TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

April 4, 2014

Mr. Matt Love, Director
Global Environmental Remediation
Exide Technologies
P.O. Box 14294
Reading, PA 19612-4294

Re: Approval with Modifications, Class 2 Landfill Groundwater Monitoring Plan, dated July 31, 2013
Exide Frisco Recycling Facility, 7471 5th St. Frisco, TX 75034-5047
TCEQ SWR No. 30516; TCEQ Hazardous Waste Permit No. HW-50206; TCEQ Agreed Order Docket No. 2011-1712-IHW-E; EPA ID No. TXD006451090; Customer No. CN600129779; Regulated Entity No. RN100218643

Dear Mr. Love:

The Texas Commission on Environmental Quality (TCEQ) has reviewed the above referenced submittal. Based on our review, the TCEQ approves the Class 2 Landfill Groundwater Monitoring Plan with the following conditions:

1. Please ensure that groundwater concentrations are compared to the appropriate Class 2 groundwater protective concentration limits (PCLs).
2. Please provide plug and abandon reports for PMW-19 and PMW-20 and evidence that these reports were provided to the Texas Water Well Drillers Board within 30 days of the date of this letter.
3. Please install monitoring well LMW-23 as noted on page 3 of the revised plan. This plan is considered to be an interim ground water monitoring plan to be implemented upon receipt of this letter.
4. Please reevaluate the proposed analytical methods used in groundwater monitoring after revising the COC screening conducted in the July 9, 2013 APAR.

Please submit semi-annual groundwater monitoring reports on or before January 21 and July 21 of each year. The semi-annual reports will also include a summary of analytical data in tabular form which lists the constituent, date sampled, monitor well number, applicable PCL, analytical results with the detection limit for those analytes which were not detected, and any analytes that exceed the PCL shown in bold or highlighted. The reports should also contain discussions of monitoring well conditions, well construction information, well yield, development and sampling issues, and any

relevant site information (droughts, excessive rainfall, etc.) to explain fluctuations in potentiometric level elevations.

We note that changes in conditions at the site may necessitate modifications to the approved plan. Please call me at (512) 239-2361 if you need additional information or wish to discuss these comments or the due date. Thank you for your cooperation in this matter.

Sincerely,

Gary Beyer, Project Manager
Team 1, VCP-CA Section
Remediation Division
Texas Commission on Environmental Quality

GB/ms

cc: Eric Pastor, Pastor, Behling, & Wheeler, LLC, 2201 Double Creek Drive, Suite 4004, Round Rock, Texas 78664
James Gradney, Enforcement Coordinator, TCEQ Office of Compliance and Enforcement, MC-224
Sam Barrett, Waste Program Manager, TCEQ Region 4 Office, Dallas/Fort Worth
Bill Shafford, Technical Specialist, Office of Waste, TCEQ

EXIDE TECHNOLOGIES *World Leader in Electrical Energy Solutions*

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July 29, 2013

Mr. Zak Covar
Executive Director
Texas Commission on Environmental Quality
MC-127
P.O. Box 13087
Austin, TX 78753

Order Compliance Team
Enforcement Division
Texas Commission on Environmental Quality
MC-149A
P.O. Box 13087
Austin, Texas 78711-3087

Attn: Mr. Gary Beyer, TCEQ
Mr. Bill Shafford, TCEQ

Subject: Exide Technologies Frisco Recycling Center, Frisco, Texas
Agreed Order Docket No. 2011-1712-IHW-E; TCEQ SWR No. 30516
Submission of Revised Class 2 Landfill Groundwater Monitoring Plan

Dear Mr. Covar,

Attached is a revised Class 2 Groundwater Monitoring Plan (GMP) based on comments received from the Texas Commission on Environmental Quality (TCEQ) dated July 1, 2013. The Class 2 Landfill GMP, dated April 11, 2013 was submitted in satisfaction of the requirements of Section III.3.b.ii of the Agreed Order which requires that within 60 days after the effective date of the Agreed Order, Exide submit to the TCEQ Executive Director for approval a GMP at the active landfill to be implemented following receipt of written approval from the Executive Director.

Please note, in a conversation on July 11, 2013 with Mr. Gary Beyer, Project Manager, Remediation Division with the TCEQ, Mr. Beyer acknowledged the first semi-annual report will be due on or before January 21, 2014 and not July 21, 2013 as indicated in the comments received on July 1, 2013 because the TCEQ has not yet approved the Class 2 GMP.

Sincerely,

Exide Technologies

Vanessa Coleman
Vanessa.Coleman@Exide.com

CC: Mr. Gary Beyer – TCEQ
Mr. Bill Shafford – TCEQ
Mr. James Gradney – TCEQ
Mr. John Shelton – TCEQ
Ms. Margaret Ligarde – TCEQ
Mr. Sam Barrett – TCEQ Region 4 Office
Mr. Matthew Love – Exide (Matt.Love@Exide.com)
Ms. Aileen Hooks – Baker Botts (Aileen.Hooks@BakerBotts.com)
Mr. Eric Pastor – Pastor, Behling & Wheeler, LLC (Eric.Pastor@PBWLLC.com)

REVISED CLASS 2 LANDFILL GROUNDWATER MONITORING PLAN

EXIDE FRISCO RECYCLING CENTER
FRISCO, TEXAS

Agreed Order Docket No. 2011-1712-IHW-E
TCEQ SWR No. 30516

July 31, 2013

Prepared for:
EXIDE TECHNOLOGIES
13000 Deerfield Parkway, Building 200
Milton, GA 30004

Prepared by:
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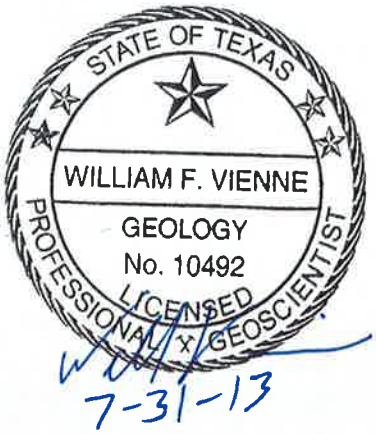

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1.0 INTRODUCTION

1.1 Purpose

This Groundwater Monitoring Plan (the Plan) presents the procedures for the groundwater monitoring program for the operating Class 2 Landfill at the Frisco Recycling Center in Frisco, Texas in accordance with the Agreed Order Docket No. 2011-1712-IHW-E Section III.3.b.ii. The Plan describes the procedures for monitoring well installation and development, sampling, sample management, analytical methods, quality assurance/quality control, sample custody control and data reduction. The monitoring system was designed to monitor the uppermost groundwater-bearing unit (GWBU) to evaluate any potential releases from the operating landfill. As required by the Agreed Order, this Plan will be implemented following receipt of written approval of the Executive Director of the Texas Commission on Environmental Quality (TCEQ). This Plan is a revision of a previous version of a Plan submitted to the TCEQ on April 11, 2013. The changes in this revised Plan were made to address TCEQ comments on the April 11, 2013 Plan as provided in a letter dated July 1, 2013 and clarified in discussions on July 11, 2013.

1.2 Site Location and Description

The Class 2 Landfill (hereafter, the Landfill) is located at the Frisco Recycling Center (FRC) near Frisco, Collin County, Texas. A location map of the Landfill is provided as Figure 1. The locations of the groundwater monitoring wells in the Landfill vicinity are shown on Figures 2 and 3. Initial notification for construction of an on-site Class 2 industrial landfill, including engineering plans and a landfill operations plan, was provided to the Texas Natural Resource Conservation Commission (TNRCC) by GNB Technologies, Inc. in August 1995. TNRCC acknowledgement of receipt and review of the notification was provided in a September 14, 1995 letter. Landfill construction commenced thereafter and FRC records indicate that the Landfill operations began in 1996. The Landfill currently consists of fifteen cells, nine of which (Cells 1 through 9) have been closed and capped. The closed cells of the Landfill consist of treated slag monofills. The active cells of the Landfill currently contain treated slag, but will also contain Class 2 wastes generated during the ongoing demolition and remediation activities at the FRC.

1.3 Uppermost Groundwater-Bearing Unit

The uppermost GWBU in the vicinity of the Landfill consists of clay-rich alluvial soils of Quaternary age situated unconformably above the Eagle Ford Formation. As indicated in the boring logs for the groundwater monitoring wells surrounding the Landfill (Appendix A), the Eagle Ford Formation occurs at depths ranging from approximately 14 to 24 feet below ground surface (bgs). Groundwater within the upper GWBU generally occurs under unconfined conditions at depths between approximately 10 and 20 feet bgs. Monitoring well locations are shown on Figure 2. Potentiometric surface maps for the upper GWBU based on water level elevations measured in the Landfill monitoring wells on January 31, 2013, March 11, 2013, April 5, 2013 and April 29, 2013 are plotted on Figures 3 through 6, respectively. The potentiometric surface shown in the figures generally slopes toward the southwest at a gradient of approximately 0.03 to 0.04 ft/ft.

1.4 Monitoring Well System

Historically, there were six previously existing monitoring wells in the Landfill vicinity (LMW-5, LMW-8, LMW-9, LMW-17, PMW-19 and PMW-20). The total measured depths of these wells, which were installed in 1995, range between 18 and 24 feet bgs. Well construction details are summarized in Table 1. Appendix A contains the well construction diagrams for monitoring wells LMW-5, LMW-8, LMW-9 and LMW-17; however, well construction diagrams were not available for PMW-19 and PMW-20. As a result, PMW-19 and PMW-20 were plugged and abandoned in February 2013. In connection with groundwater sampling in the vicinity of the Landfill conducted in advance of submittal of this Plan, two replacement monitoring wells (PMW-19R and PMW-20R) were constructed during the week of February 25, 2013. Well construction information for these replacement wells is summarized in Table 1 and boring logs for these wells are included in Appendix A. Figure 2 shows the locations of the previously existing six Landfill monitoring wells, as well as the locations of the two replacement wells. Table 2 contains the depth to groundwater data, while Figures 3 through 6 show potentiometric surface maps for water levels measured on January 31, 2013, March 11, 2013, April 5, 2013 and April 29, 2013, respectively. Available historical groundwater quality data for the Landfill wells are presented in Appendix B. These data were gathered from historical FRC documents and not all of these data could be confirmed through comparison to original laboratory reports.

The proposed monitoring well network for this Plan consists of eight monitoring wells. In addition to the four existing monitoring wells (LMW-5, LMW-8, LMW-9 and LMW-17) and the two replacement

monitoring wells (PMW-19R and PMW-20R), two additional monitoring wells (LMW-21 and LMW-22) were also installed during the week of February 25, 2013 in connection with groundwater sampling in the vicinity of the Landfill conducted in advance of submittal of this Plan. The locations of the two new monitoring wells are shown on Figure 2. Well construction information for these additional wells is summarized in Table 1 and boring logs for these wells are presented in Appendix A.

Development of the newly installed monitoring wells was performed during the week of March 4, 2013 by pumping and surging. The temperature, specific conductance and pH of the water removed from the wells were periodically measured during the development process and development continued until these parameters had stabilized or the well was pumped dry. As of the date of submittal of this Plan, monitoring well PMW-19R, located up-gradient of the Landfill, had not produced sufficient water for development. This well will be monitored on a monthly basis until a static water level is indicated, at which time the well will be developed and sampled. Due to the absence of measurable groundwater at PMW-19R in the five month period since its installation, an additional monitoring well (LMW-23) will be installed upon approval of this Plan west of PMW-19 (and PMW-19R) and up-gradient of the Landfill to serve as an additional background monitoring well. The proposed location of the well is shown on Figure 2. This well will be completed to the top of the Eagle Ford Shale and the screen length will not exceed 10 feet.

1.5 Proposed Monitoring Well Network

Based on the groundwater potentiometric maps presented on Figures 2 and 3, and the projected groundwater flow paths in the Landfill to downgradient wells, the proposed Landfill groundwater monitoring network consists of:

- Up-gradient monitoring wells: PMW-19R and LMW-23 (proposed);
- Cross-gradient monitoring wells: LMW-8 and LMW-9; and
- Down-gradient monitoring wells: LMW-5, LMW-17, PMW-20R, LMW-21 and LMW-22.

1.6 Sampling Schedule and Parameters

Water levels will be measured and samples will be collected from all Landfill monitoring wells on a quarterly basis with semi-annual reporting for three years or until such time as the Plan is replaced by the requirements of a permit or other legal instrument governing the site. Semi-annual reports will be

submitted on or before January 21 and July 21 of the year. Subject to the date of final TCEQ approval of this Plan, it is anticipated that the first semi-annual report will be submitted by January 21, 2014.

The following field parameters will be recorded during the sampling of each monitoring well:

- pH;
- temperature;
- specific conductance; and
- turbidity.

Each quarterly groundwater sample will be analyzed for total and dissolved arsenic, cadmium, lead and selenium. Additional groundwater samples will be collected on an annual basis to be analyzed for other constituents, including total and dissolved barium, chromium, mercury, silver, antimony, copper and zinc. The applicability of Texas Risk Reduction Program (TRRP) Protective Concentration Levels (PCLs) to total and dissolved phase constituents is discussed in Section 4.0 of this Plan. The analytical methods, sample containers, preservatives and holding times are summarized in Table 3. Detailed sampling procedures are described in Section 2.

2.0 GROUNDWATER SAMPLING

2.1 Equipment Assembly and Preparation

Activities to occur during groundwater sampling are summarized as follows:

- pre-arrangement of sample analytical requests with analytical testing laboratory;
- assembly and preparation of sampling equipment and supplies;
- groundwater sampling;
  - water-level measurements;
  - well purging;
  - field parameter measurements;
  - sample collection;
  - filtration (if needed);
- sample preservation;
- sample labeling;
- completion of sample records;
- completion of chain-of-custody records; and
- sample shipment.

Prior to the sampling event, equipment to be used will be assembled, properly cleaned and its operating condition verified. In addition, all record-keeping materials will be prepared. Sampling procedures will be conducted in general accordance with EPA SW-846 methods and in accordance with the standard operating procedures (SOPs) presented in Appendix C.

2.1.1 Equipment Check

This activity includes the verification that all equipment is in proper operating condition. An equipment check will be performed prior to each sampling event. Also, arrangements for repair or replacement of any equipment that is inoperative will be made and such repair or replacement will be completed prior to the sampling event.

2.1.2 Equipment Cleaning (Decontamination)

Decontamination of all non-disposable or non-dedicated field measurement, purging and sampling equipment will be performed for each sampling event before any purging/sampling activities begin, after

each well is sampled and at the end of the sampling event. Decontamination procedures are described in detail in the SOPs presented in Appendix C and are summarized below:

(1) Wash with low-residue soap and/or detergent solution.

(2) rinse with distilled water; and

(3) repeat steps (1) and (2) above, as necessary.

If non-dedicated, submersible pumps are used for purging and sampling, the outside casing will be washed following the steps outlined above. The interior of the pump will be rinsed by drawing distilled water through the pump. Decontamination water will be collected in a 55-gallon drum pending receipt of groundwater analytical results and properly disposed of at an approved facility.

2.2 Groundwater Sampling Procedures

2.2.1 Well Inspection

Prior to each sampling event, each well will be inspected for signs of damage to the well protective casing and well pad. The lock on each well will be checked to make sure it is present and operable. The well numbering on each well will also be checked for legibility.

2.2.2 Prevention of Cross-Contamination

Special care will be exercised to prevent contamination of the groundwater and extracted samples during the sampling activities. The primary way in which such contamination can occur is contact with improperly cleaned equipment.

To prevent such contamination, all non-dedicated sampling equipment will be thoroughly cleaned before and between uses at different sampling locations in accordance with Section 2.1.2. In addition to the use of properly cleaned equipment, a new pair of disposable latex (or similar) gloves will be worn for each well.

2.2.3 Groundwater Level Measurements

Groundwater levels will be measured before well purging. Using a pre-cleaned water level meter, the groundwater surface will be measured from the casing datum to the nearest 0.01-foot. Total depths will also be measured in the monitoring wells annually. Water level measurement procedures are described in detail in Appendix C. Water level measurements and total depths will be recorded on a Fluid Level Monitoring Record (Figure SOP-2-1 in Appendix C).

2.2.4 Well Purging and Sampling

Well purging and sampling will be conducted in accordance with the SOPs presented in Appendix C. Prior to each sampling event, the wells will be purged using a peristaltic pump and low-flow technique. Submersible pumps will be used if water levels are too low to allow the use of a peristaltic pump. The objective is to withdraw water in a manner that minimizes stress (drawdown) to the system to the extent practicable. When the pump intake is located within the screened interval, the water pumped will be drawn in directly from the formation with little mixing of casing water or disturbance to the sampling zone. Thus, samples are representative of the mobile load of constituents present.

Purging rates during sample collection will be performed at 0.5 L/min or less. The field parameters will be used to determine when the well has been adequately purged (stabilized). Stabilization will be confirmed when successive field parameters (specific conductance, pH and temperature) readings are within approximately ± 10%. Turbidity will also be collected during purging. Each field instrument will be calibrated according to the manufacturer's instructions.

A dedicated, decontaminated pump line will be attached to the peristaltic pump. The line inlet will be placed within the saturated portion of the well screen. The pump will then be turned on and measurements started for flow rate and field parameters. The pump line will be changed between wells. The pump rate and the parameter measurements will be recorded on the Groundwater Sampling Record Form presented in Appendix C (Figure SOP-3-1). If a well goes dry during purging, sampling will be performed the following day provided the well has sufficiently recharged to allow sample collection.

Sample extraction will be accomplished by using the peristaltic pump previously used to purge the well. The sample bottle will be filled directly from the pump line. If the turbidity exceeds 10 NTUs, the sample will be filtered through a disposable 10 micron filter prior to collection.

2.3 Container and Labels

The analytical testing laboratory will provide containers and appropriate container lids. The containers will be filled and container lids will be tightly closed. The following information will be legibly and indelibly written on the label:

- project identification;
- sample identification;
- name or initials of collector;
- date and time of collection;
- analysis requested;
- sample preservative, if applicable; and
- filtered or unfiltered, if applicable.

2.4 Sample Shipment

The following packaging and labeling requirements will be employed:

- preserve samples with ice;
- package sample so that it does not leak from its packaging;
- label package with
  - sample collector's name, address and telephone number;
  - laboratory's name, address and telephone number;
  - date of shipment; and
- attach chain-of-custody forms inside sample shipment container.

2.5 Chain-of-Custody Control

After samples have been obtained, chain-of-custody procedures will be followed to establish a written record concerning sample movement between the sampling site and the testing laboratory. Each shipping container will have a chain-of-custody form completed by the sampling personnel packing the samples. The chain-of-custody form for each container will be completed in triplicate and sealed in the container. One copy of this form will be maintained by the project manager and the other copies will be maintained at the laboratory. One of the laboratory copies will become a part of the permanent record for the sample and the other copy returned with the sample analyses report. Sample custody and shipment procedures

are described further in Appendix C. An example chain-of-custody form is also presented in Appendix C (Figure SOP-4-1).

Samples will be analyzed by a laboratory that is accredited by the National Environmental Laboratory Accreditation Conference (NELAC) and sample analyses will be performed in accordance with EPA SW-846 methods, as listed in Table 3.

3.0 QUALITY ASSURANCE/QUALITY CONTROL

One of the monitoring wells will be sampled in duplicate for each sampling event. The duplicate sample will be analyzed for all parameters for which the original sample is analyzed. Also, equipment blanks may be obtained to evaluate the effectiveness of decontamination procedures. Equipment blanks will be obtained by rinsing the decontaminated equipment with deionized water and collecting the rinsate. The rinsate samples will be analyzed for arsenic, cadmium, lead and selenium.

4.0 DATA REDUCTION AND PRESENTATION

Once the analytical data are received from the laboratory, the laboratory report will be reviewed for any narratives or comments indicating qualified data. Any qualified data will be closely evaluated with the laboratory. Next, the data will be reviewed for results in expected ranges. Anomalous results will be noted for additional review. The laboratory quality control report will also be reviewed to note any qualified data or other indications of anomalous runs. The data will then be deemed validated as appropriate. A Data Usability Summary (DUS) per TRRP 13 guidance will be prepared.

Groundwater elevations will be plotted on a map of the Landfill vicinity using the depth to water measurements and top of casing elevations to determine the groundwater flow direction and hydraulic gradient for each sampling event. Groundwater analytical data will be compared to applicable TRRP PCLs for each potentially complete exposure pathway, including the $^{GW}GW_{Class\ 3}$, $^{Air}GW_{Inh\text{-}V}$ (applicable for mercury only) and ^{SW}GW pathways. Total sample concentrations will be used for comparison with applicable $^{GW}GW_{Class3}$ and $^{Air}GW_{Inh\text{-}V}$ PCLs. Per TRRP-24, specific aquatic life criteria (applicable to the ^{SW}GW exposure pathway) apply only to analytes in the dissolved phase since the dissolved phase represents the bioavailable form; therefore, only dissolved sample results will be used for comparison to ^{SW}GW PCLs. Consistent with TRRP Rules §350.37(i) and §350.51(f), ^{SW}GW PCLs are only considered applicable in areas where there is a potential point of discharge of groundwater to surface water (i.e., the tributary to Stewart Creek located several hundred feet south of the Landfill, designated as the "North Tributary"); therefore, direct comparison of groundwater sample data to ^{SW}GW PCLs is only applicable to those wells located near the North Tributary (downgradient wells LMW-5, LMW-17 and LMW-22 and cross-gradient well LMW-8). A summary of the applicable PCLs for each of the proposed analytes is provided in Table 4.

PCL exceedances in the Landfill monitoring wells, subject to confirmation by re-sampling, will be considered an indication of affected groundwater and appropriate notification will be provided in writing to the TCEQ within 15 days of the receipt of final sampling results documenting the exceedance. Re-sampling to confirm the existence or non-existence of the exceedance will be conducted within two weeks of the documentation of the initial exceedance, and the results of the confirmation sampling will be reported in writing to the TCEQ within 15 days of the receipt of the final confirmation sampling results. If a release from the Landfill is indicated by a confirmed PCL exceedance in a downgradient monitoring well, then an investigation to determine the extent of the release will be conducted and a report documenting the results of the investigation will be submitted to the TCEQ within 120 days of

receipt of the final confirmation sampling results, along with a proposed remedial action plan. The TCEQ will be notified of a PCL exceedance in any well in the Landfill monitoring well network within 15 days of the receipt of the final sample results. Additional monitoring and/or investigation will be performed at the written direction of the TCEQ to evaluate whether an exceedance in a cross-gradient or up-gradient well is related to an on-site release.

Down-gradient monitoring well sampling results will be qualitatively compared to background monitoring well data as the background data set is developed using groundwater data from PMW-19R (if the well produces sufficient volume of water for sampling in the future; the well may be removed from the monitoring network, with TCEQ approval, if it remains dry) and from the proposed additional background well (LMW-23) to be installed upon approval of this Plan. A more detailed background comparison approach may be developed as appropriate based on the characteristics of the background data set once the background data set is sufficiently robust for such a comparison.

Semi-annual groundwater monitoring reports will be prepared and submitted to the TCEQ on or before January 21 and July 21 of each year for three years or until such time as the Plan is replaced by the requirements of a permit or other legal instrument governing the site. The anticipated date of the first semi-annual groundwater monitoring report is January 21, 2014. The reports will include discussions of sampling procedures/data and analytical results; analytical data documentation (including laboratory reports and data usability summaries); information on monitoring well conditions, well construction, well yield/purging, development and sampling issues and any relevant site information (droughts, excessive rainfall, etc.); potentiometric surface maps; and a summary of data in tabular form that lists the constituent, date sampled, monitoring well ID, applicable PCL, analytical results with the detection limits for constituents that were not detected and PCL exceedances as bolded or highlighted values.

TABLES

TABLE 1

SUMMARY OF WELL CONSTRUCTION INFORMATION
CLASS 2 LANDFILL EXIDE FRISCO RECYCLING CENTER
FRISCO, TEXAS

Well Name	Date Drilled	Ground Surface Elevation (ft AMSL)[1]	Top of Casing (TOC) Elevation (ft AMSL)[1]	Screened Interval (ft bgs)	Well Diameter	Total Drilled Depth (ft bgs)	Measured TOC Stickup (ft)	Total Measured Depth (ft below TOC)
LMW-5	2/3/1995	643.49	646.07	7-21.5	2"	22	2.60	25.02
LMW-8	2/4/1995	646.28	648.72	7-21.5	2"	22	2.77	21.63
LMW-9	2/4/1995	660.88	663.66	9-23.5	2"	24	2.93	27.50
LMW-17	7/24/1995	646.07	648.70	10-20	4"	23	2.40	25.14
LMW-21	2/27/2013	645.11	648.28	10-25	2"	25	3.17	28.06
LMW-22	2/27/2013	643.32	646.99	5-20	2"	20	3.67	23.12
PMW-19	NA[2]	677.89	678.86	NA	2"	NA	1.30	19.90
PMW-20	NA[2]	645.90	648.02	NA	2"	NA	2.50	25.03
PMW-19R	2/26/2013	678.45	681.79	4-19	2"	20	3.34	22.68
PMW-20R	2/26/2013	645.20	648.09	10-25	2"	25	2.89	28.25

Notes:

1 - All monitoring wells surveyed/re-surveyed in 2013 by Sparr Surveys of McKinney, Texas.

2 - NA = Well logs not available.

AMSL = above mean sea level.

ft bgs = feet below ground surface.

TABLE 2

2013 GROUNDWATER ELEVATIONS
CLASS 2 LANDFILL EXIDE FRISCO RECYCLING CENTER
FRISCO, TEXAS

Well Name	Top of Casing (TOC) Elevation (ft AMSL)	Measurement Date	Depth to Water (ft below TOC)	Water Level (ft AMSL)
LMW-5	646.07	1/23/2013	18.40	627.67
		1/31/2013	18.33	627.74
		3/11/2013	17.69	628.38
		4/5/2013	17.02	629.05
		4/29/2013	17.29	628.78
LMW-8	648.72	1/23/2013	NM	NM
		1/31/2013	15.11	633.61
		3/11/2013	14.93	633.79
		4/5/2013	14.52	634.20
		4/29/2013	14.63	634.09
LMW-9	663.66	1/23/2013	NM	NM
		1/31/2013	16.16	647.50
		3/11/2013	16.24	647.42
		4/5/2013	20.21	643.45
		4/29/2013	22.14	641.52
LMW-17	648.70	1/23/2013	18.71	629.99
		1/31/2013	18.69	630.01
		3/11/2013	18.52	630.18
		4/5/2013	18.34	630.36
		4/29/2013	16.81	631.89
LMW-21	648.28	3/11/2013	20.11	628.17
		4/5/2013	19.29	628.99
		4/29/2013	19.62	628.66
LMW-22	646.99	3/11/2013	17.18	629.81
		4/5/2013	16.93	630.06
		4/29/2013	17.16	629.83
PMW-19[1]	678.86	1/23/2013	18.03	660.83
		1/31/2013	18.04	660.82
		Plugged and Abandoned on February 26, 2013		
PMW-19R[1]	681.79	3/11/2013	Dry	
		4/5/2013	Dry	
		4/29/2013	Dry	
PMW-20[1]	648.02	1/23/2013	20.67	627.35
		1/31/2013	20.62	627.40
		Plugged and Abandoned on February 26, 2013		
PMW-20R[1]	648.09	3/11/2013	18.91	629.18
		4/5/2013	19.06	629.03
		4/29/2013	19.16	628.93

Notes:

1 - Wells PMW-19R and PMW-20R are replacement wells for PMW-19 and PMW-20, repectively, which were plugged on February 26, 2013 because completion information was not available for these wells.

AMSL = Above Mean Sea Level

NM = Not Measured

TABLE 3

GROUNDWATER SAMPLING PROTOCOL
CLASS 2 LANDFILL EXIDE FRISCO RECYCLING CENTER
FRISCO, TEXAS

Parameter (Total and Dissolved)	Analytical Method[1]	Volume (ml.)	Container[2]	Preservative[2]	Holding Time
Analyzed Quarterly:		250-500	P	HNO_3 to pH <2	6 months
Arsenic	SW6010/6020				
Cadmium	SW6010/6020				
Lead	SW6010/6020				
Selenium	SW6010/6020				
Analyzed Annually:					
Antimony	SW6010/6020				
Barium	SW6010/6020				
Chromium	SW6010/6020				
Copper	SW6010/6020				
Mercury	SW7470				
Silver	SW6010/6020				
Zinc	SW6010/6020				

Notes:
(1) Sample analyses will be performed in accordance with EPA SW-846 methods.
(2) P = plastic, G = glass, HNO_3 = Nitric Acid

TABLE 4

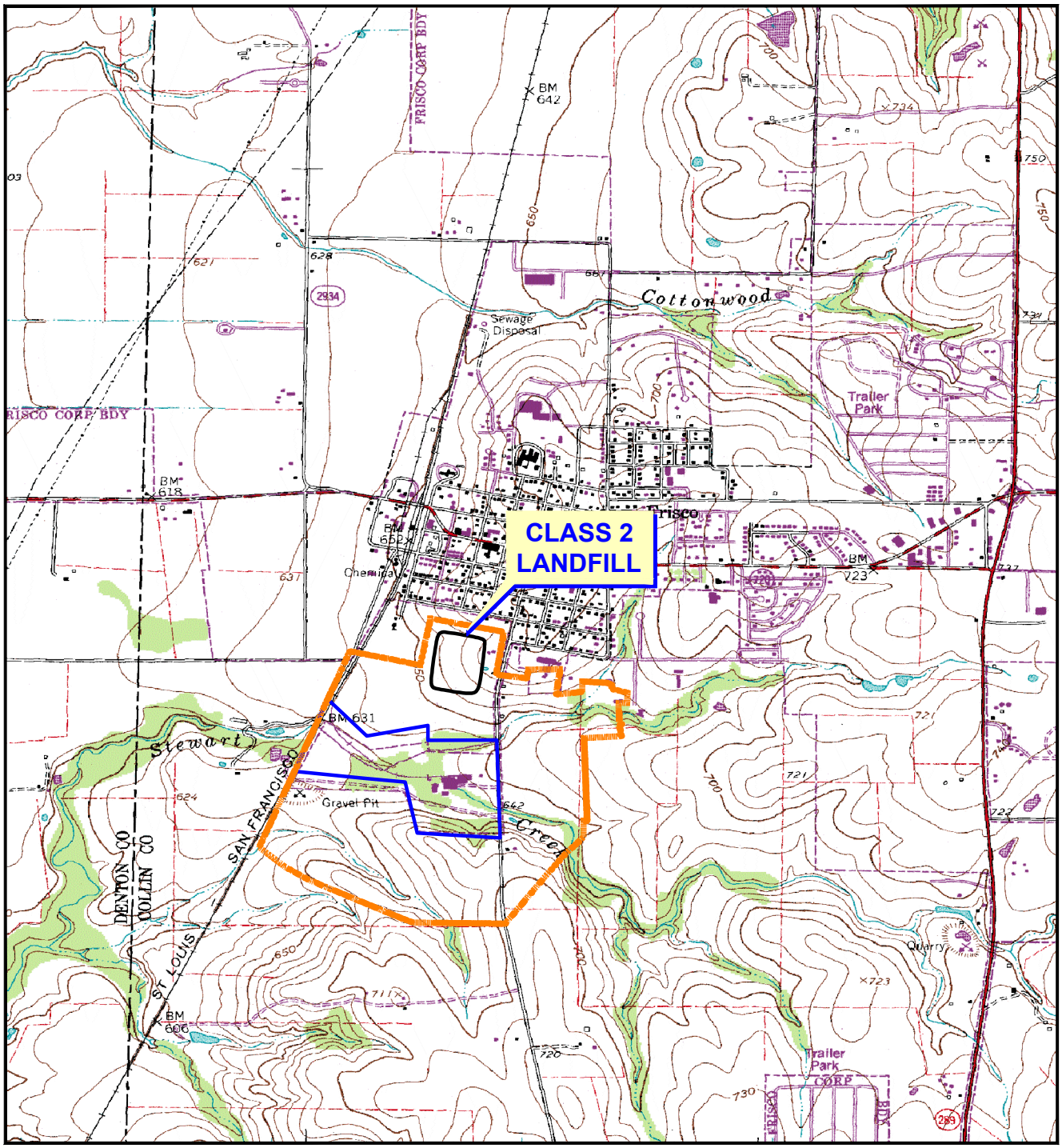
GROUNDWATER PROTECTIVE CONCENTRATION LEVELS
CLASS 2 LANDFILL EXIDE FRISCO RECYCLING CENTER
FRISCO, TEXAS

	$^{GW}GW_{Class\ 3}$ PCL	$^{Air}GW_{Inh\text{-}V}$ PCL	^{SW}GW PCL
COC	**(mg/L)**	**(mg/L)**	**(mg/L)**
Antimony	0.6	--	0.16
Arsenic	1.0	--	0.34
Barium	200	--	16
Cadmium	0.50	--	0.00908
Chromium	10	--	0.598
Copper	130	--	0.015
Lead	1.5	--	0.0688
Mercury	0.20	1.3	0.0024
Selenium	5.0	--	0.02
Silver	37	--	0.0008
Zinc	2190	--	0.123

Notes:

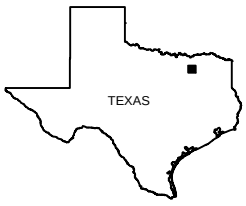
1. $^{GW}GW_{Class3}$ and $^{Air}GW_{Inh\text{-}V}$ PCLs are TRRP Tier 1 PCLs (June 2012) based on the land use of the site (commercial-industrial) and a 30 acre-source area (applicable for $^{Air}GW_{Inh\text{-}V}$ PCL).
2. TRRP Rules §350.37(i) and §350.51(f) indicate that the ^{SW}GW PCL applies for monitoring wells in locations where there is a potential point of discharge of groundwater to surface water (e.g., down-gradient wells LMW-5, LMW-17 and LMW-22 and cross-gradient well LMW-8). Per TRRP-24, specific aquatic life criteria apply to dissolved rather than total concentrations since the dissolved phase represents the bioavailable form. ^{SW}GW PCLs were conservatively set to ^{SW}SW RBELs (i.e.,no dilution factor). ^{SW}SW RBELs are based on acute ecological criteria for Stewart Creek and the North Tributary (intermittent streams), except those for barium and antimony, which are based on chronic ecological criteria because acute criteria are not established for these constituents. Per TRRP-24, RBELs for cadmium, copper, lead and zinc were adjusted based on a hardness value of 106 mg/L for Lake Lewisville, Segment 0823.

FIGURES



Boundary of Permitted Facility

Boundary of Property Owned by Exide



QUADRANGLE LOCATIONS

N

Scale in Feet

0 600 1200

SOURCE:
Base map from www.tnris.org, Frisco, TX 7.5 min. USGS quadrangle dated 1995.

EXIDE RECYCLING CENTER
FRISCO, TEXAS

Figure 1

SITE LOCATION MAP

PROJECT: 1856	BY: AJD	REVISIONS
DATE: FEB., 2013	CHECKED: EFP	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

EXPLANATION

- Approx. Landfill Area
- Monitoring Well Location
- Well Plugged and Abandoned
- Proposed Monitoring Well Location

N

Scale in Feet

0 75 150

Source of photo:
Imagery from NCTCOG, 2009 photography.

EXIDE RECYCLING CENTER
FRISCO, TEXAS

Figure 2

MONITORING WELL LOCATION MAP

PROJECT: 1856	BY: AJD	REVISIONS
DATE: JULY, 2013	CHECKED: WFV	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

EXPLANATION

- Approx. Landfill Area
- Monitoring Well Location
- (660.82) Water-Level Elevation Measured 1/31/13 (Ft MSL)
- 645 Potentiometric Contour (Ft MSL) C.I.= 5 Ft

STATE OF TEXAS
WILLIAM F. VIENNE
GEOLOGY
No. 10492
LICENSED
PROFESSIONAL GEOSCIENTIST

7-22-13

Notes:
1. PMW-19 and PMW-20 plugged and replaced by PMW-19R and PMW-20R, respectively, in the absence of well construction information.
2. PMW-19R, PMW-20R, LMW-21 and LMW-22 were installed in February 2013 (water-level elevation data not available).

N

Scale in Feet
0 75 150

Source of photo:
Imagery from NCTCOG, 2009 photography.

EXIDE RECYCLING CENTER
FRISCO, TEXAS

Figure 3

POTENTIOMETRIC SURFACE MAP JANUARY 31, 2013

PROJECT: 1856	BY: AJD	REVISIONS
DATE: JULY, 2013	CHECKED: WFV	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

EXPLANATION

- Approx. Landfill Area
- Monitoring Well Location
- Well Plugged and Abandoned
- (620.60) Water-Level Elevation Measured 3/11/13 (Ft MSL)
- 635 Potentiometric Contour (Ft MSL) C.I.= 5 Ft

STATE OF TEXAS
WILLIAM F. VIENNE
GEOLOGY
No. 10492
LICENSED PROFESSIONAL GEOSCIENTIST
7-22-13

Notes:
1. PMW-19 and PMW-20 were plugged on 2/26/2013 and replaced by PMW-19R and PMW-20R, respectively, in the absence of well construction information.

N

Scale in Feet
0 75 150

Source of photo:
Imagery from NCTCOG, 2009 photography.

EXIDE RECYCLING CENTER
FRISCO, TEXAS

Figure 4

POTENTIOMETRIC SURFACE MAP MARCH 11, 2013

PROJECT: 1856	BY: AJD	REVISIONS
DATE: JULY, 2013	CHECKED: WFV	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

EXPLANATION

- Approx. Landfill Area
- Monitoring Well Location
- Well Plugged and Abandoned
- (620.60) Water-Level Elevation Measured 4/5/13 (Ft MSL)
- 635 Potentiometric Contour (Ft MSL) C.I.= 5 Ft

STATE OF TEXAS
WILLIAM F. VIENNE
GEOLOGY
No. 10492
LICENSED
PROFESSIONAL GEOSCIENTIST

7-22-13

Notes:
1. PMW-19 and PMW-20 were plugged on 2/26/2013 and replaced by PMW-19R and PMW-20R, respectively, in the absence of well construction information.

N

Scale in Feet
0 75 150

Source of photo:
Imagery from NCTCOG, 2009 photography.

EXIDE RECYCLING CENTER
FRISCO, TEXAS

Figure 5

POTENTIOMETRIC SURFACE MAP APRIL 5, 2013

PROJECT: 1856	BY: AJD	REVISIONS
DATE: JULY, 2013	CHECKED: WFV	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

EXPLANATION

- Approx. Landfill Area
- Monitoring Well Location
- Well Plugged and Abandoned
- (620.60) Water-Level Elevation Measured 4/29/13 (Ft MSL)
- 635 Potentiometric Contour (Ft MSL) C.I.= 5 Ft

STATE OF TEXAS
WILLIAM F. VIENNE
GEOLOGY
No. 10492
LICENSED
PROFESSIONAL GEOSCIENTIST
7-22-13

Notes:
1. PMW-19 and PMW-20 were plugged on 2/26/2013 and replaced by PMW-19R and PMW-20R, respectively, in the absence of well construction information.

N

Scale in Feet
0 75 150

Source of photo:
Imagery from NCTCOG, 2009 photography.

EXIDE RECYCLING CENTER
FRISCO, TEXAS

Figure 6

POTENTIOMETRIC SURFACE MAP APRIL 29, 2013

PROJECT: 1856	BY: AJD	REVISIONS
DATE: JULY, 2013	CHECKED: WFV	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

APPENDIX A
BORING LOGS FOR LANDFILL MONITORING WELLS

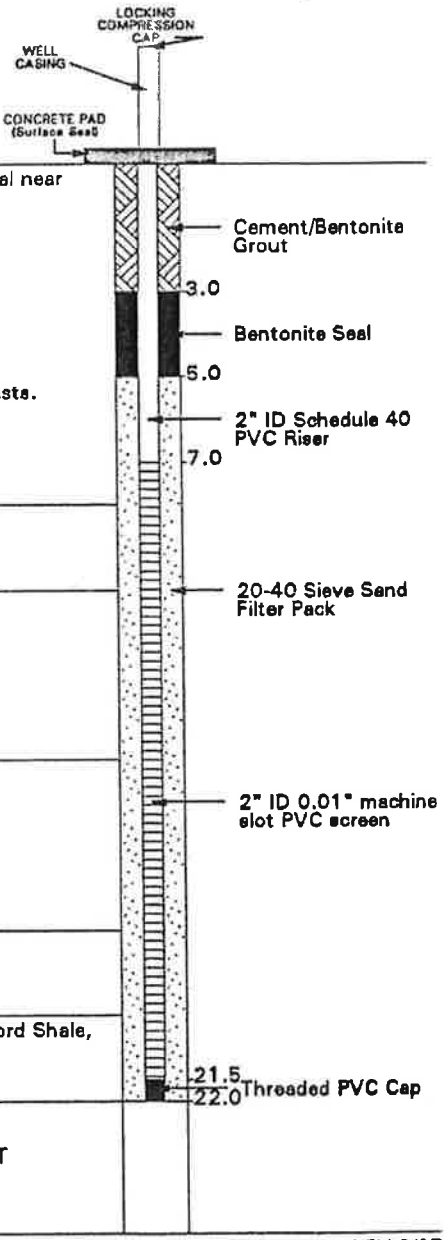
LOG OF TEST BORING

RMT, INC. JONES & NEUSE

BORING NO. B5/LMW-5

Client: GNB TECHNOLOGIES		Start Date: 2-3-95	End Date: 2-3-95	Page 1 of 1
Site: FRISCO, TEXAS		Drilling Method: HOLLOW STEM AUGER		Project Number: 50-01584.13
Geologist: BLAKE GILLESPIE	Driller: RMT-JN/R. BROTHERS	Drill Rig Type: CME-750		Borehole Diameter: 6 Inches
Site Coordinates: N: 5706.3200 E: 4174.7100	Total Depth: 22.00	Surface Elevation (ft.): 643.27	TOC Elevation (ft.): 646.61	PAD Elevation (ft.): 643.27
Datum Description: Site Datum - Elevations ref. from MSL	Datum Elevation: NA	Water Level Depth (ft.): 10.25	Date: 7/25/95	Time: 0647hrs.

Sample Type	Recovery (Inches)	Saturation	OVM (ppm)	Depth (feet)	Stratigraphy	LITHOLOGIC DESCRIPTION
	60			1–5		CLAY (CH) - dark brown, moist, soft, organic material near surface.
	48			5–8		CLAY (CH) - dark tan to brown, hard, 10% chalk clasts.
	24			8–10		GRAVELLY CLAY (CL) - tan, moist.
	48			10–14		CLAY (CH) - tan, hard.
	24			14–18		CLAYEY GRAVEL (GC) - tan.
	24			18–20		CLAY (CH) - tan, massive soft.
	24			20–22		SHALE - gray, hard, iron stained fractures. (Eagle Ford Shale, weathered)
				22–24		SHALE - gray, massive, hard. (Eagle Ford Shale) BORING TERMINATED AT 22 FEET



WELL 1584E 8/23/95

F-204B Austin (8-95)

REV 8/95

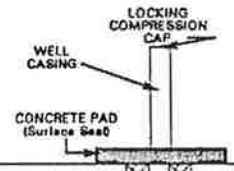
LOG OF TEST BORING

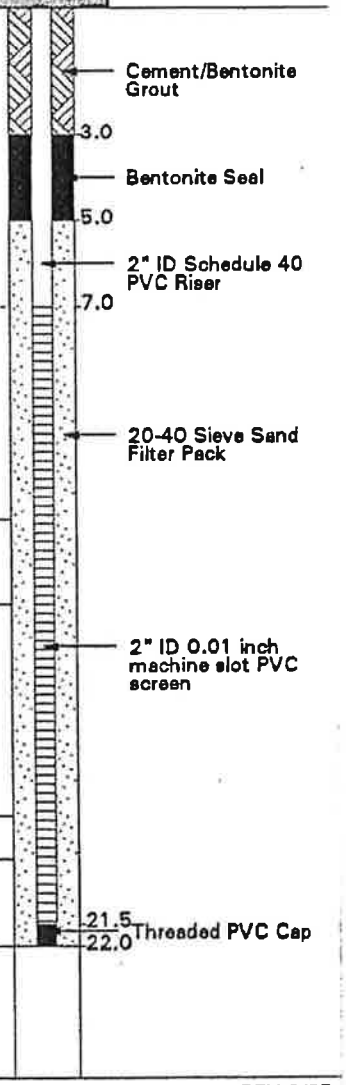
RMT, INC. JONES & NEUSE

BORING NO. B8/LMW-8

Client: GNB TECHNOLOGIES		Start Date: 2-4-95	End Date: 2-4-95	Page 1 of 1
Site: FRISCO, TEXAS		Drilling Method: HOLLOW STEM AUGER		Project Number: 50-01584.13
Geologist: BLAKE GILLESPIE	Driller: RMT-JN/R. BROTHERS	Drill Rig Type: CME-750		Borehole Diameter: 6 Inches
Site Coordinates: N: 5539.0400 E: 4812.0100	Total Depth: 22.00	Surface Elevation (ft.): 645.57	TOC Elevation (ft.): 648.68	PAD Elevation (ft.): 645.57
Datum Description: Site Datum - Elevations ref. from MSL	Datum Elevation: NA	Water Level Depth (ft.): 11.13	Date: 7/26/95	Time: 0630hrs.

Sample Type	Recovery (Inches)	Saturation	OVM (ppm)	Depth (feet)	Stratigraphy	LITHOLOGIC DESCRIPTION
	24			1-6		CLAY (CH) - dark brown, organic material, moist, firm.
	24					
	60			7		SANDY CLAY (CL) - tan, firm, 10-20% course sand and pebbles size chalk clasts.
	12	▼		8-11		
	48			12		CLAYEY GRAVEL (GC) - saturated.
				13-14		
	24			15-18		CLAY (CH) - brown, massive, very hard.
	24			19		no recovery
	24			20		SAND (SP) - gray and red, medium grained, moist.
				21		SHALE - gray, hard, massive. (Eagle Ford Shale)
				22-24		BORING TERMINATED AT 22 FEET





WELL 1584E 8/29/95

F-204B Austin (8-95)

REV 8/95

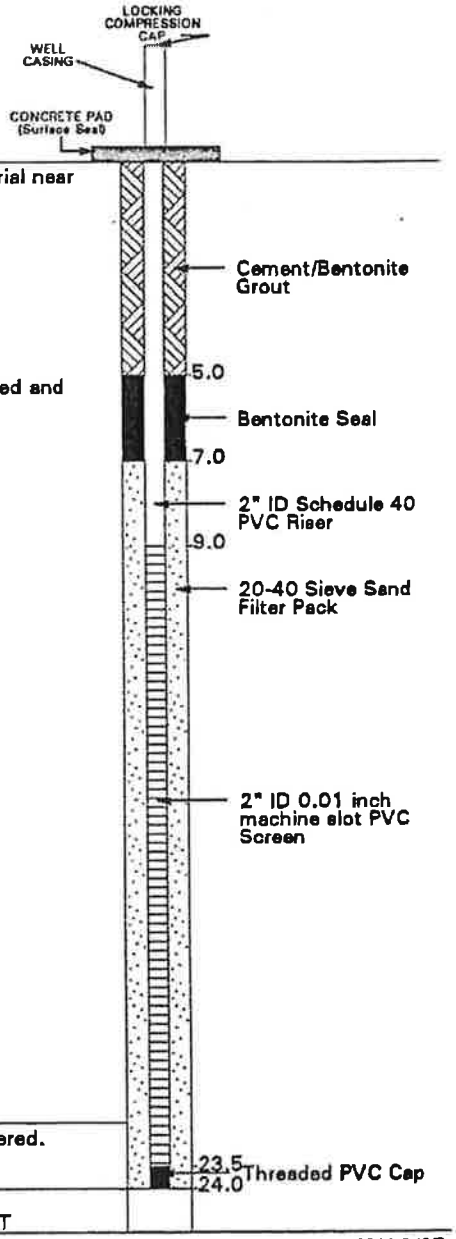
LOG OF TEST BORING

RMT, INC. JONES & NEUSE

BORING NO. B9/LMW-9

Client: GNB TECHNOLOGIES		Start Date: 2-4-95	End Date: 2-4-95	Page 1 of 1
Site: FRISCO, TEXAS		Drilling Method: HOLLOW STEM AUGER		Project Number: 50-01584.13
Geologist: BLAKE GILLESPIE	Driller: RMT-JN/R. BROTHERS	Drill Rig Type: CME-750		Borehole Diameter: 6 Inches
Site Coordinates: N: 5888.8400 E: 4833.3600	Total Depth: 24.00	Surface Elevation (ft.): 660.48	TOC Elevation (ft.): 663.72	PAD Elevation (ft.): 660.48
Datum Description: Site Datum - Elevations ref. from MSL	Datum Elevation: NA	Water Level Depth (ft.): 18.74ft.	Date: 4/24/95	Time:

Sample Type	Recovery (Inches)	Saturation	OVM (ppm)	Depth (feet)	Stratigraphy	LITHOLOGIC DESCRIPTION
				1		CLAY (CH) - dark brown, soft, friable, organic material near surface, moist, moderately soft.
	12			2		
	12			3		
	24			4		
				5		gray, massive, hard, grading into jointed clay with red and yellow staining.
				6		
				7		
	24			8		
				9		
	24			10		
				11		
				12		
	24			13		
				14		tan to brown, jointed.
	24			15		
				16		
				17		gray, massive, jointed, dry.
	24			18		
				19		
				20		
	24			21		
				22		
	24			23		SHALE - gray, massive, hard. waxy texture, weathered. (Eagle Ford Shale)
				24		BORING TERMINATED AT 24 FEET



WELL 1684E 8/23/95

F-204B Austin (8-95)

REV 8/95

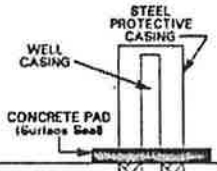
LOG OF TEST BORING

KMT JONES & NEUSE

BORING NO. LMW-17

Client: GNB TECHNOLOGIES		Start Date: 7-21-95	End Date: 7-24-95	Page 1 of 1
Site: FRISCO, TEXAS		Drilling Method: HOLLOW STEM AUGER		Project Number: 50-01584.13
Geologist: DAVID McQUADE	Driller: E.D.S.I./MIKE McNITT	Drill Rig Type: CME-750		Borehole Diameter: 8 Inches
Site Coordinates: N: 5626.1663 E: 4507.0130	Total Depth: 23.00	Surface Elevation (ft.): 646.34	TOC Elevation (ft.): 648.84	PAD Elevation (ft.): 646.34
Datum Description: Site Datum - Elevations ref. from MSL	Datum Elevation: NA	Water Level Depth (ft.): 13.52	Date: 7/26/95	Time: 0643hrs.

Sample Type	Recovery (Inches)	Saturation	OVM (ppm)	Depth (feet)	Stratigraphy	LITHOLOGIC DESCRIPTION
	24			1		CLAY (CH) - trace sand, fine grained, poorly graded, subangular, sand is chalk matrix; plastic; hard; very dark brown; moist.
	24			2		
	24			3		
	36			4		
	60			5		
				6		
				7		
				8		
				9		
				10		increase sand content, fine to coarse grained; wet.
				11		
				12		
				13		
				14		silty sand seam, fine grained
	24			15		CLAYEY SAND (SC) - fine to coarse grained, subangular, poorly graded; no plasticity; loose; tan; wet.
	36			16		CLAYEY GRAVEL with sand (GC) - fine grained, rounded, poorly graded; loose; tan; wet.
				17		
				18		
				19		
	24			20		CLAY (CH) - silty; hard; plastic; gray with rust and yellow mottling; moist.
						sand seam, very fine grained.
	24			21		SHALE - gray; dense; hard. (Eagle Ford Shale)
				22		
				23		BORING TERMINATED AT 23 FEET
				24		



WELL 1584E 8/23/95

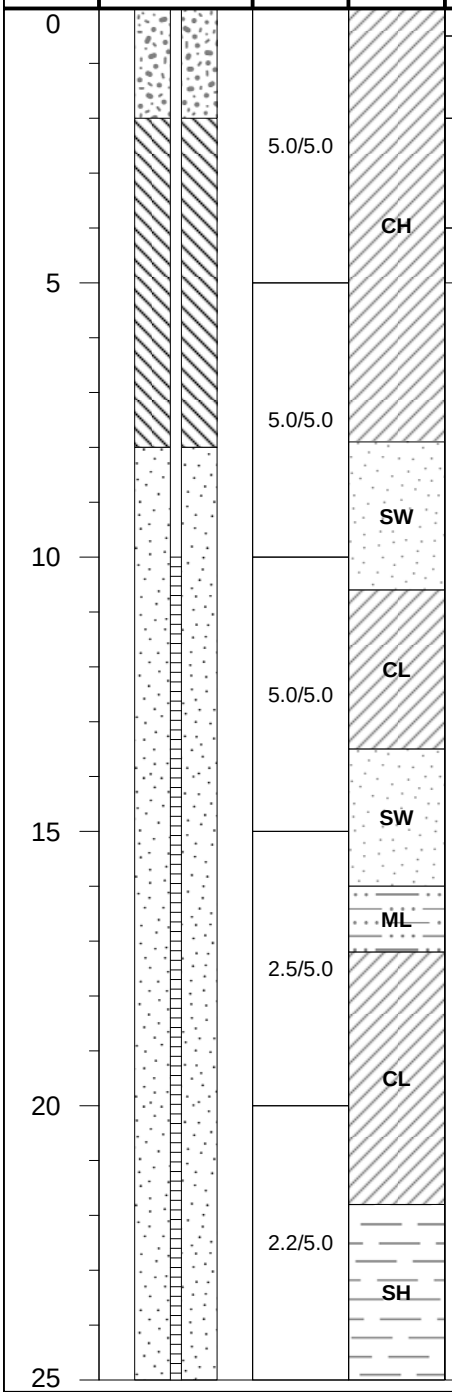
Exide Technologies

Log of Boring: LMW-21

Frisco Recycling Center
Frisco, TX

PBW Project No. 1755

Completion Date:	2/27/2013	Drilling Method:	HSA
Drilling Company:	Strata Core Services, LLC	Borehole Diameter (in.):	7.75
Driller:	Chris Combs	Total Depth (ft):	25
Driller's License:	56033	Northing:	7103205.9759
Logged By:	Tim Jennings, P.G.	Easting:	2480099.7956
Field Supervisor:	Tim Jennings, P.G.	Ground Elev. (ft AMSL):	645.11
Sampling Method:	5' Split Spoon	TOC Elev. (ft AMSL):	648.28



Lithologic Description
(0 - 1.1) Sandy, gravelly CLAY; wet, very soft, slow dilatancy, high plasticity clay, ~20-30% fine sand and fine gravel.
(1.1 - 7.9) Silty CLAY, dark gray, moist, firm to hard, no dilatancy, medium to high plasticity, trace carbonate gravel below 5'.
(7.9 - 10.6) Clayey, gravelly SAND; light brown, fine to coarse sand, moist, soft to firm, medium plasticity clay, ~10-20% clay and ~10-20% fine to medium gravel.
(10.6 - 13.5) Clayey SILT, light brown, moist, soft to firm, slow dilatancy, medium plasticity.
(13.5 - 16.0) Gravelly, clayey SAND; light brown, fine to coarse sand, moist to wet, wet at 15.8-16', firm to soft, ~40-50% fine to medium gravel, ~5-10% clay above 15'.
(16.0 - 17.2) Sandy SILT, light brown, wet, soft, medium plasticity.
(17.2 - 21.8) Sandy, gravelly CLAY; wet to dry, firm to hard, medium plasticity clay, fine to medium gravel (~5-10%) and fine to coarse sand (~10-20%) in clay matrix.
(21.8 - 25.0) SHALE, brownish gray, dry, very hard.

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
This log should not to be used separately from the report to which it is attached.

Annular Materials
(0.0 - 2.0) Concrete
(2.0 - 8.0) Bentonite Hole Plug
(8.0 - 25.0) 20/40 Silica Sand

Well Materials
(+3.16 - 10.0) Casing, 2" Sch 40 FJT PVC
(10.0 - 25.0) Screen, 2" Sch 40 FJT PVC, 0.010 slot

Exide Technologies

Log of Boring: LMW-22

Frisco Recycling Center
Frisco, TX

PBW Project No. 1755

Completion Date:	2/27/2013	Drilling Method:	HSA
Drilling Company:	Strata Core Services, LLC	Borehole Diameter (in.):	7.75
Driller:	Dan Spaust	Total Depth (ft):	20
Driller's License:	3038M	Northing:	7102891.2829
Logged By:	Roberta Russell	Easting:	2480355.4657
Field Supervisor:	Tim Jennings, P.G.	Ground Elev. (ft AMSL):	643.32
Sampling Method:	5' Split Spoon	TOC Elev. (ft AMSL):	646.99

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Sample	Lithologic Description
0		4.5/5.0	CL	0-0.5	(0 - 12.5) CLAY/Silty CLAY, dark reddish brown, yellowish brown from 9-12.5', moist, soft to firm, low to medium plasticity, ~10% calcareous nodules from 9-12.5'.
				0.5-2	
				2-4	
				4-5	
5		4.4/5.0			
10		4.0/5.0			(12.5 - 13.0) CLAY with gravel; yellowish brown, moist, soft, low plasticity, ~30-40% gravel in clay matrix.
					(13.0 - 16.0) Sandy CLAY, yellowish brown, moist, soft, low plasticity.
15		4.3/5.0			(16.0 - 17.0) Gravelly CLAY, yellowish brown, ~30-40% gravel in clay matrix.
					(17.0 - 19.5) Silty CLAY, grayish brown with orange staining, very moist, soft to firm, low plasticity.
			SH		(19.5 - 20.0) SHALE, gray, dry, hard, low to medium plasticity.
20					

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
This log should not to be used separately from the report to which it is attached.

Annular Materials
(0.0 - 0.5) Concrete
(0.5 - 1.0) Bentonite Grout
(1.0 - 2.5) Bentonite Hole Plug
(2.5 - 20.0) 20/40 Silica Sand

Well Materials
(+3.67 - 5.0) Casing, 2" Sch 40 FJT PVC
(5.0 - 20.0) Screen, 2" Sch 40 FJT PVC, 0.010 slot

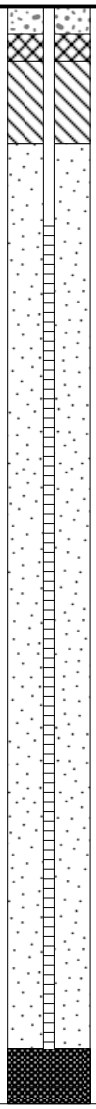
Exide Technologies

Log of Boring: PMW-19R

Frisco Recycling Center
Frisco, TX

PBW Project No. 1755

Completion Date:	2/26/2013	Drilling Method:	HSA
Drilling Company:	Strata Core Services, LLC	Borehole Diameter (in.):	7.75
Driller:	Dan Spaust	Total Depth (ft):	20
Driller's License:	3038M	Northing:	7103664.081
Logged By:	Roberta Russell	Easting:	2480920.3742
Field Supervisor:	Tim Jennings, P.G.	Ground Elev. (ft AMSL):	678.45
Sampling Method:	5' Split Spoon	TOC Elev. (ft AMSL):	681.79

Depth (ft)	Well Materials	Recovery (ft/ft)	USCS	Sample	Lithologic Description
0		3.6/5.0	CL	0-0.5	(0 - 3.0) CLAY with trace gravel, dark reddish brown, moist, soft to firm, low to medium plasticity, abundant calcareous nodules.
				0.5-2	
				2-4	
				4-5	
5		3.1/5.0	CL/ML		(3.0 - 13.0) Clayey SILT/Silty CLAY, dark reddish brown, yellowish brown from 7-10', slightly moist, very hard, low plasticity, friable from 5-6.5'.
10		3.4/5.0			
			SC/CL		(13.0 - 14.0) Clayey SAND/Sandy CLAY, light yellowish brown with orange staining (iron oxide), moist, soft, low plasticity.
					(14.0 - 19.0) SHALE, dark gray with orange staining (iron oxide along fractures and bedding planes), dry to slightly moist, soft to firm, high plasticity, weathered.
15		4.5/5.0	SH		
					(19.0 - 20.0) SHALE, dark gray, dry, very hard.
20					

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
This log should not to be used separately from the report to which it is attached.

Annular Materials
(0.0 - 0.5) Concrete
(0.5 - 1.0) Bentonite Grout
(1.0 - 2.5) Bentonite Hole Plug
(2.5 -19.0) 20/40 Silica Sand
(19.0 - 20.0) Sloughed Material

Well Materials
(+3.34 - 4.0) Casing, 2" Sch 40 FJT PVC
(4.0 - 19.0) Screen, 2" Sch 40 FJT PVC, 0.010 slot

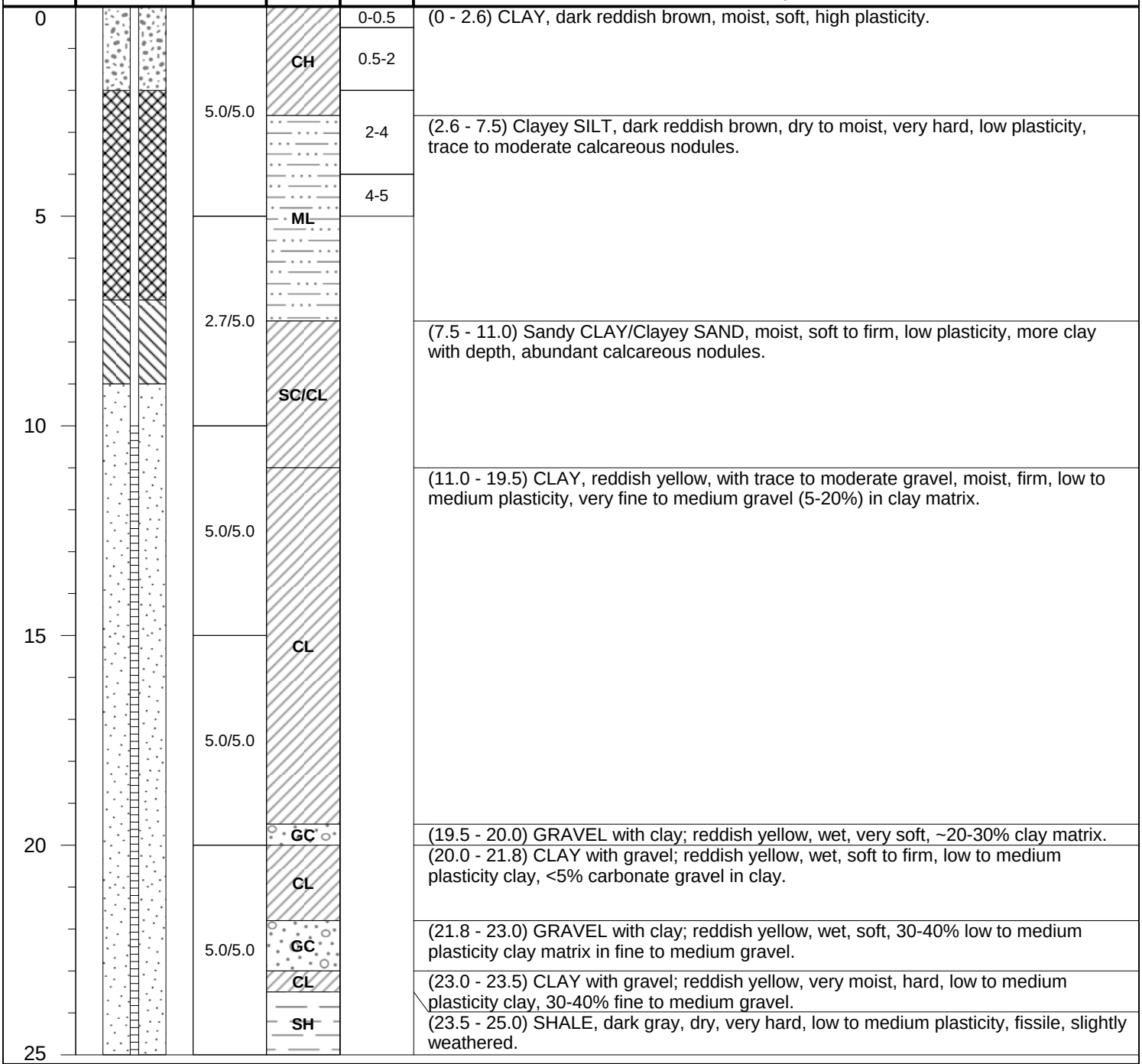
Exide Technologies

Log of Boring: PMW-20R

Frisco Recycling Center
Frisco, TX

PBW Project No. 1755

Completion Date:	2/26/2013	Drilling Method:	HSA
Drilling Company:	Strata Core Services, LLC	Borehole Diameter (in.):	7.75
Driller:	Chris Combs	Total Depth (ft):	25
Driller's License:	56033	Northing:	7103357.9244
Logged By:	Roberta Russell	Easting:	2480030.2079
Field Supervisor:	Tim Jennings, P.G.	Ground Elev. (ft AMSL):	645.2
Sampling Method:	5' Split Spoon	TOC Elev. (ft AMSL):	648.09



Lithologic Description

(0 - 2.6) CLAY, dark reddish brown, moist, soft, high plasticity.

(2.6 - 7.5) Clayey SILT, dark reddish brown, dry to moist, very hard, low plasticity, trace to moderate calcareous nodules.

(7.5 - 11.0) Sandy CLAY/Clayey SAND, moist, soft to firm, low plasticity, more clay with depth, abundant calcareous nodules.

(11.0 - 19.5) CLAY, reddish yellow, with trace to moderate gravel, moist, firm, low to medium plasticity, very fine to medium gravel (5-20%) in clay matrix.

(19.5 - 20.0) GRAVEL with clay; reddish yellow, wet, very soft, ~20-30% clay matrix.

(20.0 - 21.8) CLAY with gravel; reddish yellow, wet, soft to firm, low to medium plasticity clay, <5% carbonate gravel in clay.

(21.8 - 23.0) GRAVEL with clay; reddish yellow, wet, soft, 30-40% low to medium plasticity clay matrix in fine to medium gravel.

(23.0 - 23.5) CLAY with gravel; reddish yellow, very moist, hard, low to medium plasticity clay, 30-40% fine to medium gravel.

(23.5 - 25.0) SHALE, dark gray, dry, very hard, low to medium plasticity, fissile, slightly weathered.

PBW

Pastor, Behling & Wheeler, LLC
2201 Double Creek Dr., Suite 4004
Round Rock, TX 78664
Tel (512) 671-3434 Fax (512) 671-3446

Notes:
This log should not to be used separately from the report to which it is attached.

Annular Materials
(0.0 - 2.0) Concrete
(2.0 - 7.0) Bentonite Grout
(7.0 - 9.0) Bentonite Hole Plug
(9.0 - 25.0) 20/40 Silica Sand

Well Materials
(+2.89 - 10.0) Casing, 2" Sch 40 FJT PVC
(10.0 - 25.0) Screen, 2" Sch 40 FJT PVC, 0.010 slot

APPENDIX B
HISTORICAL GROUNDWATER MONITORING DATA

APPENDIX B

HISTORICAL GROUNDWATER MONITORING DATA
CLASS 2 LANDFILL FRISCO RECYCLING CENTER
FRISCO, TEXAS

Well ID	Sample Date	pH (s.u.)	Total Pb (mg/L)	Dissolved Pb (mg/L)
LMW-5	1/25/1997	7.90	NS	NS
	1/27/1997	NS	0.005	< 0.002
	3/15/1997	NS	NS	NS
	5/18/1997	7.10	0.002	< 0.002
	8/3/1997	7.14	< 0.002	0.002
	9/28/1997	7.22	0.005	< 0.002
	11/16/1997	7.14	0.004	0.004
	3/29/1998	7.03	0.002	<0.002
	5/17/1998	7.03	0.006	< 0.002
	7/26/1998	7.03	0.018	<0.002
	11/22/1998	6.95	0.0086	<0.005
	5/24/1999	7.10	0.0062	0.0052
	7/29/1999	7.00	< 0.005	< 0.005
	10/3/1999	6.70	< 0.010	< 0.010
	11/14/1999	6.93	< 0.010	< 0.010
	1/16/2000	6.90	< 0.010	< 0.010
	4/9/2000	7.01	0.038	< 0.010
	7/30/2000	7.06	< 0.010	< 0.010
	3/23/2001	NS	NS	NS
	7/1/2001	7.00	< 0.010	< 0.010
	8/12/2001	7.03	< 0.010	< 0.010
	11/4/2001	7.10	0.013	< 0.010
	3/8/2002	NS	NS	NS
	6/30/2002	7.01	< 0.010	< 0.010
	8/18/2002	6.84	< 0.010	< 0.010
	11/17/2002	6.37	< 0.010	< 0.010
	3/27/2003	7.10	0.007	0.008
	6/26/2003	7.18	< 0.006	< 0.006
	7/18/2003	7.20	< 0.006	< 0.006
	12/22/2003	NS	NS	NS
	3/31/2004	7.17	< 0.006	< 0.006
	3/20/2005	6.75	< 0.006	< 0.006
	11/22/2005	6.80	0.006	< 0.006
LMW-17	1/25/1997	7.40	NS	NS
	1/27/1997	NS	< 0.002	< 0.002
	3/15/1997	NS	NS	NS
	5/18/1997	7.00	< 0.002	0.003
	8/3/1997	7.11	< 0.002	< 0.002
	9/28/1997	7.19	< 0.002	< 0.002
	11/16/1997	7.08	0.006	0.006
	3/29/1998	6.87	<0.002	<0.002
	5/17/1998	6.87	< 0.002	< 0.002
	7/26/1998	6.97	<0.002	<0.002
	11/22/1998	6.83	<0.005	<0.005
	5/24/1999	7.02	0.0075	< 0.005
	7/29/1999	6.90	0.012	0.0058
	10/3/1999	6.60	< 0.010	< 0.010
	11/14/1999	6.86	< 0.010	< 0.010
	1/16/2000	6.85	< 0.010	< 0.010
	4/9/2000	6.88	< 0.010	< 0.010
	7/30/2000	6.92	< 0.010	< 0.010
	3/23/2001	NS	NS	NS
	7/1/2001	NS	NS	NS
	8/12/2001	6.84	< 0.010	< 0.010
	11/4/2001	6.90	< 0.010	< 0.010
	3/8/2002	NS	NS	NS
	6/30/2002	6.86	< 0.010	< 0.010
	8/18/2002	6.70	0.01	< 0.010
	11/17/2002	6.88	< 0.010	< 0.010
	3/27/2003	6.99	0.006	0.006
	6/26/2003	7.06	< 0.006	< 0.006
	7/18/2003	7.03	< 0.006	< 0.006
	12/22/2003	NS	NS	NS
	3/31/2004	7.03	< 0.006	< 0.006
	3/20/2005	6.64	< 0.006	< 0.006
	11/22/2005	6.58	< 0.006	< 0.006

APPENDIX B

HISTORICAL GROUNDWATER MONITORING DATA
CLASS 2 LANDFILL FRISCO RECYCLING CENTER
FRISCO, TEXAS

Well ID	Sample Date	pH (s.u.)	Total Pb (mg/L)	Dissolved Pb (mg/L)
PMW-19 (previously referred to as LMW-19)	5/18/1997	6.60	< 0.002	0.003
	8/3/1997	6.59	< 0.002	0.002
	9/28/1997	6.65	< 0.002	< 0.002
	11/16/1997	6.67	< 0.002	< 0.002
	3/29/1998	6.62	<0.002	<0.002
	5/17/1998	6.62	< 0.002	< 0.002
	7/26/1998	6.48	0.002	<0.002
	11/22/1998	6.22	<0.005	<0.005
	5/24/1999	6.68	0.017	0.014
	7/29/1999	6.40	0.014	0.014
	10/3/1999	6.20	< 0.010	< 0.010
	11/14/1999	6.38	< 0.010	< 0.010
	1/16/2000	6.42	< 0.010	< 0.010
	4/9/2000	6.52	< 0.010	< 0.010
	7/30/2000	6.51	< 0.010	< 0.010
	3/23/2001	6.69	< 0.010	< 0.010
	7/1/2001	6.63	< 0.010	< 0.010
	8/12/2001	6.49	< 0.010	< 0.010
	11/4/2001	6.60	< 0.010	< 0.010
	3/8/2002	6.47	0.024	0.013
	6/30/2002	6.46	0.014	0.012
	8/18/2002	6.37	0.018	0.015
	11/17/2002	6.74	< 0.010	< 0.010
	3/27/2003	6.68	0.01	0.009
	6/26/2003	6.67	0.007	< 0.006
	7/18/2003	6.64	0.006	< 0.006
	12/22/2003	7.00	< 0.006	< 0.006
	3/31/2004	6.68	< 0.006	< 0.006
	3/20/2005	6.31	< 0.006	< 0.006
	11/22/2005	6.26	< 0.006	< 0.006
PMW-20 (previously referred to as LMW-20)	5/18/1997	7.00	0.003	0.003
	8/3/1997	7.11	< 0.002	< 0.002
	9/28/1997	7.12	0.002	< 0.002
	11/16/1997	7.09	0.003	< 0.002
	3/29/1998	7.04	0.002	<0.002
	5/17/1998	7.04	< 0.002	< 0.002
	7/26/1998	7.00	<0.002	<0.002
	11/22/1998	6.86	<0.005	<0.005
	5/24/1999	7.10	0.0083	< 0.005
	7/29/1999	7.00	0.011	< 0.005
	10/3/1999	6.60	< 0.010	< 0.010
	11/14/1999	NS	NS	NS
	1/16/2000	6.92	< 0.010	< 0.010
	4/9/2000	6.88	< 0.010	< 0.010
	7/30/2000	7.04	< 0.010	< 0.010
	3/23/2001	7.11	< 0.010	< 0.010
	7/1/2001	NS	NS	NS
	8/12/2001	7.02	< 0.010	< 0.010
	11/4/2001	7.10	< 0.010	< 0.010
	3/8/2002	6.87	< 0.010	< 0.010
	6/30/2002	6.96	< 0.010	< 0.010
	8/18/2002	6.88	< 0.010	< 0.010
	11/17/2002	6.84	< 0.010	< 0.010
	3/27/2003	7.09	0.008	0.008
	6/26/2003	7.00	< 0.006	< 0.006
	7/18/2003	7.19	< 0.006	< 0.006
	12/22/2003	6.60	< 0.006	< 0.006
	3/31/2004	7.09	< 0.006	< 0.006
	3/20/2005	6.81	< 0.006	< 0.006
	11/22/2005	6.81	< 0.006	< 0.006

Notes:
1. Data are from historical FRC documents. Not all data could be confimed through comparison to original laboratory reports.
2. NS = not sampled.

APPENDIX C

STANDARD OPERATING PROCEEDURES

STANDARD OPERATING PROCEDURE NO. 1

EQUIPMENT DECONTAMINATION

1.0 SCOPE AND APPLICABILITY

This Standard Operating Procedure (SOP) describes the methods to be used for the decontamination of reusable field equipment that could become contaminated during use or during sampling. The equipment may include water level meters, sampling equipment, or any other type of equipment used during field activities.

Decontamination is performed as a quality assurance measure and a safety precaution. It prevents cross contamination between samples and also helps to maintain a clean working environment.

Decontamination is achieved mainly by rinsing with liquids which may include: soap and/or detergent solutions, tap water, distilled weak acid solution, and/or methanol or other solvent. Equipment may be allowed to air dry after being cleaned or may be wiped dry with chemical-free towels or paper towels if immediate re-use is necessary.

At most project sites, decontamination of equipment that is re-used between sampling locations will be accomplished between each sample collection point. Waste produced by decontamination procedures, including waste liquids, solids, rags, gloves, etc., should be collected and disposed of properly, based upon the nature of contamination.

2.0 PROCEDURES

2.1 Responsibilities

It is the responsibility of the field supervisor to ensure that proper decontamination procedures are followed and that all waste materials produced by decontamination are properly managed. It is the responsibility of the project safety officer to draft and enforce safety measures which provide the best protection for all persons involved directly with sampling and/or decontamination.

It is the responsibility of any subcontractors to follow the proper, designated decontamination procedures that are stated in their contracts and outlined in the Site-Specific Health and Safety Plan. It is the responsibility of all personnel involved with sample collection or decontamination to maintain a clean working environment and ensure that any contaminants are not negligently introduced to the environment.

2.2 Supporting Materials

Supporting materials may include the following:

1. Cleaning liquids: soap and/or detergent solutions (e.g., Alconox, etc.), potable water, and distilled water.
2. Personal protective safety gear as defined in the Site-Specific Health and Safety Plan.
3. Chemical-free towels or paper towels.
4. Disposable, nitrile gloves.
5. Waste storage containers: drums, boxes, plastic bags, etc.
6. Cleaning containers: plastic and/or stainless steel pans and buckets.
7. Cleaning brushes.

2.3 Methods

The extent of known contamination will determine the degree of decontamination required. If the extent of contamination cannot be readily determined, cleaning should be done according to the assumption that the equipment is highly contaminated. Decontamination procedures should account for the types of contaminants known or suspected to be present.

The procedures listed below constitute the field decontamination procedure for non-dedicated equipment:

1. Wash with low-residue soap and/or detergent solution.
2. Rinse with distilled water.
3. Repeat steps 1 and 2, as necessary.

If non-dedicated, submersible pumps are used for purging and sampling, the outside casing will be washed following the steps outlined above. The interior of the pump will be rinsed by drawing distilled water through the pump. Decontamination water will be collected in a 55-gallon drum pending receipt of groundwater analytical results and properly disposed of at an approved off-site facility.

3.0 DOCUMENTATION

Field notes will be kept describing the decontamination procedures followed.

4.0 QUALITY CONTROL

To assess the adequacy of decontamination procedures, field rinsate blanks may be collected. The specific number of rinsate blanks will be defined in a sampling and analysis or work plan or by the PBW project manager.

Rinsate blanks with elevated or detected contaminants should be evaluated by the Project Manager, who will relay the results to the site workers. Such results may be indicative of inadequate decontamination procedures that require corrective actions (e.g., retraining).

STANDARD OPERATING PROCEDURE NO. 2

WATER LEVEL AND WELL DEPTH MEASUREMENTS

1.0 SCOPE AND APPLICABILTIY

This Standard Operating Procedure (SOP) describes the protocol to be followed during measurement of water levels and well depths in monitoring wells and piezometers. As the work progresses and when warranted, appropriate revisions may be made when approved by the PBW Project Manager.

2.0 PROCEDURES

Before measuring water levels, the construction details and previous measurements for each well or piezometer shall be reviewed so any anomalous measurements may be identified. Well construction details and previous measurements shall be available in the field for review. Prior to each sampling event, each well will be inspected for signs of damage to the well protector, well casing and well pad. The lock on each well will be checked to make sure it is present and operable. The well numbering on each well will also be checked for legibility.

In general, water level measurements shall be performed before groundwater is removed from the well by purging or sampling.

2.1 Equipment

Equipment that may be necessary to perform measurements includes:

- Well/piezometer construction details;
- Water level probe; and
- Fluid Level Monitoring Record Sheet (Figure SOP-2-1).

2.2 Measuring Point

A measuring point (MP) shall be selected and marked for each monitoring well and piezometer in which water level measurements will be made. Generally, the MP will be the top of the well casing on the north side. The MP will be permanently marked using an indelible marker or a notch cut into the PVC casing. When the top-of-casing elevation of a monitoring well or

piezometer is surveyed, the licensed surveyor should measure the MP elevation and reference this measurement to an appropriate datum (such as feet above mean sea level).

2.3 Water Level Measurements

Water levels should be measured with an electronic water level meter and measurements will be recorded to the nearest hundredth of one foot.

The typical procedure for measuring water levels with an electric probe is as follows:

1. Switch on the probe.
2. Lower the electric cable into the well until the ammeter or buzzer indicates a closed circuit.
3. With the cable in this fixed position, note the depth to the water from the Measuring Point (MP).
4. As necessary, check the total depth of the well below the MP using the probe by slowly lowering the probe to the bottom of the well and noting the depth.

3.0 DOCUMENTATION AND RECORDS MANAGEMENT

Water levels observed in wells selected for the groundwater monitoring network should be tabulated on a Fluid Level Monitoring Record form (Figure SOP-2-1) during each monitoring period. The date and time of each measurement should also be recorded on the Fluid Level Monitoring Record. All water level measurements should be recorded to the nearest 0.01 feet.

Water level data should be recorded as feet below measuring point so that water level elevations may be calculated from the depth-to-water measurement (from measuring point) and the surveyed elevation of the measuring point at each well or piezometer.

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4.0 QUALITY CONTROL

4.1 Equipment Decontamination/Cleaning

The probe should be cleaned before and after each measurement. Cleaning should be accomplished by washing with a laboratory-grade detergent/water solution, rinsing with potable/distilled water and wiping clean. After cleaning, equipment will be packaged and sealed

in plastic bags or other appropriate containers to minimize contact with dust or other contaminants.

4.2 Technical and Records Reviews

The project manager or designated QA reviewer shall check and verify that documentation has been completed and filed per this procedure.

FLUID LEVEL MONITORING RECORD							DATE:	
Project No.		Project Name:					PAGE _____ of _____	
Weather Conditions:								
Measuring Device:		Datum (MSL, NGVD, etc.):						
Observations/Comments:								
Well ID	Time	MP Elevation (ft.)	Depth to Product (ft. BMP)	Depth to Water (ft. BMP)	PSH Thickness (ft.)	Total Depth (ft. BMP)	Water Elevation (ft)	Remarks
Measured By:					Pastor, Behling & Wheeler, LLC 2201 Double Creek Drive, Suite 4004 Round Rock Texas Phone: (512) 671-3434 Fax: (512) 671-3446			
Checked By:								

Figure SOP-2-1.

STANDARD OPERATING PROCEDURE NO. 3

WATER QUALITY SAMPLING

1.0 SCOPE AND APPLICABILITY

This Standard Operating Procedure (SOP) describes the protocol to be followed during sampling of groundwater or surface water. Appropriate revisions may be made to accommodate site-specific conditions or project-specific protocols when they are approved by the PBW Project Manager.

2.0 PROCEDURES

2.1 Groundwater Sample Collection

Individual samples from wells should be collected as follows:

A. The depth to water in a well should be measured using the procedures discussed in SOP No. 2 (Water Level and Well Depth Measurements).

B. As appropriate based on project requirements, a low-flow purge method or "micopurge" method should be used for sample collection. Wells should be purged at a low pumping rate to minimize agitation of water in the well and minimize drawdown. The goal is to limit drawdown in the well. In general, wells should be purged during sampling by pumping water at a rate less than 0.5 L per minute using a peristaltic or other appropriate pump. Bailers will not be used for purging of sampling wells. If during low-flow sampling the turbidity remains greater than 10 NTUs, the discharge from the pump will be filtered with an in-line 10 μm filter during sample collection.

C. At each well, the sample should be collected through a section of new, clean, flexible tubing.

E. The sampling intake should be placed near the center of the saturated screened interval.

F. Prior to collecting samples from a well, a clean plastic apron may be placed adjacent to or around the well to prevent equipment and sample containers from coming into contact with surface materials. Alternatively, a clean field table may be set up near the well. If used, the table will be cleaned before and after use at each well.

G. Sample containers prepared specifically for the required analyses by the analytical laboratory or their supplier should be used for sample collection. Glass sample bottles for non-volatile analyses should be filled to near the top. To account for slight expansion due to temperature changes, leave headspace approximately equivalent to the volume of liquid that would fill the bottle's cap. Plastic sample

bottles should be filled completely. Splashing of the water in the sample container and exposure to the atmosphere should be minimized during sampling. The container cap should be screwed on tightly immediately after filling the sample container.

H. Where more than one well within a specific field or site is to be sampled, the sampling sequence should typically begin with the well having the lowest suspected level of contamination. Successive samples may be obtained from wells with increasing suspected contamination. If the relative degree of suspected contamination at each well cannot be reasonably assumed, sampling may proceed from the perimeter of the site towards the center of the site. The sampling sequence can be arranged such that wells are sampled in order of increasing proximity to the suspected source of contamination, starting from the wells up-gradient of the suspected source.

I. Sampling activity for each monitoring well shall be recorded on a Groundwater Sampling Record (Figure SOP-3-1).

2.2 Sample Filtration

When analyzing for dissolved constituents, a sample should be collected using a disposable in-line 0.45-µm filter. When analyzing for total constituents, if during low-flow sampling the turbidity remains greater than 10 NTUs, the discharge from the pump will be filtered with an in-line 10-µm filter during sample collection. Samples to be analyzed for total constituents will not be filtered with a 0.45-µm filter. Water samples will be pumped through the filters using a peristaltic pump and a section of polyvinylchloride tubing or other appropriate method. Both the filter and tubing will be disposed of between samples.

2.4 Sample Containers and Volumes

Sample containers and volumes should be selected based on the target analytical suite for each sample. A summary of the required sample containers, sample volume, preservatives, sample storage, and sample holding time requirements for groundwater samples is presented on Table SOP 3-1.

2.5 Sample Labeling

Sample containers will be labeled with self-adhesive tags. Each sample will be labeled with the following information using waterproof ink:

- Project identification;
- Sample identification;
- Name or initials of collector;
- Date and time of collection;
- Analysis requested;
- Sample preservative, if applicable; and
- Filtered or unfiltered, if applicable.

2.6 Sample Preservation and Storage

As required based on the target analytes, water samples submitted for chemical analysis should be stored at 4° C in ice-cooled, insulated containers immediately after collection. The samples may be delivered to the laboratory soon after they are collected, in which case the water samples may not have had sufficient time to cool to 4° C. In these instances, the samples will be considered properly preserved as long as they were placed on ice immediately after they were collected.

2.7 Sample Custody

Samples shall be handled and transported according to the sample custody procedures discussed in SOP No. 4 entitled Sample Custody, Packaging, and Shipment. The sample collector shall document each sample on the Chain-of-Custody and Request for Analysis form (Figure SOP-4-1).

2.8 Field Measurements

Specific conductance, pH, temperature, turbidity and other measurements may be performed on water samples at the time of sample collection. Data obtained from these (or other) field water quality measurements will be recorded on the appropriate sampling records. Separate aliquots of water shall be used to make field measurements (i.e., sample containers for laboratory analysis shall not be reopened).

For groundwater samples, at least three field measurements should be taken during the course of micro-purging the well. If the parameters have not stabilized at that time, field measurements and

purging will continue until successive field parameter (specific conductance, pH and temperature) readings are within approximately ± 10%. The procedures for collecting the listed field parameters are discussed in the following sections.

2.8.1 Temperature Measurement

Temperature should be measured directly from the water source or from a separate sample aliquot. Temperature measurements should be made with a mercury-filled thermometer, bimetallic-element thermometer or electronic thermistor (usually included with the pH and/or conductivity meter). Measurements should be recorded in degrees Celsius (°C).

2.8.2 pH Measurement

A pH measurement should be made by dipping the probe directly into the water source or into a separate sample aliquot. The preferable method is to collect measurements through a flow-through cell. Prior to measurement, the container in which the field parameter sample will be collected should typically be equilibrated to the approximate temperature of the sample. This can be accomplished by immersing the container in water removed from a well during the purging process. The pH measurement should be made within a few minutes after collection of the field parameter sample using a pH electrode. The value displayed on the calibrated instrument should be recorded after the reading has stabilized. If the value falls outside of the calibrated range, then the pH meter should be recalibrated using the appropriate buffer solutions.

2.8.3 Specific Conductance Measurement

Specific conductance should be measured by dipping the probe directly into the water source or into a separate sample aliquot. The probe must be immersed to the manufacturer's recommended depth.

The value displayed on the calibrated instrument should be recorded after the reading has stabilized. If the value falls outside of the calibrated "range" set by the range dial on the instrument, then the range setting should be changed to a position that gives maximum definition. If the specific conductance value falls outside of the calibrated range of the conductivity standard solution, then the instrument should be recalibrated using the appropriate standard prior to measurement.

2.8.4 Turbidity

The turbidity meter should be operated according to the manufacturer's instructions. Turbidity measurements are taken in nephelometric turbidity units (NTUs), which are generally read to the nearest 0.1 NTUs, if possible. When using a turbidity meter, make sure the glass sample vial is very clean, does not have condensation on it, and that there are few, if any, air bubbles present in the sample. These factors can all interfere with turbidity readings. In addition, if soluble compounds in the sample begin to precipitate out of solution (e.g., dissolved iron or manganese), then the turbidity measurements may be artificially high.

2.8.5 Equipment Calibration

Equipment used to measure field parameters should be calibrated by PBW personnel according to manufacturer's instructions. In general, calibration checks should be performed at least during each day of instrument use in the field. The results should be documented on the sampling record for each sampling station.

3.0 DOCUMENTATION

When the sampling activity is completed, the sampling records should be checked by the PBW Project Manager or his/her designee, and the original record placed in the PBW project file. The following sections discuss the information that should be documented during groundwater sampling activities.

3.1 Groundwater Sampling Record

Each sampling event for each monitoring well will be recorded on a separate Groundwater Sampling Record form (Figure SOP-3-1). The documentation should typically include the following:

A. Project identification;

B. Location identification;

C. Sample identification(s) (including quality control samples);

D. Date and time of sampling;

E. Purging and sampling methods;

F. Sampling depth;

G. Name(s) of sample collector(s);

H. Inventory of sample bottles collected including sample preservation (if any), number, and types of sample bottles;

I. Total volume of water purged;

J. Results of field measurements and observations (time and cumulative purge volume, temperature, pH, specific conductance, turbidity, sediment, color, purge rate);

K. Equipment cleaning record;

L. Description and identification of field instruments and equipment; and

M. Equipment calibration record.

4.0 QUALITY CONTROL

4.1 Chain-of-Custody and Request for Analysis Form

A Chain-of-Custody and Request for Analysis form (CC/RA form) should be filled out as described in SOP No. 4.

4.2 Equipment Cleaning

Sample bottles and bottle caps should be cleaned and prepared by the analytical laboratory or their supplier using standard EPA-approved protocols. Sample bottles and bottle caps will be protected from dust or other contamination between time of receipt by PBW and time of actual usage at the sampling site.

4.3 Records Review

The PBW Project Manager or designated QA reviewer shall check and verify that documentation has been completed and filed per this procedure.

TABLE SOP 3-1
SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS

Analysis	Reference Method	Sample Container and Preservative	Sample Storage	Holding Time
Metals	6010B/6020	250-500 ml plastic bottle HNO3 to pH<2	≤ 4° C	6 mo.

GROUNDWATER SAMPLING RECORD

PAGE ____ of ____

Project Number: Project Name: Date:

Sample Number: Starting Water Level (ft. BMP): _____

Sampling Location (well ID, etc.): Casing Stickup (ft.): _____

Sampled by: Starting Water Level (ft. BGL): _____

Measuring Point (MP) of Well: Total Depth (ft. BGL): _____

Screened Interval (ft. BGL): Casing Diameter (In ID): _____

Filter Pack Interval (ft. BGL): Casing Volume (gal.):

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: _____

Purging: _____ Sampling: _____

Disposal of Discharged Water:

INSTRUMENTS (Indicate make, model, I.d.)

Water Level: _____ Thermometer: _____

pH Meter: _____ Field Calibration: _____

Conductivity Meter: _____ Field Calibration: _____

Filter / Filter Size: Other:

SAMPLING MEASUREMENTS

Time	Cum. Vol. (gal. or L)	Purge Rate (gal. or L /m)	Temp. (oC)	pH	Spec. Cond. (mmhos/cm)	D.O.	Redox (mV)	Turbidity& Color	Water Depth (ft BMP)

Water Level (ft. BMP) at End of Purge: Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY

Bottles Collected				Filtration		Remarks
Time	Volume	Composition (G, P)	No.	(Y / N)	Preservation	(quality control sample, other)

Comments:

Pastor, Behling & Wheeler, LLC
2201 Double Creek Drive, Suite 4004
Round Rock, TX 78664
(512) 671-3434 Fax (512) 671-3446

Figure SOP-3-1.

STANDARD OPERATING PROCEDURE NO. 4

SAMPLE CUSTODY, PACKAGING AND SHIPMENT

1.0 SCOPE AND APPLICABILITY

This Standard Operating Procedure (SOP) generally describes the protocol to be followed for sample custody, packaging and shipment. Appropriate revisions may be made when approved by the PBW Project Manager.

This SOP applies to any liquid or solid sample that is being transported by the sampler, a courier or an overnight delivery service.

1.1 Associated SOPs

No other SOPs are referenced in this document.

2.0 PROCEDURES

The objectives of this packaging and shipping SOP are: To minimize the potential for sample breakage, leakage or cross contamination; to provide for preservation at the proper temperature; and to provide a clear record of sample custody from collection to analysis.

2.1 Sample Labeling

To prevent misidentification of samples, labels will be affixed to each sample container. Information will be written on the label with a permanent marker and the labels will be sufficiently durable to remain legible even when wet. The following information will be included on the sample labels:

- Project identification;
- Sample identification;
- Name or initials of collector;
- Date and time of collection;
- Analysis requested;
- Sample preservative, if applicable; and
- Filtered or unfiltered, if applicable.

2.2 Packaging Materials

The following is a list of materials that are typically needed to facilitate proper sample packaging:

- Chain-of-Custody Record forms (Figure SOP-4-1, or similar);
- Coolers (insulated ice chests) or other shipping containers as appropriate to sample type;
- Transparent packaging tape;
- Zip-lock type bags (note: this is used as a generic bag type, not a specific brand name);
- Protective wrapping and packaging material; and
- Contained ice (packaged and sealed to prevent leakage when melted) or "Blue Ice".

2.3 Sample Custody from Field Collection to Laboratory

After samples have been collected, they will be maintained under chain-of-custody procedures. These procedures are used to document the transfer of custody of the samples from the field to the designated analytical laboratory. The same chain-of-custody procedures will be used for the transfer of samples from one laboratory to another, if required.

The field sampling personnel will complete a Chain-of-Custody Record and Request for Analysis (CC/RA) form (Figure SOP-4-1, or similar form) for each separate container of samples to be shipped or delivered to the laboratory for chemical or physical (geotechnical) analysis. Information contained on the form may include:

1. Project identification;
2. Date and time of sampling;
3. Sample identification;
4. Sample matrix type;
5. Sample preservation method(s);
6. Number and types of sample containers;
7. Sample hazards (if any);
8. Requested analyses;
9. Requested sample turnaround time;
10. Method of shipment;
11. Carrier/waybill number (if any);
12. Signature of sampling personnel;

13. Name of PBW Project Manager;
14. Signature, name and company of the person relinquishing and the person receiving the samples when custody is being transferred; and
15. Date and time of sample custody transfer.

The sampling personnel whose signature appears on the CC/RA form is responsible for the custody of a sample from time of sample collection until the custody of the sample is transferred to a designated laboratory, a courier, or to another PBW employee for the purpose of transporting a sample to the designated laboratory. A sample is considered to be in their custody when the custodian: (1) has direct possession of it; (2) has plain view of it; or (3) has securely locked it in a restricted access area.

Custody is transferred when both parties to the transfer complete the portion of the CC/RA form under "Relinquished by" and "Received by." Signatures, printed names, company names, and date and time of custody transfer are required. Upon transfer of custody, the PBW sampling personnel who relinquished the samples will retain a copy of the CC/RA form. When the samples are shipped by a common carrier, a Bill of Lading supplied by the carrier will be used to document the sample custody, and its identification number will be entered on the CC/RA form.

2.4 Packaging and Shipping Procedure

Be sure that all sample containers are properly labeled and all samples have been logged on the CC/RA form in accordance with the procedures explained above.

All samples should be packed in the cooler so as to minimize the possibility of breakage, cross-contamination and leakage. Before placing the sample containers into the cooler, be sure to check all sample bottle caps and tighten if necessary. Bottles made of breakable material (e.g., glass) should also be wrapped in protective material (e.g., bubble wrap, plastic gridding, or foam) prior to placement in the cooler. Place the sample containers upright in the cooler. Avoid stacking glass sample bottles directly on top of each other.

If required by the method, samples should be preserved to 4°C prior to the analysis. Water ice or “blue ice” may be used to keep the sample temperatures at 4°C. The ice may be placed in zip-lock bags between and on top of the sample containers to maximize the contact between the containers and the bagged ice.

If there is any remaining space at the top of the cooler, packing material (e.g., styrofoam pellets or bubble wrap) should be placed to fill the balance of the cooler. After filling the cooler, close the top and shake the cooler to verify that the contents are secure. Add additional packaging material if necessary.

When transport to the laboratory by the PBW sampler is not feasible, sample shipment should occur via courier or overnight express shipping service that guarantees shipment tracking and next morning delivery (e.g., Federal Express Priority Overnight). In this case, place the chain-of-custody records in a zip-lock bag and place the bag on top of the contents within the cooler. Tape the cooler shut with packaging tape. Packaging tape should completely encircle the cooler.

2.5 Documentation and Records Management

The CC/RA form, Daily Field Records, or a field notebook with field notes may be kept describing the packaging procedures and the method of shipments. Copies of all chain-of-custody records and CC/RA forms (Figure SOP-4-1, or similar form) will be retained in the project files. CC/RA forms provided by the laboratory will be acceptable as well.

3.0 QUALITY ASSURANCE

The Project Manager or designated QA reviewer should check and verify that documentation has been completed and filed per this procedure.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Chain of Custody Record

TAL-4124 (1007)

Temperature on Receipt ______

Drinking Water? Yes☐ No☐

Client	Project Manager	Date	Chain of Custody Number 152327
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page ____ of ____
City / State / Zip Code	Site Contact / Lab Contact	Analysis (Attach list if more space is needed)	
Project Name and Location (State)	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Special Instructions/ Conditions of Receipt

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other ______

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By			1. Received By		
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Figure SOP-4-1.