EXIDE TECHNOLOGIES
BATON ROUGE SMELTER

HAZARDOUS WASTE
CONTAINMENT BUILDING

CLASS 3 MODIFICATION REQUEST
LAD 008 184 137

VOLUME II

OCTOBER 2001

PREPARED BY:

PROVIDENCE ENGINEERING AND ENVIRONMENTAL GROUP LLC
POST OFFICE BOX 84380
BATON ROUGE, LOUISIANA 70808
225-766-7400

AI 1396
LAD 008 184 137

original to RC-5
copy to WAS/Peterson/Aug

LDEQ-OES

'01 OCT 17

PROVIDENCE
ENGINEERING & ENVIRONMENTAL GROUP LLC

'01 OCT 18

PERMIT DIVISION

October 17, 2001

RECEIVED
OCT 17 2001
LA DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL SERVICES

Louisiana Department of Environmental Quality
Office of Environmental Services
Permits Division
Post Office Box 82135
Baton Rouge, Louisiana 70884-2135
Attn: Ms. Bliss M. Higgins

RE: Class 3 Hazardous Waste Permit Modification
Exide Technologies
Hazardous Waste Containment Building
LAD 008 184 137
Agency Interest No. 1396

COPY

Dear Ms. Higgins:

Providence Engineering and Environmental Group, LLC (Providence Engineering), on behalf of Exide Technologies (Exide), hereby submits a Class 3 Modification request to incorporate the existing hazardous waste containment building into the operating hazardous waste permit authorized by LAD 008 184 137.

In accordance with discussions with the Louisiana Department of Environmental Quality, Exide has utilized existing information such as previously submitted applications (Part I and II), as well as updated closure plans, cost estimates, contingency plans, certification documents and waste analysis plans in preparing this Class 3 modification request.

Included in this submittal are the responses to the IT Questions and a check in the amount of $8,607.50 for the application fee as required by LAC 33:V.Chapter 51.

Thank you for your consideration in this matter. Should you have any questions or comments, do not hesitate to contact me at (225) 766-7400 or Mr. Steve Krul of Exide at (225) 775-3040

Sincerely,
Providence Engineering and Environmental Group LLC

Todd Black
Managing Partner

cc: Steve Krul, Exide
Karla Vidrine, LDEQ

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VOLUME II

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APPENDIX 1

LETTER RECEIVED FROM LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY DATED FEBRUARY 22, 2000

State of Louisiana

Department of Environmental Quality

M.J. "MIKE" FOSTER, JR.
GOVERNOR

J. DALE GIVENS
SECRETARY

FEB 22 2000

RECEIVED
FEB 28 2000
By

Steve Krul, Environmental Manager
Exide Corporation
P.O. Box 74040
Baton Rouge, Louisiana 70874-3057

RE: Exide Corporation
LAD 086 478 047
AI# 1396
Hazardous Waste Containment Building Certification

Dear Mr. Krul:

The LDEQ- Office of Environmental Services, Permits Division has reviewed the above referenced document, dated December 13, 1999. Currently, the hazardous waste containment building is operating under interim status. The Permits Division has determined that in accordance with LAC 33:V.Chapter 3, a Class 3 Modification request must be submitted to the department. This modification is to incorporate the containment building, as a permitted unit, into your existing hazardous waste operating permit.

The permit application must address all applicable hazardous waste regulations as well as the following; 1) personnel and equipment decontamination area for the building, 2) documentation demonstrating that the stored waste does not contain free liquids, 3) a set of complete drawings of secondary containment showing slopes of drainage systems and details of the underdrain collection systems for each storage area, and 4) address the possible cracks in the concrete allowing liquids to avoid the collection pipes and enter the environment.

If you have any questions regarding this matter, please contact Ms. Karla Vidrine of the Permits Section at (504) 765-0190.

Sincerely,

Michael D. Vince, MPA
Administrator

kav

APPENDIX 2

CERTIFICATION STATEMENT

EXIDE TECHNOLOGIES

CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Joseph Acker Jr.

Mr. Joseph Acker
Plant Manager

10/05/01
Date

P.O. Box 74040 • Baton Rouge, LA 70874
Phone: 225-775-3040 • FAX 225-775-3057

APPENDIX 3

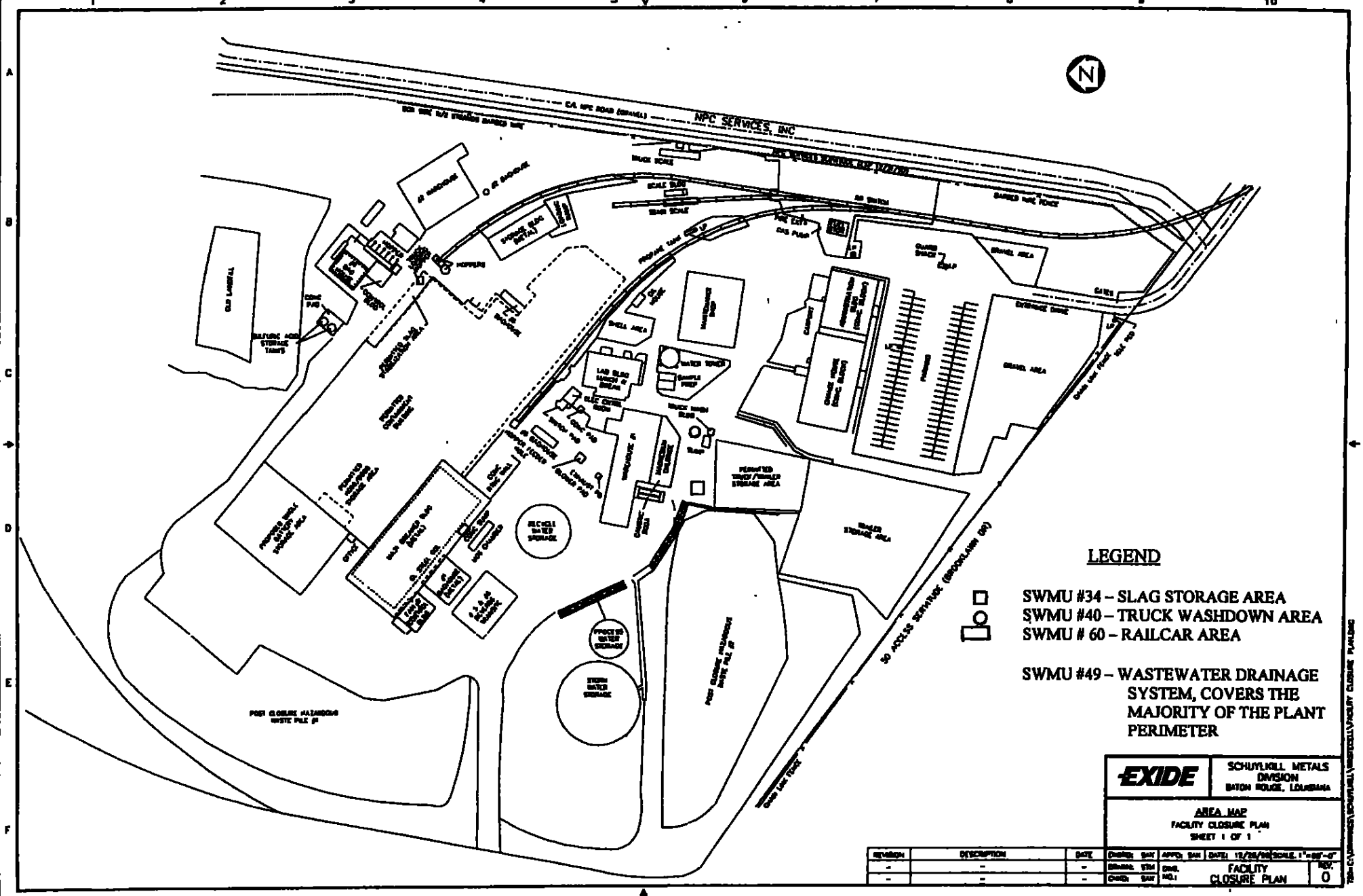
SOLID WASTE MANAGEMENT UNITS

TABLE 1

EXIDE TECHNOLOGIES BATON ROUGE SMELTER

SOLID WASTE MANAGEMENT UNITS

SWMU # 34	Slag Storage Area	This area is located on the eastern edge of Closed Waste Pile #2. It was formerly used to hold slag prior to placing the slag in the hazardous waste cell. The waste managed at this unit was slag.
SWMU # 40	Truck Washdown Area	This area is located directly east of SWMU 34, it consists of a wash down station with a pressure washer and a 2-inch hose that are used to wash down equipment and vehicles. A 4-foot by 3-foot by 3-feet deep concrete sump is located next to the wash down station. The area is used for washing out trucks that deliver spent lead acid batteries to the Smelter, for washing down lead contaminated equipment such as pumps and motors prior to conducting maintenance, and for washing down plant vehicles such as front end loaders and fork lifts. The waste managed at this unit includes aqueous wastes from wash water mixed with waste residues.
SWMU # 49	Wastewater Drainage System	This area consists of all of the plant concrete surfaces and drainage trenches and ditches. The facility is constructed to drain to a central point, at the Wastewater Treatment Plant. Drainage trenches are constructed of concrete and gravity flow to the Wastewater Treatment Plant. The waste managed by this unit include aqueous wastes such as battery acids, contact cooling water, wash down water, surface runoff and plant laundry water.
SWMU # 60	Railcar Area	This area is located at the west side of the Plant at the end of the Kansas City Southern railspur. Rail cars formerly carried material such as batteries or lead scrap to the plant to be unloaded and recycled. The wastes managed at this area include lead-acid batteries, scrap metal or spent material prior to reclamation.


NPC SERVICES, INC
50 ACCESS SERVITUDE (BROOKLAWN DR)
LEGEND
SWMU #34 – SLAG STORAGE AREA
SWMU #40 – TRUCK WASHDOWN AREA
SWMU # 60 – RAILCAR AREA
SWMU #49 – WASTEWATER DRAINAGE SYSTEM, COVERS THE MAJORITY OF THE PLANT PERIMETER
EXIDE
SCHUYLKILL METALS DIVISION
BATON ROUGE, LOUISIANA
AREA MAP
FACILITY CLOSURE PLAN
SHEET 1 OF 1
FACILITY CLOSURE PLAN
REV. 0

APPENDIX 4

WASTE ANALYSIS PLAN (REVISED)

WASTE ANALYSIS PLAN

EXIDE TECHNOLOGIES
BATON ROUGE SMELTER
BATON ROUGE, LOUISIANA

EPA ID NUMBER: LAD 008184137

August 2001

Revision 2 – August 2001

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1.0 INTRODUCTION

The Exide Technologies, Baton Rouge Smelter is located in Baton Rouge, East Baton Rouge Parish, Louisiana. This facility is a secondary lead smelter and refinery, which recycles spent lead-acid batteries and inorganic lead-bearing wastes into product lead in the form of lead pig and block ingots. The product lead is sold to customers for use in making batteries, weights, bearings, ammunition, and chemicals.

This Waste Analysis Plan provides the procedures for testing and analysis of the materials handled by the Baton Rouge Smelter. The plan meets the requirements set forth in the Louisiana Department of Environmental Quality (LDEQ), Hazardous Waste Regulations, Section 33:V.1519.

The purpose of this plan is to document the procedures that will be used to characterize incoming material and to determine that incompatible materials are separated. Included in this Waste Analysis Plan are an introduction, a background section describing the general operation of the Baton Rouge Smelter, a procedures section describing the analytical procedures used at the facility and a section describing outside laboratory services.

2.0 BACKGROUND

Exide processes lead bearing raw materials, including spent lead-acid batteries, emissions control dust, sludges and by products into metalic lead for resale and reuse. Some of the raw materials used in the process and stored on-site are classified as hazardous wastes by regulation. Exide was issued a Hazardous Waste Permit (LAD008184137) to operate three container storage areas (the truck/trailer storage area, the K069/D008 storage area and whole battery storage area). A hazardous waste treatment unit, the slag stabilization unit, is also permitted under LAD008184137. Exide also operates a containment building. A permit modification is being submitted to LDEQ to add the containment building to Exide's existing operating permit.

Most of the raw materials used by the Baton Rouge Smelter to produce lead are purchased off-site. The lead-bearing raw materials are delivered to the facility in trucks or trailers and are unloaded at the loading dock. If the material is classified as hazardous, it will be received under manifest, as specified in the Louisiana Department of Environmental Quality (LDEQ), Hazardous Waste Division Environmental Regulatory Code. Other nonhazardous and exempt materials are received under bill of ladings. Some of these lead-bearing materials are received in drums. These drums will either be emptied directly into a feedstock pile in the containment building or held temporarily in a storage area.

Lead-acid batteries are either fed directly into the battery breaker or are stored temporarily at one of the storage areas. Lead-acid batteries are processed in the battery breaker unit by cutting the batteries and hydraulically separating the individual components. The plastic is thoroughly washed to remove residual acid and lead. It is then loaded into trailers and shipped off-site for recycling. The battery acid, a weak sulfuric acid solution, is neutralized with sodium hydroxide and crystallized to form sodium sulfate salt. The salt is sold as a product. The lead material from the batteries is processed to convert lead sulfate to lead oxide. The lead oxide paste is then stored in the paste storage area of the containment building prior to recycling.

The facility operates one blast furnace and one reverbatory furnace that are both used to smelt the lead-bearing raw materials. The molten lead is refined in kettles to meet client specifications and is then cast either into ingots using two casting machines or blocks using molds. The finished lead is tested to determine if it is within specifications and is then loaded into trucks and transported off-site for reuse.

As a part of the lead recycling, a blast furnace slag is generated. This slag contains mostly iron, silica and calcium oxides, with typically less than 1% lead. However, the slag is classified as a hazardous material due to the lead content since it typically cannot pass a Toxicity Characteristic Leachate Procedure (TCLP). The slag is cooled, crushed to a small diameter, and treated using a mixture of cement and sodium silicate, as specified in the Hazardous Waste Permit. The stabilized slag is rock-like in appearance and in engineering properties. After treatment, the slag is placed in a permitted on-site Solid Waste Landfill.

3.0 IN-HOUSE WASTE SAMPLING AND ANALYTICAL PROCEDURES

The Baton Rouge Smelter has a multi-function analytical laboratory on-site. This laboratory is used to ensure that product lead is cast to meet client specifications. Additionally, the onsite laboratory performs characterization testing on incoming materials and on slags generated by the furnaces. The laboratory is also used to analyze sodium sulfate salt produced by neutralization of spent battery acid prior to the salt being shipped to clients.

The on-site laboratory is operated following the specifications set forth in Exide's Comprehensive Quality Assurance Manual. All of the equipment and instrumentation in the laboratory is calibrated following the reference method and the specifications. Calibrations are documented and recorded in calibration log books kept in the laboratory. All of the glassware used in the laboratory is cleaned following specific procedures based on use. Chemicals and reagents are stored and handled following the requirements of the material safety data sheets.

Laboratory personnel are trained in hazardous material handling practices along with chemical handling and Exide safety procedures.

Analytical methods are performed following Standard Operating Procedures (SOPs). Whenever possible the on-site laboratory uses EPA SW-846 analytical methods. However, some of the SOPs have been developed or refined by Exide based on years of experience working with lead-bearing materials, such as slags, drosses and lead ash. Appendix A presents the SOP for Slag Analysis and Appendix B contains the SOP for Incoming Material Analysis.

3.1 Incoming Lead-Bearing Material

The Baton Rouge smelter receives lead bearing materials such as drosses, spent blasting sand, spent range sand, lead plates and grids from battery manufacturing, lead ash from wire manufacturing, lead piping, and waste ceramics. Exide has a strict screening process that the generators must comply with prior to the material being accepted by the Baton Rouge Smelter. A copy of the Waste Acceptance Approval Certificate is included in Appendix C. This screening procedure includes analysis and review of new wastes streams prior to receipt to verify chemical and physical characteristics and to assist in completing waste profiles.

Exide does not accept any material that contains organic constituents, PCBs, organic lead, or metallic aluminum. Additionally, material is not accepted that contains any free liquids. If the incoming material is not received in accordance with the purchase contract, the generator is contracted and the discrepancy is reconciled or the material is returned.

Exide's Scale Operators strictly monitor receipt of incoming material on a 24-hour basis to prevent entry of unrecorded or unanalyzed wastes. Once an incoming load of lead-bearing material arrives at the smelter, it is analyzed to determine lead content and compatibility. Each receipt of lead-bearing raw materials is weighed and visually inspected to verify the purchase contract and shipping papers. The visual inspection will include labels, color, texture and homogeneity. If any foreign materials (such as trash or aluminum cans) are in the shipment, they will be removed prior to recycling.

The incoming material is sampled by qualified laboratory personnel. Sampling consists of collection of a 2- to 3-pound composite sample that is representative of the total shipment. The sample is then taken to the on-site laboratory where it is recorded in a log book and analyzed for total lead content. The parameter total lead along with the visual inspection is typically all that is required to match the incoming material to the approved profile for the material and to determine the proper recycling method.

The analytical procedure for determining total lead content of the incoming material is included in Appendix B.

3.2 Furnace Slag Analysis

In the lead recycling process, slag is produced from both the reverbatory furnace and the blast furnaces. This slag exits the furnace in a molten state into cast iron pots. The slag is cooled to room temperature in the pots and is then manually broken. A representative sample of the slag is collected by the furnace operators. Typically, one sample per shift is collected for analysis. The slag samples are analyzed at the on-site laboratory for several parameters including lead, calcium, iron, antimony and salt content. These analyses are important diagnostic tools in the proper operation of the furnaces and production of lead. Slag from the reverbatory furnace is typically high in lead content. This slag will be run through the blast furnace to recover this lead content.

Appendix A presents the SOP for analysis of blast furnace slag for lead content.

Based on the lead content, the blast furnace slag is sorted into a recycle fraction and a disposal fraction. The recycle fraction is charged in the blast furnace to further recover the lead. The disposal fraction is fed into the slag stabilization unit where it is treated with Portland cement and sodium silicate. The stabilized slag is disposed of in Exide's permitted onsite Solid Waste Landfill. A representative sample of the stabilized slag is collected at least once per quarter and sent to a contract laboratory for TCLP toxicity analysis in accordance with EPA approved procedures.

4.0 CONTRACT LABORATORY ANALYSIS

Exide uses outside, contract laboratory services for all permit required analytical testing. This testing includes:

- Semiannual groundwater samples from seven monitor wells located at the closed hazardous waste cells for pH, specific conductivity, dissolved lead, dissolved cadmium, iron, manganese, sodium, chloride, and sulfate.

- Semiannual groundwater samples from six monitor wells located at the solid waste landfills for pH, specific conductivity, lead, cadmium, manganese, selenium, sodium, antimony, chloride, and sulfate.

- Weekly samples of treated process water from Outfall 001, for lead arsenic, antimony, zinc, total suspended solids, oil and grease, and TOC.

- Quarterly samples of stabilized blast furnace slag, analyzed for TCLP metals.

- Stormwater runoff samples from Outfalls 002 and 003.

The Baton Rouge Smelter uses Pace Analytical of New Orleans, LA for this outside analytical work. A copy of Pace Analytical's QA/QC protocol is included in Appendix D. Pace Analytical has received accreditation through the LDEQ Environmental Laboratory Accreditation Program (LELAP). A copy of this LELAP certification is included in Appendix D.

In the event that Pace can not handle the sample volume, Exide has arranged for Gulf Coast Analytical of Baton Rouge to perform analytical work. The QA/QC protocol and LELAP certification for Gulf Coast is included in Appendix D.

5.0 CERTIFICATION

I hereby certify the I have examined this Waste Analysis Plan and am familiar with the provisions of The Louisiana Hazardous Waste Rules and Regulations section LAC 33:V.1519. I attest that this Waste Analysis Plan has been prepared in accordance with the guidelines presented therein and sound engineering practices. Additionally, I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

_____

Todd A. Black, P.E.
Providence Engineering & Environmental Group, LLC
P.E. Number: 27127

_____

Steven A. Krul
Environmental Manager
Exide Technologies, Baton Rouge Smelter

APPENDIX A

STANDARD OPERATING PROCEDURES FOR SLAG ANALYSIS

EXIDE TECHNOLOGIES

Standard Operating Procedures
For
Reverbatory (Reverb) Furnace Slag

EXIDE TECHNOLOGIES

Baton Rouge Smelter

EXIDE-BR-SOP001
Rev/Lead

Revision #: 2
Revision Date: 7/20/01
Reviewed By: [illegible]

1.0 Scope and Application

1.1 This Standard Operating Procedure (SOP) provides guidance for the determination of lead in high concentrations.

1.2 This SOP is applicable to mixtures of solid materials lead has been removed from or thought to contain lead in percent concentrations.

2.0 Safety

2.1 All work should be done in a hood and standard safety procedures should be followed. Protective clothing, safety glasses, and gloves should be worn at all times. **Note: Remember to always add acid to water.**

3.0 Equipment

3.1 Pulverizer or grinder
3.2 35 – mesh sieve
3.3 Analytical balance, capable of accurately weighing to the nearest 0.0001 gram
3.4 400mL beaker
3.5 watch glass
3.6 50mL and 100mL graduated cylinders
3.7 Buchner funnel (d = 5.5 cm)
3.8 #40 Whatman filter paper (d = 5.5 cm)
3.9 Side arm filtration flask
3.10 Vacuum source
3.11 50mL burret with 0.1 divisions
3.12 spot plate
3.13 Fisher burner or equivalent heat source

4.0 Reagents and Standards

4.1 Ammonia Acetate solution ($NH_4C_2H_3O_2$) - 264.6g of Ammonia Acetate, 132.3 mL Acetic Acid, bring to final volume of 1L with DI H_2O
4.2 Ammonia Molybdate solution ($(NH_4)_6Mo_7O_{24}$ $4H_2O$) – 2.7g Ammonia Molybdate, bring to final volume of 1L with DI H_2O
4.3 Hydrochloric Acid (HCl), concentrated

4.4 Lead (Pb) metal std. – Fisher Scientific Lead Metal, Lot # 914168, A.C.S. Certified @ 99.9%
4.5 Nitric Acid (HNO_3), concentrated
4.6 Sulfuric Acid (H_2SO_4), concentrated
4.7 Potassium Pyrosulfate ($K_2O_7S_2$)
4.8 Tannic Acid indicator solution ($C_{76}H_{52}O_{46}$) – 0.42g of Tannic Acid, bring to final volume of 100 mL with DI H_2O.
4.9 Tartaric Acid ($HOOC(CHOH)_2COOH$)

5.0 Procedure

5.1 Pulverize or grind the slag sample
5.2 Sift the sample through a 35-mesh sieve. Collect the sample that goes through the sieve to use as your sample.
5.3 Weigh 0.25g of sample and put into a 400mL beaker
5.4 Add 15ml of concentrated HNO_3 and 30mL of concentrated HCL
5.5 Put a watchglass on the beaker and bring the sample to a boil. Continue heating the sample until there is approximately 5 to 10mL left in the beaker.
Remove from heat and cool. **Note: Do not let the solution go dry. Remove the solution if it begins to pop.**
5.6 After the sample has cooled, add 15mL of concentrated H_2SO_4 and 8.14g of Potassium Pyrosulfate.
5.7 Heat sample with watchglass on top of beaker until dense fumes begin to roll in the top portion of the beaker. Remove from heat and let cool.
5.8 After the sample has cooled, add 100mL of DI H_2O and 7.75g of Tartaric Acid. Put watchglass on beaker and heat sample until it begins to boil then remove from heat and let cool.
5.9 After cooling, filter the sample using a Buchner funnel, side arm flask, and a vacuum source. Wash three times with 1mL portions of DI H_2O.
5.10 Discard the filtrate (aqueous portion) and place the precipitate and filter paper back into the original 400mL beaker.
5.11 Add 30mL of Ammonium Acetate solution and 70mL DI H_2O to the beaker.
5.12 Bring to a boil and titrate while hot.
5.13 Titrate with Ammonium Molybdate until a yellow color. Put a few drops of Tannic Acid indicator solution into each indentation on the spot plat.

5.14 Slowly add Ammonium Molybdate in small increments to the beaker checking for the end point between additions by putting a small portion of the titrant/sample solution to an indentation with indicator solution in it. Continue adding and checking until the sample turns light yellow when mixed on the spot plate. Check the end point by adding another drop of titrant and check for a darker yellow color. If a darker yellow is observed, then the end point was correct. If there was no color change observed, then it was a false end point and continue the titration.

6.0 Calculations

6.1 Standardization of Ammonium Molybdate

6.1.1 Weigh 0.1500g of Pb metal std
6.1.2 Add 10mL of concentrated Sulfuric Acid (H_2SO_4) and 8.14g of Potassium Pyrosulfate
6.1.3 Boil until fumes begin to roll in top portion of beaker, remove from heat and cool
6.1.4 Add 100mL of DI H_2O and 7.75g of Tartaric Acid. Bring to a boil then remove from heat and let cool.
6.1.5 Filter and discard filtrate (liquid) and keep the precipitate (solid) and filter paper.
6.1.6 Add 30ml of Ammonium Acetate and 70ml DI H_2O then bring to a boil
6.1.7 Titrate while hot with Ammonium Molybdate to yellow end point using a spot plate.
6.1.8 Calculate:

$$\frac{\text{weight of Pb sample * \% Pb in metal STD}}{\text{mL titrant used}} = \text{1g Pb factor}$$

Example:

$$\frac{0.1500*99.9}{42.7} = .3509 \text{ 1g factor}$$

6.2 % Pb = mL Titrant * (1g factor*4)

7.0 Quality Control

7.1 A Process blank (PB) is to be analyzed with every batch of samples to determine if any contamination is being added during the analysis. The process blank should be carried out through the entire procedure and subtracted from the sample results to correct for any contamination.

7.2 A sample duplicate shall consist of an additional aliquot of sample to be analyzed with the original sample aliquot. Analyze a minimum of one sample duplicate every twenty samples in order to demonstrate analyst consistency.

EXIDE TECHNOLOGIES

Baton Rouge Smelter

EXIDE-BR-SOP002
Rev/Antimony

Revision #: 2
Revision Date: 7/26/01
Reviewed By: [illegible]

1.0 Scope and Application

1.1 This Standard Operating Procedure (SOP) provides guidance for the determination of antimony in high concentrations.

1.2 This SOP is applicable to mixtures of solid materials antimony has been removed from or thought to contain antimony in percent concentrations.

2.0 Safety

2.1 All work should be done in a hood and standard safety procedures should be followed. Protective clothing, safety glasses, and gloves should be worn at all times. **Note: Remember to always add acid to water.**

3.0 Equipment

3.1 Pulverizer or grinder
3.2 35 – mesh sieve
3.3 Analytical balance, capable of accurately weighing to the nearest 0.0001 gram
3.4 500mL narrow mouth flask
3.5 25mL and 200mL graduated cylinders
3.6 50mL burret with 0.1 divisions
3.7 Fisher burner or equivalent heat source

4.0 Reagents and Standards

4.1 Hydrochloric Acid (HCl), concentrated
4.2 NBS Lead-Base Bearing Metal, 53e, Sb certified at 5.81%
4.3 Potassium Permanganate ($KMnO_4$) – 1.43g Potassium Permanganate and bring to final volume of 1L with DI H_2O
4.4 Potassium Pyrosulfate ($K_2O_7S_2$)
4.5 Sulfuric Acid (H_2SO_4)

5.0 Procedure

5.1 Pulverize or grind the slag sample.
5.2 Sift the sample through a 35-mesh sieve. Collect the sample that goes through the sieve to use as your sample.

5.3 Weigh 1.00g of sample and put into a 500mL narrow mouth flask.
5.4 Add 10mL of H_2SO_4 and 8.14g Potassium Pyrosulfate.
5.5 Heat sample to boiling. Continue heating until fumes are rolling in the top portion of the flask. Remove flask and let cool.
5.6 After cooling, add 200mL of DI H_2O and 20mL of HCl.
5.7 Bring to a boil then cool in water bath
5.8 Titrate with Potassium Permanganate to a light pink end point. Note: After turning pink the solution will continue to react and will begin to fade. Do not continue to add titrant since you have already reached the end point.

6.0 Calculations

6.1 Standardization of Potassium Permanganate

6.1.1 Weigh 1.000g of Sb NBS metal std.
6.1.2 Add 10mL of concentrated Sulfuric Acid (H_2SO_4) and 8.14g of Potassium Pyrosulfate
6.1.3 Boil until fumes begin to roll in top portion of flask, remove from heat and cool
6.1.4 Add 200mL of DI H_2O and 20mL HCl. Bring to a boil and remove and let cool.
6.1.5 Titrate with Potassium Permanganate

6.1.6 Calculate: $$\frac{\text{weight of Sb sample} * \text{\% Sb in NBS sample}}{\text{mL titrant used}} = \text{1g Sb factor}$$

Example: $$\frac{0.9874*4.62}{15.1} = 0.3021 \text{ 1g Sb factor}$$

6.2 % Sb = mL Titrant * 1g Sb factor

7.0 Quality Control

7.1 A Process blank (PB) is to be analyzed with every batch of samples to determine if any contamination is being added during the analysis. The process blank should be carried out through the entire procedure and subtracted from the sample results to correct for any contamination.

7.2 A sample duplicate shall consist of an additional aliquot of sample to be analyzed with the original sample aliquot. Analyze a minimum of one sample duplicate every twenty samples in order to demonstrate analyst consistency

EXIDE TECHNOLOGIES

Standard Operating Procedures
For
Blast Furnace Slag

EXIDE TECHNOLOGIES

Baton Rouge Smelter

EXIDE-BR-SOP003
BF/Lead

Revision #: 2
Revision Date: 7/20/1
Reviewed By: [illegible]

1.0 Scope and Application

1.1 This Standard Operating Procedure (SOP) provides guidance for the determination of lead in high concentrations.

1.2 This SOP is applicable to mixtures of solid materials lead has been removed from or thought to contain lead in percent concentrations.

2.0 Safety

2.1 All work should be done in a hood and standard safety procedures should be followed. Protective clothing, safety glasses, and gloves should be worn at all times. **Note: Remember to always add acid to water.**

3.0 Equipment

3.1 Pulverizer or grinder
3.2 35 – mesh sieve
3.3 Analytical balance, capable of accurately weighing to the nearest 0.0001 gram
3.4 400mL beaker
3.5 watch glass
3.6 50mL and 100mL graduated cylinders
3.7 Buchner funnel (d = 5.5 cm)
3.8 #40 Whatman filter paper (d = 5.5 cm)
3.9 Side arm filtration flask
3.10 Vacuum source
3.11 50mL burret with 0.1 divisions
3.12 spot plate
3.13 Fisher burner or equivalent heat source

4.0 Reagents

4.1 Ammonia Acetate solution ($NH_4C_2H_3O_2$) - 264.6g of Ammonia Acetate, 132.3 mL Acetic Acid, bring to final volume of 1L with DI H_2O
4.2 Ammonia Molybdate solution ($(NH_4)_6Mo_7O_{24}$ $4H_2O$) – 2.7g Ammonia Molybdate, bring to final volume of 1L with DI H_2O
4.3 Hydrochloric Acid (HCl), concentrated

4.4 Lead (Pb) metal std. – Fisher Scientific Lead Metal, Lot # 914168, A.C.S. Certified @ 99.9%
4.5 Nitric Acid (HNO_3), concentrated
4.6 Sulfuric Acid (H_2SO_4), concentrated
4.7 Potassium Pyrosulfate ($K_2O_7S_2$)
4.8 Tannic Acid indicator solution ($C_{76}H_{52}O_{46}$) – 0.42g of Tannic Acid, bring to final volume of 100 mL with DI H_2O.
4.9 Tartaric Acid ($HOOC(CHOH)_2COOH$)

5.0 Procedure

5.1 Pulverize or grind the slag sample
5.2 Sift the sample through a 35-mesh sieve. Collect the sample that goes through the sieve to use as your sample.
5.3 Weigh 1.00g of sample and put into a 400mL beaker
5.4 Add 15ml of concentrated HNO_3 and 30mL of concentrated HCL
5.5 Put a watchglass on the beaker and bring the sample to a boil. Continue heating the sample until there is approximately 5 to 10mL left in the beaker.
Remove from heat and cool. **Note: Do not let the solution go dry. Remove the solution if it begins to pop.**
5.6 After the sample has cooled, add 15mL of concentrated H_2SO_4 and 8.14g of Potassium Pyrosulfate.
5.7 Heat sample with watchglass on top of beaker until dense fumes begin to roll in the top portion of the beaker. Remove from heat and let cool.
5.8 After the sample has cooled, add 100mL of DI H_2O and 7.75g of Tartaric Acid. Put watchglass on beaker and heat sample till it begins to boil then remove from heat and let cool.
5.9 After cooling, filter the sample using a Buchner funnel, side arm flask, and a vacuum source. Wash three times with 1mL portions of DI H_2O.
5.10 Discard the filtrate (aqueous portion) and place the precipitate and filter paper back into the original 400mL beaker.
5.11 Add 30mL of Ammonium Acetate solution and 70mL DI H_2O to the beaker.
5.12 Bring to a boil and titrate while hot.
5.13 Titrate with Ammonium Molybdate until a yellow color. Put a few drops of Tannic Acid indicator solution into each indentation on the spot plat. Slowly add Ammonium Molybdate in small increments to the beaker checking for the end point between additions by putting a small portion of

the titrant/sample solution to an indentation with indicator solution in it. Continue adding and checking until the sample turns light yellow when mixed on the spot plate. Check the end point by adding another drop of titrant and check for a darker yellow color. If a darker yellow is observed, then the end point was correct. If there was no color change observed, then it was a false end point and continue the titration.

6.0 Calculations

6.1 Standardization of Ammonium Molybdate

6.1.1 Weigh 0.1500g of Pb metal std

6.1.2 Add 10mL of concentrated Sulfuric Acid (H_2SO_4) and 8.14g of Potassium Pyrosulfate

6.1.3 Boil until fumes begin to roll in top portion of beaker, remove from heat and cool

6.1.4 Add 100mL of DI H_2O and 7.75g of Tartaric Acid. Bring to a boil then remove from heat and let cool.

6.1.5 Filter and discard filtrate (liquid) and keep the precipitate (solid) and filter paper.

6.1.6 Add 30ml of Ammonium Acetate and 70ml DI H_2O then bring to a boil

6.1.7 Titrate while hot with Ammonium Molybdate to yellow end point using a spot plate.

6.1.8 Calculate: $\frac{\text{weight of Pb sample * \% Pb in metal STD}}{\text{mL titrant used}}$ = 1g Pb factor

Example: $\frac{0.1500*99.9}{42.7}$ = .3509 1g factor

6.2 % Pb = mL Titrant * 1g factor

7.0 Quality Control

7.1 A Process blank (PB) is to be analyzed with every batch of samples to determine if any contamination is being added during the analysis. The process blank should be carried out through the entire procedure and subtracted from the sample results to correct for any contamination.

7.2 A sample duplicate shall consist of an additional aliquot of sample to be analyzed with the original sample aliquot. Analyze a minimum of one sample duplicate every twenty samples in order to demonstrate analyst consistency.

EXIDE TECHNOLOGIES

Baton Rouge Smelter

EXIDE-BR-SOP004
BF/Insol-Lime

Revision #: 2
Revision Date: 7/20/01
Reviewed By: [illegible]

1.0 Scope and Application

1.1 This Standard Operating Procedure (SOP) provides guidance for the determination of insoluble materials and lime (CaO) concentrations.

1.2 This SOP is applicable to mixtures of solid materials such as slag.

2.0 Safety

2.1 All work should be done in a hood and standard safety procedures should be followed. Protective clothing, safety glasses, and gloves should be worn at all times. **Note: Remember to always add acid to water.**

3.0 Equipment

3.1 Pulverizer or grinder
3.2 35 – mesh sieve
3.3 Analytical balance, capable of accurately weighing to the nearest 0.0001 gram
3.4 Two 500mL beaker
3.5 10mL, 50mL, and 100mL graduated cylinders
3.6 Buchner funnel (d = 5.5 cm)
3.7 #41 Whitman filter paper (d = 9.0 cm)
3.8 Side arm filtration flask
3.9 Vacuum source
3.10 50mL burrito with 0.1 divisions
3.11 Crucible
3.12 Fisher burner or equivalent heat source

4.0 Reagents

4.1 Ammonium Chloride (NH_4Cl)
4.2 Ammonium Hydroxide (NH_4OH)
4.3 Ammonium Oxalate ($(NH_4)C_2O_4$ H_2O), saturated solution
4.4 Nitric Acid (HNO_3), concentrated
4.5 Sulfuric Acid (H_2SO_4), concentrated
4.6 Tartaric Acid ($HOOC(CHOH)_2COOH$)

5.0 Procedure

5.1 pulverize or grind the slag sample
5.2 Sift the sample through a 35-mesh sieve. Collect the sample that goes through the sieve to use as your sample.
5.3 Weigh 0.25g of sample and put into a 500mL beaker
5.4 Add 10ml of concentrated HNO_3 and 20mL of concentrated HCL
5.5 Bring to a boil. When there is almost no liquid, take the beaker off the heat and let the hot beaker finish removing the rest of the liquid.
5.6 Add 5mL of concentrated HNO3 and 7.65g of ammonium chloride
5.7 Add 100mL of DI H2O
5.8 Bring to a boil and let cool
5.9 After cooling, filter the sample. Keep the precipitate and the filtrate for further analysis

5.9.1 Insoluble Determination

5.9.1.1 Put the filter that contains the precipitate from step 5.9 into a preweighed crucible.
5.9.1.2 Put the crucible on the burner and heat until the filter paper is completely burned, then cool.
5.9.1.3 Reweigh the crucible after cooling

5.9.2 Lime (CaO) Determination

5.9.2.1 Put the filtrate (liquid) portion into a 500mL beaker
5.9.2.2 Add 30mL of Ammonium Oxalate, 30mL of Ammonium Hydroxide, and 7.75g of Tartaric Acid
5.9.2.3 Bring solution to a boil and filter while hot
5.9.2.4 Place precipitate back into the 500mL beaker
5.9.2.5 Add 200mL of DI H_2O and 10mL concentrated Sulfuric Acid
5.9.2.6 Bring solution to a boil then remove from heat and immediately titrate while hot with potassium permanganate

6.0 Calculations

6.1 Insoluble calculation

6.1.1 $(C_F - C_{Int}) * 4 * 100 = \%$ Insolubles

Where: C_F – final crucible weight in grams
C_{Int} – Initial crucible weight in grams

6.2 Standardization of Potassium Permanganate

6.2.1 Weigh 1.000g of Sb NBS metal std.
6.2.2 Add 10mL of concentrated Sulfuric Acid (H_2SO_4) and 8.14g of Potassium Pyrosulfate
6.2.3 Boil until fumes begin to roll in top portion of flask, remove from heat and cool
6.2.4 Add 200mL of DI H_2O and 20mL HCl. Bring to a boil and remove and let cool.
6.2.5 Titrate with Potassium Permanganate

6.2.6 Calculate: $\frac{\text{weight of Sb sample} * \text{\% Sb in NBS sample}}{\text{mL titrant used}}$ = 1g Sb factor

6.3 Lime (CaO) calculation

6.3.1 CaO factor = $\frac{2.8039 * \text{Sb factor} * 4}{6.088}$

where: 2.8039 = milliequivilants of Ca
6.088 = milliequivilants of Sb

6.3.2 % CaO = CaO factor * mL titrant

7.0 Quality Control

7.1 A Process blank (PB) is to be analyzed with every batch of samples to determine if any contamination is being added during the analysis. The process blank should be carried out through the entire procedure and subtracted from the sample results to correct for any contamination.

7.2 A sample duplicate shall consist of an additional aliquot of sample to be analyzed with the original sample aliquot. Analyze a minimum of one sample duplicate every twenty samples in order to demonstrate analyst consistency.

EXIDE TECHNOLOGIES

Baton Rouge Smelter

EXIDE-BR-SOP005
BF/Iron

Revision #: 2
Revision Date: 7/20/01
Reviewed By: [illegible]

1.0 Scope and Application

1.1 This Standard Operating Procedure (SOP) provides guidance for the determination of iron (FeO) in high concentrations.

1.21 This SOP is applicable to mixtures of solid materials such as slag.

2.0 Safety

2.1 All work should be done in a hood and standard safety procedures should be followed. Protective clothing, safety glasses, and gloves should be worn at all times. **Note: Remember to always add acid to water.**

3.0 Equipment

3.1 Pulverizer or grinder
3.2 35 – mesh sieve
3.3 Analytical balance, capable of accurately weighing to the nearest 0.0001 gram
3.4 500mL beaker
3.5 25mL, and 100mL graduated cylinders
3.6 50mL burret with 0.1 divisions
3.7 Fisher burner or equivalent heat source
3.8 Water bath

4.0 Reagents

4.1 Hydrochloric Acid (HCl), concentrated
4.2 Potassium Permanganate ($KMnO_4$) solution – 1.43g Potassium Permanganate and bring to a final volume of 1L with DI H_2O
4.3 Sulfuric Acid (H_2SO_4), concentrated
4.4 Zinc metal, 30 mesh (granular)

5.0 Procedure

5.1 Pulverize or grind the slag sample
5.2 Sift the sample through a 35-mesh sieve. Collect the sample that goes through the sieve to use as your sample.
5.3 Weigh 0.25g of sample and put into a 500mL beaker

5.4 Add 25mL of DI H_2O
5.5 Add 25mL of concentrated HCl
5.6 Add 10mL of concentrated H_2SO_4
5.7 Bring solution to a boil then remove from the heat
5.8 Add 300mL of DI H2O and 0.5g of Zinc metal
5.9 Bring to a boil and remove from heat, an obvious reaction will have began
5.10 Cool in the water bath until the reaction stops
5.11 Titrate with potassium permanganate until a light pink endpoint

6.0 Calculations

6.1 Standardization of Potassium Permanganate

6.1.1 Weigh 1.000g of Sb NBS metal std.
6.1.2 Add 10mL of concentrated Sulfuric Acid (H_2SO_4) and 8.14g of Potassium Pyrosulfate
6.1.3 Boil until fumes begin to roll in top portion of flask, remove from heat and cool
6.1.4 Add 200mL of DI H_2O and 20mL HCl. Bring to a boil and remove and let cool.
6.1.5 Titrate with Potassium Permanganate

6.1.6 Calculate: $\frac{\text{weight of Sb sample * \% Sb in NBS sample}}{\text{mL titrant used}}$ = 1g Sb factor

6.2 Iron (FeO) calculation

6.2.1 FeO factor = $\frac{\text{7.1844 * Sb factor * 4}}{\text{6.088}}$

where: 7.1844 = milliequivilants of Fe
6.088 = milliequivilants of Sb

6.2.2 % CaO = CaO factor * mL titrant

7.0 Quality Control

7.1 A Process blank (PB) is to be analyzed with every batch of samples to determine if any contamination is being added during the analysis. The process blank should be carried out through the entire procedure and subtracted from the sample results to correct for any contamination.

7.2 A sample duplicate shall consist of an additional aliquot of sample to be analyzed with the original sample aliquot. Analyze a minimum of one sample duplicate every twenty samples in order to demonstrate analyst consistency

APPENDIX B

STANDARD OPERATING PROCEDURES FOR ANALYSIS OF INCOMING MATERIAL

Standard Operating Procedure

Analysis of Incoming Materials

Reference Method: Exide-SOP-002

Sampling Procedure

The laboratory will be notified once the incoming material is dumped and ready to be put in the furnace. A composite sample is taken by observing the various objects present in the shipment and sampling representative quantities of the shipment.

Sample Preparation and % Moisture

1. Weigh sample pan.
2. Acquire 5 to 10 kg of sample in pan.
3. Record tare weight.
4. Place in 175F oven until completely dry, approximately 24 hours.
5. Remove sample, let cool, and weigh.
6. Record weight.

Calculation

% Moisture = (Initial Weight – Final Weight) * 100

Analysis of Dross and Mixed Samples

7. After determination of moisture content, weigh 4 to 5 kg of dried sample and place in steel crucible.
8. Remove any metal.
9. Weigh and record.
10. Remove any plastic and copper.
11. Weigh and record.
12. Let heat on burner 20 to 30 minutes.
13. Remove from heat and pour off melted lead.
14. While hot, dump dross into pan.
15. After lead has cooled, weigh and record.
16. After dross has cooled, weigh and record.
17. Weigh out 200 to 300 g of slag and grind as much as possible.
18. Pass through a 35-mesh sieve to separate the fine and the coarse particles.
19. Record the weight of the fine particles and that of the coarse particles.
20. Following Exide-SOP-001, analyze the fine particles for lead.
21. Complete the Incoming Materials Assay Form and perform all necessary calculations indicated on the form.

Analysis of Single Component or Homogeneous Samples

7. Grind dry sample.
8. Screen through 35-mesh sieve.
9. Run lead analysis on screened material following Exide-SOP-001.
10. Complete the Incoming Materials Assay Form and perform all necessary calculations indicated on the form for single component samples.

Exide Corporation

Incoming Materials Assay Form

Car #: _____ **Type of Material:** _____
Shipper: _____ **Date Received:** _____
Date/Time into oven: _____ **Date/Time out of oven:** _____

Weight in Grams	Wet	Dry
Pan and Sample	_____	_____
Pan	_____	_____
Sample	(a) _____	(b) _____
Non-metals Removed	_____	(c) _____
Metals Removed	_____	(d) _____
Moisture	(a) - (b) = _____ (e)	
Fusion Sample	(b) - [c-d-e] = _____ (f)	

Dross Fusion Analysis

Weight of Dross in Fusion Sample: _____ (g)
Metal Recovery = _____ * (f/g) _____ = (h) _____
Slag Recovery = _____ * (f/g) _____ = (i) _____
% Pb in Slag = _____ (j)

Seive Sample Weight = _____ (k)
% Coarse Material = wt of coarse particles _____ (l) /(k) = _____ * 100 = _____ %
% Fine Material = wt of fine particles _____ (m)/(k) = _____ * 100 = _____ %

Lead Assay of Entire Sample

	% Weight		% Metal		% Total
Lugs	_____ (d)	*	_____	*0.99 =	_____
Metal Recovery	_____ (h)	*	_____	*0.99 =	_____
Coarse Material	_____ (l)	*	(i)* _____	*0.97 =	_____
Slag	_____ (m)	*	(i)* _____	(j)*100 =	_____
				ASSAY =	_____

Sample Received By: _____
Sample Prepraed By: _____
Assay Technician: _____ **Date of Assay:** _____

Slag and Metal Well Assays

Date **Technician**

Source	Sb	Sn	As	Cu	Ag	Ni	Bi	Zn	S	Te	Insolubles	FeO	CaO	Pb	Cl2	Sb	Total
#1 BF 7am-7pm																	
#1 BF 7pm-7am																	
#2 BF 7am-7pm																	
#2 BF 7pm-7am																	
#3 RV 7am-7pm																	
#3 RV 7pm-7am																	
#1 BagHouse																	
Other																	

Comments:

APPENDIX C

WASTE ACCEPTANCE APPROVAL CERTIFICATES

WASTE ACCEPTANCE APPROVAL CERTIFICATES

EXIDE TECHNOLOGIES
BATON ROUGE SMELTER
BATON ROUGE, LOUISIANA

REVISION 1 AUGUST 2001

QUALIFICATION OF RECYCLE/RECLAIM MATERIALS

REVISION 01

APPROVALS:

Plant Manager — Date 8/06/01

Plant Environmental Manager — Date 8/6/01

Before any materials which have been defined as coproducts or hazardous waste under Louisiana and Federal Law are accepted for recycle/reclaim at the Exide Technologies (Exide) Baton Rouge Smelter, (referred to as the Facility), these materials must be reviewed and approved in accordance with this procedure.

1.0 APPLICABILITY

1.1 This procedure applies to all unique materials and residues proposed to be sent to the Exide facility for recycle/reclaim, which do not have a current Acceptance Approval Certificate or Coproduct Acceptance Code on file at the facility.

1.1.1 For the purposes of section 1.1, unique materials and residues shall be defined as those materials and residues which come from individual processes and individual sources. For example, two residue streams from apparently identical processes at two different source locations will be considered unique, each requiring separate qualification under this procedure.

1.1.2 Spent lead-acid batteries are exempt from the requirements of this procedure.

1.1.3 Materials generated from the manufacture of lead-acid batteries are exempt from the requirements of this procedure provided these materials have not been defined as coproducts or hazardous waste under Louisiana and Federal Law.

1.1.4 Coproducts are not required to be managed as hazardous wastes by the generator but must obtain acceptance approval in accordance with this procedure.

1.2 If the characteristics of a material or residue which has received an Acceptance Approval Certificate or Coproduct Acceptance Code in accordance with this

procedure change in any way (such as a change to the process which produces the material that introduces a new chemical constituent), that Acceptance Approval Certificate or Coproduct Acceptance Code is invalid and the generator of the material is required to obtain a new approval in accordance with all requirements of this procedure.

2.0 INFORMATION SUBMITTAL AND REVIEW

2.1 The following information for the proposed material must be submitted to the Facility Environmental Manager.

2.1.1 A Completed Exide Recyclable Material Analysis Record ER-185 (Attachment A).

2.1.2 A complete description, in writing, of the process which generates the material, including the product(s) produced and other by-products and waste streams generated by the process, and a process flow diagram.

2.1.3 Information on the quantity of the material produced and available methods of packaging and transportation.

2.1.4 A completed Letter of Certification ("BIF") for exemption for burning of lead-containing materials in industrial furnaces (Attachment B).

2.1.5 A completed Letter of Exemption for Organic Air Emission Standards (Attachment C).

2.2 The Environmental Manager shall review the information with regard to compliance with the applicable federal, state and local regulations and the Facility permit limitations.

2.2.1 If the Environmental Manager determines that acceptance of the material at the Facility would be in compliance with regulations and permits, the Environmental Manager shall forward the information to the Plant Manager.

2.2.2 If the Environmental Manager determines that acceptance of the material at the Facility would not comply with regulations and permits, the Environmental Manager shall notify the submitting party that the material can not be accepted, indicating the reason(s) for the rejection.

2.3 The Plant Manager shall review the information with regard to compatibility with the Facility process and desirability of accepting the proposed material into the Facility.

2.3.1 If the Plant Manager determines that acceptance of the material appears to be compatible and desirable, he shall notify the Environmental Manager to obtain a sample of the material for analysis in accordance with section 3.0 of this procedure.

2.3.2 If the Plant Manager determines that acceptance of the material is not compatible or desirable, he shall instruct the Environmental Manager to notify the submitting party that the material can not be accepted, indicated the reason(s) for rejection.

3.0 SAMPLE SUBMITTAL AND ANALYSIS

3.1 A representative sample of the proposed material, in a quantity not less than 300 grams, shall be submitted to the Environmental Manager for independent analysis, along with a completed chain of custody form and a description of the method used to obtain the sample.

3.2 The Environmental Manager shall forward at least 200 grams of the sample to an independent laboratory for analysis as follows:

3.2.1 Testing for materials proposed for approval as hazardous waste shall include analysis for:

TOTAL — Antimony, Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Tin, Zinc, Fluoride, Chloride, Sulfide, Aluminum, and Magnesium.

TCLP — Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium and Silver.

Additional testing for other constituents at the discretion of the Environmental Manager.

3.2.2 Testing for materials proposed for approval as coproducts shall include analysis for:

TOTAL — Antimony, Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Mercury, Selenium, Silver, Tin, Zinc, Fluoride, Chloride, Sulfide, Aluminum, and Magnesium.

Additional testing for other constituents at the discretion of the

Environmental Manager.

3.2.3 The cost of laboratory analysis performed under section 3.2 shall be paid by the submitting party. Exide will invoice the party for the amount, which shall be paid prior to acceptance of the material.

3.2.4 The Environmental Manager may, at his sole discretion, accept for approval purposes analysis data provided by the submitting party on a certificate of analysis from an approved independent laboratory. If providing such analysis, the submitting party remains subject to submittal of a representative sample under section 3.1 of this procedure.

3.3 The Environmental Manager shall forward a portion of the sample to the Facility Laboratory Manager, who shall maintain it in an inventory of samples for visual comparison with incoming materials.

3.4 The results of the laboratory analysis performed under section 3.2 shall be reported to the Environmental Manager by the independent laboratory.

4.0 ACCEPTANCE APPROVAL

4.1 The Environmental Manager shall review the laboratory analysis results with the Plant Manager to make a determination on the acceptability of the proposed material.

4.1.1 If a material proposed for approval as a hazardous waste is determined to be acceptable at the Facility, the Environmental Manager shall issue an Acceptance Approval Certificate (Attachment D) for the material. Acceptance Approval Certificates shall be individually numbered and be valid for a maximum period of one year from date of issue. The certificate and the laboratory analysis results shall be forwarded to the Exide Metals Raw Material Manager who will in turn forward them to the submitting party.

4.1.2 If a material proposed for approval as a coproduct is determined to be acceptable at the Facility, the Environmental Manager shall issue a Coproduct Acceptance Code for the material to the Exide Metals Raw Materials Manager. The Coproduct Acceptance Codes shall be individually numbered and be valid for a maximum period of one year from date of issue. The Coproduct Acceptance Code serves only as an internal approval for the Exide Raw Materials Manager to schedule the material for receipt at the Baton Rouge Smelter and is not to be distributed outside of the company.

4.1.3 If the proposed material is determined not to be acceptable at the Facility, the

Environmental Manager shall notify the submitting party that the material can not be accepted, indicated the reasons for the rejection.

4.2 Acceptance Approval for any material may be revoked at any time at the sole discretion of the Plant Manager or Environmental Manager.

4.2.1 When acceptance approval for a material has been revoked, the Environmental Manager shall notify the submitting party, in writing, that the material will no longer be accepted, indicating the reasons for the rejection. A copy of the revocation notice shall be given to the Laboratory Manager and the Exide Raw Materials Manager.

4.2.2 A material for which acceptance approval has been revoked can be re-qualified for acceptance in accordance with this procedure and at the discretion of the Plant Manager and Environmental Manager. However, misrepresentation of a material will result in permanent revocation of all acceptance approvals for the generator involved.

5.0 DOCUMENTATION

5.1 A file of all current Acceptance Approval Certificates and Coproduct Acceptance Codes for subject materials sent to the Facility for recycle/reclaim shall be maintained at the Facility by the Environmental Manager.

5.2 A listing of all current Acceptance Approval Certificates and Coproduct Acceptance Codes for materials sent to the Facility for recycle/reclaim shall be maintained by the Laboratory Manager. This listing shall include the material description, the name of the submitting party, the Acceptance Approval Certificate number or Coproduct Acceptance Code, and the expiration date of the approval.

5.2.1 The Laboratory Manager shall update the listing described in section 5.2 at the beginning of each calendar month and forward one copy each to the Environmental Manager and the Exide Metals Raw Materials Manager.

5.3 Generators shall reference the valid Acceptance Approval Certificate number on all hazardous waste manifests for shipments of hazardous waste to the Facility.

6.0 ACCEPTANCE APPROVAL RENEWAL

6.1 Sixty (60) days prior to the expiration of any current Acceptance Approval Certificate or Coproduct Acceptance Code on file at the Facility, the Environmental Manager shall notify the appropriate submitting party that renewal of the acceptance approval

is required.

6.1.1 For hazardous waste streams the submitting party will be instructed to submit current information and a current representative sample for analysis in accordance with sections 2.0 and 3.0 of this procedure.

6.1.2 For coproduct streams the submitting party will be instructed to submit current information in accordance with section 2.0 of this procedure. If the characteristics of a coproduct material have changed (such as a change to the process which produces the material stream), then complete submittal of information and a current representative sample for analysis will be required in accordance with sections 2.0 and 3.0 of this procedure.

6.2 The information and analysis results will be reviewed and acceptance approval renewed or rejected in accordance with section 4.0 of this procedure.

ATTACHMENT A

RECYCLABLE MATERIAL ANALYSIS RECORD

EXIDE TECHNOLOGIES - BATON ROUGE SMELTER

RECYCLABLE MATERIAL ANALYSIS RECORD ER-185

Check one _____Hazardous Waste _____Byproduct _____Other (Explain in Section 6)

1. Generator Information

Company Name:_____
Address, State, Zip Code:_____
Facility Name:_____ EPA ID #:_____
Facility Contact:_____ Tel. No. #:_____

2. Material Description/Characterization

Common Name of Material:_____
Generating Process:_____
_____
U.S. DOT Shipping Name:_____
DOT Hazard Class:_____ UN/NA Number:_____
Expected Annual Quantity (specify units):_____
Anticipated Shipment Frequency:_____
Packaging (Bulk, Drums, Boxes, etc.):_____
Physical Properties at 25 Degrees Celsius
Physical State (check as appropriate):
Liquid_____ Solid_____ Sludge (% solids)_____ Single Phase_____
Multi-phase_____
pH (10% slurry in distilled water for solids):_____
Density/Specific Gravity:_____
Physical Appearance (color & texture):_____
Odor (type & strength):_____

3. Material Composition

List all components within the material stream by percentage. Account for 100 percent of the material in the Typical % column.

Constituent	Typical %	Range %

8/01

4. Laboratory Analysis - Attach Laboratory Analysis

COMPLETE FOR HAZARDOUS WASTE:

RCRA Testing

Hazardous Waste Characteristics (check if applicable)

Toxicity_____ Ignitability_____ Reactivity_____ Corrosivity_____

TCLP Procedure for Metals (data expressed in mg/L)

	TC Limits		TC Limits
Arsenic_____	5.0	Lead_____	5.0
Barium_____	100.0	Mercury_____	0.2
Cadmium_____	1.0	Selenium_____	1.0
Chromium_____	5.0	Silver_____	5.0

COMPLETE FOR HAZARDOUS WASTE, CO-PRODUCT & OTHER:

Chemical Constituents - Total Concentrations (specify units)

		Expected Range (specify)			Expected Range (specify)
Aluminum	_____	_____	Lead	_____	_____
Antimony	_____	_____	Magnesium	_____	_____
Arsenic	_____	_____	Mercury	_____	_____
Barium	_____	_____	Selenium	_____	_____
Cadmium	_____	_____	Silver	_____	_____
Chlorine	_____	_____	Tin	_____	_____
Chromium	_____	_____	Zinc	_____	_____
Copper	_____	_____	Other (specify)	_____	_____
Fluoride	_____	_____	Total Metals	_____	_____

5. Exide Corporation Treatment, Storage, or Disposal Facility Information

Exide Location:	Exide Technologies, Baton Rouge Smelter		
Address:	2400 Brooklawn Drive, West End		
City, State, Zip Code:	Baton Rouge, LA 70874		
EPA Identification No.:	LAD008184137		
Facility Contact:	Joe Acker, Jr.	Telephone	(225) 775-3040

6. Additional Comments, Descriptions, or Material Stream Information

I certify and warrant that all information on this form is complete and factual (including attached information) and is an accurate representation of the known and suspected hazards of the material stream described.

_____ _____ _____

Signature Title Date

ATTACHMENT B

LETTER OF CERTIFICATION FOR EXEMPTION OF LEAD-CONTAINING MATERIALS IN INDUSTRIAL FURNACES (BIF)

ATTACHMENT B
ENV-001 Rev. 03

LETTER OF CERTIFICATION

EXEMPTION FOR BURNING OF LEAD-CONTAINING MATERIALS IN INDUSTRIAL FURNACES

This statement certifies, in accordance with Exide Technologies request of _____ (insert date), that the lead-containing materials provided by:

Name of Company _____

Street Address _____

City, State, Zip Code _____

US EPA ID No., if applicable _____

to Exide Technologies for recycling meet one or more of the following three exemption criteria for burning of lead-containing materials in industrial furnaces:

1. The material have a heating value of less than 5,000 BTU/lb and contain less than 500 ppm of toxic organic constituents, or

2. The materials are identified on the attached listing of Appendix XL to 40 CFR 266 and are:

    1. Generated or initially produced by the lead industry (defined in the regulations as lead smelting operations (both primary and secondary), lead-acid battery manufacturing, and lead chemical manufacturing (i.e., producers of lead compounds)), and

    2. If the material contains more than 500 ppm of toxic organic constituents, it does not exhibit the toxicity characteristic (TC) of 261.24 for an organic constituent and it is not listed as a hazardous waste in Subpart D of Part 261 because it contains an organic constituent as identified in Appendix VIII of Part 261, or

    3. The materials are by-product drosses, slurry and slurry screenings, slags, scrap lead, or other materials which are either not solid wastes when recycled or are exempt from regulation when recycled.

Signature _____

Printed Name _____

Title _____

Date _____

ATTACHMENT C

LETTER OF EXEMPTION FOR ORGANIC AIR EMISSION STANDARDS

CERTIFICATION

Attachment C
ENV-001 REV. 03

EXEMPTION
ORGANIC AIR EMISSION STANDARDS
HAZARDOUS WASTE TANKS AND CONTAINERS

I hereby certify that:

Name of Generator _____

Street Address _____

City, State, Zip Code _____

US EPA ID No., if applicable _____

has determined that the lead-containing materials described as _____ _____ provided to Exide Technologies for recycling are exempt from requirements for Organic Air Emission Standards for Tanks and Containers under 40 CFR Part 264, Subpart CC and Part 265, Subpart CC. This determination is based on the materials meeting the following criteria (check all that apply):

_____ The materials have an average volatile organic concentration at the point of origination less than 100 ppmw as determined by:

- _____ Direct measurement by analysis per Method 25D in 40 CFR Part 60, Appendix A.
- _____ Knowledge of the waste, which may Include information such as material balances, raw materials lists, comparison to similar materials and/or other documents.

_____ The materials are by-products, coproducts, drosses, slags, scrap lead or other materials which are either not solid wastes when recycled or are exempt from regulation when recycled.

Signature _____

Printed Name _____

Title _____

Date _____

ATTACHMENT D

ACCEPTANCE APPROVAL CERTIFICATE

EXIDE TECHNOLOGIES

EXIDE TECHNOLOGIES, BATON ROUGE SMELTER
BATON ROUGE LOUISIANA
LAD008184137

ACCEPTANCE APPROVAL CERTIFICATE

_____

(Certificate Number)

THIS IS TO CERTIFY THAT

_____

from

_____

HAS BEEN QUALIFIED FOR ACCEPTANCE AT THE EXIDE TECHNOLOGIES, BATON ROUGE SMELTER, LAD008184137 FOR RECYCLE/RECLAIM IN ACCORDANCE WITH EXIDE'S ADMINISTRATIVE PROCEDURE ENV-001.

THIS APPROVAL IS VALID FOR A PERIOD NOT TO EXCEED ONE (1) YEAR FROM THE DATE OF ISSUE, AND MUST BE RENEWED PRIOR TO THE EXPIRATION DATE LISTED BELOW FOR SHIPMENTS OF THIS MATERIAL TO CONTINUE AFTER THAT DATE.

DATE OF ISSUE: _____

EXPIRATION DATE: _____

_____
STEVEN A. KRUL
ENVIRONMENTAL MANAGER

P.O. Box 74040 • Baton Rouge, LA 70874
Phone· 225–775-3040 • FAX 225–775-3057

APPENDIX D

CONTRACT LABORATORY QA/QC PACKAGES AND LDEQ ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM CERTIFICATIONS

Pace Analytical™

Pace Analytical Services, Inc.
1000 Riverbend Blvd Suite F
St Rose, LA 70087

Phone 504 469.0333
Fax 504 469 0555

QUALITY MANUAL

New Orleans Addendum

Revision 9.0
(August 25, 2000)

Prepared by:

Pace Analytical Services, Inc.
1000 Riverbend Blvd., Suite F
St. Rose, LA 70087

(504)-469-0333

Approved by:

James L. Nelligan, Jr. — 8/25/00
General Manager — Date

Shelley Antoine — 8/25/00
Operations Manager/Technical Director — Date

Gary L. Newton — 8/25/00
QA/QC Officer — Date

The Pace Analytical Services/New Orleans Quality Manual addendum is a confidential document intended to describe policies related to the operation of the New Orleans division. The same adherence and revision practices as stated in the Pace Analytical Corporate Quality Manual are still applicable.

This is COPY # 19 of a confidential document prepared by Pace Analytical Services, Inc., and is a CONTROLLED / UNCONTROLLED document. This document has been reviewed and approved by the persons listed on the cover sheet and can only be deemed official if the proper signatures are present.

SECTION 2.0

TABLE OF CONTENTS

2.4 TABLE OF CONTENTS (NEW ORLEANS)

The Pace Analytical Services, Inc./New Orleans addendum is intended to describe policies related to operation of the New Orleans division. The same adherence and revision practices as stated in the QAM are still applicable.

TABLE OF CONTENTS

Sec.	Title	Total # of Pages
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4.2	Facilities and Equipment • TABLE NO-4.1	
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4.3.1	Minimum personnel education requirements • FIGURE NO-4.3	
4.3.2	Key Personnel (New Orleans)	
4.3.3	Authorized Signatories • FIGURE NO-4.4	
5.0	**QUALITY ASSURANCE OBJECTIVES**	**1**
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7.0	**SAMPLE CUSTODY**	**6**
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8.2.4	CCV Concentration variance	
8.2.5	Pipette Calibration	
9.0	**ANALYTICAL PROCEDURES**	**1**
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10.4	Client notification in case of lab closure/change of ownership	
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11.4.1	Control limit determination	
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18.2	Accredited Test Methods • TABLE NO-18.1	

SECTION 4.0

QA ORGANIZATION AND PERSONNEL

4.1.1 LABORATORY ORGANIZATION

Pace Analytical Services, Inc./New Orleans is defined by functional groups.. Each functional group is headed by a department manager or supervisor responsible for the group's technical performance. Department managers/supervisors and their respective groups are described in the organizational chart provided in Table 4.0. These functional groups are defined as follows:

Sample Management

The Sample Management department is responsible for the receipt, inspection and verification of sample containers, log-in of samples into the Laboratory Information Management System (LIMS), and sample distribution to their proper storage environments throughout the laboratory. Sample Management also ensures the client is supplied with the necessary sample containers with consistent and accurate sample preservation. If sample aliquoting is necessary, Sample Management will perform the aliquoting (with exception of volatiles analysis), labeling, and distributing for the entire laboratory.

Project Management

The Project Management department is the primary contact for client communications. Each project is managed from the initiation of quotes and proposals until delivery of the final report. The representatives ensure that all project requirements and requests are communicated to the appropriate laboratory personnel. Non-conformances and/or problems encountered during analysis are addressed to the client through the Project Manager. The Project Manager will track the progress of data packages within the lab, as well as, review all reports prior to release to the client

Organic Sample Preparation

The Organic Sample Preparation (Organic Prep) department is responsible for method preparation of all samples for organic analyses, except for volatile organics which require little or no sample preparation. The Organic Prep group ensures that sample integrity is maintained while being prepared. If volatile analysis sample preparation is necessary, it is performed by the GC or GC/MS analyst who is performing the analytical testing. Sample cleanup and screening is performed by the Organic Prep group when necessary. It is the responsibility of the Organic Prep manager to ensure samples are extracted within the specified method hold times, as well as, performed in accordance with method specifications. An extraction log is given to the appropriate analytical laboratory upon completion of a sample batch and extracts stored in their corresponding refrigerators.

Volatiles (GC; GC/MS)

The Volatiles manager oversees both the Volatiles GC and GC/MS laboratories. It is the responsibility of the analyst to maintain the proper operation of the instrument and ensure the instrument is calibrated in accordance with method criteria. The analyst is also responsible for maintaining the integrity of the

sample (VOAs) or the extract during the analytical run. The analyst gathers and consolidates the analytical data produced for each sample into a data package. This data package is reviewed by the volatiles manager. It is the manager's responsibility to ensure that all method and QA/QC specifications are met and documented.

Semivolatile (GC; GC/MS)

The Semivolatiles manager oversees both the GC and GC/MS laboratories. It is the responsibility of the analyst to maintain the proper operation of the instrument and ensure the instrument is calibrated in accordance to method criteria. The analyst is responsible for maintaining the integrity of the sample or the extract during the analytical run. The analyst gathers and consolidates the analytical data produced for each sample into a data package. This data package is reviewed by the Semivoloatiles manager. It is the manager's responsibility to ensure that all method and QA/QC specifications are met and documented.

Trace Metals Analysis

The Trace Metals Analysis (Metals) department is responsible for the preparing and analyzing of all samples requiring trace metal analyses. The Metals analyst is responsible for maintaining sample integrity throughout sample preparation and analysis. The analyst must perform any maintenance necessary to ensure the proper operation of the instrument and verifying that the instrument is calibrated according to method guidelines. The analyst gathers and condenses the analytical data collected for each sample into a data package. This data package is thoroughly review by the Metals manager/supervisor. The manager is responsible for ensuring that all QA/QC method requirements are met.

Water Quality

The Water Quality department encompasses general wet chemistry or biological parameters. The Water Quality analyst is responsible for making all necessary reagents, assembling of distillation (or any other) apparatus needed, and maintaining proper instrument operation for the analytical testing. The analyst is responsible for the calibrating of the instrument and/or standardization of titration reagents. The analyst records and condenses all analytical data. The Water Quality manager ensures that all QA/QC requirements are fulfilled. The manager reviews the analytical bench sheets and generates a data package.

Report Center

The Report Center is responsible for the issuance and revisions of reports to clients in a timely manner and in the appropriate report format. The Report Center generates all final reports submitted to the client. Report Center staff are responsible for the archival of all reports.

Quality Assurance

The Quality Assurance (QA) office provides an independent laboratory check that quality is maintained through out the laboratory. The QA office is responsible for the scheduling and conducting of routine internal audits and in-house performance quality control (QC) checks. The QA office spot reviews complete report data packages before and after issuance to the client. The QA office initiates and monitors the QA log process and issues QA memorandums when a systematic or procedural error is discovered. The QA office maintains records of all MDL and QC studies performed throughout the laboratory. The QA office is responsible for maintaining and reviewing the laboratory Quality Assurance

Plan. Department SOPs must be approved by the QA office, and the QA office authorizes any revisions or replacements of current SOPs. The QA office approves all report resubmissions before their release.

Below are organizational charts for Pace/New Orleans and the management structure of Pace Analytical Services, Inc., depicting the role of Pace/New Orleans within the corporate framework.

Figure NO-4.1

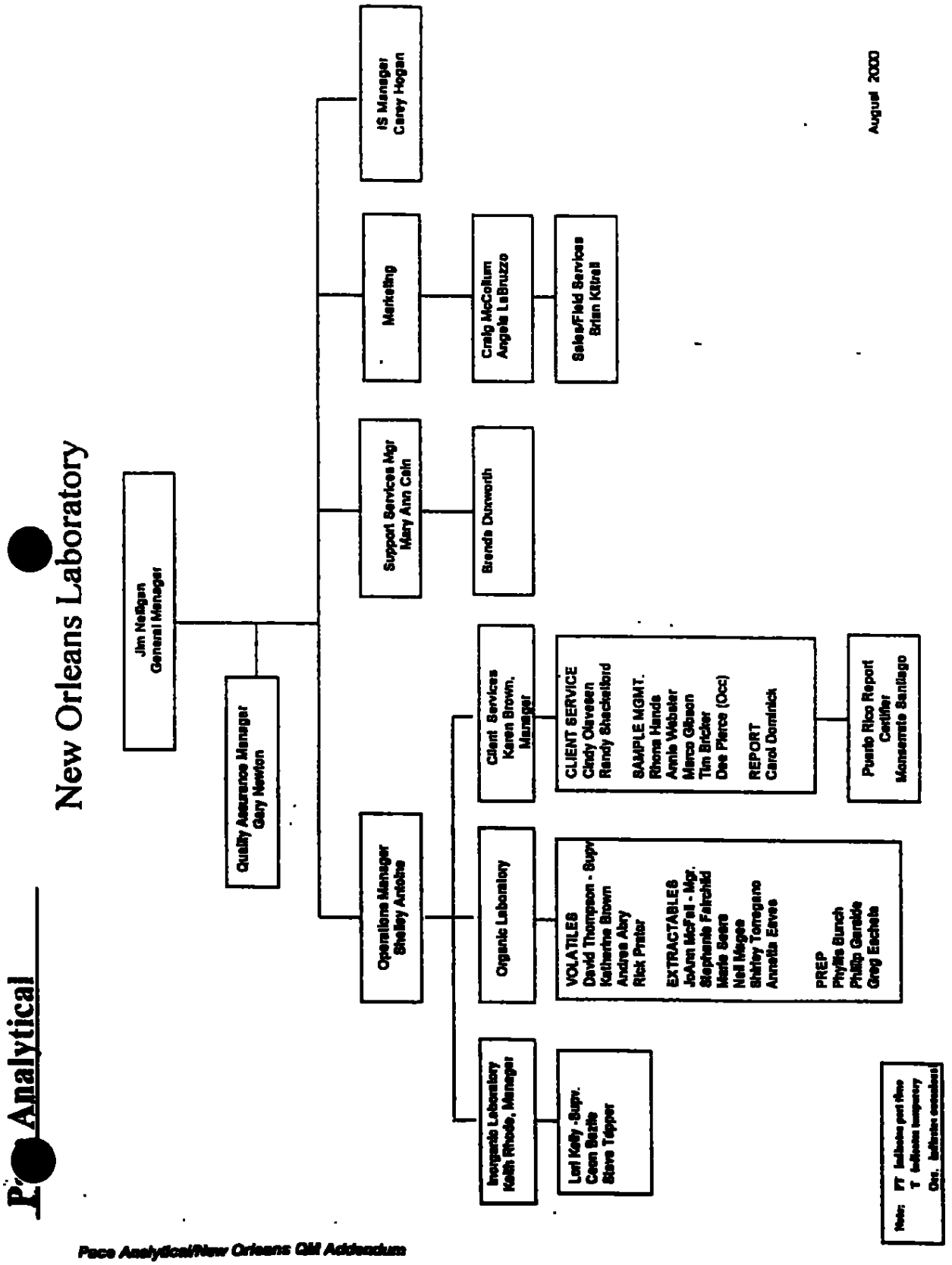
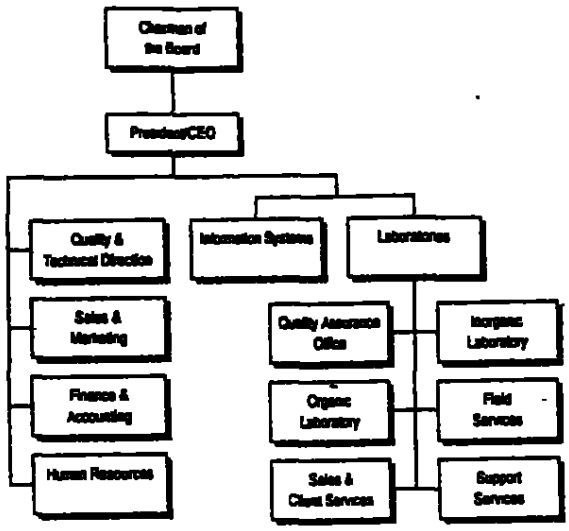
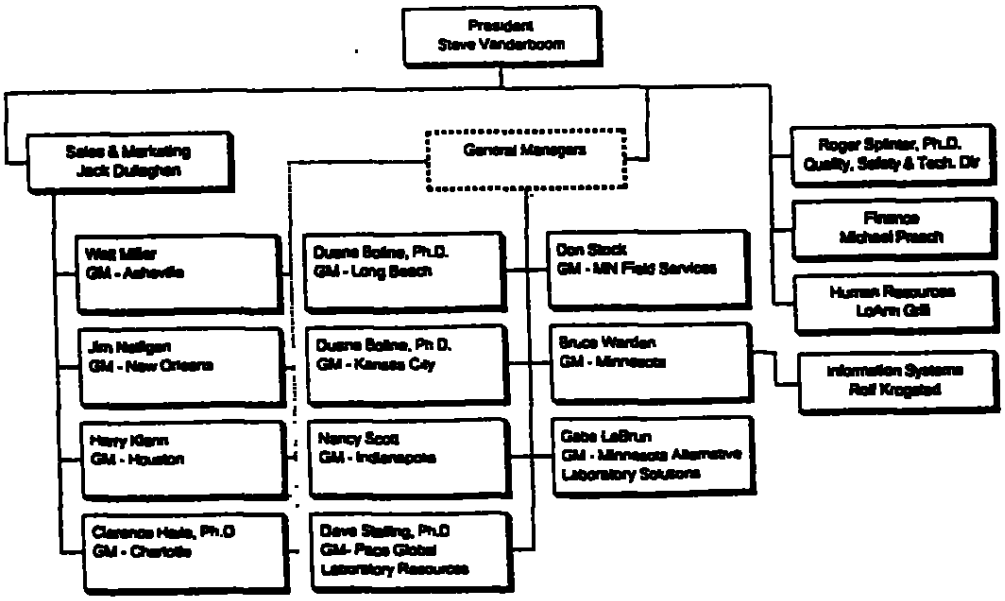

Pace Analytical
New Orleans Laboratory
Jim Nelligan
General Manager
Quality Assurance Manager
Gary Newton
IS Manager
Carey Hogan
Marketing
Craig McCollum
Angela LaBruzzo
Sales/Field Services
Brian Kittrell
Support Services Mgr
Mary Ann Cain
Brenda Duxworth
Operations Manager
Shelley Antoine
Client Services
Karen Brown,
Manager
CLIENT SERVICE
Cindy Olaveson
Randy Shackelford
SAMPLE MGMT.
Rhona Hands
Annie Webster
Marco Gibson
Tim Bricker
Dee Pierce (Occ)
REPORT
Carol Dominick
Puerto Rico Report
Certifier
Monsermite Santiago
Organic Laboratory
VOLATILES
David Thompson - Supv
Katherine Brown
Andrea Alay
Rick Prater
EXTRACTABLES
JoAnn McFall - Mgr.
Stephanie Fairchild
Marie Sears
Nell Magee
Shirley Torregano
Annette Eaves
PREP
Phyllis Bunch
Philip Garside
Greg Eschels
Inorganic Laboratory
Keith Rhode, Manager
Lori Kelly -Supv.
Coen Bastle
Steve Tepper
August 2000

Figure NO-4.2

Pace Analytical Organizational Structure



Pace Analytical Corporate Management Personnel & Laboratory General Managers



4.2 FACILITIES AND EQUIPMENT

Pace Analytical Services, Inc. is equipped with state-of-the-art instrumentation and application software in order to facilitate sample handling and thus enabling the analyst to dedicate more time to the resolution of technical problems during analytical testing. Table NO-4.1 gives a listing of current instrumentation.

Table NO-4.1

Pace Laboratory: New Orleans

Available Instrumentation:

Instrument	Manufacturer	Model	Detector	Analysis **
GC/MS	Finnigan	INCOS 50	MS	524, 624,8260,CLP
GC/MS	Finnigan	INCOS 50	MS	524, 624,8260,CLP
GC/MS	Finnigan	INCOS 50	MS	524, 624,8260,CLP
GC/MS	Finnigan	INCOS 50	MS	524, 624,8260,CLP
GC/MS	Finnigan	INCOS 50	MS	625,8270,CLP
GC/MS	Finnigan	INCOS 50	MS	524, 624,8260,CLP
GC/MS	Finnigan	INCOS 50	MS	625,8270,CLP
GC/MS	Finnigan	INCOS 50	MS	625,8270,CLP
GC/MS	Finnigan	INCOS 50	MS	625,8270,CLP
Accelerated Solvent Extractor	Dionex	ASE 200	N/A	3545
GC	Hewlett-Packard	5890	NPD (Dual)	8140, 8141
GC	Hewlett-Packard	5890	FPD (Dual)	8140, 8141
GC	Hewlett-Packard	5890II	FID (Dual)	DAI
GC	Hewlett-Packard	5890	FID (Dual)	8100,TPH(ext.)
GC	Hewlett-Packard	5890II	3 PID; 1 FID	BTEX, TPH(purge)
GC	Hewlett-Packard	5890	1 FID (Dual)	TPH(ext)
GC	Hewlett-Packard	5890II	ECD (Dual)	608, 8081, 8082, CLP
GC	Hewlett-Packard	5890II	ECD (Dual)	608, 8081, 8082, CLP
GC	Hewlett-Packard	5890	ECD/FID	Screening, TPH (ext)
GC	Hewlett-Packard	5890	ECD (Dual)	PCB, Screening
GC	Hewlett-Packard	5890	2 PID/FID	BTEX/TPH (purge)
GC	Hewlett-Packard	5890	ECD (Dual)	8151, 8121, 612
ICP	Perkin Elmer	Optima 3000 DV		200.7, 6010, CLP
AA Graphite Furnace	Perkin Elmer	4100ZL		200s, 7000s, CLP
Hg Analyzer	Perkin Elmer	FIMS400	Spectrophotometer	245.1, 7470, 7471, CLP
TOC	Dohrman	DC-80	IR	415.1, 9060
TOC	Shimadzu	5000A	IR	415.2, 9060
Auto-Analyzer	Lachat	2300	Spectrophotometer	NO2,NO3,CN,P-PO4,Phenol,SO3,Hex Cr.
Ion Analyzer	Orion	EA940	Probe	F-, pH,Ammonia
BOD	YSI	Model 58	Probe	BOD
Spectrophotometer	HACH	DR/200	Spectrophotometer	COD
Miscellaneous	Parr	1261	N/A	BTU
Panaky-Martens Closed Cup	Boekel Industries	152600	N/A	Ignite
Miscellaneous	Foxboro	Miran1FF	IR	TPH, O&G

** Analysis should correspond to a Method Name/Number from the 'Available Method' Page

4.2.4 DEPUTY QUALITY ASSURANCE OFFICER

The Quality Assurance Officer will appoint a person(s) to act as a deputy QAO should the need arise.

4.3.1 MINIMUM PERSONNEL EDUCATION REQUIREMENTS

The Human Resources director will follow company protocol in ensuring all the minimum educational requirements are met by incoming employees by signing a statement to the fact included on the new hire checklist (Refer to SOP NO-110-3). Proof of education (e.g., copy of diploma) will be included in the employee's file.

4.3.2 KEY PERSONNEL (NEW ORLEANS)

General Manager
James L. Nelligan, Jr.
Directs all departments of the laboratory in accordance with the goals and objectives of the company; accountable and responsible for the quality of the work produced, safety, and profit and loss within the above mentioned departments; oversees the management of all functions in these departments including technical, operational and administrative areas; assist Marketing and Sales in generating business; manages the facility and the development of goals and objectives for the company and the facility.
Education: B.S. Business Administration/Economics, MBA Finance

Years of Experience: 10
Related Experience: General Manager, Pace Analytical Services, Inc. St. Rose, Louisiana, Principal Vice President Prism Laboratories, Charlotte, NC; Sales Manager, Bold Research Labs, Inc. Charlotte, NC; Credit Analyst, Chrysler Credit Corporation; Financial Planner, American Express.

Operations Manager
Shelley Antoine
Coordinates analyses and checks computer data for validity, final data review and the implementation and oversight of the quality control program for the laboratory. Trains and recruits new analysts. She developed and implemented clinical screening tests for volatile organic in biological samples and is experienced in the development and preparation of grant proposals funded by government and private agencies.
Education: B.A. Biological Sciences/M.S. Biological Sciences

Years of Experience: 23
Related Experience: GC/MS and Operations Manager, Pace Analytical Services, Inc. St. Rose, Louisiana, GC/MS Operator/Supervisor, Gulf South Environmental Laboratory, New Orleans, LA, Research Associate/Task Leader, Bio-Organic Studies, University of New Orleans.

Quality Assurance Officer
Gary L. Newton
Routine quality control data review to isolate potential analytical problems. Program monitoring to ensure that procedures are followed and meet QA/QC requirements. Interface with external agencies and auditors. Establishes QA policy for laboratory.

Education: B.S. Biology

Years of Experience: 2
Related Experience: Quality Assurance Officer, Savannah Laboratories & Environmental Services, Mobile, AL.

Client Services Manager
Karen Brown
Provides leadership and guidance to project management. Meets with other department managers to organize and schedule workloads. Provides technical support to clients. Responsible for overall implementation of client services and project management activities. Prepares reports and technical papers and manages large-scale complex projects. Serves as the interface between client and laboratory management to achieve client satisfaction with delivery of analytical results within budget, on schedule and to the requested level of quality. Supervises Sample Management Staff.
Education: B.A. Biology

Years of Experience: 21
Related Experience: Client Services Manager, Pace Analytical Services Inc. St. Rose Louisiana, Division Manager, National Environmental Testing, Baton Rouge, LA., Division Manager, National Environmental Testing, Gulfport, MS Office Manager, Richard Brown, Attorney. Associate Chemist, Computer Sciences
Corporation, NSTL.

Project Manager
Randy Shackelford
Maintains communication with clients to ascertain scope and requirements of projects, processing orders for analytical services, reviewing work assignments from the laboratory, tracking samples through the analytical process to monitor holding and turnaround times and review reports and invoices. Additionally, prepares routine and non-routine quotations, reports and technical papers, and maintains client records.

Years of Experience: 10
Related Experience: Project Manager, Pace Analytical Services, Inc. St. Rose, Louisiana, Environmental Technician II-Field Services, Pace Analytical Services, Inc. St. Rose, Louisiana, Analyst, National Environmental Testing, Gulfport, Mississippi, Sample Technician and Geotechnical Driller, Burmah Technical, Gulfport, Mississippi.

Project Manager
Cindy Olavesen
Maintains communication with clients to ascertain scope and requirements of projects, processing orders for analytical services, reviewing work assignments from the laboratory, tracking samples through the analytical process to monitor holding and turnaround times and review reports and invoices. Additionally, prepares routine and non-routine quotations, reports and technical papers, and maintains client records.
Education: Jefferson Vocational Tech School

Years of Experience: 26
Related Experience: Project Manager, Pace Analytical Services, Inc. St. Rose, Louisiana, Report Center Manager/Sample & Document Control Office, Gulf South Environmental Laboratory, New Orleans, LA, Departmental Secretary, Department of Analytical Chemistry, Gulf South Research Institute.

Sample Management Supervisor
Rhona Hands
Group leader in sample management area. Schedules courier service to clients, prepares sample kits and shipping, sample receipt and distribution, entering data from Chain-of-Custody into LIMS computer system. Supports subcontracting of samples to other laboratories.
Education: B.A.

Years of Experience: 10
Related Experience: Sample Management Supervisor, Pace Analytical Services, Inc. St. Rose, Louisiana, Shipping & Receiving Supervisor, Bioassay Technician, SPL. Veterinarian Technician, Animal Eye Clinic.

Metals Lab Supervisor
Keith Rhode
Group leader in metals laboratory. Supervises personnel in completion of proper project requirements, schedules analyses to meet holding times, reviews laboratory data, and trains new personnel. Implements the quality assurance program. Metals analyses on water, wastewater soil sludge, and sediment samples using graphite furnace, ICP and cold vapor atomic absorption (AA) techniques. Is experienced in the use of the ICP analytical techniques.
Education: M.S. Analytical Chemistry/B.S. Chemistry

Years of Experience: 26
Related Experience: Metals Supervisor, Pace Analytical Services, Inc., St. Rose, Louisiana, Research Manager, Inorganic Laboratory, Gulf South Environmental Laboratory, Senior Chemist, Metal Laboratory, General Engineering Laboratories. Manager, General Chemistry Laboratory, EIRA.

Inorganics Wet Lab Supervisor
Lori Kelly
Inorganics lab - performs wet chemistry analyses including TOC, sulfide, alkalinity, TOX, and automated analyses using the Lachat autoanalyzers. Experienced in Contract Laboratory Program (CLP) protocols for cyanide.
Education: Currently pursuing Bachelor of Arts degree in Chemistry/Business Administration

Years of Experience: 11
Related Experience: Water Quality Supervisor, Pace Analytical Services, Inc. St. Rose, Louisiana, Inorganic Chemist II, EIRA, Laboratory Technician, Oxford Environmental Corporation

Information Systems Manager
Carey Hogan
Provides diagnosis, resolution, and consulting services to PC user groups including programming on assigned projects, methodology development, training and maintenance of company equipment. Responsible for daily computer and associated equipment systems operations (including data acquisitions and administrative network servers).
Education: B.S. Chemistry

Years of Experience: 11
Related Experience: Information Systems Manager, Pace Analytical Services, Inc. St. Rose, Louisiana, GC Analyst III; Gulf South Environmental Laboratory, New Orleans, Louisiana; Chemist, Raba-Kistner Consultants, Inc. San Antonio, Texas.

Volatiles Supervisor
David Thompson
Provides technical support and direction to the instrument operators and reviewing the data generated. He analyzes environmental samples by GC and GC/MS using EPA Protocols and performs instrument troubleshooting and maintenance. Also has experience in analyzing various types of samples including high and medium concentrations.
Education: B.S. Biological Science

Years of Experience: 10
Related Experience: GC/MS and Analysis II, Pace Analytical Services, Inc. St. Rose, Louisiana: GC/MS Chemist III, EIRA, St. Rose, Louisiana.

Semivolatiles Manager
Jo Ann McFall
Directs and organizes analyses of samples by operator and instrument to maximize productivity. Trains, directs and provides technical support to GC and GC/MS personnel and other departments as necessary. Reviews data and reports. Prepares standards and maintains and adequate level of supplies use by the semivolatile laboratory. Also performs analysis for semivolatile pollutants in solid and liquid matrices according to EPA protocols and guidelines as well as initiating and implementing method modifications as necessary.
Education: B.S. Biological Sciences/M.S. Biological Sciences

Years of Experience: 26
Related Experience: Manager GC/MS, Pace Analytical Services, Inc. St Rose, Louisiana; Scientist III and Chemist, Gulf South Environmental Laboratory, New Orleans, Louisiana; Research Associate Bio-Organic Studies and Graduate Teaching Assistant Dept. of Biological Sciences, University of New Orleans, New Orleans, Louisiana.

4.3.3 AUTHORIZED SIGNATORIES

Included on the next page is a list of approved signatories for the Pace/New Orleans facility. This list is updated annually.

Figure NO-4.4

PACE ANALYTICAL SERVICES, INC.
NEW ORLEANS LABORATORY
PERSONNEL SIGNATURE RECORD

EMPLOYEE	POSITION	DATE	SIGNATURE	INITIAL
ANDREA ABRY	LAB ANALYST	2/22/00	Andrea Abry	AA
SHELLEY ANTOINE	MANAGER, LAB SERVICES	2/22/00	Shelley Antoine	SA
TIMOTHY BRICKER	CLIENT SERVICES TECH	2/22/00	Timothy Bricker	TAB
KAREN BROWN	CLIENT SERVICES MGR.	2/22/00	Karen Brown	KHB
KATHERINE BROWN	LAB ANALYST	2/22/00	Katherine Brown	KB
PHYLLIS BUNCH	LAB TECHNICIAN	2/23/00	Phyllis Bunch	PB
CAROL DOMINICK	CLIENT SERVICES TECH	2/22/00	Carol Dominick	CD
ANNETTA EAVES	LAB ANALYST	2/24/00	Annetta Eaves	AE
GREGORY ESCHETE	LAB TECHNICIAN	2/23/00	Gregory Eschete	GE
STEPHANIE FAIRCHILD	LAB ANALYST	2/22/00	Stephanie Fairchild	SF
PHILLIP GARSIDE	LAB TECHNICIAN	2-22-00	Philip Garside	PG
MARCO GIBSON	CLIENT SERVICES TECH	2-22-00	Marco Gibson	MG
RHONA HANDS	CLIENT SERVICES TECH	2/22/00	Rhona Hands	RH
CAREY HOGAN	SYSTEMS MANAGER	2/22/00	Carey Hogan	CH
LORI KELLY	LAB SUPERVISOR	2/22/00	Lori P. Kelly	LK
KIM LINDOLPH	LAB TECHNICIAN	2/22/00	Kim Lindolph	KL
NEIL MAGEE	LAB ANALYST	2/22/00	Neil Magee	NM
CRAIG MCCOLLUM	ACCOUNT EXECUTIVE	2/22/00	Craig McCollum	CM
LORI MCCREA	LAB TECHNICIAN	2/22/00	Lori McCrea	LM
JO ANN MCFALL	MANAGER, LAB SERVICES	2/22/00	Jo Ann McFall	JM
JAMES NELLIGAN	GENERAL MANAGER	2/23/00	James Z. Nelligan Jr.	JN
GARY NEWTON	QA OFFICER	2/22/00	Gary L. Newton	GN
ERICA OCKMAN	LAB TECHNICIAN	2/22/00	Erica L. Ockman	EO
TYRA ORDONE	LAB TECHNICIAN	2/22/00	Tyra Ordone	TO
CINDY OLAVESEN	PROJECT MANAGER	2/22/00	Cindy Olavesen	CO
RICHARD PRATOR	LAB ANALYST	2/23/00	Richard Prator	RP
KEITH RHODE	MANAGER, LAB SERVICES	2/23/00	Keith Rhode	KR
MARIE SEARS	LAB ANALYST	2/22/00	Marie Sears	MS
RANDY SHACKELFORD	PROJECT MANAGER	2/22/00	Randy Shackelford	RS
STEPHEN TAPPER	LAB ANALYST	2/22/00	Stephen Tapper	TAP
DAVID THOMPSON	LAB SUPERVISOR	2/22/00	David Thompson	DT
SHIRLEY TORREGANO	LAB ANALYST	2/23/00	Shirley Torregano	ST
ANNIE WEBSTER	CLIENT SERVICES TECH	2/22/00	Annie Webster	AW

SECTION 5.0

QUALITY ASSURANCE OBJECTIVES

5.7 QA/QC PROCEDURES (NEW ORLEANS)

Specific QA/QC Procedures, including types and frequency of QA/QC measures and personnel responsibility, can be referenced in SOP NO-102-0.

SECTION 7.0

SAMPLE CUSTODY

7.01 NEW WORK REVIEW

When work for a new or existing client is proposed, the available resources and personnel are taken into account before an account executive issues a project quote. When this quote is issued, any analyses that would need to be subcontracted out to another laboratory (either inside or outside the Pace Analytical network) would be indicated on this preliminary quote.

Once the quote has been accepted, a project manager is assigned to that particular project and certain project information is entered into a 4-week forecast to provide project management with an overall view of all incoming work. Daily operations meetings are held each morning among project manager and laboratory managers to highlight any issues affecting certain projects and to review the status of projects are nearing completion.

7.02 SAMPLE ACCEPTANCE POLICY

Pace Analytical/New Orleans will accept all samples for which work has been approved for analytical methods performed on-site or those which can be sent out to a sub-contracted laboratory if the need arises. However, if samples happen to be received that are deemed a "safety risk," (i.e, hazardous samples, radioactive samples, etc.) Pace Analytical/New Orleans reserves the right to refuse analysis and will notify the client to this effect.

7.7.3 SUBSAMPLING PROCEDURE

For the procedure for sample subsampling, please refer to SOP NO-500-9.

7.7.4 SAMPLE CUSTODY QC CHECKS

Quality control checks are routinely observed in sample management for the following:

- Laboratory-prepared preservatives – these are tested per batch of particular preservative and are evaluated against the reporting limits for all applicable analyses.

- Container checks – All containers are received (with and without preservation) from corporate-approved vendors. The certificate of analyses demonstrating these containers are kept on record. In the event, Pace Analytical/New Orleans must add preservative to an empty container, these preservatives are taken from batches subjected to the above checks.

- Storage blanks – Storage blanks for the volatile GC/MS (waters), volatile GC/MS (soils) and volatile GC sample storage areas are performed on a monthly basis and are compared to the reporting limits for the respective analyses.

7.12 SAMPLE MANAGEMENT DOCUMENTATION (NEW ORLEANS)

Figure NO-7.2

This figure depicts the form used at Pace Analytical/New Orleans for reporting the conditions regarding sample receipt on a project-by-project basis. Any non-conformances and actions taken to rectify these non-conformances are recorded on this sheet and placed in the project folder.

Figure NO-7.4a

This form is used as an internal chain-of-custody at Pace Analytical/New Orleans.

Figure NO-7.6

This form, used for sample disposal documentation, is created by the EPIC system and displays all samples within a particular EPN.

Figure NO-7.7
This document is used as a chain-of-custody for any samples sent to a subcontractor laboratory both inside or outside the Pace Analytical Services, Inc network.

Figure NO-7.2 (front)

Pace Analytical

SAMPLE RECEIPT NONCONFORMANCE REPORT

CLIENT NAME: _____ EPN: _____

				COMMENTS
A. SUFFICIENT VOLUME:	Y	N	N/A	_____
B. CONTAINERS - INTACT:	Y	N	N/A	Broken cap: _____
				Broken container: _____
C. CUSTODY SEAL - INTACT:	Y	N	N/A	_____
D. CHAIN OF CUSTODY -				
COMPLETE:	Y	N	N/A	Not received by: _____
RELINQUISHED BY CLIENT:	Y	N	N/A	COC says: _____
TIME DISCREPANCY:	Y	N	N/A	Label says: _____
LABELS MATCH COC:	Y	N	N/A	Other: _____

E. METHOD OF SAMPLE SHIPMENT: COURIER: FedEx UPS Pace Client Other

RECEIPT DATE CORRECT _____

F. SAMPLES RECEIVED -

SAME DAY AS SAMPLED:	Y	N	_____
WITHIN 24 HOURS OF SAMPLING:	Y	N	Collected: _____
24 HRS OR MORE AFTER SAMPLING:	Y	N	Received: _____

G. SHORT HOLDING TIME ANALYSIS:	Y	N	N/A	Analysis requested _____
H. RUSH TAT REQUESTED BY CLIENT:	Y	N	N/A	TAT _____

I. PRESERVATION CHECK: (If No, see reverse side for listed discrepancies)

ACID pH < 2	Y	N	N/A	_____
CAUSTIC (SULFIDE) pH > 9	Y	N	N/A	_____
CAUSTIC (CYANIDE) pH> 12	Y	N	N/A	_____
J. HEADSPACE IN VOA /TOX VIALS:	Y	N	N/A	_____
BUBBLES?	Y	N	N/A	*(if Y, see reverse*)*

K. CORRECT MATRIX CODE: Y N N/A Not Listed: *Appears* - Water Soil Solid Other

L. ALIQUOTING REQUIRED: Y N N/A _____

M TEMPERATURE OF SAMPLE S IN COOLER UPON RECEIPT _____ °C

ICED? Y N N/A Ambient temp. (°C) _____

N. OTHER COMMENTS (see reverse): Y N N/A

Submitted by _____ Date _____

Client Contact by: _____ Date: _____

RESOLUTION: _____

F\O-SM-001:1

Figure 7.2 (back)

SAMPLE PRESERVATION CHECK

Pace Number	Client ID	Analytical Test	Preservative Received	Original / Adjusted

ACID preserved samples should have a pH of <2

CAUSTIC preserved samples should have a pH of >9 for sulfide & >12 for cyanide

Tested by: _____ Date: _____

HCl = Hydrochloric Acid
H_2SO_4 = Sulfuric Acid

HNO_3 = Nitric Acid
NAOH = Sodium Hydroxide

If bubbles found in VOA vials, record specific information below

Sample ID	# of vials with bubbles	Sample ID	# of vials with bubbles

OTHER COMMENTS

_____
_____
_____
_____
_____
_____
_____
_____

F\O-SV-001:1

Figure NO-7.4a

Pace Analytical

INTERNAL CHAIN OF CUSTODY

Client:	Analytical Parameter/Fraction:

PACE/NO ID	CLIENT ID	PACE/NO ID	CLIENT ID

Date	Relinquished by	Received by	Comments
	Printed Name Signature	Printed Name Signature	
	Printed Name Signature	Printed Name Signature	
	Printed Name Signature	Printed Name Signature	
	Printed Name Signature	Printed Name Signature	
	Printed Name Signature	Printed Name Signature	
	Printed Name Signature	Printed Name Signature	
	Printed Name Signature	Printed Name Signature	
	Printed Name Signature	Printed Name Signature	
	Printed Name Signature	Printed Name Signature	
	Printed Name Signature	Printed Name Signature	
	Printed Name Signature	Printed Name Signature	

An Equal Opportunity Employer

Figure NO-7.6

PASI New_Orleans Laboratory
CONTAINER FORM
202908 [redacted]

Project Sample Number	Sample No.	Client ID	Date Received	Container	Location	OUT	IN	OUT	IN	OUT	IN	Date Disposed
202908-001	2024437	00-103-006	17-AUG-00	Plastic unpreso	PCB							
202908-002	2024438	00-103-007	17-AUG-00	Plastic unpreso	PCB							
202908-003	2024439	00-103-008	17-AUG-00	Plastic unpreso	PCB							
202908-004	2024440	00-103-009	17-AUG-00	Plastic unpreso	PCB							
202908-005	2024441	00-103-010	17-AUG-00	Plastic unpreso	PCB							
202908-006	2024442	00-103-011	17-AUG-00	Plastic unpreso	PCB							
202908-007	2024443	00-103-012	17-AUG-00	Plastic unpreso	PCB							
202908-008	2024444	00-103-013	17-AUG-00	Plastic unpreso	PCB							
202908-009	2024445	00-103-014	17-AUG-00	Plastic unpreso	PCB							

AUGUST 17, 2000 12:38
***** End of report *****

Page: 1

Pace Analytical

SUBCONTRACTING CHAIN-OF-CUSTODY

Pace Analytical Services, Inc.
1000 Riverbend Blvd, Suite F
St Rose, LA 70087
Phone 504 469 0333
Fax 504 469 0555

Due Date: _____ Freight Carrier: _____ Custody Seals: Intact / Broken / Missing

Subcontractor: _____ Airbill #: _____ Samples: Intact / Broken / Missing

Contact: _____ EPN #: _____ Cooler Temperature (°C): _____

PACE SAMPLE ID	CLIENT SAMPLE ID	SAMPLE DATE/TIME	MATRIX	# OF CONTAINERS	ANALYTE/METHOD	SAMPLE COMMENTS

Relinquished by:	Date/Time	Received by:	Project Comments/Remarks:
Relinquished by:	Date/Time	Received by:	
Relinquished by:	Date/Time	Received for subcontractor by:	

REPORT RESULTS TO THE ADDRESS ABOVE TO THE ATTENTION OF KAREN BROWN. If the hardcopy results cannot be delivered by the above due date, please contact Karen Brown at the above number.

PO # _____

FNO-SM-003:1

Figure NO-7.7

SECTION 8.0

CALIBRATION PROCEDURES AND FREQUENCY

8.1 SECOND-SOURCE CALIBRATION CHECK STANDARD

A second-source calibration check standard is run after an initial calibration and evaluated against method-derived CCV criteria in order to verify the standards utilized in the initial calibration.

8.2.4 CCV CONCENTRATION VARIANCE

The concentration of continuing calibration standards is randomly varied until each point within the calibration range has been evaluated, whereas the cycle begins again.

8.2.5 PIPETTE CALIBRATION

Pipettes in use at Pace Analytical/New Orleans are calibrated on a quarterly basis. The accuracy of glass syringes used for standard spiking will be verified using a vendor-supplied certificate of accuracy or initial demonstrations of accuracy documented by the laboratory.

SECTION 9.0

ANALYTICAL PROCEDURES

9.0 ANALYTICAL PROCEDURES (NEW ORLEANS)

Table NO-9.1 includes all methods, which Pace Analytical services performs on a routine basis.

9.1 STATE NOTIFICATION OF MODIFIED METHODOLOGY

State regulatory agencies and other certifying agencies will also be notified of any significant departures in analytical methodology.

SECTION 10.0

DATA REDUCTION, VALIDATION AND REPORTING

10.3 ELECTRONICALLY SUBMITTED/VERBAL DATA

Reports sent by facsimile include a special report cover sheet to denote preliminary, final or revised data. This also informs the client that QA/QC has been reviewed and is acceptable (the only exception being in the case of preliminary data where the possible lack of QC data review is so noted).

Any verbal communication of data is noted on the cover sheet of each applicable project folder as to who was contacted and when.

10.4 CLIENT NOTIFICATION OF CHANGE IN BUSINESS STATUS

In the event of a lab closure or corporate buyout, clients will be notified and a decision will be made as to the maintenance or transference of client data and/or records.

10.5 COMPLIANT PROCEDURE (NEW ORLEANS)

In an effort to better document and resolve complaints raised by clients of Pace Analytical/New Orleans, complaint handling procedures are documented in SOP NO-211-0.

SECTION 11.0

QUALITY CONTROL PROCEDURES

11.4.1 CONTROL LIMIT DETERMINATION

Quality control limits are determined annually by Pace Analytical/New Orleans from the previous year's data. This data includes all data points for the previous year for analyses having more than 15 points. For those data with less that 15 points, default limits of 50-150 for organics and 70-130 for inorganics are applied until 15 data points are achieved and quality control limits recalculated. For those analyses with method-defined QC acceptance criteria, in addition, to certain client-specific criteria, the more stringent criteria will be used.

11.4.1 MEAN AND STANDARD DEVIATION CALCULATIONS

Mean

$$\bar{X} = \frac{\sum_{i=1 \text{ to } n}^{n} X_i}{n}$$

Standard Deviation

$$s = \sqrt{\frac{\sum_{i=1 \text{ to } n}^{n} (X_i - \bar{X})^2}{n}}$$

In these equations, n = population size
X_i = ith observation in the sample
$\bar{X}$ = sample mean
S = standard deviation

SECTION 15.0

CORRECTIVE ACTION

15.1 CORRECTIVE ACTION DOCUMENTATION

Discrepancy documentation used for Pace Analytical/New Orleans and their required used is documented in SOP NO-140-5.

SECTION 16.0

QUALITY ASSURANCE REPORTS TO MANAGEMENT

16.2.1 ANNUAL MANAGEMENT QUALITY SYSTEMS REVIEW

In addition to an ongoing review, an annual management review is held in which quality control information (i.e., PT testing results, corrective actions, etc.) is presented and reviewed allowing for management input for upgrading or improving the quality system. This will be documented in a Quality System Management Review Report given to the lab manager and corporate QAM.

In addition, an annual discussion of corrective actions will occur between the QAO and General Manger.

SECTION 18.0

CERTIFICATIONS

18.1 CERTIFICATION LIST (NEW ORLEANS)

The following is a current certification list for Pace Analytical/New Orleans as of the date of revision of this addendum.

Florida
- Department of Health / Inorganic and Organic Hazardous Waste (E87595).
- Department of Environmental Protection/ QAP #970167-05
- NELAP Pending

Kansas
- Department of Health and Environment / Environmental Laboratory Wastewater and Hazardous Waste (E-10266)

Louisiana
- Department of Health and Hospitals (ELAP) / Drinking Water (LA000006)
- Department of Environmental Quality (ELAP) / Organic and Inorganic (on approved laboratory list).

New Jersey
- Department of Environmental Protection and Energy / Wastewater (58002)

US Department of Agriculture
- Foreign Soil Permit / Hazardous Waste (US territories)

18.2 ACCREDITED TEST METHODS

The following table (Table NO-18.1) highlights all test methods under which Pace Analytical/New Orleans performs its NELAP-accredited testing.

TABLE NO-18.1

DESCRIPTION	METHOD
Alkalinity (titrimetric)	EPA 310.1
Alkalinity (titrimetric)	SM 2320B
BOD	SM 5210B
BOD, 5-day (20 C)	EPA 405.1
Chloride	SW 9251
Chloride (colorimetric, auto ferricyanide, AAII)	EPA 325.2
Chloride, titrimetric	SM 4500-Cl-C
Chlorine, total residual, spectrophotometric, DPD	EPA 330.4
Chromium, hexavalent	SM 3500-Cr-D
Chromium, hexavalent	SW 7196
COD	SM 5220B
COD	Hach 8000
COD, colorimetric, automated/manual	EPA 410.4
Conductance, Specific	SM 2510B
Conductance, Specific	SW 9050
Cyanide, amenable	SW 9012
Cyanide, Amenable (titrimetric, spectrophotometric)	EPA 335.1
Cyanide, reactive	SW 7.3.3.2
Cyanide, total	EPA 335.4
Cyanide, total	EPA 9010
Cyanide, total	SW 9012
Cyanide, total	SW 9014
Cyanide, Total (colorimetric, automated UV)	EPA 335.3
Cyanide, Total (titrimetric, spectrophotometric)	EPA 335.2
Flashpoint	SW 1010
Fluoride, (potentiometric, ion selective electrode)	EPA 340.2
Fluoride, (potentiometric, ion selective electrode)	SM 4500-F-C
Hardness, by calculation	SM 2340B
Herbicides	SW 8151
Mercury	SW 7470A
Mercury	SW 7471
Mercury, Cold Vapor	EPA 245.1
Mercury, Cold Vapor (automated)	EPA 245.2
Mercury, Cold Vapor (sediments)	EPA 245.5
Metals, GFAA	3113B
Metals, ICP	EPA 200.7
Metals, ICP	SW 6010
Methanol	EPA 8015-DAI
Nitrate/Nitrite, colorimetric, automated cadmium reaction	EPA 353.2
Nitrate/Nitrite, colorimetric, automated cadmium reaction	SM 4500-NO3-F
Nitrogen, Ammonia (colorimetric, automated phenate)	EPA 350.1
Oil & Grease	SW 9070
Oil & Grease	SW 9071
Oil & Grease	EPA 1664
Oil & Grease, gravimetric, separatory funnel	EPA 413.1
PAHs	SW 8100
Paint Filter Test	SW 9095
PCBs	SW 8082
Pesticides	SW 8141
Pesticides	SW 8081
Pesticides/PCBs	EPA 608
pH	SW 9045
pH	SW 9040
pH	SM 4500-H+-B
pH, Electrometric	EPA 150.1
Phenols, total	SW 9065/9066

TABLE NO-18.1, continued

DESCRIPTION	METHOD
Phenols, total	EPA 1664
Phenols, total (colorimetric, automated 4-AAP with distillation)	EPA 420.2
Phenols, total (spectrophotometric, manual 4-AAP with distillation)	EPA 420.1
Phosphorus, All forms (colorimetric, automated, ascorbic acid)	EPA 365.1
Phosphorus, total (colorimetric, automated, block digestor, AAII)	EPA 365.4
Residue, Settleable Matter (volumetric, Imhoff cone)	EPA 160.5
Residue, Filterable (gravimetric, 180 C)	EPA 160.1
Residue, Non-filterable (gravimetric, 103-105 C)	EPA 160.2
Residue, Total (gravimetric, 103-105 C)	EPA 160.3
Residue, Volatile (gravimetric, 550 C)	EPA 160.4
Semivolatile Organics	EPA 625
Semivolatile Organics	SW 8270
Semivolatile Organics	SW 8270C
Solids, total	SM 2540B
SPLP	SW 1312
Sulfate	SW 9036
Sulfate	SW 9038
Sulfate, colorimetric, automated, methyl thymol blue, AAII)	EPA 375.2
Sulfate, turbidimetric	EPA 375.4
Sulfide	SW 9030/34
Sulfide (titrimetric	EPA 376.1
Sulfide, reactive	SW 7.3.4.2
TCLP	SW 1311
TKN	EPA 351.2
TOC	SW 9060
TOC	SM 5310C
TOC	EPA 415.1
Turbidity	SM 2130B
Turbidity, Nephelometric	EPA 180.1
Volatile Organics	EPA 524.2
Volatile Organics	EPA 602
Volatile Organics	EPA 624
Volatile Organics	SW 8260B

MAR 1 9 2001

QUALITY MANUAL

Quality Assurance/Quality Control Policies and Procedures

Prepared by Pace Analytical Services, Inc.
1700 Elm Street S.E., Suite 200
Minneapolis, Minnesota 55414
(612)607-1700

for:

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Approval

3/2/01

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Date

3/2/01

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Director, Quality, Safety & Training
(612)607-6322
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g:users/oep/cover_pg.obd

Date: 1/26/01
Revision: 5.0

Signature Page

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Copy 24 issued to: Steve Krul
Name

Exide Corporation
Affiliation

3/13/01
Date

This is / is not a controlled document (control status must be circled before release).

This document, with the necessary addenda, has been accepted as the Quality Assurance Manual.

James L. Nelligan, Jr. 3/2/01 — New Orleans
Laboratory General Manager — Date — Laboratory

Gary L. Nutto 3/2/01
Quality Assurance Officer — Date

Shelley Antoine 3/2/01
Technical Director — Date

John McFall 3/2/01
Technical Director — Date

[illegible] 3/2/01
Technical Director — Date

Lori A. Kelly 3/2/01
Technical Director — Date

1.0 INTRODUCTION

1.1 FOREWORD

Pace Analytical Services, Inc. (Pace Analytical) is a privately held, full service environmental testing firm operating a system of laboratories and service centers nationwide. Pace Analytical offers extensive services, including: bioassay for aquatic toxicity, air toxics, industrial hygiene testing, explosives, high resolution mass spectroscopy of compounds, such as dioxins and coplanar PCB's, field services and mobile laboratory capabilities. Pace Analytical has developed and continues to develop a strict system of QA/QC protocols. In addition, the company has developed an advanced data management system, which is highly efficient and allows for flexible data reporting. Together, the two systems insure data reliability and timeliness.

Pace Analytical's goal is to continuously combine its expertise in laboratory operations with customized solutions to meet the specific needs of its clients.

1.2 STATEMENT OF PURPOSE

To meet the business needs of our customers for high quality, cost-effective, analytical measurements and services.

1.3 CORE VALUES

* INTEGRITY
* VALUE EMPLOYEES
* KNOW OUR CUSTOMERS
* HONOR COMMITMENTS
* FLEXIBLE RESPONSE TO DEMAND
* PURSUE OPPORTUNITIES
* CONTINUOUSLY IMPROVE

1.4 CODE OF ETHICS

Pace Analytical requires employees to conduct their tasks according to the highest professional, technical and ethical standards applicable to their area of expertise. As such, Pace Analytical requires a commitment from all staff to abide by the principles set forth by the Company. This applies to all procedures executed by employees. The following information summarizes the essential standards of ethical behavior required of Pace Analytical employees.

Pace Analytical's fundamental ethical principles are as follows:

- Each Pace Analytical employee is responsible for the propriety and consequences of his or her actions.

- Each Pace Analytical employee must conduct all aspects of Company business in an ethical and strictly legal manner, and must obey the laws of the United States and of all localities, states and nations where Pace Analytical does business or seeks to do business.

- Employee conduct on behalf of the Company with clients, suppliers, the public and one another must reflect the highest standards of honesty, integrity and fairness.

Strict adherence by each Pace Analytical employee to this Code of Ethics and to the Standards of Conduct is essential to the continued vitality of Pace Analytical. Therefore, compliance with and effective enforcement of the Code and Standards are key responsibilities of Pace Analytical management and will be addressed as elements of each employee's regular performance evaluation.

Failure to comply with the Code or Standards will result in disciplinary action up to and including termination and referral for civil or criminal prosecution where appropriate. An employee will be notified of an infraction and given an opportunity to explain as prescribed under current disciplinary procedures.

Training including specific elements of this policy will be provided to all newly hired employees and as a refresher to existing staff.

1.5 STANDARDS OF CONDUCT

Standard Operating Procedures

Each employee is responsible for complying with applicable Pace Analytical Standard Operating Procedures (SOPs).

Financial Responsibility

Pace Analytical employees must accurately keep all books, records and accounts for which they are responsible. Employees are responsible for maintaining and safeguarding all company funds and/or assets which they have in their possession or control. Additionally, all employees are responsible for submission of accurate reporting documents pertaining to timekeeping (timesheets, etc) and reimbursement requests (expense reports, tuition reimbursement, etc).

Data Integrity

The accuracy and integrity of the analytical results produced at Pace Analytical are the lifeblood of the Company. Lack of integrity in the data produced is an assault on our most basic values and puts Pace Analytical and its employees at grave financial and legal risk. Therefore, in addition to complying with applicable Pace Analytical Standard Operating Procedures (SOPs), employees are to prepare and maintain accurately all technical,

records, scientific notebooks, calculations and data bases. Employees must at all times employ good scientific judgment and are prohibited from making false entries or misrepresentations of data, dates, calculations, results or conclusions.

Confidentiality

Pace Analytical employees must not, directly or indirectly, use or disclose confidential or proprietary information except in connection with their duties at Pace Analytical, either during or for two years after employment with Pace Analytical. Confidential or proprietary information, belonging to either Pace Analytical or its clients, includes but is not limited to test results, trade secrets, matters involving research and development, procedures, methods, processes and standards, techniques unique to Pace Analytical, client information, equipment manufactured by Pace Analytical , sales and marketing plans and information, inventions, chemical compositions of materials, client specifications and requirements, and names of individuals working for or representing clients with whom Pace Analytical deals.

Drug-free Workplace

Pace Analytical recognizes that alcoholism and other drug dependencies are a significant social problem with a potential for causing severe detriment to the workforce. Employees have the right to work in an alcohol and drug-free environment and to work with persons free from the effects of alcohol and drugs. Employees who abuse alcohol or drugs are a danger to themselves and to other employees. Employees are not to report to work under the influence of alcohol or controlled substances as prescribed in the Drug-free Workplace Program. The possession, use and sale of alcohol and controlled substances as well as detailed information regarding drug testing is described in the Drug-Free Workplace Program Policy handout provided to all new employees. Additional copies are available through Human Resources. Employees are obligated to conform to the Drug-Free Workplace Program Policy strict guidelines.

Conflict of Interest

Pace Analytical employees must avoid situations that might involve a conflict of interest or appear questionable to others. The employee must be careful in two general areas:

* Participation in activities that conflict or appear to conflict with Pace Analytical responsibilities.

* Giving or receiving anything that might influence the recipient or cause another person to believe that the recipient may be influenced. This includes offering or accepting bribes, kickbacks or illegal payments.

Employees are not to engage in outside business or economic activity relating to a sale or purchase by the Company. Other questionable activities include serving on the Board of Directors of a competing or supplier company, significant ownership in a competing or supplier company, consulting with or working for a competing or supplier company or participating in any outside business during the employee's work hours.

The acceptance of gifts, loans or other consideration in excess of $50 in value is not permitted for employees or their families when such gifts come from any individual, firm or corporation doing or seeking to do business with Pace Analytical . Acceptance of any gift of cash is prohibited.

Non-Harassment

Pace Analytical places the highest value on human rights. As such, Pace Analytical endeavors to provide a workplace free of both harassment and discrimination. Harassment of an employee or applicant for employment on the basis of any characteristic protected by applicable municipal, state and federal laws, or which creates an intimidating, hostile or offensive work environment, or which interferes with an employee's performance is a violation of company policy. Employees must understand that harassment of another employee or applicant for employment based on gender is both illegal and a violation of company policy. Pace Analytical maintains a Sexual Harassment Policy which clearly defines the company's stance against sexual harassment and provides a mechanism for responding to infractions of the policy. The Sexual Harassment Policy is addressed in employee orientation and employees are provided the Policy handbook. Additional copies are available through Human Resources.

Proper and Professional Work Environment

Employees are bound to use fairness, honesty and regard for the law in their business relationships with Pace Analytical investors, clients, suppliers, employees, and applicants as well as all local, national and international communities and governments. All employees are personally obligated to uphold Pace Analytical's policy of non-discrimination against any employee or applicant for employment because of race, color, creed, religion, national origin, sex, disability, age, marital status, status with regard to public assistance or sexual orientation.

Protection of Property

Pace Analytical employees have an obligation to protect all company and client property against loss, theft and misuse. Employees are responsible for maintaining an orderly, clean workplace. Employees are also liable for using company and client property only for their intended purposes. Employees are prohibited from using company property for their personal use without the expressed permission of their supervisor or General Manager. No such use of property may be made after termination of employment with Pace Analytical. Employees must also make every effort to prevent the misuse of company and client property by other persons. Misuse includes selling, loaning or giving away company or client property.

Communications

Each employee is responsible for obtaining the information necessary to follow directives in this ethics and conduct document, and for reporting to his/her supervisor or Human Resources representative, as appropriate, any observed deviations from policies. The identity of the employee reporting the infraction will not be disclosed without his/her permission unless disclosure is unavoidable during an investigation. In no event will

adverse action be taken against a Pace Analytical employee because he/she has reported a suspected impropriety. These reports will be treated in confidence to the maximum extent consistent with the fair and rigorous enforcement of the Code of Ethics and Standards of Conduct.

Compliance

All employees are required to read, understand and comply with the various components of the standards listed in this document. As the confirmation that they understand this responsibility, each employee is required to sign an acknowledgment form, similar in content to the example contained herein. The signed form becomes part of the employee's permanent record.

ACKNOWLEDGMENT

As an employee of Pace Analytical, I understand that the Company endeavors to abide by the highest professional, ethical standards and demands as much of its employees.

Those standards, as outlined in this document, have been made known to me and I understand my responsibility to follow them as they pertain to the functions of my job. I understand that failure to comply with the terms set forth within this document will result in disciplinary action up to and including termination.

I specifically acknowledge the responsibility for compliance with the contents of this manual that apply to my duties. When performing analytical testing functions I am responsible for compliance with the entire contents of this document.

Name: _____

Signature: _____

Date: _____

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3.0 QUALITY PROGRAM SUMMARY

3.1 PROGRAM OBJECTIVES

The Pace Analytical Quality Manual presents in specific terms the policies, organization, functions, and specific quality assurance (QA) and quality control (QC) requirements designed to achieve the data quality objectives required for clients of Pace Analytical.

3.2 STATEMENT OF POLICY

Pace Analytical is committed to providing the highest quality product to our clients. The validity and reliability of the data generated is ensured by the adherence to rigorous quality assurance/quality control (QA/QC). Pace Analytical emphasizes the application of sound QA/QC principles beginning with the initial planning of the project, through all the field and laboratory activities, and ultimately to the generation of the final report. The principles of concise data quality objectives, representativeness, completeness, comparability, precision and accuracy are applied.

Pace Analytical is committed to providing the resources, including facilities, equipment and personnel, to ensure the adherence to these rigorous quality assurance/quality control protocols. Pace Analytical's quality assurance policy is based on the definition of quality as conformance to requirements; and further, on the premise that the requirements are governed by Company policies, government regulations and standard operating procedures. This commitment recognizes the need for data to be representative of the environmental conditions under consideration, and for data to be generated within a system of functions that is designed to meet applicable regulatory compliance criteria. The Quality Assurance Program contains provisions for establishing, maintaining and executing protocols which lead to results of known, appropriate and acceptable quality; documentation of these activities is an integral part of the QA program.

3.3 QUALITY ASSURANCE DOCUMENTS

3.3.1 Quality Manual

This document describes management policies related to laboratory and associated operations. It defines acceptable practices and discusses each element of the Quality Assurance Program. It functions as the Project QA Manual where no other Quality Assurance Project Plan, Statement of Work or other contractually mandated project plan has been specified. Adherence to the practices described in this manual is required of all employees. Individual laboratories may addend this Manual to specifically define additional program specific criteria. Such addenda must be approved by the laboratory general manager and quality assurance officer and appropriate training must be done.

3.3.1.1 Document Control, Distribution and Revision

In order that the Quality Manual achieve the goals outlined in Section 3.2, it is necessary that each Pace Analytical laboratory employee be familiar with the current provisions of this document. It is also necessary that this document represent a consensus among Pace Analytical management and operational personnel as to the quality level desired and the means to that end.

Prior to its publication as a controlled document, this manual is reviewed by the Laboratory General Managers, Laboratory Quality Assurance Officers with final approval by the CEO and Director of Quality. To obtain such approval, the document proceeds through an iterative process of review and revision, involving the affected managers and their designated representatives. Upon completion of review/revision, a signed/controlled copy is distributed to each laboratory general manager. The document resides on PaceNet (Pace Analytical intranet) as a read only document for all employees to access at any time.

Revision numbers are designated by an integer followed by one decimal place. This document will be reviewed in its entirety on a regular basis. Each review/revision will be tracked by incrementing the integer by one.

Individual copy distribution of this document may originate at any Pace Analytical facility and from the Corporate Office. When a copy of the Quality Manual is released, a designation is made on the cover as to whether the document is a controlled copy. Recipients of controlled copies will automatically be issued an updated version whenever revisions are made to the existing document. Each Pace Analytical location which distributes copies of this plan shall maintain a record of the name of the individual receiving the document, their affiliation, the number of the copy issued and the control status (i.e., controlled vs. uncontrolled).

3.3.2 Standard Operating Procedures Manuals

All procedures related to sample collection, storage, preparation, analysis, disposal, data validation, data reporting and employee training and safety are contained in written Standard Operating Procedures (SOPs). Each SOP contains the elements outlined in the Pace Analytical Corporate SOP ALL-P-001-A, Guidance Document for Pace Analytical for the Preparation of Standard Operating Procedure Documents. Preparation of SOPs which have company-wide application are the responsibility of the Corporate QA function. Analytical and evidentiary SOPs which are unique to an operating facility are prepared by designated personnel (e.g., analytical- section supervisor; evidentiary- laboratory

QAO). SOPs are assigned a number from the Inventory List for SOPs maintained by the Corporate Quality Office or the Quality Assurance Department of the individual lab, as applicable. This number is a part of the document control number when the SOP is accepted for implementation by Pace Analytical management. Laboratory SOPs are reviewed and approved by the Operations Manager, the QAO, and the General Manager for approval prior to implementation.

3.3.3 Project QA Manuals

Project QA Manuals are implemented as required. These include such documents as Quality Assurance Project Plans (QAPPs). For those projects which require specific QA/QC criteria, it is intended that Pace Analytical be directly involved in the development of the appropriate sections prior to any approval process. In some cases, the analytical section of a QAPP is written by Pace Analytical for the client. In this instance, the QAPP is reviewed and approved by the appropriate Pace Analytical Quality Assurance Officer and Operations Manager.

3.4 TERMS AND DEFINITIONS

Accuracy: The degree of agreement between a measured value and the true or expected value.

Aliquot: A measured portion of a sample taken for analysis.

Analyte: The specific entity an analysis seeks to determine.

Batch: Environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same NELAC-defined matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared environmental samples (extracts, digestates or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples.

Blank: A sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results.

Blind Sample: A sub-sample for analysis with a composition known to the submitter. The analyst/laboratory may know the identity of the sample but not its composition. It is used to test the analyst's or laboratory's proficiency in the execution of the measurement process.

CRDL — Contract required detection limit.

CRQL — Contract required quantitation limit

Calibration: — The process of establishing the relationship between instrument response and known, traceable quantities of analytes of interest.

Calibration Check: — Verification of the ratio of instrument response to analyte amount. A calibration check is done by analyzing for analyte standards in an appropriate solvent. Calibration check solutions are made from a stock solution which is different from the stock used to prepare standards.

Comparability: — Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. Comparable data are produced through the use of standardized procedures and techniques.

Completeness: — Measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. The equation for completeness is:

$$\frac{\text{\# of data points obtained}}{\text{\# of data points expected}} \times 100 = \text{\% completeness}$$

Continuing Calibration: — The process of analyzing standards periodically to verify the maintenance of calibration of the analytical system.

Control Chart: — A graphical representation of test results with respect to time or sequence of measurement, together with limits within which they are expected to lie when the system is in a state of statistical control.

Control Limit: — A range within which specified measurement results must fall to signify compliance. Control limits may be mandatory, requiring corrective action if exceeded, or advisory, requiring that nonconforming data be investigated and flagged.

Data Quality Objective (DQO): — Systematic strategic planning tool based on the scientific method that identifies and defines the type, quality, and quantity of data needed to satisfy a specified use.

Detection Limit — The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero, expressed either as a method detection limit or instrument detection limit.

Dry Weight: — The weight of a sample based on percent solids. The weight after drying in an oven at a specified temperature.

Duplicate Analysis: A second measurement made on the same sample extract or digestate to assist in the evaluation of precision of analysis.

Duplicate Sample: A second aliquot of the same sample that is treated the same as the original sample in order to determine the precision of the method.

Environmental Sample: An environmental sample or field sample is a representative sample of any material (aqueous, non-aqueous, or multimedia) collected from any source for which determination of composition or contamination is requested or required. Environmental samples can generally be classified as follows:

Surface Water and Ground Water

Drinking Water - Delivered (treated or untreated) water designated as potable water.

Water/Wastewater - Raw source waters for public drinking water supplies, ground waters, municipal influents/effluents, and industrial influents/effluents.

Sludge - Municipal sludges and industrial sludges.

Soil - Predominately inorganic matter ranging in classification from sands to clays.

Waste - Aqueous and non-aqueous liquid wastes, chemical solids, and industrial liquid and solid wastes.

EPIC: LIMS developed by Pace Analytical (Environmental Project Information Control)

Equipment Blank: A sample of analyte-free media which has been used to rinse common sampling equipment to check effectiveness of decontamination procedures.

Field Blank: Blank prepared in the field by filling a clean container with pure de-ionized water and appropriate preservative, if any, for the specific sampling activity being undertaken.

Field Sample: A portion of material received by the laboratory to be analyzed, that is contained in single or multiple containers and identified by a unique field ID number.

Holding Time: The elapsed time from the date/time of sample collection by the field personnel until the date/time of its processing/analysis completion. Holding time requirements are dictated by the method or QAPP, whichever is more stringent.

Homogeneity: The degree to which a property or substance is evenly distributed throughout a material.

Instrument Detection Limit: The minimum concentration of a substance that can be measured and reported on a specific analytical instrument with 99% confidence that the analyte concentration is greater than zero. The instrument detection limit is determined by replicate analyses of a standard solution prepared at the instrument. The instrument detection limit is generally more sensitive than the method detection limit because its determination does not include sample preparation steps.

Initial Calibration: The process of analyzing standards, prepared at specified concentrations, to define the quantitative response, linearity and dynamic range of the instrument to the analytes of interest. Initial calibration is performed whenever the results of a continuing calibration do not conform to the requirements of the method in use or at a frequency specified in the method.

Internal Standards: Analytes added to every standard, blank, lab control sample, matrix spike, matrix spike duplicate, and sample at a known concentration, prior to analysis for the purpose of adjusting the response factor used in quantitating target analytes. Internal standards are used as the basis for quantitation of the target compounds, and are generally applicable to organic analyses.

Laboratory Control Sample: A control sample of known composition spiked with a known concentration of analytes of interest. Aqueous and solid laboratory control samples are analyzed using the same preparation, reagents, and analytical methods employed for field samples.

LIMS: Laboratory Information Management System

Lot: A quantity of bulk material of similar composition processed or manufactured at the same time.

MRD: Method Requirements Documents are written guidelines which outline a consistent minimum definition of work performance for basic method compliance. Each MRD is intended to establish a company-wide, baseline level of consistency for a single regulatory-derived method.

Matrix: The component or substrate that contains the analyte of interest.

Matrix Spike: Aliquot of sample fortified (spiked) with known quantities of specified target compounds or analytes and subjected to the entire sample preparation and analysis procedure in order to assess the appropriateness of the method for the sample matrix by measuring recovery.

Matrix Spike Duplicate: A second aliquot of the sample that is treated the same as the original matrix spike sample. The relative percent difference between the matrix spike and matrix spike duplicate is calculated and used to assess analytical precision.

Method Blank: An analytical control consisting of a blank matrix containing all reagents, internal standards and surrogate standards, that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and contamination, and to demonstrate that this level does not exceed acceptance limits. Acceptable levels of contamination are defined by project specific data quality objectives.

Method Detection Limit: The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. Method Detection Limits are determined using replicate spike samples prepared by the lab and taken through all preparation and analysis steps of the method. The method detection limit is calculated using the appropriate Student's t-parameter times the standard deviation of a series of spiked samples.

Proficiency Testing: A process to evaluate the proficiency of an analyst or evaluation of the results obtained on test materials in either a know, single or double-blind fashion.

Precision: The measurement of agreement of a set of replicate results among themselves without any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analysis.

Protocol: A stated plan that clearly defines the objectives, methods and procedures for accomplishing a task.

PQL: The practical quantitation limit (PQL) is the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

QAPP: A Quality Assurance Project Plan or QAPP is a project specific document that describes the policies, organization, objectives, functional activities, and specific QA and QC activities designed to achieve the data quality goals of a specific project.

Quality Assurance: A system of policies and procedures whose purpose is to ensure, confirm and document that the product or service rendered fulfills the requirements of Pace Analytical and its client. Quality Assurance includes quality planning, quality control, quality assessment (auditing), quality reporting and corrective action.

Quality Control: A system of checks and corrective measures, integrated with the activities that directly generate the product or service, that serves to monitor and adjust the process to maintain conformance to predetermined requirements.

Quality System: A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities,

accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required QA and QC.

Raw Data: Any original factual information from a measurement activity or study recorded in a laboratory notebook, worksheets, records, memoranda, notes, or exact copies thereof that are necessary for the reconstruction and evaluation of the report of the activity or study. Raw data may include photography, microfilm or microfiche copies, computer printouts, magnetic media, including dictated observations, and recorded data from automated instruments. If exact copies of raw data have been prepared (e.g., tapes which have been transcribed verbatim, data and verified accurate by signature), the exact copy or exact transcript may be submitted.

Reagent Grade: Analytical reagent (AR) grade, ACS reagent grade, and reagent grade are synonymous terms for reagents which conform to the current specifications of the Committee on Analytical Reagents of the American Chemical Society.

Replicate Samples: Samples collected at the same time, from the same place, for the same analysis, as the original sample in order to determine precision between the samples.

Reporting Limit (RL): The level at which method, permit, regulatory and client specific objectives are met. The reporting limit may never be lower than the statistically determined MDL, but may be higher based on any of the above considerations. Reporting limits are corrected for sample amounts, including the dry weight of solids, unless otherwise specified. Reporting limits are generally two times the MDL.

Sample Delivery Group (SDG): A unit within a single project that is used to identify a group of samples for delivery. An SDG is a group of 20 or fewer field samples within a project, received over a period of up to 14 calendar days. Data from all samples in an SDG are reported concurrently. A Sample Delivery Group is generally defined by one of the following, whichever occurs first:

- All samples within a project; or
- Every set of 20 field samples within a project; or
- All samples received within a 14-day calendar period

Samples may be assigned to Sample Delivery Groups by matrix (i.e., all soil samples in one SDG, all water samples in another), at the discretion of the laboratory. Clients may establish different SDG classifications to meet project specific requirements.

Sensitivity: Capability of methodology or instrumentation to discriminate between samples having differing concentrations or containing differing amounts of an analyte.

Software Quality Assurance: Measures taken to ensure computer programs used to generate data are validated, verified and documented for both vendor-supplied and in-house software packages.

Split Sample: A portion or sub-sample of a total sample obtained in such a manner that is not believed to differ significantly from other portions of the same sample.

Standard: A substance or material, the properties of which are known with sufficient accuracy, to permit its use to evaluate the same property in a sample.

Standard Blank: A calibration standard consisting of the same solvent/reagent matrix used to prepare the calibration standards without the analytes. It is used to construct the calibration curve by establishing instrument background.

Standard Curve: A standard curve is a curve which plots concentrations of known analyte standard versus the instrument response to the analyte.

Standard Operating Procedure: A procedure adopted for repetitive use when performing specific measurement or sampling operation. It may be an industry accepted standard method or one developed by the user.

Surrogates: When employed, these are compounds added to every blank, sample, matrix spike, matrix spike duplicate, lab control sample, and standard prior to any processing or preparation; used to evaluate analytical efficiency by measuring recovery. Surrogate compounds are not expected to be detected in environmental media, but are similar to the analytes of interest. Surrogates are generally utilized for organic analyses.

Systems Audit: An on-site inspection or assessment of a laboratory's quality system.

Traceability: The ability to trace the source and accuracy of a material (i.e. standard) to a recognized primary reference source such as the National Institute of Standards and Technology (NIST) or USEPA.

Trip Blank: This blank is used to detect sample contamination from the container and preservative during transport and storage of the sample. A cleaned sample container is filled with laboratory pure water; any preservative used in the sample is added; and then the blank is stored, shipped, and analyzed with its group of samples.

Validation: The process by which a sample, measurement, method, or data are deemed useful for a specified purpose as based upon the DQOs established for quality control measurements such as accuracy, precision, representativeness, and completeness.

Warning Limits: The limits (typically 2 standard deviations either side of the mean) shown on a control chart within which most results are expected to lie (within a 95% probability) while the system remains in a state of statistical control.

4.0 QA ORGANIZATION AND PERSONNEL

Pace Analytical is a privately held, full-service testing firm operating an integrated system of laboratories, plus multiple service centers nationwide. Each laboratory within the system is set up as an individual entity with local management, but all share common systems and receive support from the corporate office. The chief function of the corporate office is to assist the system laboratories. The corporate office centralizes company wide accounting, business development, financial management, human resources development, information systems, marketing and quality activities. See Figure 4.1 for the Corporate Organizational structure.

4.1 LABORATORY ORGANIZATION AND DESCRIPTION OF RESPONSIBILITIES

For efficient laboratory operation, it is important that all laboratory employees understand the operational structure, specific areas of responsibility and lines of authority within the organization.

It is equally important for laboratory personnel to understand that the reporting structure of the quality function may be separate from other laboratory operations but that the quality function is totally integrated into every aspect of laboratory operation. All laboratory personnel are responsible for knowing and following proper methods and standard operating procedures; recording quality control information required by those procedures in the proper location; and suspending analyses when quality control criteria are not met.

The laboratory is managed by the General Manager. Quality Assurance reports directly to the General Manager and receives guidance and direction from the Corporate Director of Quality.

Under the direction of the General Manager or Laboratory Operations Manager, the technical staff of the laboratory is generally organized into the following functional groups, with the intent to maximize cross functional activity following proper cross training.

- Sample Preparation
- Wet Chemistry Analysis
- Metals Analysis
- GC Analysis
- GC/MS Volatiles Analysis
- GC/MS Semi-volatiles Analysis

Figure 4.2 represents a typical organizational structure for the laboratory operation. Specific laboratories may have variance to the structure based on their size and business offerings. The organizational structure for a specific laboratory is part of the laboratory's addendum.

Individuals involved with implementing procedures outlined in the Quality Manual have the following quality related duties and responsibilities:

4.1.1 Pace Analytical's Director of Quality, Safety and Training is responsible for assisting in the development, implementation and monitoring of quality programs for the company.

4.1.2 The Pace Analytical Laboratory General Manager is responsible for overall laboratory operations. Specific quality assurance responsibilities include:

1. Implement the QA Program within the specific laboratory.
2. Regularly determine the effectiveness of the QA program.
3. Approve laboratory-specific attachments to the QA manual and project-specific Quality Assurance Project Plans.
4. Recommend changes in the QA Program to the laboratory Quality Assurance Officer.
5. Serve as the focal point for the reporting and disposition of all non-conformances.

4.1.3 The Pace Analytical Laboratory Project Manager is the lead person within the laboratory for coordination of all aspects of a specific project. Specifically, some of the project manager's responsibilities include:

1. Establishing direct dialogue with the client pertaining to project requirements, including methodology, TAT, technical information, etc.
2. Arranging bottle orders and shipment of sample kits to client.
3. Verifying log-in information relative to project requirements and field sample chains of custody.
4. Interfacing with laboratory operations staff to update and set project priorities.
5. Updating clients on project status.
6. Providing verbal results to clients.
7. Assisting laboratory staff with report preparation.
8. Working with clients, laboratory staff, and other appropriate Pace Analytical staff to develop project statements of work or resolve problems of data quality.

4.1.4 The Pace Analytical laboratory Quality Assurance Officer (QAO) reviews all aspects of QA/QC for the laboratory. The duties of the laboratory QAO are to:

1. Assist the project manager in specifying QA/QC procedures to be used during the project.
2. Execute QC procedures and techniques to ensure that the laboratory achieves established standards of quality.
3. Evaluate data quality and maintain records on related QC charts and other pertinent information.
4. Monitor laboratory activities to determine conformance with authorized QA policy, and to implement appropriate steps to ensure adherence to QA programs.

5. Coordinate with the client's representative concerning external audits.
6. Review proficiency testing results.
7. Maintain a current distribution list for QAPPs and Quality Manual.
8. Assist in development and implementation of appropriate training programs.
9. Provide technical direction to the laboratory regarding existing and new analytical operation to maintain the integrity of the QA program.

4.1.5 The Operations Manager or Department Managers oversee day-to-day production and quality activities of the laboratory and laboratory related functions of the operation. The specific duties of the Operations Manager are:

1. Provide supervision of laboratory operations.
2. Implement the laboratory quality assurance plan.
3. Ensure proper scheduling and execution of testing programs.
4. Ensure that quality assurance and quality control criteria of analytical methods and projects are satisfied.
5. Assess data quality and take corrective action when necessary.
6. Notify the project team of specific laboratory non-conformances and changes.
7. Approve and release technical and data management reports.
8. Ensure that analysts and technicians maintain sample custody in the laboratory.
9. Approve project specific laboratory quality assurance plans.
10. Coordinate management of projects through technical supervisors.

4.1.6 Group Supervisors/Leaders responsibilities include:

1. Serve as the lead analyst within the specific sections.
2. Lead the training of analysts in laboratory operations and analytical procedures.
3. Organize and schedule analyses with consideration for sample holding times.
4. Implement data verification procedures.
5. Assign duties to analysts as data verifiers.
6. Evaluate instrument performance and supervise instrument calibration and preventive maintenance programs.
7. Report noncompliance situations in regard to the project to the laboratory management and the laboratory Quality Assurance Officer, as appropriate.

4.1.7 Analysts are responsible for tasks identified in the scope of work. They perform the laboratory technical activities within these tasks. The duties of analysts are to:

1. Assist in planning for each phase of their tasks and in defining objectives and activities.

2. Respond to work plan revisions related to their tasks.
3. Train and qualify alternate analysts in specified laboratory QC and analytical procedures.
4. Verify that laboratory QC and analytical procedures are being followed as specified.
5. Review sample QC data at least daily. This includes examination of raw data such as chromatograms (and checking of calculations for a minimum of 10% of the samples analyzed) as well as an inspection of reduced data, calibration curves, and laboratory notebooks.

4.1.8 The Sample Management personnel serves as sample coordinator for the laboratory. Functions carried out by designated personnel include:

1. Sign for incoming samples and verify the data entered on the chain-of-custody forms.
2. Enter the sample information into the computerized Laboratory Information Management System for tracking and reporting.

4.2 TRAINING AND ORIENTATION

Each new permanent employee receives a five part orientation: human resources, ethics, safety, quality assurance, and supervisory. The human resources orientation involves matters of immediate personal concern such as benefits, salary, and company policies. The ethics orientation focuses on core values and workplace integrity. The safety orientation is an in-depth examination of the Pace Analytical Chemical Hygiene Plan and safety program, which are consistent with the requirements of OSHA's Hazard Communication Program (29 CFR 1910.1200). The Quality Assurance orientation provides the new employee with information on the Pace Analytical QA program through an introduction to the Quality manual and SOPs, acceptable record keeping practices, and the individual's responsibility with respect to the quality assurance program. The new employee's Group Supervisor provides the employee with a basic understanding of the role of the laboratory within the structure of Pace Analytical and the basic elements of that individual's position within the laboratory.

Temporary employees receive the same orientation as permanent staff with the exception of the Human Resources orientation. The training of a new employee concentrates on his/her scientific background and work experience to provide the employee with a level of competence so that the individual will be able to function within the defined responsibilities of his/her position as soon as possible. Training is a process used to assist laboratory personnel in their professional development. The training techniques utilized include:

- On-the-job training
- Lectures
- Programmed learning
- Conferences and seminars
- Short courses
- Specialized training by instrument manufacturers

- Participation in check-sample or proficiency sample programs.

Group Supervisors/Leaders are responsible for providing documentation of training and proficiency for each employee under their supervision. The Training Documentation File indicates what procedures (SOPs) an analyst or a technician is capable of performing either independently or only with supervision. The files shall also include examples demonstrating performance of passing QC samples. Training documentation files for each person are kept in a central location in each laboratory. The Group Supervisor/Leader is responsible for updating files. These files include a current curriculum vitae or resume.

4.3 LABORATORY SAFETY

It is the policy of Pace Analytical to make safety and health an integral part of daily operations and to ensure that all employees are provided with safe working conditions, protective equipment, and requisite training to do their work without injury. Each employee is responsible for his/her own safety by complying with established Company rules and procedures.

Sample receiving areas and laboratories are equipped with suitable hoods, protective clothing and eye wear, gloves, barrier creams and any other appropriate measures to prevent or minimize staff contact with hazardous substances. Appropriate safety equipment such as eyewash stations, drench showers, spill absorbents and neutralizers, fire extinguishers, first aid materials, are available.

Each laboratory has a designated Safety Officer. The Safety Officer prepares and maintains the laboratory's Chemical Hygiene Plan/Safety Manual, safety-related SOPs, conducts safety and occupational health orientation, training and review sessions as required, and maintains up to date familiarity with safety and occupational health issues pertinent to the laboratory.

Pace Analytical's safety policies and procedures are documented in the facility's Chemical Hygiene Plan/Safety Manual.

4.4 SECURITY AND CONFIDENTIALITY

Three tiers of security are maintained within Pace Analytical for the purpose of controlling external influences on samples, analytical processes, and data. The first tier of security maintained is controlled access to laboratory buildings. Exterior doors to laboratory buildings remain either locked or continuously monitored by Pace Analytical staff. Keyless door-lock combinations (and computer access codes/logins) are changed on a regular basis. Posted signs direct visitors to the reception office and mark all other areas as off limits to unauthorized personnel. All visitors to the facilities must sign the Visitor's Logbook maintained by the receptionist. All visitors are accompanied by a staff member during the duration of their stay on the premises. The staff member escorts the visitor back to the reception area at the end of his/her visit where he/she signs out in

the Visitor's Logbook. Prior to departure of the last staff member at the close of each day the facility is checked for security.

The second security level is within the facility and may be designated as required by the Operations Manager in consultation with the General Manager. Individual Operations Manager or Group Supervisors close specific areas under their responsibility to entry by unauthorized persons. A list of authorized persons is prepared and signed by the General Manager. "Closed Areas" are designated by prominent postings at all points of access.

The final tier of security is comprised of specific secure areas for sample, data and client report storage which are lockable within the facilities or are secure in offsite storage, and to which access is limited to specific individuals or their designees. Security of sample storage areas is the responsibility of the Sample Custodian. Security of samples and data during analysis and data reduction is the responsibility of Group Supervisors and Operations Manager. Security of client report archives is the responsibility of the Quality Assurance Officer or an appropriate designee. These secure areas are locked whenever these individuals or their designees are not present in the facility.

Designated laboratory sample storage locations are designed to limit access to authorized personnel only, and provisions for lock and key access are provided. No samples are to be removed without proper authorization. If requested by client or contract, samples are not to be removed from secure storage areas without filling out the associated chain-of-custody records.

Standard business practices of confidentiality are applied to all documents and information regarding client analyses. Specific protocols for handling confidential documents are described in Pace Analytical SOPs. Additional protocols for internal identification of samples and data by number only are implemented as required under contract-specific Quality Assurance Project Plans.

Figure 4.1
Corporate/Management Structure

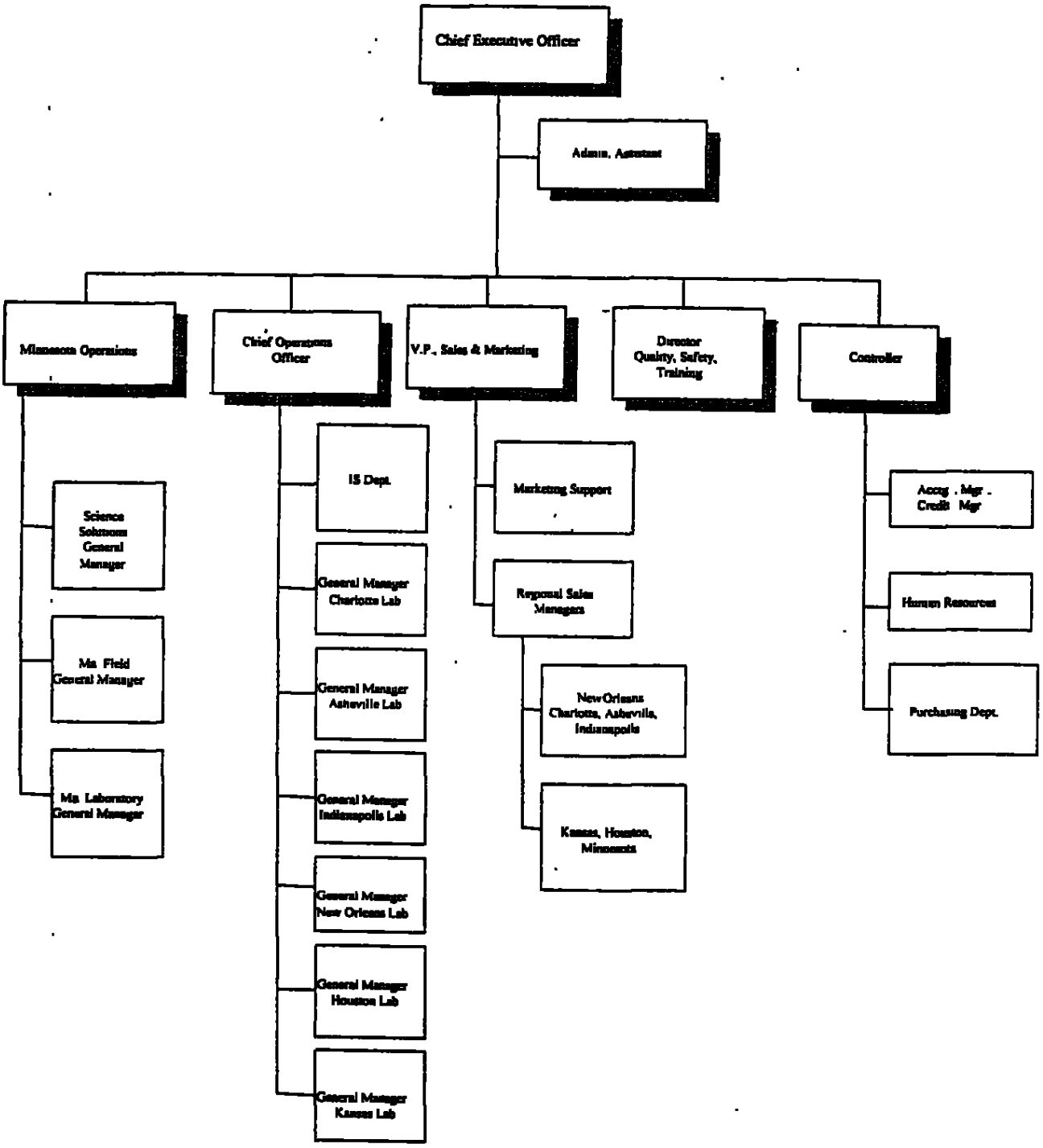
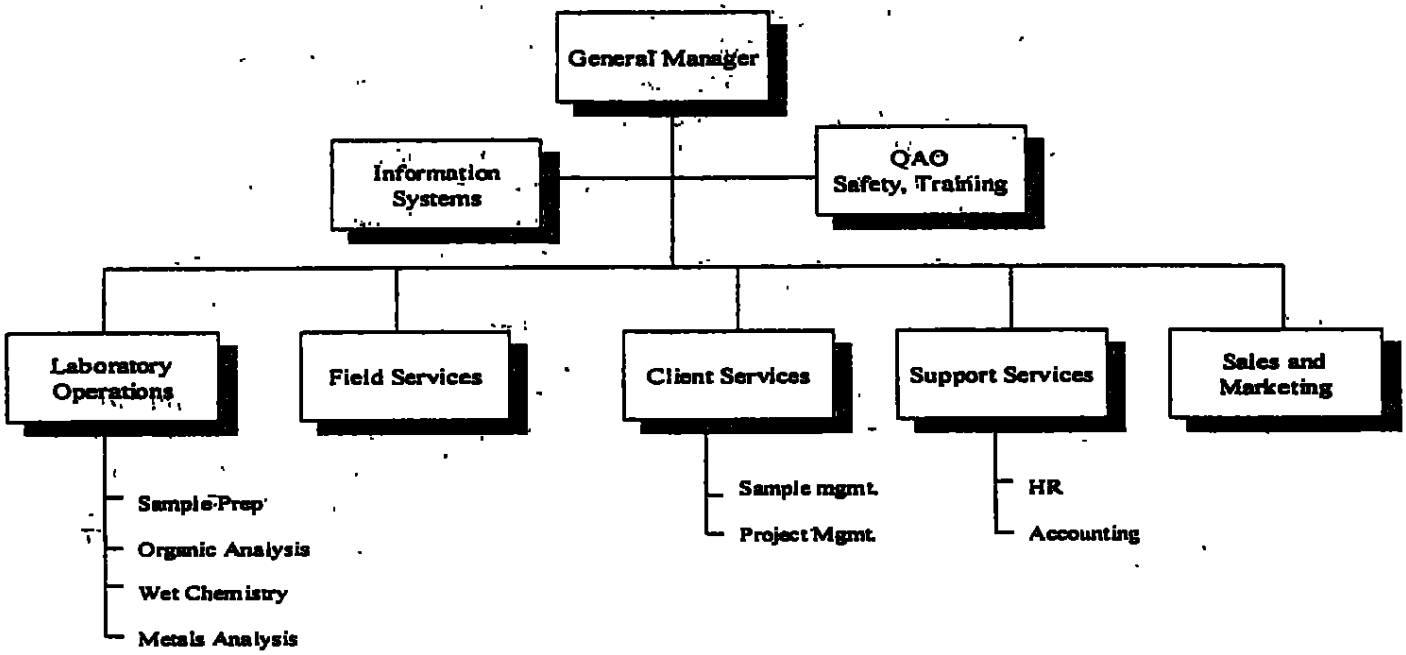


Figure 4.2
Laboratory Organizational Chart



5.0 QUALITY ASSURANCE OBJECTIVES

The purpose of this Quality Manual is to define procedures for the documentation, evaluation, verification, and reporting of data. The objective is to provide a uniform basis for sampling, sample handling, instrument maintenance and calibration, methods control, performance evaluation and analytical data generation and reporting. Specific procedures to be used for sampling, chain of custody, calibration of field instruments (pH, conductivity meters, etc.), laboratory analysis, reporting, internal quality control, audits, preventive maintenance, and corrective actions are described in specific sections of this plan. This section addresses the objectives of precision, accuracy, representativeness, completeness, and comparability (PARCC) which are used to assess whether the data meet the established DQOs (Data Quality Objectives), that are based upon the intended end use of the data.

The quality assurance objective of the laboratories is to provide data of known and documented quality. Precision, accuracy, representativeness, completeness, and comparability are used to assist in data quality assessment. The QA protocols used in the laboratories are referenced from sources including: SW 846 methodologies, EPA Contract Laboratory Program's Statement of Work (Organics and Inorganics), and 40 CFR 136 methodologies.

As stated, the objective of the Quality Assurance Program for the laboratory is to provide data of known quality. To accomplish the objectives, Pace Analytical:

- Maintains an effective, on-going QA/QC program that measures and verifies laboratory performance.
- Provides a quality organization independent of the pressures of project performance with the responsibility and authority for auditing and recommending corrective action.
- Provides a quality organization with clear paths of communication with management.
- Provides sufficient flexibility to allow controlled changes in routine methodology to meet client specific data requirements contained in project-specific quality plans.
- Monitors operational performance of the laboratory on a routine basis and provide corrective action as needed.
- Maintains complete records of sample submittal, raw data, laboratory performance, and completed analyses to support reported data.

5.1 LEVEL OF QA EFFORT

The reliability of data generated in the laboratory is evaluated at the 99% confidence level (mean +/- 3 standard deviations) for control and at the 95% confidence level (mean +/- 2 standard deviations) for warning. Precision of analyses is evaluated using sample duplicates and matrix spike duplicates. Analytical accuracy is monitored using recovery of analytes from surrogate spikes, matrix spikes, EPA reference check standards (when available) and/or lab control samples, and Proficiency Test (PT) samples.

5.2 PRECISION AND ACCURACY

The QA objectives for precision and accuracy are to achieve the QC acceptance criteria specified in the analytical procedures. For the organic and inorganic procedures, the precision and accuracy guideline requirements are specified in the individual methods.

Due to the extensive number of organic parameters and potential matrices, the development of precision and accuracy objectives and control limits for every matrix is difficult. This is typically done with (1) matrix spike and matrix spike duplicate compounds which are added to selected samples before extraction and analysis, and/or (2) surrogate spike compounds which are added to every sample, before extraction and analysis. Although the surrogate and matrix spike analyses do not provide statistically valid statements about precision and accuracy for every compound in a sample, they do give the data reviewer enough information to make judgments about precision and accuracy on a sample-by-sample basis.

Inorganic precision and accuracy objectives are determined by using duplicate or matrix spike duplicate samples (precision), matrix spike and laboratory control samples (accuracy). The following procedure is used:

> For a duplicate (or matrix spike duplicate) sample analysis, at least one duplicate (or MSD) sample is analyzed per sample matrix type (e.g., water, soil) and concentration (e.g., low, medium) per batch of samples or for each 20 samples received, whichever is more frequent, or as specified by project requirements. Samples identified as field blanks can NOT be used for duplicate (or MSD) samples analyses. If two analytical methods are used to obtain the reported values for the same element for a batch of samples (i.e., ICP, GFAA), duplicate samples are run by each method. The relative percent difference (RPD) for each component is calculated for later use during data assessment.

Precision measures the reproducibility of repetitive measurements. It is strictly defined as the degree of mutual agreement among independent measurements as the result of repeated application of the same process under similar conditions. Analytical precision is a measurement of the variability associated with duplicate (two) or replicate (more than two) analyses of the same sample in the laboratory and is determined by analysis of laboratory duplicate/replicate samples. Total precision is a measurement of the variability associated with the entire sampling and analysis process. It is determined by analysis of duplicate or replicate field samples and incorporates variability introduced by both the laboratory and field operations. Duplicate (two) samples or spiked samples are analyzed to assess field and analytical precision as required under certain programs (e.g., Air Force tasks), and the results are assessed using the relative percent difference (RPD) between duplicate measurements. Precision objectives are presented for each analytical method in the corresponding Pace Analytical Standard Operating Procedure (SOP).

Accuracy is a statistical measurement of correctness and includes components of random error (variability due to imprecision) and systematic error. It therefore reflects the total error associated with a measurement. A measurement is accurate when the value reported does not differ from the true value or known concentration of the spike or standard. Analytical accuracy is typically measured by determining the percent recovery

of known target analytes that are spiked into a field sample (a surrogate or matrix spike) or reagent water (laboratory control sample [LCS] or QC check sample). Surrogate compound recovery is reported and is used to assess method performance for each sample analyzed for volatile and semivolatile organic compounds.

Both accuracy and precision are calculated for analytical batches, and the associated sample results must be interpreted by considering these specific measures. Calculation of precision and accuracy to measurement sample results is discussed in the QC section of each SOP.

The QC limits for accuracy and precision are developed based upon laboratory derived data. When applicable, interlaboratory control limits are used to judge acceptability of data generated by the laboratories. Where EPA acceptability criteria does not exist for a given method being utilized for the first time, the laboratories may establish control limits derived from a minimum of four data points. Until verified by a statistically significant data population, the control limits will be considered as advisory limits only and will not automatically initiate a rerun or reanalysis criteria if they are not met.

Generally, QC acceptance limits are laboratory specific, having been statistically derived from an individual laboratory's data. QC objectives for a specific laboratory are included in a project specific QAPP or as a facility specific addendum to this document.

5.3 COMPLETENESS

Completeness is a measure of all information necessary for a valid scientific study. For completeness, it is expected that the methodology proposed for chemical characterization of the samples collected will provide data meeting QC acceptance criteria following standard laboratory data review and validation for at least 95% of all samples collected. Completeness may also be defined as a comparison of the number of tests successfully completed (with acceptable QC) to the number of tests requested. Discrepancy reports are completed to provide explanation when QC criteria are not met.

5.3.1 Random Error

EPA has established (preamble to 40 CFR Part 136, Vol. 49, No. 209, October 26, 1984) that there is a 5% probability that the results obtained for any one analyte will exceed the control limits established for the test due to random error. As the number of compounds measured increases in a given sample, the probability for statistical error also increases.

5.4 REPRESENTATIVENESS

Representativeness is a qualitative element that is related to the ability to collect a sample that reflects the characteristics of that part of the environment that is to be assessed. Sample representativeness is dependent on the sampling techniques used and is considered individually for each project. It is specifically addressed in the work plan.

5.5 COMPARABILITY

Comparability is also considered during preparation of a site specific work plan. One objective of comparability is to ensure that results of similar activities conducted by different parties are comparable. This often involves the use of two independent laboratories on a project or site, whereby the second laboratory is used to confirm a pre-established percentage of sample analyses. Pace Analytical uses EPA-approved or other methods and procedures to ensure comparability with data from previous or following studies. Pace Analytical participates in external and interlaboratory performance evaluation (PE) and proficiency test (PT) studies as additional means of establishing comparability in the laboratory.

5.6 TRACEABILITY

Traceability is the extent to which results can be substantiated by documentation. Traceability documentation exists in two forms: that which links final numerical results to authoritative measurement standards, and that which explicitly describes the history of each sample from collection to disposal. Refer to the sections on sample custody and records management for more specifics on Pace Analytical procedures.

5.7 PERSONNEL QUALITY OBJECTIVES

Pace Analytical is committed to the philosophy that quality operations result from quality planning, design, and work performance by skilled operational personnel. Pace Analytical's policy is to perform its varied types of technical work in accordance with standard quality assurance practices including Good Laboratory Practices (GLP) and the EPA protocols and methodologies, as well as other appropriate regulatory agency guidelines and requirements. Each laboratory within Pace Analytical has a Quality Assurance Officer responsible for maintenance of standard operating procedure records, performance of laboratory audits, tracking performance evaluation and proficiency test sample performance, monitoring federal and state certifications and documenting quality assurance activities.

Each laboratory worker is responsible for knowing standard operating procedures; following these procedures during routine analyses; recording quality control information required by those procedures in the proper location, and taking appropriate corrective action including suspending analyses when quality control criteria are not met.

6.0 SAMPLING PROCEDURES

6.1 INTRODUCTION

Obtaining representative samples and maintaining their integrity are critical parts of any monitoring program. Analytical methods have been standardized but the results of analyses are only as good as the sampling and the sample preservation methods. Defining the magnitude and the nature of an environmental problem requires collecting representative samples for laboratory analysis and data evaluation. Defining in detail the numerous available sampling procedures and their associated quality elements applicable to environmental testing is beyond the scope of this document. Quality elements required to meet the DQOs for a given sampling event must be contained in a project specific sampling plan or within an overall site work plan. The plans should present the best approved techniques currently available for sampling and sample preservation.

In sampling, the objective is to remove a small portion of an environment that is representative of the entire body. Once the sample is taken, the constituents of the sample must stay in the same condition as when collected. The length of time that these constituents will remain stable is related to their character and the preservation method used. Since preservation methods relate to the parameters to be analyzed, these techniques are classified by parameter.

6.2 SAMPLING SERVICES

Various Pace Analytical locations provide a variety of sampling services. A well-defined communication mechanism is critical to obtaining samples which are representative of site conditions. Figure 6.1 lists minimum elements which must be established, communicated, and followed during each phase of the sampling and analysis project. Listed below are the types of sampling events for which Pace Analytical can provide services.

6.2.1 Ground Water Monitoring

Collection and analysis of ground water samples from sanitary landfills, Superfund sites, abandoned hazardous waste dumps and spill sites involves the use of an extensive array of state-of-the-art sampling equipment with the ability to pre-pump and sample wells of all sizes, to depths of more than 200 feet.

6.2.2 Waste Water Monitoring

Collection of samples for routine wastewater monitoring; special compliance monitoring for metals, cyanide and total toxic organics (TTO); NPDES permit application monitoring; and more, as required by local, state of federal agencies.

6.2.3 Hazardous Waste Sampling

Pace Analytical can conduct an inventory, collect and analyze samples, and repackage and properly label hazardous waste for shipment.

6.2.4 Flow Monitoring

Monitoring flow in most types of discharges through installation of wiers or flumes and also determine flow using fluormetric dye tracing methods.

6.2.5 Soil & Soil Gas Sampling

Typically this involves collecting soil samples for volatile and semi-volatile organics, inorganics, hazardous waste constituents and most other chemical parameters of concern.

6.2.6 PCB Services

Collection of samples from transformers, electrical switches and capacitors to be tested for the presence of PCBs. Handling of PCB-related spills includes the collection and analysis of wipe, swab or soil samples.

6.2.7 Ambient Air Monitoring and Stack Emission Testing

Pace Analytical has experience in providing sampling as specified in the Toxic Organic (TO method series) protocols for ambient air monitoring, along with NIOSH and AIHA specified applications. Full capability stack sampling and testing (e.g., VOST, impinger, etc.) is available for process optimization and emission monitoring.

6.3 FIELD SUPPORT

Pace Analytical provides shipping containers, custody documents, cooler and/or sample custody seals as needed, sample bottles, labels, chemical preservatives for water samples, and trip, temperature and field blanks to support field sampling events. Tables 6.1, 6.2 and 6.3 list general guidelines for sample container types, preservatives and holding times for a variety of methods. Note that all analyses listed are not necessarily performed at all Pace Analytical locations and there may be additional laboratory analyses performed that are not included in these tables. Certain Pace Analytical locations can provide pick up and delivery services to their clients.

Upon receipt of the field samples at the laboratory, Pace Analytical ensures that sample bottles are maintained according to preservation requirements and that sample storage conditions do not contribute to the presence of test analytes in the samples.

<u>Pace Analytical Shipping Containers</u>

Pace Analytical typically uses commercial coolers for the transport of environmental samples from the field to the laboratory. Chain-of-custody seals and forms, employed for each cooler packed at Pace Analytical ensure complete documentation and provide evidence of unbroken custody of the cooler contents. Coolers meet or exceed all protocol requirements (i.e., DOT, USEPA, ASTM) for shipping. Coolers are prepared at the laboratory to provide the client with all of the sample containers needed for the analyses required by a project.

6.4 PRESERVATION

Pace Analytical provides the required chemical preservatives for water samples. High quality, reagent grade chemical preservatives are used. It is the responsibility of those collecting the samples to properly use these materials and ensure that proper preservation techniques are performed and preservative requirements are met, including the maintenance of proper temperature.

Upon receipt of samples at the laboratory, the temperature of each cooler is measured and recorded on the chain of custody or other supporting documents. Similarly, the pH of bottles to which chemical preservative was added is measured (with the exception of sample collected for volatile organic compounds and TOX), and recorded. A disposable pipette, or similar procedure to prevent sample contamination, is used to remove an aliquot of the sample for the pH check.

6.5 SAMPLE CONTAINERS

Pace Analytical provides pre-cleaned sample containers (with or without preservative) in the shipping containers for sample collection. Sample bottles are never reused by the laboratory.

6.6 SAMPLE RECEIPT SCHEDULE

Samples are usually accepted at Pace Analytical facility during normal business hours within one day following field sampling unless different arrangements are made in advance with an authorized Pace Analytical representative. Shipping containers received at the laboratory on business holidays, weekends or after normal work hours will be placed in the walk-in refrigerator and opened on the next regular business day unless prior arrangements are made in advance for that day's receipt and log-in.

Figure 6.1

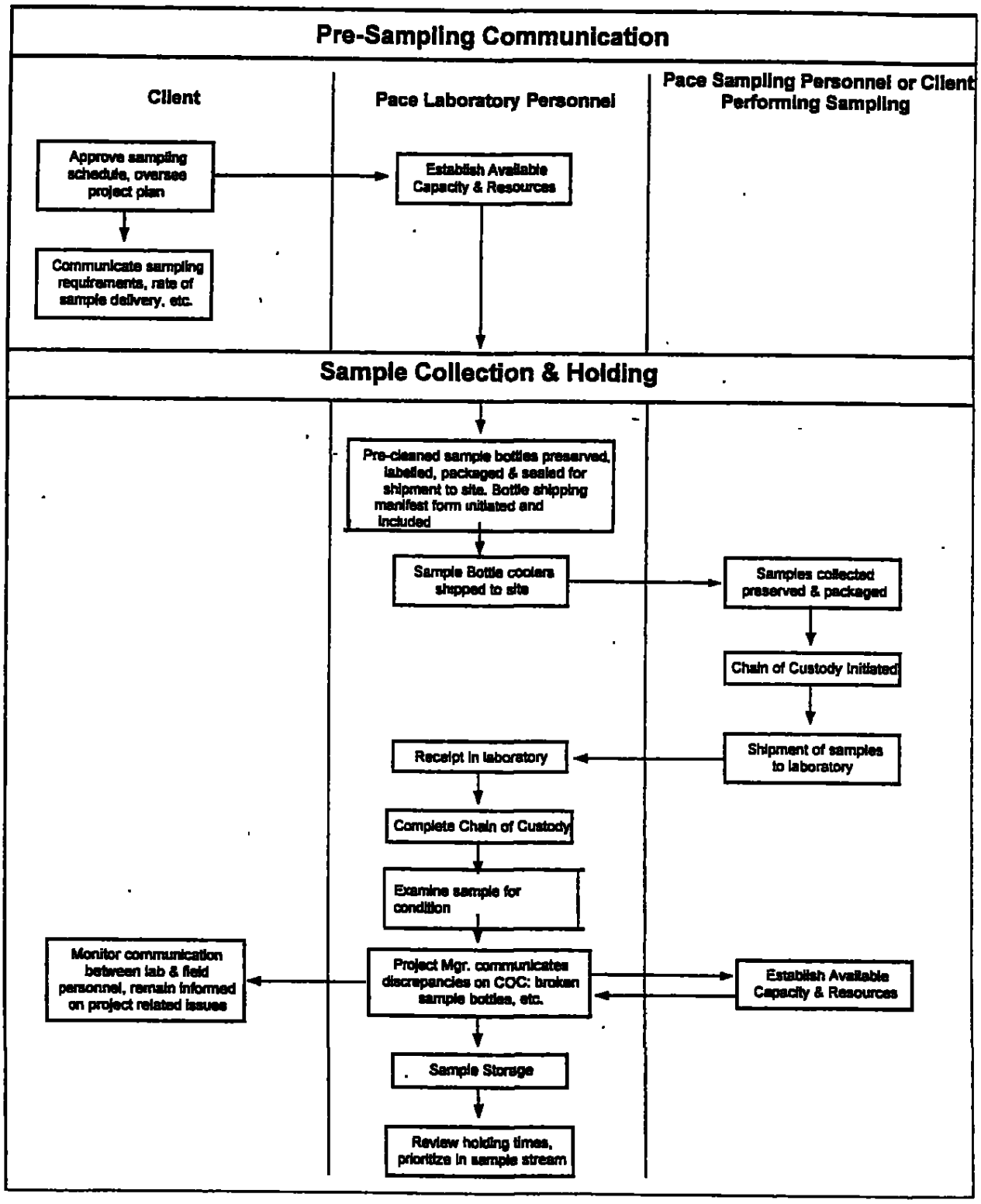

Pre-Sampling Communication
Client
Pace Laboratory Personnel
Pace Sampling Personnel or Client Performing Sampling
Approve sampling schedule, oversee project plan
Establish Available Capacity & Resources
Communicate sampling requirements, rate of sample delivery, etc.
Sample Collection & Holding
Pre-cleaned sample bottles preserved, labelled, packaged & sealed for shipment to site. Bottle shipping manifest form initiated and included
Sample Bottle coolers shipped to site
Samples collected preserved & packaged
Chain of Custody Initiated
Shipment of samples to laboratory
Receipt in laboratory
Complete Chain of Custody
Examine sample for condition
Monitor communication between lab & field personnel, remain informed on project related issues
Project Mgr. communicates discrepancies on COC: broken sample bottles, etc.
Establish Available Capacity & Resources
Sample Storage
Review holding times, prioritize in sample stream

TABLE 6.1 List of Containers, Preservatives and Holding Times for Inorganic and Organic Analyses of Aqueous Samples:

NAME	CONTAINER[1]	PRESERVATION[2]	MAXIMUM HOLDING TIME[3]
Inorganic Tests:			
Acidity	P,G	Cool, 4°C	14 days
Alkalinity	P,G	Cool, 4°C	14 days
Ammonia	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Biochemical oxygen demand	P,G	Cool, 4°C	48 hours
Bromide	P,G	None Required	28 days
Biochemical oxygen demand, carbonaceous	P,G	Cool, 4°C	48 hours
Chemical oxygen demand	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Chloride	P,G	None Required	28 days
Chlorine, total residual	P,G	None Required	Analyze immediately
Color	P,G	Cool, 4°C	48 hours
Cyanide, total amenable to chlorination	P,G	Cool, 4°C, NaOH to pH>12 0.6g ascorbic acid[4]	14 days
Fluoride	P	None Required	28 days
Hardness	P,G	HNO_3, to pH<2, H_2SO_4 to pH<2	6 months
Hydrogen ion (pH)	P,G	None Required	Analyze immediately
Kjeldahl and organic nitrogen	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Metals:			
Chromium VI	P,G	Cool, 4°C	24 hours
Mercury (SW846)	P,G	HNO_3 to pH<2	28 days in glass
Mercury (CLP, 200 series)	P,G	HNO_3 to pH<2	28 days
Metals, except chromiumVI and mercury	P,G	HNO_3 to pH<2	6 months
Nitrate	P,G	Cool, 4°C	48 hours
Nitrate-nitrite	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Nitrite	P,G	Cool, 4°C	48 hours
Oil and grease	G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Organic carbon	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Orthophosphate	P,G	Filter immediately, Cool, 4°C	48 hours
Phenols	G only	Cool, 4°C, H_2SO_4 to pH<2	28 days
Phosphorus (elemental)	G	Cool, 4°C	48 hours
Phosphorus, total	P,G	Cool, 4°C, H_2SO_4 to pH<2	28 days
Residue, total	P,G	Cool, 4°C	7 days
Residue, filterable	P, G	Cool, 4°C	7 days
Residue, nonfilterable (TSS)	P, G	Cool, 4°C	7 days
Residue, Settleable	P, G	Cool, 4°C	48 hours
Residue, volatile	P, G	Cool, 4°C	7 days
Silica	P	Cool, 4°C	28 days

TABLE 6.1 (cont.) List of Containers, Preservatives and Holding Times for Inorganic and Organic Analyses of Aqueous Samples:

NAME	CONTAINER[1]	PRESERVATION[2]	MAXIMUM HOLDING TIME[3]
Inorganics Continued:			
Specific conductance	P,G	Cool, 4°C	28 days
Sulfate	P,G	Cool, 4°C	28 days
Sulfide	P,G	Cool, 4°C, add zinc acetate & sodium hydroxide to pH>9	7 days
Sulfite	P,G	None Required	Analyze immediately
Surfactants	P,G	Cool, 4°C	48 hours
Turbidity	P,G	Cool, 4°C	48 hours
Organic Tests:			
Oil and Grease	G	Cool, 4°C, HCl or H_2SO_4 to pH<2	28 days
Organic carbon, Total (TOC)	P,G	Cool, 4°C, HCl or H_2SO_4 to pH<2	28 days
Purgeable Halocarbons	G,Teflon-lined septum	Cool, 4°C, 0.008% $Na_2S_2O_3$[4], HCl[5,6] to pH<2	14 days
Purgeable Aromatic Hydrocarbons	G,Teflon-lined septum	Cool, 4°C, 0.008% $Na_2S_2O_3$[4], HCl[5,6] to pH<2	14 days
Acrolein and acrylonitrile	G,Teflon-lined septum	Cool, 4°C, 0.008% $Na_2S_2O_3$[4] Adjust pH to 4-5	14 days
Phenols	G,Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$[4]	7 days until extraction, 40 days after extraction
Benzidines	G,Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$[4]	7 days until extraction, 40 days after extraction
Phthalate esters	G,Teflon-lined cap	Cool, 4°	7 days until extraction, 40 days after extraction
Nitrosamines	G,Teflon-lined cap	Cool, 4°C, store in dark, 0.008% $Na_2S_2O_3$[4]	7 days until extraction, 40 days after extraction
PCBs	G,Teflon-lined cap	Cool, 4°C	7 days until extraction, 40 days after extraction
Nitroaromatics and cyclic ketones	G,Teflon-lined cap	Cool, 4°C, store in dark, 0.008% $Na_2S_2O_3$[4]	7 days until extraction, 40 days after extraction
Polynuclear aromatic hydrocarbons	G,Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$[4]	7 days until extraction, 40 days after extraction
Haloethers	G,Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$[4]	7 days until extraction, 40 days after extraction
Chlorinated Hydrocarbons	G,Teflon-lined cap	Cool, 4°C, HCl or H_2SO_4	7 days until extraction, 40 days after extraction
Dioxins and Furans	G,Teflon-lined cap	Cool, 4°C, 0.008% $Na_2S_2O_3$[4]	40 days until extraction, 40 days after extraction
Total organic halides (TOX)	G,Teflon-lined cap	Cool, 4°C, HCl or H_2SO_4 to pH <2	28 days
Pesticides	G,Teflon-lined cap	Cool, 4°C pH 5-9	7 days until extraction, 40 days after extraction

Table Footnotes:
[1] Polyethylene (P) or glass (G)
[2] Sample preservation should be performed immediately upon sample collection.
[3] Holding times are based from time of sample collection.
[4] Should only be used in the presence of residual chlorine.
[5] Free chlorine must be removed prior to addition of HCl by the appropriate addition of $NA_2S_2O_3$
[6] Sample receiving no pH adjustment must be analyzed within seven days of sampling.

Table 6.2 Required Containers, Preservation Techniques, and Holding Times for Non-Aqueous, Soil or Solid Matrices (as specified in SW-846):

NAME	CONTAINER	PRESERVATION	MAXIMUM HOLDING TIME[1]
Semivolatile Organics/Organochlorine Pesticides/PCBs and Herbicides			
Concentrated waste samples	8 oz. wide mouth glass w/Teflon liner	None	14 days until extraction, 40 days after extraction
Liquid samples, no residual Chlorine present	1 gal. or 2 1/2 gal. amber glass w/Teflon liner	Cool, 4°C	Samples must be extracted within 7 days & extracts analyzed within 40 days
Residual Chloride, present	1 gal. or 2 1/2 gal. amber glass w/Teflon liner	Add 3mL 10% sodium thiosulfate	Samples must be extracted within 7 days & extracts analyzed within 40 days
Soil/sediments and sludges	8 oz. wide mouth glass w/Teflonliner	Cool, 4°C	14 days until extraction, extracts analyzed within 40 days.
Volatile Organics			
Concentrated waste samples	8 oz. wide mouth glass w/Teflonliner	None	14 days
Liquid samples, no residual Chlorine present	3x40 mL vials w/Teflon lined septum caps	Cool, 4°C[2]	14 days
Residual Chlorine, present	3x40 mL vials w/Teflon lined septum caps	Collect sample in a 4 oz. soil VOA container which has been pre-preserved w/4 drops of 10% sodium thiosulfate. Gently mix sample & transfer to a 40mL VOA vial[2]. Cool to 4°C	14 days
Acrolein & Acrylonitrile	3x40 mL vials w/Teflon lined septum caps	Adjust to pH 4-5, Cool to 4°C	14 days
Soil/sediments and sludges	4 oz. (120mL), wide mouth glass w/Teflon liner or wide mouth glass container sealed w/a septum	Cool to 4°C	14 days

[1] Holding times are based from time of sample collection.
[2] Adjust pH<2 w/H_2SO_4, HCl or solid $NaHSO_4$

Table 6.3 Required Containers, Preservation, and Technical Hold Times for Air Methods:

TEST	MEDIA	PRESERVATION	MAXIMUM HOLDING TIME [1]
TO1	Tenax tubes	Freezer - 20°C	14 days
TO2	Carbo Sieve	Cool to 4°C	14 days
VOST	Tenaz/Tenaz-charcoal	Cool to 4°C	14 days
TO4	Puf 3" long, 60mm diameter	Freezer - 10°C or below	Extracted 7 days after collection
TO1O	Puf 10cm long, 20mm diameter	Cool to 4°C	Extracted 7 days after collection
TO11	Absorbent cartridge	Cool to 4°C	30 days
TO13	Puf XAD/XAD		Extracted 7 days after collection
TO14	Summa canisters	Room temperature	Not specified
	Tedlar bags	Room temperature	48-72 hours (dependant on client)
T09	PUF XAD/XAD	Cool to 4°C	30 days
Method 3C	Summa cannisters	Room temperature	15 days
	Tedlar bags		
Method 23	XAD	Cool to 4°C	30 days

1. Holding times are based from time of sample collection.

7.0 SAMPLE CUSTODY

7.1 SAMPLE RECEIPT AND ACCEPTANCE

Sample shipments are received at the sample receiving area. Sample management personnel verify the number of shipping containers received against the numbers listed on the shipping manifest/chain-of-custody. Any damage to the shipping containers or other discrepancies observed are noted on the chain-of-custody or on the sample receiving non-conformance report. A copy is filed for future reference.

The external chain-of-custody is signed by the carrier for relinquishment of samples and signed by sample management personnel for sample receipt. The actual chain-of-custody may be supplied by Pace Analytical (Figure 7.1), or may be the client's own form. The chain-of-custody remains in the project file at all times.

7.2 CHAIN OF CUSTODY

Chain-of-Custody encompasses three major elements: field sampling, laboratory analysis and final data file. A Chain-of-Custody (COC) document may be the means in some types of legal proceedings by which evidence of custody of samples from time of receipt to completion of analysis is proven in the courts. Pace Analytical has implemented standard operating procedures to ensure that sample custody objectives of traceability and responsibility are achieved for every project. This section covers quality related activities from the receipt of samples at the laboratory through the issuance of final analytical data and the storage of data in its final data file.

Field personnel or Client representatives complete a Chain-of-Custody Form for all samples. Samples are received by the laboratory accompanied by these forms.

The sampler is responsible for providing the following information:

- Client project name
- Project location
- Field sample number/identification
- Date and time sampled
- Sample type
- Preservative
- Analysis requested
- Sampler signature
- Signature of person relinquishing samples
- Date and time relinquished
- Sampler remarks
- Custody Seal Number (if applicable)

The record is filled out completely and legibly. Errors are corrected by drawing a single line through and initialing and dating the error. All transfers of samples except to and from commercial couriers must be recorded on the Chain-of-Custody via the "relinquished" and "received by" sections. All information except signatures should be printed.

7.3 SAMPLE VERIFICATION

7.3.1 Upon arrival of a sample shipment, sample management personnel perform sample inspection. Pace Analytical's Sample I.D. and Condition Sheet, or equivalent (Figure 7.2), serves as a check-off list of procedures to follow and as documentation of the following:

1. Presence/absence of custody seals or tapes of the shipping containers and the condition of the seals (i.e., intact, broken).

2. Presence/absence of chain-of-custody; (if present, is it complete?)

3. Presence/absence of sample tags; (if present, are they removable?)

4. Agreement/non-agreement between the sample tags, chain-of-custody, and any client documentation.

5. Condition of the samples when received, including:

   - Sample temperature
   - Intact, broken/leaking
   - Headspace in VOA vials
   - Sample holding time
   - Sample pH when required
   - Adequate sample volume provided
   - Appropriate containers/preservatives used

If discrepancies are found, the Pace Analytical's project manager is contacted immediately (verbally and by using a Discrepancy Report Form, or equivalent (Figure 7.3). If the project manager is not available, the QAO is contacted for further directions. Discrepancies will be reported with analytical results.

7.4 SAMPLE LOG-IN

7.4.1 General Policies

a. Upon completing sample receipt/custody procedures, all sample and analysis data must be complete and documented on the chain of custody or accompanying forms for input into the Laboratory Information Data Management System (EPIC).

   Sample and analysis data must include:

   - Client name and contact
   - Client number
   - Pace Analytical project number
   - Pace Analytical project manager
   - Sample descriptions
   - Due date
   - List of analyses requested

b. Sample and requested analyses data are input into EPIC.

c. All samples received are logged into EPIC within one working day of receipt. Sample log in may be delayed due to client clarification of analysis needed, corrective actions for sample receipt non-conformance, or other unusual circumstances.

1. In accordance with NELAC and other analytical guidance documents, all samples will be assigned a unique ID code that is unequivocally linked to the field ID code.

d. Sample containers are labeled with the corresponding sample number.

7.5 WHEN SAMPLES ARE RECEIVED WITH NO DOCUMENTATION

7.5.1. <u>If delivered by a client</u>: Client is asked if previous arrangements were made for analysis (and with whom). The client completes a chain of custody and/or request for analysis, relinquishes samples to sample management personnel, and is given a copy of the COC.

7.5.2. <u>If received by courier or shipping, the following steps are taken</u>:

1. Client Services manager is consulted to determine the designated Pace Analytical project manager.
2. Information is requested from the Pace Analytical project manager.

7.5.3. If analysis information cannot be determined on the day of sample receipt, sample data entry personnel proceed to assign sample numbers and put samples on hold. Follow-up with project manager occurs until the analyses are determined and samples can be properly logged in.

Any additional specific procedures are documented in Sample Receiving SOP for each laboratory.

7.6 RESPONSIBILITIES FOR SAMPLE LOG IN

7.6.1. <u>Sample Management Responsibilities</u>

- Has the primary responsibility of ensuring that sample information is input into EPIC as described in the SOP. This information must be supplied by the project manager.

- Has the responsibility to make recommendations to the QAO for revising the SOP related to sample receipt.

7.7 SAMPLE STORAGE/STAGING

7.7.1. General Procedures

Samples are processed into the system immediately upon receipt for staging to prevent sample degradation.

7.7.2. Refrigerated Area Maintenance

All refrigerated areas are maintained at 4°C (+/- 2°C) The temperature is monitored and recorded each work day (certain programs may require more frequent monitoring). If the temperature fails outside the limits of 2°- 6°C, corrective action is taken as follows and appropriately documented.

1. Temperature is rechecked after an hour to verify temperature exceedance.
2. QAO and laboratory management are notified if the problem persists.
3. Every effort is made to relocate samples to a proper environment if temperature cannot be maintained after corrective actions are implemented.
4. Affected clients are notified.

7.7.3. Specific Procedures

1. <u>Volatiles</u>

   Samples for volatiles analysis are kept in designated volatile organic refrigerated areas. Where practical, soils and waters are segregated.

2. <u>Semi-Volatiles</u>

   Samples within a project are stored in a logical order such that specific samples may be readily retrieved.

3. <u>Hazardous Materials</u>

   Pure product or potentially heavily contaminated samples are tagged as "hazardous" or "lab pack" and stored separate from other samples.

4. <u>Foreign Soils</u>

   Foreign soils are soils which originate outside the United States, soils from U.S. territories are deemed foreign, or come from a quarantined area within the United States. Depending on the soil disposal practices of the laboratory, foreign soils may need to be stored separately since

the USDA requires these samples to be autoclaved or incinerated prior to disposal.

7.7.4. Responsibilities for Sample Storage/Staging

1. Sample management personnel are responsible for all samples upon receipt.

2. Sample management personnel or individual laboratory area personnel have the responsibility of daily sample storage area maintenance, disposal of old samples, managing holding blanks and providing space for incoming samples in routine storage areas.

3. Assigned individuals, including backup, are responsible for maintaining and documenting: (a) refrigerated storage area temperatures, and (b) corrective actions.

7.8 SAMPLE/DATA ACCESS AND INTERNAL CHAIN-OF-CUSTODY

7.8.1. General Policies and Procedures

Pace Analytical has implemented standard operating procedures to assure the integrity of samples and data so that they are not degraded or available to unauthorized personnel. In order to ensure that this policy is maintained, the laboratory facilities are operated under controlled access. Only employees are allowed into the laboratory facilities. Visitors must register at the front desk and be properly escorted.

Samples are removed from their proper location by designated personnel and returned to a storage area, if necessary, immediately after the required sample quantity has been taken. This procedure minimizes unnecessary time spent searching for samples and helps prevent matrix degradation from prolonged exposure to room temperature. After the final report is sent and clients are allowed adequate time to review the results, the samples are properly discarded or returned to the client.

Upon client request, additional and more rigorous chain-of-custody protocols for samples and data can be implemented. For example, for projects for which the "secure area" designation is not sufficient, analysts and technicians follow strict internal chain-of-custody procedures to further ensure the security of samples. All samples are signed out in a sample custody log book when they are removed for analysis. The sample ID, date, time, analyst, and lab of analysis is recorded in the sample custody log (Figure 7.4) or equivalent. Samples are signed back in noting date, time, and storage location, upon return.

7.9 SUBCONTRACTING ANALYTICAL SERVICES

Every effort is made to perform chemical analyses for Pace Analytical clients within a company laboratory.

When subcontracting to an external laboratory becomes necessary, a preliminary verbal communication with an appropriate laboratory is undertaken. Work performed under specific protocols may involve special consideration. The contact and preliminary arrangements and terms of agreement are made between the Pace Analytical Project Manager and the appropriate subcontract laboratory personnel (i.e., Laboratory Manager, customer services contact, or the appropriate laboratory section manager). The specific terms of the subcontract laboratory agreement includes the requirement for provision of the following (when applicable):

- Method (EPA or otherwise) of analysis
- Number and type of samples expected
- Project specific QA/QC requirements
- Deliverables required
- Laboratory certification requirement
- Price per analysis
- Turn around time requirements

Chain-of-Custody forms are generated for samples which require subcontracting to other laboratories. The sample management personnel repackage the samples for shipment, create a transfer chain-of-custody form and record the following information:

- Pace Analytical Laboratory Number
- Matrix
- Requested analysis
- Special instructions (quick turn around, required detection or reporting limits, unusual information known about the samples or analytical procedure).
- Signature in "Relinquished By"

All subcontracted sample data reports are sent to the Pace Analytical Project Manager Any Pace Analytical work sent to other labs within the Pace Analytical network is handled as subcontracted work.

7.10 SAMPLE DISPOSAL

Samples not consumed during the analyses are returned to the client or disposed of by Pace Analytical's licensed contractor.

After completion of sample analysis and submission of the analytical report, unused portions of samples are retained by the laboratory for a minimum of 30 days unless otherwise stated by the project contract or client request. After this period expires, samples will be disposed according to the nature of the samples.

<u>For In-House Sample Disposal</u>

All preserved water -Non-hazardous-Neutralize/sewer

Unpreserved water-Non-hazardous/sewer

Soil/Sludge-Non-hazardous-Refuse Disposal

All VOA's-Non-hazardous-Neutralize/sewer

Samples Extracts/Digestates-Non-hazardous--Neutralize/sewer

7.10.1 Hazardous Material/Waste Sample Disposition Option

The preferred method for disposition of hazardous samples is to return the excess sample to the client. It may not be feasible to return samples in all cases or the client may require Pace Analytical to dispose of excess samples. Pace Analytical will dispose of excess samples when required and may charge a disposal fee to recover costs for management and disposal.

7.11 LOCATION SPECIFIC SOPS FOR SAMPLE CUSTODY

Information included in this document is intended to provide a general description of procedures followed by all Pace Analytical laboratories. SOPs are in place at each Pace Analytical laboratory which provide specific information for that facility regarding sample custody.

Example
Figure 7.1
Pace Analytical Services, Inc. CHAIN-OF-CUSTODY FORM

Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

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Section A — Required Client Information

Section B — Required Project Information

Section C — To Be Completed by Pace Analytical and Client

Section D — Required Client Information

SAMPLE ID
One character per box
(A-Z, 0-9 / -)
Sample IDs MUST BE UNIQUE

ITEM #	Sample Condition	Sample Notes	Item No.	Relinquished By / Company	Date	Time	Accepted By / Company	Date	Time	Remarks / Lab ID
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

Preservatives: Unpreserved, H_2SO_4, HNO_3, HCl, NaOH, $NaHSO_4$

Temp in °C:
Received on ICE Y / N
Sealed Cooler Y / N
Samples Intact Y / N

Additional Comments:

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER
SIGNATURE of SAMPLER
DATE Signed (MM / DD / YY)

SEE REVERSE SIDE FOR INSTRUCTIONS

Pace Analytical Services, Inc. Form COC01 02/00

FIGURE 7.2
SAMPLE I.D. AND CONDITION FORM
(Format and content may vary by location)

Client:_____
Project No.:_____
Date Received:_____

SAMPLE CONDITION UPON RECEIPT CHECKLIST

Complete checklist (A) during sample receipt. If any items are marked "NO," complete section (B) of this form. Otherwise, go to record samples.

			YES	NO
(A)	1.	Are there custody seals or tapes on the shipping container?	___	___
	2.	Are custody seals on the shipping container intact?	___	___
	3.	Is there a completed Chain-Of-Custody (C-O-C)?	___	___
	4.	Do the numbers of samples received and the sample matrices agree with C-O-C?	___	___
	5.	Are there tags attached to each sample?	___	___
	6.	Are sample tags, sample containers and C-O-C all in agreement?	___	___
	7.	Is the C-O-C complete with requested analyses?	___	___
	8.	Are the samples preserved correctly?	___	___
	9.	Is there enough sample to do all analyses?	___	___
	10.	Do the samples have the proper temperature?	___	___
	11.	Are the sample containers intact (e.g., not broken, leaking)?	___	___
	12.	Are VOA vials head-space free?	___	___
	13.	Are all samples within the holding times for requested analyses?	___	___
	14.	Is pH recorded for non-VOA's?	___	___

(B) Explain "NO" item here:_____
_____
_____

Send a copy of this form to Project Manager with Discrepancy Report Form. Copy of both forms remain in the QC file.

Custodian Signature: _____

FIGURE 7.3

Pace Analytical Services, Inc.
DISCREPANCY REPORT FORM
(Format and content may vary by location)

Urgency Level: 1(___) Requires immediate attention
2(___) Requires attention today
3(___) Requires attention this week

Initiator _____ Client: _____
Date: _____
Project # _____

Sample(s) #_____

_____

_____

Discrepancy (If more space needed, use the back of this form):_____

_____

_____

To QC Manager:_____ Date: _____

Client Notified? YES ( ) NO ( ) Date & Time:_____

Project Manager Notified? YES ( ) NO ( ) Date & Time:_____

QC Response:_____

_____

Project Manager Response:_____

_____

_____

Cause and Resolution (proposed or carried out): Completed by:_____

_____

_____

Manager's Initials:
PM Signature: _____ Date:_____

QC Signature: _____ Date:_____

cc: Project File

FIGURE 7.4

Pace Analytical Services, Inc.
Internal Chain of Custody
(Format and content may vary by location)

Fractions Available

Project _____
Date Created _____
Initials _____

RELEASED _____
SDG CLOSED _____

Potentially Radioactive? r Yes r No

SAMPLES				
A	F	K	P	U
B	G	L	Q	V
C	H	M	R	W
D	I	N	S	X
E	J	O	T	Y

SAMPLES	OUT Initials Date/Time	Which Fraction	Where is it Going?	IN Initials Date/Time	Any Totally Consumed?	Comments

FIGURE 7.5

SAMPLE DISPOSITION FORM
(Format and content may vary by location)

Date removed: _____
Initials: _____

Date shipped: _____
Initials: _____

RE: Client Project ID: _____

Pace Project No.: _____

Sample ID

_____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

Dear :

All requested analyses of the samples for the above referenced project have been completed. Enclosed are the remaining portions of the samples which are being returned to you for final disposition.

If you have any questions, please call me.

Sincerely,

Project Manager

FIGURE 7.6

HAZARDOUS SAMPLE
DISPOSAL OPTION FORM
(Format and content may vary by location)

Pace Project # _____

Project Manager _____

Pull Sample Date _____

Sample #	Matrix	Location	Disposal Method	Charge

Remarks: 1 = Return to Client C = Clean
2 = In House Disposal D = Dirty

Removed from Refrigerator (initial/date) _____

Returned to Client (initial/date) _____
Disposed of Samples (initial/date _____

8.0 CALIBRATION PROCEDURES AND FREQUENCY

Equipment/instrumentation is calibrated before each use to ensure proper functioning. All calibrations are performed by an experienced analyst at scheduled intervals against certified standards which are traceable to recognized national standards or against reference standards whose values have been statistically validated. Equipment/instrumentation or a component, thereof, which gives suspect results, cannot be calibrated to specifications, or is otherwise defective is taken out of service and clearly labeled as "defective" or "out-of-service" until it has been repaired and tested to meet specifications. Equipment/instrumentation must be performing its function within the stated specifications before being placed back into service. In the event that recalibration of a piece of test equipment casts doubt on the validity of test results already transmitted to the client, the client is notified promptly by the laboratory. Equipment/instrumentation found to be consistently out of calibration is either repaired and positively verified or replaced.

The discussion presented here is general in nature, because the requirements for calibration are instrument (or equipment) and method specific. Details of calibrations can be found in the Pace Analytical Standard Operating Procedures, analytical methods, and instrument operations manuals. In addition to the summary calibration information pertaining to general analysis categories contained in the following subsections, Table 8.1 lists detailed calibration information for representative methods and applications most frequently performed at Pace Analytical.

8.1 STANDARDS AND TRACEABILITY

Analytical standards are prepared from quality grade reagent compounds, are purchased as neat chemicals or diluted standard solutions from vendors who can provide a certificate of analysis. They are used to prepare calibration and spiking standards. Each laboratory section is responsible for the preparation, storage and disposal of its standards. The preparation information is recorded into section specific Standards Notebooks in order to document traceability of prepared standards to their source material(s).

Each standard is given an internal identification number. The preparation of all stock standards is documented in a Standards Notebook which is used to record the date of preparation, analyst's initials, the source of the reference material, standard components, amounts used, final volume, final concentration(s), solvent used, expiration date of prepared standard, and the serial reference number of that stock solution, if applicable. All standards are labeled with the standard serial reference number and expiration date, pertinent hazard classification information and if space permits, the name, concentration, date of preparation and initials of preparer. All diluted working standards not consumed during an analytical session are also labeled as indicated above.

If no expiration date has been assigned by the manufacturer, then an expiration date of one year from the date of preparation (or the date first opened in the case of sealed ampules) is recorded unless degradation prior to this date is observed. In no case should the expiration date of a prepared standard exceed that of the parent standard.

Before any set of standards can be utilized in a calibration curve they must be verified either externally by the standard supplier or internally by a secondary source process:

- Analysis of qualified QC Check Sample, or
- Analysis of an independently prepared check standard prepared either from a different manufactured lot for the same vendor supplying the calibration standard or from a second supplier.

The verification standard criteria are established based on the method and are contained in the SOPs.

8.2 GENERAL CALIBRATION PROCEDURES

Calibration standards for each parameter are chosen to bracket the expected concentrations of those parameters in the sample and to operate within the linear response range of the instrument. Samples with analytical results that fall outside the calibration range are diluted until bracketed by the calibration standards. A low level standard is routinely analyzed to verify the reporting limit. Calibration standards are prepared typically at a minimum of three concentration levels, usually chosen at two to five times, five to ten times, and up to twenty times the estimated method detection limit plus a calibration blank, with the exception of most organic analyses which do not require a calibration blank. Any specific method requirement for number and type of calibration standards supercedes the general requirement. Three point standardization of ICP is acceptable if linear range is performed annually. Either an internal standard or external standard quantification technique can be utilized. The reporting limit is verified by analysis of a standard at the reporting limit.

Instrumental responses to calibration standards for each parameter are subjected to an appropriate statistical test of fitness (least squares linear regression, quadratic equation, or relative standard deviation of response factors) or as required by the method or QAPP. The calibration must reflect an acceptable correlation of data points or linearity to be acceptable. In cases where the calibration data are outside these criteria, the analyst must rerun the calibration standards (meeting the same criteria) and/or prepare a new curve, changing instrumental conditions as necessary.

During the course of analysis, calibration standards are routinely analyzed to ensure that the instrumental response has not changed. The calibration verification criteria stipulated in each method or SOP are used by the analyst to determine whether the instrument is acceptable to analyze samples. Concentration of continuous calibration verification standards are varied periodically to evaluate the entire calibration range.

The accuracy of prepared standards is periodically checked by comparison with a standard from an independent source.

Certain equipment such as balances, pH meters, and turbidity meters are normally calibrated with NIST traceable standard reference material.

8.2.1 Analytical Balances

Every 12 months, calibration of the entire analytical range is checked by a qualified service technician. The calibration of each balance is checked each day the balance is used with weights traceable to NIST. Calibration weights are ASTM

Class 1 (replaces Class S designation) and are re-certified at a minimum of every two years. Some accrediting agencies may require checks more frequently. If balances are calibrated by an external agency, verification of their weights must be provided. All information pertaining to balance maintenance and calibration is recorded in the individual balance logbook and/or is maintained on file in the QA department.

8.2.2 Thermometers

Certified, or reference, thermometers are maintained for checking calibration of working thermometers. Reference thermometers are provided with NIST traceability for initial calibration and are re-certified, at a minimum, yearly with equipment directly traceable to the NIST.

Working thermometers are compared with the reference thermometers every 12 months; digital thermometers are verified for accuracy monthly. Each thermometer is tagged and individually numbered. In addition, working thermometers are visually inspected by laboratory personnel prior to use.

Calibration temperatures and acceptance criteria are based upon the working range of the thermometer and the accuracy required for its use. Laboratory thermometer inventory and calibration data are maintained in the QA department or designated area.

8.2.3 pH/Electrometers

The meter is calibrated before use each day, and once after each four hours of continuous use, using fresh buffer solutions.

8.2.4 Spectrophotometers

During use, spectrophotometer performance is checked at established frequencies in analysis sequences against initial calibration verification (ICV) with continuing calibration verification (CCV) standards.

8.3 GC/MS CALIBRATION PROCEDURES

The minimum operations necessary to satisfy analytical requirements associated with the determination of organic compounds in water and soil/sediment samples are listed below. The following operations are performed routinely in the laboratory:

- Documentation of GC/MS mass calibration and abundance pattern
- Documentation of GC/MS response factor stability
- Internal standard response and retention time

Prior to initiating data collection, it is necessary to establish that a given GC/MS meets the standard mass spectral abundance criteria. This is accomplished through the analysis of decafluorotriphenylphosphine (DFTPP) for base/neutral and acid (BNA) compounds or p-

bromofluorobenzene (BFB) for volatile compounds. Each GC/MS system used for analysis of volatile or semivolatile organic compounds is tuned to meet method or program specific ion abundance criteria before analysis of standards, blanks, or samples can proceed.

Prior to the analysis of samples and after tuning criteria have been met, the GC/MS system is initially calibrated using multiple concentrations to determine the linearity of response. The number of concentration points used for calibration depends on the specific method criteria and/or client project requirements. USEPA criteria specify both the concentration levels for initial calibration and the specific internal standard to be used on a compound-by-compound basis for quantitation. The response factor (RF) for each compound at each concentration level is calculated using the following Equation 8.1:

$$RF = \frac{A_x}{A_{is}} * \frac{C_{is}}{C_x} \qquad (8.1)$$

Where:
A_x = area of the characteristic ion for the compound to be measured
A_{is} = area of the characteristic ion for the specific internal standards
C_{is} = concentration of the internal standard
C_x = concentration of the compound to be measured

Using the average RF from the initial calibration, the percent relative standard deviation (%RSD) for compounds identified as Calibration Check Compounds (CCCs) is calculated using Equation 8.2:

$$\%RSD = \frac{s}{\bar{x}} \times 100 \qquad (8.2)$$

Where:
RSD = relative standard deviation
s = standard deviation of initial five response factors (per compound).
$\bar{x}$ = mean of initial five response factors (per compound).

RSD <30% for RFs of CCCs (if RSD of any compound is greater than 15%, use a least squares regression if correlation coefficient $\geq$0.995) RF $\geq$ 0.050 (SPCCs)

A calibration check standard containing all compounds of interest, as well as all required surrogates, is performed each day of analysis. The RF data from the standard is compared each day against the average RF from the initial calibration for a specific instrument. If the response to a calibration check standard differs from the initial calibration by more than ±20% or as specified by the method, then investigation and corrective action is performed, including a complete re-calibration if necessary.

Continuing Calibration is checked as described in Pace Analytical SOPs or methods.

8.4 NON GC/MS CHROMATOGRAPHY CALIBRATION PROCEDURES (i.e., GC and HPLC)

Initially, a five point calibration curve, consisting of all compounds of interest (plus a calibration blank for certain analyses such as VOCs), is established to define the usable range of the instrument. Calibration is accomplished as best-fit line, quadratic equation, or average response factors (RF). The curve is determined to be linear if the correlation coefficient is $\geq$ 0.995 unless otherwise stated in the method. Linearity may also be determined using calibration factors or response factors. Response factors are calculated for each compound at each concentration level. These RFs are averaged to generate the mean RF for each compound over the range of the standard curve. The curve is determined to be linear if the RSD of the response factors is <20%, or as specified by the method. The mean response factor is used to calculate the sample concentration of the compound of interest.

$$\text{Calibration Factor (CF)} = \frac{\text{Peak area (or Height) of the Compound in the Standard}}{\text{Concentration of the Compound Injected}}$$

$$\text{Response Factor (RF)} = \frac{A_s \times C_{is}}{A_{is} \times C_s}$$

A_s = Peak Area (or Height) of the analyte or surrogate
A_{is} = Peak Area (or Height) of the internal standard.
C_{is} = Concentration of the internal standard.
C_s = Concentration of the analyte or surrogate

When sample responses exceed the range of the standard curve, the sample is diluted to fall within the range of the standard curve and reanalyzed. Full calibration is not necessary if a calibration check standard validates the initial calibration curve. If the response to a calibration check standard differs from the initial calibration by more than $\pm$15% for any analyte being quantitated or as specified by the method, then investigation and corrective action is performed, including complete re-calibration, if necessary.

Continuing Calibration is checked as described in Pace Analytical SOPs or methods.

8.5 CALIBRATION OF INDUCTIVELY COUPLED ARGON PLASMA SPECTROMETER (ICP) AND ATOMIC ABSORPTION SPECTROPHOTOMETER (AAS)

The ICP and AAS are standardized for the metal analyte of interest by the analysis of a set of calibration standards prepared by diluting a stock solution of known concentration. Working standards are prepared by dilution of the stock standard. For the AAS, the concentration of the calibration standards is chosen so as to cover the working range of the instrument. Subsequently, all sample measurements are performed within this working range. After the working standards have been prepared, they are analyzed on the ICP or AAS and the instrument response is calibrated to provide a direct readout in concentration.

The calibration is accomplished by entering the metal concentration equivalent to the readout in absorbance units (or emission intensity) during analysis of the working standards.

After the initial calibration, the analysis of the working standards is repeated during sample analysis to standardize instrument response during analysis and to confirm the calibration settings. A typical analysis sequence is presented below.

- Working standards are prepared by dilution of a stock standard solution of the metal analyte of interest.
- A calibration curve within the working range of the instrument is established by analysis of three to five working standards. Two point ICP standardizations are allowed if linear range studies are performed annually.
- An independent standard is analyzed to confirm the calibration settings. If the calibration settings do not confirm, the instrument is re-calibrated.
- Interference check standards, as specified by the method, are analyzed.
- The samples are analyzed for the metal analyte of interest.
- During sample analysis, a check standard is analyzed to monitor instrument stability. If the analysis indicates that instrument calibration has changed by more than ±10% for ICP or more than ±20% for AAS, the instrument is re-calibrated and the analysis is repeated.
- Following completion of the sample analyses, the check standard and interference check standard are reanalyzed to confirm calibration settings. If calibration settings are confirmed, the analysis is completed. However, if the calibration settings are not confirmed, the problem is corrected, and the analyses are repeated.

Written records of all calibrations are filed with the raw data.

TABLE 8.1 Summary of Calibration Requirements

Instrument	Calibration Standards Used, Initial and Daily Minimum	Acceptance Limits	Corrective Actions
GC/MS Semivolatile	Tune: DFTPP (every 12 hours) (May be combined with calibration verification.)	Meets method criteria	Re-tune instrument Repeat DFTPP analysis
	Initial: 5 levels minimum	RSD <30% for RFs of CCCs (If RSD of any compound is greater than 15%, use a least squares regression if correlation coefficient ≥0.995.) RF ≥ 0.050 (SPCCs)	Repeat Calibration Evaluate system Repeat Calibration
	Daily Verification: Mid level (every 12 hours)	% Difference <20% of the average five-point RF (CCCs) RF ≥ 0.050 (SPCCs)	Evaluate system Take corrective action Repeat Calib. Check; see Lab Supervisor
GC/MSVolatile	Tune: BFB (every 12 hours) (May be combined with calibration verification.)	Meets method criteria.	Re-tune instrument Repeat BFB Analysis
	Initial: 5 levels minimum	RSD <30% for RFs of CCCs (If RSD of any compound is greater than 15%, use a least squares regression if correlation coefficient ≥0.995.) RF ≥ 0.100 (0.30 for Chlorobenzene and 1122-Tetrachloroethane-(SPCCs)	Repeat Calibration Evaluate System Repeat Calibration
	Daily Verification: Mid-level (every 12 hours)	% Difference <20% of the average five-point RF (CCCs) RF ≥ 0.100 (0.30 for Chlorobenzene and 1122-Tetrachloroethane-)(SPCCs)	Evaluate System Take Corrective Action Repeat Calib. Check; See Lab Supervisor

TABLE 8.1 Summary of Calibration Requirements (continued)

Instrument	Calibration Standards Used, Initial and Daily Minimum	Acceptance Limits	Corrective Actions
Gas Chromatograph (8081A)	Initial: 5 level (conc. based upon instr. response)	Std curve or calibration factor (CF) if % RSD ≤ 20	Make new standards or establish new calibration curve.
	Mid level DDT/Endrin standard Daily: 1 level of check standard (midrange)	DDT/Endrin breakdown < 20% CF < ± 15% of initial calibration	Rerun standard once Perform col. maint. Repeat initial calibration
	Std check every 10 samples	CF ± 15% of daily calibration (< ± 20% for confirmation). Retention times within retention time windows.(For methods using retention time windows.)	Reanalyze samples that were analyzed after standard that failed criteria and before next standard that passes criteria
Inductively Coupled Plasma Emission Spectrometer (6010B)	Initial: high standard + blank Daily: instrument check standard and calibration std. & blank every 10 samples	ICV: < 90-110% CCV: < 90-110%	Recalibrate. Repeat twice; if outside control limit, then recalibrate making new standards if necessary
Atomic Absorption Spectrophotometer (7000A)	Initial: 3-5* levels + blank Daily: 1 check standard (midrange) & blank per 10 samples	Linear regression correlation coefficient ≥0.995; ICV: 90-110% CCV: 80-120%	Make new standards or establish new calibration curve
pH Meter	Daily: 2 levels	+0.05 pH unit Bracket sample range	Clean or replace electrode; recalibrate

TABLE 8.1 Summary of Calibration Requirements (continued)

Instrument	Calibration Standards Used, Initial and Daily Minimum	Acceptance Limits	Corrective Actions
UV-Visible Spectro-photometer	Initial: multi-levels (varies by method) + blank Daily: check standard	Linear regression correlation coefficient > 0.995; ICV: 90-110%	Recalibrate services
Analytical Balance	Daily: Sensitivity (with ASTM Class "1" weight)	±0.001 gm (varies by method)	Adjust sensitivity, re-level
Thermometers	Annually; Calibrate in constant temperature baths at two temperatures against precision thermometers certified against an NIST thermometer	±0.1 to ±0.5 C (depending upon method)	Tag and remove from service, replace

9.0 ANALYTICAL PROCEDURES

Pace Analytical laboratories are capable of analyzing the full range of environmental samples from all media, including surface and groundwater, soil, sediment, tissue, and waste. Methodologies are employed with guidance from federal agencies such as EPA, ASTM, USGS, NIOSH and, in certain instances, state regulatory agencies. Table 9.1 is a representative listing of general analytical protocol references. In some situations, Pace Analytical develops and validates methodologies which may be more applicable to a specific problem or objective.

Analytical procedures are detailed descriptions of any and all sample processing, preparation and analysis of samples in the laboratory. All analytical procedures are conducted in strict adherence with written Standard Operating Procedures developed from the references in Table 9.1 which have been reviewed and approved by the Laboratory Operations Manager, the QAO and the General Manager. Additional SOPs may be adapted from other sources or generated in-house as project needs require.

9.1 ANALYTICAL METHODS

Numerous sources of information are available to offer guidance in analytical methods. Selection of the appropriate method is dependent upon data usage and the regulatory requirements during the analysis. Tables 9.1 and 9.2 describe the analytical and QA/QC references routinely used by Pace Analytical. Pace Analytical may modify existing methods based on the following considerations:

- To meet project specific objectives
- To incorporate modifications or improvements in analytical technology
- To comply with changing regulations and requirements
- To address unusual matrices not covered in available methods

Pace Analytical discloses to its clients and regulatory agencies any instances in which modified methods are being used in the analysis of samples.

9.2 PROCEDURE DOCUMENTATION AND DOCUMENT CONTROL

All processes involved with the production and reporting of analytical data is documented through the use of Standard Operating Procedures (SOPs).

Pertinent information required to accurately define the procedures followed are delineated in the SOP, or by reference to other controlled documents from the SOP. External references may include, instrument or equipment manuals or operating instructions, bench instructions, or published methods.

9.2.1 Elements of the SOP

Each SOP describing analytical methods performed in the laboratory is prepared as specified in the Pace Analytical Standard Operating Procedure for Preparation of Standard Operating Procedures (ALL P 001).

The SOPs are logically organized according to procedure designations commonly known to laboratory personnel. Signatures indicating approval are provided by a supervisor or manager of the applicable section, the Quality Assurance Officer and the General Manager for that particular facility. Approval indicates agreement with the appropriateness and feasibility of the described procedures, and the completeness of the SOP compared to the required elements of the method.

9.2.2 Review, Revision and Distribution

All SOPs undergo an annual, documented review . Revisions due to published method changes or procedural changes are reflected in the SOP prior to implementation of the change. Retired SOPs are maintained by the Quality Office with the date of retirement to demonstrate procedures for any given time period. Review dates and applicable signatures for SOPs which do not require changes are maintained with the original document.

9.2.3 Document Control

All SOPs and subsequently referenced documents (published methods, bench instructions, equipment manuals, original forms) are maintained by the Quality Office as controlled documents. Required information for each document includes:

- The range of effective dates
- The number and location of controlled copies
- A revision number or designation which can be used to demonstrate continuity

Any revision of a controlled document necessitates:

- Retirement and maintenance of the previous version
- Replacement of all controlled copies and destruction of retired version copies
- Notification of all affected personnel that a revision has been issued

As an alternative to the hard copy system of control, secured electronic copies of controlled documents may be maintained on the local or wide-area network. These document files must be read-only for all personnel except the Quality Department and system administrator. Other requirements for this system include:

- Ready accessibility to all laboratory staff
- A complete description of the computerized aspects, including security
- A provision to explicitly indicate that all printed copies are uncontrolled and expire on the date which they were printed

Controlled copies of SOPs are issued to, and maintained in each applicable section. A complete set of SOPs is maintained in the Quality Assurance Office and is made available to all facility personnel.

9.3 METHOD VALIDATION

When non-promulgated methods (i.e. methods other than EPA, NIOSH, ASTM, AOAC, etc.) are required for specific projects or analytes of interest, or when the laboratory develops a method, the laboratory establishes the validity of the method prior to applying it to client samples. Method validity is established by meeting certain criteria for precision and accuracy as established by the data quality objectives specified by the end user of the data.

9.4 METHOD DETECTION LIMITS

Pace Analytical Services performs and documents detection limit studies for each instrument. If an instrument is utilized for more than one method, a detection limit is performed for each method on that instrument. The protocol utilized for the detection limit determination for analyses performed on samples analyzed for the Safe Drinking Water Act (SDWA) and the Clean Water ACT (CWA) is based on the protocol defined in 40 CFR 136, Appendix B. The matrix for the CWA and the SDWA samples is analyte free spiked deionized water. Detection limits for Resource Conservation Recovery Act (RCRA) samples are determined based on the protocol defined in SW 846, Third Edition, Chapter One, Volume 1A. The detection limit protocol for CWA and SDWA samples is also acceptable for RCRA program samples.

Detection limits are updated based on one or more of the following criteria: annually; when there is a change in test method that affects how the test is performed; or when a change in instrumentation occurs that affects the sensitivity of the analysis. The relationship of the detection limits to the reporting limits insures that the reporting limit is always supported by a current detection limit.

Standards are analyzed at one half the reporting limit on a quarterly basis to verify identification and quantitation.

IT IS IMPERATIVE TO NOTE THAT METHOD DETECTION LIMITS ARE HIGHLY MATRIX DEPENDENT. LIMITS DETERMINED BY PACE ANALYTICAL MAY NOT BE ACHIEVABLE IN ALL MATRICES.

9.5 COMPLIANCE

Compliance is the proper execution of recognized, documented procedures which are either approved or required. Adherence to these procedures is required in order to provide data products acceptable to a regulatory body of competent jurisdiction in a specific regulatory context. Compliance is separate from, but not inconsistent with, technical scientific quality. Pace Analytical accepts compliance as part of the Pace Analytical corporate definition of quality: "Quality is the *fulfillment of expectations and needs* in all activities, demonstrated by the satisfaction of those we serve." Pace Analytical

understands that the expectations of our clients commonly include the assumption that data and reports will satisfy a regulatory purpose and will be found acceptable *and compliant* with regulatory requirements for the performance of tests and generation of data.

9.5.1 Understanding the Regulatory Framework - Compliance is not likely to be achieved in the absence of an understanding of the regulatory framework. Pace Analytical will attempt to ascertain, prior to beginning a project, what regulatory jurisdiction (USEPA, NJDEPE, etc.) pertains to a project; within the regulatory jurisdiction, what body of regulation is meant to be satisfied (RCRA, SDWA, 21E, etc.); and finally, within this context, what protocols are required/expected (CLP, AFCEE, NFESC, ASP, etc.). Pace Analytical interacts with its clients to come to a mutual understanding of all requirements.

9.5.2 Resolving Compliance Contradictions and Hierarchies - It is a common occurrence that multiple regulatory jurisdictions overlap in a specific case. This causes uncertainty or even contradictions to arise in a work plan. Pace Analytical makes every effort to detect such inconsistencies, and communicates them to clients so that an informed decision is made by the client regarding execution of the project. Similarly, methods and protocols will often be prescribed in a scope of work or QAPP which either will not achieve stated or implied DQOs or which are in conflict with the regulatory requirements. Pace Analytical attempts to detect these inconsistencies, and upon detection, disclose same to our client. Pace Analytical voluntarily accepts a responsibility to provide advice to clients, however, **the primary decision responsibility for this issue remains with the client.**

9.5.3 Disclosure of Noncompliance - It is Pace Analytical policy to disclose in a forthright manner any detected noncompliance that may effect the usability of data produced by Pace Analytical. It is not within our expertise to predict the manner in which a specific regulator or regulatory body will interpret the rules governing analysis; therefore, Pace Analytical is unable to guarantee compliance. It is Pace Analytical policy that our responsibility begins with a bona fide and competent attempt to evaluate potential compliance issues and ends with disclosure of any findings that may be useful to our client in their making the final judgment.

TABLE 9.1

ANALYTICAL PROTOCOLS

- "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act." Federal Register, 40 CFR Part 136, October 26, 1984.
- "Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods." SW-846. Most current edition and update.
- "Methods for Chemical Analysis of Water and Wastes", EPA 600/4-79-020, 1979 Revised 1983, U.S. EPA.
- U.S. EPA Contract Laboratory Program Statement of Work for Organic Analysis,
- U.S. EPA Contract Laboratory Program Statement of Work for Inorganic Analysis,
- "Standard Methods for the Examination of Water and Wastewater",. Current Edition APHA-AWWA-WPCF.
- "Annual Book of ASTM Standards", Section 4: Construction, Volume 04.04: Soil and Rock; Building Stones, American Society for Testing and Materials, 1987.
- "Annual Book of ASTM Standards", Section 11: Water and Environmental Technology, American Society for Testing and Materials, 1987.
- "NIOSH Manual of Analytical Methods", Third Edition, 1984, U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health.
- "Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water", U.S. EPA, Environmental Monitoring and Support Laboratory - Cincinnati (September 1986).
- New York State Department of Environmental Conservation. Analytical Services Protocol, September, 1989 (revised December 1991).

Table 9.2

References

1. Handbook for Analytical Quality Control in Water and Wastewater Laboratories, U.S. EPA 600/4-79-019, March, 1979.

2. Federal Register, 40 CFR Part 136, October 26, 1984.

3. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition & Final Updates One and Two , U.S. EPA, revised Sept., 1994 and current promulgated editions.

4. Quality Assurance of Chemical Measurements, Taylor, John K.; Lewis Publishers, Inc. 1987.

5. Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WPCF: Current Edition.

6. NIOSH Manual of Analytical Methods, U.S. Department of Health, Education, and Welfare; Second Edition, 1977.

7. Methods for Non-conventional Pesticides Chemicals Analysis of Industrial and Municipal Wastewater, Test Methods, EPA-440/1-83/079-C.

8. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79--020, 1983.

9. The Determination of Inorganic Anions in Water by Ion Chromatography - Method 300.0 Test Method, EPA-600/4-84-017. March, 1984.

10. Environmental Measurements Laboratory (EML) Procedures Manual, HASL-300, US DOE, February, 1992.

11. Requirements for Quality Control of Analytical Data, HAZWRAP, DOE/HWP-65/R1, July, 1990.

12. Requirements for Quality Control of Analytical Data for the Environmental Restoration Program, Martin Marietta, ES/ER/TM-16, December, 1992.

13. Quality Assurance Manual for Industrial Hygiene Chemistry, AIHA, 1988.

14. National Environmental Laboratory Accreditation Conference. Constitution, Bylaws, and Standards, June 2000.

10.0 DATA REDUCTION, VERIFICATION AND REPORTING

Data reduction, verification and reporting are the processes that result in the delivery of quantitative analytical data to the data user. These processes include calculation of raw data into final concentration units, reviewing results for accuracy and assembly of the technical report contents for delivery to the data user.

All analytical data generated within the Pace Analytical laboratories undergo a well-defined, well-documented multi-tier review process before being reported to the client. The following describes procedures employed at Pace Analytical for translating raw analytical data into accurate, finished sample reports and describes data storage policies. The sample flow through the laboratory is shown in Figure 10.1

10.1 DATA REDUCTION

When "raw data" is manually generated by an analyst, it is recorded in either a bound notebook (run logbook), or copies of the computer printouts are appropriately labeled and stored. The term "raw data" can be a compilation of many items including, but not limited to, computer printouts, calculation sheets, charts or graphs, chromatograms, method number references, final results and analyst's initials and date of analysis. Logbooks and other bench records are kept in accordance with each laboratory's Standard Operating Procedure on documentation practices. The primary analyst is responsible for the initial reduction and review of the data. This includes entering analytical data into the EPIC Laboratory Information Management Systems; confirming compliance with required methodology; checking the calculations used; checking quality control data against known criteria; and noting any discrepancies that occurred both in the necessary logbooks and as a footnote or narrative in EPIC. The primary analyst then compiles the initial data packet for data verification. This compilation includes all relevant data; chromatograms or strip-chart recordings, other computer printouts, chain-of-custody copies if available; and logbook copies. Some agencies or clients require different levels of data reporting. For these special levels, the primary analyst may also need to compile additional project information such as initial calibration data or extensive spectral data before data package goes to verification step.

10.2 DATA VERIFICATION

Data verification is the process of examining data and accepting or rejecting it based on pre-defined criteria. This review step is designed to ensure that the reported data are free from calculation and transcription errors; that quality control parameters are evaluated; and that any discrepancies are properly documented. (The EPIC computer system refers to this verification as a **validation** step.)

Analysts performing the analysis and subsequent data reduction have the primary responsibility for the quality of the data produced. The primary analyst initiates the data validation process by reviewing and accepting the data, provided QC criteria have been met for the samples being reported. Data review checklists are used to document the data review process.

The completed data package is then sent to the Group Supervisor or designated reviewer. This reviewer provides a technical assessment of the data package and technical review for accuracy according to methods employed and laboratory protocols. This involves a quality control audit for use of the proper methodology and detection limits, compliance to quality control protocol and criteria, presence and completeness of required deliverables, and accuracy of calculations and data quantitation. Group Supervisors also review analyst generated calculations.

For data which are reduced via computer, calculations are checked by the analyst (or designee) assigned to this task at a frequency designed to assure that the data reductions are valid. The results are either manually transferred to a standard reporting form or reported via computer generation of forms.

Once the data have been technically reviewed and approved, authorization for release of the data from the analytical section is indicated by initialing and dating the data review checklist or otherwise initialing and dating the data.

The Operations or Project Manager examines the report for method appropriateness, detection limits and QC acceptability. Any deviations from the referenced methods are checked for documentation and validity, and QC corrective actions are reviewed for successful resolution.

The Operations Manager may delegate the final review and signing of reports as necessary.

Figure 10.2 provides a summary of staff responsibilities for data generation, review, verification and reporting.

Use of checklists ensure that all data are systematically handled and no steps are omitted. Checklists are reviewed and are retained and accessible should they need to be referenced at a later date.

10.3 DATA REPORTING

All data segments pertaining to a particular Pace Analytical Laboratory Project Number are delivered to the Client Services Department (Project Manager) for assembly into the final report format. All points mentioned during technical and QC review are included in a narrative if it is deemed to impact the quality of the data.

After verifying the report's completeness and accuracy, the Project Manager signs the cover letter or authorization line within the report indicating acceptance of the report.

Final reports are prepared according to the level of reporting required by the client. A standard Pace Analytical final report consists of the following components:

1. A title which designates the report as "Final Report", "Laboratory Results", "Certificate of Results", etc.
2. Name and address of laboratory (or subcontracted laboratories, if used)

3. Phone number and name of laboratory contact where questions can be referred
4. A unique number for the report (project number). The pages of the report shall be numbered and a total number of pages shall be indicated (usually in the cover letter.
5. Name and address of client and name of project (if applicable).
6. Unique identification of samples analyzed (including client sample numbers)
7. Identification of any sample which did not meet acceptable sampling requirements (from NELAC or other governing agency), such as improper sample containers, holding times missed, sample temperature, etc.
8. Date and time of collection of samples, date of sample receipt by the laboratory, dates of sample preparation and analysis, and times of sample preparation and analysis when the holding time for either is 72 hours or less.
9. Identification of the test methods used
10. Identification of sampling procedures, if sampling was conducted by the laboratory
11. Deviations from, additions to, or exclusions from the test methods. These can include failed quality control parameters, deviations caused by the matrix of the sample, etc. and can be shown as a case narrative or as defined footnotes to the analytical data.
12. Identification of whether calculations were performed on a dry or wet-weight basis
13. Reporting limits used
14. Final results or measurements, supported by appropriate chromatograms, charts, tables, spectra, etc.
15. If required, a statement of the estimated uncertainty of the test results
16. A signature and title of person accepting responsibility for the content of the report (can be an equivalent electronic identification) and date report was issued
17. If necessary, a statement clarifying that the results of the report relate only to the samples tested or to the samples as they were received by the laboratory
18. If necessary, a statement indicating that the report must not be reproduced except in full, without the written approval of the laboratory
19. Identification of all test results provided by a subcontracted laboratory or other outside source
20. Identification of results obtained outside of quantitation levels.

Any changes made to a final report shall be designated as a "Supplement" or equivalent wording. For higher levels of data reporting, a copy of all raw data is sent to the client along with a final report of results. When possible, the Pace Analytical laboratory will provide electronic data deliverables (EDD) as required by contracts or upon client request.

10.4 DATA ARCHIVE

All records pertaining to Pace Analytical labs are maintained, stored and secured by the Quality Assurance Officer or by a designated Data Archivist. These records can include client data reports, certificates pertaining to calibration and maintenance of equipment, raw data from instrumentation, quality control documents, and logbooks. These records are retained in order to provide for possible historical reconstruction of data. Records are archived and maintained by the laboratory for a period of time determined by the specific state, federal, contractual and accreditation requirements. Access to archived data is kept to a minimum, with the Data Archivist maintaining the archive documentation in a secure, fireproof (if possible) location. Some laboratories archive

their data in an off-site facility and the data archivist will keep a record of this archival as well. Records that are computer generated have either a hard copy or electronic backup copy.

In the event of a change in ownership, accountability or liability, reports of analyses performed pertaining to accreditation will be maintained by the acquiring entity for a minimum of five years. In the event of bankruptcy, laboratory reports and/or records will be transferred to the client and/or the appropriate regulatory entity.

10.5 RESPONSE TO COMPLAINTS

The Pace Analytical laboratory which conducted analyses for the client recognizes the importance of its timely response to inquiries regarding the laboratory's work for samples and projects. The laboratory will respond to inquiries as rapidly as possible as part of its corrective action plan. The Pace Analytical laboratory which originally received samples from the client is considered the primary contact for all data inquiries when subcontract or other Pace Analytical laboratories are used for analyses.

FIGURE 10.1
Laboratory Sample Flow Schematic

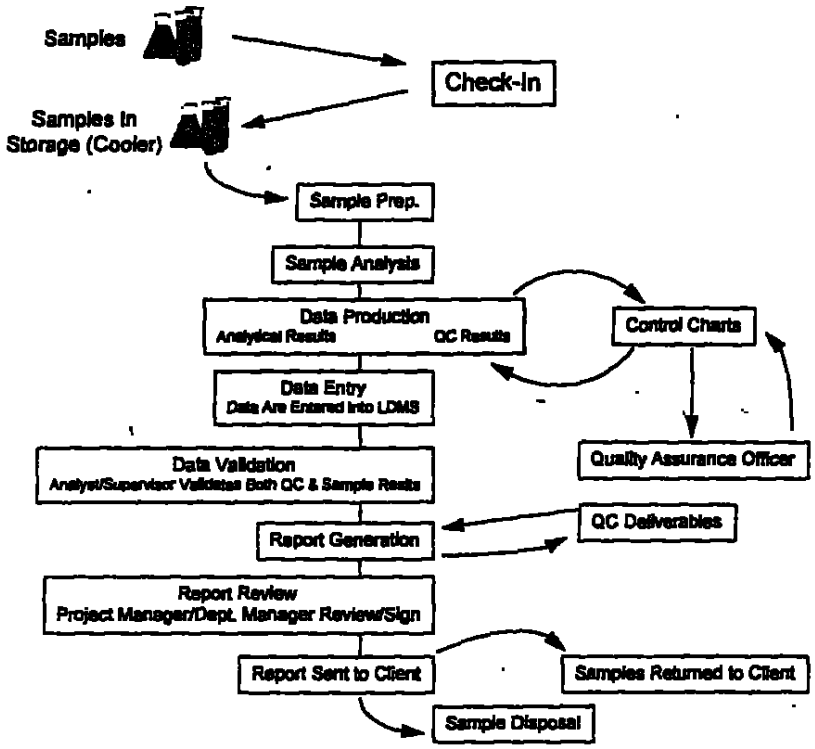

FIGURE 10.2
Analytical Data Review Process, Pace Analytical Services, Inc.

	Responsibilities
Analyst	· Analytical data entry into LDMS* · Data review - 1st level (bench) · Control charting - real time · Narrative notes · Discrepancy initiation · Provide copies of log books, as necessary · Assemble data review package
Supervisor	· Oversee daily analytical activities · Review control chart comments daily · LIMS data entry and data verification · Draft and review of narrative · Supervise contractual and technical compliance · Discrepancy review · Review quality control daily (calibrations, etc.)
Manager	· Sign-off case narrative (or designee) · Ensure program compliance · Review discrepancies requiring manager resolution · Technical conference calls with client
Quality Assurance Office	· 10 percent compliance review (data packages) - Custody when required - Calculations - Methods criteria - QC criteria - Forms - Control charting
Project Manager	· Review narratives for completeness and accuracy · Review packages for completeness and quality · Cover letter · Client/laboratory liaison · Deliver package to client

*Laboratory Data Management System (EPIC)

11.0 QUALITY CONTROL PROCEDURES

A quality control (QC) program is a systematic process that controls the validity of analytical results by measuring the accuracy and precision of each method and matrix, developing performance-based control limits and, using these limits to detect errors or out-of-control events, and requiring corrective action measures to prevent or minimize the recurrence of these events. QC procedures are implemented to ensure that sample data meet the quality objectives of the laboratory and the client.

This section addresses the specific QC procedures applied to representative analytical methods performed at Pace Analytical.

11.1 LABORATORY QUALITY CONTROL SAMPLES AND MEASUREMENTS

The results of quality control samples created in the laboratory represent estimates of accuracy and precision for the preparation and analysis steps of sample handling. This section describes the types of quality control samples used to assess the quality control procedure. The necessary SOPs are followed for preparing reagents or solutions for these QC measures.

11.1.1 Method Blank

A method blank, or laboratory reagent blank is a volume of deionized or distilled laboratory water for water samples, or a purified solid matrix for soil/sediment samples, carried through the entire analytical procedure. Blank analysis allows any method interferences caused by contaminants in solvent, reagents, glassware or sample processing hardware to be examined and verified. The volume or weight of the blank must be approximately equal to the sample volume or weight processed. Optimally, a method blank should contain no greater than five times (5X) the method detection limit, or reporting limit where applicable, for common laboratory solvents and phthalate esters; less than the detection (or reporting) limit for all other parameters unless otherwise specified in the method or project QA plan. Method blank results are maintained with other QC data and included in the final report at the client's request.

Method blank frequency is as follows:

Organic: The laboratory prepares and analyzes one method blank per analytical batch of 20 samples or less or every time samples are extracted, whichever is more frequent.

Inorganic: At least one method blank prepared and analyzed with every group of 20 samples, or with each batch (a group of samples prepared at the same time, e.g. daily) of samples digested, extracted, prepared or directly analyzed, whichever is more frequent.

11.1.2 Laboratory Control Spikes/Laboratory Control Spike Duplicates (LCS/LCSD)

The LCS consists of an aliquot of deionized/distilled laboratory water for liquid matrices and purified solid matrix for soils. If no such soil is available, laboratory pure water is substituted. The aliquot is injected with a known concentration of all the analytes of interest. They are prepared at a rate of at least one per analytical batch.

The LCS provides an estimate of bias based on recovery of the compounds from a clean matrix. These QC measures provide evidence that the lab is performing the method within accepted guidelines without matrix interferences.

An LCS/LCSD pair is substituted when sufficient sample volume is not available to prepare an MS/MSD pair.

11.1.3 Matrix Spikes/Matrix Spike Duplicates (MS/MSD)

Matrix spikes are similar to LCSs except that the analyte spikes are added to a second and third separate aliquot of the same client sample within an analytical batch. This enables the lab to assess matrix effects and field conditions. MS/MSDs are routinely prepared at a frequency of 5% (one set per twenty samples) when adequate sample volume is provided.

11.1.4 Surrogates

Surrogates are added to all organic samples, method blanks, LCS and MS prior to extraction and analysis. They provide an estimate of bias based on recovery of chemical compounds similar to target analytes but not occurring in nature. This aids in detecting any effects from the sample matrix and/or field conditions.

11.1.5 Internal Standards

Internal standards are analytes having surrogate characteristics but are added to each sample within a batch just prior to analysis. These are primarily used for quantitation. It corrects for bias or change in instrument performance from sample to sample, incorporating matrix effects associated with the analytical process only.

11.1.6 Sample Duplicate

A sample duplicate is prepared by homogenizing and splitting the sample into two equal portions before the sample preparation process. It measures precision associated with preparation through analysis and is prepared and analyzed at a rate of one per analytical batch. The MS/MSD may fulfill this function and provide a measure of overall precision.

11.1.7 Accuracy Measurements

Accuracy reflects the degree to which the measured value approximates the actual or "true" value for a given parameter and reflects the influence of systematic biases in the measurement. It is expressed as % Recovery. For the LCS, surrogates, and method blanks, the calculation is as follows:

$$\%Recovery = (SR / SA) * 100$$

Where: SR = the determined concentration
SA = the spiked concentration

For MS/MSD, the percent recovery is calculated as:

$$\%Recovery = (SSR-SR)/SA * 100$$

Where: SSR = the spiked sample determined result
SR = original sample determined result
SA = the spiked concentration

11.1.8 Precision Measurements

Precision measures the randomness associated with an analytical measurement and reflects the inherent variability in that measurement system.

The comparison of the values determined for a sample and its duplicate (MS/MSD) is expressed as relative percent difference (RPD). This calculation is as follows:

$$RPD \quad \frac{|S-D|}{[(S+D)/2]} * 100$$

Where S = original sample result
D = duplicate result

11.2 SAMPLE COLLECTION QUALITY CONTROL SAMPLES

Quality control is an integral part of sample collection as well as laboratory operations. Sample collection protocols must include checks to ensure that the sample collected is representative of the field site and free from sampling-related contamination or biases. Although different laboratory procedures will be used to analyze for the various parameters of interest, certain general QC procedures (described below) are applicable to most sampling methods. The types and frequency of collection for each of these field QC samples are detailed in each project's sampling and analysis plan.

11.2.1 Field Blanks

Field blanks are QC samples consisting of blank water that are prepared in the field. This serves to check for potential contamination that may be present in the environment where field samples are collected.

11.2.2 Trip Blanks

Trip blanks are similar to field blanks except that they are prepared in the laboratory before the sampling event. These blank samples accompany the other sample containers to the field and then accompany the collected samples back to the laboratory. Trip blanks serve to check for potential contamination that samples and sample containers may be exposed to during transport to and from the field.

11.2.3 Equipment Rinsate Blanks

Equipment rinsate blanks serve to check the adequacy of equipment cleaning between successive sample collections. These rinsates use blank water provided by the laboratory. Inadequate cleaning of sampling equipment after sample collection could result in the contamination of subsequent samples.

11.2.4 Matrix Spike/Matrix Spike Duplicate Samples (MS/MSD)

The field sampling personnel must collect a replicate set of samples such that one set is collected per twenty samples. The duplicate analyses provide information regarding homogeneity, handling, transportation, storage, and analyses.

Laboratory operations must make a conscious effort to request or collect, as part of a field sampling event, a sufficient amount of sample to satisfy the method requirements. Samples selected for MS/MSD which contain limited volume or quantity should be evaluated based on the type of analyses to be performed This information should be used in conjunction with client interaction to establish whether modifications could be made to the method.

11.3 STANDARDS

The term "standard" applies to any analyte solution of known concentration, which is traceable to a certified reference material. This includes calibration standards and spiking solutions.

Upon receipt, all purchased standard reference materials (neat and stock) are recorded into section-specific standard logbooks or databases. The standard logbook or database entries include Pace Analytical's unique ID, the name of the neat compound or solution, manufacturer, manufacturer's lot numbers, certified purity, receipt date and expiration date. Subsequent preparations of stock, intermediate, and working solutions are also documented in a standard preparation logbook. These entries must include all discrete measurements made during

preparation, sources of materials, solvent(s), solvent lot number, preparation date, expiration date, preparer's initials, and a Pace Analytical standard ID number.

The standard vial should have a reference label affixed containing the following information (if space permits):

- Standard ID #
- Standard name
- Preparation date
- Preparer's initials
- Solvent and lot number
- Concentration
- Expiration date

All primary reference standards and standard solutions are purchased from reliable commercial sources. NIST-traceable standards are preferred when available. ASTM or equivalent specifications are acceptable when NIST-traceable are not available. Certification records of all standards received are retained.

Second-source reference standards and standard solutions are purchased from a different supplier than the primary standard. If a second supplier is not available, the second source standard can be prepared from a different lot number of the sample composition from the same supplier.

Prior to utilization, newly prepared standard solutions (surrogate, calibration, spiking) are verified against another known standard prepared from another source. The verification data is maintained on file in the respective area.

11.4 CONTROL CHARTS

Control charts are quality control tools graphically displaying certain QC parameters over time. Accuracy and precision control charts are generally maintained for each method; however, for certain methods, tabulated control limits are used to monitor acceptability of quality control measurements.

11.4.1 Limits

Control limits express the outer limits of accepted method variability. Control limits are reviewed periodically against performance. Based on statistical considerations, an evaluation is made to determine whether the control limits need to be revised.

Unless otherwise stipulated in a particular method or program, control limits are statistically derived from laboratory-generated data. They are based upon ± 3s from the mean (i.e. 99% confidence interval).
The use of hard-coded limits not statistically derived from current laboratory-generated data (e.g., CLP limits) is limited to programs which specifically permit their application.

Control limits are updated annually (at a minimum) or once every 20 data points (at a maximum). Tabulated control limits are available and followed by all analysts performing the associated test. However, control charts are the preferred mechanism for monitoring quality control measurements on a real-time basis.

11.4.2 Accuracy Control Charts

Accuracy charts are maintained for surrogate and LCS recovery. Each sample is identified by its Pace Analytical sample number and the date it was analyzed. This is plotted onto a graph with the sample ID and percent recovery serving as the X and Y-axis, respectively.

11.4.3 Precision Control Charts

In cases where precision charts are maintained, the relative percent difference is plotted on the graph with the number of data points on the X-axis and the RPDs on the Y-axis. These are identified by the analysis dates and Pace sample ID number.

11.4.4 Control Chart Evaluation

Plotting and connecting successive data points on control charts enables the laboratory to detect many types of suspicious and out-of-control situations. These events can be determined by monitoring the following: outliers, runs, trends and periodicity. Outliers require immediate corrective action, whereas runs, trends and periodicity are indicators of circumstances that could lead to out of control conditions.

Outliers: A point that falls outside the control limits is classified as an out-of-control event. Whenever an analyte is outside the control limits, corrective action is performed. All calculations are checked, the integrity of the spiking solution is verified, and the instrument and operating conditions are checked to preclude the possibility of malfunction or operator error. After the systems problems have been resolved and control has been re-established, all samples in the analytical batch are reanalyzed for the out-of-control analytes.

Runs: A run is defined as a series of points that line up on one side of the central line (the mean). Any run that has a length of seven points is indicative of a potential abnormality in the process. A run can suggest several potential problems such as a system leak, elevated contamination, or incorrect standard dilution.

Trends: A trend is defined as a series of points that are marked by a continuous rise or fall. Any trend with a length of five points (may vary up to seven points) is classified as a suspicious event. A trend may indicate a change in instrument sensitivity due to conditions, such as a dirty source or injection port or standard degradation.

12.0 QUALITY ASSURANCE AUDITS AND PERFORMANCE EVALUATIONS

Integral to Pace Analytical's quality assurance program is a program of audits designed to provide feedback about the effectiveness and completeness of the various quality control and quality assurance systems in the laboratory. This section describes the types of audits conducted at Pace Analytical and discusses the roles and responsibilities of Pace Analytical personnel related to these audits.

12.1 INTERNAL AUDITS

12.1.1 Quality Assurance Officer

The QAO is responsible for designing and/or performing QA performance and systems audits. Since QA audits represent an independent assessment of laboratory functions, the auditor must be functionally independent from laboratory operations to ensure objectivity. The auditor must be familiar enough with the objectives, principles, and procedures of laboratory operations to be able to perform a thorough and effective evaluation. The auditor's ability to identify components of systems that are critical to overall data quality is especially important.

Internal audits are typically conducted by the laboratory QAO, who may be assisted by other laboratory personnel. The QAO reports directly to the Laboratory General Manager, and therefore is independent of laboratory operations. The QAO evaluates audit observations and verifies the completion of corrective actions. The Corporate Director of Quality, Safety and Training may also actively participate in the internal audit process.

12.1.2 Scope and Frequency of Internal Audits

Internal systems audits are conducted yearly. The scope of these audits includes the examination of the operations of a specific analytical department or focuses on the evaluation of a specific quality-related system as applied throughout the laboratory.

Examples of system-wide elements which can be audited include:

- Standard operating procedures, including system of review, issue, filing, maintenance, training, understanding, documentation of deviations and implementation of SOPs.
- Adherence to standard operating procedures, the Quality Manual and regulations.
- Personnel and training files, including job descriptions, resumes, documented training and training file maintenance.
- General laboratory safety, including appropriate clothing, waste disposal, health and safety plan review, obvious safety concerns.
- Labeling of reagents, solutions, standards, and associated documentation.

- Equipment and instrumentation documentation, calibration/ maintenance records, operating manuals.
- Sample handling, storage and disposal including storage locations, security, tracking/chain-of-custody, disposal practices and records, labeling and retention.
- Documentation of sample analysis, methodologies, quality control requirements.
- Documentation of discrepancy reports and corrective action.
- General procedures for data security, review, documentation, reporting and archiving.

When the operations of a specific department are evaluated, a number of functions are reviewed including:

- Documentation of technical training and analyst proficiency
- Method detection limit studies
- Internal chain-of-custody documentation
- Nonconformance documentation
- Documentation of standard preparations
- Instrument maintenance documentation
- Standard operating procedures
- Control charts
- Documentation of sample preparation and analysis
- Documentation of data review

As required on specific projects, internal audits are performed to ensure laboratory conformance to site workplans, sampling and analysis plans, QAPP, etc. Project audits include review of the following items:

- Sample log-in and chain-of-custody records
- Sample storage procedures and records
- Sample preparation and analysis procedures
- Method validation (where applicable)
- Conformance to QAPP
- Control charts (if applicable)
- Precision and accuracy assessment
- Method blanks, reagent blanks, duplicates, check samples, fortifications, surrogates, etc.
- Calibration
- Data packages
- Analyst qualifications
- Data validation and reporting

12.1.3 Internal Audit Reports and Corrective Action Plans

A full description of the audit, including the identification of the department or operation audited, the date(s) on which the audit was conducted, the specific systems examined, and the observations made during the course of the audit, are

summarized in an internal audit report. Although other personnel may assist with the performance of the audit, the QAO writes and issues the internal audit report.

The QAO identifies which audit observations are deficiencies that require corrective action.

Once completed, the internal audit report is issued jointly to the laboratory general manager and the manager(s)/supervisor(s) of the audited department(s) or operation(s). The responsible manager(s)/supervisor(s) responds with a plan to correct all of the deficiencies cited by the due date specified in the audit report. Each response must include timetables for completion of all proposed corrective actions.

The QAO reviews and accepts the audit responses. If the response is accepted, the QAO uses the action plan(s) and timetable(s) as a guideline for verifying completion of the corrective action(s). If the QAO determines that the audit response does not adequately address the correction of cited deficiencies, the response will be returned for modification.

To complete the audit process, the QAO performs a re-examination of the areas where deficiencies were found to verify that all proposed corrective actions have been implemented. An audit deficiency is considered closed once implementation of the necessary corrective action has been verified. If corrective action cannot be verified, the associated deficiency remains open until that action is completed.

12.2 EXTERNAL AUDITS

Pace Analytical is audited as required by regulatory agencies to maintain laboratory certifications, and by various commercial clients.

Audit teams external to the company review the laboratory to assess the existence of systems, implementation of the systems, and degree of technical expertise. QA staff host the audit team and assist in facilitation of the audit process. Generally, the auditors will prepare a formalized audit report listing deficiencies observed and follow-up requirements for the laboratory. In some cases, items of concern are discussed during a debriefing convened at the end of the on-site review process. The laboratory staff and supervisors develop corrective action plans to address any deficiencies with the guidance of the QAO. The laboratory manager provides the necessary resources for staff to develop and implement the corrective action plans. The QAO collates this information and provides a written report to the audit team. The report contains the corrective action plan and expected completion dates for each element of the plan. The QAO follows-up with the laboratory staff to ensure that corrective actions are implemented.

12.3 PERFORMANCE EVALUATION/PROFICIENCY TESTING PROGRAM

12.3.1 NELAP Proficiency Testing Program

Pace Analytical laboratories participate in the NELAP-defined proficiency testing program. Proficiency Test (PT) are obtained from NIST-approved providers and analyzed and reported at a minimum of two times per year for the relevant fields of testing.

For PT quantitations evaluated as being outside the acceptance ranges, investigations are performed by the responsible Manager(s)/Supervisor(s) and reports are completed. The reports are reviewed by the QAO, then forwarded to the various accreditation agencies, as required, for their review.

12.3.2 Other Performance Evaluation (PE) Studies

Other PE samples may be performed by Pace Analytical in conjunction with a specific program or contract.

13.0 PREVENTIVE MAINTENANCE

The objectives of Pace Analytical's preventive maintenance program are twofold: to establish a system of instrument care that maintains instrumentation and equipment at required levels of calibration and sensitivity and to minimize loss of productivity due to repairs. The program includes a system for documenting all routine and non-routine instrument maintenance and repairs.

13.1 MAINTENANCE RESPONSIBILITIES

The Laboratory Operations Manager and department Manager/Supervisors are responsible for providing technical leadership to all staff including serving as a technical resource to help solve equipment and method problems, evaluating and recommending investments in new technologies, improving efficiency, and coordinating instrument repair and maintenance. The analysts have a primary responsibility to perform routine maintenance.

13.2 MAINTENANCE SCHEDULES

To minimize downtime and interruption of analytical work, preventive maintenance is routinely performed on each analytical instrument. SOPs are written for each instrument that cover basic operation, maintenance procedures, and maintenance schedules.

13.3 MAINTENANCE DOCUMENTATION

All routine and non-routine instrument maintenance is documented in maintenance logbooks assigned to each instrument. These records include the following:

1. The name of the equipment
2. The manufacturer's name, type, and serial number
3. Approximate date received and date placed into service
4. Current location in the laboratory
5. Condition when received (new, used, etc.)
6. Copy of any manufacturer's manuals or instructions
7. Dates and results of calibrations and next scheduled calibration (if known)
8. Details of past maintenance activities, both routine and non-routine
9. Details of any damage, modification or major repairs

When maintenance is performed to repair an instrument problem, the entry includes a description of the symptoms that precipitated the maintenance action. Depending on the initial problem, demonstration of return to control may be satisfied by the successful analysis of a reagent blank or continuing calibration standard. The entry must include a summary of the results of that analysis and a verification by the analyst that the instrument has been returned to an in-control status. In addition, each entry must include the initials of the analyst making the entry, the dates the maintenance actions were performed, and

the date the entry was made in the maintenance logbook, if different from the date(s) of the maintenance.

13.4 SPARE PARTS

An adequate inventory of spare parts is required to minimize equipment downtime. This inventory includes those parts and supplies that:

- are subject to frequent failure,
- have limited useful lifetimes, or
- cannot be obtained in a timely manner should failure occur.

Department Manager/Supervisors are responsible for maintaining an adequate inventory of necessary spare parts for all major instruments and equipment items.

14.0 CORRECTIVE ACTION

This section describes the portion of the quality assurance system at Pace Analytical, that is implemented to address the documentation and correction of problems encountered during sample handling and analysis. The accurate and timely communication of sample handling and analysis problems to laboratory Managers/Supervisors, Project Managers, and the QAO can mean the difference between a situation that is corrected with little or no impact to sample data quality and one that results in re-sampling. Laboratory Managers/Supervisors must initiate corrective action whenever QC results for control parameters fail to stay within acceptance limits.

When errors, deficiencies, unusual occurrences, or out-of control situations exist, the QA program provides systematic procedures, referred to as "corrective actions", to resolve problems and restore proper functioning of the analytical system. Within Pace Analytical, a distinction is made between "out-of-control events" and "unusual occurrences" for the purposes of requiring corrective actions.

An out-of-control event is any event where the evaluation criteria are beyond the acceptance limits established for laboratory operation by Pace Analytical SOPs, EPA methods, or client specific contracts or protocols. This can be due to data which are outside of the accepted bounds for accuracy and/or precision because of method contamination or improper instrument calibration or maintenance.

An unusual occurrence is a one-time event such as storm events impacting power. Both out-of-control events and unusual occurrences are formally documented. Within Pace Analytical, the formal documentation reports are currently identified with different designations including, Corrective Action Report (CAR); Quality Action Log (QA Log); Non-conformance Report (NCR); Remedial Action Record (RAR); or Discrepancy Report (DR). Each of these reports serves the purpose (because of this, the names are used inter-changeably) of documenting whenever either type of event is noted. Collectively these reports are referred to as Discrepancy documents.

14.1 DISCREPANCY DOCUMENTATION

Discrepancy documentation may be initiated by an analyst, laboratory Manager/Supervisor, Project Manager, or other laboratory personnel. The Discrepancy documentation is used to document a specific problem or deficiency noted during sample handling or analysis. Depending on the specific problem or deficiency, corrective actions may be taken by the analyst, laboratory Manager/Supervisor, Project Manager, or other laboratory personnel. Since problems encountered with sample analysis often have the potential to impact data quality, appropriate corrective action is frequently determined in communications between the laboratory Project Manager and the client.

Each Discrepancy documentation requires the initials of the person documenting the problem as well as those of any person documenting additional information or corrective action. Each record is then reviewed and initialed by the department

Manager/Supervisor. If the deficiency or problem impacts client sample data, the department Manager/Supervisor passes the documentation directly to the QAO and appropriate Project Manager for their review and follow-up.

The documentation describes the actions taken at each step of the review process. Evidence of return to control must also be documented. Once documentation of the problem, corrective action, and return to control is complete, the documentation is forwarded to the QAO for review. QA review is documented with the QAO's initials and the completed original record is either passed back to the appropriate Project Manager to be filed in the client project file or is filed in the QA files, depending on the nature of the nonconformance.

14.2 OUT-OF-CONTROL-EVENTS

Out-of-control events associated with the statistical analysis and review of data are straight forward to identify. The analyst generating the data is responsible for checking the results against the established limits. Any deviations are immediately addressed. If data are outside accepted limits, the analyst immediately notifies the responsible Manager/Supervisor. If the situation can not be corrected to prevent an out-of-control condition, the Supervisor/Manager shall notify the Operations Manager and the Quality Assurance Officer. The Operations Manager and department Managers/Supervisors are responsible for identifying the source of the problem and initiating corrective action. Completion of corrective action is evidenced by the return of the procedure to prescribed acceptable limits.

Events which do not cause an immediate obvious effect on data quality are more difficult to identify. Such events could be samples stored at an incorrect temperature or held beyond prescribed holding times, or improper maintenance of records. Everyone in the laboratory is responsible for reporting "system" problems. Analysts must report out-of-control events to their Manager/Supervisor, who should then in turn report the situation to the Operations Managers and Quality Assurance Officer. Corrective action is again the ultimate responsibility of the Operations Manager and the department Managers/Supervisors. They review and approve the action taken.

If an out-of-control event does occur during analysis, for instance an LCS recovery falls outside the expected range, the analyst must describe, on the corrective action report, the event, the investigative and corrective actions taken, the cause of the event, and notify the QAO . In some cases, investigation of an out-of-control event will reveal no problems. In such cases, only the event and the investigative action is recorded.

The investigative action taken is somewhat dependent on the analysis and the event. However, listed below is a progression of steps which are taken to find the cause of an out-of-control event:

- Check calculations to ensure there are no errors
- Check standard and spiking solutions for degradation or contamination
- Check instrument performance

If the problem is determined to be the standards or instrument performance, the analyst must recalibrate or retune the instrument before reanalyzing the sample extracts affected. If the out-of-control condition is still not remediated, the samples may require reextraction and reanalysis or data qualification.

It is occasionally necessary to qualify data when the accompanying quality control data are not within established performance criteria. The qualifying of data alert the data end user to the fact that the precision and accuracy of the data produced may not fulfill the data quality objectives (DQOs) for that particular project.

14.3 QUALITY ASSURANCE PROJECT PLAN EXCEPTIONS

Due to the unknown nature of environmental samples prior to analysis, Pace Analytical has minimal control over analytical and quality control complications which arise from unique sample matrix conditions. These conditions may include such items as: highly concentrated samples containing target compounds of interest and/or non-target components; extremes in sample pH, viscosity, and solubility; and high organic content (both natural and synthetic). Each of these conditions presents a variety of challenges to the laboratory.

Most often these extremes in sample matrix composition necessitate the laboratory to employ dilution techniques in order to change the sample concentration so that it can be analyzed by the desired protocol. Unfortunately, dilution techniques raise reporting limits (RLs) and often adversely impact the surrogate standard and matrix spiking acceptance criteria.

The laboratory has the responsibility to clearly identify cases where matrix interferences preclude the generation of "compliant" data. This is done by demonstrating through reproducibility (i.e., reanalysis of the affected sample) that the quality control measurement failure resulted from unique sample matrix conditions beyond the control of laboratory, and not as a result of laboratory error. For example, in situations where the surrogate standard recoveries fall outside of control limits, samples are re-extracted and/or re-analyzed. Similar "non-compliant" results in the reanalysis indicate that it is something inherent to the sample which prevented the laboratory from reporting results deemed method compliant under data validation criteria.

Analytical projects containing particularly "dirty" samples (i.e., highly contaminated) will often fail to meet pre-established QA completeness goals (set forth in the QAPP) when prior site history does not reveal the potential for excessive values. Again, while the laboratory performs all analytical testing by the prescribed protocols, the results obtained may not meet validation criteria as a result of elevated RLs or the frequency at which surrogate and matrix spikes failed to meet acceptance limits. In cases where the laboratory is unable to meet QC criteria because of sample matrix complications beyond their control, results which are flagged "qualified" or "rejected" by data validation guidelines are often still "useable" by the end user of the data.

Pace Analytical is committed to adhering to method requirements and program quality control applications as established clients and regulatory agencies and will work

rigorously to provide data which is of the highest quality possible. However, the uncertainties associated with environmental samples do not allow Pace Analytical to assume responsibility for conditions beyond our reasonable control which directly impact the "validity" versus the usability of the associated analytical data generated.

15.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

An objective of the Pace Analytical quality assurance program is to ensure that an operational system is in place which enables management to determine the quality of all data produced within the laboratory system. An essential component of the system are the communication pathways and feedback mechanisms which ensure that management obtains quality information promptly and consistently. To achieve this objective, Pace Analytical employs informal and formal reporting processes. This information enables Pace Analytical to take corrective action promptly when required. Reporting occurs at the following frequency.

- Daily meetings at the operations level to discuss possible quality assurance problems and proposed solutions.
- Weekly meeting involving upper management to discuss laboratory performance, upcoming audits, certification programs, and past audit performances.
- Monthly meetings involving all Pace Analytical QAO's and the Corporate Director of Quality.
- Quarterly written status reports to upper management including all quality assurance concerns and pertinent laboratory issues.
- As required, internal departmental audit reports with observations and suggested corrective action procedures.

The Quality Assurance Officer is responsible for preparing reports to management indicating effectiveness of the laboratory Quality Assurance Program.

15.1 MANAGEMENT REVIEW

The Quality Assurance Officer will issue a report of QA activities and findings on a regular basis to the General Manager. The status report will include:

- Results of internal systems or performance audits
- Corrective Action activities
- Discussion of QA issues raised by laboratory users
- Results of third party or external audits
- Status of laboratory certifications
- Other significant events
- Performance Evaluation/Proficiency Test Sample Results
- Results of internal laboratory review activities
- Results of internal data review activities
- Results of Proficiency Evaluation studies
- Results of state certification applications
- Summary of holding time exceedence and data qualification
- Method detection limit study status

- Training activity summary
- SOP review/revision summary

At anytime, any laboratory employee, through the Laboratory Operations Manager, may present recommended changes to the Quality Assurance Officer.

15.2 QUARTERLY QUALITY SYSTEMS REPORTS TO MANAGEMENT

Quarterly reports are provided by the Quality Assurance Office staff to the Corporate Quality Office and the General Manager. The report summarizes quality assurance activities including details of corrective actions recommended or implemented, internal and external audit results, status of performance evaluation samples, certification status, training activities and SOP revision status.

GULF COAST
ANALYTICAL LABORATORIES, INC.

QUALITY ASSURANCE PROGRAM PLAN

FOR

Gulf Coast Analytical Laboratories
7979 GSRI Avenue
Baton Rouge, Louisiana 70820

Revision 20
March 14, 2001

Approval Signatures:

3/15/01
Date
President

3/15/01
Date
Operations Manager

3/15/01
Date
QA/QC Director

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1.0 QUALITY ASSURANCE POLICY STATEMENT

Quality Assurance consists of a planned system of activities necessary to provide confidence in the results of laboratory analytical determinations. The principal objective of Gulf Coast Analytical Laboratories (GCAL) is the production of high quality analytical data through the use of measurements that are accurate and reliable for the intended purpose. We are dedicated to providing analytical data and services that conform to all of the requirements specified and expected by our clients. This Quality Assurance Program Plan details facilities, personnel and equipment necessary for accomplishing this objective along with general procedures and practices which will be followed to maintain adherence to the objective.

There is a commitment and dedication by all laboratory staff to produce data of known and documented quality. This commitment and dedication to quality is fully supported from the bench level to upper management in order to meet the objectives of our laboratory and best serve our clients.

GCAL's approach to Quality Assurance starts with the General Manager who delineates policy and sets goals in conjunction with senior management personnel. Policies are implemented by management staff and laboratory personnel. All departments are involved in the process by providing assessment of operating procedures along with recommendations for improvements or corrections. The QAPP and the appropriate Standard Operating Procedures are distributed to all laboratory personnel. All personnel are required to read and comply with this program.

The Quality Assurance/Quality Control Director , who reports directly to the General Manager, oversees prevention, assessment, and correction procedures for the analytical laboratory and various associated departments within the organization. These three functions; prevention, assessment, and correction, comprise the foundation of the laboratory's approach to Quality Assurance.

Prevention covers positive actions taken before or during analyses to insure that the analytical systems are functioning properly. Prevention includes such things as instrument calibration and maintenance, frequent standardization, personnel training and quality control planning.

Assessment is a component of quality control that includes monitoring of performance to determine precision and accuracy. Examples include duplicate and spike analyses, check samples, peer review of calculations and validation of methodology.

Correction is action taken to determine the causes of quality defects and to restore proper functioning of the analytical system. This may involve trouble shooting to correct instrument malfunctions, or retraining of personnel.

All quality assurance activity requires constant monitoring and documentation to provide evidence of consistent, valid analytical data. GCAL keeps records of such activities in order to have available for its clients documented assurance that the data they receive quantitatively reflect the parameters requested.

The policies and practices of quality assurance/quality control presented in this plan are set forth as minimums. Additional quality assurance/quality control measures may be required for a specific project.

GULF COAST
ANALYTICAL LABORATORIES, INC.

QUALITY ASSURANCE PROGRAM PLAN

FOR

Gulf Coast Analytical Laboratories
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Quality Assurance consists of a planned system of activities necessary to provide confidence in the results of laboratory analytical determinations. The principal objective of Gulf Coast Analytical Laboratories (GCAL) is the production of high quality analytical data through the use of measurements that are accurate and reliable for the intended purpose. We are dedicated to providing analytical data and services that conform to all of the requirements specified and expected by our clients. This Quality Assurance Program Plan details facilities, personnel and equipment necessary for accomplishing this objective along with general procedures and practices which will be followed to maintain adherence to the objective.

There is a commitment and dedication by all laboratory staff to produce data of known and documented quality. This commitment and dedication to quality is fully supported from the bench level to upper management in order to meet the objectives of our laboratory and best serve our clients.

GCAL's approach to Quality Assurance starts with the General Manager who delineates policy and sets goals in conjunction with senior management personnel. Policies are implemented by management staff and laboratory personnel. All departments are involved in the process by providing assessment of operating procedures along with recommendations for improvements or corrections. The QAPP and the appropriate Standard Operating Procedures are distributed to all laboratory personnel. All personnel are required to read and comply with this program.

The Quality Assurance/Quality Control Director , who reports directly to the General Manager, oversees prevention, assessment, and correction procedures for the analytical laboratory and various associated departments within the organization. These three functions; prevention, assessment, and correction, comprise the foundation of the laboratory's approach to Quality Assurance.

Prevention covers positive actions taken before or during analyses to insure that the analytical systems are functioning properly. Prevention includes such things as instrument calibration and maintenance, frequent standardization, personnel training and quality control planning.

Assessment is a component of quality control that includes monitoring of performance to determine precision and accuracy. Examples include duplicate and spike analyses, check samples, peer review of calculations and validation of methodology.

Correction is action taken to determine the causes of quality defects and to restore proper functioning of the analytical system. This may involve trouble shooting to correct instrument malfunctions, or retraining of personnel.

All quality assurance activity requires constant monitoring and documentation to provide evidence of consistent, valid analytical data. GCAL keeps records of such activities in order to have available for its clients documented assurance that the data they receive quantitatively reflect the parameters requested.

The policies and practices of quality assurance/quality control presented in this plan are set forth as minimums. Additional quality assurance/quality control measures may be required for a specific project.

2.0 ETHICS POLICY

Gulf Coast Analytical Laboratories utilizes a clearly stated ethics policy in the form of the following Ethics and Data Integrity Statement. This agreement is discussed with all new employees during orientation and is then signed and retained with the employee's training file. Violation of the agreement is basis for termination of employment.

GULF COAST ANALYTICAL LABORATORIES, INC.

ETHICS AND DATA INTEGRITY AGREEMENT

I, _____, state that I understand the high standards of integrity required of me with regard to the duties I perform and the data I report in connection with my employment at GULF COAST ANALYTICAL LABORATORIES. Our core values are honesty, success, service and integrity, I understand that it is critical for our long-term success that each and every employee align with all company core values.

I agree that in the performance of my duties for GULF COAST ANALYTICAL LABORATORIES and its clients, I shall conform to the following ethics standards and will report immediately to the Quality Assurance Manager and the appropriate supervisor any information concerning misrepresentation of analytical data that includes, but is not limited to:

1) Altering an instrument computer or clock for any inappropriate purpose;

2) Altering the contents of logbooks and/or data sheets to misrepresent data;

3) Misrepresenting an analyst's identity;

4) Changing raw data documents with correction fluid;

5) Preparation and submittal of "fake" data packages;

6) Inappropriate calibration techniques such as peak shaving, setting fraudulent integrator parameters, or use of computer macros that alter QC results.

7) Changing reported results without proper documentation and approval;

8) Altering injection volumes for calibration and misrepresenting the true values;

9) Failure to comply with standard operating procedures or methods without proper documentation and approval;

10) Any attempt to misrepresent data or events as they actually occur in the course of data

production, review or reporting;

11) Disposing of or deleting electronic data files or hardcopy of raw data;

12) Engaging in any practice that ultimately misrepresents data or narratives in any way.

I will not knowingly participate in any such activity and will not tolerate unethical practices by others. I understand that confidentiality will be strictly enforced by GULF COAST ANALYTICAL LABORATORIES when dealing with these matters. As a further extension of my commitment to this program, I am responsible for seeking approval to report data resulting from techniques or procedures that may deviate from standard operating procedures, methods, or industry standard practices. Any such reporting of data will include a laboratory narrative that must be approved by the appropriate supervisor and the QA Manager.

If I am unsure of how to properly handle data generated by me, I am responsible for seeking advice and approval from the Quality Assurance Manager and the appropriate supervisor. I agree to inform the Quality Assurance Manager and the appropriate supervisor of any accidental reporting of non-authentic data by myself or others within 24 hours of discovery.

I understand that if I knowingly participate in any such prohibited activity, I will be subject to serious disciplinary action that may include termination by GULF COAST ANALYTICAL LABORATORIES. I also understand that I face individual suspension and debarment from all Federal programs should I be convicted of such practices. I understand that suspension and debarment from all Federal programs affects my ability to work in the environmental field, as well as, any other professions where government funding or loans may be involved. I understand the most serious consequence of unethical conduct can be imprisonment if convicted.

However, it is not the company's intent to punish anyone for an accidental mistake or oversight. Employees will not face disciplinary actions in this case. Repeated careless or neglectful behavior will be subject to corrective action. Covering up a mistake or oversight is not acceptable behavior and will result in termination. Mistakes or oversights should be immediately reported to the Quality Assurance Manager and the appropriate supervisor.

My signature affirms my understanding of the consequences of violating this "ETHICS AND DATA INTEGRITY AGREEMENT" and my commitment to its intent. My signature further affirms that I have received formal training on this topic.

_____
(Signature)

_____
(Date)

3.0 QUALITY ASSURANCE MANAGEMENT

3.1 Quality Assurance Responsibilities

The direct and ultimate responsibility for assuring data quality at Gulf Coast Analytical Laboratories rests with the General Manager. The General manager develops policies and general quality assurance strategies in collaboration with the Operations Manager, QA/QC Director, and Department Supervisors (GCMS-SVOA, GCMS-VOA, GC, Metals, Sample Preparation/Extractions, General Chemistry, Sample Management).

GCAL has clearly defined staff Quality Assurance (QA) responsibilities. The first level of QA lies with the laboratory analyst, who is responsible for performing the work properly, documenting it, and obtaining peer review to assure that it meets scientific standards. To accomplish this, the analyst must have a clear understanding of the analytical techniques and procedures used and the factors which affect the quality of the results. Analysts' capabilities are verified prior to conducting analyses and reviewed periodically thereafter.

Analysts must have a working knowledge of the QA policies, including data quality objectives for laboratory control standards, duplicates, and spikes; an understanding of detection limits and standard calibration requirements; and a knowledge of preventive maintenance techniques.

The second level of quality assurance lies with the management staff which includes Department Supervisors. Management is responsible for the proper training of analysts and stresses the importance of accuracy and reliability of results. Management is responsible for the quality of all analytical data produced. This responsibility includes routine review and approval or disapproval of all data and inspection of the QC records associated with the data. If the data are not adequately substantiated, corrective action is taken.

The QA/QC Director supports the entire process of the QA/QC program. This includes administration of the program as outlined in this manual, maintenance of QA records including this QAPP and preparation of reports to management covering QA activities. The QA/QC Director performs periodic audits of the QA procedures and staff, and coordinates all performance audits (e.g. check sample programs). The QA/QC Director will also assist in the preparation of QA programs to fit specific needs of clients, or for bid proposals.

3.2 Quality Assurance System

3.2.1 Personnel Training

It is the policy of GCAL to hire employees with an educational background and/or experience in an analytical field. On-the-job training takes place for all new employees based on needs identified by the job description and tasks of the position.

Training begins with the understanding of the official test methods to be performed and the corresponding QA/QC methodology. The Department Supervisor plays a significant role during this phase. Manuals for various methods are readily available to supplement the Standard Operating Procedure (SOP) for each analysis. Among the manuals are current copies of the EPA Test Methods for Evaluating Solid Waste (SW846), Chemical Analysis for Water and Wastes, Standard Methods and applicable ASTM methods.

The analyst must demonstrate that he/she is able to perform the tests with the accuracy and precision required. This is verified by analysis of laboratory control standards, matrix spikes, matrix spike duplicates, standards as knowns and check samples. Additionally, the trainee must demonstrate a strict adherence to the required quality control mandates set forth by the various regulatory agencies. This program accomplishes two things, (1) it educates the trainee and (2) it validates the trainee for specified tests. GCAL maintains a standard operating procedure detailing the certification process.

Training is also necessary for an employee whose performance does not meet standard requirements. This deficiency may be identified in a performance appraisal or through the occurrence of problems.

GCAL also recognizes development training as a means to increase the effectiveness of the employee and the organization. Therefore, GCAL utilizes other applicable training methods along with on-the-job training. Examples of this are seminars, specialized training by instrument manufacturers, and encouraging the employees to take related college courses.

New employees are hired for a probationary period of three months. At the end of three months the employee's records are reviewed and evaluated for performance and productivity and a decision is made whether to continue employment.

Periodic reviews are given to all personnel. The purpose of these reviews is to give recognition for good work and outline personnel and departmental objectives, suggestions for improvement and clarification of responsibilities. Other topics which concern either employee or employer are also discussed at this time.

3.2.2 Procurement and Inventory Control

Chemical reagents, solvents, gases, glassware and general chromatographic supplies are ordered as needed to maintain sufficient quantities on hand for use. Purchase orders are maintained as an inventory control of materials ordered by the laboratory. All orders are processed through central receiving and routed to the appropriate departments. Routine supplies are maintained on site in an inventory control stock room.

The grade or purity ordered varies depending on the analytical requirements. All reagents and standards must meet A.C.S. (American Chemical Society) Reagent Grade specifications or better. Chemical reagents and standards are dated when received and/or prepared in the laboratory and stored according to manufacturers suggestions. Flammable cabinets are available for hazardous reagents. Several refrigerators are in use to prevent contamination or deterioration. Incompatible reagents are stored separately. Prepared reagents and standards also must include names and concentrations. Primary reference standards are obtained from commercial or government sources as certified standards.

In organics, standards and reagents will be compared to the response for the most recent standard. In Inorganics, an independent source standard is used for verification with each analytical run.

It is the responsibility of the analyst to maintain the integrity of all chemicals used and notify the head of purchasing when standards or reagents do not meet specification so that corrective action can be taken. It is also the responsibility of the analyst to contact purchasing ahead of time before supplies are actually needed.

The purchase of analytical instrumentation is based on anticipated sample volume and the need to maintain superior quality data. Specifications are carefully examined to be sure new instrumentation meets current and anticipated needs. Warranty and service contract information is gathered at the time bids are reviewed and this information is considered in making the final selection. An extensive performance check-out before the instrument is accepted is mandatory. New equipment must undergo a rigorous method validation before being put into production. Operators of new instruments are sent to training courses if necessary.

Inventory records are maintained for all major capital equipment. Major suppliers of consumable items are:

Allometrics Fisher Scientific Company TRI-Gas Supelco VWR

3.2.3 Standards for Analysis

Preparation of standards for calibration must be made from pure materials (of known purity, 98% or better preferred) or from purchased concentrates certified by NIST, EPA, or other acceptable agencies.

All solvents used for preparation of standards for GC, GCMS, and HPLC are of pesticide grade. All standards, reagents, and solvents used for trace metal analysis must be trace-metal grade.

Stock standards can be kept up to one year if no expiration date is indicated by the manufacturer. All standards must be stored under conditions which provide the best protection against contamination and deterioration. Upon preparation of the standard, the following items must be recorded on the bottle containing the standard: date prepared, initials of the analyst preparing the standard, contents, concentration, and expiration date. All other information regarding the standard including solvent used, lot number(s) of solvent used, the analyte source, purity and lot number, expiration date, concentration, dilution procedure, analyst's initials, and date prepared must be entered in the log book (see Miscellaneous Forms at the end of this manual).

Preparation of intermediate standard solutions is strongly recommended for all analyses. These working standards include calibration standards, spiking solutions of analytes, surrogates, etc., and must be stored as required when not in use. Working standards for the analysis of volatile organic constituents must be prepared at least once in two weeks. Working standards for the analysis of semi-volatile organic constituents and pesticides must be prepared as needed or every six months.

Working standards for trace metal analysis should be prepared at least once a month for concentrations of 1 mg/L and less. Calibration standards for mercury and graphite furnace must be prepared daily.

The identification of each standard prepared must be unique and all documents related to sample analysis in which the standard was used must contain this unique identification. The document should be such that all of the standard information could be traced from the raw data for the sample.

Standards must be stored in separate refrigerated areas away from samples and extracts.

3.2.4 Instrument Operation, Calibration and Maintenance

Equipment is defined as any non-disposable mechanical and/or electronic device used in the generation or measurement of data.

Calibration is defined as adjusting equipment with reference standards to assure that any

measurement performed is quantitatively accurate. The reference standards should be traceable to primary standards (e.g., NIST or other certified standards). If traceable chemical standards are not available, standards may be prepared according to the laboratory quality control procedures or the project's requirements. Calibrations for each of the common laboratory instruments are outlined in Table 1. Specific requirements for each instrument may differ from method to method. This table illustrates the minimum acceptable criteria unless superseded by particular method criteria.

TABLE 1

	CALIBRATION CALIBRATION CURVE TOTAL POINTS -	LINEARITY REQUIRED
HPLC	5 POINT	<20 % RSD
GC-VOA	5 POINT	Average<20 % RSD
GC-SEMIVOA	5 POINT	Average <20 % RSD
GC IH	5 POINT	<20 %
GCMS	5 POINT	Average <15 % RSD
LACHAT	5 POINT/10 POINT	0.995 CORRELATION COEFFICIENT
TOX	1 POINT	N/A
TOC	4 POINT	0.995 CORR. COEFF.
ICP	4 POINT/2 POINT	0.995 CORR. COEFF.
GRAPHITE FURNACE	4 POINT	0.995 CORR. COEFF.
FLAME	4 POINT	0.995 CORR. COEFF.
PS200 Hg ANALYZER	6 POINT	0.9995 CORR. COEFF.
GPC	1 POINT	N/A

1. Equipment for the generation, measurement or determination of data shall be adequately calibrated.

2. Equipment shall have adequate procedures for operation, calibration, maintenance and quality control which shall:
   -Be prepared in written form as an SOP
   -Be congruent with the manufacturer's recommendations
   -Reflect actual use patterns for the equipment

-Establish frequency intervals particular to the equipment

3. Equipment shall be calibrated and maintained in accordance with the procedures and schedules detailed in the equipment SOP.

4 Calibration and maintenance intervals begin from the date of last calibration or service.

5. Equipment maintenance shall be documented and the records retained in accordance with the logging requirements of the SOP, in the respective equipment file.

The Operations Manager and/or the Department Supervisor shall:
- Identify, compile and write the SOP
- Make pertinent SOP's available to the appropriate staff (This is to be coordinated with the QA Manager)
- Maintain instrument SOP's with the instruments: Operation manuals shall also be available in the immediate work area. The Department Supervisor is responsible for verifying that the manufacturer's manuals are kept up-to-date by replacing obsolete information with updates provided by the manufacturer.
- Ensure that the logbooks are initiated and maintained in accordance with the SOP's
- Review records for completeness and accuracy, which indicates the equipment, is in proper working order.
- Monitor and assure compliance with the SOP.

The Quality Assurance Department shall:
-Coordinate SOP preparation.
-Coordinate review/revision of SOP's.
-Reproduce and issue SOP's.
-Retain current and historical copies of the SOP's.
-Maintain distribution list of issued SOP's. Recall superseded copies.
-Verify compliance (via inspections).

Maintenance is defined as cleaning and/or replacing equipment components to assure that the equipment has been properly and periodically serviced and is in satisfactory condition.

All measurements must be within the instrument linear range where correction factors are valid. It is the responsibility of the analyst to verify that the instrument configuration and operating conditions used satisfy the analytical requirements and to maintain quality control data confirming instrument performance and analytical results.

All analyses requiring calibration of instrumentation follow strict procedures. Space restrictions in the QA manual limit detailing all instrument calibration procedures.

3.2.5 Reporting and Recording Data

All raw data is recorded in bound books and/or by instrument printout. This includes such information as standard curves, matrix spikes, duplicates, reagent blanks, calculations and any

notations concerning a given analysis. All preventive maintenance information is recorded in a logbook assigned to each instrument.

When analyses are complete, the information is transferred to the proper worksheets and is entered into the LIMS. The data is then reviewed and authorized by the Department Supervisor. The final report is then printed. The final report will include detection limits and references for each analyte. A batch quality control report will also be included with each report. Additional quality control data may be included if requested by the client. The data validation manager or his designee will review the data. Only after the reports have been authorized and signed by the Operations Manager or his designee are they released to the client.

The laboratory will retain all records related to sample analysis including raw test data, calculations, derived data, calibrations and copies of test reports. These records will be stored in systematic manner for a minimum of five years. Longer periods of storage may be arranged at the time of a project initiation. If the laboratory is going out of business, clients will be notified at least 60 days (if time permits) prior to closure of the laboratory and will receive a final report for all submitted samples.

Additional information is kept in-house for documentation of control. This includes performance evaluation reports, equipment and supplies inventory, control charts for matrix spikes and duplicates, quality assurance audits, standards as knowns, standards as blinds and method validations. This information is used by management to track the progress and needs of the corporation.

3.3 Quality Assessment

Quality assessment is accomplished by monitoring the accuracy, completeness, and precision of the quality control data, such as blanks, calibration curves, duplicates, spikes, internal standards or surrogates. Additionally, system audits, standards as knowns and standards as blinds may be used to validate the correctness of numerical computations. Other tools are preventive maintenance charts, performance evaluations and chain-of-custody procedures. By proper maintenance of these tools, the entire system of data production is verified.

3.3.1 Processing of Quality Control Data

This section describes the analytical treatment of the data resulting from the quality control samples through specific routine procedures used to assess data precision and accuracy.

A reagent and/or method blank is prepared and analyzed with each set of samples. Field blanks (if provided by the client) are analyzed to determine possible sample contamination during collection and shipment to the laboratory. Trip blanks are applicable to volatile organics analysis (VOA) where volatile contaminants can be introduced from ambient air on site, during shipment, and in the laboratory.

Each instrument is calibrated according to the TABLE 1 on page 12. If the standard curve is known to be stable, the standard curve can be verified daily by the analysis of a midpoint standard.

One sample is to be analyzed in duplicate for each matrix and each batch of samples (Inorganics), but no less than one for each twenty samples. One sample in every batch of samples or for each matrix, but no less than one every twenty samples, is to be spiked. A matrix spike duplicate (Organics) will also be prepared for each sample selected for spiking.

Semi-annually, the Quality Assurance Manager introduces a double-blind sample unknown to the analyst. These samples are submitted to each analytical department within the laboratory.

Standard Reference Materials (SRMs) are introduced periodically into the testing scheme by the QA Manager to evaluate the testing procedure and the analyst's performance.

A Laboratory Control Standard consisting of deionized water spiked with the parameter(s) of interest is analyzed. Laboratory Control Standards are routinely used for most analyses.

Every sample is spiked with the appropriate surrogate standards prior to extraction and analysis for all organic compounds analysis. Internal standards are added to all samples for GC Volatiles and GC/MS Semi-volatiles testing prior to analysis.

When the analysis of a sample set is completed, the results will be reviewed and evaluated to assess the validity of the data set. Review is based on the following criteria:

Reagent Blank Evaluation - The reagent and/or method blank results are evaluated for high readings characteristic of background contamination. If high blank values are observed, laboratory glassware and reagents should be checked for contamination and the analysis halted until the system can be brought under control before further sample analysis proceeds. The concentration of an analyte in a reagent blank should be below the reporting limit for most methods.

Field Blank Evaluation - Field blank results are evaluated for high readings similar to the reagent and/or method blanks described above. If high field blank readings are encountered, the procedure for sample collection, shipment, and laboratory analysis should be reviewed. If both the reagent and/or method blanks and the field blanks exhibit significant background contamination, the source of contamination is probably within the laboratory. In the case of VOAs, ambient air in the laboratory and reagents should be checked as possible sources of contamination.

Calibration Standard Evaluation - The calibration curve is evaluated to determine linearity through its full range, and that sample values are within the range defined by the low and high standards. If the curve is not linear, sample values must be corrected for nonlinearity by deriving sample concentrations from a graph or by using an appropriate algorithm to fit a nonlinear curve to the standards.

Replicate Sample Evaluation - Duplicate sample analysis for the sample set is used to determine the precision of the analytical method for the sample matrix. The duplicate results are used to calculate the precision as defined by the relative percent difference (RPD). The precision value, RPD, should be plotted on control charts for the parameter determined. If the precision value exceeds the control limits, the sample set may be reanalyzed for the parameter in question.

Matrix Spike Evaluation - The observed recovery of the spike versus the theoretical spike recovery is used to calculate accuracy as defined by the percent recovery. The accuracy value, the percent recovery, should be plotted on a control chart for the parameter determined. If the accuracy value exceeds the control limits for the given parameter, the LCS is reviewed to verify the analytical system is in control. The failure may be a result of an error or the matrix. If the accuracy value exceeds the control limit, the sample set may be reanalyzed for the parameter in question.

Reference Standard Evaluation - Standard Reference Materials analyses are compared with true values and acceptable ranges. Values outside the acceptable ranges require corrective action to determine the source of error. All sample analyses should be halted pending this evaluation. Following correction of the problem, the SRM should be reanalyzed.

Laboratory Control Standard Evaluation - The results of check standard analyses are compared with the true values and the percent recovery of the check standard is calculated. If correction is required, the check standard should be reanalyzed to demonstrate that the corrective action has been successful.

Surrogate Standard Evaluation - The results of surrogate standard determinations are compared with the true values spiked into the sample matrix prior to extraction and analysis. The percent recoveries of the surrogate standards must be determined.

Additional data validation is accomplished by participation in performance evaluations such as those sponsored by EPA approved suppliers and ASI (Analytical Standards, Inc.) which provide further review for in-house QA/QC procedures.

3.3.2 Statistical Quality Control

As part of the analytical quality control program, the precision and accuracy for each parameter analyzed is determined. Initially, when these data are compiled, the evaluation is applied over a broad concentration range. As more data are accumulated, precision and accuracy determinations will be updated and criteria developed to define precision and accuracy over specific concentration ranges.

Control charts may be established for all major analytical parameters. A minimum of twenty measurements of precision and accuracy are required before control limits can be established. In general, control limits of ±three standard deviations shall be utilized. Once established, control limits are updated as additional precision and accuracy data become available.

3.3.2.1 Precision

Precision is the measure of how closely multiple analyses of a particular sample agree with each other. To determine the precision of the method and/or laboratory analyst, a routine program of replicate analyses is performed. The results of the replicate analyses are used to calculate the relative percent difference (RPD), which is the governing quality control parameter for precision.

The relative percent deviation (RPD) for replicate analyses is defined as 100 times the difference (range) of each replicate set, divided by the average value (mean) of the replicate set.

3.3.2.2 Accuracy

In addition to the evaluation of analytical precision, GCAL evaluates accuracy. When a program for evaluation of analytical accuracy is established, the evaluation is applied over the entire range of spiking concentrations. As more data are accumulated, the evaluation procedure is refined to define the analytical accuracy of the method over specific concentration ranges. To determine the accuracy of an analytical method and/or the laboratory analyst, a periodic program of sample spiking is conducted. The results of sample spiking are used to calculate the quality control parameter for accuracy evaluation, the Percent Recovery (%R).

The %R is defined as 100 times the observed concentration, minus the sample concentration, divided by the true concentration of the spike.

Control charts are developed to predict trends (positive or negative) in the analytical processes and to determine when an analysis is out of control.

Examples of situations which may show up in control charts are:

- Shift in mean - this may be caused by incorrectly prepared standards or reagents, contamination of sample, problems in instrument calibration, or analyst error.
- Trend of mean upward - this may be caused by deterioration of standards or reagents.
- -Trend of mean downward - this may be caused by concentration of standard due to evaporation of solvent or deterioration of reagents.
- Increase in variability - this may be caused by poor technique by the analyst or deviation from procedure.

3.3.3 Data Validation

Data validation is performed to check data integrity and to verify that the data is correct and of an acceptable quality. Data integrity involves reviewing all documentation for errors and mistakes. It includes review for correct documentation of sample ID's, verification that

holding times were met, transcription errors, correct calculations, complete records, and for acceptable chain of custody documentation. A review of the data is performed to verify the results and to assure that all QC is within acceptable criteria. The data is reviewed according to the criteria that applies to the particular analysis and according to the client specific project requirements. The reviewer will identify unacceptable data and initiate the appropriate corrective actions.

Data validation begins with the processing of data. Data processing can be performed by the analyst who obtained the data or by another analyst. Validation continues with checking that the data processing has been done correctly. This step can be performed by an independent analyst or the Department Supervisor. At this time a member of the QA/QC Department may review the data processing. All those who review data processing shall indicate this by signature and date on the documents validated or reviewed.

In general, data will be processed by an analyst in one of the following ways:

- Manual computation of results directly on the data sheet or on calculation pages attached to the data sheets
- Input of raw data for computer processing
- Direct acquisition and processing of raw data by a computer.

If data is manually processed by an analyst, all steps in the computation shall be provided including equations used and the source of input parameters such as response factors, dilution factors, and calibration constants. The analyst shall sign and date in ink each page of calculations. For data that are input by an analyst and processed using a computer, a copy of the input shall be kept and uniquely identified with the sample numbers and other information as needed. The samples analyzed shall be evident and the input signed and dated by the analyst. If data are directly acquired from instrumentation and processed, the analyst shall verify that the following are correct: sample numbers, calibration constants and response factors, output parameters such as units, and numerical values used for detection limits. The analyst shall sign and date the resulting output.

The Department Supervisor or his representative will validate the data entered into the LIMS. The data is then released to the Report Generation department for generation and preparation of a final report. Data reports must be reviewed to verify that information reported by GCAL corresponds with processed analytical results. The final report is reviewed by the Data Validation department prior to transmission of the report from the laboratory. The laboratory Operations Manager or his designee signs the final report. The client will be notified in writing if there were any difficulties encountered while performing the analysis.

4.0 ADMINISTRATIVE ORGANIZATION

Gulf Coast Analytical Laboratories is organized along clear lines of authority to provide our clients with service that is efficient and reliable. The organizational structure of the laboratory is shown in Appendix A. To assure communication between the departments, key personnel meet weekly, or more frequently as needed to discuss and coordinate the activities in the laboratory. The laboratory personnel also meet daily with project management to discuss key issues for that day. Resumes of key personnel are attached in Appendix A.

It is the policy of the laboratory that at each management and operational level a designated deputy or deputies will maintain continuity of service and other functions in the event of absence of key staff.

Each department within the laboratory has specific roles and responsibilities in terms of producing a product of known quality. All laboratory personnel are expected to have a working knowledge of the Quality Assurance Program Plan.

The General Manager bears the primary responsibility for data quality at the laboratory. The General Manager directs the functional areas of marketing, finance and administration for the laboratory.

The Operations Manager is responsible for coordinating the activities of analysts and technicians. The Operations Manager assures the commitment of sufficient resources for the timely generation of data of a known quality. The technical operation of the laboratory is the responsibility of the Operations Manager.

The Technical Services Manager is responsible for coordinating the activities of the sample administration department, client services, and administrative support personnel.

The Information Technology Director manages the implementation and development of information technology tools. He is also responsible for the automated data collection systems used by the laboratory. He performs strategic planning for IT projects based on projected needs of the Laboratory. Interacts with clients to determine IT requirements such as electronic deliverables.

The QA/QC Director is responsible for the preparation and maintenance of the laboratory Quality Assurance Program Plan. The QA/QC Director acts as the official laboratory contact for audits, performance evaluation studies, and project-specific quality control issues. The QA/QC Director approves and confirms the implementation of corrective actions. The QA/QC Director is responsible for the approval and distribution of controlled documents. The QA/QC Director has the authority to intercede in all areas where quality related problems exist. No work will be released until the related quality deficiency has been corrected and approval has been given to proceed forward.

Department Supervisors are responsible for the overall flow of work and data through the

laboratory. They are responsible for the maintenance of accurate SOP's. Further responsibilities include general management of all activities within their department, ensuring that all instrumentation and equipment meet performance criteria and calibration requirements, and training of laboratory staff. The Supervisor is responsible for validating data released from the department. Department Supervisors inform the Operations Manager or Technical Services Manager of project status and capacity issues.

Project Managers act as liaisons between the laboratory and the client. Responsibilities include sample scheduling, communicating project-specific requirements to laboratory personnel, review of log-in summaries, notifying the client of any sample receipt or analytical problems, monitoring the progress of analytical work, and providing data to clients in a timely manner. Project Managers document client complaints.

At the bench level, analysts are responsible for the generation of data by analyzing samples according to written SOP's. They are also responsible for ensuring that all documentation related to the analysis is accurate and complete. The analyst should inform the Department Supervisor of quality problems immediately. The analysts have the authority to accept or reject data based on compliance with QC acceptance criteria. Analysts are responsible for initial review of all data.

The Data Validation Manager is responsible for review of final reports. Any discrepancies found in the data is reported to the appropriate Department Supervisor for review and correction if necessary.

5.0 FACILITY DESCRIPTION AND CAPITAL EQUIPMENT

5.1 LABORATORY FACILITIES

Gulf Coast Analytical Laboratories is a full service environmental laboratory . The laboratory was established in 1979 with a staff of two and has grown to its present size of over 60 employees operating in a modern laboratory space of 20,000 square feet.

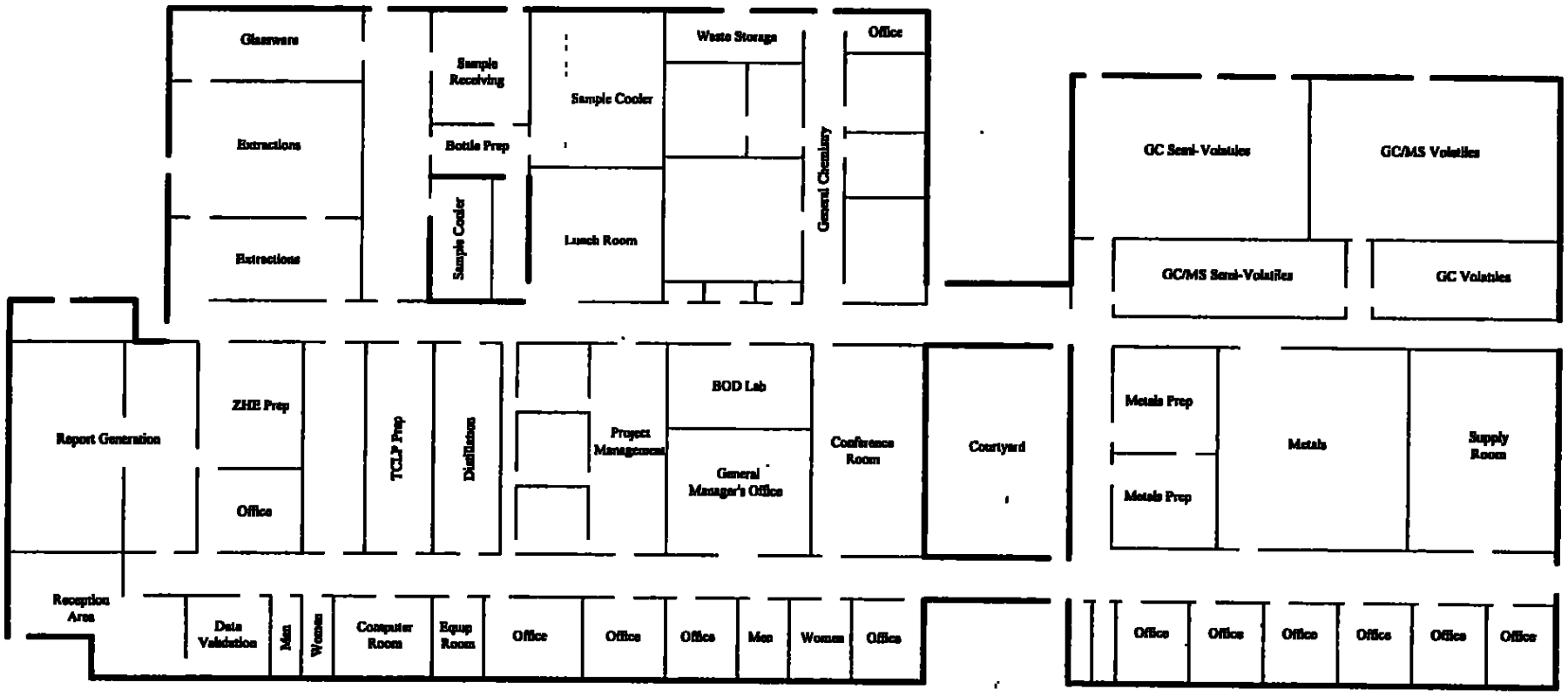
The laboratory's working areas are subdivided into areas for instrumental analysis, wet chemistry and sample preparation . These areas are designed to allow for a safe and comfortable working environment with special attention having been given to ventilation, air flow patterns and environmental controls. Administrative and Marketing areas are located for optimization of supervision and to allow for efficient handling of paperwork and results. The laboratory is protected by an electronic security system. A floor plan of the facility is included in this document.

5.2 CAPITAL EQUIPMENT

Laboratory equipment and instrumentation are maintained in compliance with instrumentation manuals. All equipment is kept in working condition to allow for conformity to each approved method. The key instrumentation such as Gas Chromatography, Mass Spectrometers/Gas Chromatographs, ICP and Atomic Absorption Spectrometers have maintenance contracts with their respective suppliers. A list of instrumentation and equipment is included in Appendix D.

GULF COAST
ANALYTICAL LABORATORIES, INC.

Facility Floor Plan



Approximate Square Footage: 19,600 Sq. Ft.

Scale: 1 in. = 25 ft.

Sample Receiving/Cooler:	1320	GCMS Volatiles:	906
Extractions/Prep:	2913	GCMS Semi-Volatiles:	394
General Chemistry:	2025	GC Volatiles:	323
Metals:	840	GC Semi-Volatiles:	906
Metals Preparation:	450	Report Generation:	713
Supply Room:	616	Offices/Storage:	8200

Drawing: flrpln2 vsd
Revised: 11/10/99

6.0 PREVENTIVE MAINTENANCE

In order to prevent system down time, minimize corrective maintenance cost and to help insure data validity, GCAL uses a system of preventive maintenance.

Specific operator manuals are used to pinpoint steps in the preventive maintenance scheme for individual instruments. All routine maintenance is performed as recommended by the manufacturer. These manuals also assist in identification of commonly needed replacement parts so that an inventory of these parts can be properly maintained.

Maintenance contracts are purchased for most instruments. This insures periodic preventive maintenance visits by factory authorized service representatives and immediate service for corrective actions if required.

An instrument log, found in Appendix C, is associated with each instrument. Notation of the date and preventive maintenance activity is recorded when performed. This includes routine service checks by laboratory personnel as well as factory service calls. Instrumentation logs are periodically reviewed by the QA manager and the information contained in them is used to help identify long and short term equipment needs of the laboratory. This log also provides a written source for future use in preventive maintenance. A preventive maintenance SOP details the frequency and type of routine maintenance required for laboratory instrumentation.

Maintenance logs are also used for ovens, refrigerators, incubators, etc. The log is to ensure that every facet in the operation of this lab is correctly documented.

Calibration curves, verification standards and internal standards insure that an instrument produces acceptable results. If calibration values do not conform to the expected results, calibration is repeated. An operator may perform routine maintenance at this point if problems persist. Some examples of these tasks would be the replacement of a nebulizer, adjusting an uptake level, cleaning a mixing chamber or replacing a column. Intensive maintenance is performed by authorized representatives of the instrument manufacturer.

All balances are serviced by an external certified service engineer semi-annually. Analytical balances are calibrated daily, using Class S weights. The Class S weights are re-certified annually. Daily temperature logs are also kept for other instrumentation to insure reliable analytical data. All liquid-in-glass thermometers used for recording temperatures are calibrated against a NIST-traceable thermometer yearly. The calibration of dial-type thermometers and temperature probes are checked quarterly against a NIST-traceable thermometer.

When a piece of equipment is deemed defective, it is taken out of service and identified with an orange "OUT OF SERVICE" label. For support equipment such as balances, ovens, coolers, and pipettors, the QA/QC Department is notified so that proper servicing and repair can be scheduled. Routine and preventive maintenance for major instrumentation is performed by the analysts. If outside service is necessary, it is scheduled by the Department Supervisor with

approval from the Operations Manager. Satisfactory instrument performance must be verified prior to returning to service any repaired equipment.

7.0 CORRECTIVE ACTION

Corrective actions are a continual part of GCAL's plan for quality assurance in sample analysis. When errors, deficiencies, or out-of-control situations develop, corrective action is taken.

Every attempt is made by the laboratory staff to comply with the requirements set forth in the methodology, Standard Operating Procedures, and the Quality Assurance Program Plan. If departures are needed due to client requests they will be reviewed by the Operations Manager and the QA/QC Director. If departures from specified requirements occur due to unforeseen circumstances , the occurrence will be documented. If samples are affected by the departure the client will be notified and a case narrative will be included with the report. Corrective action will be initiated if necessary

On-the-spot or immediate action usually applies to spontaneous, or generally non-recurring problems, such as an instrument malfunction. Long-term corrective action is used to eliminate unsatisfactory conditions in order to improve overall data quality.

On-the-spot Corrective Action Procedure: Any staff member who detects/suspects nonconformance to previously established criteria or procedure in equipment, instruments, data, methods, etc. shall immediately notify the appropriate department supervisor and/or Operations Manager. In many cases, the staff member will be able to correct the problem.

When a situation results in a change in data reported, a corrected report shall be prepared and submitted to the client. The corrected report file copy shall then be attached to the top of the original report file copy so that sample analytical data is complete and accurate.

If a large quantity of data is affected, or if any of the analyses conducted during the suspect period were of a critical nature, or if the program involved is one which requires documented corrective action, the long-term corrective action procedure is to be followed.

Long-term Corrective Action Procedure: Any staff member who detects a recurring or unresolved quality assurance problem shall advise the Operations Manager and the QA/QC Director. The QA/QC Director shall notify the Operations Manager and the Department Supervisor if applicable, and prepare and route a Corrective Action Form (CAF), and advise GCAL management by copy of the CAF (See Miscellaneous Forms).

As determined appropriate, the staff member, Department Supervisor, Operations Manager, QA/QC Director, and GCAL management shall consult to determine a suitable corrective action plan and report same on the CAF. The corrective action shall be initiated, documented and results forwarded to QA/QC Director. The QA/QC Director shall investigate to verify resolution. The QA/QC Director shall close the CAF or plan for follow up if determined necessary before CAF may be considered closed. If the corrective action was unsuccessful, the above procedure is to be repeated.

In the event that data reported to clients has been affected/corrected, they will be contacted in writing by the QA/QC Director, informing them of the circumstances and that a corrected report will be issued to them.

Corrective action forms will also be used to document and investigate customer inquiries and complaints.

8.0 LABORATORY EVALUATION AND AUDIT

8.1 Performance Audits

As a check on the laboratory's accuracy and precision, as well as to demonstrate performance for certification, GCAL participates in several inter- and intra-laboratory check sample programs. The intra-laboratory check sample program includes the submission of blind samples (duplicates and spikes) by the QA/QC Director. These samples are analyzed as routine samples by normal procedures with no additional priority or care by the analyst. In this way, a normal laboratory analysis is completed and reviewed by the QA/QC Director to monitor the control of test procedures and analysts.

On a semi-annual basis, double-blind QC samples are obtained from Analytical Standards, Incorporate (ASI) covering various parameters of water and wastewater. The results for these samples are compared to the true value or statistically determined values. ASI provides a complete report for each study along with the laboratory evaluation. This study is used to assess overall laboratory performance.

We participate in the following programs to demonstrate analytical proficiency or to provide proof of acceptable performance for certification by outside agencies.

- Water Pollution Performance Evaluation Studies
- ERA Soil Studies

8.2 System Audits

System audits are performed to determine if all aspects of the QA program are operational.

The following elements of the program are reviewed by the QA/QC Director:

Sample handling, including custody and storage procedures
Sample analysis
Records
Preventive maintenance
Check sample programs (proficiency testing)
Training

Through use of a check list, the QA/QC Director reviews all information pertaining to QA at this time, summarizes the situation and notes any deficiencies. A report is prepared based on the audit and is distributed to management in a timely manner. The report is also discussed with laboratory personnel so that a concerted effort can be made to correct any deficiencies as well as provide positive feedback.

The QA/QC department conducts a review of 5% of all final reports. The review includes a complete audit of the raw data and the report.

9.0 SUBCONTRACTING OF ANALYSIS

Sub-contracting laboratories will be reviewed with an emphasis on their overall quality control practices and compliance to Gulf Coast Analytical Laboratories quality assurance requirements. Any laboratory used for subcontracting must be approved by the QA/QC Department and must submit a copy of their Quality Assurance Manual, certification list and relevant proficiency study results. The certification list will be used to verify the sub-contract lab has the certifications required for the particular project. A list of approved subcontracting laboratories will be maintained. If testing is subcontracted to another laboratory, the client will be notified in writing.

10.0 ANALYTICAL METHODOLOGY

GCAL utilizes methods of analysis that provide evidence of analyte identification, separation from interfering substances, limits of measurement appropriate to that of analyte concentration and reasonable measures of precision and accuracy of the data obtained. Depending upon the analysis requested and the sample matrix, the methods used may be official, standard or reference, screening, or modified. Analyses will be performed in accordance with the methods cited herein unless specific project requirements or needs dictate adoption of an alternate method or modification of the cited methods.

If analysis is performed in an alternate manner, the method shall be documented. Documentation is dependent upon the specific instrumentation and data collection and reduction methods used within the lab. Methods used directly from official or standard procedures are referenced as such. Routinely used procedures are available in each department and are also available in an electronic data base on the laboratory computer network. Official protocols are used when required or requested.

The methods indicated in the following tables are typical and for information purposes only. Additional methods are available, including industrial hygiene methods.

GCAL has the capability to provide many levels of reporting formats. An outline of these formats is attached in Appendix B.

10.1 Arrangements Ensuring Laboratory Review of New Work

For the laboratory to perform additional work within its scope or to expand its scope of testing a thorough review must be undertaken. Laboratory management considers available resources and current and pending workload prior to accepting new work.

It is the responsibility of the Laboratory Operations Manager, with input from the department supervisors and General Manager, to assess the ability of the laboratory to accept new work.

ORGANICS

PARAMETERS	METHOD	REFERENCE
Halogenated Volatile Organics	8021B	2
Aromatic Volatile Organics	8021B	2
Phenols	604	6
	8041	2
Organochlorine Pesticides	608	6
	8081A	2
PCB's	8082	2
Total Organic Carbon (TOC)	415.1	1
	5310B	3
	9060	2
Total Organic Halides (TOX)	450.1	1
	9020B	2
	5050/9056	2
TPH-IR	418.1	1
TPHG	8015BM	2
TPHD	8015BM	2
GRO	8015BM	2
DRO	8015BM	2

ORGANICS

PARAMETERS	METHOD	REFERENCE
Chlorinated Hydrocarbons	8121	2
Organophosphorus Pesticides	8141A	2
Chlorinated Herbicides	8151A	2
Dissolved Gases	RSK175	9
GC/MS Volatile Organics	624	6
	8260B	2
GC/MS Semivolatile Organics	625	6
	8270C	2
GC/MS SIM	8270C	2
HPLC-PAHs	8310	2
Solvents	8000	2
Alcohols	8000	2
Extractions and Preparations		
TCLP	1311	2
Liquid-Liquid	3510C	2
	3520C	2
Ultrasonic	3550B	2
Waste Dilution	3580A	2
Soxhlet	3540C	2

ORGANICS

PARAMETERS	METHOD	REFERENCE
Extractions and Preparations		
Purge & Trap	5030B	2
Closed System Purge & Trap & Extraction for VOA in Solids and Wastes	5035	2

METALS

PARAMETERS	METHOD	REFERENCE
Aluminum		
-ICP	200.7	7
	6010B	2
Antimony		
-GFAA	204.2	1
	7041	2
-ICP	200.7	7
	6010B	2
Arsenic		
-GFAA	206.2	1
	7060A	2
-ICP	200.7	7
	6010B	2
Barium		
-ICP	200.7	7
	6010B	2
Beryllium		
-ICP	200.7	7
	6010B	2
Boron		
-ICP	200.7	7
	6010B	2
Cadmium		
-GFAA	213.2	1
	7131A	2
-ICP	200.7	7
	6010B	2
Calcium		
-ICP	200.7	7
	6010B	2

METALS

PARAMETERS	METHOD	REFERENCE
Chromium		
-GFAA	218.2	1
	7191	2
-ICP	200.7	7
	6010B	2
Chromium (Hexavalent)		
-colorimetric	7196A	2
Cobalt		
-ICP	200.7	7
	6010B	2
Copper		
-GFAA	220.2	1
	7211	2
-ICP	200.7	7
	6010B	2
Iron		
-ICP	200.7	7
	6010B	2
Lead		
-Flame	239.1	1
	7420	2
-GFAA	239.2	1
	7421	2
-ICP	200.7	7
	6010B	2
Magnesium		
-ICP	200.7	7
	6010B	2
Manganese		
-ICP	200.7	7
	6010B	2
Mercury		
-Cold vapor	245.1	1
	7470A	2
	7471A	2

METALS

PARAMETERS	METHOD	REFERENCE
Molybdenum		
-ICP	200.7	7
	6010B	2
Nickel		
-ICP	200.7	7
	6010B	2
Potassium		
-Flame	258.1	1
	7610	2
-ICP	200.7	7
	6010B	2
Selenium		
-GFAA	270.2	1
	7740	2
-ICP	200.7	7
	6010B	2
Silver		
-Flame	272.1	1
	7760A	2
-GFAA	272.2	1
	7761	2
-ICP	200.7	7
	6010B	2
Sodium		
-Flame	273.1	1
	7770	2
-ICP	200.7	7
	6010B	2
Strontium	200.7	7
	6010B	2

METALS

PARAMETERS	METHOD	REFERENCE
Tin		
-ICP	200.7	7
	6010B	2
Titanium		
-ICP	200.7	7
	6010B	2
Vanadium		
-ICP	200.7	7
	6010B	2
Zinc		
-ICP	200.7	7
	6010B	2
Zirconium		
-ICP	200.7	7
	6010B	2
Sample Preparation Methods		
- Acid Digestion - Aqueous FLAA & ICP	200.7	7
	3010A	2
- Acid Digestion - Aqueous GFAA	200.0, 2XX.X	1
	3020A	2
- Acid Digestion - Solids	3050B	2
- Microwave Assisted Acid Digestion - Solids & Organic Matrices	3051	2
	3052	2
- TCLP	1311	2
- SPLP	1312	2

INORGANICS

PARAMETERS	METHOD	REFERENCE
Acidity	305.1/305.2	1
	2310B	3
Alkalinity	310.1	1
	310.2	1
	2320B	3
Asbestos	NIOSH 7400	
BOD	405.1	1
	5210B	3
Bromide	320.1	1
	300.0	1
	9056	2
BTU	D240-92	4
Cation Exchange Capacity	9080	2
COD	Hach 8000/8328	5
Corrosivity	1110	2
	9040	2
	9045	2
Chloride	325.3	1
	300.0	1
	9056	2
	9250	2
Residual Chlorine	330.3	1
	4500-CLG	3

INORGANICS

PARAMETERS	METHOD	REFERENCE
Coliform		
-Fecal	9222D	3
Color	110.2	1
	2120C	3
Conductivity	120.1	1
	2510B	3
	9050	2
Cyanide		
-Free	335.3	1
-Total	335.2/335.3	1
	9012A	2
-Amenable to Chlorination	335.1/335.3	1
Density	2520C	3
Fluoride	340.2	1
	300.0	1
	9056	2
Hardness		
-Calculation	2340B	3
Ignitability	1010	2
Oven Moisture	2540B	3
Nitrogen		
-Ammonia	350.3	1
	4500NH3BE	3
-Kjeldahl	357.4	1
	4500-NO,NH3E	3
-Nitrate	353.2	1
-Nitrite	353.2	1

INORGANICS

PARAMETERS	METHOD	REFERENCE
Odor	140.1	1
	2150B	3
Oil & Grease	1664A	8
	9070	2
	9071A	2
Oxygen, Dissolved	360.1	1
	4500-OC	3
Phenolics	420.1/420.2	1
	9066	2
pH	150.1	1
	9040A	2
	9045A	2
Phosphorus		
-Orthophosphate	365.2	1
	4500PBE	3
-Total Phosphorus	365.1	1
Reactivity		
-Cyanide	7.3.3.2	2
-Sulfide	7.3.4.2	2
Silica, Dissolved	370.1	1
	4500-SiDE	3
Solids		
-Total Dissolved	160.1	1
	2540C	3
-Total Suspended	160.2	1
	2540D	3
-Total Solids	160.3	1
	2540B	3
-Total Volatile Solids	160.4	1
	2540E	3

INORGANICS

PARAMETERS	METHOD	REFERENCE
Specific Gravity	2710F	3
Sulfate	375.4	1
	300.0	1
	9038	2
	9056	2
Sulfide	376.1	1
	9034	2
Sulfite	377.1	1
	4500-503B	3
Surfactants		
-Ionic (MBAS)	5540C	3
-Non-Ionic (CTAS)	5540D	3
Turbidity	180.1	1
	2130B	3
Viscosity	D2196	4
Sample Preparation Procedures		
- Alkaline Digestion – Cr^{+6}	3060A	2
- Bomb Prep Method for Solid Waste	5050	2
- Distillation – Sulfides	9030B	2
- SPLP	1312	2

METHOD REFERENCES

1) EPA 600 4-79-020, Methods For Chemical Analysis of Water and Wastes, 1983, second printing.

2) EPA SW-846, Test Methods for Evaluation Solid Waste, 3rd Edition, Update I dated 7/92, Update II dated 9/94, Update IIA dated 8/93, Update IIB dated 1/95, Update III dated 12/96.

3) APHA/AWWA/WPCF, Standard Methods for the Examination of Water and Wastewater, 18th Edition, 1992.

4) ASTM, American Society for Testing & Materials.

5) Hach Company, EPA Approved Procedures for Water and Wastewater, 1986.

6) 40 CFR Part 136 Appendix A, Test Procedures for Analysis of Organic Pollutants

7) Method 200.7, Determination of Metals and Trace Elements in Water and Wastes By Inductively Coupled Plasma-Atomic Emission Spectrometry, Revision 4.4, EMMC Version, May 1994.

8) EPA-821-R-98-002, USEPA Office of Water Analytical Methods; Method 1664, Revision A: N-Hexane Extractable Material (HEM; Oil and Grease) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM; Non-polar Material) by Extraction and Gravimetry, February 1999.

9) EPA Standard Operating Procedure

11.0 STANDARD OPERATING PROCEDURES

GCAL employs standard procedures for all work performed. These standard procedures insure that work is completed in a professional and timely manner and that all contractual obligations are met.

The standard operating procedures cover (1) sample receipt and handling, (2) data generation, reduction and validation, and (3) sample and waste disposal.

Standard safety procedures are also part of GCAL Standard Operating Procedures. Confidentiality and security agreements on all work performed are strictly enforced.

The following procedures are used at GCAL in order to obtain dependable analytical results and to ensure compliance with regulations.

1) To protect yourself and others, the Laboratory Safety Manual must be followed completely. Each provision is to be read and understood thoroughly prior to working in the laboratory.

2) Sample integrity is a vital part of Quality Assurance. Samples being submitted should be logged in immediately. If there must be a delay, log-in should be aware of those samples requiring refrigeration, and store them accordingly until they can be logged in. Any sample that is suspected of being contaminated, improperly stored or preserved, or improperly prepared, should be reported to the group leader immediately. No sample is to be analyzed if there is a question as to its integrity.

3) Always return a sample to its place of origin after use. This not only aids in the preservation of sample integrity, but also in better sample tracking.

4) No sample, reagent or standard is to be left open unattended. If a samples preparation must be interrupted, the contents of the containers will be properly covered to prevent contamination and evaporation.

5) Sample homogeneity is very important in the analysis of all parameters. Liquid samples are to be shaken sufficiently. Soil samples are to be combined efficiently prior to analysis.

6) New standards and reagents are to be maintained according to procedural guidelines for each parameter. These standards are to be labeled with the date of preparation and properly stored. Pre-prepared standards and reagents are labeled with the date of receipt and properly stored. Before an analysis is performed the standards and reagents used should be checked for quality.

7) Only primary standard reagents are to be used in the preparation of laboratory

standards. The standard is to be prepared according to the method specifications including appropriate drying times.

8) Calibration requirements are to be followed for all methods. If the standard does not authenticate the initial calibration curve, a new calibration curve is necessary.

9) Each group of samples being analyzed will be accompanied by a reagent or method blank (RB). These blanks are only valid if carried through the exact chemical processes involved in analyzing the samples and quality control data. Failure to include blanks will cause data from that particular set of samples to be invalid. If a set of data is determined invalid, it must be re-analyzed.

10) Each analyst is responsible for his/her own tests. This means that they must first read and understand the official procedures. The analyst must also prove that he is able to perform the test with the precision and accuracy required. It is the duty of the group leader to work with each analyst to improve their understanding of the analysis and their ability to produce precise and accurate data. All methods used must be approved and accepted by this laboratory. Modifications on any method must be reported to the QA/QC Department to determine the reliability and accuracy of the modification.

11) All quality control data is to be calculated at the time of analysis. The appropriate corrective action must be taken for failures.

12) Quality Control data for inorganic parameters is maintained on a 5% minimum basis for all parameters analyzed in a given day.

13) Quality Control data for organic analysis is maintained daily to give a 5% minimum daily average.

14) A record of all analyses is recorded in a notebook. Preparation log sheets are stored in binders in sequential order. All raw data is filed for future reference.

15) All logbook entries are labeled, dated and signed.

16) Chromatograms are filed for future reference. All filing systems in use must be made readily available for viewing.

17) It is the responsibility of the analyst who operates a particular instrument to perform all required maintenance according to the schedule defined in the instrument manual. A record of the date and activity performed during preventive maintenance, daily services and service representative visits must be maintained.

18) Temperature and calibration checks are to be performed daily. All refrigerators,

water baths and ovens are to be checked by the analyst using them. If there are any changes made to regulate the temperature it is to be noted on the temperature record.

19) At the completion of a project, the Department Supervisor reviews the data obtained. If it is determined that the results meet the previously described criteria for acceptance of the data, the Department Supervisor initials and dates the worksheet. Results that are not approved in this manner are not accepted.

11.1 Sample Custody and Integrity

GCAL utilizes a Laboratory Information Management System (LIMS) that was specifically developed for the needs of GCAL. The MULTI-LIMS, developed by Advanced Systems Management, Inc. tracks samples and analytical data throughout the laboratory. Results are available from the LIMS package in a variety of hard copy formats. Furthermore, computer terminals can be provided to clients who wish to view their data via modem. A built in security system prevents a client from viewing any data other than their own.

The following is an example of some of the information that is entered into the system:

1. Sample number (unique to this sample)
2. Job number (unique to this job or set of samples)
3. Date received
4. Time received
5. Date analytical results due
6. Sample description
7. Identifying marks
8. Customer's name
9. Customer's address
10. Group number
11. Storage location
12. Notation of any special handling instructions or priority assignments
13. Billing information - purchase orders

14. Analyses requested

The Sample Administration Department also maintains an electronic log of all samples received. The log includes basic information concerning the samples including; date of receipt, client, matrix and tests assigned. The information is stored with the final report.

GCAL understands that sample integrity is a vital part of Quality Assurance. Samples submitted to the laboratory should be logged in immediately. If there must be a delay in this process, log-in should be aware of those samples requiring refrigeration and store them accordingly. Any sample that is suspected of being contaminated, improperly stored or preserved, or improperly prepared, should be reported to the client immediately. Storage blanks located in the volatiles refrigerators are analyzed every two weeks. Records of these analyses are maintained in the GC and GC/MS Volatiles laboratories. No sample is analyzed if there is a question concerning its integrity.

After the sample analyses are complete and the final report is issued to the client, samples are held for 60 days from receipt before disposal. Samples may be held longer per the customer request. All customers are encouraged to take possession of their remaining sample after analysis.

11.2 Chain of Custody

A complete chain of custody is maintained by GCAL. Each sample when submitted to our laboratory is accompanied by a Chain of Custody form (Figure 3). These forms contain pertinent information about the sample including specific analytical requests, sampling notes, sample condition, customer name and address.

Additionally, information concerning the site name, field identification marks, date and time of collection, sampler signature, and preservation data is recorded.

Samples are tagged, preserved if necessary and stored appropriately (i.e. refrigerator, freezer or shelf). Samples to be analyzed for volatile organic compounds are stored in refrigerators located in the volatiles analytical laboratories.

11.3 Custody Transfer

If a sample requires additional work to be performed by a qualified outside laboratory, a chain of custody form is completed and submitted with a representative portion of the sample. A copy of this form is maintained on file along with similar information located in a logbook. The chosen laboratory must sign and date the form upon receipt and return it, along with any unused sample, upon completion of analysis.

11.4 Sample Kits

Occasionally, a customer will request a sampling kit (bottles, vials, etc.) with which to collect samples. Chain of Custody forms are always sent along with the kit to insure proper sample

custody. This form is completed at the time of sample collection and is returned with the samples.

11.5 Shipping Requirements

Insulated shipping containers with freezer forms are provided upon request. The Department of Transportation (DOT) regulations shall be used for packaging and quantities of shipment. Shipping containers shall be secured using nylon strapping tape. Copies of the signed Chain of Custody (COC) forms must be delivered with the containers. Any samples being split with another party must be properly labeled, contain a COC, and be packed and shipped according to DOT regulations.

A laboratory file is maintained listing sample kits prepared for clients. It contains the client name, address, form of delivery, preservative (if requested), sample bottle distribution, and analyses to be performed. Additionally, the date the kit is requested, sent and expected arrival date is included, along with any pertinent miscellaneous information.

11.6 Cleaning Procedures

The method of cleaning is determined by the substances to be cleaned and the analysis to be performed. All bottles are purchased pre-cleaned. Accepted disposable glassware is also utilized to prevent contamination.

Water soluble substances can be washed with hot water and the vessel finally rinsed with small amounts of deionized water. Other substances may require the use of a detergent, organic solvent, chromic acid cleaning solution, nitric acid or aqua regia.

For trace metal analysis, the glassware shall be soaked in a 1:1 nitric acid bath. Rinse thoroughly with successive portions of deionized water. Chromic acid should not be used for cleaning of glassware for trace metal analysis or BOD bottles.

Glassware used for phosphate determinations should be thoroughly rinsed with tap water and then deionized water. Detergents containing phosphates should not be used for cleaning this glassware.

For ammonia and Kjeldahl nitrogen determinations, the glassware must be rinsed with ammonia-free water.

Glassware should be cleaned in the following manner:

- Wash with detergent and water
- Rinse three times with warm tap water
- Rinse three times with Type I water

- Rinse three times with acetone (reagent grade or better). (For organic glassware)
- The preceding procedure is programmed into the laboratory dishwasher which is used for most glassware. The acetone rinse step is replaced with a high heat drying step.
- Glassware used for metals analysis is soaked in an acid bath a minimum of 4 hours and then rinsed with deionized water.
- Periodically glassware may be soaked in a chromic acid cleaning solution. (Except for metals glassware and BOD bottles)
- Prior to sample preparation or analysis, the glassware is rinsed one time with the solvent to be used in the method.

11.7 Data Generation and Reduction

Initial data reduction is the responsibility of the analyst who performs the analysis and/or operates an instrument.

Each analyst records all manually generated data in a log book associated with the analysis or type of analysis being performed. The spike recoveries and precision for duplicates are calculated and recorded in the logbook. The analyst verifies that all sample identifications are accurate.

Data reduction includes all activities that convert instrument/computer responses into reportable results. This may involve calculations, compound identification, and QC sample calculations. Final results are obtained by direct reading from the instrument or calculations based on instrument readings, output, or responses. Manual data reduction is performed by calculating results with the appropriate formula. Manually entered information such as the sample ID is reviewed for accuracy on the hard copy. Computer data reduction requires that the analyst verify information used in final calculations is entered accurately. The analyst must also review the raw data for properly identified components, possible interferences, confirmation requirements, and acceptable readings for multiple integrations.

The analyst must verify that all data is accurately transcribed into a logbook or on a form. Organic final results are recorded on forms. Inorganic data is recorded in the logbooks. All data is manually posted in the LIMS.

Instrumentation run logs generated by the Unix/Target software for organic analysis are placed in a three ring binder that serves as the logbook for the applicable instruments. The run log identifies the file number for retrieving hard copy or electronic data. Other organic data run logs are documented in a logbook. The associated file number for retrieval of hard copy or electronic data is recorded. Additional information such as instrument ID, detector and column type, standard ID's, and other applicable information may also be recorded. Inorganic data results are entered in a logbook. The hard copy is retrievable based on the

analytical date and time.
All raw data is maintained in files by the individual departments.

All associated quality control samples are documented or referenced in the logbooks along with the sample analytical data or a file number which represents the appropriate hard copy or electronic data. The recoveries are documented on the raw data or in the logbook.

Data validation is performed to check data integrity and to verify that the data is correct and of an acceptable quality. Data integrity involves reviewing all documentation for errors and mistakes. It includes review for correct documentation of sample ID's, verification that holding times were met, transcription errors, correct calculations, complete records, and for acceptable chain of custody documentation. A review of the data is performed to verify the results and to assure that all QC is within acceptable criteria. The Data is reviewed according to the criteria which applies to the particular analysis and according to the client specific project requirements. The reviewer will identify unacceptable data and initiate the appropriate corrective actions. The Department Supervisor or his representative will review the data entered into the LIMS. Validated data is released to the Report Generation Department. Hard copies of the final reports are reviewed by the Data Validation Department.

12.0 SAMPLE HANDLING GUIDELINES

Inorganic and Conventional Parameters

Parameters	Method*	Container	Recommended Quantity (mL)	Preservative	Holding Time
Acidity	305.1, 2310B	P,G	100	4°C	14 days
Alkalinity	310.1, 310.2, 2320B	P,G	100	4°C	14 days
Ammonia-N	4500NH3BE, 350.3	P,G	500	4°C, H_2SO_4 to pH <2	28 days
Biochemical Oxygen Demand (BOD)	405.1, 5210B	P,G	1000	4°C	48 hours
Bromide	300.0, 9056	P,G	200	None	28 days
Chemical Oxygen Demand (COD)	HACH 8000	P,G	100	4°C H_2SO_4 to pH <2	28 days
Chloride	325.3, 9251, 9056	P,G	200	None	28 days
Chlorine. Residual	330.3, 4500 CLG	P,G	200	None	Immediately
Coliform, Fecal	9222D	P,G (sterile)	100	4°C. $Na_2S_2O_3$	6 hours
Color	2120C, 110.3	P,G	100	4°C	48 hours
Cyanide	335.1, 335.2, 335.3 9012A	P,G	1000	4°C, ascorbic acid, NaOH to pH > 12	14 days
Ferrous Iron	3500FED	P,G	100	2mHCl/100mL	Immediately
Flashpoint	1010	P,G	100	None	Not specified
Fluoride	300.0, 9056, 340.2	P	500	None	28 days
Hardness	130.2 2340B	P,G	100	HNO_3 to pH < 2	6 months
Nitrogen, Kjeldahl (TKN)	4500NH, 351.4	P,G	500	4°C, H_2SO_4 to pH < 2	28 days
Nitrate-N	353.2	P,G	100	4°C	48 hours
Nitrite-N	353.2	P,G	100	4°C	48 hours
Nitrate-Nitrite as N	353.2	P,G	200	4°C. H_2SO_4 to pH < 2	28 days
Oil and Grease	1664	G	1000	4°C, H_2SO_4 or HCl to pH < 2	28 days
Phenols	420 1, 420.2, 9066	G	1000	4°C, H_2SO_4 to pH < 2	28 days
Phosphorus, Total	365.1	P,G	200	4°C, H_2SO_4 to pH < 2	28 days
Phosphorus, Ortho	365.2, 4500PE	P,G	200	4°C	48 hours
pH	150.1, 9040B, 9045C	P,G	100	None	Immediately
Radiochemisrty					
Alpha, Beta, Radium	900 & 9000 series	P,G	2000	HNO_3 to pH < 2	6 months
Tritium		P,G	100	None	6 months
Radon, I-131		P,G	1000	HNO_3 to pH < 2	14 days
Reactivity	SW846 7.3.3.2, 7.3.4.2	G	100g	4°C	Not Specified
Silica	370.1, 4500Si D	P, PFTE, Quartz	100	4°C	28 days
Solids, Dissolved (TDS)	160.1, 2540C	P,G	100	4°C	7 days
Solids, Suspended (TSS)	160.2, 2540D	P,G	500	4°C	7 days
Solids, Volatile (TVS)	160 4, 2540E	P,G	100	4°C	7 days
Solids, Total (TS)	160 3, 2.540B	P,G	100	4°C	7 days

Inorganic and Conventional Parameters

Parameters	Method*	Container	Recommended Quantity (mL)	Preservative***	Holding Time**
Specific Conductance	120.1, 9050	P,G	100	4°C	28 days
Specific Gravity	2710F	P,G	100	4°C	28 days
Sulfate	375.4, 9056, 9038	P,G	200	4°C	28 days
Sulfide	376.1, 376.2, 9034	P,G	500	4°C, Zn acetate, NaOH to pH > 9	7 days
Sulfite	4500S03B	P,G	200	None	Immediately
Surfactants (MBAS)	425.1, 5540C	P,G	250	4°C	48 hours
Total Organic Carbon (TOC)	415.1, 9060	P,G	100	4°C. HCl to pH < 2	28 days
Total Organic Halogens (TOX)	9020B	G-TLC (amber)	100	4°C, H_2SO_4 to pH <2	28 days
Total Petroleum Hydrocarbon (TPH)	418.1	G-TLC	1000	4°C, H_2SO_4 or HCl to pH < 2	28 days
Turbidity	180.1, 2130B	P,G	100	4°C	48 hours
Viscosity	D2196	P,G	500	None	Not Specified

Solid and waste samples: Quantity 1-100g, preservative 4°C.
Organic Nitrogen = TKN – Ammonia-N

Metals

Parameters	Method*	Container	Recommended Quantity (mL)	Preservative	Holding Time
Metals (except Hexavalent Chromium and Mercury):					
Aqueous					
Total	6010B, 200.0, 7000 series	P,G	500	HNO_3 to pH < 2	6 months
Dissolved	6010B, 200.0, 7000 series	P,G	500	Filter on site HNO_3 to pH < 2	6 months
Solid					
Total	6010B, 200.0, 7000 series	P,G	100g	4°C	6 months
Hexavalent Chromium:					
Aqueous	7196A	P,G	500	4°C	24 hours
Solid	3060A/7196A	P,G	100g	4°C	30/7 days
Mercury:					
Aqueous					
Total	245.2/7470	P,G	500	HNO_3 to pH < 2	28 days
Dissolved	245.2/7470	P,G	500	Filter on site HNO_3 to pH < 2	28 days
Solid					
Total	7471	P,G	100g	4°C	28 days

Metals – Boron must be collected in a polyethylene container.
CrIII=Total Cr-Hexavalent Cr

Organic Parameters
Volatile Organics

Sample Matrix	Method*	Container	Minimum Quantity	Preservative	Holding Time
Concentrated Waste Samples	8021B, 8260B, 8015M	G-TLC or G-TLS	2 x 40mL vials or 2-oz wide mouth	4°C	14 days
Aqueous Samples	8021B, 8260B, 8015M, 624	G-TLS	2 x 40mL vials	4°C, HCl to pH < 2, $Na_2S_2O_3$ if residual chlorine present	14 days, 7 days if not acid preserved
Solid Samples	8021B,8260B, 8015M	G-TLS or G-TLC	2 x 40mL vials or 2-oz wide mouth	4°C, HCl to pH <2	14 days *

*Solid samples collected in EnCore™ samplers must be transferred to a soil sample vial within 48 hours.

Semivolatile Organics, Pesticides/PCBs, Herbicides, PAHs, Diesel

Sample Matrix	Method*	Container	Minimum Quantity	Preservative	Holding Time
Concentrated Waste Sample	8270C, 8081, 8082, 8015M, 8151A, 8141A	G-TLC (Amber)	2 x 1 Liter	None	14 days until extraction, 40 days after extraction
Aqueous Samples	8270C, 8081, 8082, 8015M, 8151A, 8141A, 8310,608, 625	G-TLC (Amber)	2 x 1 Liter	4°C	7 days until extraction, 40 days after extraction
Solid Samples	8270C, 8081, 8082, 8015M, 8151A, 8141A, 8310	G-TLC(Amber)	2 x 1 Liter	4°C	14 days until extraction, 40 days after extraction

Parameter	Method*	Container	Recommended Quantity	Preservative	Holding Time
Dioxins and Furans**	613, 8280A, 8290, 1613	G-TLC(Amber)	2 x 1 Liter	4°C	30 days until extraction, 45 days after extraction

**Concentrated wastes and soil samples are collected in 2 oz. to 1 Liter amber glass jars with TLC.

TCLP/SPLP Parameters

Parameters	Holding Time from Collection to TCLP Extraction (days)	Holding Time from TCLP Extraction to Preparative Extraction (days)	Holding Time from TCLP/Preparative Extraction to Analysis (days)	Total Time
Volatiles	14	NA	14	28
Semivolatiles	14	7	40	61
Mercury	28	NA	28	56
Metals	180	NA	180	360

Reference 40CFR Part 136 Tables IA, IB, IC, ID & IE and Table II, SW846 Table 4-1 and Table 3-1. SW846 Method 1311 & 5.

*The methods listed are from typical EPA references

Acronyms Definitions: (Teflon is a registered trademark of E.I. DuPont)

CLP EPA Contract Laboratory Program
G-TLC Glass with Teflon®-lined cap
NA Not Applicable
G. Glass
G-TLS Glass with Teflon®-lined septum
P- Polyethylene

13.0 SAMPLE AND WASTE DISPOSAL

13.1 Sample Disposal

Samples are stored in the appropriate cooler for 60 days after receipt. After 60 days, samples are moved to a waste cart. The samples are scanned out for disposal on the LIMS. The samples are then stored in the waste staging area until disposal into appropriate drums.

Hazardous samples are combined if possible and stored in specially marked waste drums until sufficient quantities are accumulated which require disposal of the drums. Hazardous samples are returned to the client whenever possible to be disposed of along with the larger quantities of that material the client needs to dispose of.

13.2 Waste Disposal

Waste generated within the laboratory is always considered hazardous. Waste management and sample disposal are performed in accordance with EPA regulations.

13.3 Bulk Waste

Generated waste is transferred to appropriate bulk waste containers until such quantities are generated that warrant drum disposal. When sufficient quantities of waste are collected the containers are prepared for shipment to approved disposal sites. Bulk waste includes oil waste, acid waste, caustic waste, PCB waste and solvent waste.

Separately labeled drums are kept for collection of chemical waste. They are labeled as follows:

Metals waste water - Contains aqueous acidic wastes
Acidic waste water - contains aqueous acidic waste
Waste water - contains aqueous waste water
Caustic waste water - contains aqueous basic or alkaline waste.
Flammable - contains organic solvents, alcohols and hydrocarbons.
Chlorinated solvents - contains organic waste known to be chlorinated.
PCB - contains oils and waste solvents containing PCB's.
Non - regulated solids - crushed glass and nonhazardous samples
Hydrocarbon waste - oils and waste solvents
Hazardous solids - Hazardous solid samples

13.4 Chemical Disposal

Properly dispose of any unused chemicals. Do not return any chemicals to original containers once removed.

All chemicals are disposed of in proper bulk waste containers.

14.0 SAFETY PROCEDURES

GCAL has a comprehensive safety program outlined for all employees. A safety manual is distributed to each employee followed by a training seminar to familiarize the employee with the safety procedures at GCAL.

14.1 Basic Safety Rules

1. All injuries are promptly reported to a supervisor.
2. All hazards are promptly reported to a supervisor.
3. Running and horseplay are not permitted in the laboratory.
4. Smoking is not permitted in the laboratory.
5. Laboratory glassware is not to be used for eating or drinking.
6. Laboratory reagents such as sucrose or sodium chloride should not be used for food.
7. Eating on the premises is confined to designated areas.

14.2 Arrangement of Furniture And Equipment

Furniture is arranged for maximum use of available space while providing working conditions that are efficient and safe.

Aisles are kept at least 4 feet wide to provide for safe passage of personnel and equipment, and are kept free of obstructions.

Stepladders or footstools are supplied for reaching high objects and are kept out of the way when not in use.

Eyewash stations, safety showers and fire extinguishers are located centrally and care is taken to avoid blocking access to them.

14.3 Hoods And Ventilation

Adequate hood facilities are installed and used where toxic or flammable materials are used. Hood windows provide physical protection and greater control of fumes.

14.4 Spills

Spilled materials are cleaned up promptly. All spills should be handled as if corrosive or dangerous unless definitely known to be harmless. Spill Kits are located in the laboratory.

Corrosive or toxic materials are not placed in waste cans in the laboratory. When in doubt a supervisor is consulted.

Broken glass is swept up immediately and discarded so as to avoid any injury or cuts.

14.5 Emergency Equipment

Fire extinguishers are located in each room of the laboratory. The paths to these are kept free and clear at all times.

An extinguisher which has been used shall not be returned to its holder until it has been recharged and checked.

Any fire that appears to be too large to extinguish immediately is reported to the fire department at once. All fires, regardless of size are to be reported to a supervisor. Causes shall be determined and necessary steps to prevent a similar accident shall be taken.

Eye washes are located in the laboratories for irrigation of the eyes if corrosive liquids should be splashed into them. Tubing attached to faucets in the sink may also be used to wash the eyes if necessary.

A safety shower is centrally located in the laboratories and is be used whenever corrosive materials are spilled on an analysts' skin or clothing.

All safety equipment is periodically checked to be sure everything is in working order and is easily accessible.

General first aid kits are located throughout the laboratory. These kits contain first aid products for the treatment of minor cuts and bruises, burns or abrasions,and personal discomfort.

14.6 Protective Equipment

Lab coats and aprons are supplied for all employees of GCAL. Protective clothing is always available to prevent damage to clothing and persons.

Shoes must be worn at all times and must be closed-toe, high heels or sandals are not acceptable.

Eye Protection is mandatory for all personnel working in the laboratory. Safety glasses or goggles should be worn by analysts to protect the full eye area.

Various types of gloves are provided for employees: Insulated gloves are provided for use when handling hot or cold items; Heavy rubber gloves are to be used when handling corrosive liquids or unknown substances; Lightweight disposable gloves are provided for use with toxic or irritating substances.

Air purifying respirators are available for use when working with organic vapors and/or acid fumes. These respirators should be worn whenever contact with irritating concentrations of these fumes are encountered.

Coverall suits made of chemically resistant material are provided for wear whenever sampling at

a hazardous waste site or in potentially dangerous or unknown situations. These suits are disposable and provide protection for clothing and personnel.

14.7 Storage of Laboratory Materials

All chemicals, reagents and glassware are stored in such a manner that they are easily located and do not present a danger. Heavy items are kept near the floor.

Flammable solvents are stored in special cabinets or in solvent bunker. Only quantities required for immediate use are stored in analytical areas.

Reagents are grouped to prevent danger from hazardous combinations. Acids and bases are stored separately.

Compressed gases are stored away from heat and open flames. They are always contained by chains or belts to prevent rolling or toppling. A special cart is used to transport replacement cylinders and empties.

14.8 Chemical And Sample Handling

If there are questions about proper chemical handling the MSDS (Material Safety Data Sheet) is used as reference.

Samples are always treated as if they were hazardous chemicals.
Rubber pipet bulbs are used.
Procedures which produce flames or toxic vapors are performed under a hood.
Chemicals are returned to their proper storage area after use.
All prepared solutions are properly labeled..
Acids are always poured into water when diluting.
Large amounts of alkali are never added to water at one time.
Glass-stoppered containers are not used for storing alkaline solutions.
Labels for Acid and Caustic solutions will note the concentrations.

14.9 Labeling

All sample and chemical solutions are clearly labeled with chemical name and concentration or sample number. Label should note any danger associated with the solution, date of preparation, laboratory assigned ID, initials of analyst, and expiration date.

15.0 CONFIDENTIALITY

GCAL understands that it must retain in confidence all information obtained through the analysis of samples or the information disclosed to GCAL in order to adequately perform and interpret analyses.

GCAL will maintain the secrecy and confidentiality of any proprietary information it receives or generates.

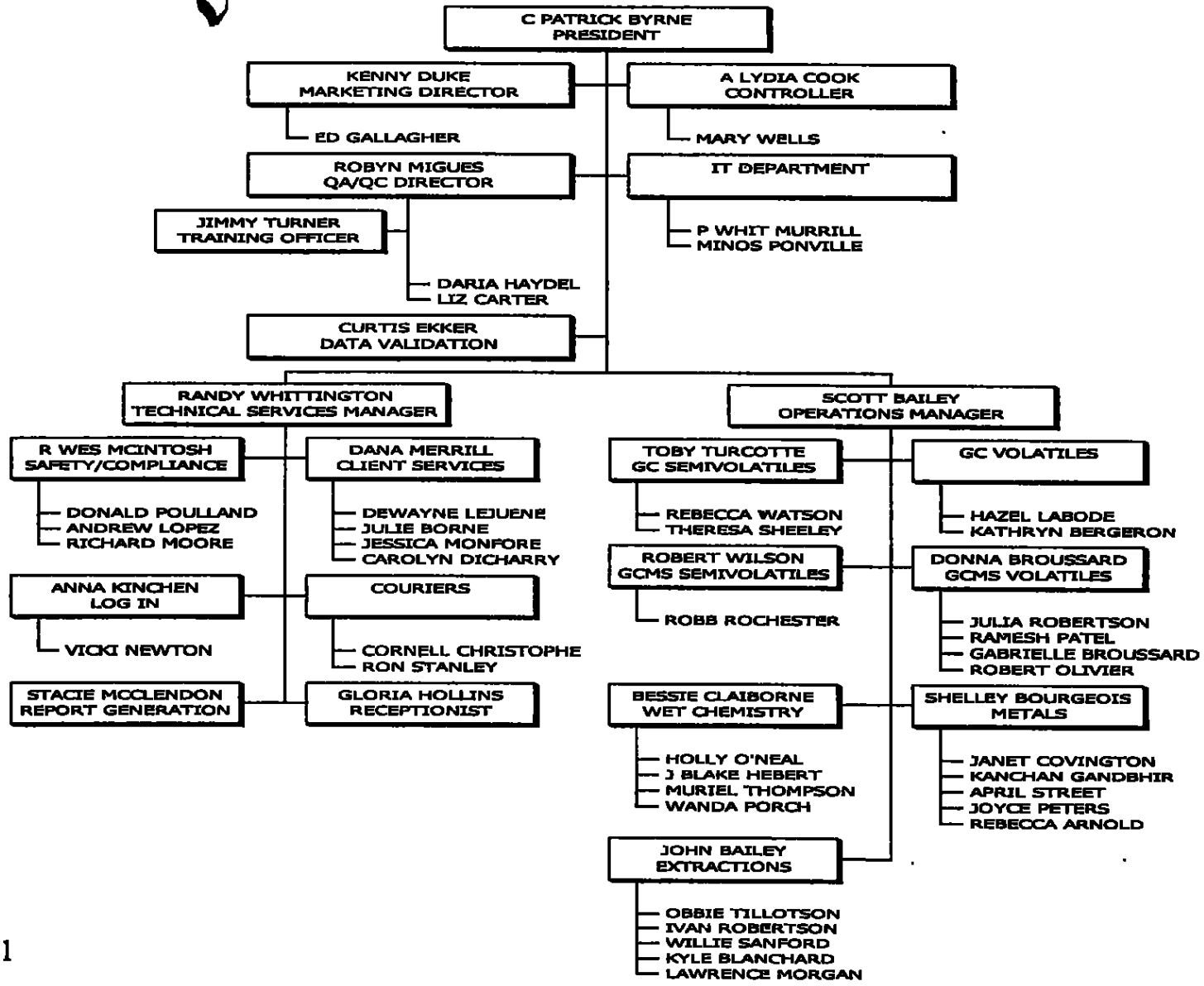
Only the party who requested the analytical work or consultation, and who will receive the final report (and invoice) will be informed of any findings.

Results of analyses will not be disclosed to anyone other than the contracting party without unequivocal authorization by the contracting party.

APPENDIX A

GULF COAST
ANALYTICAL LABORATORIES INC

ORGANIZATIONAL CHART



03/12/01

SCOTT A. BAILEY

Current Position:

Operations Manager, Gulf Coast Analytical Laboratories, Baton Rouge, LA January 1997 - Present

Responsible for coordinating the overall activities of the analytical laboratories on a daily basis and providing long-term direction. Responsibilities include monitoring the scheduling of analytical testing and releasing testing data and results.

Previous Experience:

Operations Manager, Inchcape Testing Services-Environmental Laboratories, Baton Rouge, LA September 1995 - January 1997

Responsible for coordinating the overall activities of the analytical laboratories on a daily basis and providing long-term direction. Responsibilities include monitoring the scheduling of analytical testing and releasing testing data and results.

Organics Manager, Inchcape Testing Services, Baton Rouge, LA, October1993 - September 1995

Responsible for the management of the GC, GCMS, and the extraction departments of the laboratory. Duties also included supervision of the report generation department.

Division Manager, National Environmental Testing, Baton Rouge,LA March 1992 - October 1993

Directed the functional areas of marketing, finance, chemistry, and administration for the Baton Rouge facility. Additional duties included contract administration, scheduling, and client consultation.

Operation Manager, Environmental Testing & Certification Corporation, Baton Rouge, LA , December 1989 - January 1992

Directed the functional areas of marketing,f inance,chemistry, and administration for the Baton Rouge facility. Additional duties included contract administration, scheduling, and client consultation.

Previous Experience: **Analyst, ETC, Baton Rouge, LA, December 1983 - December 1989**

Education: BS, Environmental Health, Louisiana State University, Baton Rouge, LA, December 1991

Inchcape Managerial Training Skills Workshop, 1994

Inchcape Testing Services - Environmental Laboratories, Baton Rouge, Manager and Supervisor Training Retreat - June 1996

UCLA Inchcape Executive Development Program - August 1996

STEPHEN K. BAILEY

Current Position:

Extractions Supervisor, Gulf Coast Analytical Laboratories, Baton Rouge, LA, January 1997 - Present

Responsible for the supervision and training of personnel in organic extraction department, metals preparation department, and inorganic distillation and digestion department, directing technicians in the preparation and extraction and cleanup of water, soil, sludge, and other matrices according to SW846 and 600 series methodologies,. sample scheduling, supplies inventory, and standard preparation. Oversees spiking of quality control samples. Reviews preparation bench sheets and updates preparation information in the LIMS.

Previous Experience:

Extractions Supervisor, Inchcape Testing Services - Environmental Laboratories, Baton Rouge, LA, February 1992 - January 1997

Responsible for the supervision and training of personnel in organic extraction department, metals preparation department, and inorganic distillation and digestion department, directing technicians in the preparation and extraction and cleanup of water, soil, sludge, and other matrices according to SW846 and 600 series methodologies, sample scheduling, supplies inventory, and standard preparation. Oversees spiking of quality control samples. Reviews preparation bench sheets and updates preparation information in the LIMS.

Organic Sample Preparation Team Leader, Environmental Testing and Certification, Baton Rouge, LA., January 1990 - February 1992

Responsible for directing technicians in the preparation, extraction and cleanup of water, soil, sludge, and other matrices according to USEPA CLP, SW846 and 600 series methodologies, sample scheduling, staff coordination, maintaining inventory, and problem solving. Oversee preparation, documentation, and spiking of standards. Responsible for the generation of organic sample preparation data sheets via computer and also maintaining internal sample chain of custody documentation. Experienced with the analysis of environmental samples for pH, solids, oil and grease, chemical oxygen demand, chlorides, phenols, TPH/IR, mercury, and cyanide. Assisted with sampling kit preparation, field sample collection, sample log-in, and collection and disposal of laboratory waste.

Previous Experience:

Sample Preparation Technician, ETC/Toxicon, Baton Rouge, LA., February 1988 - December 1989

Performed extractions according to USEPA CLP, SW846 and 600 series methodologies. Performed environmental wet chemical parameters including but not limited to pH, solids, chemical oxygen demand and other inorganic constituents. Prepared all sample data sheets, both incoming and outgoing.

Education:

Motivational Management Training, 1990

Conflict Management Training, 1991

Inchcape Management Training Skills Workshop - 1994

Inchcape Testing Services - Environmental Laboratories, Baton Rouge, Manager and Supervisor Training Retreat - June 1996

SHELLEY BOURGEOIS

Current Position:

Metals Supervisor, Gulf Coast Analytical Laboratories , Baton Rouge, LA, May 1998 - Present

Responsible for the management and supervision of the Metals Laboratory. Duties include the management and training of personnel, scheduling of sample workloads, supervision of metals sample preparation, analysis of samples by various analytical instrumentation, coordination of laboratory QA/QC projects, and maintenance of procedures to QA/QC guidelines. In addition, responsibilities include comprehensive data review and validation for the laboratory as well as the coordination of higher level QA data packages.

Previous Experience:

Metals Analyst, Gulf Coast Analytical Laboratories, Baton Rouge, LA, December 1997 – May 1998

Responsible for analysis of samples by various instruments including GFAA, Flame AA, ICP and the mercury analyzer. Additional responsibilities included data reduction and posting in the LIMS.

Head Technician, American Radiation Services, Baton Rouge, LA, November 1996 - December 1997

Responsible for coordinating sample analysis and field services. Supervised sample receipt, preparation, analysis, and report generation.

Analyst, Inchcape Testing Services, Baton Rouge, LA, July 1996 - November 1996

Education:

BS/Microbiology - Louisiana State University, Baton Rouge, LA, December 1995

Perkin Elmer Atomic Spectroscopy Workshop, Baton Rouge, LA, April 1998

Perkin Elmer Optima Instrument Series ICP training, Atlanta, GA, June 1998

DONNA BROUSSARD

Current Position:

GC/MS Supervisor, Gulf Coast Analytical Laboratories, Baton Rouge, LA, January 2000 - Present

Responsible for management of several GC/MS systems used for analyzing soil and water samples using EPA methodologies including 8240, 8260, 8270, 624, 625, 1311. Duties include instrument operation and maintenance, training and supervision of analysts, instrument download of data to the LIMS, validation of data, and preparation of data packages .

GC/MS-SV Supervisor, Gulf Coast Analytical Laboratories, Inc., August 1998 – January 2000

Responsible for GC/MS semi-volatile analysis of water, soil, and organic samples by EPA methodologies 8270 and 625. Duties include instrument operation and maintenance; sample preparation, analysis, and interpretation; report writing, tracking, and validation; and overall laboratory maintenance.

Previous Experience:

GC/MS SV Analyst, Gulf Coast Analytical Laboratories, Inc., July 1998 - August 1998

Responsible for GC/MS semi-volatile analysis of water, soil, and organic samples by EPA methodologies 8270 and 625. Duties include instrument operation and maintenance; sample preparation, analysis, and interpretation; report writing, and tracking; and overall laboratory maintenance.

Education:

BS Secondary Math Education, Louisiana State University, Baton Rouge, LA, May 1989

HP Column Troubleshooting Seminar – October 1997

Gulf Coast Analytical Laboratories, Introduction to Mass Spectrometry – October 1998

Gulf Coast Analytical Laboratories, Laboratory Skills Training Program – January 1999

HP Techniques of GC-MS – November 1999

CHARLES P. BYRNE

Current Position:

President and General Manager, Gulf Coast Analytical Laboratories, Baton Rouge, LA, January 1997 - present.

Responsible for all operations within the facility including laboratory, administrative, financial and marketing functions. Responsible for long range planning and structuring of future business operations.

Previous Experience:

Vice-President and General Manager, Inchcape Testing Sevices-Environmental Laboratories, Baton Rouge, LA, September 1993 - January 1997.

Corporate officer in charge of all operations within the facilit including laboratory, administrative, financial and marketing functions. Responsible for long range planning andstructuringof future business operations.

Laboratory Manager, West-Paine Laboratories, Inc. Baton Rouge, LA, June 1992 - September 1993.

Responsible for the profit and loss of the Baton Rouge facility. Directly supervise all operations of the laboratory including staffing, budgeting and production.

Organic Manager, West-Paine Laboratories, Inc., Baton Rouge, LA., August 1991 - June 1992.

Responsible for supervision of analysts functioning in the areas of Sample Extraction, Residue Analysis via GC, Purgeables and Extractables via GC-MS. Troubleshoots and interfaces with GC-MS System Management, consisting of five HP GC-MS with RTE-6-VM and RTE-A Operating Systems. Performs method development and reviews data. Previous positions included GC/MS manager and GC manager.

Previous Experience:

GC/MS Analyst, ETC/Toxicon, Baton Rouge, LA., August 1989 - June 1991.

Operator of two Finnigan MAT 4510B Gas Chromatography/Mass Spectrometry Systems conducting the analysis of volatile organic compounds using USEPA Contract Laboratory Program (CLP) methodology, including data reduction and report production using QA Formaster software. Operation of HP 5890 Gas Chromatograph (ECD, FID), performing the analysis of chlorinated pesticides and PCB's usingCLP methodology. The analysis of raw data and the production of data packages using QA Formaster software.

President/Owner, Smith, Byrne and Associates, Inc., 1983 - 1991.

Operator of family owned sales firm, representing various industrial sheet metal fabrication facilities. Responsible for contacting Louisiana clients and negotiating the purchase of various heat transfer units.

Education:

BS Microbiology, Louisiana State University, Baton Rouge, LA, 1990.

Member ACS

Inchcape Managerial Training Skills Workshop - 1993, 1994

Cornell Inchcape Executive Development Program - 1994, 1995

Government Intstitutes Inc.. RCRA Regulations. Air Toxics - 1993, 1994

Introduction to Mass Spectrometry, Basic Mass Spectrometry Interpretation - 1991

Inchcape Testing Services - Environmental Laboratories, Baton Rouge, Manager and Supervisor Training Retreat - June 1996

Louisiana State University Fire and Emergency Training Institute- HazMat Technician Refresher - 8 Hr. - June 17, 1998

Bank One Managing and Financing Independent Business - 16 Hours - October 1998

ALPHA LYDIA COOK

Current Position:

Controller and Human Resources Director, Gulf Coast Analytical Laboratories, Baton Rouge, LA, January 1997 - present

Responsible for supervision of the Accounts Receivable, Purchasing and Accounts Payable Departments. Included are responsibilities for payroll, collections, and cash management. Additional responsibilities include preparation of capital expenditure requests and reconciliation of the requests with the budget. Shares the budget preparation duty with the General Manager. Maintains the General Ledger and Accounts Payable on AccPac Accounting System on a Novell Network. Human Resources responsibilities include advertising for positions, interviewing applicants, and employee benefits.

Previous Experience:

Controller, Inchcape Testing Services - Environmental Laboratories, Baton Rouge, LA, June 1990 -January 1997
Human Resources Director, Inchcape Testing - Environmental Laboratories, Baton Rouge, LA, 1993 - January 1997

Responsible for supervision of the Accounts Receivable, Purchasing and Accounts Payable Departments. Included are responsibilities for payroll, collections, and cash management. Prepares monthly reports for Corporate office and prepares Capital Expenditure requests and reconciles requests to the budget. Budget preparation is a joint duty of the Controller and the Chief Operations Officer. Maintained the General Ledger and Accounts Payable on an automated function run on the HP3000 and on AccPac Accounting System on the Novell Network. Human Resources responsibilities include advertising for positions, interviewing applicants, and employee benefits.

Director of Business & Operations Services, University Relations and Development, Louisiana State University, Baton Rouge, LA., May 1985 - June 1990

Department handles all phases of accounting and computer work in the division. Operate an IBM System 36 computer which was upgraded in 1986 to accommodate the new programs and data base being maintained. Installed a general ledger system which is now in use by all areas of this division.

Previous Experience:

Corporate Controller, B. Olinde and Sons, Inc., Baton Rouge, LA., October 1980 - May 1985

Responsible for all phases of the accounting for the multifaceted business. Responsible for installation of a general ledger package which would integrate with the packages in place and began automating the general ledger.

Education:

BS, Microbiology, Louisiana State University, 1986

MS, Food Science/Experimental Statistics, Louisiana State University, 1974.

CPA Preparatory Program, Louisiana State University, 1978

CPA Certificate, October 1979

Cornell - Inchcape Executive Development Program - August 1991

Inchcape Managerial Training Skills Workshop - 1993, 1994

Inchcape Testing Services Environmental Laboratories - Baton Rouge, Manager and Supervisor Training Retreat, June 1996

Member - Society of Louisiana Public Accountants

Member - American Institute of Certified Public Accountants

CAROLYN A. DICHARRY

Current Position:

Project Manager, Gulf Coast Analytical Laboratories, Baton Rouge, LA,

Responsible for management of client projects and project management activities within the laboratory. Served as the interface between client and laboratory management to achieve client satisfaction with delivery of analytical results on schedule and to the requested level of quality.

Previous Experience:

QA/QC Assistant, Gulf Coast Analytical Laboratories, Baton Rouge, LA, July 1998 - Present

Responsible for assisting in implementing and monitoring the laboratory Quality Assurance Program Plan, conducting monthly internal audits, calibrating thermometers and mechanical pipets, and updating employee training files.

Supervisor, Asbestos Laboratory and Industrial Hygiene Laboratory Director, Gulf Coast Analytical Laboratories, Baton Rouge, LA, January 1997 – July 1998

Responsibilities include management, supervision, staffing, and training all asbestos personnel. Client relation, writing contracts and bids, court consultants, and business development. Formulating all QA/QC manuals, operations, analyses and procedures which adhere to EPA protocol for PLM and PCM. Ordering, designing, and maintenance of analytical equipment and laboratory facilities. Organization of intra and inter laboratory proficiency. Additional responsibilities include the administration of the industrial hygiene laboratory.

Supervisor, Asbestos Laboratory, Inchcape Testing Services - Environmental Laboratories, Baton Rouge, LA, December 1991 - January 1997.

Responsibilities include management, supervision, staffing, and training all asbestos personnel. Client relation, writing contracts and bids, court consultants, and business development. Formulating all QA/QC manuals, operations, analyses and procedures which adhere to EPA protocol for PLM and PCM. Ordering, designing, and maintenance of analytical equipment and laboratory facilities. Organization of intra and inter laboratory proficiency.

Geologist/Microscopist, West-Paine Laboratories, Inc., Baton Rouge, LA., January 1991 - December 1991.

Responsibilities include Phase Contrast Microscopy Analysis (PCM), Polarized Light Microscopy Analysis (PLM), Scanning Electron Microscopy Analysis (SEM) and Inter-Laboratory Quality Control Program for PCM and PLM analysis.

Lab Technician, Kemron Environmental Services,, Baton Rouge, LA., May 1989 - December 1989.

Responsibilities included Polarized Light Microscopy Analysis and Phase Contrast Analysis.

Education:

Secondary Education Degree, Nicholls State University, Thibodaux, LA., 1987

BS, Geology, Nicholls State University, Thibodaux, LA., 1984

Sampling and Evaluating Airborne Asbestos Dust - NIOSH 585 - May, 1989

Inchcape Testing Services - Environmental Laboratories, Laboratory Skills Training Program, August -1995

Inchcape Managerial Training Skills Workshop - 1993,1994

Inchcape Testing Services - Environmental Laboratories , Baton Rouge, Manager and Supervisor Training Retreat - June 1996

Executrain Microsoft Excel 5.0 Beginning For Windows - July, 1996

CURTIS A. EKKER

Current Position:

Data Validation Manager, Gulf Coast Analytical Laboratories, Baton Rouge, LA, January 1997 - Present

Responsible for validation of final reports. This includes correlation of data between departments, review of chain of custody, review of reported QC, verification of correct reporting level, and review of narratives.

Previous Experience:

Data Validation Manager, Inchcape Testing Services - Environmental Laboratories, Baton Rouge, LA, September 1993 - January 1997

Responsible for validation of final reports.

General Chemistry Supervisor, Inchcape Testing Services - West Paine Laboratories, Baton Rouge, LA, June1989 - September 1993

Responsible for supervising the work of 11 analysts. This includes training all new employees to follow EPA Protocol in work and to bring their proficiency up to an acceptable level of productivity. Ensure all analytical work is performed and reported with customer time requirement. Ensure that new and infrequently analyzed parameters are properly analyzed. Involved in setting up new analytical methods for Wet Lab. Responsible for generation, implementation, and maintenance of Standard Operating Procedures.

General Chemistry Laboratory Technician, West-Paine Laboratories, Baton Rouge, LA., June 1988 - June 1989

Responsible for preparation and analysis of samples by wet chemistry methods. Instrumentation included flashpoint tester amd HACH spectrophotometer. Additional responsibilities included initial review of data and associated QC and entry into the LIMS.

Education:

BS Chemistry, Southeastern Louisiana University, Hammond, LA, 1988.

Inchcape Managerial Training Skills Workshop - 1993, 1994

Education:

Dionex Ion Chromatography Training Course - 1991

Data Validation - ACS Short Course - March, 1995

Inchcape Testing Services - Environmental Laboratories, Baton Rouge, Manager and Supervisor Retreat - June 1996

ExecuTrain Microsoft Excel 5.0 Beginning For Windows - July 1996

Member - ACS

DANA MERRILL

Current Position: **Senior Project Manager, Gulf Coast Analytical Laboratories, November 2000 - Present**

Act as the main point of contact for the client in the laboratory. Provide technical information to clients and keep them informed of project progress. Coordinate and schedule projects with various departments within the laboratory according to the customers analytical and turnaround requirements. Review chains of custody, login reports and final reports.

Previous Experience: **Project Manager, Gulf Coast Analytical Laboratories, August 1994 - March 1999**

Act as the main point of contact for the client in the laboratory. Provide technical information to clients and assist with analytical needs. Review client C-O-C's and reports. Generate client invoices. Create project and site codes to allow for better handling of client samples. Disseminate information internally regarding projects and specific client needs. Document all communications with client.

GC/MS Analyst, American Analytical & Technical Services, March 1992 - July 1994

Responsibilities included analysis of environmental samples for volatile and semi-volatile constituents utilizing GC/MS systems (HP Series 5970, 5971, and 5972, with RTE-A and Chem Station Data Systems). Responsibilities also involved the creation of CLP and SW846 data packages using EPA approved methodologies and protocols including but not limited to: Methods 500, 600, 8000 series. Daily duties involved sample management, routine maintenance of analytical equipment and the preparation of calibration and quality control standards.

Previous Experience:

GC/MS Group Leader, Inchcape Testing Laboratories, January 1989 - February 1992

Coordination and scheduling of projects according to priority, hold times and work load. Review and validate data and generate quantitative analysis reports for release to clients. Responsibilities included analysis of environmental samples for volatile and semi-volatile constituents utilizing GC/MS systems (HP Series 5970, RTE-E and RTE-A Data Systems). Responsibilities also involved the creation of CLP and SW846 data packages using EPA approved methodologies and protocols including but not limited to: Methods 500, 600, 8000 series. Daily duties involved sample management, routine maintenance of analytical equipment and the preparation of calibration and quality control standards. Also responsible for training of department personnel. Supervision of 4 employees.

Organic Extraction/GC Group Leader, West Paine Laboratories, August 1987 - January 1989

Responsible for scheduling and inter-laboratory coordination of projects. Review and validate GC data and generate quantitative analysis reports for release to clients. Daily duties involved sample management, routine maintenance of analytical equipment and the preparation of calibration and quality control standards. Also responsible for training of department personnel. Supervision of 6 employees.

GC Operator, West Paine Laboratories, November 1986 -August 1987

GC operations for the purpose of analyzing extractable constituents. Review GC data and generate quantitative analysis reports for review prior to release to clients.

Lab Technician, West Paine Laboratories, May 1986 -November 1986

Prepared environmental samples for GC and GC/MS according to SW846 methodology.

Education:

Mary Carroll High School
Corpus Christi, TX 1966 Graduate
Mathematics and Science Curriculum

Hewlett Packard Short Course, Introduction to MS Interpretation, May 1991

ROBYN B. MIGUES

Current Position:

QA/QC Manager, Gulf Coast Analytical Laboratories Baton Rouge, LA, January 1997 - Present

Responsible for implementing and monitoring the laboratory Quality Assurance Program Plan, conducting internal audits, reviewing reports, investigating problem areas, control-chart generation, establishing data-quality criteria, verifying corrective actions are being taken when necessary, and monitoring performance evaluation studies. Additional duties include providing reports concerning QA matters to management.

Previous Experience:

QA/QC Manager, Inchcape Testing Services - Environmental Laboratories, Baton Rouge, LA October 1994 - January 1997

Responsible for implementing and monitoring the laboratory Quality Assurance Program Plan, conducting internal audits, reviewing reports, investigating problem areas, control-chart generation, establishing data-quality criteria, verifying corrective actions are being taken when necessary, and monitoring performance evaluation studies. Additional duties include providing reports concerning QA matters to management.

General Chemistry Supervisor, ITS, Baton Rouge, LA, June 1994 - October 1994

Responsibility includes the management and training of personnel conducting inorganic analysis using EPA methodologies. Duties include data validation, QC review, instrument maintenance and method set up.

Metals Supervisor, ITS, Baton Rouge, LA, October 1993 - June 1994

Responsible for the management and supervision of the Metals section which includes supervision of metals sample preparation, supervision and training of analysts, scheduling sample workload, analysis of samples by various analytical instrumentation and reviewing and validating all data.

Previous Experience:

Research Associate, Louisiana State University, Agronomy Department, Baton Rouge, LA, September 1990 - March 1993

Prepared and analyzed samples by ICP, maintained ICP and other laboratory equipment, assisted associate Professor of soil andenvironmental chemistrywithlaboratory courses and research projects and supervised student workers. Computer experience includes Quattro Pro and Wordperfect.

Spectroscopy and Water Departments Supervisor, James Laboratories, Lafayette, LA, February 1987 - September 1990
Laboratory Technician

Prepared and analyzed samples by ICP, Flame Atomic Absorption & Emission, Mercury Hydride System and Graphite Furnace. Performed quality control coordination, trained laboratory technicians, maintained equipment including ion meters, EC meters, TOC analyzer and spectroscopy instruments. Prepared and analyzed wastewater, sludge, soil and hazardous waste criteria samples by accepted sampling and testing procedures and handled customer correspondence.

Education:

BS Geology, University of Southwestern Louisiana, Lafayette, LA, May 1985.

Member - American Society for Quality Control

Perkin Elmer Spectroscopy training course - 1987

Basic Statistics - Pittsburgh Conference Continuing Education Program - March 1995

Quality Management/Quality Assurance in Industry and in the Laboratory - ACS Short Course - March 1995

Inchcape Managerial Training Skills Workshop - 1994

Inchcape Testing Services - Environmental Laboratories, Baton Rouge, Manager and Supervisor Training Retreat - June 1996

Executrain Microsoft Excel 5.0 Beginning For Windows - July, 1996

JAMES D. TURNER

Current Position:

Training Officer, Gulf Coast Analytical Laboratories, Baton Rouge, LA , January 2000 – present

Responsibilities include development of a company training program that will efficiently train employees to ensure compliance with the internal SOP's and the analytical methods. The officer will be responsible for initial training of new employees as well as ongoing training for all employees. The officer will also maintain the training records and the analyst certification program.

Previous Experience:

General Chemistry Supervisor, Gulf Coast Analytical Laboratories, Baton Rouge, LA, January 1997 - Present

Responsible for the supervision and training of personnel, conducting inorganic analysis using EPA methodologies, correlation and validation of data, maintenance of Standard Operating Procedures (SOPs) and instrumentation, method set up and day-to-day management of the general chemistry laboratory.

General Chemistry Department Group Leader, Inchcape Testing Services -Environmental Laboratories, Baton Rouge, LA, August 1996 - January 1997

Responsible for analyst training, instrument maintenance, and scheduling daily work loads.

General Chemistry Laboratory Technician, Inchcape Testing Services - Environmental Laboratories, Baton Rouge, LA, November 1992 - August 1996

Responsible for preparation and analysis of standards and samples for most wet chemistry tests. Experience on instrumentation includes Lachat Quick Chem Analyzer, TOC, TOX, HACH Spectrophotometer, IC, HPLC, GCMS, and GPC. Additional responsibilities included initial review of data and associated QC and entry into the LIMS.

Previous Experience:

Chemist, La-Mar-Ka Chemical, Baton Rouge, LA, November 1991 - November 1992

Responsible for preparation and standardization of chemical solutions. Instrumentation experience included D.L. 40 Auto Titrator and Moisture Analyzer.

General Chemistry Laboratory Technician, Enviromed Laboratories, Baton Rouge, LA, June 1988 - November 1991

Experience includes preparation and analysis of samples by wet chemistry methods and preparation of samples by organic extraction procedures. Introduced to GC/MS. Assisted with sample collection and waste disposal.

Education:

BS, Microbiology, Louisiana State University, Baton Rouge, LA, May 1999
Minor-Chemistry

OSHA 40 hour Hazardous Waste Training Course - August 1991

Inchcape Testing Services - Environmental Laboratories, Laboratory Skills Training Program - August 1995

Inchcape Testing Services - Environmental Laboratories, Basic Gas Chromatography Theory - May 1996

RANDY K. WHITTINGTON

Current Position:

Technical Services Manager, Gulf Coast Analytical Laboratories, Baton Rouge, LA, January 1997 - Present

Responsible for the management and supervision of Sample Management; Project Management, and Report Generation. Duties include implementing systems for increased productivity in all three sections. Also coordinates communication among these departments and other areas of the laboratory and marketing.

Previous Experience:

Technical Services Manager, Inchcape Testing Services - Environmental Laboratories, BatonRouge, LA, October 1996 - January 1997

Responsible for the management and supervision of Sample Management, Client Services, and Report Generation. Duties include implementing systems for increased productivity in all three sections. Also coordinates communication among these departments and other areas of the laboratory and marketing.

Project Manager and Data Validation Manager, Terra Consulting Group, Baton Rouge, LA, 1993 - 1996

Performed organic data validation for CLP and RCRA data packages for pesticides, PCBs, volatile and semi-volatile analytical fractions. Responsible for the design and implementation of the analytical aspects needed to generate legally defensible data for a Remedial Feasibility Investigation (RFI) at various large chemical plants. Ensured data validation issues were addressed in the day-to-day operations of the investigation.

Gas Chromatography Supervisor, West-Paine Laboratories, Baton Rouge, LA, 1991-1993

Directly responsible for the supervision of the organics laboratory in environmental and hazardous waste matrices following current SW-846, 500 and 600 series methodologies. Responsibilities include coordinating and managing of QA/QC for all Gas Chromatography data from sample log-in, extraction, analysis, review and preparation of computerized reports.

Previous Experience:

Gas Laboratory Manager, ETC/Toxicon, Baton Rouge, LA, 1988-1991

Supervised the Gas Chromatography laboratory in the analysis of Organochlorine and Organophosphorus Pesticides, PCBs, Herbicides, PNAs, VOA and Semi-VOAs; supervised all aspects of the GC laboratory including analysis, data interpretation, report preparation, instrument maintenance, method development, and problem solving. In 1990 temporarily relocated to Edison, New Jersey to restructure the Gas Chromatography division while also implementing USEPA CLP and Finnigan QA Formaster; maintained efficiency of twenty-two various Gas Chromatographs.

Education:

BS, Environmental Engineering , Columbia Southern University

Inchcape Managerial Training Skills Workshop - 1993

Finnigan QA Formaster Training

Restek Chromatography Class

APPENDIX B

LEVELS OF REPORTABLES

GENERAL INFORMATION	LEVEL I	II	III	IV*
Sample ID	X	X	X	X
Client ID	X	X	X	X
Sampled Date	X	X	X	X
Sampled Time	X	X	X	X
Chain of Custody(s)	X	X	X	X
Sample Results	X	X	X	X
Detection Limits	X	X	X	X
Analysis Date	X	X	X	X
Analysis Time	X	X	X	X
Analyst	X	X	X	X
Method	X	X	X	X
Prep Date	X	X	X	X
Sample Summary Information (Cross Reference)	X	X	X	X
Method References	NA	NA	NA	X
Narrative	**	X	X	X
ORGANIC DATA				
Surrogates	X	X	X	X
Laboratory Control Sample	NA	NA	NA	X
Method blank (Chromatograph)	NA	X	X	X
Method blank (Summary Form)	NA	NA	X	X
Quantitation Reports	NA	NA	NA	X
Tune Information	NA	NA	NA	X
Initial/Continuing Calibrations	NA	NA	NA	X
Internal Standards	NA	NA	NA	X
Sample Chromatographs	NA	NA	X	X
Sample Prep Sheets	NA	NA	NA	X
Batch QC				
Matrix Spike	X	X	NA	NA
Matrix spike duplicate	X	X	NA	NA
Client Specific QC				
Matrix spike	NA	NA	X	X
Matrix spike duplicate	NA	NA	X	X
INORGANIC DATA				
Method Blank	NA	X	X	X
Laboratory Control Sample	X	X	X	X
Initial/Continuing Calibration	NA	NA	X	X
Additional ICP QC	NA	NA	X	X
Sample Prep Sheets	NA	NA	NA	X
Batch QC				
Matrix Spike	X	X	NA	NA
Duplicate	X	X	NA	NA
Client Specific QC				
Matrix spike	NA	NA	X	X
Matrix spike duplicate	NA	NA	X	X
Duplicate	NA	NA	X	X

*Level IV - CLP like deliverable package
**Narrative included in Level I as required
Revised 01/22/97 levelpkg.xls

APPENDIX C

EQUIPMENT MAINTENANCE LOG

Department:	**Date of Receipt:**
Instrument:	**Model No.:**
Serial Number:	**Service Telephone #:**

Date	Description of Maintenance/Service	Initials

Revised 05/13/93 EQUIPLOG

APPENDIX D

GULF COAST ANALYTICAL EQUIPMENT LIST

EQUIPMENT	MAKE/MODEL	SERIAL NUMBER
GCMSSV 1	HP 5890 SERIES II	3336A54720
	HP 5971 A	3050A01785
GCMSSV 2	HP 5890 SERIES II	3336A53261
	HP 5972	3341A01343
GCMSSV 3	HP 5890 SERIES II	3310A47202
	HP 5972	3307A00395
GCMSV 0	HP 5890 SERIES II	3336A58851
	HP 5972	
GCMSV 1	HP 5890 SERIES II	2905A12032
	HP 5970	2905A12032
GCMSV 2	HP 5890 SERIES II	3029A29908
	HP 5972	3449A02093
GCMSV 3	HP 5890 SERIES II	3114A13122
	HP 5970	
GCMSV 4	HP 5890 SERIES II	3033A31455
	HP 5970.	3034A12865
PURGE/TRAP(GCMSV-0)	TEKMAR-LSC 2000	91162010
PURGE/TRAP(GCMSV-1)	TEKMAR-LSC 2000	91162010
PURGE/TRAP(GCMSV-2)	TEKMAR-LSC 2000	92114001
PURGE/TRAP(GCMSV-3)	TEKMAR-LSC 2000	93118004
PURGE/TRAP(GCMSV-4)	TEKMAR-LSC 3000	99076013
AUTOSAMPLER(GCMSV-0)	TEKMAR ALS 2016/2032	91113002
AUTOSAMPLER(GCMSV-1)	TEKMAR-PRECEPT II	99195008
AUTOSAMPLER(GCMSV-2)	TEKMAR-PRECEPT II	98364003
AUTOSAMPLER(GCMSV-3)	TEKMAR-PRECEPT II	99082001
AUTOSAMPLER(GCMSV-4)	TEKMAR-PRECEPT II	98211007
FUME HOOD	LABCONCO (#20) GCMSV	
FUME HOOD	LABCONCO(#19)	
COOLER	TRUE(#22)	1330620
REFRIG/FREEZER	SEARS (V0A 2)	983108619
FREEZER	FRIGIDAIRE, MODEL #MFU17F3GW6 (#12) GCMSV	WB02927861
REFRIGERATOR	WPAINE 0570(C6) GCMSV	
GCSV 1	HP 5890 SERIES I	2843A19501
GCSV 2	HP 5890 SERIES II	3133A37433
GCSV 3	HP 5890 SERIES II	3108A34124
GCSV 4	HP 5890 SERIES II	3029A29801
GCSV 5	HP 5890 SERIES II	3033A30601

GULF COAST ANALYTICAL EQUIPMENT LIST

EQUIPMENT	MAKE/MODEL	SERIAL NUMBER
GCSV 6	HP 5890 SERIES II	3140A38274
GCSV 7	HP 5890 SERIES II	3126A36260
GCSV 8	HP 5890 SERIES II	3336A53945
GCSV 9	PERKIN ELMER	
GCSV 10	PERKIN ELMER	
GCSV 11	HP 5890 SERIES II	3033A30303
GCSV 12	HP 5890 SERIES II	3033A33730
GCSV 13	HP 5890 SERIES II	3336A54138
EASY FLASH	TDX(GCSV#11)	997776
EASY FLASH	TDX(GCSV#7)	983302
FUME HOOD	LABCONCO(#33)	
GCV 1	TRACOR 540	
GCV 2	HP 5890 SERIES II	901838
GCV 3	HP 5890 SERIES II	
GCV 4	HP 5890 SERIES II	
GCV 5	HP 5890 SERIES II	3033A33621
GCV 6	HP 5890 SERIES II	3203A41268
GCV 7	HP 5890 SERIES II	3223A43525
PURGE/TRAP	LSC 2000 (NOT IN USE)	90163023
PURGE/TRAP	LSC 2000	90211015
PURGE/TRAP	LSC 2000	9503902
PURGE/TRAP	LSC 2000	
AUTOSAMPLER	TEKMAR ALS 2016	92157004
AUTOSAMPLER	TEKMAR ALS 2032	91150012
AUTOSAMPLER	TEKMAR ALS 2032	90233008
AUTOSAMPLER	TEKMAR ALS 2016	93130001
AUTOSAMPLER	TEKMAR ALS 2032	92268005
REFRIG/FREEZER	SEARS (#19)	
REFRIG/FREEZER	MASTERBILT (#18)	254034
BALANCE	SARTORIUS ISO 9001	
REFRIG/FREEZER	WHITE WESTINGHOUSE (#25)	BA32307660
REFRIG/FREEZER	SEARS (#11)	BA01000875
REFRIG/FREEZER	KENMORE (#14)	BA04391055
REFRIG/FREEZER	KENMORE (#15)	BA04391057
REFRIG/FREEZER	KENMORE (#17)	BA03100524
FREEZER	WHITE WESTINGHOUSE (#26)	WB83724994
[redacted]	[redacted]	[redacted]
ICP	PERKIN-ELMER OPTIMA 3000XL	069N4051802

GULF COAST ANALYTICAL EQUIPMENT LIST

EQUIPMENT	MAKE/MODEL	SERIAL NUMBER
ICP	PERKIN-ELMER OPTIMA 4300DV	077N0050202
GFAA	PERKIN-ELMER ZEEMAN 5100/HGA 600	139460
GFAA	PERKIN-ELMER 4100ZL	6421
FLAME AA	PERKIN-ELMER 3100	143298
HG ANALYZER	LEEMAN LABS PS200	1008-A
HG ANALYZER	PERKIN ELMER/FIMS 400	4515
FUME HOOD	FISHER 93-608Q(#23)	
FUME HOOD	FISHER 93-608Q(#24)	
METALS PREP		
MICROWAVE	CEM MARS5	DS-6208
DIGESTION BLOCKS(3)	CPI MOD BLOCK	
FUME HOOD (4)		
BALANCE	SARTORIUS BASIC B310S	40030070
BALANCE	METTLER AE163	C05693
EXTRACTION		
FUME HOODS (18)		
FREON RECYCLER	ENVIROSAVE 22 (NOT IN USE)	
GLASS WASHER	AMSCO 400	36911195001
SHAKER (4)		
MILLIPORE(2)		
VACUUM PUMP	WELCH 1397	
GPC (2)	ABC AP-100	9161SI/AS007-9114-9114
CENTRIFUGE	IEC HN-SII	
OVEN	FISHER	11000184
TCLP/ZHE ROTATOR (7)	ASSOCIATED DESIGN	
ZHE EXTRACTORS (27)	ENVIRONMENTAL EXPRESS	
WATER BATH (3)		
SONICATOR (4)	MISONIX	
BALANCE	METTLER PM 3000	M33557
BALANCE	SARTORIUS U4600 P+	36090160
BALANCE	METTLER PG 3001 S	1117331005
PH METER	ORION SA520	QT20A
PH METER	ORION 720A	003964
PH METER	ORION 720A	001350
PH PROBE	ORION	917006
PH PROBE	ORION	9107BN
COOLER	TRUE (#5)	1334961
REFRIG/FREEZER	WHITE WESTINGHOUSE (#8)	LA10903763

GULF COAST ANALYTICAL EQUIPMENT LIST

EQUIPMENT	MAKE/MODEL	SERIAL NUMBER
REFRIG/FREEZER	WHITE WESTINGHOUSE (#9)	BA04391056
REFRIG/FREEZER	KENMORE (#6)	E52036581
FREEZER	WHITE WESTINGHOUSE (#23)	WB40802629
[illegible]	[illegible]	[illegible]
HPLC	HP 1050	
HPLC	HP 1049A	331450G644
HPLC	HP1046A	3137G02313
TOX (2)	MITSUBISHI TOX-10E	
TOC (3)	SHIMADZU TOC-5050	30N28473/33829608
AUTOANALYZER	LACHET QUICK CHEM AE	200-474
IC(2)	DIONEX 4500I	900915
COD REACTOR (2)	HACH COD REACTOR	910404575/920800007697
TURBIDIMETER	HACH 2100A	
SPECTROPHOTOMETER	HACH DR/3000	920800003638
VISCOMETER	BROOKFIELD DVII	32587
WATER BATH	BROOKFIELD TC-200	
CLOSED CUP FLASH PT	PRECISION SCIENTIFIC	10BR-12
AMMONIA PROBE	ORION 95-12	
OXYGEN BOMB CAL	PARR	6616
CONDUCTIVITY METER	AMBER SCIENCE 604	9206030
COLIFORM BATH(2)	PRECISION SCIENTIFIC INCUBATOR	
PH METER	ORION 720A	WP# 0805
PH METER	ORION 420A	
PH PROBE	ORION 8165BN	
PH PROBE	SENOREZ S200C	
AUTOCLAVE	AMSCO EAGLE TEN (NOT IN USE)	
DO METER	YSI MODEL 59/5905 PROBE	93A01946
DO METER	YSI MODEL 5100	99M0821-AF
OVENS (3)		
FURNACE	THERMOLYNE 1500	
DESSICATORS (7)	DRY KEEPER	
INCUBATOR	FISHER SCIENTIFIC(#3)	WB93928030
BALANCE	OHAUS AS200	3994
BALANCE	AND ER-182A	4703338
BALANCE	SARTORIUS A200S	36120024
FUME HOODS (4)		
REFRIG/FREEZER	WHITE WESTINGHOUSE (#2)	WB 11908435
REFRIG/FREEZER	WHITE WESTINGHOUSE (#1)	WB10507478

GULF COAST ANALYTICAL EQUIPMENT LIST

EQUIPMENT	MAKE/MODEL	SERIAL NUMBER
[redacted]	[redacted]	[redacted]
FUME HOOD (1)		
COOLER	TRUE (#2)	708391
COOLER	TRUE (#3)	790111
WALK-IN COOLER (2)		
REFRIG/FREEZER	KENMORE (#4)	BA01902878
ELECTRONIC THERMOMETER	RAYNGER ST2L RAYTEK	
FREEZER	FRIGIDAIRE(#12) MFU17F3GW6	WB03102969
[redacted]	[redacted]	[redacted]
BALANCE	AND FX-300 WEST-PAINE 0640	5015502
BALANCE	SARTORIUS B120S	40030105

MISCELLANEOUS FORMS

GULF COAST
ANALYTICAL LABORATORIES INC.

CORRECTIVE ACTION REQUEST

Date: _____ Group #: _____
Client: _____ Sample # _____
Contact: _____ Phone#: _____
Initiated By: _____ FAX#: _____

Correction Needed: _____

ROUTING: Initial/Date when completed

QA/QC					
Operations Mgr					
Rpt Gen			Metals		
Invoicing			Wet Lab		
Extractions			Asbestos		
GC/MS VOA			Log in		
GC/MS SVOA					
GC VOA					
GC SemiVOA			IT Director		

Return to QA/QC By: _____

***Resolution:** _____

Follow Up Action: _____

Temporary: _____ **Permanent** _____

QA/QC Review: _____ **Data Val Review:** _____

Date Mailed: _____ **Copy to Initiator:** _____

***Verify all corrections are made to posting sheets, logbooks, raw data & LIMS.**

7979 GSRI Avenue, Baton Rouge, Louisiana 70820-7402 • Phone (504) 769-4900 • Fax (504) 767-5717
Email: gcal@premier.net

CORRECTIVE ACTION REQUEST/CLIENT INQUIRY REQUEST

Group #: _____

Client: _____ Initiated By/Date: _____

REASON FOR INITIATION OF CORRECTIVE ACTION

RESOLUTION	
Section	Action Taken
Narratives to be added:	

Report Generation	
Date	Action Taken

Correction Reviewed By: _____ Date Completed: _____

STANDARD PREPARATION LOGBOOK

STANDARD NAME	STD#	STOCK STD	SUPPLIER	LOT#/ EXP DATE	WT/VOL g/ml	FINAL VOL(ml)	FINAL CONC	SOLVENT/ LOT#	INIT	DATE PREPARED	EXP DATE

REFRIGERATOR TEMPERATURE
LOGBOOK

CONTROL LIMITS: 4°C +/- 2

Date	Temperature	Action taken:	Initials

Revised 07/19/94 REFTEMP_2

pH LOGBOOK

Date: _____

Slope Limits: 92–108

	Calibration		Calibration Levels				QC Check	
	Time	Analyst	1	2	3	Slope	Actual	Found
1								
2								
3								
4								
5								
6								

pH RESULTS

	Client	Sample ID	Time	Analyst	Sample wt (g)	ml DI	Result
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

Revised 09/11/96 PHS

DATE: _____ TCLP EXTRACTIONS ANALYST: _____

Sample Number:							
Sample Description							
1. VISUAL SAMPLE EVALUATION							
100% solid (Skip to 3)	(✓)						
Sample is <100% Solid	(✓)						
2. FILTRATION (Pressure Filtration is Required if Solids are ≥10%)							
Filter Weight	(F)						
Filtrate Vessel Weight	(V)						
Subsample Weight	(X)						
Weight of Dried Solids + Filter	(S)						
Weight of Filtrate + Vessel	(L)						
Weight of Filtered Solids = *X-(L-V) -F*	(FM)						
% Filter Solids = [X-(L-V) x 100] ÷ X	(%FS)						
% Dry Solids = [S-F x 100] ÷ X	(%DS)						
3. EXTRACTION FLUID DETERMINATION							
Particle Size Reduced (1mm max.)	(✓)						
Actual weight of subsample (5.0 ± 0.1g)							
Actual volume of water (96.5 ± 1 mL)							
Initial pH (After 5 min. mixing)	"pH-1"						
If pH >5, ✓ if 3.5 mL 1N HCl added							
✓ if heated and held at 50°C for 10 minutes							
Second pH (at room temperature)	"pH-2"						
If pH-1 or pH-2 < 5.0 use Fluid I	(✓)						
If pH-2 > 5.0 use Fluid II	(✓)						
4. PREPARATION FOR EXTRACTION PROCEDURE *							
Particle Size Reduced (9.5 mm max)	(✓)						
Weight of Solids to be Extracted = FM	(X)						
Filtrate Vessel Weight	(V)						
Weight of Filtrate + Vessel	(L)						
Amount of Fluid Needed = 20 x (X-L-V)							
5. TCLP ROTATION (Rotate for 18 ± 2 hours at 23 ± 2°C and 30 ± 2 rpm) Temp: _____							
Start Time							
Stop Time							
6. FINAL TCLP EXTRACT							
Volume Extract Obtained in Step 5	V1						
Volume Compatible Filtrate from Step 4	V2						
Volume Non-Compatible Filtrate from Step 4	V3						
pH Combined Extract/Filtrate	(V1 + V2)						
Compatible Phase Ratio = (V1+V2) ÷ (V1+V2+V3)							
Non-Compatible Phase Ratio = (V3) ÷ (V1+V2+V3)							

*If sample is <0.5 %FS; or <0.5 %DS; Filter Sample, collect filtrate and skip to 6. If sample is 100% solid, use 100 grams sample and 2000 mLs fluid.

LOGIN DISCREPANCY

CLIENT	CLIENT NUMBER	GROUP NUMBER

Comments/Discrepancies noted by: _____ **Date:** _____

Comments/Corrective Action by: _____ **Date:** _____

CERTIFICATIONS

GULF COAST ANALYTICAL LABORATORIES
CERTIFICATIONS

- Louisiana Department of Environmental Quality, Environmental Laboratory Accreditation Program, Certificate Number 01955 (Expiration 6/30/2001)

- Oklahoma Department of Environmental Quality, Laboratory Certification Program, ID # 9403 (Expiration: 8/31/2001)

- State of Arkansas, Department of Pollution Control and Ecology, Laboratory Certification Program (Expiration: 11/06/2001)

- State of Florida, Department of Environmental Protection, Quality Assurance Approval, QA plan # 970026 (Expiration: 07/08/2001)

- State of California Environmental Laboratory Accreditation Program, Certificate Number 2242 (Expiration: 5/31/2001)

- U.S. Army Corps of Engineers (USACE) validated laboratory (Expiration: 10/19/2002)

GCAL is currently performing work in the following states which do not have environmental certification programs:
Texas
Mississippi
Alabama
Georgia

APPENDIX 5

INSPECTION PLAN AND SCHEDULE

INSPECTION PLAN
AND SCHEDULE

EXIDE TECHNOLOGIES
BATON ROUGE SMELTER
BATON ROUGE, LOUISIANA

EPA ID NUMBER: LAD 008184137

August 2001

INTRODUCTION

The Exide Baton Rouge smelter is a secondary lead smelter and recycler that recycles inorganic lead-bearing materials including spent lead acid batteries. Exide was issued a Hazardous Waste Operating Permit (LAD008184137) by the Louisiana Department of Environmental Quality (LDEQ) on September 30, 1993. The permit lists inspection schedules for three permitted storage units and one permitted treatment unit. Exide is submitting a Class 3 permit modification to add the Containment Building to the Operating Permit.

This Inspection Plan will be included in this Class 3 permit modification.

Exide has developed this plan and schedule to meet the requirements specified in LAC 33:V.1509 and 40CFR264.15. Exide will inspect the smelter for any malfunctions and deteriorations, operator errors, and discharges that may cause a release of hazardous waste or a threat to human health.

TYPES OF INSPECTIONS

Daily Inspections

The Environmental Manager or his designate performs daily inspections of the material storage areas, the loading and unloading docks, the wastewater treatment area, and the leachate collection systems. These inspections are required by Exide's Hazardous Waste Permit and Best Management Practices/Stormwater Pollution Prevention Plan (SWPPP). The results of this inspection are documented on the form included in Appendix A and kept in the environmental files.

The Environmental Manager or his designate will perform daily opacity inspections and baghouse operation inspections. These inspections are required as a part of Exide's Air Permit. The results of the inspections are documented on the forms included in Appendix B and kept in the environmental files.

Routine visual inspections of onsite tanks and transfer equipment are performed on a daily basis as required by the Spill Prevention Control and Countermeasure Plan (SPCC Plan).

Weekly Inspections

The Environmental Manager or his designate conducts a weekly inspection of all permitted hazardous waste units.

The Truck/Trailer area is a permitted storage area where spent lead-acid batteries are stored on pallets in trucks prior to recycling. This unit will be inspected to insure that the container and trailers are structurally sound with covers or tops in place, there are no cracks on the base or pooled water in the sump, the warning signs are in place and that

the runon-runoff system is working. The contents of any trailer judged to be structurally unsound will be immediately transferred to another trailer or recycled.

The Whole Battery Storage area is a permitted storage area where spent lead-acid batteries are stored on pallets prior to recycling. This unit will be inspected weekly to be sure that the containers are structurally sound, there are no cracks or gaps in the base, and that the warning sings are in place. Any cracked or broken batteries will be either over-packed or recycled.

The K069 Container storage area is a permitted storage area were drums containing K069 and D008 wastes are stored on pallets. This unit will be inspected for structurally sound containers with covers in place, that the container are on pallets, there is no accumulated water in the storage area, and the containers are properly labeled. Any unsound container will be replace or recycled. Any uncovered container will be covered immediately.

The Slag Stabilization area is a permitted waste treatment unit that crushes and chemically stabilizes spent blast furnace slag. This unit will be inspected for warning signs in place, no cracks or gap in the base, no visible air emissions, no spills, and that the runon-runoff system is working. Any air emissions will be terminated immediately. Any repairs or upgrades will be accomplished in the shortest possible time. The Environmental manager will also be sure that all permit required TCLP and air monitoring samples have been collected, analyzed and are on file.

The Containment Building will be inspected for free liquids, visible emissions, tracking, and release of hazardous waste. Additionally, the leak detection system, the liquid collection system and the heights of the stored materials will be checked. Any corrective action necessary will be completed at the earliest possible time.

These weekly inspection results are documented on the forms included in Appendix C and kept in the environmental files.

Monthly Inspections

A monthly inspection of the closed hazardous waste cells, the fire protection systems, the telephone and alarm systems and the special respirators is conducted by the Environmental Manager or his designate. The results of this inspection are documented on the form included in Appendix C and kept in the environmental files.

Quarterly Inspections

Additional inspections performed at the Baton Rouge smelter include, quarterly tank inspections as required by the facility SPCC plan and in-coming material inspections required by the Waste Analysis Plan. Documentation of these additional inspections is kept in the Environmental Departments files.

INSPECTION SCHEDULE

As stated above, daily weekly and monthly inspections are performed at the Baton Rouge smelter. The inspection schedule is detailed below:

- Daily inspection of the wastewater treatment area, the leachate collection system, the unloading areas, and the material storage area. Along with baghouse functions and opacity.
- Weekly inspections of all of the permitted hazardous waste storage areas, the Truck/Trailer storage area, the Whole Battery Storage area, the K069 storage area, the Slag Stabilization unit, the Containment Building, and the NiCad Battery storage.
- Monthly inspections are conducted at the two closed hazardous waste cells, the plant alarm and fire protection equipment, and the special respirators.

These inspections may be performed on a more frequent basis depending on operating conditions or other circumstances.

TYPES OF PROBLEMS

The types of problems that are expected to be encountered can include equipment malfunctions, spills, material handling, labeling and notification problems, or container deterioration. The Inspection Form in Attachment 3 lists common, expected problems for each area. The Inspection Form in Attachment 1 simply lists the areas. The inspector will check those areas for any problems, such as leaks, spills, hazardous waste stored in a non-permitted area, warning signs in place, and structural integrity of the unit.

If any problems or malfunctions are noted during the inspection, Exide will immediately correct the problem and remedy the situation. Exide will note repairs and corrective action on the inspection forms.

INSPECTION LOG DOCUMENTATION

Exide will record the daily, weekly, monthly and quarterly inspections in inspection logs. These inspection logs will be kept in the Environmental Departments files. The inspection records will include the date and time of the inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs.

APPENDIX A

DAILY HAZARDOUS WASTE INSPECTION SCHEDULE AND LOG

Exide Technologies
Baton Rouge Smelter
Daily Hazardous Waste Inspection Schedule and Log

Date	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8/1/01						
8/2/01						
8/3/01						
8/4/01						
8/5/01						
8/6/01						
8/7/01						
8/8/01						
8/9/01						
8/10/01						
8/11/01						
8/12/01						
8/13/01						
8/14/01						
8/15/01						
8/16/01						
8/17/01						
8/18/01						
8/19/01						
8/20/01						
8/21/01						
8/22/01						
8/23/01						
8/24/01						
8/25/01						
8/26/01						
8/27/01						
8/28/01						
8/29/01						
8/30/01						
8/31/01						

APPENDIX B

DAILY OPACITY INSPECTION FORM AND

DAILY BAGHOUSE CHECKLIST

Exide Technologies
Baton Rouge Smelter
Daily Opacity Inspection

Date	Time	Inspector	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8/1/01								
8/2/01								
8/3/01								
8/4/01								
8/5/01								
8/6/01								
8/7/01								
8/8/01								
8/9/01								
8/10/01								
8/11/01								
8/12/01								
8/13/01								
8/14/01								
8/15/01								
8/16/01								
8/17/01								
8/18/01								
8/19/01								
8/20/01								
8/21/01								
8/22/01								
8/23/01								
8/24/01								
8/25/01								
8/26/01								
8/27/01								
8/28/01								
8/29/01								
8/30/01								
8/31/01								

X = No visible Emissions from stack

DAILY BAGHOUSE REPORT FORM

NAME: _____ **DATE:** _____ **TIME:** _____

#1 Baghouse

1) Cell Differentials 1 _____ 2 _____ 3 _____ 4 _____ 5 _____

6 _____ 7 _____ 8 _____ 9 _____ 10 _____

2) Blower Amps 1 _____ 2 _____ 3 _____

3) Inlet Temperature _____ degrees F

4) Screws Online (check if running) 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____

7 _____ 8 _____ 9 _____ 10 _____ Main _____

5) Bag leak detector operational (circle one) Yes No

#4 Baghouse

1) Cell Differentials 1 _____ 2 _____ 3 _____ 4 _____ 5 _____

6 _____ 7 _____ 8 _____

2) Blower Amps 1 _____

3) Inlet Temperature _____ degrees F

4) Screws Online (check if running) East _____ West _____ Plenum _____ B/H _____ M&S _____

Transfer _____ Incline _____ Catwalk _____ Rev. Feeder _____

5) Bag leak detector operational (circle one) Yes No

#5 Baghouse

1) Cell Differentials 1 _____ 2 _____ 3 _____

2) Blower Amps 1 _____

3) Inlet Temperature _____ degrees F

4) Bag leak detector operational (circle one) Yes No

#6 Baghouse

1) Cell Differentials 1 _____ 2 _____ 3 _____

2) Blower Amps 1 _____

3) Inlet Temperature _____ degrees F

4) Bag leak detector operational (circle one) Yes No

#7 Baghouse

1) Cell Differentials 1 _____ 2 _____ 3 _____

2) Blower Amps 1 _____

3) Inlet Temperature _____ degrees F

4) Bag leak detector operational (circle one) Yes No

Comments: _____

_____

Work in Progress (baghouse foreman): _____

_____

APPENDIX C

HAZARDOUS WASTE INSPECTION SCHEDULE

WEEKLY AND MONTHLY LOG FORM

EXIDE TECHNOLOGIES - BATON ROUGE SMELTER
HAZARDOUS WASTE INSPECTION SCHEDULE
MONTHLY AND WEEKLY

DATE/TIME										
INSPECTOR										
STATUS	OK	NOK	OK	NOK	OK	NOK	OK	NOK	OK	NOK
SLAG STABILIZATION										
1. There are no cracks, gaps, or pooled water on base or in sump.										
2. Warning signs are in place.										
3. There are no visible air emissions.										
4. The runon-runoff system works.										
5. There are no spills on base.										
6. TCLP and Air Monitoring Samples have been tested at the appropriate frequency.										
CONTAINMENT BUILDING										
1. Containment of materials and height of stored material.										
2. No free liquids.										
3. Runon-runoff barriers working.										
4. Leak detection sump.										
5. Liquid collection system.										
6. No visible emissions.										
7. No tracking.										
8. Release of any hazardous waste from the Continnment Building										
NI-CD BATTERIES										
1. Containers are structurally sound with covers in place.										
2. Containers are labeled. Date on label is less than 90 days.										

EXIDE TECHNOLOGIES - BATON ROUGE SMELTER
HAZARDOUS WASTE INSPECTION SCHEDULE
MONTHLY AND WEEKLY

DATE/TIME										
INSPECTOR										
STATUS	OK	NOK	OK	NOK	OK	NOK	OK	NOK	OK	NOK
TRUCK/TRAILER AREA										
1. Containers and trailers are structurally sound with covers or tops in place.										
2. There are no cracks, gaps or pooled water on the base nor accumulated water in sump.										
3. Warning signs are in place.										
4. Runon-runoff system works.										
WHOLE BATTERY CONTAINER AREA										
1. Containers are structurally sound with covers in place.										
2. There are no cracks, gaps or pooled water on the base nor accumulated water in sump.										
3. The warning signs are in place.										
K069 CONTAINER AREA										
1. Containers are structurally sound with covers in place.										
2. The containers are on pallets and above any liquid on the floor.										

DATE AND NATURE OF REPAIRS OR ACTIONS: _____

_____

MONTHLY

1. Closed area, Security, Monitoring Wells;
   Date_____ Time _____ Inspector _____

	OK	Other
a. No apparent clay cap erosion.		
b. Leachate collection system operating properly.		
c. No ants, termites, or burrowing animals detrimental to clay cap.		
d. Seal around monitoring well is unbroken.		
e. No holes or breaks in monitoring well casing /covers.		
f. Warning signs, security fences in place.		

2. Safety Communication Equipment;
   Date_____ Time _____ Inspector _____

	OK	Other
a. Each fire hose, extinguisher is operable and accessible.		
b. Telephone and alarm system is operable.		
c. Special respirator is operable.		

DATE AND NATURE OF REPAIRS OR ACTIONS: _____

_____

APPENDIX 6

RCRA CONTINGENCY PLAN AND EMERGENCY RESPONSE PLAN

RCRA CONTINGENCY PLAN

AND

EMERGENCY RESPONSE PLAN

EXIDE TECHNOLOGIES
BATON ROUGE SMELTER

2400 BROOKLAWN DRIVE
BATON ROUGE, LOUISIANA

Phone- 225-775-3040 Fax 225-775-3057

REVISED 8/1/01

In Compliance with OSHA Emergency Response Plan (29 CFR 1910.120) and RCRA Contingency Plan (40CFR 262, 264 and 265) requirements.

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1.0 INTRODUCTION

1.1 Purpose

The Exide Technologies, Baton Rouge smelter is located in Baton Rouge, East Baton Rouge Parish, Louisiana. This facility is a secondary lead smelter and refinery that recycles spent lead-acid batteries and inorganic lead-bearing wastes into product lead.

This Emergency Contingency Plan has been formulated in order to minimize personal injury and property damage in the event of a plant emergency or natural disaster. This plan meets the regulatory requirements specified in 29 CFR 1910.120, 40CFR 262, 264 and 265, and LAC 33:V.1513. Section 2.0 of the plan lists the assignment of duties for all Contingency Plan officers, and provides an organization chart designating responsibility. Section 3.0 of the plan documents emergency response procedures such as assemble areas and communications. Types of emergency situations and how to deal with these situations are detailed in Section 4.0 of the plan. Section 5.0 of the plan describes the plant and unit emergency shutdown procedures and Section 6.0 presents the alarm system.

Copies of this plan will be distributed to local and state law enforcement agencies, area hospitals, local fire and rescue units and the East Baton Rouge Emergency Planning Commission. This plan will be reviewed annually and updated as necessary to reflect changes in emergency procedures or equipment, site hazards or emergency personnel.

Transportation emergencies and over-the-road spill response are addressed in Exide's Transporter Contingency Plan.

1.2 Authority to Invoke Plan

The Chief Officer or his alternate will act as the Emergency Coordinator with full authority to implement the plan. If an incident occurs when the Chief Officer is not present, the plan will be invoked by the senior supervisor present. If a supervisor is not readily available and an emergency situation occurs, any employee is authorized to request the guard to sound the alarm if necessary to minimize hazards to human health and the environment in obvious emergency situations. To report emergencies, any employee can use the portable radios in the plant or the in-plant telephone system.

1.3 Training

All employees at the Baton Rouge smelter will receive initial training on the Contingency Plan and follow-up refresher training at least once per year. Any employee that has a specific duty or responsibility in the plan will receive additional training detailing their specific responsibilities. Training will be conducted when an employees responsibilities or designated actions under the plan change and whenever the plan is changed or updated.

1.4 Background

The Exide Baton Rouge smelter is located at 2400 Brooklawn Drive, in East Baton Rouge Parish, Louisiana. This facility is a secondary lead smelter and refinery which recycles inorganic lead-bearing materials into lead pig and block ingots, which are sold to customers for use in making

batteries, weights, bearings, ammunition, and chemicals. The facility has been in operation since the 1960s. Figure 1 shows the facility and surrounding area.

Spent lead acid batteries are delivered to the facility in trucks or trailers and are unloaded at the loading dock. The batteries are fed into the battery breaker unit, and are processed into individual components. Other lead-bearing materials are stored in feed-stock piles in the Containment Building. The facility operates two blast furnaces (the No. 1 blast and the No. 2 blast) and one reverberatory furnace (the No. 3 reverb) that are used to smelt the lead-bearing raw materials. The molten lead is refined and then cast into ingots using two casting machines or block using molds. The lead ingots and blocks are loaded into trucks and transported off-site for reuse.

1.5 Facility Hazards

The Baton Rouge smelter processes lead-acid batteries and other lead bearing materials into metallic lead for resale. Some of the materials received are classified as hazardous wastes or hazardous materials. Hazardous waste storage areas shown on Figure 1 include the Whole Battery Storage Area, the Truck Trailer Storage Area, the K069/D008 Storage area and the Containment Building. Additionally, some of the chemicals used at the Baton Rouge smelter are hazardous, flammable or explosive. The Baton Rouge smelter does not have any PCBs or organic lead.

Appendix A contains the latest copy of Exide's Tier Two report that lists all of the hazardous chemical used on site along with the location that the chemicals are stored. Some of the areas that could pose a danger during an emergency or natural disaster include:

- the phosphorus storage area where red phosphorus is kept,
- the sulfuric acid tanks, two 15,000 gallon tanks that contain battery acid (sulfuric acid at concentrations of approximately 15%-20%),
- the chemical warehouse, where most refining chemicals are kept including metallic calcium, metallic selenium, metallic arsenic and arsenic trioxide, sulfur, and sodium nitrate,
- the chlorination unit that contains two cylinders of chlorine gas for treating potable water,
- the gasoline tank (1,000 gallons) and diesel tank (2,000 gallons) near the smelter entrance,
- the maintenance shop where acetylene and oxygen gas cylinders and propane tanks are stored in racks,
- two caustic (sodium hydroxide slurry) tanks, each with a capacity of 10,000 gallons,
- the oxygen plant, where liquid oxygen is stored,
- the battery breaker unit which has acid storage tanks, peroxide and treatment chemicals,
- the production area, where the furnaces are operated and molten lead is refined and cast.

2.0 ASSIGNMENT OF DUTIES

The Organizational Chart, shown on Figure 2, lists each Contingency Plan officer and presents the chain-of-command that will be followed in the event of an emergency. Since emergency situations can happen at any time, the Organizational Chart lists an assistant position for each Contingency Plan officer, in the event that the primary officer in not available. Table 1 presents a list of emergency telephone numbers for all Contingency Plan Officers.

2.1 Chief Officer

The Chief Officer has overall responsibility for all emergency actions and will act as the emergency coordinator during any emergency situations. The plant manager will fill the role of the Chief Officer. He is qualified to act as the Emergency Coordinator as defined by the applicable LDEQ and EPA regulations. The Chief Officer (Emergency Coordinator) at the Baton Rouge smelter is:

Mr. Joseph Acker Jr.
Plant Manger
2400 Brooklawn Drive
Baton Rouge, LA 70807
(225) 775-3040 – Office

The Chief Officer will direct this Contingency Plan from the scene of the affected area. After the emergency or disaster is under control, he will direct salvage and re-establishment of operations. Whenever there is an emergency or natural disaster, the Chief Officer will identify the character, source amount and areal extent of any released material. The Chief Officer will meet with all of the Contingency Plan officers to assess all possible hazards caused by the emergency situation.

In the absence of the Chief Officer, the Assistant Chief Officer will assume the duties of the Chief Officer.

2.2 Assistant Chief Officer

The Assistant Chief Officer will advise and assist the Chief Officer and, in the absence of the Chief Officer, will direct the plan. The Plant Superintendent will act as the Assistant Chief Officer. He will be assisted by the Production Manager. The Assistant Chief Officer will be responsible for the safe shutdown of the smelter and other facilities, where necessary, as well as continued operation of unaffected facilities. The Assistant Chief Officer will also ascertain evacuation of hazardous areas by operating personnel when such evacuation is considered necessary.

The following are some of the assigned duties of the Assistant Chief Officer:

- Assist the Chief Officer and other Contingency Plan officers as needed.
- Advised the families of any injured employees.
- Prepare necessary press release for approval of the Chief Officer. He will have the

Communications Officer transmit these to the press.

- Compile a headcount list for the Chief Officer.

In the event that a Contingency Plan Officer and his assistant are absent, the Assistant Chief Officer will assign a qualified person to carry out the appropriate duties.

2.3 Safety Officer

The Safety Officer will assist the Chief Officer in all aspects of emergency planning, preparedness, response and training. The Health and Safety Coordinator will act as the Safety Officer. He will report to the Chief Officer in the event that this plan is invoked and will directly assist in emergency response efforts. The Safety Officer will inspect all required emergency equipment and document that all equipment and supplies are in a state of readiness. He will be aware of all emergency needs and work constantly toward providing a safe work place. The Safety Officer will plan in advance to meet any emergency situation that may present itself.

2.4 Communications Officer

The Communications Officer will maintain an up-to-date list of home telephone numbers of all key employees. The company controller will act as the Communications Officer and will be assisted by the plant telephone operator and the payroll clerk. In the event the Communications Center must be moved, the list will be taken to the new Communications Center. Some of the duties of the Communications Officer will be:

- Notify all Contingency Plan Officers as expeditiously as possible of any changes in location of the Communications Center from its normal location at the front office.
- Dispatch two men to report to the Chief Officer to serve as messengers.
- Monitor telephone communication so that only essential calls are permitted. Assign priority to calls if necessary.
- Release injury information to families at the direction of the Chief Officer or his Designee.
- Give press releases, as directed by the Chief Officer.

2.5 Utilities Officer

The Utilities Officer is responsible for the oversight and control of power, water, natural gas and oxygen. The senior plant engineer will act as the Utilities Officer. The Plant Electrician will assist the Utilities Officer. The duties of the Utilities Officer include:

- Arrange for emergency shutoff of utilities as necessary.

- Arrange for emergency water and electric power in areas that require it.

- Work with the Maintenance Officer in arranging for auxiliary equipment.

Additionally, the Utilities Officer will be responsible for advising other Contingency Plan Officers and outside assistance groups such as the Fire Department or law enforcement on special hazards associated with the emergency. These hazards may include toxicity and flammability of released products or byproducts likely to be formed in a reaction. The Utilities Officer will advise the Guard Officer to evacuate or block traffic into affected areas.

The Utilities Officer or his alternate will make an on-site inspection of the affected area to:

- Assess the situation and determine possible hazardous conditions.

- Evacuate affected areas where advisable (contact the Chief Officer first, if practical).

- Make notes of any complaints from neighbors.

2.6 Liaison Officer

The Liaison Officer will work with the Chief Officer in familiarizing all smelter personnel with Emergency Contingency Plan and ascertain that each person knows his duties and responsibilities. The Environmental Manager will act as the Liaison Officer. He will be assisted by the Environmental Superintendent. The following are some of the duties of the Liaison Officer:

- Maintain and control smelter and private transportation.

- Work with the Utilities Officer in obtaining emergency water and electric power.

- Prepare press releases and advise families, as required, in the absence of the Assistant Chief Officer.

Additionally, the Liaison Officer will notify the proper Louisiana Department of Environmental Quality administrative authority and other appropriate federal, state and local authorities that the facility is in compliance with all regulations before operations are resumed in the affected areas.

Immediately after an emergency has been brought under control, the Liaison Officer will provide for the treatment, storage and disposal of recovered waste, contaminated soil or surface water or any other material that results from a release, fire, or explosion at our facility. All materials will be managed in accordance with all applicable regulatory requirements.

2.7 Fire Officer

Fire Officer will be responsible for supervision of all fire fighting activities. The Project Engineer will act as the Fire Officer. The CX Production Manager will assist the Fire Officer. The Baton Rouge smelter does not have an onsite fire brigade. In the event of a fire the Fire Officer or his

designate will coordinate efforts of local and City of Baton Rouge Fire Departments.

In the event that the emergency is other than fire, the Fire Officer and his personnel will automatically come under direction of the Utilities Officer.

2.8 First Aid Officer

The First Aid Officer will direct first aid, as necessary, and request doctors and/or ambulances, as required. The Personnel Director will act as the First Aid Officer. She will be assisted by the Laboratory Supervisor. An ambulance will be called immediately if there is any probability of need. The First Aid Officer will be responsible for insuring that any injured person transported off-site has been properly decontaminated and is not wearing contaminated clothing. The First Aid Officer will notify the Assistant Chief Officer of the names of injured persons and the extent of injury to best of her ability.

First aid operations will be set up in the First Aid Room. If larger accommodations are necessary, the conference room will be used. Injured personnel will be taken to these areas. In event the First Aid Room cannot be used, an alternate First Aid Room will be set up near the gate. A minimal supply of first aid materials will be maintained in an Emergency Bag to be dispatched where needed. The First Aid Officer will notify all Contingency Plan Officers, through the Communications Center, of the change in normal location of the First Aid Room.

2.9 Maintenance Officer

The Maintenance Officer's primary responsibility is to perform emergency maintenance work necessary to prevent injury to personnel and minimize damage to property, product or materials. The Maintenance Supervisor will act as the Maintenance Officer. He will be assisted by the Maintenance Superintendent.

The Maintenance Officer will direct his personnel to assist the fire crew as directed by the Fire Officer; assist any rescue operations with heavy equipment as necessary; and assist in restoration of communications, utilities, and roadways.

2.10 Guard Officer

The Guard Officer is responsible for plant security, protection of plant property and traffic flow. The Guard Officer will prevent unauthorized persons from trespassing on Company property. He will also request assistance from The City of Baton Rouge Law Enforcement Agencies, if necessary.

Some of the duties of the Guard Officer will include:

- Direct evacuation of personnel.
- Restrict unauthorized Company personnel from the affected areas.
- Restrict unauthorized persons from Company property.

- Maintain a list of all plant personnel entering or leaving the smelter and their destination, including persons going to the hospital.

- Keep the smelter and adjacent thoroughfares clean of obstructions and unnecessary traffic.

- Direct the flow of traffic in smelter and direct incoming vehicles.

- Assist law enforcement personnel, as necessary.

The Guard Officer will place a guard at all gates of the smelter to restrict entry or open the gate either to admit authorized persons or for evacuation. The Purchasing Manager will act as the Guard Officer, he will be assisted by the contract Security Guard on duty at the time of the emergency.

2.11 Evacuation Wardens

The Wardens will be trained in the complete workplace layout and all of the escape routes and assembly areas, as shown on Figure 3. Sufficient Wardens will be available on each work shift. They will be aware of hazardous areas which should be avoided in an emergency, and will be familiar with any handicapped employees or any other employee problems which can hinder safe evacuation.

Before leaving the evacuation area, Wardens are to check enclosed spaces, restrooms, isolated rooms and similar area for employees who may be trapped or otherwise unable to escape. After the desired degree of evacuation is completed, Wardens are to proceed to the assembly areas and account for or otherwise verify that all employees have safely evacuated.

All shift leaders and area supervisors will be trained to act as Evacuation Wardens. The office receptionist will be responsible for head-count of all office personnel.

3.0 EMERGENCY RESPONSE

3.1 Order of Notification

If an emergency occurs during weekday hours, notification will follow the set up in the Organizational Chart (Table 1). During weekends, at night and holidays, the Shift Foreman and other supervision assigned are responsible for operation of the smelter. If an emergency occurs during off-hours, the Shift Foreman or supervisor will notify the Chief Officer and the Communication Officers. The Communication Officer will then proceed to contact all necessary personnel. Operating personnel on duty at the time of the emergency will be assigned duties by the foreman in charge until a supervisor arrives at smelter.

3.2 Plant Communications

During an emergency, the telephone system, intercoms, and portable 2-way radios carried by employees will be used for in-plant communication. Should these systems be inoperative, runners will be sent to the effected departments. The plant telephone system has a battery back up, in the event of a power failure. If the battery backup unit also fails, the telephone jack, located by the front door of the main office, must be used since it is not connected to the plant electricity. Additionally, a pay phone is located in the lunchroom that is not connected to plant electricity. Also in the event of a power failure, the plant intercom and paging systems will not be operable, portable radios and runners must be used.

3.2.1 Communications Center

In the event of an emergency, the Communications Center will be located in the Plant Manager's office. Communication is critical in an emergency situation. The Emergency Contingency Plan depends on expeditious mustering of all personnel involved as well as effective maintenance of communication systems during an emergency period. Portable radios shall be used for field communications between the Contingency Plan Officers and the affected area.

In the event it should become necessary to move the communications center, an alternate location such as the Change House or the Employee Parking Lot will be used.

3.2.2 Communications Failure

If plant communications are disabled during the emergency, the Contingency Plan Officers will use portable radios to conduct in-plant communications. Messengers will be assigned to the Communications Officer for use as the situation warrants. In the event of a communications failure, the messengers may be sent off-site to contact help in reestablishing communications. If more messengers are needed, the Communications Officer will recruit messengers from personnel at the assembly points.

3.2.3 Emergency Telephone Numbers

A current up-to-date listing of employee emergency notification telephone numbers and emergency services telephone numbers will be maintained at the Plant Managers office, in the Shift Foreman's

office, in the CX Control Room and at the Scale House. Table 1 of this plan presents a copy of the Employee Emergency Notification Telephone list. Table 2 of this plan presents a copy of the Emergency Services Telephone List.

3.3 Evacuation and Assembly Areas

3.3.1 Evacuation

Evacuation of personnel from the plant is on order of the Chief Officer (or his designee) or, otherwise, when conditions obviously warrant. A windsock is useful in determining the direction of air movement in order to walk-out and evacuate "cross-wind," rather than into or down wind from escaped toxic gases. Figure 3 shows plant evacuation routes. The evacuation procedures are as follows:

1) WALK-OUT:

All persons will exit through the main plant entrance and then assemble in the designated assembly area as shown on Figure 3. Department Managers and Shift Supervisors will account for their people and report to the Assistant Chief Officer when all are present or accounted for. If there is a hazard or danger area enroute to the main entrance, employees will evacuate to the rear of the plant and assemble at the alternate assembly area, east the Battery Breaker unit, shown on Figure 3.

2) MOTOR CONVOY:

Personal vehicles. Employees evacuating by personal vehicle should use the same vehicle used to travel to and from work that day. Individual cars and car poolers will proceed to the prearranged destination (Sportsman Texaco, across from Brooklawn Driver), upon order of the Guard Officer. Dismissal will be ordered by the Guard Officer from the prearranged destination.

Company vehicles. Assigned drivers, as appointed by the Guard Officer, will assist loading of selected administrative records and special gear. When ordered by the Guard Officer, drivers of company vehicles will proceed to Sportsman Texaco, the prearranged evacuation destination with ample parking space. Dismissal will be only on order of the Guard Officer after appropriate storage arrangements have been made for plant records and special equipment.

3.3.2 Medical Evacuation

If a person is injured and requires treatment off-site, the First Aid Officer will request medical transportation, either in the form of an ambulance in emergency situations or by employee transportation. Any person requiring evacuation for medical treatment will first be decontaminated. This includes removing any contaminated clothing and showering or washing the individual. The only exceptions will be in critical or life-threatening situations. In the event that an air evacuation is necessary, a helicopter-landing site will be designated.

3.3.3 Assembly Areas

The Main Office Building will serve as the general headquarters during an emergency. In the event of an emergency, all Contingency Plan Officers will report to headquarters. If there is a delay in reporting, the officer will send a representative to headquarters and advise the Communications Center of their whereabouts. Employees have been assigned specific duties under this plan. These personnel will be notified of their specific duties by the Contingency Plan Officer responsible and will immediately assume these duties in the event of an emergency.

During an evacuation, all employees that are not performing Contingency Plan functions will report to the designated assembly area, located outside the main plant gate, next to the Guard Shack. An alternate assembly area east the Battery Breaker unit has been designated to be used if an emergency occurs near the front portion of the smelter, blocking access to the above assembly points. These assembly areas are shown on Figure 3.

Department Managers and Shift Supervisors will immediately account for all personnel under their direct supervision. Each supervisor will appoint an alternate to make the head count in case of his absence or if he is busy with other duties. A head count report will be made to the Assistant Chief Officer.

3.4 Rescue

The majority of personnel at the Baton Rouge smelter do not have formal training in rescue operations. Therefore, rescue operations will be performed by professional fire and rescue units from the city or parish, (see Table 2 for Emergency Telephone Numbers). If necessary, smelter personnel will assist rescue crews.

3.5 Emergency Equipment

The Safety Officer maintains a list of all emergency equipment at this facility. A copy of this list is included as Appendix B. A 3M SCBA respirator with a 30-minute air tank is located in the Safety Office. Two Scott air-line respirators are located in the Change House. Absorbent material and DOT approved drums for spill control are located in the maintenance shop. Spills will be handled following the procedures specified in Exide's Spill Prevention Control and Countermeasure (SPCC) Plan.

Personal protective equipment, including respirators (equipped with combination HEPA particulate, organic vapor and acid gas filters), ear plugs, steel-toed boots, goggles, face shields, chemical resistant gloves and suits, are kept in the changehouse. An emergency locker, stocked with extra safety supplies is located in the maintenance shop. Exide maintains a stock of fall protection harnesses and lanyards in the safety office. Two air blowers that can be used to ventilate confined spaces are located in the maintenance shop. Fire protection equipment is kept in convenient locations around the smelter. A class D fire extinguisher is kept at the phosphorus building and at the chemical warehouse. All control rooms are equipped with CO_2 fire extinguishers. The No. 1 baghouse and No. 4 baghouse each have a sprinkler system.

3.6 Control of Access to Damaged Areas

A special guard crew under the supervision of the Guard Officer will guard all disaster areas to minimize access. If access to a damaged or shut-down area needs to be controlled, the Chief Officer will direct the Guard Officer to barricade the affected areas. Barricades will not be removed until the affected area is been deemed safe and has been decontaminated.

3.7 Public Relations

Prompt, intelligent handling of the press is always important for good public relations. This is particularly so in an emergency situation. The following outlines procedures to be followed in handling such matters. The Chief Officer and the Corporate Communications Officer, Mr. Tim Yost will handle press inquiries. Furnish a simple, clear, and accurate story of the occurrences as soon as it can be determined. Statement should include such facts as:

1. A summary of the incident, giving a description of situation.

2. Indicate the part of smelter or process involved.

3. Estimated degree of damage if extensive.

4. Indicate precautions taken. Stress the previous good experience of the company and how damage was minimized or is being prevented from spreading as result of company's safety program and emergency control procedures.

5. Outline how all of the company personnel are cooperating with fire department, police or other municipal authorities and services that may be involved.

6. Furnish simple background information on the plant's operations and history.

Do not give an indication or opinion as to the cause of the incident since insurance and personal liability aspects may be involved. If asked, a simple statement should be made that "the cause of the incident has not yet been determined, but is already under investigation."

3.8 Decontamination

After the area affected by the emergency situation has been deemed to be safe, decontamination of the area will proceed. Decontamination will include containing any spilled waste material, segregating waste materials for disposal, either by recycling in one of the plant furnaces, in the plant wastewater treatment system or by offsite disposal. The affected area will washed down using a high-pressure washer or wash down hose. Wash down water will be treated at the water treatment unit.

4.0 TYPES OF EMERGENCY SITUATIONS

4.1 Natural Disasters

Natural disasters such as tornadoes and hail can affect the facility operations with little or no warning. With other natural disasters such as hurricanes and flooding there is usually some time prior to the event for planning. Exide maintains a state of constant readiness in the event of any severe weather. With the onset of possible severe weather, a current list of personnel onsite will be obtained from the supervisors and kept available if needed. The decision to shut-down the plant will be made by the Chief Officer. Evacuation orders may be given or the employees may be forced to take shelter at the smelter. Evacuations will follow the procedures listed in Section 3.3.

4.1.1 Hurricanes

Exide has a detailed hurricane preparedness program. The Baton Rouge smelter will track any hurricane or tropical storm that is present in the Gulf of Mexico. As a storm system approaches the Louisiana coastline, a phased shutdown will be initiated based on the probability of hurricane impact. Moveable objects will be secured, non-essential personnel will be dismissed and production areas will be idled. After the storm has passed, the idled facility will be brought online, any necessary storm repairs will be made and normal operations resume.

4.1.2 Tornadoes

In case of a tornado, office personnel will take shelter under their desk. Employees outside of the office building/changehouse will shelter in the nearest bathroom or concrete block building. If it is impossible to reach shelter, employees should lay flat in a ditch.

4.2 Chemical Emergencies

Toxic materials likely to be released, protective measures, and decontamination procedures are listed in this section. Exide maintains three sets of up to date Material Safety Data Sheet binders that contain MSDS for all chemicals used or stored at the smelter. One set of binders is located in the Safety Office, one in the lab and one in the Guard House. Areas affected, or likely to be affected, in and out of the smelter, must be evacuated and blockaded immediately should an accidental release occur. Steps to decontaminate any affected areas will begin as soon as it is safe to proceed.

4.2.1 Acid

Acids, particularly sulfuric acid, could be accidentally released in large quantities. Such releases would affect only the immediate area and the hazard would be confined to contact of persons with liquid. The release of acid will be controlled by neutralization with sodium hydroxide, or an application of a large volume of water to dilute the material. The fluids generated by response to an acid release will be treated at the smelter's wastewater treatment plant. Personnel responding to an acid release must wear protective equipment including rubber boots or overshoes, rain suits, face shield or, in extreme circumstances, coverall rubber suits.

4.2.2 Hazardous Material Releases

In the event of a sudden or non-sudden release of hazardous waste or hazardous waste constituents to the air, soil or surface water, the Chief Officer will identify the exact source, amount and areal extent of the release to the best extent possible. The release must be stopped immediately. Once the release has been stopped, the area in the vicinity of the release will be evaluated. Decontamination will begin once the area is deemed to be safe for activity. The Liaison Office will insure that the proper regulatory authorities have been notified about the type and quantities of the release. The Baton Rouge Smelter maintains a SPCC Plan that describes in detail the spill protection, cleanup and reporting measures to be followed.

4.3 Fire

In the event of a fire, it is important to respond quickly and confine the fire to manageable limits before it progresses beyond control. Danger from debris, explosion, or building and equipment collapse can be adequately coped with by restricting employees from these areas. The Fire Officer will work with the Utilities Officer to see that plant utilities such as electricity, natural gas, and oxygen, are shut off as required. All employees have had training in incipient fire control. However, if the fire progress to an uncontrolled stage, the local and regional fire departments will be called to respond.

Fire extinguishers are located though out the plant, as shown on Figure 3. All fire extinguishers are inspected and serviced monthly by the Louisiana Fire Extinguisher located in Baton Rouge, LA. Each control room is equipped with a CO_2 fire extinguisher, which should be used in the event of an electrical fire.

It is extremely important to identify the source of the fire. Flammable chemicals are used in most areas of the smelter. Many of the refining chemicals such as red phosphorus and metallic calcium are extremely flammable and fires involving such chemicals cannot be extinguished with water. Exide has Class D fire extinguishers at the phosphorus building and the chemical warehouse. A 55-gallon drum of sand is located at the phosphorus building, it should be used to smother a fire in that area. Additionally, a large sand pile is located next to the chemical warehouse. If a chemical fire begins at the warehouse, a scoop or front end loader should use the sand to smother the fire before it spreads.

The two process baghouses (No. 1 and No. 4) each have a sprinkler system, designed to stop any fires that may occur at the baghouse. The systems are inspected on a weekly basis.

After a fire has been extinguished, the area must be monitored to make sure that the fire does not reignite. All fire equipment will be restored after use to a ready condition. Used fire extinguishers will be held in the maintenance shop until they are replaced. No used fire extinguishers will be returned to the plant for use.

4.3.1 Flammable Gases

Flammable gases, including acetylene, propane and natural gas, could be released in quantities sufficient to create a serious hazard in the plant area adjacent to the release. The primary hazards

represented here is the danger of fire and explosion. In the event of a fire, emergency measures will be directed toward controlling the release, eliminating the ignition sources and evacuation of contaminated areas. Adjacent areas will be evacuated to prevent injury should released material ignite. Fires fed by released material should be extinguished by cutting off the source of the fuel.

4.3.2 Fire Prevention

The Baton Rouge smelter maintains a housekeeping program to minimize the accumulation of combustible, flammable and hazardous materials and residues, in order that they do not contribute to a fire. Smelter personnel are trained in the hazardous and flammable properties of the materials that are used in the processes and handle flammable chemicals with extreme caution. Access to flammable chemicals is strictly controlled.

4.4 Explosion

Explosions caused by mixing non-compatible chemicals, improper handling of explosive material or pressure buildup, can occur in several areas of the smelter. In order to prevent explosions, proper work practices and procedures must be followed by all Exide employees.

The Utilities Officers will immediately start an investigation of the cause of an explosion. Steps will be taken to prevent occurrences in any other similar vessel or piece of equipment. Any damaged lines or equipment will immediately be shut off or isolated. Affected valves and switches will be tagged out immediately.

4.5 Bomb Threat Procedure

The person who receives a bomb threat call should get all details possible from the caller and record every word spoken by the person making the call. He will then notify the Chief Officer or the next person in order of notification as listed in this plan.

The Chief Officer will immediately call **the State Police HAZMAT Unit, 925-6595,** who will respond. The Chief Officer will make a determination of which areas should be evacuated. The evacuation procedures described in Section 3.2 will be followed. The Plant gates will be closed and traffic controlled. Production units affected will be shut down as specified in the Section 5.0 and all flammable materials including natural gas will be cut off to these units.

Should a suspected bomb be discovered, DO NOT TOUCH THE BOMB OR DISTURB IT IN ANY MANNER. Notify the State Police HAZMAT Unit immediately.

5.0 PLANT OR UNIT SHUTDOWN

5.1 General

The Chief Officer or his delegate will decide whether or not a shutdown is required in any or all units. Set forth hereinafter is an outline of minimum steps required for an emergency shutdown. Detailed shutdown procedures are available in operating manuals in each control room, and in the Startup, Shutdown and Malfunction Plan.

5.2 Blast Furnaces

1. Tap the remaining lead and slag,
2. Shut off the oxygen supply,
3. Pull down the air relief valve,
4. Shut down the roots blower,
5. Lower the crucible,
6. Clean shaft.

5.3 Reverberatory Furnace

1. Tap the remaining lead and slag,
2. Empty the feed belt, hopper, and dryer,
3. Switch the flue dust return,
4. Empty and shutdown the feed ram,
5. Shut down the burners,
6. Shut down the blowers for the burners.

5.4 Baghouses

When possible, it is important to delay shut down of the baghouse, since they provide a source of hygiene air aiding in protection to work force and community. If baghouse shutdown is necessary follow the procedures in the Start-up, Shutdown and Malfunction Plan:

1. Close the dampers and shut down baghouse fan,
2. Shut down the cleaning cycle and screw conveyors.

5.5 Natural Gas

The main gas shut-off valve location for the smelter is at the metering station located by the main entrance gate next to NPC's road. The Utilities Officer will be responsible for determining if natural gas needs to be shut off to a specific area of the smelter.

5.6 Electrical Power Supply

The Utilities Officers will work with the Utilities Company to restore power in the event that electricity goes down. The Maintenance Officer will arrange for motor-generator units to be placed in the most important area, if it is likely that power outage will be for considerable time. Dry cell lanterns are available from the Guard Officer to supplement the flashlights assigned to individuals.

If electricity needs to be shut off or isolated from a certain portion of the smelter, the Utilities Officer will lockout and tagout the necessary circuits. Power will not be restored until the affected unit or area is cleared.

5.7 Water Supply

If an emergency situation arises that requires shutting off the plant water, the water supply main valve is located beneath the water tower. The Utilities Officer or his designate will be responsible for shutting off water during the emergency and then restoring the water once the all clear has been given.

5.8 Mobil Equipment

During an emergency all mobile equipment will be removed from the danger area to a designated location. Keys will be located at maintenance shop during normal hours and at the guard station during off hours, holidays, and weekends.

6.0 ALARM SYSTEM

In the event of an emergency, the telephone pager system is to be used to alert employees to the emergency and to give instructions on what action is to be taken. The plant siren will also be used to alert employees to the emergency. Each employee should respond to instructions being given by the telephone page system. If the page system is inoperative or no instructions are given, employees are to check with their immediate supervisor for further instructions.

Siren Alarm System

BLAST	FREQUENCY	DESCRIPTION
1 LONG	CONTINUOUS	Low water alarm. Signal to supervision to check and take necessary corrective action to bring the water level in the water tower back up to operating levels.
1 SHORT	SCHEDULED BY TIMER	Notification to employees of work and break schedule.
2 SHORT	INTERMITTENT	**Emergency in office or changehouse areas.**
3 SHORT	INTERMITTENT	**Emergency in the Shop, Lunchroom, Lab or Yard areas.**
4 SHORT	INTERMITTENT	**Emergency at the Production, Baghouse or Warehouse areas.**
5 SHORT	INTERMITTENT	**Emergency at the Battery Breaker, Dust Reverb or Water Treatment areas.**
SHORT, LONG, SHORT, LONG	INTERMITTENT	Alarm signal to an emergency involving the **total plant** and calls for immediate evacuation of the plant. Employees are to follow supervisory instructions or report to front parking lot if no other instructions are given. The short/long blast are to be repeated several times to give notice to all employees.

TABLES

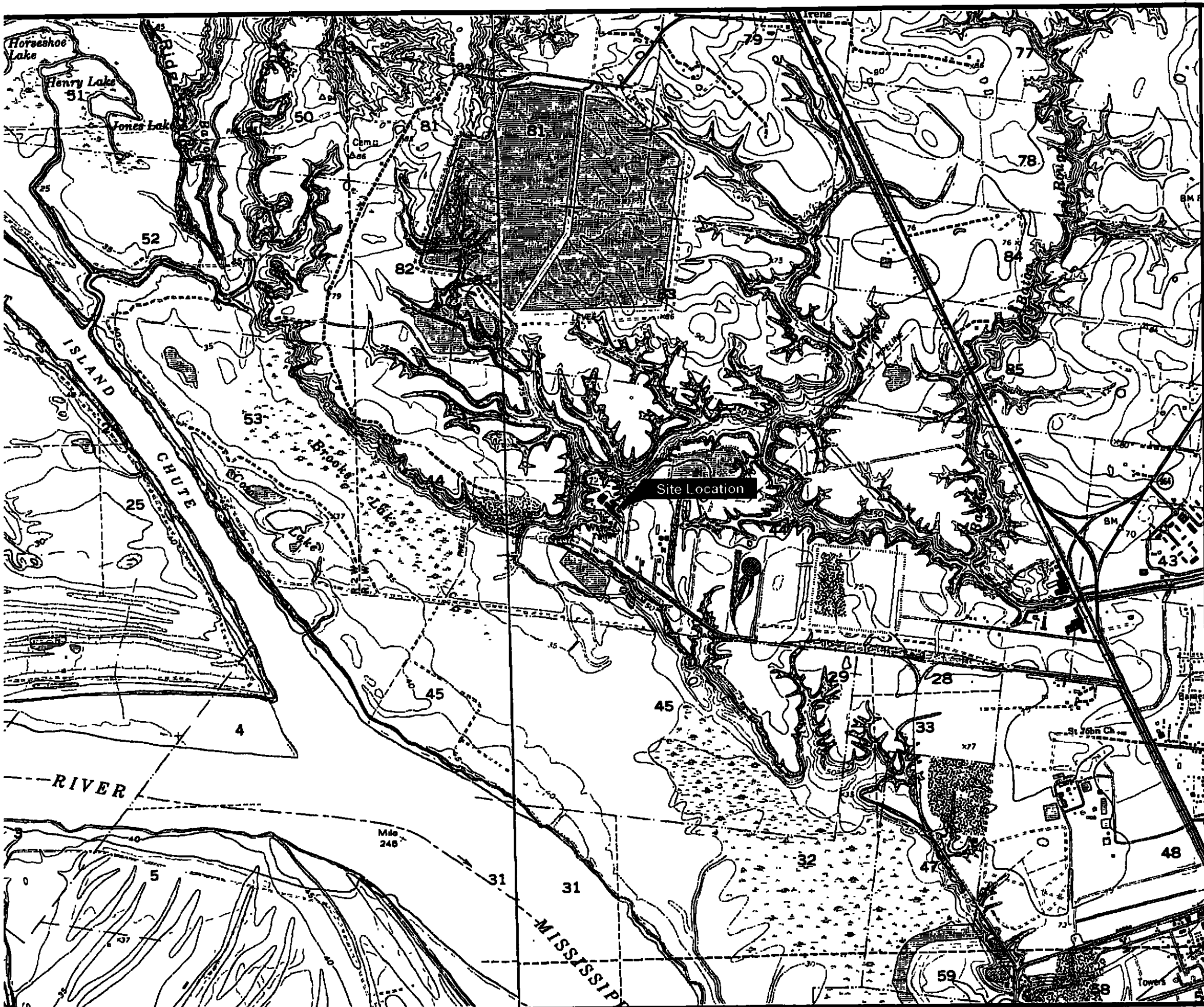
TABLE 1
EMPLOYEE EMERGENCY NOTIFICATION TELEPHONE LIST

NAME	POSITION	Phone #	Pager/Cell #
Joe Acker	**Plant Manager**	**673-6187**	**405-8190=Cell**
Dalton Mann	Plant Superintendent	261-2033	405-8191=Cell
Patrick Ellington	Safety Manger	448-7192	308-7192=Cell
Mohammad Hashmi	Controller	775-3040	772-3245= Cell
Pat Roy	Plant Engineer	638-6049	721-1402=Cell
Steve Krul	Environmental Manager	756-5866	935-8126=Pager
Michael Ashford	Project Engineer	344-6857	405-8193=Cell
Leroy Dupuy	Maintenance Supervisor	261-3484	405-8194=Cell
Jo Wood	Personnel Director	664-3117	
Dale Bonaventure	Purchasing Manager	654-8538	935-8114=Pager
Jerry Williams	Production Manager	774-6951	935-8116=Pager
Craig Simpson	CX Production Manager	756-0921	405-8192=Cell
Johnnie L. Turner	Plant Electrician	778-1097	935-8135=Pager
Larry Myers	Environmental Supervisor	275-7269	935-8139=Pager
Noel Barnes	Production Shift Supervisor	635-9103	
Ronnie Williams	Production Shift Supervisor	658-7777	
Ronnie Fisher	Production Shift Supervisor	(601) 888-7160	
Adam Brown	Production Shift Supervisor	295-0215	
Robert Delmore	CX Supervisor	927-1842	
Ron Fitzgerald	CX Supervisor	275-8621	
K.C. Lashley	Lab Supervisor	924-6288	252-0551=Cell

TABLE 2
EMERGENCY SERVICES TELEPHONE LIST

CRITICAL	***911***
MEDICAL	
Richard Hill, M.D. (Hill Medical Associates)	275-7770
Lane Memorial Hospital 6300 Main St. Zachery	658-4000
Baton Rouge General Hospital 3600 Florida Blvd.	387-7000
Baton Rouge General Hospital 8585 Picardy Ave.	763-4000
Acadian Ambulance Service (Non Critical Injuries)	267-1111
FIRE DEPARTMENTS	
Alsen Fire Department	774-3473
Brownsfield Fire Department	778-0344
Baker Fire Department	775-3712
Baton Rouge Fire Department (Dispatch Center)	389-4617
LAW ENFORCEMENT	
East Baton Rouge Sheriff's Office	389-5000
Scotlandville Sheriff's Office	389-5105
State Police Troop A	754-8500
HAZMAT UNIT	**925-6595**
OXYGEN SERVICE	
BOC (Errol Tisdale)	775-8075
Beeper	1-888789-7498
ELECTRICAL:	
A. ENTERGY: (Primary Service)	1-800-766-1648
Wayne Criswell - Service Rep. Beeper	1-800-264-2535 = 8356
Home	1 (504) 549-6905
B. HINCKLE & McCOY (Secondary Service)	654-2689 Home
Ronald Hopkins – Service Rep.	921-4896 Mobile
C. Red Simpson (Secondary Service)	504-733-2021
Randy Henry – Service Rep.	318-487-1074
NATURAL GAS	
Cypruss Gas	1-800-600-6240
MISCELLANEOUS	
Kansas City Southern Railroad	379-4241
Custom Security (Baker Warehouse)	927-5535
CHEMTREC (Over-the-Road Chemical Spills)	1-800-523-8954

FIGURES



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Reference

Base map comprised of U.S.G.S. 7.5 minute topographic maps, "Walls, LA." dated 1963, revised 1994 and "Scotlandville, LA." dated 1963, revised 1994. Image is referenced to UTM Nad 27 Zone 15.

EXIDE

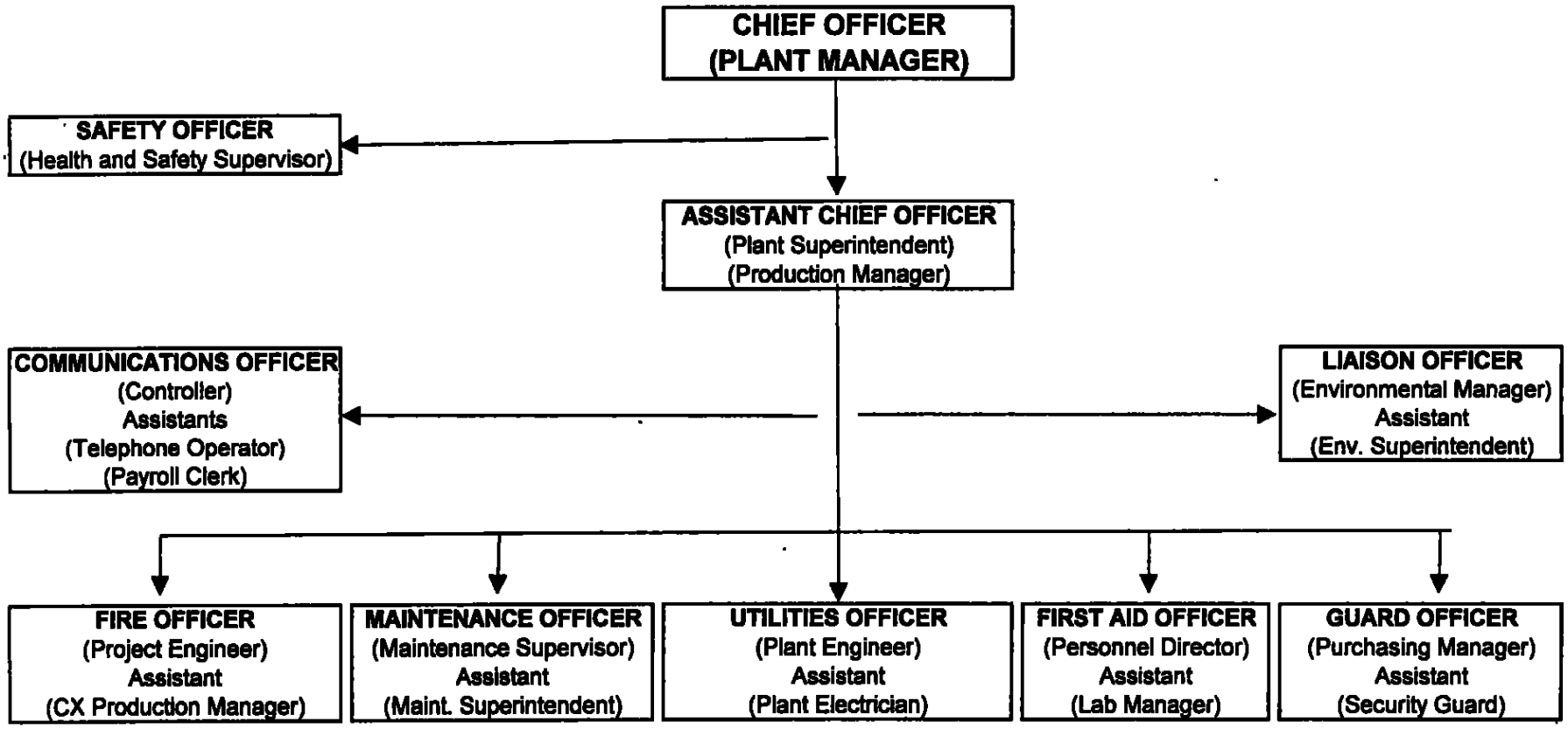
Baton Rouge Smelter
Baton Rouge, Louisiana

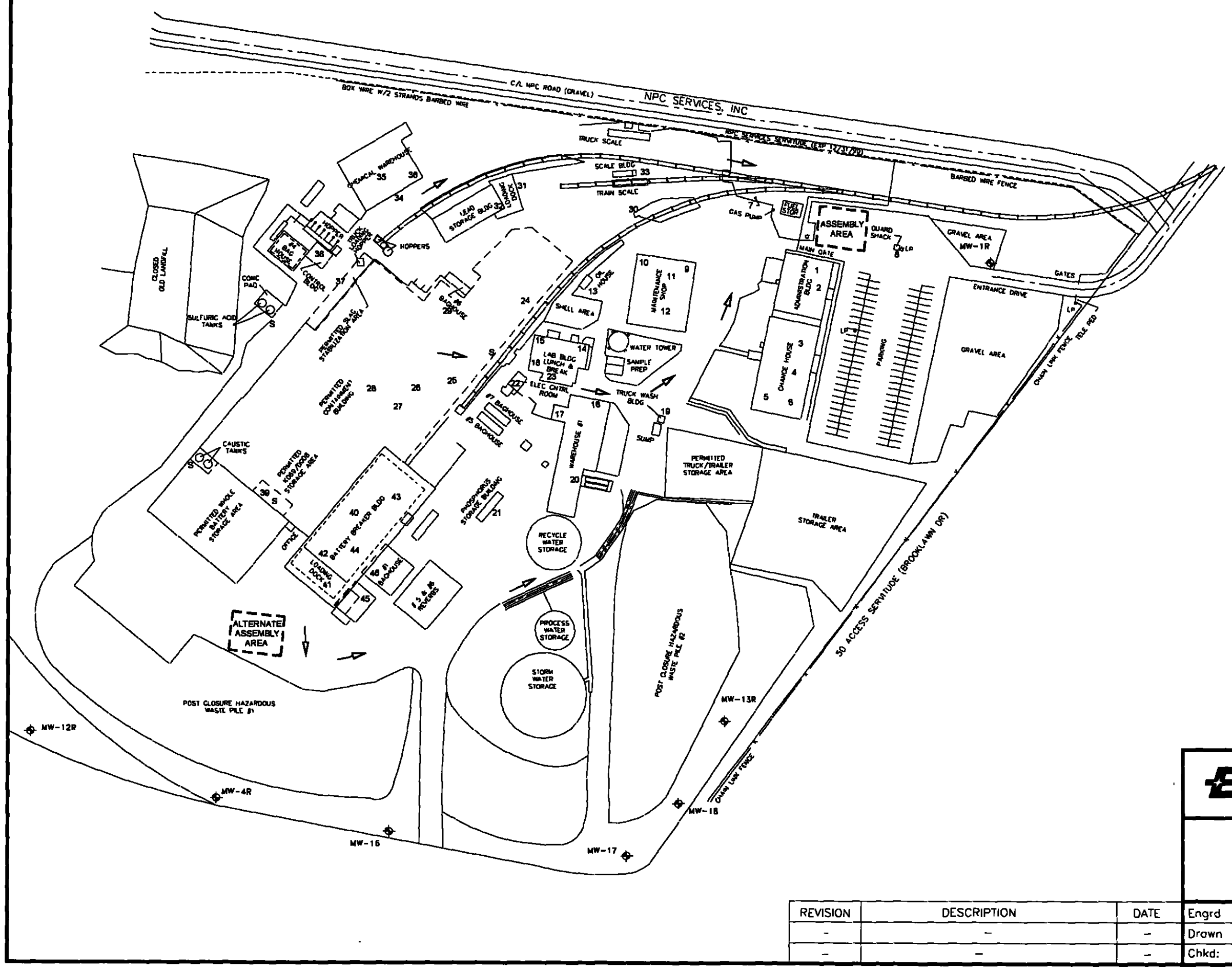
Site Location Map

Engrd	TAB	Appd	TAB	Date	09/21/01	Scale	1" = 2000'
Drawn	LMH	Dwg No	028-001-B013				1 Figure
Chkd	TAB						

FIGURE 2

EMERGENCY RESPONSE ORGANIZATIONAL CHART





Fire Extinguisher

No.	Location
1	Office Hallway
2	Office Kitchen
3,4	Changehouse Hall
5,6	Changehouse Shower
7	Fuel Station
8	Guard House
9	Spare Extinguishers - in the Shop Tool Room
10,11	Shop - Fabrication Area
12	Shop - Vehicle Repair Area
13	Oil House
14	Lab
15	Lab AA Room
16	Electrical Warehouse
17	Compressor Room
18	Lunchroom
19	Wash Rack
20	Water Treatment Unit
21	Phosphorus Storage Room
22	No 5 Baghouse Control Room
23	Outside Lunchroom
24	Kettle Floor - Kettle 11
25	No. 1 Blast Furnace
26	No 1 Blast Furnace
27,28	Upstairs - Control Rooms
29	No 1 Casting Machine
30	Mobile Equipment Storage
31	Lead Loading Dock
32	Lead Storage Warehouse
33	Rail Car Scale
34	Chemical Warehouse
35,36	Chemical Warehouse
37	Slag Crusher
38	No 4 Baghouse Control Room
39	K069 Storage Area
40	CX Electrical Control Room
41	CX Flammable Storage Area
42	CX Control Room
43	CX Boiler Room
44	CX Office
45	No 1 Baghouse Control Room
46	No. 1 Baghouse

Legend

- Groundwater Monitor Wells
- S — Safety Shower
- 37 — Fire Extinguisher (See Chart for Type an
- Evacuation Routes

Reference:

Base map comprised from drawing provided by Exide titled "Groundwater Report" dated 02/01/99.

EXIDE

Baton Rou
Smelter
Baton Rouge, L

Emergency Contingency Pla

REVISION	DESCRIPTION	DATE
-	-	-
-	-	-

Engrd	TAB	Appd:	TAB	Date 06/27/01	Scale:
Drawn	LMH	DWG NO	028-001-B008		
Chkd:	TAB				

APPENDIX A

TIER TWO REPORT

Appendix A

TIER II Facility Report

LOUISIANA CHEMICAL NETWORK

Home | Facility Information | Help

Click your browser's "Print" icon to print this page.

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* * * Mon Feb 19 06:34:37 CST 2001 * * *

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* * * Facility Identification * * *

Facility Name	EXIDE CORP-SCHUYLKILL METALS D
Facility ID	365
Facility Type	Fixed
Physical Address	2400 BROOKLAWN DRIVE BATON ROUGE LA, 70807-2400 EAST BATON ROUGE PARISH
Mailing Address	PO BOX 14205 READING PA, 19612-4205
Reporting Period	January 1 to December 31, 2000
Status	Active
SIC Code	3341
Dun & Bradstreet #	942384520

* * * Owner Information * * *

Company Name	EXIDE CORP.
Mailing Address	PO BOX 14205 READING PA, 19612-4205
Phone	601-378-0500
Fax	601-371-0463
Email	

* * * Emergency Contact * * *

Name	STEPHEN A GRAU
Title	PLANT MANAGER
Phone	225-775-3040 Ext. 127
24Hr Phone	225-775-3040
Pager	225-935-8117
Fax	225-775-3057
Cell Phone	
Email	

* * * Emergency Contact * * *

Name	STEVEN A KRUL
Title	ENVIRONMENTAL MANAGER
Phone	225-775-3040 Ext. 142
24Hr Phone	225-775-3040
Pager	225-935-8126
Fax	225-775-3057
Cell Phone	
Email	

* * * Filing Information * * *

Ready for filing Yes

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* * * Pure Chemical Description * * *

CAS #	74862
Proper Name	ACETYLENE
Chemical State	Liquid
EHS ?	No
Last Reviewed Date	02/18/2001

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* * * Hazards * * *

Physical	Fire Sudden Release of Pressure
Health	Immediate (Acute)
Reportable Quantity	100 Lbs.

---

* * * Inventory * * *

Max Daily Amount	9999
Avg Daily Amount	9999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Cylinder
Pressure	Greater than ambient
Temperature	Ambient
Location	MAINTENANCE SHOP
Confidential Location	No

Container Type(s)	Cylinder
Pressure	Greater than ambient
Temperature	Ambient
Location	UBIQUITOUS-PORTABLE UNITS
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	7429905
Proper Name	ALUMINUM METAL
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	-Not Provided-
Health	Immediate (Acute) Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	9999
Avg Daily Amount	999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Box
Pressure	Ambient

Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	7440360
Proper Name	ANTIMONY METAL
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	-Not Provided-
Health	Immediate (Acute) Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	999999
Avg Daily Amount	999999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Box
Pressure	Ambient
Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	7440382
Proper Name	ARSENIC METAL
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Reactivity
Health	Immediate (Acute) Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	999999
Avg Daily Amount	99999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Steel Drum
Pressure	Ambient
Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	1327533
Proper Name	ARSENIC TRIOXIDE
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	-Not Provided-
Health	Immediate (Acute) Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	99999
Avg Daily Amount	99999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Steel Drum
Pressure	Ambient
Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential Location	No

---

* * * Chemical Mixture Description * * *

Trade Name	BATTERIES
Common Name	BATTERIES, LEAD ACID
Chemical State	Solid
Last Reviewed Date	02/18/2001

---

* * * EPA Information * * *

Trade Secret & Approved by EPA?	No

---

* * * Mixture Components * * *

Proper Chemical	LEAD		
CAS#	7439921	53%	
Proper Chemical	ELECTROLYTE (SULFURIC ACID AND WATER)		
CAS#	7664939	40%	EHS
Proper Chemical	POLY PROPYLENE		
CAS#	9003070	6%	

---

* * * Hazards * * *

Physical	Fire Reactivity
Health	Immediate (Acute) Delayed (Chronic)
Reportable Quantity	1000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	9999999

Avg Daily Amount 9999999
Days On Site 365

---

* * * Storage Types and Storage Locations * * *

Container Type(s) Other
Pressure Ambient
Temperature Ambient
Location TRUCK/TRAILER STORAGE AREA
Confidential No
Location

Container Type(s) Other
Pressure Ambient
Temperature Ambient
Location WHOLE BATTERY STORAGE AREA
Confidential No
Location

Container Type(s) Other
Pressure Ambient
Temperature Ambient
Location CX BATTERY BREAKER BUILDING
Confidential No
Location

---

* * * Chemical Mixture Description * * *

Trade Name BATTERY FLUID
Common Name ELECTROLYTE
Chemical State Liquid
Last Reviewed Date 02/18/2001

---

* * * EPA Information * * *

Trade Secret & Approved by EPA? No

---

* * * Mixture Components * * *

Proper Chemical SULFURIC ACID
CAS# 7664939 25% EHS

Proper Chemical WATER
CAS# 7732185 85%

---

* * * Hazards * * *

Physical Reactivity
Health Immediate (Acute)
Delayed (Chronic)
Reportable Quantity 1000 Lbs.

---

* * * Inventory * * *

Max Daily Amount 999999
Avg Daily Amount 99999
Days On Site 365

---

* * * Storage Types and Storage Locations * * *

Container Type(s) Tank Inside Building
Pressure Ambient
Temperature Ambient
Location TANKS-CX BATTERY BREAKER BUILDING

Confidential Location: No

Container Type(s): Above Ground tank
Pressure: Ambient
Temperature: Ambient
Location: SULFURIC ACID STORAGE TANKS
Confidential Location: No

---

* * * Pure Chemical Description * * *

CAS #: 10043524
Proper Name: CALCIUM CHLORIDE
Chemical State: Solid
EHS ?: No
Last Reviewed Date: 02/18/2001

---

* * * Hazards * * *

Physical: -Not Provided-
Health: Delayed (Chronic)
Reportable Quantity: 5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount: 9999
Avg Daily Amount: 9999
Days On Site: 365

---

* * * Storage Types and Storage Locations * * *

Container Type(s): Bag
Pressure: Ambient
Temperature: Ambient
Location: CHEMICAL WAREHOUSE
Confidential Location: No

---

* * * Pure Chemical Description * * *

CAS #: 1305620
Proper Name: CALCIUM HYDROXIDE (LIME)
Chemical State: Solid
EHS ?: No
Last Reviewed Date: 02/18/2001

---

* * * Hazards * * *

Physical: Reactivity
Health: Immediate (Acute)
Delayed (Chronic)
Reportable Quantity: 5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount: 99999
Avg Daily Amount: 9999
Days On Site: 365

---

* * * Storage Types and Storage Locations * * *

Container Type(s): Tank Inside Building
Pressure: Ambient

Temperature	Ambient
Location	WATER TREATMENT UNIT
Confidential Location	No

Container Type(s)	Bag
Pressure	Ambient
Temperature	Ambient
Location	WATER TREATMENT UNIT
Confidential Location	No

Container Type(s)	Bag
Pressure	Ambient
Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential Location	No

Container Type(s)	Bag
Pressure	Ambient
Temperature	Ambient
Location	CX BATTERY BREAKER
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	7440702
Proper Name	CALCIUM METAL
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Fire
	Reactivity
Health	Immediate (Acute)
	Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	99999
Avg Daily Amount	9999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Steel Drum
Pressure	Ambient
Temperature	Ambient
Location	CONTAINMENT BUILDING
Confidential Location	No

Container Type(s)	Steel Drum
Pressure	Ambient
Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	65996772
Proper Name	COKE, METALLURGICAL
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	-Not Provided-
Health	Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	9999
Avg Daily Amount	9999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Other
Pressure	Ambient
Temperature	Ambient
Location	COKE HOPPER
Confidential Location	No

Container Type(s)	Other
Pressure	Ambient
Temperature	Ambient
Location	BINS IN CONTAINMENT BUILDING
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	7440371
Proper Name	COMPRESSED ARGON
Chemical State	Gas
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Sudden Release of Pressure
Health	Immediate (Acute)
Reportable Quantity	100 Lbs.

---

* * * Inventory * * *

Max Daily Amount	999
Avg Daily Amount	999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Cylinder
Pressure	Greater than ambient
Temperature	Ambient
Location	LABORATORY
Confidential Location	No

Container Type(s)	Cylinder
Pressure	Greater than ambient
Temperature	Ambient
Location	MAINTENANCE SHOP
Confidential Location	No

* * * Pure Chemical Description * * *

CAS #	7727379
Proper Name	COMPRESSED NITROGEN
Chemical State	Gas
EHS ?	No
Last Reviewed Date	02/18/2001

* * * Hazards * * *

Physical	Sudden Release of Pressure
Health	Immediate (Acute)
Reportable Quantity	100 Lbs.

* * * Inventory * * *

Max Daily Amount	9999
Avg Daily Amount	999
Days On Site	365

* * * Storage Types and Storage Locations * * *

Container Type(s)	Cylinder
Pressure	Greater than ambient
Temperature	Ambient
Location	MAINTENANCE SHOP
Confidential Location	No

* * * Chemical Mixture Description * * *

Trade Name	DIESEL FUEL #2
Common Name	DIESEL FUEL
Chemical State	Liquid
Last Reviewed Date	02/18/2001

* * * EPA Information * * *

Trade Secret & Approved by EPA?	No

* * * Mixture Components * * *

Proper Chemical	CUMENE	
CAS#	98828	3%
Proper Chemical	BENZENE	
CAS#	71432	3%

* * * Hazards * * *

Physical	Fire
Health	Immediate (Acute) Delayed (Chronic)
Reportable Quantity	100 Lbs.

* * * Inventory * * *
Max Daily Amount 99999
Avg Daily Amount 9999
Days On Site 365

---

* * * Storage Types and Storage Locations * * *

Container Type(s) Above Ground tank
Pressure Ambient
Temperature Ambient
Location TANK EAST OF OFFICE BUILDING
Confidential No
Location

---

* * * Pure Chemical Description * * *

CAS # 107211
Proper Name ETHYLENE GLYCOL (ANTI-FREEZE)
Chemical State Liquid
EHS ? No
Last Reviewed Date 02/18/2001

---

* * * Hazards * * *
Physical -Not Provided-
Health Immediate (Acute)
Delayed (Chronic)
Reportable Quantity 500 Lbs.

---

* * * Inventory * * *
Max Daily Amount 999
Avg Daily Amount 99
Days On Site 365

---

* * * Storage Types and Storage Locations * * *

Container Type(s) Steel Drum
Pressure Ambient
Temperature Ambient
Location OIL HOUSE
Confidential No
Location

---

* * * Pure Chemical Description * * *

CAS # 10028225
Proper Name FERRIC SULFATE
Chemical State Liquid
EHS ? No
Last Reviewed Date 02/18/2001

---

* * * Hazards * * *
Physical Reactivity
Health Immediate (Acute)
Delayed (Chronic)
Reportable Quantity 500 Lbs.

---

* * * Inventory * * *
Max Daily Amount 999
Avg Daily Amount 99
Days On Site 365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Plastic or non-metallic drum
Pressure	Ambient
Temperature	Ambient
Location	CX BATTERY BREAKER BUILDING
Confidential Location	No

Container Type(s)	Plastic or non-metallic drum
Pressure	Ambient
Temperature	Ambient
Location	WATER TREATMENT UNIT
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	8006619
Proper Name	GASOLINE
Chemical State	Liquid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Fire
Health	Immediate (Acute) Delayed (Chronic)
Reportable Quantity	100 Lbs.

---

* * * Inventory * * *

Max Daily Amount	9999
Avg Daily Amount	9999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Above Ground tank
Pressure	Ambient
Temperature	Ambient
Location	TANK EAST OF OFFICE BUILDING
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	7647010
Proper Name	HYDROCHLORIC ACID
Chemical State	Liquid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Reactivity
Health	Immediate (Acute) Delayed (Chronic)
Reportable Quantity	500 Lbs.

---

* * * Inventory * * *

Max Daily Amount 999
Avg Daily Amount 999
Days On Site 365

---

* * * Storage Types and Storage Locations * * *

Container Type(s) Plastic or non-metallic drum
Pressure Ambient
Temperature Ambient
Location WATER TREATMENT UNIT
Confidential Location No

---

* * * Pure Chemical Description * * *

CAS # 7722841
Proper Name HYDROGEN PEROXIDE
Chemical State Liquid
EHS ? No
Last Reviewed Date 02/18/2001

---

* * * Hazards * * *

Physical Reactivity
Health Delayed (Chronic)
Reportable Quantity 1000 Lbs.

---

* * * Inventory * * *

Max Daily Amount 9999
Avg Daily Amount 999
Days On Site 365

---

* * * Storage Types and Storage Locations * * *

Container Type(s) Steel Drum
Pressure Ambient
Temperature Ambient
Location BATTERY BREAKER UNIT
Confidential Location No

---

* * * Pure Chemical Description * * *

CAS # 1309360
Proper Name IRON PYRITE
Chemical State Solid
EHS ? No
Last Reviewed Date 02/18/2001

---

* * * Hazards * * *

Physical -Not Provided-
Health Delayed (Chronic)
Reportable Quantity 5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount 9999
Avg Daily Amount 999
Days On Site 365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Bag
Pressure	Ambient
Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	69029523
Proper Name	LEAD DROSS
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Reactivity
Health	Immediate (Acute) Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	999999
Avg Daily Amount	999999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Other
Pressure	Ambient
Temperature	Ambient
Location	CONTAINMENT BUILDING
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	7439921
Proper Name	LEAD, METAL, INORGANIC
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	-Not Provided-
Health	Immediate (Acute) Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	9999999
Avg Daily Amount	9999999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Other
Pressure	Ambient
Temperature	Ambient
Location	CONTAINMENT BUILDING

Confidential Location	No

Container Type(s)	Other
Pressure	Ambient
Temperature	Ambient
Location	PRODUCT STORAGE BUILDING
Confidential Location	No

* * * Chemical Mixture Description * * *

Trade Name	NATURAL GAS
Common Name	NON-LIQUID HYDROCARBON GAS
Chemical State	Gas
Last Reviewed Date	02/18/2001

* * * EPA Information * * *

Trade Secret & Approved by EPA?	No

* * * Mixture Components * * *

Proper Chemical	METHANE	
CAS#	74828	95%
Proper Chemical	ETHANE	
CAS#	74840	5%
Proper Chemical	PROPANE	
CAS#	74986	5%

* * * Hazards * * *

Physical	Fire
Health	Immediate (Acute)
Reportable Quantity	100 Lbs.

* * * Inventory * * *

Max Daily Amount	9999
Avg Daily Amount	9999
Days On Site	365

* * * Storage Types and Storage Locations * * *

Container Type(s)	Other
Pressure	Greater than ambient
Temperature	Ambient
Location	UBIQUITOUS IN PLANT
Confidential Location	No

* * * Pure Chemical Description * * *

CAS #	7782447
Proper Name	OXYGEN
Chemical State	Gas
EHS ?	No
Last Reviewed Date	02/18/2001

* * * Hazards * * *

Physical	Fire
	Sudden Release of Pressure
Health	Immediate (Acute)
Reportable Quantity	100 Lbs.

---

* * * Inventory * * *

Max Daily Amount	999999
Avg Daily Amount	999999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Above Ground tank
Pressure	Greater than ambient
Temperature	Cryogenic
Location	OXYGEN UNIT WEST OF CHANGE HOUSE
Confidential Location	No

Container Type(s)	Cylinder
Pressure	Greater than ambient
Temperature	Ambient
Location	MAINTENANCE SHOP
Confidential Location	No

Container Type(s)	Cylinder
Pressure	Greater than ambient
Temperature	Ambient
Location	UBIQUITOUS PORTABLE UNITS
Confidential Location	No

Container Type(s)	Other
Pressure	Greater than ambient
Temperature	Ambient
Location	UBIQUITOUS PLANT PIPING
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	65997151
Proper Name	PORTLAND CEMENT
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Reactivity
Health	Immediate (Acute)
	Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	999999
Avg Daily Amount	99999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s) Silo

Pressure	Ambient
Temperature	Ambient
Location	CEMENT HOPPER
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	1310583
Proper Name	POTASSIUM HYDROXIDE
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Reactivity
Health	Immediate (Acute) Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	99999
Avg Daily Amount	9999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Steel Drum
Pressure	Ambient
Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	74986
Proper Name	PROPANE GAS
Chemical State	Gas
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Fire Sudden Release of Pressure
Health	Immediate (Acute)
Reportable Quantity	100 Lbs.

---

* * * Inventory * * *

Max Daily Amount	9999
Avg Daily Amount	9999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Above Ground tank
Pressure	Greater than ambient
Temperature	Less than Ambient but not cryogenic
Location	TANK EAST OF MAINTENANCE SHOP
Confidential	No

Location

---

* * * Pure Chemical Description * * *

CAS #	7723140
Proper Name	RED PHOSPHORUS
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Fire
	Reactivity
Health	Immediate (Acute)
	Delayed (Chronic)
Reportable Quantity	1 Lbs.

---

* * * Inventory * * *

Max Daily Amount	9999
Avg Daily Amount	999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Steel Drum
Pressure	Ambient
Temperature	Ambient
Location	PHOSPHORUS STORAGE BUILDING
Confidential	No
Location	

---

* * * Pure Chemical Description * * *

CAS #	7782492
Proper Name	SELENIUM METAL
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Fire
Health	Immediate (Acute)
	Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	9999
Avg Daily Amount	999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Plastic or non-metallic drum
Pressure	Ambient
Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential	No
Location	

---

* * * Pure Chemical Description * * *

CAS #	144558
Proper Name	SODIUM BICARBONATE
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Reactivity
Health	Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount.	9999
Avg Daily Amount	999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Bag
Pressure	Ambient
Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	497198
Proper Name	SODIUM CARBONATE
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Reactivity
Health	Immediate (Acute) Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	9999
Avg Daily Amount	999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Bag
Pressure	Ambient
Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	1310732
Proper Name	SODIUM HYDROXIDE

Chemical State	Liquid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Reactivity
Health	Immediate (Acute) Delayed (Chronic)
Reportable Quantity	500 Lbs.

---

* * * Inventory * * *

Max Daily Amount	99999
Avg Daily Amount	9999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Tank Inside Building
Pressure	Ambient
Temperature	Ambient
Location	CX BATTERY BREAKER UNIT
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	7631994
Proper Name	SODIUM NITRATE
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Fire Reactivity
Health	Immediate (Acute) Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	99999
Avg Daily Amount	9999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Bag
Pressure	Ambient
Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential Location	No

Container Type(s)	Bag
Pressure	Ambient
Temperature	Ambient
Location	CONTAINMENT BUILDING
Confidential Location	No

---

* * * Pure Chemical Description * * *

CAS #	1344098
Proper Name	SODIUM SILICATE
Chemical State	Liquid
EHS ?	No
Last Reviewed Date	02/18/2001

* * * Hazards * * *

Physical	-Not Provided-
Health	Immediate (Acute)
Reportable Quantity	500 Lbs.

* * * Inventory * * *

Max Daily Amount	9999
Avg Daily Amount	9999
Days On Site	365

* * * Storage Types and Storage Locations * * *

Container Type(s)	Steel Drum
Pressure	Ambient
Temperature	Ambient
Location	SLAG STABILIZATION AREA
Confidential Location	No

* * * Pure Chemical Description * * *

CAS #	7757826
Proper Name	SODIUM SULFATE
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

* * * Hazards * * *

Physical	-Not Provided-
Health	Delayed (Chronic)
Reportable Quantity	5000 Lbs.

* * * Inventory * * *

Max Daily Amount	999999
Avg Daily Amount	99999
Days On Site	365

* * * Storage Types and Storage Locations * * *

Container Type(s)	Tank Inside Building
Pressure	Ambient
Temperature	Ambient
Location	CX BATTERY BREAKER UNIT
Confidential Location	No

Container Type(s)	Silo
Pressure	Ambient
Temperature	Ambient
Location	SALT SILO EAST OF CX UNIT
Confidential Location	No

Container Type(s)	Rail car

Pressure	Ambient
Temperature	Ambient
Location	RAIL SPUR
Confidential	No
Location	

---

* * * Pure Chemical Description * * *

CAS #	1313822
Proper Name	SODIUM SULFIDE
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	-Not Provided-
Health	Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	9999
Avg Daily Amount	999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Bag
Pressure	Ambient
Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential	No
Location	

---

* * * Pure Chemical Description * * *

CAS #	7704349
Proper Name	SULFUR
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	Fire
	Reactivity
Health	Immediate (Acute)
	Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	99999
Avg Daily Amount	9999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Bag
Pressure	Ambient
Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential	No

Location

---

* * * Pure Chemical Description * * *

CAS #	7440315
Proper Name	TIN, METAL
Chemical State	Solid
EHS ?	No
Last Reviewed Date	02/18/2001

---

* * * Hazards * * *

Physical	-Not Provided-
Health	Delayed (Chronic)
Reportable Quantity	5000 Lbs.

---

* * * Inventory * * *

Max Daily Amount	9999
Avg Daily Amount	9999
Days On Site	365

---

* * * Storage Types and Storage Locations * * *

Container Type(s)	Box
Pressure	Ambient
Temperature	Ambient
Location	CHEMICAL WAREHOUSE
Confidential	No
Location	

APPENDIX B

EMERGENCY EQUIPMENT LIST

APPENDIX B

EMERGENCY EQUIPMENT

Personal Protective Equipment

1. A 3M 30-minute self-contained breathing apparatus (SCBA) with 5-minute air pack is located in the Safety Office. To be used for supplied air in the event of a chlorine leak from the water well disinfectant unit.
2. Two Scott Air line (supplied air) respirators for use in oxygen deficient atmosphere are located in the Changehouse.
3. Two SEA positive pressure fan supplied SE400 respirators with high efficiency powered air-purifying filters for use in atmospheres of up to 100 times the permissible exposure limit (PEL) for lead $50mg/m^3$, located in the Safety Office.
4. 3M respirators with combination HEPA particulate, organic vapor and acid gas cartridges are located in the Changehouse. Half face respirators for use in areas less than 10 time the permissible exposure limit (PEL) for lead, full face for us in areas less than 50 times the PEL for lead.
5. Tyvek coverall suits are located in the Changehouse, in the battery breaker safety locker and in the Maintenance Shop safety locker. Used to prevent contact exposure to lead or other chemicals.
6. Ear plugs and ear muff for hearing protection are located in the Changehouse, in the battery breaker safety locker and in the Maintenance Shop safety locker.
7. Disposable nitrile gloves (for protection against contact exposure to lead or other chemicals), heat resistant leather gloves and acid resistant rubber gloves are located in the Changehouse, in the battery breaker safety locker and in the Maintenance Shop safety locker.
8. Safety glasses, goggles, face shields and hard hats are kept in the Changehouse and in the safety locker in the Maintenance Shop.
9. Steel-toed, chemical resistant boots are kept in the Changehouse.

Safety Equipment

1. Fall protection equipment, body harness, anchorage connectors and lanyards are kept in the Safety Office.
2. Locks and tags for lockout/tagout energy isolation are kept in stations at the shift foreman's office, the Battery Breaker control room and the Maintenance Shop office.
3. A Biosystems PhD-Lite gas detector for oxygen (range of 0-30% measured in percentage of air by volume), CO (0-999 ppm), H_2S (0-200 ppm) and explosive vapors, (0-100% LEL) is kept in the main office. A second gas detector is kept in the Safety Department. These meters are typically used to test the atmosphere of a confined space prior to entry.
4. Two air blowers for ventilation of confined spaces are located in the maintenance shop.
5. Fire extinguishers are located in various locations at the smelter. A Class-D extinguisher is kept at the phosphorus shed and another is kept at the Chemical Warehouse.
6. Spill absorbent material for oil or hydraulic spills is kept in the Maintenance Shop and 55-gallon gallon drums are stored in the production area.
7. Acid neutralization chemicals (caustic soda, sodium bicarbonate, and hydrate lime) are stored in the Chemical Warehouse.

APPENDIX B

EMERGENCY EQUIPMENT
PAGE 2

Mobile Equipment –

1. Forklifts are used in each department and are available if heavy lifting is needed.
2. A mobile crane (cherry picker) is located at the maintenance shop.
3. A 60-foot man-lift is also located at the maintenance shop.

Medical Equipment and Supplies

1. A stretcher is located in the lunchroom.
2. The First Aid Room is stocked with medical supplies including burn, cold and pain medication.
3. A blood pressure monitor and stethoscopes are located in the First Aid Room.
4. Eye wash stations and safety showers are located in the plant as show on Figure 3.

APPENDIX C

MSDS SHEETS FOR PRODUCTS PRODUCED AT THE

BATON ROUGE SMELTER

SCHUYLKILL METALS

A Division of Exide Corporation

MATERIAL SAFETY DATA SHEET

SOFT LEAD
GENERAL INFORMATION

TRADE NAME (COMMON NAME OR SYNONYM)	DATE ISSUED	DATE REVISED
Soft lead, corroding grade lead, pure lead	2-4-85	10-1-96

MANUFACTURER'S CONTACT
SCHUYLKILL METALS
P.O. Box 74040
Baton Rouge, Louisiana 70874

Telephone: 504-775-3040

INGREDIENTS

MATERIAL OR COMPONENT	C.A.S. #	WEIGHT %	PERMISSIBLE AIR LIMITS
Lead	7439-92-1	99.7+%	0.15 mg/meter^3* 0.05 mg/meter^3**
*ACGIH **OSHA			

PHYSICAL DATA

APPEARANCE AND ODOR	
Silver-gray metal, odorless. Various shapes and sizes.	
BOILING POINT Greater than 2700°F	MELTING POINT 621° F
SPECIFIC GRAVITY (H_2O = 1) 11.34	VAPOR DENSITY Not Applicable
SOLUBILITY IN WATER Insoluble	VAPOR PRESSURE Not Applicable
EVAPORATION RATE Not Applicable	% VOLATILES BY VOLUME Not Applicable

HEALTH HAZARD INFORMATION

ROUTES OF EXPOSURE

SKIN & EYES EXPOSURE
Direct contact or exposure may result in local irritation and possible dermatitis from repeated skin contact. Symptoms are more severe from prolonged over-exposure.

INJESTION & INHALATION EXPOSURE
Dust, fume or mist may be injested and absorbed through the digestive system or inhaled and absorbed through the respiratory track. Injestion or inhalation may cause irritation of the digestive system and respiratory track resulting in acute or cronic over-exposure.

ACUTE OR SHORT-TERM OVER-EXPOSURE

LEAD: Exposure to lead and its compounds may cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbance, weight loss, anemia and pain in legs, arms and joints.

CHRONIC OR LONG TERM OVER-EXPOSURE

LEAD: Chronic or long term exposure to lead and its compounds may produce symptoms of short term exposure, central nervous system damage, fatugue, headaches, tremors, hypertension, hullucinstions, conoulsions, delerium, gastrointestinal desturbances, anemia and wrist-drop. Kidney dysfunction and damage is possible. Impairment of male and female reproductive organs has been implicated but unsubstantiated. Pregnant women should be protected from excessive exposure to prevent possible neurological disorders in new-borns.

FIRST AID

INHALATION:	Remove from exposure. Get medical attention if experiencing effects of overexposure.
INGESTION:	Get immediate medical attention.
EYES:	Flush with large quantities of water. Get immediate medical attention.
SKIN:	Wash thoroughly with soap and water.

FIRE AND EXPLOSION DATA

FLASH POINT	AUTO IGNITION TEMPERATURE	FLAMMABLE LIMITS IN AIR
Not Applicable	Not Applicable	Not Applicable

FIRE EXTINGUISHING MEDIA
Dry chemical or carbon dioxide should be used on surrounding fire. Do Not use water on fires where molten metal is present.

SPECIAL FIRE FIGHTING PRECAUTIONS
Use approved full-facepiece, self-contained breathing apparatus and full protective clothing if involved in a fire.

UNUSUAL FIRE AND EXPLOSION HAZARD
Molten metals produce fume, dust, or mist that may be toxic.

REACTIVITY DATA

STABILITY	CONDITIONS TO AVOID	HAZARDOUS POLYMERIZATION
Stable	Not Applicable	Not Applicable

INCOMPATIBILITY
Contact with hydrogen peroxide may cause a violent reaction

HAZARDOUS DECOMPOSITION PRODUCTS
Temperatures above the melting point may produce lead oxide dust and/or fumes.

PERSONAL PROTECTION PRECAUTIONS

VENTILATION
Local exhaust ventilation shall be provided in areas where exposures are above the permissable limits or threshold limit values specified by OSHA or other local, state, and federal regulations.

RESPIRATORY PROTECTION
Use of approved (OSHA 29CFR1910.1025 (f))
respirators is required for applications
Where adequate ventilation cannot be provided.

EYES AND FACE
Face shields or vented goggles should be used around molten metal. Safety glasses should be used for operations generating flying pieces.

GLOVES
Gloves should be worn when handling the product

OTHER CLOTHING AND EQUIPMENT
Full protective clothing is required if the permissible exposure limit is exceeded. Hard hat, safety shoes, and other safety equipment should be worn as appropriate for the environment.

SPECIAL PRECAUTIONS/PROCEDURES

SPILL OR LEAK

Dust or particulate should be vacuumed, or wet swept where vacuuming is infeasible. Place material in dry, closed containers for disposal or recycling. Do not use compressed air or dry sweeping for cleaning. Use approved respiratory protection if dust/fume exposure possibility exists.

WASTE DISPOSAL METHOD

Material should be recycled if at all possible. Collection, transportation, and storage should be in accordance with federal state, and local laws.

STORAGE

Store in a dry area where accidental contact hydrogen peroxide is not possible.

OTHER SPECIAL PRECAUTIONS/PROCEDURES

Wash hands, face, neck, and arms thoroughly before eating or smoking. Eating and smoking should be confined to non-contaminated areas. Work clothes and equipment should remain in designated contaminated areas, and should never be taken home or laundered with personal clothing. Do not use compressed air for blowing dust off of clothes.

Before using the product consult the OSHA Federal Standard for Occupational Exposure to Lead 29CFR1910.1025.

ADDITIONAL INFORMATION

Lead and its inorganic compounds are neurotoxins which may produce periphesal neuropathy. For an overview of the effects of lead exposure, see OSHA 29CFR1910.1025, Appendix A.

Biological Limit	Lead	50	mg/100 grams whole blood
OSHA Action Levels	Lead	0.03	mg/m^3 (29CFR1910.1025)

*This product contains Toxic Chemicals subject to the reporting requirements of Section 313 of Title III of the SARA, 1986 and 40CFR372.

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EXIDE CORPORATION

MATERIAL SAFETY DATA SHEET

HARD LEAD
GENERAL INFORMATION

TRADE NAME (COMMON NAME OR SYNONYM)	DATE ISSUED	DATE REVISED
Hard Lead, Antimonial or Arsenical Alloy	2-4-85	12/1/99

MANUFACTURER'S CONTACT
EXIDE CORPORATION
P.O. Box 74040
Baton Rouge, Louisiana 70874

Telephone: 225 -775-3040
2400 BROOKLAWN DR.
BATON ROUGE, LA

INGREDIENTS

MATERIAL OR COMPONENT	C.A.S. #	WEIGHT %	PERMISSIBLE AIR LIMITS
Lead	7439-92-1	75-99	0.15 mg/meter^3* 0.05 mg/meter^3**
Antimony	7440-36-0	0-25	0.5 mg/meter^3* 0.5 mg/meter^3**
Arsenic	7440-38-2	0-5	0.02 mg/meter^3* 0.01 mg/meter^3**
Tin	7440-31-5	0-5	2.0 mg/meter^3* 2.0 mg/meter^3**

*ACGIH
**OSHA

PHYSICAL DATA

APPEARANCE AND ODOR	
Silver-gray metal, odorless. Various shapes and sizes.	
BOILING POINT	MELTING POINT
Not Applicable	486 - 680 F
SPECIFIC GRAVITY (H_2O = 1)	VAPOR DENSITY
9.6 - 11.3	Not Applicable
SOLUBILITY IN WATER	VAPOR PRESSURE
Insoluble	Not Applicable
EVAPORATION RATE	% VOLATILES BY VOLUME
Not Applicable	Not Applicable

HEALTH HAZARD INFORMATION

ROUTES OF EXPOSURE

SKIN & EYES EXPOSURE

Direct contact or exposure may result in local irritation and possible dermatitis from repeated skin contact. Small septic blisters and chemical burns may result from the arsenic and antimony content of the alloy. Symptoms are more severe from prolonged over-exposure.

INJESTION & INHALATION EXPOSURE

Dust, fume or mist may be injested and absorbed through the digestive system or inhaled and absorbed through the respiratory track. Injestion or inhalation may cause irritation of the digestive system and respiratory track resulting in acute or cronic over-exposure.

ACUTE OR SHORT-TERM OVER-EXPOSURE

LEAD: Exposure to lead and its compounds may cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbance, weight loss, anemia and pain in legs, arms and joints.

ANTIMONY: Injestion of antimony and its compounds may cause dizziness, nausea, vomiting, severe diarrhea, muscular pain, liver and kidney damage. Inhalation of antimony dust may cause pulmonary edema. Stibine may be generated when antimony alloys contact acid solutions and should be considered as immediate life threatening. Stibine gas may cause rapid destruction of red blood cells, blood in urine, cessation of urine production and kidney failure. Signs of exposure are headache, nausea, back pain, and upper abdominal pains.

ARSENIC: Injestion of antimony and its compounds can cause gastrointestinal upset, abdominal pain, vomiting, muscle spasms, delerium, vertigo and coma. Death may follow. Inhalation of arsenic dust may cause shortness of breath, stomach pains, muscle spasms, vertigo, delerium and coma. Arsine gas may be generated when arsenic alloys contact acid solution and should be considered as immediate life threatening. Signs of exposure are severe shortness of breath, stomach pains, muscle spasms, vertigo, delerium, coma, bloody urine, possible delerium followed by coma and death. Severe kidney damage is common in acute poisoning.

CHRONIC OR LONG TERM OVER-EXPOSURE

LEAD: Chronic or long term exposure to lead and its compounds may produce symptoms of short term exposure, central nervous system damage, fatugue, headaches, tremors, hypertension, hullucinstions, conoulsions, delerium, gastrointestinal desturbances, anemia and wrist-drop. Kidney dysfunction and damage is possible. Impairment of male and female reproductive organs has been implicated but unsubstantiated. Pregnant women should be protected from excessive exposure to prevent possible neurological disorders in new-borns.

ANTIMONY: Injestion may cause headaches, dizziness, anemia, weight loss, bleeding gums and dermatitis. Inhalation may cause inflammation of the throat, bronchitis, pneumonia, anemia, headaches, weight loss, bleeding gums, nasal inflammation and possible septum perforation.

ARSENIC: Injestion and inhalation may cause anemia, weight loss, disorders of nervous, gastrointestinal and cardiousascular systems. Implicated causative agent of skin and lung cancer particularly in long-term over-exposure in occupational environment and increased among smokers.

FIRST AID

INHALATION:	Remove from exposure. Get medical attention if experiencing effects of overexposure.
INGESTION:	Get immediate medical attention.
EYES:	Flush with large quantities of water. Get immediate medical attention.
SKIN:	Wash thoroughly with soap and water.

FIRE AND EXPLOSION DATA

FLASH POINT	AUTO IGNITION TEMPERATURE	FLAMMABLE LIMITS IN AIR
Not Applicable	Not Applicable	Not Applicable

FIRE EXTINGUISHING MEDIA
Dry chemical or carbon dioxide should be used on surrounding fire. Do Not use water on fires where molten metal is present.

SPECIAL FIRE FIGHTING PRECAUTIONS
Use approved full-facepiece, self-contained breathing apparatus and full protective clothing if involved in a fire.

UNUSUAL FIRE AND EXPLOSION HAZARD
Molten metals produce fume, dust, or mist that may be toxic and/or respiratory irritants. The products, or the dust, can react vigorously with strong oxidizing agents.

REACTIVITY DATA

STABILITY	CONDITIONS TO AVOID	HAZARDOUS POLYMERIZATION
Stable	Not Applicable	Not Applicable

INCOMPATIBILITY
Halogen gases, oxidizers or acids, or hydrogen peroxide may react violently. Under reducing conditions (strong acid or base and an active metal) or in the presence of nascent hydrogen, highly toxic stibine or arsine gas may be evolved.

HAZARDOUS DECOMPOSITION PRODUCTS
Temperatures above the melting point may produce heavy metal dust and/or fumes.

PERSONAL PROTECTION PRECAUTIONS

VENTILATION
Local exhaust ventilation shall be provided in areas where exposures are above the permissable limits or threshold limit values specified by OSHA or other local, state, and federal regulations.

RESPIRATORY PROTECTION
Use of approved (OSHA 29CFR1910.1025 (f), and 29CFR1910.1018 (h)) respirators is required for applications where adequate ventilation cannot be provided.

EYES AND FACE
Face shields or vented goggles should be used around molten metal. Safety glasses should be used for operations generating flying pieces.

GLOVES
Gloves should be worn when handling the product

OTHER CLOTHING AND EQUIPMENT
Full protective clothing is required if the permissible exposure limit is exceeded. Hard hat, safety shoes, and other safety equipment should be worn as appropriate for the environment.

SPECIAL PRECAUTIONS/PROCEDURES

SPILL OR LEAK

Dust or particulate should be vacuumed, or wet swept where vacuuming is infeasible. Place material in dry, closed containers for disposal or recycling. Do not use compressed air or dry sweeping for cleaning. Use approved respiratory protection if dust/fume exposure possibility exists.

WASTE DISPOSAL METHOD

Material should be recycled if at all possible. Collection, transportation, and storage should be in accordance with federal state, and local laws.

STORAGE

Store in a dry area where accidental contact with acids, bases, hydrogen peroxide, or halogen gases is not possible.

OTHER SPECIAL PRECAUTIONS/PROCEDURES

Wash hands, face, neck, and arms thoroughly before eating or smoking. Eating and smoking should be confined to non-contaminated areas. Work clothes and equipment should remain in designated contaminated areas, and should never be taken home or laundered with personal clothing. Do not use compressed air for blowing dust off of clothes.

Before using the product consult the OSHA Federal Standard for Occupational Exposure to Lead 29CFR1910.1025 and to Arsenic 29CFR 1910.1018.

ADDITIONAL INFORMATION

Lead and its inorganic compounds are neurotoxins which may produce periphesal neuropathy. For an overview of the effects of lead exposure, see OSHA 29CFR1910.1025, Appendix A.

Arsenic may be a pulmonary carcinogen. For an overview of the effects of arsenic exposure, see OSHA 29CFR1910.1018.

Antimony is a sever pulmonary irritant and may cause a metallic taste or damage to kidneys, liver, or nervous system. The chronic effects of antimony ingestion may resemble those of arsenic.

Tin (ic) Oxide has been shown to cause benign pneumoconiosis.

Biological Limit	Lead	50	mg/100 grams whole blood
Osha Exposure Limit	Stibine	0.10	ppm
	Arcine	0.05	ppm
OSHA Action Levels	Lead	0.03	mg/m^3 (29CFR1910.1025)
	Arsenic	0.005	mg/m^3 (29CFR1910.1018)

*This product contains Toxic Chemicals subject to the reporting requirements of Section 313 of Title III of the SARA, 1986 and 40CFR372.

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EXIDE CORPORATION

BATON ROUGE SMELTER

MATERIAL SAFETY DATA SHEET

ANHYDROUS SODIUM SULFATE

GENERAL INFORMATION

TRADE NAME:	DATE ISSUED:	DATE REVISED:
ANHYDROUS SODIUM SULFATE	01-15-97	10/20/97

MANUFACTURER'S CONTACT:

EXIDE CORPORATION
Baton Rouge Smelter
P. O. Box 74040
Baton Rouge, Louisiana 70874

24 Hour Emergency Phone: 1-504-775-3040

PRODUCT IDENTIFICATION

HMIS HAZARD RATINGS

HEALTH HAZARD 1 FIRE HAZARD 0 REACTIVITY 0

SARA/TITLE III HAZARD CATEGORIES

Immediate (ACUTE) Health: NO
Delayed (Chronic) Health: NO
Fire Hazard: NO
Reactive Hazard: NO
Sudden Release of Pressure: NO

CHEMICAL NAME: Anhydrous Sodium Sulfate **CAS NUMBER: 7757-82-6**
SYNONYMS/COMMON NAMES: Salt Cake
CHEMICAL FORMULA: Na2S04

PHYSICAL DATA

BOILING POINT @ 760 mm Hg: NA
Melting Point: NA
VAPOR PRESSURE: NA
BULK DENSITY: Loose 92-102 lb/cu. ft.
Tapped 95-105 lb/cu. ft.

SPECIFIC GRAVITY (H20 = 1): 2.7 @ 20 C
SOLUBILITY IN H20 % BY WT: ~15%
VAPOR DENSITY (Air = 1) NA:

APPEARANCE AND ODOR: Crystal, white; no odor
pH: 7

HEALTH HAZARD INFORMATION

EMERGENCY AND FIRST AID PROCEDURES

EYES:

IMMEDIATELY flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissue. GET MEDICAL ATTENTION.

SKIN:

Wash with plenty of soap and water. Wash clothing before reuse. SEEK MEDICAL ATTENTION IF IRRITATION OCCURS.

INHALATION:

If symptoms develop, get person out of contaminated area to fresh air.

INGESTION:

NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. Have patient drink several glasses of water, then induce vomiting by having patient tickle back of throat with finger. Keep airway clear. SEEK MEDICAL ATTENTION IMMEDIATELY.

ROUTES OF EXPOSURE

INHALATION:

May cause irritation of respiratory passages.

SKIN:

May cause minor irritation.

EYE CONTACT:

May cause irritation.

INGESTION:

May cause diarrhea.

EFFECTS OF OVEREXPOSURE

ACUTE:

May cause irritation of the eyes, skin or respiratory passages. Ingestion may result in diarrhea.

CHRONIC:

No known chronic effects.

TOXICOLOGY DATA:

Acute Oral LD50 (mouse) 5989 mg/kg

FIRE AND EXPLOSION DATA

FLASH POINT: NA AUTOIGNITION TEMPERATURE: Not combustible

FLAMMABLE LIMITS IN AIR. % BY VOLUME - UPPER: NA

LOWER: NA

EXTINGUISHING MEDIA:

This product is not combustible. Use agents suitable for materials in surrounding fire.

SPECIAL FIRE FIGHTING PROCEDURES:

None.

UNUSUAL FIRE AND EXPLOSION HAZARD:

None.

REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY:
None.
INCOMPATIBILITY:
None.
HAZARDOUS DECOMPOSITION PRODUCTS:
None.
CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION:
Material not known to polymerize.

SPECIAL PROTECTION

VENTILATION REQUIREMENTS:
Engineering controls and local exhaust ventilation are required to ensure that worker exposure to this product is below the current TLV for nuisance dust
(TLV = 10 mg/m^3 TWA).

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY:
A NIOSH/MSHA approved respirator, following manufacturer's recommendation should be used where dust, fumes, mist, or spray may be generated.
EYE:
Wear safety glasses with side shields or chemical safety goggles. (ANSI Z87.1)
GLOVES:
Industrial grade rubber or plastic gloves should be worn.
OTHER CLOTHING AND EQUIPMENT:
Standard work clothing. Emergency shower and eyewash facility should be in close proximity. (ANSI Z358.1)

HANDLING AND STORAGE

HANDLING AND STORAGE PRECAUTIONS:
Store in tightly closed containers away from sources of heat.

PRODUCT DISPOSAL:
Product should be completely removed from this container. Material that cannot be used or chemically reprocessed should be disposed of in a manner meeting government regulations.

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ENVIRONMENTAL PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

If a material is spilled, steps should be taken to prevent discharges to streams or sewer systems. Spills or releases should be reported, if required, to the appropriate local, state, and federal regulatory agencies.

WASTE DISPOSAL METHOD:

Clean-up action should be carefully planned and executed. Shovel or sweep up and reuse, or place in closed container for proper disposal. Flush residue with water. Shipment, storage, and/or disposal of waste materials are regulated and action to handle spilled or released materials must meet the applicable rules. If any question exists, the appropriate agencies should be contacted to assure proper action being taken.

WARNING LABEL INFORMATION

SIGNAL WORD: **CAUTION**

STATEMENT OF HAZARDS:

MAY CAUSE IRRITATION TO EYES, SKIN OR RESPIRATORY PASSAGES

PRECAUTIONARY STATEMENTS:

Do not breathe dust.

Do not get in eyes, on skin, on clothing.

Wear respirator, chemical goggles, and gloves when dust may be generated.

FIRST AID:

FOR EYES:

IMMEDIATELY flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissue. **GET MEDICAL ATTENTION.**

FOR SKIN:

Wash with plenty of soap and water. Wash clothing before reuse. **SEEK MEDICAL ATTENTION IF IRRITATION OCCURS.**

IF INHALED:

If symptoms develop, get person out of contaminated area to fresh air.

IF SWALLOWED:

NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. Have patient drink several glasses of water, then induce vomiting by having patient tickle back of throat with finger. Keep airway clear. **SEEK MEDICAL ATTENTION IMMEDIATELY.**

IN CASE OF:

SPILL OR LEAK:

Follow precautionary statements. Shovel or sweep up and reuse, or place in closed container for proper disposal. Flush residue with water.

HANDLING AND STORAGE PRECAUTIONS

Store in tightly closed containers away from sources of heat.

HMIS RATING SYSTEM: HEALTH 1 FLAMMABILITY 0 REACTIVITY 0

FOR INDUSTRIAL USE ONLY

APPENDIX 7

GROUNDWATER SAMPLING AND ANALYSIS PLAN

GROUNDWATER SAMPLING AND ANALYSIS PLAN

Baton Rouge Facility
Baton Rouge, Louisiana

July 20, 2001

Prepared for

Exide Technologies
P. O. Box 74040
Baton Rouge, Louisiana

TEA Project No. EXC-01.16

Prepared by

Toxicological & Environmental Associates, Inc.
10636 Linkwood Court
Baton Rouge, Louisiana 70810
(225) 767-3880

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1.0 INTRODUCTION

The Exide Technologies, Baton Rouge smelter is located in Baton Rouge, East Baton Rouge Parish, Louisiana. This facility is a secondary lead smelter and refinery which recycles spent lead-acid batteries and inorganic lead-bearing wastes into product lead, in the form of lead pig and block ingots. The product lead is sold to customers for use in making batteries, weights, bearings, ammunition, and chemicals.

Exide operates three permitted storage areas, one permitted treatment area and a Containment Building. The storage units are permitted to contain raw material for the smelter prior to recycling. The treatment unit is designed to stabilize blast furnace slag prior to disposal. The Containment Building houses feed piles of raw material, battery plates and other lead bearing-material prior to recycling. These units are shown on Figure 1.

Additionally, Exide operated two hazardous waste cells in the 1970s and early 1980s. These cells were used to dispose of blast furnace slag. Exide closed the two hazardous waste cells in 1985. As part of the post-closure monitoring, Exide maintains a comprehensive groundwater monitoring program at the site, in accordance with the conditions of the RCRA Operating Permit (LAD 008184137) and the Post-Closure Permit for the closed cells. The groundwater monitoring network at the two closed cells consists of seven (7) wells screened in the upper permeable zone at the site. The wells are sampled on a semiannual basis as part of the Detection Monitoring Program.

This sampling and analysis plan will be followed to ensure that samples collected from the groundwater monitoring wells at the Baton Rouge smelter are representative of the water-bearing zone being monitored. Sample collection, analyses, and reporting will be conducted on a semiannual basis throughout the post-closure care period.

This plan details sampling and analysis elements including:

- Groundwater sampling procedure (water level measurement, evacuation, sampling)
- Sample preservation, handling and analytical parameters
- Field documentation
- Chain-of-custody control
- Decontamination and cross-contamination control
- Analytical procedures
- Field and laboratory quality assurance/quality control
- Statistical method for the evaluation of groundwater data

2.0 MONITORING WELL NETWORK

The monitoring well network for the Baton Rouge smelter consists of seven wells. The wells were installed in December 1994 through February 1995. Figure 1 shows the location of these wells. The wells are screened in the first permeable zone, at depths ranging from 28 to 45 feet below ground surface. Well construction information is presented on Table 1. Locations of the monitoring wells are shown on Figure 1.

The general direction of groundwater movement at the facility, based on historical monitoring data, is primarily to the west. The groundwater monitoring network includes one upgradient well, MW-1R, and six downgradient wells. Three wells are located downgradient of each of the two closed cells. Wells MW-4R, MW-12R, MW-16, are downgradient of closed waste pile #1, the Western Disposal Area, and wells MW-13R, MW-17 and MW-18 are downgradient of closed waste pile #2, the Southern Disposal Area.

As specified in the Post-Closure permit for the two closed hazardous waste cells, the point of compliance is the vertical interval intercepted by the six downgradient wells, defined as the shallow zone. The horizontal limit of compliance is defined as a line connecting wells MW-12R, MW-4R and MW-16, for Waste Pile #1 and wells MW-13R, MW-17 and Mw-18 for Waste Pile #2.

3.0 GROUNDWATER SAMPLING PROCEDURES

The following sections describe the procedures for depth measurements, well evacuation, sampling, and sample preservation and handling.

3.1 WATER LEVEL MEASUREMENT

The water level measurement is performed on the same day and immediately prior to purging. The elevation at the top of the casing has been established at each well. This information is used to determine the water level elevation. To calculate groundwater elevation, the distance to the water level from the top of the casing is measured. Each well has a permanent reference for measuring the static water level and total depth of the well. The water elevations are measured using a weighted tape, following the procedures below:

1. The tape is decontaminated prior to use and between wells by procedures detailed in Section 5.0. The weight will be lowered gently into the well until it is heard to have touched the water. The water level measurement from top of casing to water level will be determined to ± 0.01 foot and recorded in a logbook and on a Groundwater Collection Report Form. A second measurement of well depth from the top of the casing to the bottom of the well will also be made.

The water level measurement is used to calculate the volume of water in the well from the linear feet of standing water and the well diameter. This calculation is then used to determine the volume of water to be purged from the well prior to sampling. To calculate the linear feet of water in the well, subtract the depth to the water from the total depth of the well. From the table below, determine the appropriate factor for the specific well inside diameter, multiply the linear feet by the appropriate factor listed on the table below to get the gallons of water present in the well.

Casing Diameter	Gallons/Linear Feet
2 inches	0.163
3 inches	0.367
4 inches	0.653

If 10 percent of the screened interval is blocked by sediments, Exide will redevelop the well prior to the next semiannual sampling event.

3.2 WELL EVACUATION – PURGING THE WELL

In order to obtain a representative sample of groundwater, the standing water in the well casing is purged or evacuated. Evacuation allows fresh or formation groundwater to enter the well. The optimum method to ensure that formation water is sampled is to monitor the water being purged by field measurements of pH, temperature and conductivity. For each well volume purged from the well (as calculated earlier) a measurement of these three indicator parameters, will be collected. These results are recorded on the Groundwater Collection Report form. When subsequent samples are observed to have less than ± 10 percent variation in at least two of these parameters, the well is presumed to be adequately flushed. Evacuation rates are typically kept at a rate of below 5 gpm. When possible, the water is drawn down from above the screen in the uppermost part of the water column to ensure that fresh water from the formation will move upward in the screen.

Dedicated PVC bailers are used to evacuate all of the wells at the Baton Rouge smelter. These bailers are stored in the well casing when not in use. Prior to evacuation, each bailer is decontaminated following the procedures described in Section 5.0. After initial decontamination, the well is purged.

Prior to purging, each well is checked for the presence of light and heavy non-aqueous phase liquids, (LNAPLS and DNAPLS).

During purging the bailer is lowered into the well, allowed to fill and retrieved. Caution is used when lowering the bailer into the water so as to avoid aeration of the well water. The purge water is poured into a graduated container to measure the amount of water removed from the well. During the purging and sampling process, care is taken to keep the rope and bailer from touching the ground or other potentially contaminated surfaces. When the first well volume has been removed, a groundwater sample is collected from the bailer for field

measurements of pH, temperature and conductivity. These field measurements are repeated for each subsequent well volume removed.

Alternate purging methods such as using pumps are discussed below as contingencies:

1. Suction lift pumps such as centrifugal, diaphragm or peristaltic pumps can be used to evacuate wells if the static water level is within 25 feet of ground surface. These pumps are utilized at ground surface with the intake line connected to dedicated teflon or high-density polyethylene tubing inserted into the well. The tubing should be equipped with a foot valve to avoid having aerated water from the pump fall back in the well. The outlet tubing should be placed so that the purge water is collected in a graduated container, and can be measured. Measurements of pH, conductivity and temperature should be taken for each well volume evacuated from the well. If the well is pumped dry and the recharge rate is sufficiently rapid to cause water to cascade into the well, the well should be allowed to recover. Then the pumping rate should be adjusted to a slower rate and the well re-evacuated of two well volumes before sampling.

2. Portable submersible pumps are an option for evacuating wells with water levels greater than 25 feet below land surface. The decontaminated pump should be carefully lowered into the well, trailing a discharge hose, electrical cables or air lines, and a stainless steel security cable (which should bear most of the weight). If these items are to be bundled, use plastic ties and not electrical or duct tape at the level to be submerged in the water column.

   If the pump is connected to a portable gasoline generator or air compressor, the generator should be placed some distance away from the well where fumes cannot affect sample quality. An in-line air filtration system at the discharge line should be used when an air compressor is used in conjunction with an air displacement pump. The submersible pump provides the advantage of high flow rates, however, care should be taken when operating to keep the flow rate within an acceptable limit for the particular well yield (recharge capability). As with the suction lift pumps, these pumps should be equipped with a foot valve and fitted with dedicated tubing.

   To evacuate, simply turn the pump on, prime with deionized water if needed, and measure the outlet water quantities. As with all other evacuation methods, pH, temperature and conductivity should be measured for each well volume removed.

These pumps need to be decontaminated before sampling and between sample points. Decontamination procedures are described in Section 5.0 of this document.

3. A bladder pump or gas squeeze pump consists of a housing that encloses a flexible membrane (bladder) that has check valves above and below. The pump is connected to either bottled gas or an air compressor. When in operation, water enters the membrane/bladder through the bottom check valve; compressed gas is injected into the cavity between the housing and the bladder, squeezing the bladder and forcing the water through the top check valve and ultimately out of the well. Another type of bladder pump is also available that works on the same principle except that the water enters the chamber between the membrane and the casing, and the gas is injected into the bladder. Similar to the submersible pumps, the bladder pump should be carefully lowered into the well by a security cable. In low-yielding wells (i.e., wells incapable of producing three well volumes), the bladder pump should be placed at the bottom of the well screen so that water is removed from the bottom of the well screen.

   The outlet tubing from the bladder pump should be placed so that purge water can be collected into a graduated container. Field measurements of temperature, pH and conductivity should be taken for each well volume evacuated from the well.

These alternate methods may be used in place of bailing for purging of wells at some locations.

3.3 MONITOR WELL SAMPLING

After evacuation of the required volume of water from the well, sampling will begin. Sampling of the monitor well typically occurs as soon as possible after evacuation, preferably immediately but at a minimum within 24 hours of completion of purging activities. Exide uses the dedicated bailers for collection of groundwater samples.

Prior to collecting the samples, the sample containers with appropriate preservatives will be set out. The bailer will be lowered slowly into water, quickly retrieved and emptied into the sample container. Once collected, the samples are labeled using a waterproof label and waterproof ink, placed on ice in an ice chest. The sample number, amount collected, date and

time of collection, and method of preservation are recorded on a chain-of-custody form, Groundwater Collection Report form, and in the logbook.

3.4 SAMPLE PRESERVATION AND HANDLING

The following section discusses the procedures for preserving samples, the sample containers to be employed for the required groundwater monitoring parameters, and procedures for transferring the samples to the offsite laboratory.

The sample containers and associated volumes for the required parameters are outlined in Table 2. Sample containers are certified clean by the laboratory prior to shipment for sampling. The container type and volume is documented on the groundwater field log forms and in the logbook.

Sample preservation, handling and analysis must meet the specifications of Test Methods for Evaluating Solid Waste Physical/Chemical Methods Third Edition (EPA Publication Solid Waste Physical/Chemical Methods Third Edition, EPA Publication Number SW-846, 1986, as revised December, 1987) or an equivalent substitute as approved by LDEQ. Preservation methods and preservatives are presented in Table 2 for the facility groundwater monitoring program. The sample containers are received from the laboratory with the appropriate preservatives.

Samples to be analyzed for dissolved metals are collected in sample containers without preservation. The samples are sent to the laboratory and the laboratory filters the samples prior to analysis.

Immediately upon collection, all sample containers are placed on ice until delivery to the analytical laboratory. Table 2 lists the parameters to be analyzed, and the corresponding test methods and practical quantification limits (PQL).

4.0 DOCUMENTATION

4.1 FIELD LOGBOOK

An up-to-date field logbook is kept to record all pertinent information about the monitor well sampling event. The logbook is a bound notebook with consecutively numbered pages, and records are kept using waterproof ink. Documentation is sufficient to reconstruct each sampling event without relying on the collector's memory. Entries in the logbook typically include:

- Names of the persons performing the sampling;
- Location of the sampling (well number);
- Calibration information for pH, conductivity, and temperature as applicable;
- Water level readings;
- Calculations of the standing-water volume in the well;
- Date and time of sample collection;
- Sample identification number;
- Sample container size, type and preservation;
- Sample distribution (laboratory);
- Weather conditions; and
- Any other field observations.

4.2 SAMPLE LABELS

The sample labels are waterproof and filled out with waterproof ink. At a minimum, the sample label will contain:

- Site name;
- Sample number (monitor well number);
- Collector's name;
- Date and time of sample collection;
- Parameters for analysis; and
- Preservatives, if any.

4.3 GROUNDWATER COLLECTION REPORT FORMS

Groundwater Collection Report forms are used in conjunction with a logbook. A separate groundwater collection report form will be filled out for each well sampled. This form contains blanks for information about the monitor wells, the well evacuation, replicate measurements, sampling and sample condition. Completed groundwater collection report forms are included in the semiannual groundwater reports.

4.4 CHAIN-OF-CUSTODY FORM

Each sample collected for analysis is recorded on a chain-of-custody form. The chain-of-custody form becomes the permanent record of all sample handling and shipment form the time of collection through laboratory analysis. Chain-of-custody documentation will include the following information:

- Sample identification number;
- Date and time of sample collection;
- Date sample was submitted to the laboratory;
- Sample collector's name;
- Number and type of containers;
- Parameters to be analyzed;
- Signature of persons relinquishing and obtaining custody of samples; and
- Date and time of custody transfer.

With each transfer of sample custody, the persons involved will verify sample numbers and conditions. When custody is transferred, both the person relinquishing and receiving custody must sign in the proper place. The transferor will keep a copy of the signed chain-of-custody, and the original chain-of-custody will remain with the samples.

5.0 DECONTAMINATION AND CROSS-CONTAMINATION CONTROL

In order to minimize the possibility of cross-contamination, strict cross-contamination control procedures are followed, including the following.

- Sample jars are kept in limited access areas until used.
- Latex gloves are worn during all sampling activities and changed between sampling events.
- Rope or tubing used for bailing wells is discarded between wells. Only new nylon rope or new tubing is used.
- Equipment refueling is performed only in designated areas, away from any sampling points.
- All purge water, decontamination water and discarded gloves are properly disposed of onsite, either in the facility Waste Water Treatment System (purge water and decontamination water) or in the blast furnace (discarded gloves, rope, tubing and sampling supplies).

All equipment used to collect groundwater samples will be decontaminated prior to the collection of the samples and in between sample locations. Decontamination of this equipment will be accomplished by the following procedure:

- Washing with detergent soap (phosphate free); and
- Triple rinse with clean deionized water.

6.0 ANALYTICAL PARAMETERS

Analyses of the groundwater samples is performed in accordance with SW-846 test methods or an equivalent method if approved by the administrative authority. The test methods and PQLs for the required analytical parameters are specified in Table 2. The following list of Detection Monitoring parameters are specified in the post-closure permit and will be analyzed for all wells.

Conventionals:

- pH
- Specific Conductance
- Chloride
- Sulfate

Metals:

- Dissolved Lead
- Dissolved Cadmium
- Total Iron
- Total Manganese
- Total Sodium

These parameters were selected based on process knowledge and constituents contained in the materials disposed in the closed cells.

7.0 FIELD AND LABORATORY QUALITY ASSURANCE/QUALITY CONTROL

7.1 FIELD QA/QC PROGRAM

The Field Quality Assurance/Quality Control Program will consist of meticulous sampling, handling and transfer procedures previously discussed in Section 3.0. The Field QA/QC program will also include collection of a field blank and duplicate samples.

Field blanks are prepared by the sampling crew by pouring unused deionized water into the sampling containers, handled like a sample and sent to the laboratory for analysis of all parameters. Contaminants found in the field blanks may be attributed to interaction between the sample and container, contaminated rinse water, or a handling procedure that alters the sample analysis results. The results of the field blank should not be used to correct the groundwater data; but the source of the contamination should be identified and corrective action, possibly including resampling, should be initiated.

One duplicate groundwater sample will collected for analysis during each sampling event. The duplicate will be collected from one of the downgradient wells, selected at random. The duplicate will be collected by splitting the groundwater sample into two discrete samples. One sample will be designated as the sample from the monitor well. The duplicate sample will be given a different sample identification number to differentiate it from the other sample. Typically, the sample identification is such that the laboratory does not know from which well the duplicate was collected. The duplicate will be analyzed for the same parameters as the other groundwater samples.

7.2 LABORATORY QA/QC PROGRAM

The analytical laboratory will provide for tuning, calibration and identification of potential matrix interferences using standards, laboratory blanks and spiked samples in accordance with EPA Publication No. SW-846 Third Edition Requirements, 1986, as revised December 1987, or equivalent methods if approved by the administrative authority.

Data from QC samples should be used as a measure of performance or as an indicator of potential sources of contamination, but should not be used to alter or correct analytical data. This data will be reported with other sample results. An effective program to resolve testing problems should be in place for the laboratory and this program should be implemented when such problems arise.

Exide will select a laboratory that has been certified by LDEQ through the Louisiana Environmental Laboratory Accreditation Program (LELAP). A copy of the LELAP certificate from the analytical laboratory will be maintained by Exide.

8.0 MONITOR WELL MAINTENANCE

A monitor well maintenance program has been implemented at the facility to ensure monitor well structural and mechanical integrity. Each monitor well is inspected monthly for damage or potential problems as a part of Exide's RCRA inspection checklist. An example monitor well inspection form is attached. Exide will correct any minor deficiencies in the well conditions when they are detected. LDEQ approval will be obtained before starting any major improvements affecting well construction, placement or design. A written report documenting any damages to the wells along with subsequent repairs will be submitted to LDEQ.

If any wells require plugging and abandonment, Exide will submit a work plan for plugging and abandonment to LDEQ for approval. After the plan has been approved, Exide will plug the well following the standards and guidelines specified in **"Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook"** prepared by LDEQ and the Louisiana Department of Transportation and Development, December 2000.

9.0 REPORTING

Within 15 days after completing the analytical work and review of analyses and computations, Exide will prepare a semiannual groundwater report. Upon completion, the first semiannual report will be submitted to the LDEQ. The second semiannual report will be submitted as the annual report as required by Section VI.G.8 of the Exide Post-closure Permit. These reports will include:

- A table listing analytical results of the groundwater samples;
- A scaled potentiometric surface map showing monitor well locations, groundwater elevations and groundwater flow directions;
- A graph detailing the pH and specific conductivity values for each sampling episode;
- The laboratory data package and chain-of-custody documentation; and
- A statement of whether a statistically significant change in the concentrations of the groundwater samples.

An annual report will be submitted no later than March 1. The annual report will summarize all groundwater activities for the preceding year along with an evaluation of the monitoring strategy in relation to the direction of groundwater flow and the locations of the wells. The annual report will include all of the elements of the semiannual report and contain a summary of the data for the entire year along with a section detailing the cap integrity and inspections.

Exide will use a statistical evaluation of the groundwater monitoring data to determine if there has been a statistically significant change in the concentration or value of groundwater monitoring. This evaluation will be based on procedures specified in LDEQ regulations and the EPA document entitled Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities (EPA-530-510-89-026). A statistical procedure for the evaluation of groundwater monitoring data will be selected after sufficient background monitoring data has been collected. A minimum of four sampling events will be required to establish background levels for the

monitoring parameters. Depending on the statistical approach most appropriate for the Exide site, additional sampling may be required. Discussion on the development of background levels will be presented in the annual report. When the most appropriate statistical method has been determined and adequate sampling data collected, Exide will submit its recommendation to the LDEQ for approval. Statistical evaluation of groundwater data will not begin until the statistical procedure has been approved by the LDEQ.

If it is determined that the detection monitoring program no longer satisfies the requirements of the Post-Closure Permit, Exide will submit an application for a permit modification to make the appropriate changes to the program.

TABLES

TABLE 1

RCRA POINT OF COMPLIANCE MONITORING WELLS
Exide Technologies, Baton Rouge, Louisiana

Well	Type	Zone	Status	Sampling Frequency
MW-1R	UG[1]	Shallow	Existing	Table 1 – S[2]
MW-12R	POC[3]	Shallow	Existing	Table 1 – S; Table 4 – A[4]
MW-13R	POC	Shallow	Existing	Table 1 – S; Table 4 – A
MW-16	POC	Shallow	Existing	Table 1 – S; Table 4 – A
MW-17	POC	Shallow	Existing	Table 1 – S; Table 4 – A
MW-18	POC	Shallow	Existing	Table 1 – S; Table 4 – A
MW-14R	POC	Shallow	Existing	Table 1 – S; Table 4 – A

1 UG-Upgradient Monitoring Well.

2 These wells shall be sampled semi-annually for constituents listed in Table 2 of this SAP.

3 POC-Point of compliance wells.

4 Upon Establishment of a compliance monitoring Program, these wells shall be sampled annually for constituents listed in LAC 33:V.3325.Table 4.

TABLE 2

MONITORING PARAMETERS, ANALYTICAL METHODS, AND MAXIMUM ALLOWABLE CONCENTRATIONS FOR GROUNDWATER PROTECTION STANDARDS

Exide Technologies, Baton Rouge, Louisiana

Parameter	Container Type	Preservation Method	Analytical Method (SW-846)	Maximum Concentration	PQL (µ/L)
Water Level	N/A	N/A	N/A	N/A	N/A
Specific Conductivity	G,P	Field Measurement	9050	N/A	N/A
pH	G,P	Field Measurement	9040	N/A	N/A
Chloride	G,P	Cool to 4° C	9250, 9251, 9252	BG[5]	N/A
Sulfates	G,P	Cool to 4° C	9035, 9036, 9038	BG	N/A
Lead Dissolved[4]	G,P	Filter on site; HNO3 to pH<2 Cool to 4° C	7421	BG	10
Cadmium Dissolved	G,P	Filter on site; HNO3 to pH<2 Cool to 4° C	7131	BG	1
Iron	G,P	HNO3 to pH<2; Cool to 4° C	7381	BG	N/A
Manganese	G,P	HNO3 to pH<2; Cool to 4° C	7461	BG	N/A
Sodium	G,P	HNO3 to pH<2; Cool to 4° C	7770	BG	N/A

[1] Glass (G) or polyethylene (P) containers.

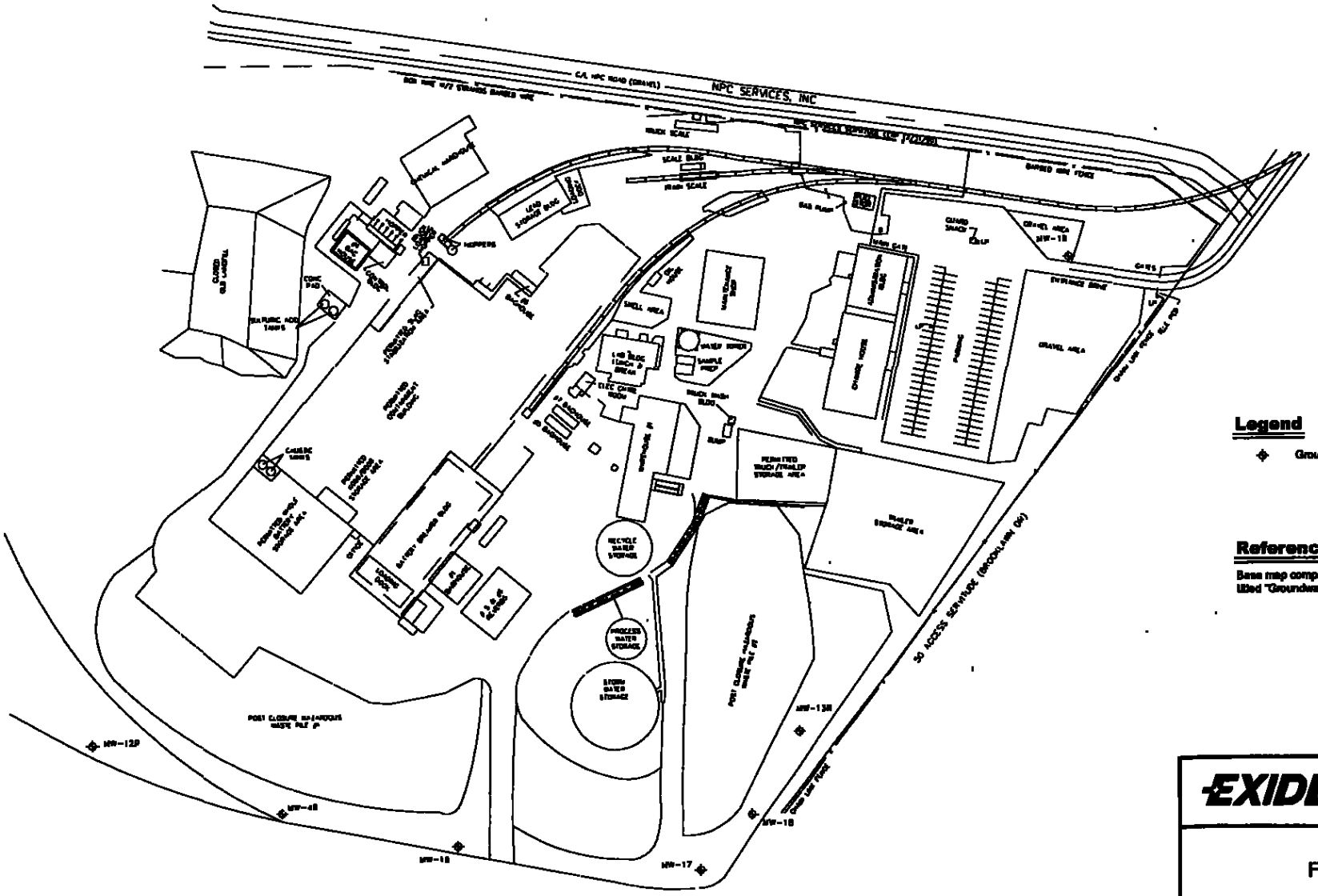
[2] The maximum allowable concentration limits will be the groundwater protection standard, unless changed through permit modification by the Administrative Authority. Background levels have been set at the Practical Quantification Limit (PQL) for non-natural constituents and at Drinking Water Standards for natural constituents unless the Permittee can demonstrate that background levels unaffected by the facility are higher than the standards set and the Administrative Authority approves such limits pursuant to LAC 33:V.3309.B.

[3] The Permittee must report to the Administrative authority, and detectable levels of compounds on Table 1, even if lower than the PQL. The Permittee must provide sufficient justification of a claim of matrix interference which would justify basing a statistical change in groundwater quality for compounds above the PQL instead of using the published SW-846 method detection limit. PQL denotes Practical Quantitation Limit which is the lowest analyte concentration in a given matrix (groundwater) that the Agency believes a competent laboratory can be expected to achieve consistently. All analyses shall be performed using methods from EPA SW-846, 3rd ed. where applicable.

[4] For soluble metals, filter through a 0.45 micron filter and acidize to pH<2 with HNO_3, then cool to 4° C. For total metals, acidize but do not filter. (See "US EPA RCRA Groundwater Monitoring Technical Enforcement Guidance Document".)

[5] BG represents background.

FIGURES



EXIDE

Baton Rouge Smelter
Baton Rouge, Louisiana

Facility Plot Plan

REVISION	DESCRIPTION	DATE
–	–	–
–	–	–

Engrd	TAB	Appd	TAB	Date	06/27/01	Scale	1" = 150'
Drawn	LMH	DWG NO	028-001-8009			FIG	1
Chkd	TAB						

APPENDIX 8

TRAINING MANUAL

TRAINING MANUAL

EXIDE TECHNOLOGIES
BATON ROUGE SMELTER

2400 BROOKLAWN DRIVE
BATON ROUGE, LOUISIANA

Revision 2 – August 2001

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1.0 INTRODUCTION

1.1 Policy

The Exide Technologies, Baton Rouge smelter is located in Baton Rouge, East Baton Rouge Parish, Louisiana. This facility is a secondary lead smelter and refinery that recycles spent lead-acid batteries and inorganic lead-bearing wastes into product lead.

Exide is committed to providing a safe and healthy work place for all of the employees, contractors and vendors at the Baton Rouge smelter. Proper training is essential for accomplishing this goal.

1.2 Scope

This Training Manual outlines the training requirements of Exide Technologies Health and Safety and Environmental Programs. The purpose of this manual is to document the procedures that are used to train all of the employees at the Baton Rouge smelter in all of the required elements of the Health and Safety, and Environmental Programs.

2.0 OBJECTIVES

The objectives of this manual include outlining a Training Program that:

- Promotes the health and safety of Exide employees,
- Provides for safe working conditions at the Baton Rouge smelter,
- Maintains compliance with all applicable environmental, health and safety regulations,
- Satisfies the training requirements of Exide's environmental, health and safety programs.
- Documents that the training has been completed.

Successfully meeting the objectives of this training program require cooperation of all Exide employees. This manual describes the types of training, the training frequency and the documentation necessary to comply with Exide requirements and regulatory considerations. Classroom training is conducted by department supervisors and the Environmental, Health and Safety Department (E,H&S) during weekly safety meetings. Table 1 presents a schedule for the weekly safety meetings. On the job training is typically task or job specific and is conducted by a supervisor or senior employee that is familiar with the job.

2.1 Regulatory Considerations

There are a number of legislative acts, government agencies, and organizations that impose requirements, restrictions, or guidelines for activities conducted at the facility. The major agencies and the associated regulations that affect the Baton Rouge smelter include the following:

- Occupational Safety and Health Agency (OSHA) – 29CRF 1910
- Louisiana Department of Environmental Quality (LDEQ) – LAC 33:III, LAC33.V, LAC33.VII, and LAC33.IX.
- Environmental Protection Agency (EPA) – 40CFR 190-299
- Department of Transportation (DOT) – 29CRF 160-175

3.0 TRAINING PROGRAM

Exide has developed a comprehensive Health and Safety Program for the Baton Rouge smelter. The program presents the guidelines for protection of the safety and health of the employees at the Exide Baton Rouge facility. The overall Health and Safety Program is divided into component programs, such as lockout tagout and confined space entry. The Health and Safety Program is administered by Exide's E,H&S Department.

This manual presents the training requirements specified in the Health and Safety program, as well as all other required training. Sections 3.1 through 3.13 outline the training programs that are in place at the Baton Rouge smelter. Appendix A presents an outline of the required elements of each of the training programs.

Written job descriptions have been developed for each position at the Baton Rouge smelter. The job descriptions list training requirements that the employees must complete. Appendix B presents a copy of these job descriptions.

New hires at the Baton Rouge smelter receive initial training on all required topics prior to beginning work.

3.1 Medical Surveillance Program

The Medical Surveillance Program at the Baton Rouge smelter is designed to protect the health of employees that may be exposed to elevated levels of heavy metals, in particular lead. Key elements of the Medical Surveillance Program include blood lead and air lead monitoring, medical examinations, and medical removal protection. The Medical Surveillance Program also includes drug screening and new hire physical evaluation.

Training on this program includes permissible exposure limits, types and frequency of exposure monitoring and medical removal protection. Part of the medical surveillance

program includes lead exposure training. This training emphases personal hygiene and proper respirator use to reduce exposure. Training is conducted at least once per year, with additional training administered as needed.

3.2 Lockout Tagout Program

The Baton Rouge Lockout Tagout Program describes the procedures to be followed when working on any type of equipment or machinery where the unexpected energizing, startup or release of energy could occur and cause injury. The program was developed to be job and equipment specific, so that employees know the proper lockout tagout procedures for the machinery or equipment in their work area. The lockout tagout program is continuously reviewed by the employees and changes to the program are documented by Management of Change forms.

Classroom training of all employees is conducted at least once per year. Lockout tagout training is also conducted whenever there is a change in employee job assignments, when employees are working near equipment they have not been trained on, a change in equipment, machinery or process, or where energy control procedures have changed. Training covers lockout tagout procedures for specific equipment and job descriptions. Periodic audits of jobs that require lockout tagout are conducted.

3.3 Confined Space Entry Program

The Confined Space Entry Program was developed to provide procedures for the safe work of personnel required to enter confined spaces. A confined space is any area large enough that an employee can enter and perform work, but has limited means of entry or exit, and is not designed for continuous occupancy. The program lists all permit required confined spaces at the Baton Rouge smelter. The program describes permitting, entry procedures, the duties and responsibilities of the entrants and attendants, communication procedures and rescue procedures.

Initial employee training is conducted prior to beginning any confined space entry. Follow-up training is conducted at least annually. Training includes a review of the permitting process, atmospheric testing procedures, calibration of the monitoring equipment, and duties of each person on the confined space entry team.

3.4 Hearing Conservation Program

The Hearing Conservation Program describes noise monitoring of work area, engineering and administrative controls, and hearing conservation measures. The goal of the program is to eliminate hearing loss due to workplace noise exposure.

All employees are trained annually in the effects of noise, the purpose, advantages and disadvantages of various types of hearing protection, and the purpose and procedure of audiometric testing. The training emphasizes the selection, fit and care of hearing protection and includes a review of the hearing conservation areas at the smelter.

3.5 Respiratory Protection Program

Exide has an established Respiratory Protection Program in place at the Baton Rouge smelter. This program is designed to protect employees from air contaminants in the workplace. The program describes the procedures for medical evaluation of employee's ability to wear a respirator, the fit testing procedures, appropriate selection of a respirator, and use, cleaning and storage of respirators. Exide's respiratory protection program is also designed to protect contractors and vendors.

Training includes instruction on respirator fit and how to check the respirator's seal. The training provides employees an oppurtunity to handle the respirator, wear it, adjust it and become familiar with the respirator in a normal breathing air atmosphere. The specific respiratory hazards of each work area are discussed, along with selection methodology and limitation of particular types of respirators. The training instructs the employees in the proper way to don a respirator, fit testing, and proper wear. Respirator maintenance, storage and emergency handling situations are also discussed. Classroom instruction is conducted at least once per year, with on-the-job training, fit testing and personnel instruction being administered as required.

3.6 Powered Industrial Truck Safety

Powered industrial trucks (fork lifts) are used by nearly every department at the Baton Rouge smelter. Powered material handling training is conducted to meet the OSHA 29 CFR 1910.178 and Exide safety requirements. This training consists of classroom instruction and hands-on operation. Operators are trained to understand the basic operations of powered industrial trucks, including pre-start inspections, fueling, stability, visibility, handling, operating environment, obstructions, obstacles, and breakdowns. Possible hazards that may be encountered on the job are discussed. Operators are trained to recognize unsafe conditions and how to react to them when they occur.

Each new employee receives powered material handling safety training. Refresher training is conducted once every three- (3) years.

3.7 Hazard Communication

Training in hazard communications includes topics such as material safety data sheets (MSDS), labeling and placarding, chemical handling and chemical hazards. This training is conducted at least once per year. Training includes a review of the material safety data sheet binders, a discussion of specific chemicals used by department and job descriptions and required labels for trucks, batteries and containers.

3.8 HAZWOPER Training

As specified by OSHA 29CFR1910.120, certain employees conducting operations at treatment storage and disposal facilities must have training in hazardous waste operations. The training is designed to help employees perform their assigned duties and

functions in a safe and healthful manner. This training is specific to job descriptions and work practices, and includes proper personal protective equipment and hazardous material handling procedures.

Every employee is given 8-hours of refresher training annually.

3.9 Baton Rouge Contingency Plan

Exide has prepared an Emergency Contingency Plan that lists emergency procedures and the emergency response organization. This plan was prepared to minimize injury and property damage in the event of a plant emergency or natural disaster. Training requirements include the plant alarm system, assembly areas, emergency response organization, emergency phone lists, fire protection equipment and evacuation routes.

Classroom training on the Emergency Contingency Plan is conducted at a minimum of once per year. Announced and unannounced emergency drills are conducted periodically.

3.10 Environmental Regulations

Training on basic environmental regulations that affect the Baton Rouge smelter is conducted for all employees. This training includes a brief discussion of regulatory agencies and programs that affect operations at the smelter. The training describes specific requirements for various job descriptions and tasks such as inspection schedules, documentation and engineering controls.

Classroom instruction on environmental regulations is conducted once per year, with on-the-job training being administered as required.

3.11 Spill Response

The Baton Rouge smelter has a Spill Prevention Control and Countermeasure Plan (SPCC) as required by LDEQ regulations. The spill response training covers spill prevention and control measures in affect at the site. Also the training discusses what to do in the event of a spill.

Spill response training is conducted at least once per year, typically in conjunction with environmental regulations training.

3.12 Work Practice Training Program

This program outlines methods and practices that when followed will reduce accidents and lead exposure. Training includes molten metal handling, chemical handling, drossing, and refining. Exide's safety consultant, Mr. Mel Cassady, CIH, completed a video exposure monitoring study of various workstations at the smelter. The video exposure monitoring has been incorporated into a Work Practice Training Program. Also part of the Work Practice training, the Baton Rouge smelter developed Job Task Analysis forms

for various jobs performed by smelter employees. This program will result in reductions of air and blood lead levels in workers. Training is conducted at least once per year and is job and task specific.

3.13 DOT Hazardous Material Training

The Department of Transportation (DOT) requires training for all employees involved in transportation of hazardous materials. Exide has a training program in place for employees who:

- load and unload hazardous materials;
- mark containers used in transporting hazardous materials;
- prepare hazardous materials for transporting;
- prepare shipping papers;
- are responsible for the safe transporting of hazardous materials;
- operate a vehicle transporting hazardous materials.

The training covers general awareness of Hazardous Material Regulations and is also function specific, describing specific requirements for each task (loading, labeling, etc.). The training is conducted initially when an employee begins working in a job that requires DOT training. Refresher training is conducted periodically.

3.14 Other Required Training

Other training that is required for all employees at the Baton Rouge smelter include sexual harassment, blood borne pathogens, heat stress, fire extinguisher use and incipient fire control, fall protection, slip trip and fall hazard avoidance, and proper lifting techniques and back protection. These topics are discussed at least once per year in the safety meetings.

4.0 RECORD KEEPING

Each employee that completes a training session fills out a Training Record sign-off sheet. These sign-off sheets are used to document the training. Training records is kept on site for all current employees of the Baton Rouge smelter. The records are retained as required by Exide's Record Retention Policy.

TABLES

Exide Technologies

Memo

To: ALL EMPLOYEES

From: G. Constant

CC: S. Grau, S. Krul

Date: 01/24/01

Re Safety Meeting Schedule

As of Monday January 29th, these changes will occur in the Safety Meeting schedule.

	Monday	Tuesday	Wednesday	Thursday	Friday
7:00	Engitec	Water treatment	Production	Shop	Production
3:00	Casting Yard and second shift maintenance				

The 3:00 meeting will consist of first and second shift yard personnel, second shift maintenance personnel and the casting crew.

Thank you

Gil Constant

Safety Supervisor

APPENDIX A

TRAINING PROGRAMS REQUIRED ELEMENTS OUTLINE

TRAINING PROGRAM REQUIRED ELEMENTS OUTLINE

Medical Surveillance Program

Required Elements of the Program

1 Annual training, with documentation.
2 Annual review of the program.

Training Program Outline

1 Pre-employment physical and annual examinations.
2 OSHA lead, cadmium and arsenic standards.
3 Blood and air lead monitoring.
4 Medical removal protection.

Lockout Tagout Program

Required Elements of the Program

1 Annual training, with documentation.
2 Annual review of the program.

Training Program Outline

1 When is lockout tagout required.
2 Types of stored energy (electric, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy).
3 General lockout tagout procedures.
4 Lockout tagout procedures for specific equipment in the plant.
5 Procedures for outside contractors.

Confined Space Entry Program

Required Elements of the Program

1 Update list of entry supervisors.
2 Reevaluate list of confined spaces.
3 Check that all confined spaces have signs.
4 Annual training with documentation.
5 Meet with outside rescue service and develop procedures for summoning service and preventing unauthorized attempted rescues.
6 Annual review of the program.

Training Program Outline

1 Definition of a Confined Space.
2 Identification of Confined Spaces in the smelter.
3 Confined Space Entry Permits.
4 Pre-entry monitoring.
5 Energy isolation and lockout tagout.
6 Job duties for Entrants, Attendants, and Supervisors.
7 Ventilation and respiratory protection requirements.
8 Communications.

TRAINING PROGRAM REQUIRED ELEMENTS OUTLINE

Hearing Conservation Program

Required Elements of the Program

1 Conduct on-site noise monitoring using personal noise dosimetry on a periodic basis.
2 Post warning signs in high noise areas.
3 Audiometric testing, baseline and annual.
4 Annual training, with documentation.
5 Annual review of the program.

Training Program Outline

1 Identifying hearing protection areas.
2 Types of hearing protection.
3 Proper fit and use of hearing protection.

Respiratory Protection Program

Required Elements of the Program

1 Annual training, with documentation.
1 Annual review of the program.

Training Program Outline

1 Required areas for respirator use.
2 Respirator selection and limitations.
3 Fit testing requirements and procedures.
4 Proper use.
5 Respirator care and maintenance.

Powered Industrial Truck Safety Program

Required Elements of the Program

1 Initial training, both classroom and driving with certification.
2 Refresher training every three years.

Training Program Outline

1 Pre-operation inspections.
2 Operating procedures.
3 Safety Rules.
4 Preventive Maintenance.

Hazard Communication Program

Required Elements of the Program

1 Annual training, with certification.
2 Annual review of the program.

TRAINING PROGRAM REQUIRED ELEMENTS OUTLINE

Training Program Outline

1 Chemical inventory.
2 MSDS binders.
3 Physical and health hazards of chemical used in specific work areas.
4 Proper labeling, handling and storage of chemicals.

Baton Rouge Contingency Plan

Required Elements of the Program

1 Annual training, with documentation.
2 Annual review of the program.
3 Update plan when there is a change in facility operations, personnel, emergency equipment or emergency procedures.

Training Program Outline

1 Contingency Plan officers and duties.
2 Alarm system.
3 Emergency response procedures.
4 Fire drills.
5 Assembly areas.

Spill Response and Environmental Regulations

Required Elements of the Program

1 Annual training, with documentation.
2 Annual review of the SPCC plan.

Training Program Outline

1 Spill prevention and control measure.
2 Regulatory agencies and programs that affect operations at the smelter.
3 Job and task specific environmental requirements.

Work Practice Training Program

Required Elements of the Program

1 Annual training, with documentation.
2 Periodic updates of the JTA system.

Training Program Outline

1 Job Task Analysis.
2 Video exposure monitoring.
3 Safety procedures for molten metal.
4 Chemical handling procedures.
5 Job specific safety procedures.

TRAINING PROGRAM REQUIRED ELEMENTS OUTLINE

DOT Hazardous Material Training

Required Elements of the Program

1 Annual training, with documentation.

Training Program Outline

1 Loading and unloading hazardous materials.
2 Proper labeling, packaging and shipping rules.
3 Shipping papers (bill of lading, manifests).

HAZWOPER 8-Hour Training

Required Elements of the Program

1 Annual training, with documentation.

Coarse Outline

1 Exide's Health and Safety Program: Required PPE, Respiratory Protection, Site Characterization, Lock-Out Tag-Out Program, Confined Space Entry Program and Hearing Conservation Program.

2 HazCom: Labeling, Signs, MSDS System, Site Specific Chemical Hazards, Biological Hazards, Physical Hazards and Molten Material Handling.

3 Medical Surveillance Program: Blood Lead, Arsenic and Cadmium, Air Lead, Video Exposure Monitoring and Exposure Limits.

4 Decontamination and Hygiene Program: Personal Hygiene, Vehicle Decontamination, Water Treatment, Fugitive Dust Control Measures (Road Sweeper, Area Cleanup).

5 Material Handling Program: Drum Handling, Chemical Handling, Upkeep of the Chemical Warehouse and Phosphorus Building, Lead Handling, Handling and Emergency Response for Compressed Gas Cylinders, Oxygen Storage Tanks and Fuel Tanks, Housekeeping.

6 Emergency Response: Baton Rouge Contingency Plan, Alarm System, First Responder Training Fire Extinguisher Use/Location and Utility Disconnects.

7 Unit Specific Hazards: Production, Casting, Battery Breaker, Slag Crusher, Yard, Baghouse, Water Treatment, Shop.

8 Review and Test.

APPENDIX B

JOB DESCRIPTIONS

JOB DESCRIPTION

JOB TITLE: REFINERY FOREMAN

FUNCTION: SUPERVISE THE REFINERY OPERATIONS.

TECHNICAL REQUIREMENTS: MUST HAVE SEVERAL YEARS EXPERIENCE AS A REFINERY OPERATOR, KNOW REFINERY OPERATIONS COMPLETELY AND HAVE A HIGH DEGREE OF MECHANICAL APTITUDE.

TRAINING: TRAINING WILL INCLUDE, BASIC ENVIRONMENTAL REGULATIONS, CHEMICAL HANDLING, CONTINGENCY PLAN, LEAD SMELTING AND RECYCLING, PROPER CLEANUP PROCEDURES, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Understand and oversee all phases of refinery operations.
- Must direct and supervise all maintenance work incidental to the furnace operations.
- Order and maintain an inventory of all chemicals needed for the refinery operations.
- Coordinate with Raw Materials Manager to ensure that the refinery produces all of the required lead products requested by customers.
- Maintain good housekeeping in the refinery area, the chemical warehouse and the lead storage warehouse.
- Train, instruct and supervise new refinery operators.
- Must follow all of Exide's safety rules and practices, and be sure that all of the refinery operators and crews are following safety practices.

JOB DESCRIPTION

JOB TITLE: REFINERY OPERATOR

FUNCTION: PERFORM ALL TASKS ASSOCIATE WITH THE REFINERY OPERATIONS.

TECHNICAL REQUIREMENTS: MUST HAVE SEVERAL YEARS EXPERIENCE IN THE REFINING OF LEAD AND LEAD ALLOYS, MUST BE KNOWLEDGEABLE OF CHEMICAL ADDITIVES REQUIRED TO PRODUCE QUALITY LEAD AND LEAD ALLOY.

TRAINING: TRAINING WILL INCLUDE, BASIC ENVIRONMENTAL REGULATIONS, CHEMICAL HANDLING, CONTINGENCY PLAN, LEAD SMELTING AND RECYCLING, PROPER CLEANUP PROCEDURES, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Conduct and supervise the refinery and casting operations.
- Coordinate with the laboratory staff to ensure proper chemical analysis of refinery produces.
- Conduct and supervise housekeeping in the refinery area, the chemical warehouse and the lead storage warehouse.
- Train, instruct and supervise new refinery and casting personnel.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: CASTER

FUNCTION: PERFORM ALL TASKS REQUIRED BY THE REFINERY OPERATOR FOR THE PRODUCTION OF LEAD AND LEAD ALLOYS.

TECHNICAL REQUIREMENTS: ON THE JOB TRAINING, MOBILE EQUIPMENT OPERATIONS AND SOME BASIC MECHANICAL APTITUDE.

TRAINING: TRAINING WILL INCLUDE, BASIC ENVIRONMENTAL REGULATIONS, CHEMICAL HANDLING, CONTINGENCY PLAN, LEAD SMELTING AND RECYCLING, PROPER CLEANUP PROCEDURES, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Must follow instructions of the refinery operator or refinery foreman.
- Perform routine maintenance work.
- Maintain good housekeeping of the work area.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: FURNACE FOREMAN

FUNCTION: SUPERVISE THE OPERATIONS OF THE SMELTERS TWO BLAST FURNACES AND ONE REVERBATORY FURNACE.

TECHNICAL REQUIREMENTS: MUST HAVE SEVERAL YEARS EXPERIENCE IN FURNACE OPERATIONS, KNOW FURNACE OPERATIONS COMPLETELY AND HAVE A HIGH DEGREE OF MECHANICAL APTITUDE.

TRAINING: TRAINING WILL INCLUDE, BASIC ENVIRONMENTAL REGULATIONS, CHEMICAL HANDLING, CONTINGENCY PLAN, LEAD SMELTING AND RECYCLING, PROPER CLEANUP PROCEDURES, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Understand and oversee all phases of furnace operations including:
  - Ensuring each furnace is properly charged,
  - Checking that no smoke is allowed to escape from the hoods,
  - Ensuring that proper startup and shut-down procedures are followed and documented,
  - Maintain furnace feed rations, to allow for consistent operations.
- Must direct and supervise all work incidental to the furnace operations.
- Work with the baghouse crew to ensure proper ventilation.
- Train, instruct and supervise new furnace operators.
- Must follow all of Exide's safety rules and practices, and be sure that all of the furnace operators and crews are following safety practices.

JOB DESCRIPTION

JOB TITLE: FURNACE OPERATOR

FUNCTION: OPERATE THE BLAST FURNACE OR THE REVERBATORY FURNACE.

TECHNICAL REQUIREMENTS: MUST HAVE EXPERIENCE IN FURNACE OPERATIONS, METALLURGY, CHARGING AND HAVE A HIGH DEGREE OF MECHANICAL APTITUDE.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CHEMICAL HANDLING, CONTINGENCY PLAN, LEAD SMELTING AND RECYCLING, PROPER CLEANUP PROCEDURES, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Direct all functions required to set up and operate the furnace.
- Work with the baghouse crew to ensure proper ventilation.
- Train and instruct new furnace operators.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: FURNACE HELPER

FUNCTION: ASSIST IN THE OPERATION OF THE BLAST FURNACE OR THE REVERBATORY FURNACE.

TECHNICAL REQUIREMENTS: MUST HAVE EXPERIENCE IN FURNACE OPERATIONS, AND HAVE A HIGH DEGREE OF MECHANICAL APTITUDE.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CHEMICAL HANDLING, CONTINGENCY PLAN, LEAD SMELTING AND RECYCLING, PROPER CLEANUP PROCEDURES, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Assist the Furnace Operator in set up and operation the furnace.
- Perform routine maintenance.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: WASTEWATER TREATMENT PLANT FOREMAN

FUNCTION: SUPERVISE THE WASTEWATER TREATMENT PLANT TO ENSURE OPERATIONS WITHIN THE PERMITTED PARAMETERS.

TECHNICAL REQUIREMENTS: MUST HAVE SEVERAL YEARS EXPERIENCE AS A TREATMENT PLANT OPERATOR, MUST HAVE A HIGH DEGREE OF TECHNICAL APTITUDE, MUST BE ABLE TO PERFORM MAINTENANCE ON ALL EQUIPMENT IN THE TREATMENT PLANT, MUST BE ABLE TO TREAT WATER TO ACCEPTABLE STANDARDS.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CHEMICAL HANDLING, CONTINGENCY PLAN, pH CALIBRATION AND MONITORING, PROPER CLEANUP PROCEDURES, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Direct and supervise all work in the wastewater treatment plant.
- Maintain inventory of supplies equipment and chemicals needed for wastewater treatment operations.
- Direct maintenance of all treatment plant equipment.
- Ensure proper documentation procedures are followed.
- Must be able to operate all of the equipment used in the wastewater treatment plant.
- Is responsible for control of chemical dosing and monitoring, to maintain the treatment plant operations within the permitted specifications.
- Train, instruct and supervise new employees at water treatment.
- Must follow all of Exide's safety rules and practices, and be sure that all of the treatment plant operators are following safety practices.

JOB DESCRIPTION

JOB TITLE: WASTEWASTE TREATMENT PLANT OPERATOR

FUNCTION: MAINTAIN THE WASTEWATER TREATMENT PLANT TO ENSURE OPERATIONS WITHIN THE PERMITTED PARAMETERS.

TECHNICAL REQUIREMENTS: MUST HAVE SEVERAL YEARS EXPERIENCE IN TREATMENT PLANT OPERATIONS, WATER AND ACID CHEMISTRY, AND EQUIPMENT MAINTENANCE.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CHEMICAL HANDLING, CONTINGENCY PLAN, pH CALIBRATION AND MONITORING, PROPER CLEANUP PROCEDURES, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Must be able to operate all of the equipment used in the wastewater treatment plant.
- Must be familiar with all of the monitoring procedures and instrumentation used in the treatment plant.
- Is responsible for control of chemical dosing and monitoring, to maintain the treatment plant operations within the permitted specifications.
- Is responsible for all operations and maintenance of equipment.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: BAGHOUSE FOREMAN

FUNCTION: SUPERVISE THE FIVE BAGHOUSES TO ENSURE OPERATIONS WITHIN THE PERMITTED PARAMETERS.

TECHNICAL REQUIREMENTS: MUST HAVE SEVERAL YEARS EXPERIENCE AS A BAGHOUSE OPERATOR, MUST HAVE A HIGH DEGREE OF TECHNICAL APTITUDE, MUST KNOW BAGHOUSE OPERATIONS COMPLETELY.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, BAG HANDLING, BAGHOUSE CLEANUP PROCEDURES, CONTINGENCY PLAN AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Direct and supervise all work in the five facility baghouses.
- Review and submit all daily, weekly, and monthly baghouse checklists.
- Direct maintenance at all of the baghouses.
- Ensure proper documentation procedures are followed.
- Responsible for ordering all supplies necessary for the baghouses.
- Must coordinate with furnace operators and shift foreman to ensure that proper drafts are maintained.
- Supervise and assist the dust reverbatory furnace operator.
- Train, instruct and supervise new employees in the baghouse crew.
- Must follow all of Exide's safety rules and practices, and be sure that all of the baghouse operators are following safety practices.

JOB DESCRIPTION

JOB TITLE: BAGHOUSE OPERATOR

FUNCTION: MAINTAIN THE BAGHOUSES TO ENSURE OPERATIONS WITHIN THE PERMITTED PARAMETERS.

TECHNICAL REQUIREMENTS: MUST HAVE SEVERAL YEARS EXPERIENCE IN BAGHOUSE OPERATIONS, AND EQUIPMENT MAINTENANCE.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, BAG HANDLING, BAGHOUSE CLEANUP PROCEDURES, CONTINGENCY PLAN AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Must be able to operate all of the equipment used in the baghouses.
- Must be familiar with the continuous emissions monitoring system used in the baghouses.
- Must monitor and maintain furnace and kettle floor draft controls.
- Must monitor and document temperature, pressure blower amps, and flows in the baghouses on a daily basis.
- Must check and document the condition of the baghouse interiors on a weekly basis.
- Must check and document shaker mechanism, isolation dampers, bag tension and fans, on a monthly basis.
- Must check and document the baghouse sprinkle system monthly.
- Must change bags when necessary.
- Must assist dust reverbatory furnace operator.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: DUST REVERBATORY FURNACE OPERATOR

FUNCTION: OPERATE ONE OF THE TWO DUST REVERBATORY FURNACES.

TECHNICAL REQUIREMENTS: MUST HAVE SEVERAL YEARS EXPERIENCE AS AN OPERATOR, MUST HAVE A HIGH DEGREE OF TECHNICAL APTITUDE, MUST KNOW THE BASIC ELEMENTS OF BAGHOUSE OPERATIONS.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CONTINGENCY PLAN, FURNACE OPERATIONS, CLEANUP PROCEDURES, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Operate one of the two dust reverbatory furnaces in a safe and environmentally sound manner.
- Complete daily documentation of activities.
- Perform preventive maintenance of the furnaces.
- Assist baghouse crew in maintenance and upkeep of the baghouses.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: SLAG STABILIZATION FOREMAN

FUNCTION: SUPERVISE THE SLAG STABILIZATION PROCESS AND PERSONNEL TO ENSURE OPERATIONS WITHIN THE PERMITTED PARAMETERS.

TECHNICAL REQUIREMENTS: MUST HAVE SEVERAL YEARS EXPERIENCE AS A SLAG STABILIZATION OPERATOR, MUST HAVE A HIGH DEGREE OF TECHNICAL APTITUDE, MUST KNOW STABILIZATION OPERATIONS COMPLETELY.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CONTINGENCY PLAN HAZARDOUS MATERIAL HANDLING, LANDFILL OPERATIONS, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Direct and supervise all work at the slag stabilization unit.
- Complete daily slag stabilization reports.
- Direct all maintenance of the slag stabilization unit.
- Ensure the vehicles receive proper preventive maintenance and care.
- Responsible for ordering all supplies and chemicals necessary for the operation.
- Train, instruct and supervise new employees in the slag stabilization crew.
- Must follow all of Exide's safety rules and practices, and be sure that all of the slag crew is following safety practices.

JOB DESCRIPTION

JOB TITLE: SLAG STABILIZATION OPERATOR

FUNCTION: OPERATE THE SLAG STABILIZATION UNIT WITHIN THE PERMITTED PARAMETERS.

TECHNICAL REQUIREMENTS: MUST HAVE SEVERAL YEARS EXPERIENCE OPERATING THE SLAG STABILIZATION UNIT, MUST BE A MOBILE EQUIPMENT OPERATOR AND HAVE EXPERIENCE WITH EQUIPMENT MAINTENANCE.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CONTINGENCY PLAN SLAG HANDLING, CLEANUP PROCEDURES, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Must be able to operate all of the equipment used at the slag stabilization unit in a safe and environmentally sound manner.
- Must be familiar with the landfill operations and requirements.
- Must be able to sort slag to ensure that only blast furnace slag is processed.
- Must maintain good housekeeping in the area.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: YARD FOREMAN

FUNCTION: SUPERVISE THE YARD OPERATION AND PERSONNEL.

TECHNICAL REQUIREMENTS: MUST HAVE SEVERAL YEARS EXPERIENCE WORKING IN THE YARD, MUST HAVE A HIGH DEGREE OF MECHANICAL APTITUDE.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CONTINGENCY PLAN, HAZARDOUS MATERIAL HANDLING, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Direct and supervise all work incidental to the yard department operation including personnel and maintenance of equipment.
- Order supplies used by the yard crew.
- Monitor truck traffic and speed limits in and out of the smelter.
- Supervise unloading of materials.
- Review and sign hazardous waste manifests associated with the receipt of incoming shipments of hazardous waste.
- Train, instruct and supervise new employees on the yard crew.
- Must follow all of Exide's safety rules and practices, and be sure that all of the yard crew is following safety practices.

JOB DESCRIPTION

JOB TITLE: YARD MAN

FUNCTION: PERFORM TASKS ASSOCIATED WITH ALL PHASES OF THE YARD OPERATIONS.

TECHNICAL REQUIREMENTS: MUST BE A MOBILE EQUIPMENT OPERATOR AND HAVE EXPERIENCE HANDLING, SHIPPING AND RECEIVING PRODUCTS.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CONTINGENCY PLAN, INCOMING HAZARDOUS MATERIAL HANDLING, CLEANUP PROCEDURES, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Must load produced lead for shipment.
- Must unload lead-bearing materials (including hazardous materials) for recycling.
- Must load sodium sulfate salt for shipment..
- Must maintain good housekeeping in the area.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: CX BATTERY BREAKER SUPERVISOR

FUNCTION: SUPERVISE THE BATTERY BREAKER OPERATION AND PERSONNEL.

TECHNICAL REQUIREMENTS: MUST HAVE EXPERIENCE WORKING IN THE BATTERY BREAKER UNIT, MUST HAVE A HIGH DEGREE OF MECHANICAL APTITUDE AND CHEMICAL KNOWLEDGE.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CONTINGENCY PLAN, CHEMICAL HANDLING, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Direct and supervise all work at the battery breaker operation including personnel and maintenance of equipment.
- Inventory and order any supplies, chemicals and equipment necessary for the operation of the unit.
- Monitor the unloading dock to be sure that enough batteries are available and stored properly.
- Supervise the breaker unit operations including monitoring all of the neutralization, desulfurization and crystallization procedures.
- Ensure that samples are collected following the proper procedures and frequencies.
- Complete proper documentation of activities.
- Train, instruct and supervise new employees on the battery breaker crew.
- Must follow all of Exide's safety rules and practices, and be sure that all of the battery breaker crew is following safety practices.

JOB DESCRIPTION

JOB TITLE: CX BATTERY BREAKER OPERATOR

FUNCTION: CONTROL AND OPERATE THE CX BATTERY BREAKER UNIT.

TECHNICAL REQUIREMENTS: MUST COMPLETE OPERATOR TRAINING AT THE BATTERY BREAKER UNIT, MUST HAVE A HIGH DEGREE OF MECHANICAL APTITUDE AND CHEMICAL KNOWLEDGE.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CONTINGENCY PLAN, CHEMICAL HANDLING, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Perform all work incidental to the battery breaker operation.
- Monitor the performance of the unit.
- Perform routine and preventive maintenance.
- Calibrate and adjust meters.
- Collect all of the required samples.
- Train, instruct and supervise new employees on the yard crew.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: CX BATTERY BREAKER DOCK LEADER

FUNCTION: SUPERVISE THE LOADING DOCK AT THE CX BATTERY BREAKER UNIT.

TECHNICAL REQUIREMENTS: MUST HAVE EXPERIENCE WORKING AT THE BATTERY BREAKER DOCK, MUST BE A MOBIL EQUIPMENT OPERATOR.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CONTINGENCY PLAN, CHEMICAL (BATTERY) HANDLING, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Direct and supervise the work at the dock including personnel and maintenance of equipment.
- Be sure that the unit has a steady supply of batteries.
- Monitor truck traffic in and out of the dock.
- Supervise unloading of batteries to ensure that incompatible materials are not feed into the unit.
- Train, instruct and supervise new employees on the dock crew.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: CX BATTERY BREAKER DOCK CREW

FUNCTION: UNLOAD BATTERIES AT THE DOCK AND FEED THEM INTO THE CX BATTERY BREAKER UNIT.

TECHNICAL REQUIREMENTS: MUST BE A MOBIL EQUIPMENT OPERATOR AND HAVE A HIGH DEGREE OF MECHANICAL APTITUDE.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CONTINGENCY PLAN, CHEMICAL (BATTERY) HANDLING, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Unload batteries from trucks onto the dock.
- Remove the shrink wrap and cardboard from the batteries.
- Inspect batteries to insure that they are compatible.
- Load batteries into the unit.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: MECHANIC

FUNCTION: REPAIR AND UP-KEEP OF ALL PLANT EQUIPMENT, VEHICLES AND SYSTEMS.

TECHNICAL REQUIREMENTS: HIGH DEGREE OF MECHANICAL APTITUDE.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CONTINGENCY PLAN, CHEMICAL HANDLING, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Inspect, maintain and repair all of the plant mobile equipment (sweeper, forklifts, scoops, backhoe and dump trucks).
- Install, maintain, troubleshoot and repair pumps, conveyors, gearboxes, and hydraulic systems.
- Install, maintain and repair all piping in the plant.
- Install, maintain and repair valves, hoses, fittings, bearing, gages and meters.
- Operate mobile equipment.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: ELECTRICIAN

FUNCTION: REPAIR AND MAINTAIN ALL OF THE PLANT ELECTRICAL SYSTEMS.

TECHNICAL REQUIREMENTS: HIGH DEGREE OF ELECTRICAL KNOWLEDGE AND MECHANICAL APTITUDE.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CONTINGENCY PLAN, CHEMICAL HANDLING, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Repair all of the plant electrical systems.
- Work with plant engineers on the installation of new electrical systems.
- Inspect and calibrate equipment.
- Maintain inventory and order electrical supplies and equipment.
- Operate mobile equipment.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: WELDER

FUNCTION: REPAIR AND UPKEEP OF ALL OF THE PLANT METAL SURFACES.

TECHNICAL REQUIREMENTS: WELDING EXPERIENCE AND MECHANICAL APTITUDE.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CONTINGENCY PLAN, CHEMICAL HANDLING, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Weld and repair all metal units including baghouses, blast furnaces, reverbatory furnace, dust reverb furnaces, slag crusher, battery breaker, casting machines and refinery kettles.
- Repair all metal flue pipes, water lines, tanks, and screw conveyors.
- Assist mechanic with repair and upkeep of plant equipment.
- Fabricate equipment and parts.
- Maintain an inventory of welding supplies and order supplies and equipment when needed.
- Operate mobile equipment.
- Must follow all of Exide's safety rules and practices.

JOB DESCRIPTION

JOB TITLE: CHANGE HOUSE, LUNCHROOM AND RESPIRATOR MAINTENANCE OPERATOR

FUNCTION: PERFORM TASK ASSOCIATED WITH MAINTAINING RESPIRATORS, CLEANING THE CHANGE HOUSE AND THE LUNCHROOM.

TECHNICAL REQUIREMENTS: MUST BE ABLE TO FOLLOW SPECIFIC PROCEDURES AND CLEANING INSTRUCTIONS.

TRAINING: TRAINING WILL INCLUDE BASIC ENVIRONMENTAL REGULATIONS, CONTINGENCY PLAN, CHEMICAL HANDLING, PROPER CLEAN-UP PROCEDURES, AND ALL EXIDE SAFETY PROCEDURES INCLUDING LOCKOUT TAG-OUT, CONFINED SPACE ENTRY, RIGHT-TO-KNOW, BLOOD LEAD MONITORING, RESPIRATORY PROTECTION, AND MSDS.

DUTIES AND RESPONSIBILITIES:

- Clean and repair respirators daily.
- Supervise and conduct cleaning of the change house and the lunchroom daily.
- Issue all of the required personal protective equipment.
- Wash, dry and sort work clothes, coveralls, and associated clothing daily.
- Maintain an inventory of supplies and order supplies and equipment when needed.
- Must follow all of Exide's safety rules and practices.

APPENDIX 9

CLOSURE/POST-CLOSURE PLAN

EXIDE® CORPORATION

SCHUYLKILL METALS DIVISION

HOME OFFICE

P.O. Box 74040
BATON ROUGE, LA 70874-4040
504-775-3040
FAX 504-775-3057

CANON HOLLOW BRANCH

P.O Box 156
FOREST CITY, MO 64451-0156
816-446-3321
FAX 816-446-3324

March 3, 1999

Dr. James H. Brent, Ph.D.
Administrator, Hazardous Waste Division
Office of Solid and Hazardous Waste
Louisiana Dept. of Environmental Quality
P.O. Box 82178
Baton Rouge, LA 70884-2178

RE: Class I Permit Modification - Revised Facility Closure Plan
Exide Corporation, Baton Rouge Smelter
LAD008184137

Dear Dr. Brent:

Enclosed please find 5 copies of this Class 1 Permit Modification, Exide Corporation's Revised Facility Closure Plan. This Closure Plan contains updated closure and post-closure cost estimates and updated closure procedures.

I would like to thank you for the assistance your staff has shown me during these discussions, and I look forward to working with them in the future. If you have any questions or require additional information, please call me (504) 775-3040 extension 142.

Sincerely,

Steve Krul
Environmental Manager

cc: Fred Ganster – Exide Environmental Operations

REVISED FACILITY CLOSURE PLAN

EXIDE CORPORATION, BATON ROUGE SMELTER

LAD008184137

Prepared for:
Exide Corporation
Baton Rouge Smelter

February 1999

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1.0 INTRODUCTION

This revised Facility Closure Plan has been developed for the Exide Corporation (Exide) Baton Rouge smelter in accordance with Chapter 35 of the Louisiana Department of Environmental Quality – Hazardous Waste Division (LDEQ-HWD) Environmental Regulatory Code. This closure plan includes a section describing the facility background and operations, the closure methodologies for each permitted hazardous waste unit, and a closure and post-closure cost estimate. The cost estimates were prepared in accordance with Chapter 37 of the LDEQ-HDW Environmental Regulatory Code.

This revised Closure Plan is being submitted to update the closure cost estimates and closure procedures. The revised closure cost estimates are listed on Table 1, and described in Section 4.0.

2.0 BACKGROUND

The Exide Baton Rouge smelter is located at 2400 Brooklawn Drive, in East Baton Rouge Parish, Louisiana. This facility is a secondary lead smelter and refinery which recycles inorganic lead-bearing materials into lead pig and block ingots, which are sold to customers for use in making batteries, weights, bearings, ammunition, and chemicals. The facility has been in operation since the early 1960s.

Most of the raw materials used by the Baton Rouge smelter to produce lead are purchased off-site. The lead-bearing raw materials are delivered to the facility in trucks or trailers and are unloaded at the loading dock. Lead acid batteries are either fed directly into the battery breaker or are stored temporarily at the truck/trailer storage area. Other lead-bearing materials are received in drums. These drums will either be emptied into a feed-stock pile in the containment building or held temporarily in the K069/D008 storage area. Lead acid batteries are processed by cutting the batteries, separating them into individual components and storing the lead-rich paste in the containment building prior to smelting. The facility operates two blast furnaces and one reverbatory furnace that are used to smelt the lead-bearing raw materials. The molten lead is cast into ingots using two casting machines. The lead ingots are loaded into trucks and transported off-site for reuse. The only non-recycled waste produced at the Baton Rouge smelter is a blast furnace slag. This slag contains mostly iron, silica and calcium oxides. The slag is treated by mixing with Portland cement and sodium silicate and is placed into a permitted solid waste landfill.

On September 30, 1993 the facility was issued a Final Operating Permit (No.LAD008184137-OP-1) by the LDEQ-HWD. The Baton Rouge smelter has three permitted hazardous waste storage areas, two are existing (the truck/trailer storage area and the K069/D008 storage area), and one is planned (the whole battery storage area). The facility has one existing permitted treatment area, the slag stabilization area. Exide also has a containment building that is used to store raw materials prior to recycling. All of these units are shown on the site map presented on Figure 1.

3.0 CLOSURE PROCEDURES

3.1 General

The hazardous waste units at the facility will be clean closed. No hazardous waste or waste residual will be left at a closed unit. The closure procedures described herein are based on Exide hiring a third party contractor or consultant to perform the closure activities. Personnel, equipment or resources from the Baton Rouge smelter will not be used in any manner as a part of the closure procedures. For each hazardous waste unit, the closure procedures will describe:

- closure methodologies for the specific units,
- maximum inventory of hazardous materials at each unit,
- a description of how the hazardous material will be removed from the unit,
- a description of the decontamination procedures to be used for each unit,
- the confirmation sampling procedures to be followed at each unit to confirm clean closure.

3.2 The Slag Stabilization Unit

The slag stabilization unit is a hazardous waste treatment unit. As a part of recycling spent lead batteries, a blast furnace slag is generated. After the slag is allowed to cool, it is treated at the slag stabilization unit. The slag is crushed to small diameter, and then treated by mixing with Portland cement and sodium silicate and is placed into a permitted solid waste landfill (GD-033-2054/P0326). Stabilized slag is sampled and analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) at least quarterly. It is planned that the slag stabilization unit will continue to operate for the lifetime of the Baton Rouge smelter. Partial closure of this unit is not anticipated.

Closure of this unit will involve removal of all slag, disposal of the slag in a permitted hazardous waste landfill, decontamination of the area and confirmation that clean closure has been achieved.

The maximum inventory of slag at the slag stabilization unit was calculated to be 144.4 tons, as shown on Table 1A. The residual slag will be loaded into lined end dump trailers. An off-site contractor using rented or contractor supplied front-end loaders will complete the loading. The trailers will transport the slag off-site to a permitted hazardous waste disposal site.

Once the residual slag has been removed, the entire slag stabilization area along with the slag crusher feed vessel will be decontaminated using steam cleaners. The front-end loader used to load the slag will also be decontaminated. The wash water will be collected in third-party supplied trailers and transported for off-site disposal. Samples of the wash water will be collected and analyzed for lead to determine if the decontamination process is complete. It is estimated that 23,500 gallons of wash water will be generated, contained, transported and disposed. Personal protective equipment for the decontamination crew will include, respirators with particle cartridges, tyvek suits, gloves and hardhats with splashguards.

Once decontamination is complete, five (5) confirmation samples will be collected and analyzed. The samples will be collected by drilling through the concrete and collecting soil samples for lead analysis. A certification report will be prepared and certified by an independent registered professional engineer, stating the facility was closed in accordance the approved closure plan.

3.3 The Containment Building

The containment building stores lead-bearing raw materials that will be recycled in the blast or reverbatory furnaces. The building is divided into bins where particular feedstock or slag is stored. The containment building is constructed with a 5-inch thick modified asphalt and 4-inch thick concrete primary liner. The primary liner overlays a leak detection granular layer, which overlays a 1.5-inch thick asphalt and 4-inch thick concrete secondary liner. The boundaries of the building are sloped to collect any liquids that may be present. The building is completely enclosed and ventilated. It is planned that the containment building will continue to operate for the lifetime of the Baton Rouge smelter. Partial closure of the containment building is not anticipated.

The maximum inventory of slag in the containment building was calculated to be 3,333 tons, as detailed in Table 1B. The residual slag will be loaded into lined end dump trailers. An off-site contractor using rented or contractor supplied front-end loaders will complete the loading. The trailers will transport the slag off-site to a permitted hazardous waste disposal site.

The maximum inventory of battery components and other lead-bearing materials has been calculated to be 10,000 tons, as shown on Table 1B. This material will be loaded into vehicles and transported to another lead smelter for recycling.

Once all of the residual slag and the lead-bearing raw materials have been removed, a sweeper truck will be used to clean any residual material. After sweeping, the walls and floor of the containment building will be decontaminated using steam cleaners. The front-end loaders used to load the inventory and the sweeper truck will also be decontaminated. The wash water will be collected in third-party supplied trailers and transported for off-site disposal. Samples of the wash water will be collected and analyzed for lead to determine if the decontamination process is complete. It is estimated that 317,216 gallons of wash water will be generated, contained, transported and disposed. Personal protective equipment for the decontamination crew will include, respirators with particle cartridges, tyvek suits, gloves and hardhats with splashguards.

Once decontamination is complete, seventy (70) confirmation samples will be collected and analyzed. The samples will be collected by drilling through the concrete and collecting soil samples for lead analysis. A certification report will be prepared and certified by an independent registered professional engineer. The report will certify that the containment building was closed in accordance the approved closure plan.

3.4 K069/D008 Storage Area

The K069/D008 storage area is located in the western portion of the containment building. This area is used to hold drums containing lead-bearing materials purchased from outside sources, until the material is recycled. The drums are inspected to insure that free liquid is not present. The floor of this storage area is constructed of concrete with no cracks or gaps. The floors are slope to drain into a sump. The drums are stacked on pallets, two pallets high, four drums to a

pallet. The K069/D008 storage area is an integral part of the facility operation. Closure of this unit is not anticipated. However, this unit may be relocated at a later date.

The maximum inventory of material in the K069/D008 storage area is 544 drums or 29,920 gallons. The inventory will be loaded into vehicles using a fork lift and transported to another lead smelter for recycling.

The area will be decontaminated using steam cleaners. The wash water will be collected in third-party supplied trailers and transported for off-site disposal. Samples of the wash water will be collected and analyzed for lead to determine if the decontamination process is complete. It is estimated that 5,750 gallons of wash water will be generated, contained, transported and disposed. Personal protective equipment for the decontamination crew will include, respirators with particle cartridges, tyvek suits, gloves and hardhats with splashguards.

Once decontamination is complete, 2 confirmation samples will be collected and analyzed. The samples will be collected by drilling through the concrete and collecting soil samples for lead analysis. A certification report will be prepared and certified by an independent registered professional engineer, stating the K069/D008 storage area was closed in accordance the approved closure plan.

3.5 Truck/Trailer Storage Area

Batteries that are received by Exide are either unloaded at the loading dock or are stored in the truck/trailer storage area. Batteries at the truck/trailer storage area are stored on pallets prior to being processed in the battery breaking area. It is planned that the Truck/Trailer storage area will continue to operate for the lifetime of the Baton Rouge smelter. Partial closure of this area is not anticipated.

The maximum inventory of batteries stored in this area is 85,000 batteries, or 85,000 gallons. The inventory is already loaded on trailer, however, time has been allotted for restacking and ordering the loaded batteries. The batteries will be transported to another lead smelter for recycling.

The area will be decontaminated using steam cleaners. The wash water will be collected in third-party supplied trailers and transported for off-site disposal. Samples of the wash water will be collected and analyzed for lead to determine if the decontamination process is complete. It is estimated that 17,280 gallons of wash water will be generated, contained, transported and disposed. Personal protective equipment for the decontamination crew will include, respirators with particle cartridges, tyvek suits, gloves and hardhats with splashguards.

Once decontamination is complete, fifteen (15) confirmation samples will be collected and analyzed. The samples will be collected by drilling through the concrete and collecting soil samples for lead analysis. A certification report will be prepared and certified by an independent registered professional engineer. The closure report will state the truck/trailer storage area was closed in accordance the approved closure plan.

3.6 The Whole Battery Storage Area

The proposed whole battery storage area will be used to store batteries prior to processing them. The batteries will be stored on pallets. This area has not yet been constructed. No closure date for this unit has been designated, and partial closure is not expected.

The maximum inventory of spent batteries will be 81,000 batteries or 81,000 gallons. The inventory will be loaded into vehicles using a fork lift and transported to another lead smelter for recycling.

The area will be decontaminated using steam cleaners. The wash water will be collected in third-party supplied trailers and transported for off-site disposal. Samples of the wash water will be collected and analyzed for lead to determine if the decontamination process is complete. It is estimated that 9,500 gallons of wash water will be generated, contained, transported and disposed. Personal protective equipment for the decontamination crew will include, respirators with particle cartridges, tyvek suits, gloves and hardhats with splashguards.

Once decontamination is complete, eight (8) confirmation samples will be collected and analyzed. The samples will be collected by drilling through the concrete and collecting soil samples for lead analysis. A certification report will be prepared and certified by an independent registered professional engineer, stating the whole battery storage area was closed in accordance the approved closure plan.

4.0 CLOSURE COST ESTIMATES

It is estimated that the cost of closing the permitted and interim status hazardous waste units at the facility, as described in this closure plan, is approximately $1,256,993.10. A detailed cost estimate is provided in Table 1. The detailed cost estimate was calculated in accordance with the requirements of LAC 33:V.3705. The cost estimate is based on the following assumptions:

- The cost is estimated in current dollars, as of November 1998.
- Closure costs are based on hiring third party contractors and consultants to close the units.
- Closure costs do not include any salvage value from the sale of hazardous waste, structures, land or other assets.

A breakdown of the closure costs for each unit is included. Table 1A presents the detailed cost estimate for the slag stabilization area. Table 1B presents the detailed cost estimate for the containment building. The detailed cost estimate for the K069/D008 storage area is presented on Table 1C. Table 1D lists the detailed cost estimate for the truck/trailer area and Table 1E has the whole battery storage area cost breakdown. Each of these tables lists the following information:

- the calculations to determine the maximum inventory,
- The unit cost of loading, transporting and disposing of the maximum inventory,

- the dimensions of the unit to be decontaminated,
- the number of people needed to complete decontamination of the unit,
- the calculation for the amount of wash water generated during decontamination,
- the number of water and soil confirmation samples to be collected at the closed unit,
- the type and amount of equipment that needs to be rented for closure activities,
- and the cost of preparing a closure certification report for each unit.

The closure cost estimate has been used by Exide to update Financial Assurance for the Baton Rouge smelter.

5.0 POST-CLOSURE CARE

The Baton Rouge smelter has two units in post-closure care, Closed Waste Pile No.1 and Closed Waste Pile No. 2. Figure 1 shows the locations of these units. The units are slag disposal areas that were closed in-place in 1985 and 1986. The post-closure period is 18 years, since the units have been closed for a period of 12 years at this time.

Post-closure care of these units involves maintenance of the cap and groundwater monitoring. Cap maintenance includes top-soil maintenance, fertilizing, reseeding, and grass cutting and upkeep. Cap integrity inspections will be performed and an annual certification by an engineer will be completed, documenting the integrity of the caps. Groundwater monitoring activities include purging and sampling 7 monitor wells twice per year, collection and analysis of groundwater samples and preparation of an annual report. One well MW-1R is located up gradient of the closed units, and six wells, MW-4R, MW-12R, MW-13R, MW-16, MW-17 and MW-18 are located down gradient of the closed units. The groundwater samples from each well will be analyzed for chloride, sulfate, total lead, total cadmium, total organic carbon (TOC) and total organic halogen (TOX). The annual report will contain the analytical data, potentiometric maps and a summary of the groundwater quality for the closed units.

Table 2 presents the post-closure care cost estimates. These estimates were prepared in accordance with LAC 33:V.3709, using current dollar values as of November 1998. The estimates are based on hiring third-party contractors or consultants to perform the post-closure activities.

TABLES

TABLE 1
SUMMARY OF CLOSURE COSTS

Description	Units	Unit Cost	Total Cost
A. Slag Stabilization Area			
1 Loading of Residual Slag (144.4 tons)	144.4	$2.00	$288.80
2 Transportation of Residual Slag (144.4 tons)	144.4	$27.50	$3,971.00
3 Disposal of Residual Slag (144.4 tons)	144.4	$150.00	$21,660.00
4 Facility Decontamination (10 hours)	10	$127.00	$1,270.00
Slag Vessel Decontamination	1	$500.00	$500.00
5 Water Characterization	5	$50.00	$250.00
6 Transportation of Wash Water (5 loads)	5	$326.00	$1,630.00
7 Disposal of Wash Water (23,500 gallons)	23,500	$0.15	$3,525.00
8 Personal Protective Equipment	6	$45.00	$270.00
9 Confirmation Sampling	5	$500.00	$2,500.00
10 Laboratory Analysis (including QA/QC samples)			
a. Wash Water	6	$18.00	$108.00
b. Concrete Core Samples	6	$20.00	$120.00
11 Equipment Lease			
a. Front End Loader	1	$125.00	$125.00
b. Steam Cleaners	5	$45.00	$225.00
12 Certification	1	$5,000.00	$5,000.00
Subtotal - A			**$41,442.80**

TABLE 1
SUMMARY OF CLOSURE COSTS

Description	Units	Unit Cost	Total Cost
B. Containment Building			
1 Inventory Disposal - Residual Slag			
a. Loading Inventory (3,333 tons)	3,333	$2.00	$6,666.00
b. Transportation of Inventory (3,333 tons)	3,333	$27.50	$91,657.50
c. Disposal of Inventory (3,333 tons)	3,333	$150.00	$499,950.00
Inventory Removal - Lead Material for Reuse			
d. Loading Inventory (10,000 tons)	10,000	$2.00	$20,000.00
e. Transportation of Inventory (10,000 tons)	10,000	$18.00	$180,000.00
2 Facility Decontamination			
a. Sweeping (10 hours)	10	$18.00	$180.00
b. Decontamination (115 hours)	115	$397.00	$45,655.00
3 Water Characterization	64	$50.00	$3,200.00
4 Transportation of Wash Water (64 loads)	64	$326.00	$20,864.00
5 Disposal of Wash Water (317,216 gallons)	317,216	$0.15	$47,582.40
6 Confirmation Sampling	70	$500.00	$35,000.00
7 Personal Protective Equipment	273	$45.00	$12,285.00
8 Laboratory Analysis (including QA/QC samples)			
a. Wash Water	67	$18.00	$1,206.00
b. Concrete Core Samples	74	$20.00	$1,480.00
9 Equipment Lease			
a. Front End Loaders	2	$125.00	$250.00
b. Steam Cleaners	20	$360.00	$7,200.00
c. Sweeper	1	$1,300.00	$1,300.00
10 Certification	1	$9,000.00	$9,000.00
Subtotal B			$983,475.90

TABLE 1
SUMMARY OF CLOSURE COSTS

Description	Units	Unit Cost	Total Cost
C. K069/D008 Storage Area			
1 Inventory Disposal			
a. Loading Inventory (544 55-gallon Drums)	544	$0.45	$244.80
b. Transportation of Inventory (544 Drums)	544	$15.00	$8,160.00
2 Facility Decontamination (4 hours)	4.0	$73.00	$292.00
3 Water Characterization	2	$50.00	$100.00
4 Transportation of Wash Water (2 load)	2	$326.00	$652.00
5 Disposal of Wash Water (5,750 gallons)	5,750	$0.15	$862.50
6 Confirmation Sampling	2	$500.00	$1,000.00
7 Personal Protective Equipment	3	$45.00	$135.00
8 Laboratory Analysis (including QA/QC samples)			
a. Wash Water	3	$18.00	$54.00
b. Concrete Core Samples	3	$20.00	$60.00
9 Equipment Lease			
a. Fork Lift	1	$75.00	$75.00
b. Steam Cleaners	2	$45.00	$90.00
10 Certification	1	$4,000.00	$4,000.00
Subtotal C			**$15,725.30**

TABLE 1
SUMMARY OF CLOSURE COSTS

Description	Units	Unit Cost	Total Cost
D. Truck/Trailer Storage Area			
1 Inventory Disposal			
a. Loading Inventory (85,000 batteries)	85,000	$0.01	$850.00
a. Transportation of Inventory (85,000 batteries)	85,000	$0.42	$35,700.00
2 Facility Decontamination (6 hours)	6	$109.00	$654.00
3 Water Characterization	6	$50.00	$300.00
4 Transportation of Wash Water (4 loads)	4	$326.00	$1,304.00
5 Disposal of Wash Water (17,280 gallons)	17,280	$0.15	$2,592.00
6 Confirmation Sampling	15	$500.00	$7,500.00
7 Personal Protective Equipment	5	$45.00	$225.00
8 Laboratory Analysis (including QA/QC samples)			
a. Wash Water	7	$18.00	$126.00
b. Concrete Core Samples	16	$20.00	$320.00
9 Equipment Lease			
b. Steam Cleaners	4	$45.00	$180.00
10 Certification	1	$3,500.00	$3,500.00
Subtotal D			**$53,251.00**

TABLE 1
SUMMARY OF CLOSURE COSTS

Description	Units	Unit Cost	Total Cost
E. Whole Battery Storage Area			
1 Inventory Disposal			
a. Loading Inventory (81,000 batteries)	81,000	$0.05	$4,050.00
b. Transportation of Inventory (81,000 batteries)	81,000	$0.42	$34,020.00
2 Facility Decontamination (5 hours)	5	$91.00	$455.00
3 Water Characterization	2	$50.00	$100.00
4 Transportation of Wash Water (2 loads)	2	$326.00	$652.00
5 Disposal of Wash Water (9,500 gallons)	9,500	$0.15	$1,425.00
6 Confirmation Sampling	8	$500.00	$4,000.00
7 Personal Protective Equipment	4	$45.00	$180.00
8 Laboratory Analysis (including QA/QC samples)			
a. Wash Water	3	$18.00	$54.00
b. Concrete Core Samples	9	$20.00	$180.00
9 Equipment Lease			
a. Fork Lift	1	$75.00	$75.00
b. Steam Cleaner	3	$45.00	$135.00
10 Certification	1	$3,500.00	$3,500.00
Subtotal E			**$48,826.00**
CLOSURE COSTS			**$1,142,721.00**
10% CONTINGENCY			$114,272.10
TOTAL CLOSURE COSTS			**$1,256,993.10**

TABLE 1A

SUPPLEMENTAL CLOSURE COST INFORMATION
SLAG STABILIZATION AREA

A. INVENTORY DISPOSAL

1. Maximum quantity of residual slag to be removed and disposed off-site.

   20'w x 15'l x 10'h = 3,000 ft^3
   1,800ft^3 / 27ft^3/yd^3 = 111.1 yd^3
   66.7yd^3 x 1.2 tons/yd^3 = 144.4 tons

2. Unit cost to dispose of residual slag.

   Loading: $2.00/ton x 144.4 tons = $288.80
   Transportation: $27.50/ton x 144.4 tons = $3,971.00
   Disposal: $150.00/ton x 144.4 tons = $21,660.00

   Total cost for inventory disposal = $25,919.80

B. DECONTAMINATION OF SLAG STABILIZATION AREA

1. Total surface area to be decontaminated.

   174'l x 27'w = 4,700ft^2 of surface area to be decontaminated.

2. Unit cost of decontamination.

   Crew = 1 supervisor ($37.00/hour) and 5 laborers ($18.00/hour each)
   100 ft^2/hour * 5 laborers = 500 ft^2/hour
   4,700ft^2 / 500 ft^2/hour = 9.5 hours
   Plus 0.5 hours for equipment decontamination
   10 hours * $127.00 = $1,270.00

3. Decontamination of the slag crusher feed vessel.

   1 feed vessel x $500.00 decontamination cost = $500.00

   Total cost for decontamination = $1,770.00

C. DISPOSAL OF WASH WATER

1. Volume of water generated during decontamination.

   High pressure wash = 4.0 gallons per ft^2
   4,700 ft^2 * 4.0 gallons per ft^2 = 18,800 gallons
   Vessel decontamination = 4,200 gallons
   Equipment decontamination = 500 gallons
   Total amount of waste water = 23,500 gallons

2. Water characterization.

   1 sample every 5,000 gallons
   Sampling crew charge = $50.00 / water sample
   23,500 gallons / 5,000 gallons/sample = 5 water samples
   5 water samples x $50.00/sample = $250.00

3. Transportation of wash water.

   23,500 gallons / 5,000gallons/ load = 5 loads
   5 loads x $326.00/load = $1,630.00 .

4. Disposal of wash water.

   23,500 gallons x $0.15/gallon = $3,525.00

   Total cost for disposal of wash water = $5,405.00

D. PERSONAL PROTECTIVE EQUIPMENT

1. $45.00 per man x 6 man crew = $270.00

E. CONFIRMATION SAMPLING

1. Concrete core samples: 1sample every 1,000ft^2
   4,700 ft^2 / 1,000 ft^2/sample = 5 samples
   Sampling crew charge = $500.00 / concrete core sample
   5 concrete core samples x /sample = $2,500.00

2. Laboratory analysis (lead).

   5 water samples x $18.00/sample = $90.00
   5 concrete core samples x $20.00/sample = $100.00
   QA/QC samples (1 water and 1 soil) = $38.00

   Total cost for confirmation sampling = $2,728.00

F. EQUIPMENT LEASE

1. 1 Front end loader = $125.00
2. 5 Steam cleaners: 5 x $45.00 = $225.00

Total cost for equipment lease = $350.00

G. CLOSURE CERTIFICATION

Lump Sum = $5,000.00

SLAG STABILIZATION AREA TOTAL CLOSURE COSTS = $41,442.80

TABLE 1B

SUPPLEMENTAL CLOSURE COST INFORMATION
CONTAINMENT BUILDING

A. INVENTORY DISPOSAL

1. Maximum quantity of residual slag to be removed and disposed off-site.

   a) Slag storage Area 1:
   100'l x 25'w x 10'h = 26,400ft^3
   26,400ft^3 / 27 ft3/yd^3 = 977.78 yd^3
   977.78 yd^3 x 1.2 tons/yd^3 = 1,333 tons

   b) Slag storage Area 2:
   77'l x 45'w x 12'h = 41,580ft^3
   29,200ft^3 / 27 ft3/yd^3 = 1,081.48 yd^3
   1081.48 yd^3 x 1.3 tons/yd^3 = 2,000 tons

Total residual slag to be removed and disposed = 3,333 tons.

2. Unit cost to dispose of residual slag.

   Loading: $2.00/ton x 3,333 tons = $6,666.00
   Transportation: $27.50/ton x 3,333 tons = $91,657.50
   Disposal: $150.00/ton x 3,333 tons = $499,950.00

   Total disposal cost of residual slag = $598,273.50

3. Maximum quantity of inventory to be removed for reuse.

   a. Wet plate storage Area 3:
   100'l x 50'w x 12'h = 60,000ft^3
   60,000ft^3 / 27 ft^3/yd^3 = 2,222.22 yd^3
   2,222.22 yd^3 x 1.8 tons/yd^3 = 4,000 tons

   b. Dry paste storage -
   Area 4: 50'l x 50'h x 12'h = 30,000 ft^3
   30,000ft^3 / 27yd^3 = 1,111.11 yd^3
   1,111.11 yd^3 x 1.7 tons/yd^3 = 2,000.00 tons

   Area 5: 100'l x 25'h x 12'h = 30,000 ft^3
   30,000ft^3 / 27yd^3 = 1,111.11 yd^3
   1,111.11 yd^3 x 1.7 tons/yd^3 = 2,000.00 tons

   Area 6: 100'l x 25'h x 12'h = 30,000 ft^3
   30,000ft^3 / 27yd^3 = 1,111.11 yd^3
   1,111.11 yd^3 x 1.7 tons/yd^3 = 2,000.00 tons

Total inventory to be removed = 10,000 tons

Total capacity of the Containment Building = 7,614.81 yd^3 as listed in the RCRA Part A Permit Application, January 1999.

4. Unit cost of inventory disposal.

   Loading: $2.00/ton x 10,000 tons = $20,000.00
   Transportation: $ 18.00/ton x 10,000 tons = $180,000.00

   Total cost of inventory disposal = $200,000.00

B. DECONTAMINATION OF CONTAINMENT BUILDING

1. Total surface area to be decontaminated:

   Area 1 Floor: 100'l x 25'w = 2,500 ft^2
   Area 1 Walls: 150'l x 10'h = 1,500 ft^2
   Area 2 Floor: 77'l x 45'w = 3,465 ft^2
   Area 2 Walls: 122'l x 12'h = 1,464 ft^2
   Area 3 Floor: 100'l x 50'w = 5,000 ft^2
   Area 3 Walls: 200'l x 12'h = 2,400 ft^2
   Area 4 Floor: 50'l x 50'w = 2,500 ft^2
   Area 4 Walls: 100'l x 12'h = 1,200 ft^2
   Area 5 Floor: 100'l x 25'w = 2,500 ft^2
   Area 5 Walls: 100'l x 12'h = 1,200 ft^2
   Area 6 Floor: 100'l x 25'w = 2,500 ft^2
   Area 6 Walls: 100'l x 12'h = 1,200 ft^2
   27,429 ft^2 = Total surface area

Plus, 42,500 ft^2 of production area and 9,000 ft^2 trackways = 78,929 ft^2

2. Unit cost of decontamination.

   Crew = 1 supervisor ($37.00/hour) and 20 laborers ($18.00/hour each)
   100ft^2/hour x 20 laborers = 700ft^2/hour
   78,929ft^2 / 700ft^2/hour = 113 hours
   Plus 2 hour for equipment decontamination
   115 hours x $397.00/hour = $45,655.00

   Sweeper = 1 laborer ($18.00) x 10 hours = $180.00

   Total cost for decontamination = $45,835.00

C. DISPOSAL OF WASH WATER

1. Volume of water generated during decontamination.

   High pressure wash = 4.0 gallons per ft^2
   78,929ft^2 x 4.0 gallons per ft^2 = 315,716 gallons
   Equipment decontamination = 1,500 gallons
   Total amount of waste water = 317,216 gallons

2. Water characterization.

   Water samples: 1 sample every 5,000 gallons
   Sampling crew charge = $50.00 / water sample
   317,216 gallons / 5,000 gallons/sample = 64 water samples
   64 water samples x $50.00/sample = $3,200.00

3. Transportation of wash water.

   317,216 gallons / 5,000 gallons/load = 64 loads
   64 loads x $326.00/load = $20,864.00

4. Disposal of wash water.

   317,216 gallons x $0.15/gallon = $47,582.40

   Total cost for disposal of wash water = $ 71,646.40

D. PERSONAL PROTECTIVE EQUIPMENT

1. **$45.00 per man x 21 man crew x 13 days = $12,285.00**

E. CONFIRMATION SAMPLING

1. Concrete core samples: 1sample every 1,000ft^2
   69,453ft^2 / 1,000ft^2/sample = 70 samples
   Sampling crew charge = $500.00 / concrete core sample
   70 concrete core samples x $500.00/sample = $35,000.00

2. Laboratory analysis (lead).

   64 water samples x $18.00/sample = $1,152.00
   70 concrete core samples x $20.00/sample = $1,400.00
   QA/QC samples (3 water and 4 soil) = $134.00

   Total cost for confirmation sampling = $37,686.00

F. EQUIPMENT LEASE

1. 2 Front end loaders x $125.00 each = $250.00
2. 20 Steam Cleaners x $180.00 each x 2 weeks = $7,200.00
3. 1 Sweeper truck x $1,300.00 = $1,300.00

Total cost for equipment lease = $8,750.00

G. CLOSURE CERTIFICATION

Lump Sum = $9,000.00

CONTAINMENT BUILDING TOTAL CLOSURE COSTS = $983,475.90

TABLE 1C

SUPPLEMENTAL CLOSURE COST INFORMATION
K069/D008 STORAGE AREA

A. INVENTORY DISPOSAL

1. Maximum quantity of inventory to be removed for reuse.

   25'w x 70'l = 1,750ft^2
   4 rows with 17 pallets/row, stacked 2 pallets high = 136 pallets
   136 pallets x 4 drums per pallet = 544 drums
   544 drums x 55-gallon capacity/drum = **29,920 gallons – As listed in RCRA Part A Permit Application, January 1999.**

2. Unit cost for inventory removal.

   Loading: $0.45/drum x 544 drums = $244.80
   Transportation: $15.00/drum x 544 = $8,160.00

   Total cost for inventory removal = $8,404.80

B. DECONTAMINATION OF K069/D008 STORAGE AREA

1. Total surface area to be decontaminated.

   25'w x 70'l = 1,750ft^{2}of surface area to be decontaminated.

2. Unit cost of decontamination.

   Crew = 1 supervisor ($37/hour) and 2 laborers ($18.00/hour each)
   300ft^2/hour x 2 laborers = 600ft^2/hour
   1,750ft^2 / 600ft^2/hour = 2.9 hours
   Equipment decontamination = 1 hour
   4 hours x $73.00 = $292.00

   Total cost for decontamination = $ 292.00

C. DISPOSAL OF WASH WATER

1. Volume of water generated during decontamination.

   High pressure wash = 3.0 gallons per ft^2
   1,750ft^2 x 3.0 gallons per ft^2 = 5,250 gallons
   Equipment decontamination = 500 gallons
   Total amount of waste water = 5,750 gallons

2. Water characterization.

   Water samples: 1 sample every 5,000 gallons
   Sampling crew charge = $50.00 / water sample
   5,750 gallons / 5,000 gallons/sample = 2 water samples
   2 sample x $50.00/sample = $100.00

3. Transportation of wash water.

   5,750 gallons / 5,000 gallons/load = 2 loads
   2 loads x $326/gallon = $652.00

4. Disposal of wash water.

   5,750 gallons x $0.15/gallon = $862.50

   Total cost for disposal of wash water = $ 1,614.5.50

D. PERSONAL PROTECTIVE EQUIPMENT

   1. $45.00 per man x 3 man crew = $135.00

E. CONFIRMATION SAMPLING

   1. Concrete core samples: 1sample every 1,000ft^2
      1,750ft^2 / 1,000ft^2/sample = 2 samples
      Sampling crew charge = $500.00 / concrete core sample
      2 concrete core samples x $500.00/sample = $1,000.00

   2. Laboratory analysis (lead).

      2 water samples x $18.00/sample = $36.00
      2 concrete core samples x $20.00/sample = $40.00
      QA/QC samples (1 water and 1 soil) = $38.00

      Total cost for confirmation sampling = $1,114.00

F. EQUIPMENT LEASE

   1. 1 Fork lift = $75.00
   2. 2 Steam cleaners: 2 x $45.00 = $90.00

   Equipment lease total = $165.00

G. CLOSURE CERTIFICATION

   Lump sum = $4,000.00

K069/D008 STORAGE AREA TOTAL CLOSURE COSTS = $15,725.30

TABLE 1D

SUPPLEMENTAL CLOSURE COST INFORMATION
TRUCK/TRAILER STORAGE AREA

A. INVENTORY DISPOSAL

1. Maximum quantity of inventory to be removed for reuse.

   85,000 batteries on pallets stored on trucks or trailers.
   1 battery = 1 gallon. Total capacity = **85,000 gallons – As listed in RCRA Part A Permit Application, January 1999.**

2. Unit cost for inventory removal.

   Loading batteries: 85,000 batteries x $0.01/battery = $850.00
   Transportation: 85,000 batteries x $0.42/battery = $35,700.00

   Total cost for inventory removal = $36,550.00

B. DECONTAMINATION OF TRUCK/TRAILER STORAGE AREA

1. Total surface area to be decontaminated.

   120'w x 120'l = 14,400ft^{2}of surface area to be decontaminated.

2. Unit cost of decontamination.

   Crew = 1 supervisor ($37/hour) and 4 laborers ($18.00/hour each)
   600ft^2/hour x 4 laborers = 2,400ft^2/hour
   14,400ft^2 / 2,400ft2/hour = 6 hours
   6 hours x $109.00 = 654.00

   Total cost for decontamination = $ 654.00

C. DISPOSAL OF WASH WATER

1. Volume of water generated during decontamination.

   High pressure wash = 1.2 gallons per ft^2
   14,400ft^2 x 1.2 gallons per ft^2 = 17,280 gallons

2. Water samples: 1 sample every 5,000 gallons
   Sampling crew charge = $50.00 / water sample
   17,280 gallons / 5,000 gallons/sample = 6 water samples
   6 water samples x $50.00/sample = $300.00

3. Transportation of wash water.

   17,280 gallons / 5,000 gallons/load = 4 loads
   4 loads x $326.00 = $1,304.00

4. Disposal of wash water.

   17,280 gallons x $0.15/gallon = $2,592.00

   Total cost for disposal of wash water = $ 4,196.00

D. PERSONAL PROTECTIVE EQUIPMENT

1. $45.00 per man x 5 man crew = $225.00

E. CONFIRMATION SAMPLING

1. Concrete core samples: 1sample every 1,000ft^2
   14,400ft^2 / 1,000ft^2/sample = 15 samples
   Sampling crew charge = $500.00 / concrete core sample
   15 concrete core samples x $500.00/sample = $7,500.00

2. Laboratory analysis (lead).

   6 water samples x $18.00/sample = $108.00
   15 concrete core samples x $20.00/sample = $300.00
   QA/QC samples (1 water and 1 soil) = $38.00

   Total cost for confirmation sampling = $7,946.00

F. EQUIPMENT LEASE

4 Steam cleaners: 4 x $45.00 = $180.00

G. CLOSURE CERTIFICATION

Lump Sum = $3,500.00

TRUCK/TRAILER STORAGE AREA TOTAL CLOSURE COSTS = $53,251.00

TABLE 1E

SUPPLEMENTAL CLOSURE COST INFORMATION
WHOLE BATTERY STORAGE AREA

A. INVENTORY DISPOSAL

1. Maximum quantity of inventory to be removed for reuse.

   75'w x 100'l = 7,500ft^2
   20 rows x 18 pallets per row x 3 pallets high = 1,080 pallets
   1,080 pallets x 75 batteries per pallet = 81,000 batteries
   1 battery = 1 gallon. Total capacity = **81,000 gallons – As listed in RCRA Part A Permit Application, January 1999.**

2. Unit cost for inventory removal.

   Loading: 81,000 batteries x $0.05/battery = $4,050.00
   Transportation: 81,000 batteries x $0.42/battery = $34,020.00

   Total cost for inventory removal = $38,070.00

B. DECONTAMINATION OF WHOLE BATTERY STORAGE AREA

1. Total surface area to be decontaminated.

   750'w x 100'l = 7,500ft^{2}of surface area to be decontaminated.

2. Unit cost of decontamination.

   Crew = 1 supervisor ($37/hour) and 4 laborers ($18.00/hour each)
   600ft^2/hour x 3 laborers = 1,800ft^2/hour
   7,500ft^2 / 1,800ft^2/hour = 4 hours
   Equipment decontamination = 1 hour
   5 hours x $91.00 = $455.00

   Total cost for decontamination = $ 455.00

C. DISPOSAL OF WASH WATER

1. Volume of water generated during decontamination.

   High pressure wash = 1.2 gallons per ft^2
   7,500ft^2 x 1.2 gallons per ft^2 = 9,000 gallons
   Equipment decontamination = 500 gallons
   Total amount of waste water = 9,500 gallons

2. Water samples: 1 sample every 5,000 gallons
   Sampling crew charge = $50 / water sample
   9,500 gallons / 5,000 gallons/sample = 2 water samples
   2 water samples x $50.00/sample = $100.00

3. Transportation of wash water.

   9,500 gallons / 5,000 gallons/load = 2 loads
   2 loads x $326.00 = $652.00

4. Disposal of wash water.

   9,500 gallons x $0.15/gallon = $1,425.00

   Total cost for disposal of wash water = $ 2,177.00

D. PERSONAL PROTECTIVE EQUIPMENT

1. $45.00 per man x 4 man crew = $180.00

E. CONFIRMATION SAMPLING

1. Concrete core samples: 1sample every 1,000ft^2
   7,500ft^2 / 1,000ft^2/sample = 8 samples
   Sampling crew charge = $500.00 / concrete core sample
   8 concrete core samples x $500.00/sample = $4,000.00

2. Laboratory analysis (lead).

   2 water samples x $18.00/sample = $36.00
   8 concrete core samples x $20.00/sample = $160.00
   QA/QC samples (1 water and 1 soil) = $38.00

   Total cost for confirmation sampling = $4,234.00

F. EQUIPMENT LEASE

1. 1 Fork lift = $75.00
2. 3 Steam cleaners: 3 x $45.00 = $135.00

Equipment lease total = $210.00

G. CLOSURE CERTIFICATION

Lump sum = $3,500.00

WHOLE BATTERY STORAGE AREA TOTAL CLOSURE COSTS = $48,826.00

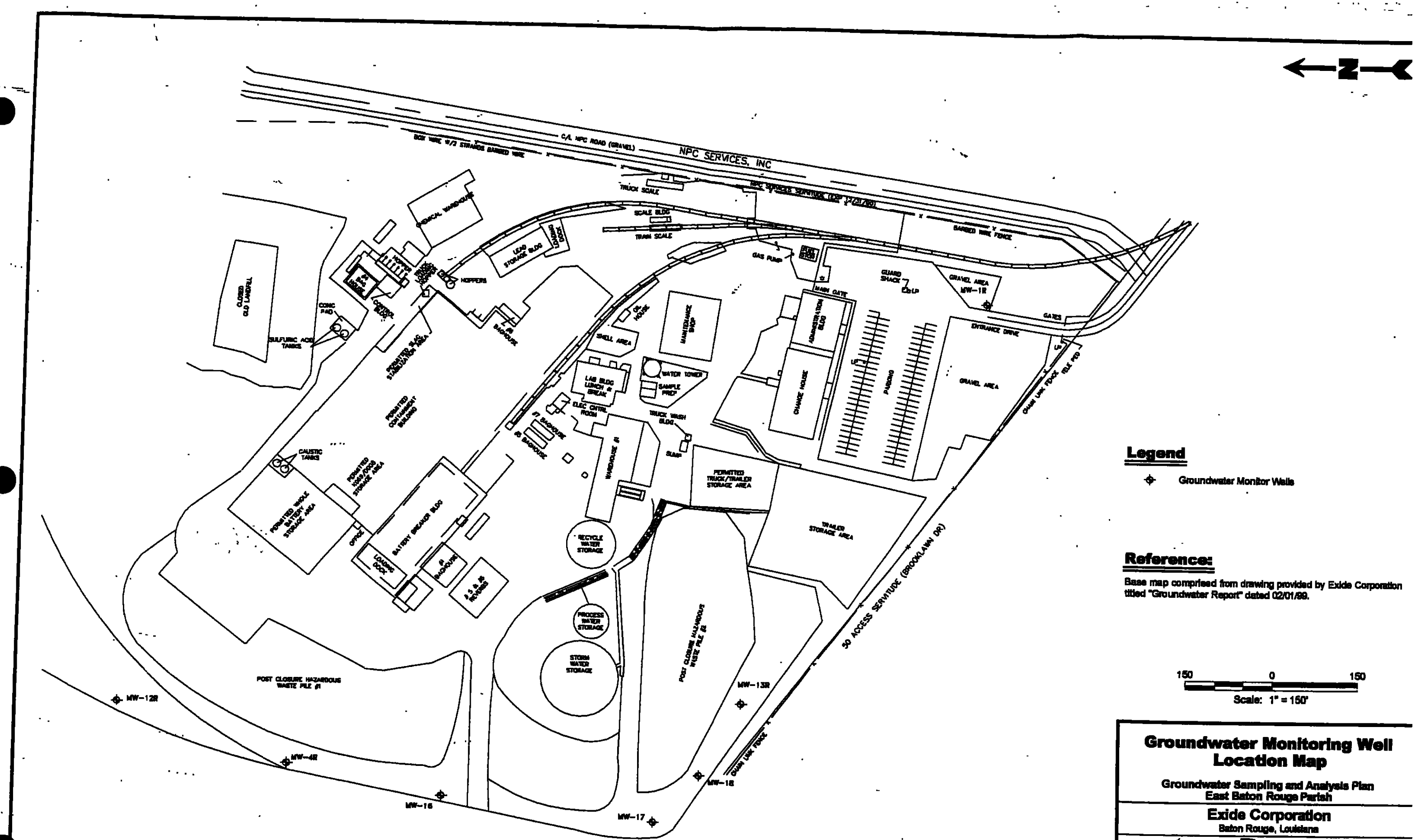
TABLE 2

POST CLOSURE CARE COST ESTIMATE

Description	Units	Unit Cost	Total Yearly Cost
TWO CLOSED WASTE PILES			
1 Cover Maintenance			
a. Top Soil Maintenance (5 acres)	5	$100.00	$500.00
b. Fertilizing and Reseeding (5 acres)	5	$60.00	$300.00
c. Grass Cutting and Upkeep ($40.00/acre x 4 events)	5	$160.00	$800.00
d. Engineer's Inspection	1	$300.00	$300.00
Subtotal			**$1,900.00**
TOTAL (18 years of Post-Closure Monitoring)	**18**	**$1,900.00**	**$34,200.00**
2 Groundwater Monitoring (7 Wells)			
a. Purging and Sampling (Twice a Year at $50.00 per well)	7	$100.00	$700.00
b. Laboratory Analysis (Twice a Year at $230.00 per well)	8*	$460.00	$3,680.00
c. Annual Report	1	$600.00	$600.00
Subtotal			**$4,980.00**
TOTAL (18 years of Post-Closure Monitoring)	**18**	**$4,980.00**	**$89,640.00**
3 LDEQ Annual Monitoring and Maintenance Fee	7	$250.00	$1,750.00
TOTAL (18 years of Post-Closure Monitoring)	18	$1,750.00	**$31,500.00**
POST-CLOSURE COSTS - CLOSED WASTE PILES			**$155,340.00**
Plus 10% Contingency			$15,534.00
TOTAL POST-CLOSURE COSTS			**$170,874.00**

* Cost includes analyzing 1 duplicate sample.

FIGURES



Legend

Groundwater Monitor Wells

Reference:

Base map comprised from drawing provided by Exide Corporation titled "Groundwater Report" dated 02/01/89.

150 0 150

Scale: 1" = 150'

Groundwater Monitoring Well Location Map

Groundwater Sampling and Analysis Plan
East Baton Rouge Parish

Exide Corporation

Baton Rouge, Louisiana

PROVIDENCE
ENGINEERING & ENVIRONMENTAL GROUP LLC
BATON ROUGE, LOUISIANA

Doc Code	028-001	Drawn:	LMH	1
		Checked:	TAB	
Dwg. No.:	028-001-B008	Approved:	TAB	Figure
		Date:	06/19/01A	

APPENDIX 10

SURETY BOND

EXIDE TECHNOLOGIES

October 9, 2001

VIA HAND DELIVERY

Mr. Darryl Serio
Louisiana Department of Environmental Quality
Office of Management and Finance
P.O. Box 82263
Baton Rouge, LA 70884-2263

RE: Financial Assurance
Exide Technologies, Baton Rouge Smelter
Solid Waste Facilities: GD-033-2054
Hazardous Waste Facilities: LAD008184137

Dear Mr. Serio:

Enclosed please find Exide Technologies' (formerly Exide Corporation) financial assurance inflation adjustment. Exide uses surety bonds as a mechanism for financial assurance. One surety bond is in place for solid waste facilities (Bond number 400JT6547 for $192,903.00) and one is in place for hazardous waste facilities (Bond number 400JT6548 for $1,449,285.00). These two bonds have not changed. In order to maintain our inflation adjustment, Exide is issuing these two letters of credit. The letter of credit for the solid waste facilities (number 151286270) is for $3,955.00, and the letter of credit for the hazardous waste facilities (number 151286269) is for $29,710.00.

If you require any questions about this matter, please call me at (225) 775-3040 extension 142.

Sincerely,
EXIDE TECHNOLOGIES

Steve Krul
Environmental Manager

cc: Mat Love – Exide Environmental Operations

P.O. Box 74040 • Baton Rouge, LA 70874
Phone: 225-775-3040 • FAX 225-775-3057

CUSTOMER REFERENCE EX2009

STANDBY LETTER OF CREDIT NO. 1S1286270
DATE OF ISSUE SEPTEMBER 5, 2001

ISSUING BANK:
FLEET NATIONAL BANK
C/O GLOBAL TRADE OPERATIONS
1 FLEET WAY, MAIL STOP. PAEH0802SM
SCRANTON PA 18507-1999

APPLICANT
EXIDE TECHNOLOGIES
210 CARNEGIE CENTER SUITE 500
PRINCETON, NJ 08540

BENEFICIARY
LOUISIANA DEPT OF ENVRMNTL QUALITY
ACCOUNT ADMINISTRATOR
P O. BOX 74040
BATON ROUGE LA 70874

AMOUNT/CURRENCY:
USD 3,955.00
THREE THOUSAND NINE HUNDRED FIFTY FIVE
AND 00/100'S US DOLLARS

DATE AND PLACE OF EXPIRY:
SEPTEMBER 5, 2002 OUR COUNTERS

DEAR SIR:

WE HEREBY ESTABLISH OUR IRREVOCABLE STANDBY LETTER OF CREDIT 1S1286270 AT THE REQUEST AND FOR THE ACCOUNT OF EXIDE TECHNOLOGIES, 210 CARNEGIE CENTER, SUITE 500, PRINCETON, NJ 08540 FOR ITS SITE GD-033-2054, P-0160 AND P-0326, BATON ROUGE SMELTER, EAST BATON ROUGE PARISH, LAD008184137 AT BATON ROUGE, LOUISIANA, IN FAVOR OF ANY GOVERNMENTAL BODY, PERSON. OR OTHER ENTITY FOR ANY SUM OR SUMS UP TO THE AGGREGATE AMOUNT OF THREE THOUSAND NINE HUNDRED FIFTY FIVE U.S. DOLLARS ($3,955.00) UPON PRESENTATION OF:

1. A FINAL JUDGMENT ISSUED BY A COMPETENT COURT OF LAW IN FAVOR OF A GOVERNMENTAL BODY, PERSON, OR OTHER ENTITY AND AGAINST PERMIT HOLDER'S OR APPLICANT'S NAME FOR SUDDEN AND ACCIDENTAL OCCURRENCES FOR CLAIMS ARISING OUT OF INJURY TO PERSONS OR PROPERTY DUE TO THE OPERATION OF THE SOLID WASTE SITE AT THE NAME OF PERMIT HOLDER OR APPLICANT AT SITE LOCATION AS SET FORTH IN THE LAC 33:VII.727.A 1.

A SIGHT DRAFT BEARING REFERENCE TO THE LETTER OF CREDIT NO. 1S1286270 DRAWN BY THE GOVERNMENTAL BODY, PERSON, OR OTHER ENTITY, IN WHOSE FAVOR THE JUDGMENT HAS BEEN RENDERED AS EVIDENCED BY DOCUMENTARY REQUIREMENT IN PARAGRAPH 1

THIS IS AN INTEGRAL PART OF LETTER OF CREDIT NUMBER: 1S1286270

THE LETTER OF CREDIT IS EFFECTIVE AS OF 05 SEPT, 2001 AND WILL EXPIRE ON 05 SEPT, 2002, BUT SUCH EXPIRATION DATE WILL BE AUTOMATICALLY EXTENDED FOR A PERIOD OF AT LEAST ONE YEAR ON THE ABOVE EXPIRATION DATE 05 SEPT 2002 AND ON EACH SUCCESSIVE EXPIRATION DATE THEREAFTER, UNLESS, AT LEAST 120 DAYS BEFORE THE THEN-CURRENT EXPIRATION DATE, WE NOTIFY BOTH THE ADMINISTRATIVE AUTHORITY AND EXIDE TECHNOLOGIES BY CERTIFIED MAIL THAT WE HAVE DECIDED NOT TO EXTEND THIS LETTER OF CREDIT BEYOND THE THEN-CURRENT EXPIRATION DATE. IN THE EVENT WE GIVE SUCH NOTIFICATION, ANY UNUSED PORTION OF THIS LETTER OF CREDIT SHALL BE AVAILABLE UPON PRESENTATION OF YOUR SIGHT DRAFT FOR 120 DAYS AFTER THE DATE OF RECEIPT BY BOTH THE DEPARTMENT OF ENVIRONMENTAL QUALITY AND EXIDE TECHNOLOGIES AS SHOWN ON THE SIGNED RETURN RECEIPTS.

WHENEVER THIS LETTER OF CREDIT IS DRAWN 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 EXIDE TECHNOLOGIES IN ACCORDANCE WITH THE ADMINISTRATIVE AUTHORITY'S INSTRUCTIONS.

EXCEPT TO THE EXTENT OTHERWISE EXPRESSLY AGREED TO, THE UNIFORM CUSTOMS AND PRACTICE FOR DOCUMENTARY LETTERS OF CREDIT (1993), INTERNATIONAL CHAMBER OF COMMERCE PUBLICATION NO. 500, SHALL APPLY TO THIS LETTER OF CREDIT.

WE CERTIFY THAT THE WORDING OF THIS LETTER OF CREDIT IS IDENTICAL TO THE WORDING SPECIFIED IN LAC 33:VII.727.A.1.D.II (E), EFFECTIVE ON THE ISSUANCE DATE.

AUTHORIZED SIGNATURE

THIS DOCUMENT CONSISTS OF 2 PAGE(S).

CUSTOMER REFERENCE: EX2008

STANDBY LETTER OF CREDIT NO. 1S1286269
DATE OF ISSUE SEPTEMBER 5, 2001

ISSUING BANK
-LEET NATIONAL BANK
C/O GLOBAL TRADE OPERATIONS
1 FLEET WAY, MAIL STOP PAEH0802SM
SCRANTON PA 18507-1999

APPLICANT
EXIDE TECHNOLOGIES
210 CARNEGIE CENTER SUITE 500
PRINCETON, NJ 08540

BENEFICIARY:
LOUISIANA DEPT OF ENVRMNTL QUALITY
ACCOUNT ADMINISTRATOR
P.O BOX 74040
BATON ROUGE LA 70874

AMOUNT/CURRENCY:
USD 29,710.00
TWENTY NINE THOUSAND SEVEN HUNDRED TEN
AND 00/100'S US DOLLARS

DATE AND PLACE OF EXPIRY:
SEPTEMBER 5, 2002 OUR COUNTERS

DEAR SIR OR MADAM :

WE HEREBY ESTABLISH OUR IRREVOCABLE STANDBY LETTER OF CREDIT NUMBER 1S1286269 IN FAVOR OF THE DEPARTMENT OF ENVIRONMENTAL QUALITY OF THE STATE OF LOUISIANA AT THE REQUEST AND FOR THE ACCOUNT OF EXIDE TECHNOLOGIES, 210 CARNEGIE CENTER, SUITE 500, PRINCETON, NJ 08540 UP TO THE AGGREGATE AMOUNT OF TWENTY NINE THOUSAND SEVEN HUNDRED TEN U.S.DOLLARS $29,710.00 UPON PRESENTATION OF:

1. A SIGHT DRAFT, BEARING REFERENCE TO THE LETTER OF CREDIT NUMBER 1S1286269 DRAWN BY THE SECRETARY OR HIS OR HER DESIGNATED REPRESENTATIVE, TOGETHER WITH;
2. A STATEMENT SIGNED BY THE SECRETARY OR HIS OR HER DESIGNATED REPRESENTATIVE, READING AS FOLLOWS:
"I CERTIFY THAT THE AMOUNT OF THE DRAFT IS PAYABLE PURSUANT TO REGULATIONS ISSUED UNDER AUTHORITY OF THE LOUISIANA ENVIRONMENTAL QUALITY ACT, R.S. 30:2001, ET SEQ."

THIS LETTER OF CREDIT IS EFFECTIVE AS OF 05 SEPT.2001, AND SHALL EXPIRE ON 05 SEPT. 2002, BUT SUCH EXPIRATION DATE WILL BE AUTOMATICALLY EXTENDED FOR A PERIOD OF AT LEAST ONE YEAR ON THE ABOVE EXPIRATION DATE 05 SEPT. 2002 AND ON EACH SUCCESSIVE

THIS IS AN INTEGRAL PART OF LETTER OF CREDIT NUMBER. 1S1286269

EXPIRATION DATE THEREAFTER, UNLESS, AT LEAST 120 DAYS BEFORE THE THEN CURRENT EXPIRATION DATE, WE NOTIFY BOTH YOU AND EXIDE TECHNOLOGIES BY CERTIFIED MAIL THAT WE HAVE DECIDED NOT TO EXTEND THIS LETTER OF CREDIT BEYOND THE THEN CURRENT EXPIRATION DATE IN THE EVENT WE GIVE SUCH NOTIFICATION, 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 EXIDE TECHNOLOGIES, AS SHOWN ON THE SIGNED RETURN RECEIPTS.

WHENEVER THIS LETTER OF CREDIT IS DRAWN 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 NAME OF OWNER/OPERATOR IN ACCORDANCE WITH YOUR INSTRUCTIONS.

WE CERTIFY THAT THE WORDING OF THIS LETTER OF CREDIT IS IDENTICAL TO THE WORDING SPECIFIED IN LAC 33:V.3719.D AS SUCH REGULATIONS WERE CONSTITUTED ON THE ISSUANCE DATE

THIS CREDIT IS SUBJECT TO "THE MOST RECENT EDITION OF THE UNIFORM CUSTOMS AND PRACTICE FOR DOCUMENTARY CREDITS, PUBLISHED AND COPYRIGHTED BY THE INTERNATIONAL CHAMBER OF COMMERCE," OR "THE UNIFORM COMMERCIAL CODE".

AUTHORIZED SIGNATURE

THIS DOCUMENT CONSISTS OF 2 PAGE(S).

SOLID WASTE FACILITY CERTIFICATE OF LIABILITY INSURANCE

Secretary
Louisiana Department of Environmental Quality
Post Office Box 82263
Baton Rouge, Louisiana 70884-2263
ATTENTION: Solid Waste Division

Dear Sir:

1. Greenwich Insurance Company, (the "Insurer") of One Greenwich Plaze, Greenwich, CT 06836-2568, hereby certifies that it has issued liability insurance covering bodily injury and property damage to Exide Corporation, 210 Carnegie Center, Suite 500, Princeton, NJ 08540, in connection with the insured's obligations to demonstrate financial responsibility under LAC 33:VII.727.A.1. The coverage applies at EPA ID#LAD008184137 for West End Brooklawn Drive, Baton Rouge, LA 70807,"sudden and nonsudden accidental occurrences". If coverage is for multiple facilities and the coverage is different for different facilities, indicate which facility(ies) are insured for sudden accidental occurrences, which are insured for nonsudden accidental occurrences, and which are insured for both). The limits of liability are $1 million each occurrence and $1 million annual aggregate, exclusive of legal defense costs. The coverage is provided under policy number PEC000506201 issued on 8/20/01. The effective date of said policy is 8/20/01.

2. The insurer further certifies the following with respect to the insurance described in Paragraph 1:

   (a). Bankruptcy or insolvency of the insured shall not relieve the insurer of its obligations under the policy.

   (b). The insurer is liable for the payment of amounts within any deductible applicable to the policy, with a right of reimbursement by the insured for any such payment made by the insurer. The provision does not apply with respect to that amount of any deductible for which coverage is demonstrated as specified in LAC 33:VII.727.A.1.d. ii, iii, or iv.

   (c). Whenever requested but the administrative authority, the insurer agrees to furnish to him a signed duplicate original of the policy and all endorsements.

   (d). Cancellation of the insurance, whether by the insurer or the insured, will be effective only upon written notice and upon lapse of 60 days after a copy of such notice is received by the administrative authority.

   (e). Any other termination of the insurance will be effective only upon written notice and upon lapse of 30 days after a copy of such written notice is received by the administrative authority.

3. I hereby certify that the wording of this certificate is identical to the wording specified in LAC 33:VII.727.A.1.d.i.(e) as such regulations were constituted on the date first written above, and that the insurer is licensed to transact the business of insurance, or eligible to provide insurance as an excess or surplus lines insurer, in one or more state, and is admitted, authorized, or eligible to conduct insurance business in the State of Louisiana.

Jeffrey S. Lejfer
(Authorized signature for insurer)

Jeff Lejfer, Vice President
(Name of person signing)

Vice President
(Title of person signing)

Lynda S. Kerstzman
(Signature of witness or notary)

8/20/01
(Date)

SEAL

Notarial Seal
Lynda S. Kerstzman, Notary Public
Uwchlan Twp., Chester County
My Commission Expires June 19, 2004
Member, Pennsylvania Association of Notaries

EXIDE CORPORATION

RECEIVED

AUG 2 2 2000

LA DEPARTMENT OF
ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL SERVICES

August 22, 2000

Mr. Michael D. Vince MPA
Administrator
Permits Division
Louisiana Department of Environmental Quality
P.O. Box 74040
Baton Rouge, LA 70874

RE: Financial Assurance
Exide Corporation, Baton Rouge Smelter
East Baton Rouge Parish
LAD008184137

Dear Mr. Vince:

Enclosed please find 3 copies of the revised surety bond for financial assurance obligations associated with the subject facility. The attached bond reflects adjustment for inflation of the surety bond issued last year at this time

If you have any questions or require any additional information, please call me at (225) 775-3040 extension 142.

Sincerely,
EXIDE CORPORATION

Steve Krul
Environmental Manager

cc: Matthew A. Love – Exide Environmental Operations

P.O. Box 74040, Baton Rouge, LA 70874
(225) 775-3040 • (225) 775-3057 Fax

The St Paul

STIPULATION
(Penalty Increase or Decrease)

ATTACHED TO AND FORMING PART OF BOND NO.	EFFECTIVE DATE OF BOND	EFFECTIVE DATE OF THIS STIPULATION	AMOUNT OF INCREASE/DECREASE	NEW PENALTY AMOUNT
400JT6548	August 20, 1999	August 18, 2000	$21,418.00	$1,449,285.00

ISSUED ON BEHALF OF	ISSUED IN FAVOR OF
Exide Corporation d/b/a Schuylkill Metals 645 Penn Street, Reading, PA 19601	Louisiana Department of Environmental Quality 7290 Bluebonnett Boulevard, Baton Rouge, LA 70810

We, St. Paul Fire and Marine Insurance Company, Surety on the above Bond, hereby stipulate and agree that from and after the effective date of this Stipulation the penalty of said Bond shall be

☒ increased ☐ decreased } *Check One* by the amount stated above but the total liability of St. Paul Fire and Marine Insurance Company

under said Bond and this Stipulation shall not exceed the sum of One Million Four Hundred Forty-Nine Thousand Two Hundred Eighty-Five and 00/100 dollars ($1,449,285.00).

COUNTERSIGNED BY:

T. D. Ruddock
T. D. Ruddock, LA Resident Agent

St. Paul Fire and Marine Insurance Company

Marjorie A. Altemus
Marjorie A. Altemus, Attorney-in-Fact

REQUEST FOR STIPULATION (INCREASE)

We Exide Corporation d/b/a Schuylkill Metals, Principal hereby request St. Paul Fire and Marine Insurance Company to execute the foregoing Stipulation.

Exide Corporation d/b/a Schuylkill Metals

By _____

CONSENT TO STIPULATION (DECREASE)

We, _____, Obligee, hereby consent to the foregoing Stipulation decreasing the Bond amount.

_____

By _____

The St Paul

POWER OF ATTORNEY

Seaboard Surety Company
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company

United States Fidelity and Guaranty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.

Power of Attorney No. 20840

Certificate No.

KNOW ALL MEN BY THESE PRESENTS: That Seaboard Surety Company is a corporation duly organized under the laws of the State of New York, and that St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company and St. Paul Mercury Insurance Company are corporations duly organized under the laws of the State of Minnesota, and that United States Fidelity and Guaranty Company is a corporation duly organized under the laws of the State of Maryland, and that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc. is a corporation duly organized under the laws of the State of Wisconsin *(herein collectively called the "Companies")*, and that the Companies do hereby make, constitute and appoint

James L. Bly, Christine A. Hartung, Leslie L. Rudat, Pamela L. Nunez, Elena Zunic, Karen L. Jensen, Nancy M. Kunold, Marjorie A. Alterrus and Elizabeth A. Hartzberg

of the City of Pittsburgh State Pennsylvania, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign the name as surety to, and to execute, seal and acknowledge any and all bonds, undertakings, contracts and other written instruments in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed this 5th day of August 1999.

Seaboard Surety Company
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company

United States Fidelity and Guaranty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.

MICHAEL B. KEEGAN, Vice President

MICHAEL R. MCKILBEN, Assistant Secretary

State of Maryland
City of Baltimore

On this 5th day of August 1999, before me, the undersigned officer, personally appeared Michael B. Keegan and Michael R. McKilben, who acknowledged themselves to be the Vice President and Assistant Secretary, respectively, of Seaboard Surety Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, United States Fidelity and Guaranty Company, Fidelity and Guaranty Insurance Company, and Fidelity and Guaranty Insurance Underwriters, Inc. and that they, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing the names of the corporations by themselves as duly authorized officers.

In Witness Whereof, I hereunto set my hand and official seal.

My Commission expires the 12th day of July, 2002.

REBECCA EASLEY-ONOKALA, Notary Public

The St Paul

STIPULATION
(Penalty Increase or Decrease)

ATTACHED TO AND FORMING PART OF BOND NO.	EFFECTIVE DATE OF BOND	EFFECTIVE DATE OF THIS STIPULATION	AMOUNT OF INCREASE/DECREASE	NEW PENALTY AMOUNT
400JT6547	August 20, 1999	August 18, 2000	$2,851.00	$192,903.00

ISSUED ON BEHALF OF	ISSUED IN FAVOR OF
Exide Corporation d/b/a Schuylkill Metals 645 Penn Street, Reading, PA 19601	Louisiana Department of Environmental Quality 7290 Bluebonnett Boulevard, Baton Rouge, LA 70810

We, St. Paul Fire and Marine Insurance Company, Surety on the above Bond, hereby stipulate and agree that from and after the effective date of this Stipulation the penalty of said Bond shall be

☒ increased
☐ decreased
Check One

by the amount stated above but the total liability of St. Paul Fire and Marine Insurance Company under said Bond and this Stipulation shall not exceed the sum of One Hundred Ninety-Two Thousand Nine Hundred Three and 00/100 dollars ($192,903.00).

COUNTERSIGNED BY:

T. D. Ruddock
T. D. Ruddock, LA Resident Agent

St. Paul Fire and Marine Insurance Company

Marjorie A. Altemus
Marjorie A. Altemus, Attorney-in-Fact

REQUEST FOR STIPULATION (INCREASE)

We Exide Corporation d/b/a Schuylkill Metals, Principal hereby request St. Paul Fire and Marine Insurance Company to execute the foregoing Stipulation.

Exide Corporation d/b/a Schuylkill Metals

By _____

CONSENT TO STIPULATION (DECREASE)

We, _____, Obligee, hereby consent to the foregoing Stipulation decreasing the Bond amount.

_____

By _____

The St Paul

POWER OF ATTORNEY

Seaboard Surety Company
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company

United States Fidelity and Guaranty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.

Power of Attorney No. 20840 Certificate No.

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James L. Bly, Christine A. Hartung, Leslie L. Rudat, Pamela L. Nunez, Elena Zuric, Karen L. Jensen, Nancy M. Kunold, Marjorie A. Altemus and Elizabeth A. Hartzberg

of the City of Pittsburgh, State Pennsylvania, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign its name as surety to, and to execute, seal and acknowledge any and all bonds, undertakings, contracts and other written instruments in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed this 5th day of August, 1999.

Seaboard Surety Company
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company

United States Fidelity and Guaranty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.

MICHAEL B. KEEGAN, Vice President

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State of Maryland
City of Baltimore

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In Witness Whereof, I hereunto set my hand and official seal.

My Commission expires the 13th day of July, 2002.

REBECCA EASLEY-ONOKALA, Notary Public

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