actually started before closure was initiated. After the coffer dam was constructed, the liquid was pumped from the northern one-third of the impoundment.

On October 26, 1988, the sludge was removed from the sampling locations. The locations were then protected by clean steel drums with both ends removed. The drums were set into the soil and sealed on the inside and outside with clay.

The samples were then extracted from the area inside the drums. The parameters selected for this initial sampling were: Cadmium; Chlorides; pH; Manganese; Sodium; Selenium; Zinc; Total Organic Halides; and Total Organic Carbon.

Samples were collected at six inch intervals to 24" at all locations with deeper samples collected at selected locations.

The results were as follows:

Cadmium was added because of its known presence in the natural soils of the area and because of its characteristic toxicity. Cadmium was not a part of the waste stream.

"C"

	Cadmium (ug/g)	Chlorides (ug/g)	pH
0-6"	11.30	113,400.0	5.66
6"-12"	3.90	6,670.0	3.06
12"-18"	3.50	11,600.0	2.99
18"-24"	3.50	9,160.0	3.36
36"	2.10	3,880.0	4.50
42"	1.61	8,370.0	4.40

	Manganese (ug/g)	Sodium (ug/g)	Selenium (ug/g)
0-6"	95.5	6,620.0	943.0
6"-12"	31.4	1,590.0	47.4
12"-18"	37.9	1,050.0	39.8
18"-24"	47.3	1,320.0	70.0
36"	91.8	807.0	LT 0.5
42"	102.0	663.0	1.1

	Zinc (ug/g)	TOC (ug/g)	TOX (ug/g)
0-6"	1700.0	9,490.0	219.74
6"-12"	121.0	6,495.00	132.16
12"-18"	161.0	5,810.0	132.70
18"-24"	217.0	4,360.0	23.50
36"	239.0	2,500.0	932.25
42"	170.0	1,840.0	216.00

"G"

	Cadmium (ug/g)	Chlorides (ug/g)	pH
0-6"	41.30	12,300.0	6.96
6"-12"	3.40	12,400.0	6.31
12"-18"	1.80	12,500.0	6.05
18"-24"	3.60	9,590.0	3.81
36"	2.83	10,582.0	3.80

	Manganese (ug/g)	Sodium (ug/g)	Selenium (ug/g)
0-6"	116.0	5,070.0	1,650.0
6"-12"	30.0	1,870.0	115.0
12"-18"	17.3	1,700.0	78.6
18"-24"	49.5	1,550.0	61.3
36"	65.0	1,530.0	30.0

	Zinc (ug/g)	TOC (ug/g)	TOX (ug/g)
0-6"	1,670.0	16,730.0	25.24
6"-12"	183.0	6,430.0	37.86
12"-18"	53.8	4,340.0	4.75
18"-24"	113.0	6,290.0	9.5
36"	32.5	--	--

	Cadmium (ug/g)	"H" Chlorides (ug/g)	pH
0-6"	35.50	LT 4,500.0	6.82
6"-12"	LT 0.70	16,200.0	6.20
12"-18"	5.50	12,900.0	6.03
18"-24"	4.70	10,900.0	5.71
36"	2.71	7,597.8	3.50

	Manganese (ug/g)	Sodium (ug/g)	Selenium (ug/g)
0-6"	204.0	5,810.0	1,020.0
6"-12"	7.7	2,220.0	48.8
12"-18"	41.6	1,810.0	170.0
18"-24"	25.3	1,940.0	186.0
36"	62.4	1,470.0	16.1

	Zinc (ug/g)	TOC (ug/g)	TOX (ug/g)
0-6"	3,400.0	14,540.0	7.35
6"-12"	24.3	6,050.0	24.76
12"-18"	324.0	6,620.0	1.16
18"-24"	165.0	6,550.0	21.77
36"	39.8	--	--

These data were used in designing the sampling program and the closure project itself.

Other soil sampling took place November 27, 1989 during the preparations for closure. The locations included the other five locations designed as "A", "B", "D", "E", and "F". All of these locations are within the south two-thirds of the impoundment. At these locations, only one sample was taken beginning at the surface. The analytes were also changed somewhat because of the information learned previously. The parameters selected were Chlorides, Sodium, Lead, Zinc, TOX, and Specific Conductance, and analysis was performed on the extract. In actuality, results for Sodium were only obtained for one sample, as the laboratory added Sodium Hydroxide to the extracts.

Additionally, instead of Total Organic Halides, selected organics were used for analysis.

The results were as follows:

<u>Parameter</u>	<u>A</u>	<u>B</u>	<u>D</u>	<u>E</u>	<u>F</u>
Chlorides (mg/l)	20,400	42,000	8,080	16,340	16,340
Lead (mg/l)	0.10	0.69	LT 0.1	LT 0.1	0.10
Zinc (mg/l)	0.22	0.04	1.14	1.08	0.78
Specific Conductance (umhos)	14,080	*	10,500	16,900	18,568
Sodium (mg/l)	--	139	--	--	--

*Not sufficient extract for analysis.

Acrylonitrile; Benzene; Carbon Disulfide; Carbon Tetrachloride; Chlorobenzene; Chloroform; 1, 2 - Dichloroethane; 1, 1 - Dichloroethylene; Isobutanol; Methylene Chloride; Methyl Ethyl Ketone; 1, 1, 1, 2 - Tetrachloroethane; 1, 1, 2, 2 - Tetrachloroethane; Tetrachloroethylene; Toluene; 1, 1, 1 - Trichloroethane; 1, 1, 2 - Trichloroethane Trichloroethylene and Vinyl Chloride were organic parameters selected for analysis. Only the following compounds exceeded the detection limits:

<u>Location</u>	<u>Parameter, Level</u>
A	Methylene Chloride, 13 ug/l
B	Methylene Chloride, 6 ug/l Toluene, 8 ug/l
E	Methylene Chloride, 8 ug/l
F	Methylene Chloride, 9 ug/l

At these levels, the compounds are not a problem, however their presence is unexplained.

C-1(c) Treated Sludge

The treated sludge was sampled at the eight locations randomly selected using a 100 foot grid superimposed on the project (See Figure C-1).

Samples were selected after treatment and formed into cubes for testing.

After curing, each sample was subjected to a Paint Filter Test and a penetrometer test of structural integrity.

Two extracts were developed for chemical testing. The acetic ~~and~~ extract was used to analyze for Cadmium, Manganese, Selenium, Sodium, and Zinc. Because of interference from the acetic acid, a dionized water extract was used to analyze for pH, Specific Conductance, Chlorides, Total Organic Halides, and Total Organic Carbon. All samples passed the Paint Filter Test and all samples showed structural strength in excess of 4.5 tons per square foot.

Cadmium levels ranged from less than detection (0.005 mg/l) at five of the eight locations, to 0.016 mg/l.

Chlorides varied by location, as might be expected, due to the nature of the discharge. Levels ranged from a low of 59.7 mg/l to a high of 294.0 mg/l.

The Manganese levels ranged from less than detection (0.01 mg/l) to a high of 0.29 mg/l. Four of the locations were less than detection, two were 0.03 mg/l, one was 0.16 mg/l, and one was 0.29 mg/l.

The levels of Total Organic Halides were all less than the detection limit of 0.05 mg/l.

The Total Organic Carbon levels ranged from a low of 0.95 mg/l to a high of 2.755 mg/l.

Selenium levels ranged from less than the detection limit of 0.05 mg/l at two locations to a high of 1.0 mg/l at one location.

The highest Sodium level, 152.0 mg/l, was noted at two locations. The low level was 92.0 mg/l.

Because of the fly ash use, the pH tended to be somewhat high, ranging from 8.4 to 10.1.

Specific Conductance levels were relatively low, ranging from 413 umhos to 1026 umhos. Except for the high reading, all others ranged from 413 to 578 umhos.

Four samples were selected randomly for further analysis. Samples #3, #5, #7, and #8 were analyzed for the following organic parameters:

Acrylonitrile; Benzene; Carbon Disulfide; Carbon Tetrachloride; Chlorobenzene; Chloroform; 1, 2 - Dichloroethane; 1, 1 - Dichloroethylene; Isobutanol; Methylene Chloride; Methyl Ethyl Ketone, 1, 1, 1, 2 - Tetrachloroethane; 1, 1, 2, 2 - Tetrachloroethane; Tetrachloroethylene; Toluene; 1, 1, 1 - Trichloroethane; 1, 1, 2 - Trichloroethane Trichloroethylene and Vinyl Chloride. Only Methylene Chloride was found above the detection limit in each case. The levels noted were as follows: #3 - 8 ug/l; #5 - 12 ug/l; #7 - 8 ug/l and #8 - 14 ug/l.

None of the levels encountered exceeded those levels which are allowed.

C-1(d) Treated Liquid

In accordance with the Sampling and Testing Schedule, twenty-one samples of treated liquid were collected and analyzed.

The parameters included EP TOX Levels for the following: Cadmium, Chloride, Manganese, Total Organic Halides, Total Organic Carbon, Selenium, Sodium, Zinc, pH, and Specific Conductance. In addition, all samples were subjected to Paint Filter Tests and Penetrometer Structural Tests.

The first sample was collected January 18, 1990 and the final sample was collected March 29, 1990.

The results are summarized as follows:

<u>Parameter</u>	<u>Minimum Levels & Date of Occurrence</u>	<u>Maximum Level & Date of Occurrence</u>
Cadmium	LT 0.005 mg/l Several Dates	0.10 mg/l February 10, 1990
Chloride	6.57 mg/l March 26, 1990	180.2 mg/l January 27, 1990
Manganese	LT 0.01 mg/l Several Dates	0.01 mg/l March 26, 1990
Total Organic Halides	LT 0.05 mg/l Several Dates	0.127 mg/l March 13, 1990
Total Organic Carbon	0.41 mg/l February 19, 1990	5.38 mg/l March 9, 1990
Selenium	Never Exceeded Detection Limit of LT 0.2 mg/l	
Sodium	31.2 mg/l March 23, 1990	348.0 mg/l January 18, 1990
Zinc	LT 0.02 mg/l March 23 & 26, 1990	0.05 mg/l March 9, 1990
pH	9.7 Several Dates	10.6 March 20, 1990
Specific Conductance	106 umhos March 17, 1990	872 umhos February 2, 1990
Paint Filter Test	All Samples Passed	
Penetrometer Test	All Samples Exceeded 4.5 Tons Per Square Foot	

C-2 WASTE ANALYSIS PLAN

The wastes were analyzed in accordance with SW-846 Test Methods for Evaluating Solid Waste. All laboratory work was done in the Eagle-Picher Laboratory which is a certified laboratory.

In addition to the designated parameters, the solidified samples were subjected to the Paint Filter Liquids Test - Method 9095. This test was used to insure that no liquids remained in the wastes.

An extract was obtained from the solidified samples using the Toxicity Characteristic ~~Leaking~~^{leaching} Procedure - Method 1311.

The methods used for the designated parameters are as follows:

<u>Parameter</u>	<u>Approved Method</u>
Cadmium	200.7
Chloride	325.3
Manganese	200.7
Selenium	200.7
Sodium	200.7
Zinc	200.7
pH	9040
Specific Conductance	9050
Total Organic Halides	9020
Total Organic Carbon	9060

The number of samples and the frequency of collection were as specified on the schedule included in this section.

Samples of the Analysis Request Form and the Chain of Custody Record follow.

**GCD RESOURCES, LLC
QUAPAW, OKLAHOMA**

PERMIT ATTACHMENT 2

SECURITY AND INSPECTIONS

4.2 Security Procedures and Equipment

Ref: 40 CFR Part 270.28
40 CFR Part 270.14(b)(4)

Owners or operators must prevent unknowing entry and minimize the possibility for unauthorized entry of persons or livestock onto the active portion of his facility unless he can demonstrate that injury and noncompliance will not result from such entry.

Wastes are not exposed during the post closure period. For purposes of this post closure permit application, security concerns are centered on potential injury or noncompliance resulting from unknowing or unauthorized entry to the closed impoundment and the impoundment's monitoring system (ground water monitoring wells). Although 25 years of safe post-closure operations demonstrate injury is an unlikely result, the impoundment must be secured against unauthorized disturbances that may adversely affect the integrity of the final cover and the monitoring wells.

The GCD operation, on rural agricultural property is not staffed on-site. A minimum four (4) strand barbed wire fence surrounds the closed impoundment. This fencing was the subject of a Class 1 modification dated November 22, 2016 (see Appendix A). The fenced area has two reinforced access gates, one on the north side and one on the south side that remain secured. The hazardous waste management unit-specific security fence line is depicted on Figures 6 and 7. Fence line coordinates are as follows:

Position	Latitude	Longitude
SE Corner	36.974141	-94.767222
NE Corner	36.976515	-94.766047
SW corner	36.974468	-94.768960
NW Corner	36.976916	-94.767267
North Gate	36.976340	-94.767681
South Gate	36.974008	-94.767520
NAD 83		

As depicted in the photograph below, the gates are of sufficient size to permit access by maintenance equipment. Also, danger signs, spaced approximately every 150 feet are posted along the fence to notify any unauthorized personnel that entry onto the area inside the fence can be dangerous.

The phrase:

CONTROLLED INDUSTRIAL WASTE DISPOSAL SITE
WARNING
POTENTIALLY HARMFUL MATERIAL UNAUTHORIZED ENTRY PROHIBITED

is boldly marked in large red letters against a contrasting white background to ensure visibility from a distance. As the photograph also demonstrates, signs are printed in the English language and are not obscured by vegetation. Post closure maintenance activities ensure vegetation is not allowed to cover the fence and obscure the signs.



Groundwater monitoring wells are located within the fenced area surrounding the closed impoundment. To ensure the security of these wells they were installed with protective bollards and locking casings and remain locked with hardened metal-keyed locks when not in use. The facility owner/operator maintains strict control over the keys.

GCD believes these security measures fulfill the intent and technical requirements of 40 CFR Parts 264.14 and 264.117(b).

4.3 Inspection Schedule

Ref: 40 CFR Part 270.28
40 CFR Part 270.14(b)(5)

The owner or operator must inspect his facility for malfunctions and deterioration, operator errors, and discharges that may be causing, or may lead to:

- (1) Release of hazardous waste constituents to the environment; or
- (2) A threat to human health.

The owner or operator must conduct these inspections often enough to identify problems in time to correct them before they harm human health or the environment.

GCD managers utilize the surrounding property and conduct regular casual inspections of the closed impoundment for conditions that may lead to the post closure release of hazardous waste or hazardous constituents in concentrations that may adversely affect human health and the environment. The security of the monitoring system is also evaluated. During annual groundwater monitoring events additional post closure inspections are performed. GCD managers ensure that all work required by the post closure activities will be conducted by qualified and appropriately trained individuals.

The types of malfunctions and deterioration that could reasonably be expected to occur at the closed surface impoundment include:

- Surface erosion
- Breach of security
- Dead or stressed vegetation
- Poorly maintained vegetative cover
- Establishment of deep rooted woody species
- Settlement
- Seepage
- Damaged monitoring wells

The closed impoundment was not designed with a separate leak detection system; therefore, inspection of liquid levels in collection sumps is irrelevant. Based upon the expected rate of deterioration and the improbability of an incident, GCD has scheduled formal visual inspections of the above described inspection elements on an annual basis.

Observations and comments from the inspection shall be recorded on an inspection form (or equivalent), dated, and signed by the inspector. Discrepancies shall be repaired or remedied as soon as possible, in some cases immediately. Certain remedies (e.g. over-seeding) may require action during a favorable growing season.

An example inspection checklist is provided on the following page.

GCD believes these inspection procedures fulfill the intent and technical requirements of 40 CFR Parts 264.15 and 264.303.

GCD RESOURCES, LLC
 POST CLOSURE INSPECTION CHECKLIST
 Closed Impoundment and Monitoring System

	Inspection item	Acceptable (Y/N)	Corrective Action
1	Surface erosion (Check final cover for formation of gullies)		
2	Breach of security (Check integrity of fence and gates)		
3	Dead or stressed vegetation (Not related to seasonal life cycles)		
4	Poorly maintained vegetative cover (Less than 75% cover)		
5	Establishment of deep rooted woody species (Avoid penetration of the final cover)		
6	Settlement (Good positive drainage and no sizable depressions)		
7	Seepage (Chemical releases from the top or sloped sides)		
8	Damaged monitoring wells (Broken bollards or casing)		
Inspection conducted by: _____ Date: _____ Time: _____ <i>File: retain for 3-year minimum</i>			Corrective action cross-reference:

**GCD RESOURCES, LLC
QUAPAW, OKLAHOMA**

PERMIT ATTACHMENT 3

POST-CLOSURE PLAN

4.6 Post Closure Plan

Ref: 40 CFR Part 270.28
40 CFR Part 270.14(b)(13)

The GCD facility is located approximately 1-mile northeast of Quapaw, Oklahoma in Ottawa County, between Quapaw, Oklahoma and Baxter Springs, Kansas. The facility is located north of U.S. Highway 69A. The post closure facility consists of a closed impoundment and monitoring wells on otherwise vacant agricultural land. The GCD tract of land consists of 147 acres (+/-) located in the S/2 of Section 24, Township 29 North, Range 23 East.

The post closure facility is adjacent to Umicore Optical Materials USA Inc., and Ceradyn, a 3M Company, on an approximate 620 acre parent tract of land that includes: the South one-half (S ½) of the Northwest one-quarter (NW ¼) and the South one-half (S/2) of Section 24, Township 29 North, Range 23 East; plus all of Section 25, Township 29 North, Range 23 East which lies north and west of U.S. Highway 69A, including a strip twenty feet wide on the south and east side of U.S. Highway 69A as it traverses Section 25, Township 29 North, Range 23 East.

The former Eagle Picher Industries Electro-Optic Materials (EOM) Department, which is now under separate ownership by Umicore Optical Materials USA, Inc. once utilized one non-discharging natural clay lined containment pond for waste water disposal.

The chemical operations at the former EOM included the primary and secondary refining of germanium and gallium, the chemical and metallurgical refining of germanium and gallium materials, the growth of single crystal silicon, the production of natural boron, and the production of lithium hydroxide.

The containment pond, when in operation, had a surface area of approximately seven and three-fourths acres with a maximum capacity of 10.8 million gallons. The EOM operation was identified by the U.S. Environmental Protection Agency Identification Number OKD 007158454.

The waste contained in the containment pond was primarily hydrochloric acid containing arsenic acid. The combination was neutralized to pH 7 using calcium hydroxide. On an intermittent basis, selenium, antimony, zinc, gallium, germanium, and ammonium fluoride traces may have been released to the pond. The neutralized lime slurry contained the following percentages, by weight: eight (8) to ten (10) percent calcium; fifteen (15) to twenty-five (25) percent chloride; zero (0) to five percent iron; zero (0) to ten (10) percent sodium; and zero to ten (10) percent magnesium, and the balance is water. The intermittent components include, by weight, zero (0) to 1.3 percent arsenic; zero (0) to ten (10) percent fluoride; zero (0) to one (1) percent antimony and zero (0) to one and one-half (1.5) percent selenium. Other elements may have been found in trace amounts.

The containment pond was designed and built to impound the liquor from the process plant after neutralization. The neutralized slurry was approximately 15% solids and 85% water. All wastes in the impoundment were from single discharge and were compatible, non-reactive, and non-ignitable.

At closure, all liquid wastes and sludge was solidified and subjected to the Paint Filter Liquids Test (Method 9095), the contaminated soils were stabilized in-place until the material passed the Paint Filter Test and all free liquid were eliminated, as detailed in the Waste Analysis section of the Term 2 Post Closure Permit (formerly Permit Attachment 1/Waste Analysis).

The operation is located in a sparsely developed area. Google Earth® images from 2015 depict no residences within one-half mile radius of the center of the closed impoundment and eight (8) single family residences immediately outside that radius in Section 19, Township 29 North, Range 24 East. The surrounding terrain although relatively flat, has adequate drainage to a tributary of Spring River. Figures 2 and 3 depict a 1-mile radius relative to the center of the closed impoundment.

Upon completion of closure, the facility began thirty (30) years post closure care. The post-closure plan must identify the activities that will be carried on after closure of the closed impoundment unit and the frequency of these activities, and include at least:

- (1) A description of the planned monitoring activities and frequencies at which they will be performed to comply with Subpart N (Landfills) of 40 CFR Part 264 during the post-closure care period; and
- (2) A description of the planned maintenance activities, and frequencies at which they will be performed, to ensure:
 - (i) The integrity of the cap and final cover or other containment systems in accordance with the requirements of Subpart N (Landfills) of 40 CFR Part 264; and
 - (ii) The function of the monitoring equipment in accordance with the requirements of Subpart N of 40 CFR Part 264; and
- (3) The name, address, and phone number of the person or office to contact about the hazardous waste disposal unit or facility during the post-closure care period.

Monitoring

The closed impoundment is monitored in three ways:

1. It is secured with fencing to prevent unknowing or unauthorized entry. See Section 4.2 entitled *Security Procedures and Equipment* for detailed information. Any failure of locks, downed fences, or other security breaks shall be reported and/or repaired immediately, and the proper notations entered in the inspection record.
2. It is subject to periodic visual inspections during routine site visits. Those inspections are conducted to evaluate the condition of the final (soil and vegetative) cover, fencing and monitoring wells. See Section 4.3 entitled *Inspection Schedule* for detailed information. GCD will formally inspect the closed impoundment annually to insure the function and integrity of the final cover and to ensure security is maintained. Any discrepancies shall be immediately repaired or remedied as required. GCD will also formally inspect

visually on an annual basis for obvious seepage or evidence of toxicity such as wet spots or dead vegetation. Observations shall be recorded, dated, and signed. Corrective actions shall be immediate.

3. It is subject to groundwater monitoring to detect the possibility of post closure escape of hazardous constituents. See Section 4.9 entitled *Groundwater Protection* for detailed information, which is summarized at the end of this Section in Table 4.6.

Maintenance

Maintenance includes activities, on an as needed basis, such as:

- ❑ Fence and gate repairs
- ❑ Removal of deep rooted woody vegetation from the final cover
- ❑ Erosion repair
- ❑ Repair or replacement of severely damaged bollards or well pads
- ❑ Keeping key access roads accessible to site vehicles

The need for maintenance will be determined during the required inspections. Most items requiring attention are such that the need will be revealed during routine site visits or well sampling. Corrective action will be taken immediately as required. Inspections will be conducted as described in Section 4.3.

The security fence, final (soil and vegetative) cover, monitoring wells, and access roads are maintained at a level necessary to preclude unknowing entry, unauthorized entry, deterioration, or other conditions that would result in the post closure release of hazardous constituents to the environment, to the extent practical.

For example, during the required sampling program, the monitoring wells will be inspected. Should collapse or other failure occur, the well will be repaired or replaced. Replacement wells will be constructed within fifty (50) feet of the failed well, or as agreed upon with the ODEQ. Repair or replacement shall be documented, notations shall be made in the facility environmental records, and shall be maintained for a minimum of three (3) years, as required.

With respect to run-on and run-off control, the site was graded (crowned) after placement of final cover to provide surface drainage. No water will be allowed to collect. The terrain is configured in such a way that run-on will be diverted around the closed impoundment. Run-off is channeled radially off the closure cap in a sheet drainage pattern to restrict erosion. Maintenance will consist of visual inspection and correction of any drainage problems noted.

Financial Requirements for Post Closure Care

The present value of the post closure Trust Fund is \$398,437 for the remaining post closure period. The detailed post closure cost estimate may be found in Section 4.8.

Any change in the Post Closure Plan that increases the cost of post closure will result in an updated cost estimate. In addition, annually, the latest post closure cost estimate will

be adjusted by either using an inflation factor derived from the annual Implicit Price Deflator for Gross National Product as published by the U.S. Department of Commerce in its *Survey of Current Business*, or by recalculating costs. If an inflation factor is used, it will be calculated by dividing the latest published annual Deflator by the Deflator for the previous year.

Term of Permit

The original post-closure permit was issued December 31, 1993; therefore, according to 40 CFR Part 264.117 post closure care must continue for 30 years after that date, or December 30, 2023. It is understood the ODEQ can extend the post closure period if necessary to protect human health and the environment. The post closure period may also be shortened. Furthermore, GCD is familiar with USEPA guidance (December 2016) provided to regulators for addressing the post closure period. GCD is applying for a full term (10 year) post closure period with the understanding the permit may be terminated before expiration when the post closure period is completed, and post closure care is no longer required.

Contact(s)

The environmental staff at GCD in Quapaw, Oklahoma will be responsible for maintaining a copy of the Post Closure Permit and Post Closure Plan during the post-closure care period. The primary contact for post closure information is:

Greg Evans – Managing Member

Mailing Address:

GCD Resources, LLC
PO Box 67
Quapaw, OK 74363

Physical Address:

GCD Resources, LLC
3225 S 625 Road
Quapaw, OK 74363

Phone:

(918) 673-2511

GCD believes these activities comply with the intent and technical requirements of 40 CFR Part 264.118.

**TABLE 4.6
 TERM 3 GROUNDWATER MONITORING PLAN SUMMARY
 GCD RESOURCES, LLC
 QUAPAW, OKLAHOMA**

WELLS	PROPOSED MONITORING REQUIREMENTS	
	ANALYTE(S)	FREQUENCY
BG-01 Background well <i>see 4.9.2.6</i>	As, Ba, Cd, Cl-, Co, Cr, F-, Hg, Mn, Na, Ni, Pb, Sb, Se, SO4, Zn, pH, SC Static Water Elevation	Annual Each sampling event
RP Slurry Wall Wells <i>see 4.9.2.8 and 4.9.2.10</i>	As, Ba, Cd, Cl-, Co, Cr, F-, Hg, Mn, Na, Ni, Pb, Sb, Se, SO4, Zn, pH, SC Static Water Elevation	Annual Each sampling event
RM Remedial Action Wells <i>see 4.9.2.9</i>	Cd, Mn, pH, SC Static Water Elevation	Annual Each sampling Event

Abbreviations:

As/Arsenic
 Ba/Barium
 Cd/Cadmium
 Cl-/Chloride
 Co/Cobalt
 Cr/Chromium
 F-/Fluoride
 Hg/Mercury
 Mn/Manganese

Na/Sodium
 Ni/Nickel
 Pb/Lead
 Sb/Antimony
 Se/Selenium
 SO4/Sulfate
 Zn/Zinc
 pH/pH
 SC/Specific Conductance

**GCD RESOURCES, LLC
QUAPAW, OKLAHOMA**

PERMIT ATTACHMENT 4

**POST-CLOSURE COST ESTIMATE
& FINANCIAL ASSURANCE**

4.8 Post Closure Cost Estimate

Ref: 40 CFR Part 270.28
40 CFR Part 270.14(b)(16)

The owner or operator of a disposal surface impoundment must have a detailed written estimate, in current dollars, of the annual cost of post-closure monitoring and maintenance of the facility.

The post closure period began upon satisfactory completion of closure in 1991. Since that time, the closed impoundment has been subject to routine security, maintenance and monitoring activities. Although post closure began in 1991, for purposes of post closure estimation, throughout the life of the permit the beginning of the post closure period is considered to coincide with post closure permit issuance in 1993. Hence for purposes of this application, 25 years of the 30-year post closure period have transpired, therefore, the costs associated with those 25 years have been spent - first by Eagle Picher entities, then by GCD following permit transfer. Financial assurance is required for the remaining post closure period.

Post closure costs for the remaining security, maintenance and monitoring have been carried forward from Term 2 for this post closure permit renewal application in accordance with 40 CFR Part 264.144. GCD has elected to maintain a trust fund to assure availability of post-closure funds. At the time of this permit application a trust fund in the amount of \$398,437 is held by:

The Midwest Trust Company
5901 College Blvd., Suite 100
Overland Park, KS 66211-1503
913-319-0353

GCD personnel have worked closely with the ODEQ regarding funding and reimbursement of expenses throughout the post closure period. The post closure cost estimate and underlying assumption are contained in the following Tables 1 and 2 and Appendix F:

- Table 1 – Post Closure Cost Estimate
- Table 2 - Basis for Post Closure Cost Estimate

TABLE 1**POST CLOSURE COST ESTIMATE**

GCD Resources, LLC
 Quapaw, Oklahoma

#	Task	Number/yr	Cost each	Duration	Total
1	Monthly Inspections	12	\$ 210.00	10	\$ 25,200.00
2	Maintenance - Vegetative cover	4	\$ 425.00	10	\$ 17,000.00
3	Maintenance - Earthen cover	2	\$ 425.00	10	\$ 8,500.00
4	Maintenance - Wells	4	\$ 400.00	10	\$ 16,000.00
5	Maintenance - Security	2	\$ 450.00	10	\$ 9,000.00
6	Groundwater Monitoring				
	<i>annual (BG, RP and RM Wells)</i>	1	\$ 7,000.00	10	\$ 70,000.00
	<i>report</i>	1	\$ 3,000.00	10	\$ 30,000.00
	<i>well replacement</i>	2	\$ 2,500.00	2	\$ 10,000.00
	<i>new well installation</i>	3	\$ 2,500.00	1	\$ 7,500.00
	<i>well pad installations</i>	2	\$ 280.00	2	\$ 1,120.00
	<i>other well repairs</i>	1	\$ 280.00	5	\$ 1,400.00
	<i>waste water disposal</i>	1	\$ 850.00	10	\$ 8,500.00
7	Compliance and Permitting Assistance	1	\$ 1,500.00	5	\$ 7,500.00
8	Post Closure Certification	1	\$ 8,500.00	1	\$ 8,500.00
	All Tasks				\$ 220,220.00
	<i>Plus 15% contingency</i>				\$ 253,253.00

Appendix F
PC - Table 1

TABLE 2

BASIS FOR POST CLOSURE COST ESTIMATE

GCD Resources, LLC
Quapaw, Oklahoma

Task #	Comments
1	One inspection per month 3 hours @ \$70/hour 10 years remaining
2	8 month growing season Cut and fertilize once every two months maximum (1/2 day) \$150 mobilization and \$275 for bush hog, spreader, seed and fertilizer 10 years remaining
3	Repairs in spring and fall \$150 mobilization and \$275 for 1/2 day for light tractor/backhoe 10 years remaining
4	25% of the wells requiring caps, locks, bollard repair per year \$150 mobilization plus labor and expense 10 years remaining
5	barbed-wire fence and access gate repairs, locks on well covers Infrequent expense Half day minimum charge and materials 10 years remaining
6	Annual testing (Table 1) - 9 wells (labor and analysis); includes required QA/QC samples Assume 2 wells will be replaced at 2 different times during the next 10 year period Assumes 3 wells to be installed to demonstrate containment for final closure Concrete pads to be added to existing monitoring wells-one time event (\$250 each plus mobilization) Assume two well pads are added or replaced every 5 years Assume one wells requires surface repair/upgrade every other year Waste water disposal assumes 495 gallons per year at \$0.20 per gallon (deep well injection) plus transportation ($\$750$) once per year ($495 \times 0.2 + 750$)
7	Bi-annual compliance and permitting assistance (mods, etc)
8	PC certification includes detailed review of annual monitoring data, senior oversight and P.E. certification

All tasks account for third party costs

**GCD RESOURCES, LLC
QUAPAW, OKLAHOMA**

PERMIT ATTACHMENT 5

GROUNDWATER MONITORING

4.9 Groundwater Protection

Ref: 40 CFR Part 270.28
40 CFR Part 270.14(c)

The Permittee must develop, conduct and maintain applicable groundwater monitoring and response programs for the closed impoundment to detect the possibility of post closure escape of hazardous constituents. According to 40 CFR Part 264.91, the required groundwater monitoring program must consist of a detection monitoring program per 40 CFR 264.98; a compliance monitoring program per 40 CFR 264.99; or a corrective action program per 40 CFR 264.100.

Whenever hazardous constituents under 40 CFR Part 264.93 from a regulated unit exceed concentration limits under 40 CFR Part 264.94 in groundwater between the compliance point under 40 CFR Part 264.95 and the down gradient facility property boundary, the owner or operator must institute a corrective action program under 40 CFR Part 264.100

4.9.1 PREVIOUS POST CLOSURE MONITORING ACTIVITIES

4.9.1.1 Former Detection Monitoring Program

The detection monitoring program originally consisted of six (6) Point of Compliance wells (MW-1, MW-2, MW-3, MW-4, MW-5 and MW-6) located near the down gradient, outside toe of the dike of the closed impoundment (east and northeast side of the impoundment), and two (2) monitoring wells (MW-7 and MW-8) installed on the west, up gradient side from the closed impoundment (see Retired Wells in Figure 6). The Point of Compliance wells and the up-gradient monitoring wells were completed in general accordance with the requirements of 40 CFR 264.97 as previously described in the Groundwater Monitoring section of the Post-Closure Permit approved in 1993.

Based on a statistical comparison of analytical results of groundwater samples collected from the up-gradient wells and the Point of Compliance wells, the groundwater protection standard was exceeded in the Point of Compliance wells and reported to the Oklahoma State Department of Health [OSDH; currently Oklahoma Department of Environmental Quality (ODEQ)] in 1987.

Due to the detected exceedance of the groundwater protection standards at the Point of Compliance, the routine detection monitoring program was suspended, and a compliance monitoring program was implemented.

Beginning with Term 2 of the permit (issued September 12, 2008) the detection monitoring wells were sampled annually. Due to persistent exceedance of select Groundwater Protection Standards, monitoring of MW-1 through MW-6 was discontinued. This action was based upon meetings and correspondence culminating in a letter from the ODEQ to GCD dated April 3, 2018 authorizing discontinuation of sampling of wells MW-1 through MW-6 due primarily to their location within the source area. See correspondence in Appendix A.

4.9.1.2 Former Compliance Monitoring Program

The compliance monitoring program originally consisted of four (4) Remedial Action wells (RM-101, RM-102, RM-103 and RM-104) located approximately 1,200 feet east and southeast of the impoundment (see Figure 7). The Remedial Action wells were completed in general accordance with the requirements of 40 CFR 264.97 as previously described in the Groundwater Monitoring section of the Post-Closure Permit approved in 1993.

Starting in November 1988, groundwater samples were collected on a quarterly basis from the Remedial Action wells and analyzed for: cadmium, chlorides, manganese, sodium, selenium, zinc, sulfate, TOC, and TOX. The pH and conductivity parameters were also measured and recorded in the field during purging of the monitoring wells.

Beginning with the second term of the permit (issued September 12, 2008) the compliance monitoring wells were sampled semi-annually. The previous 10 years of Post Closure monitoring data indicated well RM-104 was side gradient of the groundwater flow beneath the closed impoundment. For this reason, one well (designated RM-102b) was added between RM-102 and RM-103 to more precisely detect any potential post closure release of hazardous constituent(s) from the closed impoundment. Monitoring well installation was completed on July 30, 2008 in general accordance with installation standards provided in the SAP in effect at the time. Upon installation of RM-102b, RM-104 was retired (see Retired Wells in Figure 6), sampling was discontinued, and the well was used solely for purposes of determining the groundwater potentiometric surface.

Based upon meetings and correspondence culminating in a letter from the ODEQ to GCD dated April 3, 2018, parameters analyzed in RM well samples were reduced to pH, specific conductance, manganese, and cadmium due to a historic lack of permit-required parameters detected above their respective regulatory limits. See correspondence in Appendix A.

4.9.1.3 Former Corrective Action Program

After confirmation that the groundwater protection standard was exceeded in the Point of Compliance wells in 1987, and in association with investigation of the former discharge pond as a SWMU, corrective action was implemented. A Corrective Measure Study (CMS) was submitted in November 1989. Essential elements of that CMS were permitted in the Post Closure Permit as a Corrective Action Plan (CAP). That CAP called for:

- ❑ Surface drainage modifications;
- ❑ Removal of contaminated soil;
- ❑ Soil capping contaminated areas;
- ❑ Installation of a bentonite slurry wall;
- ❑ Installation of four wells (RP-1 through 4) to monitor the effectiveness of the slurry wall;
- ❑ Monitoring of RP-1 through 4; and
- ❑ Continued compliance (aka plume/remedial action) monitoring

In accordance with the CAP, a soil/bentonite slurry wall was installed in 1994, approximately 20 feet down gradient from the defined contaminant plume along the east and north sides of the former impoundment. Also, four (4) corrective action wells (RP-1, RP-2, RP-3 and RP-4) were located approximately 50 feet down gradient (north, east and southeast sides) from the slurry wall (see Figure 7). The RP monitoring wells were completed in general accordance with the requirements of 40 CFR 264.97.

Compliance monitoring has progressed throughout the post closure period (in accordance with Permit Section IV.H.) in order to determine if the facility could return to detection monitoring. Under the terms of compliance monitoring and the corrective action plan, the former owner/operator (Eagle Picher) performed:

- ❑ quarterly groundwater elevation determination for wells RM-101 through RM-104
- ❑ quarterly sampling of wells RM-101 through RM-104
- ❑ quarterly groundwater elevation determination for wells RP-1 through RP-4
- ❑ quarterly sampling of wells RP-1 through RP-4
- ❑ weekly groundwater elevation determination for wells MW-1 through MW-8
- ❑ weekly pumping and sample collection from MW-1 through MW-6
- ❑ monthly analysis of a composite sample from MW-1 through MW-6
- ❑ annual Appendix IX sampling and analysis of MW-1 through MW-6
- ❑ annual well depth measurements

Beginning with the second term of the permit (issued September 12, 2008) the corrective action wells RP-1 through RP-4 were sampled semi-annually. Annual and semi-annual groundwater monitoring reports submitted to the ODEQ contain a complete summary of all sample dates and data. Based upon meetings and correspondence culminating in a letter from the ODEQ to GCD dated April 3, 2018, parameters analyzed in RP well samples were refined based upon past detections. See correspondence in Appendix A.

4.9.1.4 Evaluation of the Efficacy of the Corrective Action Program

GCD must use existing groundwater monitoring data to ascertain whether the Corrective Action Program has been effective. Per Section IV.I.4.e., the permit allows the facility to return to detection monitoring if data from three consecutive years demonstrates that there has been no exceedance of the groundwater protection standard. This demonstration is based upon empirical data and statistical analysis of the data collected from the monitoring network.

GCD has conducted that evaluation and has found the following:

Slurry Trench

Potentiometric mapping shows that the hydraulic gradient across the slurry wall (as measured by ground water elevations up-gradient and down-gradient of the slurry wall) is moving toward equilibrium. This is best observed by examining the potentiometric maps supplied with the previous annual groundwater reports. These maps indicate that although the effect is less evident with time, the trench continues to have a beneficial impact by impeding groundwater flow and chemical diffusion across the slurry trench. For this reason, the trench continues to benefit groundwater quality down gradient of the closed impoundment.

Dewatering

During the Term 1 of the permit (1994-2003) the former owner/operator (Eagle Picher) has collected 31,562 gallons of ground water from the MW wells under the dewatering program. Using average concentrations, it was estimated that less than 20 pounds of regulated constituents had been removed from the groundwater at a cost of \$10,000's of dollars. The removal rate was determined to be very inefficient and the dewatering program was becoming more ineffective with time due to decreasing concentrations of regulated constituents in the ground water. Dewatering was discontinued based upon renewal of the original permit (Term 2, issued September 12, 2008).

Groundwater Monitoring

Certain wells and certain parameters meet the criteria for returning to detection monitoring, and certain wells and certain parameters continue to exceed the limits imposed by the Groundwater Protection Standard and/or statistical methods. However, the validity of the statistical comparison was called into question for two reasons:

- the up-gradient and down-gradient groundwater quality data was not contemporaneous; and
- All up-gradient wells in use at the time did not represent background conditions. Specifically, MW-7, MW-8 and BG01a did not appear to represent background conditions (see Retired Wells in Figure 6).

With these doubts, the statistical evaluation was halted, and the monitoring program was revised significantly in April 2018.

Based upon decades of experience with post closure monitoring and evaluation by the ODEQ, GCD recommends the following groundwater monitoring plan for Term 3 of the permit:

4.9.2 PROPOSED TERM 3 GROUNDWATER MONITORING PLAN

4.9.2.1 Point of Compliance

The point of compliance will remain: MW-1, MW-2, MW-3, MW-4, MW-5 and MW-6. Groundwater monitoring in this source area will be discontinued; however, the wells will not be closed at this time. Well closure will be subject to agreement between ODEQ and GCD, and the appropriate permit modification.

4.9.2.2 Groundwater Protection Standard

The Groundwater Protection Standard will remain the concentration limits for the constituents specified in Table 2, unless modified at a later date. Those standards have been updated to reflect current MCL/SMCLs.

4.9.2.3 Compliance Monitoring

Based upon the existing data, the Groundwater Protection Standard has been exceeded beyond the point of compliance (not all wells or all parameters). As a result, the facility cannot return to detection monitoring; therefore, compliance monitoring and corrective action monitoring will continue.

4.9.2.4 Constituents of Concern

Tables 1 and 2 identify the constituents and parameter of concern. This list is a subset of the constituents of concern identified in the previous post closure permits (Terms 1 and 2), based upon persistence and concentrations over the term of previous monitoring. As discussed later in this document, and seen in Table 1, not all Table 2 constituents and parameters will be tested in all wells each monitoring event.

4.9.2.5 Groundwater Sampling and Analysis

The monitoring program will include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide a reliable indication of groundwater quality up gradient and down gradient of the waste management area.

The groundwater sampling will be conducted in general accordance with the following protocol:

Prior to sample collection, trained field personnel will measure (gauge) the static water level in each active well using an electronic water level indicator.

Following gauging activities, each active monitoring well will be sampled using a low-flow methodology. Field measurements of temperature, pH, and conductivity will be performed at recorded intervals to confirm well recharge stabilization. Once stabilization is confirmed field parameters will be collected and groundwater samples will be collected in laboratory-provided, pre-preserved sample containers.

The sample containers will be properly labeled, and a chain-of-custody form will be completed for transfer of the collected samples to the laboratory. The sampler will retain a copy of the signed chain-of-custody showing when and to whom samples were relinquished. Collected samples will be analyzed for one or more of the parameters specified in Table 2. This sampling protocol is detailed in the Sampling and Analysis plan (SAP) provided in Appendix D.

4.9.2.6 Background Water Quality Determination

Up gradient Wells

Currently, the facility operates in the compliance monitoring mode based upon the fact that certain parameters in certain down gradient wells continue to exceed the Groundwater Protection Standard as measured by the empirical data and/or statistical methods applied to the groundwater data.

BG-01: Well BG-01 was installed near the southwest corner of the former Eagle Picher property close to municipal water tanks along Highway 69A. Although not located on

GCD-owned property, GCD has access to this location. This well is positioned up-gradient of the closed impoundment and should be unaffected by nearby Ceradyn and Umicore manufacturing operations. For this reason, water samples collected from BG-01 would be representative of the local groundwater quality¹ and may be used to provide background water quality data.

MW-7 and MW-8: During Terms 1 and 2 of the permit, samples from monitoring wells MW-7 and MW-8 were used to represent background water quality based upon their up-gradient position relative to the closed impoundment. While it is true samples from MW-7 and MW-8 represent groundwater quality up-gradient of the closed impoundment, they do not clearly represent background water quality due to their proximity to the source, and they may they have been impacted by manufacturing operations (Umicore) immediately up-gradient of their location.

GCD will:

1. Utilize BG-01 to monitor background water quality on an annual basis. See Figure 7 and Table 1.
2. Discontinue use of MW-7 and MW-8 due to their proximity to manufacturing operations. MW-7 and MW-8 are traditionally hydraulically up-gradient of the closed impoundment, but, are close to the source area and have not been found to be representative of background water quality. See Retired Wells in Figure 6.

4.9.2.7 Point of Compliance (POC) Monitoring

To date, ground water monitoring data indicates the POC wells MW-1 through MW-6 have been impacted by a release from the closed impoundment. POC wells are also a significant distance from the down gradient property line and are situated up-gradient of two other sets of groundwater monitoring wells (RPs and RMs). Furthermore, MW-1 through MW-6 are within the source area. For these reasons, they do not provide critical data. Sampling and analysis will be discontinued; however, the wells will not be closed at this time. Well closure will be subject to agreement between ODEQ and GCD, and the appropriate permit modification.

GCD will:

1. Discontinue monitoring MW-1 through MW-6.
2. Not close wells MW-1 through MW-6 without permission from the ODEQ.

4.9.2.8 Slurry Wall Monitoring (RP) Wells

The RP wells (RP-1 through RP-4) provide data regarding the performance of the slurry trench and down gradient movement of any impact identified in the POC wells. For these reasons they are predictive of important factors such as natural or engineered attenuation, contaminant degradation and the rate of contaminant travel. RP wells are also a significant distance from the down gradient property line and are situated up gradient of one other set of groundwater monitoring wells (RMs). They therefore, provide important data and warrant regular monitoring. Ultimately, the RP wells may be used to demonstrate source containment.

¹ Local groundwater quality has been affected by historic lead and zinc mining operations.

GCD will:

1. Monitor RP-1 through RP-4 on an annual basis. See Figure 7 and Table 1.

4.9.2.9 Remedial Action Monitoring (RM) Wells

The RM wells (RM-101, RM-102, RM-102B and RM-103) provide data regarding down gradient movement of any impact identified in the POC and RP wells. For these reasons they are predictive of important factors such as natural or engineered attenuation, contaminant degradation, the rate of contaminant travel and any potential off-site impact. Ultimately, the RM wells may be used to demonstrate source containment.

Although the RM wells are not located on the downgradient property line, there are no other monitoring wells down gradient of the RM wells. They therefore, provide important data and warrant regular monitoring.

GCD will:

1. Monitor RM-101, RM-102, RM-102B and RM-103 on an annual basis. See Figure 7 and Table 1.

4.9.2.10 Appendix IX Surveillance

Appendix IX to Part 264 contains a master list of groundwater monitoring constituents. During Terms 1 and 2 of the permit Appendix IX surveillance was used to determine whether additional hazardous constituents from the Appendix IX list were actually present in the uppermost aquifer and, if so, at what concentration. To accomplish this, GCD conducted enhanced sampling, herein referred to as surveillance. If the surveillance indicated that Appendix IX constituents were present in the ground water that had not already been identified in the permit as monitoring constituents in Table 2, GCD was required to resample within one month and repeat the analysis. If the second analysis confirmed the presence of new constituents, GCD reported the concentration of these additional constituents to the ODEQ within fourteen days after receipt of data from the second analysis and added them to the monitoring list.

The value of Appendix IX surveillance decreased over time as the plume stabilized. No new constituents have been added as a result of this analysis since the Q4 2013 sampling event. For this reason, Appendix IX surveillance will be discontinued.

GCD will:

1. Discontinue Appendix IX surveillance.

4.9.2.11 Analyte Removal

Monitoring constituents not detected above the laboratory reporting limit for at least 3 consecutive years may be removed from the groundwater monitoring list.

4.9.2.12 Well Retirement

With the exception of RM wells, GCD may petition that a well be retired from the monitoring plan if there has been no exceedance of the groundwater protection standard

identified in Table 2 for all analytes in the last 3 consecutive years. A data summary will accompany any request for a well retirement. In the event the petition is approved, the well will remain in place; however, samples will no longer be collected and evaluated with the following exception. The groundwater elevation in the retired well may be established to enhance the potentiometric surface mapping.

4.9.2.13 Reporting

On an annual basis, GCD will submit a groundwater monitoring report that contains:

1. a summary of the results of the sampling and analysis conducted the previous 12 months;
2. results from the required statistical evaluation, if any;
3. potentiometric maps depicting the groundwater surface from each annual monitoring event from the previous year;
4. an isoconcentration map for any analyte detected above the groundwater protection standard identified in Table 2.
5. a discussion regarding analyte removal and well retirement per Sections 4.9.2.11 and 4.9.2.12 above; and
6. an evaluation of the previous year's data.

4.9.2.14 Further Corrective Action

40 CFR Part 264.100 allows an owner/operator a reasonable time period to implement a corrective action program. At the Quapaw facility, corrective action has been previously implemented in conjunction with post closure activities, as described in Section 4.9.1.3 above. GCD recognizes that additional corrective action may be required if post closure escape of constituents threatens human health or the environment. Presently, RM wells have demonstrated on-site containment of constituents of concern.

GCD believes it is reasonable to proceed as described because a corrective action program has already been implemented at the facility during the initial stages of post closure; and because there is no reason to believe there is any threat to human health or the environment beyond the facility boundary. In addition, the ODEQ has available alternative enforcement mechanisms in the event an unreasonable threat to human health or the environment is identified.

4.9.3 SUMMARY

Previous monitoring plans were developed at the confluence of a ground water assessment, impoundment closure, enforcement-driven corrective measures and a RCRA Facility Investigation. As a result, two different monitoring programs (compliance and plume) were developed and then merged into a single permitted facility-wide monitoring program. To accomplish this, collection of background data was expedited to formulate and quickly implement the monitoring plan. Through out the first 10 years of Post Closure monitoring (Term 1), the monitoring proved out the beneficial effects of the corrective actions taken, but, did not definitively define the limits or significance of an advancing plume (that is, whether a groundwater protection standard has been met or exceeded).

The Term 2 ground water monitoring plan leveraged the existing data and filled data gaps necessary to determine the significance of potential exceedances identified during the initial stages of post-closure with the intent of defining the plume and determining if further corrective action is required. Appendix IX surveillance was added as a mechanism to ensure the list of constituents monitored was representative of any potential advancing contaminants. Well BG-01a was added, and ultimately closed, and the value of background data collected from MW7 and MW-8 was evaluated. RM-102b was added to replace RM-104 which was found to be side-gradient. The statistical evaluation of data was critically evaluated, and contingent plans were added to replace or remove wells as necessary to achieve the monitoring objectives. Also, the frequency of analysis was modified to focus on down gradient monitoring to ensure protection of human health and the environment.

The proposed Term 3 ground water monitoring plan is informed by more than two decades of monitoring, a stabilized plume that is contained on-site, and ODEQ input (see Appendix A). It includes the following features to streamline monitoring; detect the potential post-closure escape of hazardous constituents from the closed impoundment; and be more protective of human health and the environment:

- Eliminates monitoring at the point of compliance where exceedances are known to occur close to the source. Monitoring of MW-1 through MW-8 will be discontinued;
- Limits the collection of background data to BG-01;
- Discontinues Appendix IX analysis (surveillance) based upon stabilized conditions;
- Allows for the retirement of wells where no exceedances are occurring for 3 consecutive years (modeled after Corrective Action requirements);
- Retains RM wells as sentinel-wells close to the downgradient property line;
- Establishes RP and RM wells as the focal point of monitoring; and
- Provides an opportunity to demonstrate on-site containment, or lack of risk to receptors, for final closure.

The ground water monitoring plan is summarized in the following Table 1:

**TABLE 1
GROUNDWATER MONITORING PLAN SUMMARY (TERM 3)
GCD RESOURCES, LLC
QUAPAW, OKLAHOMA**

WELLS	PROPOSED MONITORING REQUIREMENTS	
	ANALYTE(S)	FREQUENCY
BG-01 Background Well <i>see 4.9.2.6</i>	As, Ba, Cd, Cl-, Co, Cr, F-, Hg, Mn, Na, Ni, Pb, Sb, Se, SO4, Zn, pH, SC Static Water Elevation	Annual Each sampling event
RP Slurry Wall Wells <i>see 4.9.2.8 and 4.9.2.10</i>	As, Ba, Cd, Cl-, Co, Cr, F-, Hg, Mn, Na, Ni, Pb, Sb, Se, SO4, Zn, pH, SC Static Water Elevation	Annual Each sampling event
RM Remedial Action Wells <i>see 4.9.2.9</i>	Cd, Mn, pH, SC Static Water Elevation	Annual Each sampling Event

Abbreviations:

As/Arsenic
 Ba/Barium
 Cd/Cadmium
 Cl-/Chloride
 Co/Cobalt
 Cr/Chromium
 F-/Fluoride
 Hg/Mercury
 Mn/Manganese

Na/Sodium
 Ni/Nickel
 Pb/Lead
 Sb/Antimony
 Se/Selenium
 SO4/Sulfate
 Zn/Zinc
 pH/pH
 SC/Specific Conductance

**TABLE 2
GROUNDWATER PROTECTION STANDARD
GCD RESOURCES, LLC
QUAPAW, OKLAHOMA**

Constituents and Parameter of Concern	Concentration of Concern (mg/L)	Source of Standard¹
Arsenic (As)	0.01	MCL ²
Barium (Ba)	2.0	MCL
Cadmium (Cd)	0.005	MCL
Chloride (Cl ⁻)	250	SMCL ³
Cobalt (Co)	0.006	Regional Screening Levels ⁴
Chromium (Cr)	0.1	MCL
Fluoride (F ⁻)	4.0	MCL
Mercury (Hg)	0.002	MCL
Manganese (Mn)	0.05	SMCL
Sodium (Na)	390.66	Upper background limit ⁵
Nickel (Ni)	0.14	OWRB ⁶
Lead (Pb)	0.015	MCL
Antimony (Sb)	0.006	MCL
Selenium (Se)	0.05	MCL
Sulfate (SO ₄)	250	SMCL
Zinc (Zn)	5	SMCL
pH	6.5 – 8.5 (standard units)	SMCL
Specific Conductance (SC)	2962 (µmhos/cm)	Upper background limit ⁵

¹ The statistical upper limit or other appropriate value will be used when MCL or SMCL values are not published, or background levels exceed the MCL or SMCL.

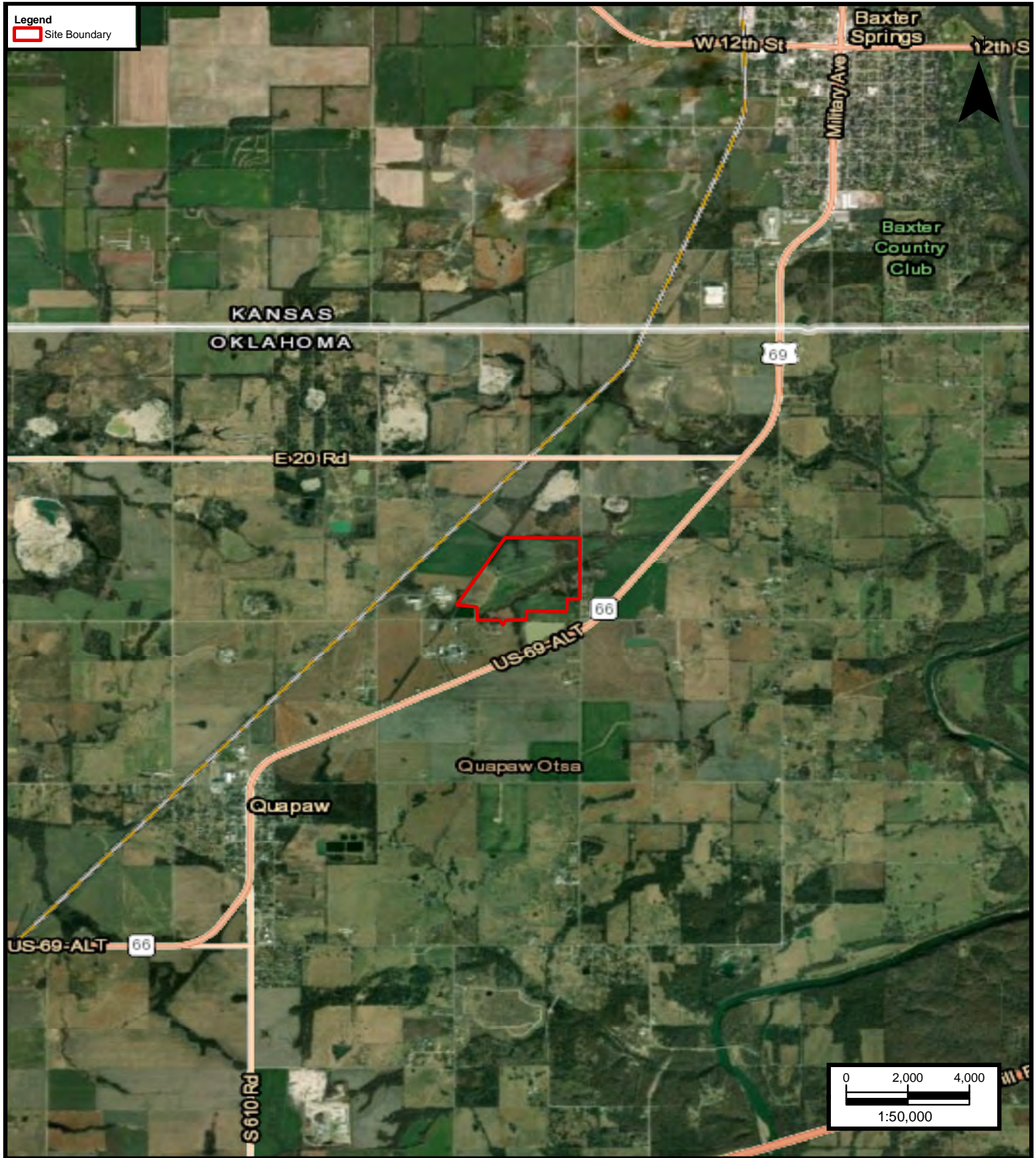
² Maximum Contaminant Level (MCL) for Primary Drinking Water Regulations


³ Secondary MCL from Secondary Drinking Water Regulations

⁴ Regional Screening Levels for Chemical Contaminants at Superfund Sites

⁵ Based upon last statistical analysis of GCD groundwater data

⁶ OAC Title 785 Chapter 45 Appendix I Criteria for Groundwater Protection (*Unofficial*)



Legend
 Site Boundary

Vicinity Map
 GCD Resources, LLC
 Quapaw PC Renewal
 Ottawa County, OK
 Sections 24, 25 T29N R23E

Project No. 453432

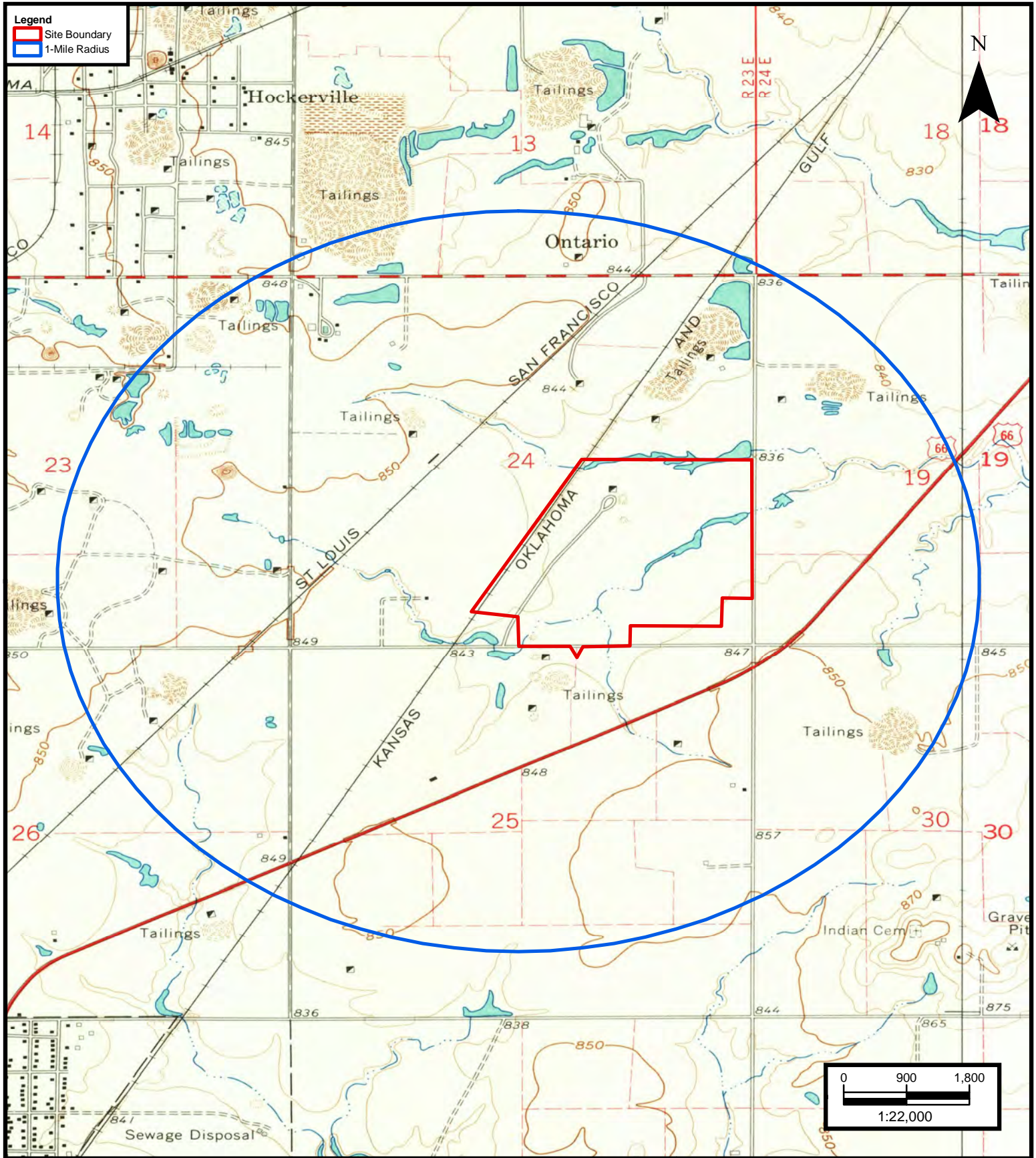


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FIGURE #

1

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Topographic Map
GCD Resources, LLC
Quapaw PC Renewal
 Ottawa County, OK
 Sections 24, 25 T29N R23E

Project No. 453432



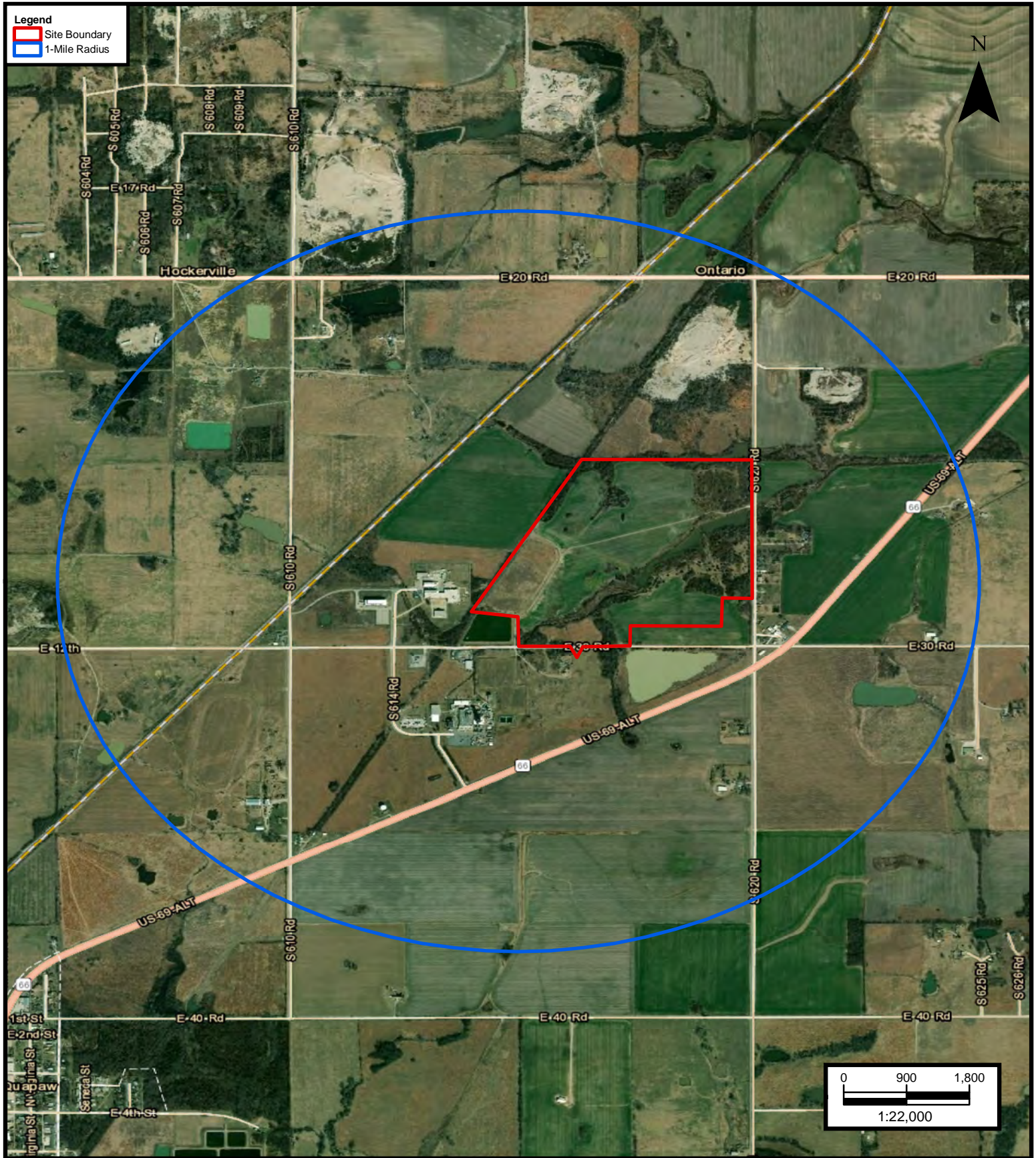
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FIGURE #

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Aerial Map
 GCD Resources, LLC
 Quapaw PC Renewal
 Ottawa County, OK
 Sections 24, 25 T29N R23E

Project No. 453432

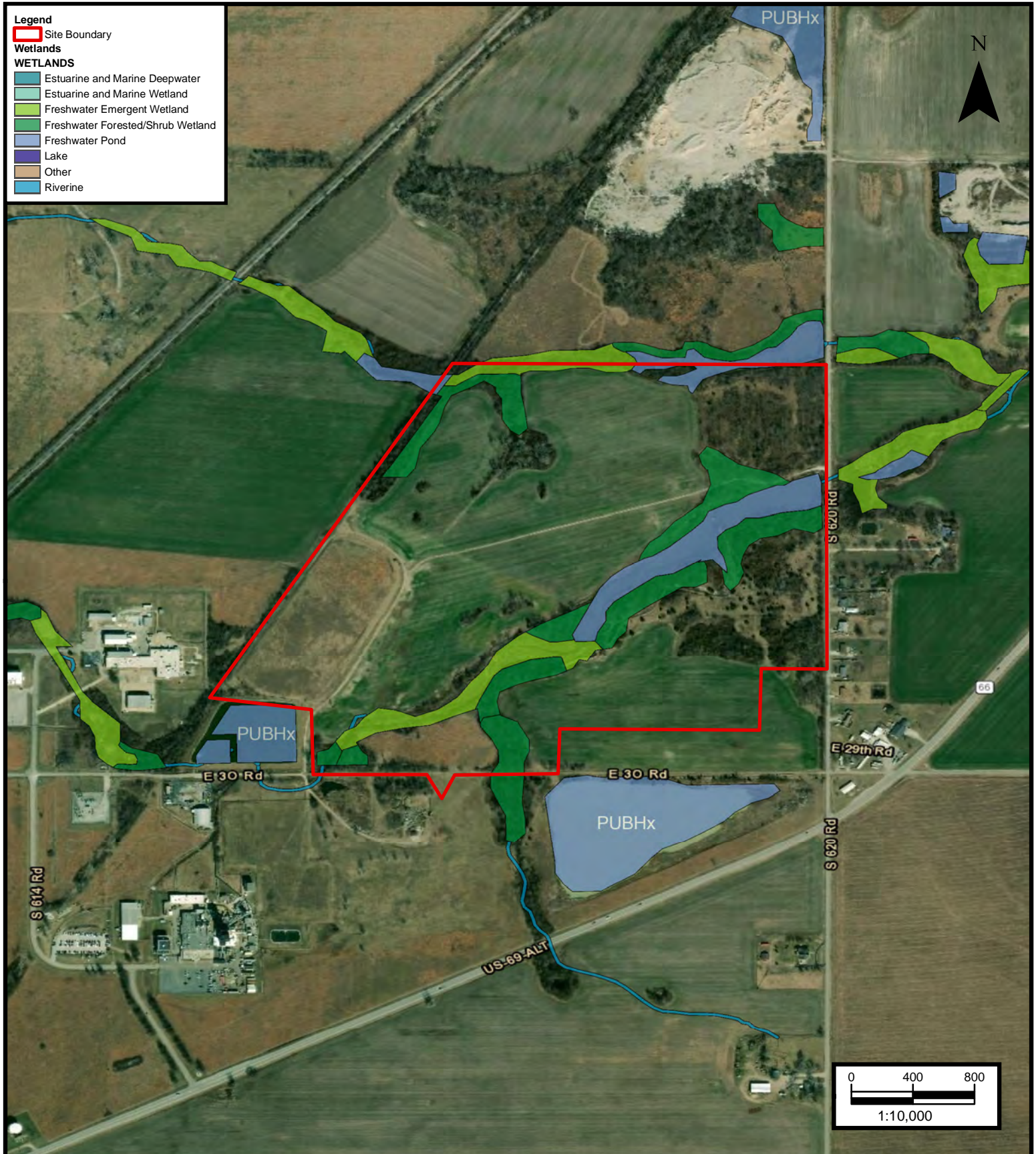


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FIGURE #

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Water Resources Map
GCD Resources, LLC
Quapaw PC Renewal
 Ottawa County, OK
 Sections 24, 25 T29N R23E

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FIGURE #

4








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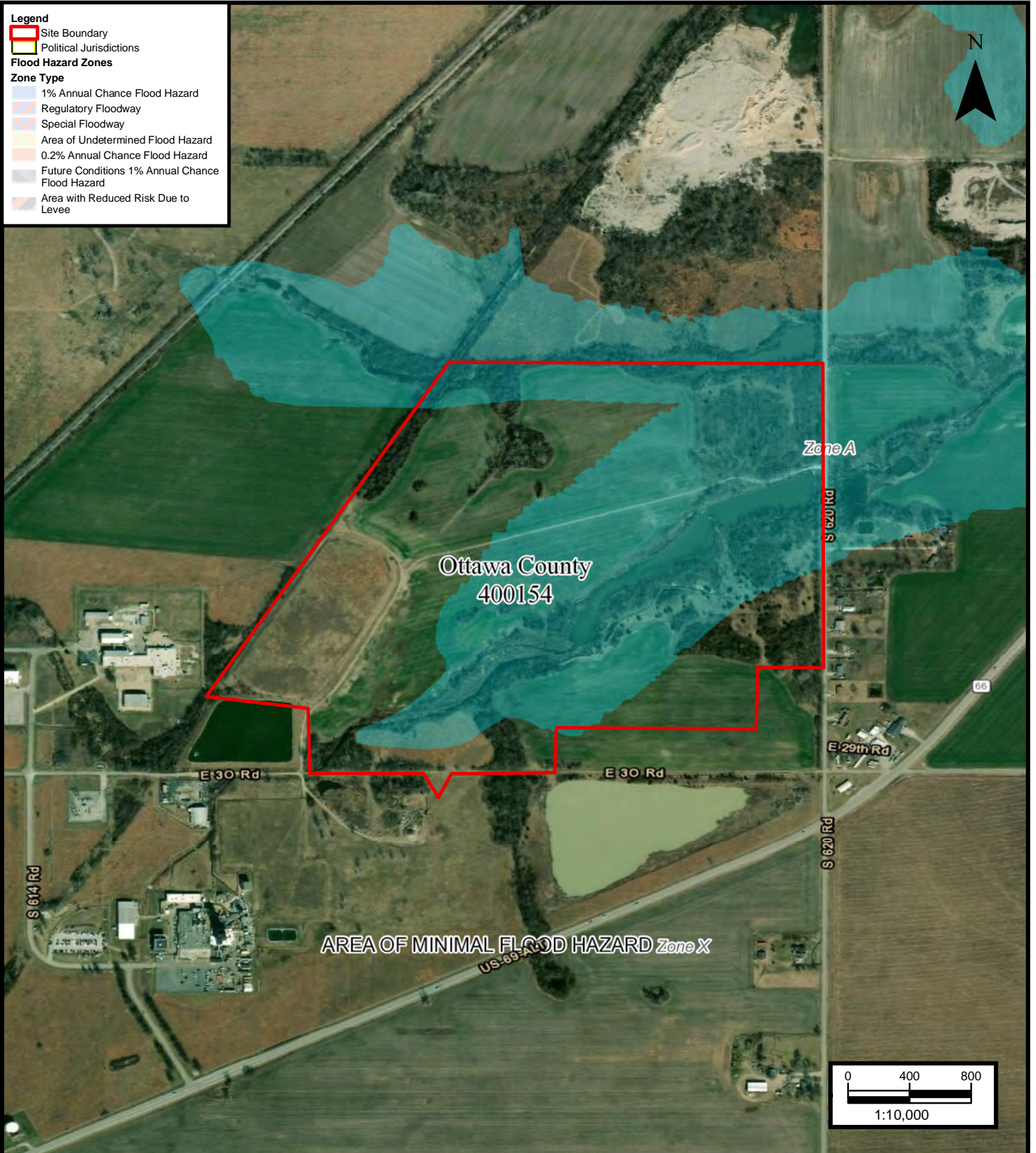
Legend

-  Site Boundary
-  Political Jurisdictions

Flood Hazard Zones

Zone Type

-  1% Annual Chance Flood Hazard
-  Regulatory Floodway
-  Special Floodway
-  Area of Undetermined Flood Hazard
-  0.2% Annual Chance Flood Hazard
-  Future Conditions 1% Annual Chance Flood Hazard
-  Area with Reduced Risk Due to Levee



Flood Plain Map eff. 8/5/2010
 GCD Resources, LLC
 Quapaw PC Renewal
 Ottawa County, OK
 Sections 24, 25 T29N R23E

Project No. 453432



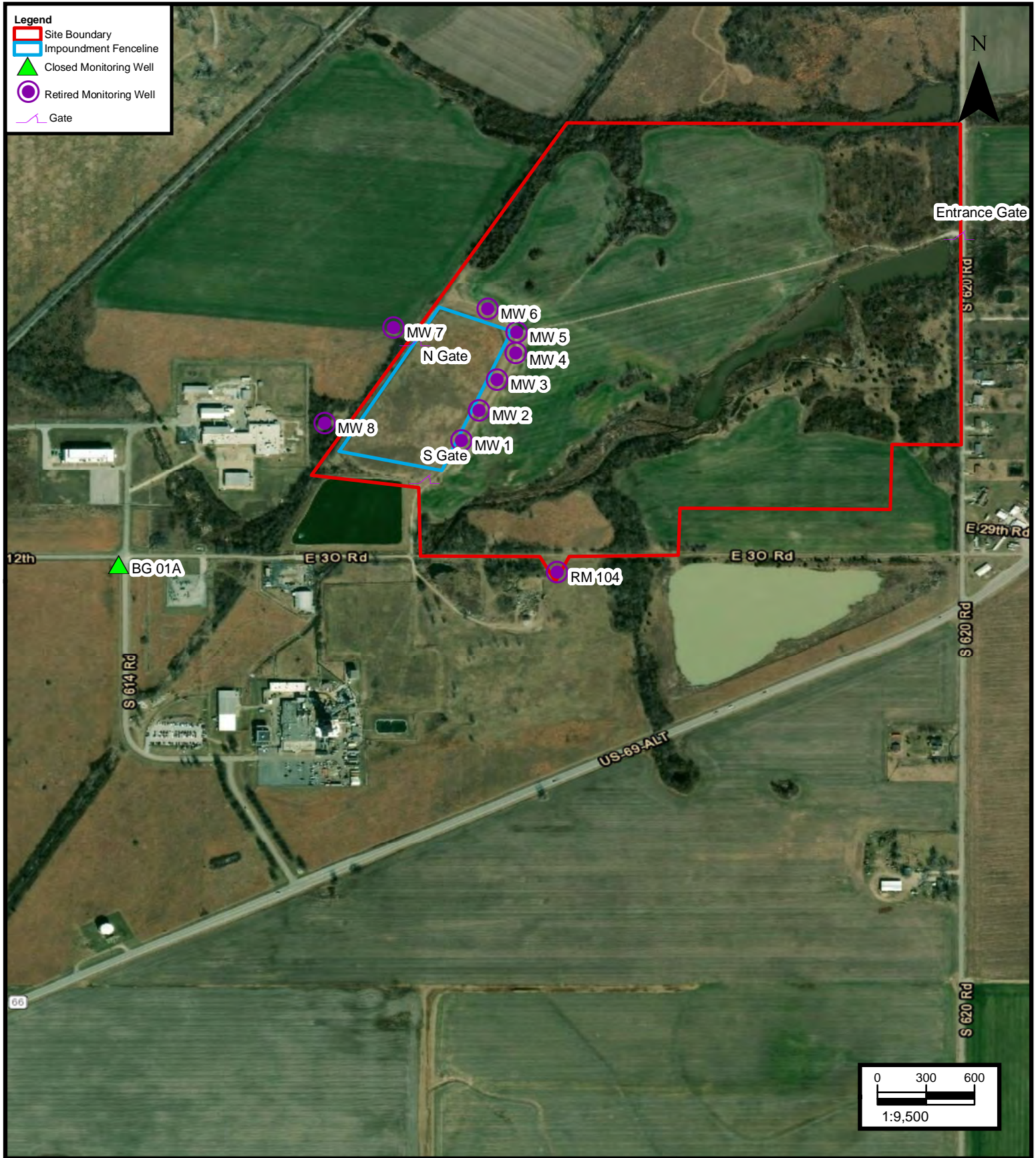
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FIGURE #

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Retired Monitoring Wells Map
 GCD Resources, LLC
 Quapaw PC Renewal
 Ottawa County, OK
 Sections 24, 25 T29N R23E

Project No. 453432



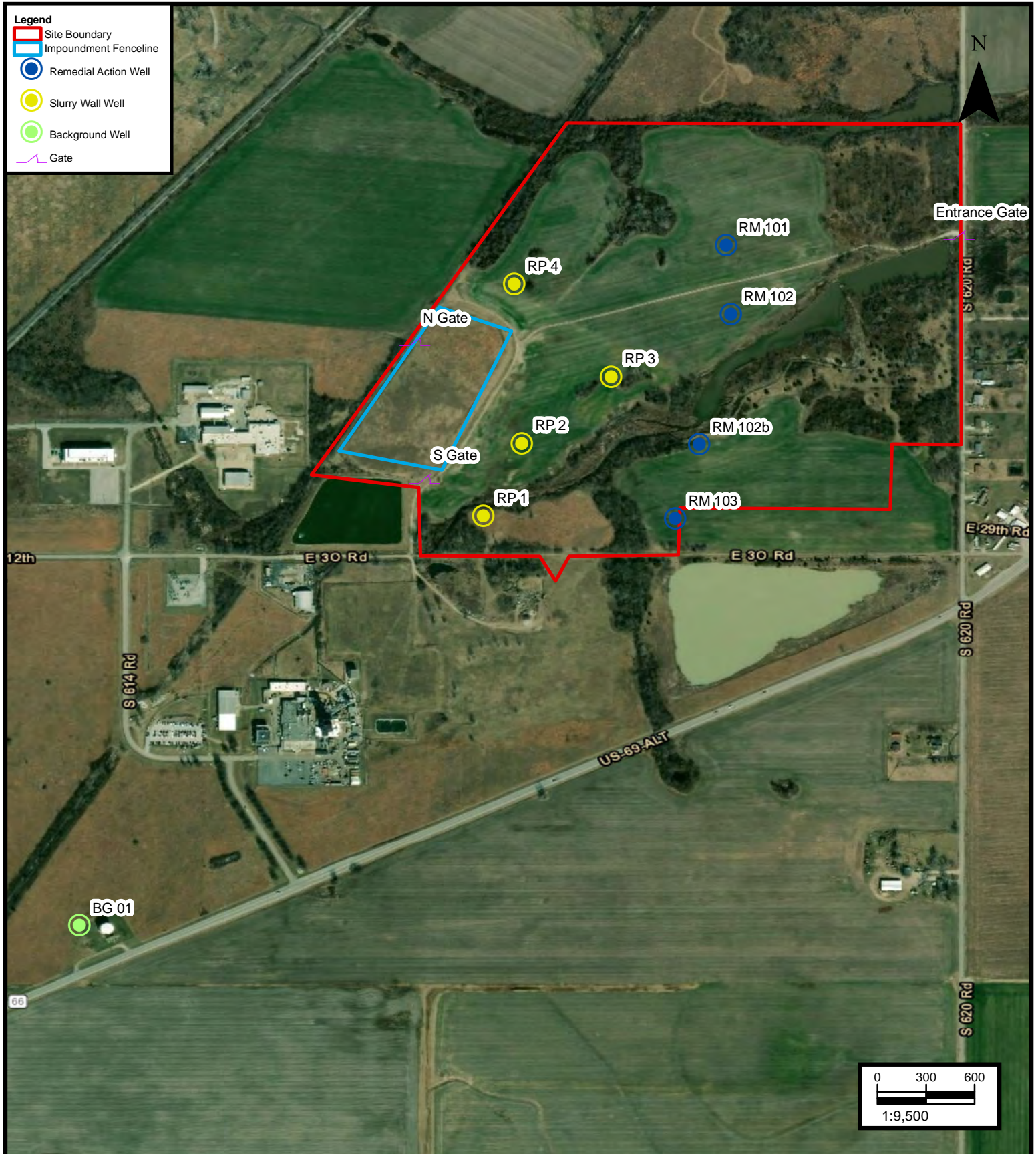
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FIGURE #

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Active Monitoring Wells Map
GCD Resources, LLC
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FIGURE #

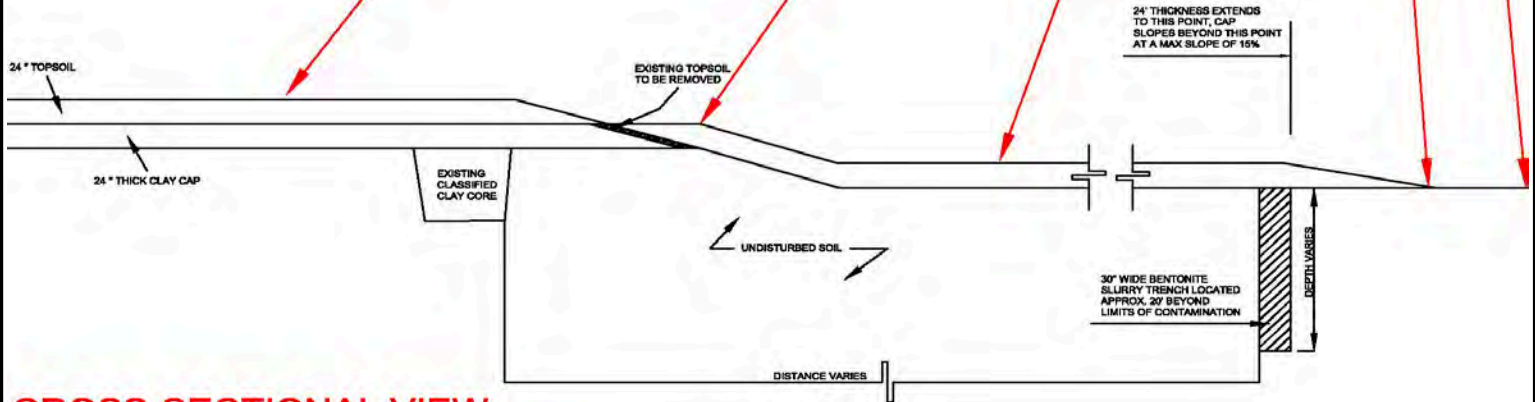
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**PLAN VIEW
NOT TO SCALE**

CLOSED
HAZARDOUS WASTE
SURFACE IMPOUNDMENT

CROSS-SECTIONAL VIEW AREA



**CROSS-SECTIONAL VIEW
NOT TO SCALE**

Sectional View Map
GCD Resources, LLC
Quapaw PC Renewal
Ottawa County, OK
Sections 24, 25 T29N R23E

Project No. 453432

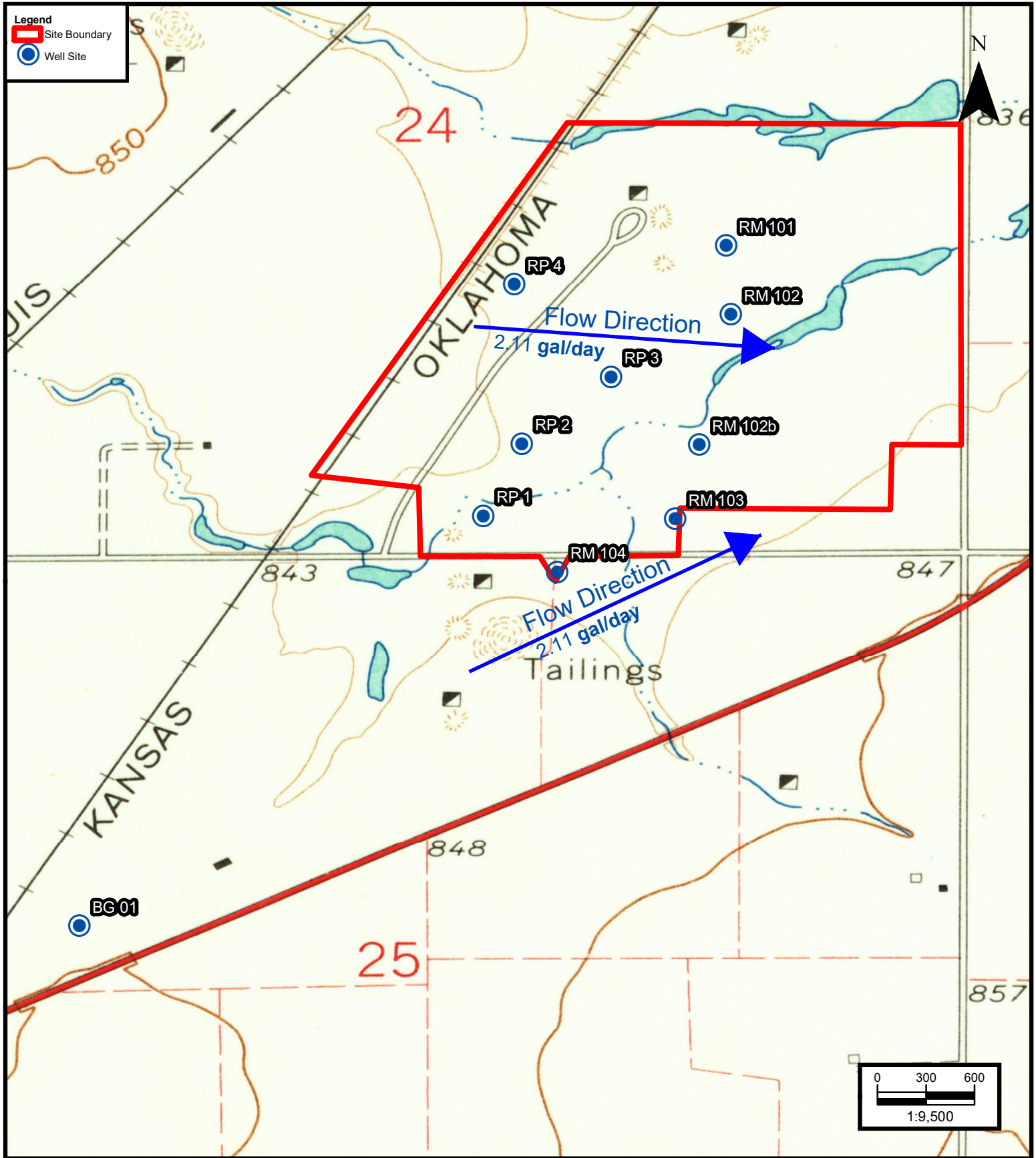


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FIGURE #

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Groundwater Flow Map
 GCD Resources, LLC
 Quapaw PC Renewal
 Ottawa County, OK
 Section 24, 25 T29N R23E

Principal Aquifer: Roubidoux Formation

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FIGURE #

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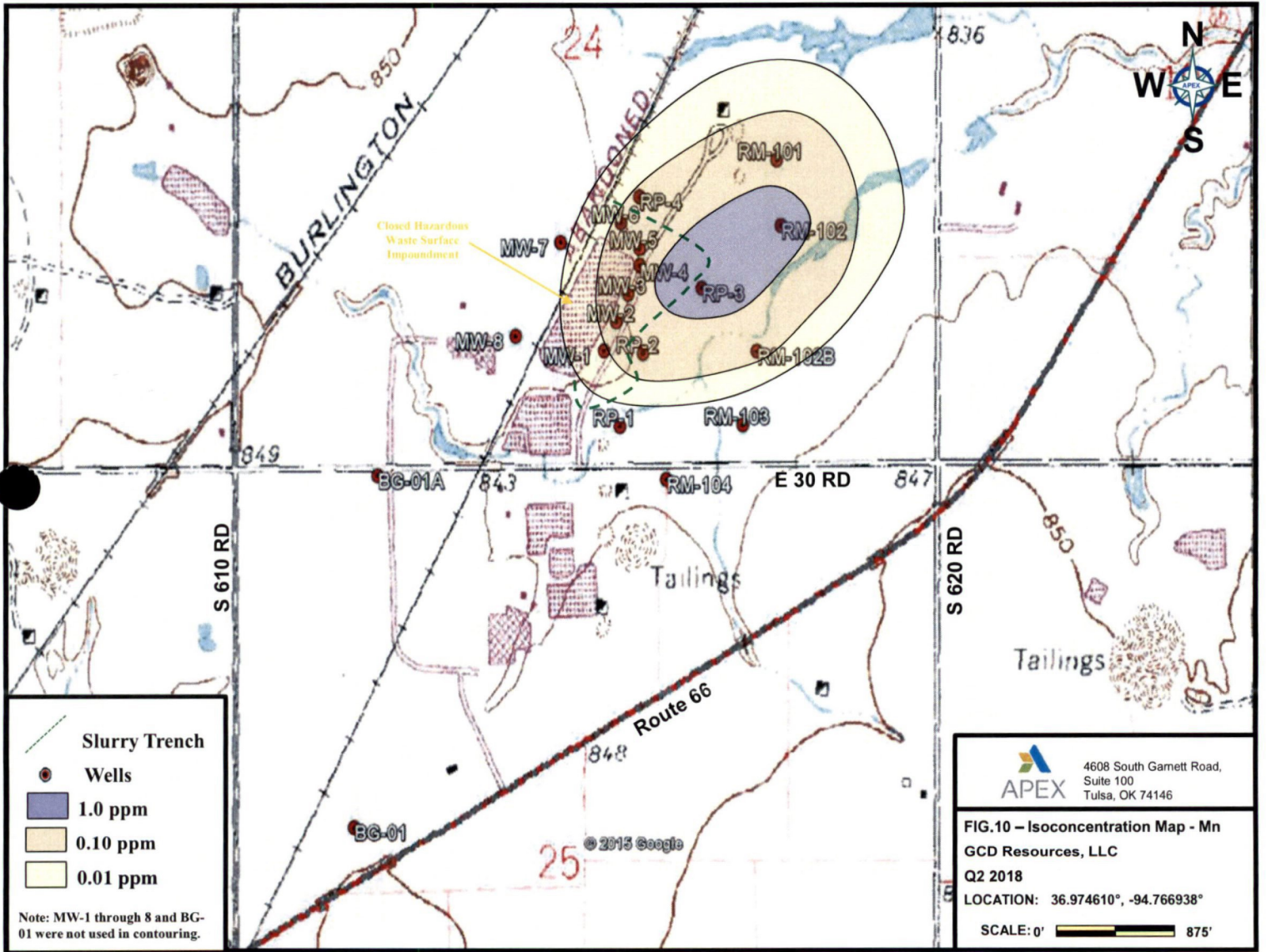


FIG.10 – Isoconcentration Map - Mn
 GCD Resources, LLC
 Q2 2018
 LOCATION: 36.974610°, -94.766938°
 SCALE: 0' 875'

**GCD RESOURCES, LLC
QUAPAW, OKLAHOMA**

PERMIT ATTACHMENT 6

SAMPLING AND ANALYSIS PLAN

SAMPLING AND ANALYSIS PLAN

This Sampling and Analysis Plan (SAP) has been written to support groundwater monitoring activities at the GCD Resources, LLC (GCD) facility in Quapaw, Oklahoma. During the Post Closure period, GCD will be required to collect and evaluate groundwater samples from the existing groundwater monitoring network, and may under unusual circumstances, be required to replace certain wells as the groundwater movement and contaminant movement is better defined. The following protocols provide guidance for these activities.

1.0 Groundwater Monitoring Well Installation

In the event wells are added to or replaced within the groundwater monitoring network, installation of groundwater monitoring wells will be supervised by a qualified geologist. The monitoring wells will be installed in conformance with guidelines presented in the RCRA Ground-Water Monitoring Draft Technical Guidance document (U.S. EPA, Office of Solid Waste, November 1992), or other ODEQ approved methodology.

Based on the anticipated lithology and groundwater depths, the wells will be completed as follows:

- Installation of 10 to 15 feet of 2-inch diameter, 0.010-inch machine slotted PVC well screen with a threaded bottom cap (Screen length will be determined in the field by the environmental professional based on the total depth of the boring and the apparent height of the water column. The intent is to set approximately five feet of screen above and below the potentiometric surface.);
- Installation of 2-inch diameter, threaded, flush-joint PVC riser pipe to grade surface;
- Addition of pre-sieved 10/20 grade silica sand for annular sand pack around the well screen from the bottom of the boring to approximately 2 feet above the top of the well screen (Based on the anticipated lithology 10/20 grade silica sand will provide an adequate filter pack, but, may be varied is necessary.);
- Placement of 2 feet of hydrated bentonite pellets above the sand pack;
- Installation of a steel or heavy gauge PVC monitoring well stick-up with a locking well cap inset in a concrete well pad contoured to resist run-on from the surrounding ground surface.

Each well will be notched or marked on the north side of the top of casing to establish a reference point for the purpose of future gauging and surveying. A boring log for each well installation will be prepared by the drilling contractor and submitted to GCD for documentation and retention purposes.

2.0 Well Development / Surveying / Gauging

The monitoring wells will be developed after a sufficient time interval to allow the grout seal to set, approximately 24 to 48 hours after completion. This will involve surging the groundwater back and forth across the well screen, followed by bailing using a disposable polyethylene bailer, or pumping the groundwater from the wells. This process will continue until the monitoring wells produce groundwater that is relatively free of fine sediment. Produced purge water will be temporarily stored onsite in labeled 55-gallon containers to await proper composite sampling and future disposal. The container labels will identify the apparent contents of the container and the initial accumulation date.

All monitoring wells will be topographically surveyed to vertical and horizontal coordinates by a licensed land surveyor. Coordinates will be documented using a Universal Transverse Mercator, state planar coordinate system, or latitude and longitude grid. Elevations for ground surface and top of casing for each well will be surveyed. The top of casing in each monitoring well will be surveyed from the north side where the previously noted mark or notch has been designated as a reference for all gauging events. The surveyor will designate a permanent arbitrary datum onsite for use to reproduce future survey requirements.

At least two weeks after the wells have been developed, the monitoring wells will be gauged with an oil/water interface probe to record the depth to groundwater beneath the site. The recorded information will be used in conjunction with survey data to generate a groundwater potentiometric surface map to evaluate groundwater flow direction in the vicinity of the site.

3.0 Groundwater Sampling

Following gauging activities, the monitoring wells will be sampled using low-flow methodology. Field measurements such as temperature, pH, and conductivity will be performed at recorded intervals during purging activities to confirm well recharge stabilization. Groundwater samples will be collected quiescently using a low-flow peristaltic pump and dedicated tubing to fill laboratory-provided, pre-preserved (where appropriate) sample containers. If/when sampling for volatile organics, care will be taken to assure that no headspace is left in the volatile organic analysis (VOA) container.

The sample containers will be properly labeled and delivered under the chain-of-custody control to an ODEQ-certified laboratory for analyses as outlined in U.S. EPA, Test Methods for Evaluation Solid Waste, SW-846, 3rd Edition, November 1986, as amended.

4.0 QC Samples for Groundwater

During the course of the groundwater monitoring, QC samples will be collected to help ensure that cross-contamination of samples did not occur from improperly cleaned

Sampling and Analysis Plan

equipment or to help ensure comparability of laboratories. Two types of QC samples for groundwater collected under this permit may be obtained as follows:

1. Field duplicates
2. Field blank

One field duplicate sample will be collected for each complete sampling event (typically nine wells). The field duplicate will be collected to help ensure that the analytical laboratory can provide reproducible analytical results. For groundwater samples, the duplicate samples will be collected by pumping water from the low-flow equipment into two identical sample containers. Duplicate samples will be so noted in the field notebook, but, will have a sample identification number different from that of its counterpart.

As an alternative to field duplicates, the environmental professional may collect one field blank sample per sampling event to document the environmental conditions under which sampling occurred. Distilled water will be poured into a sample container in the field during the sampling event. The sample will be submitted to the laboratory under chain of custody and tested for the most probable cross-contaminant.

5.0 Management and Disposal of Contaminated Waste

All waste materials generated from drilling, decontamination, and sampling activities will be collected in 55-gallon, DOT-approved containers (typically poly drums) and stored onsite until a determination is made as to appropriate disposal options. Potential waste materials which may be generated as a result of RCRA post closure monitoring include:

- Personal protective equipment (PPE);
- Drill cuttings;
- Decontamination fluids;
- Potentially impacted groundwater; and/or
- Decontamination pad materials (such as plastic sheeting).

Materials of the same type will be segregated to the extent possible. Discarded PPE will be sealed in plastic trash bags prior to being placed in a separate container for disposal.

If process knowledge is insufficient, composite samples will be collected from each waste stream (soil and water) for laboratory analyses required for disposal. Upon approval from the disposal facility, GCD will contract with a state-licensed disposal contractor, for transport and disposal of the subject containers to the designated facility. Satellite accumulation will occur at the well site. Once containers are filled, it is anticipated that waste sampling, agency approval, and transport and disposal can be completed within 90 days of generation.

Sampling and Analysis Plan

Copies of executed disposal manifests (or shipping papers) documenting proper disposal will be retained in the company files.

6.0 Equipment Decontamination

Equipment which may come into contact with subsurface soils or groundwater during drilling or sampling activities will be properly cleaned and decontaminated prior to use and between boring installations or sampling activities to minimize the risk of cross-contamination. Non-dedicated equipment to be decontaminated may include drill rods, augers, bits, continuous core barrels, pumps, or field measurement devices. Potable water for all decontamination activities will be provided by the city water supply, or small containers of purified water when large amounts are not required.

Cleaning or decontamination equipment used may include:

- Power washer
- Alconox or other non-phosphate detergent solution
- Wash tubs of various sizes and scrub brushes
- Potable water
- Wash water containment, including plastic sheeting or wash basins
- Distilled or other purified water

Example equipment decontamination procedures to be employed are as follows:

1. All personnel performing decontamination procedures must wear appropriate protective clothing, as specified in the Site-Specific Health and Safety Plan. It is anticipated that monitoring will be conducted under modified Level D protection.
2. All decontamination waste fluids will be collected in suitable containers and stored in an accumulation area onsite until proper disposal options are determined.
3. All non-dedicated sampling equipment must be decontaminated before use, between use, and upon completion of sampling operations.
4. All bits, augers, drill rods, and other down-hole tools must be pressure washed upon mobilization, between boring locations, and upon demobilization. Some equipment may be washed with laboratory grade detergent and then rinsed with potable water.
5. All sampling and field measurement equipment shall be decontaminated using laboratory-grade detergent/potable water solution, followed by a potable water rinse, followed by a distilled water rinse.

Sampling and Analysis Plan

6. All cleaning or wash buckets or tubs will be decontaminated using laboratory grade detergent/potable water solution and potable water rinse upon mobilization, between boring locations, and upon demobilization, as needed.

7.0 Control of Measuring and Test Equipment

Field Equipment

A variety of sampling and monitoring equipment will be used for this RCRA monitoring. Proper operation of equipment shall be verified by calibration or other appropriate checks.

Appropriate requirements for calibration procedures, calibration frequency, and equipment maintenance will be performed in the field. In general, these operational and maintenance procedures will be in accordance with the manufacturer's recommendations and specifications.

Laboratory Equipment

The subcontract analytical laboratory must maintain an acceptable description of laboratory standard operation procedures, calibration procedures and frequency, operational checks, equipment maintenance, provisions for corrective action, sample receipt and inspection procedures, sample tracking and storage procedures, standards traceability, personnel training procedures, and record keeping. At a minimum, these procedures will follow all laboratory guidelines in appropriate U.S. EPA analytical procedures for methods frequency. All calibration activities will be adequately documented in logbooks to identify date and time of calibration, expected results, actual results, and analyst.

Sampling Procedures

The sampling procedures that will be used are based primarily on approved protocols developed by ASTM and the U.S. EPA. The use of standard procedures will help assure the following:

- All field work will be performed utilizing sound technical guidelines and acceptable industry standards;
- Results of activities will be comparable; and
- All activities performed will be properly documented.

The standard procedures for sampling, sample handling and custody control, physical measurements, and decontamination provided in this SAP will be employed.

Sampling and Analysis Plan

Requirements for Field Personnel

All sampling and field measurement personnel will be required to read, understand, and have with them in the field the Sampling and Analysis Plan and any Site-specific Health and Safety Plan developed for the activity.

This will help ensure that all requirements and specifications are readily available to personnel. In addition, all field personnel will have completed an OSHA 40-hour HAZWOPER (29CFR 1910.120) course and be current for 8-hour OSHA Annual Refresher Training.

Laboratory Analytical Procedures

The subcontract laboratory will use standard and current EPA test methods including SW-846 for Solid Wastes, EPA 600/4-79-020 for Water and Wastes, and EPA 600/4-82-057 for Industrial Wastewater as appropriate. The laboratory must be ODEQ certified and preferably be NELAC accredited. If performing Appendix IX analyses, the laboratory reporting limits must be less than the respective Maximum Contaminant Level, or equal to Practical Quantification Limits stated in SW-846. Their QA/QC program will include programs for:

Precision

Precision will be evaluated by the analysis of the replicate samples and will be expressed as a relative percent difference.

Accuracy

Accuracy will be estimated from the analysis of QC samples whose true values are known or from surrogate or matrix spike recovery.

Completeness

Completeness will be reported as the percentage of all measurements made whose results are judged to be valid.

Field Measurement Procedures

Groundwater field measurements, such as pH, temperature, and specific conductance will be gathered in the field using calibrated meters during routine sampling events.

If deemed necessary due to expected contaminant concentrations, field measurements will be taken for health and safety monitoring and onsite screening purposes (i.e., for soils when drilling). The health and safety monitoring may include the use of a calibrated Photoionization Detector (PID), an Organic Vapor Meter (OVM), or similar device, calibrated (typically) to isobutylene.

Analytical screening of samples may also use the PID instrument for head-space screening of drill cuttings for the presence of organic vapors.

Sampling and Analysis Plan

Soil and groundwater samples will be submitted to an ODEQ-approved offsite laboratory for analysis. Specific procedures associated with each sub-task are discussed in the SAP.

8.0 Sample Handling, Storage, and Shipping

GCD, or their qualified designate, has overall responsibility for sample custody and field document control. The custodian will ensure that samplers use the appropriate sample identification and custody records, resolve custody issues in the field, and handle the shipment of samples to the designated laboratory. The custodian will also be responsible for sample security during all sampling or temporary storage activities. A final custody seal will be secured to the shipping containers prior to shipping. The designated laboratory will also have a laboratory sample custodian identified, typically the receiving department.

Sample Labels - Each sample collected, including QA/QC samples, will have a completely filled-in sample label securely attached to the sample container. The person who physically collects the sample is the Sampler and will initial the sample label or Chain of Custody.

Chain-of-Custody Record Sheets - Chain of Custody records provided by the analytical laboratory will be used to record sample custody for this project. The purpose of chain-of-custody procedures is to document the identity and integrity of the environmental samples. Custody records trace a sample from its collection through all transfers of custody to submittal to an analytical laboratory. Internal laboratory records subsequently document the sample custody through final disposition. This form will accompany each sample shipment sent from the field to the laboratory.

Custody Seals - Adhesive custody seals will be used to confirm no tampering of samples has occurred once sealed. Samples may be placed inside a large plastic bag in a cooler and sealed with a custody seal, or the entire sample cooler may be taped and sealed with the custody seal.

Sample preservation and handling prior to shipment will follow procedures outlined in the SAP. Each sample will be identified with a sample identification label and will be listed on the Chain-of-Custody record completed for each sample shipping container. The sampler or custodian will notify the laboratory sample custodian of sample shipment.

Sample storage and handling in the laboratory will be in accordance with laboratory requirements and will be adequate to ensure that custody of the sample is maintained.

Sampling and Analysis Plan

9.0 Use and Maintenance of Field Notes

Field forms will provide the means for recording all data collecting activities performed at the site, including drilling and sampling activities. Entries will be descriptive and detailed.

The following information will be provided in the daily field notes:

- Date
- Project Number and Location
- Start Time
- Weather, including temperature and wind direction information. Weather entries should be updated as needed, at least once daily.
- Identification of field and site personnel
- Signature of person making the entry
- Boring log or well completion information, as required
- Instrument calibration
- Field measurements

Entries into the field notes will also include notes of pertinent conversations with regulatory agency officials, deviations from the SAP and any other significant events or observations.

All entries will be made in indelible ink. Incorrect data entry will be crossed out with a single strike mark and initialed.

Field equipment calibration records will be recorded on the field forms, or in field notebooks dedicated to the specific equipment. At a minimum, the calibration data should include:

- Instrument ID
- Calibration personnel
- Calibration date
- Calibration results
- ID # and name of calibration standard