KOPPERS INC
PERMITTING
MSD007027543
PERMIT 2010

AI 008

enSearch

home login

Koppers Inc

MASTERFILE
RELATED
STATUS
ATTACHMENTS
TASKS

ID	Branch	SIC	County	Basin	Start	End
876	Timber and Wood Products	2491	Grenada	Yazoo River	11/09/1981	

Physical Address (Primary)	Mailing Address
1 Koppers Drive Tie Plant, MS 38960	PO Box 160 Tie Plant, MS 38960

Telecom Type	Address or Phone
Work Phone Number	(662) 226-4584, Ext. 11

Alt ID	Alt Name	Alt Type	Start	End
2804300012	Koppers, Inc.	Air-AIRS AFS	10/12/2000	
876	Koppers Inc Grenada Plant	Air-Notification	05/23/2008	
876	Koppers Inc	Air-Notification	02/10/2010	
096000012	Koppers, Inc.	Air-Title V Fee Customer	12/11/2006	
096000012	*Koppers Industries, Inc.*	*Air-Title V Operating*	*03/11/1997*	*03/01/2002*
096000012	*Koppers Industries, Inc.*	*Air-Title V Operating*	*01/13/2004*	*03/26/2007*
096000012	*Koppers, Inc.*	*Air-Title V Operating*	*03/26/2007*	*01/01/2009*
096000012	Koppers, Inc.	Air-Title V Operating	10/28/2009	09/30/2014
876 001	Koppers Company, Inc. Forest Products	GARD	12/08/1981	
MSR220005	Koppers Industries, Inc.	GP-Wood Treating	09/25/1992	
MSD007027543	*Koppers Industries, Inc.*	*Hazardous Waste-EPA ID*	*08/27/1999*	*01/23/2007*
MSD007027543	Koppers, Inc.	Hazardous Waste-EPA ID	01/23/2007	
HW8854301	*Koppers Industries, Inc.*	*Hazardous Waste-TSD*	*06/28/1988*	*06/28/1998*
HW8854301	*Koppers Industries, Inc.*	*Hazardous Waste-TSD*	*11/10/1999*	*03/26/2007*
HW8854301	*Koppers, Inc. (Owner)*	*Hazardous Waste-TSD*	*03/26/2007*	*09/30/2009*
HW8854301	Koppers, Inc./ Beazer East Inc.	Hazardous Waste-TSD	02/10/2010	01/31/2020
876	*Koppers Industries, Inc.*	*Historic Site Name*	*11/09/1981*	*12/11/2006*
876	Koppers, Inc.	Official Site Name	12/11/2006	
MSP090300	*Koppers Industries, Inc.*	*Water - Pretreatment*	*11/14/1995*	*11/13/2000*
MSP090300	*Koppers Industries, Inc.*	*Water - Pretreatment*	*09/18/2001*	*08/31/2006*

MSP090300	Koppers, Inc.	Water - Pretreatment	03/26/2007	02/28/2012
MSU081080	*Koppers Industries, Inc.*	*Water - SOP*	*11/09/1981*	*11/30/1985*

Program	SubProgram	Start Date	End Date
Air	Title V - major	06/01/1900	
Hazardous Waste	Large Quantity Generator	08/27/1999	
Hazardous Waste	TSD - Not Classified	06/28/1988	
Water	NPDES Storm	02/17/2010	
Water	PT CIU	11/14/1995	
Water	PT CIU - Timber Products Processing (Subpart 429)	11/14/1995	
Water	PT SIU	11/14/1995	

Latitude	Longitude	Metadata	S / T / R	Map Links
33 ° 44 ' 3 .00 (033.734167)	89 ° 47 ' 8 .06 (089.785572)	**Point Desc:** PG- Plant Entrance (General). Data collected by Mike Hardy on 11/8/2005. Elevation 223 feet. Just inside entrance gate. **Method:** GPS Code (Psuedo Range) Standard Position (SA Off) **Datum:** NAD83 **Type:** MDEQ	Section: Township: Range:	MGIS Google Maps MapQuest

2/19/2010 11:24:53 AM

STATE OF MISSISSIPPI
HAZARDOUS WASTE MANAGEMENT
PERMIT

THIS CERTIFIES THAT

Koppers, Inc. / Beazer East Inc.
1 Koppers Drive
Tie Plant, MS
Grenada County
MSD 007 027 543

is hereby authorized to conduct post closure care for a closed surface impoundment

This permit is issued under the authority of the Mississippi Solid Wastes Disposal Law, and particularly Section 17-17-27 thereof, and rules adopted and promulgated thereunder, all of which authorize the Department of Environmental Quality to enforce all applicable requirements, under the Mississippi Hazardous Waste Management Regulations, and associated conditions included therein.

Permit Issued: FEB 10 2010

MISSISSIPPI ENVIRONMENTAL QUALITY PERMIT BOARD

AUTHORIZED SIGNATURE
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

Permit No.: HW-88-543-01

Expires: January 31, 2020

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

LIST OF ATTACHMENTS

LIST OF FIGURES

MODULE I - GENERAL PERMIT CONDITIONS

I.A EFFECT OF PERMIT

The Permittee is required to conduct post-closure activities for a hazardous waste surface impoundment in accordance with the conditions of this Permit. Subject to Mississippi Hazardous Waste Management Regulation (MHWMR) 270.4, compliance with this Permit generally constitutes compliance, for purposes of enforcement, with Mississippi Solid Waste Disposal Law (MSWDL) of 1974, as amended. 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, any infringement of state or local law or regulations, or preclude compliance with any other Federal, State, and/or local laws and/or regulations governing the treatment and handling of explosives. Compliance with the terms of this Permit does not constitute a defense to any order issued or any action brought under Sections 3008(a), 3008(h), 3013, or 7003 of RCRA; Sections 106(a), 104 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. [MHWMR 270.4, 270.30(g)]

I.B PERMIT ACTIONS

I.B.1 Permit Modification, Revocation and Reissuance, and Termination

This Permit may be modified, revoked and reissued, or terminated for cause, as specified in MHWMR 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. [MHWMR 270.4(a) and 270.30(f)]

Permit Renewal

This Permit may be renewed as specified in MHWMR 270.30(b) and Permit Condition I.E.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. [MHWMR 270.30(b)]

I.C. 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. [MHWMR 124.16(a)]

I.D. DEFINITIONS

For purposes of this Permit, terms used herein shall have the same meaning as those in MHWMR Parts 124, 260, 264, 266, 268, and 270, unless this Permit specifically provides otherwise; where terms are not defined in the regulations 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.

I.D.1 "Director" means the Executive Director of the Mississippi Department of Environmental Quality, or his designee or authorized representative.

I.D.2 A "hazardous constituent" for purposes of this permit are those substances listed in MHWMR Part 261 Appendix VIII and Part 264 Appendix IX.

I.D.3 A "release" for purposes of this permit includes any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of any hazardous waste or hazardous constituents.

I.D.4 "Corrective Action" for the purposes of this permit, may include "corrective action" as provided in MHWMR 264.100.

I.E. DUTIES AND REQUIREMENTS

I.E.1 Duty to Comply

The Permittee shall comply with all conditions of this Permit, except to the extent and for the duration such noncompliance is authorized by an emergency Permit. Any Permit noncompliance, other than noncompliance authorized by an emergency Permit, constitutes a violation of Mississippi Solid Waste Disposal Law, Sections 17-17-1, et seq., Mississippi Code Annotated and is grounds for enforcement action; for Permit termination, revocation and reissuance, or modification; or for denial of a Permit renewal application. [MHWMR 270.30(a)]

I.E.7 Duty to Provide Information

The Permittee shall furnish to the Director, within a reasonable time, any relevant information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Permit, or to determine compliance with this Permit. The Permittee shall also furnish to the Director, upon request, copies of records required to be kept by this Permit. [MHWMR 264.74(a), 270.30(h)]

I.E.8 Inspection and Entry

Pursuant to MHWMR 270.30(i), the Permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents, as may be required by law, to:

I.E.8.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;

I.E.8.b Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Permit;

I.E.8.c Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit; and

I.E.8.d Sample or monitor, at reasonable times, for the purposes of assuring Permit compliance or as otherwise authorized by MSWDL, any substances or parameters at any location.

I.E.9 Monitoring and Records

The Director may require such testing by the Permittee, and may make such modifications to this permit, deemed necessary to ensure implementation of new regulations or requirements, or to ensure protection of human health and the environment.

I.E.9.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 to be analyzed must be the

appropriate method from the Sampling and Analysis Plan (Attachment B) or an equivalent method approved by the Director. 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, as specified in the Sampling and Analysis Plan (See Permit Attachment B). [MHWMR 270.30(j)(1)]

I.E.9.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 MHWMR 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 the Director at any time and are automatically extended during the course of any unresolved enforcement action regarding this facility. [MHWMR 264.74(b) and 270.30(j)(2)]

I.E.9.c Pursuant to MHWMR 270.30(j)(3), records of monitoring information shall specify:

I.E.9.c.i The dates, exact place, and times of sampling or measurements;

I.E.9.c.ii The individuals who performed the sampling or measurements;

I.E.9.c.iii The dates analyses were performed;

I.E.9.c.iv The individuals who performed the analyses;

I.E.9.c.v The analytical techniques or methods used; and

I.E.9.c.vi The results of such analyses.

I.E.10 Reporting Planned Changes

The Permittee shall give notice to the Director, as soon as possible, of any planned physical alterations or additions to the Permitted facility. [MHWMR 270.30(l)(1)]

I.E.11 Reporting Anticipated Noncompliance

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

I.E.12 Transfer of Permits

This Permit is not transferable to any person, except after notice to the Director. The Director may require modification or revocation and reissuance of the Permit pursuant to MHWMR 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 MHWMR Parts 264 and 270 and this Permit. [MHWMR 270.30(l)(3), 264.12(c)]

I.E.13 Compliance Schedules

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

I.E.14 Twenty-Four Hour Reporting

I.E.14.a The Permittee shall report to the Director any noncompliance which may endanger health or the environment. Any such information shall be reported orally within 24 hours from the time the Permittee becomes aware of the circumstances. The report shall include the following:

I.E.14.a.i Information concerning release of any hazardous waste that may cause an endangerment to public drinking water supplies.

I.E.14.a.ii Any information of a release or discharge of hazardous waste, or of a fire or explosion from the hazardous waste management facility which could threaten the environment or human health outside the facility.

I.E.14.b The description of the occurrence and its cause shall include:

I.E.14.b.i Name, address, and telephone number of the owner or operator;

I.E.14.b.ii Name, address, and telephone number of the facility;

I.E.14.b.iii Date, time, and type of incident;

I.E.14.b.iv Name and quantity of materials involved;

I.E.14.b.v The extent of injuries, if any;

I.E.14.b.vi An assessment of actual or potential hazards to the environment and human health outside the facility, where this is applicable; and

I.E.14.b.vii Estimated quantity and disposition of recovered material that resulted from the incident.

I.E.14.c A written submission shall also be provided within five 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. The Director may waive the five-day written notice requirement in favor of a written report within 15 days. [MHWMR 270.30(l)(6)]

I.E.15 Other Non-compliance

The Permittee shall report all other instances of noncompliance not otherwise required to be reported above, Permit Conditions I.E.10-I.E.15., at the time monitoring reports are submitted. The reports shall contain the information listed in Permit Condition I.E.14 [MHWMR 270.30(l)(10)]

I.E.16 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 the Director, the Permittee shall promptly submit such facts or information. [MHWMR 270.30(l)(11)]

I.F. SIGNATORY REQUIREMENT

All applications, reports, or information submitted to or requested by the Director, his designee, or authorized representative, shall be signed and certified by the party submitting the documents in accordance with MHWMR 270.11 and 270.30(k).

I.G. REPORTS, NOTIFICATIONS, AND SUBMISSIONS TO THE DIRECTOR

All reports, notifications, or other submissions which are required by this Permit to be sent or given to the Director should be sent by certified mail or given to:

Environmental Permits Division, Chief
Mississippi Office of Pollution Control
P. O. Box 2261
Jackson, Mississippi 39225

I.H. CONFIDENTIAL INFORMATION

In accordance with MHWMR 270.12, the Permittee may claim confidential any information required to be submitted by this Permit.

I.I. DOCUMENTS TO BE MAINTAINED AT THE FACILITY

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

I.I.1 Inspection schedules, as required by MHWMR 264.15(b)(2) and this Permit.

I.I.2 Operating Record, as required by MHWMR 264.73 and this Permit.

I.I.3 Post- Closure Plan, as required by MHWMR 264.118(a) and this Permit.

I.I.4 A copy of the financial assurance mechanism for the facility post-closure care, as required by MHWMR 264.142(d) and 264.144(d).

I.E.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. [MHWMR 270.10(h), 270.30(b)]

I.E.3 Permit Expiration

Pursuant to MHWMR 270.50, this Permit shall be effective for a fixed term not to exceed ten (10) years. As long as MDEQ is the Permit-issuing authority, 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 MHWMR 270.10, 270.13 through 270.29) and, through no fault of the Permittee, the Director has not issued a new Permit, as set forth in MHWMR 270.51.

I.E.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. [MHWMR 270.30(c)]

I.E.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. [MHWMR 270.30(d)]

I.E.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. [MHWMR 270.30(e)]

MODULE II- GENERAL FACILITY CONDITIONS

II.A. DESIGN AND OPERATION OF FACILITY

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

II.B. SECURITY

The Permittee shall comply with the security provisions of MHWMR 264.14(b)(2) and (c) and the Post-Closure Plan, Permit Attachment D.

II.C. GENERAL INSPECTION REQUIREMENTS

The Permittee shall follow the inspection schedule set out in the Post-Closure Plan, Permit Attachment D. The Permittee shall remedy any deterioration or malfunction discovered by an inspection, as required by MHWMR 264.15(c). Records of inspection shall be kept, as required by MHWMR 264.15(d).

II.D. LOCATION STANDARDS

The Permittee's regulated unit (closed RCRA SI) that is subject of this permit does not lie in the 100 year flood plain.

II.D.1 RECORD KEEPING AND REPORTING

In addition to the record keeping and reporting requirements specified elsewhere in this Permit, the Permittee shall do the following:

II.D.1.a Operating Record

The Permittee shall maintain a written operating record at the facility, in accordance with MHWMR 264.73.

II.E. GENERAL POST-CLOSURE REQUIREMENTS

II.E.1 Post-Closure Care Period

The Permittee shall begin post-closure care for each surface impoundment after completion of closure of the unit and continue for 30 years after that date. Post-closure care shall be in accordance with MHWMR 264.117 and the Post-Closure Plan, Permit Attachment D.

II.E.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, Permit Attachment D, and MHWMR 264.117(b).

II.E.3 Amendment to Post-Closure Plan

The Permittee shall amend the Post-Closure Plan in accordance with MHWMR 264.118(d), whenever necessary.

II.E.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 MHWMR 264.119(c).

II.E.5 Certification of Completion of Post-Closure Care

The Permittee shall certify that the post-closure care period was performed in accordance with the specifications in the Post-Closure Plan, as required by MHWMR 264.120.

II.E.5.a No later than 60 days after certification of closure of each hazardous waste disposal unit, the Permittee shall submit records of the type, location, and quantity of hazardous waste disposed within each cell or disposal unit, in accordance with MHWMR 264.119(a).

II.E.5.b Within 60 days of certification of closure of the first hazardous waste disposal unit and the last hazardous waste disposal unit, the Permittee shall do the following:

II.E.5.b.i Record a notation on the deed to the facility property, in accordance with MHWMR 264.119(b)(1).

II.E.5.b.ii Submit a certification that a notation, in accordance with MHWMR 264.119(b)(2), has been recorded.

II.F. COST ESTIMATE FOR FACILITY POST-CLOSURE

II.F.1 The Permittee's most recent post-closure cost estimate, prepared in accordance with MHWMR 264.144 is specified in Permit Attachment E.

II.F.2 The Permittee must revise the post-closure cost estimate whenever there is a change in the facility's Post-Closure Plan, as required by MHWMR 264.144(c).

II.F.3 The Permittee must keep at the facility the latest post-closure cost estimate as required by MHWMR 264.144(d).

II.G. FINANCIAL ASSURANCE FOR FACILITY POST-CLOSURE

The Permittee shall demonstrate continuous compliance with MHWMR 264.145 by providing documentation of financial assurance, as required by MHWMR 264.151 or 264.149, in at least the amount of the cost estimates required by Permit Condition II.F. Changes in financial assurance mechanisms must be approved by the Director pursuant to MHWMR 264.145 or 264.149.

II.H. INCAPACITY OF OWNERS OR OPERATORS, GUARANTORS, OR FINANCIAL INSTITUTIONS

The Permittee shall comply with MHWMR 264.148, whenever necessary.

MODULE III - GROUND WATER DETECTION MONITORING

III.A. MODULE HIGHLIGHTS

The Permittee is required by this module to maintain a groundwater detection monitoring system for the closed surface storage impoundment that was used in the treatment of wastewater from the wood preserving process. The groundwater detection monitoring system consists of eight wells, two up-gradient or background wells and six down-gradient wells. Monitoring wells R-1R and R-10- are the background wells. Monitoring well R-1R is 29.5 feet deep and R-10 is 27.0 feet deep. Monitoring wells R-7, R-8, R-8B, R-9, R-9C, and R-9D are down-gradient wells and are 31.0, 31.0, 46.0, 31.0, 60.5, and 87.2 feet deep, respectively. The locations of the wells are shown in Figure 6.

III.B. WELL LOCATION, INSTALLATION AND CONSTRUCTION

The Permittee shall install and maintain a ground-water monitoring system as specified below: [MHWMR 264.97]

III.B.1 The Permittee shall maintain ground-water monitoring wells at the locations specified in Figure 6 and in conformance with the following list:

III.B.1.a Monitoring well R-1R and R-10 shall be maintained as a background monitoring wells.

III.B.1.b Monitoring wells R-7, R-8, R-8B, R-9, R-9C, and R-9D shall be maintained as detection-monitoring wells for the unit identified in Permit Condition IV.B.

III.B.2 The Permittee shall maintain the monitoring wells identified in Permit Condition III.B.1, in accordance with the detailed plans and specifications presented in Permit Attachment C, Section 5.5.

III.B.3 Should the Permittee determine during an inspection or sampling event that any well identified in Condition III.B has been damaged such that it no longer meets the requirements of MHWMR 264.97(a) and (c), the Permittee shall notify the Executive Director in writing within seven (7) days of making such a determination and replace or repair the damaged well within thirty (30) days. Replacement wells should be constructed to the same specifications as the well being replaced.

III.B.4 All wells deleted from the monitoring program shall be plugged and

abandoned in accordance with the Mississippi Office of Land and Water regulations. Well plugging and abandonment methods and certification shall be submitted to the Director within thirty (30) days from the date the wells are removed from the monitoring program.

III.C. INDICATOR PARAMETERS AND MONITORING CONSTITUENTS

The Permittee shall monitor R-1R, R-10, R-7, R-8, R-8B, R-9, R-9C, and R-9D as described in Permit Condition III.B, for the following parameters and constituents: [MHWMR 264.98(a)]

Parameter or Constituent	Established Background Concentrations
naphthalene	MDL, SW-846 Method 8270
fluoranthene	MDL, SW-846 Method 8270
acenaphthylene	MDL, SW-846 Method 8270
pentachlorophenol	MDL, SW-846 Method 8270
2,4-dinitrophenol	MDL, SW-846 Method 8270

III.D. SAMPLING AND ANALYSIS PROCEDURES

The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the ground-water monitoring wells described in Permit Condition III.B: [MHWMR 264.97(d) and (e)

III.D.1 Samples shall be collected using the techniques described in the Groundwater Sampling and Analysis Plan, Permit Attachment B.

III.D.2 Samples shall be preserved and shipped, in accordance with the procedures specified in the Groundwater Sampling and Analysis Plan, Permit Attachment B.

III.D.3 Samples shall be analyzed in accordance with the procedures specified in the Groundwater Sampling and Analysis Plan, Permit Attachment B.

III.D.4 Samples shall be tracked and controlled using the chain-of-custody procedures

specified in the Groundwater Sampling and Analysis Plan, Permit Attachment B.

III.E. ELEVATION OF THE GROUND-WATER SURFACE

III.E.1 The Permittee shall determine the elevation of the ground-water surface at each well each time the ground-water is sampled, in accordance with Permit Condition III.G.2. [MHWMR 264.97(f)]

III.E.2 The Permittee shall record the surveyed elevation of the monitoring well(s) when installed (with as-built drawings).

III.F. SIGNIFICANT EVIDENCE OF A RELEASE

Historical sampling results at the facility have shown the background levels for the constituents listed in Permit Condition III.C to be below method detection limits. When evaluating the monitoring results in accordance with Permit Condition III.G., the Permittee shall use the following procedures:

III.F.1 For compounds that are not naturally occurring and/or those compounds not detected in background samples, the following conditions will constitute significant evidence of a release (subject to QA/QC checks and confirmation by retesting).

III.F.1.a A compound is detected above a PQL in a down-gradient well.

III.F.1.b More than one compound is detected in a well above the MDL but below the PQL in a single sampling event.

III.F.1.c One compound is detected in a well above the MDL but below the PQL twice or more in a twelve-month period.

III.F.1.d A compound (or compounds) is detected above the MDL but below the PQL, either in a single well or in multiple wells, and a review of data shows trends or indications that a release may have occurred. Such a review of available data, including graphical and spatial analyses, must be documented by the facility owner/operator either at the next scheduled monitoring event or as otherwise required by permit condition, regulation or law.

III.F.1.e 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, as specified in the Sampling and Analysis Plan (See Permit Attachment B). The Permittee will employ SW-846 Method 8270D, Selective Ion Monitoring (SIM) for the detection (up to 0.2µg/l) of benzo(a)pyrene or an equivalent method approved by the Director. [MHWMR 270.30(j)(1)]

III.F.2 The Permittee may choose to retest when there has been significant evidence of a release identified under Permit Condition III.F.1. A retest shall consist of analyzing two additional samples. Such samples must be collected in separate events (i.e., after re-purging the wells prior to sampling). It will not be necessary to obtain an independent sample with respect to the interval of time between subsequent samples. Confirmation of a detect will occur if analysis of either sample collected during the retest detects the compounds found in the original sample. If additional or different compounds are found in a retest, further sampling will be necessary to determine if a release of the additional constituents has occurred.

III.G. MONITORING PROGRAM AND DATA EVALUATION

III.G.1 The Permittee shall collect, preserve, and analyze samples pursuant to Permit Condition III.D.

III.G.2 The Permittee shall determine ground-water quality at each monitoring well at the compliance point during the active life of a regulated unit, including the closure period (and post-closure care period for land disposal units which do not clean close). [MHWMR 264.98(d)] The Permittee shall express the ground-water quality at each monitoring well in a form necessary for the determination of statistically significant increases (i.e., means and variances).

III.G.3 The Permittee shall determine the ground-water flow rate and direction in the uppermost aquifer at least annually. [MHWMR 264.98(e)]

III.G.4 The Permittee shall determine whether there is significant evidence of a release for each parameter identified in Permit Condition III.C each time ground-water quality is determined at the compliance point using the procedures specified in Permit Condition III.F.

III.G.5 The Permittee shall perform the evaluations described in Permit Condition III.G.4 within ninety (90) days after completion of sampling. [MHWMR 264.98(g)(2)]

III.H. RECORD KEEPING AND REPORTING

III.H.1 The Permittee shall enter all monitoring, testing, and analytical data obtained in accordance with Permit Condition III.G in the operating record. [MHWMR 264.73(b)(6)]

III.H.2 The Permittee shall submit the analytical results required by Permit Conditions III.G.2 and III.G.3 and the results of the initial statistical analyses required by Permit Condition III.G.4, in accordance with the following schedule:

Samples To Be Collected During the Preceding Months of	Results Due To The Executive Director
January – December	April 15

III.H.3 If the Permittee determines, pursuant to Permit Condition III.G, there is a statistically significant increase for any indicator parameter specified in Permit Condition III.C, the Permittee shall:

III.H.3.a Notify the Agency in writing within seven days. [MHWMR 264.98(h)(1)]

III.H.3.b Immediately sample the ground-water in all wells and determine the concentration of all constituents identified in Appendix IX of MHWMR 261. [MHWMR 264.98(h)(2)]

III.H.3.c Establish the background values for each Appendix IX constituent found in the ground-water. [MHWMR 264.98(h)(3)]

III.H.3.d Within 90 days, submit to the Agency an application for a permit modification to establish a compliance monitoring program. [MHWMR 264.98(h)(4)] The application must include the following information:

III.H.3.d.i An identification of the concentration of each Appendix

IX constituent found in the ground-water at each monitoring well at the compliance point. [MHWMR 264.98(4)(i)]

III.H.3.d.ii Any proposed changes to the ground- water monitoring system at the facility necessary to meet the requirements of compliance monitoring as described in MHWMR 264.99. [MHWMR 264.98(h)(4)(ii)]

III.H.3.d.iii Any proposed changes to the monitoring frequency, sampling and analysis procedures, or methods or statistical procedures used at the facility necessary to meet the requirements of compliance monitoring as described in MHWMR 264.99. [MHWMR 264.98(h)(4)(iii)]

III.H.3.d.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. [MHWMR 264.98(h)(4)(iv)]

III.H.3.e Submit a corrective action feasibility plan to the Agency within 180 days. [MHWMR 264.98(h)(5)]

III.H.4 If the Permittee determines, pursuant to Permit Condition III.G, there is a statistically significant increase above the background values for the parameters specified in Permit Condition III.C, a demonstration may be made that a source other than a regulated unit caused the increase or that the increase resulted from error in sampling, analysis, or evaluation. In such cases, the Permittee shall:

III.H.4.a Notify the Director in writing within seven (7) days of the intention to make a demonstration. [MHWMR 264.98(i)(1)]

III.H.4.b Within 90 days, submit a report to the Director which demonstrates that a source other than a regulated unit caused the increase, or that the increase resulted from error in sampling, analysis, or evaluation. [MHWMR 264.98(i)(2)]

III.H.4.c Within 90 days, submit to the Director an application for a permit

modification to make any appropriate changes to the detection monitoring program at the facility. [MHWMR 264.98(i)(3)]

III.H.4.d Continue to monitor in accordance with the detection monitoring program at the facility. [MHWMR 264.98(i)(4)]

III.I REQUEST FOR PERMIT MODIFICATION

If the Permittee or the Director determines the detection monitoring program no longer satisfies the requirements of the regulations, the Permittee must, within 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. [MHWMR 264.98(j)]

MODULE IV - POST-CLOSURE CARE

IV.A. MODULE HIGHLIGHTS

This module covers the post-closure care activities for the Permittee's closed surface impoundment. The closed surface impoundment was used in the treatment of wastewater from the wood preserving process. The sediment and sludge that accumulated in the impoundment met the K001 RCRA hazardous waste listing. In the summer of 1988, all sludge and visible contaminated soils were removed from the surface impoundment and shipped to a permitted off-site disposal facility. Closure activities for the surface impoundment were initiated in July 1989 which included removal of accumulated rainwater, placement of clean soil fill, construction of a soil-bentonite cap and cover system. Closure activities for the surface impoundment were completed by the end of October 1989. The closure construction documentation and closure certification for the surface impoundment were submitted to the MDEQ in January 1990. Module III of this permit covers the requirements for detection monitoring that the facility is required to conduct during the post-closure care period.

IV.B. UNIT IDENTIFICATION

The Permittee shall provide post-closure care for the following hazardous waste management units, subject to the terms and conditions of this permit, and as described as follows:

Type of Waste Unit	Description of Wastes Contained	Hazardous Waste No.
Waste Storage Impoundment	Bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol	K001

IV.C. POST-CLOSURE PROCEDURES AND USE OF PROPERTY

IV.C.1 The Permittee shall conduct post-closure care for each hazardous waste management unit listed in Permit Condition IV.B. 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 upon application and demonstration approved by MDEQ that the facility is secure,

or may be extended by MDEQ if the Director finds this is necessary to protect human health and the environment. [MHWMR 264.117(a)]

IV.C.2 The Permittee shall maintain and monitor the ground-water monitoring system and comply with all other applicable requirements of MHWMR Part 264 Subpart F during the post-closure period. [MHWMR 264.117(a)(1)]

IV.C.3 The Permittee shall comply with the requirements for surface impoundments as follows: [MHWMR 264.228(b)(1) and (3)]

IV.C.3.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, and other events;

IV.C.3.b Prevent run-on and run-off from eroding or otherwise damaging the final cover.

IV.C.3.c Maintain and monitor the ground-water monitoring system and comply with all other applicable requirements of MHWMR Subpart F;

IV.C.3.d Protect and maintain surveyed benchmarks used in complying with the surveying and record keeping requirements of MHWMR 264.309.

IV.C.4 The Permittee shall comply with all security requirements, as specified in the Post-Closure Plan, Permit Attachment D. [MHWMR 264.117(b)]

IV.C.5 The Permittee shall not allow any use of the units designated in Permit Condition IV.B, which will disturb the integrity of the final cover, liners, any components of the containment system, or the function of the facility's monitoring systems during the post-closure care period. [MHWMR 264.117(c)]

IV.C.6 The Permittee shall implement the Post-Closure Plan, Permit Attachment D. All post-closure care activities must be conducted in accordance with the provisions of the Post-Closure Plan. [MHWMR 264.117(d) and 264.118(b)]

IV.D. INSPECTIONS

The Permittee shall inspect the components, structures, and equipment at the site in accordance with the schedule contained in the Post-Closure Plan, Permit Attachment D. [MHWMR 264.117(a)(1)(ii)]

IV.E. NOTICES AND CERTIFICATION

IV.E.1 No later than 60 days after certification of closure of each permitted hazardous waste disposal unit, the Permittee shall submit to the local zoning authority, or the authority with jurisdiction over local land use, and to the Director a record of the type, location, and quantity of hazardous wastes disposed of within each cell or other disposal unit of the facility. For hazardous wastes disposed of before January 12, 1981, the Permittee shall identify the type, location, and quantity of the hazardous wastes to the best of his knowledge and in accordance with any records he has kept. [MHWMR 264.119(a)]

IV.E.2 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 they shall request a modification to this post closure permit in accordance with the applicable requirements in MHWMR 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 MHWMR 264.117(c). [MHWMR 264.119(c)]

IV.E.3 No later than 60 days after completion of the established post-closure care period for each hazardous waste disposal unit, the Permittee shall submit to the Director, 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. Documentation supporting the independent, registered professional engineer's certification must be furnished to the Director upon request until the Director releases the Permittee from the financial assurance requirements for post-closure care under MHWMR 264.145(1). [MHWMR 264.120]

IV.F. FINANCIAL ASSURANCE

IV.F.1 The Permittee shall maintain financial assurance during the post-closure period and comply with all applicable requirements of MHWMR Part 264 Subpart H. [MHWMR 264.145]

IV.F.2 The Permittee shall demonstrate to the Director that the value of the financial assurance mechanism exceeds the remaining cost of post-closure care, in order for the Director to approve a release of funds. [MHWMR 264.145(a)(10)]

IV.F.3 The Permittee shall submit itemized bills to the Director when requesting reimbursement for post-closure care. [MHWMR 264.145(a)(11)]

IV.G. 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 MHWMR Parts 124 and 270, and must include a copy of the proposed amended Post-Closure Plan for approval by the Director. The Permittee shall request a permit modification whenever changes in operating plans or facility design affect the approved Post-Closure Plan, there is a change in the expected year of final closure, or other events occur during the active life of the facility that affect the approved Post-Closure Plan. The Permittee must submit a written request for a permit modification at least 60 days prior to the proposed change in facility design or operation, or no later than 60 days after an unexpected event has occurred which has affected the Post-Closure Plan. [MHWMR 264.118(d)]

MODULE V -WASTE MINIMIZATION

V.A. APPLICABILITY

In the event that the Permittee treats, stores, or disposes of hazardous wastes onsite where such wastes were generated, then the Permittee must comply with MHWMR §264.73(b)(9), and Section 3005(h) of RCRA (42 U.S.C. 6925(h)), and the Permittee must certify, no less often than annually, that:

V.A.1 The Permittee has a program in place to reduce the volume and toxicity of hazardous waste generated to the degree determined by the Permittee to be economically practicable; and

V.A.2 The proposed method of treatment, storage or disposal is the most practical method available to the Permittee which minimizes the present and future threat to human health and the environment.

V.B. WASTE MINIMIZATION CERTIFICATION OBJECTIVES

Any future waste minimization program under Permit Condition V.A should include the following elements:

V.B.1 Top Management Support

V.B.1.a Dated and signed policy describing management support for waste minimization and for implementation of a waste minimizing plan.

V.B.1.b Description of employee awareness and training programs designed to involve employees in waste minimization planning and implementation to the maximum extent feasible.

V.B.1.c Description of how a waste minimization plan has been incorporated into management practices so as to ensure ongoing efforts with respect to product design, capital planning, production operations and maintenance.

V.B.2 Characterization of Waste Generation

Identification of types, amounts and hazardous constituents of waste streams

with the source and date of generation.

V.B.3 Periodic Waste Minimization Assessments

V.B.3.a Identification of all points in a process where materials can be prevented from becoming a waste, or can be recycled.

V.B.3.b Identification of potential waste reduction and recycling techniques applicable to each waste, with a cost estimate for capital investment and implementation.

V.B.3.c Specify performance goals, preferably quantitative, for the source reduction of waste by stream. Whenever possible, goals should be stated as weight of waste generated per standard unit of production, as defined by the generator

V.B.4 Cost Allocation System

Identification of waste management costs for each waste, factoring in liability, transportation, recordkeeping, personnel, pollution control, treatment, disposal, compliance and oversight to the extent feasible.

V.B.4.a Description of how departments are held accountable for the wastes they generate.

V.B.4.b Comparison of waste management costs with costs of potential reduction and recycling techniques applicable to each waste.

V.B.5 Technology Transfer

Description of efforts to seek and exchange technical information on waste minimization from other parts of the company, other firms, trade associations, technical assistance programs, and professional consultants.

V.B.6 Program Evaluation

V.B.6.a Description of types and amounts of hazardous waste reduced or recycled.

V.B.6.b Analysis quantification of progress made relative to each performance goal established and each reduction technique to be implemented.

V.B.6.c Amendments to waste minimization plan and explanation.

V.B.6.d Explanation and documentation of reduction efforts completed or in progress before development of the waste minimization plan.

V.B.6.e Explanation and documentation regarding impediments to hazardous waste reduction specific to the individual facility.

V.C. RECORDKEEPING AND REPORTING

V.C.1 Annually, the Permittee shall submit a certification report of the types and quantities of waste generated, and the types and quantities of waste reduced/minimized. This certified report shall include a narrative study explaining the waste generated and minimization data, a description of goals and progress made in reducing/minimizing the generation of wastes, and a description of any impediment to the reduction and minimization of waste.

V.C.2 The Permittee shall maintain copies of this certification in the facility operating record as required by MHWMR 264.73.

MODULE VI -LAND DISPOSAL RESTRICTIONS

VI.A GENERAL RESTRICTIONS

MHWMR Part 268 identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances under which an otherwise prohibited waste may continue to be placed on or in a land treatment, storage or disposal unit. The Permittee shall maintain compliance with the requirements of MHWMR Part 268. Where the Permittee has applied for an extension, waiver or variance under MHWMR Part 268, the Permittee shall comply with all restrictions on land disposal under this Part once the effective date for the waste has been reached pending final approval of such application.

VI.B LAND DISPOSAL PROHIBITIONS AND TREATMENT STANDARDS

VI.B.1 A restricted waste identified in MHWMR Part 268 Subpart C may not be placed in a land disposal unit without further treatment unless the requirements of MHWMR Part 268 Subparts C and/or D are met.

VI.B.2 The storage of hazardous wastes restricted from land disposal under MHWMR Part 268 is prohibited unless the requirements of MHWMR Part 268 Subpart E are met.

MODULE VII-ORGANIC AIR EMISSION REQUIREMENTS FOR PROCESS VENTS AND EQUIPMENT LEAKS

VII.A GENERAL INTRODUCTION

In the June 21, 1990 Federal Register, EPA published the final rule for Phase I Organic Air Emission Standards (MHWMR Parts 264 and 265, Subparts AA and BB) for hazardous waste treatment, storage, and disposal facilities. Subpart AA contains emission standards for process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, and air or steam stripping operations that process hazardous waste with an annual average total organic concentration of at least ten (10) parts per million (ppm) by weight. Subpart BB contains emission standards that address leaks from specific equipment (i.e., pumps, valves, compressors, etc.) That contains or contacts hazardous waste that has an organic concentration of at least ten (10) percent by weight.

VII.B ORGANIC AIR EMISSION STANDARDS

Prior to constructing any equipment with process vents subject to the requirements of MHWMR 264, Subpart AA or installing any additional equipment subject to the requirements of MHWMR 264, Subpart BB, the Permittee shall supply the specific Part B information required pursuant to MHWMR 270.24 and 270.25, as applicable.

MODULE VIII - PHASE II RCRA ORGANIC AIR EMISSION REQUIREMENTS

VIII.A GENERAL INTRODUCTION

On December 6, 1994, EPA published the final rule for Phase II Organic Air Emissions Standards (40 CFR Parts 264 and 265, Subpart CC) for hazardous waste treatment, storage, and disposal facilities, including certain hazardous waste generators accumulating waste on-site in RCRA permit-exempt (90-day) tanks and containers. In general, under these standards air emissions controls must be used for tanks, surface impoundments, containers and miscellaneous units which contact hazardous waste containing an average organic concentration greater than 500 ppmw at the point of origination determined by the procedures outlined in 40 CFR § 264.1083(a), except as specifically exempted under 40 CFR § 264.1080 and § 264.1082.

.

VIII.B ORGANIC AIR EMISSION STANDARDS

Prior to installing any tank, container, surface impoundment or miscellaneous unit subject to 40 CFR Part 264, Subpart CC, or modifying an existing process, waste handling or tank or container such that the unit(s) will become subject to 40 CFR Part 264 Subpart CC, the Permittee shall apply for a permit modification under § 270.42, and provide specific Part B application information required under 40 CFR §§ 270.14-17 and § 270.27, as applicable, with the modification request.

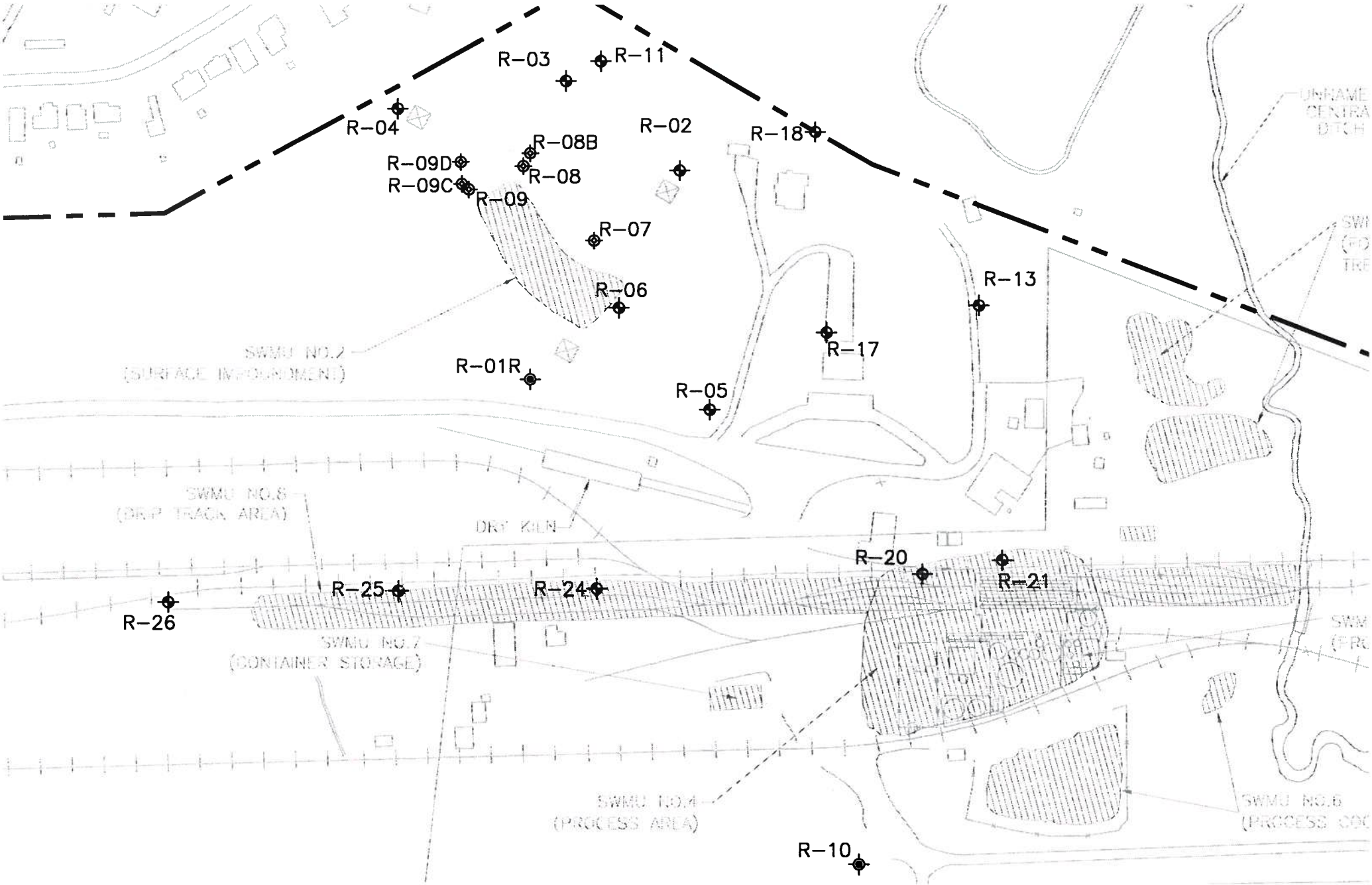
wells will be compared to reporting limits (RLs) identified in Table 4-1 for each constituent. If the detected concentrations are less than their respective RLs, no further action will be taken. If the concentration of any constituent(s) is greater than its RL in at least one well then a statistical evaluation will be performed.

Table 4-1 Reporting Limits for Semivolatile Organics

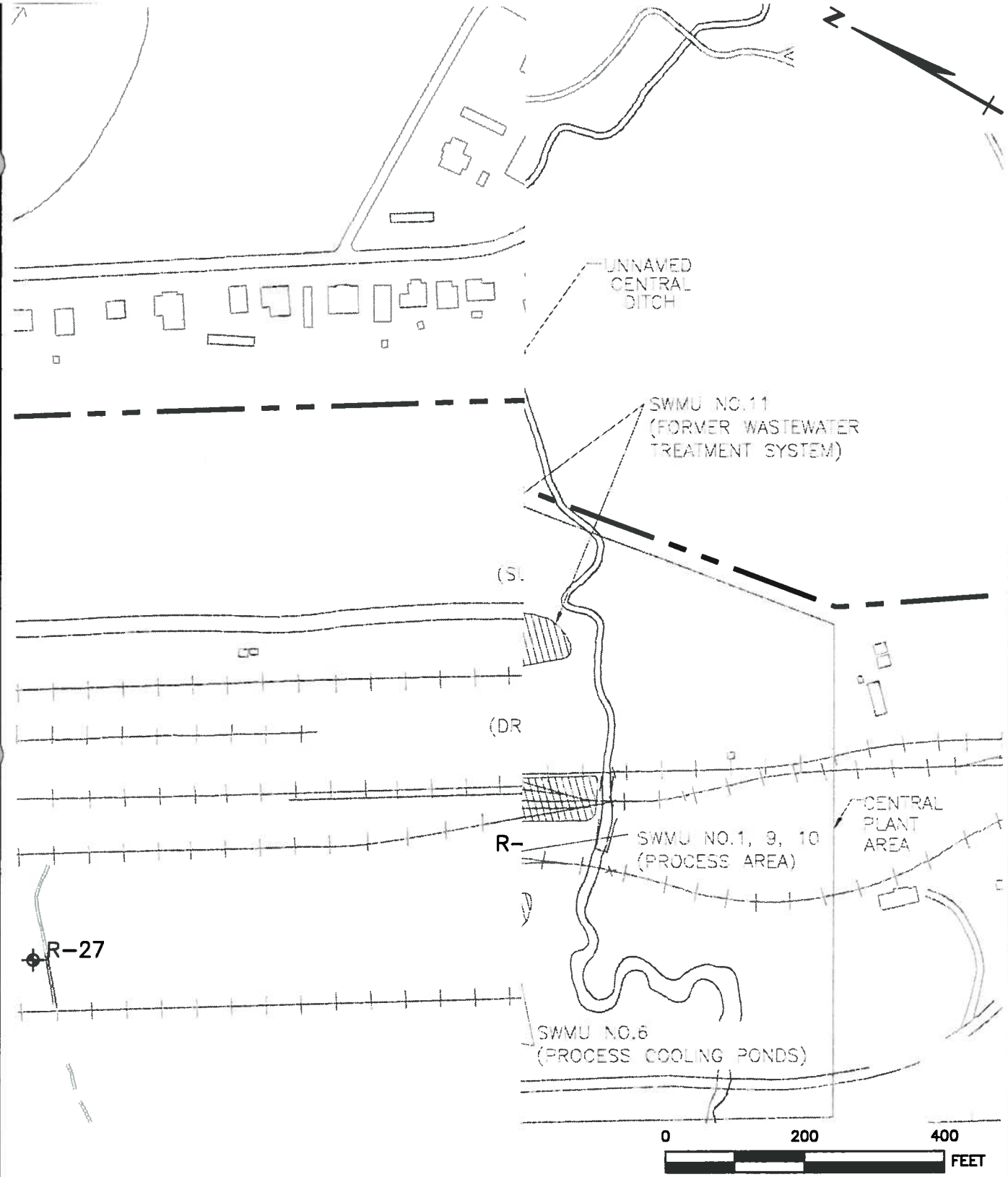
Compound	CAS	Reporting Limit (µg/L)
Acenaphthene	83-32-9	10
Acenaphthylene	208-96-8	10
Anthracene	120-12-7	10
Benzo(a)anthracene	56-55-3	10
Benzo(a)pyrene	50-32-8	0.2
4-Chloro-3-methylphenol	59-50-7	20
2-Chlorophenol	95-57-8	10
Chrysene	218-01-9	10
Dibenz(a,h)anthracene	53-70-3	10
2,4-Dimethylphenol	105-67-9	10
2-4-Dinitrophenol	54-28-5	10
Fluoranthene	206-44-0	50
Fluorene	86-73-7	10
Indeno(1,2,3-cd)pyrene	193-39-5	10
Naphthalene	91-20-3	10
Pentachlorophenol	87-86-5	1
Phenanthrene	85-01-8	10
Phenol	108-95-2	10
Pyrene	129-00-0	10
2,3.4,6-Tetrachlorophenol	58-90-2	10
2,4,5-Trichlorophenol	95-95-4	10
2,4,6-Trichlorophenol	88-06-2	10

Statistical evaluation of the analytical data will be conducted in accordance with applicable permit conditions to determine whether concentrations of constituents in compliance point monitoring wells are significantly above any concentration limits that are specified for the Facility.

FIGURE


R-03
R-11
R-04
R-02
R-18
R-08B
R-09D
R-08
R-09C
R-09
R-07
R-06
R-13
R-17
R-01R
R-05
SWMU NO.2
(SURFACE IMPOUNDMENT)
SWMU NO.8
(DRIP TRACK AREA)
DRY KILN
R-20
R-21
R-25
R-24
R-26
SWMU NO.7
(CONTAINER STORAGE)
SWMU NO.4
(PROCESS AREA)
R-10
LEGEND
PROPERTY BOUNDARY
SITE FEATURE
FENCE
RAILROAD TRACK
WELL-ID
GAUGED WELLS
WELL-ID
UPGRADIENT MONITORING WELLS
WELL-ID
DOWNGRADIENT MONITORING WE

FIGURE



PROPERTY BOUND.
SITE FEATURE
FENCE
RAILROAD TRACK

BEAZER EAST, INC.
PITTSBURGH, PENNSYLVANIA

DRWN: CRJ	DATE: 04/03/08
CHKD: AMG	DATE: 04/03/08
APPD: KCF	DATE: 04/03/08
SCALE: AS SHOWN	

KEY ENVIRONMENTAL INCORPORATED

APPENDIX H- SAMPLING AND ANALYSIS PLAN,
POST-CLOUSURE CARE
GRENADA, MISSISSIPPI

MONITORING WELL LOCATIONS

PROJECT NO: 08-648
FIGURE 1

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCE: BASEMAP REPORT Dx/XX/XX

DATE:

ENVIRONMENTAL, INC.
43RD AVENUE
RE, PA 15106

ATTACHMENT A

#103 - ENVIRONMENTAL SAMPLE PREPARATION

1.0 SCOPE AND PURPOSE

This Standard Operating Procedure (SOP) presents procedures for selecting appropriate sample containers and preservatives when collecting environmental samples for analysis at a selected laboratory. Procedures for packaging and shipping environmental samples are presented in Key SOP #114.

Environmental samples are those that are anticipated to be relatively low in analyte concentration. These samples consist of materials that may have been impacted by source area materials, but do not consist of source area materials such as sludge, material from drums, material from bulk storage tanks, *etc.* Examples of environmental samples include: soil samples collected adjacent to or underlying a source area, stream and sediment samples, and groundwater samples (which do not contain non-aqueous phase liquid).

2.0 REQUIRED MATERIALS

Required materials for sample containers and preservation may include:

- various sized glass containers (with Teflon®-lined lids or caps, clear or amber colored);
- various sized polyethylene containers (with Teflon®-lined lids or caps);
- nitric acid;
- sulfuric acid;
- hydrochloric acid;
- sodium hydroxide; and,
- sodium thiosulfate.

Project-specific, appropriate sample container size, sample volume, holding times, and preservatives should be presented in the Quality Assurance Project Plan (QAPjP).

3.0 METHODOLOGIES

Sample Containers

To limit potential chemical or physical changes in a sample during collection and transport, the sample container selection should be based on the following:

- Sample containers should be new and certified clean prior to sampling activities;
- Sample containers should be constructed of non-reactive materials; and,
- Sample containers should not chemically or physically alter the sample.

The most widely used containers for aqueous samples are composed of glass or polyethylene.

Aqueous Samples

Glass Containers

Glass containers will be used when organic compounds are the analytes of interest. Sample volume will be sufficient to fill each sample container to allow the laboratory to attain the method-specific detection limits. Specific to volatile organic analysis, sample volume will be sufficient to fill each sample container so that no air bubbles are present. Once the sample container is full (and preserved if appropriate), it will be sealed with a Teflon®-lined screw cap. Specific container sizes for each analytical category are presented in the project-specific QAPjP.

Polyethylene Containers

Polyethylene containers will be used for aqueous samples when metals and/or inorganic analytes are the parameters of interest. One-liter polyethylene bottles with solid polyethylene or polyethylene-lined caps will generally be used to collect groundwater samples for metals and inorganic analysis. Once the sample container is full (and preserved if appropriate), it will be sealed with the polyethylene screw cap. Specific container sizes for each analytical category are presented in the project-specific QAPjP.

Solid Samples

Sample containers for the soil matrix are typically clear glass with a volume of 8 ounces. Larger sample containers may be necessary depending upon the number and type of analyses.

Sample Preservation

Sample preservation is important to retard physical and chemical alterations of unstable analytes within the sample matrix. Sample preservation methods are limited and are generally intended to:

Retard biological action;

- Retard hydrolysis of chemical compounds and complexes;
- Limit photolysis;
- Reduce volatility of constituents; and,
- Reduce sorption effects.

Preservation is usually limited to acidification, treatment with an alkaline chemical, reducing light exposure, filtration, and refrigeration.

Prior to any form of preservation, the following parameters, at a minimum, will be measured in the field on water samples and recorded in the field notebook:

- pH;
- Specific conductance; and,
- Temperature.

These field measurements record baseline information on the water sample prior to external influences such as temperature, dissolved carbon dioxide, or oxygen affecting the sample.

Acidification

Acidification of samples is generally performed for two purposes. Acidifying a (water) sample serves to limit metal adsorption to the sample container and will maintain the metal in a dissolved state. Secondly, acidification will act to inhibit bacterial growth. Samples to be acidified for either purpose will require a minimum volume of 100 ml and will be acidified to a pH < 2. Acidification is performed immediately after taking field measurements or following sample filtration.

Alkaline Treatment

Samples are preserved with an alkaline chemical (*e.g.* NaOH) to form salts with volatile compounds such as cyanide. Samples undergoing this preservation require a minimum volume of 100 ml and will be treated to a pH >12.

Preservation of the sample will be performed by the addition of NaOH until the desired pH is achieved (pH > 12). Preservation of a water sample is performed immediately after the field measurements are collected and recorded.

Filtration

Filtration of samples will be used only for specific analytical parameters. It will be used when the dissolved metal content of water is of concern. Filtration will not be performed for samples to be analyzed for volatile organics, semi-volatile organics, or total recoverable metals.

When sample filtration is required, the sample will be drawn through a 0.45 micron filter. The filter material will either be paper or fiberglass dependent on the nature of the sampled water. Filtration is performed immediately following the field measurements and prior to any other preservation methods. If the sample contains a significant level of suspended solids, a paper prefilter will be used prior to the 0.45 micron filter.

Temperature Control

All field samples that are to be analyzed by the laboratory will be sealed and then refrigerated during transfer to and storage at the laboratory. Refrigeration of samples is a bacterial inhibitor and slows the chemical and biological changes of a sample exposed to an oxidizing atmosphere. Transfer and storage of samples will be between 0°C and 10°C, with a target temperature of 4°C. Solid samples are typically limited to this preservation method.

Laboratory Selection and Coordination

Choosing a qualified analytical laboratory is an integral part of sampling activities. Regulatory program requirements and certifications must be considered in selecting the laboratory to ensure that the laboratory is capable of meeting project-specific requirements. Also, the provisions of any Consent Orders or Unilateral Orders applicable to the project must be reviewed and communicated to the laboratory to ensure project-specific requirements are met.

Laboratory Selection

- An analytical laboratory will be chosen based on the following criteria:
- Capabilities of the laboratory including performance history, certifications, and regulatory program experience;
- The qualifications and experience of the laboratory staff;
- Availability of a designated technical client representative who serves as a single point of contact for all Key projects;
- Quality and completeness of standard deliverables, including electronic data transfer availability;
- The specified analyses and turnaround time; and,
- The adequacy of the laboratory's quality assurance/quality control program.

Coordination

After selecting a laboratory, the laboratory will be contacted and the following information requested pertaining to the sampling activities:

- Identification of a responsible party to act as sample custodian at the laboratory who is authorized to accept samples and verify the data entered from the accompanying chain-of-custody forms into the laboratory tracking system.

- Provisions for a laboratory sample custody log consisting of serially numbered, standard laboratory tracking report sheets.

- Specifications of laboratory sample custody procedures for sample handling, storage, and dispersement for analysis.

The laboratory will be notified within 48 hours prior to receipt of samples. The samples will be packaged and shipped *via* express courier or hand delivered within 48 hours of collection to the laboratory. The laboratory will then be contacted to verify receipt of the samples and estimated turnaround time.

Sample Packaging and Shipping

Proper sample packaging and shipping accomplishes the following:

- Allows individual samples to be tracked through transport and analysis;

- Limits the possibility of breaking or losing a sample bottle during transport; and,

- Is part of formal chain-of-custody (COC) procedures (tracking of possession of the samples).

Samples will be packaged and shipped according to the procedures in Key SOP #114, "Sample Handling, Preservation, Packaging, and Shipping."

4.0 DATA RECORDING OR MANAGEMENT

(Reserved)

5.0 REFERENCES

U.S. Environmental Protection Agency, 1986. *RCRA Groundwater Monitoring Technical Enforcement Guidance Document.* OSWER-9950.1. September 1986.

U.S. Environmental Protection Agency, 1986. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* SW-846 3rd Edition (with revisions).

U.S. Environmental Protection Agency, 1987. *A Compendium of Superfund Field Operations Methods, Part 1.* EPA/540/P-87/001. December 1987.

U.S. Environmental Protection Agency, 1991. *Compendium of ERT Groundwater Sampling Procedures.* EPA/540/P-91/007. January 1991.

#104 - SAMPLING EQUIPMENT DECONTAMINATION

1.0 SCOPE AND PURPOSE

This Standard Operating Procedure (SOP) presents methods for on-site decontamination of field sampling equipment. Decontamination is performed as a quality assurance measure and a safety precaution. Decontamination prevents cross-contamination between samples and also helps to maintain a clean working environment for the safety of the field personnel.

Although this SOP defines on-site decontamination procedures, it is highly recommended that (1) dedicated disposable sampling implements are used whenever possible, and (2) sufficient dedicated sampling implements are taken to the field so that the need for field decontamination is eliminated or reduced. For example, in collecting groundwater samples, dedicated, disposable bailers should be used, where practicable.

Decontamination is mainly achieved by washing and rinsing with liquids which include; soap and/or detergent solutions, tap water, distilled water, acetone, hexane, and nitric acid. The actual procedure will vary depending on project-specific requirements as listed in the Quality Assurance Project Plan (QAPjP), the type of equipment to be used, and the analytical parameters of interest.

2.0 REQUIRED MATERIALS[1]

- Distilled water;
- Phosphate-free detergent (e.g., Liquinox, Alconox)
- Potable water supply;
- Hexane;
- Acetone;
- Isopropanol;
- 10% Nitric acid;
- Paper towels;
- Cleaning brushes;
- Aluminum foil;
- Gloves;
- Safety glass;
- Protective clothing;
- Cleaning containers (e.g., buckets, pans); and
- Dedicated squirt bottles for each solvent above and/or distilled water.

[1] Depending on project-specific requirements, not all materials may be necessary.

3.0 METHODOLOGY

It is the primary responsibility of the field team leader to assure that the proper decontamination procedures are followed. Project-specific decontamination procedures are to be included in the field SAP. It is the responsibility of the project safety officer (or designee) to develop and implement safety measures which provide protection for all persons involved directly with decontamination.

The contaminants encountered and type of equipment used will dictate the type of field decontamination procedures required. At a minimum, the following procedures will be used:

- Remove adhered material from the sampling equipment by brushing and/or rinsing with tap water;
- Wash with non-phosphate detergent and tap water;
- Rinse with distilled tap water;
- Rinse with appropriate solvent[2], if organic constituents are of interest;
- Rinse with 10% nitric acid, if metals are a constituent of interest;
- Rinse with distilled water; and
- Air dry or dry with clean paper towels.

Safety Precautions

At a minimum, eye protection, safety shoes, and gloves are to be worn. There are several types of gloves that may be worn, depending on equipment being cleaned, type and extent of equipment contamination, and cleaning solutions or solvents being used.

Polyvinyl gloves may be worn when the equipment to be decontaminated is not heavily coated with constituents such as tars/oils. In cases where heavy accumulations of tars/oils are present on the equipment, neoprene or similar chemically compatible gloves are recommended. If a potential for skin contact exists, protective clothing should be worn.

[2] Note the specific solvent will be dictated by project-specific requirements.

4.0 QA/QC PROCEDURES

To insure that sampling equipment is cleaned properly, and does not lead to cross-contamination of samples, field rinsate blanks will be collected. A rinsate blank will consist of pouring or pumping deionized organic-free water over the specific sampling device or through the device after it has been cleaned. The rinsate sample is performed in the field and generally one rinsate blank is collected each day of sampling or at a rate of 1 per 20 for each parameter, which ever is less, for each matrix being sampled or for each type of sampling instrument decontaminated and reused per day. The rinsate samples are analyzed for the specific parameters of concern (for each matrix). Rinsate blanks are not required if dedicated sampling equipment is used. Additional quality assurance samples may be collected if deemed necessary by project specific requirements. All project specific quality assurance sampling will be defined in the sampling and analysis plan (SAP) or QAPjP prior to initiation of the field work.

5.0 RECORDING REQUIREMENTS

The field team leader will maintain a record of the decontamination procedures.

6.0 REFERENCES

United States Environmental Protection Agency, January 1991. *Compendium of ERT Groundwater Sampling Procedures.* EPA/540/P-91/007. Washington D.C.

#105 - CHAIN OF CUSTODY

1.0 SCOPE AND PURPOSE

This Standard Operating Procedure (SOP) presents procedures for documenting possession/custody of environmental samples from the time of collection through delivery to the receiving analytical laboratory. At this point, internal laboratory records should document sample custody until final disposition. This SOP also discusses sample identification and the use of chain-of-custody (COC) forms.

Possession of the samples must be traceable from the time each is collected until analysis is completed. To document sample possession, chain-of-custody procedures are followed. Chain-of-custody evidence includes all documentation associated with the sample including the chain-of-custody form, sample label, custody seal, courier's receipt (if applicable), and field notebook.

A sample is under custody if one or more of the following criteria are met:

- It is in possession of the custodian or a designated member of the sampling team;
- It is in plain view, after being in possession;
- It was in possession and is secured against tampering; and,
- It is placed in a designated secure area.

2.0 REQUIRED MATERIALS

- Sample container labels;
- Chain-of-custody forms;
- Field notebook;
- Shipping Airbills;
- Locks or Packaging Tape; and,
- Custody seals.

3.0 METHODOLOGIES

The Project Manager (or designee) is responsible for ensuring that sample labeling is completed in accordance with this SOP and that chain-of-custody forms are completed for sample shipments. All individuals relinquishing and receiving samples shall sign, date, and record the time on the chain-of-custody forms.

Sample Identification

Blank sample labels will be supplied by the analytical laboratory and affixed to the sample container. Sample labels will be completed using waterproof permanent markers or ink. The

labels will be filled out at the time of sample collection by the field sampling personnel. The following identifying sample information will be included on the label:

- Client/Site;
- Sample identification alpha-numeric code;
- Sample collector's initials;
- Date and time (military) of sample collection;
- Analytical method; and,
- Laboratory analysis to be performed.

Chain-of-Custody Forms

Once the sample containers have been filled with the sampled media and properly labeled, they will be prepared for shipment to the receiving analytical laboratory. Coolers containing samples will be accompanied by a chain-of-custody form (see example COC form in Figure 1).

The field team leader (or designee) shall complete a chain-of-custody form for each lot of packaged samples (*e.g.,* cooler). COC forms shall be completed in ink. Any transcription errors shall be corrected by striking the erroneous information with a single horizontal line. The corrected information shall be added immediately adjacent to the strikeout. The sampler should initial the correction.

The following information will be recorded on the COC form:

- Client/Site;
- Name(s) of sampler(s);
- Sample identification alpha-numeric code;
- Date and time (military) of sample collection;
- Type of sample (*e.g.*, soil, groundwater);
- Number of containers per sample location;
- Requested analyses;
- Type of containers and preservatives used;
- Name and address for the completed laboratory reports;
- Name and address for laboratory invoices; and,
- Specific instructions/notes for the laboratory, as necessary.

Any area of the COC, where sample information is not completed, should have a hatched line drawn through to show that this portion of the COC will not be completed.

Each COC will be placed in a waterproof plastic bag and affixed to the underside of the shipping container lid. Samples will be packaged properly for shipment as described in SOP #114, Sample Handling, Preservation, Packaging, and Shipping, and dispatched to the appropriate laboratory for analysis. Shipping containers will be padlocked or otherwise sealed for shipment to the laboratory.

All shipments should be accompanied by the completed Chain-of-Custody Record. The original record will accompany the shipment to the laboratory, and a copy will be retained by the field team leader for the project file. Shipping bills and receipts must be retained as part of the chain-of-custody documentation.

Upon receipt of the samples by the laboratory, the laboratory person assigned to log-in samples will confirm that the shipping container seals are in good condition and have not been disturbed. The original chain-of-custody form is to be signed and dated by the laboratory person logging in the samples. In addition, the receiving laboratory is to inspect each sample and indicate the condition of the sample on the COC. The receiving laboratory is to retain a copy of each chain-of-custody form along with the shipping bill. Internal laboratory chain-of-custody procedures will be followed once samples are logged in by the receiving laboratory.

4.0 DATA RECORDING/MANAGEMENT

As discussed in Section 3.0, information related to tracking environmental samples will be recorded on the COC forms which will be retained in the project files.

5.0 REFERENCES

U.S. Environmental Protection Agency, 1986. *RCRA Groundwater Monitoring Technical Enforcement*

U.S. Environmental Protection Agency, 1986. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* SW-846 3rd Edition (with revisions).

U.S. Environmental Protection Agency, 1987. *A Compendium of Superfund Field Operations Methods, Part 1.* EPA/540/P-87/001. December 1987.

U.S. Environmental Protection Agency, 1991. *Compendium of ERT Groundwater Sampling Procedures.* EPA/540/P-91/007. January 1991.

Figure 1
Example Chain-of-Custody Form

KEY ENVIRONMENTAL INCORPORATED

CHAIN OF CUSTODY

200 Third Avenue
Carnegie, PA 15106
Phone (412) 279-3363
Fax (412) 279-4332

Project No.:	Project Name:
Sampiers: (signatures)	

Sample I.D.	Date	Time	Comp	Grab	Sample Location Description	Number of Containers										Requested Analyses

Relinquish By: (signature)	Date	Time	Received By: (signature)	Date	Time	Notes:
Relinquish By: (signature)	Date	Time	Received By: (signature)	Date	Time	
Relinquish By: (signature)	Date	Time	Received By: (signature)	Date	Time	

Distribution: Original to Accompany samples; Copy Returned with Report

#106 - FIELD LOGBOOK

1.0 SCOPE AND PURPOSE

This Standard Operating Procedure (SOP) presents procedures for proper documentation of site activities with respect to the daily field logbook. Field logbooks are the primary source of documentation for site activities, and serve as legal record of all occurrences during those activities.

2.0 REQUIRED MATERIALS

The required materials for maintaining a field log book include a water-resistant, permanently bound notebook and a pen with permanent ink.

3.0 METHODOLOGIES

Pertinent information regarding the site and work procedures must be documented. Information recorded in the notebook should be noted with the date and time of entry. The following items are commonly included as logbook entries:

- Name and location of site;
- Date and time of arrival and departure;
- Name of person keeping log;
- Names and affiliations of project personnel;
- Sampling event description; including methodology, sample numbers and volumes, description of samples, date and time of sample collection, and name of collector;
- Prevailing weather conditions;
- Technical measurements and readings;
- Diagrams and sketches;
- Description of equipment used;
- List and descriptions of photographs; and,
- Equipment calibration information.

Information should be recorded in permanent ink for the legal record. The company name, address, and phone number should be entered at the beginning of the log book. The pages of the logbook should be numbered for ease of reference. Blank spaces should be crossed out and initialed. All notes should be written at the time of observation. Changes or deletions should be crossed out with a single line and initialed by the individual making the change. At the end of each field day, the project scientist/engineer or designee should sign and date each page of the notebook on which entries were made to verify the day's activities.

4.0 QA/QC PROCEDURES

At the end of each day of field activities, the individual or individuals maintaining the field log book should review the notes for accuracy and completeness. Corrections, deletions, or additions should be initialed and the time and date should be noted.

5.0 DATA RECORDING AND MANAGEMENT

It is recommended that a running activity log be maintained, indicating the times of activities and observations; recorded data be written in the form of tables with an appropriate title; and that diagrams be included to illustrate pertinent information. Log books should be labeled with the project name, project number, and a consecutive number for cataloging purposes.

6.0 REFERENCES

Environmental Research Center, University of Nevada - Las Vegas, March 1989, Soil Sampling Quality Assurance User's Guide, EPA/600/8-89/046.

Fetter, C. W., 1994, Applied Hydrogeology, Macmillan College Press Publishing Company, New York, New York, 691 p.

U.S. EPA, September 1986, RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, OSWER-9950.1

#109 - GROUNDWATER LEVEL MEASUREMENTS

SCOPE AND PURPOSE

This section provides general instructions for the accurate measurement of groundwater levels using various methods/equipment. The methods conform to those presented in American Society for Testing and Materials Method D 4750-87.

APPLICABILITY

The procedures presented will permit the accurate determination of water levels (depth to water measurements) in wells and piezometers. The data produced can be used in conjunction with well top-of-casing (TOC) elevations to calculate groundwater elevations and subsequently determine groundwater flow gradients and directions, and vertical gradients. The data may also be used to evaluate drawdown in pumping and/or observation wells during aquifer characterization tests.

DEFINITIONS

Top-of-Casing (TOC): The point of the well riser from which all measurements are made and for which the elevation is surveyed. If the TOC is not identified on the well casing, measurements should be taken from the northernmost point on the lip of the riser.

Depth to Water: Distance measured from TOC to the water surface in feet (to tenths and hundredths).

PROCEDURES

Depth to water measurements can be collected using several methods:

- Graduated tape and marker chalk - indirect reading; and,
- Electronic water level indicator (E-tape) - direct reading.

In general, the equipment is not dedicated for use at any one particular site or well and should, therefore, be carefully and thoroughly decontaminated between each use. Decontamination procedures are discussed in SOP No. 115. Equipment may be dedicated to a well or series of site wells if the investigation is of sufficient scope and length to support the additional cost (particularly the E-tape and electronic water level indicator). Substantial contamination (*e.g.*, floating product) in a well may also necessitate the dedication of measuring equipment.

GENERAL

The measurement for each well should be repeated until two consecutive readings are recorded that are $\pm$0.01 foot (this may not be practical during aquifer pump tests). The data will be recorded in the field logbook; for indirect methods, record both measurements—DO NOT PERFORM SUBTRACTION/ADDITION IN YOUR HEAD. All measuring devices will be decontaminated between wells.

GRADUATED TAPE

A heavy object (plunker or popper) is taped or otherwise attached to the end of a graduated tape (marked to hundredths of a foot). The plunker will help to keep the tape taut while measuring; and, since the tape tends to cling to the inside wall of the well, it will assist in lowering the tape. The first one to two feet of the tape are coated with chalk, and then the tape is slowly lowered down the well. The user will be able to determine that the water surface has been reached by (a) the "plunking" sound made by the weight when the water surface is reached, or (b) the apparent decrease in weight of the tape as the plunker/tape become buoyant in the liquid. After the water surface is encountered, the tape is lowered an additional six inches to a foot and the total length of tape in the well from the TOC is noted and recorded. When the tape is removed from the well, the point at which the chalk is wetted (washed off) is noted and recorded. By subtracting the length of tape that was below the water surface (wetted) from the total tape length extended from TOC, the depth to water can be calculated. It is important that all measurements be recorded and the calculation made from the recorded data. Never make the calculation in your head.

ELECTRONIC WATER LEVEL INDICATOR OR E-TAPE

E-tapes are constructed of two-strand insulated wire with a heavy metal object attached at the end to act as a weight. When the water surface is encountered, an electric circuit is completed, which is indicated at the surface by activation of a light or buzzer,

Some E-tapes are graduated to 0.05 foot while others are marked only every 5 or 10 feet. If the tape is marked to the nearest 0.05 foot, the depth to water from the TOC is interpolated between the marks and recorded to the nearest 0.01 foot. When the tape is marked only every 5 or 10 feet, the depth at which water is encountered is calculated by marking the length of line extended from TOC at the time of circuit completion and measuring the distance to hundredths of a foot from length marker, and adding or subtracting this distance as appropriate. Record both measurements and perform the calculation in the notebook; do not make the calculation in your head.

#114 - SAMPLE HANDLING, PRESERVATION, PACKAGING, AND SHIPPING

1.0 SCOPE AND PURPOSE

This Standard Operating Procedure (SOP) describes the procedures associated with the handling, preservation, packaging, and shipment of environmental samples for laboratory analysis or testing. Environmental samples may consist of air, groundwater, surface water, sediments, soil, non-aqueous phase liquid (NAPL), and/or sludges. The objective of sample preparation, handling, packaging, and shipping protocols is to develop standard procedures which will preserve the integrity of the samples and minimize the potential for sample tracking errors, sample spillage or leakage, and/or sample container breakage. The field team leader is responsible for the implementation of the sample handling, preservation, packaging, and shipping requirements outlined in the project-specific sampling and analysis plan (SAP).

2.0 REQUIRED MATERIALS

Required materials may include the following:

- Sample containers (preserved, as necessary);
- Sample bottle labels;
- Chain-of-Custody forms;
- Sample cooler;
- Bubble wrap or other suitable packing material;
- "Blue Ice" (*i.e.*, reusable, freezable ice packs) or sealed bagged ice;
- Shipping bills (Federal Express, Airborne, etc.);
- Packaging tape; and,
- Zip lock plastic bags.

3.0 METHODOLOGIES

3.1 Sample Handling

Sample Containers

Sample containers and appropriate preservatives (where necessary) will be supplied by the analytical laboratory. After the respective sample containers have been filled with appropriate sample media and preserved as necessary, samples will be properly identified using sample container labels, and the samples will be stored at an appropriate temperature (usually <4°C) to preserve the integrity of the samples.

Sample Preservation

Preservatives will be supplied by the laboratory. Where possible, preserved containers should be

supplied by the lab. Common preservatives include hydrochloric acid (HCl), sulfuric acid (H_2SO_4), nitric acid (HNO_3), or sodium hydroxide (NaOH). Samples will be preserved in accordance with EPA protocol specified in SW-846 or the project specific protocols outlined in the quality assurance project plan (QAPjP). Use of the preservatives will be noted on the COC for each particular sample and analytical parameter.

Sample Labels

Blank sample labels will be supplied by the analytical laboratory and affixed to the sample container. Sample labels will be completed using waterproof permanent markers or ink. The labels will be filled out at the time of sample collection by the field sampling personnel. The following identifying sample information will be included on the label:

- Client/Site;
- Sample identification alpha-numeric code;
- Sample collector's initials;
- Date and time (military) of sample collection;
- Analytical method; and,
- Laboratory analysis to be performed.

Chain-of-Custody Forms

A chain-of-custody (COC) record will be established and maintained to document sample possession from the time of collection until receipt by the laboratory. Once samples are received by the laboratory, they will be handled under the laboratory internal COC procedures. Field sampling personnel will initiate a COC record by recording the following minimum data as the samples are collected:

- Client/Site;
- Name(s) of sampler(s);
- Sample identification alpha-numeric code;
- Date and time (military) of sample collection;
- Type of sample (e.g., soil, groundwater);
- Number of containers per sample location;
- Requested analyses;
- Type of containers and preservatives used;
- Name and address for the competed laboratory reports;
- Name and address for the laboratory invoices; and,
- Specific instructions/notes for the laboratory, as necessary.

Sample COC forms will be placed in waterproof plastic bags and taped to the underside of the cooler lids. Sample COC forms will generally be supplied by the subcontracting analytical laboratory.

Subsequently, at each change of possession, the COC record will be signed by the person relinquishing the samples and by the person receiving the samples. The date and time of the transfer of possession of the sample will be recorded on the COC form; this occurs when the samples are transferred from the sampling personnel to the courier and when the samples are received at the analytical laboratory. Sample COC forms shall be completed in ink. Any transcription errors shall be corrected by striking the erroneous information with a single horizontal line. The correct information will be added immediately adjacent to the strikeout. The sampler should initial the correction. (Refer to SOP #105 for additional information).

3.2 Sample Packaging and Shipping

All samples will be transported to the analytical laboratory in durable, waterproof, secured metal or plastic coolers. Sample coolers will generally be supplied by the laboratory. All samples will be packaged very carefully to prevent sample breakage. Samples will be shipped *via* overnight carrier (*e.g.,* Federal Express, Airborne, United Parcel Service) or hand delivered to the analytical laboratory, generally within 48 hours of collection. However, project specific protocols will be checked to assure that specified sample holding times are not exceeded in the event that samples are not shipped on the same day that they were collected. Additionally, the sample security and preservation must be maintained if samples are not to be transported immediately to the laboratory. The following procedure should be followed for packaging samples for shipment to the laboratory for testing and/or analysis.

1. Place plastic bubble wrap matting or suitable material over the base and bottom corners of each cooler or shipping container.

2. Obtain a chain-of-custody record (similar to the example shown in Figure 1) and enter all the appropriate information as discussed above. Chain-of-custody records will include complete information for each sample. One or more chain-of-custody records shall be completed for each cooler or shipping container as needed to manifest each sample.

3. Place bubble wrapping or other suitable material around glass bottles and place standing upright on the base of the cooler, taking care to leave room for packing material and ice or equivalent. Rubber bands or tape may be used to secure wrapping completely around each sample bottle.

4. Place additional bubble wrap and/or Styrofoam pellet packing or equivalent material throughout the voids between sample containers within each cooler.

5. Place cold packs or ice in heavy duty "zip-lock" type plastic bags, completely close the bags, and distribute such packages over the top of the samples. Add additional bubble wrap and/or Styrofoam pellets or other packing materials to fill the balance of the cooler or container.

6. If shipping the samples by express, courier, or delivery service, sign the chain-of-custody record thereby relinquishing custody of the samples. The date and time of custody transfer should be recorded on the chain-of-custody form. The custody transfer should be documented when directly transferring custody to a receiving party or when transmitting to a shipping service for subsequent receipt by the analytical laboratory. The shipping service should not be asked to sign chain-of-custody records.

7. Remove the last copy from the chain-of-custody record and retain with the field records. Place the original and remaining copies in a "zip-lock" type plastic bag and tape the bag to the underside of the lid of the cooler or shipping container.

8. Close the top or lid of the cooler or shipping container and with another person gently rotate the container to verify that the contents are packed so that they do not move. Improve the packaging if needed and reclose.

9. Packaging tape should be wrapped entirely around the sample shipping containers. A minimum of two full wraps of packaging tape will be placed in at least two places on the cooler or shipping container. Some project-specific QAPjPs may require custody seals be placed on the sample shipping containers. Sign and date the chain-of-custody tape.

10a. When transporting samples by automobile to the laboratory, and where periodic changes of ice are required, the cooler should only be temporarily closed so that reopening of the cooler can be easily performed. In these cases, chain-of-custody will be maintained by the person transporting the samples and chain-of-custody tape need not be used. If the cooler is to be left unattended, then chain-of-custody procedures should be implemented.

10b. If shipment is required, transport the cooler to an overnight express package terminal or arrange for pickup. Obtain copies of all shipment records as provided by the shipping service.

11. Upon receipt of the samples, the analytical laboratory will open the cooler or shipping container and will sign "received by laboratory" on each chain-of-custody form. The laboratory will verify that the chain-of-custody tape has not been broken previously and that the chain-of-custody tape number corresponds with the number on the chain-of-custody record. The analytical laboratory will then forward the back copy of the chain-of-custody record to the sample collector to indicate that sample transmittal is complete.

4.0 QUALITY CONTROL

Quality control samples such as rinsate blanks and duplicates will be specified by the project QAPjP. A sample jar containing water should be sent as a temperature blank with each sample shipment requiring temperature preservation to ensure proper temperature is maintained. Also, a trip blank, provided by the laboratory will accompany shipments with samples intended for volatile organic chemical (VOC) analysis.

5.0 DATA RECORDING/MANAGEMENT

The documentation for supporting the sample handling, preservation, packaging and shipping will consist of chain-of-custody records, shipping records laboratory reports. In addition, a description of sample packaging procedures will be written in the Field Log Book. All documentation will be retained in the project files.

6.0 REFERENCES

U.S. Environmental Protection Agency, 1986. *RCRA Groundwater Monitoring Technical Enforcement Guidance Document.* OSWER-9950.1. September 1986.

U.S. Environmental Protection Agency, 1986. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* SW-846 3rd Edition (with revisions).

U.S. Environmental Protection Agency, 1987. *A Compendium of Superfund Field Operations Methods, Part 1.* EPA/540/P-87/001. December 1987.

U.S. Environmental Protection Agency, 1991. *Compendium of ERT Groundwater Sampling Procedures.* EPA/540/P-91/007. January 1991.

#117 - GROUNDWATER SAMPLING

SCOPE AND PURPOSE

This section presents the methods and equipment necessary for collection of groundwater samples. The procedures presented are based on standard industry practices and are usually required by state and federal agencies.

APPLICABILITY

These procedures are applicable to groundwater sampling programs for evaluating conditions at hazardous and solid waste disposal facilities and non-regulated sites.

DEFINITIONS

All terms in this section are in common usage or are defined within the text.

PROCEDURES

The standard procedures outlined below may be modified on a site-specific basis depending upon the constituents of interest, the ultimate data usage, and in recognition of agency policies. Methods deviating from the Key Environmental, Inc. (KEY) SOP should be discussed in the preparation of the sampling plan and revisions approved by the Project Manager and the Geosciences Manager.

Groundwater samples are generally not to be collected less than one to two weeks after well installation is completed. This should be taken into account when developing a schedule for implementation and completion of a field investigation.

EQUIPMENT

An extensive equipment list is included to aid in preparation of the sampling event (Appendix 117-A). In most cases, a pump or bailer can be used for purging and sampling. The type of pump or bailer selected will be dependent upon the well diameter, depth to water, and, in some cases, the sample parameters. There are many available pump models manufactured; several are discussed below:

X **Suction Lift Pumps**

Advantages:

- Readily available, relatively portable, and inexpensive.

Disadvantages:

- Use is limited to situations where depth to water is less than 20 feet.

- Reducing the pressure on the water may cause the volatile organic compounds (VOCs) to come out of solution. These pumps are not recommended for sample collection.

X **Portable Submersible Pumps**

Advantages:

- Portable; can be used to sample several monitoring wells in a brief period of time.

- Dependent upon the size of the pump and pumping depths; relatively large pumping rates are possible.

Disadvantages:

- Most submersible pumps require a minimum well casing inside diameter of 4 inches.

X **Air Lift Pumps**

Advantages:

- Portable; light-weight; easily transported and handled in the field.

- Capable of handling lifts of as much as 100 feet.

- Capable of producing flows of several gallons per minute (flow rate is dependent on lift).

Disadvantages:

- Air contacts the sample, which can cause a loss of volatile fraction; consequently, not acceptable for collecting samples for organic analysis.

- Not suitable for collecting samples for pH sensitive parameters such as metals.

- Requires bottle gas or oiless air compressor to drive the pump.

X **Bladder Pumps**

Advantages:

- Portable light-weight; easily transported and handled in the field.

- Small diameter pumps are available, which can easily accommodate 2-inch diameter monitoring wells.

- Drive gas does not touch sample; generally accepted method for collecting samples for all groundwater testing parameters.

Disadvantages:

- Slow pumping rates make them inefficient for pumping large volumes of water.

- Require compressed gas source, either bottled gas or oiless air compressor.

Bailers used by Remcor are constructed of various materials (Teflon™, stainless steel, or polyvinyl chloride) and are available in various diameters and lengths. Additional bailer options include bottom or top filling and bottom or top draining. The appropriate bailer should be identified in the site work plan in accordance with specific study needs:

Advantages:

- Able to be constructed from a wide variety of materials compatible with the parameter of interest.

- Sufficiently economical and convenient to allow a separate bailer to be assigned to each well to minimize the potential for cross contamination.

- No external power source required.

- Low surface to volume ratio reduces outgassing of volatile organics.

Disadvantages:

- Sometimes impractical to evacuate stagnant water in a well with a bailer.

- Transfer of water sample from bailer to sample bottle can cause aeration.

- Cross contamination can be a problem if equipment is not adequately decontaminated prior to each use.

GROUNDWATER PURGING/SAMPLING

All pertinent information should be documented in the field notebook(s) and on the Groundwater Well Purge Sheet. Prior to on-site activities, the sampling team members should read and clearly understand the site-specific sampling plan. The following methods should be followed at all sites unless alternate procedures are specifically addressed in the sampling plan:

Step 1 The land surface around the well protective casing should be covered with plastic sheeting to limit contact between the ground surface and purging/sampling equipment.

Step 2 Measure the depth to the static water level and the total depth of each well from the top of the well casing and record the data in the field notebook. Subtract the depth to static water from the total well depth to calculate the length of the water column in each well.

Step 3 Calculate the volume of water in the well according to the following formulae:

$$V_{cf} = (r^2)(L)$$

where:

V_{cf} = volume of water in cubic feet (ft3)

r = radius of the well in feet

L = length of the water column in feet.

and

$$V_{gal} = V_{cf} \times 7.481$$

where:

V_{gal} = volume in gallons

V_{cf} = volume in ft^3

Step 4 Measure sufficient length of rope and/or discharge line necessary for bailer or pump as appropriate.

Step 5a Unless directed otherwise by the sampling plan, Ipump) install the pump with the pump intake located immediately above the screened portion of the well. If a pump is not dedicated to each well, the pump should be thoroughly rinsed with distilled water between each location and new discharge line should be used for each well. Care should be taken to sample the least impacted well first and subsequent wells sampled in ascending order of impact.

Step 5b A laboratory-cleaned bailer with new disposable rope attached should be used at each well. The rope should be cut to sufficient length to allow the bailer to be lowered to the bottom of the well. While purging with a bailer, care must be taken to minimize turbidity in the samples. Never let the bailer fall into the well, lower it slowly to the water surface. Fill the bailer from the top of the water column and retrieve slowly until the bailer is free of the water column.

Step 6 Measure the necessary purge volumes by pumping or bailing into a graduated bucket. If the purged water contains a nonaqueous phase (free product) or it is required by the sampling plan, the graduated bucket should be intermittently emptied into a larger storage container (55-gallon drum). If no free product is present and the water is not a hazardous waste, the purged water may be disposed of on the ground away from the top of the well. If sufficient water is not present for purging of the required volumes, the well should be bailed dry and permitted to recharge prior to sampling. The time required for purging should be recorded in the field notes and on the Groundwater Well Purge Sheet.

If feasible, sampling should follow immediately after purging; in general, within two hours of completion of purging. If additional time is required to allow the well to recover before sufficient water is available for sampling, this should be recorded in the field notes.

Step 7a (for pumps) Decrease the discharge rate and fill aliquots in the following order:

- Field parameters, pH, specific conductance, temperature
- X VOCs - there should be no headspace in these sample bottles
- X Semivolatile organic compounds
- X Pesticides and polychlorinated biphenyls
- X Metals
- X Water quality parameters (sulfate, chloride, nitrate, etc.)

Step 7b (for bailers) The initial bail after purging should be used to fill the VOC bottles and the remainder for measurement of field parameters. Remaining sample bottles should be filled in the order indicated in Step 7a above.

Step 8 Preservatives should be added as appropriate after collecting each sample, excluding dissolved metals. The dissolved metals sample should be filtered using a 0.45-micron filter, then preserved as appropriate.

Sample labels can be affixed prior to sampling or following collection. The labels should be taped on the bottles using clear tape to prevent smearing or the labels falling off the bottles due to moisture.

Step 9 Record the approximate time of sample collection in the field notes and chain-of-custody (COC) form (SOP No. 105). Samples should be placed in iced coolers (4 to 10 degrees centigrade) immediately after collection.

Step 10 Dispose of all disposable rope and disposable health and safety equipment as solid waste unless otherwise directed in the sampling plan.

APPENDIX 117-A
EQUIPMENT LIST

Pumps (sized to well, specifications reviewed with respect to well installation and water levels);

Bailers (Teflon™, polyvinyl chloride [PVC], stainless steel; bottom or top-filling; bottom or top-draining);

Rope;

PVC discharge line (and other appropriate material);

Latex gloves (and other suitable protective clothing);

Water level indicator;

Garbage bags/plastic sheeting;

pH and specific conductance meters; thermometers;

Permanent markers;

Clear tape;

Packing tape;

Duct tape;

Chain-of-custody forms and seals;

Analytical request forms;

Preservatives, hydrochloric acid, nitric acid, sulfuric acid, sodium hydroxide);

pH paper;

Methanol;

Nitric acid ;

Spray bottles;

Distilled water;

Laboratory deionized water;

Groundwater Well Purge Sheets;

Paper towels;

Rags;

Alconoxo® soap;

Buckets (5-gallon);

Sample filtering system and 0.45-micron filters;

Blue ice or freezer bags and ice;

SS-gallon drums for containerizing purge water (when required);

Well keys;

Field logbook; and,

Key Environmental, Inc. SOPs

ATTACHMENT B

FTS

WELL NO.:

GROUNDWATER SAMPLE COLLECTION RECORD

Project No.: OM045808-091 **Date:** _____ **Time: Start:** _____ am/pm
Project Name: _____ **Finish:** _____ am/pm
Location: Grenada, MS
Weather Conditions: _____ **Collector:** _____
Print Sign

1. WATER LEVEL DATA (measured from top of well casing)

a. **Total Casing Length:** _____ (ft) b. **Well Casing Type:** _____
c. **Depth to Water:** _____ (ft) d. **Casing Diameter:** _____ (in)
e. **Length of Water Column:** _____ (ft) (a-c)
f. **Well Volume:** _____ (gal)

Conversion Factors (cf)
(e x cf = f)

Casing I.D. (in)	Conv. Fact.
1	0.041
2	0.163
3	0.367
4	0.653
6	1.470

2. WELL PURGE DATA

a. **Purge Method:** _____
b. **Field Testing Equipment:** _____
c. **Number of Well Volumes to Remove:** Three
d. **Required Total Purge Volume (1f x 2c):** _____

Vol. Purged (total gal)	Temp (° C)	pH (s.u.)	Spec. Cond.	Notes

3. SAMPLE COLLECTION INFORMATION

Sampling Method(s): _____
Sample Identification (name, time, date): _____
QC Samples (name, time, date): _____

Analytical Parameters and Methods: SVOCs (PAHs and Acid Extractable Phenolics)-8270C

Comments: _____

EQUIPMENT CALIBRATION FORM

FTS

INSTRUMENT: _____

SERIAL NO.: _____

DATE	TIME	PARAMETER		CALIBRATION READING	CALIBRATION RECORDED BY
		pH S.U.	4.00 S.U.	S.U.	
			7.00 S.U.	S.U.	
			10.00 S.U.	S.U.	
		Specific Conductivity(umhos/cm)		umhos/cm	
		Temperature (°C)		°C	

INSTRUMENT: _____

SERIAL NO.: _____

DATE	TIME	PARAMETER		CALIBRATION READING	CALIBRATION RECORDED BY
		pH S.U.	4.00 S.U.	S.U.	
			7.00 S.U.	S.U.	
			10.00 S.U.	S.U.	
		Specific Conductivity(umhos/cm)		umhos/cm	
		Temperature (°C)		°C	

ATTACHMENT C

Groundwater Protection

(RCRA Part B Application, Section 5)

5.0 GROUNDWATER PROTECTION

This section discusses the Post-Closure Care groundwater monitoring program to be carried out under this permit period. This section describes also the existing groundwater monitoring data that has been completed at the Site in the vicinity of the closed former RCRA SI: this includes interim status groundwater monitoring data collected from 1982 through 1988 and the post-closure care monitoring data collected from 1988 through the present. The information presented in this section satisfies the additional information requirements regarding groundwater protection pursuant to 40 CFR 270.14(C).

5.1 INTERIM STATUS GROUNDWATER MONITORING DATA

Interim status groundwater monitoring was initiated for the then-operating/subsequently closed SI in 1982 and continued until the issuance of the Permit, which was issued by MDEQ in June 1988. In accordance with 40 CFR 265 and MHWMR 265, groundwater upgradient and downgradient of the closed SI was monitored to determine if the closed SI was impacting groundwater quality. A description of the interim status groundwater monitoring well network, data collected from these wells, and results of the interim status monitoring program are discussed in this section.

The interim status monitoring well network was modified as directed by MDEQ several times from 1982 through 1987. In accordance with 40 CFR 265.91(a) one well (R-1) was installed hydraulically upgradient of the SI and three wells (R-2, R-3, and R-4) were installed hydraulically downgradient of the SI. In 1984, the original well system was expanded under the direction of the MDEQ to include installation of five additional wells (R-5 through R-9). Following the installation of the five wells, a bimonthly sampling and analysis program was initiated to further define the groundwater flow pattern. Results of the bimonthly sampling and analysis program indicated that wells R-5 and R-6 were hydraulically upgradient wells and wells R-7, R-8 and R-9 were hydraulically downgradient of the closed SI. However, groundwater quality data from wells R-5 and R-6 were not considered by MDEQ to be characteristic of background groundwater quality. In 1986, five additional wells (R-08B, R-10, R-10B, R-11 and R-12) were installed and in 1987 two wells (R-09C and R-09D) were installed to further characterize groundwater quality and flow. The "B", "C", and "D" series wells were installed to characterize groundwater quality at depth.

A shallow hydraulic gradient at the interim status monitoring wells for the SI made it difficult to assess the upgradient well location. As a result, the additional wells that were installed helped to determine the groundwater flow direction. Based on the subsequent well installations and determination of the groundwater surface elevation, it was determined that the groundwater flow direction at the SI was to the east-northeast, and wells R-01 (and later, R-1R, which replaced R-1) and R-10 were located hydraulically upgradient of the SI.

Boring logs and well construction details for the interim status wells are presented in Appendix E.

Interim Status Monitoring Data

Groundwater sampling was conducted at various well locations throughout the interim status period from 1982 through 1987. From March 1982 through 1984, groundwater sampling was conducted at wells R-01 through R-04. Wells R-05 and R-09 were sampled following their installation in July 1984 through February 1985. Quarterly sampling was also conducted at wells R-05 through R-09 during 1986. Wells R-08B, R-10, R-10B, R-11 and R-12 were sampled in a supplemental sampling round conducted in November 1986. The interim status detection monitoring program was initiated in January 1987. Monitoring wells R-01, R-10, R-07, R-08 and R-09 were sampled under the interim status detection monitoring program Analytical data collected during interim status are included as Appendix E-2 of the 1987 Permit Application.

5.2 MONITORING DATA UNDER THE PERMIT FROM 1988 THROUGH 1998

Under the June 28, 1988 Permit; eight wells monitored the closed SI consisting of two upgradient wells (R-01R and R-10) and six downgradient wells (R-07, R-08, R-08B, R-09, R-09C and R-09D). Figure 6 presents the locations of these wells. The detection monitoring program initially included analyses for pH, conductivity, total dissolved solids, total organic carbon, PAHs, total phenols, and pentachlorophenol. Pursuant to the Permit modification in February 1990, groundwater samples collected from wells monitoring the closed SI were analyzed for the following constituents: PAHs (EPA Method 8310), acid extractable phenolics (EPA Method 8040), phthalates (EPA Method 8060), total and dissolved chromium (EPA Method 601 OA) and mercury (EPA Method 7470) and field pH, specific conductance and temperature. A summary of historical data collected during the detection monitoring program required by the 1988 Permit are provided in Appendix E-4 of the *Post-Closure Care Permit Renewal Application* (1997 Permit Renewal Application) (Fluor Daniel GTI, 1997) and the *Post-Closure Care Permit Renewal Application* (1999 Revised Permit Renewal Application) *(ThermoRetec, revised March 1999)*. Boring logs and well construction information are provided in Appendix E.

Statistical Procedures under the 1988 and 1998 Permits

Previous SI groundwater data had shown that over 90 percent of the up gradient and downgradient monitoring well analyses were below laboratory reporting limits. Because the majority of the permit constituents were below the laboratory reporting limits, a background mean value could not be determined, and the Behrens-Fisher method could not be used for statistical evaluation.

In accordance with Section IV.F of the 1988 Permit, a statistical evaluation was to be completed using the Behrens Fisher Student's t-test or an equivalent method approved by the MDEQ. However, because of the high number of non-detects in the groundwater monitoring data, two documents were prepared by Dr. William R Kodrich, Clarion University of Pennsylvania, detailing statistical alternatives to address this situation. These documents were submitted to

MDEQ by Beazer on September 11, 1990, for MDEQ's approval for applying the statistical alternatives to the post-closure detection monitoring program for the impoundment. The September 11, 1990 submittal included the following two documents that presented:

1. Results of statistical analyses of data for the original five parameters specified in the Koppers Industries Inc. (KII) Grenada permit issued to Kopper's Grenada Facility.

2. Recommended statistical procedures for comparing mean background monitoring well concentrations with mean downgradient compliance monitoring well concentrations at KII's Grenada Facility.

In these documents, Dr. Kodrich presented several statistical methods to be used under various monitoring data situations (e.g., the percentage of non-detects). These methods are included in those recommended in the United States Environmental Protection Agency's (EPA) guidance document, *Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance (1992).* These methods also met the requirements of Mississippi Hazardous Waste Management Regulations 264.

As stated, the statistical evaluations were selected based on the frequencies of detection of the constituents and the statistical distributions of the concentrations in the background samples collected from wells R-0lR and R-10. Statistical evaluations are included in Appendix E-1 of the 1997 Permit Renewal Application and the 1999 Revised Permit Renewal Application. Because so many nondetect results were reported in this monitoring program, the data are not normally distributed. Therefore, a parametric statistical analysis such as a t-test or parametric analysis of variance where arithmetic means and standard deviations are used as a basis for decision analysis is inappropriate. The arithmetic means and standard deviations would not accurately represent the data and use of the parametric tests would most likely result in the derivation of incorrect conclusions. Therefore, nonparametric statistical tests were used to evaluate the data.

Statistical evaluations of the groundwater data were conducted as part of the 1987 Permit Application and the data showed that monitoring wells R-0l and R-10 are located up-gradient with respect to the closed SI and were determined to provide data representing background groundwater quality. The statistical evaluations also indicate that no statistically significant difference exists in comparing concentrations of the permit constituents in the downgradient monitoring wells to those concentrations measured in the up gradient monitoring wells.

During past semi-annual sampling events conducted under the 1998 Permit, the detection of constituents was very infrequent. The downgradient data were compared to a pool of upgradient data collected from wells R-01R and R-10 since the second half of 1990. For those constituents statistically analyzed using the Poisson Tolerance Limit, no downgradient concentration ever exceeded the limit. Therefore, any infrequent constituent detection was not regarded as significant. For those constituents statistically analyzed using the Wilcoxon Rank-Sum Test, downgradient concentrations were also never found to be statistically greater than the upgradient concentrations.

5.3 SITE GEOLOGY AND HYDROGEOLOGY

Regional and Site geology and hydrogeology are most recently described in the Complete Phase II RCRA Facility Investigation Report (Phase II Report, 2003) (GeoTrans, AMEC, and Groundwater Insight, July 2003). In the Phase II Report, data collected during investigations conducted during 1997, 1998, and 2000 were combined with data reported previously in the Interim Measures Workplan (AWD, 1994), to provide updated interpretations. Section 5.3.1 of this Permit Renewal presents the updated Site geology and hydrogeology from the Phase II Report. Section 5.3.2 presents hydrogeologic information specific to the Facility (closed SI units) in order to satisfy the additional information requirements of 40 CFR 270.14(c).

5.3.1 Site Geology and Hydrogeology

The uppermost aquifers in the vicinity of the Site are the Holocene-Pleistocene channel sands, which correlate with the Upper Silt and Sand Zones. These are underlain by the Upper Low-Permeability Zone, which probably correlates with the Basic City Shale; and the Lower Sand Zone, which correlates with the Meridian Sand. These are underlain by a laterally continuous layer of clay and silt, which is greater than 150 feet thick on Site and probably correlates with the upper member of the Wilcox Group.

Fill Zone - Much of the Site north of Central Ditch has fill materials overlying the native geologic materials. The fill varies in thickness from 0 to approximately 10 feet and is comprised of a broad range of grain sizes, from clay to gravel, and materials, including bricks and wood debris. The deeper portions of the fill are often saturated, whereas the shallower fill materials are dry.

Upper Silt and Sand Zones - The Upper Silt and Sand Zones are present below fill or near the land surface over most of the Site. This zone is partially saturated and includes areas of perched water on clay or silt lenses or within former impoundments or the former wood disposal area. The hydraulic conductivity of this zone is approximately 8 ft/day. The zone is unconfined to semi-confined. The moderate hydraulic conductivity is due to the presence of silt and clay in the aquifer.

Horizontal groundwater flow in this zone is generally northeastward toward Batupan Bogue, and is consistent with regional flow. However, Site topography and land use affect local flow directions. For example, in the vicinity of the Central Ditch in the central area of the Site, shallow groundwater flows toward the Central Ditch.

Upper Low-Permeability Zone - The Upper Low-Permeability Zone underlies the Upper Silt and Sand Zones. The zone is heterogeneous in composition and variable in thickness over the Site, ranging from zero to approximately 18 feet. This zone is comprised of interbedded layers of clay and silt, with intermittent sandy lenses. The Upper Low-Permeability Zone is present beneath the Former Wastewater Treatment System, including the former impoundments and wood disposal area. The Upper Low-Permeability Zone extends beyond the Central Ditch in the

middle of the Former Wastewater Treatment System area, becoming thinner to non-existent at the Ditch to the southwest and northeast. The zone appears to be discontinuous in localized areas and may allow the Upper Silt and Sand Zones to be in contact with the Lower Sand Zone.

The silt and clay beds of the Upper Low-Permeability Zone are expected to have hydraulic conductivities that are several orders of magnitude lower than the sand beds of the Upper Silt and Sand Zones. The Upper Low-Permeability Zone acts as a local partial confining unit above the Lower Sand Zone and, where present, also impedes the downward migration of DNAPL (HSI, 1996).

Lower Sand Zone - The Lower Sand Zone underlies the Upper Low-Permeability Zone. The Lower Sand Zone ranges in thickness from approximately 90 to 165 feet. The zone behaves as a confined aquifer and has an estimated average hydraulic conductivity of 36 ft/day. Groundwater flows generally north and northeastward across the Site in the Lower Sand Zone and appears to be relatively unaffected by surface topography and activities. There is a downward vertical groundwater gradient over much of the Site. The difference in potentiometric surface elevations between the Upper Silt and Sand Zones and the Lower Sand Zone is as much as three to four feet in the southern and western portions of the Site. The magnitude of the downward gradient diminishes toward the northeast and a very slight upward gradient exists in the eastern portion of the Site.

Lower Confining Zone - The Lower Confining Zone underlies the Lower Sand Zone. This zone is at least 150 feet thick at boring D96-4 and hydraulically separates the Lower Sand Zone from the deeper regional aquifers of the Middle and Lower Wilcox Group.

5.3.2 Facility-Specific Hydrogeologic Information

Figures 2 and 3 of this Renewal Application satisfy the 40 CFR 170.14(c) surface water flow and topographic map requirements. Additional requirements, including groundwater flow and location of the monitoring wells are satisfied by Figures 6 and 7. Figure 7 presents the groundwater potentiometric surface contours for the two semi-annual monitoring events conducted in 2007. Figure 6 shows the locations of the Site monitoring wells, highlighting the wells located upgradient and downgradient of the closed SI that are used in the monitoring program. Flow velocities and hydraulic gradients as determined for the 2007 semi-annual events are presented in Table 2.

5.4 CURRENT GROUNDWATER MONITORING DATA

The groundwater monitoring program for the closed RCRA SI includes semi-annual gauging and sampling of two upgradient monitoring wells (R-01R and R-10) and six downgradient monitoring wells (R-07, R-08, R-08B, R-09, R-09C, and R-09D) (Figure 6). In addition, to provide accurate determinations of groundwater flow rate and direction around the closed SI, up to thirteen additional wells are gauged during the semi-annual events. Monitoring activities are completed in accordance with the requirements of the Permit and the procedures provided in Appendix E-5 of the Permit (Sampling and Analysis Plan). Note that on January 31, 2002,

Beazer requested an interpretation of Permit language from MDEQ to clarify the Permit requirements to gauge Site monitoring wells. MDEQ confirmed (in a letter dated February 12, 2002) that the Permit requires gauging of only the eight sampled wells listed in Parts III.B.1.a and III.B.1.b of the Permit. However, in order to provide accurate determinations of groundwater flow rate and direction around the closed SI, Beazer voluntarily gauges additional wells during the semiannual sampling events.

Groundwater elevation measurements and groundwater potentiometric surface maps for the monitoring events are provided in Appendix F. Note that observations of DNAPL in non-RCRA gauging well R-20 have been consistent throughout the monitoring program.

Throughout the monitoring program, groundwater flow in the vicinity of the closed RCRA SI has been determined to be northeastward from the impoundment area. Groundwater flow velocities are calculated in accordance with the requirements of the Permit. The average hydraulic gradients calculated for groundwater across the closed RCRA SI have ranged from 0.002 feet/feet to 0.010 feet/feet. Using the conductivity of 8.63 feet/day (slug test results for A level wells [Hydro-Search Inc., December 1996]) and effective porosity of 0.3 (estimated from Freeze and Cherry, 1979), the average linear groundwater flow velocity in the vicinity of the closed RCRA SI ranged from 0.058 feet/day (21 feet/year) to 0.288 feet/day (104.9 feet/year). The groundwater flow velocities constitute a conservatively high estimate of the potential constituent transport velocity because aqueous constituents are usually subject to interactions with the soil matrix, which can significantly retard the rate of transport relative to the groundwater flow velocity.

As required by the Permit, the groundwater samples are analyzed for the constituents listed in Table 3. Following receipt of the data from the laboratory, analytical data is reviewed for completeness and quality using the protocols of the United States Environmental Protection Agency (USEPA) National Functional Guidelines and USEPA method specifications. Groundwater analytical data collected under the Permit are included with this Permit Renewal in Appendix G. Data collected throughout this monitoring program are consistently non-detect at concentrations equal to or greater than their respective estimated quantitation limits.

Statistical evaluations have consisted of empirical evaluations of the data, performed semiannually in accordance with Appendix E-6 of the 1998 Permit. Consistent with the conclusions drawn from the statistical evaluations performed under the 1987 Permit, described in Section 5.2, these evaluations demonstrate that there is no evidence of a release from the closed unit.

5.5 PROPOSED POST-CLOSURE CARE MONITORING PROGRAM

The Permit indicates that the post-closure detection monitoring program shall continue throughout the active life of the SI, including the closure period, and throughout the post-closure period (Part IV.G.3). The Mississippi Hazardous Waste Regulations incorporate by reference the federal regulations in 40 CFR Part 264. As indicated in 40 CFR Part 264.117(a)(2), the Administrator may shorten the post-closure care period for the hazardous waste unit, if it is

found that the unit is closed, and if the owner finds that the reduced period is sufficient to protect human health and the environment. Based on the removal of waste material, capping of the unit in accordance with the closure plan, the subsequent certification of closure, the extensive analytical data base and the statistical evaluations completed to date indicating the absence of unit-related constituents in the groundwater, the closed SI has not, and will not adversely impact groundwater, and subsequently human health and the environment. As such, the conditions of the closed SI meet the requirements for modifying the detection monitoring program. The modifications and rationale for the modifications are described in the following sections.

Wells Proposed to be Included in the Monitoring Program

The current detection groundwater monitoring program for the closed SI consists of eight wells (R-01R, R-07, R-08, R-08B, R-09, R-09C, R-09D and R-l0). The detection program will continue to include this network of wells. Wells R-0lR and R-10 are the upgradient wells. The remaining wells are downgradient point of compliance wells. The majority of the wells (R-01R, R-07, R-08, R-09, and R-10) are installed within the upper sand aquifer at depths ranging from 17 to 31 feet bgs. Wells R-08B, R-09C and R-09D are completed in the lower sand at depths ranging from 36 to 87 feet bgs.

Proposed Required Analytical Parameters

Analytical parameters will include the constituents of the current monitoring program listed in Table 3. These constituents include pentachlorophenol as well as the semivolatile constituents listed in 40 CFR 261 Appendix VII – Basis for listing hazardous Waste K001 Constituents. In addition, acenaphthene, fluorene, anthracene, phenanthrene, and pyrene, constituents associated with creosote will continue to be included. Groundwater samples collected during the detection monitoring program will be analyzed in accordance with Sampling and Analysis Plan provided in Appendix H.

Proposed Biennial Monitoring Frequency

Based on the consistent lack of detectable concentrations of the constituents of interest, the frequency of monitoring is proposed to be modified from semiannual to once every other year (biennial).

Statistical Evaluations

Groundwater analytical data from the downgradient wells will be compared to their estimated quantitation limits upon receipt of the data. If the detected concentrations are less than their respective Reporting Limits (RLs), no further action will be taken. If the concentration of any constituent is greater than its RL in at least one well then a statistical evaluation will be performed as described in Appendix H (Sampling and Analysis Plan).

Proposed Biennial Reporting

A biennial groundwater monitoring report will be submitted to MDEQ and will include information, as follows:

- Static groundwater level elevations;
- Potentiometric maps from the biennial sampling event;
- Groundwater flow rate and directions in uppermost aquifer;
- Evaluation of the groundwater surface elevations to determine whether the locations of wells are adequately placed to characterize groundwater flow direction and potential constituent migration; and,
- Comparison of background analytical data from upgradient wells R-01R and R-10 to the analytical results from downgradient wells.

5.6 COMPLIANCE MONITORING PROGRAM

Compliance groundwater monitoring downgradient of the closed impoundment area is not applicable based upon the groundwater monitoring data generated to date. If future Post-Closure Care groundwater detection monitoring data indicate that Facility-related constituents are present in groundwater in the uppermost aquifer at the compliance wells at concentration limits that are specified for the Facility, then a compliance monitoring program will be developed in accordance with 40 CFR Part 270.14 and Part 264.99.

ATTACHMENT D

Closure And Post Closure Requirements

(RCRA Part B Application, Section 7)

7.0 CLOSURE AND POST-CLOSURE REQUIREMENTS

This section discusses the activities performed in closing the former RCRA surface impoundments and the activities to be performed at the closed surface impoundments during this permit period. Sections 7.1 and 7.2 regarding closure plans and activities as well as the post-closure plan satisfies the requirements for the renewal application pursuant to 40 CFR 270.14(b)(13). Subsections 7.2.1 through 7.2.8 address specific requirements of 40 CFR 270.28, as follows:

- Section 7.2.1 presents justification for waiving the Post-Closure Preparedness and Prevention Plan requirements pursuant to 40 CFR 270.14(b)(6);
- Section 7.2.2 presents post-closure security requirements pursuant to 40 CFR 270.14(b)(4);
- Section 7.2.3 presents the post-closure inspection schedule and maintenance plan pursuant to 40 CFR 270.14(b)(5);
- Section 7.2.4 identifies that as per 40 CFR 270.14(b)(28) a Contingency Plan is not required because this is an application for a post-closure permit;
- Section 7.2.5 identifies that as per 40 CFR 270.14(b)(28) a Personnel Training Program is not required because this is an application or a post-closure permit;
- Section 7.2.6 addresses post-closure notices pursuant to 40 CFR 270.14(b)(14);
- Section 7.2.7 addresses the cost estimate and financial assurance mechanism for post-closure pursuant to 40 CFR 270.14(b)(16); and,
- Section 7.2.8 addresses the certification of completion of post-closure care pursuant to 40 CFR 264.120.

7.1 CLOSURE PLANS, ACTIVITIES, AND CERTIFICATION

Closure activities for the SI were completed in October 1989. The construction Documentation Report for Surface Impoundment Closure (Keystone, 1989) was submitted to the MDEQ certifying that the SI was closed in accordance with the specifications of the Facility's closure plan. A copy of the closure certification document is included in Appendix I.

Closure Performance Standard - The SI was closed in a manner that: 1) minimizes the need for further maintenance, and 2) controls and minimizes or eliminates, to the extent necessary to prevent threats to human health and the environment, post-closure escape of hazardous waste or hazardous constituents to groundwater or surface water or to the atmosphere. In general, this performance standard was achieved by removing liquids, bottom sludges and visually contaminated soils, and was ensured by the construction of a low-permeability soil-bentonite cap and vegetative soil cover. In addition groundwater monitoring will continue to document any changes in groundwater quality in the vicinity of the closed SI.

Inventory Removal, Disposal, or Decontamination of Equipment - In 1988, all K001 sludge and visually contaminated soils were removed from the SI and shipped off-site to Chemical Waste Management, Inc. located in Emelle, Alabama for disposal. Accumulated rainwater was pumped from the impoundment to the Grenada POTW in accordance with a letter, dated May 2,

1989, from the State of Mississippi, Bureau of Pollution Control, Industrial Pretreatment Division. Dewatering activities were completed by July 18, 1989. The SI was filled with clean material and covered with a low-permeability soil-bentonite cap. Closure activities were completed by the end of October 1989.

After completion of the final soil fill lift, the dozer was decontaminated. Decontamination was accomplished by scraping, shoveling and sweeping all of the soil from the dozer. Soil removal was performed while the dozer was still within the limits of the SI. Following the removal of soil, the dozer was moved to the plant's concrete-lined equipment wash-down area. All remaining soil and dirt was removed by cleaning the dozer with steam and high pressure water. All rinseate was collected and conveyed to the wash-down area sump, which connects to the plant wastewater treatment system. As required by the approved closure plan, soil removed from the equipment was placed in the SI beneath the soil-bentonite layer.

Liquid and sludges were removed from the SI prior to construction of the cap and cover. After the sludge and visually contaminated soil were removed from the SI, the subgrade was prepared, and the SI dikes were excavated and placed in the SI as fill material. A key trench was excavated with a dozer around the perimeter of the SI. Clean soil fill material from an off-site borrow source was placed in the SI. The fill material was placed in approximately 8-inch lifts and compacted to at least 90 percent of the maximum dry density. Placement and compaction of the soil fill continued until the grades required for the soil-bentonite subbase were achieved.

Soil from a pre-approved off-site borrow source and bentonite were used to construct the clay barrier cap with a permeability less than 1×10^{-7} cm/sec, The soil-bentonite layer was constructed by placing and spreading the soil into 8-inch lifts over the entire SI. This process was continued until a compacted cap two feet thick was constructed. After grading the final lift, the surface of the soil-bentonite layer was rolled smooth with a steel drum roller in preparation for the installation of the filter fabric and drainage layer.

A one-foot layer of drainage material was placed over the soil-bentonite layer. The drainage layer was then covered with geotextile fabric. Finally 18 inches of cover soil was placed over the geotextile fabric overlying the drainage layer. The soil cover was seeded and mulched to establish a vegetated cover.

A drainage channel was constructed along the western side of the capped SI to convey run-off from the west area. The channel begins at the middle of the western side of the cap and extends past the southern end of the cap until it connects with the existing drainage channel that runs from west to east. Surface grading was used around the remaining portions of the capped SI to direct run-off away from the closed SI.

Minimization of Liquid Migration - To minimize infiltration, the cover will drain by a final slope of approximately 4 percent. Also, infiltration beyond the vegetated cover is minimized because of the underlying drainage layer and compacted soil-bentonite which allow infiltration to flow to the perimeter channels.

Maintenance Needs - The closure design minimizes the required future maintenance of the closed landfill. It is intended to minimize any threats to human health and the environment because any post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated runoff, or waste products or constituents to groundwater or surface water or the atmosphere are controlled. The liquid portion of the sludge and contaminated soils were removed from the SI prior to construction of the cover. The design of the soil-bentonite cap, drainage layer, and vegetated soil layer promote positive drainage. These measures minimize the infiltration into the disposal area, and isolate the landfill from the local groundwater system. Minimum maintenance will be performed to keep the cover functional.

Drainage and Erosion - Free drainage of precipitation off the cover will be provided by the slope of the soil cover and topsoil layers. The drainage of infiltration by the conducting zone above the soil-bentonite cap is provided by the drainage layer. The drainage layer is constructed of sand which permits drainage to the collection channels. The potential for the drainage layer clogging is reduced by the use of a geotextile fabric atop the sand zone. Drainage is controlled by using off-site diversion ditches, on-site collection channels, surface grading and vegetation. The on-site collection channels are designed to control the on-site surface water and outlet it to existing drainage courses. The cover erosion potential was calculated using the Universal Soil Loss Equation. The final cover design was selected to minimize erosion.

Settlement, Subsidence and Displacement - The soils that comprise the cover are compacted, cohesive fill material, excluding the drainage layer. These materials are not expected to significantly consolidate under the applied cover overburden loading. Calculations estimating cap settlement were presented in the approved Closure Plan. The potential for waste consolidation is precluded because the waste sludges have been removed and replaced by compacted cohesive backfill. The potential for consolidation of the backfill is governed by the compaction criteria for placement and overburden loading. The overburden load has not to date, and is not expected to, cause significant consolidation of the compacted cohesive backfill.

Freeze/Thaw Effects - The soil-bentonite barrier layer is located below the average frost penetration depth reported for the geographical area. The frost penetration depth in the Grenada, Mississippi area is approximately 10 inches. The depth of cover is 3 feet over the soil-bentonite cap and reduces to a minimum of 12 inches at the edge. This provides adequate frost protection for the low-permeability cap.

7.2 POST-CLOSURE PLAN

Requirements for post-closure care include inspection, maintenance, and groundwater monitoring. This Post-Closure Care Plan for the closed SI includes inspection, monitoring, and maintenance activities that have been performed for the last nineteen years under the current permit. These activities will continue to be performed in accordance with the above-cited regulations. There are approximately 11 years remaining in the original 30-year post-closure period.

The post-closure contacts during the post-closure period are:

Facility Contact:
Mr. Michael Bollinger
Environmental Program Manager
Beazer East, Inc.
One Oxford Centre, Suite 3000
Pittsburgh, Pennsylvania 15219
(412) 208-8864

Site Contact:
Mr. Vance R. Haskin, Plant Manager
Koppers Inc.
1 Koppers Drive
P. O. Box 160
Tie Plant, Mississippi 38960
(662) 226-4584

7.2.1 Post-Closure Preparedness and Prevention

Pursuant to 40CFR 270.14(b)(6), this section provides the justification for waiving the Post-Closure Preparedness and Prevention Plan. The closed units include a constructed soil/bentonite cover over subsoils that may contain residual levels of constituents. Waste materials (*i.e.* sludge or liquid products) are not present within the units. The groundwater monitoring results have demonstrated that constituents are not present in groundwater at the closed units. There is no possibility of fire, explosion, or immediate release of hazardous waste constituents that would constitute a threat to human health or the environment. Therefore, it is recommended that a Post-Closure Preparedness and Prevention Plan not be required.

7.2.2 Post-Closure Security

The SI was closed in a manner that controls and minimizes or eliminates, to the extent necessary to prevent threats to human health and the environment, post-closure escape of hazardous waste or hazardous constituents to groundwater or surface water or to the atmosphere. In general, the performance standard was achieved by removing liquids and bottom sludges and by constructing a low-permeability cap and vegetated soil cover.

During the post-closure period, signs are posted and maintained on each side of the closed SI. The warning signs read **"DANGER - UNAUTHORIZED PERSONNEL KEEP OUT"**. The signs are legible from a distance of 25 feet and posted at all directions of approach. Access to the closed SI is controlled by a fence located around the perimeter and an entrance gate.

In addition, the entire perimeter of the Koppers Wood Treating Plant is fenced. All Koppers Plant personnel are instructed to report any unusual activities or security incidents to a supervisor who may in turn contact the police. All visitors are instructed to report to the plant office.

7.2.3 Post-Closure Inspection Schedule and Maintenance Plan

The following features are subject to inspection during the post-closure period:

- Security control devices,
- Erosion damage;
- Cover settlement, subsidence, and displacement;
- Vegetative cover condition;
- Integrity of run-on and run-off control measures;
- Cover drainage system function; and,
- Well condition.

The post-closure care of the closed SI system will be conducted by the operator during the post-closure care period.

Cover Inspection

The operator will conduct annual inspections of access and security systems (i.e., fences and gates). The operator will also examine the cover integrity, including vegetative cover condition, potential erosion damage and cover subsidence and run-on and run-off control system integrity. The results of the inspections and any corrective action taken will be placed on an inspection log sheet which is presented under Forms.

The annual inspection frequency is justified because the forces of nature are likely to cause relatively slow rates of change. For instance, the most likely natural force to affect change to the cover is rainfall runoff. However, even if several large, closely-spaced rainstorms were to cause accelerated erosion, the annual inspection schedule would still allow the operator sufficient time to take appropriate action.

Groundwater Monitoring System Inspection

The following features related to the groundwater monitoring system (all Facility wells) and benchmarks will be subject to inspection and maintenance during each biennial sampling event conducted during the post-closure care period:

- Groundwater monitoring wells;
- Monitoring well covers;
- Locks;
- Surface seals; and,
- Benchmark integrity.

Surface grout around the monitoring wells will be replaced or repaired if the significant cracks, loose or missing grout are observed. Monitoring wells will be re-surveyed if there is any noticeable change in the well such as subsidence or moved protector pipe. The monitoring wells will be kept locked when not in use. Missing or broken padlocks or caps will be replaced as needed.

The established benchmarks will be inspected, and if needed, repair work will be conducted to ensure that the proper elevation has been retained.

The result of the inspections will be placed on an inspection log which is included under Forms. The inspection log will also provide for reporting any variances noted and remedial action taken.

The operator will be responsible for maintenance activities at the closed SI. Additional labor and equipment operators may be needed occasionally and their costs have been included in the post-closure cost estimate. Maintenance activities at the closed SI will be triggered by problems/deficiencies which will be noted in the annual inspections for the cover or during the biennial groundwater monitoring inspections. Observations of the problem/deficiencies could result in initiation of one or more of the following maintenance activities (as appropriate):

- Repair of security control devices;
- Erosion damage repair;
- Correction of settlement, subsidence and displacement;
- Mowing, fertilization, and other vegetative cover maintenance;
- Repair of run-on and runoff control structures; or,
- Well repair or replacement.

7.2.4 Contingency Plan

According to 40 CFR 270.28, a Contingency Plan, per the requirements of 40 CFR270.14(b)(7), is not required because this is an application for a post-closure permit.

7.2.5 Post-Closure Personnel Training

According to 40 CFR 270.28, the personnel training requirements of 40 CFR270.14(b)(12) are not required because this is an application for a post-closure permit.

7.2.6 Post-Closure Notices

Documentation that notices required under 270.14(b)(14) and 264.119 have been submitted are described in this section. Closure of the SI as a landfill was completed in 1989. The report titled, *Closure Construction Documentation Report for the Surface Impoundment Closure* is included as Appendix I. This report contains documentation of closure construction to verify that the SI was closed in accordance with the approved closure plan. The operator and engineer certification of closure is included in Attachments A and B of this report.

Appendix J contains a copy of a survey plat submitted to the local zoning authority which indicates the location and dimension of the closed SI. The plat was prepared and certified by a professional land surveyor and contains a note, which states the area described hereon previously contained a Waste Management Unit. The use of the described area is restricted and any future uses must not disturb the integrity of the final cover without prior approval of the State of Mississippi, Department of Natural Resources.

7.2.7 Cost Estimate and Financial Assurance Mechanism for Post-Closure

In accordance with 270.14(b)(16), Table 4 summarizes the Post-Closure Cost Estimate in current dollars. The cost estimate for post-closure will be updated annually.

The current established financial assurance mechanism for post-closure care as required by 40 CFR 270.14(b)(18) and 40 CFR 264.145 is presented in Appendix K.

7.2.8 Certification of Completion of Post-Closure Care

No later than 60 days after completion of the established permit period, Beazer will submit to MDEQ (by registered mail), a certification that the post-closure care period for the hazardous waste disposal unit was performed in accordance with the specifications in the approved post-closure plan. The certification will be signed by Beazer and an independent registered professional engineer.

ATTACHMENT G

Financial Assurance Mechanism for Post-Closure

(RCRA Part B Application, Appendix K)

Bank of America

PAGE:

DATE: FEBRUARY 28, 2005

IRREVOCABLE STANDBY LETTER OF CREDIT NUMBER: 3073530

BENEFICIARY
EXECUTIVE DIRECTOR
MISSISSIPPI DEPARTMENT OF
ENVIRONMENTAL QUALITY
2380 HIGHWAY 80 WEST

JACKSON, MS 39204

APPLICANT
BEAZER EAST, INC.
ONE OXFORD CENTRE, SUITE 3000
PITTSBURGH, PA 15219

AMOUNT
USD 732,774.00
SEVEN HUNDRED THIRTY TWO THOUSAND
SEVEN HUNDRED SEVENTY FOUR AND
00/100'S US DOLLARS

EXPIRATION
DECEMBER 31, 2005 AT OUR COUNTERS

DEAR SIR OR MADAM:

WE HEREBY ESTABLISH OUR IRREVOCABLE STANDBY LETTER OF CREDIT NO. 3073530 IN YOUR FAVOR, AT THE REQUEST AND FOR THE ACCOUNT OF BEAZER EAST, INC., ONE OXFORD CENTRE, SUITE 3000, PITTSBURGH, PA 15219, UP TO THE AGGREGATE AMOUNT OF U.S. DOLLARS SEVEN HUNDRED THIRTY TWO THOUSAND SEVEN HUNDRED SEVENTY FOUR ONLY (U.S.$ 732,774.00), AVAILABLE UPON PRESENTATION OF:

(1) YOUR SIGHT DRAFT, BEARING REFERENCE TO THIS LETTER OF CREDIT NO. 3073530, AND

(2) YOUR SIGNED STATEMENT READING AS FOLLOWS: "I CERTIFY THAT THE AMOUNT OF THE DRAFT IS PAYABLE PURSUANT TO REGULATIONS ISSUED UNDER AUTHORITY OF THE RESOURCE CONSERVATION AND RECOVERY ACT OF 1976 AS AMENDED."

THIS LETTER OF CREDIT IS EFFECTIVE AS OF FEBRUARY 28, 2005 AND SHALL EXPIRE ON DECEMBER 31, 2005, BUT SUCH EXPIRATION DATE SHALL BE AUTOMATICALLY EXTENDED FOR A PERIOD OF ONE YEAR ON DECEMBER 31, 2005 AND ON EACH SUCCESSIVE EXPIRATION DATE, UNLESS, AT LEAST 120 DAYS BEFORE THE CURRENT EXPIRATION DATE, WE NOTIFY BOTH YOU AND BEAZER EAST, INC. BY CERTIFIED MAIL THAT WE HAVE DECIDED NOT TO EXTEND THIS LETTER OF CREDIT BEYOND THE CURRENT EXPIRATION DATE. IN THE EVENT YOU

ORIGINAL

Bank of America, N.A. Trade Operations
Mail Code: CA9-703-19-09
333 S. Beaudry Avenue, 19th Floor, Los Angeles, CA 9001

Bank of America

THIS IS AN INTEGRAL PART OF LETTER OF CREDIT NUMBER: 3073530

ARE SO NOTIFIED, ANY UNUSED PORTION OF THE CREDIT SHALL BE AVAILABLE UPON PRESENTATION OF YOUR SIGHT DRAFT FOR 120 DAYS AFTER THE DATE OF RECEIPT BY BOTH YOU AND BEAZER EAST, INC., AS SHOWN ON THE SIGNED RETURN RECEIPTS.

WHENEVER THIS LETTER OF CREDIT IS DRAWN ON UNDER AND IN COMPLIANCE WITH THE TERMS OF THIS CREDIT, WE SHALL DULY HONOR SUCH DRAFT UPON PRESENTATION TO US, AND WE SHALL DEPOSIT THE AMOUNT OF THE DRAFT DIRECTLY INTO THE STANDBY TRUST FUND OF BEAZER EAST, INC. IN ACCORDANCE WITH YOUR INSTRUCTIONS.

WE CERTIFY THAT THE WORDING OF THIS LETTER OF CREDIT IS IDENTICAL TO THE WORDING SPECIFIED IN 40 CFR 264.151(D) AS SUCH REGULATIONS WERE CONSTITUTED ON THE DATE SHOWN IMMEDIATELY BELOW.

BANK OF AMERICA, N.A.

STELLA ROSALES

ASSISTANT VICE PRESIDENT
DATE: FEBRUARY 28, 2005

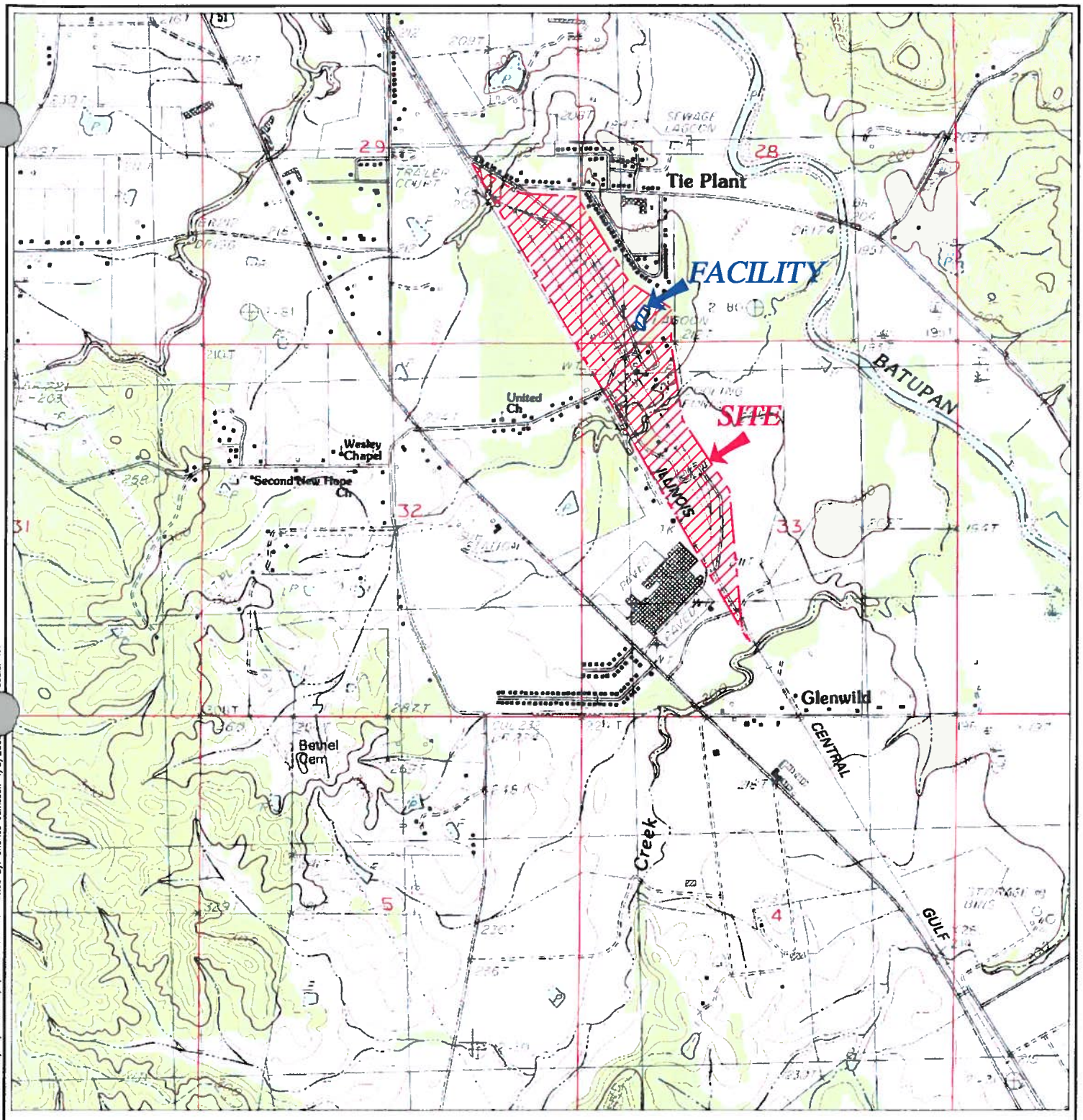
THIS CREDIT IS SUBJECT TO THE UNIFORM CUSTOMS AND PRACTICE FOR DOCUMENTARY CREDITS (1993 REVISION), INTERNATIONAL CHAMBER OF COMMERCE PUBLICATION NO. 500.

ORIGINAL

Bank of America, N.A. Trade Operations
Mail Code: CA9-703-19-09
333 S. Beaudry Avenue, 19th Floor, Los Angeles, CA 90017

Figure 1

(Site Location Map)



0 2000 4000 FEET

MISSISSIPPI

N

QUADRANGLE LOCATION

BEAZER EAST, INC.
PITTSBURGH, PENNSYLVANIA

DRWN: CRJ	DATE: 03/12/08	KEY ENVIRONMENTAL INCORPORATED
CHKD: RMB	DATE: 03/12/08	
APPD: KCF	DATE: 03/12/08	
SCALE: 1" = 2000'		

RCRA POST-CLOSURE PERMIT
RENEWAL APPLICATION
GRENADA, MISSISSIPPI

REFERENCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES
TIE PLANT, MISSISSIPPI - PROVISIONAL EDITION 1983.

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

SITE LOCATION MAP

PROJECT NO: 08-648
FIGURE 1

y:\grenada\08648\2008 renewal\permit renewal\figure-1.dwg Last Saved By: Cjameson 4/3/2008 2:21 PM Plotted By: Charles Jameson 4/3/2008 Scale: 1:1

Figure 2

(Site Topographic Map)

ATTACHMENT F

Monitoring Well Construction Diagrams and Well Specifications

(RCRA Part B Application, Appendix E)

MONITORING WELL LOG

PROJECT Grenada, MS (RCRA) WELL NO. R-1

DRILLING METHOD H.S.A. GEOLOGIST J. B. Gillespie

DRILLER DISC (Developers International Service Corp.) DATE 3/24/82

GROUND ELEVATION _____

TOP OF WELL 210.81

DEPTH OF WELL (ft) 32.77

GROUND WATER DEPTH (ft):

AT COMPLETION 22.8

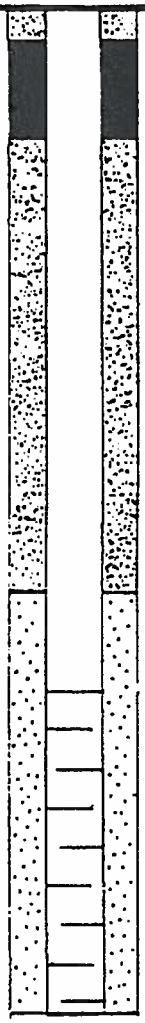
AFTER 12 HOURS 22.6

CASING MATERIAL 2" PVC SCREEN 10 ft of 0.010" screen

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION
		Brown FILL and CLAY & SILT, lt broken rock fragments
		Gray/tan CLAY & SILT, tr f brown sand
5		Brown CLAY & SILT, lt f sand
		Tan F -SAND, tr brown clay & Silt
10		Tan F -SAND
15		
20		
		Lt tan F-M SAND, tr c sand
25		
		Lt red/tan F-SAND, tr silt
30		

CONSTRUCTION



KEYSTONE ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-1R

PROJECT: Grenada Wood Plant **LOCATION:** Grenada, MS

Drilling Method: HOLLOW STEM AUGER
Driller: PROFESSIONAL SERVICE INDUSTRIES, INC..

Geologist: D. SMITH
Date : MARCH 28, 1989

Ground Elevation:
Top of Well Elev.:
Depth of Well: 29.5 FEET

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Ground Water Depth:
At Completion:

Casing Material: 2 " PVC
Screen: 2" PVC (0.01" SLOT)

GRAVEL PACK
BENTONITE
GROUT
SCREEN

Depth	Sample	SPT Blow Counts	Description
			Coarse GRAVEL (FILL)
			Orange-brown SILT AND CLAY, trace brown patches (decomposed organics), trace light gray silt and clay (mottles/veins)
5	S	7,8,12	
10	S	12,20,20	Light gray/ buff fine clean SAND, well-sorted quartz, trace mafic grains
15	S	2,3,5	
20	S	6,6,8	Light buff fine to medium clean SAND, coarsens gradually with depth
25	S	9,12,11	
			Buff/gray fine to medium clean SAND, trace rust bands, trace clay
30	S	8,8,10	
			Bottom of Boring at 30.5 feet
35			
40			

Construction

MONITORING WELL LOG

PROJECT Grenada, MA (RCRA) WELL NO. R-2

DRILLING METHOD H.S.A. GEOLOGIST J. B. Gillespie

DRILLER Developers International Service Corp. DATE 3/25/82

GROUND ELEVATION _____

TOP OF WELL 209.26

DEPTH OF WELL (ft) 30.54

GROUND WATER DEPTH (ft):

AT COMPLETION 21.54

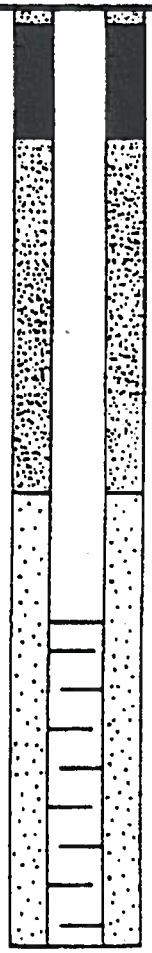
AFTER 12 HOURS 21.5

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

CASING MATERIAL 2" PVC SCREEN 10 ft of 0.010" screen

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION
		Gray CLAY & SILT, tr brown/black organic particles (roots)
5		Tan CLAYEY SILT, tr f sand
		Tan/gray CLAYEY SILT, some f sand
10		Lt tan/gray CLAYEY SILT and F-SAND
		Lt gray/tan F to V-F SAND, tr silt
15		
20		Lt tan/brown FMC SAND, tr silt
25		Gray F SAND, tr silt
30		

CONSTRUCTION



SHEET 1 OF 1

MONITORING WELL LOG

PROJECT Grenada, MS (RCRA) WELL NO. R-3

DRILLING METHOD H.S.A. GEOLOGIST J. B. Gillespie

DRILLER Developers International Service Corp. DATE 3/26/82

GROUND ELEVATION _____

TOP OF WELL 206.96

DEPTH OF WELL (ft) 29.8

GROUND WATER DEPTH (ft):

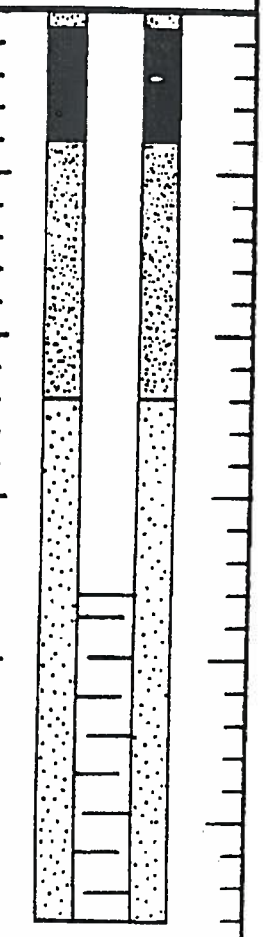
AT COMPLETION 21.8

AFTER 12 HOURS 22.0

CASING MATERIAL 2" PVC SCREEN 10 ft of 0.010" screen

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION	CONSTRUCTION
		Brown/gray SILTY CLAY, tr f sand	
5		Brown/gray CLAYEY SILT, lt f sand	
10			
15		Lt tan M-F SAND, tr silt	
20			
25			
30			



MONITORING WELL LOG

PROJECT Grenada, MS (RCRA) WELL NO. R-4

DRILLING METHOD H.S.A. GEOLOGIST J. B. Gillespie

DRILLER Developers International Service Corp. DATE 3/27/82

GROUND ELEVATION _____

TOP OF WELL 206.06

DEPTH OF WELL (ft) 30.55

GROUND WATER DEPTH (ft):

AT COMPLETION 21.55

AFTER 12 HOURS 21.0

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

CASING MATERIAL 2" PVC SCREEN 10 ft of 0.010" screen

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION	CONSTRUCTION
		Brown CLAY & SILT, tr f sand	
5		Lt tan CLAYEY SILT, and F SAND	
		Lt gray/tan F SAND, tr silt	
10			
		Lt tan/lt gray M-F SAND, tr silt	
15			
20			
25			
30			

MONITORING WELL LOG

PROJECT Grenada, MS — WELL NO. R-5

DRILLING METHOD H.S.A. — GEOLOGIST J. B. Gillespie

DRILLER P.S.I. Inc.-Engineering — DATE 7/17/84

GROUND ELEVATION _____

TOP OF WELL 211.84

DEPTH OF WELL (ft) 31.0

GROUND WATER DEPTH (ft):

AT COMPLETION _____

AFTER _____ HOURS _____

CASING MATERIAL 2" PVD — SCREEN 10' 0.010 Slot

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION
		Dk Brown TOPSOIL, tr organic (roots)
		Tan/brown/gray SILT, tr organics (roots)
5.0		Brown/tan SILT, some clay & silt, tr stone fragments
		Brown SILT and SILT & CLAY
10.0		Brown/gray SILT & CLAY and f SAND
		Tan SILT & CLAY and F SAND
15.0		Tan f SAND, tr silt
20.0		
25.0		Gray fm SAND, sl anaerobic odor
30.0		

CONSTRUCTION

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-5B

PROJECT: COLLIER LANDFILL **LOCATION: GRENADA, MS**

DRILLING METHOD: MUD ROTARY
DRILLER: LAYNE-WESTERN COMPANY,INC..

GEOLOGIST:
DATE: 8-10-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 51'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description	Construction
5			SEE R-5 BORING LOG FOR GEOLOGIC DESCRIPTIONS FROM 0 TO 30 FEET	
10				
15				
20				
25				
30				
35	s	14 19 12	Brown Grey mf SAND, trace to little Silty Clay	
40	s	1 2 12	Dark Brown CLAY & SILT, trace to little fm Sand	

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-5B

PROJECT: AWI **LOCATION: PORTSMOUTH, VA**

DRILLING METHOD: MUD ROTARY
DRILLER: LAYNE-WESTERN COMPANY INC.
GEOLOGIST:
DATE: 8-10-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 51'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description	Construction
			Brown fm SAND, little Silty Clay	
			Grey fmc SAND, little to trace Silty Clay	
45	S	7 10 8		
			Brown Silty Clay, Trace of little f Sand	
50	S	5 9 11	Grey mf Sand, Trace Clay	
			BOTTOM OF BORING 52.5'	

MONITORING WELL LOG

PROJECT Grenada, MS — WELL NO. R-6

DRILLING METHOD H.S.A. — GEOLOGIST J. B. Gillespie

DRILLER P.S.I. Inc.-Engineering — DATE 7/17/84

GROUND ELEVATION _____

TOP OF WELL 213.04

DEPTH OF WELL (ft) 31.0

GROUND WATER DEPTH (ft):

AT COMPLETION _____

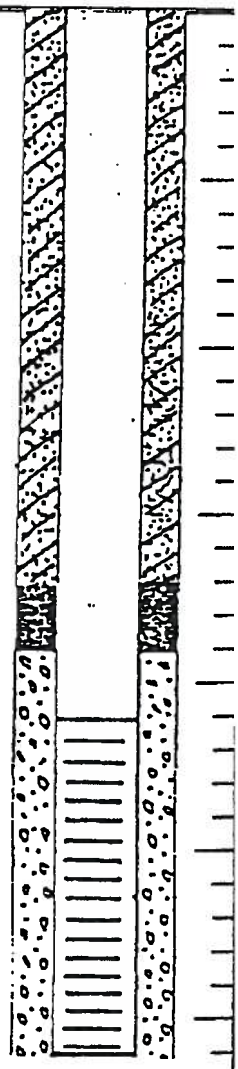
AFTER _____ HOURS _____

CASING MATERIAL 2" PVC — SCREEN 10' 0.010 Slot

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION
		Brown SILT, and SILT & CLAY, tr stone fragments
		Tan/gray SILT
5.0		Gray/brown SILT & CLAY
10.0		Tan/white f SAND, tr silt
15.0		Rust/gray fm SAND and CLAY & SILT
20.0		Gray CLAY & SILT, tr f SAND
25.0		Gray fmc SAND, tr silt
30.0		

CONSTRUCTION



MONITORING WELL LOG

PROJECT Grenada, MS — WELL NO. R-7

DRILLING METHOD H.S.A. — GEOLOGIST J. B. Gillespie

DRILLER P.S.I. Inc.-Engineering — DATE 7/17/84

GROUND ELEVATION _____

TOP OF WELL 210.98

DEPTH OF WELL (ft) 31.0

GROUND WATER DEPTH (ft):

AT COMPLETION _____

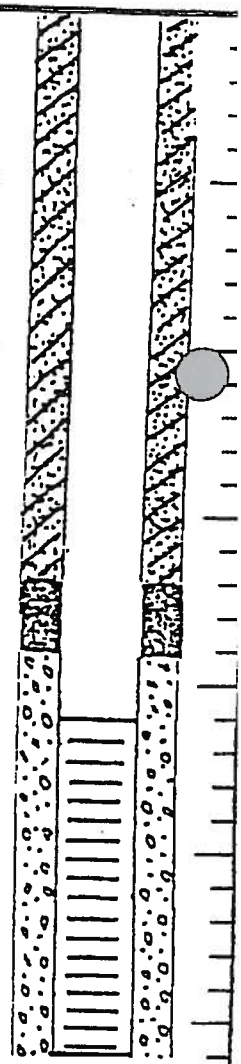
AFTER _____ HOURS _____

CASING MATERIAL 2" PVC — SCREEN 10' 0.010 Slot

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION
		Tan/brown/gray SILT, tr roots
5.0		Tan/brown SILT and SILT & CLAY
		Brown SILT & CLAY and f SAND, SILT
10.0		White vf SAND, some brown silt & clay, tr silt
		White vf SAND, tr brown silt & clay, tr silt
15.0		
		Tan f SAND, tr silt
20.0		
25.0		Gray/tan mf SAND, tr clay & silt
30.0		

CONSTRUCTION



MONITORING WELL LOG

PROJECT Grenada, MS — WELL NO. R-8

DRILLING METHOD H.S.A. — GEOLOGIST J. B. Gillespie

DRILLER P.S.I. Inc.-Engineering — DATE 7/17/84

GROUND ELEVATION _____

TOP OF WELL 214.53

DEPTH OF WELL (ft) 31.0

GROUND WATER DEPTH (ft):

AT COMPLETION _____

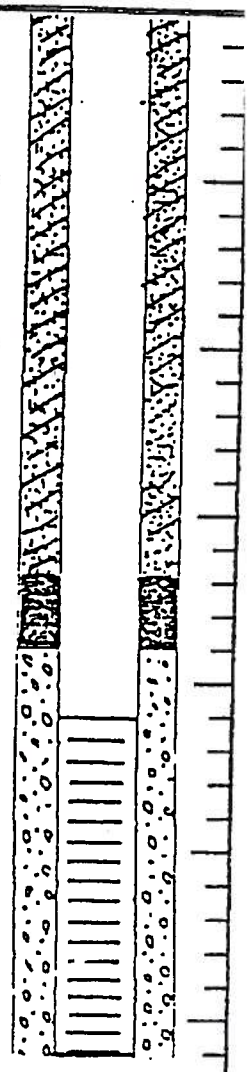
AFTER _____ HOURS _____

CASING MATERIAL 2" PVC — SCREEN 10' 0.010 Slot

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION
		Brown SILT
		Brown SILT and SILT & CLAY
5.0		Brown SILT & CLAY
10.0		
		Gray CLAY & SILT, tr vf sand
15.0		White/tan vf SAND, tr silt
20.0		
25.0		Gray/tan fmc SAND, TR SILT
30.0		

CONSTRUCTION



MONITORING WELL LOG

PROJECT Koppers Co. Inc., Grenada, Mississippi — WELL NO. R-8B

DRILLING METHOD Mud Rotary — GEOLOGIST S. A. Colton

DRILLER PSI Inc. — DATE 11/13/86

GROUND ELEVATION _____

TOP OF WELL 208.98'

DEPTH OF WELL (ft) 46

GROUND WATER DEPTH (ft):

AT COMPLETION _____

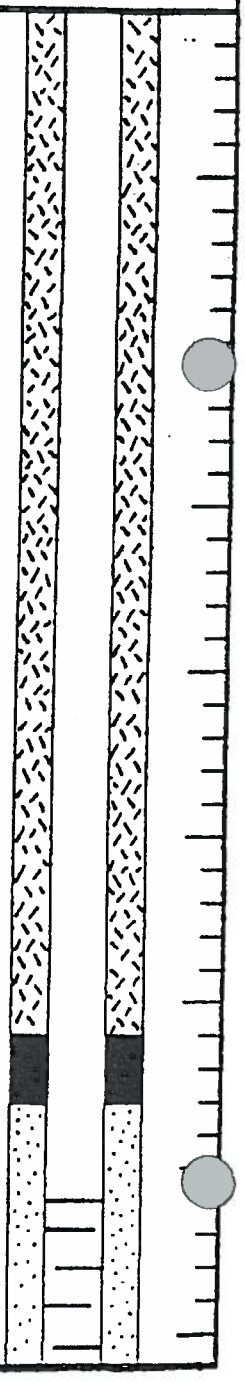
AFTER _____ HOURS _____

CASING MATERIAL 2" PVC — SCREEN 10' of 0.010" slots

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION
		No samples taken from 0-26.5 feet See R-8 Monitoring Well Log for soil description
25		Grey CLAY and SILT, tr f sand
		Brown fm SAND, tr to little pockets of clayey silt
30		Grey/green silty CLAY, tr sand
		Grey/green CLAY and SILT, tr f sand

CONSTRUCTION



MONITORING WELL LOG

PROJECT Koppers Co. Inc., Grenada, Mississippi — WELL NO. R-8B

DRILLING METHOD Mud Rotary — GEOLOGIST S. A. Colton

DRILLER PSI Inc. — DATE 11/13/86

GROUND ELEVATION _____

TOP OF WELL 208.98'

DEPTH OF WELL (ft) 46

GROUND WATER DEPTH (ft):

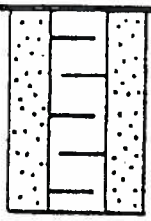
AT COMPLETION _____

AFTER _____ HOURS _____

CASING MATERIAL _____ SCREEN _____

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION	CONSTRUCTION
		Brown fm SAND, tr pockets of CLAY and SILT	
		Grey clayey SILT, tr to little f sand	
45		Brown fm SAND, tr silt	
		Bottom of boring @ 45.5'	



MONITORING WELL LOG

PROJECT Grenada, MS — WELL NO. R-9

DRILLING METHOD H.S.A. — GEOLOGIST J. B. Gillespie

DRILLER P.S.I. Inc.-Engineering — DATE 7/17/84

GROUND ELEVATION _____

TOP OF WELL 213.66

DEPTH OF WELL (ft) 31.0

GROUND WATER DEPTH (ft):

AT COMPLETION _____

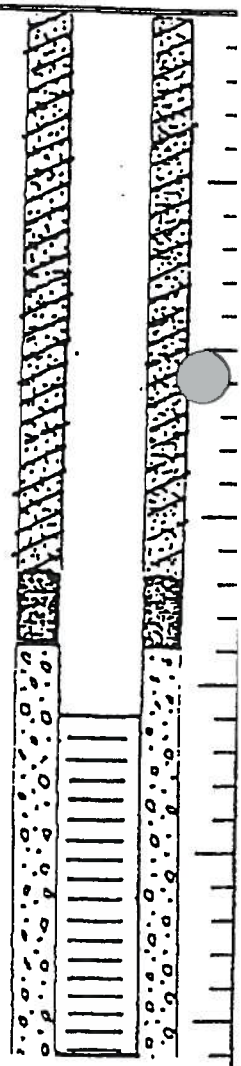
AFTER _____ HOURS _____

CASING MATERIAL 2" PVC — SCREEN 10' 0.010 Slot

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION
		Tan SILT, tr roots
		Brown SILT
5.0		Gray SILT, little silt & clay
		Shelby tube
10.0		Brown SILT & CLAY, tr roots
		Brown SILT & CLAY, tr f sand
15.0		
		Tan f SAND, tr silt
20.0		
25.0		Tan fmc SAND, tr silt
30.0		

CONSTRUCTION



KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG (R-9C)

PROJECT: Grenada RCRA **LOCATION: Grenada, Mississippi**

Drilling Method: Wash Rotary
Driller: P. S. I. Inc.-Engineering

Geologist: C.Cramer
Date: August 26, 1987

Ground Elevation: 213.10 feet
Top of Well Elev.: 215.99 feet
Depth of Well: 63.4 feet

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Ground Water Depth:
At Completion:

Casing Material: 2" I.D. PVC
Screen: 10' of 0.010 " Slotted

GRAVEL PACK
BENTONITE
GROUT
SCREEN

Depth	Sample	SPT Blow Counts	Description	Construction
			Refer to well log R-9D for descriptions	
5				
10				
15				
20				
25				
30				
35				
40				

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG (R-9C)

PROJECT: Grenada RCRA **LOCATION: Grenada, Mississippi**

Drilling Method: Wash Rotary
Driller: P. S. I. Inc.-Engineering
Geologist: C.Cramer
Date: August 26, 1987

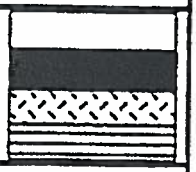
Ground Elevation: 213.10 feet
Top of Well Elev.:215.99 feet
Depth of Well: 63.4 feet

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

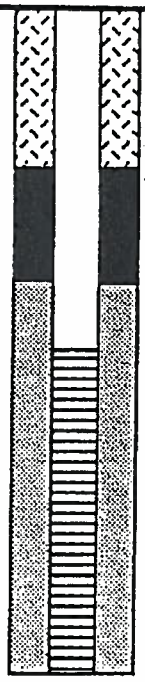
Ground Water Depth:
At Completion:

Casing Material: 2" I.D. PVC
Screen: 10' of 0.010 " Slotted

GRAVEL PACK
BENTONITE
GROUT
SCREEN



Depth	Sample	SPT Blow Counts	Description	Construction
45			Refer to well log R-9D for descriptions	
50				
55				
60				
65				
70				
75				
80				



KEYSTONE ENVIRONMENTAL RESOURCES, INC.

WELL LOG (R-9D)

PROJECT: R-9C and R-9D Well Nest **LOCATION: Grenada, Mississippi**

Drilling Method: Wash Rotary
Driller: P. S. I. Inc.-Engineering

Geolcgist: C. Cramer
Date: August 25, 1987

Ground Elevation: 213.87 feet
Top of Well Elev.:216.67 feet
Depth of Well: 90 feet

Ground Water Depth:
At Completion:

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material: 2" I.D. PVC
Screen: 10' of 0.010" slotted

GRAVEL PACK
BENTONITE
GROUT
SCREEN

Depth	Sample	SPT Blow Counts	Description	Construction
	S		Tan brown SILT, tr. roots	
	S			
5	S		Gray SILT, little clay	
	T			
10	S		Brown SILT & CLAY, tr. f sand, tr. roots	
	S			
15	S			
20	S		Tan f SAND, tr. silt	
25	S		Gray mf SAND, little silt, tr. clay,some wood fragments	
30	S			
35	S	7,14,18	35-35.2' Rust mf SAND, little silt	
			Gray CLAYEY SILT, tr. f. sand	
40	S	15,18,21	40-40.5' Rust mf SAND, tr. silt	

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG (R-9D)

PROJECT: R-9C and R-9D Well Nest **LOCATION: Grenada,Mississippi**

Drilling Method: Wash Rotary
Driller: P. S. I. Inc.-Engineering

Geologist: C. Cramer
Data: August 25, 1987

Ground Elevation: 213.87 feet
Top of Well Elev.:216.67 feet
Depth of Well: 90 feet

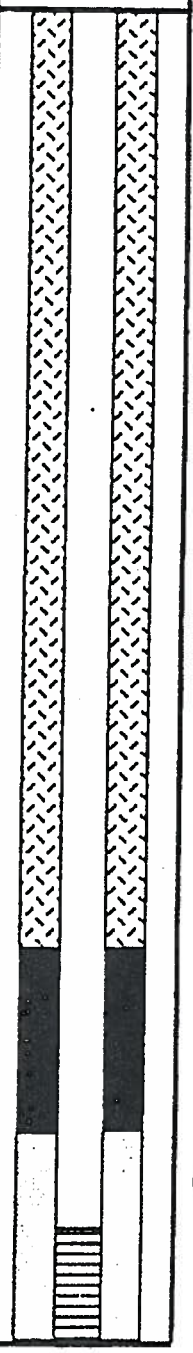
Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Ground Water Depth:
At Completion:

Casing Material: 2" I.D. PVC
Screen: 10' of 0.010" slotted

GRAVEL PACK
BENTONITE
GROUT
SCREEN

Depth	Sample	SPT Blow Counts	Description
45	S	15,20,28	Rust mf SAND, tr. silt, tr. gray silty clay laminae
50	S	15,16,17	Rust mf SAND, tr.gray silt
55	S	15,18,15	
60	S	18,24,34	Brown mf SAND & SILT, micaceous,some small silty clay pockets
65	S	16,23,31	
70	S	27,50/5	Gray f SAND & SILT,micaceous
75			
80	S	37,50/5	Gray f SAND, some silt, micaceous



KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG (R-9D)

PROJECT: R-9C and R-9D Well Nest **LOCATION: Grenada,Mississippi**

Drilling Method: Wash Rotary
Driller: P. S. I. Inc.-Engineering

Geologist: C. Cramer
Date: August 25, 1987

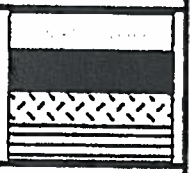
Ground Elevation: 213.87 feet
Top of Well Elev.: 216.67 feet
Depth of Well: 90 feet

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

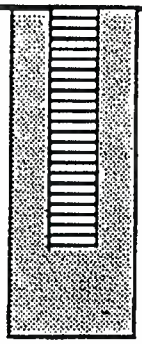
Ground Water Depth:
At Completion:

Casing Material: 2" I.D. PVC
Screen: 10' of 0.010" slotted

GRAVEL PACK
BENTONITE
GROUT
SCREEN



Depth	Sample	SPT Blow Counts	Description	Construction
85	S	31,50/5"	Gray f SAND, some silt, micaceous	
90			Bottom of Boring-90 feet	
95				
100				



MONITORING WELL LOG

PROJECT Koppers Co. Inc., Grenada, Mississippi WELL NO. R-10

DRILLING METHOD Hollow Stem Auger GEOLOGIST S. A. Colton

DRILLER PSI Inc. DATE 11/3/86

GROUND ELEVATION _____

TOP OF WELL 208.78'

DEPTH OF WELL (ft) 27

GROUND WATER DEPTH (ft):

AT COMPLETION _____

AFTER _____ HOURS _____

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

CASING MATERIAL 2" PVC SCREEN 10' of 0.010" slots

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION	CONSTRUCTION
		No samples taken See B-1 Boring Log for soil description	

5
10
15
20
25
30

MONITORING WELL LOG

PROJECT Koppers Co. Inc., Grenada, Mississippi — WELL NO. R-10B

DRILLING METHOD Mud Rotary — GEOLOGIST S. A. Colton

DRILLER PSI Inc. — DATE 11/14/86

GROUND ELEVATION _____

TOP OF WELL 208.94'

DEPTH OF WELL (ft) 47

GROUND WATER DEPTH (ft):

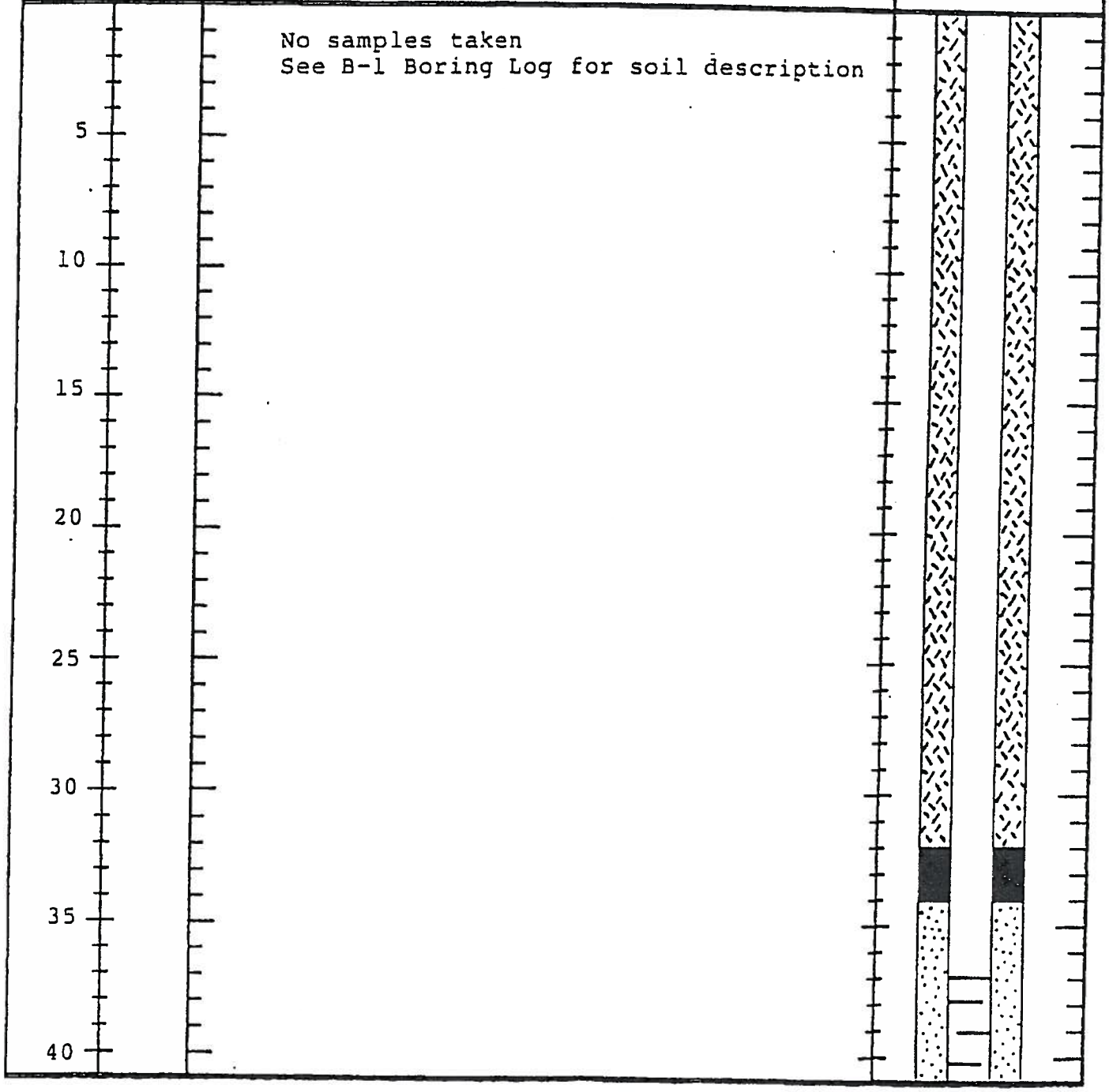
AT COMPLETION _____

AFTER _____ HOURS _____

CASING MATERIAL 2" PVC — SCREEN 10' of 0.010" slots

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION	CONSTRUCTION
		No samples taken See B-1 Boring Log for soil description	



MONITORING WELL LOG

PROJECT Koppers Co. Inc., Grenada, Mississippi WELL NO. R-1

DRILLING METHOD Mud Rotary GEOLOGIST S. A. Colton

DRILLER PSI Inc. DATE 11/14/86

GROUND ELEVATION _____

TOP OF WELL 208.94'

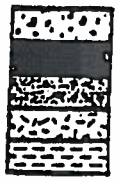
DEPTH OF WELL (ft) 47

GROUND WATER DEPTH (ft):

AT COMPLETION _____

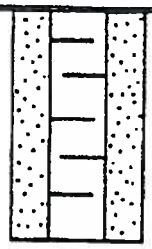
AFTER _____ HOURS _____

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN



CASING MATERIAL 2" PVC SCREEN 10' of 0.010" slots

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION	CONSTRUCTION
		No samples taken See B-1 Boring Log for soil description	
45			
50			



MONITORING WELL LOG

PROJECT Koppers Co. Inc., Grenada, Mississippi — WELL NO. R-11

DRILLING METHOD Mud Rotary — GEOLOGIST S. A. Colton

DRILLER PSI Inc. — DATE 11/12/86

GROUND ELEVATION _____

TOP OF WELL 203.74'

DEPTH OF WELL (ft) 25

GROUND WATER DEPTH (ft):

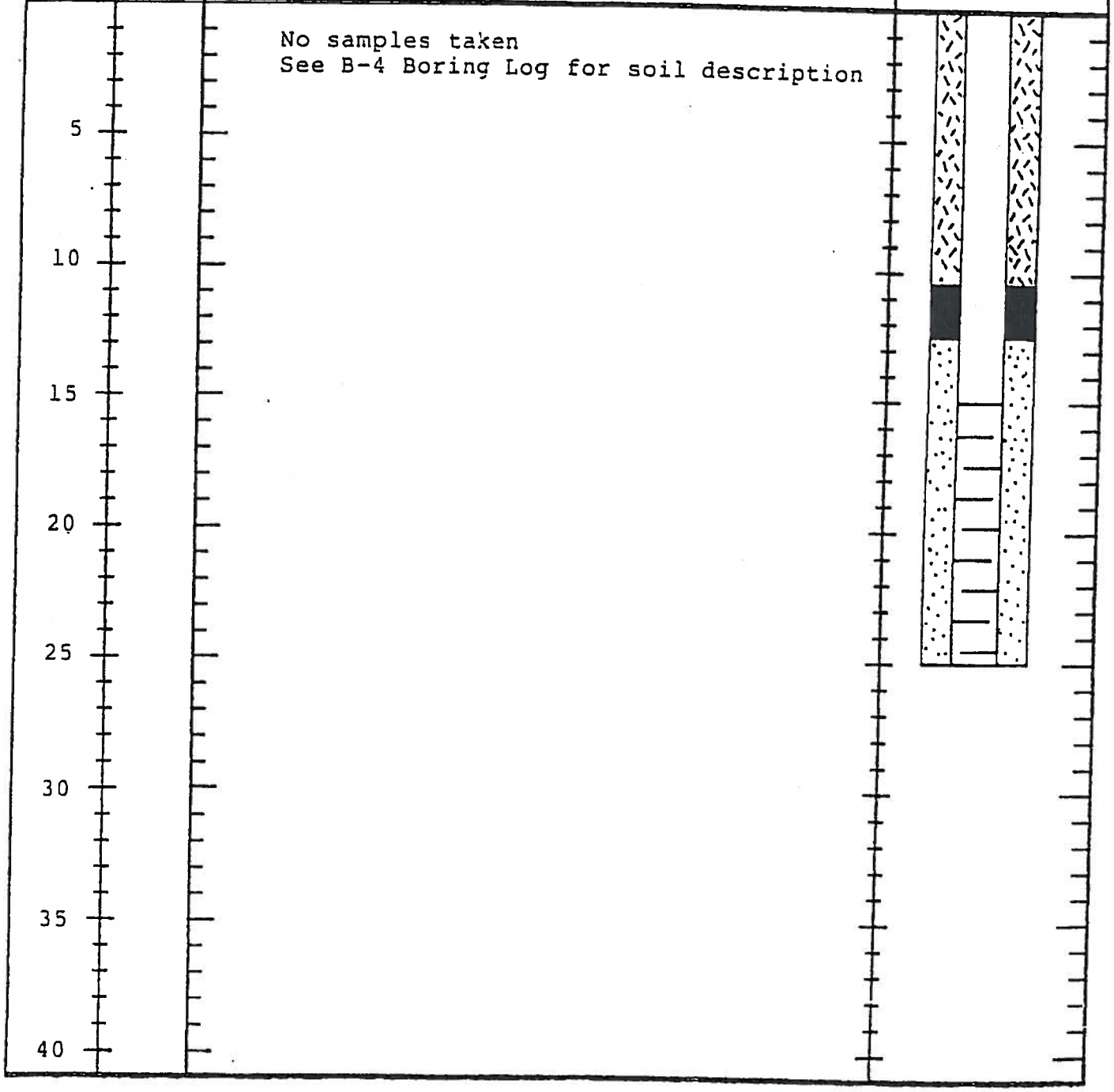
AT COMPLETION _____

AFTER _____ HOURS _____

CASING MATERIAL 2" PVC — SCREEN 10' of 0.010" slots

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION	CONSTRUCTION
		No samples taken See B-4 Boring Log for soil description	



MONITORING WELL LOG

PROJECT Koppers Co. Inc., Grenada, Mississippi WELL NO. R-1

DRILLING METHOD Mud Rotary GEOLOGIST S. A. Colton

DRILLER PSI Inc. DATE 11/6/86

GROUND ELEVATION _____

TOP OF WELL- 200.71'

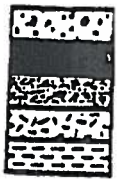
DEPTH OF WELL (ft) 20

GROUND WATER DEPTH (ft):

AT COMPLETION _____

AFTER _____ HOURS _____

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN



CASING MATERIAL 2" PVC SCREEN 10' of 0.010" slots

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION	CONSTRUCTION
		Brown clayey SILT, tr f sand, tr roots	
5			
		Grey to brown fmc SAND, tr silt	
10			
15			
20		Grey fmc SAND and silty CLAY	
		Grey/green fmc SAND, tr silt	
		Bottom of boring @ 21.5 feet	
25			

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG R-12B

PROJECT: GRENADA WOOD PLANT **LOCATION: GRENADA, MS**

DRILLING METHOD: MUD ROTARY
DRILLER: LAYNE WESTERN COMPANY, INC.
GEOLOGIST: S. COLTON
DATE: AUGUST 15, 1988

Ground Elevation:
Top of Well Elev.:
Depth of Well: 41'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description	Construction
5			SEE R-12 BORING LOG FOR GEOLOGIC DESCRIPTIONS FROM 0 TO 24.5 FEET	
10				
15				
20				
25	S	2 4 7	Grey mfc SAND, trace to little Clayey Silt	
30	S	8 11 8	Grey mic SAND, trace to little Clay	
35	S	6 35 38		
40				

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG R-12B

PROJECT: GRENADA WOOD PLANT **LOCATION: GRENADA, MS**

DRILLING METHOD: MUD ROTARY
DRILLER: LAYNE WESTERN COMPANY, INC.

GEOLOGIST: S. COLTON
DATE: AUGUST 15, 1988

Ground Elevation:
Top of Well Elev.:
Depth of Well: 41'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description	Construction
	s	8 14 15		
45			BOTTOM OF BORING 43.5'	

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-13

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: MUD ROTARY
DRILLER: LAYNE-WESTERN COMPANY, INC.
GEOLOGIST: S. COLTON
DATE: 8-3-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 31'

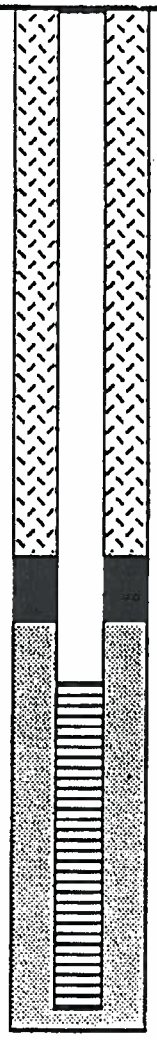
Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description
	s	1 4 7	Brown SILT & CLAY, trace f Sand, trace fm Gravel
	s	3 6 6	Brown Clayey SILT, trace f Sand
5	s	1 2 6	
			Brown fm SAND, little Silt and Clay
	s	4 5 7	Brown fm SAND, trace Silt
10	s	4 7 12	Brown Silty CLAY, some fine Sand
	s	8 12 13	Brown fm SAND, trace Silt @ 11.2 - 11.5 trace Clay
15	s	8 11 13	
20	s	6 10 14	
25	s	8 9 11	
			Grey fmc SAND and f Silty Clay pockets
30	s	4 7 16	
			BOTTOM OF BORING 31.5'
35			

Construction



KEYSTONE ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-16

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: MUD ROTARY
DRILLER: LAYNE-WESTERN COMPANY, INC.
GEOLOGIST: S. COLTON
DATE: 8-18-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 20.5'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description	Construction
	s	7 1 09		
	s	5 6 6	Brown Clayey SILT, trace f Sand	
5	s	4 8 9		
	s	8 8 9	Brown f SAND, trace to little Silt	
10	s	1 2 1	Brown Grey fmc SAND	
	s	2 1 2	Grey mc SAND, little Clay pockets, trace wood fragments	
15	s	1 2 2	Grey Clayey SILT, some f Sand	
			Grey fm SAND, little to some Silty Clay products	
20	s	2 3 7	BOTTOM OF BORING 21.5'	
25				
30				
35				

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-17

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: MUD ROTARY
DRILLER: LAYNE WESTERN COMPANY, INC.

GEOLOGIST: S. COLTON
DATE: 8-11-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 29.5'

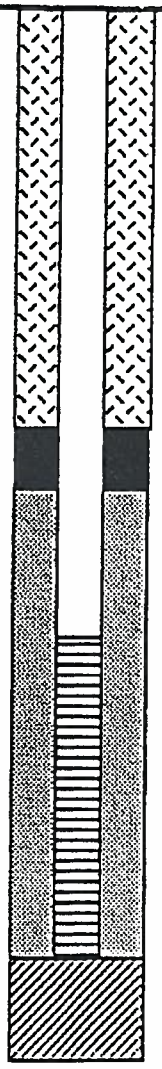
Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description
	G		
	G		
5	s	6 10 9	Brown Clayey SILT, trace f Sand
	s	6 9 11	
10	s	6 12 11	
	s	6 14 9	
15	s	7 12 9	Grey White f SAND, trace Silt
20	s	9 18 22	@ 19.5' - 21' Sand is fm @ 19.7' - 20' Clay pocket
25	s	7 14 19	@ 25' - 32.5 Sand is fmc and contains Clay pockets
30	s	4 7 13	
35			BOTTOM OF BORING 32.5' COLLAPSE TO 29.5'

Construction



KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-18

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: MUD ROTARY
DRILLER: LAYNE WESTERN COMPANY, INC.
GEOLOGIST: S. COLTON
DATE: 8-2-88

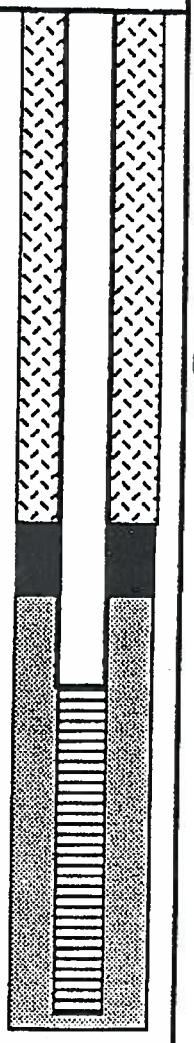
Ground Elevation:
Top of Well Elev.:
Depth of Well: 31'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description	Construction
	s	3 9 9	Brown Clayey SILT, trace f Sand, trace fine Gravel	
	s	3 5 9		
5	s	1 5 13		
			Brown Silty CLAY, trace fine Sand	
	s	9 12 18		
10	s	10 16 32	Brown Grey fm SAND, trace to little Silt	
	s	12 14 16	@ 30' trace Clay stringers	
15	s	10 18 15		
20	s	15 13 15		
25	s	11 18 17		
30	s	5 7 9		
			BOTTOM OF BORING 31.5'	
35				



KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-19

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: MUD ROTARY
DRILLER: LAYNE WESTERN COMPANY, INC.

GEOLOGIST: S. COLTON
DATE: 8-16-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 27'

Sample Collection:
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description	Construction
	G		Brown Black Clayey SILT, little fm Sand	
	G			
5	s	2 1 1	@ 2.5 - 6.5 contains up to 50% fmc Gravel	
	s	2 1 1	Brown SILT & CLAY,trace to little f Sand	
10	s	woh 3 6	Brown mottled Clayey SILT, trace f Sand	
	s	6 9 9		
15	s	4 5 11	Grey SILT, trace Sand	
20	s	4 6 10	Brown fine SAND, trace Silt	
25	s	4 5 7	Grey m SAND, trace Silt	
			BOTTOM OF BORING 27'	
30				
35				

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-20

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: HOLLOW STEM AUGER
DRILLER: LAYNE WESTERN COMPANY, INC.
GEOLOGIST: J. DiNUNZIO
DATE: 8-16-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 32'

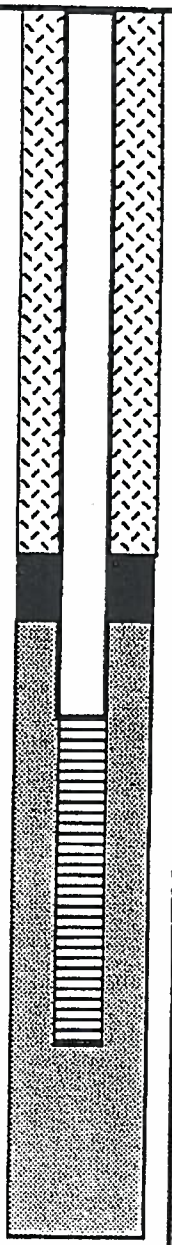
Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description
	G		FILL (asphalt, gravel)
	G		Brown Silty CLAY, trace Silt
	G		
5			
	G		Brown CLAY, trace Silt
	G		Dark Grey to Grey Brown Silty CLAY
			@ 7.5' - 10' trace f Sand
10	s	4 12 21	@ 10' - 11.25' little to some f Sand
			Grey Brown f SAND,some silt trace Clay
	s	11 15 19	
15			
	s	9 12 18	
20	s	10 14 13	Grey White fm SAND, trace to little Silt
			@ 15' - 16.5' Sand is Brown Black
25	s	4 9 10	
30			
35			
			BOTTOM OF BORING 38'

Construction



KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-21

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: HOLLOW STEM AUGER
DRILLER: LAYNE WESTERN COMPANY, INC.

GEOLOGIST: J. DiNUNZIO
DATE: 8-15-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 28'

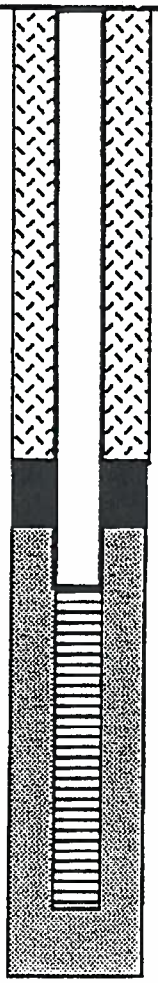
Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description
	G		FILL (black gravel, asphalt, cinders, fmc sand)
	G		Dark Grey Black Silty CLAY, trace fm Sand
5	G		
	G		
10			
	s	6 10 16	Grey Clavey SILT, trace to little f Sand
			Brown Grey f SAND & SILT, trace Clay
15			Grey Brown Silty CLAY, little f Sand
	s	4 10 4	
			White Grey fmc SAND, trace to little Silt
20	s	5 9 11	
25	s	3 7 12	
30			BOTTOM OF BORING 30'
35			

Construction



KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-22

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: HOLLOW STEM AUGER
DRILLER: LAYNE WESTERN COMPANY, INC.
GEOLOGIST: J. DiNUNZIO
DATE: 8-15-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 28'

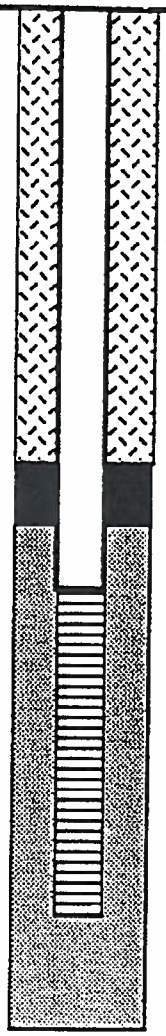
Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description
	s	4 10 9	FILL (Black Brown m Gravel and Sand, little Silt, trace brick fragments)
	s	2 2 3	
5	s	2 3 2	Black Brown Grey Silty CLAY, trace f Sand
	s	2 2 2	
10	s	2 1 2	
	s	2 2 3	
15	s	2 1 2	Dark Grey - Grey SILT & CLAY
20	s	2 2 4	Grey Green Clayey SILT
25	s	6 4 7	Grey Brown Green mc SAND @ 25' - 26.5' trace to little silt, trace wood fibers @ 30' - 31.5' some silt, trace wood fibers
30	s	6 10 11	
			BOTTOM OF BORING 31.5'
35			

Construction



KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-23

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: MUD ROTARY
DRILLER: LAYNE WESTERN COMPANY, INC.
GEOLOGIST: S. COLTON
DATE: 8-15-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 22'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-

Depth	Sample	SPT Blow Counts	Description	Construction
	s	4 7 3	FILL (cinders, little Silt, little fm Sand, and f gravel, tar in bottom 2")	
	s	1 3 4	Brown SILT & CLAY, trace f Sand	
5	s	2 4 6	Brown Silty CLAY	
	s	8 7 8	Brown f SAND, trace Silt	
10	s	7 8 7	Brown f SAND & CLAY & SILT	
	s	5 7 7	Grey mf SAND, trace silt	
15	s	4 5 4		
20	s	no recov		
			BOTTOM OF BORING 22'	
25				
30				
35				

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-24

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: HOLLOW STEM AUGER
DRILLER: LAYNE WESTERN COMPANY, INC.
GEOLOGIST: J. DiNUNZIO
DATE: 8-11-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 32'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description	Construction
	s	18 21 10	FILL (asphalt,gravel, Black Brown Silty Clay, f Sand)	
	s	2 2 5	Black Grey Silty CLAY, trace f Sand	
5	s	2 5 7	Grey to Dark Brown Silty CLAY	
	s	4 4 4	@ 5' - 9' trace f Sand	
			@ 5' - 6.5' trace roots	
10	s	3 4 6	@ 10' - 11.5' little to some fm Sand	
	s	12 19 18		
15	s	9 13 14	Grey White fm SAND, trace to little Silt	
20	s	6 8 7		
25	s	7 6 8	@ 25' - 26.5 trace silty clay, trace root fragments	
30	s	4 9 11	Grey Brown mc SAND, trace Silt	
		no sample	Grey Brown Silty CLAY	
35			BOTTOM OF BORING 37'	

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-25

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: HOLLOW STEM AUGER
DRILLER: LAYNE WESTERN COMPANY, INC.

GEOLOGIST: J. DiNUNZIO
DATE: 8-12-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 31'

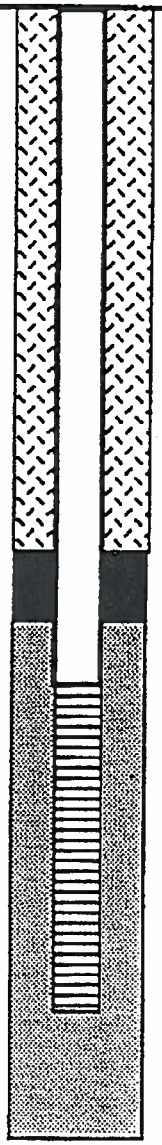
Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description
	s	7 15 15	FILL (asphalt, Gravel, Brown Clayey Silt, trace fine Sand)
	s	2 1 3	Black Green CLAY, trace Silt, trace roots, trace f Sand
5	s	3 6 7	Grey Brown Silty CLAY
	s	5 7 9	Tan fine SAND & SILT
			Brown Silty CLAY, trace f Sand, trace Gravel
10	s	9 15 16	Green Grey to Brown to Grey fm SAND
	s	7 11 15	@ 10' - 10.3' contains 50 % Clayey Silt
15	s	8 9 12	@ 10.3' - 12.5' trace to little Silt
			White to white Brown fm SAND, trace to little Silt
20	s	7 10 9	
25	s	4 8 6	Red Brown fmc SAND, trace to little Brown Grey Silty Clay
30	s	no sample	
35			BOTTOM OF BORING 35'

Construction



KEYSTONE ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-26

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: MUD ROTARY
DRILLER: LAYNE WESTERN COMPANY, INC.

GEOLOGIST: S. COLTON
DATE: 8-12-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 33'

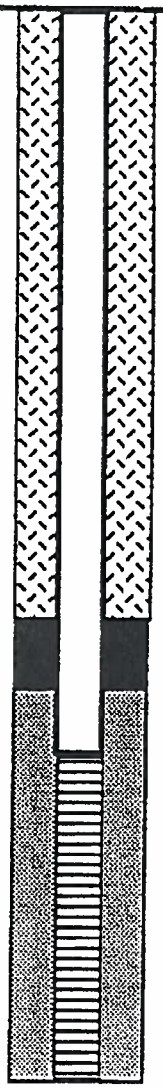
Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description
	s	7 9 7	FILL (cinders, Clay, red mc Sand)
	s	1 5 5	Brown CLAY & SILT, trace fm Sand
5	s	3 4 5	Brown Clayey SILT to SILT & CLAY, trace fm sand
	s	2 3 3	
10	s	5 17 18	Brown SILT & CLAY,
	s	6 11 12	@ 10.75' Grey White f SAND
15	s	6 10 9	
20	s	6 11 12	
25	s	2 3 3	Brown Green Silty CLAY, trace f Sand
30	s	4 7 8	Grey mf SAND, trace Silt
			BOTTOM OF BORING 33'
35			

Construction



KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-27

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: MUD ROTARY
DRILLER: LAYNE WESTERN COMPANY, INC.

GEOLOGIST: S. COLTON
DATE: 8-12-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 23'

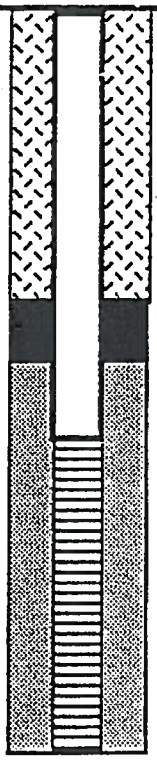
Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description
	s	4 3 3	Brown Clayey SILT, trace fm Sand, trace to little f gravel
	s	1 2 1	Brown CLAY & SILT, trace fm Sand, trace f gravel
5	s	1 1 2	
	s	3 4 6	Brown Silty CLAY,trace fm Sand, trace f Gravel
10	s	2 3 5	
	s	2 4 5	
15	s	2 3 5	
			Brown fm SAND, trace Clay
20	s	4 6 7	
			BOTTOM OF BORING 23'
25			
30			
35			

Construction



KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-28

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: HOLLOW STEM AUGER
DRILLER: LAYNE WESTERN COMPANY, INC.
GEOLOGIST: J. DiNUNZIO
DATE: 8-10-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 27'

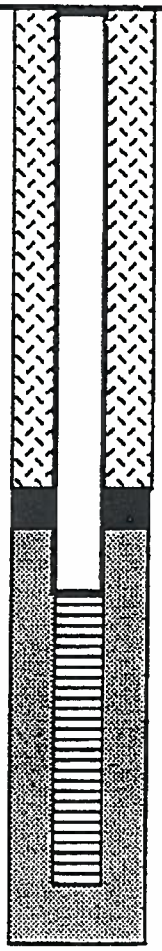
Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description
	s	6 7 7	Red Brown to Brown Silty CLAY, trace to little f Sand
	s	4 4 6	
5	s	3 5 7	Brown Green CLAY, trace Silt, trace to little f Sand
	s	3 6 8	
10	s	6 11 13	Grey White, Red Brown fm SAND, trace to some Silt
	s	12 10 7	
15	s	6 9 11	Grey Brown m SAND, trace Silt
			Red Brown Silty CLAY, some fm Sand,
20	s	4 5 6	Grey to Grey White fm SAND
25	s	4 9 6	
30			BOTTOM OF BORING 29'
35			

Construction



KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-29

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: HOLLOW STEM AUGER
DRILLER: LAYNE WESTERN COMPANY, INC.

GEOLOGIST: J. DiNUNZIO
DATE: 8-10-88

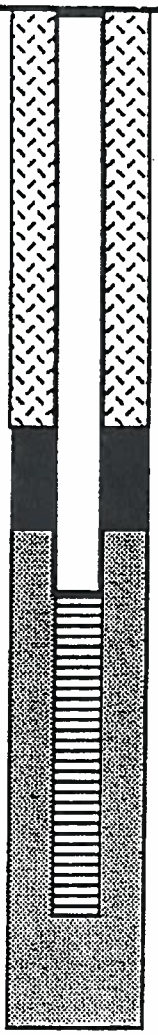
Ground Elevation:
Top of Well Elev.:
Depth of Well: 28'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description
	s	4 5 9	Dark Brown Silty CLAY, trace f Sand
	s	6 8 8	Brown CLAY to Silty Clay, trace Silt to little f Sand
5	s	4 5 6	
	s	3 4 4	
10	s	2 3 8	Red Brown CLAY, some White Grey fm Sand, trace Silt
	s	4 9 10	Brown to Grey fm SAND, little to some Silt, trace to little Clay
15	s	6 5 2	
20	s	2 2 4	
25	s	no sample	
30	s	no sample	
			BOTTOM OF BORING 31.5'
35			



KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-30

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: MUD ROTARY
DRILLER: LAYNE WESTERN COMPANY, INC.

GEOLOGIST: S. COLTON
DATE: 8-17-88

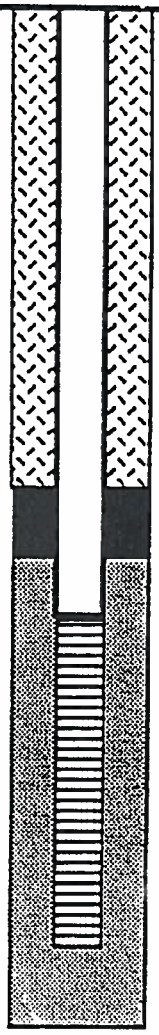
Ground Elevation:
Top of Well Elev.:
Depth of Well: 29'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description	Construction
	s	4 6 16	Brown Clayey SILT, trace f Sand	
	s	7 10 9		
5	s	12 19 31		
	s	8 10 10	White f SAND,trace Silt	
10	s	6 10 10		
	s	4 8 11	@ 12.5' - 14' Sand is fm	
15	s	10 11 12	@ 15' - 16.5 Sand is m	
20	s	10 11 12		
25	s	3 7 9		
30	s	1 3 4	@ 31.5' is Clay	
			BOTTOM OF BORING 31.5'	
35				



KEYSTONE ENVIRONMENTAL RESOURCES, INC.

WELL LOG : R-31

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: HOLLOW STEM AUGER
DRILLER: LAYNE WESTERN COMPANY, INC.

GEOLOGIST: J. DiNUNZIO
DATE: 8-17-88

Ground Elevation:
Top of Well Elev.:
Depth of Well: 34'

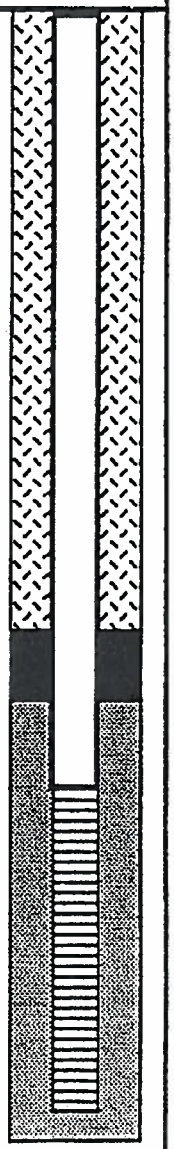
Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:
Screen:

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description
	G		FILL (Black m Gravel,some fmc Sand, little asphalt, little Black Brown Silty Clay)
	G		Black Grey to Grey Green to Grey Brown Silty CLAY @ 3' - 5' some wood fragments @ 7.5' - 9' trace to little wood fragments @ 7.5' - 11' little to some f sand
5	s	3 4 7	
10	s	4 5 15	Grey Green f SAND & SILT
	s	7 8 7	
15	s	5 7 8	Grey Brown to Brown White fm SAND, trace to little Silt
20	s	4 7 7	
25	s	10 10 5	Red Brown fm SAND, trace Silt, trace black organic streaks
30	s	7 5 9	Grey Brown fmc SAND, trace to little Brown Green Silty Clay
35			BOTTOM OF BORING 35'

Construction



KEYSTONE ENVIRONMENTAL RESOURCES, INC.

WELL LOG (M-1)

PROJECT: Groundwater Monitoring **LOCATION:** GRENADA, MISSISSIPPI

DRILLING METHOD: MUD ROTARY
DRILLER: PSI, INC.

GEOLOGIST: S. A. COLTON
DATE: October 19, 1987

Top of Well Elev.: 215.00 feet

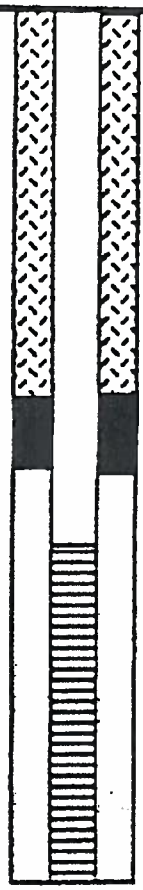
Depth of Well: 26 feet

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material: 2" I.D. PVC
Screen: 10' of 0.010" slotted

SAND PACK
BENTONITE
GROUT
SCREEN

Depth	Sample	SPT Blow Counts	Description	Construction
	S	4,6,4	Brown clayey SILT, tr fm sand, tr fm gravel	
	S	6,6,8		
5	S	5,5,5		
	S	4,4,5	Brown SILT and CLAY to silty CLAY, tr fm sand	
10	S	4,5,10		
	S	8,10,9	Tan fmc SAND, tr silt, tr clay	
15	S	6,7,5		
	S	5,8,8		
20	S	7,8,11		
	S	13,18,13		
25	S	9,9,10	Brown silty CLAY, tr to little fm sand	
			Bottom of Boring 26.5'	
30				
35				
40				



KEYSTONE ENVIRONMENTAL RESOURCES, INC.

WELL LOG (M-2)

PROJECT: Groundwater Monitoring **LOCATION:** GRENADA, MISSISSIPPI

DRILLING METHOD: MUD ROTARY
DRILLER: PSI, INC.

GEOLOGIST: S. A. COLTON
DATE: October 19, 1987

Top of Well Elev.: 215.28 feet

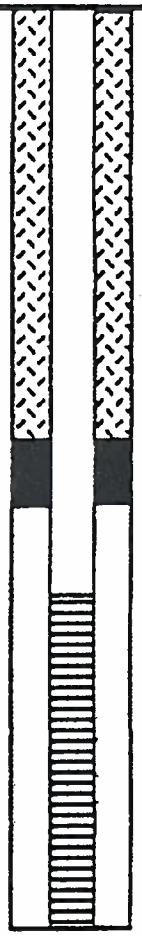
Depth of Well: 27.5 feet

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material: 2" I.D. PVC
Screen: 10' of 0.010" slotted

SAND PACK
BENTONITE
GROUT
SCREEN

Depth	Sample	SPT Blow Counts	Description
	S	3,6,13	Brown/black mf SAND, little silt and cinders
	S	3,4,5	Brown clayey SILT to SILT and CLAY, tr fm sand
5	S	4,6,7	
	S	5,4,5	
10	S	4,5,9	
			Brown SILT and CLAY, little fm sand
	S	5,7,9	
			Brown SILT and CLAY, some fm sand
15	S	13,16,24	Tan to brown/grey fmc SAND, tr clay some silty clay (18 to 18.5 feet)
	S	5,6,15	
20	S	9,10,16	
	S	14,16,14	
25	S	8,12,16	Grey/brown SILT and CLAY, tr f sand
	S	8,8,8	
30			Bottom of Boring 29'
35			
40			



KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

BORING LOG BM-2B

PROJECT: GWQA - ASH PILE **LOCATION: GRENADA, MS**

DRILLING METHOD: MUD ROTARY
DRILLER: LAW ENGINEERING, INC.
GEOLOGIST: D. SMITH
DATE: OCTOBER 22, 1989

SAMPLE COLLECTION
G - grab T - shelby tube
S - splitspoon C - rock core

Depth	Sample	SPT Blow Counts	Description
	s	3 10 11	
	s	1 0 1	
5	s	3 3 4	
	s	1 2 3	
10	s	woh / 6" 3 4	
	s	2 1 2	
15	s	2 2 4	
	s	8 4 6	
20	s	1 1 3	SEE BORING LOGS FOR WELL M-2B FOR 0' TO 55.5'
	s	2 1 2	
25	s	3 4 5	
	s	2 2 3	
30	s	1 1 1	
35	s	1 2 2	
40	s	woh/6" 1 2	

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

BORING LOG BM-2B

PROJECT: GWQA - ASH PILE **LOCATION: GRENADA, MS**

DRILLING METHOD: MUD ROTARY
DRILLER: LAW ENGINEERING, INC.
GEOLOGIST: D. SMITH
DATE: OCTOBER 22, 1989

SAMPLE COLLECTION
G - grab T - shelby tube
S - splitspoon C - rock core

Depth	Sample	SPT Blow Counts	Description
			SEE BORING LOGS FOR WELL M-2B FOR 0' TO 55.5'
45	S	3 4 4	
50	S	1 2 2	
55	S	11 23 25	
			Medium Grey fm SAND, trace Clay and Silt
60	S	4 12 17	@ 59' - 64.5' trace muscovite flakes @ 59' - 60.5' trace black Sand seams
65	S	11 21 31	
70	S	14 31 33	
			Medium Grey fmc SAND, trace Clay and Silt, trace Black Sand seams
75	S	11 34 32	
			Medium Grey fm SAND, trace Clay and Silt
80	S	16 33 36	

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

BORING LOG BM-2B

PROJECT: GWQA - ASH PILE **LOCATION: GRENADA, MS**

DRILLING METHOD: MUD ROTARY
DRILLER: LAW ENGINEERING, INC.
GEOLOGIST: D. SMITH
DATE: OCTOBER 22, 1989

SAMPLE COLLECTION
G - grab T - shelby tube
S - splitspoon C - rock core

Depth	Sample	SPT Blow Counts	Description
85	S	18 30 44	Medium Grey fm SAND, trace Clay and Silt
90	S	26 38 50 /6"	@ 84' - 85.5' trace Black organics (bone coal) in thin (< 1/4 " thick) seams @ 89' - 89.5' trace brown organics (patches of peat) @ 90' Tan f Sand, little Clay and Silt, trace Muscovite flakes (4" thick seam) @ 99' - 100.5' trace dark brown organics (3/8" thick peat seam)
95	S	50/6"	
100	S	30 50/6"	
			BOTTOM OF BORING 100.5'

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

WELL LOG M-2B

PROJECT: GWQA - ASH PILE **LOCATION: GRENADA, MS**

DRILLING METHOD: MUD ROTARY
DRILLER: LAW ENGINEERING, INC.

GEOLOGIST: D. SMITH
DATE: OCTOBER 21, 1989

Ground Elevation:
Top of Well Elev.:
Depth of Well: 47.5'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material: 2" PVC
Screen: 2" PVC (0.010 slots)

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description	Construction
	s	3 10 11	Black FILL(Sand and Clay, trace Sand and Gravel)	
	s	1 0 1	Light Grey CLAY & SILT, Silt and Clay to Clay and Silt trace to little Orange Brown patches / mottles	
5	s	3 3 4	@ 2.5' - 4' trace mc gravel (Black - weathering to rust colored silt)	
	s	1 2 3	@ 10' - 11.5' trace to little vf to f Sand, trace Rust Silt patches	
10	s	woh / 6" 3 4		
	s	2 1 2	Light Grey / Rust Silty CLAY	
15	s	2 2 4	Grading from Light Grey fm SAND, some clay to light Grey fm Sand, trace Orange Brown / rust streaks	
	s	8 4 6	@ 20' - 21.5' little to some clay	
20	s	1 1 3	Light Grey mc Sand	
	s	2 1 2	Light Grey / Orange Brown / Red Orange Silty Clay trace Dark Brown organics(plant)	
25	s	3 4 5	6" pvc casing set at 25'	
	s	2 2 3	Hard Orange Brown CLAY & SILT	
30	s	1 1 1	@ 25' - 25.5' trace dark Brown organics (decomposed plant matter)	
			@ 27.5' - 29' trace of f Sand	
			@ 29.5' - 31' little vf to f Sand	
			@ 30.5' - 31' thin (< 1/16") layers of medium Grey Clay and Silt	
35	s	1 2 2	Medium Grey Silty CLAY, trace Black organics (decomposed plant matter) grading into medium gray CLAY & SILT	
40	s	woh / 6" 1 2		

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG M-2B

PROJECT: GWQA - ASH PILE **LOCATION: GRENADA, MS**

DRILLING METHOD: MUD ROTARY
DRILLER: LAW ENGINEERING, INC.

GEOLOGIST: D. SMITH
DATE: OCTOBER 21, 1989

Ground Elevation:
Top of Well Elev.:
Depth of Well: 47.5'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material: 2" AVC
Screen: 2" PVC (0.010 slots)

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description	Construction
			SAME AS ABOVE	
45	S	3 4 4	Medium Grey fm SAND @ 44' - 45.5' some Clay @ 49' - 50.5' little Clay	
50	S	1 2 2		
			Medium Grey fmc SAND, trace Silty Clay (patch)	
55	S	11 23 25	Orange Brown fmc SAND	
			BOTTOM OF BORING 55.5'	
60			SEE BORING LOG FOR BORING BM-2B FOR 55.5' - 100.5'	
65				
70				
75				
80				

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

WELL LOG (M-3)

PROJECT: Groundwater Monitoring **LOCATION:** GRENADA, MISSISSIPPI

DRILLING METHOD: MUD ROTARY
DRILLER: PSI, INC.

GEOLOGIST: S. A. COLTON
DATE: October 19, 1987

Top of Well Elev.: 216.83 feet

Depth of Well: 30 feet

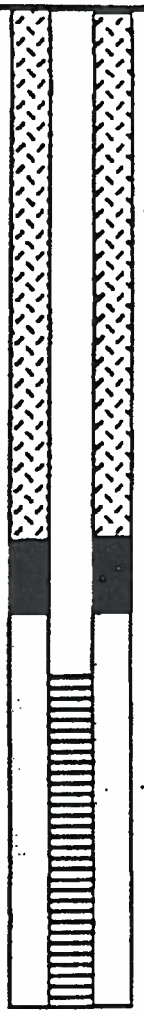
Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material:2" I.D. PVC
Screen:10' of 0.010" slotted

SAND PACK
BENTONITE
GROUT
SCREEN

Depth	Sample	SPT Blow Counts	Description
	S	3,3,4	Brown clayey SILT, tr f sand
	S	5,7,9	Brown silty CLAY to clayey SILT, tr f sand
5	S	8,11,11	
	S	6,8,11	Tan fmc SAND, little clayey silt grades to tr silt at 7.7 feet (Sand and clay pocket 22.5 to 22.9 feet)
10	S	9,13,15	
	S	7,11,13	
15	S	6,9,15	
	S	7,13,14	
20	S	8,7,10	
	S	8,8,11	
25	S	6,6,6	Brown, grey, green mottled clayey SILT to SILT and CLAY, tr f sand
	S	7,7,7	
30	S	3,2,1	
			Bottom of Boring at 31.5 feet
35			
40			

Construction



KEYSTONE ENVIRONMENTAL RESOURCES, INC.

WELL LOG (M-4)

PROJECT: Groundwater Monitoring **LOCATION: GRENADA, MISSISSIPPI**

DRILLING METHOD:MUD ROTARY
DRILLER:PSI, INC.

GEOLOGIST: S. A. COLTON
DATE: October 19, 1987

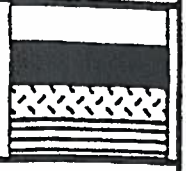
Top of Well Elev.: 215.86 feet

Depth of Well: 27.5 feet

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

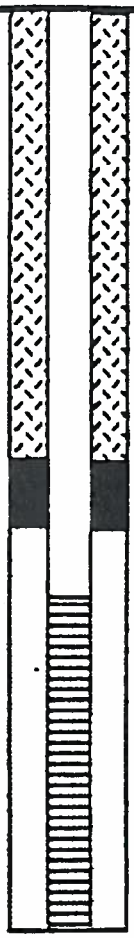
Casing Material:2" I.D.PVC
Screen: 10' of 0.010" slotted

SAND PACK
BENTONITE
GROUT
SCREEN



Depth	Sample	SPT Blow Counts	Description
0	S	1,3,4	Brown clayey SILT to silty CLAY, tr f sand
	S	13,15,18	Brown clayey SILT, tr to and f sand
5	S	14,13,11	Brown, tan f SAND, tr silt little silty clay 5.75 to 6.1 feet
	S	8,10,12	
10	S	8,10,14	
	S	9,12,13	
15	S	6,9,10	
	S	10,12,14	
20	S	7,8,11	
	S	3,3,5	Brown, grey SILT and CLAY, tr c sand
25	S	3,5,6	
	S	6,7,8	
30			Bottom of Boring 29'
35			
40			

Construction



KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

WELL LOG : M-5

PROJECT: GRENADA WOOD PLANT LOCATION: GRENADA, MS

DRILLING METHOD: MUD ROTARY
DRILLER: LAW ENGINEERING

GEOLOGIST: D. SMITH
DATE: 10-19-89

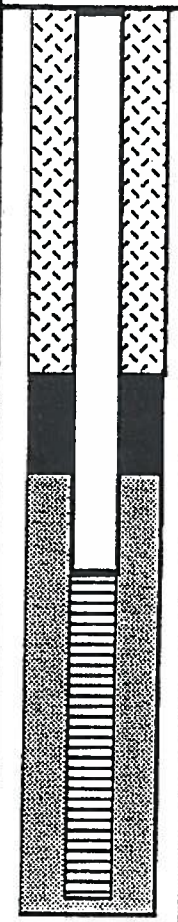
Ground Elevation:
Top of Well Elev.:
Depth of Well: 27.5'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material: 2" PVC
Screen: 2" PVC (0.010 slots)

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description	Construction
5			SEE BORING LOG FOR BORING M-5B	
10			(no samples taken)	
15				
20				
25				
30			BOTTOM OF BORING 28'	
35				



KEYSTONE ENVIRONMENTAL RESOURCES, INC.

WELL LOG M-5B

PROJECT: GWQA - ASH PILE **LOCATION: GRENADA, MS**

DRILLING METHOD: MUD ROTARY
DRILLER: LAW ENGINEERING, INC.

GEOLOGIST: D. SMITH
DATE: OCTOBER 23, 1989

Ground Elevation:
Top of Well Elev.:
Depth of Well: 50'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material: 2" PVC
Screen: 2" PVC (0.010 slots)

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description	Construction
	s	5 14 12	FILL(Brown orange Sand and Gravel, trace slag)	
			Brown SILT some Clay	
5	s	2 3 3	Orqnge Brown CLAY & SILT	
10	s	1 2 3	Light gray Brown to light Grey / Orange Brown mottled f SAND, some Clay, trace organics (decomposed plant material)	
15	s	2 3 4	Light Grey CLAY & SILT , trace Silty Clay (lense) @ 15' - 15.8' trace Orange Brown Clay and Silt @ 15.8' - 16.5' trace vf Sand	
20	s	5 14 14	Light Grey Tan mc SAND, trace f Sand and Silt	
25	s	8 11 12		
			Orange Brown Silty CLAY, trace light Grey Silty Clay (mottles)	
30	s	2 3 2	6" PVC casing set at 30'	
			Medium Grey Silty CLAY	
35	s	woh/6" 1 2	@ 29.5' - 31' trace Orange Brown mottles	
40		woh/18"		

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

WELL LOG M-5B

PROJECT: GWQA - ASH PILE **LOCATION: GRENADA, MS**

DRILLING METHOD: MUD ROTARY
DRILLER: LAW ENGINEERING, INC.

GEOLOGIST: D. SMITH
DATE: OCTOBER 23, 1989

Ground Elevation:
Top of Well Elev.:
Depth of Well: 50'

Sample Collection
G-grab T-shelby tube
S-splitspoon C-rock core

Casing Material: 2" PVC
Screen: 2" PVC (0.010 slots)

GRAVEL PACK
BENTONITE
GROUT
SCREEN
CAVE-IN

Depth	Sample	SPT Blow Counts	Description	Construction
			SAME AS ABOVE	
45	S	woh / 6" 1 3	Medium Grey Orange Brown mottled vf SAND, some Clay	
			Medium grey mc SAND, trace medium gray silty Clay (patches)	
50	S	2 2 4	BOTTOM OF BORING 50.5'	
55				
60				
65				
70				
75				
80				

MONITORING WELL LOG

PROJECT Grenada, Miss. Soravfield — WELL NO. SF-1

DRILLING METHOD HSA — GEOLOGIST C.A. Cramer

DRILLER PSI — DATE 8/21/85

GROUND ELEVATION _____

TOP OF WELL 212.74

DEPTH OF WELL (ft) _____

GROUND WATER DEPTH (ft):

AT COMPLETION _____

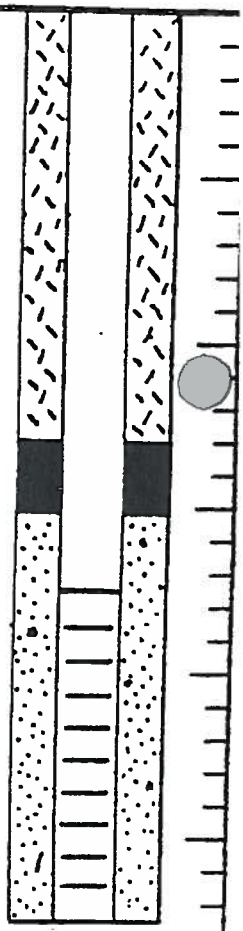
AFTER _____ HOURS _____

CASING MATERIAL 2" PVC — SCREEN 10' 0.010 slotted PVC

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION
		Brown silty CLAY, tr gravel, tr roots, moist
5		Light gray and brown mottled silty CLAY, tr silt pockets, tr organics, moist
10		
		Rust to orange, and light gray mottled silty CLAY, some organic stains, tr concretions (m gravel), moist
15		
20		Gray f SAND and SILT, tr clay, moist to wet
		Gray to Rust f SAND, little silt, tr clay, wet
25		Gray silty CLAY, tr sand, wet
		Gray SILT and f SAND, wet
		Rust to black f SAND, tr silt, wet
30		
35		

CONSTRUCTION



MONITORING WELL LOG

PROJECT Grenada, Miss. Sprayfield — WELL NO. SF-2

DRILLING METHOD HSA — GEOLOGIST C.A. Cramer

DRILLER PSI — DATE 8/22/85

GROUND ELEVATION _____

TOP OF WELL 211.04

DEPTH OF WELL (ft) _____

GROUND WATER DEPTH (ft):

AT COMPLETION _____

AFTER _____ HOURS _____

CASING MATERIAL 2" PVC — SCREEN 10' 0.010 slotted PVC

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION	CONSTRUCTION
		Light brown silty CLAY, some roots, moist	
		Light brown and gray mottled clayey SILT, tr roots, moist	
5		Brown and white silty CLAY, fractured, dry	
		Tan clayey SILT, tr white silt pockets, moist	
10		Light gray and rust CLAY and SILT, moist	
		White, tan, and rust f SAND, tr to some silt, moist	
15			
20			
		Tan mf SAND, little silt, wet	
		Blue gray silty CLAY,wet	
25		Tan to gray mf SAND, little silt, wet	
30			
35			

MONITORING WELL LOG

PROJECT Grenada, Miss. Sprayfield — WELL NO. SF-3

DRILLING METHOD HSA — GEOLOGIST C.A. Cramer

DRILLER PSI — DATE 8/22/85

GROUND ELEVATION _____

TOP OF WELL 211.09

DEPTH OF WELL (ft) _____

GROUND WATER DEPTH (ft):

AT COMPLETION _____

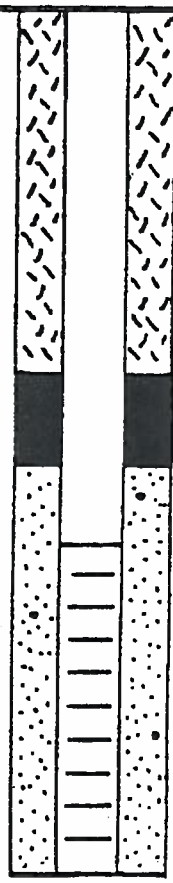
AFTER _____ HOURS _____

GRAVEL PACK
BENTONITE
BACK FILL
CONCRETE
SCREEN

CASING MATERIAL 2" PVC — SCREEN 10' 0.010" slotted PVC

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION
		Brown to gray clayey SILT, some roots, moist
		Tan and gray mottled silty CLAY, tr organic stains, moist
		Rust and gray mottled CLAY and SILT, tr f sand, moist
		White f SAND and SILT, moist
		Rust, tan and white laminated mf SAND, tr silt, gray silty clay lens, 15-15.5, 19.5-20, tr sand, moist
		Tan to gray f SAND, little to some silt, wet
		Tan mf SAND, tr silt, wet

CONSTRUCTION



5 10 15 20 25 30 35

MONITORING WELL LOG

PROJECT Grenada, Miss. Sprayfield — WELL NO. SF-4

DRILLING METHOD HSA — GEOLOGIST C.A. Cramer

DRILLER PSI — DATE 8/23/85

GROUND ELEVATION _____

TOP OF WELL 212.19

DEPTH OF WELL (ft) _____

GROUND WATER DEPTH (ft):

AT COMPLETION _____

AFTER _____ HOURS _____

CASING MATERIAL _____ SCREEN _____

STRATA DEPTH	SAMPLE DEPTH	DESCRIPTION
		Brown silty CLAY, some organics, tr sand, moist
5		Brown and tan mottled clayey SILT, tr roots, tr organic stains, moist
10		Light gray and orange mottled, SILT and CLAY, come c sand size black concretions, moist
15		White, tan, and rust laminated f SAND to mf SAND, tr silt, moist
20		Tan to gray silty CLAY, moist to wet
25		Gray f SAND and SILT, wet
		Rust and tan f SAND, little silt, tr clay, wet
30		
35		

CONSTRUCTION

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

Boring Log: B-1

Project: Grenada Wood Plant **Location: Grenada, MS**

Drilling Method: HOLLOW STEM AUGER
Driller: LAYNE-WESTERN COMPANY, INC.
Geologist: D. SMITH
Date: AUGUST, 1988

Sample collection
G-grab T-shelby tube
S-splitspoon C-rock core

Strata Depth	Sample Depth	Blow Count	Description
	S	6 8 8	FILL (orange-brown SILT, some sand and gravel)
	S	3 5 5	Orange-brown/rust mottled CLAY AND SILT, Trace organics (decomposed)
	S	3 6 7	Stiff orange-brown/rust/gray mottled CLAY AND SILT to SILT AND CLAY, trace organics (decomposed)
5	S	3 5 6	
	S	3 5 6	
	S	2 5 6	
	S	2 5 5	
10			Bottom of Boring at 10.5 feet
15			
20			

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

Boring Log: B-2

Project: Grenada Wood Plant **Location: Grenada, MS**

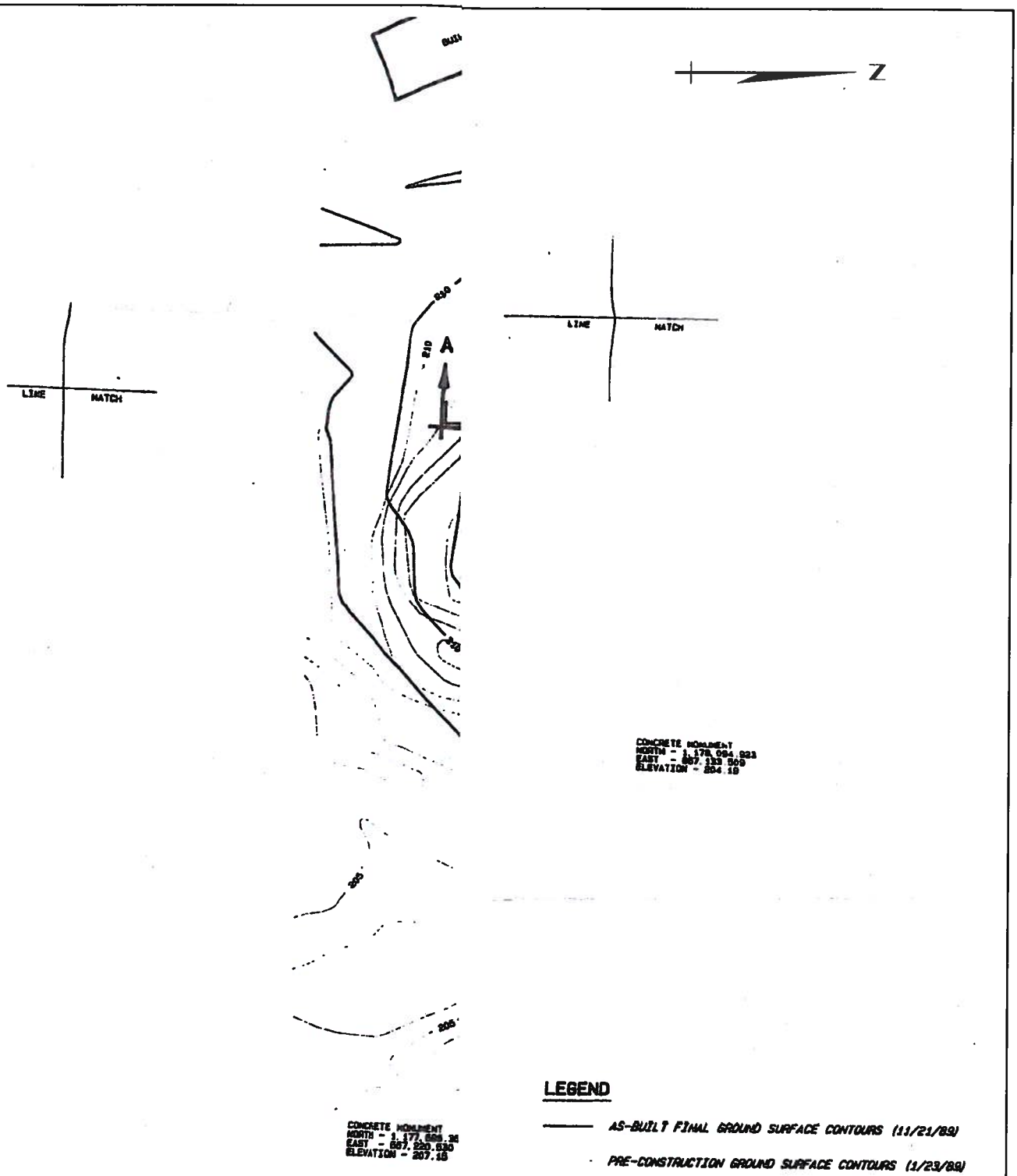
Drilling Method: HOLLOW STEM AUGER
Driller: LAYNE-WESTERN COMPANY, INC.
Geologist: D. SMITH
Date: AUGUST, 1988

Sample collection
G-grab T-shelby tube
S-splitspoon C-rock core

Strata Depth	Sample Depth	Blow Count	Description
	S	3 4 5	Light brown CLAY AND SILT, rust/gray mottled
	S	3 5 6	Light gray/rust/orange-brown mottled CLAY AND SILT
	S	3 5 4	@ 4.5-6 feet Trace decomposed organics
5	S	2 5 6	
	S	3 5 8	Stiff orange-brown/gray mottled SILTY CLAY
	S	3 4 5	
	S	3 5 6	
10			Orange-brown/gray mottled & SAND @ 10.5 feet light gray w SAND
			Bottom of Boring at 10.5 feet
15			
20			

Figure 3

(Facility Topographic Map)



REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCE:

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

BEAZER EAST, INC.
PITTSBURGH, PENNSYLVANIA

DRWN:	CRJ	DATE: 03/12/08	KEY ENVIRONMENTAL INCORPORATED
CHKD:	RMB	DATE: 03/12/08	
APPD:	KCF	DATE: 03/12/08	
SCALE:	AS SHOWN		

RCRA POST-CLOSURE PERMIT
RENEWAL APPLICATION
GRENADA, MISSISSIPPI

FACILITY TOPOGRAPHIC MAP

PROJECT NO: 08-648
FIGURE 3

y:\grenada\08648\2008 permit renewal\permit renewal\figure-3.dwg Last Saved By: Cjameson 4/3/2008 2:21 PM Plotted By: Charles Jameson 4/3/2008 2:25 PM Scale: 1:1

Figure 4

(Flood Hazard Boundary Map)

Figure 5

(Photograph of Closed Surface Impoundment)

BEAZER EAST, INC.
PITTSBURGH, PENNSYLVANIA

DRWN: CRJ	DATE: 03/12/08	KEY ENVIRONMENTAL INCORPORATED
CHKD: RMB	DATE: 03/12/08	
APPD: KCF	DATE: 03/12/08	
SCALE: AS SHOWN		

RCRA POST-CLOSURE PERMIT
RENEWAL APPLICATION
GRENADA, MISSISSIPPI

REFERENCE:

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PHOTOGRAPH OF
CLOSED FORMER SURFACE IMPOUNDMENT
MARCH 2008

PROJECT NO: 08-648
FIGURE 5

y:\grenada\08648\2008 permit renewal\permit renewal\figure-5.dwg Last Saved By: Clamason 4/3/2008 2:21 PM Plotted By: Charles Jamason 4/3/2008 2:28 PM Scale: 1:1

Figure 6

(Detection Monitoring System Well Locations Map)