TNRCC

Protecting Texas by Reducing and Preventing Pollution

Screening Site Inspection Work Plan

Old Brazos Forge
Brenham, Washington County, Texas
TXD 048 901 235

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI

Prepared in cooperation with the U.S. Environmental Protection Agency

December 1999

912642

EXPANDED SITE INSPECTION WORK PLAN

Old Brazos Forge

Brenham, Texas

TXD048901235

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Expanded Site Inspection Work Plan

Old Brazos Forge
Brenham (Washington County), Texas
TXD048901235

Prepared in cooperation with the

U.S. Environmental Protection Agency

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December 1999

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NOTE

The State predecessor agencies: Texas Water Quality Board (TWQB), Texas Department of Water Resources (TDWR), Texas Water Commission (TWC), and Texas Air Control Board (TACB), referred to throughout this report are now known as the Texas Natural Resource Conservation Commission (TNRCC). The new agency, TNRCC, became effective September 1, 1993, as mandated under State Senate Bill 2 of the 73rd Regular Legislative Session.

SECTION 1

INTRODUCTION

The Texas Natural Resource Conservation Commission (TNRCC) has been requested by the U.S. Environmental Protection Agency (EPA) Region VI to conduct an Expanded Site Inspection (ESI) at the Old Brazos Forge site (EPA Identification number TXD048901235). The facility was operated as a wire shelving manufacturing facility by Hussman Corporation (Hussman) during the period from 1965 to 1988. Hussman sold the facility to Recycled Products Corporation (RPC) on May 31, 1992 who subsequently sold the facility to Reconversion Technologies of Texas, Inc. (Retek) on August 1, 1992 (Ref. 3; 4; and 5, p. 1)

The Old Brazos Forge site consists of approximately 20 acres located at 1709 Highway 36 North, northwest of Brenham, Washington County, Texas. The remaining structures at the facility include a metal plant building covering approximately 110,000 ft^2 located on the eastern side of the property with a concrete covered parking lot located between the building and Highway 36 to the east. Three former settling lagoons with a combined area of approximately 2.4 acres are located in a separate fenced area northwest of the plant building. The site is currently inactive. (Ref. 3)

Results of previous laboratory analyses of soil samples collected on-site and from an unnamed intermittent drainage channel adjacent to the site and water samples collected from on-site monitor wells and nearby residential drinking water wells indicate that soil, surface water runoff, and ground water are the contaminant exposure pathways of concern (Ref. 3; and 5).

The purpose of this work plan is to describe the site reconnaissance and sampling activities which are planned at the site to determine if further action is required as described below.

WORK PLAN OVERVIEW

The purpose of the ESI is to document the release(s) or potential release(s) of hazardous substances from identifiable sources which may have migrated off-site. This work plan was developed using available information obtained through a review of TNRCC central files located in Austin, Texas, TNRCC Region 9 files in Waco, Texas, a review of the PA report prepared by EPA Headquarters, dated January 26, 1983, and the SSI Report, dated August 1996. The information collected from the review of records was evaluated for data gaps and additional information needs were incorporated into the work plan. This plan will be modified as necessary based on actual site conditions encountered.

Section 1 is the introduction, Section 2 is the site background and description, and Section 3 describes the site field work to be conducted. The site specific Health and Safety Plan and the Site Reconnaissance Checklist are presented as Appendices A and B, respectively.

SITE OBJECTIVE WITH RESPECT TO THE PREREMEDIAL PROCESS

The Preremedial stage of the Superfund process involves a PA and a site inspection (SI) stage consisting of a SSI, an ESI if necessary, as in this case, and, if necessary, a listing site inspection (LSI). This ESI is being conducted to determine if the above-referenced site is eligible for proposal to the National Priorities List (NPL) under the Federal Superfund Program. The ESI will focus on assessing the threat along the groundwater and soil exposure pathways within the site. The surface water pathway was adequately assessed in the SSI Report.

A PA and SSI have already been completed for the site. This ESI will build upon existing data by obtaining additional background information relevant to the site through a file review and collecting environmental samples to further characterize conditions at the site and surrounding area. Sampling conducted during the field work will attempt to document hazardous substance migration to and from the site from potential sources, and look for evidence of actual human and environmental exposure to contaminants.

PROJECT CONTACTS

EPA: William Rhotenberry, Environmental Protection Specialist (214) 665-8372
Superfund Site Assessment Manager
U.S. Environmental Protection Agency, Region VI
1445 Ross Avenue, Suite 1200, Dallas, Texas 75202

TNRCC: Wesley G. Newberry, Technical Director (512) 239-2512
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Texas Natural Resource Conservation Commission
Remediation Division, Site Assessment and Management Section
P.O. Box 13087, Capitol Station, Austin, Texas 78711

SITE CONTACT

Mr. Neal Tomlins, Court Appointed Bankruptcy Trustee (918) 747-6500
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SECTION 2

SITE BACKGROUND AND DESCRIPTION

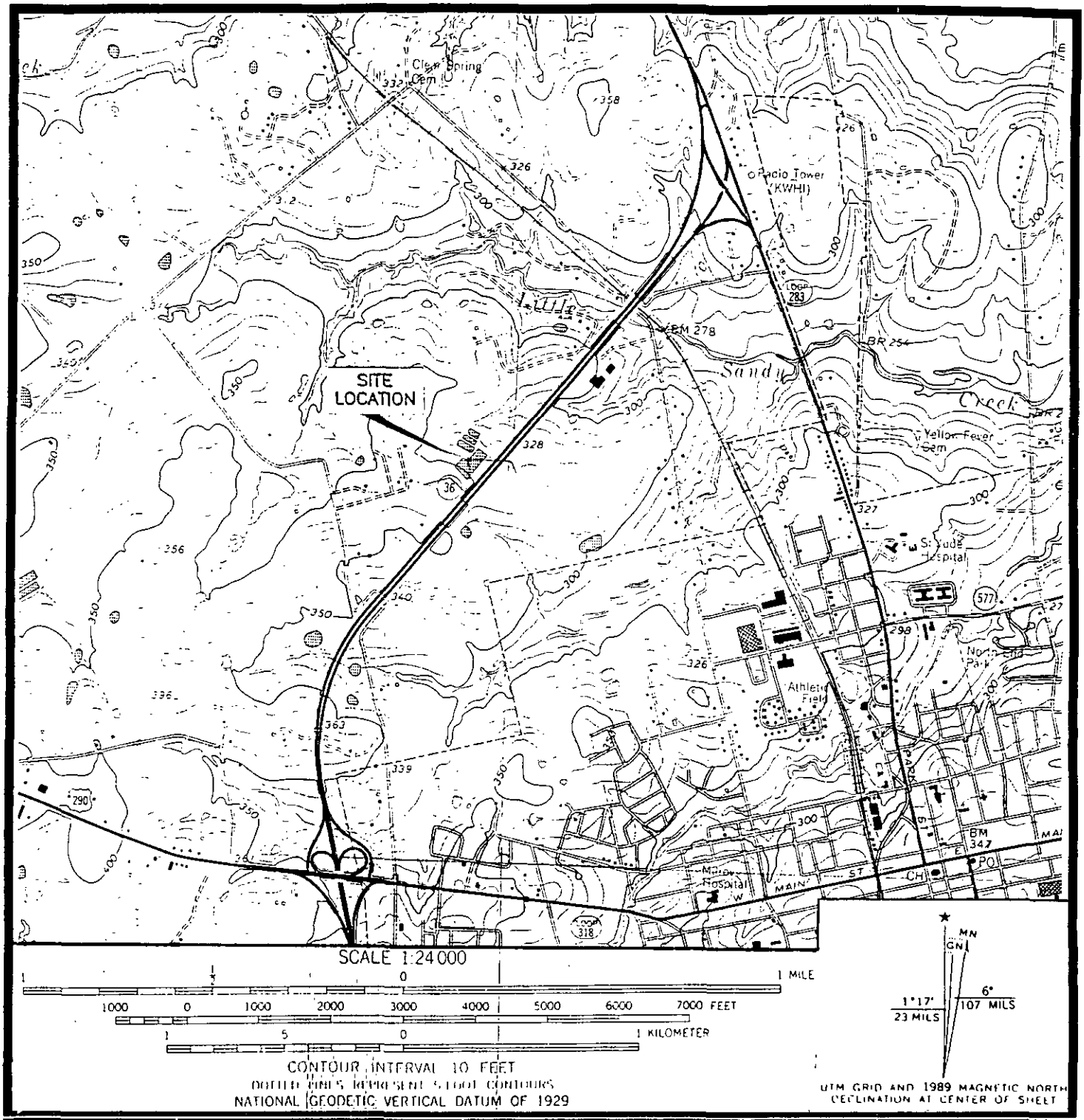
SITE INFORMATION

The Old Brazos Forge site is located at 1709 Highway 36 N., Brenham, Washington County, Texas (Fig. 1). The site is located in an undeveloped area approximately 0.3 miles northwest of the city limits of Brenham in central Washington County. The site is bounded on the west and northwest by an unnamed intermittent stream, on the east and southeast by Highway 36 N., and on the south by undeveloped land. A residential neighborhood borders the facility to the southwest (Fig. 2). The entire site is fenced with the exception of the easternmost portion of the property which is bounded by a parking lot and facility building. Entrance to the fenced portion of the site from Highway 36 North is through a locked gate located south of the building. The geographic coordinates of the site are approximately 29° 25' 07" north latitude and 30° 10' 56" west longitude.

Hussman began operation of the Old Brazos Forge site as a wire goods manufacturing and metal plating facility in 1965, on previously undeveloped land. Hussman sold the facility to RPC on May 31, 1992 who subsequently sold the facility to Retek on August 1, 1992. Following the sale of the property by Hussman, the facility was used to manufacture products from recycled plastic and rubber shavings. The facility is reported to be currently inactive (Ref. 3; 4; and 5).

The following site specific information was documented for the site during the on-site inspections by TNRCC staff and is shown in Figure 3:

> One metal building is located on the eastern side of the property. The building has an approximate area of 110,000 ft^2 and was used as a plant for wire goods manufacturing and metal plating. A concrete parking lot is located east of the plant building and along Highway 36 North with site access from the east (Ref. 5, p. 51).
>
> A ground water well is located on the subject property approximately 70 ft west of the building. This well is reportedly completed to a depth of 150 ft below ground surface (bgs) (Ref. 6, p. 63). The current condition of the well and the pump is not known.



TNRCC

Figure 1

Site Location Map

Old Brazos Forge Site

Brenham (Washington County), Texas

CERCLIS No. TXD048901235

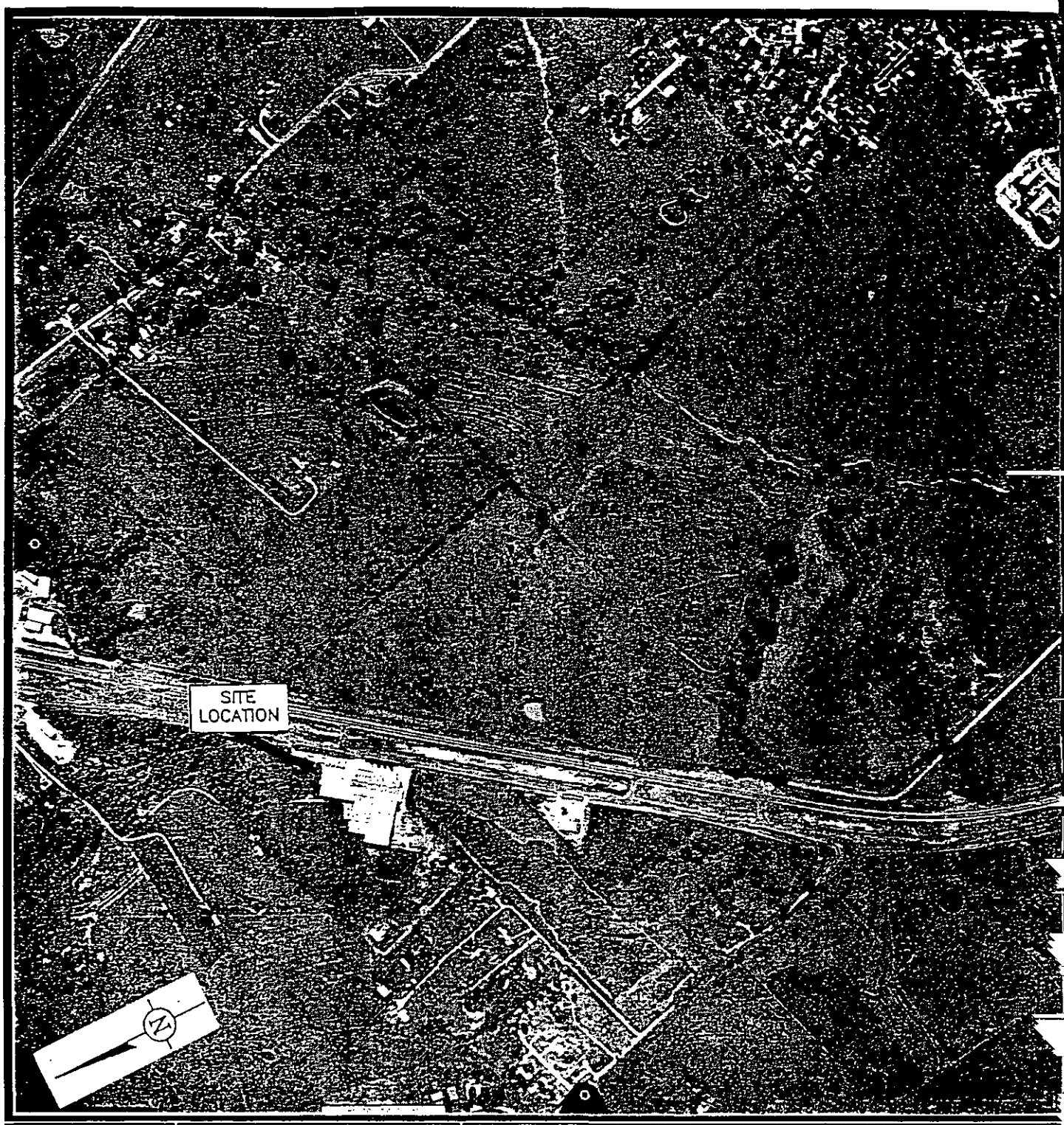


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Figure 2

1994 Aerial Photograph

Old Brazos Forge Site

Brenham (Washington County), Texas

CERCLIS No. TXD048901235

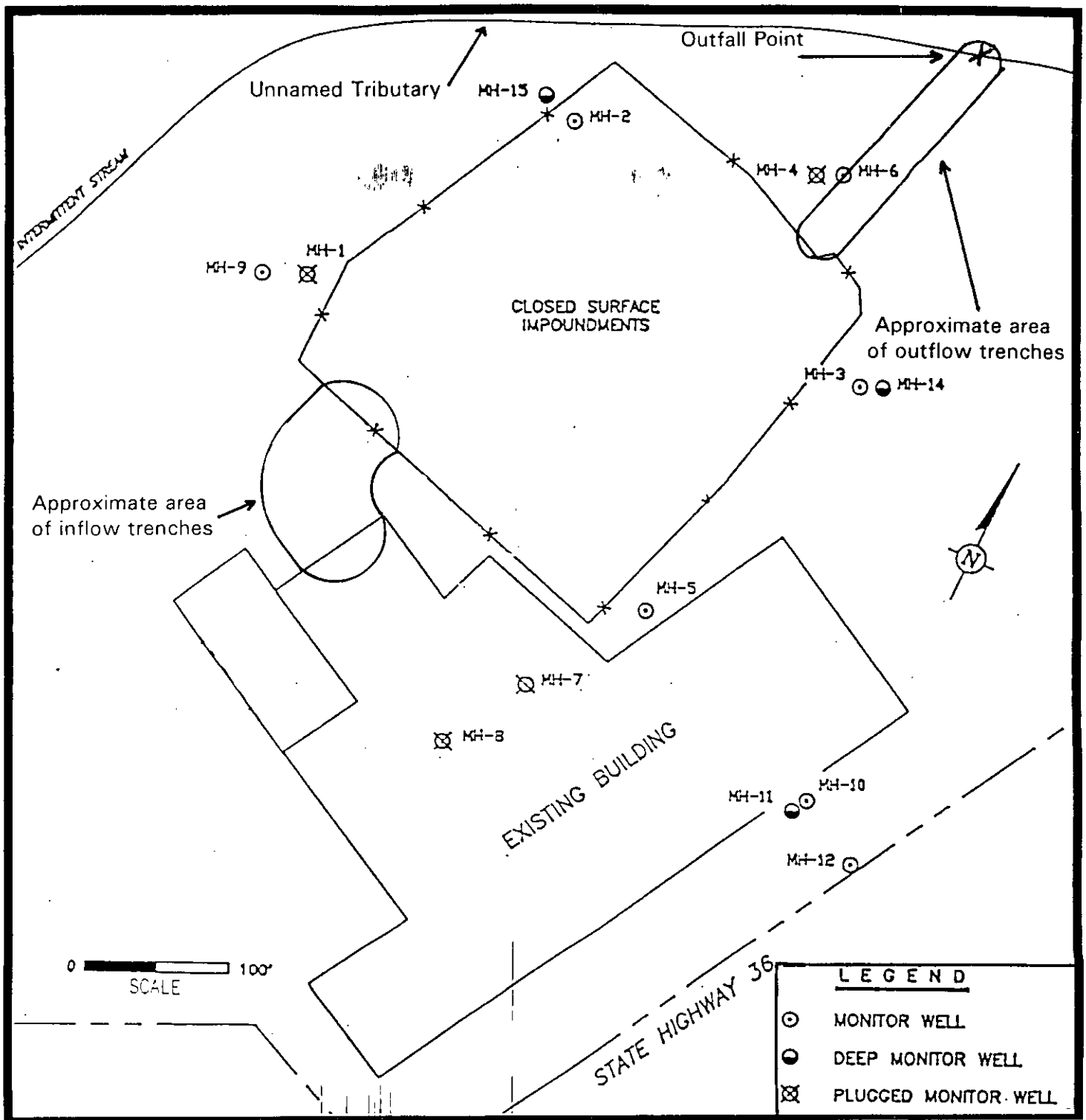

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Figure 3

Facility and Property Sketch

Old Brazos Forge Site

Brenham (Washington County), Texas

CERCLIS No. TXD048901235

Three surface impoundments are located within an approximately two acre fenced area northwest of the facility plant building. These impoundments were used as heavy metal flocculation and settling lagoons for effluent discharged from the plant. The impoundments were certified as closed in 1984 after sludge and six inches of soil were removed from the lagoons and disposed (Ref. 3, p. 3).

Prior to the close of the surface impoundments, three unlined trenches directed effluent waste water from the west side of the plant building to a single canal which then flowed to the three surface impoundments. The area encompassing the three trenches was later covered by an addition to the west side of the facility building (Ref. 3, p. 3).

An unnamed tributary of Little Sandy Creek originates from west side of the subject property. This tributary is an intermittent stream/drainage canal which meanders to the north-northeast for a distance of approximately 3,000 feet to the junction with Little Sandy Creek. Field investigations conducted by TNRCC personnel revealed that the facility was discharging waste water from the lagoons to the intermittent stream without a permit (Ref. 3, p. 1).

The PA, dated January 26, 1983, addresses the air, groundwater, and surface water exposure pathways of concern. The SSI, dated August 1996, addresses the groundwater, surface water, soil, and air exposure pathways. In this ESI, the groundwater and soil exposure pathways are being further assessed to build on the SSI Report. The surface water pathway was adequately assessed in the SSI Report. Discussion of groundwater and soil pathways are summarized in the following sections.

WASTE CONTAINMENT/HAZARDOUS SUBSTANCE IDENTIFICATION

Characteristics

The information used to identify the waste characteristics at the Old Brazos Forge site was obtained from a review of state and federal records and analysis of aerial photographs. The site was identified to have multiple waste source areas, where hazardous substances had been deposited, stored, disposed, or placed, plus soils that have become contaminated from hazardous substance migration. A record review identified cadmium, chromium, copper, lead, nickel, silver, and zinc as the primary potentially hazardous substances of concern located at the site (Ref. 3, p. 2; and 7, p. 17).

The Old Brazos Forge facility manufactured wire shelving products which involved steel manufacturing and electroplating utilizing metallic salts. From 1965 to 1982 untreated cyanide, chromium, copper, zinc, and nickel bearing sludge and waste water from electroplating operations were discharged into earthen trenches which collected and conveyed the waste to three unlined surface impoundments. Overflow from the surface impoundments was discharged from the surface impoundments through another earthen trench into the unnamed tributary of Little Sandy Creek. Analytical data documenting the release of hazardous substances at the Old Brazos Forge site has been generated from ground water, sediment, and soil samples collected from the subject facility and surrounding vicinity (Ref. 7, pp. 17 and 18; 8, pp. 21 and 26; and 9, p. 17).

During the 1996 SSI, on-site monitor wells MH-3, 5, and 12 indicated that the ground water beneath the facility contained elevated levels of chromium, manganese, and nickel at maximum concentrations of 42.3, 842, and 217 μg/l, respectively (Ref. 9, pp. 15, 16, and 17). Ground water samples were also collected from area residential drinking water wells located within one half mile of the site, during the 1996 SSI. Results of laboratory analyses of water samples from the drinking water wells sampled indicated elevated concentrations of chromium as high as 0.122 mg/L and zinc as high as 0.838 mg/L in the drinking water aquifer (Ref. 8, pp. 26, and 36).

The SSI Report documented soil pathway contamination. The results of the analysis of soil samples indicated the release of six inorganic constituents. Laboratory analysis of soil sample SO-04, collected from the area of the former waste water inflow trenches upstream of the surface impoundments, indicated a release of cadmium and zinc (Ref. 7, p. 25). Releases of chromium and nickel were indicated by analysis of soil sample SO-06 collected from the area of the former outflow trenches downstream of the surface impoundments (Ref. 7, p. 26). Analysis of soil sample SO-05, collected from the outfall to the unnamed tributary, indicated a release of chromium, nickel, and zinc (Ref. 7, p. 29). Soil sample SO-07, collected approximately 20 feet east of the northeast corner of the surface impoundments to document observed contamination, indicated releases of cadmium, chromium, lead, nickel, and zinc (Ref. 7, p. 17).

The specific areas of interest where hazardous substances were either used, stored, or spilled at the Old Brazos Forge site (Fig. 3) include: (1) the former surface impoundments, (2) the area surrounding the three earthen trenches and the single trench formed downstream of the previous three trenches, (3) the outfall area where discharge from the surface impoundments entered the intermittent tributary of Little Sandy Creek, and (4) the unnamed tributary from the outfall to the junction with Little Sandy Creek. The quantity of process effluent and heavy metals discharged from the subject site to the unnamed tributary and underlying soils and ground water could not be estimated with the historical and analytical information (Ref. 3; and 5, pp. 1 - 6).

Required Information (Data Gaps)

- Field verify the site features and locations as depicted in Figure 3.
- Field verify the locations of areas previously documented to have contaminated soil as well as areas reportedly subjected to remedial action. Note any areas void of vegetation and obtain soil samples to confirm the release of contaminants.
- Field verify previous operations at the site and any hazardous substances related to these activities through observation and interviews with site personnel.
- Obtain background soil samples to determine the naturally occurring levels of contaminants from unaffected areas adjacent to the site.

GROUNDWATER PATHWAY AND TARGETS

Characteristics

Washington County and the Old Brazos Forge site are located in the Gulf Coastal Plain of Southeast Texas. The stratigraphic units which comprise the aquifers of Washington County range in age from Eocene to Holocene. These hydrologic units, from oldest to youngest, are identified as the Jackson Group of Eocene age, Catahoula Sandstone, Jasper aquifer, and Burkeville aquiclude of Miocene Age. Collectively, these units are estimated to attain a thickness of approximately 6,000 ft, and consist primarily of interbedded sand and clay with lesser amounts of limestone, lignite, gravel, gypsum, and volcanic ash. Regionally, these stratigraphic units dip toward the Gulf of Mexico at an angle greater than that of the land surface, and they tend to thicken and occur progressively deeper basinward (Ref. 10, pp. 3 - 7).

Surface outcrops along the Texas coastal plain generally parallel the coast. The Oakville Sandstone and the Fleming Formation are the major surface outcrops covering most of Washington County. The Old Brazos Forge site reportedly lies on the outcrop of the upper section of the Oakville Sandstone which contains the hydrologic units of

the Jasper aquifer in the lower portions of the Oakville and the overlying Burkeville aquiclude in the upper portion of the Oakville and lower portion of the Fleming Formation. The lower portion of the Fleming Formation is comprised mainly of alternating beds of sand and clay and includes massive beds of gray to brown sand interbedded with gray clay silt and sand. The upper portion of the Fleming is predominantly comprised of massive clays with some thin interbeds of sand (Ref. 11, p. 18).

The major hydrologic units in the vicinity of the Old Brazos Forge site include the Catahoula Sandstone, Jasper aquifer, and the Burkeville aquiclude. The 300 to 800 feet thick Catahoula Sandstone occurs approximately 400 feet bgs in the vicinity of the subject site and is reported to yield small to moderate amounts of fresh water. The Jasper aquifer occurs within the Oakville Sandstone from approximately 150 feet below the ground surface of the site to a depth of approximately 400 feet bgs to the unconformable contact with the Catahoula Sandstone. The Burkeville aquiclude ranges in thickness from 100 to 120 feet in the Washington County area and functions as a confining unit between the overlying Evangeline Aquifer located farther to the southeast and the Jasper and other aquifers below the Burkeville. The Jasper aquifer is reported to produce moderate to large amounts of fresh water while the Burkeville produces small amounts of fresh water (Ref. 6, p. 17; and 10, p. 39).

The Jasper aquifer is the most highly developed hydrologic unit in Washington County with smaller amounts produced from the Catahoula Sandstone and the Burkeville aquiclude (Ref. 6, p. 17). Based upon information of private wells within a 4-mile radius of the site, depth to ground water ranges from approximately 20 to 200 feet bgs (Ref. 6; and 10, p. 19).

Targets

The SSI Report documented groundwater pathway contamination. The drinking water inorganic analysis indicate releases of hazardous substances at one drinking water well within a 0.25 mile radius of the site and four drinking water wells located between 0.25 and 0.5 miles from the Old Brazos Forge site. Sample GW-04 and duplicate sample GW-05, collected within the 0.25 mile radius, indicated releases of chromium and zinc to the ground water pathway (Ref. 8, pp. 21 and 26). Releases of zinc to the ground water pathway were detected within the 0.25 to 0.5 mile radius in samples GW-07, GW-09, GW-12, and GW-13 (Ref. 8, pp. 36, 46, 61, and 66).

The nearest potential groundwater target identified during the SSI was a drinking water well reportedly owned by Sally Blum (State Well No. 59-53-6Z). This well is located within the 0.25 mile radius of the site (Ref. 5, p. 8). The estimated depth of this well is 90 feet bgs and it is screened between the interval of 70 - 90 feet bgs. This well is used as a drinking water source and has been shown to be impacted with elevated levels of chromium (Ref. 5, p. 34; and 8, pp. 21 and 26). The owners of this well are currently using bottled water as their drinking water source (Ref. 5, p. 2; and 12).

An on-site ground water well is located approximately 70 feet east of the plant building. This well is reportedly completed to a depth of 292 feet bgs and was used to supply water for industrial use at the site (Ref. 6, p. 63; and 13). Two additional water wells, one located near the northeast corner of the plant building and the other located near the southeast corner of the building, are believed to have been installed at the site. Information regarding well completion details and use of produced water from these two additional on-site wells is currently unknown (Ref. 13).

No wellhead protection areas exist within a 4-mile radius of the site (Ref. 14).

The nearest residence is located approximately 200 feet west of the site across the unnamed tributary. An inspection of the subject facility by TNRCC personnel identified the water well to be owned by Patrick Zientek, the well completion details are currently unknown for this well.

The City of Brenham supplies it's residents with potable water obtained from Lake Somerville on the Brazos River. Emergency water supply is from a City of Brenham water well located in Brenham (Ref. 15).

Public supply, irrigation, industrial, and domestic water wells have been identified within a 4-mile radius of the site using State of Texas water well logs, TNRCC Public Water Supply maps, and TNRCC inspection reports of the Old Brazos Forge facility. The ground water target populations for domestic wells were calculated assuming 2.2 persons per household for Washington County. The target population was determined by dividing population of Washington County (26,154 persons) by the number of households (11,664) (Ref. 16). Populations for public supply wells were determined by the listed population served totals from a database of TNRCC public supply well information. Based upon this information, the following populations were defined:

- Within 0 - 0.25 miles of the site, one domestic well, one industrial, and two unknown use wells were identified. Drinking water from these wells is supplied to approximately two people.

- Between 0.25 - 0.50 miles of the site, there are nine domestic wells. Drinking water from these wells is supplied to approximately 20 people.

- Between 0.50 - 1 mile of the site, there are ten domestic wells, one public supply, and one irrigation well. Drinking water from these wells is supplied to approximately 67 people.

- There are 105 domestic, four public supply well and two wells designated as other in the 1 - 2 mile radius from the site. Drinking water from these wells is supplied to approximately 256 people.

- There are 84 domestic wells, nine public supply wells, two industrial wells, and two wells designated as other in the 2 - 3 mile radius from the site. Drinking water from these wells is supplied to approximately 12,082 people.

- There are 266 domestic wells, three public supply wells, one industrial wells, one irrigation wells and nine wells designated as other within the 3 - 4 mile radius from the site. Drinking water from these wells is supplied to approximately 730 people.

Required Information (Data Gaps)

- Field verification of existing well locations within 1 mile of the site. Verify by inspection, photographs, and personnel interviews whether the wells are in use and the number of people served. Obtain addresses, water level measurements, well construction details, well development procedures, water quality test results, and aquifer pumping data from the well owners, if available.

- Sample data from the nearest drinking water wells which may be present within 0.5-miles of the site to determine whether contaminants from the site have migrated to the shallow drinking water aquifer(s).

- Sample data from the nearest public drinking water well located within a 1-mile radius of the site to determine whether contaminants from the site have migrated to the public drinking water aquifer(s).

- Verify the location and status of known and reported on-site water wells.

SURFACE WATER PATHWAY AND TARGETS

The surface water pathway is a pathway of concern. Since the surface water pathway was adequately assessed in the SSI Report, further sampling will not be required for the ESI Report.

SOIL EXPOSURE PATHWAY AND TARGETS

Characteristics

Public access to the Old Brazos Forge site is restricted by means of fencing along the west, south, and northern property boundaries. The access to the eastern boundary of the Old Brazos Forge site is restricted by the plant building (Fig. 3).

The Old Brazos Forge site is located in a generally level area defined by two different soils types: the Bleiblerville clay and the Carbengle clay loam. The Bleiblerville clay is a moderately well drained, dark gray clay with a high organic matter content. This soil is very slowly permeable (less than 0.06 inches per hour (in/hr)), with medium surface runoff (Ref. 17). The Carbengle clay loam is a well drained dark gray clay loam with medium organic matter content. Runoff from this soil is medium with moderate permeability (Ref. 17).

The site is located in an undeveloped area approximately 0.3 miles northwest of the Brenham city limits. Review of aerial photography of the area surrounding the Old Brazos Forge site indicated scattered residences on largely undeveloped/vacant land. Land use south, west, and north of the site is currently unknown. Adjacent to the east side of the site is State Highway 36, across which is vacant/undeveloped land of unknown use (Ref. 5, p. 42).

Potential sources for off-site runoff applicable to the soil exposure pathway include the closed surface impoundments and the areas surrounding the former earthen trenches. Runoff from these sources would tend to flow toward the northwest to the unnamed tributary and then northeastward via the tributary channel (Ref. 3, p. 1).

Targets

There are no schools, day care centers, parks, or other established recreational areas within 200 feet of the site. The nearest occupied residence is located approximately 200 feet northwest of the site across the unnamed tributary (Ref. 12). There are no known on-site residents or workers as the site is reported to be vacant (Ref. 5, p. 1). It is not known if there are any threatened of endangered species within a 4 mile radius of the site.

Required Information (Data Gaps)

- Field verification of drainage patterns and soil exposure pathways surrounding the site.
- Verification of the distance to the nearest residence and number of occupants.
- Field verification that there are no additional sensitive environments or endangered species within a 4-mile radius of the site. Establish the location of the identified sensitive environments through correspondence or field verification.

AIR PATHWAY AND TARGETS

The air pathway is not a pathway of concern. The air pathway was adequately addressed in the SSI Report and will not require further assessment for the ESI Report.

SECTION 3

SITE NONSAMPLING DATA COLLECTION AND FIELD WORK

The Texas Natural Resource Conservation Commission (TNRCC) will perform the activities described in this section to provide site background information and analytical data that can be used by the EPA to evaluate the site using the Hazard Ranking System (HRS). This information will be presented in a documentation report that includes groundwater, soil, and sediment sampling as discussed below.

All field work will be conducted in accordance with the health and safety plan (HSP) and the TNRCC-approved PA/SI quality assurance project plan (QAPP). The HSP is in Appendix A. The HSP and the PA/SI QAPP plans will be reviewed by all personnel upon arrival at the site.

PERSONNEL REQUIREMENTS AND RESPONSIBILITIES

The TNRCC Central Office Technical Director for this Expanded Site Inspection (ESI) is Mr. Wesley Newberry and the TNRCC Program Manager is Mr. Allan Seils. The TNRCC Site Investigation Manager is Mr. Gary Hazelwood and the TNRCC Assistant Site Investigation Manager is Melissa Cordell. Other team members will be identified prior to the sampling event. The TNRCC's Central Office mailing address is Remediation Division, Site Assessment and Management Section, P.O. Box 13087, Austin, Texas 78711-3087, (telephone no. (512) 239-2514, FAX no. (512) 239-2527).

The TNRCC Central Office Program Manager and Site Investigation Manager are responsible for identifying, assigning, and organizing the staff to execute the activities required to complete the ESI. The Site Investigation Manager is responsible for completing the activities described in this plan and adhering to the sampling activities and report schedule. The planned field schedule for activities at the Old Brazos Forge site is presented in Table 1.

The TNRCC Technical Director and Program Manager will review all major reports and provide technical and administrative support to the Site Investigation Manager. The TNRCC Technical Director will review the work plan and final report and will approve the final versions. In addition, the TNRCC Technical Director and Program Manager will provide oversight for the field activities during the investigation. The EPA Region VI Site Assessment Manager (SAM) is responsible for approving the sampling activities work plan and reviewing the final report.

COMMUNITY RELATIONS

Prior to the start of any work at the site, TNRCC will inform the appropriate Washington County and/or City of Brenham authorities of the intended site visit. Individual residents and businesses in the immediate area will be contacted by letter from the TNRCC or during the off-site reconnaissance visit. Requests for site-specific information will be made during the interview process or identified in the letter from the TNRCC. TNRCC will make no other formal notifications of the ESI sampling events. Sample results will be sent to each property owner, for their property only, upon completion of the data quality assurance process. Any requests for information before or after the planned site inspection which the TNRCC receives from the above will be referred through the PA/SI Program Manager for an appropriate response. Any requests for information by the news media or parties not associated with the site will be directed through the TNRCC Technical Director or his designee to the TNRCC Central Office Media Relations Office, P.O. Box 13087, Austin, TX 78711, telephone (512) 239-5000.

The TNRCC Program Manager will provide each member of the TNRCC inspection team and the Site Investigation Manager with letters of introduction stating the purpose of the investigation and authorization to conduct appropriate field activities. The TNRCC will send notification letters to the appropriate site representatives informing them of the impending sampling activities and requesting access authorization for TNRCC inspectors to the site. TNRCC will set up the site visit only after receiving written or verbal access authorization from the property owner or their representatives.

Table 1. Old Brazos Forge
Field Schedule

Time	Activity
	Day 1
1300	Arrive at the site. Review health and safety plan. Conduct initial safety meeting. Conduct orientation (as required) for property owner(s). Verify site specific data. Establish staging area.
1400	Purge on-site monitor wells to be sampled. Begin off-site reconnaissance. Locate off-site wells, interview owners and verify number of users. Modify off-site sampling plan (if required). Record interview information in field logbook.
1630	Begin on-site reconnaissance. Review and modify on-site sampling plan. Prepare shipping and sampling labels. Prepare field logbook.
1830	End of day.
	Day 2
0700	Arrive at the site. Review health and safety plan. Conduct daily safety meeting. Review sampling strategy and prepare equipment.
0800	Begin sampling of on-site monitor wells. Record applicable well data in logbook, document sampling locations with photographs, and collect samples.
1200	Lunch break.
1300	Complete sampling of on-site monitor wells. Begin drinking water well sampling.
1600	Complete packaging and CLP lab documentation. Pack samples for overnight shipment.
1800	Deliver samples for shipping.
1830	End of day.
	Day 3
0700	Arrive at the site. Review health and safety plan. Conduct daily safety meeting. Review sampling strategy and prepare equipment.
0730	Continue drinking water sampling. Record applicable sampling data in logbook, document sampling locations with photographs and GPS readings.
1200	Lunch break.
1300	Continue drinking water sampling.
1600	Conduct packaging and CLP lab documentation. Pack samples for overnight shipment.
1800	Deliver samples for shipping.
1830	End of day.

Day 4

0700	Arrive at the site. Review health and safety plan. Conduct daily safety meeting. Review sampling strategy and prepare equipment.
0730	Continue drinking water sampling. Record applicable sampling data in logbook, document sampling locations with photographs and GPS readings.
1200	Lunch break.
1300	Continue drinking water sampling.
1600	Complete drinking water sampling, packaging and CLP lab documentation. Pack samples for overnight shipment.
1800	Deliver samples for shipping.
1830	End of day.

Day 5

0700	Arrive at the site. Review health and safety plan. Conduct daily safety meeting. Review sampling strategy and prepare equipment.
0730	Begin soil sampling. Record applicable sampling data in logbook, document sampling locations with photographs and GPS readings.
1100	Complete soil sampling.
1200	Lunch break.
1300	Packaging and CLP lab documentation. Pack samples for overnight shipment.
1600	Deliver samples for shipping.
1630	Travel back to TNRCC office
1830	End of day.

WORK PLAN ACTIVITIES

Task 1: Nonsampling and Sampling Activities and Rationale

The field team will first meet with property owner representatives (if specifically requested) and appropriate City and County authorities at the site. The purpose of the meeting will be to conduct an initial safety briefing and review the intended sampling work schedule. Information concerning past and current site conditions outlined in the PA, SSI, and ESI work plan will be discussed and verified. The Site Investigation Manager will record significant comments in the field logbook pertaining to site history and current/past operations.

After the initial meeting, an off-site reconnaissance inspection will be completed by designated team members. Information will be logged in the field logbook to include names of individuals interviewed, physical/mailing addresses, date and time of interviews, and observations noted. Information outlined in the Site Reconnaissance Checklist (Appendix B) applicable to off-site requirements will be obtained during the inspection. The off-site reconnaissance will be conducted at level D protection.

The initial on-site reconnaissance inspection will be accompanied by the owner or his designated representative, if available, to assist in identifying potential site hazards. Appropriate safety equipment will be required by each team member, which will include field respiratory protection with a combination organic/pesticide vapor cartridge and a dust/mist filter suitable for organic wastes. Personal protective equipment will initially be modified level D. If it can be established that volatile and semivolatile vapors are safely below background and action levels, the on-site reconnaissance will continue at modified level D.

Each waste management unit will initially be approached using appropriate ambient air monitoring equipment, such as a photoionization detector (PID) or organic vapor analyzer (OVA), to detect and identify potential volatile organic compounds. Any visual evidence of a release of hazardous substances will be noted to ascertain whether additional protective equipment will be required for the sampling events. In general, site safety requirements will be assessed in the initial site reconnaissance inspection, and safe entry and exit points will be identified for each proposed sampling event.

Upon completion of the site reconnaissance activities, the field team will again review the sampling plan. Sample locations will be adjusted as necessary to ensure that the samples provide sufficient data to properly evaluate the site. Photographs will be taken as required to document site conditions and support observations recorded in the field logbook. Photographs will require at a minimum, the following information for each photograph:

- Site name
- Location
- Name of photographer
- Date and time of photograph
- Description of situation/scene photographed.
- Type of camera, film, and lens setting (Must be 50mm).

The following section describes the proposed sampling plan for the Old Brazos Forge site. This plan may be modified as a result of the on-site reconnaissance and/or noted site access constraints. The samples to be collected and sample rationale are listed in Table 2. Proposed sample analyses, containers, and preservation requirements for the groundwater and soil samples are shown in Tables 3 and 4, respectively. Sample locations will be confirmed during the site reconnaissance inspection and noted in the field logbook. A field copy of this work plan will be annotated by the Site Investigation Manager to reflect actual sample locations.

Table 2. Proposed Samples to be Collected

Sample Matrix	Sample ID	Sample Location	Rationale
Ground Water Samples	GW-01	Off-site drinking water well approximately .75 miles northwest of site	Obtain background and regionally up gradient ground water sample for attribution of contaminants to site source
	GW-02	Off-site drinking water well approximately 1.5 miles southwest of site	Obtain background and regionally up gradient ground water sample for attribution of contaminants to site source
	GW-03	Off-site drinking water well approximately 1 mile northwest of site	Obtain background and regionally up gradient ground water sample for attribution of contaminants to site source
	GW-04	Off-site drinking water well located at the Sally Blum residence: 1729 Burleson Street	Determine the extent of the groundwater contamination down gradient of the site
	GW-05	Quality Assurance/Quality Control (QA/QC)	Duplicate ground water sample collected at the same location as ground water sample GW-04
	GW-06	Off-site drinking water well located at the Jerry Krueger residence: 1926 Burleson Street	Determine the extent of the groundwater contamination down gradient of the site
	GW-07	Off-site drinking water well located at the Willie Brinkmeyer residence: P.O. Box 298, across Burleson Street from Jimmy Hahn residence	Determine the extent of the groundwater contamination down gradient of the site
	GW-08	Off-site drinking water well located at the Billy Jasinski residence: 1408 Burleson Street	Determine the extent of the groundwater contamination down gradient of the site
	GW-09	Off-site drinking water well located at the Jimmy Hahn residence: 1651 Burleson Street	Determine the extent of the groundwater contamination down gradient of the site
	GW-10	Off-site drinking water well located at the Clyde Geick residence: 1856 Burleson Street	Determine the extent of the groundwater contamination down gradient of the site
	GW-11	Off-site drinking water well located at the Robert Scheel residence: 1825 Burleson Street	Determine the extent of the groundwater contamination down gradient of the site
	GW-12	Quality Assurance/Quality Control (QA/QC)	Duplicate ground water sample collected at the same location as ground water sample GW-11
	GW-13	Off-site drinking water well located at the Gertrude Faske residence: 1725 Burleson Street	Determine the extent of the groundwater contamination down gradient of the site

Sample Matrix	Sample ID	Sample Location	Rationale
	GW-14	Off-site drinking water well located at the Charles Schulte residence: 1621 Burleson Street	Determine the extent of the groundwater contamination down gradient of the site
	GW-15	Off-site drinking water well location to be determined during the off-site reconnaissance, to be located within .5 miles down gradient of the site	Determine the extent of the groundwater contamination down gradient of the site
	GW-16	Off-site drinking water well location to be determined during the off-site reconnaissance, to be located within .5 miles down gradient of the site	Determine the extent of the groundwater contamination down gradient of the site
	GW-17	Off-site drinking water well located at the Patrick Zientek residence, just north of the site across the intermittent creek	Determine the extent of the groundwater contamination in immediate vicinity of the site
	GW-18	Off-site drinking water well location to be determined during the off-site reconnaissance, to be located within .5 miles southwest of the site	Determine the extent of the groundwater contamination in close proximity of the site
	GW-19	Off-site drinking water well location to be determined during the off-site reconnaissance, to be located within .5 miles southwest of the site	Determine the extent of the groundwater contamination in close proximity of the site
	GW-20	Off-site drinking water well location to be determined during the off-site reconnaissance, to be located within .5 miles southwest of the site	Determine the extent of the groundwater contamination in close proximity of the site
	MW-01	On-site monitoring well MH-3 located down gradient of closed surface impoundments	Determine the extent of the groundwater contamination beneath the site
	MW-02	On-site monitoring well MH-5 located near southeast of closed surface impoundments	Determine the extent of the groundwater contamination beneath the site
	MW-03	On-site monitoring well MH-6 located near east boundary of closed surface impoundments	Determine the extent of the groundwater contamination beneath the site
	MW-04	Quality Assurance/Quality Control (QA/QC)	Duplicate monitor well sample collected at the same location as monitor well sample MW-03

Sample Matrix	Sample ID	Sample Location	Rationale
Soil Samples	SO-01	Unaffected soil area	Obtain background soil sample for attribution of contaminants to site sources
	SO-02	Unaffected soil area	Obtain background soil sample for attribution of contaminants to site sources
	SO-03	Unaffected soil area	Obtain background soil sample for attribution of contaminants to site sources
	SO-04	Soil sample 6 feet west of facility building.	Assess soil contamination where elevated levels of cadmium and zinc were detected during the SSI.
	SO-05	Soil sample approximately 150 feet north of surface impoundments.	Assess soil contamination where elevated levels of chromium, nickel, and zinc were detected during the SSI.
	SO-06	Soil sample from area approximately 50 feet north of surface impoundments	Assess soil contamination where elevated levels of chromium and nickel were detected during the SSI.
	SO-07	Soil sample from area approximately 20 feet east of the northeast corner of the surface impoundments	Assess soil contamination where elevated levels of cadmium, chromium, lead, nickel, silver, and zinc were detected during the SSI.
	SO-08	Soil sample from an on-site area suspected to be contaminated.	Assess soil on-site soil contamination
	SO-09	Soil sample from an on-site area suspected to be contaminated	Assess on-site soil contamination
	SO-10	Quality Assurance/Quality Control (QA/QC)	Duplicate soil sample collected at the same location as soil sample SO-09
QA/QC	FB-1	Not applicable	Field blank for drinking water matrix, QA/QC
	FB-2	Not applicable	Field blank for drinking water matrix, QA/QC
	FB-3	Not applicable	Field blank for drinking water matrix, QA/QC

Table 3. Sample Containers, Methods, Preservatives, and Holding Times for Soil/Sediment

Parameters	Sample Container	Preservative	Holding Time
Volatile organics	Two 4-ounce wide mouth glass jars with Teflon-lined lids	Cool to 4°C	14 days
Semivolatile organics	Two 4-ounce wide mouth glass jars with Teflon-lined lids	Cool to 4°C	Extract within 14 days of collection and analyze within 40 days of extraction.
Pesticides/ PBS	Two 4-ounce wide mouth glass jars with Teflon-lined lids	Cool to 4°C	Extract within 14 days of collection and analyze within 40 days of extraction.
Metals/Cyanide	Two 4-ounce wide mouth glass jars with Teflon-lined lids	Cool to 4°C	180 days after collection for metals and 14 days for cyanide.

Table 4. Sample Containers, Methods, Preservatives, and Holding Times for Aqueous Samples

Parameters	Sample Container	Preservative	Holding Time
Volatile organics	Two 40-ml wide mouth glass vials with Teflon-lined septa	Cool to 4°C	7 days
Semivolatile organics	Two 1-liter amber glass bottles with Teflon-lined lids	Cool to 4°C	Extract within 7 days of collection and analyze within 40 days of extraction.
Pesticides/PBS	Two 1-liter amber glass bottles with Teflon-lined lids	Cool to 4°C	Extract within 7 days of collection and analyze within 40 days of extraction.
Metals/Cyanide	One 1-liter polyethylene bottle with a Teflon-lined cap	HNO_3 to pH<2	6 months (except mercury*) and 14 days for cyanide

* Reference: EPA Contract Laboratory Program Statement of Work for Organics Analysis (March 1990) and Statement of Work for Inorganic Analysis (March 1990).

Waste Containment/Hazardous Substance Identification

The primary contaminants of concern include metal plating wastes generated by the former Old Brazos Forge facility that still remain on-site in existing waste management units (Ref. 3). To obtain legally defensible characterization data, a laboratory or laboratories will be designated to perform EPA-stipulated Contract Laboratory Program (CLP) analytical methods on all samples collected from the site. The specific analytical methods for this sampling event are those listed under the CLP routine analytical services (RAS) contract.

Nonsampling data to be collected include:

- Field verify the site features and locations as depicted in Figure 3.
- Field verify the locations of areas previously documented to have contaminated soil. Note any areas void of vegetation and obtain soil samples to confirm the release of contaminants.
- Field verify previous operations at the site and any hazardous substances related to these activities through observation and interviews with site personnel.

Samples collected for the soil exposure pathway will be used to characterize soils and to assess the potential migration of contaminated soils. In addition, soil samples will be collected to determine the natural occurring background levels of inorganics (metals) and organics (volatiles, semi-volatiles, PBS and pesticides) in unaffected off-site locations.

Groundwater Pathway

Nonsampling data to be collected includes:

- Field verification of existing well locations within 1 mile of the site. Verify by inspection and personnel interviews whether the wells are in use and the number of people served. Obtain water level measurements, well construction details, well development procedures, water quality test results, and aquifer pumping data from the well owners, if available.
- Verify the location and status of known and reported on-site water wells.

Groundwater samples will be collected to investigate the potential for releases of on-site contaminants to the subsurface aquifer. Contaminant pathways include seepage and infiltration from the closed surface impoundments/settling lagoons and from the unnamed tributary into the underlying aquifer. According to State well log data and observation conducted during the PA reconnaissance, there are a total of 22 recorded wells within 1 mile of the site and three additional wells not recorded within 0.25

miles of the site. There are reportedly three on-site water wells, one well was used for industrial purposes and the use of the other two wells is unknown (Ref. 13).

For the purpose of this ESI, eighteen drinking water wells will be sampled for CLP analysis. Three of the eighteen drinking water wells will be background wells. The groundwater sample from the public supply well located at the Country Place Northwest subdivision located approximately .75 mile west-northwest of the site will be used to characterize background aquifer water quality located up gradient from known site sources. This sample will be designated as the background groundwater sample and numbered GW-01. Two other background ground water samples will be taken from drinking water wells located southwest and northwest of the site approximately 1.5 and 1 mile, respectively, from the site, if the wells are still in use. These samples will be designated as samples number GW-02 and GW-03.

Five drinking water wells located down gradient of the Old Brazos Forge site and previously documented to contain elevated concentrations of contaminants will be sampled. These samples will be designated as samples number GW-04 through GW-09 with a duplicate of one of the drinking water wells numbered GW-05. Six additional drinking water wells located in the downgrading direction from the site will be sampled to check for the potential contamination. These wells and one duplicate will be numbered GW-10 through GW-16. Four additional drinking water wells located in close proximity but slightly up gradient, including the closest off-site well will be sampled to check for potential contamination. These samples will be designated as samples GW-17 through GW-20. Well description and sampling rationale are provided in Table 2. Approximate drinking water well locations are illustrated in Figure 4.

During the off-site reconnaissance inspection, if other wells are discovered within the 1-mile site radius which more appropriately represent potential groundwater contamination targets, then the plan will be modified to sample these wells from the drinking water producing zone. The well purging and sampling procedures are dependent on the type of well and are discussed in more detail in the PA/SI Quality Assurance Project Plan (QAPP).

A total of three monitor wells on the Old Brazos Forge property will be sampled. Monitor wells MH-3, MH-5, and MH-6 and a duplicate will be sampled to assess the extent of ground water contamination beneath the facility. These samples will be numbered MW-01 through MW-04.

As a general rule, all monitoring wells will be pumped or bailed a minimum of three volumes of water in the well casing until three consistent readings of the pH, conductivity, and temperature are achieved before representative samples will be withdrawn. For a well served by a tap, three to five well volumes will be removed by letting the tap run. If the system volume is unknown, the tap will be opened and allowed to run for 15 minutes prior to sampling. Field log notes will reflect the well evacuation procedure used. All samples will be collected from the discharge point as

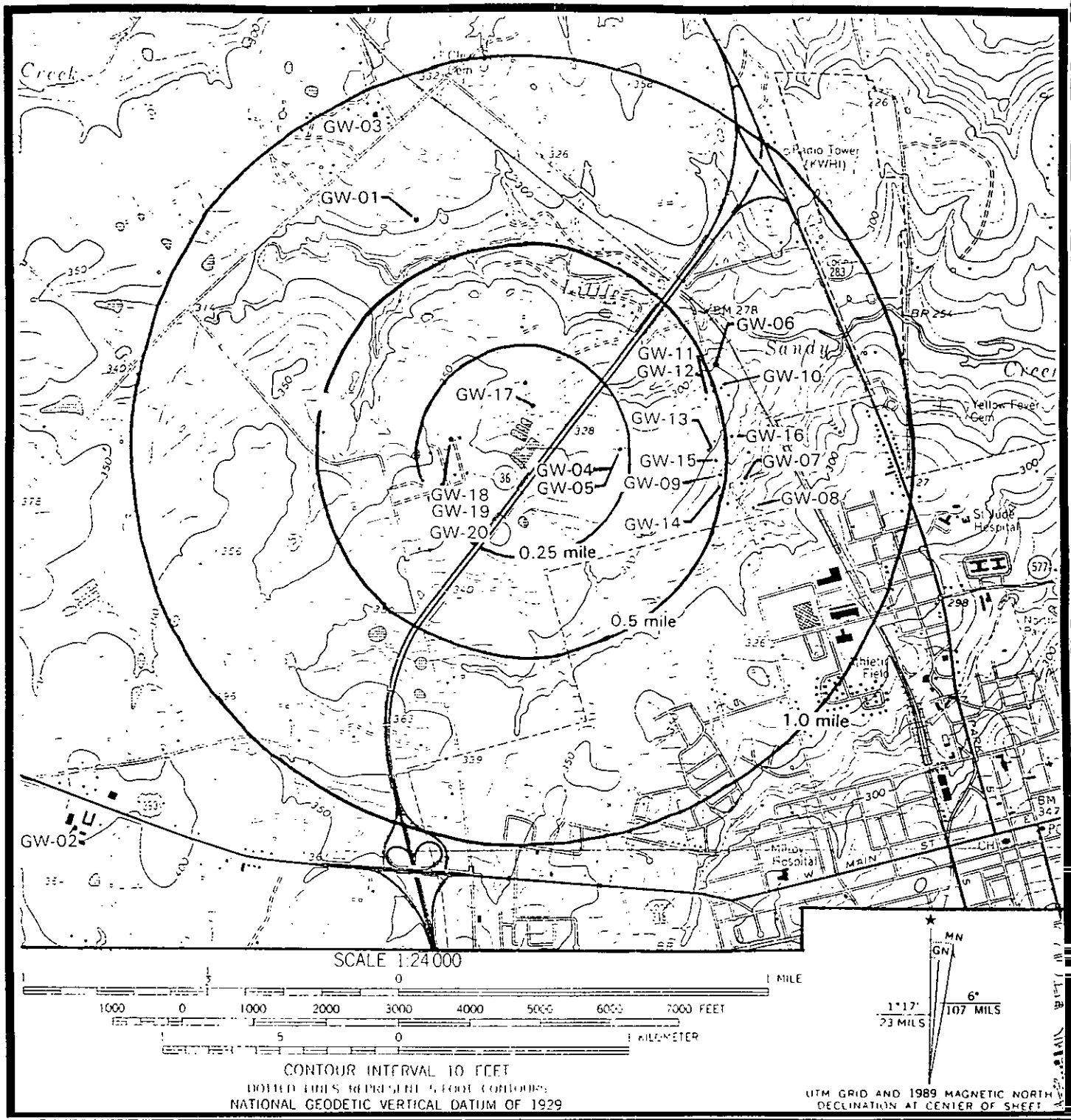

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Figure 4
Proposed Drinking Water Well Sample Locations

Old Brazos Forge Site

Brenham (Washington County), Texas

CERCLIS No. TXD048901235

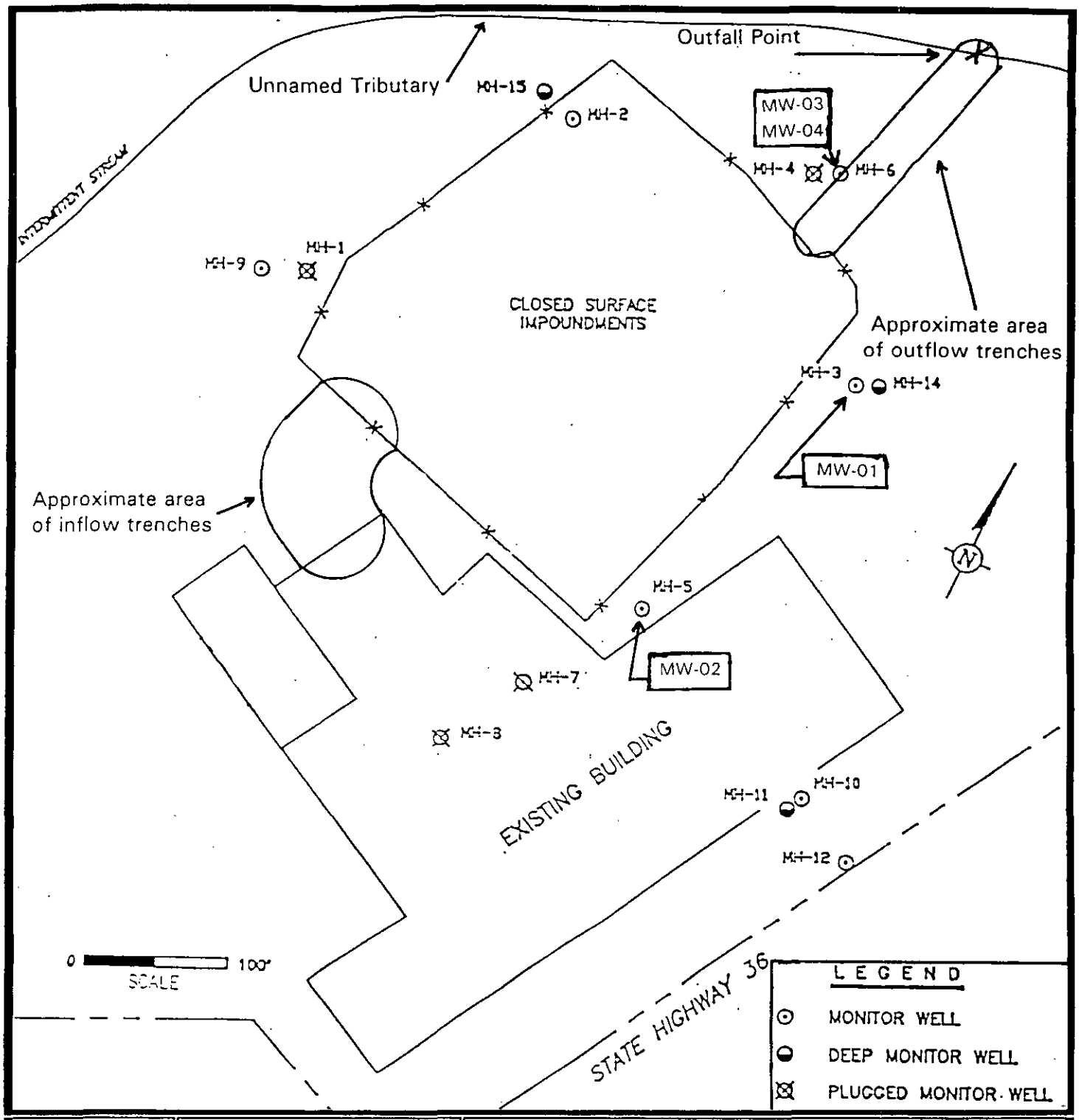

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Figure 5
Proposed Monitor Well Sample Locations

Old Brazos Forge Site

Brenham (Washington County), Texas

CERCLIS No. TXD048901235

close to the well as possible and before the water is processed through any treatment devices. If samples are taken from direct water main connections, the spigot will be flushed for 2 to 3 minutes to clear the line. For private wells with a hand pump, the water will be pumped for 5 minutes before the sample is collected.

To avoid cross contamination of samples, dedicated sampling equipment will be used. Appropriate equipment and personnel decontamination procedures are described in the PA/SI QAPP. Proper sample containers, preservation, and holding times are presented in Table 4 for CLP aqueous samples.

Surface Water Pathway

The surface water pathway is a pathway of concern. Since the surface water pathway was adequately assessed in the SSI Report, further sampling will not be required for the ESI Report.

Soil Exposure Pathway

Nonsampling data to be collected include:

- Field verification of drainage patterns and soil exposure pathways surrounding the site.
- Verification of the distance to the nearest residence and number of occupants.
- Field verification that there are no additional sensitive environments or endangered species within a 4-mile radius of the site. Establish the location of the identified sensitive environments through correspondence or field verification.

Based on existing site characterization data, the primary contaminants of concern include metal plating wastes generated by the former Old Brazos Forge facility that: (1) were allowed to discharge directly to three unlined earthen trenches which then flowed into a single trench, (2) that may have been discharged to three unlined settling lagoons on the north central portion of the, and (3) that may have been discharged or flowed overland via surface runoff to an unnamed intermittent tributary of Little Sandy Creek.

A total of ten soil (SO) samples will be collected to substantiate the release of on-site contaminants to adjacent soils. Three soil samples will be collected from an unaffected area located up gradient and upwind from known site waste sources. Laboratory analysis results will be used to identify and characterize naturally occurring levels of inorganics (metals) and organics (volatiles, semi-volatiles, PBS, and pesticides) for attribution of detected contaminants. These samples will be designated as the background soil samples and numbered SO-01 through SO-03.

Soil sample numbered SO-04 will be collected close to the west side of the facility building, where elevated levels of cadmium and zinc were detected during the SSI (Ref. 7, p. 25). Soil sample SO-05 will be collected approximately 150 feet north of the closed surface impoundments, where elevated levels of chromium, nickel, and zinc were detected during the SSI (Ref. 7, p. 29). Soil sample SO-06 will be collected approximately 50 feet north of the closed surface impoundments, where elevated levels of chromium and nickel were detected during the SSI (Ref. 7, p. 26). Soil sample SO-07 will be collected approximately 20 feet east of the closed surface impoundments, where elevated levels of cadmium, chromium, lead, nickel, silver, and zinc were detected during the SSI (Ref. 7, p. 17).

Soil samples numbered SO-08 and SO-09 will be collected from on-site areas of suspected contamination, to be determined in the field. Soil sample SO-10 will be collected as a duplicate of soil sample SO-09. These samples are listed in Table 2 and approximate sample locations are illustrated in Figure 6.

Each soil sample will be collected within 6 inches of the upper soil surface. Soil samples will be collected using a dedicated stainless steel spoon or trowel. The samples will be collected from a depth as close to the surface as possible, yet deep enough to avoid grass and roots. Soil samples for VOA analysis will be collected first, metals second, and non-volatiles last. Rocks and twigs will be removed as much as possible before placing the soil sample in the jar.

As specified by the PA/SI QAPP, samples will be placed in glass jars and sealed with Teflon-lined lids. Each of the volatile and non-volatile organic and inorganic sediment samples will be placed in two 4-ounce, wide mouth glass jars. No head space will be left in the VOA sample jars. Sample jars will be marked for identification and placed on ice for preservation. Identification markings will include: site location, sample number, date and time of collection, and names of samplers.

To avoid cross contamination of samples, dedicated sampling equipment will be used. Equipment and personnel decontamination procedures are described in the PA/SI QAPP. Proper sample containers, preservation, and holding times for CLP soil samples are presented in Table 3.

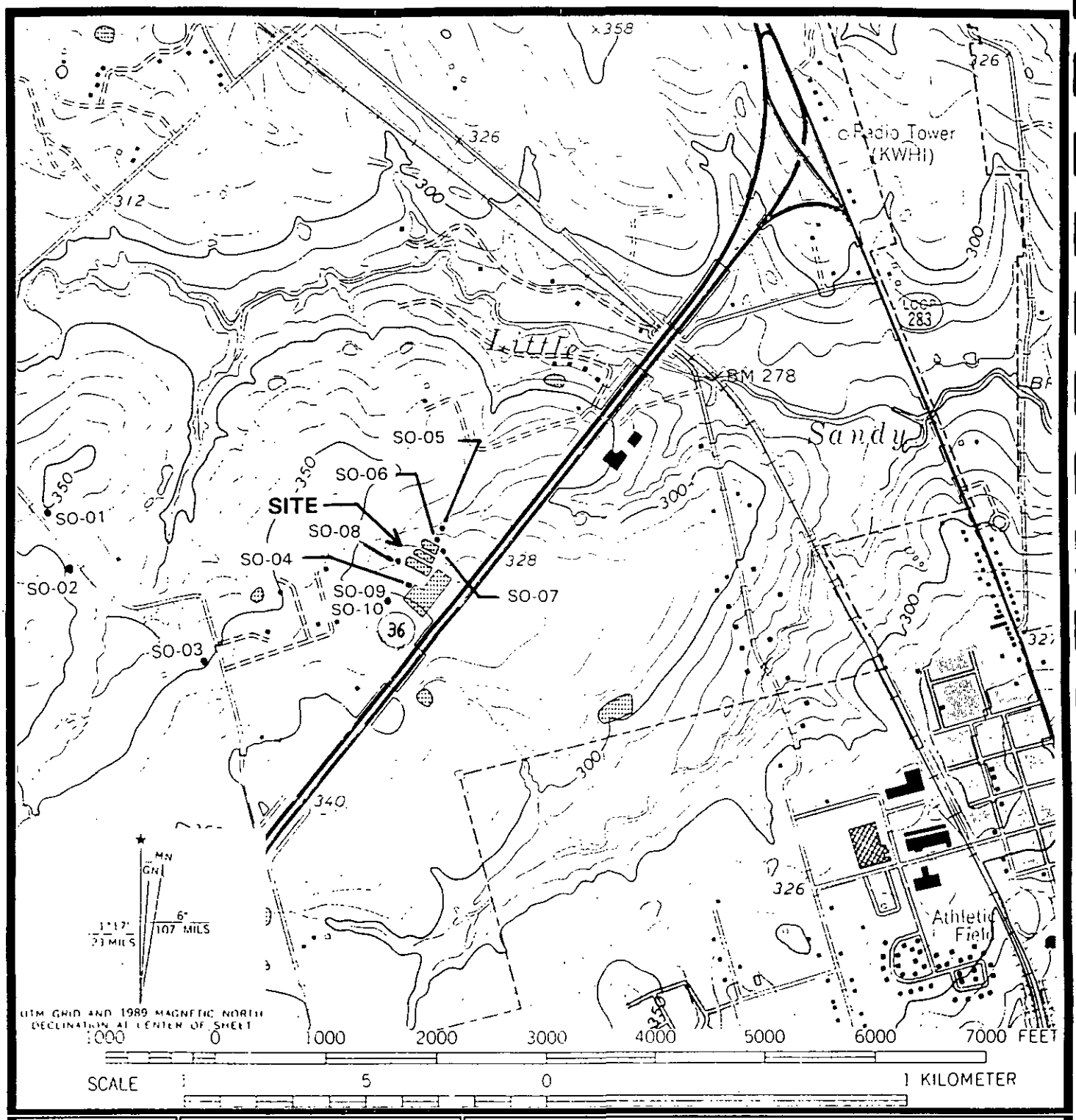

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Figure 6

Proposed Soil Sample Locations

Old Brazos Forge Site

Brenham (Washington County), Texas

CERCLIS No. TXD048901235

Air Pathway

Based on the SSI Report, the air pathway is not considered to be a pathway of concern. No air samples are planned to assess releases to the air pathway; however, results of surface soil samples collected for the soil exposure pathway will be used to assess potential for releases to occur to the air pathway.

Quality Assurance/Quality Control Samples

Three types of QA/QC samples will be used in this sampling inspection. Duplicate samples will be taken at the rate of one (1) duplicate per matrix (groundwater and soil) and one (1) duplicate for every ten (10) samples collected. Field blanks will be collected and accompany each ice chest containing groundwater samples shipped for volatile organic analysis. In addition, temperature blanks will accompany each ice chest to the respective laboratories.

A fourth QA/QC sample may be used, as required, in this sampling inspection. Equipment rinsate samples may be collected to establish that proper field decontamination procedures have been employed for sampling equipment which are used more than once in the field.

Volatile organics samples are susceptible to contamination by diffusion of organic contaminants through the Teflon-lined septum of the sample vial; therefore, a VOA field blank will be analyzed to monitor for possible sample contamination. The field blank also serves to detect contaminants in the sample bottles. Each field blank will be prepared by filling two VOA vials with CLP-specified grade water and shipping the blanks with the sample bottles. Field blanks accompany the sample bottles through collection and shipment to the laboratory and are stored with the samples. The field blanks will be analyzed for VOAs. Results of field blank analyses will be maintained with the corresponding sample analytical data in the project file.

Organic contaminates and some inorganic contaminates may volatilize during collection and subsequent shipment to the laboratory due to warming temperatures in the shipping container; therefore, a temperature blank will be monitored to insure that samples are properly cooled during shipment. One temperature blank per ice cooler will accompany the sample bottles to the laboratory. Each temperature blank will be prepared by filling one VOA vial with deionized water; enclosing it in a bubble bag; taping the package to the interior of the ice cooler and clearly marking it as the "temperature blank". Temperature blanks accompany the sample bottles through collection and shipment to the laboratory and are stored with the samples. Results of shipment temperatures will be maintained with the corresponding sample analytical data in the project file.

An equipment rinsate sample(s) will be analyzed to detect possible sample contamination of non-dedicated sample equipment through field decontamination procedures. Each equipment blank will be prepared by filling two VOA vials; one 1-gallon amber glass bottle; and two 1-liter polyethylene bottles with CLP-specified grade water collected from the final rinse of the decontaminated equipment and with shipped the other sample. The equipment rinsate sample(s) will be analyzed for volatiles, semi-volatiles, pesticides/PBS, metals, and cyanides. Results of equipment rinsate sample(s) analyses will be maintained with the corresponding sample analytical data in the project file.

Task 2: Decontamination Procedures

Equipment Decontamination

Proper decontamination procedures will aid in preserving the representativeness of the samples collected. Dedicated sampling spoons or trowels will be used to collect each soil sample at the site. These spoons or trowels will have been decontaminated prior to arrival at the site and sealed in plastic sealable bags in accordance with the PA/SI QAPP. After sampling, gross contamination (visible) will be removed from the surface of the scoops or trowels and they will be placed back in their original plastic bag. Further decontamination will be accomplished by a detergent scrub and distilled water rinse at a location away from the investigation site in accordance with the PA/SI QAPP. To minimize cross contamination, the outside of each sample container will be wiped clean with clean paper towels prior to placing the container into a plastic bag and bubble-wrapping it for shipment. An effort will be made to initially keep the outside of the containers free of gross contamination.

If sample equipment (non-dedicated) must be used more than once in the field, then the decontamination procedures for sample equipment will be followed and an equipment rinsate sample collected in the field at the end of each sampling day and/or between each sample matrix type sampled, whichever is greater.

Decontamination fluids used to clean equipment will be disposed of on-site in the approximate area of the sampling location in accordance with investigation derived waste (IDW) guidelines. Equipment decontamination will not be necessary for drinking water wells since the water sample is collected directly from the tap.

Personal Decontamination

All disposable clothing (i.e., Tyvek, gloves, etc.) will be rendered unusable prior to disposal to prevent inadvertent reuse. Boots will be scrubbed with detergent and rinsed with distilled water that will be disposed of on-site. Decontamination fluids from the rinse (if used) will also be disposed of on-site. Locations for IDW disposal will be noted in the field log book.

Task 3: Sample Shipping

During sampling activities, samples will be packed and preserved according to procedures described in the PA/SI QAPP. Excess soil or liquid will be removed from the outside of each sample prior to placing it in a sealable plastic bag and placing it into an ice cooler packed with sealed ice bags. The Site Investigation Manager will assure that all appropriate paperwork necessary to ship samples to CLP laboratories for analysis is completed. Normally, a 35-day turnaround time for RAS will be requested. Details of the sample handling and chain-of-custody (COC) requirements are discussed in greater detail in the PA/SI QAPP.

Samples collected each day will be shipped and delivered daily to the designated CLP laboratory for analysis using an overnight courier. The overnight freight courier pickup point and office schedule in the area of the site is:

Airborne Express (1-800-247-2676)
16220 Air Center Blvd.
Houston, Texas
Office hours - 8:00 am to 7:45 PM Monday through Friday
or
Airborne Express (1-800-247-2676)
9401 A Cargo Avenue
Austin, Texas 78723
Office hours - 8:00 am to 8:30 PM Monday through Friday
or
Call Airborne Express (1-800-247-2676) for a field pickup by 12:00 noon for same day shipping.

The chain-of-custody forms will be checked, signed, and placed in a sealable plastic bag and taped to the inside lid of the cooler. The outside of the cooler will be sealed with tamper-resistant tape which cannot be removed without tearing it. The sample custodian will sign across the seal prior to shipping the samples. In the event the shipper has to remove the cooler seal, the receiving laboratory will verify and record that the individual container, bottle, or vial sample seals are still intact.

During sampling and sample shipment, the site Investigation Manager (or his designee) will contact the CLP sample management office (SMO) representative, as designated on the CLP RAS Lab Assignment, each day that a shipment is sent. If there are any significant changes to the CLP analytical requirements, contact the TNRCC Central Office, Allan Seils, PA/SI Program Manager at (512) 239-2514, FAX (512) 239-2527 or his designee to coordinate and obtain approval for additional analytical requirements.

REFERENCES

1. U.S. Environmental Protection Agency. Guidance for Performing Site Inspections Under CERCLA, Office of Emergency and Remedial Response, Hazardous Site Evaluation Division, Publication 9345.1-05, September, 1992. 125 pages.

2. U.S. Environmental Protection Agency. 1996 Superfund Chemical Data Matrix (SCDM). June 1996.

3. Wyrick, Donald, Texas Natural Resource Conservation Commission, to Wendy Rozacky, Texas Natural Resource Conservation Commission. Interoffice Memorandum. July 15, 1994. 6 pages.

4. Turner, James, Recycled Products Corporation, to Ray, Laura, Texas Natural Resource Conservation Commission. Letter. December 30, 1994. 2 pages.

5. Wong, Connie, Texas Natural Resource Conservation Commission, to Newberry, Peggy, Texas Natural Resource Conservation Commission. Interoffice Memorandum, December 12, 1995. 51 pages.

6. Texas Water Development Board. Ground-Water Resources of Washington County, Texas. November 1972. 15 pages.

7. United States Environmental Protection Agency, Region 6, Houston Branch. Case Number 24517, Sample Designation Group MFGH35, CLP Data Review and Analyses Package. From Melvin L. Ritter, ESAT RPO, 6MD-HC; To B. Canellas, 6SF-RA. 29 pages.

8. United States Environmental Protection Agency, Region 6, Houston Branch. Houston Laboratory numbers 6TFADW0901 through 6TFADW0919 Analyses Package. From Douglas Lipka, Houston Laboratory Chief; To A Seils, TNRCC PA/SI Program Manager. 87 pages.

9. United States Environmental Protection Agency, Region 6, Houston Branch. Case Number 24517, Sample Designation Group MFGH06, CLP Data Review and Analyses Package. From Melvin L. Ritter, ESAT RPO, 6MD-HC; To B. Canellas, 6SF-RA. 18 pages.

10. Texas Department of Water Resources. Stratigraphic and Hydrogeologic Framework of Part of the Coastal Plain of Texas. July 1979. 25 pages.

11. Texas Water Development Board. Hydrology of the Jasper Aquifer in the Southeast Texas Coastal Plain. October 1986. 5 pages.

12. Newby, Ray, Texas Natural Resource Conservation Commission, to Connie Wong, Texas Natural Resource Conservation Commission. Meeting Memo. February 16, 1996. 1 page.

13. Newby, Ray, Texas Natural Resource Conservation Commission, to Connie Wong, Texas Natural Resource Conservation Commission. Meeting Memo. March 12, 1996. 1 page.

14. Newby, Ray, Texas Natural Resource Conservation Commission, to Dave Terry, Texas Natural Resource Conservation Commission. Telephone Memo. March 11, 1996. 1 page.

15. Newby, Ray, Texas Natural Resource Conservation Commission, to Larry Firestone, City of Brenham Water Works. Telephone Memo. March 8, 1996. 1 page.

16. Dallas Morning News. 1992-93 Texas Almanac. 1991, 3 pages.

17. U.S. Department of Agriculture. Soil Survey of Washington County, Texas. 1981. 5 pages.

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APPENDIX A

Health and Safety Plan

HEALTH AND SAFETY PLAN
FOR
EXPANDED SITE INSPECTION FIELD WORK
OLD BRAZOS FORGE SITE
TXD048901235

Prepared by

Texas Natural Resource Conservation Commission
Superfund Site Discovery and Assessment Team
Austin, Texas

Reviewed and approved by

Site Safety Officer:	Allan M. Seils Name	12/13/99 Date
Gary L. Hazelwood Site Investigation: Manager	Gary L. Hazelwood Name	11-19-99 Date
Allan M. Seils PA/SI Program Manager Representative:	Allan M. Seils Name	12/9/99 Date
John Syer TNRCC Central Office Health & Safety Representative:	John C. Syer Name	12/9/99 Date

DECEMBER 1999

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EMERGENCY CONTACTS

In the event of any situation or unplanned occurrence requiring assistance, the appropriate contact(s) should be made from the list below. For emergency situations contact the appropriate response teams:

Contingency Contacts	**Phone Number**
Fire Department	**911**
Police	**911**
Sheriff's Department	**911 or (409) 277-6250**
Medical Emergency	**911 or (409) 830-2250**

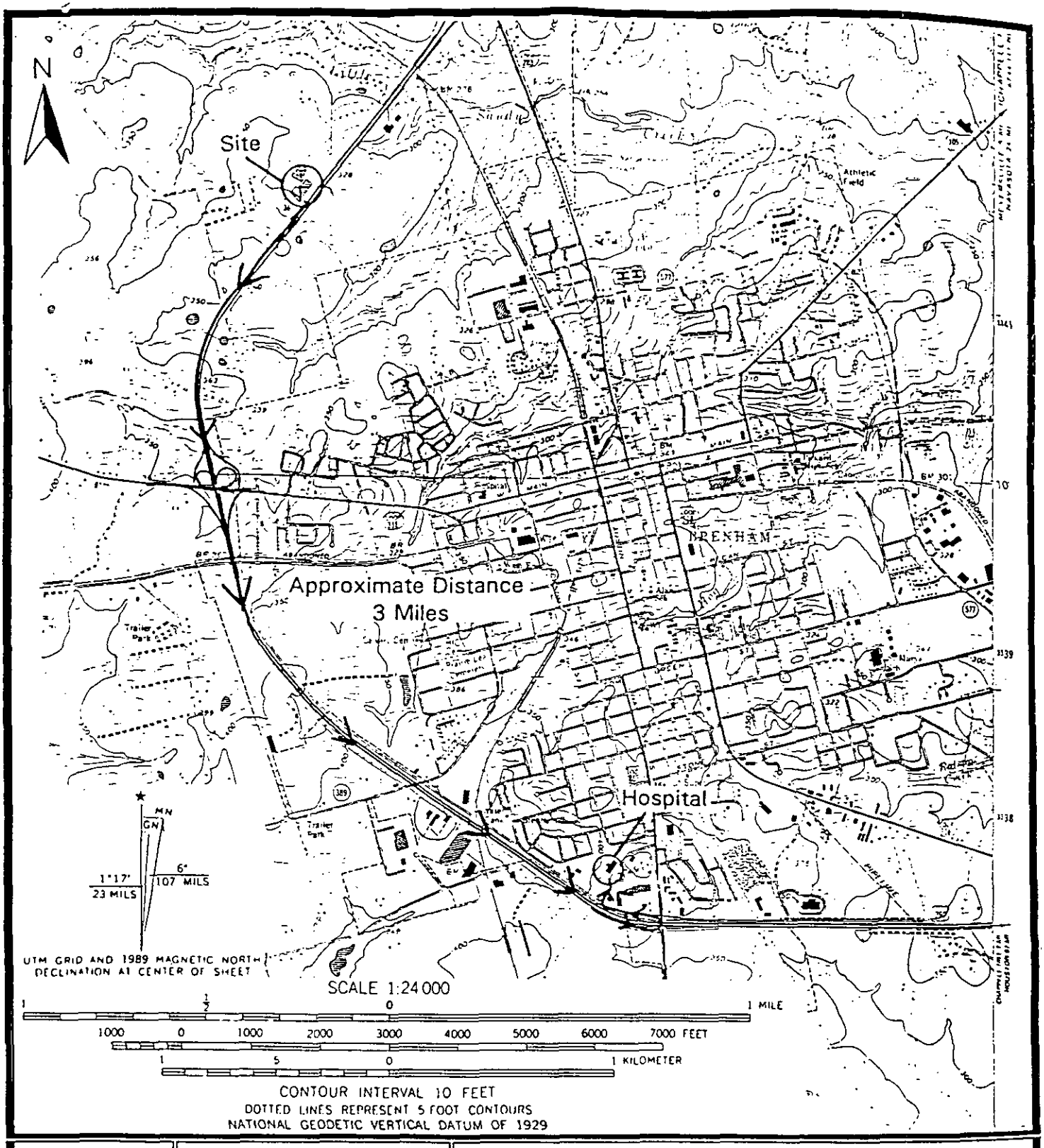
Hospital Name	Trinity Medical Center Phone No. (409) 836-6173
Hospital Address	700 Medical Pkwy. Brenham, Texas

Map to Hospital (see next page)

Directions to the Hospital from the site: Travel south on State Highway 36, approximately three miles, turn left on Medical Parkway, the hospital is on the left.

TNRCC Contacts

TNRCC PA/SI Program Manager:	Allan M. Seils- Austin, Texas Phone: Work (512) 239-2514
TNRCC Central Office Health & Safety Representative:	John Syer- Austin, Texas Phone: Work (512) 239-4136
TNRCC Field Health & Safety Representative:	To be Determined Phone: Work



TNRCC

Figure I.1
Map to Nearest Hospital

Old Brazos Forge Site

Brenham (Washington County), Texas

CERCLIS No. TXD048901235

SECTION 1

INTRODUCTION

PURPOSE AND POLICY

The purpose of this health and safety plan is to establish personnel protection standards and mandatory safety practices and procedures for work conducted for expanded site inspections (ESI) under the Texas Natural Resource Conservation Commission (TNRCC) Preliminary Assessment/Site Investigation (PA/SI) program. The plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while field work is being conducted at the Old Brazos Forge site in Washington County, Texas.

All personnel who engage in field project activities at the site must be familiar with this plan and comply with its requirements. The provisions of the plan are mandatory for all TNRCC field personnel on this project.

PROGRAM DESCRIPTION

This expanded site inspection will be conducted in conformance with the requirements of the revised Hazard Ranking System (HRS) 40 CFR Part 300; Final Rule, dated December 14, 1990. TNRCC Central Office staff recently completed collecting information needed to prepare a work plan and this health and safety plan. TNRCC Central Office staff personnel may visit the site to assist in executing the work plan and/or conduct inspection activities. Activities that will be conducted during the site visit include: site reconnaissance, interviews with any site personnel, and collection of soil and groundwater samples. The anticipated time frame for the execution of all the field work is December, 1999. This health and safety plan pertains to activities performed while executing the work plan.

SECTION 2

SITE INFORMATION

GENERAL INFORMATION

Site: Old Brazos Forge (OBF) site (EPA Identification number TXD048901235).

Location: 1709 Highway 36 North, northwest of Brenham, Washington County, Texas.

Mailing Address: None

Proposed date of field work: December, 1999

Hazard Assessment: ___ High _X_ Medium ___ Low

___ None ___ Unknown

Site description: The Old Brazos Forge (OBF) site (EPA Identification number TXD048901235). The facility was operated as a wire shelving manufacturing facility by Hussman Corporation (Hussman) during the period from 1965 to 1988. The facility has been abandoned since 1994. The OBF site consists of approximately 20 acres located at 1709 Highway 36 North, northwest of Brenham, Washington County, Texas. The geographic coordinates of the site are approximately 29° 25' 07" north latitude and 30° 10' 56" west longitude. The remaining structures at the facility include a metal plant building covering approximately 110,000 ft^2 and located on the eastern side of the property with a concrete covered parking lot located between the building to the west and Highway 36 to the east. Three former settling lagoons with a combined area of approximately 2.4 acres are located in a separate fenced area northwest of the plant building. The site is currently inactive.

SCOPE OF WORK SUMMARY

The field team will collect groundwater and soil samples. Sampling data to be collected includes: Fifteen drinking water wells within a 1 mile radius of the site (and two duplicates), to be analyzed for organics and inorganics for the determination of downward and/or outward migration of contaminants from the site to nearby residential drinking water wells. Three additional drinking water wells within a 4 mile radius of the site will be designated as background wells. Extra volumes of water will be collected for laboratory QA/QC procedures. Well logs were available in the SSI workplan for the drinking water wells that are tentatively planned for sampling. These wells were identified during previous site investigations.

Three on-site ground water monitoring wells (and a duplicate) will be analyzed for organics and inorganics to determine conditions of the uppermost aquifer at the site.

Six soil samples (and a duplicate) will be collected on-site for source characterization of contaminants to the facility. Three background soil samples will be collected for attribution of contaminants to the site. The background sample locations will be determined in the field. The likely locations will be southwest and up gradient of the site.

The soil sampling locations will be adjusted so that observed areas of contamination, as identified by potential soil contamination, visible soil staining, or visible leachate collection at the surface, are sampled.

These groundwater and soil samples will be collected according to the procedures outlined in the QAPP.

No sediment samples are planned. The SSI sediment sampling event gave an adequate evaluation of the surface water pathway. The SSI surface water pathway evaluation will be included in the ESI Report. No air samples are planned to assess releases to the air pathway; however, results of surface soil samples collected for soil exposure pathway will be used to assess potential for releases to occur to air pathway.

SITE/CHEMICAL CHARACTERISTICS

Chemical type(s):	_X_ Liquid	_X_ Solid	_X_ Sludge	__ Gas
Characteristic(s):	_X_ Corrosive	__ Ignitable	__ Radioactive	
	__ Volatile	_X_ Toxic	_X_ Reactive	
	_X_ Unknown	__ Other		

Summary of known wastes: See below.

List of chemicals used on site: The following inorganic analytes and compounds were found on-site during previous TNRCC Region 12 and 9 inspections: lead, cyanide, cadmium, chromium, copper, nickel, and zinc.

Description of all known waste disposal areas on site: The following waste and/or containment areas of concern were identified at this facility during previous site investigations:

Surface Impoundments:

Three surface impoundments are located within an approximately two acre fenced area northwest of the facility plant building. These impoundments were used as heavy metal flocculation and settling lagoons for effluent discharged from the plant. The impoundments were certified as closed in 1984 after sludge and six inches of soil were removed from the lagoons and disposed.

Unnamed Tributary:

An unnamed tributary of Little Sandy Creek originates from west side of the subject property. This tributary is an intermittent stream/drainage canal which meanders to the north-northeast for a distance of approximately 3,000 feet to the junction with Little Sandy Creek. Field investigations conducted by TNRCC personnel revealed that the facility was discharging waste water from the lagoons to the intermittent stream without a permit.

Site waste management history: A review of the facility waste management activities records revealed that OBF had received, stored and processed metals and metal plating compounds for use in it's manufacturing and plating processes. Hazardous wastes associated with electroplating and rinsing have been identified at the site and are coded F006, F007, F009, and F014.

Summary of off-site disposal: Chemical analyses of soil samples collected from the unnamed tributary by TNRCC personnel in 1984, 1986, and 1987 revealed elevated levels of heavy metals downstream of the facility. Concentrations of chromium, nickel, zinc, and copper were detected at maximum concentrations of 58,000, 34,000, 3,000, 6,000 mg/Kg.

In 1992, 1993, 1995, and 1996, ground water samples were collected from area residential water wells located within one mile to the east of the site. Results of laboratory analyses of water samples from the water wells sampled indicated elevated concentrations of chromium as high as 0.122 mg/l in the drinking water aquifer beneath the area.

Unusual features (surface impoundment/tank integrity, power lines, terrain, etc.): All remaining structures are believed to be intact and accessible. A chain-link fence borders the facility. It is not known if the site has power or running water. There are reported to be three water wells located on-site. Information regarding the completion details of only one of the wells is known.

Current status of site: Inactive, closed surface impoundments are considered to be under post-closure care and maintenance.

Summary of the regulatory history of the site: In August 1980 OBF filed a Part A hazardous waste permit application with the Texas Department of Water Resources (TDWR) for the trench collection system and the surface impoundments. The surface impoundments were regulated as hazardous waste processing/disposal facilities under TDWR and Texas Water Commission (TWC) Solid Waste Registration No. 30897. OBF submitted registrations dated June 14, 1982 and June 13, 1989.

After a wastewater treatment system was installed in 1982, the facility ceased discharging into the surface impoundments and began discharging treated effluent under TWC Water Quality Permit No. 02542 and National Pollution Discharge Elimination System (NPDES) Permit No. TX 0089486, issued on April 5, 1982.

The wastewater conveyance trenches were closed in-place in accordance with a interim status closure plan approved by TDWR on April 26, 1982. The plan included the transfer of a portion of the hazardous material within the trenches, excavated prior to the construction of a concrete foundation, to one of the surface impoundments. TDWR approved the closure plan with the requirement that the trenches be regulated as a landfill as not all of the contaminated soil was removed.

The three surface impoundments were closed in-place with a closure plan approved by TDWR on October 19, 1983. Closure certification was provided for the surface impoundments on August 22, 1984.

In 1984, OBF recorded in the Washington County deed records a .459 acre area, identified as the conveyance trenches and a 1.964 acre area, identified as the surface impoundments as hazardous waste disposal sites.

In November 1984, the facility filed an Affidavit of Exclusion with TDWR. The affidavit was filed to exempt OBF from submitting a RCRA Part B permit application. On July 31, 1985, the Texas Water Commission (TWC) withdrew the request for the RCRA Part B permit application, resulting in OBF being in violation of operating hazardous waste landfills without a permit. The landfills currently are not permitted.

A Notice of Violation was issued from the TWC Houston District on May 23, 1986 for notification, training, contingency plan, shipping, record keeping, and container management.

On May 27, 1986, TWC requested a remedial action plan from Hussman to address the contamination at the OBF site.

TWC issued a Notice of Deficiency on May 27, 1988 to Hussman regarding a Groundwater Assessment Plan (GWA). On February 1, 1989, TWC requested Phase II monitor wells and samples, post-closure permit, and a workplan for off site investigation and remediation.

On August 2, 1989, TWC approved the Phase II Report with the stipulation that quarterly ground water monitoring continue.

Hussman notified TWC on June 24, 1992 that ownership of the property had transferred to Recycled Products Corporation (RPC) of Brenham, Texas. RPC sold the property to Reconversion Technologies of Texas, Inc approximately 2 months after purchasing the property from Hussman. No Notice of Registration update or notification by the facility owners was filed during 1992-1994.

On November 3, 1994, TNRCC issued a Notice of Executive Director's Preliminary Report and Petition for a TNRCC order assessing administrative penalties and requiring corrective action by Hussman Corp., Reconversion Technologies of Texas, and Recycled Products Corp.

SECTION 3

PROJECT TEAM ORGANIZATION

Table 3.1 describes the responsibilities of all staff and on-site personnel associated with this project. The names of individuals associated with this project are listed below:

TNRCC PA/SI Program Manager:	Allan M. Seils, Austin, Texas
Staff Safety Officer:	John Syer, Austin, Texas
Site Investigation Manager:	Gary L. Hazelwood, Tyler, Texas
Assistant Site Investigation Manager:	Melissa Cordell, Austin, Texas
Site Safety Officer:	To Be Determined.

Personnel - The Site Investigation Manager designates the Site Health and Safety Officer who will be responsible to see that the site work is performed in a manner consistent with the Health and Safety Plan (HASP). The Site Health and Safety Officer will be responsible for Health and Safety briefings before each daily on-site inspection. **The Site Investigation Manager or the Site Health and Safety Officer may temporarily suspend field activities if health and safety of personnel are endangered. The Site Investigation Manager or the Site Health and Safety Offer may temporarily suspend an individual from the field activities for infractions of the HASP.**

Table 3.1
Staff and On-site Personnel

Title	General Description	Responsibilities
PA/SI Program Manager/ Deputy	Reports to upper-level management. Has authority to direct site investigation activities. Assumes responsibility of meeting all PA/SI program goals/objectives.	Prepares, organizes, and provides program support material. Reviews/approves the project Work Plan, Health and Safety Plan, and the Quality Assurance Project Plan. Appoints field team members for the field work. Briefs the Site Investigation Manager on his specific duties. Ensures, through the Staff Safety Officer, that safety and health requirements are met. Serves as the liaison with the Region VI EPA Representative.
Staff Safety Officer	Advises the PA/SI Program Manager on all aspects of health and safety. Reviews Health and Safety Plans submitted to Central Office.	Advises the PA/SI Program Manager on all health and safety issues. Reviews all project Health and Safety Plans to assure proper clothing and protective equipment are identified. Ensures that the proper protective clothing and safety equipment are available for the field investigation efforts.
Site Safety Officer	Advises the Site Investigation Manager on all aspects of health and safety. Assures proper field safety is implemented according to the project Health and Safety Plan.	Ensures that entry and exit controls at the site access control points are in place and maintained. Periodically inspects protective clothing and equipment. Confirms each team member's suitability for work based on a physician's recommendation. Monitors the work parties for signs of stress, such as cold exposure, heat stress, and fatigue. Implements the health and safety plan. Conducts periodic inspections to determine if the project Health and Safety Plan is being followed. Enforces the buddy system.

Table 3.1
Staff and On-site Personnel
(Continued)

Title	General Description	Responsibilities
Site Safety Officer (Continued)		Notifies, when necessary, local public emergency officials in coordination with on-site representatives.
		Coordinates emergency medical care.
		Ensures setup of decontamination lines and solutions appropriate for the type of chemical contamination on the site.
		Controls decontamination of all equipment, personnel, and samples from the contaminated areas.
		Ensures proper disposal of contaminated clothing and materials.
		Advises medical personnel of potential exposures and consequences.
		Notifies emergency response personnel by telephone or radio in the event of an emergency.
		Ensures that all personnel can appropriately use the equipment.
Site Investigation Manager	Prepares Work Plan, and Health and Safety Plan for review/approval. Responsible for field investigation phase of the project.	Obtains permission for site access from the property owners or their representatives. Coordinates all field activities with the appropriate local community officials.
		Prepares the Work Plan and Health and Safety Plan for Central Office review/approval. Ensures that the work plan is complete and submitted to meet schedule requirements.
		Executes the Work Plan, Health and Safety Plan, and assures QAPP requirements are met according to the project schedule.
		Enforces safety procedures through the Site Safety Officer. Documents field activities and sample collection efforts.
		Serves as a liaison with the on-site client representative.

Table 3.1
Staff and On-site Personnel
(Continued)

Title	General Description	Responsibilities
Site Investigation Manager (Continued)		Prepares and submits the final report and required support documentation for Central Office approval.
Field Team Members	Perform field activities as instructed by Site Investigation Manager.	Safely complete the on-site tasks required to fulfill the work plan.
		Notify Site Safety Officer or supervisor immediately of suspected or noted unsafe conditions observed in the field.
		Take precautions necessary to prevent injury to themselves and other employees.
		Read, sign-off, and comply with the project Health and Safety Plan before entering the site for field activities.
		Maintain visual contact between partners (buddy system).
		Perform only those tasks they believe they can do safely.
		Immediately report to the field team leader any accidents and/or unsafe conditions, or any deviations from the Health and Safety Plan.

SECTION 4

SAFETY AND HEALTH RISK ANALYSIS

RESPIRATORY HAZARDS

Respiratory hazards may exist on site from the potential presence of heavy metal contaminants, which could be inhaled if dust were produced during soil sampling activities.

CHEMICAL HAZARDS

Chemical hazards can exist when liquid, vapors, or soil samples contact human tissue. Every effort will be made to avoid inadvertent contact with the chemical media at the site. Since groundwater, soil, and sediment samples will be collected, protective equipment will be used to avoid physical contact. The chemical hazards at the site include: liquids, soils, and/or groundwater leachate containing hazardous substances and priority pollutant metals detected during previous investigations. Also, another potential hazard is contact with acidic soils or water, primarily through skin contact.

Information on the contaminants that may be encountered at the site is presented in Section 2 and Appendix B. The site may contain other hazardous chemicals that may release hazardous or toxic vapors. The site will be approached with caution, and any moving or handling of drums, containers, or equipment will be avoided.

Other chemical hazards which may be encountered at the site are airborne particulate from heavy metal contaminated soils. Since particulate are of concern, high winds and sampling activities which create dust and cause particulate to become airborne, will impose a requirement to modify operating procedures. If these conditions occur at the site, work will be conducted upwind of the hazard. If the wind conditions change or a sampling activity results in particulate matter becoming a factor, the site will be evacuated, as necessary, to minimize unnecessary exposure, or appropriate safety protection equipment will be used.

ROUTES OF EXPOSURE

The field team may be exposed to contaminated materials through inhalation, ingestion, and/or skin and eye contact.

- Respiratory system contact with hazardous airborne materials can occur. If these conditions exist, field work will be conducted upwind, proper protective equipment will be used, or the site will be evacuated.

- Eye contact with solid samples that are contaminated can occur when a worker does not wear safety glasses while samples are being taken or handled.

- Skin contact with contaminated solid or liquid samples can occur when a worker does not wear gloves and protective clothing during sampling activities.

- Gastrointestinal system contact with samples can occur when workers do not observe personal hygiene rules designed to reduce the chance of ingesting site contaminants (i.e., wash hands before smoking, eating, or drinking).

PHYSICAL HAZARDS

Abandoned Sites

The site is currently abandoned. There may be unknown physical hazards encountered during site sampling events that could cause physical injury. The structural integrity of the buildings and structures, condition of the surface impoundment berms, and potential spill areas surrounding the known waste management units present unknown physical hazards. Field work should be performed using all normal safety precautions. The Health and Safety Plan guidelines concerning avoiding physical hazards will be followed, as a minimum. In addition,

- Unnecessary moving or opening any heavy or bulky containers, drums, bags, etc., will be avoided;

- The "buddy" system will be used at all times.

Heat Stress

If elevated temperatures are encountered, heat stress may occur. Field work may be performed when daytime temperatures are high. Water will be available on site, and the Site Safety Officer will encourage workers to drink frequently to prevent dehydration and stay in shaded areas whenever possible. In addition, workers should adhere to the recommended work/rest schedule determined by the Site Safety Officer. Depending on work levels and temperatures, each individual should monitor his body temperature and note indications of heat stress as they onset. The "buddy" system will be used at all times to check each other for the first symptoms of heat stress.

Heat stress/stroke control. The TNRCC Site Safety Officer will set work and break schedules depending on the outside temperature. General guidelines for heat stress control while sampling include rest breaks in the shade for at least 10 minutes out of every hour during elevated temperatures. Rest time shall also include fluid replacement with water or electrolytes fluids.

Heat stress/stroke monitoring. The TNRCC Site Safety Officer will monitor workers who are performing strenuous activities in elevated temperatures for heat stress/ stroke. Monitoring will be conducted at the Site Safety Officers discretion, worker's request, or at the beginning of a rest period. The monitoring shall also be conducted when workers performance or mental status significantly changes. The heat stress monitoring plan may include:

- Measurement of worker heart rate, OR
- Measurement of body temperature, and
- Observation of the field team members for signs and symptoms of heat injury.

Heart rate (HR) will be measured by the radial pulse for 30 seconds as early as possible during the resting period. The HR at the beginning of the rest period should **not exceed 100 beats per minute**. If the HR exceeds 100 beats per minute, the next work period will be shortened by one third while the length of the rest period remains the same.

Body temperature will be measured using an oral thermometer. Worker **body temperature should not exceed 99.6°F**. If the worker's body temperature exceeds this, the work period will be shortened by one third while the length of the rest period remains the same. No person will be permitted to wear a semipermeable or impermeable garment **when body temperature exceeds 100.6°F.**

Table 4.1 presents suggested frequencies for heat monitoring. Heat stress monitoring will be performed by a person with a current first-aid certification. Workers that exhibit signs of heat injury will be allowed to rest until the signs are no longer observable. The signs of heat stress/stroke are depicted in Figures 4.1 and 4.2. Suggested emergency medical procedures for treating heat exhaustion and heat stroke are also provided.

Cold Injury

It is anticipated that the field sampling activities will occur during the winter months. All field personnel should be especially alert to the possibility of cold injuries, which are most likely to occur when an unprotected individual is exposed to cold temperatures. Temperature, humidity, precipitation, and wind all play roles in the development of cold injuries. The most serious cold injuries are hypothermia and frostbite. Dehydration can also occur if insufficient fluids are not taken as in hot weather. In cold weather, the individual may not be as aware of the problem since perspiration evaporates rapidly or is absorbed by layers of heavy clothing.

Individuals with a history of cold injuries (i.e., frostbite) have a higher-than-normal risk of recurrence, not necessarily involving the part previously injured. Individuals with prior cold injuries should notify the Health and Safety Officer and use the "buddy" system to monitor early detection of cold injury symptoms.

Table 4.1 - Suggested Frequency of Physiological Monitoring for Fit and Acclimatized Workers[1]

Temperature	Normal Work Ensemble[2]	Impermeable Ensemble
90°F (32.2°C) or above	After each 45 minute work period	After each 15 minutes work period
87.5-90°F (30.8-32.2°C)	After each 60 minutes work period	After each 30 minutes work period
82.5-87.5°F (28.1-30.8°C)	After each 90 minutes work period	After each 60 minutes work period
77.5-82.5°F (25.3-28.1°C)	After each 90 minutes work period	After each 90 minutes work period
72.5-77.5°F (22.5-25.3°C)	After each 150 minutes work period	After each 120 minutes work period

[1] For moderate work, e.g. walking about with moderate lifting and pushing.
[2] A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

53 Heat Exhaustion/ Heat Cramps

Signs & Symptoms: cool, pale, clammy skin / fatigue and faintness/headache/ heavy sweating/weak pulse/near-normal body temperature/nausea. Onset is gradual.

If person is unconscious, see *Heatstroke*, p. 54.

If possible, bring person indoors to a cool room. (Use air conditioner or electric fan or open windows and fan vigorously.) Outdoors, move person to a shaded area.

Have the person lie down. Elevate legs and feet with pillows or rolled blankets.

Loosen or remove clothing. Cool the skin with cool, wet sponges or cloths applied to forehead, arms, and legs

See illustration on opposite page

If the person has no heart problems or high blood pressure and is fully conscious, give sips of a salt solution (1 teaspoon salt to 16 oz. — 2 cups — water) every 15 minutes for about one hour. Check body temperature every 5 minutes and continue to cool with wet cloths.

If the person complains of muscle cramps, do not massage cramped muscles. This may increase pain

Does temperature suddenly rise? Are there convulsions, stupor, or unconsciousness?

Yes → If any of these occur, see *Heatstroke*, p. 54.

No

Calm the person by talking while attending to the problem. Explain what you are doing. Try not to show anxiety; act with confidence. Your calm behavior can help to reassure the sick person.

Does the person begin to feel better after one hour?

Yes → Keep person out of the sun and as cool and comfortable as possible.

Person should be checked by a doctor as a precaution. Discourage unnecessary exercise; this person may now be more susceptible to heat. If symptoms reappear, repeat process and call a physician.

No → Seek medical care immediately. While awaiting assistance, continue cooling with wet cloths and checking body temperature frequently.

Smelling salts, held briefly under the nose, may help to stimulate the person.

If the temperature suddenly rises or convulsions, stupor, or unconsciousness develop, see *Heatstroke*, p. 54.

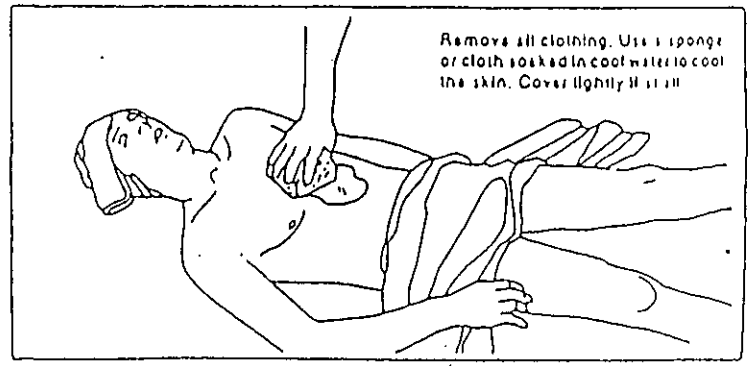


Figure 4.1

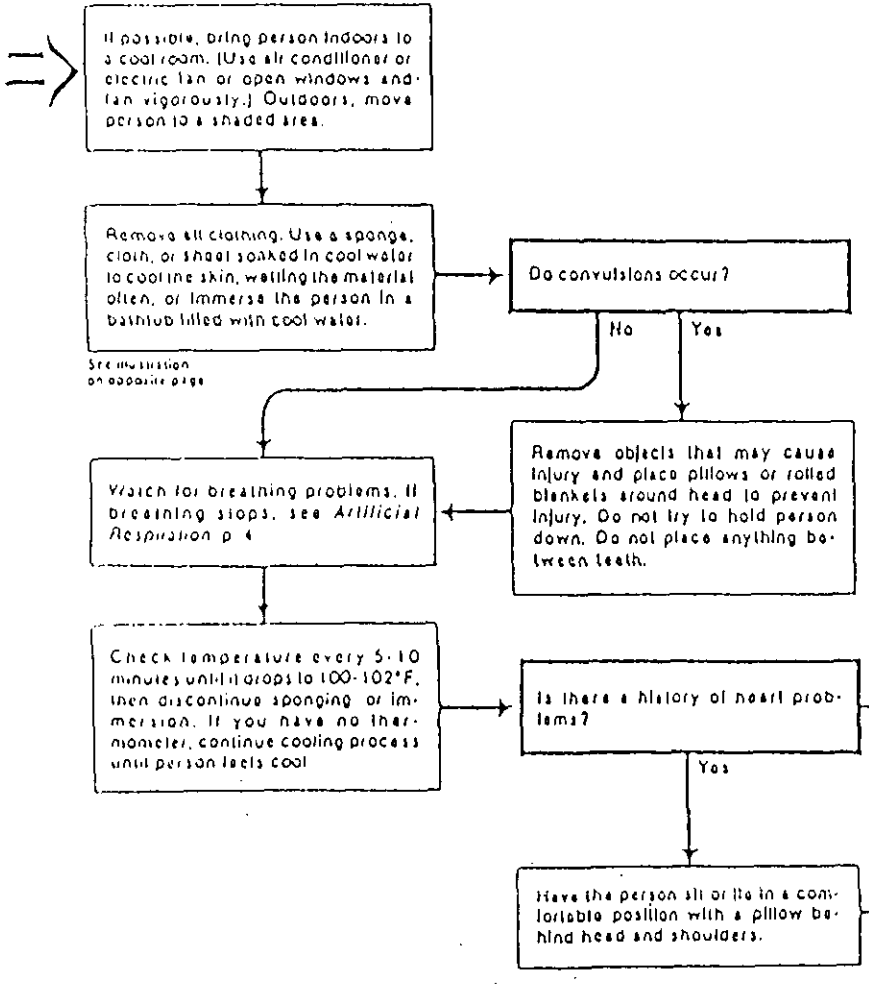
Reproduced from *Emergency Medical Procedures for the Home, Auto & Workplace*, revised edition, by The Deltakron Institute. New York: Prentice-Hall Press, 1987.

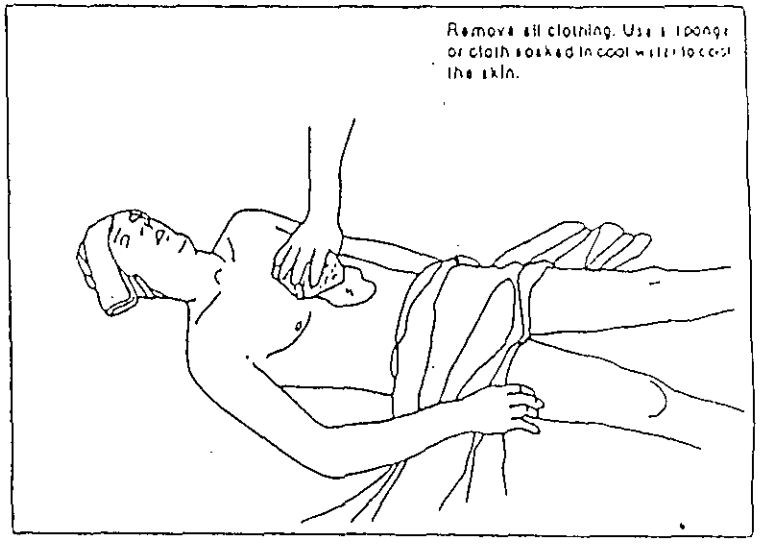
5-1 Heatstroke

Signs & Symptoms: *red, hot, dry skin/no perspiration/body temperature around 106°F (or very warm to the touch)/strong rapid pulse/stupor or unconsciousness*

If there are two or more rescuers, one should obtain emergency assistance while the other is following the procedures outlined below.

Calm the person by talking while attending to the problem. Explain what you are doing. Try not to show anxiety; act with confidence. Your calm behavior can help to reassure the sick person.





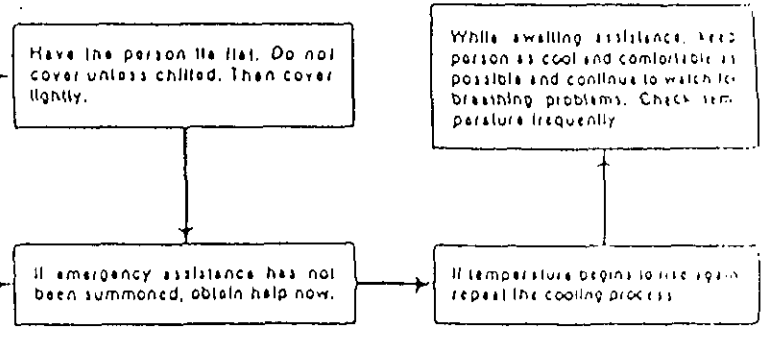


Figure 4.2

Reproduced from *Emergency Medical Procedures for the Home, Auto & Workplace*, revised edition, by The Deltakron Institute. New York: Prentice-Hall Press, 1987.

Noise

The field team may be exposed to excessive noise levels if vehicles or industrial equipment is operating at the site. Therefore, hearing protection will be available for use as appropriate.

Snake Hazards

It is not likely that snakes may be encountered at the site. However, long pants and high boots or snake guards will be worn during site activities to avoid a snake hazard. Never reach into a bushy area before checking for snakes by probing the area with a stick and listening for movement in the brush. Workers will use caution when working in areas where snakes may be present.

If a worker is bitten by a poisonous snake, the following steps should be taken:

- Attempt to identify the type of snake and its location,
- Keep the victim calm and minimize movement,
- Apply ice to the area bitten, and
- Transport victim to the nearest medical facility.

SAFE WORK PRACTICES

To ensure a strong safety awareness program during the sampling inspection, personnel must have adequate training. The Health and Safety Plan must be read by each member of the field team before conducting field activities and briefed to the field team at the beginning of each sampling day. A safety awareness must be developed and communicated to all members of the field team. All members of the field team will adhere to the following safety requirements while conducting field work for this sampling effort:

- No smoking, eating, or drinking carbonated beverages while at the site.
- Do not carry matches, lighters, or other ignition sources on the site.
- Facial hair will not be allowed where respirators contact the face.
- Contact lenses will not be worn during field work.
- Alcoholic beverages will not be permitted in state vehicles.

- Always use the "buddy" system while performing field work.
- Avoid walking through puddles or stained soil.
- Discovery of unusual or unexpected conditions will result in immediate evaluation and reassessment of site conditions and health and safety practices.
- A safety briefing will be performed each day prior to on-site work beginning.
- Other safety meetings may be conducted, as necessary.
- Take precautions to reduce injuries from field equipment and other tools.

All personnel will check their equipment at least two weeks before going into the field in case replacements are necessary. For respirator users, the correct corresponding cartridge or canister for the user's respirator will be verified before entering the site.

Tyvek coveralls, neoprene or nitrile gloves, hard hats, and rubber steel-toed boots or steel-toed shoes or boots will be worn by all personnel performing sampling activities. (Tyvek is optional if plastic sheeting is used to kneel on during soil sampling.) Safety glasses/sunglasses will be worn at all times to prevent eye irritation from particulate.

Groundwater samples will be collected from a drinking water wells reported near the site. Care will be taken to avoid direct contact with the water purged or sampled from these wells. Splash protection for use during well sampling will be available, as needed.

SECTION 5

PERSONNEL PROTECTION EQUIPMENT AND MONITORING

RESPIRATORY PROTECTION

The chemicals that may be present at the site are listed in Section 2, List of Chemicals Used On Site. Some chemical information sheets and Material Safety Data Sheets (MSDS) for the specific products/chemicals formerly used or found at the site are presented in Appendix B. Visual inspection will be used to detect the presence of any remaining chemicals by noting stained or vegetation stressed areas during the initial walk through. As a final precaution, during the sample collection efforts, warning symptoms such as headaches and nausea and observations of unusual vapors, mists, or clouds, will require using readily available respiratory protective equipment or immediate evacuation of the area.

PERSONAL PROTECTION

The required personal protection clothing will be worn during on-site inspections, especially during all sampling events, except where down-grades are acceptable:

Level D (Modified)

- Coveralls (i.e., tyvek), neoprene, PVC, or rubber boots (steel toe), inner vinyl or latex surgical gloves, outer neoprene work gloves, full-face respirator with organic and particulate filters, and a hard hat.

- Coveralls will be taped at wrists and ankles. Respirator cartridges to be used will bear NIOSH/MSHA approvals. Respirator cartridges will be changed once daily or when recommended exposure is reached to minimize the potential for break-through. If break-through occurs, cartridges must be changed.

If a down-grade is deemed acceptable:

Level D

- Tyvek (non-chemical resistant) coveralls, neoprene, PVC, rubber, or leather work boots (steel toe), optional inner vinyl or latex surgical gloves, outer neoprene work glove, optional goggles or face masks, and a hard hat.

MEDICAL SURVEILLANCE

Each field member must be a current participant in the TNRCC Health Monitoring Program, and must have already had their initial physical examination prior to entering this or any site where a potential exists for exposure to hazardous chemicals.

Each team member will acknowledge that they have had a current annual physical by signature on the Plan Acceptance Form and that they are medically fit to perform team tasks as assigned. If there are any medical restrictions on a team member's utilization, these restrictions must be provided in writing to the Site Safety Officer as noted by a physician as soon as possible before the field work begins. These restrictions will be complied with at all times while performing team tasks. If the team member cannot perform the task as required, another team member will be selected to perform the task.

SITE SPECIFIC TRAINING

The Site Safety Officer will be responsible for developing a hazard awareness briefing for all TNRCC personnel that are to perform team member tasks on the site, and other visiting personnel, as necessary. If other personnel visit the site during the sampling inspection and wish to participate, they will be required to review the Health and Safety Plan and/or receive a hazard awareness briefing from the Site Safety Officer before entering the site. This training will be acknowledged by signature of the visiting personnel on the Plan Acceptance Form (Appendix A). A daily safety meeting will be held prior to entering the site each day and a Site Safety Briefing Form completed (See Appendix C). The safety meeting will consist of the following topics:

SITE SAFETY BRIEFING (Held Each Day)

- Roll call - identify the team member responsible for site safety and health. Assure the Plan Acceptance Form has been signed by each team member.
- Discuss safety, health, and other issues that may effect the tasks assigned.
- Discuss/review proper use of personal protective equipment.
- Review work practices by which the employee can minimize risk from hazards.
- Discuss safe operation of engineering controls and equipment used on the site.
- Review potential chemicals and acute effects of the chemicals at the site.
- Review evacuation routes, signals, and emergency evacuation procedures.

- Review decontamination procedures, assign decontamination tasks.
- Assign designated area to meet in case work area must be evacuated.
- Review "buddy" system procedures.

The Site Safety Officer shall be familiar with the operation, calibration, and limitations of all field monitoring equipment. In addition, the field team should have the following health and safety items readily available:

- Copy of the Health and Safety Plan,
- First aid and snake bite kits, including ice,
- Emergency eyewash bottle,
- Air sampling/monitoring equipment (photo ionization detector, etc,),
- Oxygen/combustible gas indicator (as required),
- Fire extinguisher, and
- Distilled water (for eyewash bottle refill and decontamination procedures).

SECTION 6

FREQUENCY AND TYPES OF AIR MONITORING

The need for air monitoring equipment and frequency will be determined on a site-specific basis by anticipated respiratory concerns at the area (i.e., background samples taken off-site may not need air monitoring equipment). Table 7.1 lists the chemicals known to exist at the site and the TLV, PEL, and other pertinent information for each chemical. Table 7.2 lists the same information for the decontamination and preservation chemicals which may be used at this site.

Table 6.1 Chemicals of Record at the Old Brazos Forge Site (From NIOSH & ACDIH Pocket Guides)

Possible Chemical Contaminants	**NIOSH REL** (Recommended exposure level for 10 hr wk day/40 hr week) ST (short term exposure level/15 minutes)	**PEL** (Permissible exposure limit for 8 hr days in a 40 hr week) ST (short term exposure level/15 minutes)	**TLV** (Threshold Limit Values for 8 hours) **only listed if more stringent than PEL	**IDLH** (Immediate Dangerous to life or health concentrations	**Symptoms of Exposure** (inhalation; skin absorption)
Lead	0.1 mg/m³	0.05 mg/m³	**	700 mg/m³	Ingestion: pallor; pal eye, anorexia
Chromium	0.5 mg/m³	1.0 mg/m³	**	250 mg/m³	eye, skin, and lung irritation
Copper	1.0 mg/m³	1.0 mg/m³	**	100 mg/m³	Irritated eyes and nose, metallic taste, anemia
Nickel	0.015 mg/m³	1.0 mg/m³	**	10 mg/m³	Allergic asthma, sens derm, pneuitis
Zinc	5.0 mg/m³	5.0 mg/m³	**	500 mg/m³	Fever, chills, muscle ache, nausea, dry throat, cough, weak, blurred vision, low back pain, vomiting, fatigue, tight chest
Cyanide	5.0 mg/m³	5.0 mg/m³	**	50 mg/m³	Asphyxiation, weakness, nausea, vomiting, increased respiration, slow gasping respiration, eye and skin irritation, death
Cadmium	Carcinogen/reduce exposure as much as feasible	0.2 mg/m³ Ceiling/0.3 mg/m³	**	Carcinogen 9 mg/m³	Pulmonary edema, dyspnea; Cough, chest tight, substernal pain; headaches, chills, muscle aches, nausea, vomiting, diarrhea, anosmia, emphysema, proteinuria, mild anemia; carcinogen

ND = Not determined. Reduce exposure to lowest feasible concentrations.
N/A = Not available
ppm = Parts per million
ca = Carcinogen
a/TLV-TWA = Threshold limit value, time weighted average. OSHA-enforced average air concentration to which a worker may be exposed for an 8-hour workday without harm
b/PEL = Permissible exposure limit. Average air concentration (same definition as TLV, above) as recommended by the American Conference of Governmental and Industrial Hygienists (ACGIH).
c/IDLH = Immediately dangerous to life or health. Air concentration at which an unprotected worker can escape without debilitating injury or health effects. Expressed as ppm unless noted otherwise.
STEL = Short Term Exposure Limit.

Table 6.2 Chemicals of Record Used for Field Investigations

Chemical	TLV a/	(OSHA) PEL b/	Odor Threshold (ppm)	IDLH c/ (ppm)	Comments
Hexane	50	500		500	Calibration for HNU PI-101 photoionization detector. No anticipated problems since hexane in cylinder is only 0.14 percent by volume with air.
Nitric Acid	2	2		100	Very corrosive sample preservative agent. Avoid contact with skin, eyes, and clothing. Store bottle in an upright secure position. Do not preserve water samples suspected of containing cyanide compounds.
Hydrochloric Acid	(C).5	(C).5	1-5	100	Very corrosive sample preservative agent. Avoid contact with skin, eyes, and clothing. Store bottle in an upright secure position. Do not preserve water samples suspected of containing cyanide compounds.
Isopropanol	400			12,000	Decontamination fluid. Wear gloves when cleaning equipment.

ppm = Parts per million
ca = Carcinogen
a/TLV-TWA = Threshold limit value, time weighted average. OSHA-enforced average air concentration to which a worker may be exposed for an 8-hour workday without harm.
b/PEL = Permissible exposure limit. Average air concentration (same definition as TLV, above) as recommended by the American Conference of Governmental and Industrial Hygienists (ACGIH).
c/IDLH = Immediately dangerous to life or health. Air concentration at which an unprotected worker can escape without debilitating injury or health effects. Expressed as ppm unless noted otherwise.
(C) = denotes Ceiling limit

SECTION 7

ACCIDENT PREVENTION AND CONTINGENCY PLAN

ACCIDENT PREVENTION

All field personnel will receive health and safety training prior to the initiation of any site activities. On a day-to-day basis, individual personnel should be constantly alert for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. Rapid recognition of dangerous situations can avert an emergency. Before beginning the site investigation, a meeting will be held to discuss accident prevention (see Section 5, Site Safety Briefing). *The discussion should cover but not be limited to:*

- Tasks to be performed; time constraints (e.g., rest breaks);
- Hazards that may be encountered, including their effects, how to recognize symptoms or monitor them, concentration limits, or other danger signals; and emergency medical procedures.
- Emergency evacuation procedures.

Buddy System

The "buddy" system will be used at all times by all TNRCC field personnel while performing work related tasks on site. All activities must be conducted with a partner (buddy) who can:

- Provide his or her partner with assistance;
- Observe his or her partner for signs of chemical or weather exposure; and
- Notify the Site Safety Officer or others if emergency help is needed.

CONTINGENCY PLAN

Emergency Procedures

In the event that an emergency develops on site, the procedures delineated herein are to be immediately followed. Emergency conditions are considered to exist if:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on site, or

- A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

Chemical Exposure

If a member of the field crew demonstrates symptoms of chemical exposure, the procedures outlined below should be followed:

- Another team member (buddy) should remove the individual from the immediate area of contamination. The buddy should then notify the Site Safety Officer of the chemical exposure. The Site Investigation Manager should contact the appropriate emergency response agency.

- If the chemical is on the individual's clothing, the chemical should be neutralized or removed (if it is safe to do so).

- If the chemical has contacted the skin, the skin should be washed immediately with copious amounts of water.

- In case of eye contact, the emergency eye-wash solution should be used. Eyes should be washed for at least 15 minutes using available distilled water.

- All chemical exposure incidents must be reported to the Region/Central Office Staff Safety Offices. The Site Investigation Manager is responsible for reporting the chemical exposure incident and assist the individual's supervisor in submitting a written report (see Appendix A).

Personal Injury

In case of personal injury at the site, the following procedures should be followed:

- A team member should signal the other team member that an injury has occurred.

- A field team member trained in first aid can administer immediate treatment to the injury.

- The victim should then be transported (if applicable) to the nearest hospital or medical center, or stabilized so that further injury does not occur.

- The Site Investigation Manager is responsible for making certain that an accident report form is completed and submitted to the Region and Central Office Staff Safety Offices. Follow-up action should be taken to correct the situation that caused the accident.

Evacuation Procedures

- The Site Safety Officer will determine whether an evacuation is necessary.

- All personnel in the work area should evacuate the area and meet in the predesignated area.

- Account for all personnel. Wait for further instructions from the Site Safety Officer.

SECTION 8

SITE-SPECIFIC DECONTAMINATION PROCEDURES

Prior to leaving the site, personnel protective and sampling equipment will be decontaminated. Decontamination procedures will be conducted as follows:

- Remove and wash goggles or safety glasses (if used),
- Remove and wash chemical protective boots, gloves,
- Wash sampling equipment to remove gross contamination, and
- Wash hands and face.

Protective gloves will be placed in garbage bags and disposed of appropriately at the conclusion of site activities. Sampling equipment will be placed in plastic bags for final decontamination at the conclusion of site activities.

PERSONNEL DECONTAMINATION PROCEDURES

The TNRCC field team will establish an on-site decontamination station. An area will be set up during initial field activities prior to any sampling event. The decontamination station will have provisions for collecting disposable protective equipment; for washing boots, gloves, field instruments, sampling tools (if required); and for washing hands, face, and other exposed body parts. Investigation derived waste (IDW) from decontamination will be properly disposed in accordance with EPA guidelines outlined in the EPA/540/G-91/009, May 1991 handbook.

Decontamination equipment will include, as necessary:

- Plastic buckets, pails, and scrub brushes
- Non-phosphate detergent
- Isopropyl alcohol
- Paper towels
- Plastic garbage bags, sheets of plastic
- Deionized and potable water.

SECTION 9

DOCUMENTATION AND NOTIFICATION

LOGBOOK DOCUMENTATION REQUIREMENTS

Implementation of the Health and Safety Plan will be recorded in the field log book. Records information to be recorded shall include:

- Weather conditions at the time of the inspection (daily entry),
- Names of the personnel on-site (daily entry),
- Levels of personal protective equipment worn by the field personnel (specifically note conditions or rational for down- or up-grading PPE),
- Monitoring instrument readings,
- Subjects discussed during site health and safety briefings, and
- All safety violations.

A Health and Safety Checklist has been included in Appendix C to assist the Site Safety Officer in assuring that appropriate safety consideration have been covered in the daily safety briefing.

EPA NOTIFICATION OF IMMINENT DANGER TO THE GENERAL PUBLIC

If there is an imminent danger that the general public may come into direct contact with hazardous substances or wastes, which are readily accessible on-site, the Site Investigation Manager will notify the Project Manager who will notify the EPA no later than one (1) day after the inspection team returns from the site. Written notification will follow any verbal communication in regard.

SECTION 10

CONFINED SPACE ENTRY

A "Confined Space" means that a space:

1) is large enough and so configured that an employee can bodily enter and perform assigned work;
2) has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and
3) is not designed for continuous employee occupancy.

Should confined spaces be required to be inspected for a SSI, the Site Project Manager will be responsible for evaluating the site to determine if any confined spaces meet the definition of a permit-required confined space. "Permit-required confined space" means a confined space that has one or more of the following characteristics:

1) contains or has a potential to contain a hazardous atmosphere;
2) contains material that has the potential for engulfing an entrant;
3) has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
4) contains any other recognized serious safety or health hazard.

If permit-required confined spaces are observed on site and are required to be investigated, the Site Project Manager, or any other team member, will not enter these spaces and will notify the Staff Health and Safety Officer, who will arrange for certified personnel who can work in permit-required confined spaces.

APPENDIX A

PLAN ACCEPTANCE FORM

SUMMARY OF ACTIVITIES

ACCEPTANCE

I have read the Health and Safety plan (or been briefed on the hazards) for Expanded Site Inspection (ESI) field work to be conducted at the Old Brazos Forge Site located in Washington County, Texas, and agree to abide by the rules and guidelines contained therein. I acknowledge that I have had a current annual physical within the last 12-month period from the date signed below, and am medically cleared to perform my tasks as outlined.

Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date

VI. SUPERVISOR'S PACKET

Forms to be completed by the supervisor are:

Form #	Form Title
TWCC-1S	Employer's First Report of Injury
TWCC-6	Supplemental Report of Injury
TWCC-121	Supervisor's Investigation of Employee's Accident/Incident

Supervisor's Responsibilities

1. Complete all attached forms in accordance with the instructions outlined in the TNRCC Workers' Compensation Claims Handbook. Submit forms to the TNRCC Claims Coordinator in accordance with the time frames identified.

2. Report job related injury/illness, accident/incident to TNRCC Claims Coordinator, TNRCC Safety Manager or ADSO immediately, or as soon as possible after medical attention is provided to the employee.

3. Sign all forms in accordance with the instructions when required.

4. Keep the TNRCC Claims Coordinator updated on the status of medical services received, lost time from work, and workers compensation benefits received as a result of the injury or illness.

5. Ensure the injured employee completes all necessary paperwork as required by the Workers' Compensation Claims Handbook.

Texas Natural Resource Conservation Commission

INTEROFFICE MEMORANDUM

To: Date:

From: Cora Gratten
Claims Coordinator
Support Services Division

Subject: Employee's Packet, Workers' Compensation Claims (wcpro#1)

It has been brought to my attention that you may have been injured on the job or experienced a job related illness. I hope the injury is not serious and that you fully recover soon. Our goal as an agency is to ensure you receive proper medical care for your injury/illness and that you fully recover so that you can return to work as quickly as possible.

My responsibilities as the TNRCC Claims Coordinator is to work with you and your supervisor to ensure your claim is processed in accordance with the law. As a TNRCC employee part of your responsibilities are to fill out certain forms that are necessary to process the claim. These forms are required as part of the Workers' Compensation Claims process which is administered by the Office of the Attorney General.

Attached is a packet of material that provides some basic information regarding the Workers' Compensation and more detail about your responsibilities regarding this matter. The forms that you must fill out are included in this packet. There are also instructions provided that should be followed in completing the forms. I am also available should you need assistance in completing the forms. <u>It is critical that these forms be completed and submitted to me in accordance with the instructions and time frames that are identified.</u>

Your supervisor also has responsibilities regarding this claim, and will be sent information about your injury/illness and about their responsibilities. They will work with you to ensure you receive medical attention (if necessary) and that you return to work as quickly as possible if you miss time from work.

Again, if you need assistance at anytime regarding this incident, you may contact me at (512) 239-0245.

Attachments

cc: Employee's Supervisor

TNRCC INSTRUCTIONS FOR TWCC-1S

EMPLOYER'S FIRST REPORT OF INJURY OR ILLNESS

Required:

Form TWCC-1S must be completed and submitted to the TNRCC Claims Coordinator for any on-the-job injury that:
* has more than one day of lost time;
* is an occupational disease, with or without lost time or medical expenditures;
* resulted in the death of the employee; or
* results in expenditures for medical treatment or service.

Filing Deadline:

The form must be initially received by the TNRCC Claims Coordinator no later than the first calendar day after the first notice of injury is reported to the employee's supervisor or manager.

The TNRCC Claims Coordinator sends the form to Human Resources & Staff Development for completing information for box #s 30-35. (4-hour turn around)

Human Resources & Staff Development sends the form to Payroll/Time & Attendance for completing information for box #s 36-38. (4-hour turn around)

Financial Administration sends the form to the TNRCC Claims Coordinator for completion of box #s 39-53, then submission to the OAG-WCD.

The completed form shall be submitted to the OAG-WCD within three calendar days after the first notice of injury is reported to the employee's supervisor or manager. DO NOT send a paper copy of the TWCC-1S form to the TWCC.

NOTE: The form shall date & time stamped (on the back of the form) into each division and be hand delivered by the Division who has completed their portion of the form to the next Division who must provide information.

Completed By:

Programs listed above are responsible for completion as noted, with assistance from the TNRCC Claims Coordinator as necessary.

In cases of an extreme emergency when immediate medical attention is necessary, the TNRCC Claims Coordinator may be required to confirm a job related injury before the

TWCC-1S Form is completed by Payroll/Time & Attendance. In these situations the TNRCC Claims Coordinator may have to confirm information from Payroll/Time and Attendance by phone so the TWCC-1S Form can be faxed to the Attorney General's Office immediately. In these situations, the TNRCC Claims Coordinator will advise Payroll/Time & Attendance by e-mail that the information was for an emergency. A copy of the TWCC-1S Form should then be sent to Payroll/Time & Attendance.

Instructions:

PLEASE COMPLETE ALL APPLICABLE FIELDS. Most fields are self-explanatory, however, the following items may require more attention:

Item 4:	If no home phone, please give a phone number where the employee can be reached.
Items 7,8:	This information is no longer required.
Item 17:	This should be the first full day of lost time from work. (Please note that the Date of Injury is not considered the first day of Lost Time.)
Item 18:	List the nature of the injury. Examples include: burn, cut, or sprain.
Item 19:	List specific body part, e.g., chin, right leg, upper arm, etc. If more than one body part is affected, list each part.
Item 20:	Describe in detail. Use additional sheet of paper if necessary.
Item 24:	This should state the specific substance or exposure that directly inflicted the injury such as a tool, chemical or machine.
Item 28:	This is the employee's immediate supervisor.
Item 29:	This is the date the employee reported the injury to the employer.
Item 34:	This 4-digit code corresponds to the primary occupation in which the employee was engaged at the time of the injury or exposure. This code is from the state payroll classification table and is available from Human Resources & Staff Development, or Payroll/Time & Attendance.
Item 43:	This 9-digit code, assigned to each agency by TWCC, represents the location of the agency unit that employed the injured worker at the time of their injury or exposure.

Item 44: This 9-digit code is assigned to each agency by the Internal Revenue Service for employment, tax and reporting purposes.

Item 45: This 4-digit code is assigned to each agency and represents the nature of the employer's business. For specific questions about Primary Standard Industrial Classification (SIC) codes, call the Texas Workforce Commission (TWC) at 1-800-227-7816.

Item 46: This may be the same as the last item if the agency has one primary SIC code. If there is more than one, this should be the SIC code specific to the job being performed. If in doubt, call the TWC at the number listed above.

Item 47: TNRCC's state agency code number is 582 and is assigned by the State Comptroller of Public Accounts.

Item 51: This must be the signature and title of the TNRCC Claims Coordinator in the Support Services Division.

Item 52: Enter the number of sick leave hours credited to the employee as of the date of injury.

Distribution:

It is the TNRCC Claims Coordinator's responsibility to make distribution as indicated below.

Mail original to: Office of the Attorney General
Workers Compensation Division

Mail a copy to the claimant.

Send a copy to: TNRCC Claim File
Human Resources & Staff Development
Payroll/Time & Attendance
TNRCC Safety Manager

ail this form to:
FFICE OF THE ATTORNEY GENERAL
rkers' Compensation Division
O. Box 13777
stin, Texas 78711

lease read instruction sheet CAREFULLY,
ing special attention to items marked
an asterisk (*).

TWCC CLAIM # _____

DIRECTOR'S# _____

EMPLOYER'S FIRST REPORT OF INJURY OR ILLNESS

Name (Last, First, M.I.)

2. Sex F ☐ M ☐

3. Social Security Number

4. Home Phone ( )

5. Date of Birth (m-d-y)

Does the Employee Speak English? YES ☐ NO ☐ If No, Specify Language

Block no longer used

8. *Block no longer used*

9. Mailing Address Street or P.O.Box

City State Zip Code County

Marital Status
Married ☐ Widowed ☐ Separated ☐ Single ☐ Divorced ☐

11. Number of Dependent Children

12. Spouse's Name

Doctor's Name

Doctor's Mailing Address (Street or P.O.Box)

City State Zip Code

15. Date of Injury (m-d-y)

16. Time of Injury : am ☐ pm ☐

17. Date Lost Time Began (m-d-y)

18. Nature of Injury*

19. Part of Body Injured or Exposed*

20. How and Why Accident/Injury Occurred*

21. Was employee doing his regular job? YES ☐ NO ☐

22. Worksite Location of Injury (stairs, dock, etc.)*

23. Address Where Injury or Exposure Occurred.
Name of business if incident occurred on a business site.

Street or P.O. Box County

City State Zip Code

24. Cause of Injury (fall, tool, machine, etc.)*

25. List Witnesses

26. Return to work date/or expected (m-d-y)

27. Did employee die? YES ☐ NO ☐

28. Supervisor's Name

29. Date Reported (m-d-y)

30. Date of Hire (m-d-y)

31. Was employee hired or recruited in Texas? YES ☐ NO ☐

32. Length of Service in Current Position Months _____ Years _____

33. Length of Service in Occupation Months _____ Years _____

State Payroll Classification Code

35. Occupation of Injured Worker

36. Rate of Pay at this Job
$_____Hourly
_____Weekly $_____Monthly

37. Full Work Week is:
_____ Hours _____ Days

38. Last Paycheck was:
$_____

39. Is employee an Owner, Partner, or Corporate Officer?
YES ☐ NO ☒

40. Name and Title of Person Completing Form
Claim Coordinator

41. Name of Agency

42. Agency Mailing Address and Telephone Number
Street or P.O. Box Telephone ( )

City State Zip Code

43. Agency Location Code
___ ___ ___ / ___ ___ ___ / ___ ___ ___

Name of Location: _____

44. Federal Tax Identification Number

45. Primary Standard Industrial Classification Code (SIC)* (4 digit)

46. Specific SIC Code* (4 digit)

47. Comptroller Agency Code
___ ___ ___

48. Workers' Compensation Insurance Company
State Employee's Division, Attorney General's Office

49. Policy Number
TXSTATEPOL001

50. Did you request accident prevention services in past 12 months?
YES ☐ NO ☐ If yes, did you receive them? YES ☐ NO ☐

52. Number of Hours of Sick Leave Credited to Employee on Date of Injury

51. Signature and Title (READ INSTRUCTIONS ON INSTRUCTION SHEET BEFORE SIGNING)

X _____ Claim Coordinator Date _____

TNRCC INSTRUCTIONS FOR TWCC-6

Supplemental Report of Injury

Required:

The TWCC-6 should be completed by the supervisor immediately when the employee:

a. * Has returned to work;
b. * Has additional day(s) of disability;
c. Has a change in weekly earnings after the injury (increase or decrease);
d. Is terminated or resigns; or
e. * Has been absent from work for more than 60 days (the employing agency will complete a TWCC-6 at the end of each 60 day period as long as the employee remains unable to work).

NOTE: * A physician's statement is required for these situations.

Filing Deadline:

For each of the five required situations listed above that the TWCC-6 must be filed, the following are the corresponding filing deadlines:

a. No later than one calendar day after the employee returns to work;
b. No later than one calendar day after the additional day of disability occurs;
c. No later than five calendar days after the change in earnings has taken place;
d. No later than five calendar days after the employee resigns or is terminated; and
e. No later than five calendar days after each 60-day period that the employee is unable to return to work.

Completed By:

The employee's supervisor shall complete item #s 1-12.
The TNRCC Claims Coordinator shall complete item#s 13-17.

Instructions:

1. Check the appropriate boxes which show the reason for filing a Supplemental Report of Injury and complete only the blocks indicated.
2. In block 7 give actual wages. Please do not estimate wages. Contact Payroll/Time & Attendance for assistance in completing this block.

Distribution:

It is the TNRCC Claims Coordinator's responsibility to make distribution as indicated below.

Mail original to: Office of the Attorney General
Workers Compensation Division

Mail a copy to the claimant.

Send a copy to: TNRCC Claim File
Human Resources & Staff Development
Payroll/Time & Attendance
TNRCC Safety Manager

File original with employer's carrier.
File copy with injured employee.

CARRIER'S CLAIM # _____
TWCC # _____

SUPPLEMENTAL REPORT OF INJURY

DO NOT SEND THIS FORM TO TEXAS WORKERS' COMPENSATION COMMISSION UNLESS REQUESTED.

WHEN AND WHERE TO FILE: *For all injuries occuring January 1, 1991 or after* that require a TWCC-1, Employer's First Report of Injury, to be filed, the employer must file by first class mail or personal delivery a Supplemental Report of Injury (TWCC-6) with the employer's workers' compensation carrier and the injured employee: 1) within 3 days after the injured employee returns to work; 2) within 3 days when the employee, after returning to work, has an additional day or days of disability because of the injury; 3) within 10 days after the end of each pay period in which the employee has an increase or decrease of earnings during the time the employee is entitled to temporary income benefits; 4) within 10 days after the employee resigns or is terminated. If the injured employee is no longer employed by the employer, the employee is responsible for providing information to the carrier about amounts of earnings or offers of employment. The employee may use a TWCC-6, Employer's Supplemental Report of Injury for this purpose. **An employee has disability if he/she is unable to work as a result of the injury or has returned to work earning less than pre-injury wages because of the injury.**

EMPLOYEE INFORMATION

1. Employee's Name (Last, First M.I.) and Telephone No. ( )
2. Social Security No.
3. Date of Injury (m-d-y)
4. Employee's Mailing Address (Street or P.O. Box)

City | State | Zip Code

TO EMPLOYER: Based on above rule requirements, check boxes which show reasons for filing Supplemental Report of Injury this date:

- ☐ *employee returned to work* — Complete Block 5a or 5b; Complete Blocks 6 and 7
- ☐ *additional day(s) of disability* — Complete Block 5b; Complete Block 7
- ☐ *change in weekly earnings after injury* — Complete Blocks 5a or 5b; Complete Blocks 7 and 8
- ☐ *employee terminated/resigned* — Complete Block 5a or 5b; Complete Block 7; Complete Block 9

5. a) If initial filing of TWCC-6, first day of disability due to injury (m-d-y)

5. b) If second or subsequent filing of TWCC-6, give first day of disability due to injury for this period only (m-d-y)

6. Date of Return to Work _____
(Check box) ☐ Full Duty, Full Pay
☐ Limited Duty: Full Pay ☐ Reduced Pay

7. Weekly and Hourly Earnings at Time of This Report
(Check box) ☐ Same as Preinjury Wages
$_____ weekly
$_____ hourly
☐ Increase from Preinjury Wages ☐ Decrease from Preinjury Wages

8. No. of Hours Working Weekly at Time of This Report _____
(Check box) ☐ Increase from Preinjury Hours Worked Weekly
☐ Same as Preinjury ☐ Decrease from Preinjury Hours Worked Weekly

9. If the employee resigns or is terminated, fill in the appropriate section.
☐ Date of Resignation (m-d-y) _____
☐ Date of Termination (m-d-y) _____

10. If applicable, eight days of disability began on (m-d-y) [see above definition of disability]

9a. Reason for Resignation or Termination

11. Has injured employee died? If so, give date of death (m-d-y)

12. Was employee on limited duty at time of termination? ☐ Yes ☐ No

EMPLOYER INFORMATION

13. Employer's Business Name
14. Telephone No. ( )
15. Employer's Business Mailing Address (Street or P.O. Box)

City | State | Zip Code

16. Name of Workers' Compensation Carrier for Above Injury

17. The information provided in this report is accurate to the best of my knowledge. It may be relied upon for evaluation of the named employee's eligibility for benefits.

Signature and Title of Person Completing Form ☐ Employer ☐ Employee | Date

SUPERVISOR'S INVESTIGATION OF EMPLOYEE'S ACCIDENT/INCIDENT

1. LAST NAME OF INJURED	2. FIRST NAME	3. M.I.	4. SOCIAL SECURITY NUMBER	5. DATE OF BIRTH
			- -	/ /

6. SEX	7. DATE OF EMPLOYMENT IN UNIT	8. AGENCY NUMBER (COMPTROLLER'S CODE)	9. BUDGET NUMBER OF ASSIGNED UNIT
M ☐ F ☐	/ /		

10. JOB CLASSIFICATION CODE	11. POSITION STATUS	12. DATE OF INCIDENT	13. TIME OF INCIDENT
	☐ Full-time ☐ Part-time ☐ Floater (fills where needed)	/ /	: a.m. ☐ p.m. ☐

A. EXTENT OF INJURY (Check one only)

- ☐ 01 No injury (incident only)
- ☐ 02 Injury not requiring a TWCC-1
- ☐ 03 Medical
- ☐ 04 Lost time only (more than one day)
- ☐ 05 Medical and lost time
- ☐ 06 Fatality

B. CATEGORY (Check one only)

- ☐ 01 Occupational injury (accident)
- ☐ 02 Occupational injury (aggressive behavior)
- ☐ 03 Occupational illness/disease

C. SPECIFIC LOCATION OF OCCURRENCE (Check one only)

INDOORS:
BUILDING INVENTORY NO. _____

- ☐ 01 Auditorium
- ☐ 02 Bath/Toilet area
- ☐ 03 Boiler room
- ☐ 04 Canteen/Snack bar
- ☐ 05 Cell block
- ☐ 06 Classroom
- ☐ 07 Closet
- ☐ 08 Day room
- ☐ 09 Dormitory/Living room
- ☐ 10 Elevator
- ☐ 11 Food service area/Dining/Kitchen
- ☐ 12 Garage
- ☐ 13 Gymnasium/Recreation
- ☐ 14 Hallway/Corridor
- ☐ 15 Hospital/Clinic/Dispensary
- ☐ 16 Laboratory
- ☐ 17 Laundry
- ☐ 18 Library
- ☐ 19 Nursing station
- ☐ 20 Office areas
- ☐ 21 Program areas
- ☐ 22 Ramp
- ☐ 23 Sales store/Outlet
- ☐ 24 Seclusion room
- ☐ 25 Sleeping room
- ☐ 26 Steps/Stairs/Stairway
- ☐ 27 Storage area
- ☐ 28 Waiting room
- ☐ 29 Workshop/Technical trades
- ☐ 30 Other (specify) _____

OUTDOORS:

- ☐ 31 Athletic field
- ☐ 32 Campus
- ☐ 33 Grounds
- ☐ 34 Highway/Road/Street
- ☐ 35 Loading dock
- ☐ 36 Park or recreation area
- ☐ 37 Parking lot
- ☐ 38 Roof
- ☐ 39 Sidewalk
- ☐ 40 Steps/Stairs/Stairway
- ☐ 41 Storage area
- ☐ 42 Swimming pool area
- ☐ 43 Tower
- ☐ 44 Other (specify) _____

D. ACTIVITY ENGAGED IN BY INJURED AT TIME OF INJURY (Check one only)

- ☐ 01 Bathing
- ☐ 02 Buffing
- ☐ 03 Carrying
- ☐ 04 Cleaning
- ☐ 05 Climbing
- ☐ 06 Cutting
- ☐ 07 Descending
- ☐ 08 Digging
- ☐ 09 Dressing
- ☐ 10 Driving
- ☐ 11 Eating
- ☐ 12 Escorting
- ☐ 13 Exercising
- ☐ 14 Feeding
- ☐ 15 Grinding
- ☐ 16 Grooming
- ☐ 17 Jumping
- ☐ 18 Lifting
- ☐ 19 Loading
- ☐ 20 Mopping
- ☐ 21 Moving
- ☐ 22 Operating
- ☐ 23 Pulling
- ☐ 24 Pushing
- ☐ 25 Reaching
- ☐ 26 Redirecting
- ☐ 27 Restraining
- ☐ 28 Running
- ☐ 29 Sanding
- ☐ 30 Sawing
- ☐ 31 Searching
- ☐ 32 Securing
- ☐ 33 Sitting
- ☐ 34 Standing
- ☐ 35 Stripping
- ☐ 36 Turning
- ☐ 37 Walking
- ☐ 38 Welding
- ☐ 39 Other (specify) _____

E. BODY PART INJURED (Most serious)

- ☐ 01 Ankle
- ☐ 02 Arm
- ☐ 03 Back
- ☐ 04 Buttocks
- ☐ 05 Cheek
- ☐ 06 Chest
- ☐ 07 Chin
- ☐ 08 Ear(s)
- ☐ 09 Eye(s)
- ☐ 10 Foot-Feet
- ☐ 11 Finger/Thumb(s)
- ☐ 12 Forehead
- ☐ 13 Groin
- ☐ 14 Hand
- ☐ 15 Hips
- ☐ 16 Internal organ
- ☐ 17 Jaw
- ☐ 18 Knee(s)
- ☐ 19 Leg(s)
- ☐ 20 Mouth
- ☐ 21 Neck
- ☐ 22 Nose
- ☐ 23 Pelvis
- ☐ 24 Rib(s)
- ☐ 25 Scalp
- ☐ 26 Shoulder
- ☐ 27 Toe(s)
- ☐ 28 Wrist(s)
- ☐ 29 Other (specify) _____

F. TYPE OF INJURY (Check primary one)

- ☐ 01 Abrasion
- ☐ 02 Amputation
- ☐ 03 Bite
- ☐ 04 Bruise
- ☐ 05 Burn
- ☐ 06 Concussion
- ☐ 07 Cut
- ☐ 08 Dermatitis
- ☐ 09 Dislocation
- ☐ 10 Foreign object
- ☐ 11 Fracture
- ☐ 12 Frostbite
- ☐ 13 Hearing loss
- ☐ 14 Heart attack
- ☐ 15 Heat exhaustion
- ☐ 16 Hernia
- ☐ 17 Infection
- ☐ 18 Inflamation
- ☐ 19 Internal injuries
- ☐ 20 Puncture
- ☐ 21 Rupture
- ☐ 22 Scratch
- ☐ 23 Shock
- ☐ 24 Sprain
- ☐ 25 Sting
- ☐ 26 Strain
- ☐ 27 Other (specify) _____

G. TYPE OF OCCURRENCE (Check one only)

- ☐ 01 Aggression (client, student, inmate, patient)
- ☐ 02 Bodily reaction (drug, medication)
- ☐ 03 Caught in, on, under, or between
- ☐ 04 Contact with chemicals
- ☐ 05 Contact with electric current
- ☐ 06 Contact with temperature extremes

G. CONTINUED

- ☐ 07 Fall on same level
- ☐ 08 Fall on different level
- ☐ 09 Over-exertion (exceeding physical ability resulting in strain, rupture)
- ☐ 10 Overexposure to environmental hazards (noise, toxic)
- ☐ 11 Slip (not a fall)
- ☐ 12 Struck against (rough, sharp object)
- ☐ 13 Struck by falling, moving object
- ☐ 14 Other (specify) _____

H. PHYSICAL THING MOST CLOSELY ASSOCIATED WITH OCCURRENCE (Check one)

- ☐ 01 Aircraft
- ☐ 02 Air pressure
- ☐ 03 Animal (snake, dog, horse, etc.)
- ☐ 04 Athletic equipment (baseball, bat, dart, etc.)
- ☐ 05 Attachments (belt, pulley, gear, shaft)
- ☐ 06 Building component
- ☐ 07 Cabinet
- ☐ 08 Chemical (solid, liquid, or gas)
- ☐ 09 Clothing
- ☐ 10 Container (bottle, box, barrel, cylinder, etc.)
- ☐ 11 Curb
- ☐ 12 Doors (automatic, manual, revolving)
- ☐ 13 Drugs or medicine
- ☐ 14 Dust
- ☐ 15 Electrical apparatus
- ☐ 16 Elevator, escalator
- ☐ 17 Explosives
- ☐ 18 Eyewear
- ☐ 19 Fan
- ☐ 20 Fire, flame, smoke
- ☐ 21 Floor
- ☐ 22 Food products
- ☐ 23 Fumes
- ☐ 24 Furniture, fixtures
- ☐ 25 Gas
- ☐ 26 Glass items
- ☐ 27 Gun
- ☐ 28 Ground (earth)
- ☐ 29 Hand tool
- ☐ 30 Heating equipment
- ☐ 31 Hoisting equipment
- ☐ 32 Icy condition
- ☐ 33 Infectious or parasitic agent
- ☐ 34 Inmate, client, employee
- ☐ 35 Insect
- ☐ 36 Kitchen equipment
- ☐ 37 Knife
- ☐ 38 Lighting fixture and equipment
- ☐ 39 Ladder, scaffold
- ☐ 40 Locker
- ☐ 41 Machine
- ☐ 42 Material handling equipment
- ☐ 43 Metal
- ☐ 44 Mineral items (asphalt, clay, gravel, etc.)
- ☐ 45 Motor vehicle
- ☐ 46 Needle
- ☐ 47 Office equipment (chair, desk, cabinet, etc.)
- ☐ 48 Paint
- ☐ 49 Particle
- ☐ 50 Pavement
- ☐ 51 Person (other than client, inmate, employee)
- ☐ 52 Pipe
- ☐ 53 Platform, dock, ramp

Continued On Other Side

I. CONTINUED

- ☐ 54 Pole
- ☐ 55 Power tool or machinery (lathe, saw, etc.)
- ☐ 56 Radiating equipment (microwave, x-ray, etc.)
- ☐ 57 Receptacle
- ☐ 58 Smoke
- ☐ 59 Stair, step
- ☐ 60 Sun
- ☐ 61 Trench/Ditch
- ☐ 62 Vegetation
- ☐ 63 Weather
- ☐ 64 Wood
- ☐ 65 Other (specify) _____

I. ACT/PRACTICE ASSOCIATED WITH OCCURRENCE (Check one only)

- ☐ 01 Contact with electrical source (tool, device, wire, etc.)
- ☐ 02 Entering an unauthorized area
- ☐ 03 Failure to practice safe driving technique
- ☐ 04 Failure to use established route or taking short cut
- ☐ 05 Failure to use handrail, grab bar
- ☐ 06 Failure to use lockout device
- ☐ 07 Failure to use/wear personal protective equipment (PPE)
- ☐ 08 Failure to warn of known hazards (i.e. no safety sign, light, barricade, instruction, etc.)
- ☐ 09 Failure to wear appropriate dress (shoes, shirt, blouse)
- ☐ 10 Handling (of object, material, item, thing)
- ☐ 11 Horseplay
- ☐ 12 Improper mixing or storing (non-compatible material, chemicals, etc.)
- ☐ 13 Improper placing or storing (materials, tools, equipment)
- ☐ 14 Lifting (including position, stance)
- ☐ 15 Making safety devices inoperative
- ☐ 16 No unsafe act/practice on the part of employee
- ☐ 17 Operating/Working at unsafe speed
- ☐ 18 Operating without proper authority/clearance
- ☐ 19 Over or unnecessary exposure to hazards (gas, fumes, dust, chemicals, mist, radiation, etc.)
- ☐ 20 Repairing or servicing moving object/thing (machine, equipment, etc.)

I. CONTINUED

- ☐ 21 Riding moving equipment not designed for passengers
- ☐ 22 Unobservant (daydreaming, inattentive, etc.)
- ☐ 23 Using unsafe/defective tool, material, equipment
- ☐ 24 Using wrong tool, material equipment
- ☐ 25 Working/Walking under suspended load (crane, hoist, derrick)
- ☐ 26 Working in a confined space without proper safeguard
- ☐ 27 Working without adequate lighting
- ☐ 28 Other (specify) _____

J. CONDITION (PHYSICAL HAZARD) ASSOCIATED WITH OCCURRENCE (Check one)

- ☐ 01 Congested area
- ☐ 02 Electrical hazard (uninsulated wire, overloaded circuit, inadequate ground, etc.)
- ☐ 03 Excessive noise
- ☐ 04 Harmful animals/insects/reptiles
- ☐ 05 Health hazards (radiation, gas, fumes, dust, vapors, etc.)
- ☐ 06 Improper housekeeping
- ☐ 07 Improperly stored chemicals, hazardous substances
- ☐ 08 Inadequate ventilation
- ☐ 09 Inadequate or no warning signs
- ☐ 10 Layout or design (office, shop, equipment)
- ☐ 11 Lighting
- ☐ 12 Mislabeled/Unlabeled chemicals, hazardous materials, etc.
- ☐ 13 No unsafe condition
- ☐ 14 Open trench, hole, ditch, sharp drop-off
- ☐ 15 Poisonous vegetation (oak, ivy, etc.)
- ☐ 16 Protruding object (nail, wire, splinter, etc.)
- ☐ 17 Rough/Sharp objects
- ☐ 18 Slipping or tripping hazard
- ☐ 19 Step, stairs, ladder, or other working surfaces
- ☐ 20 Unguarded machine, belt, pulley, roller, etc.

J. CONTINUED

- ☐ 21 Unsafe/Defective hand or electric tools
- ☐ 22 Unsafe equipment
- ☐ 23 Unsafe material
- ☐ 24 Unsafe vehicle
- ☐ 25 Unshored trench, excavation, etc.
- ☐ 26 Walkway, sidewalk, pavement
- ☐ 27 Other (specify) _____

K. DID THE STATE OR THE UNIT HAVE A SAFETY RULE, REGULATION, OR STANDARD THAT WOULD HAVE PREVENTED THE OCCURRENCE?

☐ 01 Yes ☐ 02 No

L. WAS THE RULE, REGULATION, OR STANDARD VIOLATED?

☐ 01 Yes ☐ 02 No

M. ACTION(S) TAKEN OR PLANNED TO PREVENT RECURRENCE (Check all that apply)

- ☐ 01 Action taken with employee for violating rules, regulations or procedures
- ☐ 02 All employees were made aware of the occurrence cause, consequence, and action taken to prevent recurrence
- ☐ 03 Employee given basic training
- ☐ 04 Employee given refresher or remedial training
- ☐ 05 Existing rule, regulation or standard (SOP) enforced
- ☐ 06 Existing rule, regulation or standard (SOP) revised
- ☐ 07 New rule, regulation or standard prepared
- ☐ 08 Physical hazard(s) corrected
- ☐ 09 Other positive action taken _____

N. DESCRIBE BRIEFLY IN NARRATIVE FORM THE CIRCUMSTANCES THAT LED TO AND CAUSED THIS OCCURRENCE.

ANSWER: WHO? WHAT? WHERE? WHEN? WHY? AND HOW? (Use additional sheet if necessary)

		/ /	( )
INJURED'S IMMEDIATE SUPERVISOR (print)	SIGNATURE	DATE	PHONE

P. REVIEWED BY

P.1 SECTION/DEPARTMENT/DIVISION ADDITIONAL DUTY SAFETY OFFICER COMMENT:

		/ /
	SIGNATURE	DATE

P.2 SECTION/DEPARTMENT/DIVISION HEAD COMMENT:

		/ /
	SIGNATURE	DATE

P.3 AGENCY OR FACILITY SAFETY MANAGER:

A) Repeat occurrence: ☐ 01 No ☐ 02 Yes; total incidents: ☐ 03 Two ☐ 04 Three ☐ 05 Four ☐ 06 Five ☐ 07 Over Five

B) Were three (3) or more workers injured in this accident? (if so, complete a separate form for each employee) ☐ 01 Yes ☐ 02 No

C) Comment

	/ /
SIGNATURE	DATE

TNRCC INSTRUCTIONS FOR TWCC-121

Supervisor's Investigation of Employee's Accident/Incident

Required:

Immediately after receiving notice of an injury/illness, accident/incident the supervisor should investigate the accident/incident and complete this form. The ADSO and the Division Director who serves the area where the injured employee works should review and comment on the supervisors comments.

Filing Deadline:

The form must be received by the TNRCC Claims Coordinator no later than one week after the First Report of Injury or Illness (TWCC-1S), or notice of an accident/incident is reported to the supervisor.

Completed By:

The injured employee's immediate supervisor, or next in charge in the event of absence of the immediate supervisor, is responsible for completion of the form.

Instructions:

1. The form must be typed or clearly printed.
2. The supervisor should complete the form, comment and sign in block N.
3. The appropriate ADSO should comment and sign in block P.1.
4. The appropriate of the supervisor should comment and sign in block P.2.
5. The TNRCC Safety Manager should complete and sign in block P.3.

Distribution:

It is the TNRCC Claims Coordinator's responsibility to make distribution as indicated below.

Send a copy to: Claimant
Near Miss Incident File

V. EMPLOYEE'S PACKET

Forms to be completed by the injured employee are:

Form #	Form Title
Pub. No. PI96-007A (03-96)	Employee Rights & Responsibilities
WCD-16	Authorization for Release of Information
WCD-29	Employee's Report of Injury
WCD-74	Witness Statement
WCD-80	Employee's Election Regarding Utilization of Sick Leave

Employee Responsibilities

1. Report job related injury/illness, accident/incident to their supervisor or the TNRCC Claims Coordinator immediately, or as soon as possible after medical attention is received.

2. Complete all forms in accordance with the instructions outlined in the Workers' Compensation Claims Handbook.

3. Sign all forms in accordance with the instructions when required.

4. Keep their supervisor updated on the status of medical services received, lost time from work, and workers compensation benefits received as a result of the injury or illness.

5. Return to work as soon as possible after a lost time injury/illness. Provide original of physicians release to return to work.

6. Provide original of any and all documentation related to medical expenses and physicians statements relating to the injury/illness.

TNRCC INSTRUCTIONS FOR Pub. No. PI96-007A (3-96)

EMPLOYEE RIGHTS & RESPONSIBILITIES

Required:

See attached TWCC Advisory 96-03 for specific information and requirements regarding this form.

Filing Deadline:

Not Applicable

Completed By:

Not Applicable

Instructions:

A copy of this form must be provided to the injured Employee with the Employee's Packet at the same time the Employer's First Report of Injury is filed with the OAG.

BROWN
VE DIRECTOR

TEXAS
WORKERS' COMPENSATION COMMISSION
SOUTHFIELD BUILDING, 4000 SOUTH IH-35, AUSTIN, TEXAS 78704-7491
(512)448-7900

TWCC ADVISORY 96-03

SUBJECT: EMPLOYEE RIGHTS AND RESPONSIBILITIES FORM

Rule 120.2(e) requires employers to provide injured workers with a summary of their rights and responsibilities at the same time that the Employer's First Report of Injury is filed with the insurance carrier. The Rule provides that the English and Spanish text provided by the Commission must be used without any changes or additional words.

The "Employee Rights And Responsibilities Under The Texas Workers' Compensation System" form published by the Commission (Pub. No. PI96-007A) must be used by employers to comply with the requirements of Rule 120.2(e). This form must be provided in the exact format and text as published by the Commission. The use of published brochures or other information is not a substitute for this form. Failure to use the published form will constitute non-compliance with this Rule.

While the employer may include other information or brochures, this form must be provided to the injured worker. Effective May 1, 1996, the most current version of this form published by the Commission must be used to comply with the provisions of Rule 120.2(e).

Signed this 28th day of March, 1996

Todd K. Brown, Executive Director

Attachment:

Employee Rights And Responsibilities Under the Texas Workers' Compensation System [Pub. No. PI96-007A (3-96)]

Distribution:

Austin Carrier Representatives
TWCC Staff
Public Information List

PUB NO. P96-007A (3-95)

Employee Rights and Responsibilities under the Texas Workers' Compensation System

is information describes your rights and responsibilities under the Texas workers' compensation system. For more information or for assistance, please call the Texas Workers' Compensation Commission field office handling your claim, or call 1-800-252-7031.

Your rights under the Texas workers' compensation system

You may have the right to receive benefits.

You may receive benefits regardless of who caused or helped cause your injury. You may not receive benefits if your injury occurred while you were intoxicated, you injured yourself intentionally or while unlawfully attempting to injure someone else, you were injured by another person for personal reasons, you were injured while voluntarily participating in an off-work activity, you were injured by an act of God, or your injury occurred during horseplay.

You have the right to receive the medical care reasonable and necessary to treat your work-related injury or illness for the rest of your life.

You have the right to the initial choice of doctor.

You may not change doctors except with the approval of the Commission. You do not need to get approval to go to a different doctor for emergency treatment, if you or your doctor moves, or if your doctor is unable to continue treating you.

You have the right to hire an attorney to help you get benefits or to help you resolve disputes.

You have the right to receive assistance from appropriate, qualified Commission staff and, in the event of a dispute resolution proceeding, from a Commission ombudsman free of charge. To request assistance, contact the field office handling your claim, or call 1-800-252-7031.

You have the right to receive information and assistance regarding your claim. Commission staff will explain your rights and responsibilities under the Texas Workers' Compensation Act. Additionally, you have the right to be assisted by a Commission ombudsman in informal dispute resolutions and in administrative proceedings if you are not represented. However, an ombudsman cannot serve as a legal representative or attorney for you.

You have the right to confidentiality.

Only people who need to know—such as your doctor, your employer, or your employer's insurance carrier—may see information in the Commission's files. A prospective employer may get limited information from the Commission about your claims. If you wish someone who is assisting you to have access to your file, you must provide written approval for them to do so.

Your responsibilities under the Texas workers' compensation system

❶ ***You have the responsibility to tell your employer about your injury or illness.***

You must tell your employer *within 30 days* of the date you were injured, or *within 30 days* of the date you first knew your illness might be work-related. You, or someone helping you, may either talk with or write your employer or any supervisor where you work.

If you do not tell your employer within 30 days, you could lose your right to get benefits.

❷ ***You have the responsibility to fill out a claim form and send it to the Commission.***

You must send a completed claim form, called a TWCC-41, to the Commission *within one year* of the date you were injured, or *within one year* of the date you first knew your illness might be work-related. Send the completed claim form to the Commission even if you are already getting benefits.

If you do not send the form within one year, you could lose your right to get benefits. For a copy of the form, call the field office handling your claim, or call 1-800-252-7031.

❸ ***You have the responsibility to tell the Commission and the insurance carrier any time your income changes.***

If you are *not* getting benefits and you have changed employers since your injury, tell the Commission if your injury causes you to miss work or lose income. Call 1-800-252-7031.

If you *are* getting benefits and you have changed employers since your injury, tell the Commission and the insurance carrier paying your benefits if your income changes. Tell the Commission and the insurance carrier regardless of whether your income went up or down. If you have stopped working since your injury, tell the Commission and the insurance carrier if you start working again or if you have a job offer.

❹ ***You have the responsibility to tell your doctor how you were injured and if you believe it may be work-related.***

If possible, tell the doctor before the doctor treats you.

❺ ***You have the responsibility to tell the Commission and the insurance carrier how to contact you.***

You should contact the Commission and the insurance carrier if your home address, work address, or phone number changes, so the Commission and the insurance carrier will be able to contact you when necessary.

ployers: You must provide this information to the injured worker at the same time you report the injury to your insurance carrier. If your insurance carrier has agreed

PUB NO. P196-007A (3-96)

Derechos y Responsabilidades para el Trabajador bajo el Sistema Tejano de Compensación para Trabajadores

Esta información describe sus derechos y sus responsabilidades en el sistema de compensación para trabajadores de Tejas. Para mayor información o ayuda, por favor llame a la oficina local de la Comisión Tejana de Compensación para Trabajadores que maneja su reclamo o llame al 1-800-252-7031.

Sus derechos en el sistema Tejano de compensación para trabajadores

❶ *Usted puede tener derecho a recibir beneficios.*

Usted puede recibir beneficios a pesar de que alguien le causó o le ayudó a causar su lesión. Puede ser que no reciba beneficios si su lesión ocurrió mientras usted estaba intoxicado, si se lesionó intencionalmente o mientras estaba tratando de lastimar a otra persona ilegalmente, o si fue lastimado por otra persona por razones personales, si se lastimó mientras estaba participando voluntariamente en una actividad fuera del trabajo y después de horas de trabajo, si fue lastimado por un acto de Dios, o si su lesión ocurrió mientras estaba payasando.

❷ *Usted tiene el derecho de recibir tratamiento médico que sea razonable y necesario para tratar su lesión o enfermedad relacionada con su trabajo por el resto de su vida.*

❸ *Usted tiene el derecho de escoger a su propio médico inicialmente.*

Usted no puede cambiar de médico, excepto con la aprobación de la Comisión. Usted no tiene que obtener aprobación para ir a un médico diferente en casos de tratamiento de emergencia, o si usted o su médico se mudan o si su médico no esta disponible para continuar con su tratamiento.

❹ *Usted tiene el derecho de contratar a un abogado para que le ayude a obtener beneficios o para que le ayude a resolver disputas.*

❺ *Usted tiene el derecho de recibir asistencia gratuita del personal apropiado y calificado de la Comisión. En caso de que occurá un procedimiento administrativo, tiene el derecho de recibir asistencia gratuita de un ombudsman para resolver disputas. Para pedir ayuda, comuniquese con la oficina local que esta manejando su reclamo o llame al 1-800-252-7031.*

Usted tiene el derecho de recibir información y asistencia relacionado con su reclamo. Personal de la Comisión le explicará sus derechos y responsabilidades bajo la Ley Tejana de Compensación para Trabajadores. Adicionalmente, usted tiene el derecho de recibir asistencia de un ombudsman de la Comisión en resolución de disputas informales y en procedimientos administrativos si no tiene representación legal. Sin embargo, un ombudsman no puede servirle como su representante legal o su abogado.

❻ *Usted tiene el derecho a su confidencialidad.*

Solo personas que necesiten información acerca de su reclamo—como su médico, su patrón cuando se lesionó, o la compañía de seguros de ese patrón—puede ver la información en el archivo de la Comisión. Un futuro o posible patrón puede obtener información limitada de la Comisión acerca de sus reclamos. Si usted desea que alguien que lo esté representando o asistiendo tenga acceso a su archivo, necesita primero proporcionar aprobación por escrito antes de que lo puedan obtener.

Sus responsabilidades en el sistema Tejano de compnsación para trabajadores

❶ *Usted tiene la responsabilidad de notificar a su patrón de su lesión o enfermedad.*

Usted debe notificar a su patrón *dentro de 30 días* desde la fecha que se lesionó, o *dentro de 30 días* desde de la fecha en que usted se enteró primero que su lesión o enfermedad pudo haber sido relacionada con su trabajo. Usted, o la persona que le esté ayudando puede hablar con o escribir al patrón o a cualquier supervisor donde usted este trabajando.

Si usted no notifica a su patrón dentro de 30 días desde la fecha de su lesión, puede perder su derecho a beneficios.

❷ *Usted tiene la responsabilidad de llenar un formulario de reclamo y enviarlo a la Comisión.*

Usted debe completar y enviar su formulario de reclamo, que se llama TWCC-41, a la Comisión *dentro de un año* de la fecha en que se enteró que su lesión o enfermedad pudo haber sido relacionada con su trabajo.

Envie el formulario a la Comisión aunque esté recibiendo beneficios.

Si usted no envía el formulario dentro de un año, usted puede perder el derecho de recibir beneficios. Para obtener una copia del formulario, llame a la oficina local que esta manejando su reclamo o llame al 1-800-252-7031.

❸ *Usted tiene la responsabilidad de notificar a la Comisión y a la compañía de seguros cada vez que cambien sus ingresos.*

Si usted *no* esta recibiendo beneficios y ha cambiado de trabajo desde su lesión, avise a la Comisión si su lesión le causa faltar al trabajo o perder sueldo. Llame al 1-800-252-7031.

Si usted *esta* recibiendo beneficios y ha cambiado de trabajo desde su lesión, avise a la Comisión y la compañía de seguros que le está pagando sus beneficios si hay un cambio de ingresos. Avise a la Comisión o la compañía de seguros a pesar de que suban o bajen sus ingresos. Si usted ha dejado de trabajar desde el día de su lesión, avise a la Comisión y la compañía de seguros si empieza a trabajar de nuevo o tiene oferta de empleo.

❹ *Usted tiene la responsabilidad de avisar a su médico como se lesionó y si creé que su lesión puede ser relacionada con el trabajo.*

Si es posible, avise a su médico antes de que le dé tratamiento médico.

❺ *Usted tiene la responsabilidad de avisar a la Comisión y a la compañía de seguros como se pueden comunicar con usted.*

Debe de avisar a la Comisión y la compañía de seguros de cualquier cambio de domicilio, dirección de trabajo, o número telefónico, para que la Comisión y la compañía de seguros puedan comunicarse con usted cuando sea necesario.

Empresario/Empleador: Usted debe proveer esta información al trabajador lesionado al mismo tiempo que debe reportar el accidente o lesión a su compañía de

TNRCC INSTRUCTIONS FOR WCD-16

Authorization for Release of Information

Required:

Immediately after sustaining a work-related injury, the claimant should fill out this release form so that the Workers' Compensation Division (WCD) can obtain from providers copies of relevant medical documents which will assist in the handling of the claim.

Filing Deadline:

The form must be received by the TNRCC Claims Coordinator no later than three days after the supervisor is notified of the injury.

Completed By:

The claimant must complete this form.

Instructions:

1. The claimant must type or clearly print his/her name on the patient line and the second line.

2. The claimant must date and sign the form.

Distribution:

It is the TNRCC Claims Coordinator's responsibility to make distribution as indicated below.

Mail original to: Office of the Attorney General
Workers Compensation Division

Mail a copy to the claimant.

Send a copy to: TNRCC Claim File

AUTHORIZATION FOR RELEASE OF INFORMATION
(WCD-16)

Patient:_____

TO WHOM IT MAY CONCERN:

You are hereby expressly authorized to release and furnish to the Workers' Compensation Division of the Office of the Attorney General of Texas, and/or any associate, assistant, representative, agent, or employee thereof, any and all desired information, (including, but not limited to, office records, medical reports, memos, hospital records, laboratory reports, including results of any and all tests including alcohol and/or drug tests, X-rays, X-ray reports, including copies thereof) pertaining to the physical and/or mental condition which is the basis of my workers' compensation claim. This includes not only all current and/or future information, but also all past medical information which is related to the injury or injuries which form the basis of my claim.

(Print name)_____

Photostatic copies of this signed authorization will be considered as valid as the original.

This is not a release of claims for damages.

DATED:_____ SIGNED:_____

PLEASE SIGN THE ABOVE MEDICAL AUTHORIZATION AND RETURN IT, SO THAT WE MAY SECURE RELEASE OF YOUR MEDICAL RECORDS.

THANK YOU.

OFFICE OF THE ATTORNEY GENERAL
WORKERS' COMPENSATION DIVISION

TNRCC INSTRUCTIONS FOR WCD-29

Employee's Report of Injury

Required:

This form should always be filled out by the injured employee and filed with the Workers' Compensation Division (WCD). This will help to expedite benefits in a more timely manner.

Filing Deadline:

The form must be received by the TNRCC Claims Coordinator no later than one week after the First Report of Injury or Illness (TWCC-1S) is filed with the TNRCC Claims Coordinator.

Completed By:

The claimant is responsible for completion of this form, with the assistance from the supervisor and TNRCC Claims Coordinator.

Instructions:

All fields should be completed and printed legibly. Make sure that the claimant signs and dates the bottom of the form.

Distribution:

It is the TNRCC Claims Coordinator's responsibility to make distribution as indicated below.

Mail original to: Office of the Attorney General
Workers Compensation Division

Mail a copy to the claimant.

Send a copy to: TNRCC Claim File
TNRCC Safety Manager

(PLEASE USE WITH ALL SUBMISSIONS TO EXPEDITE HANDLING)

EMPLOYEE'S REPORT OF INJURY

Dear Claimant:

We have received a report that you were injured in the course of your employment. In order for us to process your claim efficiently, please fill in all lines completely and print legibly. **Attach additional sheets if necessary.**

1. Name: _____ Social Security: _____
   LAST FIRST MI MAIDEN
2. Give your current home address: _____
3. By whom are you employed? _____
4. What is your job title/description? _____
5. What are your monthly wages? _____ 6. How many days per week do you work? _____
7. On what date were you injured? _____
8. What was the exact location of the accident (street address if possible)? _____
9. How did the accident happen? _____
10. What part of your body was injured? _____
11. When did you report this accident? _____
12. To whom did you make your accident report? _____
13. List name(s), address(es), and telephone number(s) of witness or witnesses: _____
14. Name, address, and telephone number of physician who provided treatment: _____
15. When did you first receive treatment? _____
16. When did you stop working as a result of your accident? _____
17. Name, address, and telephone number of doctor presently treating you: _____
18. When were you last treated? _____
19. Have you returned to work? _____ If so, when? _____
20. Have you lost any wages on account of your accident? _____
21. Have you ever had a previous injury claim? _____ If so, describe: _____

(dated) _____ (signed) _____

TNRCC INSTRUCTIONS FOR WCD-74

Witness Statement

Required:

Immediately after receiving notice of any injury, the Employee's Supervisor should determine the names, addresses, and telephone numbers of all witnesses to the incident. A statement should be taken from each witness and forwarded to the TNRCC Claims Coordinator.

Filing Deadline:

The form must be received by the TNRCC Claims Coordinator no later than the fifth calendar day after the first notice of injury is reported to the supervisor.

Completed By:

The person giving the statement is responsible for completing this form, with assistance from the TNRCC Claims Coordinator.

Instructions:

1. The form should be typewritten or hand printed.

2. The witness may have actually seen the accident, or may have acquired knowledge about the accident from some other source. The witness's information may relate to how the accident occurred, or to something else that is relevant. Check the first or second box, as appropriate. Be specific. Sometimes you will be given someone's name as being a witness, who when asked claims to know nothing about the accident. In such a case, the third box should be checked.

3. If the space provided on the form is insufficient, attach additional sheets.

Distribution:

It is the TNRCC Claims Coordinator's responsibility to make distribution as indicated below.

Mail original to: Office of the Attorney General
Workers Compensation Division

Send a copy to: TNRCC Claim File
TNRCC Safety Manager

CLAIM NUMBER_____
(If Known)

WITNESS STATEMENT
(WCD-74)

MUST BE TYPED
OR PRINTED

Claimant_____
Employer_____
Date of Injury_____
Statement Taken by _____

Name:_____Age:_____
Residence Address: _____
Home Telephone:_____Work Telephone: _____
Employer: _____
On _____, 19_____, at about _____p.m./a.m., I was
in or at (clearly state your own location) _____
_____
when an accident involving the above employee is alleged to have occurred.

(check only one box)

☐ I saw the accident.
The accident occurred in the following manner: _____
_____
_____
_____
_____
_____

Other pertinent information and source:_____
_____
_____

☐ I did not see the accident.
Information given me by (name of person) _____
indicates it occurred as follows:_____
_____
_____
_____
_____
_____

Other pertinent information and source:_____
_____
_____

☐ I know nothing whatsoever about the occurrence.

_____ _____
Signature Date

TNRCC INSTRUCTIONS FOR WCD-80

Employee's Election Regarding Utilization of Sick Leave

Required:

The injured employee must choose whether or not they will utilize sick leave before receiving workers' compensation income benefits.

Filing Deadline:

The form must be received by the WCD no later than the second calendar day after the first day of lost time has occurred.

Completed By:

It is the supervisor's responsibility to ensure this form is completed and signed by the employee. The employee must sign the form if physically able to do so.

Instructions:

1. If an employee chooses to use no sick leave at all, even during the seven day waiting period, the WCD-80 form still must be completed and the second box must be checked under "Election 2".

2. If an employee chooses to use sick leave until it is exhausted, instead of receiving workers' compensation benefits during that period, fill out and sign Election I.

3. If an employee chooses to use sick leave only during the seven-day waiting period, and wants to begin receiving compensation payments thereafter, fill out and sign Election 2.

4. Be sure to fill in the amount of sick leave available to the claimant at the time of injury. Also fill in the claim number, if known.

5. Employee must sign the form before making distribution.

Distribution:

It is the TNRCC Claims Coordinator's responsibility to make distribution as indicated below.

Mail original to: Office of the Attorney General
Workers Compensation Division

Send a copy to: TNRCC Claim File
Payroll/Time & Attendance
Human Resources & Staff Development
TNRCC Safety Manager

CLAIM NUMBER _____
(If Known)

EMPLOYEE'S ELECTION REGARDING UTILIZATION OF SICK LEAVE (WCD-80) (Texas Labor Code, Sec. 501.044)

ELECTION 1

I hereby elect to use sick leave until it is exhausted before receiving weekly payments of workers' compensation. By making this election, I understand that I am not entitled to weekly payments of compensation until my sick or emergency leave is exhausted.

(Type Employee's Name as Shown on Payroll)	(Hours of Sick Leave Available as of Date of Injury)
(Employee's Social Security Number)	(Name of Agency)
(Employee's Signature/Date)	(Claims Coordinator's Signature/Date)

ELECTION 2

I hereby elect to receive weekly payments of workers' compensation after the seven (7) day waiting period. I understand that I may use sick or emergency leave for the seven (7) day waiting period, but that I may not use sick or emergency leave after that time. I understand that I may not receive weekly payments of compensation and sick or emergency leave at the same time.

I ☐ do ☐ do not desire to use sick leave for the waiting period.

(Type Employee's Name as Shown on Payroll)	(Name of Agency)
(Employee's Social Security Number)	(Claims Coordinator's Signature/Date)
(Employee's Signature/Date)	

Form No. WCD-80 9-93

APPENDIX B

Sax's Dangerous Properties of Industrial Materials

Ninth Edition

RICHARD J. LEWIS, SR.

VNR

VAN NOSTRAND REINHOLD

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Sax's Dangerous Properties of Industrial Materials, Ninth Edition is also available as a CD-ROM subscription (with three quarterly updates). For ordering information, please call:

1-800-575-5886

ims-rat TDLo:45 g/kg/1Y-I:ETA JNCIAM 46,1131,71
skn-ham TDLo:53,950 mg/kg/65W-I:CAR JNCIAM 53,1259,74
scu-rat TD:990 mg/kg/55W-I:NEO JNCIAM 52,1579,74

SAFETY PROFILE: Questionable carcinogen with experimental carcinogenic, tumorigenic, and neoplastigenic data. When heated to decomposition it emits acrid smoke and fumes.

CAD000 CAS:7440-43-9 HR: 3
CADMIUM
mf: Cd mw: 112.40

PROP: Hexagonal, ductile, crystals or soft, silver-white, lustrous, malleable metal. Tarnishes in air, particularly moist air. Mp: 321°, bp: 767°, d: 8.642, vap press: 1 mm @ 394°. Sol dil acids (H_2 evolved).

SYNS: C.I. 77180 ☐ COLLOIDAL CADMIUM ☐ KADMIUM (GERMAN)

TOXICITY DATA WITH REFERENCE
mnt-mus:emb 6 µmol/L TXCYAC 4,57,90
cyt-ham:ovr 1 µmol/L CGCGBR 26,251,80
orl-rat TDLo:155 mg/kg (male 13W pre):REP BECTA6 20,96,78
scu-rat TDLo:250 µg,/kg (female 19D post):REP APTOD9 19,A122,80
orl-rat TDLo:21,500 µg/kg (multi):TER ENVRAL 22,466,80
orl-mus TDLo:1700 mg/kg (female 8-12D post):REP TCMUD8 6,361,86
orl-mus TDLo:448 mg/kg (multi):TER AEHLAU 23,102,71
ivn-rat TDLo:8 mg/kg (female 8-15D post):TER JJATDK 1,264,81
orl-rat TDLo:220 mg/kg (female 1-22D post):TER TOLED5 11,233,82
orl-rat TDLo:21,500 µg/kg (multi):REP ENVRAL 22,466,80
ipr-rat TDLo:1124 µg/kg (male 1D pre):REP TXAPA9 41,194,77
orl-rat TDLo:23 mg/kg (female 1-22D post):TER PSEBAA 158,614,78
ivn-rat TDLo:1250 µg/kg (female 9D post):TER JJATDK 1,264,81
par-ham TDLo:2 mg/kg (female 8D post):TER TJADAB 31,52A,85
ihl-wmn TDLo:129 µg/m³/20Y-C:CAR AJIM08 10,153,86
scu-rat TDLo:3372 µg/kg:CAR ENVRAL 55,40,91
ims-rat TDLo:40 mg/kg/4W-I:CAR JEPTDQ 1(1),51,77
ims-rat TD:70 mg/kg:ETA BJCAAI 18,124,64
ims-rat TD:63 mg/kg:ETA NATUAS 193,592,62
ims-rat TD:45 mg/kg/4W-I:NEO NCIUS* PH-43-64-886,SEPT,71
ihl-man TCLo:88 µg/m³/8.6Y:KID AEHLAU 28,147,74
ihl-hmn LCLo:39 mg/m³/20M AIHAAP 31,180,70
unk-man LDLo:15 mg/kg 85DCAI 2,73,70
orl-rat LD50:225 mg/kg TXAPA9 41,667,77
ihl-rat LC50:25 mg/m³/30M SAIGBL 16,212,74
orl-mus LD50:890 mg/kg 41HTAH-,14,78
ihl-mus LCLo:170 mg/m³ NTIS** PB158-508
ipr-mus LD50:5700 µg/kg TXAPA9 37,403,76
unr-mus LD50:890 mg/kg GTPZAB 22(5),6,78
orl-rbt LDLo:70 mg/kg AMPMAR 34,127,73
scu-rbt LDLo:6 mg/kg PROTA*-,-,55
ivn-rbt LDLo:5 mg/kg JOGBAS 35,693,28

CONSENSUS REPORTS: NTP 7th Annual Report on Carcinogens. IARC Cancer Review: Group 1 IMEMDT 58,119,93; Animal Sufficient Evidence IMEMDT 2,74,73; Animal Sufficient Evidence IMEMDT 11,39,76; Human Sufficient Evidence IMEMDT 58,119,93; Human Limited Evidence IMEMDT 7,139,87; Animal Limited Evidence IMEMDT 58,119,93. Cadmium and its compounds are on the Community Right-To-Know List. Reported in EPA TSCA Inventory. EPA Genetic Toxicology Program.

OSHA PEL: TWA 5 µg(Cd)/m³
ACGIH TLV: Dust and Salts: TWA 0.05 mg(Cd)/m³ (Proposed: TWA 0.01 mg(Cd)/m³ (dust), Suspected Human Carcinogen; 0.002 mg(Cd)/m³ (respirable dust), Suspected Human Carcinogen); BEI: 10 µg/g creatinine in urine; 10 µg/L in blood. (Proposed: 5 µg/g creatinine in urine; 5 µg/L in blood)
DFG BAT: Blood 1.5 µg/dL; Urine 15 µg/dL. MAK: Suspected Carcinogen
NIOSH REL: (Cadmium) Reduce to lowest feasible level

SAFETY PROFILE: Confirmed human carcinogen with experimental carcinogenic, tumorigenic, and neoplastigenic data. A human poison by inhalation and possibly other routes. Poison experimentally by ingestion, inhalation, intraperitoneal, subcutaneous, and intravenous routes. In humans inhalation causes an excess of protein in the urine. Experimental teratogenic and reproductive effects. Mutation data reported. The dust ignites spontaneously in air and is flammable and explosive when exposed to heat, flame, or by chemical reaction with oxidizing agents, metals, HN_3, Zn, Se, and Te. Explodes on contact with hydrazoic acid. Violent or explosive reaction when heated with ammonium nitrate. Vigorous reaction when heated with nitryl fluoride. When heated to a high temperature it emits toxic fumes of Cd. See also CADMIUM COMPOUNDS.

For occupational chemical analysis use OSHA: #ID-125G or NIOSH: Cadmium, 7048; welding and Brazing Fume, 7200; elements, 7300.

CAD250 CAS:543-90-8 HR: 3
CADMIUM(II) ACETATE
mf: $C_2H_4O_2 \cdot 1/2Cd$ mw: 116.25

PROP: Monoclinic, colorless crystals; odor of acetic acid. Mp: 256°, bp: decomp, d: 2.341.

SYNS: ACETIC ACID, CADMIUM SALT ☐ BIS(ACETOXY)CADMIUM ☐ CADMIUM ACETATE (DOT) ☐ CADMIUM DIACETATE ☐ C.I. 77185

TOXICITY DATA WITH REFERENCE
cyt-hmn:lym 10 nmol/L MUREAV 85,236,81
otr-ham:emb 1 µmol/L CNREA8 39,193,79
dnd-ham:emb 1 µmol/L CNREA8 39,193,79
ipr-rat TDLo:2 mg/kg (female 20D post):REP BECTA6 23,25,79
ipr-rat TDLo:1 mg/kg (14D preg):TER BECTA6 23,25,79
ipr-rat TDLo:2371 µg/kg (12D preg):REP BECTA6 20,206,78
scu-rat TDLo:2325 ng/kg (female 1D pre):REP JRPFA4 17,559,68

CMI250 CAS:24613-89-6 HR: 3
CHROMIC CHROMATE
mf: Cr_3O_{12}•2Cr mw: 452.00

SYNS: CHROMIC ACID, CHROMIUM(3+) SALT (3:2) ☐ CHROMIUM CHROMATE (MAK)

TOXICITY DATA WITH REFERENCE
imp-rat TDLo:112 mg/kg:NEO AIHAAP 20,274,59

CONSENSUS REPORTS: IARC Cancer Review: Animal Sufficient Evidence IMEMDT 2,100,73. Reported in EPA TSCA Inventory. Chromium and its compounds are on the Community Right-To-Know List.

OSHA PEL: CL 0.1 mg(CrO_3)/m³
ACGIH TLV: TWA 0.05 mg(Cr)/m³; Confirmed Human Carcinogen.
DFG MAK: Animal Carcinogen, Suspected Human Carcinogen.
NIOSH REL: (Chromium(VI)) TWA 0.001 mg(Cr(VI))/m³

SAFETY PROFILE: Confirmed carcinogen with experimental carcinogenic and neoplastigenic data. Very powerful oxidizer. See also CHROMIUM COMPOUNDS.

For occupational chemical analysis use NIOSH: Chromium Hexavalent 7024.

CMI300 CAS:13537-21-8 HR: 3
CHROMIC PERCHLORATE
mf: Cl_3O_{12}•Cr mw: 350.35

SYNS: CHROMIUM PERCHLORATE ☐ CHROMIUM TRIPERCHLORATE ☐ PERCHLORIC ACID, CHROMIUM(3+) SALT

CONSENSUS REPORTS: IARC Cancer Review: Group 3 IMEMDT 49,49,90; Animal Inadequate Evidence IMEMDT 49,49,90; Human Inadequate Evidence IMEMDT 49,49,90.

OSHA PEL: TWA 0.5 mg(Cr)/m³
ACGIH TLV: TWA 0.5 mg(Cr)/m³; Not Classifiable as a Carcinogen.
DOT CLASSIFICATION: 5.1; *Label:* Oxidizer

SAFETY PROFILE: A toxic and reactive oxidizing solid. When heated to decomposition it emits toxic vapors of Cr.

CMI500 CAS:1308-31-2 HR: 3
CHROMITE (mineral)
mf: Cr_2FeO_4 mw: 223.85

PROP: Black or brown-black cubic crystals. Relatively insol in acids.

SYNS: CHROME ORE ☐ CHROMITE ☐ CHROMITE ORE ☐ IRON CHROMITE

TOXICITY DATA WITH REFERENCE
mma-sat 2 mg/plate CRNGDP 3,1331,82
cyt-hmn:oth 500 mg/L BJCAAI 44,219,81
sce-ham:ovr 10 mg/L CRNGDP 3,1331,82

CONSENSUS REPORTS: NTP 7th Annual Report on Carcinogens. IARC Cancer Review: Group 3 IMEMDT 7,165,87; Animal Inadequate Evidence IMEMDT 23,205,80. Chromium and its compounds are on the Community Right-To-Know List.

OSHA PEL: TWA 0.5 mg(Cr)/m³
ACGIH TLV: TWA 0.05 mg/m³ (ore processing); Confirmed Human Carcinogen (ore processing)

SAFETY PROFILE: Confirmed human carcinogen during ore processing. Human mutation data reported. See also CHROMIUM COMPOUNDS and IRON.

CMI750 CAS:7440-47-3 HR: 3
CHROMIUM
mf: Cr mw: 52.00

PROP: Hard ductile blue-white metal. Resists oxidation in air. Bp: 26° @ 2690 mm. More reactive to acids than Mo or W and can be rendered passive. Rapidly attacked by fused NaOH + KNO_3 or $KClO_4$.

SYNS: CHROME ☐ CHROMIUM METAL (OSHA)

TOXICITY DATA WITH REFERENCE
ivn-rat TDLo:2160 µg/kg/6W-I:ETA JNCIAM 16,447,55
imp-rat TDLo:1200 µg/kg/6W-I:ETA JNCIAM 16,447,55
imp-rbt TDLo:75 mg/kg:ETA ZEKBAI 52,425,42

CONSENSUS REPORTS: NTP 7th Annual Report on Carcinogens. IARC Cancer Review: Group 3 IMEMDT 7,165,87; Animal Inadequate Evidence IMEMDT 23,205,80. Chromium and its compounds are on the Community Right-To-Know List. Reported in EPA TSCA Inventory.

OSHA PEL: TWA 1 mg/m³
ACGIH TLV: TWA 0.5 (Cr)mg/m³; Not Classifiable As Carcinogen

SAFETY PROFILE: Confirmed human carcinogen with experimental tumorigenic data. Powder will explode spontaneously in air. Ignites and is potentially explosive in atmospheres of carbon dioxide. Violent or explosive reaction when heated with ammonium nitrate. May ignite or react violently with bromine pentafluoride. Incandescent reaction with nitrogen oxide or sulfur dioxide. Incompatible with oxidants. See also CHROMIUM COMPOUNDS.

For occupational chemical analysis use OSHA: #ID-125G or NIOSH: Chromium, 7024; Welding and Brazing Fume, 7200; Elements, 7300.

CMJ000 CAS:628-52-4 HR: 3
CHROMIUM ACETATE HYDRATE
mf: $C_4H_6O_4$•Cr•H_2O mw: 188.12

PROP: Air-sensitive dark red crystals. Stable in air for short period. Sltly sol in H_2O and EtOH; sol in hot H_2O.

SYNS: ACETIC ACID, CHROMIUM (2+) SALT (8CI, 9CI) ☐ CHROMIUM(2+) ACETATE ☐ CHROMIUM(II) ACETATE ☐ CHROMIUM DIACETATE ☐ CHROMOUS ACETATE ☐ CHROMOUS ACETATE MONOHYDRATE

TOXICITY DATA WITH REFERENCE
orl-rat LD50:11,260 mg/kg AIHAAP 30,470,69

CONSENSUS REPORTS: Reported in F

TOXICITY DATA WITH REFERENCE
ivn-rat LD50:15 mg/kg ARZNAD 11,848,61
ipr-mus LD50:10 mg/kg AIPTAK 155,165,65
scu-mus LD50:15 mg/kg FATOAO 44,342,81
ivn-mus LD50:1 mg/kg CSLNX* NX#00462
ivn-mky LDLo:90 µg/kg ARZNAD 13,412,63
ipr-cat LD50:200 µg/kg AIPTAK 155,165,65
ivn-cat LD50:76 mg/kg ARZNAD 13,220,63
idu-cat LDLo:1290 µg/kg ARZNAD 20,229,70
ivn-pig LDLo:50 µg/kg ARZNAD 20,229,70
idu-pig LDLo:3170 µg/kg ARZNAD 20,229,70

SAFETY PROFILE: Poison by subcutaneous, intravenous, intraduodenal, intraperitoneal, and possibly other routes. When heated to decomposition it emits acrid smoke and fumes.

CNH785 CAS:3253-62-1 HR: 3
CONVALLATOXOL
mf: $C_{29}H_{44}O_{10}$ mw: 552.73

PROP: Needles or prisms from MeOH/Et_2O. Mp: 170–172°.

SYNS: CONVALLOTOXOL ☐ CONVALOTOXOL ☐ COVALLATOXOL ☐ α-I-STROPHANTHIDOL-3,6-DEOXY-MANNOPYRANOSIDE

TOXICITY DATA WITH REFERENCE
ivn-cat LD50:87 µg/kg JPETAB 111,365,54
ivn-rat LD50:56 mg/kg AIPTAK 155,165,65
ipr-mus LD50:30 mg/kg AIPTAK 155,165,65
ipr-cat LD50:130 µg/kg AIPTAK 155,165,65

SAFETY PROFILE: Poison by intravenous and intraperitoneal routes. When heated to decomposition it emits acrid smoke and fumes.

CNH789 HR: 3
COONTIE

PROP: The coontie looks like a low palm with a short trunk and a few 2-foot long pinnate leaves. It produces seed cones. It grows on the southeastern coast of Georgia, Florida, the Bahamas, the northwestern coast of Jamaica, the Dominican Republic, and Puerto Rico.

SYNS: BAY BUSH (BAHAMAS) ☐ COMPTIE ☐ FLORIDA ARROWROOT ☐ GUAYIGA (DOMINICAN REPUBLIC) ☐ MARUNGUEY (PUERTO RICO) ☐ PALMITA de JARDIN (PUERTO RICO) ☐ SAGO CYCAS ☐ SEMINOLE BREAD ☐ YUGILLA (CUBA) ☐ ZAMIA PUMILA

SAFETY PROFILE: The roots and trunk contain the poison cycasin. Ingestion of these plant parts may cause persistent vomiting, diarrhea, colic, depression, and muscular paralysis. Washing the grated root with water renders it edible. See also CYCASIN.

CNH792 CAS:8001-61-4 HR: 2
COPAIBA OIL

PROP: From steam distillation of South American *Copaifera* L. (Fam. Leguminosae) balsam. Colorless to yellow liquid; characteristic odor, aromatic, slightly bitter taste. D: 0.880–0.907; ref. index: 1.493–1.500 @ 20°. Sol in alc, fixed oils, mineral oil.

SYNS: BALSAM CAPTIVI ☐ BALSAMS, COPAIBA ☐ COPAIBA BALSAM ☐ COPAIBA OLEORESIN ☐ JESUIT'S BALSAM

TOXICITY DATA WITH REFERENCE
orl-rat LD50:5 g/kg FCTXAV 14,687,76

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

SAFETY PROFILE: Mildly toxic by ingestion. Large doses cause vomiting and diarrhea. Can also cause dermatitis and kidney damage. When heated to decomposition it emits acrid smoke and irritating fumes.

CNH800 CAS:11078-23-2 HR: 2
COPIAMYCIN
mf: $C_{55}H_{97}NO_{22}$ mw: 1124.53

PROP: Crystals from MeOH. Mp: 144° (decomp).

SYN: NSC-110326

TOXICITY DATA WITH REFERENCE
orl-mus LD50:1030 mg/kg 85GDA2 7,53,81
ipr-mus LD50:1200 mg/kg 85GDA2 7,53,81
scu-mus LD50:1050 mg/kg 85GDA2 7,53,81

SAFETY PROFILE: Moderately toxic by ingestion, subcutaneous, and intraperitoneal routes. When heated to decomposition it emits toxic fumes of NO_x.

CNI000 CAS:7440-50-8 HR: 2
COPPER
mf: Cu mw: 63.54

PROP: Reddish, malleable and ductile metal. Slowly weathers to green patina. Mp: 1083°, bp: 25° @ 2595 mm, d: 8.92, vap press: 1 mm @ 1628°.

SYNS: ALLBRI NATURAL COPPER ☐ ANAC 110 ☐ ARWOOD COPPER ☐ BRONZE POWDER ☐ CDA 101 ☐ CDA 102 ☐ CDA 110 ☐ CDA 122 ☐ C.I. 77400 ☐ C.I. PIGMENT METAL 2 ☐ COPPER-AIRBORNE ☐ COPPER BRONZE ☐ COPPER-MILLED ☐ COPPER SLAG-AIRBORNE ☐ COPPER SLAG-MILLED ☐ 1721 GOLD ☐ GOLD BRONZE ☐ KAFAR COPPER ☐ M1 (COPPER) ☐ M2 (COPPER) ☐ OFHC Cu ☐ RANEY COPPER

TOXICITY DATA WITH REFERENCE
orl-rat TDLo:152 mg/kg (22W pre):TER GISAAA 45(3),8,80
iut-rat TDLo:250 µg/kg (female 1D pre):REP IJEBA6 19,1124,81
orl-rat TDLo:1210 µg/kg (female 35W pre):REP GISAAA 42(8),30,77
orl-rat TDLo:1520 µg/kg (female 22W pre):TER GISAAA 45(3),8,80
ipl-rat TDLo:100 mg/kg:ETA AIHAAP 41,836,80
orl-hmn TDLo:120 µg/kg:GIT PHRPA6 73,910,58

CONSENSUS REPORTS: Reported in EPA TSCA Inventory. Copper and its compounds are on the Community Right-To-Know List.

OSHA PEL: TWA (dust, mist) 1 mg(Cu)/m³; (fume) 0.1 mg/m³
ACGIH TLV: TWA (dust, mist) 1 mg(Cu)/m³; (fume) 0.2 mg/m³
DFG MAK: (dust) 1 mg/m³; (fume) 0.1 mg/m³

SAFETY PROFILE: Questionable carcinogen with experimental tumorigenic data. Experimental teratogenic and reproductive effects. Human systemic effects by ingestion: nausea and vomiting. See also COPPER COMPOUNDS. Liquid copper explodes on contact with water. Potentially explosive reaction with actylenic compounds, 3-bromopropyne, ethylene oxide, lead azide, and ammonium nitrate. Ignites on contact with chlorine, chlorine trifluoride, fluorine (above 121°), and hydrazinium nitrate (above 70°). Reacts violently with C_2H_2, bromates, chlorates, iodates, ($Cl_2 + OF_2$), dimethyl sulfoxide + trichloroacetic acid, ethylene oxide, H_2O_2, hydrazine mononitrate, hydrazoic acid, H_2S + air; $Pb(N_3)_2$, K_2O_2, NaN_3, Na_2O_2 sulfuric acid. Incandescent reaction with potassium dioxide. Incompatible with 1-bromo-2-propyne.

For occupational chemical analysis use OSHA: #ID-125G or NIOSH: Copper, 7029; Welding and Brazing Fume, 7200; Elements, 7300.

CNI250 CAS:142-71-2 HR: 3
COPPER ACETATE
mf: $C_4H_6O_4$·Cu mw: 181.64

PROP: Greenish-blue powder or small crystals.

SYNS: ACETATE de CUIVRE (FRENCH) ☐ ACETIC ACID, CUPRIC SALT ☐ COPPER(2+) ACETATE ☐ COPPER(II) ACETATE ☐ COPPER DIACETATE ☐ COPPER(2+) DIACETATE ☐ CRYSTALLIZED VERDIGRIS ☐ CRYSTALS of VENUS ☐ CUPRIC ACETATE ☐ CUPRIC DIACETATE ☐ NEUTRAL VERDIGRIS ☐ OCTAN MEDNATY (CZECH)

TOXICITY DATA WITH REFERENCE
scu-rat TDLo:40 mg/kg (7-10D preg):REP CRSBAW 166,1237,72
orl-rat LD50:595 mg/kg MarJV# 29MAR77
scu-rat LD50:350 mg/kg PMDCAY 15,211,77
ipr-mus LD50:2500 µg/kg BCPCA6 30,771,81

CONSENSUS REPORTS: Reported in EPA TSCA Inventory. Copper and its compounds are on the Community Right-To-Know List.

ACGIH TLV: TWA 1 mg(Cu)/m³

SAFETY PROFILE: Poison by subcutaneous and intraperitoneal routes. Moderately toxic by ingestion. Experimental reproductive effects. When heated to decomposition it emits acrid smoke and irritating fumes. See also COPPER COMPOUNDS.

CNI325 CAS:6046-93-1 HR: 3
COPPER(II) ACETATE MONOHYDRATE
mf: $C_4H_6O_4$·Cu·H_2O mw: 199.66

PROP: Green crystals. Mp: 115°. Sol in H_2O and EtOH; sltly sol in Et_2O.

SYNS: COPPER(2+) ACETATE, MONOHYDRATE ☐ COPPER DIACETATE MONOHYDRATE ☐ CUPRIC ACETATE MONOHYDRATE

TOXICITY DATA WITH REFERENCE
orl-rat LD50:710 mg/kg AIHAAP 30,470,69
orl-mus LDLo:1600 mg/kg AECTCV 14,111,85
ipr-mam LD50:5 mg/kg JANSAG 55,337,82

CONSENSUS REPORTS: Copper and its compounds are on the Community Right-To-Know List.

SAFETY PROFILE: Poison by intraperitoneal route. Moderately toxic by ingestion. See also COPPER COMPOUNDS

CNI500 CAS:12540-13-5 HR: 3
COPPER ACETYLIDE
mf: C_2Cu mw: 87.56

PROP: A black or brown solid.

SYN: COPPER CARBIDE

CONSENSUS REPORTS: Copper and its compounds are on the Community Right-To-Know List.

ACGIH TLV: TWA 1 mg(Cu)/m³
DOT CLASSIFICATION: Forbidden

SAFETY PROFILE: Ignites and then explodes when heated to 100°C. Much more sensitive to impact, friction, and heat than copper(I) acetylide (the red-brown form). See also COPPER COMPOUNDS and ACETYLIDES.

CNI600 CAS:11133-98-5 HR: 3
COPPER ALLOY, Cu, Be

SYN: COPPER-BERYLLIUM ALLOY

TOXICITY DATA WITH REFERENCE
ihl-hmn TCLo:300 ng(Be)/m³:PUL AEHLAU 9,473,64

CONSENSUS REPORTS: IARC Cancer Review: Group 1 IMEMDT 58,41,93; Human Sufficient Evidence IMEMDT 58,41,93; Animal Sufficient Evidence IMEMDT 1,17,72; Animal Sufficient Evidence IMEMDT 23,143,80; Animal Sufficient Evidence IMEMDT 58,41, 93. Copper and its compounds, as well as beryllium and its compounds, are on the Community Right-To-Know List.

OSHA PEL: TWA 0.002 mg(Be)/m³; STEL 0.005 mg(Be)/m³/30M; CL 0.025 mg(Be)/m³
ACGIH TLV: TWA 0.002 mg(Be)/m³, Suspected Human Carcinogen.
NIOSH REL: (Beryllium) CL not to exceed 0.0005 mg (Be)/m³

SAFETY PROFILE: Confirmed carcinogen. Cases of berylliosis have been reported from exposure to so-called low beryllium alloys. Human systemic effects by inhalation: dyspnea, fibrosing alveolitis, weight loss or decreased weight gain. See also BERYLLIUM COMPOUNDS and COPPER COMPOUNDS. When heated to decomposition it emits very toxic fumes of BeO.

CNI900 HR: 3
COPPER ARSENATE HYDROXIDE
mf: $AsCu_2HO_5$ mw: 283.01

PROP: A green solid.

SYNS: COPPER ARSENATE (BASIC) ☐ CUPROUS ARSENATE, BASIC

CONSENSUS REPORTS: Copper and its compounds as well as arsenic and its compounds are on the Community Right-To-Know List.

heated to decomposition, or on contact with acid or acid fumes, they emit toxic fumes of CN^-.

COI000 CAS:4027-17-2 HR: 3
CYANATOTRIBUTYLSTANNANE
mf: $C_{13}H_{27}NOSn$ mw: 332.10

SYN: TRIBUTYLTIN CYANATE

TOXICITY DATA WITH REFERENCE
ivn-mus LD50:6300 µg/kg CSLNX* NX#02224

CONSENSUS REPORTS: Cyanide and its compounds are on the Community Right-To-Know List.

OSHA PEL: TWA 0.1 mg(Sn)/m³ (skin)
ACGIH TLV: TWA 0.1 mg(Sn)/m³ (skin) (Proposed: TWA 0.1 mg(Sn)/m³; STEL 0.2 mg(Sn)/m³ (skin))
NIOSH REL: (Organotin Compounds) TWA 0.1 mg(Sn)/m³

SAFETY PROFILE: Poison by intravenous route. Tributyl tin compounds are very toxic to marine life. See also CYANATES and TIN COMPOUNDS. When heated to decomposition it emits toxic fumes of NO_x and CN^-.

For occupational chemical analysis use NIOSH: Organotin Compounds 5504.

COI125 HR: 3
CYANEA CAPILLATA TOXIN

SYN: TOXIN, JELLYFISH, SCYPHOZOAN, CYANEA CAPILLATA

TOXICITY DATA WITH REFERENCE
ivn-rat LD50:800 µg/kg TOXIA6 15,3,77
ipr-mus LD50:300 µg/kg TOXIA6 15,3,77
ivn-mus LD50:300 µg/kg TOXIA6 15,3,77
ivn-rbt LD50:300 µg/kg TOXIA6 15,3,77
ivn-ckn LD50:2 mg/kg TOXIA6 15,3,77

SAFETY PROFILE: A deadly poison by intravenous and intraperitoneal routes.

COI250 CAS:917-61-3 HR: 3
CYANIC ACID, SODIUM SALT
DOT: UN 2207/UN 2478/UN 3080
mf: CNO•Na mw: 65.01

SYNS: CYANSAN ☐ SAN-CYAN ☐ SODIUM ISOCYANATE ☐ WEECON ☐ ZASSOL

TOXICITY DATA WITH REFERENCE
orl-hmn TDLo:5400 mg/kg/24W:EYE,MET AROPAW 94,927,76
orl-rat LD50:1500 mg/kg JPETAB 185,653,73
ims-rat LD50:310 mg/kg BJPCAL 1,186,46
orl-mus LDLo:4 mg/kg APFRAD 19,740,61
ipr-mus LD50:260 mg/kg JPETAB 185,653,73

CONSENSUS REPORTS: Cyanide and its compounds are on the Community Right-To-Know List. Reported in EPA TSCA Inventory.

DOT CLASSIFICATION: 6.1; *Label:* KEEP AWAY FROM FOOD (UN 2207); DOT Class: 6.1; *Label:* Poison (UN 2206); DOT Class: 6.1; *Label:* Poison, Flammable Liquid (UN 3080); DOT Class: 3; *Label:* Flammable Liquid, Poison (UN 2478)

SAFETY PROFILE: Poison by ingestion, intraperitoneal, and intramuscular routes. Human systemic effects by ingestion: weight loss, changes in the visual field, and other eye effects. See also CYANATES. When heated to decomposition it emits very toxic fumes of CN^- and Na_2O.

COI500 CAS:57-12-5 HR: 3
CYANIDE
DOT: UN 1935
mf: CN^- mw: 26.02

SYNS: CARBON NITRIDE ION (CN⁻) ☐ CYANIDE(CN⁻) ☐ CYANIDE, dry (UN 1588) ☐ CYANIDE ANION ☐ CYANIDE (CN⁻) ☐ CYANIDE ION ☐ CYANIDE(CN⁻) ION ☐ CYANIDE SOLUTIONS (DOT) ☐ CYANURE ☐ HYDROCYANIC ACID, ION(CN⁻) ☐ ISOCYANIDE ☐ RCRA WASTE NUMBER P030

TOXICITY DATA WITH REFERENCE
ipr-mus LD50:3 mg/kg NATUAS 228,1315,70

CONSENSUS REPORTS: Cyanide and its compounds are on the Community Right-To-Know List.

OSHA PEL: TWA 5 mg(CN)/m³
ACGIH TLV: CL 5 mg/m³ (skin)
DFG MAK: 5 mg/m³
NIOSH REL: (Cyanide) TWA CL 5 mg/m³/10M
DOT CLASSIFICATION: 6.1; *Label:* Poison, KEEP AWAY FROM FOOD

SAFETY PROFILE: Very poisonous by most routes. Cyanide directly stimulates the chemoreceptors of the carotid and aortic bodies with a resultant hyperpnea (*increase in the depth and rate of respiration*). Cardiac irregularities are often noted, but the heart invariably outlasts the respirations. Death is due to respiratory arrest of central origin. It can occur within seconds or minutes of the inhalation of high concentrations of HCN gas. Because of slower absorption, death may be more delayed after the ingestion of cyanide salts, but the critical events still occur within the first hour. Two other sources of cyanide have been responsible for human poisoning: the naturally occurring amygdalin and the drug nitroprusside.

Amygdalin is a cyanogenic glycoside found in apricot, peach, and similar fruit pits and in sweet almonds (Sayre and Kaymakcalan, 1941). It is a chemical combination of glucose, benzaldehyde, and cyanide from which the latter can be released by the action of β-glucosidase or emulsion. Although these enzymes are not found in mammalian tissues, the human intestinal microflora appears to possess these or similar enzymes capable of effecting cyanide release resulting in human poisoning. For this reason, amygdalin may be as much as 40 times more toxic by the oral route as compared with intravenous injection. Amygdalin is the major ingredient of Laetrile, and this alleged anticancer drug has also been responsible for human cyanide poisoning.

An ethical drug that may also cause cyanide poisoning in overdose is the potent vascular smooth-muscle relaxant sodium nitroprusside. Although nitroprusside is related chemically to ferricyanide, unlike the latter it

penetrates into erythrocytes and reacts with hemoglobin to release its cyanide (Smith and Kruszyna, 1974). Fortunately, the therapeutic margin for nitroprusside appears to be quite large.

Cyanide is commonly found in certain rat and pest poisons, silver and metal polishes, photographic solutions, and fumigating products. Compounds such as potassium cyanide can also be readily purchased from chemical stores. Cyanide is readily absorbed from all routes, including the skin, mucous membranes, and by inhalation, although alkali salts of cyanide are toxic only when ingested. Death may occur with ingestion of even small amounts of sodium or potassium cyanide and can occur within minutes or hours depending on route of exposure. Inhalation of toxic fumes represents a potentially rapidly fatal type of exposure. A blood cyanide level of greater than 0.2 µg/mL is considered toxic. Lethal cases have usually had levels above 1 µg/mL.

Clinically, cyanide poisoning is reported to produce a bitter, almond odor on the breath of the patient; however, only a small proportion of the population is genetically able to discern this characteristic odor. Typically, cyanide has a bitter, burning taste, and, following poisoning, symptoms of salivation, nausea without vomiting, anxiety, confusion, vertigo, giddiness, lower-jaw stiffness, convulsions, opisthotonos, paralysis, coma, cardiac arrhythmias, and transient respiratory stimulation followed by respiratory failure may occur. Bradycardia is a common finding, but in most cases heartbeat usually outlasts respiration (Wexler et al., 1947). A prolonged expiratory phase is considered to be characteristic of cyanide poisoning. (Casarett and Doull's, *Toxicology, The Basic Science of Poisons 2nd ed.* Doull, Klaassen and Amdur (eds), Macmillan Pub. Co. Inc. New York, NY).

The volatile cyanides resemble HCN physiologically, inhibiting tissue oxidation and causing death through asphyxia. Cyanogen is probably as toxic as HCN; the nitriles are generally considered somewhat less toxic, probably because of their lower volatility. The nonvolatile cyanide salts appear to be relatively nontoxic systemically, so long as they are not ingested and care is taken to prevent the formation of HCN. Workers, such as electroplaters and picklers, who are daily exposed to cyanide solutions may develop a "cyanide" rash, characterized by itching, and by macular, papular, and vesicular eruptions. Frequently there is secondary infection. Exposure to small amounts of cyanide compounds over long periods of time is reported to cause loss of appetite, headache, weakness, nausea, dizziness, and symptoms of irritation of the upper respiratory tract and eyes. See also specific cyanide compounds.

Flammable by chemical reaction with heat, moisture, acid. Many cyanides rather easily evolve HCN, a flammable gas that is highly toxic. Carbon dioxide from the air is sufficiently acidic to liberate HCN from cyanide solutions. Reaction with hypochlorite solutions may be violent at pH 10.0–10.3. Cyanides explode if melted with nitrites or chlorates at about 450°. Violent reaction with F_2, Mg, nitrates, HNO_3, nitrites. Metal cyanides are easily oxidized and may be thermally unstable. N-cyano derivatives may be reactive or unstable. Many organic nitriles can be very reactive under the right conditions. When heated to decomposition or on contact with acid, acid fumes, water, or steam, cyanides emit toxic and flammable vapors of CN^-. See also HYDROCYANIC ACID.

For occupational chemical analysis use OSHA: #ID-120 or NIOSH: Cyanides (Aerosol and Gas) 7904.

COI750 CAS:528-58-5 HR: 1
CYANIDOL
mf: $C_{15}H_{11}O_6$ mw: 287.26

SYNS: 1-BENZOPYRYLIUM, 2-(3,4-DIHYDROXYPHENYL)-3,5,7-TRIHYDROXY-, CHLORIDE ☐ CYANIDIN ☐ CYANIDIN CHLORIDE ☐ CYANIDOL CHLORIDE ☐ 2-(3,4-DIHYDROXYPHENYL)-3,5,7-TRIHYDROXY-1-BENZOPYRYLIUM CHLORIDE ☐ GASTROTELOS ☐ IdB-1027 ☐ 3,3'4',5,7-PENTAHYDROXYFLAVYLIUM CHLORIDE

TOXICITY DATA WITH REFERENCE
mnt-hmn:lyms 200 mg/L MUREAV 246,205,91
sce-hmn:lyms 100 mg/L MUREAV 246,205,91
orl-dog LD:>3 g/kg DRFUD4 14,224,89
orl-uns LD:>6 g/kg DRFUD4 14,224,89

SAFETY PROFILE: Low toxicity by ingestion. Mutation data reported. When heated to decomposition it emits acrid smoke and irritating fumes.

COJ250 CAS:107-91-5 HR: 3
2-CYANOACETAMIDE
mf: $C_3H_4N_2O$ mw: 84.09

PROP: White powder. Mp: 119°, bp: decomp.

SYNS: CYANACETAMIDE ☐ CYANOACETAMIDE ☐ CYANOIMINOACETIC ACID ☐ MALONAMIDE NITRILE ☐ MALONAMONITRILE ☐ NITRILOMALONAMIDE ☐ USAF KF-14

TOXICITY DATA WITH REFERENCE
orl-mus LD50:1680 mg/kg KHZDAN 9,50,66
ipr-mus LD50:200 mg/kg NTIS** AD691-689
scu-gpg LD50:1155 mg/kg MELAAD 47,192,56

CONSENSUS REPORTS: Cyanide and its compounds are on the Community Right-To-Know List. Reported in EPA TSCA Inventory.

SAFETY PROFILE: Poison by intraperitoneal route. Moderately toxic by ingestion and subcutaneous routes. See also NITRILES. When heated to decomposition it emits toxic fumes of NO_x and CN^-.

COJ500 CAS:372-09-8 HR: 3
CYANOACETIC ACID
mf: $C_3H_3NO_2$ mw: 85.07

PROP: A solid. Mp: 66°, bp: 108° @ 15 mm.

SYNS: ACIDE CYANACETIQUE (FRENCH) ☐ CAA ☐ CYANESSIGSAEURE (GERMAN) ☐ MALONIC MONONITRILE ☐ MONOCYANOACETIC ACID ☐ USAF KF-17

TOXICITY DATA WITH REFERENCE
orl-rat LD50:1500 mg/kg LONZA# 12JAN81
ipr-mus LD50:200 mg/kg NTIS** AD691-490
scu-rbt LDLo:1900 mg/kg AIPTAK 5,161,1899
scu-frg LDLo:1300 mg/kg AIPTAK 5,161,1899

CONSENSUS REPORTS: Reported in EPA TSCA

skn-rbt 14,178 µg/24H open MLD AIHAAP 23,95,62
eye-rbt 500 mg/24H MLD 85JCAE-,272,86
orl-rat LD50:4890 mg/kg AMIHBC 10,61,54
ihl-rat LCLo:2000 ppm/4H AMIHBC 10,61,54

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

DOT CLASSIFICATION: 3; *Label:* Flammable Liquid

SAFETY PROFILE: Mildly toxic by ingestion and inhalation. An irritant to skin and eyes. Flammable liquid. A dangerous fire hazard when exposed to heat or flame; can react vigorously with oxidizing materials. When heated to decomposition it emits acrid smoke and fumes. See also ALDEHYDES.

HEM500 CAS:628-02-4 HR: 2
HEXANAMIDE
mf: $C_6H_{13}NO$ mw: 115.20

PROP: A solid. Mp: 100°. Mod sol in hot water.

SYNS: CAPROAMIDE ☐ CAPRONAMIDE ☐ NCI-C02142

TOXICITY DATA WITH REFERENCE
orl-mus TDLo:438 g/kg/1Y-C:CAR JEPTDQ 3(5-6),149,80

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

SAFETY PROFILE: Questionable carcinogen with experimental carcinogenic data. When heated to decomposition it emits toxic fumes such as NO_x.

HEN000 CAS:110-54-3 HR: 3
n-HEXANE
DOT: UN 1208
mf: C_6H_{14} mw: 86.20

PROP: Colorless clear liquid; faint odor. Fp: −93.6°, bp: 69°, ULC: 90–95, lel: 1.2%, uel: 7.5%, flash p: −9.4°F, d: 0.655 @ 25°/4°, autoign temp: 437°F, vap press: 100 mm @ 15.8°, vap d: 2.97. Insol in water; misc in chloroform, ether, alc. Very volatile liquid.

SYNS: ESANI (ITALIAN) ☐ GETTYSOLVE-B ☐ HEKSAN (POLISH) ☐ HEXANE (DOT) ☐ HEXANEN (DUTCH) ☐ HEXANES (FCC) ☐ NCI-C60571

TOXICITY DATA WITH REFERENCE
eye-rbt 10 mg MLD TXAPA9 55,501,80
cyt-ham:fbr 500 mg/L FCTOD7 22,623,84
ihl-rat TCLo:10,000 ppm/7H (female 15D pre):REP TOXID9 1,152,81
ihl-rat TCLo:5000 ppm/20H (female 6-19D post):TER NTIS** DE88-006812
ihl-hmn TCLo:190 ppm/8W:PNS AJIMD8 10,111,86
orl-rat LD50:28,710 mg/kg TXAPA9 19,699,71
ipr-rat LDLo:9100 mg/kg TXAPA9 1,156,59
ihl-mus LCLo:120 g/m³ AEPPAE 143,223,29

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

OSHA PEL: TWA 50 ppm
ACGIH TLV: TWA 50 ppm; BEI: 5 mg(2,5-hexanedione)/L in urine at end of shift; 40 ppm n-hexane in end-exhaled air during shift
DFG MAK: 50 ppm (180 mg/m³)
NIOSH REL: TWA (Alkanes) 350 mg/m³
DOT CLASSIFICATION: 3; *Label:* Flammable Liquid

SAFETY PROFILE: Slightly toxic by ingestion and inhalation. Human systemic effects: hallucinations, structural change in nerve or sheath. Experimental teratogenic and reproductive effects. Mutation data reported. An eye irritant. Can cause a motor neuropathy in exposed workers. May be irritating to respiratory tract and narcotic in high concentrations. Inhalation of 5000 ppm for 1/6 hour produces marked vertigo; 2500–1000 ppm for 12 hours produces drowsiness, fatigue, loss of appetite, paresthesia in distal extremities; 2500–500 ppm produces muscle weakness, cold pulsation in extremities, blurred vision, headache, anorexia, and onset of polyneuropathy. 2000 ppm for 1/6 hour produces no symptoms. 1000–500 ppm for 3–6 months produces fatigue, loss of appetite, distal paresthesia. Dangerous if abused.

Flammable liquid. A very dangerous fire and explosion hazard when exposed to heat or flame; can react vigorously with oxidizing materials. Mixtures with dinitrogen tetraoxide may explode at 28°. To fight fire, use CO_2, dry chemical. When heated to decomposition it emits acrid smoke and fumes.

For occupational chemical analysis use NIOSH: Hydrocarbons, Bp: 36–126°C, 1500.

HEO000 CAS:124-09-4 HR: 3
1,6-HEXANEDIAMINE
DOT: UN 1783/UN 2280
mf: $C_6H_{16}N_2$ mw: 116.24

PROP: Colorless leaflets, long needles by sublimation; odor of piperidine. Mp: 39–42°, bp: 205°. Absorbs water and CO_2 from air; very sol in water; sltly sol in alc, benzene.

SYNS: 1,6-DIAMINOHEXANE ☐ HEXAMETHYLENEDIAMINE ☐ 1,6-HEXAMETHYLENEDIAMINE ☐ HEXAMETHYLENEDIAMINE, solid (UN 2280) (DOT) ☐ HEXAMETHYLENEDIAMINE, solution (UN 1783) (DOT) ☐ HMDA ☐ NCI-C61405

TOXICITY DATA WITH REFERENCE
orl-rat TDLo:3 g/kg (female 6–15D post):TER JJATDK 7,259,87
orl-rat LD50:750 mg/kg TXAPA9 42,417,77
ihl-mus LCLo:750 mg/m³/10M NDRC** NDCcc-132,Sept,42
ipr-mus LD50:320 mg/kg GISAAA 43(11),110,78
scu-mus LD50:1300 mg/kg 85GMAT -,74,82
ivn-mus LD50:180 mg/kg CSLNX* NX#02313
skn-rbt LD50:1110 mg/kg TXAPA9 42,417,77

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

ACGIH TLV: TWA 0.5 ppm
DOT CLASSIFICATION: 8; *Label:* Corrosive

SAFETY PROFILE: Poison by intravenous and intraperitoneal routes. Moderately toxic by ingestion, inhalation, and skin contact. An experimental teratogen. A corrosive irritant to skin, eyes, and mucous membranes. Combustible when exposed to heat or flame; can react with oxidizing materials. See also AMINES.

HHK100 **HR: 2**
HYDROCHLORBENZETHYLAMINE DIMALEATE
mf: $C_{24}H_{31}ClN_2O_5 \cdot 2C_4H_4O_4$ mw: 651.17

SYNS: 2-(2-(2-(4-(p-CHLORO-α-PHENYLBENZYL)-1-PIPERAZINYL) ETHOXY)ETHOXY)ETHANOL DIMALEATE ☐ ETHANOL, 2-(2-(2-(4-(p-CHLORO-α-PHENYLBENZYL)-1-PIPERAZINYL)ETHOXY)ETHOXY)-, DIMALEATE ☐ ETODROXIZINE DIMALEATE ☐ ETODROXYZINE DIMALEATE

TOXICITY DATA WITH REFERENCE
orl-rat TDLo:1 g/kg (female 8-15D post):REP PSDTAP 9,134,68
orl-rat LD50:920 mg/kg PSDTAP 9,134,68

SAFETY PROFILE: Moderately toxic by ingestion. An experimental teratogen. Experimental reproductive effects. When heated to decomposition it emits toxic fumes of NO_x and Cl^-.

HHL000 **CAS:7647-01-0** **HR: 3**
HYDROCHLORIC ACID
DOT: UN 1050/UN 1789/UN 2186
mf: ClH mw: 36.46

PROP: Colorless, corrosive, gas or fuming liquid; strongly corrosive with pungent odor. Dissolves in H_2O to give a strong, highly-corrosive acid. Mp: −114.3°, bp: −84.8°, d: 1.639 g/L (gas) @ 0°, 1.194 @ −26° (liquid), vap press: 4.0 atm @ 17.8°. Misc with water, alc. Very sol in H_2O; sol in MeOH, EtOH, and Et_2O.

SYNS: ACIDE CHLORHYDRIQUE (FRENCH) ☐ ACIDO CLORIDRICO (ITALIAN) ☐ ANHYDROUS HYDROCHLORIC ACID ☐ CHLOORWATERSTOF (DUTCH) ☐ CHLOROHYDRIC ACID ☐ CHLOROWODOR (POLISH) ☐ CHLORWASSERSTOFF (GERMAN) ☐ HYDROCHLORIC ACID, solution (UN 1789) (DOT) ☐ HYDROCHLORIDE ☐ HYDROGEN CHLORIDE, anhydrous (UN 1050) (DOT) ☐ HYDROGEN CHLORIDE, refrigerated liquid (UN 2186) (DOT) ☐ MURIATIC ACID ☐ SPIRITS of SALT

TOXICITY DATA WITH REFERENCE
eye-rbt 100 mg rns MLD TXCYAC 23,281,82
dnr-esc 25 μg/well ENMUDM 3,429,81
cyt-grh-par 20 mg NULSAK 9,119,66
ihl-rat TCLo:450 mg/m³/1H (1D pre):TER AKGIAO 53(6),69,77
ihl-hmn LCLo:1300 ppm/30M 29ZWAE -,207,68
ihl-hmn LCLo:3000 ppm/5M TABIA2 3,231,33
unr-man LDLo:81 mg/kg 85DCAI 2,73,70
ihl-rat LC50:3124 ppm/1H AMRL** TR-74-78,74
ihl-mus LC50:1108 ppm/1H JCTODH 3,61,76
ipr-mus LD50:1449 mg/kg COREAF 256,1043,63
orl-rbt LD50:900 mg/kg BIZEA2 134,437,23
ihl-rbt LCLo:4416 ppm/30M JIHTAB 24,222,42

CONSENSUS REPORTS: EPA Extremely Hazardous Substances List. Community Right-To-Know List. Reported in EPA TSCA Inventory. EPA Genetic Toxicology Program.

OSHA PEL: CL 5 ppm
ACGIH TLV: CL 5 ppm
DFG MAK: 5 ppm (7 mg/m³)
DOT CLASSIFICATION: 8; *Label:* Corrosive (UN 1789); DOT Class: 2.3; *Label:* Poison Gas, Corrosive (UN 1050, UN 2186)

SAFETY PROFILE: A human poison by an unspecified route. Mildly toxic to humans by inhalation. Moderately toxic experimentally by ingestion. A corrosive irritant to the skin, eyes, and mucous membranes. Mutation data reported. An experimental teratogen. A concentration of 35 ppm causes irritation of the throat after short exposure. In general, hydrochloric acid causes little trouble in industry other than from accidental splashes and burns. It is a common air contaminant and is heavily used in industry.

Nonflammable gas. Explosive reaction with alcohols + hydrogen cyanide; potassium permanganate; sodium; tetraselenium tetranitride. Ignition on contact with fluorine; hexalithium disilicide; metal acetylides or carbides (e.g., cesium acetylide; rubidium acetylide). Violent reactions with acetic anhydride; 2-amino ethanol; NH_4OH; Ca_3P_2; chlorosulfonic acid; 1,1-difluoroethylene; ethylene diamine; ethylene imine; oleum; $HClO_4$; β-propiolactone; propylene oxide; ($AgClO_4$ + CCl_4); NaOH; H_2SO_4; U_3P_4; vinyl acetate; CaC_2; CsC_2H; Cs_2C_2; Mg_3B_2; $HgSO_4$; RbC_2H; Rb_2C_2; Na. Vigorous reaction with aluminum; chlorine + dinitroanilines (evolves gas). Potentially dangerous reaction with sulfuric acid releases HCl gas. When heated to decomposition it emits toxic fumes of Cl^-. See also HYDROGEN CHLORIDE.

For occupational chemical analysis use NIOSH: Acids, Inorganic, 7903.

HHM000 **CAS:8007-56-5** **HR: 3**
HYDROCHLORIC ACID, mixed with NITRIC ACID (3:1)
DOT: UN 1798
mf: $ClH \cdot HNO_3$

PROP: Yellow, fuming, corrosive, volatile liquid; suffocating odor. Misc with water.

SYNS: AQUA REGIA ☐ NITROHYDROCHLORIC ACID (DOT) ☐ NITROHYDROCHLORIC ACID, diluted (DOT) ☐ NITROMURIATIC ACID (DOT)

DOT CLASSIFICATION: 8; *Label:* Corrosive

SAFETY PROFILE: A corrosive irritant to the eyes, skin, and mucous membranes. When heated to decomposition it emits very toxic HCl, HNO_3, Cl^-, and NO_x. See also HYDROCHLORIC ACID, NITRIC ACID, and NITROSYL CHLORIDE.

HHM500 **CAS:455-80-1** **HR: 3**
HYDROCHLORIDE of DI-n-BUTYLAMINOPROPYL-3-IODO-4-FLUOROBENZOATE
mf: $C_{18}H_{25}FINO_2 \cdot ClH$ mw: 471.82

SYN: 4-FLUORO-3-IODOBENZOIC ACID-3-(DIBUTYLAMINO)PROPYL ESTER, HYDROCHLORIDE

TOXICITY DATA WITH REFERENCE
scu-mus LD50:3000 mg/kg JAPMA8 39,4,50
ivn-mus LDLo:55 mg/kg JAPMA8 39,4,50

SAFETY PROFILE: Poison by intravenous route. Moderately toxic by subcutaneous route. When heated to decomposition it emits very toxic fumes of F^-, NO_x, I^-, and HCl.

H

For occupational chemical analysis use NIOSH: Isopropyl Acetate S50.

ING400 CAS:4212-94-6 HR: 2
ISOPROPYL-N-ACETOXY-N-PHENYLCARBAMATE
mf: $C_{12}H_{14}NO_4$ mw: 237.28

SYNS: o-ACETYL-N-CARBOXY-N-PHENYL-HYDROXYLAMINE ISOPROPYL ESTER ☐ (ACETYLOXY)PHENYL-CARBAMIC ACID ☐ ACYLATE ☐ ACYLATE-1 ☐ N-CARBOISOPROPOXY-o-ACETYL-N-PHENYL CARBAMATE

TOXICITY DATA WITH REFERENCE
orl-rat LD50:3400 mg/kg 85GMAT -,32,82
ihl-rat LC50:1170 mg/m³/6H 85GMAT -,32,82
orl-mus LD50:2075 mg/kg 85GMAT -,32,82

SAFETY PROFILE: Moderately toxic by inhalation and ingestion routes. When heated to decomposition it emits toxic fumes of NO_x. See also CARBAMATES and ESTERS.

ING509 HR: 3
2-ISOPROPYL ACRYLALDEHYDE OXIME
mf: $C_6H_{11}NO$ mw: 113.16

$H_2C{=}C[CH(CH_3)_2]CH{=}NOH$

SAFETY PROFILE: Reacts in air to form heat-sensitive explosive peroxides. When heated to decomposition it emits toxic fumes of NO_x. See also ALDEHYDES.

INH000 CAS:2210-25-5 HR: 3
N-ISOPROPYLACRYLAMIDE
mf: $C_6H_{11}NO$ mw: 113.18

SYNS: ISOPROPYL ACRYLAMIDE ☐ ISOPROPYLAMID KYSELINY AKRYLOVE ☐ N-(1-METHYLETHYL)-2-PROPENAMIDE ☐ NIPAM ☐ 2-PROPENAMIDE, N-(1-METHYLETHYL)-(9CI)

TOXICITY DATA WITH REFERENCE
spm-mus-orl 238 mg/kg/5W-C ARTODN 59,201,86
orl-mus TDLo:238 g/kg (male 5W pre):REP ARTODN 59,201,86
orl-mus LD50:419 mg/kg ARTODN 47,179,81
ipr-mus LDLo:500 mg/kg CBCCT* 6,51,54

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

SAFETY PROFILE: Poison by ingestion. Moderately toxic by intraperitoneal route. Experimental reproductive effects. Mutation data reported. When heated to decomposition it emits toxic fumes of NO_x. See also AMIDES.

INJ000 CAS:67-63-0 HR: 3
ISOPROPYL ALCOHOL
DOT: UN 1219
mf: C_3H_8O mw: 60.11

$(CH_3)_2CHOH$

PROP: Clear, colorless liquid; slt odor, sltly bitter taste. Mp: −88.5 to −89.5°, bp: 82.5°, lel: 2.5%, uel: 12%, flash p: 53°F (CC). d: 0.7854 @ 20°/4°, refr index: 1.377 @ 20°, vap d: 2.07, ULC: 70. Fp: −89.5°; autoign temp: 852°F. Misc with water, alc, ether, chloroform; insol in salt solns. Sol in water.

SYNS: ALCOOL ISOPROPILICO (ITALIAN) ☐ ALCOOL ISOPROPYLIQUE (FRENCH) ☐ DIMETHYLCARBINOL ☐ ISOHOL ☐ ISOPROPANOL (DOT) ☐ ISO-PROPYLALKOHOL (GERMAN) ☐ LUTOSOL ☐ PETROHOL ☐ i-PROPANOL (GERMAN) ☐ PROPAN-2-OL ☐ 2-PROPANOL ☐ sec-PROPYL ALCOHOL (DOT) ☐ i-PROPYLALKOHOL (GERMAN) ☐ SPECTRAR

TOXICITY DATA WITH REFERENCE
skn-rbt 500 mg MLD NTIS** AD-A106-944
eye-rbt 16 mg AJOPAA 29,1363,46
eye-rbt 10 mg MOD TXAPA9 55,501,80
cyt-smc 200 mmol/tube HEREAY 33,457,47
cyt-rat-ihl 1030 µg/m³/16W-I GTPZAB 25(7),33,81
orl-rat TDLo:6480 mg/kg (male 26W pre):REP GISAAA 43(1),8,78
ihl-rat TCLo:10,000 ppm/7H (female 1-19D post):TER FCTOD7 26,247,88
orl-man TDLo:14,432 mg/kg:CNS,CVS,PUL NEJMAG 277,699,67
orl-hmn TDLo:223 mg/kg:CNS,CVS JLCMAK 12,526,27
orl-man LDLo:5272 mg/kg AJCPAI 38,144,62
orl-hmn LDLo:3570 mg/kg:CNS,PUL,GIT 34ZIAG -,359,69
unr-man LDLo:2770 mg/kg 85DCAI 2,73,70
orl-rat LD50:5045 mg/kg GISAAA 43(1),8,78
ihl-rat LCLo:16,000 ppm/4H JIDHAN 31,343,49
ipr-rat LD50:2735 mg/kg EVHPAZ 61,321,85
ivn-rat LD50:1099 mg/kg EVHPAZ 61,321,85
orl-mus LD50:3600 mg/kg GISAAA 43(1),8,78
ihl-mus LCLo:12,800 ppm/3H IAEC** 17JUN74
ipr-mus LD50:4477 mg/kg EVHPAZ 61,321,85
scu-mus LDLo:6000 mg/kg HBTXAC 1,172,56
ivn-mus LD50:1509 mg/kg EVHPAZ 61,321,85
orl-dog LD50:4797 mg/kg JLCMAK 29,561,44
ivn-dog LDLo:5120 mg/kg JLCMAK 29,561,44
ivn-cat LDLo:1963 mg/kg HBTXAC 1,172,55
orl-rbt LD50:6410 mg/kg FAONAU 48A,114,70
skn-rbt LD50:12,800 mg/kg NPIRI* 1,100,74

CONSENSUS REPORTS: IARC Cancer Review: Group 3 IMEMDT 7,229,87. The isopropyl alcohol strong acid manufacturing process is on the Community Right-To-Know List. EPA Genetic Toxicology Program. Reported in EPA TSCA Inventory.

OSHA PEL: TWA 400 ppm; STEL 500 ppm
ACGIH TLV: TWA 400 ppm; STEL 500 ppm
DFG MAK: 400 ppm (980 mg/m³)
NIOSH REL: (Isopropyl Alcohol) TWA 400 ppm; CL 800 ppm/15M
DOT CLASSIFICATION: 3; *Label:* Flammable Liquid

SAFETY PROFILE: Moderately toxic to humans by an unspecified route. Moderately toxic experimentally by intravenous and intraperitoneal routes. Mildly toxic by skin contact. Human systemic effects by ingestion or inhalation: flushing, pulse rate decrease, blood pressure lowering, anesthesia, narcosis, headache, dizziness, mental depression, hallucinations, distorted perceptions, dyspnea, respiratory depression, nausea or vomiting, coma. Experimental teratogenic and reproductive effects. Mutation data reported. An eye and skin irritant. Questionable carcinogen.

The single lethal dose for a human adult is about 250 mL, although as little as 100 mL can be fatal. It can cause corneal burns and eye damage. Acts as a local respiratory irritant and in high concentration as a narcotic. It has good warning properties because it causes a mild irritation of the eyes, nose, and throat at a concentration level of 400 ppm. It may induce a mild narcosis, the effects of which are usually transient, and it is somewhat less toxic than the normal isomer, but twice as volatile.

There is some evidence that humans can acquire a slight tolerance to this material. It is absorbed by the skin, but single or repeated applications on the skin of rats, rabbits, dogs, or human beings induced no untoward effects. It acts very much like ethanol in regard to absorption, metabolism, and elimination but with a stronger narcotic action. Chronic injuries have been detected in animals. Workers producing isopropanol show an excess of sinus and laryngeal cancers. This may be caused, completely or in part, by the by-product, isopropyl oil. Humans have ingested up to 20 mL diluted with water and noticed only a sensation of heat and slight lowering of the blood pressure. There are, however, reports of serious illness from as little as 10 mL taken internally. A common air contaminant.

Flammable liquid. A very dangerous fire hazard when exposed to heat, flame, or oxidizers. Moderately explosive when exposed to heat or flame. Reacts with air to form dangerous peroxides. The presence of 2-butanone increases the reaction rate for peroxide formation. Hydrogen peroxide sharply reduces the autoignition temperature. Violent explosive reaction when heated with aluminum isopropoxide + crotonaldehyde + heat. Forms explosive mixtures with trinitromethane; hydrogen peroxide (similar in power and sensitivity to glyceryl nitrate). Reacts with barium perchlorate to form the highly explosive propyl perchlorate. Ignites on contact with dioxygenyl tetrafluoroborate; chromium trioxide; potassium tert-butoxide (after a delay). Reacts with oxygen to form dangerously unstable peroxides. Vigorous reaction with sodium dichromate + sulfuric acid; aluminum (after a delay period). Reacts violently with H_2 + Pd; nitroform; oleum; $COCl_2$; Al triisopropoxide; oxidants. Can react vigorously with oxidizing materials. To fight fire, use CO_2, dry chemical, alcohol foam. When heated to decomposition it emits acrid smoke and fumes. See also ALCOHOLS.

For occupational chemical analysis use NIOSH: Alcohols I, 1400.

INK000 CAS:75-31-0 HR: 3
ISOPROPYLAMINE
DOT: UN 1221
mf: C_3H_9N mw: 59.13

$(CH_3)_2CHNH_2$

PROP: Colorless liquid; amino odor. Mp: −101.2°, flash p: −35°F (OC), d: 0.694 @ 15°/4°, autoign temp: 756°F, d: 2.03, bp: 33–34°, lel: 2.3%, uel: 10.4%. Misc with water, alc, and ether.

SYNS: 2-AMINO-PROPAAN (DUTCH) ☐ 2-AMINOPROPAN (GERMAN) ☐ 2-AMINOPROPANE ☐ 2-AMINO-PROPANO (ITALIAN) ☐ ISOPROPILAMINA (ITALIAN) ☐ 1-METHYLETHYLAMINE ☐ MONOISOPROPYLAMINE ☐ 2-PROPANAMINE ☐ sec-PROPYLAMINE ☐ 2-PROPYLAMINE

TOXICITY DATA WITH REFERENCE
skn-rbt 500 mg/24H SEV 28ZPAK -,62,72
skn-rbt 345 mg open MOD UCDS** 11/15/71
skn-rbt 10 mg/24H open SEV AMIHBC 4,119,51
eye-rbt 50 µg open SEV AMIHBC 4,119,51
eye-rbt 50 µg/24H SEV 28ZPAK -,62,72
orl-rat LD50:820 mg/kg UCDS** 11/15/71
ihl-rat LC50:4000 ppm/4H IAEC** 17JUN74
orl-mus LD50:2200 mg/kg GISAAA 45(3),79,80
ihl-mus LCLo:7000 ppm/40M SCCUR* -,7,61
orl-rbt LD50:3200 mg/kg GISAAA 45(3),79,80
skn-rbt LD50:380 mg/kg IAEC** 17JUN74
skn-rbt LD50:550 mg/kg IAEC** 17JUN74
orl-gpg LD50:2700 mg/kg GISAAA 45(3),79,80
ihl-mam LC50:1800 mg/m³ TPKVAL 14,80,75

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

OSHA PEL: TWA 5 ppm; STEL 10 ppm
ACGIH TLV: TWA 5 ppm; STEL 10 ppm
DFG MAK: 5 ppm (12 mg/m³)
DOT CLASSIFICATION: 3; *Label:* Flammable Liquid; DOT Class: 3; *Label:* Flammable Liquid, Corrosive

SAFETY PROFILE: Poison by skin contact. Moderately toxic by ingestion. Mildly toxic by inhalation. A severe skin and eye irritant. Occasionally contact causes sensitization. Narcotic in high concentration. Very dangerous fire hazard and moderate explosion hazard when exposed to sparks, heat, flame, or oxidizers. Can react vigorously with oxidizing materials. Reacts with perchloryl fluoride to form an explosive liquid. Incompatible with 1-chloro-1,3-epoxypropane. To fight fire, use alcohol foam, CO_2, dry chemical. When heated to decomposition it emits toxic fumes of NO_x. See also AMINES.

INL000 CAS:15572-56-2 HR: 2
ISOPROPYLAMINE HYDROCHLORIDE
mf: $C_3H_9N{\cdot}ClH$ mw: 95.59

PROP: A solid. Mp: 153–155°.

SYNS: MONOISOPROPYLAMINE HYDROCHLORIDE ☐ 2-PROPANAMINE, HYDROCHLORIDE (9CI)

TOXICITY DATA WITH REFERENCE
ipr-mus LD50:1545 mg/kg YKKZAJ 97,1117,77

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

SAFETY PROFILE: Moderately toxic by intraperitoneal route. When heated to decomposition it emits very toxic fumes of NO_x and HCl. See also AMINES.

INM000 CAS:3615-24-5 HR: 3
4-(ISOPROPYLAMINO)ANTIPYRINE
mf: $C_{13}H_{19}N_3O$ mw: 245.36

PROP: Crystals from Me_2CO/AcOH. Mp: 80°.

SYNS: 1,2-DIHYDRO-1,5-DIMETHYL-4-((1-METHYLETHYL)AMINO)-2-PHENYL-3H-PYRAZOL-3-ONE ☐ ISOPIRINA ☐ ISOPROPYLAMI-

decomposition it emits acrid smoke and irritating fumes.

LCC000 CAS:8000-28-0 HR: 1
LAVENDER ABSOLUTE

PROP: Found in the flowers of *Lavandula officinalis chaix*. The main constituent is linalyl acetate. A dark green liquid prepared from alcoholic extract of a residue which is extracted from plant material using an organic solvent.

SYNS: LAVENDEL OEL ☐ OIL of LAVENDER

TOXICITY DATA WITH REFERENCE
skn-rbt 500 mg/24H MLD FCTXAV 14,449,76
orl-rat LD50:4250 mg/kg FCTXAV 14,449,76

SAFETY PROFILE: Mildly toxic by ingestion. A skin irritant. When heated to decomposition it emits acrid smoke and irritating fumes.

LCD000 CAS:8000-28-0 HR: 1
LAVENDER OIL

PROP: Found in the flowers of *Lavandula officinalis* Chaix et Villars (*Lavandula vera* De Candolle (Fam. *Labiatae*). The main constituent is linalyl acetate. A colorless to yellow liquid; characteristic odor and taste of lavender flowers. D: 0.875, refr index: 1.459–1.470 @ 20°.

SYNS: LAVENDEL OEL (GERMAN) ☐ OIL of LAVENDER

TOXICITY DATA WITH REFERENCE
skn-rbt 500 mg/24H MLD FCTXAV 14,451,76
orl-rat LD50:9040 mg/kg PHARAT 14,435,59

CONSENSUS REPORTS: Reported in EPA TSCA Inventory.

SAFETY PROFILE: Mildly toxic by ingestion. A skin irritant. When heated to decomposition it emits acrid smoke and irritating fumes.

LCE000 CAS:64083-05-2 HR: 2
LD-813

PROP: Commercial mixture of aromatic amines containing approx 40% MOCA.

TOXICITY DATA WITH REFERENCE
orl-rat TDLo:37 g/kg/2Y-C:CAR TXAPA9 31,159,75

SAFETY PROFILE: Questionable carcinogen with experimental carcinogenic data. When heated to decomposition it emits toxic fumes of NO_x. See also AROMATIC AMINES.

LCF000 CAS:7439-92-1 HR: 3
LEAD
af: Pb aw: 207.19

PROP: Bluish-gray, soft, weak, ductile metal that tarnishes in moist air. Otherwise stable to O_2 and H_2O at ordinary temp. Mp: 327.43°, bp: 1740°, d: 11.34 @ 20°/4°, vap press: 1 mm @ 973°. Dissolves in dil HNO_3, acetic acid, HCl (slowly). Sol in alkali solns. Attacked at room temp by F_2 and Cl_2.

SYNS: C.I. 77575 ☐ C.I. PIGMENT METAL 4 ☐ GLOVER ☐ LEAD FLAKE ☐ LEAD S2 ☐ OLOW (POLISH) ☐ OMAHA ☐ OMAHA & GRANT ☐ SI ☐ SO

TOXICITY DATA WITH REFERENCE
cyt-hmn-unr 50 µg/m³ MUREAV 147,301,85
cyt-rat-ihl 23 µg/m³/16W GTPZAB 26(10),38,82
cyt-mky-orl 42 mg/kg/30W TOLED5 8,165,81
orl-dom TDLo:662 mg/kg (female 1-21W post):REP TXAPA9 25,466,73
orl-mus TDLo:4800 mg/kg (female 1-16D post):TER BECTA6 18,271,77
orl-wmn TDLo:450 mg/kg/6Y:PNS:CNS JAMAAP 237,2627,77
ihl-hmn TCLo:10 µg/m³:GIT:LIV VRDEA5 (5),107,81
ipr-rat LDLo:1000 mg/kg EQSSDX 1,1,75
orl-pgn LDLo:160 mg/kg HBAMAK 4,1289,35

CONSENSUS REPORTS: IARC Cancer Review: Group 2B IMEMDT 7,230,87; Animal Inadequate Evidence IMEMDT 23,325,80. Lead and its compounds are on the Community Right-To-Know List. Reported in EPA TSCA Inventory. EPA Genetic Toxicology Program.

OSHA PEL: TWA 0.05 mg(Pb)/m³
ACGIH TLV: TWA 0.15 mg(Pb)/m³; BEI: 50 µg(lead)/L in blood; 150 µg(lead)/g creatinine in urine
DFG MAK: 0.1 mg/m³; BAT: 70 µg(lead)/L in blood, 30 µg(lead)/L in blood of women less than 45 years old
NIOSH REL: TWA (Inorganic Lead) 0.10 mg(Pb)/m³

SAFETY PROFILE: Poison by ingestion. Moderately toxic by intraperitoneal route. Questionable carcinogen. Human systemic effects by ingestion and inhalation: loss of appetite, anemia, malaise, insomnia, headache, irritability, muscle and joint pains, tremors, flaccid paralysis without anesthesia, hallucinations and distorted perceptions, muscle weakness, gastritis and liver changes. The major organ systems affected are the nervous system, blood system, and kidneys. Lead encephalopathy is accompanied by severe cerebral edema, increase in cerebral spinal fluid pressure, proliferation and swelling of endothelial cells in capillaries and arterioles, proliferation of glial cells, neuronal degeneration and areas of focal cortical necrosis in fatal cases. Experimental evidence now suggests that blood levels of lead below 10 µg/dL can have the effect of diminishing the IQ scores of children. Low levels of lead impair neurotransmission and immune system function and may increase systolic blood pressure. Reversible kidney damage can occur from acute exposure. Chronic exposure can lead to irreversible vascular sclerosis, tubular cell atrophy, interstitial fibrosis, and glomerular sclerosis. Severe toxicity can cause sterility, abortion, and neonatal mortality and morbidity. An experimental teratogen. Experimental reproductive effects. Human mutation data reported. Very heavy intoxication can sometimes be detected by formation of a dark line on the gum margins, the so-called "lead line."

When lead is ingested, much of it passes through the body unabsorbed, and is eliminated in the feces. The greater portion of the lead that is absorbed is caught by the liver and excreted, in part, in the bile. For this reason, larger amounts of lead are necessary to cause

NCW300 **CAS:5868-05-3** **HR: 1**
NICERITROL
mf: $C_{29}H_{32}N_4O_8$ mw: 556.57

PROP: Crystals. Mp: 160–164°.

SYNS: 2,2-BIS((3-PYRIDINYLCARBONYL)OXY)METHYL)-1,3-PROPANEDIYL ESTER of 3-PYRIDINECARBOXYLIC ACID ☐ BURFOR ☐ CARDIOLIPOL ☐ PENTAERYTHRITOL TETRANICOTINATE ☐ PERYCIT ☐ SK 1

TOXICITY DATA WITH REFERENCE
orl-rat TDLo:42 g/kg (35D pre):REP OYYAA2 14,755;77
orl-rat LD50:20 g/kg NIIRDN 6,546,82
ipr-rat LD50:5000 mg/kg NIIRDN 6,546,82
scu-rat LD50:5000 mg/kg NIIRDN 6,546,82
orl-mus LD50:20 g/kg NIIRDN 6,546,82
ipr-mus LD50:5000 mg/kg NIIRDN 6,546,82
scu-mus LD50:5000 mg/kg NIIRDN 6,546,82
ipr-rbt LD50:5000 mg/kg NIIRDN 6,546,82

SAFETY PROFILE: Mildly toxic by ingestion. Experimental reproductive effects. When heated to decomposition it emits toxic fumes of NO_x. See also ESTERS.

NCW500 **CAS:7440-02-0** **HR: 3**
NICKEL
af: Ni aw: 58.71

PROP: A silvery-white, hard, malleable and ductile metal. D: 8.90 @ 25°, vap press: 1 mm @ 1810°. Crystallizes as metallic cubes. Mp: 1455°, bp: 2920°. Stable in air at room temp.

SYNS: C.I. 77775 ☐ Ni 270 ☐ NICHEL (ITALIAN) ☐ NICKEL 270 ☐ NICKEL (DUST) ☐ NICKEL PARTICLES ☐ NICKEL SPONGE ☐ Ni 0901-S ☐ Ni 4303T ☐ NP 2 ☐ RANEY ALLOY ☐ RANEY NICKEL

TOXICITY DATA WITH REFERENCE
otr-ham:kdy 400 mg/L IAPUDO 53,193,84
otr-ham:emb 5 µmol/L TOXID9 1,132,81
orl-rat TDLo:158 mg/kg (MGN):TER AEHLAU 23,102,71
scu-rat TDLo:3000 mg/kg/6W-I:ETA JNCIAM 16,55,55
ims-rat TDLo:56 mg/kg:CAR IAPUDO 53,127,84
par-rat TDLo:40 mg/kg/52W-I:ETA,TER AEHLAU 5,445,62
imp-rat TDLo:250 mg/kg:CAR JNCIAM 16,55,55
ims-mus TDLo:200 mg/kg:NEO NCIUS* PH 43-64-886,SEPT,70
imp-rbt TDLo:165 mg/kg/2Y-I:NEO,TER JNCIAM 16,55,55
orl-rat LDLo:5 g/kg FDRLI* 7684D,83
itr-rat LDLo:12 mg/kg NTIS** AEC-TR-6710
ivn-mus LDLo:50 mg/kg FATOAO 23,549,60
ivn-dog LDLo:10 mg/kg 14CYAT 2,1120,63
scu-rat LDLo:12,500 µg/kg NTIS** PB158-508
ipr-rbt LDLo:7 mg/kg NTIS** PB158-508
scu-rbt LDLo:7500 µg/kg NTIS** PB158-508
orl-gpg LDLo:5 mg/kg AMPMAR 25,247,64

CONSENSUS REPORTS: NTP 7th Annual Report On Carcinogens. IARC Cancer Review: Group 1 IMEMDT 7,264,87; Animal Sufficient Evidence IMEMDT 11,75,76; Animal Inadequate Evidence IMEMDT 2,126,73. Community Right-To-Know List. Reported in EPA TSCA Inventory.

OSHA PEL: TWA Soluble: Compounds: 0.1 mg(Ni)/m³; Insoluble Compounds: 1 mg(Ni)/m³
ACGIH TLV: TWA 1 mg(Ni)/m³; (Proposed: TWA 0.05 mg(Ni)/m³; Human Carcinogen)
DFG TRK: Human Carcinogen
NIOSH REL: (Inorganic Nickel) TWA 0.015 mg(Ni)/m³

SAFETY PROFILE: Confirmed carcinogen with experimental carcinogenic, neoplastigenic, tumorigenic, and teratogenic data. Poison by ingestion, intratracheal, intraperitoneal, subcutaneous, and intravenous routes. An experimental teratogen. Ingestion of soluble salts causes nausea, vomiting, diarrhea. Mutation data reported. Hypersensitivity to nickel is common and can cause allergic contact dermatitis, pulmonary asthma, conjunctivitis, and inflammatory reactions around nickel-containing medical implants and prostheses. Powders may ignite spontaneously in air. Reacts violently with F_2; NH_4NO_3; hydrazine; NH_3; (H_2 + dioxane); performic acid; P; Se; S; (Ti + $KClO_3$). Incompatible with oxidants (e.g., bromine pentafluoride; peroxyformic acid; potassium perchlorate; chlorine; nitryl fluoride; ammonium nitrate). Raney-nickel catalysts may initiate hazardous reactions with ethylene + aluminum chloride; p-dioxane; hydrogen; hydrogen + oxygen; magnesium silicate; methanol; organic solvents + heat; sulfur compounds. Nickel catalysts have caused many industrial accidents.

For occupational chemical analysis use OSHA: #ID-125G or NIOSH: Elements (ICP) 7300; Metals in Urine (ICP) 8310.

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NCX000 **CAS:373-02-4** **HR: 3**
NICKEL(II) ACETATE (1:2)
mf: $C_4H_6O_4 \cdot Ni$ mw: 176.81

PROP: Green prisms or hygroscopic green powder. Mp: decomp, d: 1.798.

SYNS: ACETIC ACID, NICKEL(2+) SALT ☐ NICKELOUS ACETATE

TOXICITY DATA WITH REFERENCE
pic-esc 160 µmol/L ENMUDM 6,59,84
dns-rat-ipr 129 µmol/kg/5D-I CRNGDP 6,1819,85
otr-ham:kdy 225 mg/L IAPUDO 53,193,84
ivn-ham TDLo:10 mg/kg (8D preg):REP ADTEAS 5,51,72
ims-rat TDLo:420 mg/kg/47W-I:NEO NCIUS* PH 43-64-886,JUL,68
imp-rat TDLo:95 mg/kg/78W-C:ETA PAACA3 5,50,64
orl-rat LD50:350 mg/kg PWPSA8 11,39,68
ipr-rat LD50:23 mg/kg PWPSA8 11,39,68
orl-mus LD50:410 mg/kg PWPSA8 11,39,68
ipr-mus LD50:32 mg/kg PWPSA8 11,39,68
scu-gpg LDLo:20 mg/kg JOHYAY 8,565,08

CONSENSUS REPORTS: NTP 7th Annual Report On Carcinogens. IARC Cancer Review: Group 1 IMEMDT 7,264,87. Nickel and its compounds are on the Community Right-To-Know List. Reported in EPA TSCA Inventory.

OSHA PEL: TWA 0.1 mg (Ni)/m³
ACGIH TLV: TWA 0.1 mg(Ni)/m³; (Proposed: TWA 0.05 mg(Ni)/m³; Human Carcinogen)
NIOSH REL: (Inorganic Nickel) TWA 0.015 mg(Ni)/m³

SAFETY PROFILE: Confirmed carcinogen with experi-

NEB000 CAS:561-78-4 HR: 3
NISENTIL HYDROCHLORIDE
mf: $C_{16}H_{23}NO_2 \cdot ClH$ mw: 297.86

SYNS: ALPHAPRODINE HYDROCHLORIDE □ 1,3-DIMETHYL-4-PHENYL-4-PIPERIDINOL, PROPIONATE, HYDROCHLORIDE □ 1,3-DIMETHYL-4-PHENYL-4-PIPERIDYL PROPIONATE HYDROCHLORIDE □ dl 1,3-DIMETHYL-4-PHENYL-4-PIPERIDINOL PROPIONATE HYDROCHLORIDE □ (±)-1,3-DIMETHYL-4-PHENYL-4-PIPERIDYL ESTER PROPIONIC ACID HYDROCHLORIDE □ (±)-α-1,3-DIMETHYL-4-PHENYL-4-PROPIONOXYPIPERIDINE HYDROCHLORIDE □ NISENTIL □ NU-1196 □ PRISILIDENE HYDROCHLORIDE □ α-PRODINE HYDROCHLORIDE

TOXICITY DATA WITH REFERENCE
orl-hmn LDLo: 1440 μg/kg CTOXAO 5,307,72
orl-rat LD50: 90 mg/kg JPETAB 93,314,48
ipr-rat LD50: 22 mg/kg JPETAB 99,312,50
scu-rat LD50: 23 mg/kg JPETAB 99,312,50
ivn-rat LD50: 25 mg/kg AIPTAK 109,171,57
ipr-mus LD50: 73 mg/kg JPETAB 99,312,50
scu-mus LD50: 98 mg/kg JPETAB 99,312,50
ivn-mus LD50: 32 mg/kg JPETAB 99,314,48
ivn-dog LD50: 36,200 μg/kg AIPTAK 109,171,57
ivn-rbt LD50: 19 mg/kg JPETAB 99,312,50

SAFETY PROFILE: A deadly human poison by ingestion. Poison experimentally by ingestion, subcutaneous, intravenous, and intraperitoneal routes. When heated to decomposition it emits toxic fumes of NO_x and HCl. See also NISENTIL.

NEC000 CAS:1432-75-3 HR: 3
NITRALAMINE HYDROCHLORIDE
mf: $C_{10}H_{13}ClN_2O_2S \cdot ClH$ mw: 297.22

PROP: A solid. Mp: 109–113°.

SYNS: 2-((o-CHLORO-α-(NITROMETHYL)BENZYL)THIO)ETHYLAMINE HYDROCHLORIDE □ ((α-NITROMETHYL)-o-CHLOROBENZYLTHIO)ETHYLAMINE HYDROCHLORIDE

TOXICITY DATA WITH REFERENCE
ivn-mus LD50: 100 mg/kg CSLNX* NX#08976
ipr-rat LD50: 124 mg/kg 28ZEAL 4,301,69
ipr-mus LD50: 130 mg/kg 28ZEAL 4,301,69

SAFETY PROFILE: Poison by intravenous and intraperitoneal routes. When heated to decomposition it emits very toxic fumes of SO_x, NO_x, and Cl^-.

NEC500 CAS:101976-64-1 HR: 3
NITRAMINOACETIC ACID
mf: $C_2H_4N_2O_4$ mw: 120.08

SYNS: O-ACETYL NITROHYDROXYAMINE □ O-ACETYL-N-NITROHYDROXYLAMINE

TOXICITY DATA WITH REFERENCE
orl-mus LD50: 40 mg/kg 85ERAY 1,902,78
ipr-mus LD50: 43 mg/kg 85ERAY 1,902,78
ivn-mus LD50: 32 mg/kg 85ERAY 1,902,78

SAFETY PROFILE: Poison by ingestion, intraperitoneal, and intravenous routes. When heated to decomposition it emits toxic fumes of NO_x. See also AMINES.

NED000 HR: 3
NITRATES

PROP: Organic nitrates are usually termed nitro compounds. These compounds are a combination of the nitro ($-NO_2$) group and an organic radical. However, this term is often used to denote nitric acid esters of an organic material. Inorganic nitrates are compounds of metals with the monovalent NO_3 radical.

SAFETY PROFILE: Large amounts taken by mouth may have serious or even fatal effects. The symptoms are dizziness, abdominal cramps, vomiting, bloody diarrhea, weakness, convulsions, and collapse. Small, repeated doses may lead to weakness, general depression, headache, and mental impairment. Also, there is some implication of increased cancer incidence among those exposed.

Flammable by spontaneous chemical reaction; practically all nitrates are powerful oxidizing agents. Some nitrates may explode when shocked, exposed to heat or flame, or by spontaneous chemical reaction (see also EXPLOSIVES, HIGH). All the inorganic nitrates act as oxygen carriers; under proper conditions, these can give up their oxygen to other materials which may in turn detonate. Ammonium nitrate has all the properties of the other nitrates, but it is also able to detonate by itself under certain conditions. It is therefore a high explosive, although very insensitive to impact and difficult to detonate. In the pure state, it requires a combination of an initiator and a high explosive. It is a relatively safe high explosive, which, however, must be stored in a cool, ventilated place away from acute fire hazards and easily oxidized materials. Ammonium nitrate must not be confined because, if a fire should start, confinement can cause detonation with extremely violent results.

Violent reaction with Al; BP; cyanide; esters; PN_3H; P; NaCN; $SnCl_2$; sodium hypophosphite; thiocyanates. Dangerous disaster hazard due to fire and explosion hazard. When heated to decomposition it emits toxic fumes of NO_x. They are powerful oxidizing agents that may cause violent reaction with reducing materials. Nitrates should be protected carefully in storage.

NED500 CAS:7697-37-2 HR: 3
NITRIC ACID
DOT: UN 2031
mf: HNO_3 mw: 63.02

PROP: Transparent, colorless or yellowish, fuming, suffocating, caustic and corrosive liquid. Pure acid; decomp especially in light. Mp: −42°, bp: 83°, d: 1.50269 @ 25°/4°.

SYNS: ACIDE NITRIQUE (FRENCH) □ ACIDO NITRICO (ITALIAN) □ AQUA FORTIS □ AZOTIC ACID □ AZOTOWY KWAS (POLISH) □ HYDROGEN NITRATE □ NITRIC ACID, over 40% (DOT) □ HYDROGEN NITRATE □ KYSELINA DUSICNE □ NITRIC ACID other than red fuming with >70% nitric acid (DOT) □ NITRIC ACID other than red fuming with not >70% nitric acid (DOT) □ SALPETERSAEURE (GERMAN) □ SALPETERZUUROPLOSSINGEN (DUTCH)

TOXICITY DATA WITH REFERENCE
orl-rat TDLo: 2345 mg/kg (female 18D post): REP ZHYGAM 29,667,83

orl-rat TDLo:21,150 mg/kg (female 1-21D post):TER ZHYGAM 29,667,83
orl-hmn LDLo:430 mg/kg YAKUD5 22,651,80
unr-man LDLo:110 mg/kg 85DCAI 2,73,70

CONSENSUS REPORTS: Reported in EPA TSCA Inventory. EPA Genetic Toxicology Program. Community Right-To-Know List.

OSHA PEL: TWA 2 ppm; STEL 4 ppm
ACGIH TLV: TWA 2 ppm; STEL 4 ppm
DFG MAK: 2 ppm (5 mg/m³)
NIOSH REL: (Nitric Acid) TWA 2 ppm
DOT CLASSIFICATION: 8; *Label:* Corrosive, Oxidizer, Poison

SAFETY PROFILE: Human poison by ingestion. An experimental teratogen. Experimental reproductive effects. Corrosive to eyes, skin, mucous membranes, and teeth. Causes upper respiratory irritation that may seem to clear up, only to return in a few hours and more severely. Depending on environmental factors the vapor will consist of a mixture of the various oxides of nitrogen and nitric acid. Flammable by chemical reaction with reducing agents. It is a powerful oxidizing agent.

Explosive reaction with acetic anhydride, acetone + acetic acid (in storage), acetone + hydrogen peroxide, acetone + sulfuric acid (if confined), alcohols, alkane thiols, 2-aminothiazole, 2-aminothiazole + sulfuric acid, dinitrogen tetraoxide or sulfuric acid + aromatic amines (e.g., aniline, n-ethylamine, o-toluidine, xylidine, p-phenylenediamine), benzidine (hypergolic), benzonitrile + sulfuric acid, 5-acetylamino-3-bromobenzo(b)thiophene, 1,4-bis(methoxymethyl)-2,3,5,5-tetramethylbenzene (at 80°C), 1,3-bis(trifluoro- methyl) benzene + sulfuric acid (vapors are ignited by spark), tert-butyl-m-xylene, cadmium phosphide, chlorobenzene, cotton + rubber + sulfuric acid + water (mixture has caused industrial explosions), crotonaldehyde (hypergolic), cyclohexylamine, 1,2-diaminoethane-bis(trimethylgold), diethyl ether, diethyl ether + sulfuric acid, 1,1-dimethyl hydrazine (hypergolic), dimethyl sulfide, dimethyl sulfide + 1,4-dioxane, dimethyl sulfoxide + water, dinitrogen tetraoxide + nitrogenous fuels (hypergolic with triethylamine, dimethylhydrazine, mixo-xylidine), dioxane + perchloric acid, diphenyldistibene, divinyl ether (hypergolic), ethane sulfonamide, 5-ethyl-2-methylpyridine, fat + sulfuric acid (when confined), 2-formylamino-1-phenyl-1,3-propanediol, fluorine, furfurylidene ketones (hypergolic), glycerin + sulfuric acid, hexalithium disilicide, 2,2,4,4,6,6-hexamethyl-trithiane, hydrazine (hypergolic), hydrocarbons, hydrocarbons + 1,1-dimethylhydrazine, hydrogen peroxide + soils, ion exchange resins, magnesium + 2-nitroaniline (hypergolic), metal acetylides (e.g., cesium acetylide, rubidium acetylide), metal cyanides, metal hexacyanoferrates (3-) or (4-), metal thiocyanates, 4-methylcyclohexanone (above 75°C), methylthiophene, nitrobenzene + sulfuric acid, 1-nitronaphthalene + sulfuric acid, nonmetal hydrides (e.g., arsine, phosphine, tetraborane(10), stibene), phosphorus, organic materials + oxidizers (e.g., perchloric acid, potassium chlorate, sulfuric acid), phenylacetylene + 1,1-dimethylhydrazine, phosphine derivatives (e.g., phosphine, phosphonium iodide, ethyl phosphine, tris(iodomercury) phosphine), tetraphosphorus diiodo triselenide, phosphorus trichloride, polyurethane foam, propiophenone + sulfuric acid, pyrocatechol (hypergolic), potassium phosphinate + heat, resorcinol, rubber, silicone oil, silver buten-3-ynide, sulfur dioxide, 1,3,5-triacetylhexahydro-1,3,5-triazine + trifluoroacetic anhydride, triazine + trifluoroacetic anhydride, zinc ethoxide. Explosive or hypergolic reaction with various hydrocarbons (e.g., acetylene derivatives, benzene, 3-carene, cashew nut shell oil, cyclopentadienes, dicyclopentadiene, dienes, hexamethylbenzene, mesitylene, burning petroleum products, toluene, turpentine, p-xylene).

Ignition on contact with acetone, alcohols + disulfuric acid, alcohols + potassium permanganate, aliphatic amines, O-alkyl ethylene dithiophosphate, ammonia, anilinium nitrate + inorganic materials [e.g., copper(I) chloride, potassium permanganate, sodium pentacyanonitrosylferrate, vanadium(V) oxide, ammonium metavanadate, sodium metavanadate], aromatic amines + metal compounds [e.g., ammonium metavanadate, copper(I) oxide, copper(II) oxide, iron(III) chloride, iron(III) oxide, potassium chromate, potassium dichromate, potassium hexacyanoferrate(I), potassium hexacyanoferrate(III), sodium metavanadate, sodium pentacyanonitrosylferrate(II), vanadium(V) oxide], dichromates + organic fuels (e.g., ammonium dichromate, potassium dichromate, potassium chromate, cyclohexanol, 2-cresol, 3-cresol, furfural), diphenyl tin, lead-containing rubber, metals (e.g., lithium, sodium, magnesium), nonmetal hydrides (e.g., hydrogen iodide, hydrogen selenide, hydrogen sulfide, hydrogen telluride), phosphorus vapor, nickel tetraphosphide, tetraphosphorus iodide, polysilylene, turpentine + catalysts (e.g., concentrated sulfuric acid, iron(III) chloride, ammonium metavanadate, copper(II) chloride), wood.

Forms explosive mixtures with acetic acid, acetic acid + sodium hexahydroxyplatinate(IV), acetic anhydride + hexamethylenetetramine acetate, acetoxyethylene glycol, ammonium nitrate, anilinium nitrate, 1,2-dichloroethane, dichloroethylene, dichloromethane, diethylaminoethanol, 3,6-dihydro-1,2,2H-oxazine, dimethyl ether, 1,3-dinitrobenzene, disodium phenyl orthophosphate, 2-hexenal (heat sensitive), hydrofluoric acid + lactic acid, hydrofluoric acid + propylene glycol + silver nitrate, hydrogen peroxide + ketones (e.g., 2-butanone, 3-pentanone, cyclopentanone, cyclohexanone, 3-methylcyclohexanone), hydrogen peroxide + mercury(II) oxide, metals (e.g., titanium, uranium, tin), metal salicylates, nitroaromatics (e.g., mono- and di-nitrobenzenes, di- and tri-nitrotoluenes), nitrobenzene + water, nitromethane, salicylic acid.

Incompatible with 4-acetoxy-3-methoxybenzaldehyde, acetylene, acrolein, acrylonitrile, acrylonitrile + methacrylate copolymer, allyl alcohol, allyl chloride, 2-amino ethanol, ammonium hydroxide, aniline, anion exchange resins, antimony, SbH_3, arsenic hydride, arsine + boron tribromide, benzo[b]thiophene derivatives, N-benzyl-N-ethylaniline + sulfuric acid, bismuth, boron, boron decahydride, B_4H_{10}, boron phosphide, bromine pentafluoride, butanethiol, 2,6-di-tert-butyl phenol, calcium hypophosphite, carbon, $C_2H_5PH_2$, cellulose, Cs_2C_2, chlorine trifluoride, 4-chloro-2-nitroaniline, chlorosulfonic acid, coal, CuN_3, Cu_3N_2, copper(I) nitride, cresol,

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cumene, cyanides, cyclic ketones, cyclohexanol + cyclohexanone, diborane, di-2-6-butoxyethylether (butex), dichromate + anion exchange resins, diisopropylether, dimethylaminomethylferrocene + water, unsdimethyl hydrazine, diphenylmercury, epichlorohydrin, ethanol, m-ethylaniline, ethylene diamine, ethylene imine, 5-ethyl-2-picoline, formaldehyde + impurities, formic acid + heat, formic acid + urea, furfural, furfuryl alcohol, germanium, glycerol + hydrofluoric acid, glyoxal, hydrogen iodide, HN_3, hydrogen peroxide, hydrogen selenide, hydrogen sulfide, H_2Te, indane + sulfuric acid, FeO, iron(II) oxide powder, isoprene, ketones + hydrogen peroxide, lactic acid + HF, Li_6Si_2, magnesium silicide, magnesium phosphide, magnesium-titanium alloy, manganese, mesityl oxide, mesitylene, metals (e.g., bismuth powder, germanium powder, uranium powder, molten zinc), 2-methyl-5-ethyl pyridine, NdP, nonmetal powders (e.g., boron, silicon, arsenic, carbon), n-butyraldehyde, oleum, phosphorus halides, phthalic acid, phthalic anhydride, polyalkenes (e.g., polyethylene, polypropylene), polydibromosilane, polyethylene oxide derivatives, KH_2PO_2, β-propiolactone, propylene oxide, pyridine, Rb_2C_2, reductants, selenium, selenium iodophosphide, silver + ethanol, sodium, sodium hydroxide, NaN_3, sucrose, sulfamic acid, sulfuric acid, sulfuric acid + $C_6H_5CH_3$, sulfuric acid + glycerides, sulfur halides (e.g., sulfur dichloride, sulfur dibromide, disulfur dibromide), sulfuric acid + terephthalic acid, terpenes, thioaldehydes, thiocyanates, thioketones, thiophene, titanium, titanium alloy, titanium-magnesium alloy, toluidine, triazine, tricadmium diphosphide, triethylgallium monoetherate, trimagnesium diphosphide, 2,4,6-trimethyltrioxane, uranium, uranium disulfide, uranium-neodymium alloy, uranium-neodymium-zirconium alloy, vinylacetate, vinylidene chloride, zinc, zirconium-uranium alloys.

Will react with water or steam to produce heat and toxic and corrosive fumes. To fight fire, use water. When heated to decomposition emits highly toxic fumes of NO_x and hydrogen nitrate.

For occupational chemical analysis use OSHA: #ID-127 or NIOSH: Acids, Inorganic, 7903.

NEE000 CAS:13277-59-3 HR: 1
NITRIC ACID, DODECYL ESTER
mf: $C_{12}H_{25}NO_3$ mw: 231.38

SYNS: DODECYL NITRATE □ LAURYLESTER KYSELINY DUSICNE (CZECH) □ LAURYLNITRAT (CZECH) □ LAURYL NITRATE

TOXICITY DATA WITH REFERENCE
skn-rbt 500 mg/24H MLD 28ZPAK -,49,72
eye-rbt 500 mg/24H MLD 28ZPAK -,49,72

SAFETY PROFILE: A skin and eye irritant. When heated to decomposition it emits toxic fumes of NO_x. See also ESTERS.

NEE500 CAS:7697-37-2 HR: 3
NITRIC ACID (RED FUMING)
DOT: UN 2032
mf: HNO_3 mw:63.02

PROP: Colorless to yellow to red corrosive liquid. D: >1.480. Contains from 8 to 17% NO_2 (AMIHBC 10,418,54).

SYNS: NITRIC ACID, FUMING (DOT) □ NITRIC ACID, RED FUMING (DOT) □ NITROUS FUMES □ RED FUMING NITRIC ACID □ RFNA

TOXICITY DATA WITH REFERENCE
ihl-rat LC50:67 ppm (NO_2)/4H AMIHBC 10,418,54

CONSENSUS REPORTS: EPA Genetic Toxicology Program.

DOT CLASSIFICATION: 8; *Label:* Corrosive, Oxidizer, Poison

SAFETY PROFILE: Poison by inhalation. A corrosive irritant to skin, eyes, and mucous membranes. A very dangerous fire hazard and very powerful oxidizing agent. Can react explosively with many reducing agents. Will react with water or steam to produce heat and toxic, corrosive, and flammable vapors. When heated to decomposition it emits highly toxic fumes of NO_x. See also NITRIC ACID.

NEF000 HR: 3
NITRIC ACID (WHITE FUMING)

PROP: Contains from 0.1 to 0.4% NO_2 (AMIHBC 10,418,54).

SYNS: WFNA □ WHITE FUMING NITRIC ACID

TOXICITY DATA WITH REFERENCE
ihl-rat LC50:244 ppm (NO_2)/30M AMIHBC 10,418,54

SAFETY PROFILE: Moderately toxic by inhalation. A corrosive irritant to skin, eyes, and mucous membranes. A very dangerous fire hazard and a very powerful oxidizing agent. Can react explosively with many reducing agents. Will react with water or steam to produce heat and toxic, corrosive, and flammable vapors. When heated to decomposition it emits highly toxic fumes of NO_x. See also NITRIC ACID.

NEF500 CAS:10196-18-6 HR: 2
NITRIC ACID, ZINC SALT, HEXAHYDRATE
mf: $N_2O_6 \cdot Zn \cdot 6H_2O$ mw: 297.51

PROP: Tetragonal, colorless crystals. D: 2.065 @ 14°, mp: 36.4°, bp: $-H_2O$ @ 105–131°.

SYNS: DUSICNAN ZINECNATY (CZECH) □ ZINC(II) NITRATE, HEXAHYDRATE (1:2:6)

TOXICITY DATA WITH REFERENCE
skn-rbt 500 mg/24H SEV 28ZPAK -,10,72
eye-rbt 20 mg/24H SEV 28ZPAK -,10,72
orl-rat LD50:1190 mg/kg 28ZPAK -,10,72

CONSENSUS REPORTS: Zinc and its compounds are on the Community Right-To-Know List.

SAFETY PROFILE: Moderately toxic by ingestion. A severe skin and eye irritant. Can react violently with carbon; copper; metal sulfides; organic matter; phosphorus; sulfur. When heated to decomposition it emits toxic fumes of NO_x and ZnO. See also ZINC COMPOUNDS and NITRATES.

weakness, headache, and nausea. When heated to decomposition it emits toxic fumes of Br^- and NO_x.

ZBA525 CAS:60525-15-7 HR: 3
ZIMELIDINE DIHYDROCHLORIDE
mf: $C_{17}H_{19}BrN_2 \cdot 2ClH$ mw: 390.18

SYNS: (Z)-3-(4-BROMOPHENYL)-N,N-DIMETHYL-3-(3-PYRIDINYL)-2-PROPEN-1-AMINE DIHYDROCHLORIDE ☐ H102/09 HYDROCHLORIDE ☐ ZIMELIDINE HYDROCHLORIDE

TOXICITY DATA WITH REFERENCE
orl-rat TDLo: 12 mg/kg (6-17D preg): REP KSRNAM 17,1833,83
orl-rat TDLo: 120 mg/kg (6-17D preg): TER KSRNAM 17,1833,83
orl-man TDLo: 36 mg/kg BMJOAE 287,1672,83
orl-wmn TDLo: 12 mg/kg/6D-I: PNS HUTODJ 3,141,84
orl-wmn TDLo: 36 mg/kg/9D-I: GIT,LIV BMJOAE 287,1181,83
orl-rat LD50: 844 mg/kg APSXAS 20,295,83
ipr-rat LD50: 99,800 µg/kg APSXAS 20,295,83
scu-rat LD50: 227 mg/kg APSXAS 20,295,83
ivn-rat LD50: 45,800 µg/kg KSRNAM 17,1833,83
orl-mus LD50: 341 mg/kg KSRNAM 17,1833,83
ipr-mus LD50: 84,400 µg/kg APSXAS 20,295,83
scu-mus LD50: 154 mg/kg KSRNAM 17,1833,83
ivn-mus LD50: 27,700 µg/kg KSRNAM 17,1833,83
orl-dog LD50: 271 mg/kg KSRNAM 17,1833,83
ivn-dog LD50: 57/mg/kg KSRNAM 17,1833,83
orl-cat LDLo: 80 mg/kg APSXAS 20,295,83
orl-rbt LD50: 300 mg/kg KSRNAM 17,1833,83
ivn-rbt LD50: 50,800 µg/kg KSRNAM 17,1833,83

SAFETY PROFILE: Poison by ingestion, subcutaneous, intravenous, and intraperitoneal routes. Human systemic effects: ataxia, diarrhea, fasciculations, hypermotility, jaundice. An experimental teratogen. Experimental reproductive effects. When heated to decomposition it emits toxic fumes of Br^-, NO_x, and HCl. See also ZIMELIDINE.

ZBJ000 CAS:7440-66-6 HR: 3
ZINC
DOT: UN 1435/UN 1436
af: Zn aw: 65.37

PROP: Bluish-white, lustrous, metallic element. Not perceptibly attacked by pure H_2O. Mp: 419.8°, bp: 908°, d: 7.14 @ 25°, vap press: 1 mm @ 487°. Stable in dry air.

SYNS: BLUE POWDER ☐ C.I. 77945 ☐ C.I. PIGMENT BLACK 16 ☐ C.I. PIGMENT METAL 6 ☐ EMANAY ZINC DUST ☐ GRANULAR ZINC ☐ JASAD ☐ MERRILLITE ☐ PASCO ☐ ZINC ASHES (UN 1435) (DOT) ☐ ZINC DUST ☐ ZINC DUST (DOT) ☐ ZINC POWDER ☐ ZINC POWDER (DOT)

TOXICITY DATA WITH REFERENCE
skn-hmn 300 µg/3D-I: MLD 85DKA8 -,127,77
ihl-hmn TCLo: 124 mg/m³/50M: PUL,SKN AHYGAJ 72,358,10

CONSENSUS REPORTS: Zinc and its compounds are on the Community Right-To-Know List. Reported in EPA TSCA Inventory. EPA Genetic Toxicology Program.

DOT CLASSIFICATION: 4.3; *Label:* Dangerous When Wet, Spontaneously Combustible; DOT Class: 4.3; *Label:* Dangerous When Wet (UN 1435)

SAFETY PROFILE: Human systemic effects by inhalation: cough, dyspnea, and sweating. A human skin irritant. Pure zinc powder, dust, and fumes are relatively nontoxic to humans by inhalation. The difficulty arises from oxidation of zinc fumes immediately prior to inhalation or presence of impurities such as Cd, Sb, As, Pb. Inhalation may cause sweet taste, throat dryness, cough, weakness, generalized aches, chills, fever, nausea, vomiting.

Flammable in the form of dust when exposed to heat or flame. May ignite spontaneously in air when dry. Explosive in the form of dust when reacted with acids. Incompatible with NH_4NO_3, BaO_2, $Ba(NO_3)_2$, Cd, CS_2, chlorates, Cl_2, ClF_3, CrO_3, (ethyl acetoacetate + tribromoneopentyl alcohol), F_2, hydrazine mononitrate, hydroxylamine, $Pb(N_3)_2$, (Mg + $Ba(NO_3)_2$ + BaO_2), $MnCl_2$, HNO_3, performic acid, $KClO_3$, KNO_3, K_2O_2, Se, $NaClO_3$, Na_2O_2, S, Te, H_2O, $(NH_4)_2S$, As_2O_3, CS_2, $CaCl_2$, NaOH, chlorinated rubber, catalytic metals, halocarbons, o-nitroanisole, nitrobenzene, nonmetals, oxidants, paint primer base, pentacarbonyliron, transition metal halides, seleninyl bromide. To fight fire, use special mixtures of dry chemical. When heated to decomposition it emits toxic fumes of ZnO. See also ZINC COMPOUNDS.

For occupational chemical analysis use NIOSH: Zinc, 7030; Welding and Brazing Fume, 7200; Elements, 7300.

ZBS000 CAS:557-34-6 HR: 3
ZINC ACETATE
mf: $C_4H_6O_4 \cdot Zn$ mw: 183.47

PROP: Crystals; astringent taste. D: 1.735, mp: 237°. Very sol in water; somewhat sol in alc.

SYNS: ACETIC ACID, ZINC SALT ☐ DICARBOMETHOXYZINC ☐ ZINC DIACETATE

TOXICITY DATA WITH REFERENCE
cyt-ham: ovr 45 mg/L MUREAV 223,267,89
msc-mus: lym 10 mg/L MUREAV 223,267,89
ivg-rbt TDLo: 10,525 µg/kg (1D pre): REP CCPTAY 22,659,80
orl-rat LD50: 2510 mg/kg MarJV# 29MAR77
ipr-mus LD50: 57 mg/kg TXAPA9 49,41,79
ivn-rbt LDLo: 5 mg/kg AIMDAP 37,641,26

CONSENSUS REPORTS: Zinc and its compounds are on the Community Right-To-Know List. Reported in EPA TSCA Inventory.

SAFETY PROFILE: Poison by intraperitoneal and intravenous routes. Moderately toxic by ingestion. Experimental reproductive effects. Mutation data reported. Incompatible with zinc salts; alkalies and their carbonates; oxalates; phosphates; sulfides. When heated to decomposition it emits toxic fumes of ZnO. See also ZINC COMPOUNDS.

APPENDIX C

SITE SAFETY BRIEFING

Job Number (Site) Old Brazos Forge Site Number TXD048901235

Date _____ Start Time _____ Completed _____

Site Location Highway 36 North, Brenham, Washington County, Texas

Type of Work (General) Collect samples

****

SAFETY ISSUES

Tasks (this shift) _____

Protective Clothing/Equipment _____

Physical Hazards _____

Control Methods _____

Chemical Hazards _____

Decontamination Procedures/Tasks _____

Evacuation Procedures/Route/Signals _____

Evacuation Meeting Area _____

Nearest Phone _____

Hospital Name/Address _____

Special Topics (incidents, actions taken, etc.) _____

****

ATTENDEES

Print Name	Sign Name

Meeting conducted by: _____

SITE SAFETY BRIEFING

Job Number (Site) Old Brazos Forge Site Number TXD048901235

Date _____ Start Time _____ Completed _____

Site Location Highway 36 North, Brenham, Washington County, Texas

Type of Work (General) Collect samples

****

SAFETY ISSUES

Tasks (this shift) _____

Protective Clothing/Equipment _____

Physical Hazards _____

Control Methods _____

Chemical Hazards _____

Decontamination Procedures/Tasks _____

Evacuation Procedures/Route/Signals _____

Evacuation Meeting Area _____

Nearest Phone _____

Hospital Name/Address _____

Special Topics (incidents, actions taken, etc.) _____

****

ATTENDEES

Print Name	Sign Name

Meeting conducted by: _____

SITE SAFETY BRIEFING

Job Number (Site) Old Brazos Forge Site Number TXD048901235

Date _____ Start Time _____ Completed _____

Site Location Highway 36 North, Brenham, Washington County, Texas

Type of Work (General) Collect samples

****

SAFETY ISSUES

Tasks (this shift) _____

Protective Clothing/Equipment _____

Physical Hazards _____

Control Methods _____

Chemical Hazards _____

Decontamination Procedures/Tasks _____

Evacuation Procedures/Route/Signals _____

Evacuation Meeting Area _____

Nearest Phone _____

Hospital Name/Address _____

Special Topics (incidents, actions taken, etc.) _____

****

ATTENDEES

Print Name	Sign Name

Meeting conducted by: _____

SITE SAFETY BRIEFING

Job Number (Site) Old Brazos Forge Site Number TXD048901235

Date _____ Start Time _____ Completed _____

Site Location Highway 36 North, Brenham, Washington County, Texas

Type of Work (General) Collect samples

****

SAFETY ISSUES

Tasks (this shift) _____

Protective Clothing/Equipment _____

Physical Hazards _____

Control Methods _____

Chemical Hazards _____

Decontamination Procedures/Tasks _____

Evacuation Procedures/Route/Signals _____

Evacuation Meeting Area _____

Nearest Phone _____

Hospital Name/Address _____

Special Topics (incidents, actions taken, etc.) _____

****

ATTENDEES

Print Name	Sign Name

Meeting conducted by: _____

HEALTH AND SAFETY CHECKLIST

_ 1. Conduct safety briefing (each day).

_ 2. Conduct initial site survey (first day).

_ 3. Personal Protective Equipment: Tyvek (or chemical resistant suit) coveralls, boots, inner and outer gloves, respirator and matching organic and particulate filter canisters, hard hat, and goggles.

_ 4. Copy of HASP.

_ 5. First aid and snakebite kits, including ice.

_ 6. Calibrated air monitoring devices.

_ 7. Water.

_ 8. Emergency contact list and map to hospital (or mark in HASP).

_ 9. Appropriate weather gear (i.e., rain gear, cold weather clothing, etc.)

_ 10. Copy of ESI Workplan.

TNRCC

APPENDIX B

Site Reconnaissance Checklist

SITE RECONNAISSANCE CHECKLIST

I. General
   1. Name and title of site contact.
   2. Telephone number.
   3. Site address.
   4. Mailing address (if different).
   5. Name of owner and/or operator.
   6. Mailing address.

II. Site History
   1. How long has current owner/operator been at site?
   2. What were previous uses of site? Who were previous owners?
   3. Size of site (acres).
   4. Is any other property used that is not contiguous with site?
   5. Permits (RCRA, TDH, etc.)
   6. Any past spills or other environmental or accident problems.
   7. What were previous waste management practices?

III. Current Operations
   1. What is currently being done at facility?
   2. What are waste management practices?
   3. What are hazardous chemical management practices?
   4. List major hazardous chemicals/constituents present and past.
   5. Discuss sources (e.g., tanks, impoundments, containers, etc.).
   6. Number of employees - current, peak.

IV. Source Characteristics
   1. Identify type of wastes and quantities disposed of at site.
      a. Identify source of information.
      b. Photograph.
      c. Dimension (quantity, volume, area) of waste locations.
      d. Containment controls (clay cap, clay liner, vegetative cover, etc.)
      e. Existing data.
      f. Condition/integrity of storage/disposal units.

Site Reconnaissance Checklist, continued

V. Groundwater Pathway

1. Distance from source to nearest well. Identify name and address of well owner, if possible - and estimate well usage (number of people served, irrigation, supplemental, etc.).
2. Verify wells within range of site. Indicate depth to water for each well and number of people served. Identify as many owners and addresses as practically feasible.
   a. 0 - 0.25 mile
   b. 0.25 - 0.50 mile
   c. 0.50 - 1.00 mile
   d. 1.00 - 2.00 mile
   e. 2.00 - 3.00 mile
   f. 3.00 - 4.00 mile
3. Aquifer nearest wells are screened in, and water quality.

VI. Surface Water Pathway

1. Identify the TNRCC Basin and Stream Segment where the site is located.
2. Describe surface water quality including:
   a. average discharge,
   b. total basin drainage area,
   c. TNRCC surface water quality monitoring stations.
3. Are there surface water bodies within 2 miles of site?
4. Provide sketch of surface water runoff and flow patterns for 15 stream-miles downstream.
5. identify intakes along surface water route within 15 stream-miles downstream.
6. What is water use at each intake.
7. Identify fisheries along the 15 stream-mile downstream pathway.
8. Identify sensitive environments along the 15 stream-mile downstream pathway (see attached list).
9. Identify downstream recreational uses.
10. Estimate approximate flow rates for each water body within the 15 stream-mile target distance (i.e., <10 cfs, 10-100 cfs, 100-1,000 cfs, 1,000- 10,000 cfs, etc.). Estimate length of each stream segment.
11. Identify the annual rainfall and net rainfall at the site.
12. Is site in flood plain (10 year, 100 year, 500 year)?
13. Estimate upgradient drainage area limits (watershed).
14. Draw a sketch of drainage from site to nearest surface water including any other contributing tributaries.
15. Identify recreational uses downstream (15 miles).

VII. Soil Exposure Pathway

1. Describe status of site access, fencing, gates, locks, condition of security controls.
2. Describe adjacent land use.
3. Describe off-site runoff patterns.

Site Reconnaissance Checklist, continued

4. Describe number of people with residence, school, or day care on-site or within 200 yds.
5. Locate nearest school or day care.
6. Number of workers on-site (include maximum number to cover work on-site).
7. Evidence of recent human activity at the site.
8. Identify sensitive environments, (see list end of checklist).
9. Describe any off-site runoff pattern existing at the site.

VIII. Air Pathway

1. Estimate number of people within 4 miles (city or county records).
   a. 0 - 0.25 mile
   b. 0.25 - 0.50 mile
   c. 0.50 - 1.00 mile
   d. 1.00 - 2.00 mile
   e. 2.00 - 3.00 mile
   f. 3.00 - 4.00 mile
2. Shortest distance from source to occupied building.
3. Identify known releases to air.
4. Identify reports of adverse health effects.
5. Identify existence of sensitive environments within 4 miles (see end of checklist for list).

Miscellaneous Inquiries

1. Are any additional aerial photographs depicting site history available?
2. Meteorological data.
3. Nearest recreational area? Hospital?
4. Local water supply sources?

Site Sketches to Include

1. Date(s) of visit.
2. Well locations (including nearest to site).
3. Storage areas (past and present).
4. UST and above ground storage tanks.
5. Waste Areas.
6. Buildings
7. Access roads.
8. Areas of ponded water, or depressions in surface.
9. Drainage direction.
10. Photograph locations and directions.
11. Vegetation and significant landscaped features.
12. Any irregular appearance for soil, vegetation, tanks, etc. such as may result from spill, backfill operation, recent dirt moving work, etc.

TNRCC

APPENDIX C

References

TNRCC

Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 1

TARGET SHEET

SITE NAME: OLD BRAZOS FORGE INC

CERCLIS I.D.: TXD048901235 DATE OF DOC: 12/1/99

TITLE OF DOC.: PA/SSI WORK PLAN

NO. OF PGS. THIS TARGET SHEET REPLACES: ?

SDMS #: 912642 KEYWORD: 10.07

CONFIDENTIAL ?		OVERSIZED ITEMS ?	
COLOR ITEMS ?		MISSING PAGES ?	
ENCLOSURES / ATTACH. NOT INCLUDED ?			X
ALTERN. MEDIA ?		CROSS REFERENCE ?	

LAB DOCUMENT ?		LAB NAME:	
ASC./BOX #:		RAW ANALYT. DATA ?	
CASE #:		SDG #:	

COMMENTS : REFERENCE 1 NOT INCLUDED

VERSION 3

TNRCC

Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 2

TARGET SHEET

SITE NAME: OLD BRAZOS FORGE INC

CERCLIS I.D.: TXD048901235 DATE OF DOC: 12/1/99

TITLE OF DOC.: PA/SSI WORK PLAN

NO. OF PGS. THIS TARGET SHEET REPLACES: ?

SDMS #: 912642 KEYWORD: 10.07

CONFIDENTIAL ?		OVERSIZED ITEMS ?	
COLOR ITEMS ?		MISSING PAGES ?	
ENCLOSURES / ATTACH. NOT INCLUDED ?			X
ALTERN. MEDIA ?		CROSS REFERENCE ?	

LAB DOCUMENT ?		LAB NAME:	
ASC./BOX #:		RAW ANALYT. DATA ?	
CASE #:		SDG #:	

COMMENTS : REFERENCE 2 NOT INCLUDED

VERSION 3

TNRCC

Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 3

Texas Natural Resource Conservation Commission

INTEROFFICE MEMORANDUM

TO: Wendy Rozacky, Chief
Enforcement Section
Industrial and Hazardous Waste Division

DATE: July 15, 1994

THRU: Ernerst Heyer, Manager
Field Support Section, Field Operations Division

THRU: Susan Bredehoft, Liaison
Industrial and Hazardous Waste, Field Operations Division

FROM: Donald E. Wyrick, Environmental Quality Specialist
Region 9 - Waco

SUBJECT: Enforcement Action: Reconversion Technologies of Texas, Inc. (RETEK), No TNRCC Solid Waste Registration Number, No EPA I.D. Number, Compliance Evaluation Inspection (CEI) conducted June 16, 1994.

Introduction:

On June 16, 1994, the writer and Ms. Connie Wong, Enforcement Coordinator, Industrial and Hazardous Waste (I&HW) Division, Texas Natural Resource Conservation Commission (TNRCC), contacted Mr. Ken Drum, Plant Manager, Reconversion Technologies of Texas, Inc. (RETEK) and conducted an I&HW Compliance Evaluation Inspection (CEI) and investigation at the facility located at 1709 Highway 36 North, Brenham, (Washington County), Texas 77833. The inspection and investigation was initiated in response to a request from Ms. Wong regarding a potential threat to public health and the environment, which exists at the site, documentation of current and historical violations associated with the site and in view of pending TNRCC enforcement action.

RETEK manufactures cattle trailer flooring, air conditioning pads, fencing and panels from plastic and rubber tire shavings. Wastes generated at the facility include used motor oil, hydraulic oil, scrap metal, card board, wooden pallets and miscellaneous paper trash. RETEK failed to notify the TNRCC Executive Director of waste streams generated and waste management activities. An unauthorized discharge of wastewater from the process operations building was observed during the inspection. Mr. Drum stated that the discharge was cooling water. An unauthorized discharge of wastewater was observed and documented at this location by Ms. Wong during an inspection conducted on January 5, 1993. A copy of an Inter-office memorandum from Ms. Wong to the Enforcement Screening Committee, which addresses this matter is provide as Attachment A.

RETEK is located on a 20 acre site approximately one mile northwest of Brenham. Old Brazos Forge (OBF), owned by Hussman Corporation, 12999 St. Charles Rock Road, Bridgeton, MO 63044, manufactured wire shelving products at this site from 1965 to May of 1988. Steal manufacturing and electroplating were conducted during that period. From 1965 to 1982 untreated cyanide, chromium, copper, zinc and nickel bearing sludges and wastewater from electroplating operations were discharged into earthen trenches which collected and conveyed the waste to three unlined surface impoundments located in series. A sketch of these facilities is provided as Attachment B. Overflow discharged through another earthen trench into an unnamed tributary of the Little Sandy Creek. Chemical analyses of sediment samples collected from the unnamed tributary of Little Sandy Creek revealed heavy metals contamination downstream of the waste management units.

Samples collected from the tributary by TNRCC Region 12 representatives in 1984, 1986 and 1987 revealed elevated concentrations of chromium, lead, nickel, zinc and copper. A letter dated May 27, 1987, was sent to mr. Dennis Barron, General Manager, OBF, requesting a response regarding remediation of the documented contamination. No information is available regarding any action initiated by the company to address this matter. Attachment C provides copies of the chemical analyses of samples collected from the tributary, the letter to OBF and other related correspondence. During the inspection conducted on June 16, 1994, three soil samples were collected from the streamed of the tributary at points upstream, adjacent to, and downstream of the hazardous waste disposal sites for chemical analysis. The test results will be provided when they are available.

Groundwater contamination resulting from releases at the RETEK facility site has been documented. Sixteen groundwater monitoring wells have been installed at the site. Four of these wells have been plugged. Only six wells are currently being monitored and two of these are located upgradient of the abandoned disposal sites. A groundwater quality assessment conducted in 1988 by Reed and Associates, Inc. revealed chromium, copper, nickel, and zinc contamination in on-site downgradient monitoring wells. The water quality assessment also identified significantly greater conductivity concentrations than background conductivity values. the pH, TOC and TOX concentrations showed significant changes in downgradient monitoring wells.

On July 6, 1992 the TWC District 7 office received a request for assistance from Ms. Sally Blum, Route 6 Box 6033, Brenham, Texas 77833, regarding possible contamination of her water well. Ms. Blum had water samples collected from her well tested and the analysis revealed chromium levels as high as .0502 mg/l. Ms. Blum's house is located approximately one-half mile from the RETEK facility and the well is ninety feet deep. On August 28, 1992, Field representative from the TWC District 7 office (Houston) collected two samples from Ms. blum's well. Chemical analyses of the samples revealed elevated chromium concentrations of .055 mg/l and .056 mg/l.

On July 5, 1993, Ms. Wong collected a water sample from the Blum well and the Sheild's well another water well located down gradient from the hazardous waste disposal sites at RETEK. The samples revealed 70 ug/l hexavalent chromium and 9.1 ug/l hexavalent chromium respectively. Hexavalent chromium does not naturally occur in nature and indicates an industrial source of contamination. On January 5, 1993, Ms. Wong also collected samples from groundwater monitoring wells designated as well MW-5 and well MW-12, located at the RETEK facility. Laboratory results revealed that well MW_5 had a total chromium concentration of .112 mg/l and well MW-12 had a total chromium concentration of .147 mg/l. These concentrations exceed chromium concentrations found in upgradient monitoring well MW-2 and MW-9 and also exceed the Federal Drinking Water Standard of .100 mg/l. The sample collected from well MW-12 revealed a hexavalent chromium concentration of 4.1 ug/l. Copies of the chemical analyses of samples collected from the two private water wells located downgradient of the RETEK facility and from monitoring wells located on RETEK property, a groundwater contamination report prepared by TNRCC Region 12 representative and associated correspondence regarding the request for assistance are provided as Attachment D.

RETEK's groundwater monitoring system does not appear to be adequate. According to Ms. Wong, the groundwater in the down gradient pathway is not being sufficiently monitored. There is only one downgradient well from the trench area disposal site, well MW-10. The groundwater flow from the trench area is to the southeast of well MW-10. This determination is based a review by Ms. Wong, of water contour maps dated 1985 through 1988 and other geological data available.

During the sampling events conducted at RETEK on January 5, 1993, Ms. Wong documented that the monitoring well samples were very cloudy and that this may indicate the need for rehabilitation of the wells due to silting problems.

During the June 16, 1994, inspection, it was noted that several of the wells did not have adequate surface pads, locking caps, monitoring well identification numbers or bumper guards. 55-gallon drums located near the wells for collection of purge water were in a deteriorated state and several had holes in them. The surface impoundment landfill and area of the monitoring wells was overgrown with weeds. Cracks were observed at the southwest corner of the landfill. Photographs indicating the deteriorated state of the purge drums, state of the wells and general lack of maintenance and provided at Attachment E.

TNRCC notice of violation (NOV) letter dated December 17, 1993, was sent to Mr. John Jarrett, RETEK, as a result of a records review which identified several violations of the I&HW rules and areas of concern. Mr. Jarrett was requested to respond in writing by February 1,1 994 with the company's actions to correct the deficiencies and a schedule by which corrective action would be initiated and completed. A response was received on February 1,1 994. The response indicated that the company did not feel that any actions were warranted. A copy of the NOV letter, response letter and associated Inter-office memorandums to the TNRCC Enforcement Screening Committee, I&HW Division are provided as Attachment F.

In August of 1980 OBF filed a Part A hazardous waste permit application with the Texas Department of Waste Resources (TDWR) for the trench collection system and the surface impoundments. A copy of TDWR letter referencing the permit applications is provided as Attachment G. The surface impoundments were regulated as hazardous waste processing/disposal facilities under TDWR and Texas Water Commission (TWC) Solid Waste Registration No. 30897. Copies of OBF's Notice of Registration dated June 14, 1982 and June 13, 1989 are provided at Attachment H.

After a wastewater treatment system was installed in 1982, the facility ceased discharging into the surface impoundments and began discharging treated effluent into the unnamed tributary of Little Sandy Creek. The discharge was regulated under TWC Water Quality Permit No. 02542 and National Pollution Discharge Elimination System (NPDES) Permit No. TX 0089486, issued on April 5, 1982. Metal-Bearing sludge generated by the wastewater treatment system was (1) dewatered with a filter press, (2) accumulated for less than 90 days, and (3) shipped to an approved waste disposal site.

The wastewater conveyance trenches were closed in-place in accordance with a interum status closure plan approved by TDWR on April 26, 1982. The soils within the earthen trenches had elevated concentrations of chromium, copper, nickel and zinc. The plan included the transfer of a portion of the hazardous material within the trenches, excavated prior to the construction of a concrete foundation, to one of the surface impoundments. A building was constructed on top of the trench disposal area. A sketch of the disposal facilities indicating the location of the trenches, building and surface impoundments in provided as Attachment I. The TDWR approved the closure plan with the requirement that the trenches be regulated as a landfill, because not all of the contaminated soil was removed. The surface impoundments were also closed in-place with a closure plan approved by the TDWR on October 19, 1983. Closure certification was provided for the surface impoundments on August 22, 1984.

In 1984, OBF recorded in the Washington county deed records a .459 acre area, identified as the conveyance trenches and a 1.964 acre area, identified as the surface impoundments as hazardous waste disposal sites. Copies of the disposal site deed recordations are attached (Attachment J).

In November 1984, the facility filed an Affidavit of Exclusion (Attachment K) with the TDWR. The Affidavit of exclusion was filed to exempt OBF from submitting a RCRA Part B permit application. The exclusion was not applicable to the hazardous waste management facilities; collection trenches and surface impoundments, addressed in the Part A permit application. On July 31, 1985, the TWC withdrew the request for the RCRA Part B permit application, resulting in OBF being in violation of operating hazardous waste landfills without a permit . The landfills are currently not permitted.

On August 8, 1984 OBF and Chesley Industries, 20775 Chesley Drive, Farmington, Michigan, merged, with Chesley Industries being the surviving Corporation. Hussman Corporation is the Parent corporation of Chesley Industries. Chesley Industries sold the OBF 20 acre site to Recycled Products Corporation on may 18, 1992. Recycled Products Corporation sold the property to Reconversion Technologies of Texas Inc., with the exception of the 1.964 acre tract, being used as a hazardous waste disposal site, on August 1, 1992. Copies of Deed transaction records to the property are provided as Attachment L.

A chronological list of events and documents regarding OBF/RETEK was complied by Ms. Wong and is provided as Attachment M.

Violations:

Based on the facts and information obtained during the June 16, 1994, inspection and on-going investigation of the facility, the following alleged violations of I &HW regulations were noted.

Technical Recommendations

Conclusion

Based on facts and information obtained during the inspection and investigation which revealed that releases of contaminants from the site have impacted a receiving stream and the groundwater, a potential threat to public health exists at the site and in view of significant current and unresolved historical violations documented at this site.

Donald E. Wyrick
Don Wyrick, EQS

Jim Edwards
Jim Edwards
Waste Program Manager, R-9

TNRCC

Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 4

RECYCLED PRODUCTS CORPORATION
4111 Shorecrest Drive – Dallas, Texas 75209
Phone 214/358-1844 Fax 214/358-4230

December 30, 1994

Ms. Laura Ray, Staff Attorney
TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
P. O. Box 13087
Austin, Texas 78711-3087

Re: Solid Waste Registration No. 82313 (formerly 30897) Otherwise known as the Old Brazon Forge Property (Hussman) in Brenham, Texas, owned by Reconversion Technologies of Texas.

Dear Ms. Ray:

On December 20th, 1994, I was in attendance at a meeting in your offices along with representatives of Retek and Hussman. Although I have never owned any stock in Recycled Products Corporation, I am President. I was there to represent RPC.

RPC is a shell corporation with no significant cash value assets. I, personally, am in Chapter 11. I have been in bankruptcy since July 1990, and I see no change in that status for several years to come.

Allow me to review for you the facts surrounding RPC's involvement, if any:

1. RPC bought the subject property from Hussman on or about May 31, 1992.

2. RPC sold the subject property on or about August 1, 1992 to Retex, with the understanding that they would do the sampling, inspections and all things necessary to be in compliance..

3. RPC never operated a manufacturing of facility there. Not even for one day. RPC never applied for electrical power at the subject property. RPC never contributed one ounce of pollution of any kind to the subject property.

4. Jim Turner was President of Retex on or about August 1, 1992. This relationship was terminated abruptly on August 25, 1993. During my term as President, Retex kept up its agreement with Hussman relating to inspections and care of the fenced in area. I believe that Retex was in full compliance and never contributed to any pollution of the property

during this time. I have no knowledge of what has happened on the property since August 25, 1993. I was ordered not to set foot on the property again. I haven't!

5. If RPC, because of technical ownership for two months, should be assessed any penalties, I'll assure you that RPC does not have the financial capability to participate. I personally do not have the financial ability to be any help whatsoever, including paying my own expenses to come to Austin for meetings. My knowledge is so limited that my intellectual contribution is thimble-sized. On the other hand, I want to be as helpful as possible because I am dedicated to keeping this earth clean for future generations.

Sincerely yours,

James E. Turner

James E. Turner, Individually

James E. Turner

James E. Turner, President of Recycled Products Corporation

TNRCC

Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 5

ERN copy

Texas Natural Resource Conservation Commission

INTEROFFICE MEMORANDUM

To: Peggy Newberry, I & HW Liason Date: 12-19-95
Field Operations Division

Thru: JMV J. Mac Vilas, Supervisor
I & HW Team I, Waste Section
Enforcement Division

From: Connie Wong, Enforcement Coordinator
I & HW Team I, Waste Section, Enforcement Division

Subject: Reconversion Technologies of Texas (RETEK)
Former Old Brazos Forge Site
1709 Highway 36 Northwest, Brenham, Texas 77833
TNRCC Solid Waste Registration Nos. 82313 and 30897
EPA I.D. No. TXD048901235

I. INTRODUCTION

On November 15, 1995, J. Mac Vilas and Connie Wong of the Enforcement Division conducted an inspection of the above noted facility and sampled four residential water wells located approximately one half mile downgradient of the 20 acre site. The facility was bought by RETEK in December, 1992 from Recycled Products and was shut down on/about May of 1995. The facility was originally owned by the Hussman Corporation which operated the former Old Brazos Forge Company at this site. Finished metal products were produced including food display racks. RETEK, along with Hussman Corporation and Recycled Products, were issued a Notice of Petition and Executive Director's Report by TNRCC on November 3, 1994 which alleged violations of the Texas Administrative Code, Title 30 and the Code of Federal Regulations, Title 40. Many of the violations and areas of concern relate to the three (3) former surface impoundments and earthen trenches that were used to manage industrial and hazardous wastewater and sludges (EPA listed waste F006, F007, F009 and F019). The surface impoundments and trenches were closed as hazardous waste landfills, measuring 1.964 acres and 0.459 acre, in August 1984 and July 1982, respectively. This memorandum documents new violations, continuing violations and areas of concern observed during the inspection.

II. VIOLATIONS

A. NEW VIOLATIONS

1. 30 TAC §335.112(a)(6) - Standards, incoporating; 40 CFR §265.117(b)(1) - Security

This regulation states that the Regional Administrator may require, at partial and final closure, continuation of any of the security requirements of §265.14 during part or all of the

post-closure care when access by the public may pose a hazard to human health. The security requirements in 40 CFR §265.14(b) states that a sign with the legend, "Danger - Unauthorized Personnel Keep Out," must be posted at each entrance to the active portion of the facility and at other locations in sufficient numbers to be seen from any approach to this active portion.

The former surface impoundments, closed as a hazardous waste landfill, did not have signs with the required legend in sufficient numbers and places to be seen from any approach (see Attachment F, Photographs #6, 7, 8, 9, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34). High vegetation also impeded viewing of the signs.

2. <u>30 TAC §335.4 - General Prohibitions and Texas Water Code §26.121 - Unauthorized Discharge Prohibited</u>

Section §335.4 of 30 TAC states that no person may cause, suffer, allow or permit the collection, handling, storage, processing or disposal of industrial solid waste in such a manner so as to cause: (1) the discharge or imminent threat of discharge of such waste into or adjacent to waters in the State without obtaining specific authorization for such a discharge from the TNRCC; (2) the creation or maintenance of a nuisance; or (3) the endangerment of the public health and welfare.

In addition, Section §26.121 of the Texas Water Code states that no person may engage in any activity which would cause pollution of waters in the State.

On September 28, 1995, TNRCC sampled four residential water wells within one half mile and downgradient of the facility (see Attachment A and Attachment F, Photographs #35 - 48). The results indicated that two wells were contaminated with hexavalent chromium (see Attachment B). These two wells also had total chromium above the EPA Drinking Water Standard.

On November 15, 1995, TNRCC re-sampled the four wells. The November 15, 1995 sample results also indicated that the same two wells were contaminated with hexavalent chromium and one of these wells exceeded the EPA Drinking Water Standard for total chromium (see Attachment C). Three of the four sampled wells are currently used as drinking water sources for the residents. The owner of the other well (Blum well) has been purchasing and drinking bottled water since the January 1993 TNRCC sampling and discovery of hexavalent chromium in their well. A survey of the area by TNRCC personnel revealed that there are approximately 15 homes in the area of the contaminated wells and a number of trailer homes adjacent to the closed hazardous waste landfill at the facility (see Attachment D).

Hexavalent chromium, commonly used in metal plating operations, is not naturally occurring in ground water. In a previous sampling event TNRCC conducted on January 5, 1993, groundwater samples from the facility's monitor wells indicated that there was chromium in concentrations above the Drinking Water Standard in two downgradient wells (MH-5 and MH-12) and hexavalent chromium in one downgradient well (MH-12). There are no other known industrial sources of chromium and hexavalent chromium near the contaminated residential wells or between the contaminated wells and the facility. In addition, the concentration of hexavalent chromium has increased from 70 to 88 micrograms/liter and the total chromium concentration has increased three fold from 0.05 to 0.15 milligrams/liter in one of the residential wells (Blum well) located downgradient and closest to the facility from January 1993 to November 1995.

3. <u>30 TAC §335.112(a)(5) - Standards, incorporating; 40 CFR §265.90(b) - Ground-Water Monitoring</u>

The owner or operator must install, operate and maintain a ground-water monitoring system which complies with §265.91 - §265.94. The ground-water monitoring program must be carried out during the active life of the facility, and for disposal facilities, during the post-closure period as well.

On November 15, 1995, TNRCC personnel noted a number of items that indicated the groundwater monitoring system is not being maintained, including the fact that the wells were inaccessible due to overgrown vegetation. In addition, it is evident that the required groundwater sampling at the closed hazardous waste landfill is not being conducted, since the wells at the facility are inaccessible, and since the TNRCC files indicate that the last ground-water sampling report filed by the facility was dated October 29, 1994. Without sampling of the monitor wells, the concentrations of chromium and other hazardous waste constituents already present in ground water cannot be monitored.

4. <u>30 TAC §335.112(a)(6) - Standards, incorporating; 40 CFR §265.228(a)(2)(iii) - Post Closure Care for a Surface Impoundment</u>

At closure, the owner or operator must provide post-closure care for a landfill, including the following: cover the surface impoundment with a final cover designed and constructed to provide long-term minimization of the migration of liquids through the closed impoundment and promote drainage and minimize erosion of the cover.

On November 15, 1995, TNRCC personnel noted that the landfill cover was overgrown with vegetation over 6 feet in height (see Attachment F, Photographs #6, 7, 8, 9, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34). In addition, the soil and vegetation

near the landfill appeared to be dry. The tall vegetation does not promote drainage of the cover and the dry vegetation and soil does not indicate that it has been watered to prevent cracking of the landfill cover. A breach in the integrity of the landfill cover may result in exposure of hazardous waste to the ground water, soil or air.

5. 30 TAC §335.112(a)(6) - Standards, incorporating; 40 CFR §265.228(b)(3) - Post-Closure Care of a Ground-Water Monitoring System

During the post-closure care period, the owner/operator of a surface impoundment in which wastes remain after closure must maintain and monitor the ground-water monitoring system.

On November 15, 1995, TNRCC personnel noted the following items indicating the ground-water monitoring system is not being maintained. The outercasing to well MH-12 was damaged (see Attachment F, Photograph #2); this may allow surface contamination to enter at the well head. Well MH-10 was unlocked (see Attachment F, Photograph #3), allowing access by unauthorized persons to the well. The grass and vegetation in and around the landfill was over six feet tall, making monitor wells MH-2, MH-6, MH-9 and MH-15 inaccessible for sampling (see Attachment F, Photographs #6-9, and #24-34). The concentration of chromium and other hazardous waste constituents in ground water could not be monitored if the wells are not sampled. Well MH-3 had a bent bumper pole (see Attachment F, Photographs #4, 5).

6. 30 TAC §335.112(a)(6) - Standards, incorporating; 40 CFR §265.118(d)(1) - Post Closure Care Plan Amendment

This regulation states that the owner or operator must amend the post-closure plan whenever events which occur during the active life of the facility, including final closures, affect the post-closure plan.

The facility was closed in May 1995 and TNRCC has still not received any amendment to the post-closure care plan. Lack of a post-closure care plan amendment and implementation thereof may result in an undetected release of hazardous waste to the ground water, soil or air.

B. **CONTINUING VIOLATIONS**

1. 30 TAC §335.112(a)(7) - Standards, incorporating; 40 CFR §265.145 - Post-Closure Financial Assurance

An owner or operator of a facility with a hazardous waste disposal unit must establish financial assurance for post-closure care of the disposal units.

On November 30, 1995, the TNRCC Financial Assurance Section noted that the property owners, RETEK and Recycled Products, have not posted financial assurance since June 1992 for the maintenance of the landfill and the groundwater monitoring system. TNRCC is currently holding a letter of credit issued by The Boatmen's National Bank [Letter of Credit No. S703118, Amendment 005] dated May 12, 1995 from Hussman Corporation for financial assurance for the hazardous waste landfills. This violation was previously noted in the TNRCC Executive Director's Report dated November 3, 1994.

2. <u>30 TAC §335.116(b)/40 CFR §265.91(a)(2) - Ground-Water Monitoring System</u>

A ground-water monitoring system must be capable of yielding ground-water samples for analysis and must consist of monitoring wells (at least three) installed hydraulically downgradient at the limit of the waste management area. Their numbers, locations and depths must ensure that they immediately detect any statistically significant amounts of hazardous waste or hazardous waste constituents that migrate from the waste management area to the uppermost aquifer.

The ground water directly downgradient from the southern end of the 1.964 acres landfill and 0.459 acre landfill area is not being monitored (see Attachment E). Well MH-10 is downgradient from this area; however, it alone is not sufficient to monitor all the ground water downgradient from the southern area of the landfill. The flow path from the southern area, as determined from water contour maps dated 1985 through 1995, is towards the southwest of MH-10. Additionally, MH-10 is not at the limit of the waste management area. According to the water contour maps in Attachment D, well MH-6 is not a downgradient well; therefore, the waste management area is being monitored by only two downgradient wells at the limit of the waste management area. This violation was previously noted in the TNRCC Executive Director's Report dated November 3, 1994.

3. <u>30 TAC §335.2(i)/40 CFR §270.1(c) - Permit Required</u>

Owners and operators of surface impoundments, landfills, land treatment units and waste pile units that received wastes after July 25, 1982, or that certified closure after January 26, 1983, must have post-closure permits, unless they demonstrate closure by removal.

Two hazardous waste landfills, 0.459 acre and 1.964 acres in size, were closed at the facility in July 1982 and August 1984, respectively. The 1.964 acre landfill is subject to post-closure permitting, while both landfills are subject to post-closure care under 40 CFR 265. An affidavit for exclusion from permitting based on accumulation time limit and wastewater treatment system exemption was filed in November

1984 and was approved by TNRCC on July 31, 1985. However, this affidavit failed to demonstrate that the closed, 1.964 acre hazardous waste landfill met any permit exemptions, including accumulation time storage requirements and the definition of a wastewater treatment system tank. Thus, the affidavit was approved on inaccurate information provided by the facility. In June 1992, the ownership of the facility transferred from Hussman Corporation to Recycled Products, thus terminating the exclusion from permitting based on the affidavit. In December 1992, Reconversion Technologies of Texas (RETEK) purchased approximately 18 acres of the property, excluding the 1.964 acre landfill, but including the buildings and the 0.459 acre landfill. TNRCC notified Hussman Corporation by letter dated February 1, 1989 that a post-closure care permit would be required for the 1.964 acre landfill and the facility has not obtained a post-closure care permit since then. This violation was previously noted in the TNRCC Executive Director's Report dated November 3, 1994.

III. AREAS OF CONCERN

1. On November 15, 1995, TNRCC personnel noted that the barbed wire fence around the facility was in disrepair at the south end of the building, allowing entrance of unauthorized persons onto the facility grounds.

2. On November 15, 1995, TNRCC personnel noted that there were abandoned plastic materials in various stages of processing stored in a haphazard manner about the facility yard. In particular, TNRCC noted that there were piles of plastic (see Attachment F, Photographs #13, 14, 15, 17, 18, 19, 20, 21), wooden pallets (see Attachment F, Photographs #13, 20, 21), and drums of unknown contents by well MH-3 (see Attachment F, Photographs #4, 5) and on the south end and back of the building (see Attachment F, Photographs #14, 18, 21).

The photographs and associated maps are included as attachments to this report. This information is submitted as file information.

Signed: Connie Wong

Connie Wong, Enforcement Coordinator

cc: Don Wyrick, TNRCC Region 9 - Waco

Attachments A - F

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A. Map of Drinking Water Wells Sampled

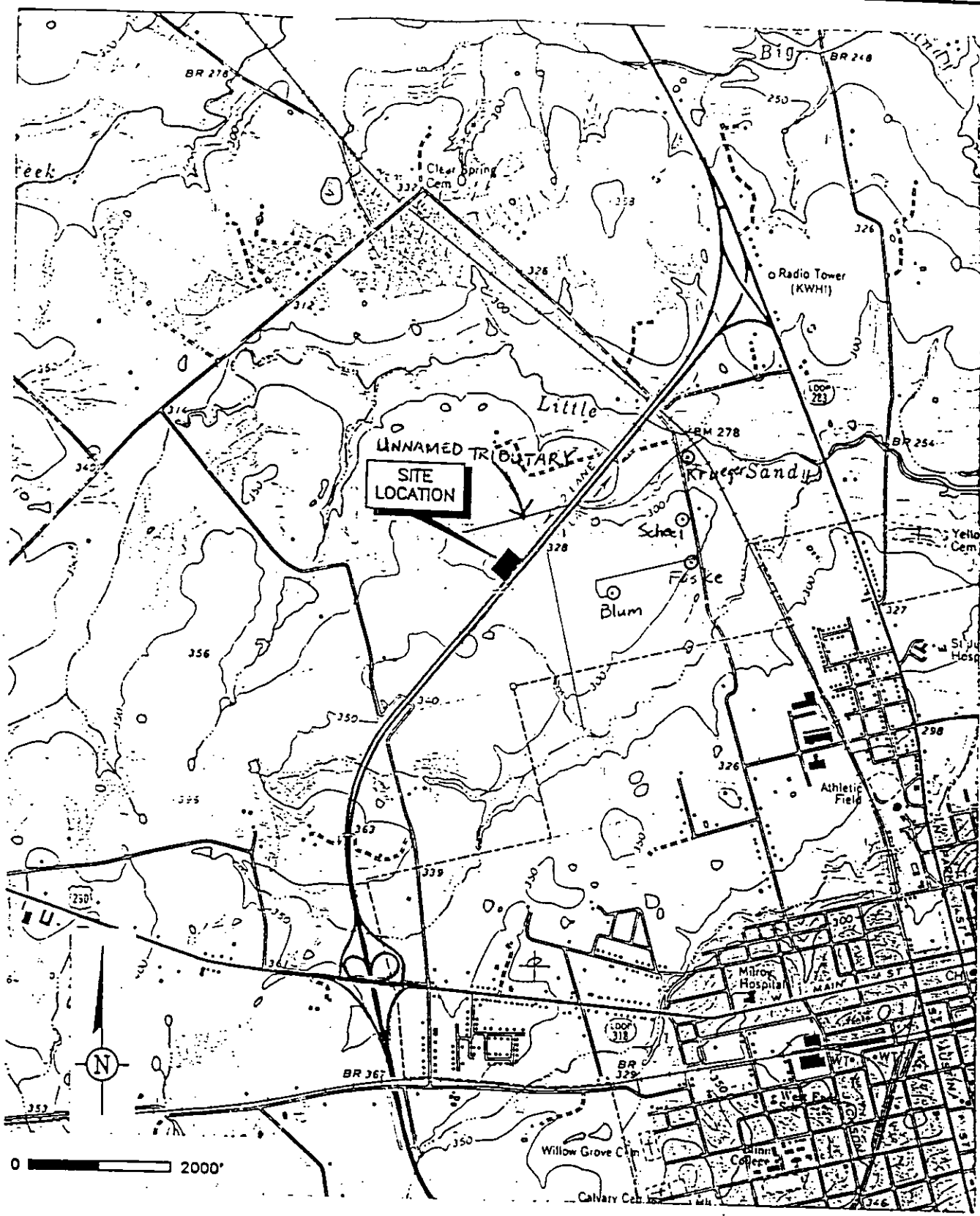
B. Laboratory Results, Chain of Custody Tags and Laboratory Quality Control Data for Samples Taken on 9-28-95

C. Laboratory Results, Chain of Custody Tags and Laboratory Quality Control Data for Samples Taken on 11-15-95

D. Aerial Photo dated 9-16-94

E. Water Contour Maps from 1985 to 1995 Indicating Insufficient Number of Downgradient Wells and Unmonitored Trench Landfill

F. Photographs taken on 11-15-95 of the Retek Facility and the Residential Drinking Water Wells Sampled



DRAFTER:
APPROVED:
CHECKED:
DRAWING:
FILE NO.:
PRJCT NO.: CC0195.001
DWG DATE:

ATTACHMENT A

CASE DEVELOPMENT INSPECTION (C.D.I.)

11-15-95

RETEK / OLD BRAZOS FORGE
S.W.R. Nos. 82313 and 30897
MAP OF DRINKING WATER WELLS

– BRENHAM, TEXAS

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SUPPLEMENT TO FINAL ANALYSIS REPORT

REVISED
LAB ID: 9603171
FACILITY: TNRCCFOD
ACCT NO: TNRCCFOD
LCRA

SAMPLE TYPE: Water

ORIGINAL DATE REPORTED: 10/31/9
REVISION DATE REPORTED: 11/15/9
DATE RECEIVED: 09/28/9
SAMPLE DATE: 09/28/9
SAMPLE TIME: 1215
DEPTH:

LOCATION ID: HM 06633

Faske

PARAMETER	RESULTS	UNITS	METHOD #	PQL in WATER	DATE ANALYZED
Arsenic, Dissolved	<0.05	mg/L	EPA200.7	0.05	10/09/95
Arsenic, Total	<0.05	mg/L	EPA200.7	0.05	10/18/95
Barium, Dissolved	0.24	mg/L	EPA200.7	0.01	10/09/95
Barium, Total	0.21	mg/L	EPA200.7	0.01	10/18/95
Cadmium, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Cadmium, Total	<0.01	mg/L	EPA200.7	0.01	10/18/95
Chromium, Dissolved	0.01	mg/L	EPA200.7	0.01	10/09/95
Chromium, ICPMS	27.2	ug/L	EPA200.8	1.0	11/15/95
Chromium, Total	0.12	mg/L	EPA200.7	0.01	10/18/95
Copper, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Copper, Total	<0.01	mg/L	EPA200.7	0.01	10/18/95
Cyanide, Total	<0.020	mg/L	EPA335.2	0.001	10/11/95
Hexavalent chromium	0.01	mg/l	EPA7196	0.01	09/28/95
Lead, Dissolved	0.07	mg/L	EPA200.7	0.05	10/09/95
Lead, Total	<0.05	mg/L	EPA200.7	0.05	10/18/95
Manganese, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Manganese, Total	0.01	mg/L	EPA200.7	0.01	10/18/95
Mercury, Diss.-AA	<0.2	ug/L	EPA245.1	0.2	10/13/95
Mercury, Total-AA	<0.2	ug/L	EPA245.1	0.2	10/04/95
Nickel, Dissolved	<0.02	mg/L	EPA200.7	0.02	10/09/95
Nickel, Total	<0.02	mg/L	EPA200.7	0.02	10/26/95
Selenium, Dissolved	0.09	mg/L	EPA200.7	0.05	10/09/95
Selenium, ICPMS	<4.0	ug/L	EPA200.8	4.0	11/15/95
Selenium, Total	<0.05	mg/L	EPA200.7	0.05	10/18/95
Silver, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Silver, Total	<0.01	mg/L	EPA200.7	0.01	10/18/95
Total Hardness	231	mg/L	SM2340B	1	10/18/95
Zinc, Dissolved	0.13	mg/L	EPA200.7	0.01	10/09/95
Zinc, Total	0.12	mg/L	EPA200.7	0.01	10/18/95

Roland Garcia for
BUCK HENDERSON
LABORATORY MANAGER

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SUPPLEMENT TO FINAL ANALYSIS REPORT

REVISED
LAB ID: 9603170
FACILITY: TNRCCFOD
ACCT NO: TNRCCFOD
LCRA

SAMPLE TYPE: Water

ORIGINAL DATE REPORTED: 10/31/
REVISION DATE REPORTED: 11/15/
DATE RECEIVED: 09/28/
SAMPLE DATE: 09/28/
SAMPLE TIME: 1140
DEPTH:

LOCATION ID: HM 06644 Blum

PARAMETER	RESULTS	UNITS	METHOD #	PQL in WATER	DATE ANALYZED
Arsenic, Dissolved	<0.05	mg/L	EPA200.7	0.05	10/09/95
Arsenic, Total	<0.05	mg/L	EPA200.7	0.05	10/18/95
Barium, Dissolved	0.31	mg/L	EPA200.7	0.01	10/09/95
Barium, Total	0.28	mg/L	EPA200.7	0.01	10/18/95
Cadmium, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Cadmium, Total	<0.01	mg/L	EPA200.7	0.01	10/18/95
Chromium, Dissolved	0.11	mg/L	EPA200.7	0.01	10/09/95
Chromium, ICPMS	107.8	ug/L	EPA200.8	1.0	11/15/95
Chromium, Total	0.11	mg/L	EPA200.7	0.01	10/18/95
Copper, Dissolved	0.01	mg/L	EPA200.7	0.01	10/09/95
Copper, Total	0.02	mg/L	EPA200.7	0.01	10/18/95
Cyanide, Total	<0.020	mg/L	EPA335.2	0.001	10/11/95
Hexavalent chromium	0.07	mg/l	EPA7196	0.01	09/28/95
Lead, Dissolved	<0.05	mg/L	EPA200.7	0.05	10/09/95
Lead, Total	0.07	mg/L	EPA200.7	0.05	10/18/95
Manganese, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Manganese, Total	<0.01	mg/L	EPA200.7	0.01	10/18/95
Mercury, Diss.-AA	<0.2	ug/L	EPA245.1	0.2	10/13/95
Mercury, Total-AA	<0.2	ug/L	EPA245.1	0.2	10/04/95
Nickel, Dissolved	<0.02	mg/L	EPA200.7	0.02	10/09/95
Nickel, Total	<0.02	mg/L	EPA200.7	0.02	10/26/95
Selenium, Dissolved	0.11	mg/L	EPA200.7	0.05	10/09/95
Selenium, ICPMS	5.0	ug/L	EPA200.8	4.0	11/15/95
Selenium, Total	<0.05	mg/L	EPA200.7	0.05	10/18/95
Silver, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Silver, Total	<0.01	mg/L	EPA200.7	0.01	10/18/95
Total Hardness	327	mg/L	SM2340B	1	10/18/95
Zinc, Dissolved	0.78	mg/L	EPA200.7	0.01	10/09/95
Zinc, Total	0.70	mg/L	EPA200.7	0.01	10/18/95

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SUPPLEMENT TO FINAL ANALYSIS REPORT

REVISED
LAB ID: 9603168
FACILITY: TNRCCFOD
ACCT NO: TNRCCFOD
LCRA

SAMPLE TYPE: Water

ORIGINAL DATE REPORTED: 10/31/9
REVISION DATE REPORTED: 11/15/9
DATE RECEIVED: 09/28/9
SAMPLE DATE: 09/28/9
SAMPLE TIME: 0915
DEPTH:

LOCATION ID: HM 06631 Krueger

PARAMETER	RESULTS	UNITS	METHOD #	PQL in WATER	DATE ANALYZED
Arsenic, Dissolved	<0.05	mg/L	EPA200.7	0.05	10/09/95
Arsenic, Total	<0.05	mg/L	EPA200.7	0.05	10/18/95
Barium, Dissolved	0.30	mg/L	EPA200.7	0.01	10/09/95
Barium, Total	0.28	mg/L	EPA200.7	0.01	10/18/95
Cadmium, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Cadmium, Total	<0.01	mg/L	EPA200.7	0.01	10/18/95
Chromium, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Chromium, ICPMS	17.1	ug/L	EPA200.8	1.0	11/15/95
Chromium, Total	0.02	mg/L	EPA200.7	0.01	10/18/95
Copper, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Copper, Total	<0.01	mg/L	EPA200.7	0.01	10/18/95
Cyanide, Total	<0.020	mg/L	EPA335.2	0.001	10/11/95
Hexavalent chromium	<0.01	mg/l	EPA7196	0.01	09/28/95
Lead, Dissolved	<0.05	mg/L	EPA200.7	0.05	10/09/95
Lead, Total	<0.05	mg/L	EPA200.7	0.05	10/18/95
Manganese, Dissolved	0.02	mg/L	EPA200.7	0.01	10/09/95
Manganese, Total	0.02	mg/L	EPA200.7	0.01	10/18/95
Mercury, Diss.-AA	<0.2	ug/L	EPA245.1	0.2	10/04/95
Mercury, Total-AA	<0.2	ug/L	EPA245.1	0.2	10/04/95
Nickel, Dissolved	<0.02	mg/L	EPA200.7	0.02	10/09/95
Nickel, Total	<0.02	mg/L	EPA200.7	0.02	10/26/95
Selenium, Dissolved	0.10	mg/L	EPA200.7	0.05	10/09/95
Selenium, ICPMS	<4.0	ug/L	EPA200.8	4.0	11/15/95
Selenium, Total	<0.05	mg/L	EPA200.7	0.05	10/18/95
Silver, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Silver, Total	<0.01	mg/L	EPA200.7	0.01	10/18/95
Total Hardness	258	mg/L	SM2340B	1	10/18/95
Zinc, Dissolved	0.40	mg/L	EPA200.7	0.01	10/09/95
Zinc, Total	0.37	mg/L	EPA200.7	0.01	10/18/95

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LABORATORY MANAGER

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SUPPLEMENT TO FINAL ANALYSIS REPORT

REVISED
LAB ID: 9603169
FACILITY: TNRCCFOD
ACCT NO: TNRCCFOD
LCRA

SAMPLE TYPE: Water

ORIGINAL DATE REPORTED: 10/31/9
REVISION DATE REPORTED: 11/15/9
DATE RECEIVED: 09/28/9
SAMPLE DATE: 09/28/9
SAMPLE TIME: 1030
DEPTH:

LOCATION ID: HM 06632 Scheel

PARAMETER	RESULTS	UNITS	METHOD #	PQL in WATER	DATE ANALYZED
Arsenic, Dissolved	<0.05	mg/L	EPA200.7	0.05	10/09/95
Arsenic, Total	0.05	mg/L	EPA200.7	0.05	10/18/95
Barium, Dissolved	0.14	mg/L	EPA200.7	0.01	10/09/95
Barium, Total	0.12	mg/L	EPA200.7	0.01	10/18/95
Cadmium, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Cadmium, Total	<0.01	mg/L	EPA200.7	0.01	10/18/95
Chromium, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Chromium, ICPMS	20.9	ug/L	EPA200.8	1.0	11/15/95
Chromium, Total	0.01	mg/L	EPA200.7	0.01	10/18/95
Copper, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Copper, Total	<0.01	mg/L	EPA200.7	0.01	10/18/95
Cyanide, Total	<0.020	mg/L	EPA335.2	0.001	10/11/95
Hexavalent chromium	<0.01	mg/l	EPA7196	0.01	09/28/95
Lead, Dissolved	<0.05	mg/L	EPA200.7	0.05	10/09/95
Lead, Total	0.07	mg/L	EPA200.7	0.05	10/18/95
Manganese, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Manganese, Total	<0.01	mg/L	EPA200.7	0.01	10/18/95
Mercury, Diss.-AA	<0.2	ug/L	EPA245.1	0.2	10/04/95
Mercury, Total-AA	<0.2	ug/L	EPA245.1	0.2	10/04/95
Nickel, Dissolved	<0.02	mg/L	EPA200.7	0.02	10/09/95
Nickel, Total	<0.02	mg/L	EPA200.7	0.02	10/26/95
Selenium, Dissolved	0.12	mg/L	EPA200.7	0.05	10/09/95
Selenium, ICPMS	<4.0	ug/L	EPA200.8	4.0	11/15/95
Selenium, Total	<0.05	mg/L	EPA200.7	0.05	10/18/95
Silver, Dissolved	<0.01	mg/L	EPA200.7	0.01	10/09/95
Silver, Total	<0.01	mg/L	EPA200.7	0.01	10/18/95
Total Hardness	290	mg/L	SM2340B	1	10/18/95
Zinc, Dissolved	0.17	mg/L	EPA200.7	0.01	10/09/95
Zinc, Total	0.16	mg/L	EPA200.7	0.01	10/18/95

Roland Garcia for

BUCK HENDERSON
LABORATORY MANAGER

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QUALITY CONTROL DATA REPORT

REPORT DATE: 11/13/95

% SPIKE RECOVERY

SAMPLE ID	As	Ba	Cd	Cr	Cu	Pb	Hg-AA	Mn	Ni	Se	Ag	Zn
9603168-71 Dis.	107.3	98.9	107.8	107.7	98.5	104.5	95.2	105.4	105.7	120.6	88.1	108.2
9603168-71 Total	100.3	93.3	98.2	96.6	100.2	92.4		94.8	100.4	94.8	100.9	99.3
9603173-76 Dis.	107.0	101.8	107.9	106.9	104.3	109.2	96.6	108.3	107.7	105.9	108.5	110.7
UPPER LIMIT	130	130	130	130	130	130	130	130	130	130	130	130
LOWER LIMIT	70	70	70	70	70	70	70	70	70	70	70	70

RELATIVE % DEVIATION

SAMPLE ID	As	Ba	Cd	Cr	Cu	Pb	Mn	Ni	Se	Ag	Zn	Hg-AA
9603168-71 Dis.	0.3	0.0	3.0	1.3	0.0	1.7	0.8	0.8	0.1	0.0	1.5	0.2
9603168-71 Total	0.1	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.1	0.7	0.0	
9603173-76 Dis.	2.8	0.0	1.7	1.8	1.5	3.4	1.7	1.6	2.2	1.4	1.6	0.2
UPPER LIMIT	+15	+15	+15	+15	+15	+15	+15	+15	+15	+15	+15	+15
LOWER LIMIT	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15

% STANDARD RECOVERY

SAMPLE ID	As	Ba	Cd	Cr	Cu	Pb	Mn	Ni	Se	Ag	Zn	Hg-AA	Fe
9603168-71 Dis.	103.6	100.5	105.7	106.0	101.1	104.9	105.1	104.2	103.3	104.1	106.8	96.4	
9603168-71 Total	99.4	93.6	102.4	101.1	94.0	99.2	99.4	105.9	99.2	98.7	101.4		99.2
9603173-76 Dis.	105.3	101.3	106.7	107.2	101.9	107.0	106.0	105.3	104.6	104.8	107.6	98.2	
UPPER LIMIT	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0
LOWER LIMIT	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

Roland Garcia

QA APPROVED

TEXAS WATER COMMISSION

TWC-0287 (Rev.05-05-86)

No. HM 06631 District 9 County Washington Basin Brazos Lab. LCRA

Discharger Name Old Brazos Forge Time Collected

Plant Name BETEK Point of Collection Krueger water well

Method of Flow Measurement N/A

PERMIT NUMBER	PAGE NO.	CARD TYPE	DATE Mo.	Day	Yr.	MAT STAMP
1 9	10 12	13	14 15	16 17	18 19	20
			09	28	95	W

Chlorine Contact Time N/A

Date Shipped hand delivered 9/28/95

Collector's Signature Don Wyrick

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Flow (gpd)		Water Temperature (°F)		pH	
00056		00011		00400	
D.O. (mg/l)		Turbidity (JTU)			
00300		00070			

TEXAS WATER COMMISSION

No. HM 06631 District 9 Lab. Used LCRA Lab. No.

Type Sample: Heavy Metals

Grab ✓ Composite Hr.

Observations

Material Sampled: Raw, Partially Treated, Final, Stream, Solid Waste water well

Method of Preservation HNO_3, Ice

Auxillary Tags AT040367, AT040368, AT040369, + AT040370

Date Completed

Analyst's Signature

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Arsenic		Barium			
Cadmium		Chromium		Copper	
Lead		Manganese		Mercury	
Nickel		Selenium		Silver	
Zinc					

TEXAS WATER COMMISSION

DISTRICT 9

No. HM 06631

05014

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

No. AT 040368 Corresponds to HM 06631

Lab. No.

Date Taken 9/28/95 Time Taken

Date Sealed 9/28/95 Date Shipped 9/28/95 hand delivered

Method of Conveyance State vehicle (hand delivered)

Certification (Sig.) Don Wynell

TWC 0169 (Rev. 10-20-94)

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

No. AT 040367 Corresponds to HM 06631

Lab. No.

Date Taken 9/28/95 Time Taken

Date Sealed 9/28/95 Date Shipped 9/28/95 hand delivered

Method of Conveyance State vehicle (hand delivered)

Certification (Sig.) Don Wynell

TWC 0169 (Rev. 10-20-94)

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

No. AT 040369 Corresponds to HM 06631

Lab No.

Date Taken 9/28/95 Time Taken

Date Sealed 9/28/95 Date Shipped 9/28/95 Hand Delivered

Method of Conveyance State vehicle (hand delivered)

Certification (Sig.) Don't Wyrick

TWC 0169 (Rev. 10-20-94)

05016

TEXAS WATER COMMISSION

TWC-0287 (Rev.05-05-86)

No. HM 06632 District 9 County Washington Basin Brazos Lab. LCRA

Discharger Name Old Brazos Forge

Time Collected

Plant Name RETEK

Point of Collection School's water well

Method of Flow Measurement N/A

PERMIT NUMBER	PAGE NO.	CARD TYPE	DATE Mo.	DATE Day	DATE Yr.	MAT STAMP
1 9	10 12	13	14 15	16 17	18 19	20
			09	28	95	W

Chlorine Contact Time N/A

Date Shipped 9/28/95 hand delivered

Collector's Signature Don Wyrick

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Flow (gpd)		Water Temperature (°F)		pH	
00056		00011		00400	
D.O. (mg/l)		Turbidity (JTU)			
00300		00070			

TEXAS WATER COMMISSION

No. HM 06632 District 9

Lab. Used LCRA Lab. No.

Type Sample: Heavy Metals

Material Sampled: Raw, Partially Treated, Final, Stream, Solid Waste water well

Grab ✓ Composite Hr.

Method of Preservation HNO_3, Ice

Observations

Auxillary Tags AT040324, AT040505, AT040306

Date Completed

Analyst's Signature

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Arsenic		Barium			
Cadmium		Chromium		Copper	
Lead		Manganese		Mercury	
Nickel		Selenium		Silver	
Zinc					

TEXAS WATER COMMISSION

DISTRICT 9

No. HM 06632

TWC 0287

0501

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

No. AT 040306 Corresponds to HM 06632

Lab. No.

Date Taken 9/28/95 Time Taken

Date Sealed 9/28/95 Date Shipped 9/28/95 hand delivered

Method of Conveyance State vehicle (hand delivered)

Certification (Sig.) Don Wynick

TWC 0169 (Rev. 10 20 94)

05018

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

No. AT 040304 Corresponds to HM06632

Lab. No.

Date Taken 9/28/95 Time Taken

Date Sealed 9/28/95 Date Shipped 9/28/95 hand delivered

Method of Conveyance State vehicle (hand delivered)

Certification (Sig.) Don Wlynich

TWC 0169 (Rev. 10-20-94)

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

No. AT 040305 Corresponds to HM06632

Lab. No.

Date Taken 9/28/95 Time Taken

Date Sealed DW 9/28/95 Date Shipped 9/28/95 hand delivered

Method of Conveyance State vehicle (hand delivered)

Certification (Sig.) Don Wlynich

TWC 0169 (Rev. 10-20-94)

TEXAS WATER COMMISSION

TWC 0287 (Rev.05-05-86)

No. HM 06633 District 9 County Washington Basin Brazos Lab. LCRA

Discharger Name Old Brazos Forge Time Collected

Plant Name RETEK Point of Collection Faske water well

Method of Flow Measurement N/A

PERMIT NUMBER	PAGE NO.	CARD TYPE	DATE Mo.	Day	Yr.	MAT. STAT.
1 9	10 12	13	14 15	16 17	18 19	20
			09	28	95	W

Chlorine Contact Time N/A

Date Shipped 9/28/95 hand delivered

Collector's Signature Don Wynick

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Flow (gpd)		Water Temperature (°F)		pH	
00056		00011		00400	
D.O. (mg/l)		Turbidity (JTU)			
00300		00070			

TEXAS WATER COMMISSION

No. HM 06633 District 9 Lab. Used LCRA Lab. No.

Type Sample: Heavy Metals

Material Sampled: Raw, Partially Treated, Final, Stream, Solid Waste Water Well

Grab ✓ Composite Hr. Method of Preservation HNO3, Ice

Observations Auxillary Tags AT040363, AT040364, AT040365, & AT040366

Date Completed

Analyst's Signature

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Arsenic		Barium			
Cadmium		Chromium		Copper	
Lead		Manganese		Mercury	
Nickel		Selenium		Silver	
Zinc					

TEXAS WATER COMMISSION

DISTRICT 9

No. HM 06633

TWC 0737

05020

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

No. AT 040364 Corresponds to HM 06633

Lab. No.

Date Taken 9/28/95 Time Taken

Date Sealed 9/28/95 Date Shipped 9/28/95

Method of Conveyance State vehicle (hand delivered)

Certification (Sig.) Don Wyrich

TWC 0169 (Rev. 10 20 94)

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

No. AT 040365 Corresponds to HM 06633

Lab. No.

Date Taken 9/28/95 Time Taken

Date Sealed 9/28/95 Date Shipped 9/28/95

Method of Conveyance State vehicle (hand delivered)

Certification (Sig.) Don Wyrich

TWC 0169 (Rev. 10 20 94)

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

No. AT 040363 Corresponds to HM06633

Lab. No.

Date Taken 9/28/95 Time Taken

Date Sealed 9/28/95 Date Shipped 9/28/95

Method of Conveyance State vehicle (hand delivered)

Certification (Sig.) Don Wright

TWC 0163 (Rev. 10 20 94)

05022

TEXAS WATER COMMISSION

TWC-0287 (Rev.05-05-66)

No. HM 06634 District 9 County Washington Basin Brazos Lab. LCRA

Discharger Name Old Brazos Forge Time Collected

Plant Name RETEK Point of Collection Blum water well — B.A. Blank

Method of Flow Measurement N/A

PERMIT NUMBER	PAGE NO.	CARD TYPE	DATE Mo.	DATE Day	DATE Yr.	MAT. STATE
1 9	10 12	13	14 15	16 17	18 19	20
			09	25	95	N

Chlorine Contact Time N/A

Date Shipped 9/28/95 hand delivered

Collector's Signature Dan Wyrick

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Flow (gpd)		Water Temperature (°F)		pH	
00056		00011		00400	
D.O. (mg/l)		Turbidity (JTU)			
00300		00070			

TEXAS WATER COMMISSION

No. HM 06634 District

Lab. Used Lab. No.

Type Sample: Heavy Metals

Grab ✓ Composite Hr.

Observations Field Filtered Total Dissolved Metals

Material Sampled: Raw, Partially Treated, Final, Stream, Solid Waste

Method of Preservation HNO_3, Ice

Auxillary Tags

Date Completed

Analyst's Signature

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Arsenic	Dissolved	Barium	"		
Cadmium	"	Chromium	"	Copper	"
Lead	"	Manganese	"	Mercury	"
Nickel	"	Selenium	"	Silver	"
Zinc	"	(Total Dissolved Metals)			

TEXAS WATER COMMISSION

DISTRICT 9

No. HM 06634

05023

TEXAS WATER COMMISSION

TWC 0287 (Rev.05-05-86)

No. HM 06641 District 2 County Washington Basin Brazos Lab. LCRA

Discharger Name OLD Brazos Forge

Time Collected

Plant Name RETEK

Point of Collection Krueger water well — Q.A. Blank

Method of Flow Measurement N/A

Chlorine Contact Time N/A

Date Shipped 2/08/95 hand delivered

Collector's Signature Don Wegrich

PERMIT NUMBER (1–9)	PAGE NO. (10–12)	CARD TYPE (13)	DATE Mo. (14–15)	DATE Day (16–17)	DATE Yr. (18–19)	DATA STAMP (20)
			02	25	95	W

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Flow (gpd)	00056	Water Temperature (°F)	00011	pH	00400
D.O. (mg/l)	00000	Turbidity (JTU)	00070		

TEXAS WATER COMMISSION

No. HM 06641 District 2 Lab. Used LCRA Lab. No.

Type Sample: Heavy Metals

Material Sampled: Raw, Partially Treated, Final, Stream, Solid Waste

Grab ✓ Composite Hr.

Method of Preservation

Observations Field Filtered Total Dissolved Metals

Auxiliary Tags

Date Completed

Analyst's Signature

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Arsenic	Dissolved	Barium	"		
Cadmium	"	Chromium	"	Copper	"
Lead	"	Manganese	"	Mercury	"
Nickel	"	Selenium	"	Silver	"
Zinc	"	(Total Dissolved Metals)			

TEXAS WATER COMMISSION

DISTRICT

No. HM 06641

05024

TEXAS WATER COMMISSION

TWC 0287 (Rev 05-05 86)

No. HM 06642 District 9 County Washington Basin Brazos Lab. LCBA

Discharger Name Old Brazos Forge

Time Collected

Plant Name RETEK

Point of Collection Sheets Water Well

Method of Flow Measurement N/A

PERMIT NUMBER (1–9)	PAGE NO. (10–12)	CARD TYPE (13)	DATE Mo. (14–15)	Day (16–17)	Yr. (18–19)	MAT STEAM (20)
			09	23	95	W

Chlorine Contact Time N/A

Date Shipped 9/25/95 hand delivered

Collector's Signature Don Wyrick

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Flow (gpd)	00056	Water Temperature (°F)	00011	pH	00400
D.O. (mg/l)	00300	Turbidity (JTU)	00070		

TEXAS WATER COMMISSION

No. HM 06642 District 9

Lab. Used LCBA Lab. No.

Type Sample: Heavy Metals

Material Sampled: Raw, Partially Treated, Final, Stream, Solid Waste water well

Grab ✓ Composite Hr.

Method of Preservation HNO_3, Ice

Observations Field Filtered Total Dissolved Metals

Auxiliary Tags

Date Completed

Analyst's Signature

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Arsenic	Dissolved	Barium	"		
Cadmium	"	Chromium	"	Copper	"
Lead	"	Manganese	"	Mercury	"
Nickel	"	Selenium	"	Silver	"
Zinc	"	(Total Dissolved Metals)			

TEXAS WATER COMMISSION

DISTRICT 9

No. HM 06642

TWC 0287

05025

TEXAS WATER COMMISSION

TWC 0287 (Rev. 05 05 86)

No. HM 06643 District 9 County Washington Basin Brazos Lab. LCRA

Discharger Name CPD Brazos Forge Time Collected

Plant Name BETEK Point of Collection Faske water well — QA Blank

Method of Flow Measurement N/A

PERMIT NUMBER (1–9)	PAGE NO. (10–12)	CARD TYPE (13)	DATE Mo. (14–15)	Day (16–17)	Yr. (18–19)	MAT. STAB. (20)
			09	28	95	W

Chlorine Contact Time N/A

Date Shipped 9/28/95 hand delivered

Collector's Signature Dana Wyatt

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Flow (gpd)	00056	Water Temperature (°F)	00011	pH	00400
D.O. (mg/l)	00300	Turbidity (JTU)	00070		

TEXAS WATER COMMISSION

No. HM 06643 District 9 Lab. Used LCRA Lab. No.

Type Sample: Heavy Metals

Material Sampled: Raw, Partially Treated, Final, Stream, Solid Waste water well

Grab ✓ Composite Hr. Method of Preservation HNO3

Observations Field Filtered Total Dissolved Metals

Auxillary Tags

Date Completed

Analyst's Signature

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Arsenic	Dissolved	Barium	"		
Cadmium	"	Chromium	"	Copper	"
Lead	"	Manganese	"	Mercury	"
Nickel	"	Selenium	"	Silver	"
Zinc	"	(Total Dissolved Metals)			

TEXAS WATER COMMISSION

DISTRICT 9

No. HM 06643

TWC 0287

05026

TEXAS WATER COMMISSION

TWC 0287 (Rev.05 05-86)

No. HM 06644 District 9 County Washington Basin Brazos Lab. LCRA

Discharger Name Old Brazos Forge Time Collected

Plant Name RETEK Point of Collection Blum water well

Method of Flow Measurement N/A

PERMIT NUMBER	PAGE NO.	CARD TYPE	DATE Mo.	Day	Yr.	MAT. STAMP
1 9	10 12	13	14 15	16 17	18 19	20
			09	28	95	W

Chlorine Contact Time N/A

Date Shipped 9/28/95 hand delivered

Collector's Signature Don Wyrick

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Flow (gpd)		Water Temperature (°F)		pH	
00056		00011		00400	
D.O. (mg/l)		Turbidity (JTU)			
00300		00070			

TEXAS WATER COMMISSION

No. HM 06644 District 9 Lab. Used LCRA Lab. No.

Type Sample: Heavy Metals

Grab ✓ Composite Hr.

Observations

Material Sampled: Raw, Partially Treated, Final, Stream, Solid Waste Water well

Method of Preservation HNO_3, Ice

Auxillary Tags AT 040300, AT 040301, & AT 040302

Date Completed

Analyst's Signature

21 CODE	26 PARAMETER VALUE	35 CODE	40 PARAMETER VALUE	49 CODE	54 PARAMETER VALUE 62
Arsenic		Barium			
Cadmium		Chromium		Copper	
Lead		Manganese		Mercury	
Nickel		Selenium		Silver	
Zinc					

TEXAS WATER COMMISSION

DISTRICT 9

No. HM 06644

TWC 0287

0502

LCRA
THE POWER TO MAKE A DIFFERENCE.

FINAL ANALYSIS REPORT

DUPLICATE
LAB ID: 9604755
FACILITY: TNRCC-CO
ACCT NO: TNRCC-ERNEST HEYER

SAMPLE TYPE: Drk. W

ORIGINAL DATE REPORTED: 11/17/
DUPLICATE DATE REPORTED: 11/20/
DATE RECEIVED: 11/15/
SAMPLE DATE: 11/15/
SAMPLE TIME: 1045
DEPTH:

LOCATION ID: SW 183558 Faske

PARAMETER	RESULTS	UNITS	METHOD #	MCL in WATER	DATE ANALYZED
Hexavalent chromium	0.01	mg/l	EPA7196	0.01	11/15/95

Buck Henderson

BUCK HENDERSON
LABORATORY MANAGER

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The mission of the Lower Colorado River Authority (LCRA) is to provide reliable, low-cost utility and public services in partnership with our customers and communities and to use our leadership role and environmental authority to ensure the protection and constructive use of the area's natural resources. The LCRA is a Texas conservation and reclamation district operating with no taxing authority.

P.O. BOX 220 AUSTIN, TX 78767-0220 (512) 473-3200 (512) 473-3298 FAX

05028

LCRA
HE POWER TO MAKE A DIFFERENCE.

FINAL ANALYSIS REPORT

PLICATE
LAB ID: 9604756
ACILITY: TNRCC-CO
CCT NO: TNRCC-ERNEST HEYER

SAMPLE TYPE: Drk. W

ORIGINAL DATE REPORTED: 11/17/9
DUPLICATE DATE REPORTED: 11/20/9
DATE RECEIVED: 11/15/9
SAMPLE DATE: 11/15/9
SAMPLE TIME: 1134
DEPTH:

CATION ID: SW 183564 Blum

RAMETER	RESULTS	UNITS	METHOD #	MCL in WATER	DATE ANALYZED
xavalent chromium	0.09	mg/l	EPA7196	0.01	11/15/95

Buck Henderson

UCK HENDERSON
BORATORY MANAGER

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e mission of the Lower Colorado River Authority (LCRA) is to provide reliable, low-cost utility and public services in partnership with our customers and communities and to use our leadership role and environmental authority to ensure the protection and constructive use of the area's natural resources. The LCRA is a Texas conservation and reclamation district operating with no taxing authority.

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05029

LCRA

HE POWER TO MAKE A DIFFERENCE.

FINAL ANALYSIS REPORT

JPLICATE
LAB ID: 9604757
ACILITY: TNRCC-CO
ACCT NO: TNRCC-ERNEST HEYER

SAMPLE TYPE: Drk. W

ORIGINAL DATE REPORTED: 11/17/95
DUPLICATE DATE REPORTED: 11/20/95
DATE RECEIVED: 11/15/95
SAMPLE DATE: 11/15/95
SAMPLE TIME: 1210
DEPTH:

OCATION ID: SW 183567 Scheel

ARAMETER	RESULTS	UNITS	METHOD #	MCL in WATER	DATE ANALYZED
xavalent chromium	<0.01	mg/l	EPA7196	0.01	11/15/95

Buck Henderson

CK HENDERSON
BORATORY MANAGER

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05030

LCRA
HE POWER TO MAKE A DIFFERENCE.

FINAL ANALYSIS REPORT

PLICATE
LAB ID: 9604758
ACILITY: TNRCC-CO
CCT NO: TNRCC-ERNEST HEYER

SAMPLE TYPE: Drk. W

ORIGINAL DATE REPORTED: 11/17/9
DUPLICATE DATE REPORTED: 11/20/9
DATE RECEIVED: 11/15/9
SAMPLE DATE: 11/15/9
SAMPLE TIME: 1241
DEPTH:

CATION ID: SW 183570 Krueger

RAMETER	RESULTS	UNITS	METHOD #	MCL in WATER	DATE ANALYZED
xavalent chromium	<0.01	mg/l	EPA7196	0.01	11/15/95

Buck Henderson

UCK HENDERSON
BORATORY MANAGER

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e mission of the Lower Colorado River Authority (LCRA) is to provide reliable, low-cost utility and public services in partnership with our customers and communities and o use our leadership role and environmental authority to ensure the protection and constructive use of the area's natural resources. The LCRA is a Texas conservation and reclamation district operating with no taxing authority.

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LCRA
THE POWER TO MAKE A DIFFERENCE.

FINAL ANALYSIS REPORT

LAB ID: 9604759
ACILITY: TNRCC-CO
ACCT NO: TNRCC-ERNEST HEYER

SAMPLE TYPE: Drk. W

ORIGINAL DATE REPORTED: 11/17/95

DATE RECEIVED: 11/15/95
SAMPLE DATE: 11/15/95
SAMPLE TIME: 1035
DEPTH:

LOCATION ID: SW 183557 Faske

PARAMETER	RESULTS	UNITS	METHOD #	PQL in WATER	DATE ANALYZED
rsenic, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
Barium, ICPMS	232.0	ug/L	EPA200.8	1.0	11/16/95
Cadmium, ICPMS	<1.0	ug/L	EPA200.8	1.0	11/16/95
hromium, ICPMS	59.9	ug/L	EPA200.8	1.0	11/16/95
opper, ICPMS	8.0	ug/L	EPA200.8	1.0	11/16/95
Lead, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
nganese, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
ercury, Total-AA	<0.2	ug/L	EPA245.1	0.2	11/16/95
Nickel, ICPMS	8.3	ug/L	EPA200.8	1.0	11/16/95
elenium, ICPMS	4.9	ug/L	EPA200.8	4.0	11/16/95
lver, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
Zinc, ICPMS	121.8	ug/L	EPA200.8	1.0	11/16/95

Roland Garcia for
CK HENDERSON
ABORATORY MANAGER

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THE POWER TO MAKE A DIFFERENCE.

FINAL ANALYSIS REPORT

LAB ID: 9604761
ACILITY: TNRCC-CO
CCT NO: TNRCC-ERNEST HEYER

SAMPLE TYPE: Drk. W

ORIGINAL DATE REPORTED: 11/17/95

DATE RECEIVED: 11/15/95
SAMPLE DATE: 11/15/95
SAMPLE TIME: 0007
DEPTH:

CATION ID: SW 183566 Scheel

RAMETER	RESULTS	UNITS	METHOD #	PQL in WATER	DATE ANALYZED
senic, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
rium, ICPMS	132.9	ug/L	EPA200.8	1.0	11/16/95
dmium, ICPMS	<1.0	ug/L	EPA200.8	1.0	11/16/95
romium, ICPMS	51.2	ug/L	EPA200.8	1.0	11/16/95
pper, ICPMS	10.2	ug/L	EPA200.8	1.0	11/16/95
ad, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
nganese, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
rcury, Total-AA	<0.2	ug/L	EPA245.1	0.2	11/16/95
ckel, ICPMS	11.2	ug/L	EPA200.8	1.0	11/16/95
lenium, ICPMS	4.4	ug/L	EPA200.8	4.0	11/16/95
lver, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
nc, ICPMS	223.1	ug/L	EPA200.8	1.0	11/16/95

Roland Garcia for
CK HENDERSON
BORATORY MANAGER

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FINAL ANALYSIS REPORT

LAB ID: 9604762
FACILITY: TNRCC-CO
ACCT NO: TNRCC-ERNEST HEYER

SAMPLE TYPE: Drk. W

ORIGINAL DATE REPORTED: 11/17/9

DATE RECEIVED: 11/15/9
SAMPLE DATE: 11/15/9
SAMPLE TIME: 1127
DEPTH:

LOCATION ID: SW 183563 Blum

PARAMETER	RESULTS	UNITS	METHOD #	PQL in WATER	DATE ANALYZED
Arsenic, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
Barium, ICPMS	293.1	ug/L	EPA200.8	1.0	11/16/95
Cadmium, ICPMS	<1.0	ug/L	EPA200.8	1.0	11/16/95
Chromium, ICPMS	152.8	ug/L	EPA200.8	1.0	11/16/95
Copper, ICPMS	32.1	ug/L	EPA200.8	1.0	11/16/95
Lead, ICPMS	3.6	ug/L	EPA200.8	1.0	11/16/95
Manganese, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
Mercury, Total-AA	<0.2	ug/L	EPA245.1	0.2	11/16/95
Nickel, ICPMS	17.9	ug/L	EPA200.8	1.0	11/16/95
Selenium, ICPMS	6.9	ug/L	EPA200.8	4.0	11/16/95
Silver, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
Zinc, ICPMS	458.1	ug/L	EPA200.8	1.0	11/16/95

Roland Garcia for

BUCK HENDERSON
LABORATORY MANAGER

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FINAL ANALYSIS REPORT

3 ID: 9604763
ILITY: TNRCC-CO
T NO: TNRCC-ERNEST HEYER

SAMPLE TYPE: Drk. W
ORIGINAL DATE REPORTED: 11/17/95

DATE RECEIVED: 11/15/95
SAMPLE DATE: 11/15/95
SAMPLE TIME: 1238
DEPTH:

TION ID: SW 183569 Krueger

ETER	RESULTS	UNITS	METHOD #	PQL in WATER	DATE ANALYZED
enic, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
m, ICPMS	293.8	ug/L	EPA200.8	1.0	11/16/95
ium, ICPMS	<1.0	ug/L	EPA200.8	1.0	11/16/95
mium, ICPMS	47.6	ug/L	EPA200.8	1.0	11/16/95
r, ICPMS	7.3	ug/L	EPA200.8	1.0	11/16/95
ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
anese, ICPMS	18.4	ug/L	EPA200.8	1.0	11/16/95
ry, Total-AA	<0.2	ug/L	EPA245.1	0.2	11/16/95
l, ICPMS	8.9	ug/L	EPA200.8	1.0	11/16/95
nium, ICPMS	<4.0	ug/L	EPA200.8	4.0	11/16/95
er, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
ICPMS	764.6	ug/L	EPA200.8	1.0	11/16/95

Roland Garcia for
HENDERSON
ATORY MANAGER

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05035

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FINAL ANALYSIS REPORT

LAB ID: 9604760
CILITY: TNRCC-CO
CCT NO: TNRCC-ERNEST HEYER

SAMPLE TYPE: Drk. W

ORIGINAL DATE REPORTED: 11/17/95

DATE RECEIVED: 11/15/95
SAMPLE DATE: 11/15/95
SAMPLE TIME: 0800
DEPTH:

OCATION ID: SW 183561 Field Blank

ARAMETER	RESULTS	UNITS	METHOD #	PQL in WATER	DATE ANALYZED
senic, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
arium, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
admium, ICPMS	<1.0	ug/L	EPA200.8	1.0	11/16/95
romium, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
pper, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
ead, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
nganese, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
rcury, Total-AA	<0.2	ug/L	EPA245.1	0.2	11/16/95
ickel, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
lenium, ICPMS	<4.0	ug/L	EPA200.8	4.0	11/16/95
lver, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95
inc, ICPMS	<2.0	ug/L	EPA200.8	1.0	11/16/95

Roland Garcia for

CK HENDERSON
ABORATORY MANAGER

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FINAL ANALYSIS REPORT

DUPLICATE
LAB ID: 9604764
FACILITY: TNRCC-CO
ACCT NO: TNRCC-ERNEST HEYER

SAMPLE TYPE: Drk. W

ORIGINAL DATE REPORTED: 12/04
DUPLICATE DATE REPORTED: 12/06
DATE RECEIVED: 11/15
SAMPLE DATE: 11/15
SAMPLE TIME: 1030
DEPTH:

LOCATION ID: SW 183556 Faske

PARAMETER	RESULTS	UNITS	METHOD #	PQL in WATER	DATE ANALYZE
Cyanide, Total	<0.020	mg/L	EPA335.2	0.020	11/29/9

Roland Garcia for
BUCK HENDERSON
LABORATORY MANAGER

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05037

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FINAL ANALYSIS REPORT

LICATE
AB ID: 9604765
ILITY: TNRCC-CO
CT NO: TNRCC-ERNEST HEYER

SAMPLE TYPE: Drk. W
ORIGINAL DATE REPORTED: 12/04/9
DUPLICATE DATE REPORTED: 12/06/9
DATE RECEIVED: 11/15/9
SAMPLE DATE: 11/15/9
SAMPLE TIME: 1122
DEPTH:

ATION ID: SW 183559 Blum

RAMETER	RESULTS	UNITS	METHOD #	PQL in WATER	DATE ANALYZED
anide, Total	<0.020	mg/L	EPA335.2	0.020	11/29/95

Roland Garcia for
UCK HENDERSON
ABORATORY MANAGER

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FINAL ANALYSIS REPORT

DUPLICATE
LAB ID: 9604766
FACILITY: TNRCC-CO
ACCT NO: TNRCC-ERNEST HEYER

SAMPLE TYPE: Drk. W

ORIGINAL DATE REPORTED: 12/04/
DUPLICATE DATE REPORTED: 12/06/
DATE RECEIVED: 11/15/
SAMPLE DATE: 11/15/
SAMPLE TIME: 1205
DEPTH:

LOCATION ID: SW 183565 Scheel

PARAMETER	RESULTS	UNITS	METHOD #	PQL in WATER	DATE ANALYZEI
Cyanide, Total	<0.020	mg/L	EPA335.2	0.020	11/29/9

Roland Garcia for
BUCK HENDERSON
LABORATORY MANAGER

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FINAL ANALYSIS REPORT

UPLICATE
LAB ID: 9604767
ACILITY: TNRCC-CO
ACCT NO: TNRCC-ERNEST HEYER

SAMPLE TYPE: Drk. W

ORIGINAL DATE REPORTED: 12/04/95
DUPLICATE DATE REPORTED: 12/06/95
DATE RECEIVED: 11/15/95
SAMPLE DATE: 11/15/95
SAMPLE TIME: 1236
DEPTH:

OCATION ID: SW 183568 Krueger

ARAMETER	RESULTS	UNITS	METHOD #	PQL in WATER	DATE ANALYZED
yanide, Total	<0.020	mg/L	EPA335.2	0.020	11/29/95

Roland Garcia for
BUCK HENDERSON
ABORATORY MANAGER

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QUALITY CONTROL DATA REPORT

REPORT DATE: 12/12/95

% SPIKE RECOVERY

SAMPLE ID	Hg-AA	As	Ba	Cd	Cr	Cu	Pb	Mn	Ni	Se	Ag	Zn
9604759-63 Total	90.2	141.2**	92.0	97.4	95.7	98.8	98.2	97.1	96.9	158.9**	89.6	95.0
UPPER LIMIT	130	130	130	130	130	130	130	130	130	130	130	130
LOWER LIMIT	70	70	70	70	70	70	70	70	70	70	70	70

RELATIVE % DEVIATION

SAMPLE ID	Hg-AA	As	Ba	Cd	Cr	Cu	Pb	Mn	Ni	Se	Ag	Zn
9604759-63 Total	-1.8	-1.9	-3.5	-1.5	-1.7	-0.4	-0.1	-0.2	-0.9	-1.5	0.9	-16.3*
UPPER LIMIT	+15	+15	+15	+15	+15	+15	+15	+15	+15	+15	+15	+15
LOWER LIMIT	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15

% STANDARD RECOVERY

SAMPLE ID	Hg-AA	As	Ba	Cd	Cr	Cu	Pb	Mn	Ni	Se	Ag	Zn
9604759-63 Total	94.0	96.9	97.6	99.9	104.2	105.3	99.2	105.6	102.2	102.3	99.4	105.0
UPPER LIMIT	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0
LOWER LIMIT	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0

Dilution required on sample.
** Above QC limits due to matrix effect.

Buck Henderson

BUCK HENDERSON
LABORATORY MANAGER

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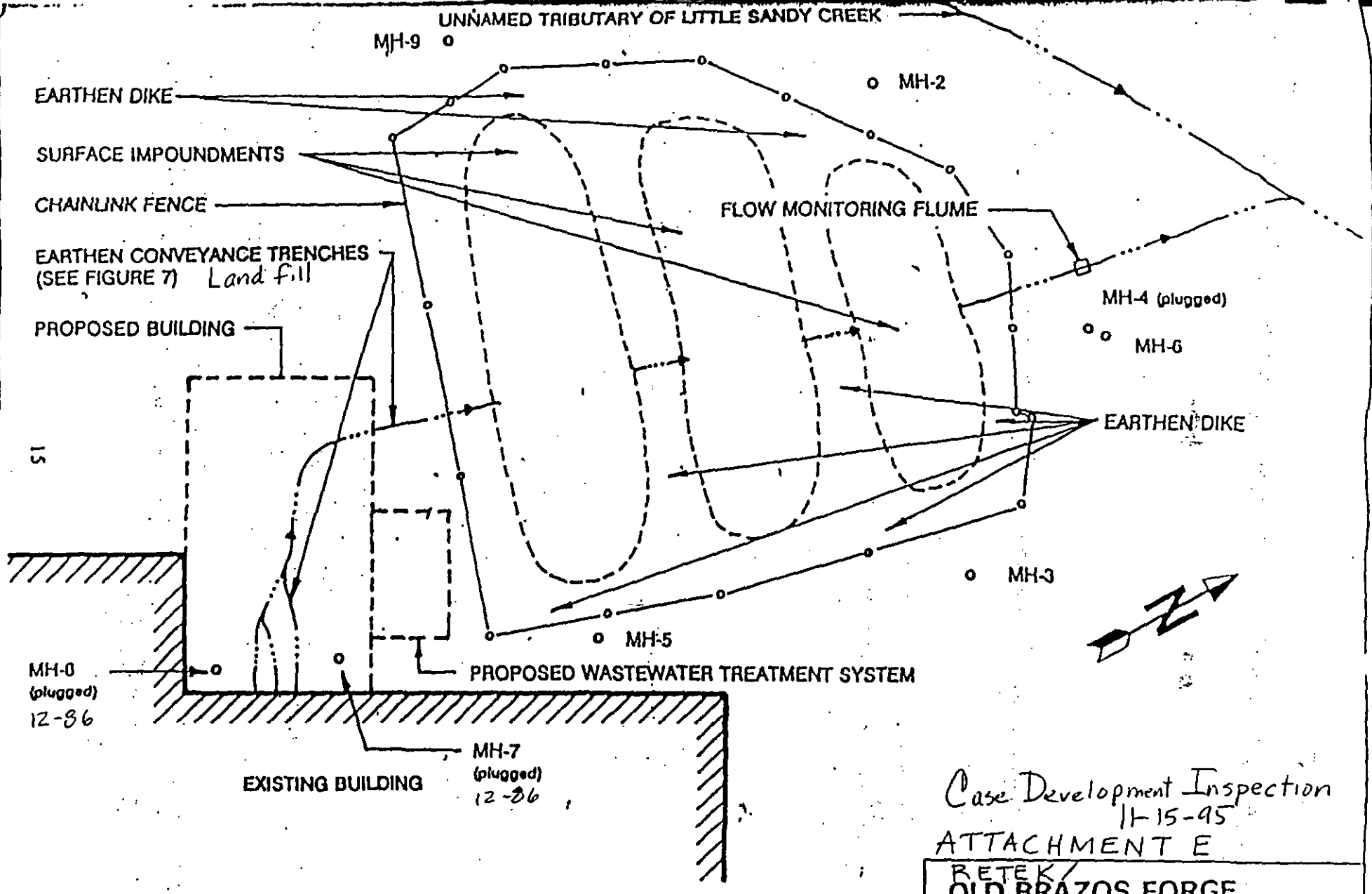
RETEK/Old Brazos Forge
S.W.R. Nos. 82313 & 30897
Brenham, Texas
Case Development Inspection
11-15-95
ATTACHMENT D

05042

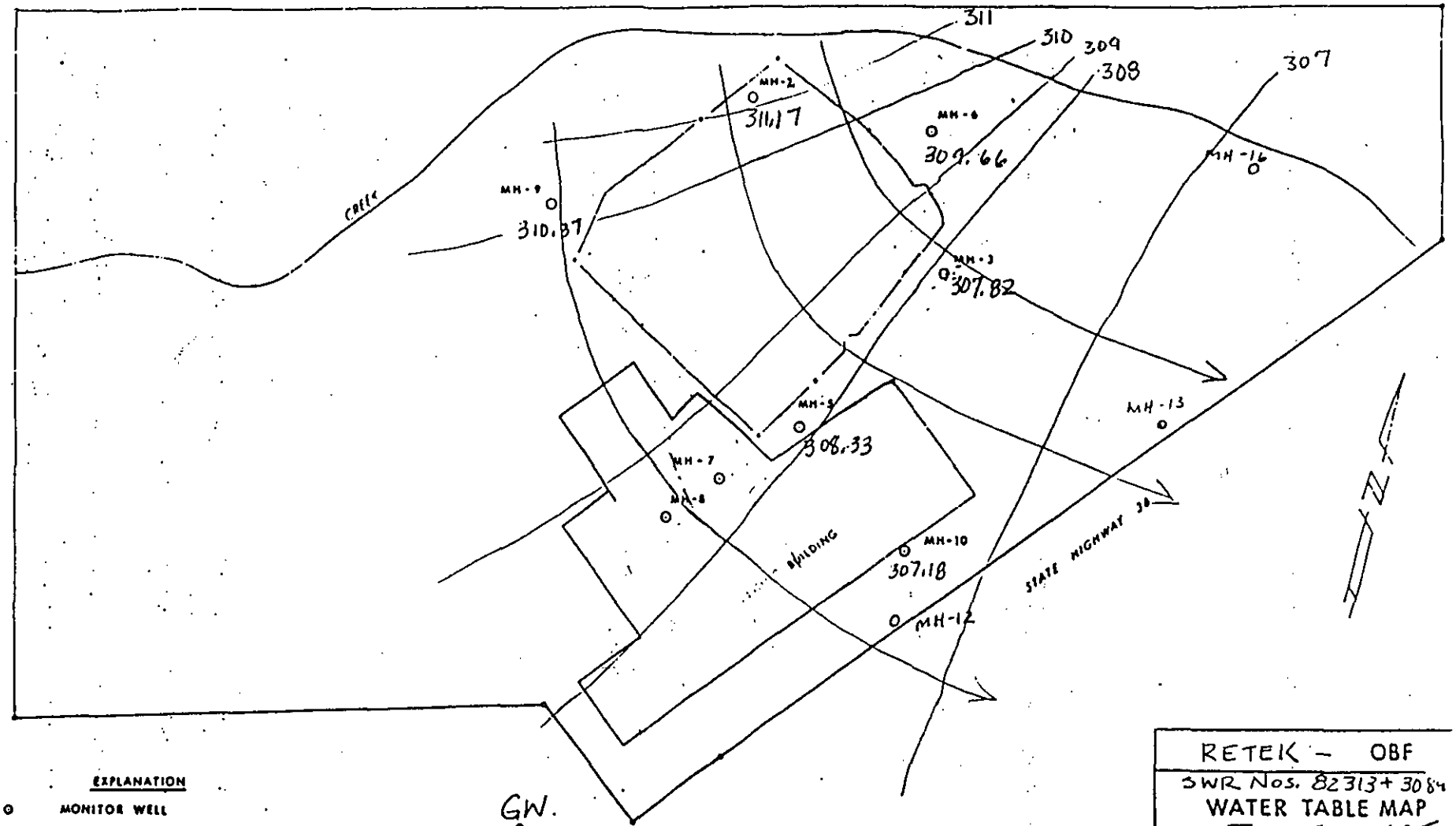


Source: O'Malley and Clay, Inc., Letter to TDWR, Jan., 1984

Case Development Inspection
11-15-95
ATTACHMENT E

RETEK/
OLD BRAZOS FORGE
S.W.R. Nos. 82313 + 30897
Location of Trench Landfill

050043



EXPLANATION

- MONITOR WELL
- 311.00' WATER TABLE ELEVATION
- 310' WATER TABLE CONTOUR
- APPROXIMATE SCALE = 1" = 100'

GW. flow direction

MH-7 & MH-8 - plugged in 1986

MH-12, MH-13, MH-16 - installed in 1989; not sampled for post-closure monitoring

RETEK - OBF

SWR Nos. 82313 + 30844

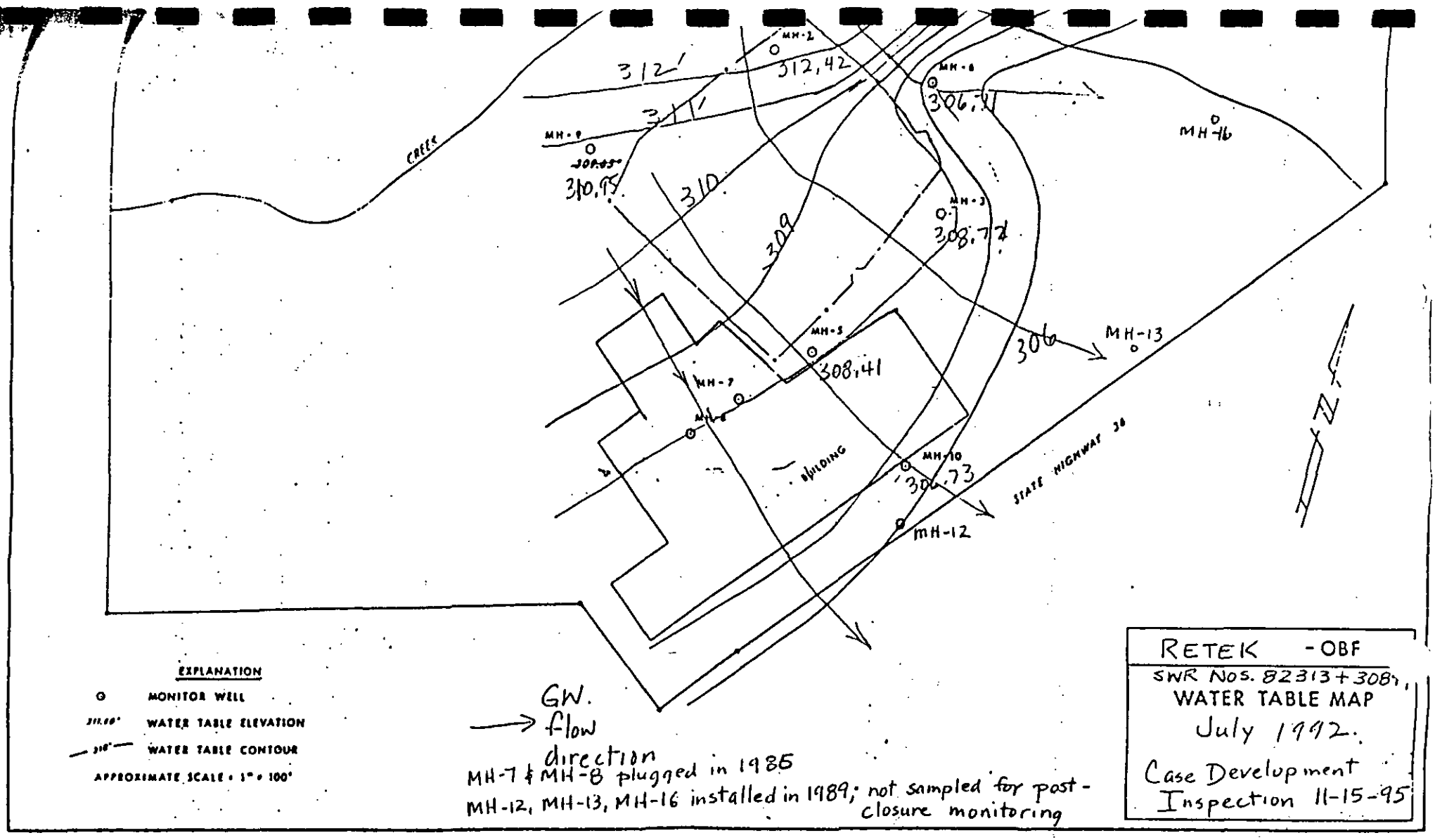
WATER TABLE MAP

Jan. 26, 1995

Case Development Inspection 11-15-

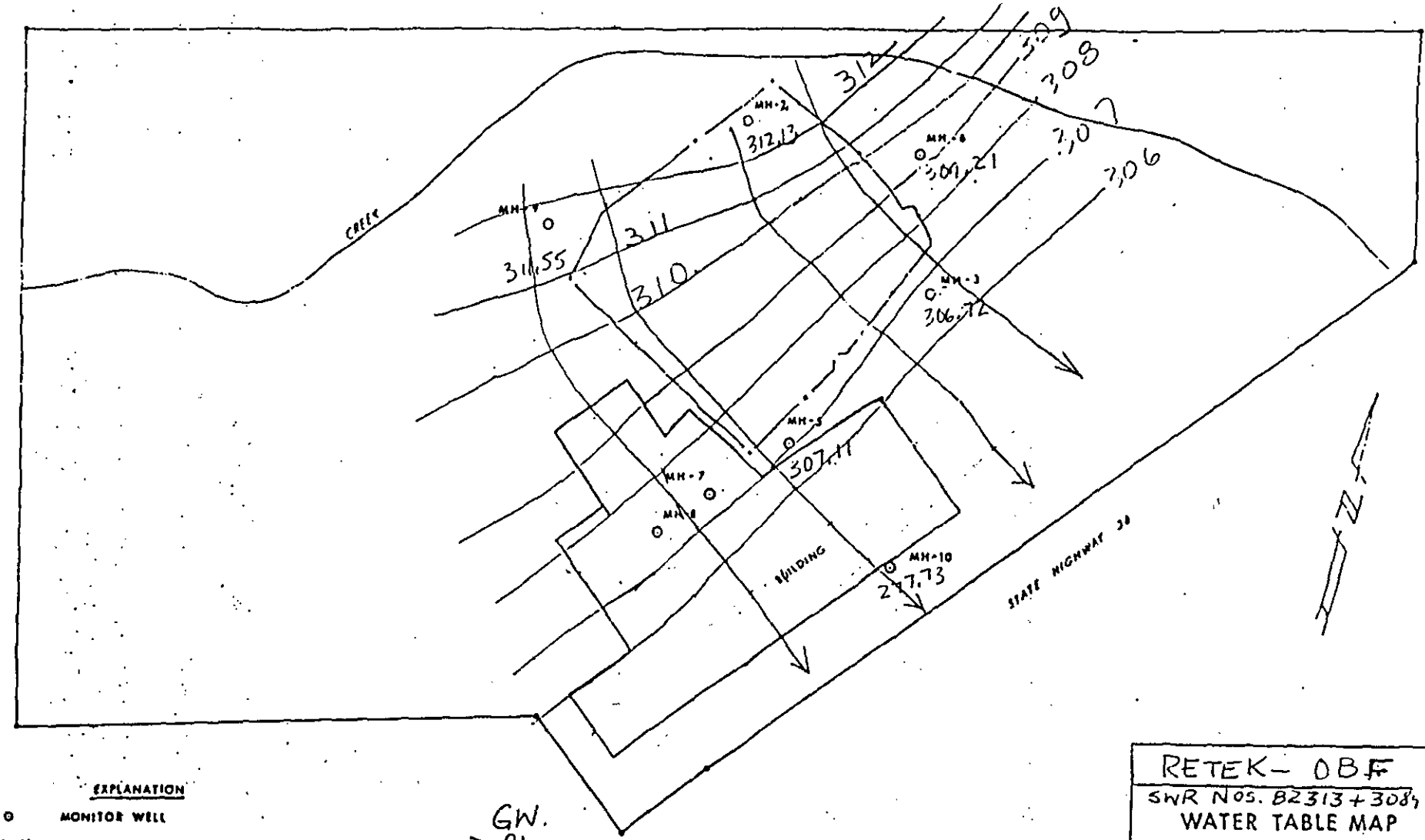
Attachment E

05044



Attachment E

05045



EXPLANATION

- ○ MONITOR WELL
- 311.55' WATER TABLE ELEVATION
- 310' WATER TABLE CONTOUR
- APPROXIMATE SCALE = 1" = 100'

→ GW. flow direction

MH-7 & MH-8 plugged in 1986

MH-12, MH-13, MH-16 installed in 1989; not sampled for post-closure monitoring

RETEK- OBF

SWR Nos. B2313 + 3084,

WATER TABLE MAP

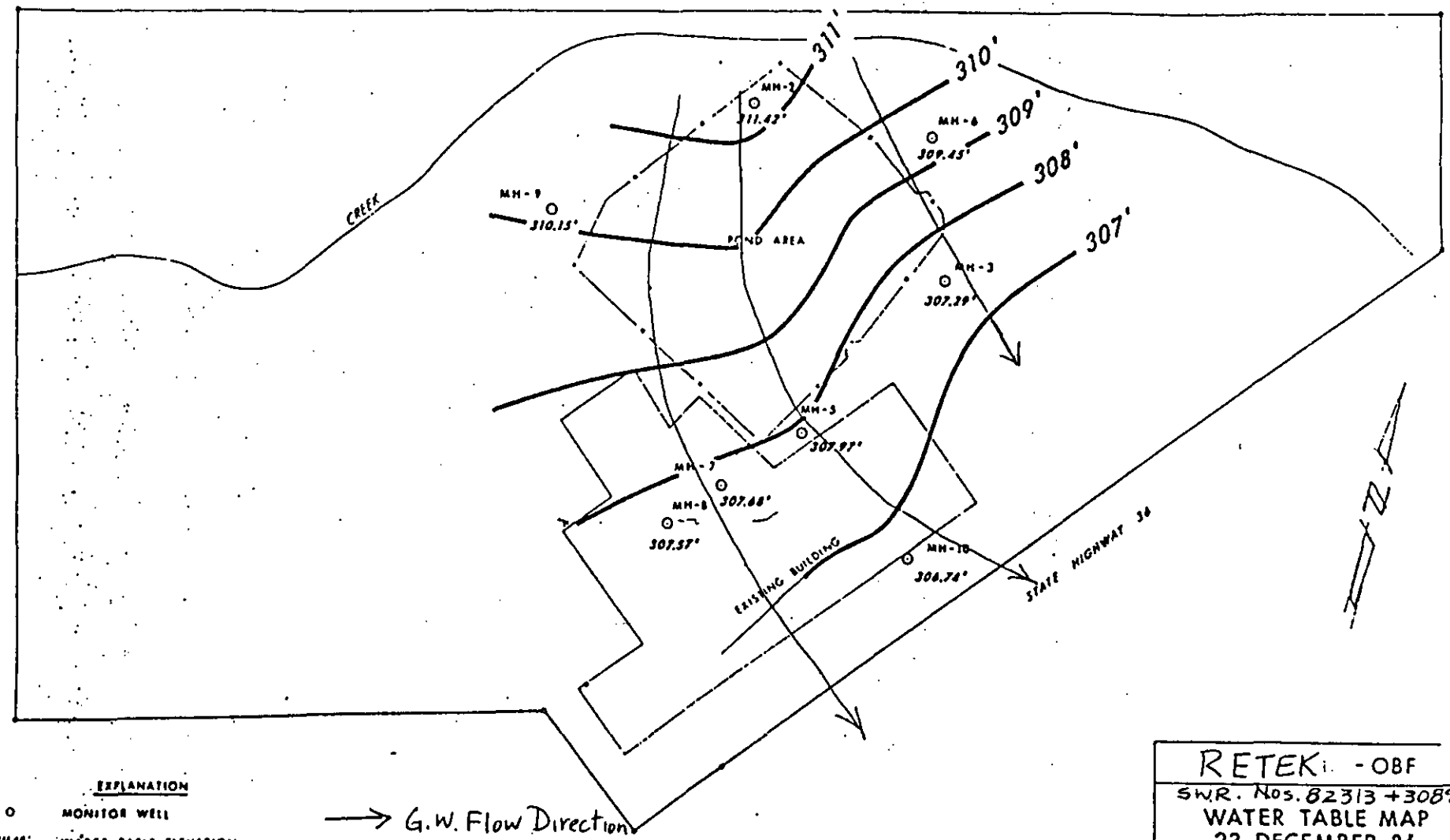
Jan 1992

Case Development

Inspection 11-15-95

Attachment E

05046



EXPLANATION

- ○ MONITOR WELL
- 311.00' WATER TABLE ELEVATION
- 310' WATER TABLE CONTOUR
- SCALE: 1" = 100'

→ G.W. Flow Direction

MH-7 & MH-8 plugged in 1986

RETEK - OBF

SWR. Nos. 82313 + 30897

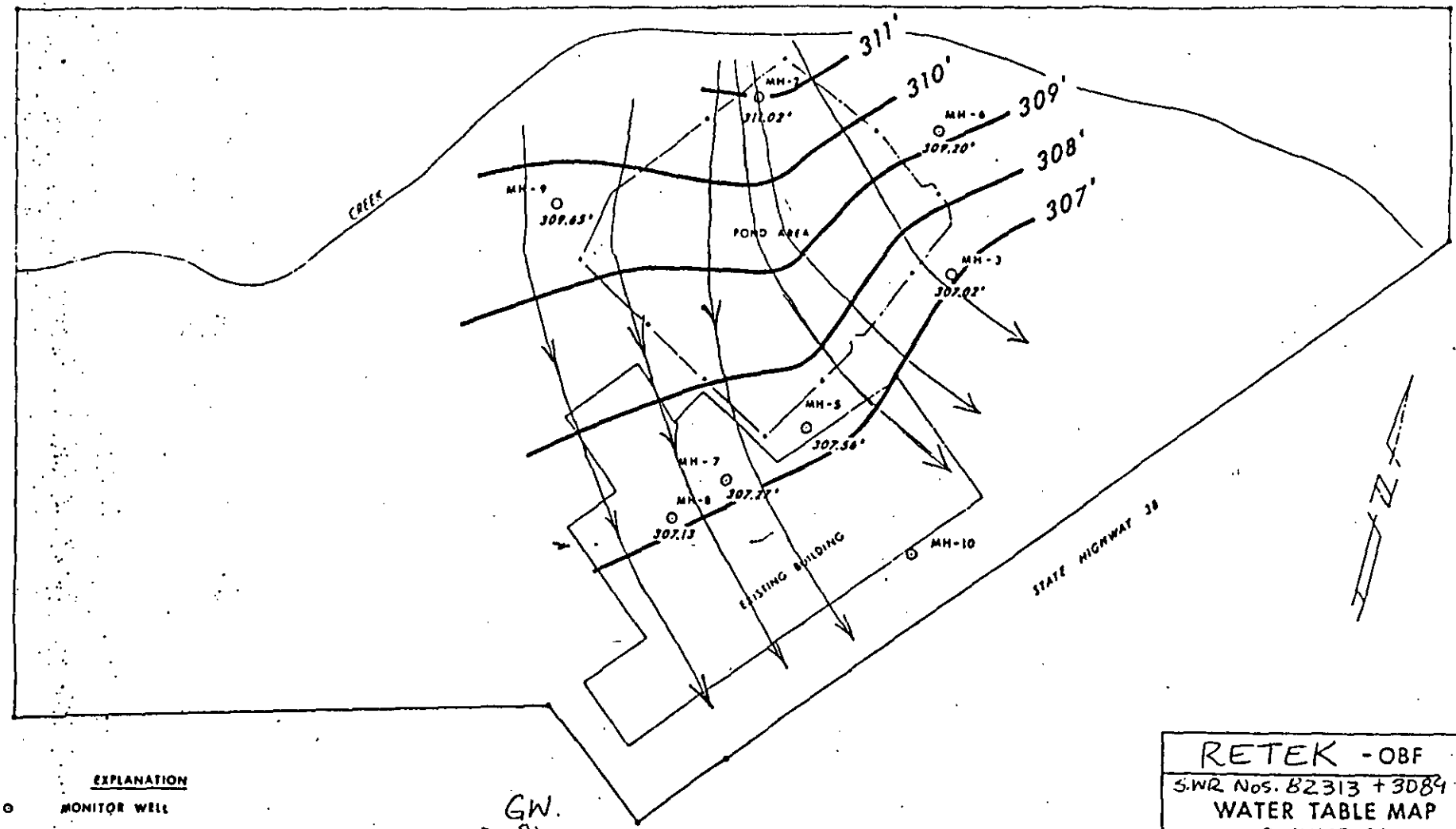
WATER TABLE MAP

23 DECEMBER 86

Case Development Inspection 11-15-95

Attachment E

05047



EXPLANATION

- ⊙ MONITOR WELL
- 311.00' WATER TABLE ELEVATION
- 310' WATER TABLE CONTOUR
- APPROXIMATE SCALE = 1" = 100'

GW. flow direction

MH-7 & MH-8 plugged in 1986

RETEK - OBF

S.WR Nos. 82313 + 3089

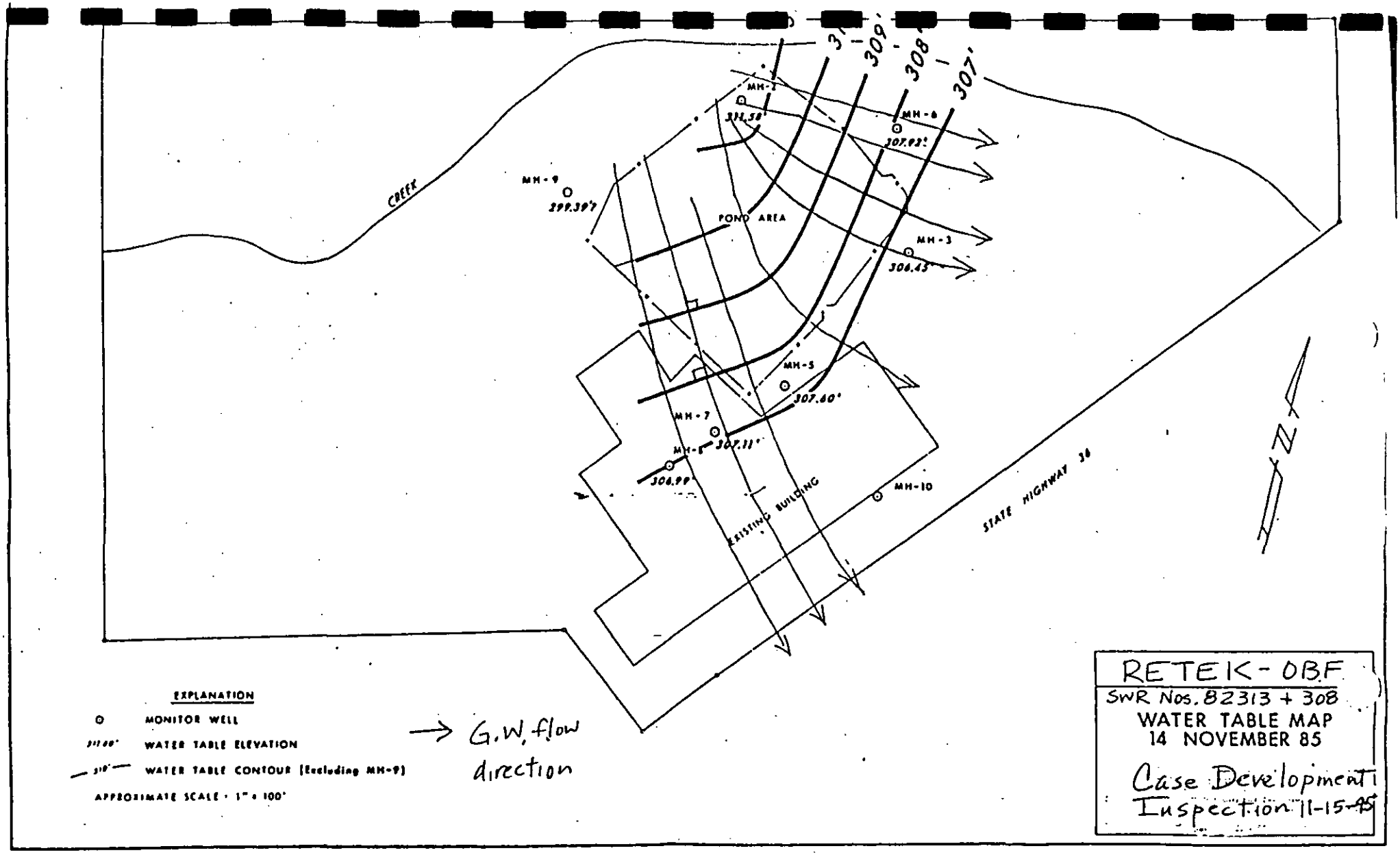
WATER TABLE MAP

9 JUNE 86

Case Development Inspection 11-15-95

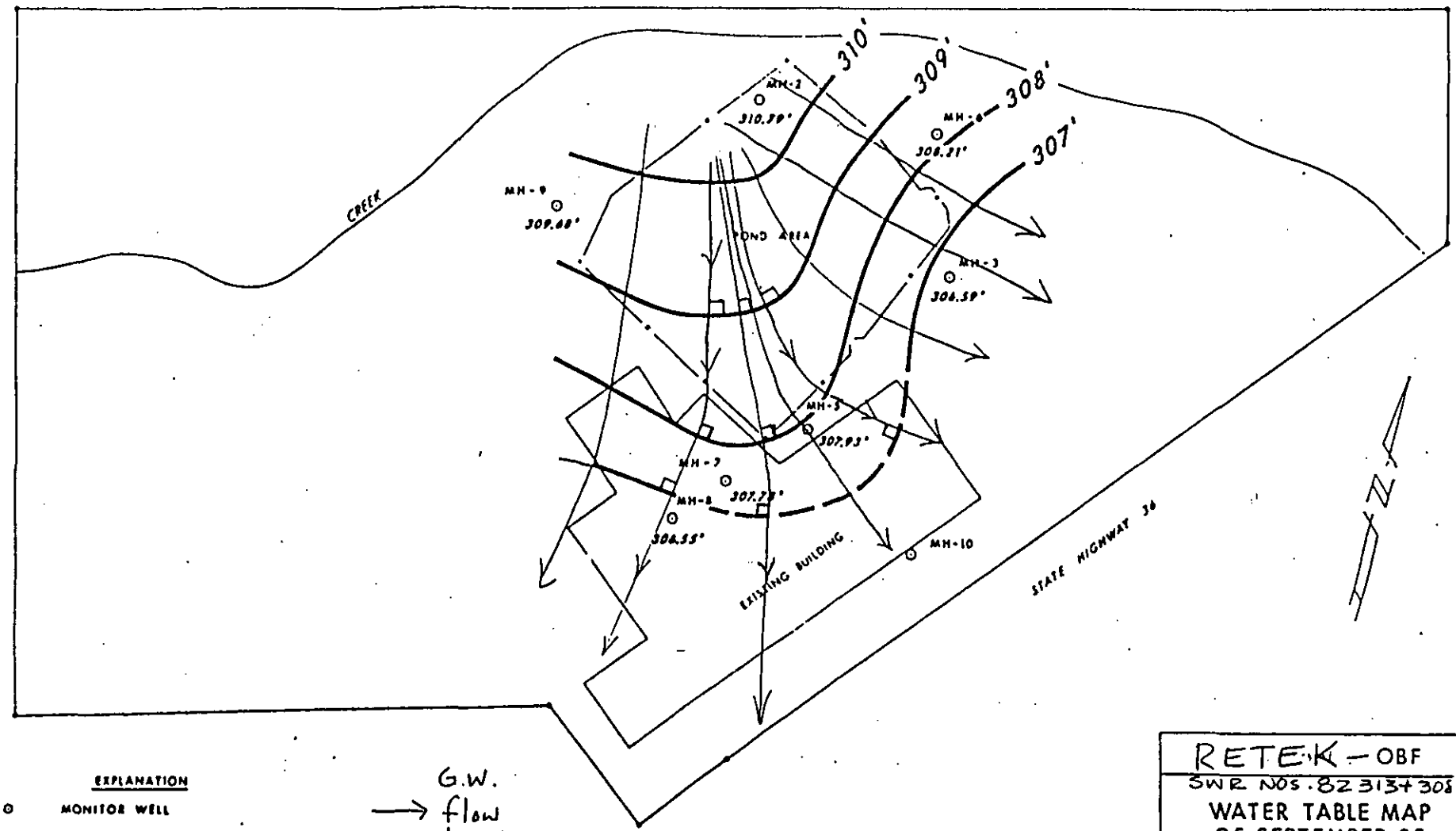
Attachment E

05048



Attachment E

05049



EXPLANATION

- ⊙ MONITOR WELL
- 311.00' WATER TABLE ELEVATION
- 310' WATER TABLE CONTOUR

APPROXIMATE SCALE = 1" = 100'

NOTE: Water levels measured by Aqua Tech Laboratories

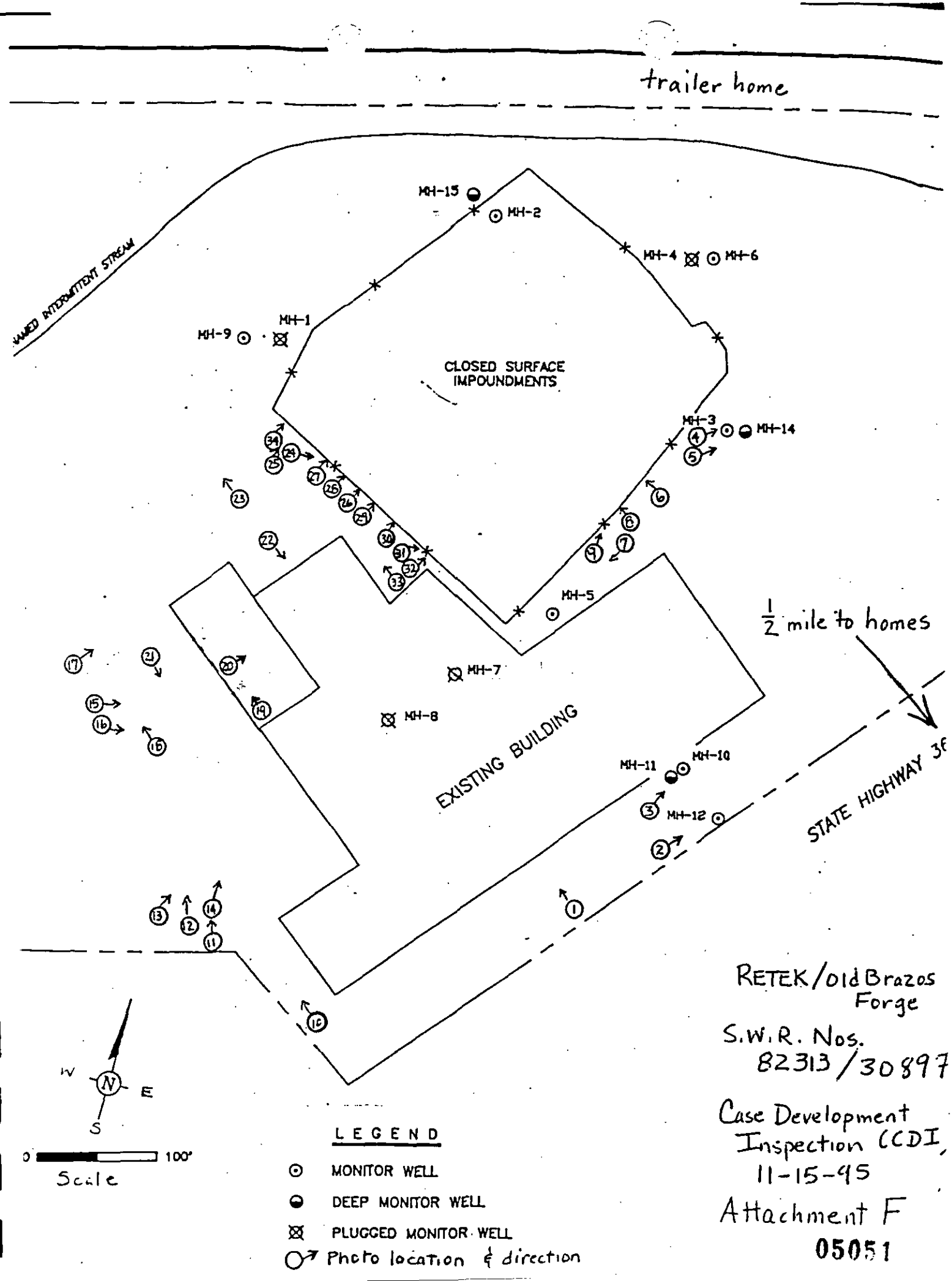
→ G.W. flow direction

RETEK - OBF
SWR NOS. 82313+308
WATER TABLE MAP
25 SEPTEMBER 85

Case Development
Inspection 11-15-95

Attachment E

05050



RETEK/Old Brazos Forge

S.W.R. Nos. 82313/30897

Case Development Inspection (CDI) 11-15-95

Attachment F

05051

TNRCC

Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 6

TEXAS
WATER
DEVELOPMENT
BOARD

GB
1025.T4W35
S2

Report 162

GROUND-WATER RESOURCES OF WASHINGTON COUNTY, TEXAS

November 1972

REPRINTED BY THE TEXAS DEPARTMENT OF WATER RESOURCES

JANUARY 1983

Table 2.–Physical Characteristics and Water-Bearing Properties of the Hydrologic Units

SYSTEM	SERIES	GEOLOGIC UNIT		HYDROLOGIC UNIT	MAXIMUM THICKNESS (FT)	GENERAL COMPOSITION	WATER-BEARING PROPERTIES AND DISTRIBUTION OF SUPPLY
Quaternary	Holocene Pleistocene	Alluvium		Alluvium of the Brazos River	75	Red-brown to brown clay and silt; commonly overlying lighter-colored fine to coarse sand and gravel. Present beneath the flood plain of the Brazos River; in places forms isolated terraces.	Yields small to large amounts of fresh water to wells on the flood plain of the Brazos River.
Tertiary	Pliocene	Goliad Sand		Evangeline aquifer	650	Interbedded sand and clay; in places black chert grains in whitish sand give a salt and pepper effect.	Yields moderate amounts of fresh water.
	Miocene	Fleming Formation		Burkeville aquiclude	200	Predominately clay; contains some thin beds of sand.	Yields small amounts of fresh water.
				Jasper aquifer	1,300	Alternating beds of sand and clay, includes massive beds of gray to brown sand interbedded with gray clay.	Yields moderate to large amounts of fresh to slightly saline water.
		Catahoula Sandstone		Catahoula Sandstone	800	Alternating beds of gray clay, tuff, and sandstone. Lower sandstones may be hard, white, and opaline.	Yields small to moderate amounts of fresh water.
	Eocene	Jackson Group		Jackson[1] Group	1,400	Predominately a terrestial shale; contains clay, volcanic ash, sandstone, and limestone.	Yields small to moderate amounts of water.
		Claiborne Group	Yegua Formation	Yegua Formation	1,300	Interbedded sand and carbonaceous clay, sandy clay, and silt; contains lignite and volcanic ash.	Not known to contain fresh to slightly saline water in Washington County.
			Cook Mountain Formation	Cook Mountain Formation	570	Predominately fossiliferous shale containing a 50-75 foot thick sand bed near the middle of the formation. Contains thin lenses of limestone, glauconitic sandstone and gypsum.	Not known to contain fresh or slightly saline water in Washington County.
			Sparta Sand	Sparta Sand	280	Fine to medium sand containing some brown lignitic shale. In places shale beds divide massive sand into an upper and lower unit.	Not known to yield water to wells in Washington County. May yield moderate amounts of slightly saline water in northwestern part of county.
			Weches Greensand	Weches Greensand	110	Predominately fossiliferous glauconitic shale; some sandstone and thin fossiliferous limestone.	Not known to contain fresh or slightly saline water in Washington County.
			Queen City Sand	Queen City Sand	500	Massive to thin-bedded, ferruginous and slightly lignitic sandstone interbedded with gray or brown, silty, lignitic shale.	Not known to yield water to wells in Washington County. May yield small amounts of slightly saline water.
			Reklaw Formation	Reklaw Formation	270[1]	Gray to brown shale in upper part and glauconitic sandstone interbedded with shale in lower part. The sandstone is fine- to coarse-grained and highly ferruginous.	Not known to contain fresh or slightly saline water in Washington County.
			Carrizo Sand	Carrizo Sand	465[1]	Massive, friable, commonly cross-bedded, well sorted, fine- to medium-grained, light-gray sandstone. Contains increasing amounts of shale downdip.	Not known to yield water to wells in Washington County. May yield small amounts of slightly saline water.

1/ In Lee County.

Catahoula Sandstone

The Catahoula Sandstone is a series of alternating beds of gray clay, tuff, and sandstone that unconformably overlie the Jackson Group. Sandstones in the lower part may be hard, white, and opaline.

The Catahoula crops out in a ½- to 4-mile-wide band in northern Washington County. Near the outcrop, the unit has a thickness of about 300 feet. In the southeastern part of the county, the thickness increases to a maximum of about 800 feet. The Catahoula is capable of yielding moderate amounts of fresh to slightly saline water to wells on the outcrop and in areas as much as 10 to 15 miles downdip.

Jasper Aquifer

The Jasper aquifer, which is equivalent to the lower part of the Fleming Formation of Miocene age (Table 2), is composed of alternating beds of sand and clay that unconformably overlie the Catahoula Sandstone. The unit includes massive, gray to brown, crossbedded sands interbedded with gray clay.

The Jasper crops out in the central part of the county (Figure 5). The thickness of the formation near the outcrop is about 800 feet, but it thickens rapidly down-dip and reaches a maximum thickness of about 1,300 feet near the Austin-Waller-Washington County line. The Jasper is capable of yielding moderate to large amounts of fresh to slightly saline water and is the most highly developed hydrologic unit in the county.

The approximate altitude of the base of the Jasper aquifer is shown on Figure 7. The dip averages about 80 feet a mile; but locally steepens to as much as 200 feet a mile.

Burkeville Aquiclude

The Burkeville aquiclude consists generally of a massive clay that overlies the Jasper and separates it from the Evangeline aquifer. In Washington County down-dip from the outcrop, it ranges in thickness from about 120 to 200 feet. Although basically a confining layer, the Burkeville contains some thin beds of sand which locally yield small amounts of fresh water.

Evangeline Aquifer

The Evangeline aquifer is a sequence of alternating clays and sands above the Burkeville aquiclude. In places, black chert grains in the whitish sands produce a salt and pepper effect. The Evangeline includes the upper part of the Fleming Formation of Miocene age and the alternating sands and clays of the Goliad Sand of Pliocene age. The Evangeline has a maximum thickness of approximately 550 feet in extreme southeastern Washington County, where the Evangeline yields moderate amounts of fresh water to wells. The approximate altitude of the base of the Evangeline is shown in Figure 6.

Alluvium of the Brazos River

Generally, the alluvial deposits are composed of red-brown to brown clay and silt, fine to coarse sand, and gravel. These sediments lense, interfinger, and grade laterally or vertically into finer or coarser materials. Normally, the finer grained materials predominate in the upper part of the alluvium; the coarser grained materials, such as gravel, occur in the lower part.

Alluvial deposits occur in Washington County as flood plain alluvium and terrace deposits (Cronin and Wilson, 1967). The terrace materials exist as remnants that cap hilltops or stand as isolated bodies above the flood plain. None of the terrace deposits are hydrologically significant in Washington County.

The flood plain alluvium, which consists of sand, gravel, silt, and clay, contains abundant fresh water. These deposits, which rest unconformably on the truncated surfaces of the older bedrock units, attain a maximum thickness of about 75 feet. In places, the alluvium contains extensive gravel beds that are 30 to 40 feet thick.

In addition to the alluvium deposited along the Brazos River, alluvium is also present along Yegua Creek, Jackson Creek, Red Gully, Caney Creek, and Mill Creek. The tributary stream alluvium is in hydrologic continuity with and thus is assigned to the alluvium of the Brazos River.

A more complete discussion of the alluvium of the Brazos River can be found in Cronin and Wilson (1967) and Cronin and others (1963).

GROUND-WATER HYDROLOGY

The general principles of ground-water hydrology as they apply to Washington County are discussed in this section of the report. For additional information, the reader is referred to: Baldwin and McGuinness (1963), Leopold and Langbein (1960), Meinzer (1923a, p. 2-142; 1923b), and Todd (1959, p. 14-114).

Source and Occurrence of Ground Water

Precipitation within the county and in adjoining areas to the north and northwest is the main source of groundwater in Washington County. Most precipitation runs off as streamflow; part is evaporated at the land surface, transpired by plants or retained by capillary

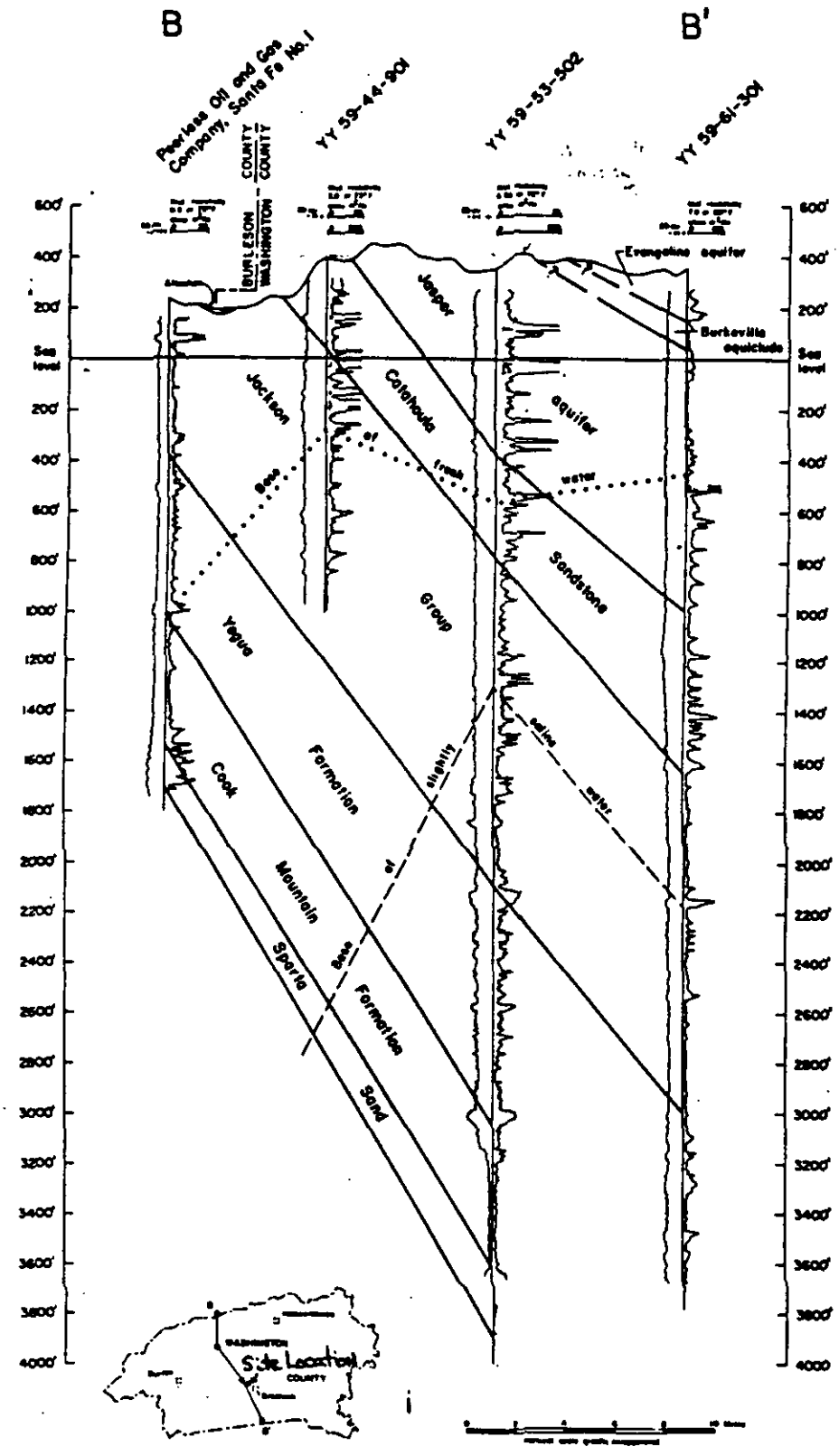


Figure 21
Geohydrologic Section B-B', Burleson and Washington Counties

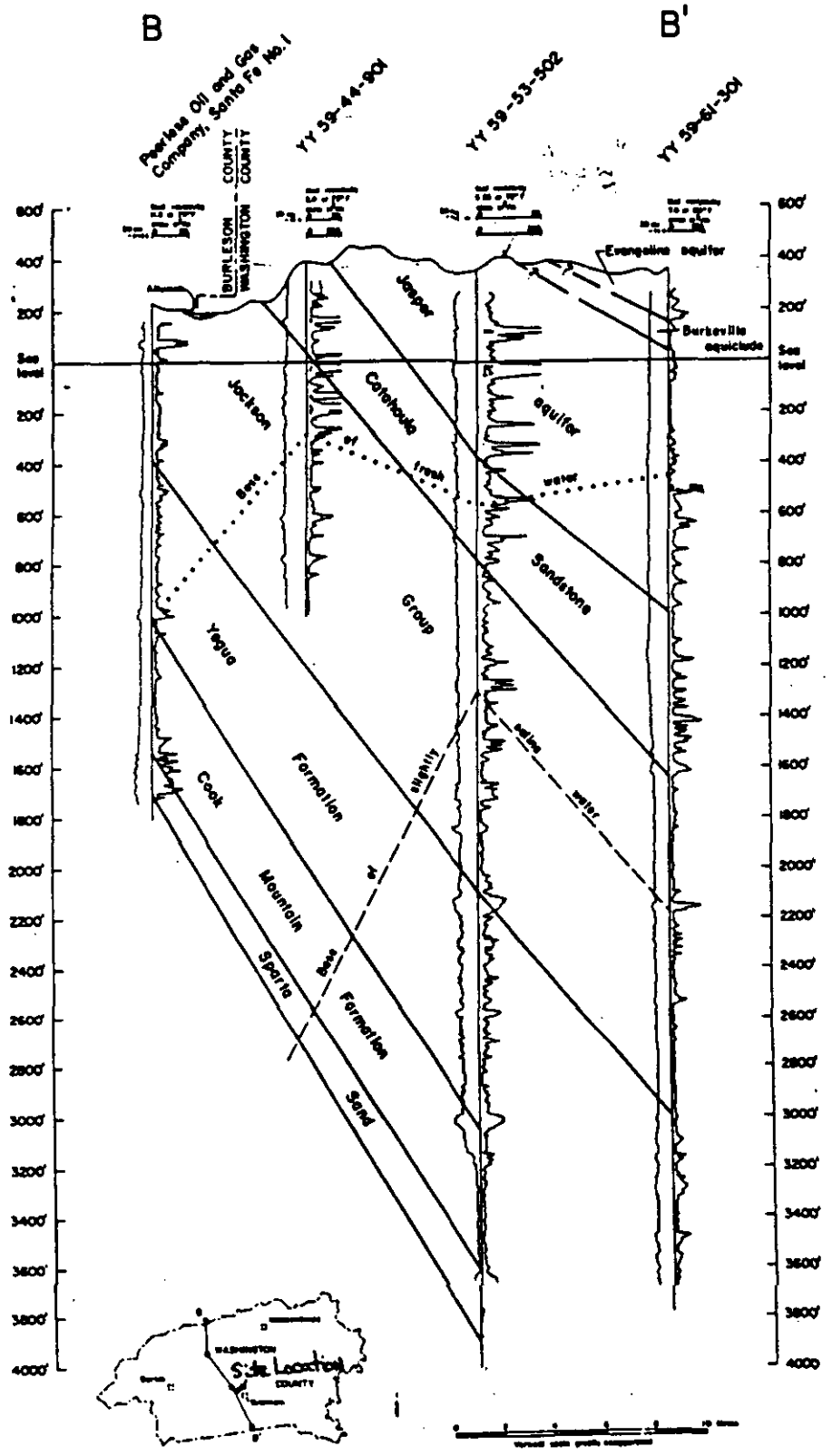


Figure 21
Geohydrologic Section B-B', Burleson and Washington Counties

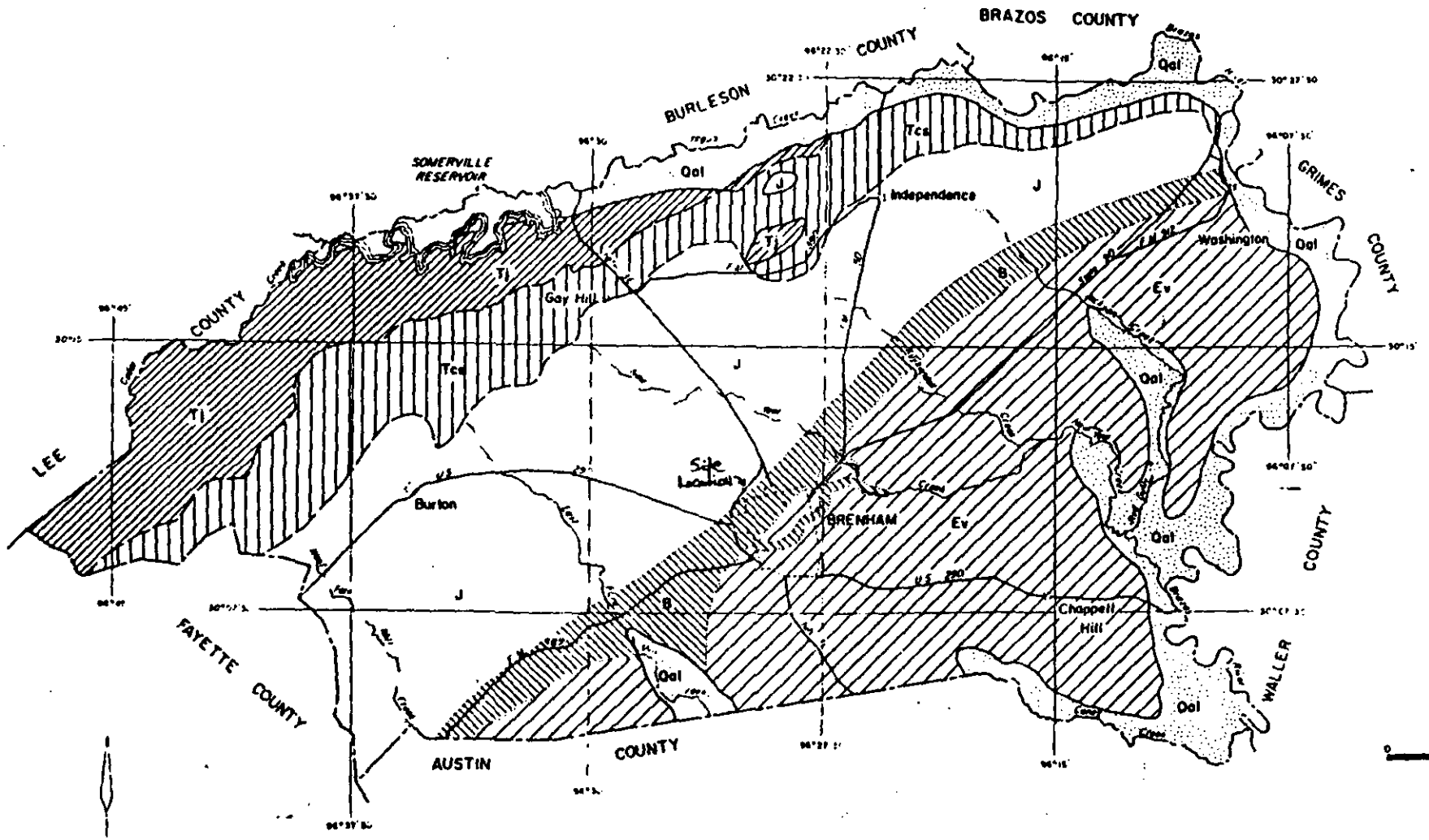


Figure 5
Outcrops of the Geologic and Hydrologic Units

Base from U.S. Geological Survey topographic quadrangles

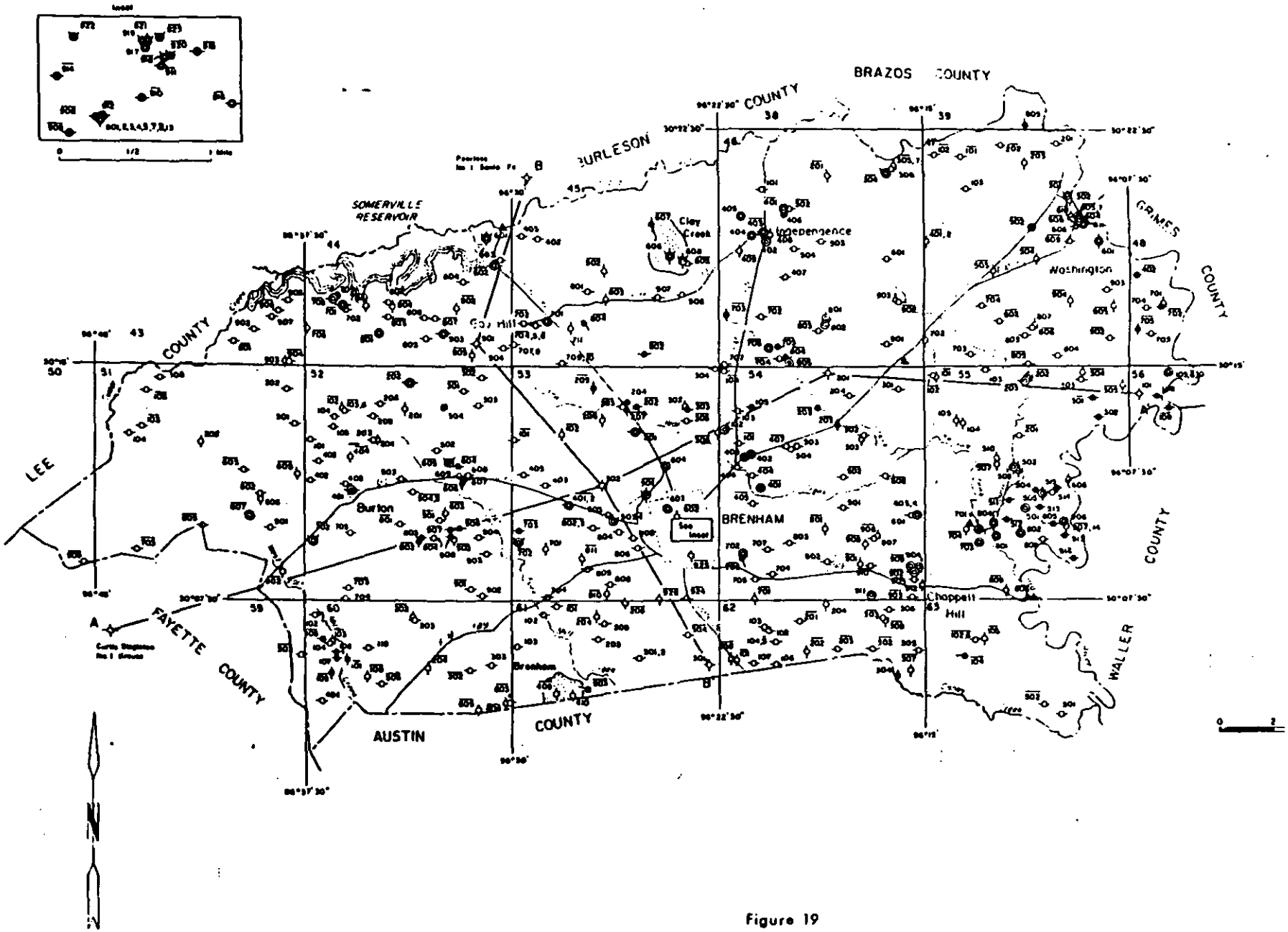


Figure 19
Locations of Wells, Spring and Test Holes

Base from U S Geological Survey topographic quadrangles

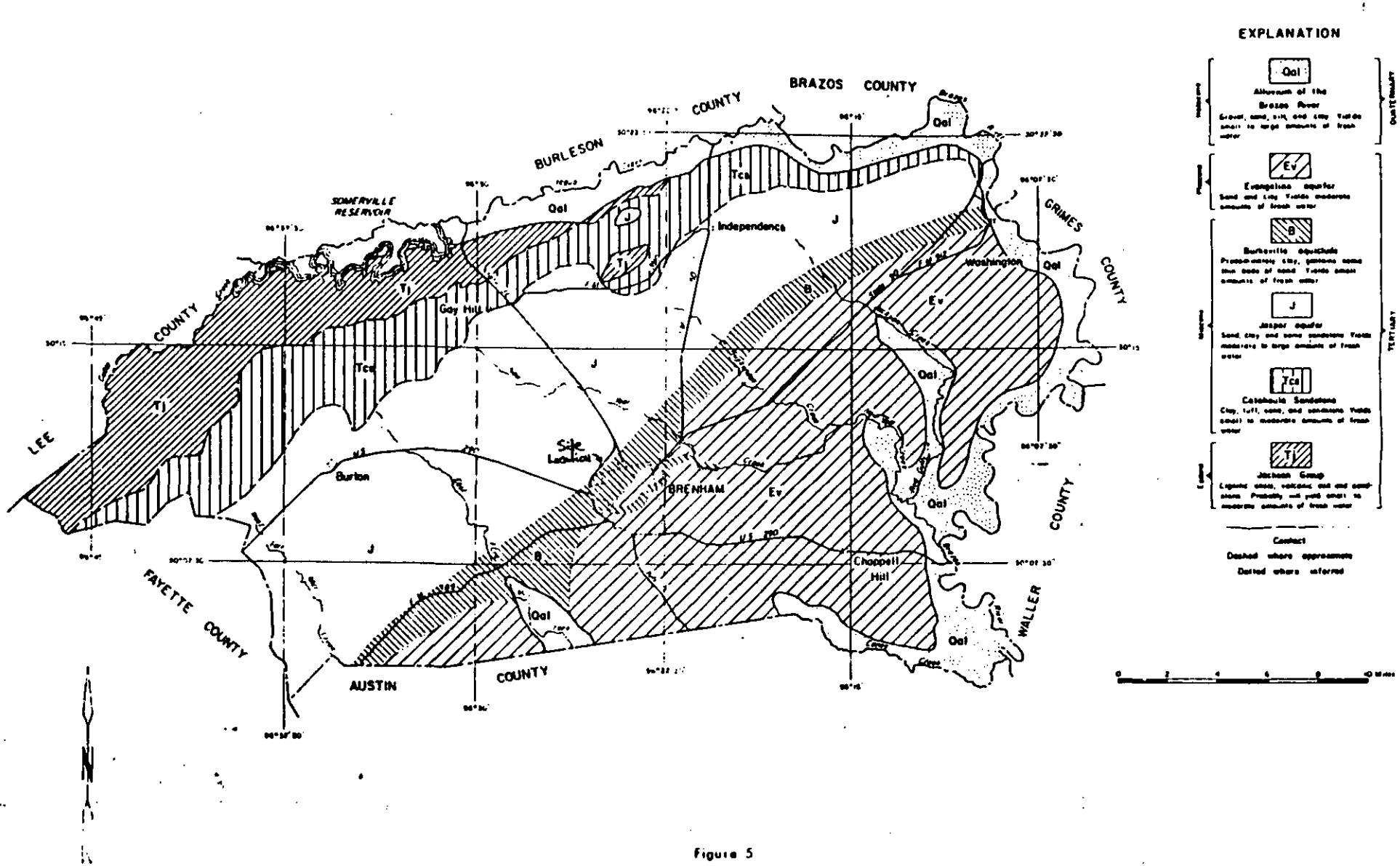


Figure 5

Outcrops of the Geologic and Hydrologic Units

Base from U.S. Geological Survey topographic quadrangles

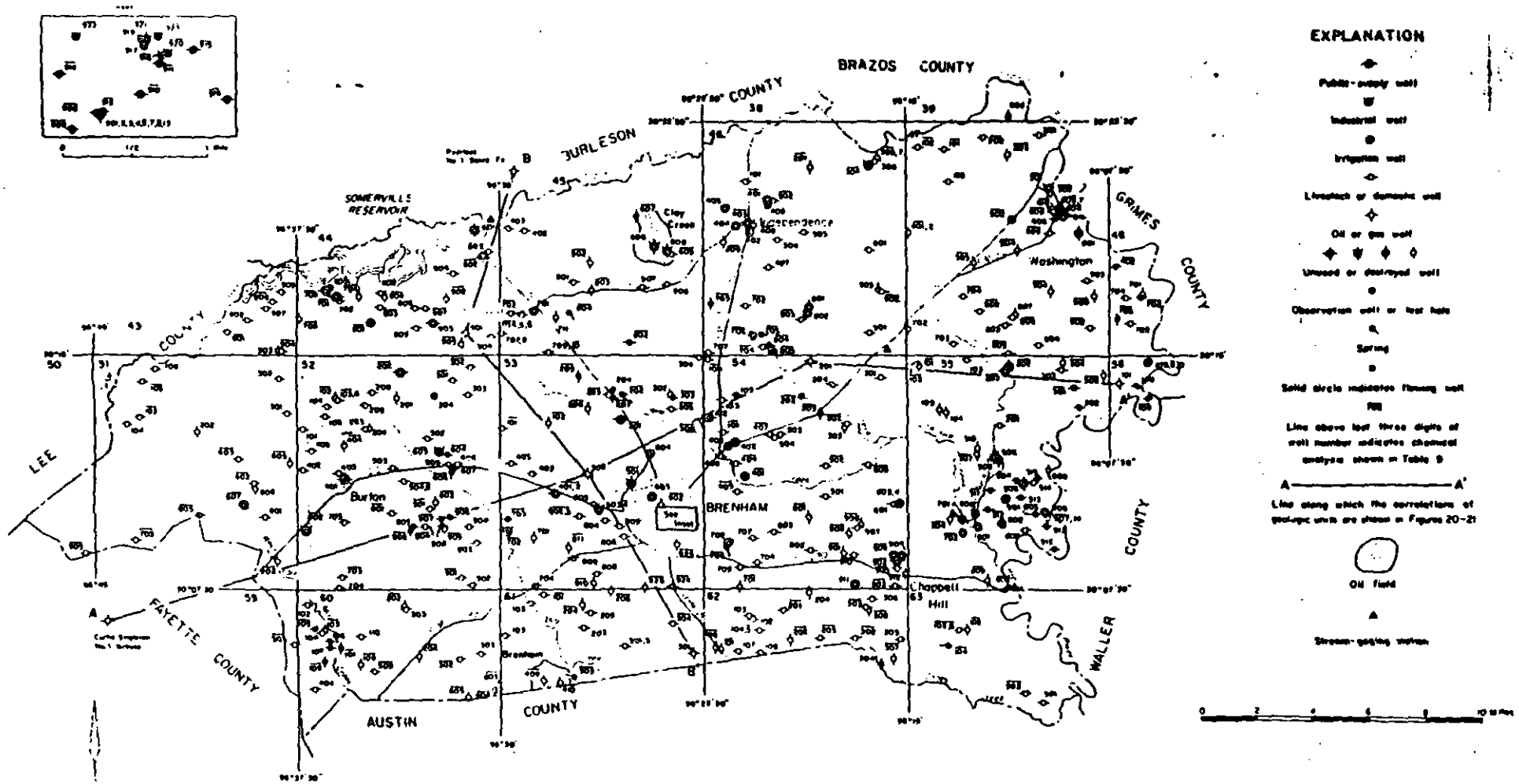

EXPLANATION
Public-supply well
Industrial well
Irrigation well
Livestock or domestic well
Oil or gas well
Unused or destroyed well
Observation well or test hole
Spring
Solid circle indicates flowing well
Line above last three digits of well number indicates chemical analysis shown in Table 9
A——A'
Line along which the correlations of geologic units are shown in Figures 20-21
Oil field
Stream-gaging station
BRAZOS COUNTY
JURLESON
SOMERVILLE RESERVOIR
Clay Creek
Independence
Washington
GRIMES COUNTY
LEE COUNTY
Burton
BRENHAM
Chappell Hill
FAYETTE COUNTY
AUSTIN COUNTY
WALLER COUNTY

Figure 19

Table 6.--Records of Wells, Springs, and Test Holes--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: BELOW LAND SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* YY-59-52-906	Charles Hodde	Frank Bros.	1915	161	6	J	340	+	July 23, 1942	J,E,1/2 Flows	D	Measured flow 0.4 gpm, July 23, 1942.
* 907	Mrs. R. Wendler	--Bomill	1907	191	6	J	355	+	do.	E,<1 Flows	D	Flow small "trickle", July 23, 1942.
908	Harold Wendler	C. Erickson	1955	198	4	J	333	+	Jan. 3, 1969	J,E, Flows	D	Estimated flow 4 gpm, Jan. 3, 1969.
* 53-101	Vernon Runge	Beaumier Iron Works	1964	356	4	J	455	124.4	Dec. 12, 1968	S,E,1	D	Casing slotted from 301 to 352 ft.
* 102	A. D. Spinn	--	--	22	48	J	400	--	--	N	U	Dug well, rock curb. Old well.
* 201	Yegua Development Co.	Layne-Texas Co.	1964	1,070	8 5/8	J,Tcs	350	76.8	July 26, 1968	T,E,20	P	Casing slotted from 470 to 500, 505 to 625, 775 to 795, 805 to 825, 930 to 950, 960 to 970, 985 to 990, and 1,025 to 1,060 ft. 2/
* 202	C. Machemehl	Pomykal Drilling Co.	1965	320	2 1/2	J	255	+21.8	Nov. 19, 1968	N Flows	S	Open hole. Reported flow 10 gpm, Sept. 27, 1965. 2/
* 203	Richard Spinn	E. Gajeske	1940	175	4	J	270	--	--	J,E,1	D	Reported flowed until 1962.
204	do.	Seismic Crew	1953	104	4	J	265	15.0	Nov. 19, 1968	N	U	Seismic test hole. Reported flowed until 1962.
* 205	Leo Arndt	E. Gajeske	1924	69	7	J	330	+	July 31, 1942	Flows,N	U	Estimated flow 10 gpm, July 31, 1942.
* 206	H. Hodde	--	--	130	6	J	342	--	--	N	U	
* 207	J. F. Presley	Seismic Crew	1940	123	3	J	278	+	July 24, 1942	Flows	U	Measured flow 6 gpm, July 24, 1942. Reported no longer flows, Oct. 16, 1959.

See footnotes at end of table.

Within Three Mile Radius of the Site

Table 6.--Records of Wells, Springs, and Test Holes--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: BELOW LAND SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
TY-59-53-302	N. W. Freeman	--	--	80	6	J	261	5.0	Nov. 19, 1968	N	U	Reported well may be caved. Old well.
* 303	do.	Pomykal Drilling Co.	1955	261	4	J	261	49.2	do.	J,E,1/2 Flows	D	Measured flow 17 gpm, Nov. 19, 1968. Reported has sulphur odor
304	St. John's Church	do.	1965	312	4	J	371	108	Jan. 1965	S,E,<1	D	Casing slotted from 172 to 202 ft. 2/
* 305	N. W. Freeman	E. A. Holly Co.	1955	229	8	J	255	10.5	Feb. 11, 1969	S,E	D	Reported flowed when drilled, and for several years thereafter.
* 306	L. C. Jeske	Ed Hafer	1930	218	3	J	250	30	1930	J,E	U	Measured flow 1.7 gpm, July 2, 1942. Reported no longer flowed in 1968.
* 401	Robert Lange	Alfred Conklin	1953	434	4	J	422	--	--	J,E,3	P	
* 402	do.	Pomykal Drilling Co.	1961	436	4	J	422	123.9	Oct. 17, 1968	S,E,2	P	
403	Louis Look	E. Gajeske	1930	89	4	J	405	52.0	Dec. 12, 1968	S,E,1/3	D	
405	G. L. Morris	Pomykal Drilling Co.	1966	126	4	J	380	45	Sept. 1966	S,E,1/2	D	Casing slotted from 112 to 126 ft. 2/
* 501	The Old Brazos Forge	Beaumier Iron Works	1964	292	4	J	355	150	Nov. 1964	S,E,1	U	Casing slotted from 264 to 284 ft.
502	--Jackson well 1	Shell Oil Co.	1963	11,614	--	--	352	--	--	--	--	Oil test. 1/
503	Brenham Bowling Corp.	Pomykal Drilling Co.	1959	420	4	J	405	--	--	S,E	Ind	
* 504	do.	do.	1964	480	4	J	400	141	June 1964	S,E, 1 1/2	Ind	Casing slotted from 447 to 480 ft. 2/
505	Edwin Draehn	do.	1965	167	4	J	392	112	May 1965	S,E,<1	D	Casing slotted from 158 to 167 ft. 2/

See footnotes at end of table.

Table 6.--Records of Wells, Springs, and Test Holes--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: BELOW LAND SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* YY-59-53-602	Brenham Packing Co.	--	1942	48	5	B	289	32	May 1942	N	U	
603	Robert Gascamp	A. B. Conkling	1955	135	4	B	339	--	--	J,E,1	Irr	Casing slotted from 125 to 135 ft. 2/
604	F. C. Kugel	Beaumier Iron Works	1957	495	4	J	330	100	Feb. 1969	S,E, 1 1/2	Ind	Casing slotted from 475 to 495 ft.
701	Mt. Pilgrim Church	--	--	40	24	J	342	--	--	N	U	Dug well, concrete curb. Dry, Oct. 17, 1968.
* 702	W. Ludemann	--	1910	34	48	J	300	23.2 24.1	July 22, 1942 Oct. 17, 1968	J,E,3/4	Ind	Dug well, concrete curb. Pesticide and herbicide analyses taken Oct. 17, 1968; results negative.
* 703	Robert Lange	Pomykal Drilling Co.	1951	337	4	J	335	+	June 1951	J,E,1/2 Flows	D	Reported not flowing in 1968.
704	Travis Smith	J. W. Schwickert	1900	30	38	B	296	22.8	Dec. 27, 1968	J,E,1/2	D	Dug well, concrete curb.
* 802	V. Whitmarsh	J & S Drilling	1965	457	4	J	405	127.1	Oct. 17, 1968	S,E,1	D	
* 803	do.	A. B. Conklin	1950	127	4	J	406	--	--	P,E,1/2	D	
804	W. Engelage	Pomykal Drilling Co.	1967	168	4	B-J	380	105	Aug. 1967	S,E,1/2	D	Casing slotted from 149 to 168 ft. 2/
805	Leo Hinze	do.	1964	176	4	J	390	120	Apr. 1964	S,E,1/2	D	Casing slotted from 156 to 176 ft. 2/
806	Calvin Borman	do.	1967	63	4	B	398	48	Oct. 1967	S,E,1/2	D	Casing slotted from 50 to 63 ft. 2/
808	Wilfred Nordt	A. B. Conklin	1954	125	4	B	325	40	1965	J,E,1	S	Casing slotted from 115 to 125 ft.
809	J. A. Boeker	Freiemeyer Bros.	1962	105	4	B	350	59.3	Dec. 19, 1968	J,E,1/2	D	
* 810	Fred Weise	--	1890	41	24	B	311	31.7	July 15, 1942	N	U	Dug well, tile curb.
* 811	Charles Hodde	--	--	76	6	B	370	67	July 1942	N	U	Old well.

See footnotes at end of table.

Table 6.--Records of Wells, Springs, and Test Holes--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: BELOW LAND SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
YY-59-53-901	City of Brenham well 1	--	1913	320	8	J	310	58.7 57.2	June 23, 1942 Nov. 20, 1942	N	U	Abandoned in 1934; destroyed prior to 1959.
902	City of Brenham well 2	--	1913	185	12	J	320	59.5 56.6	June 23, 1942 Nov. 20, 1942	N	U	Destroyed prior to 195[illegible]
903	City of Brenham well 3	G. C. Booth	1913	182	8	J	310	58.8	Nov. 20, 1942	N	U	
904	City of Brenham well 4	do.	1913	96	12	B	310	10.7	June 23, 1942	N	U	Destroyed prior to 1968
* 905	City of Brenham well 5	Layne-Texas Co.	1933	1,515	8	Tcs	310	35.5	May 22, 1961	N	U	Screen from 1,210-1,240, 1,298-1,320, and 1,432-1,495 ft. 2/ 3/
* * 906	City of Brenham well 6	J. W. Jackson	1935	143	10	J;BT	310	41.0	Feb. 13, 1969	T,E,5	P	Water level measured while water was cascading through hole in casing at around 30 ft. 2/
* 907	City of Brenham well 7	do.	1934	198	10	J	310	67.2	May 22, 1961	N	U	3/
* 908	City of Brenham well 8	--	1944	200	6	J	310	--	--	N	U	
* * 909	City of Brenham well 9	Layne-Texas Co.	1948	511	5	J	310	82.3 68.1	July 24, 1968 Feb. 11, 1969	T,E,40	P	Screen from 98-121, 129-139, 169-190, 371-401, 424-434, and 479-512 ft.
* * 910	City of Brenham well 10	do.	1948	(500)	10	J	310	70	Jan. 1949	T,E,40	P	Screen from 84-120, 139-150, 188-211, 360-380, 438-449, and 468-490 ft. 2/
* 911	City of Brenham well 11	Texas Water Wells	1952	593	10	J	280	65	Aug. 1952	T,E,60	P	Screen from 73-88, 95-107, 122-142, 185-207, 298-308, 345-395, 465-505, 518-525 ft. 2/

See footnotes at end of table.

* No Longer Used For Public Water Supplies

Table 6.--Records of Wells, Springs, and Test Holes--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: BELOW LAND SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* YY-59-53-912	City of Brenham *	--	1884	Spring	--	B	305	+	Jan. 2, 1969	Flows	P	Spring, dug out and brick lined, used for "well reservoir". In use since about 1884, as auxiliary public supply source. Reported to flow continuously. Measured discharge 12 gpm, Jan. 2, 1969. Measured temp. 21°C.
913	City of Brenham well 9	Layne-Texas Co. and John Booth	1930	1,504	16	Tcs	310	--	--	N	U	Well never used. One of two wells numbered "9". Screen from 1,216-1,234, 1,257-1,303, 1,355-1,396, and 1,452-1,501 ft. Reported yield 406 gpm. 2/
* 914	Travis Voelkel *	Layne-Texas Co.	1907	785	12	J	336	--	--	T,E,10	P	
* 915	City of Brenham well 12	Texas Water Wells	1963	820	12	J	267	42	Dec. 1963	T,E,75	P	Casing: 12-in. to 415 ft; 10-in. from 415 to 820 ft. Screen from 75-86, 120-143, 350-414, 468-518, and 750-810 ft. 2/
* 916	City of Brenham well 13	do.	1968	1,000	12	J	315	200	Apr. 1958	T,E,100	P	Casing: 12-in. to 520 ft; 10-in. from 520-1,000 ft. Screen from 120 to 135, 395 to 470, 520 to 595, 835 to 885, and 970 to 990 ft.
917	Brenham Cotton Mills well 1	Beaumier Iron Works	1963	660	4	J	310	71	1963	S,E,5	Ind	Casing slotted from 464 to 542 ft.
* 918	Brenham Cotton Mills well 2	do.	--	598	4	J	310	96.6	July 30, 1968	S,E,5	Ind	Casing slotted from 349 to 577 ft.
919	Brenham Cotton Mills well 3	Pomykel Drilling Co.	1962	535	8	J	310	--	--	T,E,5	Ind	Screen from 494 to 535 ft. 2/

See footnotes at end of table.

* No longer Used For Public Water Supplies

Table 6.--Records of Wells, Springs, and Test Holes--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: BELOW LAND SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
* YY-59-53-920	Brenham Cotton Mills well 4	Beaumier Iron Works	1967	587	6	J	230	--	--	T,E,40	Ind	Screen from 294 to 416 ft. Reported pumping level 250 ft.
* 921	Brenham Cotton Mills	do.	1903	200	10 3/4	J	310	40 73.3	July 1941 July 30, 1968	N	U	
* 922	Brenham Bottling Co.	E. Gajeske	1955	168	4	J	335	40	1955	S,E, 1 1/2	Ind	Screen from 163 to 168 ft.
* 923	Blue Bell Creameries	do.	1923	180	6	J	315	79.0	Aug. 23, 1968	S,E,5	Ind	Screen from 160 to 180 ft. Used for cooling and washing.
* 924	M. C. Morris	A. B. Conklin	1960	212	4	Ev	372	132.9	Nov. 22, 1968	S,E,3/4	D	Screen from 198 to 212 ft.
* 925	Louise Stone	--Posey	1895	700	5	J	375	--	--	N	U	Drilled before 1906 by Heberstone. At 1,500 ft. water rose to within 40 ft. of the surface, but the well did not flow.
* 926	Albert Kramer	Walter Rinn	1930	102	3	Ev	370	--	--	N	U	
* 54-101	W. Schomburg	B & P Drilling Co.	1956	433	4	J	260	1.1	Sept. 16, 1968	S,E	D	Casing slotted from 412 to 433 ft.
102	City of Brenham Airport	Beaumier Iron Works	1967	210	6	J	240	.6	do.	S,E,3	P	Casing slotted from 168 to 210 ft. Test hole 343 ft.
103	B. R. Wellman	Pomykal Drilling Co.	1965	114	4	J	308	83	Apr. 1965	S,E,1/2	D	Casing slotted from 104 to 114 ft. Pump set at 105 ft. 2/
* 104	Mrs. P. Schulte	do.	1958	360	4	J	342	43.4	Aug. 16, 1968	S,E,3/4	D	
105	Henry Wellman	do.	1963	115	4	J	285	+	Jan. 29, 1963	Flows, N	D	Casing slotted from 103 to 115 ft. 2/
201	F. Fulberg	Mount Selman	1941	4,762	--	--	283	--	--	--	--	Oil test. 1/

See footnotes at end of table.

TNRCC

Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 7

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
HOUSTON BRANCH
10625 FALLSTONE RD.
HOUSTON, TEXAS 77099

MEMORANDUM

Date: 5-15-1996

Subject: Contract Laboratory Program Data Review

From: Melvin L. Ritter, ESAT RPO, 6MD-HC

To: B. Canellas , 6SF-RA

M. Ritter 5/15

Site: OLD BRAZOS FORGE

Case#: 24517

SDG#: MFG-H35

The EPA Region 6 Houston Branch ESAT data validation team has completed a review of the submitted Contract Laboratory Program (CLP) data package for the referenced site. The samples analyzed and reviewed are detailed in the attached Regional data review and assessment report for this case.

The data package was found to be:

( ) Acceptable: No major problems with data package.

(X) Provisional: Use of data requires caution.
Data is acceptable for Regional use. Problems are noted in the review report.

( ) Unacceptable: Some or all of data should not be used.
Problems are noted in the review report.

Questions regarding the data review report can be addressed to me.

Attachments

cc: R. Flores, Region 6 CLP/TPO
M. El-feky, Region 6 Data Coordinator

Files (2)

07801

Recycled/Recyclable
Printed with Soy/Canola Ink on paper that

USEPA REGION: VI

INORGANIC REGIONAL ACCEPTANCE/REJECTION/REDUCED VALUE RECOMMENDATION FORM

LAB CODE: CHEM	CASE NO.: 24517	SDG NO.: MFGH35
SITE NAME: OLD BRAZOS FORGE		NUMBER OF SAMPLES: 18

FORM DUE DATE 06/03/96

SDG MAILDATE 05/07/96

PART I. DATA ACCEPTANCE OR REJECTION

INSTRUCTIONS: EPA REGIONS MUST ACCEPT OR REJECT DATA WITHIN 30 DAYS. IF DATA ARE BEING REJECTED, THIS FORM MUST BE ACCOMPANIED BY 1.) A SIGNED MEMO FROM THE REGIONAL OFFICIAL DESCRIBING THE CONTRACTUAL REASONS FOR REJECTION. ATTACH ALL RELATED DOCUMENTS (DATA REVIEWS,TELEPHONE LOGS, ETC.), 2.) ALL REJECTED DATA.

A. FULL DATA ACCEPTANCE OR REJECTION
CHECK ONE OF THE FOLLOWING IF YOU FULLY ACCEPT OR FULLY REJECT ALL SAMPLES IN THIS SDG.

✓ ACCEPT ALL ____ REJECT ALL

B. REJECTION OF ALL SAMPLES FOR A PARTICULAR FRACTION
CHECK ONE OF THE FOLLOWING IF YOU FULLY REJECT ALL SAMPLES IN A PARTICULAR FRACTION IN THIS SDG.
ALL FRACTIONS NOT MARKED AS REJECTED ARE ACCEPTED.

REJECT ALL: ____ METALS ____ CYANIDE

C. REJECTION AT THE SAMPLE AND FRACTIONAL LEVEL
CHECK THE FOLLOWING TO REJECT SAMPLES AT THE SAMPLE/FRACTIONAL LEVEL AND COMPLETE THE REVERSE SIDE OF THIS FORM.

____ PARTIAL ACCEPTANCE AND REJECTION BY SAMPLE/FRACTION

PART II. REDUCED VALUE

INSTRUCTIONS: REGION RECOMMENDS REDUCED VALUE AND RETAINS THE DATA. FOR A REDUCED VALUE TO BE PROCESSED, THIS FORM MUST BE ACCOMPANIED BY A SIGNED MEMO FROM THE REGIONAL OFFICIAL CITING THE CONTRACTUAL NON-COMPLIANCE; THE DOLLAR AMOUNT FOR REDUCED VALUE; AND A WRITTEN JUSTIFICATION (NARRATIVE) OF HOW SAMPLE WORTH WAS DETERMINED FOR EACH AFFECTED SAMPLE. ATTACH ALL RELATED DOCUMENTS (DATA REVIEWS, TELEPHONE LOGS, ETC.)

CHECK ONE OF THE FOLLOWING:

✓ NO REDUCED VALUE ____ REDUCED VALUE (COMPLETE REVERSE SIDE)

IDENTIFY THE SAMPLES/FRACTIONS THAT ARE RECOMMENDED FOR REDUCED VALUE ON THE REVERSE SIDE OF THIS FORM.

THIS FORM CANNOT BE PROCEESSED WITHOUT A SIGNATURE

NAME OF REGIONAL OFFICIAL: MAHMOUD ELFEKY

SIGNATURE: M. Elfeky DATE: 5-16-96

SEND THIS FORM TO: CLASS C/O DYNCORP
INVOICE PROCESSING & CALCULATION GROUP
300 NORTH LEE STREET, ALEXANDRIA, VA 22314

SEE LIST OF SAMPLES ON REVERSE SIDE

LAB CODE: CHEM	CASE NO.: 24517	SDG NO.: MFGH35

PART III. PARTIAL ACCEPTANCE AND REJECTION BY SAMPLE

ENTER AN "X" IN THE BLOCK TO THE RIGHT OF THE "Y" FOR THE FRACTION RECOMMENDED FOR REJECTION
ENTER A "D" IN THE BLOCK TO THE RIGHT OF THE "Y" FOR THE FRACTION RECOMMENDED FOR REDUCED VALUE.
ALL SAMPLES THAT ARE NOT MARKED WITH AN "X" OR A "D" ARE ACCEPTED.

SAMPLE	FRACTIONS ANALYZED METALS		CYANIDE	
LCSS	Y		Y	
MFGD97	Y		Y	
MFGD99	Y		Y	
MFGE00	Y		Y	
MFGH35	Y		Y	
MFGH36	Y		Y	
MFGH37	Y		Y	
MFGH38	Y		Y	
MFGH39	Y		Y	
MFGH39D	Y		Y	
MFGH39S	Y		Y	
MFGH40	Y		Y	
MFGH41	Y		Y	
MFGH42	Y		Y	
MFGH43	Y		Y	
MFGH44	Y		Y	
MFGH45	Y		Y	
MFGH46	Y		Y	

LOCKHEED ENVIRONMENTAL SYSTEMS & TECHNOLOGIES CO.
TWO ALLEN CENTER
1200 SMITH STREET, SUITE 800
HOUSTON, TX 77002

MEMORANDUM

DATE: May 10, 1996

TO: Dr. Melvin Ritter, ESAT RPO, Region VI

FROM: Dr. Tom C.H. Chiang, ESAT ETM, Region VI

SUBJECT: CLP Data Review

REF: TDF # 6-6247A ESAT File # I1970

Attached is the data review summary for Case # 24517
SDG # MFGH35
Site OLD BRAZOS FORGE

COMMENTS:

I. CONTRACTUAL ASSESSMENT OF DATA PACKAGE:

The hard copy data review detected the following contractual non-compliance. This non-compliance was not detected by CCS.

The laboratory analyzed an Interference Check Sample AB (ICSAB) that does not correspond to Table 2 on page E-21 of SOW ILM04.0. No results were affected.

II. TECHNICAL/USABILITY ASSESSMENT OF DATA PACKAGE:

A total of 360 results were reviewed for this data package. The reviewer qualified less than five percent of the results. The data package is technically provisional because three arsenic results had inconsistent ICP replicate readings.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
HOUSTON BRANCH
10625 FALLSTONE ROAD
HOUSTON, TEXAS 77099

INORGANIC REGIONAL DATA ASSESSMENT

CASE NO. 24517
LABORATORY CHEM
CONTRACT # 68-D5-0166
SDG # MFGH35
SOW# ILM04.0
ACCT # 6TFAJN43 SF # TFAUZZ

SITE OLD BRAZOS FORGE
NO. OF SAMPLES 15
MATRIX SOIL
REVIEWER (IF NOT ESD) ESAT
REVIEWER'S NAME Mervin Doucet
COMPLETION DATE May 10, 1996

SAMPLE NO.:				
	MFG-D97	MFG-H36	MFG-H40	MFG-H44
	MFG-D99	MFG-H37	MFG-H41	MFG-H45
	MFG-E00	MFG-H38	MFG-H42	MFG-H46
	MFG-H35	MFG-H39	MFG-H43	

DATA ASSESSMENT SUMMARY

	ICP	HG	CYANIDE
1. HOLDING TIMES	O	O	O
2. CALIBRATIONS	O	O	O
3. BLANKS	O	O	O
4. MATRIX SPIKES	O	O	O
5. DUPLICATE ANALYSIS	O	O	O
6. ICP QC	M		
7. FAA QC			
8. LCS	O	O	O
9. SAMPLE VERIFICATION	O	O	O
10. OTHER QC	O	O	O
11. OVERALL ASSESSMENT	M	O	O

O = Data had no problems.
M = Data qualified because of major or minor problems.
Z = Data unacceptable.
N/A= Not applicable

ACTION ITEMS: The laboratory analyzed an incorrect ICSAB solution.

AREAS OF CONCERN: Inconsistent ICP replicate readings were reported for three arsenic results.

NOTABLE PERFORMANCE:

INORGANIC QA REVIEW
CONTINUATION PAGE

Case 24517 SDG MFGH35 Site OLD BRAZOS FORGE Lab CHEM

COMMENTS: The data package consisted of 15 soil samples for total metals and cyanide analysis by ILM04.0. According to the ITR/COC, sample MFG-H39 was identified as the laboratory QC sample. Samples MFG-D97/MFG-H45 and MFG-H35/MFG-H38 were field duplicate pairs. The data package met the required 35-day turnaround time. Approximately 48 percent of the reported results were above the CRDL's.

The laboratory analyzed an ICSAB that does not correspond to Table 2 on page E-21 of SOW ILM04.0. This contractual non-compliance did not affect any sample results.

This data package is technically provisional because of problems with inconsistent ICP replicate readings. The technical usability of all reported sample results is appropriately indicated by ESAT's final data qualifiers in the attached Data Summary Sheet.

An Evidence Audit was conducted for the Complete Sample Delivery Group File (CSF), and the Evidence Inventory Checklist is attached to this report.

1. **Holding Times:** Acceptable. All holding time and sample preservation criteria were met.

2. **Calibrations:** Acceptable. All calibrations were acceptable. One lead CRDL standard recovery was below 50 percent, but it was not associated with the samples in this SDG. One selenium CRDL standard recovery was above 150 percent, but the reviewer made no qualifications because all selenium results were below the IDL.

3. **Blanks:** Acceptable. Preparation and calibration blanks met contractual requirements although 14 analyte concentrations were reported in the blanks. Cadmium, chromium, cobalt, nickel, and sodium in the calibration blanks affected some sample results below the CRDL's. The following sample results were above the CRDL's and biased low because of the calibration blank concentrations:

   the cadmium result for sample MFG-E00, and

   the chromium result for sample MFG-H36.

4. **Pre-digestion/Pre-distillation Matrix Spike Recovery:** Acceptable. All matrix spike recoveries met QC criteria.

INORGANIC QA REVIEW
CONTINUATION PAGE

Case 24517 SDG MFGH35 Site OLD BRAZOS FORGE Lab CHEM

5. **Duplicate Analysis:** Acceptable. All laboratory duplicate results demonstrated acceptable precision.

6. **ICP Quality Control:**

   Serial Dilution: Acceptable. All serial dilution differences met QC criteria.

   Interference Check Sample: Acceptable. All ICS results were acceptable indicating correct interelement and background correction.

   ICP Coefficient of Variation: Provisional. The arsenic results for samples MFG-D99, MFG-H39, and MFG-H43 are estimated because inconsistent ICP replicate readings resulted in %RSD's greater than 20 percent. All other ICP replicate readings were consistent.

7. **Furnace Atomic Absorption Quality Control:** Not Applicable.

8. **Laboratory Control Sample:** Acceptable. The LCS results were within QC limits.

9. **Sample Verification:** The reviewer detected reporting errors not found by CCS and contacted the laboratory for resubmission (see attached FAX Record Log).

10. **Other QC:**

    Field Duplicates: Acceptable. All differences between field duplicate results were acceptable.

11. **Overall Assessment:** The data package is technically provisional because three arsenic results had inconsistent ICP replicate readings.

INORGANIC/ORGANIC COMPLETE SDG FILE (CSF) INVENTORY CHECKLIST

Case 24517 SDG No. MFGH35 SDG Nos. To Follow SAS No. Date Rec 5/2/96

EPA Lab ID: CHEM

Lab Location: ENGLEWOOD, NJ

Region: 6 Audit No.: 24517/MFGH35

Re_Submitted CSF? Yes _____ No X

Box No(s): 1

COMMENTS:

7-8. The laboratory did not report sample receipt temperatures associated with Airbill no. 4343320575. The reviewer contacted the laboratory for resubmission.

11. The laboratory did not sign one of the Traffic Reports. The reviewer contacted the laboratory for resubmission.

Note: The laboratory signed and dated the paper attached to the airbill stickers because no space is provided for the laboratory receipt signatures.

ORIGINALS	YES	NO	N/A
CUSTODY SEALS			
1. Present on package?	X		
2. Intact upon receipt?	X		
FORM DC-2			
3. Numbering scheme accurate?	X		
4. Are enclosed documents listed?	X		
5. Are listed documents enclosed?	X		
FORM DC-1			
6. Present?	X		
7. Complete?		X	
8. Accurate?		X	
CHAIN-OF-CUSTODY RECORD(s)			
9. Signed?	X		
10. Dated?	X		
TRAFFIC REPORT(s) PACKING LIST(s)			
11. Signed?		X	
12. Dated?	X		
AIRBILLS/AIRBILL STICKER			
13. Present?	X		
14. Signed?	X		
15. Dated?	X		
SAMPLE TAGS			
16. Does DC-1 list tags as being included?	X		
17. Present?	X		
OTHER DOCUMENTS			
18. Complete?	X		
19. Legible?	X		
20. Original?		X	
20a. If "No", does the copy indicate where original documents are located?	X		

Over for additional comments.

Audited by: Mervin L Doucet MERVIN DOUCET/DATA REVIEWER Date 5/6/96

Audited by: _____ _____ Date _____

Audited by: _____ _____ Date _____

Signature Printed Name/Title

TO BE COMPLETED BY CEAT

Date Recvd by CEAT: _____ Date Entered: _____ Date Reviewed: _____

Entered by: _____ _____

Reviewed by: _____ _____

Signature Printed Name/Title

07008

INORGANIC DATA QUALIFIER DEFINITIONS

The following definitions provide brief explanations of the ESAT Region 6 qualifiers assigned to results in the data review process.

U	Undetected at the laboratory reported detection limit (IDL).
L	Reported concentration is between the IDL and the CRDL.
J	Result is estimated because of outlying quality control parameters such as matrix spike, serial dilution, FAA spike recovery, etc.
R	Result is unusable.
F	A possibility of a false negative exists.
UC	Reported concentration should be used as a raised detection limit because of apparent blank contamination.
^	Positive bias.
V	Negative bias.

DATA SUMMARY

Case No.: 24517
Laboratory: CHEM

SDG. No.: MFGH35
Matrix: SOIL

Reviewer: M. DOUCET
Units: MG/KG

EPA TR #=> LAB ID	MFG-D97	FLAG	MFG-D99	FLAG	MFG-E00	FLAG	MFG-H35	FLAG	MFG-H36	FLAG	COMMENTS
ALUMINUM	13500		4580		9060		4540		3320		
ANTIMONY	0.92	U	0.95	U	1.1	U	0.92	U	1.1	U	
ARSENIC	4		2.1	LJ	8.3		9.2		2.7		
BARIUM	74.2		56.4		164		128		60.4		
BERYLLIUM	0.49	L	0.25	L	0.39	L	0.23	U	0.27	U	
CADMIUM	0.23	U	0.24	U	3.5	Jv	0.23	U	0.27	U	
CALCIUM	23900		7230		36400		13500		19600		
CHROMIUM	13.4		26		391		7.5		3.5	Jv	
COBALT	3.4	LJv	1.5	LJv	5.4	L	11.8		1.4	LJv	
COPPER	5.2	L	13.3		287		5.7	L	4.5	L	
IRON	7770		3560		26000		5140		3240		
LEAD	7.3		6.7		137		10.9		4.9		
MAGNESIUM	2040		696	L	1520		711	L	473	L	
MANGANESE	276		93.5		305		829		141		
MERCURY	0.12	U	0.12	U	0.14	U	0.35		0.14	U	
NICKEL	8.7	L	39.1		1790		13.4		2.4	L	
POTASSIUM	837	L	624	L	681	L	241	L	223	L	
SELENIUM	0.92	U	0.95	U	1.1	U	0.92	U	1.1	U	
SILVER	0.46	U	0.47	U	0.73	L	0.46	U	0.53	U	
SODIUM	84.4	LJv	31.6	LJv	123	LJv	62.4	LJv	75.1	LJv	
THALLIUM	1.4	U	1.4	U	1.7	U	1.4	U	1.6	U	
VANADIUM	19.7		10.6	L	16.9		25.4		8.5	L	
ZINC	24.4		28.6		2160		23.1		20.7		
CYANIDE	0.41	U	0.43	U	0.48	L	0.41	U	0.46	U	
% SOLIDS	85		81.3		70.3		85		73.1		

DATA SUMMARY

Case No.: 24517
Laboratory: CHEM

SDG. No.: MFGH35
Matrix: SOIL

Reviewer: M. DOUCET
Units: MG/KG

EPA TR #=> LAB ID	MFG-H37	FLAG	MFG-H38	FLAG	MFG-H39	FLAG	MFG-H40	FLAG	MFG-H41	FLAG	COMMENTS
ALUMINUM	1160		4780		1740		1070		34100		
ANTIMONY	0.93	U	0.95	U	0.94	U	0.92	U	0.99	U	
ARSENIC	1.7	L	3.6		3.3	J	1.3	L	10.9		
BARIUM	11.4	L	90.7		93.9		25.5	L	208		
BERYLLIUM	0.23	U	0.24	U	0.23	U	0.23	U	1.1	L	
CADMIUM	0.23	U	0.24	U	0.23	U	0.23	U	0.25	U	
CALCIUM	4180		10500		105000		6050		50400		
CHROMIUM	3.2		8.8		2.2	LJv	2	LJv	22.3		
COBALT	0.23	U	4.4	L	1.1	LJv	0.26	LJv	5.8	L	
COPPER	3.5	L	4.4	L	3	L	4	L	11.5		
IRON	1260		5010		1780		1320		18200		
LEAD	2		8.8		6		2.5		14.7		
MAGNESIUM	196	L	679	L	263	L	162	L	5720		
MANGANESE	19.4		397		209		17.4		335		
MERCURY	0.12	U	0.12	U	0.12	U	0.12	U	0.13	U	
NICKEL	3.4	L	8.1	L	1.7	LJv	1.3	LJv	12.6		
POTASSIUM	73	L	241	L	110	L	63.7	L	1770		
SELENIUM	0.93	U	0.95	U	0.94	U	0.92	U	0.99	U	
SILVER	99.4		0.47	U	0.47	U	0.46	U	0.5	U	
SODIUM	45.6	LJv	49.2	LJv	75	LJv	22.3	LJv	86.7	LJv	
THALLIUM	1.4	U	1.4	U	1.4	U	1.4	U	1.5	U	
VANADIUM	4.3	L	14.5		6.6	L	4.6	L	42.8		
ZINC	11.3		23		18.2		20.5		53		
CYANIDE	0.4	U	0.44	L	1.1		0.39	U	1		
% SOLIDS	83.5		82.7		85.5		82.6		79.2		

DATA SUMMARY

Case No.: 24517
Laboratory: CHEM

SDG. No.: MFGH35
Matrix: SOIL

Reviewer: M. DOUCET
Units: MG/KG

EPA TR #=> LAB ID	MFG-H42	FLAG	MFG-H43	FLAG	MFG-H44	FLAG	MFG-H45	FLAG	MFG-H46	FLAG	COMMENTS
ALUMINUM	20400		25700		36900		12900		23600		
ANTIMONY	1.2	U	1	U	0.97	U	0.9	U	1.1	U	
ARSENIC	7.6		6.4	J	10.3		3		4.1		
BARIUM	146		112		208		68.7		135		
BERYLLIUM	0.77	L	1	L	1.2	L	0.48	L	1	L	
CADMIUM	7.2		0.26	U	0.24	U	0.23	U	0.26	U	
CALCIUM	135000		9950		43400		26300		20200		
CHROMIUM	37.5		228		24.7		21.8		358		
COBALT	3.4	LJv	6.2	L	6.1	L	3.4	L	6.6	L	
COPPER	66.3		43.7		13.9		4.6	L	24.5		
IRON	12200		14200		19500		7610		14500		
LEAD	18.6		14.9		17.5		7.8		13.5		
MAGNESIUM	3930		3630		6380		2010		3320		
MANGANESE	265		248		437		253		375		
MERCURY	0.15	U	0.13	U	0.12	U	0.12	U	0.33		
NICKEL	25		645		15.2		12		539		
POTASSIUM	1340	L	1550		2300		782	L	1320	L	
SELENIUM	1.2	U	1	U	0.97	U	0.9	U	1.1	U	
SILVER	0.58	U	0.52	U	0.48	U	0.45	U	0.53	U	
SODIUM	178	LJv	157	LJv	142	L	64.9	LJv	80.5	LJv	
THALLIUM	1.7	U	1.6	U	1.5	U	1.4	U	1.6	U	
VANADIUM	36.1		25.8		41.4		19.3		22.6		
ZINC	6510		52.6		60.2		31.2		1430		
CYANIDE	0.51	U	0.46	U	0.44	U	0.39	U	0.46	U	
% SOLIDS	66.6		74.3		80.3		85.4		72.2		

In Reference to
Case 24517 SDG MFGH35
Page 1 of 2
ESAT FILE NO.: I1970

Contract Laboratory Program
REGIONAL/LABORATORY COMMUNICATION SYSTEM
FAX Record Log

Date of FAX: May 10, 1996

Laboratory Name: CHEM

Lab Contact: DIVYA MEHTA

Region: 6

Regional Contact: Mervin Doucet (ESAT)

FAX Initiated by: Region

In reference to data for the following sample numbers:

All samples in this SDG.

Summary of Questions/Issues:

1. The SDG was not reported on the Inorganic Traffic Report/Chain of Custody (SOW ILM04.0, page B-6). For future reference, please report the SDG.

2. The ICP operator analyzed an Interference Check Sample AB (ICSAB) solution that does not correspond to Table 2 on page E-21 of SOW ILM04.0. Please explain this contractual deviation.

3. The Sample Log-in Technician did not report the full contract number, 68-D5-0166, on the SDG Traffic Cover Sheet and both ITR/COC's. For future reference, please report the full contract number.

4. The receipt temperatures for samples associated with airbill no. 4343320575 were not reported on the Form DC-1. The receipt temperatures must be taken even though a temperature blank is not located in the cooler. Please resubmit the Form DC-1 with the receipt temperatures.

5. According to the cyanide distillation log (page 227), the analyst incorrectly reported the weight for sample MFG-H39 on Form 13 (page 53).

6. According to the ICP sample preparation worksheet (page 219), the analyst incorrectly reported the weights for samples MFG-H39 and MFG-H39D, and MFG-H39S on Form 13 (page 55).

7. The mercury and cyanide instrument ID numbers were not reported in the raw data. Please report the instrument ID numbers, as reported on the Form 14's, on the first page of the mercury and cyanide raw data and resubmit.

The EPA expects the laboratory to look into items and submit data within seven days to Christy Macdowell, U.S. EPA, 10625 Fallstone Road, Houston TX 77099.

Mervin S Doucet
Signature

5/10/96
Date

Distribution: (1) Lab Copy (2) Region Copy

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGD97

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

Matrix (soil/water): SOIL Lab Sample ID: 3162S

Level (low/med): LOW Date Received: 03/29/96

% Solids: 85.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13500			P
7440-36-0	Antimony	0.92	U		P
7440-38-2	Arsenic	4.0			P
7440-39-3	Barium	74.2			P
7440-41-7	Beryllium	0.49	B		P
7440-43-9	Cadmium	0.23	U		P
7440-70-2	Calcium	23900			P
7440-47-3	Chromium	13.4			P
7440-48-4	Cobalt	3.4	B		P
7440-50-8	Copper	5.2	B		P
7439-89-6	Iron	7770			P
7439-92-1	Lead	7.3			P
7439-95-4	Magnesium	2040			P
7439-96-5	Manganese	276			P
7439-97-6	Mercury	0.12	U		CV
7440-02-0	Nickel	8.7	B		P
7440-09-7	Potassium	837	B		P
7782-49-2	Selenium	0.92	U		P
7440-22-4	Silver	0.46	U		P
7440-23-5	Sodium	84.4	B		P
7440-28-0	Thallium	1.4	U		P
7440-62-2	Vanadium	19.7			P
7440-66-6	Zinc	24.4			P
	Cyanide	0.41	U		CA

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGD99

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

Matrix (soil/water): SOIL Lab Sample ID: 3163S

Level (low/med): LOW Date Received: 03/29/96

% Solids: 81.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	4580			P
7440-36-0	Antimony	0.95	U		P
7440-38-2	Arsenic	2.1	B		P
7440-39-3	Barium	56.4			P
7440-41-7	Beryllium	0.25	B		P
7440-43-9	Cadmium	0.24	U		P
7440-70-2	Calcium	7230			P
7440-47-3	Chromium	26.0			P
7440-48-4	Cobalt	1.5	B		P
7440-50-8	Copper	13.3			P
7439-89-6	Iron	3560			P
7439-92-1	Lead	6.7			P
7439-95-4	Magnesium	696	B		P
7439-96-5	Manganese	93.5			P
7439-97-6	Mercury	0.12	U		CV
7440-02-0	Nickel	39.1			P
7440-09-7	Potassium	624	B		P
7782-49-2	Selenium	0.95	U		P
7440-22-4	Silver	0.47	U		P
7440-23-5	Sodium	31.6	B		P
7440-28-0	Thallium	1.4	U		P
7440-62-2	Vanadium	10.6	B		P
7440-66-6	Zinc	28.6			P
	Cyanide	0.43	U		CA

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGE00

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

Matrix (soil/water): SOIL Lab Sample ID: 3161S

Level (low/med): LOW Date Received: 03/29/96

% Solids: 70.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	9060			P
7440-36-0	Antimony	1.1	U		P
7440-38-2	Arsenic	8.3			P
7440-39-3	Barium	164			P
7440-41-7	Beryllium	0.39	B		P
7440-43-9	Cadmium	3.5			P
7440-70-2	Calcium	36400			P
7440-47-3	Chromium	391			P
7440-48-4	Cobalt	5.4	B		P
7440-50-8	Copper	287			P
7439-89-6	Iron	26000			P
7439-92-1	Lead	137			P
7439-95-4	Magnesium	1520			P
7439-96-5	Manganese	305			P
7439-97-6	Mercury	0.14	U		CV
7440-02-0	Nickel	1790			P
7440-09-7	Potassium	681	B		P
7782-49-2	Selenium	1.1	U		P
7440-22-4	Silver	0.73	B		P
7440-23-5	Sodium	123	B		P
7440-28-0	Thallium	1.7	U		P
7440-62-2	Vanadium	16.9			P
7440-66-6	Zinc	2160			P
	Cyanide	0.48	B		CA

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH35

.ab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

ab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

atrix (soil/water): SOIL Lab Sample ID: 3132S

evel (low/med): LOW Date Received: 03/28/96

Solids: 85.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	4540			P
7440-36-0	Antimony	0.92	U		P
7440-38-2	Arsenic	9.2			P
7440-39-3	Barium	128			P
7440-41-7	Beryllium	0.23	U		P
7440-43-9	Cadmium	0.23	U		P
7440-70-2	Calcium	13500			P
7440-47-3	Chromium	7.5			P
7440-48-4	Cobalt	11.8			P
7440-50-8	Copper	5.7	B		P
7439-89-6	Iron	5140			P
7439-92-1	Lead	10.9			P
7439-95-4	Magnesium	711	B		P
7439-96-5	Manganese	829			P
7439-97-6	Mercury	0.35			CV
7440-02-0	Nickel	13.4			P
7440-09-7	Potassium	241	B		P
7782-49-2	Selenium	0.92	U		P
7440-22-4	Silver	0.46	U		P
7440-23-5	Sodium	62.4	B		P
7440-28-0	Thallium	1.4	U		P
7440-62-2	Vanadium	25.4			P
7440-66-6	Zinc	23.1			P
	Cyanide	0.41	U		CA

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH36

ab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

ab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

atrix (soil/water): SOIL Lab Sample ID: 3131S

evel (low/med): LOW Date Received: 03/28/96

Solids: 73.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	3320			P
7440-36-0	Antimony	1.1	U		P
7440-38-2	Arsenic	2.7			P
7440-39-3	Barium	60.4			P
7440-41-7	Beryllium	0.27	U		P
7440-43-9	Cadmium	0.27	U		P
7440-70-2	Calcium	19600			P
7440-47-3	Chromium	3.5			P
7440-48-4	Cobalt	1.4	B		P
7440-50-8	Copper	4.5	B		P
7439-89-6	Iron	3240			P
7439-92-1	Lead	4.9			P
7439-95-4	Magnesium	473	B		P
7439-96-5	Manganese	141			P
7439-97-6	Mercury	0.14	U		CV
7440-02-0	Nickel	2.4	B		P
7440-09-7	Potassium	223	B		P
7782-49-2	Selenium	1.1	U		P
7440-22-4	Silver	0.53	U		P
7440-23-5	Sodium	75.1	B		P
7440-28-0	Thallium	1.6	U		P
7440-62-2	Vanadium	8.5	B		P
7440-66-6	Zinc	20.7			P
	Cyanide	0.46	U		CA

olor Before: BROWN Clarity Before: Texture: MEDIUM

olor After: YELLOW Clarity After: Artifacts:

omments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH37

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

Matrix (soil/water): SOIL Lab Sample ID: 3133S

Level (low/med): LOW Date Received: 03/28/96

% Solids: 83.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1160			P
7440-36-0	Antimony	0.93	U		P
7440-38-2	Arsenic	1.7	B		P
7440-39-3	Barium	11.4	B		P
7440-41-7	Beryllium	0.23	U		P
7440-43-9	Cadmium	0.23	U		P
7440-70-2	Calcium	4180			P
7440-47-3	Chromium	3.2			P
7440-48-4	Cobalt	0.23	U		P
7440-50-8	Copper	3.5	B		P
7439-89-6	Iron	1260			P
7439-92-1	Lead	2.0			P
7439-95-4	Magnesium	196	B		P
7439-96-5	Manganese	19.4			P
7439-97-6	Mercury	0.12	U		CV
7440-02-0	Nickel	3.4	B		P
7440-09-7	Potassium	73.0	B		P
7782-49-2	Selenium	0.93	U		P
7440-22-4	Silver	99.4			P
7440-23-5	Sodium	45.6	B		P
7440-28-0	Thallium	1.4	U		P
7440-62-2	Vanadium	4.3	B		P
7440-66-6	Zinc	11.3			P
	Cyanide	0.40	U		CA

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH38

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

Matrix (soil/water): SOIL Lab Sample ID: 3134S

Level (low/med): LOW Date Received: 03/28/96

Solids: 82.7

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	4780			P
7440-36-0	Antimony	0.95	U		P
7440-38-2	Arsenic	3.6			P
7440-39-3	Barium	90.7			P
7440-41-7	Beryllium	0.24	U		P
7440-43-9	Cadmium	0.24	U		P
7440-70-2	Calcium	10500			P
7440-47-3	Chromium	8.8			P
7440-48-4	Cobalt	4.4	B		P
7440-50-8	Copper	4.4	B		P
7439-89-6	Iron	5010			P
7439-92-1	Lead	8.8			P
7439-95-4	Magnesium	679	B		P
7439-96-5	Manganese	397			P
7439-97-6	Mercury	0.12	U		CV
7440-02-0	Nickel	8.1	B		P
7440-09-7	Potassium	241	B		P
7782-49-2	Selenium	0.95	U		P
7440-22-4	Silver	0.47	U		P
7440-23-5	Sodium	49.2	B		P
7440-28-0	Thallium	1.4	U		P
7440-62-2	Vanadium	14.5			P
7440-66-6	Zinc	23.0			P
	Cyanide	0.44	B		CA

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

FORM I - IN ILM04.0

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH39

ab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

ab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

atrix (soil/water): SOIL Lab Sample ID: 3127S

evel (low/med): LOW Date Received: 03/28/96

Solids: 85.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1740			P
7440-36-0	Antimony	0.94	U		P
7440-38-2	Arsenic	3.3			P
7440-39-3	Barium	93.9			P
7440-41-7	Beryllium	0.23	U		P
7440-43-9	Cadmium	0.23	U		P
7440-70-2	Calcium	105000			P
7440-47-3	Chromium	2.2	B		P
7440-48-4	Cobalt	1.1	B		P
7440-50-8	Copper	3.0	B		P
7439-89-6	Iron	1780			P
7439-92-1	Lead	6.0			P
7439-95-4	Magnesium	263	B		P
7439-96-5	Manganese	209			P
7439-97-6	Mercury	0.12	U		CV
7440-02-0	Nickel	1.7	B		P
7440-09-7	Potassium	110	B		P
7782-49-2	Selenium	0.94	U		P
7440-22-4	Silver	0.47	U		P
7440-23-5	Sodium	75.0	B		P
7440-28-0	Thallium	1.4	U		P
7440-62-2	Vanadium	6.6	B		P
7440-66-6	Zinc	18.2			P
	Cyanide	1.1			CA

olor Before: BROWN Clarity Before: Texture: MEDIUM

olor After: YELLOW Clarity After: Artifacts:

omments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH40

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

Matrix (soil/water): SOIL Lab Sample ID: 3130S

Level (low/med): LOW Date Received: 03/28/96

% Solids: 82.6

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1070			P
7440-36-0	Antimony	0.92	U		P
7440-38-2	Arsenic	1.3	B		P
7440-39-3	Barium	25.5	B		P
7440-41-7	Beryllium	0.23	U		P
7440-43-9	Cadmium	0.23	U		P
7440-70-2	Calcium	6050			P
7440-47-3	Chromium	2.0	B		P
7440-48-4	Cobalt	0.26	B		P
7440-50-8	Copper	4.0	B		P
7439-89-6	Iron	1320			P
7439-92-1	Lead	2.5			P
7439-95-4	Magnesium	162	B		P
7439-96-5	Manganese	17.4			P
7439-97-6	Mercury	0.12	U		CV
7440-02-0	Nickel	1.3	B		P
7440-09-7	Potassium	63.7	B		P
7782-49-2	Selenium	0.92	U		P
7440-22-4	Silver	0.46	U		P
7440-23-5	Sodium	22.3	B		P
7440-28-0	Thallium	1.4	U		P
7440-62-2	Vanadium	4.6	B		P
7440-66-6	Zinc	20.5			P
	Cyanide	0.39	U		CA

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH41

ab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

ab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

atrix (soil/water): SOIL Lab Sample ID: 3156S

evel (low/med): LOW Date Received: 03/29/96

Solids: 79.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	34100			P
7440-36-0	Antimony	0.99	U		P
7440-38-2	Arsenic	10.9			P
7440-39-3	Barium	208			P
7440-41-7	Beryllium	1.1	B		P
7440-43-9	Cadmium	0.25	U		P
7440-70-2	Calcium	50400			P
7440-47-3	Chromium	22.3			P
7440-48-4	Cobalt	5.8	B		P
7440-50-8	Copper	11.5			P
7439-89-6	Iron	18200			P
7439-92-1	Lead	14.7			P
7439-95-4	Magnesium	5720			P
7439-96-5	Manganese	335			P
7439-97-6	Mercury	0.13	U		CV
7440-02-0	Nickel	12.6			P
7440-09-7	Potassium	1770			P
7782-49-2	Selenium	0.99	U		P
7440-22-4	Silver	0.50	U		P
7440-23-5	Sodium	86.7	B		P
7440-28-0	Thallium	1.5	U		P
7440-62-2	Vanadium	42.8			P
7440-66-6	Zinc	53.0			P
	Cyanide	1.0			CA

olor Before: BROWN Clarity Before: Texture: MEDIUM

olor After: YELLOW Clarity After: Artifacts:

omments:

EPA SAMPLE NO.

MFGH42

INORGANIC ANALYSIS DATA SHEET

ab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

ab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

atrix (soil/water): SOIL Lab Sample ID: 3158S

evel (low/med): LOW Date Received: 03/29/96

Solids: 66.6

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	20400			P
7440-36-0	Antimony	1.2	U		P
7440-38-2	Arsenic	7.6			P
7440-39-3	Barium	146			P
7440-41-7	Beryllium	0.77	B		P
7440-43-9	Cadmium	7.2			P
7440-70-2	Calcium	135000			P
7440-47-3	Chromium	37.5			P
7440-48-4	Cobalt	3.4	B		P
7440-50-8	Copper	66.3			P
7439-89-6	Iron	12200			P
7439-92-1	Lead	18.6			P
7439-95-4	Magnesium	3930			P
7439-96-5	Manganese	265			P
7439-97-6	Mercury	0.15	U		CV
7440-02-0	Nickel	25.0			P
7440-09-7	Potassium	1340	B		P
7782-49-2	Selenium	1.2	U		P
7440-22-4	Silver	0.58	U		P
7440-23-5	Sodium	178	B		P
7440-28-0	Thallium	1.7	U		P
7440-62-2	Vanadium	36.1			P
7440-66-6	Zinc	6510			P
	Cyanide	0.51	U		CA

olor Before: BROWN Clarity Before: Texture: MEDIUM

olor After: YELLOW Clarity After: Artifacts:

omments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH43

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

Matrix (soil/water): SOIL Lab Sample ID: 3160S

Level (low/med): LOW Date Received: 03/29/96

% Solids: 74.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	25700			P
7440-36-0	Antimony	1.0	U		P
7440-38-2	Arsenic	6.4			P
7440-39-3	Barium	112			P
7440-41-7	Beryllium	1.0	B		P
7440-43-9	Cadmium	0.26	U		P
7440-70-2	Calcium	9950			P
7440-47-3	Chromium	228			P
7440-48-4	Cobalt	6.2	B		P
7440-50-8	Copper	43.7			P
7439-89-6	Iron	14200			P
7439-92-1	Lead	14.9			P
7439-95-4	Magnesium	3630			P
7439-96-5	Manganese	248			P
7439-97-6	Mercury	0.13	U		CV
7440-02-0	Nickel	645			P
7440-09-7	Potassium	1550			P
7782-49-2	Selenium	1.0	U		P
7440-22-4	Silver	0.52	U		P
7440-23-5	Sodium	157	B		P
7440-28-0	Thallium	1.6	U		P
7440-62-2	Vanadium	25.8			P
7440-66-6	Zinc	52.6			P
	Cyanide	0.46	U		CA

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH44

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

Matrix (soil/water): SOIL Lab Sample ID: 3155S

Level (low/med): LOW Date Received: 03/29/96

% Solids: 80.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	36900			P
7440-36-0	Antimony	0.97	U		P
7440-38-2	Arsenic	10.3			P
7440-39-3	Barium	208			P
7440-41-7	Beryllium	1.2	B		P
7440-43-9	Cadmium	0.24	U		P
7440-70-2	Calcium	43400			P
7440-47-3	Chromium	24.7			P
7440-48-4	Cobalt	6.1	B		P
7440-50-8	Copper	13.9			P
7439-89-6	Iron	19500			P
7439-92-1	Lead	17.5			P
7439-95-4	Magnesium	6380			P
7439-96-5	Manganese	437			P
7439-97-6	Mercury	0.12	U		CV
7440-02-0	Nickel	15.2			P
7440-09-7	Potassium	2300			P
7782-49-2	Selenium	0.97	U		P
7440-22-4	Silver	0.48	U		P
7440-23-5	Sodium	142	B		P
7440-28-0	Thallium	1.5	U		P
7440-62-2	Vanadium	41.4			P
7440-66-6	Zinc	60.2			P
	Cyanide	0.44	U		CA

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

FORM I - IN ILM04.0

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH45

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

Matrix (soil/water): SOIL Lab Sample ID: 3157S

Level (low/med): LOW Date Received: 03/29/96

Solids: 85.4

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12900			P
7440-36-0	Antimony	0.90	U		P
7440-38-2	Arsenic	3.0			P
7440-39-3	Barium	68.7			P
7440-41-7	Beryllium	0.48	B		P
7440-43-9	Cadmium	0.23	U		P
7440-70-2	Calcium	26300			P
7440-47-3	Chromium	21.8			P
7440-48-4	Cobalt	3.4	B		P
7440-50-8	Copper	4.6	B		P
7439-89-6	Iron	7610			P
7439-92-1	Lead	7.8			P
7439-95-4	Magnesium	2010			P
7439-96-5	Manganese	253			P
7439-97-6	Mercury	0.12	U		CV
7440-02-0	Nickel	12.0			P
7440-09-7	Potassium	782	B		P
7782-49-2	Selenium	0.90	U		P
7440-22-4	Silver	0.45	U		P
7440-23-5	Sodium	64.9	B		P
7440-28-0	Thallium	1.4	U		P
7440-62-2	Vanadium	19.3			P
7440-66-6	Zinc	31.2			P
	Cyanide	0.39	U		CA

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH46

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH35

Matrix (soil/water): SOIL Lab Sample ID: 3159S

Level (low/med): LOW Date Received: 03/29/96

% Solids: 72.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	23600			P
7440-36-0	Antimony	1.1	U		P
7440-38-2	Arsenic	4.1			P
7440-39-3	Barium	135			P
7440-41-7	Beryllium	1.0	B		P
7440-43-9	Cadmium	0.26	U		P
7440-70-2	Calcium	20200			P
7440-47-3	Chromium	358			P
7440-48-4	Cobalt	6.6	B		P
7440-50-8	Copper	24.5			P
7439-89-6	Iron	14500			P
7439-92-1	Lead	13.5			P
7439-95-4	Magnesium	3320			P
7439-96-5	Manganese	375			P
7439-97-6	Mercury	0.33			CV
7440-02-0	Nickel	539			P
7440-09-7	Potassium	1320	B		P
7782-49-2	Selenium	1.1	U		P
7440-22-4	Silver	0.53	U		P
7440-23-5	Sodium	80.5	B		P
7440-28-0	Thallium	1.6	U		P
7440-62-2	Vanadium	22.6			P
7440-66-6	Zinc	1430			P
	Cyanide	0.46	U		CA

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

TNRCC

Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 8

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
HOUSTON BRANCH
10625 FALLSTONE RD.
HOUSTON, TEXAS 77099

April 26, 1996

Pollution Cleanup Division

Allan M. Seils
PA/SI Program (MC 142)
Superfund Site Discovery and Assessment Program
Emergency Response & Assessment Program
Pollution Cleanup Division
Texas Natural Resource Conservation Commission
P.O. Box 13087
Austin, Texas 78711-3087

Dear Mr. Seils,

Attached are the EPA Region 6 Houston Laboratory results for samples submitted from the Old Brazos Forge site. Nineteen water samples were received by the Houston Laboratory on March 28-29, 1996 to be analyzed for semi-volatiles, volatiles, pesticides, PCBs, metals, and cyanide. The Houston Laboratory numbers assigned to these samples are 6TFADW0901 through 6TFADW0919.

Standard procedures for quality assurance and quality control were followed in the analysis and reporting of the results. These procedures are documented in the Region 6 Quality Management Plan, and in the Houston Laboratory Standard Operating Procedures manual. Please note that the results are related only to the samples tested. This final report should only be reproduced in full.

Sincerely,

Douglas Lipka
Chief
Houston Laboratory

Attachments (19)

cc: Bart Canales; 6SF-RA
w/o attachment

08001

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April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0901

Source: OLD BRAZOS FORGE

Site Description: STA. GW-1

Date/Time Received: 3/28/96 10:00

Date/Time Collected: 3/26/96 10:10

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
ABN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
PCB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 1

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-01

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	ND	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

Lyst Notes: none

Attachment : 1

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-01 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

Attachment 1

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-01* DATE REPORTED: 4/12/1996
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-01	DATE	
SOURCE:	OLD BRAZOS FORGE	RECEIVED:	28-Mar-96
TYPE:	AQUEOUS	DATE	
ANALYSTS:	RC, LC, BS, TNRCC	REPORTED:	26-Apr-96

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	ND	3	UG/L
BARIUM	251	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	104000	150	UG/L
CHROMIUM	ND	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	167	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	2430	150	UG/L
MANGANESE	18	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	1900	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	19200	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	ND	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0902

Source: OLD BRAZOS FORGE

Site Description: STA. GW-2

Date/Time Received: 3/28/96 10:00

Date/Time Collected: 3/26/96 8:43

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
ABN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CNC	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
PCB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 2

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-02

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	ND	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis-(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

nalyst Notes: none

 Attachment : 2

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-02 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

Attachment 2

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-02* DATE REPORTED: 4/12/1996
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-02	DATE	
SOURCE:	OLD BRAZOS FORGE	RECEIVED:	28-Mar-96
TYPE:	AQUEOUS	DATE	
ANALYSTS:	RC, LC, BS, TNRCC	REPORTED:	26-Apr-96

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	ND	3	UG/L
BARIUM	199	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	122000	150	UG/L
CHROMIUM	ND	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	ND	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	2180	150	UG/L
MANGANESE	ND	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	ND	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	27500	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	100	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0903

Source: OLD BRAZOS FORGE

Site Description: STA. GW-3

Date/Time Received: 3/28/96 10:00

Date/Time Collected: 3/26/96 12:03

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
ABN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
PCB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 3

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-03

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	ND	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis-(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

Analyst Notes: none

Attachment : 3

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-03

Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens

Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

Attachment 3

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-03* DATE REPORTED: 4/12/1996
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-03	DATE RECEIVED:	28-Mar-96
SOURCE:	OLD BRAZOS FORGE		
TYPE:	AQUEOUS	DATE REPORTED:	26-Apr-96
ANALYSTS:	RC, LC, BS, TNRCC		

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	ND	3	UG/L
BARIUM	217	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	103000	150	UG/L
CHROMIUM	ND	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	779	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	2480	150	UG/L
MANGANESE	11	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	1630	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	18900	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	48	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0905

Source: OLD BRAZOS FORGE

Site Description: STA. GW-4

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/28/96 11:33

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
ABN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
PCB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 5

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-05

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	ND	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis-(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

Analyst Notes: none

 Attachment : 5

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-05 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	5.6	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

Attachment 5

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-05*
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

DATE REPORTED: 4/12/1996

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-05	DATE RECEIVED:	28-Mar-96
SOURCE:	OLD BRAZOS FORGE		
TYPE:	AQUEOUS	DATE REPORTED:	26-Apr-96
ANALYSTS:	RC, LC, BS, TNRCC		

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	ND	3	UG/L
BARIUM	324	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	136000	150	UG/L
CHROMIUM	110	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	33	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	2680	150	UG/L
MANGANESE	ND	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	ND	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	44200	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	347	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0906

Source: OLD BRAZOS FORGE

Site Description: STA. GW-5

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/28/96 11:33

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
ABN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
PCB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 6

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-06

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	ND	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

Analyst Notes: none

Attachment : 6

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-06

Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens

Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	5.4	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

Attachment 6

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-06* DATE REPORTED: 4/12/1996
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-06	DATE	
SOURCE:	OLD BRAZOS FORGE	RECEIVED:	28-Mar-96
TYPE:	AQUEOUS	DATE	
ANALYSTS:	RC, LC, BS, TNRCC	REPORTED:	26-Apr-96

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	ND	3	UG/L
BARIUM	319	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	134000	150	UG/L
CHROMIUM	122	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	26	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	2640	150	UG/L
MANGANESE	ND	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	ND	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	43600	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	342	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0907

Source: OLD BRAZOS FORGE

Site Description: STA. GW-6

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/28/96 8:45

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
ABN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
PCB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 7

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-07

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	ND	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis-(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

nalyst Notes: none

 Attachment : 7

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-07 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

Attachment 7

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-07* DATE REPORTED: 4/12/1996
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-07	DATE RECEIVED:	28-Mar-96
SOURCE:	OLD BRAZOS FORGE		
TYPE:	AQUEOUS	DATE REPORTED:	26-Apr-96
ANALYSTS:	RC, LC, BS, TNRCC		

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	5.9	3	UG/L
BARIUM	253	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	99700	150	UG/L
CHROMIUM	ND	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	141	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	4250	150	UG/L
MANGANESE	ND	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	2100	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	30700	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	ND	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0908

Source: OLD BRAZOS FORGE

Site Description: STA. GW-7

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/27/96 10:02

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
ABN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
PCB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 8

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-08

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

Compound Name	Results*	Det Limits
Acenaphthene	ND	2
Acenaphthylene	ND	2
Anthracene	ND	2
Benzoic Acid	ND	10
Benzo(a)Anthracene	ND	8
Benzo(a)Pyrene	ND	8
Benzo(b)Fluoranthene	ND	8
Benzo(g,h,i)Perylene	ND	8
Benzo(k)Fluoranthene	ND	8
Benzyl Alcohol	ND	4
bis(2-Chloroethoxy)Methane	ND	2
bis(2-Chloroethyl) Ether	ND	2
bis(2-chloroisopropyl)Ether	ND	2
bis-(2-Ethylhexyl)Phthalate	6.9	4
4-Bromophenylphenyl Ether	ND	8
Butylbenzylphthalate	ND	4
Carbazole	ND	2
4-Chloroaniline	ND	4
2-Chloronaphthalene	ND	2
2-Chlorophenol	ND	4
4-Chlorophenylphenyl Ether	ND	8
4-Chloro-3-Methylphenol	ND	8
Chrysene	ND	8
Dibenzofuran	ND	2
Dibenzo(a,h)Anthracene	ND	8
1,2-Dichlorobenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	3
3,3'-Dichlorobenzidine	ND	10
2,4-Dichlorophenol	ND	6
Diethylphthalate	ND	2
2,4-Dimethylphenol	ND	6
DimethylPhthalate	ND	2

units: ug/L

Compound Name	Results*	Det Limits
2,4-Dinitrophenol	ND	30
2,4-Dinitrotoluene	ND	6
2,6-Dinitrotoluene	ND	6
4,6-Dinitro-2-Methylphenol	ND	20
Di-n-Butylphthalate	ND	2
Di-n-Octyl Phthalate	ND	4
Fluoranthene	ND	2
Fluorene	ND	2
Hexachlorobenzene	ND	2
Hexachlorobutadiene	ND	5
Hexachlorocyclopentadiene	ND	10
Hexachloroethane	ND	3
Indeno(1,2,3-cd) Pyrene	ND	8
Isophorone	ND	4
2-Methylnaphthalene	ND	2
2-Methylphenol	ND	6
4-Methylphenol	ND	6
Naphthalene	ND	2
2-Nitroaniline	ND	8
3-Nitroaniline	ND	8
4-Nitroaniline	ND	8
Nitrobenzene	ND	2
2-Nitrophenol	ND	10
4-Nitrophenol	ND	13
N-Nitrosodiphenylamine	ND	4
N-Nitroso-Di-n-Propylamine	ND	6
Pentachlorophenol	ND	15
Phenanthrene	ND	2
Phenol	ND	4
Pyrene	ND	2
1,2,4-Trichlorobenzene	ND	20
2,4,5-Trichlorophenol	ND	3
2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

alyst Notes: none

 Attachment : 8

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-08 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

Attachment 8

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-08* DATE REPORTED: 4/12/1996
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-08	DATE	
SOURCE:	OLD BRAZOS FORGE	RECEIVED:	28-Mar-96
TYPE:	AQUEOUS	DATE	
ANALYSTS:	RC, LC, BS, TNRCC	REPORTED:	26-Apr-96

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	ND	3	UG/L
BARIUM	314	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	97600	150	UG/L
CHROMIUM	ND	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	1190	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	4500	150	UG/L
MANGANESE	20	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	2460	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	32200	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	838	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0909

Source: OLD BRAZOS FORGE

Site Description: STA. GW-8

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/27/96 11:00

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
ABN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
PCB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 9

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-09

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	ND	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis-(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

Analyst Notes: none

 Attachment : 9

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-09 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

Attachment 9

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-09* DATE REPORTED: 4/12/1996
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-09	DATE RECEIVED:	28-Mar-96
SOURCE:	OLD BRAZOS FORGE		
TYPE:	AQUEOUS	DATE REPORTED:	26-Apr-96
ANALYSTS:	RC, LC, BS, TNRCC		

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	ND	3	UG/L
BARIUM	233	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	176000	150	UG/L
CHROMIUM	ND	10	UG/L
COBALT	ND	20	UG/L
COPPER	30	20	UG/L
IRON	ND	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	2110	150	UG/L
MANGANESE	ND	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	ND	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	16100	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	ND	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0910

Source: OLD BRAZOS FORGE

Site Description: STA. GW-9

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/28/96 10:17

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
ABN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
PCB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 10

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-10

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	5.1	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis-(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

Analyst Notes: none

 Attachment : 10

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-10 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

Attachment 10

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-10* DATE REPORTED: 4/12/1996
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-10	DATE RECEIVED:	28-Mar-96
SOURCE:	OLD BRAZOS FORGE		
TYPE:	AQUEOUS	DATE REPORTED:	26-Apr-96
ANALYSTS:	RC, LC, BS, TNRCC		

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	ND	3	UG/L
BARIUM	221	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	95600	150	UG/L
CHROMIUM	ND	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	921	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	4200	150	UG/L
MANGANESE	16	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	2870	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	30800	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	550	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0911

Source: OLD BRAZOS FORGE

Site Description: STA. GW-10

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/27/96 11:55

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
ABN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
PCB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 11

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-11

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625
(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	ND	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-Chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis-(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

Analyst Notes: none

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 Attachment : 11

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-11 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

Attachment 11

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-11*
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

DATE REPORTED: 4/12/1996

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-11	DATE RECEIVED:	28-Mar-96
SOURCE:	OLD BRAZOS FORGE		
TYPE:	AQUEOUS	DATE REPORTED:	26-Apr-96
ANALYSTS:	RC, LC, BS, TNRCC		

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	ND	3	UG/L
BARIUM	148	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	126000	150	UG/L
CHROMIUM	ND	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	ND	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	1610	150	UG/L
MANGANESE	ND	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	ND	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	22600	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	42	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0912

Source: OLD BRAZOS FORGE

Site Description: STA. GW-11

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/27/96 11:55

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
ABN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
PCB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 12

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-12

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	ND	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis-(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

Analyst Notes: none

 Attachment: 12

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-12 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

Attachment 12

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-12* DATE REPORTED: 4/12/1996
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-12	DATE RECEIVED:	28-Mar-96
SOURCE:	OLD BRAZOS FORGE		
TYPE:	AQUEOUS	DATE REPORTED:	26-Apr-96
ANALYSTS:	RC, LC, BS, TNRCC		

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	ND	3	UG/L
BARIUM	150	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	127000	150	UG/L
CHROMIUM	ND	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	ND	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	1630	150	UG/L
MANGANESE	ND	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	ND	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	22900	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	46	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0913

Source: OLD BRAZOS FORGE

Site Description: STA. GW-12

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/28/96 12:58

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
BN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
CB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 13

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-13

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	ND	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis-(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

alyst Notes: none

 Attachment: 13

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-13 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND — Means not detected above the listed detection limits.

Attachment 13

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-13* DATE REPORTED: 4/12/1996
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-13	DATE RECEIVED:	28-Mar-96
SOURCE:	OLD BRAZOS FORGE		
TYPE:	AQUEOUS	DATE REPORTED:	26-Apr-96
ANALYSTS:	RC, LC, BS, TNRCC		

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	ND	3	UG/L
BARIUM	201	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	91000	150	UG/L
CHROMIUM	ND	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	3810	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	3960	150	UG/L
MANGANESE	46	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	2240	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	29600	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	312	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0914

Source: OLD BRAZOS FORGE

Site Description: STA. GW-13

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/27/96 16:33

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
ABN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
PCB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 14

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-14

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	ND	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis-(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

lyst Notes: none

 Attachment: 14

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-14 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

Attachment 14

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-14* DATE REPORTED: 4/12/1996
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-14	DATE RECEIVED:	28-Mar-96
SOURCE:	OLD BRAZOS FORGE		
TYPE:	AQUEOUS	DATE REPORTED:	26-Apr-96
ANALYSTS:	RC, LC, BS, TNRCC		

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	ND	3	UG/L
BARIUM	233	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	97300	150	UG/L
CHROMIUM	ND	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	2120	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	4300	150	UG/L
MANGANESE	22	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	2280	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	31400	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	650	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0915

Source: OLD BRAZOS FORGE

Site Description: STA. GW-14

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/27/96 15:00

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
BN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
CB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 15

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-15

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	ND	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis-(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

Analyst Notes: none

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 Attachment : 15

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-15 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

Attachment 15

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: 6TFADW09-15
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

DATE REPORTED: 4/12/1996

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-15	DATE RECEIVED:	28-Mar-96
SOURCE:	OLD BRAZOS FORGE		
TYPE:	AQUEOUS	DATE REPORTED:	26-Apr-96
ANALYSTS:	RC, LC, BS, TNRCC		

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	ND	3	UG/L
BARIUM	250	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	93800	150	UG/L
CHROMIUM	25	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	ND	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	2130	150	UG/L
MANGANESE	ND	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	ND	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	47600	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	80	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0916

Source: OLD BRAZOS FORGE

Site Description: STA. GW-15

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/28/96 8:45

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
ABN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
PCB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 16

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-16

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	ND	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis-(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

Analyst Notes: none

 Attachment: 16

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-16 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND -- Means not detected above the listed detection limits.

Attachment 16

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-16* DATE REPORTED: 4/12/1996
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-16	DATE RECEIVED:	28-Mar-96
SOURCE:	OLD BRAZOS FORGE		
TYPE:	AQUEOUS	DATE REPORTED:	26-Apr-96
ANALYSTS:	RC, LC, BS, TNRCC		

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	7.3	3	UG/L
BARIUM	253	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	98900	150	UG/L
CHROMIUM	ND	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	131	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	4250	150	UG/L
MANGANESE	ND	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	2180	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	30800	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	ND	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0917

Source: OLD BRAZOS FORGE

Site Description: STA. GW-16

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/27/96 15:55

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
ABN	ACID/BASE NEUTRALS	ORGANIC	COMPLETE	4/26/96
CN	CYANIDE	INORGANIC	COMPLETE	4/26/96
M23	23 SUPERFUND LIST METALS	METALS	COMPLETE	4/26/96
PCB	POLYCHLORINATED BIPHENYLS	ORGANIC	COMPLETE	4/26/96
PES	PESTICIDES	ORGANIC	COMPLETE	4/26/96
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 17

ORGANIC ANALYSIS DATA

6MD-HO Sample NO: 6TFADW09-17

Date Reported: 17-Apr-96

Analyst: D.Gregg

Sample Type: WATER

SEMI-VOLATILE COMPOUNDS BY METHOD 625

(continuous extractor)

units: ug/L

units: ug/L

Compound Name	Results*	Det Limits	Compound Name	Results*	Det Limits
Acenaphthene	ND	2	2,4-Dinitrophenol	ND	30
Acenaphthylene	ND	2	2,4-Dinitrotoluene	ND	6
Anthracene	ND	2	2,6-Dinitrotoluene	ND	6
Benzoic Acid	ND	10	4,6-Dinitro-2-Methylphenol	ND	20
Benzo(a)Anthracene	ND	8	Di-n-Butylphthalate	ND	2
Benzo(a)Pyrene	ND	8	Di-n-Octyl Phthalate	ND	4
Benzo(b)Fluoranthene	ND	8	Fluoranthene	ND	2
Benzo(g,h,i)Perylene	ND	8	Fluorene	ND	2
Benzo(k)Fluoranthene	ND	8	Hexachlorobenzene	ND	2
Benzyl Alcohol	ND	4	Hexachlorobutadiene	ND	5
bis(2-Chloroethoxy)Methane	ND	2	Hexachlorocyclopentadiene	ND	10
bis(2-Chloroethyl) Ether	ND	2	Hexachloroethane	ND	3
bis(2-chloroisopropyl)Ether	ND	2	Indeno(1,2,3-cd) Pyrene	ND	8
bis-(2-Ethylhexyl)Phthalate	ND	4	Isophorone	ND	4
4-Bromophenylphenyl Ether	ND	8	2-Methylnaphthalene	ND	2
Butylbenzylphthalate	ND	4	2-Methylphenol	ND	6
Carbazole	ND	2	4-Methylphenol	ND	6
4-Chloroaniline	ND	4	Naphthalene	ND	2
2-Chloronaphthalene	ND	2	2-Nitroaniline	ND	8
2-Chlorophenol	ND	4	3-Nitroaniline	ND	8
4-Chlorophenylphenyl Ether	ND	8	4-Nitroaniline	ND	8
4-Chloro-3-Methylphenol	ND	8	Nitrobenzene	ND	2
Chrysene	ND	8	2-Nitrophenol	ND	10
Dibenzofuran	ND	2	4-Nitrophenol	ND	13
Dibenzo(a,h)Anthracene	ND	8	N-Nitrosodiphenylamine	ND	4
1,2-Dichlorobenzene	ND	3	N-Nitroso-Di-n-Propylamine	ND	6
1,3-Dichlorobenzene	ND	3	Pentachlorophenol	ND	15
1,4-Dichlorobenzene	ND	3	Phenanthrene	ND	2
3,3'-Dichlorobenzidine	ND	10	Phenol	ND	4
2,4-Dichlorophenol	ND	6	Pyrene	ND	2
Diethylphthalate	ND	2	1,2,4-Trichlorobenzene	ND	20
2,4-Dimethylphenol	ND	6	2,4,5-Trichlorophenol	ND	3
DimethylPhthalate	ND	2	2,4,6-Trichlorophenol	ND	6

(*) ND = Not detected above the listed detection limit.

(*) ND = Not detected above the listed detection limit.

nalyst Notes: none

 Attachment : 17

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-17 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

Attachment 17

PESTICIDE/PCB ANALYSIS

6MD-HO SAMPLE NO.: *6TFADW09-17* DATE REPORTED: 4/12/1996
SAMPLE TYPE: Water
ANALYST: LARRY STRECK

CAS #		UG/L (PPB)
319-84-6	Alpha-BHC	ND DL=< 0.05
319-85-7	Beta-BHC	ND DL=< 0.05
319-86-8	Delta-BHC	ND DL=< 0.05
58-89-9	Gamma-BHC (Lindane)	ND DL=< 0.05
76-44-8	Heptachlor	ND DL=< 0.05
309-00-2	Aldrin	ND DL=< 0.05
1024-57-3	Heptachlor Epoxide	ND DL=< 0.05
949-98-8	Endosulfan I	ND DL=< 0.05
60-57-1	Dieldrin	ND DL=< 0.10
72-55-9	4,4' DDE	ND DL=< 0.10
72-20-8	Endrin	ND DL=< 0.10
33213-65-9	Endosulfan II	ND DL=< 0.10
72-54-08	4,4' -DDD	ND DL=< 0.10
742193-4	Endrin Aldehyde	ND DL=< 0.10
53494-70-5	Endrin Ketone	ND DL=< 0.10
10341-07-8	Endosulfan Sulfate	ND DL=< 0.10
50-29-3	4,4' -DDT	ND DL=< 0.10
72-43-5	Methoxychlor	ND DL=< 0.50
5103-71-9	Alpha-Chlordane	ND DL=< 0.05
5103-74-2	Gamma- Chlordane	ND DL=< 0.05
8001-35-2	Toxaphene	ND DL=< 5.00
12674-11-2	Aroclor 1016	ND DL=< 1.00
11104-28-2	Aroclor 1221	ND DL=< 2.00
11141-16-5	Aroclor 1232	ND DL=< 1.00
53469-21-9	Aroclor 1242	ND DL=< 1.00
12672-29-6	Aroclor 1248	ND DL=< 1.00
11097-69-1	Aroclor 1254	ND DL=< 1.00
11096-82-5	Aroclor 1260	ND DL=< 1.00

ND DL = NOT DETECTED , DETECTION LIMIT

US EPA HOUSTON BRANCH

SAMPLE #:	6TFADW09-17	DATE RECEIVED:	28-Mar-96
SOURCE:	OLD BRAZOS FORGE		
TYPE:	AQUEOUS	DATE REPORTED:	26-Apr-96
ANALYSTS:	RC, LC, BS, TNRCC		

PARAMETER	CONCENTRATION	DETECTION LIMIT <=	UNITS
ALUMINUM	ND	100	UG/L
ANTIMONY	ND	60	UG/L
ARSENIC	ND	3	UG/L
BARIUM	232	10	UG/L
BERYLLIUM	ND	5	UG/L
CADMIUM	ND	5	UG/L
CALCIUM	97000	150	UG/L
CHROMIUM	ND	10	UG/L
COBALT	ND	20	UG/L
COPPER	ND	20	UG/L
IRON	1510	25	UG/L
LEAD	ND	3	UG/L
MAGNESIUM	4160	150	UG/L
MANGANESE	19	5	UG/L
MERCURY	ND	0.2	UG/L
NICKEL	ND	20	UG/L
POTASSIUM	2380	1000	UG/L
SELENIUM	ND	3	UG/L
SILVER	ND	10	UG/L
SODIUM	31000	500	UG/L
THALLIUM	ND	5	UG/L
VANADIUM	ND	30	UG/L
ZINC	212	20	UG/L
CYANIDE	ND	0.02	MG/L

ND: LESS THAN DETECTION LIMIT

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0904

Source: OLD BRAZOS FORGE

Site Description: STA. FB-1

Date/Time Received: 3/28/96 10:00

Date/Time Collected: 3/26/96 9:43

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

Attachment: 4

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-04

Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens

Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0918

Source: OLD BRAZOS FORGE

Site Description: STA. FB03

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/27/96 11:37

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

 Attachment: 18

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-18 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

April 26, 1996

U.S. Environmental Protection Agency

Houston Branch Management System

Report for Sample Number 6TFADW0919

Source: OLD BRAZOS FORGE

Site Description: STA. FB04

Date/Time Received: 3/29/96 10:10

Date/Time Collected: 3/28/96 11:17

Sample Type: DW

Date Completed: 4/26/96

Comments:

Parameter	Description	Section	Status	Report Date
VOA	VOLATILE ORGANIC ANALYSIS	ORGANIC	COMPLETE	4/26/96

 Attachment: 19

ORGANIC ANALYSIS DATA

6MD-HO Sample Number: 6TFADW09-19 Date Reported: 16-Apr-96

Analyst:Kenneth W. Stevens Sample Type: DW

VOLATILE COMPOUNDS BY METHOD 624

units - microgram/liter - µg/l

Compound Name	Results*	Detection Limits
acetone	ND	5
acrolein	ND	100
acrylonitrile	ND	100
benzene	ND	2
bromodichloromethane	ND	2
bromoform	ND	2
2-butanone	ND	5
bromomethane	ND	5
carbon disulfide	ND	5
carbon tetrachloride	ND	2
chlorobenzene	ND	5
chloroethane	ND	5
chloroform	ND	2
chloromethane	ND	5
dibromochloromethane	ND	2
1,1-dichloroethane	ND	2
1,1-dichloroethene	ND	2
1,2-dichloroethane	ND	2
1,2-dichloroethene (total)	ND	2
1,2-dichloropropane	ND	2
cis-1,3-dichloropropane	ND	2
trans-1,3-dichloropropane	ND	2
ethylbenzene	ND	5
2-hexanone	ND	5
methylene chloride	ND	5
4-methyl-2-pentanone	ND	5
styrene	ND	5
1,1,2,2-tetrachloroethane	ND	2
tetrachloroethene	ND	2
toluene	ND	5
1,1,1-trichloroethane	ND	2
1,1,2-trichloroethane	ND	2
trichloroethene	ND	2
vinyl chloride	ND	5
ortho-xylene	ND	5
para- and/or *meta*-xylene	ND	5

* ND --- Means not detected above the listed detection limits.

TNRCC

Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 9

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
HOUSTON BRANCH
10625 FALLSTONE RD.
HOUSTON, TEXAS 77099

MEMORANDUM

Date: 5-15-1996

Subject: Contract Laboratory Program Data Review

From: Melvin L. Ritter, ESAT RPO, 6MD-HC

To: B. Canellas , 6SF-RA

MLRitter 5/15/96

Site: OLD BRAZOS FORGE

Case#: 24517

SDG#: MFG-H06

The EPA Region 6 Houston Branch ESAT data validation team has completed a review of the submitted Contract Laboratory Program (CLP) data package for the referenced site. The samples analyzed and reviewed are detailed in the attached Regional data review and assessment report for this case.

The data package was found to be:

( ) Acceptable: No major problems with data package.

(X) Provisional: Use of data requires caution.
Data is acceptable for Regional use. Problems are noted in the review report.

( ) Unacceptable: Some or all of data should not be used.
Problems are noted in the review report.

Questions regarding the data review report can be addressed to me.

Attachments

cc: R. Flores, Region 6 CLP/TPO
M. El-feky, Region 6 Data Coordinator

Files (2)

09001

Recycled/Recyclable
Printed with Soy/Canola Ink on paper that

USEPA REGION: VI

INORGANIC REGIONAL ACCEPTANCE/REJECTION/REDUCED VALUE RECOMMENDATION FORM

LAB CODE: CHEMS	CASE NO.: 24517	SDG NO.: MFGH06
SITE NAME: OLD BRAZOS FORGE		NUMBER OF SAMPLES: 8

FORM DUE DATE: 06/03/96

SDG MAILDATE: 05/07/96

PART I. DATA ACCEPTANCE OR REJECTION

INSTRUCTIONS: EPA REGIONS MUST ACCEPT OR REJECT DATA WITHIN 30 DAYS. IF DATA ARE BEING REJECTED, THIS FORM MUST BE ACCOMPANIED BY 1.) A SIGNED MEMO FROM THE REGIONAL OFFICIAL DESCRIBING THE CONTRACTUAL REASONS FOR REJECTION. ATTACH ALL RELATED DOCUMENTS (DATA REVIEWS,TELEPHONE LOGS, ETC.), 2.) ALL REJECTED DATA.

A. FULL DATA ACCEPTANCE OR REJECTION
CHECK ONE OF THE FOLLOWING IF YOU FULLY ACCEPT OR FULLY REJECT ALL SAMPLES IN THIS SDG.

✓ ACCEPT ALL ____ REJECT ALL

B. REJECTION OF ALL SAMPLES FOR A PARTICULAR FRACTION
CHECK ONE OF THE FOLLOWING IF YOU FULLY REJECT ALL SAMPLES IN A PARTICULAR FRACTION IN THIS SDG. ALL FRACTIONS NOT MARKED AS REJECTED ARE ACCEPTED.

REJECT ALL: ____ METALS ____ CYANIDE

C. REJECTION AT THE SAMPLE AND FRACTIONAL LEVEL
CHECK THE FOLLOWING TO REJECT SAMPLES AT THE SAMPLE/FRACTIONAL LEVEL AND COMPLETE THE REVERSE SIDE OF THIS FORM.

____ PARTIAL ACCEPTANCE AND REJECTION BY SAMPLE/FRACTION

PART II. REDUCED VALUE

INSTRUCTIONS: REGION RECOMMENDS REDUCED VALUE AND RETAINS THE DATA. FOR A REDUCED VALUE TO BE PROCESSED, THIS FORM MUST BE ACCOMPANIED BY A SIGNED MEMO FROM THE REGIONAL OFFICIAL CITING THE CONTRACTUAL NON-COMPLIANCE; THE DOLLAR AMOUNT FOR REDUCED VALUE; AND A WRITTEN JUSTIFICATION (NARRATIVE) OF HOW SAMPLE WORTH WAS DETERMINED FOR EACH AFFECTED SAMPLE. ATTACH ALL RELATED DOCUMENTS (DATA REVIEWS, TELEPHONE LOGS, ETC.)

CHECK ONE OF THE FOLLOWING:

✓ NO REDUCED VALUE ____ REDUCED VALUE (COMPLETE REVERSE SIDE)

IDENTIFY THE SAMPLES/FRACTIONS THAT ARE RECOMMENDED FOR REDUCED VALUE ON THE REVERSE SIDE OF THIS FORM.

THIS FORM CANNOT BE PROCESSED WITHOUT A SIGNATURE

NAME OF REGIONAL OFFICIAL: MAHMOUD ELFEKY

SIGNATURE: M. Elfeky DATE: 5-16-96

SEND THIS FORM TO: CLASS C/O DYNCORP
INVOICE PROCESSING & CALCULATION GROUP
300 NORTH LEE STREET, ALEXANDRIA, VA 22314

SEE LIST OF SAMPLES ON REVERSE SIDE

LAB CODE: CHEM	CASE NO.: 24517	SDG NO.: MFGH06

PART III. PARTIAL ACCEPTANCE AND REJECTION BY SAMPLE

ENTER AN "X" IN THE BLOCK TO THE RIGHT OF THE "Y" FOR THE FRACTION RECOMMENDED FOR REJECTION
ENTER A "D" IN THE BLOCK TO THE RIGHT OF THE "Y" FOR THE FRACTION RECOMMENDED FOR REDUCED VALUE.
ALL SAMPLES THAT ARE NOT MARKED WITH AN "X" OR A "D" ARE ACCEPTED.

SAMPLE	FRACTIONS ANALYZED METALS		CYANIDE	
LCSW	Y			
MFGH06	Y		Y	
MFGH07	Y		Y	
MFGH08	Y		Y	
MFGH09	Y		Y	
MFGH18	Y		Y	
MFGH18D	Y		Y	
MFGH18S	Y		Y	

LOCKHEED ENVIRONMENTAL SYSTEMS AND TECHNOLOGIES CO.
TWO ALLEN CENTER
1200 SMITH STREET, SUITE 800
HOUSTON, TX 77002

MEMORANDUM

DATE: May 13, 1996

TO: Dr. Melvin Ritter, ESAT RPO, Region VI

FROM: Dr. Tom C.H. Chiang, ESAT ETM, Region VI

SUBJECT: CLP Data Review

REF: TDF # 6-6248A, ESAT File # I-1971

Attached is the data review summary for Case # 24517
SDG # MFGH06
Site OLD BRAZOS FORGE

COMMENTS:

I. CONTRACTUAL ASSESSMENT OF DATA PACKAGE:

CCS failed to report the following non-compliance that the reviewer detected in the hardcopy package. The non-compliance did not affect the technical usability of the sample results.

The laboratory analyzed an Interference Check True Solution AB (ICSAB) that does not correspond to TABLE 2 on page E-21 of ILM04.0.

II. TECHNICAL/USABILITY ASSESSMENT OF DATA PACKAGE:

A total of 120 results were reviewed for this data package. The package is technically provisional because of the following problems.

A. The reviewer qualified approximately 18 percent of the results.

B. Selenium and thallium ICP coefficients of variation were high.

C. Field duplicate precision was poor for chromium and lead.

09004

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
HOUSTON BRANCH
10625 FALLSTONE ROAD
HOUSTON, TEXAS 77099

INORGANIC REGIONAL DATA ASSESSMENT

CASE NO.	24517	SITE	OLD BRAZOS FORGE
LABORATORY	CHEM	NO. OF SAMPLES	5
CONTRACT#	68-D5-0166	MATRIX	water
SDG#	MFGH06	REVIEWER (IF NOT ESD)	ESAT
SOW#	RAS ILM04.0	REVIEWER'S NAMES	Mike Fertitta
ACCT# 6TFAJN43	SF# TFAUZZ	COMPLETION DATE	May 13, 1996

SAMPLE NO.'s: MFG-H06, MFG-H18, MFG-H07, MFG-H08, MFG-H09

DATA ASSESSMENT SUMMARY

	ICP	HG	CN
1. HOLDING TIMES	O	O	O
2. CALIBRATIONS	O	O	O
3. BLANKS	O	O	O
4. MATRIX SPIKES	O	O	O
5. DUPLICATE ANALYSIS	O	O	O
6. ICP QC	M		
7. FAA QC			
8. LCS	O	N/A	N/A
9. SAMPLE VERIFICATION	O	O	O
10. OTHER QC	M	O	O
11. OVERALL ASSESSMENT	M	O	O

O = Data had no problems.
M = Data qualified because of minor or major problems.
Z = Data unacceptable.
NA = Not applicable.

ACTION ITEMS:

AREAS OF CONCERN: The laboratory analyzed an ICSAB that does not comply with ILM04.0. One selenium analysis and one thallium analysis had high coefficients of variation. Aluminum, chromium, iron, and lead field duplicate results were inconsistent.

NOTABLE PERFORMANCE: The data package arrived at the Region 1 day before the contractual 35-day requirement.

INORGANIC QA REVIEW
CONTINUATION PAGE

CASE 24517 SDG MFGH06 SITE OLD BRAZOS FORGE LAB CHEM

COMMENTS: The laboratory analyzed five water samples for total metals and cyanide by SOW ILM04.0. The sampler identified samples MFG-H06 and MFG-H07 as field duplicates and sample MFG-H18 as the laboratory QC sample. The laboratory met the contractual 35-day data package turnaround requirement.

Approximately 43 percent of the results were above the CRDL's. The data package is technically provisional because of problems with ICP coefficients of variation and field duplicate precision. The technical usability of the sample results is discussed below, and any qualifications are listed in the attached Data Summary Table.

The reviewer conducted an Evidence Audit for the Complete Sample Delivery Group File (CSF), and the Evidence Inventory Checklist is attached to this report.

1. **Holding Times:** Acceptable. Field preservation of samples met contractual requirements. The laboratory met contractual and technical holding time criteria for all analyses.

2. **Calibrations:** Acceptable. Instrument calibrations met contractual requirements. CRDL standard analyses indicated acceptable instrument performance near the CRDL's.

3. **Blanks:** Acceptable. All blanks met contractual criteria. Calibration blanks contained nine target analytes below CRDL levels, but these concentrations did not affect the sample results. Aluminum, magnesium, and sodium preparation blank concentrations were due to baseline instability and not caused by contamination introduced during sample preparation.

4. **Pre-digestion/Pre-distillation Matrix Spike Recovery:** Acceptable. All matrix spike recoveries were within the QC limits.

5. **Duplicate Analysis:** Acceptable. Duplicate results for all analytes met SOW QC criteria.

INORGANIC QA REVIEW
CONTINUATION PAGE

CASE 24517 SDG MFGH06 SITE OLD BRAZOS FORGE LAB CHEM

6. **ICP Quality Control:**

Interference Check Sample: Acceptable. Analyte recoveries for analyses of True Solution AB were within the QC limits, although concentrations of antimony, arsenic, lead, selenium, silver, and thallium did not meet contract specifications. In the reviewer's opinion, sample results were not affected since ICS analyses indicated acceptable application of interelement and background corrections.

Serial Dilution: Acceptable. All serial dilution percent differences met the QC criterion.

Coefficients of Variation: Provisional. Consistent replicate ICP readings indicated acceptable instrument precision for most analyses. The reviewer qualified as estimated the selenium result for sample MFG-H07 and the thallium result for sample MFG-H09 because coefficients of variation exceeded 20 percent.

7. **Furnace Atomic Absorption (FAA) Quality Control:** FAA was not used for this SDG.

8. **Laboratory Control Sample (LCS):** Acceptable. All LCS results were within the QC limits.

9. **Sample Verification:** The reviewer contacted the laboratory concerning a contractual non-compliance (see attached FAX Record Log).

10. **Other QC:**

Field Duplicates: Provisional. Field duplicate results were consistent for most analytes. Chromium and lead differences exceeded twice the CRDL's, and RPD's exceeded 35 percent for aluminum and iron. The reviewer qualified all aluminum, chromium, iron, and lead sample results as estimated.

11. **Overall Assessment:** The data package is technically provisional because of the following problems.

The reviewer qualified one selenium result and one thallium result as estimated because coefficients of variation were high.

INORGANIC QA REVIEW
CONTINUATION PAGE

CASE 24517 SDG MFGH06 SITE OLD BRAZOS FORGE LAB CHEM

11. Overall Assessment (continued):

The reviewer qualified all aluminum, chromium, iron, and lead sample results as estimated because of poor field duplicate precision.

09008

INORGANIC DATA QUALIFIER DEFINITIONS

The following definitions provide brief explanations of the ESAT Region 6 qualifiers assigned to results in the data review process.

U Undetected at the laboratory reported detection limit (IDL).

L Reported concentration is between the IDL and the CRDL.

J Result is estimated because of outlying quality control parameters such as matrix spike, serial dilution, FAA spike recovery, etc.

R Result is unusable.

F A possibility of a false negative exists.

UC Reported concentration should be used as a raised detection limit because of apparent blank contamination.

^ Positive bias.

v Negative bias.

DATA SUMMARY

Case No.: 24517 SDG. No.: MFGH06 Reviewer: M. FERTITTA

Laboratory: CHEM Matrix: WATER Units: ug/L

EPA TR #=>	MFG-H06	FLAG	MFG-H07	FLAG	MFG-H08	FLAG	MFG-H09	FLAG	MFG-H18	FLAG	COMMENTS
ALUMINUM	7860	J	11700	J	5570	J	4420	J	1990	J	
ANTIMONY	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U	
ARSENIC	8.1	L	12.8		7.1	L	9.5	L	6.8	L	
BARIUM	301		332		363		318		367		
BERYLLIUM	1.8	L	1.9	L	1.3	L	1.1	L	1.0	U	
CADMIUM	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	
CALCIUM	369000		410000		364000		266000		144000		
CHROMIUM	15.2	J	35.8	J	17.7	J	42.3	J	7.7	LJ	
COBALT	5.9	L	7.1	L	3.4	L	2.6	L	1.1	L	
COPPER	27.1		34.2		26.8		112		23.5	L	
IRON	3800	J	6410	J	3700	J	2770	J	1500	J	
LEAD	8.6	J	14.9	J	14.1	J	15.0	J	10.3	J	
MAGNESIUM	4430	L	5150		4260	L	3790	L	2750	L	
MANGANESE	237		271		503		842		100		
MERCURY	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	
NICKEL	21.4	L	35.0	L	37.6	L	217		19.0	L	
POTASSIUM	1720	L	2840	L	1700	L	2810	L	2500	L	
SELENIUM	4.0	U	4.0	UJ	4.0	U	4.0	U	4.0	U	
SILVER	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	
SODIUM	20700		20200		18100		31500		16700		
THALLIUM	6.0	U	6.0	U	6.0	U	6.0	UJ	6.0	U	
VANADIUM	22.3	L	30.3	L	18.7	L	18.0	L	10.1	L	
ZINC	41.4		61.4		113		153		59.1		
CYANIDE	7.0	U	7.0	U	11.2		7.0	U	7.0	U	

INORGANIC/ORGANIC COMPLETE SDG FILE (CSF) INVENTORY CHECKLIST

Case No. 24517 SDG No. MFGH06 SDG Nos. To Follow SAS No. Date Rec 05/02/96

EPA Lab ID: CHEM

Lab Location: Englewood, NJ

Region: 6 Audit No.: 24517/MFGH06

Re_Submitted CSF? Yes ____ No X

Box No(s): ONE

COMMENTS:

ORIGINALS	YES	NO	N/A
CUSTODY SEALS			
1. Present on package?	X		
2. Intact upon receipt?	X		
FORM DC-2			
3. Numbering scheme accurate?	X		
4. Are enclosed documents listed?	X		
5. Are listed documents enclosed?	X		
FORM DC-1			
6. Present?	X		
7. Complete?	X		
8. Accurate?	X		
CHAIN-OF-CUSTODY RECORD(s)			
9. Signed?	X		
10. Dated?	X		
TRAFFIC REPORT(s) PACKING LIST(s)			
11. Signed?	X		
12. Dated?	X		
AIRBILLS/AIRBILL STICKER			
13. Present?	X		
14. Signed?	X		
15. Dated?	X		
SAMPLE TAGS			
16. Does DC-1 list tags as being included?	X		
17. Present?	X		
OTHER DOCUMENTS			
18. Complete?	X		
19. Legible?	X		
20. Original?		X	
20a. If "NO", does the copy indicate where original documents are located?	X		

Over for additional comments.

Audited by: Michael J. Fertitta Michael J. Fertitta/Data Reviewer Date 05/07/96

Audited by: Date

Audited by: Date

Signature Printed Name/Title

TO BE COMPLETED BY CEAT

Date Recvd by CEAT: Date Entered: Date Reviewed:

Entered by:

Reviewed by:

Signature Printed Name/Title

Lockheed Environmental Systems & Technologies Co. I-1971
ESAT Region 6

1200 Smith Street, Suite 800, Houston, TX 77002
Telephone: (713) 654-4844

FACSIMILE COVER SHEET

Please deliver the following pages to:

Name Divya Mehta

Firm CHEM

Address 110 Route 4

City Englewood State NJ 07631

Telephone (201) 567-6868 Ext. _____

Fax Telephone No. (201) 567-1333 Ext. _____

Sender:

Name Michael J. Fertitta

Date May 13, 1996 Time _____

Total Number of pages including this Cover Sheet 2

If you do not receive all the pages or if any pages are unclear, please call: (713) 654-4844.

MESSAGES:

Fax Model No. Xerox Telecopier 7033, (713) 654-4852

In Reference To
Case 24517 SDG MFGH06
ESAT File No. I-1971

Contract Laboratory Program
REGIONAL/LABORATORY COMMUNICATION SYSTEM

FAX Record Log

Date of FAX: May 13, 1996
Laboratory Name: CHEM
Lab Contact: Divya Mehta
Region: 6
Regional Contact: Michael J. Fertitta-ESAT
FAX initiated by: ____ Laboratory ___X___ Region

In reference to data for the following samples:

MFG-H06	MFG-H18			
MFG-H07				
MFG-H08				
MFG-H09				

Summary of Questions/Issues:

ICP

The Interference Check True Solution AB (ICSAB) (pages 22 to 27) does not correspond to TABLE 2 on page E-21 of ILM04.0. Antimony, arsenic, selenium, and thallium are not present, and lead and silver concentrations are high. Please contact your ICSAB source (EPA-LV) for instructions concerning this matter and respond with the status of resolution.

The EPA expects the laboratory to look into the above items and submit the data within 7 days to:

Attn: Christy Macdowell - U.S. EPA
10625 Fallstone Road
Houston, TX 77099

If you have any questions, please contact me at (713) 654-4844.

Michael J. Fertitta
Signature

05/13/96
Date

Distribution: (1) Lab Copy, (2) Region Copy

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH06

ab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

ab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH06

atrix (soil/water): WATER Lab Sample ID: 3142S

evel (low/med): LOW Date Received: 03/28/96

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7860			P
7440-36-0	Antimony	4.0	U		P
7440-38-2	Arsenic	8.1	B		P
7440-39-3	Barium	301			P
7440-41-7	Beryllium	1.8	B		P
7440-43-9	Cadmium	1.0	U		P
7440-70-2	Calcium	369000			P
7440-47-3	Chromium	15.2			P
7440-48-4	Cobalt	5.9	B		P
7440-50-8	Copper	27.1			P
7439-89-6	Iron	3800			P
7439-92-1	Lead	8.6			P
7439-95-4	Magnesium	4430	B		P
7439-96-5	Manganese	237			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	21.4	B		P
7440-09-7	Potassium	1720	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	20700			P
7440-28-0	Thallium	6.0	U		P
7440-62-2	Vanadium	22.3	B		P
7440-66-6	Zinc	41.4			P
	Cyanide	7.0	U		CA

olor Before: BROWN Clarity Before: CLOUDY Texture:

olor After: YELLOW Clarity After: CLEAR Artifacts:

omments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH07

ab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

ab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH06

atrix (soil/water): WATER Lab Sample ID: 3141S

evel (low/med): LOW Date Received: 03/28/96

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11700			P
7440-36-0	Antimony	4.0	U		P
7440-38-2	Arsenic	12.8			P
7440-39-3	Barium	332			P
7440-41-7	Beryllium	1.9	B		P
7440-43-9	Cadmium	1.0	U		P
7440-70-2	Calcium	410000			P
7440-47-3	Chromium	35.8			P
7440-48-4	Cobalt	7.1	B		P
7440-50-8	Copper	34.2			P
7439-89-6	Iron	6410			P
7439-92-1	Lead	14.9			P
7439-95-4	Magnesium	5150			P
7439-96-5	Manganese	271			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	35.0	B		P
7440-09-7	Potassium	2840	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	20200			P
7440-28-0	Thallium	6.0	U		P
7440-62-2	Vanadium	30.3	B		P
7440-66-6	Zinc	61.4			P
	Cyanide	7.0	U		CA

olor Before: BROWN Clarity Before: CLOUDY Texture:

olor After: YELLOW Clarity After: CLEAR Artifacts:

omments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH08

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH06

Matrix (soil/water): WATER Lab Sample ID: 3140S

Level (low/med): LOW Date Received: 03/28/96

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	5570			P
7440-36-0	Antimony	4.0	U		P
7440-38-2	Arsenic	7.1	B		P
7440-39-3	Barium	363			P
7440-41-7	Beryllium	1.3	B		P
7440-43-9	Cadmium	1.0	U		P
7440-70-2	Calcium	364000			P
7440-47-3	Chromium	17.7			P
7440-48-4	Cobalt	3.4	B		P
7440-50-8	Copper	26.8			P
7439-89-6	Iron	3700			P
7439-92-1	Lead	14.1			P
7439-95-4	Magnesium	4260	B		P
7439-96-5	Manganese	503			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	37.6	B		P
7440-09-7	Potassium	1700	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	18100			P
7440-28-0	Thallium	6.0	U		P
7440-62-2	Vanadium	18.7	B		P
7440-66-6	Zinc	113			P
	Cyanide	11.2			CA

Color Before: BROWN Clarity Before: CLOUDY Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH09

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH06

Matrix (soil/water): WATER Lab Sample ID: 3139S

Level (low/med): LOW Date Received: 03/28/96

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	4420			P
7440-36-0	Antimony	4.0	U		P
7440-38-2	Arsenic	9.5	B		P
7440-39-3	Barium	318			P
7440-41-7	Beryllium	1.1	B		P
7440-43-9	Cadmium	1.0	U		P
7440-70-2	Calcium	266000			P
7440-47-3	Chromium	42.3			P
7440-48-4	Cobalt	2.6	B		P
7440-50-8	Copper	112			P
7439-89-6	Iron	2770			P
7439-92-1	Lead	15.0			P
7439-95-4	Magnesium	3790	B		P
7439-96-5	Manganese	842			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	217			P
7440-09-7	Potassium	2810	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	31500			P
7440-28-0	Thallium	6.0	U		P
7440-62-2	Vanadium	18.0	B		P
7440-66-6	Zinc	153			P
	Cyanide	7.0	U		CA

Color Before: BROWN Clarity Before: CLOUDY Texture:

Color After: YELLOW Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MFGH18

Lab Name: CHEMTECH CONSULTING GROUP Contract: 68-D5-0166

Lab Code: CHEM Case No.: 24517 SAS No.: SDG No.: MFGH06

Matrix (soil/water): WATER Lab Sample ID: 3136S

Level (low/med): LOW Date Received: 03/28/96

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1990			P
7440-36-0	Antimony	4.0	U		P
7440-38-2	Arsenic	6.8	B		P
7440-39-3	Barium	367			P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	1.0	U		P
7440-70-2	Calcium	144000			P
7440-47-3	Chromium	7.7	B		P
7440-48-4	Cobalt	1.1	B		P
7440-50-8	Copper	23.5	B		P
7439-89-6	Iron	1500			P
7439-92-1	Lead	10.3			P
7439-95-4	Magnesium	2750	B		P
7439-96-5	Manganese	100			P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	19.0	B		P
7440-09-7	Potassium	2500	B		P
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P
7440-23-5	Sodium	16700			P
7440-28-0	Thallium	6.0	U		P
7440-62-2	Vanadium	10.1	B		P
7440-66-6	Zinc	59.1			P
	Cyanide	7.0	U		CA

Color Before: WHITE Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

TNRCC

Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 10

TDWR
R236
c.3R

Report 236

STRATIGRAPHIC AND HYDROGEOLOGIC FRAMEWORK OF PART OF THE COASTAL PLAIN OF TEXAS

TEXAS DEPARTMENT OF WATER RESOURCES

July 1979
1000.1

AUG 21 '95
MAR 28 1996

TEXAS DEPARTMENT OF WATER RESOURCES

REPORT 236

STRATIGRAPHIC AND HYDROGEOLOGIC FRAMEWORK OF PART OF THE COASTAL PLAIN OF TEXAS

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By C-FLY

E. T. Baker, Jr.
United States Geological Survey

This report was prepared by the U.S. Geological Survey under cooperative agreement with the Texas Department of Water Resources.

July 1979

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Table 1.--Stratigraphic and Hydrogeologic Framework of Part of the Coastal Plain of Texas

Era	System	Series	Stratigraphic Units	Hydrogeologic Units	Selected Faunal Markers	Remarks
CENOZOIC	Quaternary	Holocene	Alluvium	Chicot aquifer		Quaternary System undifferentiated on sections.
		Pleistocene	Beaumont Clay			
			Montgomery Formation			
			Bentley Formation			
			Willis Sand			
	Tertiary	Pliocene	Goliad Sand	Evangeline aquifer		Goliad Sand overlapped east of Lavaca County.
		Miocene	Fleming Formation	Burkeville confining system	*Potamides matiana* *Bigenerina nodosaria var. directa* *Bigenerina humblei* *Amphistegina sp.*	
			Oakville Sandstone	Jasper aquifer		Oakville Sandstone included in Fleming Formation east of Washington County.
			Surface: Catahoula Tuff or Sandstone; Subsurface: Upper part of Catahoula Tuff or Sandstone	Catahoula confining system (restricted)	*Discorbis nomada* *Discorbis gravelli* *Heterostegina sp.* *Marginulina idiomorpha*	Catahoula Tuff designated as Catahoula Sandstone east of Lavaca County.
			Anahuac Formation			Anahuac and "Frio" Formations may be Oligocene in age.
			"Frio" Formation		*Textularia mississippiensis*	
		Oligocene(?)	Surface: Frio Clay; Subsurface: Vicksburg Group equivalent		*Textularia warren*	Frio Clay overlapped or not recognized on surface east of Live Oak County.
		Eocene	Jackson Group: Whitsett Formation: Fashing Clay Member	Not discussed as hydrologic units in this report.		Indicated members of Whitsett Formation apply to south-central Texas. Whitsett Formation east of Karnes County may be, in part or in whole, Oligocene in age.
			Jackson Group: Whitsett Formation: Calliham Sandstone Member or Tordilla Sandstone Member			
			Jackson Group: Whitsett Formation: Dubose Member		*Marginulina cocoaensis*	
			Jackson Group: Whitsett Formation: Deweesville Sandstone Member			
			Jackson Group: Whitsett Formation: Conquista Clay Member		*Textularia hockleyensis*	
			Jackson Group: Whitsett Formation: Dilworth Sandstone Member		*Massilina pratti*	
			Jackson Group: Manning Clay			
			Jackson Group: Wellborn Sandstone		*Textularia dibollensis*	
			Jackson Group: Caddell Formation			
			Claiborne Group: Yegua Formation		*Nonionella cockfieldensis*	
			Claiborne Group: Cook Mountain Formation		*Discorbis yeguaensis*	
			Claiborne Group: Sparta Sand		*Eponides yeguaensis*	
			Claiborne Group: Weches Formation		*Ceratobulimina eximia*	
			Claiborne Group: Queen City Sand			
			Claiborne Group: Reklaw Formation			
			Claiborne Group: Carrizo Sand			
			Wilcox Group			
		Paleocene	Midway Group			

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and W. M. Sandeen (U.S. Geological Survey) of Houston, Texas, delineated the Chicot and Evangeline aquifers on the sections. Their contribution is gratefully acknowledged. Geologic sections and type logs of oil fields including faunal occurrences by the Houston Geological Society (1954, 1962), the Corpus Christi Geological Society (1954, 1955, 1967, 1972), and the South Texas Geological Society (1962, 1967) were extensively utilized as aids in identifying deep subsurface formations. The geologic sections of Eargle, Dickinson, and Davis (1975) served to identify near-surface formations in parts of South Texas.

Metric Conversions

For those readers interested in using the metric system, the metric equivalents of English units of measurements are given in parentheses. The English units used in this report have been converted to metric units by the following factors:

From	Multiply by	To obtain
feet	0.3048	meters (m)
miles	1.609	kilometers (km)

STRATIGRAPHIC FRAMEWORK

General Features of Deposition and Correlation Problems

Cenozoic sediments that underlie the Coastal Plain of Texas are tens of thousands of feet thick at the coastline. These clastic sediments of sand, silt, and clay represent depositional environments ranging from nonmarine at the outcrops of most units to marine where the units may carry a distinctive suite of fossils. Oscillations of ancient seas and changes in amount and source of sediments that were deposited caused facies changes downdip and along strike. For example, a time-stratigraphic unit having age equivalency may consist of sand in one area, sandy clay in a second area, and clay in a third area. Subsidence of the basin of deposition and rising of the land surface caused the stratigraphic units to thicken Gulfward. Growth faults (faults that were more or less continuously active) greatly increased the thickness of some stratigraphic units in short distances. All of these factors contributed to the heterogeneity of the units from place to place, which in turn makes correlation difficult.

Stratigraphic Units

In the discussion to follow, emphasis will be placed on stratigraphic units that are designated in this report as Miocene in age. Many of the correlation problems of the Cenozoic deposits involve these units to a large degree. Also the main thrust of this report is directed at the Miocene in keeping with the ultimate objective of modeling the flow in the Miocene aquifers.

The stratigraphic nomenclature used in this report was determined from several sources and may not necessarily follow the usage of the U.S. Geological Survey.

Pre-Miocene

Delineation of most of the pre-Miocene units of Cenozoic age present relatively few problems of significance. This is especially true of the pre-Jackson units (Midway Group to Yegua Formation). The top of the Carrizo Sand of the Claiborne Group (included with the underlying Wilcox Group on the sections) can be easily delineated, which makes the position of the unit unmistakable in the subsurface. From about the Sabine River to the San Marcos Arch (section F-F', Figure 7, is centered over this structural feature), the top of the Carrizo-Wilcox is about 3,000 feet (914 m) beneath the landward edge of the Catahoula outcrop. Southward from the San Marcos Arch into the Rio Grande Embayment of South Texas, its position steadily increases in depth to more than 7,000 feet (2,134 m) at the western end of section K-K' (Figure 12).

Facies changes occur downdip in the Sparta and Queen City Sands of the Claiborne Group, and where these units grade into clay, delineation on a time-stratigraphic basis is virtually impossible from electrical-log interpretation. The same problem affects the Yegua Formation of the Claiborne Group, although the Yegua remains sandy for greater distances downdip. It can be delineated by lithology on most of the sections in this report. Also, the presence of important faunal markers such as *Nonionella cockfieldensis* and *Ceratobulimina eximia* aid in locating the approximate top and base, respectively, of the Yegua, regardless of its lithology.

The delineation of the Jackson Group is significant in establishing the framework for the Miocene units. This is because the outcropping Frio Clay of Oligocene(?) age of South Texas is completely overlapped in Live Oak County by the Miocene Catahoula (or is not recognized on the surface east of

County to the Sabine River, the percentage of sand in the formation increases eastward. In Jasper and Newton Counties, the amount of sand in the section above the base of the Fleming greatly exceeds the amount of clay. This can be seen in wells 30 and 31 on strike section L''-L''' (Figure 15).

Delineation of the base of the Fleming from the to the deep subsurface has not been attempted on most of the sections because of complex facies changes. In southeast Texas on sections A-A', B-B', and C-C' (Figures 2-4), an approximate base of the Fleming is shown downdip to short distances beyond the pinchout of the Anahuac. The preponderance of sand above the Anahuac in this area, however, makes any delineation on the basis of electrical logs speculative. Deep wells near the coastline penetrate marine facies of the Fleming which carry a diagnostic fauna. Numerous species, which serve to identify the formation, have been described by Rainwater (1964). *Potamides matsoni*, *Amphistegina sp.*, *Bigenerina humblei*, and *Bigenerina nodosaria var. directa* are faunal markers indicated on some of the sections.

Post-Miocene

Delineation of the stratigraphic units of Pliocene, Pleistocene, and Holocene age has not been attempted. Correlation problems with most of these stratigraphic units are too numerous to solve by using only electrical logs. Delineation of the Pleistocene units—Willis Sand, Bentley Formation, Montgomery Formation, and Beaumont Clay—is exceedingly difficult due to the lithologic similarity of the sediments and lack of paleontological control. The contact at the surface of the basal Quaternary with the Goliad Sand or older units is, however, shown on the dip sections.

The Goliad Sand of Pliocene age overlies the Miocene units in the deep subsurface as well as in places on the surface. Except for a few isolated outcrops, it is otherwise entirely overlapped on the surface east of Lavaca County by Pleistocene deposits. Its inland extent beneath the overlap is presumed to be only several miles southeast from the most downdip exposures of the Fleming Formation. From Lavaca County to the Rio Grande, the width of the Goliad outcrop gradually increases because the Goliad progressively overlaps older units in the Rio Grande Embayment of South Texas.

The Goliad Sand can usually be identified on the surface and in the subsurface by a preponderance of sand except in the far eastern part of the State where sand predominates from the base of the Miocene to the surface. In this area, the identity of the Goliad cannot be established with certainty. Delineation of the base of the Goliad has been made, where outcrop control is available, on the strike and dip sections west of Colorado County. The base of the Goliad has been approximated at about 2,200 feet (671 m) below sea level near the coastline on sections I-I' and J-J' (Figures 10, 11).

HYDROGEOLOGIC FRAMEWORK

The following discussion is restricted to the hydrogeologic framework of five units—Catahoula confining system (restricted), Jasper aquifer, Burkeville confining system, Evangeline aquifer, and Chicot aquifer. A discussion of other hydrologic units of Cenozoic age is beyond the purpose and scope of this report.

The quality of the ground water that is indicated on the sections to be less than 3,000 mg/l of dissolved solids is referred to in this report as fresh to slightly saline water. This terminology follows the classification of Winslow and Kister (1956).

Catahoula Confining System (Restricted)

The Catahoula confining system (restricted) is treated in this report as a quasi-hydrologic unit with different boundaries in some areas than the stratigraphic unit of the same name. Its top (base of the Jasper aquifer) is delineated along lithologic boundaries that are time-stratigraphic in some places but that transgress time lines in other places. Its base, which coincides with the base of the stratigraphic unit, is delineated everywhere along time-stratigraphic boundaries that are independent of lithology. No attempt was made to establish a lithologic (hydrologic) base for the unit, which would have created a distinct hydrologic unit. Such effort would have involved a thorough hydrologic evaluation of pre-Miocene formations, which is beyond the scope of the project.

In many places, the Catahoula confining system (restricted) is identical to the stratigraphic unit, but there are notable exceptions. These departures of the hydrologic boundaries from the stratigraphic boundaries are most prominent in the eastern part of the Coastal Plain near the Sabine River (Figure 15), in places in South Texas (Figure 11), and in numerous places at the outcrop and in the shallow subsurface. In these places, the very sandy parts of the Catahoula Tuff or Sandstone (stratigraphic unit) that lie immediately below the Oakville Sandstone or Fleming Formation are included in the overlying Jasper aquifer. This leaves a lower

section from 0 to 2,000 feet (610 m) or more in thickness that consists predominantly of clay or tuff with some interbedded sand to compose the Catahoula confining (restricted) system. In most areas, this delineation creates a unit that is generally deficient in sand so as to preclude its classification in these areas as an aquifer. Thus in much of its subsurface extent, the Catahoula confining system (restricted) functions hydrologically as a confining layer that retards the interchange of water between the overlying Jasper aquifer and underlying aquifers.

The amount of clay and other fine-grained clastic material in the Catahoula confining system (restricted) generally increases downdip, until the Anahuac Formation is approached. Below this unit, the "Frio" Formation becomes characteristically sandy and contains highly saline water that extends to considerable depths.

Jasper Aquifer

The Jasper aquifer, which was named by Wesselman (1967) for the town of Jasper in Jasper County, Texas, has heretofore not been delineated farther west than Washington, Austin, and Fort Bend Counties. In this report, a delineation as far downdip as possible has been made of the Jasper from the Sabine River to the Rio Grande.

The configuration of the Jasper aquifer in the subsurface, as shown on the sections, is geometrically irregular. This irregularity is due to the fact that the delineation was necessarily made on the basis of the aquifer being a rock-stratigraphic unit. The hydrologic boundaries were defined by observable physical (lithologic) features rather than by inferred geologic history.

The configuration of the base and top of the Jasper transgresses stratigraphic boundaries along strike and downdip. The lower boundary of the aquifer coincides with the stratigraphic lower boundary of the Oakville or Fleming in some places. In other places the base of the Jasper lies within the Catahoula or coincides with the base of that unit. The top of the aquifer is within the Fleming Formation in places, follows the top of the Oakville Sandstone in other places, and is within the Oakville in still other places.

The Jasper ranges in thickness from as little as 200 feet (61 m) to about 3,200 feet (975 m). The maximum thickness occurs within the region of highly saline water in the aquifer. An average range in thickness of the aquifer within the zone of fresh to slightly saline water is from about 600 to 1,000 feet (183 to 305 m). In the eastern part of the Coastal Plain of Texas the Jasper contains a greater percentage of sand than in the southern part. At the Sabine River, the Jasper attains a thickness of 2,400 feet (732 m) in well 31 on section L''-L''' (Figure 15), where the aquifer is composed almost entirely of sand. Fresh to slightly saline water, as shown on section D-D' (Figure 5), occurs as deep as 3,000 feet (914 m) below sea level.

Delineation of the Jasper aquifer in Louisiana (Whitfield, 1975), in western Louisiana and eastern Texas (Turcan, Wesselman, and Kilburn, 1966), and in Jasper and Newton Counties, Texas (Wesselman, 1967) shows that the thickness of the Jasper at the Sabine River closely approximates that given by the author. For example, the author assigns a thickness of 2,400 feet (732 m) to the Jasper in well 31 on section L''-L''' (Figure 15), and the authors cited above show essentially the same thickness at the site. This agreement in aquifer thickness, however, is contrasted to different interpretations of the stratigraphic composition or age of the aquifer near the Sabine River. The authors cited above restrict the Jasper to a part of the Fleming Formation, whereas this paper redefines the Jasper at its type locality near the Sabine River to include the upper part of the Catahoula of Texas in addition to the lower part of the Fleming of Texas. (This redefinition applies only to the area of the type locality and is thus only locally valid. Elsewhere in the Coastal Plain of Texas the Jasper assumes a different stratigraphic makeup.)

The stratigraphic discrepancies at the Texas-Louisiana border are attributed to different interpretations of the surface geology at the State line. The Palestine quadrangle of the Geologic Atlas of Texas (Barnes, 1968b) shows the Catahoula outcrop to be about 6 miles (9.7 km) wide at the Sabine River, whereas Welch (1942) shows the outcrop in Louisiana to be about 1 mile (1.6 km) wide. A close comparison of the two geologic maps indicates that in Louisiana the Lena, Carnahan Bayou, and at least part of the Dough Hills Members of Fisk (1940) of the Fleming Formation of Kennedy (1892), in addition to the Catahoula of Welch (1942), are equivalent to the Catahoula of Texas. Wesselman (1967) assigned the Carnahan Bayou Member as the basal part of the Jasper, which is reasonable; but this member is Catahoula in age in Texas. As long as the discrepancy in geologic mapping is unresolved,

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ubsurface correlations of the Catahoula-Fleming ontact, as well as formation thicknesses, will continue differ.

Burkeville Confining System

The Burkeville confining system, which was named Wesselman (1967) for outcrops near the town of urkeville in Newton County, Texas, is delineated on he sections from the Sabine River to near the Rio rande. It separates the Jasper and Evangeline aquifers d serves to retard the interchange of water between he two aquifers.

The Burkeville has been mapped in this report as a ock-stratigraphic unit consisting predominantly of silt d clay. Boundaries were determined independently m time concepts although in some places the unit ppears to possess approximately isochronous oundaries. In most places, however, this is not the case. r example, the entire thickness of sediment in the urkeville confining system in some areas is younger han the entire thickness of sediment in the Burkeville in her places.

The configuration of the unit is highly irregular. oundaries are not restricted to a single stratigraphic it but transgress the Fleming-Oakville contact in many aces. This is shown on sections D-D' to G-G' and J-J' Figures 5-8 and 11). Where the Oakville Sandstone is esent, the Burkeville crops out in the Fleming but dips dually into the Oakville because of facies changes rom sand to clay downdip.

The typical thickness of the Burkeville ranges from bout 300 to 500 feet (91 to 152 m). However, thick ections of predominantly clay in Jackson and Calhoun unties account for the Burkeville's gradual increase to s maximum thickness of more than 2,000 feet (610 m) s shown on section F-F' (Figure 7).

The Burkeville confining system should not be onstrued as a rock unit that is composed entirely of silt d clay. This is not typical of the unit, although amples of a predominance of silt and clay can be seen n some logs in sections H-H' and I-I' (Figures 9-10). In ost places, the Burkeville is composed of many dividual sand layers, which contain fresh to slightly line water; but because of its relatively large ercentage of silt and clay when compared to the derlying Jasper aquifer and overlying Evangeline, the urkeville functions as a confining unit.

Evangeline Aquifer

The Evangeline aquifer, which was named and defined by Jones (Jones, Turcan, and Skibitzke, 1954) for a ground-water reservoir in southwestern Louisiana, has been mapped also in Texas, but heretofore has been delineated no farther west than Washington, Austin, Fort Bend, and Brazoria Counties. Its presence as an aquifer and its hydrologic boundaries to the west have been a matter of speculation. D. G. Jorgensen, W. R. Meyer, and W. H. Sandeen of the U.S. Geological Survey (written commun., March 1, 1976) recently refined the delineation of the aquifer in previously mapped areas and continued its delineation to the Rio Grande. The boundaries of the Evangeline as they appear on the sections in this report are their determinations.

The Evangeline aquifer has been delineated in this report essentially as a rock-stratigraphic unit. Although the aquifer is composed of at least the Goliad Sand, the lower boundary transgresses time lines to include sections of sand in the Fleming Formation. The base of the Goliad Sand at the outcrop coincides with the base of the Evangeline only in South Texas as shown in sections H-H' to K-K' (Figures 9-12). Elsewhere, the Evangeline at the surface includes about half of the Fleming outcrop. The upper boundary of the Evangeline probably follows closely the top of the Goliad Sand where present, although this relationship is somewhat speculative.

The Evangeline aquifer is typically wedge shaped and has a high sand-clay ratio. Individual sand beds are characteristically tens of feet thick. Near the outcrop, the aquifer ranges in thickness from 400 to 1,000 feet (122 to 305 m), but near the coastline, where the top of the aquifer is about 1,000 feet (305 m) deep, its thickness averages about 2,000 feet (610 m). The Evangeline is noted for its abundance of good quality ground water and is considered one of the most prolific aquifers in the Texas Coastal Plain. Fresh to slightly saline water in the aquifer, however, is shown to extend to the coastline only in section J-J' (Figure 11).

Chicot Aquifer

The Chicot aquifer, which was named and defined by Jones (Jones, Turcan, and Skibitzke, 1954) for a ground-water reservoir in southwestern Louisiana, is the youngest aquifer in the Coastal Plain of Texas. Over the years, the aquifer gradually was mapped westward from Louisiana into Texas where, heretofore, its most

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APPENDIX A

STREAMBED SEDIMENT LABORATORY REPORTS

Aqua-Tech
Laboratories, Inc.
WATER AND WASTEWATER TESTING
P.O. BOX 1036
HEARNE, TEXAS 77859

December 31, 1986

IENT: Hussmann Old Brazos Forge
DRESS: P. O. Box 322, Brenham, TX 77833
MPLE DATE: 12-12-86
MPLE POINT: Sites 1, 2, 3, 4, 5, 6, 8 as indicated by TWC map.
MPLED BY: Doug Wallace
MPLE TYPE: Soil

	EP METALS			TOTAL METALS					
MPLE	Cr ppm	Cd ppm	Pb ppm	Cr ppm	Cd ppm	Pb ppm	Ni ppm	Zn ppm	Cu ppm
te 1	<0.05	<0.005	<0.05	78	0.4	15	519	110	44
ite 2	<0.05	<0.005	<0.05	139	0.3	18	320	95	62
te 3	<0.05	<0.005	<0.05	71	0.4	11	127	47	34
ite 4	<0.05	<0.005	<0.05	45	0.4	15	161	27	22
te 5	<0.05	<0.005	<0.05	469	0.3	12	700	49	92
te 6	<0.05	<0.005	<0.05	2540	0.5	30	5110	84	268
ite 8	<0.05	<0.005	<0.05	67	0.7	20	484	390	60

certify that the presented analytical results were obtained under my direction ing the methods of testing and procedure in accordance with applicable existing PA/TWC regulations. I also certify that this is a true and correct analyses of he samples collected by this laboratory, within an acceptable confidence interval.

John Brien

hn Brien, Director

Aqua-Tech Laboratories, Inc.

WATER AND WASTEWATER TESTING
P.O. BOX 1036
HEARNE, TEXAS 77859

November 11, 1987

Client: Hussmann-Brazos Forge
Address: P.O. Box 322
Brenham, TX 77833
Date Sampled: 7-23-87
Sampled by: June Brien
Type: Soil
Site: Creek Bed

SITE	TIME	TOTAL (ppm) Nickel	Copper	Chromium	Zinc
BG	11:30 am	17	8	16	30
1	11:20 am	965	55	100	138
2	11:15 am	276	27	2.94	37
3	11:10 am	420	39	565	32
4	11:00 am	278	24	112	29
5	10:55 am	12,000	960	5740	380
6	10:50 am	540	30	166	43
*7y	10:25 am	1,100	31	45	280
7	10:25 am	810	32	61	220
7 dulp	10:25 am	950	70	55	230

		EP TOX (ppm) Nickel	Copper	Chromium	Zinc
7	10:25 am	13.6	0.08	0.05	1.7

* 7y included mostly yellow colored soil from site 7.

June M. Brien
June M. Brien, Director

Aqua-Tech
Laboratories, Inc.
WATER AND WASTEWATER TESTING
P.O. BOX 1036
HEARNE, TEXAS 77859

March 3, 1988

CLIENT: EUSSMAN OLD BRAZOS FORGE
ADDRESS: P. O. Box 322
SAMPLE DATE: 12-15-87
SAMPLE POINT: Soil from Creek
SAMPLED BY: JMB & DT
SAMPLE TYPE: Grab

TOTAL (ppm)

SITE	TIME	Nickel	Copper	Chromium	Zinc
BG	11:50 AM	15	7	19	50
1	11:40 AM	920	146	255	520
2	11:37 AM	900	34	298	47
3	11:35 AM	1210	44	480	52
4	11:32 AM	590	76	940	46
5	11:30 AM	153	8	63	19
6	11:25 AM	570	43	169	68
7	11:45 AM	184	41	179	410
	EPA METHOD #	249.1	220.1	218.1	289.1

EP Toxicity (ppm)

SITE	TIME	Nickel	Copper	Chromium	Zinc
7	11:45 AM	6.00	0.14	0.14	1.05

John Brien, Director

RECEIVED FEB 27 1989

Aqua-Tech
Laboratories, Inc.
WATER AND WASTEWATER TESTING
P.O. BOX 1036
HEARNE, TEXAS 77859

February 21, 1989

CLIENT: HUSSMAN OLD BRAZOS FORGE
ADDRESS: P. O. Box 322
SAMPLE DATE: 12-16-88
SAMPLE POINT: Soil from creek
SAMPLED BY: JMB & CR
SAMPLE TYPE Grab

TOTAL (ppm)

SITE	Nickel ppm	Copper ppm	Chromium ppm	Zinc ppm
BG	88	95 89 88	660 525 560	94
1	40	42	113	78
2	285	43	174	65
3	84	94 110	460 398	85 84
4	199 197	70	152	65
5	250	26	84	34
6	450	36 32	295	40
7	245	29 43	61 59	65
EPA METHOD #	249.1	220.1	218.1	289.1

EP Toxicity (ppm)

SITE	Chromium ppm
BG	<0.05
1	<0.05
2	<0.05
3	<0.05
4	<0.05
5	<0.05
6	<0.05
7	<0.05

John Brien, D' ctor

RECEIVED MAR 2 3 1989

Aqua-Tech

Laboratories, Inc.

WATER AND WASTEWATER TESTING
P.O. BOX 1036
HEARNE, TEXAS 77859

March 21, 1989

CLIENT: HUSSMAN OLD BRAZOS FORGE
ADDRESS: P. O. Box 322
SAMPLE DATE: 3-9-89
SAMPLE POINT: Old and New background sites from creek
SAMPLED BY: Amy Yates (Aqua-Tech)
SAMPLE TYPE Grab

SITE	TOTAL (ppm) Nickel ppm		Copper ppm		Chromium ppm		Zinc ppm	
Old Background	26	24	8	9	27	29	39	39
New Background	555	545	65	65	313	325	52	53
EPA METHOD #	249.1		220.1		218.1		289.1	

John Brien, Director

Table 1. Streambed Soil Total Chromium Concentrations, Former Old Brazos Forge Facility

		Soil Sample Location							
Sample Date	Sampled By	1	2	3	4	5	6	7	BG
* 1984	TNRCC	670	600	530	1,500	4,450	5,400	---	---
* 12/12/86	TNRCC	122 (0.024)	54 (0.008)	124 (0.026)	800 (0.048)	1,310 (0.05)	58,000 (0.064)	---	24 (0.008)
12/12/86	OBF	78 (<0.05)	139 (<0.05)	71 (<0.05)	45 (<0.05)	469 (<0.05)	2,540 (<0.05)	---	---
** 7/23/87	OBF/AT	100	2.94	565	112	5,740	166	45;61;55 (0.05)	16
** 12/15/87	OBF/AT	255	298	480	940	63	169	179 (0.14)	19
** 12/16/88	OBF/GM	113 (<0.05)	174 (<0.05)	460;398 (<0.05)	152 (<0.05)	84 (<0.05)	295 (<0.05)	61;59 (<0.05)	660;525;560 (<0.05)
3/9/89	OBF/AT	---	---	---	---	---	---		27;29;313;325
6/94	TNRCC	50.8	---	---	204	---	---	---	8.8

BG Background sample location
OBF Old Brazos Forge
AT Aquatech Laboratories, Inc.
GM Geraghty & Miller
* Sampled by TNRCC at following locations: 1 - northwest corner of OBF property in streambed, 2 - discharge point, 3 - halfway between discharge and Rt. 36, 4 - north side of Rt. 36 in right-of-way, 5 - south side of Rt. 36 in right-of-way, 6 - private property 80 yards east of Rt. 36
** Sampled at following locations: 1 - outfall, 2 - 50 yards downstream, 3 - 100 yards downstream, 4 - 150 yards downstream, 5 - 200 yards downstream, 6 - 250 yards downstream, BG - upstream of discharge

Results given in milligrams per kilogram, EP Toxicity results in parenthesis

Note: 12/86 - Sample locations assumed same as 1984
7/87 - TNRCC split; results unknown
12/88 - TNRCC split locations, 1, 5, 6, BG; results unknown
3/89 - Sampled at original background and new background locations
Location 7 not known

10014

Table 2. Streambed Soil Total Copper Concentrations, Former Old Brazos Forge Facility

		Soil Sample Location							
Sample Date	Sampled By	1	2	3	4	5	6	7	BG
* 1984	TNRCC	710	540	328	1,000	3,050	6,000	---	---
* 12/12/86	TNRCC	48	5	32	144	507	58	---	<0.1
12/12/86	OBF	44	62	34	22	92	268	---	---
** 7/23/87	OBF/AT	55	27	39	24	960	30	31;32;70	8
** 12/15/87	OBF/AT	146	34	44	76	8	43	41	7
** 12/16/88	OBF/GM	42	43	94;110	70	26	36;32	29;43	95;89;88
3/9/89	OBF/AT	---	---	---	---	---	---	---	8;9;65;65
6/94	TNRCC	8.3	---	---	15.6	---	---	---	4.4

BG Background sample location
OBF Old Brazos Forge
AT Aquatech Laboratories, Inc.
GM Geraghty & Miller
* Sampled by TNRCC at following locations: 1 - northwest corner of OBF property in streambed, 2 - discharge point, 3 - halfway between discharge and Rt. 36, 4 - north side of Rt. 36 in right-of-way, 5 - south side of Rt. 36 in right-of-way, 6 - private property 80 yards east of Rt. 36
** Sampled at following locations: 1 - outfall, 2 - 50 yards downstream, 3 - 100 yards downstream, 4 - 150 yards downstream, 5 - 200 yards downstream, 6 - 250 yards downstream, BG - upstream of discharge

Results given in milligrams per kilogram

Note: 12/86 - Sample locations assumed same as 1984
7/87 - TNRCC split; results unknown
12/88 - TNRCC split locations, 1, 5, 6, BG; results unknown
3/89 - Sampled at original background and new background locations
Location 7 not known

Table 3. Streambed Soil Total Nickel Concentrations, Former Old Brazos Forge Facility

		Soil Sample Location							
Sample Date	Sampled By	1	2	3	4	5	6	7	BG
* 1984	TNRCC	970	1,430	2,120	7,000	24,050	34,000	---	---
* 12/12/86	TNRCC	323	111	206	970	4,470	98	---	16
12/12/86	OBF	519	320	127	161	700	5,110	---	---
** 7/23/87	OBF/AT	965	276	420	278	12,000	540	1;100;810;950	17
** 12/15/87	OBF/AT	920	900	1,210	590	153	570	184	15
** 12/16/88	OBF/GM	40	285	84	199;197	250	450	245	88
3/9/89	OBF/AT	---	---	---	---	---	---	---	26;24;555;545
6/94	TNRCC	103	---	---	61.3	---	---	---	6.6

BG Background sample location
OBF Old Brazos Forge
AT Aquatech Laboratories, Inc.
GM Geraghty & Miller
* Sampled by TNRCC at following locations: 1 - northwest corner of OBF property in streambed, 2 - discharge point,. 3 - halfway between discharge and Rt. 36, 4 - north side of Rt. 36 in right-of-way, 5 - south side of Rt. 36 in right-of-way, 6 - private property 80 yards east of Rt. 36
** Sampled at following locations: 1 - outfall, 2 - 50 yards downstream, 3 - 100 yards downstream, 4 - 150 yards downstream, 5 - 200 yards downstream, 6 - 250 yards downstream, BG - upstream of discharge

Results given in milligrams per kilogram

Note: 12/86 - Sample locations assumed same as 1984
7/87 - TNRCC split; results unknown
12/88 - TNRCC split locations, 1, 5, 6, BG; results unknown
3/89 - Sampled at original background and new background locations
Location 7 not known

10016

Table 4. Streambed Soil Total Zinc Concentrations, Former Old Brazos Forge Facility

		Soil Sample Location							
Sample Date	Samples By	1	2	3	4	5	6	7	BG
* 1984	TNRCC	560	520	486	740	1,100	3,000	---	---
* 12/12/86	TNRCC	107	39	28	67	145	419	---	32
12/12/86	OBF	110	95	47	27	49	84	---	---
** 7/23/87	OBF/AT	138	37	32	29	380	43	280;220;230	30
** 12/15/87	OBF/AT	520	47	52	46	19	68	410	50
** 12/16/88	OBF/GM	78	65	85;84	65	34	40	65	94
3/9/89	OBF/AT	---	---	---	---	---	---	---	39;39;52;53
6/94	TNRCC	26.1	---	---	21.3	---	---	---	21.3

BG Background sample location
OBF Old Brazos Forge
AT Aquatech Laboratories, Inc.
GM Geraghty & Miller
* Sampled by TNRCC at following locations: 1 - northwest corner of OBF property in streambed, 2 - discharge point, 3 - halfway between discharge and Rt. 36, 4 - north side of Rt. 36 in right-of-way, 5 - south side of Rt. 36 in right-of-way, 6 - private property 80 yards east of Rt. 36
** Sampled at following locations: 1 - outfall, 2 - 50 yards downstream, 3 - 100 yards downstream, 4 - 150 yards downstream, 5 - 200 yards downstream, 6 - 250 yards downstream, BG - upstream of discharge

Results given in milligrams per kilogram

Note: 12/86 - Sample locations assumed same as 1984
7/87 - TNRCC split; results unknown
12/88 - TNRCC split locations, 1, 5, 6, BG; results unknown
3/89 - Sampled at original background and new background locations
Location 7 not known

10017

Table 5. Surface Water Quality

Sample ID	Ca	Cl	CO3	HCO3	K	Mg	Mn	Na	NO3	pH	SO4	TDS	Zn	Cu	Cr	Ni
Southwestern Laboratories																
US (Little Sandy Creek Upstream)	86.0	54.4	0.0	180	1.42	3.89	(<0.05)	31.8	0.39	7.66	32.2	468	---	---	---	---
	96.0	67.0	0.0	177	1.52	3.92	(<0.05)	36.3	0.16	7.68	26.0	496	---	---	---	---
	96.6	57.4	0.0	180	1.41	3.82	(<0.05)	30.9	0.26	7.69	31.8	410	---	---	---	---
	95.0	57.4	0.0	173	1.41	3.94	(<0.05)	31.1	0.34	7.74	32.6	464	---	---	---	---
MS (Little Sandy Creek Midway Downstream)	93.5	61.4	0.0	167	1.50	3.72	(<0.05)	31.6	0.31	7.95	29.7	398	---	---	---	---
	100.0	61.4	0.0	180	1.49	3.81	0.52	31.0	0.39	7.77	19.7	430	---	---	---	---
	94.1	59.4	0.0	185	1.38	3.79	0.07	30.8	0.14	7.80	27.9	526	---	---	---	---
	94.1	60.4	0.0	167	1.40	3.72	(<0.05)	31.0	0.14	7.99	28.4	376	---	---	---	---
DS (Little Sandy Creek Downstream)	84.8	56.4	0.0	163	1.58	3.76	(<0.05)	30.2	0.29	7.92	27.0	454	---	---	---	---
	90.0	57.4	0.0	143	1.61	3.67	(<0.05)	29.8	0.18	7.81	27.4	368	---	---	---	---
	87.0	54.4	0.0	179	1.52	3.87	0.05	29.8	0.29	7.80	26.3	414	---	---	---	---
	88.2	54.4	0.0	184	1.54	3.68	0.05	29.5	0.31	7.85	26.4	498	---	---	---	---
Aqua-Tech Laboratories																
US (Little Sandy Creek Upstream)	99.8	57.4	0.0	260	1.44	2.6	0.05	34.8	1.56	7.5	26	524	(<0.05)	(<0.05)	(<0.05)	(<0.05)
	97.8	55.9	0.0	290	1.31	2.7	0.13	31.2	0.87	7.3	24	580	(<0.05)	(<0.05)	(<0.05)	(<0.05)
	92.8	58.3	0.0	260	1.51	3.1	0.15	29.2	1.03	7.3	25	509	(<0.05)	(<0.05)	(<0.05)	(<0.05)
	83.4	55.4	0.0	260	1.41	3.3	0.10	35.6	0.78	7.1	24	510	(<0.05)	(<0.05)	(<0.05)	(<0.05)
MS (Little Sandy Creek Midway Downstream)	67.6	61.7	0.0	220	0.92	2.9	(<0.05)	38.8	0.59	7.6	17	435	(<0.05)	(<0.05)	(<0.05)	(<0.05)
	88.4	61.7	0.0	310	1.13	2.4	(<0.05)	33.6	1.21	7.1	19	476	(<0.05)	(<0.05)	(<0.05)	(<0.05)
	92.4	58.8	0.0	240	1.22	2.8	(<0.05)	32.8	0.38	7.3	22	474	(<0.05)	(<0.05)	(<0.05)	(<0.05)
	69.8	62.2	0.0	250	0.87	2.4	(<0.05)	39.6	1.83	7.8	21	481	(<0.05)	(<0.05)	(<0.05)	(<0.05)
DS (Little Sandy Creek Downstream)	62.2	58.3	0.0	154	1.11	2.4	0.06	29.2	17.12	7.2	21	506	(<0.05)	(<0.05)	(<0.05)	(<0.05)
	96.6	55.4	0.0	290	1.38	2.7	0.17	32.0	0.47	7.4	21	543	(<0.05)	(<0.05)	(<0.05)	(<0.05)
	82.2	53.4	0.0	270	1.21	2.9	0.13	29.6	0.46	7.3	21	521	(<0.05)	(<0.05)	(<0.05)	(<0.05)
	63.6	58.3	0.0	280	1.12	2.7	0.10	28.8	0.36	7.6	24	449	(<0.05)	(<0.05)	(<0.05)	(<0.05)

--- Not analyzed

Note: Results in milligrams per liter except pH.

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TABLE 6. WATER LEVEL MEASUREMENTS - JANUARY 26, 1995

WELL	GROUND ELEV. (FT. MSL)	MP ELEV. (FT. MSL)	DEPTH TO WATER (FT.)	GW ELEV. (FT. MSL)	COMPLETION ZONE
MH-2	328.82	332.62	21.45	311.17	SH
MH-3	330.12	333.42	25.60	307.82	SH
MH-5	343.01	343.01	34.68	308.33	SH
MH-6	326.37	329.67	20.01	309.66	SH
MH-9	339.85	342.35	31.98	310.37	SH
MH-10	344.83	347.33	40.15	307.18	SH
MH-11	346.09	349.03	71.69	277.34	DP
MH-12	345.24	347.68	40.44	307.24	SH
MH-13	330.64	333.22	24.81	308.41	SH
MH-14	330.87	334.08	57.31	276.77	DP
MH-15	329.46	332.49	55.79	276.70	DP
MH-16	316.90	318.92	15.09	303.83	SH

MSL - mean sea level
MP - measuring point
GW - groundwater
SH - shallow sand
DP - deep sand

OBFWL25.XLS / 3/25/95

Table 7. Shallow Zone Groundwater Quality - Chromium

		WELL NUMBER						
SAMPLE DATE		MH-2	MH-3	MH-5	MH-6	MH-9	MH-10	MH-12	MH-13
07/21/82					< 0.01				
03/27/83		< 0.02	< 0.02	< 0.02	0.02				
05/06/83		< 0.02	< 0.02		< 0.02				
08/10/83		< 0.02	< 0.02		< 0.02				
07/10/84		0.03							
03/07/85		< 0.001	0.124	0.023	0.062	< 0.001			
04/17/85		< 0.05				< 0.05			
06/27/85			0.06	< 0.05	< 0.05				
07/02/85			0.05						
07/22/85		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05			
08/01/85									
09/27/85		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05			
12/09/85		0.001	0.018	0.064	0.011	0.007			
03/10/86		< 0.001	0.009	0.025	0.004	0.004			
06/10/86		< 0.01	0.08	0.01	< 0.01	< 0.01			
12/29/86		< 0.05	0.15	< 0.05	< 0.05	< 0.05	< 0.05		
04/27/87							< 0.05		
06/30/87		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
09/28/87							< 0.05		
12/15/87		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
06/24/88		< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01		
08/03/88		< 0.01	0.03	0.03	< 0.01	0.02	< 0.01		
12/15/88		0.01	0.01	0.02	0.01	0.01	0.02		
06/30/89		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
09/25/89								< 0.05	< 0.05
12/20/89		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
03/06/90		< 0.03	< 0.03	0.03	< 0.03	< 0.03	< 0.03		
06/26/90		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
11/26/90		< 0.03	< 0.03	0.03	< 0.03	< 0.03	< 0.03		
01/15/91		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
05/23/91		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
07/23/91		< 0.03	0.04	< 0.03	< 0.03	< 0.03	< 0.03		
11/19/91		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
07/27/92		< 0.03	0.05	< 0.03	< 0.03	< 0.03	< 0.03		
10/19/92		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
01/05/93	**			0.112				0.147	
01/05/93	*			0.06				0.08	
01/11/93		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
04/27/93		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
08/31/93		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
10/25/93		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
01/31/94		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
04/26/94		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		

-CONCENTRATIONS IN MILLIGRAMS PER LITER
-NO VALUE INDICATES SAMPLE NOT COLLECTED
- < DENOTES LESS THAN
* TOTAL (UNFILTERED) ANALYSIS, SAMPLED BY AQUA-TECH LABORATORIES, INC.
** TNRCC SAMPLE RESULTS

CHROM.XLS3/25/95

Table 8. Shallow Zone Groundwater Quality - Copper

	WELL NUMBER							
SAMPLE DATE	MH-2	MH-3	MH-5	MH-6	MH-9	MH-10	MH-12	MH-13
07/21/82				< 0.01				
03/27/83								
05/06/83								
08/10/83								
07/10/84								
03/07/85								
04/17/85								
06/27/85								
07/02/85								
07/22/85	< 0.03	0.26		0.04				
08/01/85								
09/27/85	< 0.03	0.06		< 0.03				
12/09/85	0.002	0.092		0.01				
03/10/86	< 0.01	0.06	0.04	0.01	0.01			
06/10/86	< 0.02	0.14	0.03	< 0.02	< 0.02			
12/29/86	< 0.05	0.07	0.05	< 0.05	< 0.05			
04/27/86								
06/30/87	< 0.05	0.06	< 0.05	< 0.05	< 0.05			
09/28/87								
12/15/87	< 0.05	0.1	< 0.05	< 0.05	< 0.05	< 0.05		
06/24/88	0.02	0.06	0.04	0.02	0.04	0.02		
08/03/88	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
12/15/88	0.04	0.03	0.04	0.01	0.03	0.02		
06/30/89	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
09/25/89							< 0.05	< 0.05
12/20/89	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02		
03/06/90	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02		
06/26/90	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02		
01/15/91	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02		
05/23/91	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02		
07/23/91	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02		
11/19/91	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
07/27/92	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
10/19/92	< 0.05	0.08	< 0.05	< 0.05	< 0.05	< 0.05		
01/11/93	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
04/27/93	< 0.05	0.06	< 0.05	< 0.05	< 0.05	< 0.05		
08/31/93	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
10/25/93	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
01/31/94	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
04/26/94	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		

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-CONCENTRATIONS IN MILLIGRAMS PER LITER
-NO VALUE INDICATES SAMPLE NOT COLLECTED
-< DENOTES LESS THAN

COPPER2.XLS 4/3/95

Table 9. Shallow Zone Groundwater Quality - Nickel

	WELL NUMBER							
SAMPLE DATE	MH-2	MH-3	MH-5	MH-6	MH-9	MH-10	MH-12	MH-13
07/21/82				0.01				
03/27/83								
05/06/83								
08/10/83								
07/10/83								
03/07/85								
04/17/85								
06/27/85								
07/02/85								
07/22/85	< 0.05	0.28		0.14				
08/01/85								
09/27/85	< 0.02	0.06		< 0.02				
12/09/85	0.017	0.56		0.068				
03/10/86	0.011	0.35	0.17	0.013	0.006			
06/10/86	< 0.04	50.9	0.49	0.24	< 0.04			
12/29/86	0.19	3.5	0.36	0.08	0.07			
04/27/86								
06/30/87	0.08	3.2	0.22	0.09	0.05			
09/28/87								
12/15/87	< 0.05	1.38	0.25	< 0.05	< 0.05	< 0.05		
06/24/88	0.05	0.7	0.77	0.61	0.52	0.23		
08/03/88	0.02	0.13	0.05	0.05	0.05	0.07		
12/15/88	0.03	0.28	< 0.01	0.01	0.02	0.04		
06/30/89	0.05	0.39	0.17	0.1	0.12	0.11		
09/25/89							< 0.05	< 0.05
12/20/89	< 0.05	0.23	< 0.05	< 0.05	< 0.05	< 0.05		
03/06/90	< 0.03	0.05	< 0.03	< 0.03	< 0.03	< 0.03		
06/26/90	0.05	0.15	0.04	< 0.03	0.03	< 0.03		
01/15/91	< 0.03	0.17	0.07	< 0.03	< 0.03	< 0.03		
05/23/91	< 0.03	0.21	0.1	< 0.03	< 0.03	< 0.03		
07/23/91	0.06	0.14	0.09	0.04	0.06	0.03		
11/19/91	0.03	0.17	0.1	0.05	< 0.02	0.02		
07/27/92	< 0.02	0.15	0.08	0.05	0.06	< 0.02		
10/19/92	< 0.05	0.13	< 0.05	< 0.05	< 0.05	< 0.05		
01/11/93	< 0.02	0.06	0.06	< 0.02	< 0.02	< 0.02		
04/27/93	< 0.02	0.06	0.05	< 0.02	< 0.02	< 0.02		
08/31/93	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02		
10/25/93	< 0.02	0.1	0.02	< 0.02	< 0.02	< 0.02		
01/31/94	< 0.02	0.11	0.04	< 0.02	< 0.02	0.03		
04/26/94	< 0.02	0.06	0.04	< 0.02	< 0.02	< 0.02		

-CONCENTRATIONS IN MILLIGRAMS PER LITER
-NO VALUE INDICATES SAMPLE NOT COLLECTED
-< DENOTES LESS THAN

NICK.XLS 3/29/95

Table 10. Shallow Zone Groundwater Quality - Zinc

	WELL NUMBER							
SAMPLE DATE	MH-2	MH-3	MH-5	MH-6	MH-9	MH-10	MH-12	MH-13
07/21/82				0.03				
03/27/83								
05/06/83								
08/10/83								
07/10/84								
03/07/85								
04/17/85								
06/27/85								
07/02/85								
07/22/85	0.02	18		0.82				
08/01/85								
09/27/85	0.01	2		0.03				
12/09/85	0.02	0.11		0.08				
03/10/86	0.03	0.68	0.05	0.03	0.05			
06/10/86	0.02	1.25	0.16	0.03	0.02			
12/29/86	0.07	0.46	0.09	< 0.05	0.06			
04/27/86								
06/30/87	0.05	0.31	0.07	0.05	0.05			
09/28/87								
12/15/87	< 0.05	0.45	0.17	0.06	< 0.05	< 0.05		
06/24/88	0.07	0.29	6.2	1.4	0.82	0.25		
08/03/88	0.03	0.06	0.05	0.04	0.04	0.07		
12/15/88	0.22	0.22	0.11	0.19	0.12	0.12		
06/30/89	0.08	0.38	0.09	0.08	0.11	< 0.05		
09/25/89							* 0.06	0.05
12/20/89	< 0.05	0.18	0.11	< 0.05	0.09	0.05		
03/06/90	0.06	0.13	0.06	0.06	0.03	0.05		
06/26/90	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
01/15/91	0.04	0.13	0.05	< 0.03	< 0.03	0.05		
05/23/91	0.06	0.1	0.09	0.31	0.07	0.08		
07/23/91	0.05	0.08	0.04	0.04	0.06	0.04		
11/19/91	0.03	0.05	0.06	0.07	0.06	0.19		
07/27/92	< 0.02	0.05	0.16	0.06	0.07	0.25		
10/19/92	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02		
01/11/93	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02		
04/27/93	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02		
08/31/93	0.04	0.11	0.08	0.03	0.03	0.07		
10/25/93	< 0.02	0.028	< 0.02	0.051	< 0.02	0.02		
01/31/94	0.03	0.07	< 0.02	0.03	< 0.02	< 0.02		
04/26/94	0.032	0.048	0.081	0.044	0.042	0.048		

-CONCENTRATIONS IN MILLIGRAMS PER LITER
-NO VALUE INDICATES SAMPLE NOT COLLECTED
-< DENOTES LESS THAN
* MAXIMUM CONCENTRATION OF FOUR REPLICATE SAMPLES (OTHERS NON-DETECT)

ZINC2.XLS 4/3/95

Table 11. Deep Sand Water Quality

Sample ID	Ca	Cl	CO3	HCO3	K	Mg	Mn	Na	NO3	pH	SO4	TDS	Zn	Cu	Cr	Ni
Southwestern Laboratories																
MW-15	88.1	40.3	0.0	204	2.62	2.97	(<0.05)	26.4	0.48	7.05	14.2	510	---	---	---	---
(Upgradient)	83.8	40.8	0.0	204	2.54	2.95	(<0.05)	26.4	0.45	7.07	14.2	416	---	---	---	---
	74.6	39.8	0.0	212	2.56	3.01	(<0.05)	26.5	0.43	7.09	14.2	452	---	---	---	---
	83.0	39.8	0.0	201	2.29	2.98	(<0.05)	26.1	0.41	7.07	14.2	432	---	---	---	---
MW-11	106.0	62.9	0.0	205	4.07	3.20	0.11	42.2	0.46	7.07	13.1	500	---	---	---	---
(Sidegradient)	78.3	62.9	0.0	183	3.72	3.11	0.11	43.4	0.45	7.10	12.8	478	---	---	---	---
	71.5	62.9	0.0	194	3.92	3.13	0.10	42.8	0.43	7.00	12.7	378	---	---	---	---
	76.0	62.9	0.0	195	3.68	3.18	0.09	42.3	0.21	7.06	12.5	480	---	---	---	---
MW-14	77.9	49.8	0.0	205	2.98	2.90	(<0.05)	30.8	0.80	7.04	17.1	468	---	---	---	---
(Downgradient)	83.5	49.3	0.0	195	2.49	2.90	(<0.05)	28.7	0.58	7.08	13.9	514	---	---	---	---
	76.6	50.3	0.0	185	2.14	2.92	(<0.05)	27.8	0.63	7.01	13.0	558	---	---	---	---
	87.2	49.8	0.0	193	2.17	2.91	(<0.05)	27.7	0.53	7.07	13.3	508	---	---	---	---
Aqua-Tech Laboratories																
MW-15	65.8	33.0	0.0	370	7.1	1.9	(<0.05)	37.5	0.59	6.6	21.0	486	(<0.05)	(<0.05)	(<0.05)	(<0.05)
(Upgradient)	62.6	33.5	0.0	370	7.1	2.2	(<0.05)	28.5	0.62	6.9	24.0	426	0.05	(<0.05)	(<0.05)	(<0.05)
	67.8	34.5	0.0	380	6.0	2.2	(<0.05)	26.7	0.59	6.6	24.0	496	(<0.05)	(<0.05)	(<0.05)	(<0.05)
	69.0	33.5	0.0	450	5.3	2.6	(<0.05)	29.1	1.01	6.5	13.0	472	(<0.05)	(<0.05)	(<0.05)	(<0.05)
MW-11	77.8	52.5	0.0	13,450	5.0	2.0	0.18	51.0	0.29	7.0	20.0	29,074	(<0.05)	(<0.05)	(<0.05)	(<0.05)
(Sidegradient)	87.8	54.4	0.0	2,980	5.7	2.2	0.15	38.8	0.64	6.6	12.0	275	(<0.05)	(<0.05)	(<0.05)	(<0.05)
	89.0	56.8	0.0	890	4.7	2.1	0.16	41.6	0.33	6.6	13.0	3,214	(<0.05)	(<0.05)	(<0.05)	(<0.05)
	89.0	58.3	0.0	520	7.3	1.6	0.15	45.0	0.65	6.7	11.0	520	0.10	(<0.05)	(<0.05)	(<0.05)
MW-14	58.2	41.8	0.0	3,070	7.9	1.5	(<0.05)	38.4	2.08	6.8	42.0	587	(<0.05)	(<0.05)	(<0.05)	(<0.05)
(Downgradient)	71.4	51.0	0.0	640	7.0	1.8	(<0.05)	31.6	0.62	7.1	26.0	517	(<0.05)	(<0.05)	(<0.05)	(<0.05)
	78.6	51.0	0.0	910	6.9	2.0	(<0.05)	29.2	0.56	6.4	26.0	561	(<0.05)	(<0.05)	(<0.05)	0.06
	81.4	51.5	0.0	590	6.4	2.0	(<0.05)	32.0	1.99	6.5	22.0	255	(<0.05)	(<0.05)	(<0.05)	0.05

--- Not analyzed

Note: Results in milligrams per liter except pH.

10024

Table 12. Groundwater Analytical Methods, Containers, and Preservatives. Former Old Brazos Forge Facility.

Parameter	Analytical Method	Sample Container	Preservative	Holding Time
Chromium	200.7 [b] or 6010 [a]	1 liter/plastic or glass	Field Filter (0.45 micron), HNO3 to pH <2	180 days
Copper	200.7 [b] or 6010 [a]	1 liter/plastic or glass	Field Filter (0.45 micron), HNO3 to pH <2	180 days
Nickel	200.7 [b] or 6010 [a]	1 liter/plastic or glass	Field Filter (0.45 micron), HNO3 to pH <2	180 days
Zinc	200.7 [b] or 6010 [a]	1 liter/plastic or glass	Field Filter (0.45 micron), HNO3 to pH <2	180 days
Carbonate	2320B [c] or 310 [b]	1 liter/plastic or glass	Cool 4 degree Celsius	14 days
Bicarbonate	2320B [c] or 310 [b]	1 liter/plastic or glass	Cool 4 degree Celsius	14 days
Calcium	200.7 [b] or 6010 [a]	1 liter/plastic or glass	Field Filter (0.45 micron), HNO3 to pH <2	180 days
Chloride	300.0, 325.2 [b] or 9252 [a]	1 liter/plastic or glass	Cool 4 degree Celsius	28 days
Iron	200.7 [b] or 6010 [a]	1 liter/plastic or glass	Field Filter (0.45 micron), HNO3 to pH <2	180 days
Magnesium	200.7 [b] or 6010 [a]	1 liter/plastic or glass	Field Filter (0.45 micron), HNO3 to pH <2	180 days
Manganese	200.7 [b] or 6010 [a]	1 liter/plastic or glass	Field Filter (0.45 micron), HNO3 to pH <2	180 days
Sodium	200.7 [b] or 6010 [a]	1 liter/plastic or glass	Field Filter (0.45 micron), HNO3 to pH <2	180 days
Sulfate	300.0 [b] or 9038 [a]	1 liter/plastic or glass	Cool 4 degree Celsius	28 days
pH	150.1 [b] or 9040 [a]	1 liter/plastic or glass	Cool 4 degree Celsius	analyze immediately
TDS	160.1 [b]	1 liter/plastic or glass	Cool 4 degree Celsius	7 days

[a] "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods", USEPA, SW-846, 3rd Edition, November 1990.

[b] "Methods for Chemical Analysis of Water and Wastes", USEPA, EPA 600/4-79-020, Revised March 1983.

[c] "Standard Mehtods for the Examination of Water and Wastewater", APHA - AWWA - WPLF, 17th Edition, 1989 and 1991 Supplement.

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Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 11

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Report 295

Hydrology of the Jasper Aquifer in the Southeast Texas Coastal Plain

October 1986

Texas Water Development Board

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REPORT 295

HYDROLOGY OF THE JASPER AQUIFER IN THE SOUTHEAST TEXAS COASTAL PLAIN

By

E. T. Baker, Jr.
U.S. Geological Survey

This report was prepared by the U.S. Geological Survey under cooperative agreement with the Texas Water Development Board

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AUSTIN, TEXAS

October 1986

thick at the coastline in southeast Texas. This wedge of clastic sediment rapidly thins inland from the coastline to extinction along an irregular line from 70 to 100 miles inland from the coastline.

The Goliad Sand of Pliocene age; Willis Sand, Bentley Formation, Montgomery Formation, and Beaumont Clay of Pleistocene age; and alluvium of Holocene age comprise the post-Miocene sediments. All of these units are similar in lithology, and for this reason, delineation using electrical logs has not been attempted on the stratigraphic and hydrologic sections. Notwithstanding the difficulty in identifying these stratigraphic units individually in the subsurface, as a group they constitute significant aquifers in the southeast Texas Coastal Plain.

Hydrologic Units

The following discussion will emphasize five hydrologic units—the Catahoula confining system (restricted), which underlies the Jasper aquifer; the Jasper aquifer; and the Burkeville confining system and the Evangeline and Chicot aquifers, which overlie the Jasper. The hydrology of the units underlying and overlying the Jasper is important for understanding the water flow system in the Jasper and for modeling the aquifer.

Catahoula Confining System (Restricted)

The Catahoula confining system (restricted), which was named by Baker (1979) after the Catahoula Sandstone, is treated in this report as a quasi-hydrologic unit. In most of southeast Texas, this confining system has different boundaries than the stratigraphic Catahoula. Its top (base of the Jasper aquifer) is delineated along lithologic boundaries that are time-stratigraphic in some places, but transgress time lines in other places. Its base, which coincides with the base of the stratigraphic unit, is delineated everywhere in the report area along time-stratigaphic boundaries that are independent of lithology. No attempt was made to establish a lithologic (hydrologic) base for the unit, which would have created a distinct hydrologic unit. Such an effect would have involved a thorough hydrologic evaluation of pre-Miocene formations, which was beyond the scope of this study.

In some places, the Catahoula confining system (restricted) is identical to the stratigraphic unit, but there are notable exceptions. These departures of the hydrologic boundaries from the stratigraphic boundaries are most prominent in the eastern part of the study area near the Sabine River (Figure 7) and in numerous places at the outcrop and in the shallow subsurface (Figures 3-6). In these places, the very sandy parts of the Catahoula Sandstone (stratigraphic unit) that lie immediately below the Oakville Sandstone or Fleming Formation are included in the overlying Jasper aquifer. This leaves a lower section from 0 to 2,000 feet or more in thickness that consists predominantly of clay or tuff with some interbedded sand to compose the Catahoula confining system (restricted). In most places, this delineation creates a unit that generally is deficient in sand so as to preclude its classification in these areas as an aquifer. For this reason, in most of its shallow to moderately deep subsurface extent, the Catahoula confining system (restricted) functions hydrologically as a confining layer that greatly restricts interchange of water between the overlying Jasper aquifer and the underlying aquifers.

The quantity of clay and other fine-grained clastic material in the Catahoula confining system (restricted) generally increases downdip, until the Anahuac Formation is encountered at

depths of 2,800 to 3,600 feet below sea level. Below this level, the "Frio" Formation becomes characteristically sandy and contains moderately saline water to brine (3,000 to more than 35,000 mg/l of dissolved solids) that extends to depths of many thousands of feet.

Jasper Aquifer

The Jasper aquifer, which was named by Wesselman (1967) for the town of Jasper in Jasper County, Texas, until recently had not been delineated farther west than Washington, Austin, and Fort Bend Counties in southeast Texas. Recently, delineations of the Jasper, as well as other related hydrogeologic units, were made by Baker (1979) across the Coastal Plain of Texas from the Sabine River to the Rio Grande.

The configuration of the Jasper aquifer in the subsurface, as shown in the sections, is geometrically irregular because the delineation was made on the basis of the aquifer being a rock-stratigraphic unit. The hydrologic boundaries were defined from observable physical (lithologic) features rather than from inferred geologic time lines, which do not necessarily correspond to lithologic features.

The position of the base and top of the Jasper aquifer in southeast Texas transgresses stratigraphic boundaries along strike and downdip. The base of the aquifer coincides with the stratigraphic lower boundary of the Oakville Sandstone or Fleming Formation in some places. In other places, the base of the Jasper lies within the Catahoula Sandstone or coincides with the base of that unit. The top of the aquifer is within the Fleming in places and is within the Oakville in other places. The dip of the top of the Jasper is fairly uniform in rate within the zone of fresh to slightly saline water. Within this zone, which is about 50 to 75 miles in width, the dip averages about 55 ft/mi to the south-southeast (Figure 8).

The Jasper aquifer ranges in thickness, where it is not eroded, from as little as 200 feet to about 3,200 feet within the area of its delineation. The maximum thickness occurs in the region where the aquifer contains moderately saline water to brine. An average range in thickness of the aquifer within the zone of water having concentrations of less than 3,000 mg/l of dissolved solids is from about 1,000 to 1,500 feet. At the Sabine River, the Jasper attains a thickness of 2,400 feet in well 12 in section E-E' (Figure 7), where the aquifer is composed predominantly of sand. This predominance of sand in the Jasper in the eastern part of the study area, however, diminishes in a westward direction.

The Jasper aquifer contains water having concentrations of less than 3,000 mg/l of dissolved solids from its outcrop to about 50 to 75 miles downdip from its outcrop. This downdip limit approximately parallels the coastline passing a few miles north of Beaumont and near the center of Houston. Water having concentrations of less than 3,000 mg/l of dissolved solids occurs in the Jasper as deep as 3,000 feet below sea level in section D-D' (Figure 6). Although pumpage from the Jasper is not significant, it is capable of yielding 3,000 gal/min or more of water to wells in certain areas.

Burkeville Confining System

The Burkeville confining system was named by Wesselman (1967) for outcrops near the town of Burkeville in Newton County, Texas. It separates the Jasper and Evangeline aquifers and retards the interchange of water between the two aquifers.

The Burkeville confining system is a rock-stratigraphic unit predominantly consisting of silt and clay. Upper and lower boundaries of the unit do not strictly correspond to geologic time boundaries, although in some places the unit appears to possess approximately isochronous boundaries. The configuration of the top and bottom of the unit is irregular. Boundaries are not restricted to a single stratigraphic unit but are included within the Fleming Formation and Oakville Sandstone in some places. This is shown in section D-D' (Figure 6).

The thickness of the Burkeville confining system ranges from about 100 to 1,000 feet. In general, the greatest variations occur in the relatively deep subsurface within the zone of moderately saline water to brine. A typical thickness of the Burkeville is about 300 feet.

The Burkeville confining system is predominantly composed of fine-grained materials, such as silt and clay, as shown in numerous geophysical logs. In most places, these fine-grained sediments are interbedded with sand lenses, which contain fresh to slightly saline water. Some of these sand lenses yield water to small-capacity wells. Because of its relatively large percentage of silt and clay when compared to the underlying Jasper aquifer and overlying Evangeline aquifer, the Burkeville is a confining unit. The effectiveness of the unit as a confining layer is further borne out by the fact that hydro-static pressures in the Jasper and Evangeline are notably different immediately above and below the Burkeville where detailed testing by well drillers has been done.

Evangeline and Chicot Aquifers

The Evangeline and Chicot aquifers were named and defined by Jones (Jones, Turcan, and Skibitzke, 1954) for ground-water reservoirs in southwestern Louisiana. They also have been mapped in Texas, but until recently, had not been delineated farther west than Washington, Austin, and Fort Bend Counties in southeast Texas. Their positions in the Coastal Plain of Texas westward to the Rio Grande are now known from mapping by D. G. Jorgensen, W. R. Meyer, and W. H. Sandeen of the U.S. Geological Survey (Baker, 1979).

The Evangeline aquifer primarily has been delineated as a rock-stratigraphic unit. Although the aquifer is composed of at least Pliocene-age sediments, its lower boundary crosses time lines to include sections of sand in the Fleming Formation. Within most of the study area, the Evangeline at the surface includes about the upper one-third of the Fleming outcrop as seen in sections A-A', B-B', and C-C' (Figures 3-5). In the western part of the area where the Oakville Sandstone is recognized, the Evangeline includes more than three-fourths of the Fleming outcrop as seen in section D-D' (Figure 6). The upper boundary of the aquifer probably closely follows the top of the Pliocene-age sediments or the Goliad Sand, which is not exposed, except perhaps in a few isolated places, in the report area. This stratigraphic relationship of the top of the Evangeline is somewhat speculative.

The Chicot aquifer has been defined to exclusively include the Quaternary age sediments. Its delineation in the subsurface on this stratigraphic basis is problematical due to the difficulty in identifying the base of the Quaternary deposits on electrical logs. This subsurface delineation in southeast Texas has been based largely on the presence of a greater sand-to-clay ratio in the Chicot than in the underlying Evangeline aquifer. In some places, a prominent clay layer has been used as the boundary. Differences in hydraulic conductivity or water levels in some areas also

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Old Brazos Forge
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REFERENCE 12

MEETING MEMO TO THE FILE

Participants: Connie Wong Ray Newby	Representing: TNRCC OCE/Waste TNRCC PCD/SSDAT
Date of Meeting: 02/16/96	File No.: SWR# 30897 and 82313
Location: TNRCC Austin Bldg. F	Subject: Old Brazos Forge Site

Information for File: Meeting was conducted with Connie Wong, enforcement coordinator, to brief Ray Newby, SSI project manager, on the regulatory and technical background of the subject site. The following information summarizes the current status of the site:

The site is known to have on-site soil and ground water contamination from heavy metal constituents.

Off-site sediment and ground water contamination has been documented.

Off-site drinking water wells have been impacted in the apparent downgradient direction of the site. It is believed that the persons currently affected by the contaminated drinking water have obtained bottled water supplies or are supplied by a water supply company.

An off-site trailier home located adjacent to the site and to the west is believed to be supplied by well water. Details regarding the identity of the owner and completion information of the water well are currently unknown.

Heavy metals have been detected in on-site monitor wells. Monitor wells may need to be redeveloped prior to sampling as PRP consultant has reported turbid samples.

Site operated as a metal wire products facility since mid 1960s until late 1980s. Heavy metal contaminated water was discharged from west side of plant to three trenches which conveyed waste water to three unlined settling lagoons. Waste water was then discharged to stream.

Long history of inspections in files for both SWR #s.

Paula McCormick of TNRCC inspected site in 1986 and noted blue-discolored sediments in intermittent stream. Soil samples indicated chormium and nickel impacts.

Don Wyrick is TNRCC Region 9 contact for this site.

Signed: _____

TNRCC

Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 13

MEETING MEMO TO THE FILE

Participants: Connie Wong Ray Newby	Representing: TNRCC OCE/Waste TNRCC PCD/SSDAT
Date of Meeting: 03/12/96	File No.: SWR# 30897 and 82313
Location: TNRCC Austin Bldg. F	Subject: Old Brazos Forge Site

Information for File: Meeting was conducted with Connie Wong, enforcement coordinator, to answer additional questions regarding site from Ray Newby, SSI project manager, on the regulatory and technical background of the subject site. The following information summarizes the current status of the site:

Besides the registered industrial supply water well located west of the facility building, no information was found in well logs concerning two other on-site water wells indicated on a site map that was attached to an EPA correspondence.

One of the residential wells sampled previously, the Jerry Krueger residence, is apparently the well indicated on the plotted well log as owned by C. Geick.

Signed: _____

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Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 14

TELEPHONE MEMO TO THE FILE

Call to: Dave Terry TNRCC/WU	Call From: Ray Newby
Date of Call: 03/11/96	File No.: TXD048901235
Phone No.: 239-4755	Subject: Wellhead Protection Areas (WPAs)
Information for File: I inquired with Dave as to the presence of any known designated WPAs in the vincinity of Brenham (Washington County), Texas. Dave said that there were no WPAs in Washington County. The closest one was located near Clay (Burleson County), Texas.	

Signed: Ray Newby

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Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 15

TELEPHONE MEMO TO THE FILE

Call to: Larry Firestone City of Brenham	Call From: Ray Newby, TNRCC
Date of Call: 03/08/96	File No.: TXD048901235
Phone No.: 409-277-1266	Subject: City of Brenham Water Wells

Information for File: I called Larry to inquire as to the status of the City of Brenham's water wells. Larry stated that only one well, City of Brenham #12 was operational. The well is used as emergency backup for a population of approximatley 13,000 persons. Drinking water is currently obtained from Lake Somerville on the Brazos River. The residences outside the City of Brenham along Burleson Street are supplied by the well located at the Country Place Northwest subdivision. Jim Brown, a City of Brenham day supervisor maintains the Country Place NW well as a second job.

Signed: _____

TNRCC

Work Plan Report

Old Brazos Forge
TXD048901235

REFERENCE 16

An accurate one-word description of Texas is "diverse." No other state has the range of geography it has - from the Piney Woods of East Texas to the mountains of El Paso to the coastline of the Gulf of Mexico to the plains of the Panhandle.

Texans themselves and their interests are just as diverse, and the 56th edition of the Texas Almanac spotlights this fact. Included in this book are expanded demographics on each of the 254 counties. Plus, special emphasis is placed on the history of Central Texas - the state's melting pot of cultures.

In addition to regular features such as Texas politics and government, the environment, population and education, this edition also contains these special features:

- ★ The birds of Texas
- ★ A review of dinosaurs that roamed Texas
- ★ A brief history of Spain in celebration of the quincentennial
- ★ A look at mystery writers in Texas
- ★ Courageous Texans: 65 won the Congressional Medal of Honor
- ★ 1990: The year of women in Texas politics
- ★ Archaeology: Who were the first Texans?
- ★ A political scorecard for Texas counties

These are only a few of the topics for researchers and browsers alike amid the wealth of information that makes the 1992-93 Texas Almanac a true "Encyclopedia of Texas."

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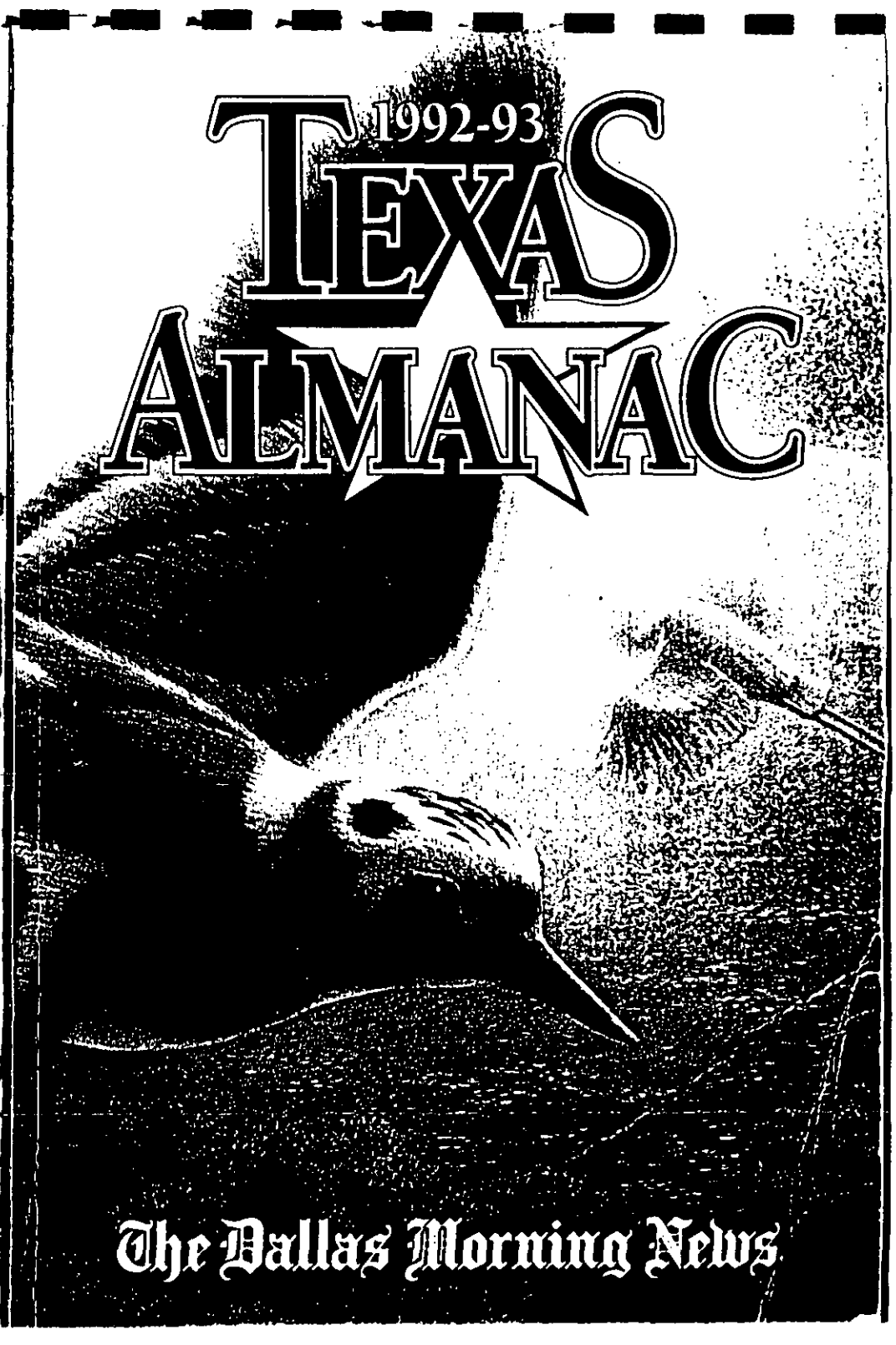

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1992-93 TEXAS ALMANAC

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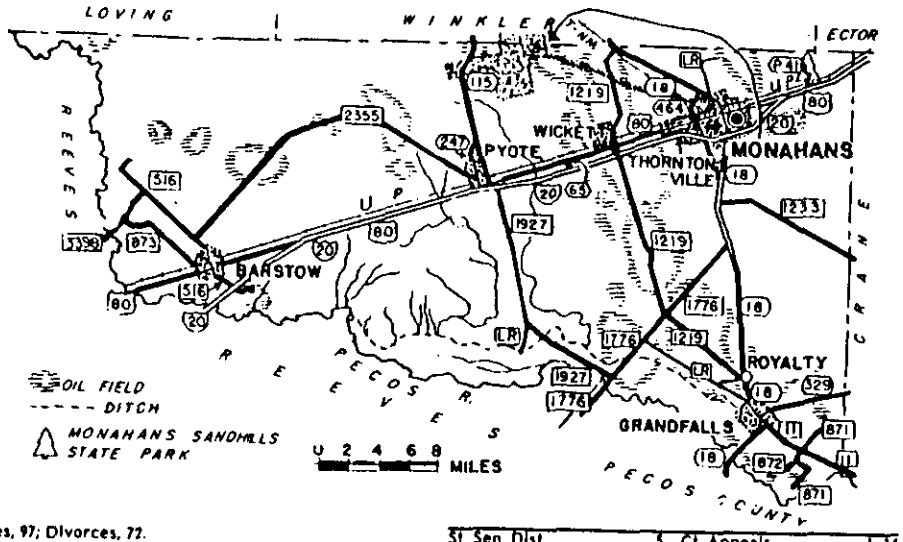


riages, 97; Divorces, 72.

Ethnicity, 1990: White, 9,905 (75.5%); Black, 457 (3.5%); American Indian, 75 (0.6%); Asian, 25 (0.2%); Hispanic, 4,830 (36.8%); Other, 2,653 (20.2%).

Recreation: Monahans Sandhills State Park, Museum; Pyote Rattlesnake Museum; Million Barrel Museum; county park; local events.

Minerals: Production of oil, gas, sand and gravel.

Agriculture: Income mostly from beef cattle; cotton, hay grown; some irrigation for cotton.

Business: Oil, gas, other minerals dominate economy.

MONAHANS (8,101) county seat; center for oil, agribusiness; gasoline plant; pecan shelling; county hospital, nursing home. Other towns, Barstow (535); Grandfalls (583); Pyote (348), West Texas Children's Home; Thorntonville (693); Wickett (560).

Washington County

LOCATION: Southeast (M-18).

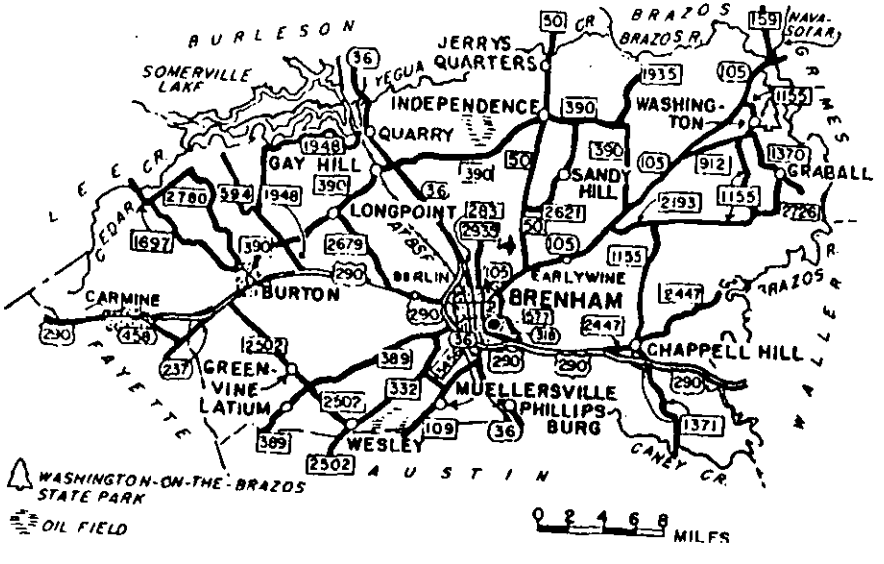
Cong. Dist.	10	U.S. Jud. Dist.	W-An.
St. Sen. Dist.	5	Ct. Appeals	1, 14
St. Rep. Dist.	13	Admin. Jud. Dist.	2
St. Dist. Cts.	21, 335		

History: Named for George Washington; an original county; created 1836; organized 1837.

Physical Features: Rolling prairie of sandy loam, alluvial soils; Brazos River and tributaries.

Population	26,154	Av. Weekly Wage	$334.46
Area (sq. mi.)	621.3	Density	43
Land Area	609.2	Water Area	12.1
Civilian Labor	12,909	Jobless Rate	3.0
Altitude (ft.)	460-343	Retail Sales	$173,770,059
Rainfall (in.)	39.7	Gross Sales	$602,662,360
Jan. min.	[illegible]	Reg. Voters	13,868
July max.	96	Election Turnout	60.9
Grow. Season (days)	277	Vehicles	24,529
Total Income (mil.)	$457	Lane Miles	624
Per Capita Income	$17,529	Tax Value	$1,409,218,145
Total Wages	$180,389,495	Fed. Spending	$70,324
Housing	11,664	Defense Spending	$2,623

Vital Statistics, 1989: Births, 361; Deaths, 290; Marriages, 197; Divorces, 102.



Washington Co. (Cont.)

Ethnicity, 1990: White, 19,782 (75.6%); Black, 5,463 (20.9%); American Indian, 46 (0.2%); Asian, 186 (0.7%); Hispanic, 1,158 (4.4%); Other, 677 (2.6%).

Recreation: Many historic sites; Washington-on-the-Brazos State Park; Texas Baptist Historical Museum; Star of Republic Museum; Somerville Lake; fishing, hunting; old homes; bluebonnet trails in spring, cotton-gin festival in April.

Minerals: Oil, natural gas and stone.

Agriculture: Most income from cattle, hogs, horses, dairy products, poultry; crops chiefly hay, cotton, horticultural plants.

Business: Agribusinesses, oil, tourism, manufacturing.

BRENHAM (11,952) county seat; cotton processing; varied manufacturing; Blinn College, Brenham State School. Other town, Burton (311), national landmark cotton gin, local activities.

Webb County

LOCATION: Southwest (R-13).

Cong. Dist.	23	U.S. Jud. Dist.	S-La.
St. Sen. Dist.	21	Ct. Appeals	4
St. Rep. Dist.	43	Admin. Jud. Dist.	4
St. Dist. Cts.	49, 111, 341		

History: Named for Republic of Texas leader James Webb; created, organized 1848 from Nueces and Bexar counties.

Physical Features: Rolling, some hills; much brush; sandy, gray soils; alluvial along Rio Grande.

Population	133,239	Av. Weekly Wage	$293.94
Area (sq. mi.)	3,375.6	Density	40
Land Area	3,356.9	Water Area	18.7
Civilian Labor	53,159	Jobless Rate	10.8
Altitude (ft.)	899-372	Retail Sales	$1,494,265,174
Rainfall (in.)	20.1	Gross Sales	$2,629,969,590
Jan. min.	45	Reg. Voters	47,221
July max.	99	Election Turnout	30.6
Grow. Season (days)	322	Vehicles	79,809
Total Income (mil.)	$1,066	Lane Miles	885
Per Capita Income	$8,043	Tax Value	$3,956,555,217
Total Wages	$662,179,952	Fed. Spending	$307,889
Housing	37,053	Defense Spending	$11,476

Vital Statistics, 1989: Births, 3,614; Deaths, 711; Marriages, 1,262; Divorces, 270.

Ethnicity, 1990: White, 93,657 (70.3%); Black, 156 (0.1%); American Indian, 201 (0.2%); Asian, 484 (0.4%); Hispanic, 125,069 (93.9%); Other, 38,741 (29.1%).

Recreation: Major tourist gateway to Mexico; hunting, fishing; Casa Blanca Lake, water recreation, golf; Border Olympics in March; Rio Grande art festival in April; Washington's Birthday celebration; historic sites; museum; Fort McIntosh.

Minerals: Production of natural gas, oil, stone, sand and gravel.

Agriculture: Among leading beef-cattle counties, stocker production growing; crops include vegetables, grain sorghums, cotton; about 4,500 acres irrigated.

Business: International trade, tourism, oil and gas operations, government center; manufacturing, agribusinesses; a major gateway for trade and tourism with Mexico.

LAREDO (122,899) county seat; founded in 1755 by Tomas Sanchez; varied manufacturing; meat packing; major rail, highway gateway to Mexico; Laredo Junior College, Laredo State University; mental health center; hospitals, nursing homes; many tourist facilities. Other town, El Cenizo (1,399).

Wharton County

LOCATION: Southeast (Q-18).

Cong. Dist.	14	U.S. Jud. Dist.	S-Hn.
St. Sen. Dist.	5	Ct. Appeals	13
St. Rep. Dist.	29	Admin. Jud. Dist.	2
St. Dist. Cts.	23, 329		

History: Named for John A. and William H. Wharton, brothers active in the Texas Revolution; county created, organized 1846 from Jackson, Matagorda counties.

Physical Features: Prairie; bisected by Colorado River; alluvial, black, sandy loam soils.

Population	39,955	Av. Weekly Wage	$321.98
Area (sq. mi.)	1,094.5	Density	37
Land Area	1,090.2	Water Area	4.3
Civilian Labor	21,969	Jobless Rate	4.3
Altitude (ft.)	148-71	Retail Sales	$260,119,694
Rainfall (in.)	41.3	Gross Sales	$551,757,013
Jan. min.	44	Reg. Voters	18,816
July max.	93	Election Turnout	46.4
Grow. Season (days)	266	Vehicles	36,009
Total Income (mil.)	$574	Lane Miles	919
Per Capita Income	$14,670	Tax Value	$2,116,357,161
Total Wages	$225,072,437	Fed. Spending	$115,491
Housing	16,262	Defense Spending	$2,721

Vital Statistics, 1989: Births, 666; Deaths, 393; Marriages, 308; Divorces, 165.

Ethnicity, 1990: White, 29,127 (72.9%); Black, 6,308 (15.8%); American Indian, 38 (0.1%); Asian, 131 (0.3%); Hispanic, 10,103 (25.3%); Other, 4,351 (10.9%).

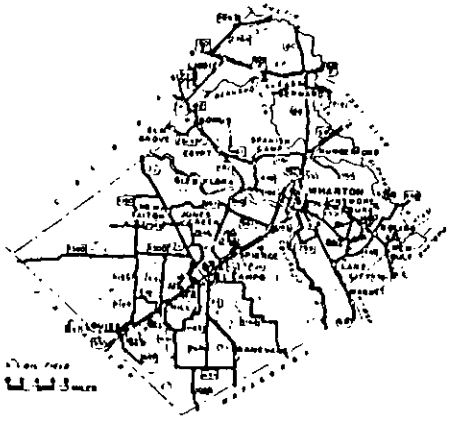
Recreation: Hunting, fishing; big-game trophy, art and historical museums; historic sites; festivals.

Minerals: Production of oil, gas, sulphur.

Agriculture: Most income from crops; leading rice-producing county; other crops are sorghums, cotton, corn; cow-calf operations, poultry important; about 115,000 acres irrigated, mostly rice and corn.

Business: Economy based on oil, sulphur, other minerals; agribusinesses, varied manufacturing.

WHARTON (9,011) county seat; mineral, produce processing; hospitals, clinics, nursing homes; Wharton County Junior College. Other towns, El Campo (10,511), aluminum processing, manufacturing, rice processing, storage; plastic, styrofoam processing; wholesale nursery; hospital, nursing home; local events; East Bernard (1,544), agribusiness, varied manufacturing, Boling-Iago (1,119).



Wheeler County

LOCATION: Eastern Panhandle (C-11).

Cong. Dist.	13	U.S. Jud. Dist.	N-Am.
St. Sen. Dist.	31	Ct. Appeals	7
St. Rep. Dist.	88	Admin. Jud. Dist.	9
St. Dist. Cts.	31		

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Work Plan Report

Old Brazos Forge
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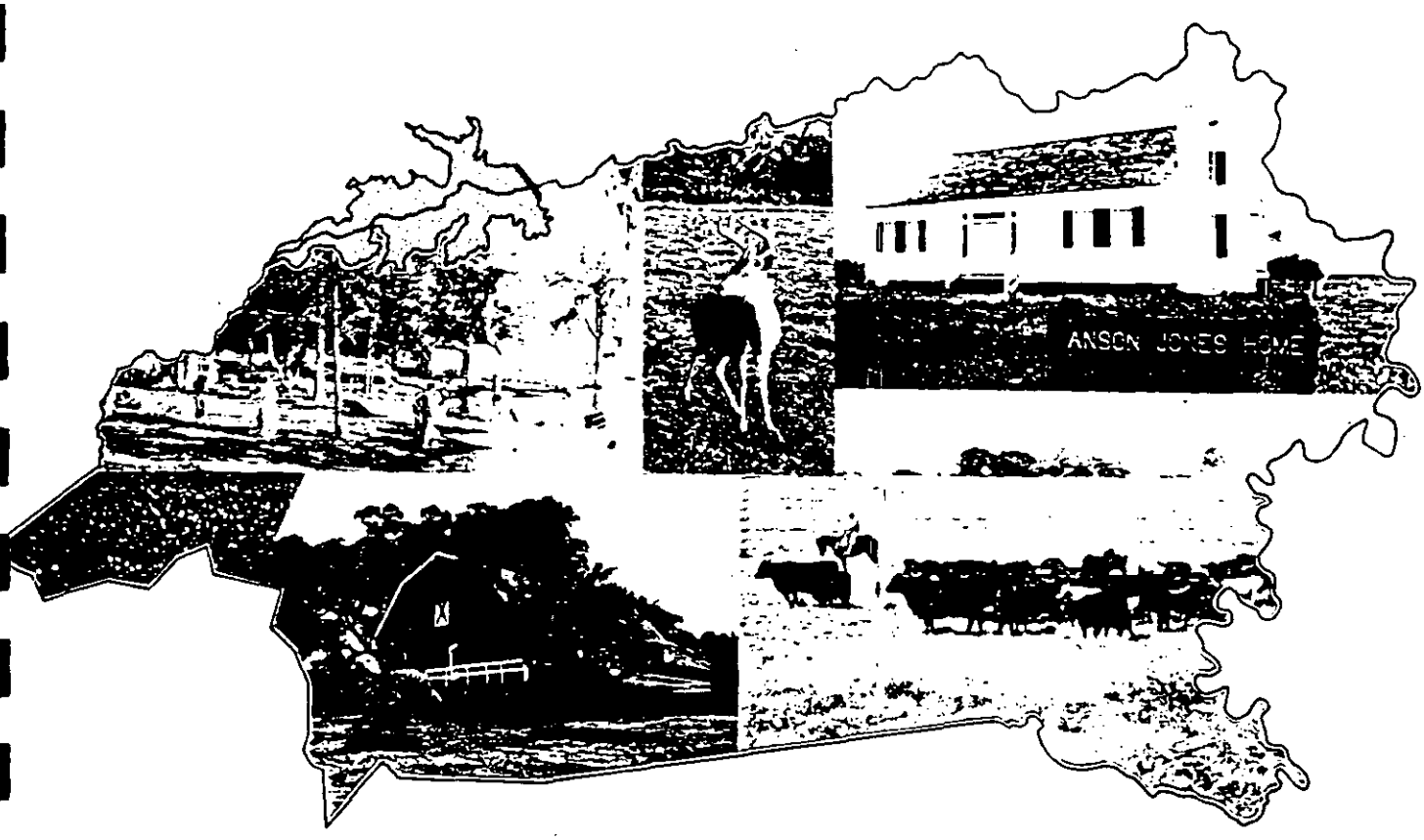

United States Department of Agriculture
Soil Conservation Service
In Cooperation with
Texas Agricultural Experiment Station

The total annual precipitation is 39.65 inches. Of this, 21 inches, or 50 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 15 inches. The heaviest 1-day rainfall during the period of record was 6.85 inches at Brenham on September 12, 1961. Thunderstorms occur on about 30 days each year, and most occur in summer.

Snowfall is rare. In 80 percent of the winters, there is no measurable snowfall. In 10 percent, the snowfall, usually of short duration, is more than 3 inches. The heaviest 1-day snowfall on record was more than 3 inches.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The sun shines 80 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the south-southeast. Average windspeed is highest, 15 miles per hour, in April.

Tornadoes and severe thunderstorms occur occasionally. These storms are local and of short duration. The pattern of damage is variable and spotty.

agriculture

The main agricultural enterprises in Washington County are beef and dairy cattle ranches. A small amount of row crops, such as corn, cotton, and grain sorghum, are grown.

During early settlement almost all of the county was cultivated. The rolling topography, slope, and soil erosion have reduced the yields of row crops. Recently, much of the land has been used for pasture, and cattle production has increased. Established pastures of improved bermudagrass, kleingrass, and bahiagrass have replaced areas of native grass and old, eroded fields.

Approximately 60 percent of the county belongs to absentee owners, most of whom reside in the city of Houston, about 70 miles away. Many people have retired to this area and others plan to do so. The small farms are for recreation and retirement. These people increase the value of their properties by improving buildings, constructing fences, building roads, planting grasses, and controlling erosion.

natural resources

Soil is the most important natural resource in Washington County. Oil, gas, lignite, rock, gravel, and water are also important. Numerous shallow oil wells are in the southwest part of the county. A limited amount of lignite is in the north part of the county. Rock and gravel are in the northern and the eastern parts of the county. Underground water for home use is easily available throughout the central part of the county. Lake Somerville is also a good source of high quality water.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, rangeland and woodland managers, engineers, planners, developers and builders, home buyers, and others.

This soil is in capability subclass VIe and the Claypan Savannah range site.

5—Belk clay, 0 to 1 percent slopes. This deep, nearly level soil is on bottom lands. Individual areas are elongated and are 50 to 125 acres. This soil is rarely flooded.

Typically, the surface layer is reddish brown clay about 25 inches thick. From 25 to 62 inches is dark brown silt loam. This soil is calcareous and moderately alkaline throughout.

This soil is well drained. Runoff is slow. Permeability is very slow. Natural fertility is high and organic matter content is medium. Available water capacity is high. The hazard of water erosion is slight.

Included in some mapped areas of this soil are small areas of Brazoria, Clemville, Norwood, and Trinity soils. Included soils make up less than 15 percent of a mapped area.

This soil is used dominantly for crops.

This soil has high potential for crop production, but it needs proper management, which includes additions of fertilizer. This soil is well suited to grain sorghum and cotton. It is also well suited to bahiagrass and kleingrass pasture.

This soil has low potential for most urban and recreational development. Flooding and very slow permeability are limitations for both.

This soil is in capability subclass IIIs and the Clayey Bottomland range site.

6—Bleiblerville clay, 1 to 3 percent slopes. This deep, gently sloping soil is on uplands. Individual areas are irregularly shaped and are 20 to 200 acres in size.

Typically, the surface layer is very dark gray clay about 33 inches thick. From 33 to 63 inches is dark gray clay. The underlying layer from 63 to 75 inches is pale yellow clay mottled with dark gray. This soil is calcareous and moderately alkaline throughout.

This soil is moderately well drained. Runoff is medium. Permeability is very slow. Natural fertility and organic matter content are high. Available water capacity is high. The hazard of water erosion is moderate.

Included in some mapped areas of this soil are small amounts of Frelsburg, Latium, and Brenham soils and of Bleiblerville clay, 0 to 1 percent slopes. Included soils make up less than 20 percent of a mapped area.

This soil is used dominantly as rangeland and improved pasture (fig. 6). Some areas are used for corn and grain sorghum, and some are used for native grass hay (fig. 7). Most areas of this soil have been cultivated at one time or another.

The soil has high potential for forage or crop production, but it needs proper management and additions of fertilizer. The main suited crops are cotton, corn, and grain sorghum.

This soil has low potential for most urban and recreational development. Shrink-swell properties and very slow permeability are limitations, and low strength is also a limitation for roads and streets.

This soil is in capability subclass IIe and the Blackland range site.

7—Bleiblerville clay, 3 to 5 percent slopes. This deep, gently sloping soil is on uplands. Individual areas are irregularly shaped and are 15 to 125 acres.

Typically, the surface layer is black clay about 15 inches thick. From 15 to 62 inches is dark gray clay. The underlying layer from 62 to 73 is mottled gray and olive clay. The soil is calcareous and moderately alkaline throughout.

This soil is moderately well drained. Runoff is medium. Permeability is very slow. Natural fertility and organic matter content are high. Available water capacity is high. The hazard of water erosion is severe.

Included in some mapped areas of this soil are small amounts of Frelsburg, Latium, and Brenham soils. Included soils make up less than 15 percent of a mapped area.

This soil is used dominantly for native or improved pasture.

The soil has medium potential for crops. The main crops are cotton, corn, and grain sorghum. This soil has high potential for pasture production, but it needs proper management, which includes additions of fertilizer.

This soil has low potential for most urban and recreational development. Shrink-swell properties, very slow permeability, and, for roads and streets, low strength are limitations.

The soil is in capability subclass IIIe and the Blackland range site.

8—Bosque clay loam, frequently flooded. This deep, nearly level soil is on bottom lands. Slopes are 0 to 1 percent. Individual areas are elongated and are 70 to 300 acres.

Typically, the surface layer is dark gray clay loam about 22 inches thick. From 22 to 40 inches is mottled grayish brown and pale brown loam. The underlying layer from 40 to 62 inches is dark gray clay loam. This soil is calcareous and moderately alkaline throughout.

This soil is well drained. Runoff is slow to medium. Permeability is moderate. Natural fertility and organic matter content are high. Available water capacity is high. This soil floods briefly 1 to 3 times each year. The hazard of water erosion is slight.

Included in some areas of this soil are small areas of Gowen and Nahatche soils. Included soils make up less than 20 percent of a mapped area.

Areas of this soil that have sparse to dense stands of pecan, elm, or hackberry trees are used dominantly for native or improved pasture. A few of the higher areas are cultivated.

This soil has high potential for forage production, but it needs good management and proper fertilization. It has low potential for crops because of the hazard of flooding.

Typically, the surface layer of the Burlewash soil is light brownish gray fine sandy loam about 8 inches thick. The subsoil from 8 to 23 inches is brown clay. The underlying layer from 23 to 40 inches is stratified clay and white sandstone. The soil is typically very strongly acid throughout.

The Burlewash soil is well drained. Runoff is medium. Permeability is very slow.

Typically, the surface layer of the Koether soil is light brownish gray stony loamy sand about 16 inches thick. The underlying material is strongly cemented sandstone. The soil is typically very strongly acid throughout.

The Koether soil is somewhat excessively drained. Runoff is rapid. Permeability is rapid; however, the sandstone is impervious except for the cracks and fissures.

Other soils in this association are small amounts of Falba, Shalba, and Rehburg soils.

These soils are used as rangeland and for wildlife habitat.

The soils are not suited to cultivation because of steep slopes, shallow depths, and stones. In most areas vegetation is post oak, blackjack oak, yaupon, and bluestem grass.

These soils have low potential for urban and recreational development because of slopes, stones, and very slow permeability. The esthetic value of these areas is high because of the scenic views created by the steep and broken landscape.

These soils are in capability subclass VIIs and Claypan Savannah range site.

18—Carbengle clay loam, 1 to 3 percent slopes. This moderately deep, gently sloping soil is on uplands. Individual areas are long and narrow and range from 15 to 60 acres.

Typically, the surface layer is very dark gray loam about 12 inches thick. The subsoil from 12 to 29 inches is pale brown silty clay loam that contains 50 percent carbonates. The underlying layer from 29 to 35 inches is white, slightly cemented sandstone. The soil is moderately alkaline and calcareous throughout.

The soil is well drained. Permeability is moderate. Available water capacity is low. Surface runoff is medium. Natural fertility is medium, and organic matter content is high. The hazard of erosion is moderate. The soil is easy to work because it has good drainage and permeability.

Included in some mapped areas of this soil are small amounts of Brenham and Renish soils. The Brenham soil is on the broader ridgetops. The Renish soil is on the upper slopes of hills. A soil which is similar to Carbengle soil but which is calcareous fine sandy loam and is on crests of hills are included. Included soils make up about 15 percent of mapped areas.

This soil is used mainly for pasture. Some mesquite, elm, ash, and hackberry trees are in these areas. Most areas have been cultivated in the past.

This soil has high potential for pasture. It is adapted to bermudagrass and kleingrass. It has medium potential for crops; however, terraces and grassed waterways are necessary to reduce erosion.

The soil has medium potential for most urban and recreational uses. The moderate depth to sandstone and high lime content are limitations.

This soil is in capability subclass IIe and the Clay Loam range site.

19—Carbengle clay loam, 3 to 5 percent slopes. This moderately deep, gently sloping soil is on uplands. Individual areas are long and narrow and range from 20 to 80 acres.

Typically, the surface layer is very dark gray clay loam about 12 inches thick. The subsoil from 12 to 34 inches is clay loam that is light gray in the upper part and white in the lower part and contains 50 percent carbonates. The underlying layer from 34 to 60 inches is a white, slightly cemented sandstone. The soil is moderately alkaline and calcareous throughout.

This soil is well drained. Runoff is medium. Permeability is moderate. Natural fertility and organic matter content are medium. Available water capacity is low. The hazard of water erosion is moderate.

Included in mapped areas of this soil are small amounts of Klump, Knolle, and Renish soils and a soil that is dark, calcareous fine sandy loam throughout. Also included are two soils that are similar to the Carbengle soil except one has a lighter colored surface layer and one has sandstone at a depth of 40 to 60 inches. Included soils make up about 15 percent of mapped areas.

This soil is used for pasture of improved bermudagrass or for rangeland. Most of these soils have been cultivated in the past.

This soil has high potential for forage production. It is well suited to improved bermudagrasses and kleingrass. It has medium potential for crops. Closely spaced crops, terracing, and grassed waterways are necessary to control erosion.

This soil has medium potential for urban and recreational use because of depth to rock and low strength, which affects roads and streets.

The soil is in capability subclass IIIe and the Clay Loam range site.

20—Carbengle clay loam, 5 to 8 percent slopes. This moderately deep, gently rolling soil is on uplands. Individual areas are long and narrow and range from 30 to 90 acres.

Typically, the surface layer is brown clay loam about 12 inches thick. The subsoil from 12 to 36 inches is yellowish brown clay loam that contains 50 percent carbonates. From 36 to 48 inches is white, slightly cemented sandstone. The soil is moderately alkaline and calcareous throughout.

This soil is well drained. Runoff is medium. Permeability is moderate. Natural fertility and organic