GW - 355

MONITORING REPORTS

DATE:

8/95

Remedial Action Plan

for

Subsurface Soil & Groundwater

Transwestern Pipeline Company

Bell Lake Plant

Lea County, New Mexico

RECEIVED

AUG 11 1995

Environmental Bureau
Oil Conservation Division

Submitted to:

State of New Mexico Oil Conservation Division

Santa Fe, New Mexico

Prepared for:

Transwestern Pipeline Company

Roswell, New Mexico

Prepared by:

Cypress Engineering Services, Inc.

Houston, Texas

July 26, 1995

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Introduction

Cypress Engineering Services, Inc. (CES) has been retained by Transwestern Pipeline Company (TPC) to prepare a conceptual remedial action plan for contaminated subsurface soils and groundwater at TPC's Bell Lake Plant.

Questions and correspondence concerning this remedial action plan should be directed to:

Mr. Larry Campbell
Division Environmental Specialist
Roswell Technical Operations
Transwestern Pipeline Company
P.O. Box 1717
Roswell, NM 88202-1717
(505) 625-8022

TPC's Bell Lake Plant is located on the west side of County Road 21, in Lea County, New Mexico, approximately 25 miles Northwest of Jal, New Mexico. *Figure 1* is a site location map identifying the subject property and surrounding area.

The sources of the soil and groundwater contamination at the facility are the former unlined surface impoundments (pits) located in the Northeast corner of the Bell Lake Plant property. *Figure 2* is a site plan identifying the locations of the former drain pit, former burn pit, and former North pit.

Facility Operations

The Bell Lake plant began operation in 1961. During its operation, the facility performed three primary functions:

- Dehydration - removal of water from natural gas by a regenerative triethylene glycol (TEG) process
- Sweetening- removal of H_2S from natural gas by a regenerative amine process
- Mercaptan removal- removal of mercaptan from natural gas by a regenerative caustic process

During past operations, pipeline liquid wastes were placed in three unlined impoundments located on the northeast quarter of the facility property and one concrete lined impoundment located on the northwest quarter (*Figure 2*). The soil contamination beneath the former unlined impoundments resulted from the release to the subsurface of wastes generated by the plant processes.

The sweetening plant was taken out of service in 1985. Currently, dehydration is the only active process occurring at the site.

Completed Environmental Investigations

Three previous hydrogeologic investigations were conducted to delineate the extent of soil and ground-water impacts at the facility.

A summary of the groundwater analyses obtained from all three investigations is presented in *Appendix C.*

Brown & Caldwell, October and November 1993

The first investigation was performed by Brown & Caldwell in October and November 1993. The report is dated April 1994 (Brown & Caldwell, 1994).

The preliminary investigation was conducted to investigate subsurface conditions and possible impact to soil and groundwater surrounding six on-site structures. These structures include four inactive pipeline liquid waste surface impoundments, one underground storage tank (UST) formerly containing triethylene glycol (TEG), and a septic system leach field. Brown and Caldwell advanced a total of eighteen soil borings, with three of the borings converted to shallow groundwater monitoring wells.

Based upon data collected from Brown & Caldwell's site assessment activities, Brown and Caldwell determined that soils and groundwater in the vicinity of the surface impoundments located to the Northeast sector of the site are impacted by petroleum hydrocarbons. Data collected during the investigation indicates an area of impacted soil and groundwater is located east and southeast of the three former unlined surface impoundments, the former drain, burn,

and North pits. Soils located in the vicinity of the underground storage tank, east of the main plant building are impacted by petroleum hydrocarbons. No phase separated hydrocarbons were detected during the investigation.

Brown & Caldwell, December 1994

The second investigation was also performed by Brown & Caldwell in December 1994. The report is dated July 1995 (Brown & Caldwell, 1995).

Brown & Caldwell conducted the project to obtain data on the dissolved phase volatile organic compound plume down gradient of known impacted areas and to evaluate the feasibility of intrinsic bioremediation and monitoring as a remediation alternative. During the course of this project, three monitor wells were installed, soil and groundwater samples were collected and the horizontal hydraulic conductivity of the saturated zone was determined using slug test methods. One monitor well was positioned on site and two monitor wells were positioned offsite on adjacent property to the East.

The BTEX and DO concentrations measured at the site indicated that intrinsic bioremediation is occurring.

Cypress Engineering Services, May 1995

Sampling activity was performed by Cypress Engineering Services in May 1995. Groundwater surface elevations were determined and groundwater samples were collected and submitted for analyses.

The groundwater surface elevations and direction of groundwater flow were determined and are presented in *Figure 2*. Groundwater surface elevation data are presented in *table 2*. A summary of the groundwater analyses obtained from the investigation is presented in *table 1*.

Laboratory analytical results for samples collected during this investigation are presented in *Appendix E*.

Site Geology and Hydrogeology

According to the New Mexico Bureau of Mines and Mineral Resources (1982), the site is situated in an area of recent Quaternary alluvial and terrace deposits. The surface materials covering this area of Lea County consists of loosely consolidated sands and gravely sands. The uppermost stratigraphic unit underlying the site is the Santa Rosa formation. This formation consists of interbedded sandstones and gravels.

The strata encountered to approximately 35 feet below grade during the investigation was loosely consolidated sands and gravely sands. Below 35 feet, and extending for approximately four feet, is a consolidated sandstone, which is cemented and contains irregular layers of chert. Strata encountered below the cherty sandstone are interbedded siltstones and sandstones to a maximum exploration depth of 100 feet.

Groundwater at the facility was determined to exist in an unconfined aquifer with static groundwater at approximately 90 feet below grade. Based on field measurements collected from the wells during the investigation, groundwater flow is to the southeast at a gradient of approximately 0.002 feet per foot. Groundwater surface elevation data collected by Cypress Engineering Services in May 1995 are presented in *table 2*.

Water well drilling records for three nearby groundwater wells indicate numerous shale, hard clay, and sandstone structures below the depth of approximately 100 ft. down to approximately 650 ft.

Groundwater Use

There is no known use of the shallow groundwater aquifer within a 2 mile radius of the facility. The deeper groundwater aquifer is used for industrial purposes.

One water well is currently in use at the subject facility. It is located in the SE sector of the property and is identified on the site map. It was completed in 1967 to a total depth of 659 ft. The screened interval of this well is from 550 ft. to 659 ft. below grade. Well completion records indicate that it produces a maximum of 30 gpm. The location of this water well is shown on *figure 2*.

Facility records indicate that a previous water well was completed at the facility. This previous well is no longer in service and is sealed with a metal plate welded to the top of the well casing. It was completed in 1961 to a total depth of 642 ft. The screened interval of this well is from 539 ft. to 603 ft. below grade. Well completion records

indicate that it produced a maximum of 28 gpm. The location of this water well was adjacent to the existing in-use on-site water well.

A search was conducted of records in the State Engineers Office in Roswell, NM to identify any other water wells within a two mile radius of the subject facility. The results of the search identified one water well completed in 1953 by Continental Oil Co. The well was verified as being in service and is identified on the location map approximately 0.8 miles NE of the facility at the Conoco facility. It has a total depth of 678 ft. and is cased down to 650 feet. The location of this water well is shown on *figure 1.*

A USGS topographic map identifies a water well approximately 1.3 miles to the Southeast of the facility. This well formerly served as a water source for a stock tank. It is presently abandoned.

Impacted Groundwater

In May 1995, Cypress Engineering Services collected groundwater samples from the six shallow groundwater monitoring wells and from the on-site water well for analysis of BTEX, PAH, TDS, pH, Alkalinity, Major Ions, and Metals.

Analytical results confirmed that the shallow groundwater had been impacted with petroleum hydrocarbons and associated plant wastes. The shallow groundwater monitoring wells down-gradient of the three unlined impoundments, MW-1, 4, 5, and 6, all had BTEX compounds detected.

The up-gradient shallow groundwater monitoring well, MW-3, did not have any BTEX compounds detected.

The on-site water well, which is screened in the deeper groundwater aquifer, also did not have any BTEX compounds detected.

No wells had any PAH compounds detected.

The groundwater surface elevations determined during the May 1995 sampling event are shown in *figure 2.* Analytical results of the sampling event are shown in *figures 3 and 4.*

The area of groundwater contamination addressed by the groundwater monitoring program (*Section 2*) of this remedial action plan extends from the vicinity of the three former unlined impoundments located on the northeast quarter of the facility property in a Southeasterly direction beyond the facility property boundary. *Figure 2* also identifies the direction of groundwater migration and the location of groundwater monitoring wells within and beyond the subject property boundary.

Impacted Soils

In October and November 1993, Brown & Caldwell collected soil samples from the eighteen soil borings (three of which were converted to shallow groundwater monitoring wells) for analysis of BTEX, PAH, and TPH.

The samples were collected from the vicinity of six on-site structures. These structures include four inactive pipeline liquid waste surface impoundments (Burn pit, Drain pit, North pit, and Concrete lined surface impoundment), one underground storage tank (UST) formerly containing triethylene glycol (TEG), and a septic system leach field.

Surface soils

Shallow soils (within approximately 15 ft. below grade) were found to be impacted in the following areas of the facility property:

1. Burn pit	TPH and BTEX compounds at 4 - 6 ft.
2. Drain pit	TPH and BTEX compounds at 9 - 11 ft.
3. North pit	TPH, BTEX, and PAH compounds at 14 - 16 ft.
4. Concrete lined surface impoundment	TPH and BTEX compounds at 0 - 2 ft
5. UST	TPH and BTEX compounds at 5 - 7 ft.

Shallow soils in the leach field area were not impacted.

Prior to October, 1993, the unlined impoundments were backfilled to approximately six inches above grade and the concrete lined impoundment was filled to one foot above grade with concrete.

In December 1994, TPC excavated and treated shallow contaminated soils in the vicinity of the former unlined impoundments. Soil was excavated to a depth of approximately 15 ft., mixed with clean fill and an essential nutrient solution (in the form of fertilizer) to enhance biodegradation of hydrocarbons, processed and mixed by "shredding," and then placed back into the excavation.

Deeper soils

Deeper soils (below approximately 15 ft. below grade) were found to be impacted in the following areas of the facility property:

1.	Burn pit	TPH at 40 - 42 ft. and BTEX compounds at 29 - 31 ft.
2.	Drain pit	TPH and BTEX compounds at 95 - 97 ft.
3.	North pit	TPH, BTEX, and PAH compounds at 34 - 36 ft.

Deeper soils in the concrete lined surface impoundment, UST, and leach field areas were not impacted.

The deeper soil contamination that is addressed by the soil remediation system (*Section 3*) of this remedial action plan is located in the immediate vicinity of the three former unlined impoundments, burn pit, drain pit, and North pit, extending below the center of each former impoundment and extending less than an estimated 20 ft. beyond the edges of the former pits.

Groundwater Monitoring Program

Objective

TPC proposes to monitor the natural attenuation of the contaminants impacting groundwater at the site. In general, this will be accomplished by periodic ground water sampling events. Ground water samples will be collected from existing groundwater monitor wells and additional proposed monitoring wells. Samples will be analyzed according to the analytical program at the frequency specified in the monitoring schedule. Reports will be prepared and submitted to the NMOCD.

Monitoring Well Network

All existing monitoring wells at the site will be utilized in the groundwater monitoring program. In addition to the existing wells, more wells will be completed and included in the program.

Existing monitoring Wells

TPC will monitor the water quality in the six shallow monitoring wells (MW-1, 2, 3, 4, 5, and 6) screened in the shallow ground water aquifer (approximately 100 ft. below grade).

MW-3 is the up-gradient well at the site. Analytical results have shown that MW-3 has not been impacted by past facility operations. This well will serve as an indicator of the background groundwater quality of the shallow groundwater aquifer.

In addition to the shallow monitoring wells, TPC will monitor the deeper on-site water well which is screened in the interval of 550 ft. to 659 ft. below grade. This deeper water well will serve as an indicator to detect if impacted shallow groundwater has migrated downward through the layers of shale, hard clay, and sandstone structures from 100 ft. down to 650 ft. or other potential migration pathways. Analytical results have shown that this water well has not been impacted by past facility operations.

Installation of Additional Monitor Wells

TPC will complete three additional downgradient shallow monitoring wells at the site in an attempt to define the lateral extent of shallow groundwater contamination. The locations of these wells have been selected to identify whether impacted groundwater has migrated beyond the facility's South property boundary or the East boundary of the off-site area with archaeological clearance.

One of the additional monitor wells will be located within the facility boundary. Two of the wells will be located to the East of the facility property within State of New Mexico land, within the off-site area with archaeological

clearance. The proposed locations of the three downgradient shallow monitoring wells (MW-7, 8, and 9) are indicated on *figure 2*.

Each of these wells will be completed to the depth of approximately 100 ft. below grade, which is 10 ft. below the water table. Each well will be screened from the interval of 85 ft. below grade (5 ft. above the water table) to 100 ft. (the terminal depth of the well). All of the additional groundwater monitoring wells will be constructed with 2 in. diameter PVC casing. The 15 ft. well screens will have 0.01-inch slots. A sand filter pack will be placed in the annular space of the wells between the well screen and the borehole. A 3 ft. bentonite seal will be placed approximately 5 ft. above the top of the well screen. The remaining borehole will be grouted from the seal to the surface. The wells will be developed by surging and bailing, with approximately five well volumes of water removed from each well.

TPC will also include in the groundwater monitoring program the three SVE wells that will be installed as part of the soil remediation system. The locations of these wells have been selected to remediate impacted soils in the vicinity of the former unlined surface impoundments. The proposed locations of the three SVE wells (SVE-1, 2, and 3) are indicated on *figure 2*.

Analytical Program

BTEX (Method 8020), TPH (Method 8015), TDS, and major ions (Ca, K, Mg, Na, Cl, NO_2, NO_3, and SO_3) will be monitored for all wells.

Field determinations, including pH, conductivity, temperature and Dissolved Oxygen (DO) will be recorded during every monitoring event.

All samples will be delivered to a qualified laboratory for analyses.

Monitoring Schedule

Quarterly monitoring for BTEX and TPH will be performed on all wells during the first year of monitoring.

After the first year, annual monitoring for BTEX, TPH, TDS, and major ions will be performed on all wells.

Reporting

A written annual report of the groundwater monitoring program and soil remediation system shall be submitted each year by July 31 and shall include the following information determined since the previously submitted report:

a. Water table maps showing the elevation of the water table at the time of sampling and the direction of groundwater flow.
b. Tabulation of depth of water measurements and water table elevations at each time of measurement.
c. Results of any sampling. The detection limits and method of analysis shall be reported with the results.
d. Assessment of the progress of the remediation
e. Summary of any changes made to the Groundwater Monitoring Program.
f. Summary of maintenance, operational difficulties, and repairs.
g. Recommendations for any changes.

Duration, Termination, and Abandonment

The groundwater monitoring program shall continue until TPC proposes and obtains approval from the NMOCD to terminate the program.

The groundwater monitoring wells, MW-1, 2, 3, 4, 5, 6, 7, 8, and 9, and SVE wells, SVE-1, 2, and 3, shall be abandoned upon termination of the groundwater monitoring program in accordance with the applicable requirements of the State of New Mexico and with the current (i.e. at the time of abandonment) American Society for Testing and Materials standard guide for decommissioning of ground water wells, currently, ASTM D5299 - Guide for the decommissioning of ground water wells, vadose zone monitoring devices, boreholes, and other devices for environmental activities.

Because the groundwater monitoring program will continue after the soil remediation system has been terminated, the SVE wells that are also being used for groundwater monitoring will not be abandoned at the termination of the soil remediation system, but will be abandoned at the termination of the groundwater monitoring program.

Soil Remediation System

Objective

The proposed corrective action technology for removal of subsurface soil contaminants beneath the former unlined surface impoundments is soil vapor extraction (SVE). This process will recover sorbed-phase and vapor-phase contamination. Soil contamination within 50 ft. of the groundwater surface will be remediated to ensure that potential sources of groundwater contamination are eliminated.

Soil Vapor Extraction System

Soil vapor extraction is a proven technology for the removal of volatile organic compounds (VOCs) from soils with moderate to high air permeability. In addition to removing VOCs, the process enhances aerobic microbial degradation of residual sorbed soil contaminants by increasing the oxygen concentration in the subsurface. Based on the results of the SVE systems at sites with similar soil characteristics and contaminates, it appears that SVE will be highly effective in removing the low-molecular-weight hydrocarbon distillates at the site.

The SVE system will consist of three SVE wells, piping, and a 200-standard cubic feet per minute (scfm) thermal catalytic oxidizer.

Based on the estimated flow rate requirements of the SVE wells and the contaminant mass removal rates, emission control may be required for full-scale operation of the SVE system. TPC will obtain the necessary air quality permit from the New Mexico Environment Department Air Quality Bureau.

The following tasks will be required to implement the proposed soil remediation system.

- Obtain air quality permit
- Finalize SVE system design and prepare construction plans; solicit contractor bid quotations and select construction contractors
- Construct SVE wells and order equipment
- Construct SVE piping; install equipment

In addition, once the system is started, TPC will perform operation and maintenance of the system and eventually propose the termination of the system.

Installation of SVE Wells

The proposed locations of the three SVE wells (SVE-1, 2, and 3) are indicated on *figure 2*.

Each of these wells will be completed to the depth of approximately 100 ft. below grade, which is 10 ft. below the water table. Each well will be screened from the interval of 40 ft. below grade (50 ft. above the water table) to 100 ft. (the terminal depth of the well). All of the SVE wells will be constructed with 2 in. diameter PVC casing. The 60 ft. well screens will have 0.01-inch slots. A sand filter pack will be placed in the annular space of the wells between the well screen and the borehole. A 3 ft. bentonite seal will be placed approximately 5 ft. above the top of the well screen. The remaining borehole will be grouted from the seal to the surface. The wells will be developed by surging and bailing, with approximately five well volumes of water removed from each well.

It is estimated that a flow rate of approximately 1 scfm per linear foot of screen could be obtained from 2-inch-diameter SVE wells. The radius of influence is estimated as 45 feet. The proposed design assumes 1 scfm per linear foot of un-saturated zone screen. The SVE wells will draw air from the un-saturated screened zone from 40 ft. bgs. to the water table at 90 ft. bgs., for an approximate 50 ft. screened interval per well, for an estimated total flow rate of 50 scfm per well.

Installation of SVE Surface Facilities

All SVE surface facilities will be located within the facility boundaries.

Aboveground SVE piping will consist of high-density polyethylene (HDPE) pipe in various diameters according to head loss calculations along the three circuits. Due to the remoteness of the location and the short-term nature of the project, it is proposed that the piping be laid on the ground surface rather than in trenches. HDPE piping is better suited to this application than PVC because it is more flexible and less likely to be damaged by ultraviolet radiation or vehicular traffic.

The proposed treatment system for the extracted soil vapors is a thermal catalytic oxidizer manufactured by Baker Furnace, Inc. The 200-scfm oxidizer will extract soil vapors using a 7.5-hp positive displacement pump. Extracted vapors are passed through a moisture separator and then into a combustion chamber where the operating temperature is maintained at or above 1400°F. After destruction of the VOCs, the air stream is vented to the atmosphere. Information describing the thermal oxidizer is attached in *Appendix D.*

To ensure that the combustion temperature is maintained within the required operating range, the oxidizer is equipped to use natural gas as a supplemental fuel. The 7.5-hp positive displacement pump will require a 3-phase, 220-volt electrical hookup.

Reporting

A written annual report of the groundwater monitoring program and soil remediation system shall be submitted each year by July 31 and shall include the following information determined since the previously submitted report:

a. Assessment of the progress of the remediation
b. Summary of any changes made to the Soil Remediation System.
c. Summary of maintenance, operational difficulties, and repairs.
d. Recommendations for any changes.

Duration, Termination, and Abandonment

The soil remediation system shall continue until TPC proposes and obtains approval from the NMOCD to terminate the system.

Because the groundwater monitoring program will continue after the soil remediation system has been terminated, the SVE wells that are also being used for groundwater monitoring will not be abandoned at the termination of the soil remediation system, but will be abandoned at the termination of the groundwater monitoring program.

Appendices

A: References

Brown & Caldwell. 1994. *Subsurface Investigation, Transwestern Bell Lake Plant, Jal, New Mexico.* April 1994.

Brown & Caldwell. 1995. *Final Monitoring Well Installation and Intrinsic Bioremediation Evaluation Report, Transwestern Pipeline Company Bell Lake Plant, Lea County, New Mexico.* July 1995.

New Mexico Bureau of Mines and Minerals. 1982. *Geologic Map of New Mexico.* US Geological Survey.

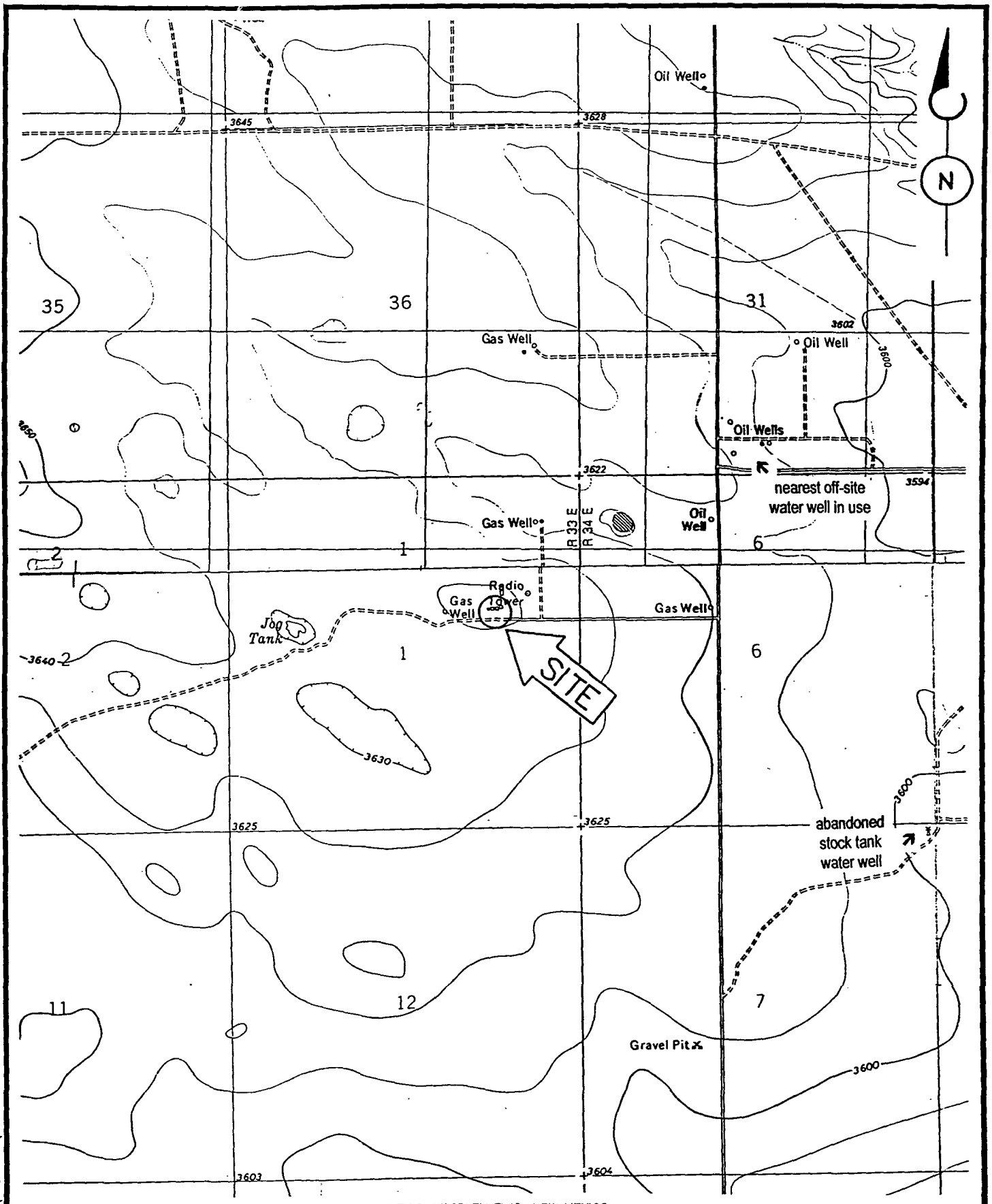
B: Figures

Figure 1: Site Location Map

Figure 2: Site Plan and Groundwater Elevation Map

Figure 3: Site Plan and BTEX Distribution Map

Figure 4: Site Plan and pH/Alk/TDS/Cl Distribution Map



USGS TOPO QUADS: BELL LAKE, SAN SIMON SINK, TIP TOP WELLS, WOODLEY FLAT, NEW MEXICO

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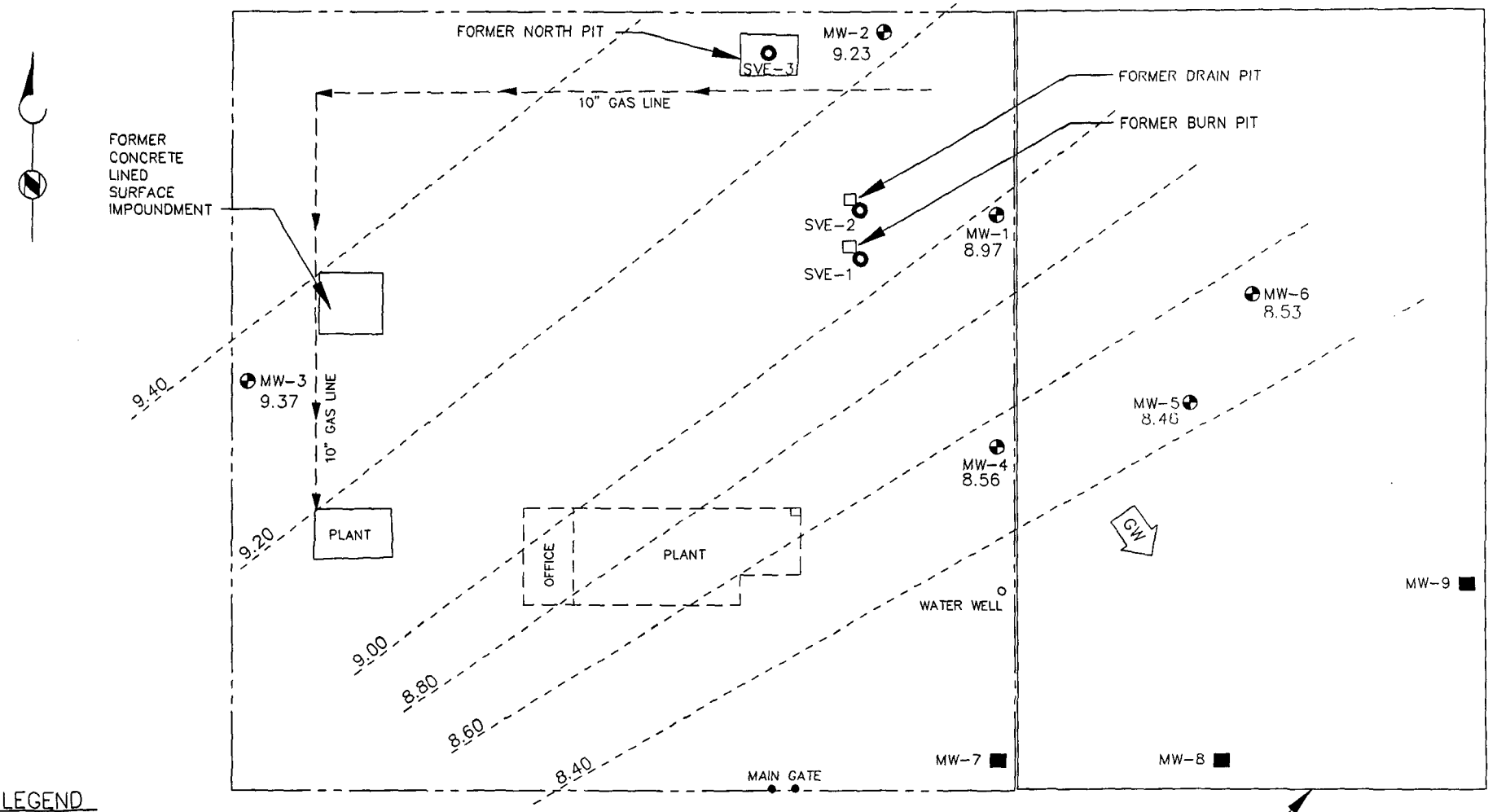

LEGEND

- ■ PROPOSED MONITORING WELL
- O PROPOSED SVE WELL
- ◒ MONITORING WELL
- 8.50 GROUNDWATER ELEVATION (FT.)
- GW GROUNDWATER FLOW DIRECTION

CYPRESS ENGINEERING SERVICES, INC. HOUSTON, TEXAS SUBMITTED:____ DATE:____ APPROVED:____ DATE:____	REV. / DESCRIPTION / BY / DATE	0 50 100 SCALE: 1" = 100' DRAWN BY: GCR DATE 7/11 CHK'D BY: ____ DATE ____ APPROVED: ____ DATE ____	TITLE: GROUNDWATER ELEVATION MAP MAY 31, 1995 CLIENT: TRANSWESTERN PIPELINE COMPANY SITE LOCATION: BELL LAKE PLANT JAL, NEW MEXICO	DATE: 07/11/95 PROJECT NUMBER FIGURE NUMBER: 2

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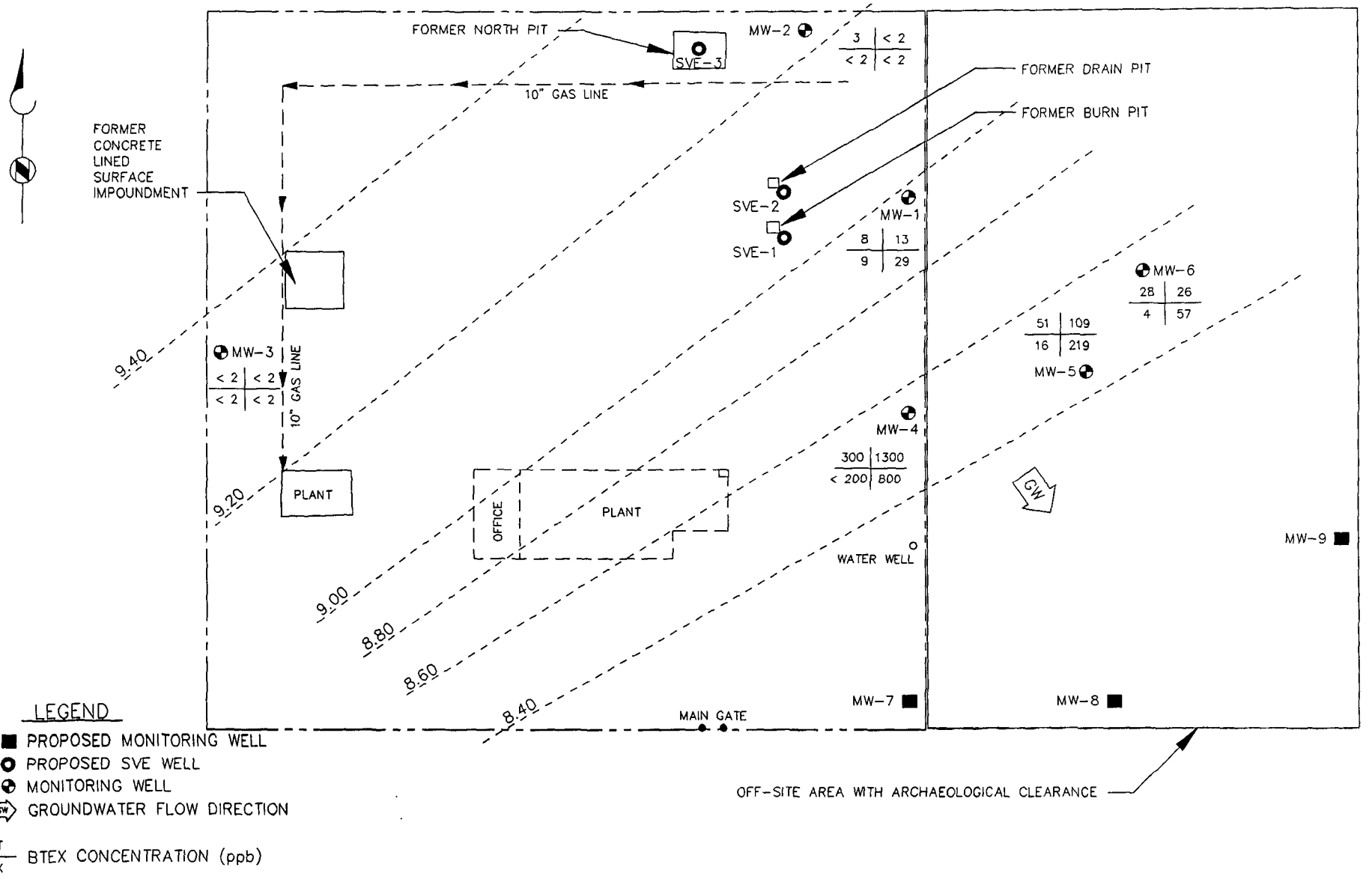

LEGEND

- ■ PROPOSED MONITORING WELL
- O PROPOSED SVE WELL
- MONITORING WELL
- GW GROUNDWATER FLOW DIRECTION

B	T
E	X

BTEX CONCENTRATION (ppb)

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CYPRESS ENGINEERING SERVICES, INC.
HOUSTON, TEXAS

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SCALE: 1" = 100'
DRAWN BY: GCR DATE 7/11
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APPROVED: ____ DATE ____

TITLE: BTEX DISTRIBUTION MAP MAY 31, 1995

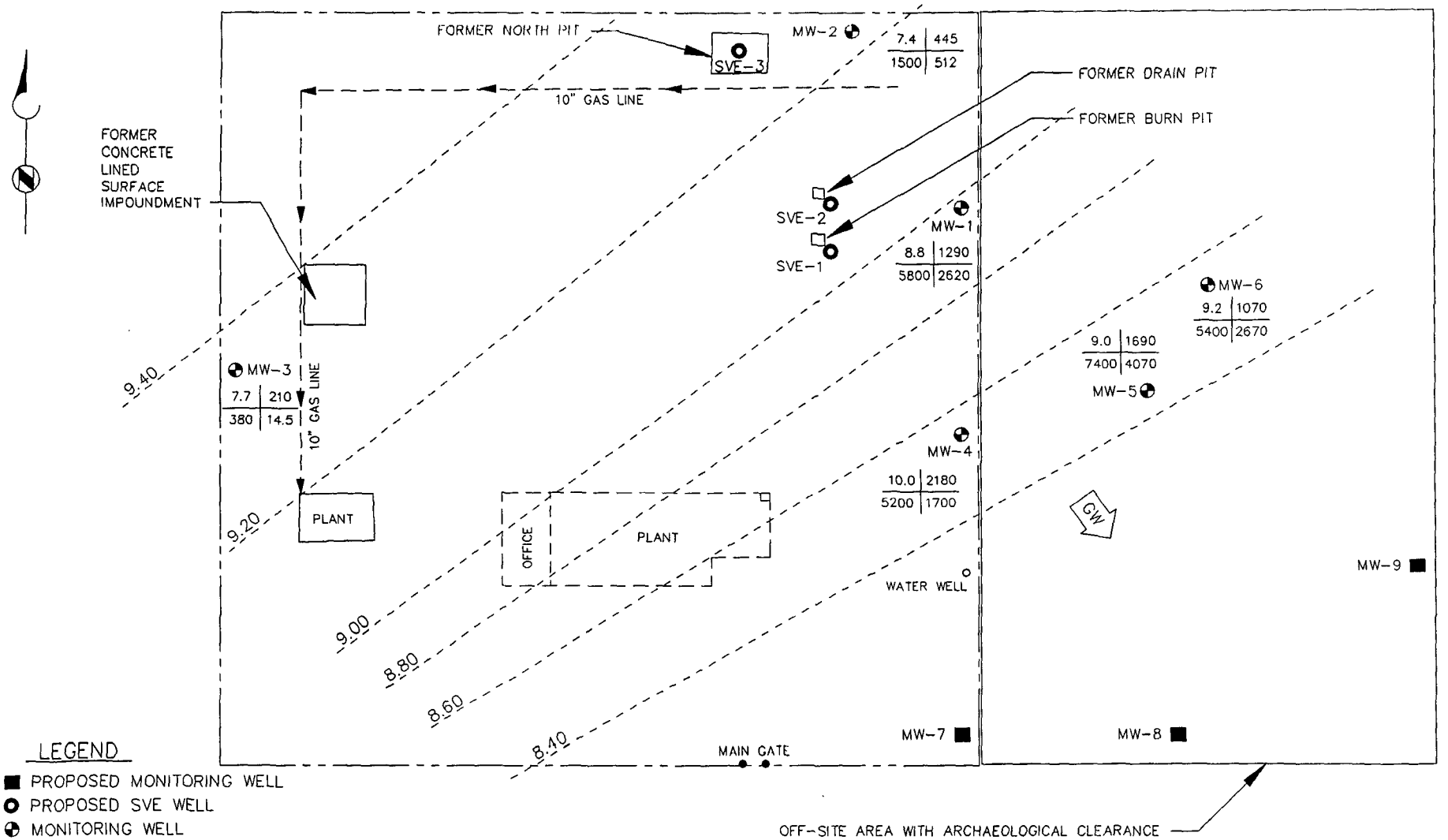
CLIENT: TRANSWESTERN PIPELINE COMPANY

SITE LOCATION: BELL LAKE PLANT JAL, NEW MEXICO

DATE: 07/11/95

PROJECT NUMBER:

FIGURE NUMBER: 3



LEGEND

- ■ PROPOSED MONITORING WELL
- O PROPOSED SVE WELL
- ◔ MONITORING WELL
- GW GROUNDWATER FLOW DIRECTION

pH | Alk. / TDS | Cl — ph (units); Alk., TDS, & Cl (mg/L)

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CYPRESS ENGINEERING SERVICES, INC. HOUSTON, TEXAS	0 50 100 SCALE: 1" = 100'	TITLE pH/Alk/TDS/Cl DISTRIBUTION MAP MAY 31, 1995	DATE 07/11/95
SUBMITTED: ____ DATE: ____	DRAWN BY: GCR DATE 7/11	CLIENT TRANSWESTERN PIPELINE COMPANY	PROJECT NUMBER
APPROVED: ____ DATE: ____	CHK'D BY: ____ DATE ____	SITE LOCATION BELL LAKE PLANT JAL, NEW MEXICO	FIGURE NUMBER 4
REV. DESCRIPTION BY DATE	APPROVED: ____ DATE ____		

C: Tables

Table 1: Summary of Groundwater Analyses

Table 2: Groundwater Surface Elevations

Remedial Action Plan for Subsurface Soil and Groundwater
Transwestern Pipeline Company Bell Lake Plant
Summary of Groundwater Analyses

Well	Sampling Date	TDS (mg/L)	Alk., total (mg/L)	pH (units)	BTEX (ug/L)				Major Ions (mg/L)									Metals (mg/L)											
					Benzene	Toluene	Ethylbenzene	Total xylenes	Chloride	Sulfate	Sulfite	N-Nitrate	N-Nitrite	Calcium	Magnesium	Potassium	Sodium	Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Selenium	Silver	Zinc
NMWQCC Standard		1000	none	6-9	10	750	750	620	250	600	none	10	none	none	none	none	none	0.1	1.0	0.01	0.05	1.0	1.0	0.05	0.2	0.002	0.05	0.05	10
MW-1	10/93				**24**	29	32	82																					
	12/94	**7100**		8.8	**92**	50	**54**	bdl		140		.06[b]													0.036				
	5/95	**5800**	1290	8.8	8	13	9	29	**2620**	78.3	2.0	0.37	0.04	62.7	114	12.6	1400	0.07	0.32	bdl	bdl	bdl	0.73	bdl	**0.28**	bdl	bdl	bdl	bdl
MW-2	10/93	**9200**			bdl[a]	bdl[a]	bdl[a]	bdl[a]																					
	12/94	**2600**		7.2	6	5	bdl	bdl		51		bdl[b]													0.072				
	5/95	**1500**	445	7.4	3	bdl	bdl	bdl	**512**	73.6	0.50	bdl	0.01	79.8	43.1	5.4	195	0.06	0.22	bdl	bdl	0.02	**3.7**	bdl	**0.67**	bdl	bdl	bdl	0.04
MW-3	10/93	**1500**			bdl[a]	bdl[a]	bdl[a]	bdl[a]																					
	12/94	320		7.3	bdl	bdl	bdl	bdl		31		3.6[b]													0.0081				
	5/95	380	210	7.7	bdl	bdl	bdl	bdl	14.5	43.4	0.50	3.3	bdl	54.7	17.6	7.1	20.5	bdl	0.21	bdl	bdl	bdl	0.22	bdl	bdl	bdl	bdl	bdl	bdl
MW-4	12/94	**4700**		**9.7**	18	71	4	160		70		bdl[b]													0.035				
	5/95	**5200**	2180	**10.0**	**300**	**1300**	bdl	**800**	**1700**	104	17.5	bdl	bdl	bdl	0.76	4.9	1650	**0.33**	0.23	bdl	bdl	bdl	0.11	bdl	0.03	bdl	bdl	bdl	bdl
MW-5	12/94	**9500**		**9.3**	9	20	4	64		49		bdl[b]													0.0023				
	5/95	**7400**	1690	**9.0**	**51**	109	16	219	**4070**	12.4	4.5	bdl	0.01	4.8	2.0	13.8	2690	**0.14**	0.88	bdl	bdl	0.01	0.13	bdl	0.02	bdl	bdl	bdl	bdl
MW-6	12/94	**4700**		8.5	bdl	0.3	bdl	bdl		150		bdl[b]													0.056				
	5/95	**5400**	1070	**9.2**	**28**	26	4	57	**2670**	78.3	2.5	0.59	0.04	11.1	4.6	14.4	1320	**0.33**	0.36	bdl	bdl	bdl	0.25	bdl	0.04	bdl	bdl	bdl	bdl
Water Well	5/95	900	144	8.2	bdl	bdl	bdl	bdl	100	356	0.50	bdl	bdl	38.7	23.2	5.3	194	bdl	0.02	bdl	bdl	bdl	0.39	bdl	0.01	bdl	bdl	bdl	bdl

bdl - below detection limit

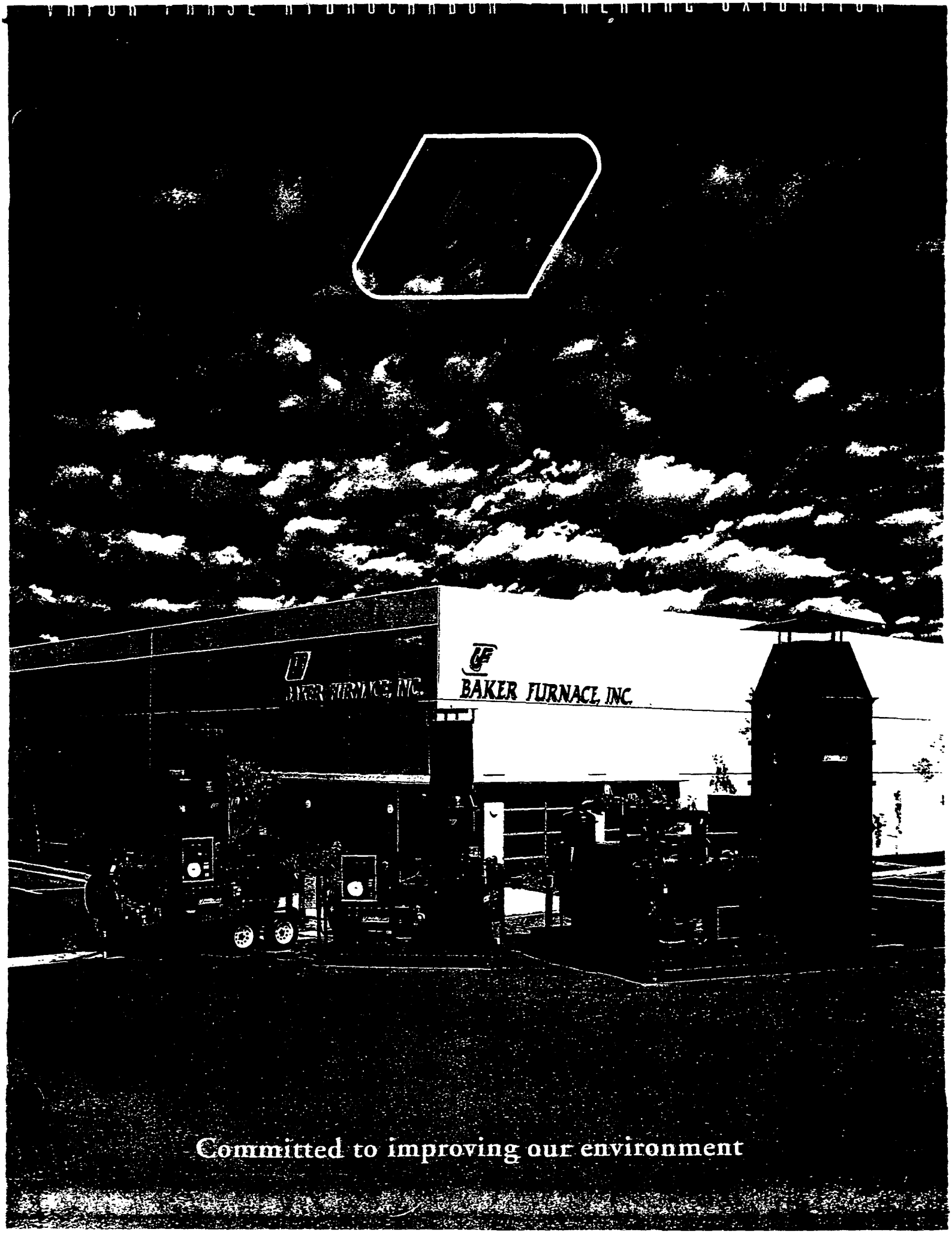
[a] - EPA Method 8240 rather than 8020

[b] - Nitrate + Nitrite

Remedial Action Plan for Subsurface Soil and Groundwater
Transwestern Pipeline Company Bell Lake Plant
Summary of Groundwater Surface Elevations

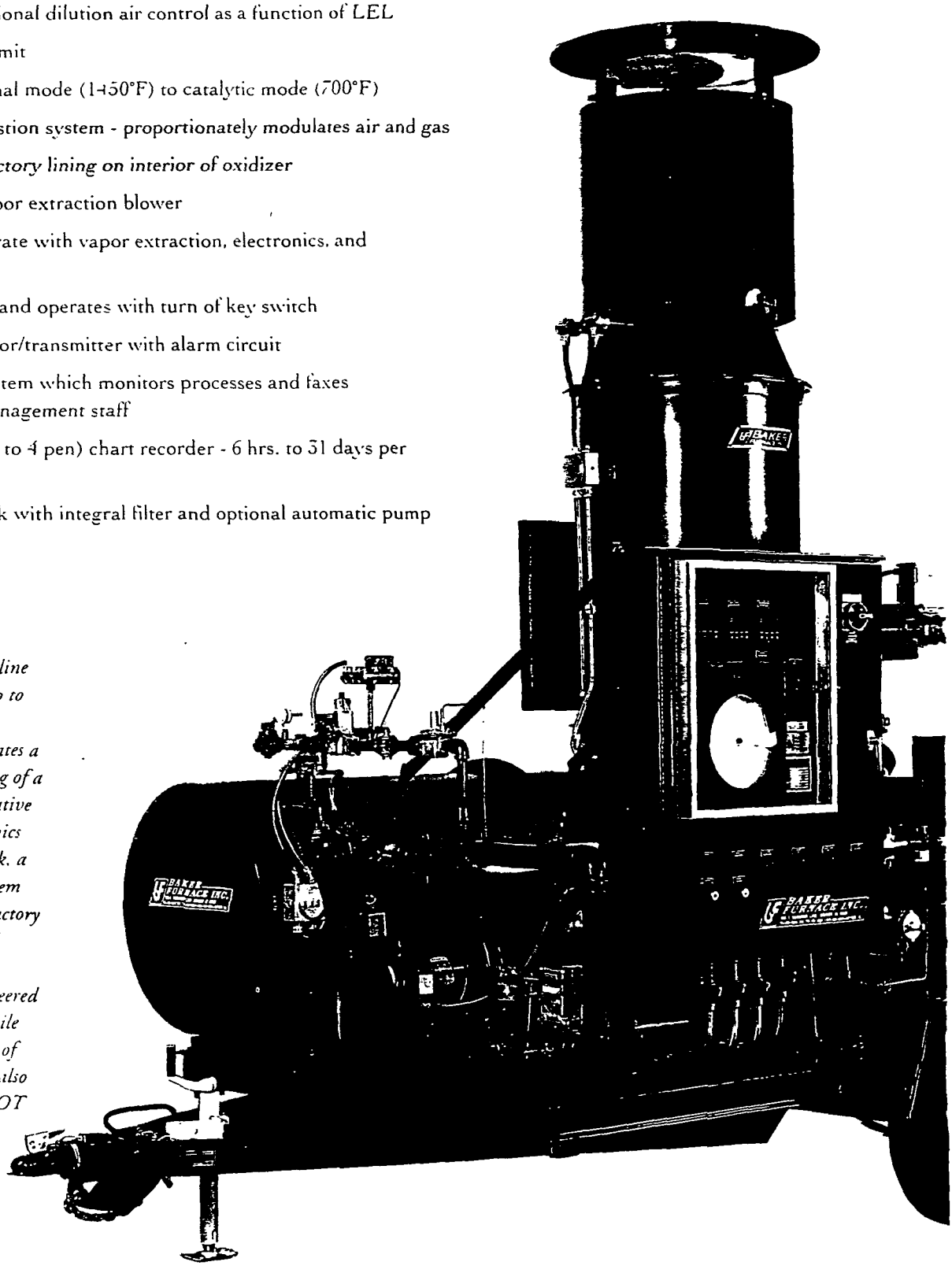
Well	Top of Casing (ft)	Sampling Date 11/93		Sampling Date 12/94		Sampling Date 5/95	
		Depth to Water (ft)	Groundwater Surface Elevation (ft)	Depth to Water (ft)	Groundwater Surface Elevation (ft)	Depth to Water (ft)	Groundwater Surface Elevation (ft)
MW-1	98.15	88.97	9.18	89.38	8.77	89.18	8.97
MW-2	97.46	88.02	9.44	88.15	9.31	88.23	9.23
MW-3	102.54	92.96	9.58	93.08	9.46	93.17	9.37
MW-4	98.53			89.90	8.63	89.97	8.56
MW-5	97.82			89.33	8.49	89.36	8.46
MW-6	97.23			88.65	8.58	88.70	8.53

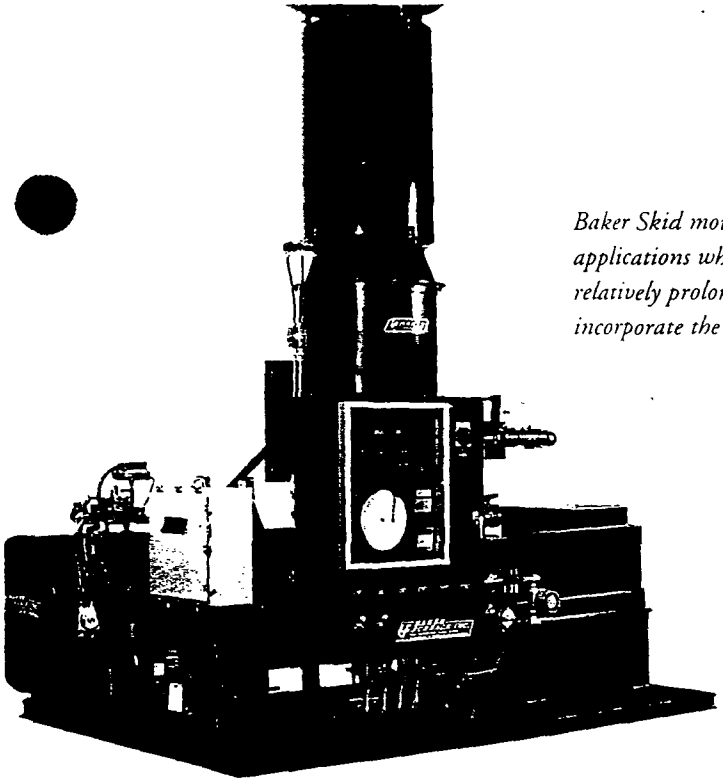
D: Thermal Oxidizer Information


BAKER FURNACE, INC.
Committed to improving our environment

- Five separate safety interlocks
- AGA (American Gas Association) engineering report on Baker Oxidizers
- Automatic and proportional dilution air control as a function of LEL
- SCAQMD general permit
- Convertible from thermal mode (1450°F) to catalytic mode (700°F)
- Highly efficient combustion system - proportionately modulates air and gas
- *Highly insulating refractory lining on interior of oxidizer*
- Silence package for vapor extraction blower
- Complete ready to operate with vapor extraction, electronics, and combustion system
- Fully automatic- starts and operates with turn of key switch
- LEL combustibles sensor/transmitter with alarm circuit
- On board telemetry system which monitors processes and faxes information back to management staff
- Three pen (expandable to 4 pen) chart recorder - 6 hrs. to 31 days per revolution
- Moisture knockout tank with integral filter and optional automatic pump with level switches

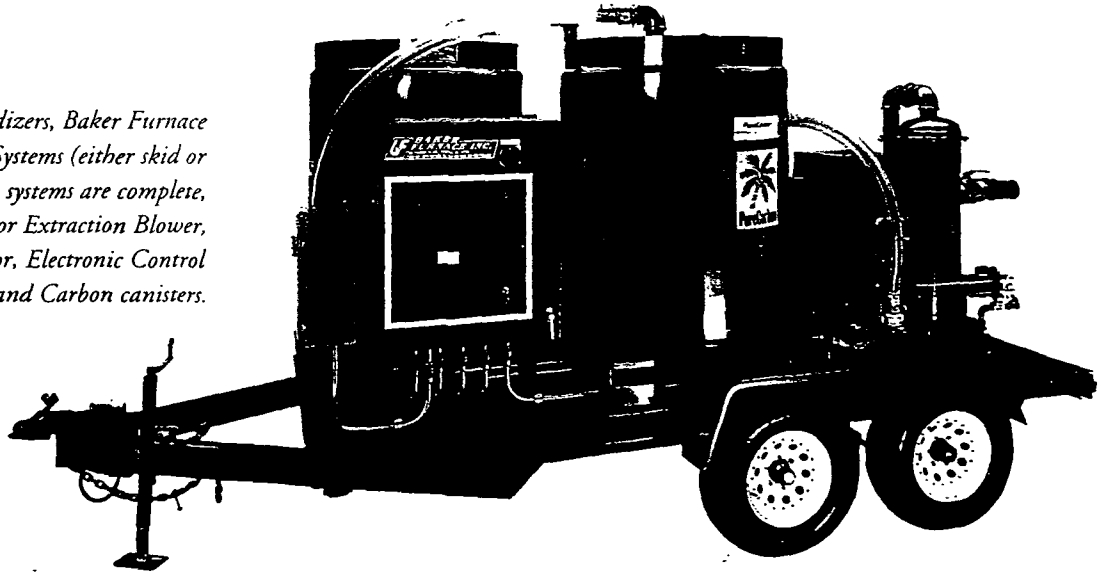
Baker manufactures a standard line of Trailer mounted Oxidizers up to 500 cfm flow rate in 100 cfm increments. Each unit incorporates a vapor extraction system consisting of a positive displacement or regenerative blower, a U.L. classified electronics panel, a moisture knock-out tank, a complete combustion burner system and 5 safety interlocks with a Factory Mutual (FM) supplemental fuel train. The trailered (and skid mounted) units have been engineered to fit in a minimum of space while still retaining a full compliment of equipment. The trailered units also have electric brakes and meet DOT (Department of Transportation) specifications.

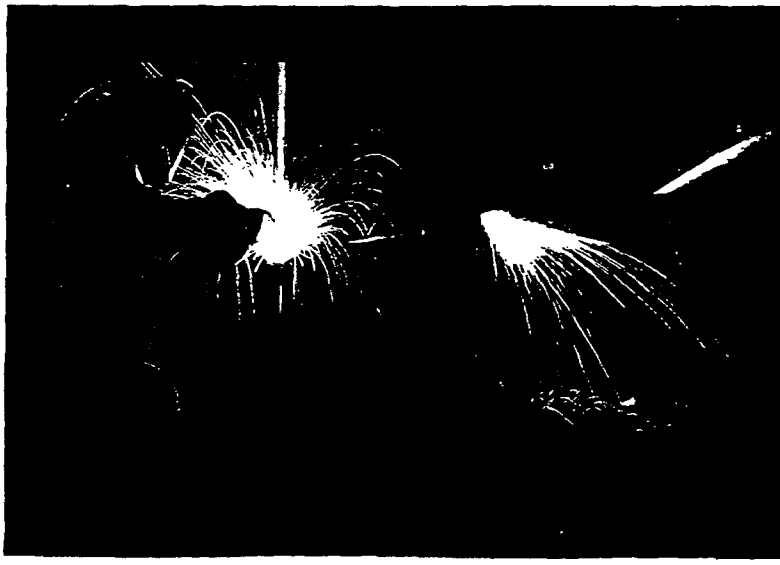




Baker Skid mounted Oxidizers are designed for those remediation applications where the Thermal Oxidizer is going to be stationary for a relatively prolonged period of time. Skid and trailer mounted units both incorporate the same design features.

In addition to Thermal Oxidizers, Baker Furnace also manufactures Carbon Systems (either skid or trailer mounted). These systems are complete, ready to operate with Vapor Extraction Blower, LEL combustibles sensor, Electronic Control Panel and Carbon canisters.





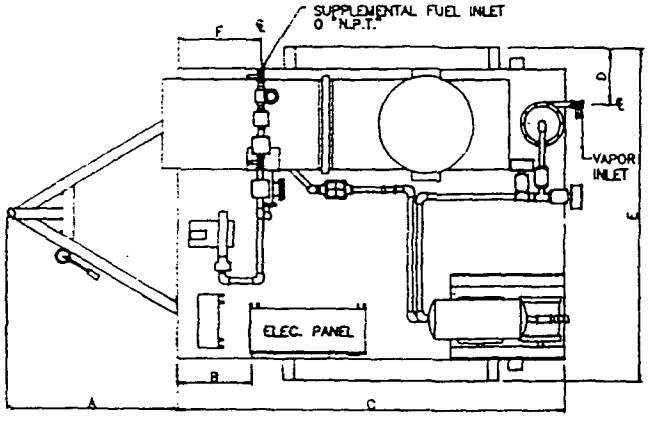
Baker Furnace maintains a complete fabrication/assembly shop and constructs each Oxidizer from the ground up. We do not utilize sub-contractors and as such have tight quality and production controls. Baker Oxidizers are subjected to rigorous tests before shipment and every component group (Electronics, Combustion and Vapor Extraction) is assembled on our premises.

TRAILER MOUNTED THERMAL OXIDIZERS
dimensions in inches

OXIDIZER	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q
100 CFM	51	20	120	20	91	18	82.5	171	19.5	162	56	60.5	2	1	8	[illegible]
200 CFM	51	20	120	20	91	18	82.5	171	19.5	162	56	60.5	2.5	1	8	[illegible]
300 CFM	60	20	144	20	97	18	87	204	24	162	56	60.5	3	1	8	[illegible]
400 CFM	60	20	168	20	97	18	87	204	24	162	70	75.5	4	1.5	8	[illegible]
500 CFM	60	20	168	20	97	18	87	228	24	162	70	75.5	5	1.5	8	[illegible]

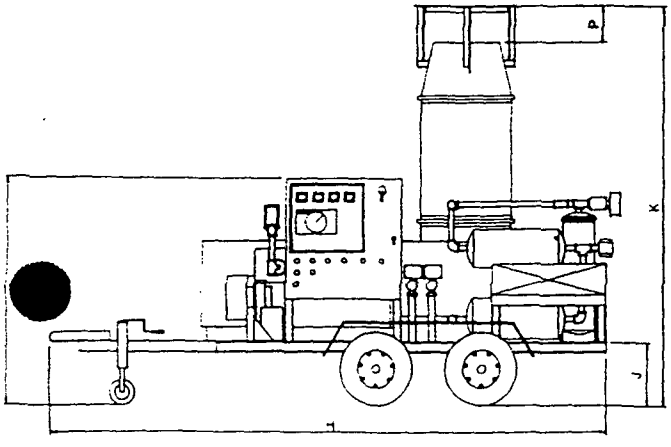
SKID MOUNTED THERMAL OXIDIZERS
dimensions in inches

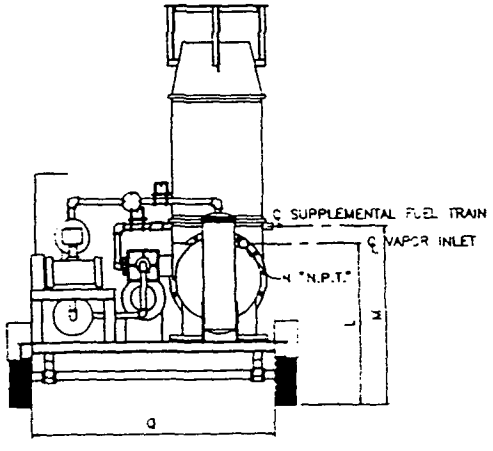
OXIDIZER	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q
100 CFM	N/A	20	120	18	N/A	18	69	N/A	6	162	39	39	2	1	8	[illegible]
200 CFM	N/A	20	120	18	N/A	18	69	N/A	6	162	39	39	2.5	1	8	[illegible]
300 CFM	N/A	20	132	18	N/A	18	69	N/A	6	162	39	42	3	1	8	[illegible]
400 CFM	N/A	20	168	18	N/A	18	69	N/A	6	162	53	45	4	1.5	8	[illegible]
500 CFM	N/A	20	168	18	N/A	18	69	N/A	6	162	53	50	5	1.5	8	[illegible]

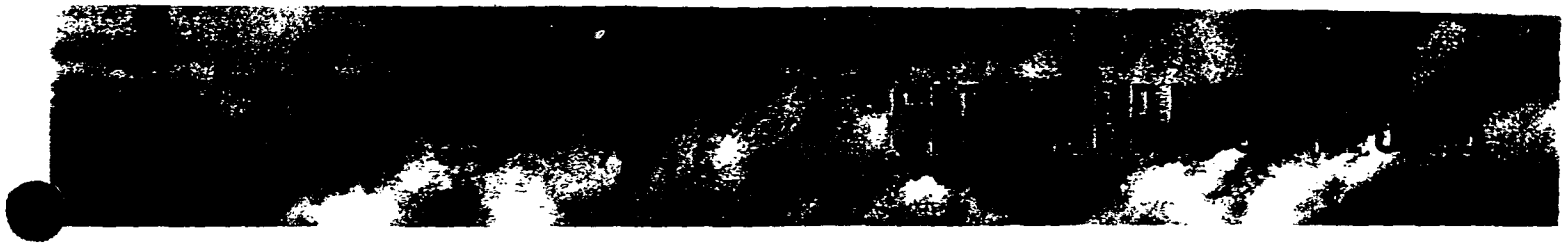


OXIDIZER
Weights in lbs. (approximate)

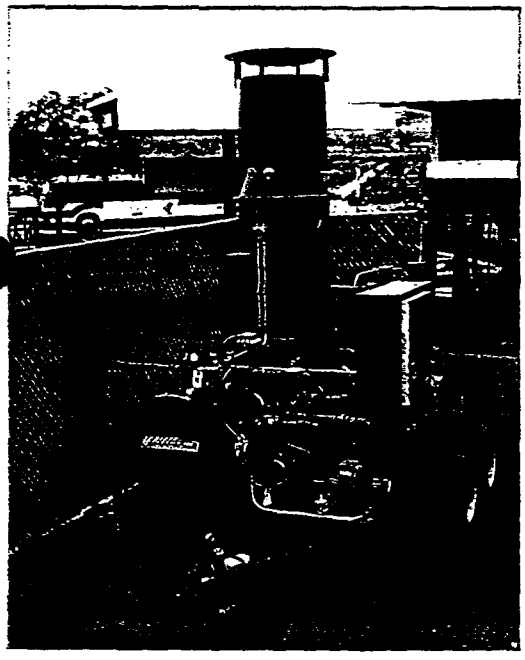
TYPE	100 CFM	200 CFM	300 CFM	400 CFM	500 CFM
Skid	4600	4800	5100	5700	5900
Trailer	5800	5900	6500	6800	7100





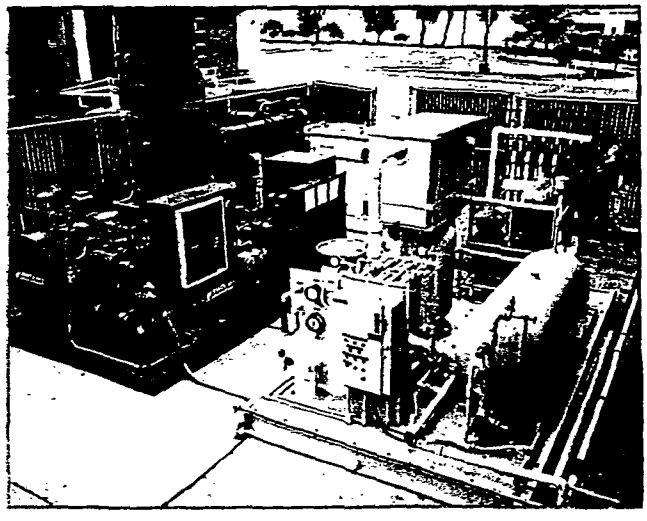


One day pilot study performed at active retail service station. 200 cfm trailer mounted units are available for short or long term rental periods. Factory trained personnel are available to operate equipment on pilot studies, perform onsite field service, or provide technical assistance over the telephone.



Trailer mounted 200 cfm oxidizer remediating gasoline storage tank leak at active retail service station.

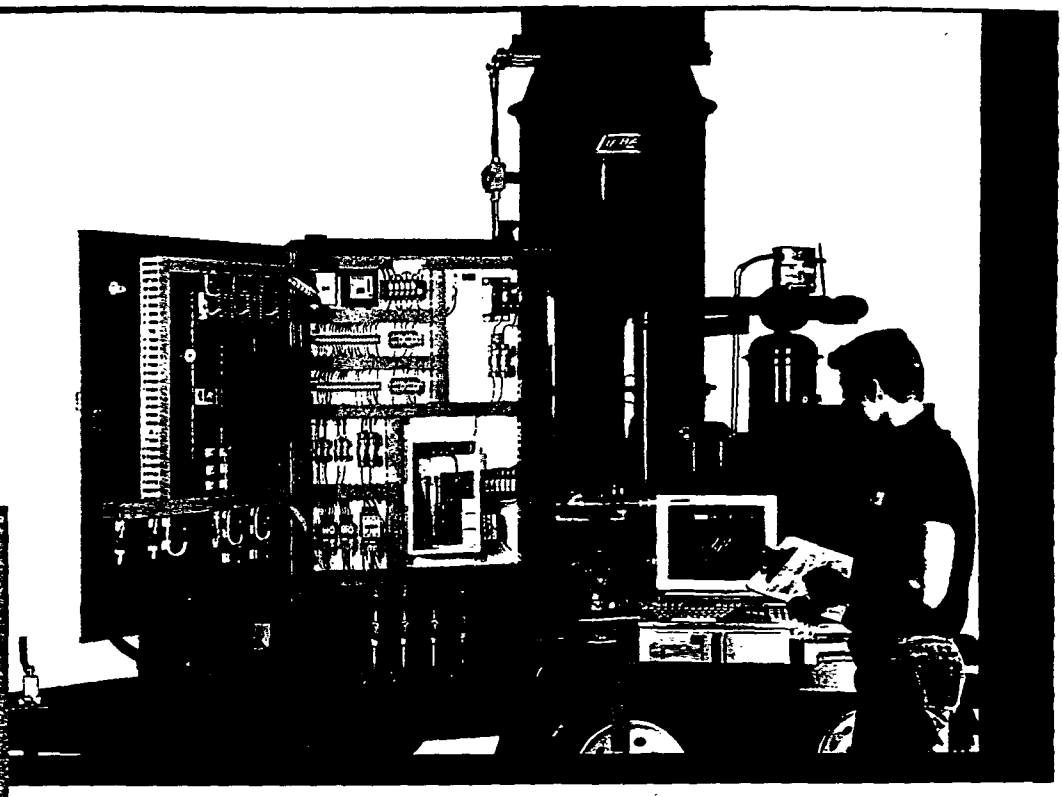
Skid mounted 400 cfm Baker Oxidizer being utilized to remediate hydrocarbon contaminated soil concurrently with water filtration system. Soil contaminant's include gasoline and diesel fuel.



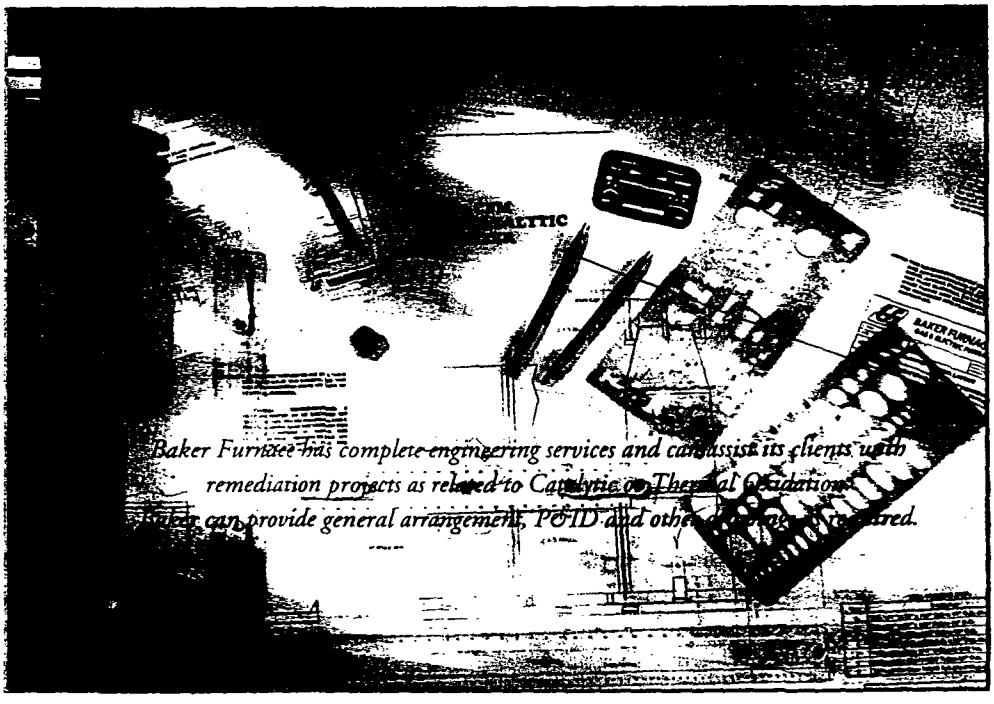
Applications for Baker Oxidation systems include:

- Underground storage tank remediation
- Paint spray booths and drying ovens
- Lithographic printing
- Bakeries - (ethyl alcohol)
- Other industrial processes which emit volatile organic compounds

Baker Furnace Thermal Oxidizers are equipped with a U.L. (Underwriters boratory) classified control panel. A U.L. Classification sticker is applied after a thorough diagnostics check via our computer sofiware.



ENCLOSED FLAME CONTROL PANEL
CLASSIFIED BY
Underwriters Laboratories Inc.®
AS TO ELECTRICAL FIRE
& SHOCK HAZARD ONLY
No. AD-72027
Klockner MOELLER 61/6-7
HAUL-1113



Baker Furnace has complete engineering services and can assist its clients with remediation projects as related to Catalytic or Thermal Oxidation. Baker can provide general arrangement, P&ID and other [illegible] required.

BAKER FURNACE INC.

1015 E. Discovery Lane, Anaheim, CA 92801 • 714-491-9293
Fax 714-491-8221 • 800-237-5575 Outside CA

DISTRIBUTED BY

Baker Thermal Oxidizer Specifications

100 through 500 CFM Units *(600 through 10,000 CFM quoted on request)*

Baker Thermal Oxidizers are designed for vapor extraction based soil remediation projects and other VOC destruction applications where burning the volatiles has been specified as the most cost effective method. Baker Oxidizers feature fully automatic operation, and use either natural gas or propane as supplemental fuel. The VOC destruction rates achieved by our Direct Fired and Catalytic units are excellent. (Please refer to the section on destruction rates for actual quantified rates.) The units are equipped with 6 separate safety interlocks and feature U.L. (Underwriters Laboratory), F.M. (Factory Mutual) and C.S.A. (Canadian Standards) approved components where applicable. Our 100 – 500 CFM units have been approved by A.G.A. (American Gas Association) Laboratories. Selected units have been granted general approval by the South Coast Air Quality Management District (responsible for greater Los Angeles area.) Baker Furnace was the first oxidizer manufacturer to secure this type of approval. Each unit is carefully sized for the correct volume of air and correct residence time for the vapors being oxidized. We size our Thermal Oxidizers for 1 full second of residence time to ensure a thorough destruction of the vapors being introduced into the Oxidizer.

Dimensions

For specific dimensions on the #100 through #500 CFM Thermal Oxidizers (either skid or trailer mounted), please refer to our general arrangement drawing #101212 enclosed with these specifications.

Oxidizer Weights in lbs.

TYPE	100CFM	200CFM	300CFM	400CFM	500CFM
Skid	3400	3600	4100	4300	4300
Trailer	4200	4300	4900	5100	5100

Vapor Extraction Blower

A positive displacement blower with a 208/230/460 volt three phase (or 220 volt single phase) sixty (60) HZ. motor to deliver a correct volume of air at 4" of Hg. will be provided. Higher vacuums are available on request in the 10 to 12" Hg. range. The blower is belt driven and is equipped with an O.S.H.A. approved guard over the belts and sheaves. The blower also is fitted with inlet and outlet silencers and a "Kunkle" vacuum relief valve. Baker Furnace can provide a regenerative blower in lieu of the positive displacement blower if so desired.

Blower Horsepower and Amperage Ratings at 4" HG Vacuum

Oxidizer	100CFM	200CFM	300CFM	400CFM	500CFM
Horsepower	2	3	5	5	7.5
Amperage 230 V. 1 Ph.	12	17	28	28	40
208 V. 3 Ph.	7.8	11	17.5	17.5	25.3
230 V. 3 Ph.	6.8	9.6	15.2	15.2	22
460 V. 3 Ph.	3.4	4.8	7.6	7.6	11

Knock Out Pot

A 12" or 16" diameter knock out pot with a manual drain is an integral part of the vapor extraction train. The pot is equipped with a sight glass and a brass ball cock for draining off liquid. An automatic pump with level switches can be fitted to the knock out pot on request. (See also high level knockout drain/shutoff in options section).

Air Filters

Replaceable air filters are furnished with the unit and are located in the knock out pot and on the two dilution air inlets. The knock out pot filter can be readily changed by removing the top of the knock out pot. The air dilution filters are external and can also be readily changed. Baker Furnace maintains a supply of replacement filters in stock at all times.

Three Way Valving with Automatic Air Dilution

Motor actuated three-way valves are installed to supply clean air to purge the combustion system prior to ignition of the pilot and to restrict VOC laden air from entering the Thermal Oxidizer until it reaches its operating temperature. The valves automatically switch over at a preset temperature which is configured into the process temperature controller. Two of the valves are proportionally modulated and are linked to oxygen and L.E.L. sensors. The sensors are connected to digital microprocessor based P.I.D. controllers which proportionately modulate the butterfly valves around a setpoint which has been selected. L.E.L. and oxygen levels are simply set on the P.I.D. controllers and then maintained automatically by the amount of dilution air which enters the Oxidizer.

Supplemental Fuel and Vapor Inlet Pipe Sizes

Please refer to our general arrangement drawing #101212 included with these specifications for specific pipe sizes for the #100 through #500 Thermal Oxidizers.

Air Flow Measurement

Post dilution process air flow to the combustion chamber is measured via a pitot tube and electronic air flow transmitter. An averaging pitot tube measures differential pressure, which is translated into an electronic signal by the transmitter. and sent to the chart recorder. Air flow is one of the three process variables monitored and recorded continuously by our Honeywell 3-pen chart recorder.

Combustion System

An Eclipse MVTA (medium velocity tempered air) combustion burner will be supplied with the Thermal Oxidizer utilizing a combustion blower, modulating gas butterfly valve, spark ignition, piloting and FM approved flame safety relays. The combustion burner is also equipped with a FM approved gas fuel train. The burner will fire on propane or natural gas. Inlet gas pressure should be 2-5 PSI at the regulator on the fuel train. Please refer to the fuel usage charts provided with these specifications for data regarding the use of supplemental fuel versus VOC concentrations at the influent to the Oxidizer. The charts are available for both Catalytic and Direct fired operation.

Control Panel

A complete, U.L. Approved Three Phase control panel is included with a choice of 208/230/460 volts (or 220 volt Single Phase if required) and would consist of the following component parts:

1. Honeywell 3 pen chart recorder (4 pen available)
2. Honeywell digital microprocessor based process controller
3. Honeywell high limit temperature controller
4. Honeywell L.E.L. controller with alarm setpoint -4-20 output
5. Honeywell O_2 controller -4-20 milliamp output
6. Totalizing hour meter - up to 9999 hours
7. Nema four panel with 3 Phase or 1 Phase disconnect
8. Step down transformer for 120 V. circuitry (3 ph. panels)
9. Alarm contacts in process and high limit controllers
10. FM approved flame safety relays
11. Combustion purge timer
12. All necessary fuses, terminal strips, wiring
13. Complete wiring schematic
14. Locking glass enclosure over instruments

Refractory Lining

A 5" thick 2300° F. ceramic fiber lining is installed in the Thermal Oxidizer to keep the exterior surface at a safe temperature. The ceramic fiber material has a very low K value which means it is an excellent insulator (does not store or transfer heat readily). A ceramic throat is fitted within the Oxidizer at a specific location and is sized for velocity of 15 ft/sec. The combustion chamber is sized for 10 ft/sec.

Steel Construction

All components are manufactured from heavy grades of hot rolled A-36 steel plate. Weldments are accomplished under an argon CO_2 purge to assure gas free homogeneous bonding of components. The Oxidizer is to be of a cylindrical design with flanged connections for maintenance purposes in the future. All components will be skid mounted on a heavy channel base with slots for forklift access.

Operating Temperatures

Direct fired Oxidizers are designed to operate at 1450° F. (AQMD requires minimum 1400° F.) while the Catalytic units are designed to operate at 700° F. (at the entry to the Catalyst).

Residence Time for Vapors

Our Oxidizers are designed for 1 full second of residence time. Los Angeles AQMD requires 0.7 seconds for Thermal Oxidizers.

Destruction Efficiencies

Direct fired units have destruction efficiencies above 99% while the Catalytic units are advertised to have rates above 97%. We generally see higher than 97% destruction efficiency for Catalytic operation and we are still exceeding the criteria set forth by AQMD at 97% destruction.

Options:

Catalytic "Plug In" Module

Baker Furnace has developed a "plug in" Catalytic Module which can be installed in our existing direct fired Oxidizer with a minimum of effort. The catalyst inside the module is a monolithic material which significantly reduces the pressure drop across it and provides maximum surface area for the gasses which are to be catalyzed.

Each module is designed to fit down inside the Thermal Oxidizer chamber and bolt in place between the cone and stack section. Please refer to our enclosed drawing which shows the relationship of the Catalytic Module to the Thermal Oxidizer.

Once the Module is bolted in place, the only remaining task is to reduce the temperature setting on the process temperature and high limit controllers. The entire process to install the Catalytic Module should only take 1 – 2 hours.

The use of the Catalytic Module Option will greatly reduce supplemental fuel usage when the concentrations of VOC's are at low levels because the temperature requirement for a catalyst based system is approximately one-half that of a direct fired unit. The incoming vapors need only be heated to 700° prior to the catalyst versus 1450° in the direct fired unit. The delta T (change in temperature) is reduced by almost one-half, which results in a significant reduction in supplemental fuel usage.

Our Thermal Oxidation unit is configured with a "High Limit" temperature controller, as standard equipment, which will protect the catalyst in the event the catalytic process becomes overly exothermic and the temperature attempts to run away.

Baker Furnace can provide installation (on site) of the Catalytic Module at a nominal cost. Please refer to the charts provided with these specifications for supplemental fuel usage at various VOC concentrations for both Catalytic and Direct Fired Oxidizers to project the savings you might achieve by using the Catalytic Module.

Trailer

We can mount the Oxidizer on a tandem axle trailer with a steel deck. Each oxidizer component is mounted securely with bolts, which allows the component to be removed for maintenance if required. The trailer is equipped with electric brakes and all lights necessary for licensing the unit for the road. Please refer to our general arrangement drawing #101212 for specific overall dimensions on the trailer. The trailer, as well as the Thermal Oxidizer, is painted with federal safety blue enamel.

Telemetry "Remote Monitoring" Fax System

The Oxidizer can be equipped with a remote monitoring and reporting system which interfaces with the control instrumentation on the unit. This information can be faxed to a maximum of three locations. The IBM compatible operating software is extremely user friendly and allows you to select the destination of the fax reports, the number of reports you wish to receive each day, and the time of day at which you receive them. The fax reports are typically configured to show process combustion temperature, process air flow to the combustion chamber, and the percent of L.E.L. in the process vapor stream. In addition to the "routine" faxes, the system will also send an alarm fax in the event the unit shuts down for any reason. This report will specify which one of four failure conditions caused the unit to shut down. The addition of the telemetry system requires a dedicated phone line at the site and a fax machine at the receiving end.

Silence package

If you anticipate installing the Oxidizer in an area where noise levels are a critical issue, i.e. residential area etc., the unit can be configured with a quiet design blower package. The blower inlet and exhaust silencers, as well as the blower itself are enclosed with a soundproofed material.

Vacuum Upgrade

Our standard unit will generate a maximum of 4" hg vacuum. Per your specifications we can provide up to 10" hg vacuum in 2" increments. Proper vacuum sizing is very important to ensure that your unit can operate at the engineered flow rate.

High Water Level Shutoff/Pump

If you believe that water will be a problem at the site(s) where you install the Oxidizer, we can install a shutoff switch in the knockout tank which will shut the Oxidizer down if the knockout tank fills up with water. In addition, we can also install a pump which will automatically drain the knockout tank if it fills up with water. Assuming appropriate secondary storage was in place, this process would only require your attention when the secondary holding tank filled up.

Safety Interlocks and Safety Devices on Baker Thermal Oxidizers

Air Proving Switch

Two U.L., FM and CSA approved air proving switches are provided to ascertain that the positive displacement vapor extraction blower and combustion blower are operational. In the event that either blower fails, the air proving switch will "open" the limits circuit thereby causing the unit to shut down the supplemental fuel line and to close the vapor line to the Oxidizer.

High/Low Gas Pressure Switch

A U.L., FM and CSA approved gas pressure switch is provided in the supplemental fuel train which will also "open" the limits circuit in the event an unusually high or low gas pressure condition exists.

High Temperature Limit Controller

A U.L. and FM approved high temperature limit controller has been engineered into the limits circuit to shut down the Oxidizer in the event a high temperature condition exists. The limit controller must be manually reset (per FM requirement) before the Oxidizer can be rendered operational. While in the high limit condition, the Oxidizer will not utilize supplemental fuel nor will vapors be allowed to enter the Oxidizer until the controller is manually reset.

FM Approved Flame Safety Device

Our Thermal Oxidizers utilize a FM approved and U.L. recognized flame safety device which lights the combustion burner on the Thermal Oxidizer after a 60 second purge (5 air changes) of the combustion chamber. The burner has a 15 second ignition trial which lights pilot only. In the event the pilot does not light, the flame safety device locks out the supplemental fuel train thereby reducing the potential for an explosion. The main gas valve in the supplemental fuel train cannot open unless the pilot has been established. Flame monitoring is accomplished via a 3/16" diameter inconel flame rod.

L.E.L. Combustibles Sensor and Controller

A catalytic bead L.E.L. sensor and controller have been integrated into the limits circuit. In the event that the alarm set point for L.E.L. has been exceeded, the L.E.L. controller "opens" the limits circuit which subsequently closes the vapor butterfly valve and temporarily shuts down the combustion burner until the L.E.L. returns to a safe level below the alarm setpoint.

Flame Arrester

A U.L. approved flame arrester has been piped into the vapor extraction discharge line in close proximity to the Thermal Oxidizer. The flame arrester prevents propagation of flame back to the source.

FM Approved Supplemental Fuel Train

A FM supplemental fuel train is provided with the Oxidizer and is fitted with an approved safety shut off valve for the main gas. The shut off valve will close in 0.3 seconds in the event of flame failure. The main gas valve is held shut with a 150 lb. force to assure a tight closure.

Oxygen Sensor and Proportional Dilution Valve

A O_2 sensor and P.I.D. controller is provided to monitor oxygen content in the vapor stream. We require 18% oxygen (minimum) in the stream for sufficient combustion of volatiles. In the event the oxygen content of the vapor stream drops off significantly the O_2 controller opens a proportionally modulated butterfly valve and lets in dilution air to bring the oxygen content up to a satisfactory level.

Alarm Card in Process Temperature Controller

We have integrated an alarm card into the process temperature controller to restrict the entry of volatiles into the Oxidizer until it reaches its correct operating temperature (1400° F.). This is accomplished by setting an alarm value equal to 1400 in the controller. When this value (in temperature) is reached, the process controller sends a signal to a butterfly valve drive motor which opens the valve and allows the vapor stream to enter the Oxidizer. Vapors cannot enter the Oxidizer at any temperature below which the alarm value has been set. This prevents the incomplete burning of hydrocarbons which occurs at lower operating temperatures.

Catalytic Oxidizer

BTU's/hr of Supplemental Fuel Required to Raise Air Temperature of Influent Vapor Stream from 100° F. to 700° F. at Various PPM VOC Concentrations

PPM VOC'S	% LEL	AIR FLOW SCFM				
		100	200	300	400	500
0	0	79,000	158,000	237,000	316,000	395,000
250	1.8	72,500	145,000	217,500	290,000	362,500
500	3.6	65,000	130,000	195,000	260,000	325,000
750	5.4	57,500	115,000	172,500	230,000	287,500
1000	7.3	52,500	105,000	157,500	210,000	262,500
1500	10.9	39,000	78,000	117,000	156,000	195,000
2000	14.5	25,000	50,000	75,000	100,000	125,000
2500	18.1	12,500	25,000	37,500	50,000	62,500
3000	21.7	0	0	0	0	0

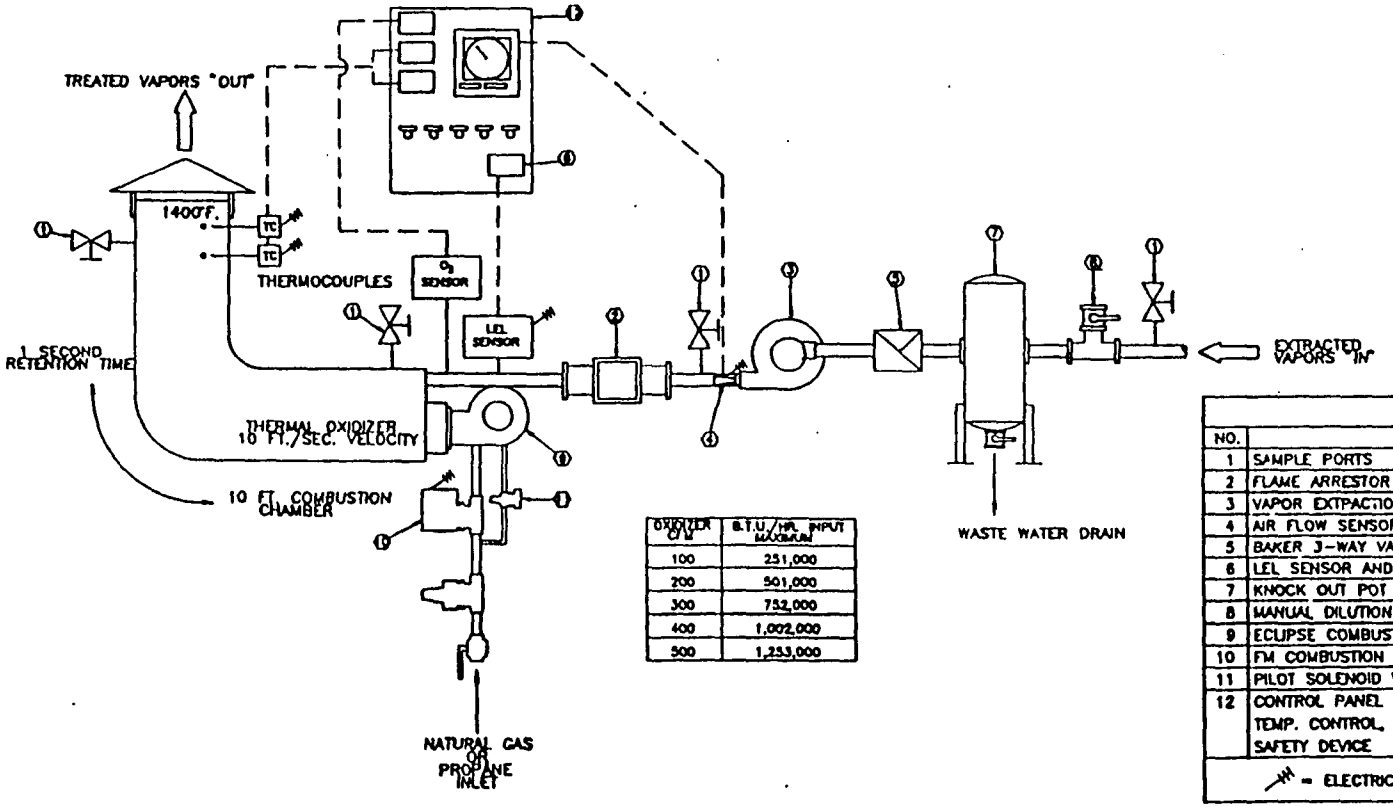
Direct Fired Oxidizer

BTU's/hr of Supplemental Fuel Required to Raise Air Temperature of Influent Vapor Stream from 100° F. to 1400° F. at Various PPM VOC Concentrations

250
370,000 440,000

PPM VOC'S	% LEL	300,000 AIR FLOW SCFM				
		100	200	300	400	500
500	3.6	134,000	268,000	402,000	536,000	670,000
1000	7.3	120,000	240,000	360,000	480,000	600,000
1500	10.9	108,000	216,000	324,000	432,000	540,000
2000	14.5	92,500	185,000	277,500	370,000	462,500
2500	18.1	80,000	160,000	240,000	320,000	400,000
3000	21.7	67,500	135,000	202,500	270,000	337,500
3500	25.4	57,500	115,000	172,500	230,000	287,500
4000	29.0	40,000	80,000	120,000	160,000	200,000
4500	32.6	26,000	52,000	78,000	104,000	130,000
5000	36.2	14,000	28,000	42,000	56,000	70,000
5500	39.9	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -
6000	43.5	- 0 -	- 0 -	- 0 -	- 0 -	- 0 -

GENERAL ARRANGEMENT DRAWING



OXIDIZER C.F.M.	B.T.U./HR. INPUT MAXIMUM
100	251,000
200	501,000
300	752,000
400	1,002,000
500	1,253,000

LEGEND	
NO.	DESCRIPTION
1	SAMPLE PORTS
2	FLAME ARRESTOR
3	VAPOR EXTRACTION BLOWER
4	AIR FLOW SENSOR - SIGNAL TO CHART RECORDER
5	BAKER 3-WAY VALVING W/ PROPORTIONAL AIR DILUTION
6	LEL SENSOR AND LEL CONTROLLER WITH ALARM SETPOINT
7	KNOCK OUT POT WITH INTEGRAL SENSOR & OPTIONAL AUTO. PUMP
8	MANUAL DILUTION VALVE
9	ECLIPSE COMBUSTION BURNER & SUPPLEMENTAL BLOWER
10	FM COMBUSTION FUEL TRAIN
11	PILOT SOLENOID VALVE
12	CONTROL PANEL WITH CHART RECORDER, TEMP. CONTROL, OVER TEMP. CONTROL, AIR MONITOR, LEL AND FM APPROVED FLAME SAFETY DEVICE
	= ELECTRICAL SIGNAL = SAMPLE PORTS

THERMAL OXIDIZER PROCESS AND INSTRUMENTATION DIAGRAM

E: Laboratory Analytical Reports

Sampling performed by Cypress Engineering Services, May 1995

NATIONAL ENVIRONMENTAL TESTING, INC.

Dallas Division
1548 Valwood Parkway
Suite 118
Carrollton, TX 75006
Tel: (214) 406-8100
Fax: (214) 484-2969

ANALYTICAL AND QUALITY CONTROL REPORT

George Robinson
ENRON CORPORATION
Env. Affairs, Rm 3 AC 3142
P.O. Box 1188
Houston, TX 77251

06/08/1995

NET Job Number: 95.03553

Enclosed is the Analytical and Quality Control report for the following samples submitted to the Dallas Division of NET, Inc. for analysis. Reproduction of this analytical report is permitted only in its entirety.

Sample Number	Sample Description	Date Taken	Date Received
263804	MW-1	05/31/1995	06/02/1995
263805	MW-2	05/31/1995	06/02/1995
263806	MW-3	05/31/1995	06/02/1995
263807	MW-4	05/31/1995	06/02/1995
263808	MW-5	05/31/1995	06/02/1995
263809	MW-6	05/31/1995	06/02/1995
263810	WATER WELL	05/31/1995	06/02/1995

National Environmental Testing, Inc. certifies that the analytical results contained herein apply only to the specific samples analyzed.

Holding Times: All holding times were within method criteria.

Method Blanks: All method blanks were within quality control criteria.

Instrument calibration: All calibrations were within method quality control criteria.

Analysis Comments: No Unusual Comments

Gregory K. Horton
Project Coordinator

OCEAN GROUP

ANALYTICAL REPORT

George Robinson
ENRON CORPORATION
Env. Affairs, Rm 3 AC 3142
P.O. Box 1188
Houston, TX 77251

06/08/1995
Job No.: 95.03553

Project Name: TW BELLE LAKE PLANT

Date Received: 06/02/1995

263804 MW-1
Taken: 05/31/1995

Sulfate, Dissolved	78.3	mg/L
Alkalinity, total (CACO3)	1,290	mg/L
Chloride	2,620	mg/L
N-Nitrate	0.37	mg/L
N-Nitrite	0.04	mg/L
pH	8.8	units
Sulfite	2.0	mg/L
Arsenic, Dissolved, ICP	0.07	mg/L
Barium, Dissolved, ICP	0.32	mg/L
Cadmium, Dissolved, ICP	<0.01	mg/L
Calcium, Dissolved, ICP	62.7	mg/L
Chromium, Dissolved, ICP	<0.01	mg/L
Copper, Dissolved, ICP	<0.01	mg/L
Iron, Dissolved, ICP	0.73	mg/L
Lead, Dissolved, ICP	<0.03	mg/L
Magnesium, Dissolved, ICP	114	mg/L
Manganese, Dissolved, ICP	0.28	mg/L
Mercury, Dissolved, CVAA	<0.0002	mg/L
Potassium, Dissolved, ICP	12.6	mg/L
Selenium, Dissolved, ICP	<0.04	mg/L
Silver, Dissolved, ICP	<0.01	mg/L
Sodium, Dissolved, ICP	1400	mg/L
Zinc, Dissolved, ICP	<0.03	mg/L
Total Dissolved Solids	5,800	mg/L
EPA 8020-AQ (Preserved)		
Benzene	8	ug/L
Ethylbenzene	9	ug/L
Toluene	13	ug/L
Xylenes, Total	29	ug/L
SURR: a,a,a-TFT	85	% Rec
BASE/NEUTRALS - 8270 AQUEOUS		
Acenaphthene	<5.	ug/L
Acenaphthylene	<5.	ug/L
Anthracene	<5.	ug/L
Benzo(a)anthracene	<5.	ug/L
Benzo(b)fluoranthene	<5.	ug/L
Benzo(k)fluoranthene	<5.	ug/L
Benzo(g,h,i)perylene	<5.	ug/L
Benzo(a)pyrene	<5.	ug/L
Chrysene	<5.	ug/L
Dibenzo(a,h)anthracene	<5.	ug/L

ANALYTICAL REPORT

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06/08/1995
Job No.: 95.03553

Project Name: TW BELLE LAKE PLANT

Date Received: 06/02/1995

263804 MW-1
Taken: 05/31/1995

Fluoranthene	<5.	ug/L
Fluorene	<5.	ug/L
Indeno(1,2,3-cd)pyrene	<5.	ug/L
Naphthalene	<5.	ug/L
Phenanthrene	<5.	ug/L
Pyrene	<5.	ug/L
SURR: 2-Fluorobiphenyl	81	%
SURR: Nitrobenzene-d5	88	%
SURR: Terphenyl-d14	82	%

263805 MW-2
Taken: 05/31/1995

Sulfate, Dissolved	73.6	mg/L
Alkalinity, total (CACO3)	445	mg/L
Chloride	512	mg/L
N-Nitrate	<0.10	mg/L
N-Nitrite	0.01	mg/L
pH	7.4	units
Sulfite	0.50	mg/L
Arsenic, Dissolved, ICP	0.06	mg/L
Barium, Dissolved, ICP	0.22	mg/L
Cadmium, Dissolved, ICP	<0.01	mg/L
Calcium, Dissolved, ICP	79.8	mg/L
Chromium, Dissolved, ICP	<0.01	mg/L
Copper, Dissolved, ICP	0.02	mg/L
Iron, Dissolved, ICP	3.7	mg/L
Lead, Dissolved, ICP	<0.03	mg/L
Magnesium, Dissolved, ICP	43.1	mg/L
Manganese, Dissolved, ICP	0.67	mg/L
Mercury, Dissolved, CVAA	<0.0002	mg/L
Potassium, Dissolved, ICP	5.4	mg/L
Selenium, Dissolved, ICP	<0.04	mg/L
Silver, Dissolved, ICP	<0.01	mg/L
Sodium, Dissolved, ICP	195	mg/L
Zinc, Dissolved, ICP	0.04	mg/L
Total Dissolved Solids	1,500	mg/L
EPA 8020-AQ (Preserved)		
Benzene	3	ug/L
Ethylbenzene	<2	ug/L
Toluene	<2	ug/L

ANALYTICAL REPORT

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06/08/1995
Job No.: 95.03553

Project Name: TW BELLE LAKE PLANT

Date Received: 06/02/1995

263805 MW-2
Taken: 05/31/1995

Xylenes, Total	<2	ug/L
SURR: a,a,a-TFT	71	% Rec
BASE/NEUTRALS - 8270 AQUEOUS		
Acenaphthene	<6.	ug/L
Acenaphthylene	<6.	ug/L
Anthracene	<6.	ug/L
Benzo(a)anthracene	<6.	ug/L
Benzo(b)fluoranthene	<6.	ug/L
Benzo(k)fluoranthene	<6.	ug/L
Benzo(g,h,i)perylene	<6.	ug/L
Benzo(a)pyrene	<6.	ug/L
Chrysene	<6.	ug/L
Dibenzo(a,h)anthracene	<6.	ug/L
Fluoranthene	<6.	ug/L
Fluorene	<6.	ug/L
Indeno(1,2,3-cd)pyrene	<6.	ug/L
Naphthalene	<6.	ug/L
Phenanthrene	<6.	ug/L
Pyrene	<6.	ug/L
SURR: 2-Fluorobiphenyl	92	%
SURR: Nitrobenzene-d5	68	%
SURR: Terphenyl-d14	128	%

263806 MW-3
Taken: 05/31/1995

Sulfate, Dissolved	43.4	mg/L
Alkalinity, total (CACO3)	210	mg/L
Chloride	14.5	mg/L
N-Nitrate	3.3	mg/L
N-Nitrite	<0.01	mg/L
pH	7.7	units
Sulfite	0.50	mg/L
Arsenic, Dissolved, ICP	<0.03	mg/L
Barium, Dissolved, ICP	0.21	mg/L
Cadmium, Dissolved, ICP	<0.01	mg/L
Calcium, Dissolved, ICP	54.7	mg/L
Chromium, Dissolved, ICP	<0.01	mg/L
Copper, Dissolved, ICP	<0.01	mg/L
Iron, Dissolved, ICP	0.22	mg/L
Lead, Dissolved, ICP	<0.03	mg/L

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Date Received: 06/02/1995

263806 MW-3
Taken: 05/31/1995

Magnesium, Dissolved, ICP	17.6	mg/L
Manganese, Dissolved, ICP	<0.01	mg/L
Mercury, Dissolved, CVAA	<0.0002	mg/L
Potassium, Dissolved, ICP	7.1	mg/L
Selenium, Dissolved, ICP	<0.04	mg/L
Silver, Dissolved, ICP	<0.01	mg/L
Sodium, Dissolved, ICP	20.5	mg/L
Zinc, Dissolved, ICP	<0.03	mg/L
Total Dissolved Solids	380	mg/L
EPA 8020-AQ (Preserved)		
Benzene	<2	ug/L
Ethylbenzene	<2	ug/L
Toluene	<2	ug/L
Xylenes, Total	<2	ug/L
SURR: a,a,a-TFT	103	% Rec
BASE/NEUTRALS - 8270 AQUEOUS		
Acenaphthene	<5.	ug/L
Acenaphthylene	<5.	ug/L
Anthracene	<5.	ug/L
Benzo(a)anthracene	<5.	ug/L
Benzo(b)fluoranthene	<5.	ug/L
Benzo(k)fluoranthene	<5.	ug/L
Benzo(g,h,i)perylene	<5.	ug/L
Benzo(a)pyrene	<5.	ug/L
Chrysene	<5.	ug/L
Dibenzo(a,h)anthracene	<5.	ug/L
Fluoranthene	<5.	ug/L
Fluorene	<5.	ug/L
Indeno(1,2,3-cd)pyrene	<5.	ug/L
Naphthalene	<5.	ug/L
Phenanthrene	<5.	ug/L
Pyrene	<5.	ug/L
SURR: 2-Fluorobiphenyl	92	%
SURR: Nitrobenzene-d5	86	%
SURR: Terphenyl-d14	85	%

263807 MW-4
Taken: 05/31/1995

Sulfate, Dissolved	104	mg/L
Alkalinity, total (CACO3)	2,180	mg/L

ANALYTICAL REPORT

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Project Name: TW BELLE LAKE PLANT

Date Received: 06/02/1995

263807 MW-4
Taken: 05/31/1995

Chloride	1,700	mg/L
N-Nitrate	<0.10	mg/L
N-Nitrite	<0.01	mg/L
pH	10.0	units
Sulfite	17.5	mg/L
Arsenic, Dissolved, ICP	0.33	mg/L
Barium, Dissolved, ICP	0.23	mg/L
Cadmium, Dissolved, ICP	<0.01	mg/L
Calcium, Dissolved, ICP	<0.10	mg/L
Chromium, Dissolved, ICP	<0.01	mg/L
Copper, Dissolved, ICP	<0.01	mg/L
Iron, Dissolved, ICP	0.11	mg/L
Lead, Dissolved, ICP	<0.03	mg/L
Magnesium, Dissolved, ICP	0.76	mg/L
Manganese, Dissolved, ICP	0.03	mg/L
Mercury, Dissolved, CVAA	<0.0002	mg/L
Potassium, Dissolved, ICP	4.9	mg/L
Selenium, Dissolved, ICP	<0.04	mg/L
Silver, Dissolved, ICP	<0.01	mg/L
Sodium, Dissolved, ICP	1650	mg/L
Zinc, Dissolved, ICP	<0.03	mg/L
Total Dissolved Solids	5,200	mg/L
EPA 8020-AQ (Preserved)		
Benzene	300	ug/L
Ethylbenzene	<200	ug/L
Toluene	1,300	ug/L
Xylenes, Total	800	ug/L
SURR: a,a,a-TFT	111	% Rec
BASE/NEUTRALS - 8270 AQUEOUS		
Acenaphthene	<6.	ug/L
Acenaphthylene	<6.	ug/L
Anthracene	<6.	ug/L
Benzo(a)anthracene	<6.	ug/L
Benzo(b)fluoranthene	<6.	ug/L
Benzo(k)fluoranthene	<6.	ug/L
Benzo(g,h,i)perylene	<6.	ug/L
Benzo(a)pyrene	<6.	ug/L
Chrysene	<6.	ug/L
Dibenzo(a,h)anthracene	<6.	ug/L
Fluoranthene	<6.	ug/L

ANALYTICAL REPORT

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06/08/1995
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Date Received: 06/02/1995

263807 MW-4
Taken: 05/31/1995

Fluorene	<6.	ug/L
Indeno(1,2,3-cd)pyrene	<6.	ug/L
Naphthalene	<6.	ug/L
Phenanthrene	<6.	ug/L
Pyrene	<6.	ug/L
SURR: 2-Fluorobiphenyl	99	%
SURR: Nitrobenzene-d5	82	%
SURR: Terphenyl-d14	92	%

263808 MW-5
Taken: 05/31/1995

Sulfate, Dissolved	12.4	mg/L
Alkalinity, total (CACO3)	1,690	mg/L
Chloride	4,070	mg/L
N-Nitrate	<0.10	mg/L
N-Nitrite	0.01	mg/L
pH	9.0	units
Sulfite	4.5	mg/L
Arsenic, Dissolved, ICP	0.14	mg/L
Barium, Dissolved, ICP	0.88	mg/L
Cadmium, Dissolved, ICP	<0.01	mg/L
Calcium, Dissolved, ICP	4.8	mg/L
Chromium, Dissolved, ICP	<0.01	mg/L
Copper, Dissolved, ICP	0.01	mg/L
Iron, Dissolved, ICP	0.13	mg/L
Lead, Dissolved, ICP	<0.03	mg/L
Magnesium, Dissolved, ICP	2.0	mg/L
Manganese, Dissolved, ICP	0.02	mg/L
Mercury, Dissolved, CVAA	<0.0002	mg/L
Potassium, Dissolved, ICP	13.8	mg/L
Selenium, Dissolved, ICP	<0.04	mg/L
Silver, Dissolved, ICP	<0.01	mg/L
Sodium, Dissolved, ICP	2690	mg/L
Zinc, Dissolved, ICP	<0.03	mg/L
Total Dissolved Solids	7,400	mg/L
EPA 8020-AQ (Preserved)		
Benzene	51	ug/L
Ethylbenzene	16	ug/L
Toluene	109	ug/L
Xylenes, Total	219	ug/L

ANALYTICAL REPORT

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Date Received: 06/02/1995

263808 MW-5
Taken: 05/31/1995

SURR: a,a,a-TFT	103	% Rec
BASE/NEUTRALS - 8270 AQUEOUS		
Acenaphthene	<7.	ug/L
Acenaphthylene	<7.	ug/L
Anthracene	<7.	ug/L
Benzo(a)anthracene	<7.	ug/L
Benzo(b)fluoranthene	<7.	ug/L
Benzo(k)fluoranthene	<7.	ug/L
Benzo(g,h,i)perylene	<7.	ug/L
Benzo(a)pyrene	<7.	ug/L
Chrysene	<7.	ug/L
Dibenzo(a,h)anthracene	<7.	ug/L
Fluoranthene	<7.	ug/L
Fluorene	<7.	ug/L
Indeno(1,2,3-cd)pyrene	<7.	ug/L
Naphthalene	<7.	ug/L
Phenanthrene	<7.	ug/L
Pyrene	<7.	ug/L
SURR: 2-Fluorobiphenyl	82	ug/L
SURR: Nitrobenzene-d5	97	ug/L
SURR: Terphenyl-d14	91	ug/L

263809 MW-6
Taken: 05/31/1995

Sulfate, Dissolved	78.3	mg/L
Alkalinity, total (CACO3)	1,070	mg/L
Chloride	2,670	mg/L
N-Nitrate	0.59	mg/L
N-Nitrite	0.04	mg/L
pH	9.2	units
Sulfite	2.5	mg/L
Arsenic, Dissolved, ICP	0.33	mg/L
Barium, Dissolved, ICP	0.36	mg/L
Cadmium, Dissolved, ICP	<0.01	mg/L
Calcium, Dissolved, ICP	11.1	mg/L
Chromium, Dissolved, ICP	<0.01	mg/L
Copper, Dissolved, ICP	<0.01	mg/L
Iron, Dissolved, ICP	0.25	mg/L
Lead, Dissolved, ICP	<0.03	mg/L
Magnesium, Dissolved, ICP	4.6	mg/L

ANALYTICAL REPORT

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263809 MW-6
Taken: 05/31/1995

Manganese, Dissolved, ICP	0.04	mg/L
Mercury, Dissolved, CVAA	<0.0002	mg/L
Potassium, Dissolved, ICP	14.4	mg/L
Selenium, Dissolved, ICP	<0.04	mg/L
Silver, Dissolved, ICP	<0.01	mg/L
Sodium, Dissolved, ICP	1320	mg/L
Zinc, Dissolved, ICP	<0.03	mg/L
Total Dissolved Solids	5,400	mg/L
EPA 8020-AQ (Preserved)		
Benzene	28	ug/L
Ethylbenzene	4	ug/L
Toluene	26	ug/L
Xylenes, Total	57	ug/L
SURR: a,a,a-TFT	83	% Rec
BASE/NEUTRALS - 8270 AQUEOUS		
Acenaphthene	<7.	ug/L
Acenaphthylene	<7.	ug/L
Anthracene	<7.	ug/L
Benzo(a)anthracene	<7.	ug/L
Benzo(b)fluoranthene	<7.	ug/L
Benzo(k)fluoranthene	<7.	ug/L
Benzo(g,h,i)perylene	<7.	ug/L
Benzo(a)pyrene	<7.	ug/L
Chrysene	<7.	ug/L
Dibenzo(a,h)anthracene	<7.	ug/L
Fluoranthene	<7.	ug/L
Fluorene	<7.	ug/L
Indeno(1,2,3-cd)pyrene	<7.	ug/L
Naphthalene	<7.	ug/L
Phenanthrene	<7.	ug/L
Pyrene	<7.	ug/L
SURR: 2-Fluorobiphenyl	94	%
SURR: Nitrobenzene-d5	91	%
SURR: Terphenyl-d14	84	%

263810 WATER WELL
Taken: 05/31/1995

Sulfate, Dissolved	356	mg/L
Alkalinity, total (CACO3)	144	mg/L
Chloride	100	mg/L

ANALYTICAL REPORT

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06/08/1995
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Date Received: 06/02/1995

263810 WATER WELL
Taken: 05/31/1995

N-Nitrate	<0.10	mg/L
N-Nitrite	<0.01	mg/L
pH	8.2	units
Sulfite	0.50	mg/L
Arsenic, Dissolved, ICP	<0.03	mg/L
Barium, Dissolved, ICP	0.02	mg/L
Cadmium, Dissolved, ICP	<0.01	mg/L
Calcium, Dissolved, ICP	38.7	mg/L
Chromium, Dissolved, ICP	<0.01	mg/L
Copper, Dissolved, ICP	<0.01	mg/L
Iron, Dissolved, ICP	0.39	mg/L
Lead, Dissolved, ICP	<0.03	mg/L
Magnesium, Dissolved, ICP	23.2	mg/L
Manganese, Dissolved, ICP	0.01	mg/L
Mercury, Dissolved, CVAA	<0.0002	mg/L
Potassium, Dissolved, ICP	5.3	mg/L
Selenium, Dissolved, ICP	<0.04	mg/L
Silver, Dissolved, ICP	<0.01	mg/L
Sodium, Dissolved, ICP	194	mg/L
Zinc, Dissolved, ICP	<0.03	mg/L
Total Dissolved Solids	900	mg/L
EPA 8020-AQ (Preserved)		
Benzene	<2	ug/L
Ethylbenzene	<2	ug/L
Toluene	<2	ug/L
Xylenes, Total	<2	ug/L
SURR: a,a,a-TFT	105	% Rec
BASE/NEUTRALS - 8270 AQUEOUS		
Acenaphthene	<5	ug/L
Acenaphthylene	<5	ug/L
Anthracene	<5	ug/L
Benzo(a)anthracene	<5	ug/L
Benzo(b)fluoranthene	<5	ug/L
Benzo(k)fluoranthene	<5	ug/L
Benzo(g,h,i)perylene	<5	ug/L
Benzo(a)pyrene	<5	ug/L
Chrysene	<5	ug/L
Dibenzo(a,h)anthracene	<5	ug/L
Fluoranthene	<5	ug/L
Fluorene	<5	ug/L

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Date Received: 06/02/1995

263810 WATER WELL
Taken: 05/31/1995

Indeno(1,2,3-cd)pyrene	<5	ug/L
Naphthalene	<5	ug/L
Phenanthrene	<5	ug/L
Pyrene	<5	ug/L
SURR: 2-Fluorobiphenyl	59	%
SURR: Nitrobenzene-d5	53	%
SURR: Terphenyl-d14	111	%

NET®

QUALITY CONTROL REPORT
Continuing Calibration Verification (CCV)

JOB NUMBER: 95.03553

PARAMETER	ANALYST	DATE ANALYZED	METHOD	CCV RESULT	CCV TRUE CONCENTRATION	% REC.	FLAG
Alkalinity, total (CACO3)	ham	06/05/1995	SM-2320B	2,575	2,500	103	NA
Chloride	bwb	06/05/1995	SM-4500Cl	500	500	100	NA
N-Nitrate	bwb	06/03/1995	E-352.1	0.52	0.50	104	NA
N-Nitrite	bwb	06/03/1995	E-354.1	0.05	0.050	100	NA
pH	rsd	06/02/1995	SM-4500H.	8.77	9.18	96	NA
Arsenic, Dissolved, ICP	cbw	06/05/1995	S-6010	1.00	1.00	100	NA
Barium, Dissolved, ICP	cbw	06/05/1995	S-6010	1.02	1.00	102	NA
Cadmium, Dissolved, ICP	cbw	06/05/1995	S-6010	1.01	1.00	101	NA
Calcium, ICP	cbw	06/05/1995	E-200.7	11.1	11.0	101	NA
Chromium, Dissolved, ICP	cbw	06/05/1995	S-6010	1.01	1.00	101	NA
Copper, Dissolved, ICP	cbw	06/05/1995	S-6010	1.01	1.00	101	NA
Iron, Dissolved, ICP	cbw	06/05/1995	S-6010	1.01	1.00	101	NA
Lead, Dissolved, ICP	cbw	06/05/1995	S-6010	1.03	1.00	103	NA
Magnesium, ICP	cbw	06/05/1995	E-200.7	10.1	10.0	101	NA
Manganese, Dissolved, ICP	cbw	06/05/1995	S-6010	1.01	1.00	101	NA
Mercury, Dissolved, CVAA	jmd	06/06/1995	E-245.1	0.53	0.50	106	NA
Potassium, ICP	cbw	06/05/1995	E-200.7	10.3	10.0	103	NA
Selenium, Dissolved, ICP	cbw	06/05/1995	S-6010	0.99	1.00	99	NA
Silver, Dissolved, ICP	cbw	06/05/1995	S-6010	1.01	1.00	101	NA
Sodium, ICP	cbw	06/05/1995	E-200.7	10.1	10.0	101	NA
Zinc, Dissolved, ICP	cbw	06/05/1995	S-6010	1.00	1.00	100	NA
Total Dissolved Solids	ham	06/06/1995	E-160.1	NA	2000	NA	NA

Method References and Codes

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D: ASTM Method

M: Method has been modified

*: Other Reference

QUALITY CONTROL REPORT
Continuing Calibration Verification
(CCV)

JOB NUMBER: 95.03553

PARAMETER	ANALYST	DATE ANALYZED	METHOD	CCV RESULT	CCV TRUE CONCENTRATION	% REC.	FLAG
EPA 8020-AQ (Preserved)			S-8020M				
Benzene	dwr	06/01/1995	S-8020M	18	20	90	NA
Ethylbenzene	dwr	06/01/1995	S-8020M	20	20	100	NA
Toluene	dwr	06/01/1995	S-8020M	20	20	100	NA
Xylenes, Total	dwr	06/01/1995	S-8020M	64	60	107	NA
EPA 8020-AQ (Preserved)			S-8020M				
Benzene	dwr	06/02/1995	S-8020M	20	20	100	NA
Ethylbenzene	dwr	06/02/1995	S-8020M	20	20	100	NA
Toluene	dwr	06/02/1995	S-8020M	19	20	95	NA
Xylenes, Total	dwr	06/02/1995	S-8020M	64	60	107	NA
EPA 8020-AQ (Preserved)			S-8020M				
Benzene	dwr	06/05/1995	S-8020M	21	20	105	NA
Ethylbenzene	dwr	06/05/1995	S-8020M	21	20	105	NA
Toluene	dwr	06/05/1995	S-8020M	20	20	100	NA
Xylenes, Total	dwr	06/05/1995	S-8020M	68	60	113	NA
EPA 8020-AQ (Preserved)			S-8020M				
Benzene	dwr	06/06/1995	S-8020M	21	20	105	NA
Ethylbenzene	dwr	06/06/1995	S-8020M	21	20	105	NA
Toluene	dwr	06/06/1995	S-8020M	21	20	105	NA
Xylenes, Total	dwr	06/06/1995	S-8020M	67	60	112	NA
EPA 8020-AQ (Preserved)			S-8020M				
Benzene	dwr	06/06/1995	S-8020M	21	20	105	NA

Method References and Codes

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JOB NUMBER: 95.03553

PARAMETER	ANALYST	DATE ANALYZED	METHOD	CCV RESULT	CCV TRUE CONCENTRATION	% REC.	FLAG
Ethylbenzene	dwr	06/06/1995	S-8020M	21	20	105	NA
Toluene	dwr	06/06/1995	S-8020M	20	20	100	NA
Xylenes, Total	dwr	06/06/1995	S-8020M	68	60	113	NA
EPA 8020-AQ (Preserved)			S-8020M				
Benzene	dwr	06/06/1995	S-8020M	21	20	105	NA
Ethylbenzene	dwr	06/06/1995	S-8020M	21	20	105	NA
Toluene	dwr	06/06/1995	S-8020M	21	20	105	NA
Xylenes, Total	dwr	06/06/1995	S-8020M	67	60	112	NA
EPA 8020-AQ (Preserved)			S-8020M				
Benzene	dwr	06/07/1995	S-8020M	23	20	115	NA
Ethylbenzene	dwr	06/07/1995	S-8020M	19	20	95	NA
Toluene	dwr	06/07/1995	S-8020M	20	20	100	NA
Xylenes, Total	dwr	06/07/1995	S-8020M	62	60	103	NA
BASE/NEUTRALS - 8270 AQUEOUS			S-8270				
Acenaphthene	slw	06/06/1995	S-8270	52.7	50.0	105	NA
Acenaphthylene	slw	06/06/1995	S-8270	52.3	50.0	105	NA
Anthracene	slw	06/06/1995	S-8270	51.1	50.0	102	NA
Benzo(a)anthracene	slw	06/06/1995	S-8270	49.5	50.0	99	NA
Benzo(a)pyrene	slw	06/06/1995	S-8270	52.7	50.0	105	NA
Benzo(b)fluoranthene	slw	06/06/1995	S-8270	56.8	50.0	114	NA
Benzo(k)fluoranthene	slw	06/06/1995	S-8270	53.0	50.0	106	NA
Benzo(g,h,i)perylene	slw	06/06/1995	S-8270	40.4	50.0	81	NA

Method References and Codes

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E-601 through 625: "Guidelines Establishing Test Procedures for the Analysis of Pollutants", U.S. EPA, 40CFR, Part 136, rev. 1990.

S-1000 through 9999: "Test Methods for Evaluating Solid Waste", U.S. EPA SW-846, 3rd Edition, 1986.

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NET®

QUALITY CONTROL REPORT
Continuing Calibration Verification (CCV)

JOB NUMBER: 95.03553

PARAMETER	ANALYST	DATE ANALYZED	METHOD	CCV RESULT	CCV TRUE CONCENTRATION	% REC.	FLAG
Chrysene	slw	06/06/1995	S-8270	50.8	50.0	102	NA
Dibenzo(a,h)anthracene	slw	06/06/1995	S-8270	42.6	50.0	85	NA
Fluoranthene	slw	06/06/1995	S-8270	58.6	50.0	117	NA
Fluorene	slw	06/06/1995	S-8270	48.0	50.0	96	NA
Indeno(1,2,3-cd)pyrene	slw	06/06/1995	S-8270	41.3	50.0	83	NA
Naphthalene	slw	06/06/1995	S-8270	51.8	50.0	104	NA
Phenanthrene	slw	06/06/1995	S-8270	52.0	50.0	104	NA
Pyrene	slw	06/06/1995	S-8270	44.6	50.0	89	NA
BASE/NEUTRALS - 8270 AQUEOUS			S-8270				
Acenaphthene	slw	06/07/1995	S-8270	47.7	50.0	95	NA
Acenaphthylene	slw	06/07/1995	S-8270	47.6	50.0	95	NA
Anthracene	slw	06/07/1995	S-8270	51.4	50.0	103	NA
Benzo(a)anthracene	slw	06/07/1995	S-8270	51.0	50.0	102	NA
Benzo(a)pyrene	slw	06/07/1995	S-8270	49.5	50.0	99	NA
Benzo(b)fluoranthene	slw	06/07/1995	S-8270	57.6	50.0	115	NA
Benzo(k)fluoranthene	slw	06/07/1995	S-8270	40.8	50.0	82	NA
Benzo(g,h,i)perylene	slw	06/07/1995	S-8270	57.4	50.0	115	NA
Chrysene	slw	06/07/1995	S-8270	50.8	50.0	102	NA
Dibenzo(a,h)anthracene	slw	06/07/1995	S-8270	57.6	50.0	115	NA
Fluoranthene	slw	06/07/1995	S-8270	57.4	50.0	115	NA
Fluorene	slw	06/07/1995	S-8270	46.1	50.0	92	NA
Indeno(1,2,3-cd)pyrene	slw	06/07/1995	S-8270	57.4	50.0	115	NA

Method References and Codes

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QUALITY CONTROL REPORT
Continuing Calibration Verification
(CCV)

JOB NUMBER: 95.03553

PARAMETER	ANALYST	DATE ANALYZED	METHOD	CCV RESULT	CCV TRUE CONCENTRATION	% REC.	FLAG
Naphthalene	slw	06/07/1995	S-8270	50.4	50.0	101	NA
Phenanthrene	slw	06/07/1995	S-8270	52.3	50.0	105	NA
Pyrene	slw	06/07/1995	S-8270	54.7	50.0	109	NA

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E-601 through 625: "Guidelines Establishing Test Procedures for the Analysis of Pollutants", U.S. EPA, 40CFR, Part 136, rev. 1990.

S-1000 through 9999: "Test Methods for Evaluating Solid Waste", U.S. EPA SW-846, 3rd Edition, 1986.

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QUALITY CONTROL REPORT
BLANKS

JOB NUMBER: 95.03553

PARAMETER	DATE ANALYZED	BLANK	UNITS	REPORTING LIMIT	FLAG
Alkalinity, total (CACO3)	06/05/1995	<5.0	mg/L	5.0	NA
Chloride	06/05/1995	<5.0	mg/L	5.0	NA
N-Nitrate	06/03/1995	<0.10	mg/L	0.10	NA
N-Nitrite	06/03/1995	<0.01	mg/L	0.01	NA
pH	06/05/1995	N/A	units	N/A	NA
Sulfite	06/08/1995	<0.50	mg/L	0.50	NA
Arsenic, Dissolved, ICP	09/01/1992	<0.04	mg/L	0.04	NA
Barium, Dissolved, ICP	09/01/1992	<0.05	mg/L	0.05	NA
Cadmium, Dissolved, ICP	09/01/1992	<0.01	mg/L	0.01	NA
Calcium, ICP	06/05/1995	<0.10	mg/L	0.10	NA
Chromium, Dissolved, ICP	09/01/1992	<0.01	mg/L	0.01	NA
Copper, Dissolved, ICP	09/01/1992	<0.02	mg/L	0.02	NA
Iron, Dissolved, ICP	09/01/1992	<0.05	mg/L	0.05	NA
Lead, Dissolved, ICP	09/01/1992	<0.03	mg/L	0.03	NA
Magnesium, ICP	06/05/1995	<0.10	mg/L	0.10	NA
Manganese, Dissolved, ICP	09/01/1992	<0.01	mg/L	0.01	NA
Mercury, Dissolved, CVAA	06/06/1995	<0.0002	mg/L	0.0002	NA
Potassium, ICP	06/05/1995	<0.50	mg/L	0.50	NA
Selenium, Dissolved, ICP	09/01/1992	<0.04	mg/L	0.04	NA
Silver, Dissolved, ICP	09/01/1992	<0.01	mg/L	0.01	NA
Sodium, ICP	06/05/1995	<0.50	mg/L	0.50	NA
Zinc, Dissolved, ICP	09/01/1992	<0.03	mg/L	0.01	NA
Total Dissolved Solids	06/06/1995	<10.0	mg/L	10	NA
EPA 8020-AQ (Preserved)					
Benzene	06/01/1995	<2	ug/L	2	NA
Ethylbenzene	06/01/1995	<2	ug/L	2	NA
Toluene	06/01/1995	<2	ug/L	2	NA
Xylenes, Total	06/01/1995	<2	ug/L	2	NA
EPA 8020-AQ (Preserved)					
Benzene	06/02/1995	<2	ug/L	2	NA
Ethylbenzene	06/02/1995	<2	ug/L	2	NA
Toluene	06/02/1995	<2	ug/L	2	NA
Xylenes, Total	06/02/1995	<2	ug/L	2	NA
EPA 8020-AQ (Preserved)					
Benzene	06/05/1995	<2	ug/L	2	NA
Ethylbenzene	06/05/1995	<2	ug/L	2	NA
Toluene	06/05/1995	<2	ug/L	2	NA
Xylenes, Total	06/05/1995	<2	ug/L	2	NA

Advisory Control Limits for Blanks

Metals/Wet Chemistry/Conventionals/GC - All compounds should be less than the Reporting Limit.

GC/MS Semi-Volatiles - All compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the Reporting Limit.

GC/MS Volatiles - Toluene, Methylene chloride, Acetone and Chloroform should be less than 5 times the Reporting Limit. All other volatile compounds should be less than the Reporting Limit.

NET®

QUALITY CONTROL REPORT
BLANKS

JOB NUMBER: 95.03553

PARAMETER	DATE ANALYZED	BLANK	UNITS	REPORTING LIMIT	FLAG
EPA 8020-AQ (Preserved)					
Benzene	06/06/1995	<2	ug/L	2	NA
Ethylbenzene	06/06/1995	<2	ug/L	2	NA
Toluene	06/06/1995	<2	ug/L	2	NA
Xylenes, Total	06/06/1995	<2	ug/L	2	NA
EPA 8020-AQ (Preserved)					
Benzene	06/06/1995	<2	ug/L	2	NA
Ethylbenzene	06/06/1995	<2	ug/L	2	NA
Toluene	06/06/1995	<2	ug/L	2	NA
Xylenes, Total	06/06/1995	<2	ug/L	2	NA
EPA 8020-AQ (Preserved)					
Benzene	06/06/1995	<2	ug/L	2	NA
Ethylbenzene	06/06/1995	<2	ug/L	2	NA
Toluene	06/06/1995	<2	ug/L	2	NA
Xylenes, Total	06/06/1995	<2	ug/L	2	NA
EPA 8020-AQ (Preserved)					
Benzene	06/07/1995	<2	ug/L	2	NA
Ethylbenzene	06/07/1995	<2	ug/L	2	NA
Toluene	06/07/1995	<2	ug/L	2	NA
Xylenes, Total	06/07/1995	<2	ug/L	2	NA
BASE/NEUTRALS - 8270 AQUEOUS					
Acenaphthene	06/06/1995	<5	ug/L	5	NA
Acenaphthylene	06/06/1995	<5	ug/L	5	NA
Anthracene	06/06/1995	<5	ug/L	5	NA
Benzo(a)anthracene	06/06/1995	<5	ug/L	5	NA
Benzo(b)fluoranthene	06/06/1995	<5	ug/L	5	NA
Benzo(k)fluoranthene	06/06/1995	<5	ug/L	5	NA
Benzo(g,h,i)perylene	06/06/1995	<5	ug/L	5	NA
Benzo(a)pyrene	06/06/1995	<5	ug/L	5	NA
Chrysene	06/06/1995	<5	ug/L	5	NA
Dibenzo(a,h)anthracene	06/06/1995	<5	ug/L	5	NA
Fluoranthene	06/06/1995	<5	ug/L	5	NA
Fluorene	06/06/1995	<5	ug/L	5	NA
Indeno(1,2,3-cd)pyrene	06/06/1995	<5	ug/L	5	NA
Naphthalene	06/06/1995	<5	ug/L	5	NA
Phenanthrene	06/06/1995	<5	ug/L	5	NA
Pyrene	06/06/1995	<5	ug/L	5	NA

Advisory Control Limits for Blanks

Metals/Wet Chemistry/Conventionals/GC - All compounds should be less than the Reporting Limit.

GC/MS Semi-Volatiles - All compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the Reporting Limit.

GC/MS Volatiles - Toluene, Methylene chloride, Acetone and Chloroform should be less than 5 times the Reporting Limit. All other volatile compounds should be less than the Reporting Limit.

NATIONAL ENVIRONMENTAL TESTING, INC.

CHAIN OF CUSTODY RECORD

COMPANY ENRON Environmental Affairs
ADDRESS P.O. Box 1188, Rm 3AC3142, Houston, Tx 77251
PHONE (713) 646-7329 FAX x-7247
PROJECT NAME/LOCATION TW Belle Lake Plant
PROJECT NUMBER
PROJECT MANAGER George Robinson

REPORT TO: George Robinson
INVOICE TO: George Robinson
P.O. NO.
NET QUOTE NO.

SAMPLED BY
George Robinson (PRINT NAME) — SIGNATURE

(PRINT NAME) — SIGNATURE

DATE	TIME	SAMPLE ID/DESCRIPTION	MATRIX	GRAB	COMP	# and Type of Containers: HCl	NaOH	HNO_3	H_2SO_4	OTHER	ANALYSES: 8020/BTEX only	8270/PAH only	pH	COMMENTS
5/31		MW-1	A	X		2					✓	✓	✓	
		MW-2									✓	✓	✓	
		MW-3									✓	✓	✓	
		MW-4									✓	✓	✓	
		MW-5									✓	✓	✓	
		MW-6									✓	✓	✓	
		Water Well									✓	✓	✓	Hold for analysis

Per Jeff Robinson on another COC

If VOA Vials

Waiting added 30.00 6/6 BT

To assist us in selecting the proper method

Is this work being conducted for regulatory compliance monitoring? Yes ___ No X
Is this work being conducted for regulatory enforcement action? Yes ___ No X
Which regulations apply: RCRA ___ NPDES Wastewater ___ UST ___ Drinking Water ___ Other X None ___

CONDITION OF SAMPLE: BOTTLES INTACT? YES / NO
FIELD FILTERED? YES / NO
COC SEALS PRESENT AND INTACT? YES / NO
VOLATILES FREE OF HEADSPACE? YES / NO
TEMPERATURE UPON RECEIPT: 4°
Bottles supplied by NET? YES / NO

SAMPLE REMAINDER DISPOSAL: RETURN SAMPLE REMAINDER TO CLIENT VIA ___
I REQUEST NET TO DISPOSE OF ALL SAMPLE REMAINDERS ___ DATE ___

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED FOR NET BY:
	6/1/95	4:00 p.m.			6/2/95	9:30 AM	

METHOD OF SHIPMENT: FedEx Overnight

REMARKS:

NATIONAL ENVIRONMENTAL TESTING, INC.

CHAIN OF CUSTODY RECORD

COMPANY ENRON Environmental Affairs
ADDRESS P.O. Box 1188, Rm 3AC 3142, Houston, Tx 77251
PHONE (713) 646-7327 FAX x-7247
PROJECT NAME/LOCATION TW Belle Lake Plant
PROJECT NUMBER
PROJECT MANAGER George Robinson

REPORT TO: George Robinson
INVOICE TO: George Robinson
P.O. NO.
NET QUOTE NO.

SAMPLED BY
George Robinson (PRINT NAME)
SIGNATURE

(PRINT NAME)
SIGNATURE

DATE	TIME	SAMPLE ID/DESCRIPTION	MATRIX	GRAB	COMP	# and Type of Containers: HCl	NaOH	HNO_3	H_2SO_4	OTHER	ANALYSES: TPS	Tot Alk	Major Ions - Ca, K, Mg, Na, Cl, SO_4	Na, SO_4	Metals - Ag, As, Ba, Cd, Cr, Cu, Fe, Hg, Mn, Pb, Se, Zn	
5/31		MW-1 (263804)	A	X						3	X	X	X		X	
		MW-2 (263805)														
		MW-3 (263806)														
		MW-4 (263807)														
		MW-5 (263808)														
		MW-6 (263809)														
↓		Water Well (263810)	↓	↓						↓	↓	↓	↓		↓	X

Run Sulfate on filtered portion

2 1 Liter 500 ml

Checked bottles from pH not received

pH

To assist us in selecting the proper method

Is this work being conducted for regulatory compliance monitoring? Yes ___ No X
Is this work being conducted for regulatory enforcement action? Yes ___ No X
Which regulations apply: RCRA ___ NPDES Wastewater ___ UST ___ Drinking Water ___ Other X None ___

COMMENTS

Filter in lab prior to Analysis (All samples)

Note: The one liter bottles contained ~5 ml of liquid but were marked "No Preservative". Please check pH to make sure there was no acid in the containers.

dlg 6/2

4c

CONDITION OF SAMPLE: BOTTLES INTACT? YES / NO
FIELD FILTERED? YES / NO
COC SEALS PRESENT AND INTACT? YES / NO
VOLATILES FREE OF HEADSPACE? YES / NO
TEMPERATURE UPON RECEIPT:
Bottles supplied by NET? YES / NO

SAMPLE REMAINDER DISPOSAL: RETURN SAMPLE REMAINDER TO CLIENT VIA ___
I REQUEST NET TO DISPOSE OF ALL SAMPLE REMAINDERS ✓ DATE ___

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED FOR NET BY:
	6/1/95	4:00pm			6/2/95	9:30 AM	DS DeWitt

METHOD OF SHIPMENT: FedEx Overnight

REMARKS: —

PT 1 - ORIGINAL - WHITE PT 2 - NET PROJECT MANAGER - YELLOW PT 3 - CUSTOMER COPY - PINK