SITE INSPECTION REPORT

HOUSTON LIGHTING AND POWER W.A. PARISH GENERATING STATION
THOMPSONS, FORT BEND COUNTY, TX
EPA CERCLA ID NO.: TXD097311849

Prepared for

U.S. Environmental Protection Agency
Region 6
1445 Ross Avenue
Dallas, TX 75202

Contract No.: 68-W5-0019
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September 1997

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SECTION 1
INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), Roy F. Weston, Inc. (WESTON®) has been tasked to perform a Site Inspection (SI) of the Houston Lighting and Power W.A. Parish Generating Station (HL&P) site (EPA CERCLA Identification Number TXD097311849) in Thompsons, Fort Bend County, Texas (Figure 1-1). Based on available site information, WESTON believes that the site is eligible for action under CERCLA/SARA. The U.S. Environmental Protection Agency (EPA) Region 6 retained WESTON to complete this investigation under EPA Contract Number 68-W5-0019 and Work Assignment Number 06-97-03-0004.

This document represents the final report for the SI. The purpose of this report is to provide the background information collected for the site, to discuss the SI activities, and to present the analytical data obtained as part of the investigation.

1.1 OBJECTIVES OF THE INVESTIGATION

The SI is the second investigation in a series of screening assessments in which EPA evaluates hazardous waste sites under CERCLA/SARA prior to their possible inclusion on the National Priorities List (NPL). The following are the primary objectives of the SI:

- Identify and document any sources of hazardous substances at the site and evaluate the threat that migration or exposure of hazardous substances may pose to human health and the environment.

- Collect information that can be used to assess the site using EPA's Hazard Ranking System (HRS) to help determine whether further investigation of the site under CERCLA/SARA is warranted in order to pursue listing of the site on the NPL.

1.2 SCOPE OF WORK

The SI is intended to be a screening investigation of the site. The SI Scope of Work is, therefore, centered on characterizing the site through the completion of limited site-related research, site reconnaissance, and focused sampling activities. As directed by the EPA, no samples were collected during the SI. WESTON completed the following major tasks as part of this SI:

- A site reconnaissance was performed to document current site conditions and identify potential sources of hazardous substances at the site. As part of the reconnaissance, a survey of the site's vicinity was completed to identify potential receptors or targets of hazardous substance migration and exposure attributable to the site.

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- A site-specific Task Work Plan (TWP) and a Health and Safety Plan (HASP) were prepared to provide a detailed plan of action for subsequent SI activities.

- Information concerning the environmental setting of the site was obtained to describe the groundwater, surface water, soil exposure, and air pathways.

- Available regulatory compliance files from federal, state, and local government agencies were reviewed, and telephone interviews were conducted with authorities knowledgeable of the site and its surroundings.

- Previous sample analyses were reviewed and utilized to document the presence and migration of hazardous substances attributable to the site.

- All available information from observations, records review, interviews, site area environmental and demographic characteristics, and historical sample analyses were evaluated.

- The analytical data generated from the previous site investigations were reviewed and tabulated.

- This report was prepared to present the findings of the SI.

1.3 REPORT FORMAT

The SI Report is presented in a format that is intended to facilitate evaluation of the site using the HRS. The report contains the following sections:

- Section 1—Introduction
- Section 2—Site Characteristics
- Section 3—Waste Source Characterization and Site Concerns
- Section 4—Groundwater Pathway
- Section 5—Surface Water Pathway
- Section 6—Soil Exposure
- Section 7—Air Pathway
- Section 8—Conclusions
- Section 9—References

The referenced figures and tables are found at the end of each section. The appendices present additional information and are as follows:

- Appendix A—Photographs
- Appendix B—References

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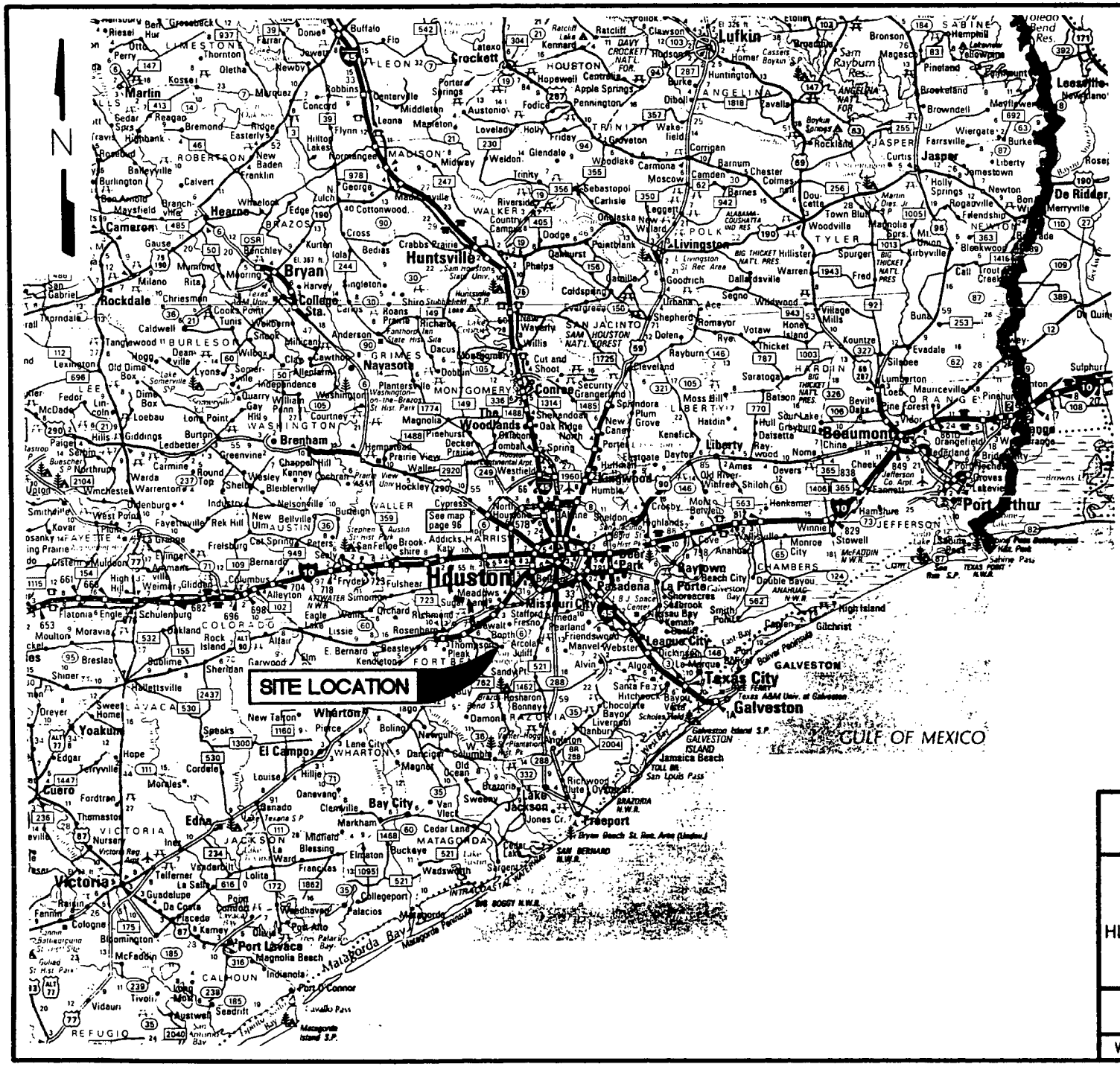

MAP PREPARED FROM
RAND McNALLY ROAD ATLAS
TEXAS
1994 EDITION

0 15 30

APPROXIMATE SCALE IN MILES

WESTON®
MANAGERS DESIGNERS/CONSULTANTS

FIGURE 1–1

SITE LOCATION MAP

HL&P W.A. PARISH GENERATING STATION
THOMPSONS, TEXAS

CERCLA ID. NO.: TXD097811849

EPA REGION VI
SITE INSPECTION

W.O. NO. : 11098–122–027–0001

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SECTION 2
SITE CHARACTERISTICS

WESTON collected and reviewed available background information regarding the location, description, operational history, and regulatory compliance of the site. The discussion in this section of the report is based on this background information, which is referenced throughout the text.

2.1 SITE DESCRIPTION AND BACKGROUND INFORMATION

The following characteristics of the site are summarized in this subsection of the report:

- Site Location
- Site Ownership
- Site Description
- Site Operational History
- Site Regulatory Compliance History
- Nearby Land Use

2.1.1 Site Location

The HL&P site is located at 2759 Jones Road, Thompsons, Fort Bend County, Texas. The site can be reached by traveling south from the City of Houston on U.S. Highway 59 (Hwy. 59). Exit at Crabb River Road and travel approximately 2 miles south on Crabb River Road, continue 3 miles south on FM 762, then travel 3 miles east on Jones Road. The site is located approximately 3 miles southwest of the Town of Thompsons and adjacent to Smithers Lake. The geographic coordinates of the site are approximately 29°28'45" north latitude and 95°38'05" west longitude (Reference 1). A Site Area Map derived from the U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle maps of Smithers Lake, Missouri City, Sugar Land, and Thompsons, Texas, is provided as Figure 2-1 (Reference 2).

2.1.2 Site Ownership

The HL&P site is privately owned by Houston Light and Power. WESTON contacted Mr. Robert Moles, HL&P Parish Station General Manager, at P.O. Box 98, Thompsons, Texas 77481 in May 1997. Mr. Robert Moles signed an EPA Access Agreement on 8 May 1997, allowing WESTON access to the HL&P site to complete the SI (Reference 3). WESTON conducted a site reconnaissance of the HL&P site and the surrounding area on 22 May 1997.

2.1.3 Site Description

WESTON performed the off-site reconnaissance in general accordance with the following documents:

- WESTON's Generic Site Inspection Work Plan (Document Control No. 4603-23-0008, dated 15 August 1991).

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- The HASP prepared by WESTON for the SI.

- The EPA Guidelines for Performing Site Inspections under CERCLA, September 1992.

WESTON conducted a site reconnaissance of the HL&P site and the surrounding area on 22 May 1997. During the reconnaissance, WESTON personnel drove around the site and took photographs to document site conditions. The photographs are presented in Appendix A. The area surrounding the site was examined to identify potential receptors or targets of hazardous substance migration from the site. Nearby land use and potential alternative source sites were also documented. The HL&P property consists of a coal and gas power production facility covering approximately 3,000 acres (Reference 4). Access to the property is restricted by a fence and a security gate at the entrance to the plant. During business hours, a security guard occupies the guard house at the entrance to the facility; otherwise, the gate is locked. A Site Plan is provided as Figure 2-2. Notable site features of the power plant include an administration building, a coal pile, a paved parking lot, and 14 solid waste management units (SWMUs), described below (References 4 and 5):

- SWMU 1—An open tank settling basin used for the collection of low-volume chemical wastes.

- SWMU 2—A sump used for temporary storage of demineralizer wastewater prior to transfer into SWMU 1.

- SWMU 3—Another settling basin for low-volume chemical wastes.

- SWMU 4—Two chemical treatment systems for discharge from SWMUs 1 and 3.

- SWMU 5—A holding basin for discharge to SWMU 4.

- SWMU 6—A sump to collect discharge to SWMU 5.

- SWMU 7—A surface impoundment that collects inorganic metal-cleaning wastewater. Contents are sent to SWMU 4 for treatment.

- SWMU 8—A surface impoundment containing organic metal-cleaning waste. The organic sludge is burned in two boilers.

- SWMU 9—Three former temporary inorganic acid-storage ponds.

- SWMU 10—A Class II nonhazardous waste industrial landfill area.

- SWMU 11—Three waste oil collection facilities.

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- SWMU 12—An outside drum storage area on a concrete slab.

- SWMU 13—A bulk storage area that is only used intermittently during facility maintenance.

- SWMU 14—A landfill that is used for the on-site disposal of construction demolition debris.

Other site features include Smithers Lake, Dry Creek, and Rabbs Bayou. The site is bounded to the north by Smithers Lake, to the south by Jones Road, and to the west and east by open areas of vegetation (Reference 2). Presently, there are nine monitoring wells and seven potable water wells on-site (References 6 and 7).

2.1.4 Site Operational History

The HL&P site is privately owned by Houston Light and Power. The W.A. Parish Generating Station began operating in 1958 with gas-fired turbine units. Two coal-fired units were constructed between 1974 and 1978, and coal operations began in 1978. Two more coal-fired units came on-line in 1980 and 1982 (Reference 4). The plant produces electricity by generating steam from both gas-operated and coal-fired turbines. Process water is routed through chemical treatment systems to remove suspended solids and adjust pH. Treated wastewater is discharged into Smithers Lake. Sludges remaining on the floor of surface impoundments are periodically removed and sent through a rotary vacuum to remove moisture. Dried sludge, bottom ash, and fly ash are stored in cells located within an on-site nonhazardous industrial landfill. Bottom ash and fly ash are sold for recovery. Flue gas desulfurization sludge is dewatered and stored in the industrial landfills. Oil and oil sludge generated on-site are drummed and stored for off-site disposal. All other waste associated with the power plant operations are stored for off-site disposal.

In 1977, three inorganic acid storage ponds (SWMU 9) were excavated for temporary use during the construction of two units of the chemical waste treatment system. On an intermittent basis, the natural clay-lined impoundments were used for the disposal of a mixture of chemical cleaning waste from the feedwater and boiler (References 4 and 5). In 1978, analytical results and information concerning the sampling of waste from the temporary surface impoundments indicated that the waste contained elevated concentrations of metals (Reference 8). HL&P files indicated at the time of the sampling event that the impoundments held approximately 6,400,000 gallons of wastewater (Reference 8). No wastewater was stored in the three impoundments after early 1980. By March 1982, all three impoundments had been backfilled and graded over following waste removal. Soil was not removed from the impoundment during this activity (Reference 9).

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2.1.5 Summary of Previous Investigations

WESTON reviewed available EPA CERCLA files and background information provided by HL&P. Based on this file information, previous investigations performed for the HL&P site include the following:

- In 1976, McClelland Engineers, Inc. conducted a geotechnical investigation at the ash storage area (SWMU 10) (Reference 10). Soil borings indicated relatively uniform soil conditions throughout the tract that consisted primarily of highly plastic clays of CH classification to about a 30-feet depth underlain by silty fine sand to the maximum depth explored, 60 feet. The report also concluded that the 4 feet of natural silty clay-plastic clay (CL-CH) soils in the ash storage area (SWMU 10) would provide a suitable liner for all the cells in the landfill. Thus, additional compacted clay or artificial liners were not needed. However, the report also indicated that localized deposits of silts, which may be present at the excavation's finished grade, should be excavated and replaced by compacted clay.

- On 8 June 1983, an Open Dump Inventory inspection was conducted by Texas Department of Water Resources (TDWR) (Reference 11). The inspector indicated that runoff from the landfill cells in SWMU 10 was not contained, because the landfill cells were not diked or bermed and were located next to Rabbs Bayou. The SWMU was found to be compliant with all other criteria.

- In 1985, Resource Engineering conducted a hydraulic evaluation to assess the need for groundwater monitoring in the vicinity of SWMU 10, the industrial landfill (Reference 12). Data generated from a cone penetrometer survey were used to develop six stratigraphic cross sections, which characterized the soil profile across the area. The profiles indicated that the potential for groundwater contamination was low. However, Resource Engineering recommended a conservative approach by installing two monitoring wells within shallow sand zones. The report recommended both wells would screen the entire sand layer and would help to establish the hydraulic gradient and to provide monitoring of the hydrogeologic unit.

- On 28 January 1986, EPA issued a Notice of Violations citing 18 violations of untreated wastewater releases into Smithers Lake during 1985. These violations were attributed to mechanical breakdowns, and corrective actions were addressed in Houston Lighting and Power's Answer to Findings of Violation and Administrative Order of 28 January 1986, dated 3 March 1986 (Reference 13).

- In 1988, A.T. Kearney, Inc. conducted a review of the state's interim status clean-closure determination of the outdoor container storage area (SWMU 12) for the EPA Region 6 (Reference 14). The A.T. Kearney, Inc. review found the closure had not met the closure performance standard of 40 CFR 265.111. The Closure

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Plan and Certification of Closure did not demonstrate how closure activities controlled, minimized, or eliminated post-closure escape of hazardous waste, contaminated runoff, or hazardous waste decomposition products to the ground or surface water or to the atmosphere (Reference 14). On 23 September 1995, the Texas Water Commission (TWC) approved the closure (Reference 15).

- In July 1990, ICF Technology, Inc. conducted a Preliminary Assessment (PA) under contract to EPA Region 6. CERCLA, TWC, and National Pollutant Discharge Elimination System (NPDES) files were searched for available information. A site reconnaissance was not conducted. The PA indicated that the site contained eight surface impoundments, two chemical waste treatment systems, three acid collection/ash ponds, a lagoon storage area, waste oil and oil sludge collection systems, two less-than-90-day container storage areas, one bulk storage area, and a landfill (Reference 4).

  The PA reported concern with the contaminants found in a TWC Notice of Solid Waste Management Registration and laboratory data from samples collected by HL&P on 11 March 1983 for Extraction Procedure Toxicity (EP Toxicity) tests. Sample analysis of demineralizer regenerant wastewater, metal cleaning inorganic acids (wastewater and sludge), and metal cleaning organic acids revealed arsenic, barium, cadmium, chromium, endrin, lead, lindane, selenium, and toxaphane in trace amounts. The TWC registration form listed acetone, asbestos, mercury, and polychlorinated biphenyl (PCB) contaminated solids and fluids as having been stored on-site.

  The PA report concluded that waste migrations to groundwater, surface water, and air and soil exposure were a concern due to the targets in each pathway. On 2 August 1990, based on the findings of the PA, EPA recommended a site sampling investigation be performed on the HL&P site in order to document the potential for or extent of any contamination in the groundwater and surface water pathway (References 16 and 17).

Presently, the plant is not permitted under Resource Conservation and Recovery Act (RCRA). However, the plant is an industrial solid waste management facility regulated by the Texas Natural Resource Conservation Commission (TNRCC). All hazardous waste generated at the site is stored in RCRA-compliant units for less than 90 days and shipped off-site (Reference 5). The plant applied for a Part A permit under RCRA in the early 1980s, but this application was later retracted (Reference 18). All outfalls of discharge water into Smithers Lake are regulated by a NPDES permit (Reference 5).

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2.1.6 Nearby Land Use

Land use in the vicinity of the site was observed during the site reconnaissance. The HL&P site is located in a rural area of Thompsons, Texas. The site is bounded to the north by Smithers Lake, to the south by Jones Road, and to the west and east by open areas of vegetation (Reference 2).

2.2 SOURCE AREAS AND SITE CONCERNS

Information concerning known or potential sources at the site and the constituents thought to be associated with each source are described in the following subsections. Also, a summary of potential concerns associated with contaminant migration and exposure through the groundwater, surface water, soil exposure, and air pathways is included.

2.2.1 Known and Potential Sources

Based on available background information and WESTON's site reconnaissance, the sources at the site consist of eight surface impoundments, two chemical waste treatment systems, the closed acid collection/ash surface impoundment, industrial landfills with an overflow pond, and a less-than-90-day hazardous waste storage area. According to available information, the constituents of concern are mainly metals.

2.2.2 Site Concerns

Possible concerns associated with the source at the HL&P site and the migration of, or exposure to, hazardous substances attributable to the site through the groundwater, surface water, soil exposure, and air pathways are summarized as follows:

- A release to groundwater is of minor concern. The open surface impoundments have fiberglass-lined concrete bottoms. The industrial landfill cells have a natural clay liner. The closed surface impoundments may have a natural clay liner; however, studies of this area have not been conducted. The 90-day hazardous waste storage area consists of a concrete slab (Reference 5). The tanks stored in this area have secondary containment. Analytical data from the October 1996 monitoring wells sampling event indicated the existence of low levels of metals (Reference 19). However, these levels were below the MCLs for drinking water (Reference 20).

- A release to surface water is of minor concern. All outfalls from the facilities are regulated by TNRCC and are under a NPDES permit (Reference 5). The outfalls are monitored for flow rate, suspended solids, pH, and certain metals of concern. Exceedences and discharges are reported routinely. However, exceedences that have occurred were of short duration due mainly to mechanical failures and excessive rainfall (Reference 21). Necessary repairs were made and procedures were reviewed and revised to mitigate the potential for releases. In addition, the

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oil drainage collection system also serves as a mechanism for containing rainwater runoff for the facility.

- Soil exposure is of minor concern. Much of the facility is covered by buildings and concrete, the entire site is enclosed by a fence, and the plant entrance is monitored by a guard. There are approximately 400 on-site workers (Reference 5).

- A release to air is of minor concern. The constituents of concern are metals and have a low volatility. In addition, the boiler stacks and the fly ash and bottom ash hopper are regulated by TNRCC under an air permit (References 22 and 23).

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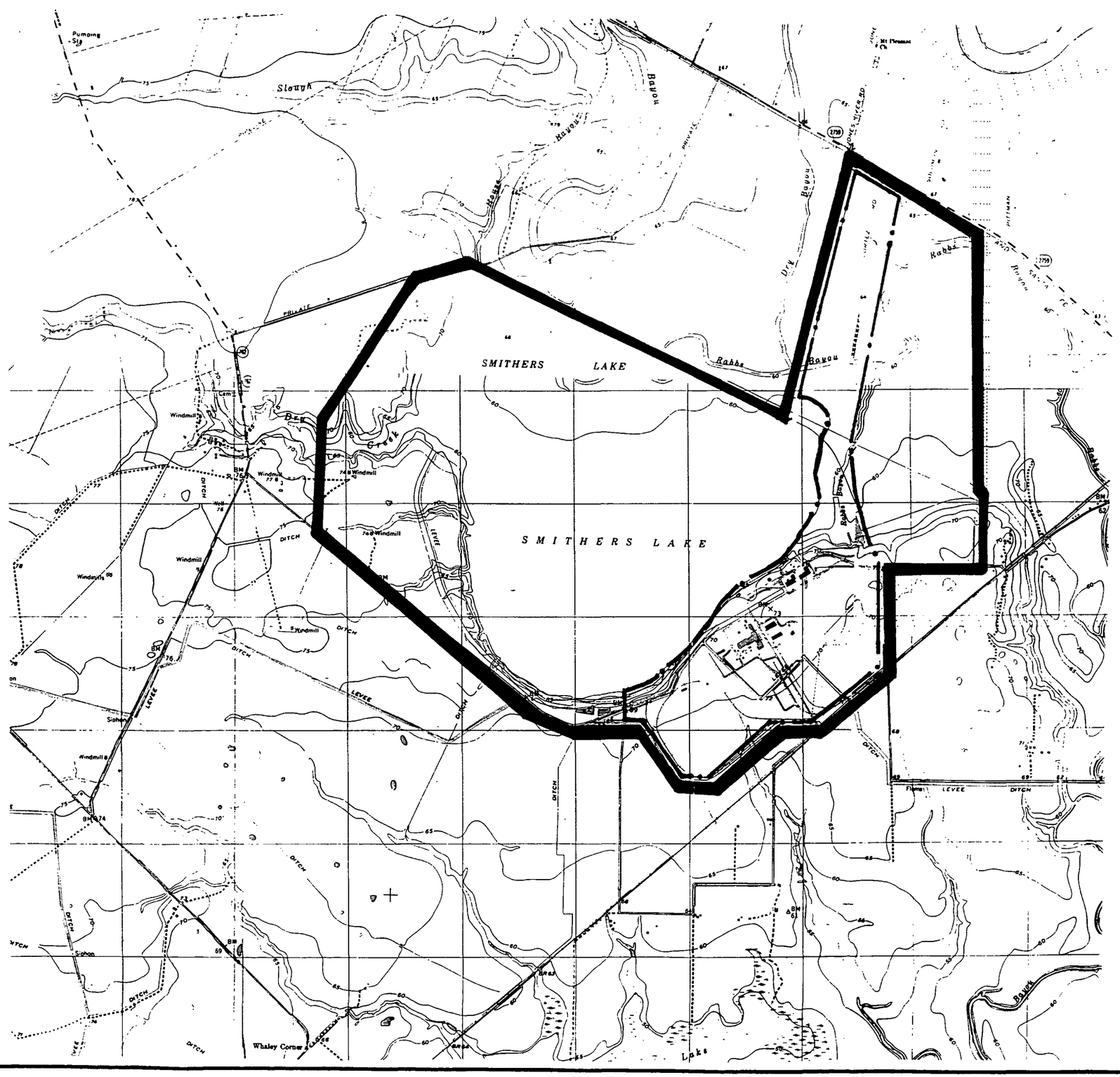


LEGEND

HL&P PROPERTY BOUNDARY

SITE BOUNDARY

BASE MAP FROM:
U.S. DEPT. OF THE INTERIOR
GEOLOGICAL SURVEY
SMITHERS LAKE QUADRANGLE
MISSOURI CITY QUADRANGLE
SUGAR LAND QUADRANGLE
THOMPSONS QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
1953 & 1970 SERIES

0 1200 2400
APPROXIMATE SCALE IN FEET

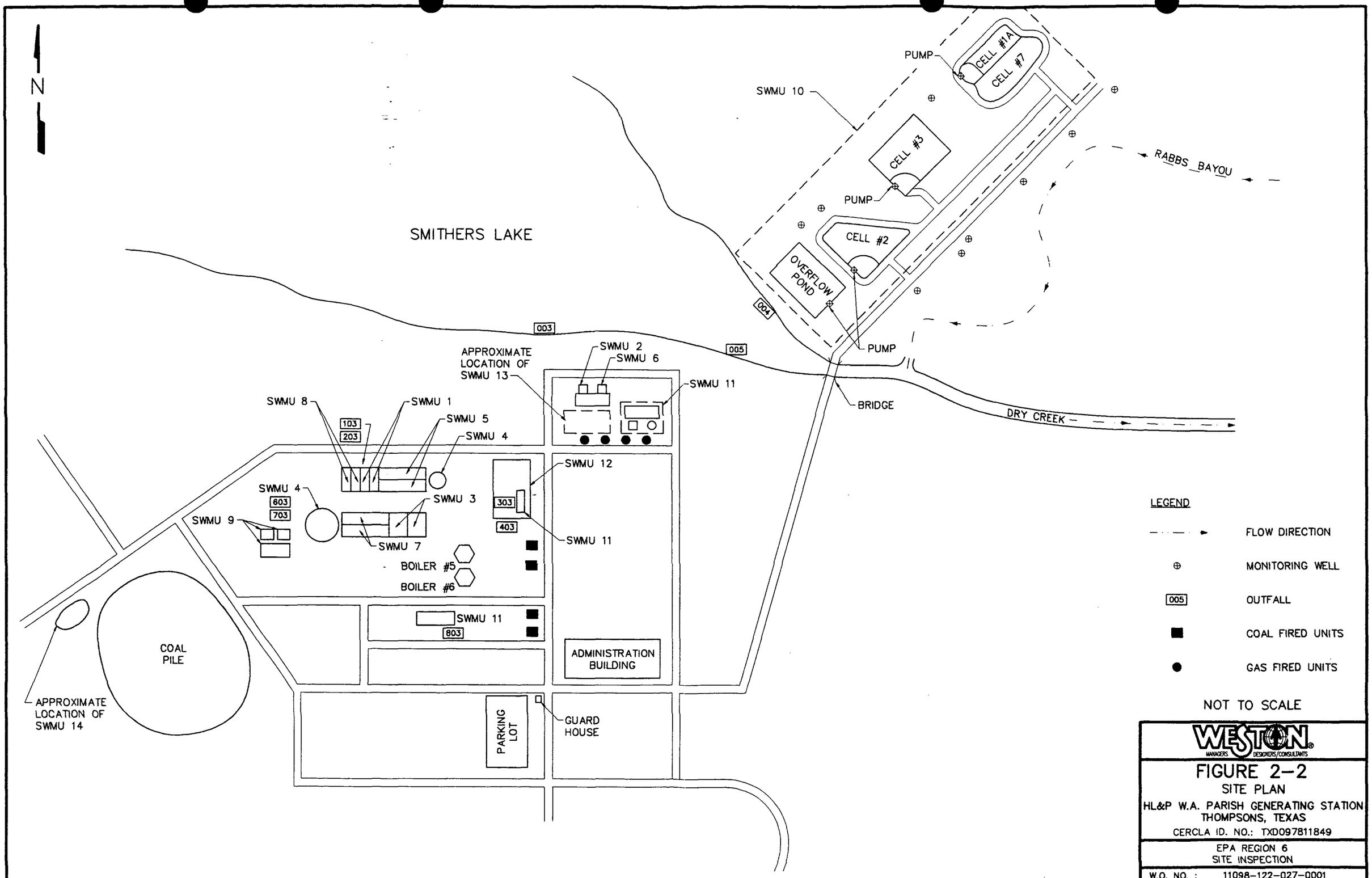
WESTON
MANAGERS DESIGNERS/CONSULTANTS

FIGURE 2-1
SITE AREA MAP
HL&P W.A. PARISH GENERATING STATION
THOMPSONS, TEXAS
CERCLA ID. NO.: TXD097811849

EPA REGION 6
SITE INSPECTION

W.O. NO. : 11098-122-027-0001

H:\DWG\HL&P\SITEMAP.JC 09-11-97 (NEWWEST.PCP)



WESTON
MANAGERS DESIGNERS/CONSULTANTS

FIGURE 2-2
SITE PLAN
HL&P W.A. PARISH GENERATING STATION
THOMPSONS, TEXAS
CERCLA ID. NO.: TXD097811849

EPA REGION 6
SITE INSPECTION

W.O. NO. : 11098-122-027-0001

H:\DWG\HL&P\HL&P001.DMBF 09-11-97 (NEWWEST.PCP)

SECTION 3
WASTE SOURCE CHARACTERIZATION AND SITE CONCERNS

At the direction of EPA, WESTON did not conduct sampling activities at the site as part of this SI. In general accordance with the objectives of the SI, WESTON developed a strategy for incorporating analytical results from previous sampling events and available site historical information for the purpose of documenting the presence of hazardous substances and concerns at the site. The results of past waste source sampling and analysis and available historical information including regulatory compliance information are used to summarize the source waste characterization and site concerns in this section.

3.1 WASTE SOURCE CHARACTERISTICS

The following subsections summarize each of the fourteen potential waste sources at the HL&P site that were identified in the 1990 PA. In order to describe each potential waste source, each subsection will be subdivided as follows:

- Activity—A description of waste generation and containment features of the SWMU.
- Existing Permit—The permit associated with the SWMU and/or its outfall.
- Monitoring—The type and frequency of monitoring associated with the SWMU and/or its permit and a summary of the monitoring results.
- Concerns—Compliance status and/or comments associated with the SWMU.

Information concerning the following subsections was collected from the following sources:

- The 1990 PA by ICF Technology (Reference 4).
- WESTON's field log book (Reference 5).
- McClelland Engineers' Geotechnical Investigation of Ash Storage Area (Reference 10).
- Wastewater discharge data sample results from February and March 1997 for various NPDES-permitted outfalls that are associated with SWMUs 1, 3, 5, 7, 10, and 11 (Reference 24).
- The 12 April 1985 memorandum outlining the guidelines for the Class III construction debris landfill, SWMU 14 (Reference 25).

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- The 2 July 1996 TNRCC Notice of Registration (NOR) (Reference 26).
- NPDES permit information (fax) (Reference 27).
- October 1996 groundwater data from the sampling of the monitoring wells surrounding SWMU 10 (Reference 19).
- Wastewater Permit Exceedence Notification prepared by HL&P, January 1996 to June 1997 (Reference 21).
- Telephone call with Lucien Klejbuck of HL&P (Reference 28).
- November 1995 Application for an Amendment to TNRCC Permit No. 5794 for the Injection of Boiler Cleaning Wastewater into Stream Generating Units 5 and 6 (Reference 20).
- TNRCC Permit No. 6430A, Fly Ash-Bottom Ash Disposal System (Reference 23).
- The 1996 maximum contaminant level (MCL) list of metal concentrations in groundwater (Reference 20).

3.1.1 SWMU 1—Demineralizer Acid/Base Regeneration Wastewater Surface Impoundment 1

Activity

The impoundment is an abovegrade, fiberglass-lined concrete open tank settling basin having two compartments holding 232,000 gallons each. It is used for the collection of low-volume chemical wastes including make-up demineralizer regenerant; condensate polisher backwash; boiler area, fly ash silo, and area and precipitator washdown wastes. This waste is classified as Class II waste. Waste from the settling basin is sent to the chemical waste treatment system (SWMU 4). Accumulated sludge is periodically removed from the basin floors and is sent to the sludge dewatering system portion of SWMU 4. After treatment, the wastewater is discharged by internal outfall 203 into Smithers Lake. It should be noted that wastewater from the aforementioned internal outfall 203 and internal outfalls 103, 303, 403, 603, 703, and 803 that shall be discussed later in this text combine into outfall 003, which discharges directly into Smithers Lake.

Existing Permit

The internal outfall associated with SWMU, outfall 203, is permitted under the NPDES program and under TNRCC Discharge Permit Number TX0006394.

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Monitoring

Discharge from outfall 203 is monitored daily for flow rate and weekly for total suspended solids (TSS) and oil and grease. Outfall 003 is monitored continuously for temperature and flow rate and weekly for total residual chlorine and biomonitored once every six months. The results are self-reported to TNRCC.

Concerns

The current compliance status of outfalls 203 and 003 is unknown. However, the exceedence summary for January 1996 to June 1997, submitted to TNRCC, reported no exceedences for these outfalls.

3.1.2 SWMU 2—Demineralizer Acid/Base Regeneration Wastewater Surface Impoundment 2

Activity

The impoundment is a below-grade, fiberglass-lined concrete sump tied to SWMU 1 and has a storage capacity of 82,000 gallons. It is used for the temporary storage of demineralizer wastewater prior to transfer to a chemical waste treatment system. The accumulated demineralizer regenerant inorganic sludge is periodically removed from the sump floor and is sent to the sludge dewatering system. After treatment, the wastewater is discharged into Smithers Lake by internal outfall 203.

Existing Permit

Because SWMU 2 is tied to SWMU 1, the internal outfall associated with this SWMU is outfall 203. This outfall is permitted under the NPDES program and under TNRCC Discharge Permit Number TX0006394.

Monitoring

Discharge from outfall 203 is monitored daily for flow rate and weekly for TSS and oil and grease. Outfall 003 is monitored continuously for temperature and flow rate and weekly for total residual chlorine and biomonitored once every six months. The results are self-reported to TNRCC.

Concerns

The current compliance status of outfall 203 is unknown. However, the exceedence summary for January 1996 to June 1997, submitted to TNRCC, reported no exceedences for this outfall.

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3.1.3 SWMU 3—Demineralizer Acid/Base Regeneration Wastewater Surface Impoundment 3

Activity

The impoundment is an abovegrade, fiberglass-lined concrete open settling basin tied to SWMU 1 and has a storage capacity of 82,000 gallons. It is used for the collection of low-volume chemical wastes prior to transfer through outfall 403 to a chemical waste treatment system. The accumulated demineralizer regenerant inorganic sludge is periodically removed from the basin floors and is sent to the sludge dewatering system. After treatment, the wastewater is discharged into Smithers Lake by outfall 703.

Existing Permit

Outfalls 403 and 703 are permitted under the NPDES program and under TNRCC Discharge Permit Number TX0006394.

Monitoring

Discharge from outfall 403 and 703 is monitored daily for flow rate and weekly for TSS and oil and grease.

Concerns

The current compliance status of outfall 703 is unknown. However, the exceedence summary for January 1996 to June 1997, submitted to TNRCC, reported that in December 1996 the daily maximum oil and grease in outfall 703 exceeded the permitted daily maximum. Twenty-four hour notification of this event was provided to TNRCC. The exceedence was believed to be the result of sulfur in the waste stream from the flue gas desulfurization system (FGDS). Procedures that control the volume of wastewater from the FGDS are reportedly being reviewed (Reference 21).

3.1.4 SWMU 4—Chemical Waste Treatment System

Activity

The chemical waste treatment system is a treatment system for discharge from SWMUs 1 and 3. The system consists of two steel-constructed clarifiers with a capacity of approximately 902,000 gallons and 1,842,000 gallons. A 6-inch-curbed concrete dike surrounds the clarifiers. This concrete dike is designed to direct any spills or runoff into a collection sump. The collected water from the sump is sent back to the wastewater treatment system.

The clarifiers consist of solids contact clarifiers and primary and secondary pH adjustment, control system reaction, mixing tanks for suspended solids removal and pH adjustment. The sludge generated in the chemical waste treatment systems, containing demineralizer regenerant, boiler

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blowdown and inorganic metal cleaning waste, is pumped to the sludge dewatering system, which is separate from SWMU 4. The sludge is removed to a thickener and sent through a rotary vacuum filter. Dried sludge is trucked to the industrial landfill (SWMU 10). The wastewater from SWMU 4 is eventually discharged into Smithers Lake by internal outfalls 103, 203, 603, and 703.

Existing Permit

These outfalls are permitted under the NPDES program and under TNRCC Discharge Permit Number TX0006394.

Monitoring

The type and frequency of monitoring for outfalls 103, 203, 603, and 703 are covered in Subsections 2.4.1.1, 2.4.1.3, 2.4.1.5, and 2.4.1.7.

Concerns

Concerns and comments associated with the outfalls of this SWMU are discussed in Subsections 2.4.1.1, 2.4.1.3, 2.4.1.5, and 2.4.1.7.

3.1.5 SWMU 5—Inorganic Metal Cleaning Wastewater Surface Impoundment 1

Activity

The impoundment is an abovegrade, fiberglass-lined concrete basin with two compartments holding 850,000 gallons each. It is used for the collection of inorganic metal cleaning wastes. These wastes include hydrochloric acid boiler cleaning wastes, boiler blowdown, and air preheater wash. The wastes are collected for treatment in Units 5 and 6 of SWMU 4 for pH adjustment, metal precipitation, and sedimentation. The metal cleaning inorganic sludge from the basin floors are periodically sent to the sludge dewatering system. The waste is classified as Class II waste. The treated wastewater is discharged through outfall 103 into Smithers Lake.

Existing Permit

Outfall 103 is permitted under the NPDES program and under TNRCC Discharge Permit Number TX0006394.

Monitoring

Discharge from outfall 103 is monitored daily for flow rate and weekly for TSS, oil and grease, iron, and copper.

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Concerns

The current compliance status of outfall 103 is unknown. However, the exceedence summary for January 1996 to June 1997, submitted to TNRCC, reported no exceedences for this outfall.

3.1.6 SWMU 6—Inorganic Metal Cleaning Wastewater Surface Impoundment 2

Activity

The impoundment is actually a sump for discharge to SWMU 5 that consists of two below-grade, fiberglass-lined concrete basins holding 21,000 gallons and 54,000 gallons. The waste is classified as Class II waste. The treated wastewater is discharged through outfall 103 into Smithers Lake.

Existing Permit

Outfall 103 is permitted under the NPDES program and under TNRCC Discharge Permit Number TX0006394.

Monitoring

Discharge from outfall 103 is monitored daily for flow rate and weekly for TSS, oil and grease, iron, and copper.

Concerns

The current compliance status of outfall 103 is unknown. However, the exceedence summary for January 1996 to June 1997, submitted to TNRCC, reported no exceedences this outfall.

3.1.7 SWMU 7—Inorganic Metal Cleaning Wastewater Surface Impoundment 3

Activity

The impoundment is an abovegrade, fiberglass-lined concrete basin with two compartments holding 1,189,000 gallons each. The basin collects inorganic metal cleaning wastes including hydrochloric acid boiler cleaning wastes, boiler blowdown, and air preheater wash prior to treatment in SWMU 4. The sludge from the basin floor is periodically sent to the sludge dewatering system. The waste is classified as Class II waste. The treated wastewater is discharged through internal outfall 603 into Smithers Lake.

Existing Permit

Outfall 603 is permitted under the NPDES program and under TNRCC Discharge Permit Number TX0006394.

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Monitoring

The outfall is monitored daily for flow rate and weekly for TSS, oil and grease, iron, and copper.

Concerns

The current compliance status of outfall 603 is unknown. However, the exceedence summary for January 1996 to June 1997, submitted to TNRCC, reported no exceedences for this outfall.

3.1.8 SWMU 8—Organic Metal Cleaning Waste Surface Impoundment

Activity

The impoundment is a below-grade, fiberglass-lined concrete basin with two compartments holding 173,922 gallons each. The organic metal cleaning wastes consist of hydroxyacetic-formic acid and ammoniated citric acid used in cleaning boilers and equipment. The waste is burned in two boilers. The boiler ash is stored in the industrial landfill (SWMU 10).

Existing Permit

The air emissions of the two boilers are permitted under TNRCC Permit Number 5794.

Monitoring

Air emissions monitoring is conducted by collecting a wastewater sample from each concrete basin prior to injection into the boilers. The wastewater is sampled for metallic oxides and salts, chlorides, fluorides, and nitrates. Additional monitoring of these units is related to the 1990 Clean Air Act and the Acid Rain Provisions as specified under 40 CFR 75. This consists of continuous stack monitoring of nitrogen oxides (NO_x), sulfur dioxide (SO_2), and carbon dioxide (CO_2) along with stack flow and opacity.

Concerns

Information concerning the compliance status of the boilers was not available. However, the existing air permit indicated that the stacks of the boilers are continuously monitored. In addition, to insure compliance with the permit requirements, a wastewater sample is collected from each concrete basin and analyzed prior to injection into the boilers. When verification of the chemical constituent ranges in the permit is confirmed, then permission to inject the wastewater into the boiler is given.

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3.1.9 SWMU 9—Inorganic Acid/Ash Collection Surface Impoundments

Activity

In 1977, three inorganic collection surface impoundments comprised of 0.56 acres (500,000 gallons), 0.75 acres (1,000,000 gallons), and 4.27 acres (5,000,000 gallons) were excavated for temporary use during the construction of two units of the chemical waste treatment system. On an intermittent basis, the natural clay-lined impoundments were used for the disposal of a mixture of chemical cleaning waste from the feedwater and boiler. In 1978, analytical results and information based on waste sampling of the temporary surface impoundments indicated that the waste reportedly contained concentrations of metals: chromium, copper, manganese, zinc, iron, and sodium. No wastewater entered the three impoundments after early 1980. By March 1982, waste was removed from all three impoundments, backfilled, and graded over. Soil was not removed from the impoundment during this activity.

Existing Permit

No permits are associated with this SWMU.

Monitoring

No monitoring is associated with this SWMU.

Concerns

According to McClelland Engineers, Inc. 1978 Geotechnical Report, the geology of the site in the SWMU 10 area provides a natural clay liner that exhibits a coefficient of permeability of 1.0×10^{-7} centimeters per second (cm/sec) or lower. Contaminants that could migrate to groundwater may be contained by the natural clay soils; however, no studies have been done in the area of SWMU 9. In 1982, the ponds were reportedly backfilled and graded over, thus preventing runoff from the SWMU. The low volatility of the contaminants of concern (metals) greatly diminish the risk of air exposure.

3.1.10 SWMU 10—Industrial Landfill and Overflow Collection Pond

Activity

The industrial landfill consists of four cells for the storage of fly, bottom ash, and Class II industrial waste. In Cell 2, fly ash and bottom ash are blended before being spread in the cell to produce a more stable product. Cell 3 at the time of WESTON's site reconnaissance was a new and unused cell designated for bottom ash, and Cell 1A contained Class II industrial waste. Cell 1 contained Class II nonhazardous waste and was closed in 1989. Each landfill cell has a collection pond, which collects the runoff from that cell. All runoff from the landfill cells is pumped to an

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overflow settling basin pond. The water from the overflow pond is discharged through outfall 004 into Smithers Lake.

Existing Permit

Air emissions from the fly ash and bottom ash disposal system are permitted under the TNRCC Permit No. 5430A. Discharge through outfall 004 is permitted under the NPDES program and under TNRCC Discharge Permit Number TX0006394.

Monitoring

Air emissions from the fly ash and bottom ash blending process and Cells 1A, 2, and 3 are monitored for particulate matter. The discharge through outfall 004 is monitored daily for flow rate, TSS, and oil and grease and bimonthly for selenium. Chronic biomonitoring tests are conducted quarterly. Although not required by any permit, nine monitoring wells are located around the landfill cells and the overflow pond. These wells are sampled biannually. Samples are analyzed for alkalinity, pH, specific conductance, temperature, turbidity, TSS, metals, chloride, fluoride, phosphorus, and sulfate.

Concerns

Based on the PA report and observations made during WESTON's site reconnaissance, all of the industrial landfill cells and the overflow pond have some type of liner. The four existing cells in the landfill area have a 3-foot natural clay liner. Based on McClelland Engineer's geotechnical investigation, this natural clay liner has a coefficient of permeability of 1.0×10^{-7} cm/sec or lower. The overflow pond has a 40 mil. (0.040 inches) synthetic liner overlying a natural 3-foot clay liner.

WESTON reviewed the analytical data from the most recent groundwater monitoring sampling event. In October 1996, nine groundwater samples were collected from the nine groundwater monitoring wells located around the industrial landfill area. Groundwater monitoring data generated from the sampling event reported low levels of metals, well below the MCLs in drinking water.

The current compliance status of outfall 004 is unknown. However, the exceedence summary for January 1996 to June 1997, submitted to TNRCC, reported no exceedences for this outfall.

3.1.11 SWMU 11—Waste Oil and Sludge Collection Facilities

Activity

Three separate waste oil and sludge collection facilities have been documented in previous reports. All three locations are shown on Figure 2-2 (Site Plan Map); however, only two locations were observed during the site reconnaissance. In general, the floor drains in the two

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observed facilities are located in work locations where potential oil spillage could occur and in equipment operation areas. The floor drains also serve as a containment mechanism for collecting rainwater runoff. All of the floor drain treatment system liquid is routed through the facilities oil/water separator and/or concrete-lined settling basin. The oil is skimmed from the wastewater and drummed and stored in a less-than-90-day storage area (SWMU 12) for off-site disposal. The wastewater is routed through outfalls 005, 303, and 803 into Smithers Lake.

Existing Permit

The outfalls are permitted under the NPDES program and under TNRCC Discharge Permit Number TX0006394.

Monitoring

Discharge from outfalls 005, 303, and 803 is monitored daily for flow rate and weekly for TSS and oil and grease. The pH of discharge from outfall 005 is monitored weekly.

Concerns

The current compliance status of outfalls 005, 303, and 803 is unknown. However, the exceedence summary for January 1996 to June 1997, submitted to TNRCC, reported one exceedence of TSS from outfall 005, two exceedences of oil and grease from outfall 303, and one exceedence of oil and grease from outfall 803. Most of these exceedences were caused by equipment failures or excessive rainfall. Repairs were completed and procedures were updated. No other exceedences for these outfalls were reported.

3.1.12 SWMU 12—90-Day Maximum Hazardous Waste Storage Area

Activity

This area is an outdoor 90-day maximum hazardous waste storage area consisting of a concrete slab for storage of drums and tanks. Wastes are stored in tanks or drums prior to being shipped off-site to approved hazardous waste treatment facilities. Drums are stored on wooden pallets. Aboveground tanks are contained within 1-foot concrete dikes. One of the waste oil collection facilities (SWMU 11) is contained within the concrete slab storage area.

Existing Permit

No permits are associated with this SWMU.

Monitoring

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Concerns

There are no concerns associated with the SWMU.

3.1.13 SWMU 13—Bulk Storage Area

Activity

The 1990 PA identified a bulk storage area that used bins for the storage of lead-contaminated blasting material prior to off-site disposal. However, during WESTON's site reconnaissance, Houston Lighting and Power indicated that a designated bulk storage area does not exist, but a general area where the bins are used is identified on the Site Plan Map (Figure 2-2). The bins were used during intermittent maintenance.

Existing Permit

No permits are associated with this SWMU.

Monitoring

No monitoring is associated with this SWMU.

Concerns

There are no concerns associated with the SWMU.

3.1.14 SWMU 14—Nonhazardous Construction Debris Landfill

Activity

This unit contains only construction demolition nonhazardous waste.

Existing Permit

No permits are associated with this SWMU.

Monitoring

No monitoring is associated with this SWMU.

Concerns

There are no concerns associated with the SWMU.

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3.2 SUMMARY OF WASTE SOURCE CHARACTERIZATION

Table 2-1 at the end of this section summarizes the characterization of each waste source.

3.3 WASTE SOURCE CONCLUSIONS

Based on available background information and WESTON's site reconnaissance, the sources at the site consist of eight surface impoundments, two chemical waste treatment systems, the closed acid collection/ash surface impoundments, an industrial landfill area with an overflow pond, and a less-than-90-day hazardous waste storage area. According to available information, the constituents of concern are mainly metals. However, migration of contaminants of concern are inhibited by liners in the surface impoundments, landfill cells, and overflow pond and a concrete pad in the storage area. These areas are monitored for discharge exceedences by TNRCC under NPDES and air permits and are controlled by run-on and stormwater collection systems. The facility also has its own Spill Prevention Control and Countermeasures (SPCC) and Pollution Prevention (PPP) Plans (Reference 5). In addition, the three temporary acid collection/ash surface impoundment ponds were backfilled and closed in 1982.

The storage area and nonhazardous landfill do not pose any potential hazard to human health or the environment, because the storage area (SWMU 13) is used intermittently during maintenance and the waste stored in the landfill is nonhazardous.

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HOUSTON LIGHTING AND POWER W.A. PARISH GENERATING STATION
THOMPSONS, FORT BEND COUNTY, TX
EPA CERCLA ID NO.: TXD097311849

TABLE 3-1

SUMMARY OF POTENTIAL WASTE SOURCES

SWMU	DESCRIPTION	PERMIT	MONITORING TYPE/FREQUENCY	CONTAINMENT FEATURES	BASIS OF CONCERN
1	Surface Impoundment	NPDES	Outfalls are monitored daily for flow rate and weekly for TSS.	Fiberglass liner within concrete basin.	Low on all concern associated with this source.
2	Surface Impoundment	NPDES	Outfalls are monitored daily for flow rate and weekly for TSS.	Fiberglass liner within concrete basin.	No concern associated with this source.
3	Surface Impoundment	NPDES	Outfalls are monitored daily for flow rate and weekly for TSS and oil and grease.	Fiberglass liner within concrete basin.	Between January 1996 and June 1997, one exceedence of oil and grease was reported. Procedures for this system are being reviewed. No other exceedences were reported.
4	Steel Clarifiers and Sludge Dewatering	NPDES	Outfalls are monitored daily for flow rate and weekly for one or more of TSS, and oil and grease	6-inch concrete curbed dike designed to direct spills or runoff into a collection sump. The collected water from the sump is sent back to the wastewater treatment system.	No concern associated with this source.
5	Surface Impoundment	NPDES	Outfalls are monitored daily for flow rate and weekly for TSS, oil and grease, iron, and copper.	Fiberglass liner within concrete basin.	No concern associated with this source.

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TABLE 3-1 (Continued)

SUMMARY OF POTENTIAL WASTE SOURCES

SWMU	DESCRIPTION	PERMIT	MONITORING TYPE/FREQUENCY	CONTAINMENT FEATURES	BASIS OF CONCERN
6	Surface Impoundment	NPDES	Outfalls are monitored daily for flow rate and weekly for TSS.	Fiberglass liner within concrete basin.	No concern associated with this source.
7	Surface Impoundment	NPDES	Outfalls are monitored daily for flow rate and weekly for TSS, oil and grease, iron, and copper.	Fiberglass liner within concrete basin.	No concern associated with this source.
8	Surface Impoundment	TNRCC Air Permit	Wastewater is sampled for metallic oxides and salts, chlorides, fluorides, and nitrates prior to injection into boilers for confirmation of permitted limits. Stacks of the boilers are continuously monitored for NO_x, SO_2, CO_2, flow rate, and opacity.	Fiberglass liner within concrete basin.	No concern associated with this source.
9	Three Surface Impoundments	Not Applicable (Closed)	Not Applicable	Natural clay liner. Ponds existed from 1977 to 1982. Wastewater was emptied from the ponds, and the ponds were backfilled and graded over.	No concern associated with this source.

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TABLE 3-1 (Continued)

SUMMARY OF POTENTIAL WASTE SOURCES

SWMU	DESCRIPTION	PERMIT	MONITORING TYPE/FREQUENCY	CONTAINMENT FEATURES	BASIS OF CONCERN
10	Industrial Landfills and Overflow Pond	TNRCC Air Permit NPDES	Air emissions of the fly ash and bottom ash blending facility are monitored for particulate matter. Wastewater from the overflow pond is monitored daily for flow rate, TSS, and oil and grease and bimonthly for selenium. Chronic biomonitoring tests are conducted quarterly. Monitoring wells around the landfills and overflow pond are sampled biannually.	The landfill cells have a 3-foot natural clay liner that has a coefficient of permeability of 1.0×10^{-7} cm/sec or lower. The overflow pond has a 40 mil. synthetic liner with a natural 3-foot clay liner underneath.	Based on available information, a release to groundwater from this SWMU has not been documented.
11	Waste Oil and Sludge Collection Facilities	NPDES	The three outfalls associated with the SWMU are monitored daily for flow rate and weekly for TSS and oil and grease.	The settling basins are concrete lined.	From January 1996 to June 1997, four exceedences of TSS and oil and grease were reported.

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TABLE 3-1 (Continued)

SUMMARY OF POTENTIAL WASTE SOURCES

SWMU	DESCRIPTION	PERMIT	MONITORING TYPE/FREQUENCY	CONTAINMENT FEATURES	BASIS OF CONCERN
11 (continued)	Waste Oil and Sludge Collection Facilities	NPDES	The outfall that discharges directly into Smithers Lake (005) is monitored weekly for pH levels.	The waste oil and oil sludge collected from the basins are drummed and stored at SWMU 12 for off-site disposal. The oil drainage collection system also serves as a mechanism for containing rainwater runoff for the facility.	These exceedences were mainly due to mechanical failures and excessive rainfall. Repairs were made and procedures have been revised, and no other exceedences were reported thereafter.
12	Waste Storage Area	Not Applicable	Not Applicable	The area is a 90-day maximum hazardous waste outside storage area consisting of a concrete slab. Drums are placed on wooden pallets. Aboveground tanks are contained with 1-foot concrete dikes.	No concern associated with this source.
13	Storage Area	Not Applicable	Not Applicable	Not Applicable	No concern associated with this source.

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TABLE 3-1 (Continued)

SUMMARY OF POTENTIAL WASTE SOURCES

SWMU	DESCRIPTION	PERMIT	MONITORING TYPE/FREQUENCY	CONTAINMENT FEATURES	BASIS OF CONCERN
14	Nonhazardous Landfill	Not Applicable	Not Applicable	Not Applicable	No concern associated with this source.

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SECTION 4
GROUNDWATER PATHWAY

A discussion of the groundwater pathway, one of four major pathways of potential hazardous waste migration assessed in this report, is provided in this section. The discussion focuses on the aquifer characteristics of the region, the likelihood of a release to groundwater, and the potential targets of hazardous waste migration through the groundwater pathway.

4.1 HYDROGEOLOGIC DESCRIPTION

Information in this subsection was obtained from McClelland Engineers, Inc.'s *Geotechnical Investigation of the Ash Storage Area, W A. Parish Generating Station and* Resource Engineering's *Hydrogeologic Investigation at the W.A. Parish Generating Station* (References 10 and 12).

4.1.1 Geologic Framework

The HL&P site is located in the western Gulf Coastal Plain geologic region on the Beaumont Formation and the alluvium of the Brazos River. The Beaumont Formation is principally a poorly bedded, calcareous clay containing thin discontinuous stringers and lenses of silt, sand, and fine sand.

The Beaumont Formation is part of a hydro-stratigraphic unit known as the Chicot aquifer. The thickness of the aquifer increases toward the Gulf of Mexico from zero at the western edge of the Quaternary outcrop (80 miles from the gulf) to more than 1,200 feet at the gulf. The Evangeline aquifer immediately underlies the Chicot aquifer. The Evangeline aquifer thickness is greater, up to 2,000 feet near the gulf. Both major aquifers indicate regional water flow toward the gulf.

Potentiometric surface maps produced by ERM Southwest, Inc. indicate that groundwater in the vicinity of the site flows in a north-eastward direction (Reference 29). Localized flow directions are controlled by surface water bodies including Smithers Lake and the Brazos River.

4.2 LIKELIHOOD OF RELEASE

Important factors related to the likelihood of a release from a source of hazardous substances at the site to groundwater are presented in this subsection.

4.2.1 Depth to Groundwater

Measurement to depth of groundwater in the boreholes drilled during the McClelland Engineers, Inc. 1978 geotechnical investigation of the industrial landfill area indicated that the depth to water is 8 to 10 feet below ground surface (bgs) (Reference 10).

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4.2.2 Depth of Contamination

Based on the PA report and observations made during WESTON's site reconnaissance, most of the SWMUs have some type of liner (References 4 and 5). The liners of the surface impoundments, chemical waste treatment systems, and container storage area are made of concrete. The four existing cells in the landfill area have a 3-foot natural clay liner. Based on McClelland Engineers' geotechnical investigation, this clay liner has a coefficient of permeability of 1.0×10^{-7} cm/sec or lower (Reference 10). The overflow pond has a 40 mil. geotextile liner overlying a 3-foot natural clay liner. SWMU 9, the former temporary storage ponds, may be lined by a 3-foot natural clay liner.

4.2.3 Annual Precipitation

The average annual precipitation in the area of the site is approximately 46 inches (Reference 30). The net annual precipitation in the area of the site is approximately 9.1 inches (Reference 31).

4.2.4 Thickness of Impermeable Layers

The upper portion of the Beaumont Formation, consisting mainly of clay, is considered to be a regional impermeable layer. The thickness of the Beaumont Formation is approximately 100 feet in the area of the site (Reference 12).

4.2.5 Groundwater Sampling and Analytical Results

Per authorization and direction from EPA, no field sampling activities were performed by WESTON during this SI. Based on available information, a release to groundwater has not been documented at the site. In October 1996, nine groundwater samples were collected from the nine groundwater monitoring wells located around the industrial landfill area (Reference 19). Groundwater monitoring data generated from the sampling event reported low levels of metals. However, these levels were well below the MCL in drinking water.

4.3 GROUNDWATER PATHWAY TARGETS

Groundwater pathway targets include the total population being provided with drinking water from wells located near the site, Well Head Protection Areas (WHPAs), and resources relying on groundwater.

4.3.1 Nearest Well

The nearest drinking water well is located on site (see Figure 2-2, Site Plan Map).

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4.3.2 Other Nearby Wells

According to Houston Lighting and Power, there are nine monitoring wells and seven potable water wells on-site (References 5 and 6). Groundwater is a major source of water supply, providing water for residential use, irrigation of crops, livestock watering, and industrial use (References 5, 12, and 32). Seven irrigation, 28 private drinking water, 10 stock, and 14 public supply wells have been identified within a 4-mile radius of the site (Reference 33).

4.3.3 Well Head Protection Areas

No WHPAs have been identified near the site (Reference 34).

4.3.4 Groundwater Resources

Groundwater is a major source of water supply, providing water for residential use, irrigation of crops, livestock watering, and industrial use (References 12, 32, and 33).

4.4 GROUNDWATER PATHWAY CONCLUSIONS

A release to groundwater does not appear to be of concern. The open surface impoundments have fiberglass liners within concrete. The landfill cells have a natural clay liner that has a coefficient of permeability of 1.0×10^{-7} cm/sec or lower. The closed surface impoundments may have a natural clay liner; however, studies of this area have not been conducted. The 90-day hazardous waste storage area consists of a concrete slab. The tanks stored in this area have secondary containment. Analytical data from the October 1996 monitoring wells sampling event indicated the existence of low levels of metals. However, these levels were below the MCLs for drinking water.

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SECTION 5
SURFACE WATER PATHWAY

Surface water is the second of four pathways of potential hazardous waste migration assessed for the site. A discussion of the types of surface water draining the site, the probable point of entry (PPE) for a hazardous substance from the site to enter surface water, the likelihood of a release, and the potential targets of the pathway are discussed in this section.

5.1 HYDROLOGIC SETTING

The PA described the local topography as relatively flat with Smithers Lake at the highest elevation. Natural drainage flows from Smithers Lake to lower elevations through Dry Creek, Rabbs Bayou, and unnamed tributaries to the Brazos River (Reference 4). Smithers Lake is privately leased by the power plant. Flood maps indicate a continued interaction between Smithers Lake and the northern section of Rabbs Bayou (Reference 35).

5.1.1 Overland Flow Segment

Based on available information and site reconnaissance observations, treated wastewater is discharged directly into Smithers Lake.

5.1.2 Probable Point of Entry

According to the PA and observations made during the site reconnaissance, treated wastewater from the power generating facility is discharged into Smithers Lake (References 4 and 5). All run-on to the industrial landfill cells is pumped into an overflow pond, settles in the basin and then, is discharged into Smithers Lake. The PPEs for a release of hazardous substances from a source area at the site would occur at the outfalls to Smithers Lake; specifically outfalls 003, 004, and 005.

5.1.3 Surface Water Flow Path

Natural drainage flows from Smithers Lake to lower elevations through Dry Creek, Rabbs Bayou, and unnamed tributaries to the Brazos River (Reference 4).

5.2 LIKELIHOOD OF RELEASE

Important factors related to the likelihood of a release from a source of hazardous substances at the site to surface water are presented in the following subsections.

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5.2.1 Distance to Surface Water

Since the PPE is at the site, there is no distance between the site to surface water. Based on available information, a release to surface water has not occurred.

5.2.2 Flood Frequency

Based upon floodplain maps obtained from the Federal Emergency Management Agency (FEMA), the power plant is located on a Zone C or out of the floodplain surface. The industrial landfill area and overflow pond rest on both Zone A (100-year floodplain) and Zone B (between 100- and 500-year floodplain) (Reference 35).

5.2.3 2-Year, 24-Hour Rainfall

The 2-year, 24-hour rainfall for the area of the site is approximately 4.5 inches (Reference 37).

5.2.4 Flood Containment

Based on observations made during the site reconnaissance and available information, the waste oil/oil sludge collection facilities are designed to collect all stormwater from the power plant facility area. The drainage system in the industrial landfill area was designed to collect all run-on from the landfill cells into collection ponds. The water is then pumped from the collection ponds into an overflow settling pond. The wastewater is then pumped into Smithers Lake under a NPDES permit.

5.2.5 Surface Water/Sediment Sampling and Analytical Results

Per authorization and direction from EPA, no field sampling activities were performed by WESTON during this SI. However, all treated wastewater from the power plant is discharged to Smithers Lake through internal and external outfalls. These outfalls are regulated by TNRCC under a NPDES permit and are monitored for discharge exceedences. From January 1996 to June 1997, five NPDES permit exceedences of the associated outfalls were reported that were mainly caused by mechanical failures. These failures were corrected, and procedures associated with the operations of the SWMUs are either being reviewed or updated. In addition, the site also has a SPCC (Reference 5).

5.3 SURFACE WATER PATHWAY TARGETS

Surface water pathway targets include fisheries, drinking water intakes, sensitive environments, and resources that rely on surface water downstream of the PPE. The targets identified within the surface water pathway are discussed in the following subsections.

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5.3.1 Drinking Water Intakes

There are no drinking water intakes in the 15-mile Target Distance Limit (Reference 5).

5.3.2 Wetlands and Other Sensitive Environments

Based the National Wetlands Inventory map, the wetland frontage along the surface water pathway is mainly composed of uplands or nonwetlands. Along Smithers Lake, there is approximately 0.2 mile Palustrine forested deciduous saturated/semipermanent/seasonal and of Palustrine forested seasonal saturated/semipermanent/seasonal wetland frontage. Along Dry Creek, there is approximately 0.1 mile of Palustrine emergent persistent semipermanent and seasonal wetland frontage. Along Rabbs Bayou, there is approximately 2.351 miles of Palustrine forest deciduous temporary, Palustrine emergent persistent temporary, Palustrine emergent persistent saturated/semipermanent/seasonal diked, and Palustrine emergent persistent semipermanent wetland frontage (Reference 37).

The PA reported that Worthington Lake, approximately 5 miles downstream, was a Bald Eagle rookery. Other threatened and endangered species inhabiting Fort Bend County are the Houston toad, American peregrine falcon, arctic peregrine falcon, whooping crane, Eskimo curlew, brown pelican, white-faced ibis, Attwater's greater prairie-chicken, black bear, timber/canebrake rattlesnake, Texas tortoise, and Texas horned lizard (Reference 38).

5.3.3 Fisheries

Recreational fishing occurs infrequently in Smithers Lake from bridges (Reference 5).

5.3.4 Resources

Livestock are occasionally watered from Rabbs Bayou (Reference 32).

5.4 SURFACE WATER PATHWAY CONCLUSIONS

Potential for contaminants to migrate into the surface water pathway appears be of minor concern. The surface water from the facilities is controlled by the oil/oil sludge collection facilities. All run-on to the industrial landfills is collected into an overflow pond that is a settling pond. All treated wastewater enters Smithers Lake through internal and external outfalls that are regulated by TNRCC and are under a NPDES permit. Exceedences and discharges are reported routinely. However, exceedences that have occurred were of short duration as a result of mechanical failures and excessive rainfall. Necessary repairs were made, and procedures were reviewed and revised to mitigate the potential for releases.

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SECTION 6
SOIL EXPOSURE

Soil exposure is another potential route of exposure to hazardous substances attributable to the site. The discussion in this section focuses on the important soil exposure factors such as soil type, area of contamination, accessibility and the likelihood of exposure, and the potential targets.

6.1 SURFICIAL CONDITIONS

Information regarding the surficial conditions at the site is summarized in the following subsections.

6.1.1 Soil Type

Based on observations made during the site reconnaissance, the power plant facility portion of the site is mostly covered by buildings, the plant, a parking lot, and concrete (Reference 5 and Appendix A). Soils at the location of the industrial landfills are classified as the Bernard-Edna series. The Bernard-Edna series is a somewhat poorly drained, very slowly permeable, upland soil. It has a slightly acid, very dark gray clay loam surface, and a very dark gray clay subsoil that is slightly acid in the upper part and neutral to moderately alkaline in the lower part. Slopes range from 0 to 5%, but are mainly less than 1% (Reference 39).

6.1.2 Areas of Contamination

Based on observations from the site reconnaissance, there were no noticeable areas of contamination.

6.2 LIKELIHOOD OF EXPOSURE

Important factors related to the likelihood of exposure to an area of contaminated soil at the site are presented in the following subsections.

6.2.1 Attractiveness of the Site

The HL&P site consists of an active coal and gas power plant. There are approximately 400 workers present at the site, and there are no residences located adjacent to the site (Reference 4). The attractiveness of the site is considered to be low.

6.2.2 Site Accessibility

Access to the site is restricted by a perimeter fence (Reference 5). A guard is on duty during the day at the entrance to the plant; otherwise, the entrance is locked.

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6.2.3 Soil Analytical Results from Previous Investigations

There are no known previous soil sampling events associated with the HL&P site.

6.2.4 SI Soil Sampling and Analytical Results

No field sampling activities were performed by WESTON during this SI. Per authorization and direction from EPA, WESTON has used historical data for this SI.

6.3 SOIL EXPOSURE TARGETS

The resident population living or working in an area of soil contamination, the population living near areas of soil contamination, designated recreational areas, and terrestrial resources such as agriculture are potential targets of soil exposure. The soil exposure targets identified are summarized in the following subsections.

6.3.1 Resident Population

The resident population is defined as those persons in houses, schools, or day care facilities who are located on a property where soil contamination attributable to the site has been documented and whose residences are within 200 feet of that contamination.

The HL&P site consists of an active business with 400 on-site workers. Based on observations made during the site reconnaissance, residential dwellings, schools, or day care facilities were not identified on-site or in the vicinity of the site (Reference 5).

6.3.2 Nearby Population

The nearby population includes those persons who live within 1 mile of areas of soil contamination attributable to the site. Those persons in houses, schools, or day care facilities within 1 mile of the site have been considered part of the nearby population.

WESTON reviewed 1990 Census information (Reference 40) and USGS topographic maps (Reference 2) to estimate the nearby population living is specific distances around the site. Based on available 1990 Census information, the number of persons per household is 3.14. There are approximately 400 persons on-site (References 5). The population distribution within 1 mile of the site is summarized in Table 6-1.

6.3.3 Sensitive Environments

Although, no terrestrial sensitive environments have been identified at the site, several endangered species are described as ranging in the area of the site.

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6.3.4 Resources

No resources are known to exist at or near the site.

6.4 SOIL EXPOSURE CONCLUSIONS

Soil exposure is of minor concern. There are approximately 400 on-site workers; however, much of the facility is covered by buildings and concrete. Neither nearby nor residential population has been identified at the site. In addition, the entire site is enclosed by a fence, and the plant entrance is monitored by a guard.

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TABLE 6-1
NEARBY POPULATION

DISTANCE INTERVAL	ESTIMATED POPULATION	REFERENCE
On-Site	400	5
>0 to 0.25 mile	22	2, 40
>0.25 to 0.5 mile	22	2, 40
>0.5 to 1 mile	1,110	2, 40

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SECTION 7
AIR PATHWAY

The discussion in this section of the report focuses on the air pathway, another potential route of hazardous substance migration from the site. Atmospheric conditions, the likelihood of a release to air, and potential air pathway targets are identified below.

7.1 METEOROLOGICAL CONDITIONS

The meteorological conditions in the site region are summarized as follows:

- The average annual precipitation in the area of the site is approximately 46 inches (Reference 30).
- The prevailing wind direction is from the southeast (Reference 41).

7.2 LIKELIHOOD OF RELEASE

Information regarding the likelihood of a release to the air pathway is described in the following subsections.

7.2.1 Air Sampling Results from Previous Investigations

No analytical data for the air pathway are known to be available. However, the air emissions from the boilers associated with SWMU 8 and the hoppers associated with SWMU 10 are regulated by TNRCC under two air permits (References 22 and 23).

7.2.2 Previous Air Quality Sampling and Analytical Results

There is no known previous air quality sampling to have been conducted at the site.

7.3 AIR PATHWAY TARGETS

Potential targets of the air pathway include on-site workers, the nearby population living within 4 miles of the site, and any sensitive environments in the area. The targets identified for the air pathway are discussed in the following subsections.

7.3.1 Population Within 4 Miles

WESTON reviewed 1990 Census information (Reference 40) and USGS topographic map (Reference 2) to estimate the nearby population living in specific distances around the site. Based on available 1990 Census information, the population density for Fort Bend County is 3.14 persons per

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household. There are approximately 400 workers present at the site. The population within 4 miles of the HL&P site is summarized in Table 7-1.

7.3.2 Sensitive Environments

Sensitive environments have been identified previously in this report under subsection 5.3.2. These targets include wetlands within approximately 1 mile of the site along Rabbs Bayou, a Bald Eagle rookery located approximately 2 miles away from the site, and the Houston toad, American peregrine falcon, arctic peregrine falcon, whooping crane, Eskimo curlew, brown pelican, white-faced ibis, Attwater's greater prairie-chicken, black bear, timber/canebrake rattlesnake, Texas tortoise, and Texas horned lizard that inhabit Fort Bend County (Reference 38).

7.3.3 Resources

No resources that may be targets of the air pathway have been identified.

7.4 AIR PATHWAY CONCLUSIONS

Based on available information, a release to the air pathway has not been documented, and a release to air is not suspected. The boiler stacks and the fly ash and bottom ash hopper are regulated by TNRCC under an air permit. In addition, the constituents of concern are metals and have a low volality. Based on this information, the air pathway is not a concern.

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TABLE 7-1
POPULATION WITHIN 4 MILES

DISTANCE INTERVAL	ESTIMATED POPULATION	REFERENCE
On-Site	400	5
>0 to 0.25 mile	22	2, 40
>0.25 to 0.5 mile	22	2, 40
>0.5 to 1 mile	1,110	2, 40
>1 to 2 miles	73	2, 40
>2 to 3 miles	164	2, 40
>3 to 4 miles	487	2, 40

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SECTION 8
CONCLUSIONS

Concerns associated with the migration and exposure pathways are summarized as follows:

- Based on the information provided in Section 4, a release to groundwater is a minor concern. The open surface impoundments have fiberglass liners and concrete bottoms. The landfill cells have a natural clay liner that has a coefficient of permeability of 1.0×10^{-7} cm/sec or lower. The closed surface impoundments may have a natural clay liner; however, studies of this area have not been conducted. The 90-day hazardous waste storage area consists of a concrete slab. The tanks stored in this area have secondary containment. Analytical data from the October 1996 monitoring wells sampling event indicated the existence of low levels of metals. However, these levels were below the MCLs for drinking water

- Based on the information provided in Section 5, a release to surface water is a minor concern. The oil drainage collection system also serves as a mechanism for containing rainwater runoff for the facility. All run-on to the industrial landfills is collected into an overflow pond that is a settling pond. Treated wastewater from the power plant facility and the overflow pond enters Smithers Like through outfalls that are regulated by TNRCC and are under a NPDES permit. Exceedences and discharges are reported routinely, and exceedences that have occurred were of short duration as a result of mechanical failures and excessive rainfall. Necessary repairs were made, and procedures were reviewed and revised to mitigate the potential for releases.

- Based on the information provided in Section 6, soil exposure is of minor concern. There are approximately 400 on-site workers; however, much of the facility is covered by buildings and concrete. No obvious areas of potential soil contamination were observed during the site reconnaissance. In addition, the entire site is enclosed by a fence, and the plant entrance is monitored by a guard.

- Based on the information provided in Section 7, a release to the air pathway is not a concern. The boiler stacks and the fly ash and bottom ash hopper are regulated by TNRCC under an air permit. In addition, the constituents of concern are metals and have a low volality.

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SECTION 9
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APPENDIX A

PHOTOGRAPHS

Photograph: 1

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing southwest) Collection pond of Cell 1A. The water from the pond is pumped from the pipe (located in the background) to the overflow pond.

Photograph: 2

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing northeast) The corner of Cell 1A.

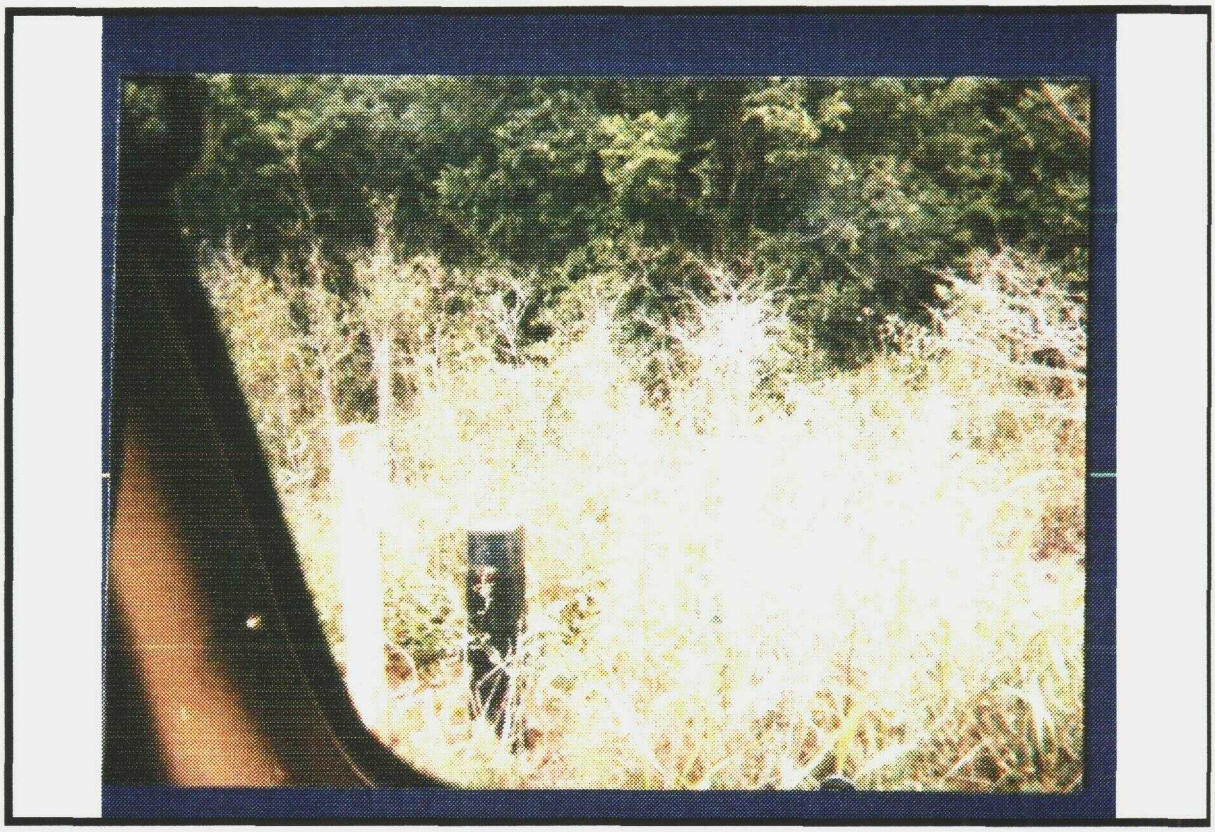
Photograph: 3

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing northeast) Cell 1 is a closed Class 2 nonhazardous industrial waste landfill.

Photograph: 4

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing south) The drainage ditch near Cell 1A. This drainage ditch directs all run-off that is not from the landfill cells to Rabbs Bayou.

Photograph: 5



Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing east) The monitoring well located northeast of Cells 1A and 1.

Photograph: 6

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing west) At the time of this photograph, Cell 1B was new and unused.

Photograph: 7

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing south) Collection pond in Cell 3.

Photograph: 8

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing southeast) Monitoring wells (located in the background) located southeast of Cell 3.

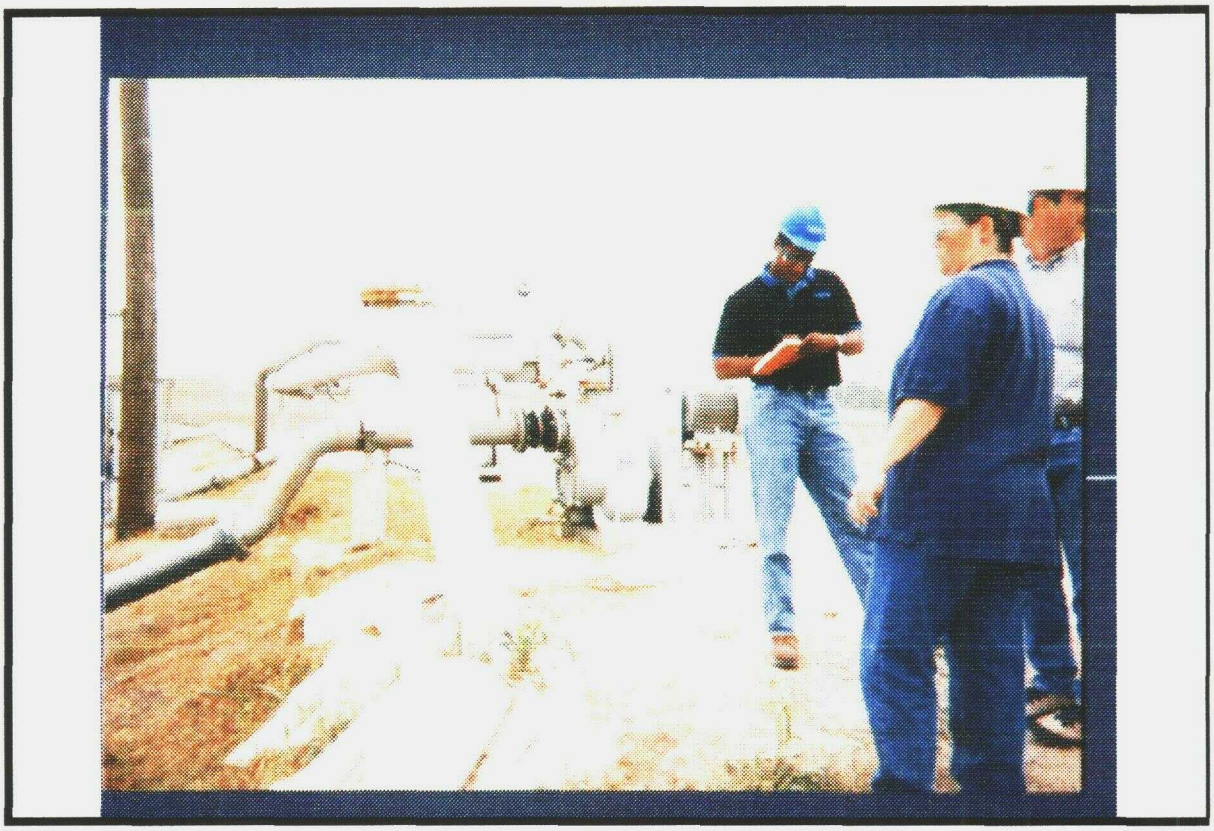
Photograph: 9

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing southwest) Drainage ditch to overflow pond located south of Cell 3.

Photograph: 10

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing north) The east side of the overflow pond. The pond is a settling basin that has a 40 mil. geotech liner that is shown. The pipes are where the water is pumped from the basin to Smithers Lake.

Photograph: 11



Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing north) The pump for the overflow pond.

Photograph: 12

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing south) Outfall 004 - From the overflow pond to Smithers Lake.

Photograph: 13

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing east) Outfall 803.

Photograph: 14

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing north) SWMU 11 - API separator for oil and water. The oil is skimmed from the top.

Photograph: 15

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing west) SWMU 9 - Location of the three former temporary ponds of boiler cleaning waste.

Photograph: 16

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing north) Drums and above ground storage tanks in the 90-day storage area. The tanks have a 1-foot concrete dike. The drums are standing on wooden pallets.

Photograph: 17

Site Name:	HL&P Parish Station
Site Location:	Thompsons, TX
Weston Work Order:	11098-112-027-0001
Photographer:	Joy Ishigo
Witness:	Carol La Breche
Date of Photograph:	05/22/97
Description:	(Facing northeast) Drums and the oil separator in the 90-day storage area. The drums are standing on wooden pallets.

APPENDIX B

REFERENCES

REFERENCE 1

LATITUDE AND LONGITUDE CALCULATION WORKSHEET
USING GEOGRAPHIC INFORMATION SYSTEM AND ArcCAD

SITE NAME: Houston Lighting & Power W.A. Parish Generating Station CERCLIS #: TXD097311849

AKA: _____ SSID: _____

ADDRESS: 2759 Jones Rd, Thompsons, Texas

CITY: Thompsons STATE: Texas ZIP CODE: 77481

SITE REFERENCE POINT: _____

USGS QUAD MAP NAME: SMITHERS LAKE TOWNSHIP: ____ N/S RANGE: ____ E/W

SCALE: 1:24,000 MAP DATE: 1953 SECTION: ____ 1/4 ____ 1/4 ____ 1/4

MAP DATUM: (1927) 1983 (CIRCLE ONE) MERIDIAN: _____

COORDINATES FROM CONTROL POINT ~~#1~~ (NORTHWEST 2.5' GRID TICK)

LONGITUDE: ___° ___' ___" LATITUDE: ___° ___' ___"

COORDINATES FROM CONTROL POINT ~~#2~~ #1 (SOUTHWEST 2.5' GRID TICK)

LONGITUDE: 95° 40' 00" LATITUDE: 29° 27' 30"

COORDINATES FROM CHECK POINT ~~#3~~ #2 (NORTHEAST 2.5' GRID TICK)

LONGITUDE: 95° 37' 30" LATITUDE: 29° 30' 00"

COORDINATES FROM CHECK POINT #4 (SOUTHEAST 2.5' GRID TICK)

LONGITUDE: ___° ___' ___" LATITUDE: ___° ___' ___"

1. INPUT FILE A:\ _____
2. OUTPUT FILE A:\ _____
3. INPUT FILE A:\ _____
4. OUTPUT FILE A:\ _____

SITE LATITUDE: 29° 28' 45.97"

SITE LONGITUDE: 95° 38' 04.85"

INVESTIGATOR: _____ DATE: _____

CAD OPERATOR David W. Mahy DATE: 7/10/97

1) THE GEOGRAPHIC INFORMATION SYSTEM (GIS) AND ArcCAD WERE USED TO CALCULATE SITE LATITUDE AND LONGITUDE.

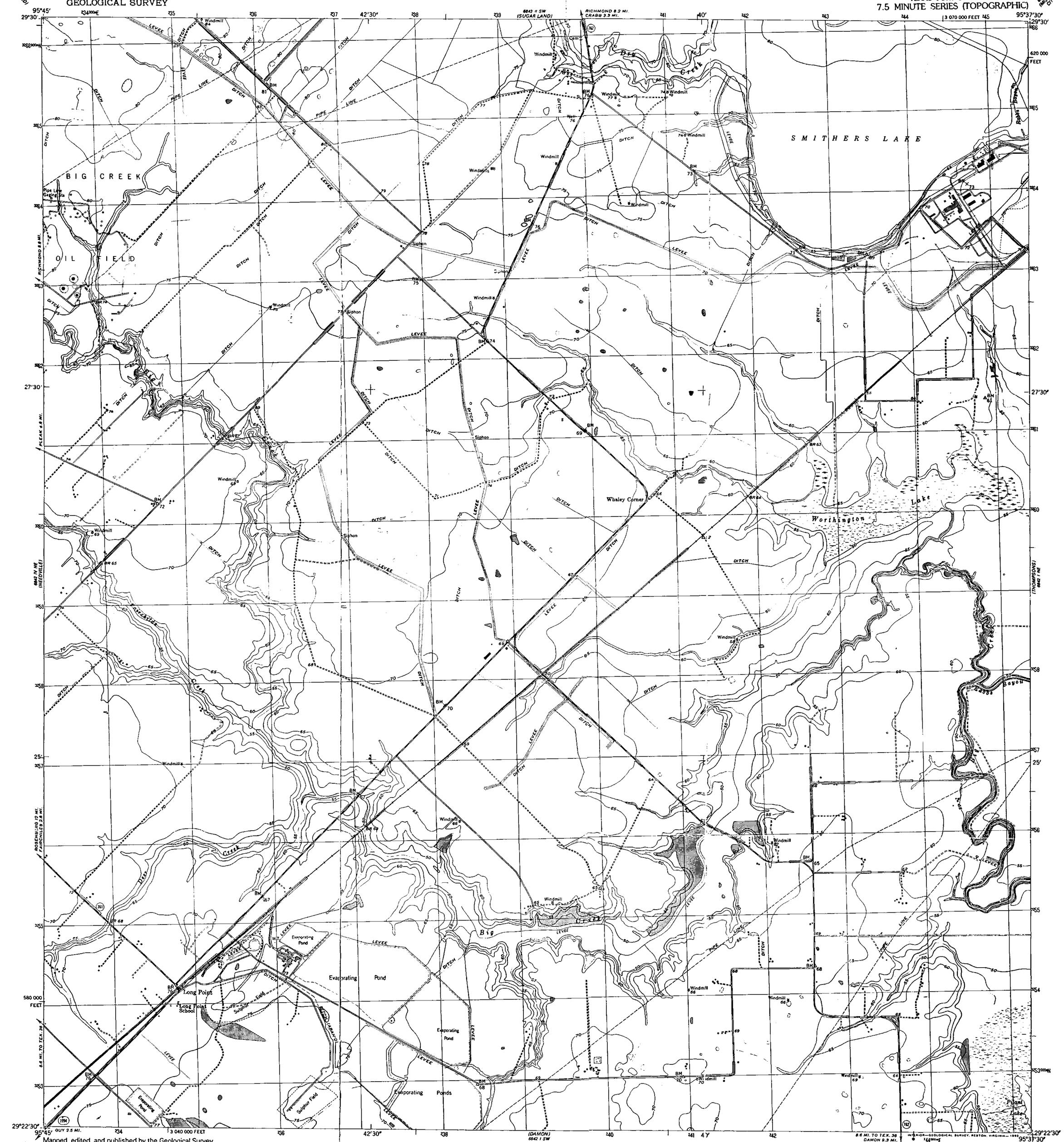
2) COORDINATE FILE PRINTOUT IS ATTACHED.

arcs:46032328:latlong.map(as)

REFERENCE 2

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SMITHERS LAKE QUADRANGLE
TEXAS-FORT BEND CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Culture and drainage in part compiled from aerial photographs taken 1946, 1947, and 1951. Topography by plane-table surveys by U.S. Bureau of Reclamation 1947, and by the Geological Survey 1953

Polyconic projection. 1927 North American Datum
10,000-foot grid based on Texas coordinate system, south central zone
1000-meter Universal Transverse Mercator grid, zone 15
The difference between 1927 North American Datum and North American Datum of 1983 (NAD 83) for 7.5 minute intersections is given in USGS Bulletin 1875. The NAD 83 is shown by dashed corner ticks

MN GN 1°19' 23 MILS 7° 124 MILS
UTM GRID AND 1980 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Revisions shown in purple compiled from aerial photographs taken 1977 and other source data. This information not field checked. Map edited 1980

SCALE 1:24 000
1 ½ 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

TEXAS
QUADRANGLE LOCATION

2995-243

ROAD CLASSIFICATION
Heavy-duty — 4 LANE | 6 LANE — Light-duty
Medium-duty — 4 LANE | 6 LANE — Unimproved dirt
U. S. Route — State Route

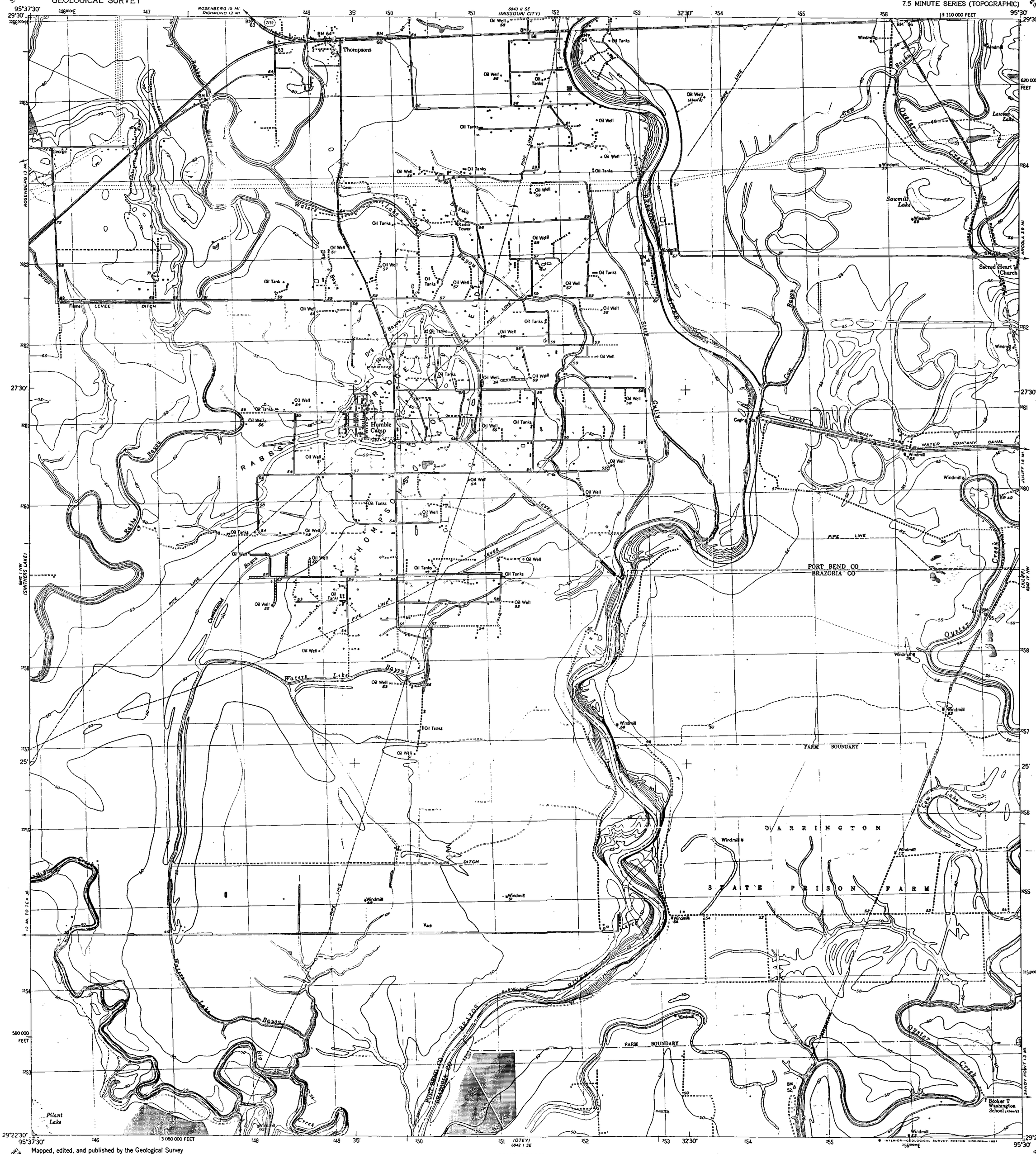
GAYLORD STICKLE CO. & ASSOC. Inc.
AUTHORIZED AGENTS FOR USGS
Houston, TX (713) 526-5471

SMITHERS LAKE, TEX.
29095-D6-TF-024

1953
PHOTOREVISED 1980
DMA 6842 I NW-SERIES V882

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

THOMPSONS QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Control by USGS, NOS/NOAA, and Texas GLO State Reclamation Department

Culture and drainage in part compiled from aerial photographs taken 1951. Topography by plane-table surveys 1953

Polyconic projection. 1927 North American Datum
10,000-foot grid based on Texas coordinate system, south central zone.

1000-meter Universal Transverse Mercator grid, zone 15

To place on the predicted North American Datum 1983 move the projection lines 21 meters south and 22 meters east as shown by dashed corner ticks

Revisions shown in purple compiled from aerial photographs taken 1977 and other source data. This information not field checked. Map edited 1980

GN MN
1°16' / 23 MILS
7° / 124 MILS
UTM GRID AND 1980 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 ½ 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

UNCLASSIFIED
Houston, Tx.

TEXAS
QUADRANGLE LOCATION

2995-244

ROAD CLASSIFICATION

Heavy-duty — 4 LANE | 6 LANE — Light-duty
Medium-duty — 4 LANE | 6 LANE — Unimproved dirt
U. S. Route — State Route

THOMPSONS, TEX.
29095-D5-TF-024

1953
PHOTOREVISED 1980
DMA 6842 I NE-SERIES V882

COOPER

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUGAR LAND QUADRANGLE
TEXAS—FORT BEND CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Planimetry by photogrammetric methods from aerial photographs taken 1968. Topography enlarged from 1:62 500 scale map of Sugar Land quadrangle dated 1955. Topography by planetable surveys. Field checked 1970

Polyconic projection. 1927 North American Datum
10,000-foot grid based on Texas coordinate system, south central zone
1000-meter Universal Transverse Mercator grid ticks, zone 15, shown in blue

Fine red dashed lines indicate selected fence lines

To place on the predicted North American Datum 1983 move the projection lines 21 meters south and 23 meters east as shown by dashed corner ticks

UTM GRID AND 1980 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Revisions shown in purple compiled from aerial photographs taken 1977 and other source data. This information not field checked. Map edited 1980

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

GAYLORD STICKLE CO. & ASSOC., INC.
AUTHORIZED AGENTS FOR U.S.G.S. MAPS
Houston, TX (713) 529-8471

QUADRANGLE LOCATION

2995-312

ROAD CLASSIFICATION

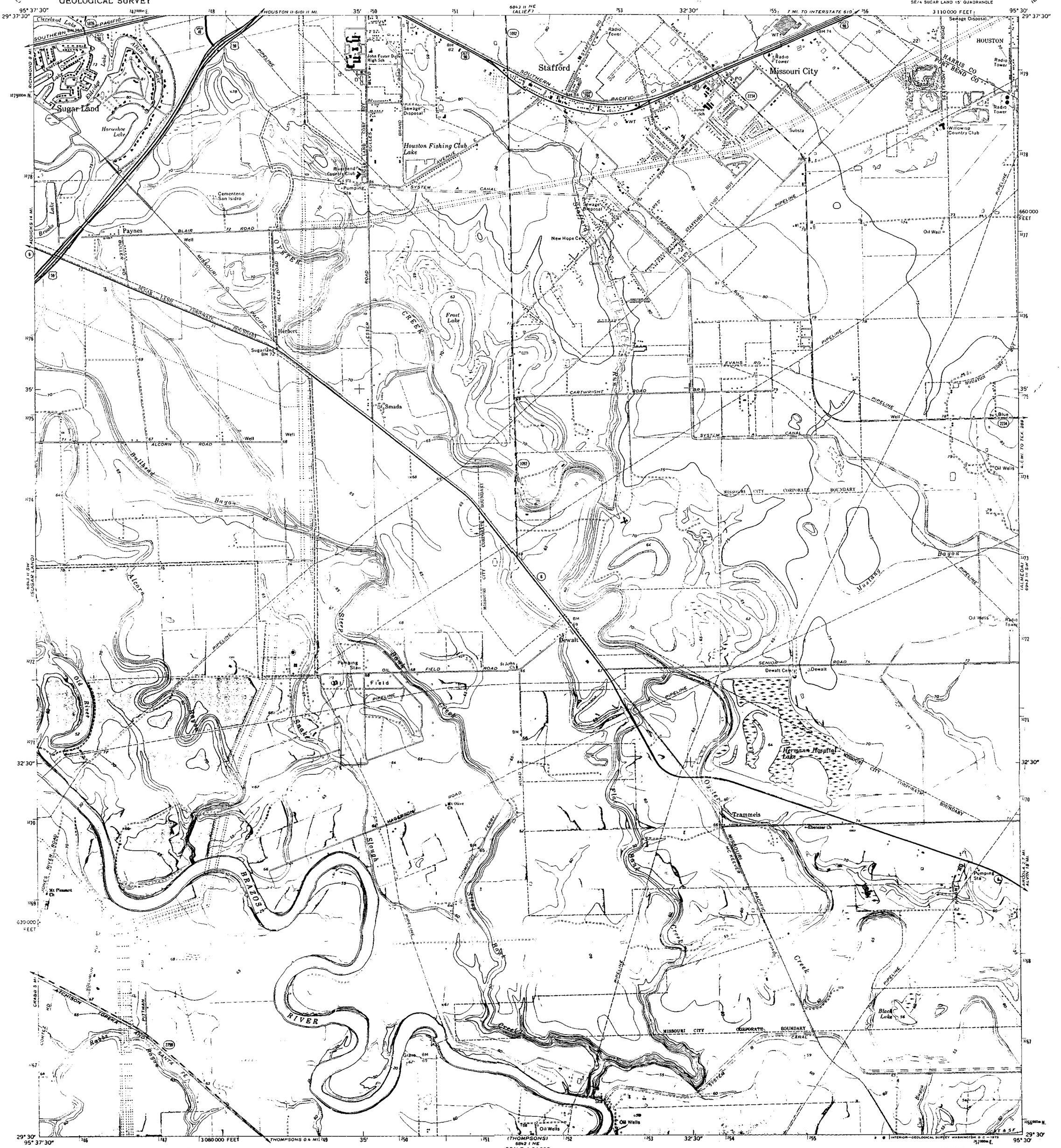
Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U. S. Route — State Route

SUGAR LAND,
29095-E6-TF-

1970
PHOTOREVI
DMA 6843 II S

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MISSOURI CITY QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 SUGAR LAND 15' QUADRANGLE



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Planimetry by photogrammetric methods from aerial photographs taken 1968. Topography enlarged from 1:62 500 scale map of Sugar Land quadrangle dated 1955. Topography by planetable surveys. Field checked 1970

Polyconic projection. 1927 North American datum
10,000-foot grid based on Texas coordinate system, south central zone
1000-meter Universal Transverse Mercator grid ticks, zone 15, shown in blue

Fine red dashed lines indicate selected fence lines

UTM GRID AND 1970 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
DATUM IS MEAN SEA LEVEL

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

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GAYLORD STICKLE COMPANY & ASSO. INC.
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AUTHORIZED AGENTS FOR
U. S. GEOLOGICAL SURVEY MAPS
713-659-7283 HOUSTON, TEXAS

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U. S. Route — State Route

MISSOURI CITY, TEX.
SE/4 SUGAR LAND 15' QUADRANGLE
N2930—W9530/7.5

1970

AMS 6843 II SE—SERIES V882

REFERENCE 3

The Light company
Houston Lighting & Power

P.O. Box 1700 Houston, Texas 77251-1700 713-207-1111

May 12, 1997

CERTIFIED MAIL

Mr. Don Markham
Superfund Site Assessment (6SF-RA)
USEPA Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

SUBJECT: CONSENT FOR ACCESS TO PROPERTY
HOUSTON LIGHTING & POWER CO.
W.A. PARISH ELECTRIC GENERATING STATION
EPA I.D. NO: TXD097311849

Dear Mr. Markham:

Pursuant to a May 1, 1997 letter from Ms. Susan Webster of EPA Region 6 to Mr. Robert Moles of Houston Lighting & Power Company's (HL&P) W.A. Parish EGS, please find attached a completed CONSENT FOR ACCESS TO PROPERTY that has been signed by Mr. Moles.

Please also note that the EPA I.D. Number for the W. A. Parish facility is TXD097311849.

Should you have any questions regarding this matter, please call me at (713) 945-8201.

Sincerely,

R.T. Bye, Division Manager
Environmental Assessment &
Waste Management Division
Environmental Department

Attachment
lwk/wapepa.ltr

MA... ...NTAL
Assessment & Was... ...it

CONSENT FOR ACCESS TO PROPERTY

Name: Mr. Robert Moles, General Manager

EPA I.D. No.: TXD097~~8~~311849
Site Name: HL&P Parish Station

Description of Property: The HL&P Parish Station is located at 2759 Jones Road in Thompsons, Texas (see attached site location maps).

I hereby consent to officers, employees, and representatives authorized by the United States Environmental Protection Agency (EPA) entering and having continued access to my property for the following purposes:

1. Reviewing and copying documents related to the site;
2. The taking of such soil, water and air samples as may be determined to be necessary;
3. The sampling of any solids or liquids stored or disposed of on property;
4. The drilling of holes and the installation of monitoring wells for subsurface investigation of subsurface contamination.

I realize that these actions are undertaken pursuant to EPA's response and enforcement responsibilities under the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA), 42 U.S.C. § 9601 et seq., as well as 40 CFR Part 300.400 Subpart E.

I am the property owner, or a responsible agent of the property owner, and I warrant that I have the authority to enter into this access agreement.

Place a check mark in the appropriate space. Please note that if no selection is made EPA will assume that you do not wish to be provided with a portion of the sample.

(✓) Please provide me with a portion of each sample taken at the property described above. I understand that there will be no charge for the sample portions provided by the EPA. I also understand that I must furnish suitable containers, be responsible for the laboratory analytical analysis, and sign for the transfer of custody from the EPA designated sampler.

( ) I do not wish to receive a portion of samples taken at the property described above.

This written permission is given by me voluntarily with knowledge of my right to refuse and without threats or promises of any kind.

5-8-97
DATE

RJ Moles GENERAL MANAGER
SIGNATURE, Title

start:10981227:moles.501(wds)

REFERENCE 4

PRELIMINARY ASSESSMENT

of

HOUSTON LIGHTING AND POWER W. A. PARISH GENERATING STATION

(TXD097311849)

Filed in SA Vol. 2

Prepared By:

Carol Cox, FIT Environmental Scientist

ICF Technology, Inc.
Region VI

July 20, 1990

SUPERFUND
FILE

FEB 0 2 1993

REORGANIZED

PRELIMINARY ASSESSMENT

of

HOUSTON LIGHTING AND POWER W. A. PARISH GENERATING STATION

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FIGURES

FIGURE	TITLE
1	SITE LOCATION MAP
2	SITE SKETCH OF UNITS 1-4
3	SITE SKETCH OF UNITS 5-8

ATTACHMENTS

ATTACHMENT	TITLE
A	SOLID WASTE MANAGEMENT UNIT LIST

1. SITE INFORMATION

The Region VI Field Investigation Team (FIT) was tasked by the U.S. Environmental Protection Agency (EPA) under Technical Directive Document (TDD) F-06-8908-32 to conduct the Preliminary Assessment (PA) of the Houston Lighting and Power W. A. Parish Generating Station (TXD097311849) in Thompsons, Fort Bend County, Texas.

1.1 SITE LOCATION

The Houston Lighting and Power W. A. Parish Generating Station is located at 2759 Jones Road, Thompsons, Texas 77481, 3 miles southwest of the Town of Thompsons. The mailing address is P. O. Box 1700, Houston, Texas 77001. Site coordinates are 29°29'15" north latitude and 95°38'0" west longitude. The facility encompasses approximately 3,000 acres (Figure 1).

1.2 SITE BACKGROUND

The privately owned Houston Lighting and Power Company had an estimated revenue of $3 billion for fiscal year 1989 (Ref. 26).

2. BACKGROUND AND OPERATING HISTORY

This section addresses site history and operations, known and potential problems, and regulatory involvement of federal, state or local agencies.

2.1 SITE HISTORY

The W. A. Parish Generating Station began operating June 1, 1958 with gas-fired turbine units (Ref. 27, p. 1). Coal-fired units 5 and 6 were constructed between 1974 and 1978 (Figure 2). Operations began in late 1978 (Ref. 6, p. 3). Coal-fired units 7 and 8 came on-line in 1980 and 1982 respectively (Figure 3) (Ref. 9, p. 9; Ref. 11, p. 1). The plant produces electricity by generating steam from gas-operated and coal-fired turbines. Process water is routed through chemical treatment systems to remove suspended solids and adjust pH. Treated wastewater is discharged into Smithers Lake, Rabbs Bayou or Dry Creek. Sludges remaining on the floors of surface impoundments are periodically removed and sent through a rotary vacuum to remove moisture. Dried sludge is stored in the lagoon area. Bottom ash and fly ash are stored in the lagoon prior to being sold for recovery. Flue gas desulfurization sludge is dewatered and stored in the lagoon. Oil and oil sludge generated on-site is drummed and stored for off-site disposal. PCB and mercury contaminated solids and PCB capacitator fluids are drummed for off-site disposal. Lead contaminated blasting material is stored in bins prior to disposal off-site (Ref. 5, pp. 5-6; Ref. 6, pp. 1-4; Ref. 9, p. 5).

2.2 KNOWN AND POTENTIAL PROBLEMS

Contaminants of concern were found in a Texas Water Commission (TWC) Notice of Solid Waste Management Registration and laboratory data from samples collected by Houston Lighting and Power on March 11, 1983 for Extraction Procedure Toxicity (EP Toxicity) tests. The samples were analyzed by Southern Petroleum

Laboratories in accordance with the extraction procedures outlined by the EPA in Part 261, Appendix II of the Hazardous Waste Regulations (Ref. 6, p. 13). Analysis of demineralizer regenerant wastewater, metal cleaning inorganic acids (wastewater and sludge) and metal cleaning organic acids revealed arsenic, barium, cadmium, chromium, endrin, lead, lindane, selenium and toxaphene in trace amounts (Ref. 6, pp. 18-31). The TWC registration form listed acetone, asbestos, mercury and PCB contaminated solids and fluids as having been stored on-site (Ref. 5).

The Houston Lighting and Power analytical data concerns the classification of waste. EP toxicity data from the wastewaters and sludges resulted in declassification to Class II waste on April 8, 1981 (Ref. 6, pp. 2-3).

CERCLA, TWC and NPDES files were searched for available information. An off-site reconnaissance inspection was not performed.

A Closure Plan was approved by the TWC on September 23, 1985 for the Outdoor Container Storage Area. A December 1988 Closure Review by A. T. Kearney, Inc. determined that the closure did not meet the closure performance standard of 40 CFR 265.111. The Closure Plan and Certification of Closure did not demonstrate how closure activities controlled, minimized or eliminated post-closure escape of hazardous waste. The container storage area managed 55-gallon drums of hazardous wastes, including spent solvents and paint thinners (Ref. 6, p. 11; Ref. 15, pp. 2, 4).

2.3 REGULATORY INVOLVEMENT

The facility applied to the EPA for a hazardous waste permit on November 19, 1980 (Ref. 27, p. 1). The NPDES permit number is TX0006394. The TWC Registration number is 01038 (Ref. 19, p. 1). The generating station is registered with the Texas Department of Water Resources (TDWR) under Solid Waste Registration number 31631 (Ref. 6, p. 16).

3. WASTE CONTAINMENT AND HAZARDOUS SUBSTANCE IDENTIFICATION

Waste generation and containment are addressed in this section.

3.1 DOCUMENTATION

Process water is pumped to fiberglass-lined concrete settling basins for treatment in the chemical waste treatment systems. The systems consist of the settling basins, solids contact clarifier for suspended solids removal and primary and secondary pH adjustment. Treated wastewater is discharged via an NPDES permit. Accumulated sludge is sent through a sludge dewatering system prior to storage in the lagoon (Ref. 6, pp. 1-4; Ref. 9, pp. 2-11). Between February 2 and April 17, 1989, 24,560 gallons of untreated wastewater were discharged into Smithers Lake (Ref. 19). Violations such as these have been attributed to mechanical breakdowns (Ref. 24, p. 2). Other substances such as waste oils, spent solvents, lead contaminated sandblasting material, asbestos insulation and paint thinner are generated on-site (Ref. 6, pp. 1-4; Ref. 5). These materials are stored in Container Storage Area 2 prior to off-site disposal (Ref. 5, pp. 5-6; Ref. 9, p. 5).

3.2 WASTE GENERATION

Wastes generated on-site are addressed in the attached Solid Waste Management Unit List (Attachment A) per EPA request.

3.3 CONTAINMENT

Waste containment is addressed in the attached Solid Waste Management Unit List (Attachment A) per EPA request.

4. PATHWAY CHARACTERISTICS

This section characterizes environmental pathways and evaluates the potential of contaminant migration from the facility.

4.1 GROUND WATER

The W. A. Parish Generating Station is located in the western Gulf Coastal Plain Geologic Region on the Beaumont Formation and the alluvium of the Brazos River. The Beaumont Formation is principally a poorly bedded, calcareous clay containing thin discontinuous stringers and lenses of silt, sand and fine sand (Ref. 14, pp. 3-5).

The Beaumont Formation is part of a larger stratigraphic unit known as the Chicot Formation, which provides water for domestic use, livestock watering (Ref. 18) and industrial use (Ref. 14, p. 6). The thickness of the aquifer increases toward the Gulf of Mexico from zero at the western edge of the Quaternary outcrop (80 miles from the Gulf) to more than 1,200 feet at the Gulf (Ref. 14, p. 6). The Evangeline Aquifer immediately underlies the Chicot Aquifer and is an important source of ground water in the Houston Metropolitan area. The aquifer thickness is greater, up to 2,000 feet near the Gulf. Both major aquifers indicate regional water flow toward the Gulf (Ref. 14, pp. 3-7).

Measurement to depth of ground water in the boreholes drilled during a geotechnical investigation of the ash storage area by McClelland Engineers, Inc. suggests the water level is 8 to 10 feet below the ground surface (Ref. 12, p. 2). Nearby residential wells are screened in the Chicot Aquifer (Ref. 7). W. A. Parish wells 306 and 307 penetrate the Chicot Aquifer. W. A. Parish wells 302, 303, 204 and 313 draw from the Evangeline Aquifer (Ref. 16, pp. 2-6). Water level measurements for wells 302, 303 and 304 indicate a decrease in static water level between 1980 and 1984 (Ref. 28, p. 44; Ref. 16, p. 44). Ground water is not being monitored at the plant because the waste is classified as Class II waste (Ref. 10, p. 18).

The Thompsons area receives an estimated annual net precipitation of 46 inches (Ref. 32).

Wastes are contained in fiberglass lined concrete surface impoundments prior to storage in the lagoon area or prior to treatment for discharge into Smithers Lake. Rabbs Bayou or Dry Creek via an NPDES permit. The storage areas within the lagoon are lined with 3 feet of compacted clay (Ref. 14, p. 2). Heavy metals are the contaminants of concern (Ref. 6, pp. 1-4; Ref. 5; Ref, 9, pp. 2-11).

4.4 AIR

The contaminants of concern are primarily heavy metals contained in liquids, sludges and dried sludges (Ref. 6, pp. 1-4; Ref. 9, pp. 2-11). Surface impoundments and the lagoon storage areas are not covered. Lead contaminated sandblasting material is stored in open bins (Ref. 6, p. 11). File information does not determine how solvents, waste oils, paint thinner and oil sludges are drummed for removal.

4.5 GROUND WATER RELEASE TO SURFACE WATER

This pathway was not evaluated because the top of the uppermost aquifer is 8 to 10 feet below the bottom of the surface water bodies (Smithers Lake, Rabbs Bayou and Dry Creek) being evaluated (Ref. 1, p. 170; Ref. 12, p. 2).

5. TARGETS

This section characterizes the environmental pathways and associated targets of contaminant migration from the facility.

5.1 GROUND WATER

The nearest wells are located within 1/8 mile of the site (Ref. 2; Ref. 7). The area is not designated as a Wellhead Protection area (Ref. 25). Ground water is the major source of water supply, providing water for residential use, irrigation of crops, livestock watering and industrial use (Ref. 14, p. 6; Ref. 18; Ref. 22). Ground water services approximately 3,000 people within the 4 mile target distance limit (Ref. 2; Ref. 3, p. 57; Ref. 23).

5.2 SURFACE WATER

Surface water is not used as a drinking water source within the target area (Ref. 18; Ref. 22). Livestock are occasionally watered from Rabbs Bayou (Ref. 22). Worthington Lake, approximately 5 miles downstream, is a Bald Eagle rookery (Ref. 8). Other endangered species inhabiting Fort Bend County include the Piping Plover, Whooping Crane, American Alligator and Least Interior Tern (Ref. 31).

5.3 SOIL EXPOSURE

Data analysis of samples collected by Houston Lighting and Power indicate that hazardous substances are found in sludges generated on-site (Ref. 5, pp. 1-9; Ref. 6, pp. 17-31). These sludges are dried and stored in open areas in the lagoon (Ref. 9, pp. 1, 3). Workers actively transport the sludges for storage

4.2 SURFACE WATER

The local topography is relatively flat, with Smithers Lake at the highest elevation. Natural drainage flows from Smithers Lake to lower elevations through Dry Creek, Rabbs Bayou and unnamed tributaries (Ref. 2). Smithers Lake is privately owned by the power plant. No information is available regarding the dam along the northern boundary of the lake. Flood maps indicate a continued interaction between Smithers Lake and the northern section of Rabbs Bayou (Ref. 20). Rabbs Bayou dissects the lagoon area, which also contains undrained depressions (Ref. 12, p. 4). Storage areas within the lagoon are not diked or bermed and are non-compliant with Chapter 3 (Surface Water Non-Point Source Discharge) and Chapter 8 (Floodplains) of the Open Dump Inventory Criteria (Ref. 10, pp. 2, 10).

NPDES Outfalls from the plant discharge into the following:

Outfall 001:	Dry Creek, to Rabbs Bayou to the Brazos River in Segment 1202 of the Brazos River Basin
Outfall 002:	Smithers Lake or Dry Creek
Outfall 003:	Smithers Lake
Outfall 004:	Smithers Lake
Outfall 005:	Smithers Lake
Outfall 006:	Smithers Lake (Ref. 29, p. 1)

Smithers Lake has three water intakes located near the power plant (Figures 2 and 3). No other intakes are located along the Smithers Lake, Rabbs Bayou or Dry Creek (Ref. 18; Ref. 22). Smithers Lake is infrequently fished from bridges (Ref. 18). Rabbs Bayou and an unnamed tributary feed Worthington Lake. A Bald Eagle (Haliaeetus leucocephalus) rookery is located approximately five miles downstream (Ref. 2; Ref. 8). Other endangered species inhabiting Fort Bend County include the Piping Plover (Charadrius melodus), Whooping Crane (Grus americana), American Alligator (Alligator mississippiensis) and Least Interior Tern (Sterna antillarum) (Ref. 31).

Rabbs Bayou is a minimum perennial stream, having an average flow of less than 10 cubic feet per second (Ref. 1, p. 139; Ref. 2). Gaging station information from Dry Creek is unavailable. Average flow for the Brazos River at Richmond, Texas (1941-1987), approximately 15 miles upstream of the site, is 7,209 cubic feet per second (Ref. 30, p. 3). The 2 year, 24 hour rainfall for the area is estimated at 4.5 inches (Ref. 4, p. 2). Federal Emergency Management Agency Flood Insurance Rate Maps indicate the generating station is on a Zone C, or out of floodplain, surface. The lagoon area rests on both Zone A (100 year floodplain) and Zone B (between 100 and 500 year floodplain) (Ref. 20; Ref. 21).

4.3 SOIL EXPOSURE

The facility is active, with 96 employees in the gas-fired production area and 543 employees in the coal-fired production area (Ref. 23). There are no on-site residents (Ref. 2). Location of Guard House indicates that access is controlled (Figure 3).

(Ref. 11, pp. 7-8). The population within 1 mile is estimated at 1,000 (Ref. 2; Ref. 23).

5.4 AIR

Population within the 4 mile target area is approximately 3,000 (Ref. 2; Ref. 23). Land use is primarily livestock ranching and isolated rice growing (Ref. 17, p. 1; Ref. 18). Worthington Lake, located between 1 and 2 miles from the site, is a known Bald Eagle rookery (Ref. 2; Ref. 8). The Piping Plover, Whooping Crane, American Alligator and Least Interior Tern, also endangered species, are known to inhabit Fort Bend County (Ref. 31).

6. CONCLUSIONS

The W. A. Parish Generating Station provides more than 25% of the electric power for the greater Houston area (Ref. 13, p. 3).

The identified Solid Waste Management Units (SWMUs) include eight surface impoundments, two chemical waste treatment systems, three acid collection/ash ponds, a lagoon storage area, waste oil and oil sludge collection systems, two less than 90 day container storage areas, one bulk storage area and a landfill. An outdoor container storage area received TWC closure plan approval on September 23, 1985 (Ref. 15, p. 2).

The primary pathways of concern are the ground water, surface water, air and soil exposure pathways. Ground water is the major source of drinking water for the area, servicing an estimated 3,000 people. Ground water is also used for livestock watering, crop irrigation and industrial use. Surface water is occasionally used for livestock watering. Approximately 5 miles downstream from the site is Worthington Lake, a Bald Eagle rookery. Other endangered species such as the Piping Plover, Whooping Crane, American Alligator and Least Interior Tern are known to inhabit Fort Bend County. Air and soil exposure pathways are of concern because open surface impoundments, storage bins and the lagoon storage area expose workers and nearby residents to heavy metals.

The financial status of Houston Lighting and Power appears to be sound. The 1989 company sales totaled $3 billion.

HRS DOCUMENTATION LOG SHEET

SITE NAME Houston Light & Power
W.A. Parish Generating Station
CITY Thompsons STATE TX
IDENTIFICATION NUMBER TXD097311849

REFERENCE NUMBER	DESCRIPTION OF THE REFERENCE
1	U.S. Environmental Protection Agency. Draft Final Rule Revised Hazard Ranking System. February 15, 1990.
2	U.S.G.S. 7.5 minute series Topographic map. Missouri City, TX. 1970, photorevised 1980. Smithers Lake, TX. 1953, photorevised 1980. Thompsons, TX. 1953. Sugar Land, TX. 1970, photorevised 1980.
3	U.S. Department of Commerce. Estimates of Households for Counties: July 1, 1985. Issued March 8, 1988.
4	Hershfield, David M. Rainfall Frequency Atlas of the United States. U.S. Department of Agriculture Soil Conservation Service. Technical Paper No. 40. 1961.
5	Texas Water Commission Notice of Registration Solid Waste Management. May 23, 1989.
6	Letter. Revised Part A Application. From: W.F. McGuire, Environmental Protection Department, Houston Lighting and Power. To: Ray Henry, Texas Department of Water Resources. October 9, 1984.
7	Texas Water Well Drillers Board. Well Logs.
8	Record of Communication. Sensitive Environments Near Smithers Lake, Rabbs Bayou, Fort Bend County, Texas. From: Dorinda Sullivan, Data Manager, Natural Heritage Program. To: Carol Cox, FIT Environmental Scientist, EPA Region VI. February 21, 1990. TXD097311849.
9	Process Description for Hazardous Waste Streams. Attachment G. W.A. Parish Generating Station. 1980.

10	Texas Department of Water Resources Open Dump Inventory. Inspector's Comments. Houston Lighting and Power, W.A. Parish Generating Station. Inspection June 8, 1983.
11	Letter. Disposal of Stabilized Flue Gas Desulfurization Wastes at W.A. Parish Generating Station. From: W.F. McGuire, Environmental Protection Department, Houston Lighting and Power. To: Jay Snow, Texas Department of Water Resources. September 20, 1982.
12	Geotechnical Investigation of the Ash Storage Area, W.A. Parish Generating Station. Prepared by McClelland Engineers, Inc. for Houston Lighting and Power. July 28 1976.
13	Letter. Expansion of Coal Combustion By-Product Storage Area, W.A. Parish Generating Station. From: W.F. McGuire, Environmental Protection Department, Houston Lighting and Power. To: Jay Snow, Texas Department of Water Resources. May 13, 1985.
14	Hydrogeologic Evaluation at the W.A. Parish Generating Station for Houston Lighting and Power. Prepared by Resource Engineering for Houston Lighting and Power Company. December 1985.
15	Letter. Clean Closure Review. From: Arthur Glazer, Kearney/Centaur Division, A.T. Kearney, Inc. To: Tom Clark, U.S. Environmental Protection Agency. December 9, 1988.
16	Ratzlaff, Karl W., et al. Records of Wells, Drillers Logs, Water Level Measurements, and Chemical Analysis of Groundwater in Brazoria, Fort Bend, and Waller Counties, Texas, 1975-79. Texas Department of Water Resources, Report 277. July 1983.
17	Industrial Solid Waste Disposal Compliance Monitoring Inspection Report. Prepared by the Texas Department of Water Resources. August 13, 1984.

18	Record of Communication. Information Concerning Farming, Soil Types and Use of Smithers Lake - Thompson's Area, Fort Bend County, Texas. From: Carol Cox, FIT Environmental Scientist, EPA Region VI. To: Eddie Garcia, Soil Conservation Technician, U.S. Soil Conservation Service. March 2, 1990. TXD097311849.
19	Wastewater Permit Exceedence Notification. Prepared by Houston Lighting and Power. February 27 - April 21, 1990.
20	Federal Emergency Management Agency Flood Insurance Rate Map. Fort Bend County and Certain Political Districts. Map Panel Numbers 245, 400, 425 and 265. Effective August 5, 1986.
21	Record of Communication. Floodplain of Smithers Lake, Rabbs Bayou, Fort Bend County, Texas. From: Carol Cox, FIT Environmental Scientist, EPA Region VI. To: Henry Flemming, Floodplain Management Coordinator, U.S. Corps of Engineers. March 2, 1990. TXD097311849.
22	Record of Communication. Use of Water from Rabbs Bayou; Erosion Control for Smithers Lake - Thompson's Area, Texas. From: Carol Cox, FIT Environmental Scientist, EPA Region VI. To: Eddie Garcia, Soil Conservation Technician, U.S. Soil Conservation Service. March 2, 1990. TXD097311849.
23	Record of Communication. Employee Count for W.A. Parish Generating Station. From: Carol Cox, FIT Environmental Scientist, EPA Region VI. To: Hilda Montecinos, Senior Secretary, W.A. Parish Generating Station. March 7, 1990. TXD097311849.
24	Letter. Administrative Order Docket No. VI-86-020, NPDES Permit No. TX0006394. From: Robert E. Morse, III, Baker and Botts. To: Paul Whitley, EPA Region VI. March 3, 1986.
25	Record of Communication. Wellhead Protection for Southern Fort Bend County, Texas. From: Carol Cox, FIT Environmental Scientist, EPA Region VI. To: Brad Cross, Wellhead Protection Program, Texas Water Commission. April 6, 1990. TXD097311849.

26 Standard and Poor's Register of Corporations, Directors and Executives 1990 - Corporations, Volume 1.

27 U.S. Environmental Protection Agency. Hazardous Waste Permit Application. November 19, 1980.

28 Williams, James F., III, et al. Records of Wells, Drillers Logs, Water Level Measurements and Chemical Analyses of Ground Water in Brazoria, Fort Bend and Waller Counties, Texas. 1980 - 1984. U.S. Geological Survey Open File Report 86 - 68. 1986.

29 Permit: Authorization to Discharge Under the National Pollutant Discharge Elimination System. June 17, 1988.

30 Buckner, H.D., et al. Water Resources Data, Texas, Water Year 1987. Volume 2. U.S. Geological Survey Water Data Report TX-87-2. 1988.

31 Endangered and Threatened Species of Texas and Oklahoma. 1987 with 1988 Addendum. U.S. Fish and Wildlife.

32 U.S. Department of Commerce. Climatic Atlas of the United States. June 1982. Reprinted by the National Oceanic and Atmospheric Administration. 1983.

ATTACHMENT A

SOLID WASTE MANAGEMENT UNIT LIST

SWMU 1 Demineralizer Acid/Base Regeneration Wastewater Surface Impoundment 1:

Located northwest of Unit 5, the impoundment is an above-grade, fiberglass lined concrete basin having two compartments holding 232,000 gallons each (Figure 3) (Ref. 6, p. 10). Opened in 1978, it is used for the collection of low volume chemical wastes including make up demineralizer regenerant wastes (DRW) from Units 1-4 and Units 5 and 6 prior to treatment. Condensate polisher backwash, boiler area, fly ash silo area and precipitator washdown are also collected there. The accumulated demineralizer regenerant inorganic sludge (DRIS) is periodically removed from the basin floors and is sent to the sludge dewatering system. The demineralizer regenerant wastewater from Units 1-6 are treated in the Units 5 and 6 Chemical Waste Treatment System located next to the basins. This system consists of a contact clarifer and primary and secondary pH adjustment. This waste is classified as Class II waste [Texas Water Commission (TWC) 241470] based Extraction Procedure Toxicity Tests (EP Toxicity). Treated wastewater is discharged under NPDES permit no. TX0006394 into Smithers Lake or Dry Creek. Total volume of waste received has not been determined. Estimated 1983 total wastewater discharged from the three demineralizer regenerant wastewater impoundments was 2.1 x 10^9 pounds. (Ref. 6, pp. 1-4; Ref. 9, p. 1).

SWMU 2 Demineralizer Acid/Base Regeneration Wastewater Surface Impoundment 2:

The impoundment is located north of the cooling tower (Figure 2) and is a below-grade, fiberglass-lined concrete basin with a storage capacity of 82,000 gallons (Ref. 6, p. 10). Since 1978 it has been used for the temporary storage of demineralizer wastewater from Units 1 through 4 prior to transfer to Units 5 and 6 Chemical Waste Treatment System. The accumulated DRIS is periodically removed from the the basin floor for treatment in the sludge dewatering system. After treatment the wastewater is discharged via an NPDES permit. The waste is classified as Class II waste (Ref. 6, p. 2; Ref. 9, p. 1).

SWMU 3 Demineralizer Acid/Base Regeneration Wastewater Surface Impoundment 3:

Located north of Units 7 and 8, the impoundment is an above-grade, fiberglass-lined concrete basin with two compartments of 196,000 gallons each (Figure 3) (Ref. 6, p. 10). Opened in 1980, it is used for the collection of low volume chemical wastes, including make up DRW from Units 7 and 8 prior to treatment. These tanks are also used for the collection of condensate polisher backwash, boiler area, fly ash silo area and precipitator washdown. The accumulated demineralizer regeneration wastes are treated in the Units 7 and 8 Chemical Waste Treatment System. Classified as Class II waste (TWC 241470), the treated wastewater is discharged via an NPDES permit (Ref. 6, p. 2; Ref. 9, p. 1).

SWMU 4 Chemical Waste Treatment System/Demineralizer Regeneration Sludge/Inorganic Metal Cleaning Waste Sludge

Units 5 and 6 Chemical Waste Treatment System and Units 7 and 8 Chemical Waste Treatment System were activated in 1978 and 1980 respectively (Figure 3). The Systems consist of concrete settling basins (SWMUs 1 and 3) and steel constructed clarifiers with a capacity of approximately 902,000 gallons (Ref. 9, p. 4)and 1,842,000 gallons (Ref. 9, p. 3), respectively. The clarifiers consist of solids contact clarifiers and primary and secondary pH adjustment control system reaction mixing tanks for suspended solids removal and pH adjustment. The sludge generated in the chemical waste treatment systems, containing demineralizer regenerant, boiler blowdown and inorganic metal cleaning waste, is pumped to the sludge dewatering system. The sludge is removed to a thickener and sent through a rotary vacuum filter. Dried sludge is trucked to the ash pond/lagoon. Based on EP Toxicity tests, this waste is classified as Class II waste (TWC 240540) (Ref. 6, p. 2; Ref. 9, p. 1).

SWMU 5 Inorganic Metal Cleaning Wastewater Surface Impoundment 1:

Located northwest of Unit 5, the impoundment is an above-grade, fiberglass-lined concrete basin with two compartments holding 850,000 gallons each (Figure 3) (Ref. 9, p. 4). Opened in 1978, it is used for the collection of inorganic metal cleaning wastes (IMCW). These wastes include hydrochloric acid boiler cleaning wastes, boiler blowdown and air preheater wash from Units 1-6. The wastes are collected for treatment in the Units 5 and 6 Chemical Waste Treatment System for pH adjustment, metal precipitation and sedimentation. The metal cleaning inorganic sludge (MCIS) from the basin floors are periodically sent to the sludge dewatering system. Total IMCW for 1983 were 7.5×10^5 pounds. (Ref. 6, p. 4). Classified as a Class II waste (TWC 241210), the treated wastewater is discharged via an NPDES permit to Smithers Lake (Ref. 6, p. 2; Ref. 9, p. 1).

SWMU 6 Inorganic Metal Cleaning Wastewater Surface Impoundment 2:

Located north of the cooling tower, the impoundment consists of two below-grade, fiberglass-lined concrete basins holding 21,000 gallons and 54,000 gallons, respectively (Figure 2) (Ref. 9, p. 4). These basins, opened in 1978, collect IMCW from Units 1-4 prior to transfer to Units 5 and 6 IMCW basin (SWMU 5). Sludge from the tank bottoms is sent to the sludge dewatering system. The IMCW is sent through the Units 5 and 6 Chemical Waste Treatment System. Treated wastewater is discharged via an NPDES permit (Ref. 6, p. 2; Ref. 9, p. 1).

SWMU 7 Inorganic Metal Cleaning Wastewater Surface Impoundment 3:

Located north of Units 7 and 8, the impoundment is an above-grade, fiberglass-

lined concrete basin with two compartments holding 1,189,000 gallons each (Figure 3) (Ref. 6, p. 10). Opened in 1980, the basin collects IMCW, including hydrochloric acid boiler cleaning wastes, boiler blowdown and air preheater wash from Units 7 and 8 prior to treatment in the Chemical Waste Treatment System. The sludge from the basin floor is periodically sent to the sludge dewatering system. After treatment, the wastewater is discharged via an NPDES permit. This waste is classified as Class II waste (6, p. 2; Ref. 9, p. 1).

SWMU 8 Organic Metal Cleaning Waste Surface Impoundment/Organic Metal Cleaning Sludge

Located northwest of Unit 5, the impoundment is a below-grade, fiberglass-lined concrete basin with two compartments holding 178,922 gallons each (Figure 3) (Ref. 9, p. 4). The basin was opened in 1978. The organic metal cleaning wastes (OMCW) consists of hydroxyacetic-formic acid and ammoniated citric acid used in cleaning boilers and equipment. OMCW from Units 5 through 8 are collected by gravity into boiler cleaning waste holding basins, impoundment four. Located west of Boiler Number 2, the basins are used for temporary storage (Figure 2). No other file information is available for this impoundment. The OMCW from Units 5 through 8 are collected in basins adjacent to Units 5 and 6. Prior to early 1980, the OMCW for Units 1 through 8 were injected into the Units 5 and 6 Chemical Waste Treatment System. The organic metal cleaning sludge (OMCS) was periodically removed from the basin bottoms for treatment in the sludge dewatering system. Dried sludge was trucked to the ash pond. Treated wastewater was discharged via an NPDES permit into Smithers Lake. As of late 1980, OMCW is held in basins for injection into an energy producing boiler for incineration. OMCS is removed for treatment and eventual storage in the ash pond. Based on EP Toxicity analysis, the OMCW (TWC 215290) and the OMCS (TWC 248990) are classified as Class II waste (Ref. 6, p. 2; Ref. 9, p. 1).

SWMU 9 Inorganic Acid Collection Ponds/Ash Ponds

Three inorganic acid collection ponds comprised of 0.56 acres (500,000 gallons), 0.76 acres (1,000,000 gallons) and 4.27 acres (5,000,000 gallons) (Ref. 9, pp. 5, 9) were excavated in 1977 for temporary use during the construction of Units 5 and 6. Located northeast of the Coal Pile (Figure 3), the natural clay-lined impoundments were used for the disposal of various treatment sludges from the chemical waste and metal cleaning waste treatment systems and ash from coal burning. Wastewater was pumped to Units 5 and 6 wastewater treatment system for treatment prior to NPDES discharge. This waste has been classified as Class II waste (TWC 241210) (Ref. 6, p. 2; Ref. 9, p. 1).

see analytics {citric acid, hydroacetic acid}

No wastewater entered the impoundments after early 1980. The aboveground piping to the impoundments was removed during construction of Units 7 and 8 wastewater treatment system, which was in service by June of 1980. By March of 1982, all three impoundments had been filled in and graded. Source of the fill is not on file. No soil was removed from the impoundments during this

activity. Information concerning diking or berming is not on file. Groundwater migration of contaminants is inhibited by the clayey nature of the soil (Ref. 12, p. 2). Without secondary containment, surface water migration to Smithers Lake and Dry Creek was possible (Ref. 6, p. 3).

SWMU 10 Ash Storage Area/Ash Pond/Lagoon

This area was originally designated to store ash waste generated by coal-fired Units 5 through 8. The area has a registered size of 945.868 acres. Approximately 140 acres were in use prior to 1985 when 30 additional acres were utilized (Ref. 2; Ref. 10, p.1). The area is referred to as an ash storage area or ash pond prior to June 1983. A June 8, 1983 inspection report lists the area as a registered lagoon (Ref. 10, p. 1). The proposal for the area indicated that several containment areas surrounded by earthen embankments would house the waste (Ref. 12, p. 1). As of the 1983 report, there were no dikes surrounding the designated areas (Ref. 10, p. 2).

Soil borings from a 1976 geotechnical investigation by McClelland Engineers, Inc. and a 1985 hydrologic evaluation by Resource Engineering indicate relatively uniform soil conditions throughout the tract. A 35 foot deep layer of primarily highly plastic clay with occasional silty clay or silt lenses, underlain by silty fine sand, was reported. Permeability of the soil is 1×10^{-7} centimeters/second. Replacement of the lenses with compacted clay was recommended prior to storage of wastes (Ref. 12, p. 2; Ref. 14, p. 2). Measurements to the depth of ground water in the boreholes suggest the water level is 8 to 10 feet below the surface (Ref. 12, p.2). The tract has little topographic relief but contains undrained depressions and is dissected by Rabbs Bayou (Ref. 12, p. 4).

The lagoon is used for the disposal of dried treatment sludges from the chemical waste and metal cleaning waste treatment systems, bottom (boiler) ash, fly ash and flue gas desulfurization sludge.

Dried Treatment Sludge

Dried treatment sludge is transported from the chemical waste treatment systems and stored in the southern section of the lagoon area. No file information is available as to the amount of dried sludge present. An approximately 60 acre storage area was in use until 1985. In 1985 an additional 30 acres was utilized (Ref. 14, p. 20). The dried treatment sludge is classified as Class II waste based on EP Toxicity analysis (TWC 241470, TWC 241210) (Ref. 6, p. 10; Ref. 9, pp. 1, 3). With the recorded lack of containment structures, drainage pathways include Rabbs Bayou and Dry Creek, which eventually flow into the Brazos River (Ref. 2). Ground water migration is inhibited by low soil permeability (Ref. 12, p. 2; Ref. 14, p. 2).

Bottom (Boiler) Ash

Bottom ash is stored in the northern section of the lagoon area. This material is retrieved from the boilers and stockpiled prior to being sold for recovery. No file information is available as to waste quantity and EP

Toxicity. Lacking containment structures, the drainage pathway would include Rabbs Bayou and Dry Creek (Ref. 10, p. 2). Ground water migration is inhibited due to the low permeability rate (Ref. 12, p. 2).

Fly Ash

The fly ash disposal is contracted to Ash Management, Inc. of Marietta, Georgia. The disposal area is the only true lagoon in the permitted tract. Fly ash is brought to the lagoon via truck. A portable header transports lagoon water to the truck and the water is mixed with the fly ash to form a slurry. The slurry is then discharged into a system of cells, where the heavier ash settles out and is stored prior to being sold for recovery. Excess water from the cells is discharged back to the lagoon. The waste is classified as Class II waste (Ref. 11, p. 1). The lagoon occupies approximately 40 acres and is not contained (Ref. 2; Ref. 10, p. 2). Surface water drainage would flow into Rabbs Bayou and Dry Creek. Groundwater migration is inhibited by the low soil permeability rate (Ref. 12, p. 2).

Flue Gas Desulfurization Sludge

This sludge is stored just north of the center of the lagoon. Unit 8 utilizes a wet limestone Flue Gas Desulfurization (FGD) System to remove sulfur dioxide from the flue gas. Spent limestone slurry is transported from the FGD system absorbers to a thickener for processing. The sludge from the thickener is then transferred to rotary vacuum filters for dewatering. The sludge is transferred via conveyor belt to plug mills where it is blended with fly ash from Unit 8 to stabilize the product. The stabilized sludge forms a concrete-like substance which is loaded onto trucks for transport to the storage area. Wastewater produced returns to the FDG system or is transferred to the Units 7 and 8 Chemical Waste Treatment System. The approximately 30 acre disposal area within the lagoon is registered with the Texas Department of Water Resources (TDWR) as a Class I disposal site. The sludge was declassified in 1983 as a Class II material (11, pp. 3, 4, 6-8). With 3 feet of natural clay as a liner (Ref. 12, p. 2), ground water migration is inhibited. Drainage pathways lead to Rabbs Bayou and Dry Creek.

SWMU 11 Waste Oil and Sludge/Waste Oil and Sludge Collection Facilities

The waste oil and sludge removed from the oily waste treatment systems are collected in:

for Units 1 through 4: oil traps, API separator, waste oil storage sump, Tricellarator, surface storage tank (2000 gallons) and two lined concrete subsurface basins (1500 gallons each) (Ref. 9, p. 5).

for Units 5 and 6: lift stations, the oily waste treatment system retention pond and the Tricellarator.

for Units 7 and 8: lift stations, the oily waste treatment system retention pond and the Tricellarator.

The oily sludge generated from the oily waste treatment system is classified as Class I non-hazardous or Class II waste depending on the amount of oil present in the sludge. Waste oil and waste oil sludge are drummed and housed in a less than 90-day storage area for off-site disposal (Ref. 6, p. 3; Ref. 9, pp. 1, 2).

SWMU 12 Container Storage Areas

Container Storage Area 1 (less than 90-days)

This enclosed area houses drummed PCB contaminated solids and PCB capacitator fluid prior to shipment off-site for disposal (Ref. 5, pp. 1, 5, 7). No other file information is available for this area.

Container Storage Area 2 (less than 90-days)

This enclosed area, opened in 1980, stores drummed waste paint thinner [estimated 1983 quantity: 2.6×10^3 pounds. (Ref. 6, p. 4)], spent solvent [estimated 1983 quantity: 4.0×10^3 pounds. (Ref. 6, p. 4)] and other miscellaneous storage containers for off-site disposal. Miscellaneous contained materials include:

Asbestos insulation: asbestos used for insulation is placed in bags and wet down prior to off-site disposal. Actual percent asbestos is variable but small. Insulation containing asbestos is classified as a Class I non-hazardous waste (TWC 170750) (Ref.5, p. 2; Ref. 6, p. 11; Ref. 9, p. 5).

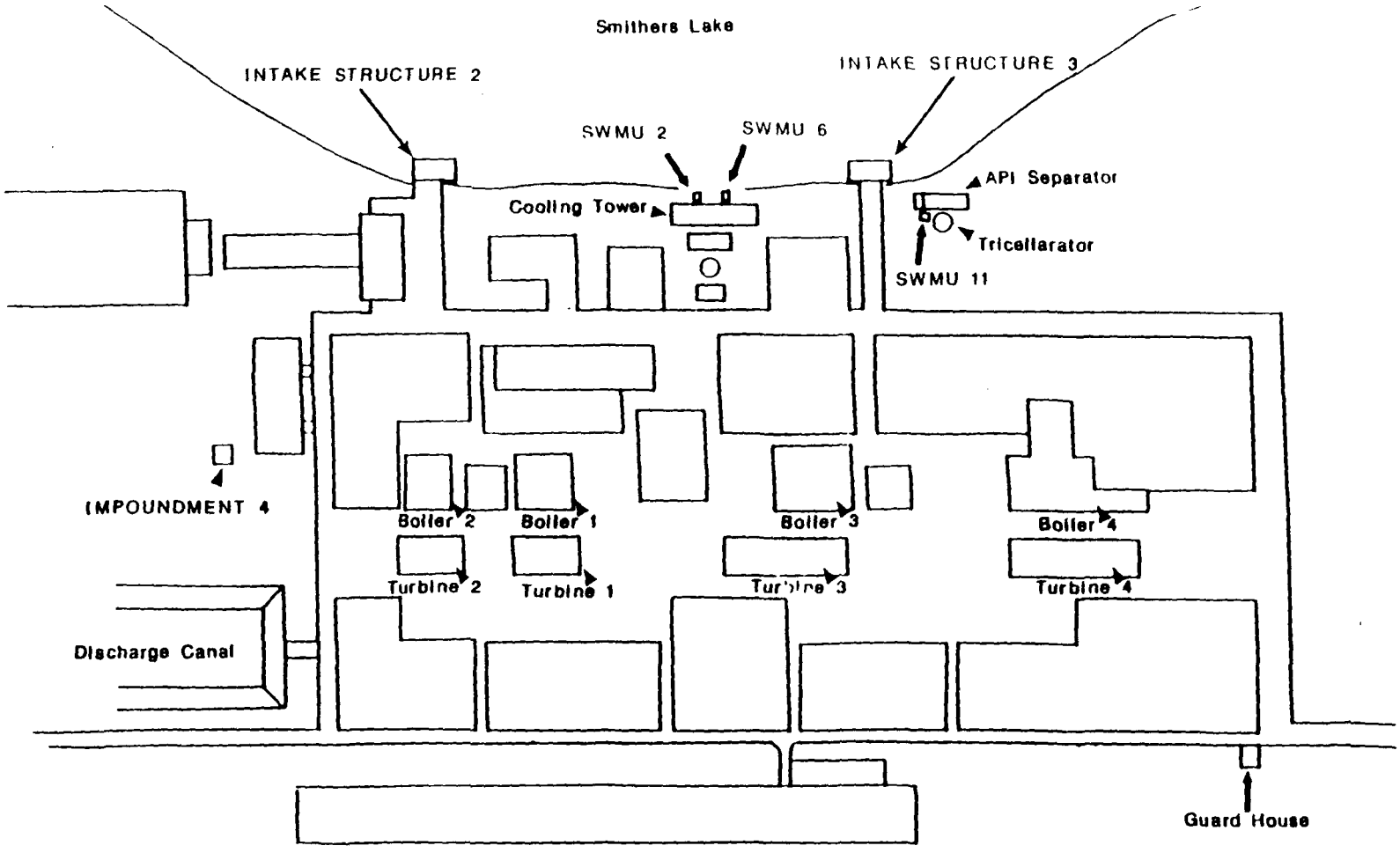
Oil and Oil Contaminated Solids: These wastes are drummed and stored prior to off-site disposal (Ref. 5, p. 5; Ref. 6, p. 11).

Other: Other drummed wastes include: diesel contaminated material, mercury contaminated solids, acetone, resin, organic and inorganic phosphates, sodium hydroxide contaminated material, spent antifreeze, and an isopropanol mixture (Ref. 5, p. 5, Ref. 6, p. 11; Ref. 9, p. 5).

Information regarding waste quantity, location and pathways are not on file.

Outdoor Container Storage Area

The outdoor container storage area is the only documented unit that has undergone closure at the generating station. Opened in 1980, the concrete pad housed drummed spent solvents, paint thinner, oily wastes, sandblasting grit and refractory bricks prior to off-site disposal. The storage area was located west of the oil separator pit and adjacent to the Tricellarator (Figure 2). The TWC approved the closure plan September 23, 1985. Documentation of closure indicates that closure did not meet performance standards of 40 CFR 265.111. The Closure Plan and Certification of Closure did not demonstrate how closure activities controlled, minimized or eliminated post-closure escape of hazardous waste, hazardous constituents, contaminated

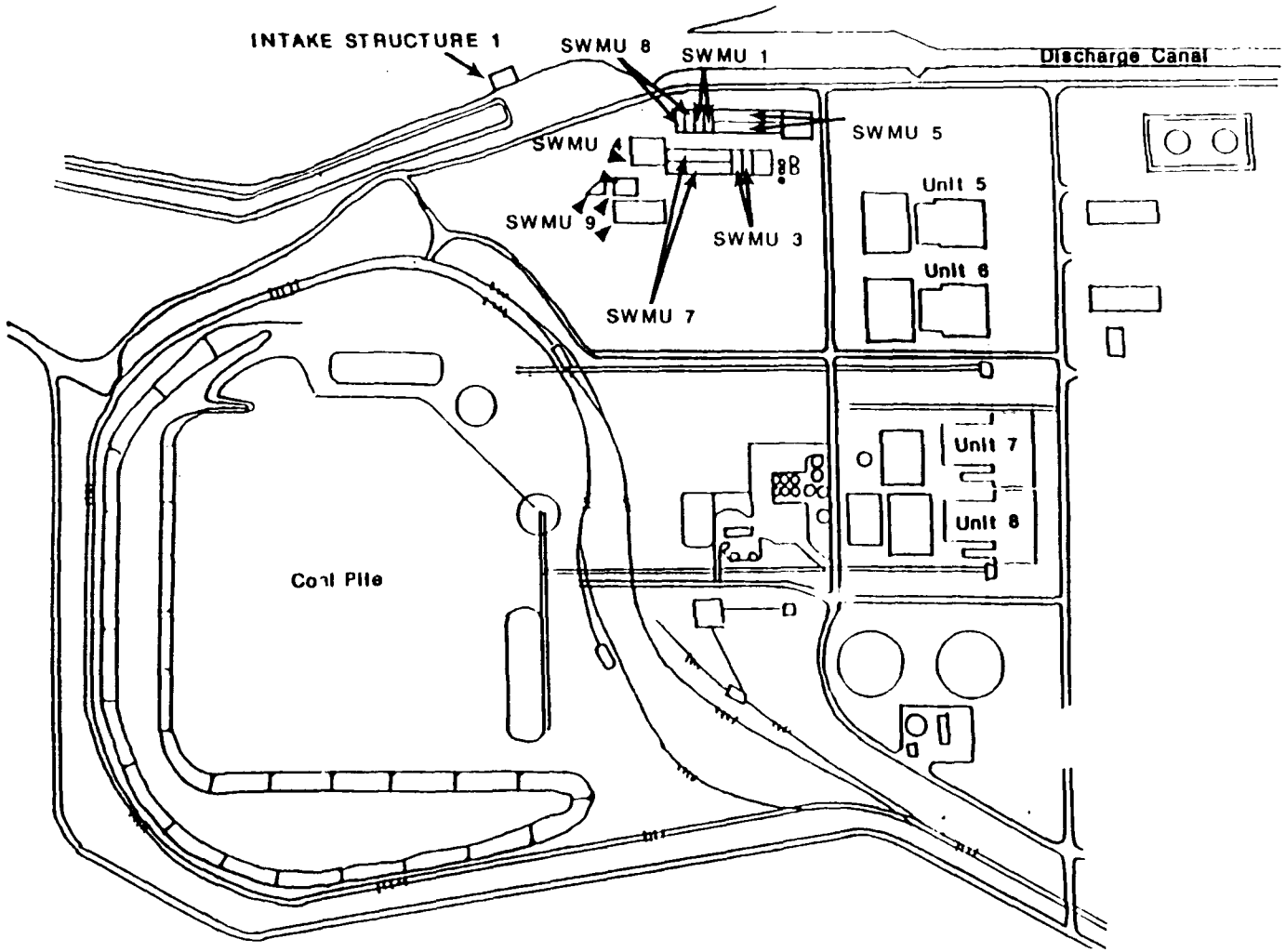


Site Sketch of Units 1-4
W. A. PARISH GENERATING STATION
THOMPSONS, TX
TDD NO. F-6-8908-632
CERCLIS NO. TXD097311849
FIGURE 2

NOT TO SCALE

N

ICF

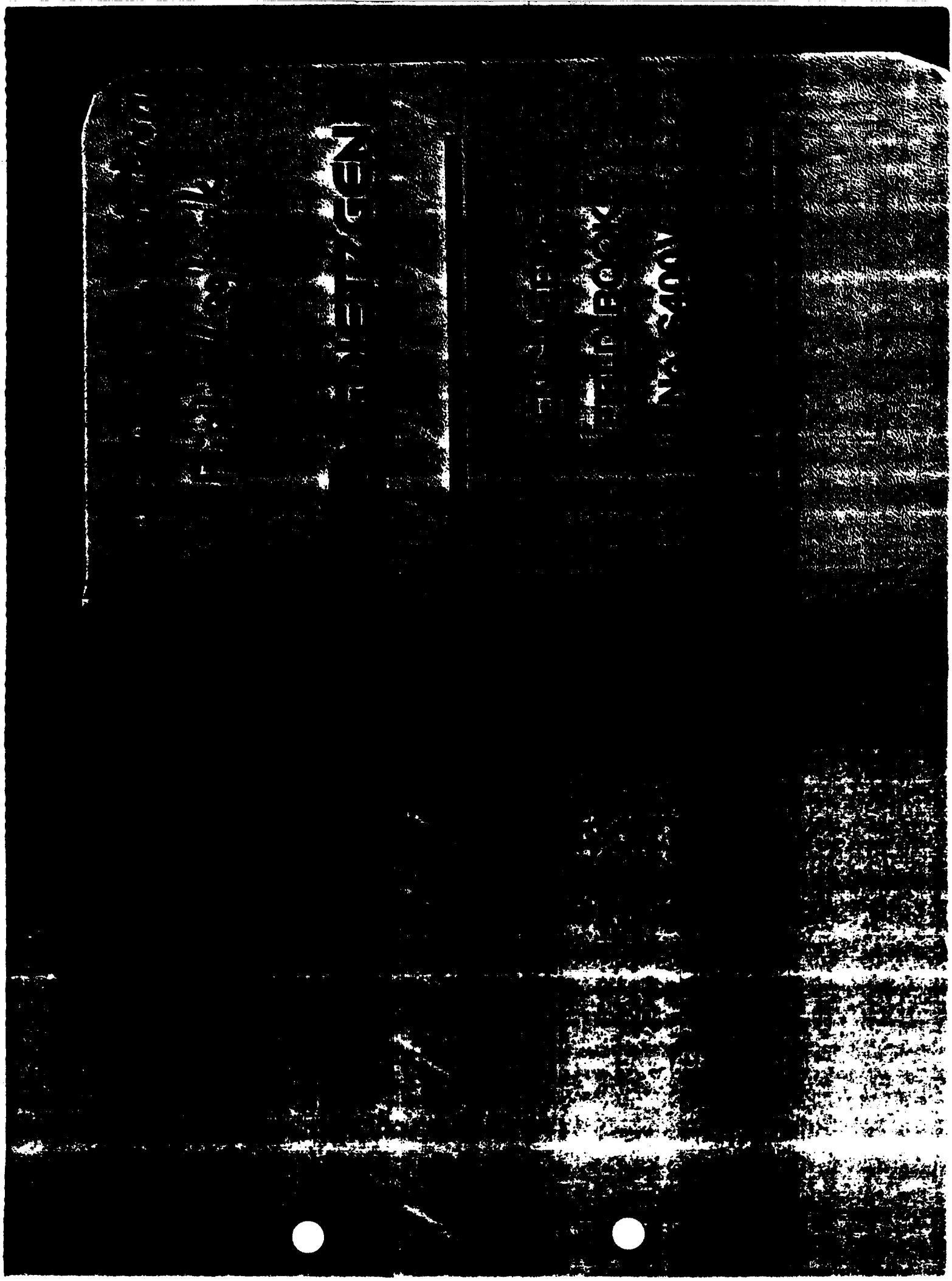


Site Sketch of Units 5-8
W. A. PARISH GENERATING STATION
THOMPSONS, TX
TDD NO. F-6-8908-632
CERCLIS NO. TXD097311849
FIGURE 3

NOT TO SCALE

N

REFERENCE 5



INDEX PAGE

JOB NO.	PROJECT	PAGE NUMBER

5/12/97
W.O.# 11098-112-087-2
FCT

HL&P Parish Station

0900 Arrive at HL&P's Energy Development Complex near I-45 south & Beltway 8. Meet with Bob Carpenter, Rick Bye, Lou Klejbuk, & Jeff Davis from the waste management group, + Debbie Baca from the W.A. Parish plant. Debbie Baca - 343-2313

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RICHARD E. BYE
Manager, Environmental Assessment/Waste Management

The Light
company

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I began the meeting by explaining the purpose of EPA involvement.

Notes:
- the plant is not permitted under RCRA
- the plant is an industrial solid waste facility regulated by TNRCC

- all hazardous waste at site for transport, storage, or disposal (TSD) is for less than 90 days.

- the plant applied for a Part A under RCRA in the early 80's, but this application was later removed.

- the plant opened in 1976 & began burning coal in 1979.

5/12/97
W.O. # 11091-112-027
ECT

HL&P Parish Station

HL&P has provided me with a site plan, site access agreement form (also sent to EPA), and the N.O.R. (Notice of Registration) filed with the TNRCC.

During the meeting, I provided HL&P w/ the Solid Waste Management Unit (SWMU) list from the 1990 PA by ICF Technology.
The following is additional info to the SWMU List:

- the site reports under the NPDES program and to TNRCC under discharge permit number 01038, with analyses for TSS, oil & grease, & flow in monthly reports.

SWMU 1 open tank settling basin. ~~NPDES outfall no. 3~~
SWMU 2 sump tied to SWMU 1
SWMU 3 settling basin open tank. ~~NPDES outfall no. 209~~
SWMU 4 treatment system for discharge from SWMUs 1 & 3. The text says 2 cells, but it's actually 3.
SWMU 5 holding basin (2 cells) for discharge to SWMU 4.

5/12/97
W.O. #11094-112-027
ECT

HL&P Parish Station

SWMU 6 sump for discharge to SWMU 5

SWMU 7 contents sent to SWMU 4 for treatment

SWMU 8 organic sludge is burned in 2 boilers (permitted) & not sent to the sludge dewatering system

SWMU 9 No longer exists. Was used as temporary storage until to construction of above grade storage basins (SWMUs 1 & 5)

SWMU 10 All Class II non-hazardous waste. 3 cells. Appears in the N.O.R. as #001: Landfill. Each waste type is stored in a different cell. HL&P will provide a sampling plan.

SWMU 11 Consists of 3 locations, all permitted under NPDES & TNRCC.

SWMU 12 drum storage outdoors on a concrete slab.

SWMU 13 ??? No designated bulk storage area, only intermittent during maintenance.

SWMU 14 contains only construction & demolition waste

Under the NPDES permit, SWMUs 1, 2, & 5 are covered under outfall numbers 103 & 203. SWMU 3 & 7 are covered under NPDES outfall numbers 603 and 703, respectively.

Lou Klejbuck will provide Weston with the following additional data:

- documentation of the removal of the RCRA Part A application
- chemical monitoring data under NPDES
- waste classification (TCLP) data
- air permit covering 2 boilers associated w/SWMU 8.
- map showing SWMUs 10 & 14.

1030 Meeting over. Site recon will likely only involve SWMUs 9-12.

5/22/97
ECT

HL&P Parish Station

0845 Arrive at site. Meet w/ Jeff Davis, Debbie Baca, Lou Klejbuk, + Ted Davis from the wastewater department.

Reporting under TNRCC N.O.R. since approx ≈ 1982. NPDES reporting since plant opened. Operate under SPPP for coal burning unit. 4-5 parameters
Sample Request Form -- see for description of sample locations. HL&P internal document.

Landfills have monitoring wells. e Sampled internally twice per year. No state monitoring requirements

0900 Depart for recon

All runon to landfill cells is pumped to an overflow pond (lined), settles in the basin, + is discharged under an NPDES permit to Smithers Lake

OVA zeroed to 95ppm methane. Also mini-RAM zeroed

HL&P Parish Station

Landfills: Fly ash, Bottom Ash } Cell 2
Bottom Ash -- Cell 3
Class II } Cell 1A
see NOR { blast grit, construction debris } Cell 1 (Closed)

GW flow toward N/NE toward Brazos River
OVA = Ø, mini-RAM = Ø

Dikes surrounding landfills 3A approx 6-8 ft @ S end
Cell 1 closed heavy vegetation, no standing water. 3 ft clay cap. under TNRCC rules.
Closed since about 1990. 2-3 ft elsewhere

Monitoring wells are 4-inch
Drinking water wells on-site
Bottom ash more granular + coarse than cell #2

Cell 3 impoundment receives runoff from cell 3 + pumped runoff from cell 1A
Cell 1B under construction to contain Class II waste

Plant employs approx 400 people, open 24/7.
Fence encompasses site. Security guard during business

5/22/97
ECT

HL&P Parish Station

hours. Locked gate otherwise

Overflow pond has spigot @ pump. Pipe goes underground to Smithers Lake (discharge point)

TNRCC conducts annual inspections & in effect represents EPA.

Liner = 40mil HDPE + 3ft clay underneath

Base of landfills = 3 ft natural clay liners w/ 10^{-7} cm/s permeability

1015 Other overflow ponds have 3 ft clay, no plastic
OVA & mini-RAM = Ø

Smithers Lake leased from George Foundation
Entire lake within property fence line
Part of lease agreement is it's fishing, not open to the public. As such, HL&P employees not allowed to fish Smithers Lake

Fly ash & bottom ash sold as a road base & cement.
Excess is landfilled as a Class II waste

ECT
5/22/97

HL&P Parish Station

Oil/water separator is part of both the NPDES & TNRCC permit

SWMU 9 boilers washed out after manufacture prior to use. Water treated prior to discharge in pond. No solids

SWMU 12. Haz waste storage area. 90 day max
Drum storage on pallets. Tanks in 1-ft concrete dikes. Entire area is concrete
Impoundment collects from floor drains in Units 5 & 6. Oil is periodically skimmed
Water is treated & discharged to outfall 303

1115 Return to main building for summary.
Need -- last year's stormwater data
-- potentiometric map: landfill area
-- closure documentation for cell 1 (landfill)
-- location of drinking water wells
-- well completion logs
-- SAP for wells
-- clean copy of Figure 9, sheet 1 of 4

1130 Depart site.

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W. A. Parish Plant

Energy Production Department
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P.O. Box 98 Thompsons, TX 77481 (713) 343-2313

REFERENCE 6

GROUNDWATER MONITORING PROGRAM
SAMPLING AND ANALYSIS
QUALITY ASSURANCE PLAN

Limestone and W. A. Parish
Electric Generating Stations

Prepared for:
Houston Lighting and Power Company

October 1996

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1.0 INTRODUCTION

This Sampling and Analysis Quality Assurance Plan (SAQAP) has been prepared to facilitate the implementation of a voluntary groundwater monitoring program at HL&P's Limestone Electric Generating Station (LEGS) and W.A. Parish Electric Generating Station (WAPEGS). This document covers the quality assurance/quality control (QA/QC) procedures to be followed in both the field and laboratory. Properly implemented, this plan will help ensure that the groundwater is sampled and analyzed in a technically defensible and consistent manner. The procedures set forth in these plans also facilitate the data validation process by providing quantitative methods to assess data quality, useability, and comparability.

Section 2 defines the overall quality objectives for the program and how quality assurance objectives (QAOs) are quantified. Sections 3 through 6 cover the field aspects of the program, including the following items:

- Field equipment and material needs;
- Purging and sampling procedures;
- Site-specific sampling requirements for the LEGS and PEGS facilities;
- Field instrument use and calibration;
- Field quality assurance/quality control (QA/QC) procedures;
- Proper documentation of field sampling and measurement activities; and
- Sample shipping and handling procedures.

Section 7 gives details on the analytical methods and laboratory QA/QC procedures which must be followed, including these items:

- Descriptions of the selected analytical methods;
- Quantitation levels;
- Instrument calibration requirements;
- Routine laboratory QA/QC and troubleshooting procedures; and

- Project-specific requirements for matrix spike and laboratory control sample concentrations.

Section 8 describes procedures for electronic data entry into the project database, viewing and printing tables and graphs from the database, and performing an independent validation of analytical reports. This section has been prepared to facilitate use of EPRI's MANAGES for Windows, Ver. 2.0 database software for many of these tasks.

2.0 QUALITY ASSURANCE OBJECTIVES FOR GROUNDWATER DATA

A quality assurance/quality control (QA/QC) program is implemented to assure that data of known quality are produced. The QA/QC program provides a mechanism for ongoing control and evaluation of the measurement quality. Measurement quality is assessed by considering the precision, accuracy, representativeness, completeness, and comparability of the data. These parameters are collectively called the quality assurance objectives (QAOs). By following a QA/QC program, data sufficient to perform data validation are produced, and the QAOs may be used to validate the data if required for the project.

The QAOs (presented in Section 7) and the quantitation limits for each method indicate the sensitivity and data quality that can be expected for routine sample analysis. These are the criteria that should be used to assess and select analytical methods that will produce data of sufficient quality for this project. Using these consistently defined criteria ensures that the analytical system is performing within acceptable limits and is capable of producing results that are comparable to those produced by other laboratories.

2.1 Accuracy

Accuracy measures correctness, or how close a measurement is to the "true" or expected value. As it includes random error (variability due to imprecision) and systematic error (bias), accuracy reflects the total error associated with a measurement. A measurement is accurate when the reported value is within the acceptance limits from the true value, or known concentration of a spike or standard. Accuracy is measured in both a control matrix (laboratory-pure water) and the actual sample matrix (groundwater) using laboratory control samples (LCS) and matrix spike samples (MS), respectively. LCS recoveries provide an indication that the system is in statistical control during sample analysis, whereas MS results indicate whether the analytes of interest are recovered effectively from the sample matrix. Accuracy is determined by calculating the percent recovery of known concentrations of target analytes spiked into the QC samples. The stated accuracy objectives for LCS and MS apply to spiking levels which are at least five times the method detection limits.

$$\text{Percent Recovery} = 100\% \times \frac{C_m}{C_t}$$

where:

C_m = the measured concentration, and

C_t = the true concentration.

2.2 Precision

Precision measures the reproducibility of repetitive measurements, and is defined as the agreement among independent measurements produced by applying the same process under similar conditions. Analytical precision is a measurement of the variability associated with analyses of the same sample in the laboratory and is evaluated using LCS and LCS duplicate results. Matrix precision is estimated by comparing MS/MSD and field duplicate results. Interpretation of precision data must include all possible sources of variability. For instance, the field duplicate results incorporate variability from the analytical process, sample collection and handling, and matrix factors. Precision is evaluated by calculating the relative percent difference (RPD) between duplicate spike or sample analyses and comparing it with the appropriate precision objective for each analyte (refer to Table 7.1).

$$RPD = (R1 - R2)/[(R1 + R2)/2] \times 100$$

where:

R1 = Initial result

R2 = Field duplicate result

2.3 Representativeness

Objectives for representativeness are defined for each facility and sampling and analysis task and are discussed in the Sampling and Analysis Plan (Section 4). Representativeness is achieved in part through the standard sampling and analytical procedures described in this SAQAP. Representativeness is also influenced by appropriate selection of such elements as proper well locations, drilling and installation procedures, and sampling locations for field duplicates and equipment blanks.

2.4 Comparability

Comparability is the confidence with which one data set can be compared to another. However, the range of field conditions encountered must be considered in ultimately determining comparability. Comparability is achieved by using standard methods for sampling, analysis, and data review, reporting data in standard units, and using standard and comprehensive reporting

formats. Complete field documentation using standardized data collection forms also supports the assessment of comparability. Analysis of reference samples, or performance evaluation (PE) samples, may also be used to provide additional information that can be used to assess comparability of analytical data produced in the laboratory or field.

The precision and accuracy objectives, quantitation limits, field procedures, and guidelines presented in this SAQAP have been established to attain the greatest possible degree of data comparability.

2.5 Completeness

Completeness for the data set is defined as the percentage of unqualified and estimated results and represents the results usable for data interpretation and decision making. Completeness is calculated for each method and matrix for an assigned group of samples after the QC data have been evaluated and data qualifiers (flags) have been assigned.

Valid results used to meet the completeness objective are those which provide defensible estimates of the true concentration of an analyte in a sample. They include non-qualified and estimated results. Estimated results are qualified to indicate that one or more QC specifications were not met. Although the analyte can be identified, the concentration cannot be verified as precise and accurate within project objectives. These results are considered to be usable as long as the cited quality flags and any associated limitations are considered by data users. Invalid results are those for which there is an indication that the prescribed sampling or analytical protocol was not followed. Results qualified as rejected or unusable, or that were not reported because of sample loss, breakage, or analytical error, negatively influence completeness. The completeness objective for this project will be 90% where:

$$\text{Completeness} = \frac{\text{Total number of analyte results - rejected and unreported results}}{\text{Total number of analyte results.}} \times 100\%$$

3.0 WELL SAMPLING PROCEDURES

This section outlines the methods used for collecting groundwater samples, decontaminating the sampling equipment, and managing the wastes generated during these activities. The procedures included are proven techniques which are designed to ensure that samples collected from monitoring wells are representative of the groundwater in the formation within which the well is screened.

3.1 Equipment and Materials Needed

All groundwater monitoring wells will be sampled using a portable, submersible, centrifugal pump, such as a Redi-Flo2® or similar-type pump. Equipment and materials required for groundwater sampling include:

- Copies of the approved SAQAP and Site Safety and Health Plan (SSHP);
- Portable submersible centrifugal purge/sample pump and Teflon™-lined discharge hose;
- Electrical source (gasoline-powered electric generator);
- Electric water level meter (E-line);
- Field analytical instruments for measuring alkalinity, pH, specific conductance, temperature, and turbidity;
- Calibration standards and operating manuals for the field analytical instruments;
- pH paper;
- Sample containers, preservatives (nitric acid), coolers, sample labels, and ice;
- Field documentation materials (field log book, groundwater sampling forms, chain-of-custody forms);
- Health and safety equipment as specified in the SSHP;
- Materials and supplies needed for sampling equipment decontamination (covered in Section 3.4); and
- Waste container to store purged groundwater and other liquid wastes.

3.2 Well Purging and Groundwater Sample Collection

The following is a method for collecting groundwater samples using a low-flow purging/ sampling technique that is preferred by the Ground-Water Monitoring Team of the Municipal Solid Waste Division of TNRCC (Council, 1996) and the USEPA (Puls and Barcelona, 1995). The concept of low-flow purging and sampling is that the well is purged at a rate that is equal to or less than the rate that formation water normally moves through the well screen. Samples are collected from water that flows through the screened portion of the well without mixing with the stagnant casing water that may be present above the screened interval. The low rate of pumping also reduces sample turbidity by minimizing the stresses induced on the formation and filter pack caused by pumping and the disturbance of settled particles that may have collected in the bottom of the well. Properly conducted, low-flow purging will help prevent the occurrence of statistical false positives by decreasing sample variability and the content of colloidal particles which may contain contaminant artifacts.

The optimum flow rate differs for each well, depending on the hydrogeological conditions of the aquifer and well design and installation. It is important that the desired flow rate for each well be determined and then repeated during subsequent sampling events. In some cases, such as aquifers with low transmissivity, drawdown may be excessive so that low-flow purging is not appropriate. In these cases, the conventional technique of removing 3 to 5 wetted casing volumes should be used.

1) Ensure that all equipment is operating properly and calibrated according to the equipment manuals provided by the manufacturer. Field instrument calibration and operating procedures are presented in Section 4. Copies of the manufacturer's equipment manuals are included in Appendix A.

2) Begin filling out the Groundwater Sampling Form (Appendix B); indicate the well location ID and starting time for well purging in the Field Log Book.

3) Open the well, noting condition of inner well seal/cap on the Groundwater Sampling Form, and measure depth to water with a clean E-line, taking care to cause minimal disturbance to the water standing in the well. Calculate the total submerged casing volume using the formula listed on the Form.

4) Lower a clean submersible pump into the well **very slowly**, causing minimal disturbance of the static water in the well. The pump intake should be set at approximately the middle of the saturated portion of the screened interval (refer to Tables 4-1 and 4-2 for a listing of well screen depths). Connect the pump wiring to a suitable electrical source.

5) Purge the well at a flow rate sufficiently low to draw down the water level in the well no more than 0.33 ft. The objective during purging is to achieve a steady-state condition so that well recharge is equal to the sustained pumping rate. Monitor the water level continuously during purging using an E-line. Record depth-to-water measurements and flow rate during purging on the Groundwater Sampling Form.

6) Measure pH, specific conductance, temperature, and turbidity at the beginning of the well purge and at a maximum interval of 3 to 5 minutes. Take a minimum of 4 readings per well purged. Purging will be complete when measurements of turbidity and pH have stabilized within approximately 10% over at least two successive measurements made 3 to 5 minutes apart. Record the water quality readings and the volume purged on the Groundwater Sampling Form. Should the well be pumped dry during purging, the sampler will wait until the well has recharged to its original static water level before attempting to collect samples.

7) After purging is complete, immediately begin collecting groundwater samples, filling the appropriate containers as specified in Table 3-1. Samples for alkalinity/pH should have no headspace remaining in the capped container.

8) Unless the analytical laboratory has provided sample containers which contain required preservatives, the sample aliquot for metals analysis must be acidified. Add concentrated nitric acid dropwise until the pH is less than 2. Use pH paper to make the measurements.

9) Complete the sample labels accurately and legibly and affix to the sample containers. Wrap the labels with clear packaging tape to prevent the labels from washing off. Place the entire group of sample containers for each well in a 1-gal. resealable plastic bag and stored on ice for the remainder of the sampling event.

10) Titrate the alkalinity sample using a Hach alkalinity kit (refer to Section 6.1).

11) Decontaminate all sampling equipment according to the procedure described in Section 3.4.

12) Dispose of purge water and contaminated wash/rinse water in accordance with Section 3.5.

Table 3-1
Sample Volumes, Containers, Preservation, and Holding Times

Parameter	Sample Volume (mL)	Container Type	Preservation	Holding Time (days)
Alkalinity	100	Plastic	None	On-site analysis
Anions	1000	Plastic	Cool, 4°C	28
Metals	1000	Plastic	HNO_3 to pH<2, Cool, 4°C	180 (28 for Hg)
TDS	500	Plastic	Cool, 4°C	7
Total Phosphate	1000	Plastic	H_2SO_4 to pH <2, Cool, 4°C	28

3.3 Sample Preservation, Holding Times, Containers, and Sample Volumes

Table 3-1 outlines the requirements for sample volumes, preservation, container types, and holding times. Sample preservation is required to prevent sample degradation during shipping and prior to laboratory analysis. Refrigeration is required of all sample containers immediately following sample collection. Samples collected for alkalinity should be analyzed at the well head or soon thereafter (do not hold these samples longer than 4 hours prior to analysis). Samples collected for metals analysis require a reagent addition of concentrated nitric acid to bring the pH below 2. Acidification increases the solubility of the metals and prevents precipitation of metal species within the sample container. Field duplicates and field blanks require the same preservation as normal samples.

3.4 Equipment Decontamination

Decontamination is performed as a quality assurance measure and safety precaution. It helps prevent cross-contamination among samples and maintains a clean working environment for the safety of field personnel.

The types of sampling equipment used to collect groundwater samples can be decontaminated by rinsing with a detergent solution, followed by successive rinses with potable water and deionized (DI) water. Scrubbing of the discharge hose and pump housing with a soft bristle brush should be conducted as needed. A gardener's pump sprayer, dedicated for this use, makes an ideal dispenser for the final rinse with DI water. If the equipment is not to be reused immediately following decontamination, it should be protected by placing in a clean polyethylene bag. If there is any question about the cleanliness of a piece of equipment, it should be considered contaminated and undergo full decontamination prior to use.

3.4.1 Decontamination Equipment and Materials

- Soap or detergent solution (Alconox or equivalent), potable water, and DI water;
- Pump sprayer for dispensing DI rinse water;
- Washwater containers (e.g., buckets or tubs) capable of holding a minimum of 5 gallons;
- Cleaning brush with soft bristles; and
- Polyethylene garbage bags.

3.4.2 Decontamination Procedure

1) Wash the pump and discharge tubing in a tub containing a detergent solution. Remove any solid particles from the sampling equipment by gentle brushing with a soft bristle brush;

2) Rinse the equipment thoroughly with potable water in a separate tub; and

3) Rinse the equipment with DI water.

3.5 Investigation-Derived Waste Management

Four types of wastes will be generated during the groundwater sampling event: (1) well purge water; (2) decontamination rinse water; (3) used personal protective equipment; and (4) miscellaneous solid waste, such as paper trash. The solid wastes can be disposed in any solid waste dumpster on the station property. Aqueous wastes should be collected in a drum or tank and then discharged into an appropriate surface water impoundment, such as the Emergency Pond at LEGS, or the Final Stormwater Retention Pond at WAPEGS.

4.0 SAMPLING AND ANALYSIS PLANS

This section contains the site-specific requirements for the groundwater monitoring programs at the Limestone and W.A. Parish Electric Generating Stations.

4.1 Limestone Electric Generating Station

The HL&P Limestone Station is a lignite coal-fired electric generating station located about 10 miles north of Jewett, Texas, in Limestone and Freestone Counties. HL&P owns and operates a solid waste disposal area (SWDA) which receives high- and low- volume combustion byproducts. The SWDA consists of a 380-acre Class II landfill which receives FGD scrubber sludge, bottom ash, and Type F fly ash, a stormwater retention pond, and an emergency pond (Figure 4-1). The landfill has been filled to roughly 30% of its ultimate capacity, with about 12% of the area completed with a clay cover, topsoil, and permanent vegetation. The stormwater retention pond collects any surface water runoff from the unclosed portions of the landfill. Runoff from the closed sections of the landfill is diverted to the perimeter ditch which discharges into Lynn Creek. Lynn Creek flows into Lamb Creek, which enters an arm of Lake Limestone on the Navasota River. The groundwater monitoring program at LEGS is designed to monitor potential impacts of the Solid Waste Disposal Area (SWDA) on groundwater resources beneath the landfill and in the vicinity of Lynn Creek downgradient of the landfill.

4.1.1 Sampling Locations

Nine monitoring wells are located around the SWDA; seven are hydraulically downgradient of the SWDA, and two are cross gradient (Figure 4-1). Groundwater quality data, water level data, and a discussion of the adequacy of the monitor well network are summarized in *Evaluation of Groundwater Monitoring Results, Coal Combustion Byproduct Management Facilities, Final Report* (Radian, 1996). Two earlier reports (Espey Houston, October 1987; April 1991) provide soil boring and well installation records.

4.1.2 Number and Types of Samples

During each semi-annual sampling event, static water level measurements will be taken and a set of groundwater samples will be collected at each of the nine monitoring wells. In addition, QC samples will be collected from specific wells as described in Table 4-1.

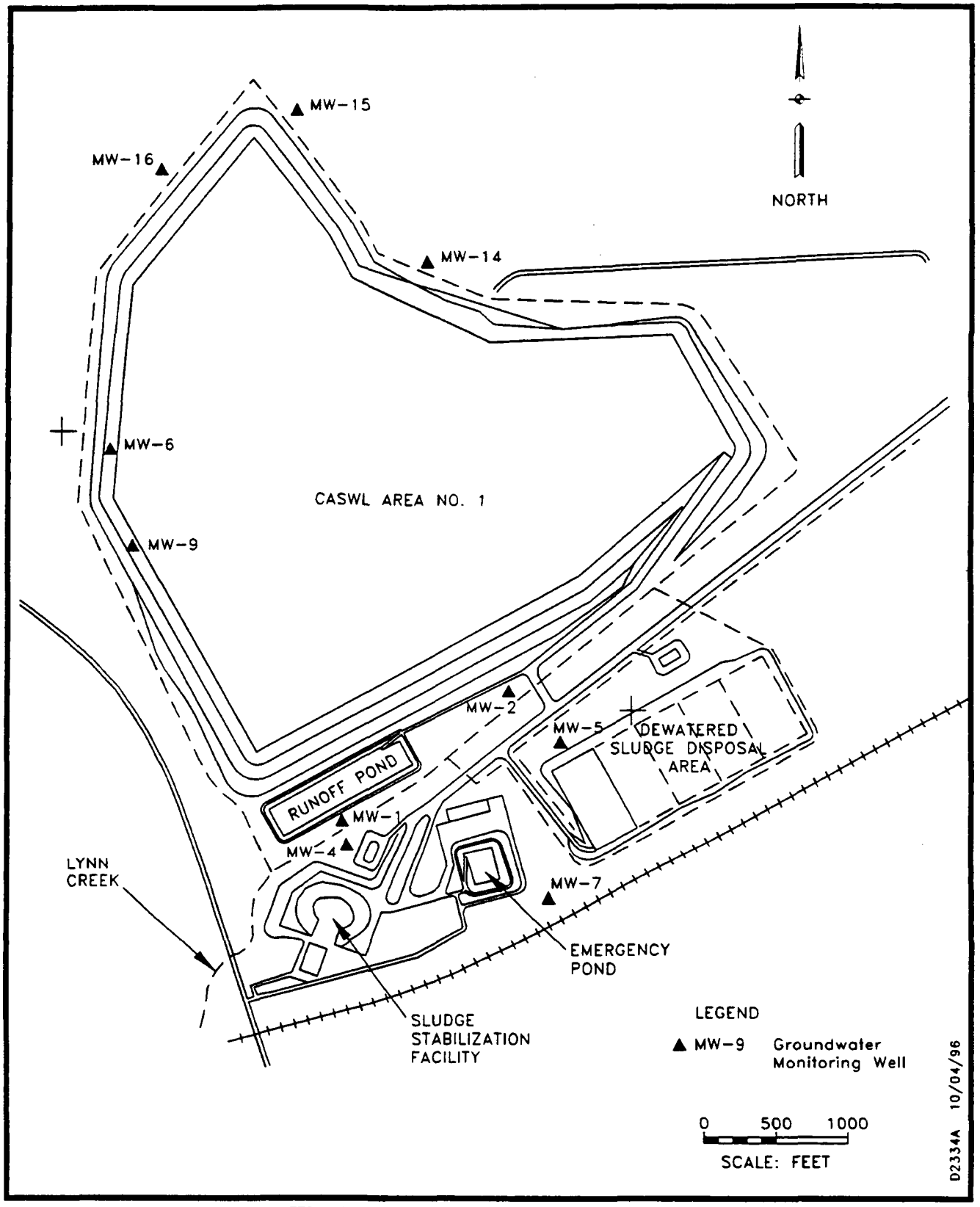


Figure 4-1. Monitor Well Locations at the Limestone Electric Generating Station

Table 4-1
Sampling Details for the Limestone Station Groundwater Monitoring Program

Monitor Well ID	Measuring Point Elev. (ft MSL)	Screen Interval Below MP (ft)	Normal Field Samples	Field QC Samples
MW-1	420.93	38.5-58.5	1 full set[b]	--
MW-2	430.14	29.8-49.8	1 full set	--
MW-3	443.26	57.5-77.5	1 full set	--
MW-4	421.61	25.2-45.2	1 full set	--
MW-5	464.44	34.7-54.7	1 full set	--
MW-6	457.16	29.0-49.0	1 full set	Take equipment blank
MW-7	451.21	35.3-45.3	1 full set	Field duplicate, MS/MSD
MW-8	452.20	36.0-51.0	1 full set	--
MW-9	452.16	26.3-41.3	1 full set	--

[a]MP = measuring point indicated by notch on top of PVC well casing.
[b] Separate containers for metals, anions, TDS, total phosphate, and alkalinity analyses (refer to Table 3-1).

4.2 W.A. Parish Electric Generating Station

The W.A. Parish Generating Station is located about 20 miles southwest of Houston near Thompsons, Texas. Both coal-fired and natural gas-fired combustion units are operated. The coal-fired units use principally western coal and produce Class C flyash, bottom ash, and scrubber solids. Currently, most of the flyash and scrubber solids produced by the station are sold and transported offsite. The combustion byproduct storage area is located north of the plant, on the opposite side of Smithers Lake and consists of three Class 2 solid waste landfills (Figure 4-2). The total disposal area is slightly less than 100 acres. Each landfill area contains a stormwater retention basin which stores water prior to discharge into Smithers Lake. About 60% of landfill area 1 has been completed and capped with a compacted soil liner and a vegetated topsoil layer.

The monitor well network in the byproduct storage area was established in two phases, beginning in 1989. A first set of monitor wells have been decommissioned and replaced with nine active monitor wells: seven installed in the Pleistocene-age Beaumont Formation, and two installed in recent sediments associated with Rabbs Bayou which bisects the byproduct storage area. Potentiometric levels and water quality parameters differ significantly between wells completed in these two units which suggests that the aquifers are hydraulically distinct.

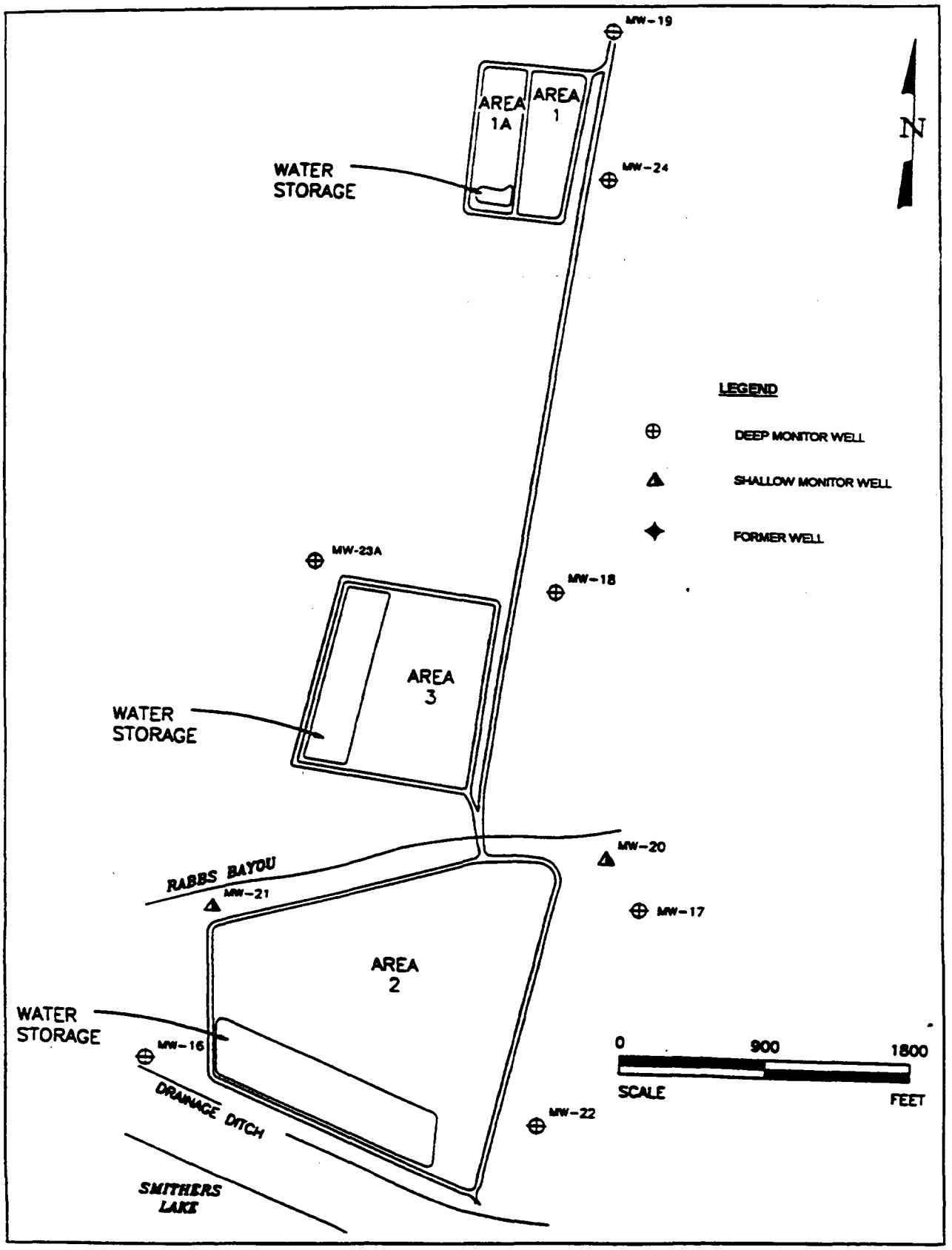


Figure 4-2. Monitor Well Locations at the W.A. Parish Electric Generating Station

4.2.1 Sampling Locations

There are nine monitoring wells located throughout the SWDA at the W. A. Parish Station (Figure 4-2). Two of these (MW-16 and MW-23) are upgradient wells completed in the Beaumont Formation. Two of the downgradient wells (MW-20 and MW-21) are shallow wells completed in the Recent Rabbs Bayou alluvium.

During past sampling events, anomalously high initial pH readings (>9) were observed prior to purging for some of the wells (MW-16, -17, and -18). In all cases, the pH values dropped to values around 7 with subsequent purging. The most likely cause for the abnormally high pH values is faulty bentonite seals above the well screens which allow solutes derived from the cement grout to enter the well casing. Caution must be exercised while purging these wells to ensure that pH and specific conductance values have stabilized to normal values before samples are collected.

4.2.2 Number and Types of Samples

During each semi-annual sampling event, static water level measurements will be taken and a set of groundwater samples will be collected at each of the nine monitoring wells. In addition, QC samples will be collected from specific wells as described in Table 4-2.

Table 4-2
Sampling Plan for the W. A. Parish Station Groundwater Monitoring Program

Monitor Well ID	MP[a] Elev. (ft MSL)	Screen Interval Below MP (ft)	Normal Sample	Field QC Samples
MW-16	61.02	43.9-53.9	1 full set[b]	--
MW-17	64.80	55.2-65.2	1 full set	--
MW-18	63.91	40.1-50.1	1 full set	Field duplicate, MS/MSD
MW-19	66.25	39.8-49.8	1 full set	--
MW-20	64.43	12.9-27.9	1 full set	--
MW-21	63.92	9.8-24.8	1 full set	Take equipment blank after
MW-22	62.98	41.5-51.5	1 full set	--
MW-23	64.70	40.0-50.0	1 full set	--
MW-24	63.30	40.0-50.0	1 full set	--

[a]MP = measuring point indicated by notch on top of PVC well casing.
[b]Separate containers for metals, anions, TDS, total phosphate, and alkalinity analyses.

5.0 SAMPLE CUSTODY AND DOCUMENTATION

Proper sample documentation and custody procedures prevent loss or mixing of samples prior to acceptance by the analytical laboratory. This section describes the procedures to be followed.

5.1 Sample Labels and Identification Convention

All sample containers will be clearly labeled in black ink with the following information:

- Project/facility name (e.g., HL&P/LMS-GWS). LMS is the designation for LEGS, WAP is the designation for WAPEGS. GWS stands for Groundwater Sampling;
- Sample ID (e.g., MW-5);
- Sampler's initials;
- Date/time of collection; and
- Analyte requested (e.g., metals, anions, total phosphate, TDS).

Shown below is sample label which contains this information.

IPL LABORATORIES Houston, TX 713-660-0901

Client/Project		Sample ID	
HL&P LMS - GWS		MW - 5	
Matrix	Sampled By	Date	Time
W	HRPII	8-28-96	2:05

Analysis / Remarks

TDS

To save time and avoid confusion in the field, it is strongly recommended that sample labels be prepared prior to the field event.

5.2 Groundwater Sampling Form

A groundwater sampling log (Appendix B) will be completed at each monitor well where a groundwater sample is collected.

5.3 Field Log Book

Entries into a field log book will be completed for all field activities. At a minimum, the entries in the field logbook will include:

- Weather and field conditions;
- Names of field personnel;
- An inventory of all samples collected, including date, time, number of sample containers, and sample ID; and
- Description and resolution of any problems encountered.

5.4 Chain-of-Custody Form

Field personnel will complete a chain-of-custody record for each lot of samples. The completed chain-of-custody form will accompany each shipping container of samples from the field to the laboratory. This procedure will establish documentation needed to trace sample possession, should the need arise. Chain-of-custody forms are usually supplied by the analytical laboratory. An example chain-of-custody form is included in Appendix B.

5.5 Sample Shipment

All groundwater samples will be stored at approximately 4°C from the time of collection until analysis. In the field, samples are stored inside insulated coolers. It is recommended that sets of sample containers which constitute an individual sample be placed within Ziploc® bags to keep them separate from other samples. Ice for sample preservation is double-bagged to prevent leakage. When packing the samples for shipment, make sure that each sample is in contact with ice.

When packaging samples for commercial transport, an absorbent material such as vermiculite should be used to minimize any leakage of sample fluids. Glass samples containers are not required for this project — if glass bottles are used, they will be separated by padded materials or plastic bottle mesh.

Upon delivery of the sample lots to the laboratory, the field supervisor will have the laboratory sample controller indicate the time and date of arrival and sign the chain-of-custody form. A copy of the form will be kept in the project files.

6.0 FIELD ANALYTICAL PROCEDURES AND QUALITY CONTROL

This section describes the procedures and QA/QC program to be used for field analytical tests. All groundwater samples must be characterized in the field for alkalinity, pH, specific conductance, temperature, and turbidity (refer to Table 6-1). Several of these parameters are tested repeatedly while purging each monitoring well prior to collecting samples. Manufacturer's operating procedures for each type of analytical instrument are included in Appendix A.

Table 6-1
Field Analyses for Groundwater Samples

Analyte	Method	Appendix C Methodology	Quantitation Limit	Reference
Alkalinity	Colorimetric titration	A.1	1.0 mg/L	ASTM D 1067
pH	pH electrode	A.2	0.2 pH units	EPA Method 9040
Specific Conductance	Wheatstone bridge conductivity meter	A.3	2 µmhos/cm	EPA Method 9050
Temperature	Digital thermometer	A.4	0.1 °C	EPA Method 170.1
Turbidity	Nephlometric spectrometer	A.5	0.1 NTU	EPA Method 180.1

6.1 Alkalinity

Alkalinity (carbonate and bicarbonate) determinations must be made in the field at the time of sampling if the concentrations are to accurately represent those originally present in the groundwater. Samples are titrated with a standard solution of a strong acid, usually sulfuric acid. The following equations represent the reactions involved:

(1) $2CO_3^{=} + H_2SO_4 = 2HCO_3^{-} + SO_4^{=}$ ($pK_a = 8.3$); and

(2) $2HCO_3^{-} + H_2SO_4 = 2H_2CO_3 + SO_4^{=}$ ($pK_a = 4.5$)

Bicarbonate is the predominant inorganic carbon species in expected groundwater samples from the LEGS and WAPEGS sites.

6.1.1 Reagent and Equipment Requirements

- Hach Model AL-DT field test kit with digital titrator and 1.6 N sulfuric acid cartridges;
- Bromcresol green-methyl red powder pillars;
- 100-mL graduated cylinder; and
- 250-mL erlenmeyer beaker.

6.1.2 Instrument Operation

Alkalinity is measured using a Hach® alkalinity test kit, model AL-DT. The test kit includes the necessary items: a digital titrating pipet, sulfuric acid cartridges, dispensing tips, bromcresol green-methyl red mixed indicator packets, graduated cylinder and erlenmeyer flask. Samples are titrated colorimetrically using the digital pipet and a mixed indicator solution of bromcresol green-methyl red. The mixed indicator goes through a series of color changes from blue to an end point color of pink.

6.1.3 Procedure

Insert a delivery tube into 1.6 N H_2SO_4 titration cartridge and then attach the cartridge to the titrator body. Turn the delivery knob to eject a few drops of titrant. Reset the counter to zero and wipe the tip. Using a 100-mL graduated cylinder, measure and transfer 100-mL of the sample into a 250-mL erlenmeyer flask. Add the contents of one bromcresol green - methyl red indicator powder pillow to the flask and swirl to mix. Begin adding acid by increments of 2 to 5 Hach units or so, swirling the flask vigorously for several seconds. As the titration proceeds, the solution will change to a light greenish blue-gray (pH 5.1), to light violet (pH 4.8), and then to the light pink endpoint (pH 4.5). The most sensitive part of the titration is usually between pH 4.8 and 4.3. As the end point is approached, a momentary change in color will be noted in that portion of the solution with which the acid first mixes. From that point on, adding acid in increments of one Hach unit is desirable to avoid overshooting the endpoint. Record the number of Hach units required to reach the light pink endpoint.

6.1.4 Data Reduction

The alkalinity (as total or bicarbonate alkalinity), in mg per liter, is equal to the number of Hach units required to reach the light pink endpoint. This assumes a sample volume of 100 mL

and a H_2SO_4 acid strength of 1.6 N. Consult the manufacturer's manual (Appendix A) if a different acid strength or sample volume are used.

6.1.5 Quality Control

The quality control activities required include analyzing field duplicate samples at a frequency of one per ten samples or 1 per sampling event (whichever is lower). Duplicate results should have a RPD of less than 10%, otherwise, resample and reanalyze.

6.2 pH

pH is measured with a glass hydrogen ion electrode compared against a reference electrode of known potential by means of a pH meter. The measurement must be conducted immediately upon collection of a groundwater sample from the well.

6.2.1 Reagent and Equipment Requirements

- pH/mV meter (Orion Model 210 or equivalent);
- Combination pH electrode;
- 100 mL beakers;
- pH 4, 5, 7, and 9 buffers;
- Filling solution for combination electrode; and
- Thermometer or electronic temperature probe.

6.2.2 Instrument Operation and Calibration

pH measurements will be made using an Orion SA210 portable, digital pH meter. Calibrate the pH meter at each sampling location with buffer solutions that bracket the anticipated range of sample pH. Typically, the groundwater pH is anticipated to be in the 6 - 8 range. Use fresh pH buffer solutions each day. Refer to the manufacturer's instruction manual (Appendix B.2) for the stepwise calibration and operating procedure.

Measurement of pH is temperature sensitive, so the temperature of the buffer solutions and samples must be determined beforehand and the temperature/slope control adjusted to the correct temperature.

6.2.3 Quality Control

QC activities include: (1) instrument calibration at each sampling location as described above. Calibration results should be within ±0.05 pH unit of the true buffer pH at the temperature of the buffer (refer to the buffer manufacturer's literature to determine the true buffer pH at a given temperature); and (2) analyzing field duplicate samples at a frequency of one per ten samples or one per sampling event (whichever is lower). Duplicate results should have a RPD of less than 10%, otherwise, resample and reanalyze.

6.3 Specific Conductance

Specific conductance provides an estimate of the total concentration of ionic species dissolved in groundwater. This method uses a conductivity meter with a Wheatstone bridge. Conductivity should be measured at the well head as part of the well purging procedure.

6.3.1 Reagent and Equipment Requirements

- Conductivity meter (Fisher Model 09-325-360 or equivalent);
- 0.01*M* and 0.001*M* KCl check solutions. To prepare, dissolve 0.7456g anhydrous KCl (dry in oven at 105°C) in deionized water and dilute to 1,000 mL. This solution will have a specific conductance of 1413 µmhos/cm at 25°C. Dilute 100 mL of this stock solution to 1 liter. The specific conductance of this solution will be 1413 µmhos/cm at 25°C;
- Clean 500 mL HDPE bottles for KCl check solutions;
- 100 mL and 1L volumetric flasks; and
- Electrode cleaning solution (isopropyl alcohol or foaming tub and tile cleaner).

6.3.2 Instrument Operation and Calibration

The Fisher Model 09-325-360 conductance meter does not require calibration. However, daily checks with two standard check solutions is required.

6.3.3 Quality Control

QC activities include: (1) daily measurement of at least two standard check solutions with conductivities in the range of the samples; (2) cleaning the electrode if the measured conductivity of either check solutions varies by more than ±10% from the stated value; and (3) analyzing field

duplicates at a frequency of one per every ten wells (or one per sample set, whichever is lower). Field duplicate results should have a RPD of less than 10%, otherwise, resample and reanalyze.

6.4 Temperature

Temperature is measured using a digital thermometer and thermocouple sensor on fresh, flowing groundwater.

6.4.1 Reagent and Equipment Requirements

- Electronic thermometer and temperature probe (Cole-Palmer Digi-Sense® Type J or K or equivalent);
- ASTM glass thermometer; and
- Insulated sample cup.

6.4.2 Instrument Operation and Calibration

The digital thermometer should be calibrated following the manufacturer's procedure initially and after every three months.

6.4.3 Quality Control

QC activities include: (1) instrument calibration using the manufacturer's procedure after every three months; (2) a daily calibration check against an ASTM glass thermometer. If the two temperature readings vary by more than ±10% , then the electronic meter must be recalibrated; and (3) analyzing field duplicates at a frequency of one per every ten wells (or one per sample set, whichever is lower). Field duplicate results should have a RPD of less than 10%, otherwise, resample and reanalyze.

6.5 Turbidity

Turbidity is defined as the expression of the optical property that causes light to be scattered and absorbed rather than transmitted directly through the sample. Turbidity is caused by suspended solids including silt, clay, organic matter, microbes, and other fine particles. It is a good measure of general water quality and is used to show changes in water clarity as a monitor well is purged.

6.5.1 Reagent and Equipment Requirements

- Portable turbidimeter (Hach Model DR/2000 or equivalent);
- Set of 3 Formazin primary standards, covering the range of 0 - 450 NTU, prepared from stock 4000 NTU formazin solution; and
- Deionized water.

6.5.2 Instrument Operation and Calibration

The Hach Model DR/2000 is calibrated using a preprogrammed procedure that allows the microprocessor to adjust the calibration curve as needed. Calibration is based on formazin, the accepted primary standard for turbidity measurement. Since the diluted formazin suspensions are not stable, dilution working standards must be freshly prepared from the 4000 NTU stock suspension for initial instrument calibration. For routine, daily calibration, deionized water can serve as a calibration blank. Refer to the manufacturer's instruction manual, which is included as Appendix A.4

6.5.3 Quality Control

QC activities include: (1) instrument calibration using primary formazin standards prior to each sampling event, as described in the manufacturer's instruction manual; (2) daily instrument calibration using a deionized water blank as described in the manufacturer's instruction manual; and (3) analyzing field duplicate samples at a frequency of one per ten samples or one per sampling event (whichever is lower). Duplicate results should have a RPD of less than 10%, otherwise, resample and reanalyze.

7.0 LABORATORY QUALITY CONTROL AND ANALYTICAL PROCEDURES

This section describes the QAOs for groundwater samples that will be collected during the voluntary monitoring effort. The analytical methods that will be performed are presented in Section 7.3.

Quality control is achieved by collecting and/or analyzing a series of field duplicates, blank, spike, and spike duplicate samples and ensuring that the analytical results are within QC objectives specified for the particular method. QC sample results are used to quantify precision and accuracy. Control of measurement quality (i.e., control of error sources that affect measurement quality) is possible for sample collection and analysis; however, matrix interference and sample heterogeneity are not amenable to control. Imprecision or bias from these natural sources of error must be estimated from QC samples. Thus, QC sample results are used to identify any problems or limitations in the associated field sample results.

The QC components described below will ensure that data of known quality are produced and documented. The internal QC checks, frequency, acceptance criteria, and corrective actions required to meet project objectives for each analytical method are presented in Table 7-1.

Measurement quality objectives for precision and accuracy are presented in Tables 7-2 and 7-3. The QC sample results are assessed using these measurement QAOs during data review and validation, which is discussed in Section 6.3.

7.1 Field Quality Control

Field QC will be achieved by collecting field duplicate samples and equipment blanks. These field QC samples will be documented in the field logbooks and submitted "blind" to the laboratory. In this manner, the laboratory cannot distinguish between natural and QC samples during analysis. These components of the sampling program will ensure that data of known quality are produced throughout the project.

7.1.1 Field Duplicates

A field duplicate sample is a second sample collected at the same location as the original sample. Duplicate sample results are used to assess precision, including variability associated with both the laboratory analysis and the sample collection process. Duplicate samples will be

collected simultaneously or in immediate succession, using identical techniques. They will be treated in an identical manner during storage, transportation, and analysis. The frequency for collecting field duplicates will be one per sampling event.

7.1.2 Equipment Blanks

Equipment blanks consist of deionized water run through the groundwater sampling pump after decontamination, collected in a sampling bottle, and transported to the laboratory for analysis. An equipment blank will be analyzed for all analytes requested for that sampling point. Equipment blanks are designed to identify cross-contamination between samples from improperly decontaminated equipment; however, the fact that analytes are detected in equipment blanks may be due to sampling, transportation, extraction or analysis contamination. The frequency for collecting equipment blanks will be one blank per sampling event.

7.2 Laboratory Quality Control

Laboratory QC is necessary to control the analytical process within method and project specifications, to assess the accuracy and precision of analytical results, and to identify assignable causes for atypical analytical results. Laboratory QC samples are documented at the bench and are reported with the analytical results. The QC checks in the laboratory are specific to the analytical method and generally include the use of the following QC samples as appropriate for the method.

7.2.1 Initial Calibration

An initial calibration is performed on the instrument as required for each analytical method, usually using a range of calibration standards with the low standard near the detection limit for the analyte. These standards are used to determine the linear dynamic range for the initial instrument calibration.

7.2.2 Continuing Calibration

A continuing calibration verification standard (CCV) is prepared independently from the initial calibration standards. CCVs should be analyzed after every ten field samples to verify the calibration of the instrument. After a CCV is run, a continuing calibration blank (CCB) should also be analyzed to check for any instrument carryover. A CCB is a reagent blank that does not undergo any sample preparation.

7.2.3 Laboratory Control Samples

Laboratory control samples (LCS) are prepared in the laboratory and consist of deionized water spiked with a secondary source of analytes of interest at specified concentrations, usually in the mid-calibration range. The LCS is taken through the entire sample preparation and analysis process to assess statistical control of the method and instrument. An LCS and an LCS duplicate (LCSD) should be analyzed, so that both accuracy and precision can be estimated. LCS are required for all analytical methods performed in the laboratory. Table 7-2 presents recommended LCS components and concentrations.

7.2.4 Method Blanks

A method blank is a sample composed of all the reagents in the same quantities used to prepare a sample for analysis. The method blank undergoes the same sample preparation and analysis procedures as a field sample. Blank results indicate whether any target analytes may be attributed to laboratory sources (reagents, glassware, instrumentation) or field sources or conditions (equipment, shipping and handling, ambient conditions) rather than the sampled groundwater.

7.2.5 Reagent Blanks

A reagent blank is laboratory pure water analyzed as a sample. This type of blank does not undergo any type of sample preparation. It is typically used to zero an instrument.

7.2.6 Matrix Spike Samples

A matrix spike (MS) is a solution of known concentrations of target analytes that is spiked into a field sample before sample preparation and analysis. An additional aliquot of the sample is spiked for the matrix spike duplicate (MSD) analysis. The analytical results of the duplicate spiked samples are used to measure the percent recovery of each spiked compound and compare the recovery between samples, which provides estimates of the accuracy and precision of the method within an actual sample matrix. MS/MSD samples are collected in the same manner as field duplicates; however, the sample labels will indicate that these additional samples are for MS/MSD analyses. MS/MSD samples will be collected at a frequency of one pair every 20 samples or one per sampling event (whichever is greater).

7.2.7 Detection/Quantitation/Reporting Limits

Detection, quantitation, and reporting limits must be distinguished for proper understanding and data use. The method detection limit (MDL) is the minimum analyte concentration that

can be measured and reported with 99% confidence that the concentration is greater than zero (40 CFR Part 136 Appendix B). The quantitation limit represents the concentration of an analyte that can be routinely measured in the sampled matrix with "reasonable" confidence in both identification and quantitation. Quantitation limits are often based on analytical judgment and experience. Although these limits are not statistical measures, they may be determined by applying a standard formula or factor to the MDL.

Laboratories generally establish quantitation limits that are reported with the analytical results; these may be called reporting limits, detection limits, reporting detection limits, or other terms. The limits must be less than or equal to the quantitation limits listed in Table 7-4; however, sample-specific quantitation limits for samples diluted for analysis may exceed the project quantitation limits.

7.2.8 Reporting Uncensored Data

Uncensored data are measurements made using the standard analytical procedures, except that results below the detection/quantitation/reporting limit are not discarded or reported as "not detected". Thus, numerical results are available for essentially all sample measurements. Uncensored data can be used for statistical analysis without concern that measurement variability, such as varying detection limits, will complicate data interpretation.

7.3 Analytical Procedures

The analytical methods selected are those currently used for the Houston Lighting and Power voluntary groundwater monitoring program. The quantitation limits given in Table 7-4 were determined by Southern Petroleum Laboratories, Inc., Houston, Texas and are those currently used for this project. The federal standards for drinking water are listed for comparison (*Drinking Water Regulations and Health Advisories*, U.S. EPA, May 1995).

In the following sections, the methods and associated QC samples are described. *Methods of Chemical Analysis of Water and Wastes* (US EPA, 1983) was used as a reference for all methods. Detailed QC requirements such as frequency, acceptance criteria and corrective actions are presented in Table 7-1.

7.3.1 Total Dissolved Solids by Method 160.1

The total dissolved solids in a water sample are found gravimetrically by filtering the sample, transferring to a pre-weighed evaporating dish, and evaporating to dryness at 180 °C.

The sample is then cooled and weighed. The drying cycle is repeated until a constant weight is obtained.

The following QC should be performed for this method:

- Calibration of the balance with Class S weights at two levels (0.200 g and 100 g) should be done before weighing any samples;
- One method blank should be prepared and analyzed for each batch (a batch is no more than 20 field samples);
- One sample duplicate analysis should be performed for each batch; and
- One LCS/LCSD pair should be prepared and analyzed for each batch.

7.3.2 Metals by Method E200.7

Water samples are analyzed for trace elements or metals by inductively coupled plasma atomic emission spectroscopy (ICPES) using EPA method 200.7 (See Table 7-4 for analytes run by this method). Digestion of the samples is achieved by following the procedure given in Section 4.1.3 of the Atomic Absorption Methods section of *Methods of Chemical Analysis of Water and Wastes* (US EPA, 1983). The trace elements are then simultaneously or sequentially determined using ICPES.

The laboratory should conduct the following QC:

- An initial calibration of the instrument should be performed. Detailed calibration procedures for ICPES systems are described in Test *Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846,* Third Edition (US EPA, 1986).
- An initial calibration verification sample (ICV) should be analyzed immediately following initial calibration. This involves reanalysis of the upscale calibration standard. Following the ICV, a CCB should be run.
- An interference check sample should also be analyzed before any samples. Two solutions, major analytes and major plus minor analytes, should be analyzed twice per eight hour shift.
- The calibration should be verified by analyzing a CCV standard every ten samples and at the end of the batch. After every CCV, a CCB should be analyzed.

- One method blank should be prepared and analyzed with each batch.
- One LCS/LCSD pair is required for each digestion and analytical batch.
- One MS/MSD pair is required for each digestion and analytical batch.
- A serial dilution analysis should be performed for each batch of samples. A 1:5 dilution of a sample should meet ±10% of the original determination, assuming that the concentration of the sample is greater than 5 times the MDL. If not, a matrix effect should be assumed and an analytical spike performed. An analytical spike is a spike added to a sample after preparation.

7.3.3 Graphite Furnace Atomic Absorption Metals Analyses

Water samples are analyzed for arsenic, lead, and selenium by graphite furnace atomic absorption spectroscopy (GFAA) using EPA methods E206.2, E239.2, and E270.2, respectively. Sample preparation is achieved by following the same procedure as that for ICPES. Discrete aliquots of sample extract are then deposited in a graphite tube furnace. The graphite tube is resistively heated by an electrical current to temperatures sufficient to vaporize the element of interest. This method usually has a linear analysis range at the parts per billion (ppb) or sub-ppb level.

The following QC components should be included for every batch of samples analyzed by GFAA.

- A multi-point calibration curve should be generated daily for each element using a calibration blank and at least three upscale standards. Linear regression is used to define the calibration curve. Detailed initial calibration procedures for the GFAA spectrometry system are described in the Atomic Absorption Methods section of *Methods for Chemical Analysis of Water and Wastes* (US EPA, 1983).
- CCVs and CCBs should be run immediately following initial calibration, after every ten field samples, and at the end of the batch. The recommended CCV is a 50 ppb standard (5 ppb for cadmium). CCBs for this method should be deionized water with 1% nitric acid.
- One method blank is required for each digestion and analytical batch.
- One LCS/LCSD pair is required for each digestion and analytical batch.
- One MS/MSD pair is required for each digestion and analytical batch.

- A serial dilution analysis and analytical spike, if needed, should also be performed as described in Section 7.3.1. If the analytical spike criteria are not met, the method of standard additions (MSA) should be used. MSA involves adding known amounts of standard to a sample to compensate for difficult sample matrices.

7.3.4 Chloride by Method 325.3

Determination of chloride in the water samples will be found titrimetrically. After acidification, the sample is titrated with mercuric nitrate in the presence of mixed diphenylcarbazone-bromophenol blue indicator.

The following QC samples should be analyzed for this method:

- A titrant standardization should be performed daily;
- One method blank should be prepared and analyzed for each batch;
- One LCS/LCSD pair should be prepared and analyzed for each batch; and
- One MS/MSD pair should be prepared and analyzed for each batch.

7.3.5 Fluoride by Method 340.2

Water samples are analyzed for fluoride by ion selective electrode using EPA Method 340.2. Fluoride is determined potentiometrically using a fluoride electrode in conjunction with a standard single junction sleeve-type reference electrode and a pH meter having an expanded millivolt scale or a selective ion meter having a direct concentration scale for fluoride.

The following QC should be performed for this method:

- A six-point calibration should be performed daily.
- A reagent blank should be analyzed daily at the beginning of each calibration.
- One method blank should be prepared and analyzed with each batch.
- CCVs should be analyzed immediately following calibration of the instrument, after every ten samples, and at the end of the batch. The recommended CCVs for this method are 1.0 mg/L standards.

- One LCS/LCSD pair should be prepared and analyzed for each batch.
- One MS/MSD pair should be prepared and analyzed for each batch.

7.3.6 Phosphorus by Method 365.2

Phosphorus is determined colorimetrically after reaction of the sample with ammonium molybdate and antimony potassium tartrate in an acid medium. Formation of an antimony-phospho-molybdate complex occurs and subsequent reduction by ascorbic acid produces an intensely blue colored complex. Only ortho-phosphate gives this result. Persulfate digestion or sulfuric acid hydrolysis may convert other phosphorus compounds to the ortho form.

The following QC should be performed for this method:

- A six-point initial calibration should be performed daily.
- One reagent blank should be prepared and analyzed daily to set the instrument to zero. A reagent blank for this method is digested deionized water.
- One method blank should be prepared and analyzed for each batch.
- CCVs and CCBs should be analyzed after every ten field samples and at the end of the batch.
- One LCS/LCSD pair should be prepared and analyzed for each batch.
- One MS/MSD pair should be prepared and analyzed for each batch.

7.3.7 Sulfate by Method 375.4

Determination of sulfate in the water samples is done turbidimetrically. Sulfate ion is converted to a barium sulfate suspension under controlled conditions. The resulting turbidity is determined by a nephelometer and compared to a curve prepared from standard sulfate solution results.

The following QC should be performed for this method:

- A five-point calibration should be done daily, with concentrations of 5, 10, 15, 20, and 25 mg/L;

- One method blank should be prepared and analyzed for each batch;
- CCVs and CCBs should be analyzed after every ten samples and at the end of the batch;
- One LCS/LCSD pair should be prepared and analyzed for each batch; and
- One MS/MSD pair should be prepared and analyzed for each batch.

Table 7-1
Summary of Calibration and Internal QC Procedures

Analytical Method	Applicable Parameter	Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action
E160.1	Total Dissolved Solids	Calibration of Balance	Daily before Batch 1 is analyzed	± 0.0020 g for 0.200 g ± 0.0200 g for 100 g	1. Recalibrate. 2. If still out, repair balance and recalibrate.
		Method Blank	One per batch	Measured concentration must be < QL	Blank Contamination: Identify source of contamination. If source of contamination is not apparent, repeat analysis of all samples in the batch. Document if outside hold time.
		LCS/LCSD	One pair per analytical batch	1. Accuracy: See Table 7-2 2. Precision: See Table 7-2	1. Accuracy: If one LCS fails, consult QC officer and document. If both LCSs fail, reanalyze if samples within hold time. 2. Precision: Consult with QC officer and document.
		Sample Duplicate	One per batch	< 15% RPD	Document if precision tolerances are not met provided the sample concentration is greater than 100 mg/L.
E200.7	ICPES Metals	Initial Calibration	Daily before any other analysis	N/A	N/A
		Initial Calibration Verification	Daily immediately following initial calibration.	95 - 105% recovery	Repeat initial calibration verification; if still out, repeat calibration.
		Interference Check Samples	Daily at beginning and end of analytical run or twice per 8-hour shift.	80 - 120% of true value	Correct source of interference and rerun sample. If still out, contact QC officer.
		Calibration Blank	Prior to start of batch, after every ten samples, and at the end of the batch.	Measured concentrations must be < QL or ± 3 standard deviations of the mean value of the calibration blank, whichever is less.	Blank Contamination: 1. Reanalyze calibration blank. 2. If blank is still contaminated, identify and correct source of contamination, then repeat calibration blank analysis. 3. If still out, reanalyze all samples since last valid calibration blank.

Table 7-1
(Continued)

Analytical Method	Applicable Parameter	Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action
E200.7 (continued)	ICPES Metals (continued)	Method Blank	One per batch	Measured concentrations for all analytes must be < QL unless: 1) the lowest concentration of the analyte in the samples is 10x the blank concentration; or 2) sample results are < QL.	Blank Contamination: 1. Reanalyze method blank. 2. If method blank is still contaminated, identify and correct source of contamination, then prepare samples with new method blank.
		LCS/LCSD	One LCS/LCSD pair for each digestion and analytical batch.	1.Accuracy: See Table 7-2 2.Precision: See Table 7-2	1.Accuracy: Reanalyze LCS/LCSD. If recoveries for same analytes are still out, stop, identify, and correct problem before proceeding. If digestion batch is to be prepared, document. If samples can't be re-digested, contact QC officer and document. 2.Precision: Reanalyze LCS/LCSD. If recoveries for same analytes are still out, stop, identify, and correct problem before proceeding.
		Continuing Calibration Verification	Following interference check standards, after every ten samples, and at the end of the batch.	90% - 110% recovery for all elements except potassium 90% - 115% recovery for potassium	Accuracy: 1. Reanalyze CCV. 2. Identify and correct problem, then reanalyze all samples analyzed since last valid calibration verification.

Table 7-1
(Continued)

Analytical Method	Applicable Parameters	Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action
E200.7 (continued)	ICPES Metals (continued)	MS/MSD	One MS/MSD pair per batch	1. Accuracy: See Table 7-3 2. Precision: See Table 7-3	1. Accuracy: a. If there is an assignable cause, and LCS/LCSD are within acceptable limits, contact QC officer and document. b.If no assignable cause, run analytical spike. c.If analytical spike fails, and LCS/LCSD results are within acceptable limits, assume matrix interference, and document as such. d.Contact QC officer to determine if special measures should be performed in an attempt to resolve matrix interferences. 2. Precision: a. If there is an assignable cause, and LCS/LCSD are within acceptable limits, contact QC officer and document. b. If there is no assignable cause, analyze analytical spike.
		Serial Dilution	Once per analytical batch if undiluted concentration > 5 times the DL.	± 10% of undiluted value	Run an analytical spike.
		Analytical Spike	When serial dilution fails or when MS/MSD fails with no assignable cause.	75% - 125% recovery	Contact QC officer and document.
E206.2, E270.2, E239.2	GFAA Metals	Initial Calibration	Daily before any other analysis.	Correlation coefficient ≥ -0.995	Identify and reanalyze outlying point(s); recalculate curve using repeated points.
		ICV	Daily before Batch 1 is analyzed.	90 - 110% of theoretical value	Accuracy: 1. Repeat calibration verification. 2. If still out, identify and correct problem. Run calibration verification again. If still out, recalibrate.

Table 7-1
(Continued)

Analytical Method	Applicable Parameter	Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action
E206.2, E270.2, E239.2 (continued)	GFAA Metals (continued)	Method Blank	One per each preparative and analytical batch	Measured concentrations must be < QL	Blank Contamination: 1. Reanalyze method blank. 2. If method blank is still contaminated, identify and correct source of contamination, then prepare samples with new method blank.
		Initial Calibration Blank	After initial calibration verification	Within ± QL	1. Reanalyze calibration blank. 2. If still out, recalibrate.
		LCS/LCSD	One LCS/LCSD pair for each digestion and analytical batch.	1. Accuracy: See Table 7-2 2. Precision: See Table 7-2	1. Accuracy: Reanalyze LCS/LCSD. If recoveries for the analyte are still out, stop, identify, and correct problem before proceeding. If digestion batch is to be prepared, document. If samples can't be redigested, contact QC officer and document. 2. Precision: Reanalyze LCS/LCSD. If recoveries for same analytes are still out, stop, identify, and correct problem before proceeding.

Table 7-1
(Continued)

Analytical Method	Applicable Parameters	Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action
E206.2, E270.2, E239.2 (continued)	GFAA Metals (continued)	MS/MSD	One MS/MSD pair per batch	1. Accuracy: See Table 7-3 2. Precision: See Table 7-3	1. Accuracy: a. If there is an assignable cause, and LCS/LCSD are within acceptable limits, document and contact QA Officer. b. If no assignable cause, run analytical spike. c. If analytical spike fails, and LCS/LCSD results are within acceptable limits, run MSA, and document. d. Contact QC officer to determine if special measures should be performed in an attempt to resolve matrix interferences. 2. Precision: a. If there is an assignable cause, and LCS/LCSD are within acceptable limits, document and contact QC officer. b. If there is no assignable cause, analyze analytical spike.
		Continuing Calibration Verification	After every ten samples and at the end of the analytical batch.	80-120% of true value	Accuracy: 1. Repeat calibration verification. 2. If still out, identify and correct problem, then reanalyze all samples analyzed since last valid calibration verification.
		Continuing Calibration Blank (CCB)	Following each continuing calibration verification and at the end of the analytical batch.	Within ± QL	1. Reanalyze calibration blank. 2. If still out, correct the problem and reanalyze all samples since last valid calibration blank.
		Serial Dilution Analysis	One per analytical batch	Within 10% agreement with undiluted value if undiluted value > 25 times the MDL.	Perform analytical spike.

Table 7-1
(Continued)

Analytical Method	Applicable Parameter	Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action
E206.2, E270.2, E239.2 (continued)	GFAA Metals (continued)	Analytical Spike	As corrective action for serial dilution or matrix spike.	85-115% recovery	Perform method of standard additions.
		Method of Standard Additions (MSA)	As corrective action when analytical spike fails.	Correlation coefficient ≥ -0.995. Slope ≤ 20% different compared to calibration curve.	1. Reanalyze samples by MSA. 2. If still out, document.
E325.4	Chloride	Titrant standardization	Daily, prior to sample analysis.	RPD < 5%	Repeat analysis. If still out, contact Lab Manager to resolve problem.
		Method Blank	One per batch	None specified.	Blank Contamination: 1. Perform system blank. 2. If system blank is contaminated, identify and correct source of contamination, then repeat method blank analysis. 3. If system blank is clean, prepare samples with new method blank.
		LCS/LCSD	One LCS/LCSD pair per batch	1. Accuracy: See Table 7-2 2. Precision: See Table 7-2	1. Accuracy: Analyze a third LCS. If recovery for same analytes are still out, stop, identify, and correct problem before proceeding. 2. Precision: Analyze a third LCS. If precision for same analytes is still out, stop, identify, and correct problem before proceeding.

Table 7-1
(Continued)

Analytical Method	Applicable Parameter	Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action
E325.4 (continued)	Chloride (continued)	MS/MS Duplicate	One MS/MSD pair per batch	1. Accuracy See Table 7-3 2. Precision See Table 7-3	1. Accuracy: a. Reanalyze spiked sample. b. If still out, and LCS/LCSD results are within acceptable limits, assume matrix interference and document as such. 2. Precision: a. Reanalyze spiked sample. b. If still out, and LCS/LCSD results are within acceptable limits, assume matrix interference and document.
E340.2	Fluoride	Initial Calibration	Daily	Correlation of coefficient ≥ -0.995	Identify and repeat outlying point(s); recalculate curve using repeated points.
		Initial Calibration Verification	Following complete calibration	90%-110% recovery	1. Repeat calibration verification. 2. If still out, identify and correct problem. Analyze calibration verification again. If still out, recalibrate.
		Continuing Calibration Verification	Every 10 samples and at end of batch	90%-110% recovery	Accuracy: 1. Repeat calibration verification. 2. If still out, identify and correct problem, then reanalyze all samples analyzed since last valid calibration verification.
		Method Blank	One for each analytical batch	Measured concentrations must be < QL	Blank Contamination 1. Identify and correct source of contamination. 2. Repeat blank analysis.
		LCS/LCS Duplicate	One LCS/LCSD pair per batch	1. Accuracy: See Table 7-2 2. Precision: See Table 7-2	1. Accuracy: If one LCS fails, consult QC officer and document. If both LCSs fail, reanalyze samples if within hold time. 2. Precision: Consult with QC officer and document.

Table 7-1
(Continued)

Analytical Method	Applicable Parameter	Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action
E340.2 (continued)	Fluoride (continued)	MS/MSD	One MS/MSD pair per analytical batch	1. Accuracy: See Table 7-3 2. Precision: See Table 7-3	1. If either MS or MSD is outside of either accuracy or precision tolerances and LCS/LCSD results are acceptable, then assume matrix interference and document as such. 2. Contact QC officer to determine if special measures should be performed in an attempt to resolve matrix interferences.
		System Blank	Daily at the beginning of each calibration	Measured concentrations must be < QL	Blank Contamination: 1. Identify and correct source of contamination. 2. Repeat blank analysis.
E365.2	Total Phosphate	Reagent Blank	Daily	NA	NA
		Initial Calibration	Daily	Correlation coefficient ≥0.995	Identify and repeat outlying point(s); recalculate curve using repeated points.
		Continuing Calibration Verification	Every 10 samples within an analytical batch	90%-110% recovery	Accuracy: 1. Repeat calibration verification. 2. If still out, identify and correct problem, then reanalyze all samples analyzed since last valid calibration verification.
		Initial Calibration Verification	Daily immediately following calibration curve.	90% - 110% recovery	Accuracy: 1. Repeat calibration verification. 2. If still out, identify and correct problem, run calibration verification again; if still out, recalibrate.
		LCS/LCS Duplicate	One LCS/LCSD pair per each preparation and analytical batch (t-PO_4 only).	1. Accuracy: See Table 7-2 2. Precision: See Table 7-2	1. Accuracy: If one LCS fails, consult QC officer and document. If both LCSs fail, reanalyze if within hold time. 2. Precision: Consult with QC officer and document.

Table 7-1
(Continued)

Analytical Method	Applicable Parameter	Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action
E365.2 (continued)	Total Phosphate (continued)	MS/MS Duplicate	One MS/MSD pair per preparation and analytical batch (t-PO_4 only).	1. Accuracy: See Table 7-3 2. Precision: See Table 7-3	1. If either MS or MSD is outside of either accuracy or precision tolerances and LCS/LCSD results are acceptable, then assume matrix interference and document. 2. Contact QC officer to determine if special measures should be performed in an attempt to resolve matrix interferences.
		Method Blank	One per preparation and analytical batch (t-PO_4 only).	Measured concentrations must be < QL.	Blank Contamination 1. Identify and correct source of contamination. 2. Repeat blank analysis. 3. Re-prep sample if necessary.
E375.4	Sulfate	Multipoint Calibration	Daily	Correlation coefficient ≥0.995	Identify and repeat outlying points; recalculate curve using repeated points.
		LCS/LCSD	One LCS/LCSD pair per batch	1. Accuracy: See Table 7-2 2. Precision: See Table 7-2	1. Accuracy: a. Analyze a third LCS. If recovery is still outside limits, stop, identify, and correct problem before proceeding with analyses. 2. Precision: a. Analyze a third LCS. If agreement is still outside limits, stop, identify, and correct problem before proceeding with sample analyses.
		Continuing Calibration Verification	After every 10 samples and at the end of each analytical batch	80-120% of true value	1. Repeat calibration verification. 2. If still out, identify and correct problem, then reanalyze all samples analyzed since last valid calibration verification.

Table 7-1
(Continued)

Analytical Method	Applicable Parameter	Quality Control Check	Minimum Frequency	Acceptance Criteria	Corrective Action
E375.4 (continued)	Sulfate (continued)	MS/MSD	One MS/MSD pair per batch	1. Accuracy: See Table 7-3 2. Precision: See Table 7-3	1. Accuracy: a. Reanalyze spiked sample. b. If still out, and LCS/LCSD results are within acceptable limits, assume matrix interference and document as such. 2. Precision: a. Reanalyze spiked sample. b. If still out, and LCS/LCSD results are within acceptable limits, assume matrix interference and document as such.
		Method Blank	One per analytical batch	Measured concentrations must be < QL	Blank Contamination: 1. Perform system blank. 2. If system blank is contaminated, identify and correct source of contamination, then repeat method blank analysis. 3. If system blank is clean, prepare samples with new method blank.

Table 7-2
Laboratory Control Standard Measurement Quality Objectives and Recommended Spiking Concentrations

Method	Analyte	LCS Accuracy Objectives	LCS Precision Objectives	Recommended LCS Spiking Concentrations (mg/L)
E200.7	Aluminum	80-120	20	10
E200.7	Barium	80-120	20	1
E200.7	Boron	80-120	20	1
E200.7	Cadmium	80-120	20	0.08
E200.7	Calcium	80-120	20	10
E200.7	Chromium	80-120	20	0.08
E200.7	Iron	80-120	20	10
E200.7	Magnesium	80-120	20	10
E200.7	Manganese	80-120	20	1
E200.7	Potassium	80-120	20	20
E200.7	Sodium	80-120	20	10
E206.2	Arsenic	75-125	20	0.05
E239.2	Lead	75-125	20	0.05
E270.2	Selenium	75-125	20	0.05
E365.2	Phosphorus	total: 80-120 ortho: 85-115	20	total: 0.5-0.8
E325.4	Chloride	90-110	10	10.0 mg/l
E340.2	Fluoride	85-115	11	0.5 mg/l
E375.4	Sulfate	80-120	20	10.0 mg/l

Table 7-3
Matrix Spike Measurement Quality Objectives
and
Recommended Spiking Concentrations

Method	Analyte	MS Accuracy Objectives	MS Precision Objectives	Recommended MS Spiking Concentrations (mg/L)
E200.7	Aluminum	80-120	20	10
E200.7	Barium	80-120	20	1
E200.7	Boron	80-120	20	1
E200.7	Cadmium	80-120	20	0.08
E200.7	Calcium	80-120	20	10
E200.7	Chromium	80-120	20	0.08
E200.7	Iron	80-120	20	10
E200.7	Magnesium	80-120	20	10
E200.7	Manganese	80-120	20	1
E200.7	Potassium	80-120	20	20
E200.7	Sodium	80-120	20	10
E206.2	Arsenic	75-125	20	0.05
E239.2	Lead	75-125	20	0.05
E270.2	Selenium	75-125	20	0.05
E365.2	Phosphorus	total: 80-120 ortho: 85-115	20	total: 0.20
E325.4	Chloride	80-120	20	-
E340.2	Fluoride	85-115	11	0.5
E375.4	Sulfate	80-120	20	10 mg/L

Table 7-4
Minimum Quantitation Limits

Analytical Method	Parameter	Quantitation Limit (mg/L)	Federal MCL [a] (mg/L)
E160.1	Total Dissolved Solids	4	500 [b]
E200.7	Aluminum	0.1	0.05 to 0.2 [b]
	Barium	0.005	2
	Boron	0.1	-
	Cadmium	0.005	0.005
	Calcium	0.1	NL
	Chromium	0.01	0.1
	Iron	0.02	0.3 [b]
	Magnesium	0.1	NL
	Manganese	0.005	0.05 [b]
	Potassium	1	NL
	Sodium	0.1	-
E206.2	Arsenic	0.01	0.05
E239.2	Lead	0.004	0.015 [c]
E270.2	Selenium	0.008	0.05
E365.2	Phosphorus	0.06	-
E325.3	Chloride	1	250 [b]
E340.2	Fluoride	0.1	4
E375.4	Sulfate	1	250 [b]

NL = Analyte not listed in Drinking Water Regulations and Health Advisories.
[a] Federal Maximum Contaminant Level for drinking water.
[b] Secondary Maximum Contaminant Level.
[c] Action Level.

8.0 ELECTRONIC DATA ENTRY, REPORTING, AND VALIDATION

This section describes procedures for entering data electronically into the project database, viewing the data from the database using reports and graphs, and performing an independent validation of the analytical data. The procedures for electronic data entry and reporting explain certain features of EPRI's MANAGES for Windows database software.

This section is not intended as a training guide to the setup and operation of the project database. Only the portion of MANAGES' Data Import Routine and the Graphs and Reports functions which will be used for routine data entry and reports are included.

8.1 Database Structure

MANAGES is used to establish and manipulate relational database files using Microsoft's ACCESS database architecture. Each database file is identified by the Site ID which is specified on the opening menu. The Site IDs are **LMS** for the Limestone Station, and **WAP** for the W.A. Parish Station. MANAGES utilizes individual tables which contain information on global analytical parameters, site information, site parameters, sample locations, sample results, and data entry limits. For the LMS and WAP sites, these tables have already been populated, with the exception of the Limits tables. It is expected that in the future, HL&P may utilize the Limits table to validate and evaluate sample results.

8.2 Electronic Data Import

Data entry from a Laboratory Information Management System (LIMS) or a spreadsheet file is supported by MANAGES' import routine. Supported input file formats include: Lotus 1-2-3, Microsoft Excel, Borland dBase, Borland Quattro Pro, Borland Paradox, Microsoft Access, Microsoft FOXPRO, ASCII files, Word Perfect, Microsoft Word, and others.

Data can be imported into the Sample Descriptions, Sample Results, Locations, Global Parameters, and Site Parameters tables. This section describes only the procedure for electronic import of data from electronic files provided by Southern Petroleum Laboratories (SPL) into the Sample Results table using MANAGES' Express Import subroutines.

8.2.1 Preparation of the Import Source File

If requested, SPL will provide a diskette containing the sample data for each analytical work order. SPL's standard export convention provides the data in an ASCII format, using comma and parentheses delimited fields. There is no header row at the top of the file to identify the fields. The data fields are populated in the following order:

- **Lab Name** (e.g., SPL);
- Project (e.g., WAP GWS);
- **Lab ID** (e.g., 9608096-01A);

- **Location** (e.g., MW-21);
- Matrix (e.g., WATER);
- **Sampling Date** (Julian format);
- Sampling Time (e.g., 16:20:00);
- Login Date (Julian format);
- Analysis Date (Julian format);
- Analyst (initials);
- Report Date (Julian format);
- Analyte Code (3 - 6 digit alphanumeric field);
- **Analyte Name** (e.g., Chloride);
- Analytical Method (e.g., METHOD 325.3*);
- Analyte Name (same as above);
- **Detection Limit**;
- **Result**;
- **Units** (e.g., mg/L);
- **ND Flag**;

The source data file must be restructured to remove unnecessary fields and to convert dates to a standard date format (e.g., 10/15/96). A spreadsheet program such as Excel, Quattro Pro, or 1-2-3 should be used to import the SPL ASCII file and to manipulate the fields. The source file is prepared using following steps:

1) Import the SPL file as an ASCII comma-parentheses delimited file;

2) Delete all columns (fields) except those shown above in bold font;

3) Insert a header row with the following six field labels: LAB, LAB ID, LOCATION, DATE, ANALYTE, METHOD, DETECTION LIMIT, RESULT, UNITS, FLAG, and LT_VALUE. The LT_VALUE field is empty;

4) Change the DATE field to short international date format (e.g., 10/15/96);

5) In the FLAG field, change the "**ND**" entries to "**YES**";

6) In the LT_VALUE field, place a "<" character in each record which has "**YES**" in the corresponding FLAG field;

7) Save the file in the MANAGES2\LMS or MANAGES2\WAP subdirectory with a **.WK1** extension (Lotus 1-2-3 format).

8.2.2 Creating a New Setup File

MANAGES' Express Import routine uses a set up file to link fields from the source file and the MANAGES' destination table. This procedure needs to be run initially for each site to

establish the setup file which is then part of the site database. Afterwards, the setup file can called up each time that an electronic data entry is made.

The steps that follow create a new setup file called SPLSETUP:

1) From the MANAGES main menu, run **File/ Import/ Express**. Select **Create New Setup** and select the correct source file;

2) MANAGES will display the source table structure . The field names and field sizes are assigned automatically from the header row of the source file. Hit the **OK** button;

3) The Field Mapping Table is displayed next. Hit **No** on the Confirm Bar. It is now necessary to manually link the fields from the source file to the Destination Table. Use the mouse to drag each field name from the source file column to the appropriate field name on the Destination/ Samples Table. The table below shows the correct links.

Lab	Lab_name
Lab ID	Lab_id
Location	Location_id
Date	Sample_date
Analyte	Parmcodealiasname
Method	Analysis_method
Result	Analysis_result
DL	Detection_limit
Units	Measure_unit
Flag	Result_not_detectable
Lt_value	Lt_value

4) Hit the **Import** button. A question bar will ask whether to save the setup file before importing. Answer **Yes** and list the file name as **SPLSETUP**;

5) The Conversion window will then be displayed. Hit **Start**. When the conversion is complete, the data from the source file have been successfully added to the site database file.

6) Express Import goes through a validation routine to check the import data. If

there are any problems with the data import, an Error Correction table will be displayed. This table lists all records which were imported and a description of any errors encountered. Common errors include parameter or location names not included in the Site Parameter or Location tables and records previously entered into the database. If these problems are encountered, use the ? fields to add location names, overlay previous data, etc. After all corrections are made, hit the **Validate** button.

8.2.3 Using an Existing Setup File

After a setup file has been saved, it can be recalled each time an electronic data import is conducted. From the **Import Express** menu, choose **Existing Setup**. A menu will allow you to select the correct setup file. Upon selection, the Field Mapping Table opens. This table displays the links between field in the source table and the MANAGES' import table. It the current source file name differs from the previous source file name listed in the Field Mapping Table, it will be necessary to **Delete** the source file name and then **Insert** the current source file name. Hit the **Import** button and then **Start** to run the conversion process. The data in the source table is then imported, updating the Sample Results table.

8.3 Viewing Data Reports and Graphs

MANAGES offers a variety of graphs, report tables, and statistical procedures to present and analyze groundwater data. This section describes how to produce tables and graphs which can be used to validate sample data after it is entered into the database, or to manually change or add data to the database file.

8.3.1 Viewing Individual Sample Data

To look at or change/add data for individual samples, select **Tables** from the main menu. Next select **Samples**, which will open the Sample Manager screen. Select **View** which will show the Sample Data Hierarchy screen. Select the date of interest and hit **GoTo**. All sample data for that sampling date will be shown. Using the tab screens, select the sample location of interest and then select the **Results** tab to show the analytical results. Results can be revised or new data added using this screen.

8.3.2 Viewing and Printing All Parameters for Single Locations by Date

To validate data after it has been entered, it is useful to print the entire data set for each sample. Select **Graphs & Reports/ Site Analysis/ Sample Summary/ Results**. This will open the Sample Summary Settings Screen. Select the sampling locations of interest and hit the check mark. MANAGES will probably select all sampling locations regardless of those chosen. The View screen will come up next. Scroll from one sample location the next to view the data. This table lists the parameter code, parameter name, result, units, detection limit, method, preservative used, and other useful information for each data record. Values which are below the detection limit are listed as "<0.00". Data tables for individual samples can be printed from this screen.

8.3.3 Viewing and Printing All Results for Multiple Locations by Date

The keystroke sequence **Graphs & Reports/ Multiple Parameter Analysis/ All Parameters vs. Location by Date** produces a data table which shows multiple sample locations on the same page. Select the locations of interest and then hit the check mark. The view screen will come up, listing the sample results for each analytical parameter. Values which are below the detection limit are listed as zero. The table format is abbreviated, but is useful for comparing results among several sampling locations.

8.3.4 Viewing and Printing Time Series Charts for Individual Locations

A time series graph for a single location can be produced using the keystroke sequence **Graphs & Reports/ Single Parameter Analysis/ Sens Slope Overlay Graph**. On the selection screen, enter the parameter name of interest, and select a sample location. The Sen Slope Overlay Graph displays the parameter values over time using a Sen estimate of slope line which represents the median slope between adjacent point pairs.

8.4 Independent Data Review and Validation

Laboratory data reports will be issued for each work order. A work order is generated for a single client's samples, received by the laboratory on the same day, having fewer than 20 field samples, and requiring similar analytical procedures. This section describes the procedures which should be followed to ensure that all laboratory reports are consistent with the project QAOs.

The data validation task will consist of reviewing three areas of data quality. The QC checks used to assess measurement precision are field duplicates, duplicate MS samples, and duplicate LCS samples. The QC checks used for the assessment of measurement accuracy are LCS samples and MS samples. The third group of QC data reviewed are the results for field (equipment) blanks and laboratory (method) blanks. The analyst is responsible for all of the primary calculations, calculation of percent recoveries and RPDs for comparison to applicable tolerance limits, comparison of all QC results to acceptance limits, and compiling all data for peer review. In addition, validation of the laboratory reports and sample custody documentation will be performed to ensure that all samples were analyzed as requested and all preparation and analysis hold times were met. The peer reviewer should be a quality control officer or project manager, and is responsible for checking that calibration and QC results meet applicable tolerance limits.

The person designated to be responsible for database management will review and summarize all QC sample results to evaluate the sampling and analytical performance. This process will identify analytical methods and compounds for which the QA objectives are not satisfied and corresponding sample data will be qualified with a "flag" indicating the problem, or will be discussed with the laboratory manager responsible for the analytical results.

9.0 REFERENCES

Council, T. *Guidelines for Low-Flow Purging and Sampling at Municipal Solid Waste Landfills in Texas.* Municipal Solid Waste Division, Texas Natural Resources Conservation Commission. 1996.

Puls, R.W. and M.J. Barcelong. *Long-Flow (Minimal Drawdown) Ground-Water Sampling Procedures.* EPA Ground Water Issue. EPA/540/S-95/504. U.S. EPA. December 1995.

Radian International. *Evaluation of Groundwater Monitoring Results, Coal Combustion Byproduct Management Facilities, Final Report.* Prepared for HL&P. 1996.

U.S. EPA. *Drinking Water Regulations and Health Advisories.* May 1995.

U.S. EPA. *Methods of Chemical Analysis of Water and Wastes*, EPA 600/4-79-020. Washington, D.C., 1983.

U.S. EPA. *Methods for Evaluating Solid Wastes Physical/Chemical Methods SW-846*, Third Edition, Office of Solid Waste and Emergency Response. Washington, D.C., 1986.

APPENDIX A

MANUFACTURER'S INSTRUCTION MANUALS FOR FIELD EQUIPMENT

A.1
REDI-FLO2 GROUNDWATER SAMPLING PUMP

LIMITED WARRANTY

Redi-Flo2 pumps manufactured by GRUNDFOS are warranted to the original user only to be free of defects in material and workmanship for a period of 12 months from the date of installation or 18 months from the date of manufacture. GRUNDFOS' liability under this warranty shall be limited to repairing or replacing at GRUNDFOS' option, without charge, F.O.B. GRUNDFOS' factory or authorized service station, any product of GRUNDFOS manufacture. GRUNDFOS will not be liable for any costs of removal, installation, transportation, or any other charges which may arise in connection with a warranty claim. Products which are sold but not manufactured by GRUNDFOS are subject to the warranty provided by the manufacturer of said products and not by GRUNDFOS' warranty. GRUNDFOS will not be liable for damage or wear to products caused by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair, or if the product was not installed in accordance with GRUNDFOS' printed installation and operation instructions.

To obtain service under this Warranty, contact the Distributor or Dealer from which it was purchased to obtain instructions. **Under no circumstances should defective product be returned to the Distributor, Dealer, or GRUNDFOS without specific instructions from them to do so.**

GRUNDFOS WILL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES, OR EXPENSES ARISING FROM INSTALLATION, USE, OR ANY OTHER CAUSES. THERE ARE NO EXPRESS OR IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH EXTEND BEYOND THOSE WARRANTIES DESCRIBED OR REFERRED TO ABOVE.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages and some jurisdictions do not allow limitations on how long implied warranties may last. Therefore, the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction.

LRF-IO-002	Rev. 10/92

GRUNDFOS Pumps Corp. · 2555 Clovis Avenue · Clovis, CA 93612
Support Centers: Allentown, PA · Atlanta, GA

Redi-Flo2

Installation and Operating Instructions

GRUNDFOS

SAFETY WARNING

Adherence To Environmental Regulations

When handling and operating the Redi-Flo2 system, all environmental regulations concerning the handling of hazardous material must be observed. When the pump is taken out of operation, great care should be taken to ensure that the pump contains no hazardous material that might cause injury to human health or to the environment.

Motor Fluid

The pump motor is filled with approximately .85 ounces (25 milliliters) of contaminant-free water. During operation, it is possible that a very small portion of this water could be replaced by the fluid being pumped. Therefore, there is a potential risk for cross contamination if used in portable applications. A filling syringe is provided with each pump to simplify the replacement of this water with clean water.

Returning A Pump For Service

Only pumps that are certified as uncontaminated will be accepted by GRUNDFOS for servicing. GRUNDFOS must receive this certification prior to receiving the pump. If not, GRUNDFOS will refuse to accept delivery of the pump. In these cases, all costs incurred in returning the product to the customer will be paid by the customer.

Electrical Hazards

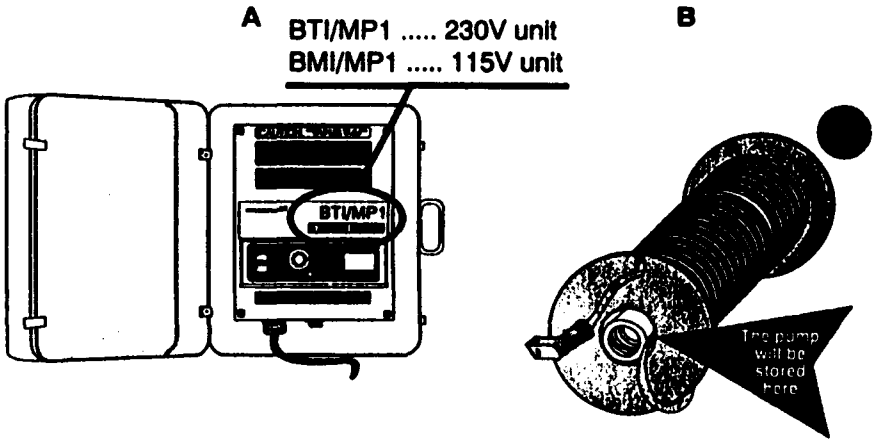
The Redi-Flo2 pumping system is not approved for Class I, Division I, Group D locations as specified by the National Electrical Code (NEC). Consult local authorities and regulations if you have any doubt about its suitability for a specific application.

PRE-INSTALLATION CHECKLIST

Components of Your Redi-Flo2

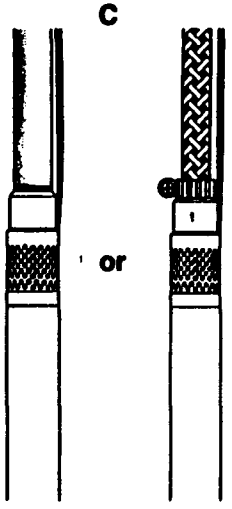
Your Redi-Flo2 Environmental Pumping system should contain the following components:

A. Converter in a protective carrying case
B. MP1 pump and motor with motor lead



To operate the system you will also need:

C. Hose or pipe to connect to the pump and lower it into the well
D. An electrical plug to connect the converter power cord to your portable generator or other power source (BTI/MP1 only plug supplier on BMI/MP1).
E. Some type of safety cable (and attachments) for lowering and lifting the pump

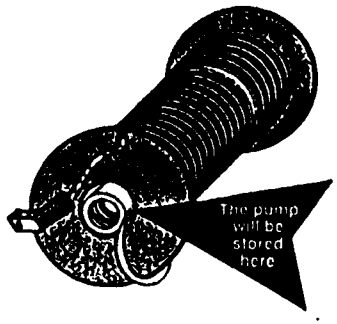


(The exact type of plug used will depend upon your generator).

Assembly Instructions

All electrical work should be performed by a qualified electrician in accordance with the latest edition of the National Electrical Code, local codes and regulations.

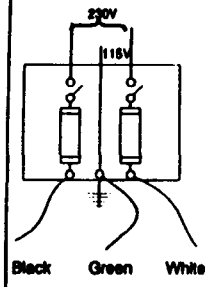
1



Unpack the components of the Redi-Flo2 system. The MP1 pump will be packed in the center of the motor lead roll.

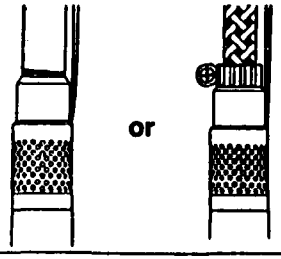
2

Strip the cord jacket and insulation from the ends of the converter power cord. Consult your local electrician to connect the leads to the electrical plug. (The ground wire should be connected to the elongated plug terminal and single phase 230 volt power should be measured across the black and white leads.)



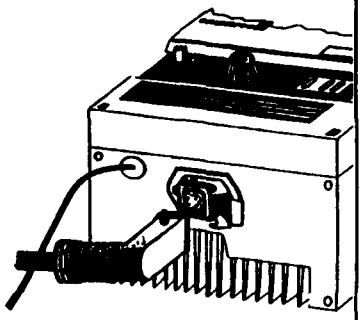
If the converter connects directly to a permanent power supply, consult your local electrician to connect the wires as shown.

3



Connect the MP1 pump to the pipe or hose through which the fluid will be pumped. If a hose is connected, a compression coupling should be used to ensure a strong, watertight fit. A safety cable may be attached to the pump (using a special bracket), as well as a plastic spiral flex clamp to secure the wire. A check valve may also be fitted to prevent liquid from flowing back into the pump after it is turned off (backflow prevention).

4



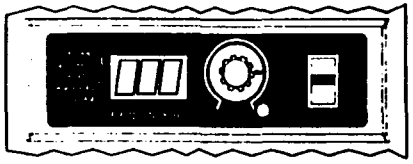
Fit the motor lead plug into the converter. Fit the converter plug into the generator (or other power source).

Starting

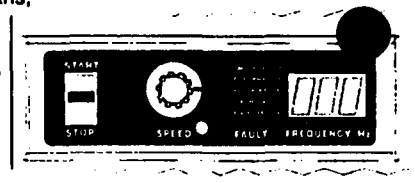
The Redi-Flo2 is easy to operate. Simply:

1. Submerge the pump in water.
2. Start the generator (or other power source).
3. If the generator has a circuit breaker, turn it on. Plug power cord into generator.
4. Check the frequency display on the front of the converter. It should read "0" (zero). If it doesn't, refer to the Troubleshooting section on pages 13-14.
5. If this is the first time the converter is being used or it has not been used for more than six months, leave the converter on for at least 15 minutes before proceeding to step 6.
6. Set the converter's speed dial near the middle of the dial (12 o'clock position).
7. Start the pump by pressing the **Start/Stop** switch into the "Start" position.
8. Adjust the pump performance by turning the speed dial.

BMI/MP1 Panel
115 Volt



BTI/MP1 Panel
230 Volt



Stopping

To stop the pump, press the **Start/Stop** switch on the converter to the "Stop" position. There is no need to reduce the pump speed first. Turn the POWER OFF at the generator **BEFORE** removing the motor lead from the converter.

Operating Conditions

To ensure the Redi-Flo2 operates properly, follow these guidelines:

- The MP1 pump must be installed vertically with the discharge end pointing upwards.
- The electrical voltage to the converter must always be + or -10% of the specified power supply.
- SPECIFIED POWER SUPPLY- BTI/MP1- 220-230 Volts, single phase, AC. (198 to 253 Volts) BMI/MP1- 115 Volts, single phase, AC. (109 to 126 Volts)
- The motor and pump must always be completely submerged in fluid to ensure lubrication of the shaft seal and cooling of the motor.
- While the pump is pumping, the distance down from the ground level to the level of the water in the well must not be greater than 270 feet.
- If the pump is used in a well larger than 4" in diameter, a shroud should be used around it to ensure proper motor cooling.
- The temperature of the water being pumped should be between 34°F and 86°F (1°C and 30°C)

Purging A Well

If the pump is being used to purge a well, start it at the maximum speed. Do not stop the pump until the pumped water contains no visible particles (to avoid blockage within the pump).

Thawing A Frozen Pump

If the liquid in the pump is frozen so the motor shaft cannot rotate, lower it into water and start it at the slowest speed. Continue to operate the pump at this speed for about 10 minutes, at which time it will be thawed and ready for operation.

Dismantling & Reassembling

The MP1 pump can be dismantled and reassembled quickly and easily by referring to the diagram on page 11 and following these steps:

DISMANTLING

1. Shut the pump off using the converter's Start/Stop switch.
2. Turn the generator (or other power supply) OFF.
3. Disconnect the motor lead from the converter.
4. Remove the pipe or hose connected to the pump (OPTIONAL).
5. Remove the Set Screw (position 12 in the diagram on page 11). Grasp the Inlet Screen (position 1) and slowly but forcefully pull it up over the Pump Housing (position 2).

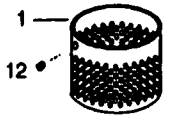
DO NOT ALLOW THE INLET SCREEN TO SCRAPE THE INSULATION FROM THE MOTOR LEADS.

6. Unscrew and remove the Pump Housing (counterclockwise when viewed from the top). This will expose the impeller assembly (guide vanes, wear rings, etc.), which can now be removed by hand for extended cleaning or replacement.

REASSEMBLY

To reassemble the MP1 pump, refer to the diagram on page 11 and:

1. Make sure the motor lead is not connected to the converter.
2. Return the impeller assembly components (guide vanes, wear rings, etc.) to the shaft in the proper order.
3. Screw the Pump Housing (position 2) back onto the top of the pump. If all of the impellers and chambers were replaced correctly, the Pump Housing should screw on easily. Hand tighten.
4. Slip the Inlet Screen (position 1) back over the Pump Housing. Screw the Set Screw (position 12) back into the Inlet Screen.

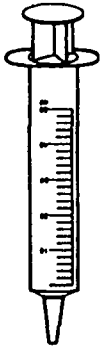


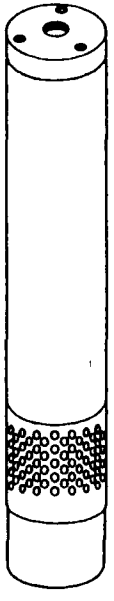
MAKE SURE YOU LINE UP THE MOTOR LEAD WITH THE RECESSED AREA IN THE PUMP HOUSING TO AVOID SCRAPING THE INSULATION FROM THE LEADS

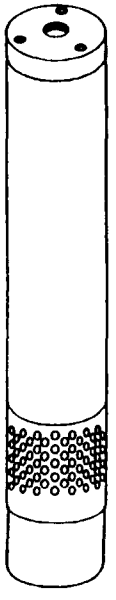
Replacement Of Motor Fluid

If the pump is moved from well to well, it should be thoroughly decontaminated prior to being installed in the next well. In addition to cleaning the individual components inside and outside, the water in the pump motor should be replaced using the syringe that came with your pump. This can be accomplished through the following steps:

1. Shut the pump off using the converter's Start/Stop switch.
2. Turn the generator (or other power supply) OFF.
3. Unplug the pump from the converter.
4. Turn the pump and motor upside down.
5. Use a flat screwdriver to remove the filling screw on the bottom of the motor.







6. Empty the water from the motor and refill it using contaminant-free water and the syringe that came with your MP1 pump. The water level should be even with the bottom edge of the screw hole.
7. Replace and tighten the filling screw.
8. Turn the pump over several times, then remove the filling screw again to let any trapped air escape (if air is left inside the motor, the life of the motor will be shortened). Add more water, if necessary.
9. Replace and tighten the filling screw.

Replacing the Motor Lead

To replace the motor lead, refer to the diagram on page 11 and follow these steps:

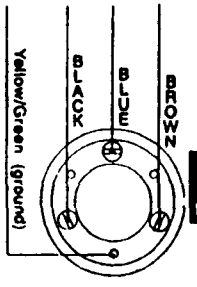
REMOVING THE OLD MOTOR LEAD

1. Make sure the power is turned **OFF**, the converter is turned **OFF**, and the motor lead is not connected to the converter.
2. Loosen and remove the Set Screw (position 12) from the Inlet Screen (position 1).
3. Slide the Inlet Screen off the pump. If you plan to use this motor lead again, be careful not to scrape insulation from it as the Inlet Screen is removed.
4. Loosen and remove the Pump Housing (position 2). Remove the impeller assembly (impellers, guide vanes, etc.).
5. Refer to the illustration on page 8. Use the special Motor Lead Screwdriver (shown at right) that came with your new motor lead to loosen and remove the Motor Lead Screw (position 14) for the ground lead (green/yellow wire).
6. Pull up on the ground lead to remove it. Using a small screwdriver and precision electronics pliers, pry up and remove the Teflon® Washer (position 15) and Brass Washers (position 16) from inside the enlarged Ground Motor Screw (position 13). Remove the Ground Motor Screw.
7. Use an allen wrench (2.5 mm) to remove the two Motor Screws (position 19) holding the Suction Interconnector (position 10) in place. Remove the Suction Interconnector but be very careful to note which of its slots is lined up with which motor lead -- this will be very helpful during reassembly. You may wish to scratch a mark on both the Suction Interconnector and the motor to aid in matching them up later.
8. Refer to the illustration at the bottom of this page. Use the special Motor Lead Screwdriver to loosen and remove the remaining Motor Lead Screws (position 14).
9. Pull up on each of the leads to remove them. Make a note which color conductor comes out of each hole -- **this is a MUST** when installing the new motor lead. Using a small screwdriver and precision electronics pliers, unscrew and remove the Teflon ® Washer (position 15) and the Grommet (position 17).

INSTALLING THE NEW MOTOR LEAD

10. Ensure the motor lead holes are clean and free of moisture.
11. String the Inlet Screen (position 1) onto the motor lead.
12. String the motor lead components (shown at right) onto the end of each motor lead wire (except the yellow/green ground wire).
13. For each wire, place the Crimped Pin (position 18) down into the motor lead hole. Press the Grommet (position 17) and Teflon ® Washer (position 15) down around the lead.

Motor Leads

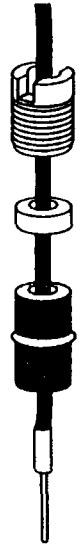


Be sure to reconnect the lead wires in their previous pattern shown at left so that in clockwise order they are **black-blue-brown.**

Top of Motor

For Tefzel motor lead use the following wiring pattern: Green stripe (Ground), 1st wire to the right (previously black), 2nd wire to the right (previously blue), third wire to the right (previously brown).

Power Conducting Motor Leads



14. While pushing the lead down into the motor lead hole, use the special Motor Lead Screwdrive to tighten the Motor Lead Screw (position 14) into place. Repeat for the other two lead wires
15. Replace the Suction Interconnector (position 10). Replace the Ground Motor Screw (positio 13). Since the ground wire will be attached to this screw, you will want to put it into the hole that will cause the least amount of twisting to the wire.
16. Replace and tighten the two Motor Screws (position 19) with an allen wrench.
17. Repeat steps 12-14 for the ground motor lead. Note on the illustration (at right) that the ground lead uses two Brass Washers (position 16) instead of a Grommet and Crimped Pin.
18. Return the impeller assembly to the top of the Suction Interconnector (position 10). Refer to the diagram on page 11 for the proper sequence.
19. Screw the Pump Housing (position 2) back onto the Suction Interconnector.
20. Position the motor lead in the recessed area of the Pump Housing.
21. Carefully push the Inlet Screen (position 1) over the Pump Housing and the Suction Interconnector.

Ground Motor Lead

BE VERY CAREFUL TO AVOID SCRAPING THE INSULATION FROM THE MOTOR LEAD AS THE INLET SCREEN IS FITTED.

22. Line up the screw hole in the Inlet Screen with the screw hole in the Pump Housing. Fit anc tighten the Set Screw (position 12).
23. Connect the motor lead to the converter and test the rotation of the pump. Submerge the pump in water, start it at its slowest speed and make sure the pump shaft is turning counterclockwise (when viewed from the top). If the rotation is incorrect, switching any two power leads (with POWER OFF) will correct the problem.

24. Reconnect the hose or pipe.

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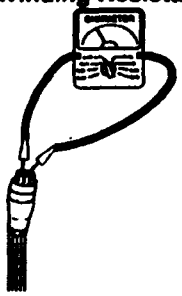
Periodic Motor Inspection

If the pump is operating at a decreased capacity and the impeller assembly components (impellers, guide vanes, etc.) do not appear to be the cause, the motor should be checked. A checklist of things to examine includes:

- ❑ Check the fluid level inside the motor (refer to page 6). Replace and refill as necessary.
- ❑ Inspect the outside of the motor for cracks, dents, etc.
- ❑ Remove the Inlet Screen (position 1), Pump Housing (position 2), and the impeller assembly (guide vanes, wear rings, etc.). Try to spin the motor shaft by hand. It should spin freely. If it does not, the motor must be replaced.
- ❑ Check the winding and insulation resistance of the motor and lead.

Winding Resistance



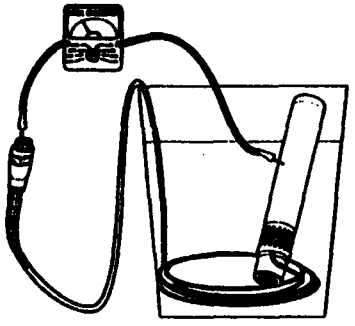
Turn the power off and disconnect the motor lead from the converter. Using an ohmmeter, set the scale to R X 1. Zero-adjust the meter and measure the resistance between any two power conducting leads (prongs on the motor lead plug).

If the ohm value is too low, the motor may be shorted. If too high, the motor windings or the leads may be open.

Lead Length	Ohm Value
0 ft	3.0 - 3.5 Ω
50 ft	3.6 - 4.1 Ω
75 ft	3.9 - 4.4 Ω
100 ft	4.2 - 4.7 Ω
125 ft	4.5 - 5.0 Ω
150 ft	4.8 - 5.3 Ω
175 ft	5.1 - 5.6 Ω
200 ft	5.4 - 5.9 Ω
250 ft	6.0 - 6.5 Ω
300 ft	6.6 - 7.1 Ω

Insulation Resistance

Turn the power off and disconnect the motor lead from the converter. Use a megohmmeter or megger (1 Meg = 1 M = 1 million). Zero-adjust the meter and measure the resistance between any power conducting leads (prongs on the motor lead plug) and ground. A good way to accomplish this (as shown at right) is to submerge the motor lead and MP1 pump in a bucket of water. Touch one lead of the megohmmeter to the pump and one to a motor lead.

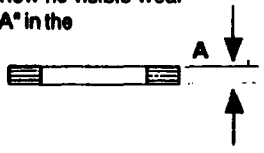


If the ohm value is lower than 2MΩ, the motor is defective and must be replaced.

Checking Components For Wear

The pump components should be periodically checked to ensure they are still within their minimum operating tolerances (illustrated below).

Impeller (position 5) ..... The impellers should show no visible wear.
Guide Vane (position 3) ..... The guide vanes should show no visible wear
Wear Ring (position 4) ..... The minimum thickness ("A" in the illustration) should never be less than 1.0 mm



In addition, visually check all components for cracks, corrosion, or wear.

Storage Requirements

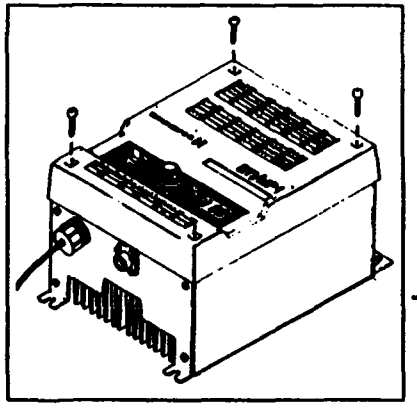
The pump should be thoroughly cleaned before storage to ensure no contamination is present. Both the pump and the converter should be stored in a clean and dry area in the following temperature range:

- 20°C to +50°C
or
0°F to 120°F

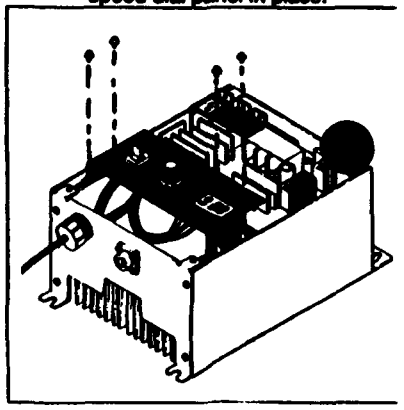
Replacing the Converter Fuses

The converter fuses can be replaced by following these steps:

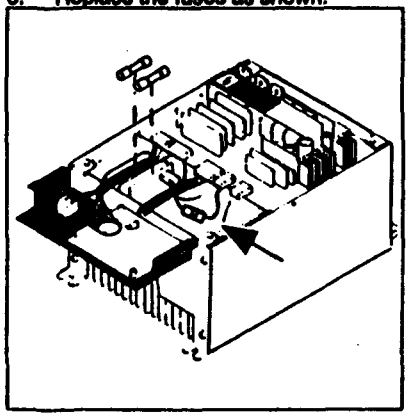
1. Turn the **POWER OFF.**
2. Disconnect the converter from the power source.
3. Wait at least 3 minutes to give the capacitors time to discharge any remaining voltage.
4. Remove the four screws holding the front cover of the converter in place and remove the front cover.



5. Remove the four screws holding the speed dial panel in place.



6. Replace the fuses as shown.



NOTE:
The BTI/MP1 converter uses two 30A, 250V, single element, fuses, and one fuse-able link fuse (250V 3/10A). .

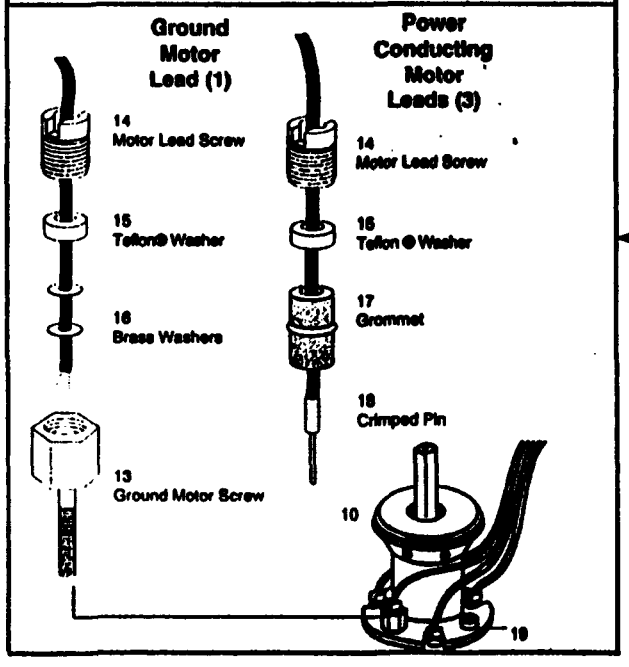
Pump Components

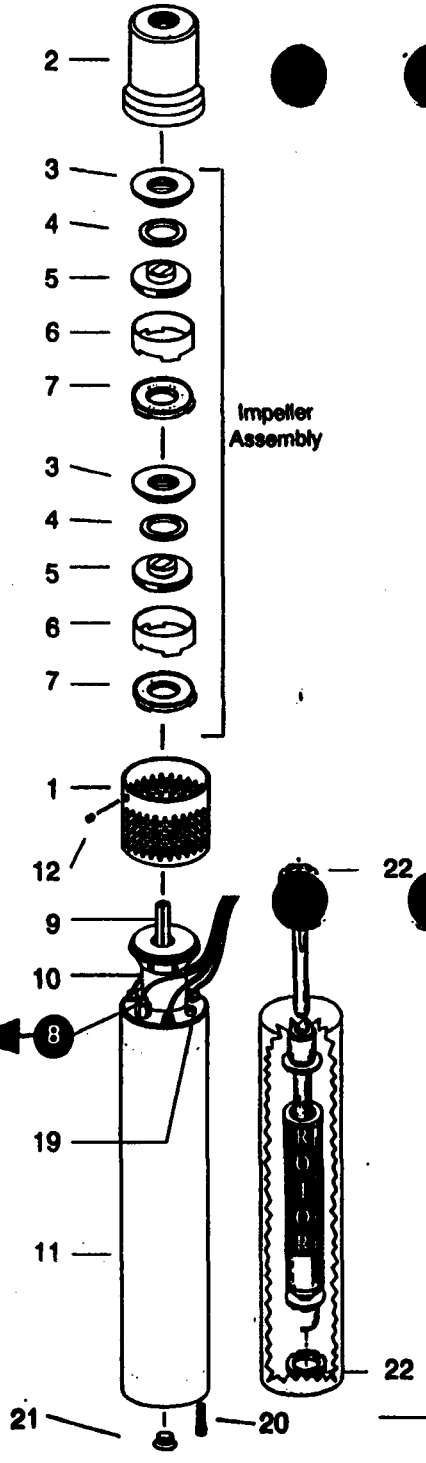
Position No.	Part Description	No. Used Per Pump	Part Number
1	Inlet Screen	1	1A0004
2	Pump Housing 1/2" NPT	1	1A0044
3	Guide Vane	2	see Service Kits
4	Wear Ring	2	*
5	Impeller	2	*
6	Spacer Ring	2	*
7	Wear Plate	2	*
8	Motor Lead Assembly	4	see Pos. 13 - 18
9	Shaft	1	not available *
10	Suction Interconnector	1	1A5004
11	Stator Housing	1	not available *
12	Set Screw	1	see Service Kits
13	Ground Motor Screw	1	*
14	Motor Lead Screw	4	*
15	Teflon® Washer	4	*
16	Brass Washer	2	*
17	Grommet	3	*
18	Crimped Pin	3	*
19	Motor Screw (long)	2	*
20	Motor Screw (short)	6	*
21	Filling Screw w/ O-Ring	1	*
22	Motor Thrust Washers	2	*

Teflon® is a registered trademark of Du Pont

* Not economical to replace. Must purchase complete pump/motor

MOTOR LEAD ASSEMBLY (position 8)





Service Kits, Tools, and Motor Leads

Replacement parts, service tools, and motor leads are available using the following part numbers:

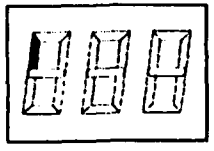
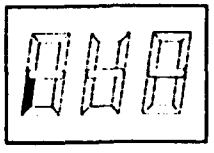
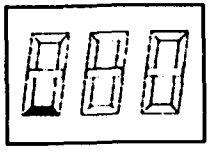
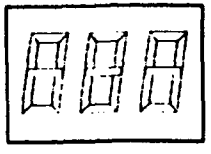
Position No. In Diagram	Part Description	No. In Kit	Part Number
Service Kits			
3	Guide Vane	2	125061
4	Wear Ring	2	
5	Impeller	2	
6	Spacer Ring	2	
7	Wear Plate	2	
4	Wear Ring	4	1A5050
7	Wear Plate	4	
13	Ground Motor Screw	1	1A00028
14	Motor Lead Screw	4	
15	Teflon Washer	4	
16	Brass Washer	2	
17	Grommet	3	
18	Crimped Pin	3	
5	Impeller	2	1A00018
12	Set Screws	25	1A00038
14	Motor Lead Screws	12	1A00048
15	Teflon Washer	25	1A00058
16	Brass Washer	25	1A00068
17	Grommet	25	1A00078
18	Crimped Pin	50	1A00088
19	Motor Screw (long)	25	1A00098
20	Motor Screw (short)	25	1A00108
21	Filling Screw with O-Ring	5	1A00118
22	Motor Thrust Washers	4	1A00128

Service Tools	Part Number
Special Motor Lead Screwdriver	SV0370
Syringe (to refill motor)	ID6066
Crimping Tool Kit (Required to crimp, "crimped pin").	1A00141

Motor Leads		Part Number
All motor leads come with a Converter Plug attached and a special Motor Lead Screwdriver	30 foot length	1A5070
	50 " "	1A 5071
	75 " "	1A 5072
	100 " "	1A 5073
	125 " "	1A 5074
	150 " "	1A 5075
	175 " "	1A 5076
	200 " "	1A 5077
	250 " "	1A 5078
	300 " "	1A 5079

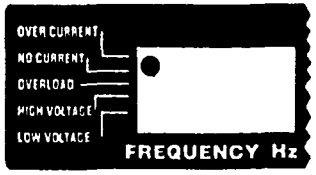
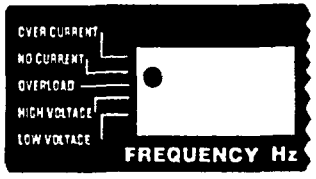
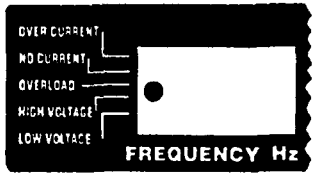
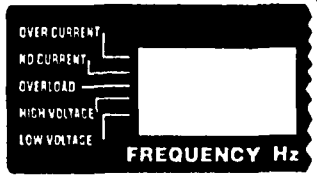
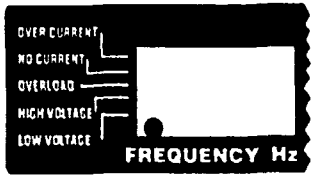
TROUBLESHOOTING

The converter will shut itself off if any major faults occur, and signal (on the converter display) the cause of the fault. These include:

If the display shows this:	The fault is:	Which is caused by:	To correct, simply:
		· A thermal cut-out or shutdown	Wait until the motor has cooled to a normal temperature. Restart the motor using the on/off switch on the converter.
	Function Loss	· Defective motor lead or pump · Momentary problem (transient fault)	1. Reset the converter and restart it. If it shuts down again, then ... 2. Switch off the power supply. Turn the power supply back on and restart the converter. If the converter shuts down again, the pump or the motor lead may be defective. If the converter **doesn't** shut down again, it was probably a transient fault (momentary power surge, etc.). **IF ALL CHECKS INDICATE THAT THE PUMP IS O.K., THEN THE CONVERTER MAY BE DEFECTIVE**
	**Overvoltage**	· The input voltage is too high · There was a momentary power surge	1. Reset the converter and restart it. If it shuts down again, then ... 2. Reduce the voltage coming into the converter (refer to the "Technical Data" section on the following pages for operating ranges).
	**Low Line**	· The input voltage is too low · There was a momentary voltage drop	1. Reset the converter and restart it. If it shuts down again, then ... 2. Increase the voltage coming into the converter (refer to the "Technical Data" section on the following pages for operating ranges).
	**Power Supply**	The power supply is defective	Check the voltage of the incoming power supply (should be between 190-253 V).
	Pump Problem (if numbers climb only to about 50 - 130)	· The pump shaft is locked · One of the 3 motor leads is not making contact with the motor	1. Turn the speed dial to maximum frequency. If this results in a **Function Loss**, follow the troubleshooting instructions listed above. 2. If you **don't** get a Function Loss, the problem is with the converter.
	**No Display = No Power**	· The converter is not being supplied with power · The power being supplied is a very low voltage · The internal fuses are defective	1. Check the amount of the incoming voltage. If it is within allowable limits (190 - 253 V), then ... 2. Flip the generator circuit breaker (if it has one) to the "ON" position. Reset the converter and restart it. If the converter still shows no display, then ... 3. Switch the power supply off. Check the fuses in the converter and replace if necessary. If the fuses are OK, then ... 4. Check the electrical plugs to ensure all connections are made properly.

TROUBLESHOOTING

The converter will shut itself off if any major faults occur, and signal (on the converter display) the casue of the fault. These include:

If the display shows this:	The fault is:	Which may be caused	To correct, simply:
	**Overcurrent**	· Output line-to-line	Check insulation among each output line.
		· Output line-to-ground	Check insulation between ground and output line.
		· Momentary overload	Reduce load on motor.
		· Overheat	Check ambient temperature. If incorrect, cool unit. Possible Power Circuit board defect.
	**No Current**	· Motor disconnection	Check continuity for motor coils and motor leads. Check motor lead output connector.
	**Overload**	· Internal thermal overload	Reduce load on motor.
	**High Voltage**	· Input voltage is too high	Check input voltage. If incorrect, reduce input voltage.
	**Low Voltage**	· Input voltage too low	Check input voltage.

Converter Specifications - BTI/MP1 230 Volt

Power

Supplied By Generator/Power Supply

Voltage:	Single phase, 230 volt (+ or - 10%)
Frequency:	50-60 Hz (+ or - 2%)
Maximum Current:	10 amps

Produced By Converter

Output Voltage:	3 phase 25-220 volts
Frequency:	46 - 400 Hz
Maximum Current:	5.5 amps
Internal Fuses:	2 each of 250V single element 1 of 250V 3/10A

Connections

Motor Lead Connector:	AMP CPC Plug, Type 206429-1
Power Cable:	Type SJOW, 14 AWG, 10' long

Dimensions and Weight

Dimensions:	Case is 9"x14"x18.5"
Net Weight:	25 lbs

Operating Conditions

Ambient Temperature:	32°F to 104°F (0° to 40° C)
Relative Air Humidity:	Maximum 95%
Radio Noise Filter:	Noise may occur when the converter is connected to the municipal electrical supply. It can be eliminated by adding a filter, such as a Siemens filter, type B 84112-B-A 120/20 A.

Storage Conditions

Ambient Temperature:	-13°F to 149°F (-25° to 65°C)
Relative Air Humidity:	Maximum 50% at 104°F (40°C) unlimited Maximum 90% at 68°F (20°C) for periods not exceeding 30 days per year. 75% annual average Non-condensing

Performance

Acceleration Time:	0 to 400 Hz in 10 seconds
Deceleration Time:	400 to 0 Hz in 10 seconds

Converter Specifications - BMI/MP1 115 Volt

Power

Supplied By Generator/Power Supply

Voltage:	Single phase, 115 volts (+ or - 10%)
Frequency:	50-60 Hz (+ or - 2%)
Maximum Current:	16 amps

Produced By Converter

Output Voltage:	3 phase 25 - 220 volts
Frequency:	50 - 400 Hz
Maximum Current:	6 amps

Dimensions and Weight

Dimensions:	Case is 9"x14"x18.5"
Net Weight:	18 lbs

Storage Conditions

Ambient Temperature:	-40°F to 149°F (-40°C to 65°C)
Relative Air Humidity:	5% up to 95% relative air humidity

Performance

Acceleration Time:	0 to 400 Hz in 6 seconds
Deceleration Time:	400 to 0 Hz in 6 seconds

Motor/Pump Specifications

Power

Input Power:	1.5 Kw (2 Horsepower)
Voltage:	3 phase, 220 volts at 400 Hz
Maximum Current:	6 amps
Motor Protection:	Thermal overload - Thermik Geratebau, Serie Disconnect Temperature: 176°F (80°C) Rate Current: 5 amps Current Overload - Incorporated into converter

Connection

Discharge Port:	1/2" Female NPT

Available Lead Lengths: 30, 50, 75, 100, 125, 150, 175, 200, 250, and 300 feet

Operating Conditions

Max. Fluid Temp.:	86°F (30°C)
Min. Fluid Temp.:	34°F (1°C)

Dimensions and Weight

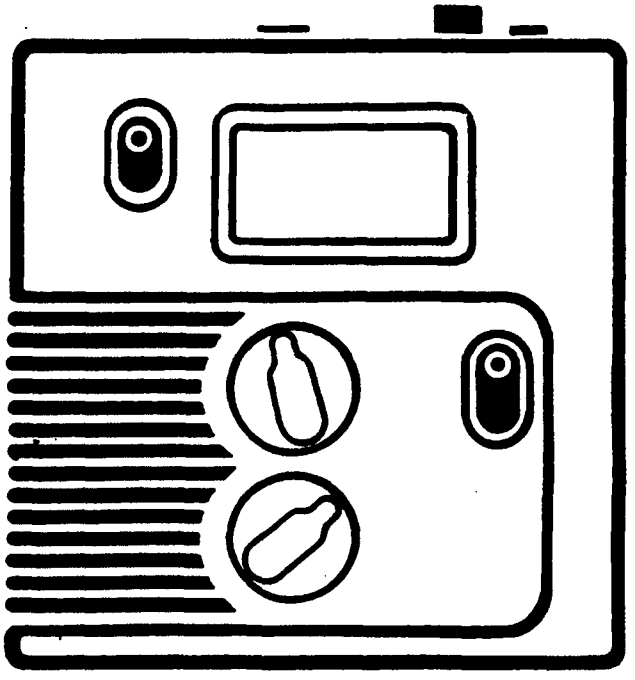
Dimensions:	(Including pump and motor) 11.3" length x1.81" diameter
Net Weight:	5.5 lbs., excluding motor lead

A.2
ORION MODEL 210 DIGITAL pH METER

ORION

Laboratory Products Group
Orion Research Incorporated

MODEL 210 DIGITAL pH METER
INSTRUCTION MANUAL



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GENERAL INFORMATION

Introduction

The ORION SA 210 is a portable battery-operated digital pH meter for field, plant or laboratory use. It is designed for versatile, easy operation, and can be used in or out of the accompanying carrying case. The instrument is lightweight and is designed to fit comfortably in the hand. All controls are on the meter face, which allows one hand calibration.

The instrument measuring range is −1999 to + 1999 mV, and pH is displayed to two decimal places. The meter has a large easy to read LCD display.

Instrument Description See **Figure 1**.

1 **ON/OFF Switch** Controls power to meter.

2 **LCD Display** Automatically displays data in large numerals with negative polarity sign and decimal point. pH values are displayed from 0 to 14 with 0.01 pH unit resolution. Millivolt range is −1999 to + 1999. Dissolved oxygen is measured from 0 to 14 ppm when meter is used with Model 97-08 Oxygen Electrode.

3 **Mode Control** Provides operator with choice of measuring sample in either pH or mV mode.

4 **Calibration Control** Used to standardize the meter/electrode system in buffers of known pH.

5 **Temperature/Slope Control** Compensates for variation in electrode slope or solution temperature.

6 **Electrode Connection** Accepts BNC connector from combination electrodes and pin tip jack available for use with separate half-cell reference electrodes.

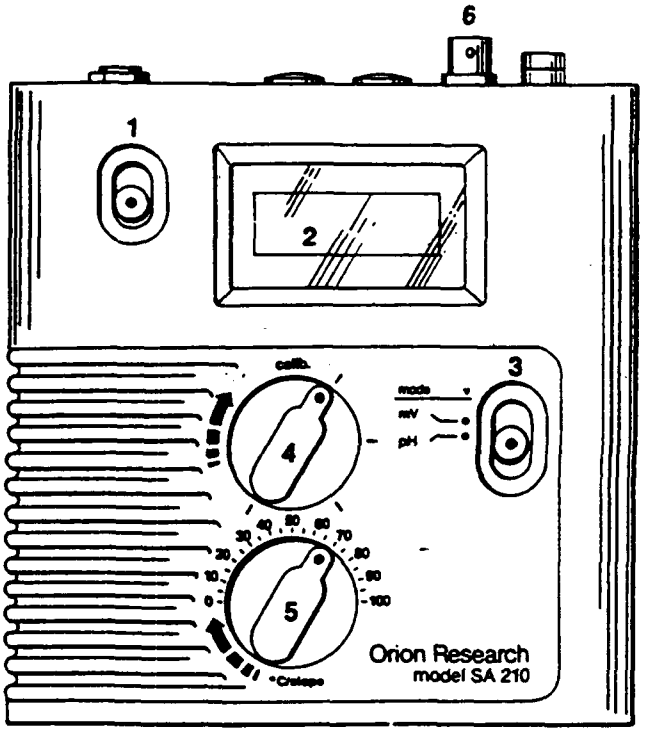


Figure 1
Face of the SA 210

INSTRUMENT SET-UP

Support Rod See Figure 2.

1. Attach support rod base to side of meter carrying case and tighten clamp screw.
2. Insert support rod into base. Tighten by turning rod clockwise.
3. Attach electrode holder to top of support rod.

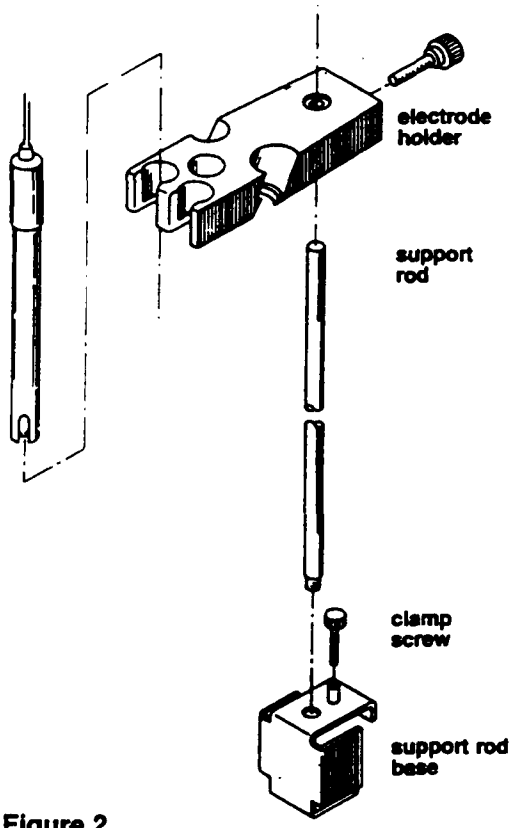


Figure 2
Support Rod and Clamp

Power Source

ORION SA 210 operates on one non-rechargeable 9-volt alkaline battery. Optional AC line adapters are available for both 110 and 220 volt mains. Refer to **ACCESSORIES**, page 7.

Battery Installation See Figure 3.

1. Remove access panel on back of meter. No tools are required, simply slide cover towards bottom of meter.
2. Attach battery connector clip of meter to battery terminals, install battery and replace access panel.

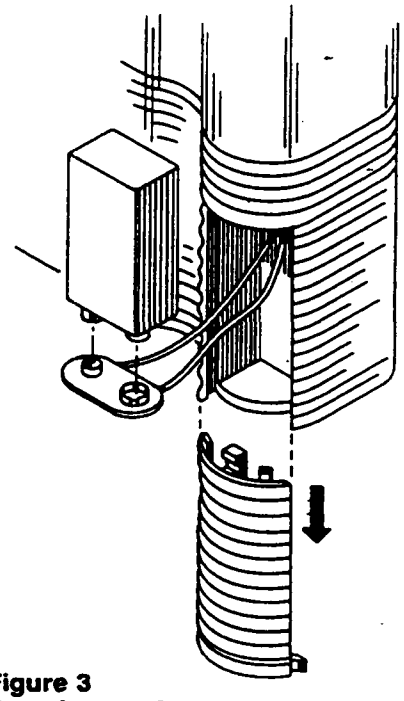


Figure 3
Rear Access Panel Removed

INSTRUMENT SET-UP (continued)

Electrode Connections

1. Attach electrodes with BNC connectors directly to the top of the meter. Refer to **Figure 4**.
2. Electrodes without BNC connectors may be used with a commercially available BNC adapter (Orion Cat. No. 090033). See **Figure 5**.

   If using a combination electrode, electrode connection **3** is not used.

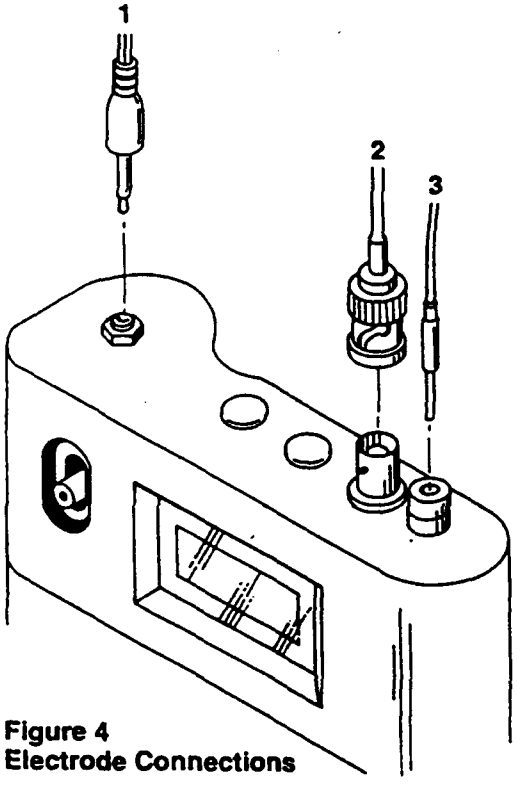


Figure 4
Electrode Connections

Legend

1 AC line adapter
2 BNC connector
3 Reference pin-tip connector

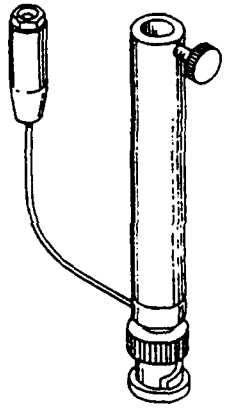


Figure 5
U.S. Standard Connector To BNC Adapter

Meter Check-Out Procedure

1. Slide power switch to **ON** position.
2. Slide **mode** switch to **pH**. If **LO BATT** indicator on LCD remains on, battery must be replaced.
3. When using optional AC line adapter, disregard step 2. Connect line adapter to meter and appropriate power source.
4. Attach BNC shorting plug (Orion Cat. No. 090045) to BNC connector on top of meter. Slide **mode** switch to **pH**. Adjust **calib** knob to read a steady 7.00. If this cannot be done, refer to **TROUBLE-SHOOTING**, page 6.
5. Remove the shorting plug. After successful completion of steps 1-4, the meter is ready for use with an electrode.

MEASUREMENT PROCEDURES

pH Measurements See **Figure 6**.

Single Buffer Standardization

1. Sample and buffer temperature must be equal. Set **temp/slope** control to buffer temperature (°C).
2. Place electrode in a buffer solution with pH value within 1.5 units of the expected sample value and stir moderately.
3. Slide **mode** switch to **pH**. Allow reading to stabilize, then adjust **calib** control so that correct buffer value at that temperature is displayed.
4. Remove electrodes from the buffer solution and rinse.
5. Place electrodes into sample and stir moderately. Allow reading to stabilize.
6. Record pH value displayed.

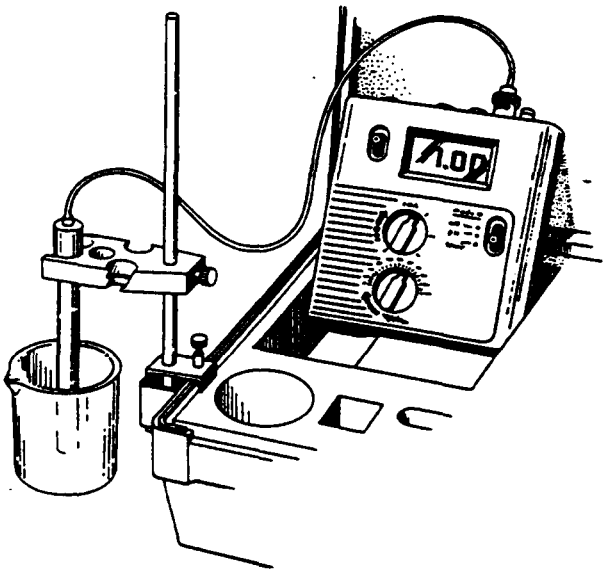


Figure 6
SA 210 Meter Set Up For Sample Measurement

Two Buffer Standardization

NOTE: For maximum accuracy, perform a two buffer calibration once at the beginning of each day. This procedure provides the correct setting for **temp/slope control. Subsequent measurements are made after a single buffer calibration.**

1. Sample and buffer temperature must be equal. Set **temp/slope** control to buffer temperature (°C).
2. Place electrode in pH 7 buffer and stir moderately.
3. Slide **mode** switch to **pH**. Allow reading to stabilize, then adjust **calib** control so that correct buffer value at that temperature is displayed.
4. Remove electrode from the buffer solution and rinse.
5. Place electrode in second buffer and stir moderately. Allow reading to stabilize.
6. Adjust **temp/slope** control until correct value of second buffer is displayed. Remove electrode from solution and rinse.
7. Place electrode in sample and stir moderately. Allow reading to stabilize.
8. Record pH value displayed.

If sample temperature differs significantly from the buffer temperatures used to calibrate, an adjustment can be made. Raise or lower the **temp/slope** control from its current setting, described in step 6, by the difference between the actual temperature and the sample temperature. For maximum accuracy use ATC probe.

MEASUREMENT PROCEDURES (continued)

Potentiometric Measurements

Potentiometric titrations are performed in mV mode using either ion selective or redox electrodes with BNC connectors. Detailed instructions for any ORION electrode are given in the electrode instruction manual. Titration instructions are included in ORION Redox Electrode (Model 96-78) Instruction Manual, or in standard analytical chemistry texts. U.S. Standard to BNC adapters are available from Orion (Cat.No. 090033).

Dissolved Oxygen Measurement

Dissolved oxygen measurements are displayed in ppm when ORION Model 97-08-99 Dissolved Oxygen Electrode is used with the SA 210 Meter. Follow the instructions in the electrode manual. Be sure to set meter mode switch to pH.

TROUBLESHOOTING GUIDE

The following section covers troubleshooting that can be performed without special tools or skills. The Orion Technical Service Personnel can be consulted for troubleshooting advice by calling 1-800-225-1480 or 617-864-5400. Outside North America contact your local authorized ORION Representative.

Malfunction	Possible Cause	Remedy
No Display	No power to meter	Check that switch is in ON position.
		Replace battery.
		Check that adapter is receiving power and is plugged in securely.
More than one decimal displayed	mode switch is between positions	Adjust switch to proper position.
Erratic readings or drift. Readings out of range.	Electrode failure	Follow meter checkout procedure. If meter okay, check electrode.

INSTRUMENT WARRANTY

ORION RESEARCH INCORPORATED warrants this instrument will operate for one year from the date of purchase when used under normal laboratory conditions, and in accordance with the operating limitations and maintenance procedures given in the instruction manual. In the event of failure within the warrant period, Orion, or its Authorized Dealer, will, at Orion's option, repair or replace the non-conforming instrument at no charge to the customer.

THE WARRANTY DESCRIBED ABOVE IS EXCLUSIVE AND IN LIEU OF ANY OTHER WARRANTY, WHETHER STATUTORY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ALL WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OF TRADE, EXCEPT TITLE. THE BUYER'S SOLE AND EXCLUSIVE REMEDY IS FOR REPAIR, OR REPLACEMENT OF THE DEFECTIVE INSTRUMENT OR PART, OR REFUND OF THE PURCHASE PRICE; BUT IN NO EVENT SHALL ORION (ITS CONTRACTORS AND SUPPLIERS OF ANY TIER) BE LIABLE TO THE BUYER OR ANY PERSON, IN CONTRACT OR IN TORT (INCLUDING NEGLIGENCE) FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Representations and warranties made by any person, including dealers, representatives and employees of Orion, which are inconsistent or in conflict with the terms of this warranty shall not be binding upon Orion unless in writing and signed by one of its officers.

NOTICE OF COMPLIANCE

This meter may generate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type-tested and found to comply with the limits for a Class B computing device in accordance with specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If the meter does cause interference to radio or television reception, which can be determined by turning the unit off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the meter with respect to the receiver
- Move the meter away from the receiver.
- Plug the meter into a different outlet so that the meter and receiver are on different branch circuits.

If necessary, the user should consult the manufacturer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems."

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

REPAIR AND SERVICE

A Return Authorization Number must be obtained from Orion Laboratory Products Customer Service before returning any product for in-warranty repair, replacement or credit. Contact ORION by calling 1-800-225-1480 (USA outside Mass.) or 617-864-5400. Outside the USA and Canada consult your local in-country, authorized Orion Laboratory Products Distributor for product service information.

OPTIONAL ACCESSORIES

Cat. No.	Description
815600	ROSS® epoxy body, bulb guard combination pH electrode
9104BN	Laboratory grade combination pH electrode (BNC connector)
910600	GX-series epoxy body, gel-filled combination pH electrode (BNC connector)
912600	GX-series epoxy body, gel-filled flask combination pH electrode (BNC connector)
913600	GX-series epoxy body, gel-filled flask combination pH electrode (BNC connector)
915600	RX-series refillable, epoxy body combination pH electrode (BNC connector)
9162BN	Combination pH electrode with rugged bulb (BNC connector)
9163BN	Combination pH electrode with needle shape (BNC connector)
910004	pH 4 buffer packets, box of 25 packets, each packet making 200 ml of buffer
910007	pH 7 buffer packets, box of 25 packets, each packet making 200 ml of buffer
910009	pH 9 buffer packets, box of 25 packets, each packet making 200 ml of buffer
910104	pH 4.01 buffer, 475 ml bottle
910107	pH 7.00 buffer, 475 ml bottle
910110	pH 10.01 buffer, 475 ml bottle
970899	Dissolved oxygen electrode
910002	Electrode holder
090033	U.S. Standard to BNC connector adapter
090045	Shorting plug
020120	110V AC line adapter
020121	220V AC line adapter
020041	Shoulder strap and meter holder for *hands free* operation
020042	Carrying case with foam insert, without meter or accessories
020043	Support rod and guide
020044	Accessory pack includes two 60 ml bottles and one 150 ml beaker
020045	Electrode rod stand for bench-top meter use outside carrying case

If the line converters that Orion supplies, Cat. No. 020121 and 020120, are not available, any line converter meeting the following specifications may be used.

Converter for 120 VAC to 9 VDC

This specification describes an AC-to-DC power supply for use with ORION products.

Electrical Specifications

1. The power supply shall furnish rectified, filtered, unregulated DC voltage.
2. The input voltage shall be 100-130 VAC, 47-63 Hz.
3. The open circuit output voltage shall not exceed 15.5 VDC at an input voltage of 130 VAC, 60 Hz.
4. The unit shall produce an output voltage not less than 9.0 VDC with a load of 200 MADC at an input voltage of 115 VAC, 60 Hz.

Mechanical Specifications

1. The power supply shall plug into two blade wall outlets that are standard in North America for 115 VAC service.
2. Output cord shall terminate in a standard 3.5 mm diameter phone plug. The tip shall be negative, the sleeve positive.

Safety

1. The power supply shall be UL listed and CSA approved.

Converter for 220 VAC to 9 VDC

This specification describes an AC-to-DC power supply for use with ORION Products.

Electrical Specifications

1. The power supply shall furnish rectified, filtered, unregulated DC voltage.
2. The input voltage shall be 200-240 VAC, 47-63 Hz.
3. The open circuit output voltage shall not exceed 15.5 VDC at an input voltage of 240 VAC, 50 Hz.
4. The unit shall produce an output voltage not less than 9.0 VDC with a load of 200 MADC at an input voltage of 220 VAC, 50 Hz.

Mechanical Specifications

1. The power supply shall plug into wall outlets that are appropriate for the area.
2. Suggested cord length is 1.5 meters long.
3. Output cord shall terminate in a standard 3.5 mm diameter phone plug. The tip shall be negative, the sleeve positive.

SPECIFICATIONS

The SA 210 Portable pH/mV Meter (Orion Cat. No. 021000) is for hand-held and bench-top use.

Modes
pH, mV, O_2 (with O_2 probe)

pH range
pH 0 to 14

pH resolution
0.01

mV range
−1999 to +1999 mV showing negative polarity sign

mV resolution
1 mV

Temperature compensation
Manual

Sample temperature range
−5 to 105°C

Input impedance
> 100,000 megohms

Instrument drift
< 50 microvolts/°C

Input bias current
< ± 1 pico amp at 25°C and < ± 4 pico amps over full operating range

Environmental requirements
5 to 45°C and 5 to 80% relative humidity, non-condensing

Isopotential point
pH 7 (fixed)

Power requirement
One 9 volt battery. Optional 110 or 220 volt line adapter(s) available for AC line use.

Inputs
BNC combination and separate pin tip reference jack

Meter dimensions
14 cm X 14 cm X 4 cm

Meter weight
0.5 kg

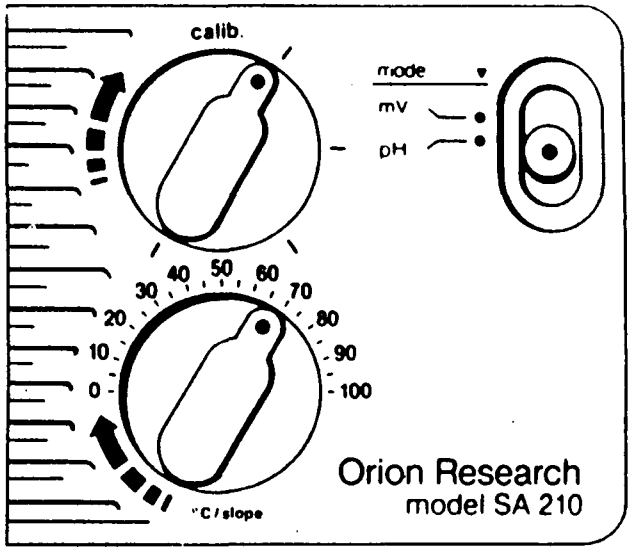
Meter case
Splash-proof, chemical resistant

Carrying case dimensions
38.1 cm x 27.9 cm x 11.4 cm

Carrying case weight
1.8 kg

Two Buffer Calibration

1. Sample and buffers should be at the same temperature. Set **°C/slope** control to buffer temperature (°C).
2. Connect electrode to meter and place into a beaker of pH 7.00 buffer and stir moderately.
3. Slide **mode** switch to **pH**. Allow reading to stabilize, then adjust **calib** control so that correct buffer value at that temperature is displayed.
4. Remove electrode from the buffer solution and rinse.
5. Place electrode into second buffer and stir moderately. Allow reading to stabilize.
6. Adjust **°C/slope** control until correct value of second buffer is displayed. Remove electrode from solution and rinse.
7. Place electrode in sample and stir moderately. Allow reading to stabilize.
8. Record pH value displayed.



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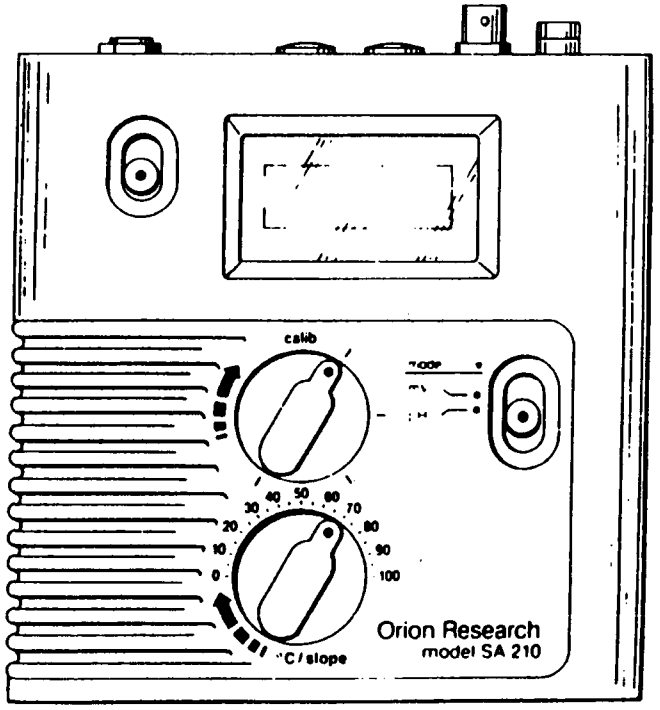
Printed in U S A
Form 210TG/6840
Part No 205377 001

SA 210 pH/mV METER
TRAINING GUIDE

The ORION SA 210 pH/mV Meter, for economical pH/mV/O_2/redox measurements in the lab or field.

- No-slip, one-handed grip. Ribbed design, and durable, dust and splash resistant housing make this lightweight meter a superior choice for outdoor, process, or active lab environments.
- Orion quality in a portable meter, and made in the U.S.A.
- Unique electrode rod and holder attaches to the carrying case – making measurements easy to perform on a flat surface such as your lab bench-top, a truck tailgate, or, a flat rock.
- Versatile neckstrap meter holder accessory allows hands-free movement or converts to a sturdy stand for measurements on a bench-top or flat surface.

Turn this card over for instructions on how to perform a two buffer calibration. Consult the meter instruction manual for specifications and further operational information.



ORION
Orion Research Incorporated
Laboratory Products Group
840 MEMORIAL DRIVE, CAMBRIDGE MA 02139 U S A
TEL 617 864 5400, 800 225 1480 / TLX 921466
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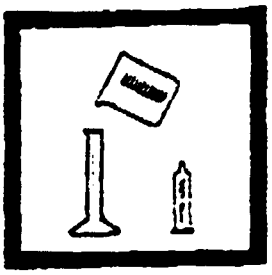
TEL 01 910 7858 / TLX 57829

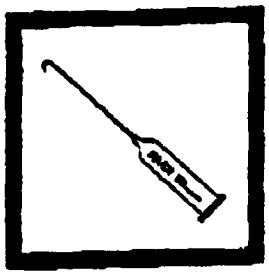
A.3
HACH MODEL AL-DT ALKALINITY TEST KIT

ALKALINITY (Phenolphthalein and Total))

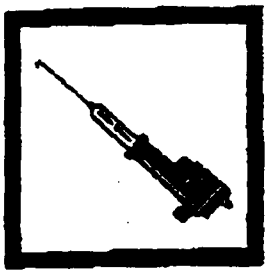


1. Select the sample volume and Sulfuric Acid (H_2SO_4) Titration Cartridge corresponding to the expected alkalinity concentration as mg/L calcium carbonate ($CaCO_3$) from *Table 1*.

Note: See Sampling and Storage following these steps.



2. Insert a clean delivery tube into the titration cartridge. Attach the cartridge to the titrator body. See *Part 1. Step-by-Step*. for assembly instructions if necessary.



3. Turn the delivery knob to eject a few drops of titrant. Reset the counter to zero and wipe the tip.

4. Use a graduated cylinder or pipet to measure the sample volume from *Table 1*. Transfer the sample into a 250 mL erlenmeyer flask. Dilute to about 100 mL with demineralized water if necessary.

Table 1

Range (mg/L as CaCO3)	Sample Volume (mL)	Titration Cartridge (H_2SO_4)	Catalog Number	Digit Multiplier
10-40	100	0.1600	14388-01	0.1
40-160	25	0.1600	14388-01	0.4
100-400	100	1.600	14389-01	1.0
200-800	50	1.600	14389-01	2.0
500-2000	20	1.600	14389-01	5.0
1000-4000	10	1.600	14389-01	10.0

5. Add the contents of one Phenolphthalein Indicator Powder Pillow and swirl to mix.

Note: A solution of one pH 8.3 Buffer Powder Pillow and one Phenolphthalein Powder Pillow in 50 mL of demineralized water is recommended as a comparison for determining the proper end-point color.

Note: Four drops of Phenolphthalein Indicator Solution may be substituted for the Phenolphthalein Indicator Powder Pillow.

6. If the solution turns pink, titrate to a colorless end point. Place the delivery tube tip into the solution and swirl the flask while titrating with sulfuric acid. Record the number of digits required.

Note: If the solution is colorless before titrating with Sulfuric acid, the Phenolphthalein (P) alkalinity is zero; proceed with Step 8.

7. Calculate:

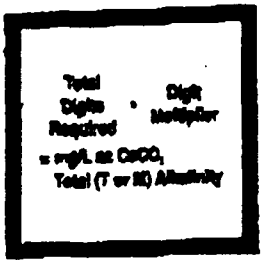
Digits Required x Digit Multiplier = mg/L $CaCO_3$ P Alkalinity

8. Add the contents of one Bromcresol Green-Methyl Red Indicator Powder Pillow to the flask and swirl to mix.

Note: Four drops of Methyl Purple Indicator Solution may be substituted for the Bromcresol Green-Methyl Red Indicator Powder Pillow. Titrate from green to a gray end point (pH 5.1).

Note: A solution of one Bromcresol Green-Methyl Red Powder Pillow and one pillow of the appropriate pH buffer in 50 mL of demineralized water is recommended as a comparison for judging the proper end-point color. If the pH 3.7 end point is used, use a Bromphenol Blue Powder Pillow instead of a Bromcresol Green-Methyl Red and titrate to a green end point.

9. Continue the titration with sulfuric acid to a light greenish blue-gray (pH 5.1), a light violet-gray (pH 4.8), or a light pink (pH 4.5) color, as required by the sample composition; see *Table 2*. Record the number of digits required.



10. Calculate:

Total Digits Required x Digit Multiplier = mg/L as $CaCO_3$ Total (T or M) Alkalinity

Note: Carbonate, bicarbonate and hydroxide concentrations may be expressed individually using the relationships shown in Table 3 on page 34.

Table 2

Sample Composition	End Point
Alkalinity about 30 mg/L	pH 5.1
Alkalinity about 150 mg/L	pH 4.8
Alkalinity about 500 mg/L	pH 4.5
Silicates or Phosphates present	pH 4.5
Industrial waste or complex system	pH 3.7

Table 3 Alkalinity Relationships

Result of Titration	Hydroxide Alkalinity	Carbonate Alkalinity	Bicarbonate Alkalinity
Phenolphthalein Alkalinity = 0	0	0	Equal to total
Phenolphthalein Alkalinity less than one half of Total Alkalinity	0	2 times the Phenolphthalein Alkalinity	Total Alkalinity minus two times Phenolphthalein Alkalinity
Phenolphthalein Alkalinity equal to one half of Total Alkalinity	0	2 times the Phenolphthalein Alkalinity	0
Phenolphthalein Alkalinity greater than one half of Total Alkalinity	2 times the Phenolphthalein minus Total Alkalinity	2 times the difference between Total and Phenolphthalein Alkalinity	0
Phenolphthalein Alkalinity equal to Total Alkalinity	Equal to the Total Alkalinity	0	0

Sampling and Storage

Collect samples in clean plastic or glass bottles. Fill completely and cap tightly. Avoid excessive agitation or prolonged exposure to air. Samples should be analyzed as soon as possible after collection but can be stored at least 24 hours by cooling to 4 °C (39 °F) or below. Warm to room temperature before analyzing.

Accuracy Check (Standard Additions Method)

This accuracy check should be performed when interferences are suspected or to verify analytical technique.

1. Snap the neck off an Alkalinity Voluette Ampule Standard, 0.500 N.
2. Use a TenSette Pipet to add 0.1 mL of standard to the sample titrated in Steps 6 or 9. Resume titration back to the same end point. Record the number of digits needed.

3. Repeat, using two more additions of 0.1 mL. Titrate to the end point after each addition.

4. Each 0.1 mL addition of standard should require 25 additional digits of 1.600 N titrant or 250 digits of 0.1600 N titrant. If these uniform increases do not occur, refer to *Appendix A, Accuracy Check and Standard Additions* in this manual to determine the cause.

Interferences

Highly colored or turbid samples may mask the color change at the end point. Use a pH meter for these samples.

Chlorine may interfere with the indicators. Add one drop of 0.1 N Sodium Thiosulfate to eliminate this interference.

Summary of Method

The sample is titrated with sulfuric acid to a colorimetric end point corresponding to a specific pH. Phenolphthalein alkalinity is determined by titration to a pH of 8.3, as evidenced by the color change of phenolphthalein indicator, and indicates the total hydroxide and one half the carbonate present. M (methyl orange) or T (total) alkalinity is determined by titration to a pH between 3.7 and 5.1, and includes all carbonate, bicarbonate and hydroxide.

Required Reagents

(varies with sample characteristics)

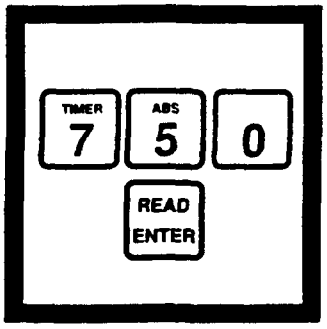
Description	Cat. No
Alkalinity Reagent Set (about 100 tests)	
Includes: (1) 943-99, (1) 942-99, (1) 14389-01, (1) 14388-01.	22719-00
Bromcresol Green-Methyl Red Powder Pillows, 100/pkg	943-99
Phenolphthalein Powder Pillows, 100/pkg	942-99
Sulfuric Acid Titration Cartridge, 1.600 N, each	14389-01
Sulfuric Acid Titration Cartridge, 0.1600 N, each	14388-01
Water, demineralized, 4 L.	272-56

A.4
HACH MODEL DR/2000 TURBIDITY METER

TURBIDITY (0 to 450 FTU)

For water, wastewater and seawater

Absorptometric Method*



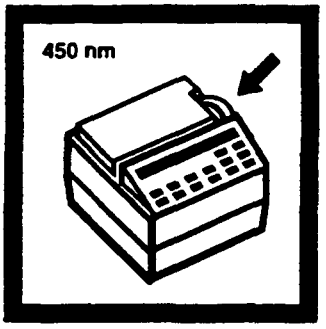
1. Enter the stored program number for turbidity.

Press: **7 5 0 READ/ENTER**

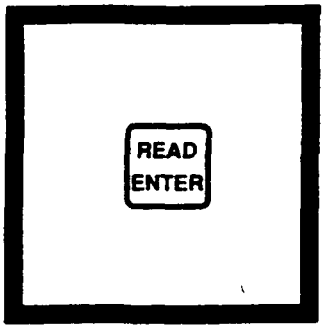
The display will show:
DIAL nm TO 450

Note: DR/2000s with software versions 3.0 and greater will display "P" and the program number.

Note: Instruments with software versions 3.0 and greater will not display "DIAL nm TO" message if the wavelength is already set correctly. The display will show the message in Step 3. Proceed with Step 4.

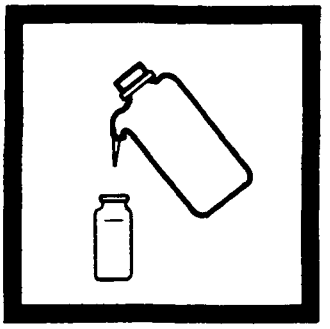


2. Rotate the wavelength dial until the small display shows:
450 nm



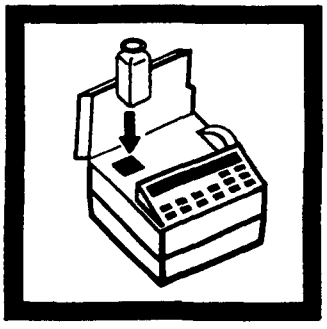
3. Press: **READ/ENTER**

The display will show:
FTU TURBIDITY



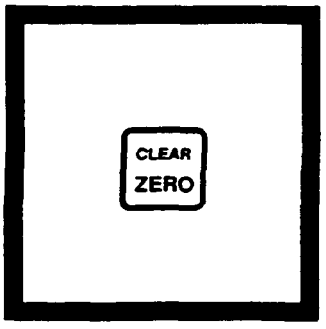
4. Pour 25 mL of demineralized water (the blank) into a sample cell.

Note: For highly colored samples, a filtered portion of the sample is used in place of the demineralized water.



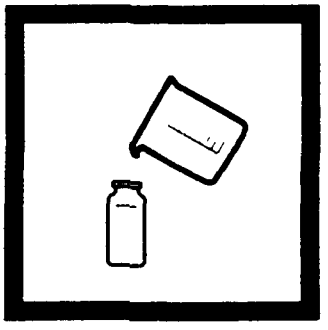
5. Place the blank into the cell holder. Close the light shield.

Note: The Pour-Thru Cell cannot be used with this procedure.



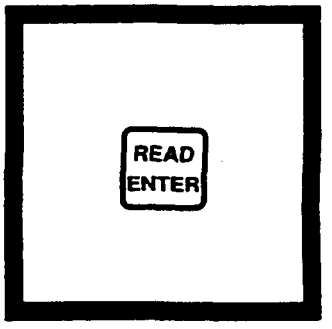
6. Press: **ZERO**

The display will show:
WAIT
then:
0. FTU TURBIDITY



7. Pour 25 mL of sample into another sample cell. Immediately place this sample cell into the cell holder. Close the light shield.

Note: The sample must be well mixed before transferring it to the sample cell.



8. Press: **READ/ENTER**

The display will show:
WAIT
then the result in Formazin Turbidity Units (FTU) will be displayed.

Note: In the constant-on mode, pressing READ/ENTER is not required. WAIT will not appear. When the display stabilizes, read the result.

*Adapted from FWPCA *Methods for Chemical Analysis of Water and Wastes*, 275 (1969)

SAMPLING AND STORAGE

Collect samples in clean plastic or glass bottles. Samples should be analyzed as soon as possible after collection but can be stored 48 hours by cooling to 4 °C (39 °F). Warm samples to room temperature before analyzing.

ACCURACY CHECK

Standard Solution Method

The stored program has been calibrated using a milky white suspension of a polymer called formazin. Standard formazin solutions for checking the accuracy of the test can be prepared using the following procedure:

a) Dissolve 1.000 gram of hydrazine sulfate in demineralized water and dilute to the mark in a 100–mL volumetric flask.

b) Dissolve 10.00 grams of hexamethylenetetramine in demineralized water and dilute to the mark in a 100–mL volumetric flask.

c) Mix 5.0 mL of each solution in a 100–mL volumetric flask and allow to stand undisturbed for 24 hours at 25 ±3 °C (77 ±5 °F). Standing temperature is important for correct polymer formation.

d) Dilute to the mark and mix.

The turbidity of this stock solution is 400 FTU and it should be prepared monthly. Dilutions used for standard solutions must be prepared fresh daily. A more convenient prepared formazin stock solution, 4000 NTU (or 4000 FTU), is available from Hach.

PRECISION

In a single laboratory, using a standard solution of 140 FTU and one representative lot of reagent with the DR/2000, a single operator obtained a standard deviation of ±2 FTU.

SUMMARY OF METHOD

The turbidity test measures an optical property of the water sample which results from the scattering and absorbing of light by the particulate matter present. The amount of turbidity registered is dependent on such variables as the size, shape and refractive properties of the particles.

This procedure is calibrated using formazin turbidity standards and the readings are in terms of formazin turbidity units (FTU). This test cannot be used for EPA reporting purposes but may be used for day to day in–plant monitoring. [A formazin turbidity unit (FTU) is equivalent to a nephelometric turbidity unit (NTU) when readings are made on a nephelometer.]

OPTIONAL REAGENTS

Description	Units	Cat. No.
Formazin Stock Solution, 4000 NTU	500 mL	2461–49
Hexamethylenetetramine	500 g	1878–34
Hydrazine Sulfate	100 g	742–26
Water, demineralized	4 L	272–56

OPTIONAL APPARATUS

Flask, volumetric, Class A, 100 mL	each	14574–42
Flask, filter, 500 mL	each	546–49
Filter Holder	each	13529–00
Filter Pump, aspirator	each	2131–00
Pipet Filler, safety bulb	each	14651–00
Pipet, volumetric, Class A, 5.0 mL	each	14515–37
Stopper, rubber, one–hole, No. 7	6/pkg	2119–07
Tubing, rubber, 5/16" I.D.	12 feet	560–19
Tweezers, plastic	each	14282–00

Related Products

For the most precise turbidity measurements, the Hach Model 2100P Portable Turbidimeter, Model 18900 Ratio Turbidimeter, or Model 43900 Ratio Turbidimeter/XR are recommended. These instruments are true nephelometers that meet all the performance requirements for turbidity measurements described in APHA *Standard Methods*, the EPA *Methods of Chemical Analysis of Water and Wastes* and the *Federal Register*.

For additional ordering information, see final section.
In the U.S.A. call 800–227–4224 to place an order.

APPENDIX B

SAMPLE DOCUMENTATION FORMS

GROUNDWATER SAMPLING FORM

Date/Time _____ Well I.D. _____
Location _____
Sampler _____ Others present _____
Weather: Wind _____, Precipitation _____, Temperature _____
Well Secure (Y/N) _____ Comments _____
Total depth: _____ - Depth to Water _____ = Ht. (ft) _____
Wetted Casing Volume _____, Actual Purge Volume _____
Screen Interval (ft) _____, Pump Intake Depth (ft) _____
pH meter calibrated (Y/N) _____, Conductivity meter calibrated (Y/N) _____
Turbidimeter calibrated (Y/N) _____

PURGE LOG

	Time	Conductivity (µmhos/cm)	pH	Turbidity (NTU)	Temperature (°C)	Water Depth (ft)
Initial						

Purge flow rate (mL/min) _____ Sampling flow rate (mL/min) _____
Sample ID _____ No. of Containers _____
Alkalinity Determined at wellhead? (Y/N) _____

Comments_____
_____
_____

Wetted Casing Volume (gal.) = Ht. x 0.653 (4 in. casing)
= Ht x 0.163 (2 in. casing)

SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No: H- 9284

page ___ of ___

Client Name:

Address/Phone:

Client Contact:

Project Name:

Project Number:

Project Location:

Invoice To:

SAMPLE ID	DATE	TIME	comp	grab	matrix (W=water S=soil SL=sludge O=other:)	bottle (P=plastic A=amber glass G=glass V=vial)	size (1=1 liter 4=4oz 40=vial 8=8oz 16=16oz)	pres. (1=HCl 2=HNO3 3=H2SO4 O=other:)	Number of Containers	Requested Analysis								

Client/Consultant Remarks:

Laboratory remarks:

Intact? ☐ Y ☐ N

Temp:

Requested TAT

24hr ☐ 72hr ☐

48hr ☐ Standard ☐

Other ☐ _____

Special Reporting Requirements: Fax Results ☐ Raw Data ☐ Standard QC ☐ Level 3 QC ☐ Level 4 QC ☐

Special Detection Limits (specify):

PM review (initial):

1. Relinquished by Sampler:	date	time	2. Received by:
3. Relinquished by:	date	time	4. Received by:
5. Relinquished by:	date	time	6. Received by Laboratory:

☐ 8880 Interchange Drive, Houston, TX 77054 (713) 660-0901

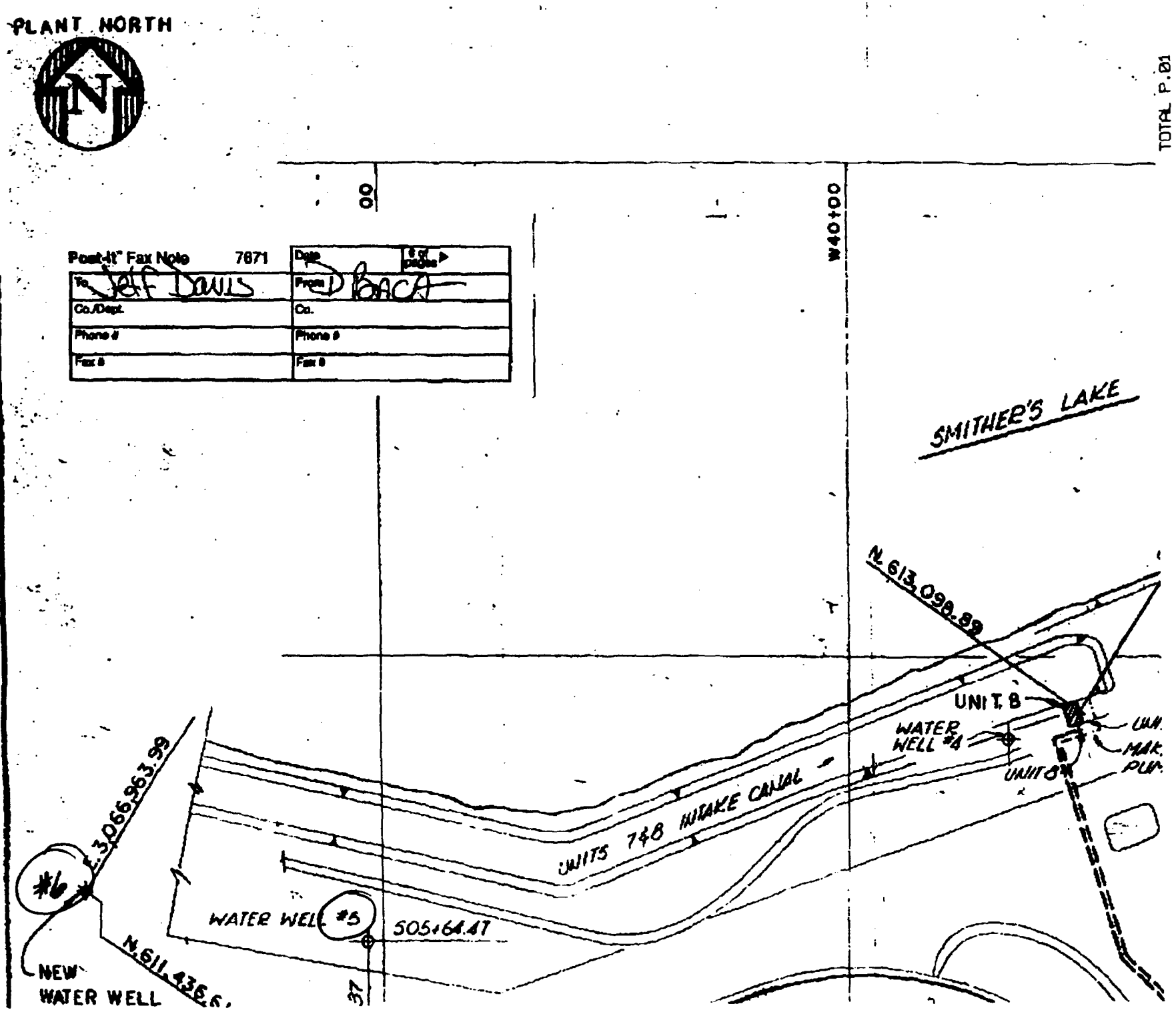
☐ 459 Hughes Drive, Traverse City, MI 49684 (616) 947-5777

☐ 500 Ambassador Caffery Parkway, Scott, LA 70583 (318) 237-4775

☐ 1511 E. Orangethorpe Avenue, Fullerton, CA 92631 (714) 447-6868

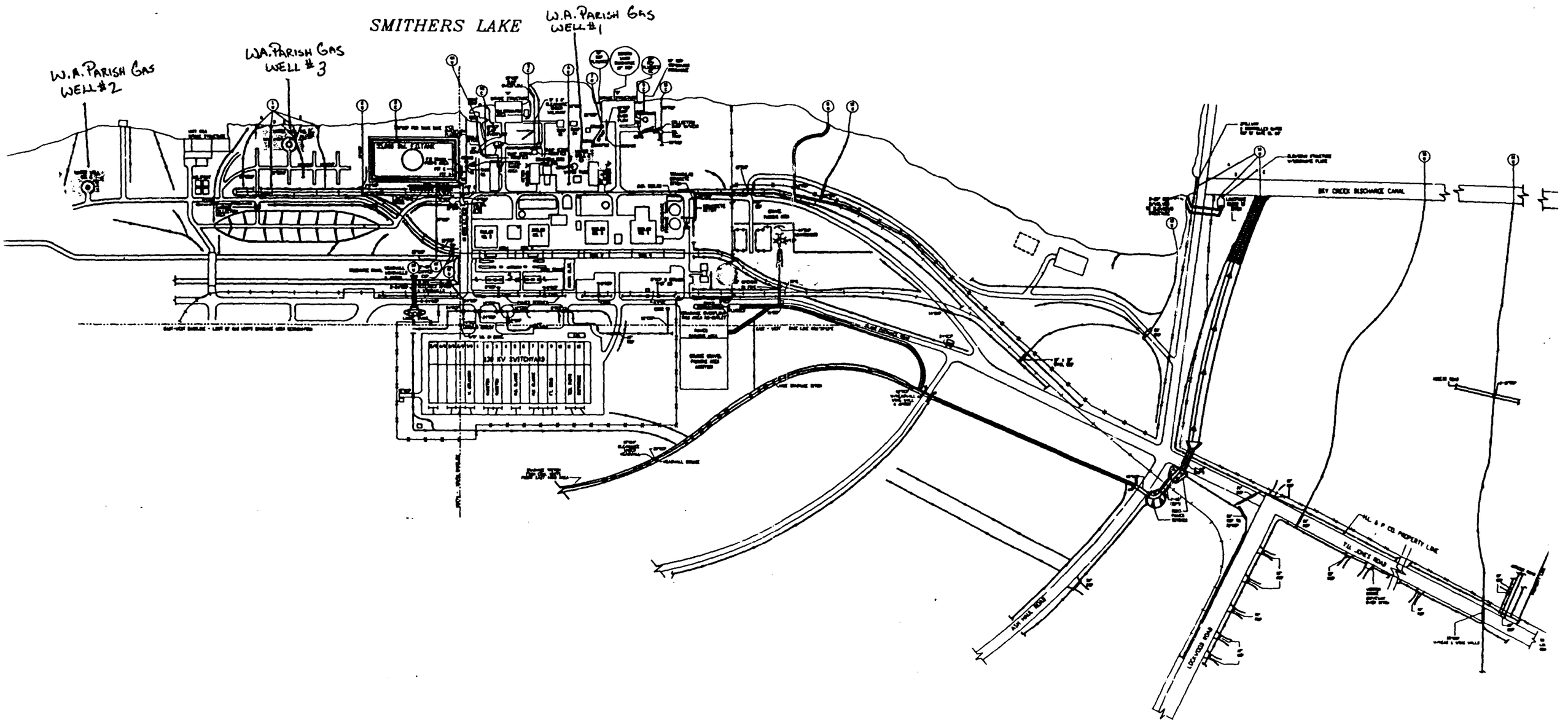
REFERENCE 7

Post-it™ Fax Note 7671	Date	# of pages ▶
To Jeff Davis	From D Baca	
Co./Dept.	Co.	
Phone #	Phone #	
Fax #	Fax #	

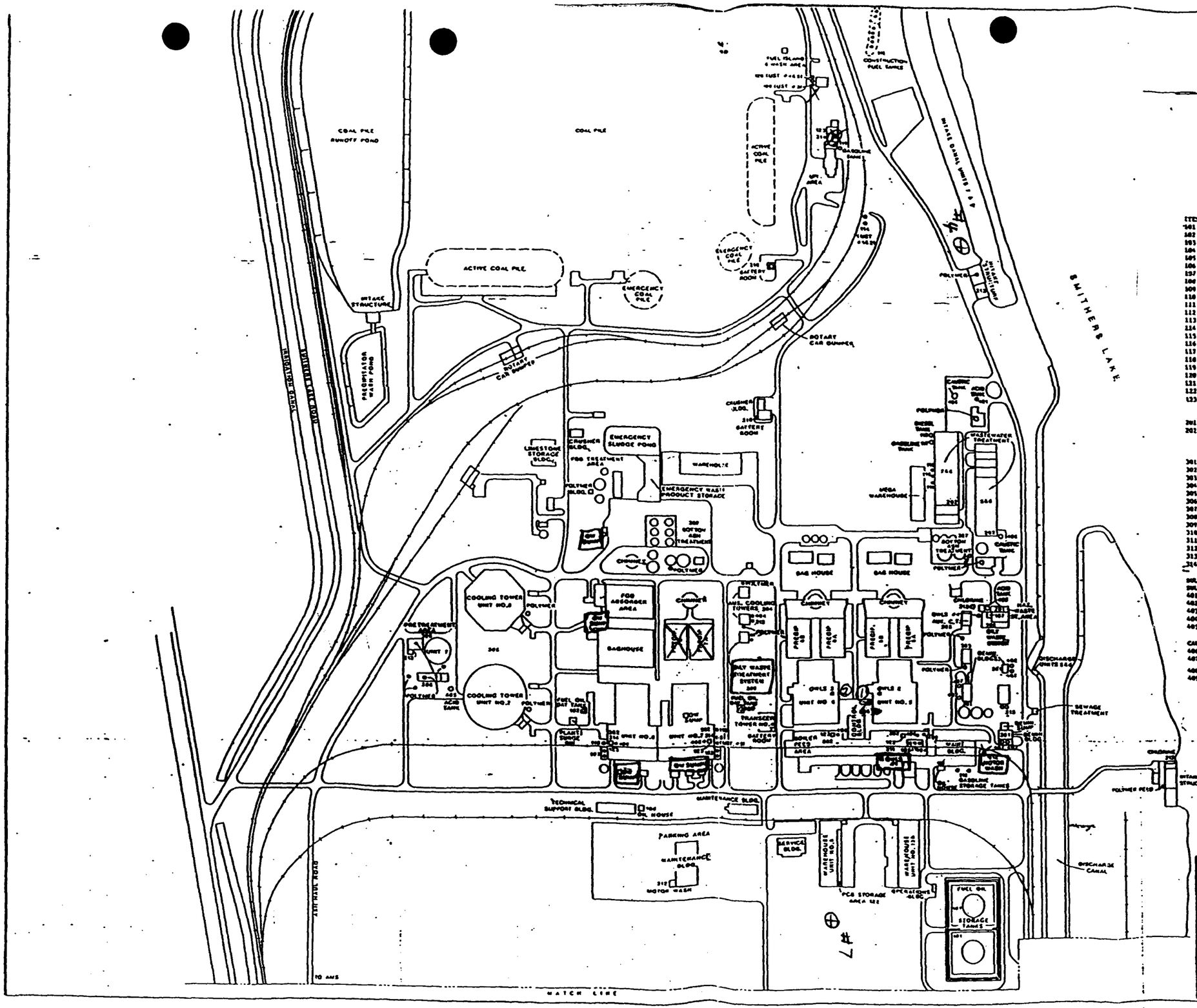


TOTAL P.01

PWS-0790140



OUTFALL COORDINATES



OIL STORAGE

ITEM

401 TWO - 50,000 GAL. FUEL OIL TANKS
402 TWO - 500 GAL. FUEL OIL DAY TANKS
403 FOUR - 300 GAL. LUBE OIL TANKS
404 TWO - 440 GAL. LUBE OIL TANKS
405 ONE - 185 GAL.-LUBE OIL TANK
406 TWO - OIL DRUMS
407 ONE - 2000 GAL. WASTE OIL TANK (BLAF)
408 ONE - 300 GAL. WASTE OIL TANK (ANS-OFF BAF)
409 ONE - 2,000 GAL. WASTE OIL TANK (WFI - UST #3)
410 TWO - 250 GAL. DIESEL FUEL TANKS
411 TWO - 500 GAL. DIESEL FUEL TANKS
412 ONE - 6,000 GAL. DIESEL FUEL TANK (ANS-OFF BAF)
413 ONE - 500 GAL. DIESEL FUEL TANK (TRUCK)
414 TWO - 10,000 GAL. UNDERGROUND DIESEL TANKS (WFI - UST #1&2)
415 ONE - 1,270 GAL. UNDERGROUND DIESEL TANK (UST #6)
416 FOUR - 1,000 GAL. GASOLINE TANKS
417 ONE - 1,000 GAL. GASOLINE TANK (TRUCK)
418 SEVEN - CONSTRUCTION FUEL TANKS (VARIOUS SIZES)
419 ONE - 1,300 GAL. GASOLINE TANK (WFI)
420 TWO - 2,000 GAL. UNDERGROUND PRODUCT OIL TANKS (WFI - UST # 4 & 5)
421 TWO - 250 GAL SEPARATOR LIQUIDS TANKS (1-4 BAF)
422 ONE - PCB STORAGE AREA
423 PRODUCT OIL STORAGE (WFI)

HAZARDOUS WASTE MANAGEMENT FACILITIES

201 HAZARDOUS WASTE STORAGE AREA
202 WASTEWATER TREATMENT AREAS

HAZARDOUS SUBSTANCE STORAGE FACILITIES

301 TWELVE MAKEUP DEMINERALIZERS
302 FOUR BOILER CHEMICAL FEED SYSTEMS
303 UNITS 5 & 6 AUXILIARY COOLING TOWERS
304 UNITS 7 & 8 AUXILIARY COOLING TOWERS
305 MAIN COOLING TOWERS
306 PRETREATMENT AREA
307 BOTTOM ASH TREATMENT AREA
308 UNIT 5 & 6 OILY WASTE TREATMENT SYSTEM
309 UNIT 7 & 8 OILY WASTE TREATMENT SYSTEM
310 THREE - BATTERY ROOMS (WFI)
311 BATTERY ROOM
312 MOTOR WASH AREA
313 FIVE - CHLORINE SYSTEMS
314 SUBSTANCE CHEMICAL SUBSTANCE

BULK CHEMICAL STORAGE TANKS

SULFURIC ACID

401 ONE - 30,000 GAL. TANK (7 & 8 WASTE WATER)
402 THREE - 13,700 GAL. TANKS (DEMINERALIZER)
403 ONE - 8,300 GAL. TANK (5-6 AUX. COOLING TOWER)
404 ONE - 9,300 GAL. TANK (7-8 AUX. COOLING TOWER)
405 ONE - 9,300 GAL. TANK (MAIN COOLING TOWER)

CAUSTIC

406 TWO - 7,300 GAL. TANKS (WASTEWATER)
407 THREE - 13,700 GAL. TANKS (DEMINERALIZERS)
408 EIGHT - 235 GAL. AMMONIUM HYDROXIDE TANKS (BOILER AREAS EACH UNIT)
409 ONE - 1,000 GAL. ALUM TANK

ERT

A RESOURCE ENGINEERING COMPANY

ATTACHMENT 1

SITE PLAN UNITS 5-8

W. A. PARISH PLANT

HOUSTON LIGHTING AND POWER CO.

DRAWN BY: SJ	DATE: 12-16-86	PROJECT NO: 344-04
CHK'D BY:	REVISED:	DWG NO:

REFERENCE 8

HL&P 3695 (10-75)

Houston Lighting & Power Company

W. A. PARISH PROJECT
DOCUMENT REVIEW SHEET

REVIEWERS SHOULD ROUTE COMPLETED DOCUMENTS AS FOLLOWS

ORIGINAL TO: J.R. Bickham

CC:

CC. W/O ATTACH. TO: D. M. Kasper

CORRESPONDENCE SERIAL NUMBE

DATE ISSUED

DATE ACTION REQUIRED

REVIEWER

REVIEW COOR.

OTHER

SUBJECT: Hydrostatic Test Procedure Unit #6.

RESPONSE FROM: [x] REVIEWER [ ] REVIEW COORDINATOR [ ] OTHER

R.C. Patyrak BY DATE 2-2-78.

DEPARTMENT/DIVISION Environmental Protection/Water Quality. PAGE OF

It is my understanding that Hydro. test water will be within all previously transmitted Effluent Requirements since it will consist of demineralized water. As such, this material can be discharged directly to the lake. Care should be taken not to send this water to the temporary holding ponds.

SUBJECT FILE NUMBERS: PRIMARY

SECONDARY:

THE AREA BELOW SHOULD BE FILLED IN BY THE REVIEW COORDINATOR IF A REVIEW COORDINATOR HAS BEEN ASSIGNED:

[ ] I ACKNOWLEDGE RECEIPT OF ABOVE COMMENTS

[ ] THE REVIEWER WAS CONTACTED REGARDING THOSE COMMENTS WHICH WERE NOT INCORPORATED

[ ] THE ABOVE COMMENTS REFLECT THE COMPOSITE HL&P COMMENTS ON THE REVIEWED DOCUMENT

[ ] CORRESPONDENCE RESULTING FROM THIS REVIEW TO ORIGINATOR WAS ISSUED

REVIEW COORDINATOR DATE

Chris
xc. RCP Corr
RA, WAP Co
TOWR

Houston Lighting & Power Company

from the desk of R. C. PATYRAK
to DON KASPER. date 2-7-78

ATTACHED ARE RESULTS OF FIELD TESTS AND LABORATORY TREATABILITY STUDIES ON W.A. PARISH BCW. THEY SHOW.

(1) THE WASTE MUST BE TREATED BEFORE RELEASE

(2.) THE WASTE IS CHEMICALLY TREATABLE FOR IRON REMOVAL.

BASED ON THESE TESTS IT WOULD BE ACCEPTABLE FROM REGULATORY VIEW TO TREAT AND RELEASE.

SUGGEST THAT IF THIS IS THE DESIRED COURSE OF ACTION, WE MAKE

☐ xc

Houston Lighting & Power Company

from the desk of R. C. PATYRAK

to _____ date 2-7-78.

A CLOSER EVALUATION OF EXACT PROCEDURES, PROBLEMS, COSTS, ETC. THERE WILL BE A CONSIDERABLE AMOUNT OF SLUDGE WHICH MUST BE HANDLED AND THIS COULD PRESENT SOME PROBLEMS.

IN ANY EVENT AN ACCEPTABLE COURSE OF ACTION NEEDS TO BE DEVELOPED SOON.

① DBC
② Site Insp

HOUSTON LIGHTING & POWER COMPANY

Environmental Protection Department/Water Quality
Site Inspection Report

SITE: W.A. PARISH
DATE OF INSPECTION: 8/21/78
REGULATORY AGENCY: -
CONDUCTING OFFICIAL(S): -
ENV. PROT. DEPT. REPRESENTATIVE(S): D.B. CHIN, K.M. WHELAN
OTHER PARTICIPANTS: J.H. McCONNELL

NATURE OF INSPECTION: VIEW UNITS 5 & 6 CECP PROGRESS.
PLANT AREAS INSPECTED:

A: OUTFALL 101, 201
COMMENTS:
CHEMICAL WASTE

Operational in manual mode only using batch treatment by Par-Chem Inc. McCONNELL anticipates automation by 9/15/78. Retention capacity limited by fiberglassing of the NORTH AND SOUTH BASINS; THIS BEING A POTENTIALLY SIGNIFICANT PROBLEM DUE TO THE UNIT 6 PRE-O CLEANING CURRENTLY IN PROGRESS.

B: OUTFALL _____
COMMENTS:

C: OUTFALL 201
COMMENTS:
FLOOR DRAINS 5, 6.

SYSTEM O/S THIS DATE. FLOW BEING ROUTED TO 201 RET. AREA FOR L.V. TRMT.

D: OUTFALL _____
COMMENTS:

E: OUTFALL _____
COMMENTS:

F: OUTFALL _____
COMMENTS:

PARALLEL SAMPLES COLLECTED: -
SUMMARY POTENTIALLY NONCOMPLIANT AREAS: CAPACITY PROBLEMS AS INDICATED ABOVE.

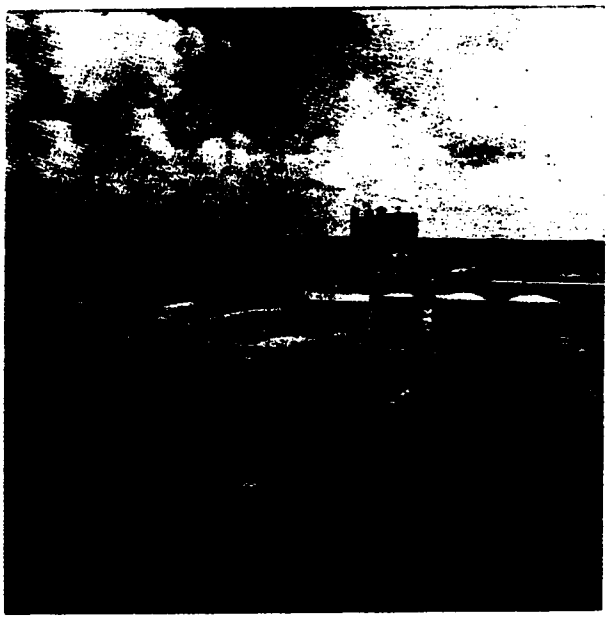
OVERALL STATUS: _____

REPORT BY KMW. DATE 8/24.

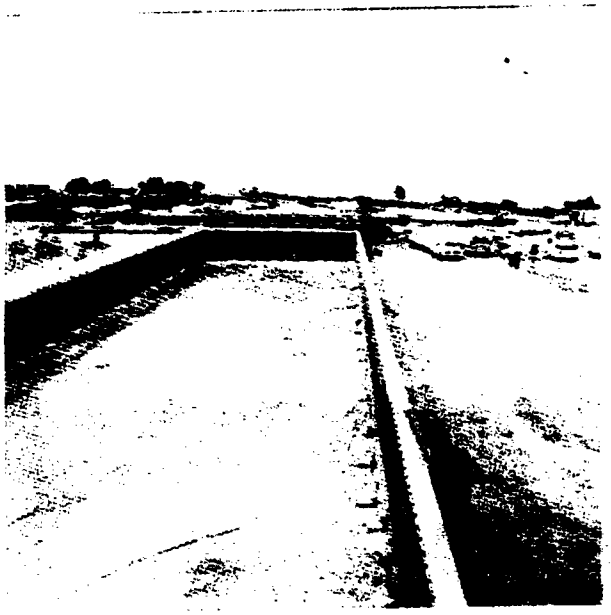
(Attachments)

KMW 10/77

WAC CWTS CLARIFIERS
8/21/78



VIEW SHOWING U666 FDTS; AUX TOWERS, LOOKING TOWARD I-4.



FIBERGLASSING RET. PITS
8/21/78

VIEW SHOWING TEMPORARY RET. PONDS AND COAL YARD

Houston Lighting & Power Company

from the desk of K. M. WHELAN

to Chris date 2/04

NEW FILE

ENVIRONMENTAL STUDIES CECP

W.A. PARISH WASTEWATER TREATABILITY

5/14/97

Bechtel Dwg. JOB # 13051 dwg. no 8-C-110-G01, REV. C thru F, dated 10/7/78 shows "3 (earthen ponds) holding ponds." by waste water permanent ponds (concrete).

J. Palermo

P.S. A later check of the original dwg. in EDC Records revealed that the ponds have been deleted on the dwg!

J. Palermo
5-14-97
2:30 pm

SOUTHERN PETROLEUM LABORATORIES, INC.

P.O. BOX 20807
HOUSTON, TEXAS 77026
(713) 668-4448

P.O. BOX 52768
LAFAYETTE, LOUISIANA 705(
(318) 984-2374

Mr. Richard Patyrak
Houston Lighting & Power Company
Energy Development Complex, Room C 275
P. O. Box 1700
Houston, Texas

W. A. PARISH
Special Samples
January 1978

Invoice No. 69219

Sample Date:	January 31, 1978	January 31, 1978
SPL No.:	12001	12002
Description:	Temp C, NW Corner	MCW North
Arsenic	<0.02	<0.02
Barium	<0.4	<0.4
Cadmium	<0.01	<0.01
Chromium	<0.1	<0.1
Copper	0.3	0.3
Lead	<0.1	<0.1
Manganese	8.1	1.8
Mercury	<0.005	<0.005
Nickel	<0.05	<0.05
Selenium	<0.02	<0.02
Silver	<0.05	<0.05
Zinc	1.10	0.86
Iron	102	15
Sodium	440	320
Total Dissolved Solids	2880	820
Chloride	840	60
Sulfate	780	540
pH	1.68	2.10
Alkalinity	<1	<1
Chemical Oxygen Demand	282	4

All values in mg/l except pH

Southern Petroleum Laboratories, Inc.

Sammy Russo

Sammy Russo

RECEIVED
FEB 9 1978
ENVIRONMENTAL PROTECTION DEPT.
WATER QUALITY

SOUTHERN PETROLEUM LABORATORIES, INC.

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Energy Development Complex, Room C 275
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Houston, Texas

W. A. PARISH
Special Samples
January 1978

Invoice No. 69219

Sample Date:	January 31, 1978	January 31, 1978
SPL No.:	11997	11998
Description:	Temp. C, SW Corner	Temp. Pit B, SE Corner
Arsenic	<0.02	<0.02
Barium	<0.4	<0.4
Cadmium	<0.01	<0.01
Chromium	0.1	0.1
Copper	0.2	0.4
Lead	<0.1	<0.1
Manganese	7.2	2.8
Mercury	<0.005	<0.005
Nickel	<0.05	<0.05
Selenium	<0.02	<0.02
Silver	<0.05	<0.05
Zinc	1.12	0.65
Iron	115	30
Sodium	460	340
Total Dissolved Solids	2740	1200
Chloride	850	116
Sulfate	780	500
pH	1.68	2.41
Alkalinity	<1	<1
Chemical Oxygen Demand	282	194

All values in mg/l except pH

Southern Petroleum Laboratories, Inc.

Sammy Russo

Sammy Russo

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Houston Lighting & Power Company
Energy Development Complex, Room C 275
P. O. Box 1700
Houston, Texas

W. A. PARISH
Special Samples
January 1978

Invoice No. 69219

Sample Date:	January 31, 1978	January 31, 1978
SPL No.:	12007	12008
Description:	Temp. Pit A, SE Corner	MCW South
Arsenic	∠ 0.02	∠ 0.02
Barium	∠ 0.4	∠ 0.4
Cadmium	∠ 0.01	∠ 0.01
Chromium	∠ 0.1	∠ 0.1
Copper	0.3	0.4
Lead	∠ 0.1	∠ 0.1
Manganese	1.4	2.0
Mercury	∠ 0.005	∠ 0.005
Nickel	∠ 0.05	∠ 0.05
Selenium	∠ 0.02	∠ 0.02
Silver	∠ 0.05	∠ 0.05
Zinc	0.76	3.90
Iron	26	55
Sodium	380	520
Total Dissolved Solids	1270	2230
Chloride	64	228
Sulfate	900	1600
pH	1.91	1.61
Alkalinity	∠ 1	∠ 1
Chemical Oxygen Demand	8	11

All values in mg/l except pH

Southern Petroleum Laboratories, Inc.

Sammy Russo

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Houston, Texas

W. A. PARISH
Special Samples
January 1978

Invoice No. 69219

Sample Date:	January 31, 1978	Janaury 31, 1978
SPL No.:	12009	12010
Description:	Temp. Pit C,NECorner	Temp. Pit A, NW Corner
Arsenic	∠0.02	∠0.02
Barium	∠0.4	∠0.4
Cadmium	∠0.01	∠0.01
Chromium	∠0.1	∠0.1
Copper	0.3	0.4
Lead	∠0.1	∠0.1
Manganese	7.6	0.8
Mercury	∠0.005	∠0.005
Nickel	∠0.05	∠0.05
Selenium	∠0.02	∠0.02
Silver	∠0.05	∠0.05
Zinc	1.26	0.77
Iron	121	23
Sodium	420	560
Total Dissolved Solids	2360	1307
Chloride	798	68
Sulfate	740	960
pH	1.71	1.90
Alkalinity	∠1	∠1
Chemical Oxygen Demand	278	4

All values in mg/l except pH

Southern Petroleum Laboratories, Inc.

Sammy Russo

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W. A. PARISH
Special Samples
January 1978

Invoice No. 69219

Sample Date:	January 31, 1978	January 31, 1978
SPL No.:	12003	12004
Description:	Temp. Pit B, SW Corner	Temp. A,Sw Corner
Arsenic	<0.02	<0.02
Barium	<0.4	<0.4
Cadmium	<0.01	<0.01
Chromium	<0.1	<0.1
Copper	0.4	0.4
Lead	<0.1	<0.1
Manganese	2.2	2.1
Mercury	<0.005	<0.005
Nickel	<0.05	<0.05
Selenium	<0.02	<0.02
Silver	<0.05	<0.05
Zinc	0.73	0.73
Iron	29	21
Sodium	280	330
Total Dissolved Solids	1120	1250
Chloride	120	66
Sulfate	480	940
pH	2.48	1.82
Alkalinity	<1	<1
Chemical Oxygen Demand	198	4

All Values in mg/l except pH

Southern Petroleum Laboratories, Inc.

Sammy Russo

Sammy Russo

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FEB 9 1978
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WATER QUALITY

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Houston Lighting & Power Company
Energy Development Complex, Room C 275
P. O. Box 1700
Houston, Texas

W. A. PARISH
Special Samples
January 1978

Invoice No. 69219

Sample Date:	January 31, 1978	January 31, 1978
SPL No.:	12005	12006
Description:	Temp Pit A, NE Corner	Temp Pit C, SE Corner
Arsenic	∠ 0.02	∠ 0.02
Barium	∠ 0.4	∠ 0.4
Cadmium	∠ 0.01	∠ 0.01
Chromium	∠ 0.1	∠ 0.1
Copper	0.4	0.4
Lead	∠ 0.1	∠ 0.1
Manganese	2.8	7.7
Mercury	∠ 0.005	∠ 0.005
Nickel	∠ 0.05	∠ 0.05
Selenium	∠ 0.02	∠ 0.02
Silver	∠ 0.05	∠ 0.05
Zinc	0.74	1.20
Iron	22	111
Sodium	330	390
Total Dissolved Solids	1270	2860
Chloride	76	830
Sulfate	880	800
pH	1.88	1.70
Alkalinity	∠ 1	∠ 1
Chemical Oxygen Demand	8	274

All values in mg/l except pH

Southern Petroleum Laboratories, Inc.

Sammy Russo

Sammy Russo

RECEIVED
FEB 9 1978
ENVIRONMENTAL PROTECTION DEPT.
WATER QUALITY

(2-77)

HOUSTON LIGHTING & POWER COMPANY
ENGINEERING DEPARTMENT

By PSG Checked _____ Date 2-3-78 PS _____ ER _____
PROJECT PARISH WASTE PONDS

SAMPLES OF WATER WERE OBTAINED AND COMBINED FROM TWO EARTHEN LINED PONDS AND A COMPARTMENT OF THE CONCRETE TANK. THE WASTE IN THESE PONDS IS A MIXTURE OF CHEMICAL CLEANING WASTE FROM THE FEEDWATER AND BOILER. THE TOTAL FOR THE WASTE WAS 20,241,900 lbs. THIS REPRESENTED 4,914 lbs IRON OR 243 ppm Fe OR 2,427,036 gal

THE PONDS HAVE (AS OF 2-1-78) 53,300,000 lbs WASTEWATER OR 6,400,000 gal

A-pond	1,000,000 gal	102.5 lbs Iron
B "	1,000,000	135.7 "
C "	3,000,000	1,668 "
NORTH PIT	500,000 gal	35.4
SOUTH	900,000	243
		2185 lbs

tentative numbers.

not necessarily

4914 − 2185 = 2729 lbs IRON PRECIPITATED OUT ALREADY

$$\frac{20,241,900 \times 1\,ppm}{1 \times 10^6} = 20.24\ lbs$$

$$\frac{53,300,000 \times ppm}{1,000,000} = 20.24$$

∴ REMOVE TO 0.4 ppm Fe WE CAN REMOVE TO 0.04 ppm Fe

#

HOUSTON LIGHTING & POWER COMPANY
ENGINEERING DEPARTMENT

By RSG Checked _____ Date _____ PS _____ ER _____
PROJECT W. A. PARISH 3 EARTHEN PIT COMPOSITE SAMPLE
METAL CLEANING + LOW VOLUME WASTES

① STOCK SOLUTION : 20g $Ca(OH)_2$ Qs 500ml = 40 mg/ml

② INTO 1000 ml SAMPLE Add
③ RAPID MIX 30 min
④ SETTLE 30 min

	ml STOCK SOLN	RESULTING SOLN. CON. mg/l	Ph	Fe mg/l	Cu mg/l
1	1	40	2.4	26.0	0.27
2	2.5	100	2.7	24.8	0.29
3	7.5	300	3.7	17.8	0.27
4	12.5	500	4.4	15.4	0.25
5 ☆	20.0	800	11.4	0.3	0.02
6	25.0	1000	11.5	0.5	0.01
	RAW	—	2.4	22.7	0.27

		$Ca(OH)_2$	Na_2CO_3 (g/l)	Ph	Fe	Cu
7	17.1 ml	684	0.5g	11.1	0.09	0.02
8	17.1	684	1.0	10.8	0.06	0.01
9 ☆	17.1	684	1.5	10.95	0.04	0.01
10	17.1	684	2.0	10.75	0.07	0.02

beaker #9 TOTAL HARDNESS 62
CALCIUM " 3

_____

WA[illegible]rich Pond

	Cu	CaO (mg/l waste)	Na_2CO_3	JTU	pH	Fe	$CaCO_3$ CaH^-
1	0.03	640	0	15	11.4	.09	1360
2	.02	576	1000	15	~11.2	.12	520
*3	<.01	520	2000	18	11.2	.06	80
4	.02	188	1000	20	10.8	.22	264
5	.02	172	1500	23	10.1	.63	400
6	.04	0	4000	25	9.8	.28	600
7	.01	176	1000	21	9.05	1.31	235
*8	.02	68	1500	21	8.95	.54	100

10% slaked lime / gallon

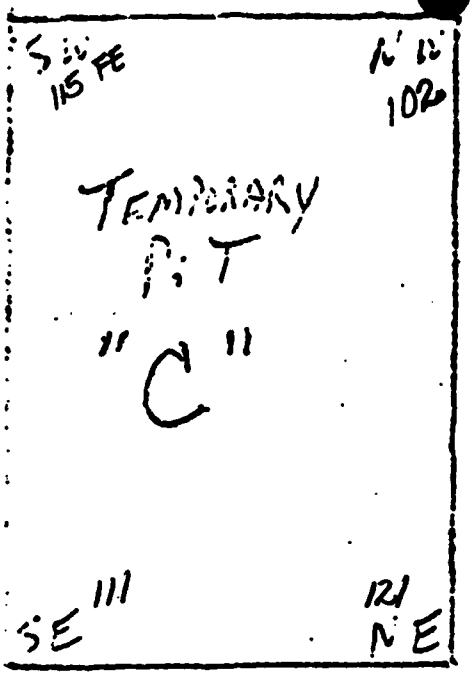
10% Na_2CO_3 / gallon

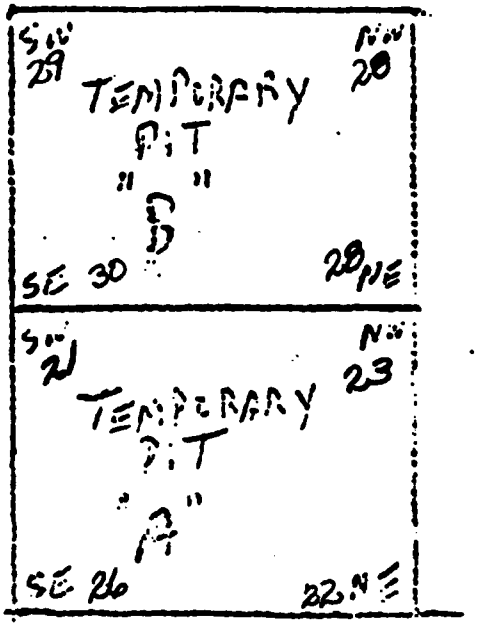
lbs CaO / 10^3 gal H_2O

lbs Na_2CO_3 / 10^3 gal H_2

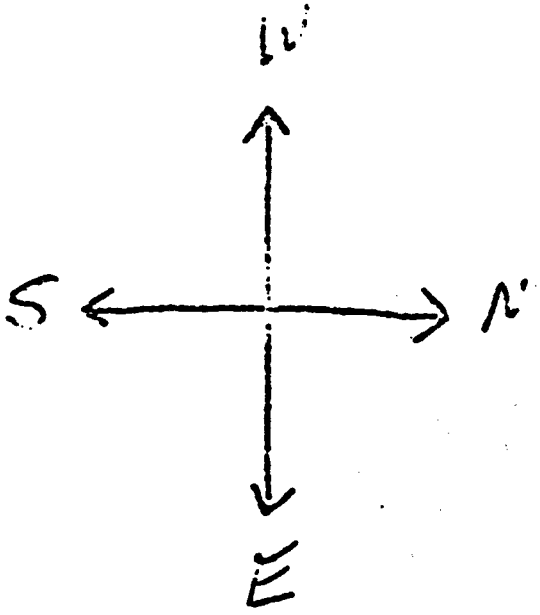
2/1/78

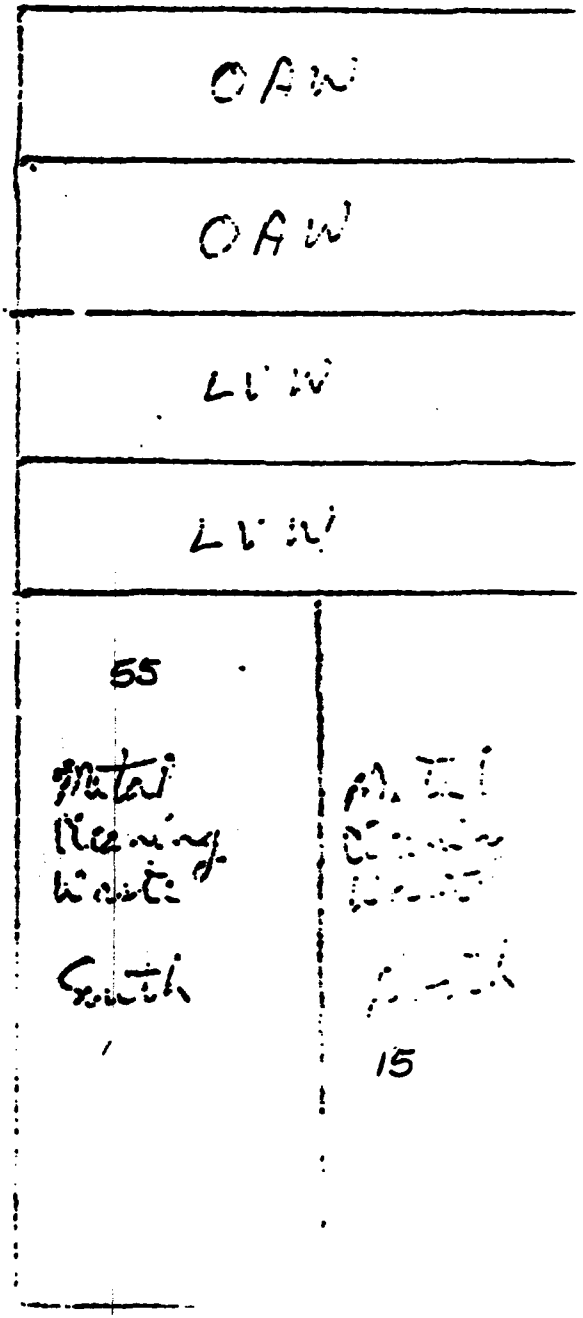
Collected 1/31/78





W.A. PARKS
WASTE
WATER





WAP SPECIAL SAMPLES / SPL 2-6-78

PARAMETERS (mg/L)

SPL#	LOCATION	AR	BA	CD	CR	CU	PB	MG	HG*	NI	SE*	AG	ZN	FE	NA	TDS	CL	SULFATE	F	ALK	COD
12010	TEMP PIT A N.W. CORNER	<.02	<0.4	<.01	<.01	0.4	<.1	0.8	<.005	<.05	<.02	<.05	.19	22	560	1307	68	460	1.40	<1.0	4
12005	TEMP PIT A N.E. CORNER	<.02	<0.4	<.01	<.01	0.4	<.1	2.0	<.005	<.05	<.02	<.05	.34	22	330	1270	76	800	1.88	<1.0	8
12007	TEMP PIT A S.E. CORNER	<.02	<0.4	<.01	<.01	0.3	<.1	1.9	<.005	<.05	<.02	<.05	.26	26	380	1270	68	900	1.91	<1.0	8
12009	TEMP PIT A S.W. CORNER	<.02	<0.4	<.01	<.01	0.4	<.1	2.1	<.005	<.05	<.02	<.05	.73	21	230	1250	66	910	1.82	<1.0	4
	AVERAGE, TEMP. PIT A	<.02	<0.4	<.01	<.01	0.37	<.1	1.07	<.005	<.05	<.02	<.05	.25	23	400	1274	68.5	770		<1.0	6
12000	TEMP. PIT B N.W. CORNER	<.02	<0.4	<.01	<.01	0.3	<.1	2.2	<.005	<.05	<.02	<.05	.66	28	420	1150	116	500	2.42	<1.0	190
11999	TEMP. PIT B N.E. CORNER	<.02	<0.4	<.01	<.01	0.4	<.1	2.1	<.005	<.05	<.02	<.05	.62	28	330	1110	114	510	2.43	<1.0	200
11998	TEMP. PIT B S.E. CORNER	<.02	<0.4	<.01	<.01	0.4	<.1	2.8	<.005	<.05	<.02	<.05	.65	29	390	1000	116	500	2.41	<1.0	190
12003	TEMP. PIT B S.W. CORNER	<.02	<0.4	<.01	<.01	0.4	<.1	2.2	<.005	<.05	<.02	<.05	.78	29	280	1120	120	480	2.48	<1.0	190
	AVERAGE, TEMP. PIT B	<.02	<0.4	<.01	<.01	0.37	<.1	2.35	<.005	<.05	<.02	<.05	.65	28.75	345	1145	116.5	497.5		<1.0	190
12001	TEMP. PIT C N.W. CORNER	<.02	<0.4	<.01	<.01	0.3	<.1	8.1	<.005	<.05	<.02	<.05	1.10	102	440	2000	849	760	1.68	<1.0	270
12004	TEMP. PIT C N.E. CORNER	<.02	<0.4	<.01	<.01	0.3	<.1	7.6	<.005	<.05	<.02	<.05	1.26	124	420	2360	798	740	1.76	<1.0	270
12006	TEMP. PIT C S.E. CORNER	<.02	<0.4	<.01	<.01	0.4	<.1	7.7	<.005	<.05	<.02	<.05	1.20	111	390	2060	838	800	1.72	<1.0	270
11997	TEMP. PIT C S.W. CORNER	<.02	<0.4	<.01	<.01	0.3	<.1	7.7	<.005	<.05	<.02	<.05	1.12	118	410	2240	850	780	1.68	<1.0	270
	AVERAGE, TEMP. PIT C	<.02	<0.4	<.01	<.01	0.3	<.1	7.65	<.005	<.05	<.02	<.05	1.17	112.5	420	2040	823.5	775		<1.0	270
12002	MCW NORTH	<.02	<0.4	<.01	<.01	0.2	<.1	1.8	<.005	<.05	<.02	<.05	.86	15	320	820	60	590	2.10	<1.0	4
12008	MCW SOUTH	<.02	<0.4	<.01	<.01	0.4	<.1	2.0	<.005	<.05	<.02	<.05	2.92	55	500	2230	228	1000	1.64	<1.0	11
	AVERAGE, MCW	<.02	<0.4	<.01	<.01	0.35	<.1	1.9	<.005	<.05	<.02	<.05	2.38	35	410	1525	144	795	1.86	<1.0	25
	AVERAGE, TOTAL	<.02	<0.4	<.01	<.01	0.36	<.1	3.64	<.005	<.05	<.02	<.05	1.08	51.4	335	1672	314.4	777.3		<1.0	135

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* Hg AND SE NOT COMPLETED THIS DATE

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Revised Part A Application
W. A. Parish Generating Station

The Part A application prepared in August 1980 listed several wastes/facility components which have been removed in the revised Part A. These wastes/components are discussed below:

1. Demineralizer Regenerant Inorganic Sludge

   This sludge accumulates at the bottom of concrete tanks which store low volume wastes including demineralizer regenerant. Based on EP toxicity analyses submitted to your office on April 8, 1981 (letter attached), this waste has been declassified to a Class II waste (TWC 241470).

2. Metal Cleaning Inorganic Sludge

   This sludge accumulates at the bottom of concrete tanks which store inorganic wastes including hydrochloric acid boiler and equipment cleaning wastes. Based on EP toxicity analyses submitted to your office on April 8, 1981 (letter attached), this waste has been declassified to a Class II waste (TWC 241210).

3. Metal Cleaning Organic Acids/Metal Cleaning Organic Acids Collection Tanks

   This waste is generated from ammoniated citric acid or hydroxyacetic-formic acid boiler and equipment cleanings. It is stored in concrete tanks prior to being injected in an energy-producing boiler for incineration. Based on EP toxicity analyses submitted to your office on April 8, 1981 (letter attached), this waste has been declassified to a Class II waste (TWC 215290).

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4. Metal Cleaning Organic Sludge

   This sludge accumulates at the bottom of concrete tanks which store organic acids. Based on EP toxicity analyses submitted to your office on April 8, 1981 (letter attached), this waste has been declassified to a Class II waste (TWC 248990).

5. Chemical Waste Treatment System Sludge/Chemical Waste Treatment Systems & Ash Disposal Area

   Concrete chemical waste treatment systems are used to treat demineralizer regenerant and inorganic metal cleaning waste (when generated) prior to NPDES discharge. The sludge which accumulates in the settling chamber of the treatment systems is pumped to the sludge handling system prior to disposal in the ash disposal area (listed as Facility Number 01, Lagoon/Pond, under Part III of Notice of Registration). Based on EP toxicity analyses submitted to your office on February 23, 1981 (letter attached), this sludge has been declassified to a Class II waste (TWC 240540).

6. Waste Oil and Sludge/Waste Oil and Sludge Collection Facilities

Oily sludge generated from the oily waste treatment systems is classified as a Class I nonhazardous or Class II waste, depending on the amount of oil present in the sludge. The attached EP toxicity analyses of oily sludge indicate that no hazardous constituents are present.

7. Asbestos In Insulation

Insulation containing asbestos is classified as a Class I nonhazardous waste (TWC 170750). Asbestos, originally listed on the Part A application, is not an EPA listed hazardous waste.

8. Inorganic Acids Collection Ponds

The three inorganic impoundments identified in Table III-2 and Table III-4 of the August 1980 Part A application were excavated in 1977 for temporary use during construction of Units 5 & 6. On an intermittent basis, the impoundments collected boiler blowdown and inorganic metal cleaning waste from pre-operational cleanings of Units 5 & 6. These wastes were then transferred to Units 5 & 6 concrete tank wastewater treatment system for treatment prior to NPDES discharge. Hazardous waste entered the impoundments on four separate occasions during pre-operational cleanings, the last event being an inorganic metal cleaning in September 1978.

No wastewater entered the three impoundments after early 1980. The above-ground piping to the impoundments was removed during construction of Units 7 & 8 wastewater treatment system which was in service by June 1980. By March 1982, all three impoundments had been filled in and graded over. No dirt was removed from the impoundments during this activity.

The following pages of the Part A application have been revised to reflect current hazardous waste management practices at the W. A. Parish Generating Station.

Table III-I Generated Hazardous Wastes and Management Activities

Verbal Description of Waste	TDWR Sequence Number	TDWR Waste Code Number	EPA Hazard Code	EPA Hazardous Waste No.	Waste Management Activities (Check applicable items) Off-Site Disposal	On-Site Storage[1]	On-Site Processing[2]	On-Site Disposal	Estimated 1983 Annual Quantity Generated (lbs)	SIC Code and Process
Demineralizer Acid and Base Regeneration Wastewater	010 011	902570 902560	C	D002		X	X		2.1×10^{9}*	4911 - Water Treatment
Inorganic Metal Cleaning Waste	013	903070	C	D002		X	X		7.5×10^{5}	4911 - Boiler & Condenser Cl
Spent Solvents	008	910100	I	D001	X	X	X		4.0×10^{4}	4911 - Degreasing
Paint Thinner	009	910110	I,T	D001 F003,F005	X	X			2.6×10^{3}	4911 - Painting
Blasting Material Contaminated with Lead		973280	E	D008	X	X			7.8×10^{5}**	4911 - Painting

* Total quantity discharged from low volume waste tanks under NPDES permit.

** Anticipated 1984 annual quantity generated (lbs).

[1] "Storage" means the interim containment or control of waste after generation and prior to ultimate disposal.

[2] "Processing" means the extraction of materials, transfer, volume reduction, conversion to energy, or other separation and preparation of solid waste for reuse or disposal, including the treatment or neutralization of hazardous waste so as to render such waste nonhazardous, safer for transport, amenable for recovery, amenable for storage, or reduced volume. The "transfer" of solid waste for reuse or disposal as used above, does not include the actions of a carrier in conveying or transporting solid waste by truck, ship, pipeline, or other means.

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Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste: Demineralizer Acid and Base Regeneration Wastewater

Process (see last column in Table III-1): Water Treatment

TDWR Sequence Number of Waste (if assigned): 010, 011

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

___ Lagoon/Pond (unlined)
___ Lagoon/Pond (lined)
___ Basin (earthen, above-grade lined)
___ Basin (earthen, above-grade unlined)
___ Basin (earthen, below-grade lined)
___ Basin (earthen, below-grade unlined)
___ Basin (concrete, above-grade lined)
___ Basin (concrete, above-grade unlined)
___ Basin (concrete, below-grade lined)
___ Basin (concrete, below-grade unlined)
___ Basin (other)
___ Pit (lined)
___ Pit (unlined)
___ Incinerator
___ Open Controlled Incineration Area
___ Boiler (energy-producing)
___ Landfill (sanitary)
___ Landfill (surface, open)
___ Landfill (other)

___ Landfarm
___ Landspreading Area
___ Spray Irrigation Area
___ Flood Irrigation Area
___ Septic Tank/Drain Field
___ Injection Well
*2 Tank (surface storage)
*1 Tank (sub-surface storage)
___ Tank (surface processing)
___ Tank (sub-surface processing)
___ Tank (other)
___ Drum Storage Area (open)
___ Drum Storage Area (enclosed)
___ Drum Storage Area (other)
___ Bulk Storage Area (open)
___ Bulk Storage Area (enclosed)
___ Bulk Storage Area (other)
___ Other (specify _____)

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* Part of wastewater treatment unit

W. A. Parish Generating Station

Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste	Inorganic Metal Cleaning Waste
Process (see last column in Table III-1)	Boiler & Condenser Cleaning
TDWR Sequence Number of Waste (if assigned)	013

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

___ Lagoon/Pond (unlined)
___ Lagoon/Pond (lined)
___ Basin (earthen, above-grade lined)
___ Basin (earthen, above-grade unlined)
___ Basin (earthen, below-grade lined)
___ Basin (earthen, below-grade unlined)
___ Basin (concrete, above-grade lined)
___ Basin (concrete, above-grade unlined)
___ Basin (concrete, below-grade lined)
___ Basin (concrete, below-grade unlined)
___ Basin (other)
___ Pit (lined)
___ Pit (unlined)
___ Incinerator
___ Open Controlled Incineration Area
___ Boiler (energy-producing)
___ Landfill (sanitary)
___ Landfill (surface, open)
___ Landfill (other)

___ Landfarm
___ Landspreading Area
___ Spray Irrigation Area
___ Flood Irrigation Area
___ Septic Tank/Drain Field
___ Injection Well
*2 Tank (surface storage)
*2 Tank (sub-surface storage)
___ Tank (surface processing)
___ Tank (sub-surface processing)
___ Tank (other)
___ Drum Storage Area (open)
___ Drum Storage Area (enclosed)
___ Drum Storage Area (other)
___ Bulk Storage Area (open)
___ Bulk Storage Area (enclosed)
___ Bulk Storage Area (other)
___ Other (specify _____ _____)

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* Part of wastewater treatment unit

W. A. Parish Generating Statio.

Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste: Spent Solvents

Process (see last column in Table III-1): Degreasing

TDWR Sequence Number of Waste (if assigned): 008

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

___ Lagoon/Pond (unlined)

___ Lagoon/Pond (lined)

___ Basin (earthen, above-grade lined)

___ Basin (earthen, above-grade unlined)

___ Basin (earthen, below-grade lined)

___ Basin (earthen, below-grade unlined)

___ Basin (concrete, above-grade lined)

___ Basin (concrete, above-grade unlined)

___ Basin (concrete, below-grade lined)

___ Basin (concrete, below-grade unlined)

___ Basin (other)

___ Pit (lined)

___ Pit (unlined)

___ Incinerator

___ Open Controlled Incineration Area

3 Boiler (energy-producing)

___ Landfill (sanitary)

___ Landfill (surface, open)

___ Landfill (other)

___ Landfarm

___ Landspreading Area

___ Spray Irrigation Area

___ Flood Irrigation Area

___ Septic Tank/Drain Field

___ Injection Well

___ Tank (surface storage)

___ Tank (sub-surface storage)

___ Tank (surface processing)

___ Tank (sub-surface processing)

___ Tank (other)

1 Drum Storage Area (open)

1 Drum Storage Area (enclosed)

___ Drum Storage Area (other)

___ Bulk Storage Area (open)

___ Bulk Storage Area (enclosed)

___ Bulk Storage Area (other)

X Other (specify Mixed with waste oil for pickup by a waste oil recycling firm)

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Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste: Paint Thinner

Process (see last column in Table III-1): Painting

TDWR Sequence Number of Waste (if assigned): 009

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

___ Lagoon/Pond (unlined)
___ Lagoon/Pond (lined)
___ Basin (earthen, above-grade lined)
___ Basin (earthen, above-grade unlined)
___ Basin (earthen, below-grade lined)
___ Basin (earthen, below-grade unlined)
___ Basin (concrete, above-grade lined)
___ Basin (concrete, above-grade unlined)
___ Basin (concrete, below-grade lined)
___ Basin (concrete, below-grade unlined)
___ Basin (other)
___ Pit (lined)
___ Pit (unlined)
___ Incinerator
___ Open Controlled Incineration Area
___ Boiler (energy-producing)
___ Landfill (sanitary)
___ Landfill (surface, open)
___ Landfill (other)

___ Landfarm
___ Landspreading Area
___ Spray Irrigation Area
___ Flood Irrigation Area
___ Septic Tank/Drain Field
___ Injection Well
___ Tank (surface storage)
___ Tank (sub-surface storage)
___ Tank (surface processing)
___ Tank (sub-surface processing)
___ Tank (other)
1 Drum Storage Area (open)
1 Drum Storage Area (enclosed)
___ Drum Storage Area (other)
___ Bulk Storage Area (open)
___ Bulk Storage Area (enclosed)
___ Bulk Storage Area (other)
___ Other (specify _____)

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Table III-2 Hazardous Waste Management Facility Component Summary Sheet

Verbal Description of Waste **Blasting Material Contaminated With Lead**

Process (see last column in Table III-1) **Painting**

TDWR Sequence Number of Waste (if assigned) _____

Indicate the facility components used for storage/processing/disposal of the above-specified waste by entering the number of such facility components by which this waste is managed.

___ Lagoon/Pond (unlined)

___ Lagoon/Pond (lined)

___ Basin (earthen, above-grade lined)

___ Basin (earthen, above-grade unlined)

___ Basin (earthen, below-grade lined)

___ Basin (earthen, below-grade unlined)

___ Basin (concrete, above-grade lined)

___ Basin (concrete, above-grade unlined)

___ Basin (concrete, below-grade lined)

___ Basin (concrete, below-grade unlined)

___ Basin (other)

___ Pit (lined)

___ Pit (unlined)

___ Incinerator

___ Open Controlled Incineration Area

___ Boiler (energy-producing)

___ Landfill (sanitary)

___ Landfill (surface, open)

___ Landfill (other)

___ Landfarm

___ Landspreading Area

___ Spray Irrigation Area

___ Flood Irrigation Area

___ Septic Tank/Drain Field

___ Injection Well

___ Tank (surface storage)

___ Tank (sub-surface storage)

___ Tank (surface processing)

___ Tank (sub-surface processing)

___ Tank (other)

___ Drum Storage Area (open)

___ Drum Storage Area (enclosed)

___ Drum Storage Area (other)

___ Bulk Storage Area (open)

X Bulk Storage Area (enclosed)

___ Bulk Storage Area (other)

___ Other (specify _____ _____)

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Table III-4 Hazardous Waste Facility Components List

Facility Component		Status			Approximate Design Capacity			Number of Years	Date in
Name	TDWR Seq. No.	Inactive	Active	Proposed	(cu yds)	(gal)	(lbs)	Utilized	Service
Tank (surface storage) #1			X			2 compartments of 232,000 gal. ea.		6	1978
Verbal Description: Lined concrete tank for collection of low volume wastes, including demineralizer regeneration wastewater from Units 1-4 and Units 5 & 6, prior to treatment. Treated wastewater is discharged via NPDES permit.									
Tank (surface storage) #3			X			2 compartments of 196,000 gal. ea.		4	1980
Verbal Description: Lined concrete tank for collection of low volume wastes, including demineralizer regeneration wastewater from Units 7 & 8, prior to treatment. Treated wastewater is discharged via NPDES permit.									
Tank (sub-surface storage) #2			X			82,000		6	1978
Verbal Description: Lined concrete tank for collection of demineralizer regeneration wastewater from Units 1-4 prior to transfer to Units 5 & 6 low volume waste tank.									
Tank (surface storage)			X			2 compartments of 807,000 gal. ea.		6	1978
Verbal Description: Lined concrete tank for collection of inorganic wastes including inorganic metal cleaning wastes from Units 1-4 and Units 5 & 6, prior to treatment. Treated wastewater is discharged via NPDES permit.									
Tank (surface storage)			X			2 compartments of 1,189,000 gal. ea.		4	1980
Verbal Description: Lined concrete tank for collection of inorganic wastes including inorganic metal cleaning wastes from Units 7 & 8, prior to treatment. Treated wastewater is discharged via NPDES permit.									
Tank (sub-surface storage)			X			20,000 and 54,000		6	1978
Verbal Description: Two lined concrete tanks for collection of inorganic metal cleaning wastes from Units 1-4 prior to transfer to Units 5 & 6 inorganic metal cleaning waste tank.									

Note: All above facilities are part of wastewater treatment units.

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W. A. Parish Generating Station

Table III-4 Hazardous Waste Facility Components List

Facility Component		Status			Design Capacity			Number of Years Utilized	Date in Service
Name	TDWR Seq. No.	Inactive	Active	Proposed	(cu yds)	(gal)	(lbs)		
Boiler (energy-producing)	04		X			NA		NA	NA
Verbal Description: Three boilers for incineration of spent solvents mixed with waste oil.									
Drum Storage (open)	05		X			NA		4	1980
Verbal Description: Drum storage area for waste paint thinner and spent solvents prior to off-site disposal.									
Drum Storage (enclosed)	05		X			NA		4	1980
Verbal Description: Drum storage area for waste paint thinner and spent solvents prior to off-site disposal.									
Bulk Storage Area (enclosed)			X			NA		1	1984
Verbal Description: Enclosed bins for storage of blasting material prior to off-site disposal.									
Verbal Description:									
Verbal Description:									

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Attachment G
W. A. Parish Generating Station
Process Description for Hazardous Waste Streams

1. Demineralizer Acid and Base Regeneration Wastewater (EPA Hazard Code C)

Demineralizer regeneration wastewater is collected and treated in a series of concrete and metal tanks. The waste from Units 1-4 is collected in a concrete tank and then transferred to Units 5 & 6 concrete low volume waste tank where it mixes with demineralizer regenerant from Units 5 & 6. The waste from Units 7 & 8 is collected in Units 7 & 8 concrete low volume waste tank. Demineralizer regenerant is then pumped from each of the two low volume waste tanks to its respective chemical waste treatment system (metal tanks) for pH adjustment and suspended solids removal. Treated wastewater is discharge in accordance with the NPDES discharge.

2. Inorganic Metal Cleaning Waste (EPA Hazard Code C)

Inorganic metal cleaning waste is collected and treated in a series of concrete and metal tanks. The waste from Units 1-4 is collected in concrete tanks and then transferred to Units 5 & 6 concrete inorganic metal cleaning waste tank where it mixes with inorganic waste from Units 5 & 6. The waste from Units 7 & 8 is collected in Units 7 & 8 concrete inorganic metal cleaning waste tank. Inorganic metal cleaning waste is then pumped from each of the two inorganic metal cleaning waste tanks to its respective chemical waste treatment system (metal tanks) for pH adjustment, suspended solids and metals removal. Treated wastewater is discharged in accordance with the NPDES permit.

3. Spent Solvents (EPA Hazard Code I)

Spent solvents are collected in drums for off-site disposal, mixed with waste oil for recycling, or incinerated in an energy-producing boiler.

4. Paint Thinner (EPA Hazard Code I, T)

Paint thinner waste is collected in drums for temporary storage prior to off-site disposal.

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5. Blasting Material Contaminated With Lead (EPA Hazard Code E)

Waste blasting material is collected in bins for temporary storage prior to off-site disposal.

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SW Reg 3.02

Received TDWR
Oct 31, 1983 RRA

GEOTECHNICAL INVESTIGATION
ASH STORAGE AREA
W.A. PARISH GENERATING STATION

Report to

HOUSTON LIGHTING & POWER COMPANY
Houston, Texas

McClelland engineers, inc.
geotechnical consultants

MEMORANDUM REPORT

McClelland engineers, inc. / geotechnical consultants

6100 HILLCROFT / HOUSTON, TEXAS 77081
TEL. 713 / 772-3701 TELEX 762-447

SUBJECT: Geotechnical Investigation
Ash Storage Area
W. A. Parish Generating Station

DATE: July 28, 1976

REPORT NO.: 0176-220-2

TO: Houston Lighting & Power Company
P.O. Box 1700
Houston, Texas 77001

Attention: Mr. James Malinak

Introduction

Submitted here is the report on our geotechnical investigation conducted at the proposed site for ash storage at the W. A. Parish Generating Station near Thompsons, Texas. This study was conducted in general accordance with our letter proposal dated June 15, 1976 and was authorized by your Purchase Order No. L-53980, dated June 29, 1976.

Project Description. Houston Lighting & Power Company is planning the construction of ash storage areas at its W. A. Parish Generating Station near Thompsons, Texas. The proposed site is located in an 800-acre tract just north of Smithers Lake as shown on Plate 1. We understand that several containment areas surrounded by earth embankments are anticiapted to store ash waste generated by the coal fired units at Parish Station; however, the exact locations of the storage areas have not been established.

Purpose and Scope of Study. The purposes of this investigation were to determine the general subsurface conditions in the 800-acre site and develop recommendations for design and construction that will minimize seepage of storm runoff outside of the containment areas. Information on subsurface conditions was provided by undisturbed-sample borings drilled to determine soil stratigraphy and to obtain soil samples. Additional soils data were provided by five undisturbed-sample borings completed prior to this study. Laboratory tests were performed on selected samples recovered from the borings to determine pertinent physical properties of the soils. Design and construction considerations were developed from all the field and laboratory data.

Principal Findings. The principal findings and conclusions of this study are as follows:

(1) The soil borings disclose relatively uniform soil conditions throughout the 800-acre tract that consist primarily of highly plastic clays of CH classification to about 35-ft depth underlain by silty fine sand to the maximum depth explored, 60 ft. Layers of silty clay (CL) and silt (MH-ML) of varying depths and thicknesses are found in some borings. Measurements of the depth to water in the boreholes suggest the groundwater level may be 8 to 10 ft below the surface, approximately El 52.

(2) Laboratory permeability tests were performed on two samples of silty clay (CL) to obtain what we believe would be an estimate of the maximum permeability of the silty clay soils present at the site. The test results indicate the coefficient of permeability for CL soils may range from 2.25×10^{-6} to 2.76×10^{-8} cm per sec, depending on soil plasticity characteristics and void ratio. Our previous experience with soils having properties similar to the near surface CH-CL soils which dominate the site, indicates these materials should have a coefficient of permeability of 1×10^{-7} cm per sec or lower in their natural state. We would expect the permeability to be of the same order of magnitude, or lower, when the CH-CL soils are compacted at a moisture content slightly above optimum and to a dry density of 95 percent of the maximum dry density determined in accordance with ASTM D 698-70.

(3) The near-surface natural clays which are predominantly of CH classification are satisfactory for the construction of embankments and of perimeter dikes for diverting surface runoff. Embankment materials should not contain excessive vegetation, roots and other organic matter. Depending on the natural moisture content of the embankment soils, weather conditions during construction, and soil plasticity characteristics lime treatment may be needed to facilitate compaction.

(4) The location of the ash storage areas should be established to provide at least 4 ft of low permeability natural in-place clay soils beneath the storage area and surrounding embankments. The 4 ft of natural CL-CH soils should provide a suitable liner for the storage areas; therefore, we do not feel that additional earth or artificial liners are needed. Localized deposits of silts that may be present at finished grade should be excavated and replaced by compacted clay. In areas where the impermeable clay is not present in sufficient thickness, we recommend either to remove and replace the more permeable soils

with clay of CH-CL classification or construct an earth liner to obtain an equivalent thickness of impermeable clay soil of at least 4 ft.

Field Investigation

Subsurface conditions at the site were investigated by 31 undisturbed-sample borings spaced in a grid pattern generally 1000 ft apart, as shown on Plate 2. The borings are numbered 177 through 181 and 213 through 238 to be consecutive with previous borings made at W. A. Parish Generating Station for other projects and were drilled to depths ranging from 10 to 60 ft using a truck-mounted rotary drilling rig. Borings 177 through 181 were drilled during a previous investigation using wet rotary procedures, but the remaining holes were made by advancing an auger without the use of water.

Sampling for cohesive soils was performed with a 3-in. thin-walled tube sampler in general accordance with the procedures of ASTM D 1587-74 and for cohesionless soils with a 2-in. split-barrel sampler using the Standard Penetration Test procedure described by ASTM D 1586-67. The samples were removed from the sampler in the field and classified by a soil technician. Representative portions were sealed in containers and transported to our Houston laboratory for testing. Detailed descriptions of the soils encountered in the borings are given on the individual boring logs presented on Plates 3 through 14. A key to most of the symbols and terms appearing on the boring logs is given on Plate 15.

Measurements of the depth to water in the open boreholes were made generally one day after completion of the borings. This information is recorded in the lower right-hand corner of the boring logs along with the date of the measurement.

Laboratory Investigation

The laboratory testing program was designed to measure pertinent engineering properties of the soils encountered in the borings. Tests were performed on selected specimens from Borings 177 through 181 to measure cohesive shear strengths. General classification tests were conducted on various samples to complete the soil descriptions, provide an indication on soil permeability, and to provide correlations which would expand the usefulness of the strength data. The results of most of these soil tests are plotted or tabulated on the individual boring logs on Plates 3 through 14. The following tabulation gives the types and

number of tests performed for this study. Also noted are the symbols used to plot the test results on the boring logs or the method of presentation if not plotted.

Type of Test	Number of Tests	Symbol
Unconfined Compression	4	○
Unconsolidated-Undrained Triaxial Compression	4	△
Hand Penetrometer	33	⊙
Torvane	93	⌖
Water Content	126	●
Liquid and Plastic Limits	41	+-----+
Percent Passing No. 200 Sieve	8	Tabulated under "-#200,%" on log
Sieve Analyses	3	See Plate 16

Falling head permeability tests were performed on two soil samples; results of these tests are presented on Plates 17 and 18.

General Site Conditions

Geology. The site is located within the geologic flood plain of the Brazos River. In some areas the natural soils encountered near the ground surface are apparently of Recent geologic age which have been deposited during floods as interfluvial clays and silts. Beneath the river valley deposits are clay and sand strata of Pleistocene geologic age which were deposited in a deltaic environment and exposed to many cycles of alternate wetting and drying during a period of low ocean level resulting in the densification of the underlying strata. The flood plain clays have also been desiccated and densified by areal exposure.

The Fort Bend County Soil Survey Report describes two major surficial soil types in this area, the Miller clay and soils of the Sloping Alluvial Land. The Miller clay, CH according to the Unified Classification System, is generally reddish-brown and exhibits a very low permeability. Sloping Alluvial Land soils are found on the banks of streams or sloughs and may be coarse or fine textured deposits.

Topography. The 800-acre tract is relatively level but contains undrained depressions and is dissected by tributaries of Rabbs Bayou. Ground surface

varies from El 57 to El 64 ft as shown by elevations at the borehole locations. The northwest portion of the site is densely wooded while the remaining acreage is used for pasture land.

General Soil Conditions. Soil conditions disclosed by the boring data consist principally of stiff to hard brown and gray clay of CH classification to about 30-ft depth. Values of liquid limits and plasticity indices vary from 52 to 109 and from 29 to 73, respectively. Natural water contents are found to be at or above the plastic limit and cohesive shear strength estimates obtained with a Torvane ranged from 600 to 4000 psf.

Boring 179 disclosed alternating strata of silt, silty clay and sand below the upper clay. Layers of silty clay, CL classification, of varying thicknesses and positions are disclosed in Borings 218, 225, 227 through 229, 233 through 235 and 238. Values of liquid limits and plasticity indices range from 27 to 45 and from 7 to 30, respectively. The majority of the liquid limit values of the clay, however, exceed 30 as shown on Plate 18.

Groundwater Level. Measurements of the depth of water in the open augered boreholes indicate the depth to groundwater may vary from El 47 to El 59 ft with an average of El 51 ft. Water level measurements in Borings 177 and 178 indicated the depth to water may be 1 to 2.5 ft below the ground surface near those locations.

Permeability. The permeability tests performed on samples of silty clay indicate the coefficient of permeability may vary from 2.3×10^{-6} to 2.8×10^{-8} cm per sec, depending on clay plasticity characteristics and void ratio. The value of 2.3×10^{-6} cm per sec obtained on a silty clay sample of very low plasticity whose liquid and plastic limits were 29 and 22, respectively, is judged to represent an upper value for soil permeability of the silty clays. Since most of the clay soils found at this site exhibit significantly higher plasticity characteristics, we would expect these CH-CL clays to have a coefficient of permeability of 1.0×10^{-7} cm per sec or lower in either a natural state or when compacted in accordance with recommendations presented in the following paragraphs.

Design and Construction Considerations

Site Selection. We recommend that the ash storage areas be located and constructed so that there will be at least 4 ft of relatively impermeable natural

clay, CH or CL classification (liquid limit and plasticity index of at least 30 and 15, respectively), that forms the base of the storage areas and embankments. Silt or clay of very low plasticity (liquid limit and plasticity index less than 30 and 15, respectively) that is present at or within 4 ft of finished grade should be removed and replaced by compacted clay of CH or CL classification that exhibits a liquid limit of at least 30 and plasticity index of 15 or more. Alternatively, an earth liner should be constructed to obtain an equivalent thickness of impermeable clay of at least 4 ft. We do not feel that either natural or artificial liners will be needed for ash storage areas constructed in accordance with the above criteria.

Fill Selection and Placement. Earthwork embankments around the ash storage areas may be constructed from the natural clay soils found on the site. We recommend that the clay fill should have a liquid limit of at least 30 and plasticity index of 15 or more. The surface soils containing excessive vegetation, roots and other organic material probably to a depth of 6 in. should be stripped from beneath the embankments and should not be used for earthwork construction.

Clay fill should be placed in lifts not exceeding about 8-in. loose thickness and compacted to a dry density of about 95 percent of the maximum dry density determined in accordance with ASTM D 698-70. The moisture content of the clay fill during compaction should be at or slightly above the optimum moisture content as determined by the same test procedure.

* * *

The following illustrations are attached and complete this report.

Plate 1	Vicinity Map
Plate 2	Plan of Borings
Plates 3 through 14	Logs of Borings
Plate 15	Key to Terms and Symbols
Plate 16	Grain-size Curves
Plate 17	Results of Permeability Tests
Plate 18	Plasticity Chart

We appreciate the opportunity to assist you on this project. Please call on us when we can be of further assistance.

McCLELLAND ENGINEERS, INC.

Edward J. Ulrich, Jr., P.E.
Project Manager

LSM/EJU/smc
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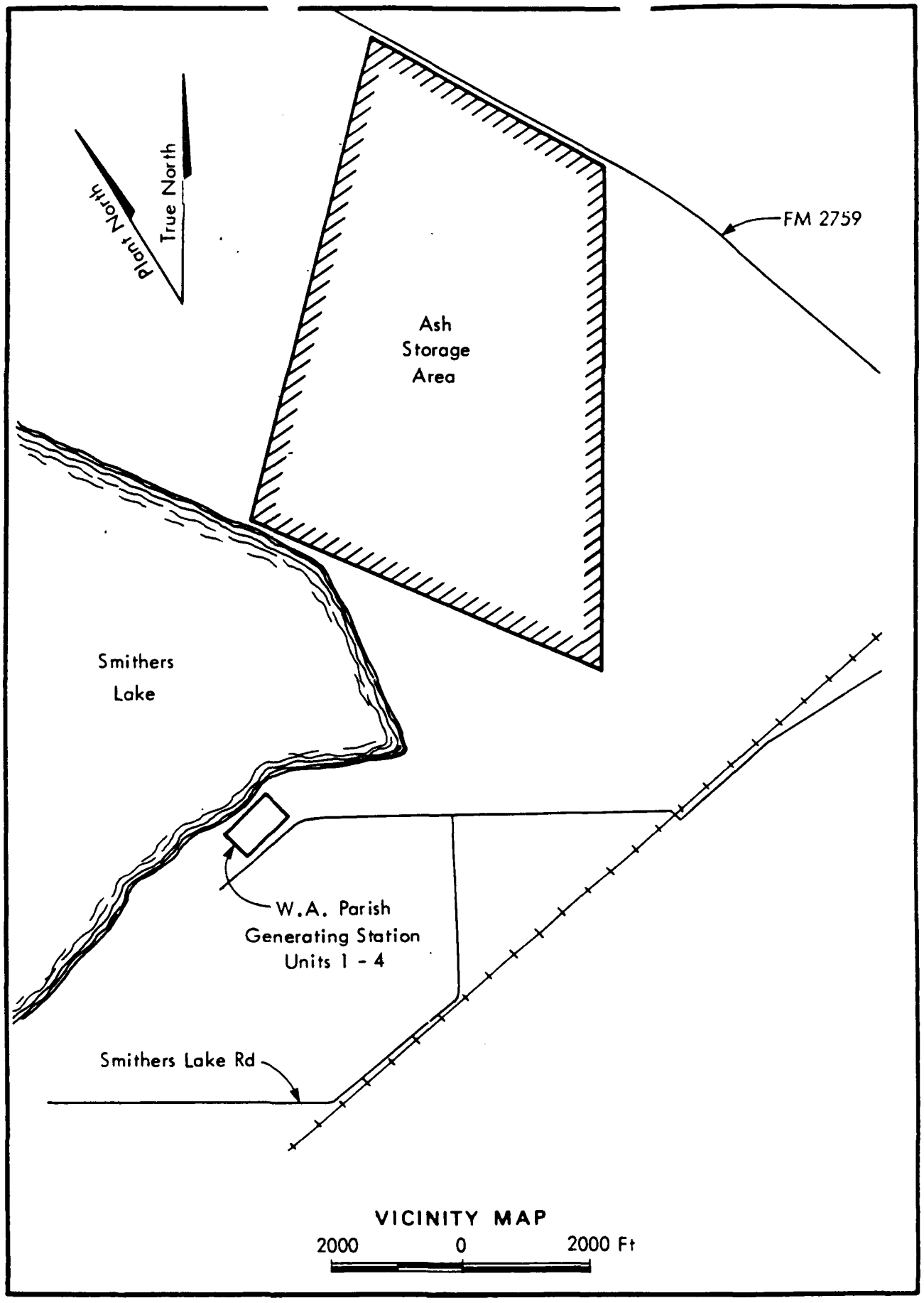

VICINITY MAP

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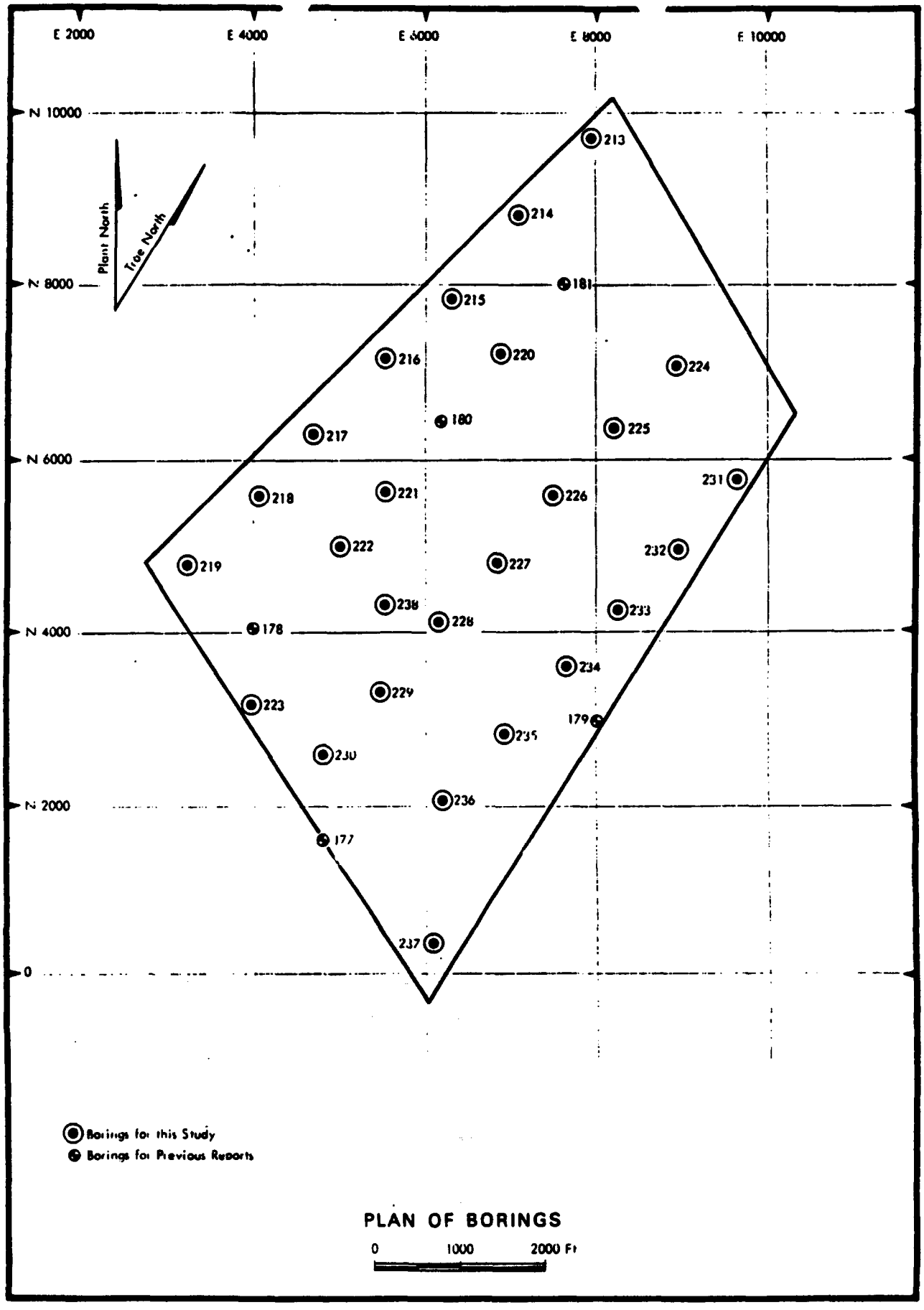
PLATE 1



PLAN OF BORINGS

0 1000 2000 Ft

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PLATE 2

LOG OF BORING NO. 177
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

TYPE: 3" thin-walled tube & 2" split-barrel LOCATION: N 1646.5; E 4869.6

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (10 20 30 40 50 60 70)	- # 200, %
			Firm dark gray clay (CH)				
			-with organic matter to 2'				
5			-brown, 4.5' to 6'				94
			-reddish brown, 6' to 13'				
			-with sand pockets, 6' to 22'				
			-stiff below 6'		86		
10							
			-reddish brown & gray, 13' to 18'				
15			-slickensided, 13' to 22'				
			-brown & gray, 18' to 22'				
20					86		
			-with reddish brown silt layers, 22' to 26'				
25							
30							
			-brown & gray below 33'				
35							
			-with shell fragments below 38'				
40							
			Tan silt, slightly clayey, with clay seams (ML)	4			
50			Tan fine to medium sand (SP)	26			7
60							

Note Scale Change

COMPLETION DEPTH: 50'
DATE: June 6, 1975

DEPTH TO WATER IN BORING: 0.7' Caved at: 3.3' DATE: June 16, 1975

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LOG OF BORING NO. 178
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

TYPE: 3" thin-walled tube & 2" split-barrel LOCATION: N 4136.7; E 4034.6

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT, % (10 20 30 40 50 60 70) — LIQUID LIMIT	-#200, %
			Firm brown clay (CH)				
			-with organic matter to 2'				
			-slickensided below 2'		86	92	
5							
			-with calcareous nodules & mica, 7' to 13'		90		
10			-stiff below 7'				
			-reddish brown with ferrous nodules, 8' to 23'		88		
15							
			-with calcareous nodules & shell fragments, 18' to 23'				
20							
			-with tan silt layers, 23' - 25'				
25			-brown & gray below 25'				
					84		
30							
35			Brown & gray silty fine sand (SM)				30
			-tan below 38.5'				
40				20			
				21			
50			-with brown clay pockets & traces of medium sand below 48.5'	50/9"			13
60							

Note Scale Change

COMPLETION DEPTH: 60'
DATE: June 5, 1975

DEPTH TO WATER IN BORING: 2.5' Caved at: 5.2' DATE: June 6, 1975

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PLATE 4

LOG OF BORING NO. 179
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

TYPE: 3" thin-walled tube & 2" split-barrel LOCATION: N3024.7; E8057.1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (10 20 30 40 50 60 70)	- #200, %
			Stiff dark gray clay (CH) -with roots to 1.5' -brown with calcareous nodules & sand pockets below 2'				
5			Tan silt (MH) -with roots & ferrous nodules below 5'				87
10							
			Stiff reddish brown clay, blocky -with silt layer, 13' to 13.5' (CH)		92		
15							
			Soft dark gray very silty clay (CL) -with tan silt layer, 19.5' to 21' -brown below 21'				
20							
25			Tan silt (MH)				
30			Stiff reddish brown clay (CH) -brown with gray streaks below 29.5' -with organic matter, 33' to 35'	5			
35							
40			Tan silty fine sand (SM)	12			13
			Brown silt with clay seams (MH)	4			
50			Tan silty fine sand with clay pockets (SM)	20			14
60							

Note Scale Change

COMPLETION DEPTH: 50'
DATE: June 6, 1975

DEPTH TO WATER IN BORING: 9.3'

Caved at: 10.5'

DATE: June 16, 1975

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PLATE 5

LOG OF BORING NO. 180
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

TYPE: 3" thin-walled tube & 2" split-barrel LOCATION: N 6476.7; E 6243.6

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT (0.2 0.4 0.6 0.8 1.0 1.2 1.4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (10 20 30 40 50 60 70)	- #200, %
			Firm brown clay (CH)				
			-with organic matter to 2'		80		
			-stiff, 2' to 4'				109
5			-with calcareous nodules, 4' to 29.5'				
			-stiff reddish brown, 5.5' to 8'				
10			-very stiff, 8' to 18'				
			-reddish brown & light gray, slickensided, with sand pockets & ferrous stains, 8' to 27'		96		
15			-stiff below 18'				
20							
25			-gray, 27' to 29.5'				
30							
			-with sand pockets, organic matter & shell fragments below 33'				89
35							
40			Brown silt with clay seams & pockets & organic matter (MH)				91
			Stiff brown clay (CH)				
			-with silt layer, 43.5' to 44.4'				
50			Tan fine to medium sand with shell fragments & traces of mica (SP)	15			6
				48			
60							

Note Scale Change

COMPLETION DEPTH: 56.5'
DATE: June 5, 1975

DEPTH TO WATER IN BORING: 11.5' Caved at: 12'

DATE: June 6, 1975

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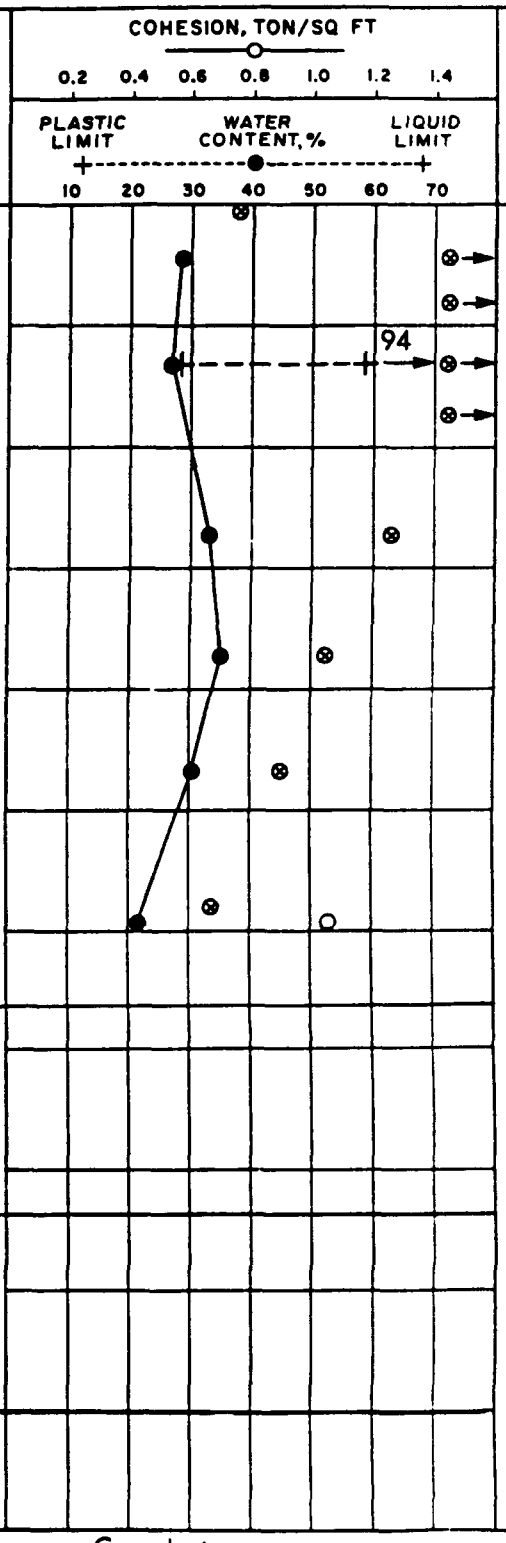
LOG OF BORING NO. 181
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

TYPE: 3" thin-walled tube & 2" split-barrel LOCATION: N 8093.5; E 7649.2

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	-#200, %
			Stiff brown clay (CH)			
			-with organic matter to 1.5'			
5			-with calcareous nodules, 2' to 6.5'			
			-very stiff, blocky, 2' to 23'			
			-reddish brown with ferrous nodules, 6.5' to 13'			
10						
			-reddish brown & light gray and slickensided below 13'			
15						
20						
			-with silt pockets & partings, 23' to 26'			
25			-stiff below 23'			
			-gray, slightly sandy, with organic matter, 26' to 32'		103	
30						
			Brown & gray silt (MH)			88
35						
			-tan with reddish brown & gray clay pockets below 38'			88
40						
			Tan silty fine sand (SM)	13		
50				18		28
60						



Note Scale Change

COMPLETION DEPTH: 60'
DATE: June 6, 1975

DEPTH TO WATER IN BORING: -

Caved at: 11.4'

DATE: June 12, 1975

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LOG OF BORING NO. 213
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

4" Auger
Type: 3" thin-walled tube **Location:** N 9700; E 7919

Surface El : 63.6'

Depth, Feet	Symbol	Samples	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
			Very stiff brown clay (CH)				
			-with organic matter to 3'	1.2	32	90	30
			-with ferrous nodules to 7'				
5			-with calcareous nodules, 2' to 5'	1.2	31		
			-tan below 5'	1.1	33		
				1.2	33		
10							
15							
20							

Completion Depth: 9.5' Depth To Water
Date: June 27, 1976 In Boring: Dry Date: June 28, 1976

LOG OF BORING NO. 214
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

4" Auger
Type: 3" thin-walled tube **Location:** N 8821; E 7140

Surface El : 63.9'

Depth, Feet	Symbol	Samples	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
			Stiff brown clay with calcareous nodules (CH)	0.5			
			-with organic matter to 3'	1.0	40		
			-with ferrous nodules below 3'	1.2	32	84	28
5			-red & slickensided below 3.5'		33		
			-very stiff below 5'	1.2	34		
10							
15							
20							

Completion Depth: 9.5' Depth To Water
Date: June 27, 1976 In Boring: Dry Date: June 28, 1976

LOG OF BORING NO. 215
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

4" Auger
Type: 3" thin-walled tube **Location:** N 7900; E 6386

Surface El : 63.9'

Depth, Feet	Symbol	Samples	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
			Very stiff brown clay (CH)				
			-with organic matter to 5'				
			-gray, 2' to 3.5'	1.2	38	98	30
			-with calcareous nodules below 2'				
5			-brown, 3.5' to 5.5'	1.0	36		
			-red with ferrous nodules below 5.5'	1.1	33		
				1.2	33		
10							
15							
20							

Completion Depth: 9.5' Depth To Water
Date: June 27, 1976 In Boring: Dry Date: June 28, 1976

LOG OF BORING NO. 216
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

6" Auger
Type: 3" thin-walled tube **Location:** N 7210; E 5583

Surface El : 64.0'

Depth, Feet	Symbol	Samples	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
			Very stiff brown clay with calcareous & ferrous nodules (CH)	1.6	36	95	31
			-with organic matter to 3'				
5			-red below 5.5'	1.2	34		
				1.0	34		
				1.3	31		
10							
15							
20							

Completion Depth: 9.5' Depth To Water
Date: June 26, 1976 In Boring: Dry Date: June 27, 1976

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PLATE 8

LOG OF BORING NO. 217
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

4" Auger
Type: 3" thin-walled tube **Location:** N 6350; E 4788

Surface El : 63.8'

Depth, Feet	Symbol	Samples		Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
			Stiff brown clay with calcareous (CH) nodules				
			-with organic matter to 4'	0.7	38	96	27
			-with ferrous nodules, 4' to 7.5'				
5			-red, 4.5' to 13.5'				
			-with 2" silt seam at 6.5'	0.8	29		
			-very stiff below 7'				
10				1.0	35		
			-tan & light gray below 13.5'				
15							
			-with shell fragments below 18.5'				
20				1.2	35		

Completion Depth: 19.5' Depth To Water
Date: June 28, 1976 In Boring: 5' Date: June 29, 1976

LOG OF BORING NO. 218
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

6" Auger
Type: 3" thin-walled tube **Location:** N 5750; E 4130

Surface El : 64.1'

Depth, Feet	Symbol	Samples		Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
			Stiff brown clay (CH)				
			-with organic matter to 2'	0.8	22	30	20
			-silty 2' to 2.5'		38		
			-tan & gray below 2.5'				
5			-with tan silt partings below 3.5'	2.0	17		
			-hard below 5'				
			Very stiff tan silty clay (CL)				
10					24	29	22
15							
20							

Completion Depth: 10' Depth To Water
Date: June 26, 1976 In Boring: Dry Date: June 27, 1976

LOG OF BORING NO. 219
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

4" Auger
Type: 3" thin-walled tube **Location:** N 4830; E 3307

Surface El :

Depth, Feet	Symbol	Samples		Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
			Stiff brown clay (CH)				
			-with organic matter to 4.5'	0.8	35		
			-with calcareous nodules below 2'				
5			-gray & tan, 2.5' to 5.5'	0.8	38	91	31
			-very stiff below 6'				
			-with ferrous nodules, 8' to 14.5'	0.9	28		
10							
15				1.2	34		
			-tan & gray, slickensided below 18.5'				
20				1.2	33		

Completion Depth: 20' Depth To Water
Date: June 28, 1976 In Boring: 16.5' Date: June 29, 1976

LOG OF BORING NO. 220
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

4" Auger
Type: 3" thin-walled tube **Location:** N 7260; E 6985

Surface El : 63.4'

Depth, Feet	Symbol	Samples		Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
			Stiff brown clay with calcareous (CH) & ferrous nodules	1.0	35	102	32
			-with organic matter to 3.5'				
			-very stiff below 2.5'	1.8	15		
5			-red & gray below 4'				
			-slickensided with silt partings, 6' to 7'	1.9	31		
				1.6	31		
10							
15							
20							

Completion Depth: 9.5' Depth To Water
Date: June 27, 1976 In Boring: Dry Date: June 28, 1976

LOG OF BORING NO. 221
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

6" Auger
Type: 3" thin-walled tube Location: N 5700; E 5584

Surface El : 63.8'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Very stiff brown clay. (CH)				
	-with organic matter to 4.5'	1.5	29	99	25
	-with calcareous nodules to 6'	1.0	34		
5	-with ferrous nodules, 2' to 6'				
	-tan, 2.5' to 6'	1.3	29		
	-red below 6'				
		1.9	32		
10					
15					
20					

Completion Depth: 9' Depth To Water
Date: June 26, 1976 In Boring: Dry Date: June 27, 1976

LOG OF BORING NO. 222
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

4" Auger
Type: 3" thin-walled tube Location: N 5072; E 5075

Surface El : 57.1'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Very stiff gray clay (CH)	2.3	52		
	-with organic matter to 5'				
	-gray & tan, 2' to 5'	0.6	42	98	33
5					
		1.7	34		
		1.0	32		
10					
15					
20					

Completion Depth: 9.5' Depth To Water
Date: June 27, 1976 In Boring: 9' Date: June 28, 1976

LOG OF BORING NO. 223
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

4" Auger
Type: 3" thin-walled tube Location: N 3260; E 4054

Surface El : 61.2'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Firm brown clay with calcareous &				
	ferrous nodules (CH)	0.8	32	89	31
	-with organic matter to 3.5'				
	-very stiff below 2.5'	1.9	28		
5	-red & gray below 4'				
	-slickensided with silt partings,	1.6	27		
	6' to 7'	1.6	26		
10					
15					
20					

Completion Depth: 9' Depth To Water
Date: June 27, 1976 In Boring: Dry Date: June 28, 1976

LOG OF BORING NO. 224
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

4" Auger
Type: 3" thin-walled tube Location: N 7120; E 9010

Surface El : 62.6'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Very stiff brown clay with calcareous	1.5	32		
	nodules (CH)	1.1	35	88	31
	-with organic matter to 3.5'				
	-brown & tan, 4' to 5.5'	1.6	30		
5	-with ferrous nodules below 4.5'				
	-tan below 5.5'				
	-with silt seam at 7.5'				
	-hard below 7.5'	2.5+	20		
10					
15					
20					

Completion Depth: 9.5' Depth To Water
Date: June 28, 1976 In Boring: Dry Date: June 29, 1976

LOG OF BORING NO. 225
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

4" Auger
Type: 3" thin-walled tube Location: N 6360; E 8369

Surface El: 64.1'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Hard dark gray clay (CH)				
	-with organic matter to 3'	2.5+	20	61	20
	-red with ferrous nodules & silt partings below 2'	2.5+	14		
5					
	Hard red silty clay (CL)	2.5+	10	33	18
10					
15					
20					

Completion Depth: 8.5' Depth To Water
Date: June 28, 1976 In Boring: Dry Date: June 29, 1976

LOG OF BORING NO. 226
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

4" Auger
Type: 3" thin-walled tube Location: N 5630; E 7557

Surface El: 62.1'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Stiff gray clay (CH)				
	-with organic matter to 3'	0.7	39	90	35
	-with calcareous nodules below 2'				
	-very stiff below 3'				
5	-tan & dark gray, 4.5' to 7.5'	1.2	31		
	-red below 7.5'				
	-with ferrous nodules below 8'	1.0	30		
10					
15					
20					

Completion Depth: 9.5' Depth To Water
Date: June 28, 1976 In Boring: Dry Date: June 29, 1976

LOG OF BORING NO. 227
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

4" Auger
Type: 3" thin-walled tube Location: N 4835; E 6900

Surface El: 59.3'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Hard brown clay (CH)				
	-with organic matter to 3.5'	2.2	33	99	27
	-with calcareous nodules below 2.5'				
	-very stiff below 5'	2.0	33		
5	-with ferrous nodules, 6' to 8'	1.8	31		
	-with tan silt partings below 9.5'	1.6	26		
10					
		1.5	34		
15	Stiff to firm tan & brown silty clay (CL)				
	-with clay seams below 18'	0.3	29	39	17
20					

Completion Depth: 19.5' Depth To Water
Date: June 28, 1976 In Boring: 10.1' Date: June 29, 1976

LOG OF BORING NO. 228
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

6" Auger
Type: 3" thin-walled tube Location: N 4125; E 6231

Surface El: 64.2'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Hard dark gray clay with organic matter (CH)	2.2	30		
	Stiff tan & dark gray silty clay with siltstone nodules & dark gray clay pockets (CL)		34	45	1[illegible]
5	-red below 6'				
			24	2[illegible]	15
10					
15					
20					

Completion Depth: 10' Depth To Water
Date: June 26, 1976 In Boring: 8.6' Date: June 2[illegible], 197[illegible]

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PLATE 11

LOG OF BORING NO. 229
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

6" Auger
Type: 3" thin-walled tube Location: N 3380; E 5531

Surface El : 61.9'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Hard brown clay with calcareous nodules (CH)	2.0	28	93	28
	-with organic matter to 2.5'				
	-brown & dark gray, 2' to 4'				
5	-slickensided below 2.5'	1.8	28		
	-with ferrous nodules below 4'				
	-tan, 4' to 12'				
	-very stiff below 5'	1.1	31		
10					
	-red & light gray below 12'				
15					
	Stiff gray & tan silty clay with tan silt seams (CL)	0.8	21	34	15
20					

Completion Depth: 20' Depth To Water
Date: June 26, 1976 In Boring: 10.9' Date: June 27, 1976

LOG OF BORING NO. 230
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

6" Auger
Type: 3" thin-walled tube Location: N 2669; E 4860

Surface El : 61.6'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Very stiff brown clay (CH)				
	-with organic matter to 3'				
	-with calcareous nodules below 2.5'	1.0	39	97	28
	-red with ferrous nodules below 4'				
5		1.6	32		
		1.3	34		
10					
15					
20					

Completion Depth: 9' Depth To Water
Date: June 26, 1976 In Boring: 9.5' Date: June 27, 1976

LOG OF BORING NO. 231
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

6" Auger
Type: 3" thin-walled tube Location: N 5820; E 9694

Surface El : 63.0'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Hard brown clay (CH)				
	-with organic matter to 5'	2.5+	30		
	-with tan silty fine sand pockets at 2.5'	2.5+	22	52	23
5	-red & dark gray below 4.5'	2.4	20		
	-with sand pockets, 4.5' to 5'	1.7	24		
	-with silt partings below 6.5'				
10					
15					
20					

Completion Depth: 9' Depth To Water
Date: June 26, 1976 In Boring: Dry Date: June 27, 1976

LOG OF BORING NO. 232
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

6" Auger
Type: 3" thin-walled tube Location: N 5020; E 8990

Surface El : 58.6'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Hard brown & dark gray clay (CH)				
	-with organic matter to 3'				
	-with calcareous nodules below 0.5'	2.5+	25	90	29
5	-with tan silt partings & pockets, 3.5' to 14'	2.5+	23		
	-tan & gray, slickensided below 6'				
10					
		1.9	23		
15					
		1.7	30		
20					

Completion Depth: 19.5' Depth To Water
Date: June 26, 1976 In Boring: Dry Date: June 27, 1976

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PLATE 12

LOG OF BORING NO. 233
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

6" Auger
Type: 3" thin-walled tube Location: N 4290; E 8325

Surface El : 62.7'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Hard dark gray & brown clay (CH) with organic matter -tan silt partings below 2.5'	2.3	20		
	Hard red silty clay with silt seams (CL)	2.5+	13	34	16
5	Hard brown clay with calcareous nodules (CH)	2.0	20		
	Firm red & brown silty clay (CL)	0.2	22		
10					
15					
20					

Completion Depth: 10' Depth To Water
Date: June 25, 1976 In Boring: Dry Date: June 26, 1976

LOG OF BORING NO. 234
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

6" Auger
Type: 3" thin-walled tube Location: N 3687; E 7725

Surface El : 61.6'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Very stiff brown, tan & dark gray (CH) clay with ferrous -with organic matter to 3'	1.2	34	96	28
5	-gray, 2' to 4.5' -with calcareous nodules below 2'	1.6	30		
	-tan & gray 4.5' to 7.5' -red below 7.5' -silty, 7.5' to 9.5' & 12' to 13.5' -with silt seams, 9.5' to 12'		26		
10					
			26		
15	-with red silt partings below 18'	1.5	28		
20					

Completion Depth: 20' Depth To Water
Date: June 25, 1976 In Boring: 12.3' Date: June 26, 1976

LOG OF BORING NO. 235
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

6" Auger
Type: 3" thin-walled tube Location: N 2897; E 7010

Surface El : 61.4'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Hard tan clay (CH) -with organic matter to 3'	2.4	39	98	29
		0.7	24		
5	Stiff red silty clay (CL)	0.5	21	33	22
10		0.5	24		
15					
20					

Completion Depth: 10' Depth To Water
Date: June 25, 1976 In Boring: 9.7' Date: June 26, 1976

LOG OF BORING NO. 236
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

6" Auger
Type: 3" thin-walled tube Location: N 2128; E 6290

Surface El : 61.7'

Depth, Feet	Description	Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
	Hard brown clay with (CH) calcareous nodules	2.0	33		
	-with organic matter to 3' -with ferrous nodules to 4.5'	1.2	31	88	30
5	-red below 2.5' -with tan silt seams & siltstone nodules below 6.5'				
	-stiff below 9.5'	0.8	27		
10					
15					
20					

Completion Depth: 10' Depth To Water
Date: June 25, 1976 In Boring: 9.4' Date: June 26, 1976

LOG OF BORING NO. 237
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 6" Auger / 3" thin-walled tube Location: N 450; E 6160

Surface El : 57.3'

Depth, Feet	Symbol	Samples		Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
			Very stiff dark gray clay (CH)		43		
			-with organic matter to 6.5'				
			-dark gray & tan, 2' to 6.5'	1.3	40	104	36
			-with calcareous nodules below 4.5'				
5							
			-tan & light gray below 6.5'	1.5	32		
10							
15							
20							

Completion Depth: 9.5' Depth To Water
Date: June 25, 1976 In Boring: 8.4' Date: June 26, 1976

LOG OF BORING NO. 238
ASH STORAGE AREA
W. A. PARISH GENERATING STATION

Type: 4" Auger / 3" thin-walled tube Location: N 4480; E 5510 (Approx.)

Surface El : 64.1'

Depth, Feet	Symbol	Samples		Cohesion, tsf	Water Content, %	Liquid Limit	Plastic Limit
			Very stiff brown clay with organic matter (CH)				
			Very stiff red silty clay with silt seams & calcareous nodules (CL)	1.1	19	39	17
5				1.1	20		
			Very stiff red clay with calcareous nodules (CH)	1.8	24		
				1.2	30		
10							
15							
20							

Completion Depth: 9' Depth To Water
Date: June 27, 1976 In Boring: Dry Date: June 28, 1976

LOG OF BORING NO.

Type: Location:

Surface El :

Depth, Feet	Symbol	Samples

Completion Depth:
Date:

LOG OF BORING NO.

Type: Location:

Surface El :

Depth, Feet	Symbol	Samples

Completion Depth:
Date:

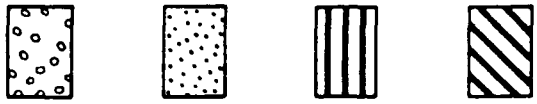
McCLELLAND ENGINEERS

PLATE 14

SYMBOLS AND TERMS USED ON BORING LOGS

SOIL TYPES

(SHOWN IN SYMBOL COLUMN)



Gravel | Sand | Silt | Clay

Predominant type shown heavy

SAMPLER TYPES

(SHOWN IN SAMPLES COLUMN)

Shelby Tube | Auger | Split Spoon | No Recovery

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on No. 200 sieve): Includes (1) clean gravels and sands, and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as determined by laboratory tests.

DESCRIPTIVE TERM	RELATIVE DENSITY
Loose	0 to 40%
Medium dense	40 to 70%
Dense	70 to 100%

FINE GRAINED SOILS (major portion passing No. 200 sieve): Includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests.

DESCRIPTIVE TERM	UNCONFINED COMPRESSIVE STRENGTH TON/SQ FT
Very soft	less than 0.25
Soft	0.25 to 0.50
Firm	0.50 to 1.00
Stiff	1.00 to 2.00
Very stiff	2.00 to 4.00
Hard	4.00 and higher

Note: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of planes of weakness or cracks in the soil. The consistency ratings of such soils are based on penetrometer readings.

TERMS CHARACTERIZING SOIL STRUCTURE

Slickensided – having inclined planes of weakness that are slick and glossy in appearance.

Fissured – containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.

Laminated – composed of thin layers of varying color and texture.

Interbedded – composed of alternate layers of different soil types.

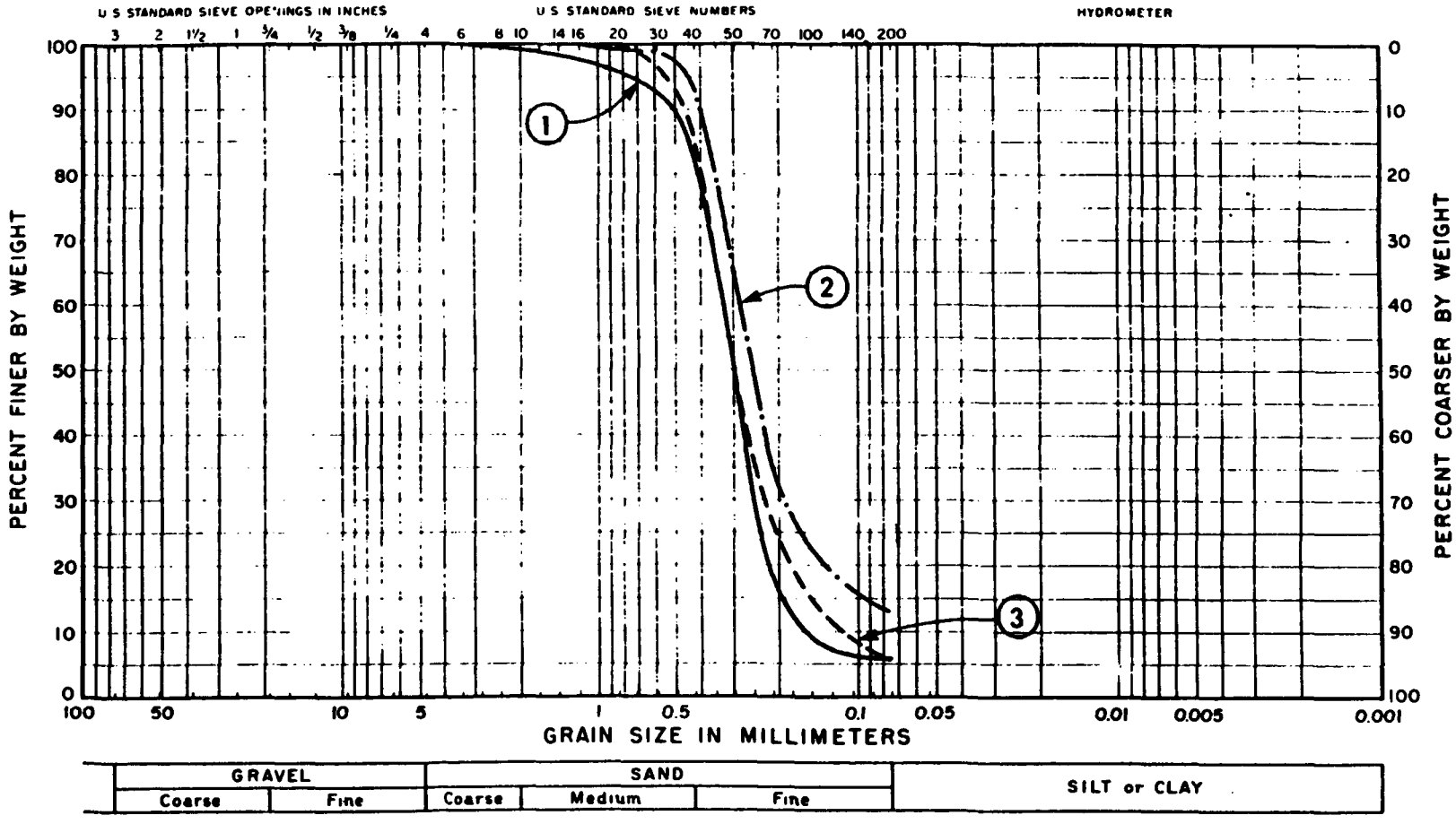
Calcareous – containing appreciable quantities of calcium carbonate.

Well graded – having wide range in grain sizes and substantial amounts of all intermediate particle sizes.

Poorly graded – predominantly of one grain size, or having a range of sizes with some intermediate size missing.

Terms used in this report for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in Technical Memorandum No. 3-357, Waterways Experiment Station, March 1953

GRAIN SIZE CURVES



Curve No.	Boring No.	Depth, Ft.	Material
1	177	50	Tan fine to medium sand
2	179	50	Tan silty fine sand
3	180	50	Tan fine to medium sand

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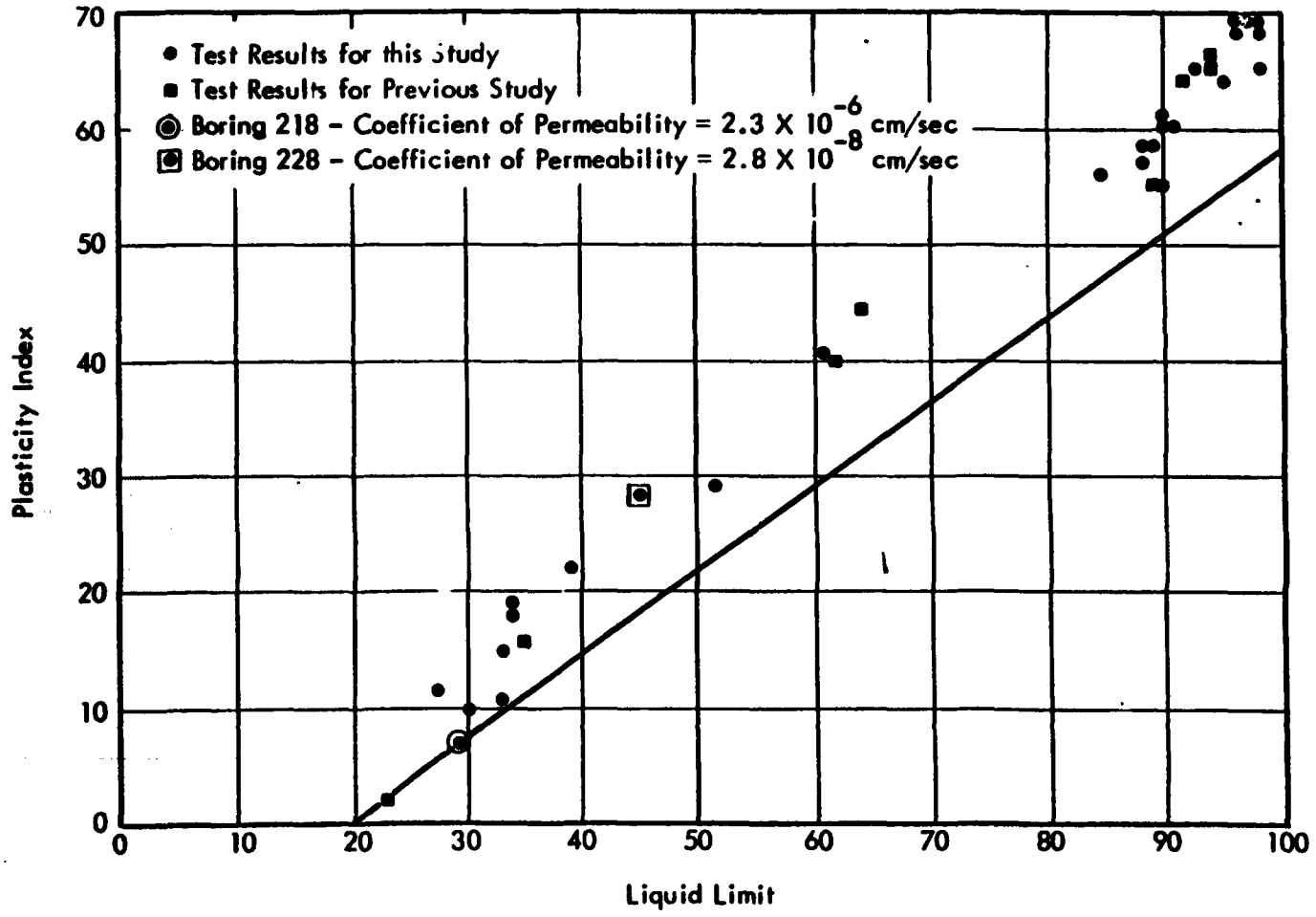
PLATE 16

Boring	Depth, Ft.	Material	Unit Dry Weight pcf	Water Content, %	Liquid Limit	Plastic Limit	Permeability cm/sec
218	10	Silty Clay	102	24	29	22	2.3×10^{-6}
228	2.5	Silty Clay	95	34	45	17	2.8×10^{-8}

RESULTS OF PERMEABILITY TESTS



PLASTICITY CHART

REFERENCE 11

TDWR OPEN DUMP INVENTORY
INSPECTOR'S COMMENTS
HOUSTON LIGHTING & POWER
W. A. PARISH GENERATING STATION
TDWR REGISTRATION NO. 31631
INSPECTION JUNE 8, 1983

Elizabeth L. Whitney met with Ellen Zampello and Richard Bye of the Houston Lighting and Power Company on Wednesday, June 8, 1983. The facility investigated was Facility No. 01, a lagoon at the W. A. Parish Generating Station, TDWR No. 31631.

The lagoon has a registered size of 945.868 acres. Currently 80 acres are in use. The facility handles three wastes, Sequence Nos. 002, Miscellaneous Inorganic Sludges; 004, Boiler Ash; and 020, Fly Ash.

The fly ash disposal is contracted to Ash Management, Inc. of Marietta, Georgia. Fly Ash is brought to the lagoon via truck. A portable header transports lagoon water to the truck and the water is mixed with the fly ash to form a slurry. The slurry is then discharged to a system of cells. In the cell, the heavier ash settles out and is sold for recovery. One use is as a road base material. Any excess water in the cell is discharged back to the lagoon.

Bottom ash is also stockpiled at the site in a small area. This material is retrieved from the boiler and is sold for recovery.

Flue Gas Desulfurization sludge is stockpiled in another portion of the permitted lagoon area. This sludge has recently been declassified as a hazardous waste and is now classified as Class II. It is dry when stockpiled. Houston Lighting and Power also plans to sell this waste for recovery. Marketing plans are underway currently. The stockpiling of this sludge at the facility began this Spring.

Three other wastes, Sequence Nos. 012, Demineralizer Regenerant Sludge; 014, Sludge containing Inorganics; and 016, Sludge containing Organics are not currently disposed of in the lagoon area. These wastes are on the Solid Waste Registration in the event of a need at the generating station to clean out tanks containing this matter.

Compliance Data on next page

There are no dikes surrounding the lagoon area. Mr. Bye, Environmental Engineer for Houston Lighting & Power, stated that the facility is not in the 100 year flood plain. In addition, he stated the acreage in use is small in comparison to the permitted area. An inspection of perimeter contours of the lagoon area shows contaminated runoff would be contained within the 945.868 acre area according to Mr. Bye.

Although the Permit states that the facility is a lagoon, the only lagoon area is for the fly ash disposal. The remaining acreage in the 945 acre permitted facility is dry, and this is where the other wastes are stockpiled.

Noncompliant with Ch. 3 (Surface Water - Non-Point Source Disch and Ch. 8 (Floodplains) of the Open Dump Inventory Criteria.

Compliant with all other Criteria.

Low Priority for Ground-Water Monitoring (Ch. 4)

J. Stadler

7-28-83

REFERENCE 12

ISW 31631

HYDROGEOLOGIC EVALUATION

AT THE

W.A. PARISH GENERATING STATION

FOR

HOUSTON LIGHTING & POWER COMPANY

HOUSTON, TEXAS

DECEMBER 1985

344-02

RESOURCE ENGINEERING

3000 RICHMOND AVENUE, HOUSTON, TEXAS 77098, (713) 520-9900

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1. Figures
2. Surface Deposits Map
3. Cone Penetrometer Logs and Boring Log

1.0 INTRODUCTION

During the summer of 1985, REI performed a detailed hydrogeologic investigation of the coal combustion by-product storage area at Houston Lighting & Power (HL&P) Company's W.A. Parish Electric Generating Station. The purpose of the investigation was to assess the need for groundwater monitoring in the vicinity of the storage area.

There are three areas designated for coal combustion by-product storage as shown in Figure 1 of Attachment 1. Two of these are active above-ground landfills, and the third is a proposed 30-acre site for an above-ground landfill. All three areas are designed for storage of coal combustion by-products (fly ash, bottom ash and FGD sludge) generated at the Parish Station. All coal combustion by-products have been designated as Class II wastes by the Texas Water Commission.

In order to evaluate the hydrogeology of the area, it was necessary to first define the subsurface stratigraphy. This information, along with the knowledge of the regional geology and hydrogeology, provides for an interpretation of the potential for groundwater contamination and the need for groundwater monitoring.

2.0 REGIONAL GEOLOGY

The HL&P Parish Station is located on the western Gulf Coastal Plain Geologic Region which consists of thousands of feet of sedimentary materials deposited by formerly and presently active deltaic, alluvial, eolian dune, bay-estuarine and barrier island-shoreline geologic processes. The Gulf Coastal Plain is underlain by a thick series of sedimentary deposits (in excess of 30,000 feet) which crop out in belts parallel to the Coast and dip at low angles thickening down-dip toward the Gulf. The lithology of these sequences reflect three depositional environments: continental (alluvial plain), transitional (delta, lagoon, and beach), and marine (continental shelf).

The deposits of the Gulf Coastal Plain belong chiefly to the Tertiary Period (70 million to 3 million years old) and to the Pleistocene epoch and Holocene epoch, 3 million to 0.2 million years and 0.2 million years old to present, respectively.

The upper Tertiary (Pliocene) and Quaternary (Pleistocene and Holocene) stratigraphic units are, from the oldest to youngest, the Goliad Formation of Pliocene age, the Willis Formation of Pleistocene age, the Montgomery and Bentley of Pleistocene age, the Beaumont Formation of Pleistocene age, and Pleistocene to Recent alluvial and Coastal deposits.

The Goliad Formation lies unconformally over clays of the Fleming Formation and is, in turn, overlain by deposits of the Willis Formation. The Goliad crops out in a belt 10 to 20 miles wide that trends roughly northeast and parallel to the coast. The Goliad sediments are generally light-gray, medium to coarse grained unconsolidated sands, locally cemented, and cross-bedded. These sands are interbedded with pinkish or greenish calcareous clay, marls, and clayey sands. A cherty conglomerate is common at the base of the formation.

The Willis Formation overlies the Goliad and consists predominately of sands. The Montgomery and Bentley overlie the Willis and are undifferentiated sediments consisting of clay with some sand layers.

The Beaumont Formation of Pleistocene age, which crops out over most of Harris County, overlies the Montgomery and Bentley. The Beaumont Formation crops out as a low plain 30 to 40 miles wide and parallel to the coastline and dips southeast toward the Gulf at a rate of 1.5 to 5 feet per mile. The Beaumont Formation is principally a poorly bedded, calcareous clay of various colors, containing thin discontinuous stringers and lenses of silt, sand, and fine sand. These materials were deposited in deltaic and fluvial environments and distributary channels; interdistributary lakes, bays, and lagoons; and river channel and overbank deposits.

The Geologic Atlas of Texas, Houston Sheet, 1968 (Attachment 2) describes the surface deposits in the vicinity of the Parish Station as belonging to the Recent Alluvium of the Brazos River and the Beaumont Formation of Pleistocene age. The deposits are described as being mostly point bar, natural levee, stream channel and backswamp deposits.

Typical environments of deposition for the sand bodies encountered at the Parish Station are shown in Figure 2 of Attachment 1. These include the meander belt system in which sandy point bars were deposited in shifting meandering loops. Such deposition resulted in a sinuous, stacked geometry of sand bodies encompassed by overbank deposits of mud, organic material and crevasse splay deposits. Crevasse splay deposits result when the level of the water in the channel is higher than the level outside the channel, thin sheets of water then flow down the sides of the levees. The levee sediment is easily eroded, however, so that sheet flows tend to be concentrated into channels and thus erode gaps through the levees. Such gaps have been named crevasses. As such the stratigraphy is complex with sinuous sand stringers as well as thin, laterally extensive sheet sand deposits.

3.0 REGIONAL HYDROLOGY

Groundwater in the Coastal Plain region occurs under both confined and unconfined conditions. Shallow aquifers in alluvial valleys are important sources of groundwater for limited rural domestic and livestock watering purposes. Wells in these aquifers are generally less than 50 feet deep, and typically yield a few gallons per minute. Recharge of the unconfined aquifers is mainly from local infiltration of rainfall, runoff, and ponded water. Deeper confined aquifers are the source of large volume municipal and industrial groundwater supplies in the area. These include the Chicot, Evangeline, and Jasper aquifers.

The Chicot aquifer system includes the uppermost confined aquifers in the area and generally refers to all Pleistocene or Quaternary deposits, including the unconfined alluvial aquifers, the confining Beaumont clay and underlying Montgomery Formation, Bentley Formation and Willis sand. The thickness of the aquifer increases toward the Gulf from zero at the western edge of the Quaternary outcrop (80 miles from the Gulf) to over 1,200 feet at the Gulf. The transmissivity ranges from zero to about 20,000 feet^2/day, with storage coefficients ranging from 0.004 in the confined area of the aquifer to 0.20 in the northern, unconfined area.

The Evangeline aquifer, comprised of Pleistocene deposits, immediately underlies the Chicot. It is the most important source of fresh groundwater in the Houston metropolitan area. Although it has a lower hydraulic conductivity than the Chicot, the thicknesses are greater, up to about 2,000 feet near the Gulf of Mexico. The transmissivity is greater than that of the Chicot aquifer over much of the area, ranging over 5,000 $feet^2$/day at the Gulf. The storage coefficient ranges from 0.0005 in the southern confined area to 0.20 in the northern unconfined area. Also, both of the major aquifers nearest the ground surface indicate regional gradients to the southeast, with water in the aquifers flowing down dip between confining layers.

The Evangeline aquifer is underlain by the Burkeville confining layer of the Tertiary Fleming Formation. Below the Burkeville is the Jasper aquifer.

Rainfall is the source of the abundant supply of groundwater in the region. U.S. Weather Bureau records extending back to 1889 show that the extremes in annual precipitation range from more than 70 inches in 1900 to 23 inches in 1917. The average annual precipitation is about 45 inches. Approximately 10 inches of this precipitation runs off in surface streams. Evaporation and transpiration by plants

account for most of the remainder. A small portion percolates down through the soil and past the root zone, eventually to reach the water table.

4.0 STRATIGRAPHIC INVESTIGATION

4.1 Field Techniques - There were three areas of investigation: the large existing storage area, the proposed storage area, and a smaller existing storage area located approximately 1100 feet north of the proposed new storage area. The near surface (upper 40 feet) geologic materials were mapped using a geophysical tool called a cone penetrometer. Cone penetrometer soundings were located at 25 locations across the area as shown on the map in Figure 1 of Attachment 1. The grid pattern for the cone locations was based on the data collected in the field as each sounding was made, thus, the distance between each cone location could be adjusted to yield the maximum amount of information per number of soundings.

The cone penetrometer measures mechanical properties of the soil as the cone is forced into the earth. The readings from the cone are recorded on a strip chart log similar to an electric log. Although the properties measured are different, the cone penetrometer log can be interpreted using the same techniques employed in analyzing electric logs.

To confirm the reliability of the cone penetrometer, a hollow stem auger was used to advance a correlation soil boring next to cone sounding location number 7. The boring was sampled continuously and logged by a REI hydrogeologist. The soil samples were used to verify the cone penetrometer interpretation. The cone logs and boring log are included as Attachment 3.

Upon completion of the cone penetrometer work, all but two holes were grouted to the surface with cement. Penetrometer hole numbers 10 and 15 were not grouted due to the hole being covered over when the cone penetrometer truck had to be towed from the location after becoming stuck in the mud. All the sounding locations were surveyed to a local benchmark by an HL&P survey crew.

4.2 Data Analysis - The data generated from the cone penetrometer survey was used to develop six stratigraphic cross sections (Figures 3 through 7 in Attachment 1), which characterize the soil profile across the site. These cross-sections reveal the elevations of the upper and lower contacts between the more transmissive units and the underlying and overlying clays. The predicted ages of the deposits are indicated by the numeric sequence of the strata, with the most recent strata identified with the highest number.

4.2.1 Existing Large and Proposed Storage Areas - Analysis of cone logs show three distinct transmissive zones (2, 6, and 7) in the upper 40 feet at the northern edge of the existing large storage area. Evidence from cone logs and the correlation boring indicate that although the sandy zones represent different periods of deposition they are all hydrologically connected. This fact can be best demonstrated by examining cone log number 7 and the correlation boring. Zones 6 and 7 consist of a red brown silty fine sand with occasional very thin (6 inches or less) discontinuous clayey seams. A characteristic thin clay zone was observed to separate zones 6 and 7. However, this clay zone is not significant enough to act as a hydrologic seal. Zone 7 is generally found at a depth of approximately 12 feet below the road surface on the dike top and varies in thickness from 3 feet to 15 feet. The top of zone 6 shows an appreciable amount of scour and therefore the top of this zone varies considerably in depth across the site, from 15 feet to 25 feet below surface. Zone 2 was only observed at two cone locations, numbers 4 and 7, as well as the correlation boring. Zone 2 was found at a depth of 37.5 feet in the correlation boring and exists as a medium to coarse grained gray sand.

An extent map, Figure 8 in Attachment 1, was prepared showing the general trend of the hydrologic unit, zones 2, 6, and 7. This unit occurs beneath the northern edge of the existing storage area roughly paralleling Rabbs Bayou running between the two storage areas. The unit trends approximately east to west. There is also evidence that a much smaller sand channel exists at the southern edge of the large existing storage area. This unit appears to be very limited in extent and therefore rather insignificant with respect to zones 2, 6, and 7.

4.2.2 Existing Northern Storage Area - The smaller existing storage area to the north is characterized by clay-silty clay in the upper 23 feet. Below the clay unit exists a thick sequence (at least 23 feet) of silty fine sand which contains occasional thin seams of clay. However, these clay seams are very thin and limited in extent and thus do not appear as being effective hydrologic barriers. Refer to cone logs 22 thru 25 and stratigraphic cross-sections E-E' and F'F'. The sandy interval appears to occur across the entire northern storage area.

5.0 CONCLUSIONS

The depositional history of the area has resulted in a complex stratigraphy across the site in which numerous transmissive zones exist in some locations as a stacked geometry of sand channels. Although these different sandy zones represent different periods of deposition, they must be treated as one hydrologic unit.

The large existing storage area is lined with 3 feet of compacted clay which would prevent contaminant migration. However, the transmissive zones are the potential contaminant migration pathway due to their proximity to the surface. Although these shallow zones are not major sources of groundwater, they can be used as small quantity sources for domestic and livestock use. Therefore, it must be concluded that groundwater monitoring of the near surface sand channel between the large existing and proposed storage areas is advisable.

The clay layer beneath the proposed storage area and the existing smaller storage area to the north is sufficient to preclude groundwater monitoring. Previous geological reports have indicated that this 20 foot thick clay layer has a permeability of less than 10^{-7} cm/sec. Although the depth to groundwater may only be ten feet or less as previously reported, this low permeability would inhibit any migration within the clay.

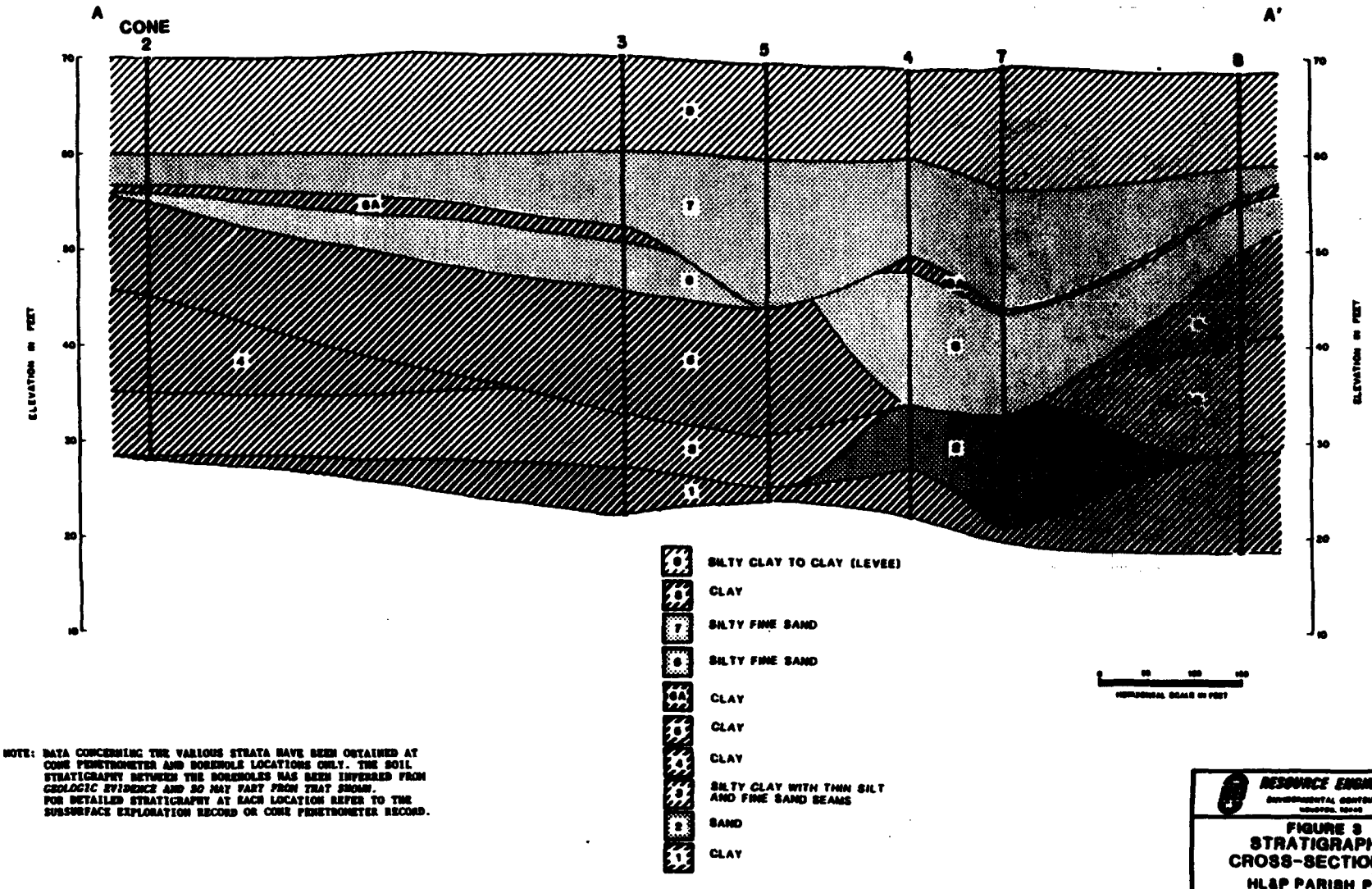
The small sand zone found on the north side of the large existing storage area is not considered a major potential contaminant migration pathway. It is quite thin and narrow and overlain with the 3 foot clay liner in place in the storage area.

Although the hydrologic unit identified between the existing large and the proposed storage areas is a potential migration pathway, there is no impact on the regional aquifers. These aquifers are several hundred feet below the surface and are overlain by the confining Beaumont clay. Therefore, no monitoring is necessary for these aquifers.

6.0 RECOMMENDATIONS

Although the potential for groundwater contamination is low, a conservative approach is recommended with the installation of monitoring wells within the shallow sand of zones 6 and 7. Two wells should be placed within the aerial extent of this hydrogeologic unit: one at the eastern edge and one at the western edge of the gap between the existing large and proposed storage areas shown in Figure 8. Both wells should screen the entire sand layer. This will help establish the hydraulic gradient and provide monitoring of the hydrogeologic unit.

No groundwater monitoring wells are recommended for the new disposal area or the northern area. The surface clay layer should be sufficient to inhibit contaminant migration from these above ground units.



NOTE: DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT CONE PENETROMETER AND BOREHOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN THE BOREHOLES HAS BEEN INFERRED FROM *GEOLOGIC EVIDENCE AND SO MAY VARY FROM THAT SHOWN.* FOR DETAILED STRATIGRAPHY AT EACH LOCATION REFER TO THE SUBSURFACE EXPLORATION RECORD OR CONE PENETROMETER RECORD.

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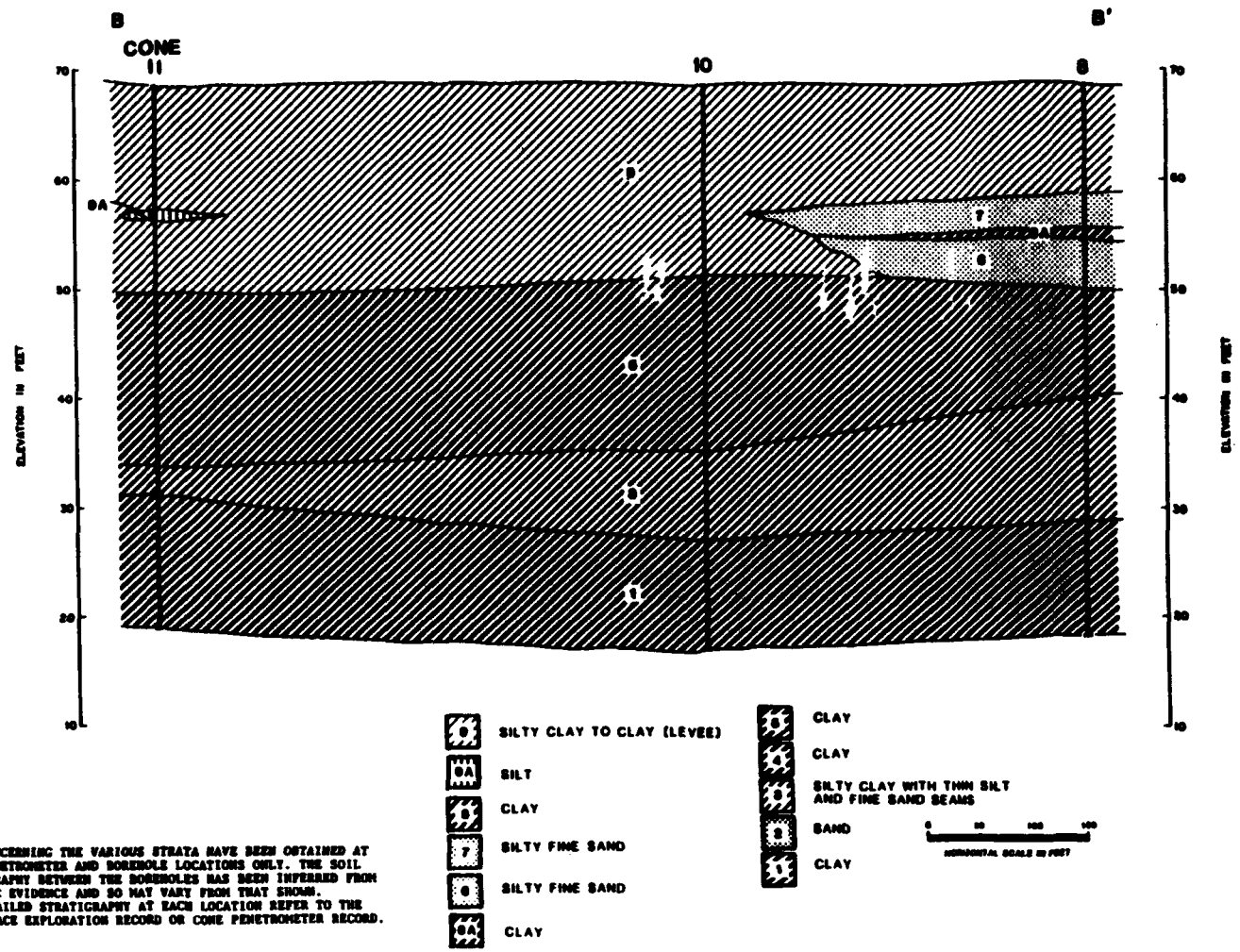
HOUSTON, TEXAS

FIGURE 3
STRATIGRAPHIC
CROSS-SECTION A A'
HL&P PARISH PLANT

DRAWN BY SJ | DATE | PROJECT NO.

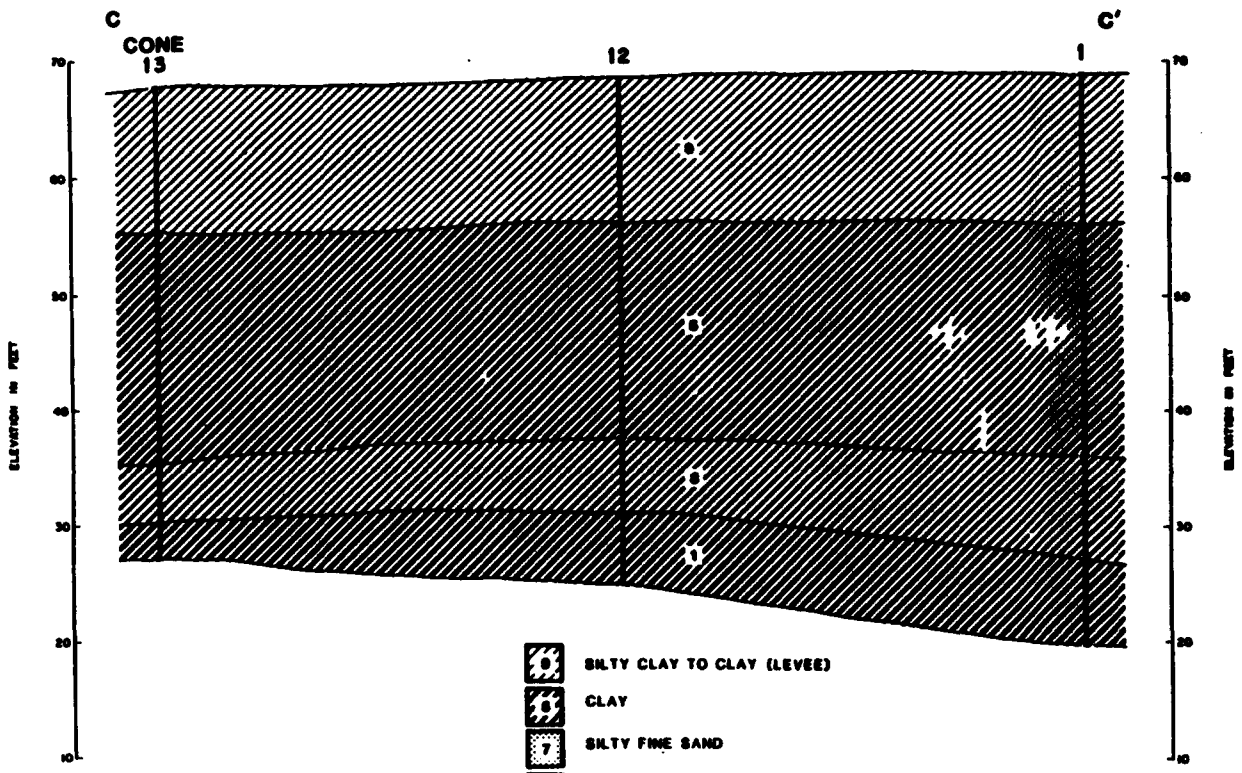


NOTE: DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT CONE PENETROMETER AND BOREHOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN THE BOREHOLES HAS BEEN INFERRED FROM GEOLOGIC EVIDENCE AND SO MAY VARY FROM THAT SHOWN. FOR DETAILED STRATIGRAPHY AT EACH LOCATION REFER TO THE SUBSURFACE EXPLORATION RECORD OR CONE PENETROMETER RECORD.

RESOURCE ENGINEERING
ENVIRONMENTAL CONSULTANTS
HOUSTON, TEXAS

FIGURE 4
STRATIGRAPHIC
CROSS-SECTION BB'
HL&P PARISH PLANT

DRAWN BY | DATE | PROJECT NO.

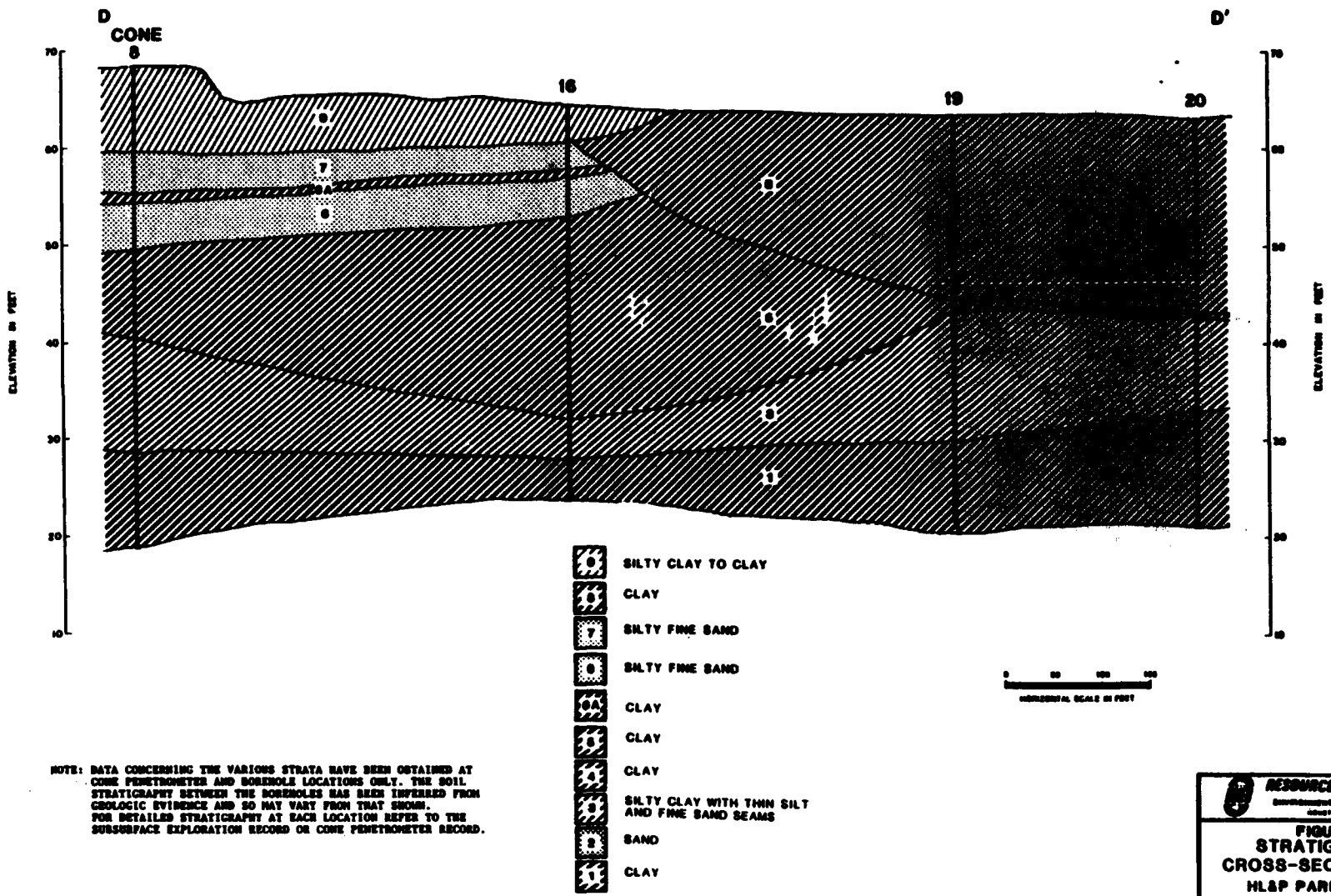


NOTE: DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT CONE PENETROMETER AND BOREHOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN THE BOREHOLES HAS BEEN INFERRED FROM GEOLOGIC EVIDENCE AND SO MAY VARY FROM THAT SHOWN. FOR DETAILED STRATIGRAPHY AT EACH LOCATION REFER TO THE SUBSURFACE EXPLORATION RECORD OR CONE PENETROMETER RECORD.

RESOURCE ENGINEERING
ENVIRONMENTAL CONSULTANTS
HOUSTON TEXAS

FIGURE 6
STRATIGRAPHIC
CROSS-SECTION CC'
HL&P PARISH PLANT

DRAWN BY | DATE | PROJECT NO.

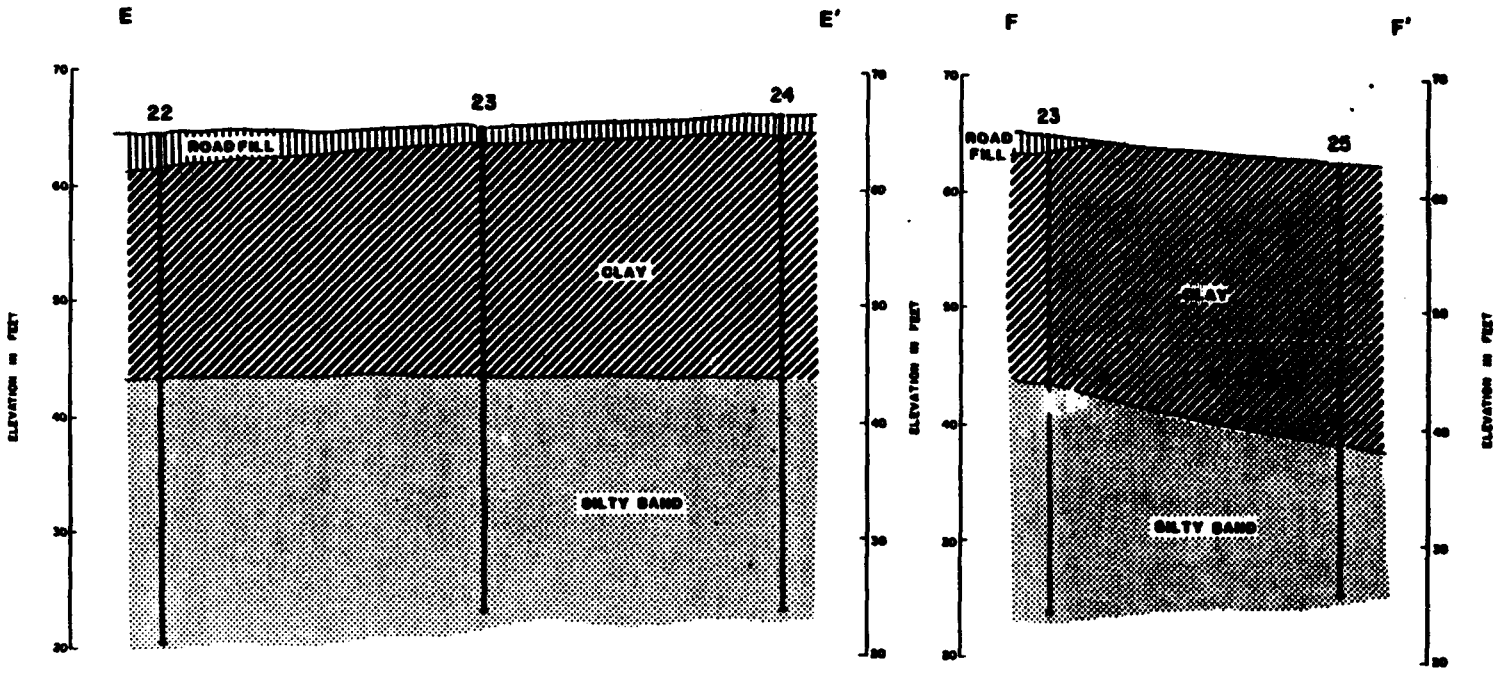


NOTE: DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT CONE PENETROMETER AND BOREHOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN THE BOREHOLES HAS BEEN INFERRED FROM GEOLOGIC EVIDENCE AND SO MAY VARY FROM THAT SHOWN. FOR DETAILED STRATIGRAPHY AT EACH LOCATION REFER TO THE SUBSURFACE EXPLORATION RECORD OR CONE PENETROMETER RECORD.

RESOURCE ENGINEERING
ENVIRONMENTAL CONSULTANTS
HOUSTON, TEXAS

FIGURE 6
STRATIGRAPHIC
CROSS-SECTION DD'
HL&P PARISH PLANT

DRAWN BY: | DATE | PROJECT NO.



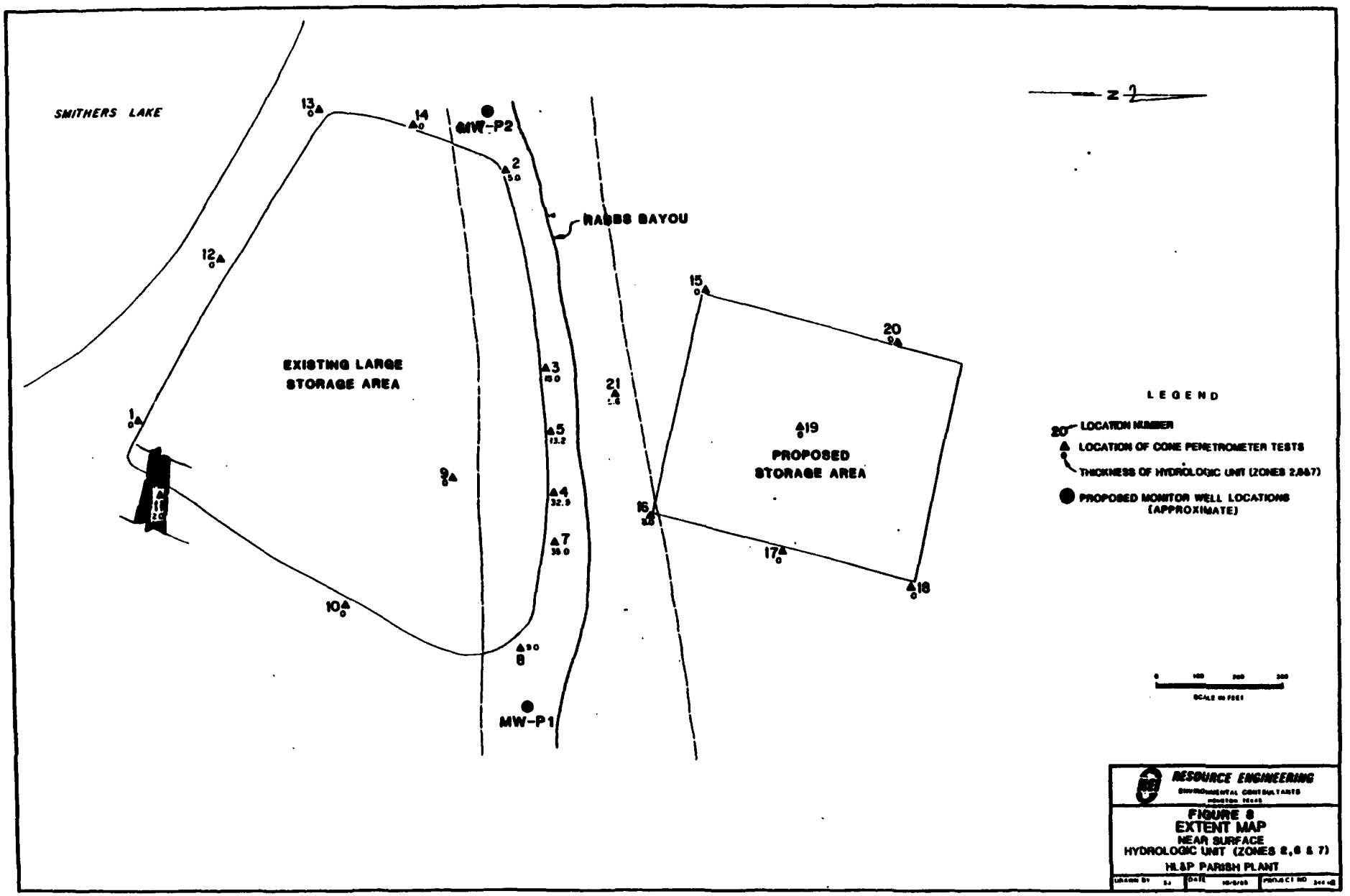
NOTE: DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT CONE PENETROMETER AND BOREHOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN THE BOREHOLES HAS BEEN INFERRED FROM GEOLOGIC EVIDENCE AND SO MAY VARY FROM THAT SHOWN. FOR DETAILED STRATIGRAPHY AT EACH LOCATION REFER TO THE SUBSURFACE EXPLORATION RECORD OR CONE PENETROMETER RECORD.

0 50 100 150
HORIZONTAL SCALE IN FEET

RESOURCE ENGINEERING
ENVIRONMENTAL CONSULTANTS
HOUSTON, TEXAS

FIGURE 7
STRATIGRAPHIC
CROSS-SECTION EE' & FF'
HL&P PARISH PLANT

DRAWN BY EJ | DATE [illegible] | PROJECT NO [illegible]


SMITHERS LAKE
EXISTING LARGE STORAGE AREA
PROPOSED STORAGE AREA
RABBS BAYOU
MW-P1
MW-P2
LEGEND
LOCATION NUMBER
LOCATION OF CONE PENETROMETER TESTS
THICKNESS OF HYDROLOGIC UNIT (ZONES 2,6&7)
PROPOSED MONITOR WELL LOCATIONS (APPROXIMATE)
SCALE IN FEET
RESOURCE ENGINEERING
ENVIRONMENTAL CONSULTANTS
FIGURE 8
EXTENT MAP
NEAR SURFACE
HYDROLOGIC UNIT (ZONES 2,6 & 7)
HL&P PARISH PLANT

REFERENCE 13

1 - Permit/CD
BG 2 - AO & AO matl (copy)
3 - DMR's
4 - Viol. Sum. Log
5 - NOV
6 - Correspondence
7 - Other
11-14-86 Filed
Clerk's Initials.

BAKER & BOTTS
ONE SHELL PLAZA
910 LOUISIANA
HOUSTON, TEXAS 77002-4995

OTHER OFFICES
WASHINGTON, D.C.
DALLAS
AUSTIN

TELEPHONE: (713) 229-1234
TELECOPIER: (713) 229-1730
TELEX: 76-2779

G-23,673

March 3, 1986

Paul Whitley (6W-EA)
U.S. Environmental Protection
Agency - Region VI
1201 Elm Street
Dallas, Texas 75270

RE: Administrative Order Docket No. VI-86-020, NPDES Permit No. TX0006394, In the Matter of Houston Lighting & Power Company

Dear Mr. Whitley:

Enclosed for filing please find the original and one copy of our Answer to Findings of Violation and Administrative Order of January 28, 1986. By copy of this correspondence, we are serving Rex McDonnell at the Texas Water Commission and Robert L. Deese of EPA with a copy of the same.

Very truly yours,

BAKER & BOTTS

BY _____
ROBERT E. MORSE, III

REM:175

Enclosures

cc: Mr. Robert L. Deese
U.S. Environmental Protection
Agency - Region VI
1201 Elm Street
Dallas, Texas 75270

RECEIVED
MAR 03 1986
6W-EA

cc: Mr. Rex McDonnell
Texas Water Commission
P. O. Box 13087
Capitol Station
Austin, Texas 78711

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6

IN THE MATTER OF	§	DOCKET NO. VI-86-020
	§	
HOUSTON LIGHTING &	§	
POWER COMPANY	§	
	§	
PROCEEDINGS UNDER SECTION	§	
309(a)(3) and (a)(4),	§	
CLEAN WATER ACT, [33 U.S.C.	§	ANSWER TO FINDINGS OF
1319(a)(3) and (a)(4)],	§	VIOLATION AND ADMIN-
in RE: NPDES PERMIT NO.	§	ISTRATIVE ORDER OF
TX0006394	§	JANUARY 28, 1986

I.

Houston Lighting & Power Company (the "Company") received the captioned Administrative Order on January 31, 1986, which is the effective date of such Order.

II.

Before responding to the instructions on pages 6 and 7 of the Order, the Company respectfully wishes to respond to the alleged violations contained in Paragraph IV thereof, including reference to the past history of the Company's extensive compliance efforts to control and reduce overflows at the W. A. Parish Generating Station. Initially, we would refer Region VI to the Company's August 12, 1983 and September 9, 1983 responses to Administrative Order No. VI-83-153 and to the July 16, 1985 letter of Jack V. Ferguson to W. F. McGuire closing that administrative order based on the Company's compliance. Second, we would refer Region

VI to each of the notices of treatment system overflow submitted in connection with the alleged bypasses, wherein previous corrective actions are described in detail. We would note in passing that most of the alleged "bypasses" did not constitute "intentional diversions of waste streams from any portion of a treatment facility" (see permit definition of the term "bypass"), but rather constituted mechanical breakdowns which would be more appropriately classified as "upsets" within the meaning of the NPDES permit.

In reviewing the alleged "bypasses," we have determined that they can be categorized according to the four separate plant areas where they originated, i.e., (1) the floor and yard drain collection areas for Units 1-4, (2) the stormwater collection system for Units 5 and 6, (3) the stormwater collection system north of Unit 7 and (4) the cooling tower pretreatment system. For each of these four areas, we will next discuss the apparent cause of the alleged violations and the actions taken to minimize or alleviate the recurrence of each discovered condition.

1. <u>Floor Drainage Wastewater from Units 1-4</u>

Two of the alleged violations (March 19, 1985 and May 16, 1985) concern floor drainage wastewater which overflowed a collection sump, entering the stormwater

drainage system to Smithers Lake (a privately owned cooling lake), when mechanical and electrical problems resulted in the failure of both the main and backup sump pumps which would normally pump floor drainage wastewater to the low volume treatment system.

The March 19, 1985 bypass occurred when the discharge valve for both pumps failed requiring the operator to turn the sump off until the needed repairs were completed. During this maintenance period, floor drainage wastewater entered the sump, resulting in an unintentional overflow. These valves are now being routinely inspected to insure proper operation. The May 16, 1985 malfunction was the result of a short circuit which interrupted the electrical supply to both pumps. Both the March 19, 1985 and May 16, 1985 incidents were exceptional and were corrected in an expeditious manner.

The sump collection system in question is used throughout the W. A. Parish Generating Station and has generally proven to be effective and reliable. We therefore do not feel that any further corrective action is necessary in this area.

2. Stormwater Collection System for Units 5 and 6

Fifteen of the alleged violations (June 12, June 13, July 6, July 10, August 7, August 9, August 12, August

13, August 14, August 19, September 16, September 21, October 1, October 14 and October 19, 1985) involved overflows to Smithers Lake via the stormwater drainage system for Units 5 and 6 (see Attachment A). These alleged bypasses included overflows of collection sumps for demineralizer regeneration wastewater and sanitary sewage. One spill occurred when a temporary line being used during a precipitator wash unexpectedly disconnected. Additionally, a spill occurred when a drain line associated with the coal handling facilities became plugged. Spills from the bottom ash system from ruptured transport lines and hopper maintenance were also captured in the Unit 5 and 6 stormwater system.

The September 16, 1985 demineralizer regeneration wastewater sump overflow occurred when a restricted diameter transfer line caused back pressure which reduced the capacity of the transfer pumps used to pump water to the low volume treatment basins. The restricted transfer line is scheduled to be replaced by April 15, 1986. The October 1, 1985 overflow occurred when a lift station pump went out of service and the remaining backup pump could not keep up with the final rinse of a cation bed regeneration. Although the malfunctioning pump has been repaired, larger capacity pumps and motors have been purchased for this sump. It is

anticipated that these new pumps and motors, with their additional operating capacity, will be installed by April 1, 1986.

The July 6 and July 10, 1985 overflows of demineralizer wastewater occurred as a result of a broken valve indicator at the wastewater holding basins. The indicators showed the value to be open when in fact it was closed. The closed valve did not allow the demineralizer transfer sump to pump to the basins resulting in sump overflow. The defective valve has since been replaced.

The September 21, 1985 sewage treatment lift station overflow was unique in that one pump was disabled due to electrical problems, and the backup pump failed to operate due to a malfunctioning float switch. Although additional float switch devices are being tested, we do not feel that any modifications are necessary to the sewage collection system, which has generally proven to be effective and reliable.

The October 19, 1985 precipitator wash overflow occurred when a hose disconnected from a temporary pump used to transfer precipitator washwater to a lift station. This malfunction was repaired soon after it was discovered, and we do not expect this problem to occur again.

The August 14, 1985 coal washdown overflow occurred as a result of a plugged drain line causing excess water to back up in the tripper deck and eventually overflow to storm drains below the tripper deck. Once it was discovered, the line was cleaned and placed back into service.

The remaining alleged bypasses in the Unit 5 and 6 area involved bottom ash spills, which occurred due to plugged or ruptured pipes and hopper maintenance conducted to remove pluggages within the hopper. Due to the nature of its use, bottom ash transport pipe is subject to considerable abrasion and will weaken rapidly. This wear on the pipes has led to many of the pipe ruptures. Although much of the pipe has been routinely replaced, including all the Unit 5 pipe, those remaining sections of old pipe will be replaced during the next Unit 6 maintenance annual which will be completed by May 9, 1986. Additionally, the new pipe will be inspected periodically and either rotated or replaced if excessive wear is evident. Elbow joints which cannot be rotated will be replaced if considerable wear is discovered. Also, curbing is now in place on both Units 5 and 6 to redirect excess water during hopper maintenance to appropriate treatment facilities.

Although a considerable amount of effort has been expended to eliminate overflows in the Unit 5 and 6 area,

the Company has recently implemented an "end-of-pipe" containment project to capture future spills which enter the stormwater drainage system for Units 5 and 6. All Unit 5 and 6 overflows cited in the Order entered Smithers Lake via a common storm drainage pipe. The proposed "end-of-pipe" containment project includes the construction of two transfer sumps to divert dry weather flows from the two stormwater catch basins to the wastewater treatment system. Thus, process water leakage that is not captured upstream should be routed to treatment facilities. Attached as Attachment C is a copy of the Engineering Design Plan for this project as well as an additional project discussed later in this answer. Also attached is a critical path schedule as required in the Administrative Order. Again, it is believed that this additional project will capture those spills in this area which escape existing primary and secondary containment structures.

3. Stormwater Collection System North of Unit 7

Five of the alleged bypasses (March 20, May 5, June 1, June 19 and July 11, 1985) involved overflows into the stormwater collection system north of Unit 7 and south of Unit 6 (see Attachment B). These incidents included overflows of the auxiliary cooling tower basins for Unit 7,

spills of the bottom ash transport system for Unit 7 and 8 and a spill of air preheater washwater.

The March 20, 1985 auxiliary cooling tower overflow was attributed to a fan being out of service during a heavy rainfall event. The fan problem was corrected and is not expected to recur.

The May 5 air preheater washwater spill occurred as a result of damage to a transfer line during ongoing construction activities. Once the spill was discovered, the air preheater wash was discontinued until the damaged pipe could be repaired. We feel that the spill was a unique incident and is unlikely to recur.

Three bottom ash spills (June 1, June 19 and July 11, 1985) occurred due to operator errors during hopper maintenance and use of dewatering equipment and due to inadequate ash dewatering, resulting in leaks from ash disposal trucks leaving the containment area under the dewatering bins. Proper operating procedures have been reviewed with the operators. Containment projects in the Unit 7 and 8 area have previously been constructed and have largely been successful in the past.

As described in the previous section on Units 5 and 6 and as set forth in Attachment C, the Company is pursuing additional "end-of-pipe" controls for the Unit 7

area. This will allow for the redirection of any dry weather flows to the low volume wastewater treatment system and thereby provide additional backup to the previously constructed containment structures.

4. Cooling Tower Pretreatment System

The cooling tower pretreatment system provides softened and clarified make-up water to the condenser cooling water system. Four overflows (January 22, February 5, February 10 and March 30-April 1, 1985) were cited in the Order, all of which resulted in wastewater entering the stormwater drainage system and ultimately Smithers Lake. The first overflow was the result of faulty sump agitation line positioning which allowed sludge to accumulate around the pump suction and reduce its pumping capacity. As soon as the problem was discovered, blowdown to the sump was discontinued, and the sump agitation lines were repositioned to dislodge the sludge around the pumps. Inspection of the sump agitation system will be done periodically to insure that this problem does not recur.

The next two overflows were caused by a faulty blowdown valve which allowed blowdown to leak into a sump. The blowdown valve has been repaired and has been operating properly for over a year. This valve is also now inspected

periodically, and we do not expect any more problems of this type.

The March 30-April 1, 1985 spill occurred due to the rupture of an inlet water pipe delivering lake water to the pretreatment system. This rupture occurred several days before a scheduled outage for annual maintenance. The ruptured make-up line prevented proper neutralization of lime softened water which normally occurs through acid injection and turbulent mixing in the transfer piping of this system to the main cooling towers. However, with inlet water unavailable due to the rupture, the wastewater could not be neutralized before draining the tank in order to perform annual maintenance. A procedure for manually transferring the high pH water from the clarifier to the transfer line with portable pumps has since been developed. From this line, the water can be routed to either the Unit 7 or Unit 8 main cooling tower basin where an existing acid injection system can be utilized to neutralize the water prior to ultimate discharge via Outfall 701 to Smithers Lake. We therefore do not believe this incident will be repeated.

III.

As described above, the Company believes that it has taken a good engineering approach to the overflow

problems identified in the Order. Most problems were corrected immediately upon discovery. Backup pumps and containment structures were already in place. Increased inspection/maintenance activities have been scheduled. Installation of increased displacement pumps and motors, where appropriate, is in progress. In addition, the Company is pursuing the construction of an "end-of-pipe" capture system in the stormwater drainage lines that will provide additional insurance against future overflows. As requested, a critical path schedule is provided for this project. We believe that the foregoing efforts will be effective and will result in general compliance in the identified problem areas.

Respectfully submitted,

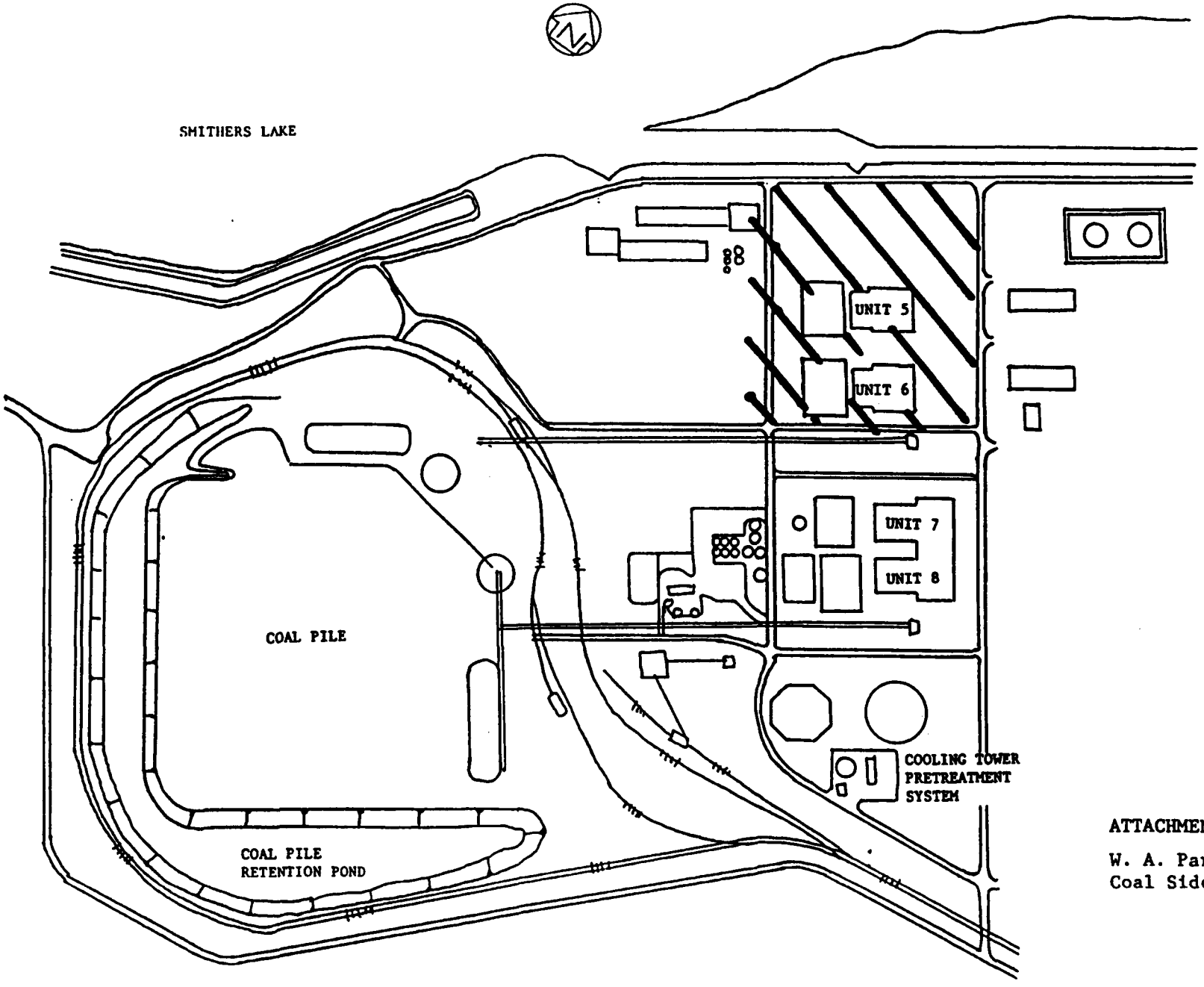
BAKER & BOTTS

DATED: March 3, 1986

BY

ROBERT E. MORSE, III
3000 One Shell Plaza
Houston, Texas 77002
(713) 229-1492
Attorneys for Houston
Lighting & Power Company

001REMNP/118E01



ATTACHMENT A

W. A. Parish
Coal Side Plant Area

REFERENCE 14

II. D.5

Kearney/Centaur Division
A.T. Kearney, Inc.
P.O. Box 1438
225 Reinekers Lane
Alexandria, Virginia 22313
703 683 7932

Management Consultants

ATKEARNEY

December 9, 1988

Mr. Tom Clark
Regional Project Officer
U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, Texas 75202-2733

Reference: EPA Contract No. 68-01-7374; Work Assignment No. R26-02-20; Houston Lighting & Power Company - W.A. Parish Generating Station; Thompsons, Texas; EPA I.D. No. TXD097311849; Clean-Closure Review

Dear Mr. Clark:

Enclosed please find the review of the State's Interim Status Clean-Closure determination for Houston Lighting & Power Company - W.A. Parish Generating Station (HLP - Parish) in Thompsons, Texas. This project called for the Kearney Team to review information in the State of Texas files that was used by the State in making a determination to allow clean-closure at the HLP - Parish facility. This review briefly discusses the background of the units that have undergone closure and describes the documentation for the closure process. Project deliverables include the following:

- A report documenting the findings of the review.
- The completed checklist (including general and unit-specific information).

The checklist uses two codes: N/A and NIF. N/A is used for items not considered applicable. NIF is used for items where information appears to be required, or may help characterize the adequacy of the procedures used to close a unit, but was not found in the file.

As you requested, we reviewed the file information for compliance with 40 CFR 264 and 265, as appropriate, EPA's interpretation of clean closure as described in the Federal Register (52 FR 8704, March 19, 1987), and other relevant policies and guidances.

The primary information sources for the review are included in a reference list at the end of the checklist.

The Outdoor Container Storage Area is the only documented unit that has undergone closure at the HLP - Parish facility. The Texas Water Commission (TWC) approved the Closure Plan as stated in a September 23, 1985 letter to HLP - Parish. The letter also states that an Affidavit of Exclusion will be processed upon completion of the closure activities and receipt of the Certification of Closure signed by an independent, registered professional engineer. The file chronology is confusing because an April 30, 1985 letter from TWC to the HLP - Parish facility indicated TWC had already accepted HLP - Parish withdrawing their application for a hazardous waste permit and their Affidavit of Exclusion.

There were a number of other waste management units identified during the file review; however, their function and status are unclear. A summary of these waste management units and a discussion of some of the unclear issues are included in the report.

Based on the information reviewed from TWC's files (specifically the Closure Plan and Certification of Closure, documenting how the unit was closed), closure of the Outdoor Container Storage Area has not met the closure performance standard of 40 CFR 265.111. The Closure Plan and Certification of Closure have not demonstrated how closure activities controlled, minimized, or eliminated post-closure escape of hazardous waste, hazardous constituents, contaminated run-off, or hazardous waste decomposition products to the ground or surface water or to the atmosphere.

If you have any questions or desire any additional information, please do not hesitate to call me or Dorothy La Russo, the Work Assignment Manager (who may be reached at 703/683-7932).

Sincerely,

Arthur Glazer
Technical Director

Enclosures

cc: V. Cammack, EPA Region VI
J. Levin
D. Bean
D. La Russo
A. Schaffer
T. Bingman, B/TSA

REFERENCE 15

TEXAS WATER COMMISSION

Paul Hopkins, Chairman
Ralph Roming, Commissioner
John O. Houchins, Commissioner

Larry R. Soward, Executive Director
Mary Ann Hefner, Chief Clerk
James K. Rourke, Jr., General Counsel

September 23, 1985

Mr. W. F. McGuire, Manager
Environmental Protection Department
Houston Lighting and Power
P. O. Box 1700
Houston, Texas 77001

Dear Mr. McGuire:

Re: Solid Waste Registration No. 31631
W. A. Parish Generating Station
Full Facility Closure

We have completed a review of the hazardous waste facility closure plan, as detailed in your submittal of May 22, 1985. The subject closure plan describes the proposed method of closure for one drum storage area. The closure activities described in the plan have been evaluated pursuant to Title 31 of Texas Administrative Code (TAC) Sections 335.211-335.216, including the closure performance standard of 31 TAC 335.212.

This letter constitutes approval by the Executive Director of the hazardous waste facility closure plan, as described in your referenced submittal. Upon completion of the closure activities, certifications should be submitted by the owner or operator of the subject facility and by an independent Registered Professional Engineer that the hazardous waste management facility has been closed in accordance with the approved closure plan. Once the aforementioned certifications are received, we will resume processing of your Affidavit of Exclusion.

Should you have any questions regarding this evaluation, please contact Joe Gingerich of the Hazardous and Solid Waste Permits Section at AC512/463-8187 or AC512/463-8505.

Sincerely,

Larry R. Soward

Larry R. Soward
Executive Director

JG:bb
cc: Bill Brown, Field Operations Liaison
TWC District 7 Office - Deer Park

HOUSTON LIGHTING & POWER COMPANY
WA PARISH GENERATING STATION
THOMPSONS, TEXAS

EPA I.D. NO. TXD097311849

I. Description of Facility

The Houston Lighting & Power Company - WA Parish Generating Station (HLP-Parish) is located in Thompsons, Texas. The facility generates electric power through steam production. The Outdoor Container Storage Area (container storage area) is the only documented unit that has undergone closure at this facility.

II. Outdoor Container Storage Area

The container storage area is located on a concrete pad west of the oil separator pit and adjacent to the tricellerator. The container storage area managed 55-gallon drums of hazardous waste including spent solvents, paint thinners, oily wastes, miscellaneous oily wastes, sandblasting grit, and refractory bricks. A closure plan was approved by the Texas Water Commission (TWC) on September 23, 1985. Based on the file evaluation, the closure plan does not include information on the following: (References 1, 14, 23)

- volume of wastes;
- sampling and testing program for the wastes within the drums to identify hazardous constituents being disposed;
- demonstration that the containment system (i.e., concrete pad) has sufficient capacity to contain ten percent of the volume of the containers or the volume of the largest container, whichever is greater;
- integrity of the containment system;
- demonstration there have been no releases to soil and ground water;
- type of off-site disposal (e.g., incineration);
- health-based criteria to determine the potential health and environmental impacts of the waste residues;
- criteria for determining the extent of decontamination;
- detailed description of the decontamination steps (e.g., specifying the type of detergent to clean the pad);
- methods for sampling and testing to demonstrate success of decontamination; and

- run-off control during decontamination of the container storage area.

A letter from TWC to HLP - Parish dated April 30, 1985 accepted the Affidavit of Exclusion from the facility and withdrew the hazardous waste permit (Reference 12). A certification of closure, signed by an independent, registered professional engineer, for the container storage area was submitted to TWC on November 7, 1985 (Reference 23). HLP - Parish intends to manage drums containing hazardous and non-hazardous waste in the container storage area for less than 90 days after closure has been completed.

III. Other Units

- Table III-4, Hazardous Waste Facility Components List, identifies an enclosed drum storage area that managed drums containing waste paint thinners and spent solvents prior to off-site disposal. There was no information in the files regarding the status of the drum storage area or types and volumes of wastes stored. (Reference 5)

- A Compliance Monitoring Inspection conducted by TWC on August 18, 1984 identified a closed container storage area that at the time of the inspection was being used for less-than-90-day storage. There is no information describing whether this storage area is the same as the Outdoor Container Storage Area.

- The following information concerning three inorganic surface impoundments was stated in an October 9, 1984 letter from HLP to TWC:

> "The three inorganic impoundments identified in Table III-2 (Hazardous Waste Management Facility Components List) and Table III-4 (Hazardous Waste Facility Components List) of the August 1980 Part A application were excavated in 1977 for temporary use during construction of Units 5 & 6. On an intermittent basis, the impoundments collected boiler blowdown and inorganic metal cleaning waste from pre-operational cleanings of Units 5 & 6. These wastes were then transferred to Units 5 & 6 concrete tank wastewater treatment system for treatment prior to NPDES discharge. Hazardous waste entered the impoundments on four separate occasions during pre-operational cleanings, the last event being an inorganic metal cleaning in September 1978."

"No wastewater entered the three impoundments after early 1980. The above-ground piping to the impoundments was removed during construction of Units 7 & 8 wastewater treatment system which was in service by June 1980. By March 1982, all three impoundments had been filled in and graded over. No dirt was removed from the impoundments during this activity." (Reference 7)

No other information was found in the files concerning the three surface impoundments and Units 5 through 8.

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

(Complete Sections I through IV for Entire Facility)

I. GENERAL INFORMATION

A. Facility Name: Houston Lighting & Power Company-W.A. Parish Generating Station

B. EPA I.D. No.: TXD097311849

C. Address: Y.H. Jones Road, Thompsons, TX

D. Check the type of unit/units closed or proposed to be closed and indicate the number of each type of unit that is being reviewed:

( ) Surface Impoundment ____
( ) Landfill ____
( ) Waste Pile ____
(X) Container Storage ____
( ) Tank ____
( ) Land Treatment ____
( ) Other (Describe) ____

II. INFORMATION SOURCE(S)

A. Check type of materials reviewed in completing the evaluation and provide the date of the documents:

(X) Part A Permit Application 11/18/80 (Reference 1)
( ) Part B Permit Application ____
( ) Interim Status Closure Plan 5/22/85 (Reference 14)
( ) RCRA Permit ____
( ) RCRA Facility Assessment ____
(X) Closure Certification 11/7/85 (Reference 23)
( ) CME Report ____
( ) Consent Agreement ____
( ) Sampling Results ____

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

(Complete Sections I through IV for Entire Facility)

I. GENERAL INFORMATION

A. Facility Name: Houston Lighting & Power Company-W.A. Parish Generating Station

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( ) Landfill ____
( ) Waste Pile ____
(X) Container Storage ____
( ) Tank ____
( ) Land Treatment ____
( ) Other (Describe) ____

II. INFORMATION SOURCE(S)

A. Check type of materials reviewed in completing the evaluation and provide the date of the documents:

(X) Part A Permit Application 11/18/80 (Reference 1)
( ) Part B Permit Application (Reference 14)
( ) Interim Status Closure Plan 5/22/85
( ) RCRA Permit ____
( ) RCRA Facility Assessment ____
(X) Closure Certification 11/7/85 (Reference 23)
( ) CME Report ____
( ) Consent Agreement ____
( ) Sampling Results ____

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

II. INFORMATION SOURCE(S) (Cont'd)

A. Check type of materials reviewed in completing the evaluation and provide the date of the documents (Cont'd)

( ) Other Correspondence (Describe) _____

(X) Other Materials (Describe) References 2-13, 15-22, 23-29

B. Briefly summarize interviews with Region and/or State personnel. Include the name(s) of the personnel interviewed and the date:
Interviews were not conducted with Region and/or State personnel

III. ENVIRONMENTAL SETTING

A. Source of Data - Cite Reference Noted in Section II: NIF

B. Surface Water

(1) Annual Precipitation: NIF

(2) Annual Evaporation: NIF

(3) Net Annual Precipitation: NIF

(4) Distance to Nearest Surface Water and Description: NIF

* NIF = No Information Found

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

III. ENVIRONMENTAL SETTING (Cont'd)

B. Surface Water (Cont'd)

(5) Describe Facility Slope and Intervening Terrain: NIF

C. Geology

(1) Describe Soil Type: NIF

( ) Cohesionless

( ) Cohesive

(2) Predominant Soil Type in Accordance with USCS Classification System: NIF

( ) Clay

( ) Silty Clay

( ) Sandy Clay

( ) Clayey Silt/Clayey Sand

( ) Sandy Silt

( ) Other

(3) Test Results of Permeability: NIF

( ) Less than $1x10^{-7}$ cm/sec

( ) Greater than $1x10^{-7}$ cm/sec

(4) Test Procedures: Laboratory NIF ; Field NIF

Describe: NIF

(5) Is there consistency in test results of permeability? NIF

( ) Yes ( ) No

Describe inconsistency(ies)

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

III. ENVIRONMENTAL SETTING (Cont'd)

C. Geology (Cont'd)

(6) Soil Stratification: NIF

( ) Interbedded Soil Layers

( ) Continuous Layer

( ) Discontinuous Soil Horizon

( ) Other

D. Hydrogeology

(1) Source of data - cite reference noted in Section II: NIF

(2) Depth to ground water: Feet NIF ; Elevation NIF

(3) Direction of ground-water flow: NIF

(4) Is the site's ground water flow direction different from regional flow direction? ( ) Yes ( ) No NIF

(5) If no, flow direction is altered because of: NIF

( ) Drawdown induced by pumping

( ) Topographic features

( ) Structural features

( ) Other(s) (Describe) _____

(6) Presence of monitoring wells on site? ( ) Yes ( ) No NIF

(7) If yes, have unit specific constituents been detected?

( ) Yes ( ) No

Indicate last sampling date: NIF

(8) Is contamination statistically significant? NIF

( ) Yes ( ) No

(9) Are primary drinking water standards exceeded? NIF

( ) Yes ( ) No

If yes, indicate constituents and levels detected: _____

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

III. ENVIRONMENTAL SETTING (Cont'd)

D. Hydrogeology (Cont'd)

(10) Are secondary drinking water standards exceeded? NIF

( ) Yes ( ) No

If yes, indicate constituents and levels detected: _____

E. Receptor

(1) Source of data - cite reference noted in Section II: NIF

(2) Population within one-mile radius: NIF

(3) Population within three-mile radius: NIF

(4) Source and distance of potable water supply: NIF

( ) Surface water

( ) Municipal wells

( ) Private well

(5) Indicate depth to aquifer supplying drinking water: NIF

(6) Indicate endangered species in the area: NIF

IV. HEALTH AND SAFETY PROCEDURES

A. Is proposed decontamination of construction equipment described in sufficient detail? ( ) Yes ( ) No N/A*

If no, describe specific deficiencies: _____

B. Is rinsate disposal adequately described?

( ) Yes (X) No

* N/A = Not Applicable

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE STATE CLEAN-CLOSURE DETERMINATIONS IN EPA REGION VI

(Complete Sections V through IX for Each Unit Under Review)

V. UNIT DESCRIPTION

A. Type of Unit:

( ) Surface Impoundment
( ) Landfill
( ) Waste Pile
(X) Container Storage
( ) Tank
( ) Land Treatment
( ) Other

B. Name, location or other information to identify the unit: Container Storage Area; west of the oil separator pit and adjacent to the tricellerator

C. Regulatory Basis for Closing the Unit (May Be More Than One): N/A

( ) 40 CFR 265
( ) 40 CFR 264
( ) Consent Agreement
( ) Waste accepted to the unit prior to July 26, 1982
( ) Waste accepted to the unit after July 26, 1982
( ) Unit closed after January 26, 1983

D. Did the State perform a site visit? ( ) Yes (X) No

If yes, indicate the name of the person conducting site visit, date and nature of the visit: _____

Summarize key findings of the visit including the status of clean-closure activities: _____

E. Closure Plan Approval Date by the State: 9/23/85

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

V. UNIT DESCRIPTION (Cont'd)

F. Closure Certification: (X) Yes ( ) No
If no, indicate schedule for Closure Certification: _____

G. Is Closure Certification by a:
(X) Professional Engineer
(X) Independent Engineer
( ) Plant Engineer
( ) Other Person _____

H. Is Closure Certification approved by the State? NIF
( ) Yes ( ) No
If no, describe the basis for non-approval: There is no documentation in the files indicating the state approved the certification

I. Dimensions of Unit
(1) Dimensions: Length NIF, Width NIF, Depth NIF
(2) Year of Construction:
Start-Up Date NIF
Inactive Date NIF
Closure Date 11/85
(3) Was a Liner(s) Required: ( ) Yes (X) No
(4) If Yes, Liner Type and Brief Description:
( ) Liner not installed, as required
( ) Clay liner _____
( ) Geomembrane liner
( ) Combination of clay and geomembrane liner _____
( ) Other liner (Describe) _____
Briefly describe, the appropriateness of the liner of the site: _____

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

V. UNIT DESCRIPTION (Cont'd)

J. Physical Status of the Unit:

(1) Thickness of liner(s) N/A

(2) QA/QC documentation N/A

(3) Briefly describe any problems identified with the liner:

K. History of Compliance/Enforcement Problems: ( ) Yes (X) No

L. If Yes, Describe Compliance/Enforcement Action:

M. Documents Reviewed by the State: NIF

Design Plan ( ) As Built Drawings ( )

Briefly discuss the adequacy of these documents: TWC evaluated the Closure Plan according to Title 31 of Texas Administrative Code (TAC) Sections 835.211-335.216, including the closure performance standard of 31 TAC 335.212

N. State's Basis for Approval of Clean-Closure: NIF

O. Describe proposed final use in the area of the unit: Containers storing hazardous waste for less than 90 days

VI. WASTE CHARACTERIZATION

A. Source of Data - Cite Reference Noted in Section II: References 14, 22, 23

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

VI. WASTE CHARACTERIZATION (Cont'd)

B. Waste Managed

( ) Listed Waste (Describe Waste or Waste Types): NIF

(X) Characteristics

(X) Ignitability

( ) Corrosivity

(X) Reactivity

( ) Toxicity

(X) Appendix VIII Hazardous Constituents (Describe) Polyester resin, vinylester resin, acetone, MEKP

( ) Other hazards that pose a threat to public health and the environment (Describe) NIF

C. Quality Control procedures used in testing: ( ) Yes (X) No

D. If yes, were the procedures used adequate? ( ) Yes ( ) No

If no, describe deficiencies: No sampling/testing of the waste within the drums were performed

VII. WASTE REMOVAL/DECONTAMINATION

A. Source of Data - Cite Reference Noted in Section II: Reference 23

Houston Lighting & Power Co. - W.A. Parish Generating Station
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CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

VII. WASTE REMOVAL/DECONTAMINATION (Cont'd)

B. Cleanup Standards

(1) Cleanup standards used:

( ) Background

( ) Health based

(X) Other (Describe) Drums were removed and area scrubbed with a detergent (type of detergent was not described)

(2) Who established cleanup standards?

( ) State

( ) EPA

( ) Proposed by Applicant

(3) Basis for determining cleanup criteria: The area was scrubbed and rinsed. Rinse water was placed in drums

(4) Describe any numerical standards that were used to establish cleanup criteria: NIF

(5) Explain the adequacy of cleanup criteria: Did not clean the unit to health based criteria

(6) Indicate Quality Assurance/Quality Control procedures in establishing cleanup criteria: NIF

C. Waste Removal

(1) How was waste disposed? 11 drums of waste were transferred off site to Rollins Environmental Services

(2) Manifest for material moved off site: ( ) Yes ( ) No NIF

D. Liner, associated piping and contaminated subsoil removal:

(1) Source of data - cite reference noted in Section II: NIF

Houston Lighting & Power Co. - W.A. Parish Generating Station
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CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

VII. WASTE REMOVAL/DECONTAMINATION (Cont'd)

D. Liner, associated piping and contaminated subsoil removal (cont'd):

(2) Geomembrane liner: N/A

( ) Removal off site

( ) Decontamination (treated)

( ) Disposal on site after treatment

Describe decontamination procedure: _____

(3) Soil/clay liner: NIF

( ) Removal off site

( ) Decontamination (treated)

( ) Disposal on site after treatment

Describe decontamination procedure: _____

(4) Sampling scheme to characterize contamination in underlying soil: NIF

( ) Systematic

( ) Random

(5) How was material disposed off site? NIF

(6) Manifest for material moved off site: ( ) Yes ( ) No NIF

(7) Contaminated subsoil testing for waste constituents? NIF

( ) Yes ( ) No

(8) Is location of background soil sampling correct? NIF

( ) Yes ( ) No

If no, describe the deficiencies: Background soil sampling was not performed

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

VII. WASTE REMOVAL/DECONTAMINATION (Cont'd)

D. Liner, associated piping and contaminated subsoil removal (cont'd):

(9) Nature of soil samples tested: NIF

( ) Grab

( ) Composite

Indicate depth of soil sampled: _____

(10) Is contamination of underlying soil adequately describe? NIF

( ) Yes ( ) No

If not, describe deficiencies: _____

(11) Decontamination/removal of leachate collection/removal system: NIF

( ) Yes ( ) No

E. Waste Removal from Surface Impoundment:

(1) Source of data - cite reference noted in Section II: N/A

(2) Were liquid and sludges treated and/or stabilized?

N/A

(3) Was procedure for removal of any liquid waste adequate?

( ) Yes ( ) No N/A

(4) Describe liquid waste removal procedure and name of facility accepting waste: N/A

(5) Was the plan for handling sludge adequate?

( ) Yes ( ) No N/A

If no, describe deficiencies: _____

(6) Manifest for off-site waste: ( ) Yes ( ) No N/A

Houston Lighting & Power Co. - W.A. Parish Generating Station
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CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

VII. WASTE REMOVAL/DECONTAMINATION (Cont'd)

F. Cleanup of Ground Water:

(1) Describe how potential contamination of ground water was addressed as a part of clean closure: N/A

(2) Did the unit have ground water monitoring wells?
( ) Yes (X) No
If no, did the Agency issue a waiver? ( ) Yes ( ) No N/A
If yes, did the wells detect waste constituents? N/A
( ) Yes ( ) No

(3) Is ground water monitoring required under clean closure?
( ) Yes (X) No

(4) Describe how the potential for release of waste constituents into the ground water was reconciled as a part of clean closure: N/A

VIII. OTHER CONSIDERATIONS

A. Describe any other available criteria used for the unit:
NIF

B. Was the clean-closure of the unit affected by the financial condition of the facility? ( ) Yes ( ) No NIF

Houston Lighting & Power Co. - W.A. Parish Generating Station
EPA I.D. No. TXD097311849

CHECKLIST TO EVALUATE
STATE CLEAN-CLOSURE DETERMINATIONS
IN EPA REGION VI

VII. WASTE REMOVAL/DECONTAMINATION (Cont'd)

C. Did the unit's location with respect to population affect the closure of the unit? ( ) Yes ( ) No NIF
If yes, describe: _____

D. Was the unit's closure approvals affected by local constraints?
( ) Yes ( ) No NIF
If yes, describe the circumstances: _____

IX. OTHER COMMENTS

The closure plan does not provide the following: volume of wastes; list of hazardous constituents; type of detergent to decontaminate the storage area; run-off control during washing & rinsing; sampling of wash water; and criteria to determine clean closure.

X. REFERENCES

1. Letter from Houston Lighting & Power Company (HL&P) to Texas Department of Water Resources (TDWR), Additions and Modifications to TDWR Hazardous Waste Permit Applications, September 30, 1980.

2. Part A Application for W.A. Parish Generating Station, November 18, 1980.

3. W.A. Parish Plant Site, Units 5 thru 8.

4. W.A. Parish Generating Station, Facility Components

5. U.S. Environmental Protection Agency's Review of Part A Application for W.A. Parish, August 6, 1981.

6. Conditions of Operation During Interim Status, EPA Region VI, August 6, 1981.

7. Revised Part A Application for W.A. Parish Generating Station, October 9, 1984.

8. Letter from HL&P to TDWR, Notification of Change in Waste Management Methods, October 26, 1984.

9. Letter from HL&P to TDWR, Request for Addition of Mercury Contaminated Waste to the Industrial Solid Waste Registration, March 21, 1985.

10. Interoffice Memorandum from Jim Feeley to Charles Eanes, TDWR, Hazardous Waste Permit Exclusion Review, April 10, 1985.

11. Letter from HL&P to TDWR, Affidavit of Exclusion, April 12, 1985.

12. Letter from TDWR to HL&P, Withdrawal of Hazardous Waste Permit, April 30, 1985.

13. letter from HL&P to TDWR, Expansion of Coal Combustion By-Product Storage Area, May 13, 1985.

14. Letter from HL&P to TDWR, Closure Plan for W.A. Parish Container Storage Area, May 22, 1985.

15. Letter from TDWR to HL&P Publication of Notice of Receipt of Final Facility Closure Plans, July 30, 1985.

16. Letter from HL&P to U.S. EPA and TDWR, EPA Administrative Order Monitoring Data, August 2, 1985.

17. Letter from HL&P to TDWR, Revisions to Houston Lighting & Power Company's Revisions to Houston Lighting & Power Company's Solid Waste Regulations, August 5, 1985.

18. Letter from HL&P to TDWR, Publication of Notice of Final Facility Closure, August 29, 1985.

19. Letter from Analytical Petroleum Research Laboratories to HL&P, August 8, 1985, Results of Sampling Conducted, August 30, 1985.

20. Letter from Texas Water Commission (TWC) to HL&P, Approval of Drum Storage Area Closure Plan, September 23, 1985.

21. Letter from HL&P to TWC, Revisions to Houston Lighting & Power Company's Solid Waste REgulations, September 26, 1985.

22. Letter from HL&P to TWC, Addition to Industrial Solid Waste Registration, November 1, 1985.

23. Letter from HL&P to TWC, Certification of Closure of Container Storage Area, November 7, 1985.

24. Letters from TWC to HL&P, Evaluation Construction and Closure Plans/Specifications for 30-Acre Landfill, November 13, 1985.

25. Letter from TWC to U.S. EPA Region VI, Addition of Closure Certification to W.A. Parish Part B Permit Application, November 19, 1985.

26. Interoffice Memorandum from Rex Coffman to Ann McGisley, TWC, Amendments to Land Disposal Universe, July 28, 1986.

27. Notice of Registration, July 17, 1987.

28. Notice of Registration, September 27, 1988.

29. Interoffice Memorandum from Jeff Korth, TWC, to File, Review of Hazardous Waste Land Disposal Operations, Undated.

REFERENCE 16

SF

INSPECTION REPORT REVIEW
POTENTIAL HAZARDOUS WASTE SITE

SITE NAME : Houston Lighting and Power - Parish Sta
LOCATION : Thompsons
SITE NUMBER: TXD097811849
SURVEY DATE: 7/20/90 INSPECTED BY: STATE (FIT) TAT OTHER: _____
LABORATORY : ___CLP ___EPA ___OTHER_____

RECEIVED FROM: Ed Sierra, 6F-SH DATE RECEIVED: 7/24/90

SAMPLE TYPE(s): None

SOIL	SURFACE WATER	GROUND WATER	DRINKING WATER
off / on -site	off / on -site	off / on -site	off / on -site

CONTAMINANT(s): (Organics) (Inorganics) Radionuclides Microbiological

FOLLOW UP (Y/N):

Y (Re)Sampling Requested
N Further Action is URGENT
Y Locate Drinking Water Sources
Y Keep Site Active ("N"=No Further Action)
___ Concur with Report Recommendations

SUMMARY: This preliminary assessment of this major electric generating facility documented the generation of various organic & inorganic hazardous wastes on-site and the potential for affecting groundwater, surface water & air. Although the site is permitted and apparently well operated (all the wastes appear to be collected & retained onsite or are ~~contained~~ & disposed off off-site) there have been no soil or water samples have been taken to document the environmental safety of this facility. Since the FIT report does not make a recommendation, I will recommend that a site sampling Investigation be conducted which highlights ground water sampling of on-site and off-site wells to look for the contaminants listed for this facility (Acetone, asbestos, mercury, PCB, Arsenic, Barium, cadmium, chromium, cyanide, lead, selenium, & toxaphene.

F. Warren Morris 8/2/90
ENGINEER/REVIEWER

Concurrence:

REFERENCE 17

Superfund Site Strategy Recommendation Region 6

Site Name: Houston Lighting + Power Parish Sta Site Number: TXD097311849

Alias Site Name(s): _____

Address: 2759 Jones Road

City/County or Parish/State/Zip: Thompsons / Ft. Bend / TX / 77481

Recommendation:

[ ] 1. No further remedial action planned under Superfund.

[X] 2. Further pre-remedial investigative action needed under Superfund:

PA _____
SSI ✓ Priority: High ___ Medium ___ Low ✓
LSI _____
Other _____
To be performed by FIT

[X] 3. Action may be appropriate under other authority: RCRA ✓
NPDES _____ SPCC _____ 404 _____ TSCA _____ UIC _____
SMCRA _____ State _____ Other _____.

Discussion:

The facility is a generating station which produces electricity by generating steam from gas-operated + coal-fired turbines. Contaminants of concern are primarily heavy metals contained in liquids, sludges, + dried sludges. Groundwater migration in the area is inhibited due to low soil permeability; the pathway of primary concern is surface water. The Rabbs Bayou dissects the Lagoon Storage Area where sludge and fly + bottom ash are stored. These storage areas within the lagoon are not diked or bermed. Rabbs Bayou feeds Worthington Lake which is the location of a Bald Eagle rookery. Another SWMU of concern is the Bulk Storage Area which uses open bins for the storage of lead contaminated sandblasting material. Considering that much of the file information, on which the PA was based, was somewhat dated; recommend SSI be conducted to more accurately determine the current potential for or extent of any contamination.

SUPERFUND FILE

FEB 02 199

Copies to (please list): TWC, ATSDR, 6W-S, 6E-E, 6H-P

Recommended By: Linda Weber Date: 8/2/90

Approved By: [signature] Date: 8/6/90

REFERENCE 18

AFFIDAVIT OF EXCLUSION FROM HAZARDOUS WASTE PERMITTING REQUIREMENT

Registration No. 31631

Application No. _____
(Dept. Use Only)

Facility Name W. A. Parish Generating Station

County of Fort Bend

L. B. Horrigan, Jr. being duly sworn, deposes and says:

I am Vice President, Fossil Plant Engineering & Construction of Houston Lighting & Power Co.
Title (Owner or Principal Officer) Facility Owner

P. O. Box 1700, Houston, Texas 77001.
and Address

This affidavit is being executed for the purpose of notifying the Executive Director of the Texas Department of Water Resources that the named facility does not require a hazardous waste permit because:

Check appropriate box(es):

- [ ] No hazardous waste is stored, processed or disposed on-site
- [x] The facility qualifies for the "Accumulation Time" storage exclusion of Texas Administrative Code, Section 335.69
- [ ] The facility qualifies for the "Small Quantity Generator" exclusion of Texas Administrative Code, Section 335.2(e)
- [ ] The facility qualifies for the "Elementary Neutralization Unit" exclusion of Texas Administrative Code, Section 335.2(f)
- [x] The facility qualifies for the "Wastewater Treatment Unit" exclusion of Texas Administrative Code, Section 335.2(f)
- [ ] Other (Explain with an attachment and reference TDWR rule)

Signature

Sworn to before me this 7th day of May, 1984.

Hazel E. Burks
Notary Public in and for

Harris County, Texas

My commission expires 6-29-85

NOTARY PUBLIC STATE OF TEXAS

REFERENCE 19

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

ENVIRONMENTAL
OCT 29 1996
Assessment & Waste Mgmt

Southern Petroleum Laboratories, Inc.

Certificate of Analysis Number: 96-10-784

Approved for Release by:

Brent Barron, Client Services Supervisor

Date: 10/26/96

Greg Grandits
Laboratory Director

Idelis Williams
Quality Assurance Officer

The attached analytical data package may not be reproduced except in full without the express written approval of this laboratory.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

CASE NARRATIVE

QUALITY CONTROL RESULTS SUMMARY

WORK ORDER NO.: 96-10-784

Southern Petroleum Laboratories (SPL) is pleased to present the results of laboratory analyses to Houston Lighting and Power Co. Seven liquid samples were received at our laboratory on October 11, 1996 at a temperature of 5 degrees Celsius. The following is a brief narrative of the laboratory analysis.

These samples were analyzed per the Chain of Custody. There were no deviations from the required methods.

Sample "MW-18" was randomly chosen for SPL's Quality Assurance program. The Matrix Spike (MS) Matrix Spike Duplicate (MSD) as well as the Relative Percent Difference were outside of the advisory quality control limits for the analysis of Aluminum. The Matrix Spike Duplicate was outside of the advisory quality control limits for the analysis of Calcium, Magnesium, and Sodium. The Relative Percent Difference was also outside of the advisory quality control limits for the analysis of Calcium. The Laboratory Control sample for this batch was well within SPL's Quality Control guidelines.

If you have any questions, please feel free to call me.

Brent Barron
Client Services Supervisor

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-01

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-18

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 10:45:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Chloride Method 325.3 * Analyzed by: CA Date: 10/21/96	275	10	mg/L
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/11/96	ND	1	mg/L
Fluoride Method 340.2 * Analyzed by: CA Date: 10/18/96	0.4	0.1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/11/96	332	1	mg/L
Sulfate Method 375.4 * Analyzed by: ST Date: 10/21/96	56	5	mg/L
Total Dissolved Solids Method 160.1 * Analyzed by: PT Date: 10/17/96	857	1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-090'

Certificate of Analysis No. H9-9610784-01

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-18

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 10:45:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Total Phosphorus Method 365.2 * Analyzed by: DSE Date: 10/19/96	0.11	0.06	mg/L
Aluminum, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.1	mg/L
Arsenic, Total METHOD 206.2 * Analyzed by: WFL Date: 10/21/96	ND	0.01	mg/L
Barium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	0.247	0.005	mg/L
Boron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/21/96	0.2	0.1	mg/L
Calcium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	138	0.1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-01

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-18

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 10:45:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.005	mg/L
Chromium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.01	mg/L
Iron, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	1.23	0.02	mg/L
Potassium, Total METHOD 200.7 * Analyzed by: JM Date: 10/22/96	2	1	mg/L
Magnesium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	35.3	0.1	mg/L
Manganese, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	0.49	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-01

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-18

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 10:45:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Sodium, Total METHOD 200.7 * Analyzed by: JM Date: 10/22/96	175	0.1	mg/L
Acid Digestion-Total, GF EPA 4.1.3 Analyzed by: GB Date: 10/16/96	10/16/96		
Acid Digestion-Total, ICP EPA 4.1.3 Analyzed by: GB Date: 10/16/96	10/16/96		
Selenium, Total METHOD 270.2 * Analyzed by: WFL Date: 10/21/96	ND	0.008	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
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Certificate of Analysis No. H9-9610784-02

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-20

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 11:50:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Chloride Method 325.3 * Analyzed by: CA Date: 10/21/96	65	1	mg/L
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/11/96	ND	1	mg/L
Fluoride Method 340.2 * Analyzed by: CA Date: 10/18/96	0.9	0.1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/11/96	410	1	mg/L
Sulfate Method 375.4 * Analyzed by: ST Date: 10/21/96	2920	500	mg/L
Total Dissolved Solids Method 160.1 * Analyzed by: PT Date: 10/17/96	3710	1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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Certificate of Analysis No. H9-9610784-02

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-20

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 11:50:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Total Phosphorus Method 365.2 * Analyzed by: DSE Date: 10/19/96	0.11	0.06	mg/L
Aluminum, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	0.2	0.1	mg/L
Arsenic, Total METHOD 206.2 * Analyzed by: WFL Date: 10/21/96	ND	0.01	mg/L
Barium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	0.025	0.005	mg/L
Boron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/21/96	**4.9**	0.1	mg/L
Calcium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	231	0.1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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Certificate of Analysis No. H9-9610784-02

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-20

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 11:50:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.005	mg/L
Chromium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.01	mg/L
Iron, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.02	mg/L
Potassium, Total METHOD 200.7 * Analyzed by: JM Date: 10/22/96	1	1	mg/L
Magnesium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	265	0.1	mg/L
Manganese, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	0.24	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-02

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-20

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 11:50:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Sodium, Total METHOD 200.7 * Analyzed by: JM Date: 10/22/96	524	0.5	mg/L
Acid Digestion-Total, GF EPA 4.1.3 Analyzed by: GB Date: 10/16/96	10/16/96		
Acid Digestion-Total, ICP EPA 4.1.3 Analyzed by: GB Date: 10/16/96	10/16/96		
Selenium, Total METHOD 270.2 * Analyzed by: WFL Date: 10/21/96	ND	0.008	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
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Certificate of Analysis No. H9-9610784-03

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-21

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 13:50:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Chloride Method 325.3 * Analyzed by: CA Date: 10/21/96	285	10	mg/L
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/11/96	ND	1	mg/L
Fluoride Method 340.2 * Analyzed by: CA Date: 10/18/96	0.7	0.1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/11/96	482	1	mg/L
Sulfate Method 375.4 * Analyzed by: ST Date: 10/21/96	3810	500	mg/L
Total Dissolved Solids Method 160.1 * Analyzed by: PT Date: 10/17/96	6670	1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
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Certificate of Analysis No. H9-9610784-03

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-21

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 13:50:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Total Phosphorus Method 365.2 * Analyzed by: DSE Date: 10/19/96	0.08	0.06	mg/L
Aluminum, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.1	mg/L
Arsenic, Total METHOD 206.2 * Analyzed by: WFL Date: 10/21/96	ND	0.01	mg/L
Barium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	0.017	0.005	mg/L
Boron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/21/96	3.6	0.1	mg/L
Calcium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	330	0.1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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Certificate of Analysis No. H9-9610784-03

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-21

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 13:50:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.005	mg/L
Chromium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.01	mg/L
Iron, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.02	mg/L
Potassium, Total METHOD 200.7 * Analyzed by: JM Date: 10/22/96	2	1	mg/L
Magnesium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	266	0.1	mg/L
Manganese, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	**0.56**	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-03

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-21

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 13:50:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Sodium, Total METHOD 200.7 * Analyzed by: JM Date: 10/22/96	1350	0.5	mg/L
Acid Digestion-Total, GF EPA 4.1.3 Analyzed by: GB Date: 10/16/96	10/16/96		
Acid Digestion-Total, ICP EPA 4.1.3 Analyzed by: GB Date: 10/16/96	10/16/96		
Selenium, Total METHOD 270.2 * Analyzed by: WFL Date: 10/21/96	ND	0.008	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-04

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-23

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 08:15:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Chloride Method 325.3 * Analyzed by: CA Date: 10/21/96	205	10	mg/L
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/11/96	ND	1	mg/L
Fluoride Method 340.2 * Analyzed by: CA Date: 10/18/96	0.5	0.1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/11/96	338	1	mg/L
Sulfate Method 375.4 * Analyzed by: ST Date: 10/21/96	51	5	mg/L
Total Dissolved Solids Method 160.1 * Analyzed by: PT Date: 10/17/96	769	1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-04

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-23

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 08:15:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Total Phosphorus Method 365.2 * Analyzed by: DSE Date: 10/19/96	0.10	0.06	mg/L
Aluminum, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	0.6	0.1	mg/L
Arsenic, Total METHOD 206.2 * Analyzed by: WFL Date: 10/21/96	0.01	0.01	mg/L
Barium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	0.205	0.005	mg/L
Boron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/21/96	0.2	0.1	mg/L
Calcium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	117	0.1	mg/L

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-04

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-23

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 08:15:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.005	mg/L
Chromium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.01	mg/L
Iron, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	0.52	0.02	mg/L
Potassium, Total METHOD 200.7 * Analyzed by: JM Date: 10/22/96	6	1	mg/L
Magnesium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	31.3	0.1	mg/L
Manganese, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	**0.48**	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-04

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-23

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 08:15:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Sodium, Total METHOD 200.7 * Analyzed by: JM Date: 10/22/96	152	0.1	mg/L
Acid Digestion-Total, GF EPA 4.1.3 Analyzed by: GB Date: 10/16/96	10/16/96		
Acid Digestion-Total, ICP EPA 4.1.3 Analyzed by: GB Date: 10/16/96	10/16/96		
Selenium, Total METHOD 270.2 * Analyzed by: WFL Date: 10/21/96	ND	0.008	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8887 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-05

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-24

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 09:15:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Chloride Method 325.3 * Analyzed by: CA Date: 10/21/96	295	10	mg/L
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/11/96	ND	1	mg/L
Fluoride Method 340.2 * Analyzed by: CA Date: 10/18/96	0.6	0.1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/11/96	408	1	mg/L
Sulfate Method 375.4 * Analyzed by: ST Date: 10/21/96	99	5	mg/L
Total Dissolved Solids Method 160.1 * Analyzed by: PT Date: 10/17/96	1040	1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
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HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-05

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-24

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 09:15:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Total Phosphorus Method 365.2 * Analyzed by: DSE Date: 10/19/96	0.19	0.06	mg/L
Aluminum, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.1	mg/L
Arsenic, Total METHOD 206.2 * Analyzed by: WFL Date: 10/21/96	0.01	0.01	mg/L
Barium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	0.111	0.005	mg/L
Boron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/21/96	0.3	0.1	mg/L
Calcium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	109	0.1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-05

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-24

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 09:15:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.005	mg/L
Chromium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.01	mg/L
Iron, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	1.06	0.02	mg/L
Potassium, Total METHOD 200.7 * Analyzed by: JM Date: 10/22/96	2	1	mg/L
Magnesium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	40.1	0.1	mg/L
Manganese, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	**0.87**	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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Certificate of Analysis No. H9-9610784-05

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-24

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 09:15:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Sodium, Total METHOD 200.7 * Analyzed by: JM Date: 10/22/96	222	0.1	mg/L
Acid Digestion-Total, GF EPA 4.1.3 Analyzed by: GB Date: 10/16/96	10/16/96		
Acid Digestion-Total, ICP EPA 4.1.3 Analyzed by: GB Date: 10/16/96	10/16/96		
Selenium, Total METHOD 270.2 * Analyzed by: WFL Date: 10/21/96	ND	0.008	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-06

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-25

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 10:45:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Chloride Method 325.3 * Analyzed by: CA Date: 10/21/96	275	10	mg/L
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/11/96	ND	1	mg/L
Fluoride Method 340.2 * Analyzed by: CA Date: 10/18/96	0.4	0.1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/11/96	320	1	mg/L
Sulfate Method 375.4 * Analyzed by: ST Date: 10/21/96	54	5	mg/L
Total Dissolved Solids Method 160.1 * Analyzed by: PT Date: 10/17/96	850	1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-06

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-25

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 10:45:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Total Phosphorus Method 365.2 * Analyzed by: DSE Date: 10/19/96	0.12	0.06	mg/L
Aluminum, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	0.2	0.1	mg/L
Arsenic, Total METHOD 206.2 * Analyzed by: WFL Date: 10/21/96	ND	0.01	mg/L
Barium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	0.240	0.005	mg/L
Boron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/21/96	0.2	0.1	mg/L
Calcium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	139	0.1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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HOUSTON, TEXAS 77054
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Certificate of Analysis No. H9-9610784-06

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-25

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 10:45:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.005	mg/L
Chromium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.01	mg/L
Iron, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	1.28	0.02	mg/L
Potassium, Total METHOD 200.7 * Analyzed by: JM Date: 10/22/96	2	1	mg/L
Magnesium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	35.8	0.1	mg/L
Manganese, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	**0.51**	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
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Certificate of Analysis No. H9-9610784-06

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-25

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 10:45:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Sodium, Total METHOD 200.7 * Analyzed by: JM Date: 10/22/96	172	0.1	mg/L
Acid Digestion-Total, GF EPA 4.1.3 Analyzed by: GB Date: 10/16/96	10/16/96		
Acid Digestion-Total, ICP EPA 4.1.3 Analyzed by: GB Date: 10/16/96	10/16/96		
Selenium, Total METHOD 270.2 * Analyzed by: WFL Date: 10/21/96	ND	0.008	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
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Certificate of Analysis No. H9-9610784-07

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: Rinsate

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 14:25:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Chloride Method 325.3 * Analyzed by: CA Date: 10/21/96	ND	1	mg/L
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/11/96	ND	1	mg/L
Fluoride Method 340.2 * Analyzed by: CA Date: 10/18/96	ND	0.1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/11/96	4	1	mg/L
Sulfate Method 375.4 * Analyzed by: ST Date: 10/21/96	ND	1	mg/L
Total Dissolved Solids Method 160.1 * Analyzed by: PT Date: 10/17/96	2	1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
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PHONE (713) 660-090'

Certificate of Analysis No. H9-9610784-07

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: Rinsate

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 14:25:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Total Phosphorus Method 365.2 * Analyzed by: DSE Date: 10/19/96	ND	0.06	mg/L
Aluminum, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.1	mg/L
Arsenic, Total METHOD 206.2 * Analyzed by: WFL Date: 10/21/96	ND	0.01	mg/L
Barium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.005	mg/L
Boron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/21/96	ND	0.1	mg/L
Calcium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	104	0.1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610784-07

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: Rinsate

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 14:25:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.005	mg/L
Chromium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.01	mg/L
Iron, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.02	mg/L
Potassium, Total METHOD 200.7 * Analyzed by: JM Date: 10/22/96	ND	1	mg/L
Magnesium, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	0.1	0.1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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Certificate of Analysis No. H9-9610784-07

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/23/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: Rinsate

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/11/96 14:25:00
DATE RECEIVED: 10/11/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Manganese, Total METHOD 200.7 * Analyzed by: JM Date: 10/21/96	ND	0.01	mg/L
Sodium, Total METHOD 200.7 * Analyzed by: JM Date: 10/22/96	0.4	0.1	mg/L
Acid Digestion-Total, GF EPA 4.1.3 Analyzed by: GB Date: 10/16/96	10/16/96		
Acid Digestion-Total, ICP EPA 4.1.3 Analyzed by: GB Date: 10/16/96	10/16/96		
Selenium, Total METHOD 270.2 * Analyzed by: WFL Date: 10/21/96	ND	0.008	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

QUALITY CONTROL

DOCUMENTATION

ICP Spectroscopy Method 200.7 Quality Control Report

Matrix: Water Units: mg/L Analyst: JM

Date: 102296 Time: 0755 File Name: 102296M1 Checked: 10/23/96

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE: (713) 660-0901

Laboratory Control Sample

Element	Mth. Blank	True Value	Result	% Recovery	Lower Limit	Upper Limit
Silver						
Aluminum						
Arsenic						
Barium						
Beryllium						
Calcium						
Cadmium						
Cobalt						
Chromium						
Copper						
Iron						
Potassium	ND	20.00	20.28	101	16.00	24.00
Magnesium						
Manganese						
Sodium	ND	20.00	20.83	104	16.00	24.00
Nickel						
Lead						
Antimony						
Selenium						
Thallium						
Vanadium						
Zinc						

Work Orders in Batch

Work Order	Fractions
96-10-784	01C-07C

Matrix Spike - Spike Duplicate Results **Work Order Spiked: 96-10-784 01C**

Element	Sample Result	Spike Added	Matrix Spike Result	Matrix Spike Recovery		Matrix Spike Duplicate Result	Matrix Spike Duplicate Recovery		QC Limits % Recovery		Spike RPD %		QC Limits %
Silver													
Aluminum													
Arsenic													
Barium													
Beryllium													
Calcium													
Cadmium													
Cobalt													
Chromium													
Copper													
Iron													
Potassium	2.179	10.0	12.74	105.6		12.57	103.9		90	110	1.6		20.0
Magnesium													
Manganese													
Sodium	174.8	10.0	179.3	45.0	*	183	82.0	*	90	110	58.3	**	20.0
Nickel													
Lead													
Antimony													
Selenium													
Thallium													
Vanadium													
Zinc													

* Spike Results Outside Method Limits
** Spike RPD Outside Method Limits

ICP Spectroscopy Method 200.7 Quality Control Report

Matrix: Water Units: mg/L Analyst: JM

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Date: 102196 Time: 0819 File Name: 102196M1 Checked: 10/22/96

Laboratory Control Sample

Element	Mth. Blank	True Value	Result	% Recovery	Lower Limit	Upper Limit
Silver						
Aluminum	ND	2.00	2.09	105	1.60	2.40
Arsenic						
Barium	ND	2.00	2.02	101	1.60	2.40
Beryllium						
Calcium	ND	20.00	19.68	98	16.00	24.00
Cadmium	ND	2.00	1.82	91	1.60	2.40
Cobalt						
Chromium	ND	2.00	1.95	97	1.60	2.40
Copper						
Iron	ND	2.00	1.98	99	1.60	2.40
Potassium						
Magnesium	ND	20.00	19.42	97	16.00	24.00
Manganese	ND	2.00	1.96	98	1.60	2.40
Sodium						
Nickel						
Lead						
Antimony						
Selenium						
Thallium						
Vanadium						
Zinc						

Work Orders in Batch

Work Order	Fractions
96-10-784	01C-07C

Matrix Spike - Spike Duplicate Results **Work Order Spiked: 96-10-784 01C**

Element	Sample Result	Spike Added	Matrix Spike Result	Matrix Spike Recovery		Matrix Spike Duplicate Result	Matrix Spike Duplicate Recovery		QC Limits % Recovery		Spike RPD %		QC Limits %
Silver													
Aluminum	ND	1.0	1.731	173.1	*	1.118	111.8	*	90	110	43.0	**	20.0
Arsenic													
Barium	0.2469	1.0	1.259	101.2		1.256	100.9		90	110	0.3		20.0
Beryllium													
Calcium	137.7	10.0	148	103.0		153	153.0	*	90	110	39.1	**	20.0
Cadmium	ND	1.0	0.9483	94.8		0.9396	94.0		90	110	0.9		20.0
Cobalt													
Chromium	ND	1.0	1.00	100.0		0.9946	99.5		90	110	0.5		20.0
Copper													
Iron	1.233	1.0	2.236	100.3		2.273	104.0		90	110	3.6		20.0
Potassium													
Magnesium	35.28	10.0	45.37	100.9		46.42	111.4	*	90	110	9.9		20.0
Manganese	0.492	1.0	1.491	99.9		1.501	100.9		90	110	1.0		20.0
Sodium													
Nickel													
Lead													
Antimony													
Selenium													
Thallium													
Vanadium													
Zinc													

* Spike Results Outside Method Limits
** Spike RPD Outside Method Limits

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/22/96
Analyzed on: 10/21/96
Analyst: WFL

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Arsenic, Total
METHOD 206.2 *

SPL Sample ID Number	Blank Value ug/L	Amt Added ug/L	Matrix Spike Recovery %	Matrix Spike Duplicate Recovery %	Relative Percent Difference %	QC Limits Recovery	RPD Max.
9610546-01E	ND	50.0	88.6	87.4	1.4	75 - 125	20

-9610A66

Samples in batch:

9610784-01C 9610784-02C 9610784-03C 9610784-04C
9610784-05C 9610784-06C 9610784-07C

COMMENTS:

HF
10/22/96
HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-090

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/22/96
Analyzed on: 10/21/96
Analyst: WFL

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Arsenic, Total
METHOD 206.2 *

SPL Sample ID Number	Blank Value ug/L	LCS Concentration ug/L	Measured Concentration ug/L	% Recovery	QC Limits Recovery
9610546-01E	ND	50.0	43.5	87.0	83 - 114

-9610A66

Samples in batch:

9610784-01C 9610784-02C 9610784-03C 9610784-04C
9610784-05C 9610784-06C 9610784-07C

COMMENTS:
LCS=SPL ID#:94-464-198-12

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/21/96
Analyzed on: 10/21/96
Analyst: DQ

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Boron, Total
METHOD 200.7 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	4.00	4.126	103	90 - 110

-9610B03

Samples in batch:

9610784-01C 9610784-02C 9610784-03C 9610784-04C
9610784-05C 9610784-06C 9610784-07C

COMMENTS:

LCS=SPL ID#: 94-452-25-20
94-452-24-18
94-452-24-20

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/21/96
Analyzed on: 10/21/96
Analyst: DQ

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Boron, Total
METHOD 200.7 *

SPL Sample ID Number	Blank Value mg/L	Amt Added mg/L	Matrix Spike Recovery %	Matrix Spike Duplicate Recovery %	Relative Percent Difference %	QC Limits Recovery	RPD-Max.
9610784-01C	ND	2.00	101	103	2.0	90 - 110	20

-9610B03

Samples in batch:

9610784-01C 9610784-02C 9610784-03C 9610784-04C
9610784-05C 9610784-06C 9610784-07C

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/15/96
Analyzed on: 10/11/96
Analyst: LAR

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

Bicarbonate, as CaCO3
METHOD SM 4500-CO2D **

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9610771-01E	290	294	1.4	3

-9610721

Samples in batch:

9610771-01E 9610771-04E 9610784-01A 9610784-02A
9610784-03A 9610784-04A 9610784-05A 9610784-06A
9610784-07A

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/15/96
Analyzed on: 10/11/96
Analyst: LAR

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

Carbonate, as CaCO3
METHOD SM 4500-CO2D **

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9610771-01E	ND	ND	0	2.2

-9610720

Samples in batch:

9610771-01E 9610771-04E 9610784-01A 9610784-02A
9610784-03A 9610784-04A 9610784-05A 9610784-06A
9610784-07A

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/21/96
Analyzed on: 10/21/96
Analyst: CA

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Chloride
METHOD 325.3 *

SPL Sample ID Number	Blank Value mg/L	Amt Added mg/L	Matrix Spike Recovery %	Matrix Spike Duplicate Recovery %	Relative Percent Difference %	QC Limits Recovery	RPD Max.
9610784-01A	ND	50.00	100	100	0	93.2 - 109.3	2.7

-9610A21

Samples in batch:

9610558-08B 9610558-11B 9610558-12B 9610784-01A
9610784-02A 9610784-03A 9610784-04A 9610784-05A
9610784-06A 9610784-07A

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/21/96
Analyzed on: 10/21/96
Analyst: CA

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Chloride
METHOD 325.3 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	51.60	51.48	99.8	90 - 110

-9610A22

Samples in batch:

9610558-08B	9610558-11B	9610558-12B	9610558-13B
9610644-01B	9610644-02B	9610644-03B	9610644-04B
9610644-05B	9610644-06B	9610644-07B	9610784-01A
9610784-02A	9610784-03A	9610784-04A	9610784-05A
9610784-06A	9610784-07A	9610B07-03A	9610B08-03A

COMMENTS:

SPL LCS ID# 9553564-1

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/18/96
Analyzed on: 10/18/96
Analyst: CA

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Fluoride
METHOD 340.2 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	1.00	0.966	96.6	90 - 110

-9610929

Samples in batch:

9610707-01A	9610707-02A	9610707-03A	9610707-04A
9610784-01A	9610784-02A	9610784-03A	9610784-04A
9610784-05A	9610784-06A	9610784-07A	9610967-01A
9610A28-01I	9610A28-03I	9610A28-04I	9610A28-05I

COMMENTS:

SPL LCS ID# 9553564-1

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/18/96
Analyzed on: 10/18/96
Analyst: CA

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Fluoride
METHOD 340.2 *

SPL Sample ID Number	Blank Value mg/L	Amt Added mg/L	Matrix Spike Recovery %	Matrix Spike Duplicate Recovery %	Relative Percent Difference %	QC Limits Recovery	RPD * Max.
9610967-01A	ND	0.500	102	102	0	78 - 113	3.6

-9610930

Samples in batch:

9610784-07A 9610967-01A 9610A28-01I 9610A28-03I
9610A28-04I 9610A28-05I

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/18/96
Analyzed on: 10/18/96
Analyst: CA

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Fluoride
METHOD 340.2 *

SPL Sample ID Number	Blank Value mg/L	Amt Added mg/L	Matrix Spike Recovery %	Matrix Spike Duplicate Recovery %	Relative Percent Difference %	QC Limits Recovery	RPD Max.
9610707-04A	ND	0.500	94.6	95.0	0.4	78 - 113	3.6

-9610927

Samples in batch:

9610707-01A 9610707-02A 9610707-03A 9610707-04A
9610784-01A 9610784-02A 9610784-03A 9610784-04A
9610784-05A 9610784-06A

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-090

10/22/96

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/22/96
Analyzed on: 10/21/96
Analyst: WFL

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Selenium, Total
METHOD 270.2 *

SPL Sample ID Number	Blank Value ug/L	LCS Concentration ug/L	Measured Concentration ug/L	% Recovery	QC Limits Recovery
9610546-01E	ND	50.0	45.5	91.0	80 - 120

-9610A54

Samples in batch:

9610784-01C 9610784-02C 9610784-03C 9610784-04C
9610784-05C 9610784-06C 9610784-07C

COMMENTS:
LCS=SPL ID#:94-464-198-12

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-090

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/22/96
Analyzed on: 10/21/96
Analyst: WFL

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Selenium, Total
METHOD 270.2 *

SPL Sample ID Number	Blank Value ug/L	Amt Added ug/L	Matrix Spike Recovery %	Matrix Spike Duplicate Recovery %	Relative Percent Difference %	QC Limits Recovery	RPD Max.
9610546-01E	ND	50.0	82.6	81.8	1.0	75 - 125	20

-9610A54

Samples in batch:

9610784-01C 9610784-02C 9610784-03C 9610784-04C
9610784-05C 9610784-06C 9610784-07C

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/21/96
Analyzed on: 10/21/96
Analyst: ST

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Sulfate
METHOD 375.4 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	20.00	19.99	100	90 - 110

-9610A30

Samples in batch:

9610558-08B	9610558-11B	9610558-12B	9610558-13B
9610644-01B	9610644-02B	9610644-03B	9610644-04B
9610644-05B	9610644-06B	9610644-07B	9610784-01A
9610784-02A	9610784-03A	9610784-04A	9610784-05A
9610784-06A	9610784-07A	9610914-01A	

COMMENTS:

SPL LCS ID#9553564-1

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/21/96
Analyzed on: 10/21/96
Analyst: ST

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Sulfate
METHOD 375.4 *

SPL Sample ID Number	Blank Value mg/L	Amt Added mg/L	Matrix Spike Recovery %	Matrix Spike Duplicate Recovery %	Relative Percent Difference %	QC Limits Recovery	RPD Max.
9610558-11B	ND	10.00	106	106	0	79.6 - 122	11.8

-9610A28

Samples in batch:

9610558-08B 9610558-11B 9610558-12B 9610784-01A
9610784-02A 9610784-03A 9610784-04A 9610784-05A
9610784-06A 9610784-07A

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/19/96
Analyzed on: 10/17/96
Analyst: PT

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Total Dissolved Solids
METHOD 160.1 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	420.6	416	98.9	90 - 110

-9610957

Samples in batch:

9610784-01A	9610784-02A	9610784-03A	9610784-04A
9610784-05A	9610784-06A	9610784-07A	9610937-01A
9610938-01A	9610939-01A	9610981-02D	

COMMENTS:

LCS# 9553564-12

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/19/96
Analyzed on: 10/17/96
Analyst: PT

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

Total Dissolved Solids
METHOD 160.1 *

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9610784-01A	857	856	0.1	20

-9610958

Samples in batch:

9610784-01A 9610784-02A 9610784-03A 9610784-04A
9610784-05A 9610784-06A 9610784-07A 9610938-01A
9610939-01A 9610981-02D

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/21/96
Analyzed on: 10/19/96
Analyst: DSE

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Total Phosphorus
METHOD 365.2 *

SPL Sample ID Number	Blank Value mg/L	Amt Added mg/L	Matrix Spike Recovery %	Matrix Spike Duplicate Recovery %	Relative Percent Difference %	QC Limits Recovery	RPD Max.
9610784-07B	ND	0.25	102	101	1.0	54.7 - 141	20

-9610A78

Samples in batch:

9610784-01B 9610784-02B 9610784-03B 9610784-04B
9610784-05B 9610784-06B 9610784-07B

COMMENTS:

CHAIN OF CUSTODY

AND

SAMPLE RECEIPT CHECKLIST

SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No: 96-10784

H- 10168

page 1 of 1

Client Name: HL&P

Address/Phone: 12301 Kurland / 945-8211

Client Contact: JEFF DAVIS

Project Name: WAP GWS

Project Number: KNF-92-900

Project Location: WAP

Invoice To: P.O. Box 1700 Houston TX 77251-1700

matrix: W=water S=soil SL=sludge O=other:

bottle: P=plastic A=amber glass G=glass V=vial

size: 1=1 liter 4=4oz 40=vial 8=8oz 16=16oz

pres.: 1=HCl 2=HNO3 3=H2SO4 O=other:

Requested Analysis

SAMPLE ID	DATE	TIME	comp	grab	matrix	bottle	size	pres.	Number of Containers	Anions, TDS	Metals	Total Phosphate						
MW-18	10-11-96	10:45		✓	W	P	3-1	1-2 1-3	3	✓	✓	✓						
MW-20	10-11-96	11:50		✓	W	P	3-1	1-2 1-3	3	✓	✓	✓						
MW-21	10-11-96	1:50		✓	W	P	3-1	1-2 1-3	3	✓	✓	✓						
MW-23	10-11-96	8:15		✓	W	P	3-1	1-2 1-3	3	✓	✓	✓						
MW-24	10-11-96	9:15		✓	W	P	3-1	1-2 1-3	3	✓	✓	✓						
MW-25	10-11-96	10:45		✓	W	P	3-1	1-2 1-3	3	✓	✓	✓						
RINSATE	10-11-96	2:25		✓	W	P	3-1	1-2 1-3	3	✓	✓	✓						

Client/Consultant Remarks:

Laboratory remarks:

Intact? ☑ Y ☐ N

Temp: 5°C

Requested TAT

24hr ☐ 72hr ☐

48hr ☐ Standard ☑

Other ☐ _____

Special Reporting Requirements: Standard QC ☑ Fax Results ☐ Raw Data ☐ Level 3 QC ☐ Level 4 QC ☐

Special Detection Limits (specify):

PM review (initial): BB 10/12

1. Relinquished by Sampler: Stephen R. Prichett	date 10-11-96	time 3:35	2. Received by: Don Carter
3. Relinquished by: Don Carter	date 10-11-96	time	4. Received by:
5. Relinquished by:	date	time	6. Received by Laboratory:

☑ 8880 Interchange Drive, Houston, TX 77054 (713) 660-0901

☐ 459 Hughes Drive, Traverse City, MI 49684 (616) 947-5777

☐ 500 Ambassador Caffery Parkway, Scott, LA 70583 (318) 237-4775

☐ 1511 E. Orangethorpe Avenue, Fullerton, CA 92631 (714) 447-6868

SPL Houston Environmental Laboratory

Sample Login Checklist

Date:	Time:
10-11-96	1535

SPL Sample ID:
96-10-78f

			Yes	No
1	Chain-of-Custody (COC) form is present.		✓	
2	COC is properly completed.		✓	
3	If no, Non-Conformance Worksheet has been completed.			
4	Custody seals are present on the shipping container.		✓	
5	If yes, custody seals are intact.		✓	
6	All samples are tagged or labeled.		✓	
7	If no, Non-Conformance Worksheet has been completed.			
8	Sample containers arrived intact		✓	
9	Temperature of samples upon arrival:		5° C	
10	Method of sample delivery to SPL:	**SPL Delivery**		
		Client Delivery	✓	
		FedEx Delivery (airbill #)		
		Other:		
11	Method of sample disposal:	SPL Disposal	✓	
		HOLD		
		Return to Client		

Name:	Date:
[illegible]	10-11-96

HOUSTON LABORATORY
6880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Southern Petroleum Laboratories, Inc.

Certificate of Analysis Number: 96-10-707

Approved for Release by:

Brent Barron, Client Services Supervisor

Date: 10/26/96

Greg Grandits
Laboratory Director

Idelis Williams
Quality Assurance Officer

The attached analytical data package may not be reproduced except in full without the express written approval of this laboratory.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

CASE NARRATIVE

QUALITY CONTROL RESULTS SUMMARY

WORK ORDER NO.: 96-10-707

Southern Petroleum Laboratories (SPL) is pleased to present the results of laboratory analyses to Houston Lighting and Power Co. Four liquid samples were received at our laboratory on October 10, 1996 at a temperature of 5 degrees Celsius. The following is a brief narrative of the laboratory analysis.

These samples were analyzed per the Chain of Custody. There were no deviations from the required methods.

For Metals analysis on QC batch 101796Q1 the sample randomly chosen for SPL's Quality Assurance program exhibited these deficientcies. The Matrix Spike (MS) Matrix Spike Duplicate (MSD) as well as the Relative Percent Difference were outside of the advisory quality control limits for the analysis of Sodium. The Matrix Spike Duplicate was outside of the advisory quality control limits for the analysis of Cadmium and Magnesium. The Laboratory Control sample for this batch was well within SPL's Quality Control guidelines.

If you have any questions, please feel free to call me.

Brent Barron
Client Services Supervisor

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610707-01

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-16

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 14:20:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Chloride Method 325.3 * Analyzed by: CA Date: 10/16/96	163	2	mg/L
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/10/96	ND	1	mg/L
Fluoride Method 340.2 * Analyzed by: CA Date: 10/18/96	0.4	0.1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/10/96	428	1	mg/L
Sulfate Method 375.4 * Analyzed by: ST Date: 10/17/96	147	25	mg/L
Total Dissolved Solids Method 160.1 * Analyzed by: JS Date: 10/15/96	924	2	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610707-01

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-16

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 14:20:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Total Phosphorus Method 365.2 * Analyzed by: DSE Date: 10/19/96	0.20	0.06	mg/L
Aluminum, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	0.1	0.1	mg/L
Arsenic, Total METHOD 206.2 * Analyzed by: WFL Date: 10/17/96	0.02	0.01	mg/L
Barium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	0.172	0.005	mg/L
Boron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/21/96	0.2	0.1	mg/L
Calcium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	135	0.1	mg/L

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610707-01

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-16

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 14:20:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	ND	0.005	mg/L
Chromium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	ND	0.01	mg/L
Iron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	4.46	0.02	mg/L
Potassium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	3	1	mg/L
Magnesium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	37.1	0.1	mg/L
Manganese, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	[illegible]60	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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PHONE (713) 660-0901

Certificate of Analysis No. H9-9610707-01

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-16

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 14:20:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Sodium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	141	0.2	mg/L
Acid Digestion-Total, GF EPA 4.1.3 Analyzed by: AG Date: 10/14/96	10/14/96		
Acid Digestion-Total, ICP EPA 4.1.3 Analyzed by: AG Date: 10/14/96	10/14/96		
Selenium, Total METHOD 270.2 * Analyzed by: WFL Date: 10/18/96	ND	0.008	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610707-02

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-17

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 11:33:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Chloride Method 325.3 * Analyzed by: CA Date: 10/16/96	189	2	mg/L
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/10/96	ND	1	mg/L
Fluoride Method 340.2 * Analyzed by: CA Date: 10/18/96	0.4	0.1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/10/96	342	1	mg/L
Sulfate Method 375.4 * Analyzed by: ST Date: 10/17/96	62	5	mg/L
Total Dissolved Solids Method 160.1 * Analyzed by: JS Date: 10/15/96	742	2	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610707-02

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-17

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 11:33:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Total Phosphorus Method 365.2 * Analyzed by: DSE Date: 10/19/96	0.40	0.06	mg/L
Aluminum, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	0.2	0.1	mg/L
Arsenic, Total METHOD 206.2 * Analyzed by: WFL Date: 10/17/96	0.02	0.01	mg/L
Barium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	0.364	0.005	mg/L
Boron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/21/96	0.2	0.1	mg/L
Calcium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	115	0.1	mg/L

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610707-02

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-17

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 11:33:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	ND	0.005	mg/L
Chromium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	ND	0.01	mg/L
Iron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	5.00	0.02	mg/L
Potassium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	4	1	mg/L
Magnesium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	27.2	0.1	mg/L
Manganese, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	0.40	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610707-02

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-17

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 11:33:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Sodium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	117	0.2	mg/L
Acid Digestion-Total, GF EPA 4.1.3 Analyzed by: AG Date: 10/14/96	10/14/96		
Acid Digestion-Total, ICP EPA 4.1.3 Analyzed by: AG Date: 10/14/96	10/14/96		
Selenium, Total METHOD 270.2 * Analyzed by: WFL Date: 10/18/96	ND	0.008	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610707-03

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-19

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 09:55:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Chloride Method 325.3 * Analyzed by: CA Date: 10/16/96	312	5	mg/L
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/10/96	ND	1	mg/L
Fluoride Method 340.2 * Analyzed by: CA Date: 10/18/96	0.5	0.1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/10/96	380	1	mg/L
Sulfate Method 375.4 * Analyzed by: ST Date: 10/17/96	124	10	mg/L
Total Dissolved Solids Method 160.1 * Analyzed by: JS Date: 10/15/96	1110	2	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610707-03

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-19

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 09:55:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Total Phosphorus Method 365.2 * Analyzed by: DSE Date: 10/19/96	0.08	0.06	mg/L
Aluminum, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	ND	0.1	mg/L
Arsenic, Total METHOD 206.2 * Analyzed by: WFL Date: 10/17/96	ND	0.01	mg/L
Barium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	0.123	0.005	mg/L
Boron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/21/96	0.3	0.1	mg/L
Calcium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	116	0.1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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Certificate of Analysis No. H9-9610707-03

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-19

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 09:55:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	ND	0.005	mg/L
Chromium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	ND	0.01	mg/L
Iron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	0.543	0.02	mg/L
Potassium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	3	1	mg/L
Magnesium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	48.4	0.1	mg/L
Manganese, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	[illegible]	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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HOUSTON TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610707-03

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-19

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 09:55:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Sodium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	179	0.2	mg/L
Acid Digestion-Total, GF EPA 4.1.3 Analyzed by: AG Date: 10/14/96	10/14/96		
Acid Digestion-Total, ICP EPA 4.1.3 Analyzed by: AG Date: 10/14/96	10/14/96		
Selenium, Total METHOD 270.2 * Analyzed by: WFL Date: 10/18/96	ND	0.008	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
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Certificate of Analysis No. H9-9610707-04

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-22

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 13:35:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Chloride Method 325.3 * Analyzed by: CA Date: 10/16/96	525	10	mg/L
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/10/96	ND	1	mg/L
Fluoride Method 340.2 * Analyzed by: CA Date: 10/18/96	0.5	0.1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: LAR Date: 10/10/96	460	1	mg/L
Sulfate Method 375.4 * Analyzed by: ST Date: 10/17/96	270	25	mg/L
Total Dissolved Solids Method 160.1 * Analyzed by: PT Date: 10/16/96	2310	2	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
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HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9610707-04

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-22

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 13:35:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Total Phosphorus Method 365.2 * Analyzed by: DSE Date: 10/19/96	0.12	0.06	mg/L
Aluminum, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	ND	0.1	mg/L
Arsenic, Total METHOD 206.2 * Analyzed by: WFL Date: 10/17/96	0.03	0.01	mg/L
Barium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	0.080	0.005	mg/L
Boron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/21/96	0.4	0.1	mg/L
Calcium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	182	0.1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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Certificate of Analysis No. H9-9610707-04

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-22

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 13:35:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	ND	0.005	mg/L
Chromium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	ND	0.01	mg/L
Iron, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	0.848	0.02	mg/L
Potassium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	2	1	mg/L
Magnesium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	86.3	0.1	mg/L
Manganese, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	1.53	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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Certificate of Analysis No. H9-9610707-04

Houston Lighting & Power Co.
12301 Kurland Drive
Houston, TX 77034
ATTN: Jeff Davis

P.O.# KNF-92-900
DATE: 10/21/96

PROJECT: WAP GWS
SITE: WAP
SAMPLED BY: Houston Lighting & Power
SAMPLE ID: MW-22

PROJECT NO: KNF-92-900
MATRIX: WATER
DATE SAMPLED: 10/10/96 13:35:00
DATE RECEIVED: 10/10/96

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Sodium, Total METHOD 200.7 * Analyzed by: DQ Date: 10/17/96	268	0.2	mg/L
Acid Digestion-Total, GF EPA 4.1.3 Analyzed by: AG Date: 10/14/96	10/14/96		
Acid Digestion-Total, ICP EPA 4.1.3 Analyzed by: AG Date: 10/14/96	10/14/96		
Selenium, Total METHOD 270.2 * Analyzed by: WFL Date: 10/18/96	ND	0.008	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

QUALITY CONTROL

DOCUMENTATION

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/18/96
Analyzed on: 10/17/96
Analyst: WFL

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Arsenic, Total
METHOD 206.2 *

SPL Sample ID Number	Blank Value ug/L	LCS Concentration ug/L	Measured Concentration ug/L	% Recovery	QC Limits Recovery
LCS	ND	50.0	43.5	87.0	83 - 114

-9610920

Samples in batch:

9610707-01C 9610707-02C 9610707-03C 9610707-04C

COMMENTS:
LCS=SPL ID#:94-464-198-12

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/18/96
Analyzed on: 10/17/96
Analyst: WFL

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Arsenic, Total
METHOD 206.2 *

SPL Sample ID Number	Blank Value ug/L	Amt Added ug/L	Matrix Spike Recovery %	Matrix Spike Duplicate Recovery %	Relative Percent Difference %	QC Limits Recovery	RPD Max.
9610707-01C	ND	50.0	81.6	81.6	0	75 - 125	20

-9610920

Samples in batch:

9610707-01C 9610707-02C 9610707-03C 9610707-04C

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/21/96
Analyzed on: 10/21/96
Analyst: DQ

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Boron, Total
METHOD 200.7 *

SPL Sample ID Number	Method Blank mg/L	Sample Result mg/L	Spike Added mg/L	Matrix Spike Result mg/L	Matrix Spike Recovery %	Matrix Spike Duplicate Result mg/L	Matrix Spike Duplicate Recovery %	RPD (%)	QC LIMITS (Advisory) RPD Max	QC LIMITS (Advisory) % REC
9610635-01C	ND	.630	2.00	2.652	101	2.66	102	1.0	20	90 -110

-9610A99

Samples in batch:

9610707-01C 9610707-02C 9610707-03C 9610707-04C

COMMENTS:

LCS=SPL ID#: 94-452-25-20
94-452-24-18
94-452-24-20

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/21/96
Analyzed on: 10/21/96
Analyst: DQ

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Boron, Total
METHOD 200.7 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	4.00	4.086	102	90 - 110

-9610A99

Samples in batch:

9610707-01C 9610707-02C 9610707-03C 9610707-04C

COMMENTS:

LCS=SPL ID#: 94-452-25-20
94-452-24-18
94-452-24-20

ICP Spectroscopy Method 200.7 Quality Control Report

Matrix: Water Units: mg/L Analyst: DO

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE 713-660-0901

Date: 101796 Time: 09:16 File Name: 101796Q1 Checked: JM 10/17/96

Laboratory Control Sample

Element	Mth. Blank	True Value	Result	% Recovery	Lower Limit	Upper Limit
Silver						
Aluminum	ND	2.00	2.14	107	1.60	2.40
Arsenic						
Barium	ND	2.00	2.06	103	1.60	2.40
Beryllium						
Calcium	ND	20.00	20.53	103	16.00	24.00
Cadmium	ND	2.00	1.91	96	1.60	2.40
Cobalt						
Chromium	ND	2.00	2.06	103	1.60	2.40
Copper	ND	2.00	2.03	101	1.60	2.40
Iron	ND	2.00	2.06	103	1.60	2.40
Potassium	ND	20.00	20.33	102	16.00	24.00
Magnesium	ND	20.00	20.25	101	16.00	24.00
Manganese	ND	2.00	2.05	103	1.60	2.40
Sodium	ND	20.00	19.98	100	16.00	24.00
Nickel						
Lead						
Antimony						
Selenium						
Thallium						
Vanadium						
Zinc	ND	2.00	2.01	100	1.60	2.40

Work Orders in Batch

Work Order	Fractions
96-10-635	01C
	03C MS
	04C MSD
96-10-707	01C-04C
96-10-517	01B
	02A

Matrix Spike - Spike Duplicate Results **Work Order Spiked: 96-10-635 01C**

Element	Sample Result	Spike Added	Matrix Spike Result	Matrix Spike Recovery		Matrix Spike Duplicate Result	Matrix Spike Duplicate Recovery		QC Limits % Recovery		Spike RPD %		QC Limits %
Silver													
Aluminum	0.189	1.0	1.223	103.4		1.192	100.3		90	110	3.0		20.0
Arsenic													
Barium	0.1937	1.0	1.15	95.6		1.129	93.5		90	110	2.2		20.0
Beryllium													
Calcium	127.4	10.0	136.4	90.0		136.5	91.0		90	110	1.1		20.0
Cadmium	0.0198	1.0	0.941	92.1		0.9187	89.9	*	90	110	2.5		20.0
Cobalt													
Chromium	ND	1.0	0.963	96.3		0.9382	93.8		90	110	2.6		20.0
Copper	0.0137	1.0	0.9864	97.3		0.9667	95.3		90	110	2.0		20.0
Iron	0.4968	1.0	1.461	96.4		1.426	92.9		90	110	3.7		20.0
Potassium	33.71	10.0	43.53	98.2		42.93	92.2		90	110	6.3		20.0
Magnesium	20.31	10.0	29.83	95.2		29.24	89.3	*	90	110	6.4		20.0
Manganese	0.0895	1.0	1.047	95.8		1.021	93.2		90	110	2.8		20.0
Sodium	563.4	10.0	575.7	123.0	*	570.1	67.0	*	90	110	58.9	**	20.0
Nickel													
Lead													
Antimony													
Selenium													
Thallium													
Vanadium													
Zinc	0.5094	1.0	1.476	96.7		1.509	100.0		90	110	3.4		20.0

* Spike Results Outside Method Limits
** Spike RPD Outside Method Limits

PB
10/21/96

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/21/96
Analyzed on: 10/18/96
Analyst: WFL

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Selenium, Total
METHOD 270.2 *

SPL Sample ID Number	Blank Value ug/L	LCS Concentration ug/L	Measured Concentration ug/L	% Recovery	QC Limits Recovery
LCS	ND	50.0	46.7	93.4	80 - 120

-9610989

Samples in batch:

9610707-01C 9610707-02C 9610707-03C 9610707-04C

COMMENTS:
LCS=SPL ID#:94-464-198-12

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

10/21/96

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/21/96
Analyzed on: 10/18/96
Analyst: WFL

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Selenium, Total
METHOD 270.2 *

SPL Sample ID Number	Blank Value ug/L	Amt Added ug/L	Matrix Spike Recovery %	Matrix Spike Duplicate Recovery %	Relative Percent Difference %	QC Limits Recovery	RPD Max.
9610707-01C	ND	50.0	81.4	83.6	2.7	75 - 125	20

-9610989

Samples in batch:

9610707-01C 9610707-02C 9610707-03C 9610707-04C

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/21/96
Analyzed on: 10/19/96
Analyst: DSE

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Total Phosphorus
METHOD 365.2 *

SPL Sample ID Number	Blank Value mg/L	Amt Added mg/L	Matrix Spike Recovery %	Matrix Spike Duplicate Recovery %	Relative Percent Difference %	QC Limits Recovery	RPD Max.
961070/-01B	ND	0.25	98.0	98.0	0	54.7 - 141	20

-9610A77

Samples in batch:

9610707-01B 9610707-02B 9610707-03B 9610707-04B

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/11/96
Analyzed on: 10/10/96
Analyst: LAR

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

Bicarbonate, as CaCO3
METHOD SM 4500-CO2D **

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9610453-02B	84	82	2.4	3

-9610556

Samples in batch:

9610453-02B 9610453-03B 9610707-01A 9610707-02A
9610707-03A 9610707-04A

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/11/96
Analyzed on: 10/10/96
Analyst: LAR

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

Carbonate, as CaCO3
METHOD SM 4500-CO2D **

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9610453-02B	436	444	1.8	2.2

-9610555

Samples in batch:

9610453-02B 9610453-03B 9610707-01A 9610707-02A
9610707-03A 9610707-04A

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/17/96
Analyzed on: 10/16/96
Analyst: CA

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Chloride
METHOD 325.3 *

SPL Sample ID Number	Blank Value mg/L	Amt Added mg/L	Matrix Spike Recovery %	Matrix Spike Duplicate Recovery %	Relative Percent Difference %	QC Limits Recovery	RPD Max.
9610830-04C	ND	50.00	102	102	0	93.2 - 109.3	2.7

-9610816

Samples in batch:

9610707-01A 9610707-02A 9610707-03A 9610707-04A
9610830-04C

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON TEXAS 77054
PHONE (713) 660-090

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/17/96
Analyzed on: 10/16/96
Analyst: CA

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Chloride
METHOD 325.3 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	51.60	51.48	99.8	90 - 110

-9610817

Samples in batch:

9610707-01A 9610707-02A 9610707-03A 9610707-04A
9610830-04C

COMMENTS:

SPL LCS ID# 9553564-1

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/18/96
Analyzed on: 10/18/96
Analyst: CA

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Fluoride
METHOD 340.2 *

SPL Sample ID Number	Blank Value mg/L	Amt Added mg/L	Matrix Spike Recovery %	Matrix Spike Duplicate Recovery %	Relative Percent Difference %	QC Limits Recovery	RPD Max.
9610707-04A	ND	0.500	94.6	95.0	0.4	78 - 113	3.6

-9610927

Samples in batch:

9610707-01A 9610707-02A 9610707-03A 9610707-04A
9610784-01A 9610784-02A 9610784-03A 9610784-04A
9610784-05A 9610784-06A

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/18/96
Analyzed on: 10/18/96
Analyst: CA

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Fluoride
METHOD 340.2 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	1.00	0.966	96.6	90 - 110

-9610929

Samples in batch:

9610707-01A	9610707-02A	9610707-03A	9610707-04A
9610784-01A	9610784-02A	9610784-03A	9610784-04A
9610784-05A	9610784-06A	9610784-07A	9610967-01A
9610A28-01I	9610A28-03I	9610A28-04I	9610A28-05I

COMMENTS:

SPL LCS ID# 9553564-1

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/17/96
Analyzed on: 10/17/96
Analyst: ST

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Sulfate
METHOD 375.4 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	20.00	19.16	95.8	90 - 110

-9610880

Samples in batch:

9610271-01F	9610271-02F	9610362-01D	9610362-02D
9610364-01G	9610364-05G	9610366-01F	9610707-01A
9610707-02A	9610707-03A	9610707-04A	

COMMENTS:

SPL LCS ID#9553564-3

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-090

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/17/96
Analyzed on: 10/17/96
Analyst: ST

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Sulfate
METHOD 375.4 *

SPL Sample ID Number	Blank Value mg/L	Amt Added mg/L	Matrix Spike Recovery %	Matrix Spike Duplicate Recovery %	Relative Percent Difference %	QC Limits Recovery	RPD Max.
9610364-01G	ND	10.00	118	117	0.9	79.6 - 122	11.8

-9610879

Samples in batch:

9610364-01G 9610364-05G 9610366-01F 9610707-01A
9610707-02A 9610707-03A 9610707-04A

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-090

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/17/96
Analyzed on: 10/15/96
Analyst: JS

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Total Dissolved Solids
METHOD 160.1 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	420.6	415.0	98.7	90 - 110

-9610881

Samples in batch:

9610707-01A	9610707-02A	9610707-03A	9610775-01B
9610775-03B	9610775-09B	9610775-10B	9610775-11B
9610775-15B	9610781-01C	9610824-01C	9610830-04D
9610883-03C	9610901-02B		

COMMENTS:

LCS = SPL ID#: 9553564-12

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/17/96
Analyzed on: 10/15/96
Analyst: JS

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

Total Dissolved Solids
METHOD 160.1 *

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9610781-01C	65660	66000	0.5	20

-9610882

Samples in batch:

9610707-01A	9610707-02A	9610707-03A	9610775-01B
9610775-03B	9610781-01C	9610824-01C	9610830-04D
9610883-03C	9610901-02B		

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/17/96
Analyzed on: 10/16/96
Analyst: PT

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

Total Dissolved Solids
METHOD 160.1 *

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9610782-03C	10514	10523	0.1	20

-9610884

Samples in batch:

9610707-04A 9610758-03C 9610782-03C

COMMENTS:

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 10/17/96
Analyzed on: 10/16/96
Analyst: PT

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Total Dissolved Solids
METHOD 160.1 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	289.2	294.0	102	90 - 110

-9610885

Samples in batch:

9610707-04A 9610758-03C 9610782-03C

COMMENTS:

LCS = SPL ID#: 9553564-13

CHAIN OF CUSTODY

AND

SAMPLE RECEIPT CHECKLIST

SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No: 96-10-707

H- 10171

page ___ of ___

Client Name: HL & P

Address/Phone: 12301 KURLAND / 945 8211

Client Contact: JEFF DAVIS

Project Name: WAP GWS

Project Number: KNF-92-900

Project Location: WAP

Invoice To: P.O. Box 1700 Hou, TX 77251-1700

SAMPLE ID	DATE	TIME	comp	grab	matrix: W=water S=soil SL=sludge O=other:	bottle: P=plastic A=amber glass G=glass V=vial	size: 1=1 liter 4=4oz 40=vial 8=8oz 16=16oz	pres.: 1=HCl 2=HNO3 3=H2SO4 O=other:	Number of Containers	Requested Analysis: ANIONS, TDS	METALS PH2 K 10/10/96	TOTAL PHOSPHATE 2						
MW-16	10-10-96	2:40		✓	W	P	3-1	1-2 1-3	3	✓	✓	✓						
MW-17	10-10-96	11:33		✓	W	P	3-1	1-2 1-3	3	✓	✓	✓						
MW-19	10-10-96	9:55		✓	W	P	3-1	1-2 1-3	3	✓	✓	✓						
MW-22	10-10-96	1:35		✓	W	P	3-1	1-2 1-3	3	✓	✓	✓						

Client/Consultant Remarks:

Laboratory remarks:

Intact? ☑ Y ☐ N

Temp: 5°C ROI

Requested TAT

24hr ☐ 72hr ☐

48hr ☐ Standard ☑

Other ☐ _____

Special Reporting Requirements: Standard QC ☑ Fax Results ☐ Level 3 QC ☐ Raw Data ☐ Level 4 QC ☐

Special Detection Limits (specify):

PM review (initial): SB 10/11

	date	time	
1. Relinquished by Sampler: Harlan R Pickett II	10-10-96	5 50	2. Received by: Ruben Estrada 10/10/96 1550
3. Relinquished by:	date	time	4. Received by:
5. Relinquished by:	date	time	6. Received by Laboratory:

☑ 8880 Interchange Drive, Houston, TX 77054 (713) 660-0901

☐ 459 Hughes Drive, Traverse City, MI 49684 (616) 947-5777

☐ 500 Ambassador Caffery Parkway, Scott, LA 70583 (318) 237-4775

☐ 1511 E. Orangethorpe Avenue, Fullerton, CA 92631 (714) 447-6868

SPL Houston Environmental Laboratory

Sample Login Checklist

Date:	Time:
10-10-96	1550

SPL Sample ID:
96-10-707

			Yes	No
1	Chain-of-Custody (COC) form is present.		✓	
2	COC is properly completed.		✓	
3	If no, Non-Conformance Worksheet has been completed.			
4	Custody seals are present on the shipping container.		✓	
5	If yes, custody seals are intact.		✓	
6	All samples are tagged or labeled.		✓	
7	If no, Non-Conformance Worksheet has been completed.			
8	Sample containers arrived intact		✓	
9	Temperature of samples upon arrival:		5° C	
10	Method of sample delivery to SPL:	**SPL Delivery**		
		Client Delivery	✓	
		FedEx Delivery (airbill #)		
		Other:		
11	Method of sample disposal:	SPL Disposal	✓	
		HOLD		
		Return to Client		

Name:	Date:
[illegible]	10-10-96

GROUNDWATER SAMPLING FORM

Date/Time 10-10-96 2:10 Well I.D. MW-16
Location WAP
Sampler HRPII Others present SWS / JEFF DAVIS
Weather: Wind —, Precipitation —, Temperature 85°
Well Secure (Y/N) Y Comments
Total depth: 53.9 - Depth to Water 7.14 = Ht. (ft)
Wetted Casing Volume, Actual Purge Volume
Screen Interval (ft) 44 - 54, Pump Intake Depth (ft) 45
pH meter calibrated (Y/N) Y, Conductivity meter calibrated (Y/N) Y
Turbidimeter calibrated (Y/N) Y

PURGE LOG

	Time	Conductivity (µmhos/cm)	pH	Turbidity (NTU)	Temperature (°C)	Water Depth (ft)
Initial	2:20	728	6.65	—	23.1	9.2
	2:25	730	6.79	—	22.9	9.2
	2:30	738	6.88	—	23.0	9.2
	2:35	767	6.94	—	23.0	9.25
	2:40	783	6.99	—	23.0	9.25

Purge flow rate (mL/min) 1000 Sampling flow rate (mL/min) 1000
Sample ID MW-16 No. of Containers 4
Alkalinity Determined at wellhead? (Y/N) Y 420

Comments

Wetted Casing Volume (gal.) = Ht. x 0.653 (4 in. casing)
= Ht x 0.163 (2 in. casing)

GROUNDWATER SAMPLING FORM

Date/Time 10-10-96 10:45 Well I.D. MW-17
Location WAP
Sampler [illegible] Others present SWS / [illegible]
Weather: Wind —, Precipitation —, Temperature 80
Well Secure (Y/N) Y Comments
Total depth: 65.1 - Depth to Water 14.75 = Ht. (ft) 50.45
Wetted Casing Volume, Actual Purge Volume 25 GAL
Screen Interval (ft) 55' - 65', Pump Intake Depth (ft) 45'
pH meter calibrated (Y/N) Y, Conductivity meter calibrated (Y/N) Y
Turbidimeter calibrated (Y/N) Y

PURGE LOG

	Time	Conductivity (µmhos/cm)	pH	Turbidity (NTU)	Temperature (°C)	Water Depth (ft)
Initial	10:55	1254	7.74	0	23.0	14.75
	11:01	1502	9.51	0	23.7	14.75
	11:03	1459	8.20	0	23.9	14.8
	11:13	1458	7.43	0	23.8	14.[illegible]
	11:20	1434	7.07	0	23.5	14.[illegible]
	11:25	1281	6.93	0	23.5	14.[illegible]
	11:[illegible]	1573	6.[illegible]	0	23.5	14.8

Purge flow rate (mL/min) 500 Sampling flow rate (mL/min) [illegible]
Sample ID MW-17 No. of Containers 4
Alkalinity Determined at wellhead? (Y/N) Y 365

Comments

Wetted Casing Volume (gal.) = Ht. x 0.653 (4 in. casing)
= Ht x 0.163 (2 in. casing)

GROUNDWATER SAMPLING FORM

Date/Time 10-11-96 10:00 Well I.D. MW - 18
Location WAP
Sampler HAPII Others present SWS
Weather: Wind NW < 5, Precipitation –, Temperature [illegible]
Well Secure (Y/N) Y Comments
Total depth: 50.1 - Depth to Water 14.9 = Ht. (ft) 35.[illegible]
Wetted Casing Volume, Actual Purge Volume 19 GAL
Screen Interval (ft) 40 - 50, Pump Intake Depth (ft) 45
pH meter calibrated (Y/N) Y, Conductivity meter calibrated (Y/N) Y
Turbidimeter calibrated (Y/N) Y

PURGE LOG

	Time	Conductivity (µmhos/cm)	pH	Turbidity (NTU)	Temperature (°C)	Water Depth (ft)
Initial	10:05	3340	10.59	–	21.0	15.7
	10:10	3430	10.94	–	21.8	15.6
	10:15	3110	10.90	–	22.2	15.[illegible]
	10:20	2030	10.13	–	22.3	15.[illegible]
	10:25	1660	9.07	–	22.4	15.5
	10:30	1650	8.74	–	22.4	15.5
	[illegible]	1640	8.53	–	22.2	15.65
	[illegible]	1610	8.30	–	22.2	15.65
	10:45	1680	8.16	–	22.2	15.65

Purge flow rate (mL/min) 750 Sampling flow rate (mL/min) 750
Sample ID MW - 18 No. of Containers 4
Alkalinity Determined at wellhead? (Y/N) Y 324

Comments COLLECTED DUPLICATE SAMPLE & [illegible]
[illegible] MW - 25

Wetted Casing Volume (gal.) = Ht. x 0.653 (4 in. casing)
= Ht x 0.163 (2 in. casing)

GROUNDWATER SAMPLING FORM

Date/Time 10-10-[illegible] 9:00 Well I.D. MW-19
Location LAD
Sampler [illegible] Others present [illegible]
Weather: Wind —, Precipitation —, Temperature [illegible]
Well Secure (Y/N) Y Comments Sunny
Total depth: [illegible] - Depth to Water 26.0 = Ht. (ft) 24.[illegible]
Wetted Casing Volume ~~[illegible]~~ 15.7, Actual Purge Volume [illegible]
Screen Interval (ft) [illegible], Pump Intake Depth (ft) 45
pH meter calibrated (Y/N) Y, Conductivity meter calibrated (Y/N) [illegible]
Turbidimeter calibrated (Y/N) Y

PURGE LOG

	Time	Conductivity (µmhos/cm)	pH	Turbidity (NTU)	Temperature (°C)	Water Depth (ft)
Initial	[illegible]	1743	6.09	0	21.6	26.95
	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	0	23.4	[illegible]
	[illegible]	[illegible]	6.65	0	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]

Purge flow rate (mL/min) [illegible] Sampling flow rate (mL/min) [illegible]
Sample ID [illegible] No. of Containers 4
Alkalinity Determined at wellhead? (Y/N) Y 399

Comments

Wetted Casing Volume (gal.) = Ht. x 0.653 (4 in. casing)
= Ht x 0.163 (2 in. casing)

24
.653
72
120
144
15.672
15.7

GROUNDWATER SAMPLING FORM

Date/Time 10-11-96 11:25 Well I.D. MW-20
Location WAP
Sampler HRP II Others present SWS
Weather: Wind NW<5, Precipitation –, Temperature 75°
Well Secure (Y/N) Y Comments
Total depth: 28.0 - Depth to Water 9.8 = Ht. (ft) 18.2
Wetted Casing Volume , Actual Purge Volume
Screen Interval (ft) 13'-28', Pump Intake Depth (ft) 20'
pH meter calibrated (Y/N) Y, Conductivity meter calibrated (Y/N) Y
Turbidimeter calibrated (Y/N) Y

PURGE LOG

	Time	Conductivity (µmhos/cm)	pH	Turbidity (NTU)	Temperature (°C)	Water Depth (ft)
Initial	11:30	3910	6.86	–	22.1	10.5
	11:35	3980	7.04	–	22.7	9.8
	11:40	4020	7.06	–	22.9	9.85
	11:45	4020	7.07	–	22.9	9.9
	11:50	4040	7.07	–	22.9	9.9

Purge flow rate (mL/min) 1000 Sampling flow rate (mL/min) 1000
Sample ID MW-20 No. of Containers 4
Alkalinity Determined at wellhead? (Y/N) Y 397

Comments

Wetted Casing Volume (gal.) = Ht. x 0.653 (4 in. casing)
= Ht x 0.163 (2 in. casing)

GROUNDWATER SAMPLING FORM

Date/Time 10-11-96 1:25 Well I.D. MW - 21
Location WAP
Sampler HRP II Others present SWS
Weather: Wind NW <5, Precipitation —, Temperature 80°
Well Secure (Y/N) Y Comments
Total depth: 25.0 - Depth to Water 6.0 = Ht. (ft) 19
Wetted Casing Volume , Actual Purge Volume 9 GAL
Screen Interval (ft) 10'-25', Pump Intake Depth (ft) 17'
pH meter calibrated (Y/N) Y, Conductivity meter calibrated (Y/N) Y
Turbidimeter calibrated (Y/N) Y

PURGE LOG

	Time	Conductivity (µmhos/cm)	pH	Turbidity (NTU)	Temperature (°C)	Water Depth (ft)
Initial	1:30	6310	6.46	—	23.5	8.5
	1:35	7720	6.76	—	24.5	8.6
	1:40	7710	6.80		25.2	8.85
	1:45	7710	6.81	—	25.9	8.7
	1:50	7780	6.81	—	26.5	8.65

Purge flow rate (mL/min) 750 Sampling flow rate (mL/min) 750
Sample ID MW - 21 No. of Containers 4
Alkalinity Determined at wellhead? (Y/N) Y 471

Comments COLLECTED RINSATE SAMPLE AFTER DECONING EQUIPMENT.

Wetted Casing Volume (gal.) = Ht. x 0.653 (4 in. casing)
= Ht x 0.163 (2 in. casing)

GROUNDWATER SAMPLING FORM

Date/Time 10-10-96 1:00 Well I.D. MW-22
Location WAP
Sampler HMPII Others present SWS / JEFF DAVIS
Weather: Wind —, Precipitation —, Temperature 85°
Well Secure (Y/N) Y Comments
Total depth: 54.5 - Depth to Water 12.65 = Ht. (ft)
Wetted Casing Volume, Actual Purge Volume 12 GAL.
Screen Interval (ft) 41' - 51', Pump Intake Depth (ft) 45'
pH meter calibrated (Y/N) Y, Conductivity meter calibrated (Y/N) Y
Turbidimeter calibrated (Y/N) Y

PURGE LOG

	Time	Conductivity (µmhos/cm)	pH	Turbidity (NTU)	Temperature (°C)	Water Depth (ft)
Initial	1:10	2830	6.53	—	22.7	13.34
	1:15	2820	6.82	—	22.8	13.35
	1:20	2820	6.98	—	22.9	13.35
	1:25	2640	7.06	—	23.0	13.40
	1:30	2450	7.10	—	23.0	13.25
	1:35	2480	7.15	—	23.1	13.20

Purge flow rate (mL/min) 750 Sampling flow rate (mL/min) 750
Sample ID MW-22 No. of Containers 4
Alkalinity Determined at wellhead? (Y/N) Y 410

Comments

Wetted Casing Volume (gal.) = Ht. x 0.653 (4 in. casing)
= Ht x 0.163 (2 in. casing)

GROUNDWATER SAMPLING FORM

Date/Time 10-11-96 7:50 Well I.D. MW-23
Location WAP
Sampler HRPII Others present SWS
Weather: Wind NW-25, Precipitation —, Temperature 70°
Well Secure (Y/N) Y Comments
Total depth: 50.0' - Depth to Water 14.15 = Ht. (ft) 35.85
Wetted Casing Volume , Actual Purge Volume 13 GAL
Screen Interval (ft) 40'-50', Pump Intake Depth (ft) 45'
pH meter calibrated (Y/N) Y, Conductivity meter calibrated (Y/N) Y
Turbidimeter calibrated (Y/N) Y

PURGE LOG

	Time	Conductivity (µmhos/cm)	pH	Turbidity (NTU)	Temperature (°C)	Water Depth (ft)
Initial	7:55	1247	6.73	—	20.6	16.15
	8:00	1234	6.97	—	22.0	17.0
	8:05	1244	7.04	—	22.4	17.5
	8:10	1243	7.08	—	22.5	17.1
	8:15	1238	7.08	—	22.6	17.1

Purge flow rate (mL/min) 750 Sampling flow rate (mL/min) 750
Sample ID MW-23 No. of Containers
Alkalinity Determined at wellhead? (Y/N) Y 330

Comments

Wetted Casing Volume (gal.) = Ht. x 0.653 (4 in. casing)
= Ht x 0.163 (2 in. casing)

GROUNDWATER SAMPLING FORM

Date/Time 10-11-96 8:50 Well I.D. MW-24
Location WAP
Sampler HRPII Others present SWS
Weather: Wind NW < 5, Precipitation —, Temperature 70°
Well Secure (Y/N) Y Comments
Total depth: 50.0 - Depth to Water 18.65 = Ht. (ft) 31.35
Wetted Casing Volume, Actual Purge Volume 19.66
Screen Interval (ft) 40' - 50', Pump Intake Depth (ft) 45
pH meter calibrated (Y/N) Y, Conductivity meter calibrated (Y/N) Y
Turbidimeter calibrated (Y/N) Y

PURGE LOG

	Time	Conductivity (µmhos/cm)	pH	Turbidity (NTU)	Temperature (°C)	Water Depth (ft)
Initial	8:55	1414	6.13	—	20.4	19.55
	9:02	1773	6.45	—	21.6	19.6
	[illegible]	[illegible]	6.56	—	21.7	[illegible]
	[illegible]	1680	6.60		[illegible]	19.7
	[illegible]	[illegible]	6.61		21.7	19.7

Purge flow rate (mL/min) [illegible] Sampling flow rate (mL/min) [illegible]
Sample ID MW-24 No. of Containers 9
Alkalinity Determined at wellhead? (Y/N) Y 207

Comments

Wetted Casing Volume (gal.) = Ht. x 0.653 (4 in. casing)
= Ht x 0.163 (2 in. casing)

REFERENCE 20

—Kallus

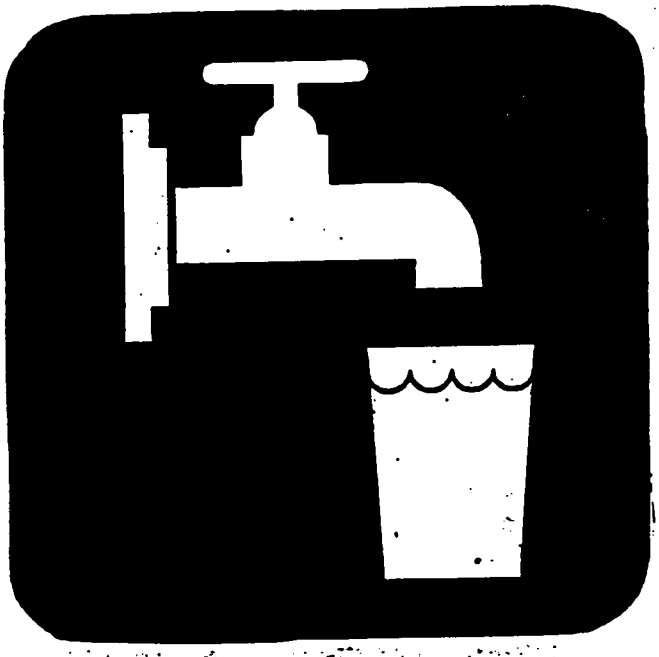
United States
Environmental Protection
Agency

Office of Water
4304

EPA 822-R-96-001
February 1996

EPA

DRINKING WATER REGULATIONS AND HEALTH ADVISORIES



DRINKING WATER REGULATIONS

AND HEALTH ADVISORIES

by

Office of Water
U.S. Environmental Protection Agency
Washington, D.C.

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LEGEND

Abbreviations column descriptions are:

MCLG - Maximum Contaminant Level Goal. A non-enforceable concentration of a drinking water contaminant that is protective of adverse human health effects and allows an adequate margin of safety.

MCL - Maximum Contaminant Level. Maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

RfD - Reference Dose. An estimate of a daily exposure to the human population that is likely to be without appreciable risk of deleterious effects over a lifetime.

DWEL - Drinking Water Equivalent Level. A lifetime exposure concentration protective of adverse, non-cancer health effects, that assumes all of the exposure to a contaminant is from a drinking water source.

(*) The codes for the **Status Reg** and **Status HA** columns are as follows:

F - final
D - draft
L - listed for regulation
P - proposed
T - tentative *(not officially proposed)*

Other codes found in the table include the following:

NA - not applicable
PS - performance standard 0.5 NTU - 1.0 NTU
TT - treatment technique

** - No more than 5% of the samples per month may be positive. For systems collecting fewer than 40 samples/month, no more than 1 sample per month may be positive.

*** - guidance

- Large discrepancies between Lifetime and Longer-term HA values may occur because of the Agency's conservative policies, especially with regard to carcinogenicity, relative source contribution, and less-than-lifetime exposures in chronic toxicity testing. These factors can result in a cumulative UF (uncertainty factor) of up to 5 to 5000 when calculating a Lifetime HA.

Chemicals	Standards: Status Reg.	Standards: MCLG (mg/l)	Standards: MCL (mg/l)	Status HA	Health Advisories: 10-kg Child: One-day (mg/l)	10-kg Child: Ten-day (mg/l)	10-kg Child: Longer-term (mg/l)	70-kg Adult: Longer-term (mg/l)	70-kg Adult: RfD (mg/kg day)	70-kg Adult: DWEL (mg/l)	70-kg Adult: Lifetime (mg/l)	70-kg Adult: mg/l at 10^{-4} Cancer Risk	Cancer Group
INORGANICS													
Aluminum	L	-	-	D	-	-	-	-	-	-	-	-	-
Ammonia	L	-	-	D	-	-	-	-	-	-	30	-	D
Antimony	F	0.006	0.006	F	0.01	0.01	0.01	0.015	0.0004	0.01	0.003	-	D
Arsenic	L	-	0.05	D	-	-	-	-	-	-	-	0.002	A
Asbestos (fibers/l >10μm length)	F	7 MFL	7 MFL	-	-	-	-	-	-	-	-	700 MFL	A
Barium	F	2	2	F	-	-	4	-	0.07	2	2	-	D
Beryllium	F	0.004	0.004	D	30	30	4	20	0.005	0.2	-	0.0008	B2
Boron	L	-	-	D	4	0.9	0.9	3	0.09	3	0.9	-	D
Bromate	L	zero	0.01	-	-	-	-	-	-	-	-	-	-
Cadmium	F	0.005	0.005	F	0.04	0.04	0.005	0.02	0.0005	0.02	0.005	-	D
Chloramine	P	4***	4	D	1	1	1	1	0.1	3.3	3/4***	-	-
Chlorate	L	-	-	D	-	-	-	-	-	-	-	-	-
Chlorine	P	4	4	D	-	-	-	-	0.1	-	-	-	D
Chlorine dioxide	L	0.8	0.8	D	-	-	-	-	0.01	0.35	0.3	-	D
Chlorite	L	0.08	1	D	-	-	-	-	0.003	0.1	0.08	-	D
Chromium (total)	F	0.1	0.1	F	1	1	0.3	0.6	0.005	0.3	0.1	-	D
Copper (at tap)	F	1.3	TT**	-	-	-	-	-	-	-	-	-	D
Cyanide	F	0.2	0.2	F	0.2	0.2	0.2	0.6	0.022	0.8	0.2	-	D
Fluoride*	F	4	4	-	-	-	-	-	0.12	-	-	-	-
Hypochlorite	P	4[1]	-	-	-	-	-	-	-	-	-	-	-
Hypochlorous acid	P	4[1]	-	-	-	-	-	-	-	-	-	-	-
Lead (at tap)	F	zero	TT**	-	-	-	-	-	-	-	-	-	B2
Manganese	L	-	-	D	-	-	-	-	0.14[2]	-	-	-	-
Mercury (inorganic)	F	0.002	0.002	F	-	-	-	0.002	0.0003	0.01	0.002	-	D
Molybdenum	L	-	-	D	0.02	0.02	0.01	0.05	0.005	0.2	0.04	-	D
Nickel	F	0.1[4]	0.1[5]	F	1	1	0.5	1.7	0.02	0.6	0.1	-	D
Nitrate (as N)	F	10	10	F	-	10*	-	-	1.6	-	-	-	*

* Under review.
** Copper — action level 1.3 mg/L, Lead — action level 0.015 mg/L
*** Measured as free chlorine.
[1] Regulated as chlorine.
[2] In food.
[3] In water.
[4] Being remanded

November 1995

Chemicals	Standards			Status HA	Health Advisories								Cancer Group
					10-kg Child			70-kg Adult					
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		One-day (mg/l)	Ten-day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RfD (mg/kg day)	DWEL (mg/l)	Lifetime (mg/l)	mg/l at 10^{-6} Cancer Risk	
Nitrite (as N)	F	1	1	F	-	1*	-	-	0.16*	-	-	-	*
Nitrate + Nitrite (both as N)	F	10	10	F	-	-	-	-	-	-	-	-	*
Selenium	F	0.05	0.05	-	-	-	-	-	0.005	-	-	-	-
Silver	-	-	-	D	0.2	0.2	0.2	0.2	0.005	0.2	0.1	-	D
Sodium	-	-	-	D	-	-	-	-	-	20**	-	-	-
Strontium	L	-	-	D	25	25	25	90	0.6	90	17	-	D
Sulfate	P	500	500	D	-	-	-	-	-	-	-	-	-
Thallium	F	0.0005	0.002	F	0.007	0.007	0.007	0.02	0.00007	0.002	0.0004	-	-
Vanadium	T	-	-	D	-	-	-	-	-	-	-	-	D
White phosphorous	-	-	-	F	-	-	-	-	0.00002	0.0005	0.0001		D
Zinc	L	-	-	F	6.	6	3	10	0.3	10	2	-	D
Zinc chloride (measured as Zinc)	L	-	-	F	6	6	3	10	0.3	10	2	-	D
RADIONUCLIDES													
Beta particle and photon activity (formerly man-made radionuclides)	F	zero	4 mrem	-	-	-	-	-	-	-	-	4 mrem/y	A
Gross alpha particle activity	F	zero	15 pCi/L	-	-	-	-	-	-	-	-	15 pCi/L	A
Combined Radium 226 & 228	F	zero	5 pCi/L	-	-	-	-	-	-	-	-	20 pCi/L	A
Radon	P	zero	300 pCi/L+	-	-	-	-	-	-	-	-	150 pCi/L	A
Uranium	P	zero	20 µg/L					-	0.003			-	A

* Under review. ** Guidance.

+1991 Proposed National Primary Drinking Water Rule for Radionuclides

REFERENCE 21

The Light company
Houston Lighting & Power
P.O. Box 1700 Houston, Texas 77251-1700 713-207-1111

FAX COVERSHEET

Fax Number (713) 945-7598

TO: Joy - Roy Weston

FAX NUMBER: 713/621-6959

FROM: Bob Carpenter

TEL. #: 713/945-8197

# of pages (including coversheet): 12

Message: Attached is a list of exceedences reported to the agency for W.A. Parish for the time-frame of 1/96-6/97. Also included are single page exceedence summaries submitted to the agency along with the monthly discharge monitoring report. Call if you have questions.

Carpenter

Page No. 1
07/24/97

IPNE_NO	FACILITY	DATE_EVENT	TYPE	PARAMETER	OUTFALL_NO
960001	WAP	01/22/96	Max.	O&G	WAP005
960002	WAP	01/22/96	Max.	TSS	WAP005
960026	WAP	06/24/96	Max.	O&G	WAP303
960024	WAP	06/11/96	Unauthorized discharge		
960031	WAP	06/25/96	Max.	O&G	WAP803
960043	WAP	12/30/96	Max.	O&G	WAP703
970019	WAP	03/03/97	Max.	O&G	WAP303
970020	WAP	03/25/97	Max.	TSS	WAP503
970021	WAP	03/31/97	Avg.	TSS	WAP503
970023	WAP	03/30/97	Max.	TSS	WAP503
970028	WAP	05/14/97	Unauthorized discharge		WAP
970033	WAP	06/02/97	Max.	pH	WAP001

11580271

Compliance samples taken on January 22, 1996 from the W. A. Parish Gas Plant Floor Drainage Treatment System, Outfall 005, resulted in a daily maximum oil and grease value (O&G) of 97 mg/l which exceeds the permitted daily maximum of 20 mg/l. The elevated O&G is believed to have resulted from excess turbine lube oil in the separator portion of the treatment system. The excess oil is believed to be from a leak in the Unit 4 turbine lube oil filtering system. The leak has been repaired and the separator has been skimmed of excess oil. All O&G samples collected since January 22, 1996 have been compliant with permit limits. Details of the January 22, 1996 O&G event were reported to the TNRCC District 12 Office on January 24, 1996.

Compliance samples taken on January 22, 1996 from the W. A. Parish Gas Plant Floor Drainage Treatment System, Outfall 005, resulted in a daily maximum total suspended solids (TSS) value of 116 mg/l which exceeds the permitted daily maximum of 100 mg/l. The elevated TSS is believed to have resulted from excess turbine lube oil in the separator portion of the treatment system. The excess oil is believed to be from a leak in the Unit 2 turbine lube oil filtering system. The leak has been repaired and the separator has been skimmed of excess oil. All TSS samples collected since January 22, 1996 have been compliant with permit limits.

Compliance samples taken on June 24, 1996 from the W. A. Parish Coal Plant Floor Drainage Treatment System, Outfall 303, resulted in a daily maximum oil and grease value (O&G) of 25 mg/l which exceeds the permitted daily maximum of 20 mg/l. The elevated O&G is believed to have resulted from heavy rainfall, which caused excessive flow through the system, while during the same time period the chemical feed rate to the system had been reduced to better control Total Suspended Solids (TSS) in the system. The chemical feed system will be adjusted to maintain compliance during normal flow conditions and the feed rate will be increased during periods of excessive flow.

Compliance samples taken on March 3, 1997 from the W. A. Parish Coal Plant Floor Drainage Treatment System, Outfall 303, resulted in a daily maximum oil and grease value (O&G) of 25 mg/l which exceeds the permitted daily maximum of 20 mg/l. The investigation of the elevated O&G did not reveal a specific cause. The system flow and chemical feed rates were within the normal operating range and subsequent samples were compliant with permitted limits. Increased oversight of the system will occur to ensure proper system operation.

Data collected on June 25, 1996, during wastewater permit renewal sampling at the W. A. Parish Electric Generating Station revealed that a daily maximum Oil and Grease (O&G) collected from Outfall 803, Units 7&8 Low Volume Wastewater treatment system was 23.0 mg/l. This result exceeds the permitted discharge limit of 20 mg/l. All other O&G data collected in June, including previously submitted routine compliance sampling and 3 additional permit renewal sampling, were compliant with permit conditions. The permit renewal sample results were received from a commercial analytical laboratory on July 22, 1996.

On June 11, 1996 approximately 550 gallons of condensate water overflowed from the condensate storage tank to a storm drain and was discharged into the discharge canal at the W. A. Parish Electric Generating Station. The discharge canal then flows into Smithers Lake through Outfall 003. Samples of the overflow were collected and the analysis resulted in a Total Suspended Solids level of < 1 mg/l and an Oil & Grease level of < 1 mg/l. The overflow occurred when the condensate storage tank was being filled and the overflow was not immediately noticed. Tank filling procedures were reviewed with personnel involved with the condensate storage tank filling operation.

Compliance samples taken on December 30, 1996 from the W. A. Parish Electric Generating Station, Units 7 & 8 Low Volume Waste Water Treatment System, Outfall 703, resulted in a daily maximum oil and grease value (O&G) of 32 mg/l which exceeds the permitted daily maximum of 20 mg/l. The elevated O&G is believed to have resulted from sulfur in the waste stream, as verified by further analysis of the residue which resulted from the O&G analysis. The source of the sulfur is believed to be the flue gas desulfurization system (FGDS) whose wastewater is routed through Outfall 703 along with wastewater from other sources, such as bottom ash transfer water. Procedures which control the volume of wastewater from the FGDS will be reviewed. Twenty four hour notificatioln of this event was provided, via fax, to the TNRCC District 12 Office on January 2 1997 and a written notification was provided on January 7, 1997.

Samples collected on March 25 and March 30, 1997 from the W. A. Parish Coal Plant Outfall 503, Units 7 & 8 Cooling Tower Blowdown resulted in daily maximum total suspended solids (TSS) levels of 265 mg/l and 163 mg/l, respectively.

The elevated TSS levels are believed to have resulted from heavy rains which caused a change of the water quality in the plant's intake canal and a subsequent change to the pretreatment system effluent quality. Adjustments to the pretreatment chemical feed were made as variations of influent quality were observed and excess sludge was removed from the system to improve the effluent water quality.

On May 14, 1997, plant personnel discovered an unauthorized discharge to Smithers Lake. The unauthorized discharge was coming from a floor drainage treatment system sump which was collecting excess wastewater caused by a ruptured expansion joint in the piping system during a metal chemical cleaning operation. Approximately, 4000 gallons of chemical metal cleaning wastewater and wastewater previously collected in the floor drainage system were discharged. The discharge was terminated and the remaining wastewater containing chemical cleaning wastes, was removed from the floor drainage system and sent to the Chemical Metal Cleaning Wastewater Treatment System. Samples for the unauthorized discharge were collected, and the analyses results were: Cu=<0.05 mg/l, Fe=2.55 mg/l, O&G=4 mg/l, TSS=69 mg/l, and pH=6.2. The ruptured expansion joint has been replaced.

Compliance samples taken on June 2, 1997 from the W. A. Parish Plant Outfall 001, Discharge Blowdown and Overflow from Smithers Lake, resulted in a pH of 9.1 su which exceeds the permitted maximum of 9 su. An investigation of the elevated pH did not yield any specific conclusion regarding the cause. A review of the pH level reported for this outfall from January 1992 to present indicated that a pH excursion had not occurred prior to June 2, 1997 and pH values reported since June 2, 1997 to present have been compliant. The pH levels in the lake are routinely in a range from 8.4 su to 8.9 su. Plant personnel will continue to monitor trends in the pH levels to determine if additional action is required.

REFERENCE 22

APPLICATION FOR AN AMENDMENT
TO
TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
PERMIT NO. 5794
FOR THE
INJECTION OF BOILER CLEANING WASTEWATER
INTO STEAM GENERATING UNITS 5 AND 6
AT THE
HOUSTON LIGHTING & POWER COMPANY
W.A. PARISH ELECTRIC GENERATING STATION

November, 1995

Houston Lighting & Power Company
Environmental Department
Air Resources Division
P O Box 1700
Houston, TX 77251

APPLICATION FOR AN AMENDMENT
TO
TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
PERMIT NO. 5794
FOR THE
INJECTION OF BOILER CLEANING WASTEWATER
INTO STEAM GENERATING UNITS 5 AND 6
AT THE
HOUSTON LIGHTING & POWER COMPANY
W.A. PARISH ELECTRIC GENERATING STATION

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- Control Efficiencies

Appendix C — Modeling Results

NOTE TO APPLICANT: Please mark an "X" in the column labeled "Applicant use" to indicate that the information has been provided. You may also use the column labeled "Comments & Discussion" to further explain your action.

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
NEW SOURCE REVIEW PROGRAM - CORE SECTION
AIR QUALITY PERMIT APPLICATION
ADMINISTRATIVE COMPLETENESS (CORE) CHECKLIST

TNRCC use only

COMPANY _____ PROJ No.: _____ PROJ TYPE: _____ CORE ENGR: _____ RECORD No.: _____
REGION _____ COUNTY _____ Tech. Contact: _____ Phone: _____
DATE RECD by CORE: _____ Comments _____ DATE ADMIN COMP: _____
DATE RECD by TECH. ENGR: _____ Comments _____ TECH. ENGR: _____ TECHNICAL SECT.: _____

PI-1 REF	REQUIRED INFORMATION	Applicant use		<------ TNRCC use only ------> DATE ADMN COMPLETE	NOT COMPLETE	NOTHING SUBMITTED	COMMENTS & DISCUSSION
	CONFIDENTIAL Information?(1)	X					[ ]YES [X]NO
	CONFIDENTIAL pages marked?	X					[ ]YES [X]NO
	CORE Checklist attached	X	*				[X]YES [ ]NO
	NOV related notification	X					[ ]YES [X]NO
	Net number of new jobs created	X					
	Name of elected State Senator	X					
	Name of elected State Repr.	X					
I.	Type of Application	X	*				[ ]PERMIT [X]AMENDMENT
	A. Permittee Name, Tax ID & Addr.	X					
	Technical Contact (addr,phone)	X					
	B. Owner Name, Tax ID & Address	X					
	C. Product/Business & SIC Code	X	*				
II.	A. Plant/Site Name	X					
	B. Address of Facility	X					
	C. Nearest City, County and Zip	X	*				
	D. Latitude and Longitude	X					
	E. TNRCC Air Quality Acct. No.	X	*				
III.	A. Name of Facility	X					
	B. Facility Type	X					[X]PERMANENT [ ]PORTABLE
	C. Operating Schedule	X					
	D. Start Dates	X	*				CONST DATE N/A OPER DATE 1/1/96
IV.	A. New Permit Unit - grass roots	N/A					New grass roots facility at this location.
	B. New Permit Unit - nonpermitted	N/A					Modification of exist. non-permitted facility.
	C. Amendment - permitted facility	X					[X]Present Permit No. 5794
	D. Change in Location	N/A					[ ]Present Permit No.
V.	A. Compliance History - Exempt	N/A					[ ]YES [X]NO
	B. Comp. Hist. - site => 5 yr old	X					[X]YES [ ]NO
	C. Comp. Hist. - new site	N/A					[ ]YES [X]NO
	D. Comp. Hist. - site < 5 yr old	N/A					[ ]YES [X]NO
VI.	A. Area Map	X					
	School within 3,000 feet?	X					[ ]YES [X]NO
	B. Plot Plan	X					
	C. Table 1(a) & Emission Calc.	X					
	D. BACT Analysis	X					
	E. Franchise Tax Certificate	N/A	*				[X]N/A [ ]Certificate good thru __/__/__
	F. Permit Fee Required?	X					[X]YES [ ]NO
	Fee Certification & Table 30	X					
	G. Actual emissions past 2 yr	X					[ ]YES [X]NO
	H. Stand. exempt. or grandfather unit rolled into permit?	X					[ ]YES [X]NO
	Information on units provided?	N/A					[ ]YES [X]NO
VII.	A. Process Flow Diagram	X					
	B. Process Description	X					
	C. Material Balance	X					
VIII.	116.111(1) TNRCC Rules & Regs	X					
	116.111(2) Emissions Measurement	X					
	116.111(3) BACT Analysis	X					
	116.111(4) NSPS	X					
	116.111(5) NESHAPS	X					
	116.111(6) Facility Performance	X					
	116.111(7) Nonattainment review	X					MAJOR SOURCE/MODIFICATION? [ ]YES [X]NO
	116.111(8) PSD review	X					MAJOR SOURCE/MODIFICATION? [ ]YES [X]NO
	116.111(9) Impacts/Modeling	X					
X.	Copy to EPA Region 6 office	N/A	*				[ ]YES [X]N/A
	Copy to TNRCC Regional Office	X	*				[X]YES City - Houston
	Copy to Local Program(s)	N/A	*				[ ]YES [X]N/A
XI.	Application sealed by Prof.Engr.?	N/A					[ ]YES [X]N/A
XII.	Authorizing Signature/Date	X					

* *These items will not result in the application being considered administratively deficient; however, they MUST be submitted prior to final action or approval of the application.*

(1) *CONFIDENTIAL information MUST be clearly marked on each page and separated from non-confidential information. The application must include a non-confidential version describing the confidential information for the public file. To be considered confidential, each page must be marked "CONFIDENTIAL" at the time of submittal.*

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
FORM PI-1 GENERAL APPLICATION -- AIR QUALITY PERMIT

A PERMIT TO CONSTRUCT MUST BE APPROVED BEFORE ANY ACTUAL WORK IS BEGUN ON THE FACILITY. This is not a stand alone document. Please refer to the "Form PI-1, Permit Application Instructions" manual (Instructions) for specific details to complete this application. Please print or type all information. All information requested herein must be completed and submitted before public notification procedures may be authorized. Please contact the CORE Section of the New Source Review Program with any questions at 512/239-1240 (FAX No. 512/239-1300). Written inquiries may be addressed to: Texas Natural Resource Conservation Commission, Office of Air Quality, New Source Review Program, P.O. Box 13087, Austin TX 78711-3087.

V E R Y I M P O R T A N T !

Is CONFIDENTIAL information being submitted with this application? [ ]-YES [X]-NO
If YES, is each "confidential" page so marked in big red letters? [ ]-YES [ ]-NO
Has a CORE checklist been attached to this application? ..... [X]-YES [ ]-NO
Is this application in response to, or related in any way to, a Notice of Violation at this location? [ ]-YES [X]-NO. If YES, date of Notice of Violation: _____
Also, if YES, pursuant to Rule: _____

Please furnish the following information pertaining to this facility SITE:

1. **Please estimate the net number of new jobs which will be created in the community as a result of the operation of the facility authorized by this application: 0**
2. **Name of elected State Senator: Ken Armbrister**
3. **Name of elected State Representative: Huey McCoulskey**

Please furnish the following information pertaining to Compliance History:

Submit a 5-year Compliance History in accordance with Regulation VI, Rule 116.120-116.126 for all facilities classified in Sections V.C and V.D of Form PI-1 below.

I. TYPE OF APPLICATION: [ ]-CONSTRUCTION PERMIT [X]-AMENDMENT, Permit No. 5794

A. PERMIT ISSUED TO: Houston Lighting & Power Company
[Entity legally responsible for permit; i.e., Owner or Operator of the facility]
Permittee's Texas State Comptroller's Tax ID No.: 17406944151
Permittee's address (Person, Title, Address): Mr. Ben C. Carmine, Manager - Air Resources Division, P.O. Box 1700, Houston, TX 77251
Telephone: (713) 945- 8191 FAX: (713) 945- 7598
Permittee's Technical Contact (Person, Title, Address): Mr. Chris C. Thiele, Engineer, P.O. Box 1700, Houston, TX 77251
Telephone: (713) 945- 8023 FAX: (713) 945- 7598

B. OWNER OF FACILITY: _____
[If different from permittee; include names of proprietor/general partner(s) if applicable]
Owner's Texas State Comptroller's Tax ID No.: _____
Owner's address (Person, Title, Address): _____

C. Principal Company Product or Business: Utility - Electric Generation
Plant SIC Code: 4911

II. FACILITY PHYSICAL LOCATION:

A. Name of plant or site: W.A. Parish Electric Generating Station
B. Street Address: Y.U. Jones Road
C. Nearest City: Richmond County: Fort Bend Site Zip Code: 77481
D. Latitude: 29 ° 28 ' 22 "N Longitude: 95 ° 38 ' 10 "W (must be to nearest second)
E. Plant Site TNRCC Air Quality Account Number: FG - 0020 - V

III. FACILITY TYPE AND OPERATING SCHEDULE:

A. Name of facility to be permitted: Wastewater Injection:Steam Generating Units 5 and 6
B. Facility Type (Check One): [X] Permanent, [ ] Portable.
C. Facility Operating Schedule: (24)Hours/day; (7)Days/week; (52)Weeks/year
( ) Seasonal - explain: _____
D. Start Dates (Proposed/Actual): Construction: / N/A/ (P/A)
Operation: 01 / 01 / 96 (P/A) P

IV. FACILITY CLASSIFICATION (Check only one block):

A. [ ] New Permitted Facility - New grass roots facility at this location.
B. [ ] New Permitted Facility - Modification of existing non-permitted Facility.
C. [X] Amendment to Permitted Facility. Permit No(s). 5794
D. [ ] Change in Location of Permitted Facility. Permit No(s). _____
Location of Present Facility: _____

V. COMPLIANCE HISTORY (See attached Supplemental Information Sheet):

A. [ ] Exemption claimed under Rule 116.121, or
B. [X] Existing Site => 5 years old. TNRCC will compile Compliance History, or
C. [ ] New Site (This is a new grassroots site with no operating history), or
D. [ ] Existing Site < 5 years old.
If "C" or "D", does applicant have similar facilities in Texas? [ ]-YES [ ]-NO.

VI. SUBMIT THE FOLLOWING GENERAL INFORMATION:

A. Submit a current area map as specified in the Instructions.
Are any schools located within 3000 feet of this facility? [ ]-YES [X]-NO.

B. Submit a plot plan of the plant property as specified in the Instructions.

C. Submit emission data, including fugitive emissions and stack parameters, on Table 1(a). Attach emission calculations and information showing how emissions were determined. See Instructions for further details.

D. Submit an analysis of Best Available Control Technology, including the estimated installed capital and operating costs for all abatement equipment associated with the facility. See Instructions for further details.

VERY IMPORTANT!

E. Franchise Tax. Submit a copy of a Certificate of Good Standing from the State Comptroller's Office with each application if the permit is to be issued to a corporation. See Instructions if you are not a corporation or for further information.

F. Permit Fee. Enclose required fee, fee certification and estimated capital cost (Table 30); or furnish explanation why fee is not required. (See Regulation VI Rule 116.141.) $450.00

G. Please submit actual emissions (tons per year) for the last two (2) years to determine federal applicability.

H. Are there any standard exemptions or grandfathered units related to this permit that you wish to roll into the permit or amendment at this time? Yes ( ) No (X)
Provide information on these units.

VII. SUBMIT (A) PROCESS FLOW DIAGRAM, (B) PROCESS DESCRIPTION AND (C) MATERIAL BALANCE AS SPECIFIED IN THE INSTRUCTIONS (see Instructions concerning submittal of confidential information.)

VIII. GENERAL APPLICATION REQUIREMENTS:

Submit itemized information and/or analysis that will demonstrate that all general application requirements as specified in Rule 116.111 of TNRCC Regulation VI are met. **Each requirement in Rule 116.111 must be addressed in this application.** See Instructions for further details. Atmospheric dispersion modeling may be required as part of the air quality impact analysis per Rule 116.111(9).

Is this facility a MAJOR SOURCE/MODIFICATION with regard to one of the following:
1. §116.111(7) - Nonattainment ..... [ ]-YES [X]-NO
2. §116.111(8) - Prevention of Significant Deterioration [ ]-YES [X]-NO.

IX. APPEAL PROCESS:

Commission Rule 116.114(a)(3) should be consulted for the procedure to be used to appeal the failure of the agency to process an application within the prescribed time limits.

X. A copy of this application and all attachments must be sent by the applicant to the EPA Region 6 office in Dallas if PSD or Nonattainment Review is applicable in any form, the appropriate TNRCC Regional Office and to any local air pollution control program having jurisdiction. Copies of the application were sent to:

EPA Region 6 Office in Dallas ..... : [ ]-YES [X]-Not applicable.
TNRCC Regional Office (city) sent to: TNRCC Region 12, Houston
Copies sent to these local programs: 1. _____
[X]-NOT APPLICABLE. 2. _____

XI. §116.110(d). PE Seal. Is the estimated capital cost of the project for which application is made greater than $2 million dollars? [ ]-YES [X]-NO

If **YES**, application must be submitted under seal of a Texas registered Professional Engineer, unless exemption is claimed pursuant to the Texas Engineering Practice Act.
[ ] - Exemption is claimed pursuant to Section _____ of the TEPA.

XII. I, Ben C. Carmine, Manager - Air Resources Division
(Name - Please print or type) (Title: Owner, Plant Manager, President, Vice-President, Environmental Director, etc.)
state that I have knowledge of the facts herein set forth and that the same are true and correct to the best of my knowledge and belief. I further state that to the best of my knowledge and belief, the project for which application is made will not in any way violate any provision of the Texas Health & Safety Code (THSC), Chapter 382, Texas Clean Air Act, as amended, or any of the air quality Rules and Regulations of the Texas Natural Resource Conservation Commission or any local governmental ordinance or resolution enacted pursuant to the Texas Clean Air Act. I further state that I have read and understand Section 382.091, THSC, which defines CRIMINAL OFFENSES for certain violations, including intentionally or knowingly making or causing to be made false material statements or representations in this application, and Section 382.092, THSC, pertaining to CRIMINAL PENALTIES.

DATE 11/6/95 SIGNATURE B.C. Carmine

Version 12/05/94 NOTE - ORIGINAL SIGNATURE IN INK IS REQUIRED.

TEAM Environmental Services, Inc.

5600 Northwest Central Drive, Suite 200
Houston, Texas 77092
Office: (713) 690-3800
1-800-580-3800
Fax: (713) 690-1606

RECEIVED

OCT 02 1995

ENVIRONMENTAL DEPT

Chris Thiele
Environmental Engineer
Houston Lighting and Power Company
P.O. Box 1700
Houston, Texas 77251

September 29, 1995

Dear Chris,

As per our conversation on September 21, 1995, we have completed the 3-hour and annual HF modeling runs. This letter like the previous letter (September 22,1995) explains the modeling scenario and procedures modeled at the WA Parish Station.

Modeling Setup Parameters
The TNRCC Air Quality Modeling Guidelines (November 1993) document was used as guidance for the modeling demonstration. Industrial Source Complex Short-Term model (93109) was used with 1988 meteorological surface data from Houston International Airport and 1988 upper air data from Lake Charles. Default parameters for the ISC2ST were used along with flat terrain for elevation. The EPA's Building Profile Input Program, (95086) was used to calculated building downwash effects for all sources in the modeling.

Emissions Parameters
The exit parameters and emission rates that are modeled in the demonstration were provided by Houston Lighting and Power. Table 1 lists the emission rates and stack parameters used in the modeling while Table 2 and Table 3 list the resulting maximum impacts from the hourly and annual modeling runs. Note that a total emission rate of 1 lb/hr emission rate was used. The 1 lb/hr emission rate was divided equally between both stacks, because each source emits equal amounts of the same pollutants.

Table 1
Emission And Stack Parameters For WA Parish Modeling

EPN	Emission Rate (g/s)	Stack Height (m)	Stack Diameter (m)	Exhaust Temperature (K°)	Stack Velocity (m/s)	UTM East Coordinates (km)	UTM North Coordinates (km)
Stack5	0.063	182.88	7.3152	404.814	22.494	244.431	3263.716
Stack6	0.063	182.88	7.3152	404.814	22.494	244.484	3263.626

Receptor Grids

Receptor grids of 1 kilometer to 100-meter spacing were used and discrete receptors were placed around the property line in 100-meter intervals. An initial 1 kilometer receptor spacing grid was used to locate areas that contained the highest impacts. Then two 100-meter receptor spacing grids were used to locate the maximum impact.

Modeling Results

The model predicts the maximum 1-hour impact of 0.0525 $\mu g/m^3$ to occur about 100 meters to the southwest of HL&P property line. Since a unit emission rate (1 lb/hr) was used in place of the actual emission rate further calculation must be done to find the predicted impact for the actual emission rate. The bottom of Table 2 shows the calculations for this procedure. The maximum 1-hour impact for HCl is 0.5675 $\mu g/m^3$, which is below the TNRCC Effects Screening Level (ESL) of 75 $\mu g/m^3$. The same procedure was performed for HF 3-hour standard. The maximum 3-hour Modeled Maximum Impact was found by setting the ISC model keyword to produce 3-hour impact results. The maximum 3-hour impact for HF is 0.1176 $\mu g/m^3$, which is below the TNRCC Regulation of 4.9 $\mu g/m^3$.

The Annual Modeled Maximum Impact was 0.00016 $\mu g/m^3$, which occurred to the northwest of HL&P's property line. The Actual Pollutant Impacts are calculated on Table 3 and compared to the TNRCC ESLs. However, HF doesn't have an annual average and it is therefore not calculated. HF does have 12-hour, 24-hour, 7 day, and 30 day averaging periods. Instead of modeling each time period, conversion factors can be used to calculate these other averaging times. The TNRCC memo from James Red of the TNRCC on January 11, 1995 lists these conversion factors.

I am glad that we are able to be of service to you and should you need any further modeling or need help with other environmental problems please let me know.

Sincerely,

Shannon Paulson

Shannon Paulson
Project Scientist

Table 2

HL&P WA Parish Electric Generating Station Emissions

100 METER RECEPTER GRID
SHORT TERM RESULTS
HOURLY AVERAGE

Boiler Cleaning Wastewater Compounds	Actual Emission Rate (lbs/hr)	Modeled Emission Rate (lbs/hr)	Modeled Maximum Impact (µg/m3)	Actual Pollutant Impact (µg/m3)	TNRCC Standard* (µg/m3)	Ratio of Impact to Standard %
Metal Oxides						
Ag_2O	0.000012	1.0	0.0525	<0.000001	0.10	<0.01%
Al_2O_3	0.001177	"	"	0.000062	50.00	<0.01%
BaO	0.000172	"	"	0.000009	5.00	<0.01%
CaO	0.019152	"	"	0.001005	20.00	<0.01%
CuO	0.020703	"	"	0.001087	10.00	0.01%
Fe_2O_3	0.071292	"	"	0.003743	50.00	<0.01%
K_2O	0.002051	"	"	0.000108	20.00	<0.01%
MgO	0.001730	"	"	0.000091	50.00	<0.01%
MoO_2/MoO_3	0.000230	"	"	0.000012	50.00	<0.01%
Na_2O	0.068719	"	"	0.003608	20.00	0.02%
SiO_2	0.003789	"	"	0.000199	50.00	<0.01%
SnO_2	0.001099	"	"	0.000058	20.00	<0.01%
V_2O_5	0.000002	"	"	<0.000001	0.50	<0.01%
ZnO	0.000719	"	"	0.000038	50.00	<0.01%
HAPs - Hazardous Air Pollutants						
As_2O_5	0.000585	1.0	0.0525	0.000031	0.10	0.03%
CdO	0.000151	"	"	0.000008	0.10	<0.01%
CrO_2/CrO	0.003437	"	"	0.000180	1.00	0.02%
HgO	0.498675	"	"	0.026180	0.50	5.24%
Mn_2O_3	0.016502	"	"	0.000866	2.00	0.04%
NiO	0.013103	"	"	0.000688	0.15	0.46%
PbO_2	0.000199	"	"	0.000010	NA	NA
SeO_3	0.008615	"	"	0.000452	2.00	0.02%
Non-Metals						
HCl	5.945545	1.0	0.0525	0.312141	75.00	0.42%
HF	3.515698	"	0.0184	0.184574	4.90	3.77%
NO_3	36.285480	"	0.0525	1.904988	NA	NA
$Ba_3(PO_4)_2$	0.025482	"	"	0.001338	5.00	0.03%
$BaSO_4$	0.123922	"	"	0.006506	50.00	0.01%

Sample Calculation

[(Actual Emission Rate)÷(Modeled Emission Rate)]·(Modeled Maximum Impact) = Actual Pollutant Impact

HCl: [(5.946 lb/hr)÷(1 lb/hr)]·(0.0525 µg/m3) = 0.312 µg/m3

Note: The modeled maximum impact for HF is a 3-hour average to compare with the 3-hour TNRCC standard.

* NA signifies that the short-term ESLs for Pb and NO3 are not readily available.

Table 3

HL&P WA Parish Electric Generating Station Emissions

100 METER RECEPTER GRID
LONG TERM RESULTS
ANNUAL AVERAGE

Boiler Cleaning Wastewater Compounds	Actual Emission Rate (tn/yr)	Actual Emission Rate (lbs/hr)	Modeled Emission Rate (lbs/hr)	Modeled Maximum Impact (µg/m3)	Actual Pollutant Impact (µg/m3)	TNRCC Standard* (µg/m3)	Ratio of Impact to Standard %
Metal Oxides							
Ag_2O	0.000004	0.000001	1.0	0.00016	<0.000001	0.010	<0.01%
Al_2O_3	0.000186	0.000042	"	"	<0.000001	5.000	<0.01%
BaO	0.000005	0.000001	"	"	<0.000001	0.500	<0.01%
CaO	0.002415	0.000551	"	"	<0.000001	2.000	<0.01%
CuO	0.001245	0.000284	"	"	<0.000001	1.000	<0.01%
Fe_2O_3	0.011567	0.002641	"	"	<0.000001	5.000	<0.01%
K_2O	0.000148	0.000034	"	"	<0.000001	2.000	<0.01%
MgO	0.000237	0.000054	"	"	<0.000001	5.000	<0.01%
MoO_2/MoO_3	0.000016	0.000004	"	"	<0.000001	5.000	<0.01%
Na_2O	0.010400	0.002374	"	"	<0.000001	2.000	<0.01%
SiO_2	0.000410	0.000094	"	"	<0.000001	5.000	<0.01%
SnO_2	0.000088	0.000020	"	"	<0.000001	2.000	<0.01%
V_2O_5	0.000000	0.000000	"	"	<0.000001	0.050	<0.01%
ZnO	0.000088	0.000020	"	"	<0.000001	5.000	<0.01%
HAPs - Hazardous Air Pollutants							
As_2O_3	0.000107	0.000024	1.0	0.00016	<0.000001	0.010	<0.01%
CdO	0.000043	0.000010	"	"	<0.000001	0.010	<0.01%
CrO_2/CrO	0.000378	0.000086	"	"	<0.000001	0.100	<0.01%
HgO	0.005352	0.001222	"	"	<0.000001	0.050	<0.01%
Mn_2O_3	0.000553	0.000126	"	"	<0.000001	0.200	<0.01%
NiO	0.001622	0.000370	"	"	<0.000001	0.015	<0.01%
PbO_2	0.000023	0.000005	"	"	<0.000001	1.500	<0.01%
SeO_3	0.000888	0.000203	"	"	<0.000001	0.200	<0.01%
Non-Metals							
HCl	0.522865	0.119376	1.0	0.00016	0.000019	0.100	0.02%
HF	0.678500	0.154909	"	"	0.001627	0.820	0.20%
NO_3	2.016027	0.460280	"	"	0.000074	100.000	<0.01%
$Ba_3(PO_4)_2$	0.001273	0.000291	"	"	<0.000001	0.500	<0.01%
$BaSO_4$	0.005188	0.001184	"	"	<0.000001	5.000	<0.01%

Sample Calculation

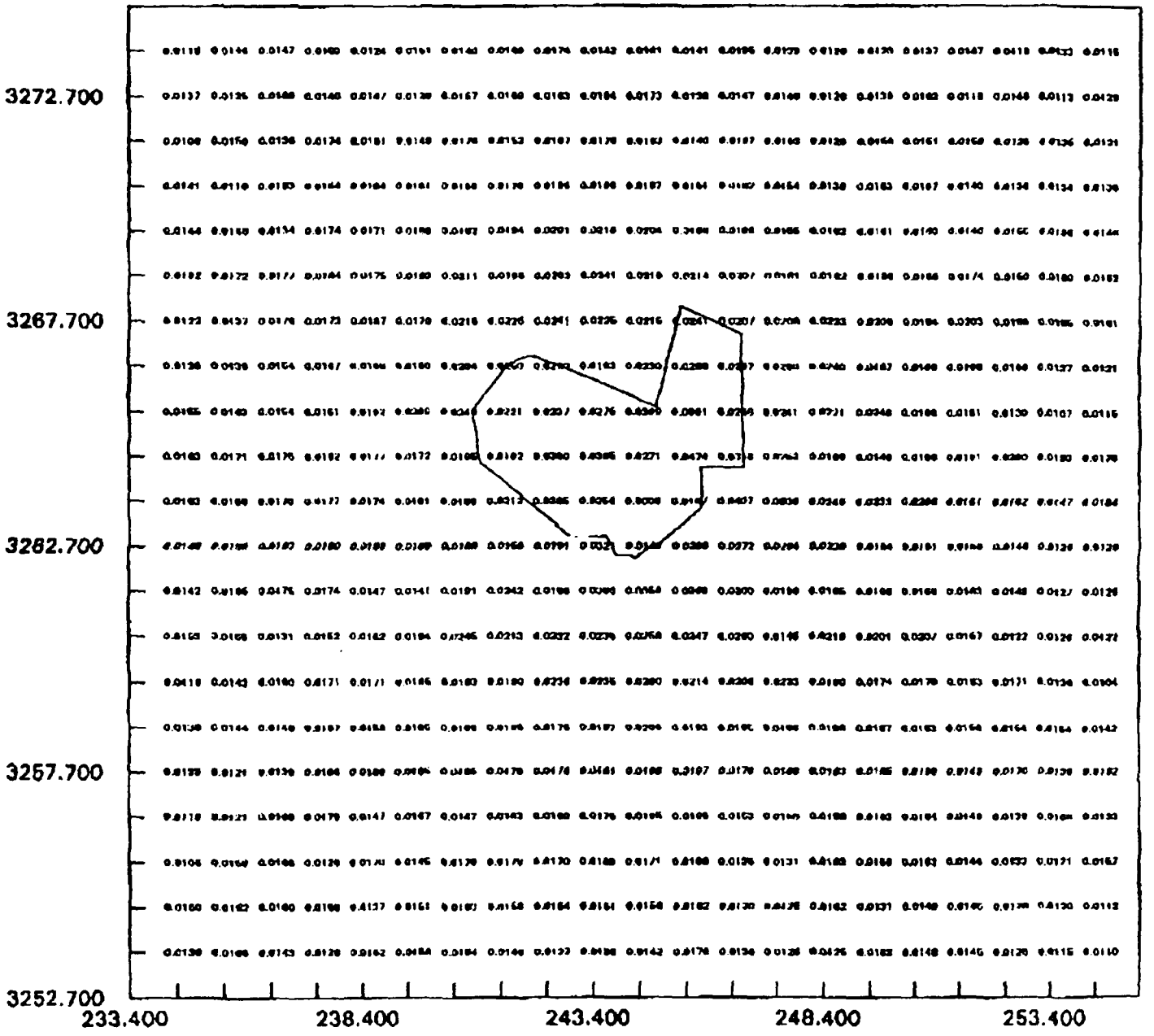
[Actual Emission Rate (tn/yr)] x (2000 lb/tn) x (1 yr/8760 hrs) = Actual Emission Rate (lb/hr)
[(Actual Emission Rate (lb/hr))÷(Modeled Emission Rate)]·(Modeled Maximum Impact) = Actual Pollutant Impact
HCl: (0.5229 tn/yr) x (2000 lb/tn) x (1 yr/8760 hrs) = 0.119 lb/hr
HCl: [(0.119 lb/hr)÷(1 lb/hr)]·(0.00016 µg/m3) = 0.000019 µg/m3

Note: the actual pollutant impact for HF is the annual emission rate (converted to lb/hr) multiplied by the hourly maximum modeled impact from Table 2 (0.0525 µg/m3) and a conversion factor of 0.2. This impact is compared with the 30-day NAAQS limit. The conversion factor is from a TNRCC memo (dated 1/11/95) and is used to convert hourly average concentration values to 30-day values.

Figure 1

WA PARISH STATION - 1 LB/HR UNIT EMISSION RATE IMPACTS

1 Kilometer Receptor Grid Spacing



Concentrations in $\mu g/m^3$ Edge Markings are UTM in Kilometers

Maximum Off-Property Impact of .0407 $\mu g/m^3$ at: 246.400, 3263.700

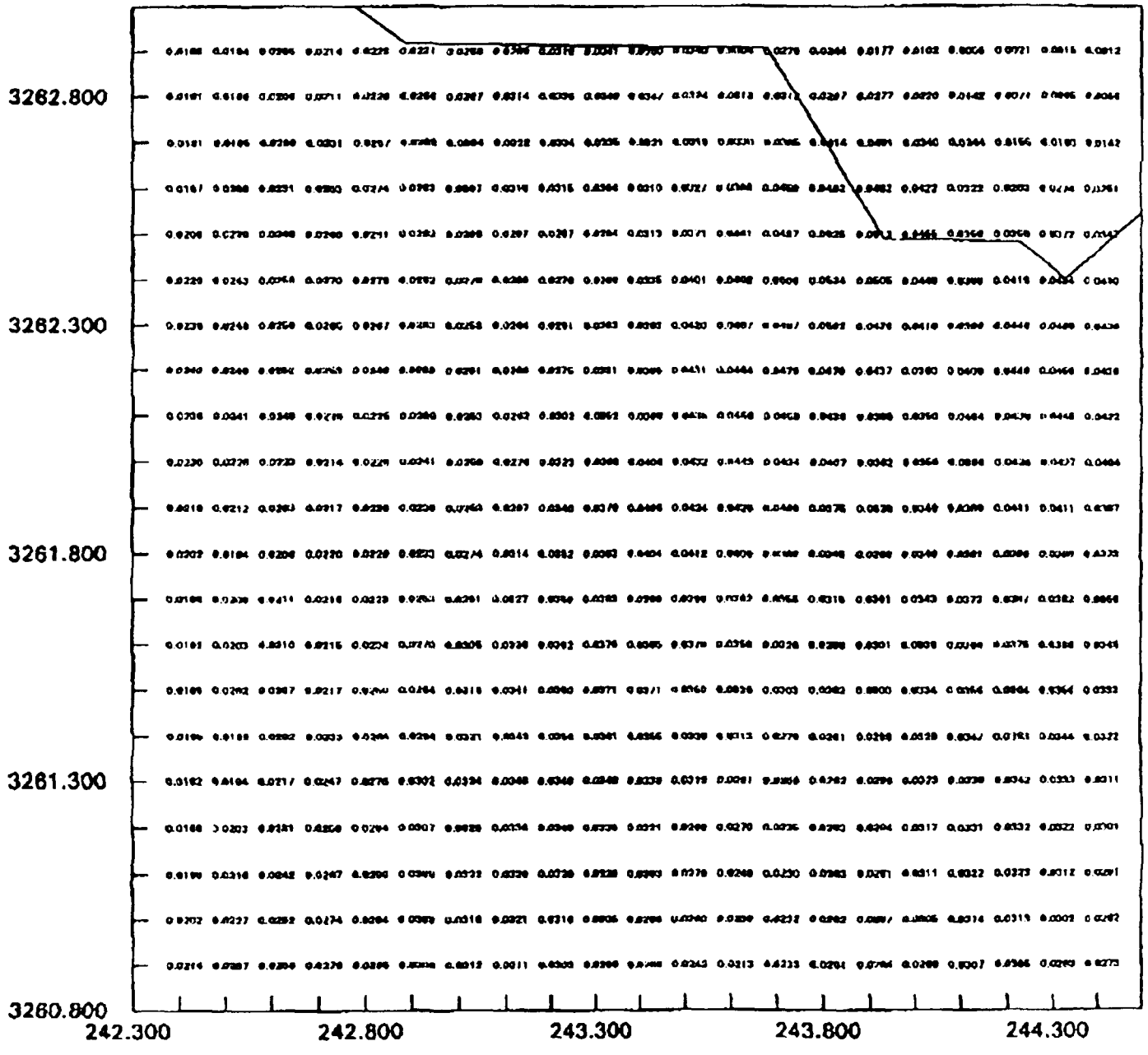
Model options: CONC RURAL FLAT DFAULT
Period and Value: HIGH 1ST HIGH 1-HR
Source Group: ALL

Data File: OR1K--1-.MAX File Date:

Figure 2

WA PARISH STATION - 1 LB/HR UNIT EMISSION RATE IMPACTS

100 Meter Receptor Grid Spacing



Concentrations in $\mu g/m^3$ Edge Markings are UTM in Kilometers

Maximum Off-Property Impact of .0525 $\mu g/m^3$ at: 243.800, 3262.500

Model options: CONC RURAL FLAT DFAULT
Period and Value: HIGH 1ST HIGH 1-HR
Source Group: ALL

Data File: OR1CB-1.MAX File Date:

HOUSTON LIGHTING & POWER COMPANY
BOILER CLEANING WASTEWATER EMISSION CALCULATIONS
AC AND HAF WASTEWATER

Notes: (1) (2) (3) (4) (5)

Metal	Metal Oxide(s)	Mol Wt Metal or Ion	Mol Wt Oxide or Cmpd	Mol Metal/ Mol Oxide	Inj Rate gal/min	Max gal/hr	Max gal/yr	Metal Conc. ppm (max)	Metal Conc. ppm (avg)	Uncntrld lb/hr	Uncntrld tn/yr	Cntrl Eff. %	TOTAL Cntrld lb/hr	TOTAL Cntrld tn/yr	PER UNIT Cntrld lb/hr	PER UNIT Cntrld tn/yr
Ag	Ag2O	107.9	231.7	2	25	3000	4,000,000	0.44	0.23	0.012	0.004	99.79%	0.000025	0.000009	0.000012	4.3E-06
Al	Al2O3	27.0	102.0	2	25	3000	4,000,000	45.35	10.76	2.140	0.338	99.89%	0.002354	0.000372	0.001177	0.000186
Ba	BaO	137.3	153.3	1	25	3000	4,000,000	11.22	0.49	0.313	0.009	99.89%	0.000344	0.000010	0.000172	5.0E-06
Ca	CaO	40.1	56.1	1	25	3000	4,000,000	995.50	188.30	34.821	4.391	99.89%	0.038303	0.004830	0.019152	0.002415
Cu	CuO	63.5	79.5	1	25	3000	4,000,000	331.10	29.87	10.352	0.623	99.60%	0.041406	0.002490	0.020703	0.001245
Fe	Fe2O3	55.8	159.6	2	25	3000	4,000,000	3630.00	883.41	129.621	21.030	99.89%	0.142583	0.023133	0.071292	0.011567
K	K2O	39.1	94.2	2	25	3000	4,000,000	64.90	7.01	1.954	0.141	99.79%	0.004103	0.000295	0.002051	0.000148
Mg	MgO	24.3	40.3	1	25	3000	4,000,000	75.90	15.57	3.145	0.430	99.89%	0.003459	0.000473	0.00173	0.000237
Mo	MoO2/MoO3*	95.9	143.9	1	25	3000	4,000,000	11.15	1.18	0.418	0.029	99.89%	0.000460	0.000032	0.00023	0.000016
Na	Na2O	23.0	62.0	2	25	3000	4,000,000	1943.70	441.26	65.447	9.905	99.79%	0.137439	0.020801	0.068719	0.0104
Si	SiO2	28.1	60.1	1	25	3000	4,000,000	128.81	20.92	6.888	0.746	99.89%	0.007577	0.000820	0.003789	0.00041
Sn	SnO2	118.7	150.7	1	25	3000	4,000,000	33.00	3.95	1.047	0.084	99.79%	0.002198	0.000175	0.001099	0.000088
V	V2O5	50.9	181.9	2	25	3000	4,000,000	0.07	0.03	0.003	0.001	99.89%	0.000003	0.000001	1.7E-06	4.9E-07
Zn	ZnO	65.4	81.4	1	25	3000	4,000,000	22.00	4.02	0.684	0.083	99.79%	0.001437	0.000175	0.000719	0.000088
TOTAL PM:															0.1908	0.0268
Hazardous Air Pollutants (HAPs):																
As	As2O5	74.9	229.8	2	25	3000	4,000,000	7.63	2.09	0.292	0.053	99.60%	0.001170	0.000214	0.000585	0.000107
Cd	CdO	112.4	128.4	1	25	3000	4,000,000	0.44	0.19	0.013	0.004	97.60%	0.000301	0.000087	0.000151	0.000043
Cr	CrO2/CrO*	52.0	84.0	1	25	3000	4,000,000	28.38	4.68	1.146	0.126	99.40%	0.006874	0.000756	0.003437	0.000378
Hg	HgO	200.6	216.6	1	25	3000	4,000,000	52.80	0.85	1.425	0.015	30.00%	0.997350	0.010704	0.498675	0.005352
Mn	Mn2O3	54.9	157.8	2	25	3000	4,000,000	229.90	11.55	8.251	0.276	99.60%	0.033004	0.001105	0.016502	0.000553
Ni	NiO	58.7	74.7	1	25	3000	4,000,000	58.85	10.93	1.872	0.232	98.60%	0.026206	0.003245	0.013103	0.001622
Pb	PbO2	207.2	239.2	1	25	3000	4,000,000	2.76	0.47	0.080	0.009	99.50%	0.000398	0.000045	0.000199	0.000023
Se	SeO3	79.0	127.0	1	25	3000	4,000,000	14.30	2.21	0.574	0.059	97.00%	0.017229	0.001775	0.008615	0.000888
Non-Metals:																
Cl-	HCl	35.4	36.5	1	25	3000	4,000,000	2310.00	304.72	59.455	5.229	80.00%	11.891089	1.045729	5.945545	0.522865
F-	HF	19.0	20.0	1	25	3000	4,000,000	534.60	154.76	14.063	2.714	50.00%	7.031397	1.357001	3.515698	0.6785
NO3-	NO3	62.0	62.0	1	25	3000	4,000,000	2904.00	242.02	72.571	4.032	0.00%	72.570960	4.032053	36.28548	2.016027
PO4-	Ba3(PO4)2	95.0	601.9	3	25	3000	4,000,000	877.80	65.77	46.330	2.314	99.89%	0.050963	0.002546	0.025482	0.001273
SO4-	BaSO4	96.1	233.4	1	25	3000	4,000,000	3712.50	233.15	225.313	9.433	99.89%	0.247845	0.010377	0.123922	0.005188

(1) Cr and Mo each form two different oxides. As a conservative estimate, it is assumed that these elements form the heavier oxide.
(2) Maximum gal/hr is based on the maximum injection rate of 25 gal/min per unit, or 50 gal/min total. Maximum gal/yr is based on the maximum expected annual BCW throughput.
(3) Emissions in lb/hr are based on max ppms from W A Parish and other plants which could send BCW to W A Parish for injection. As a conservative estimate, max ppms are increased by a factor of 10% to account for fluctuations in concentrations.
(4) Emissions in tn/yr are based on avg ppms from W A Parish.
(5) Control Efficiencies for Al, Ba, Ca, Fe, Mg, Mo, Si, V, phosphates, and sulfates are based on 1989 baghouse tests for Unit 5 (99.89%) and Unit 6 (99.90%). The Unit 5 result was used as a conservative estimate because it had the lower efficiency. Ag, K, Na, Sn, and Zn are assumed to have a control efficiency 0.1% less than the Unit 5 test result. These elements are more volatile and are more likely to form vapors when incinerated and recondense on finer particles. Control efficiencies for As, Cd, Cr, Cu, Pb, Mn, Hg, Ni, Se, HCl, and HF were based on test results from several different boilers as determined by an EPRI/DOE study. Results were determined for each unit. As a conservative estimate, the lowest result was used and rounded down to the nearest 0.1%.

PERMIT NO. 5794 PERMIT TYPE: CONSTRUCTION [ ] AMENDMENT [X] REVISION [ ] RENEWAL [ ]

ACCOUNT ID NO. FG0020V

TABLE 1(a)
EMISSION SOURCES

DATE 10/95

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA EMISSION POINT DISCHARGE PARAMETERS																
EMISSION POINT [1]		CHEMICAL COMPOSITION OF TOTAL STREAM		AIR CONTAMINANT EMISSION RATE		UTM COORDINATES OF EMISSION PT. [6]			SOURCE HEIGHT ABOVE GROUND [ft.]	SOURCE HEIGHT ABOVE STRUCT. [ft.]	STACK SOURCES (7) EXIT DATA			FUGITIVE SOURCES [8]	
NUMBER	NAME	COMPONENT OR AIR CONTAMINANT NAME [2]	CONC. (%v) [3]	#/HR [4]	TONS/YR [5]	ZONE	EAST [meters]	NORTH [meters]			DIA. [ft.]	VEL. [fps]	TEMP. [°F]	LENGTH [ft.]	WIDTH [ft.]
WAP5	Unit 5 Stack	TSP		0.191	0.027	15	244431	3263716	600	356	24	73.8	269		
		PM_{10}		0.191	0.027										
		As_2O_3		5.85×10^{-4}	1.07×10^{-4}										
		CdO		1.51×10^{-4}	4.30×10^{-5}										
		CrO_3/CrO		0.003	3.78×10^{-4}										
		HgO		0.499	0.005										
		Mn_2O_3		0.017	5.53×10^{-4}										
		NiO		0.013	0.002										
		PbO_2		1.99×10^{-4}	2.30×10^{-5}										
		SeO_3		0.009	8.88×10^{-4}										

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 78 feet.
TACB STANDARD CONDITIONS ARE 68°F AND 14.7 PSIA [RULE 131.01.00.001(55)]

NOTE: EMISSIONS REPRESENTED ABOVE ARE FOR BCW INJECTION ONLY. FOR THE PURPOSES OF COMPLETING THIS TABLE, TOTAL ANNUAL EMISSIONS FROM UNITS 5 & 6 HAVE BEEN DIVIDED EVENLY BETWEEN THE TWO UNITS. HOWEVER, ANNUAL EMISSIONS FROM EACH UNIT ARE NOT LIMITED TO HALF THE TOTAL; INSTEAD, ANNUAL EMISSION LIMITS SHOULD APPLY TO TOTAL EMISSIONS FROM BOTH UNITS.

PERMIT NO. 5794 PERMIT TYPE: CONSTRUCTION [ ] AMENDMENT [X] REVISION [ ] RENEWAL [ ]

ACCOUNT ID NO. FG0020V

DATE 10/95

TABLE 1(a)
EMISSION SOURCES

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA EMISSION POINT DISCHARGE PARAMETERS															
EMISSION POINT (1)		CHEMICAL COMPOSITION OF TOTAL STREAM		AIR CONTAMINANT EMISSION RATE		UTM COORDINATES OF EMISSION PT. (6)			SOURCE HEIGHT ABOVE GROUND (ft.)	SOURCE HEIGHT ABOVE STRUCT. (ft.)	STACK SOURCES (7) EXIT DATA			FUGITIVE SOURCES (8)	
NUMBER	NAME	COMPONENT OR AIR CONTAMINANT NAME (2)	CONC. (%v) (3)	#/HR (4)	TONS/YR (5)	ZONE	EAST (meters)	NORTH (meters)			DIA. (ft.)	VEL. (fps)	TEMP. (°F)	LENGTH (ft.)	WIDTH (ft.)
WAP5 (cont'd)	Unit 5 Stack	HCl		5.946	0.523	15	244431	3263716	600	356	24	73.8	269		
		HF		3.516	0.679										
		NO_x		36.285	2.016										
		Phosphates		0.025	0.001										
		Sulfates		0.124	0.005										
WAP6	Unit 6 Stack	TSP		0.191	0.027	15	244484	3263626	600	356	24	73.8	269		
		PM_{10}		0.191	0.027										
		As_2O_3		5.85×10^{-4}	1.07×10^{-4}										
		CdO		1.51×10^{-4}	4.30×10^{-5}										
		CrO_3/CrO		0.003	3.78×10^{-4}										

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 78 feet.
TACB STANDARD CONDITIONS ARE 68°F AND 14.7 PSIA [RULE 131.01.00.001(55)]

NOTE: EMISSIONS REPRESENTED ABOVE ARE FOR BCW INJECTION ONLY. FOR THE PURPOSES OF COMPLETING THIS TABLE, TOTAL ANNUAL EMISSIONS FROM UNITS 5 & 6 HAVE BEEN DIVIDED EVENLY BETWEEN THE TWO UNITS. HOWEVER, ANNUAL EMISSIONS FROM EACH UNIT ARE NOT LIMITED TO HALF THE TOTAL; INSTEAD, ANNUAL EMISSION LIMITS SHOULD APPLY TO TOTAL EMISSIONS FROM BOTH UNITS.

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NUMBER	NAME	COMPONENT OR AIR CONTAMINANT NAME [2]	CONC. (%v) [3]	#/HR [4]	TONS/YR [5]	ZONE	EAST [meters]	NORTH [meters]			DIA. [ft.]	VEL. [fps]	TEMP. [°F]	LENGTH [ft.]	WIDTH [ft.]
WAP6 (cont'd)	Unit 6 Stack	HgO		0.499	0.005	15	244484	3263626	600	356	24	73.8	269		
		Mn_2O_3		0.017	5.53×10^{-4}										
		NiO		0.013	0.002										
		PbO_2		1.99×10^{-4}	2.30×10^{-5}										
		SeO_3		0.009	8.88×10^{-4}										
		HCl		5.946	0.523										
		HF		3.516	0.679										
		NO_x		36.285	2.016										
		Phosphates		0.025	0.001										
		Sulfates		0.124	0.005										

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL 78 feet.
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NOTE: EMISSIONS REPRESENTED ABOVE ARE FOR BCW INJECTION ONLY. FOR THE PURPOSES OF COMPLETING THIS TABLE, TOTAL ANNUAL EMISSIONS FROM UNITS 5 & 6 HAVE BEEN DIVIDED EVENLY BETWEEN THE TWO UNITS. HOWEVER, ANNUAL EMISSIONS FROM EACH UNIT ARE NOT LIMITED TO HALF THE TOTAL; INSTEAD, ANNUAL EMISSION LIMITS SHOULD APPLY TO TOTAL EMISSIONS FROM BOTH UNITS.

ITEM VI.D BEST AVAILABLE CONTROL TECHNOLOGY

HL&P believes that the use of fabric filters to control particulate emissions resulting from the injection of BCW represents Best Available Control Technology for this process. In addition, HL&P also believes that further controls would be neither economically reasonable nor technically practicable considering the minimal impact of emissions resulting from BCW injection on the surrounding area.

ITEM VI.E FRANCHISE TAX

A Certificate of Good Standing from the State Comptroller's office is not required for permit amendments. Therefore, a Certificate of Good Standing has not been included with this amendment application.

ITEM VI.F PERMIT FEE

Due to the fact that this permit amendment application does not include any physical modification of the Units 5 and 6 BCW injection system, there is no capital cost associated with this permit amendment application. Therefore, according to the guidelines stated in Regulation VI, §116.141, a permit fee of $450.00 is required. HL&P is submitting a check in the amount of $450.00 made payable to the TNRCC as payment of the permit fee. A TNRCC Table 30 is included on the following page.

TABLE 30

CERTIFICATION OF ESTIMATED CAPITAL COST AND PERMIT APPLICATION FEE

Regulation VI, Rule 116.141

Include estimated cost of the equipment and services that would normally be capitalized according to standard and generally accepted corporate financing and accounting procedures.

	Estimated Capital Cost
DIRECT COSTS	
Process and control equipment not previously owned by the applicant and permitted in Texas	$ 0.00
Auxiliary equipment, including exhaust hoods, ducting, fans, pumps, piping, conveyors, stacks, storage tanks, waste disposal facilities, and air pollution control equipment specifically needed to meet permit and regulation requirements	0.00
Freight charges	0.00
Site preparation (including demolition), construction of fences, outdoor lighting, road and parking areas	0.00
Installation (including foundations), erection of supporting structures, enclosures or weather protection, insulation and painting, utilities and connections, process integration and process control equipment	0.00
Auxiliary buildings, including materials storage, employee facilities, and changes to existing structures	0.00
Ambient air monitoring network	0.00
INDIRECT COSTS	
Final engineering design and supervision and administrative overhead	0.00
Construction expense (including construction liaison), securing local building permits, insurance, temporary construction facilities and construction clean-up	0.00
Contractor's fee and overhead	0.00
TOTAL ESTIMATED CAPITAL COST =	**$ 0.00**

I certify that the total estimated capital cost of the project as defined in Texas Natural Resource Conservation Commission Rule 116.141 is equal to or less than the above figure.

Signed by: B.C. Carmine

Title: Manager, Air Resources Div.

Company: Houston Lighting & Power

Date: 11/6/95

Estimated Capital Cost	Permit Application Fee	PSD Application Fee
Less than $300,000	$450 (minimum fee)	$1,500 (minimum fee)
$300,000 to $50,000,000	0.15% of capital cost	- - - - -
$300,000 to $15,000,000	- - - - -	0.5% of capital cost
Greater than $50,000,000	$75,000 (maximum fee)	- - - - -
Greater than $15,000,000	- - - - -	$75,000 (maximum fee)

PERMIT APPLICATION FEE (from table above) = $ 450.00

Rev. 09/30/93

ITEM VI.G FEDERAL APPLICABILITY

The W.A. Parish station is a major source located in the Houston/Galveston ozone nonattainment area. However, the increase in VOC and NO_x emissions resulting from BCW injection will be less than five (5) tons per year. Therefore, netting calculations are not required and actual emission calculations from the two previous years are not included with this application.

ITEM VI.H STANDARD EXEMPTIONS/GRANDFATHERED UNITS

HL&P does not wish to roll any standard exemptions or grandfathered units into Permit No. 5794 at this time.

SECTION VII PROCESS INFORMATION

ITEM VII.A PROCESS FLOW DIAGRAM

A process flow diagram (Figure VII.A-1), which illustrates the BCW injection system, is included on the following page.

W. A. PARISH UNITS 5 AND 6
BCW INJECTION

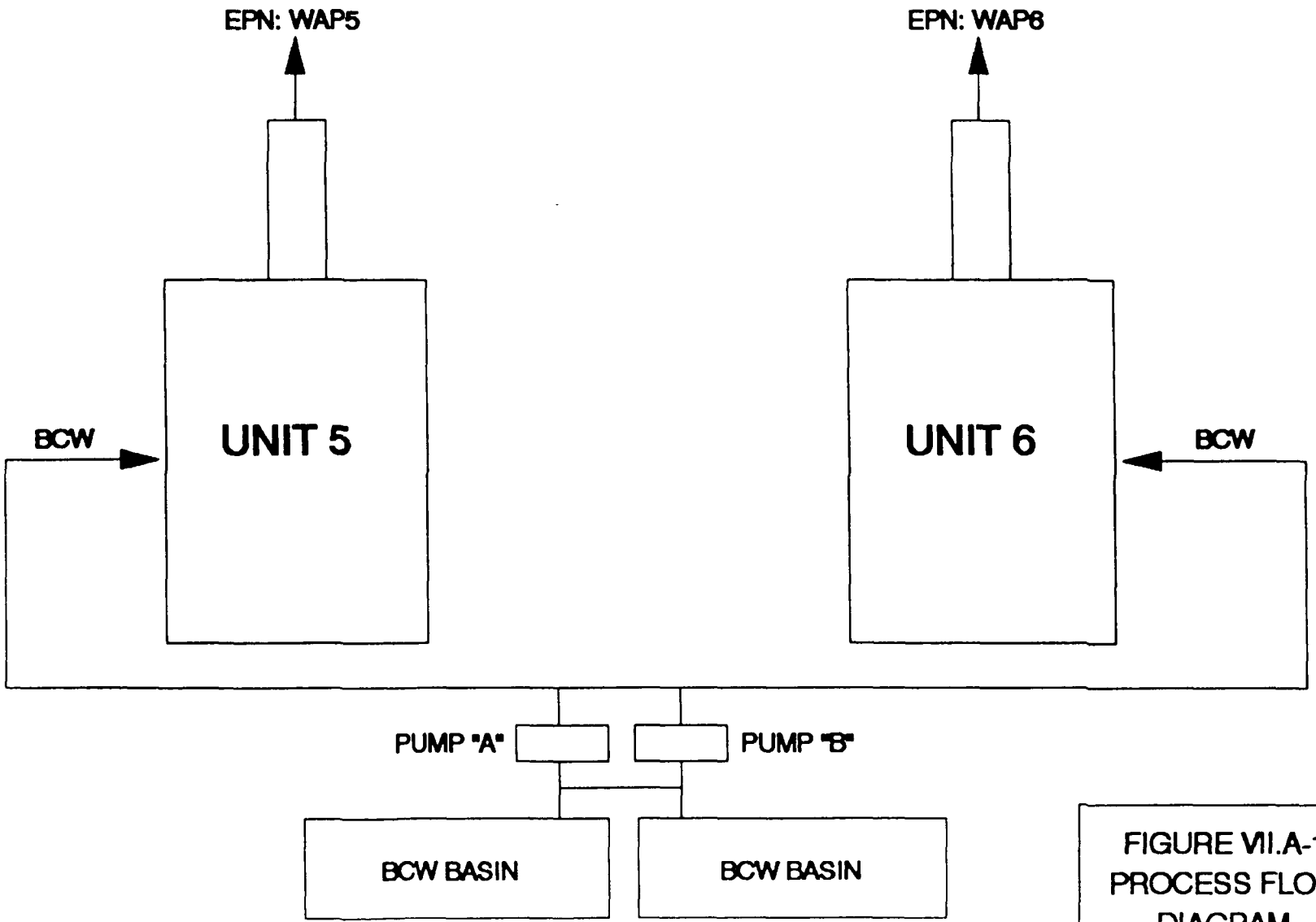


FIGURE VII.A-1
PROCESS FLOW
DIAGRAM

ITEM VII.B PROCESS DESCRIPTION

It is necessary to chemically clean the water side of utility boilers in order to maintain heat transfer efficiency. HL&P uses two types of cleaning solutions to clean its units: hydroxy acetic formic acid (HAF) and ammoniated citric acid (AC). Permit No. 5794 currently authorizes HL&P to inject 310,000 gallons of AC wastewater and 280,140 gallons of HAF wastewater into Units 5 and 6 per year. This permit amendment seeks to increase that amount to 4,000,000 gallons of total BCW, a difference of 3,409,860 gal/yr. This is the maximum annual amount of AC and HAF wastewater that is expected to be generated at W.A. Parish and other HL&P stations which could send wastewater to W.A. Parish for injection. HL&P is currently permitted to inject BCW into Unit 5 or 6 at a rate of 25 gal/min. Under this permit amendment, simultaneous injection into Units 5 and 6 would be allowed and the maximum hourly injection rate would increase to 25 gal/min per unit, or 50 gal/min total.

BCW from W.A. Parish and other stations is held in two large concrete basins until it is ready for injection. BCW can be pumped into the Unit 5 and Unit 6 boiler furnaces using one or both BCW transfer pumps. The BCW is injected into the furnace, where it is incinerated on the "G" (rear burner) or "E" (front burner) burner levels on either the north or south side of the boiler.

ITEM VII.C MATERIAL BALANCE

A TNRCC Material Balance Table (Table 2) is included on the following page.

TABLE 2

MATERIAL BALANCE

This material balance table is used to quantify possible emissions of air contaminants and special emphasis should be placed on potential air contaminants, for example: If feed contains sulfur, show distribution to all products. Please relate each material (or group of materials) listed to its respective location in the process flow diagram by assigning point numbers (taken from the flow diagram) to each material.

LIST EVERY MATERIAL INVOLVED IN EACH OF THE FOLLOWING GROUPS	Point No. from Flow Diagram	Process Rate (lbs/hr or SCFM) standard conditions: 70°F 14.7 PSIA. Check appropriate column at right for each process.	Measurement	Estimation	Calculation
1. Raw Materials - Input Boiler Cleaning Wastewater		24,990 lb/hr		X	
2. Fuels - Input					
3. Products & By-Products - Output					
4. Solid Wastes - Output					
5. Liquid Wastes - Output					
6. Airborne Waste (Solid) - Output TSP CrO_2/CrO PbO_2 PM_{10} HgO SeO_3 As_2O_5 Mn_2O_3 Phosphates CdO NiO Sulfates		See Table 1(a)		X	
7. Airborne Wastes (Gaseous) - Output HCl HF NO_x		See Table 1(a)		X	

SECTION VIII GENERAL APPLICATION REQUIREMENTS

TNRCC Regulation VI, §116.111 specifies requirements that the owner or operator of the facility must meet prior to obtaining a permit or permit amendment. The following discussion addresses all permit amendment requirements specified in TNRCC Regulation VI, §116.111 and demonstrates that HL&P will meet all applicable requirements.

TNRCC Regulation VI, §116.111 states: "...In order to be granted a permit, permit amendment, or special permit amendment, the owner or operator of the ... facility shall submit information to the Texas Natural Resource Conservation Commission (TNRCC) which shall demonstrate that all of the following are met:

(1) Protection of public health and welfare. The emissions from the ... facility will comply with all rules and regulations of the TNRCC and with the intent of the Texas Clean Air Act (TCAA), including protection of the health and physical property of the people. In considering the issuance of a permit for construction or modification of any facility within 3,000 feet or less of an elementary, junior high/middle, or senior high school, the TNRCC shall consider any possible adverse short-term or long-term side effects that an air contaminant or nuisance odor from the facility may have on the individuals attending these school facilities."

As outlined below, HL&P currently operates and will continue to operate the BCW injection system in compliance with all rules and regulations of the TNRCC and with the intent of the TCAA. Furthermore, there are no schools within 3,000 feet of the W.A. Parish facility.

TNRCC Regulation I - Control of Air Pollution from Visible Emissions and Particulate Matter
BCW injection may result in occasional visible emissions. However, visible emissions from this process are not currently and will not in the future be in excess of the 20% opacity limit specified in TNRCC Regulation I, §111.111(a)(1)(B). Also, HL&P currently injects and will continue to inject BCW into Units 5 and 6 in compliance with the allowable PM emission rates specified in §111.153. As a result, the BCW injection system complies with TNRCC Regulation I.

TNRCC Regulation I, §111.121 - §111.129 specifically address incineration activities. These regulations apply to "incinerators" as defined in §101.1, a definition which excludes any units which burn less than 1% waste annually on a Btu basis. Since BCW accounts for far less than 1% of annual heat input to W.A. Parish Units 5 and 6, these units are not considered incinerators, and TNRCC Regulation I, §111.121 - §111.129 does not apply.

TNRCC Regulation II - Control of Air Pollution from Sulfur Compounds
BCW injection may result in emissions of sulfates. However, TNRCC Regulation II does not regulate sulfate emissions. Therefore, TNRCC Regulation II does not apply to BCW injection.

TNRCC Regulation III - Control of Air Pollution from Toxic Materials
TNRCC Regulation III specifies emission limits and air quality standards for inorganic fluoride compounds, beryllium, and lead. BCW injection will not result in beryllium emissions. In addition, the lead standards specified in TNRCC Regulation III apply only to lead smelting operations. Therefore, they do not apply to BCW injection.

BCW injection will result in emissions of hydrogen fluoride (HF). However, these emissions will not result in adverse off-property impacts. The Industrial Source Complex Short-Term (ISC2ST) modeling program has shown that emissions from BCW injection will result in minimal impacts which are less than 2% of the maximum allowable atmospheric concentrations specified in TNRCC Regulation III, §113.3(a)(2)(A) (refer to Appendix C - Modeling Results). Therefore, BCW injection complies with TNRCC Regulation III.

TNRCC Regulation IV - Control of Air Pollution from Motor Vehicles
BCW injection does not involve the use of motor vehicles. Therefore, TNRCC Regulation IV does not apply to this process.

TNRCC Regulation V - Control of Air Pollution from Volatile Organic Compounds
BCW injection does not result in VOC emissions. Therefore, TNRCC Regulation V is not applicable.

TNRCC Regulation VII - Control of Air Pollution from Nitrogen Compounds
BCW injection results in emissions of nitrogen compounds. However, nitrogen compound emissions will not exceed the limits specified in TNRCC Regulation VII, §117.105 (emission calculations for BCW injection are provided under Item VI.C of this document). As a result, BCW injection complies with TNRCC Regulation VII.

TNRCC Regulation VIII - Air Pollution Episodes
HL&P operates the BCW injection system in compliance with the air pollution episode requirements specified in TNRCC Regulation VIII. Furthermore, an emission reduction plan is not required for W.A. Parish since it is not located in one of the counties listed in TNRCC Regulation VIII §118.5. As a result, BCW injection complies with TNRCC Regulation VIII.

TNRCC Regulation IX - Control of Air Pollution from Carbon Monoxide
BCW injection does not result in carbon monoxide emissions. In addition, TNRCC Regulation IX applies only to specific process, among which BCW injection is not included. Therefore, TNRCC Regulation IX is not applicable to the BCW injection system.

TNRCC Regulation X - Control of Air Pollution from Hazardous Waste or Solid Waste Management Facilities
The BCW injection system is neither a hazardous waste nor a solid waste management facilities. Therefore, TNRCC Regulation X does not apply to BCW injection.

TNRCC Regulation XI - Control of Air Pollution from Municipal Waste Facilities
The BCW injection system is not a municipal waste facility. Therefore, TNRCC Regulation XI does not apply to BCW injection.

TNRCC Regulation XII - Operating Permits
W.A. Parish will comply with the requirements of TNRCC Regulation XII.

TNRCC Regulation VI, §116.111(2) states: "Measurement of emissions. The ...facility will have provisions for measuring the emission of significant air contaminants as determined by the Executive Director. This may include the installation of sampling ports on exhaust stacks and construction of sampling platforms in accordance with guidelines in the TNRCC 'Compliance Sampling Manual'."

Records of wastewater analyses and of the amount of wastewater injected into Units 5 and 6 will be maintained at the facility. Therefore, emissions of air contaminants from BCW injection can be estimated using the methods developed under Item VI.C of this document.

TNRCC Regulation VI, §116.111(3) states: "Best Available Control Technology (BACT). The ...facility will utilize BACT, with consideration given to the technical practicability and economic reasonableness of reducing or eliminating the emissions from the facility."

HL&P believes that the level of control currently being applied to BCW injection represents BACT for this process. Furthermore, HL&P also believes that further controls would be neither economically reasonable nor technically practicable considering the impact of emissions resulting from BCW injection on the surrounding area.

TNRCC Regulation VI, §116.111(4) states: "Federal New Source Performance Standards (NSPS). The emissions from the ...facility will meet at least the requirements of any applicable NSPS as listed under Title 40 Code of Federal Regulations (CFR) Part 60, promulgated by the U.S. Environmental Protection Agency (EPA) pursuant to authority granted under the Federal Clean Air Act (FCAA), §111, as amended."

NSPS Subpart E addresses performance standards for incinerators. However, the definition of "incinerator" stated in Subpart E includes only units which incinerate solid wastes. W.A. Parish Units 5 and 6 do not and will not incinerate solid wastes. Therefore, Units 5 and 6 are not subject to NSPS Subpart E. No other NSPS Subparts address the BCW injection process. Therefore, BCW injection is not subject to NSPS requirements.

NSPS Subpart D addresses performance standards for fossil fuel-fired steam generators for which construction began after August 17, 1971. Construction of Units 5 and 6 began in 1974. Units 5 and 6 operate in compliance with the requirements of NSPS Subpart D.

TNRCC Regulation VI, §116.111(5) states: "National Emission Standards for Hazardous Air Pollutants (NESHAP). The emissions from the ...facility will meet at least the requirements of any applicable NESHAP, as listed under 40 CFR Part 61, promulgated by EPA pursuant to authority granted under the FCAA, §112, as amended."

BCW injection at W. A. Parish may result in minimal emissions of oxides of mercury. However, NESHAP Subpart E (National Emission Standard for Mercury) addresses specific processes, among which BCW injection is not included. BCW injection will not result in emissions of any of the other hazardous air pollutants listed in 40 CFR 61 Subpart A, §61.01. BCW injection is not covered by any of the remaining subparts, which address specific processes. As a result, BCW injection is not subject to NESHAP requirements.

TNRCC Regulation VI, §116.111(6) states: "Performance demonstration. The ...facility will achieve the performance specified in the permit application. The applicant may be required to submit additional engineering data after a permit has been issued in order to demonstrate further that the proposed facility will achieve the performance specified in the permit application. In addition, dispersion modeling, monitoring, or stack testing may be required."

This permit amendment application does not involve a physical change in the BCW injection process. As a result, information included in this permit amendment application represents the actual performance of the BCW injection process.

TNRCC Regulation VI, §116.111(7) states: "Nonattainment review. If the ...facility is located in a nonattainment area, it shall comply with all applicable requirements under the undesignated head concerning nonattainment review."

W.A. Parish is located in Fort Bend County, which is classified as nonattainment for ozone. The W.A. Parish facility is a major source of VOC and NO_x as defined in Section 101.1 of the TNRCC General Rules. However, this amendment application is not associated with an increase of VOC emissions, and an increase in NO_x emissions, if any, which results from increased BCW injection is expected to be minimal. Therefore, netting calculations are not required and nonattainment review does not apply.

TNRCC Regulation VI, §116.111(8) states: "Prevention of Significant Deterioration (PSD) review. If the ...facility is located in an attainment area, it shall comply with all applicable requirements under the undesignated head concerning PSD."

W.A. Parish is located in Fort Bend County, which is classified as attainment for PM, SO_2, CO, and lead. Although the W.A. Parish facility is a major source of PM, SO_2, and CO emissions, this amendment does not represent a significant increase in emissions of these pollutants or of lead. Therefore, PSD review is not required for this amendment application.

TNRCC Regulation VI, §116.111(9) states: "Air dispersion modeling. Computerized air dispersion modeling may be required by the TNRCC Permits Program to determine the air quality impact from a proposed new facility or source modification."

Modeling was performed using the ISC2ST program. Theoretical maximum short-term and long-term off-property concentrations for each pollutant (in $\mu g/m^3$) were estimated by the program based on an emission rate of 1 lb/hr (a 3-hour estimate was performed for HF). The theoretical concentrations were then multiplied by the maximum hourly and average hourly emission rates for each pollutant to obtain actual short-term and long-term concentrations for each pollutant, respectively. Actual emission rates used for modeling purposes are based on the **increase** in BCW throughput requested by this permit amendment application. The short- and long-term concentrations were compared with short- and long-term ESLs to determine whether further modeling may be needed. According to TNRCC guidelines, more detailed modeling may be required for pollutants which exceed 10% of their short- or long-term ESLs (the guideline is 2% for HF). All pollutants emitted due to injection and incineration of BCW in Units 5 and 6 were below these limits. Therefore, no further modeling is needed (refer to the Modeling Results section of Appendix B for further information).

APPENDIX A

TNRCC TABLE 11: FABRIC FILTERS

TABLE 11
FABRIC FILTERS

Point Number(from Flow Diagram) EPNs: WAP5 and WAP6	Manufacturer & Model No. (if available) Joy Technologies
Name of Abatement Device Baghouse (3 per unit)	Type of Particulate Controlled Fly Ash

GAS STREAM CHARACTERISTICS

Flow Rate (acfm)		Gas Stream Temperature (°F)	Particulate Grain Loading (grain/scf)	
Design Maximum	Average Expected		Inlet	Outlet
2,900,000	2,724,000	300	1.2	0.00125

Pressure Drop (in. H_2O)	Water Vapor Content of Effluent Stream (lb water/lb dry air)	Fan Requirements (hp) (ft^3/min)
4 - 7	0.081	N/A

PARTICULATE DISTRIBUTION
(By Weight) N/A

Micron Range	Inlet	Outlet
0.0-0.5	%	%
0.5-1.0	%	%
1.0-5.0	%	%
5-10	%	%
10-20	%	%
over 20	%	%

FILTER CHARACTERISTICS

Filtering Velocity (acfm/ft^2 of Cloth)	Bag Diameter (in.)	Bag Length (ft)	Number of Bags	Number of Compartments in Baghouse
16.68	12	35 (max)	3 x 4968	12

Bag rows will be:	Walkways will be provided between banks of bags:
Staggered (Straight)	(Yes) No

Filtering Material: Fiberglass with I-625 or Teflon B finish

Describe Bag Cleaning Method and Cycle: Reverse Air Flow

Capital Installed Cost $ N/A Annual Operating Cost $ N/A

ADDITIONAL INFORMATION

On separate sheets attach the following:

A. Details regarding principle of operation *(see Attachment 1)*

B. An assembly drawing (Front and Top View) of the abatement device dimensioned and to scale clearly showing the design, size and shape. N/A

If the device has bypasses, safety valves, etc., include in drawing and specify when such bypasses are to be used and under what conditions. *(see Attachment 1)*

ATTACHMENT 1

System Description

Flue gas leaving the air preheaters enters the hopper of each compartment and then passes up through the tubesheet into the individual bags. The flyash entrained in the gas stream impinges on and is collected on the filter cloth as the gas stream flows through the fabric. As the filter cake builds up on the cloth, the system draft loss increases and the bags must be cleaned.

The bags will be cleaned by taking a compartment off-stream and passing clean gas flow in a reverse direction through the bags. During this operation, the filter cake drops off into the hoppers and is later discharged to a pressurized pneumatic flyash handling system for transport to existing flyash storage silos.

After passing through the filter, the flue gas leaves the baghouse through the outlet duct. The baghouse will be designed with a 100 percent bypass system for protection of the bags from high temperature excursions. Manual control of the bypass will also be provided to bypass the baghouses during boiler start-ups.

APPENDIX B

EMISSION CALCULATION REFERENCES

BCW ANALYSES

HOUSTON LIGHTING & POWER COMPANY
BOILER CLEANING WASTEWATER EMISSION CALCULATIONS

METAL OR NON-METAL	MAXIMUM CONCENTRATIONS OF METALS/NON-METALS (ppm)									MAX INCR. BY 10%
	SRB	CBY	DPW	GBY	WAP	PHR	THW	WEB	MAX	
Ag	0.10	0.10	0.40	0.20	0.40				0.40	0.44
Al	10.00	2.23	1.75	13.10	41.23			1.31	41.23	45.35
As	6.00	6.94	1.00	6.00	6.00				6.94	7.63
Ba	10.20	0.80	0.50	1.90	3.70	1.00		2.40	10.20	11.22
Ca	136.00	100.00	36.90	60.00	905.00	67.25	41.70	28.30	905.00	995.50
Cd	0.40	0.04		0.20	0.30				0.40	0.44
Cr	2.40	1.24	0.78	6.00	25.80	2.45	0.07	2.45	25.80	28.38
Cu	107.00	0.07	32.00	8.20	301.00	1.13	1.82	1.46	301.00	331.10
Fe	1200.00	9.15	765.00	46.00	3300.00	4.06	7.28	79.50	3300.00	3630.00
Hg	17.00	0.04	0.40	48.00	4.60	0.01	0.09	0.10	48.00	52.80
K	9.80	22.00	59.00	34.00	28.00	3.60	6.50	2.40	59.00	64.90
Mg	38.40	69.00	4.47	10.00	62.00	15.00	6.35	10.00	69.00	75.90
Mn	13.00	0.59	0.42	0.30	209.00	0.13	0.53	1.67	209.00	229.90
Mo	3.50	0.52	2.00	3.20	10.14	0.65		0.20	10.14	11.15
Na	896.00	740.00	1767.00	245.00	1400.00	330.00	224.40	260.00	1767.00	1943.70
Ni	6.00	0.13	0.54	4.00	53.50	0.10	0.73	0.21	53.50	58.85
Pb	1.00	0.54	0.80	2.00	2.51	0.30	0.10	0.40	2.51	2.76
Se	2.50	0.36	0.90	0.32	13.00				13.00	14.30
Si	54.00	3.85	113.70	53.00	117.10	7.28	7.72	19.60	117.10	128.81
Sn	1.24	1.12	30.00	3.10	28.00				30.00	33.00
V					0.06				0.06	0.07
Zn	8.10	0.20	0.50	0.40	20.00	1.15	0.21	1.20	20.00	22.00
Non-Metals:										
Cl-	1418.00	982.64	274.00	158.00	2100.00	97.00	230.00	46.07	2100.00	2310.00
F-	123.00	26.00	0.52	25.40	486.00	0.63	3.50	40.30	486.00	534.60
NO3-	429.00	7.48	88.00	37.40	2640.00	70.40	8.80	132.00	2640.00	2904.00
PO4-	120.00	0.27	3.00	1.80	798.00	0.32	2.00	1.50	798.00	877.80
SO4-	3375.00	375.00	118.00	140.00	2470.00	90.00	200.00	150.00	3375.00	3712.50

CONTROL EFFICIENCIES

WA Parish, Caballo	#5	#6	#7	#8
PM (lb/MMBtu)	0.0047	0.0047	0.0057	0.0077
Tons/unit	1,295,680	1,360,678	871,121	1,147,216
Dry tons/unit	915,204	961,115	685,951	810,336
Trillion Btus/yr	22.18	23.29	16.62	19.64

	Emission factor			Emission factor			Emission factor			Emission factor		
	lb/tril Btu	% Control	lb/yr	lb/tril Btu	% Control	lb/yr	lb/tril Btu	% Control	lb/yr	lb/tril Btu	% Control	lb/yr
Antimony	0.2	<99.80%	<3.7	0.2	<99.80%	<3.9	0.2	<99.77%	<3.1	0.2	<97.72%	<4.5
Arsenic	0.5	99.64%	11	0.5	99.64%	12	0.6	99.58%	10	0.8	99.45%	16
Beryllium	0.010	99.94%	0.2	0.010	99.94%	0.2	0.012	99.93%	0.2	0.017	99.90%	0.3
Cadmium	0.38	<97.68%	<8.5	0.38	<97.68%	<8.9	0.42	<97.45%	<7	0.49	<97.03%	<9.6
Hydrogen Chloride	1,651	<80.00%	<36600	1,651	<80.00%	<38400	1,651	<80.00%	<27400	500	<93.94%	<9600
Chromium	2.0	99.50%	43	2.0	99.50%	46	2.2	99.44%	36	2.6	99.33%	51
Cobalt	0.4	99.73%	9	0.4	99.73%	9	0.4	99.69%	7	0.6	99.62%	11
Copper	3.4	99.71%	76	3.4	99.71%	79	3.8	99.68%	63	4.5	99.62%	89
Hydrogen Fluoride	2,476	50.00%	54,912	2,476	50.00%	57,667	2,476	50.00%	41,157	127	97.44%	2,486
Lead	0.9	99.59%	21	0.9	99.59%	22	1.1	99.52%	18	1.4	99.39%	28
Manganese	6.4	99.75%	141	6.4	99.75%	148	7.1	99.72%	119	8.6	99.66%	168
Mercury	10	30.00%	211	10	30.00%	222	9.5	30.00%	158	7.9	42.30%	154
Nickel	1.6	98.91%	35	1.6	98.91%	37	1.7	98.80%	29	2.0	98.61%	39
Phosphorus	18.5	99.94%	410	18.5	99.94%	431	22.3	99.92%	370	29.8	99.90%	586
Selenium	3.7	97.00%	82	3.7	97.00%	87	3.7	97.00%	62	3.7	97.00%	73

WA Parish, Jacobs Ranch	#5	#6	#7
PM (lb/MMBtu)	0.0047	0.0047	0.0057
Tons/unit	639,093	571,153	479,004
Dry tons/unit	461,745	484,908	346,080
Trillion Btus/yr	11.09	11.64	8.31

	Emission factor			Emission factor			Emission fa
	lb/tril Btu	% Control	lb/yr	lb/tril Btu	% Control	lb/yr	lb/tril Btu	% Contr
Antimony	0.2	<99.81%	<1.7	0.2	<99.81%	<1.8	0.2	[illegible]79
Arsenic	0.4	99.67%	5	0.4	99.67%	5	0.5	[illegible]81
Beryllium	0.009	99.95%	0.1	0.009	99.95%	0.1	0.011	99.94
Cadmium	0.36	97.81%	4.0	0.36	97.81%	4.2	0.40	97.59
Hydrogen Chloride	1,666	<80.00%	<18500	1,666	<80.00%	<19400	1,668	<80.00
Chromium	2.0	99.56%	22	2.0	99.56%	23	2.3	99.51
Cobalt	0.4	99.76%	4	0.4	99.76%	5	0.5	99.73
Copper	2.9	99.70%	32	2.9	99.70%	33	3.2	99.67
Hydrogen Fluoride	2,916	50.00%	32,322	2,916	50.00%	33,944	2,916	50.00
Lead	0.9	99.63%	10	0.9	99.63%	11	1.1	99.57
Manganese	3.7	99.68%	41	3.7	99.68%	43	4.1	99.64
Mercury	10	30.00%	110	10	30.00%	115	9.9	30.00
Nickel	2.3	99.34%	26	2.3	99.34%	27	2.5	99.28
Phosphorus	24.2	99.94%	269	24.2	99.94%	282	29.2	99.83
Selenium	2.5	97.00%	28	2.5	97.00%	29	2.5	97.00

#6
0.0077
565,983
406,836
9.82

tor	Emission factor		
lb/yr	lb/trl Btu	% Control	lb/yr
<1.5	0.2	<99.74%	<2.1
4	0.7	99.49%	7
0.1	0.016	99.91%	0.1
3.3	0.47	97.20%	4.6
<13900	505	<93.94%	<4960
19	2.7	99.41%	28
4	0.6	99.66%	6
27	3.8	99.60%	37
24,228	149	97.44%	1,463
9	1.4	99.45%	14
34	5.0	99.57%	49
82	8.2	42.30%	80
21	3.0	99.16%	29
242	39.1	99.91%	384
21	2.5	97.00%	25

WA Parish, Belle Ayr	#5	#6	#7	#8
PM (lb/MMBtu)	0.0047	0.0047	0.0057	0.0077
Tons/unit	886,830	931,318	664,685	785,213
Dry tons/unit	823,087	654,344	467,008	551,691
Trillion Btus/yr	15.09	15.85	11.31	13.36

	Emission factor			Emission factor			Emission factor			Emission factor		
	lb/trll Btu	% Control	lb/yr	lb/trll Btu	% Control	lb/yr	lb/trll Btu	% Control	lb/yr	lb/trll Btu	% Control	lb/yr
Antimony	0.2	<99.79%	<2.6	0.2	<99.79%	<2.8	0.2	<99.76%	<2.2	0.2	<99.71%	<3.2
Arsenic	0.4	99.61%	6	0.4	99.61%	6	0.5	99.55%	5	0.6	99.41%	8
Beryllium	0.010	<99.64%	<0.2	0.010	<99.64%	<0.16	0.013	<99.92%	<0.1	0.018	<99.89%	<0.2
Cadmium	0.39	<97.61%	<6	0.39	<97.61%	<6.3	0.43	<97.37%	<4.9	0.51	<96.94%	<6.8
Hydrogen Chloride	1,651	<80.00%	<24900	1,651	<80.00%	<26200	1,651	<80.00%	<18700	500	<93.94%	<6690
Chromium	1.8	99.44%	28	1.8	99.44%	29	2.1	99.38%	23	2.5	99.26%	33
Cobalt	0.3	99.69%	5	0.3	99.69%	5	0.3	99.64%	4	0.4	99.55%	6
Copper	3.2	99.67%	48	3.2	99.67%	50	3.5	99.64%	40	4.2	99.57%	56
Hydrogen Fluoride	2,787	50.00%	42,058	2,787	50.00%	44,168	2,787	50.00%	31,523	142	97.44%	1,904
Lead	0.8	99.55%	13	0.8	99.55%	13	1.0	99.46%	11	1.2	99.33%	17
Manganese	4.2	99.65%	63	4.2	99.65%	66	4.7	99.61%	53	5.6	99.53%	75
Mercury	6	30.00%	87	6	30.00%	92	5.8	30.00%	65	4.8	42.30%	64
Nickel	1.4	98.67%	21	1.4	98.67%	22	1.5	98.53%	17	1.8	98.30%	23
Phosphorus	13.9	99.93%	210	13.9	99.93%	220	16.7	99.92%	189	22.4	99.89%	300
Selenium	3.7	97.00%	56	3.7	97.00%	59	3.7	97.00%	42	3.7	97.00%	50

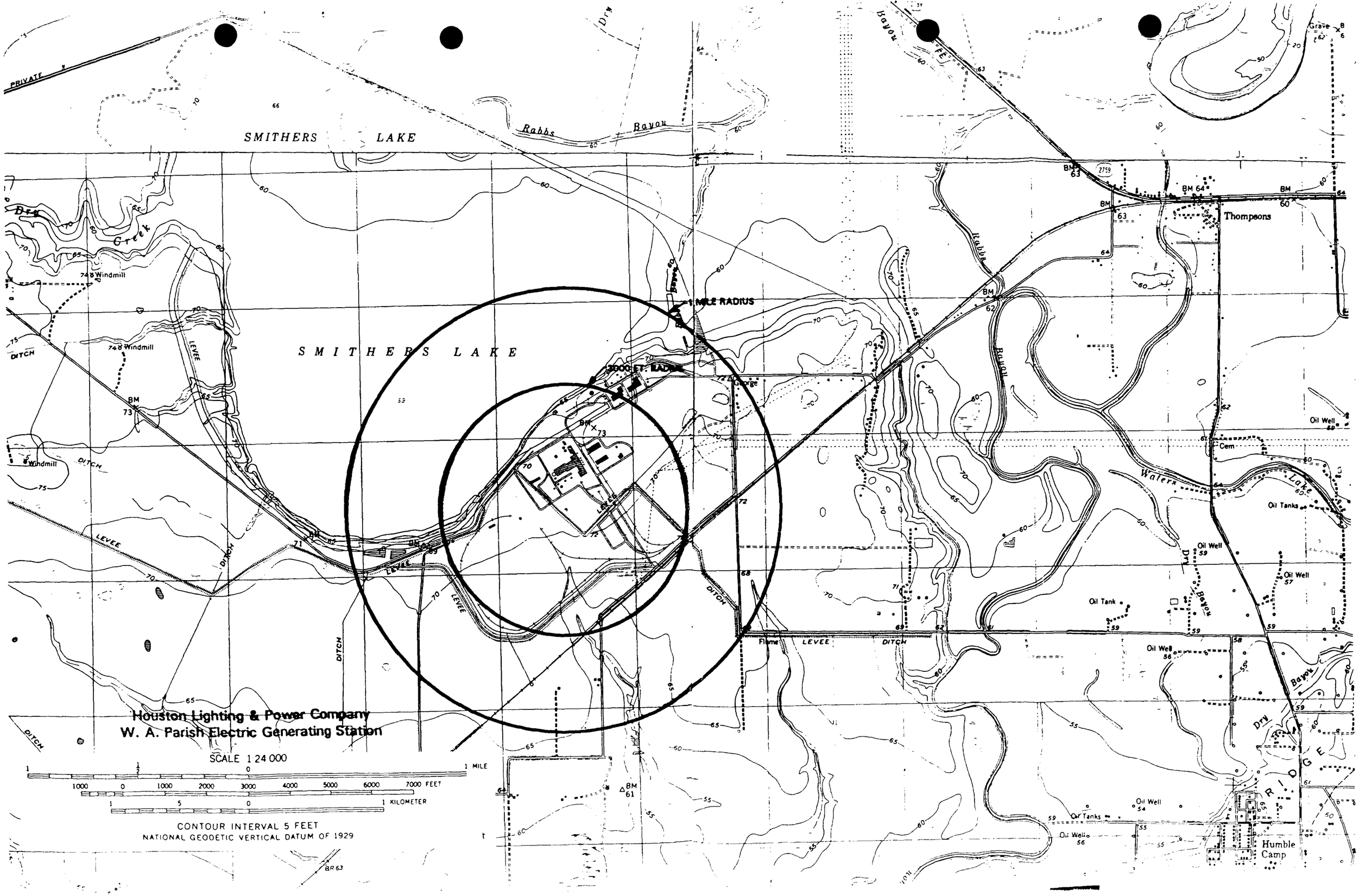
APPENDIX C

MODELING RESULTS

HOUSTON [illegible] NG & POWER COMPANY
BOILER [illegible] WASTEWATER EMISSION CALCULATIONS
AC AND HA[illegible] STEWATER

[illegible] (1)		Mol Wt Metal or Ion	Mol Wt Oxide or Cmpd	Mol Metal/ Mol Oxide	Inj Rate gal/min	(2) Max gal/hr	(3) Max gal/yr	Metal Conc. ppm (max)	Metal Conc. ppm (avg)	(4) Uncntrld lb/hr	(5) Uncntrld tn/yr	(6) Cntrl Eff. %	Cntrld lb/hr
[illegible]		107.9	231.7	2	25	1500	3,409,860	0.44	0.23	0.006	0.004	99.79%	0.00001
[illegible]		27.0	102.0	2	25	1500	3,409,860	45.35	10.76	1.070	0.289	99.89%	0.00117
[illegible]		74.9	229.8	2	25	1500	3,409,860	7.63	2.09	0.146	0.046	99.60%	0.00058
[illegible]		137.3	154.3	1	25	1500	3,409,860	11.22	0.49	0.156	0.008	99.89%	0.00017
[illegible]		40.1	56.1	1	25	1500	3,409,860	995.50	188.30	17.411	3.743	99.89%	0.01915
[illegible]		112.4	128.4	1	25	1500	3,409,860	0.44	0.19	0.006	0.003	97.60%	0.00015
[illegible]	[illegible]O*	52.0	84.0	1	25	1500	3,409,860	28.38	4.68	0.573	0.107	99.40%	0.00343
[illegible]		63.5	79.5	1	25	1500	3,409,860	331.10	29.87	5.176	0.531	99.60%	0.02070
[illegible]		55.8	159.6	2	25	1500	3,409,860	3630.00	883.41	64.611	17.927	99.89%	0.07129
[illegible]		200.6	216.6	1	25	1500	3,409,860	52.80	0.85	0.712	0.013	30.00%	0.49867
K		39.1	94.2	2	25	1500	3,409,860	64.90	7.01	0.977	0.120	99.79%	0.00205
[illegible]		24.3	40.3	1	25	1500	3,409,860	75.90	15.57	1.572	0.367	99.89%	0.00173
[illegible]		54.9	157.8	2	25	1500	3,409,860	229.90	11.55	4.126	0.236	99.60%	0.01650
[illegible]	[illegible]O3*	95.9	143.9	1	25	1500	3,409,860	11.15	1.18	0.209	0.025	99.89%	0.00023
[illegible]		23.0	[illegible]	2	25	1500	3,409,860	1943.70	441.26	32.723	8.444	99.79%	0.06871
[illegible]		58.7	74.7	1	25	1500	3,409,860	58.85	10.93	0.936	0.198	98.60%	0.01310
[illegible]		207.2	239.2	1	25	1500	3,409,860	2.76	0.47	0.040	0.008	99.50%	0.00018
[illegible]		79.0	127.0	1	25	1500	3,409,860	14.30	2.21	0.287	0.050	97.00%	0.00861
Sr		28.1	60.1	1	25	1500	3,409,860	128.81	20.92	3.444	0.636	99.89%	0.00378
Sn		118.7	150.7	1	25	1500	3,409,860	33.00	3.95	0.523	0.071	99.79%	0.00108
V		50.9	181.9	2	25	1500	3,409,860	0.07	0.03	0.002	0.001	99.89%	0.00000
Zn		65.4	81.4	1	25	1500	3,409,860	22.00	4.02	0.342	0.071	99.79%	0.00071
[illegible]													
[illegible]		35.4	36.5	1	25	1500	3,409,860	2310.00	304.72	29.728	4.457	80.00%	5.94554
[illegible]		19.0	20.0	1	25	1500	3,409,860	534.60	154.76	7.031	2.314	50.00%	3.51561
[illegible]		62.0	62.0	1	25	1500	3,409,860	2904.00	242.02	36.285	3.437	0.00%	36.28544
[illegible]O4	[illegible]4)2	95.0	601.9	3	25	1500	3,409,860	877.80	65.77	23.165	1.973	99.89%	0.02549
[illegible]		96.1	233.4	1	25	1500	3,409,860	3712.50	233.15	112.657	8.042	99.89%	0.12393

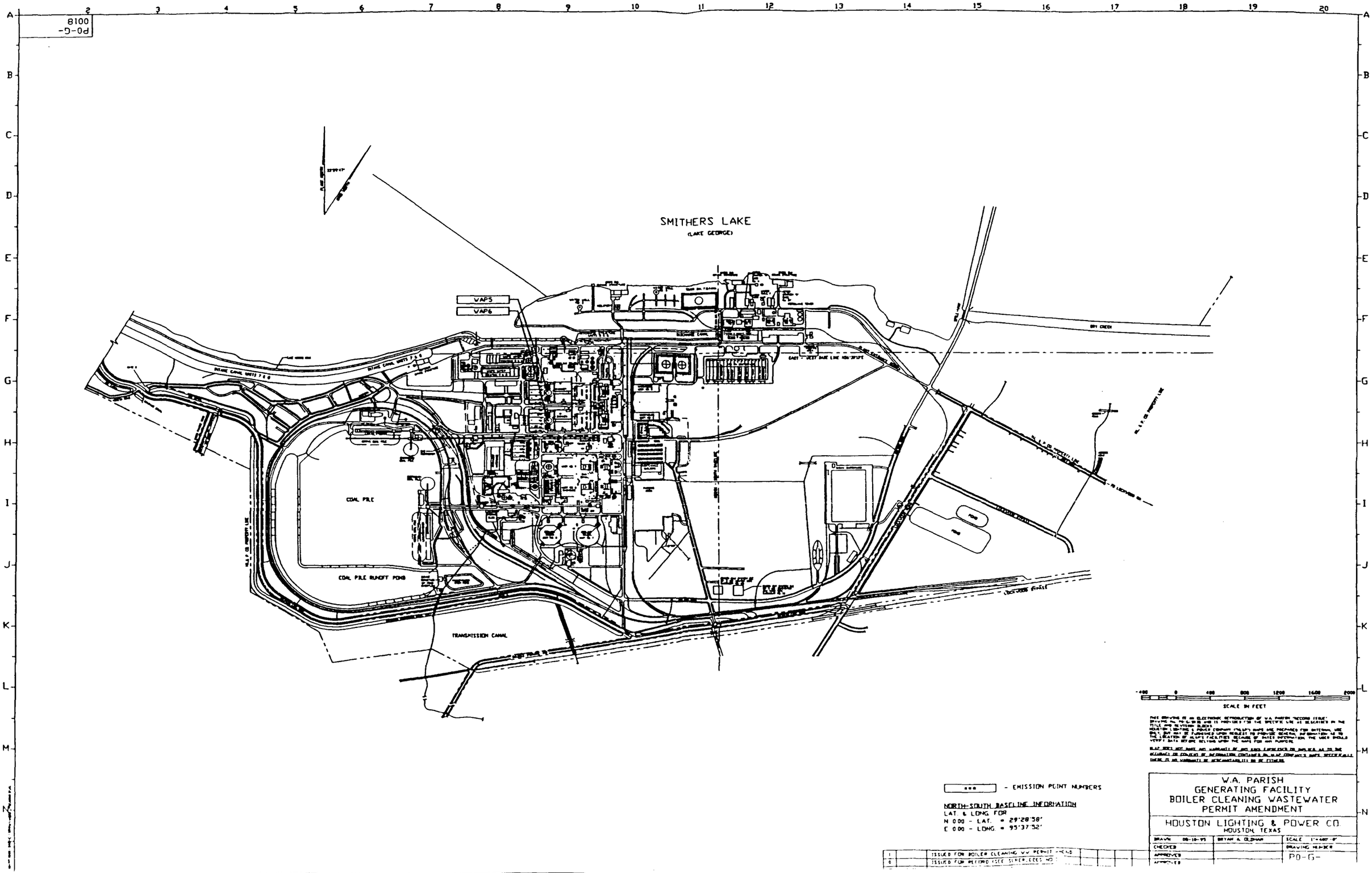
(1) [illegible] form two different oxides. As a conservative estimate, it is assumed that these elements form the heavier oxide.
(2) [illegible] above is equal to the maximum amount of BCW that can be incinerated in both units (50 gal/min) minus the currently permitted amount (25 gal/min).
(3) [illegible] tions are based on the total maximum amount of BCW that will be incinerated in one year minus currently permitted amounts of AC and HAF wastewater
[illegible] rate based on max ppms from W A Parish and other plants which could send BCW to W A Parish for injection. As a conservative estimate, max ppms
[illegible] are based on avg ppms from W A Parish
[illegible] Al, Ba, Ca, Fe, Mg, Mn, [illegible] V, phosphates, and sulfates are based on 1989 baghouse tests for Unit 5 (99.89%) and Unit 6 (99.90%). The Unit 5 re
[illegible] found to have [illegible] 0.1% less than the Unit 5 test result. These elements are more volatile and are more likely to form vapors when incine
[illegible] and HF were [illegible] results from several different boilers. Results were determined for each unit. As a conservative estimate, the lowest resul
[illegible] concentrations are [illegible] averages determined by modeling and based on an emission rate of 1 lb/hr. They are multiplied by controlled lb/hr
[illegible]CO, and [illegible] did not [illegible] route listings in ESL. The ESLs for Ag (soluble cmpds), Cu dusts & mists, KOH, NaOH, and silicone (all), respectively,
[illegible] NAAQS (3 month avg). [illegible] term NOx limit shown above is the limit specified in NAAQS (annual avg). No short-term Pb or NOx limits are speci
[illegible] 30-day (long term [illegible]). The hourly theoretical max concentration shown above for HF (0.0184 ug/cu m) is a 3-hour average. As an estimate
[illegible] ug/cu m) and multiply [illegible] 0.2 (conversion factor from 1/11/95 TNRCC memo; used to convert hourly average concentrations to 30-day values).



SMITHERS LAKE
Rabbs Bayou
Dry Creek
Windmill
DITCH
LEVEE
1 MILE RADIUS
3000 FT. RADIUS
George
Thompsons
Rabbs Bayou
Walers Lake
Dry Bayou
Oil Well
Oil Tanks
Oil Tank
Cem
Flume
Humble Camp
RIDGE
Houston Lighting & Power Company
W. A. Parish Electric Generating Station
SCALE 1:24 000
1 MILE
7000 FEET
1 KILOMETER
CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ITEM VI.B PLOT PLAN

A scaled plot plan of the W.A. Parish facility illustrating the property line, a benchmark, and true North direction is included as Figure VI.B-1. The locations of Unit 5 (EPN WAP5) and Unit 6 (EPN WAP6) are also illustrated on the plot plan.



8100
P0-G-
SMITHERS LAKE
(LAKE GEORGE)
VAP5
VAP6
COAL PILE
COAL PILE RUNOFF POND
TRANSMISSION CANAL
SCALE IN FEET
- EMISSION POINT NUMBERS
NORTH-SOUTH BASELINE INFORMATION
LAT. & LONG. FOR
N 0.00 - LAT. = 29°28'58"
E 0.00 - LONG. = 95°37'52"
W.A. PARISH
GENERATING FACILITY
BOILER CLEANING WASTEWATER
PERMIT AMENDMENT
HOUSTON LIGHTING & POWER CO.
HOUSTON, TEXAS
DRAWN 08-10-95
BRYAN A. OLDHAM
SCALE 1"=400'-0"
CHECKED
APPROVED
APPROVED
DRAWING NUMBER
P0-G-
1 ISSUED FOR BOILER CLEANING WW PERMIT AMEND
0 ISSUED FOR RECORD (SEE SUPERSEDES NO.)

ITEM VI.C EMISSION CALCULATIONS

In this section, annual and maximum hourly emissions resulting from BCW injection are calculated for EPNs WAP5 and WAP6. The calculation of uncontrolled emissions is based on the maximum expected BCW throughput and data obtained from chemical analyses of BCW at W.A. Parish and other HL&P electric generating stations. Controlled emissions are based on estimated fabric filter control efficiencies for each substance emitted.

SOURCES OF EMISSIONS

The sources of emissions related to BCW injection are chemical reactions caused by incineration of the metals, phosphates, sulfates, chlorides, fluorides, and nitrates present in the wastewater. Upon incineration, the metals form oxides, while the phosphates and sulfates combine with some of the metals to form metallic salts. Metallic oxides and salts are emitted as particulate matter (PM). Chlorides and fluorides are assumed to be emitted as HCl and HF, respectively. Nitrates are assumed to be emitted as NO_3. PM emissions, all of which are conservatively assumed to be PM_{10}, are controlled by fabric filter dust collectors. Emissions of metallic oxides included on the Hazardous Air Pollutants (HAP) list are speciated and listed separately, while all other metallic oxides have been grouped together as TSP and PM_{10}.

BCW THROUGHPUT

Maximum emissions are based on the maximum BCW injection rate of 25 gal/min per unit, or a total of 50 gal/min. The maximum annual BCW throughput is based on the maximum expected amount of BCW generated at W.A. Parish and other HL&P electric generating stations. A maximum of 4,000,000 gal/yr of BCW is expected to be generated at W.A. Parish and the other stations considered.

WASTEWATER ANALYSES

Emissions resulting from BCW injection were calculated using concentration data obtained from AC and HAF wastewater analysis reports from W.A. Parish and other electric generating stations. In accordance with current BCW injection permit requirements, BCW is sampled prior to injection, the samples are analyzed, and a report is generated for each sampling. The maximum concentrations for each substance were calculated for each station and, as a conservative estimate, the overall maximum concentration for each metal or non-metal found in the wastewater was then calculated from data from each station. To conservatively account for the fluctuations found in the wastewater analyses, the maximum concentration was increased by a factor of 10%. This concentration was then used to estimate the maximum hourly emission rate of each pollutant. To estimate annual emission rates, the average (mean) concentration for each contaminant was calculated from data from W.A. Parish only.

CONTROL EFFICIENCIES

In order to calculate controlled emissions, uncontrolled emission rates have been multiplied by estimated fabric filter dust collector control efficiencies. The Electric Power Research Institute (EPRI) and the Department of Energy (DOE) have sponsored measurement programs at fossil-fuel utility boilers for several years. Using the results of the EPRI/DOE studies, control efficiencies were estimated for several substances, including HCl and HF, for Units 5 and 6. As a conservative estimate, the lowest control efficiency for each substance was used. Results of 1989 baghouse tests performed on the W.A. Parish coal-fired units were used to estimate control efficiencies for elements which were not included in the EPRI/DOE study. As a conservative estimate, the Unit 5 result (99.89%) was used for these calculations because it is slightly lower than the Unit 6 result (99.90%). Due to the fact that some elements are more volatile than others and are more likely to recondense on smaller solid particles, the control efficiencies for these elements have been reduced by 0.1%. A summary of the method by which control efficiencies have been estimated can be found on the following page.

Pollutant	*Control Eff.*	*Estimation Method*
Ag_2O	99.79%	More volatile: baghouse test minus 0.1%
Al_2O_3	99.89%	Baghouse test
As_2O_5	99.60%	EPRI/DOE study
BaO	99.89%	Baghouse test
CaO	99.89%	Baghouse test
CdO	97.60%	EPRI/DOE study
CrO_2/CrO	99.40%	EPRI/DOE study
CuO	99.60%	EPRI/DOE study
Fe_2O_3	99.89%	Baghouse test
HgO	30.00%	EPRI/DOE study
K_2O	99.79%	More volatile: baghouse test minus 0.1%
MgO	99.89%	Baghouse test
Mn_2O_3	99.60%	EPRI/DOE study
MoO_2/MoO_3	99.89%	Baghouse test
Na_2O	99.79%	More volatile: baghouse test minus 0.1%
NiO	98.60%	EPRI/DOE study
PbO_2	99.50%	EPRI/DOE study
SeO_3	97.00%	EPRI/DOE study
SiO_2	99.89%	Baghouse test
SnO_2	99.79%	More volatile: baghouse test minus 0.1%
V_2O_5	99.89%	Baghouse test
ZnO	99.79%	More volatile: baghouse test minus 0.1%
HCl	80.00%	EPRI/DOE study
HF	50.00%	EPRI/DOE study
NO_3	00.00%	N/A
Phosphates	99.89%	Baghouse test
Sulfates	99.89%	Baghouse test

EXAMPLE EMISSION CALCULATION

MW_m	= Molecular weight of metal or non-metal ion (lb/lb-mol)
MW_o	= Molecular weight of metal oxide or non-metallic compound (lb/lb-mol)
Mol_m/Mol_o	= No. of moles of metal or non-metal needed to form one mole of oxide or compound
Q_h	= Maximum hourly BCW throughput (gal/hr)
Q_a	= Maximum annual BCW throughput (gal/yr)
C_{max}	= Maximum concentration of metal or non-metal in BCW (ppm)
C_{avg}	= Average concentration of metal or non-metal in BCW (ppm)
CE	= Control efficiency (%)
E_h	= Hourly emission rate (lb/hr)
E_a	= Annual emission rate (tn/yr)

Example: Ag/Ag_2O

MW_m	= 107.9 lb/lb-mol
MW_o	= 231.7 lb/lb-mol
Mol_m/Mol_o	= 2
Q_h	= 3000 gal/hr
Q_a	= 4,000,000 gal/yr
C_{max}	= 0.44 ppm
C_{avg}	= 0.12 ppm
CE	= 99.79%

Maximum Hourly Emissions

E_h = $(C_{max}) \times (Q_h) \times (8.33\ lb/gal) \times (1/MW_m) \times (Mol_o/Mol_m) \times MW_o \times (1/1 \times 10^6) \times (1\text{-}CE)$

E_h = (0.44 ppm) x (3000 gal/hr) x (8.33 lb/gal) x (1/107.9 lb/lb-mol) x (1/2) x (231.7 lb/lb-mol) x $(1/1 \times 10^6)$ x (1-99.79%)

E_h = **2.5×10^{-5} lb/hr**

Annual Emissions

E_a = $(C_{avg}) \times (Q_a) \times (8.33\ lb/gal) \times (tn/2000\ lb) \times (1/MW_m) \times (Mol_o/Mol_m) \times MW_o \times (1/1 \times 10^6) \times (1\text{-}CE)$

E_a = (0.12 ppm) x (4,000,000 gal/yr) x (8.33 lb/gal) x (tn/2000 lb) x (1/107.9 lb/lb-mol) x (1/2) x (231.7 lb/lb-mol) x $(1/1 \times 10^6)$ x (1-99.79%)

E_a = **4.5×10^{-6} tn/yr**

A spreadsheet showing hourly and annual emission calculations for all pollutants can be found on the following page. A Table 1(a) is also included in this section. For the purposes of completing the Table 1(a), the total annual emissions from both Units 5 and 6 have been divided evenly between the two units. However, annual emissions from each unit are not limited to half the total; instead, annual emission limits should apply to total emissions from both units.

SECTION II FACILITY PHYSICAL LOCATION

W.A. Parish is located on Y.U. Jones Road near the town of Thompsons in Fort Bend County (Latitude 29° 28' 22" and Longitude 95° 38' 10"). The TNRCC Air Quality Account Number for W.A. Parish is FG-0020-V.

SECTION III FACILITY TYPE AND OPERATING SCHEDULE

W.A. Parish Units 5 and 6 are permanent facilities that operate on a continuous 24 hr/day, 7 day/week, 52 week/yr schedule. There is no construction associated with this permit amendment. HL&P proposes to begin operation of the BCW injection system as authorized by this permit amendment on January 1, 1996.

SECTION IV FACILITY CLASSIFICATION

As previously mentioned in Section I of this document, HL&P is applying for an amendment of TNRCC Permit No. 5794.

SECTION V COMPLIANCE HISTORY

W.A. Parish is an existing facility and is more than five years old. Information regarding the compliance history of the facility has not been provided due to the fact that the TNRCC compiles information regarding the compliance history for existing facilities that are more than five years old.

SECTION VI GENERAL INFORMATION

ITEM VI.A AREA MAP

W.A. Parish is located on Y.U. Jones Road near the town of Thompsons in Fort Bend County. The area surrounding the facility is primarily undeveloped farm and ranch land. An area map (Figure VI.A-1) is provided which illustrates the area surrounding the facility. This area map is extracted from the Smithers Lake, Thompsons, Sugar Land, and Missouri City, Texas - United States Geological Survey (USGS) 7.5 minute (Scale 1:24,000) quadrangle maps.

SECTION I PROJECT DEFINITION AND FORM PI-1

INTRODUCTION

Houston Lighting & Power Company (HL&P) is applying for an amendment of Texas Natural Resource Conservation Commission (TNRCC) Permit No. 5794 which authorizes the injection of boiler cleaning wastewater (BCW) into Steam Generating Units 5 and 6 (Units 5 and 6) located at the W.A. Parish Electric Generating Station (W.A. Parish) in Fort Bend County, Texas. The construction permit (C-5794) for BCW injection into Units 5 and 6 was issued by the TACB in November 1977. The operating permit (R-5794) was issued in April 1985. Permit No. 5794 was altered in October 1994 to allow injection of BCW generated at any HL&P facility into Units 5 & 6. HL&P is seeking to amend Permit No. 5794 to increase the amount of BCW to be injected into Units 5 and 6 on both an hourly and an annual basis.

ORGANIZATION OF DOCUMENT

This document consists of a TNRCC permit amendment application addressing all regulatory considerations associated with amendment of Permit No. 5794 and is structured around TNRCC Form PI-1, which is included in Section I. Sections II, III, IV, and V of this document contain descriptions of the physical location of the facility, the facility type and operating schedule, the facility classification, and information regarding the compliance history of the facility, respectively. Section VI provides general information about the facility including an area map, a plot plan, a detailed emission analysis and a TNRCC Table 1(a), an analysis of Best Available Control Technology, and information regarding the permit fee accompanied by a TNRCC Table 30. Section VI also addresses federal applicability and the addition of standard exemptions or grandfathered units to Permit No. 5794. Section VII provides process information including a process flow diagram, a process description, and a TNRCC Material Balance Table (Table 2). Section VIII addresses the general application requirements as stated in TNRCC Regulation VI, §116.111 and demonstrates that HL&P will inject BCW into Units 5 and 6 in accordance with these requirements.

Also included in this document are three appendices. Appendix A contains a TNRCC Fabric Filter Table (Table 11) for the fabric filter dust collectors associated with Units 5 and 6. Appendix B contains backup data and spreadsheets used in Item VI.C (Emission Calculations). Appendix C contains modeling results.

REFERENCE 23

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 7

To Joy Page	From Lou Klejbuk
Co. Roy Weston	Co. HL&P
Dept. Landfill Air Permit	Phone # (713) 945-8199
Fax # (713) 621-6959	Fax #

August 16, 1994

[illegible]
Anthony Grigsby, Executive Director

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

Protecting Texas by Reducing and Preventing Pollution

August 16,1994

RECEIVED
AUG 26 1994

DAVID JANIK
~~Mr. Greg Rhodes~~
JTM INDUSTRIES, INC.
P.O. Box ~~94~~ 38
Thompsons, Texas 77481

Re: Permit Renewal
Permit No. 6430A
Fly Ash - Bottom Ash
Disposal System
Thompsons, Fort Bend County
Account ID No. FG-0049-U

Dear Mr. Rhodes:

Pursuant to Texas Natural Resource Conservation Commission Rule 116.314(a) of Regulation VI, your permit is hereby renewed. Enclosed are new provisions and a maximum allowable emission rates table. Please attach these to your permit. We will appreciate your carefully reviewing the conditions of the permit and assuring that all requirements are consistently met.

Thank you for your cooperation in sending us the information necessary to evaluate your operations and for your commitment to air pollution control. Please let us know if you have any questions.

Sincerely,

Anthony C. Grigsby
Anthony C. Grigsby
Executive Director

Enclosures

cc: Ms. Karen Kilpatrick, Manager, Air Program, Houston

GENERAL PROVISIONS

Permit No. 6430A

1. Equivalency of Methods - It shall be the responsibility of the holder of this permit to demonstrate or otherwise justify the equivalency of emission control methods, sampling or other emission testing methods and monitoring methods proposed as alternatives to methods indicated in the provisions of this permit. Alternative methods shall be applied for in writing and shall be reviewed and approved by the Executive Director prior to their use in fulfilling any requirements of this permit.

2. Sampling Requirements - If sampling of stacks or process vents is required, the holder of this permit must contact the Source and Mobile Monitoring Section of the Texas Natural Resource Conservation Commission (TNRCC) prior to sampling to obtain the proper data forms and procedures. The holder of this permit is also responsible for providing sampling facilities and conducting the sampling operations at his own expense.

3. Appeal - This permit may be appealed pursuant to Rule 103.81 of the Procedural Rules of the TNRCC and Section 382.032 of the Texas Clean Air Act. Failure to take such appeal constitutes acceptance by the applicant of all terms of the permit.

4. Construction Progress - Start of construction, construction interruptions exceeding 45 days and completion of construction shall be reported to the appropriate regional office of the TNRCC not later than 10 working days after occurrence of the event.

5. Recordkeeping - Information and data concerning production, operating hours, sampling and monitoring data, if applicable, fuel type and fuel sulfur content, if applicable, shall be maintained in a file at the plant site and made available at the request of personnel from the TNRCC or any local air pollution control program having jurisdiction. The file shall be retained for at least two years following the date that the information or data is obtained.

6. Maintenance of Emission Control - The facilities covered by this permit shall not be operated unless all air pollution emission capture equipment and abatement equipment are maintained in good working order and operating properly during normal facility operations.

SPECIAL PROVISIONS

Permit No. 6430A

EMISSION STANDARDS AND WORK PRACTICES

1. This permit covers only those sources of emissions listed in the attached table entitled "Emission Sources - Maximum Allowable Emission Rates," and those sources are limited to the emission limits and other conditions specified in that attached table. Compliance with the annual emissions limits is based on a consecutive 12-month period rather than the calendar year. Compliance with the annual emissions limits is based on the disposal of 653,517 tons per year (tpy) of fly ash, 71,058 tpy of scrubber sludge, 163,379 tpy of bottom ash, and 26,832 tpy of economizer ash based on a 12-month period as defined above. That portion of the fly ash which is contained in the scrubber sludge is included in the total fly ash figure. Scrubber sludge is reported without fly ash.

   If any condition of this permit is more stringent than another condition, then the more stringent condition shall govern and be the standard by which compliance is demonstrated.

2. Operation of the ash slurring system is limited to 8 hours per day, 6 days per week, and 52 weeks per year or 2,496 hours per year.

   Truck unloading to the Base Material/Pelletizer Silo, Emission Point Number (EPN) BM1, is limited to 300 hours per year.

3. Operation of the ash disposal system is limited to the disposal of 653,517 tpy of fly ash, 71,058 tpy of scrubber sludge, 163,379 tpy of bottom ash, and 26,832 tpy of economizer ash.

   Operation of the Base Material/Pelletizer Equipment, EPNs DP1 through DP6, is limited to the production of a total of 16,000 tpy of base material and pellets including rejects.

4. Plant roads shall be oiled and/or sprinkled with water and/or chemicals as necessary to achieve maximum control of dust emissions.

5. No visible emissions resulting from ash disposal activities shall leave the plant property.

6. All spills of ash or sludge shall be cleaned up immediately. Cleanup of these spills shall be accomplished with no visible emissions. Spills of wet bottom ash and sludge shall be cleaned before they dry.

7. All equipment shall be properly maintained to minimize emissions and reduce the risk of equipment failure.

COMPLIANCE PROVISION

8. Operation of the slurry and base material/pelletizing equipment in excess of the time periods specified in Special Provision No. 2 and the capacity specified in Special Provision No. 3 shall be a violation of this permit. Excessive dust emissions resulting from plant roads not maintained according to Special Provision No. 4 and spills not properly cleaned according to Special Provision No. 6 shall be considered a violation of this permit.

RECORDKEEPING REQUIREMENTS

9. A copy of this permit shall be kept at the plant site and made available at the request of personnel from the Texas Natural Resource Conservation Commission (TNRCC) or any air pollution control agency having jurisdiction.

10. The following records shall be maintained on-site for a rolling two-year period and made available for inspection by the TNRCC or any other air pollution control agency having jurisdiction.

    A. Records of the number of trucks using the facility each day.

    B. Records of the weight of bottom ash, fly ash, scrubber sludge, and economizer ash disposed of each day.

    C. Records of the duration of truck unloading to the base material/pelletizer silo.

    D. Records of the production in pounds per hour and tpy of base material and pellets including rejects.

E. Records of the occurrences of all spills including the reason for the spill, an estimate of material spilled, and the corrective action taken to comply with Special Provision No. 6.

REPORTING REQUIREMENTS

11. The holder of this permit shall submit annual reports to the TNRCC Houston Regional Office. These reports shall contain a summary of all periods of noncomplying operations and emissions as specified in Special Provision No. 8. The reports shall also include the occurrences of all spills including the reason for the spill, an estimate of material spilled, and the corrective action taken to comply with Special Provision No. 6.

SAMPLING AND OPACITY REQUIREMENTS

12. Sampling ports and platform(s) shall be incorporated into the design of the baghouse stack according to the specifications set forth in the attachment entitled "Chapter 2, Stack Sampling Facilities". Alternate sampling facility designs may be submitted for approval by the Executive Director of the Texas Natural Resource Conservation Commission.

13. Stack sampling may be required at a later date if determined necessary by the Executive Director.

14. Opacity of emissions from the baghouse stack must not exceed 20% averaged over a 6-minute period, except for those periods described in Rule 111.111(a)(1)(E) of Regulation I.

Dated August 16, 1994

EMISSION SOURCES - MAXIMUM ALLOWABLE EMISSION RATES

Permit No. 6430A

This table lists the maximum allowable emission rates and all sources of air contaminants on the applicant's property covered by this permit. The emission rates shown are those derived from information submitted as part of the application for permit and are the maximum rates allowed for these facilities. Any proposed increase in emission rates may require an application for a modification of the facilities covered by this permit.

AIR CONTAMINANTS DATA

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates * lb/hr	TPY
BH1	Base Material/Pelletizer Silo Baghouse	PM_{10}	0.06	0.009
DP1 (4)	Silo to Pugmill Transfer Point	PM	0.01	0.009
		PM_{10}	0.005	0.005
DP2 (4)	Pugmill to Pelletizer Transfer Point	PM	0.003	0.004
		PM_{10}	0.002	0.002
DP3 (4)	Pelletizer to Stockpile Transfer Point	PM	0.003	0.004
		PM_{10}	0.002	0.002
DP4 (4)	Stockpile to Hopper Transfer Point	PM	0.003	0.004
		PM_{10}	0.002	0.002
DP5 (4)	Hopper to Screen Transfer Point	PM	0.003	0.004
		PM_{10}	0.002	0.002
DP6 (4)	Screen to Product Transfer Point	PM	0.003	0.004
		PM_{10}	0.002	0.002
Fugitives (4)	Fugitive Road Dust Emissions	PM		60.29
		PM_{10}		30.14
C2 (4)	Storage Cell 2	PM		13.66
		PM_{10}		6.83
C3 (4)	Storage Cell 3	PM		12.57
		PM_{10}		6.29
C1A (4)	Storage Cell 1A	PM		3.15
		PM_{10}		1.58

(1) Emission point identification - either specific equipment designation or emission point number from plot plan.

[illegible]

EMISSION SOURCES - MAXIMUM ALLOWABLE EMISSION RATES

(3) PM - particulate matter
PM_{10} - particulate matter less than 10 microns in diameter
(4) Fugitive emissions are an estimate only and should not be considered as a maximum allowable emission rate.

* Emission rates are based on and the Ash Disposal System is limited by the following maximum operating schedule and ash handling rate:

Hrs/day 8 Days/week 6 Weeks/year 52 or Hrs/year 2,080
653.517 tons per year (tpy) of fly ash, 71.058 tpy of scrubber sludge, 163.379 tpy of bottom ash, and 26.832 tpy of economizer ash.

Emission rates are based on and the Base Material/Pelletizer System (EPN DP1 through DP6) is limited by the following maximum production rate:

16,000 tpy of base material and pellets including rejects.

Dated August 16, 1994

REFERENCE 24

SOLID WASTE MANAGEMENT UNITS - W. A. PARISH

	Flow *	O&G **	TSS **	Selenium **	pH **
	(MGD)	(mg/l)	(mg/l)	(ppb)	(std. units)
SWMU #1 - Outfall 203	0.384	<1.0	12.0		
	0.569	<1.0	12.0		
	0.595	<1.0	8.0		
	0.569	<1.0	12.0		
	0.259	1.0	6.0		
	0.148	<1.0	4.0		
	0.808	<1.0	6.0		
	0.727	<1.0	13.0		
	0.548	<1.0	5.0		
SWMU #3 - Outfall 703	0.255	13.0	17.0		
	0.146	8.0	16.0		
	0.233	3.0	5.0		
	0.224	16.0	12.0		
	0.067	8.0	6.0		
	0.222	1.0	8.0		
	0.288	<1.0	14.0		
	0.163	1.0	14.0		
	0.278	4.0	12.0		
SWMU #5 - Outfall 103		No Discharge			
SWMU #7 - Outfall 603		No Discharge			
SWMU #10 - Outfall 004	1.032	<1.0	6.0	<10.0	
	2.359	<1.0	4.0	<10.0	
	1.032	<1.0	38.0		
	0.885	<1.0	4.0	15.0	
	2.359	<1.0	4.0		
	2.211	<1.0	4.0		
	1.425	1.0	6.0	9.0	
	2.359	<1.0	6.0		
	2.359	<1.0	7.0		
	2.211	<1.0	6.0		
	0.983	<1.0	11.0	18.0	
	2.359	1.0	10.0	20.0	
	2.359	1.0	12.0		
	2.359	2.0	8.0		
	1.966	<1.0	7.0		

SOLID WASTE MANAGEMENT UNITS - W. A. PARISH

	Flow *	O&G **	TSS **	Selenium **	pH **
	(MGD)	(mg/l)	(mg/l)	(ppb)	(std. units)
SWMU #11					
Units 1-4 - Outfall 005	0.110	4.0	2.0		7.7
	0.110	2.0	4.0		7.6
	0.110	4.0	4.0		7.5
	0.112	3.0	8.0		7.8
	0.110	9.0	2.0		7.5
	0.110	5.0	5.0		7.9
	0.202	5.0	4.0		7.8
	0.110	4.0	2.0		7.7
	0.110	5.0	5.0		7.4
Units 5-6 - Outfall 303	0.015	3.0	2.0		
	0.011	2.0	4.0		
	0.001	6.0	14.0		
	0.014	4.0	14.0		
	0.020	25.0	39.0		
	0.027	7.0	16.0		
	0.082	13.0	10.0		
	0.010	3.0	4.0		
	0.001	4.0	2.0		
Units 7-8 - Outfall 803	0.006	2.0	2.0		
	0.001	7.0	13.0		
	0.001	8.0	14.0		
	0.001	5.0	20.0		
	0.001	5.0	11.0		
	0.001	4.0	14.0		
	0.004	5.0	6.0		
	0.001	3.0	5.0		
	0.001	3.0	16.0		
Note: SWMU's #1, #3, #5 and #7 discharge through SWMU #4.					
* Flow data corresponds to day of sample collection.					
** Sample results from February - March, 1997.					

REFERENCE 25

HL1 JJA (3-84)

Houston Lighting & Power Company

OFFICE MEMORANDUM

To J. M. Purdy

From E. A. Feith/B. C. Carmine

Subject TEXAS DEPARTMENT OF WATER RESOURCES GUIDELINES FOR SOLID WASTE DISPOSAL AT THE W. A. PARISH CLASS III LANDFILL

April 12, 1985
PB-HL-HL-361

As you are aware, HL&P will be furnishing a disposal facility for Class III industrial solid wastes generated by contractors during W. A. Parish Upgrade Project construction activities. Since HL&P's construction representative will be responsible for directing construction wastes to designated disposal areas, we are furnishing guidelines for the use of the subject facility.

The Class III landfill at the W. A. Parish Station is registered with the Texas Department of Water Resources (TDWR) as a solid waste disposal facility used exclusively for inert construction waste materials. The following materials are permitted for disposal in the landfill:

1. Concrete, bricks, clean fill material;
2. Plastic (bags, tarps, buckets);
3. Rubber hose and tires;
4. Untreated wood;
5. PVC pipe;
6. Glass;
7. Scrap metal and other ferrous materials; and
8. Empty cans (containing less than one inch of dried residue).

Proper operating procedures for the landfill include periodic consolidation and compaction of the inert materials followed by covering with fill material. The active disposal area should be kept free of standing water.

Dumpsters (if provided by HL&P) are to be used for the following materials:

1. Paper products, blueprints, office trash, cardboard boxes, etc.; and
2. Municipal garbage, food leftovers, and household garbage.

Dumpster material is not to be placed in the Class III landfill.

Certain wastes cannot be placed in the Class III landfill or on-site dumpster. The following materials are to be disposed of off-site through a TDWR registered recycle/disposal facility:

1. Paint thinner, solvents, adhesives, glue and other liquids;

Houston Lighting & Power Company

OFFICE MEMORANDUM

To J. M. Purdy

From E. A. Feith/B. C. Carmine

Subject TEXAS DEPARTMENT OF WATER RESOURCES GUIDELINES FOR SOLID WASTE DISPOSAL AT THE W. A. PARISH CLASS III LANDFILL

2. Oily waste (sorb-all, wiping cloths, oil filters which are not fully drained, oil contaminated soil);
3. Oil and grease;
4. Toxic chemical products;
5. Equipment batteries; and
6. Treated wood.

Questions regarding these guidelines should be addressed to Dr. R. D. Groover at 922-2195.

BCC/rmg

cc: W. B. Little
R. J. Klapper
J. R. Smith
A. J. Granger
R. C. Patyrak
R. D. Groover
K. A. Ripper
R. C. Pease

REFERENCE 26

*** TEXAS NATURAL RESOURCE CONSERVATION COMMISSION ***
Notice of Registration
Industrial and Hazardous Waste

This registration does not constitute authorization of any waste management activities or facilites listed below. The registration reflects hazardous and/or industrial waste generation and management activities for which the registrant has provided notification. Requirements for solid waste management are provided by Texas Administrative code section 335 of the rules of the Texas Natural Resource Conservation Commission (TNRCC). Changes or additions to waste management methods referred to in this notice require written notification to the TNRCC.

Solid Waste Registration Number: 31631 EPA Id: TXD097311849

The Solid Waste Registration Number provides access to computerized and filed information pertaining to your operation. Please refer to that number in any correspondence.

Company Name: Houston Lighting & Power
Site Name: W. A. Parish EGS
Site Location: Y. U. Jones Road, Thompsons, TX
Contact: Bye, R. T.

Region: 12
County: 79 Fort Bend
Title: Env Asses & Waste Mgt

Initial Registration Date: 12/14/1979
Last Amendment Date: 06/18/1996
Last Date NOR Computer update: 07/02/1996
Phone: 713-945-8201

Mailing Address: P. O. Box 1700
Houston, TX 77251-

Site Street Address: Y. U. Jones Road
Thompsons, TX 77481

Registration Status: Active
Registration Type: Generator
Generator Type: Industrial

Reporting Method: STEERS

Hazardous Waste Generation Status: Large Quantity Generator

Primary SIC Code: 4911 Electric Services
Handler Status:

Operator Information
Name: Houston Lighting & Power
Phone:
Address: P.O. Box 1700
Houston, TX, 77251

Owner Information
Name:
Phone:
Address:

As of 06/18/1996 - the next unassigned sequence number for WASTES is 0502 and
the next unassigned sequence number for UNITS is 017.

Section 335, Chapter 31 of the Texas Adminstrative Code specifies the notification, record keeping, manifesting and reporting requirements for hazardous and industrial solid wastes.

31631 Houston Lighting & Power

**** WASTE INFORMATION ****

Texas Waste Code	Waste Class	Status	Date of Status	Managed Onsite/ Offsite	Radio-active	TNRCC Audit Complete
****** Active Wastes ******						
0001319H	H	Active	01/20/94	On/Off	No	No

Description from Generator: Hazardous Blast Grit is dry blast media contaminated with rust, debris and paint chips. There is no apparent odor to the wastee and it is from light tan to black in color. Various surface preparation methods require that the surface be stripped of all existing rust, debris, and dried paint. One method of surface preparation utilizes blasting the surface with particles. This material can be used only once and then it must be discarded. Existing wastestream on NOR.

Refers to waste code (6): 973280
Form Code: 319 Other waste inorganic solids
EPA Hazardous Waste Numbers: D006 D008
Current Management Units: Contain Store Area 005 008
* Origin Codes: 1 Onsite-process/service
* Source Codes: A29 Other surface coating/preparation A19 Other cleaning and degreasing
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

0003105H	H	Active		On	No	No

Description from Generator: Demineralizer Acid Regenerant Wastewater is typically a clear, colorless liquid -- occasionally it has a milky appearance or is clear with red or blue/green tint. The makeup demineralizer treats well water and/or surface water for boiler use by removing minerals by an ion exchange method. Theion exxchange process consists of cationic, anionic and mixed bed (cationic and anionic exchangers). The cationic exchanger removes cations from the water and replaces them with hydrogen ions. The efficiency of anion removal (especially silicatess) is increased by mixing some cation resin with the anion resin. There is about 2.5 times as much anion resin as cation resin in a mixed be exchanger. The mixed bed is primarily an anion unit. A synthetic resin of plastic beads is used for ion exchange. The resin will hold ions in chemical combination then gives them up in exchange for ions with a stronger charge. A sulfuric acid solution removes the cations or metals from the cation resin and puts hydrogen ions back in the resin. Demineralizer Acid Regenerant is the spent acid after regeneration of the boiler water cationic demineralizer. Existing wastestream on NOR.

Refers to waste code (6): 902570
Form Code: 105 Acidic aqueous waste
EPA Hazardous Waste Numbers: D002
Current Management Units: Tank (Surface) 006 007
* Origin Codes: 1 Onsite-process/service
* Source Codes: A49 Other processes other than surface preparation
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

31631 Houston Lighting & Power

Texas Waste Code	Waste Class	Status	Date of Status	Managed Onsite/ Offsite	Radio-active	TNRCC Audit Complete

****** Active Wastes ******

0004110H H Active 01/20/94 On No No

Description from Generator: Demineralizer base regenerant wastewater is typically a clear, colorless liquid. Occassionally it has a milky appearance or is clear with red or blue/green tint. The makeup demineralizer treats well water and/or surface water for boiler use by removing minerals by an ion exchange method. The ion ixchange process consists of cationic, anionic and mixed bed (cationic & anionic) exchanger removes anions from the water and replaces then with hydroxide ions (OH). The efficiency of anion removal (especially silicates) is increased by mixing some cation resin with the anion resin. There is about 2.5 times as much anion resin as cation resin in a mixed bed exchanger. The mixed bed is primarily an anion unit. A synthetic resin of plastic beads is used for ion exchange. The resin will hold in chemical combination then gives them up in exchange for ions with a stronger charge. A sulfuric acid solution removes the cations or metals from the cation resin and puts hydrogen ions back on the resin. Demineralizer Base Regenerant is the spent caustic (NaOH) after regenration of the boiler water anionic demineralizer bed. Existing wastestream on Notice of Registration.

Refers to waste code (6): 902560
Form Code: 110 Caustic aqueous waste
EPA Hazardous Waste Numbers: D002
Current Management Units: Tank (Surface) 006 007
* Origin Codes: 1 Onsite-process/service
* Source Codes: A49 Other processes other than surface preparation
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

0005409H H Active 01/20/94 On/Off No No

Description from Generator: solvent contaminated rags are rags contaminated with solvent, dried paint, and oily residues. Rags ae used during painting for cleanup activities, and they are also used in maintenance-related activities for cleaning or degreasing equipment. Existing wastestream on NOR.

Refers to waste code (6): 979740
Form Code: 409 Other non-halogenated organic solids
EPA Hazardous Waste Numbers: D029 D035 F001 F003 F005
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service
* Source Codes: A21 Painting
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

31631 Houston Lighting & Power

Texas Waste Code	Waste Class	Status	Date of Status	Managed Onsite/ Offsite	Radio-active	TNRCC Audit Complete

****** Active Wastes ******

0006204H H Active 01/20/94 On/Off No No

Description from Generator: Spent solvent is a clear and colorless to dark gray/black opaque liquid and has a strong organic odor. Spent solvents are generated during various painting and maintenance activities (i.e., cleaning, degreasing, etc.). Existing wastestream on NOR.

Refers to waste code (6): 910100

Form Code: 204 Halogenated/non-halogenated solvent mixture

EPA Hazardous Waste Numbers: D001 D035 F001 F003 F005

Current Management Units: Contain Store Area 005

* Origin Codes: 1 Onsite-process/service

* Source Codes: A21 Painting A19 Other cleaning and degreasing

* Measurement Points: 1 Before mixing

* SIC Codes: 4911 Electric Services

0007307H H Active 01/20/94 On/Off No No

Description from Generator: Paint Chips and Rust (Hazardous) will be small to large particles, red or brown in color, with slight to no odor. This waste is generated during general maintenance activities. Existing wastestream.

Refers to waste code (6): 979740

Form Code: 307 Metal scale, filings, or scrap

EPA Hazardous Waste Numbers: D006 D008

Current Management Units: Contain Store Area 005

* Origin Codes: 1 Onsite-process/service

* Source Codes: A21 Painting A29 Other surface coating/preparation

* Measurement Points: 1 Before mixing

* SIC Codes: 4911 Electric Services

0008209H H Active 01/20/94 On/Off No No

Description from Generator: Liquid paint waste includes unused paint that has not hardened and still flows. this waste will also include paint thinner that is not used as a cleaning solvent but as a thinning agent for the paint. Periodically paint that is not used must be disposed of. Existing wastestream on NOR.

Refers to waste code (6): 910650

Form Code: 209 Organic paint, ink, lacquer, or varnish

EPA Hazardous Waste Numbers: D001 D005 D006 D008 D035

Current Management Units: Contain Store Area 005

* Origin Codes: 1 Onsite-process/service

* Source Codes: A58 Discarding out-of-date products or chemicals A57 Discarding off-spec material

* Measurement Points: 1 Before mixing

* SIC Codes: 4911 Electric Services

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Texas Waste Code	Waste Class	Status	Date of Status	Managed Onsite/ Offsite	Radio-active	TNRCC Audit Complete

****** Active Wastes ******

0009117H H Active 01/20/94 On/Off No No

Description from Generator: Discarded instruments containing mercury. Existing wastestream on registration.
Refers to waste code (6): 912520
Form Code: 117 Waste liquid mercury
EPA Hazardous Waste Numbers: D009
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service 2 Spill clean-up
* Source Codes: A56 Discontinue use of process equipment
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

0010219H H Active 01/20/94 On/Off No No

Description from Generator: Waste Diesel is a liquid with either one or two visible phases. If two phases are present, the light (upper) phase is diesel and the heavier (lower) phase is water. Diesel is used throughout the facility in various pieces of equipment. Occasionally this fuel becomes contaminated with water due to condensation, water leaking into tanks, or equipment damage allowing coolant to contaminate the fuel. Existing watstestream.
Refers to waste code (6): 912900
Form Code: 219 Other organic liquids
EPA Hazardous Waste Numbers: D018
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service
* Source Codes: A57 Discarding off-spec material
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

0011219H H Active 01/20/94 On/Off No No

Description from Generator: Waste gasoline is a liquid with either one or two visible phases. If two phases are present, the lighter upper phase is gasoline and the heavier lower phase is water. Gasoline is used throughout the facility in various pieces of equipment. Occasionally this fuel becomes contaminated with water due to condensation, water leaking into tanks, or equipment damage allowing coolant to contaminate the fuel. The composition of this waste varies but is primarily gasoline with some water or other water-based contaminants. Existing wastestream on NOR.
Refers to waste code (6): 918380
Form Code: 219 Other organic liquids
EPA Hazardous Waste Numbers: D001 D018
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service 2 Spill clean-up
* Source Codes: A57 Discarding off-spec material
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

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Texas Waste Code	Waste Class	Status	Date of Status	Managed Onsite/ Offsite	Radio-active	TNRCC Audit Complete

****** Active Wastes ******

0012117H H Active 01/20/94 On/Off No No

Description from Generator: This waste is elemental mercury that has been drained from process instruments. Existing wastestream.
Refers to waste code (6): 912520
Form Code: 117 Waste liquid mercury
EPA Hazardous Waste Numbers: D009
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service 2 Spill clean-up
* Source Codes: A56 Discontinue use of process equipment A94 Laboratory wastes
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

0013307H H Active 01/20/94 On/Off No No

Description from Generator: Metal grinding waste is powdery brown/black metal fines. it is generated from the various types of grinding equipment utilized in the machine shops, and field locations for smoothing and finishing metal surfaces. This waste is composed of grinding fines, cutting oil, coolant, solvents, and degreasers. Initial generation, December, 1993.
Form Code: 307 Metal scale, filings, or scrap
EPA Hazardous Waste Numbers: D006 D008 F001 F003
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service
* Source Codes: A29 Other surface coating/preparation A19 Other cleaning and degreasing
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

0014101H H Active 01/20/94 On/Off No No

Description from Generator: Machine coolant is a liquid which is composed of water, machine coolant,, cutting oils, solvents, and grinding fines. It is generated from the various machining operations as a function of heat transfer medium. First generated approximately December, 1993.
Form Code: 101 Aqueous waste with low solvents
EPA Hazardous Waste Numbers: D006 D008 F001 F003
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service
* Source Codes: A49 Other processes other than surface preparation
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

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****** Active Wastes ******

0015319H H Active 01/20/94 On/Off No No

Description from Generator: Mercury Contaminated Debris is dirt, debris, sorbent (i.e., rags, paper towels, etc.), and mercury. Existing wastestream.
Refers to waste code (6): 978850
Form Code: 319 Other waste inorganic solids
EPA Hazardous Waste Numbers: D009
Current Management Units: Contain Store Area 005
* Origin Codes: 2 Spill clean-up
* Source Codes: A53 Cleanup of spill residues
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

0017003H H Active 06/18/96 On/Off No No

Description from Generator: Expired shelf life & off-spec. lab chemicals used for chemical analyses & small vol. of misc. waste. 1st gen-5/94
Form Code: 003 Mixed lab packs
EPA Hazardous Waste Numbers: D002
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service
* Source Codes: A58 Discarding out-of-date products or chemicals A57 Discarding off-spec material
A94 Laboratory wastes
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

0020409H H Active 01/20/94 On/Off No No

Description from Generator: Paint Waste. solid includes dry, unused paint that is hardened and no longer flowe. Periodically paint that is not used loses its solvents and will no longer flow. This dry, unused paint is disposed. The composition of this waste will vary with each shipment but will consist mainly of dry paint. Existing waste steam on NOR.
Refers to waste code (6): 979740
Form Code: 409 Other non-halogenated organic solids
EPA Hazardous Waste Numbers: D001 D005 D006 D008 D035
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service
* Source Codes: A21 Painting
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

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****** Active Wastes ******

0025105H H Active 09/18/95 On/Off No No

Description from Generator: Hydrocloric acid cleaning solution is used for removing metal deposits from hydrogen/lube oil coolers. 1st Gen-9/95.
Form Code: 105 Acidic aqueous waste
EPA Hazardous Waste Numbers: D002 D007
Current Management Units: Tank 010
* Origin Codes: 1 Onsite-process/service
* Source Codes: A02 Acid cleaning
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

0027105H H Active 07/21/95 On/Off No No

Description from Generator: Acidic aqueous waste is unused product such as hydrochloric acid, nitric acid, phosporic acid from maint. activities.
Form Code: 105 Acidic aqueous waste
EPA Hazardous Waste Numbers: D002
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service
* Source Codes: A58 Discarding out-of-date products or chemicals
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

0030409H H Active 08/10/94 On/Off No No

Description from Generator: Paint waste debris is comprised of used plastic and cloth drop cloths used to cover equipment and floors during painting activities. Paint waste debris also includes any rags, filters, stirring sticks, and paint brushes. Existing wastestream.
Refers to waste code (6): 979740
Form Code: 409 Other non-halogenated organic solids
EPA Hazardous Waste Numbers: D005 D006 D007 D008 D035
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service
* Source Codes: A21 Painting
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

0035110H H Active 01/11/96 On/Off No No

Description from Generator: Unused product (waste corrosive liquid) primarily with expired shelf life
Form Code: 110 Caustic aqueous waste
EPA Hazardous Waste Numbers: D002
Current Management Units: Landfill 002
* Origin Codes: 1 Onsite-process/service
* Source Codes: A58 Discarding out-of-date products or chemicals
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

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****** Active Wastes ******

0050119H H Active 01/20/94 On/Off No No

Description from Generator: Waste Barium chloride Solution is a dark, opaque liquid with an odor. Barium Chloride is used by the JTM (on-site ash management contractor) laboratory to wash samples. Existing wastestream on NOR.
Refers to waste code (6): 900490
Form Code: 119 Other inorganic liquids
EPA Hazardous Waste Numbers: D002 D005
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service
* Source Codes: A94 Laboratory wastes
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

01013111 1 Active 01/20/94 Off No

Description from Generator: Asbestos is a solid material white to gray in color. This waste is usually made up of sheets of material (used in insulation), but could also be in smaller portions. During various maintenance and construction activities, existing insulation or gaskets on process piping or within buildings must be removed. At times, the insulation which is removed contains asbestos. This material can only be used once and then it must be discarded. Existing wastestream on NOR.
Refers to waste code (6): 170750
Form Code: 311 Asbestos solids and debris
Current Management Units: None
* Origin Codes: 1 Onsite-process/service

01023021 1 Active 06/02/94 On/Off No

Description from Generator: Dibasic Acid contaminated material is generated as a result of spill cleanup activities associated with the demineralizer regenerant acid tanks. First generated approximately March, 1994.
Form Code: 302 Soil contaminated with inorganics only
Current Management Units: Contain Store Area 005
* Origin Codes: 2 Spill clean-up

01031191 1 Active 01/20/94 On/Off No

Description from Generator: Diesel contaminated with water (Classs 1) is primarily water with a slight diesel sheen. Diesel is used throughout the facility in various pieces of equipment. Occasionally this fuel becomes contaminated with water due to condensation or water collecting into sumps that are located on top of the tank. Existing wastestream n NOR.
Refers to waste code (6): 912900
Form Code: 119 Other inorganic liquids
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service

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Texas Waste Code	Waste Class	Status	Date of Status	Managed Onsite/ Offsite	Radio-active	TNRCC Audit Complete

****** Active Wastes ******

01046031 1 Active 01/20/94 On/Off No

Description from Generator: Floor Drain Treatment System Sludge is a dark, thick sludge with a hydrocarbon odor. This waste is the sludge removed from and oil/water separator. The oil/water separator is used for wastewater treatment. Existing wastestream on NOR.

Refers to waste code (6): 183230

Form Code: 603 Oily sludge

Current Management Units: Tank 012
Contain Store Area 005

* Origin Codes: 1 Onsite-process/service

01054091 1 Active 01/20/94 On/Off No

Description from Generator: Used Asphalt is a solid, brown to black material with a slight hydrocarbon odor. It is generated from removing worn asphalt from roads and parking lots. Existing watestream on NOR.

Refers to waste code (6): 273630

Form Code: 409 Other non-halogenated organic solids

Current Management Units: Contain Store Area 005

* Origin Codes: 1 Onsite-process/service

01061191 1 Active 01/20/94 On/Off No

Description from Generator: Gasoline contaminated with water (Class 1) is primarily water with a slight gasoline sheen. Gasoline is used throughout the facility in various pieces of equipment. Occasionally this fuel becomes contaminated with water due to condensation or water collecting into sumps that are located on top of the tank. Existing wastestream on NOR.

Refers to waste code (6): 918380

Form Code: 119 Other inorganic liquids

Current Management Units: Contain Store Area 005

* Origin Codes: 1 Onsite-process/service

01073011 1 Active 01/20/94 Off No

Description from Generator: Hydrocarbon contaminated soil is contaminated with petroleum based oils and fuels. The soil may have an oily hydrocarbon odor and the color varies from light brown to black. This waste has been generated by spill cleanup activities or by underground storage tank construction/remediation projects. Existing wastestream on NOR.

Refers to waste code (6): 179360

Form Code: 301 Soil contaminated with organics

Current Management Units: None

* Origin Codes: 2 Spill clean-up

01083011 1 Active 01/20/94 On/Off No

Description from Generator: Mineral oil contaminated soil (< 1 ppm PCBs) has an oily hydrocarbon odor and the color varies from light brown to black. This waste has been generated by soil cleanup activities. Existing wastestream on NOR.

Refers to waste code (6): 179360

Form Code: 301 Soil contaminated with organics

Current Management Units: Contain Store Area 005

* Origin Codes: 2 Spill clean-up

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Texas Waste Code	Waste Class	Status	Date of Status	Managed Onsite/ Offsite	Radio-active	TNRCC Audit Complete

****** Active Wastes ******

01093191 1 Active 01/20/94 On/Off No

Description from Generator: Class 1 Blast Grit is dry blast media contaminated with rust, debris and paint chips. There is no apparent odor to the waste and it is from light tan to black in color. Various surface preparation methods require that the surface be stripped of existing rust, debris and dried paint. One method of surface preparation utilizes blasting the surface with particles. This material can be used only once and then it must be discarded. Existing wastestream on NOR.

Refers to waste code (6): 273280

Form Code: 319 Other waste inorganic solids

Current Management Units: Contain Store Area 005 008

* Origin Codes: 1 Onsite-process/service

01103101 1 Active 01/20/94 On/Off No

Description from Generator: Used filters is composed of used vehicle or machine oil filters. used oil filters are generated during routine vehicle or machinery maintenance when they are removed for disposal. Existing wastestream on NOR.

Refers to waste code (6): 172870

Form Code: 310 Spent solid filters or adsorbents (inorganic)

Current Management Units: Contain Store Area 005

* Origin Codes: 1 Onsite-process/service

01121191 1 Active 07/08/94 On/Off No

Description from Generator: Phosphate cleaning solution is a clear to milky-white colored liquid that has no detectable odor. This material is used to remove oil-based contaminants that are on the hydrogen cooler tubes. First generated July, 1994.

Form Code: 119 Other inorganic liquids

Current Management Units: Tank 010
Tank (Surface) 006

* Origin Codes: 1 Onsite-process/service

01133081 1 Active 01/20/94 On/Off No

Description from Generator: RCRA empty metal containers of all types and sizes that meet all requirements of RCRA empty (31 TAC 335.41(f)(2)). This waste is generated by general plant operations and maintenance activities. Existing wastestream on Notice of Registration.

Refers to waste code (6): 179450

Form Code: 308 Empty or crushed metal drums or containers

Current Management Units: Contain Store Area 005 008

* Origin Codes: 1 Onsite-process/service

01144061 1 Active 01/20/94 On/Off No

Description from Generator: RCRA empty plastic or fiber containers of all types and sizes that meet all requirements of RCRA empty (31 TAC 335.41(f)(2)). This waste is generated by general plant operations and maintenance activities. Existing wastestream on Notice of Registration.

Refers to waste code (6): 179450

Form Code: 406 Empty fiber or plastic containers

Current Management Units: Contain Store Area 005 008

* Origin Codes: 1 Onsite-process/service

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****** Active Wastes ******

01172961 1 Active 01/20/94 On/Off No

Description from Generator: Spent Antifreeze is a liquid with low viscosity. It is also opaque and green to brown in color. Antifreeze (ethylene glycol) is used in various pieces of equipment as a coolant and/or as instrumentation liquid to lower the freezing point and raise the oiling point of the coolant and/or liquid. Periodically this material must be drained and disposed of. Existing wastestream on NOR.

Refers to waste code (6): 108320
Form Code: 296 Ethylene glycol based antifreeze
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service

01182191 1 Active 01/20/94 On/Off No

Description from Generator: EHC (Electric Hydraulic Control Fluid) is composed of trixylenyl phosphate (90-100%), water (0-5%), and dirt, russt (0-5%). EHC fluid is used in electrical equipment or any other mechanical equipment. it is periodically drained from various pieces of equipment. Existing wastestream on NOR.

Refers to waste code (6): 119000
Form Code: 219 Other organic liquids
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service

01194091 1 Active 01/20/94 On/Off No

Description from Generator: Waste grease can range from a dark brown smooth material with a slight odor to a black gritty material with a moderate odor. Grease is used as a lubricant in machinery and vehicles. During routine maintenance this grease is change out and the waste grease is discarded. Existing wastestream.

Refers to waste code (6): 180440
Form Code: 409 Other non-halogenated organic solids
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service

01202061 1 Active 01/20/94 On/Off No

Description from Generator: Waste oil is used hydraulic, mineral or motor oils from vehicles, electrical equipment or any other mechanical equipment. Any oil in this category contains less than 1 ppm PCBs. used oil is drained from variouss pieces of equipment or vehicles periodically. Existing wastestream on NOR.

Refers to waste code (6): 210450
Form Code: 206 Waste oil
Current Management Units: Tank 012 014 015 016
Contain Store Area 005
* Origin Codes: 1 Onsite-process/service

01223071 1 Active 01/20/94 On/Off No

Description from Generator: Paint Chips and Rust (Class 1) will be small to large pieces, red or brown in color, with slight to no odor. This waste is generated during general maintenance activities. Existing wastestream.

Refers to waste code (6): 273280
Form Code: 307 Metal scale, filings, or scrap
Current Management Units: Contain Store Area 005 008

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Refer to 40 CFR Part 261 for Descriptions of EPA Hazardous Waste Numbers.

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****** Active Wastes ******

* Origin Codes: 1 Onsite-process/service

01234091 1 Active 01/20/94 On/Off No

Description from Generator: spent roofing Material varies in size and shape. it is composed of tar paper, asphalt, gravel, and foam insulation. It is a dark brown to black and has a slight hydrocarbon odor. It is generated from replacing worn or damaged roofs. Existing wastestream on NOR.

Refers to waste code (6): 273630

Form Code: 409 Other non-halogenated organic solids

Current Management Units: Contain Store Area 005 008

* Origin Codes: 1 Onsite-process/service

01254891 1 Active 01/20/94 On/Off No

Description from Generator: Floorsweep is a brown/red saw dust with a hydocarbon odor. Floorsweep is generated as a result of dust and dirt control from floor sweeping activities. Existing wastestream.

Refers to waste code (6): 279760

Form Code: 489 Petroleum contaminated solids

Current Management Units: Contain Store Area 005 008

* Origin Codes: 1 Onsite-process/service

01273071 1 Active 01/20/94 On/Off No

Description from Generator: Metal Grinding waste (dry) are powdery brown/black metal fines. It is generated from the various types of grinding equipment utilized in the machine shops, and field locations for smoothing and finishing metal surfaces. It also includes welding slag that is chipped or ground from surface welds, and boiler rust from the surface preparation of boiler tubes. Thes machining operations use no coolant, oils, solvents, or degreasers. First generated December 1993.

Form Code: 307 Metal scale, filings, or scrap

Current Management Units: Contain Store Area 005

* Origin Codes: 1 Onsite-process/service

01284091 1 Active 01/20/94 On/Off No

Description from Generator: Asbestos roofing material with Asphalt varies in size and shape. It is dark brown to black and has a slight hydrocarbon odor. Spent roofing material is generated from replacing worn or damaged roofs. Existing wastestream.

Refers to waste code (6): 170750

Form Code: 409 Other non-halogenated organic solids

Current Management Units: Contain Store Area 005

* Origin Codes:

01294091 1 Active 03/20/96 On/Off No No

Description from Generator: Paint waste debris is comprised of used plastic & fabric drop cloths, contam. rags, filters, stir sticks & brushes.

Form Code: 409 Other non-halogenated organic solids

Current Management Units: Contain Store Area 005

* Origin Codes: 1 Onsite-process/service

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****** Active Wastes ******

01310031 1 Active 06/02/94 On/Off No
Description from Generator: Expired shelf life and off-specification laboratory chemicals used for chemical analyses and small volume of miscellaneous waste. None of these materials exhibit the characteristics of hazardous waste. First generated May, 1994.
Form Code: 003 Mixed lab packs
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service

01403091 1 Active 06/18/96 On/Off No No
Description from Generator: Used carbon zinc batteries that are removed from service when their useful life has expired. 1st gen. Feb 96
Form Code: 309 Batteries or battery parts, casings, cores
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service

01504891 1 Active On/Off No
183230
Description from Generator: Hydrocarbon contaminated rags/Absorbent material; Maintenance related activities. Existing wastestream on notice of registration.
Refers to waste code (6): 183230
Form Code: 489 Petroleum contaminated solids
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service 2 Spill clean-up

01552011 1 Active 06/08/93 On/Off No
Description from Generator: Class 1 non-haz. spent solvent; initial generation: 4/93
Form Code: 201 Concentrated solvent-water solution
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service

01604031 1 Active 09/20/95 On/Off No No
Description from Generator: Spent polymer is a liquid product with ahydrocarbon odor which becomes a waste when it becomes too old and solidifies.
Form Code: 403 Solid resins or polymerized organics
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service

02003072 2 Active 01/20/94 On/Off No
Description from Generator: Boiler and air preheater rust will be small to large particles, red or brown in color, with slight to no odor. This waste is generated when vacuum ducts, air preheater, boiler and boiler furnace are cleaned during maintenance activities. Existing wastestream on NOR.
Refers to waste code (6): 271430
Form Code: 307 Metal scale, filings, or scrap
Current Management Units: Contain Store Area 005 008
* Origin Codes: 1 Onsite-process/service

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****** Active Wastes ******

02013902 2 Active 06/02/94 On/Off No No

Description from Generator: Construction Debris is made up of various non-inert debris form construction/renovation activities such as rock, brick, concrete, dirt and certain plastics and rubber, which meet the Class 2 classification criteria. Existing wastestream. May include used asphalt, and spent roofing material.

Refers to waste code (6): 273630

Form Code: 390 Non-haz concrete, cement, construction debris

Current Management Units: Contain Store Area 008

* Origin Codes: 1 Onsite-process/service

02025192 2 Active 01/20/94 No No

Description from Generator: cooling Tower Sludge is a semisolid material with a ild or noodor. The sludge typically has a light color. This sludge is generated in the cooling towers when salts/solids precipitate from water. Solid settle in the bottom and form a sludge. Periodically, the sludge is cleaned out. Existing wastestream on NOR.

Refers to waste code (6): 240540

Form Code: 519 Other inorganic sludges

Current Management Units: None

* Origin Codes: 1 Onsite-process/service

02033082 2 Active 01/20/94 On/Off No

Description from Generator: Class 2 empty metal containers that are 5 gallons or greater and meet all requirements of a Class 2 empty container (31 TAC 335.508(20). This waste is generated by general plant operations and maintenance activities. Existing wastestream on Notice of Registration.

Refers to waste code (6): 270504

Form Code: 308 Empty or crushed metal drums or containers

Current Management Units: Contain Store Area 005 008

* Origin Codes:

02044062 2 Active 01/20/94 On/Off No

Description from Generator: Class 2 fiber or plastic containers that are 5 gallons or greater and meet all requirements of a Class 2 empty container (31 TAC 335.508(2)). This waste is generated by general plant operations and maintenance activities. Existing wastestream on Notice of Registration.

Refers to waste code (6): 270504

Form Code: 406 Empty fiber or plastic containers

Current Management Units: Contain Store Area 005 008

* Origin Codes: 1 Onsite-process/service

02053012 2 Active 01/20/94 On/Off No

Description from Generator: Mineral oil contaminated soil (Class 2) contains less than one ppm PCBs. The soil has an oily hydrocarbon odor and the color varies from light brown to black. This waste has been generated by oil spill cleanup activities. It is conprised of soil with hydrocarbons present at levels below 1500 ppm. Existing wastestream on NOR.

Form Code: 301 Soil contaminated with organics

Current Management Units: Contain Store Area 005 008

* Origin Codes: 2 Spill clean-up

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****** Active Wastes ******

02063192 2 Active 01/20/94 On No

Description from Generator: Class 2 blast Grit is dry blast media contaminated with rust, debris, and paint chips. There is no apparent odor to the waste and it is from light tan to black in color. Various suface prepation methods require that the surface be stripped of all existing rust, debris, and dried paint. One method of surface preparation utilizes blasting the surface with particles. This material can be used only once and then it must be discarded. Esisting waste stream on NOR.

Refers to waste code (6): 273280
Form Code: 319 Other waste inorganic solids
Current Management Units: Contain Store Area 005 008
* Origin Codes: 1 Onsite-process/service

02074092 2 Active On/Off No
273630

Description from Generator: Clothing and personal protective equipment
Refers to waste code (6): 273630
Form Code: 409 Other non-halogenated organic solids
Current Management Units: Boiler 004
Landfill 001
Contain Store Area 005
* Origin Codes: 1 Onsite-process/service

02083072 2 Active 01/20/94 On/Off No

Description from Generator: Class 2 Paint chips and Rust will be small to large particles, red or brown in color, with slight to no odor. This waste is generated during general maintenance activities. Existing wastestream.

Refers to waste code (6): 273280
Form Code: 307 Metal scale, filings, or scrap
Current Management Units: Contain Store Area 005 008
* Origin Codes: 1 Onsite-process/service

02099022 2 Active 01/20/94 On/Off No

Description from Generator: General miscellaneous plant trash includes items such as office trash paper, cardboard, food wrappings, etc., discarded packaging of nonhazardous materials (paper, plastic, etc.) and other misc. debris. This waste is generated during nonhazardous activities which include debris from typing (paper), snack bar operation (food wrappings and discarded food), warehouse operations (noncontaminated packing) and the like. Existing wastestream on NOR.

Refers to waste code (6): 279760
Form Code: 902 Supplemental plant production refuse
Current Management Units: Contain Store Area 008
* Origin Codes: 1 Onsite-process/service

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****** Active Wastes ******

02104032 2 Active 01/20/94 On/Off No

Description from Generator: Spent resin beads vary as to physical appearance depending upon the type of resin used. The makeup demineralizer treats well water and/or surface water for boiler use by removing minerals by an ion exchange method. The ion exchange process consists of cationic, anionic and mixed bed (cationic & anionic) exchangers. The cationic exchanger removes cations from the water and replaces them with hydrogen ions. The anionic exchanger removes anions from the water and replaces them with hydroxide ions (OH). The efficiency of anion removal (especially silicates) is increased by mixing some cation resin with the anion resin. There is about 2.5 times as much anion resin as cation resin in the mixed bed exchanger. The mixed bed is primarily an anion unit. A synthetic resin of plastic beads is used for ion exchange. The resin will hold ions in chemical combination then gives them up in exchange for ions with a stronger charge. A sulfuric acid solution removes the cations from the cation resin and puts hydrogen ions back on the resin. A sodium hydroxide (caustic) solution removes the anions from the anions resin and puts hydroxide ions back on the resin. The waste is generated when spent demineralizer regenerant beads are removed and replaced with fresh resin beads. Existing waste stream on NOR.

Form Code: 403 Solid resins or polymerized organics

Current Management Units: Contain Store Area 005 008

* Origin Codes: 1 Onsite-process/service

02112192 2 Active 01/20/94 On/Off No

Description from Generator: Spent Activated alumina is made up of white, marble-sized, spheres that have not discernible odor. Alumina is used in as a dessicant in air dryers to assist in removing moisture from the air used in instrumentation. After this material is spent, it is collected and sent for disposal. Exissting wastestream on NOR.

Form Code: 219 Other organic liquids

Current Management Units: Contain Store Area 005 008

* Origin Codes: 1 Onsite-process/service

02133192 2 Active On/Off No
170300

Description from Generator: Spent refractory material

Refers to waste code (6): 170300

Form Code: 319 Other waste inorganic solids

Current Management Units: Landfill 001
Contain Store Area 005 008

* Origin Codes: 1 Onsite-process/service

02153912 2 Active 05/03/95 On No No

Description from Generator: Water treatment sludge is lt. brown to to tan in color. It is gener. when sludge from the thickeners is dewatered.

Form Code: 391 Nonhaz dewatered wastewater treat sludge (inorg)

Current Management Units: Landfill 001

* Origin Codes: 1 Onsite-process/service

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Texas Waste Code	Waste Class	Status	Date of Status	Managed Onsite/ Offsite	Radio-active	TNRCC Audit Complete

****** Active Wastes ******

02166082 2 Active 01/20/94 On/Off No

Description from Generator: Sanitary waste water treatment sludge is a brown/black sludge from the sewage treatment system. It is generated from removing the sludge from the sanitary treatment system. It is a combination of biological solids and water from the sanitary sewage treatment process. First generated approximately February, 1994.

Form Code: 608 Sewage or other untreated biological sludge (org.)

Current Management Units: WWTP 011

* Origin Codes: 1 Onsite-process/service

02174882 2 Active 01/20/94 On/Off No

Description from Generator: Creosote treated wood will include pieces of cylindrical poles, cross-arms, railroad ties, etc. These pieces will vary in size and shape and color. The wood may have a strong cresol/creosote odor. This waste is primarily generated from replacing utility poles but may also, at times, be generated during construction/renovation activities. Existing wastestream on NOR.

Form Code: 488 Wood debris

Current Management Units: Contain Store Area 008

* Origin Codes: 1 Onsite-process/service 2 Spill clean-up

02183012 2 Active 01/20/94 On/Off No

Description from Generator: Hydrocarbon contaminated soil is contaminated with petroleum based oils and fuels. The soil has an oily hydrocarbon odor and the color varies from light brown to black. This waste has been generated by spill cleanup activities or by underground storage tank construction/remediation projects. Total Petroleum Hydrocarbon is less than 1500 ppm. Existing wastestream on NOR.

Form Code: 301 Soil contaminated with organics

Current Management Units: Contain Store Area 005 008

* Origin Codes: 2 Spill clean-up

02225192 2 Active 01/20/94 On/Off No

Description from Generator: Chemical Waste Treatment System Sludge is a semi-solid material with a mild or no odor. The sludge typically has a light color. This sludge is generated in the chemical waste water treatment system tanks when salts/solids precipitate from water. Solids settle in the bottom and form a sludge. Periodically, the sludge is cleaned out. Existing waste stream.

Refers to waste code (6): 240150

Form Code: 519 Other inorganic sludges

Current Management Units: Landfill 001
Tank (Surface) 007

* Origin Codes:

02303042 2 Active 01/20/94 On No

31631 Houston Lighting & Power

Unit Number	Unit Type	Unit Status	Date of Status	Classes of Waste Managed in Unit Onsite / Offsite	Unit Permit Number	Unit # on Permit	Regulatory Status	Deed Recording Needed/Date

Description from Generator: Bottom ash is a solid, dark, gray to black, moist, granular material with no odor. Bottom ash is a by-product of coal combustion. THe input streams are coal and air. The coal is stored in piles prior to burning. To control dust, these coal piles are sprayed with a chemical foam. The coal is then crushed to facilitate the physical separation of pyrites. The coal is then burned in the furnace at temperatures in excess of 2000 degrees F. The bottom ash exits the bottom of the furnace and is combined with the separated pyrites and then mixed with water and "SLUICED" over to the waste handling area. The mixture is dewatered on vacuum filters prior to placement in the on-site landfill. Existing wastestream on the NOR.

Refers to waste code (6): 270270
Form Code: 304 Other "dry" ash, slag, or thermal inorgan. residue
Current Management Units: Landfill 001
* Origin Codes: 1 Onsite-process/service

02323042 2 Active 01/20/94 On No

Description from Generator: Fly ash is a solid, tan to light brown, dry, fine grain with no odor. Fly ash is a by-product of coal combustion. The input streams are coal and air. The coal is stored in piles prior to burning. To control dust, these coal piles are sprayed with a chemical foam. The coal is then burned in the furnace at temperatures in excess of 2000 degrees F. The fly ash exits the top of the furnace. The fly ash is collected in the baghouse and then transferred in a dry form over to the waste handling area. The fly ash is disposed of in on-site landfills. Existing wastestream on NOR.

Form Code: 304 Other "dry" ash, slag, or thermal inorgan. residue
Current Management Units: Landfill 001
* Origin Codes: 1 Onsite-process/service

02333042 2 Active 01/20/94 On No No

Description from Generator: Coal fly ash mixed with flue gas desulfurization (FGD) scrubber sludge is a solid, tan to light brown, moist, fine grain material with no odor. FGD scrubber sludge is a by-product of coal combustion. Input streams are lignite, air, & limestone slurry. Coal is stored in piles prior to burning. To constrol dust, coal piles are sprayed with chemical foam. Coal is them burned in furnace at temperatures in excess of 2,000 degrees F. Gases exit furnace at the top & are routed through baghouses for fly ash removal. Flue gases from baghouses are then routed to the FGD unit. Flue gases are exposed to a limestone slurry. Slurry reacts with sulfur compounds in the flue gases & binds them into solution. Sspent slurry is mixed with fly ash prior to disposal in on-site landfill. Waste includes replaceable process equipment such as preheater baskets, mist eliminator abosrbers that contain fly ash/scrubber sludge from FGD unit.

Refers to waste code (6): 272250
Form Code: 304 Other "dry" ash, slag, or thermal inorgan. residue
Current Management Units: Landfill 001
* Origin Codes: 1 Onsite-process/service

02411052 2 Active 06/02/94 On No

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Unit Number	Unit Type	Unit Status	Date of Status	Classes of Waste Managed in Unit Onsite / Offsite	Unit Permit Number	Unit # on Permit	Regulatory Status	Deed Recording Needed/Date

Description from Generator: A hydroxyacetic formic acid mixture (HAF) is used for removing the iron deposits from supercritical boilers. The acid cleaning solution is injected into the boiler and circulated for four to six hours to extract metal deposits. The acid cleaning solution is rinsed with approximately two boiler volumes of demineralized water to displace the acid solution. The next step is the addition of ammonia and hydrazine to the circulating water. The water is reheated to 200 degrees F and maintained as an oxygen removal and passivation (oxide protective coating) step. The final step is to flush the boiler with approximately one boiler volume of demineralized water. The organic acid metal cleaning waste and associated flushes are drained from the boiler to concrete tanks where it is stored prior to injection in one of the facility's boilers or is treated and discharged via an EPA/TNRCC wastewater discharge permit requirement. HAF organic acid metal cleaning waste is comprised of hydroxyacetic/formic acid, hydrazine, aqueous ammonia, and demineralized water. The waste also includes any iron deposits that have been removed from the boiler during the cleaning operation. Existing wastestream.

Refers to waste code (6): 215290
Form Code: 105 Acidic aqueous waste
Current Management Units: Boiler 004
Tank (Surface) 006 007
* Origin Codes: 1 Onsite-process/service

02421052 2 Active 06/02/94 On No No

Description from Generator: Citric organic acid metal cleaning waste is a green/black liquid with a distinct ammonia odor. Citric acid cleaning solution is used for removing metal deposits from drum boilers. The citric acid cleaning is accomplished in two stages. The boiler is filled with demineralizer water and heated to 210 degrees F. The ammoniated citric acid is added to the boiler water and the chemical solution soaks for 2-3 hours to extract the unwanted iron deposits. A portion of the chemical cleaning solution is drained to allow for the addition of the anhydrous ammonia. The boiler is then soaked for an additional 8-10 hours to continue removing the iron and copper from the boiler. At the completion of the chemical cleaning stage, the boiler is rinsed a minimum of three times with demineralized water. The organic acid metal cleaning waste and associated flushes are drained from the boiler to concrete tanks where it is stored prior to injection in one of the facility's boilers or is treated and discharged via an EPA/TNRCC wastewater discharge permit requirement. Existing wastestream.

Refers to waste code (6): 215290
Form Code: 105 Acidic aqueous waste
Current Management Units: Boiler 004
Tank (Surface) 006 007
* Origin Codes: 1 Onsite-process/service

02441192 2 Active 06/02/94 On/Off No

Description from Generator: Floor Drain Treatment System Liquid Wastewater is a clear liquid with little to no odor. This wastewater is generated as a result of collecting drainage and runoff water within the power plant area. In general, the floor drains are located in work locations where potential oil spillage could occur, and equipment operation areas. The floor drains also serve as a containment mechanism for containing contaminated rainwater runoff. All floor drain treatment system liquid is routed through the facility's oil/water separator and settling basin before being discharged through a permitted TNRCC/EPA NPDES outfall.

Form Code: 119 Other inorganic liquids
Current Management Units: Tank 012

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Refer to 40 CFR Part 261 for Descriptions of EPA Hazardous Waste Numbers.

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Texas Waste Code	Waste Class	Status	Date of Status	Managed Onsite/ Offsite	Radio-active	TNRCC Audit Complete

****** Active Wastes ******

* Origin Codes: 3 From non-haz waste mgmt

02475192 2 Active 06/02/94 On/Off No

Description from Generator: Organic Acid Cleaning Sludge is brown/black semisolid material with a mild odor. Organic sludge is made up of solids generated during the organic acid cleaning of the boilers. When the spent organic acids are sent to the organic ponds, the solids settle in the ponds and form a sludge. Periodically, the sludge from the pond is removed. Existing wastestream.

Refers to waste code (6): 248990

Form Code: 519 Other inorganic sludges

Current Management Units: Tank (Surface) 006 007

* Origin Codes: 1 Onsite-process/service

02513192 2 Active 04/03/95 On/Off No

Description from Generator: Cooling Tower Fill varies in shape, size, with a mild odor. This waste is generated as a result of replacing worn cooling tower fill due to sediment buildup. First generated March 1995.

Form Code: 319 Other waste inorganic solids

Current Management Units: Landfill 001
Contain Store Area 008

* Origin Codes: 1 Onsite-process/service

02551142 2 Active 06/02/94 On/Off No

Description from Generator: Demineralizer regenerant wastewater is typically a colorless liquid occasionally having a milky appearance or a slight reddish or blue-green tint. Demineralizer regenerant wastewater is generated as a result of "cleaning" anion and cation resins used in water treatment systems at power plants. The regeneration process involves numerous steps in the entire regeneration "train," many on which are fresh water "flushes or rinses" of the resins to remove solution of sulfuric acid and or sodium hydroxide used in the "cleaning" (mineral displacement) process. The management of demineralizer regenerant wastewater (all wastewater from the regeneration process) typically involves initial collection in a sump or basin where neutralization begins. Typically, these sumps/basins are ancillary to on-site elementary neutralization units and/or wastewater treatment units which are exempt from the RCRA permit requirements. This wastestream is also exempt from TNRCC waste generation fee requirements, but subject to the NPDES/wastewater discharge permit requirements. A grab sample of the commingled wastewater form the regeneration process indicates that the wastewater is a Class 2 non-hazardous waste. This is not a new wastestream but part of an ongoing wastewater treatment process.

Form Code: 114 Other aqueous waste with low dissolved solids

Current Management Units: Tank (Surface) 006 007

* Origin Codes: 1 Onsite-process/service

02604092 2 Active 06/02/94 On/Off No

Description from Generator: 100% Medical Waste (wastes associated with first aid station, medical emegencies, or other non-surgical medical treatment)

Form Code: 409 Other non-halogenated organic solids

Current Management Units: Contain Store Area 005

* Origin Codes: 1 Onsite-process/service

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Texas Waste Code	Waste Class	Status	Date of Status	Managed Onsite/ Offsite	Radio-active	TNRCC Audit Complete

****** Active Wastes ******

03003903 3 Active 06/02/94 On Yes
Description from Generator: Class 3 Construction Debris is made up of various inert and essentially insoluble debris from construction/renovation activities such as rock, brick, glass, dirt, and certain plastics and rubber, which meet the Class 3 classification criteria.
Refers to waste code (6): 370510
Form Code: 390 Non-haz concrete, cement, construction debris
Current Management Units: Landfill 002
* Origin Codes: 1 Onsite-process/service

0501203H H Active 01/20/94 Off No No
Description from Generator: Waste Naphtha could vary from amber color to dark grey/black. Typically, it has a strong hydrocarbon/solvent odor. Waste naphtha is spent Safety Kleen. The waste is generated through the maintenance and cleaning/degreasing of various machinery, tools, and metal parts, etc. Existing waste on Notice of Registration.
Refers to waste code (6): 990001
Form Code: 203 Non-halogenated solvent
EPA Hazardous Waste Numbers: D001 D006 D008 D018 D035 D039 D040
Current Management Units: None
* Origin Codes: 1 Onsite-process/service
* Source Codes: A19 Other cleaning and degreasing
* Measurement Points: 1 Before mixing
* SIC Codes: 4911 Electric Services

173880 1 Active On/Off No
Description from Generator: PCB CAPACITOR
Form Code:
Current Management Units: Contain Store Area 003
* Origin Codes:

179430 1 Active On/Off No
Description from Generator: PCB CONTAMINATED SOLIDS
Form Code:
Current Management Units: Contain Store Area 003
* Origin Codes:

270131 2 Active On No
Description from Generator: DEMINERALIZER RESIN BEADS, SPENT
Form Code:
Current Management Units: Landfill 001
* Origin Codes:

271250 2 Active 03/11/93 On/Off No
Description from Generator: SPENT ACTIVATED ALUMINA
Form Code:
Current Management Units: Contain Store Area 005
* Origin Codes:

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Texas Waste Code	Waste Class	Status	Date of Status	Managed Onsite/ Offsite	Radio-active	TNRCC Audit Complete
****** Active Wastes ******						
280440	2	Active		On/Off		No
Description from Generator:		GREASE				
Form Code:						
Current Management Units:		Contain Store Area				005
* Origin Codes:						
283230	2	Active		On/Off		No
Description from Generator:		Hydrocarbon contaminated rags/absorbent material				
Form Code:						
Current Management Units:		Contain Store Area				005
* Origin Codes:						
285500	2	Active	03/11/93	On/Off		No
Description from Generator:		CREOSOTE TREATED WOOD				
Form Code:						
Current Management Units:		Contain Store Area				008
* Origin Codes:						
903070	H	Active		On		No
Description from Generator:		METAL CLEANING WASTE, INORGANIC				
Form Code:						
EPA Hazardous Waste Numbers:		D002				
Current Management Units:		Tank (Surface)				006 007
* Origin Codes:						
903860	H	Active		On/Off	No	No
Description from Generator:		PHOSPHATE CLEANING SOLUTION				
Form Code:		119 Other inorganic liquids				
EPA Hazardous Waste Numbers:		D002				
Current Management Units:		Tank				010
		Contain Store Area				005
* Origin Codes:		1 Onsite-process/service				
* Source Codes:		A19 Other cleaning and degreasing				
* SIC Codes:		4911 Electric Services				
910110	H	Active		On/Off	No	No
Description from Generator:		PAINT THINNER				
Form Code:		211 Paint thinner or petroleum distillates				
EPA Hazardous Waste Numbers:		D001 D035 F003 F005				
Current Management Units:		Contain Store Area				005
* Origin Codes:		1 Onsite-process/service				
* Source Codes:		A21 Painting				
* SIC Codes:		4911 Electric Services				

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Texas Waste Code	Waste Class	Status	Date of Status	Managed Onsite/ Offsite	Radio-active	TNRCC Audit Complete
****** Active Wastes ******						
972210	H	Active	03/11/93	On/Off	No	No

Description from Generator: MERCURY VAPOR LAMPS
Form Code: 319 Other waste inorganic solids
EPA Hazardous Waste Numbers: D008
Current Management Units: Contain Store Area 005
* Origin Codes: 1 Onsite-process/service
* Source Codes: A99 Other
* SIC Codes: 4911 Electric Services

* The first value is considered the primary value (e.g. primary origin code).
As of 06/18/1996, the next unassigned sequence number for WASTES is 0502.

Refer to 40 CFR Part 261 for Descriptions of EPA Hazardous Waste Numbers.

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**** UNITS AT THIS SITE MANAGING WASTE ****

** 'Active' & 'Closure Pending' Units **

Unit Number	Unit Type	Unit Status	Date of Status	Classes of Waste Managed in Unit Onsite / Offsite	Unit Permit Number	Unit # on Permit	Regulatory Status	Deed Recording Needed/Date
001	Landfill	Active	11/01/79	2/ NA	NA	NA		Yes/04/01/90

System Types:

Wastes Currently Managed in Unit:

02074092	Clothing a	02133192	Spent refr	02153912	Water trea	02225192	Chemical W	02303042	Bottom ash
02315112	Flue Gas D	02323042	Fly ash is	02333042	Coal fly a	02513192	Cooling To	240150	WATER TREA
240540	INORGANIC	248990	ORGANIC CO	270131	DEMINERALI	270270	Bottom Ash	271430	Preheater
272250	ASH, FLY,	273280	SANDBLASTI						

002	Landfill	Active	11/01/79	3 H/ NA	NA	NA		Yes/

System Types:

Wastes Currently Managed in Unit: 0035110H Unused pro 03003903 Class 3 Co 370510 CONSTRUCTI

003	Contain Store Area	Active	04/01/80	1/ NA	NA	NA		NA /

System Types: 141 Storage

Biennial System Regulatory Status: Regulatory status unknown

Wastes Currently Managed in Unit: 173880 PCB CAPACI 179430 PCB CONTAM

004	Boiler	Active		2/ NA	NA	NA		Yes/

System Types:

Wastes Currently Managed in Unit: 02074092 Clothing a 02411052 A hydroxya 02421052 Citric org 215290 METAL CLEA

Wastes Previously Managed in Unit: 02133192

005	Contain Store Area	Active		1 2 H/ NA	NA	NA	RCRA Pmt Exempt - Accumulation Time	NA /

Description from Company: Drum storage area

System Types: 141 Storage

Biennial System Regulatory Status: Regulatory status unknown

Wastes Currently Managed in Unit:

0001319H	Hazardous	0005409H	solvent co	0006204H	Spent solv	0007307H	Paint Chip	0008209H	Liquid pai
0009117H	Discarded	0010219H	Waste Dies	0011219H	Waste gaso	0012117H	This waste	0013307H	Metal grin
0014101H	Machine co	0015319H	Mercury Co	0017003H	Expired sh	0020409H	Paint Wast	0027105H	Acidic aqu
0030409H	Paint wast	0050119H	Waste Bari	01023021	Dibasic Ac	01031191	Diesel con	01046031	Floor Drai
01054091	Used Aspha	01061191	Gasoline c	01083011	Mineral oi	01093191	Class 1 Bl	01103101	Used filte
01133081	RCRA empty	01144061	RCRA empty	01172961	Spent Anti	01182191	EHC (Elect	01194091	Waste grea
01202061	Waste oil	01223071	Paint Chip	01234091	spent roof	01254891	Floorsweep	01273071	Metal Grin
01284091	Asbestos r	01294091	Paint wast	01310031	Expired sh	01403091	Used carbo	01504891	Hydrocarbo
01552011	Class 1 no	01604031	Spent poly	02003072	Boiler and	02033082	Class 2 em	02044062	Class 2 fi
02053012	Mineral oi	02063192	Class 2 bl	02074092	Clothing a	02083072	Class 2 Pa	02104032	Spent resi
02112192	Spent Acti	02133192	Spent refr	02183012	Hydrocarbo	02494092	Paint wast	02604092	100% Medic
108320	ANTIFREEZE	109710	OIL, CUTTI	110450	OIL, WASTE	119000	EHC Fluid	152920	TANK BOTTO
170750	ASBESTOS	172870	OIL FILTER	175240	PHOSPHATES	179360	SOIL, HYDR	179450	RCRA EMPTY
180440	GREASE	210450	OIL, WASTE	271250	SPENT ACTI	273280	SANDBLASTI	280440	GREASE
283230	Hydrocarbo	900490	BARIUM CHL	902640	HYDRAZINE	903860	PHOSPHATE	910100	SOLVENTS,
910110	PAINT THIN	910650	PAINT WAST	912520	MERCURY, L	912900	Diesel con	914280	ISOPROPANO
916510	Caustic pa	917240	ACETONE AN	918380	Gasoline c	972210	MERCURY VA	973280	SANDBLASTI
976330	SODIUM HYD	977750	DIESEL CON	978850	MERCURY CO	979130	LEAD CONTA	979740	PAINT, DRY
980370	ASPHALT	990001	WASTE PETR						

Wastes Previously Managed in Unit: 110480

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Unit Number	Unit Type	Unit Status	Date of Status	Classes of Waste Managed in Unit Onsite / Offsite	Unit Permit Number	Unit # on Permit	Regulatory Status	Deed Recording Needed/Date

** 'Active' & 'Closure Pending' Units **

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006 Tank (Surface) Active 08/01/84 1 2 H/ NA NA NA RCRA Pmt Exempt-W.W.T. NA /
Description from Company: Clarification & neutralization permitted effluent treatment unit
System Types: 121 Neutralization only
Biennial System Regulatory Status: Regulatory status unknown
Wastes Currently Managed in Unit:

0003105H	Deminerali	0004110H	Deminerali	01121191	Phosphate	02411052	A hydroxya	02421052	Citric org
02475192	Organic Ac	02551142	Deminerali	902560	WASTEWATER	902570	WASTEWATER	903070	METAL CLEA

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007 Tank (Surface) Active 2 H/ NA NA NA NA /
Description from Company: Clarification & neutralization permitted effluent treatment unit
System Types:
Biennial System Regulatory Status: Regulatory status unknown
Wastes Currently Managed in Unit:

0003105H	Deminerali	0004110H	Deminerali	02225192	Chemical W	02411052	A hydroxya	02421052	Citric org
02475192	Organic Ac	02551142	Deminerali	902560	WASTEWATER	902570	WASTEWATER	903070	METAL CLEA

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008 Contain Store Area Active 1 2 H/ NA NA NA NA /
Description from Company: BINS
System Types:
Wastes Currently Managed in Unit:

0001319H	Hazardous	01093191	Class 1 Bl	01133081	RCRA empty	01144061	RCRA empty	01223071	Paint Chip
01234091	spent roof	01254891	Floorsweep	02003072	Boiler and	02013902	Constructi	02033082	Class 2 em
02044062	Class 2 fi	02053012	Mineral oi	02063192	Class 2 bl	02083072	Class 2 Pa	02099022	General mi
02104032	Spent resi	02112192	Spent Acti	02133192	Spent refr	02174882	Creosote t	02183012	Hydrocarbo
02513192	Cooling To	170750	ASBESTOS	179360	SOIL, HYDR	179450	RCRA EMPTY	270504	CONTAINERS
279760	PLANT REFU	285500	CREOSOTE T	973280	SANDBLASTI				

Wastes Previously Managed in Unit: 02074092

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009 Land Treatment Active 06/08/93 1/ NA NA NA Non-Hazardous Regulated NA /
Description from Company: The diked containment structure surrounding the fuel oil storage tank will be used for land farming
System Types: 131 Land treatment/application/farming
Wastes Currently Managed in Unit: 179360 SOIL, HYDR
Wastes Previously Managed in Unit: 01284091

---

010 Tank Active 01/20/94 1 H/ NA NA NA RCRA Pmt Exempt - Accumulation Time NA /
Description from Company: 90 Day Storage Tank
System Types: 141 Storage
Wastes Currently Managed in Unit: 0025105H Hydroclori 01121191 Phosphate 903860 PHOSPHATE

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011 WWTP Active 01/20/94 2/ NA NA NA Non-Hazardous Regulated NA /
Description from Company: Sanitary Waste Water Unit
System Types: 081 Biological treatment
Wastes Currently Managed in Unit: 02166082 Sanitary w

31631 Houston Lighting & Power

Unit Number	Unit Type	Unit Status	Date of Status	Classes of Waste Managed in Unit Onsite / Offsite	Unit Permit Number	Unit # on Permit	Regulatory Status	Deed Recording Needed/Date
** 'Active' & 'Closure Pending' Units **								
012	Tank	Active	06/02/94	1 2/ NA	NA	NA	Non-Hazardous Regulated	NA /
Description from Company: Oil/Water Separator (located north of unit 4)								
System Types: 124 Phase separation								
Wastes Currently Managed in Unit: 01046031 Floor Drai 01202061 Waste oil 02441192 Floor Drai								
014	Tank	Active	06/02/94	1/ NA	NA	NA	Non-Hazardous Regulated	NA /
Description from Company: Waste Oil Storage Tank (located in the HWSA)								
System Types: 141 Storage								
Wastes Currently Managed in Unit: 01202061 Waste oil								
015	Tank	Active	06/02/94	1/ NA	NA	NA	Non-Hazardous Regulated	NA /
Description from Company: Waste Oil Storage Tank (located east of JTM garage)								
System Types: 141 Storage								
Wastes Currently Managed in Unit: 01202061 Waste oil								
016	Tank	Active	06/02/94	1/ NA	NA	NA	Non-Hazardous Regulated	NA /
Description from Company: Waste Oil Storage Tank (former UFI garage)								
System Types: 141 Storage								
Wastes Currently Managed in Unit: 01202061 Waste oil								

As of 06/18/1996, the next unassigned sequence number for UNITS is 017.

Index to NOR for Solid Waste Registration Number 31631 Houston Lighting & Power
for wastes and units

Wastes

Waste Code	Waste Description	NOR Page	Old Texas Waste Code
** Active Wastes **			
0001319H	Hazardous Blast Grit is dry blast media contaminat	2	
0003105H	Demineralizer Acid Regenerant Wastewater is typica	2	
0004110H	Demineralizer base regenerant wastewater is typica	3	
0005409H	solvent contaminated rags are rags contaminated wi	3	
0006204H	Spent solvent is a clear and colorless to dark gra	4	
0007307H	Paint Chips and Rust (Hazardous) will be small to	4	
0008209H	Liquid paint waste includes unused paint that has	4	
0009117H	Discarded instruments containing mercury. Existin	5	
0010219H	Waste Diesel is a liquid with either one or two vi	5	
0011219H	Waste gasoline is a liquid with either one or two	5	
0012117H	This waste is elemental mercury that has been drai	6	
0013307H	Metal grinding waste is powdery brown/black metal	6	
0014101H	Machine coolant is a liquid which is composed of w	6	
0015319H	Mercury Contaminated Debris is dirt, debris, sorbe	7	
0017003H	Expired shelf life & off-spec. lab chemicals	7	
0020409H	Paint Waste. solid includes dry, unused paint that	7	
0025105H	Hydrocloric acid cleaning solution is used for r	8	
0027105H	Acidic aqueous waste is unused product such as hyd	8	
0030409H	Paint waste debris is comprised of used plastic an	8	
0035110H	Unused product (waste corrosive liquid) primarily	8	
0050119H	Waste Barium chloride Solution is a dark, opaque l	9	
01013111	Asbestos is a solid material white to gray in colo	9	
01023021	Dibasic Acid contaminated material is generated as	9	
01031191	Diesel contaminated with water (Classs 1) is prima	9	
01046031	Floor Drain Treatment System Sludge is a dark, thi	10	
01054091	Used Asphalt is a solid, brown to black material w	10	
01061191	Gasoline contaminated with water (Class 1) is prim	10	
01073011	Hydrocarbon contaminated soil is contaminated with	10	
01083011	Mineral oil contaminated soil (< 1 ppm PCBs) has a	10	
01093191	Class 1 Blast Grit is dry blast media contaminated	11	
01103101	Used filters is composed of used vehicle or machin	11	
01121191	Phosphate cleaning solution is a clear to milky-wh	11	
01133081	RCRA empty metal containers of all types and sizes	11	
01144061	RCRA empty plastic or fiber containers of all type	11	
01172961	Spent Antifreeze is a liquid with low viscosity.	12	
01182191	EHC (Electric Hydraulic Control Fluid) is compose	12	
01194091	Waste grease can range from a dark brown smooth ma	12	
01202061	Waste oil is used hydraulic, mineral or motor oils	12	
01223071	Paint Chips and Rust (Class 1) will be small to la	12	
01234091	spent roofing Material varies in size and shape.	13	
01254891	Floorsweep is a brown/red saw dust with a hydocarb	13	
01273071	Metal Grinding waste (dry) are powdery brown/black	13	
01284091	Asbestos roofing material with Asphalt varies in s	13	
01294091	Paint waste debris is comprised of used plastic &	13	
01310031	Expired shelf life and off-specification laborator	14	
01403091	Used carbon zinc batteries that are removed fr	14	
01504891	Hydrocarbon contaminated rags/Absorbent material;	14	183230
01552011	Class 1 non-haz. spent solvent; initial generation	14	
01604031	Spent polymer is a liquid product with ahydrocarbo	14	
02003072	Boiler and air preheater rust will be small to lar	14	

Index to NOR for Solid Waste Registration Number 31631 Houston Lighting & Power
for wastes and units

Wastes

Waste Code	Waste Description	NOR Page	Old Texas Waste Code
02013902	Construction Debris is made up of various non-iner	15	
02025192	cooling Tower Sludge is a semisolid material with	15	
02033082	Class 2 empty metal containers that are 5 gallons	15	
02044062	Class 2 fiber or plastic containers that are 5 gal	15	
02053012	Mineral oil contaminated soil (Class 2) contains l	15	
02063192	Class 2 blast Grit is dry blast media contaminated	16	
02074092	Clothing and personal protective equipment	16	273630
02083072	Class 2 Paint chips and Rust will be small to larg	16	
02099022	General miscellaneous plant trash includes items s	16	
02104032	Spent resin beads vary as to physical appearance d	17	
02112192	Spent Activated alumina is made up of white, marbl	17	
02133192	Spent refractory material	17	170300
02153912	Water treatment sludge is lt. brown to to tan in	17	
02166082	Sanitary waste water treatment sludge is a brown/b	18	
02174882	Creosote treated wood will include pieces of cylin	18	
02183012	Hydrocarbon contaminated soil is contaminated with	18	
02225192	Chemical Waste Treatment System Sludge is a semi-s	18	
02303042	Bottom ash is a solid, dark, gray to black, moist,	18	
02323042	Fly ash is a solid, tan to light brown, dry, fine	19	
02333042	Coal fly ash mixed with flue gas desulfurization (	19	
02411052	A hydroxyacetic formic acid mixture (HAF) is used	19	
02421052	Citric organic acid metal cleaning waste is a gree	20	
02441192	Floor Drain Treatment System Liquid Wastewater is	20	
02475192	Organic Acid Cleaning Sludge is brown/black semiso	21	
02513192	Cooling Tower Fill varies in shape, size, with a m	21	
02551142	Demineralizer regenerant wastewater is typically a	21	
02604092	100% Medical Waste (wastes associated with first a	21	
03003903	Class 3 Construction Debris is made up of various	22	
0501203H	Waste Naphtha could vary from amber color to dark	22	
173880	PCB CAPACITOR	22	
179430	PCB CONTAMINATED SOLIDS	22	
270131	DEMINERALIZER RESIN BEADS, SPENT	22	
271250	SPENT ACTIVATED ALUMINA	22	
280440	GREASE	23	
283230	Hydrocarbon contaminated rags/absorbent material	23	
285500	CREOSOTE TREATED WOOD	23	
903070	METAL CLEANING WASTE, INORGANIC	23	
903860	PHOSPHATE CLEANING SOLUTION	23	
910110	PAINT THINNER	23	
972210	MERCURY VAPOR LAMPS	24	

Units

Unit Sequence Number	Unit Description	NOR Page
** Active and Closure Pending Units **		
001		25
002		25
003		25
004		25

Index to NOR for Solid Waste Registration Number 31631 Houston Lighting & Power
for wastes and units

Units

Unit Sequence Number	Unit Description	NOR Page
005	Drum storage area	25
006	Clarification & neutralization permitted effluent	26
007	Clarification & neutralization permitted effluent	26
008	BINS	26
009	The diked containment structure surrounding the fu	26
010	90 Day Storage Tank	26
011	Sanitary Waste Water Unit	26
012	Oil/Water Separator (located north of unit 4)	27
014	Waste Oil Storage Tank (located in the HWSA)	27
015	Waste Oil Storage Tank (located east of JTM garage	27
016	Waste Oil Storage Tank (former UFI garage)	27

REFERENCE 27

The Light company
Houston Lighting & Power
P.O. Box 1700 Houston, Texas 77251-1700 713-207-1111

FAX COVERSHEET

Fax Number (713) 945-7598

TO: JOY PAGE - ROY F. WESTON

FAX NUMBER: 621-6959

FROM: BOB CARPENTER

TEL. #: 713/945-8197

# of pages (including coversheet): 11

Message: PLEASE FIND NPDES PERMIT NO. TX 0006394 FOR W.A. PARISH: COVER PAGE, OUTFALL 103, OUTFALL 203, OUTFALL 303 (& 403 NOT IN SWMU SCOPE), OUTFALL 603, OUTFALL 703 AND OUTFALL 803. PLEASE CALL IF YOU HAVE ADDITIONAL QUESTIONS. ALSO INCLUDING OUTFALLS 001, 002, 004 AND 005

OUTFALL 203

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 203 - low volume wastewater and ash transport water.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		mg/l	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	Daily	Estimate
Total Suspended Solids	1/Week	Grab
Oil and Grease	1/Week	Grab

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 203 - where comingled wastes are discharged from the treatment facility prior to mixing with condenser cooling waters.

See Part II for steam electric subcategory definitions.

OUTFALLS 303 and 403

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 303 - low volume wastewaters (units 5 and 6 oily floor drainage) and outfall 403 - low volume wastewaters (units 5 and 6 auxiliary cooling tower blowdown).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass (lbs/day)		mg/l	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	Daily	Estimate
Total Suspended Solids	1/Week	Grab
Oil and Grease	1/Week	Grab

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfalls 303 and 403- at the point of discharge from the low volume waste treatment system prior to mixing with outfall 203 waters.

See Part II for steam electric subcategory definitions.

OUTFALL 603

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 603 - chemical metal cleaning wastes and low volume wastes.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		mg/l	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20
Iron	N/A	N/A	1	1
Copper	N/A	N/A	0.5	1

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	Daily	Estimate
Total Suspended Solids	1/Week	Grab
Oil and grease	1/Week	Grab
Iron*	1/Week	Grab
Copper*	1/Week	Grab

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 603 - where comingled wastes are discharged prior to mixing with outfall 503 waters.

* These parameters apply only when discharging metal cleaning wastes.

See Part II for steam electric subcategory definitions.

OUTFALL 703

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 703 - Units 7 and 8 low volume wastewater and ash transport waters.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		mg/l	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	Daily	Estimate
Total Suspended Solids	1/Week	Grab
Oil and Grease	1/Week	Grab

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 703 - where the comingled wastes are discharged prior to mixing with outfall 503 waters.

See Part II for steam electric subcategory definitions.

OUTFALL 803

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 803 - Units 7 and 8 low volume wastewaters.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		mg/l	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	Daily	Estimate
Total Suspended Solids	1/Week	Grab
Oil and Grease	1/Week	Grab

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 803 - where low volume wastes are discharged prior to mixing with outfall 203 waters.

See Part II for steam electric subcategory definitions.

OUTFALL 004

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 004 - stormwater runoff from units 5 through 8 ash storage area.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		mg/l unless noted	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20
Selenium	N/A	N/A	Report	Report
Selenium***	0.36	0.76	29 µg/l	63 µg/l
Biomonitoring	N/A	N/A	N/A	N/A

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	Daily*	Calculated
Total Suspended Solids	Daily*	Grab
Oil and Grease	Daily*	Grab
Selenium	2/Month*	Grab***
Biomonitoring**	**	24-Hr. Composite

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 004 - where stormwater runoff from units 5 through 8 ash storage area discharges from the retention ponds prior to discharge to Smithers Lake.

* When discharge occurs.

** See Part II.J. Chronic biomonitoring tests shall be performed quarterly.

*** Applies 36 months after the effective date of the permit.

OUTFALL 005

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 005 - Units 1 through 4 low volume wastes.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		mg/l	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	Report	Report
Total Suspended Solids	N/A	N/A	30	100
Oil and Grease	N/A	N/A	15	20

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	Daily	Estimate
Total Suspended Solids	1/Week	Grab
Oil and Grease	1/Week	Grab

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored weekly by a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 005 - where low volume wastes are discharged prior to entering Smithers Lake.

See Part II for steam electric subcategory definitions.

REFERENCE 28

WESTON

PHONE CONVERSATION RECORD

ISHIGOJ
Originator

Conversation with:

Name: Lucien Klejbuck

Company: Houston Lighting & Power

Phone: (713)945-8199

Date: 07/17/97

Time: 1400

☐ Originator Placed Call

■ Originator Received Call

Subject: NPDES Permit and Chemical Treatment Facility

Notes: Mr. Klejbuck referred me to Bob Carpenter regarding NPDES permitting and monitoring information.

Mr. Klejbuck explained that the clarifiers have a 6-inch curbed concreted dike sourrounding them. This dike is designed to direct any spills or runoff into a collection sump. The collected water is then sent back into the wastewater treatment system.

☐ **File:** _____

☐ **Tickle File:** _____

☐ **Follow-Up By:** _____

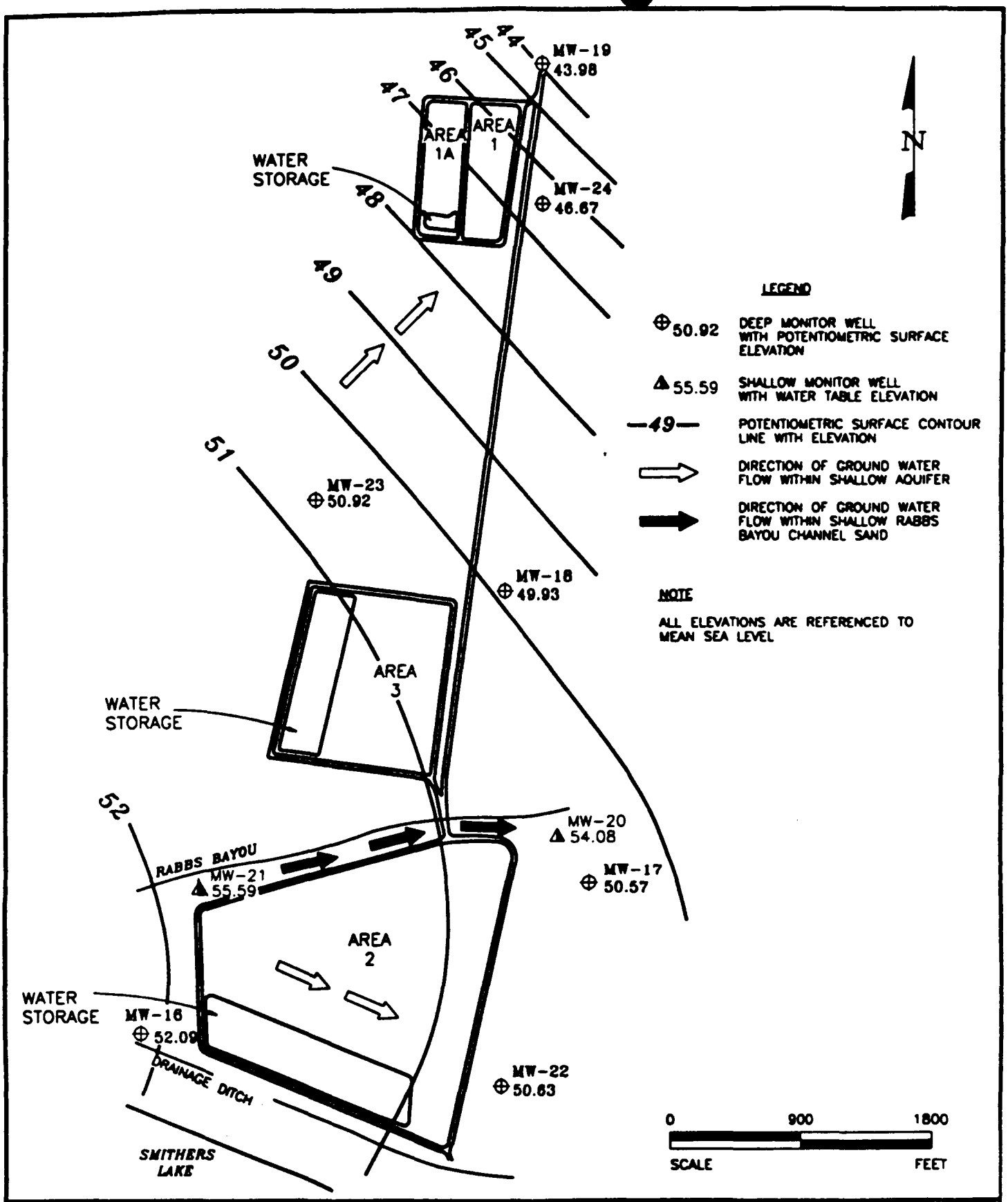
☐ **Copy/Route To:** _____

_____

Follow-Up-Action:

Originator's Initials: _____

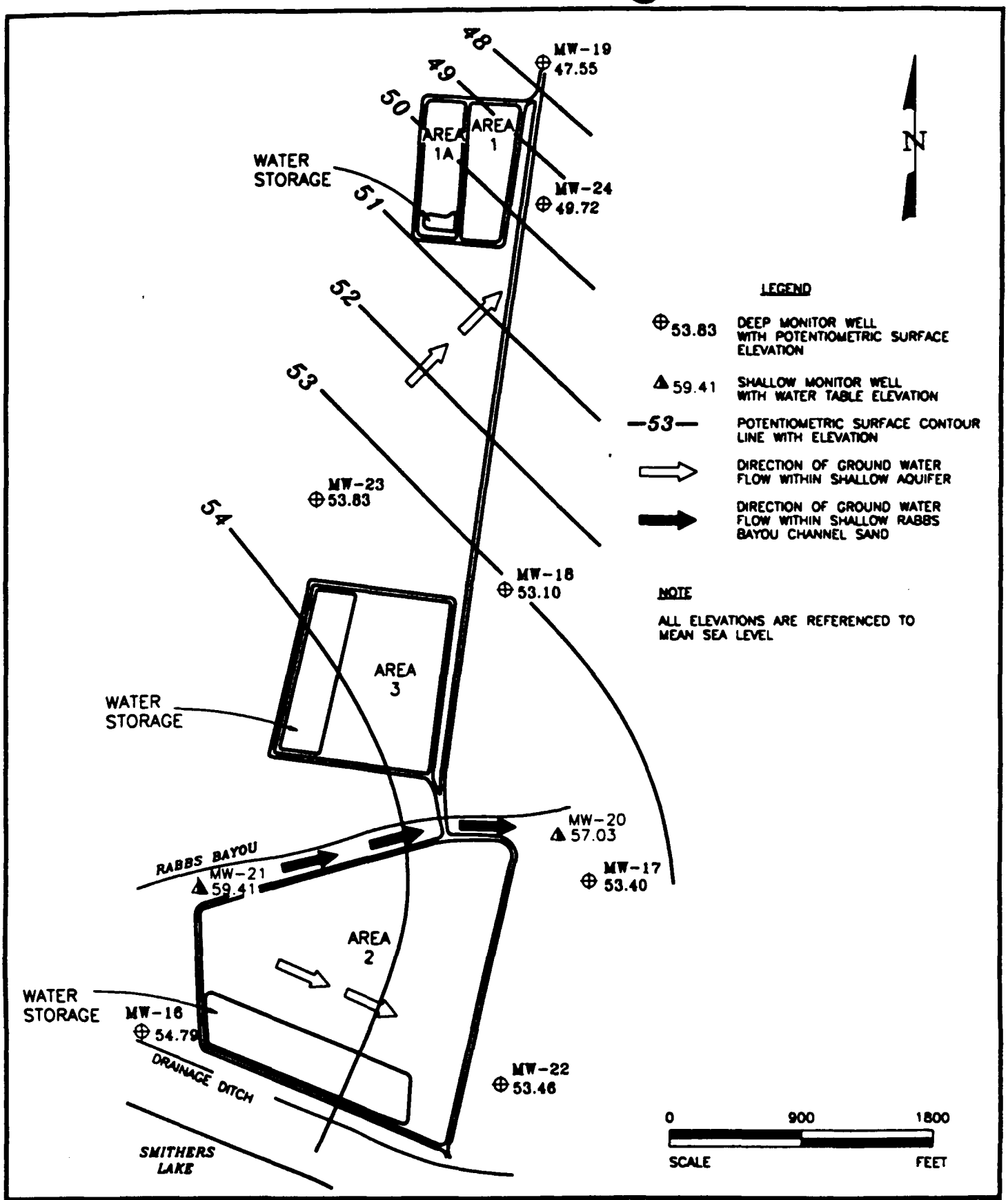
REFERENCE 29



ERM-Southwest, Inc.
HOUSTON • NEW ORLEANS • AUSTIN • DALLAS • EL PASO

DATE 04/05/94 | W.O.NO. 7311A031D94

FIGURE 3-1
POTENTIOMETRIC SURFACE MAP
OCTOBER 21, 1992 ELEVATIONS
COAL COMBUSTION BY-PRODUCT DISPOSAL AREAS
Houston Lighting & Power Co.
W.A. Parish Generating Station
Thompsons, Texas



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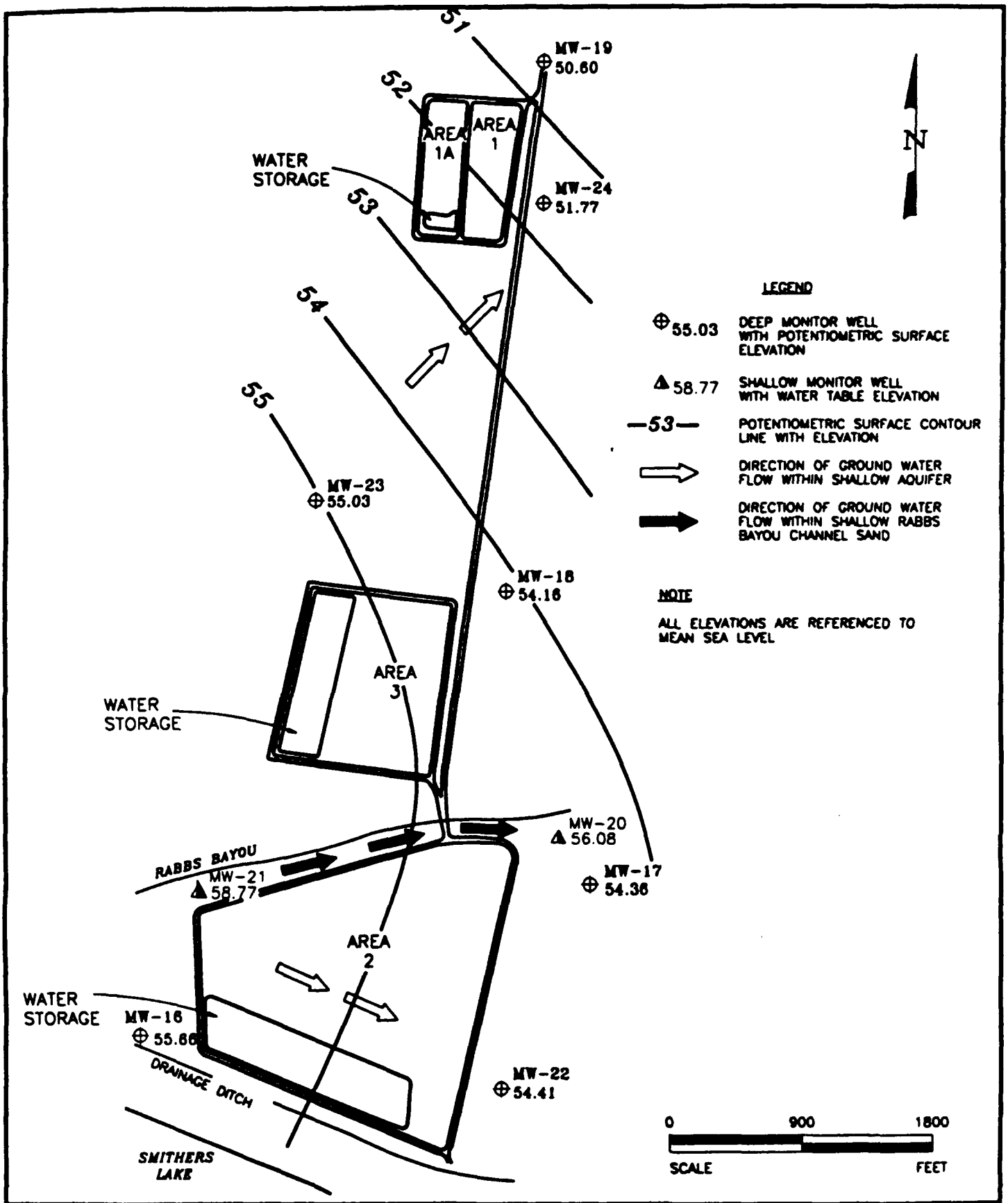
ERM

DATE 04/05/94 | W.O.NO. 7311A030D94

FIGURE 3-2
POTENTIOMETRIC SURFACE MAP
MARCH 9, 1993 ELEVATIONS
COAL COMBUSTION BY-PRODUCT DISPOSAL AREAS
Houston Lighting & Power Co.
W.A. Parish Generating Station
Thompsons, Texas



ERM-Southwest, Inc.
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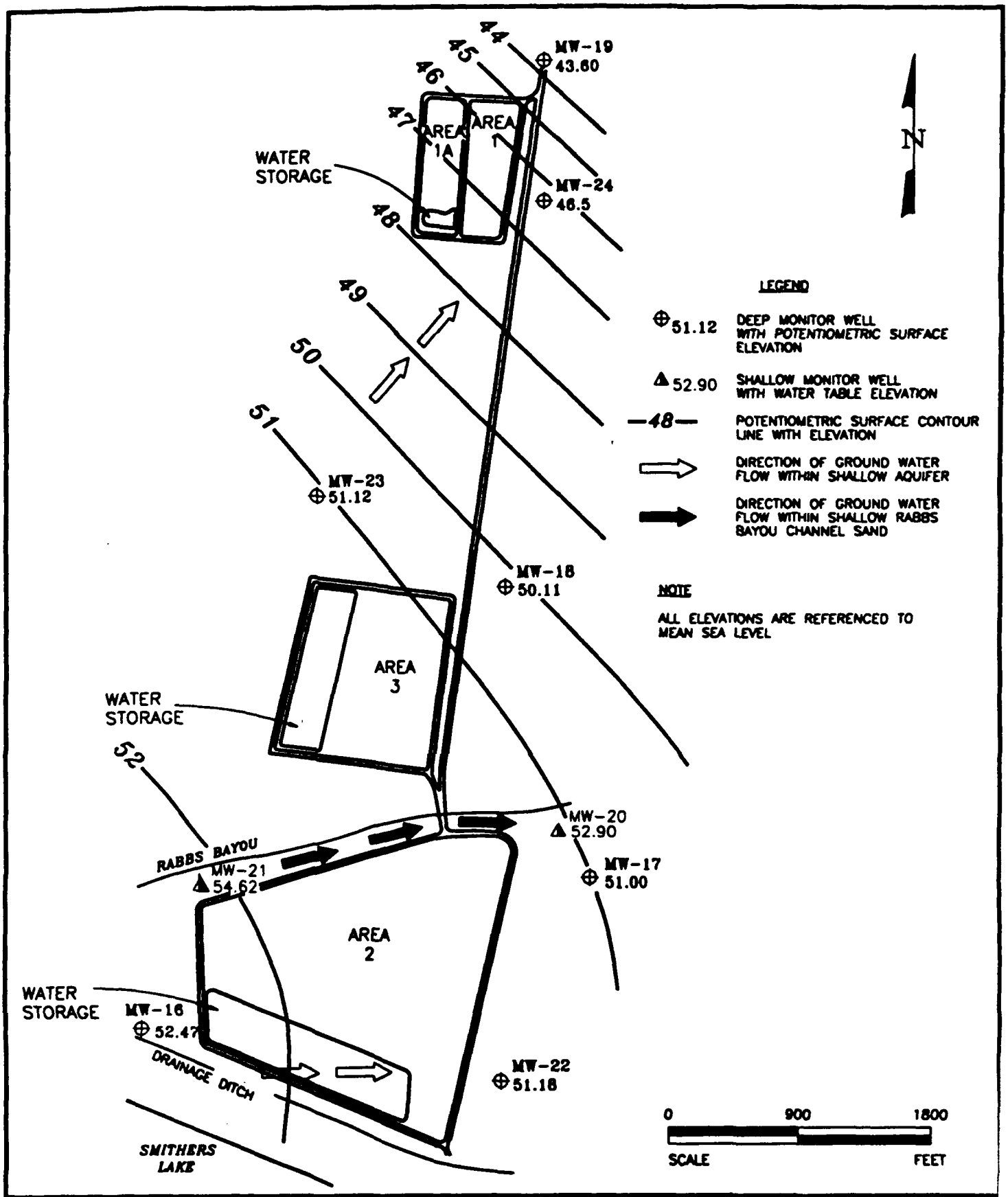
ERM

DATE 04/05/94 | W.O.NO. 7311A029D94

FIGURE 3-3
POTENTIOMETRIC SURFACE MAP
JULY 6, 1993 ELEVATIONS
COAL COMBUSTION BY-PRODUCT DISPOSAL AREAS
Houston Lighting & Power Co.
W.A. Parish Generating Station
Thompsons, Texas



ERM-Southwest, Inc.
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ERM

DATE 04/05/94 | W.O.NO. 7311A028D94

FIGURE 3-4
POTENTIOMETRIC SURFACE MAP
SEPTEMBER 30, 1993 ELEVATIONS
COAL COMBUSTION BY-PRODUCT DISPOSAL AREAS
Houston Lighting & Power Co.
W.A. Parish Generating Station
Thompsons, Texas

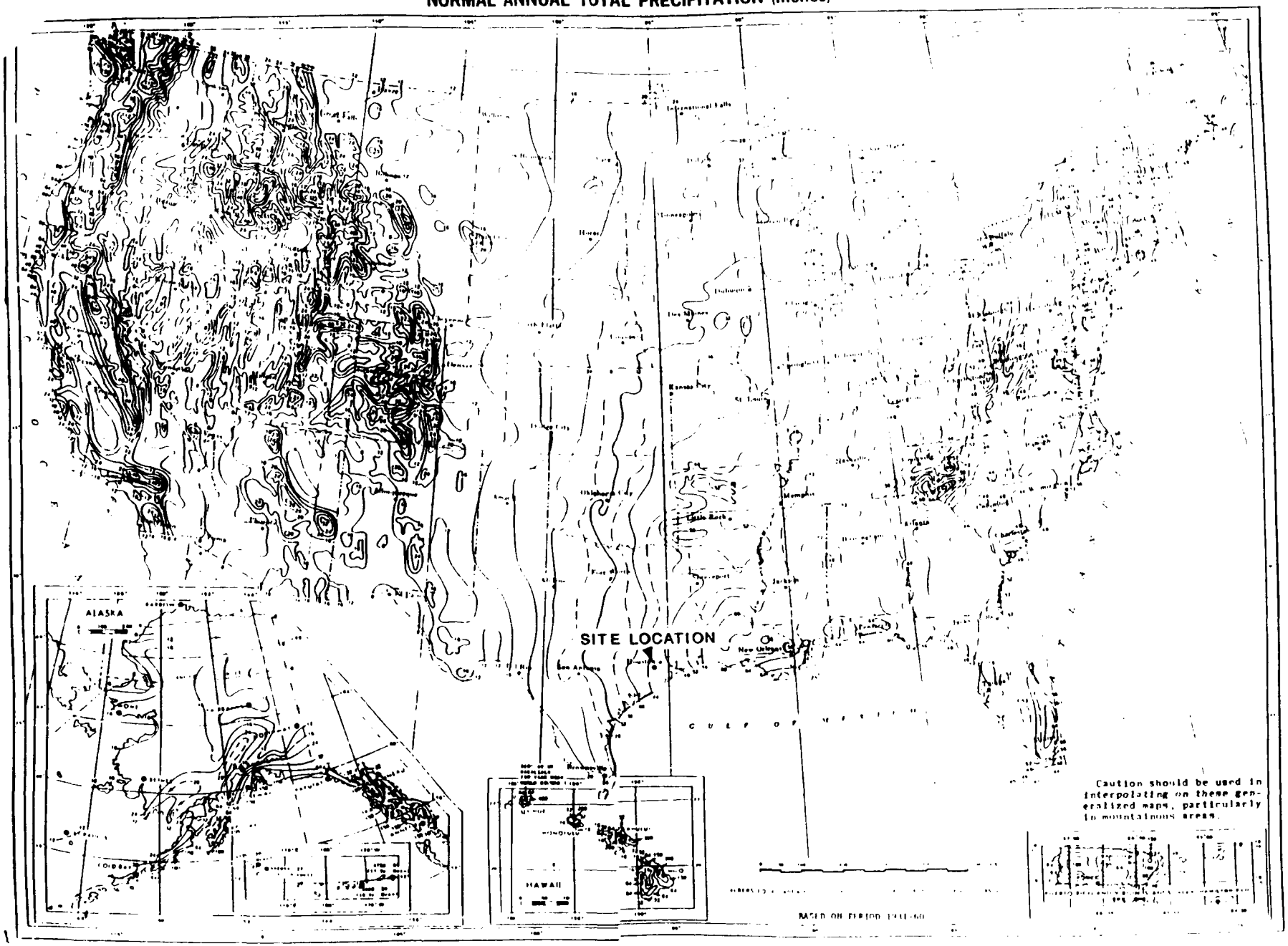
REFERENCE 30

CLIMATIC ATLAS OF THE UNITED STATES

U.S. DEPARTMENT OF COMMERCE

Environmental Data Service

NORMAL ANNUAL TOTAL PRECIPITATION (Inches)



REFERENCE 31

HL&P Parish Station
Net Annual Precipitation Calculation

Month	Precipitation (inches)	Temperature (degrees F)	Factor	Evaporation (inches)	Net Precipitation (inches)
Jan	3.20	52.0	0.87	0.63	2.57
Feb	2.80	55.4	0.93	0.96	1.84
Mar	2.40	62.5	1.00	1.90	0.50
Apr	2.50	69.9	1.07	3.34	0.00
May	4.40	75.9	1.14	4.98	0.00
Jun	5.30	81.2	1.17	6.64	0.00
Jul	3.90	83.4	1.16	7.28	0.00
Aug	3.80	83.4	1.11	6.97	0.00
Sep	4.90	79.6	1.03	5.43	0.00
Oct	3.40	71.3	0.96	3.26	0.14
Nov	3.60	62.6	0.89	1.71	1.90
Dec	3.00	55.0	0.85	0.85	2.15
				Annual Net Precipitation	***9.10 inches***

$$a = 6.75e\text{-}7\, I^3 - 7.71e\text{-}5\, I^2 + 1.79e\text{-}2\, I + 0.49$$

$$I = \sum_{i=1}^{12} (T_i/5)^{1.5}$$

$$E_i = 1.6F_i(10T_i / I)^a$$

E_i = Monthly potential evapotranspiration in inches for month i.
F_i = Monthly latitude adjusting value for month i.
T_i = Mean monthly temperature in degrees Celsius for month i.

Source: Dunne, T. and Leopold, L.B. 1978. Water in Environmental Planning. W.H. Freeman and Company, New York.

REFERENCE 32

RECORD OF COMMUNICATION Reference 22	[xx] Phone Call	[ ] Discussion	[ ] Field Trip
	[ ] Conference	[ ] Other (specify)	

(Record Of Item Checked Above)

TO:	FROM:	DATE:
Eddie Garcia Soil Conservation Tech. Soil Conservation Serv. 713-342-8582	Carol Cox FIT Env. Scientist EPA Region VI ICF Technology 214-744-1641	3-2-90 TIME: 4:00 p.m.

SUBJECT: Use of Water From Rabbs Bayou, Erosion Control for Area, Smithers Lake, Thompsons

SUMMARY OF COMMUNICATION:

Rabbs Bayou is used primarily for drainage from the cities of Richnond and Rosenberg. The Fort Bend County Drainage District dug out the bayou approximately five years ago and seeded it with Bermuda grass. Rabbs Bayou holds little water and most farmers do not use it for livestock watering. Fencing is sometimes done to allow cattle access to the water. Very little soil erosion occurs in the area.

Carol Cox

EPA Form 1300-6 (7-72)
Replaces EPA HQ Form 5300-3 Which May Be Used Until Supply Is Exhausted.

Ref 22

REFERENCE 33

- wells whose 2.5' section falls within one mile of the site boundary.

May 21, 1997

TEXAS WATER DEVELOPMENT BOARD
GROUND WATER DATA SYSTEM

RECORDS OF WELLS, SPRINGS, AND TEST HOLES
COUNTY - Fort Bend

WELL	OWNER	LATITUDE	LONGITUDE	DATE COM-PLETED	DEPTH OF WELL (FT.)	CASING AND SCREEN DATA: CASING OR SCREEN	DIAM-ETER (IN.)	TOP DEPTH (FT.)	BOT DEPTH (FT.)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (FT.)	WATER LEVEL: MEASURE-MENT FROM LSD (FT.)	DATE	METHOD OF LIFT AND POWER	USE OF WATER	REMARKS
65-27-401	Robert Hausler	293403	954432	1957	140					112CHCTU	80	-34.50	03-0 -1964 - -	N	U	Well taps alluvium and Pleistocene bedrock.
65-27-402	M.B. Pyle	293354	954421	1956	545					112CHCT	80	-53.00	07-0 -1956 - -	T N	I	
65-27-403	A. Hagan	293234	954338		100					112CHCTU	80		- - - -		U	
65-27-404	Unknown	293401	954240		44					112CHCTL	77	-37.12 -33.90	04-23-1964 01-15-1969	P H	U	
65-27-405	J.c. Wessendorff	293252	954248	1972	85					112CHCT	75	-36.00	01-02-1972 - -	T E 15.00	I	Casing slotted from 65 to 85 ft. Suppies Lake.
65-27-501	Vallet Bros.	293445	954049	1967	81					112CHCTL	75	-39.00	05-0 -1967 - -	P W	S	
65-27-502	--Bertrand	293433	954206	1939	6503					NOT-APPL	76		- - - -			Oil test.
65-27-503	R.J. Ranson	293415	954149		95					112CHCTU	68		- - - -	N	U	
65-27-504	Plantation Municipal Utilities District	293237	954152	1978	809					112CHCT	81	-114.00 -135.50	06-15-1978 02-05-1987	T E	P •	Casing slotted from 509 to 799 ft. Reported yield 1000 gpm with draw-down of 45 ft when drilled.
65-27-505	Plantation MUD No.2	293245	954148	1980	840					112CEVG	80	-141.70 -142.99	03-26-1986 01-19-1996		P	
65-27-506	Fort Bend Count M.U.D. #106	293331	954117	1989	1942	C C S C S C S	16 11 11 11 11 11 11	0 1469 1574 1604 1652 1680 1698	1569 1574 1604 1652 1680 1698 1720	121EVGL	70	-214.94	08-25-1989 - -	T E	P	Reported yield 1500 gpm with 127 feet drawdown after pumping 36 hours in 1989.

RECORDS OF WELLS, SPRINGS, AND TEST HOLES
COUNTY - Fort Bend

WELL	OWNER	LATITUDE	LONGITUDE	DATE COM-PLETED	DEPTH OF WELL (FT.)	CASING AND SCREEN DATA: CASING OR SCREEN	DIAM-ETER (IN.)	TOP DEPTH (FT.)	BOT DEPTH (FT.)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (FT.)	WATER LEVEL: MEASURE-MENT FROM LSD (FT.)	DATE	METHOD OF LIFT AND POWER	USE OF WATER	REMARKS
65-27-704	Fort Bend County Road Maintenance	293226	954233	1986	245					112CHCT	83	-100.20	03-04-1987 - -	S E	P	
65-27-801	August Meyers	293049	954229		79					112CHCTU	81		- - - -	N	U	
65-27-802	B.R. McNulty	293229	954059	1969	170					112CHCTU	77	-45.70	01-09-1969 - -	N	S	
65-27-803	Tex.Eastern Trans. Corp	293144	954156	1955	614					112CHCTL	79	-62.00 -82.00	12-02-1955 01-17-1969	T E 5.00	N	stock, power
65-27-805	George Ranch	293022	954109	1977	237					112GLFC	73	-52.00	08-00-1977 - -	S E	P	
65-28-401	Humble Oil & Ref	293305	953535	1955	711					112CHCTL	68	-81.00 -179.34	03-08-1955 01-17-1996	T E 15.00	N	
65-28-402	Humble Oil & Ref	293352	953619	1946	484					112CHCTL	67	-33.70 -84.90	05-01-1947 01-27-1964	N	U	
65-28-403	Humble Oil & Ref	293352	953613	1947	671					112CHCTL	67	-38.30 -88.70	05-01-1947 01-18-1965	N	U	
65-28-404	Humble Oil & Ref	293315	953534	1928	716					112CHCTL	69	-40.36 -138.58	05-01-1947 01-12-1976	N	U	
65-28-405	Humble Oil & Ref	293318	953543	1929	710					112CHCTL	69		- - - -	N	U	
65-28-406	Fort Bend County Municipal Utilities	293419	953610	1976	1664					121EVGL	65	-179.00	09-0 -1976 - -	T E 150.00	P	Screen from 689 to 1652 ft. Reported yield 3544 gpm with a drawdown of 315 ft when drilled. TEst hole drilled to 1794 ft.
65-28-501	Humble Oil & Ref	293304	953449	1945	448					112CHCTL	67	-40.93 -164.71	05-01-1947 01-15-1980	N	U	
65-28-502	C. Renshaw	293332	953338	1968	599					112CHCTL	68	-129.00	05-0 -1968 - -	T E 10.00	P	

RECORDS OF WELLS, SPRINGS, AND TEST HOLES
COUNTY - Fort Bend

WELL	OWNER	LATITUDE	LONGITUDE	DATE COM-PLETED	DEPTH OF WELL (FT.)	CASING AND SCREEN DATA: CASING OR SCREEN	DIAM-ETER (IN.)	TOP DEPTH (FT.)	BOT DEPTH (FT.)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (FT.)	WATER LEVEL: MEASURE-MENT FROM LSD (FT.)	DATE	METHOD OF LIFT AND POWER	USE OF WATER	REMARKS
65-28-603 (Continued)																with 41 ft drawdown when drilled.
65-28-604	Thunderbird Utilities District; Thunderbird	293434	953115	1975	1326					121EVGL	75	-202.00	06-24-1975	T E 100.00	P	332 ft of screen from 626 to 1299 ft. Reported yield 757 gpm with 30 ft drawdown when drilled. Thunderberd North Subdivision.
65-28-605	Ft.Bend County MUD 45	293328	953014	1983	1000					121EVGL	72	-243.50 -238.83	03-13-1986 02-03-1987		P	
65-28-606	HOUSTON INTERNATIONAL TELEPORT	293737	953459	1985	80					112CHCT	85			S E	N	
65-28-701	Humble Oil & Ref	293209	953612	1947	523					112CHCTL	65	-35.50 -35.90	05-01-1947 12-30-1948	N	U	
65-28-702	Glen R. Shultz	293229	953528	1974	247					112CHCTL	65	-68.00	05-16-1975		H → domestic	Casing slotted from 236 to 246 ft.
65-28-703	Lee M. Brawner	293219	953519	1973	300					112CHCTL	65			E	H → domestic	
65-28-704	John B. Hasty	293225	953524	1976	233					112CHCTL	65	-62.00	11-20-1976	S E	H	Casing slotted from 233 to 233 ft.
65-28-705	Robert C. Newton	293222	953524	1976	237					112CHCTL	66	-61.00	02-08-1976	S E	H	Casing slotted from 227 to 237 ft.
65-28-706	Mr. Newberne	293226	953523	1976	250					112CHCTL	64	-64.00	11-13-1976	S E	H	Casing slotted from 240 to 250 ft.
65-28-707	Charles J. Shuman	293228	953523	1976	303					112CHCTL	60	-66.00	08-21-1976	S E	H	Casing slotted from 293 to 303 ft.
65-28-708	Bill Cayan	293229	953523	1974	239					112CHCTL	62	-65.00	01-21-1974	S E	H	Casing slotted from 227 to 239 ft.
65-28-709	Drake Williams	293226	953527	1976	303					112CHCTL	63	-64.00	04-15-1976	S E	H	Casing slotted from 293 to 303 ft.
65-28-710	Peter Mellan	293224	953527	1976	242					112CHCTL	66	-64.00	07-06-1976	S E	H	Casing slotted from 232 to 242 ft.

RECORDS OF WELLS, SPRINGS, AND TEST HOLES
COUNTY · Fort Bend

WELL	OWNER	LATITUDE	LONGITUDE	DATE COM-PLETED	DEPTH OF WELL (FT.)	CASING AND SCREEN DATA: CASING OR SCREEN	DIAM-ETER (IN.)	TOP DEPTH (FT.)	BOT DEPTH (FT.)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (FT.)	WATER LEVEL: MEASURE-MENT FROM LSD (FT.)	DATE	METHOD OF LIFT AND POWER	USE OF WATER	REMARKS
65-29-402	United Salt Corp	293345	952845	1956	488					112CHCTL	74		· ·	N	U	
													· ·			
65-29-403	Gulf Pipeline Co	293453	952754	1920	665					112CHCTL	72	-45.30	12-06-1938	A	N	
												-124.40	06-17-1955			
65-29-404	State Prison	293454	952931	1925	600					112CHCTL	83		· ·	A	U	
													· ·			
65-29-405	Blue Ridge Elem.School	293453	952835	1968	565					112CHCTL	72	-193.00	08-0 -1968	S E	P	
												-231.97	01-17-1996	5.00		
65-29-406	Capitol City Broad-casing Corp	293345	952845	1954	333					112CHCTL	71	-83.00	08-0 -1954	T E	N	
													· ·	5.00		
65-29-407	Houston Gun club	293428	952744	1956	100					112CHCTU	68	-13.30	11-21-1968	S E	I	
												-14.10	02-07-1986	3.00		
65-29-408	United Salt Corp	293451	952907	1965	488					112CHCTL	74	-208.00	11-0 -1967	S E	N	
													· ·	5.00		
65-29-501	Anchor Wate co	293450	952559	1958	355					112CHCTL	66	-109.00	0 -0 -1959	S E	U	
													· ·	3.00		
65-29-502	Retzloff Chemical co	293459	952557	1957	90					112CHCTU	66		· ·	N	U	
													· ·			
65-29-503	Retzloff Chemical	293454	952616		180					112CHCTU	66		· ·	S E	N	
													· ·	5.00		
65-29-504	Dr.J.R. McIntyre	293454	952610	1946	235					112CHCTL	65		· ·	J E	H	
													· ·	1.50		
65-29-505	Charles A. Bahr	293251	952722	1947	110					112CHCTU	76	-13.50	11-14-1968	C E	H S	
													· ·	0.75		
65-29-506	Troy Construction Co	293458	952615	1964	354					112CHCTL	65	-115.00	05-01-1964	S E	N	
													· ·	2.00		
65-29-507	Ted Oliver	293457	952610		32					112CHCTU	65	-10.60	11-15-1968	J E	H	
													· ·	0.50		

OMIT Sections 65-29

RECORDS OF WELLS, SPRINGS, AND TEST HOLES
COUNTY - Fort Bend

WELL	OWNER	LATITUDE	LONGITUDE	DATE COM-PLETED	DEPTH OF WELL (FT.)	CASING AND SCREEN DATA: CASING OR SCREEN	DIAM-ETER (IN.)	TOP DEPTH (FT.)	BOT DEPTH (FT.)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (FT.)	WATER LEVEL: MEASURE-MENT FROM LSD (FT.)	DATE	METHOD OF LIFT AND POWER	USE OF WATER	REMARKS
65-35-103	--Davis	292834	954435	1949	3469					NOT-APPL			- -			
65-35-201	George Ranch	292937	954104	1956	884					121EVGL	75	-73.00 -84.80	07-31-1956 01-23-1969	N 30.00	U	
65-35-202	Percy Gonyo	292747	954143	1925	85					112CHCTU	74	-15.00	0 -0 -1936	N	U	
65-35-203	George Ranch	292950	954046	1978	240	C S	4 3	0 214	212 234	112CHCT	72	-52.00	10-10-1978	S E	H	
65-35-301	Humble Oil & Ref	292947	953853	1946	302					112CHCTL	61	-12.10 -18.20	04-30-1947 09-06-1949	N	U	
65-35-302	Houston Lt. & Pwr	292903	953755	1956	702					112CHCTL	74	-54.00 -12.60	04-0 -1956 12-13-1995	S E 25.00	N	
65-35-303	Houston Ltg & Pwr	292853	953813	1956	803					112CEVG	72	-63.00 -12.40	04-16-1956 12-13-1995	T E 125.00	N	
65-35-304	A.P. George	292859	953805	1967	853					112CEVG	70	-100.00 -140.00	02-08-1967 12-13-1995	S E 60.00	N	
65-35-305	A.P. George	292947	953851	1946	8147					NOT-APPL			- -			
65-35-306	Houston Lighting and Power Co. Well 4	292838	953754	1975	851					112CEVG	70	-120.00	10-22-1975		N	200 ft of screen from 460 to 832 ft. Reported yield 1500 gpm with 58 ft drawdown when drilled.
65-35-307	Houston Lighting and Power Co., Well 6	292819	953855	1979	850					112CHCT	70	-115.00	06-07-1979	T E	N	255 ft of screen from 400 to 835 ft. Reported yield 2030 gpm with 40 ft drawdown drilled.
65-35-308	HOUSTON LIGHTING AND P OWER CO	292855	953809	1981	859					121EVGL	71	-129.00	01-14-1981	T E	N	
65-35-501	Slavik Estate	292707	954039	1910	85					112CHCTU	66		- -	N	U	

RECORDS OF WELLS, SPRINGS, AND TEST HOLES
COUNTY - Fort Bend

WELL	OWNER	LATITUDE	LONGITUDE	DATE COM-PLETED	DEPTH OF WELL (FT.)	CASING AND SCREEN DATA: CASING OR SCREEN	DIAM-ETER (IN.)	TOP DEPTH (FT.)	BOT DEPTH (FT.)	WATER BEARING UNIT	ALTITUDE OF LAND SURFACE (FT.)	WATER LEVEL: MEASURE-MENT FROM LSD (FT.)	DATE	METHOD OF LIFT AND POWER	USE OF WATER	REMARKS
65-36-202	H.M. Naylor Oil Co	292913	953407	1938	400					112CHCTL	58		- - - -	N	U	
65-36-203	The Texas Co	292808	953434	1932	600					112CHCTL	58	-9.00 -77.30	0 -0 -1940 02-01-1967	N	U	
65-36-204	Houston Oilfield Eq.Co	292839	953408	1932	150					112CHCTU	58	-16.20 -47.00	04-29-1947 01-27-1966	N	U	
65-36-205	Chicago corp	292924	953330	1939	400					112CHCTL	60	-22.40	12-30-1948 - -	N	U	
65-36-206	Gulf Oil Corp	292953	953324	1939	420					112CHCTU	59	-66.30	10-10-1968 - -	J E 0.75	S	
65-36-207	Chicago Corp	292933	953353	1943	400					112CHCTL	58	-21.00 -76.97	0 -0 -1945 01-18-1996	P E 0.25	N	
65-36-208	CHAMPLIN PETROLEUM	292939	953436	1984	348					112CHCTL	62	-80.00	12-04-1988 - -	S E	H	
65-36-209	Champlin Petroleum	292931	953338	1976	345					112CHCTL	58	-79.50 -78.96	02-13-1987 01-18-1996	A	U	
65-36-210		292816	953429		345					112CHCTL	57	-74.50	02-12-1987 - -		U N	
omit → 65-36-301	T.H. Scanlon Est.	292929	953111		522					112CHCTL	60		- - - -	N	U	
65-36-401	Lockwood & Sharp	292718	953639	1955	9021					NOT-APPL			- - - -			
65-36-501	Humble Oil & Ref	292727	953457	1932	534					112CHCTL	66	-29.70	04-29-1947 - -	N	U	
65-36-502	Humble Oil & Ref	292726	953457	1945	503					112CHCTL	66	-74.60	01-28-1969 - -	N	U	
65-36-503	Humble Oil & Ref	292727	953457	1945	495					112CHCTL	66		- - - -	S E 3.00	N	

TEXAS WATER DEVELOPMENT BOARD
GROUND WATER DATA SYSTEM

TABLE OF AQUIFER CODES AND AQUIFER NAMES USED
COUNTY - Fort Bend

USGS CODE	AQUIFER NAME
112CEVG	CHICOT AND EVANGELINE AQUIFERS
112CHCT	CHICOT AQUIFER
112CHCTL	CHICOT AQUIFER,LOWER
112CHCTU	CHICOT AQUIFER,UPPER
112GLFC	GULF COAST AQUIFER
121EVGL	EVANGELINE AQUIFER
NOT-APPL	AQUIFER CODE IS NOT APPLICABLE TO THIS WELL

REFERENCE 34

RECORD OF COMMUNICATION Reference 25	[xx] Phone Call	[ ] Discussion	[ ] Field Trip
	[ ] Conference	[ ] Other (specify)	

(Record Of Item Checked Above)

TO:	FROM:	DATE: 4-6-90
Brad Cross Wellhead Protection Program, Texas Water Commission 512-371-6319	Carol Cox FIT Env. Scientist EPA Region VI ICF Technology 214-744-1641	TIME: 2:45 p.m.

SUBJECT: Wellhead Protection For Southern Fort Bend County, Texas

SUMMARY OF COMMUNICATION:

No well heads south of Myer Intermediate School, Highway 365 south of Rosenburg are protected under the Texas Wellhead Protection Program. The school lies approximately ten miles northwest of Thompsons, Texas.

Carol Cox

EPA Form 1300-6 (7-72)
Replaces EPA HQ Form 5300-3 Which May Be Used Until Supply Is Exhausted.

REFERENCE 35

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

FORT BEND COUNTY, TEXAS AND CERTAIN POLITICAL DISTRICTS

COMMUNITY NAME	COMMUNITY NUMBER
(UNINCORPORATED AREAS)	480228

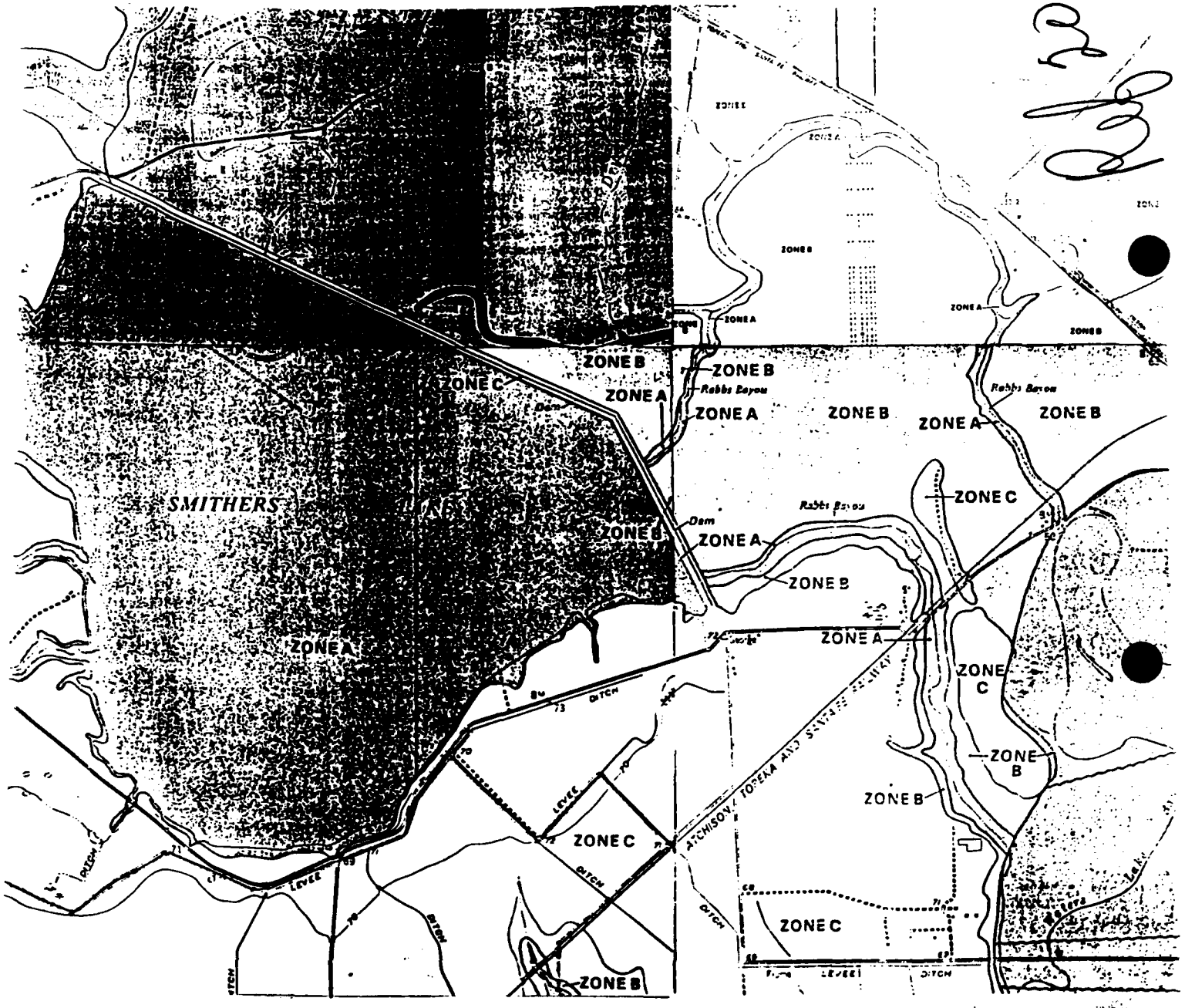
PANEL 245 OF 550

(SEE MAP INDEX FOR PANELS NOT PRINTED)

MAP PANEL NUMBER
480228 0245 B

EFFECTIVE DATE:
AUGUST 5, 1986

Federal Emergency Management Agency



REFERENCE 36

U.S. DEPARTMENT OF COMMERCE
Frank H. Douglas, Secretary

WEATHER BUREAU
F. W. Reichelderfer, Chief

Reference 4

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture

NOTICE
Rainfall frequency information for durations of 1 hour and less for the Central and Eastern States has been superseded by NOAA Technical Memorandum NWS HYDRO-35 Five to Sixty-Minute Precipitation Frequency for the Eastern and Central United States. This publication (Accession No. PB 272-112/AS) is obtainable from:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

WASHINGTON, D.C.

THIS ATLAS IS OBSOLETE FOR THE FOLLOWING 11 WESTERN STATES: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

NOAA ATLAS 2: PRECIPITATION-FREQUENCY ATLAS OF THE WESTERN UNITED STATES (GPO: 11 Vols., 1973) supersedes the Technical Paper 40 data for these states.

All but 3 of the 11 state volumes are out of print, and no reprint is presently planned.

Institutions in the eleven western states likely to have copies of these volumes for their state for public inspection are:

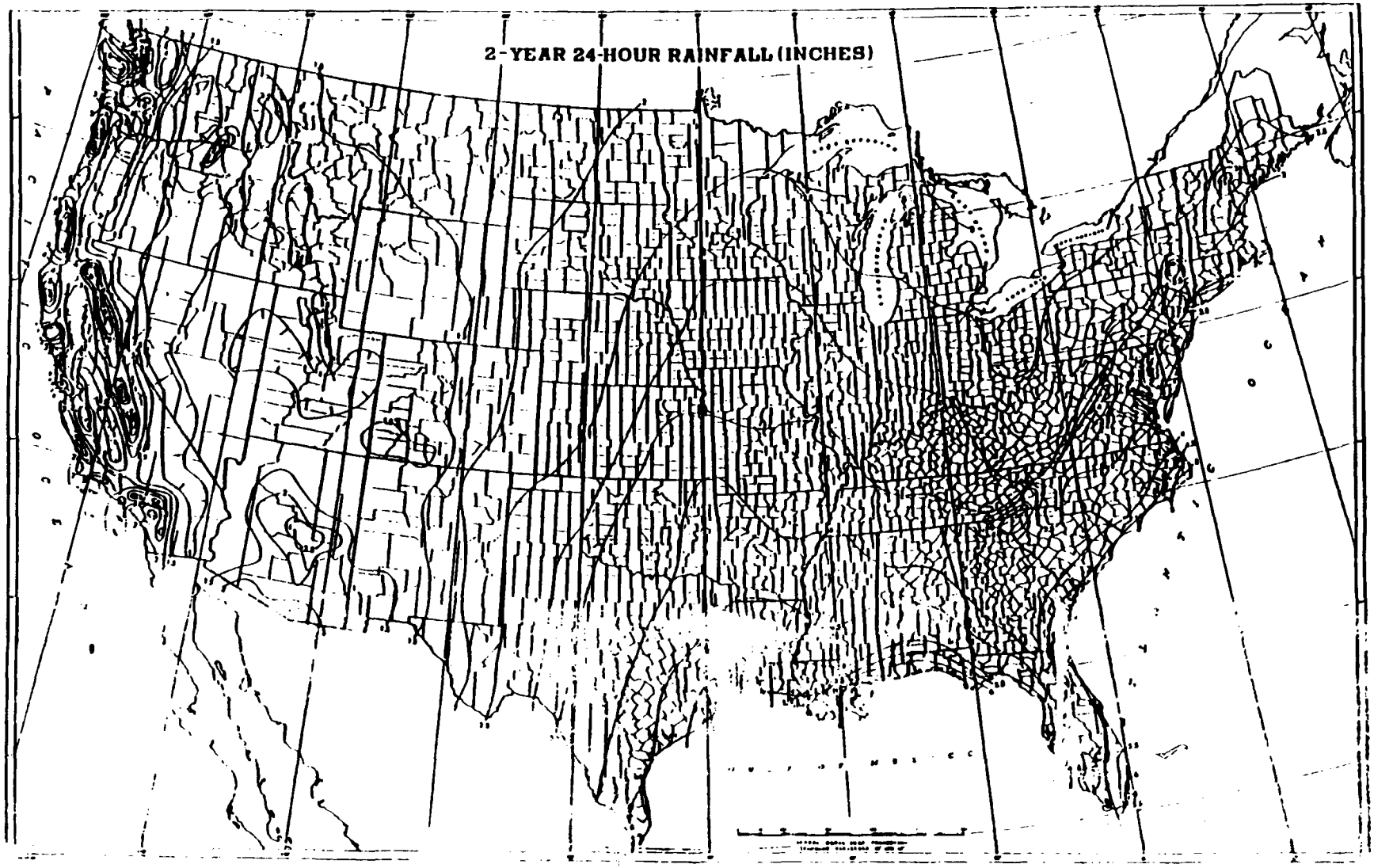
US Department of Agriculture Soil Conservation Service Offices
US Army Corps of Engineers Offices
Selected University Libraries
National Weather Service Offices (may also have volumes for adjacent states).
National Weather Service Forecast Offices (may have all eleven volumes)

Elsewhere, libraries of universities where hydrology and meteorology degree programs are offered may shelve some of the eleven volumes.

The three volumes in print as of 1 Jan 1983 at the GPO are:

Vol	State	GPO Stock Number	Price
IV	New Mexico	003 017-00158 0	$10.00
VI	Utah	003-017 00160 1	12.00
VII	Nevada	003 017-00161-0	9.50

[illegible] for VISA and MASTERCARD orders which


2-YEAR 24-HOUR RAINFALL (INCHES)

REFERENCE 37

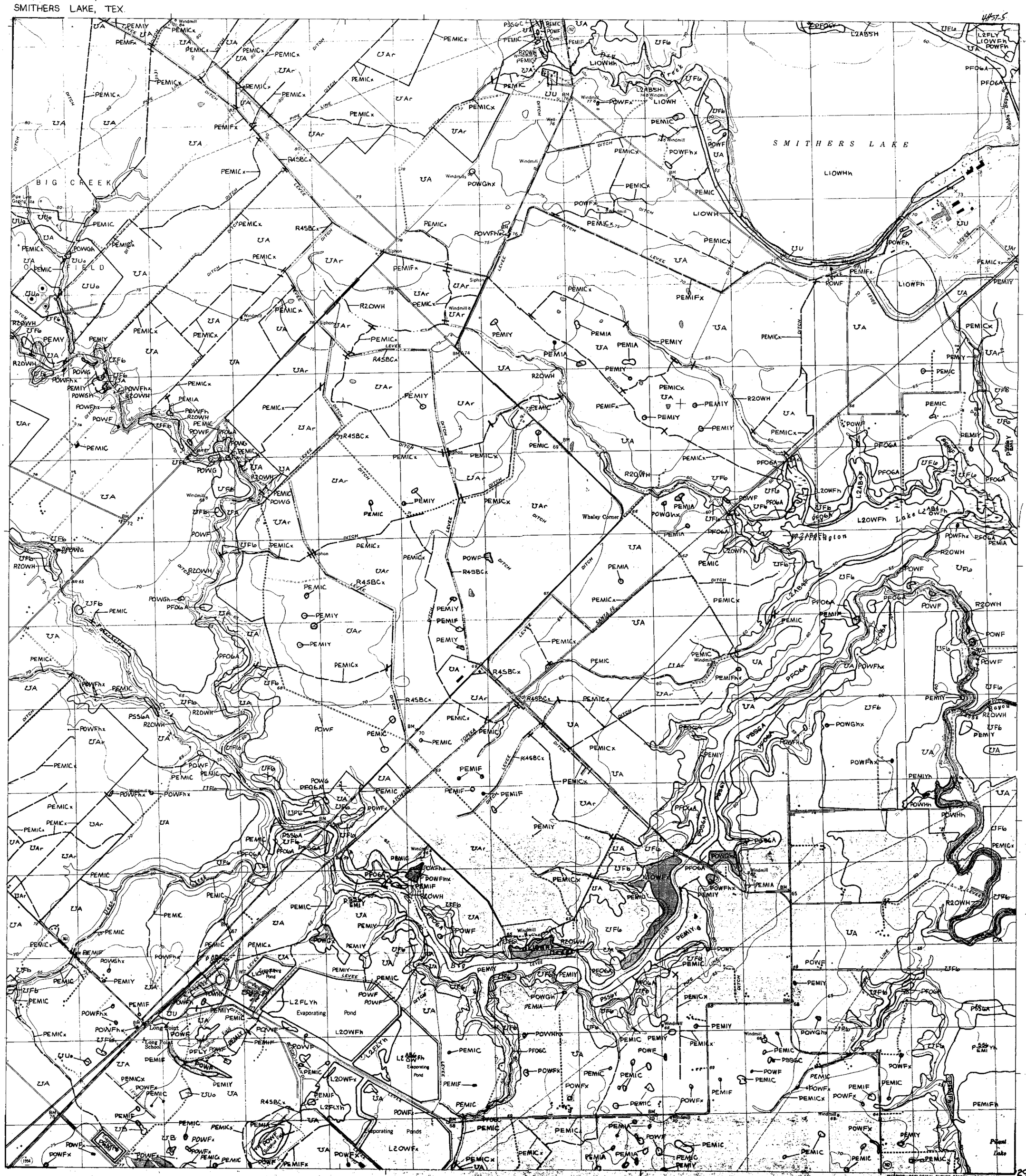
F 14064C-D

NATIONAL WETLANDS INVENTORY

UNITED STATES DEPARTMENT OF THE INTERIOR

SMITHERS LAKE, TEX.

SMITHERS LAKE, TEX.



HOUSTON SW
ANGLETON

SMITHERS LAKE, TEX.

SCALE 1:24 000

Other information concerning the wetland resources depicted on this document may be available. For information, contact:
Regional Director (ARDE) Region II
U.S. Fish and Wildlife Service
P.O. Box 1306
Albuquerque, New Mexico 87103

For information on obtaining copies of map, contract:

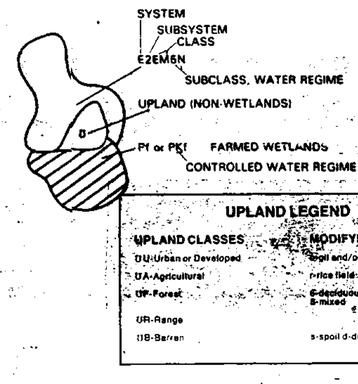
Information Transfer Specialist
National Coastal Ecosystems Team
U.S. Fish and Wildlife Service
1010 Gause Blvd.
Slidell, LA 70458

SPECIAL NOTE

This document was prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands were identified on the photographs based on vegetation, visible hydrology, and geography in accordance with **Classification of Wetlands and Deep-Water Habitats of the United States** (An Operational Draft), Cowardin, et al, 1977. The aerial photographs typically reflect conditions during the specific year and season when they were taken. In addition, there is a margin of error inherent in the use of the aerial photographs. Thus, a detailed on the ground and historical analysis of a single site may result in a revision of the wetland boundaries established through photographic interpretation. In addition, some small wetlands and those obscured by dense forest cover may not be included on this document.

Federal, State and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, State or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, State or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

SYMBOLOGY EXAMPLE



NOTES TO THE USER

- Wetlands which have been field examined are indicated on the map by an asterisk (*).
- Dominance type (either vegetative or sedentary animal) can be added to the map by the interested user.
- Additions or corrections to the wetlands information displayed on this map are solicited. Please forward such information to the address

AERIAL PHOTOGRAPHY

DATE: 11 / 1 /79
SCALE: 1:65 000
TYPE: CIR
DATE: / /
SCALE:
TYPE:
DATE: / /
SCALE:
TYPE:

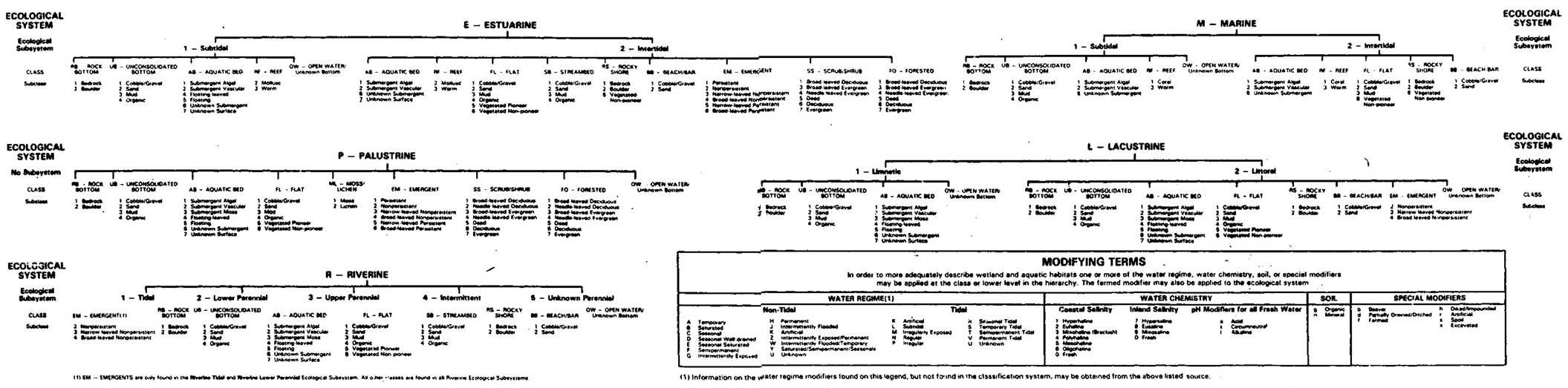
U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Prepared by Office of Biological Services
for the National Wetlands Inventory
and the National Coastal Ecosystems Team
Sponsored by the Minerals Management Service
U.S. Department of the Interior
Gulf of Mexico OCS Office
Metairie, Louisiana

Photointerpretation by:
Texas A&M University
College Station, Texas

WETLAND LEGEND

U – Primarily represents upland areas, but may include unclassified wetlands such as man-modified areas, non photo-identifiable areas and/or unintentional omissions.



MODIFYING TERMS

In order to more adequately describe wetland and aquatic habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system

WATER REGIME(1)		WATER CHEMISTRY			SOIL	SPECIAL MODIFIERS
Non-Tidal	Tidal	Coastal Salinity	Inland Salinity	pH Modifiers for all Fresh Water		
A Temporary B Saturated C Seasonal D Seasonal Well drained E Seasonal Saturated F Semipermanent G Intermittently Exposed	H Permanent J Intermittently Flooded K Artificial Z Intermittently Exposed/Permanent W Intermittently Flooded/Temporary Y Saturated/Semipermanent/Seasonal U Unknown	K Artificial L Subtidal M Irregularly Exposed N Regular P Irregular R Seasonal Tidal S Temporary Tidal T Semipermanent Tidal V Permanent Tidal U Unknown	1 Hyperhaline 2 Euhaline 3 Mixohaline (Brackish) 4 Polyhaline 5 Mesohaline 6 Oligohaline 0 Fresh	7 Hypersaline 8 Eusaline 9 Mixosaline 0 Fresh	a Acid t Circumneutral i Alkaline	b Beaver d Partially Drained/Ditched f Farmed	h Diked/Impounded r Artificial s Spoil x Excavated

(1) Information on the water regime modifiers found on this legend, but not found in the classification system, may be obtained from the above listed source.

(1) EM – EMERGENTS are only found in the Riverine Tidal and Riverine Lower Perennial Ecological Subsystem. All other classes are found in all Riverine Ecological Subsystems.

AF 14064C-D

NATIONAL WETLANDS INVENTORY

UNITED STATES DEPARTMENT OF THE INTERIOR

THOMPSONS, TEX.

THOMPSONS, TEX.

HOUSTON SW
ANGLETON

THOMPSONS, TEX.

SCALE 1:24 000

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SYMBOLOGY EXAMPLE

SYSTEM
SUBSYSTEM
CLASS
E2EM5N
SUBCLASS, WATER REGIME
UPLAND (NON-WETLANDS)
PI or PKf FARMED WETLANDS
CONTROLLED WATER REGIME

UPLAND LEGEND

UPLAND CLASSES	MODIFYING TERMS
UU-Urban or Developed	o-oil and/or gas
UA-Agricultural	r-rice field
UF-Forest	d-deciduous 7-evergreen 8-mixed
UR-Range	
UB-Barren	s-spoil d-dune

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- Dominance type (either vegetative or sedentary animal) can be added to the map by the interested user.
- Additions or corrections to the wetlands information displayed on this map are solicited. Please forward such information to the address indicated.
- Some areas designated R4SB, R4SBW, or R4SBJ (intermittent streams) may not meet the definition of wetlands.

AERIAL PHOTOGRAPHY

DATE: 11 / /79
SCALE: 1:65 000
TYPE: COLOR
DATE: / /
SCALE:
TYPE:
DATE: / /
SCALE:
TYPE:

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

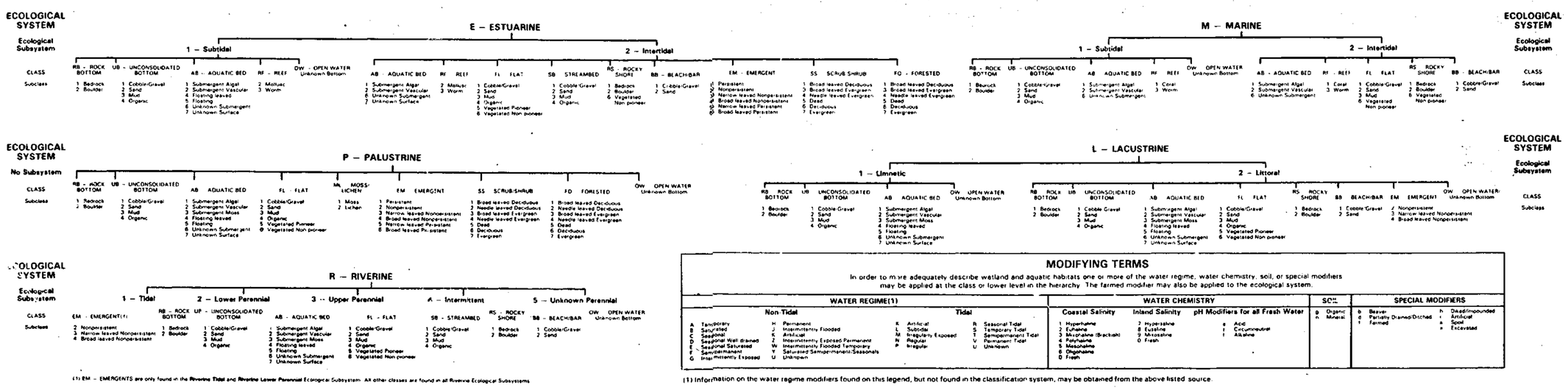
Prepared by Office of Biological Services for the National Wetlands Inventory and the National Coastal Ecosystems Team

Sponsored by the Minerals Management Service
U.S. Department of the Interior
Gulf of Mexico OCS Office
Metairie, Louisiana

Photointerpretation by:
Texas A&M University
College Station, Texas

WETLAND LEGEND

U – Primarily represents upland areas, but may include unclassified wetlands such as man-modified areas, non photo-identifiable areas and/or unintentional omissions.



MODIFYING TERMS

In order to more adequately describe wetland and aquatic habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

WATER REGIME(1)		WATER CHEMISTRY			SOIL	SPECIAL MODIFIERS
Non-Tidal	Tidal	Coastal Salinity	Inland Salinity	pH Modifiers for all Fresh Water		
A Temporary	H Permanent	1 Hyperhaline	7 Hyperhaline	a Acid	o Organic	b Beaver
B Saturated	J Intermittently Flooded	2 Euhaline	8 Euhaline	c Circumneutral	n Mineral	d Partially Drained/Ditched
C Seasonal	K Artificial	3 Mesohaline (Brackish)	9 Mixohaline	i Alkaline		f Farmed
D Seasonal Well Drained	Z Intermittently Exposed Permanent	4 Polyhaline	0 Fresh			h Diked/Impounded
E Seasonal Saturated	W Intermittently Flooded Temporary	5 Mesohaline				r Artificial
F Semipermanent	Y Saturated Semipermanent/Seasonal	6 Oligohaline				s Spoil
G Intermittently Exposed	U Unknown	0 Fresh				x Excavated

(1) Information on the water regime modifiers found on this legend, but not found in the classification system, may be obtained from the above listed source.

(1) EM – EMERGENTS are only found in the Riverine Tidal and Riverine Lower Perennial Ecological Subsystem. All other classes are found in all Riverine Ecological Subsystems.

REFERENCE 38

TEXAS PARKS AND WILDLIFE DEPARTMENT
ENDANGERED RESOURCES BRANCH
SPECIAL SPECIES LIST
FORT BEND COUNTY

Revised:
97-04-11

Scientific Name	Common Name	Federal Status	State Status
*** AMPHIBIANS			
BUFO HOUSTONENSIS	HOUSTON TOAD	LE	E
*** BIRDS			
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	LE	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	E/SA	T
GRUS AMERICANA	WHOOPING CRANE	LE	E
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	LT	T
MYCTERIA AMERICANA	WOOD STORK		T
NUMENIUS BOREALIS	ESKIMO CURLEW	LE	E
PELECANUS OCCIDENTALIS	BROWN PELICAN	LE	E
PLEGADIS CHIHI	WHITE-FACED IBIS		T
TYMPANUCHUS CUPIDO ATTWATERI	ATTWATER'S GREATER PRAIRIE-CHICKEN	LE	E
*** MAMMALS			
URSUS AMERICANUS	BLACK BEAR	T/SA	T
*** REPTILES			
CROTALUS HORRIDUS	TIMBER/CANEBRAKE RATTLESNAKE		T
GOPHERUS BERLANDIERI	TEXAS TORTOISE		T
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD		T
*** VASCULAR PLANTS			
HYMENOXYS TEXANA	TEXAS PRAIRIE DAWN	LE	E
LEITNERIA FLORIDANA	CORKWOOD		

Codes:
- LE,LT - Federally Listed Endangered/Threatened
- PE,PT - Federally Proposed Endangered/Threatened
- E/SA,T/SA - Federally Endangered/Threatened by Similarity of Appearance
- C1 - Federal Candidate, Category 1; information supports proposing to list as endangered/threatened
- DL,PDL - Federally Delisted/Proposed Delisted
- E,T - State Endangered/Threatened

Species appearing on these lists do not all share the same probability of occurrence within a county. Some species are migrants or wintering residents only. Additionally, a few species may be historic or considered extirpated within a county. Species considered extirpated within the state are so flagged on each list. Each county's revised date reflects the last date any changes or revisions were made for that county, to reflect current listing statuses and taxonomy.

3 pages
Fort Bend
713-981-6959
by page

COUNTY LISTS OF TEXAS' SPECIAL SPECIES

Includes: * Vertebrates, Invertebrates, and Vascular Plants on Texas Biological and Conservation Data System's (TXBCD) special species lists--e.g., species/subspecies/variety has federal listed, proposed, or candidate status, state listed status, or species/subspecies/variety carries global rarity rank placing it on special species lists
* Colonial Waterbird Nesting Areas and Migratory Songbird Fallout Areas--only for coastal counties

Excludes: * Natural Plant Communities--e.g., Little Bluestem-Indiangrass Series (native prairie remnant), Water Oak-Willow Oak Series (bottomland hardwood community), Saltgrass-Cordgrass Series (salt or brackish marsh), Sphagnum-Beakrush Series (seepage bog)
* Other Significant Features--e.g., non-coastal bird rookeries and migratory bird information, bat roosts, bat caves, invertebrate caves, prairie dog towns

Revised Dates: Each county's revised date reflects the last date any changes or revisions were made for that county, to reflect current listing statuses and taxonomy.

Parameters: Species appearing on these lists do not all share the same probability of occurrence within a county. Some species are migrants or wintering residents only. Additionally, a few species may be historic or considered extirpated within a county. Species considered extirpated within the state are so flagged on each list, and include: Margay, Gray Wolf, Red Wolf, Ivory-billed Woodpecker, Bachman's Warbler, San Marcos Gambusia, Blotched Gambusia, Rio Grande Silvery Minnow, and Bluntnose Shiner.

Background and Utility: * The TXBCD, established in 1983, is the state's most comprehensive source of information on rare, threatened, and endangered plants and animals, exemplary natural communities, and other significant features. The TXBCD is constantly updated, providing current information on the statewide status and locations of these unique "elements" of natural diversity, which are special species, natural communities, and other significant features.

* The TXBCD gathers biological information from museum and herbarium collection records, publications, experts in the scientific community, organizations, individuals, and on-site field surveys conducted by staff on public lands or on private lands with written permission. Staff botanists, zoologists, and ecologists perform field surveys to locate and verify specific occurrences of biological elements of the highest priority and collect accurate information on their condition, quality, and management needs.

----- continued -----

* The TXBCD can be used to help evaluate the environmental impact of routing and siting options for development projects. It also assists in impact assessment, environmental review, and permit review. Approximately 300 project reviews of these types are performed each month.

To Request Project Review: * A site-specific review can provide information on special species, natural communities, and other significant features occurring or potentially occurring in the general vicinity of a project. Species information, such as known habitats and breeding/flowering periods, are generally noted in responses.

* For site-specific project review contact the TXBCD's Environmental Review Coordinator at 512/912-7058 (fax), shannon.breslin@tpwd.state.tx.us (email), 3000 South IH-35, Suite 100, Austin, Texas 78704 (mail), or 512/912-7021 (phone) and provide the following:
  >> description of project and its scope,
  >> physical description of natural features of site,
  >> current condition and/or past site use, and
  >> a map depicting the project's precise geographic location (please include copy from USGS 7.5' topographic quadrangle with project boundaries clearly noted, plus quad and county name; in lieu of topo, a county or other precise map will suffice if detailed directions allow us to locate the site on our topos).

* Please allow up to 4 weeks for review, longer for large projects.

Disclaimer: The TXBCD information is based on the best data currently available to the State regarding threatened, endangered, or otherwise sensitive species. However, the TXBCD cannot provide a definite statement as to the presence, absence, or condition of special species, natural communities, or other significant features in any area, nor can it substitute for on-site evaluation by qualified biologists. It is intended to assist the user in avoiding harm to species that may occur.

Citation: Please use the following citation to credit the TXBCD as the source for this county level information.

> Texas Biological and Conservation Data System. Texas Parks and Wildlife Department, Endangered Resources Branch. County Lists of Texas' Special Species. (county name(s) and revised date(s)).

REFERENCE 39

TX0021

SOIL INTERPRETATIONS RECORD

MLRA(S): 150A

BERNARD SER

REV. JDC,LCB, 6-81

VERTIC ARGIAQUOLLS, FINE, MONTMORILLONITIC, THERMIC

THE BERNARD SERIES IS A SOMEWHAT POORLY DRAINED, VERY SLOWLY PERMEABLE, UPLAND SOIL. IT HAS A SLIGHTLY ACID, VERY DARK GRAY CLAY LOAM SURFACE AND A VERY DARK GRAY CLAY SUBSOIL THAT IS SLIGHTLY ACID IN THE UPPER PART AND NEUTRAL TO MODERATELY ALKALINE IN THE LOWER PART. SLOPES RANGE FROM 0 TO 5 PERCENT, BUT ARE MAINLY LESS THAN 1 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-6	CL, L, FSL	CL	A-6, A-7	0	100	98-100	90-100	80-95	30-49	12-2
6-60	C, SIC, CL	CL, CH	A-7	0	98-100	98-100	90-100	90-100	41-70	22-4
60-78	SIC, SICL, CL	CL, CH	A-7	0	100	93-100	90-100	75-90	41-65	25-4

DEPTH (IN.)	CLAY (PCT)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS K	T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CONCRETE
0-6	15-35	1.20-1.45	0.06-0.2	0.15-0.20	5.6-7.3	-	MODERATE	.32	5	-	2-6	HIGH	LOW
6-60	35-60	1.20-1.45	<0.06	0.12-0.18	5.6-7.8	-	HIGH	.32					
60-78	30-60	1.30-1.50	<0.06	0.15-0.20	6.6-8.4	-	HIGH	.32					

FLOODING FREQUENCY	DURATION	MONTHS	HIGH WATER TABLE DEPTH (FT)	KIND	MONTHS	CEMENTED PAN DEPTH (IN)	HARDNESS	BEDROCK DEPTH (IN)	HARDNESS	SUBSIDENCE INIT. (IN)	TOTAL (IN)	HYD GRP	POTENTIAL FROST ACTION
NONE-RARE			0-3.0	APPARENT	DEC-FEB	-		260		-		D	-

SANITARY FACILITIES (B)

SEPTIC TANK ABSORPTION FIELDS	SEVERE-WETNESS,PERCS SLOWLY
SEWAGE LAGOON AREAS	SLIGHT
SANITARY LANDFILL (TRENCH)	SEVERE-WETNESS,TOO CLAYEY
SANITARY LANDFILL (AREA)	SEVERE-WETNESS
DAILY COVER FOR LANDFILL	POOR-TOO CLAYEY,HARD TO PACK,WETNESS

BUILDING SITE DEVELOPMENT (B)

SHALLOW EXCAVATIONS	SEVERE-WETNESS
DWELLINGS WITHOUT BASEMENTS	NONE: SEVERE-WETNESS,SHRINK-SWELL RARE: SEVERE-FLOODING,WETNESS,SHRINK-SWELL
DWELLINGS WITH BASEMENTS	NONE: SEVERE-WETNESS,SHRINK-SWELL RARE: SEVERE-FLOODING,WETNESS,SHRINK-SWELL
SMALL COMMERCIAL BUILDINGS	NONE: SEVERE-WETNESS,SHRINK-SWELL RARE: SEVERE-FLOODING,WETNESS,SHRINK-SWELL
LOCAL ROADS AND STREETS	SEVERE-LOW STRENGTH,WETNESS,SHRINK-SWELL
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	SEVERE-WETNESS

CONSTRUCTION MATERIAL (B)

ROADFILL	POOR-LOW STRENGTH,WETNESS,SHRINK-SWELL
SAND	IMPROBABLE-EXCESS FINES
GRAVEL	IMPROBABLE-EXCESS FINES
TOPSOIL	POOR-WETNESS,TOO CLAYEY

WATER MANAGEMENT (B)

POND RESERVOIR AREA	0-3%: SLIGHT 3-5%: MODERATE-SLOPE
EMBANKMENTS DIKES AND LEVEES	SEVERE-HARD TO PACK,WETNESS
EXCAVATED PONDS AQUIFER FED	SEVERE-SLOW REFILL
DRAINAGE	0-3%: PERCS SLOWLY 3+%: PERCS SLOWLY,SLOPE
IRRIGATION	0-3%: WETNESS,PERCS SLOWLY 3+%: WETNESS,PERCS SLOWLY,SLOPE
TERRACES AND DIVERSIONS	WETNESS,PERCS SLOWLY
GRASSED WATERWAYS	WETNESS,PERCS SLOWLY

REGIONAL INTERPRETATIONS

U.S.D.A. SOIL CONSERVATION SERVICE
HYDRIC SOILS IN
FORT BEND COUNTY AREA, TEXAS

JANUARY 14, 1992

MAP UNITS WITH A HYDRIC COMPONENT ARE LISTED FIRST FOLLOWED BY THE REMAINING MAP UNITS IN THE SURVEY AREA. THE "HYDRIC CRITERIA" COLUMN INDICATES WHAT CAUSED THE SOIL TO BE INCLUDED IN THE HYDRIC LIST. SEE THE "CRITERIA FOR HYDRIC SOILS" TO DETERMINE THE MEANING OF THIS COLUMN.

MAP SYMBOL	MAP NAME	HYDRIC COMPONENT	HYDRIC CRITERIA 1/	TOPOGRAPHIC LOCATION NOTES	HYDRIC INCLUSIONS	FARMED-NATURAL CONDITION Y/N	NO NA CON
Ba	BEAUMONT CLAY	BEAUMONT (TX0022)	2B3	NLU		YES	NO
Bg	BIBB FINE SANDY LOAM	BIBB (AL0033)	2B3,4	FP		NO	YE
Ca	CLODINE FINE SANDY LOAM	CLODINE (TX0025)	2B3	NLU		YES	NO
Ec	EDNA-WALLER COMPLEX	WALLER (TX0926)	2B3,3	DU		YES	NO
Kc	KATY-WALLER COMPLEX	WALLER (TX0926)	2B3,3	DU		YES	NO
Kd	KAUFMAN CLAY, FREQUENTLY FLOODED (KAMAN)	KAUFMAN (TX01125)	4	FP		NO	YE
Me	MILLER-ROEBUCK CLAY (BRAZORIA SUMPT)	ROEBUCK (SUMP, TX0796)	2B3,3,4	FP		NO	YE
Na	NAVASOTA-IUKA COMPLEX (GLADEWATER-NARATCHE)	NAVASOTA (GLADEWATER, TX0429)	2B3,4	FP		NO	YE
		IUKA (NARATCHE, TX0024)	2B3,4	FP		NO	YE
Ra	ROEBUCK CLAY (SUMPT)	ROEBUCK (SUMPT,TX0796)	2B3,3,4	DFP		NO	YE
Wa	WALLER SOILS	WALLER (TX0926)	2B3,3	DU		YES	NO
Wb	WALLER-KATY COMPLEX SLIGHTLY SALINE	WALLER (TX0926)	2B3,3	DU		YES	NO
Aa	ASA FINE SANDY LOAM						
Ab	ASA SILTY CLAY LOAM						
Ac	ASA-PLEDGER COMPLEX			DFP	SUMPT		
Bb	BERNARD CLAY LOAM, 0 TO 1 PERCENT SLOPES			DU	2/		
Bc	BERNARD-EDNA CLAY LOAMS, 1 TO 4 PERCENT SLOPES						
Bd	BERNARD-EDNA CLAY LOAMS, 4 TO 8 PERCENT SLOPES						
Be	BERNARD-EDNA COMPLEX, 0 TO 1 PERCENT SLOPES			DU	2/		
Ea	EDNA FINE SANDY LOAM, 0 TO 1 PERCENT SLOPES			DU	2/		
Eb	EDNA FINE SANDY LOAM, 1 TO 4 PERCENT SLOPES						
Fa	FULSHEAR FINE SANDY LOAM, 1 TO 4 PERCENT SLOPES						
Ha	HOCKLEY LOAMY FINE SAND, 1 TO 4 PERCENT SLOPES (MONAVILLE)						
Ka	KATY FINE SANDY LOAM, 0 TO 1 PERCENT SLOPES			DU	2/		
Kb	KATY FINE SANDY LOAM, 1 TO 4 PERCENT SLOPES						
Ke	KENNEY LOAMY FINE SAND, 0 TO 2 PERCENT SLOPES						
Kg	KENNEY LOAMY FINE SAND, 2 TO 6 PERCENT SLOPES						
Kh	KENNEY-FULSHEAR COMPLEX, 4 TO 8 PERCENT SLOPES						
La	LAKE CHARLES CLAY, 0 TO 1 PERCENT SLOPES			NLU	BEAUMONT		
Lb	LAKE CHARLES CLAY, 1 TO 4 PERCENT SLOPES						
Lc	LAKE CHARLES COMPLEX, 4 TO 8 PERCENT SLOPES						
Ma	MILLER CLAY (BRAZORIA)			DFP	SUMPT		
Mb	MILLER FINE SANDY LOAM, (CLEMVILLE)						
Mc	MILLER SILT LOAM, (BRAZORIA)			DFP	SUMPT		
Md	MILLER SILTY CLAY LOAM (BRAZORIA)			DFP	SUMPT		
Nb	NORWOOD CLAY (BELK)						
Nc	NORWOOD SILT LOAM						
Nd	NORWOOD SILTY CLAY LOAM						
Pa	PLEDGER CLAY			DFP	SUMPT		
Sa	SANDY ALLUVIAL LAND (TX8022)			DFP	ROEBUCK		
Sb	SLOPING ALLUVIAL LAND						
Wc	WASTE LAND						
Ya	YAHOLA FINE SANDY LOAM (OKLARED)						

1/ Soils with hydric criteria of 2A, 2B2, or 2B3 alone are hydric only because of saturation.
2/ This map unit may contain small areas of unnamed soils with hydric characteristics, generally in depressions or along drainageways.
NOTE: Information on the county hydric soil list is intended for land use planning, evaluating land use alternatives and planning site investigatio Because of map scale, small areas of dissimilar soils may be included within mapped areas of a named soil. Onsite investigations may be need for precise identification and delineation of hydric soil areas.

TOPOGRAPHIC LOCATION NOTES
DU---Depressional uplands
DFP--Depressional floodplains
FP---Floodplains
GSU--Gently sloping uplands
MUD--Mounded uplands
NLU--Nearly level uplands

CRITERIA FOR HYDRIC SOILS

1. All Histosols except Folists, or

2. Soils in Aquic suborder, Aquic subgroups, Albolls suborder, Salorthids great group, Pell great groups of Vertisols, Pachic subgroups, or Cumulic subgroups, that are:

   a. Somewhat poorly drained and have a frequently occurring water table at less than 0.5 ft from the surface for a significant period (usually more than 2 weeks) during the growing season, or

   b. poorly drained or very poorly drained and have either:

      (1) a frequently occurring water table at less than 0.5 ft from the surface for a significant period (usually more than 2 weeks) during the growing season if textures are coarse sand, sand, or fine sand in all layers within 20 in, or for other soils

      (2) a frequently occurring water table at less than 1.0 ft from the surface for a significant period (usually more than 2 weeks) during the growing season if permeability is equal to or greater than 6.0 in/h in all layers within 20 in, or

      (3) a frequently occurring water table at less than 1.5 ft from the surface for a significant period (usually more than 2 weeks) during the growing season if permeability is less than 6.0 in/h in any layer within 20 in, or

3. Soils that are frequently ponded for long duration or very long duration during the growing season, or

4. Soils that are frequently flooded for long duration or very long duration during the growin season.

Revised NTchs 9/27/90

REFERENCE 40

U.S. Department of Commerce
Economics and Statistics Administration
BUREAU OF THE CENSUS

CENSUS '90

1990 CPH-1-45

1990 Census of Population and Housing

Summary Population and Housing Characteristics

Texas

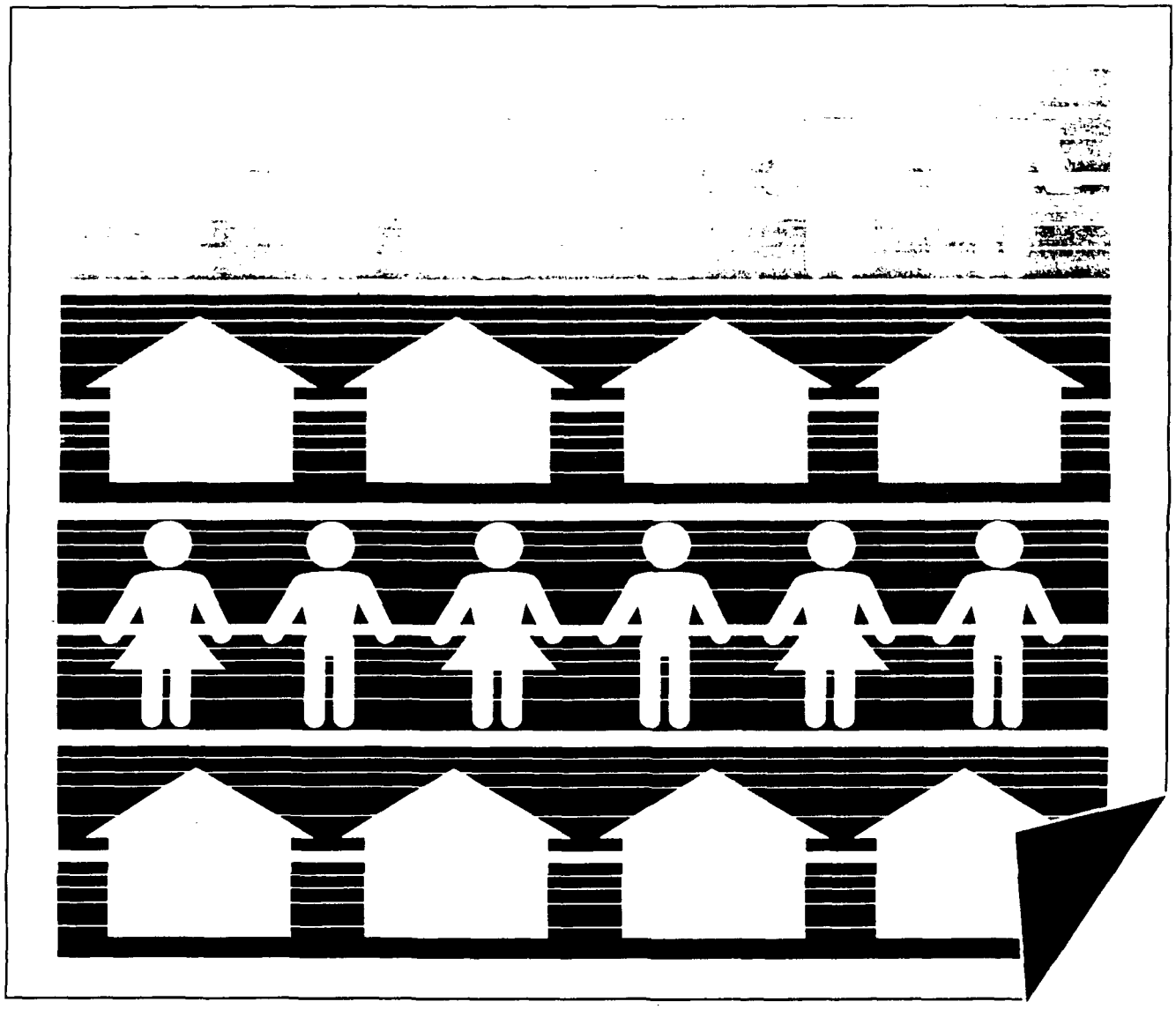


Table 5. **Household, Family, and Group Quarters Characteristics: 1990**—Con.

For definitions of terms and meanings of symbols, see text)

State / County / County Subdivision / Place	Persons in households	All households	Family households: Total	Family households: Married-couple family	Family households: Female householder, no husband present	Nonfamily households: Total	Nonfamily households: Householder living alone: Total	Nonfamily households: Householder living alone: 65 years and over: Total	Nonfamily households: Householder living alone: 65 years and over: Female	Persons per— Household	Persons per— Family	Persons in group quarters: Total	Persons in group quarters: Institutionalized persons	Persons in group quarters: Other persons in group quarters
El Paso County—Con.														
El Paso East division	50 108	12 298	11 146	9 184	1 498	1 152	989	373	262	4.07	4.31	101	23	78
Clint town	1 035	294	256	202	37	38	33	16	13	3.52	3.81	–	–	–
El Paso city (pt.)	1 909	600	524	456	59	76	63	8	4	3.18	3.44	65	–	65
Fabens CDP	5 599	1 425	1 278	959	263	147	133	75	49	3.93	4.20	–	–	–
Homestead Meadows CDP	4 978	1 205	1 107	937	108	98	74	12	8	4.13	4.31	–	–	–
Horizon City town	2 308	874	687	616	57	187	164	79	59	2.64	3.01	–	–	–
San Elizario CDP	4 385	1 004	934	751	129	70	66	24	16	4.37	4.55	–	–	–
Socorro town (pt.)	22 057	4 986	4 634	3 765	691	352	289	91	64	4.42	4.60	–	–	–
Sparks CDP	1 276	286	271	223	37	15	14	5	4	4.46	4.61	–	–	–
El Paso North Central division	9 807	2 732	2 621	2 481	110	111	106	–	–	3.59	3.68	4 480	189	4 291
El Paso city (pt.)	53	15	15	12	2	–	–	–	–	3.53	3.53	–	–	–
Fort Bliss CDP	9 698	2 702	2 592	2 457	108	110	106	–	–	3.59	3.68	4 217	–	4 217
El Paso Northwest division	21 312	5 977	5 041	4 150	691	936	783	267	187	3.57	3.94	1 245	1 209	36
Anthony town	2 083	597	490	403	66	107	102	59	40	3.49	3.97	1 245	1 209	36
Canutillo CDP	4 442	1 217	1 030	809	172	187	160	56	39	3.65	4.02	–	–	–
El Paso city (pt.)	9 990	2 943	2 456	2 045	332	487	385	104	80	3.39	3.75	–	–	–
Vinton village	605	184	149	121	18	35	32	17	10	3.29	3.75	–	–	–
Westway CDP	2 381	525	482	395	61	43	40	12	7	4.54	4.77	–	–	–
Erath County	26 526	10 877	7 014	5 973	761	3 863	3 086	1 332	1 099	2.44	3.04	1 465	489	976
Dublin division	4 884	1 852	1 340	1 141	156	512	470	293	243	2.64	3.16	145	145	–
Dublin city	3 045	1 216	831	687	118	385	363	251	212	2.50	3.12	145	145	–
Morgan Mill-Bluff Dale division	1 751	658	518	467	30	140	125	72	49	2.66	3.06	–	–	–
Stephenville division	18 425	7 799	4 715	3 968	548	3 084	2 385	921	778	2.36	3.02	1 320	344	976
Stephenville city	12 191	5 508	2 973	2 393	450	2 535	1 954	780	679	2.21	2.95	1 311	335	976
Stephenville South division	1 466	568	441	397	27	127	106	46	29	2.58	2.93	–	–	–
Falls County	16 434	6 492	4 477	3 399	860	2 015	1 900	1 175	945	2.53	3.14	1 278	1 278	–
Chilton division	2 304	851	643	543	71	208	196	110	84	2.71	3.20	–	–	–
Bruceville-Eddy city (pt.)	1	1	–	–	–	1	1	–	–	1.00	–	–	–	–
Golinda city (pt.)	289	133	90	79	8	43	40	23	19	2.17	2.68	–	–	–
Lott division	2 002	764	549	438	78	215	209	119	94	2.62	3.20	–	–	–
Lott city	775	312	206	142	50	106	102	69	57	2.48	3.20	–	–	–
Marlin division	7 656	3 119	2 035	1 375	560	1 084	1 026	634	517	2.45	3.13	1 154	1 154	–
Marlin city	6 145	2 516	1 611	1 046	485	905	856	547	454	2.44	3.15	241	241	–
Perry division	765	290	222	196	16	68	57	30	25	2.64	3.05	11	11	–
Reagan division	796	308	228	197	22	80	73	47	34	2.58	3.10	–	–	–
Rosebud division	2 911	1 160	800	650	113	360	339	235	191	2.51	3.10	113	113	–
Rosebud city	1 525	641	405	309	79	236	225	163	136	2.38	3.09	113	113	–
Fannin County	24 027	9 691	6 977	5 899	795	2 714	2 555	1 588	1 255	2.48	2.99	777	766	11
Bonham division	8 536	3 533	2 422	1 979	350	1 111	1 051	672	549	2.42	2.99	467	467	–
Bonham city	6 219	2 649	1 704	1 321	307	945	899	589	484	2.35	3.00	467	467	–
Dodd City division	1 457	576	433	364	45	143	134	78	64	2.53	2.98	–	–	–
Dodd City town	350	138	108	90	12	30	30	19	16	2.54	2.94	–	–	–
Windom town	269	108	74	56	13	34	32	23	20	2.49	3.04	–	–	–
Ector division	2 377	951	715	631	63	236	223	137	100	2.50	2.95	152	152	–
Ector town	494	208	146	132	9	62	59	44	33	2.38	2.93	–	–	–
Savoy city	725	308	209	170	33	99	92	59	41	2.35	2.92	152	152	–
Whitewright town (pt.)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Honey Grove division	2 491	1 059	716	579	96	343	326	227	181	2.35	2.94	72	72	–
Honey Grove city	1 681	740	462	358	78	278	264	188	152	2.27	2.95	–	–	–
Ladonia division	899	378	247	179	54	131	122	77	55	2.38	3.00	–	–	–
Ladonia town	658	277	176	119	45	101	95	64	50	2.38	3.07	–	–	–
Pecan Gap city (pt.)	12	5	4	2	2	1	1	1	–	2.40	2.75	–	–	–
Leonard division	4 930	1 880	1 414	1 225	136	466	436	254	198	2.62	3.10	75	75	–
Bailey city	187	75	52	42	5	23	23	13	10	2.49	3.13	–	–	–
Leonard city	1 669	649	464	373	72	185	175	112	92	2.57	3.15	75	75	–
Trenton city	655	270	182	148	29	88	83	58	50	2.43	3.04	–	–	–
Whitewright town (pt.)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Ravenna-Telephone division	3 337	1 314	1 030	942	51	284	263	143	108	2.54	2.90	11	–	11
Fayette County	19 688	8 101	5 645	4 799	592	2 456	2 300	1 413	1 090	2.43	2.99	407	382	25
Fayetteville division	1 772	744	513	451	38	231	221	152	109	2.38	2.97	11	–	11
Fayetteville town	283	139	81	65	7	58	57	42	35	2.04	2.75	–	–	–
Flatonia division	2 956	1 193	833	693	82	360	335	208	141	2.48	3.03	87	87	–
Flatonia town	1 208	466	318	240	53	148	131	74	57	2.59	3.17	87	87	–
La Grange division	6 106	2 534	1 743	1 461	213	791	740	440	359	2.41	2.98	115	115	–
La Grange city (pt.)	3 754	1 627	1 044	832	164	583	549	329	275	2.31	2.95	115	115	–
La Grange West division	2 965	1 160	860	754	78	300	270	151	106	2.56	3.03	100	100	–
La Grange city (pt.)	82	36	23	20	2	13	13	6	4	2.28	3.00	–	–	–
Round Top division	1 590	704	475	416	37	229	222	149	117	2.26	2.83	–	–	–
Carmine city	192	87	55	50	4	32	32	20	15	2.21	2.89	–	–	–
Round Top town	81	41	27	25	2	14	14	10	8	1.98	2.48	–	–	–
Schulenburg division	4 299	1 766	1 221	1 024	144	545	512	313	258	2.43	3.02	94	80	14
Schulenburg city	2 361	1 005	641	499	116	364	340	217	184	2.35	3.04	94	80	14
Fisher County	4 773	1 892	1 383	1 201	127	509	489	323	267	2.52	3.04	69	68	1
McCaulley division	370	139	104	92	8	35	32	21	17	2.66	3.18	–	–	–
Hamlin city (pt.)	3	1	1	1	–	–	–	–	–	3.00	3.00	–	–	–
Roby division	1 997	800	596	534	40	204	196	134	114	2.50	2.96	1	–	1
Roby city	615	253	170	145	20	83	82	57	51	2.43	3.11	1	–	1
Rotan division	2 406	953	683	575	79	270	261	168	136	2.52	3.09	68	68	–
Rotan city	1 846	726	507	416	72	219	213	146	121	2.54	3.18	67	67	–
Floyd County	8 374	2 982	2 280	1 992	198	702	676	430	347	2.81	3.32	123	107	16
Floydada division	5 011	1 831	1 356	1 167	134	475	459	284	226	2.74	3.30	64	64	–
Floydada city	3 832	1 418	1 015	844	128	403	391	250	198	2.70	3.32	64	64	–
Lockney division	3 363	1 151	924	825	64	227	217	146	121	2.92	3.36	59	43	16
Lockney town	2 148	731	565	483	56	166	162	118	99	2.94	3.47	59	43	16
Foard County	1 757	739	499	421	61	240	229	161	122	2.38	2.99	37	37	–
Crowell division	1 495	636	424	357	52	212	203	144	112	2.35	2.98	37	37	–
Crowell city	1 193	512	331	274	44	181	172	124	98	2.33	3.00	37	37	–
Thalia division	262	103	75	64	9	28	26	17	10	2.54	3.05	–	–	–
Fort Bend County	221 072	70 424	58 921	49 268	7 319	11 503	9 547	2 392	1 856	3.14	3.46	4 349	4 175	174

REFERENCE 41

U.S. DEPARTMENT OF COMMERCE
C. R. Smith, Secretary

ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
Robert M. White, Administrator

ENVIRONMENTAL DATA SERVICE
Woodrow C. Jacobs, Director

JUNE 1968

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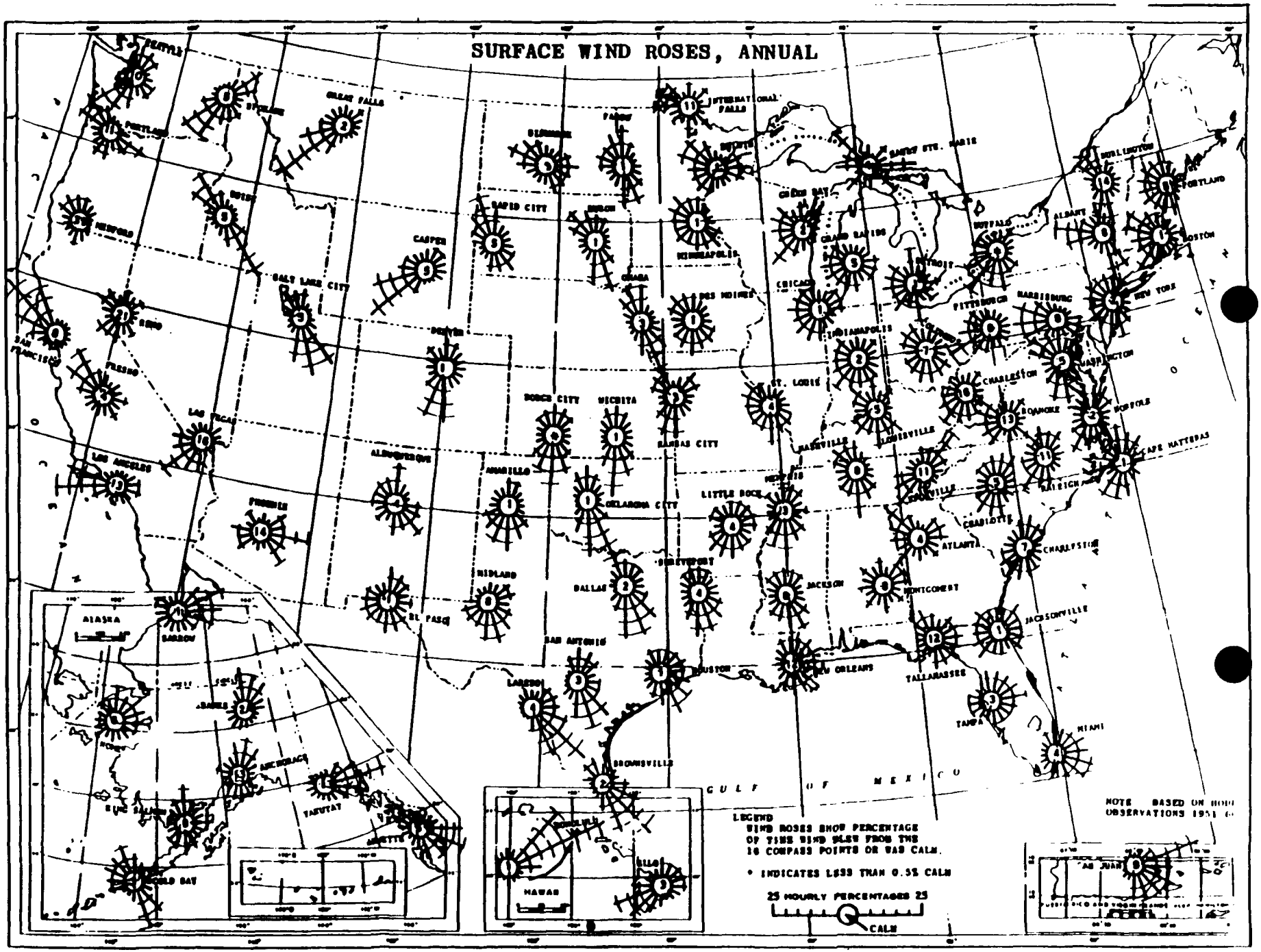
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