REDACTED VERSION

TNRCC

Protecting Texas by Reducing and Preventing Pollution

Screening Site Inspection Work Plan

Former Gary Air Force Base
San Marcos, Caldwell County, Texas
TXD PENDING

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI

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

June 2000

90096971

SCREENING SITE INSPECTION WORK PLAN

Former Gary Air Force Base Site

San Marcos, Texas

TXD Pending

SIGNATURE PAGE

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Screening Site Inspection Work Plan

Former Gary Air Force Base Site
San Marcos, Texas
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Prepared in cooperation with the

Texas Natural Resource Conservation Commission
and
U.S. Environmental Protection Agency

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June 2000

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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 a Screening Site Inspection (SSI) at the Former Gary Air Force Base site (a.k.a. Gary Job Corps and San Marcos Municipal Landfill) (EPA ID No. PENDING). The site is located along Texas Highway 21, approximately four miles east of San Marcos in Caldwell County, Texas. The site consists of 2,236.56 acres purchased by the U.S. War Department in 1942. The base was designated the San Marcos Army Air Field in 1943 and was used by the Army as a navigation school until 1955 when the mission of the base was changed to an advanced aviation school. In 1964 the former base was reported as excess to the General Services Administration (GSA). Current owners are the U.S. Department of Labor and the City of San Marcos, Texas (Ref. 4). The City of San Marcos operated a Type I trench type municipal landfill from 1969 until 1984 on 84 acres of the former base (Ref. 4). Department of Defense structures that remain at the site include airplane hangars, warehouses, facility support buildings, family housing, runways, taxiways, utilities, underground storage tanks and fuel lines, railroad spurs, streets, and a security fence. The Gary Job Corps and the San Marcos Municipal Airport utilize the remaining structures. New facilities have also been constructed on both the Gary Job Corps and airport portions of the property. A large portion of the property owned by the City of San Marcos is leased for farming use and crops are currently planted. The surrounding land use is primarily agricultural and rural residential.

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

WORK PLAN OVERVIEW

The purpose of the SSI is to document the release(s) or potential release(s) of hazardous substances from identifiable sources that may have migrated off-site. This work plan was developed using available information obtained through a review of TNRCC files. 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 by the Site Investigation Manager based on actual 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. Water well logs and information, Quality Assurance/Quality Control (QA/QC) Requirements document, and the Site Reconnaissance Checklist are presented as appendices A through C, respectively.

SITE OBJECTIVE WITH RESPECT TO THE PREREMEDIAL PROCESS

The preremedial stage of the Superfund process involves a Preliminary Assessment (PA) and a site inspection (SI) stage consisting of an SSI and, if necessary, a listing site inspection (LSI). This SSI 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 SSI will focus on assessing the threat along the groundwater and soil exposure pathways within the site.

This SSI 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. 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 PHONE

EPA:
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Texas Natural Resource Conservation Commission
Pollution Cleanup Division
Emergency Response and Assessment Section
P.O. Box 13087, Capitol Station, Austin, Texas 78711

SITE CONTACTS

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Airport Manager
City of San Marcos
512/393-8160

Ms. Beverly Richardson
Job Corps Dallas Regional Office
214/767-2567

SECTION 2
SITE BACKGROUND AND DESCRIPTION

SITE INFORMATION

The United States Government acquired 2,236.56 acres in March 1942 that was used by the U.S. Army as a navigation training facility. In May 1946 the facility began training helicopter pilots. In 1948 the base was renamed as the San Marcos Air Force Base; in 1953 it was redesignated as the Gary Air Force Base and in 1955 the name was changed to the Edward Gary Air Force Base. At this time, the mission of the base was changed to an advanced aviation school. The Army reaquired the base in 1956 and it was renamed Camp Gary and used for an aviation school. The former base was reported as excess to the General Services Administration on September 11, 1964 (Ref. 4). A portion of the site is owned by the U.S. Department of Labor and used for the Gary Job Corps facility. The remaining acreage is owned by the City of San Marcos and used for the municipal airport, leased for agr cultural use, and a small portion is used by Southwest Texas State University. The approximate geographic coordinates of the site are 29° 54" North Latitude and 97° 52" West Longitude (Ref. 5). See Figure 1 for the location of the former Gary AFB.

The City of San Marcos operated a Type I, trench-type sanitary landfill on a portion of the former Gary Air Force Base from 1969 through 1984. The landfill is located on 84 acres of land near the eastern boundary of the site. Two additional landfill locations within the former Gary AFB site were proposed by the City of San Marcos, but the permits for those locations were never approved. Gary Job Corps performed the trenching activities for the landfill as training exercises for their students. The Texas Department of Health (TDH) approved the landfill closure plans on December 13, 1985 (Ref. 16).

In October 1989, the Environmental Protection Agency (EPA) sampled all monitoring wells at the site and drinking water wells at private residences to the south of the site in the community of Reedsville. Organic analysis of samples from the monitoring wells found included 1,1-dichloroehtene, 1, 2-dichloroethene, vinyl chloride, carbon disulfide, pyrene, and delta-BHC. Inorganic analysis discovered arsenic, barium, beryllium, chromium, cobalt, lead, vanadium, and zinc above background levels. Organic analysis of samples from the residential drinking water wells found bromoform, phenol, and cis-1,2-dichloroethene. Inorganics found included barium, mercury, and cyanide slightly above background levels. The City of San Marcos installed additional monitoring wells in April 1990 at the request of the Texas Water Commission (TWC) and encountered construction debris including wood, metal wire, glass, and insulation materials, as well as benzene and

toluene during well installation activities. The wells were located outside of the official landfill boundaries (Ref. 4).

TNRCC Municipal Solid Waste files for permit 640 document analytical results from groundwater monitoring wells that exhibited tetrachloroethene, benzene, chlorobenzene, trichloroethene, 1,1,2,2-tetrachloroethene, chloroethane, 1,1-dichloroethane, chloroform, vinyl acetate, 2-hexanone, tetrahydrofuran, 1,4-dichlorobenzene, and 1,2-dichloroethene (cis) above detection levels. Information in the file indicated that no liners were on the sides or bottoms of the nine-foot deep trenches. Subsidence channels of two to four feet deep were noted on the south/southeast midsection of the landfill. It was also noted that a portion of the landfill had been plowed and corn was being grown. Analytical data or other data was requested to document that moisture is not percolating into the landfill in the plowed area (Ref. 11).

The Gary Job Corps Center is located on 817 acres of land within the boundaries of the former Gary Air Force Base. The site is currently a residential vocational training facility for economically disadvantaged youth. Electrical power transformers were inherited from the former military occupants and were originally stored in a fenced storage yard. The transformers were later moved to a warehouse with a curbed floor. The Gary Job Corps facility Solid Waste Registration No. 73125 file shows transformers containing PCBs were disposed of at an off-site facility in 1992. The file also documents disposal of cyanogens chloride, mercury from dental clinic activities, waste paint residuals, waste from printing trade operations, solvents from automotive and mechanical trades, building construction materials, waste oil, and waste fluorescent and mercury – containing lighting. Three Leaking Petroleum Storage Tank (LPST) sites are associated with the Gary Job Corps Site: 108133, 96595, and 109958. LPST No. 108133 remains an active site and has phase separated hydrocarbons present in one of the two monitoring wells on the site (Ref. 17).

WASTE CONTAINMENT/HAZARDOUS SUBSTANCE IDENTIFICATION

Characteristics

The information used to identify the waste characteristics at the former Gary AFB site was obtained from a review of state and federal records and analysis of aerial photographs. The site was identified to have potential waste source areas, where hazardous substances may have been deposited, stored, disposed, or placed. A record review identified volatile organic compounds, semivolatile organic compounds, PCBs and tetraethyl lead as potential hazardous substances at the site. Residential wells sampled in 1989 contained varying concentrations of cis-1,2-dichloroethene, 1,1-dichloroethane, trichloroethene, and 1,4-dichlorobenzene (Ref. 4).

Potential waste source areas are located on both the Gary Job Corps property and the portion of the site controlled by San Marcos Municipal Airport. The areas of concern

include the former municipal landfill, possible former military landfills, and soil potentially contaminated by PCBs. Three Leaking Petroleum Storage Tank (LPST) numbers are associated with the Gary Job Corps Site: 108133, 96595, and 109958. Only LPST No. 108133 remains an active site with phase-separated hydrocarbons documented in the monitoring wells.

Approximately 1,825,320 cubic yards of solid waste were deposited at the San Marcos Municipal landfill. The landfill operated from 1969 to 1984 and covered 84 acres (Ref. 16). The site had been operated as a landfill since
World War II (Ref. 4). Possible PCB contamination may have resulted from the storage of electric transformers in the utility yard next to building 11-215. In 1987, a transformer pole broke near building 7-102 and oil spilled onto the ground. Surface soil was removed following the incident (Ref. 16).

A February 8, 1991, conversation with a former Gary Job Corps employee documented in the files state that military airplanes were washed in concrete bays with the water going through storm drains to a drainage ditch near the east end of the airport concrete apron (Ref. 14). It was also stated that the military performed "burn and cover" disposal of tetraethyl lead at the site. The locations of such activities cannot be located (Ref. 15).

In a TWC 1988 inspection, it was noted that three maintenance shops generate waste oils and solvents: heavy equipment maintenance, motor pool, and mechanics training shop. The quantities were less than 1,000 kg per month. At that time, ten electric transformers containing PCBs were on-site awaiting disposal (Ref. 16).

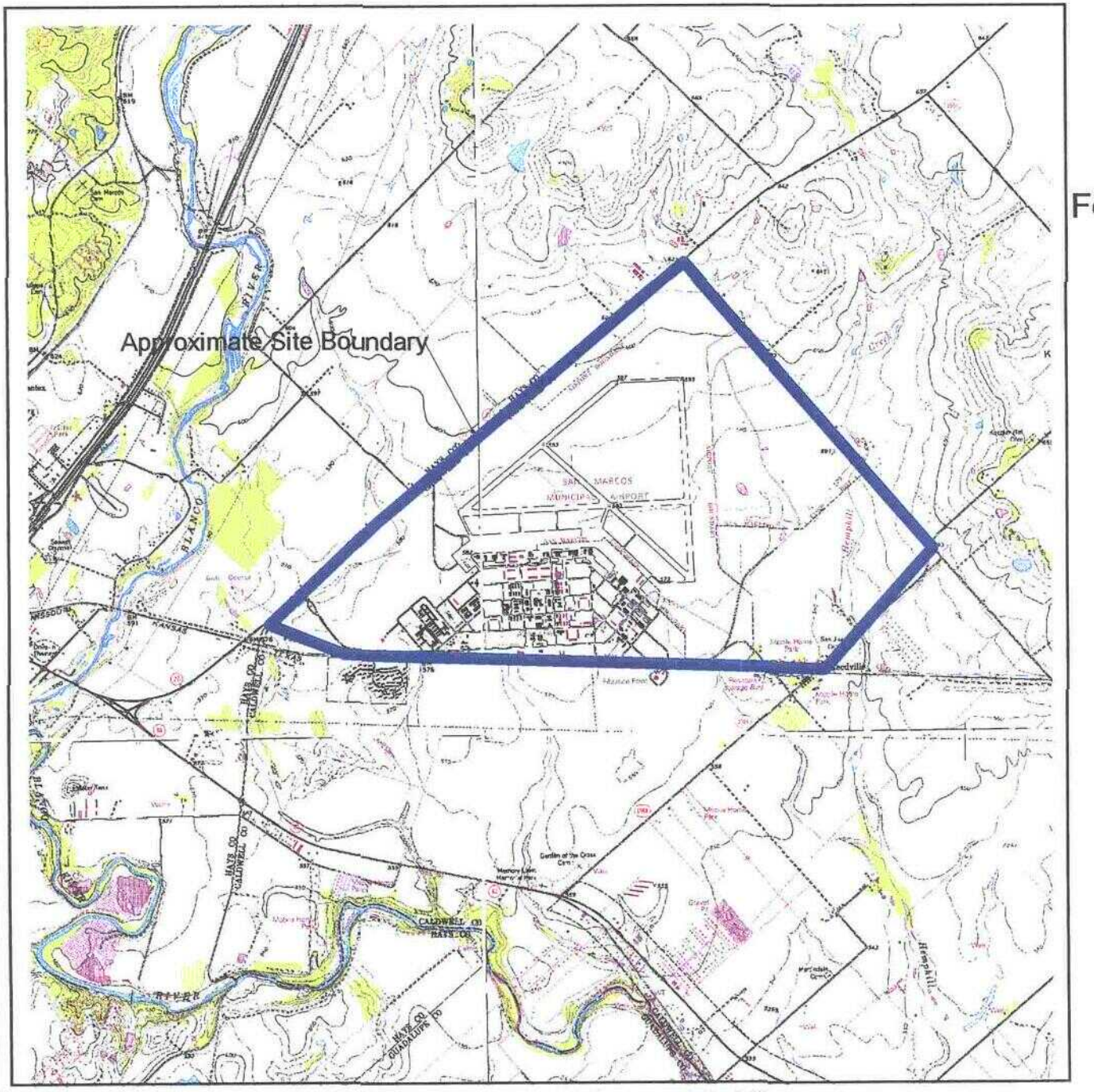
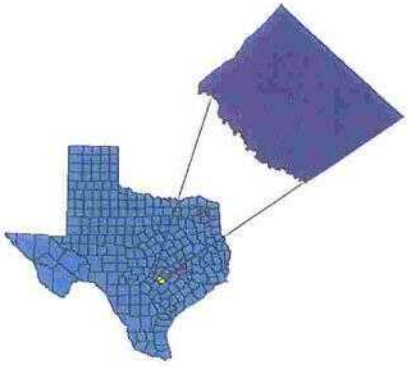


Figure 1

Site Location Map

Former Gary Air Force Base
San Marcos
Caldwell Couinty, Texas



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Required Information (Data Gaps)

- Field verify the location, areal extent stained soil, stressed vegetation, impoundments and waste pile areas. 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 and ground water samples to determine the naturally occurring levels of hazardous substances from unaffected areas adjacent to the site.

GROUNDWATER PATHWAY AND TARGETS

Characteristics

The principal water-bearing formations underlying the site vicinity, from oldest to youngest, are the Wilcox Group, Carrizo Sand, Reklaw Formation, Queen City Sand, Leona Formation, and Recent alluvium. The Carrizo Sand and Wilcox Group together form the most productive water-bearing zone. The water supply wells in the immediate vicinity of the site are installed in the Recent alluvium, which has a maximum thickness of approximately 45 feet and is characterized by gravel, clay, silt, and sand. The estimated potential yields from wells tapping the Recent alluvium ranges from 0 to 300 gpm (Ref. 6).

No extensive groundwater investigation has been conducted at the site, therefore no definitive information may be given as to the occurrence or depth to these aquifers.

In past investigations, groundwater occurred at a depth of approximately 22 to 27 feet below ground surface (bgs) (Ref. 4). Ten monitoring wells were installed at the site during investigations conducted under the purview of the TNRCC Municipal Solid Waste Division. The ten wells were plugged and abandoned in November 1996 (Ref. 13). Two monitoring wells were installed at the LPST site 108133 in May 1996 (Ref. 17). Surface drainage appears to be toward the south-southeast into the San Marcos River.

Figure 2: Geologic Units in Caldwell County

System	Series	Geologic unit	Maximum thickness (feet)	Character of rocks	Water-bearing properties
Quaternary	Recent	Alluvium	45±	Gravel, clay, silt, and sand.	Yields small to moderate quantities of fresh to slightly saline water to numerous wells for domestic and stock use, and some irrigation.
	Pleistocene	Leona Formation	40±	Gravel, sand, marl, silt, clay, caliche, and conglomerate.	Yields small to large quantities of fresh water to numerous wells for domestic and stock use, public supply, and some irrigation.
Tertiary(?)	Pliocene(?)	Uvalde Gravel	5	Predominantly flint gravel and cobbles and some limestone boulders.	Not known to yield water to wells in Caldwell County.
Tertiary	Eocene	Weches Greensand	100	Iron-bearing glauconitic clay and sand.	Do.
		Queen City Sand	500	Massive to thin-bedded fine to medium sand and clay with some lenses of conglomerate containing iron.	Yields small quantities of fresh to slightly *saline water to a few wells for domestic and* stock use. Capable of yielding moderate *quantities of water to properly constructed* wells.
		Reklaw Formation	400	Glauconitic sand and silt in the lower part of formation and clay and some thin beds of sandstone in the upper part.	Do.
		Carrizo Sand	400	Fine to coarse, loose, cross-bedded sand; some thin beds of sandstone and clay.	Yields small to moderate quantities of fresh to slightly saline water to wells for domestic and stock use, and some irrigation. Capable of yielding large quantities of water to properly constructed wells.
		Wilcox Group	2,000	Fine to medium sand, clay, sandy clay, sandstone, and silty shale with some lenses of limestone.	Yields small to large quantities of fresh to moderately saline water to a large number of wells for domestic and stock use, public supply, and some irrigation.
	Paleocene	Midway Group	600	Clay, silt, glauconitic sand, and thin beds of limestone and sandstone.	Not known to yield water to wells in Caldwell County.
Cretaceous	Gulf	Navarro Group	600	Predominantly clay and silt and some lenses of bluish sandstone.	Mostly non-water-bearing. Yields small quantities of highly mineralized water to wells in a few places.
		Taylor Marl, Austin Chalk, and Eagle Ford Shale, undifferentiated	1,200	Clay, shale, marl, and limestone.	Not known to yield fresh or slightly saline water to wells in Caldwell County.
	Comanche	Washita Group	200	Limestone and clay.	Do.
		Fredericksburg Group	500	do	Do.

Targets

The City of San Marcos operates and maintains 8 wells to supply public drinking water No documentation is available to indicate that public drinking water wells in the vicinity of the site have been contaminated by hazardous substances from the site. Wells for the City of San Marcos range in depth from 115 to 315 feet (Ref. 8).

A wellhead protection area exists within a 4-mile radius of the site (Ref. 7).

Based upon a review of state records, the following public supply wells were defined (Ref. 8):

- There are no water supply wells onsite
- Between 0.25 - 0.50 miles of the outer boundaries of the Gary AFB site, there are 6 water wells.
- Between 0.50 - 1 mile of the outer boundaries of the Gary AFB site there are 3 water wells.
- Between 1 - 2 miles of the outer boundaries of the Gary AFB site there are 9 water wells.
- Between 2 and 3 miles of the outer boundaries of the Gary AFB site, there are 26 water wells.
- Between 3 and 4 miles of the outer boundaries of the Gary AFB site there are 16 water wells.

Required Information (Data Gaps)

- 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.
- Sample data from drinking water wells which may be present within 1-mile radius of the site to determine whether contaminants from the site have migrated to the shallow drinking water aquifer(s).

  Obtain background well water samples from nearby upgradient drinking water wells unaffected by site conditions to determine the naturally occurring levels of contaminants.

SURFACE WATER PATHWAY AND TARGETS

Characteristics

The Former Gary AFB site is located within the Guadalupe River Basin and will drain to Segment 1808 (Ref. 9). Average annual rainfall in the vicinity of the site is 32.65 inches (Ref. 10).

SOIL EXPOSURE PATHWAY AND TARGETS

Characteristics

Land use onsite is municipal, light industrial, educational and residential. Surrounding land use is mixed agricultural and residential. The former Gary AFB site occupies approximately 2, 200 acres with residential dwellings located on the Gary Job Corps portion of the site. The Gary Job Corps property is almost totally enclosed by security fencing. Residences are also located in the community of Reedville that borders the site on the southeast boundary.

The soil present at the site is the Branyon clay of the Branyon Series. The Branyon series consists of deep, nearly level to gently sloping soils on old terraces. These soils formed in calcareous clayey alluvium. In a representative profile the surface layer is dark-gray calcareous clay about 44 inches thick. Below this is gray calcareous clay about 28 inches thick that has many slickensides. The next layer is light-gray clay that extends to a depth of 96 inches (Ref. 10).

Branyon soils are moderately well drained. These soils take in water rapidly when they are dry and very slowly when they are wet. Available water capacity is high. Runoff is slow and the hazard of erosion is slight. These soils are used mostly for crops, with a few areas used as improved pasture (Ref. 10).

The Lewisville series consists of deep, nearly level to gently sloping soils on old terraces. These soils formed in calcareous clayey and loamy alluvium. The surface layer is very dark grayish-brown calcareous silty clay about 12 inches thick underlain by a dark yellowish brown calcareous silty clay loam about 18 inches thick. Below this is very pale brown calcareous clay loam that has soft masses and concretions of calcium carbonate. The soils are well drained with moderate permeability. The Lewisville soils are mostly used for crops and improved pasture (Ref. 10).

Targets

Analysis of 1990 census block group data indicates the following population figures surrounding the Gary AFB site:

0 – 1/4 mile	=	61 persons
1/4 – 1/2 mile	=	184 persons
1/2 - 1 mile	=	735 persons
1 - 2 miles	=	777 persons
2 - 3 miles	=	2,197 persons
3 - 4 miles	=	12,329 persons

A site visit was conducted on April 6, 2000 and the following information was gathered:

According to Mr. Jack Doughty, manager of the San Marcos Municipal Airport, the approximate resident population of Gary Job Corps facility is approximately 3,000. The facility houses students in dormitory facilities. Recreational facilites are also located on the site. A security fence separates the Gary Job Corps facility from the airport.

The former San Marcos Municipal Landfill area is included in the portion of the airport property that is being cultivated and crops are currently planted. According to Mr. Doughty, the land is also used for grazing cattle.

At the time of preparation of this workplan, it is unknown if any endangered or threatened species reside on the former Gary AFB site or could potentially be impacted within a 4 mile radius.

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.
- Collect sample data to substantiate the presence of hazardous substances in surface soils.
- 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.
- Obtain background soil samples to determine the naturally occurring levels of contaminants in off-site surface soils adjacent to the site.

AIR PATHWAY AND TARGETS

Characteristics

No air samples are planned to assess releases to the air pathway. The air pathway will not be evaluated during this SSI.

No analytical data was available to document offsite migration of airborne transported hazardous substances from existing onsite sources.

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 sludge sampling as discussed below.

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

PERSONNEL REQUIREMENTS AND RESPONSIBILITIES

The TNRCC Central Office Technical Director for this screening site inspection (SSI) is Wesley Newberry and the TNRCC Program Manager is Allan Seils. The TNRCC Site Investigation Manager is Susy Loftus. 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.

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 SSI. 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 Gary AFB 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 City of San Marcos and Gary Job Corps 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 SSI 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 to the TNRCC for information before or after the planned site inspection 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.

Day 1 (Monday)	
Time	Activity
900	Meet at site. Conduct orientation for contractor as required. Verify site specific data. Review and sign Health & Safety Plan. Prepare field logbook. Begin onsite and offsite reconnaissance. Mark onsite and offsite soil sample locations. Review and modify sampling plan as necessary. Begin installation of borings.
1200	Lunch
1300	Return to site. Continue installation of borings and collection of soil and groundwater samples. . Wrap and pack samples for shipment. Complete CLP lab documentation.
1800	Contractor will deliver samples for overnight shipment to CLP lab. End of day.
Day 2 (Tuesday)	
Time	Activity
0730	Meet at site. Conduct site safety briefing. Review tasks to be completed this day.
0800	Begin installation of borings. Collect soil and groundwater samples from borings.
1200	Lunch
1300	Return to site. Begin surface soil sampling.
1700	Complete soil sampling. Wrap and pack samples for shipment. Complete CLP lab documentation.
1900	Contractor will deliver samples for overnight shipment to CLP lab. End of day.
Day 3 (Wednesday)	
Time	Activity
0730	Meet at site. Conduct daily site safety briefing. Review tasks to be completed on this day.
0800	Begin collection surface soil samples.
1200	Lunch

1300	Return to site. Begin collection of groundwater samples from drinking water wells.
1730	Complete ground water sampling. Wrap and pack samples for shipment. Complete CLP lab documentation.
1830	Contractor will deliver samples for overnight shipment to CLP lab. End of day.
Day 3 (Thursday)	
Time	Activity
0730	Meet at site. Conduct daily site safety briefing. Review tasks to be completed on this day.
0800	Begin collection of groundwater samples form domestic drinking water wells.
1200	Lunch
1300	Resume collection of groundwater samples from domestic drinking water wells.
1700	Complete sampling. Wrap and pack samples for shipment. Complete CLP documentation.
1800	Contractor will deliver samples for overnight shipment to CLP lab. End of day.

WORK PLAN ACTIVITIES

Task 1: Nonsampling and Sampling Activities and Rationale

The field team will first meet with property owner representatives. 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 SSI 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 Gary AFB 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 soil and ground water 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 workplan will be annotated by the Site Investigation Manager to reflect actual sample locations.

Table 2 Proposed Samples to be Collected at Gary Air Force Base			
Sample Number	**Matrix**	**Location**	**Rationale**
SO-01	Soil	*Boring location near northern property boundary.*	Establish background *contaminant levels of surface* soil
SO-02	Soil	Possible former disposal area in northeastern portion of site. Depth of sample to be determined during boring installation by field screening of 3-6 feet bgs interval and 9-12 feet bgs interval.	Source characterization sample
SO-03	Soil	Closed San Marcos Municipal Landfill. Depth of sample to be determined during boring installation by field screening of 3-6 feet bgs interval and 9-12 feet bgs interval.	Source characterization sample
SO-04	Soil	Possible former disposal area in eastern portion of site. Depth of sample to be determined during boring installation by field screening of 3-6 feet bgs interval *and 9-12 feet bgs interval.*	Source characterization sample
SO-05	Soil	Possible former disposal area south of closed municipal landfill. Depth of sample to be determined during boring installation by field screening of 3-6 feet bgs interval and 9-12 feet bgs interval.	Source characterization sample
SO-06	Soil	Possible former disposal area south of closed municipal landfill. Depth of sample to be determined during boring installation by field screening of 3-6 feet bgs interval and 9-12 feet bgs interval.	Source characterization sample
SO-07	Soil	Duplicate of SO-6	QA/QC
SO-08	Soil	Possible former disposal area near western boundary of site. Depth of sample to be determined during boring installation by field screening of 3-6 feet bgs interval and 9-12 feet bgs interval.	Source characterization sample
SO-09	Soil	Surface soil sample from Gary Job Corps facility at drainage ditch south of equipment maintenance area	Assess and characterize hazardous substances released at the site
SO-10	Soil	Surface soil sample from drainage ditch south of former landfill	Assess and characterize hazardous substances released at the site
SO-11	Soil	Surface soil sample from Gary Job Corps facility in former transformer storage yard	Assess and characterize hazardous substances released at the site
SO-12	Soil	Surface soil sample from location of transformer oil spill	Assess and characterize hazardous substances released at the site
SO-13	Soil	Surface soil sample near drainage culvert on western portion of property. Possible former disposal area.	Assess and characterize hazardous substances released at the site

Sample Number	Matrix	Location	Rationale
SO-14	Soil	Surface soil sample from possible fuel dump	Assess and characterize hazardous substances release at the site
SO-15	Soil	Background surface soil sample	Establish background levels of surface soil
SO-16	Soil	Background soil sample from 3-6 feet bgs	Establish background levels of soil from 3-6 feet bgs
SO-17	Soil	Background soil sample from 9–12 feet bgs	Establish background levels of soil from 9-12 feet bgs
SO-18	Soil	Background soil sample from 3-6 feet bgs	Establish background levels of soil from 3-6 feet bgs
SO-19	Soil	Background soil sample from 9-12 feet bgs	Establish background levels of soil from 9-12feet bgs
SO-20	Soil	Duplicate of SO-11	QA/QC
S0-21	Soil	Duplicate of SO-14	QA/QC
GW-1	Ground water	Boring location near northern boundary of property	Determine background levels of groundwater
GW-2	Ground water	Boring location in possible former disposal area	Assess and characterize ground water contamination
GW-3	Ground water	Boring location in closed municipal landfill	Assess and characterize ground water contamination
GW-4	Ground water	Boring location in possible former disposal area	Assess and characterize ground water contamination
GW-5	Ground water	Boring location in possible former disposal area	Assess and characterize ground water contamination
GW-6	Ground water	Boring location in possible former disposal area	Assess and characterize ground water contamination
GW-7	Ground water	Duplicate of GW-6	QA/QC
GW-8	Ground water	Boring location in possible former disposal area	Assess and characterize ground water contamination
GW-9	Ground water	Drinking water well located at residence	Determine if drinking water well has been impacted by release of contaminants
GW-10	Ground water	Drinking water well located at residence	Determine if drinking water well has been impacted by release of contaminants
GW-11	Ground water	Drinking water well located at residence	Determine if drinking water well has been impacted by release of contaminants
GW-12	Ground water	Drinking water well located at residence	Determine if drinking water well has been impacted by release of contaminants
GW-13	Ground water	Drinking water well located at residence	Determine if drinking water well has been impacted by release of contaminants

Sample Number	Matrix	Location	Rationale
GW-14	Ground water	Drinking water well located at residence	Determine if drinking water well has been impacted by release of contaminants
GW-15	Ground water	Drinking water well located at residence	Determine if drinking water well has been impacted by release of contaminants
GW-16	Ground water	Drinking water well located at residence	Background groundwater conditions
GW-17	Ground water	Boring from location near possible former fuel dump	Assess and characterize groundwater contamination
GW-18	Ground water	Duplicate of GW-09	QA/QC
GW-19	Ground water	Boring location near the northern boundary of property	Determine background levels of groundwater
FB-1	Ground water	Field blank collected at same location as GW-08	QA/QC
FB-2	Ground water	Field blank collected at same location as GW-01	QA/QC
ER-1	Water	Equipment rinsate for day one sampling, direct push equipment	QA/QC
ER-1	Water	Equipment rinsate for day two sampling, direct push equipment	QA/QC
ER-1	Water	Equipment rinsate for day three sampling, soil sampling equipment	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 widemouth glass jars with Teflon-lined septa	Cool to 4^0C	14 days
Semivolatile organics	Two 4-ounce widemouth glass jars with Teflon-lined lids	Cool to 4^0C	Extract within 14 days of collection and analyze within 40 days of extraction.
Pesticides/ PCBs	Two 4-ounce widemouth glass jars with Teflon-lined lids	Cool to 4^0C	Extract within 14 days of collection and analyze within 40 days of extraction.
Metals/Cyanide	Two 4-ounce widemouth glass jars with Teflon-lined lids	Cool to 4^0C	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 widemouth* glass vials with Teflon-lined septa	*Cool to* 4^0C	*7 days*
Semivolatile organics	Two 1-liter amber glass bottles with Teflon-lined lids	Cool to 4^0C	Extract within 7 days of collection and analyze within 40 days of extraction.
Pesticides/PCBs	Two 1-liter amber glass bottles with Teflon-lined lids	Cool to 4^0C	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 volatile, semivolatile, metal, cyanide, pesticide and PCB wastes generated, managed or disposed of by the U.S. Army or U.S. Air Force during the operation of the site or other tenants after the airbase was shut down and the property deeded to the City of San Marcos or U.S. Department of Labor. To obtain legally defensible characterization data, a laboratory 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:

- Verify site features, source areas and volumes through direct field observation.
- Approximate volume and type of waste material still present in the on-site waste management units by inspection or through interviews with former site personnel.

Based on existing site characterization data, the primary contaminants of concern include volatile, semivolatile, metal, cyanide, pesticide and PCB wastes generated, managed or disposed of by the U.S. Army or U.S. Air Force during operation of the site or other tenants after the airbase was shut down and the property deeded to the City of San Marcos. A total of twenty-one (21) soil samples will be collected to substantiate the release of contaminants. Two soil samples will be collected to characterize background conditions at

the surface, two from a depth of approximately 3-6 feet below ground surface (bgs) and two from a depth of approximately 9-12 feet bgs. Laboratory analysis results will be used to identify and characterize naturally occurring levels of inorganics (metals), and organics (volatiles and semi-volatiles) for attribution of detected contaminants. These samples will be designated as the background soil samples and numbered SO-1, SO-15, SO-16, SO-17, SO-18, and SO-19.

Soil samples will be collected in the subsurface during drilling activities and from the surface near drainage pathways and known waste management units or source areas other than landfills. The samples will be designated as SO-2 through SO-8 and SO-14. A duplicate of SO-6 will be taken for QA/QC purposes and designated SO-7. A duplicate of SO-14 will be taken designated SO-21. The soil core will be field screened during drilling activities and the samples to be submitted for analysis will be selected based upon field screening results and physical observations. The most likely depths for the soil samples will be between 3 and 6 feet bgs and 9 and 12 feet bgs because of previous landfilling practices. A previous investigation at the site near the former landfill discovered construction debris and garbage at depths ranging from 5 feet to 12 feet bgs (Ref. 4).

Surface soil samples to document source areas will be taken at a depth of 0 to 6 inches bgs and designated SO-9 through SO-13. SO-9 will be located in or near the drainage ditch where it has been reported equipment wash water was drained. SO-11 and SO-12 will be in the two areas where electrical transformers may have leaked or spilled PCBs into the soil. SO-10 and SO-13 will be taken in or near drainage ditches near suspected former landfills. A duplicate of SO-11 will be taken for QA/QC purposes and designated SO-20.

Groundwater samples will be collected to investigate the potential for releases of on-site contaminants to the subsurface aquifer. On-site groundwater samples will be taken from direct push borings installed in potential source areas. The samples will be designated as GW-01 through GW-08 and GW-17.

Groundwater Pathway

Nonsampling data to be collected includes:

- Verify existing on- and off-site drinking water wells located within a 1-mile radius of the site and the population served by these wells. Water level measurements, well construction details, well development procedures, water quality test results, and aquifer pumping data will be obtained from interviews with the well owners, if available.

Groundwater samples will be collected to investigate the potential for releases of on-site contaminants to the subsurface aquifer. On-site groundwater samples will be taken from direct push borings installed in potential source areas. The samples will be designated as GW-01 through GW-08 and GW-17.

During this SSI, approximately eight domestic water wells will be sampled for CLP analysis. The samples will be designated GW-09 through GW-15. Groundwater samples from the two borings located near the northern boundary of the Gary AFB site and upgradient of known waste sources will be used to characterize aquifer water quality located upgradient from known site sources. These sample will be designated as the background groundwater samples and designated as numbered GW-01 and GW-19. The sample GW-16 will be taken from a drinking water well upgradient of the source and used to document background water quality from a drinking water well.

During the off-site reconnaissance inspection, if other wells are discovered within the 1-mile site radius that 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 Quality Assurance Project Plan (QAPP).

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 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 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. Purging will be considered complete after three (3) consistent readings of pH, temperature, and conductivity are achieved.

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

Surface Water Pathway

Nonsampling data to be collected include:

- Verify that there is no perennial surface water body within 2 miles of the site by visual inspection.

(Since there is no apparent surface water discharge pathway, no sediment samples will be collected for this SSI.)

Soil Exposure Pathway

Nonsampling data to be collected include:

- Verify site drainage patterns and soil exposure pathways by direct observation during the site reconnaissance inspection.

- Determine if sensitive environments or endangered species habitats exist within or along identified off-site migration pathways by visual inspection or interviews with knowledgeable local personnel.

- Verify the distance to the nearest residence, school, day care center, park or recreational area through observation.

- Verify the total number of on-site workers during daily shifts through observation or interviews with knowledgeable personnel.

Based on existing site characterization data, the primary contaminants of concern include volatile, semivolatile, metal, cyanide, pesticide and PCB wastes generated, managed or disposed of by the U.S. Army or U.S. Air Force during operation of the site or other tenants after the airbase was shut down and the property deeded to the City of San Marcos. The surface soil samples SO-09, SO-11, and SO-12 will be used to evaluate the soil exposure pathway.

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. The deeper soil sample will be collected using a dedicated stainless steel spoon and exposed using a dedicated shovel should the soil be too packed to easily excavate. 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 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, widemouth glass jars. No headspace 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 QAPP. Proper sample containers, preservation, and holding times for CLP soil samples are presented in Table 3.

Air Pathway

Nonsampling data to be collected include:

- Verify the location of the nearest resident and occupied building by observation during the off-site reconnaissance inspection.

- Confirm that no adverse health effects have been reported due to releases of hazardous substances to the air by interviews with nearby long-term residents and a review of Public Health Department records.

- Verify that there are no sensitive environments or endangered species within a 4-mile radius of the site through consultation with TDPW local staff or by observation during the off-site reconnaissance inspection.

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. In addition, the field PID used during the initial on-site reconnaissance will provide an indication of the presence of volatile organic compounds in the air at the site.

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 or one (1) per day, whichever is greater. 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/PCBs, metals, and cyanides. Results of equipment rinsate sample(s) analyses will be maintained with the corresponding sample analytical data in the project file.

Locations of proposed samples to be collected during this SSI are shown in Figure 3.

Figure 3
Sampling Locations
Former Gary Air Force Base
San Marcos, Caldwell County, Texas

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 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 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 domestic wells since the water sample is collected directly from the tap.

Personal Decontamination

All disposable clothing (i.e., Tivek, 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 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 attached QAPP (Appendix A).

Samples collected each day will be shipped and delivered daily to the designated CLP laboratory for analysis using an overnight courier. The contractor performing the sampling during this SSI will choose the overnight carrier.

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) 239-4814 or his designee to coordinate and obtain approval for additional analytical requirements.

REFERENCES

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3. US 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.

4. Department of the Army, Ft. Worth District Corps of Engineers, William D. Brown, Colonel, EN, Commanding, memorandum through Commander, Tulsa District, Attn: Randy Bratcher, CESWT-EC-GR, for Commander, Southwestern Division. Subject: DERP-FUDS Inventory Project (INPR)for Site No. K06TX023200, San Marcos Municipal Airport, TX (Formerly Gary Air Force Base).

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6. Texas Department of Ground Water Resources. Report 239. Ground Water Resources of Caldwell County, Texas. January 1966. 88 pages.

7. Kenneth May, TNRCC Source Water Assessment and Protection, Water Utilities Division.

8. TNRCC Public Drinking Water Supply Records.

9. Texas Natural Resource Conservation Commission. The State of Texas Water Quality Inventory. Volume 4. 1994. 614 pages.

10. United States Department of Agriculture Soil Conservation Service and Texas Agriculture Experiment Station. Soil Survey of Caldwell County, Texas. July 1978. 73 pages.

11. Texas Water Commission letter to City of San Marcos. July 9, 1993.

12. Jim Highland, P.E., Federal Facilities Compliance Coordinator, US EPA, Memo to File. April 18, 1995.

13. TNRCC Municipal Solid Waste Permit No. 640 File.

14. Randy Neibuhr, U.S. Army Corp of Engineers, conversation record with Dick Moncure of the Gary Job Corps Center. February 8, 1991.

15. Ecology and Environment, Inc., Sampling Plan for Gary Job Corps facility, San Marcos, Texas (TX1161630644). May 10, 1988.

16. TWC Interoffice Memorandum, Gary Job Corps Center – Solid Waste Registration No. 73125 – Special Inspection of February 2, 1988 – Caldwell County. Feburary 10, 1988.

17. TNRCC Leaking Petroleum Storage Tank No. 108133 File.

APPENDIX A

Quality Assurance Project Plan

TNRCC

Protecting Texas by Reducing and Preventing Pollution

Quality Assurance Project Plan

for

Texas Natural Resource Conservation Commission Preliminary Assessment/Site Inspection Program

(FY 2000-2001)

October 1999

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.

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.
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. Identify sensitive environments, (see list end of checklist).
8. 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.

Site Reconnaissance Checklist, continued

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.

ATTACHMENT A

SURFACE WATER AND AIR SENSITIVE ENVIRONMENTS

Sensitive Environment
Critical habitat for Federally designated endangered or threatened species
Marine Sanctuary
National Park
Designated Federal Wilderness Area
Ecologically important areas identified under the Coastal Zone Wilderness Act
Sensitive Areas identified under the National Estuary Program or Near Coastal Water Program of the Clean Water Act
Critical Areas identified under the Clean Lakes Program of the Clean Water Act (tributaries in lakes or entire small lakes)
National Monument
National Seashore Recreation Area
National Lakeshore Recreation Area
Habitat known to be used by Federally designated or proposed endangered or threatened species
National Preserve
National or State Wildlife Refuge
Unit of Coastal Barrier Resources System
Federal land designated for the protection of natural ecosystems
Administratively Proposed Federal Wilderness Area
Spawning areas critical for the maintenance of fish/shellfish species within a river system, bay or estuary
Migratory pathways and feeding areas critical for the maintenance of anadromous fish species in a river system
Terrestrial areas utilized by large or dense aggregations of vertebrate animals (semi-aquatic foragers) for breeding
National river reach designated as recreational
Habitat known to be used by State designated endangered or threatened species
Habitat known to be used by a species under review as to its Federal endangered or threatened status
Coastal Barrier (partially developed)
Federally designated Scenic or Wild River
State land designated for wildlife or game management
State designated Scenic or Wild River
State designated Natural Area
Particular areas, relatively small in size, important to maintenance of unique biotic communities
State designated areas for the protection/maintenance of aquatic life under the Clean Water Act
Wetlands

ATTACHMENT B

SOIL EXPOSURE PATHWAY
TERRESTRIAL SENSITIVE ENVIRONMENT

Terrestrial Sensitive Environment	*Assigned*
Terrestrial critical habitat for Federally designated endangered or threatened species	
National Park	
Designated Federal Wilderness Area	
National Monument	
Terrestrial habitat known to be used by Federally designated or proposed threatened or endangered species	
National Preserve (terrestrial)	
National or State terrestrial Wildlife Refuge	
Federal land designated for protection of natural ecosystems	
Administratively proposed Federal Wilderness Area	
Terrestrial areas utilized by large or dense aggregations of animals (vertebrate species) for breeding	
Terrestrial habitat used by State designated endangered or threatened species	
Terrestrial habitat used by species under review for Federally designated endangered or threatened status	
State lands designated for wildlife or game management	
State designated Natural Areas	
Particular areas, relatively small in size, important to maintenance of unique biotic communities	

APPENDIX D

TNRCC FY2000-2001
Quality Assurance Project Plan

Quality Assurance Project Plan

Texas Natural Resource Conservation Commission
Preliminary Assessment/Site Inspection
Program (FY 2000-2001)

Prepared in cooperation with the

U.S. Environmental Protection Agency

October 1999

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QTRACK # TQ-99-012

QUALITY ASSURANCE PROJECT PLAN
FOR
TNRCC PRELIMINARY ASSESSMENT AND SCREENING SITE INSPECTION PROGRAM

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Appendix B - Sampler's Guide to the Contract Laboratory Program

Appendix C - Multi-Media, Multi-Concentration, Organic Analytical Service for Superfund Quick Reference Fact Sheet, August 1999

Appendix D - Multi-Media, Multi-Concentration, Inorganic Analytical Service for Superfund Quick Reference Fact Sheet, August 1999

Appendix E - Low Concentration Organic Analytical Service for Superfund (Water Matrix) Quick Reference Fact Sheet, August 1999

REFERENCES

Interim Draft EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5, May 1994

EPA Data Quality Objectives Process for Superfund, EPA QA/G-4, September 1994.

USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Document No. ILM04.0

USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Revision No. OLM03.1, August, 1994

USEPA National Functional Guidelines for Inorganic Data Review, EPA 540/R-94/013, February 1994.

USEPA National Functional Guidelines for Organic Data Review, EPA 540/R-94/012, February 1994.

QAPP DISTRIBUTION LIST

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SECTION A

PROJECT MANAGEMENT

(A4) PROJECT ORGANIZATION and (A6) PROJECT DESCRIPTION

This document is a Quality Assurance Project Plan (QAPP) for the planning and implementation by the Texas Natural Resource Conservation Commission (TNRCC) of the Preliminary Assessments (PA) and Site Inspections (SI) in Texas for the U.S. Environmental Protection Agency (EPA) Superfund program. This QAPP has been prepared in accordance with the "External Review Draft Final EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations", EPA QA/R-5, October 1998; "EPA Guidance for Quality Assurance Project Plans", EPA QA/G-5, February 1998; "Guidance for the Data Quality Objectives Process", EPA QA/G-4, Final - EPA/600/R-96/055, September 1994. The site assessment process begins with site discovery, or notification to EPA or the TNRCC of possible releases of hazardous substances. The sites are evaluated using a phased investigation consisting of the PA and, if necessary, the SI. The PA is a limited scope investigation based primarily on available information. Samples are not collected during a PA. The PA distinguishes sites that pose no threat to human health and the environment from sites that may pose a significant threat. Sites that may pose a threat receive a further action recommendation after the PA and undergo an SI, where investigators collect sufficient waste and environmental media samples to identify sites that have a high probability of qualifying for the National Priorities List (NPL). This QAPP serves as a controlling mechanism to ensure that all data collected are of satisfactory quality.

A Regional EPA site assessment representative may accompany TNRCC personnel on the PA site visit and based solely on the field findings an immediate decision will be made on whether to proceed with preparation of an Screening Site Inspections (SSI) Work Plan. On those occasions when no EPA site assessment representative is present, the TNRCC PA/SI Program Manager, Technical Director and designated Site Investigation Manager (with EPA follow up concurrence) will decide if the site should proceed to the SSI stage. The TNRCC Site Investigation Managers will be responsible for collecting the samples defined in the SSI or Expanded Site Investigation (ESI) Work Plan (WP), initiating the proper chain-of-custody, health and safety, and quality assurance procedures. The TNRCC Site Investigation Managers will also be responsible for making any field sampling determinations as dictated by site conditions. Samples from the sites will be analyzed for semivolatiles, volatiles, metals, cyanide, pesticides and Polychlorinated Biphenyls (PCBs) and, if required, dioxins/furans.

If, considering site conditions, 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 EPA will be notified no later than one (1) day after the inspection team returns from the site visit. Written notification will follow any verbal communication in this regard. The EPA will determine the course of action.

The Preliminary Assessments and Site Investigation (PA/SI) program organization chart, Figure 1.1, identifies the key individuals who will be primarily responsible for performance of the project. This organizational structure forms a management team of professionals to oversee the technical aspects of the project, supported by an administrative team who will ensure that personnel and equipment are available to the project when required.

Allan M. Seils, will function as TNRCC Program Manager. Mr. Seils will be responsible for overall coordination of project activities. He also will serve as primary TNRCC contact for the EPA. The Technical Director, Wesley G. Newberry, will review the SSI work plans, Preliminary Assessment (PA) and SSI reports, and progress reports. The Quality Assurance Specialist will be responsible for reviewing data in accordance with the procedures outlined in this QAPP, and will complete associated data assessment reports. The Quality Assurance Specialist will function independently of the Program Manager and will assure that project quality control is maintained. The Quality Assurance Specialist will audit the field work at 20% of the SSI/ESI sites. The Health and Safety Officer, will function independently of the Program Manager. As such, he, or his designee will be responsible for ensuring that all on-site activities comply with the approved site specific Health and Safety Plan.

A generic Health and Safety Plan (H&SP) will be followed during performance of each PA site visit. Individual site H&SPs will be prepared for all SSI sites as part of the work plan development. All H&SPs will be based on TNRCC's health and safety program and TNRCC's understanding of current health and safety regulations.

During Fiscal Years 2000 and 2001, the TNRCC will complete twenty-four (24) Preliminary Assessments (PAs), including early Potentially Responsible Party (PRP) searches, and twenty-eight (28) Screening Site Inspections (SSIs) in Texas in accordance with the Cooperative Agreement (CA) with the U.S. Environmental Protection Agency (EPA). A minimum of two (2) persons per PA and four (4) persons per SSI/ESI will be used to conduct field activities. At these sites, one TNRCC staff person will be designated as the lead Site Investigation Manager and will have the on-site responsibility for ensuring that the HS&P and QAPP are followed, and that appropriate data are collected to allow for preparation of site-specific SSI/ESI WP. The Site Investigation Manager also will be responsible for planning and conducting the site visit and preparing the final PA, SSI report including PREScore calculations and/or Documentation Record for the site.

Figure 1.1 Preliminary Assessments and Site Investigation Program Organization Chart

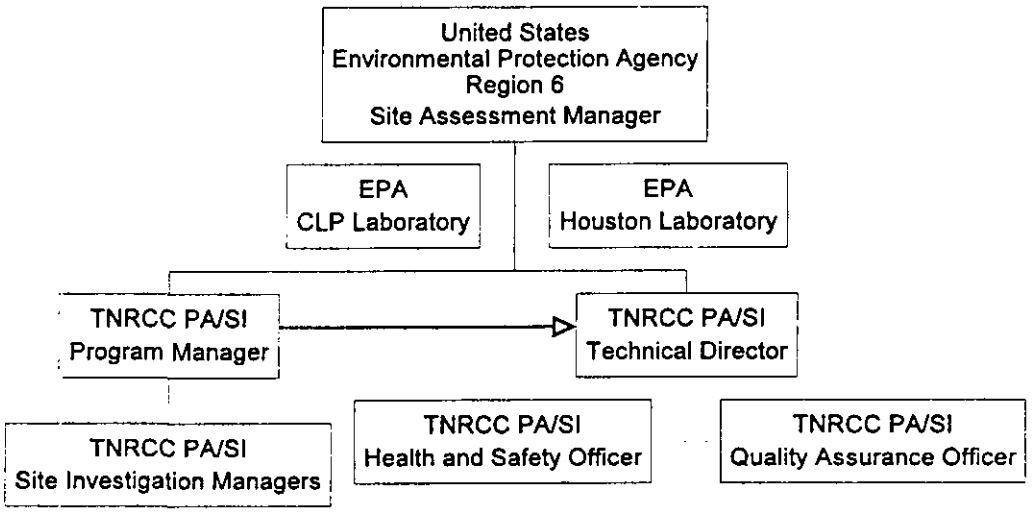

Table 1.2 Schedule of Preliminary Assessments

PA Activity Schedule	Technical Work Hours After Site Assignment
Site Assignment to TNRCC	0
PA Background Research	60
PA Site Reconnaissance	12
Draft PA Report Complete	38
Final PA Report Complete	10
Total Hours:	120

Table 1.3 Schedule of Site Inspections

SSI Activity Schedule	Technical Work Hours After Site Assignment
Site Assignment to TNRCC	0
SSI Background Research	60
Prepare SSI Work Plan	70
Prepare Health & Safety Plan	40
Execute SSI Work Plan (includes acquiring site access)	137
Validate Data	40
Draft PRESCORE Calculation	11
Draft SSI Report Complete	125
Final PRESCORE Report	1
Final SSI Report Complete	16
Total Hours:	500

It is anticipated the TNRCC Program Manager will issue site assignments such that the majority of PAs are completed within the first six (6) months of the fiscal year. See Appendix A - Preliminary Assessment/Site Inspection Program Fiscal Year 2000 Schedule. This will allow those sites which progress directly to an SSI Work Plan to be completed within the final six months of the fiscal year. The total anticipated time to complete each PA is 120 hours and each SSI is 500 hours. A detailed schedule for the completion of PAs and SSIs is presented in Tables 1.2 and 1.3, respectively. In the event an expanded SSI (ESI) is warranted, the total anticipated time to complete the ESI is 600 hours from site assignment. If the site is to be proposed for the NPL, a Hazard Ranking System (HRS) package may be warranted, and the total anticipated time to complete the HRS is 700 hours from completion of the ESI. These schedules may be adjusted to meet specific requirements of the EPA guidance. This guidance currently includes the following references: (1) *Federal Register,* 40 CFR Part 300, December 14, 1990; (2) "Guidance for Performing Preliminary Assessments Under Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA)" September, 1991; 3) "Guidance for Performing Site Inspections Under CERCLA", September, 1992; 4) "Regional Quality Control Guidance for NPL Candidate Sites", December, 1991; 5) "Region 6 CLP Training Manual", October, 1993; 6) "Management of Investigation-Derived Wastes During Site Inspections", May, 1991; and 7) Sampler's Guide to the Contract Laboratory Program, 1996.

The TNRCC Site Investigation Manager designated to lead investigations at the SSI/ESI site will develop a WP and sampling strategy for the site. The information gained from the PA, tentative disposition, and other timely information will be used in determining tentative numbers, nature, and location of samples collected. The WP consists of (1) a list of project contacts; (2) data quality objectives, and a site background review including site history, descriptions of the site including geology, hydrology, soil conditions, site map(s), and waste handling practices including types and quantities of wastes generated (if known); (3) a WP summary including field personnel, site reconnaissance plan, sampling strategy, sampling locations and map(s), and QA/QC sample protocols and decontamination procedures. The WP will also identify potential targets for the groundwater, surface water, soil exposure, and air pathways; (4) a health and safety plan to describe potential hazards and necessary site specific precautions and preparations for completing the field work described in the sampling plan; and (5) general project requirements such as a schedule, equipment needed, and mobilization/demobilization procedures.

The TNRCC Site Investigation Managers will prepare the WP according to the format agreed to by the EPA for use on the FY2000 and 2001 Multi-Site PA/SI Scope of Work. Revisions to this format will be determined by the EPA and TNRCC project managers prior to preparing the first documents. The EPA will be responsible for approving each work plan; however, the

decision to proceed with WP implementation may be delegated by the EPA Site Assessment Manager (SAM) to the TNRCC Program Manager, as appropriate.

EPA shall choose a laboratory to be used for this project under its Contract Laboratories Program (CLP) and shall incur all costs for sample analyses. A CLP laboratory or the EPA Houston's Laboratory shall provide analytical support for drinking water samples. The sample analyses shall include analysis for all constituents listed on the CLP Routine Analytical Services (RAS) Organic Target Compound List (TCL) and Inorganic Target Analyte List (TAL).

(A5) PROJECT DEFINITION/BACKGROUND

The major objective of this project is to perform and complete Preliminary Assessments and Screening Site Inspections at sites judged to be potentially hazardous because of current and past operational and waste disposal activities. The PA and SSI reports will provide technical information and data that can be used to determine the score of each respective site according to the Hazard Ranking System (HRS). The HRS is the primary means by which EPA evaluates sites for Superfund's National Priorities List (NPL).

Preliminary Assessments (PA) and Screening Site Inspections (SSI) will be conducted in conformance with the requirements of the revised Hazard Ranking System (HRS), Final Rule, dated December 14, 1990. The EPA furnished guidance for performance of these tasks and it will be used as reference material in collecting data, planning, and conducting on-site activities, and in preparation of the reports for each site. This guidance currently includes the following references: (1) *Federal Register,* 40 CFR Part 300, December 14, 1990; (2) "Guidance for Performing Preliminary Assessments Under CERCLA" September, 1991; 3) "Guidance for Performing Site Inspections Under CERCLA", September, 1992; 4) "Regional Quality Control Guidance for NPL Candidate Sites", December, 1991; 5) "Region 6 CLP Training Manual", October, 1993; 6) "Management of Investigation-Derived Wastes During Site Inspections", May, 1991; and 7) Sampler's Guide to the Contract Laboratory Program, 1996.

Initial preparations for each PA, SSI and ESI site visit will involve obtaining information for preparation of the Health and Safety Plan and SSI/ESI WP. This task also includes obtaining access to the sites and the site inspection visit. Prior to any on-site inspections, the project staff and the TNRCC Program Manager will review the results of the preliminary assessment and/or available EPA and/or TNRCC files to address any health and safety risk concerns, and to assess the level of effort necessary to perform the site visit.

The TNRCC project staff will conduct a detailed background study for each PA/SSI/ESI site prior to any field activities. The purpose of this study is to collect available file information concerning activities at the site, hydrogeologic, photographic and topographic in formation pertinent to the site (to be used in pathway evaluation), and population and ecological information available for the area surrounding the site (to be used in a target evaluation).

Site activities information to be collected during this background study will be primarily the EPA, TNRCC, and other State and Federal agency records on the site. Hydrogeologic and topographic information will be collected at this time primarily from USGS topographic maps, city and county maps, county and regional water reports, county and regional geologic cross sections, state well construction records, soil maps, etc. Population and ecological information will be collected primarily from census figures, USGS topographic maps, public school records, the Texas Manufacturers Index, U.S. Fish and Wildlife and Texas Parks and Wildlife endangered species publications, and additional information if available. Aerial photography, as available from the Texas Natural Resources Information System, Texas Department of Transportation, and other sources, will also be examined for additional information about the site.

The data collected will, whenever possible, be selected to meet the requirements of the HRS model. It is understood that, at the level of effort appropriate for a PA, it may not be possible at some sites to collect "HRS quality" data to fulfill every requirement of the model. The TNRCC will make every reasonable effort to collect "HRS quality" data for every site, within the limits of the project schedule, budget, and the available information. Every effort will be made to collect the best available information during the performance of each PA. In addition, all SSI/ESI information will be collected in accordance with applicable SI guidance.

The level of effort required for the SSI background research may be greater than that normally required. This increased effort is necessary because the PAs for some of the sites may not have been prepared prior to publication of the current HRS guidance and do not contain complete HRS information. Therefore, this additional PA information may need to be collected during the background study task of the SSI/ESI.

In most cases, it will be necessary to obtain advance permission to inspect the sites. The TNRCC will obtain access agreements for each site. The designated TNRCC Site Investigation Manager for each site will prepare a written notification to the site owner/operator of the impending site visit, followed by telephone confirmation by the TNRCC Site Investigation Manager. The TNRCC Site Investigation Manager will also be responsible for notifying the local TNRCC Regional Office of the impending site visit. The TNRCC Program Manager will provide each member of the TNRCC project staff with written credentials describing the nature of the project and the authority under which it is conducted.

Upon arrival at a site, the inspection team will conduct an initial survey of the site to ensure adequate safety precautions are in place during site activities. The Site Investigation Manager will, when possible, conduct a detailed interview with site representatives. Where operator records are present, these will be reviewed for an indication of the type and quantity of materials disposed of at a given site. Where possible, the party responsible for waste disposal will be determined. Interviews with other individuals familiar with the site will be conducted as appropriate before, during, or after on-site reconnaissance activities.

In addition, a thorough site reconnaissance, if possible, will be conducted at each site. The inspection team will visually survey and document the location of the site relative to any roads or other access, drainage systems, surface waters, nearby structures, drums, tanks, monitoring wells, facility boundaries, unique geological features, and other factors which may affect pollutant migration pathways. These factors will be recorded, to the extent practical, on a field site sketch which will be prepared during the site visit. The facility sketch also will document the location of sensitive environmental receptors such as on-site and off-site homes and public building, natural areas, and drinking water supplies. Residences within 400 yards of the site will be included in the site sketch. Indicators of existing problems, such as areas of diseased, dying, or distressed vegetation or discolored soil, also will be noted on the site sketch. Photographs will be taken as necessary to document observations and on-site activities. Generalized population information, including collection of environmental equality data, will be based on the number and types of surrounding homes and businesses.

For each PA, initial activities will involve the collection of site background information and completion of a site visit. A Regional EPA site assessment representative may accompany TNRCC personal on the PA site visit and based solely on the field findings an immediate decision will be made on whether to proceed with preparation of an SSI Work Plan. On those occasions when no EPA site assessment representative is present, the TNRCC PA/SI Program Manager, Technical Director and designated Site Investigation Manager (with EPA follow up concurrence) will decide if the site should proceed to the SSI stage.

If a site is designated to proceed to the SSI phase, then an SSI Work Plan and final SSI Report will be prepared for submission to the EPA. A complete PA will not be prepared for these sites. An abbreviated PA Report will be prepared for those PA candidate sites which are determined ineligible for CERCLA response by the EPA site assessment representative.

For SSI/ESI visits, environmental samples will be collected in accordance with the approved WP to provide site-specific data on the hazardous substances present as well as pollutant dispersal pathways. The samples collected during the SSIs and ESIs typically will be from the following sources:

- o On-site and off-site soils;
- o Groundwater from existing potable or agricultural water or monitoring wells;
- o Water or waste from open drums, surface impoundments, or evaporation pits;
- o Point of entry into receiving waters in the runoff pathway(s) from the site;
- o Environmentally sensitive areas near the site.

For each SSI, field activities will be conducted in two steps. TNRCC will collect information needed to prepare a work plan before the site visit. Following approval of the work plan, TNRCC will visit the site to execute the work plan, including sampling activities. The collected information, including sample results, will be compiled into a final SSI Report for the site.

(A7) DQO for MEASUREMENT DATA

A quality assurance (QA) program is essential to assure the quality, controllability, accountability, and traceability of the work being performed for the TNRCC PA/SI Program. Quality assurance encompasses all actions taken by TNRCC and its subcontractors to achieve results which are accurate, reliable, and legally defensible for all aspects of the project. TNRCC and its subcontractors will adhere to the quality assurance procedures outlined herein and will rigorously implement the QA program throughout the duration of the project.

The primary goal of this QA program is to ensure the accuracy and completeness of the data which ultimately will be used to score and to determine the status of the sites that are investigated. In order to achieve this accuracy and completeness, it is necessary that all sampling, analysis, and data management activities be conducted in accordance with preset standards, and that these activities be reviewed regularly to maintain full compliance with the standards. This program has been designed so that corrective action can be implemented quickly if necessary without causing undue expense or delay to the project. The standards and review procedures which TNRCC will use to attain optimum accuracy and completeness of data are outlined in this plan. All subcontractors to TNRCC will be required to follow these standards and procedures, at a minimum.

The quality assurance objectives for all measurement data include considerations of precision, accuracy, completeness, representativeness, and comparability. Compliance with the QA objectives will be judged individually for each site. QC objectives stated in the EPA CLP Statements Of Work (SOW):

CLP analytical services are defined in Statements of Work (SOWs). The following SOWs provide the technical and contractual framework for commercial environmental testing laboratories to apply EPA CLP analytical methods for the preparation/isolation, detection, and quantitative measurement of organic target compounds and inorganic target analytes in water and soil/sediment environmental samples.

Each SOW includes a summary of general requirements; reporting and deliverable requirements; target compound or target analyte list and contract required quantitation/detection limits; specific analytical methods; quality assurance/quality control requirements; chain-of-custody and sample documentation requirements; a glossary of terms; and specifications for reporting data in computer-readable format, when applicable.

1. USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration, OLM03.0 (Revisions OLM03.1 and OLM03.2)

This document defines the analytical methods accepted by the CLP for the isolation, detection, and quantitative measurement of 33 volatile, 64 semivolatile, and 28 pesticide/Aroclor target compounds in water and soil/sediment environmental samples.

2. USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, ILM04.0

This document defines the analytical methods accepted by the CLP for the preparation, detection, and quantitation of 23 inorganic target analytes and cyanide in water and soil/sediment environmental samples.

3. USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Low Concentration Water, OLC02.1

This document defines the analytical methods accepted by the CLP for the isolation, detection, and quantitative measurement of 41 volatile, 59 semivolatile, and 28 pesticide/Aroclor target compounds in low concentration groundwater and drinking water type samples.

PRECISION

The precision of a measurement is an expression of mutual agreement of multiple measurement values of the same property conducted under prescribed similar conditions. Precision is evaluated most directly by recording and comparing multiple measurements of the same parameter on the same exact sample under the same conditions or a matrix spike and matrix spike duplicate. It is usually expressed in terms of the relative percent difference (RPD). The RPD can be evaluated both internally (laboratory duplicates) and externally (field duplicates) to the laboratory. Laboratory duplicate control limits for organics are method and laboratory specific, and will be evaluated as part of the EPA-CLP data validation. For metals analysis, a control limit of 20 percent RPD will be used for matrix spike and matrix spike duplicate sample values greater than or equal to 5 times the contract required detection limit. For field duplicates, a RPD of $\pm 50\%$ percent will be used as the objective of precision.

Field measurements may be taken of pH, conductivity, temperature, water level, and organic vapor concentration based on systems photo ionization detector (HNU) or organic vapor analyzer (OVA) readings. The objective for precision of field data collection methods is to achieve and maintain the factory specifications for the field equipment. For the pH meter, precision will be tested by multiple readings in the medium concerned. The readings will be within 0.1 pH standard units after the instrument has been field calibrated with standard buffer solutions.

The water level indicator readings will be precise within 0.1 foot for duplicate measurements. The HNU or OVA will be calibrated each day prior to field use. If calibration readings deviate 15 percent or more from the concentration of the calibration gas, the instrument will be recalibrated.

ACCURACY

The degree of accuracy of a measurement is based on a comparison of the measured value with the actual true value. Accuracy of an analytical procedure is best determined based on the recoveries of matrix spike, matrix spike duplicate, and surrogate compounds.

The degree of accuracy and the recovery of analyte to be expected for the analyses of QC samples and spiked samples is dependent on the matrix, method of analysis, and the compound or element being determined. The concentration of the analyte relative to the method detection limit is also a major factor in determining the accuracy of the measurement. For metals analysis, spike recovery limits of 75-125 percent will be used. The QC acceptance ranges and limits for GC/MS organic analyses used to assess the accuracy of the data according to CLP protocol stated in stated in the EPA CLP Statements Of Work. These QC acceptance ranges and limits will be used as part of the EPA-CLP data validation.

The objective for accuracy of field measurements is to achieve and maintain factory specifications for the field equipment. The pH meter is calibrated with standard buffer solutions. The HNU or OVA will be calibrated daily with calibration gas.

REPRESENTATIVENESS

Samples taken must be representative of the population. Because uncontrolled hazardous waste sites vary greatly in size and complexity, specific SI sampling guidelines that apply to all sites are not possible. Site-specific sampling plans are located in the workplan developed for each site.

COMPARABILITY

Consistency in the acquisition, handling, and analysis of samples is necessary so the results may be compared with previous and future studies. Concentrations will be reported in a manner consistent with general practices. Standard EPA analytical methods and quality control will be used to support the comparability of analytical results with those obtained in other testing. Calibrations will be performed in accordance with EPA or manufacturer's specifications and will be checked with the frequency specified in the EPA CLP Statements Of Work.

COMPLETENESS

The completeness of the data is measured as the amount of valid data obtained from the measurement system (field and laboratory) versus the amount of data expected from the system. The EPA-CLP data validation will determine the amount of valid data obtained from each site inspection. At the end of each SSI, completeness of data will be assessed and, if any data omissions are apparent, an attempt will be made to re-sample the parameters in question. The specific objective for the completeness of this project will be greater than or equal to 90 percent for field and laboratory data for each site.

ANALYTICAL PARAMETERS AND QUANTITATION LIMITS

The analytical parameters and their quantitation limits for use on this project are determined under the EPA's Contract Laboratories Program (CLP). All samples will be analyzed by CLP methods. Quantitation limits are determined by the Contract Required Quantitation Limit (CRQL) and the Contract Required Detection Limit (CRDL) which is the minimum level of detection acceptable. See Appendices C, D, E.

HOLDING TIMES

Holding times specified by EPA protocols will be set for samples collected under this program. See Appendix B, p. 14.

(A9) TRAINING

A large percentage of TNRCC Site Investigation Managers have prior experience in conducting site investigations; however, all inspectors will undergo a formal training program. Major areas covered during the formal training project will be the objectives of the PA and SSI, preparation for inspection, legal ramifications, health and safety considerations, use of monitoring and sampling equipment in the field, sample shipment and chain-of-custody

procedures, the appropriate procedures to be followed relative to any denial-of-entry problems encountered, and other aspects of the work to be performed under this project.

Each TNRCC employee involved in sample collection will be trained on how to collect representative samples from every medium which might be encountered. Project personnel will receive additional training in proper field documentation and in health and safety procedures. All training will be documented, and records will be maintained by the Program Manager.

(A10) DOCUMENTATION and RECORDS

Documentation Records will include documentation for all HRS factors evaluated. All assertions of fact will be referenced in the record. All reports will be submitted to the EPA as they are completed. Any corrections or additions to the submitted material that the EPA deems necessary and appropriate will be made by the TNRCC within budget constraints. A PA, SSI/ESI WP, SSI Report, and Documentation Record will be deemed complete and final when the EPA approval is received, or within six (6) months of submittal, whichever comes first.

Following the site visits and completion of analytical work, the TNRCC will prepare a PA or a PA (Abbreviated) and/or SSI report or Documentation Record (for ESI sites only) highlighting significant findings for each site. The abbreviated PA Reports will be prepared in accordance with the requirements stated in the "Guidance for Performing Preliminary Assessments Under CERCLA", September 1991, Section 4.4 Abbreviated Reporting. The final SSI reports will be prepared in accordance with the report outlines approved by the EPA. Documentation Records will be prepared in accordance with current guidance and by using the companion WordPerfect® version of the Documentation Record. Should additional guidance become available prior to completion of this project, the TNRCC will evaluate the effect that conformance to this guidance will have on the schedule and budget, and will submit a revised schedule and budget to the EPA for approval.

The SSI reports will contain a description of the site, the operating history and nature of waste handling at the site, and a discussion of waste sources, pathway characteristics, and identification and description of potential human and environmental targets. In addition, the SSI report will contain a description of the data collected, analytical results, and QA/QC data. Supporting documents will be included in the SSI report as appendices and will consist of stratigraphic, hydrogeologic, and topographic information; a site sketch and other pertinent maps; laboratory and chain-of-custody report originals; photographs; field notes; and reports from previous investigations at the site. All data collected during each SSI/ESI visit will be validated using the most current EPA data validation guidelines and any EPA Regional instructions.

QUALITY ASSURANCE REPORT

A summary of all QA activities and findings during the course of this project will be reported to the EPA on a site specific basis with the final site inspection reports. Other project-related quality assurance items and corrective actions will be discussed in the monthly progress reports. These may include the following items:

1. Summary of QA management, including any changes;
2. Measures of data quality from the project;
3. Significant problems related to work quality, and the status of any corrective actions implemented;
4. Results of QA performance audits;
5. Results of QA systems audits;
6. Assessment of data quality in terms of precision, accuracy, completeness, representativeness, and comparability; and
7. Quality-assurance-related training.

RECORD KEEPING

All information pertinent to PA site visits and SSI sampling activities will be recorded in a logbook. This book will be bound and have consecutively numbered pages. Entries in the logbook will be made in ink and will include, at a minimum, a description of all activities, the names of all individuals involved (sampling and oversight), date and time of sampling, weather conditions, any problems, and all field measurements.

SECTION B

MEASUREMENT/DATA ACQUISITION

(B1) SAMPLING PROCESS DESIGN

After approval of the SSI work plan, the field activities will be executed. At each site, these activities may include soil sampling, sediment sampling, surface water sampling, and groundwater sampling.

Detailed reports on all PA and SSI non-sampling data collection and SSI sampling activities will be kept in field logbooks. In this book will be noted the date, time, location, and identification of each sample, along with the collector's name, a description of all equipment used and any problems encountered, and general comments of the inspection team. Logbooks also are used to record pertinent information regarding the site itself, including date, time, location, and identification of all photographs taken during the site visit.

Proper identification and labeling of samples is crucial to an effective sampling program. Immediately upon collection, each sample must be sealed and tagged. The tag should be marked with a sample identification number, station location, type (composite or grab), concentration (low, medium, or high), the parameters requested, collector's name, and the date and time of sample collection.

For many of the SSIs, the determining factor of hazard evaluation will be the data provided by sampling and analytical activities. Thus, it is important that QA/QC be maintained for each sample. The purpose of this Section is to outline specific procedures for inspectors to use while acquiring and handling samples during an inspection to ensure that quality data are obtained.

Certified clean sample bottles will be used for sample collection. Custody of these bottles will be maintained by documenting the batch number of the sealed box, documenting opening of the box, and keeping the bottles locked up at all times. If returned to the office, the bottles will be placed in a sealable container and secured with custody seals.

(B2) SAMPLE METHODS REQUIREMENTS

This Section discusses the standard sampling procedures. Other sampling procedures may be used as determined necessary by the lead Site Investigation Manager and with approval of the Technical Director or Program Manager.

Regardless of sample type, the following principles and procedures should be adhered to during the sample collection phase of a site inspection:

1. Obtain ice before visiting a site where sample collection is involved.

2. Add appropriate preservatives to the sample bottles at the time of sample collection. See Appendix B, p. 14. The bottles required for each analysis are shown in Appendix B, p. 9-10.

3. If there is reason to suspect the presence of toxic vapors, precede sampling activities by an initial survey of suspect areas, using appropriate safety gear and a photoionization detector (or equivalent). The potential use of air monitoring equipment should have been specified in the SSI Work Plan. If it was not, and if organic vapor presence is possible, contact the Program Manager and Project Safety Officer for possible changes in safety procedures.

4. If possible, collect background samples first, then proceed from the probable least contaminated to most contaminated sampling points.

5. Change disposable gloves between sampling points, placing used gloves in a plastic bag for disposal.

6. If it is necessary to reuse sampling devices, use the specified decontamination procedures between sampling points.

7. At each sampling location,
   a. Photograph the collection of samples.
   b. Record in the logbook:
   - Sample number;
   - Photo number;
   - Location (show on site sketch);
   - Type of sample;
   - Date and Time; and
   - Relevant observations.

8. If a facility representative requests, they will be allowed the opportunity to collect split samples. If these are desired, place samples directly in different containers at the sampling point rather than splitting them at a later time. In the event there may not be enough soil, sediment, and/or groundwater volume to provide split samples, collect the SSI required sample first and than provide the remaining volume to the facility representative.

9. Before placing samples in the iced cooler:

   a. Complete the sample tags and labels, and place clear tape over the sample labels on the sample containers to protect the writing from moisture.

   b. Check the pH of all preserved water samples (exclusive of VOA samples).

   c. Place a custody seal around the bottle cap.

   d. Wrap the sample containers with plastic foam, bubble pack, or equivalent to protect against breakage.

   e. The TNRCC will include in each ice chest with samples to be shipped for analysis, a temperature blank taped to the side of the chest prior to shipping.

   f. Place the sample containers in plastic Ziploc® bags or equivalent to prevent melted ice from contacting the container.

   g. Place wrapped sample containers into ice chests filled with 2 to 3 inches of vermiculite.

10. Remove water from melted ice frequently, and replace with fresh ice. Place ice in plastic Ziploc® or sealable bags to minimize water leakage during shipment.

GROUNDWATER WELL SAMPLING PROCEDURES

General

The primary consideration is to obtain a representative sample of the groundwater zone of interest without mixing the sample with stagnant (standing) water in the well casing.

To safeguard against collecting nonrepresentative stagnant water in a sample, the following guidelines and techniques will be adhered to during sample withdrawal:

1. As a general rule, all monitoring wells shall be pumped or bailed a minimum of three volumes of water in the well casing with three (3) consecutive consistent readings within 10% RPD for conductivity, $\pm$ 1°C for temperature, and within $\pm$ 0.5 pH units before representative samples are withdrawn.

2. For wells that can be pumped or bailed to dryness with the sampling equipment, the well should be evacuated and allowed to recover to 85 percent of original water level before sample withdrawal. In the event the well has not recovered to 85 percent after 24 hours, a sample may be drawn from the well. Enter the well volume recovered into the field logbook.

3. The purge waters will be managed according to guidance provided in the "Management of Investigation-Derived Wastes During Site Inspections", May 1991. The preference is to leave both RCRA hazardous and non-hazardous investigation-derived wastes on-site whenever it complies with regulations and does not pose any immediate threat to human health and the environment.

Sampling, Monitoring, and Evacuation Equipment

Sample containers will conform to EPA regulations for the appropriate constituents.

The following equipment should be on hand when sampling wells:

1. Coolers for sample shipping and cooling, chemical preservatives, and appropriate packing materials.

2. Camera and film, labels, appropriate keys (for locked wells), tape measure, water level indicators, and pH/temperature/specific-conductivity meter.

3. Pumps. Pumps will normally be used to obtain samples, although samples may be obtained directly from the pump discharge line for high yielding monitoring wells and wells with dedicated pumps.

4. Bailers and monofilament line with tripod-pulley assembly (if necessary).

5. Decontamination solutions--tap water, distilled water, Alconox, isopropanol, CLP specified grade water.

Ideally, sample withdrawal equipment should be completely inert, economical to manufacture, easily cleaned, and reused, able to operate at remote sites in the absence of power resources, and capable of delivery variable rates for well flushing and sample collection.

Calculation of Well Volume

Calculations are to be made according to the following steps:

1. Obtain all available information on well construction (casing, screens, etc.).

2. Determine well or casing diameter.

3. Determine static water level (feet below top of casing).

4. Determine depth of well from top of casing.

5. Calculate number of linear feet of static water (total depth minus the static water level).

6. Calculate one well volume in gallons: $V = Tr^2 (0.163)$, where T is linear feet of static water, and r is the inside radius of the well of casing in inches.

7. Determine the well volumes in gallons to be evacuated before sampling.

If possible, a number of observations will be made when groundwater sampling is to take place. Some of the information can be gained from file review prior to a site inspection.

1. Note if monitoring wells are locked. Arrangements must be made to secure keys or to remove locks by other means and re-secure the wells.

2. Note the condition of the monitoring wells (i.e. casing, concrete pad, etc.).

3. Note well diameters to ensure that a pump and/or bailer of the proper size will be available. The diameter is also necessary for calculating the wells' static water volume.

4. Note the type of casing materials--PVC, steel, etc.

5. Note any observable physical characteristics of the groundwater as it is being sampled--color, odor, turbidity, etc.

6. Measure the static water level of each well before sampling, if possible. This is best accomplished with an electronic water level indicator. Similarly, determine the total depth of the well before sampling. Obtain these measurements whether or not well logs are available, since the measurements are required in calculating the static water volume of the well.

7. Measure the pH, temperature, and specific conductivity of the groundwater being sampled. To avoid possible contamination problems, measure temperature, pH, and specific conductivity on a portion of groundwater which is not in a sample container to be sent out for analysis.

SURFACE WATER SAMPLING PROCEDURES

Surface water sampling locations will be selected according to the probability that they will show contaminants migrating from a site. In general, samples will be taken from streams running through or adjacent to a site, including those bodies of water which may receive surface runoff or leachate from a site. Samples will only be collected where it can be shown that the site provides the only source of contaminants to the surface water body. Care will be taken in sampling leachate breakouts, which may have high concentrations of contaminants. Surface water will also be sampled from any adjacent standing bodies of water such as ponds, lakes, or swamps which might be receiving contaminants.

Grab samples will be collected using a pond sampler. The pond sampler, described in "Samplers and Sampling Procedures for Hazardous Waste Streams," EPA 1980 (EPA-600/2-80-018), consists of a beaker attached with a clamp to a telescoping aluminum pole. This sampler allows a sample to be collected several feet from the bank or berm.

TAP WATER SAMPLING PROCEDURES

Well depth, casing size, and holding-tank volume will be obtained, if possible to calculate the volume of the system, and the system will be evacuated by removing three to five volumes by letting a tap run. If the well depth, casing size, or holding-tank volume is not readily available or is unknown, a tap will be opened and allowed to run at highest flow for at least 15 minutes. Well purging well be considered complete after three consistent readings of pH, temperature and conductivity. These readings can be obtained within the 15 minutes the tap is allowed to run. The well evacuation strategy will be documented in the field book.

Samples will be collected in containers in accordance with the sampling guidelines from a point as close to the well as possible and before the water is processed through any water treatment devices (e.g., softeners or filters). In many cases this may not be possible. When samples must be collected after the filtration or softener system, the situation will be documented in the logbook. The exact type of filtration system or softener in use will be recorded. To determine whether desorption of the filters is occurring, samples may be collected after water has passed through treatment devices. When possible, do not collect samples through a water hose. Samples should be collected directly from the spout.

If samples are taken from direct water main connections, the spigot will be flushed for 2 to 3 minutes (15 to 30 minutes is not necessary) to clear the service line. Water parameters (conductivity, temperature, and pH) will be measured. Well purging will be considered complete after three (3) consistent readings of pH, temperature and conductivity. Samples will *not* be collected from spigots after treatment (except as noted above) or from spigots that leak around their stems **or that** contain aeration devices or screens within the faucet.

For private wells equipped with hand or mechanical pumps, the water will be pumped for 5 minutes before the sample is collected directly from the spout.

SURFACE SOIL SAMPLING PROCEDURES

Areas selected for sampling will be located in order to collect a representative fraction of the soils with the minimum of samples. A surface inspection of the subject area will be made to locate pertinent features (e.g., rock outcrops, drainage patterns, surface runoff, erosion areas, etc.) and to evaluate the relationship among these features and potential sources of pollution. The locations of sediment deposition areas are good indicators of surface runoff direction.

A method of obtaining a shallow soil sample is to use stainless steel spoon or shovel. When deemed appropriate, a deeper soil sample may be obtained through the use of a soil corer. After collection, the soil sample will then be placed in the appropriate glass bottle. After the sample has been collected, the top of the bottle and lid will be wiped with a clean paper towel to ensure a tight seal. Samples for VOA analysis will be collected first, followed by samples for BNA's, metals and pesticides/PCBs. If metals are the primary concern at a site, the metals sample will be collected second. Care will be taken to fill the 120 mL VOA sample as full as possible to eliminate headspace. A decontaminated shovel or spade can be used to uncover the top 6 inches of soil so the sample can be collected from beneath the surface.

Sampling equipment such as stainless steel scoops and spoons, and shovels or spades must be decontaminated according to the specified procedures between sampling locations to avoid cross contamination. Dedicated sampling equipment will normally be used. If dedicated equipment are not used, then an equipment rinsate sample shall be collected at the end of each sampling day to demonstrate decontamination efficiency by TNRCC field personnel.

SEDIMENT SAMPLING PROCEDURES

Areas selected for sampling will be located in order to collect a representative fraction of the sediments with the minimum of samples. The primary consideration in sample site selection will be to choose an area of quiescent settling with low hydrologic activity or energy, and to evaluate these areas and potential sources of pollution. For example, areas that are: 1) inside the bend of channels; 2) backwater areas or side channels; and 3) of heavy shoaling and deposition. Quiescent areas are conducive to the settling of finer materials.

Sediment samples will be collected by use of a stainless steel spoon; or for samples greater than six (6) inches beneath the water surface, samples will be collected using either an Ekman dredge or sediment corer. When using a dredge, it will be lowered to the bottom of the water body with a minimum of substrate disturbance. Once the dredge jaws have been triggered, the closed dredge will be retrieved at a moderate speed of less than two (2) feet/second. Water overlying the sediment in the dredge will be gently decanted by slightly tipping the dredge until the water runs out the top. The decanting process will be completed in a manner to avoid

the removal of surficial sediments. In order to avoid contamination from material on the dredge walls, a stainless steel spoon will be used to remove sediments to a depth of one inch and no closer than 0.75 inches to the wall of the dredge. The sediment sample will then be placed in the appropriate glass bottle. Pebbles and sticks will not be transferred to the sample bottle. Additional dredge samples will be collected as needed to fill the sample bottle. After the sample has been collected, the top of the bottle and lid will be wiped with a clean paper towel to ensure a tight seal. Samples for VOA analysis will be collected first, followed by samples for BNA's, metals and pesticides/PCBs.

If metals are the primary concern at a site, the metals sample will be collected second. Care will be taken to fill the 120 mL VOA sample as full as possible to eliminate headspace. The Ekman dredge and stainless steel spoons must be decontaminated according to the specified procedures between sampling locations to avoid cross contamination. Dedicated sampling equipment will normally be used.

DECONTAMINATION PROCEDURES

To prevent contamination of samples by materials originating from the variety of on-site sampling tools and equipment, all sampling equipment (sample scoops, bailers, surface water dippers) will be decontaminated. Dedicated sampling equipment will be available for each sample planned. All equipment to be used at one site will be decontaminated in one batch prior to initiating any sampling. Each sampling tool will be placed in an individual sealable plastic bag or wrapped in a large plastic trash bag and closed with a custody seal. In the event that additional sampling is required or a sampling tool's integrity is questionable, then that tool will go through a decontamination process. The decontamination procedures are as follows:

1. Rinse equipment with tap (potable) water.

2. Clean the equipment with a brush in a solution of laboratory-grade detergent (Liquinox, Alconox, or equivalent) and potable water.

3. Rinse with tap water.

4. Rinse with 10 percent nitric acid solution, (trace metals grade) if analyzing for metals.

5. Rinse with distilled or deionized water.

6. If analyzing for organics, rinse with reagent-grade isopropanol.

7. Rinse with deionized water.

8. Air dry.

9. Place in plastic sealable bag if immediate use is not expected.

The sampling equipment will be cleaned as described above before its use for collecting each sample. After sampling is complete, each sample tool will be cleaned with a detergent wash and rinsed with distilled water to remove any potential contamination.

(B3) SAMPLE HANDLING/CUSTODY REQUIREMENTS

Sample custody is an integral part of any sample collection and analysis plan. Several steps for maintaining sample custody apply to field sample custody versus laboratory sample custody. First, in the field, the appropriate collection, identification, preservation, and shipment of the samples will ensure sample integrity. The second step is correct sample bottle identification and preparation. Lastly, when samples reach the laboratory, they are assigned a laboratory number and maintained at 4°C until sample preparation and analyses can be performed.

FIELD SAMPLE CUSTODY

Sample custody and documentation procedures described in this Section will be followed throughout all sample collection for all TNRCC SSIs. Components of sample custody are field logbooks, sample labels, sample tags, and chain-of-custody forms. CLP Organic and Inorganic Traffic Report (TR) forms will serve as chain-of-custody forms for this project. When Dioxin samples are to be collected the PCDD/PCDF Traffic Report (For Dioxin CLP Analysis) form will be used for this project.

FIELD LOGBOOKS

Bound field logbooks will be maintained by the Site Investigation Manager and other team members to provide a daily record of significant events, observations, and measurements during the field investigation. Each page in the logbook will be initialed by the author and signed after the last entry of each day. All entries by persons other than the author will be initialed or signed. All entries will be signed and dated.

All information pertinent to the field survey and sampling will be recorded in the logbooks. The logbooks will be bound books with consecutively numbered pages that are at least 4 ½ inches by 7 inches in size. Waterproof ink will be used in making all entries. Entries in the logbook will include, at the minimum, the following:

· General information:

- Names and titles of author and assistant, date and time of entry, and *physical/environmental conditions during field activity*
- Location of sampling activity
- Name and title of field crew.

· Sampling documentation:

- Sample medium (e.g., soil)
- Description of sampling point(s)
- Date and time of collection
- Sample identification number(s).
- Photographs

· Other information:

- Names and titles of any site visitors or interviewees
- Field observations and unusual field conditions
- Any field measurements made (such as pH, conductivity, temperature) including specific calibration data and documentation of field equipment (serial number, decontamination, etc.)
- Modifications to the work plan
- Sample handling (e.g., preservation with ice).

None of the field logbooks or chain-of-custody documents will be destroyed or discarded, even if they are illegible or contain inaccuracies that require a replacement document. If a previously recorded value is discovered to be incorrect, the wrong information will be crossed out in such manner that it is still legible, the correct value written in, and the change initialed and dated. If the change is made by someone other than the original author or if the change is made on a subsequent day, a reason for the change will be recorded at the then-current active location in the logbook, with cross-references.

SAMPLE TAGS

All samples collected at the site will be placed in an appropriate sample container for preservation and shipment to the designated laboratory. Each sample will be identified with a separate identification label and tag. The bottles and ice chests will be sealed with custody seals. Sample identification tags and custody seals will be provided by the CLP Sample Management Office. The tag will indicate if the sample is a split sample. The label will contain the sample number. The following information will be recorded on the tag:

- Analyses to be performed
- Sample identification number
- Source/location of sample
- Type of sample (composite or grab)
- Preservatives used (ice)
- Date
- Time (a four-digit number indicating the 24-hr clock time collection; for example, 1430 for 2:30 PM)
- Sampler's signature
- CLP case number.

Once the tag is complete, a custody seal will be placed over the lid of the bottle. The custody seal will show the date and sampler's signature.

TRAFFIC REPORT FORMS

Introduction - Samples and Sample Numbers

The CLP organic and inorganic multi-sample Traffic Reports/Chain-of-Custody forms (TRs) document samples shipped to CLP laboratories. They also enable the Sample Management Office (SMO) and the Region to track samples and ensure that the samples are shipped to the appropriate contract laboratory. TRs will be used each time Routine Analytical Services (RAS) samples are shipped to a CLP laboratory. The TRs may document up to ten samples shipped to one CLP laboratory under one case number and RAS analytical program.

The TR includes a chain-of-custody record which is located at the bottom of the form. The form is used as physical evidence of sample custody. According to EPA enforcement requirements, official custody of samples must be maintained and documented from the time of collection until the time the samples are introduced as evidence in the event of litigation. The lead Site Investigation Manager is responsible for the care and custody of the sample until sample shipment.

A sample is considered to be in custody if any of the following criteria are met:

1. The sample is in possession of the sampling team or is in view after being in possession.

2. The sample was in possession and then locked up or sealed to prevent tampering.

3. The sample is in a secured area, and security is documented.

CLP sample types are defined by the RAS analytical program. Under the RAS Protocol (SOW), a RAS sample consists of a low or medium concentration water matrix or a soil/sediment matrix that is single phase and homogeneous. No oily sample, nor a multi-phasic sample can be shipped to a CLP laboratory operating under the RAS contract. Such high concentration samples are handled only by Special Analytical Services (SAS) CLP laboratories. The collection and management of high concentration samples will be conducted in accordance with the requirements outlined in the "Region 6 CLP Training Manual", August 1996.

Low concentration samples are samples collected from off-site areas, where hazards are thought to be significantly reduced by normal environmental processes. Medium concentration samples are those where a compound or element may comprise as much as 15% of the total sample.

Low/medium concentration inorganic, low to medium concentration organic, and high concentration organic. Low/medium inorganic samples may be analyzed for total metals, cyanide, or both. Low/medium organic samples may be analyzed for VOAs, base/neutral/acid (BNAs), pesticide/PCBs, or any combination of these. High concentration organic samples may be analyzed for VOAs, BNA, and pesticide/PCBs. Inorganic samples are documented on Inorganic TRs. Organic and high concentration samples are documented on Organic TRs.

A CLP sample is one matrix - water or soil - never both. The CLP sample is further defined as consisting of all the sample aliquots from one station location, for each matrix and RAS analytical program.

The CLP generates unique sample numbers that must be assigned to each organic and inorganic sample. The unique CLP sample numbers are printed at SMO on adhesive labels and distributed to the region as requested. The field team leader will be responsible for assigning this critical sample number correctly and transcribing it accurately on the TR.

Organic sample numbers are in the format XX123, and have ten labels per strip four for extractables, two for VOAs, and four blank (extra). **UNUSED LABELS will be destroyed to prevent duplication of sample numbers.**

Inorganic sample numbers are in the format MXX123 and have seven labels per strip-- two for total metals, two for cyanide, and three extra (see Attachment 1). Remember that the unique sample number must only be used once. **EXTRA LABELS must be destroyed.**

Use only the labels provided by EPA Region 6. CLP sample numbers are alphabetically coded to correspond with each region as follows:

Table 2.3 EPA Region Sample Letter Codes

Letter Code			Letter Code		
Organic	Inorganic	Region	Organic	Inorganic	Region
A	MA	I	F	MF	VI
B	MB	II	G	MG	VII
C	MC	III	H	MH	VIII
D	MD	IV	Y	MY	IX
E	ME	V	J	MJ	X

Remember:

- TRs must be used for each case number with every shipment of samples to each CLP laboratory.
- Organic samples, high concentration samples, and inorganic samples are assigned separate, unique sample numbers. Each sample consists of all the sample aliquots from a sample station location for analysis in one of the three analytical programs.
- A CLP RAS sample will be analyzed as either a water or a soil sample.
- Prevent accidental duplication of sample numbers by destroying unused labels.
- Use the sample numbers specific to EPA Region 6.

· Contact the Program Manager or Technical Director at telephone number 512/239-2514 or 512/239-2512 if you need to collect more than the previously approved number of samples or a high concentration sample.

· Call Regional Sample Control Center (RSCC) at telephone number 281/983-2130 or 281/983-2137 if you have any questions about using TRs.

Forms Completion - Case Documentation

Instructions for filling out the Organic and Inorganic Traffic Report/Chain of Custody forms are as follows:

Top of Form
· SAS Number

· Enter this number only if explicitly told to do so by the RSCC.

· Case Number

· Enter this number.

Box No. 1

· Project code/site information:

· Leave the Project Code, Account Code, Regional Information and Non-Superfund Program fields blank.

· Enter the Site name, City/State and Site Spill ID in the designated spaces.

Box No. 2

· Regional information:

· Enter the EPA Region number (6), the name of your Sampling Company (TNRCC), and your name and signature in the designated spaces.

Box No. 3

· Type of activity:

· Check funding level for sampling. Next, check the code which describes the task of the sampling mission:

Funding Level

SF - Superfund
PRP - Potential responsible party
ST - State
FED - Federal

Pre-Remedial

PA - Preliminary Assessment
SSI - Screening Site Investigation
LSI - Listing Site Investigation

Remedial

RIFS - Remedial investigation feasibility study
RD - Remedial design
O&M - Operations and maintenance
NPLD - National priorities list delete

Removal

CLEM - Classic emergency
REMA - Removal assessment
REM - Removal
Oil - Oil response
UST - Underground storage tank response

Box No. 4

· Shipping Information:

· Enter the Date Shipped, the Carrier (i.e. Federal Express, Purolator, Airborne) and the Airbill Number in the appropriate spaces.

Box No. 5

· Ship to:

· Enter the name of the CLP laboratory contact (sample custodian) and its full address in the box.

Box No. 6

· Preservative:

· This box provides a list of commonly-used preservatives. Please enter the appropriate preservative used in Column D.

Box No. 7

· Sample description:

· This box provides a list of the description/matrices of samples that are collected. Please enter the appropriate description in Column A.

Completing the Form - Sample Documentation

· Carefully transcribe the CLP Sample Number(s) from the printed sample labels on the TR in the space provided.

Note: If you have made a mistake, do NOT attempt to erase or write over your mistake. Draw a single line through the mistake and initial and date it. Then, enter the correct information on the next line.

Complete columns A through G to describe the sample.

Column A, Sample Description

Enter the appropriate sample description code from Box No. 7.

When out in the field:

If sampling groundwater or surface water, describe both VOA TRIP BLANKS and EQUIPMENT RINSATE SAMPLES as No. 1 "Surface Water or Groundwater"

If sampling only soil/sediment, describe both the EQUIPMENT RINSATE SAMPLE and the FIELD BLANK SAMPLE as No. 4 "Field QC".

When conducting a laboratory decontamination event:

Describe both the EQUIPMENT RINSATE SAMPLE and the ULTRA DI SAMPLE as No. 4 "Field QC".

Note: Item No. 6 "Oil" and item No. 7 "Waste" are for SAS projects only. DO NOT SHIP OILY SAMPLES OR WASTE SAMPLES WITHOUT MAKING PRIOR ARRANGEMENTS WITH THE PROJECT MANAGER AND RSCC.

Column B, Concentration

Organic--If sample is estimated to be low or medium concentration, enter "L." When shipping SAS high concentration samples (previously arranged with Program Manager and RSCC), enter"H."

Inorganic--Enter "L" for low concentration, "M" for medium concentration, and "H" for high concentration (under previous SAS arrangement).

Note: *Ship medium and high concentration organic and inorganic samples in metal cans.*

Column C, Sample Type

Please enter which type of sample (composite or grab) was collected.

Column D, Preservation

Please enter preservation used (i.e., HCL, NaOH, HNO_3, H_2SO_4) refer to Box No. 6 or the reference number of the preservation (1-7, N). Always include ice as a preservative in addition to any chemical preservative used.

Column E, RAS Analysis

Check the analytical fractions requested for each sample, for example, VOAs, SVs, and pesticides are for low/medium concentration organics. Request only total metals and cyanide for RAS low/medium concentration inorganics.

Note: Aroclors/Toxaphenes may be requested, when using the High Concentration SOW, in a SAS Request.

Note: Either total or dissolved metals can be requested for each individual inorganic sample assigned a unique sample number, but not both analyses. A unique number must be assigned for each, even though they are from the same station location.

Column F, Regional Specific Tracking Number or Tag Number

Enter the Region specific tracking number or tag number(s) in the space provided. Since space is limited try to use tag numbers in a sequential order.

Column G, Station Location Number

Enter the Station Location Number in the space provided.

Column H, Month/Day/Year/Time of Sample Collection

Record the month, day, year, and time in military time (e.g., 1600 hours = 4:00 P.M.) of sample collection.

Column I, Sampler Initials

Enter the samplers initials.

Column J, Corresponding CLP Organic/Inorganic- Sample No.

Enter the corresponding CLP sample number for organic or inorganic analysis.

Column K, Designated Field QC

Enter the appropriate qualifier for "Blind" Field QC samples in this column.

Note: All samples must have a qualifier.

Blind Field QC	Qualifier
Blank	B
Duplicate	D
Rinsate	R
Performance Evaluation Samples	PE
Not a QC sample	---------

Note: **This information will be entered into EPA Headquarters database to track QC sample data. Please complete this Section carefully and accurately.**

Box Titled, "Shipment for Case Complete (Y/N)"

This should reflect the status of the samples scheduled at a lab for a specific case. When ALL samples scheduled/collected for shipment to a lab for a specific case have been shipped, the case is complete.

Box Titled, "Page 1 of "

Please enter the number of TRs per shipment.

Box Titled, "Sample Used for Spike and/or Duplicate"

Please enter sample number to be used for matrix spike and/or duplicate sample (internal lab QC). One per twenty/matrix/concentration/lab. See back of TR form.

Box Titled, "Additional Sampler Signatures"

Please record any additional sampler signatures you are unable to record in box 2.

Box Titled, "Chain-of-Custody Seal Number"

Leave the Chain-of-Custody Seal Number blank (Not used in Region 6).

Box Titled, "Split Samples Accepted/Declined"

Sampler should ask sight owner, PRP, etc. whether they want split samples taken. The split samples are either accepted or declined. Sampler should record their signature if split samples are collected and check the appropriate box.

How and When to Separate and Send Traffic Report/Chain-of-Custody Form Copies

When all paperwork has been completed by the sampler and samples are ready to be shipped:

Bottom 2 copies (white and yellow) of the traffic report/chain-of-custody forms should be placed in a plastic bag and taped to the inside of the cooler.

Top Blue/Green copy - Send to Region within five (5) working days from date of sample shipment. On this copy indicate in Column K the duplicate sample number.

Myra Perez
USEPA Region 6
10625 Fallstone Road
Houston, Texas 77099

Pink copy - Retain copy for files.

Instructions on the Reverse

Instructions summarizing CLP sample volumes, packaging, and shipment reporting requirements are printed on the back of the TRs.

SHIPPING OF SAMPLES

Samples will be shipped and delivered to the designated laboratory for analysis daily. During sampling and sample shipment, the lead Site Investigation Manager (or designee) will contact the SMO (designated on the CLP RAS Lab Assignment information facsimile) to inform them of shipments. **TNRCC WILL NOT CONTACT THE RECEIVING LABORATORY!!**

The samples will be shipped in ice chests by an overnight carrier such as Airborne Express. The TR forms (white and yellow) will be placed within the ice chest, which will be sealed with custody seals and/or tamper-resistant tape. Custody seals will be signed by the sample custodian shipping the samples. The air bill number will be noted on the chain-of-custody form. In addition the Airbill and TR form(s), each ice chest will contain an additional Airbill to provide for return of the ice chest to Judie Mattocks MC-142, Pollution Cleanup Division, TNRCC, Technical Park Center, Building D, 12100 Park 35 Circle, Austin, Texas 78753.

(B4) ANALYTICAL PROCEDURES and (B10) DATA MANAGEMENT

All analytical procedures will conform to analytical methods specified in the Routine Analytical Services (RAS) contract with the EPA. All data is managed by EPA in accordance with the USEPA Contract Laboratory Program Statement of Works for Organic and Inorganic Analyses. Data received by TNRCC in accordance with the 2000 and 2001 Cooperative Agreement is returned to EPA after validation for use in the SSI reports. EPA maintains full control of record-keeping procedures, receipt of data from the laboratory, and for detecting/correcting laboratory errors.

As per the EPA-CLP Statement of Work for Organic Analysis (including February 1994 revision), laboratories are required to perform any method specified in Exhibit D for volatile organic compounds (CLP-VOA), semivolatile organic compounds (CLP-SV), and pesticide/PCB compounds (CLP-PEST). As per the EPA-CLP Statement of Work for inorganic analysis (including February 1994 revision), laboratories are required to perform methods specified in Exhibit D. Metals will be analyzed using the 200 series, CLP-modified, methods as specified in Exhibit D. Cyanide will be analyzed by method 335.2 CLP-modified. Table 2.3 list the methods to be performed during this project under the RAS contract.

Table 2.4 Analytical Procedures for USEPA-CLP

Parameters	Method
Organics	
Volatile organics (VOA)	CLP-VOA
Semivolatile organics (BNA)	CLP-SV
Pesticides/PCBs	CLP-PEST
Inorganics	
Cyanides	335.2 CLP-M*
Metals	
Aluminum	202.2 CLP-M or 202.1 CLP-M
Antimony	204.2 CLP-M
Arsenic	206.2 CLP-M
Barium	208.2 CLP-M or 202.1 CLP-M
Beryllium	210.2 CLP-M
Cadmium	213.2 CLP-M
Calcium	218.2 CLP-M
Chromium	215.1 CLP-M
Cobalt	219.2 CLP-M or 219.1 CLP-M
Copper	220.2 CLP-M or 220.1 CLP-M
Iron	236.2 CLP-M or 236.1 CLP-M
Lead	239.2 CLP-M
Magnesium	242.1 CLP-M
Manganese	243.2 CLP-M or 243.1 CLP-M
Mercury	245.1 CLP-M, 245.2 CLP-M, or 245.5 CLP-M
Nickel	249.2 CLP-M or 249.1 CLP-M
Potassium	258.1 CLP-M
Selenium	270.2 CLP-M
Silver	272.2 CLP-M
Sodium	273.1 CLP-M
Thallium	279.2 CLP-M
Vanadium	286.2 CLP-M or 286.1 CLP-M
Zinc	289.2 CLP-M or 289.1 CLP-M

* CLP-M modified for the Contract Laboratory Program

(B5) QUALITY CONTROL REQUIREMENTS

Quality assurance for analytical work on this project will involve analysis of blank samples, spiked samples, and duplicate samples. For each group of 20 samples (or less if fewer than 20 samples are collected) of similar matrix (i.e., groundwater/surface water, soil/sediment) collected at each site, CLP internal laboratory QA/QC analysis will be conducted on one blank, one spiked, and one duplicate spiked sample. Field duplicates will be collected at a rate of 10% for each matrix and/or one per day, whichever is greater. Also, the TNRCC will include in each ice chest with samples to be shipped for analysis a temperature blank taped to the side of the chest prior to shipping.

LABORATORY QUALITY CONTROL BLANKS, SPIKED BLANKS, AND MATRIX SPIKES

Analysis of blank samples verifies that the analytical method does not introduce contaminants. The spiked blank is generated by addition of standard solutions to the blank water. The matrix spike will be generated by the CLP laboratory through the addition of standard solutions to a randomly selected field sample. Extra volume (triple volume) for a matrix spike and matrix spike duplicate will be collected for one water sample (groundwater or surface water, but not both) by the field team and sent to the assigned CLP Laboratory for internal quality control. In addition, one soil sample (no extra volume) will be designated on the TR by the field team and sent to the designated CLP laboratory for internal quality control.

FIELD QUALITY CONTROL SAMPLES

All samples will be collected with dedicated equipment, if possible. All sampling equipment will be decontaminated prior to initiating sampling activities. Three types of blanks will be taken in the field. The first type, **field blanks**, are blanks that are exposed to the same contamination as the field samples (e.g., airborne contaminants that are not from the waste being sampled). The second type, **trip blanks**, are collected for volatiles only. Volatile organics samples are susceptible to contamination by diffusion of organic contaminants through the Teflon-lined septum of the sample vial; therefore, a VOA **trip blank** will be analyzed to monitor for possible sample contamination. The trip blank also serves to detect contaminants in the sample bottles. These blanks are similar to field blanks with the exception that they are not exposed to field conditions. They allow evaluation of contamination generated from sample containers and changes occurring during the shipping and laboratory storage process. The third type, **equipment rinsate** blanks, will consist of CLP-specified grade water that has been poured over the equipment after completion of decontamination. The number of blanks collected in the field will be specified by the work plans for each site. The blanks collected in the field will not be counted for the laboratory's quality control protocol for matrix spikes or duplicate samples.

FIELD DUPLICATES

For samples collected for laboratory analysis, field duplicates will be collected at a rate of 10 percent of the total number of samples collected during each day of sampling for each sample matrix type at every site. The number of samples collected will be rounded up to the next increment of ten, such that twenty-one samples would require collection of three duplicates, if collected within three days. At least one field duplicate will be collected per day of sampling and will be packaged and sent to the laboratory for analysis with the other samples of the same sample matrix type.

EQUIPMENT RINSATE SAMPLES

Equipment rinsate samples will be collected to establish that proper sample bottle preparation, decontamination and handling techniques have been employed. Dedicated sample equipment will be used at each site for each sample station. All sample equipment will be decontaminated in the field and carefully packaged for return to the TNRCC Central Office. The decontarninated equipment will be taken to the TNRCC Region 11 Austin Office laboratory where one equipment blank will be collected and shipped to the assigned CLP laboratory for analysis. The equipment rinsate sample will be prepared by collecting CLP-specified grade water from the final rinse of the sampling equipment. Finally, the sample equipment will be placed in individual dated plastic bags, including chain-of-custody seals.

If sample equipment must be used more than once in the field, then the decontamination procedures for sample equipment will be followed and a rinsate sample collected in the field at the end of each sampling day and/or between each sample matrix type sampled, whichever is greater, and shipped to the assigned CLP laboratory with the associated sample matrix type. The number and type of QA samples at each site will be estimated in the SSI work plan. Modifications to the plan may be deemed necessary by the site investigation manager depending on field conditions, the on-site determination of additions or removals of sample locations, and the number of days required to complete the site sampling investigation.

(B7) CALIBRATION PROCEDURES AND FREQUENCY

Calibration of field instruments and equipment will be performed at approved intervals as specified by the manufacturer or more frequently as conditions dictate. Calibrations also may be performed at the start and completion of each test run. However, such calibrations will be re-initiated after any delay caused by meals, work shift change, or damage incurred. Standards will be used and duplicate samples analyzed in the field to verify pH and specific conductance data.

Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the EPA-CLP specifications. Calibration of laboratory equipment will be based on approved written procedures. It is the responsibility of the EPA data validators to ensure that the proper calibration protocols specified in the CLP statement of work were used. These calibration procedures and frequencies are included in the EPA Contract Laboratory Program, "Statement of Work for Organic Analysis" including revisions through August, 1994 and in the EPA Contract Laboratory Program, "Statement of Work for Inorganic Analysis" including revisions through February, 1994.

Records of calibration, repair, or replacement will be filed and maintained by the designated laboratory personnel performing quality control activities in accordance with EPA-CLP requirements. Calibration records of assigned laboratories will be filed and maintained at the laboratory location where the work is performed and will be subject to QA audit.

(B6 and B8) INSTRUMENT/EQUIPMENT TESTING, INSPECTION, PREVENTIVE MAINTENANCE PROCEDURES

Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendations and written procedures developed by the operators.

SCHEDULES

Manufacturer's procedures identify the schedule for servicing critical items in order to minimize the downtime of the measurement system. It will be the responsibility of the operator to adhere to this maintenance schedule and to arrange any necessary and prompt service as required. Service to the equipment, instruments, tools and gauges shall be performed by qualified personnel.

In the absence of any manufacturer's recommended maintenance criteria, a maintenance procedure will be developed by the operator based on experience and previous use of the equipment.

RECORDS

Logs will be established to record maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. Records produced will be reviewed, maintained, and filed by the operator when equipment, instruments, tools, and gauges are used at the sites. The Program Quality Assurance Specialist will audit these records to verify complete adherence to these procedures. Any deviations from these procedures will be reported to the Program Technical Director.

SECTION C

ASSESSMENT/OVERSIGHT

(C1) ASSESSMENT AND RESPONSE

QA audits are performed by the Program Quality Assurance Specialist. Functioning as an independent agent, the Program Quality Assurance Specialist will plan, schedule, and approve system and process audits according to procedures determined by the Program Technical Director, customized to specific project requirements. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, activities, and documentation of the measurement system(s), including subcontractor activities.

The Program Quality Assurance Specialist will report directly to the Technical Director. The Program Quality Assurance Specialist will coordinate and monitor the overall QA program, including all on-site activities and the quality control programs of the laboratories. Implementing prompt, effective, and accurate corrective action in response to noncompliance that may occur on projects is absolutely essential in assuring the quality of the end product.

QUALITY SYSTEM AUDIT

A quality system audit refers to a detailed evaluation of the Project's Quality Assurance Program to determine its conformance to the Multi-Site Cooperative Agreement commitments and standard TNRCC procedures. Such an audit includes preparation of formal plans and a checklist based on established requirements. A copy of a field audit checklist is at the end of this section. Audits will be performed on TNRCC work.

(C2) REPORTS TO MANAGEMENT

Audit reports will be written by the Program Quality Assurance Specialist after gathering and evaluating all available data. Items, activities, and documents determined by the Program Quality Assurance Specialist to be non-compliant will be identified at interviews conducted with the Technical Director and Program Manager. Non-compliant elements will be logged, documented, and controlled through audit findings, which are attached to the audit report. These audit findings are directed to the Program Manager to resolve the noncompliance satisfactorily in a specified and timely manner.

All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the Program QA/QC Officer prior to issue. QA verification of acceptable resolutions may be determined by re-audit for documented surveillance of the item or activity. Upon verification acceptance, the Program QA/QC Officer will close out the audit report and findings.

It is the Program Manager's overall responsibility to ensure that all corrective actions to resolve audit findings are acted upon promptly and satisfactorily by project personnel.

FIELD AUDIT CHECKLIST

Project No. _____

Project Name _____

Site Investigation Manager _____

Auditor _____

Dates of Field Audit _/__/__ - _/__/__

A: Health and Safety

1. The Site-Specific Health and Safety Plan has been prepared by the TNRCC Site Investigation Manager and subsequently approved by the TNRCC Program Manager and TNRCC Health and Safety Officer prior to arrival to the site.

Yes ___ No ___

Comments_____

_____

2. The Site-Specific Health and Safety Plan has been signed by all who intend to enter within the site boundaries prior to entry onto the site.

Yes ___ No ___

Comments_____

_____

B: Project Organization Adequate ___ Marginal ___ Failed ___

1. Did the Site Investigation Manager hold a briefing with each participant to go over any concerns or questions for project organization?

Yes ___ No ___

Comments_____

_____

2. Did the Site Investigation Manager provide appropriate number and types of material supplies necessary to collect samples (jars, bottles, gloves, pens, coolers, coolant, preservatives, protective gear, Work Plan, Health and Safety Plan, CLP, QAPP or other reference material)?

Yes ___ No ___

Comments_____

_____

3. Were additional instructions given to each participant not otherwise found in the preliminary written material, such as the Site-Specific Work Plan, Health and Safety Plan, CLP or QAPP?

Not Applicable ___

Additional Instructions_____

_____

C: Sample Collection Procedures

1a. Did the Site Investigation Manager ensure that the sampler collected adequate volumes of sample to allow for the planned sample analyses and field duplicates, plus any laboratory QC blanks and laboratory QC duplicates/spikes, as applicable?

Yes ___ No ___

Comments_____

_____

1b. Did the Site Investigation Manager provide a supply of the appropriate type of sample containers for the samples collected?

Yes ___ No ___ No Modifications ___ Modifications ___

Comments_____

_____

2. Were samples collected as stated in the Site-Specific Work Plan (number, frequency, and type)?

Yes ___ No ___ No Modifications ___ Modifications ___

Sample Modifications_____

_____

D: Chain of Custody

1a. Did the Site Investigation Manager ensure that the sample tags were properly completed and attached to each sample container?

Yes ___ No ___

Comments_____

_____

1b. Did the Site Investigation Manager ensure that the custody seals were properly completed and attached to each sample container in unbroken condition?

Yes ___ No ___

Comments_____

_____

1c. Did the Site Investigation Manager ensure that each sample container was labeled with the sample number and protected with clear tap?

Yes ___ No ___

Comments_____

_____

2. Was each completed traffic report , faxed to EPA, original copy mailed to EPA, and copies corrected as necessary?

Yes ___ No ___

Comments_____

_____

3. Did the traffic report accompany each shipment to the correct EPA contract lab?

Yes ___ No ___

Comments_____

_____

E: Field Observations Adequate ___ Marginal ___ Failed ___

1. Were field observations written in ink and presented accurately in the field logbook, and was each page signed and dated?

Yes ___ No ___

Comments_____

_____

2. Were photographs logged in the logbook with the date, time, location, name of person taking the picture, type of sample, sample number, and the photo number?

Yes ___ No ___

Comments_____

_____

3. Prior to use, did the Site Investigation Manager ensure that the measuring equipment was calibrated to standard procedures as presented in accompanied documents written specifically for the instrument?

Yes ___ No ___

Comments_____

_____

4. Have any accountable documents been lost?

Not Applicable ___

Documents Lost_____

_____

General Comments or Concerns Regarding the Sampling Procedures, Organization, and Site Investigation Management:

_____

_____

_____

Printed Name of Auditor_____

Signature of Auditor _____ Date_____

SECTION D

DATA VALIDATION AND USABILITY

(D1 and D2) DATA REVIEW, VALIDATION, VERIFICATION METHODS

FIELD MEASUREMENT DATA

Field measurements will be made by field geologists and engineers, environmental analysts, and technicians. The following standard reporting units will be used during all phases of the project:

- pH will be reported to 0.1 standard units.
- Specific conductance will be reported to two significant figures below 100 umhos per centimeter (umhos/cm) and three significant figures above 100 umhos/cm.
- Temperature will be reported to the nearest 0.5° Celsius (°C).
- Water levels measured in wells will be reported to the nearest 0.1 foot.
- Soil sampling depths will be reported to the nearest 0.5 foot.

Field data will be validated using different procedures.

- Checklists will be used during the processing of data that will identify errors - for example, identifying errors in identification codes.
- Checks may be made for consistency with parallel data sets (data sets obtained presumably from the same population) - for example, from the same region of the aquifer or volume of soil.

The purpose of these validation checks and tests is to identify outliers, i.e., observations that do not conform to the pattern established by other observations. Outliers may be the result of transcription error or instrumental breakdowns. Outliers may also be manifestations of a greater degree of spatial or temporal variability than expected.

If an outlier is identified, a decision concerning its fate will be rendered. Obvious mistakes in data will be corrected when possible, and the correct value will be inserted. If the correct value cannot be obtained, the data may be excluded. An attempt will be made to explain the existence of the outlier. If no plausible explanation can be found for the outlier, it may be excluded, but a note to that effect will be included in the report. Also, an attempt will be made to determine the effect of the outlier when both included and excluded in the data set.

LABORATORY DATA

The procedures used for calculations and data reduction are specified in each method referenced previously. It will be the responsibility of the laboratory to follow these procedures.

VALIDATION

The laboratory data will be validated by EPA according to the following EPA documents:

- National Functional Guidelines for Organic Data Review (August 1994)
- National Functional Guidelines for Evaluating Inorganics Analyses (February 1994).

REPORTING

The project analytical report from the CLP laboratory will contain data sheets and the results of analysis of QC samples. Analytical reports may also contain the following items:

- Project identification
- Field sample number
- Laboratory sample number
- Sample matrix description
- Date of sample collection
- Analytical method description and reference citation
- Individual parameter results
- Date of analysis (extraction, first run, and subsequent runs)
- Quantitation limits achieved
- Dilution or concentration factors
- Corresponding QC report (including duplicates and spikes).

Matrix interferences on some of the samples, particularly the waste samples, may result in increased detection limits. Matrix interference will be reported as the cause of increased detection limits.

(D3) RECONCILIATION WITH DQO

The following procedures have been established to assure that conditions adverse to quality--malfunctions, deficiencies, deviations, and errors--are promptly investigated, evaluated, and corrected.

INITIATION OF CORRECTIVE ACTION

When a condition adverse to quality is noted at the project site, laboratory, or subcontractor locations, the cause of the condition will be determined and corrective action taken to preclude repetition. All project personnel have the responsibility, as part of normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality.

Corrective actions may be initiated at a minimum:

- When predetermined acceptance standards--objectives for precision, accuracy, and completeness--are not attained.
- When procedures or data compiled are determined to be faulty.
- When equipment or instrumentation is found faulty.
- When samples and test results cannot be traced with certainty.
- When quality assurance requirements have been violated.
- When designated approvals have been circumvented
- As a result of an audit.

PROCEDURE DESCRIPTION

Project management and staff, including field investigation teams, sample control personnel, and laboratory groups, monitor ongoing work performance in the normal course of daily responsibilities.

Following identification of an adverse condition or quality assurance problem, notification of the deficiency will be made to the project manager and senior individual in charge of the activity found to be deficient, along with recommendations for correction. Following implementation of corrective action, the senior individual in charge will report actions taken and results to the Program Manager and Program QA/QC Officer.

EQUATIONS FOR PRECISION, ACCURACY, AND COMPLETENESS

Planned procedures used to assess data precision and accuracy are in accordance with 44 FR 69533, "Guidelines Establishing Test Procedures for the Analyses of Pollutants", and appendix III, "Example Quality Assurance and Quality Control Procedures for Organic Priority Pollutants", December 3, 1979. Completeness is recorded by comparing the number of parameters initially analyzed with the number of parameters successfully completed and validated.

PRECISION

Relative percent difference (RPD) is calculated as:

$$RPD = \frac{|x_1 - x_2|}{x} \times 100\%$$

where:
x_1 = analyte concentration of first duplicate
x_2 = analyte concentration of second duplicate
x = average analyte concentration of duplicates 1 and 2.

ACCURACY

Accuracy is expressed as a percent recovery (PR), calculated by:

$$PR = \frac{(A-B)}{C} \times 100\%$$

where:
A = spiked sample result (SSR)
B = sample result (SR)
C = spike added (SA).

COMPLETENESS

The completeness of the data will be determined by:

$$PC = \frac{N_a}{N_t} \times 100\%$$

where:
PC = percent complete
N_a = number of actual valid results
N_t = number of theoretical results obtainable.

APPENDIX A

Preliminary Assessment/Site Inspection Program Fiscal Year 2000 Schedule

The Preliminary Assessment/Site Inspection Program Fiscal Year 2000 Schedule will be inserted as soon as it becomes available

APPENDIX B

Sampler's Guide to the Contract Laboratory Program

United States
Environmental Protection
Agency

Office of
Solid Waste and
Emergency Response

9240.0-30
EPA/540/R-96/032
PB96-963511

Superfund

SAMPLER'S GUIDE TO THE CONTRACT LABORATORY PROGRAM

9240.0-30
EPA/540/R-96/032
PB96-963511

Sampler's Guide to the Contract Laboratory Program

Office of Emergency and Remedial Response
U.S. Environmental Protection Agency
Washington, DC 20460

NOTICE

The policies and procedures set forth here are intended as guidance to Agency and other government employees. They do not constitute rulemaking by the Agency, and may not be relied on to create a substantive or procedural right enforceable by any other person. The Government may take action that is at variance with the policies and procedures in this manual.

For further information on the Contract Laboratory Program (CLP) or to obtain a copy of the *User's Guide to the Contract Laboratory Program*, contact the National Technical Information Service (NTIS) of the United States Department of Commerce at (703) 487-4650. In addition, the entire current Superfund bibliography may be purchased from NTIS at (703) 487-4650.

Additional copies of this manual can be obtained from:

National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650

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PREFACE

The *Sampler's Guide to the Contract Laboratory Program* has been prepared by the U.S. Environmental Protection Agency Analytical Operations Center. It is specifically designed for samplers to help clarify sampling procedures necessary to submit samples for CLP analysis. The *Sampler's Guide to the Contract Laboratory Program* acts as a reference for the Regions and sampling contractors to promote consistency in sampling procedures throughout the Regions and to ensure the proper adherence to CLP requirements. This document is intended to be used as a supplement to, not as a replacement for, existing Regional sampling instructions.

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1.0 THE CLP NETWORK

The Contract Laboratory Program (CLP) is a national program of commercial contractor laboratories supporting the Environmental Protection Agency's (EPA's) Superfund nationwide effort to clean up designated hazardous waste sites. Superfund was originally established under the 1980 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and presently exists under the 1986 Superfund Amendments and Reauthorization Act (SARA).

The CLP provides chemical analytical services using state-of-the-art technology for the ten EPA Regions. The program is structured to provide data of known and documented quality for use in supporting EPA enforcement actions or other user needs. To achieve this goal, the CLP has established strict quality assurance procedures and detailed documentation requirements.

The CLP is directed by the Analytical Operations Center (AOC) in the Office of Emergency and Remedial Response (OERR) in the Office of Solid Waste and Emergency Response (OSWER). AOC includes the Organic and Inorganic Program Coordinators and the Administrative Project Officers (APOs) for the CLP laboratories, the Project Officer for the Contract Laboratory Analytical Services Support (CLASS) contract, the Project Officer for the Quality Assurance Technical Support (QATS) contract, the National Automated Data Processing (ADP) Manager, and the Quality Assurance Coordinator. AOC responsibilities include the following:

- Development of analytical methods;
- Development of the Statements of Work (these documents define required analytical methods, quality control, detection/quantitation limits and holding times) for the analytical services procured under the CLP;
- Development of and implementing policies and budgets for Superfund analytical operations;
- Development of information management policies and products for analytical data;
- Management of the CLASS and QATS contracts;
- National administration, evaluation, and management of the CLP; and
- Direction of CLP quality assurance activities in coordination with overall OSWER quality assurance activities.

In coordinating Superfund sampling efforts, AOC is supported by the APOs, the contractor-operated CLASS office, the Regional Technical Project Officers (TPOs), the Regional Sample Control Centers (RSCCs), and the Regional Site Managers (Site Assesssment Managers, On-Scene Coordinators and Remedial Project Managers). See Exhibit 1-1 for a generalized organization chart (functions may vary by Regions).

Currently, AOC is allowing other Agencies/Departments the opportunity to "buy-into" the CLP. This is being done on a cost-reimbursable basis through Interagency Agreements.

Administrative Project Officer

The APO is responsible for monitoring laboratory performance, initiating contract action, and funding laboratory contracts. The APO works closely with the TPOs and laboratories to resolve problems. The APO is also responsible for developing analytical methods and designing new CLP services.

Contract Laboratory Analytical Services Support

The CLASS contractor provides management, operations, and administrative support to the CLP. The CLASS contractor routinely receives Regional analytical requests, coordinates and schedules sample analyses, tracks sample shipments and analyses, receives and checks data for completeness and compliance, processes laboratory invoices, and maintains a repository of sampling records and program data.

Regional Technical Project Officer

The TPO monitors the technical performance of the contract laboratories in his or her Region. The TPO works closely with the APOs in responding to laboratory technical problems and leads laboratory on-site evaluations. The TPO is the sole Regional official who may contact the CLP laboratories.

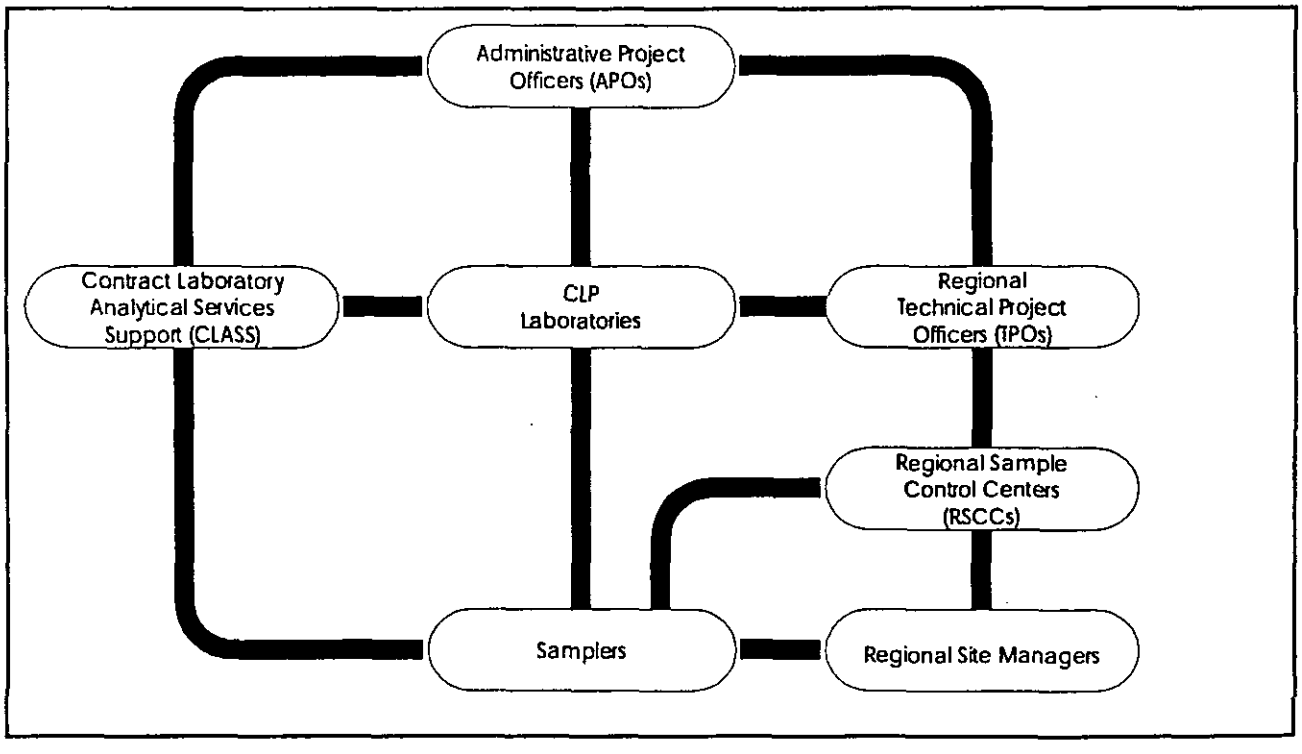
Regional Sample Control Center

In most Regions, the RSCC coordinates the sampling efforts and serves as the central point of contact for sampling questions and problems. The RSCC assists in coordinating the level of Regional sampling activities to correspond with the monthly projected demand for analytical services.

Regional Site Manager

The Regional Site Manager (Site Assessment Manager, On-Scene Coordinator or Remedial Project Manager) is responsible for coordinating the development of data quality objectives and for overseeing project-specific remedial contractors, state officials, or private parties conducting site sampling efforts.

Exhibit 1-1. CLP Organization Chart



1.1. PROCUREMENT OF CONTRACT LABORATORY SERVICES

1.1.1. Procedures for requesting/scheduling analytical services.

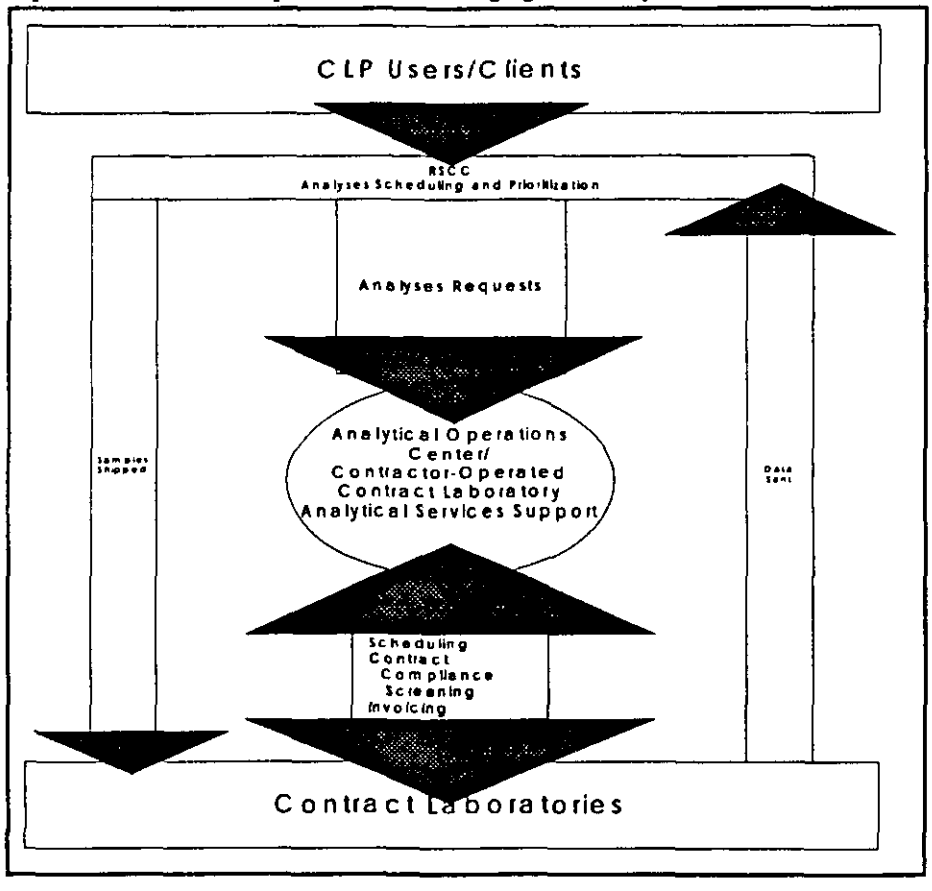
To initiate a CLP Analytical Services (CLPAS) request, the RSCC or Regional/Agency designee contacts the appropriate CLASS Coordinator by telephone or fax and provides a complete description of the analytical requirement. The information required to initiate a CLPAS request includes the sampler's name, sampler's phone number, site name, city and state where the site is located, site spill identification number, expected date of sample shipment, number of samples, type of analyses, turn-around-time, fractions to be analyzed, and sample matrix.

1.1.1. Timing and scheduling

By noon eastern time on the Wednesday of the week prior to the scheduled start of a planned sampling activity, the RSCC or Regional/Agency designee contacts the CLASS Coordinator to place a CLPAS request and to provide scheduling information to the CLASS contractor. This lead-time enables the laboratories to prepare for EPA samples, and to provide for resolution of sampling questions. It also allows the sampler time to prepare the required sample documentation prior to field activity, if appropriate. Late scheduling requests (i.e., requests received between Wednesday noon and the date of sampling) are accommodated with available laboratory capacity. To avoid possible shortfalls, Regions are strongly encouraged to submit all CLPAS scheduling requests prior to Wednesday noon, when possible. A more complete discussion of the procedures for arranging CLP analytical services can be found in the User's Guide to the Contract Laboratory Program.

1.1.2. Chain of Communication within the CLP

Exhibit 1-2.



2.0 CONTRACT LABORATORY ANALYTICAL SERVICCES SUPPORT

The CLP provides the user community with a wide range of Contract Laboratory Program Analytical Services (CLPAS) through laboratories that have been awarded government contracts under the CLP.

CLPAS services generally apply to the analysis of water and soil/sediment samples for specific target organic and inorganic analytes, and are performed under firm, fixed-price, standardized contracts that include standard analytical methodologies, quality assurance and quality control (QA/QC) procedures, and data reporting formats. The CLP analytical services are shown with their corresponding fractions and concentrations in Exhibit 2-1.

EPA Regions may request a portion of the analytical services provided under the CLP. For example, CLP Analytical Services-volatile analysis may be ordered without CLP Analytical Services-semi-volatile analysis or CLP Analytical Services-pesticide/Aroclor analysis. However, CLP Analytical Services-pesticide analysis may not be ordered without CLP Analytical Services-Aroclor analysis, since fractions may not be split.

Exhibit 2-1. Contract Laboratory Program Analytical Services

STATUS OF SERVICE	ANALYTICAL SERVICES	FRACTIONS	CONCENTRATION[1]	MATRIX	TURN-AROUND TIMES[2]
Available	Multi-Media, Multi-Concentration Organics (Low/Medium)	Volatiles, Semivolatiles, Pesticides/Aroclors	Low, Medium	Water, Soil/ Sediment	14 or 35 days, depending on contract requirements
	Multi-Media, Multi-Concentration Inorganics (Low/Medium)	Total Metals, Dissolved Metals, Cyanide	Low, Medium	Water, Soil/ Sediment	14 or 35 days, depending on contract requirements
Future	Low Concentration Organics	Volatiles, Semivolatiles, Pesticides/Aroclors	Low[3]	Water	14 days
	Water Quality/ Wet Chemistry	Alkalinity, Ammonia, Total Organic Carbon, Chemical Oxygen Demand, Chloride, Nitrate/Nitrite, Phosphorus, Total Dissolved Solids, Total Suspended Solids, Sulfate	Low, Medium, High	Water	14 days

1 See Section 3.1, CLPAS Sample Definition, for the definitions of low, medium, and high concentrations.

2 Turnaround times are the maximum time allowed under the CLPAS contracts for laboratory submission of all reporting and deliverable requirements. Turnaround times for each sample are calculated from the day on which the sample is received at the CLP laboratory, as recorded on the shipper's delivery receipt and traffic report/chain-of-custody form.

3 Low concentration for these services refers to the analytical quantitation limits for drinking water samples.

3.0 SAMPLE COLLECTION

3.1 Sample Definition

A CLP Analytical Services sample is defined by one sample matrix at one concentration level from one station location for each individual or set of analytical fraction(s), provided the fractions are all requested from the same CLP Analytical Service. CLP Analytical Services are generally used to analyze low and medium concentration samples. Low concentration samples are considered to be those samples collected in areas where immediate hazards are thought to be significantly reduced either by normal environmental processes or because of limited contamination. Medium concentration samples are most often those collected on-site in areas of moderate dilution by normal environmental processes. High concentration samples are considered to be those collected directly from drums, pits, ponds, lagoons, or areas where no dilution of waste is evident [these sample analyses are not available under current CLP Statements of Work]. For the most current definition of low or medium concentration please refer to the current CLP Statements of Work. The sampler must identify low, medium, and high concentration samples in the field in order to determine sample collection volume, packaging, and shipping procedures. CLP Analytical Services matrices can be water, soil or sediment. In some instances a mixed-matrix sample may be collected which contains either a supernatant (for a sediment/soil sample) or a precipitate (for a water sample). In those instances, it is best to discuss the required procedures with the TPO or APO. In general, two individual samples should be collected by separating the aqueous layer from the solid/precipitate layer at the point of collection is preferable.

A CLP Analytical Services sample consists of all sample aliquots (portions) from one station location, for one matrix, for one analytical program, for one laboratory necessary to collect appropriate volumes needed for the analysis of each fraction. One CLP Analytical Services sample may be contained in several bottles and vials. For example for the Low/Medium Organics CLP Analytical Service, one water sample might consist of all of the containers needed for the three analytical fractions available under this service (i.e., volatile fraction, semi-volatile fraction, and pesticide/Aroclor fraction), even though the fractions will be collected in separate containers. Therefore, the fractions of the CLP Analytical Service, along with the type of matrix and the expected concentration level (low/medium or high level), determine container type and volume.

As an example, let's say you are sampling at Leroy's Pond (see Exhibits 3.1 and 3.2). *You are instructed to collect one low/medium concentration water sample and one low/medium concentration soil/sediment sample, each to be analyzed for all of the low/medium organic and inorganic fractions available through CLP Analytical Service.* According to CLP guidelines, each individual inorganic sample may be analyzed for total metals or dissolved metals, but not both. If you want data for both dissolved metals and total metals from the same station location, you must collect two separate samples and assign them each unique CLP sample numbers.

For the CLP Analytical Services Multi-Media, Multi-Concentration Inorganics (Low/Medium) contract, the analytical fractions of interest are total metals and cyanide. For the CLP Analytical Services Multi-Media, Multi-Concentration Organics (Low/Medium) contract, the analytical fractions of interest are volatiles, semivolatiles, and pesticides/Aroclors. In the future it will be possible to consider the Organic Low Concentration (water only) service.

Exhibit 3-1. Sampling at Leroy's Pond

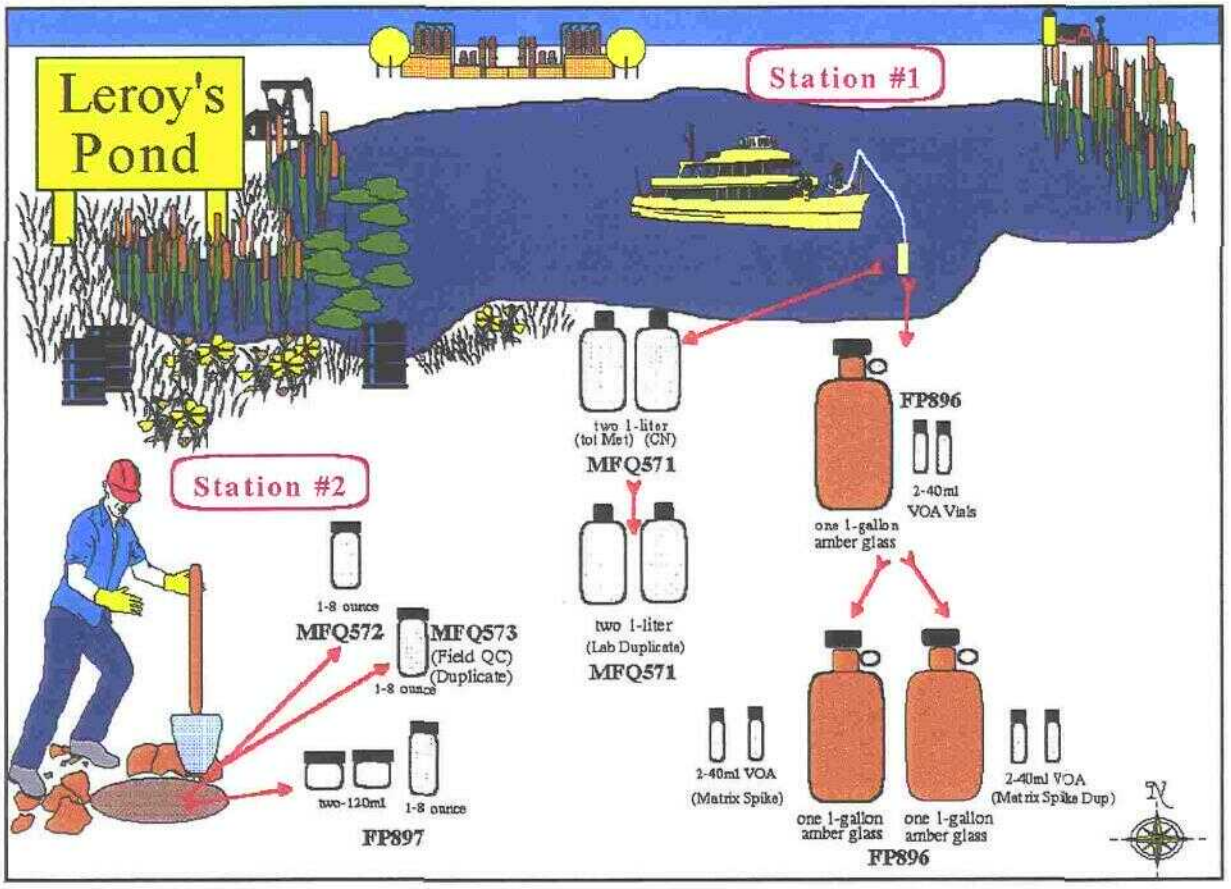


Exhibit 3-2. Table of Sampling at Leroy's Pond

MATRIX	LOW/MEDIUM ORGANICS	LOW/MEDIUM INORGANICS
Water	Volatiles Semivolatiles Pesticides/Aroclors	Total Metals Cyanide
Soil/Sediment	Volatiles Semivolatiles Pesticides/Aroclors	Total Metals Cyanide
Total number of samples collected = 4	2 organic samples (1 water + 1 soil/sediment)	2 inorganic samples (1 water + 1 soil/sediment)

Because you are collecting samples from two matrices for two analytical services, you must collect four separate samples: one water sample and one soil/sediment sample to be analyzed for CLP Analytical Services organics and one water sample and one soil/sediment sample to be analyzed for CLP Analytical Services inorganics. Note that a single sample may consist of several containers because each fraction and each concentration category require a certain volume for analysis.

3.2 CLP Analytical Services and Project Data Quality Objectives

Before requesting CLP Analytical Services, project managers should evaluate whether the services offered under the CLP are appropriate to meet the Data Quality Objectives (DQOs) [1] established for their project. This evaluation should take place during the planning stages of a sampling project and be documented in the Quality Assurance Project Plan (QAPP)[1] and/or the Sampling and Analysis Plan (SAP) [1].

The following specifications/features of CLP Analytical Services (this information is generally found in the Statement of Work for the analytical service) should be evaluated to determine the adequacy of the standardized services to meet the project DQOs:

- list of included target analytes/compounds
- sample concentrations covered
- required minimum sample volumes
- laboratory subsample size
- sample preparation and digestion methods
- analytical methods
- turnaround times
- Instrument Detection Limits
- Contract Required Quantitation/Detection Limits
- QA/QC requirements (e.g., identity, frequency, and acceptance criteria for laboratory QC samples)
- laboratory sample receipt and custody requirements
- data package deliverables (reporting requirements)

For example, the detection limits required to meet the project DQOs for some risk assessments might be lower than the Contract Required Detection Limits offered by the CLP. The standard CLP digestion and analytical methods might not be suitable for the sample matrix of interest. The CLP data turnaround times might be too long for some emergency response sampling projects. For situations such as the emergency response scenario, it is possible that a combination of CLP Analytical Services for the non time-critical analytes and alternative fast-turnaround services (14-day turn around time) for the time-critical analytes would be adequate to meet the project DQOs.

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[1]For more information regarding QA and SAP planning and the DQO process, consult the documents listed in Section 9.0 of this guide.

If it is determined that CLP Analytical Services will not be adequate for all or some of the samples to be collected, alternatives should be explored. Each EPA Region may have developed analytical services options to supplement the laboratory services available nationally through the CLP. Contact the appropriate Regional analytical services representatives (usually the personnel listed in Section 7.0, Communications Network) for guidance in obtaining analytical services that will meet project DQOs.

3.3 References to CLP Laboratory Services in QAPPs and SAPs

QAPPs and SAPs typically contain sections describing analytical laboratory services. Standard, or boiler-plate, language is often used to describe laboratory requirements for procedures such as sample receipt and notification and laboratory participation in analyzing Performance Evaluation Samples (PESs). CLP contract specifications are designed to incorporate many of the most common good laboratory practice requirements, such as the requirement for laboratory Quality Management Plans (QMPs for further information see Section 9.0). If CLP Analytical Services will be requested for all or some of the samples covered in a QAPP and/or SAP, care should be taken to ensure that the QAPP/SAP descriptions of laboratory services for the CLP-destined samples are compatible with the CLP contract specifications. For example, CLP contracts do not allow CLP laboratories to contact samplers directly regarding problems with sample receipt. (Note that only the EPA Contracting Officer for the CLP has the authority to modify CLP contract specifications.) **It is generally the responsibility of the project manager to make sure that the project laboratory services requirements are communicated to the Regional analytical services representatives.**

QAPPs and/or SAPs also typically include standard operating procedures (SOPs) for procedures such as completing chain-of-custody forms, sample identification, and sample packaging and shipment. SOPs that will be used when collecting samples for analysis through the CLP should be reviewed before use to ensure that CLP requirements are accommodated. Many consultants' SOPs call for the site name to be provided on the form. However, for CLP Analytical Services samples, Case Numbers, rather than site names are used. SOPs associated with the collection of CLP samples should be reviewed before use to ensure that CLP requirements are accommodated.

In addition, QAPPs and SAPs specify such information as the analytical methods and laboratory QC requirements that will be used for samples. When CLP Analytical Services will be requested for samples, it is common for the QAPP or SAP to reference the appropriate CLP Statement of Work (SOW) for details such as the laboratory QC sample frequencies. There is often confusion regarding how to reference CLP SOWs, because several versions of a SOW for a particular analytical service, such as "Low/Medium Organics," may be active under contracts at the same time. Also QAPP and SAP authors do not control CLP laboratory assignments and will not know in advance which laboratory and corresponding SOW version will be assigned for their samples. Therefore, QAPP and SAP authors should refer to CLP SOWs as in the following example:

> "Low/medium concentration soil samples will be analyzed according to the specifications of the current EPA Superfund Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentrations Organics."

3.4 Sample Volume

The collection of proper sample volume is imperative to the success of sample analysis. If sufficient sample volume is not collected, the analysis of all required parameters and complete quality control determinations may not be possible. (See Section 3.6, Quality Control Samples.) Therefore, it is especially important to note the volume requirements for each specified. If adequate sample volume cannot be collected, notify the authorized RSCC or CLP Analytical Services Support personnel sample immediately. Note that more than one container may be required to provide the total volume of sample needed (e.g., two-40-ml glass vials for one volatile organic compound [VOC] analysis). Exhibits 3-3 and 3-4 specify the required sample volume and container type for each CLP Analytical Services fraction. Container type codes are detailed in Section 3.5, Sample Containers, and in Exhibit 3-5.

Exhibit 3-3. Low/Medium Organics Sample Volume

SAMPLE MATRIX	CONCENTRATION	FRACTION	LABORATORY QC SAMPLE VOLUME	MINIMUM SAMPLE VOLUME	CONTAINER TYPE[1]
Water	Low/Medium	Volatiles	4 each (40 mL)	2 each (40 mL)	B or D
		Semivolatiles	4 L	2 L	A,E,F,G,H,J, or K
		Pesticides/Aroclors	4 L	2 L	A,E,F,G,H,J, or K
Soil/ Sediment	Low/Medium [2]	Volatiles	4 each (40 mL)	2 each (40 mL)	D or B
		Semivolatiles	4 oz.	4 oz.	A,E,F,G,H,J, or K
		Pesticides/Aroclors	4 oz.	4 oz.	A,E,F,G,H,J, or K

[1] Some sample containers may have small neck sizes and inhibit sampling efforts. See Exhibit 3.4 for container types.

[2] All medium soil/sediment sample containers should be double contained before shipment (e.g., sample bottle/jar/vial placed in clean, lidded metal paint can). Consult DOT regulations for applicable shipping requirements.

Exhibit 3-4. Low/Medium Inorganics Sample Volume

SAMPLE MATRIX	CONCENTRATION	FRACTION	LABORATORY QC SAMPLE VOLUME	MINIMUM SAMPLE VOLUME	CONTAINER TYPE[1]
Water	Low/Medium	Total Metals	1L	1 L	A,C,E,F,G,H,J,K, or L
		Dissolved Metals	1L	1 L	A,C,E,F,G,H,J,K, or L
		Cyanide	1.5 L	1 L	A,C,E,F,G,H,J,K, or L
Soil/ Sediment	Low/Medium [2]	Total Metals	6 oz.	6 oz.	A,C,E,F,G,H,J,K, or L
		Cyanide	6 oz.	6 oz.	A,C,E,F,G,H,J,K, or L

[1] Some sample containers may have small neck sizes and inhibit sampling efforts. See Exhibit 3.4 for container types

[2] All medium concentration soil/sediment sample containers should be double contained before shipping (e.g., sample bottle/jar/vial placed in clean, lidded metal paint can). Consult DOT regulations for applicable shipping requirements.

3.5 Sample Containers

Exhibit 3-4 lists sample containers generally used during sample collection. Always use clean sample containers of an assured quality. For container cleaning procedures and additional container information, refer to the current iteration of *Specifications and Guidance for Contaminant-Free Sample Containers*, December 1992, OSWER Directive 92.0-05A. See Exhibits 3-3 and 3-4 for sample volume requirements. Samplers may wish to purchase pre-cleaned/quality assured bottles in lieu of cleaning their own bottles.

3.6 Quality Control Samples

QC samples are used to estimate the precision and accuracy of analytical results and to examine sources of error introduced by field and laboratory practices. A designated number of field QC samples may be included in each batch of samples which are sent to the CLP laboratory, as specified by the Sampling and Analysis Plan. A designated number of laboratory QC samples must be included in each batch of samples which are sent to the laboratory, as specified by

Exhibit 3-5 Sample Container Types

CONTAINER TYPE	SPECIFICATIONS
A	**Container:** 80-oz. amber glass, ring handle bottle/jug, 38-mm neck finish. **Closure:** Polypropylene or phenolic cap, 38-430 size; 0.015-in Teflon liner.
B	**Container:** 40-mL glass vial, 24-mm neck finish. **Closure:** Polypropylene or phenolic, open-top, screw cap, 15-cm opening, 24-400 size. **Septum:** 24-mm disc of 0.005-in Teflon bonded to 0.120-in silicon for total thickness of 0.125-in.
C	**Container:** 1-L high density polyethylene, cylinder-round bottle, 28-mm neck finish. **Closure:** Polyethylene cap, ribbed, 28-410 size; F217 polyethylene liner.
D	**Container:** 120-mL wide mouth glass vial, 48-mm neck finish. **Closure:** Polypropylene cap, 48-400 size; 0.015-in Teflon liner.
E	**Container:** 16 oz. tall, wide mouth, straight-sided, flint glass jar, 63-mm neck finish. **Closure:** Polypropylene or phenolic cap, 63-400 size; 0.015-in Teflon liner.
F	**Container:** 8-oz. short, wide mouth, straight-sided, flint glass jar, 70-mm neck finish. **Closure:** Polypropylene or phenolic cap, 70-400 size; 0.015-in Teflon liner.
G	**Container:** 4-oz. tall, wide mouth, straight-sided, flint glass jar, 48-mm neck finish. **Closure:** Polypropylene or phenolic cap, 48-400 size; 0.015-in Teflon liner.
H	**Container:** 1-L amber, Boston round, glass bottle, 33-mm pour-out neck finish. **Closure:** Polypropylene or phenolic cap, 33-430 size; 0.015-in Teflon liner.
J	**Container:** 32-oz. tall, wide mouth, straight-sided, flint glass, 89-mm neck finish. **Closure:** Polypropylene or phenolic cap, 89-400 size; 0.015-in Teflon liner.
K	**Container:** 4-L amber glass, ring handle bottle/jug, 38-mm neck finish. **Closure:** Polypropylene or phenolic cap, 38-430 size; 0.015-in Teflon liner.
L	**Container:** 500-mL high-density polyethylene, cylinder-round bottle, 28-mm neck finish. **Closure:** Polypropylene cap, ribbed, 28-410 size; F217 polyethylene liner.
M	**Container:** 120-mL wide mouth glass vial, 48-mm neck finish. **Closure:** Polypropylene cap, 48-400 size; 0.015-in Teflon liner.

the CLP contract. Because the amount and type of QC samples collected vary between Regions, always refer to Regional guidance. Note that the types and frequencies of field QC samples should always meet project DQOs.

Field QC samples may include field duplicate samples, trip blanks, equipment blanks, and field blanks. The field QC samples should be prepared (i.e., labeled, packaged, preserved, and shipped to the assigned laboratory) identically to the primary field samples, and should remain "blind" to the laboratory to ensure indiscriminate handling. Each *field* QC sample receives a separate sample number. See Section 5.0, Sample Documentation.

Laboratory QC samples include matrix spikes and matrix spike duplicates for organic samples and matrix spike and sample duplicates for inorganic samples. The laboratory QC sample is an additional volume of an existing sample required by the laboratory's contract; the additional volume must be supplied by the sampler (see exhibits 3-3 and 3-4). Samplers **should designate one sample per matrix per 20 samples as a "laboratory QC" sample.** If the sampler does not designate a sample as the "laboratory QC," then it is possible that the laboratory could select the blank as the QC or use the primary field samples to meet contract QC requirements. The laboratory use of primary field samples for QC analysis can detract from data quality and useability. For example, if a laboratory requires two liters of field sample to perform a requested analysis without QC, and the laboratory receives two liters of field sample to perform the requested analysis along with matrix spike and duplicate analyses, the laboratory may split the field sample using

one liter for the required analysis and one half liter each for the matrix spike and duplicate analyses. In doing so, the laboratory will double the achievable sample quantitation limits, and possibly fail to meet project DQOs. Samplers should label the laboratory QC sample containers and corresponding paperwork as "lab QC" as described in Section 5.4, Traffic Report/Chain-of-Custody Forms. Remember that the laboratory QC sample is not an additional sample and does not receive its own unique sample number. Exhibit 3-6 explains some of the types of QC samples that may be collected. Follow volume requirements as specified in Section 3.4, Sample Volume.

3.7 Duplicate and Split Samples

Duplicate samples may be collected to determine the variability of the sampling process. Duplicate samples should be collected simultaneously from the same source and under identical conditions as the original sample. Aqueous duplicate samples are collected from successive volumes from the same sample source and device (e.g., bailers). Soil duplicates are collected from the same sample source and device.

Split samples may be collected to measure the variability between laboratories. The sample should be collected by separating one sample into two or more sample containers. Aqueous split samples should be collected by either obtaining consecutive sample volumes from the same bailer or mixing the volumes in a large intermediate vessel, as appropriate, depending on the nature of contaminants and Regional guidance. When collecting aqueous samples with devices, such as a bailer, for example, the following guidance should be followed. If more than one bailer is required to obtain the required sample volume, the first half volume of the first bailer should be poured into the first container, and the second half volume of the first bailer should be poured into the second container.

The first half volume of the second bailer should be poured into the second container, and the second half volume of the second bailer should be poured into the first container. This filling sequence should continue until both containers are filled. Please note that when sampling for VOC analysis, more than one bailer should not be used and sample mixing should be avoided because these procedures may increase analyte loss due to evaporation. Refer to Section 4.2.1, Volatile Organic Compound Collection, for guidelines on collecting samples for VOC analysis. When split samples are collected using an intermediate vessel, continually stir the contents of the intermediate vessel with a clean pipette or precleaned Teflon rod, and allow the contents to be alternately siphoned into respective sample containers using Teflon tubing. Any device used for stirring, or tubing used for siphoning, must be cleaned in the same manner as other equipment. Since a true split for sediment, sludge, and soil samples is not feasible under field conditions, a split soil sample should be considered a duplicate.

3.8 Performance Evaluation Samples

A Performance Evaluation Sample (PES) is a specially prepared Quality Control sample which is used to evaluate a laboratory's analytical proficiency. Most of the Organic PESs are supplied in ampules while most of the Inorganic PESs are supplied in plastic bottles. The frequency of use and the type(s) of PES(s) to be used during a sampling event should be specifically addressed in the Sampling and Analysis Plan. The availability and use of PESs should be coordinated through the Regional RSCC and/or TPO contact.

3.9 Recommendations for CLP Analytical Services Sample Preservation and Holding Times

Sample Preservation

Some water samples must be chemically preserved before shipment to the laboratory. All low concentration samples should be cooled to 4 ° ± 2 °C. Samples should be preserved and cooled immediately upon sample collection. Preservation techniques vary among the Regions; so use the information in Exhibit 3-7 as general guidance for properly preserving samples. *Contact your RSCC for Region-specific instructions.*

Exhibit 3-6 QC Samples

QC SAMPLE	SAMPLE TYPE	PURPOSE	COLLECTION[1]	SAMPLE NUMBER
Field QC Samples	Field Duplicate[2]	To check reproducibility of laboratory and field procedures. To indicate matrix non-homogeneity.	Collect from areas that are known or suspected to be contaminated. Collect one sample per week or 10% (Regions may vary) of all field samples per matrix, whichever is greater.	Assign two separate (unique) CLP sample numbers (i.e., one number to the primary sample and one to the duplicate). Submit blind to the lab.
	Field Blank	To check cross-contamination during sample collection, sample shipment, and in the laboratory. Also to check sample containers.	Collect for each group of samples of similar matrix per each day of sampling. Use water (demonstrated to be free of the contaminants of concern) for organics; use metal-free (deionized or distilled) water for inorganics.	Assign separate CLP sample numbers to the field blanks. Submit blind to the lab.
	Volatiles Trip Blank	To check contamination during sample handling and shipment from field to laboratory.	Collect one sample (water demonstrated to be free of the contaminants of concern) per each day of organics sampling. This sample is prepared off-site, before sampling commences, and placed in the cooler used to ship volatile samples.	Assign separate CLP sample numbers to the trip blanks. Submit blind to the lab.
	Equipment Blank or Rinse Blank	To check field decontamination procedures.	Collect when sampling equipment is decontaminated and reused in the field or when a sample collection vessel (bailer or beaker) will be used. Use blank water (water demonstrated to be organic-free, deionized or distilled for inorganics) to rinse the equipment, and collect this rinse water into the sample containers.	Assign separate CLP sample numbers to the equipment blanks. Submit blind to the lab.
Laboratory QC Samples[3]	Matrix Spike and Matrix Spike Duplicate	Required by laboratory's contract to check accuracy and precision of organic analyses.	Collect triple volume for one water sample per 20 water samples. The triple volume water sample should be collected in the first shipment of organics samples.	Assign the primary sample, extra volume, matrix spike and matrix spike duplicate the same CLP sample number. Label the extra volume "Lab QC."
	Matrix Spike and Lab Duplicate	Required by laboratory's contract to check accuracy and precision of inorganic analyses.	Collect double volume for one water sample per 20 water samples. The double water volume sample should be collected in the first shipment of inorganic samples.	Assign the primary sample, extra volume, spike and duplicate the same CLP sample number. Label the extra volume "Lab QC."

[1] Consult Regional guidance for field QC sample frequencies, laboratory QC sample frequencies are fixed in the CLP contracts.
[2] A true split for sediment, sludge, and soil samples (and other heterogeneous samples such as highly turbid waters) is typically not feasible under field conditions. A split of this type of sample should generally be considered a duplicate.
[3] No extra volume is required for the soil/sediment matrix; however, the sample to be used for laboratory QC must be designated on the TR/COC.

Holding Times

Samples should be shipped to scheduled CLP laboratories as soon as possible after collection. Daily shipment of samples to CLP laboratories is very important, whenever possible, because many samples are stable only for a short period of time following collection. The technical holding times listed in Exhibit 3-7 are the maximum lengths of time that samples may be held from the time of collection to the time of analysis and still be considered valid. Samples that exceed these holding times may not be valid, and re-sampling may be necessary. The contractual holding times in Exhibit 3-8 are holding times that the CLP laboratory must follow to comply with the terms of the contract and are described in the CLP Analytical Services SOW. Contractual holding times are the same or shorter than the technical holding times to allow for sample packaging and shipping.

Exhibit 3-7 Recommendations for Sample Preservation and Technical Holding Times

PARAMETER TYPE	MEASUREMENT	PRESERVATIVE	TECHNICAL HOLDING TIME	CONTRACT MANDATED HOLDING TIME
Metals	Dissolved	Filter on-site, HNO_3 to pH<2, Cool, 4 °C	6 Months [1]	180 Days[4]
	Suspended	Filter on-site, Cool, 4 °C	6 Months	180 Days[4]
	Total	HNO_3 to pH<2, Cool 4 °C	6 Months	180 Days[4]
	Chromium[6+]	Cool, 4 °C	24 Hours	180 Days[4]
	Mercury Dissolved	Filter, HNO_3 to pH<2, Cool, 4 °C	28 Days	26 Days[4]
	Mercury Total	HNO_3 to pH<2, Cool, 4 °C	28 Days	26 Days[4]
Inorganics, Non-Metals	Alkalinity	Cool, 4 °C	14 Days	14 Days
	Carbon, Total Organic	Cool, 4 °C, H_2SO_4 to pH<2	28 Days	28 Days
	Chemical Oxygen Demand	Cool, 4 °C, H_2SO_4 to pH<2	28 Days	28 Days
	Chloride	None Required	28 Days	28 Days
	Cyanide	Cool, 4 °C, NaOH to pH>12, 0.6 g ascorbic acid [2]	14 Days [3]	12 Days
	Nitrogen Ammonia	Cool, 4 °C, H_2SO_4 to pH<2	28 Days	28 Days
	Nitrate plus Nitrite	Cool, 4 °C, H_2SO_4 to pH<2	28 Days	28 Days
	Phosphorus	Cool, 4 °C, H_2SO_4 to pH<2	28 Days	28 Days
	Solids, Total Dissolved	Cool, 4 °C	7 Days	7 Days
	Solids, Total Suspended	Cool, 4 °C	7 Days	7 Days
	Sulfate	Cool, 4 °C	28 Days	28 Days
	Anions by Ion Chromatography	Cool, 4 °C	28 Days	28 Days
Organics	Pesticides/Aroclors	Cool, 4 °C, pH 5-9	14 Days	Extract in 10 Days
	Semivolatiles	Cool, 4 °C, *store in dark*	Extract in 7 days	Extract in 10 Days
	Volatiles (preserved)	Cool, 4 °C, HCl to pH<2	14 Days	10 Days[4]

'Source: Adapted from EPA-600/4-82-055, Technical Additions to Methods for Chemical Analysis of Water and Wastes and *40 Code of Federal Regulations § 136. Table II --Required Containers, Preservation Techniques, and Holding Times. 1995.*

* These are recommendations for sample preservation and holding times for aqueous samples. No official technical holding times are specified for soils/sediments under Superfund. However, EPA-specified contractual holding times do apply to soil/sediments. See Section 4.2.1, Volatile Organic Compound Collection for recommended procedures for the collection, handling, and preservation of soil samples to minimize the loss of volatile compounds. Please check your CLP Analytical Services SOW for required preservatives and holding times.

1 Samples should be filtered immediately on-site before adding a preservative.

2 Only use ascorbic acid in the presence of residual chloride. See section 4.2.1.

3 Maximum holding time is 24 hours when sulfide is present. Optionally, all samples may be tested with lead acetate paper before the pH adjustment to determine if sulfide is present. If sulfide is present, it can be removed by adding cadmium nitrate powder until a negative spot test is obtained using lead acetate paper. The sample is filtered and then NaOH is added to pH>12.

4 Analysis Start Date minus Laboratory Receive Date .

4.0 GENERAL SAMPLING TECHNIQUES AND CONSIDERATIONS

4.1 General Sampling Techniques

This section provides information on guidance documents available for collecting CLP Analytical Services samples. Samples should be collected according to the approved site specific Quality Assurance Project Plan and the Sampling Analysis Plan (EPA QA/R-5 "*EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations*" and EPA Order 5360.1). This document does not define specific sampling procedures for the CLP Analytical Services because specific sampling protocols depend on individual site conditions, Regional requirements, and DQOs. Regions may have their own specific requirements for individual sampling programs, the Regions are responsible for generating Region-specific sampling SOPs. Information regarding surface water, sediment, soil and groundwater sampling can be found in many documents including the following sources:

- *Compendium of ERT Surface Water and Sediment Sampling Procedures*, EPA/540/P-91/005.
- *Compendium of ERT Soil Sampling and Surface Geophysics Procedures*, EPA/540/P-91/006.
- *Compendium of ERT Groundwater Sampling Procedures*, EPA/540/P-91/007
- *Quality Assurance Sampling Plan for Environmental Response (QASPER) software, Version 4.1, ERT.*
- *Requirements for the Preparation of Sampling and Analysis Plans*, Draft, US Army Corps of Engineers. June 30, 1994. EM 200-1-3.

Other sources are available. This list is not exhaustive.

These documents, along with appropriate Regional guidance and procedures, should be consulted for detailed sample collection, preservation, handling and storing, equipment decontamination, and quality assurance/quality control procedures. When working with potentially hazardous materials, follow U.S. EPA and OSHA requirements, specific health and safety procedures, and Department of Transportation (DOT) requirements.

Regional sampling protocols and Regional QA guidelines should be consulted. Proper procedures for insuring good sampling results should be followed.

4.2 Special Sampling Considerations

This section provides general guidance for VOC, low concentration contaminant, and duplicate and split sample collection, along with procedures for sample compositing and mixing. The guidance provided in this section may be useful and appropriate for the collection of CLP Analytical Services samples.

The Regions should have developed specific SOPs to address the procedures for preserving samples in the field.

Testing and amelioration of carbonates, residual chlorine or oxidants in VOC samples and sulfides and residual chlorine in extractable fractions should be included in Regional guidance.

4.2.1 Volatile Organic Compound Collection

When collecting samples for VOC analysis, care should be taken to prevent analyte loss by evaporation. The following procedures are designed to minimize sample contamination and analyte loss during aqueous and non-aqueous VOC sample collection. Also, be sure to follow Regional guidance to ensure that proper prepreservation treatment is accomplished (e.g., residual chlorine). See Technical Notes on Drinking Water Methods, EPA/600/R-94/173, page 53.

Aqueous VOC Sample Collection

- Rinse the vial with sample water prior to actual sample collection and preservation. See Section 3.8, Sample Preservation and Holding Times, and Exhibit 3-7.
- Avoid excessive aeration and agitation of the sample by pouring the sample slowly down the edge of the sample vial.
- Fill vial so that a reverse (convex) meniscus is present (in the case of water in a glass container).
- Place septum on the vial so that the Teflon side is in contact with the sample and then tighten the cap.
- Immediately invert the vial and lightly tap to locate air bubbles.
- If air bubbles are present, discard the sample and recollect the sample. Check the recollected sample for air bubbles. If air bubbles are present, additional sample water may be added to the vial in an attempt to eliminate the air bubbles. The presence of air bubbles after three consecutive attempts to rid the sample of the condition should result in the use of a new sample container and recollection of the sample. Regions vary in their approach to rinsing the sampling vial and recollecting the sample in the same vial. BE SURE TO FOLLOW REGIONAL GUIDANCE.
- Do NOT mix or composite samples.
- Immediately transfer the vial to the sample shuttle [device which contains a "set" of VOC vials] once it has been collected. Do not allow ice to touch the vials.

Solid VOC Sample Collection

- Minimize headspace as much as possible.
- Pack sample lightly with either a glass rod, Teflon spatula, or stainless steel spatula.
- Secure cap with Teflon-side of septum in contact with sample.
- Do NOT mix or composite samples.
- Immediately transfer the vial to the sample shuttle once it has been collected. Do not allow ice to touch the vials.
- Wipe outside of sample container to remove excess sample from threads to ensure a tight lid fit.

4.2.2 Contaminant Sampling

Some compounds can be detected in the ppb and/or ppt range. Extreme care must be taken to prevent cross-contamination of these samples. The following precautions should be taken when trace contaminants are of concern:

- Disposable gloves should be worn each time a different location is sampled.
- When collecting both surface water and sediments samples, surface water samples should be collected first. This reduces the chance of sediment dispersal into surface water, and the resulting loss of surface water sample integrity.

- Sampling should occur in a progression from the least to most contaminated area, if this information is known.

- Samplers should use equipment constructed of Teflon, stainless steel, or glass that has been properly precleaned for collecting samples for trace organics compound analyses. (A set of procedures for cleanin g sampling equipment may be found in Regional guidance. Equipment constructed of plastic or PVC should not be used to collect samples for trace organic compounds analyses.

4.2.3 Sample Compositing and Mixing

When compositing solid samples, (i.e., sediment, soil, sludge) for analysis of compounds present in trace quantities, a stainless steel or Teflon bowl and spatula should be used. Samples for VOC analysis should not be composited to minimize evaporation. The sample should be thoroughly mixed and divided into subsections in the compositing container. The procedure for sectioning is as follows:

- Roll the contents of the compositing container to the middle of the container and mix.

- Quarter the sample and move to the sides of the container.

- Mix each quarter individually and roll to the middle of the compositing container.

- Mix the sample once more, composite quarter subsamples, place in container.

The approximate quantity of each subsection should be recorded in the field logbook.

5.0 SAMPLE DOCUMENTATION

Each sample processed by the CLP must be properly documented to ensure timely analysis of all parameters requested and to support the use of the sample data in potential enforcement actions. **It is the sampler's responsibility to fill out all appropriate paperwork completely and correctly.** This section provides instructions for completing all CLP forms and other sample documentation. Each EPA Region may require additional documentation. It is important to follow both the national guidelines and Regional guidelines for CLP Analytical Services samples. Contact your RSCC for Region-specific instructions and guidance prior to the sampling activity. Contact the Region VII RSCC for informatio n regarding sample documentation for the Rapid Turnaround Dioxin Analytical Service.

5.1 Case Number/Sample Delivery Group

A Case number is assigned by the CLASS contractor to CLP Analytical Services sampling events and is five digits in length. Each CLP Analytical Services sampling event receives a distinct Case number which helps maintain sit e confidentiality. (Contract laboratories should not know the site name for the samples they are analyzing in order to avoid potential conflict of interest problems.) The Case number also enables the CLASS contractor and the Region to easily track CLP Analytical Services sampling events. The Sample Delivery Group (SDG) is a unit within a Case that is used to identify a group of samples for delivery. An SDG is defined as one of the following, whichever comes first: all samples with a Case, or every set of 20 field samples within a Case, or the field samples in a Case which are received at a laboratory during a specified period of time, beginning with receipt of the first sample in the Case or SDG. Note : Laboratory QC sample frequencies are based on the SDG.

5.2 Sample Number

The CLP sample number is a unique number that identifies each sample under a CLP Analytical Services analytical program. A CLP Analytical Services sample is defined by one sample matrix at one concentration level from one station location for each individual or set of analytical fraction(s), provided the fractions are all requested from the same CL P Analytical Service. The sample number is preprinted on adhesive labels and is provided by your RSCC, who routinel y orders them from the CLASS contractor. Exhibit 5-1 shows examples of CLP Analytical Service sample labels. Sample numbers are comprised of a Regional letter code and sequential sample numbering. Regional letter codes are listed i n Exhibit 5-2. Use only the labels provided to the Region in which you are sampling. **It is your responsibility to assign this critical sample number correctly and to transcribe it accurately on the appropriate documentation.** Place the label on the appropriate sample container and transcribe the sample number onto the sample tag and TR/COC (Tracking Report/Chain of Custody) form. The unique sample number must only be used for one sample. Destroy all unused labels to prevent duplication of sample numbers. Do not add digits or hyphens to the CLP sample numbers. If additional sample numbers are needed in the field, contact your RSCC. The sampler should consider placing clear tape over the adhesive labels as this procedure will help preserve the information on the adhesive labels. Samplers should attempt to use the provided CLP sample numbers in numerical order [as much as possible]. All samples must have sample numbers on the label and tag, if tags are used. The use of sample tags is highly recommended (see Section 5-3).

Organic Sample Numbers

Organic sample numbers are five characters long and have the format XXXXX. The first letter indicates the Region, the remaining letters and numbers are used for sequential sample numbering (see Exhibits 5-1 and 5-2). Organic sample numbers are preprinted on labels. For the organic fractions, there are ten labels four for semivolatiles (labeled extractables), two for volatiles, and four are blank (for pesticides/Aroclors and extra sample volume). Remember that the unique sample number must only be used for one sample. Destroy all unused labels to prevent duplication of sample numbers.

Inorganic Sample Numbers

Inorganic sample numbers are six characters long and have the format MXXXXX. The "M" indicates that this sample is inorganic, the second letter indicates the Region, and the remaining letters and numbers are used for sequential sample numbering (see Exhibits 5-1 and 5-2). Inorganic sample numbers are preprinted on labels, seven labels per strip. Two labels are for total metals, two for cyanide and three blanks (for extra sample volume). According to CLP guidelines, each individual inorganic sample may be analyzed for total metals or dissolved metals, but not both. That is, samples collected for total metal and dissolved metal analyses must receive separate (unique) sample numbers. Remember that the unique sample number must only be used for one sample. Destroy all unused sample labels.

Exhibit 5-1. CLP Analytical Services Sample Labels

Organic

BLH01 - Semivolatile
BLH01 - Semivolatile
BLH01 - Semivolatile
BLH01 - Semivolatile
BLH01 - VOA
BLH01 - VOA
BLH01 - Pesticide/Aroclor
BLH01 -
BLH01
[Blanks may be included]

Inorganic

MBJT01 - Total Metals
MBJT01 - Total Metals
MBJT01 - Cyanide
MBJT01 - Cyanide
MBJT01
MBJT01
MBJT01

[Blanks may be included]

Exhibit 5-2. CLP Analytical Services Regional Letter Codes

REGION	LETTER CODE	
	ORGANIC	INORGANIC
I	A	MA
II	B	MB
III	C	MC
IV	D	MD
V	E	ME
VI	F	MF
VII	G	MG
VIII	H	MH
IX	Y	MY
X	J	MJ

5.3 Sample Tag

To support the use of sample data in potential enforcement actions, samples should be identified according to EPA National Enforcement Investigations Center (NEIC) sample control guidelines. NEIC recommends that samples other than *in situ* measurements (e.g., pH, temperature, conductivity) be identified with a sample tag. Each sample aliquo t removed from a hazardous waste site to be transferred to a laboratory for analysis should, therefore, be identified with a sample tag. The sample tag is returned to the Region by the laboratory along with the corresponding data package as physical evidence of sample receipt and analysis.

Check with your authorized requestor (RSCC or Project Manager, it will vary among the Regions) to determine th e availability of and the specific requirements for sample tags. Tie a sample tag on each sample container. (See Section 6.0, Sample Packaging and Shipping for tying procedures.) Exhibit 5-3 is an example of a sample tag. Exhibit 5-4 contains instructions for completing a sample tag.
Section 6.1, Sample Packaging, contains additional information on sample tags

Exhibit 5-3. Sample Tag

Project Code 2	Station No. 3	Mo./Day/Year 4	Time 5	Designate: 6		
				Comp.	Grab x	
Z5M10.0	26	8/9/91	10:07			

Tag No. 7712

Station Location 7: MONITORING WELL #26 SPLIT SPOON #11

Sampler's (Signatures) 8: John Jones

Lab. Sample No.	Remarks:				Pesticides	VOA organics	ABN		Cyanide	Metals	Phenolics	COD, TOC, Nutrients	BOD Anions Solids (TSS) (TDS) (SS)	ANALYSES 10	Preservative: Y☒ N☐ 9
1	CASE NO. 1746 SAMPLE NO. MR3501								x						

0

Exhibit 5-4. Sample Tag Instructions

STEPS	INSTRUCTIONS
STEP 1	Under the "Remarks" heading, record the CLP Case number and sample number.
STEP 2	Record the project code (e.g., contract number, work assignment number, Interagency Agreement number, etc.) assigned by EPA.
STEP 3	Enter the station number assigned by the sampling team coordinator.
STEP 4	Record the month, day, and year of sample collection.
STEP 5	Enter the military time of sample collection, e.g., 13:01 for 1:01 p.m.
STEP 6	Place an "X" to indicate composite or grab sample.
STEP 7	Record the station location (description) as specified in the project plan.
STEP 8	Sign the sample tag with your name.
STEP 9	Place an "X" in the box next to "yes" or "no" to indicate if a preservative was added to the sample.
STEP 10	Under "analyses," place an "X" in the box next to the parameters for which the sample is to be analyzed.
Note: Leave the box for "laboratory sample number" blank.	

5.4 Traffic Report/Chain-of-Custody Forms

The organic and inorganic traffic report/chain-of-custody (TR/COC) forms enable the CLASS contractor and the Region to track CLP Analytical Services samples and ensure that the samples are shipped to the appropriate contract laboratory. **The TR/COC form is functionally similar to a packing slip that accompanies a shipment of goods.** The TR/COC form includes a chain-of-custody record located at the bottom of the form. The form is used as physical evidence of sample custody. EPA-NEIC guidelines specify that official custody of samples must be maintained and documented from the time of collection until the time the samples are introduced as evidence in the event of litigation. **The sampler is responsible for the care and custody of the sample until sample shipment.** A sample is considered to be in your custody if any of the following criteria are met:

- The sample is in your possession or is in your view after being in your possession;
- The sample was in your possession and then locked up or sealed to prevent tampering; or
- You have placed the sample in a secured area.

Document CLP Analytical Services organic, inorganic samples on separate CLP TR/COC forms. TR/COC forms must be completed for every shipment of CLP Analytical Services samples to a contract laboratory. **Use indelible ink only, no pencil (a ball point pen is best)!** Make corrections by drawing a line through and initialing and dating the error, then enter the correct information. **Erasures are not allowed!** Each TR/COC form should be imprinted. Each TR/COC form documents up to 10 samples per Case number and sample shipment.

A separate TR/COC form must accompany each cooler for each daily shipment. The TR/COC forms must address all samples in that cooler, but not address samples in any other cooler. This practice maintains the chain-of-custody for all samples in case of mis-shipment.

Instructions summarizing CLP sample volumes, packaging and reporting requirements are printed on the back of the TR/COC forms.

Any errors on the TR/COC forms should be immediately reported to the authorized RSCC or CLASS personnel who can then inform the laboratory. The faster such problems are identified, the faster they can be corrected and critical delays in sample analysis may be avoided. See Section 7.0, Communication Network.

Exhibits 5-5, and 5-6 are examples of completed TR/COC forms. Exhibit 5-7 provides step-by-step instructions for filling out the organic and inorganic TR/COC forms. Exhibit 5-8 provides purpose codes for the forms. Samplers may find it helpful to carry these instructions to the field. Site managers should consider appending these instructions to the SAP.

After you have properly completed the TR/COC form, place the **bottom** two copies (white and yellow for organic and inorganic samples) in a plastic bag, then tape the bag to the inside of the sample cooler lid. The second copy (pink for organic and inorganic samples) must be returned to the CLASS contractor within five days of sample shipment. The address of the CLASS contractor is provided in Exhibit 7-3. The top copy (blue for organic and green for inorganic) should be sent to designated Regional personnel.

Note: **All samples in a cooler must be recorded on a TR/COC form inside the cooler and each unique sample number should be listed on only one TR/COC form.** (In the case where aliquots of the same sample are collected at different times [as may occur when well development is very slow] and shipped sequentially, fractions may be given different sample numbers. If fractions are given unique sample numbers, it will be necessary for the Region to track the fractions and maintain the knowledge that the fractions are from the same sample.) If all containers necessary for the analysis of 10 samples cannot fit into one cooler, divide samples into more coolers, making sure that all containers for each sample are in the same cooler. Place corresponding sample documentation into each cooler. **IF MORE THAN ONE TR/COC FORM IS USED FOR THE SAMPLES IN ONE COOLER**, then all of the forms must have complete header information and signatures.

5.5 Field Operations Records Management System

In an effort to streamline the resource intensive field documentation functions that occur during sampling activities, EPA-NEIC, at the request of the AOC, developed the Field Operations Records Management System II (FORMS II). FORMS II is software that facilitates the capture of field information during sampling events, and automates the production of bottle labels, sample tags, bottle-specific custody seals, chain-of-custody records, cooler seals, PRP sample receipt records, and field reports. FORMS II enables field personnel to download data to the laboratory, RSCC, and Regional users. FORMS II design features include the following:

Hardware portability/compatibility/versatility

Because field samplers cannot guarantee access to an AC power source or a stable computer working environment, FORMS II is compatible with existing portable hardware including portable computers, portable printers, and portable bar code scanning devices. While FORMS II is mouse-compatible, unknown field conditions prohibit FORMS II reliance on a mouse; but other pointing devices may be useful.

FORMS II uses hardware units specially selected to minimize the likelihood of failure or downtime as a result of adverse field conditions.

Bar code application

FORMS II uses bar code technology to accelerate the sample packing process for sample shipment to CLP laboratories. In addition, laboratory personnel may use the sample bottle bar codes to facilitate receipt and associated records management activities.

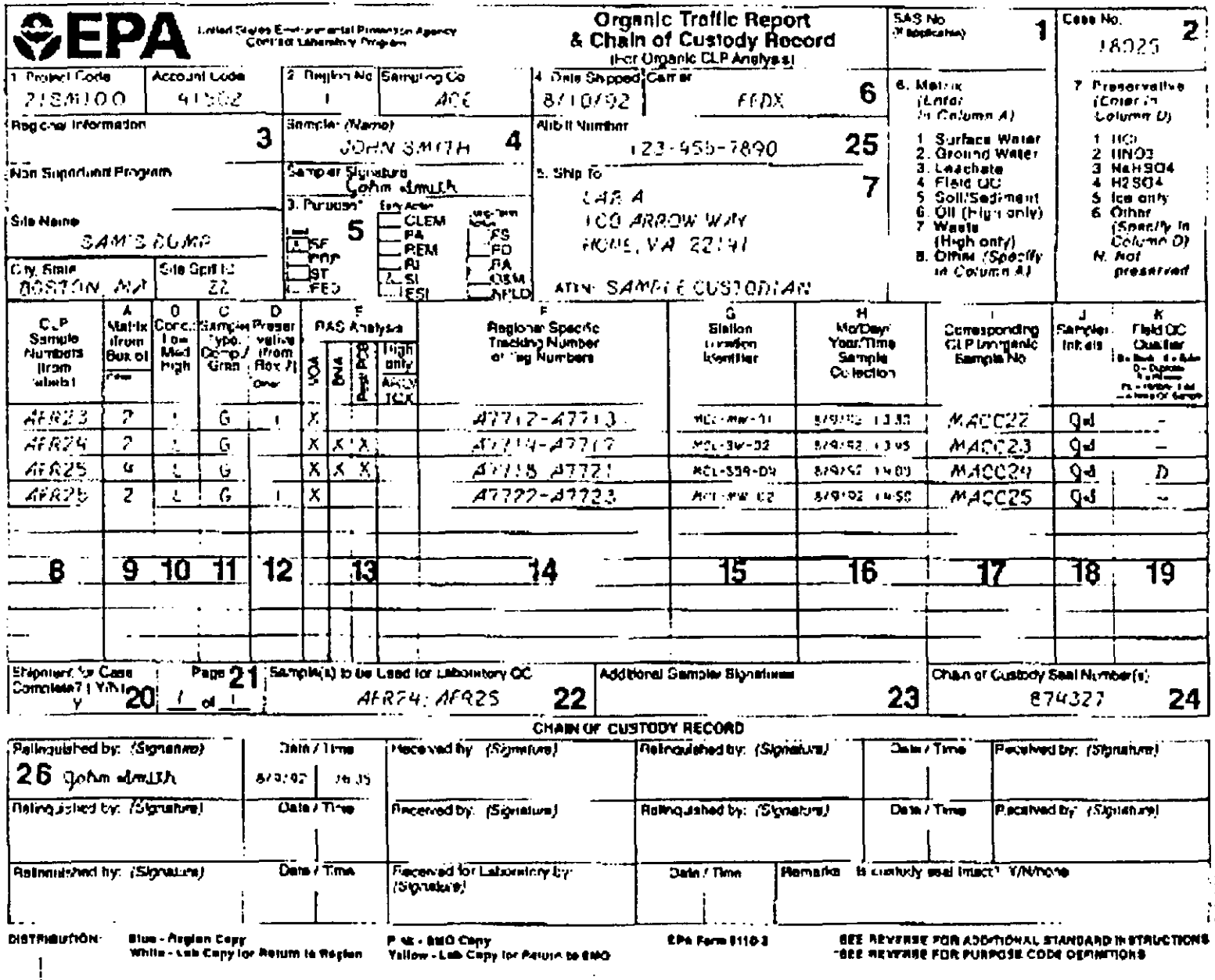
Flexibility for multiple samplers/samples

Field samplers and field sampling organizations often use unique numbering and identification schemes in addition to the CLP sample numbers when collecting samples. They also vary in their approach to many other activities. For that reason, FORMS II design includes choices for: identification scheme, activity names, labeling information, and number and types of labels/tags/seals.

Sample Definitions

FORMS II design is based on field sample, QC sample, and analytical fraction definitions that are consistent with those provided in Section 3.0, Sample Collection. FORMS II improves field time management, standardizes information management, and captures collection information in an electronic format early in the field sampling process. Estimated training time for new FORMS II users is less than two hours. FORMS II is currently managed by AOC. If you are interested in using FORMS II, please contact AOC at (703) 603-8870.

Exhibit 5-5. Organic TR/COC Form Example



EPA United States Environmental Protection Agency Contract Laboratory Program

Organic Traffic Report & Chain of Custody Record
(For Organic CLP Analysis)

SAS No. (If applicable) 1 | Case No. 18025 2

1. Project Code: 21SM100 | Account Code: 41502
2. Region No: 1 | Sampling Co: ACE
4. Date Shipped: 8/10/92 | Carrier: FEDX 6

Regional Information 3 | Sampler (Name): JOHN SMITH 4 | Airbill Number: 123-455-7890 25

Non Superfund Program | Sampler Signature: John Smith

Site Name: SAM'S DUMP

City, State: BOSTON, MA | Site Spill ID: 22

3. Purpose* 5: Lead: X SF, PDP, ST, FED | Early Action: CLEM, PA, REM, RI, X SI, ESI | Long-Term Action: FS, FD, RA, O&M, NPLD

5. Ship To 7: LAB A, 100 ARROW WAY, HOME, VA 22141 | ATTN: SAMPLE CUSTODIAN

6. Matrix (Enter in Column A): 1. Surface Water 2. Ground Water 3. Leachate 4. Field QC 5. Soil/Sediment 6. Oil (High only) 7. Waste (High only) 8. Other (Specify in Column A)

7. Preservative (Enter in Column D): 1. HCl 2. HNO3 3. NaHSO4 4. H2SO4 5. Ice only 6. Other (Specify in Column D) N. Not preserved

CLP Sample Numbers (from labels)	A Matrix (from Box 6) Other	B Conc. Low Med High	C Sample Type Comp./Grab	D Preservative (from Box 7) Other	E RAS Analysis VOA	BNA	Pest/PCB	High only ARCL/TCX	F Regional Specific Tracking Number of Tag Numbers	G Station Location Identifier	H Mo/Day/Year/Time Sample Collection	I Corresponding CLP Inorganic Sample No.	J Sampler Initials	K Field QC Qualifier
AFR23	2	L	G	1	X				A7712-A7713	MCL-MW-01	8/9/92 13:30	MACC22	gd	–
AFR24	2	L	G		X	X	X		A7714-A7717	MCL-SW-02	8/9/92 13:45	MACC23	gd	–
AFR25	4	L	G		X	X	X		A7718-A7721	MCL-SSB-04	8/9/92 14:00	MACC24	gd	D
AFR26	2	L	G	1	X				A7722-A7723	MCL-MW-02	8/9/92 14:50	MACC25	gd	–
8	9	10	11	12		13			14	15	16	17	18	19

Shipment for Case Complete? (Y/N) 20 | Page 21 1 of 1 | Sample(s) to be Used for Laboratory QC: AFR24; AFR25 22 | Additional Sampler Signatures 23 | Chain of Custody Seal Number(s): 874327 24

CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
26 John Smith	8/9/92 16:35				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks: Is custody seal intact? Y/N/none	

DISTRIBUTION: Blue - Region Copy; White - Lab Copy for Return to Region; Pink - SMO Copy; Yellow - Lab Copy for Return to SMO

EPA Form 9110-3

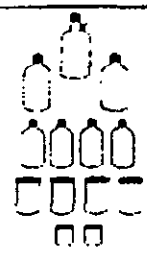
*SEE REVERSE FOR ADDITIONAL STANDARD INSTRUCTIONS
**SEE REVERSE FOR PURPOSE CODE DEFINITIONS

Exhibit 5-5. Organic TR/COC Form Example (Continued)

Organic Traffic Report/Chain of Custody Form Instructions

This form replaces both the individual Traffic Report and EPA Chain of Custody Record.

Water Samples	Required Volume	Container Type
Extractable Analysis (Low Level)	1 Gallon	1 X 4-Liter Amber Glass Bottle OR 2 X 80 oz. Amber Glass Bottle OR 4 X 1 Liter Amber Glass Bottles
Extractable Analysis	1 Gallon	32 oz. Wide-Mouth Glass Jars
Volatile Analysis (Low Level*)	80 mL	2 X 40-ml. Glass Vials



*All Medium and High Level Samples Must be Sealed in Metal Can for Shipment

Soil/Sediment Samples	Required Volume	Container Type
Extractable Analysis (Low or Medium Level*)	6 oz	1 X 8-oz. Wide Mouth Glass Jar OR
	240 mL	2 X 4 oz. Wide-Mouth Glass Jars
Volatile Analysis (Low or Medium Level*)		2 X 120 mL Wide-Mouth Glass Vials†

†Soil VOA Vials under study, subject to change, check to ensure proper sealing

HIGH CONCENTRATION SAMPLE COLLECTION REQUIREMENTS

Liquid or Solid Samples	Required Volume	Container Type
Extractable and Volatile Analysis	6 oz	1 X 8-oz. Wide-Mouth Glass Jar

1. **Organic Sample Collection Requirements**
   - Please indicate which sample(s) are to be used for laboratory QC (Matrix Spike/Matrix Spike Duplicate).
   - Ship medium and high concentration samples in metal cans.
   - Aqueous samples require one triple-volume sample per twenty for Matrix Spike/Matrix Spike Duplicate.
   - Oily samples can not be analyzed under the Contract Laboratory Program Analytical Services (CLPAS) program.

2. **Cooler and Sample Documentation**
   - Complete all sections of the Traffic Report/Chain of Custody Form - Press firmly with a ball point pen to ensure that carbon copies are legible. Check the information and correct any errors.
   - Please remember to complete the Chain of Custody information on the form.
   - Seal the two sets of laboratory Traffic Report/Chain of Custody Form copies in a plastic bag. Include a return address and a method for returning the cooler. Tape bag under cooler lid.
   - Seal each container in a plastic bag.
   - Pack medium and high concentration samples in metal cans.
   - Cool low waters to 4° C. Cooling of low soils is optional. Do not cool medium or high concentration waters and soils.
   - Separate and surround cooler contents with vermiculite or equivalent packaging.
   - Seal the cooler, overlapping the lid and body with custody seals.
   - Mail CLASS the pink copy of the Traffic Report/Chain of Custody Form within 5 days.

3. **Sample Shipment and Reporting**
   - All relevent Department of Transportation regulations must be followed when shipping samples.
   - PHONE IN ALL SHIPMENTS IMMEDIATELY TO CLASS (or to RSCC, if instructed)

     Required information:
     - Case Number
     - Date shipped
     - Number of samples by concentration, matrix and analyses.
     - Carrier and airbill number
     - Next planned shipment

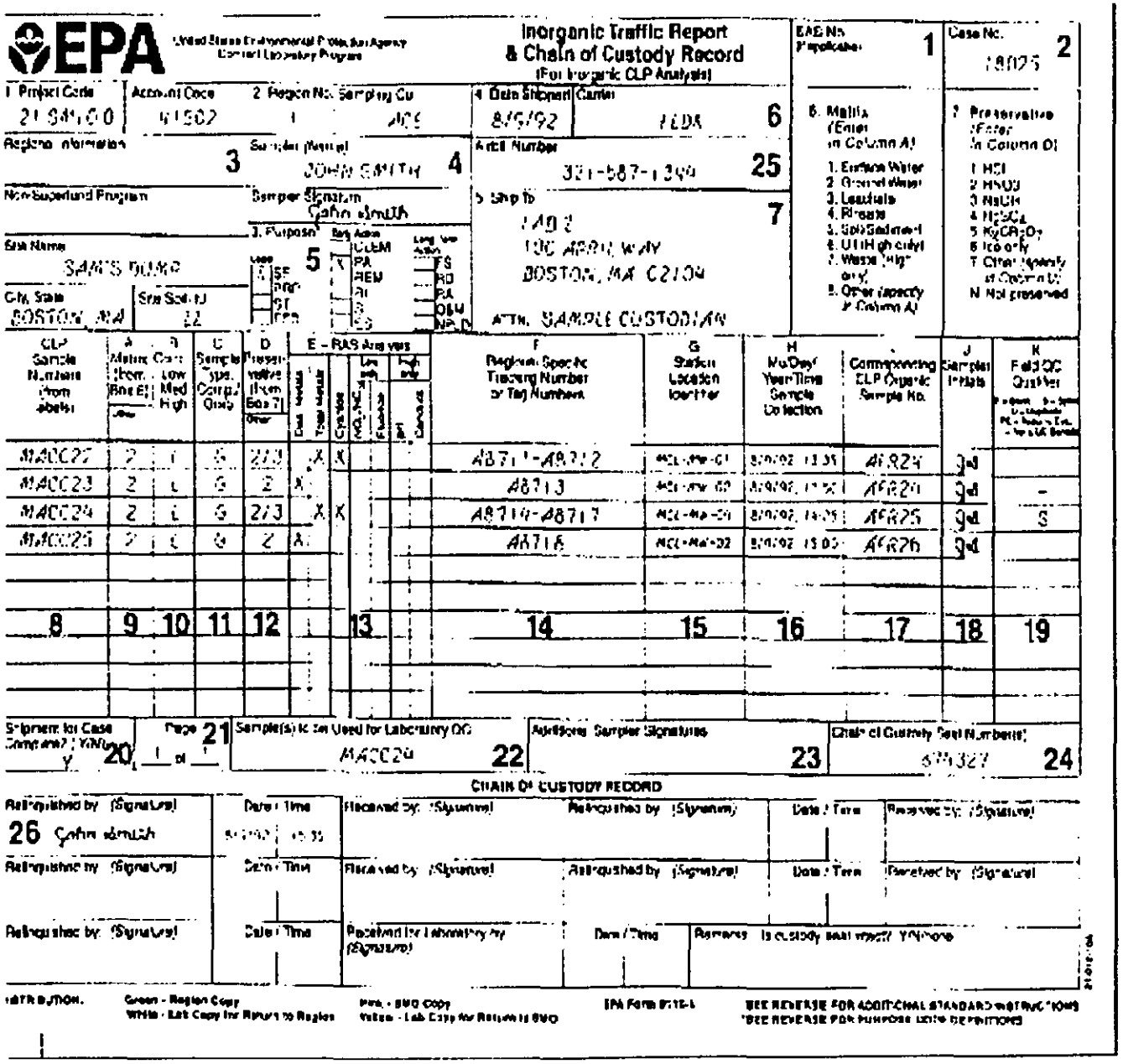
     Leave your name and a number where you can be reached.
   - Information for SATURDAY DELIVERIES must be phoned in by 3:00 PM (Eastern) the preceding FRIDAY.
   - Report any delays or changes of scope (i.e., changes in number of samples to be collected, matrix changes, etc.)
   - CALL IF YOU HAVE ANY QUESTIONS

     Contract Laboratory Analytical Services Support
     300 North Lee Street
     Alexandria, VA 22314
     Phone: (703) 519-1200
     FAX: (703) 519-8626

Purpose Codes

Lead		Early Action				Long-Term Action	
SF	= Superfund	CLEM	= Classical Emergency	SI	= Site Inspection	FS	= Feasibility Study
PRP	= Commercial Potentially Responsible Party	PA	= Early Action Preliminary Assessment	ESI	= Expanded Site Inspection	RD	= Remedial Design
ST	= State	REM	= Removal	RI	= Remedial Investigation	RA	= Remedial Action
FED	= Federal Facility					O&M	= Operation & Maintenance
						NPLD	= National Priorities List Deletion

★ U.S. GPO: 1995-864-781



EPA — United States Environmental Protection Agency, Contract Laboratory Program

Inorganic Traffic Report & Chain of Custody Record

(For Inorganic CLP Analysis)

EAS No. If Applicable: 1

Case No.: 18025 2

1 Project Code: 21 SAMPLE

Account Code: 41502

2 Region No.: 1

Sampling Co.: ACS

4 Date Shipped: 8/5/92

Carrier: FEDX 6

Regional Information: 3

Sampler (Print): JOHN SMITH 4

Airbill Number: 321-587-1349 25

Non-Superfund Program

Sampler Signature: John Smith

5 Ship To: LAB 2, 100 ARGO WAY, BOSTON, MA 02104, ATTN: SAMPLE CUSTODIAN 7

Site Name: SAMPLE SOURCE

3. Purpose: 5 — Low: SE, Prel, SI, Ref; Med: RA, RI, S, RS; Long Turn Around: FS, RD, FA, DSM, NP

Action: CLEAN: PA, REM, RI; DEL: S

City, State: BOSTON, MA

Site Sub-ID: 22

6. Matrix (Enter in Column A): 1. Surface Water, 2. Ground Water, 3. Leachate, 4. Rinsate, 5. Soil/Sediment, 6. Ultrahigh Oily, 7. Waste (High Oily), 8. Other (Specify in Column A)

7. Preservative (Enter in Column D): 1 HCl, 2 HNO3, 3 NaOH, 4 H2SO4, 5 K2Cr2O7, 6 Ice only, 7 Other (Specify in Column D), N Not preserved

CLP Sample Number (from labels)	A Matrix (from Box 6)	B Conc. Low / Med / High	C Sample Type: Comp / Grab	D Preservative (from Box 7)	E – RAS Analyses: Data Validator; Type Validator; CLP Low (VOA, SVOA, Pesticide); CLP High only; Dioxin only	F Regional Specific Tracking Number or Tag Number	G Station Location Identifier	H Mo/Day/Year/Time Sample Collection	Corresponding CLP Organic Sample No.	J Sample Tags	K Field QC (Trip Blank, Field Blank, MS, MSD, Duplicate, Rinsate, Other)
MA0C27	2	L	G	2/3	X	X	A8711-A8712	MCL-MW-01	8/05/92 13:35	AR824	Sd	
MA0C23	2	L	G	2	X		A8713	MCL-MW-02	8/05/92 14:50	AR820	Sd	-
MA0C24	2	L	G	2/3	X	X	A8714-A8717	MCL-MW-03	8/05/92 14:25	AR825	Sd	S
MA0C25	2	L	G	2	X		A8716	MCL-MW-02	8/05/92 15:00	AR826	Sd	
8	9	10	11	12		13	14	15	16	17	18	19

Shipment for Case Complete? Y/N: Y 20

Page: 21 1 of 1

Sample(s) to be Used for Laboratory QC: MA0C24 22

Airbill or Sampler Signature: 23

Chain of Custody Seal Number(s): 678327 24

CHAIN OF CUSTODY RECORD

Relinquished by (Signature)	Date / Time	Received by (Signature)	Relinquished by (Signature)	Date / Time	Received by (Signature)
26 John Smith	8/5/92 15:35				
Relinquished by (Signature)	Date / Time	Received by (Signature)	Relinquished by (Signature)	Date / Time	Received by (Signature)
Relinquished by (Signature)	Date / Time	Received for Laboratory by (Signature)	Date / Time	Remarks: Is custody seal intact? Y/N/none	

DISTRIBUTION: Green - Region Copy; White - Lab Copy for Return to Region; Pink - SMO Copy; Yellow - Lab Copy for Return to SMO

EPA Form 9135-1

SEE REVERSE FOR ADDITIONAL STANDARD INSTRUCTIONS

SEE REVERSE FOR PURPOSE CODE DEFINITIONS

Exhibit 5-6. Inorganic TR/COC Form Example

Exhibit 5-6. Inorganic TR/COC Form Example (Continued)

Inorganic Traffic Report/Chain of Custody Form Instructions

This form replaces both the individual Traffic Report and EPA Chain of Custody Record.

Water Samples	Required Volume	Container Type
Metals Analysis (Low Level)	1 Liter	1 X 1-Liter Polyethylene Bottle OR 2 X 500-ml. Polyethylene Bottle
Metals Analysis (Medium Level*)	16 oz.	1 X 16-oz Wide-Mouth Glass Jar
Cyanide Analysis (Low Level)	1 Liter	1 X 1-Liter Polyethylene Bottle OR 2 X 500-ml. Polyethylene Bottle
Cyanide Analysis (Medium Level*)	16 oz.	1 X 16-oz Wide-Mouth Glass Jar

Soil/Sediment Samples	Required Volume	Container Type
Metals and Cyanide (CN*) Analysis (Low or Medium Level*)	6 oz.	1 X 8-oz Wide-Mouth Glass Jar OR 2 X 4-oz. Wide-Mouth Glass Jars

HIGH CONCENTRATION SAMPLE COLLECTION REQUIREMENTS

Liquid or Solid Samples	Required Volume	Container Type
Metals and Cyanide* Analysis	6 oz.	1 X 8-oz Wide-Mouth Glass Jar

*All Medium and High Level Samples Must be Sealed in Metal Can for Shipment

1. Inorganic Sample Collection Requirements

- Please indicate which sample(s) are to be used for laboratory QC (Matrix Spike/Duplicate).
- Aqueous samples require one double-volume sample per twenty for laboratory Matrix/Spike Duplicate.
- Preserve low level water samples:

Total metals	Preserve with HNO_3 to pH ≤ 2
Dissolve metals	Preserve with HNO_3 to pH ≤ 2 after filtering through a 0.45 µm filter.
Cyanide	Preserve with 10 N NaOH to pH > 12

- Oily samples can not be analyzed under the Contract Laboratory Program Analytical Services (CLPAS) program.
- Ship medium and high concentration samples in metal cans.

2. Cooler and Sample Documentation

- Complete all sections of the Traffic Report/Chain of Custody Form - Press firmly with a ball point pen to ensure that carbon copies are legible. Check the information and correct any errors.
- Please remember to complete the Chain of Custody information on the form.
- Seal the two sets of laboratory Traffic Report/Chain of Custody Form copies in a plastic bag. Include a return address and a method for returning the cooler. Tape bag under cooler lid.
- Seal each container in a plastic bag.
- Pack medium and high concentration samples in metal cans.
- Cool low waters to 4° C. Cooling of low soils is optional. Do not cool medium or high concentration waters and soils.
- Separate and surround cooler contents with vermiculite or equivalent packaging.
- Seal the cooler, overlapping the lid and body with custody seals.
- Mail CLASS the pink copy of the Traffic Report/Chain of Custody Form within 5 days.

3. Sample Shipment and Reporting

- All relevent Department of Transportation regulations must be followed when shipping samples.
- PHONE IN ALL SHIPMENTS IMMEDIATELY TO CLASS (or to RSCC, if instructed)

  Required information:
  - Case Number
  - Date shipped
  - Number of samples by concentration, matrix and analyses.
  - Carrier and airbill number
  - *Next planned shipment*

  Leave your name and a number where you can be reached.
- Information for SATURDAY DELIVERIES must be phoned in by 3:00 PM (Eastern) the preceding FRIDAY.
- Report any delays or changes of scope (i.e., changes in number of samples to be collected, matrix changes, etc.)
- CALL IF YOU HAVE ANY QUESTIONS

  Contract Laboratory Analytical Services Support
  300 North Lee Street
  Alexandria, VA 22314
  Phone: (703) 519-1200
  FAX: (703) 519-8626

Purpose Codes

Lead		Early Action				Long-Term Action	
SF	= Superfund	CLEM	= Classical Emergency	SI	= Site Inspection	FS	= Feasibility Study
PRP	= Commercial Potentially Responsible Party	PA	= Early Action Preliminary Assessment	ESI	= Expanded Site Inspection	RD	= Remedial Design
ST	= State	REM	= Removal	RI	= Remedial Investigation	RA	= Remedial Action
FED	= Federal Facility					O&M	= Operation & Maintenance
						NPLD	= National Priorities List Deletion

* U.S. GPO: 1988-394-780

Exhibit 5-7. Organic and Inorganic Traffic Report/Chain-of-Custody Forms Instructions

STEP	INSTRUCTIONS
STEP 1	The SAS Order number is no longer applicable. Leave this box blank.
STEP 2	Record the Case number that has been assigned to the sampling event.
STEP 3	Transcribe the project codes and site information. Enter the project and account codes assigned to the project by the RSCCs or EPA Site Managers. Record the site name, city, state, and site spill ID (assigned by your Region). This part of the form is desensitized and will not print on the laboratory copies. All site information must be kept confidential.
STEP 4	*Record your Region number and the name of your sampling company. Print your name and include your* signature in the space following. Additional space for sampler signatures is provided for in the area designated as Step 23.
STEP 5	Place a check mark in the appropriate box for funding lead under the column labeled "Lead." Place another check mark under either the "Early Action" or "Long-Term Action" columns for sampling effort. Two boxes must be checked in this area. Note that RCRA is an example of a federal lead sampling activity. Purpose codes are described in Exhibit 5-8.
STEP 6	Record the date shipped, the carrier name (e.g., Federal Express, Purolator or Airborne) and the air bill number.
STEP 7	Record the name and full address of the contract laboratory. Enter the name of the sample custodian or CLP contact. If contact name is unknown, write "CLP Sample Custodian."
STEP 8	Transcribe the CLP sample number from the preprinted sample labels exactly as it appears. Do not add hyphens, extra zeros, characters, or digits.
STEP 9	Record the appropriate matrix code from the choices listed in box number 6 on the form. If the Region is shipping a quality control (QC) sample such as a field blank, coolant blank, trip blank, spike, duplicate, or performance evaluation sample, then "Field QC" should be entered as the matrix for that sample. *However, if the Region wishes to keep the QC sample blind to the laboratory [this is recommended], then the sampler should enter either "1," "2," or "3" for water QC samples, and "5" for soil/sediment QC samples as the matrix code in Column A, "Matrix."*
STEP 10	Enter the estimated sample concentration. For organic samples, enter "L" for low/medium aqueous samples, "L" for low concentration solid samples, and "M" for medium concentration solid samples. For inorganics, enter "L" for low concentration samples, "M" for medium concentration, and "H" for high concentration.
STEP 11	Enter the sample type, either composite or grab.
STEP 12	Record the type of preservative, using the codes from box number 7 on the form.
STEP 13	In the analysis columns, make a check mark for each fraction to be analyzed. (It is not necessary to write the number of sample containers used.) Organics fractions are volatiles, semivolatiles, and pesticides/Aroclors; Inorganic fractions are total metals, dissolved metals, and cyanide. For each individual inorganic sample, you may request either total metal or dissolved metal analyses, but not both. That is, samples collected for total *metal and dissolved metal analyses must receive separate (unique) sample numbers. Note: Your form may also* contain future or recently discontinued fraction analyses.
STEP 14	Transcribe the Region-specific tracking numbers or tag numbers designated by the RSCC. If possible, all tag numbers for each CLP sample should be on one line. If several tags with consecutive numbers are used for one sample, the first number must be completely transcribed. Remaining tag numbers in the sequence can either be represented by including only those numbers that are unique (separated by commas) or by listing the first and last numbers of the sequence, separated by a dash. The TR/COC form entries should make it clear which tag number corresponds to which fraction.
STEP 15	Enter the station location number.
STEP 16	Record the month, day, year, and time, in military style (e.g., 1600 hours = 4:00 p.m.), of sample collection. This may make field QC samples (e.g., duplicates) non-blind to the laboratory.
STEP 17	Enter the corresponding organic or inorganic CLP sample number, if applicable.
STEP 18	Enter your initials.

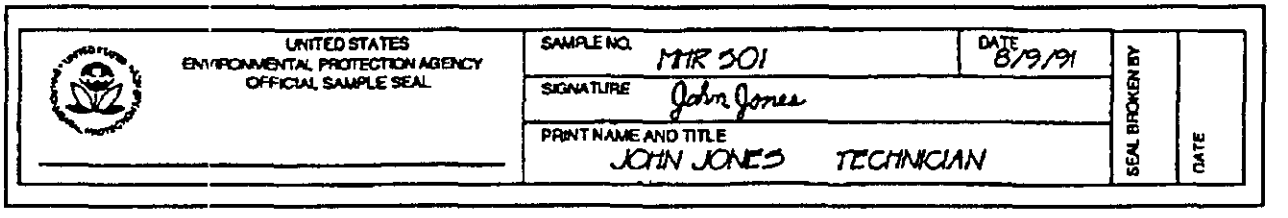
Exhibit 5-8. Purpose Codes

FUNDING ACTIVITY	CODE	DEFINITION
Funding Lead	SF	Superfund
	PRP	Potentially Responsible Party
	ST	State
	FED	Federal
Early Action	CLEM	Classic Emergency
	PA	Preliminary Assessment
	REM	Removal
	RI	Remedial Investigation
	SI	Site Inspection
	ESI	Expanded Site Inspection
Long-Term Action	FS	Feasibility Study
	RD	Remedial Design
	RA	Remedial Action
	O&M	Operations and Maintenance
	NPLD	National Priorities List Delete

5.6 Custody Seal

The custody seal is used to seal sample containers before they are placed into the cooler. Custody seals are also placed across the cooler opening after the cooler has been properly secured. The purpose of a custody seal is to indicate that the sample has not been tampered with prior to analysis. Therefore, for potential litigation purposes, you must sign and date the custody seal. It is a good practice to place the seal so that it is the signature that would be broken if the sample/cooler were opened (e.g., place the signature across the cooler/sample opening). Contact your authorized requestor or RSCC to obtain custody seals. Note: The space for "Sample No." does not need to be filled out on custody seals placed across the cooler opening. An example of a signed custody seal is shown in Exhibit 5-9. Because the use of custody seals varies between Regions, always refer to Regional guidance.

Exhibit 5-9. Custody Seal



6.0 SAMPLE PACKAGING AND SHIPPING

6.1 Sample Packaging

Follow all state and Federal regulations governing environmental sample packaging and shipment. Ship according to U.S. Department of Transportation (DOT) and International Air Transportation Association (IATA) regulations. The following sample packaging and shipping procedures need to be considered as minimum requirements. For some samples and shipping situations, these requirements may need to be exceeded.

- The site name should not appear on any documentation sent to the CLP laboratory.

- Aqueous samples for inorganic samples and volatile organic analysis may require chemical preservation. Note that the Regions may have slightly different requirements for the preservation of samples for volatile analysis, so Regional requirements should be consulted. Refer to Section 3.8, Sample Preservation and Holding Times, for these techniques before packaging.

- Check all lids/caps to make sure they are tight and will not leak. Place a completed custody seal over each container lid/cap, except for vials for volatile samples where the custody seal must be wrapped around the lid. (Note that the Regions may have slightly different requirements for placing custody seals and using tags, so Regional requirements should also be consulted. For custody seals, the objective is to place the seals in such a way that sample containers cannot be opened or tampered with without breaking the seal).

- Make sure sample labels are intact and covered with a piece of clear tape for protection. Tie on completed sample tags. Although there are no procedural requirements for tying on sample tags, a recommended approach is to tie the tag onto the sample bottle with a string by wrapping the string around the neck of the sample bottle and then tying the string into a knot.

- Enclose the sample container in clear plastic bag and seal the bag. Make sure the sample tags and labels are visible. See Exhibit 6-1. Note that if bubble wrap or other wrapping material will be placed around the labeled and tagged containers, write the sample number and fraction (e.g., "BLH01-VOCs") so that it is visible on the outside of the wrap, and then place the wrapped container in a clear plastic bag and seal the bag.

- Make sure that all samples that need to be kept cold (4+/-2°C) have been thoroughly cooled before placing in packing material so that the packing material serves to insulate the cold. Change the ice prior to shipment as needed. Ideally, pack the cooled samples into shipping containers that have already been chilled.

- Any soil/sediment samples suspected to be of medium/high concentration or containing dioxin must be enclosed in a metal can with a clipped or sealable lid (e.g., paint cans) to achieve double containment of those samples. Place suitable absorbent packing material around the sample container in the can. Make sure sample is securely stored in can and the lid is sealed. Label the outer metal container with the sample number and fraction of the sample inside. See Exhibit 6-1.

- Use a CLEAN waterproof metal or hard plastic ice chests or coolers in good repair for shipping samples. Remove the inapplicable previous shipping labels. Make sure any drain plugs are shut and seal plugs shut on the inside and outside with a suitable tape such as duct tape. Line the cooler with plastic (e.g., large heavy-duty garbage bag) before inserting samples.

- Ship samples at 4° +/- 2°C, place double-bagged ice on top of samples. Ice must be sealed in double plastic bags to prevent melting ice from soaking the packing material. Loose ice must <u>not</u> be poured into the cooler.

- It is good practice to conduct an inventory of sample numbers, fractions, and containers when placing samples into the coolers, and then check the inventory against the corresponding TR/COC form before sealing the cooler to make sure that all samples and containers are present.

- Pack the lined shipping containers with noncombustible, absorbent packing material such as vermiculite or rock wool. Place the packing material on the bottom of the shipping container (inside the plastic liner) and around sample bottles or metal cans to avoid breakage during shipment. Never use earth, ice, paper, or styrofoam to pack samples. Earth is a contaminant, melted ice may cause complications and allow the sample containers to bang together when the shipping container is moved, and styrofoam presents a disposal problem (it also may easily blow out of the shipping container at the site).

- For samples that need to be shipped at 4° +/-2°C, place double-bagged ice on top of samples and fill remaining space with packing material. Note that if sample bottles have been protected with packaging material such as bubble wrap, then some double-bagged ice or ice packs may also be placed between samples.

- Use tape to securely fasten the top of the plastic used to line the shipping container. It is a good idea to then place a completed custody seal around the top of the bag which contains the sample in case the outer seals placed across the cooler lid are inadvertently damaged during shipment.

- Enclose all sample documentation (i.e., TR/COC, other chain-of-custody forms, and cooler return shipping documents) in a waterproof plastic bag, and tape the bag to the underside of the cooler lid. See Exhibit 6-2. This documentation should address all samples in the cooler, but not address samples in any other cooler. If more than one cooler is being used, place separate sample documentation in each cooler.

- Instructions for returning the cooler should be documented inside the cooler lid. Write a return name and address for the sample cooler on the inside of the cooler lid in permanent ink to ensure return of the cooler.

- Tape the cooler shut using strapping tape over the hinges. Place completed custody seals across the top and sides of the cooler lid so that lid cannot be opened without breaking the seal. See Exhibit 6-3.

- Place clear tape over the seal to prevent inadvertent damage to the seal during shipment. Do not place clear tape over the seals in a manner that would allow the seals to be lifted off with the tape and then reaffixed without breaking the seal.

Exhibit 6-1. Sample Packaging

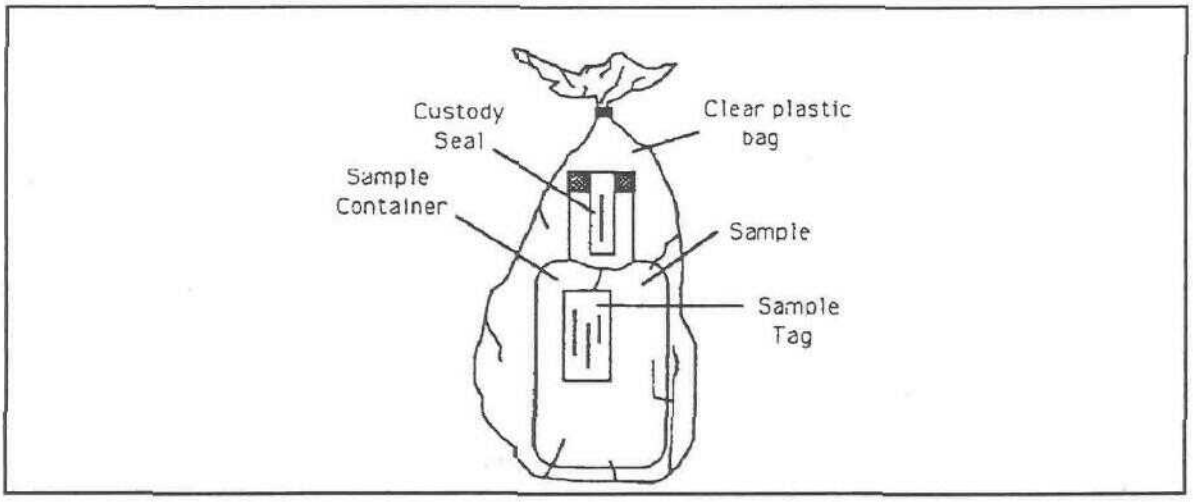


Exhibit 6-1a. Sample Packaging

Exhibit 6-2. Sample Cooler With Documentation

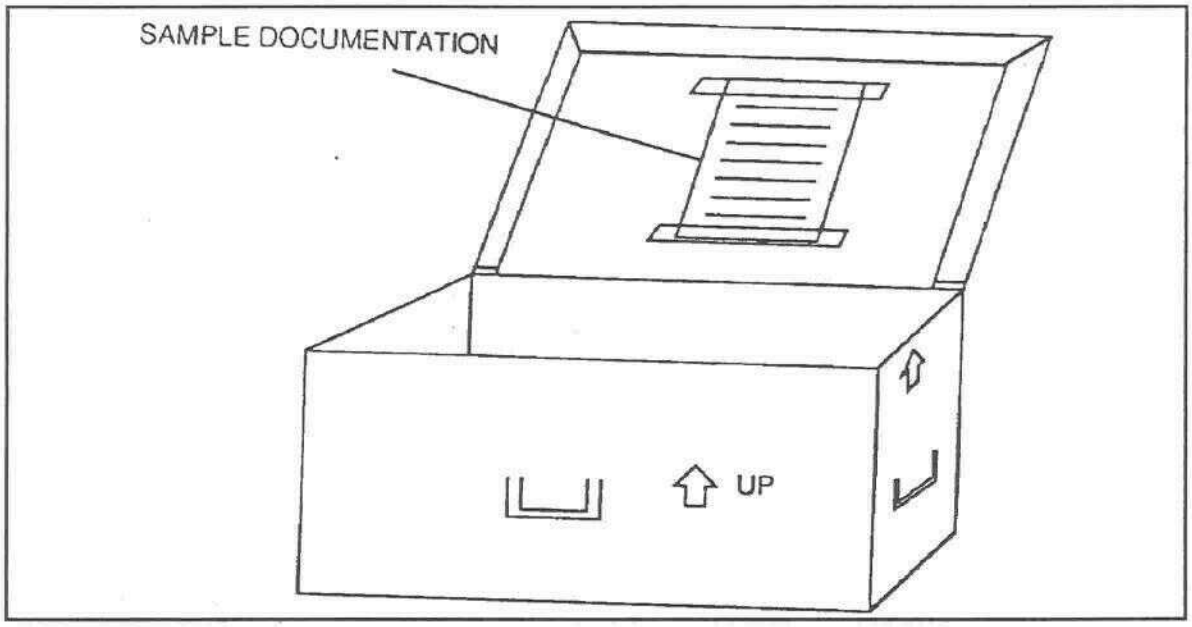
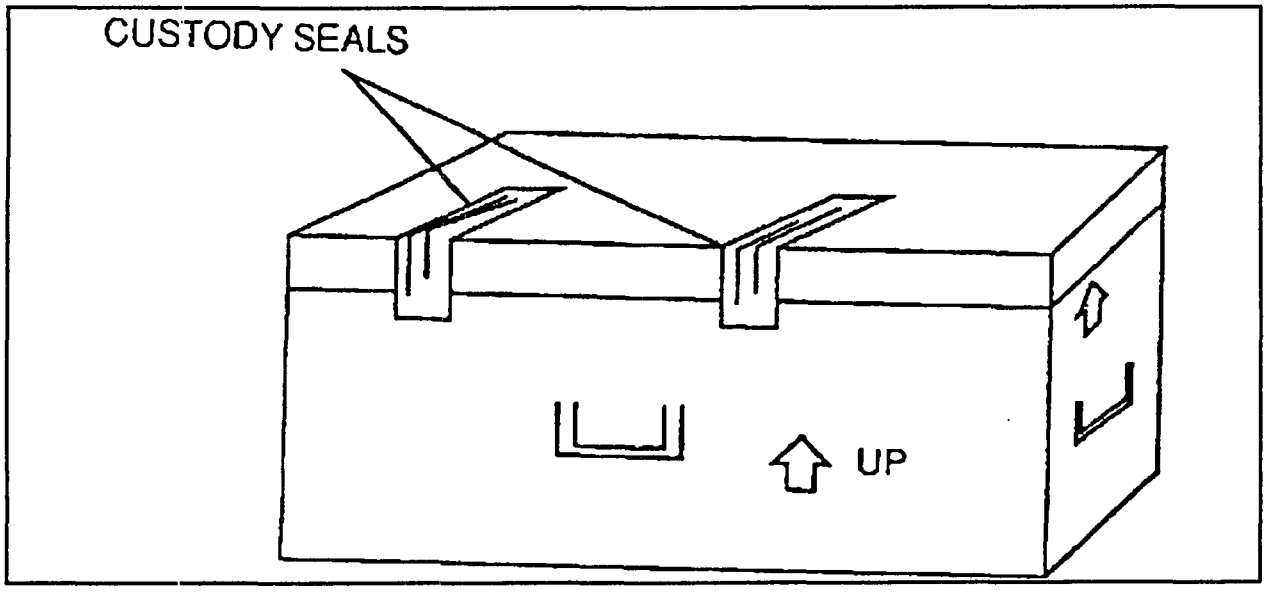


Exhibit 6-2a. Sample Cooler With Documentation

Exhibit 6-3. Sealed Cooler



6.2 Sample Shipping

Clearly label cooler and fill out appropriate shipping papers. Exhibit 6-4 shows the top of a cooler ready to be shipped.

- Place return address labels clearly on the outside of the cooler.
- If more than one cooler is being delivered to a laboratory, mark each cooler as "1 of 2," "2 of 2," etc. An air bill should be filled out for each cooler being shipped. When addressing the air bill to ship samples, identify the recipient as the "sample custodian."
- Ship samples through a commercial carrier, such as Federal Express, Purolator, or equivalent.
- Fill out all required government and commercial carrier shipping papers according to DOT and IAT A commercial carrier regulations.
- Ship all samples by overnight delivery, in accordance with DOT and IATA regulations.

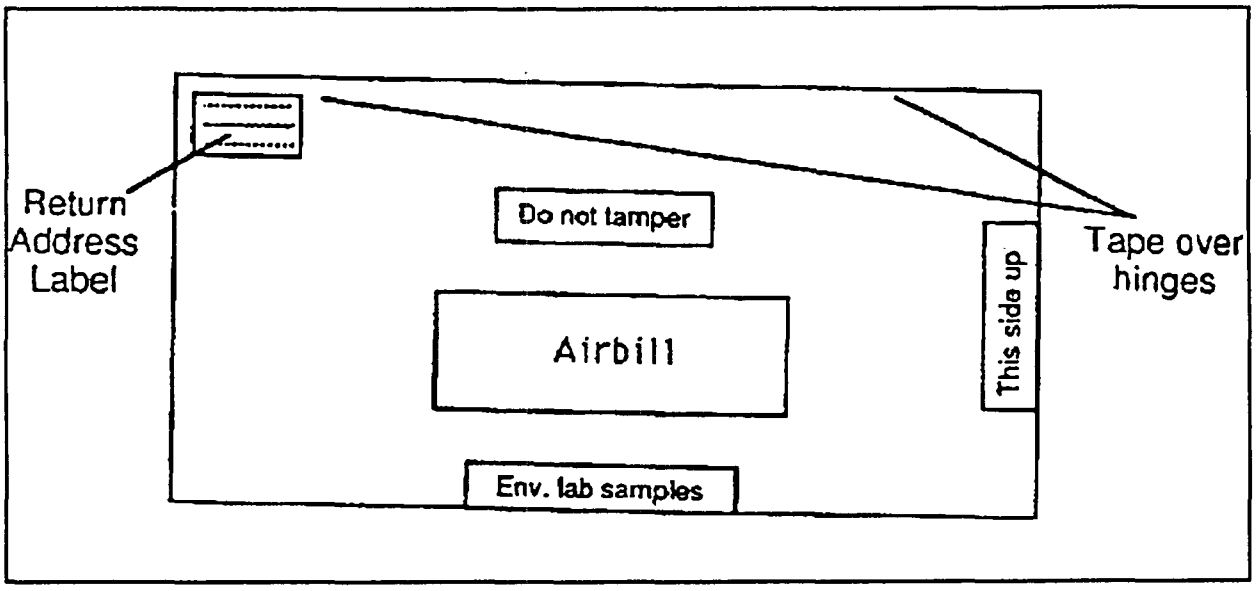
6.3 Potential Sampling Problems

Sometimes problems arise during sampling from improper sampling practices or other reasons. Some common problems to watch out for are:

- Filling out paperwork incorrectly or incompletely.
- Using the wrong Case number.
- Collecting less than the required sample volume.

- Shipping samples to the wrong laboratory.

Exhibit 6-4. Top of Cooler



- Assigning the same CLP sample number to dissolved and total metals water samples collected from the same location.
- Using incorrect sample containers.
- Improperly filling or packing sample containers.
- Preserving sample with incorrect preservative.
- Improperly labeling cooler.

These problems may delay sample analysis. If any of these problems occur, contact your RSCC or CLASS Coordinator immediately for instructions.

6.4 Reporting Sample Shipment

Notify the authorized RSCC or CLASS personnel, as directed, of all sample shipments on the day of shipment. This notification enables the CLASS contractor to track the shipment of samples from the field to the laboratory and ensures timely laboratory receipt of samples. When calling the CLASS contractor [General number: (703) 519-1200], provide the following information:

- Your name, phone number, and Region.
- Case number of the project.

- Exact number(s) of samples (not number of containers), matrix(ces) and concentration(s) of samples shipped. Type of analysis required.
- Laboratory(ies) to which samples were shipped.
- Carrier name and air bill number(s) for the shipment.
- Method of shipment (e.g., overnight, two day).
- Date of shipment.
- Suspected contaminants associated with the samples or site (e.g., dioxin, radio chemicals).
- Information on completions, changes, delays, continuations, etc., pertinent to the Case and sampling project.

Sample shipments made after 5 p.m. EST should be scheduled with the CLASS contractor at the start of business the next day (8 a.m. EST). **You must notify the CLASS contractor by 3 p.m. EST Friday for sample shipments that will be delivered on Saturday.** If the CLASS contractor cannot notify the laboratory of a Saturday delivery, there may not be anyone present at the CLP laboratory to receive samples until Monday.

6.5 Sample Cooler Returns

Regional and Regional Support Contractor Responsibilities

The EPA Regions and their support contractors are responsible for providing a mechanism for shipping empty sampl e coolers from the CLP laboratories back to the originating sampling office. AOC provides the following suggestions to maintain consistency among cooler transportation programs:

- Sampling contractors should include a completed shipping label in the cooler, which can have any code d information for tracking purposes.
- The label should consist of multi-copies so the laboratory and the sampling contractors can each retain one for their records.
- The label should be designed so that the laboratory can simply place the already-completed label on the cooler for shipment purposes.
- The label should include third-party billing information so that the transportation carrier is able to invoice the correct sampling contractor. The laboratory should be informed of the identity of the carrier.
- To avoid confusion, each Region should attempt to use only a minimum number of different carriers.
- Sufficient information should be included on the label to enable the sampling contractor to track use of the billing number.
- The process should be as easy as possible for the laboratories.

Laboratory Responsibilities

The laboratory is required to return sample coolers to the appropriate sampling office within 14 calendar days following shipment receipt. The laboratory should ensure that the account numbers provided by the Region are used only for the return of Government-owned shipping containers.

Laboratories are required to remove packing and other materials from the coolers before each pick-up and are required to ensure that the coolers are clean. Laboratories can determine from visual inspection if the coolers are clean. A n authorized laboratory official is required to sign and telefax the pick-up records to the designated transportation contractor or sampler within two calendar days of cooler pick-up for return.

If laboratories do not follow the procedures, notify the TPO listed in Exhibit 7-1 for the Region where the laboratory is located.

7.0 COMMUNICATION NETWORK

This section provides Regional contacts for questions or concerns regarding CLP Analytical Services sampling and analysis. Exhibit 7-1 lists names and telephone numbers for Regional Technical Project Officers, who serve as the first line of contact for the laboratory for all technical problem resolution. Exhibit 7-2 gives names, addresses, and telephone numbers of Regional primary RSCCs. These contacts are available for CLP Analytical Services analytical requests and serve as the first contact for information regarding sampling. Exhibit 7-3 gives names, addresses, and telephone numbers of the CLASS Regional CLP Analytical Service contacts, who serve as a second contact for information regarding sampling. The RSCCs and CLASS coordinators can advise samplers regarding problems that occur in the field.

Exhibit 7-1. Regional Technical Project Officers

Region	Technical Project Officer	Telephone Number
Region I	Deb Szaro, Moira Lataille	(617) 860-4312
Region II	Pat Sheridan	(908) 906-6169
Region III	Stevie Wilding	(410) 573-6833
Region IV	Gary Bennett	(706) 546-3287
Region V	Brian Freeman	(312) 353-2720
Region VI	Ray Flores	(713) 983-2139
Region VII	Larry Marchin	(913) 551-5170
Region VIII	Steve Callio	(303) 312-7290
Region IX	Steve Remaley	(415) 744-1496
Region X	Bruce Woods	(206) 553-1193

Exhibit 7-2. RSCC Addresses and Contacts

Regional Sample Control Centers	Primary RSCC*
USEPA Region I, WMD 60 Westvoew Street Lexington, MA 02173	Christine Clark (617) 860-4615
USEPA Region II, ESD 2890 Woodbridge Ave. Bldg. 209, MS220 Edison, NJ 08837	Phil Guarraia (908) 321-6697
USEPA Region III, CRL 201 Defense Highway, Suite 200 Annapolis, MD 21401	Carolyn Sierra (410) 573-2755
USEPA Region IV, ESD Env. Compliance Branch College Station Road Athens, GA 30613	Bill Bokey (706) 546-3299
USEPA Region V, WMD 77 W. Jackson Blvd. (HSMC-5J) Chicago, IL 60604	Cecilia Luckett (312) 886-1488
USEPA Region VI, Laboratory 10625 Fallstone Road Houston, TX 77099	Myra Perez (713) 983-2130
USEPA Region VII, ESD 25 Funston Rd. Kansas City, KS 66115	Nicole Roblez (913) 551-5130
USEPA Region VIII, 8ES-MEB 999 18th St. 5th Floor Denver, CO 80202	Carol Beard (303) 312-6047
USEPA Region IX, OPM, P-3-2 75 Hawthorne St. San Francisco, CA 94105	Gail Jones (415) 744-1498
USEPA Region X, ESD 1200 Sixth Ave. (M/S ES-095) Seattle, WA 98101	Laura Castrilli (206) 553-4323/1795

* Primary RSCC assignments are subject to change.

Exhibit 7-3. CLASS CLP Analytical Services Coordinators [1]

Region	CLASS Regional Coordinator [2]	Telephone Number
Region I	Neil Rogers	(703) 519-1019
Region II	Neil Rogers	(703) 519-1019
Region III	Carol Shaeffer	(703) 519-1461
Region IV	Carol Shaeffer	(703) 519-1461
Region V	Mistie Llewellyn	(703) 519-1084
Region VI	Mistie Llewellyn	(703) 519-1084
Region VII	Mistie Llewellyn	(703) 519-1084
Region VIII	Carol Shaeffer	(703) 519-1461
Region IX	Neil Rogers	(703) 519-1019
Region X	Neil Rogers	(703) 519-1019

[1] The address for CLASS is Contract Laboratory Analytical Services Support, P.O. Box 818, Alexandria, VA, 22313. The phone number for CLASS is (703) 519-1200.
[2] The coordinator assignment is subject to change.

8.0 GLOSSARY

AOC: Analytical Operations Center. The U.S. EPA Center which directs the national Contract Laboratory Program.

APO: Administrative Project Officer. The APOs are part of AOC and monitor laboratory performance, initiate contract action and laboratory funding, help resolve problems, and develop and design analytical services and methods.

Aliquot: A measured portion of a sample taken for analysis. One or more aliquots make up a sample.

Case: A finite, usually predetermined number of samples collected over a given time period from a particular site. A Case consists of one or more sample delivery groups (SDGs). See sample delivery group.

Case number: Number assigned to a set of CLP Analytical Services samples by the CLASS contractor for trackin g purposes.

CLASS: Contract Laboratory Analytical Services Support. The contractor-operated CLASS office provides management, operations, and administrative support to the CLP. The CLASS contractor schedules sample shipment for CLP Analytical Services requests.

CLP: Contract L aboratory Program. The CLP provides analytical services to the 10 EPA Regions through contracte d commercial laboratories.

CLPAS: Routine CLP Analytical Services performed by laboratories that have been awarded CLP government contracts.

Concentration: Defined as high, medium, or low and used to determine how much volume is collected or the analytical protocol to be followed.

Data turnaround time: The maximum length of time allowed for laboratories to submit analytical data to EPA in order to avoid liquidated damages. Data turnaround time begins at the validated time of sample receipt (VTSR) at the laboratory.

DOT: Department of Transportation.

Fraction: A specific subunit of an analytical protocol. For example, for low/medium organics, the fractions are volatiles, semivolatiles, and pesticides/Aroclors.

FORMS II: FORMS II is software that facilitates the capture of field information during sampling events, and automates the production of bottle labels, sample tags, bottle-specific custody seals, chain-of-custody records, cooler seals, PRP sample receipt records, and field reports.

Headspace: Air pocket in a VOA vial.

Holding time: The maximum amount of time a sample may be stored before analysis.

IATA: International Air Transportation Association.

Matrix: The principal material of which the sample is composed of, usually water or soil/sediment for CLP Analytica l Services samples.

NEIC: National Enforcement Investigations Center, a part of EPA, which is supporting the Agency's enforcement program, located in Denver, Colorado.

Preservative: A chemical added to inorganic and volatile water samples to maintain the integrity of the sample. Some common preservatives include nitric acid, hydrochloric acid, and sodium hydroxide.

QC Samples: Samples used to estimate the precision and accuracy of analytical results in the field and in the laboratory.

RSCC: Regional Sample Control Center. The RSCC coordinates Regional sampling efforts.

Sample: A single, discrete portion of the environment collected from a specified physical location at a specific time. The single sample may be placed in multiple vessels. The aliquots are identified by the same sample number.

Sample container: The individual bottle that contains the sample or an aliquot of the sample. The type of sample container varies for different sample fractions and concentrations.

Sample custody: Legal possession of and responsibility for an EPA sample. Documentation of sample custody is maintained on the chain-of-custody part of the traffic report or packing list. The sample is in your custody if any of the following criteria are met: 1) the sample is in your possession or is in your view after being in your possession, 2) the sample was in your possession and then locked up or sealed to prevent tampering, or 3) you have placed the sample in a secured area.

Sample label: Adhesive labels distributed by the RSCC that provide the sample numbers to be assigned to the samples.

Sample number: The sample number from the sample label that identifies the sample or an aliquot of the sample.

SDG: The sample delivery group (SDG) is a unit within a Case that is used to identify a group of samples for delivery. An SDG is defined as one of the following, whichever comes first:

- all samples within a Case, or
- every set of 20 field samples within a Case, or
- all field samples in a Case which are received at a laboratory during a specified period of time, beginning with receipt of the first sample in the Case or SDG.

SOW: Statement of work. This document specifies how laboratories analyze samples under a particular CLP analytical program.

Station location: The specific location where samples are collected on a site.

TAL: Target Analyte List. TALs list the target analytes to test for in inorganic analyses.

TCL: Target Compound List. TCLs list the target compounds to test for in organic analyses.

TPO: Regional Technical Project Officer. The TPO monitors the activities of the contract laboratories located in his or her Region.

TR/COC: CLP Analytical Services Traffic Report/Chain of Custody form. This form is used to track CLP Analytical Services samples from sample collection to sample receipt by the laboratory.

Volume: The amount of sample collected. Volume requirements differ between CLP Analytical Services programs, matrices, fractions, and concentrations.

VOA: Volatile Organic compound Analysis. Used synonymously with VOC.

VOC: Volatile Organic Compound.

VTSR: Verified Time of Sample Receipt.

9.0 EPA REFERENCE DOCUMENTS

Copies of the EPA Reference documents may be obtained from:

National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650

U.S. EPA, "The Data Quality Objectives process for Environmental Decisions," QAMS EPA QA/G4.

U.S. EPA, "The Data Quality Objectives process for Superfund," EPA540-R-93-071.

U.S. EPA, "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations," EPA QA/R5, Draft Interim Final, August 1994.

U.S. EPA, "EPA Requirements for Quality Management Plans," QAMS Interim Final, 8/94.

U.S. EPA, "User's Guide to the Contract Laboratory Program," EPA/540/P-91/002, 1991.

U.S. EPA, Compendium of ERT Surface Water and Sediment Sampling Procedures, EPA/540/P-91/005.

U.S. EPA, Compendium of ERT Soil Sampling and Surface Geophysics Procedures, EPA/540/P-91/006.

U.S. EPA, Compendium of ERT Groundwater Sampling Procedures, EPA/540/P-91/007.

U.S. EPA, Soil Sampling and Analysis for Volatile Organic Compounds, EPA/540/4-91/001.

U.S. EPA, Technical Notes on Drinking Water Methods, EPA/600/R-94/173.

Specifications and Guidance for Contaminant-Free Sample Containers, December 1992, OSWER Directive 92.0-05A.

Current CLP Statements of Work are available through NTIS and the CLU-IN Bulletin Board [System Operator at (301) 589-8368] on the Internet (via telnet) at CLU-IN.EPA.GOV.

US Army Corps of Engineers. Requirements for the Preparation of Sampling and Analysis Plans, Draft, June 30, 1994. EM 200-1-3.

APPENDIX C

Multi-Media, Multi-Concentration, Organic Analytical Service
for Superfund
Quick Reference Fact Sheet, August 1999

United States Environmental Protection Agency | Office of Solid Waste and Emergency Response | Publication 9240.0-08FSC August 1999

EPA

Multi-Media, Multi-Concentration, Organic Analytical Service for Superfund (OLM03.2)

Office of Emergency and Remedial Response
Analytical Operations\Data Quality Center (5204G)

Quick Reference Fact Sheet

Under the legislative authority granted to the U.S. Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), EPA develops standardized analytical methods for the measurement of various pollutants in environmental samples from known or suspected hazardous waste sites. Among the pollutants that are of concern to the EPA at such sites, are a series of volatile, semivolatile, and pesticide/Aroclor (pesticide/PCB) compounds that are analyzed using gas chromatography coupled with mass spectrometry (GC/MS) and gas chromatography with an electron capture detector (GC/ECD). The Analytical Operations\Data Quality Center (AOC) of the Office of Emergency and Remedial Response (OERR) offers an analytical service that provides data from the analysis of water and soil/sediment samples for organic compounds for use in the Superfund decision-making process. Through a series of standardized procedures and a strict chain-of-custody, the organic analytical service produces data of known and documented quality. This service is available through the Superfund Contract Laboratory Program (CLP).

DESCRIPTION OF SERVICES

The organic analytical service provides a technical and contractual framework for laboratories to apply EPA/CLP analytical methods for the isolation, detection, and quantitative measurement of 33 volatile, 64 semivolatile, and 28 pesticide/Aroclor (pesticide/PCB) target compounds in water and soil/sediment environmental samples. The CLP provides the methods to be used and the specific technical, reporting, and contractual requirements, including quality assurance, quality control, and standard operating procedures, by which EPA evaluates the data. This service uses GC/MS and GC/ECD methods to analyze the target compounds. Two data delivery turnarounds are available to CLP customers: 35-day turnaround and 14-day turnaround after laboratory receipt of the last sample in the set.

DATA USES

This analytical service provides data which EPA uses for a variety of purposes, such as determining the nature and extent of contamination at a hazardous waste site, assessing priorities for response based on risks to human health and the environment, determining appropriate cleanup actions, and determining when remedial actions are complete. The data may be used in all stages in the investigation of a hazardous waste site including site inspections, Hazard Ranking System scoring, remedial investigations/feasibility studies, remedial design, treatability studies, and removal actions. In addition, this service provides data that are available for use in Superfund enforcement/litigation activities.

TARGET COMPOUNDS

The compounds for which this service is applicable and the corresponding quantitation limits are listed in **Table 1**. For water samples, the lowest quantitation limits reportable are 10 ppb for the volatile compounds, 10 ppb for the semivolatile compounds, and 0.05 ppb for the pesticide/Aroclor (pesticide/PCB) compounds. For soil samples, the lowest quantitation limits reportable are 10 ppb for the volatile compounds, 330 ppb for the semivolatile compounds, and 1.7 ppb for the pesticide/Aroclor (pesticide/PCB) compounds. Specific sample quantitation limits are highly matrix dependent. Compounds identified with concentrations below the quantitation limit are reported as estimated concentration values.

Table 1. Target Compound List and Contract Required Quantitation Limits (CRQLs) For OLM03.2*

		Quantitation Limits	
		Water (ug/L)	Low Soil (ug/Kg)
VOLATILES			
1.	Chloromethane	10	10
2.	Vinyl Chloride	10	10
3.	Bromomethane	10	10
4.	Chloroethane	10	10
5.	1,1-Dichloroethene	10	10
6.	Acetone	10	10
7.	Carbon Disulfide	10	10
8.	Methylene Chloride	10	10
9.	1,2-Dichloroethene (total)	10	10
10.	1,1-Dichloroethane	10	10
11.	2-Butanone	10	10
12.	Chloroform	10	10
13.	1,1,1-Trichloroethane	10	10
14.	Carbon Tetrachloride	10	10
15.	Benzene	10	10
16.	1,2-Dichloroethane	10	10
17.	Trichloroethene	10	10
18.	1,2-Dichloropropane	10	10
19.	Bromodichloromethane	10	10
20.	cis-1,3-Dichloropropene	10	10
21.	4-Methyl-2-pentanone	10	10
22.	Toluene	10	10
23.	trans-1,3-Dichloropropene	10	10
24.	1,1,2-Trichloroethane	10	10
25.	Tetrachloroethene	10	10
26.	2-Hexanone	10	10
27.	Dibromochloromethane	10	10
28.	Chlorobenzene	10	10
29.	Ethylbenzene	10	10
30.	Xylenes (total)	10	10
31.	Styrene	10	10
32.	Bromoform	10	10
33.	1,1,2,2-Tetrachloroethane	10	10
SEMIVOLATILES			
34.	Phenol	10	330
35.	bis-(2-Chloroethyl)ether	10	330
36.	2-Chlorophenol	10	330
37.	1,3-Dichlorobenzene	10	330
38.	1,4-Dichlorobenzene	10	330
39.	1,2-Dichlorobenzene	10	330
40.	2-Methylphenol	10	330
41.	2,2'-oxybis (1-Chloropropane)	10	330
42.	4-Methylphenol	10	330
43.	N-Nitroso-di-n-propylamine	10	330
44.	Hexachloroethane	10	330
45.	Nitrobenzene	10	330
46.	Isophorone	10	330
47.	2-Nitrophenol	10	330
48.	2,4-Dimethylphenol	10	330
49.	bis-(2-Chloroethoxy)methane	10	330
50.	2,4-Dichlorophenol	10	330
51.	1,2,4-Triclorobenzene	10	330
52.	Naphthalene	10	330
53.	4-Chloroaniline	10	330
54.	Hexachlorobutadiene	10	330
55.	4-Chloro-3-methylphenol	10	330
56.	2-Methylnaphthalene	10	330
57.	Hexachlorocyclopentadiene	10	330
58.	2,4,6-Trichlorophenol	10	330
59.	2,4,5-Trichlorophenol	25	830
60.	2-Chloronaphthalene	10	330
61.	2-Nitroaniline	25	830
62.	Dimethylphthalate	10	330
63.	Acenaphthylene	10	330
64.	2,6-Dinitrotoluene	10	330
65.	3-Nitroaniline	25	830
66.	Acenaphthene	10	330
67.	2,4-Dinitrophenol	25	830
68.	4-Nitrophenol	25	830
69.	Dibenzofuran	10	330
70.	2,4-Dinitrotoluene	10	330
71.	Fluorene	10	330
72.	Diethylphthalate	10	330
73.	4-Chlorophenyl-phenylether	10	330
74.	4-Nitroaniline	25	830
75.	4,6-Dinitro-2-methylphenol	25	830
76.	N-Nitrosodiphenylamine	10	330
77.	4-Bromophenyl-phenylether	10	330
78.	Hexachlorobenzene	10	330
79.	Pentachlorophenol	25	830
80.	Phenanthrene	10	330
81.	Anthracene	10	330
82.	Carbazole	10	330
83.	Di-n-butylphthalate	10	330
84.	Fluoranthene	10	330
85.	Pyrene	10	330
86.	Butylbenzylphthalate	10	330
87.	3,3'-Dichlorobenzidine	10	330
88.	Benzo(a)anthracene	10	330
89.	Chrysene	10	330
90.	bis-(2-Ethylhexyl)phthalate	10	330
91.	Di-n-octylphthalate	10	330
92.	Benzo(b)fluoranthene	10	330
93.	Benzo(k)fluoranthene	10	330
94.	Benzo(a)pyrene	10	330
95.	Indeno(1,2,3-cd)pyrene	10	330
96.	Dibenz(a,h)anthracene	10	330
97.	Benzo(g,h,i)perylene	10	330

		Quantitation Limits	
PESTICIDES/AROCLORS (PESTICIDES/PCBs)		Water (ug/L)	Soil (ug/Kg)
98.	alpha-BHC	0.05	1.7
99.	beta-BHC	0.05	1.7
100.	delta-BHC	0.05	1.7
101.	gamma-BHC (Lindane)	0.05	1.7
102.	Heptachlor	0.05	1.7
103.	Aldrin	0.05	1.7
104.	Heptachlor epoxide	0.05	1.7
105.	Endosulfan I	0.05	1.7
106.	Dieldrin	0.10	3.3
107.	4,4'-DDE	0.10	3.3
108	Endrin	0.10	3.3
109.	Endosulfan II	0.10	3.3
110.	4,4'-DDD	0.10	3.3
111.	Endosulfan sulfate	0.10	3.3
112.	4,4'-DDT	0.10	3.3
113.	Methoxychlor	0.50	17
114.	Endrin ketone	0.10	3.3
115.	Endrin aldehyde	0.10	3.3
116.	alpha-Chlordane	0.05	1.7
117.	gamma-Chlordane	0.05	1.7
118.	Toxaphene	5.0	170
119.	Aroclor-1016	1.0	33
120.	Aroclor-1221	2.0	67
121.	Aroclor-1232	1.0	33
122.	Aroclor-1242	1.0	33
123.	Aroclor-1248	1.0	33
124.	Aroclor-1254	1.0	33
125.	Aroclor-1260	1.0	33

* For volatiles, quantitation limits for medium soils are approximately 120 times the quantitation limits for low soils. For semivolatile medium soils, quantitation limits are approximately 30 times the quantitation limits for low soils.

The list of target compounds for this service was originally derived from the EPA Priority Pollutant List of 129 compounds. In the years since the inception of the CLP, compounds have been added to and deleted from the Target Compound List (TCL), based on advances in analytical methods, evaluation of method performance data, and the needs of the Superfund program.

For drinking water and groundwater type samples, use of the low concentration organic analytical service is recommended.

METHODS AND INSTRUMENTATION

For semivolatile and pesticide/Aroclor (pesticide/PCB) water samples, a 1-L aliquot is extracted with methylene chloride using a continuous liquid-liquid extractor or separatory funnel (for pesticides/Aroclors (pesticides/PCBs) only)). For low level semivolatile soil and pesticide/Aroclor (pesticide/PCB) soil samples, a 30-g soil sample is extracted with methylene chloride/acetone. For medium level semivolatile soil samples, a 1-g soil sample is extracted with methylene chloride using sonication. For both water and soil samples, the extract is concentrated, subjected to fraction-specific cleanup procedures, and analyzed by GC/MS for semivolatiles or GC/ECD for pesticides/Aroclors (pesticides/PCBs).

For volatile water samples, 5 mL of water is added to a purge and trap device and purged with an inert gas at room temperature. For volatile low level soil samples, a 5-g aliquot of soil is added to a purge and trap device with 5 mL of reagent water and purged with an inert gas at 40°C. For volatile medium level soil samples, 4 g are extracted with methanol and an aliquot is added to reagent water. For both water and soil samples, the volatiles purged from the sample are trapped on a solid sorbent. They are subsequently desorbed by rapidly heating the sorbent and then introduced into a GC/MS system. **Table 2** summarizes the methods and instruments used in this analytical service.

DATA DELIVERABLES

Data deliverables for this service include both hardcopy/ electronic data reporting forms and supporting raw data. The laboratory must submit data to EPA within 35 days (or 14 days for 14-day contracts) after laboratory receipt of the last sample in the set. EPA then processes the data through an automated Data Assessment Tool. DAT is a complete CLP data assessment package. DAT incorporates Contract Compliance Screening (CCS) and Computer-Aided Data Review and Evaluation (CADRE) review to provide EPA Regions with PC-compatible reports, spreadsheets, and electronic files within 24 to 48 hours from the receipt of the data for data validation. This automated tool facilitates the transfer of analytical data into Regional databases. In addition to the Regional electronic reports, the CLP laboratories are provided with a data assessment report that documents the instances of noncompliance. The laboratory has 10 days to reconcile defective data and resubmit the data to EPA. EPA then reviews the data for noncompliance and sends a final data assessment report to the CLP laboratory and the Region.

QUALITY ASSURANCE

The quality assurance (QA) process consists of management review and oversight at the planning, implementation, and completion stages of the environmental data collection activity. This process ensures that the data provided are of the quality required. During the implementation of the data collection effort, QA activities ensure that the quality control (QC) system is functioning effectively and that the deficiencies uncovered by the QC system are corrected. After environmental data are collected, QA activities focus on assessing the quality of data to determine its suitability to support enforcement or remedial decisions.

Each contract laboratory prepares a quality assurance plan (QAP) with the objective of providing sound analytical chemical measurements. The QAP must specify the policies, organization, objectives, and functional guidelines, as well as the QA and QC activities designed to achieve the data quality requirements for this analytical service.

QUALITY CONTROL

The QC process includes those activities required during analytical data collection to produce data of known and documented quality. The analytical data acquired from QC procedures are used to estimate and evaluate the analytical results and to determine the necessity for or the effect of corrective action procedures. The QC procedures required for this analytical service are shown in **Table 3**.

Table 2. Methods and Instruments

Fraction	Water	Soil
Volatiles	Purge and trap followed by GC/MS analysis	Purge and trap followed by GC/MS analysis
Semivolatiles	Continuous liquid-liquid extraction followed by GC/MS analysis	Sonication followed by GC/MS analysis
Pesticides/Aroclors (Pesticides/PCBs)	Continuous liquid-liquid or separatory funnel extraction followed by dual column GC/ECD analysis	Sonication followed by dual column GC/ECD analysis

Table 3. Quality Control

QC Operation	Frequency
System Monitoring Compounds (volatiles)	Added to each sample, standard, and blank
Surrogates (for semivolatiles and pesticides/Aroclors (pesticides/PCBs))	Added to each sample, standard, and blank
Method Blanks (volatiles)	Analyzed at least every 12 hours for each matrix and level
Method Blanks (semivolatiles and pesticides/Aroclors (pesticides/PCBs))	Prepared with each group of 20 samples or less of the same matrix and level, or each time samples are extracted
Instrument Blank (volatiles)	Analyzed after a sample which contains compounds at concentrations greater than the calibration range
Instrument Blank (pesticides/Aroclors (pesticides/PCBs))	Every 12 hours on each GC column used for analysis
Storage Blanks (volatiles)	Prepared and stored with each set of samples
GC/MS mass calibration and ion abundance patterns (volatiles and semivolatiles)	Every 12 hours for each instrument used for analysis
GC Resolution Check (pesticides/Aroclors (pesticides/PCBs))	Prior to initial calibration, on each instrument used for analysis
Initial Calibration	Upon initial set up of each instrument, and each time continuing calibration fails to meet the acceptance criteria
Continuing Calibration	Every 12 hours for each instrument used for analysis
Internal Standards (volatiles and semivolatiles)	Added to each sample, standard, and blank
Matrix Spike and Matrix Spike Duplicate	Once every 20 or fewer samples of same fraction, matrix, and level

PERFORMANCE MONITORING ACTIVITIES

Laboratory performance monitoring activities are provided primarily by AOC and the Regions to ensure that contract laboratories are producing data of the appropriate quality. EPA performs on-site laboratory audits, data package audits, and GC/MS tape audits, and evaluates laboratory performance through the use of blind performance evaluation samples.

For more information, or for suggestions to improve this analytical service, please contact:

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Organic Program Manager
USEPA/AOC
401 M Street, SW (5204G)
Washington, DC 20460
703-603-8849
FAX: 703-603-9112

APPENDIX D

Multi-Media, Multi-Concentration, Inorganic Analytical Service for Superfund

Quick Reference Fact Sheet, August 1999

United States Environmental Protection Agency | Office of Solid Waste and Emergency Response | Publication 9240.0-09FSC August 1999

EPA

Multi-Media, Multi-Concentration, Inorganic Analytical Service for Superfund (ILM04.0)

Office of Emergency and Remedial Response
Analytical Operations\Data Quality Center (5204G)

Quick Reference Fact Sheet

Under the legislative authority granted to the U.S. Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), EPA develops standardized analytical methods for the measurement of various pollutants in environmental samples from known or suspected hazardous waste sites. Among the pollutants that are of concern to the EPA at such sites, are a series of inorganic analytes and cyanide that are analyzed using inductively coupled plasma (ICP), atomic absorption (AA), and colorimetric techniques. The Analytical Operations\Data Quality Center (AOC) of the Office of Emergency and Remedial Response (OERR) offers an analytical service that provides data from the analysis of water and soil/sediment samples for inorganic analytes for use in the Superfund decision-making process. Through a series of standardized procedures and a strict chain-of-custody, the inorganic analytical service produces data of known and documented quality. This service is available through the Superfund Contract Laboratory Program (CLP).

DESCRIPTION OF SERVICES

The inorganic analytical service provides a technical and contractual framework for laboratories to apply EPA/CLP analytical methods for the preparation, detection, and quantitative measurement of 23 inorganic target analytes and cyanide in water and soil/sediment environmental samples. The CLP provides the methods to be used and the specific technical, reporting, and contractual requirements, including quality assurance, quality control, and standard operating procedures, by which EPA evaluates the data. This service uses inductively coupled plasma, atomic absorption, and colorimetric methods to analyze the inorganic target analytes and cyanide. Two data delivery turnarounds are available to CLP customers: 35-day turnaround and 14-day turnaround after laboratory receipt of the last sample in the set.

DATA USES

This analytical service provides data which EPA uses for a variety of purposes, such as determining the nature and extent of contamination at a hazardous waste site, assessing priorities for response based on risks to human health and the environment, determining appropriate cleanup actions, and determining when remedial actions are complete. The data may be used in all stages in the investigation of a hazardous waste site including site inspections, Hazard Ranking System scoring, remedial investigations/feasibility studies, remedial design, treatability studies, and removal actions. In addition, this service provides data that are available for use in Superfund enforcement/litigation activities.

TARGET ANALYTES

The analytes and detection limits for which this service is applicable are listed in **Table 1**. The list of target analytes for this service was originally derived from the EPA Priority Pollutant List of 129 compounds. In the years since the inception of the CLP, analytes have been added to and deleted from the Target Analyte List, based on advances in analytical methods, evaluation of method performance data, and the needs of the Superfund program. Specific detection limits are highly matrix dependent.

METHODS AND INSTRUMENTATION

Table 2 summarizes the methods and instruments used in this analytical service.

Table 1
Target Analyte List and Contract Required Detection Limits (CRDLs) (ILM04.0)

Abbreviation	Analyte	Contract Required Detection Limit[1] (ug/L)
Al	Aluminum	200
Sb	Antimony	60
As	Arsenic	10
Ba	Barium	200
Be	Beryllium	5
Cd	Cadmium	5
Ca	Calcium	5000
Cr	Chromium	10
Co	Cobalt	50
Cu	Copper	25
Fe	Iron	100
Pb	Lead	3
Mg	Magnesium	5000
Mn	Manganese	15
Hg	Mercury	0.2
Ni	Nickel	40
K	Potassium	5000
Se	Selenium	5
Ag	Silver	10
Na	Sodium	5000
Tl	Thallium	10
V	Vanadium	50
Zn	Zinc	20
Cn	Cyanide	10

Sample concentration exceeding five times the detection limit of the instrument or method in use may be reported even though the instrument or method detection limit is greater than the CRDL. This is illustrated in the following example:

For lead:
Method in use = ICP
Instrument Detection Limit (IDL) = 40
Sample Concentration = 220
Contract Required Detection Limit (CRDL) = 3

[1]The Contract Required Detection Limit is the instrument detection limit obtained in pure water.

DATA DELIVERABLES

Data deliverables for this service include both hardcopy/ electronic data reporting forms and supporting raw data. The laboratory must submit data to EPA within 35 days (or 14 days for 14-day contracts) after laboratory receipt of the last sample in the set. EPA then processes the data through an automated Data Assessment Tool. DAT is a complete CLP data assessment package. DAT incorporates Contract Compliance Screening (CCS) and Computer-Aided Data Review and Evaluation (CADRE) review to provide EPA Regions with PC-compatible reports, spreadsheets, and electronic files within 24 to 48 hours from the receipt of the data for data validation. This automated tool facilitates the transfer of analytical data into Regional databases. In addition to the Regional electronic reports, the CLP laboratories are provided with a data assessment report that documents the instances of noncompliance. The laboratory has 10 days to reconcile defective data and resubmit the data to EPA. EPA then reviews the data for noncompliance and sends a final data assessment report to the CLP laboratory and the Region.

QUALITY ASSURANCE

The quality assurance (QA) process consists of management review and oversight at the planning, implementation, and completion stages of the environmental data collection activity. This process ensures that the data provided are of the quality required. During the data collection effort, QA activities ensure that the quality control (QC) system is functioning effectively and that the deficiencies uncovered by the QC system are corrected. After environmental data are collected, QA activities focus on assessing the quality of data to determine its suitability to support enforcement or remedial decisions.

Each contract laboratory prepares a quality assurance plan (QAP) with the objective of providing sound analytical chemical measurements. The QAP must specify the policies, organization, objectives, and functional guidelines, as well as the QA and QC activities designed to achieve the data quality requirements for this analytical service.

QUALITY CONTROL

The QC process includes those activities required during analytical data collection to produce data of known and documented quality. The analytical data acquired from QC procedures are used to estimate and evaluate the analytical results and to determine the necessity for or the effect of corrective action procedures. The QC procedures required for this analytical service are shown in **Table 3**.

Table 2. Methods and Instruments

Analyte	Instrument	Method
Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Se, Ag, Na, Tl, V, Zn	Inductively Coupled Plasma (ICP)	Acid digestion followed by ICP analysis
As, Pb, Tl, Se	Graphite Furnace Atomic Absorption (GFAA)	Acid digestion followed by GFAA analysis
Ca, Mg, Na, K	Flame Atomic Absorption (FAA)	Acid digestion followed by FAA analysis
Hg	Cold Vapor Atomic Absorption (CVAA)	Acid and permanganate oxidation followed by CVAA analysis
CN	Manual and Semi-automated Colorimetric	Distillation followed by colorimetric analysis

Table 3. Quality Control

QC Operation	Frequency
Instrument Calibration	Daily or each time instrument is set up
Initial Calibration Verification	Following each instrument calibration
Initial Calibration Blank	Following each instrument calibration
Continuing Calibration Verification	Every ten analytical samples or every two hours during a run and at the beginning and end of each run
Continuing Calibration Blank	Every ten analytical samples or every two hours during a run and at the beginning and end of each run
Interference Check Sample	Every twenty analytical samples and at the beginning and end of each run
CRDL Standard for ICP	Every twenty analytical samples and at the beginning and end of each run
CRDL Standard for AA	At the beginning of each AA analytical run
Serial Dilution	For each matrix type and concentration for each sample delivery group (SDG)
Preparation Blank	For each sample preparation, analysis, and matrix per batch of prepared samples
Laboratory Control Sample	For each sample preparation and analysis procedure for each batch
Matrix Spike Sample Analysis	For each matrix type, concentration level, and method for each SDG
Duplicate Sample Analysis	For each matrix type, concentration level, and method for each SDG
Post Digestion Spike	Each time matrix spike recovery is outside QC limits
Analytical Spike	For each analytical sample analyzed by furnace AA
Method of Standard Addition	When the analytical spike recovery is outside QC limits
Instrument Detection Limit Determination	Quarterly
Interelement Corrections	Annually for ICP instruments only
Linear Range Analysis	Quarterly for ICP instruments only

PERFORMANCE MONITORING ACTIVITIES

Laboratory performance monitoring activities are provided primarily by AOC and the Regions to ensure that contract laboratories are producing data of the appropriate quality. EPA performs on-site laboratory audits, data package audits, and evaluates laboratory performance through the use of blind performance evaluation samples.

For more information, or for suggestions to improve this analytical service, please contact:

Tanya Mitchell
Inorganic Program Manager
USEPA/AOC
401 M Street, SW (5204G)
Washington, DC 20460
703-603-8872
FAX: 703-603-9112

APPENDIX E

Low Concentration Organic Analytical Service for Superfund
(Water Matrix)
Quick Reference Fact Sheet, August 1999

United States Environmental Protection Agency | Office of Solid Waste and Emergency Response | Publication 9240.0-32FSA August 1999

EPA

Low Concentration Organic Analytical Service for Superfund (Water Matrix) (OLC02.1)

Office of Emergency and Remedial Response
Analytical Operations\Data Quality Center (5204G)

Quick Reference Fact Sheet

Under the legislative authority granted to the U.S. Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), EPA develops standardized analytical methods for the measurement of various pollutants in environmental samples from known or suspected hazardous waste sites. Among the pollutants that are of concern to the EPA at such sites, are a series of volatile, semivolatile, and pesticide/Aroclor (pesticide/PCB) compounds that are analyzed using gas chromatography coupled with mass spectrometry (GC/MS) and gas chromatography with an electron capture detector (GC/ECD). The Analytical Operations\Data Quality Center (AOC) of the Office of Emergency and Remedial Response (OERR) offers an analytical service that provides data from the analysis of groundwater and drinking water type samples for organic compounds for use in the Superfund decision-making process. Through a series of standardized procedures and a strict chain-of-custody, the low concentration organic analytical service produces data of known and documented quality. This service is available through the Superfund Contract Laboratory Program (CLP).

DESCRIPTION OF SERVICES

The low concentration organic analytical service provides a technical and contractual framework for laboratories to apply EPA/CLP analytical methods for the isolation, detection, and quantitative measurement of 41 volatile, 59 semivolatile, and 28 pesticide/Aroclor (pesticide/PCB) target compounds in low concentration groundwater and drinking water type samples. The CLP provides the methods to be used and the specific technical, reporting, and contractual requirements, including quality assurance, quality control, and standard operating procedures, by which EPA evaluates the data. The data turnaround time for this contract is 14 days after laboratory receipt of the last sample in the set.

DATA USES

This analytical service provides data which EPA uses for a variety of purposes, such as determining the nature and extent of contamination at a hazardous waste site, assessing priorities for response based on risks to human health and the environment, determining appropriate cleanup actions, and determining when remedial actions are complete. The data may be used in all stages of a hazardous waste site including site inspections, Hazard Ranking System scoring, remedial investigations/ feasibility studies, remedial design, treatability studies, and removal actions. In addition, this service provides data that are available for use in Superfund enforcement/litigation activities.

TARGET COMPOUNDS

The compounds and quantitation limits for which this service is applicable are listed in **Table 1**. The lowest quantitation limits reportable are 1 ppb for the volatile compounds, 5 ppb for the semivolatile compounds, and 0.01 ppb for the pesticide/Aroclor (pesticide/PCB) compounds. Specific sample quantitation limits are highly matrix dependent. The list of target compounds for this service was originally derived from the EPA Priority Pollutant List of 129 compounds. In the years since the inception of the CLP, compounds have been added to and deleted from the Target Compound List (TCL), based on advances in analytical methods, evaluation of method performance data, and the needs of the Superfund program.

Table 1. Target Compound List and Contract Required Quantitation Limits (CRQLs) in ug/L (OLC02.1)

VOLATILES		
1.	Chloromethane	1
2.	Bromomethane	1
3.	Vinyl Chloride	1
4.	Chloroethane	1
5.	Methylene Chloride	2
6.	Acetone	5
7.	Carbon Disulfide	1
8.	1,1-Dichloroethene	1
9.	1,1-Dichloroethane	1
10.	cis-1,2-Dichloroethene	1
11.	trans-1,2-Dichloroethene	1
12.	Chloroform	1
13.	1,2-Dichloroethane	1
14.	2-Butanone	5
15.	Bromochloromethane	1
16.	1,1,1-Trichloroethane	1
17.	Carbon Tetrachloride	1
18.	Bromodichloromethane	1
19.	1,2-Dichloropropane	1
20.	cis-1,3-Dichloropropene	1
21.	Trichloroethene	1
22.	Dibromochloromethane	1
23.	1,1,2-Trichloroethane	1
24.	Benzene	1
25.	trans-1,3-Dichloropropene	1
26.	Bromoform	1
27.	4-Methyl-2-pentanone	5
28.	2-Hexanone	5
29.	Tetrachloroethene	1
30.	1,1,2,2-Tetrachloroethane	1
31.	1,2-Dibromoethane	1
32.	Toluene	1
33.	Chlorobenzene	1
34.	Ethylbenzene	1
35.	Styrene	1
36.	Xylenes (total)	1
37.	1,3-dichlorobenzene	1
38.	1,4-Dichlorobenzene	1
39.	1,2-Dichlorobenzene	1
40.	1,2-dibromo-3-chloropropane	1
41.	1,2,4-Triclorobenzene	1
SEMIVOLATILES		
42.	Phenol	5
43.	bis-(2-Chloroethyl)ether	5
44.	2-Chlorophenol	5
45.	2-Methylphenol	5
46.	2,2'-oxybis(1-Chloropropane)	5
47.	4-Methylphenol	5
48.	N-Nitroso-di-n-propylamine	5
49.	Hexachloroethane	5
50.	Nitrobenzene	5
51.	Isophorone	5
52.	2-Nitrophenol	5
53.	2,4-Dimethylphenol	5
54.	bis-(2-Chloroethoxy)methane	5
55.	2,4-Dichlorophenol	5
56.	Naphthalene	5
57.	4-Chloroaniline	5
58.	Hexachlorobutadiene	5
59.	4-Chloro-3-methylphenol	5
60.	2-Methylnaphthalene	5
61.	Hexachlorocyclopentadiene	5
62.	2,4,6-Trichlorophenol	5
63.	2,4,5-Trichlorophenol	20
64.	2-Chloronaphthalene	5
65.	2-Nitroaniline	20
66.	Dimethylphthalate	5
67.	Acenaphthylene	5
68.	2,6-Dinitrotoluene	5
69.	3-Nitroaniline	20
70.	Acenaphthene	5
71.	2,4-Dinitrophenol	20
72.	4-Nitrophenol	20
73.	Dibenzofuran	5
74.	2,4-Dinitrotoluene	5
75.	Diethylphthalate	5
76.	4-Chlorophenyl-phenylether	5
77.	Fluorene	5
78.	4-Nitroaniline	20
79.	4,6-Dinitro-2-methylphenol	20
80.	N-Nitrosodiphenylamine	5
81.	4-Bromophenyl-phenylether	5
82.	Hexachlorobenzene	5
83.	Pentachlorophenol	20
84.	Phenanthrene	5
85.	Anthracene	5
86.	Di-n-butylphthalate	5
87.	Fluoranthene	5
88.	Pyrene	5
89.	Butylbenzylphthalate	5
90.	3,3'-Dichlorobenzidine	5
91.	Benzo(a)anthracene	5
92.	Chrysene	5
93.	bis-(2-Ethylhexyl)phthalate	5
94.	Di-n-octylphthalate	5
95.	Benzo(b)fluoranthene	5
96.	Benzo(k)fluoranthene	5
97.	Benzo(a)pyrene	5
98.	Indeno(1,2,3-cd)pyrene	5
99.	Dibenz(a,h)anthracene	5
100.	Benzo(g,h,i)perylene	5
PESTICIDES/AROCLORS (PESTICIDES/PCBs)		
101.	alpha-BHC	0.01
102.	beta-BHC	0.01
103.	delta-BHC	0.01
104.	gamma-BHC (Lindane)	0.01
105.	Heptachlor	0.01
106.	Aldrin	0.01
107.	Heptachlor epoxide	0.01
108	Endosulfan I	0.01
109.	Dieldrin	0.02
110.	4,4'-DDE	0.02
111.	Endrin	0.02
112.	Endosulfan II	0.02
113.	4,4'-DDD	0.02
114.	Endosulfan sulfate	0.02
115.	4,4'-DDT	0.02
116.	Methoxychlor	0.10
117.	Endrin ketone	0.02
118.	Endrin aldehyde	0.02
119.	alpha-Chlordane	0.01
120.	gamma-Chlordane	0.01
121.	Toxaphene	1.0
122.	Aroclor-1016	0.20
123.	Aroclor-1221	0.40
124.	Aroclor-1232	0.20
125.	Aroclor-1242	0.20
126.	Aroclor-1248	0.20
127.	Aroclor-1254	0.20
128.	Aroclor-1260	0.20

If the compound concentration for water samples other than low concentration groundwater and drinking are suspected of containing higher than 25 ug/L, then it is recommended that the sampler use the multi-media, multi-concentration organic analytical service.

PREPARATION METHODS AND INSTRUMENTATION

For semivolatile and pesticide/Aroclor (pesticide/PCB) water samples, a 1-L aliquot is extracted with methylene chloride using continuous liquid-liquid extraction or separatory funnel (for pesticides/Aroclors (pesticides/PCBs) only). The extract is concentrated, subjected to fraction-specific cleanup procedures, and analyzed by GC/MS for semivolatiles or GC/ECD for pesticides/Aroclors (pesticides/PCBs). For volatiles, 25 mL of water is added to a purge and trap device and purged with an inert gas at room temperature. The volatiles purged from the sample are trapped on a solid sorbent. They are subsequently desorbed by rapidly heating the sorbent and then introduced into a GC/MS system. **Table 2** summarizes the preparation methods and instruments used in this analytical service.

DATA DELIVERABLES

Data deliverables for this service include both hardcopy data reporting forms and supporting raw data. The laboratory must submit data to EPA within 14 days after laboratory receipt of the last sample in the set. EPA then checks the data for compliance with contract requirements. A report of instances of noncompliance is distributed to the

laboratory and the Region within 10 days from the receipt of the data. The laboratory has 10 days to reconcile defective data and resubmit the data to EPA. EPA then screens the data and sends a final data assessment report to the laboratory and the Region.

QUALITY ASSURANCE

The quality assurance (QA) process consists of management review and oversight at the planning, implementation, and completion stages of the environmental data collection activity. This process ensures that the data provided are of the quality required. During the implementation of the data collection effort, QA activities ensure that the quality control (QC) system is functioning effectively and that the deficiencies uncovered by the QC system are corrected. After environmental data are collected, QA activities focus on assessing the quality of data to determine its suitability to support enforcement or remedial decisions.

Each contract laboratory prepares a quality assurance plan (QAP) with the objective of providing sound analytical chemical measurements. The QAP must specify the policies, organization, objectives, and functional guidelines, as well as the QA and QC activities designed to achieve the data quality requirements for this analytical service.

QUALITY CONTROL

The QC process includes those activities required during analytical data collection to produce data of known and documented quality. The analytical data acquired from QC procedures are used to estimate and evaluate the analytical results and to determine the necessity for or the effect of corrective action procedures. The QC requirements for this analytical service are shown in **Table 3**.

Table 2. Preparation Methods and Instruments

Fraction	Preparation Method	Analytical Instrument
Volatiles	Purge and trap	GC/MS analysis
Semivolatiles	Continuous liquid-liquid extraction	GC/MS analysis
Pesticides/Aroclors (Pesticides/PCBs)	Continuous liquid-liquid or separatory funnel extraction	GC/ECD analysis

Table 3. Quality Control

QC Operation	Frequency
System Monitoring Compound (volatiles)	Added to each sample, standard, and blank
Method Blanks (volatiles)	Analyzed at least every 12 hours
Method Blanks (semivolatiles and pesticides/Aroclors (pesticides/PCBs))	Prepared with each group of 20 samples or less, or each time samples are extracted
Instrument Blank (volatiles)	Analyzed after a sample which contains compounds at concentrations greater than the calibration range
Surrogates (semivolatiles and pesticides/Aroclors (pesticides/PCBs))	Added to each sample, standard, and blank
Instrument Blank (pesticides/Aroclors (pesticides/PCBs))	Every 12 hours on each GC column used for analysis
Storage Blank (volatiles)	Prepared and stored with each group of samples
GC/MS mass calibration and ion abundance patterns (volatiles and semivolatiles)	Every 12 hours for each instrument used for analysis
GC Resolution Check (pesticides/Aroclors (pesticides/PCBs))	Prior to initial calibration on each GC column used for analysis
Initial Calibration	Upon initial set up of each instrument, and each time continuing calibration fails to meet the acceptance criteria

Table 3. Quality Control (Continued)

QC Operation	Frequency
Continuing Calibration	Every 12 hours for each instrument used for analysis
Internal Standards (volatiles and semivolatiles)	Added to each sample, standard, and blank
Laboratory Control Sample (LCS)	Prepared and analyzed with each group of 20 samples or less
Laboratory Evaluation Sample	Prepared and analyzed (if provided) with each set of 20 samples or less

PERFORMANCE MONITORING ACTIVITIES

Laboratory performance monitoring activities are provided primarily by AOC and the Regions to ensure that contract laboratories are producing data of the appropriate quality. EPA performs on-site laboratory audits, data package audits, and GC/MS tape audits, and evaluates laboratory performance through the use of blind performance evaluation samples.

For more information, or for suggestions to improve this analytical service, please contact:

Terry Smith
Organic Program Manager
USEPA/AOC
401 M Street, SW (5204G)
Washington, DC 20460
703-603-8849
FAX: 703-603-9112

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.

APPENDIX C

Signed Access Agreement

THE CITY OF SAN MARCOS

RECEIVED
APR 28 2000
SITE ASSESSMENT & MANAGEMENT SECTION

April 27, 2000

Texas Natural Resource Conservation Commission
ATTN: Wesley G. Newberry
P.O. Box 13087
Austin, Texas 78711-3087

RE: Former Gary Air Force Base, San Marcos, Caldwell County, Texas / Notification to Perform Screening Site Inspection (SSI)

Dear Mr. Newberry:

Enclosed is our executed modified Access Agreement. Please return a fully executed copy of the Access Agreement to our office.

If you have any questions, please do not hesitate to contact our office at (512) 830-8150.

Sincerely,

Richard L. Howell
Legal Assistant to the
City Attorney

cc: Jack Doughty, Airport Manager

ACCESS AGREEMENT

This Agreement is entered into by and between the City of San Marcos (the "Licensor"), owner of the real property described below (the "Property"), and the Texas Natural Resource Conservation Commission (the "Licensee"), an agency of the State of Texas.

1. Grant of License; Description of Property. In consideration of $1.00, payment of which is acknowledged by Licensor, and other valuable consideration, including the compliance by the Licensee with its obligations under this Agreement, the Licensor grants to the Licensee a non-exclusive, revocable license to enter upon the following real property (the "Property"):

> The property known as the San Marcos Municipal Airport, consisting of approximately _____ acres of property as depicted on the map attached to this Agreement

2. Authorized Purposes. The license granted is for the following purposes only:

A. The taking of such soil, water, and air samples.

B. The drilling of holes and the construction, repair, and maintenance of monitor wells.

C. Other actions related to the investigation of the surface or subsurface conditions.

D. The performance of removal and remedial activity, as necessary.

E. Actions necessary for removal and remedial work at the Property to mitigate releases or threats of releases of hazardous substances, pollutants, or contaminants from or onto the Property.

3. Licensee's Obligations. The Licensee, for itself and its employees and agents, agrees to

A. notify the Licensor's Airport Manager each time the Licensee enters the Property;

B. use only those routes of access that are approved by the Airport Manager;

C. perform all testing and sampling work in a safe and workmanlike manner; and

D. hold harmless the Licensor, its officers, agents and employees from and against personal injury and property damage claims on the part of the Licensee, its employees and agents in connection with the Licensee's activities at the Property.

4. Splitting of Samples. The Licensee agrees to provide to the Licensor a portion of any soil, air or water sample taken by the Licensee or its employees or agents at the Property. The Licensor will furnish suitable containers for its sample portions. The Licensor will be responsible for any laboratory analytical analysis of its sample portions.

5. Licensor's Retained Rights; Restrictions on Licensee. The Property is an active general aviation facility. The Licensor retains, reserves, and shall continue to enjoy the use of the Property, subject to the terms of all covenants of title in the deeds for the Property to the Licensor from the United States of America. The Licensor may restrict the Licensee's access to all or a part of the property if safety or aviation considerations dictate or an emergency exists. The Licensee agrees to abide by all such restrictions.

6. Lessees of the Licensor. The Licensor has leased portions of the Property to third parties for private and commercial aviation purposes and for agricultural purposes. The Licensee agrees to obtain the separate permission of these lessees for any entry by the Licensee, its employees or agents on the premises leased to them.

7. Grant is Nonexclusive. The access for which permission is given to the Licensee is nonexclusive, and the Licensor retains the right to lease and grant access to areas of the Property to other parties.

8. Term. The term of this Agreement will commence upon signature by both parties and shall be effective until one party terminates this Agreement after giving 10 days notice to the other party.

9. Miscellaneous.

A. This Agreement shall bind and inure to the benefit of the respective parties, their personal representatives, successors, administrators, heirs, executors, and assigns.

B. This instrument contains the entire agreement between the parties. Any oral representations or modifications concerning this instrument shall be of no force and effect.

C. This Agreement may be amended only by a written document signed by both parties.

Licensor: City of San Marcos

By: _____
Larry D. Gilley, City Manager

_____
Date

Licensee: Texas Natural Resource Conservation Commission

By: _____

Susy L. Lotus, Project Manager
Printed name, title

5-2-00
Date

JANIE GARZA
NOTARY PUBLIC
State of Texas
Comm. Exp. 04-10-2001

GRANTEE

Signature of Representative of the Texas Natural Resource Conservation Commission

Susy L. LOFTUS
Printed or Typed Name

STATE OF TEXAS
COUNTY OF Harp

ACKNOWLEDGMENT

BEFORE ME, a Notary Public, on this day personally appeared Larry D. Kelly, known to be the person whose name is subscribed to the foregoing instrument concerning the property located at San Marcos Municipal Airport, and acknowledged to me that he/she executed the same as the act and deed of the property owner for the purpose and consideration therein expressed.

Given under my hand and seal of office this 27th day of April, 2000.

RICHARD L. HOWELL
Notary Public, State of Texas
My Commission Expires
JULY 7, 2002

Richard L Howell
Notary Public

Typed or Printed Name of Notary

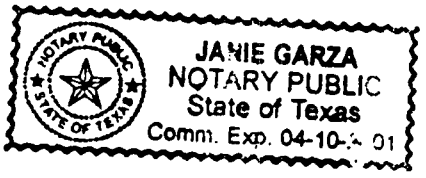
My commission expires the _____ day of _____, _____.

STATE OF TEXAS
COUNTY OF TRAVIS

ACKNOWLEDGMENT

BEFORE ME, a Notary Public, on this day personally appeared Susy L. Loftus, a representative of the Texas Natural Resource Conservation Commission, known to be the person whose name is subscribed to the foregoing instrument concerning the property located at San Marcos Municipal Airport, and acknowledged to me that he/she executed the same for the purpose and consideration therein expressed.

Given under my hand and seal of office this 2 day of May, 2000.



Janie Garza
Notary Public

Janie Garza
Typed or Printed Name of Notary

My commission expires the 10 day of April, 2001.

Reference 4

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF

CESWF-ED-G (200-1a) 2 August 1991

MEMORANDUM THRU COMMANDER, TULSA DISTRICT, ATTN: CESWT-EC-GR (RANDY BRATCHER)

FOR COMMANDER, SOUTHWESTERN DIVISION, ATTN: CESWD-ED-E (DAVID BARBER)

SUBJECT: DERP-FUDS Inventory Project Report (INPR) for Site No. K06TX023200, San Marcos Municipal Airport and Gary Job Corps Properties (Formerly Gary Air Force Base), San Marcos, Texas

1. This INPR reports on the DERP-FUDS preliminary assessment of the San Marcos Municipal Airport and Gary Job Corps properties. An initial site visit was conducted in 1986, with additional site visits being conducted on 8 February and 19 March 1991. The site survey summary sheet and site maps are at Encl 1.

2. It was determined that the site was formerly used by the Army and Air Force. A recommended Findings and Determination of Eligibility is at Encl 2.

3. It has also been determined there is hazardous waste at the site eligible for cleanup under DERP-FUDS. The categories of hazardous waste at the site are BD/DR, CON/HTW, and PRP/HTW. The Army constructed hangars, warehouses, numerous facility support buildings, runways, taxiways, utilities, underground fuel storage tanks, underground fuel lines, family housing units, railroad spurs, and a security fence at the former base. The improvements constructed at the site by the Army were in sound condition when the base was deactivated and are currently being beneficially used by the Department of Labor and the city of San Marcos. Therefore, due to policy considerations, a BD/DR project is not proposed at this site. A project summary sheet and DD Form 1391 are at Encl 3 for the proposed CON/HTW project. A project summary sheet is at Encl 4 for the proposed PRP/HTW project.

4. I recommend that you:

a. Approve and sign the Findings and Determination of Eligibility;

b. Forward a copy of this INPR to CEMRD for appropriate action on the PRP/HTW project;

c. Forward a copy of this INPR to CEHND for the PA file; and

d. Forward a copy of this INPR to CEMP-R requesting approval and funds for this District to accomplish the CON/HTW project. If funds are provided for the CON/HTW project, Fort Worth District can award a tank removal contract.

4 Encls

WILLIAM D. BROWN
Colonel, EN
Commanding

U S ARMY CORPS OF ENGINEERS
Fort Worth District

ENVIRONMENTAL DESIGN BRANCH

OFFICE	NAME/ OFFICE SYMBOL	OFFICE PHONE NO.	FAX NO
FROM			
Fort Worth District US Army COE	Randy Niebuhr CESWF-EV-DI	817/978-3221 ext. 1642	817/978-2991
TO			
TNRCC	Susy Loftus	512/239-2944	512/239-4814

CLASSIFICATION	PRECEDENCE	NO. PAGES	DATE	SIGNATURE
Unclassified	Routine	12	9 March 2000	Randy Niebuhr

REMARK

Transmittal of Formerly Used Defense Sites Inventory Project Report for the former Gary AFB.

SITE SURVEY SUMMARY SHEET
FOR
DERP-FUDS SITE NO. K06TX023200
SAN MARCOS MUNICIPAL AIRPORT AND GARY JOB CORPS PROPERTIES, TX
AUGUST 1991

SITE NAME: San Marcos Municipal Airport and Gary Job Corps properties, formerly Gary Air Force Base.

LOCATION: The site is located along Texas Highway 21, approximately four miles east of San Marcos, Caldwell County, Texas.

SITE HISTORY: In 1942, the U.S. War Department purchased 2,236.56 acres (2,230.08 fee acres and 6.48 easement acres) in Caldwell County, Texas. The base was designated the San Marcos Army Airfield in 1943 and was used by the Army as a navigation school. In 1948, the base was redesignated as the San Marcos Air Force Base; in 1953, it was renamed as the Gary Air Force Base; and finally in 1955, the base name was changed to Edward Gary Air Force Base. Also in 1955, the mission of the base was changed from a navigation school to an advanced aviation school. The base was improved as a flying field with associated facilities and structures following the change in the mission. The former base was reported excess to the General Services Administration (GSA) on 11 September 1964. The current owners are the Department of Labor (Gary Job Corps) and the city of San Marcos, Texas.

SITE VISIT: In 1986, personnel from CESWF toured the Gary Job Corps (GJC) property with Mr. Dick Moncure, GJC Facilities Manager. On 8 February and 19 March 1991, Mr. Randy Neibuhr, CESWF, met with Mr. Moncure and also Mr. Steve Jenkins, Director for the Department of Environment and Engineering, city of San Marcos.

CATEGORY OF HAZARDS: The categories of potential hazards are CON/HTW and PRP/HTW. The remaining Department of Defense (DOD) structures at the former air base are: airplane hangars, warehouses, numerous facility support buildings, family housing, runways, taxiways, utilities, underground fuel storage tanks, underground fuel lines, railroad spurs, streets, and a security fence. The structural improvements constructed at the site by the Army and Air Force were in sound condition when the base was deactivated and are currently being beneficially used by the Department of Labor and the city of San Marcos. Therefore, due to policy considerations, a BD/DR project is not proposed at this site.

PROJECT DESCRIPTION: There are two potential projects at this site.

a. CON/HTW. The project would consist of the removal of 16 underground storage tanks (USTs) which have not been beneficially

used, a survey to locate two suspected USTs, removal of the two suspected USTs if they are found, removal of underground fuel lines and fuel pumps and manifolds, and the removal of five overhead fuel dispensers. The Gary Job Corps has removed four other USTs and has used one UST, which is not proposed for removal under this project. The CON/HTW project is proposed under Project No. K06TX023201.

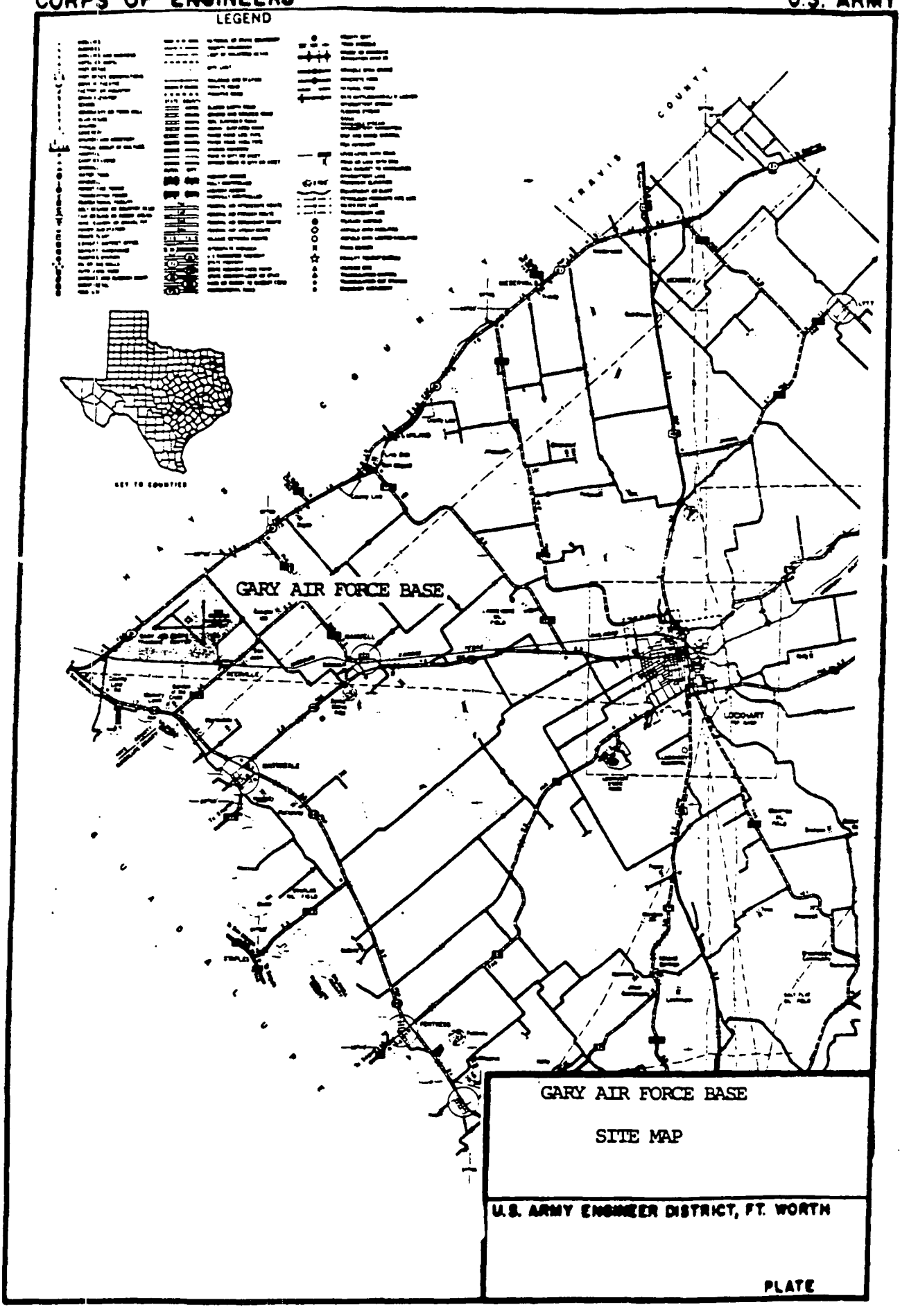
b. PRP/HTW. The city of San Marcos, Texas, established a municipal landfill in 1969 on a portion of the former base. Contaminated groundwater has been detected in monitoring wells surrounding the landfill and in private drinking water wells south of the former base. Aerial photographs taken during the time the base was active have been obtained by the City which shows suspicious trenches on the east side of the former base. The City is also aware of past disposal practices conducted by the Gary Job Corps. The Texas Department of Health is requiring the City to expand the groundwater monitoring program, but the City contends that they should not bear the total financial burden of the monitoring and testing of the wells since the monitoring wells may be reflecting contaminants contributed by past and present occupants of the site. The PRP/HTW project is proposed under Project No. K06TX023202.

AVAILABLE STUDIES AND REPORTS: Attachment 1 - UST Summary; Attachment 2 - 1989 EPA Gary Airfield Sampling and Analysis; Attachment 3 - 1989 City of San Marcos Draft Report - Ground-Water Assessment, City of San Marcos Landfill; Attachment 4 - 1990 City of San Marcos - Documentation of Well Installation and Ground-Water Sampling and Analysis; Attachment 5 - 1990 Results from Fort Worth District, Private Drinking Water Well Sampling.

FORT WORTH DISTRICT POC: Randy Niebuhr, 817/334-3223.

CORPS OF ENGINEERS

U.S. ARMY



GARY AIR FORCE BASE

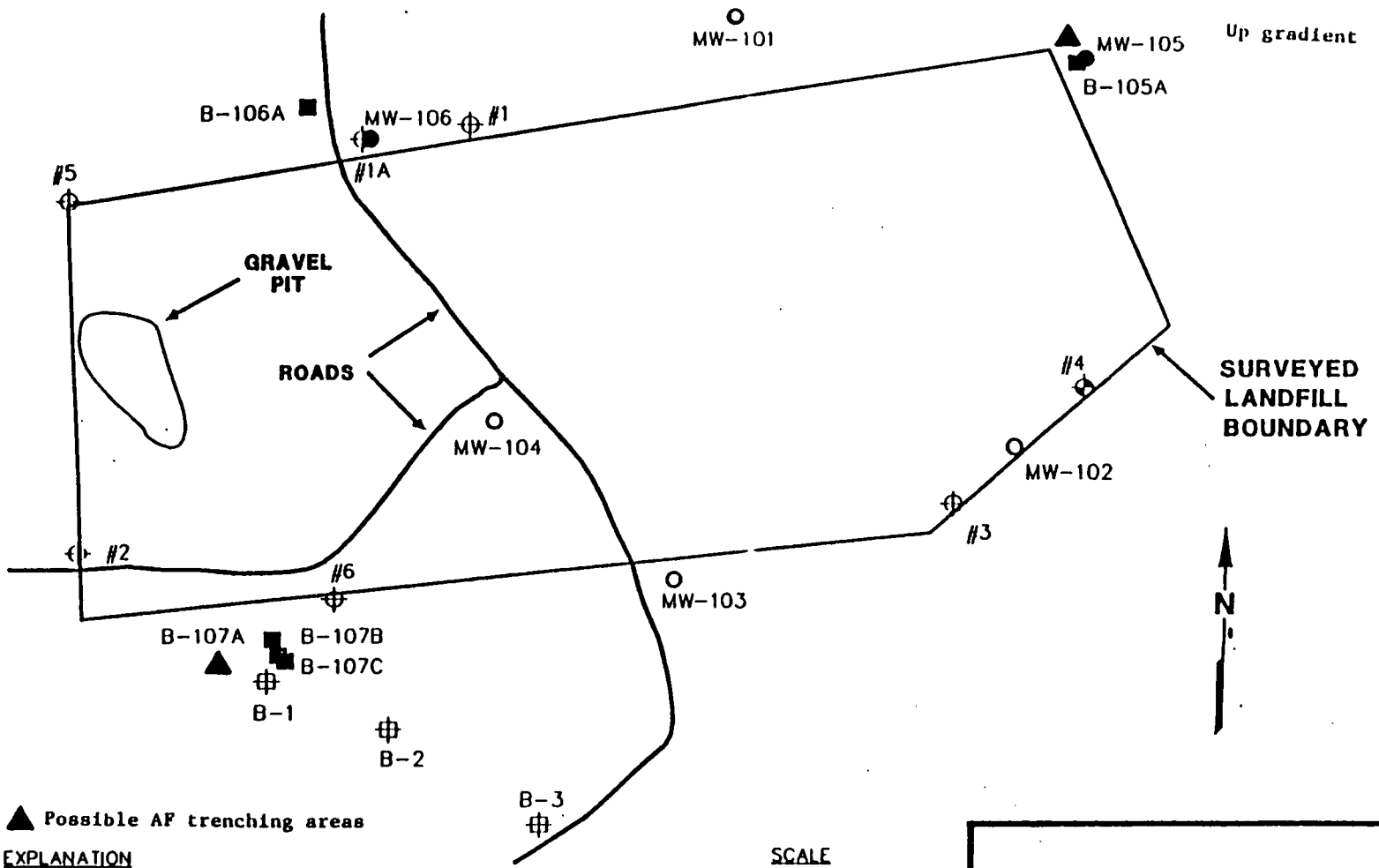
SITE MAP

U.S. ARMY ENGINEER DISTRICT, FT. WORTH

PLATE

CORPS OF ENGINEERS

U.S. ARMY



▲ Possible AF trenching areas

EXPLANATION

- ○ – Monitoring Well Constructed October, 1989
- ● – Monitoring Well Constructed April, 1990
- ⊕ – Monitoring Well Plugged and Abandoned October, 1989
- ⊕ – Previously Existing Well Which Is No Longer Present (Abandonment Status Unknown)
- ⊕ – Soil Boring for Previous Investigation (Approximate Location)
- ■ – Soil Boring Completed April, 1990

SCALE
1" = 400'

FORMERLY GARY AFB

U.S. ARMY ENGINEER DISTRICT, FT. WORTH

K06TX023200

PLATE

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FORMERLY USED DEFENSE SITES PROGRAM
FINDINGS AND DETERMINATION OF ELIGIBILITY

SAN MARCOS MUNICIPAL AIRPORT AND GARY JOB CORPS PROPERTIES, TX

SITE NO. K06TX023200

FINDINGS OF FACT

1. In 1942, the U.S. War Department purchased 2,236.56 acres (2,230.08 fee acres and 6.48 easement acres) located along Texas Highway 21, four miles east of San Marcos, Texas. The site was developed and named San Marcos Army Airfield. The base was renamed San Marcos Air Force Base in 1948, redesignated Gary Air Force Base in 1953, and finally renamed Edward Gary Air Force Base in 1955.

2. The Army established a navigation school at the former base. In 1955, the facilities were expanded and the Air Force established an advanced aviation school at the site. Improvements constructed at the site include: airplane hangars, warehouses, numerous facility support buildings, family housing units, runways, taxiways, utilities, underground fuel storage tanks, underground fuel lines, railroad spurs, and a security fence. The facility remained active until it was deactivated in 1964. The site was never subject to other than Department of Defense (DOD) control during the period of DoD interest.

3. On 11 September 1964, the base (2,236.56 acres), was reported excess to the General Services Administration (GSA). The site was transferred to the city of San Marcos and the Department of Labor (DOL). There was a recapture clause in the deeds to the City and the DOL. The following statement was also included in both deeds:

"The party of the second part does hereby release the Government, and will take whatever action may be required by the Administrator of General Services to assure the complete release of the Government from any and all liability the Government may be under for restoration or other damages under any lease or other agreement covering the use by the Government of the airport, or part thereof, owned, controlled or operated by the Party of the Second Part, upon which, adjacent to which, or in connection with which, any property transferred by this deed was located or used; provided, that no such release shall be construed as depriving the Party of the Second Part of any right it may otherwise have to receive reimbursement under Section 17 of the Federal Airport Act (49 U.S.C. 1116) for the necessary rehabilitation or repair of public airports heretofore or hereafter substantially damaged by any Federal agency."

DETERMINATION

Based on the foregoing findings of fact, the site has been determined to be formerly used by the Department of Defense. It is, therefore, eligible for the Defense Environmental Restoration Program - Formerly Used Defense Sites, established under 10 USC 2701 et seq.

8 June 92
DATE

ROBERT L. HERNDON
Brigadier General, USA
Commanding

PROJECT SUMMARY SHEET
FOR
DERP-FUDS CON/HTW PROJECT NO. K06TX023201
SAN MARCOS MUNICIPAL AIRPORT AND GARY JOB CORPS PROPERTIES, TX
AUGUST 1991 -

PROJECT DESCRIPTION: There are 16 underground storage tanks (USTs), two suspected USTs, underground fuel lines, fuel pumps and manifolds, and five overhead fuel dispensers remaining at the former air base. One additional remaining UST has been beneficially used by the Gary Job Corps personnel, and the Gary Job Corps has previously removed four USTs located at the former base exchange gas station. Excavation near the buried fuel tank, the fuel pumps and the manifolds, and at the southwest side of the former base has revealed soil contamination. The source of the contamination at the southwest fuel pumps is speculated to have resulted from spills or overfilling the system.

PROJECT ELIGIBILITY: The USTs, underground fuel lines, fuel pumps and manifolds, and five overhead fuel dispensers were constructed and used by the Army and Air Force. Five USTs have been beneficially used by the Gary Job Corps and four of these tanks have been excavated and removed by the Job Corps.

POLICY CONSIDERATIONS: The one remaining UST which has been beneficially used by the Gary Job Corps is not proposed for removal under this project.

PROPOSED PROJECT: The following aspects of the CON/HTW project meet eligibility criteria and policy considerations. Sixteen USTs are proposed for removal and remediation of any contaminated soil. A survey will be conducted to determine if two additional suspected USTs do exist, and remove the USTs if they are located. The fuel lines will be flushed of any remaining fuel and the liquids properly disposed. Also, the fuel lines will be excavated and the bottom of the excavations tested to determine if any fuel has leaked from the lines. Any contaminated soil in the fuel line excavations will be removed and the excavations backfilled. The five overhead fuel dispensers will also be removed.

DD FORM 1391: Attached.

FORT WORTH DISTRICT POC: Randy Niebuhr, 817/334-3223.

1. COMPONENT	FY 19 91 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
ARMY		AUGUST 1991

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
FORMER GARY AFB, SAN MARCOS MUNICIPAL AIRPORT AND GARY JOB CORPS	DERP-FUDS

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NO.	8. PROJECT COST ($000)
	CON/HTW	K06TX023201	$500.656

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT/COST	COST ($000)
Remove UST - 25,000 gal	ea	7	25.706	179.942
Remove UST - 12,000 gal	ea	7	11.171	78.197
Remove UST - 9,000 gal	ea	2	8.986	17.972
Remove suspected UST - 1,000 gal	ea	2	1.710	3.420
Remove fuel lines	job	1	31.293	31.293
Remove overhead fuel dispensers	ea	5	1.159	5.795
Sampling and analysis	job	1	44.000	44.000
SUBTOTAL				360.619
Construction Contingencies		15.00%		54.093
TOTAL CONSTRUCTION COST				414.712
Supervision & Administration		8.00%		33.177

10. DESCRIPTION OF PROPOSED CONSTRUCTION

a. Remove and dispose of 16 underground storage tanks (USTs).

b. Remove and dispose of two suspected USTs.

c. Remove and dispose of fuel lines (4" gas line and 6" filler line).

d. Remove five overhead fuel dispensers and associated concrete blocks (9' x 14' x 2').

e. Test and analyze tank contents and soil samples.

f. E&M survey to detect two suspected USTs.

DD FORM 1391

1. COMPONENT	FY 1991 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
ARMY		AUGUST 1991

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
FORMER GARY AFB, SAN MARCOS MUNICIPAL AIRPORT & GARY JOB CORPS	DERP-FUDS

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NO.	8. PROJECT COST ($000)
	CON/HTW	K06TX023201	$500.656

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT/COST	COST ($000)
TOTAL CONSTRUCTION FUNDS				447.889
Engineering and Design		6.00%		26.873
Sampling and Analysis		5.00%		22.394
E&M UST Survey				3.500
TOTAL DESIGN COST				52.767
TOTAL IMPLEMENTATION COST				500.656

10. DESCRIPTION OF PROPOSED CONSTRUCTION

DD FORM 1391

PROJECT SUMMARY SHEET
FOR
DERP-FUDS PRP/HTW PROJECT NO. K06TX023202
SAN MARCOS MUNICIPAL AIRPORT AND GARY JOB CORPS PROPERTIES, TX
SITE NO. K06TX023200
AUGUST 1991

PROJECT DESCRIPTION: The city of San Marcos operated a Type I, trench-type sanitary landfill at the former base from 1969 through 1984. The landfill is located on 84 acres of land, which the General Services Administration (GSA) deeded to the Gary Job Corps in 1965, on the eastern edge of the former base. The City operated the landfill; the Job Corps opened the trenches and covered the full trenches. The Job Corps did the landfill trenching and filling as training exercises for their students. The landfill was closed to the public in June 1983, and totally closed in 1984. The Texas Department of Health (TDH) approved the landfill closure plans on 13 December 1985. The final closure activities included final cover and grading and revegetation.

In October 1989, the Environmental Protection Agency (EPA) sampled all monitoring wells at the site, as well as drinking water wells at private residences to the south of the former base. All of the wells sampled by the EPA contained low levels of contaminants, but generally appeared to be below the established drinking water standards. See Attachment 3 for results of previous monitoring well sampling and Attachment 5 for results of the 1990 Fort Worth District private drinking well sampling. In April 1990, the City installed four more monitoring wells around the former landfill (see Attachment 4), and encountered some construction debris, benzene, and toluene during the drilling phase of one of the new wells. The well location where the debris and volatile organics were encountered was outside the boundaries of the former landfill. One of the new monitoring wells is reportedly upgradient of the former landfill and the groundwater from that well is contaminated.

The City contends that the Air Force and Gary Job Corps have disposed of materials at or near the former landfill site, and the Job Corps continues to dispose of construction debris in the area. A consultant for the city of San Marcos has obtained aerial photos taken when the base was still an active Air Force installation which show apparent trenches in the area where the landfill was later located. Mr. Dick Moncure, now retired, was the facility manager for the Gary Job Corps and was present at the base when it was active. Mr. Moncure reported that the Air Force practiced what he called burn and cover disposal in the open fields east of the runways. He also provided the Corps of Engineers an undated aerial photo of the active base which shows an active disposal area south and west of the runways.

The EPA has expressed no further interest in the landfill

since their testing episode in 1989. The TDH has expressed continued interest in the landfill and is requiring the city of San Marcos to do more testing and install more monitoring wells. Since the Air Force and Gary Job Corps has apparently disposed of materials in the same area as the closed landfill, the City is concerned that the contaminants found in monitoring wells at the former landfill might be emanating from a source other than the landfill. The City does not feel that they should bear the total financial burden of the continued monitoring well sampling, analysis, and installations if there are other possible sources of contamination, and other contributors.

PROJECT ELIGIBILITY: The former base was constructed by the Army and used by both the Army and Air Force.

POLICY CONSIDERATIONS: There is no policy applicable to this project.

PROPOSED ACTIVITIES: A Remedial Investigation/Feasibility Study should be performed to characterize the nature and extent of contamination at the site, and negotiations with regulatory agencies and other PRPs should be initiated.

FORT WORTH DISTRICT POC: Randy Niebuhr, 817/334-3223.

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT

PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS (EPA Form 2070-12)

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [XX] A. GROUNDWATER CONTAMINATION
02 [XX] OBSERVED (DATE Apr 90) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED Unknown
04 NARRATIVE DESCRIPTION

Volatile organics have been detected in the groundwater from monitoring wells located near the landfill.

01 [ ] B. SURFACE WATER CONTAMINATION
02 [ ] OBSERVED (DATE _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____
04 NARRATIVE DESCRIPTION

None noted.

01 [ ] C. CONTAMINATION OF AIR
02 [ ] OBSERVED (DATE _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____
04 NARRATIVE DESCRIPTION

None noted.

01 [ ] D. FIRE/EXPLOSIVE CONDITIONS
02 [ ] OBSERVED (DATE _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____
04 NARRATIVE DESCRIPTION

None noted.

01 [ ] E. DIRECT CONTACT
02 [ ] OBSERVED (DATE _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____
04 NARRATIVE DESCRIPTION

None noted.

01 [XX] F. CONTAMINATION OF SOIL
02 [ ] OBSERVED (DATE _____) [XX] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED Unknown
04 NARRATIVE DESCRIPTION

Due to contamination discovered in the groundwater, the potential exists for soil contamination due to the contamination passing through the soil to the groundwater.

01 [XX] G. DRINKING WATER CONTAMINATION
02 [ ] OBSERVED (DATE _____) [XX] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED Unknown
04 NARRATIVE DESCRIPTION

See item 01 above.

01 [ ] H. WORKER EXPOSURE/INJURY
02 [ ] OBSERVED (DATE _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____
04 NARRATIVE DESCRIPTION

None noted.

01 [ ] I. POPULATION EXPOSURE/INJURY
02 [ ] OBSERVED (DATE _____) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED _____
04 NARRATIVE DESCRIPTION

None noted.

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT

PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS (EPA Form 2070-12)

II. HAZARDOUS CONDITIONS AND INCIDENTS (continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE_____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None noted.

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE_____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None noted.

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE_____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None noted.

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES — 02 ☐ OBSERVED (DATE_____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED_____ 04 NARRATIVE DESCRIPTION

None noted.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE_____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None noted.

01 ☐ O. CONTAM. OF SEWERS, STORM DRAINS, WWTP's — 02 ☐ OBSERVED (DATE_____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None noted.

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE_____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None noted.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

None noted.

III. TOTAL POPULATION POTENTIALLY AFFECTED:_____

IV. COMMENTS

V. SOURCES OF INFORMATION

San Marcos Municipal Airport/Gary Job Corps
East of San Marcos, Caldwell County, TX

PRP Negotiations			
1. Research/Labor		$150,000.00	
2. Overhead	0.1	$15,000.00	
3. Adminstration	0.2	$30,000.00	
		$195,000.00	$195,000.00
RI/FS			
1. Scope of Work		$40,000.00	
2. Develop Work Plans		$120,000.00	
3. Field Investigations		$150,000.00	
4. Lab Analysis		$20,000.00	
5. Data Evaluation		$15,000.00	
6. RI Report		$65,000.00	
7. FS Report		$50,000.00	
8. Overhead	0.1	$46,000.00	
9. Administration	0.2	$92,000.00	
		$598,000.00	$598,000.00
Supervision and Administration	0.08	$47,840.00	$47,840.00
TOTAL FOR PRP/HTW RI/FS:			$840,840.00

ATTACHMENT 1

UNDERGROUND STORAGE TANK SUMMARY

SAN MARCOS MUNICIPAL AIRPORT AND GARY JOB CORPS
(FORMERLY GARY AIR FORCE BASE)
UNDERGROUND STORAGE TANK SUMMARY

NUMBER OF USTs	VOLUME (GALLONS)	CONTENTS	LOCATIONS	USED
7	25,000 ea	JP-4 (?)	Bldg 10-353 area	No
7	12,000 ea	JP-4 (?)	Bldg 10-353 area & adj to Bldg 4-356	No
2	9,000 ea	JP-4 (?)	Bldg 10-353 area	No
2 (Suspected)	1,000 ea	Diesel	Central tower & water pumping sta	No
1	10,000	Gasoline	Bldg 11-152	Yes
4	Unknown	Gasoline	Removed	Yes
23 (Total)				

ATTACHMENT 2

1989 EPA GARY AIRFIELD SAMPLING AND ANALYSES

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1445 ROSS AVENUE, SUITE 1200
DALLAS, TEXAS 75202

April 19, 1989

Mr. Stephen M. Jenkins, P.E.
Director, Environment and Engineering
City of San Marcos
630 East Hopkins
San Marcos, Texas 78666

Dear Mr. Jenkins:

This is in response to your Freedom of Information Act (FOIA) request, dated March 27, 1989, regarding results of analyses of water samples collected from monitoring wells at the Gary Airfield site, otherwise known as the Gary Job Corps site. The samples were collected by an Environmental Protection Agency (EPA) contractor - Ecology and Environment, Inc. We are enclosing a copy of the information that you requested. Pursuant to 40 CFR 2.120, there will be no fee for processing your request. If you have any questions about the enclosed information, please contact me at (214) 655-6740.

Sincerely,

Presley B. Hatcher

Presley B. Hatcher, Environmental Specialist
Superfund Site Assessment Section (6H-MA)

Enclosures

RECEIVED
APR 26 1989
CITY OF SAN MARCOS
ADMINISTRATION

ECOLOGY AND ENVIRONMENT, INC.

DALLAS, TEXAS

MEMORANDUM

To: Ed Sierra, Region VI RPO

Thru: K. H. Malone, Jr., FITOM

From: Brenda Nixon Cook, FIT Chemist

Date: January 12, 1989

Subj: Sampling Mission Report for Gary Job Corps Center,
San Marcos, TX (TX1161630644)
TDD #F-06-8809-11
PAN #FTX0529HAB

Gary Job Corps, located approximately one mile northeast of San Marcos, Texas on Highway 21, is a vocational school operated by the Department of Labor for disadvantaged youth. The school occupies a portion of a former World War II air base with the remainder of the air base belonging to the City of San Marcos. Previous investigations of this facility indicated two possible sources of contamination originating from the facility: contamination by lead and PCB rrom prior military activity, and unknown contamination from the City of San Marcos Municipal Landfill, located in the area northeast of the main base facility. To address these allegations, the FIT was tasked to sample monitoring wells at the San Marcos Municipal Landfill and residential drinking water wells within half a mile of the Landfill and Job Corps Facility.

On October 18, 1988, FIT members Brenda Cook, David Anderson, Lloyd Collins and Lyle Winnette conducted a well survey to identify and obtain permission to sample the residential wells nearest to the facility. The following wells were identified: three wells belonging to (b) (6) (closest wells to landfill), one well belonging to (b) (6), one well belonging to (b) (6), one well belonging to (b) (6) and two wells belonging to (b) (6) (one upgradient) (Figure 2).

On October 19, the FIT members accompanied by Mr. Steve Jenkins, Environmental Coordinator for the City of San Marcos, arrived at the landfill. Mr. Jenkins stated that the upgradient monitoring well was dry and could not be sampled. After locating the three monitoring wells by vehicle, FIT members Cook and Anderson initiated site characterization procedures. No ambient air characteristics were recorded above background (background HNU reading 0.4 ppm benzene equivalents). The FIT purged Monitoring Well #2. Monitoring Well #2 was pumped dry and allowed to recharge overnight, prior to sampling. To

avoid overpumping, the FIT hand bailed Monitoring Well #3 until pH, conductivity and temperature readings were constant. Monitoring Well #3 was sampled at this point. Temperature, pH, and conductivity readings were recorded for each monitoring well (Table 1.1). Water level indicator and depths of well readings were taken from each monitoring well (Table 1.2). Trip blanks were prepared in the field on October 19th by filling sample bottles with deionized water.

Residential wells of (b) (6) and (b) (6) were sampled on October 19th. The FIT learned that the wells belonging to (b) (6) were dry and no longer used. Due to drought conditions and inactivity, many of the wells were dry. The FIT was unsuccessful in locating additional upgradient wells. Temperature, pH and conductivity readings were recorded for each residential well sampled (Table 1.1).

On October 20, Monitoring Well #2 was sampled. Only two 1-liter amber bottles were sent to a CLP laboratory from the well due to insufficient well recharge volume. Two residential wells belonging to (b) (6) were sampled but the third (b) (6) well to be sampled was dry. Temperature, pH and conductivity readings were recorded for each well sampled. Due to the limited sample volume from Monitoring Well #2, the PH, temperature and conductivity readings taken on October 19th were used for the record.

Residential well samples were sent to the EPA Houston Laboratory to be analyzed for TCL organics, metals, cyanide, alkalinity and hardness. Monitoring well samples were sent to CLP laboratories to be analyzed for TCL organics, metals and cyanide. Chain of Custody forms are attached to this report.

Due to the lack of an appropriate background sample, the least contaminated well was used as the standard to compare the extent of contamination in the other well samples. The residential well used as a background sample belongs to (b) (6)

TCL organic analysis of the monitoring wells indicate the presence of 1,1-dichloroethene, 1,2-dichloroethene (total), vinyl chloride, carbon disulfide, pyrene, and delta-BHC in the groundwater underlying the facility. Inorganic analysis of the monitoring wells indicated the presence of arsenic, barium, beryllium, chromium, cobalt, lead, vanadium and zinc above background. Concentrations of contaminants in Monitoring Well #3 were significantly higher than those in Monitoring Well #2.

TCL organic analysis of the residential drinking water wells indicated the presence of bromoform, phenol and cis-1,2-dichloroethene in the alluvial aquifer. Cis-1,2-dichloroethene was detected in three of the five sampling locations. Inorganic analysis of the residential drinking water wells indicated the presence of barium, mercury and cyanide slightly above the background level in some of the residential well samples.

A documented release of hazardous material to the alluvial aquifer underlying the San Marcos Municipal Landfill appears to have occurred. A lateral migration of cis-1,2-dichloroethene in the alluvial aquifer is documented by the presence of this compound in both the monitoring wells and the downgradient residential drinking water wells. The source of the contaminants is believed to be the closed municipal landfill.

As a result of these findings, FIT has been tasked (TDD #F06-8812-25) to resample the residential wells to validate contamination. At this time FIT recommends no further action pending the results of the resampling.

BNC/amw

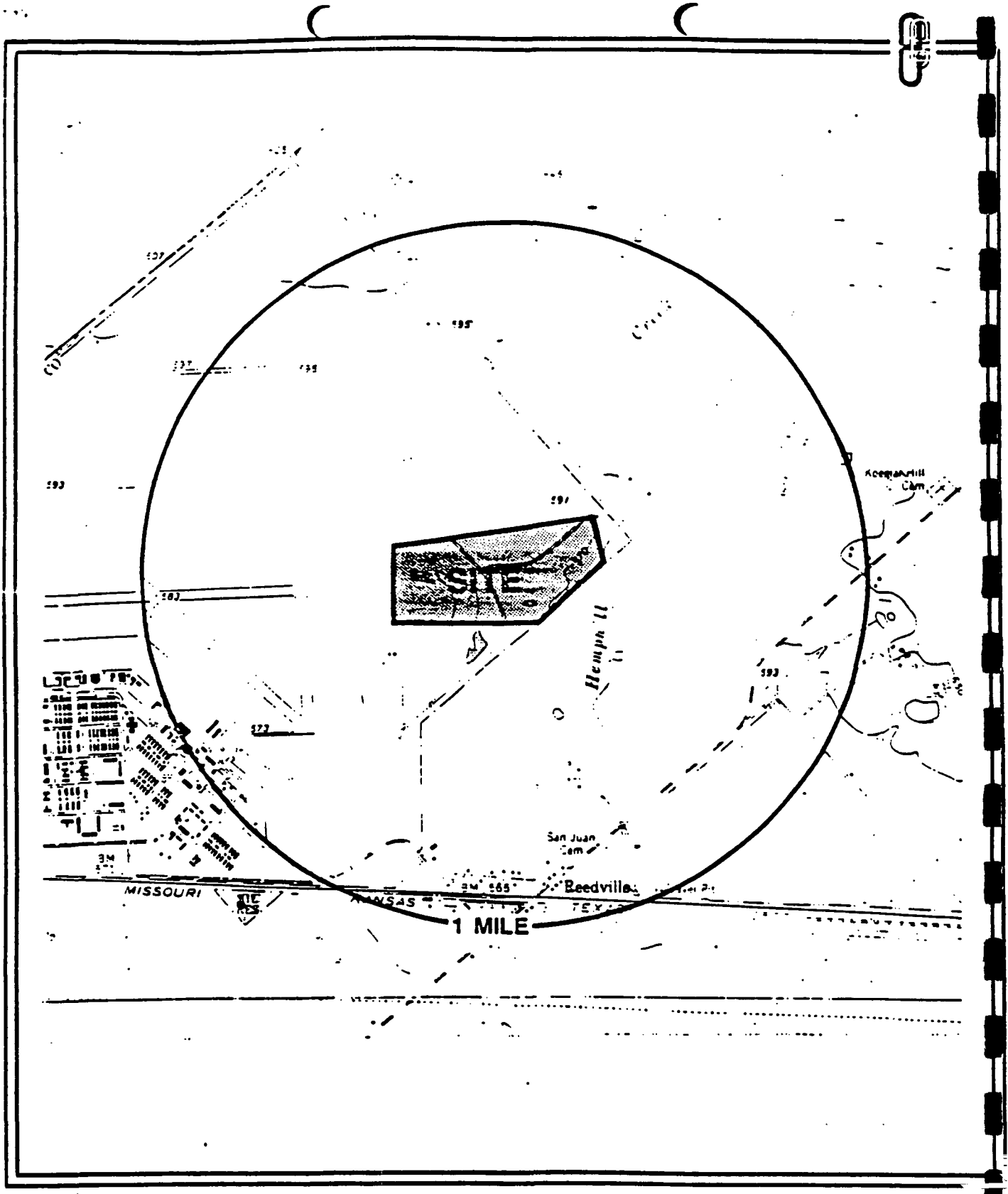


FIGURE 1
SITE LOCATION MAP
GARY JOB CORP.
SAN MARCOS, TEXAS
TX1161630644

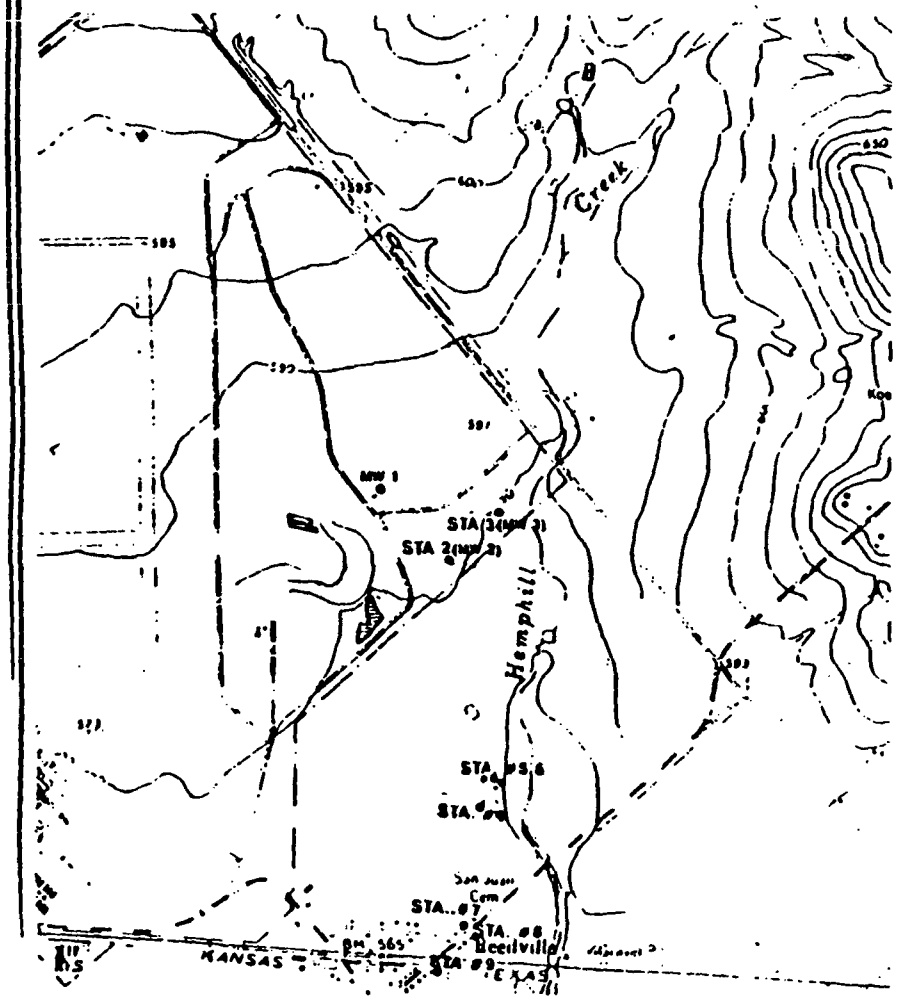


Table 1.1

PH, Temperature and Conductivity Data

Sta. #	Well Location	PH	Temperature	Conductivity
2	Southeast MW	6.7	26	380
3	Southwest MW	6.4	21.5	1750
7	(b) (6)	6.4	27	840
8		6.4	26	875
9		6.6	25	490
4	(b) (6) Dwelling)	6.4	22.5	1000
5-6	(b) (6) Barn)	6.3	24	1350

Temperature in degrees Celcius
Conductivity in micro ohms

Table 1.2

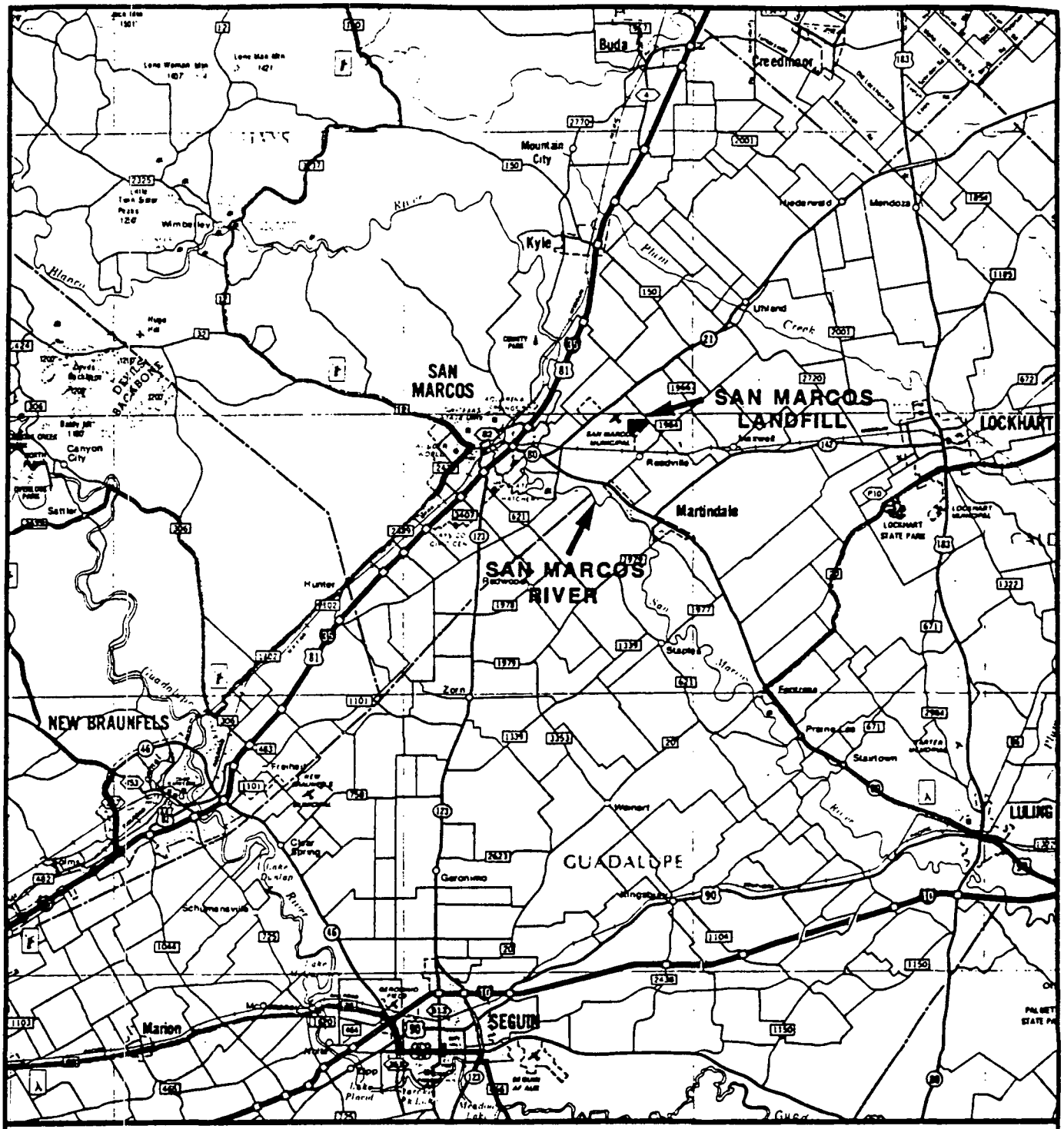
Well depth, Water levels and Casing Measurements

Sta.#	Well description	Depth	Water level	Casing
2	Southwest MW	30'9"	22'	3'5"
3	Southeast MW	33'6"	19'8"	2'4"
NA	Upgradient MW	35'10"	Dry	2'6"

FIGURE 2
SAMPLING LOCATIONS

ATTACHMENT 3

1989 CITY OF SAN MARCOS DRAFT REPORT
GROUND-WATER ASSESSMENT - CITY OF SAN MARCOS LANDFILL



Source: Continental Map Inc., 'Central Texas' 1986
1986 Edition

CITY OF SAN MARCOS

FIGURE 1

SITE LOCATION MAP

PROJECT: 89-3093	BY: EFP	REVISIONS
DATE: NOV. 1989	CHECKED: DRF	

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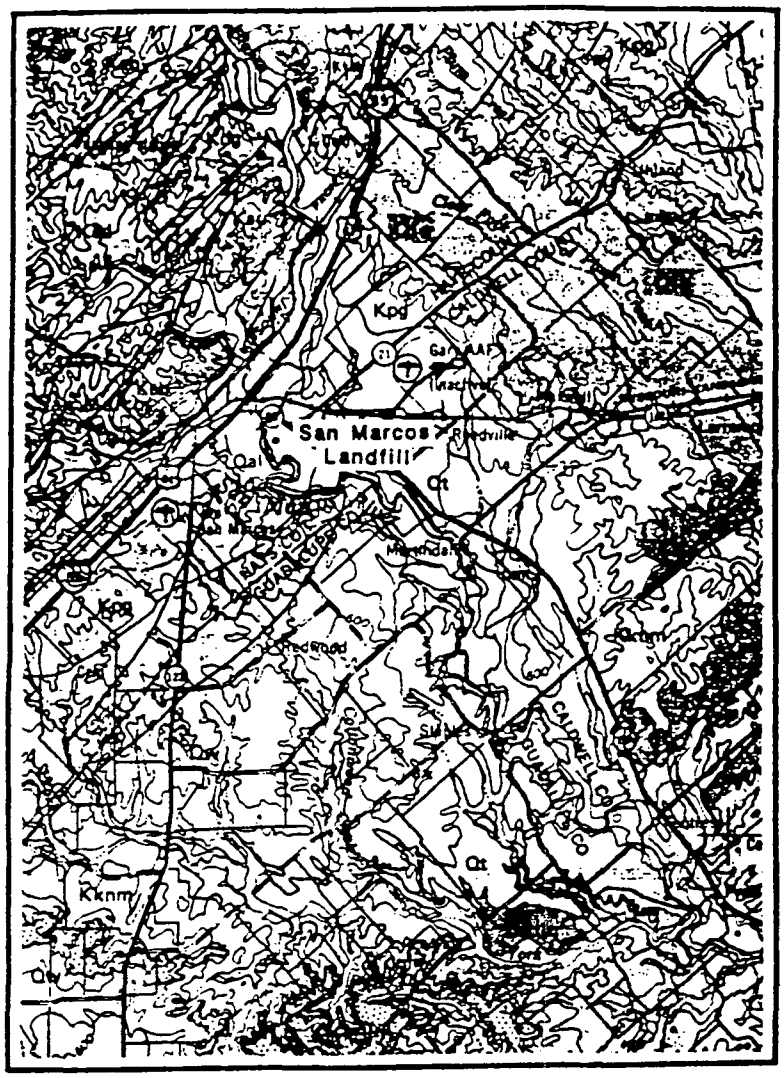

LEGEND

SCALE

0 5

Statute Miles

N

SOURCE: GEOLOGIC ATLAS OF TEXAS
SEGUIN SHEET, 1974

EXPLANATION

QUATERNARY

- Qal — Alluvium
- Fluviatile terrace deposits
- Willis Formation

TERTIARY

- Midway Group

CRETACEOUS

- Navarro Group and Marlbrook Marl ("upper Taylor marl")
- Pecan Gap Chalk
- Austin Chalk
- Eagle Ford Group and Buda Limestone undivided
- Del Rio Clay and Georgetown Formation undivided
- Edwards Limestone
- Glen Rose Formation

Fault

U
D

U, upthrown side. D, downthrown side. dashed where inferred

CITY OF SAN MARCOS

FIGURE 3

REGIONAL GEOLOGIC MAP

PROJECT: 89-3093	BY: MKW	REVISIONS
DATE: NOV. 1989	CHECKED: DRF	

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DRAFT REPORT

GROUND-WATER ASSESSMENT INVESTIGATION
CITY OF SAN MARCOS LANDFILL

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1.0 EXECUTIVE SUMMARY

This report describes the findings of a ground-water assessment for the City of San Marcos sanitary landfill, located east of the municipal airport and the Gary Job Corps Center in extreme eastern Caldwell County, Texas. The City of San Marcos operated a trench type sanitary landfill on the 84-acre landfill property from late 1969 until 1984. Aerial photographs suggest that other entities may have conducted disposal operations prior to, during and after this period in areas within and/or adjacent to the 84-acre site.

The terrace deposits underlying the City of San Marcos closed sanitary landfill are composed of an upper clay/sandy clay zone within which the landfill trenches were excavated, and a lower, coarse-grained unit consisting of gravel, clayey gravel and sand.

Ground water occurs under unconfined flow conditions within the coarse-grained unit, which is underlain by relatively impermeable clays of the Navarro Group. Ground-water flow is generally to the south at average linear flow rates of 60 to over 400 feet per year.

Chemistry data for site monitoring wells indicate the presence of several volatile organic compounds in ground water from the terrace deposits at the landfill site. These compounds include 1,1-dichloroethane (1,1-DCA), tetrachloroethene (PCE), trichloroethene (TCE), benzene, several chlorinated benzene compounds, cis-1,2-dichloroethene (cis-1,2-DCE), and ethyl ether. Sampling and analysis of several private wells completed in the terrace gravel downgradient of the landfill has documented the occurrence of 1,1-DCA, cis-1,2-DCE, TCE and 1,4-dichlorobenzene in ground water. The compound found most consistently and

frequently in both the private wells and the monitoring wells is cis-1,2-DCA.

In consideration of the above conclusions and consistent with the objective of establishing an appropriate ground-water monitoring system at the site, the following recommendations are offered:

1. Two additional monitoring wells should be installed upgradient of the landfill property at the locations shown on Figure 2. These wells are considered necessary for several reasons: 1) the one upgradient well, MW-101, is dry; 2) potentiometric contours have identified two upgradient areas, one to the northeast and one to the north of the property; 3) examination of historic aerial photographs have indicated that disposal areas other than the City of San Marcos Landfill may have been in operation in the upgradient areas; and 4) further definition of the extent of saturated conditions in the terrace gravel deposit is warranted.

2. One additional monitoring well should be installed downgradient of the western portion of the landfill property (see Figure 2 near old well #6) to monitor ground-water conditions in this area and further define the extent of the saturated terrace gravel.

3. The three new wells and the three existing monitoring wells should be sampled and analyzed for the parameters listed in Table 4, including Priority Pollutant volatile organic compounds.

4. The federal government entities with responsibility for the Job Corp and previous military operations should be identified and contacted with respect to investigating the

possibility for, and extent of, federal waste disposal operations in the vicinity of the City landfill.

2.0 INTRODUCTION

This report presents the findings of a ground-water assessment for the City of San Marcos sanitary landfill (now closed). The assessment was performed by McCulley, Frick & Gilman, Inc. at the request of the City of San Marcos. Investigation activities associated with the assessment included the review of pertinent Texas Department of Health (TDH) and City of San Marcos files, the plugging and abandonment of existing monitoring wells, the construction and development of new monitoring wells, and the collection and analysis of ground-water samples.

2.1 BACKGROUND

2.1.1 Site Description and History

The City of San Marcos landfill is located just east of the Gary Job Corps Center and the San Marcos Municipal Airport, and approximately 4 miles east of San Marcos (see Figure 1). Portions of the site were used as an Army base in the 1930's and later operated as Gary Air Force Base during World War II. The 84-acre site reportedly had been used for waste disposal since World War II. The City of San Marcos operated a sanitary landfill on the site from late 1969 to 1984.

The City of San Marcos was granted an emergency permit to operate a Type I sanitary landfill on the site in 1969 by the State Department of Health (TDH). The site geologic and ground-water conditions were evaluated at the time of application, and the landfill designed with the objective of preventing ground-water contamination. The design included ground-water monitoring wells to detect changes in ground-water quality as a result of the landfill operation. The site conditions and landfill design were reviewed by the Texas Department of Health and the Texas Water

Quality Board. Both agencies concurred that the landfill, if operated within the specified depth limitations, would have minimal effect on water resources. The TWQB acknowledged that some minor seepage to underlying ground water would likely occur but that the influence would be minor and "hardly detectable in later years" (H. Yantis, TWQB to G. Herzik, TDH, November 24, 1969). File data indicate that the landfill was inspected periodically by the Department of Health.

As required by the Texas Solid Waste Disposal Act and the Municipal Solid Waste Management Regulations, the City of San Marcos applied for a permit to operate the site as a municipal solid waste facility site in 1976. The permit (No. 640) was granted in October of 1977, following a lengthy review and public hearing process. Special provisions were attached to the permit for protection of surface and ground waters, including specification of maximum trench depths and procedures for constructing bottom liners with insitu clays. There was no requirement for monitoring of ground water. A permit amendment (No. 640-A) was granted in July of 1981 to be valid until no later than August 24, 1984. The amendment included a provision for collecting ground-water samples from six existing monitoring wells. The landfill was closed to the public in June of 1983 and completely in 1984. The closure plan for the landfill site was approved by the TDH on December 13, 1985. Closure activities included final cover and grading, and revegetation.

Based on a review of aerial photographs obtained from the Texas Natural Resource Information System (1951, 1957, 1966, 1974 and 1975), and U.S.G.S. topographic maps (1958 photos, photorevised 1973), some aspects of the site history can be described. The 1951 and 1957 photos, and the topographic map, show evidence of excavations in the vicinity of the landfill. The largest feature is a large arcuate excavation straddling the southern boundary of

the property. The 1966 photographs indicate widespread grading of the area, new roads and several areas of trench and pit excavations to the north, south and at the east end of the landfill property (the arcuate excavation is no longer present). This activity predates the City landfill operation by over three years. The photorevised topography (1973) on the U.S.G.S. topographic map shows two small east-west oriented trenches on the west side of the current landfill property and a larger, irregular excavation south of the property. The 1974 and 1975 photographs show excavations throughout the vicinity of the landfill, within the same boundaries as in 1966. The City of San Marcos landfill trenches are clearly visible in the southeast quadrant of the landfill property on the 1974-75 photos. Numerous other excavations are evident to the west, south, north and within the landfill property. Furthermore, disposal of wastes in the open pit south of the landfill property by the Gary Job Corp (?) is still occurring, as was observed during the field investigation for this study.

2.1.2 Overview of Previous Investigations

In conjunction with landfill construction and monitoring activities, subsurface investigations were performed at the landfill site by several firms, including Lockwood, Andrews & Newnam, Inc. and Trinity Engineering Testing Corporation. These investigations were performed as early as 1970. The subsurface investigation activities included the drilling of test borings and the installation of ground-water monitoring wells. The primary purpose of the test borings was to establish the shallow site stratigraphy so that a minimum thickness of clay could be maintained between the base of the landfill trench excavations and the underlying coarse-grained sediments.

Monitoring wells were installed at the landfill as early as 1970, and sampled in 1970, 1971, 1974 and 1977, according to available data. By 1981, a network of six monitoring wells was in place along the periphery of the landfill site, according to the permit amendment (No. 640-A). It is not clear whether some or all of these wells were the same wells as sampled during the 1970's, although it seems likely. All six of the wells had been apparently damaged or destroyed at least once by heavy equipment operating in the area, with three permanently out of service by 1982. One of the six wells (#1) was "relocated" in August 1981 and the new well called 1A. The three monitoring wells remaining in 1989 (#1B, #3 and #4) had all been repaired or replaced at least once, with well #1 finally being relocated approximately one-half mile north of its former location along the northern property line of the landfill. There is also some confusion with the well numbering, in that wells #3 and #4 have been called #2 and #3, respectively, on sampling records. Reports documenting the construction of monitoring wells are available only for wells #1A and its replacement #1B, well #3B, and well #4. No documentation for the other wells, other than conflicting, hand-drawn well location maps, was available in either the City or TDH files.

Analytical data for ground-water samples collected from the site monitoring wells up until 1988 were limited to selected inorganic species and (since 1985) total organic carbon (TOC). Starting in early 1988, ground water samples from monitoring wells #3 and #4 have been analyzed for volatile organic compounds (VOC) by gas chromatography/mass spectrophotometry (GC/MS). Up to three VOCs have been detected at very low parts per billion concentrations.

Apparently in response to written complaints and as part of a preliminary site assessment of the adjacent federal facility, Ecology and Environment, Inc. (E&E), working for Region VI of the

US EPA, sampled landfill monitoring wells and residential drinking water wells in the vicinity during October 1988. Samples were analyzed for VOCs, trace metals/elements, major cations and alkalinity. Samples were not analyzed for important general chemistry parameters such as total dissolved solids, chloride, sulfate and total organic carbon. Several VOCs were detected in the monitoring wells and one VOC, cis-1,2-dichloroethene (cis-1,2-DCE), was detected in four of the five shallow residential wells sampled. The residential wells were sampled again in January, 1989 by E&E and the existence of VOCs in ground water was confirmed. The one-day site assessment by E&E also identified possible hazardous waste disposal problems at the Gary Job Corp Center.

Water chemistry data for a large number of residential wells sampled during the 1970's were also found in the TDH files for the City of San Marcos Landfill. Evaluation of this data, which is of questionable quality and does not include VOCS, was not performed for this investigation.

2.2 OBJECTIVES

The objectives of this ground-water assessment were as follows:

1) to provide the foundation for a ground-water monitoring system that meets Texas Department of Health requirements;

2) to evaluate the hydrogeology of the landfill site and adjacent areas in sufficient detail to assess the occurrence, quality and movement of ground water; and

3) to assess the possible sources of volatile organic compounds detected in ground-water samples from on-site and off-site wells.

In order to accomplish these objectives a Ground-Water Assessment Work Plan (dated May 23, 1989) was implemented. This work plan consisted of the following major tasks:

Task 1 - File Reviews/Site Reconnaissance
Task 2 - Well Plugging
Task 3 - Well Installation, Development and Testing
Task 4 - Ground-Water Sampling and Analysis
Task 5 - Data Analysis and Report Preparation

Section 3.0 of this ground-water assessment report reviews the regional hydrologic and hydrogeologic conditions, while Section 4.0 summarizes the field and laboratory methods used in the investigation. The site hydrogeologic conditions are discussed in Section 5.0 and ground-water quality data are evaluated in Section 6.0. Section 7.0 presents the conclusions and recommendations of the investigation.

3.0 REGIONAL HYDROGEOLOGIC CONDITIONS

3.1 PHYSIOGRAPHY AND CLIMATE

The City of San Marcos Landfill is located in northwestern Caldwell County and east of the Hays County line (Figure 2). Caldwell County is located in the Western Gulf Coastal Plain, just southeast of the boundary with the Edwards Plateau of Central Texas. This boundary is generally delineated by the Balcones Fault Zone (or Balcones Escarpment) which trends roughly northeast-southwest.

The climate of Caldwell County can be described as subhumid with mild winters and hot summers. The average annual low and high temperatures for this area are 55°F and 80°F, respectively (TDWR, 1982). The normal annual precipitation in the area is approximately 34 inches (TDWR, 1982). The heaviest precipitation often comes in the months of April, May and September, although there is no significant rainy season. The potential annual evaporation in this area is approximately 65 inches, or about twice the annual rainfall (DeCook, 1960).

3.2 STRATIGRAPHY AND STRUCTURE

The discussions regarding the geology and hydrogeology of the regional area (Sections 3.2 and 3.3, respectively) are based principally on information presented in Rasmussen (1947), DeCook (1960) and Follett (1966). As mentioned above, Caldwell County lies just southeast of the boundary between the Edwards Plateau and the Gulf Coastal Plain. In addition to being a physiographic boundary, this boundary represents a change in surface geology from the Cretaceous rocks of the Edwards Plateau to the Tertiary sediments of the Coastal Plain. The Balcones fault zone provides the structural control for this boundary, as older, more

resistant Cretaceous rocks have been faulted upward relative to the younger, less resistant Tertiary sediments. These faults are typically normal faults which were active in Miocene time (between 12 and 27 million years ago). Several faults related to the Luling-Mexia-Talco fault zone occur in the northwest and central parts of the county. The relative movement along these faults is opposite of the Balcones faults, with the upthrown rocks to the southeast and the downthrown rocks to the northwest.

The Cretaceous and younger sediments rest upon a structural basement of deformed Paleozoic rocks. During Mesozoic time, transgressive Cretaceous seas extended from the southeast and covered the entire Central Texas area. More or less continuous deposition along the Gulf Coast from the Cretaceous Period to the present time was accompanied by faulting along the Balcones fault zone (DeCook, 1960).

Rocks of several different ages crop out in Caldwell County. In general, the rocks crop out in narrow, southeastward trending bands, except for the Quaternary alluvium and fluviatile terrace deposits which form a sinuous veneer over the older rocks. This banded outcrop pattern is typical of the entire Gulf Coastal Plain. Figure 3 is a regional geologic map showing surface relationships between the different strata. A stratigraphic column is included to illustrate the relative ages of the formations. Table 1 is a regional stratigraphic summary showing the age relationships among the rocks.

The oldest rocks occurring in the region are the lower Cretaceous rocks of the Comanche Series. These rocks include the Glen Rose Formation, the Edwards Limestone, the Del Rio Clay and Georgetown Formation (undivided) and the Eagle Ford Group and Buda Limestone (undivided). These rocks are predominantly limestone, shale, clay and dolomite. The Comanche Series rocks were typically

deposited in shallow, nearshore environments (Sellards et al, 1932). Some reef limestones are present, especially in the Edwards Limestone and Georgetown Formation. Of the Comanche Series rocks, the Glen Rose and the Edwards are the only formations which yield significant amounts of groundwater to the area. The occurrence and movement of groundwater in the Edwards Limestone and Glen Rose Formation are discussed in Section 3.3.

Rocks of the upper Cretaceous Gulf Series occur to the southeast of the older Comanche Series rocks noted above, and in the vicinity of the San Marcos Landfill. These rocks include the Austin Chalk, the Pecan Gap Chalk and the Navarro Group and Marlbrook Marl (upper Taylor Marl). These rocks are predominantly chalk and calcareous clay deposited in shallow, warm-water environments. None of these units is known to yield significant amounts of groundwater to the region, although shallow wells may provide water for domestic and stock uses on a very limited scale.

Several formations of Tertiary age occur in the region to the south and east of the San Marcos Landfill, and cover a large portion of Caldwell County. These strata are widespread to the south, forming the banded outcrop pattern mentioned above which stretches toward the Gulf of Mexico shoreline. Units include (from oldest to youngest) the Midway Group, Wilcox Group, Carrizo Sand, Reklaw Formation, Queen City Sand, Weches Greensand, and Uvalde Gravel. Lithologies are gravel, sand, silt, clay and glauconitic sand.

Sediments of Quaternary (Pleistocene and Recent) age occur sporadically in the region. These units are typically fluviatile (stream-deposited) sediments occurring along existing drainages or as terrace deposits (higher elevation remnants of fluvial sediments) which occur as a veneer over the older rocks. The

fluviatile sediments are identified as Quaternary alluvium (Qal), Quaternary terrace deposits (Qt), and as the Leona Formation (Qle), which is a specific fluviatile terrace deposit. These sediments consist of varying amounts of gravel, sand, silt and clay, and can be important water-bearing units on a local scale (see Section 3.3).

The terrace deposits are sediments deposited by rivers and streams which cut through the area during the last several thousand years. Particularly significant are the Leona Formation which outcrops in a southeast trending band in the northeast portion of Caldwell County, and the Quaternary terrace deposits which occur along the San Marcos River. The Leona Formation is primarily a coarse-grained unit thought to have been deposited by the ancient Blanco River. It is a significant water-bearing unit for local residents. The Quaternary terrace deposits are associated with deposition fluival processes of the San Marcos River in Quarternary time, and may contain significant amounts of ground water in areas to the west and south of the San Marcos Landfill.

3.3 OCCURRENCE AND MOVEMENT OF GROUND WATER

The principal water-bearing formations in the region are Quaternary alluvium and terrace deposits, Tertiary sands, the Glen Rose Formation and the Fredericksburg Group, which includes the Edwards Limestone. Most wells in Hays County to the north and west of the site are completed in the Glen Rose Formation and the Fredericksburg. Most of the wells in Caldwell County are completed in the Quaternary deposits and Tertiary sands.

The sources of ground water to these units are precipitation on outcrops of permeable units and from hydraulic connection with water-bearing units in the subsurface. Ground-water movement is

generally to the southeast, or in the direction of dip of the water-bearing formations. Water occurs under both unconfined and confined conditions.

The Glen Rose Formation outcrops over nearly half of Hays County. This outcrop area represents the chief recharge area to the Glen Rose. The direction of ground-water movement in the Glen Rose is in the direction of dip, or to the southeast. The Glen Rose is not considered a potential water-bearing unit in Caldwell County because of its depth and poor water quality.

The Edwards Limestone is a primary aquifer for a large part of Central Texas. It is not used as a source of drinking water in Caldwell County for a number of reasons, including the presence of other shallower water-bearing units which are more economical to utilize and poor water quality (brackish and high sulfate).

The geologic units of Cretaceous Age that overlie the Fredericksburg Group rocks in eastern Hays and western Caldwell Counties, are considered aquitards and are not known to yield fresh or slightly saline water to wells in Caldwell County. The undifferentiated Navarro Group and Marlbrook Marl ("upper Taylor marl") which crops out in the vicinity of the landfill and underlies the Quarternary deposits (Figure 3), does not yield fresh to slightly saline water to wells in the area (Follett, 1966). According to Follett, the Navarro normally contains saline water.

Several Tertiary formations supply water to residents of Caldwell County. These include the Queen City Sand, Reklaw Formation, Carrizo Sand, and Wilcox Group. The Carrizo Sand and the Wilcox Group are considered as one unit because they are hydrologically connected. Together they form the principal aquifer in Caldwell County. Because the Tertiary Formations outcrop to the south of

the San Marcos Landfill, and do not occur in the subsurface beneath the landfill, they will not be discussed in detail.

The only significant water-bearing units in the vicinity of the San Marcos Landfill are the Quaternary fluivial deposits (Qal, Qt and Qle on Figure 3). These units are discussed below.

The Leona Formation (Qle) supplies water to many shallow wells in an area extending from the southeastern edge of Lockhart northwest to Hays County. The Leona Formation is composed of stratified gravel, and minor amounts of sand, caliche, marl, clay, silt, sandstone and conglomerate. In most places the gravel is fairly well cemented and resembles concrete. The thickness of the Leona Formation in Caldwell County ranges from a few feet at its margins to about 40 feet, however the saturated thickness does not exceed 7 or 8 feet in most cases (Follett, 1966). Some wells completed in the Leona, such as those on the margins, are only seasonally saturated.

The movement of ground water in the Leona Formation is to the southeast, following the general slope of the plain. Where the Leona rests upon relatively permeable rocks such as the Wilcox Group, it may be a source of recharge to the underlying units. To the north and east of the landfill area, where the Leona often occupies a high topographic position overlying the relatively impermeable Navarro and Austin rocks, springs at the margins of the Leona outcrop are common.

The broad fluviatile terrace deposit (Qt on Figure 3) underlies the San Marcos Landfill, and continues southward along the San Marcos River. Numerous wells and cut banks show that the terrace is resting upon almost impermeable clays of the Pecan Gap Chalk and the Navarro group in the vicinity of the San Marcos Landfill. The thickness of this terrace is generally about 30 feet in the

area, although thicknesses of up to 45 feet have been reported. In the vicinity of the San Marcos Landfill, the terrace consists of two distinct sedimentary units: the lower part is a sheet of stratified or cross-bedded gravel and sand about 15 feet thick, and the upper part is primarily clay with minor amounts of gravel, sand, silt and caliche, also about 15 feet thick (Rasmussen, 1947).

The alluvium yields small to moderate quantities of water to numerous dug wells and springs in the area. The wells are used chiefly for domestic and stock purposes and to a small extent for irrigation (Follett, 1966). As in the Leona Formation, only the lower several feet of the terrace deposits (included in Recent Alluvium by Follett) are saturated. Follett (1966) estimated the saturated thickness of the alluvium at about 8 feet. The alluvium is generally recharged rapidly from precipitation and runoff, and from the streams that cross it.

In general the water from the Leona Formation and from the terrace deposits is of good quality, although it is often very hard. Follet (1966) examined 232 samples from shallow wells and observed hardness values from 1 to 1,830 parts per million as $CaCO_3$.

4.0 SUMMARY OF FIELD AND LABORATORY METHODS

The field and laboratory methods used during this investigation are summarized in this section. The field data collection efforts and laboratory analytical work were performed during the period of September 21 to November 11, 1989. Specific field activities included the following:

1) construction of four ground-water monitoring wells;

2) development of the three new monitoring wells which contained ground water;

3) collection of ground-water samples from three monitoring wells for subsequent laboratory analysis;

4) measurement of water levels in existing and new wells, and an existing gravel pit pond;

5) plugging and abandonment of three previously-existing monitoring wells;

6) performance of in-situ hydraulic tests; and

7) surveying of investigation locations.

Laboratory investigations included chemical analysis of ground water samples. A brief summary of the field and laboratory methods used is presented below; more detailed descriptions of field methods are presented in Appendix A and documentation of field work is included in Appendices C, D, E, G and H.

4.1 DRILLING AND MONITORING WELL CONSTRUCTION

Monitoring well drilling was performed by hollow stem auger techniques. The contracted drilling company was Jones Environmental Drilling, Inc. of San Antonio, Texas. Four monitoring wells, MW-101, MW-102, MW-103 and MW-104, were installed on September 21 and 22, 1989. The locations of the monitoring wells are shown in Figure 2. The purposes of the monitoring wells, which were completed in the fluvial terrace deposit above the Navarro Group clays, were threefold: 1) to document and further clarify the hydrogeologic conditions in the vicinity of the City of San Marcos landfill; 2) to replace previously installed wells for which documentation was limited and construction possibly inappropriate; and 3) to provide a ground-water monitoring network acceptable to the Texas Department of Health.

Borehole lithologies were continuously sampled with a split barrel sampler advanced ahead of the auger flights during drilling. Some of the gravel intervals could not be sampled by this method and were collected from the auger flights.

For monitoring well construction, the augers were typically left in the borehole during well casing installation. Two-inch I.D., flush-threaded PVC casing was used for construction of all the monitoring wells. All the wells except MW-101 contained water immediately after installation and during subsequent measurements. A Brainard-Kilman hand pump was used to develop MW-102, MW-103 and MW-104. Continuously sampled borehole lithologic descriptions and monitoring well construction diagrams are provided in Appendix C. Monitoring well construction details are summarized in Table 2. Copies of the State of Texas water well drillers reports filed by the Licensed Water Well Driller

are included in Appendix D, and well development records are contained in Appendix E.

4.2 WELL PLUGGING AND ABANDONMENT

Monitoring wells numbered #1B, #3 and #4 (according to City of San Marcos maps) were previously installed wells that MFG was contracted to plug and abandon. The entire casing strings were removed and the empty boreholes reamed out and plugged with cement according to the procedures outlined in Appendix A. All three wells were plugged and abandoned on September 22, 1989.

4.3 GROUND-WATER SAMPLING AND ANALYSIS

Completed ground-water sampling forms are presented in Appendix E and a summary of the field procedures used during sample collection are contained in Appendix A. Field quality assurance (QA) procedures followed during sampling included the collection of a trip blank and a field blank (equipment rinsate). Details of field quality assurance procedures and results are contained in Appendix B.

As part of the ground-water sampling activities, and at other times listed on the data sheets, water levels were measured in MW-102, MW-103 and MW-104. Well MW-101 has been dry since installation. Water levels were also measured in the existing wells (#1B, #3 and #4) prior to plugging. Field water level monitoring records are contained in Appendix E. Reduced water level data and calculated elevations are presented in Table 3.

Ground-water samples collected from the monitoring wells were analyzed by National Environmental Testing Corp. (NET) of Austin, Texas. Results of ground-water analyses are summarized in Table

4; the laboratory reports for these analyses are provided in Appendix F.

4.4 HYDRAULIC TESTING

In-situ hydraulic tests (slug tests) were performed in monitoring wells MW-102, MW-103 and MW-104. Slug-in tests were performed by introducing two and one half gallons of deionized water into each well and monitoring the water level recovery. A detailed description of the procedures followed during hydraulic testing is presented in Appendix A. Because the wells are screened in unconfined water-bearing units, slug test results were analyzed by the methodology developed by Bouwer and Rice (1976) for unconfined aquifers. The calculated horizontal hydraulic conductivities are listed in Table 5. Data, graphs and calculations for the slug tests are contained in Appendix H.

4.5 SURVEYING

Surveying of the newly installed monitoring wells (MW-101, MW-102, MW-103 and MW-104), the one aborted monitoring well location (103A), the locations of the previously existing plugged and abandoned wells (#1B, #3, and #4), and the water surface in the gravel pit was performed by J. Byrn and Associates of San Marcos, Texas. Horizontal coordinates were surveyed at each location except the gravel pit; elevations of the top of the concrete pads and the top of the PVC well casing was surveyed for each monitoring well. The horizontal coordinates were determined by assigning an arbitrary set of coordinates (5000, 5000) to point number 300 on the survey base map (Appendix G) and referencing all surveyed locations to that point. A concrete monument located to the southwest of the landfill was used as a cross reference for the horizontal coordinates. This monument is the same reference point used by the City of San Marcos in previous

surveys of the landfill site and the airport. Elevations of surveyed sites were referenced from a USGS benchmark located near Camp Gary Job Core Training Site. The survey reports and a map are contained in Appendix G.

5.0 SITE CONDITIONS

5.1 TOPOGRAPHY AND SURFACE DRAINAGE

The overall topography in the vicinity of the landfill property is characterized by a gentle southward slope toward the San Marcos River, modified locally near natural and artificial drainage features. According to the topography shown on the U.S.G.S. 7.5 min quadrangle sheet (Uhland, Tex.), which is based on 1958 aerial photography, the entire area of the landfill sloped south or south-southeast toward Hemphill Creek. Since that time, the topography and surface drainage have been modified extensively within and to the north, west and south of the landfill, principally by activities of the Gary Job Corps heavy equipment trainees, which included constructing a network of drainage ditches and swales, and also by airport construction. The topography shown on Figure 2 is based on aerial photography flown in 1986. Surface elevations within and immediately adjacent to the landfill range from about 580-585 feet (NGVD) along the northern boundary to less than 570 feet along the southern boundary.

The landfill lies within the drainage area of Hemphill Creek. The eastern two-thirds of the landfill property drains to Hemphill Creek, primarily by flow in swales trending west to east. Some areas of internal drainage are apparent in the eastern part of the property. Drainage in the western one-third is toward a man-made ditch that terminates in a large depression south of the landfill. Any overflow from this depression would enter a minor drainage that extends southeastward into a broad flat area that is still within the Hemphill Creek drainage area.

5.2 GEOLOGY

The geologic conditions within and adjacent to the landfill were evaluated on the basis of descriptive logs from boreholes for the four new monitoring wells (MW-101 through MW-104) and available logs for borings drilled in conjunction with previous work. The previous boring logs are summarized as follows:

* 3 borings (B-1, B-2 and B-3) drilled in August 1970 in the area just south of the landfill property (locations shown on Figure 2);

* 6 borings drilled in 1981 to depths of about 16 feet along a proposed trench in the northwest quadrant of the landfill property;

* 5 borings drilled in 1982 to depths of about 15 feet along a proposed trench in the northwest quadrant of the landfill property; and

* logs for borings at monitoring well locations #1A, #1B and #3 (locations shown on Figure 2).

The landfill property and the surrounding area is mantled by fluviatile terrace deposits (stream-laid sediments). These terrace deposits overlie the bedrock clay unit, which has been called either the Navarro Group and Marlbrook Marl, or the "upper Taylor Marl." According to the geologic map (Figure 3), the terrace deposits do not extend north of the county road on the northeast side of the property. However, the records for State Well No. 67-02-701, which is a domestic/stock use well located on the north side of the county road from the landfill, indicate that this well is approximately 27 feet deep and completed in the terrace deposits.

The terrace deposits range in thickness from about 23 to 38 feet. The stratigraphy of the terrace sediments is fairly uniform and consists of the following lithologies (from top to bottom): surficial dark brown or dark gray, plastic clay (4-5 feet thick); yellowish brown to brown sandy clay with some gravel and calcareous nodules (9-15 feet thick); brown to yellowish brown clayey or silty sand (1-9 feet thick); and gravel, sandy or clayey to clean (5-15 feet thick). The base elevation of the gravel unit is shown on Figure 4. The map illustrates that the gravel base appears lowest in the central and southern parts of the landfill and highest toward the northeast.

The general stratigraphic relationships across the landfill property and adjacent areas are shown on the cross sections in Figure 5. The terrace deposits are shown as divided into an upper clay unit, which comprises the surficial dark clay and the underlying sandy clay, and a coarse-grained unit, which includes the gravel deposits and any overlying sands.

The landfill trenches have been excavated into the upper clay and sandy clay units, with the intent of maintaining several feet of separation (i.e. clayey material) between the base of the trenches and the coarser-grained, potentially water-bearing sediments. Documentation of this separation is available for the northwest quadrant of the site (used during the last 3-4 years of operation) in the form of several reports, including proposed bottom grade plans and Soils and Liner Evaluations. No similar documentation is available for the period of time between 1969 and about 1980, although there are inspection reports in the TDH files that describe trench bottom and liner characteristics.

5.3 OCCURRENCE AND MOVEMENT OF GROUND WATER

Ground water occurs within the gravel unit at the base of the terrace deposits at three of the four monitoring wells installed at the site in October of 1989. The water level is below the top of the permeable strata, indicating unconfined (water table) flow conditions. The ground-water elevations at each well and in the gravel pit at the west end of the landfill property, and potentiometric contours (lines of equal water level elevations) are shown on Figure 6. The water levels and profiles of the potentiometric surface are also depicted on the cross sections (Figure 5). Based on four data points, the approximate potentiometric contours indicate that ground-water flow is generally toward the south. However, the contours indicate that flow is locally directed toward the area of MW-104 and MW-103. At the latter locations, the gravel deposits were clean or had a sand matrix, and thus very high hydraulic conductivity (K). Analysis of the field hydraulic tests yielded estimated K values of about 5×10^{-2} cm/sec (140 feet/day) for these two wells, while MW-102, completed in a gravelly clay, had a K value of about 7×10^{-3} cm/sec (20 feet/day). The potentiometric contours may reflect variations in water-transmitting properties of the terrace deposits, whereby the ground-water flux under a lower gradient within high K zones will be as great as within low K zones and under higher gradients. Approximate average linear flow rates range from about 60 to over 400 feet per year, using the above range of K values, the average gradient estimated from potentiometric contours on Figure 6, and an estimated effective porosity of .30, a value typical for sands and gravel.

Ground water was not encountered in monitoring well MW-101. The elevation of the base of the gravel unit at MW-101 is 7 to 11 feet higher than at the wells located west and south, and consequently, above the ground-water bearing zone within the very

permeable terrace gravel (see cross section A-A' in Figure 5). The previously mentioned domestic well located on the north side of the county road and completed in the terrace material, was reported to have a depth to water of about 24 feet in 1963, indicating that saturated conditions may exist within the gravel unit in areas to the east and north of the landfill property.

Recharge of the terrace deposits likely occurs by infiltration of incident precipitation during wetter than normal years. Because of the high evapotranspiration potential and low rainfall, percolation below the root zone may not significant during years with normal or less than normal precipitation. However, the surficial clays over the general area, which are predominantly soils of the Branyon Series, are characterized by large dessication cracks (up to 3 inches wide) when the soil is dry. This feature was observed in the field during the current investigation and may contribute to ground-water recharge. Infiltration from tanks, roadside ditches and areas of internal drainage within and near the landfill may also contribute recharge, especially along the northern and eastern limits of the terrace deposits, which are possibly less than 1000 feet to the east and north and about one mile to the northwest of the landfill property.

The clays of the Navarro Group beneath the terrace gravel are several orders of magnitude less permeable and can essentially be considered to represent an impermeable base. Ground water that reaches the terrace gravel moves laterally within the gravel in a generally southerly or southwesterly direction toward the San Marcos River. Discharge eventually occurs as baseflow to the river or its tributaries, well pumpage or evapotranspiration in discharge areas.

6.0 GROUND-WATER QUALITY EVALUATION

This section of the report includes a review of the ground-water chemistry data obtained as part of the ground-water assessment investigation. These data are considered in the context of historical ground-water chemistry data for site monitoring wells and nearby residential drinking water wells. The laboratory results for samples collected as part of the ground-water assessment are summarized in Table 4. The laboratory reports containing these data are included in Appendix F.

As mentioned in Section 2.1.2, historical ground-water chemistry data (from 1971 to the present) for monitoring wells in the vicinity of the landfill site are limited and typically are not supported by any sampling procedure description, well purging summary or chain-of-custody documentation. In several cases there is even some question as to which well a particular set of chemistry data corresponds. Wells #3 and #4 are the only monitoring wells in the vicinity of the landfill site for which there is a somewhat consistent set of chemistry data.

6.1 GENERAL CHEMISTRY PARAMETERS

General chemistry parameters usually used as indicators of potential leachate migration from a municipal landfill include chloride, sulfate, total dissolved solids (TDS) and total organic carbon (TOC). Chloride, sulfate and TDS are the three parameters for which the most complete historical record exists. A review of ground-water chemistry data from 1970 through 1989 for wells #3 and #4 indicates wide variability in these parameters but few definable trends that could indicate contamination by a more mineralized landfill leachate. There was a perceptible increase in TDS and sulfate concentrations during the time period, with the greatest increases in these parameters noted in samples

collected in 1988 and 1989. Sulfate concentration increases in these two wells were most noticeable, with values increasing from approximately 30 to 40 mg/L in 1970s samples to over 100 mg/L and as high as 288 mg/L in 1988 and 1989 samples.

The increase in TDS concentrations in wells #3 and #4 with time was not nearly as dramatic as the sulfate concentration increase. TDS concentrations in the two wells showed considerable fluctuations between consecutive sampling events, thus diminishing the significance of the overall change from the 1970s to 1989. TDS concentrations in well #3 samples collected during the 1970s ranged from 300 to 800 mg/L while TDS values for 1988 and 1989 samples from the same well varied from 800 to 1000 mg/L. Similarly TDS concentrations in well #4 samples collected during the 1970s ranged from 300 to 1000 mg/L, while the TDS values in 1988 and 1989 were approximately 1100 to 1500 mg/L.

Chloride concentrations in ground-water samples from wells #3 and #4 were even more varied than the TDS data, to the point of precluding any interpretations regarding long-term trends. TOC (total organic carbon) analyses were not performed on any samples until 1985 and no general trends are apparent for the 1985-1989 time period. As mentioned previously, the other four site monitoring wells (wells #1, #2, #5 and #6) were all destroyed by 1982 and no conclusions with regard to potential chemical migration could be drawn on the basis of the limited data obtained.

Thus, the review of historical general chemistry ground-water data for wells #3 and #4 suggests some variations in typical indicator parameters, but no consistent trends to indicate leachate releases to ground water. The reliability of the data is limited by the sketchy documentation of sampling and sampling protocols, as well as by the crucial questions regarding

monitoring well construction techniques. Gross fluctuations within the historical ground-water data set also limit the confidence of any chemical migration conclusions. A more reliable evaluation of ground-water quality, albeit without consideration of temporal trends, can be made by consideration of analytical results for ground-water samples collected in October 1989 from the wells installed as part of this ground-water assessment.

Because ground-water was not encountered in the upgradient well, MW-101, no background general chemistry concentrations are available for comparison with results for samples collected from the other newly installed wells; however, some meaningful interpretations can still be made. Chloride, TDS and sulfate concentrations in the ground-water samples from the newly installed wells were higher than corresponding historical values for samples from the previous monitoring wells. As indicated in Table 4, chloride, TDS and sulfate concentrations exceeded drinking water criteria in all three of the wells sampled.

Most general chemistry parameters were significantly higher in the MW-103 sample than in the MW-102 and MW-104 samples. The three exceptions to this generalization are TOC and alkalinity, which were both greatest in the MW-102 sample, and nitrate, which was greatest in the MW-104 sample. Chloride, TDS and sulfate, the three general chemistry parameters potentially most indicative of leachate migration, were all significantly greater in the MW-103 sample than the others. This observation is consistent with the location of MW-103 as the well most directly downgradient from the majority of the landfill site (see Figure 6), and would appear to indicate potential migration of landfill leachate into the shallow groundwater. However, any conclusions regarding landfill leachate migration made on the basis of a single sampling round are unconvincing, and need to be

substantiated by reliable data collected over several sampli rounds from the new set of monitoring wells.

6.2 VOLATILE ORGANIC COMPOUND CONCENTRATIONS

Additional insights into the possibility of chemical migrati from the landfill area can be gained by consideration of the available VOC data. Historical VOC data for the previously existing monitoring wells (wells #1 through #6) is very limi VOC analyses were only performed on some of the 1988 and 198 samples from wells #3 and #4. These VOC analyses did detect dichloroethane (1,1-DCA) in both wells at concentrations as as 10.7 ug/L. As illustrated in Figure 7, 1,1-DCA, tetrachloroethene (PCE) and trichloroethene (TCE) were detec in the February 1989 sample from well #3, with 1,1-DCA prese the well #4 sample collected at that time as well.

The presence of VOCs in shallow ground water at the landfil was confirmed by the laboratory results for the newly insta monitoring wells. These data are summarized in Table 4 and plotted on Figure 7. In addition to the 1,1-DCA, PCE and T detected in the earlier samples, benzene, several chlorinat benzene compounds, cis-1,2-dichloroethene (cis-1,2-DCE), a ethyl ether were present in at least one of the samples fr newly installed monitoring wells. Although a number of VO detected in the October 1989 samples, concentrations were typically near detection limits. Furthermore, with the ex of PCE in the ground-water sample from well MW-104, no VO detected at concentrations above drinking water criteria listed in Table 4.

The potential implications of the VOCs detected in monito wells at the landfill site are realized with the consider VOC data for samples collected by the EPA contractor fro

observed, it is concluded that there is no trace metals data indicating chemical migration of landfill leachate to ground water. As was noted for the general chemistry parameters, conclusions made on the basis of analytical results for a single sampling round should be considered preliminary and should be augmented by data from subsequent sampling events.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

On the basis of the available and reliable historical data, and the data obtained during this investigation, the following conclusions are noted:

1. The City of San Marcos operated a trench type sanitary landfill on the 84-acre landfill property from late 1969 until 1984. Aerial photographs suggest that other entities may have conducted disposal operations prior to, during and after this period in areas within and/or adjacent to the 84-acre site.

2. The terrace deposits underlying the City of San Marcos closed sanitary landfill are composed of an upper clay/sandy clay zone within which the landfill trenches were excavated, and a lower, coarse-grained unit consisting of gravel, clayey gravel and sand.

3. Ground water occurs under unconfined flow conditions within the coarse-grained unit, which is underlain by relatively impermeable clays of the Navarro Group. Ground-water flow is generally to the south at average linear flow rates of 60 to over 400 feet per year.

4. Chemistry data for site monitoring wells indicate the presence of several volatile organic compounds in ground water from the terrace deposits at the landfill site. These compounds include 1,1-dichloroethane (1,1-DCA), tetrachloroethene (PCE), trichloroethene (TCE), benzene, several chlorinated benzene compounds, cis-1,2-dichloroethene (cis-1,2-DCE), and ethyl ether. Sampling and

analysis of several private wells completed in the terrace gravel downgradient of the landfill has documented the occurrence of 1,1-DCA, cis-1,2-DCE, TCE and 1,4-dichlorobenzene in ground water. The compound found most consistently and frequently in both the private wells and the monitoring wells is cis-1,2-DCA.

7.2 RECOMMENDATIONS

In consideration of the above conclusions and consistent with the objective of establishing an appropriate ground-water monitoring system at the site, the following recommendations are offered:

1. Two additional monitoring wells should be installed upgradient of the landfill property at the locations shown on Figure 2. These wells are considered necessary for several reasons: 1) the one upgradient well, MW-101, is dry; 2) potentiometric contours have identified two upgradient areas, one to the northeast and one to the north of the property; 3) examination of historic aerial photographs have indicated that disposal areas other than the City of San Marcos Landfill may have been in operation in the upgradient areas; and 4) further definition of the extent of saturated conditions in the terrace gravel deposit is warranted.

2. One additional monitoring well should be installed downgradient of the western portion of the landfill property (see Figure 2 near old well #6) to monitor ground-water conditions in this area and further define the extent of the saturated terrace gravel.

3. The three new wells and the three existing monitoring wells should be sampled and analyzed for the parameters listed in Table 4, including Priority Pollutant volatile organic compounds.

4. The federal government entities with responsibility for the Job Corp and previous military operations should be identified and contacted with respect to investigating the possibility for, and extent of, federal waste disposal operations in the vicinity of the City landfill.

8.0 REFERENCES

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TABLE 1. REGIONAL STRATIGRAPHIC SUMMARY

System	Series	Geologic Unit	Maximum Thickness (feet)
Quaternary	Recent	Alluvium	45
	Pleistocene	Leona Formation	40
Tertiary	Pliocene ?	Uvalde Gravel	5
	Eocene	Weches Formation	50
		Queen City Sand	250
		Reklaw Formation	80
		Carrizo Sand	140
		Wilcox Group	1300
	Paleocene	Midway Group	150
Cretaceous	Gulf	Navarro Group Marlbrook Marl (undivided)	600
		Pecan Gap Chalk	200
		Austin Chalk	400
		Eagle Ford Group Buda Limestone (undivided)	90
	Comanche	Del Rio Clay Georgetown Formation (undivided)	105
		Edwards Limestone	400
		Glen Rose Formation	800

TABLE 2. MONITORING WELL CONSTRUCTION SUMMARY

MONITORING WELL LOCATION	COORDINATES NORTHING (FT)	COORDINATES EASTING (FT)	GROUND LEVEL ELEVATION (FT NGVD)	TOP OF WELL CASING ELEVATION (FT NGVD)	WELL STATUS (2)	DATE COMPLETED	DRILLING METHOD (3)	TOTAL DEPTH (ft BGL) BORING	TOTAL DEPTH (ft BGL) WELL	BORING DIAMETER (inches)	CASING TYPE	CASING DIAMETER (inches)
MW-101	5579.13	7491.48	574.51	576.33	In Use	Sep-89	HSA	33.5	27.7	8	PVC	2
MW-102	4371.83	8326.51	567.30	569.37	In Use	Sep-89	HSA	26.5	26.2	8	PVC	2
MW-103	3985.15	7335.32	570.94	573.19	In Use	Sep-89	HSA	28.6	28.3	8	PVC	2
MW-104	4443.62	6822.80	572.74	575.06	In Use	Sep-89	HSA	33.8	33.5	8	PVC	2
#1B	8117.50	6075.61	594.54	MM	P & A	Aug-86	MR	36.0	33.0	8	PVC	4
#3	4208.88	8130.62	567.49	569.49	P & A	Aug-86	MR	35.0	33.0	8	PVC	2
#4	4543.16	8494.55	566.16	567.66	P & A	unknown	unknown	35.0	33.0	unknown	PVC	4

TABLE 2. MONITORING WELL CONSTRUCTION SUMMARY

	SCREENED INTERVAL (4)				BENTONITE SEAL INTERVAL				FILTER PACK INTERVAL				GRAVEL UNIT INTERVAL			
	DEPTH		ELEVATION		DEPTH		ELEVATION		DEPTH		ELEVATION		DEPTH		ELEVATION	
LOCATION	TOP (ft BGL)	BOTTOM (ft BGL)	TOP (FT NGVD)	BOTTOM (FT NGVD)	TOP (ft BGL)	BOTTOM (ft BGL)	TOP (FT NGVD)	BOTTOM (FT NGVD)	TOP (ft BGL)	BOTTOM (ft BGL)	TOP (FT NGVD)	BOTTOM (FT NGVD)	TOP (ft BGL)	BOTTOM (ft BGL)	TOP (FT NGVD)	BOTTOM (FT NGVD)
MW-101	17.7	27.7	556.8	546.8	9.5	14.0	565.0	560.5	14.0	28.0	560.5	546.5	9.7	23.5	564.8	551.0
MW-102	16.2	26.2	551.1	541.1	9.5	12.5	557.8	554.8	12.5	27.5	554.8	539.8	13.5	19.8	553.8	547.5
MW-103	18.3	28.3	552.6	542.6	14.2	16.5	556.7	554.4	16.5	28.6	554.4	542.3	21.5	30.0	549.4	540.9
MW-104	23.5	33.5	549.2	539.2	18.6	20.2	554.1	552.5	20.2	33.8	552.5	538.9	27.5	33.0	545.2	539.7
#1B	28.0	33.0	566.5	561.5	No Bentonite Seal				4.0	36.0	590.5	558.5	Gravel Unit not encountered			
#3	26.8	33.0	540.7	534.5	No Bentonite Seal				4.0	35.0	563.5	532.5	23.0	28.0	544.5	539.5
#4	28.0	33.0	538.2	533.2	No Bentonite Seal				4.0	35.0	562.2	531.2	unknown			

NOTES:

(1) NGVD = National Geodetic Vertical Datum, 1929

(2) Key to Well Status:
In Use = Well presently part of monitoring network
P & A = Well plugged and abandoned, no longer in use

(3) Key to Drilling Method:
HSA = Hollow Stem Auger
MR = Mud Rotary

(4) Screened section of Well #3 consisted of holes drilled in PVC pipe at 0.5 foot intervals. All other wells were constructed with 0.01-inch machine-slotted well screens.

(5) Well construction information for Wells #1B, 3, and 4 is based on water well drillers reports and field observations during plugging and abandonment. Inconsistencies between well completion forms and field observations suggest that the drillers reports are of limited reliability.

TABLE 3. WATER LEVEL DATA SUMMARY

LOCATION	GROUND SURFACE ELEVATION (FT NGVD)	ELEVATION TOP OF WELL CASING (FT NGVD)	MEASUREMENT DATE	DEPTH TO WATER BELOW TOP OF WELL CASING (FT)	ELEVATION OF WATER (FT NGVD)
MW-101	574.51	576.33	25-Sep-89	DRY	
			03-Oct-89	DRY	
			01-Nov-89	DRY	
MW-102	567.30	569.37	25-Sep-89	22.30	547.07
			03-Oct-89	22.59	546.78
			01-Nov-89	22.60	546.77
MW-103	570.94	573.19	25-Sep-89	28.19	545.00
			03-Oct-89	28.19	545.00
			01-Nov-89	28.65	544.54
MW-104	572.74	575.06	25-Sep-89	29.68	545.38
			03-Oct-89	29.69	545.37
			01-Nov-89	30.12	544.94
Well #1B	594.54	NM(1)	21-Sep-89	DRY	
Well #3	567.49	569.49	21-Sep-89	23.25	546.24
Well #4	566.16	567.66	21-Sep-89	19.83	547.83
Gravel Pit			02-Nov-89		546.71

NOTE:

(1) NM = Not Measured

TABLE 4. GROUND-WATER ANALYTICAL RESULTS

PARAMETER	UNITS	WELL NUMBER MW-102	MW-103	MW-104	DRINKING WATER CRITERIA	REFERENCE
Date Sampled		03-Oct-89	03-Oct-89	03-Oct-89		
Sample Number		45228	45229	45230		
GENERAL CHEMISTRY						
Alkalinity	(mg/L as CaCO3)	640	560	434		
Calcium	(mg/L)	256	756	704	na (5)	
Chloride	(mg/L)	478	1020	326	300	(TDH)(6)
Conductivity	(umhos/cm)	2830	4640	2200	na	
Hardness	(mg/L as CaCO3)	432	1400	244	na	
Magnesium	(mg/L)	29.7	62	23.4	na	
Nitrate- Nitrogen	(mg/L)	0.28	0.4	2.31	10	(TDH)
pH	(units)	6.8	6.7	7.0	7	(TDH)
Potassium	(mg/L)	7.9	4.2	2.6	na	
Sodium	(mg/L)	302	475	227	na	
Sulfate	(mg/L)	183	667	239	300	(TDH)
Total Organic Carbon (TOC)	(mg/L)	14	11	4	na	
Total Dissolved Solids (TDS)	(mg/L)	1570	2600	1200	1000	(TDH)
CATION SUM	(meq/L)	28.54	63.55	46.97		
ANION SUM	(meq/L)	30.08	53.83	22.84		
CATION / ANION BALANCE	(%)	2.6	8.3	34.6		

TABLE 4. GROUND-WATER ANALYTICAL RESULTS

PARAMETER	UNITS	WELL NUMBER MW-102	MW-103	MW-104	DRINKING WATER CRITERIA	REFERENCE
METALS						
Arsenic	(mg/L)	0.018	<0.005	<0.005	0.5	(MCL)(3)
Barium	(mg/L)	<0.5	<0.5	<0.5	5.0	(PMCL)(4)
Cadmium	(mg/L)	<0.005	<0.005	0.16	0.005	(PMCL)
Chromium	(mg/L)	<0.005	0.01	<0.005	0.1	(PMCL)
Copper	(mg/L)	<0.005	0.009	0.008	1.0	(SMCL)(7)
Iron	(mg/L)	3.3	0.32	0.27	0.3	(TDH)
Lead	(mg/L)	<0.05	<0.05	<0.05	0.05	(MCL)
Manganese	(mg/L)	1.74	4.32	0.791	0.5	(TDH)
Mercury	(mg/L)	<0.0006	0.0011	<0.0006	0.002	(PMCL)
Selenium	(mg/L)	<0.005	<0.005	<0.005	0.05	(PMCL)
Silver	(mg/L)	<0.005	<0.005	<0.005	0.05	(MCL)
Zinc	(mg/L)	<0.005	<0.005	<0.005	5	(SMCL)
VOLATILE ORGANICS						
Benzene	(ug/L)	1.6	<1	<1	5	(MCL)
Chlorobenzene	(ug/L)	3.8	<1	<1	100	(PMCL)
1,2-dicholorobenzene	(ug/L)	1.0	<1	<1	600	(PMCL)
1,3-dicholorobenzene	(ug/L)	8.9	1.6	<1	na	
1,1-dichloroethane (1,1-DCA)	(ug/L)	2.0	3.1	6.2	na	
Trichloroethene (TCE)	(ug/L)	<1	2.6	1.2	5	(MCL)
Tetrachloroethene (PCE)	(ug/L)	<1	2.9	9.4	5	(PMCL)

PARAMETER	UNITS	WELL NUMBER MW-102	MW-103	MW-104	DRINKING WATER CRITERIA	REFERENCE
VOLATILE OGRANICS (Cont.)						
cis-1,2-dichloroethene (cis-1,2-DCE)	(ug/L)	6.2	21.3	9.4	70	(PMCL)
1,1-Oxybisethane (ethyl ether)	(ug/L)	10	ND	ND	na	

NOTES:

(1) Analyses performed by National Environmental Testing Corp., Austin, Texas.

(2) Values for metals are total (not dissolved) concentrations. Due to an equipment failure, field filtering of metals samples could not be performed.

(3) MCL = Maximum Contaminant Level (Federal Drinking Water Standard).

(4) PMCL = Proposed Maximum Contaminant Level (Proposed May 22,1989).

(5) na = no drinking water criteria available.

(6) TDH = Texas Department of Health Drinking Water Criteria.

(7) SMCL = Secondary Maximum Contaminant Level (established for taste and odor purposes.

TABLE 5. FIELD HYDRAULIC TEST RESULTS

WELL NO.	MATERIAL	HOLE DIAMETER*	K (gpg/ft2)	K (ft/day)	K (cm/sec)
MW-102	gravelly clay	8 inch	19.02	2.5	9.0 x 10-4
		12 inch	122.43	16.4	5.79 x 10-3
MW-103	clayey sand and sandy gravel	8 inch	232.97	31.2	1.1 x 10-2
		12 inch	1390.74	186.4	6.6 x 10-2
MW-104	clayey sand and sandy gravel	8 inch	146.24	19.6	6.91 x 10-3
		12 inch	946.67	126.8	4.47 x 10-2

* Effective borehole diameter used in Bouwer and Rice (1976) method.

APPENDIX A

DETAILED FIELD & LABORATORY INVESTIGATIVE METHODS

TABLE OF CONTENTS

A-1 INTRODUCTION

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A-1 INTRODUCTION

The scope of field activities for the City of San Marcos Landfill investigation included: (1) installation of four monitoring wells within the landfill boundary and adjacent to individual landfill cells, (2) plugging of three previously existing monitoring wells, (3) development of three monitoring wells, (4) sampling of three new monitoring wells to assess possible ground-water quality impacts of the landfill, and (5) performance of hydraulic testing in the new monitoring wells to assess the horizontal hydraulic conductivity of the fluvial terrace deposits. These field activities were performed during the period from September 21, through November 1, 1989.

The field and laboratory methods employed during the City of San Marcos landfill investigation are summarized in this appendix. Hydrogeologic locations discussed herein are shown on Figure 2.

A-2 DRILLING METHODS

The drilling of monitoring wells MW-102, MW-103 and MW-104 was performed using a Mobile Drill Corporation model B-61 hollow stem auger rig. The rig was operated by Jones Environmental Drilling, Inc., of San Antonio, Texas. Prior to the commencement of drilling, and between each monitoring well boring location, the drilling rig and associated equipment that would come into contact with the borehole were thoroughly steam cleaned. The monitoring wells were drilled using 7-7/8 inch inside diameter (ID) auger flights. Borings were continuously sampled using a five foot long split core barrel that was attached to the center rods of the auger flights. A summary of monitoring well boring lithologies and detailed field logs of the borings are presented in Table 2 and Appendix C, respectively.

A-3 MONITORING WELL CONSTRUCTION

Monitoring wells MW-101, MW-102, MW-103 and MW-104 were constructed using 2-inch ID, schedule 40 PVC blank and slotted casing (0.010 slots) that was thoroughly steam cleaned on-site prior to installation. Brainard-Kilman flush-joint-threaded casing with Viton O-rings or Teflon tape was used in all wells. Threaded PVC bottom caps and stainless steel centralizers were attached to each casing string. The design of each casing string as determined by the field hydrogeologist, and as based on the continuous core sample lithologies.

Each of the boreholes was drilled through a gravel interval into an underlying clay unit of the Navarro Group, or "upper Taylor Marl". In wells MW-102, MW-103 and MW-104, ten feet of slotted casing was placed to extend partly above and partly below the water table that was encountered during drilling. A water-bearing zone was not encountered during drilling of MW-101; consequently, ten feet of slotted casing was positioned opposite the dry gravel unit and the underlying clay to monitor ground water should it eventually occur there.

Because the soils at the MW-104 site were stable, the monitoring well was constructed in the open borehole, after the auger flights were removed. Unstable materials at the MW-101, MW-102 and MW-103 sites necessitated the construction of monitoring wells within the hollow stem augers, with auger flights removed as annular materials (filter sand, bentonite pellets) were emplaced.

The 10-20 graded sand used for filter pack construction was emplaced in the borehole annulus to a level approximately three feet above the top of the slotted casing. Approximately two and one-half to five feet of bentonite pellets were then placed on top of the filter pack. The depth of annular materials was verified with a weighted tape. The remaining annular space was

filled with a cement-bentonite grout (approximately 2 to 5 percent bentonite by dry weight cement). Three to four 94-pound bags of Type I Portland cement were used for each well. Lockable protective metal casings and six inch thick, six foot square concrete pads were installed at all the monitoring wells. Keyed locks were attached to all well covers after the concrete pads were completed.

Well construction diagrams are contained in Appendix C and summarized in Table 2. Water well drillers reports are presented in Appendix D.

A-4 PLUGGING OF EXISTING WELLS

Three previously installed monitoring wells did not meet current Texas Department of Health monitoring well construction guidelines and were therefore plugged and abandoned. There was some confusion about proper well identification numbers of the wells to be plugged. For example, the well identified as number 3 on the map was labelled number 2 at the well site and number 4 on the map was labelled number 3 at the site. According to the well numbers posted on the City of San Marcos map, MFG supervised the plugging of wells 1B, 3 and 4.

The water levels and total depths of each well, were measured prior to abandonment. The first step was to break up the concrete pads with a sledge hammer. The drill rig was then moved onto the well site and the casing was extracted from the borehole.

Approximately 34 and 32 feet of four inch diameter Tri-Loc PVC casing were pulled from well sites 1B and 4, respectively. The casing was easily lifted from the boreholes and there was no evidence of a borehole seal (cement or bentonite) in the annulus of either well. A five-foot section of screen (.01 inch slotted casing) was present at the base of each of the two well casing strings. After removal of the casing, the boreholes were reamed to a depth equal to the amount of casing removed with 7-7/8 inch

hollow stem augers flights. A small amount of clayey sand mixed with pea gravel, which was thought to be filter pack material, was lifted from well 4. There did not appear to be any filter pack material in well 1B.

Approximately thirty feet of two inch, solvent-welded PVC bell-end casing was pulled from well 3. The screened interval consisted of circular holes drilled in the bottom 10 feet of the blank casing at 0.5 foot intervals. The annulus did contain a filter pack and appeared to be grouted to the surface.

After the well casings were removed, Type I Portland cement was pumped through the auger flights into the old well borings. In order to obtain a continuous seal, the auger flights were removed as the cement level rose from the base of the hole to the surface. The cement in the plugged borings subsequently settled to a level about two and a half feet below ground surface and the remainder of the hole was filled with clay soil to the surface. Each boring required approximately four 94-pound bags of cement mixed t the ratio of about 6 gallons per bag.

A-5 MONITORING WELL DEVELOPMENT

Three of the four monitoring wells completed at the City of San Marcos Landfill were developed by using a Brainard-Kilman 1-1/4 inch PVC hand pump. The fourth well, MW-101, was dry. Temperature, pH, specific conductance, odor and visual appearance were periodically monitored during the development process. The wells were purged until these parameters appeared to stabilize. With the exception of well MW-102, the wells pumped continuously. Well MW-102 pumped dry approximately every five gallons and subsequently took 30 minutes to recover. An organic odor was detected during the development of each well. Well development records are contained in Appendix E-1.

A-6 GROUND-WATER SAMPLING AND ANALYSIS

As mentioned above, only three of the four wells completed at the City of San Marcos landfill contained water. Wells MW-102, MW-103 and MW-104 were sampled for ground-water quality analysis. Completed ground-water sampling forms are contained in Appendix E.

Equipment used during the sampling process was cleaned prior to the commencement of sampling, and between each monitoring well location. The water level probe and weighted tape were rinsed with deionized water between each well location. The bailers were cleaned with a non-phosphate soap solution, rinsed with potable water and then given a final rinse with deionized water. The wire cable used to lower the bailers was thoroughly rinsed with deionized water between each sampling location.

After the well was opened and allowed a few minutes to equilibrate with atmospheric pressure, the water level was measured to the nearest 0.01 feet with the water level probe and the total depth of each well measured. Using these measurements, the volume of water in the well casing was calculated. The well was then purged with a precleaned 1-1/2 inch Teflon bailer.

Temperature, pH, specific conductance, odor and visual appearance were monitored during the purging process. The wells and were purged until approximately three well volumes were removed; if the field parameters had stabilized after three well casing volumes had been purged (as was the case for all three wells sampled during this investigation) the well was sampled. Ground-water samples were collected using a Teflon bailer and transferred directly to the appropriate sample container. Due to an equipment malfunction, samples collected for trace metal analysis could not be filtered and were analyzed for on a total basis.

Sample containers and preservatives were supplied by the analytical laboratory. The following containers and preservation techniques were used for each suite of analyses:

1) Volatile organics: two 40 mL glass with Teflon lined septum in cap, no preservative;
2) Total Organic Carbon: four 500 mL plastic, sulfuric acid preservative;
3) Metals: one 500 mL plastic, nitric acid preservative; and
4) General chemistry: one 1 liter plastic, no preservative.

Field quality assurance (QA) samples included a trip blank and a field blank (equipment rinsate). Details of field quality assurance procedures and an evaluation of QA laboratory results are contained in Appendix B. Sample containers were labeled at the respective well location using a permanent marker, and were promptly transferred to ice chests for shipment to the laboratory. Chain-of-custody forms (Appendix F) were completed at the time of sample collection and signed by the appropriate personnel when the custody of samples changed.

Analyses of the ground-water samples were performed by National Environmental Testing, Inc. (NET) of Austin, Texas. Ground-water chemistry data are contained in Appendix F and are summarized in Table 4.

A-7 HYDRAULIC TESTING

In-situ hydraulic tests (slug tests) were performed in monitoring wells MW-102, MW-103 and MW-104. A slug test consists of "instantaneously" raising or lowering the water level in a well, and then monitoring the recovery of the water level through time. The small well diameter and relatively short column of

water present in each well necessitated the use of a deionized water slug rather than a solid slug. Consequently, the slug tests at the San Marcos Landfill consisted of rapidly introducing 2.5 gallons of deionized water into each well.

A Geokon model 4500 SV-50 vibrating-wire pressure transducer with an operating range of 50 psi was used to measure changes in water levels in the wells during the slug tests. The transducer actually measures variations in pressure due to the changing water levels. The pressure readings are converted to feet of water (above the transducer) and recorded by a Campbell Scientific model CR-10 datalogger. The datalogger was programed to record the water levels at 2-second intervals during the first two minutes of the test. The recording interval gradually increased to three minutes near the end of the test. Due to the highly permeable nature of the water-bearing units at the San Marcos Landfill, the slug tests were very rapid; the longest one lasting 300 seconds.

Prior to the start of a test, the water level and total depth of the well were measured. The pressure transducer was then secured in the well at a depth below the water level. The water level probe, the transducer and transducer cable were all rinsed with deionized water prior to and between each slug test. Before the start of each test, 10 to 15 minutes were allowed for water levels to adjust to the displacement caused by the transducer and cable, and for the transducer to equilibrate to the ambient water temperature. Water levels were monitored both manually and with the CR-10 several times to confirm that static conditions existed.

As the data were collected, the water levels recorded by the CR-10 were examined to monitor the progress of the test. Manual water level measurements were also taken during the test to confirm the transducer readings. The slug-in test was terminated when the CR-10 reading exhibited a value within 90

percent of the initial static water level.

The data collected by the CR-10 were stored in the memory of the datalogger and transferred to a cassette tape in the field. Data from the cassette tape were subsequently transferred to an office computer for data analysis. The data sets are converted to comma-delineated ASCII format and imported to a special LOTUS 1-2-3 worksheet for rapid calculation and graphical presentation.

Because the three San Marcos monitoring wells were screened in unconfined water-bearing units, slug test results were analyzed by the methodology developed by Bouwer and Rice (1976) for unconfined aquifers. To allow for water level fluctuation within the screened interval in the well during the tests, the following correction was made to include the porosity of the gravel pack in the cross-sectional area of the well (Bouwer and Rice 1976):

$$R_e = [r_c^2 + n(r_w^2 - r_c^2)]^{0.5}$$

where:

R_e = effective radius of the well, including gravel pack porosity;

r_c = radius of the well screen;

n = porosity of the gravel pack; and

r_w = radius of the bore hole.

The porosity of the gravel pack was assumed to be 0.30 for the above equation. The initial calculated conductivity values, which assumed an eight-inch diameter borehole, seemed low for the type of water-bearing strata encountered (gravel) at the landfill site. After reviewing the well completion and boring log forms, it seemed apparent that the annulus of the boreholes could be larger than 8 inches due to caving and wash out of the gravel. The conductivities were recalculated assuming a 12 inch diameter borehole.

Appendix H contains printouts of the LOTUS 1-2-3 worksheets, data graphs showing straight-line fits, and computer printouts of the method calculations which illustrate the applicable formulas, define the input variables, and display the input values and solutions. The calculated horizontal hydraulic conductivities for both 8 and 12 inch boreholes are summarized in Table 5.

APPENDIX F

LABORATORY REPORTS:

GROUND-WATER CHEMISTRY DATA

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Gulf Coast, Inc.
Austin Division
2621-130 Ridgepoint Drive
Austin, TX 78754
Tel: (512) 928-8905
Fax: (512) 928-3208

Formerly: Aqualab, Inc.

ANALYTICAL REPORT

Eric Pastor
McCULLEY, FRICK & GILMAN
5818 Balcones Dr., Ste 202
Austin TX 78731

11-08-89

SAMPLE NO: 45228

City of San Marcos

SAMPLE DESCRIPTION: MW-102

Date Taken: 10-03-89

Date Received: 10-05-89

Alkalinity, Bicarb.(CaC03)	640.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	640.	mg/L
Alkalinity, Phenol.(CaC03)	<1.	mg/L
Anion/Cation Balance	2.6	%
Chloride	478.	mg/L
Conductivity	2,830.	umhos/cm
Fluoride	0.5	mg/L
Hardness, Total (CaC03)	432.	mg/L
Nitrogen, Nitrate	0.28	mg/L
pH	6.8	units
Solids, Dissolved	1,570.	mg/L
Sulfate	183.	mg/L
TOC a	15.	mg/L
TOC b	14.	mg/L
TOC c	14.	mg/L
TOC d	14.	mg/L
Arsenic	0.018	mg/L
Barium	<0.5	mg/L
Cadmium	<0.005	mg/L
Calcium	256.	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.005	mg/L
Iron	3.3	mg/L
Lead	<0.05	mg/L
Magnesium	29.7	mg/L
Manganese	1.74	mg/L
Mercury	<0.0006	mg/L
Potassium	7.9	mg/L

Pam Jupe, Manager
Austin Division

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Gulf Coast, Inc.
Austin Division
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Fax: (512) 928-3208

Formerly: Aqualab, Inc.

ANALYTICAL REPORT

Eric Pastor
McCULLEY, FRICK & GILMAN
5818 Balcones Dr., Ste 202
Austin TX 78731

11-08-89

SAMPLE NO: 45228

City of San Marcos

SAMPLE DESCRIPTION: MW-102

Date Taken: 10-03-89

Date Received: 10-05-89

Selenium	<0.005	mg/L
Silver	<0.005	mg/L
Sodium	302.	mg/L
Zinc	<0.005	mg/L

Pam Jupe, Manager
Austin Division

NATIONAL ENVIRONMENTAL TESTING, INC.

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Austin TX 78731

11-08-89

SAMPLE NO: 45228

City of San Marcos

SAMPLE DESCRIPTION: MW-102

Date Taken: 10-03-89 Date Received: 10-05-89

METHOD 8240 VOLATILES

Acrolein	<10.0	ug/L
Acrylonitrile	<10.0	ug/L
Benzene	1.6	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<20.0	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	3.8	ug/L
Chloroethane	<20.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<20.0	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	1.0	ug/L
1,3-Dichlorobenzene	8.9	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	2.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
trans-1-2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	<1.0	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

Pam Jupe, Manager
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NET NATIONAL ENVIRONMENTAL TESTING, INC.

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5818 Balcones Dr., Ste 202
Austin TX 78731

11-08-89

SAMPLE NO: 45228

City of San Marcos

SAMPLE DESCRIPTION: MW-102

Date Taken: 10-03-89

Date Received: 10-05-89

METHOD 8240 VOLATILES

1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<20.0	ug/L

Pam Jupe, Manager
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11-08-89

SAMPLE NO: 45228

City of San Marcos

SAMPLE DESCRIPTION: MW-102

Date Taken: 10-03-89

Date Received: 10-05-89

MISCELLANEOUS ORGANICS

1,1-Oxybisethane	*10.	ug/L
cis-1,2-Dichloroethene	6.2	ug/L

*Value based upon an assumed reponse factor of 1.

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11-08-89

SAMPLE NO: 45229

City of San Marcos

SAMPLE DESCRIPTION: MW-103

Date Taken: 10-03-89

Date Received: 10-05-89

Alkalinity, Bicarb.(CaC03)	560.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	560.	mg/L
Alkalinity, Phenol.(CaC03)	<1.	mg/L
Anion/Cation Balance	8.3	%
Chloride	1,020.	mg/L
Conductivity	4,640.	umhos/cm
Fluoride	0.4	mg/L
Hardness, Total (CaC03)	1,400.	mg/L
Nitrogen, Nitrate	0.40	mg/L
pH	6.7	units
Solids, Dissolved	2,600.	mg/L
Sulfate	667.	mg/L
TOC a	12.	mg/L
TOC b	11.	mg/L
TOC c	11.	mg/L
TOC d	11.	mg/L
Arsenic	<0.005	mg/L
Barium	<0.5	mg/L
Cadmium	<0.005	mg/L
Calcium	756.	mg/L
Chromium, Total	0.010	mg/L
Copper	0.009	mg/L
Iron	0.32	mg/L
Lead	<0.05	mg/L
Magnesium	62.	mg/L
Manganese	4.32	mg/L
Mercury	0.0011	mg/L
Potassium	4.2	mg/L

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11-08-89

SAMPLE NO: 45229

City of San Marcos

SAMPLE DESCRIPTION: MW-103

Date Taken: 10-03-89

Date Received: 10-05-89

Selenium	<0.005	mg/L
Silver	<0.005	mg/L
Sodium	475.	mg/L
Zinc	<0.005	mg/L

Pam Jupe, Manager
Austin Division

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11-08-89

SAMPLE NO: 45229

City of San Marcos

SAMPLE DESCRIPTION: MW-103

Date Taken: 10-03-89

Date Received: 10-05-89

METHOD 8240 VOLATILES

Acrolein	<10.0	ug/L
Acrylonitrile	<10.0	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<20.0	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<20.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<20.0	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	1.6	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	3.1	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
trans-1-2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	2.9	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

Pam Jupe, Manager
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Austin TX 78731

11-08-89

SAMPLE NO: 45229

City of San Marcos

SAMPLE DESCRIPTION: MW-103

Date Taken: 10-03-89 Date Received: 10-05-89

METHOD 8240 VOLATILES

1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	2.6	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<20.0	ug/L

Pam Jupe, Manager
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Austin TX 78731

11-08-89

SAMPLE NO: 45229

City of San Marcos

SAMPLE DESCRIPTION: MW-103

Date Taken: 10-03-89 Date Received: 10-05-89

MISCELLANEOUS ORGANICS

cis-1,2-Dichloroethene	21.3	ug/L

Pam Jupe, Manager
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Formerly: Aqualab, Inc.

ANALYTICAL REPORT

Eric Pastor
McCULLEY, FRICK & GILMAN
5818 Balcones Dr., Ste 202
Austin TX 78731

11-13-89

SAMPLE NO: 45230

City of San Marcos

SAMPLE DESCRIPTION: MW-104

Date Taken: 10-03-89

Date Received: 10-05-89

Alkalinity, Bicarb.(CaC03)		434.	mg/L
Alkalinity, Carb. (CaC03)		<1.	mg/L
Alkalinity, Total (CaC03)		434.	mg/L
Alkalinity, Phenol.(CaC03)		<1.	mg/L
Anion/Cation Balance		35.1	%
Chloride		326.	mg/L
Conductivity		2,200.	umhos/cm
Fluoride		0.3	mg/L
Hardness, Total (CaC03)		244.	mg/L
Nitrogen, Nitrate		2.31	mg/L
pH		7.0	units
Solids, Dissolved		1,200.	mg/L
Sulfate		239.	mg/L
TOC	a	4.	mg/L
TOC	b	4.	mg/L
TOC	c	5.	mg/L
TOC	d	5.	mg/L
Arsenic		<0.005	mg/L
Barium		<0.5	mg/L
Cadmium		0.016	mg/L
Calcium		704.	mg/L
Chromium, Total		<0.005	mg/L
Copper		0.008	mg/L
Iron		0.27	mg/L
Lead		<0.05	mg/L
Magnesium		23.4	mg/L
Manganese		0.791	mg/L
Mercury		<0.0006	mg/L
Potassium		2.6	mg/L

Pam Jupe, Manager
Austin Division

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Gulf Coast, Inc.
Austin Division
2621-130 Ridgepoint Drive
Austin, TX 78754
Tel: (512) 928-8905
Fax: (512) 928-3208

Formerly: Aqualab, Inc.

ANALYTICAL REPORT

Eric Pastor
McCULLEY, FRICK & GILMAN
5818 Balcones Dr., Ste 202
Austin TX 78731

11-13-89

SAMPLE NO: 45230

City of San Marcos

SAMPLE DESCRIPTION: MW-104

Date Taken: 10-03-89

Date Received: 10-05-89

Selenium	<0.005	mg/L
Silver	<0.005	mg/L
Sodium	227.	mg/L
Zinc	<0.005	mg/L

Pam Jupe, Manager
Austin Division

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ANALYTICAL REPORT

Eric Pastor
McCULLEY, FRICK & GILMAN
5818 Balcones Dr., Ste 202
Austin TX 78731

11-13-89

SAMPLE NO: 45230

City of San Marcos

SAMPLE DESCRIPTION: MW-104

Date Taken: 10-03-89 Date Received: 10-05-89

METHOD 8240 VOLATILES

Acrolein	<10.0	ug/L
Acrylonitrile	<10.0	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<20.0	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<20.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<20.0	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	6.2	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
trans-1-2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	9.4	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

Pam Jupe, Manager
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ANALYTICAL REPORT

Eric Pastor
McCULLEY, FRICK & GILMAN
5818 Balcones Dr., Ste 202
Austin TX 78731

11-13-89

SAMPLE NO: 45230

City of San Marcos

SAMPLE DESCRIPTION: MW-104

Date Taken: 10-03-89

Date Received: 10-05-89

METHOD 8240 VOLATILES

1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	1.2	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<20.0	ug/L

Pam Jupe, Manager
Austin Division

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ANALYTICAL REPORT

Eric Pastor
McCULLEY, FRICK & GILMAN
5818 Balcones Dr., Ste 202
Austin TX 78731

11-08-89

SAMPLE NO: 45230

City of San Marcos

SAMPLE DESCRIPTION: MW-104

Date Taken: 10-03-89 Date Received: 10-05-89

MISCELLANEOUS ORGANICS

cis-1,2-Dichloroethene	9.4	ug/L

Pam Jupe, Manager
Austin Division

NET NATIONAL ENVIRONMENTAL TESTING, INC.

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Formerly: Aqualab, Inc.

ANALYTICAL REPORT

Eric Pastor
McCULLEY, FRICK & GILMAN
5818 Balcones Dr., Ste 202
Austin TX 78731

11-08-89

SAMPLE NO: 45231

City of San Marcos

SAMPLE DESCRIPTION: Trip Blank

Date Taken: 10-04-89 Date Received: 10-05-89

METHOD 8240 VOLATILES

Acrolein	<10.0	ug/L
Acrylonitrile	<10.0	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<20.0	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<20.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<20.0	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
trans-1-2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	<1.0	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

Pam Jupe, Manager
Austin Division

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ANALYTICAL REPORT

Eric Pastor
McCULLEY, FRICK & GILMAN
5818 Balcones Dr., Ste 202
Austin TX 78731

11-08-89

SAMPLE NO: 45231

City of San Marcos

SAMPLE DESCRIPTION: Trip Blank

Date Taken: 10-04-89 Date Received: 10-05-89

METHOD 8240 VOLATILES		
1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<20.0	ug/L

Pam Jupe, Manager
Austin Division

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Formerly: Aqualab, Inc.

ANALYTICAL REPORT

Eric Pastor
McCULLEY, FRICK & GILMAN
5818 Balcones Dr., Ste 202
Austin TX 78731

11-08-89

SAMPLE NO: 45232

City of San Marcos

SAMPLE DESCRIPTION: Sample Blank

Date Taken: 10-04-89 Date Received: 10-05-89

METHOD 8240 VOLATILES

Acrolein	<10.0	ug/L
Acrylonitrile	<10.0	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<20.0	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<20.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<20.0	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
trans-1-2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	<1.0	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

Pam Jupe, Manager
Austin Division

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Gulf Coast, Inc.
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2621-130 Ridgepoint Drive
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Fax: (512) 928-3208

Formerly: Aqualab, Inc.

ANALYTICAL REPORT

Eric Pastor
McCULLEY, FRICK & GILMAN
5818 Balcones Dr., Ste 202
Austin TX 78731

11-08-89

SAMPLE NO: 45232

City of San Marcos

SAMPLE DESCRIPTION: Sample Blank

Date Taken: 10-04-89 Date Received: 10-05-89

METHOD 8240 VOLATILES

1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<20.0	ug/L

Pam Jupe, Manager
Austin Division

COMPREHENSIVE QUALITY CONTROL DATA REPORT

For Sample Numbers 45228-45230

SAMPLE	PARAMETER	% RPD	SPK. RSLT.	SPK. AMT.	%REC.
45230	Alk. Bicarb.	0.93			
45230	Alk. Carb.	0.0			
45230	Alk. Total		530.	100.	96
45230	Alk. Phenol	0.0			
45230	Cloride		426.	100.	100
45234	Conductivity	0.0			
45162	Fluoride		2.05	1.00	100
45230	Hardness		9.7	3.6	100
45258	Nitrate		4.02	2.00	91
45228	pH	0.0			
45230	TDS	0.95			
45114	TOC		114.	100.	99
45230	Sulfate		769.	500.	106
45230	Arsenic		0.0427	0.050	85
45230	Barium		1.73	2.00	86
44714	Chromium		45.7	20.0	88
45230	Calcium		496.	400.	87
45230	Cadmium		0.059	0.050	86
45230	Copper		0.260	0.250	101
45614	Iron		50.0	40.0	112
45230	Lead		1.457	1.500	97
45229	Mangnesium		148.	100.	86
45230	Manganese		5.76	5.00	99
45109	Mercury		0.0018	0.0020	90
45230	Potassium		53.7	50.0	102

% RPD criteria for acceptability = +/- 20%
% Recovery criteria for acceptability = 75-125%

COMPREHENSIVE QUALITY CONTROL DATA REPORT

For Sample Numbers 45228-45230

SAMPLE	PARAMETER	% RPD	SPK. RSLT.	SPK. AMT.	%REC.
45228	Selenium		0.050	0.050	100
45230	Silver		0.357	0.400	89
45230	Sodium		428.	200.	101
45230	Zinc		0.214	0.200	197

% RPD criteria for acceptability = +/- 20%
% Recovery criteria for acceptability = 75-125%

WATER VOLATILE COMPREHENSIVE QUALITY CONTROL DATA REPORT

Lab Name: NATIONAL ENVIRONMENTAL TESTING - Gulf Coast Region

File Reference: >10850::D7 Date and Time: 10/18/89 2:43

Sample No.: 9040 S Misc.: 5ml H20 + 10ul#551 + Surr's

Operator: RUS Mass Spec: 1

SPIKE COMPOUNDS	SPIKE ADDED (ug/L)	MS CONC. (ug/L)	MS REC %	MSD CONC. (ug/L)	MSD REC %	RPD %
1,1-Dichloroethene	50.0	46.8	93.6	48.5	96.9	3.5
Trichloroethene	50.0	45.6	91.3	46.0	92.0	.8
Benzene	50.0	54.3	108.6	56.1	112.2	3.2
Toluene	50.0	46.9	93.9	46.3	92.6	1.4
Chlorobenzene	50.0	45.1	90.2	44.4	88.8	1.6

COMMENTS: QA for 45228-45232

KEY: Matrix AQ-aqueous NA-nonaqueous SO-soil SL-sludge P-petroleum A-air OT-other
Consumer P-plastic G-glass T-teflon B-brass OT-other

CHAIN-OF-CUSTODY RECORD AND REQUEST FOR ANALYSIS

NO. 89-3093-1

McCULLEY, FRICK & GILMAN, INC.

☐ 3300 Arapahoe Ave., Suite 218
Boulder, CO 80303
TEL: (303) 447-1823
FAX: (303) 447-1836

☒ 5818 Balcones Dr., Suite 202
Austin, TX 78731
TEL: (512) 371-1667
FAX: (512) 454-4126

☐ 5 Third St., Suite 916
San Francisco, CA 94103
TEL: (415) 495-7110
FAX: (415) 495-7107

PROJECT No.: 89-3093 PROJECT NAME: City of San Marcos PAGE: 2 OF: 2
SAMPLER (Signature): Rebecca C. Smyth DATE:
METHOD OF SHIPMENT: hand carried CARRIER/ WAYBILL NO. DESTINATION: NET Austin, TX
SPECIAL INSTRUCTIONS/HAZARDS: Comprehensive QA/QC

SAMPLES / **ANALYSIS REQUEST**

Lab No.	Sample Identification	Sample Collection DATE	Sample Collection TIME	Matrix*	Preservation HCL	Preservation HNO_3	Preservation H_2SO_4	Preservation COLD	Preservation NONE	Preservation OTHER	Containers* VOL. (ml)	Containers* TYPE*	Containers* No.	Methods EPA 601/8010	Methods EPA 602/8020	Methods EPA 624/8240	Methods EPA 625/8270	Methods TPH as Gasoline	Methods TPH as Diesel	Methods BTEX	Methods Metals	Methods Gen. Chem			Handling HOLD	Handling RUSH	Handling STANDARD	REMARKS (Special handling procedures, specific analytical methods, observations, etc.)
	MW-104	10/4/89		AQ		X		X			500	P	1								X						X	~~[illegible]~~
	MW-104	10/4/89		↓				X	X		1000	P	1									X					X	
	Trip Blank	10/4/89		AQ				X	X		40	G	2			X											X	
	Sample Blank	10/4/89		AQ				X	X		40	G	2			X											X	

TOTAL NUMBER OF CONTAINERS 6

LABORATORY COMMENTS/ CONDITION OF SAMPLES

RELINQUISHED BY: SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME	RECEIVED BY: SIGNATURE	PRINTED NAME	COMPANY
Rebecca C. Smyth	Rebecca C Smyth	MFG	10/4/89	1825	Eric Pastor	Eric Pastor	MFG
Eric Pastor	Eric Pastor	MFG	10/5/89	0915	E. C. Koehler	Eric Koehler	LABORATORY NET

*KEY: Matrix AQ-aqueous NA-nonaqueous SO-soil SL-sludge P-petroleum A-air OT-other Containers P-plastic G-glass T-teflon B-brass OT-other

ATTACHMENT 4

1990 CITY OF SAN MARCOS - DOCUMENTATION OF WELL INSTALLATION AND GROUND-WATER SAMPLING AND ANALYSIS

McCULLEY, FRICK & GILMAN, INC.

CONSULTING
HYDROLOGISTS
AND GEOLOGISTS

5818 BALCONES DRIVE, SUITE 202
AUSTIN, TEXAS 78731
(512) 371-1667

June 12, 1990
(MFG Project No. 90-3135)

Mr. Stephen Jenkins, P.E.
Director of Environment and Engineering
City of San Marcos
630 E. Hopkins
San Marcos, Texas 78666

RE: Documentation of Well Installation and Ground-Water Sampling and Analysis, April-May 1990, City of San Marcos Landfill, Gary Job Corps Center, Caldwell County, Texas

Dear Mr. Jenkins:

With this letter report, McCulley, Frick and Gilman, Inc. (MFG) is pleased to transmit documentation of well installation and ground-water sampling and analyses performed in April-May, 1990. The work was performed in accordance with our Work Plan and Cost Estimate dated January 12, 1990, as recommended in the Ground-Water Assessment Report (MFG, December 1989) for the City of San Marcos landfill near the Gary Job Corps Center. Attached with this letter are the following information and data:

- hydrogeologic data location map showing the locations of the new wells and soil borings,
- soil boring logs for each drilling location,
- well installation specifications and construction summaries,
- well construction diagrams (Texas Department of Health format),
- copies of State of Texas Well Reports sent to the Texas Water Commission,
- well development records,
- survey data,
- water level monitoring records,
- ground-water sampling records,
- sample chain-of-custody forms, and
- a summary table and laboratory reports of ground-water analyses and QA/QC results.

SCOPE OF WORK

The drilling program was completed on April 19-20, 1990. Our Work Plan called for two new monitoring wells up-gradient of the landfill and one new monitoring well down-gradient of the landfill. The scope of work was modified during the drilling operation due to the presence of trash in borings up-gradient and down-gradient of the surveyed landfill boundary. Also, as you requested, an additional hole was drilled up-gradient of the landfill in an attempt to locate ground water within the gravel terrace deposit.

At the proposed up-gradient well location near the northeast corner of the City of San Marcos landfill (Figure 1), trash (tin cans) was encountered in boring B-105A approximately 70 feet east of the surveyed landfill boundary line. Therefore, the drilling rig was moved about 20 feet further away from the landfill, and well MW-105 was installed.

At the proposed up-gradient well location along the northwest side of the landfill boundary (Figure 1), the base of the gravel deposit (top of the Upper Taylor Marl) was encountered at a depth of approximately 30 feet in boring B-106A. After leaving the hole open overnight, no water was observed in the hole. Therefore, a new boring was completed at the approximate location of the previous well #1A, where the base of the gravel was reported to be at a depth of 38.5 feet. The depth of the base of the gravel at the new location was approximately the same as in B-106A and again, saturated conditions were not encountered. Therefore, well MW-106 was installed at the #1A location to detect saturation in the gravel deposit should it occur. B-106A was plugged with a Portland cement/bentonite slurry.

At the proposed down-gradient well location near the southwest corner of the landfill boundary, trash was encountered in three borings: B-107A, B-107B and B-107C (Figure 1). The borings were completed along a transect roughly perpendicular to the landfill boundary and north of the edge of the large drainage ditch. The trash encountered in the borings primarily consisted of building materials (concrete, wood, glass, metal, wire, wood fiber insulation and stucco). However, organic vapors up to 53 ppmv (as isobutylene) were noted in the B-107C boring. As you requested, a new well was not installed down-gradient of the landfill at this location.

Well MW-105 was developed on April 24, 1990 and the new well and boring locations were surveyed on April 30, 1990. Water levels in all of the monitoring wells were recorded on April 30 and May 5, 1990. Well MW-106 was dry each time, as was MW-101. The water level in the gravel pit was surveyed on April 30, and measured again on May 5 from a staff gage installed prior to the surveying.

Ground-water samples were collected from the monitoring wells containing water (MW-102, MW-103, MW-104 and MW-105) on April 30, 1990 and submitted to the laboratory (NET Gulf Coast, Inc.) for analysis on May 1, 1990.

SUMMARY OF FINDINGS

Base of Gravel

The elevation of the base of the gravel at the well MW-106 location is approximately 549 feet AMSL, which is approximately 7-8 feet higher than projected based on information from the previous wells #1 and #1A (Figure 4, Ground-Water Assessment Report, MFG, December, 1989). The elevation of the base of the gravel in well MW-105 (approximately 548 feet AMSL) is approximately 3-4 feet lower than previously projected.

Water Levels

Comparison of the water levels measured on April 30, 1990 with those measured in November of 1989 (Figure 6, Ground-Water Assessment Report) indicates a general decline in water levels, with the exception of well MW-102 in which the water level rose 0.64 feet. The water level measurements indicated declines in wells MW-103 (1.91 feet) and MW-104 (0.44 feet) and the gravel pit (1.05 feet). Compared to the April 30 measurements, the water levels measured on May 5, 1990 revealed a rise in water levels in all of the wells (from 0.86 feet to 0.17 feet) and in the gravel pit (0.15 feet) due to rainfall in the area.

Although the base of gravel elevations are approximately the same in wells MW-105 and MW-106, well MW-106 is dry. Ground-water flow in the western part of the site (south of MW-106) is toward the southeast while flow in the eastern part of the landfill is toward the southwest. The variations in ground-water flow directions and the presence of water in well MW-105 indicate that a significant source of recharge to the gravel deposit is present northeast of the landfill, apparently in the vicinity of Hemphill Creek and other drainages along the county road bordering the property. Likewise, water in the gravel pit also provides a source of recharge to the gravel layer in the western part of the landfill. Extrapolation of ground-water elevation contours to the MW-106 location indicates that the elevation of ground water at MW-106 would be below the base of the gravel. As observed, the northern extent of saturation in the gravel deposit is currently south of well MW-106.

Ground-Water Chemistry

In general, the same volatile organic compounds were detected in wells MW-102, MW-103 and MW-104 as before (October 3, 1989), but the concentrations were generally lower (Table 1). No new organic compounds were detected in the wells and no significant changes in general chemistry or metal concentrations were observed. The sample from up-gradient well MW-105, the only new well containing ground water, did not contain volatile organic compounds, with the exception of 1,3-dichlorobenzene, which was detected at a concentration of 1.7 μg/L. The presence of this compound probably reflects the close proximity of the well MW-105 to landfill trash (encountered 20 feet away in the down-gradient direction in boring B-105A). The trichlorofluoromethane (freon) detected in the field and trip blanks is a product of laboratory contamination.

In summary, the results of the ground-water analyses are consistent with previous findings and do not alter the preliminary conclusions drawn in the Ground-Water Assessment Report (MFG, December, 1989). With the exception of the PCE concentration in the sample taken from well MW-104 on October 3, 1989 (9.4 μg/L), all volatile organic compound concentrations in samples collected from the existing monitoring wells are below the current (Federal Drinking Water Standards) or proposed (Federal Register, May 22, 1989) maximum contaminant levels.

The relative absence of volatile organic compounds in the sample from well MW-105 suggests that the source of volatile organic compounds found in down-gradient wells is within the surveyed landfill boundary, and not from a source northeast of the landfill boundary. Likewise, due to the lack of saturation at MW-101 and MW-106, there is no current evidence of a source or a pathway for ground-water contamination to the north of the landfill boundary. However, the presence of a large above-ground diesel tank, the abundance of heavy equipment and the evidence of spills associated with refueling and maintenance activities in the Gary Job Corps Center training area (which overlies part of the landfill) suggest the possibility of contamination sources in that area.

Drilling and soil sampling at locations 105 and 107 (Figure 1) revealed the presence of landfill trash outside the surveyed landfill boundaries. The trash encountered in B-105A suggests that the landfill boundary may be inaccurate in that area. The nature of the trash encountered at location 107 (primarily building materials), the distance away from the surveyed landfill boundary (up to 170 feet), and the presence of high levels of organic vapors in the boreholes (up to 53 ppmv as isobutylene) suggest that the landfill trash disposed at the 107 location may originate from some of the unregulated industrial disposal activities of the Gary Job Corps Center or from previous military disposal activities.

We appreciate the opportunity to work with the City of San Marcos. Please feel free to call if you have any questions.

Sincerely,

McCULLEY, FRICK AND GILMAN, INC.

Bence V. Close
Project Ground-Water Hydrologist

Douglas R. Frick
Principal Hydrogeologist

Enclosures
BVC/DRF/mmo

TABLE 1. GROUND-WATER ANALYTICAL RESULTS

PARAMETER	UNITS	WELL NUMBER MW-102	MW-103	MW-104	MW-105	DRINKING WATER CRITERIA	REFERENCE
Date Sampled		30-Apr-90	30-Apr-90	30-Apr-90	30-Apr-90		
Sample Number		50414	50415	50416	50417		
GENERAL CHEMISTRY							
Alkalinity	(mg/L as CaCO3)	548	554	460	508		
Calcium	(mg/L)	245	340	233	192	na (5)	
Chloride	(mg/L)	404	852	328	124	300	(TDH)(6)
Conductivity	(umhos/cm)	2500	4100	2300	1460	na	
Hardness	(mg/L as CaCO3)	328	96 *	256	216	na	
Magnesium	(mg/L)	29.6	42.6	18.5	17.6	na	
Nitrate- Nitrogen	(mg/L)	1.42	0.83	7.12	3.19	10	(TDH)
pH	(units)	6.6	6.5	6.7	6.7	7	(TDH)
Potassium	(mg/L)	7.9	4.8	2.7	3.5	na	
Sodium	(mg/L)	238	393	221	90.6	na	
Sulfate	(mg/L)	219	475	271	90	300	(TDH)
Total Organic Carbon (TOC)	(mg/L)	66	113	51	80	na	
Total Dissolved Solids (TDS)	(mg/L)	1560	2670	1410	900	1000	(TDH)
CATION / ANION BALANCE	(%)	3.2	9.1	2.7	1.5		

TABLE 1. GROUND-WATER ANALYTICAL RESULTS

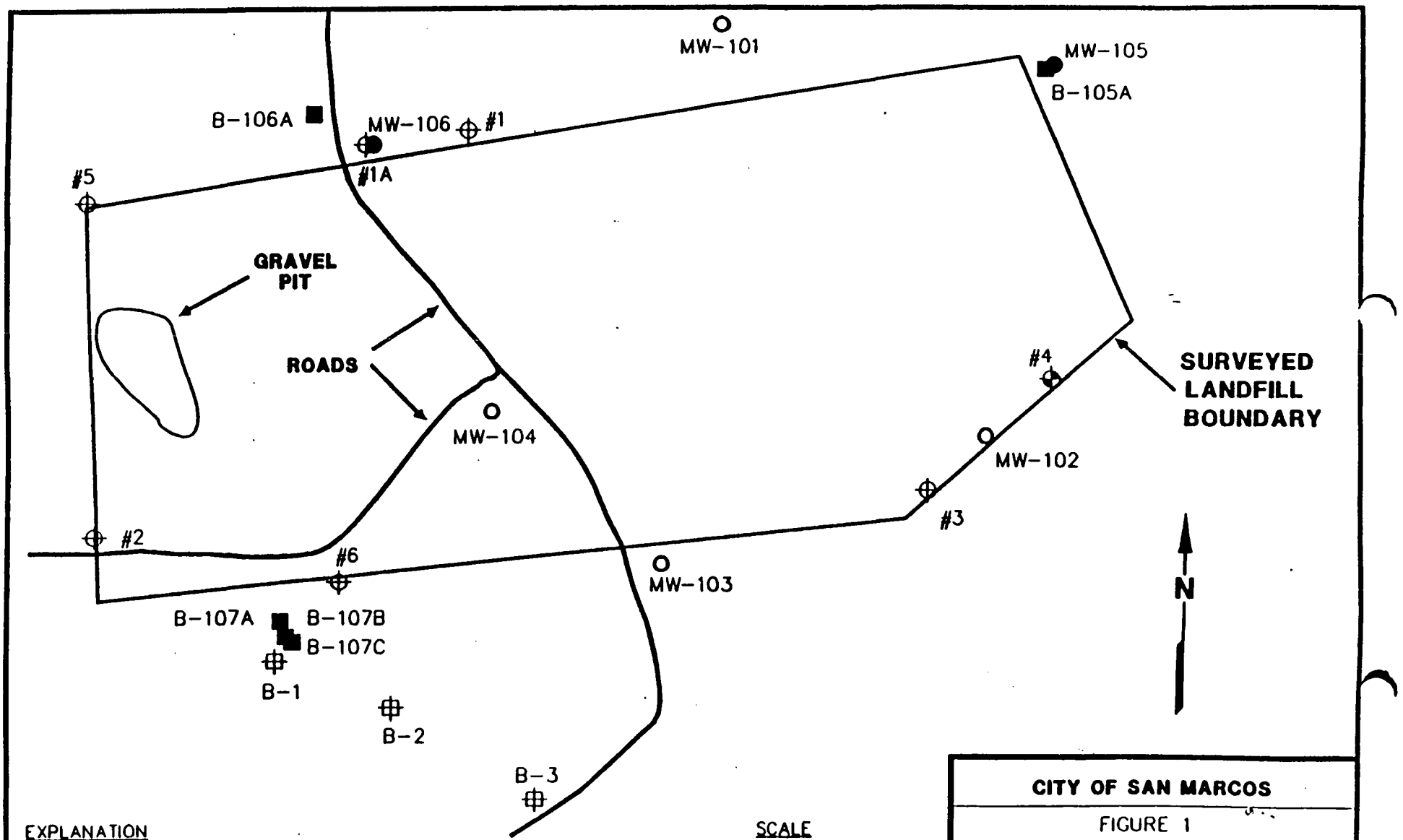
PARAMETER	UNITS	WELL NUMBER MW-102	MW-103	MW-104	MW-105	DRINKING WATER CRITERIA	REFERENCE
METALS							
Arsenic	(mg/L)	0.015	<0.005	<0.005	<0.005	0.5	(MCL)(3)
Barium	(mg/L)	0.17	0.08	0.08	0.09	5.0	(PMCL)(4)
Cadmium	(mg/L)	<0.005	<0.005	<0.005	<0.005	0.005	(PMCL)
Chromium	(mg/L)	<0.005	<0.005	<0.005	<0.005	0.1	(PMCL)
Copper	(mg/L)	<0.005	<0.005	<0.005	<0.005	1.0	(SMCL)(7)
Iron	(mg/L)	5.2	0.09	<0.06	<0.06	0.3	(TDH)
Lead	(mg/L)	<0.05	<0.05	<0.05	<0.03	0.05	(MCL)
Manganese	(mg/L)	2.0	2.6	0.09	0.14	0.5	(TDH)
Mercury	(mg/L)	<0.0006	<0.0006	<0.0006	0.0007	0.002	(PMCL)
Selenium	(mg/L)	<0.005	<0.005	<0.005	<0.005	0.05	(PMCL)
Silver	(mg/L)	<0.005	<0.005	<0.005	<0.005	0.05	(MCL)
Zinc	(mg/L)	0.02	0.02	0.03	0.02	5	(SMCL)
VOLATILE ORGANICS							
Benzene	(ug/L)	<1	<1	<1	<1	5	(MCL)
Chlorobenzene	(ug/L)	1.6	<1	<1	<1	100	(PMCL)
1,2-dicholorobenzene	(ug/L)	<1	<1	<1	<1	600	(PMCL)
1,3-dicholorobenzene	(ug/L)	2.6	3.8	<1	1.7	na	
1,1-dichloroethane (1,1-DCA)	(ug/L)	1.4	2.8	2.0	<1	na	
Trichloroethene (TCE)	(ug/L)	<1	1.2	<1	<1	5	(MCL)
Tetrachloroethene (PCE)	(ug/L)	<1	1.2	1.2	<1	5	(PMCL)

TABLE 1. GROUND-WATER ANALYTICAL RESULTS

PARAMETER	UNITS	WELL NUMBER MW-102	MW-103	MW-104	MW-105	DRINKING WATER CRITERIA	REFERENCE
VOLATILE OGRANICS (Cont.)							
cis-1,2-dichloroethene (cis-1,2-DCE)	(ug/L)	3.3	23	10.2	ND	70	(PMCL)

NOTES:

(1) Analyses performed by National Environmental Testing Corp., Austin, Texas.
(2) Values for metals are dissolved concentrations.
(3) MCL = Maximum Contaminant Level (Federal Drinking Water Standard).
(4) PMCL = Proposed Maximum Contaminant Level (Proposed May 22,1989).
(5) na = no drinking water criteria available.
(6) TDH = Texas Department of Health Drinking Water Criteria.
(7) SMCL = Secondary Maximum Contaminant Level (established for taste and odor purposes.
(8) ND = Not Detected.
* color interference noted by laboratory



EXPLANATION

- O – Monitoring Well Constructed October, 1989
- ● – Monitoring Well Constructed April, 1990
- ⊕ – Monitoring Well Plugged and Abandoned October, 1989
- ⊕ – Previously Existing Well Which Is No Longer Present (Abandonment Status Unknown)

SCALE
1" = 400'

CITY OF SAN MARCOS

FIGURE 1
HYDROGEOLOGIC DATA
LOCATION MAP

PROJECT 90-3135	BY JAB	REVISIONS
DATE JUNE 1990	CHECKED BVC	

FIELD LOG BORING

Job No 90-3135 Client City of San Marcos Boring B-105A Page 1 of 1
Location upgradient, near eastern landfill boundary Date 7/19/90
Coordinates: N not surveyed E Elev. Ft.
Geologist RC Smyth Driller G. Ric Jones Geophysical Log Yes ☐ No ☒

DEPTH IN FEET	Sample	Percent Recovery	Soil Class.	OVM ppm	Time	DESCRIPTION
0		92	CH	0.0	0950	0.0 - 2.5' Clay: very dark grayish brown (10YR 3/2); plastic and cohesive; hard; slight reaction to 10% HCl; 1-5% limestone gravel; trace caliche pockets; thin layer of gravel and mottled clay at 1.5 - 2.0 ft.
2						
				0.5	1005	2.5 - 5.0 Hit "trash" (tin cans) at about 3.0 feet.
4						
6						

Comments: Backfilled hole with cuttings and moved about 20 feet further east, away from landfill boundary. No samples were retained.

McCULLEY, FRICK & GILMAN, INC.

FIELD LOG BORING

Job No. 90-3135 Client City of San Marcos Boring MW-105 Page 1 of 3
Location upgradient, near eastern landfill boundary Date 4/19/90
Coordinates: N 5478.75 E 8487.07 Elev. Ft. 573.89 ft AMSL
Geologist RC Smyth Driller G. Ric Jones Geophysical Log Yes ☐ No ☒

DEPTH IN FEET	Sample	Percent Recovery	Soil Class.	OVM ppm	Time	DESCRIPTION
0		60	CL	—	1025	0.0-2.5 Fill material: mixture of dark grayish brown clay (10YR 3/2) and limestone gravel. Grass at top.
2		96	CH	0.5	1030	2.5-5.0 Clay: black (10YR 2/1); hard, plastic, cohesive; blocky texture; abundant roots; trace limestone gravel (up to 1cm in diameter); slight reaction to 10% HCl.
4		84	CL	0.0	1045	5.0-7.5 Clay: mottled dark grayish brown (10YR 3/2) and grayish brown (10YR 5/2); hard, plastic, cohesive, blocky; slight reaction to 10% HCl; trace roots, 1-5% limestone gravel; 1-5% pockets to thin laminae of fine-grained quartz sand, sand content increases toward base.
6						
8		92	SC	0.0	1050	7.5-10.0 Clayey Sand: yellow (10YR 8/6); mod. hard, crumbles easily (brittle or friable); more clay-rich towards top; strong reaction to 10% HCl; trace roots; trace limestone pebbles that are altering to caliche.
10						
12		96	SC	0.0	1055	10.0-12.5 Clayey Sand: yellow (10YR 8/6); soft and crumbles easily; strong reaction to 10% HCl; very clay-rich; 1-5% dark minerals; trace caliche pockets.

Comments:

McCULLEY, FRICK & GILMAN, INC.

FIELD LOG BORING

Job No. 90-3135 Client City of San Marcos Boring MW-105 Page 2 of 3
Location Upgradient, near eastern landfill boundary Date 4/9/90
Coordinates: N 5478.75 E 8487.07 Elev. Ft. 573.89 ft AMSL
Geologist R.C. Smyth Driller G. Ric Jones Geophysical Log Yes ☐ No ☒

DEPTH IN FEET	Sample	Percent Recovery	Soil Class.	OVM PPM	Time	DESCRIPTION
12		64	SC	0.0	1100	12.5 - 15.0 same as above
14		0 Grab sample from auger flights		0.0	1105	15.0 - 17.5 No recovery. Cuttings appear to be sand as above. Driller thinks we hit gravel at 16.0 feet.
16						
18		0 Grab sample from auger flights		0.0	1110	17.5 - 20.0 No recovery. Cuttings are fragments of limestone gravel.
20						20.0 - 22.5 Drive sampler through limestone gravel.
22		100	GC	—	1125	20.0 - 21.0 Gravel: yellow (10YR 7/6); v. poorly sorted; unconsolidated; clay to cobble size gravel particles; gravel consists of limestone w/ quartz veins running through it.
24		93	GC.	0.0	1140	21.0 - 22.5 clayey Gravel: yellow (10YR 7/6); v. poorly sorted; unconsolidated; clay to cobble size gravel particles; strong reaction to 10% HCl; quartz sand matrix w/ ls. and chert gravel. (Gravel gets jammed in sampler
26						

Comments: 22.5 - 25.0 interval was not continuously cored

McCULLEY, FRICK & GILMAN, INC.

FIELD LOG BORING

Job No. 90-3135 Client City of San Marcos Boring MW-105 Page 3 of 3
Location upgradient near eastern landfill boundary Date 4/19/90
Coordinates: N 5478.575 E 8487.07 Elev. Ft. 573.8± MSL
Geologist R.C. Smyth Driller G. Ric Jones Geophysical Log Yes ☐ No ☒

DEPTH IN FEET	Sample	Percent Recovery	Soil Class.	OVM ppm	Time	DESCRIPTION
26		100	GC	0.0	1150	25.0 - 25.85 Very clayey Gravel: v. wet sample of same as above description.
28		—	CL	—	—	25.85 - 30.0 Upper Taylor Claystone: mottled brownish yellow (10YR 6/8) and pale olive (5Y 6/3); hard and blocky texture; finely laminated; 1-5% organic material; 1-5% oxidized sand laminae.
30						
32						
34						
36						
38						
40						

Comments:

McCULLEY, FRICK & GILMAN, INC.

FIELD LOG BORING

Job No. 90-3135 Client City of San Marcos Boring B-106A Page 1 of 2
Location upgradient; toward northwest corner of landfill Date 4/19/90
Coordinates: N 5342.30 E 6274.38 Elev. Ft. 579.52 ft AMSL
Geologist J.A. Beach Driller G. Ric Jones Geophysical Log Yes ☐ No ☒

DEPTH IN FEET	Sample	Percent Recovery	Soil Class.	OVM ppm	Time	DESCRIPTION
0			CH	0.0	1645	0.0-2.5 Clay: black (10YR 2/1); v. cohesive, high plasticity; very little rxn to 10% HCl; trace roots, trace limestone pebbles.
2.5			CH	0.0	1655	2.5-5.5 SAA with sand content increasing toward base.
5.0			SC	0.0	1705	5.5-7.5 very sandy Clay: yellowish brown (10YR 5/5); low plasticity; mod. rxn. w/ 10% HCl; organic-rich laminations; 1-5% "caliche" laminations.
7.5		98	SC	0.0	1710	7.5-10.0 V. sandy Clay: brownish yellow (10YR 6/6); soft and crumbles easily; strong rxn to 10% HCl; lamina of caliche & ls. nodules at base.
10		95	SC	0.0	1713	10.0-12.5 clayey SAND: brownish yellow (10YR 6/6); very poorly sorted; loose and porous fine-grained sand; 1-5% organics; trace limestone gravel
12.5		98	SM	0.5	1715	12.5-15.0 silty clayey SAND: yellow (10YR 7/6); strong rxn to 10% HCl; poorly sorted; clay to fine-grained qtz. sand.
15.0		95	SP	0.0	1725	15.0-17.5 SAND: brownish yellow (10YR 7/6); v. poorly sorted: clay to gravel; grain size increases to gravel at base; fine to medium-grained sand
17.5						

Comments:

McCLELLEY, FRICK & GILMAN, INC.

FIELD LOG BORING

Job No. 90-3175 Client City of San Marcos Boring B-106A Page 2 of 2
Location upgradient, toward northwest corner of landfill Date 4/19/90
Coordinates: N 5342.30 E 6274.38 Elev. Ft. 579.52 ft AMSL
Geologist JA Beach Driller G. Ric Jones Geophysical Log Yes ☐ No ☒

DEPTH IN FEET	Sample	Percent Recovery	Soil Class.	OVM ppm	Time	DESCRIPTION
17.5		20	GM	0.0	1730	17.5 - 20.0 Sandy Gravel; brownish yellow (10YR 6/6); very strong rxn to HCl; v. poorly sorted; limestone gravel up to 5 cm in diameter.
20		—	GM	0.0	1735	20.0 - 22.5 sandy Gravel: light yellowish brown (10YR 6/4); strong rxn to 10% HCl; up to 1" diameter pebbles that are moderately rounded; trace shell frags.
22.5		30	SP	0.0	1750	22.5 - 25.0 sandy Gravel: brownish yellow (10YR 6/6); SAA
25.0		80	GM	0.0	1800	25.0 - 27.5 silty sandy GRAVEL: brownish yellow (10YR 6/6); very poorly sorted; strong rxn to 10% HCl; oxidized organic material coating grains; rounded ls. nodules up to 1" diameter MORE DAMP than above
27.5		—	GM	1.9	1805	27.5 - 28.5 SAA. Drillers noted organic odor.
		NR				28.5 - 29.0 gravelly SAND; brownish yellow (10YR 6/6); strong rxn to 10% HCl. DAMPNESS increases w/depth.
30						
						31.0 - 32.5 Upper Taylor "Marl" Claystone: mottled brownish yellow (10YR 6/8) and pale olive (5Y 6/3); hard & blocky; 1-5% organic material; 1-5% oxidized sand laminae.
32.5						

Comments:

McCULLEY, FRICK & GILMAN, INC.

FIELD LOG BORING

Job No. 20-3135 Client City of San Marcos Boring MW-106 Page 1 of 2
Location (± 200' east of B-106A across road) Date 4/20/90
Coordinates: N 5234.05 E 6461.30 Elev. Ft. 578.38 ft AMSL
Geologist JAB / RCS Driller G. Ric Jones Geophysical Log Yes ☐ No ☒

DEPTH IN FEET	Sample	Percent Recovery	Soil Class.	OVM ppm	Time	DESCRIPTION
0		88	CH	—	1138	0.0-2.5 clay: black (10YR 2/1); mod. rxn to 10% HCl; cohesive and highly plastic; moderately hard; trace ls. nodules; Top 6" has been disturbed.
2.5						2.5-4.0 (SAA)
						4.0-5.0 sandy CLAY: SAA but more sand.
5.0		88	CL	1.2	1154	5.0-7.5 sandy CLAY: brownish yellow (10YR 6/6); strong rxn to 10% HCl; trace caliche; trace ls. pebbles up to 1" dia.; fine-grained sand; trace organic streaks.
7.5		80	CL	—	—	7.5-10.0 (SAA)
10.0		84	SC	0.0	1205	10.0-12.5 clayey SAND: brownish yellow (10YR 6/6); strong reaction to 10% HCl; more sand than overlying sample: fine-grained, very poorly sorted; trace dark minerals; soft and crumbles easily.
12.5		80	SC	0.0	1215	12.5-15.0 (SAA)
15.0		76	SC	0.0	1217	15.0-17.5 clayey SAND: brownish yellow (10YR 6/6); strong reaction to 10% HCl; soft; fine to medium-grained sand, poorly sorted; trace limestone pebbles, 1.0 to 1.5 inches in diameter.
17.5						

Comments:

McCULLEY, FRICK & GILMAN, INC.

FIELD LOG BORING

Job No. 90-3135 Client City of San Marcos Boring MW-106 Page 2 of 2
Location ≈ 200' east of B-106A - across road. Date 9/20/90
Coordinates: N 5234.05 E 6461.30 Elev. Ft. 578.38 Ft AMSL
Geologist JAB/RCS Driller G. Ric Jones Geophysical Log Yes ☐ No ☒

DEPTH IN FEET	Sample	Percent Recovery	Soil Class.	OVM ppm		DESCRIPTION
17.5		85	GM	2.0	1220	17.5 - 20.0 Sandy GRAVEL: yellow (10YR 7/6); strong reaction to 10% HCl; unconsolidated; limestone gravel increases in size to 1 inch diameter at base of interval; subangular to subrounded.
20.0		—	GM	1.9	1225	20 - 22.5 sandy GRAVEL: brownish yellow (10YR 6/8); strong reaction to 10% HCl; unconsolidated; limestone gravel with medium-grained sand matrix; Damp; Looks more oxidized than overlying interval.
22.5		40	GM	0.0	1235	22.5 - 25.0 (SAA) oyster shell in cuttings
25.0		40	GM	0.0	1240	25.0 - 27.5 gravelly SAND: yellow (10YR 7/6) same as above except more sand than gravel; v. poorly sorted.
27.5		0	—	0.0	1245	27.5 - 30.0 No recovery Driller notes base of gravel at 29.5 ft BGL.
30.0		0	—	—	—	30.0 - 32.5 No recovery
32.5		100	CL	—	—	32.5 - 34.0 Taylor Marl Claystone: mottled brownish yellow (10YR 6/6) and pale olive (5Y 6/3); hard or blocky; very finely laminated; near vertical fractures filled w/oxidized organic material.
35.0						

Comments: Interval from 32.5 - 34.0 was collected by hammering a split-spoon sampler. Actual depth = 32.5 ft ±

McCULLEY, FRICK & GILMAN, INC.

FIELD LOG BORING

Job No. 92-3135 Client City of San Marcos Boring B-107A Page 1 of 1
Location Near southwestern edge of Land Fill Date 4/20/92
Coordinates: N 3803.67 E 6182.70 Elev. Ft. 575.67 A AMSL
Geologist RCS Driller G. Ric Jones Geophysical Log Yes ☐ No ☒

DEPTH IN FEET	Sample	Percent Recovery	Soil Class.	OVM PPM	Time	B-107A: DESCRIPTION
0		88	—	3.0	0915	0.0 - 2.5
						TOP 0.5 = Fill: V. clayey SAND; yellow (10YR 7/6);
						0.5 - 2.5 clay: Very dark brown (10YR 3/2); highly compacted; high plasticity clay; tr caliche pebbles and sand laminae; 1-5% roots.
2						
		92	—	0.0	0920	2.5 - 5.0
4						Hit trash — aluminum cans and metal scrap(?).

Comments:

McCULLEY, FRICK & GILMAN, INC.

FIELD LOG BORING

Job No. 90-3135 Client City of San Marcos Boring B-107B Page 1 of 1
Location Near southwestern edge of Imhoff Date 4/20/90
Coordinates: N not surveyed E _____ Elev. Ft. _____
Geologist JCS/JAB Driller G. Ric Jones Geophysical Log Yes ☐ No ☒

DEPTH IN FEET	Sample	Percent Recovery	Soil Class.	OVM ppm		DESCRIPTION
0						0.0-2.0 : Hit concrete in first run.
2						

Comments:

McCULLEY, FRICK & GILMAN, INC.

FIELD LOG BORING

Job No. 90-3135 Client City of San Marcos Boring B-107C Page 1 of 1
Location downgradient, near southwestern [illegible] Date 4/20/90
Coordinates: N 3757.66 E 6212.38 Elev. Ft. 575.77
Geologist RCSmyth Driller G. Ric Jones Geophysical Log Yes ☐ No ☑

DEPTH IN FEET	Sample	Percent Recovery	Soil Class.	OVM ppm	Time	DESCRIPTION
0		80	—	0.0	0945	0.0-2.5 Fill material: mixture of clay, sand and gravel w/ woody material at base; strong reaction to 10% HCl; wire came up on auger flights.
2		64	—	0.0 0.9	950 952	2.5-5.0 Fill material down to 4.0: more clay than above plus wood chunks (possibly part of 2x4 planks), wood fiber insulation material; yellow, microcrystalline, sulfurous pockets (≈2-5 mm in diameter); Broke open sample and got an OVM reading of 0.9 ppm.
4						
		76	CH	30.0	1000	5.0-7.5 Clay: very dark brown (10YR 2/2); looks like clay fill that has been compressed together; wood chunks at 7.0 feet; burned wood material containing white caliche-looking lenses; strong reaction to 10% HCl; glass fragments; wire in drill cuttings.
6						
8						
		8	—	53.0	1020	7.5-10.0 Piece of wood jammed in sampler. drill cuttings: glass, wood, metal, wood fiber insulation white stucco. Strong organic odor.
10		4	—	22.0	1025	
						10.0-12.5 Out of trash at [illegible]
12		16	SC	22.0	1030	12.5-15.0 Clayey SAND: light yellowish brown (10YR 6/4); woody material; altered limestone pebbles in fine-grained sand matrix; [illegible]
14						

Comments:

McCULLEY, FRICK & GILMAN, INC.

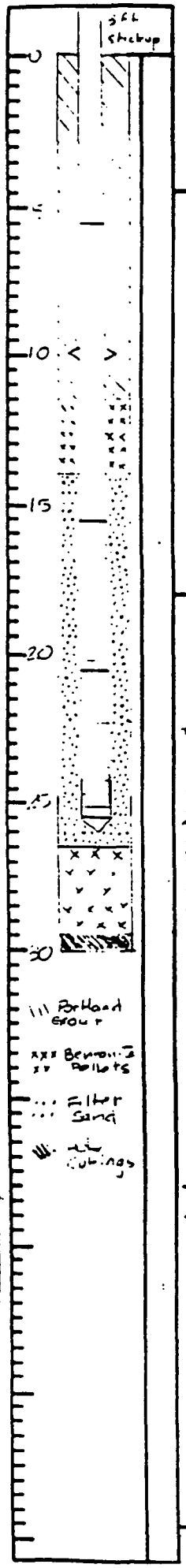
WELL MW-105

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N: 5478.75 E: 8487.07

ELEVATION: GROUND LEVEL 573.87'
TOP OF CASING 576.56'

PROJECT City of San Marcos / TAP Permit
STAFF RC Smith
LOCATION Landfill
SUPERVISOR DYClose



DRILLING SUMMARY:

TOTAL DEPTH Hole = 30 ft ; Well = 26 ft
BOREHOLE DIAMETER 9 inch
DRILLER Ric Jones
TWC Licence # 2799-M
RIG Mobil Drill B-62 HD
BIT(S) 9 inch cutter head w/ hollow-stem augers (8" O.D. & 3 3/8" I.D.)
DRILLING FLUID none

WELL DESIGN:

BASIS: GEOLOGIC LOG ↘ GEOPHYSICAL LOG

CASING STRING(S): C= CASING S= SCREEN

+3.0	5.5	C1			
5.5	15.5	C2			
15.5	20.5	S1			
20.5	25.5	S2			
25.5	26.0	Bottom cap			

CASING: C1 2"x10' Triloc PVC (Sch 40)
C2 " "
C3
C4

SCREEN: S1 2"x5' Triloc PVC screen (0.01)
S2 "
S3
S4

CENTRALIZERS 10 ft. AGL - [illegible] @ 20.

FILTER MATERIAL 16-30 Silica Sand (100 # bags) 6 bags placed from 14-26.5 ft. AGL

CEMENT Portland Type I w/ 5% bentonite powder : 2 - [illegible] bags from 11.5 ft. AGL to surface ; later grouted to 2.5 ft.

OTHER Bentonite chips : 1/2 " pellets in 5 gallon buckets : 1 bucket from 26.5 - 29 ft ; 2 buckets from 11.5-19 ft. Hydrated w/ 1 gal D.I. H2O per bucket Bent.

CONSTRUCTION TIME LOG:

TASK	START DATE	START TIME	FINISH DATE	FINISH TIME
DRILLING:	4/19/90	1030	4/19/90	12
GEOPH. LOGGING:				
CASING:	4/19/90	1320	4/19/90	13
FILTER PLACEMENT:	4/19/90	1325	4/19/90	152
CEMENTING:	4/19/90	1525	4/19/90	154
DEVELOPMENT:	4/24/90	1000	4/24/90	14
OTHER:				

DECONTAMINATION:

* Steam cleaned augers & PVC well casing prior to well installation.

COMMENTS:

* cut 1.5 off of top PVC blank
* First attempted filter sand emplacement through augers was abandoned due to sand bridging between augers & well casing ; well installed to ground surface [illegible] (Rev = 32.3)
* [illegible]

McCULLEY FRICK & GILMAN INC

A. Monitor Well Data Sheet

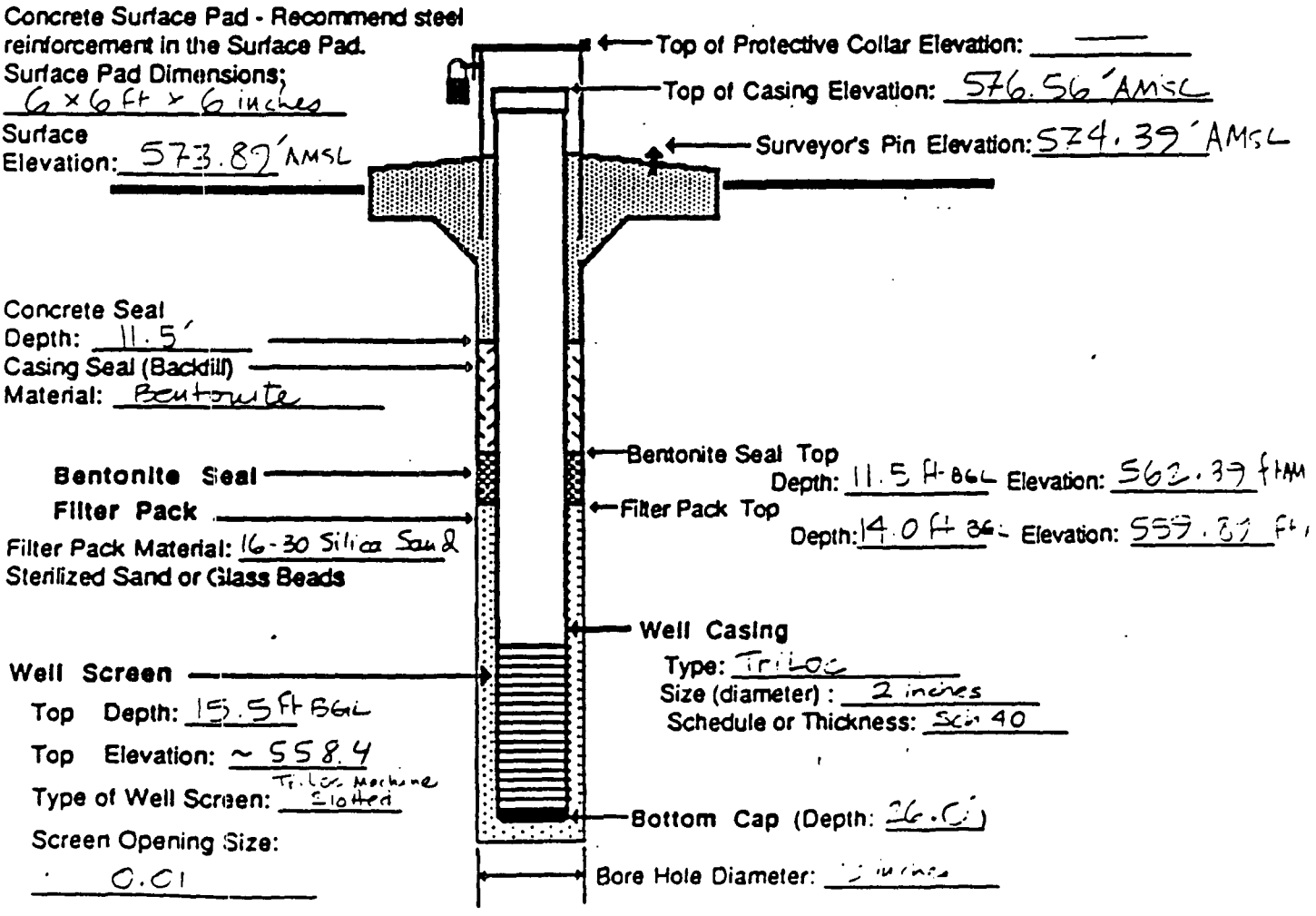
Texas Department of Health
Division of Solid Waste Manager
SE. 67 (3/1/89-B)

Permittee or Site Name: City of San Marcos
County: Caldwell
Date of Monitor Well Installation: 4/19/90
Monitor Well: Latitude: N: 5148.75 Longitude: E: 4987.07
Monitor Well Groundwater
Gradient: Upgradient / Downgradient ___

TDH Permit No. : ___
Monitor Well I.D. No.: MW-105
Date of Monitor Well
Development: 4/24/90
Monitor Well Driller
Name: G. Ric Jones
License No.: 2799-M

NOTE:
(A) The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Rebecca C. Smyth
Static Water Level Elevation (with respect to MSL) after Well Developement : 549.6
Name of Geologic Formation(s) in which Well is completed: Quaternary Alluvium
Type of Locking Device: Master Lock # 3213
Type of Casing Protection: steel



Send original copy by certified mail to: Texas Water Comm[illegible], P.O. Box 13087, Austin, Texas 78711 — Please use black

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas
WELL REPORT

Texas Water Well Drillers Boa.
P.O. Box 13087
Austin, Texas 78711

1) OWNER City of San Marcos (Name) ADDRESS 630 East Hopkins (Street or RFD) San Marcos (City) Texas (State) 7866[illegible]

2) LOCATION OF WELL:
County ~~Hays~~ Caldwell _____ . _____ miles in _____ (NE, SW, etc.) direction from _____ (Town)

Driller must complete the legal description below with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ LEGAL DESCRIPTION:
Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____
☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-Watering

5) DRILLING METHOD (Check):
☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ [illegible] ☐ Air Rotary ☐ Cable Tool ☒ Other H.S.[illegible]

6) WELL LOG: M.W.# 105
Date Drilling: Started 4/19 19 90 Completed 4/19 19 90

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
9	Surface	30

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☐ Gravel Packed ☒ Other 16-30 Sand
If Gravel Packed give interval ... from 14 ft. to 26.5 ft.
Bentonite seal 11.5-14.0

From (ft.)	To (ft.)	Description and color of formation material
0.0	7.5	Clay Dark Grey Brown
7.5	16.0	Clayey Sand Light Brown
16.0	25.8	Fine-Coarse Clay Gravel
26.0	30.0	Brown-Grey Clay

NOTE: Bentonite seal from 29.0-26.5

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Ca[illegible] S[illegible]
2	N	Riser	+3.0'	16.0'	
2	N	Screen	16.0'	26.0'	.01[illegible]

9) CEMENTING DATA [Rule 287.44(1)]
Cemented from 0 ft. to 11.5 ft. No. of Sacks Used 3
_____ ft. to _____ ft. No. of Sacks Used _____
Method used Manyo
Cemented by J.E.D.I.

10) SURFACE COMPLETION
☒ Specified Surface Slab Installed [Rule 287.44(2)(A)]
☐ Pitless Adapter Used [Rule 287.44(3)(B)]
☐ Approved Alternative Procedure Used [Rule 287.71]

11) WATER LEVEL:
Static level _____ ft. below land surface Date _____
Artesian flow _____ gpm. Date _____

12) PACKERS: Type Depth

13) TYPE PUMP:
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS:
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: _____ gpm with _____ ft. drawdown after _____ hrs.

15) WATER QUALITY:
Did the drilling penetrate any strata which contained undesirable constituents?
☐ Yes ☐ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I unders[illegible] that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME JONES ENVIRONMENTAL DRILLING INC. (Type or print) WELL DRILLER'S LICENSE NO. 2799-M

ADDRESS P.O. Box 10304 Corpus Christi (Street or RFD) (City) Texas (State) 78460-0304 (Zip)

(Signed) _____ (Licensed Well Driller) (Signed) _____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TWC use only: Well No. _____ Located on map _____

WWD-012 (Rev. 09/21/88)

WELL OWNER'S COPY

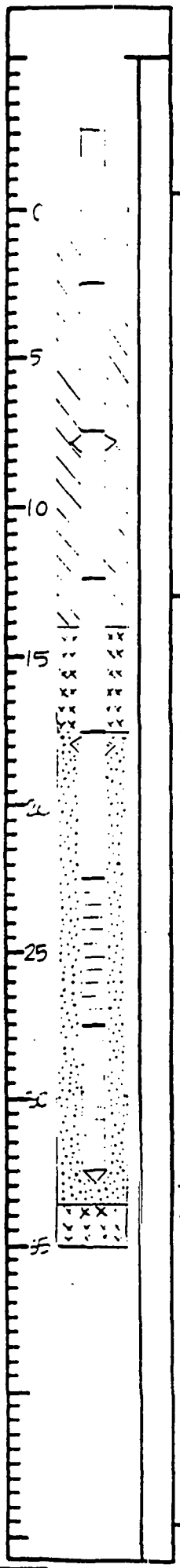
WELL MW-106

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N: 5234.05 E: 6461.30

ELEVATION: GROUND LEVEL 578.38

TOP OF CASING 580.50



LOCATION Landfill

SUPERVISOR B.V. Close

PROJECT City of San Marcos

STAFF R.C. [illegible] / J.A. Beach

DRILLING SUMMARY:

TOTAL DEPTH Hole = 35 ft ; Well = 33 ft

BOREHOLE DIAMETER 9 inch

DRILLER Ric Jones
TWC Licence # 2799-M

RIG Mobil Drill B-62HD

BIT(S) 9 inch cutter head w/ hollow-stem augers (8" O.D. & 3 3/8" I.D.)

DRILLING FLUID None

CONSTRUCTION TIME LOG:

TASK	START DATE	START TIME	FINISH DATE	FINISH TIME
DRILLING:	4/20/90	1145	4/20/90	131
GEOPH. LOGGING:				
CASING:	4/20/90	1520	4/20/90	154
FILTER PLACEMENT:	4/20/90	1545	4/20/90	160
CEMENTING:	4/20/90	1600	4/20/90	163
DEVELOPMENT: (DRY)	—		—	
OTHER:				

WELL DESIGN:

BASIS: GEOLOGIC LOG ✓ GEOPHYSICAL LOG ___

CASING STRING(S): C-CASING S-SCREEN

+2.5	2.5	C_1	27.5	32.5	S_2
2.5	7.5	C_2	32.5	33.0	Bottom cap
7.5	12.5	C_3			
12.5	17.5	C_4			
17.5	22.5	C_5			
22.5	27.5	S_1			

CASING: C1 2" x 5' Triloc PVC (Sch 40)
C2 " " "
C3 " " "
C4 " " "
C5 " " "

SCREEN: S1 2" x 5' Triloc PVC screen (0.01)
S2 " "
S3
S4

CENTRALIZERS 8, 18 ft BGL, 4 [illegible] steel.

FILTER MATERIAL 16-30 Silica Sand (100# [illegible]) 1/3 bag from 33-33.7 ft BGL ; 6 2/3 bags from 17.5-30.5 ft BGL.

CEMENT Portland Type I w/ [illegible] bentonite powder 4-94 lb bags from 14.1 ft BGL to surface ; [illegible] settling to ≈ 2 ft BGL ; used ~ 8 gal H_2O ; [illegible]

OTHER Bentonite Seal : 1/2" [illegible] 5 gal bucket 1 bucket from 33.7 - 35 ft BGL ; 2 buckets from 14.1 - 17.5' BGL. 1 gal D.I. H_2O per bentonite bucket.

DECONTAMINATION:

* Steam-cleaned augers and [illegible] casing prior to drilling & well installation.

COMMENTS:

* 5 ft steel protective casing w/ locking cap set on well (Key # 3213)
* 6 x 6 ft x 6 inch, steel-reinforced concrete pad completed at surface.

McCULLEY, FRICK & GILMAN, INC.

A. Monitor Well Data Sheet

Texas Department of Health
Division of Solid Waste Management
SE. 67 (3/1/89-B)

Permittee or Site Name: City of San Marcos

TDH Permit No. : _____

County: Caldwell

Monitor Well I.D. No.: MW-106

Date of Monitor Well Installation: 1/20/90

Date of Monitor Well Development: DRY well

Monitor Well: Latitude: N 5231.05 Longitude: E 6161.30

Monitor Well Driller Name: G. Ric Jones

Monitor Well Groundwater Gradient: Upgradient X Downgradient ____

License No.: 2799-M

NOTE:

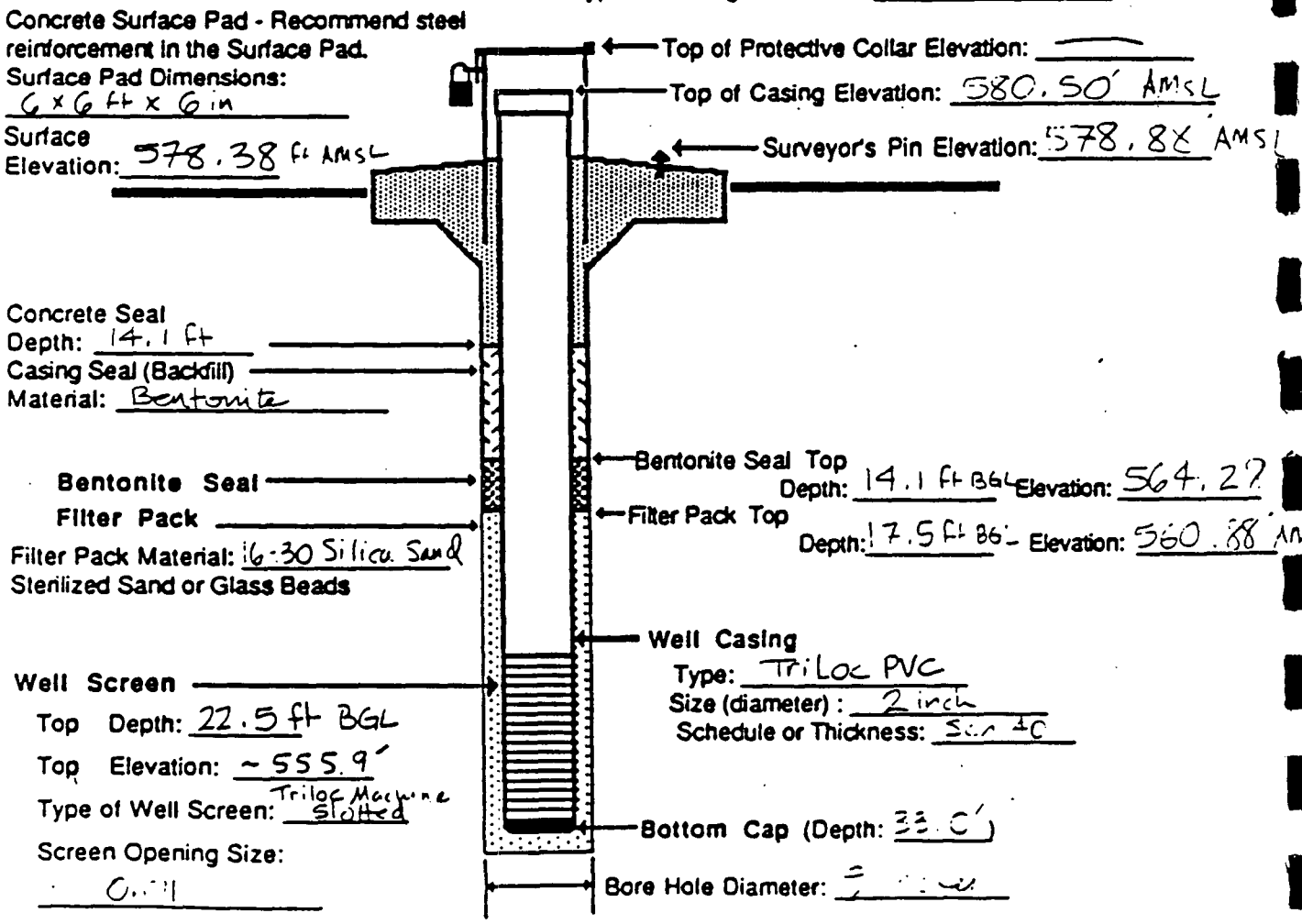
(A) The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor we
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Rebecca C. Smith

Static Water Level Elevation (with respect to MSL) after Well Developement : DRY

Name of Geologic Formation(s) in which Well is completed: Quaternary alluvium

Type of Locking Device: Master Lock #3213 Type of Casing Protection: Steel



Send original copy by certified mail to: Texas Water Comm , P.O. Box 13087, Austin, Texas 78711 — Please use black in

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas
WELL REPORT

Texas Water Well Drillers Boar
P.O. Box 13087
Austin, Texas 78711

1) OWNER City of San Marcos (Name) ADDRESS 630 East Hopkins (Street or RFD) San Marcos (City) Texas (State) 78666 (Zip)

2) LOCATION OF WELL:
County Hays . _____ miles in _____ (NE, SW, etc.) direction from _____ (Town)
CALDWELL

Driller must complete the legal description below with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ LEGAL DESCRIPTION:
Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____
☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-Watering

5) DRILLING METHOD (Check): ☐ Dri
☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bor ☐ Air Rotary ☐ Cable Tool ☒ Other H.S.

6) WELL LOG: M.W.# 107 106
Date Drilling: Started 4/20 19 90 Completed 4/20 19 90

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
9	Surface	35.0

From (ft.)	To (ft.)	Description and color of formation material
0	4.0	Dark Black Clay
4.0	18.0	Clay Sandy Tan
18.0	29.5	Fn- Coarse Sandy
29.5	35.0	Tan & Grey Clay

(Use reverse side if necessary)

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☐ Gravel Packed ☒ Other 16-30 Sand
If Gravel Packed give interval . . . from 15 ft. to 33.0 ft.
Bentonite seal 13-15

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casing Screen
2	N	Riser	+3'	23.0	
2	N	Screen	25.0	33.0	.01

9) CEMENTING DATA [Rule 287.44(1)]
Cemented from 0 ft. to 13.0 ft. No. of Sacks Used 4
_____ ft. to _____ ft. No. of Sacks Used _____
Method used Manyo
Cemented by J.E.D.I.

10) SURFACE COMPLETION
☒ Specified Surface Slab Installed [Rule 287.44(2)(A)]
☐ Pitless Adapter Used [Rule 287.44(3)(B)]
☐ Approved Alternative Procedure Used [Rule 287.71]

11) WATER LEVEL:
Static level _____ ft. below land surface Date _____
Artesian flow _____ gpm. Date _____

12) PACKERS: Type Depth

13) TYPE PUMP:
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS:
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: _____ gpm with _____ ft. drawdown after _____ hrs.

15) WATER QUALITY:
Did the drilling penetrate any strata which contained undesirable constituents?
☐ Yes ☐ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME JONES ENVIRONMENTAL DRILLING INC. (Type or print) WELL DRILLER'S LICENSE NO. 2799-M

ADDRESS P.O. Box 10304 (Street or RFD) Corpus Christi (City) Texas (State) 78460-0304 (Zip)

(Signed) _____ (Licensed Well Driller) (Signed) _____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TWC use only: Well No. _____ Located on map _____

WWD-012 (Rev. 09/21/88)

WELL OWNER'S COPY

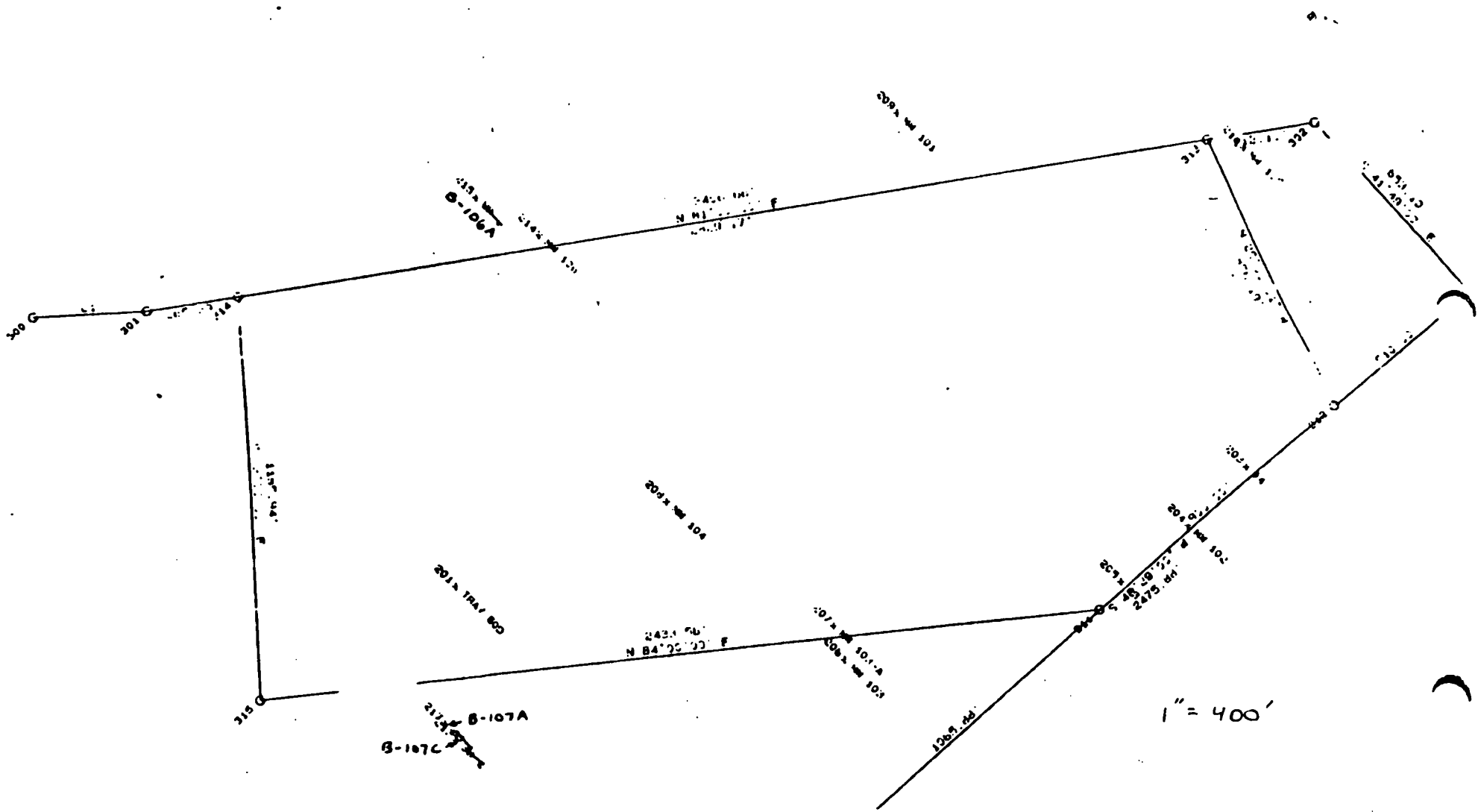
LIST COORDINATES

PT#	NORTH	EAST	ELEV
213	3757.66	6212.38	NG 575.7
~~SB-2~~ B-107C			
214	5234.05	6461.30	T.o.f PVC 575.5
MW 106			c/c 575.5
215	5342.30	6274.38	NG 574.5
~~SB-1~~ B-106A			
216	5478.75	8487.07	Top PVC 576.3
MW 105			c/c 574.3
217	3803.67	6182.70	NG 575.6
~~SB-1~~ B-107A			

4/30/90 surface of water in P.I 575.6

STATE OF TEXAS
DAVID C. WILLIAMSON
4190
REGISTERED
PUBLIC SURVEYOR

David C. Williamson


B-106A
B-107A
B-107C
1" = 400'

WELL DEVELOPMENT RECORD

WELL NUMBER: MW-105

Project No: 90-3135 Project Name: City of San Marcos PAGE: 1 of: 1

Date(s): 4-24-90

Developed by: JABeach

Measuring Point (MP) of Well: Top of Casing

Screened Interval (ft.BGL): 16-26

Filter Pack Interval (ft.BGL): 14-26.5

Starting Water Level (ft. BMP): 27.17

Casing Stickup (ft.): 2.14

Starting Water Level (ft. BGL): 25.03

Total Depth (ft. BGL): ~26.

Casing Diameter (in ID): 2

Casing Volume (gal.): .648

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: Decon with non-phosphate soap, distilled wate

Development: Check clarity by bailing; then switch to pump to develop / finish by ba with

Disposal of Discharged Water: Plastic lined barrel / to cover

INSTRUMENTS (indicate make, model, i.d.):

Water Level: Olympic Well Probe

Thermometer: Ertco

pH Meter: Markson Model #93

Field Calibration: ✓

Conductivity Meter: Cole-Parmer 500 Series

Field Calibration: ✓

Other: OVM

Field Calibration:

DEVELOPMENT MEASUREMENTS

Date/ Time 4/24/90	Purge Characteristics: Cumul. Vol. (gal)	Purge Characteristics: Water Level (ft.BGL)	Water Quality Data: Temp. (°C)	Water Quality Data: pH	Water Quality Data: Specific Conductance (µmhos/cm) @ Field Temp.	Water Quality Data: Specific Conductance (µmhos/cm) @ 25 °C	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
10:55	.1	25.10	24.	6.56	1183		yellow	some sed. very turbid	no flow
11:30	3		22.5	6.52	1150		"	"	no odor
11:40	6		23.	6.54	V142		"	less turbid	
11:55	9		22.5	6.49	1150		"	less turbid fine sediment	"
12:[illegible]	12		22.5	6.47	1152		"	"	well production 5-
12:20	18		[illegible]	6.59	1115		light yellow	slightly turbid	no odor
[illegible]	24		[illegible]	[illegible]	[illegible]			"	"
13:07	30		22.5	6.52	1160		[illegible]	clear	no odor
13:[illegible]	32		22.5	6.52	1165		"	no sediment	almost clear
13:30	38		22.5	6.50	1160		"	Some turbidity	turbidity caused by agitation of bailer

Total Discharge (gallons): 38

Casing Volumes Removed: 59

Observations/Comments: OVM reading = 0.0 @ beginning of development

13:30 water level = 27.19' BMP

ABBREVIATIONS:
BMP - Below measuring point
BGL - Below ground level
Cumul. Vol. - Cumulative volume removed
ID - Inside Diameter
C - Celsius
gal. - gallons
ft. - feet
in. - inches

McGinley, Price & Gilman, Inc.
5818 Balcones Drive, Suite 202
Austin, Texas 78731
512 - 371 - 1667

WATER LEVEL MONITORING RECORD

WELL NUMBER or DATE: 4-24-90

Project No: 90-3135 Project Name: City of San Marcos PAGE: 1 of 1

Weather Conditions: Cloudy, Windy, Occasional showers

Measuring Point of Well (MP): Top of Casing

Measuring Device: Olympic Water Level Probe

Observations / Comments:

DATE or WELL	TIME	MP ELEVATION (feet, NGVD)	DEPTH TO WATER (feet below MP)	CONVERSIONS or CORRECTIONS (feet)	WATER LEVEL ELEVATION (feet, NGVD)	REMARKS	MEASURED BY
MW-101	13:50	-	DRY		-		JAP
MW-102	13:55	569.37	22.10		547.27		
MW-103	14:00	573.19	30.31		542.88		
MW-104	14:05	575.06	31.80		543.26		
MW-105	10:30	576.56	27.17		549.39		
MW-106	14:10	580.50	DRY		-		

Measured by: James Beach

Checked by: Bernie Close

McCulley, Frick & Gilman, Inc.
5818 Balcones Drive, Suite 202
Austin, Texas 78731
512-371-1667

WATER LEVEL MONITORING RECORD

WELL NUMBER or DATE: 4-30-90

Project No: 90-3135 Project Name: City of San Marcos PAGE: 1 of 1

Weather Conditions: Clear, 10 mph Wind from Southwest

Measuring Point of Well (MP): Top of Casing

Measuring Device: Olympic Well Probe

Observations / Comments:

DATE or WELL	TIME	MP ELEVATION (feet, NGVD)	DEPTH TO WATER (feet below MP)	CONVERSIONS or CORRECTIONS (feet)	WATER LEVEL ELEVATION (feet, NGVD)	REMARKS	MEASURED BY
MW-101	1315	–	DRY		-		JAB/TMS
MW-102	1240	569.37	21.96		547.41		
MW-103	1200	573.19	30.56		542.63		
MW-104	1035	575.06	31.95		543.11		
MW-105	1120	576.56	26.97		549.59		
MW-106	1025	586.50	DRY		-		
Gravel Pit		–	–		545.66	Surveyed elevation	Byrr & Associates

Measured by: James Flach

Checked by: [illegible] Close

McCulley, [illegible], Inc.
5818 Balcones Drive, Suite 202
Austin, Texas 78731
512 - 371 - 1667

WATER LEVEL MONITORING RECORD

WELL NUMBER or DATE: 5/5/90

Project No: 90-3135 Project Name: City of San Marcos Landfill PAGE: 1 of 1

Weather Conditions: Sunny - Clear 70's -

Measuring Point of Well (MP): TOC (PVC)

Measuring Device: Olympic Well Probe

Observations / Comments:

DATE or WELL	TIME	MP ELEVATION (feet, NGVD)	DEPTH TO WATER (feet below MP)	CONVERSIONS or CORRECTIONS (feet)	WATER LEVEL ELEVATION (feet, NGVD)	REMARKS	MEASURED BY
MW-101	1050	-	DRY		-		THKS
MW-102	1120	569.37	21.46'		547.91		
MW-103	1110	573.19	30.32'		542.87		
MW-104	1055	575.06	31.78'		543.28		
MW-105	1125	576.56	26.11		550.45		
MW-106	1041	580.50	DRY		-		
*Pt Staff	1100	548.96	3.15'		545.21	*measured below T/staff to wtr surface	

Measured by: T.W. Scanlon

Checked by: Bernie Clow

McCulley, Frick & Gilman, Inc.
5818 Balcones Drive, Suite 202
Austin, Texas 78731
512 - 371 - 1667

CHAIN-OF-CUSTODY RECORD AND REQUEST FOR ANALYSIS

NO. 1001-3135

McCULLEY, FRICK & GILMAN, INC.

☐ 3300 Arapahoe Ave., Suite 218
Boulder, CO 80303
TEL: (303) 447-1823
FAX: (303) 447-1836

☑ 5818 Balcones Dr., Suite 202
Austin, TX 78731
TEL: (512) 371-1667
FAX: (512) 454-4126

☐ 5 Third St., Suite 916
San Francisco, CA 94103
TEL: (415) 495-7110
FAX: (415) 495-7107

PROJECT No: 90-3135 PROJECT NAME: City of San Marcos Landfill PAGE: 1 OF: 2

SAMPLER (Signature): James Beach DATE: 4-30-90

METHOD OF SHIPMENT: Deliver to lab personnel CARRIER/ WAYBILL NO. _____ DESTINATION: NET, Austin TX

SPECIAL INSTRUCTIONS/HAZARDS: Comprehensive QA/QC

SAMPLES																ANALYSIS REQUEST															
					Preservation							Containers*			Methods											Handling			REMARKS (Special handling procedures, specific analytical methods, observations, etc.)
Lab No.	Sample Identification	Sample Collection DATE	TIME	Matrix*	HCL	HNO3	H2SO4	COLD	NONE	OTHER	VOL (ml)	TYPE*	No.	EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	TPH as Gasoline	TPH as Diesel	BTEX	TOC	Metals	Gen. Chem.		HOLD	RUSH	STANDARD	
	MW-102	4-30	12:50	AQ		X		X			500	P	1									X					X	
	MW-102	4-30	↓	↓			X	X			500	P	1								X						↓	
	MW-102	4-30						X	X		40	G	2			X												VOA
	MW-102	4-30						X	X		1000	P	1										X					
	MW-103		12:10					X	X		40	G	2			X												VOA
	MW-102		12:15			X		X			500	P	1									X						
	MW-103		12:15				X	X			500	P	1								X							
	MW-103		12:20					X	X		1000	P	1										X					
	TRIP BLANK		10:00					X	X		40	G	2			X												VOA
	Rinsate		10:00					X	X		40	G	2			X												VOA

TOTAL NUMBER OF CONTAINERS 14

LABORATORY COMMENTS/ CONDITION OF SAMPLES

RELINQUISHED BY: SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME	RECEIVED BY: SIGNATURE	PRINTED NAME	COMPANY
James Beach	James Beach	MFG	5-1-90	10:30	Rusty Verry	Rusty Verry	NET

LABORATORY 5-1-90 1030

*KEY Matrix AQ aqueous NA nonaqueous SO soil SL sludge P petroleum A air OT other Containers P plastic G glass T teflon B brass OT other

DISTRIBUTION: PINK ... YELLOW ... WHITE: ... Originator

CHAIN-OF-CUSTODY RECORD AND REQUEST FOR ANALYSIS

NO. 1001-3135

McCULLEY, FRICK & GILMAN, INC.

☐ 3300 Arapahoe Ave., Suite 218
Boulder, CO 80303
TEL: (303) 447-1823
FAX: (303) 447-1836

☑ 5818 Balcones Dr., Suite 202
Austin, TX 78731
TEL: (512) 371-1667
FAX: (512) 454-4126

☐ 5 Third St., Suite 916
San Francisco, CA 94103
TEL: (415) 495-7110
FAX: (415) 495-7107

PROJECT No.: 90HW-3135 PROJECT NAME: City of San Marcos Landfill PAGE: 2 OF: 2
SAMPLER (Signature): James Beach DATE: 4-30-90
METHOD OF SHIPMENT: Hand Delivery CARRIER/ WAYBILL NO. DESTINATION: NET, Austin TX
SPECIAL INSTRUCTIONS/HAZARDS: Comprehensive QA/QC

Lab No.	Sample Identification	Sample Collection DATE	Sample Collection TIME	Matrix*	Preservation HCL	Preservation HNO3	Preservation H2SO4	Preservation COLD	Preservation NONE	Preservation OTHER	Containers* VOL (ml)	Containers* TYPE*	Containers* No.	Methods EPA 601/8010	Methods EPA 602/8020	Methods EPA 624/8240	Methods EPA 625/8270	Methods TPH as Gasoline	Methods TPH as Diesel	Methods BTEX	Methods TOC	Methods Metals	Methods Gen Chem	Handling HOLD	Handling RUSH	Handling STANDARD	REMARKS (Special handling procedures, specific analytical methods, observations, etc.)
	MW-104	4-30	10:30	AQ				X	X		40	G	2			X										X	VOA
	MW-104	↓	↓	↓			X	X			500	P	1								X					↓	
	MW-104					X		X			500	P	1									X					
	MW-104							X	X		1000	P	1										X				
	MW-105		11:30					X	X		40	G	2			X											VOA
	MW-105						X	X			500	P	1								X						
	MW-105					X		X			500	P	1									X					General Chem
	MW-105	↓	↓	↓				X	X		1000	P	1										X			↓	

TOTAL NUMBER OF CONTAINERS 10

LABORATORY COMMENTS/ CONDITION OF SAMPLES

RELINQUISHED BY: SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME	RECEIVED BY: SIGNATURE	PRINTED NAME	COMPANY
James Beach	James Beach	MFG	5-1-90	1030	Rusty Nereng	Rusty Nereng	NET

LABORATORY 5-1-90 1030

*KEY: Matrix AQ aqueous NA nonaqueous SO soil SL sludge P petroleum A air OT other Containers P plastic G glass T teflon B brass OT other

DISTRIBUTION PINK Field Copy YELLOW Laboratory Copy WHITE Return to Originator

GROUND-WATER SAMPLING RECORD

PAGE: 1 of: 1

SAMPLE NUMBER: MW-102

Project No: 90-3135 Project Name: City of San Marcos Landfill Date 4-30-90

Sampling Location (well ID, etc.): MW-102

Sampled by: TAS / JAE

Measuring Point (MP) of Well: Toc.

Screened Interval (ft.BGL): 16.2 - 26.2

Filter Pack Interval (ft.BGL): 12.5 - 27.5

Starting Water Level (ft. BMP): 21.96

Casing Stickup (ft.): 2.4

Starting Water Level (ft. BGL): 19.56

Total Depth (ft. BGL): 27.05

Casing Diameter (in ID): 2"

Casing Volume (gal.): 1.20

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: Rinse Tap, scrub Alc. Na3 PO4 soap, rinse, repeate, DI rinse

Purging: bail using tripod/cable reel Sampling: Sample ex. VOA, casing vol to clark pump

Disposal of Discharged Water: Barrel @ site

INSTRUMENTS (indicate make, model, i.d.):

Water Level: Olympic Well Probe Thermometer: Hg Bulb

pH Meter: Markson #93 Field Calibration: 4, 7 & 10 pH buffers

Conductivity Meter: Cole Parmer 1481-60 Field Calibration: Internal calibration

Filtration: Geo-tech .45 µm in-line filter Other:

SAMPLING MEASUREMENTS

Date/ Time	Purge Characteristics: Cumul.Vol. (gal)	Purge Rate (gpm)	Water Quality Data: Temp. (°C)	pH	Specific Conductance (µmhos/cm) @ Field Temp	@ 25 °C	Appearance: Color	Turbidity & Sediment	Remarks
12:40	1.25	bail	22.0	6.12	2000				no odor
12:43	2.50	"	22.5	6.22	2000				collect samples
12:50	3.75	"	23.0	6.28	2020		"	"	

Water Level (ft. BMP) at End of Purge: Sample Intake Depth (ft. BMP): 25

SAMPLE-INVENTORY

Bottles Collected: Time	Volume	Composition (glass, plastic)	Quantity	Filtration (Y/N)	Preservation (type)	Remarks (quality control sample, other)
12:50	40 ml	glass	2	N	NaCl	VOC
12:50	500 "	glass	1	N	H2SO4	TOC
12:50	500		1	Y	"	diss. metals
12:50	1000 ml		1	N	-	general chem.

Chain-of-Custody Record No. 1001 - 3125

ABBREVIATIONS:
BMP - below measuring point
BGL - below ground level
Cumul.Vol. - Cumulative volume removed
ID - Inside Diameter
C - Celsius
gal. - gallons
gpm - gallons per minute
ft. - feet

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GROUND-WATER SAMPLING RECORD

PAGE: 1 of: 1

SAMPLE NUMBER: MW-103

Project No: 90-3135 Project Name: City of Tom Mkrcos Landfill Date 4-30-90

Sampling Location (well ID, etc.): MW-103

Sampled by: TMS / JAE

Measuring Point (MP) of Well: TOC

Screened Interval (ft.BGL): 18.3 - 28.3

Filter Pack Interval (ft.BGL): 16.5 - 28.6

Starting Water Level (ft. BMP): 30.56

Casing Stickup (ft.): 2.7'

Starting Water Level (ft. BGL): 27.86

Total Depth (ft. BGL): 28.6'

Casing Diameter (in ID): 2"

Casing Volume (gal.): .15

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: Rinse w/TAP scrub w/ Alg Soap rinse, repeat, DI Rinse

Purging: Purge using tripod / cable & reel Sampling: sample each casing volume to check pa

Disposal of Discharged Water: to soil @ site

INSTRUMENTS (indicate make, model, i.d.):

Water Level: Olympic Well Probe Thermometer: Hg Bulb

pH Meter: Markson #93 Field Calibration: 4, 7 & 10 pH Buffer

Conductivity Meter: Cole Parmer 1481-60 Field Calibration: Factory calibration

Filtration: Geo-Tech .45 µm in-line filter Other:

SAMPLING MEASUREMENTS

Date/ Time	Purge Characteristics: Cumul. Vol. (gal)	Purge Rate (gpm)	Water Quality Data: Temp. (°C)	pH	Specific Conductance (µmhos/cm) @ Field Temp	Specific Conductance (µmhos/cm) @ 25° C.	Appearance: Color	Appearance: Turbidity & Sediment	Remarks
12:00	.15	1.5 l	26	6.61	3220		light	[illegible]	organic odor
12:02	.30	"	24	6.12	3060				"
12:05	.45	"	23.5	6.15	3100				color " temp "

Water Level (ft. BMP) at End of Purge: 27 Sample Intake Depth (ft. BMP): 27

SAMPLE INVENTORY

Bottles Collected: Time	Volume	Composition (glass, plastic)	Quantity	Filtration (Y/N)	Preservation (type)	Remarks (quality control sample, other)
12:10	40 ml	glass	3	N	—	VOC
12:15	500	plastic	1	Y	HNO3	Sp. Grav. Chl.
[illegible]	500	"	1	N	HNO3	TOC
12:20	250	"	1	N	—	TOX

Chain-of-Custody Record No. 1001 - 3135

ABBREVIATIONS:
BMP - Below measuring point
BGL - Below ground level
Cumul.Vol. - Cumulative volume purged
ID - Inside Diameter
C - Celsius
gal. - gallons
gpm - gallons per minute
in. - inches

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GROUND-WATER SAMPLING RECORD

PAGE: 1 of: 1

SAMPLE NUMBER: MW-104

Project No: 90-3135 Project Name: City of San Marcos Landfill Date 4-30 10

Sampling Location (well ID, etc.): MW-104

Sampled by: JAE/TMS

Measuring Point (MP) of Well: TOC

Screened Interval (ft.BGL): 23.5-33.5

Filter Pack Interval (ft.BGL): 20.2-33.8

Starting Water Level (ft. BMP): 31.95

Casing Stickup (ft.): 2.6

Starting Water Level (ft. BGL): 29.35

Total Depth (ft. BGL): 33.82

Casing Diameter (in ID): 2"

Casing Volume (gal.): .72

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: Rinse w/ Tap, scrub w/ Non Phos Soap, rinse repeat, DI rinse

Purging: Purge with tripod/cable set Sampling: Sample each casing vol to check pa

Disposal of Discharged Water: Ground @ site

INSTRUMENTS (indicate make, model, i.d.):

Water Level: Olympic Well Probe Thermometer: Hg bulb

pH Meter: Myron #93 Field Calibration: 4, 7 + 10 pH Buffers

Conductivity Meter: Cole Parmer 1481-60 Field Calibration: Internal Calibration

Filtration: Geotech .45 µm in-line filter Other:

SAMPLING MEASUREMENTS

Date/ Time	Purge Characteristics: Cumul.Vol. (gal)	Purge Rate (gpm)	Water Quality Data: Temp. (°C)	pH	Specific Conductance (µmhos/cm) @ Field Temp	@ 25 °C.	Appearance: Color	Turbidity & Sediment	Remarks
10:35	.75	[illegible]	23.5	6.54	1761		[illegible]	[illegible]	
10:40	1.50		23.0	6.64	1805		"	"	
10:50	2.25	"		6.66	1815		"	[illegible]	[illegible]

Water Level (ft. BMP) at End of Purge: 31 Sample Intake Depth (ft. BMP): 31

SAMPLE INVENTORY

Bottles Collected: Time	Volume	Composition (glass, plastic)	Quantity	Filtration (Y/N)	Preservation (type)	Remarks (quality control sample, other)
10:30	40 ml	glass	2	N	—	VOCs
10:30	500 "	plastic	1	N	H_2SO_4	TOC
10:30	500 "	"	1	Y	HNO_3	dissolved metals
10:30	1000 "	"	1	N	—	[illegible]

Chain-of-Custody Record No. 1001-3135

ABBREVIATIONS:
BMP - below measuring point
BGL - below ground level
Cumul.Vol. - Cumulative volume removed
ID - Inside Diameter
C - Celsius
gal. - gallons
gpm - gallons per minute
in. - inches

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GROUND-WATER SAMPLING RECORD

PAGE: 1 of: 1

SAMPLE NUMBER: MW-105

Project No: 90-3135 Project Name: City of San Marcos Landfill Date 4-30-90

Sampling Location (well ID, etc.): MW-105

Sampled by: TMS/JAB

Measuring Point (MP) of Well: TOC

Screened Interval (ft.BGL): 16-26

Filter Pack Interval (ft.BGL): 14-26.5

Starting Water Level (ft. BMP): 26.97

Casing Stickup (ft.): 2.14

Starting Water Level (ft. BGL): 24.83

Total Depth (ft. BGL): ~26-

Casing Diameter (in ID): 2"

Casing Volume (gal.): .67

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: Rinse w/ Tap, Scrub w/ Non PO4 Soap, rinse, repeat, DI rinse

Purging: Tripod / cable reel Sampling: sample each casing vol. / check pr

Disposal of Discharged Water: Barrel @ site

INSTRUMENTS (indicate make, model, i.d.):

Water Level: Olympic Well Probe Thermometer: Hg Bulb

pH Meter: Markson #93 Field Calibration: 4, 7+10 pH Buffers

Conductivity Meter: Cole Parmer 1481-60 Field Calibration: Internal Calibration

Filtration: Geotech .45 µm in-line filter Other:

SAMPLING MEASUREMENTS

Date/ Time	Purge Characteristics: Cumul.Vol. (gal)	Purge Rate (gpm)	Water Quality Data: Temp. (°C)	pH	Specific Conductance (µmhos/cm) @ Field Temp	@ 25 °C	Appearance: Color	Turbidity & Sediment	Remarks
11:20	.75	bail	24.0	6.50	1205		light [illegible]	turbid [illegible]	
11:30	1.50	"	23.5	6.75	1230		"	"	
11:35	2.25	"	23.5	6.74	1227		"	"	collect samples

Water Level (ft. BMP) at End of Purge: 28 Sample Intake Depth (ft. BMP): 28

SAMPLE INVENTORY

Bottles Collected: Time	Volume	Composition (glass, plastic)	Quantity	Filtration (Y/N)	Preservation (type)	Remarks (quality control sample, other)
11:30	40 ml	glass	2	N	—	VOC's
11:30	500 "	plastic	1	N	H_2SO_4	TOC
11:30	500 "	"	1	Y	HNO_3	dissolved metals
11:30	1000 "	"	1	N	—	gen. chem

Chain-of-Custody Record No. 1001-3135

ABBREVIATIONS:
BMP - below measuring point
BGL - below ground level
Cumul.Vol. - Cumulative volume removed
ID - Inside Diameter
C - Celsius
gal. - gallons
gpm - gallons per minute
in. - inches

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ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
Austin TX 78731

05-25-90

SAMPLE NO: 50414

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-102

Date Taken: 04-30-90

Date Received: 05-01-90

Alkalinity, Bicarb.(CaCO3)	548.	mg/L
Alkalinity, Carb. (CaCO3)	<1.	mg/L
Alkalinity, Total (CaCO3)	548.	mg/L
Alkalinity, Phenol.(CaCO3)	<1.	mg/L
Anion/Cation Balance	3.24	%
Chloride	404.	mg/L
Conductivity	2,500.	umhos/cm
Fluoride	0.4	mg/L
Hardness, Total (CaCO3)	328.	mg/L
Nitrogen, Nitrate	1.42	mg/L
pH	6.6	units
Solids, Dissolved	1,560.	mg/L
Sulfate	219.	mg/L
TOC a	69.	mg/L
TOC b	60.	mg/L
TOC c	65.	mg/L
TOC d	66.	mg/L
Arsenic	0.015	mg/L
Barium	0.17	mg/L
Cadmium	<0.01	mg/L
Calcium	245.	mg/L
Chromium, Total	<0.01	mg/L
Copper	<0.02	mg/L
Iron	5.2	mg/L
Lead	<0.03	mg/L
Magnesium	29.6	mg/L
Manganese	2.0	mg/L
Mercury	<0.0006	mg/L
Potassium	7.9	mg/L

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Austin Division

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ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
Austin TX 78731

05-25-90

SAMPLE NO: 50414

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-102

Date Taken: 04-30-90 Date Received: 05-01-90

Selenium	<0.005	mg/L
Silver	<0.01	mg/L
Sodium	238.	mg/L
Zinc	0.02	mg/L

Pam Jupe, Manager
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ANALYTICAL REPORT

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05-25-90

SAMPLE NO: 50414

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-102

Date Taken: 04-30-90 Date Received: 05-01-90

METHOD 8240 VOLATILES

Acrolein	<10.0	ug/L
Acrylonitrile	<10.0	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<20.0	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	1.6	ug/L
Chloroethane	<20.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<20.0	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	2.6	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	1.4	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
trans-1-2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	<1.0	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

Pam Jupe, Manager
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ANALYTICAL REPORT

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McCULLEY, FRICK & GILMAN, INC.
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05-25-90

SAMPLE NO: 50414

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-102

Date Taken: 04-30-90 Date Received: 05-01-90

METHOD 8240 VOLATILES

1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<20.0	ug/L
cis-1,2-Dichloroethene	3.3	ug/L

Pam Jupe, Manager
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ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
Austin TX 78731

05-25-90

SAMPLE NO: 50415

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-103

Date Taken: 04-30-90

Date Received: 05-01-90

Alkalinity, Bicarb.(CaC03)	554.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	554.	mg/L
Alkalinity, Phenol.(CaC03)	<1.	mg/L
Anion/Cation Balance	9.11	%
Chloride	852.	mg/L
Conductivity	4,100.	umhos/cm
Fluoride	0.42	mg/L
Hardness, Total (CaC03)	96.	mg/L
Nitrogen, Nitrate	0.83	mg/L
pH	6.5	units
Solids, Dissolved	2,670.	mg/L
Sulfate	475.	mg/L
TOC a	107.	mg/L
TOC b	89.	mg/L
TOC c	93.	mg/L
TOC d	113.	mg/L
Arsenic	<0.005	mg/L
Barium	0.08	mg/L
Cadmium	<0.01	mg/L
Calcium	340.	mg/L
Chromium, Total	<0.01	mg/L
Copper	<0.02	mg/L
Iron	0.09	mg/L
Lead	<0.03	mg/L
Magnesium	42.6	mg/L
Manganese	2.6	mg/L
Mercury	<0.0006	mg/L
Potassium	4.8	mg/L

Pam Jupe, Manager
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ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
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05-25-90

SAMPLE NO: 50415

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-103

Date Taken: 04-30-90

Date Received: 05-01-90

Selenium	<0.005	mg/L
Silver	<0.01	mg/L
Sodium	393.	mg/L
Zinc	0.02	mg/l

Pam Jupe, Manager
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ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
Austin TX 78731

05-25-90

SAMPLE NO: 50415

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-103

Date Taken: 04-30-90

Date Received: 05-01-90

METHOD 8240 VOLATILES

Acrolein	<10.0	ug/L
Acrylonitrile	<10.0	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<20.0	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<20.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<20.0	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	3.8	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	2.8	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
trans-1-2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	1.2	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

Pam Jupe, Manager
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ANALYTICAL REPORT

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05-25-90

SAMPLE NO: 50415

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-103

Date Taken: 04-30-90

Date Received: 05-01-90

METHOD 8240 VOLATILES		
1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	1.2	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<20.0	ug/L
cis-1,2-Dichloroethene	23.0	ug/L

Pam Jupe, Manager
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ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
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05-25-90

SAMPLE NO: 50416

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-104

Date Taken: 04-30-90

Date Received: 05-01-90

Alkalinity, Bicarb.(CaC03)	460.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	460.	mg/L
Alkalinity, Phenol.(CaC03)	<1.	mg/L
Anion/Cation Balance	2.67	%
Chloride	328.	mg/L
Conductivity	2,300.	umhos/cm
Fluoride	0.66	mg/L
Hardness, Total (CaC03)	256.	mg/L
Nitrogen, Nitrate	7.12	mg/L
pH	6.7	units
Solids, Dissolved	1,410.	mg/L
Sulfate	271.	mg/L
TOC a	51.	mg/L
TOC b	51.	mg/L
TOC c	47.	mg/L
TOC d	51.	mg/L
Arsenic	<0.005	mg/L
Barium	0.08	mg/L
Cadmium	<0.01	mg/L
Calcium	233.	mg/L
Chromium, Total	<0.01	mg/L
Copper	<0.02	mg/L
Iron	<0.06	mg/L
Lead	<0.03	mg/L
Magnesium	18.5	mg/L
Manganese	0.09	mg/L
Mercury	<0.0006	mg/L
Potassium	2.7	mg/L

Pam Jupe, Manager
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ANALYTICAL REPORT

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McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
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05-25-90

SAMPLE NO: 50416

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-104

Date Taken: 04-30-90

Date Received: 05-01-90

Selenium	<0.005	mg/L
Silver	<0.01	mg/L
Sodium	221.	mg/L
Zinc	0.03	mg/L

Pam Jupe, Manager
Austin Division

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ANALYTICAL REPORT

Doug Frick
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05-25-90

SAMPLE NO: 50416

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-104

Date Taken: 04-30-90 Date Received: 05-01-90

METHOD 8240 VOLATILES

Acrolein	<10.0	ug/L
Acrylonitrile	<10.0	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<20.0	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<20.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<20.0	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	2.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
trans-1-2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	1.2	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

Pam Jupe, Manager
Austin Division

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Gulf Coast, Inc.
Austin Division
2621-130 Ridgepoint Drive
Austin, TX 78754
Tel: (512) 928-8905
Fax: (512) 928-3208

ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
Austin TX 78731

05-25-90

SAMPLE NO: 50416

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-104

Date Taken: 04-30-90 Date Received: 05-01-90

METHOD 8240 VOLATILES

1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<20.0	ug/L
cis-1,2-Dichloroethene	10.2	ug/L

Pam Jupe, Manager
Austin Division

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ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
Austin TX 78731

05-25-90

SAMPLE NO: 50417

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-105

Date Taken: 04-30-90

Date Received: 05-01-90

Alkalinity, Bicarb.(CaC03)	508.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	508.	mg/L
Alkalinity, Phenol.(CaC03)	<1.	mg/L
Anion/Cation Balance	1.53	%
Chloride	124.	mg/L
Conductivity	1,460.	umhos/cm
Fluoride	0.68	mg/L
Hardness, Total (CaC03)	216.	mg/L
Nitrogen, Nitrate	3.19	mg/L
pH	6.7	units
Solids, Dissolved	900.	mg/L
Sulfate	90.	mg/L
TOC a	72.	mg/L
TOC b	80.	mg/L
TOC c	87.	mg/L
TOC d	80.	mg/L
Arsenic	<0.005	mg/L
Barium	0.09	mg/L
Cadmium	<0.01	mg/L
Calcium	192.	mg/L
Chromium, Total	<0.01	mg/L
Copper	<0.02	mg/L
Iron	<0.06	mg/L
Lead	<0.03	mg/L
Magnesium	17.6	mg/L
Manganese	0.14	mg/L
Mercury	0.0007	mg/L
Potassium	3.5	mg/L

Pam Jupe, Manager
Austin Division

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ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
Austin TX 78731

05-25-90

SAMPLE NO: 50417

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-105

Date Taken: 04-30-90 Date Received: 05-01-90

Selenium	<0.005	mg/L
Silver	<0.01	mg/L
Sodium	90.6	mg/L
Zinc	0.02	mg/L

Pam Jupe, Manager
Austin Division

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Gulf Coast, Inc.
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ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
Austin TX 78731

05-25-90

SAMPLE NO: 50417

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-105

Date Taken: 04-30-90

Date Received: 05-01-90

METHOD 8240 VOLATILES

Acrolein	<10.0	ug/L
Acrylonitrile	<10.0	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<20.0	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<20.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<20.0	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	1.7	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
trans-1-2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	<1.0	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

Pam Jupe, Manager
Austin Division

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ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
Austin TX 78731

05-25-90

SAMPLE NO: 50417

City of San Marcos Landfill

SAMPLE DESCRIPTION: MW-105

Date Taken: 04-30-90 Date Received: 05-01-90

METHOD 8240 VOLATILES		
1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<20.0	ug/L

Pam Jupe, Manager
Austin Division

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ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
Austin TX 78731

06-07-90

SAMPLE NO: 50418

City of San Marcos Landfill

SAMPLE DESCRIPTION: Trip Blank

Date Taken: 04-30-90 Date Received: 05-01-90

METHOD 8240 VOLATILES

Acrolein	<10.0	ug/L
Acrylonitrile	<10.0	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<20.0	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<20.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<20.0	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
trans-1-2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	<1.0	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

Pam Jupe, Manager
Austin Division

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Gulf Coast, Inc.
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ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
Austin TX 78731

06-07-90

SAMPLE NO: 50418

City of San Marcos Landfill

SAMPLE DESCRIPTION: Trip Blank

Date Taken: 04-30-90 Date Received: 05-01-90

METHOD 8240 VOLATILES

1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	1.1	ug/L
Vinyl chloride	<20.0	ug/L

Pam Jupe, Manager
Austin Division

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Gulf Coast, Inc.
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2621-130 Ridgepoint Drive
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ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
Austin TX 78731

06-07-90

SAMPLE NO: 50419

City of San Marcos Landfill

SAMPLE DESCRIPTION: Field Blank

Date Taken: 04-30-90 Date Received: 05-01-90

METHOD 8240 VOLATILES

Acrolein	<10.0	ug/L
Acrylonitrile	<10.0	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<20.0	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<20.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<20.0	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
trans-1-2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	<1.0	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

Pam Jupe, Manager
Austin Division

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Gulf Coast, Inc.
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ANALYTICAL REPORT

Doug Frick
McCULLEY, FRICK & GILMAN, INC.
5818 Balcones Dr., Ste 202
Austin TX 78731

06-07-90

SAMPLE NO: 50419

City of San Marcos Landfill

SAMPLE DESCRIPTION: Field Blank

Date Taken: 04-30-90 Date Received: 05-01-90

METHOD 8240 VOLATILES		
1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	1.0	ug/L
Vinyl chloride	<20.0	ug/L

Pam Jupe, Manager
Austin Division

ATTACHMENT 5

1990 RESULTS FROM FORT WORTH DISTRICT PRIVATE DRINKING WATER WELL SAMPLING

BETZ ANALYTICAL SERVICES

P.O. BOX 4300 • 9669 GROGANS MILL ROAD • THE WOODLANDS, TX 77380 • 713-367-6201 • FAX 713-292-3905

RECEIVED

SEP 27 1990

CITY OF SAN MARCOS
San Marcos, TX

September 20, 1990

Attention: Stephen Jenkins

Dear Mr. Jenkins:

Attached are the analytical results for your samples identified as A0830232 through A0830238, which were sampled on August 29, 1990.

We at Betz appreciate the opportunity to serve you with quality analytical testing. If you have any questions about the results, please do not hesitate to contact me.

Idelis Z. Williams

Idelis Z. Williams
Project Manager
Betz Laboratories
(713) 367-6201
FAX (713) 367-3189

BETZ ANALYTICAL SERVICES

P.O. BOX 4300 • 9669 GROGANS MILL ROAD • THE WOODLANDS, TX 77380 • 713-367-6201 • FAX 713-292-3905

CITY OF SAN MARCOS
San Marcos, TX

Date Submitted: 8/30/90
Date Reported: 9/20/90

Attention: Stephen Jenkins

VOLATILE ORGANICS (EPA 8240)

Sample Description: (b) (6) Property
Date Samlpled: 8/29/90

Laboratory ID: A0830232
Date Analyzed: 9/6/90

Compound	ug/l
Acetone	ND [50]
Benzene	ND
Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND [10]
2-Butanone	ND [100]
Carbon Disulfide	ND
Carbon Tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND [10]
2-Chloroethylvinylether	ND [10]
Chloroform	ND
Chloromethane	ND [10]
Dibromochloromethane	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND

BETZ ANALYTICAL SERVICES

P.O. BOX 4300 • 9669 GROGANS MILL ROAD • THE WOODLANDS, TX 77380 • 713-367-6201 • FAX 713-292-3905

VOLATILE ORGANICS (EPA 8240)
(cont'd)

Laboratory ID: A0830232

Compound		ug/l	
Trans-1,2-Dichloroethene		ND	
1,2-Dichloropropane		ND	
cis-1,3,Dichloropropene		ND	
trans-1,3-Dichloropropene		ND	
Ethylbenzene		ND	
2-Hexanone		ND	[50]
Methylene Chloride		ND	
4-Methyl-2-pentanone		ND	[50]
Styrene		ND	
1,1,2,2-Tetrachloroethane		ND	
Tetrachloroethene		ND	
Toluene		ND	
1,1,1-Trichloroethane		ND	
1,1,2-Trichloroethane		ND	
Trichloroethene	<	5	
Vinyl acetate		ND	[50]
Vinyl chloride		ND	[10]
Xylenes total	<	5	
Dichlorobenzenes		ND	

Limit of Practical Quantitation is 5 ug/l, unless otherwise noted in brackets.

Surrogate Recovery:		Recovery Limits
1,2-Dichloroethane-d4	100 %	76-114 %
Toluene-d8	100 %	88-110 %
Bromofluorobenzene	102 %	86-115 %

BETZ ANALYTICAL SERVICES

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VOLATILE ORGANICS (EPA 8240)

Sample Description: (b) (6) Site
Date Samlpled: 8/29/90

Laboratory ID: A0830233
Date Analyzed: 9/6/90

Compound	ug/l
Acetone	ND [50]
Benzene	ND
Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND [10]
2-Butanone	ND [100]
Carbon Disulfide	ND
Carbon Tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND [10]
2-Chloroethylvinylether	ND [10]
Chloroform	ND
Chloromethane	ND [10]
Dibromochloromethane	ND
1,1-Dichloroethane	< 5
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND

P.O. BOX 4300 • 9669 GROGANS MILL ROAD • THE WOODLANDS, TX 77380 • 713-367-6201 • FAX 713-292-3905

VOLATILE ORGANICS (EPA 8240)
(cont'd)

Laboratory ID: A0830233

Compound	ug/l
Trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3,Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Ethylbenzene	ND
2-Hexanone	ND [50]
Methylene Chloride	ND
4-Methyl-2-pentanone	ND [50]
Styrene	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
Toluene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	< 5
Vinyl acetate	ND [50]
Vinyl chloride	ND [10]
Xylenes total	ND
Dichlorobenzenes	ND

Limit of Practical Quantitation is 5 ug/l, unless otherwise noted in brackets.

Surrogate Recovery:		Recovery Limits
1,2-Dichloroethane-d4	100 %	76-114 %
Toluene-d8	96 %	88-110 %
Bromofluorobenzene	98 %	86-115 %

BETZ ANALYTICAL SERVICES

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VOLATILE ORGANICS (EPA 8240)

Sample Description: (b) (6) Site
Date Samlpled: 8/29/90

Laboratory ID: A0830234
Date Analyzed: 9/6/90

Compound		ug/l
Acetone	<	50 [50]
Benzene		ND
Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND [10]
2-Butanone		ND [100]
Carbon Disulfide		ND
Carbon Tetrachloride		ND
Chlorobenzene		ND
Chloroethane		ND [10]
2-Chloroethylvinylether		ND [10]
Chloroform		ND
Chloromethane		ND [10]
Dibromochloromethane		ND
1,1-Dichloroethane		ND
1,2-Dichloroethane		ND
1,1-Dichloroethene		ND

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VOLATILE ORGANICS (EPA 8240)
(cont'd)

Laboratory ID: A0830234

Compound	ug/l
Trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3,Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Ethylbenzene	ND
2-Hexanone	ND [50]
Methylene Chloride	ND
4-Methyl-2-pentanone	ND [50]
Styrene	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
Toluene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Vinyl acetate	ND [50]
Vinyl chloride	ND [10]
Xylenes total	< 5
Dichlorobenzenes	ND

Limit of Practical Quantitation is 5 ug/l, unless otherwise noted in brackets.

Surrogate Recovery:		Recovery Limits
1,2-Dichloroethane-d4	100 %	76-114 %
Toluene-d8	102 %	88-110 %
Bromofluorobenzene	100 %	86-115 %

BETZ ANALYTICAL SERVICES

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VOLATILE ORGANICS (EPA 8240)

Sample Description: (b) (6) Site
Date Samlpled: 8/29/90

Laboratory ID: A0830235
Date Analyzed: 9/6/90

Compound		ug/l
Acetone	<	50 [50]
Benzene		ND
Bromodichloromethane		ND
Bromoform		ND
Bromomethane		ND [10]
2-Butanone		ND [100]
Carbon Disulfide		ND
Carbon Tetrachloride		ND
Chlorobenzene		ND
Chloroethane		ND [10]
2-Chloroethylvinylether		ND [10]
Chloroform		ND
Chloromethane		ND [10]
Dibromochloromethane		ND
1,1-Dichloroethane		ND
1,2-Dichloroethane		ND
1,1-Dichloroethene		ND

BETZ ANALYTICAL SERVICES

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VOLATILE ORGANICS (EPA 8240)
(cont'd)

Laboratory ID: A0830235

Compound	ug/l
Trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3,Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Ethylbenzene	ND
2-Hexanone	ND [50]
Methylene Chloride	ND
4-Methyl-2-pentanone	ND [50]
Styrene	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
Toluene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Vinyl acetate	ND [50]
Vinyl chloride	ND [10]
Xylenes total	< 5
Dichlorobenzenes	ND

Limit of Practical Quantitation is 5 ug/l, unless otherwise noted in brackets.

Surrogate Recovery:		Recovery Limits
1,2-Dichloroethane-d4	100 %	76-114 %
Toluene-d8	98 %	88-110 %
Bromofluorobenzene	98 %	86-115 %

BETZ ANALYTICAL SERVICES

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VOLATILE ORGANICS (EPA 8240)

Sample Description: (b) (6) -Pecan Grove
Date Samlpled: 8/29/90

Laboratory ID: A0830236
Date Analyzed: 9/6/90

Compound	ug/l
Acetone	ND [50]
Benzene	ND
Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND [10]
2-Butanone	ND [100]
Carbon Disulfide	ND
Carbon Tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND [10]
2-Chloroethylvinylether	ND [10]
Chloroform	ND
Chloromethane	ND [10]
Dibromochloromethane	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND

VOLATILE ORGANICS (EPA 8240)
(cont'd)

Laboratory ID: A0830236

Compound	ug/l
Trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3,Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Ethylbenzene	ND
2-Hexanone	ND [50]
Methylene Chloride	ND
4-Methyl-2-pentanone	ND [50]
Styrene	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
Toluene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Vinyl acetate	ND [50]
Vinyl chloride	ND [10]
Xylenes total	< 5
Dichlorobenzenes	ND

Limit of Practical Quantitation is 5 ug/l, unless otherwise noted in brackets.

Surrogate Recovery:		Recovery Limits
1,2-Dichloroethane-d4	102 %	76-114 %
Toluene-d8	96 %	88-110 %
Bromofluorobenzene	98 %	86-115 %

VOLATILE ORGANICS (EPA 8240)

Sample Description: (b) (6) - Residence
Date Samlpled: 8/29/90

Laboratory ID: A0830237
Date Analyzed: 9/6/90

Compound	ug/l
Acetone	ND [50]
Benzene	ND
Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND [10]
2-Butanone	ND [100]
Carbon Disulfide	ND
Carbon Tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND [10]
2-Chloroethylvinylether	ND [10]
Chloroform	ND
Chloromethane	ND [10]
Dibromochloromethane	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND

VOLATILE ORGANICS (EPA 8240)
(cont'd)

Laboratory ID: A0830237

Compound		ug/l	
Trans-1,2-Dichloroethene		ND	
1,2-Dichloropropane		ND	
cis-1,3,Dichloropropene		ND	
trans-1,3-Dichloropropene		ND	
Ethylbenzene		ND	
2-Hexanone		ND	[50]
Methylene Chloride		ND	
4-Methyl-2-pentanone		ND	[50]
Styrene		ND	
1,1,2,2-Tetrachloroethane		ND	
Tetrachloroethene		ND	
Toluene		ND	
1,1,1-Trichloroethane		ND	
1,1,2-Trichloroethane		ND	
Trichloroethene		ND	
Vinyl acetate		ND	[50]
Vinyl chloride		ND	[10]
Xylenes total	<	5	
Dichlorobenzenes		ND	

Limit of Practical Quantitation is 5 ug/l, unless otherwise noted in brackets.

Surrogate Recovery:		Recovery Limits
1,2-Dichloroethane-d4	100 %	76-114 %
Toluene-d8	98 %	88-110 %
Bromofluorobenzene	98 %	86-115 %

VOLATILE ORGANICS (EPA 8240)

Sample Description: (b) (6) Site
Date Samlpled: 8/29/90

Laboratory ID: A0830238
Date Analyzed: 9/6/90

Compound	ug/l
Acetone	ND [50]
Benzene	ND
Bromodichloromethane	ND
Bromoform	ND
Bromomethane	ND [10]
2-Butanone	ND [100]
Carbon Disulfide	ND
Carbon Tetrachloride	ND
Chlorobenzene	ND
Chloroethane	ND [10]
2-Chloroethylvinylether	ND [10]
Chloroform	ND
Chloromethane	ND [10]
Dibromochloromethane	ND
1,1-Dichloroethane	ND
1,2-Dichloroethane	ND
1,1-Dichloroethene	ND

VOLATILE ORGANICS (EPA 8240)
(cont'd)

Laboratory ID: A0830238

Compound	ug/l
Trans-1,2-Dichloroethene	ND
1,2-Dichloropropane	ND
cis-1,3,Dichloropropene	ND
trans-1,3-Dichloropropene	ND
Ethylbenzene	ND
2-Hexanone	ND [50]
Methylene Chloride	ND
4-Methyl-2-pentanone	ND [50]
Styrene	ND
1,1,2,2-Tetrachloroethane	ND
Tetrachloroethene	ND
Toluene	ND
1,1,1-Trichloroethane	ND
1,1,2-Trichloroethane	ND
Trichloroethene	ND
Vinyl acetate	ND [50]
Vinyl chloride	ND [10]
Xylenes total	ND
Dichlorobenzenes	ND

Limit of Practical Quantitation is 5 ug/l, unless otherwise noted in brackets.

Surrogate Recovery:		Recovery Limits
1,2-Dichloroethane-d4	100 %	76-114 %
Toluene-d8	100 %	88-110 %
Bromofluorobenzene	96 %	86-115 %

Delz Labs, The Woodlands

CHAIN OF CUSTODY RECORD

PROJECT NO. | PROJECT NAME

SAMPLERS (Signature)
Randy Niebuhr
Chad Kirby

STA NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOA						REMARKS
	8/29/00	1230		1	(b) (6) [redacted] property	2	X						Teflon bailer
	"	1210		1	site	2	X						" "
	"	1135		1	site	2	X						" "
	"	1120		1	site	2	X						" "
	"	1015		1	Calcon grove	2	X						" "
	"	945		1	Residence	2	X						" "
	"	900		1	[redacted]	2	X						" "
				1	Travel Blank	1	X						

Relinquished by (Signature)	Date / Time	Received by (Signature)	Relinquished by (Signature)	Date / Time	Received by (Signature)
Randy Niebuhr	8/29/00 2:30 PM	[signature]			
Relinquished by (Signature)	Date / Time	Received by (Signature)	Relinquished by (Signature)	Date / Time	Received by (Signature)
[signature]	8/29/00 2:30P				
Relinquished by (Signature)	Date / Time	Received for Laboratory by (Signature)	Date / Time	Remarks	
		[signature]	8/30/00 9:15		

DISTRIBUTION: Original Accompanies Shipment; Copy to Coordinator Field Files

Reference 5

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SAN MARCOS NORTH QUADRANGLE
TEXAS
7.5 MINUTE SERIES (TOPOGRAPHIC)

(DRIFTWOOD) (BUDA)

98°00' 30°00' 97°52'30" 29°52'30"

Produced by the United States Geological Survey

Control by USGS, NOS/NOAA and Texas Department of Highways & Public Transportation

Compiled from aerial photographs taken 1958. Revisions shown in purple and woodland compiled from aerial photographs taken 1986 and other sources and have been field checked
Map edited 1994. Conflicts may exist between some updated features and previously mapped contours

North American Datum of 1927 (NAD 27). Projection and 10 000-foot ticks: Texas Coordinate System, south central zone (Lambert Conformal Conic)
Blue 1000-meter Universal Transverse Mercator ticks, zone 14

North American Datum of 1983 (NAD 83) is shown by dashed corner ticks. The values of the shift between NAD 27 and NAD 83 for 7.5-minute intersections are obtainable from National Geodetic Survey NADCON software

Areas covered by dashed light-blue pattern are subject to controlled inundation

UTM GRID AND 1994 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

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

TEXAS
QUADRANGLE LOCATION

2997-333

ROAD CLASSIFICATION

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

SAN MARCOS NORTH, TEX.

29097-H8-TF-024

1964
REVISED 1994
DMA 6443 IV NW-SERIES V882

● INTERIOR-GEOLOGICAL SURVEY, RESTON, VIRGINIA—1994

Reference 6

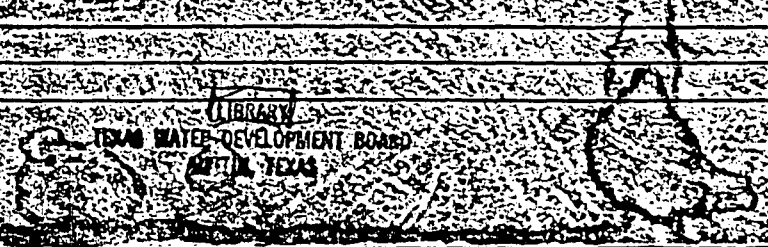
TWDB
R012
c.4

TEXAS
WATER
DEVELOPMENT
BOARD

REPORT 12

GROUND-WATER RESOURCES OF CALDWELL COUNTY, TEXAS

JANUARY 1966
REPRINTED OCTOBER 1969



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AUSTIN, TEXAS

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JUL 23 1986
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MAY 4 1987
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TEXAS WATER DEVELOPMENT BOARD

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REPORT 12

GROUND-WATER RESOURCES OF CALDWELL COUNTY, TEXAS

By

C. R. Follett, Hydraulic Engineer
United States Geological Survey

Prepared by the U.S. Geological Survey
in cooperation with the
Texas Water Development Board
Caldwell County Commissioners' Court
and the
Guadalupe-Blanco River Authority

January 1966
Reprinted October 1969

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TEXAS WATER DEVELOPMENT BOARD
AUSTIN, TEXAS

Table 2.--Geologic units and their water-bearing properties in Caldwell County

System	Series	Geologic unit	Maximum thickness (feet)	Character of rocks	Water-bearing properties
Quaternary	Recent	Alluvium	45±	Gravel, clay, silt, and sand.	Yields small to moderate quantities of fresh to slightly saline water to numerous wells for domestic and stock use, and some irrigation.
	Pleistocene	Leona Formation	40±	Gravel, sand, marl, silt, clay, caliche, and conglomerate.	Yields small to large quantities of fresh water to numerous wells for domestic and stock use, public supply, and some irrigation.
Tertiary(?)	Pliocene(?)	Uvalde Gravel	5	Predominantly flint gravel and cobbles and some limestone boulders.	Not known to yield water to wells in Caldwell County.
Tertiary	Eocene	Weches Greensand	100	Iron-bearing glauconitic clay and sand.	Do.
		Queen City Sand	500	Massive to thin-bedded fine to medium sand and clay with some lenses of conglomerate containing iron.	Yields small quantities of fresh to slightly saline water to a few wells for domestic and stock use. Capable of yielding moderate quantities of water to properly constructed wells.
		Reklaw Formation	400	Glauconitic sand and silt in the lower part of formation and clay and some thin beds of sandstone in the upper part.	Do.
		Carrizo Sand	400	Fine to coarse, loose, cross-bedded sand; some thin beds of sandstone and clay.	Yields small to moderate quantities of fresh to slightly saline water to wells for domestic and stock use, and some irrigation. Capable of yielding large quantities of water to properly constructed wells.
		Wilcox Group	2,000	Fine to medium sand, clay, sandy clay, sandstone, and silty shale with some lenses of limestone.	Yields small to large quantities of fresh to moderately saline water to a large number of wells for domestic and stock use, public supply, and some irrigation.
	Paleocene	Midway Group	600	Clay, silt, glauconitic sand, and thin beds of limestone and sandstone.	Not known to yield water to wells in Caldwell County.
Cretaceous	Gulf	Navarro Group	600	Predominantly clay and silt and some lenses of bluish sandstone.	Mostly non-water-bearing. Yields small quantities of highly mineralized water to wells in a few places.
		Taylor Marl, Austin Chalk, and Eagle Ford Shale, undifferentiated	1,200	Clay, shale, marl, and limestone.	Not known to yield fresh or slightly saline water to wells in Caldwell County.
	Comanche	Washita Group	200	Limestone and clay.	Do.
		Fredericksburg Group	500	do	Do.

alluvium is about 15 feet per mile; the surface also has a component of slope toward the San Marcos River.

The alluvium yields small to moderate quantities of fresh to slightly saline water to numerous dug wells and to springs. The wells are used chiefly for domestic and stock purposes and to a small extent for irrigation. Several springs, which flow from the alluvium at its contact with the underlying rocks, occur along gullies near the San Marcos River and along the bank of the river. No estimate was made of the total natural discharge of these springs, but the flow probably fluctuates over a wide range as indicated by spring BU-67-09-303, which had an estimated flow of 150 gpm on July 3, 1946, and 25 gpm on November 7, 1963.

GROUND WATER

Occurrence of Ground Water

The occurrence of ground water only as it applies to Caldwell County is discussed briefly here. The general principles of the occurrence and movement of ground water in all types of rocks have been described in detail by many writers including Meinzer (1923, p. 2-142), Meinzer and others (1942, p. 385-478), and Tolman (1937).

The source of ground water is precipitation on the surface of the earth. A large part of the precipitation runs off or is soon consumed by evapotranspiration, or is stored in the soil to be evaporated or transpired later. A small part of the water infiltrates through the soil and subsoil, moves downward to the water table, and becomes recharge or part of the ground water in storage. Factors affecting recharge include the intensity and amount of rainfall, the slope of the land surface, the type of soil, the type of material between the soil and the water table, the permeability of the aquifer, the quantity of water in the aquifer, and the rate of evapotranspiration.

In sandy outcrop areas, ground water is unconfined and is under water-table conditions. Downdip from the outcrop or recharge areas where the aquifer is overlain by less permeable material, the water becomes confined and is under artesian conditions.

Water under artesian conditions, if not disturbed by man's withdrawals, will rise in wells to an elevation equal to its elevation in the recharge area less the loss in pressure due to friction. Where the elevation of the land surface near a well is considerably below the general level of the area of outcrop, the pressure may be sufficient to cause the water to rise above the land surface and the well will flow. A few wells in the Plum Creek valley flow small quantities of water.

Ground water moves slowly (tens to hundreds of feet a year) under the influence of gravity from areas of recharge to areas of discharge. The water is discharged naturally through seeps and springs in the outcrop of the aquifer, by transpiration where the water table is close enough to the surface to be reached by the roots of plants or trees, and by seepage through semiconfining beds, or along faults, into another aquifer having a lower pressure. Ground water is also discharged artificially through wells.

Along the edges of the Leona Formation where it is thin, the underlying formation may protrude above the water table at times, and in these places the Leona itself may not always contain water. For example, well BU-67-02-602, which was dug through the Leona and a few feet into the underlying Navarro Group, is supplied by water from the Leona when the water levels are high during periods of abundant rainfall. In dry seasons when the water level recedes, the well is dry.

Several wells have been used for irrigation in periods of extreme drought such as 1925 and 1955-56, and relatively large yields have been reported. Well BU-67-02-903, a 40 by 200-foot pit, yielded 1,820 gpm for several hours after which the pit was allowed to fill over night before pumping was resumed. Continuous yields of about 500 gpm could be expected from properly constructed wells at the most favorable locations where the gravel is highly permeable and the saturated thickness is greatest.

Because of the high topographic position of the Leona Formation and the relative impermeability of the underlying rocks northwest of Lockhart, at least part of the water is drained from the formation by gravity springs. As evidence, numerous springs and seeps that are fed by water from the Leona occur along Clear Fork Plum Creek and other smaller tributaries to Plum Creek. On April 15, 1964, Clear Fork Plum Creek had a flow of 90 gpm at State Highway 142 and a flow of 410 gpm at the swimming pool in Lockhart State Park about $2\frac{1}{2}$ miles southwest of Lockhart, all of the water coming from seeps and springs in the Leona.

The total spring flow from the Leona Formation probably is large. The movement of water in the formation is generally toward the southeast, following the prevailing slope of the plain. South of Lockhart where the Leona rests upon the Wilcox, a relatively permeable unit, the Leona probably acts as a recharge facility for the underlying Wilcox. This is borne out by the fact that southeast of Lockhart only a few wells obtain all their water from the Leona because most of the water has drained down into the underlying Wilcox. Also, the quality of the water from the Wilcox seems to be improved where the Wilcox is overlain by the Leona. For example, water from well BU-67-11-309, which is on the Leona outcrop but produces from the Wilcox, is of better quality than the water from well BU-67-11-311, which is on the Wilcox outcrop. Leakage from the Leona into the Wilcox also is indicated by fewer and smaller springs along the margin of the Leona plain southeast of Lockhart.

Recent Alluvium

The Recent alluvium in Caldwell County is a continuation of the body of alluvium which starts along the Blanco River near San Marcos in Hays County and extends downstream along the San Marcos River (Figure 6). Numerous wells and cut banks show that the alluvium is resting on almost impermeable clay and shale of the Navarro or Midway Groups in the northwestern part of the county. Rasmussen (1947, p. 13) says that the alluvium consists of two distinct sedimentary units--the lower part is a sheet of stratified, in places crossbedded, gravel and sand about 15 feet thick, and the upper part is massive buff-colored clayey silt, also about 15 feet thick. The writer observed well BU-67-10-110 several times while it was being dug into the alluvium and noted that the material brought up was clay, silt, and gravel and little or no sand. The bottom few feet where water was found was not observed. The maximum thickness of the alluvium is about 45 feet. The downstream gradient of the surface of the

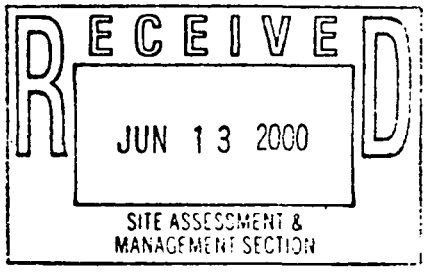
Reference 7

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

INTEROFFICE MEMORANDUM

DATE: June 9, 2000

TO: Susy Loftus
Superfund Project Coordinator
Remediation



THRU: John Meyer
Senior Geologist
SWAP

FROM: Ken May
Source Water Assessment & Protection
Public Drinking Water Section
Water Permits & Resource Management

SUBJECT: Public Water Supply Sources

Susan:

Attached is a print-out of a query ran on our SWAP db to pull out USGS topographic map locations and well data for all PWS wells located on the subject quads. The associated wellhead protection areas for SWP program participants is a 1/4 mile radius for each well. At the time these delineations were generated this program used a standard 1/4 mile radius, circa 1989. In actuality, in the Edwards aquifer, areas of influence for recharge can extend back to the recharge zone. The river alluvium wells are considered groundwater under the influence of surface water wells.. The delineated area for these wells would be the truncated watershed back to the headwaters. .We hope this information is useful. Thanks!

Ken.

Reference 8

RECEIVED
JUN 13 2000
SITE ASSESSMENT &

Public Water Supply Water Sources

TNRCC

Located within the following USGS Topographic Map Area:

SAN MARCOS NORTH 29097-H8 2997-333

06/07/2000

PWS ID	PWS Name					
0160014	STONEGATE SUBDIVISION WATER SYSTEM		PO BOX 1703			
	PWS Type: C		SAN MARCOS		TX 786671703	
	Pws Active? I		5123967005	Population: 4		

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G0160014A	295616	330	218EBFZA	999	I	
1	975432	19950905	67016			100
G0160014B	295616	330	218EBFZA	999	I	
2	975432	19950912	67016			100

PWS ID	PWS Name					
0280003	MAXWELL WATER SUPPLY CORPORATION		PO BOX 158			
	PWS Type: C		MAXWELL		TX 786560158	
	Pws Active? A		5123576253	Population: 4100		

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G0280003A	295455	300	218EDRD	001	O	
1	975444	19710315	67019			370
G0280003B	295456	300	218EDRD	001	O	
2	975443	19760511	67019			1200
G0280003C	295455	300	218EDRD	001	O	
3	975446	19880613	67019			1200

PWS ID	PWS Name					
1050001	SAN MARCOS CITY OF		630 E HOPKINS ST			
	PWS Type: C		SAN MARCOS		TX 786666314	
	Pws Active? A		5123938346	Population: 42554		

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050001A	295327	130	218EBFZA	001	O	
2-SPRING LK PS	975605		67018			4500
G1050001B	295327	115	218EBFZA	001	O	
1-SPRING LK PS	975606	19410000	6701806			2800
G1050001C	295320	202	218EBFZA	002	O	
4-COMANCHE ST.	975647	19661214	6701802			1000
G1050001D	295319	300	218EBFZA	002	O	
5-COMANCHE ST.	975648	19700112	6701805			3400

Public Water Supply Water Sources

Located within the following USGS Topographic Map Area:

TNRCC SAN MARCOS NORTH 29097-H8 2997-333 06/07/2000

G1050001F	295327	130	218EBFZA	999	P	
OLD WELL 1	975605		67018			0
G1050001I	295447	185	218EBFZA	005	O	
GREEN HAVEN	975456	19690303	67019			300

PWS ID	PWS Name				
1050002	KYLE CITY OF		PO BOX 40		
	PWS Type: C		KYLE	TX	786400040
	Pws Active? A		5122685341	Population:	4221

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050002A	295928	765	218EBFZA	001	O	
1-FM 150/BLANCO	975301	19491012	6701308			450
G1050002B	295914	658	218EBFZA	001	O	
2-ALLEN/SCOTT	975253	19740225	6701309			650
G1050002C	295936	640	218EBFZA	002	O	
3-CR 136	975332	19811207	6701310			500

PWS ID	PWS Name				
1050003	SOUTHWEST TEXAS STATE UNIVERSITY		PHYISCAL PLANT		
	PWS Type: C		SAN MARCOS	TX	78666
	Pws Active? A		5122451985	Population:	22200

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050003A	295324	200	218EBFZA	001	O	
1-NR JACKSON HA	975639		67018			1470
G1050003B	295325	200	218EBFZA	001	O	
2-NR JACKSON HA	975639		67018			1270
G1050003C	295324	150	218EBFZA	999	E	
3-OLD PWR HOUSE	975619		67018			500

PWS ID	PWS Name				
1050009	SAN MARCOS BAPTIST ACADEMY		2801 RANCH ROAD 12		
	PWS Type: P		SAN MARCOS	TX	78666
	Pws Active? A		5123532400	Population:	400

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050009B	295351	375	218EBFZA	999	A	
2	975955	19800615	67017			0

	G1050009D	295410	330	218EBFZA	999	N	
	4	975929	19820223	67017			0
	G1050009E	295411	300	218EBFZA	999	A	
	5	975956	19820208	67017			60

PWS ID	PWS Name				
1050061	AQUARENA SPRINGS-PFM		PO BOX 2330		
	PWS Type: N		SAN MARCOS	TX	786672330
	Pws Active? I		5123968900	Population:	1500

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050061A	295332	55	218EBFZA	999	A	
1	975552		67018			100
G1050061B	295336	0	UNKNOWN	999	T	
2	975557		67018			350
G1050061C	295337	0	UNKNOWN	999	A	
3	975558		67018			0

PWS ID	PWS Name				
1050063	AZTEC VILLAGE MHP		591 ROLAND RD		
	PWS Type: C		KYLE	TX	78640
	Pws Active? I		5123531806	Population:	393

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050063A	295721	177	218EBFZA	999	Y	
1	975259	19790801	67016			84
G1050063B	295718	275	218EBFZA	999	Y	
2	975303	19730000	67016			35

PWS ID	PWS Name				
1050072	AQUA TRIO MOBILE HOME PARK		PO BOX 829		
	PWS Type: C		KYLE	TX	786400825
	Pws Active? I		5122682501	Population:	45

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050072A	295801	590	218EBFZA	999	I	
1	975232	19610531	67013			30

Public Water Supply Water Sources

Located within the following USGS Topographic Map Area:

TNRCC | SAN MARCOS NORTH | 29097-H8 | 2997-333 | 06/07/2000

PWS ID	PWS Name					
1050080	GRANITE CREEK WSC		11100 BRITTMOORE PARK DR			
	PWS Type: C		HOUSTON		TX	770041
	Pws Active? A		7139833000	Population:		135

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050080A	295815	360	218EBFZA	001	D	
1-HOMESTEAD RD	975349		67013			15
G1050080B	295815	360	218EBFZA	001	O	
2-N OF WELL #1	975351		67013			16
G1050080C	295811	360	218EBFZA	002	O	
3	975349		67013			20

PWS ID	PWS Name					
1050089	CRESTWOOD CENTER		3355 BEE CAVE RD STE 102B			
	PWS Type: N		AUSTIN		TX	78746
	Pws Active? A		5123278833	Population:		50

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050089A	295355	425	218EBFZA	001	O	
1-BEHND CENTER	975813		67017			20

PWS ID	PWS Name					
1050100	OAK MEADOWS		11100 BRITTMOORE PARK DRIVE			
	PWS Type: C		HOUSTON		TX	77041
	Pws Active? A		5123262393	Population:		395

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050100A	295753	600	218EBFZA	001	O	
1	975837		67011			55
G1050100B	295826	400	218EBFZA	002	O	
2	975750	19920903	67011			60

PWS ID	PWS Name					
1050103	WONDERLAND SCHOOL WATER SYSTEM		302 COUNTRY ESTATES			
	PWS Type: P		SAN MARCOS		TX	78666
	Pws Active? A		5123929404	Population:		223

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050103A	295406	244	218TRNT	001	O	
1	975817		67017			10

Public Water Supply Water Sources

Located within the following USGS Topographic Map Area:

TNRCC | SAN MARCOS NORTH | 29097-H8 | 2997-333 | 06/07/2000

PWS ID	PWS Name
1050104	

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status / Pumpage (gpm)
G1050104A 1	295245 975440	0	UNKNOWN 67019	999	Y 0

PWS ID	PWS Name					
1050123	BLANCO RIVER RANCH		PO BOX 1703			
	PWS Type:	C	SAN MARCOS		TX	786671703
	Pws Active?	A	5123967006	Population:	30	

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status / Pumpage (gpm)
G1050123A	295617.4 975430.9	330	UNKNOWN	001	O 40
G1050123B	295617.4 975430.9	330	UNKNOWN	001	O 38

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Public Water Supply Water Sources

Located within the following USGS Topographic Map Area:

TNRCC

06/07/2000

PWS ID	PWS Name

Water Source *Owner Designation*	Latitude \ Longitude	Well Depth * *Drill Date* *	Aquifer Code * *State Well No.* *	Entry Point	Operational Status Pumpage (gpm)

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Public Water Supply Water Sources

Located within the following USGS Topographic Map Area:

TNRCC | MARTINDALE | 29097-G7 | 2997-331 | 06/07/2000

PWS ID	PWS Name					
0280012	TRI COMMUNITY WATER SUPPLY CORP		PO BOX 11			
	PWS Type: C		FENTRESS		TX	786220011
	Pws Active? A		5124882573	Population:	1150	

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G02800'2A	294510	19	100ALVM	001	O	
1	974647	19720328	67109			186
G0280012B	294528	40	110ALVM	001	O	
3	974644	19961004	67109			350

PWS ID	PWS Name					
0280013	MARTINDALE WATER SUPPLY CORP		PO BOX 175			
	PWS Type: C		MARTINDALE		TX	786550175
	Pws Active? A		5123576951	Population:	1827	

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G0280013A	295024	33	112LEON	001	O	
1	975042	19240000	6710101			260
G0280013B	295025	45	110ALVM	002	O	
2	975040	19550000	6710102			400

PWS ID	PWS Name					
0940017	STAPLES FARMERS CORPORATION		PO BOX 67			
	PWS Type: C		STAPLES		TX	786700067
	Pws Active? A		5123576358	Population:	612	

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G0940017A	294701	34	100ALVM	001	O	
1-FM 1977	974951	19590000	6710801			165
G0940017B	294701	34	100ALVM	001	O	
2-E OF STAPLES	974951		67108			75

Public Water Supply Water Sources

TNRCC

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MARTINDALE 29097-G7 2997-331 06/07/2000

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Public Water Supply Water Sources

Located within the following USGS Topographic Map Area:

TNRCC SAN MARCOS SOUTH 29097-G8 2997-332 06/07/2000

PWS ID	PWS Name					
0280017	PECAN TRAILER PARK	PWS Type: N	2120 MARTINDALE RD TRLR 201			
		Pws Active? A	SAN MARCOS	TX	786669669	
			5123960070	Population:	125	

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G0280017A	295144	34	100ALVM	001	O	
1	975322	19590000	67108			31
G0280017B	295144	50	125MDWY	999	N	
2-50'W/O WELL#1	975320	19310000	6710803			30

PWS ID	PWS Name					
0940015	CRYSTAL CLEAR WATER SUPPLY CORP	PWS Type: C	2370 FM 1979			
		Pws Active? A	SAN MARCOS	TX	786662100	
			8303721031	Population:	10944	

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G0940015A	295119	229	218EBFZA	999	E	
LAUREL ESTATES	975853	19650325	6709101			200
G0940015B	295109.6	325	218EBFZA	002	O	
MCCARTY LANE 1	975910.7	19780000	67091			600
G0940015C	295108.7	321	218EBFZA	002	O	
MCCARTY LANE 2	975909.7	19730000	6709111			450
G0940015F	295142.8	217	218EBFZA	006	O	
WILLOW CREEK	975847.9	19840000	67091			800
G0940015H	295104.9	250	218EBFZA	002	O	
ED'S WELL	975905		67091			0

PWS ID	PWS Name					
1050001	SAN MARCOS CITY OF	PWS Type: C	630 E HOPKINS ST			
		Pws Active? A	SAN MARCOS	TX	786666314	
			5123938346	Population:	42554	

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050001E	295147	315	218EBFZA	003	O	
6-MCCARTY LANE	975925	19840712	67091			1500
G1050001L	295009	265	218EBFZA	007	O	
OAK RDG 2-SOYAR	975938	19610000	6709104			482

Public Water Supply Water Sources

Located within the following USGS Topographic Map Area:

TNRCC SAN MARCOS SOUTH 29097-G8 2997-332 06/07/2000

PWS ID	PWS Name
1050023	

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050023A	295223	40	100ALVM	999	Y	
1	975348	19630101	67093			31

PWS ID	PWS Name					
1050057	MOCKINGBIRD MOBILE HOME PARK		PO BOX 1084			
	PWS Type: C		SAN MARCOS	TX	786671084	
	Pws Active? A		5123925411	Population:	120	

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050057A	295216	60	218EBFZA	001	O	
1-NEAR OF MHP	975748	19500000	67091			30
G1050057B	295210	60	218EBFZA	002	O	
2-W END OF MHP	975755	19650101	67091			30

PWS ID	PWS Name					
1050066	STRINGTOWN WATER SERVICE CORP		2370 FM 1979			
	PWS Type: C		SAN MARCOS	TX	786664462	
	Pws Active? A		5123960045	Population:	205	

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050066A	295103	300	218EBFZA	999	E	
1	975903	19801114	67091			150

PWS ID	PWS Name					
1050105	YELLOW ROCK MOBILE HOME PARK		1055 CAP ROCK HL			
	PWS Type: C		NEW BRAUNFELS	TX	781324247	
	Pws Active? A		8306080233	Population:	90	

Water Source / Owner Designation	Latitude \ Longitude	Well Depth * / Drill Date *	Aquifer Code * / State Well No. *	Entry Point	Operational Status	Pumpage (gpm)
G1050105A	295013	200	218EBFZA	001	O	
1	975920		67091			45

Public Water Supply Water Sources

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Reference 9

The State of Texas Water Quality Inventory

SURFACE WATER QUALITY MONITORING PROGRAM

12th Edition, 1994 • Prepared Pursuant to Section 305(b) Federal Clean Water Act

94

Basin Summaries, Basin Maps, Segment Fact Sheets, and Water Quality Status Tables (Basins 13 - 25)

3

VOLUME THREE

SFR-11 ◆ 11/94

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

THE STATE OF TEXAS WATER QUALITY INVENTORY

12th Edition
1994

Prepared Pursuant to
SECTION 305(b)
FEDERAL CLEAN WATER ACT

VOLUME 3

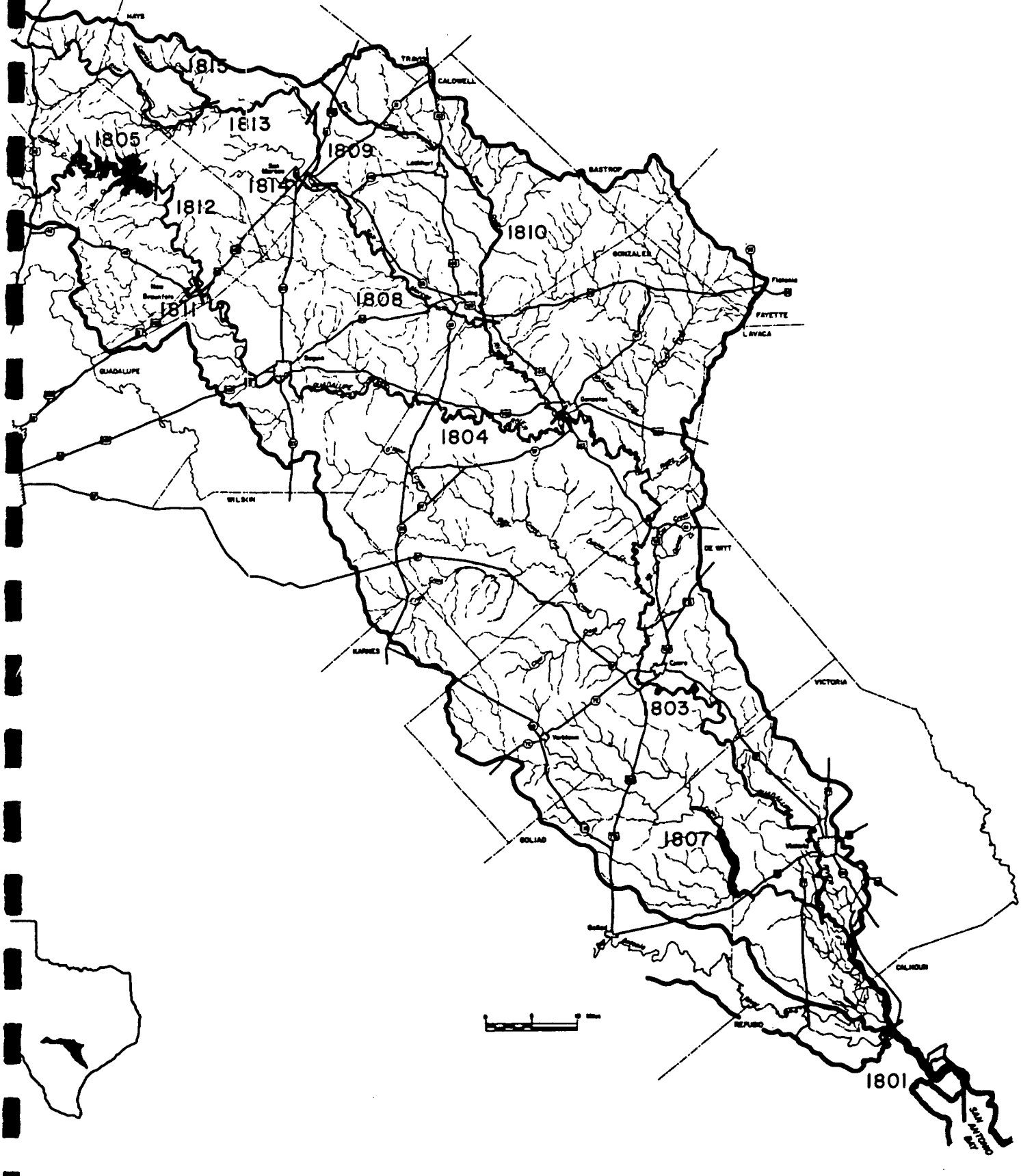
Basin Summaries, Basin Maps, Segment Fact Sheets,
and Water Quality Status Tables (Basins 13-25)

by the

Texas Natural Resource Conservation Commission

November 1994

GUADALUPE RIVER BASIN



Reference 10

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SOIL SURVEY OF

Caldwell County, Texas

United States Department of Agriculture
Soil Conservation Service
In cooperation with
Texas Agricultural Experiment Station

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Soil survey of Caldwell County, Texas

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Issued July 1978

brown and very dark grayish brown. The B horizon is 22 to 50 inches thick and is very pale brown, brown, dark yellowish brown, yellowish brown, or light yellowish brown. This horizon ranges from silty clay to clay loam and from a few to 20 percent, by volume, calcium carbonate concretions.

Lewisville silty clay, 0 to 1 percent slopes (LeA).—This nearly level soil is on broad terraces. Areas are irregular in shape and range from 30 to 200 acres in size, but they are dominantly about 75 acres. This soil has the profile described as representative of the series.

Included with this soil in mapping are areas of soils that have a dark surface layer more than 20 inches thick and areas that are less than 35 percent clay. These soils make up less than 30 percent of any mapped area.

This soil is suited to all crops commonly grown in the county, and most areas are cultivated. A few small areas are in improved pasture or small grain and are used for grazing. Runoff is slow, and the hazard of erosion is slight. Capability unit I–1; pasture and hay group 7C; Clay Loam range site.

Lewisville silty clay, 1 to 3 percent slopes (LeB).—This gently sloping soil is on terraces in long, narrow areas 10 to 110 acres in size.

The surface layer is dark grayish-brown calcareous silty clay about 16 inches thick. The next layer is yellowish-brown calcareous silty clay about 13 inches thick. Below this is about 14 inches of light yellowish-brown silty clay that is about 10 percent, by volume, strongly cemented masses of calcium carbonate. The next layer is light yellowish-brown clay loam that is about 20 percent, by volume, soft masses of calcium carbonate.

Included with this soil in mapping are small areas of Seawillow soils and areas of soils that have a dark surface layer more than 20 inches thick. Included soils make up less than 30 percent of any mapped area.

This soil is well suited to all crops commonly grown in the county, and most areas are cultivated. Runoff is medium, and the hazard of erosion is moderate. Capability unit IIe–3; pasture and hay group 7C; Clay Loam range site.

Lewisville silty clay, 3 to 5 percent slopes, eroded (LeC2).—This gently sloping soil is on terraces in long, narrow areas 10 to 100 acres in size. Gullies 1 foot to 3 feet deep and 15 to 30 feet wide dissect the surface at intervals of 200 feet.

Between the gullies, the surface layer is dark grayish-brown calcareous silty clay about 16 inches thick. The next layer is about 20 inches of brown calcareous silty clay that has a few calcium carbonate concretions. Below this is brown silty clay that is about 20 percent, by volume, soft masses and concretions of calcium carbonate.

Included with this soil in mapping are spots of eroded soils that have a light-colored surface layer. Also included are small areas of soils that are similar to Lewisville soil, except that they are less than 35 percent clay. Included soils make up less than 30 percent of any mapped areas.

This soil is used for crops and as improved pasture. It is suited to all crops commonly grown in the county. Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe–5; pasture and hay group 7C; Clay Loam range site.

Mabank Series

The Mabank series consists of deep, nearly level to gently sloping soils on uplands. These soils formed in shaly clay.

In a representative profile the surface layer is grayish-brown loam about 7 inches thick. Below this is very dark gray clay loam about 7 inches thick over about 9 inches of dark-gray clay that has a few reddish-brown mottles. The next layer is gray clay about 16 inches thick that has material from the surface in filled cracks. Below this is about 37 inches of grayish-brown and pale-brown sandy clay that has a few yellowish-brown mottles and soft masses of calcium carbonate. The underlying material is pale-brown shaly clay that has many yellowish-brown mottles.

Mabank soils are somewhat poorly drained. Permeability is very slow, and available water capacity is medium.

These soils are in crops, improved pasture, and brushy range.

Representative profile of Mabank loam, 0 to 1 percent slopes, 2.2 miles south on Texas Highway 304 from its intersection with Farm Road 713 in Delhi, then 1,300 feet west of the highway, in a pasture:

A1—0 to 7 inches, grayish-brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; massive when dry, crushed in the hand breaks to weak, granular structure when moist; hard, friable; slightly acid; abrupt, wavy boundary.

B21tg—7 to 14 inches, very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; weak, coarse, blocky structure; very hard, firm; streaks of material from the surface in filled cracks; slightly acid; abrupt, wavy boundary.

B22tg—14 to 23 inches, dark-gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; few, fine, faint, reddish-brown (5YR 5/3) mottles in the lower part; strong, coarse, blocky structure; extremely hard, very firm; vertical streaks of grayish-brown (10YR 5/2) fine sandy loam material in filled cracks; few small slickensides; neutral; gradual, smooth boundary.

B23tg—23 to 39 inches, gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; moderate, coarse, blocky structure; very hard, firm; material from the surface in thin vertical cracks; neutral; gradual, smooth boundary.

B31t—39 to 65 inches, grayish-brown (10YR 5/2) sandy clay, dark grayish brown (10YR 4/2) moist; few, fine, faint, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky stucture; hard, firm; material from the surface in thin vertical cracks; few soft masses of calcium carbonate; mildly alkaline; clear, smooth boundary.

B32t—65 to 76 inches, pale-brown (10YR 6/3) sandy clay, brown (10YR 5/3) moist; few, fine, yellowish-brown (10YR 5/6) mottles; hard, firm; about 5 percent soft masses of calcium carbonate; few black concretions; mildly alkaline; abrupt, smooth boundary.

C—76 to 84 inches, pale-brown (10YR 6/3) shaly clay, brown (10YR 5/3) moist; many, coarse, distinct, yellowish-brown (10YR 5/6) mottles; massive; very hard, firm; few soft masses of calcium carbonate; mildly alkaline.

The A horizon is 4 to 10 inches thick. It is very dark gray or grayish brown and is neutral or slightly acid.

The B2 horizon is very dark gray, gray, light gray, brownish gray, or dark gray. It ranges from clay loam to clay and from slightly acid to mildly alkaline. In most profiles, some part of this horizon has fine yellowish-brown and reddish-brown mottles.

The B3 horizon is grayish brown, pale brown, light

surface layer makes cultivation difficult. Runoff is medium, and the hazard of erosion is moderate. Capability unit IIIe–2; pasture and hay group 7B; Blackland range site.

Jedd Series

The Jedd series consists of moderately deep, sloping to moderately steep soils on uplands. These soils formed in weakly consolidated sandstone.

In a representative profile the surface layer is about 12 inches of brown gravelly sandy loam that is about 40 percent, by volume, pebbles. About 50 percent of the surface is covered with sandstone stones. The next layer is about 5 inches of light-brown very gravelly sandy loam that is about 60 percent, by volume, sandstone pebbles. Below this is red strongly acid clay about 11 inches thick. The underlying material is reddish-yellow, very strongly acid, weakly cemented sandstone.

Jedd soils are well drained. Permeability is moderately slow, and available water capacity is very low.

These soils are used mostly as range. A few areas are in improved pasture.

Representative profile of Jedd gravelly sandy loam in an area of Jedd stony soils, 5 to 20 percent slopes, about 4 miles east of Luling on Farm Road 1322 from its junction with U.S. Highway 183, then 3 miles southeast on a county road to its junction with another county road and railroad, in a wooded pasture:

A1—0 to 12 inches, brown (7.5YR 5/4) gravelly sandy loam, dark brown (7.5YR 4/4) moist; weak, fine, granular structure; slightly hard, very friable; common fine roots; about 40 percent, by volume, angular sandstone pebbles; 50 percent of the surface covered with sandstone stones; slightly acid; abrupt, smooth boundary.

A2—12 to 17 inches, light-brown (7.5YR 6/4) very gravelly sandy loam, light brown (7.5YR 6/4) moist, weak, granular structure; slightly hard, very friable; common fine roots; about 60 percent, by volume, angular sandstone pebbles; slightly acid; abrupt, wavy boundary.

B2t—17 to 28 inches, red (2.5YR 5/8) clay, red (2.5YR 4/8) moist; few, fine, distinct mottles of yellowish brown (10YR 5/8) and a few, fine, faint mottles of yellowish red (5YR 5/8); moderate, medium, subangular blocky structure; very hard, firm; common fine roots; patchy clay films; few sandstone fragments; strongly acid; abrupt, wavy boundary.

C—28 to 60 inches, reddish-yellow (5YR 6/8) weakly cemented sandstone and strata of brownish-yellow (10YR 6/8) fine sandy loam; very strongly acid.

The A horizon ranges from 30 to 80 percent, by volume, coarse fragments. The A1 horizon is 3 to 12 inches thick and is brown or pale brown. It ranges from fine sandy loam or sandy loam to loamy sand and is neutral or slightly acid. This horizon is gravelly, very gravelly, cobbly, or very cobbly in places. The A2 horizon is 3 to 8 inches thick and is light brown, brown, or light yellowish brown. This horizon ranges from fine sandy loam to loamy fine sand and is neutral or slightly acid.

The B2t horizon is 6 to 16 inches thick. This horizon is red or yellowish red and has a few red and yellow mottles in places. It ranges from clay to sandy clay, is gravelly or cobbly in places, and is medium acid or strongly acid.

The C horizon is 20 to 40 inches of weakly consolidated to strongly cemented sandstone and is reddish yellow or light reddish brown. This horizon has a few pockets and strata of fine sandy loam, loamy fine sand, and sandy clay loam.

Jedd stony soils, 5 to 20 percent slopes (JsF).—These sloping to moderately steep soils are on uplands in areas 25 to 100 feet higher than soils in surrounding areas. Most areas are oval in shape and are 10 to 300 acres in size. Soil patterns are not uniform. The surface layer is variable. It ranges from gravelly, very gravelly, cobbly, or very cobbly loamy sand to fine sandy loam or sandy loam and is about 50 percent stones.

Included with these soils in mapping are small areas of Rosanky soils. Also included are areas of soils that have a surface layer more than 20 inches thick and areas in which the layer above the underlying material is more than 40 inches thick. Included areas make up less than 20 percent of any mapped area.

These soils are mostly in range. They are too stony and steep for crops. A few small areas are in improved pasture. Runoff is rapid, and the hazard of erosion is slight. Capability unit VIe–3; pasture and hay group 8D; Sandstone Hills range site.

Lewisville Series

The Lewisville series consists of deep, nearly level to gently sloping soils on old terraces. These soils formed in calcareous clayey and loamy alluvium.

In a representative profile the surface layer is very dark grayish-brown calcareous silty clay about 12 inches thick. The next layer is dark yellowish-brown calcareous silty clay about 12 inches thick over yellowish-brown calcareous silty clay loam about 18 inches thick. Below this is very pale brown calcareous clay loam that has soft masses and concretions of calcium carbonate.

Lewisville soils are well drained. Permeability is moderate, and available water capacity is high.

These soils are used mostly for crops. A few areas are in improved pasture.

Representative profile of Lewisville silty clay, 0 to 1 percent slopes, 1 mile northeast of the school in Maxwell on a county road, then 1.4 miles northwest on another county road, then 1,000 feet northeast of the road, in a cultivated field:

Ap—0 to 4 inches, very dark grayish brown (10YR 3/2) silty clay, very dark brown (10YR 2/2) moist; strong, granular structure; hard, friable; few calcium carbonate concretions; calcareous; moderately alkaline; abrupt, smooth boundary.

A1—4 to 12 inches, very dark grayish brown (10YR 3/2) silty clay, very dark brown (10YR 2/2) moist; strong, granular structure; hard, friable; dark-brown (7.5YR 4/2) streaks in filled cracks and worm channels; calcareous; moderately alkaline; gradual, smooth boundary.

B21—12 to 24 inches, dark yellowish-brown (10YR 4/4) silty clay, dark yellowish brown (7.5YR 3/4) moist; strong, granular structure; hard, friable; yellowish-brown (10YR 5/4) material in worm channels; calcareous; moderately alkaline; clear, smooth boundary.

B22—24 to 42 inches, yellowish-brown (10YR 5/4) silty clay loam, dark yellowish brown (10YR 4/4) moist; strong, granular structure; hard, friable; yellowish-brown (10YR 5/4) material in worm channels; calcareous; moderately alkaline; clear, smooth boundary.

B3ca—42 to 60 inches, very pale brown (10YR 7/4) clay loam, light yellowish brown (10YR 6/4) moist; strong, granular structure; hard, friable; about 40 percent, by volume, soft masses of calcium carbonate; calcareous; moderately alkaline.

The A horizon is 8 to 20 inches thick and is dark grayish

calcareous clay loam that extends to a depth of 60 inches.

Bosque soils are well drained. Permeability is moderate, and available water capacity is high.

The soils in frequently flooded areas are mostly in native pasture and pecan orchards. Occasionally flooded areas are used mainly for crops.

Representative profile of Bosque clay loam, 0.75 mile south of the Luling Foundation Farm headquarters at Luling on U.S. Highway 90, in a field:

Ap—0 to 4 inches, dark grayish-brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate, fine, subangular blocky structure; hard, friable; many fine roots; many earthworm channels; few broken snail shells; calcareous; moderately alkaline; abrupt, smooth boundary.

A1—4 to 25 inches, dark grayish-brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate, fine, subangular blocky and granular structure; hard, friable; many fine roots; many earthworm channels; few broken snail shells; calcareous; moderately alkaline; clear, smooth boundary.

C—25 to 60 inches, pale-brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; massive; hard, friable; few roots; few fine lenses of very pale brown (10YR 7/3) silt loam; calcareous; moderately alkaline.

The A horizon is 20 to 50 inches thick. It is dark grayish brown or very dark grayish brown and ranges from clay loam to loam. The C horizon is brown, pale brown, or grayish brown and ranges from loam to clay loam.

Bosque clay loam (Bo).—This nearly level soil is on flood plains along the San Marcos River. Slopes range from 0 to 1 percent. Most areas are crescent shaped and lie in the bends of the river. In places, secondary flood channels dissect the soil areas. This soil is flooded once every 5 to 7 years, but flooding lasts only a few hours. It has the profile described as representative of the series.

Included with this soil in mapping are small areas of Seguin and Trinity soils that make up less than 15 percent of any mapped area.

This soil is well suited to all crops commonly grown in the county, and most areas are cultivated. Runoff is slow, and the hazard of erosion is slight. Capability unit I–1; pasture and hay group 2A; Loamy Bottomland range site.

Bosque soils, frequently flooded (Bp).—This mapping unit is made up of nearly level soils on flood plains. Areas are long and narrow and are parallel to the stream channel along the San Marcos River. Slopes are 0 to 1 percent. Bosque soils make up about 65 percent of the mapping unit. The remaining 35 percent is soils that are similar to Bosque soils, except that they have more silt throughout the profile. The soils in this mapping unit are flooded at least once each year, and flooding lasts 1 or 2 days following heavy rains. Soil patterns are not uniform, and they occur without regularity. The surface layer ranges from clay loam to loam because deposition by floodwater causes surface alteration.

These Bosque soils have a surface layer of dark grayish-brown calcareous loam about 35 inches thick. The next layer is brown calcareous loam that has lenses of silt loam and threads of calcium carbonate and extends to a depth of 60 inches.

The soils in this mapping unit are well suited to use as range, and most areas are in native or improved pasture and pecan orchards (fig. 8). Runoff is slow, and the hazard of erosion is slight. Capability unit Vw–1; pasture and hay group 2A; Loamy Bottomland range site.

Branyon Series

The Branyon series consists of deep, nearly level to gently sloping soils on old terraces. These soils formed in calcareous clayey alluvium.

In a representative profile the surface layer is dark-gray calcareous clay about 44 inches thick. Below this is gray calcareous clay about 28 inches thick that has many fine slickensides. The next layer is light-gray clay that extends to a depth of 96 inches.

Branyon soils are moderately well drained. These soils take in water rapidly when they are dry and very slowly when they are wet. Available water capacity is high.

These soils are used mostly for crops. A few areas are used as improved pasture.

Representative profile of Branyon clay, 0 to 1 percent slopes, 4,000 feet northeast of a railroad crossing in Reedville on Farm Road 1984, then 4,000 feet southeast on a county road to the intersection of railroad tracks, then 2,000 feet south of the road, in a cultivated field:

Ap—0 to 4 inches, dark-gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate, fine, granular structure; extremely hard, very firm, sticky and plastic; few roots; few fine concretions of ferromanganese; calcareous; moderately alkaline; abrupt, smooth boundary.

A11—4 to 44 inches, dark-gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; parallelepipeds part to moderate, medium, angular blocky structure; extremely hard, very firm, sticky and plastic; few fine roots, mostly on surfaces of peds; common, coarse, grooved slickensides; few fine concretions of calcium carbonate; few fine concretions of ferromanganese; calcareous; moderately alkaline; gradual, wavy boundary.

A12—44 to 72 inches, gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; parallelepipeds part to moderate, medium, angular blocky structure; very hard, very firm; sticky and plastic; few roots; few dark-gray streaks from above; many fine slickensides; few fine concretions of calcium carbonate; few fine concretions of ferromanganese; calcareous; moderately alkaline; gradual, wavy boundary.

AC1—72 to 86 inches, light-gray (10YR 7/2) clay, light brownish gray (10YR 6/2) moist; few, medium, distinct, brown (10YR 5/3) mottles; moderate, medium, angular blocky structure; very hard, very firm, sticky and plastic; few dark-gray streaks from above; few soft masses and concretions of calcium carbonate; few fine concretions of ferromanganese; calcareous; moderately alkaline; gradual, wavy boundary.

AC2—86 to 96 inches, light-gray (10YR 7/2) clay, light brownish gray (10YR 6/2) moist; few, medium, distinct, brown (10YR 5/3) mottles; moderate, medium, angular blocky structure; very hard, extremely firm, sticky and plastic; few, thin, dark-gray streaks from above; common soft masses and concretions of calcium carbonate; few fine concretions of ferromanganese; calcareous; moderately alkaline.

The Ap and A11 horizons are 20 to 60 inches thick and are dark gray or very dark gray. The A12 horizon ranges in thickness from 4 to 17 inches within a horizontal distance of 40 inches.

The AC horizon is 10 to 50 inches thick and ranges from

Reference 11

John I all, Chairman
Pam Reed, Commissioner
Peggy Garner, Commissioner

TEXAS WATER COMMISSION

PROTECTING TEXANS' HEALTH AND SAFETY BY PREVENTING AND REDUCING POLLUTION

July 9, 1993

CERTIFIED MAIL #P118309396
RETURN RECEIPT REQUESTED

Honorable Kathy Morris, Mayor
City of San Marcos
630 East Hopkins
San Marcos, Texas 78666

Re: Municipal Solid Waste - Caldwell County
City of San Marcos - Permit Application No. MSW640 & MSW640A
Within the Gary Job Corps Training Center,
1.0 Mi SE of SH-21; 1.6 Mi SW FM-1966

Dear Mayor Morris:

On June 25, 1993, Mr. Richard Garcia of the Texas Water Commission's (TWC) District 8 office inspected the referenced municipal solid waste disposal facility and was accompanied by Mr. Bill Patterson, City Surveyor. During this inspection conditions were observed and documented that constitute a violation of the TWC's Municipal Solid Waste Regulations (MSWR).

The following area of noncompliance was observed and documented during this inspection:

1) 31 Texas Administrative Code (TAC) §330.150(c)(2): "... The final cover for the top portion of a landfill shall have a minimum gradient of 2.0% and shall not exceed 6.0%, but shall possess a sufficient minimum grade to preclude ponding of surface water when total fill height and expected subsidence are taken into consideration. ..."

Violation - Subsidence channels were noted on the south/southeast midsection of the landfill. Some were two (2) to four (4) feet deep.

Corrective Action and Compliance Schedule - The existing top grades must be shaped and smoothed to meet the 2 to 6% slope requirements. This corrective action must be implemented prior to September 30, 1993.

At the time of the inspection, it was difficult to assess the drainage patterns across the site, however it was possible to identify and document the areas of subsidence. It is possible that these subsidence areas could be a contributing factor to the monitoring well problems we have encountered in the past. It is highly recommended that the site be mowed during the summer season to facilitate monitoring of post closure maintenance.

Although department approval is not necessary for post closure uses of landfills other than those specified in Subsection 330.154(a), the department believes that Subsection 330.154 (b)(3) "...the ponding of water, excessive irrigation, or plowing to a depth below the top soil should not be allowed unless there is assurance(s) that percolation of moisture into the buried waste will not occur." During this inspection the southwest corner of the landfill approximately 40 feet had been plowed and corn was being grown on site. We are requesting analytical data and or boring if necessary, to provide us with those assurances that moisture is not percolating into the landfill in this area.

During the on site visit with Mr. Bill Patterson, it was revealed that a recent aerial map had been done that would clearly identify the monitoring wells as well as the site boundaries. Please provide us a copy of your most current aerial map. Although the site is basically surrounded by the airport and the Gary Job Corp facilities, access to the site was not difficult. There is one entrance going through the airport and two unsecured entrances to the site on County Road 238. (North/Northeast of the property)

Upon sixty (60) days from the date of this letter we will reinspect the referenced facility to evaluate your conformance with the above stated compliance schedules. Failure to correct the violations within the prescribed sixty (60) day period may subject San Marcos to administrative penalties. TWC personnel are available to assist you with any technical assistance that you may require in order to effect compliance.

Sincerely,

H. W. Merritt, Jr., P. E.
Program Manager
Municipal Solid Waste

HWM/JRG/jnr

cc: MSW Compliance & Enforcement Section, Austin

Reference 12

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE APR 1 6 1985

SUBJECT Pollution Control Screening at Gary Job Corps Center, San Marcos, Texas

FROM Jim Highland, P.E.
Federal Facilities Compliance Coordinator (6ES-FA)

TO File, Gary Job Corps Center, San Marcos, Texas

On Tuesday, April 9, 1985, I visited the subject Federal Facility to survey pollution control facilities and activities relative to implementation of Executive Order 12088 and the requirements of the environmental laws administered by EPA. This survey is part of a regional initiative to screen significant minor Federal Facilities (FF) not currently in the sphere of FF receiving regular compliance inspections by the State and/or EPA. These surveys are intented to surface any obvious or apparent problems needing correction or warranting closer investigation through follow-up compliance inspections. The visits are informal and consultative in nature and this report should not be interpreted as a formal finding of actual compliance status.

Gary Job Corps Center (GJCC) is located on 817 acres of land approximately 1 mile northeast of San Marcos, Texas on State Highway No. 21. It is a residential vocational training center for economically pressed youth who have dropped out of school and are unable to find jobs. It provides vocational training in 24 areas of the building, construction, manufacturing and automotive trades, service occupations and special programs. Basic education courses are also provided in support of the vocational training. Current GJCC population is approximately 2,500 resident and 600 non-resident. GJCC has its own power, natural gas and water distribution and sewage collection and disposal systems. Solid waste collection and disposal and pesticide control services are contracted to outside firms. Air, solid waste and wastewater emissions sources include dormitories and other residences, service and educational buildings, dining halls, shops (carpentry, sheet metal, welding, machine, printing, automotive and heavy equipment repair), heavy equipment operation and storage and transfer facilities for automotive and diesel fuel.

My primary contacts and guides for the survey were Mr. Dick Moncure, Environmental Coordinator, and Mr. Mo Gloria. During the screening, I identified no apparent problems in the areas of air and water pollution control under the CAA and CWA, RCRA waste handling and disposal, pesticides use and handling, nor their activities covered under the Safe Drinking Water Act. However, I did note the following apparent violations or potential problems connected with their CERCLA and TSCA activities:

Apr 18 1985 Violations

EPA Form 1320-6 (Rev. 3-76)

1. CERCLA (Superfund) Activities.

Since December, 1964, the Job Corps has occupied a part of a former military air base of WWII vintage (1943), and GJCC personnel have little information concerning possible hazardous materials and waste handling and disposal activities of the former military tenants. Mr. Moncure told me he was there for a while before the Job Corps took over their portion, and he knows there was some landfilling being done at that time. He said he's not sure about any hazardous wastes being buried there during the military operation, but he thinks there may have been some tetraethyl lead buried then. GJCC has also conducted some on-site landfilling, but Mr. Moncure said he knows of no hazardous wastes buried during that time, only refuse, some garbage and some construction and demolition debris. I told him CERCLA and Executive Order 12088 require Federal agencies to review their past activities, determine whether any of those activities are potential hazardous waste problems, and take whatever remedial steps are necessary to eliminate the problems. I suggested he contact the Department of Defense (DOD) Former Sites Program (FSP) to see if they have investigated, or plan to investigate, the problem potential at the Gary facility. If not, GJCC should request a DOD investigation, and any necessary remedial actions, under the FSP.

2. TSCA Regulated Activities.

GJCC has a large number (100+) of electrical power tranformers in service or in storage for either future use, repair or disposal. Many of these transformers were inherited from the former military owners, and Job Corps personnel have no information whether or not any of them contain PCBs. GJCC has set up no PCB records system, labeled no transformers, tested no dielectric fluid, nor attempted to confirm the existence of PCBs. Some transformers sitting in a storage yard were observed to be leaking and oil stains were visible on the ground. Most of the transformer nameplates observed either had no information as to type of dielectric or were not clear whether the fluid could be PCB-contaminated. I recommended they immediately implement a program to determine the presence of PCBs in those transformers not currently in service, especially those which are leaking, and set up the required PCB records system if necessary. I also suggested they may need to provide a regulation storage facility for some of their transformers. Mr. Moncure advised me that they have already ordered some test kits to begin testing transformers for PCBs and will provide labeling, recordkeeping and storage as necessary to comply with PCB regulations, if PCBs are found.

CONCLUSION: It appears that immediate future follow-up activity in connection with the GJCC may appropriately be limited to monitoring the progress of (1) necessary CERCLA investigations and/or remedial actions to confirm fulfillment of CERCLA responsibilities and (2) the Center's efforts to assure compliance with the PCB regulations. The need for an early follow-up TSCA compliance inspection will be left to the judgement of the regional TSCA enforcement program. No immediate follow-up visits are recommended for the other media programs at this time.

cc: McKee, 6AW-SC
Mount, 6AW-P
Frey, 6AW-AE
Ferguson, 6W-EC
Brown, 6AW-HC
Murphy, 6AW-PP
Graham, 6W-SP

Reference 13

MSW640

THE CITY OF SAN MARCOS

December 4, 1996

Ms. Aida Lichaa
Municipal Solid Waste Division
Texas Natural Resource Conservation Commission
P.O. Box 13987
Austin, TX 78711

RE: Solid Waste Permit # 640, City of San Marcos

Dear Ms. Lichaa:

As noted in my letter to you dated March 22, 1996 and our subsequent conversation, the monitoring wells at the San Marcos landfill have been pulled and plugged. A copy of the well driller's Plugging Report is attached for your reference. This report has been filed by the driller with the TNRCC.

This officially concludes all monitoring efforts at the San Marcos landfill. All post-closure monitoring efforts have been completed and the facility has complied with all requirements of the State of Texas.

If you have any questions, please call me at 512/393-8130.

Cordially,

Stephen M. Jenkins, P.E.
Director, Department of Environment & Engineering

cc: Ms. Lisa Lawson, U.S. Army Corps of Engineers
Mr. Stanley A. Burger, U.S. Department of Labor
Mr. Larry D. Gilley, City Manager

SOLID WASTE 96 DEC -6 AM 11:59

DEC 10 96

Please use black ink.

File WHITE COPY with:
TNRCC
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

State of Texas
PLUGGING REPORT

(This form must be completed and filed with the TNRCC within 30 days following the date the well is plugged as required by current statutory law.)

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

A. WELL IDENTIFICATION AND LOCATION DATA

1) OWNER City of San Marcos (Name) ADDRESS 630 East Hopkins (Street or RFD) San Marcos (City), TX (State) 78666 (Zip)

2) ADDRESS OF WELL: County HAYS CAMP GARY LAND FILL (CLOSED) CITY OF SAN MARCOS (Street, RFD or other) SAN MARCOS (City), TX (State) 78666 (Zip) GRID # SEE ATTACHMENT

3) OWNER'S WELL NO: —

4) WELL TYPE (Check): ☐ Water ☒ Monitor ☐ Injection ☐ De-watering

5)

Driller, Pump Installer, or Landowner performing the plugging operations must locate and identify the location of the well within a specific grid on a full scale-gridded County map available from the TNRCC/Installers Certification Program. The location of the well should be denoted within the grid by placing a corresponding dot in the grid to the right. The legal description section below is optional.

☐ LEGAL DESCRIPTION:

Section No. _____ Block No. _____ Township SEE ATTACHMENT

Abstract No. _____ Survey Name _____

Distance and direction from two intersecting section lines or survey lines: SEE ATTACHMENT

96 DEC -6 AM 9:59

SOLID WASTE

N

B. HISTORICAL DATA ON WELL TO BE PLUGGED (if available)

6) Driller U.S. CORP OF ENG. License No. — City —

7) Drilled _____ 19____; 8) Diameter of hole 2 inches; 9) Total depth of well 35 feet

C. CURRENT PLUGGING DATA

10) Date well plugged 11-20, 1996.

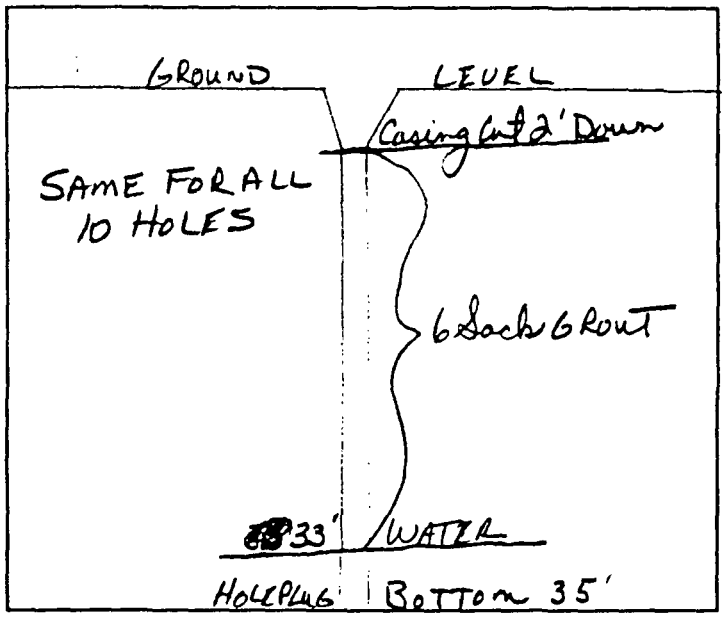
11) Sketch of well: Using space at right, show method of plugging the well including all casing and cemented intervals.

12) Name of Driller/Pump Installer actually performing the plugging operations
ALAN MILLER / MILLER WATER WELL SERV.
License number 4294 PILL

13) Casing and cementing data relative to the plugging operations:

DIAMETER (inches)	CASING LEFT IN WELL FROM (feet)	CASING LEFT IN WELL TO (feet)
2"	2'	33'
(TOTAL OF 10 HOLES JUST ALIKE)		

CEMENT PLUG(S) PLACED IN WELL FROM (feet)	CEMENT PLUG(S) PLACED IN WELL TO (feet)	SACK(S) OF CEMENT USED
33'	30'	HOLE PLUG
30'	0	6 SACK GROUT



D. VALIDATION OF INFORMATION INCLUDED IN FORM

I hereby certify that this well was plugged by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 13 will result in the report(s) being returned for completion and resubmittal.

Company or Individual's Name (type or print) MILLER WATER WELL SERVICE

Address: Street or RFD P.O. Box 53 City KYLE State TEXAS Zip 78640

Signatures:

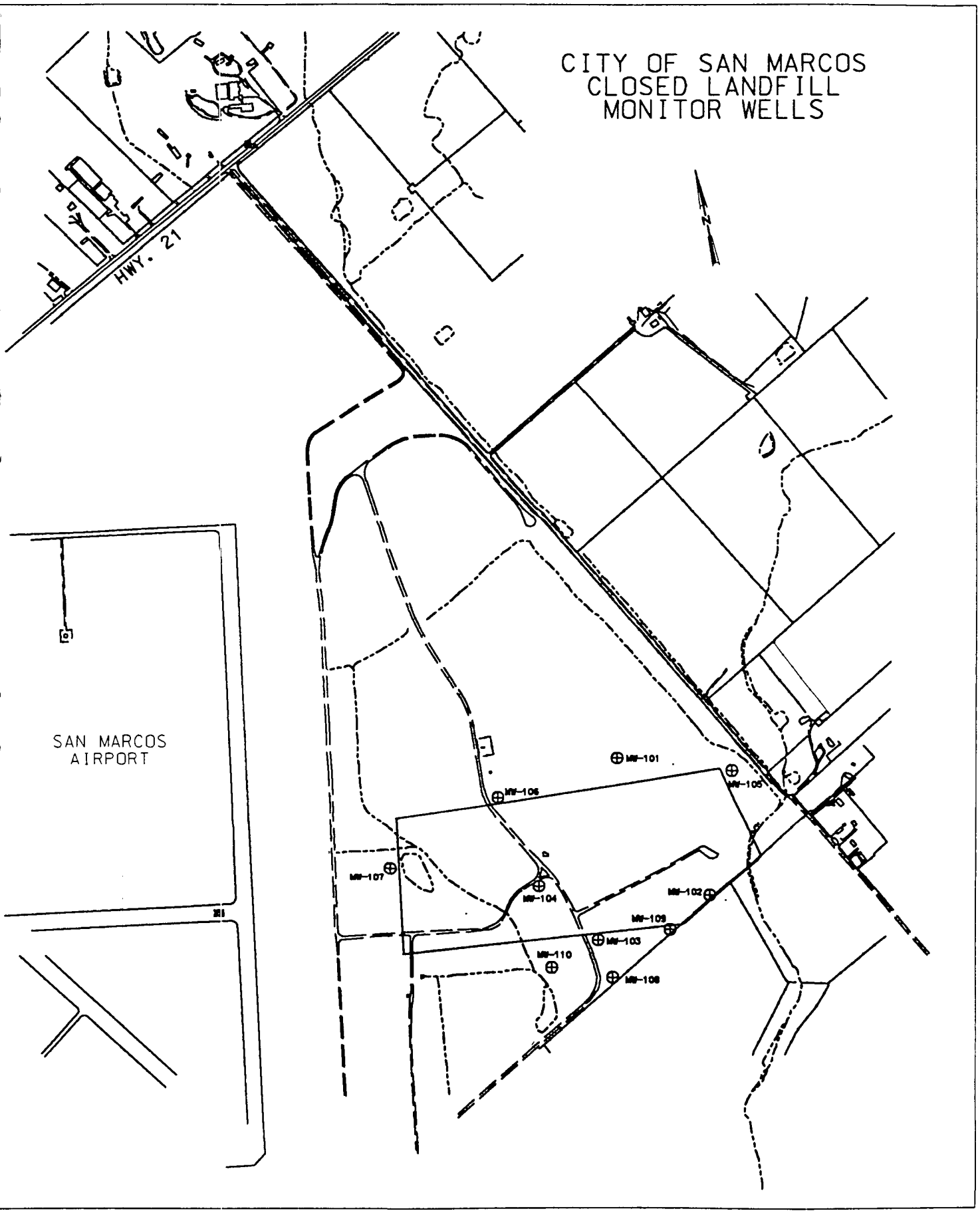
Alan Miller — Licensed Driller/Pump Installer — 12-3-96 Date

[signature] — Owner of Well — 12/03/96 Date

_____ Trainee/Apprentice _____ Date

White - TNRCC Yellow - Well Owner Pink - Licensed Well Driller/Pump Installer

TNRCC-0055 (Rev. 01-12-95)


CITY OF SAN MARCOS
CLOSED LANDFILL
MONITOR WELLS
HWY. 21
SAN MARCOS
AIRPORT
MW-101
MW-105
MW-106
MW-107
MW-104
MW-102
MW-109
MW-103
MW-110
MW-108

Reference 14

Ag 1.
8 of 2

CONVERSATION RECORD

TIME 0830 | DATE 8 FEB. 91

TYPE: [X] VISIT ☐ CONFERENCE ☐ TELEPHONE ☐ INCOMING ☐ OUTGOING

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU	ORGANIZATION (Office, dept., bureau, etc.)	TELEPHONE NO.
Dick Moncure	Gary Job corps Center	512 396-6543

SUBJECT

Preliminary assessment at former Gary AFB

ROUTING	
NAME/SYMBOL	INT

SUMMARY

— 7 UST – 25,000 POL gallons each unused
— 3 UST – 12,000 POL " " "
— 1 UST – 12,000 POL " " used
— 1 UST – 10,000 motorpool " " Used
— 4 UST – Removed

Mr. Moncure was working at the base during the time the base was closed. He watched the Air Force pump fuel out of the tanks, remove tetra ethal lead from the inside of the UST, filled the tanks with water, and sealed the tanks. Mr. Moncure said that the motorpool UST failed a tightness test and has been taken out of service. One -12,000 UST has been opened to use as a motorpool tank. The water was crystal clear but had enough TPH to prevent the water to be pumped into an on-site sewer sys. Fuel lines going to overhead dispensers should be flushed & capped. Remove 3 overhead dispensers.

ACTION REQUIRED

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE

ACTION TAKEN

SIGNATURE	TITLE	DATE

Gary AFB

CONVERSATION RECORD

TIME | DATE

TYPE
☒ VISIT ☐ CONFERENCE ☐ TELEPHONE ☐ INCOMING ☐ OUTGOING

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU	ORGANIZATION (Office, dept., bureau, etc.)	TELEPHONE NO.

ROUTING

NAME/SYMBOL	INT

SUBJECT

SUMMARY

The city has 5 UST of ~~2500~~ 12,000 gallons each + overhead fuel dispensers. Fuel lines to dispensers. Possible UST at control tower.

The airplanes were washed in concrete bays, with the water going through storm drains to a drainage ditch. Should test the sediments for TCE and other contamination.

The city has placed a landfill on their portion of the former base and contaminated groundwater. They claim the water contamination is due to Air Force burn & cover landfills on the base — PRP project

ACTION REQUIRED

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE
	Randy Niebuhr	8 Feb 91

ACTION TAKEN

SIGNATURE	TITLE	DATE

CONVERSATION RECORD

TIME 0830 | DATE 8FEB.91

TYPE
☒ VISIT ☐ CONFERENCE ☐ TELEPHONE ☐ INCOMING ☐ OUTGOING

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU	ORGANIZATION (Office, dept., bureau, etc.)	TELEPHONE NO.
Dick Moncure	Gary Job Corps Center	512 396-6543

SUBJECT

Preliminary assessment at former Gary AFB

ROUTING NAME/SYMBOL	INT

SUMMARY

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— 1 UST – 12,000 POL " " used
— 1 UST – 10,000 motorpool " " used
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ACTION REQUIRED

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE

ACTION TAKEN

SIGNATURE	TITLE	DATE

Pg. 2

Gary AFB

CONVERSATION RECORD

TIME | DATE

TYPE: ☒ VISIT ☐ CONFERENCE ☐ TELEPHONE ☐ INCOMING ☐ OUTGOING

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU	ORGANIZATION (Office, dept., bureau, etc.)	TELEPHONE NO.

ROUTING

NAME/SYMBOL	INT

SUBJECT

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ACTION REQUIRED

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE
	Randy Niebuhr	8 Feb. 91

ACTION TAKEN

SIGNATURE	TITLE	DATE

Reference 15

ECOLOGY AND ENVIRONMENT, INC.

DALLAS, TEXAS

MEMORANDUM

TO: David Wineman, RPO Region VI

THRU: K. H. Malone, Jr., FITOM

FROM: Brenda Nixon Cook, FIT Chemist

PRELIMINARY
This does not ... final opinion of EPA

DATE: May 10, 1988

SUBJ: Sampling Plan for Gary Job Corps facility, San Marcos, Texas
(TX1161630644)
TDD# F06-8802-20
PAN FTX0529SBA

The FIT previously submitted a Site Inspection Report (EPA T2070-3) to EPA on February 18, 1988 regarding the Gary Job Corps facility at San Marcos. As indicated, historical aerial photographs of the site had been requested in order to locate previous waste disposal areas to aid in the development of a sampling plan. Additional background information gathered by the FIT is also included in this memorandum.

In 1965, the Department of Defense closed Camp Gary as a military airbase, and deeded the airport and the land northeast of the facility to the City of San Marcos. The Department of Labor obtained the main base and surrounding buildings in 1965 for use by the Gary Job Corps as their educational campus. Previous investigations by the FIT at the Gary Job Corps facility indicated three areas of concern, i.e. 1) possible PCB contamination of the soil from the 341 electric transformers in storage at this facility; 2) alleged burial of tetraethyl lead by the military in the mid-1950s; and 3) the former City of San Marcos landfill.

The earlier site inspection report submitted to EPA indicated that the Department of Labor appears to be responding adequately to the problem of the electric transformers at the facility. However past practices concerning handling and storage of these transformers are unknown and for this reason soils which may in the past had continual contact with these transformers may have been contaminated by PCBs. With the construction and modification of building 9-356 at the facility, there now exists a well contained storage area for these transformers. Prior to moving the transformers to building 9-356, all transformers not in use were stored in the transformer utility yard near building 11-215. For this reason the soil near building 11-215 should be sampled. On September 17, 1987 a transformer pole broke near building 7-102 and a electric transformer fell to the ground leaching possible PCB contaminated oil onto the ground. Topsoil near the area where the pole broke was removed and drummed as PCB contaminated soil. Soils near where the transformer pole broke should be sampled to ensure that all PCB contaminated soil was adequately removed.

ATTACHMENT

PRELIMINARY
This ... final opinion of EPA

05/31/2000 TNRCC RECORDS BLDG D

Due to the lack of information concerning past military landfills and the location of the alleged burial of tetraethyl lead at this facility, the FIT requested historical aerial photographs to help determine past waste disposal practices and locations. In a conversation with Mr. Monocure, Gary Job Corps Center Environmental Coordinator, on October 21, 1987, he stated that he believed that the military had once operated a landfill northeast of the main base area and two fuel dumps, one at the east and one at the vest ends of the airport ramp. Aerial photographs from 1951 show no landfill activity in the area. Aerial photographs of the area northeast of the main base from 1958 indicate possible landfill activities, thus supporting the earlier allegation that tetraethyl lead may have been buried at this facility in the mid-1950s. In a conversation with Mr. Monocure on April 26, 1988 he stated that he could locate the previous military landfill at the facility. No records for wastes exist for the military landfill; however Mr. Monocure stated that the military first burned and then buried the remaining wastes. Soil samples taken around the perimeter of the military landfill and at each fuel dump would determine the presence of contamination, if any, from the previous military vaste disposal practices.

In addition to the threat of PCB contamination from the electric transformers and the alleged burial of tetraethyl lead at the facility there also exists possible contamination of the alluvial aquifer from the City of San Marcos Municipal Landfill located in the area northeast of the main base facility. The municipal landfill appears to have been located east of and adjacent to the military landfill, based on interpretation of the historical aerial photos. Since submission of the site inspection report the EPA has received inquiries from several sources concerning possible contamination of the alluvial aquifer underlying the closed San Marcos Landfill. According to records from the Texas Department of Health the municipal landfill occupied an 84 acre tract of land northeast of the main base facility from 1969-1984. During this time approximately 1,825,320 cubic yards of solid waste were deposited. In a 1966 aerial photo, there appears to be considerable activity in the area northeast of the main base where the municipal landfill is located; however this area was not permitted for landfill activities until June of 1969. In a conversation with Mr. Monocure on April 26, 1988, he stated that he believed that dumping by the City of San Marcos began prior to 1969.

The Texas Department of Health records for the San Marcos Municipal Landfill provided the following geological information: the alluvial layer of the soil beneath the landfill consists of silty clay layers followed by a sand/gravel water bearing zone located at a depth of 15 - 20 feet. Records indicate that the trench type landfill operated by the city was not to go below 12 feet in depth leaving a 3 feet clay bottom to serve as a natural liner. Complaints from citizens suggesting that this 3-ft clay layer had not been maintained were included the Department of Health files.

Water usage in this area is provided by three separate sources. Water for the Job Corp residents is provided by the City of San Marcos. Other area residents are either using their own water wells or are members of the Maxvell Water Supply Corporation. The majority of residents use the Maxvell Water Supply Corp for drinking and their own well water for watering yards, gardens, and livestock. A small portion of the surrounding community does rely solely on the alluvial aquifer for their total water usage. A well

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D

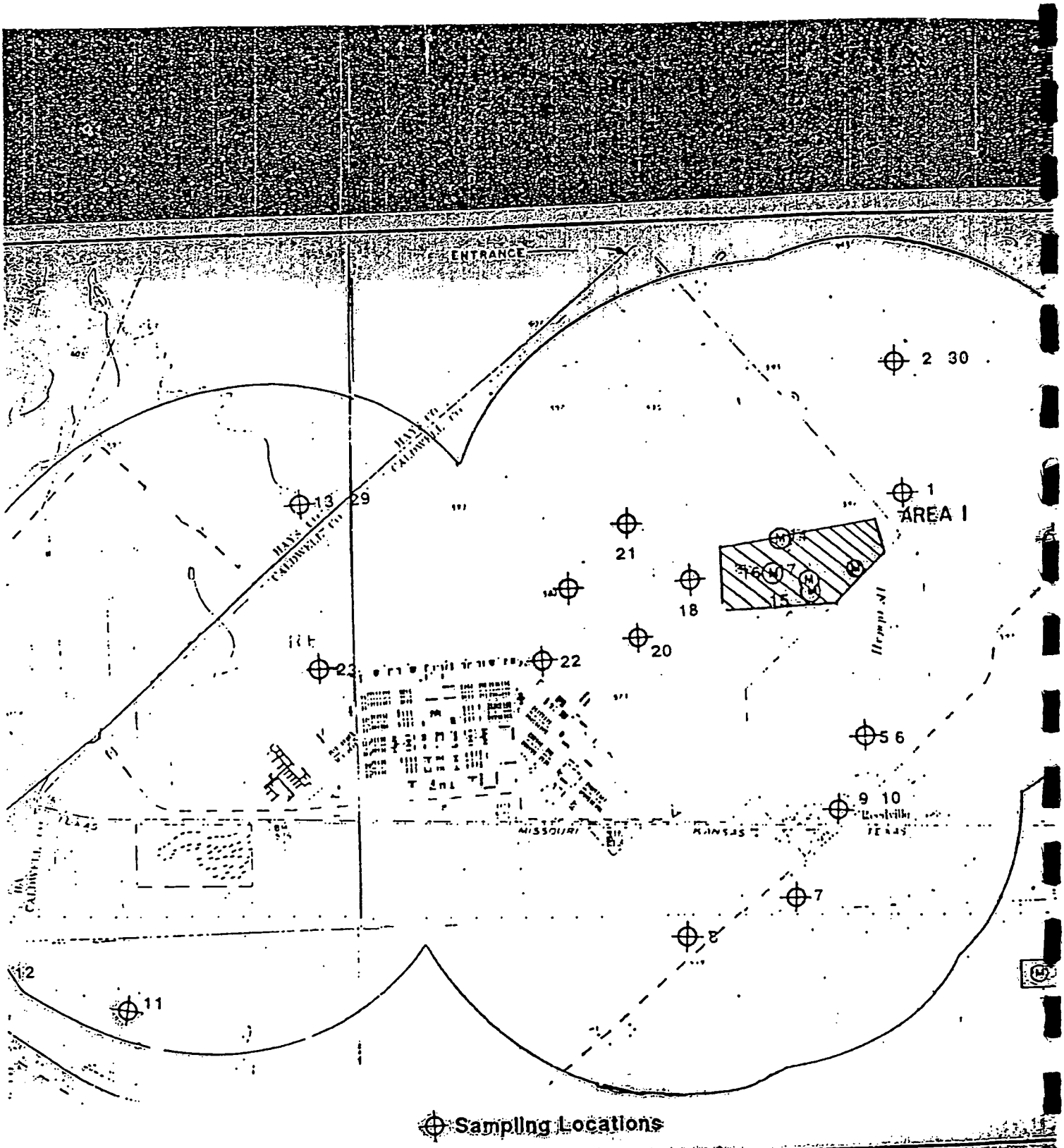
survey for the area would better determine water usage of the alluvial aquifer and provide data for a more strategic sampling of the wells surrounding the municipal landfill.

Due to the recent inquiries concerning the quality of the water in the alluvial aquifer surrounding the Camp Gary facility it is recommended that all three potential sources of contamination be examined. In addition to sampling ground water wells in close proximity to the municipal landfill and the earlier military landfill, areas on the main base facility that might have been contaminated by PCB electric transformers stored on this facility should also be sampled.

Attached is the proposed sampling plan.

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D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AREA I
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MISSOURI
KANSAS
TEXAS
Sampling Locations

Sampling Plan for Gary Job Corp and San Marcos Municipal Landfill
TX1161630644

Groundvater wells

Sampling locations are based on an old well survey(1976) found in the Texas Department of Health File. During several phone calls trying to validate the survey, it was evident that a new well survey would be needed to obtain more accurate information to provide a representative sampling of the groundvater in the area surrounding the San Marcos Municipal Landfill. Locations may change based upon results of the proposed well survey.

Sample Number	Station Number	Sample Location Description
1	1	Residential Well belonging to (b) (6) approximately 300 ft east of San Marcos Municipal Landfill (QA\QC)
2	2	Residential Well belonging to (b) (6) northeast of San Marcos Municipal Landfill. (Background)
3	3	Residential Well belonging to (b) (6) southeast of San Marcos Municipal Landfill.
4	4	Residential Well belonging to (b) (6) southeast of San Marcos Municipal Landfill.
5	5	Residential Well belonging to (b) (6) south of San Marcos Municipal Landfill
6	6	Residential Well belonging to (b) (6) south of San Marcos Municipal Landfill. Duplicate of 5.
7	7	Residential Well belonging to (b) (6) south of San Marcos Municipal Landfill.

ATTACHMENT

8	8	Residential Well belonging to (b) (6) south west of San Marcos Municipal Landfill.
9	9	Residential well Reedville Area south of San Marcos Municipal Landfill.
10	10	Residential well Reedville area south of San Marcos Municipal Landfill.
11	11	Residential Well belonging to (b) (6) (b) (6) southwest of San Marcos Municipal Landfill and Gary Job Corp Facility.
12	12	Residential Well belonging to (b) (6) (b) (6) southwest of San Marcos Municipl Landfill and Gary Job Corp Facility.
13	13	Residential Well belonging to (b) (6) northwest of San Marcos Municipal Landfill and Gary Job Corp Facility (Background).
Monitoring Wells		
14	14	Monitoring Well 1B San Marcos Municipal Landfill- Up Gradient
15	15	Monitoring Well 3, San Marcos Municipal Landfill- Down Gradient (QA\QC)
16	16	Monitoring Well 4B, San Marcos Municipal Landfill- Down Gradient
17	17	Monitoring Well 4B, San Marcos Municipal Landfill- Down Gradient. Duplicate of 16
Soils and Sediments		
18	18	East of previous military landfill site. Sample taken at depth of 4-6 ft.

19	19	West of previous military landfill site. Sample taken at depth of 4-6 ft.
20	20	South of previous military landfill site. Sample taken at depth of 4-6 ft.
21	21	North of previous military landfill site. Sample taken at depth of 4-6 ft.
22	22	East fuel dump. Sample taken at depth of 4-6 ft.
23	23	West fuel dump. Sample taken at depth of 4-6 ft.
24	24	Soil near building 7-102 where transformer fell . Surface Soil.
25	25	Soil near building 7-102 where transformer fell. Sample taken at depth of 4-6 ft.
26	26	Soil in former transformer Utility Yard building 11-215. Surface Soil (QA|QC).
27	27	Soil in former transformer Utility Yard building 11-215. Sample taken at depth of 4-6 ft.
28	28	Soil in former transformer utility yard building 11-215, Sample taken at depth of 4-6 ft. Duplicate of 27.
29	29	Background soil taken near well #13 (Patterson) northwest of facility.
30	30	Background soil taken near well 12 (b) (6) northeast of facility.

ATTACHMENT

RECORD OF COMMUNICATION	(Record of Item Checked Below) X Phone Call ___ Discussion ___ Field Trip ___ Conference ___ Other(Specify)	
TO: Dick Monocure *Environmental* Coordinator, Gary Job Corp	From: Brenda Nixon Cook FIT Chemist	Date: April 26, 1988 Time: 12:06

SUBJECT: Possible areas of contamination at Gary Job Corps Facility

SUMMARY OF COMMUNICATION

Mr. Monocure confirmed that the transformer fell near building 7-102 and that prior to moving the transformers to their present location they had been stored in the utility yard near building 11-215. Mr. Monocure also stated there had been gravel excavation east of the facility from 1951-1965. He confirmed that Gary Job Corps had first occupied the facility in 1965 and at that time the airport and the land northeast of the facility had been deeded to the City of San Marcos. He also said he believed the city began dumping in about 1965. He stated that during the military occupation of the facility, a landfill had existed in the near vicinity of the municipal landfill. He also stated that he could pinpoint the location of the previous military landfill. When asked about the current status of PCB contaminated trnasformer and soil, he stated that pending release of funds, removal would begin. Had already contracted for removal and would call me back with the particulars.

CONCLUSIONS, ACTION TAKEN OR REQUIRED

INFORMATION COPIES
TO:

EPA FORM 1300-6 (7-72)
Replaces EPA HQ Form 5300-3 which may be used until Supply is Exhausted.

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D

RECORD OF COMMUNICATION	(Record of Item checked Below) X Phone Call ___ Discussion ___ Field Trip ___ Conference ___ Other(Specify)	
TO: Brenda Cook	From: Dick Honocure	Date: April 26, 1988 Time: 3:47

SUBJECT: Name of contractor removing PCB soil transformers at Gary Job Corp

SUMMARY OF COMMUNICATION

United Power Services

313 Hill Avenue

Nashville, Tennessee owner-Larry Christodovou (615) 255-3700

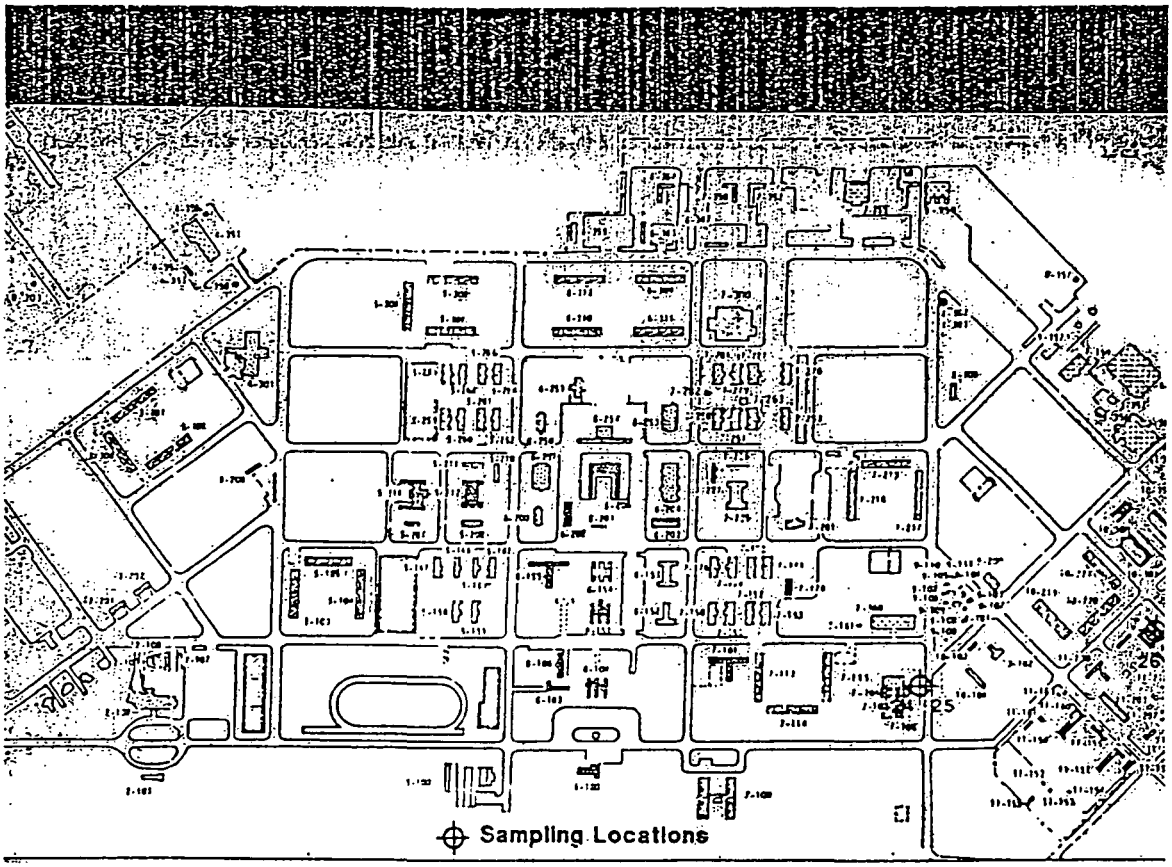
CONCLUSIONS, ACTION TAKEN OR REQUIRED

INFORMATION COPIES TO:

EPA FORM 1300-6 (7-72)
Replaces EPA HQ Form 5300-3 which may be used until Supply is Exhausted.

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D

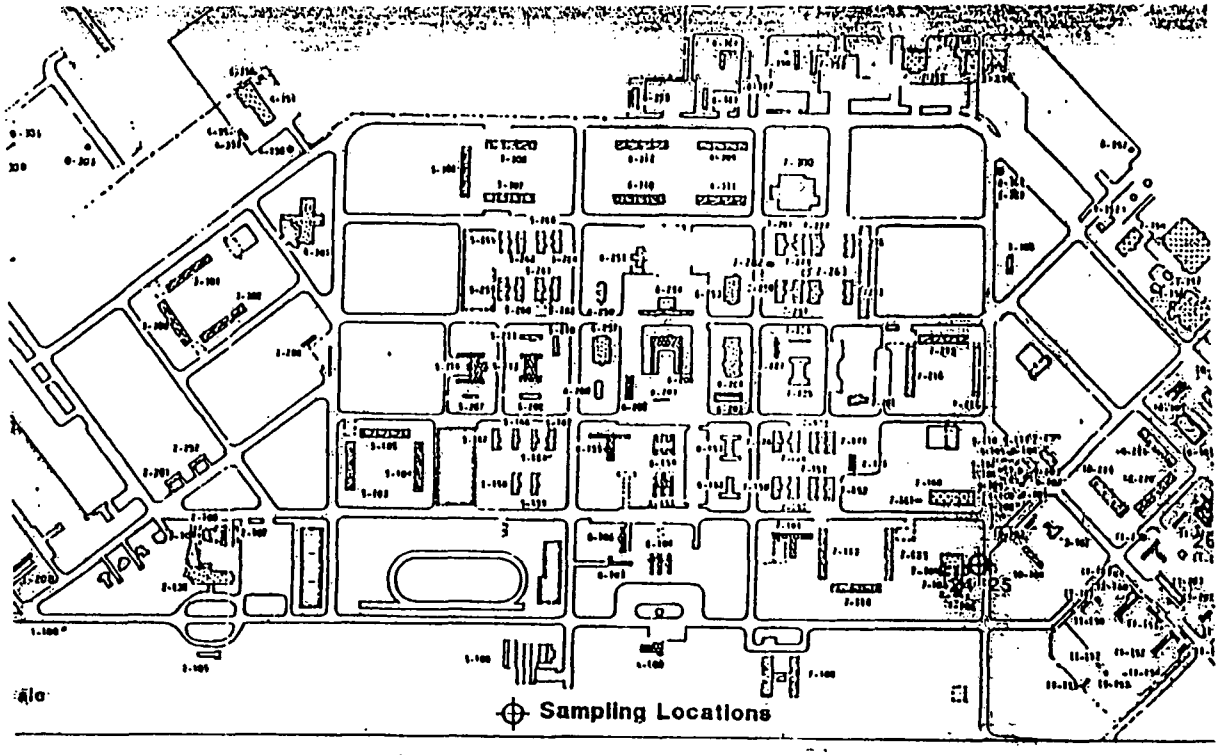


GARY JOB CORPS CENTER

SITE SKETCH

San Marcus, Tx. Caldwell County

TX1161630644

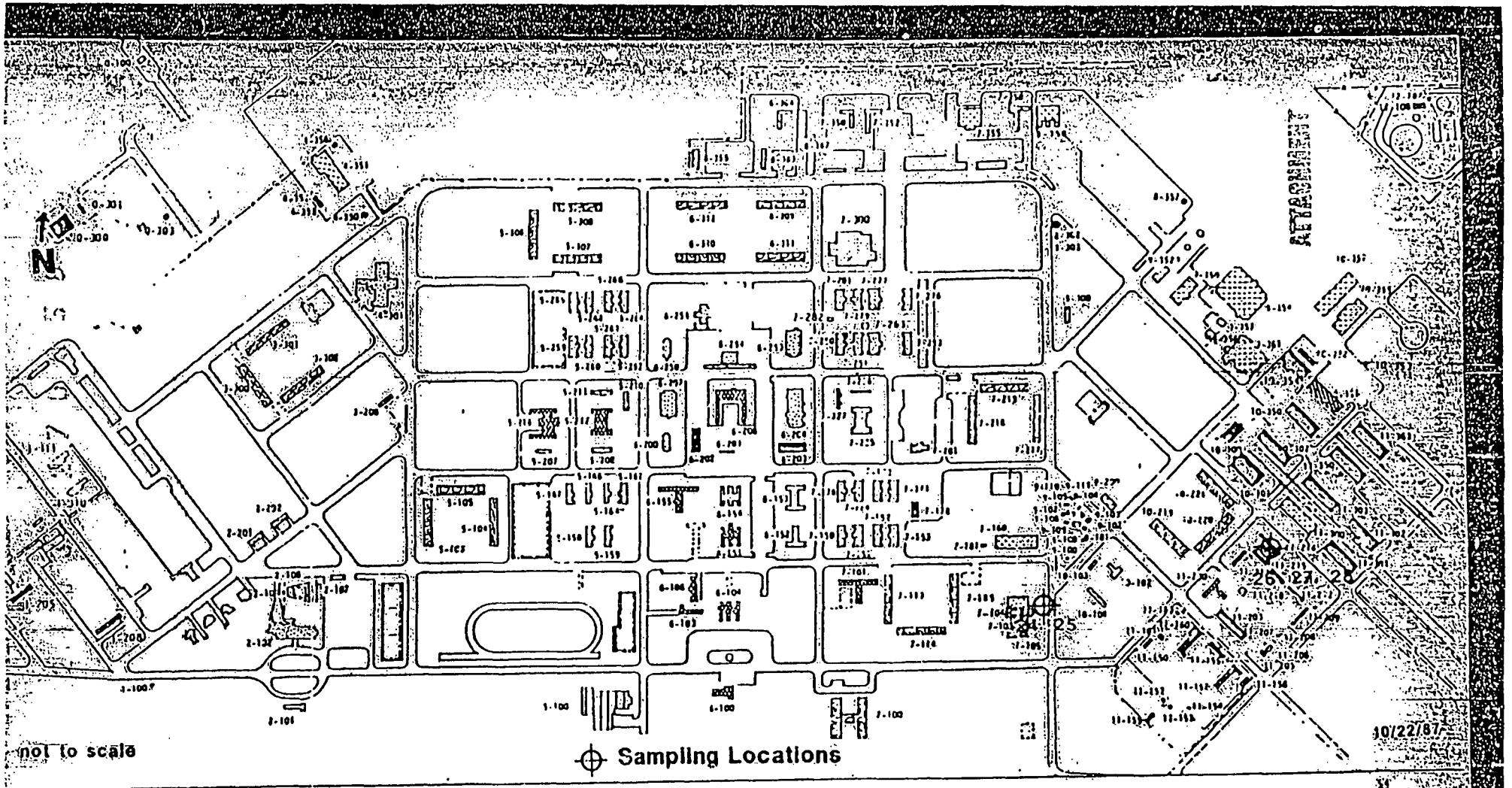


GARY JOB CORPS CENTER

SITE SKETCH

San Marcus, Tx. Caldwell County

TX1161630644



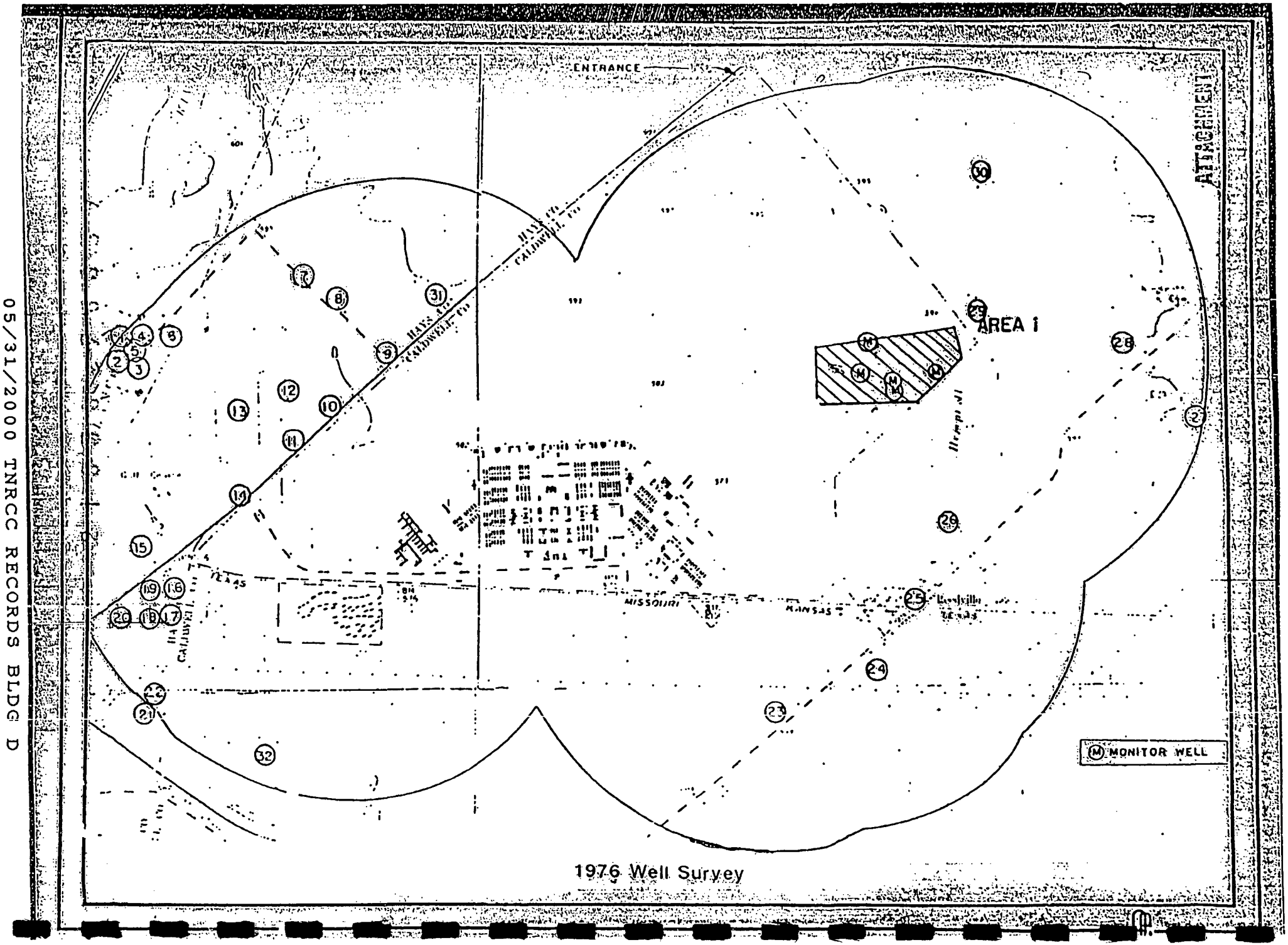
GARY JOB CORPS CENTER

SITE SKETCH

San Marcus, Tx. Caldwell County

TX1161630644

05/31/2000 TNRCC RECORDS BLDG D



1976 Well Survey

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D

ENCLOSURE 4

1976 Well Survey

Water Well Information

1. 40' house use (Rice)
2. 40' yard use (Roscoe)
3. 50' house-drilled (Cooper)
4. 50' each 2 house-1 dug-1 drilled (Victory Cleaners)
5. 50' house use-drilled (Mutscheechner)
6. 50' each yard and stock use-(2 wells) 1 across road on Maxwell (b) (6)
7. 50' Stock use-dug
8. 50' each stock and garden-Maxwell (b) (6)
9. 50' Stock use ((b) (6)
10. 40' house use
11. 40' house use
12. 40' house use
13. 40' stock use
14. 50' house use
15. 35' not in use-Quail Creek-dug well
16. 30' public use-dug well (Lucksen Traidor Park)
17. 50' yard use-dug well (Waldrip)
18. 50' yard use ((b) (6)
19. 50' house use (b) (6)
20. 50' each not in use - dug wells (Francisco Navales)
21. 70' drilled-30' dug house with 1 public supply (L. S. Cobb)
22. 50' not in use
23. 40' yard use (b) (6)

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D

24. 35' yard use-dug (b) (6) [redacted]

25. 30' to 50' 15 wells 10 house use Reedville Area

26. 35' each (2 wells) 1 house use-dug (b) (6) [redacted]

27. 60' each (3 wells) Stock use (b) (6) [redacted]

28. 30' house use-dug (b) (6) [redacted]

29. 30' (2 wells) 1 house and 1 abandon

30. 70' stock use (b) (6) [redacted]

31. 50' house use

32. 35' house use-dug well (b) (6) [redacted]

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D

RECORD OF COMMUNICATION

[X] Phone Call [ ] Discussion [ ] Field Trip
[ ] Conference [ ] Other (Specify)

(Record of Item Checked Above)

TO:
Dick Moncure
Environmental Coordinator
Gary Job Corp. Center

FROM:
Brenda Nixon Cook
FIT Chemist

DATE
10-21-87

TIME
1500

SUBJECT
Status of PCB transformers&possible location of past landfills.

SUMMARY OF COMMUNICATION

Mr. Moncure confirmed the date that the transformer pole broke was 9-17-87 and tha
building number for the transformer storage facility was 9-356. He stated that the
one time had a municipal landfill east of the airstrip. When asked about previous m
landfills, he stated that he thought there had been 2 fuel dumps, one at the east an
at the west end of the airport ramp, and 2 or 3 landfills northeast of the airstrip.
tioned about the probable location of the buried tetraethyl lead, he said he did no
for sure but his guess would be near the fuel dumps.

CONCLUSIONS, ACTION TAKEN OR REQUIRED

INFORMATION COPIES
TO:

ATTACHMENT

EPA Form 1300-6 (7-72)
Replaces EPA HQ Form 5300-3 Which May Be Used Until Supply Is Exhausted

05/31/2000 TNRCC RECORDS BLDG D

Continued From Front

XIV. PERMIT INFORMATION

List all applicable permits held by the site and provide the related information.

A. PERMIT TYPE (e.g., RCRA, State, NPDES, etc.)	B. ISSUING AGENCY	C. PERMIT NUMBER	D. DATE ISSUED (mo., day, & yr.)	E. EXPIRATION DATE (mo., day, & yr.)	F. IN COMPLIANCE (mark 'X') 1. YES	2. NO	3. UNKNOWN
Industrial solid waste	Texas water commission	73125	11-30-86				X
Hazardous waste generator	EPA	TX1161630644					X
Potential water ID	Texas Dept. of Health	0280011	4-25-80				X
NPDES	State	12067-01	4-24-84	4-29-89	X		
NPDES	EPA	TX0057380	1-31-87	1-30-92	X		

XV. PAST REGULATORY OR ENFORCEMENT ACTIONS

☒ NONE ☐ YES (summarize in this space)

NOTE: Based on the information in Sections III through XV, fill out the Tentative Disposition (*Section II*) information on the first page of this form.

recycled paper
recycled paper
recycled paper

05/31/2000 TNRCC RECORDS BLDG D

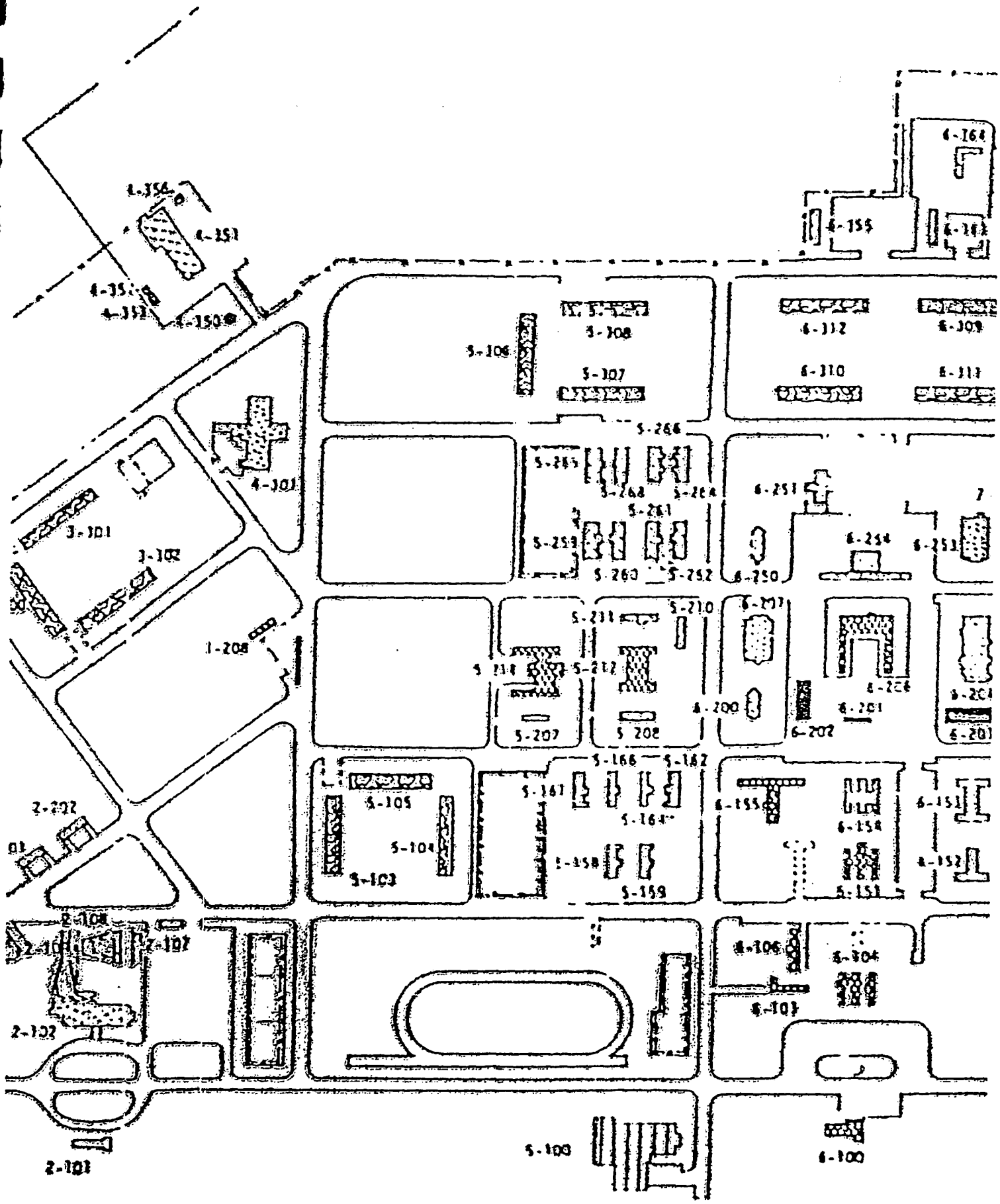
POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT SUPPLEMENTAL SHEET

Instruction - This sheet is provided to give additional information in explanation of a question on the form 7070-3

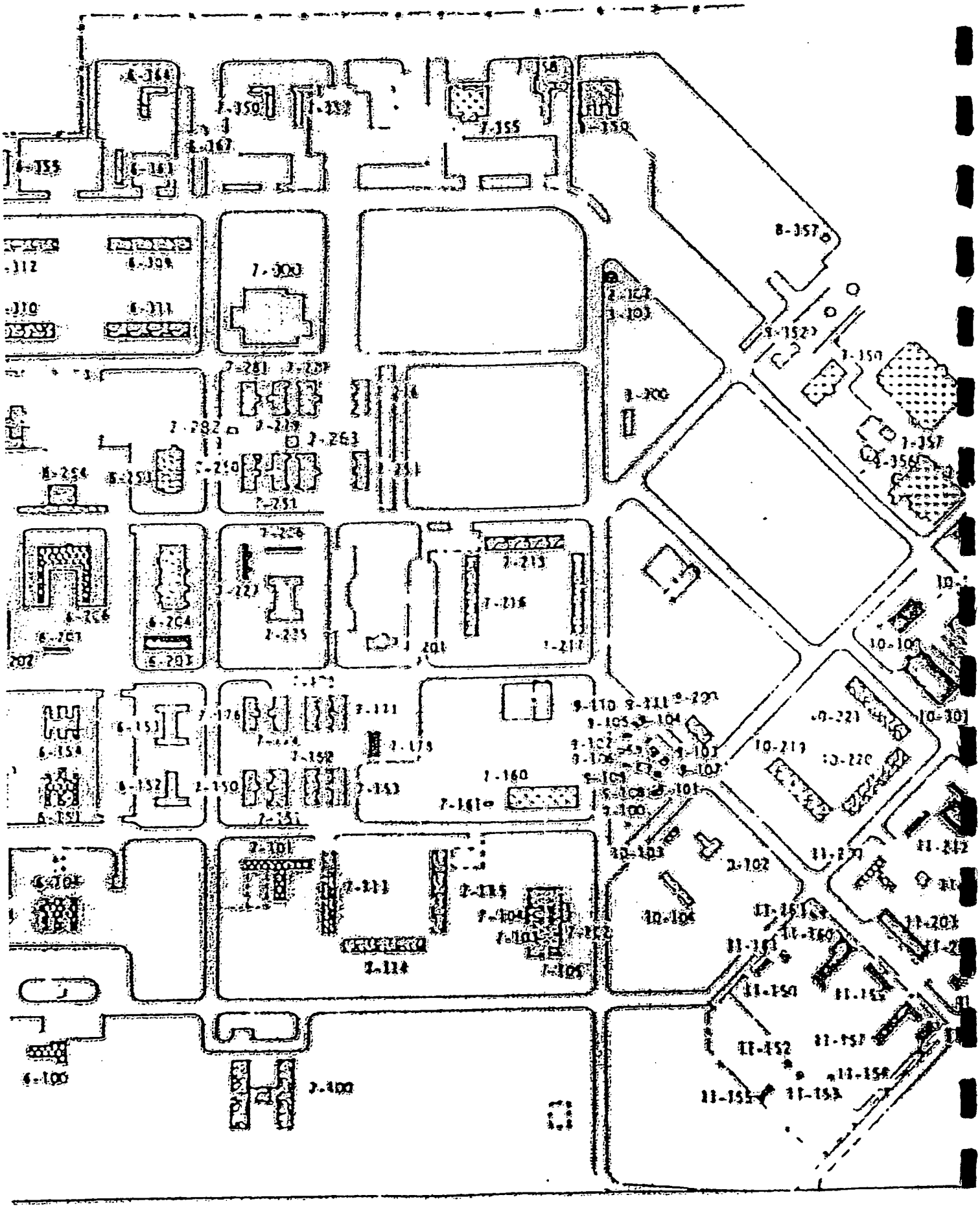
Corresponding number on form	Additional Remark and/or Explanation
VIII. U.	Due to the size of the facility FIT has requested historical photos of the facility (1945-1965) to determine precise locations of the military landfills and aid in the development of a sampling plan. At this time FIT believes that the Department of Labor is responding adequately to the problem of the PCB transformers and that no action is necessary by the EPA. FIT recommends no further action be taken until hist photos are received. FIT will then attempt to determine the location of the buried tetraethyl lead and past military landfill activities. Due to the large size of the facility, no further conclusions can be drawn until FIT can pinpoint the location of past landfills. A sampling plan will be forwarded upon receipt of the aforementioned historical aerial photos.

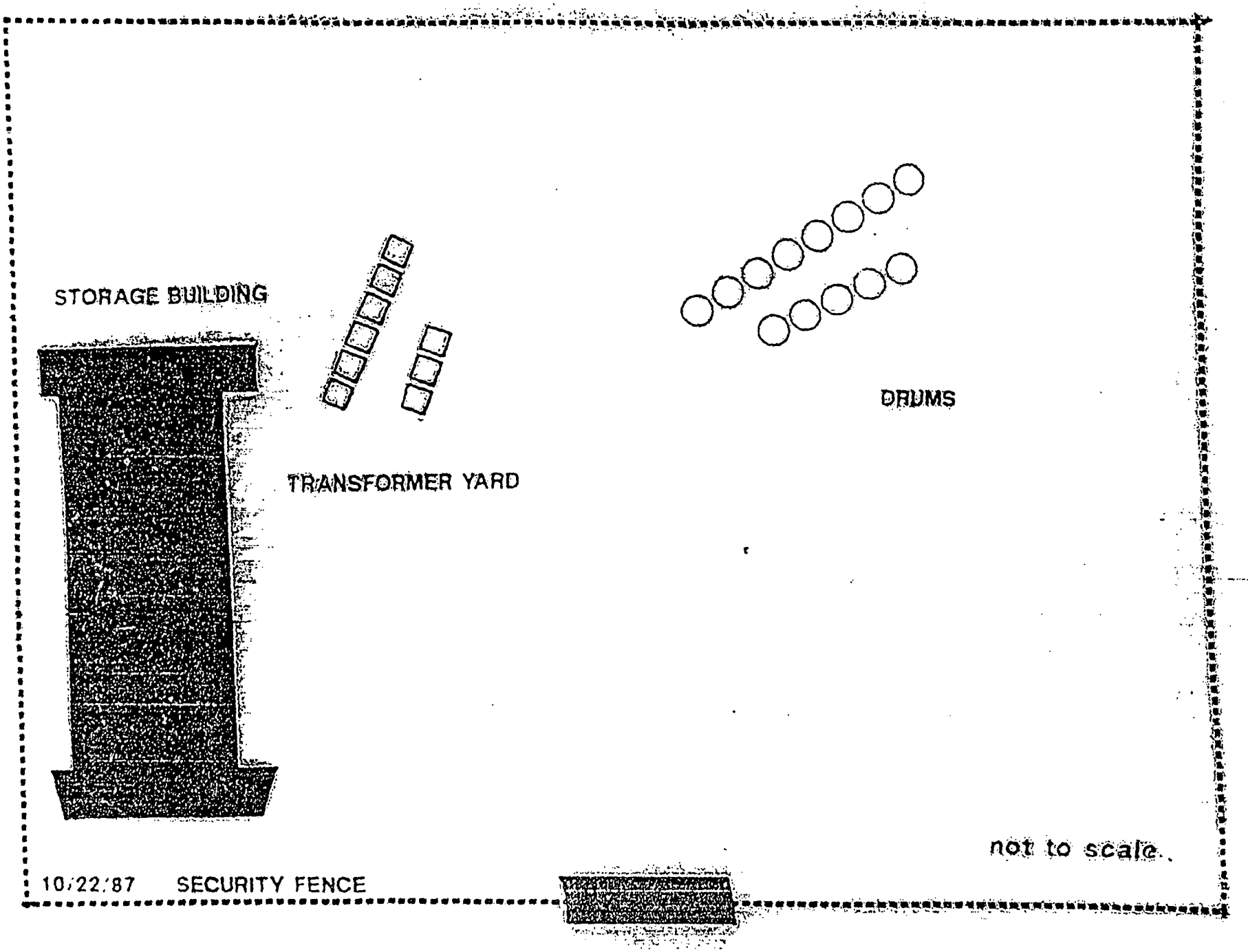
ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D



05/31/2000 TNRCC RECORDS BLDG D





05/31/2000 TNRCC RECORDS BLDG D

ANA-LAB
THE COMPLETE SERVICE LAB
2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 214 984-0551
Analytical Chemistry • Waste Treatment & Disposal • Equipment Sales

Gary Job Corps Tranformer Analysis Summary

Ana-Lab #	Sample #	Results	Transformer Identification, Conditon, and Location
[illegible]	Sample #1	14	Hiper Core 1380609 25 KVA W of water plant - Old
1197[illegible]	Sample #2	<10	Westinghouse 3156895 37.5 KVA At water plant - Old
119[illegible]	Sample #3	<10	Westinghouse 3156899 37.5 KVA At water plant - Old
1197[illegible]	Sample #4	<10	Westinghouse 3156901 37.5 KVA At water plant - Old
119715	Sample #5	<10	Hiper Core Maloney 1452932 7.5 KVA N. Bldg. 205 - Fair condition
1197[illegible]	Sample #6	<10	Delta Star E920455 10 KVA NW Bldg. 205 - Fair condition
119717	Sample #7	180	AC 3700277 25 KVA N Bldg. 311 - Not in use
[illegible]	Sample #8		3709037 37.5 KVA N Bldg. 311 - Not in use
[illegible]9719	Sample #9	<10	Alamo D287002 25 KVA N Bldg. 311 - Not in use
[illegible]	Sample #10	<10	Westinghouse 1512602-A 10 KVA Main Gate
119[illegible]	Sample #11	<10	AC 3744639 37.5 KVA Building 1-208 - Old
119722	Sample #12	14	Westinghouse 3169111 25 KVA Bldg. 1-208 - Old
1197[illegible]	Sample #13	<10	AC 3686056 25 KVA E. Bldg. 1-311 - Fair condition
1197[illegible]	Sample #14	70	AC 3709039 37.5 KVA E. Bldg. 1-311 - Fair condition
119[illegible]	Sample #15	<10	AC 3686053 25 KVA E. Bldg. 1-311 - Fair condition
[illegible]	Sample #16	52	Westinghouse 3105444 [illegible] KVA Bldg. 1-310 - Old
119727	Sample #17	38	Alamo 3668395 10 KVA Bldg. 1-100 - Good
119[illegible]	Sample #18	32	Westinghouse 3185202 10 KVA Bldg. 1-100 - Old
[illegible]	Sample #19	15	Alamo 74AC9522 25 KVA At Livers Res. 1-151 - Good, needs gasket.
[illegible]	Sample #20	[illegible]	Alamo M217202 50 KVA At Agee 1-1[illegible]
1197[illegible]	Sample #21	22	AC 3727306 25 KVA Bldg. 156 - Good condition
1197[illegible]	Sample #22	<10	Westinghouse 64AM6499 75 KVA Bldg. 2-102 - Good condition
119[illegible]	Sample #23	<10	Westinghouse 65AA6022 75 KVA Bldg. 2-102 - Good condition
11973[illegible]	Sample #24	14	Alamo 931733 75 KVA Bldg. 2-102 - Good condition
1197[illegible]	Sample #25	<10	Westinghouse 72AB425 25 KVA Behind Bldg. 2-202 - Good condition
1197[illegible]	Sample #26	15	Westinghouse 3166518 7.5 KVA Open area W Bldg. 3-300 - Old
1197[illegible]	Sample #27	<10	Westinghouse 72AA3663 25 KVA Open area NW Bldg. 3-300
[illegible]	Sample #28	<10	GE L330196174AA 37.5 KVA Bldg. 3-301 - Good
[illegible]	Sample #29	<10	Alamo 6057421 50 KVA Bldg. 3-301 - Good
119[illegible]	Sample #30	<10	Westinghouse 71AE11835 37.5 KVA Bldg. 3-301 - Good
1197[illegible]	Sample #31	<10	Alamo G057415 37.5 KVA Bldg. 3-302 - Good
119[illegible]	Sample #32	12	Alamo West 72AD417 25 KVA Bldg. 3-302 - Good
119742	Sample #33	12	AC 3727293 25 KVA Open area W Bldg. 3-208 - Old, not in use
11974[illegible]	Sample #34	[illegible]	AC 3744642 37.5 KVA Bldg. 3-208 - Fair condition
11[illegible]	Sample #35	28	AC 3888033 25 KVA Bldg. 3-208 - Fair condition
119745	Sample #36	32	AC 3734474 75 KVA Bldg. 4-301 - Fair condition
[illegible]	Sample #37	<10	Alamo G057405 25 KVA Bldg. 4-3[illegible] - Poor [illegible] not
[illegible]	Sample #38	[illegible]	AC [illegible] 25 KVA [illegible]

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D

ANA-LAB CORP.
THE COMPLETE SERVICE LAB

2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 214/984-0551

Analytical Chemistry • Waste Treatment & Disposal • Equipment Sales

Gary Job Corps Tranformer Analysis Summary

Ana-Lab #	Sample #	Results	Transformer Identification, Conditon, and Location
119749	Sample #39	<10	Alamo E157002 37.5 KVA - Needs gasket
119750	Sample #40	2200	Alamo 3178346 25 KVA - Good Pol
119751	Sample #41	25	Westinghouse 3156365 10 KVA Stored in Bldg. 9-356 - Bad
119752	Sample #42	Dry	Delta Star E860031 10 KVA Dry - Stored in Bldg. 9-356 - Bad
119753	Sample #43	<10	GE 4383784 Almost dry - Stored in Bldg. 9-356 - Bad
119754	Sample #44	<10	GE 3141255 Almost dry - Stored in Bldg. 9-356 - Bad
119755	Sample #45	30	Westinghouse 3165578 10 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119756	Sample #46	14	Westinghouse 3058317 25 KVA Almost dry - Stored in Bldg. 9-356 - Bad
1197	Sample #47	26	Maloney Hiper Core 1376376 50 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119758	Sample #48	1200	GE C320186 50 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119759	Sample #49	<10	ESCO 5160 50 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119760	Sample #50	3600	Maloney HC 1424763 50 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119761	Sample #51	<10	Maloney HC 1424759 50 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119762	Sample #52	20	WEstinghouse 3060330 100 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119763	Sample #53	160	ESCO 5166 50 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119764	Sample #54	<10	Westinghouse 65AA2920 100 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119765	Sample #55	<10	Maloney HC 1413161 75 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119766	Sample #56	30	GE 6549408 50 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119767	Sample #57	<10	Westinghouse 3060328 100 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119768	Sample #58	Dry	AC 3690383 75 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119769	Sample #59	<10	Westinghouse 3059540 15 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119770	Sample #60	<10	Westinghouse 5895677 25 KVA Almost dry - Stored in Bldg. 9-356 - Bad
119771	Sample #61	<10	Alamo G057408 25 KVA By Bldg. 5-308 - Good condition
119772	Sample #62	<10	AC 3744643 37.5 KVA By Bldg. 5-308 - Leaks
119773	Sample #63	<10	Delta Star E930868 37.5 KVA Open area W of Bldg. 5-308
119774	Sample #64	1500	AC 3700222 37.5 KVA Open area W of Bldg. 5-2
119775	Sample #65	42	Westinghouse 3165673 15 KVA Open area W of Bldg. 5-2
119776	Sample #66	<10	Westinghouse 5895907 25 KVA Open area W of Bldg. 5-2 - Old, leaks
120034	Sample #67	25	Westinghouse 74G9656 50 KVA Good condition
120035	Sample #68	60	Westinghouse 74H13860 75 KVA Good condition
120036	Sample #69	80	Westinghouse 74B13834 50 KVA Good condition
120037	Sample #70	17	Alamo E187006 37.5 KVA Between Bldgs. 312 & 310 Good condition
120038	Sample #71	18	Delta Star E930811 37.5 KVA Between Bldgs. 312 & 310
120039	Sample #72	<10	Alamo J6066815 37.5 KVA Between Bldgs. 312 & 310
120040	Sample #73	<10	GE 384388Y74AA 37.5 KVA Good condition
120041	Sample #74	<10	Delta Star E9201845 50 KVA Good condition
120042	Sample #75	<10	Alamo 71-217-9 37.5 KVA Good condition
120043	Sample #76	<10	Allis Chalmers Y3695327 37.5 KVA Out of service - old

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D

ANA-LAB CORP.
THE COMPLETE SERVICE LAB

2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 214/984-0551

Analytical Chemistry • Waste Treatment & Disposal • Equipment Sales

Gary Job Corps Transformer Analysis Summary

Ana-Lab #	Sample #	Results	Transformer Identification, Conditon, and Location
120044	Sample #77	15	Westinghouse 3146334 10 KVA Out of service, bad shape.
120045	Sample #78	20	Allis Chalmers 3630304 15 KVA Out of service, bad shape.
120046	Sample #79	19	Alamo G057420 50 KVA Good condition
120047	Sample #80	15	Allis Chalmers 3737570 50 KVA Good condition
120048	Sample #81	<10	Allis Chalmers 3748217 50 KVA Good condition
120049	Sample #82	10	Allis Chalmers 3713800 25 KVA Good condition
120050	Sample #83	<10	Allis Chalmers 3700278 25 KVA Good condition
120051	Sample #84	10	Allis Chalmers 7288437 25 KVA Good condition
120052	Sample #85	<10	Allis Chalmers 3744640 37.5 KVA Out of service
120053	Sample #86	<10	Allis Chalmers 3748215 50 KVA By field
120054	Sample #87	<10	Delta Star E920631 50 KVA By Bldg. 5-105
120055	Sample #88	15	Westinghouse 3178353 25 KVA Out of service, bad shape
120056	Sample #89	245	Allis Chalmers 3700294 25 KVA Fair condition, by Tennis Courts
120057	Sample #90	<10	Alamo G247001 25 KVA By track, good condition
120058	Sample #91	<10	Alamo 3105445 15 KVA By track, good condition
120059	Sample #92	12	Allis Chalmers 3713885 15 KVA Fair condition
120060	Sample #93	<10	Delta Star E920505 15 KVA Out of service, fair condition
120061	Sample #94	<10	Alamo E187008 37.5 KVA Good condition, N of Bldg. 10-220
120062	Sample #95	<10	Westinghouse 73L13116 50 KVA Good condition, N of Bldg. 10-220
120063	Sample #96	<10	Allis Chalmers 3744637 37.5 KVA Good condition, N of Bldg. 10-220
120064	Sample #97	440	GE 6712519 25 KVA S of Bldg. 10-220 Old, leaks, poor condition
120065	Sample #98	<10	Alamo M217201 50 KVA S of Bldg. 10-220
120066	Sample #99	25	Delta Star E913505 37.5 KVA By Bldg. 7-115, Hot, good condition
120067	Sample #100	<10	Alamo L187001 50 KVA By Bldg. 7-115
120068	Sample #101	<10	Alamo 0057411 37.5 KVA Bldg. 7-113, 7-101
120069	Sample #102	<10	Alamo 3713875 25 KVA Bldg. 7-113, 7-101
120070	Sample #103	<10	Alamo 6057419 50 KVA Good condition
120071	Sample #104	16	Alamo 71-217-1 50 KVA Good condition
120072	Sample #105	<10	Alamo 6057422 50 KVA Oil dark & hot
120073	Sample #106	<10	Alamo E00760 25 KVA Good condition
120074	Sample #107	<10	GE L4324091T4AA 37.5 KVA Good condition
120075	Sample #108	<10	Alamo G057423 75 KVA Behind orientation bldg.
120076	Sample #109	<10	Alamo G057416 50 KVA Behind orientation bldg.
120077	Sample #110	<10	Alamo 1921752 50 KVA Behind orientation bldg.
120078	Sample #111	<10	Allis Chalmers 3737574 50 KVA Bldg. 5-159, Dry, out of service
120079	Sample #112	<10	Delta Star E922318 50 KVA Bldg. 5-159, Dry, out of service
120080	Sample #113	<10	Allis Chalmers 9690368 75 KVA Bldg. 15-152, Fair condition
120081	Sample #114	<10	Delta Star E920606 [illegible] KVA [illegible]

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D

ANA-LAB CORP.
THE COMPLETE SERVICE LAB
Analytical Chemistry • Waste Treatment & Disposal • Equipment Sales

Gary Job Corps Tranformer Analysis Summary

Ana-Lab #	Sample #	Results	Transformer Identification, Conditon, and Location
120082	Sample #115	1600	Allis Chalmers 3700217 37.5 KVA
120083	Sample #116	18	Allis Chalmers 3630303 15 KVA Out of service
120084	Sample #117	14	RTE 841132615 25 KVA Airport by 6-355, good
120085	Sample #118	14	Westinghouse 3058310 25 KVA Out of service, bad condition
120086	Sample #119	<10	Delta Star E940973 15 KVA Fair condition
120087	Sample #120	<10	Delta Star E940976 15 KVA Fair condition
120088	Sample #121	<10	Westinghouse 5381795 10 KVA Out of service, bad condition
120089	Sample #122	<10	GE G890461-67Y 15 KVA. Out of service, good condition
120090	Sample #123	<10	Westinghouse 5882192 10 KVA Out of service
120091	Sample #124	<10	Delta Star E920501 15 KVA Near airport, out of service, poor
120092	Sample #125	65	Allis Chalmers 3700279 25 KVA
120093	Sample #126	<10	Delta Star E9131501 37.5 KVA By bldg. 5-158, fair condition
120094	Sample #127	<10	Alamo G057417 50 KVA By bldg. 5-158, good condition
120095	Sample #128	<10	Delta Star E930812 37.5 KVA By bldg. 5-158, fair condition
120096	Sample #129	<10	Allis Chalmers 3686045 25 KVA By bldg. 6-151
120097	Sample #130	<10	Alamo 3096067 25 KVA By bldg. 6-151
120098	Sample #131	22	Greenville 71-217-2 50 KVA By bldg. 6-151
120099	Sample #132	19	Alamo J6066816 25 KVA By bldg. 7-218
120100	Sample #133	17	Alamo 712175 37.5 KVA By bldg. 7-218
120101	Sample #134	<10	Delta Star E92046 10 KVA Vacant lot across from 7-218 & 7-253 dead, out of ser
120102	Sample #135	<10	Allis Chalmers 3737590 15 KVA Lot across from 7-218 & 7-253 dead, out of serv
120103	Sample #136	39	Westinghouse 3176934 10 KVA Lot across from 7-218 & 7-253 dead, out of serv
120104	Sample #137	<10	Allis Chalmers 3734838 25 KVA Across from vacant lot, out of service
120105	Sample #138	<10	Allis Chalmers 3150724 15 KVA Across from vacant lot
120106	Sample #139	<10	Allis Chalmers 3695317 37.5 KVA Across from vacant lot,out of service, oil low
120107	Sample #140	<10	Allis Chalmers 3700292 25 KVA Bldg. 8-300
120108	Sample #141	<10	Allis Chalmers 3737576 50 KVA Bldg. 8-300
120109	Sample #142	<10	(rust)RTD 7308063 50 KVA Vacant lot across from 8-300, out of service, poor
120110	Sample #143	<10	Alamo 607705 10 KVA Beside orientation (south), good condition
120111	Sample #144	<10	Alamo G057407 25 KVA Beside orientation (south) near street
120112	Sample #145	<10	Delta Star E913502 37.5 KVA Beside orientation (south) near street
120113	Sample #146	<10	Allis Chalmers 3737575 50 KVA Beside bldg. 11-303
120114	Sample #147	<10	Allis Chalmers 3737568 50 KVA Beside bldg. 11-303
120115	Sample #148	<10	Allis Chalmers 3737561 50 KVA Beside bldg. 11-303
120116	Sample #149	<10	Alamo L2265239 37.5 KVA Beside bldg. 10-301, pad mount, very good condition
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
120118	Sample #151	<10	Delta Star E930310 37.5 KVA Beside bldg. 10-301 pad mt. very good condition
120119	Sample #152	<10	Delta Star E920502 15 KVA Between bldg. 10-301 & 10-300 fair condition

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D

ANA-LAB CORP.
THE COMPLETE SERVICE LAB

2600 DUDLEY ROAD – KILGORE, TEXAS 75662 – 214/984-0551

Analytical Chemistry • Waste Treatment & Disposal • Equipment Sales

Gary Job Corps Tranforrer Analysis Summary

Ana-Lab #	Sample #	Results	Transformer Identification, Conditon, and Location
120120	Sample #153	<10	Delta Star E930867 37.5 KVA Between bldg. 10-301 & 10-300, fair condition
120121	Sample #154		Delta Star E920500 37.5 KVA Between bldg. 10-301 & 10-300, fair condition
120263	Sample #155	<10	Alamo G057416 37.5 KVA Beside Bldg 9-200, across 9-102 - 9-104
120264	Sample #156	<10	Alamo G077010 25 KVA Beside Bldg 9-200, across 9-102 - 9-104
120265	Sample #157	<10	Delta Star E920326 50 KVA At back between 7-358 & 8-350
120266	Sample #158	<10	Allis Chalmers 3694940 75 KVA At back between 7-358 & 8-350
120267	Sample #159	<10	Allis Chalmers 3668406 10 KVA Between 7-350 & 7-352
120268	Sample #160	<10	Allis Chalmers 3668399 10 KVA Between 7-350 & 7-352
120269	Sample #161	<10	Alamo G057408 25 KVA By bldg. 5-308 Good condition
120270	Sample #162	15	Allis Chalmers 3744643 37.5 KVA By Bldg. 5-308 Leaks
120271	Sample #163	15	
120272	Sample #164	<10	Westinghouse 64AM11959 75 KVA Behind 6-254
120273	Sample #165	17	Alamo F930603 25 KVA Beside 6-207
120274	Sample #166	40	Allis Chalmers 3700220 37.5 KVA Between 5-210 & 5-211
120275	Sample #167	<10	Delta Star E930866 37.5 KVA Between 5-210 & 5-211
120276	Sample #168	<10	Allis Chalmers 403688 37.5 KVA Bldg. 5-214
120277	Sample #169	<10	Allis Chalmers 3737577 50 KVA Bldg. 5-214
120278	Sample #169	<10	Alamo 71-217-7 37.5 KVA Out of service
120279	Sample #171	<10	Westinghouse 64AK2023 37.5 KVA Tennis cts. Bldg. 5-104 Poor, out of service
120280	Sample #172	<10	Rural Elec. Inc. 68381 37.5 KVA Tennis cts. Bldg. 5-104
120281	Sample #173	<10	Allis Chalmers 3668404 10 KVA Bldg. 5-208 Poor, oil smells burned
120282	Sample #174	<10	Delta Star E920498 15 KVA Bldg. 5-208 Hot, oil smells burned
120283	Sample #175	<10	Delta Star E920465 10 KVA Out of service, smells burned
120284	Sample #176	<10	Allis Chalmers 3727295 25 KVA Bldg. 5-212 & 210
120285	Sample #177	<10	Delta Star E920183 50 KVA Bldg. 5-212 & 210
120286	Sample #178	<10	Allis Chalmers 3727307 25 KVA Bldg. 5-212 & 210
120287	Sample #179	<10	Delta Star W200921 167 KVA Pad mt. by Bldg. 7-251, 7-279, & 7-263
120288	Sample #180	<10	Delta Star W200922 167 KVA Pad mt. by Bldg. 7-251, 7-279, & 7-263
120289	Sample #181	<10	Delta Star W200920 167 KVA Pad mt. by Bldg. 7-251, 7-279, & 7-263
120290	Sample #182	15	Alamo G057409 25 KVA Bldg. 7-281 & 7-250
120291	Sample #183	<10	Delta Star E861942 25 KVA Bldg. 7-281 & 7-250
120292	Sample #184	<10	Alamo G057499 25 KVA Bldg. 7-281 & 7-250
120293	Sample #185	<10	Delta Star E920322 50 KVA Bldg. 7-255 (Library) Blown fuse
120294	Sample #186	<10	Delta Star E891628 100 KVA Bldg. 7-255 (Library)
120295	Sample #187	<10	Delta Star E920328 50 KVA Bldg. 7-255 (Library)
120296	Sample #188	<10	RTE 7308051 25 KVA Across Bldg. 10-300
120297	Sample #189	15	Alamo 1849068 37.5 KVA Beside Bldg. 7-101
120298	Sample #190	<10	Allis Chalmers 6700221 37.5 KVA Beside Bldg. 7-101

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D

ANA-LAB CORP.
THE COMPLETE SERVICE LAB
2600 DUDLEY ROAD – KILGORE, TEXAS 75662 – 214/984-0551
Analytical Chemistry • Waste Treatment & Disposal • Equipment Sales

Gary Job Corps Tranformer Analysis Summary

Ana-Lab #	Sample #	Results	Transformer Identification, Conditon, and Location
120411	Sample #266	20	Westinghouse 3156365 10 KVA Bldg. 9-356
120412	Sample #267	Dry	Delta Star E860031 10 KVA Bldg. 9-356 Dry (no oil)
120413	Sample #268	<10	GE 4388784 6600 Volts Bldg. 9-356
120414	Sample #269	10	Alamo Delta Star L932156 25 KVA By Bldg. 9350
120415	Sample #270	<10	Alamo G057413 37.5 KVA By Bldg. 9350 No PCBs
120416	Sample #271	30	GE 1975141YGMA 37.5 KVA By 10-352 No PCBs
120417	Sample #272	35	Allis Chalmers 3709031 37.5 KVA By 10-352 No PCBs
120418	Sample #273	18	Allis Chalmers 3700229 37.5 KVA By 10-352 No PCBs
120419	Sample #274	250	GE 6548909 37.5 KVA By 7-355
120420	Sample #275	400	GE 6712098 37.5 KVA By 7-355
120421	Sample #276	<10	Westinghouse 3154898 37.5 KVA By 7-355
120422	Sample #277	<10	Delta Star 940977 15 KVA By 6-364
120423	Sample #278	24	Allis Chalmers 3630299 15 KVA By 6-364
120424	Sample #279	60	Allis Chalmers 3700293 25 KVA By 6-364
120425	Sample #280	<10	Westinghouse 65AA2922 100 KVA Hospital
120426	Sample #281	<10	Westinghouse E7211199CC3 100 KVA By Hospital
120427	Sample #282	<10	General 5918-4 10 KVA By Hospital
120428	Sample #283	<10	GE G548626-66Y 100 KVA Pad by 9-356
120429	Sample #284	<10	GE G882970-677 100 KVA Pad by 9-356
120430	Sample #285	<10	GE G542600-66Y 100 KVA Pad by 9-356
120705	Sample #286	<10	Westinghouse 3144098. 15 KVA Bldg. 9-356 (Stored)
120706	Sample #287	<10	Delta Star E920499 15 KVA Bldg. 9-356 (Stored)
120707	Sample #288	<10	Westinghouse 3121171 5 KVA Bldg. 9-356 (Stored)
120708	Sample #289	<10	GE C118158 10 KVA Bldg. 9-356 (Stored)
120709	Sample #290	<10	Westinghouse 3146355 10 KVA Bldg. 9-356 (Stored)
120710	Sample #291	<10	Alamo 9156395 10 KVA Bldg. 9-356 (Stored)
120711	Sample #292	25	Hiper Core 1350543 10 KVA Bldg. 9-356 (Stored)
120712	Sample #293	<10	Alamo K127002 10 KVA Bldg. 9-356 (Stored)
120713	Sample #294	<10	Alamo K127001 10 KVA Bldg. 9-356 (Stored)
120714	Sample #295	<10	LMI 219018 10 KVA Bldg. 9-356 (Stored)
120715	Sample #296		No data plate (dry) Bldg. 9-356 (Stored)
120716	Sample #297	<10	Westinghouse 3146792 15 KVA Bldg. 9-356 (Stored)
120717	Sample #298	15	Allis Chalmers 1829911 10 KVA Bldg. 9-356 (Stored)
120718	Sample #299	<10	Delta Star E830290 5 KVA Bldg. 9-356 (Stored)
120719	Sample #300	<10	Delta Star E940975 15 KVA Bldg. 9-356 (Stored)
120720	Sample #301	<10	Westinghouse 5882191 10 KVA Bldg. 9-356 (Stored)
120721	Sample #302	<10	Allis Chalmers 373758 15 KVA Bldg. 9-356 (Stored)
120722	Sample #303		Westinghouse 3156360 (dry) 10 KVA Bldg. 9-356 (Stored)

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D

ANA-LAB CORP.
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2600 DUDLEY ROAD – KILGORE, TEXAS 75662 – 214/984-0551
Analytical Chemistry • Waste Treatment & Disposal • Equipment Sales

Gary Job Corps Tranformer Analysis Summary

Ana-Lab #	Sample #	Results	Transformer Identification, Conditon, and Location
120723	Sample #304	<10	Alaso G07704 10 KVA Bldg. 9-356 (Stored)
120724	Sample #305		Westinghouse 3156368 10 KVA Bldg. 9-356 (Stored)
120725	Sample #306	15	Westinghouse 3166524 7.5 KVA Bldg. 9-356 (Stored)
120726	Sample #307	<10	Delta Star E920454 10 KVA Bldg. 9-356 (Stored)
120727	Sample #308	<10	Allis Chalmers 3734845 25 KVA Bldg. 9-356 (Stored)
120728	Sample #309		Westinghouse 3176935 (dry) 25 KVA Bldg. 9-356 (Stored)
120729	Sample #310		GE 6705383 (dry) 7.5 KVA Bldg. 9-356 (Stored)
120730	Sample #311	<10	Esco 5154 5 KVA Bldg. 9-356 (Stored)
120731	Sample #312	320	GE 6705244 7.5 KVA Bldg. 9-356 (Stored)
120732	Sample #313	470	GE 6705285 7.5 KVA Bldg. 9-356 (Stored)
120733	Sample #314	<10	Westinghouse 5910485 15 KVA Bldg. 9-356 (Stored)
120734	Sample #315	<10	Westinghouse 3146799 15 KVA Bldg. 9-356 (Stored)
120735	Sample #316	<10	? 71AB1916 50 KVA Bldg. 9-356 (Stored)
120736	Sample #317		Allis Chalmers 3713825 25 KVA Bldg. 9-356 (Stored)
120737	Sample #318		Allis Chalmers 3630302 15 KVA Bldg. 9-356 (Stored)
120738	Sample #319		Alaso 3178348 25 KVA Bldg. 9-356 (Stored)
120739	Sample #320		Allis Chalmers 3734839 25 KVA Bldg. 9-356 (Stored)
120740	Sample #321		Allis Chalmers 3754842 25 KVA Bldg. 9-356 (Stored)
120741	Sample #322		Alaso G057410 25 KVA Bldg. 9-356 (Stored)
120742	Sample #323		Hiper Core 1385065 15 KVA Bldg. 9-356 (Stored)
120743	Sample #324		Alaso H086901 75 KVA Bldg. 9-356 (Stored)
120744	Sample #325		Allis Chalmers 1820673 25 KVA Bldg. 9-356 (Stored)
120745	Sample #326		Westinghouse 74H13865 75 KVA Bldg. 9-356 (Stored)
120746	Sample #327		GE 6713094 (almost dry) 37.5 KVA Bldg. 9-356 (Stored)
120747	Sample #328		Allis Chalmers 3630297 15 KVA Bldg. 9-356 (Stored)
120748	Sample #329		Westinghouse 3178345 25 KVA Bldg. 9-356 (Stored)
120749	Sample #330		Delta Star E92025 50 KVA Bldg. 9-356 (Stored)
120750	Sample #331		Allis Chalmers 3630300 15 KVA Bldg. 9-356 (Stored)
120751	Sample #332		Hiper Core 1385050 15 KVA Bldg. 9-356 (Stored)
120752	Sample #333		Allis Chalmers 3709246 50 KVA Bldg. 9-356 (Stored)
120753	Sample #334		Delta Star F920321 50 KVA Bldg. 9-356 (Stored)
120754	Sample #335		Westinghouse 5895674 25 KVA Bldg. 9-356 (Stored)
120755	Sample #336		Alaso K127003 10 KVA Bldg. 9-356 (Stored)
120756	Sample #337		Allis Chalmers 1820685 25 KVA Bldg. 9-356 (Stored)
120757	Sample #338		Allis Chalmers 1820675 25 KVA Bldg. 9-356 (Stored)
120758	Sample #339		Line Material 933 Bldg. 9-356 (Stored)
120759	Sample #340		Line Material 791 Bldg. 9-356 (Stored)
120760	Sample #341		GE 6711728 25 KVA Bldg. 9-356 (Stored)

ATTACHMENT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

APR 15 1985

SUBJECT: Pollution Control Screening at Gary Job Corps Center, San Marcos, Texas

FROM: Jim Highland, P.E.
Federal Facilities Compliance Coordinator (6ES-FA)

TO: File, Gary Job Corps Center, San Marcos, Texas

On Tuesday, April 9, 1985, I visited the subject Federal Facility to survey pollution control facilities and activities relative to implementation of Executive Order 12088 and the requirements of the environmental laws administered by EPA. This survey is part of a regional initiative to screen significant minor Federal Facilities (FF) not currently in the sphere of FF receiving regular compliance inspections by the State and/or EPA. These surveys are intented to surface any obvious or apparent problems needing correction or warranting closer investigation through follow-up compliance inspections. The visits are informal and consultative in nature and this report should not be interpreted as a formal finding of actual compliance status.

Gary Job Corps Center (GJCC) is located on 817 acres of land approximately 1 mile northeast of San Marcos, Texas on State Highway No. 21. It is a residential vocational training center for economically pressed youth who have dropped out of school and are unable to find jobs. It provides vocational training in 24 areas of the building, construction, manufacturing and automotive trades, service occupations and special programs. Basic education courses are also provided in support of the vocational training. Current GJCC population is approximately 2,500 resident and 600 non-resident. GJCC has its own power, natural gas and water distribution and sewage collection and disposal systems. Solid waste collection and disposal and pesticide control services are contracted to outside firms. Air, solid waste and wastewater emissions sources include dormitories and other residences, service and educational buildings, dining halls, shops (carpentry, sheet metal, welding, machine, printing, automotive and heavy equipment repair), heavy equipment operation and storage and transfer facilities for automotive and diesel fuel.

My primary contacts and guides for the survey were Mr. Dick Moncure, Environmental Coordinator, and Mr. Mo Gloria. During the screening, I identified no apparent problems in the areas of air and water pollution control under the CAA and CWA, RCRA waste handling and disposal, pesticides use and handling, nor their activities covered under the Safe Drinking Water Act. However, I did note the following apparent violations or potential problems connected with their CERCLA and TSCA activities:

ATTACHMENT

EPA Form 1320-6 (Rev. 3-76)

05/31/2000 TNRCC RECORDS BLDG D

GW

TEXAS WATER DEVELOPMENT BOARD

WELL SCHEDULE

Aquifer Alluvium Field No. 2 State Well No. 67-02-702

Owner's Well No. County Caldwell

1. Location: 1/4, 1/4 Sec., Block Survey Wm Pettus, A-21

2. Owner: Courtenay Marshall Address: Route 1, Box 23A, Maxwell, Tex

Tenant: Address:

Driller: Address:

3. Elevation of is ft. above msl, determined by

4. Drilled: 19 ? (Dug) Cable Tool, Rotary,

5. Depth: Rept. ft. (Meas.) 27 ft.

6. Completion: Open Hole, Straight Wall, Underreamed, Gravel Packed (38" inside dia. Corrugated Concrete tile)

7. Pump: Mfgr. None Type

No. Stages, Bowls Diam. in., Setting ft.

Column Diam. in., Length Tailpipe ft.

8. Motor: Fuel Make & Model HP.

9. Yield: Flow gpm, Pump gpm, Meas., Rept., Est.

10. Performance Test: Date Length of Test Made by

Static Level ft. Pumping Level ft. Drawdown ft.

Production gpm Specific Capacity gpm/ft.

11. Water Level: 16.5 ft. (Rept. Meas.) 2-26 1968 (above below) top of concrete tile which is 0.9 ft. (above below) surface.

ft. rept. meas. 19 above below which is ft. above below surface.

ft. rept. meas. 19 above below which is ft. above below surface.

ft. rept. meas. 19 above below which is ft. above below surface.

12. Use: Dom., Stock, Public Supply, Ind., Irr., Waterflooding, Observation, (Not Used)

13. Quality: (Remarks on taste, odor, color, etc.)

Temp. °F, Date sampled for analysis 2-26-68 Laboratory TSDH

Temp. °F, Date sampled for analysis Laboratory

Temp. °F, Date sampled for analysis Laboratory

14. Other data available & circled: Driller's Log, Radioactivity Log, Electric Log, Formation Samples, Pumping Test,

15. Record by: David J. White Date 2-26 1968

Source of Data

16. Remarks:

CASING & BLANK PIPE

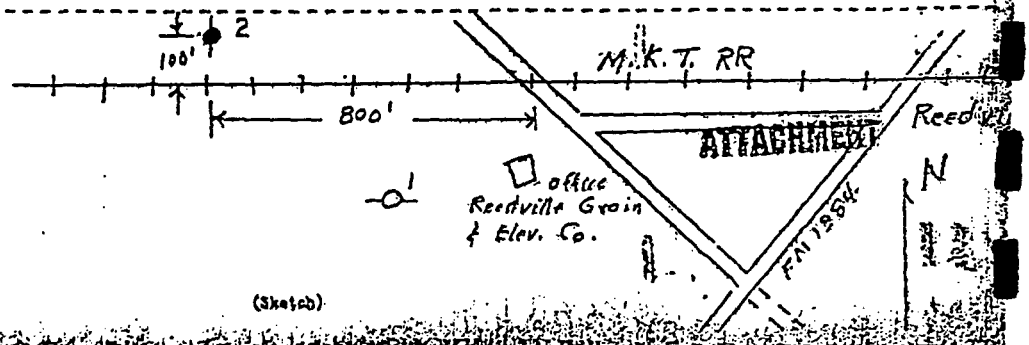
Cemented From ft. to ft.

Diam. (in.)	Type	Setting, ft. from	to

WELL SCREEN

Screen Openings

Diam. (in.)	Type	Setting, ft. from	to



(Sketch)

05/31/2000 TNRCC RECORDS BLDG D

GW 1

TEXAS WATER DEVELOPMENT BOARD

WELL SCHEDULE

Aquifer Alluvium Field No. 3 State Well No. 67-02-703

Owner's Well No. County Caldwell

1. Location: 1/4, 1/4 Sec., Block, Survey Wm Pettus, A-21

2. Owner: T. G. Langham Address: Route 1, Maxwell, Texas

Tenant: Address:

Driller: Address:

3. Elevation of is ft. above msl, determined by

4. Drilled: 1932; (Dug) Cable Tool, Rotary,

5. Depth: (Rept.) 31 ft. Meas. ft.

6. Completion: Open Hole, Straight Wall, Underreamed, Gravel Packed

7. Pump: Mfgr. Type Jet

No. Stages, Bowls Diam. in., Setting ft.

Column Diam. in., Length Tailpipe ft.

8. Motor: Fuel Electric Make & Model HP.

9. Yield: Flow gpm, Pump gpm, Meas., Rept., Est.

10. Performance Test: Date Length of Test Made by

Static Level ft. Pumping Level ft. Drawdown ft.

Production gpm Specific Capacity gpm/ft.

11. Water Level: 17.0 ft. (rept. meas.) 2-26 1968 (above below) top of steel casing which is 2.6 ft. (above below) surface.

ft. rept. meas. 19 above below which is ft. above below surface.

ft. rept. meas. 19 above below which is ft. above below surface.

ft. rept. meas. 19 above below which is ft. above below surface.

12. Use: (Dom.) Stock, Public Supply, Ind., Irr., Waterflooding, Observation, Not Used.

13. Quality: (Remarks on taste, odor, color, etc.)

Temp. °F, Date sampled for analysis 2-26-68 Laboratory TSDH

Temp. °F, Date sampled for analysis Laboratory

Temp. °F, Date sampled for analysis Laboratory

14. Other data available as circled: Driller's Log, Radioactivity Log, Electric Log, Formation Samples, Pumping Test,

15. Record by: David J. White Date 2-26 1968

Source of Data

16. Remarks:

CASING & BLANK PIPE

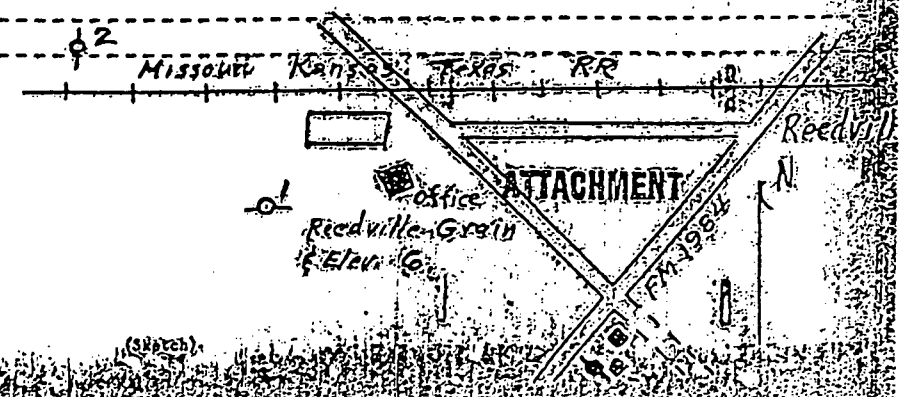
Cemented From ft. to ft.

Diam. (in.)	Type	Setting ft. From	To
	36" Steel Casing		

WELL SCREEN

Screen Openings

Diam. (in.)	Type	Setting ft. From	To



(Sketch)

05/31/2000 TNRCC RECORDS BLDG D

GW 1

TEXAS WATER DEVELOPMENT BOARD

WELL SCHEDULE

Aquifer Alluvium Field No. 1 State Well No. 67-02-707

Owner's Well No. County Caldwell

1. Location: 1/4, 1/4 Sec., Block, Survey Wm. Pettus, A-21

(Formerly Gulco Grain Co.)

2. Owner: Reedville Grain & Elevator Co. Address: P.O. Box 841, San Marcos, Tex.

Mgr. John W. Jones Address: same

Driller: Address:

3. Elevation of is ft. above msl, determined by

4. Drilled: 1961; (Dug) Cable Tool, Rotary,

5. Depth: Rept. ft. (Meas.) 26 ft.

6. Completion: Open Hole, Straight Wall, Underreamed, Gravel Packed {38" (inside dia. concrete rings)

7. Pump: Mfgr. Type Jet

No. Stages, Bowls Diam. in., Setting ft.

Column Diam. in., Length Tailpipe ft.

8. Motor: Fuel Electric Make & Model HP.

9. Yield: Flow gpm, Pump gpm, Meas., Rept., Est.

10. Performance Test: Date Length of Test Made by

Static Level ft. Pumping Level ft. Drawdown ft.

Production gpm Specific Capacity gpm/ft.

11. Water Level: 14.7 ft. (Rept. Meas.) Feb. 26 1968 (above below) top of concrete ring which is 1.0 ft. (above below) surface.

ft. rept. meas. 19 above below which is ft. above below surface.

ft. rept. meas. 19 above below which is ft. above below surface.

ft. rept. meas. 19 above below which is ft. above below surface.

12. Use: (Dom.) Stock, Public Supply, Ind., Irr., Waterflooding, Observation, Not Used.

13. Quality: (Remarks on taste, odor, color, etc.) peculiar odor

Temp. °F, Date sampled for analysis Feb. 26, 1968 Laboratory TSHD

Temp. °F, Date sampled for analysis Laboratory

Temp. °F, Date sampled for analysis Laboratory

14. Other data available as circled: Driller's Log, Radioactivity Log, Electric Log,

Formation Samples, Pumping Test,

15. Record by: David J. White Date Feb. 26 1968

Source of Data John W. Jones

16. Remarks: Well is located between the 13th & 14th cylindrical grain elevator west of the office about 230 feet.

CASING & BLANK PIPE

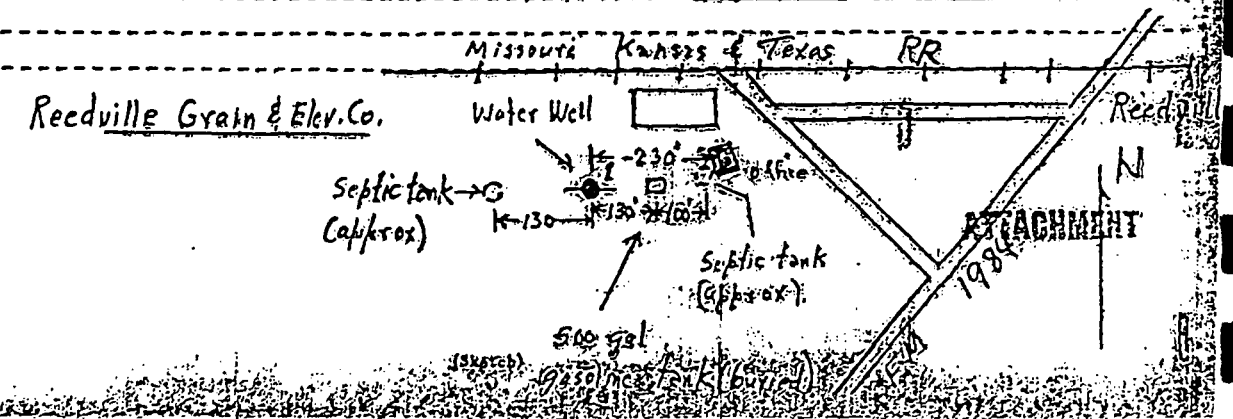
Cemented From ft. to ft.

Diam. (in.)	Type	Setting, ft. from	to

Well Screen

Screen Openings

Diam. (in.)	Type	Setting, ft. from	to



05/31/2000 TNRCC RECORDS BLDG D

TEXAS WATER DEVELOPMENT BOARD

WELL SCHEDULE

Aquifer Alluvium Field No. 4 State Well No. 67-02-708

Owner's Well No. 5 County Caldwell

1. Location: 1/4, 1/4 Sec. , Block , Survey
1/2 mile NE Reedville on FM 1984, then NW 900 feet
2. Owner: Joe K. Alexander Address: Route 1, Maxwell, Texas
Tenant: Address:
Driller: Address:
3. Elevation of is ft. above msl, determined by
4. Drilled: approx. 1954 Dug Cable Tool, Rotary,
5. Depth: Rept. 29 ; Meas. ft. 10' x 14' concrete (poured) curb & 13 high; then open hole
6. Completion: Open Hole, Straight Wall, Underreamed, Gravel Packed 16 feet to TD
7. Pump Mfg: Berkeley 6" centrifugal Type
No. Stages: , Bowls Diam. in., Setting ft.
Column Diam. in., Length Tailpipe ft.
8. Motor: Fuel Butane to be converted to electric
9. Yield: Flow gpm, Pump gpm, Meas., Rept., Est.
10. Performance Test: Date Length of Test Made by
Static Level ft. Pumping Level ft. Drawdown ft.
Production gpm Specific Capacity gpm/ft.

CASING & BLANK PIPE
Cemented From ft. to ft.

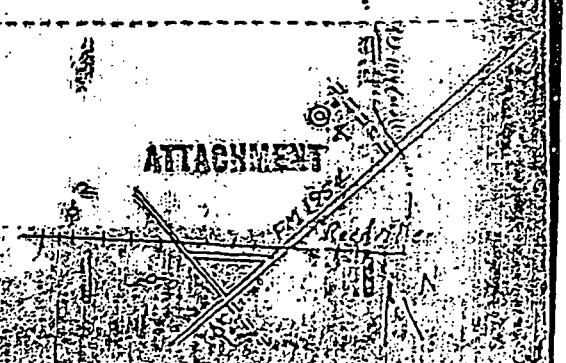
Diam. (in.)	Type	Setting, ft. from	to

11. Water Level: 10.6 ft. rept. meas. 2-28 1968 above below top of concrete curb which is at ft. above below surface.
ft. rept. meas. 19 above below which is ft. above below surface.
ft. rept. meas. 19 above below which is ft. above below surface.
ft. rept. meas. 19 above below which is ft. above below surface.
12. Use: Dom., Stock, Public Supply, Ind., Irr., Waterflooding, Observation, Not Used,
13. Quality: (Remarks on taste, odor, color, etc.)
Temp. °F, Date sampled for analysis 2-28-68 Laboratory TSDH
Temp. °F, Date sampled for analysis Laboratory
Temp. °F, Date sampled for analysis Laboratory
14. Other data available as circled: Driller's Log, Radioactivity Log, Electric Log, Formation Samples, Pumping Test,
15. Record by: David J. White Date 2-28 1968
Source of Data Joe K. Alexander
16. Remarks:

WELL SCREEN
Screen Openings

Diam. (in.)	Type	Setting, ft. from	to

ATTACHMENT



(Sketch)

05/31/2000 TNRCC RECORDS BLDG D

Send original copy by certified mail to the Texas Department of Water Resources P.O. Box 13087 Austin, TX 78711

State of Texas
WATER WELL REPORT

For TDWR use only
Well No. 67-10-15
Located on map
Received:

1) OWNER: (b) (6) Address: (b) (6) (Street or RFD) (City) (State) (Zip)

2) LOCATION OF WELL: County CLOVIS 2 miles in N.W. direction from MARTINDALE (N.E., S.W., etc.) (Town)

Driller must complete the legal description to the right with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal description:
Section No. _____ Block No. _____ Township _____
Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____
☑ See attached map.

3) TYPE OF WORK (Check): ☑ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): ☑ Domestic ☐ Industrial ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Other _____

5) DRILLING METHOD (Check): ☑ Mud Rotary ☐ Air Hammer ☐ Driven ☐ Bored ☐ Air Rotary ☐ Cable Tool ☐ Jetted ☐ Other _____

6) WELL LOG:
Date drilled 9-15-78

Diameter of Hole: Dia. (in.)	From (ft.)	To (ft.)
4"	Surface	40

7) BOREHOLE COMPLETION: ☐ Open Hole ☑ Straight Wall ☐ Underreamed ☐ Gravel Packed ☐ Other _____ If Gravel Packed give interval . . . from _____ ft. to _____ ft.

From (ft.)	To (ft.)	Description and color of formation material
0	6	TOP SOIL
6	28	CLAY
28	35	GRAVEL
35	40	SHALE

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casing Screen
4"	NEW	PVC	0	28	
11	"	11 SLOTTED	28	35	

CEMENTING DATA
Cemented from _____ ft. to _____ ft.
Method used _____
Cemented by _____ (Company or Individual)

9) WATER LEVEL:
Static level 28 ft. below land surface Date 9-15-78
Artesian flow _____ gpm. Date _____

10) PACKERS: Type _____ Depth _____

11) TYPE PUMP:
☐ Turbin ☐ Jet ☑ Submersible ☐ Cylinder ☐ Other _____
Depth to pump bowls, cylinder, jet, etc. 35 ft.

12) WELL TESTS:
☐ Type Test: ☑ Pump ☐ Baller ☐ Jetted ☐ Estimated
Yield: 25 gpm with 0 ft. drawdown after 1 hrs.

(Use reverse side if necessary)

13) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable water? ☐ Yes ☑ No
If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes Color

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME Roy Williams (Type or Print) Water Well Drillers Registration No. 1040
ADDRESS P.O. Box 853 (Street or RFD) LOCKHART (City) TEX (State) 78644 (Zip)
(Signed) Roy Williams (Water Well Driller) LOCKHART WELDING SERVICE (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

☐ Additional instructions on reverse side.
TDWR-0393

05/31/2000 TNRCC RECORDS BLDG D

9-185—July 193
Revised

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES BRANCH

WELL SCHEDULE

Date [illegible], 19[illegible] Field No. _____

Record by [illegible] Office No. _____

Source of data [illegible]

1. Location: State [illegible] County Caldwell

Map on Hwy 80, NE of 108

_____ ¼ _____ ¼ sec. _____ T _____ N/S R _____ E/W

2. Owner: Robert Harper Address _____

Tenant _____ Address _____

Driller _____ Address _____

3. Topography San Marcos R Valley

4. Elevation 533 ft. above/below Topo

5. Type: Dug, drilled, driven, bored, jetted _____ 19__

6. Depth: Rept. _____ ft. Meas. 33 ft.

7. Casing: Diam. 60 in., to _____ in., Type _____

Depth _____ ft., Finish _____

8. Chief Aquifer River Al. From _____ ft. to _____ ft.

Others 29.70-12-30-63 29.97-3-2-64

9. Water level 29.54 ft. rept./meas. 11-8 1963 above/below _____

_____ which is 1.5 ft. above/below surface

10. Pump: Type T Capacity _____ G.M. _____

Power: Kind _____ Horsepower 15

11. Yield: Flow _____ G.M., Pump _____ G.M., Meas., Rept. Est. _____

Drawdown _____ ft. after _____ hours pumping _____ G.M.

12. Use: Dom., Stock, PS., RR., Ind., Irr., Obs. _____

Adequacy, permanence _____

13. Quality _____ Temp _____ °F.

Taste, odor, color _____ Sample Yes/No _____

Unfit for _____

14. Remarks: (Log, Analyses, etc.) [illegible]

[illegible] 30.86 [illegible]

[illegible]

ATTACHMENT

2103027014 5

05/31/2000 TNRCC RECORDS BLDG D

Gary Job Corps

Law Offices of

Louis T. Rosenberg and Associates

A Professional Corporation

Louis T. Rosenberg

Randal C. Gray
Dale E. Muller
Of Counsel

Alex H. Coy III

Texas Bank North Bldg.
13750 Hwy. 281 N., Suite 700
San Antonio, Texas 78232
(512) 494-4494
Fax (512) 496-4740

400 E. Anderson Lane
Suite 604
Austin, Texas 78752
(512) 837-7033

February 5, 1988

Mr. Lamar W. Hankins
City Attorney
City of San Marcos
630 E. Hopkins
San Marcos, TX 78666

RE: Cause No. 18397
Maxwell Water Supply Corporation vs
C. R. Freeman, Jr., C. R. Freeman Construction Co.,
Hemphill Estates Water Co., Inc. of Caldwell County,
John Wade, Janie Wade, and David Williams
Our File No. 0111-87-H

RE: Superfund File No. TX1161630644

Dear Mr. Hankins:

I am enclosing the January 21, 1988 correspondence from David Gonzalez, Enviromental Engineer, Superfund Site Assessment Section, Enviromental Protection Agency, Dallas, Texas.

I call your attention to the information being collected at this time, plus the information back in 1985.

Because the City of San Marcos is performing well site testing, pursuant to agreement and/or order from the Texas Water Commission, I think it would be appropriate for you to be aware of the U. S. Enviromental Protection Agency Investigation, and past findings. With regard to past findings, I call your attention to Attachment A, and the April 18, 1985, Memorandum.

I am not entirely clear that the electrical transformers and the tetraethyl lead problems are all on the base or off the base (Gary Job Corp Center).

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D

In our earlier discussions concerning the waste site, I had the impression that the landfill site was off the base, but I am not entirely sure whether or not is was on military property, private property, or several locations.

Because a site investigation is anticipated, and further corrective measures are being solicited so as to prevent contamination of water in the general area of Reedville/Gary Job Corps Center, I thought it was useful that you have this information, and would ask that you relay it on to the appropriate city staff persons.

By copy of this correspondence I am informing Mr. David Gonzales of my communication to you, and ask that you make him aware of the periodic well site testing that is being accomplished by the City of San Marcos.

Based on the well site tests with which you have made me familiar, there are high chemical findings in the area, and this information should be relayed to Mr. Gonzales so that he might be able to correlate this with his ongoing investigation.

Thank you kindly for your attention to this matter.

Very truly yours,

LOUIS T. ROSENBERG, P.E.

Louis T. Rosenberg

LTR/mg

Enclosures: Correspondence dated 1/21/88 by David Gonzalez, Enviromental Engineer, Superfund Site Assessment Section with attachments.

cc: Maxwell Water Supply Corporation (w/encls)

cc: Mr. David Gonzales, Enviromental Engineer
Superfund Site Assessment Section
Enviromental Protection Agency (w/o encls)

cc: William J. Ellison, County Judge
Caldwell County, Lockhart, TX (w/encls)

ATTACHMENT

05/31/2000 TNRCC RECORDS BLDG D

Reference 16

Texas Water Commission

INTEROFFICE MEMORANDUM

TO : Russ Kimble, Chief, Reports and Management Section DATE: February 10, 1988
Hazardous and Solid Waste Division

THRU : Luis E. Campos, Hazardous and Solid Waste Coordinator
Field Operations Division

FROM : Gary McCoig, Field Investigator
District 8

SUBJECT: Gary Job Corps Center - Solid Waste Registration No. 73125 - Special Inspection of February 2, 1988 - Caldwell County

On February 2, 1988, a special inspection was conducted at the Gary Job Corps Center in response to Attachment 1. The center was represented during the inspection by Dick Moncure (Manager of Facilities) and Terry Airhart (Supervisor of Plants and Systems). The Job Corp Center provides vocational training to underprivileged youths in many different areas including auto mechanics and auto body repair and painting. There are three maintenance shops that generate waste oils and spent solvents; heavy equipment maintenance, motor pool and the mechanics training shop. The solvents used (Varsol and Naptha) are hazardous by the characteristic of ignitability (Attachment 2). The quantities generated are less than 1000 kg per month of spent solvents. These spent solvents are combined with waste oils at each point of origin and disposed of by Frank's Waste Oil Service of DeValle, Texas.

The Job Corps Center presently has 10 electric transformers on-site that contain PCBs. These transformers have been taken out of service and are stored in a locked warehouse awaiting disposal. On August 17, 1987 an electric pole holding two PCB transformers broke resulting in a spill of approximately 10 gallons of oil containing PCBs. Gary Job Corps Center removed thirty 55 gallon drums of contaminated soil from the spill site. These drums are stored at the warehouse awaiting disposal. The spill was reported to the National Response Center, EPA and the Texas Water Commission-Spill Response Unit.

The Job Corp Center was originally a World War II military air base. At some time in the past tetra ethyl lead from several underground storage tanks were disposed of on-site. The location of this disposal is not known. Mr. Moncure was able to contact a former employee of the Tetra Ethyl Lead Corporation who was involved in the disposal activities. This individual was unable to recall the location but revealed that the tetra ethyl lead was disposed of by land applications.

The inspection revealed no anomalies in the centers present solid waste handling practices and registration.

Gary McCoig

Billy H. Boggs

RECEIVED
FEB 11 1988
FIELD OPERATIONS

GMc/pg
Attachments

05/31/2000 TNRCC RECORDS BLDG D

Reference 17

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
PETROLEUM STORAGE TANK DIVISION
ASSESSMENT REPORT FORM

This form should only be submitted when all information has been obtained as outlined in the document entitled *Guidance for Risk-Based Assessments at LPST Sites in Texas.* If the Table of Contents (page 2) is not fully completed, the TNRCC will return this form to the responsible party without review. This document must not be altered in any manner. **Requested information denoted with "*" is beyond the minimal requirements for a site assessment as defined by 30 TAC 334.78(a)(5).** Attach a workplan(s) and preapproval request(s) for those activities on sites eligible for reimbursement for the next appropriate activity.

LPST ID No: 108133 Facility ID No: 22732 Site priority: 4.1

Facility Name: Gary Job Corps Center (Former Gary Air Force Base)

Facility Address: Highway 21 East

City: San Marcos State: TX Zip: 78667

RP Name: US Army Corps of Engineers

RP Address: P.O. Box 17300

City: Fort Worth State: TX Zip: 76102

I certify that all work has been conducted in accordance with accepted industry standards/practices and adhered to TNRCC guidance and rules. I certify that I am aware that misrepresentation of any of the above claims is a violation of 30 TAC 33.4453(b)(1)(E) and that this violation may result in the disciplinary actions set forth in 30 TAC 334.453 and or 334.463 and 334.465.

Thompson Professional Group (Registered Corrective Action Specialist) | 00710 (RCAS Reg. No.) | August 21, 1998 (Expiration date)

(Signature) | 1/8/98 (Date)

(713) 956-4100 (Telephone #) | (713) 956-4121 (FAX #)

Michael Kane (Project Manager) | 01279 (CAPM Reg. No.) | July 30, 1998 (Expiration date)

(Signature) | 1/8/98 (Date)

713) 956-4100 (Telephone #) | (713) 956-4121 (FAX #)

RECEIVED
FEB 0 9 1998
TNRCC / PST
RPR

By signature below, I certify that I have reviewed this report for completeness.

RANDY NIEBUHR (Name of Responsible Party Contact) | U.S. ARMY CORPS OF ENGINEERS (Company)

Randy Niebuhr (Signature) | 6 February 98 (Date)

817/978-3223, ext. 1642 (Telephone #) | 817/978-2991 (FAX #)

mailing address: TNRCC/PST Division/RPR Section
MC 137
P.O. Box 13087
Austin, TX 78711-3087

LPST ID: 108133
Site Name: Former Gary Air Force Base
Site Location: Gary Job Corps, Hwy 21 East, San Marcos, Caldwell County

TABLE OF CONTENTS

Item	Title	Page	(■) Completed
Worksheet E	Executive Summary	3	■
Worksheet 1.0	Site Description	4	■
Worksheet 2.0	Land Use	5	■
Worksheet 3.0	Water Well Inventory	6	■
Worksheet 4.0	Receptor Survey	7-8	■
Worksheet 5.0	Site Assessment History	9	■
Worksheet 6.0	Tank System Characterization	10	■
Worksheet 7.0	Soil Assessment	11-12	■
Worksheet 8.0	Groundwater Assessment	13-14	■ NA □
Worksheet 9.0	Vapor Assessment	15	■
Worksheet 10.0	Surface Water Assessment	16	□ NA ■
Worksheet 11.1-5	Plan A Evaluation	17-22	■
Worksheet 12.0	Site Prioritization	23-25	■
Abbreviations		26	
			(■) Enclosed
Attachment 1	Site plan illustrating location of entire former/current UST/AST system(s), subsurface utilities, limits of excavation, system removal or repair, sampling points, and surface cover		■
Attachment 2	Vicinity map or aerial photograph illustrating surrounding land use and receptors identified within a 500-foot radius		■
Attachment 3	USGS topographic map with plotted water well locations		■
Attachment 4	Copies of completion details and water well drillers reports for located wells (0.5 mile radius)		■
Attachment 5	Site plan(s) illustrating former/current UST/AST system(s) and all (i.e., soil, groundwater, vapor, surface water) sampling points		■
Attachment 6	Soil contaminant concentration maps		■
Attachment 7	Groundwater gradient map		■ NA □
Attachment 8	Groundwater contaminant concentration maps		■ NA □
Attachment 9	Biodegradation Indicator Distribution Map*		□ NA ■
Attachment 10	Soil Gas Survey Maps*		□ NA ■
Attachment 11	Vapor Contaminant Concentration Map		■
Attachment 12	Surface Water Contaminant Concentration Map		□ NA ■
Attachment 13	Surface Water Flow Map		■ NA □
Attachment 14	Soil boring logs to include: lithology, field screening, sample locations, well completion details, TNRCC Form 0019		■
Attachment 15	Summary table of all soil, groundwater, surface water, and vapor analytical results, including from all sampling points, and tank removal or repair activities		■
Attachment 16	Summary tables of all gauging data, water level data, NAPL thickness and corrected water level data and well screen interval (if applicable)		■ NA □
Attachment 17	Copies of all analytical reports including complete chain-of-custody and quality assurance/quality control documentation		■
Attachment 18	Copies of manifests, waste receipts, or other documents necessary to document waste disposition		■
Attachment 19	Photographic documentation		■
Attachment 20	Proposal for next appropriate action and/or Site Closure Request		■

LPST ID: 108133
Site Name: Former Gary Air Force Base
Site Location: Gary Job Corps, Hwy 21 East, San Marcos, Caldwell County

EXECUTIVE SUMMARY

Check all applicable boxes.

UST/AST System Status: ☐ Active ■ Permanently Removed from Service
☐ Temporarily Out of Service ☐ Temporarily Indefinitely Out of Service (Variance Due Date: _____)

Current site land use:
■ vacant ☐ indus./coml. ■ residential ☐ agricultural ☐ recreational ☐ UST/AST Facility

Sources of Release: ■ tank(s) ■ piping ☐spills ■ dispenser ☐ Other: _____

Substance Released:
☐ gasoline ☐ diesel ☐ waste oil ☐ hydraulic fluid ☐ AV gas ■ jet fuel ☐ Other:

Site Assessment History:
■ Preliminary/LSA ☐ Groundwater Monitoring ■ Remedial Action ☐ Emergency Response

Affected environmental media: ☐ surficial soil (<2 ft. BGS) ■ soil (2 to 15 ft. BGS) ■ soil (>15 ft. BGS)
■ groundwater ☐ surface water ☐ air

Identified affected receptors: ☐ water wells ☐ basements/structures ☐ habitat ☐ building ☐ underground utilities
☐ surface water ☐ exposed contaminated soil ☐ Other Distance from site (ft.): _____

Samples collected ■ yes ☐ no Abatement initiated: ■ yes ☐ no Type: Permanent Removal

Identified potential receptors: ☐ water wells ☐ basements/structures ☐ habitat ☐ building ■ underground utilities
☐ surface water ☐ exposed contaminated soil ☐ Other Distance from site (ft.): _____

Depth to first encountered groundwater (ft.) BGS: ☐ >50 ■ 15-50 ☐ 0-15

Presence of NAPLs (ft.):
☐ sheen ■ 0.1-0.5 ft. ☐ 0.5-2 ft. ☐ 2-5 ft. ☐ >5 ft. ☐ none Recovery Initiated: ■ yes ☐ no

Current NAPL extent: ■ on-site ■ off-site

Dissolved-phase extent: ■ on-site ■ off-site ☐ unknown

Groundwater beneficial use category:
☐ Cat. I ☐ Cat. II ☐ Cat. III ■ Cat. IV ☐ Soils only affected, regional beneficial use can not be established.

Contaminants of Concern Exceed Target Concentrations of Affected media:

Soil (Worksheets 7.0, 11.1-5):	■ yes ☐ no
Groundwater (Worksheet 8 & 11.1-4):	☐ yes ■ no
Vapors (Worksheet 9.0):	☐ yes ■ no
Surface Water (Worksheet 10.0):	☐ yes ■ no

Site Priority: 1._____ 2._____ 3._____ 4._1_____

Recommended Actions:

☐ a) Affected Receptors Identified - Propose additional corrective action and/or monitoring program.

☐ b) Site does not exceed Plan A criteria - Submit site closure request form.

☐ c) Site does not exceed Plan A criteria - Propose verification groundwater monitoring program.

■ d) Site exceeds Plan A criteria - Propose corrective action to achieve Plan A criteria.

☐ e) Site exceeds Plan A criteria - Propose Plan B risk assessment and/or evaluation.

LPST ID: 108133

SITE DESCRIPTION

Location Description

Facility Name: Former Gary Air Force Base

Address: Hwy 21 East, Gary Job Corps Center

Cross-Street: E. Kane Avenue at 10th Street

City: San Marcos

County: Caldwell

Current Site Water Supply: City of San Marcos

Notes: Site lies between Building 9-361 and Buildings 10-350 and 10-351. Building 9-361 is described as a vocational education building, Building 10-350 is a storage-support building, and Building 10-351 is an administration building. Gary Job Corps is a vocational education facility. Building 10-221 is considered housing, and is located approximately 600 ft. southwest of the site (see Attachment 2).

Topography

Terrain: ■ Flat ☐ Steep ☐ Variable

Ground Surface Slope
Direction Southeast Grade (ft./ft.) 0.005 ft/ft

Other Comments:

Discuss any significant onsite or adjacent significant topographic feature.

A small surface storm drainage ditch is located about 700 ft. east of the site. This flows in a southerly direction and into Hemphill Creek.

Local Climate:

Average Annual Rainfall (in.): 32

Within 100 Year Floodplain: yes / ■ no

Other Comments:

Discuss recent (i.e., within the past year) extreme climatic changes. Discuss engineered modifications to floodplain status or designation.

LPST ID: 108133

LAND USE

PAST, CURRENT, AND FUTURE USE (check all that apply)

■ Past use of site:
- ■ Commercial/Industrial
- ☐ Residential
- ☐ Agricultural
- ☐ Recreational
- ☐ Vacant
- ■ UST/AST Facility

■ Past Predominant Land Use of the Area:
- ■ Commercial/Industrial
- ☐ Residential

Describe: Former Gary Air Force Base, Gary Job Corps-Department of Labor

■ Current use of site:
- ☐ Commercial/Industrial
- ☐ Residential
- ☐ Agricultural
- ☐ Recreational
- ■ Vacant
- ☐ UST/AST Facility

■ Current Predominant Land Use of the Area:
- ☐ Commercial/Industrial
- ■ Residential

■ Type of Residential Area:
- ☐ Minority/Low Income ☐ Non-minority/Low Income
- ■ Other

Describe: Gary Job Corps-Department of Labor, a vocational education facility

■ Future use of site:
- ☐ Commercial/Industrial
- ☐ Residential
- ☐ Agricultural
- ☐ Recreational
- ■ Vacant
- ☐ UST/AST Facility

■ Future Predominant Land Use of the Area:
- ☐ Commercial/Industrial
- ■ Residential

Describe: Gary Job Corps-Department of Labor, a vocational education facility

List all facilities (not limited to PST regulated) within 500 feet of the site that could be a source of contaminants:

Facility Name & Type: San Marcos Mun. Airport
Address: Highway 21 East
Facility No.: NA
LPST ID No. NA
Owner/Operator: City of San Marcos

Facility Name & Type: NA
Address: NA
Facility No.: NA
LPST ID No. NA
Owner/Operator: NA

Facility Name & Type: NA
Address: NA
Facility No.: NA
LPST ID No. NA
Owner/Operator: NA

Other Comments:

Additional facilities may be listed and noted on Attachment 2.

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WATER WELL INVENTORY

SUMMARY OF WELLS WITHIN 0.5 MILE RADIUS OF THE SITE

			Downgradient Direction		
	Total No.	Active No.	Total No.	Active No.	No. Screened in Affected Zone
Public/Municipal:	0	0	0	0	0
Industrial:	0	0	0	0	0
Domestic:	0	0	0	0	0
Agricultural:	0	0	0	0	0

POTENTIAL RECEPTOR POINTS

	Closest Downgradient Water Well	Closest Downgradient Well Screened Within Affected Zone
Well No./Designation:	NA	NA
Distance from Site (ft.):	NA	NA
Total Well Depth (ft.):	NA	NA
Current Use of Water:	NA	NA
Screened Interval below Ground Surface (ft):	NA	NA
Year Constructed:	NA	NA

Comments: *(Include discussion of any ordinances which prevent or influence the future installation of water wells at the site or surrounding area.)*

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RECEPTOR SURVEY

Underground Utility Survey

Nearest Underground Utility
Name: NA
Type: 4" Sanitary Sewer
Depth of Utility: 4 - 5'
Distance & Direction
From Affected Zone: Within

Nearest Downgradient Utility
Name: NA
Type: 4" Sanitary Sewer
Depth of Utility: 4 - 5'
Distance & Direction
From Affected Zone: Within

Other Comments:

Discuss other receptors and indicate on Attachment 2. If affected discuss abatement measures.

4" sanitary sewer line is located immediately south of the site and above the zone of contaminated soil.

An 8" water line is located along the eastern boundary of the site, at and above the perimeter of the zone of contaminated soil.

(See Attachments 1 and 6 for illustration)

Building Survey

Nearest Building
Name: Bldg 9-361
Type: Vocational Education
Distance & Direction
From Affected Zone: 80 ft. west

Nearest Downgradient Building
Name: Bldg 10-350
Type: Education Administration
Distance & Direction
From Affected Zone: 100 ft. southeast

Other Comments:

Discuss nearest and other receptors and indicate on Attachment 2. Buildings should include residences, schools, day care facility, nursing home, etc.

The buildings situated near the site are Building 9-361, Vocational Education; Building 10-350, Storage-Support; and Building 10-351, Administration. These buildings are part of Gary Jobs Corps, United States Department of Labor.

Surface Water Hydrology

Nearest Surface Water
Name: NA
Type: Drainage Ditch
Distance & Direction
From Affected Zone: 700 ft. east

Impacted Surface Water
Name: NA
Type: NA
Distance & Direction
From Affected Zone: NA

Nearest Downgradient Surface Water
Name: Hemphill Creek
Type: Creek
Distance & Direction
From Affected Zone: 1 Mile East

Other Comments:

If affected complete Worksheet 10.0. Describe potential for affected storm water or groundwater discharge to surface water feature.

The drainage ditch only contains water during rainfall events.

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HABITAT SURVEY

Presence of Sensitive Habitat
Site located within or affects a sensitive or protected habitat? ☐ yes (explain below) ■ no

Name: NA
Location: NA

Discussion: *Provide the habitat type (wildlife sanctuary, wetlands, etc.), condition, regulatory authority, and other information relative to habitat characterization.*

SUMMARY AND RECOMMENDED ACTION

Observed or Potential Impacts	Recommended Action
■ None observed or anticipated	- No action required
☐ Potential for Significant Impact	- Additional Corrective Action Required (See Attachment 20)
☐ Significant Impact Observed	- Additional Corrective Action Required (See Attachment 20)

Comments: *Discuss any emergency abatement and continued corrective action.*

On November 12, 1997, a visit was made to the site by Thompson Professional Group, Inc., personnel to confirm the existence of NAPLs in the two groundwater monitoring wells. A NAPL layer approximately 0.5' was discovered in MW-1, and was removed by bailing. No NAPL was located in MW-2.

A follow-up site visit was made on December 1, 1997 to determine if NAPL had recharged into MW-1. Approximately 0.1' of NAPL was found in MW-1, and was removed by bailing. MW-2 was checked for NAPL, and a oil/water interface detector did not detect any NAPL, however, a barely visible sheen was detected visually on the surface of the water in the bailer. Subsequent bailings did not reveal additional NAPL in MW-2.

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SITE ASSESSMENT HISTORY

SUMMARY OF PREVIOUS SITE ACTIVITIES

Typical site activities to be recorded include:
- Preliminary/Limited/Comprehensive Site Assessment
- Emergency Response
- Risk/Exposure Assessment
- Remedial/Corrective Actions

Types of sampling to be included: ● Soil ● Groundwater ● Surface Water ● Vapors

Date Completed	Description of Activity	Sampling and Testing	Result/Impact/Target Cleanup
April 20, 1994	4 UST's removed.	Soil: BTEX, TPH, total lead.	Native soil impacted, overexcavation ordered.
April 30, 1994	Structure housing associated pumps removed, and area below excavated	Soil: BTEX, TPH, total lead.	Native soils impacted.
June 9, 1994	Overexcavations completed.	Soil: BTEX, TPH, total lead.	Native soils near tankhold still impacted. LSA ordered.
July 1, 1994	Excavation lined with impermeable liner, backfilled and restored to original grade. Grass planted.	None.	None.
May 17, 1996	LSA performed.	Soil: BTEX, TPH, PAH Water: BTEX, TPH, PAH	Soils and groundwater impacted.
May 30, 1996	Groundwater measurements taken, additional samples collected.	Water: BTEX, PAH	Groundwater impacted.
July 17, 1996	Groundwater measurements taken, additional samples collected.	Water: TDS	Groundwater impacted.
Sept. 24, 1997	Additional LSA performed.	Soil: BTEX, TPH, Water: BTEX, TPH, PAH	Soils and groundwater impacted.
Nov. 12, 1997	Water level measurements taken.	None	NAPL observed in MW1, recovery initiated.
Dec. 1, 1997	Water level measurements taken.	None	NAPL observed in MW1 and MW2, recovery initiated.

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UST/AST SYSTEM CHARACTERIZATION

Release Information

UST/AST System Status:
☐ Active ■ Permanently Removed From Service
☐ Temporarily Out of Service
☐ Temporarily/Indefinitely Out of Service (Due Date:_____)

Method of release discovery:
■ UST Removal ☐ Release Detection Equipment
☐ Divestiture Assessment ☐ Inventory Control
☐ System Tightness Testing ☐ Other_____

Substance released (check all that apply):
☐ Gasoline ☐ Diesel ☐ Waste Oil
☐ AV Gas ■ Jet Fuel ☐ Hydraulic Fluid
☐ Other: _____

Source of release(s): Date Discovered:
☐ Spills/overfills _____
☐ Piping _____
■ Dispenser April 30, 1994
■ Tank April 20, 1994
☐ Other _____

Other Comments:

Describe the measures taken to abate the release:

The tanks, pump pit and pump islands were removed from service, overexcavations removed some of the contaminated soils.

Removal Information

Date(s) of removal(s): April 20, and April 30, 1994
Type of removal:
■ Removal from the ground ☐ Closure in place
Water in tankhold during excavation? ☐ yes ☐ no
Depth of water in tankhold (BGS):
☐ <5 ft. ☐ 5-10 ft. ☐ 11-15 ft. ☐ None
NAPL: ☐ yes ■ no Thickness (ft.):_____
Water Evacuated from tankhold: ☐ yes ■ no
Volume (gal.): _____
Groundwater recharged into tankhold: ■ yes ☐ no
Depth (ft. BGS): 22 ft.
Status of excavation(s):
☐ Open with water ☐ Open/dry
☐ Backfilled with impervious cover
■ Backfilled with no impervious cover
Type of fill material:
■ Untreated backfill ☐ Treated backfill ☐ Other
☐ Clean fill - gravel ■ Clean fill - sandy/clay

Other Comments:

Provide the maximum contaminant concentrations milligrams per kilograms (mg/kg) of untreated backfill returned to the tankhold(s): Benzene ≤ 0.6 TEX <1.8 TPH 480 OTHER Total Lead 32. If a new UST/AST system was installed describe & indicate on Attachment 1.

The tank removal information presented in this report is based on the removal of Tanks 8-11, and the pump structures for Tanks 1-7 and Tanks 8-11. The report detailing the removal of Tanks 1-7, and the abandonment of the associated product piping was unavailable for the preparation of this document.

The overexcavations were lined with an impervious liner before backfilling occurred.

Maximum level of contamination detected in native soils upon completion of removal/repair (mg/kg):

Chemical of Concern	Sample Date	Sample Location/Depth	Laboratory Method Detection Limit	Maximum Concentration (mg/kg)
Benzene	6/9/94	Tank 08, bottom of hold	0.1	4.35
Toluene	6/9/94	Tank 08, bottom of hold	0.1	7.96
Ethylbenzene	6/9/94	Tank 08, bottom of hold	0.1	13.38
Total Xylenes	6/9/94	Tank 08, bottom of hold	0.1	57.35
TPH	6/9/94	Tank 08, bottom of hold	5	16705
Metals	NA	NA	NA	NA
VOC	NA	NA	NA	NA
Other Total Lead	4/20/94	Tank 08, northwest wall	0.1	38

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SOIL ASSESSMENT

SOIL DATA COLLECTION AND EVALUATION

Number of soil sampling points: Fifteen (15)

Method of determination: ☐ Direct Push ■ Borings ☐ Other: _____

Surface cover over affected soil zone (check all that apply):
☐ Concrete ☐ Asphalt ☐ Gravel ■ Dirt ■ Grass ☐ Other: _____

Percent of affected soil zone covered with impervious cover:
■ 0-25 % ☐ 25-50 % ☐ 50-75 % ☐ 75-100%

If there is no impervious surface cover, is there public access to the affected surface (0-2 ft.) soil? ■ yes ☐ no

Affected soil zone thickness (ft.): Ten (10)

*Affected soil zone surface area dimensions (ft.): *Approximately* 120 ft. by 220 ft.

Maximum depth of contamination exceeding appropriate Plan A risk-based levels: 5 ft. BGS

*Estimated volume of soil exceeding Plan A target concentration (yd^3): _____

*Minimum distance from affected soil zone to property boundary: ■ 0-10 ft. ☐ 10-50 ft. ☐ 50-100 ft.
☐ 100-300 ft. ☐ 300-500 ft. ☐ >500 ft. ☐ Extends beyond property boundary

Waste disposal: ■ Landfill ☐ On-site treatment ☐ Off-site treatment
☐ Other ☐ Pending ☐ None

Maximum level of contamination detected in native soils (mg/kg):

Chemical of Concern	Sample Date	Sample Depth (ft.)	Sample ID	Laboratory Method Detection Limit	Max Conc. (mg/kg)	Target Cleanup Goals †
Benzene	5/16/96	17	B5-5417	0.001	0.630	22
Toluene	5/16/96	17	B5-5417	0.001	1.700	3257
Ethylbenzene	5/16/96	20.5	B8-8720	0.001	44.000	3357
Total Xylenes	5/16/96	20.5	B8-8720	0.001	25.00	968
TPH	5/16/96	20.75	B6-6520	10	6300	NA
Total Lead	NA	NA	NA	NA	NA	NA
Naphthalene	5/16/96	20.5	B8-8720	0.150	6.200	782
Other: Benzo(B)Fluoran.	5/16/96	5	B8-8705	2.2	5.9	0.877
Other_____				NA		

* Beyond the minimal requirements for a Site Assessment as defined by 30 TAC 334.
† Refer to Worksheets 11.1-5 and *Risk-Based Corrective Action for Leaking Storage Tank Sites*, RG-36, Table A-1.

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* Geotechnical soil parameters:

Parameter	Result	Depth	Location/Sample ID	Method of Determination
Dry Bulk Density (g/m^3):	1.54E6	23-24 ft	B-6 (23.0-24.0')	ASTM D 5084-90
Effective Porosity (%):	42.6	23-24 ft	B-6 (23.0-24.0')	ASTM D 5084-90
Fraction Organic Carbon (g/g):	0.14	23-24 ft	B-6 (23.0-24.0')	Walkey-Blk
Intrinsic Permeability (cm^2):	9.98E-14	23-24 ft	B-6 (23.0-24.0')	ASTM D 5084-90
Water Content (cm^3/cm^3):	0.292*	23-24 ft	B-6 (23.0-24.0')	ASTM D 5084-90
Other	NA	NA	NA	NA

* Biodegradation Indicators:

Present spatial distribution of O_2, CO_2, CH_4, etc. levels on map. (Attachment 9)

* Moisture fraction.

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GROUNDWATER ASSESSMENT

GROUNDWATER DATA AND EVALUATION

Groundwater affected by release: ■ yes ☐ no (If no, complete only the Beneficial Groundwater Use Categories on this Worksheet.)

Site Hydrogeology	Upper Most Zone	Other
Depth to groundwater (ft.)	25 ft. (varies)	
Aquifer type (Perched, confined, unconfined)	Perched	
*Estimated Aquifer thickness (ft.)	1-6 ft. (varies)	
*Water level fluctuations (± ft.)	1 ft.	
Gradient (ft./ft.)/Direction	0.005/SSE (varies)	/
*Saturated hydraulic conductivity (ft./day)		
*Approximate well yield (gpd)		
Lithology	Sandy Gravel	
Geologic Formation	Leona Formation	
Major/minor aquifer name	NA - Perched	
Total dissolved solids (mg/L)	530	
Confining layer depth (ft. BGS)	NA	
Confining layer thickness (ft.)	NA	

Beneficial Groundwater Use Categories

Mark the potential beneficial use category for the impacted zone and indicate the selection criteria. Complete the appropriate worksheet (11.1-5) for the Category indicated.

☐ Category I	☐ Category II	☐ Category III	■ Category IV
☐ Impacted or threatened water supply well(s)I	☐ Affected groundwater zone TDS <3,000 ppm, and no beneficial useH is documented within 0.5 miles of the site.	☐ Affected groundwater zone TDS 3,000 - 10,000 ppm, and no beneficial useH within 0.5 miles of the site.	☐ Affected groundwater zone TDS >10,000 ppm, and no beneficial useH is documented within 0.5 miles of the site.
OR ☐ Affected groundwater zone TDS <3,000 ppm, and water well(s)I or water supply spring within 0.5 miles of the site. OR ☐ Soils only affected. Regional groundwater beneficial useH cannot be established.	OR ☐ TDS 3,000 - 10,000 ppm, and beneficial useH is documented within the 0.5 miles of the site.		OR ■ Well yield <150 gpd (i.e., affected zone is not considered to have a beneficial useH)

I If construction details of water well(s) are unknown or can not be proven, the interval is assumed to be connected.
H Applies to a drinking water source producing from the same or connected interval as the affected groundwater zone.

Groundwater Sampling Points

	On-Site (provide well ID)	*Beyond Property Boundary (provide well ID)
Number of Sampling points:	Boring 1/MW-1	Boring 15/MW-2
Number of permanent monitoring wells:	MW-1	MW-2
Static water levels above screened intervals: ☐ yes ■ no		

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DISSOLVED-PHASE PLUME

*Aerial extent of dissolved-phase plume (ft^2): 7000, estimated

*Distance from edge of plume to property boundary if on-site: ☐ <10 ft. ☐ 10-50 ft. ☐ 50-100 ft. ☐ 100-300 ft. ☐ >300 ft.

*Distance from property boundary to edge of plume if off-site: ☐ <10 ft. ☐ 10-50 ft. ■ 50-100 ft. ☐ 100-300 ft. ☐ >300 ft.

Maximum level of contamination detected in groundwater (mg/L):

Contaminant	Sample Date	Sample ID	Laboratory Method Detection Limit	Maximum Concentration (mg/L)	Target Cleanup Goals†
Benzene	5/16/96	G1-1234	0.001	1.500	NA
Toluene	5/30/96	MW1-7471	0.001	0.009	NA
Ethylbenzene	5/16/96	G1-1234	0.001	0.170	NA
Total Xylenes	5/16/96	G1-1234	0.001	<0.005	NA
MTBE	NA	NA	NA	NA	NA
TPH	5/16/96	G1-5234	0.5	7	NA
Naphthalene	9/25/97	MW2-25	0.09	3.67	NA
Other: Fluorene	9/25/97	MW2-25	0.0105	0.0394	NA

† Refer to Worksheet 11.1-3 and the *Risk-Based Correction Action for Leaking Storage Tank Sites*, RG-36, Table A1.

NAPL PLUME

NAPL Present? ■ yes ☐ no

	On-Site (provide well ID)	Thickness (ft.)	*Beyond Property Boundary (provide well ID)	Thickness (ft.)
Current maximum NAPL thickness (ft.):	MW-1	< 0.1	MW-2	Sheen
	NA	NA	NA	NA
	NA	NA	NA	NA
	NA	NA	NA	NA

NAPL recovery method: ■ hand bail ☐ passive skimmer ☐ sorbent socks ☐ automated system ☐ none

Volume recovered to date (gals.): 0.035

*Aerial extent of NAPL plume: (ft^2)_____ ☐ beyond property boundary

*Distance from edge of NAPL plume to property boundary if on-site: ☐ <10 ft ☐ 10-50 ft ☐ 50-100 ft ☐ 100-300 ft ☐ >300 ft

*Distance from edge of NAPL plume from property boundary if off-site: ☐ <10 ft ■ 10-50 ft ☐ 50-75 ft ☐ 75-100 ft ☐ >100 ft

* Biodegradation Indicators:

Present spatial distribution of dissolved Oxygen, dissolved CO_2, dissolved CH_4, Fe, SO_4, or other alternate electron acceptors on isoconcentration map. (Attachment 9)

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VAPOR ASSESSMENT

VAPOR DATA AND EVALUATION

Known vapor impact: ☐ yes ■ no

Location: ☐ ambient air ☐ utilities ☐ residences
☐ hospital ☐ school/day care ☐ commercial buildings ☐ other:

Lower Explosive Limit (LEL) concentrations: ☐ not measured ☐ measured ■ calculated[1]

NAPL present or soil concentration near saturation (for calculating soil vapor concentrations, refer to *Risk-Based Correction Action for Leaking Storage Tank Sites*, RG-36): ■ yes ☐ no Depth (ft. BGS): 25 ft.

Vapor monitoring data:

Sample No.	Location	Depth	% LEL	Total Organic Vapors (ppmv)	Benzene (ppmv)	Other
B5-5417	Boring 5	17 ft.	1.3	1437	0.6385	NA
B8-8720	Boring 8	20.5ft.	1.0	75		7.0836 EB
B5-5417	Boring 5	17 ft.	1.2	1737		0.8340 T
B8-8720	Boring 8	20.5 ft.	1.0	75		15.85 X

If vapor concentrations exceed 25% of the LEL or other potential for explosive vapor exist in surface or subsurface structure, describe affected area, methods of determination, and any abatement measure. Identify and discuss any occupational or indoor air exposures to released contaminants. Provide all calculations for the determination of the target concentrations:

EB = Ethyl benzene
T = Toluene
X = Xylene

Calculations on following page.

[1]LEL% should reflect whole mixture evaluation. If more than one compound is present, actual measurement of vapors will typically be warranted.

Site Specific Soil Vapor Calculations

Sample ID	Sample Depth	Contaminant	Bulk Soil Concentration	Soil Water Partition Coeffecient	Organic Carbon Partition Coefficient	Soil Organic Carbon Fraction	Dry Soil Bulk Density	Total Soil Porosity	Water Content	Air Fill Soil Porosity	Henry's Constant (Demensional Form)	Henry's Constant (Unitless)	Leachate Conc.	Target Soi Conc.	Calculated Soil Vapor Concentration
			C_t	K_d	K_{oc}	F_{oc}	B	Φ	Φ_w	Φ_a	H	H'	C_t	C_t	C_a
B5-5417	17'	Benzene	0.63	0.116	83	0.0014	1.54	0.419	0.1	0.319	0.00559	0.2324	0.5	0.1146	0.6385
B8-8720	20.5'	Ethyl benzene	44	1.54	1100	0.0014	1.54	0.419	0.1	0.319	0.00643	0.2673	70	116.2212	7.0836
B5-5417	17'	Toluene	1.7	0.42	300	0.0014	1.54	0.419	0.1	0.319	0.00637	0.2648	100	53.9787	0.8340
B8-8720	20.5'	Xylenes	25	0.336	240	0.0014	1.54	0.419	0.1	0.319	0.00704	0.2927	1000	461.5560	15.8514

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SURFACE WATER ASSESSMENT

SURFACE WATER DATA AND EVALUATION

Surface water(s) affected: ☐ yes ■ no Name:_____ Type:_____
Name:_____ Type:_____

NAPL present on surface water or run off: ☐ yes ■ no

NAPL recovery method: ☐ passive skimmer ☐ sorbent socks ☐ automated system ☐ booms ☐ other _____ ■ none

Volumes recovered to date (gals.): NA

Aerial extent of NAPL plume (ft.5): NA

Uses of affected surface water: ☐ drinking water ☐ contact recreation ☐ habitat for endangered species ☐ agriculture

Is a public or domestic surface water intake impacted? ☐ yes ■ no

If impacted lake or pond, indicate affected surface area (ft.5): NA

Average depth of surface water (ft.): NA

Maximum level of contamination detected in surface water (mg/P):

Contaminant	Sample Date	Sample Location & ID	Laboratory Method Detection Limit	Maximum Concentration (mg/L)	Target Cleanup Goals†
Benzene	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA
Total Xylenes	NA	NA	NA	NA	NA
MTBE	NA	NA	NA	NA	NA
TPH	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA
Other_____	NA	NA	NA	NA	NA
Other_____	NA	NA	NA	NA	NA

† Refer to 30 TAC, Chapter 307, the MCL or the *Risk-Based Correction Action for Leaking Storage Tank Sites*, RG-36.

Describe affected area, methods of determination and any abatement measures. Discuss the migration pathway between the source of contamination and the surface water body.

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PLAN A EVALUATION

CATEGORY I: Soil and Groundwater Target Cleanup Level Determination

- Complete this worksheet for Category I sites. Indicate the maximum detected concentration for the chemicals of concern.
- If groundwater is >15 feet BGS, calculate groundwater protective soil concentrations using the equilibrium partition equation on Worksheet 11.5 (when site specific geotechnical parameters have been analyzed).
- Check the box for each compound that exceeds the target concentrations. If any boxes are checked, further corrective action (i.e., monitoring, Plan B, CAP) will be required.
- If other chemicals of concern are present but not listed, refer to *Risk-Based Corrective Action for Leaking Storage Tank Sites (RG-36)*.

Chemical of Concern	GROUNDWATER (mg/L)		SOIL (mg/kg)				
			Depth to Affected Soil ≤15 ft.		Depth to Affected Soil >15 ft.		
	TARGET CONC.	MAX. LAB. ANALYZED CONC.	TARGET CONC.	MAX. LAB. ANALYZED CONC.	TARGET CONC.	MAX. LAB. ANALYZED CONC.	GW >15 ft. CALC. SOIL CONC. C_T
BENZENE	☐ 0.005		☐ 0.13		☐ 0.13		
ETHYLBENZENE	☐ 0.7		☐ 160		☐ 160		
TOLUENE	☐ 1		☐ 69		☐ 69		
XYLENE	☐ 10		☐ 568		☐ 568		
ACENAPHTHENE	☐ 2.19		☐ 314		☐ 314		
ANTHRACENE	☐ 11		☐ 13		☐ 13		
BENZO(A)ANTHRACENE	☐ 0.000117		☐ 0.877[H]		☐ 3.2		
BENZO(B)FLUORANTHENE	☐ 0.000117		☐ 0.877[H]		☐ 13		
BENZO(K)FLUORANTHENE	☐ 0.00117		☐ 8.77[H]		☐ 47		
BENZO(A)PYRENE	☐ 0.0002		☐ 0.0877[H]		☐ 220		
CHRYSENE	☐ 0.0117		☐ 7.2		☐ 7.2		
DIBENZO(A,H)ANTHRACENE	☐ 0.0000117		☐ 0.0877[H]		☐ 7.7		
FLUORANTHENE	☐ 1.46		☐ 156		☐ 156		
FLUORENE	☐ 1.46		☐ 247		☐ 247		
INDENO(1,2,3-CD)PYRENE	☐ 0.000117		☐ 0.877[H]		☐ 17		
NAPHTHALENE	☐ 1.46		☐ 389		☐ 389		
PYRENE	☐ 1.1		☐ 99		☐ 99		
OTHER	☐		☐		☐		
OTHER	☐		☐		☐		

H - Value represents health-based concentration

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PLAN A EVALUATION

CATEGORY II: Soil and Groundwater Target Cleanup Level Determination

- Complete this worksheet for Category II sites. Indicate the maximum detected concentration for the chemicals of concern.
- If groundwater is >15 feet BGS, calculate groundwater protective soil concentrations using the equilibrium partition equation on Worksheet 11.5 (when site specific geotechnical parameters have been analyzed).
- Check the box for each compound that exceeds the target concentrations. If any boxes are checked, further corrective action (i.e., monitoring, Plan B, CAP) will be required.
- If other chemicals of concern are present but not listed, refer to *Risk-Based Corrective Action for Leaking Storage Tank Sites (RG-36)*

Chemical of Concern	GROUNDWATER (mg/L)		SOIL (mg/kg)				
			Depth to Affected Soil <15 ft.		Depth to Affected Soil >15 ft.		
	TARGET CONC.	MAX. LAB. ANALYZED CONC.	TARGET CONC.	MAX. LAB. ANALYZED CONC.	TARGET CONC.	MAX. LAB. ANALYZED CONC.	GW >15 ft. CALC. SOIL CONC. C_T
BENZENE	☐ 0.0294		☐ 0.74		☐ 0.74		
ETHYLBENZENE	☐ 3.65		☐ 835		☐ 835		
TOLUENE	☐ 7.3		☐ 503		☐ 503		
XYLENE	☐ 73		☐ 968		☐ 968		
ACENAPHTHENE	☐ 2.19		☐ 314		☐ 314		
ANTHRACENE	☐ 11		☐ 13		☐ 13		
BENZO(A)ANTHRACENE	☐ 0.00117		☐ 0.877[H]		☐ 32		
BENZO(B)FLUORANTHENE	☐ 0.00117		☐ 0.877[H]		☐ 129		
BENZO(K)FLUORANTHENE	☐ 0.0117		☐ 8.77[H]		☐ 47		
BENZO(A)PYRENE	☐ 0.000117		☐ 0.0877[H]		☐ 220		
CHRYSENE	☐ 0.117		☐ 7.2		☐ 7.2		
DIBENZO(A,H)ANTHRACENE	☐ 0.000117		☐ 0.0877[H]		☐ 33		
FLUORANTHENE	☐ 1.46		☐ 156		☐ 156		
FLUORENE	☐ 1.46		☐ 247		☐ 247		
INDENO(1,2,3-CD)PYRENE	☐ 0.00117		☐ 0.877[H]		☐ 17		
NAPHTHALENE	☐ 1.46		☐ 389		☐ 389		
PYRENE	☐ 1.1		☐ 99		☐ 99		
OTHER	☐		☐		☐		
OTHER	☐		☐		☐		

H - Value represents health-based concentration

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PLAN A EVALUATION

CATEGORY III: Soil and Groundwater Target Cleanup Level Determination

- Complete this worksheet for Category III sites. Indicate the maximum detected concentration for the chemicals of concern.
- If groundwater is >15 feet BGS, calculate groundwater protective soil concentrations using the equilibrium partition equation on Worksheet 11.5 (when site specific geotechnical parameters have been analyzed).
- Check the box for each compound that exceeds the target concentrations. If any boxes are checked, further corrective action (i.e., monitoring, Plan B, CAP) will be required.
- If other chemicals of concern are present but not listed, refer to *Risk-Based Corrective Action for Leaking Storage Tank Sites (RG-36)*

Chemical of Concern	GROUNDWATER (mg/L)		SOIL (mg/kg)				
			Depth to Affected Soil ≤15 ft.		Depth to Affected Soil >15 ft.		
	TARGET CONC.	MAX. LAB. ANALYZED CONC.	TARGET CONC.	MAX. LAB. ANALYZED CONC.	TARGET CONC.	MAX. LAB. ANALYZED CONC.	GW >15 ft. CALC. SOIL CONC. C_T
BENZENE	☐ 0.14		☐ 3.5		☐ 3.5		
ETHYLBENZENE	☐ 5.21		☐ 1193		☐ 1193		
TOLUENE	☐ 10.4		☐ 716		☐ 716		
XYLENE	☐ 104		☐ 968		☐ 968		
ACENAPHTHENE	☐ 3.13		☐ 314		☐ 314		
ANTHRACENE	☐ 13		☐ 13		☐ 13		
BENZO(A)ANTHRACENE	☐ 0.00556		☐ 0.877[H]		☐ 153		
BENZO(B)FLUORANTHENE	☐ 0.00556		☐ 0.877[H]		☐ 154		
BENZO(K)FLUORANTHENE	☐ 0.0556		☐ 8.77[H]		☐ 47		
BENZO(A)PYRENE	☐ 0.000556		☐ 0.0877[H]		☐ 330		
CHRYSENE	☐ 0.556		☐ 7.2		☐ 7.2		
DIBENZO(A,H)ANTHRACENE	☐ 0.000556		☐ 0.0877[H]		☐ 33		
FLUORANTHENE	☐ 2.08		☐ 156		☐ 156		
FLUORENE	☐ 2.08		☐ 247		☐ 247		
INDENO(1,2,3-CD)PYRENE	☐ 0.00556		☐ 0.877[H]		☐ 17		
NAPHTHALENE	☐ 2.08		☐ 389		☐ 389		
PYRENE	☐ 1.56		☐ 99		☐ 99		
OTHER	☐		☐		☐		
OTHER	☐		☐		☐		

H - Value represents health-based concentration

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PLAN A EVALUATION

CATEGORY IV: Soil Target Cleanup Level Determination

- Complete this worksheet for Category IV sites. Check the appropriate column indicating the predominant land use and surface cover.
- Indicate the maximum detected soil concentration for the chemical of concern in the column checked. Check the box for each compound that exceeds the target concentration. If any boxes are checked, further corrective action will be required.
- Dermal exposure should be calculated if depth to groundwater is <15 feet, unless documentation can be provided that surface cover will be maintained and/or construction practices will not encroach upon groundwater[a]. For dermal exposure calculations refer to Chapter 10 of *Dermal Exposure Assessment, Principles and Applications (Interim Report)*, EPA/600/8-91/011B.NTIS PB92205665. Attach and provide all dermal exposure assessment calculations. Provide tables which include result and maximum detected concentrations.
- If other chemicals of concern are present but not listed, refer to *Risk-Based Corrective Action for Leaking Storage Tank Sites (RG-36)*.

Chemical of Concern	☐ RESIDENTIAL		■ RESIDENTIAL		☐ COML./INDUSTRIAL	
	☐ Surface to 2 Feet Without Impervious Cover (Soil mg/kg)		■ 2-15 Feet Without Impervious Cover ☐ Surface to 15 Feet with Impervious Cover (Soil mg/kg)		Surface to 15 feet Regardless of Surface Cover (Soil mg/kg)	
	Target Concentrations Based on Ingestion and Inhalation	Maximum Laboratory Analyzed Concentration	Soil Target Concentrations Based on Ingestion	Maximum Laboratory Analyzed Concentration	Target Concentrations Based on Ingestion/Inhalation	Maximum Laboratory Analyzed Concentration
BENZENE	☐ 6.3	Not Sampled	☐ 22	0.067	☐ 10	
ETHYLBENZENE	☐ 3357	Not Sampled	☐ 3357[b]	0.580	☐ 3357	
TOLUENE	☐ 3257	Not Sampled	☐ 3257[b]	0.660	☐ 3257	
XYLENE	☐ 968	Not Sampled	☐ 968[b]	2.100	☐ 968	
ACENAPHTHENE	☐ 314	Not Sampled	☐ 314[b]	< 5.000	☐ 314	
ANTHRACENE	☐ 13	Not Sampled	☐ 13[b]	0.480	☐ 13	
BENZO(A)ANTHRACENE	☐ 0.877	Not Sampled	☐ 0.877	0.780	☐ 7.8	
BENZO(B)FLUORANTHENE	☐ 0.877	Not Sampled	■ 0.877	5.900	☐ 7.8	
BENZO(K)FLUORANTHENE	☐ 8.77	Not Sampled	☐ 8.77	3.100	☐ 47	
BENZO(A)PYRENE	☐ 0.0877	Not Sampled	☐ 0.0877	< 1.100	☐ 0.784	
CHRYSENE	☐ 7.2	Not Sampled	☐ 87.7	0.590	☐ 7.2	
DIBENZO(A,H)ANTHRACENE	☐ 0.0877	Not Sampled	☐ 0.0877	< 2.400	☐ 0.784	
FLUORANTHENE	☐ 156	Not Sampled	☐ 156[b]	2.200	☐ 156	
FLUORENE	☐ 247	Not Sampled	☐ 247[b]	< 5.600	☐ 247	
INDENO(1,2,3-CD)PYRENE	☐ 0.877	Not Sampled	☐ 0.877	< 2.600	☐ 7.84	
NAPHTHALENE	☐ 782	Not Sampled	☐ 782[b]	< 3.000	☐ 782	
PYRENE	☐ 99	Not Sampled	☐ 99[b]	3.600	☐ 99	
OTHER	☐		☐		☐	
OTHER	☐		☐		☐	

a Written statements, institutional controls must be provided that impermeable surfaces will be maintained.
b Maximum concentration based on pure product saturation limits.

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PLAN A EVALUATION

SOILS ONLY AFFECTED (Regional Groundwater Beneficial Use Can Not Be Established)

- ! Complete this worksheet when groundwater beneficial use can not be established. Check the appropriate land use and indicate the maximum detected soil concentration for the chemicals of concern in the appropriate columns.
- For those chemicals of concern exceeding the default target concentrations, use site specific parameters (if collected) to calculate target soil concentrations using the equilibrium partition equation (on the following page).
- Check the box for each chemical of concern that exceeds the default target concentration and the calculated C_T value (Target Soil Concentration Protective of Groundwater determined by the equilibrium partition equation).
- If any boxes are checked, further corrective action will be required.
- If other chemicals of concern are present but not listed, refer to *Risk-Based Corrective Action for Leaking Storage Tank Sites (RG-36).*

Chemical of Concern	SOIL (mg/kg)								
	Affected Soil =15 ft.						Affected Soil >15 ft.		
	☐ RESIDENTIAL			☐ COMMERCIAL / INDUSTRIAL					
	DEFAULT TARGET CONC.	MAX. LAB. ANALYZED CONC.	CALC. SOIL TARGET CONC. C_T	DEFAULT TARGET CONC.	MAX. LAB. ANALYZED CONC.	CALC.SOIL TARGET CONC. C_T	DEFAULT TARGET CONC.	MAX. LAB. ANALYZED CONC.	CALC. SOIL TARGET CONC. C_T
BENZENE	☐ 0.13		☐	☐ 0.13		☐	☐ 0.13		☐
ETHYLBENZENE	☐ 160		☐	☐ 160		☐	☐ 160		☐
TOLUENE	☐ 69		☐	☐ 69		☐	☐ 69		☐
XYLENE	☐ 568		☐	☐ 568		☐	☐ 568		☐
ACENAPHTHENE	☐ 314		☐	☐ 314		☐	☐ 314		☐
ANTHRACENE	☐ 13		☐	☐ 13		☐	☐ 13		☐
BENZO(A)ANTHRACENE	☐ 0.877[H]		☐ 0.877[H]	☐ 3.2		☐	☐ 3.2		☐
BENZO(B)FLUORANTHENE	☐ 0.877[H]		☐ 0.877[H]	☐ 7.8[H]		☐ 7.8[H]	☐ 13		☐
BENZO(K)FLUORANTHENE	☐ 8.77[H]		☐ 8.77[H]	☐ 47		☐	☐ 47		☐
BENZO(A)PYRENE	☐ 0.0877[H]		☐ 0.0877[H]	☐ 0.784[H]		☐ 0.784[H]	☐ 220		☐
CHRYSENE	☐ 7.2		☐	☐ 7.2		☐	☐ 7.2		☐
DIBENZO(A,H)ANTHRACENE	☐ 0.0877[H]		☐ 0.0877[H]	☐ 0.784[H]		☐ 0.784[H]	☐ 7.7		☐
FLUORANTHENE	☐ 156		☐	☐ 156		☐	☐ 156		☐
FLUORENE	☐ 247		☐	☐ 247		☐	☐ 247		☐
INDENO(1,2,3-CD)PYRENE	☐ 0.877[H]		☐ 0.877[H]	☐ 7.84[H]		☐ 7.84[H]	☐ 17		☐
NAPHTHALENE	☐ 389		☐	☐ 389		☐	☐ 389		☐
PYRENE	☐ 99		☐	☐ 99		☐	☐ 99		☐
OTHER	☐		☐	☐		☐	☐		☐
OTHER	☐		☐	☐		☐	☐		☐

H - Value represents health-based concentration. The equilibrium partition equation may only be used when affected soils are >15 feet BGS for these chemicals of concern.

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PLAN A EVALUATION

EQUILIBRIUM PARTITION EQUATION

- Use this section to determine the target soil concentrations protective of groundwater (C_T). The C_T value may be calculated for each chemical of concern under the following conditions:
  - the option is provided on the appropriate column of the site specific category worksheet;
  - default target concentration was exceeded;
  - site specific soil parameters have been collected.
- Provide all calculations for each chemical of concern.

PARAMETERS	REFERENCE VALUES USED TO CALCULATE DEFAULT TARGET CONCENTRATION	SITE SPECIFIC VALUES
C_w = Category I groundwater target concentration (chemical specific) (mg/L)	*Reference worksheet 11.1 for chemical specific category I target concentration.*	
ρ_s = Dry Soil bulk density (g-soil/cm^3-soil)	1.8	1.54
θ_w = Water content (cm^3-H_2O/cm^3-soil)	0.1	Not Measured
θa = Air content (cm^3-air/cm^3-soil)	0.22	0.319
f_{oc} = Faction of organic carbon (g-C/g-soil)	0.002	0.0014
K_{oc} = Carbon-Water sorption coefficient (chemical specific) (g-H_2O/g-soil)	*Reference RG-36, page 55, Table B-1 for chemical specific values.*	See next page
K_d = Soil-Water sorption coefficient = $K_{oc} \times f_{oc}$	Chemical Specific	See next page
H' = Unitless form of Henry's law constant H x 41.57 (at 25°C)	*Reference RG-36 page 55*	See next page
C_l = Leachate Concentration Dilution Factor = 100	= Dilution Factor x C_W	See next page

Use this equation to determine the target soil concentration which is protective of groundwater for each chemical of concern. Use site specific geotechnical parameters to calculate C_T. (Use referenced default values for any parameters not analyzed.)

C_T = Target soil concentration protective of groundwater determined by the equilibrium partition equation

$$C_T = \frac{C_l \times \rho_s K_d + \theta_w + \theta_a H'}{\rho_s}$$

Calculations on following page.

Site Specific Target Soil Calculations

Contaminant	Category 1 Groundwater Target Concentration	Soil-Water Sorption Coefficient	Carbon-Water sorption Coefficient	Fraction of Organic Carbon	Dry Soil Bulk Density	Total Soil Porosity	Water Content	Air Content	Henry's Constant (Demisional)	Henry's Contant (Unitless)	Leachate Concentration	Target Soil Concentration
	C_w	K_d	K_{oc}	F_{oc}	B	θ	θ_w	θ_a	H	H'	C_l	C_t
Benzene	0.005	0.1162	83	0.0014	1.54	0.419	0.1	0.319	0.0056	0.2324	0.5	0.115
Ethyl benzene	0.7	1.54	1100	0.0014	1.54	0.419	0.1	0.319	0.0064	0.2673	70	116.221
Toluene	1	0.42	300	0.0014	1.54	0.419	0.1	0.319	0.0064	0.2648	100	53.979
Xylenes	10	0.336	240	0.0014	1.54	0.419	0.1	0.319	0.007	0.2927	198	91.388
Acenaphthene	2.19	6.44	4600	0.0014	1.54	0.419	0.1	0.319	9E-05	0.0038	3.42	22.250
Anthracene	11	19.6	14000	0.0014	1.54	0.419	0.1	0.319	0.001	0.0424	0.045	0.885
Benzo a anthracene	0.000117	1932	1380000	0.0014	1.54	0.419	0.1	0.319	1E-06	0.0000	0.0057	11.013
Benzo b fluoranthene	0.000117	770	550000	0.0014	1.54	0.419	0.1	0.319	1E-05	0.0005	0.014	10.781
Benzo k fluoranthene	0.00117	770	550000	0.0014	1.54	0.419	0.1	0.319	4E-05	0.0016	0.0043	3.311
Benzo a pyrene	0.0002	7700	5500000	0.0014	1.54	0.419	0.1	0.319	6E-07	0.0000	0.003	23.100
Chrysene	0.0117	280	200000	0.0014	1.54	0.419	0.1	0.319	1E-06	0.0000	0.0018	0.504
Dibenzo(A,H)anthracene	0.0000117	4620	3300000	0.0014	1.54	0.419	0.1	0.319	7E-08	0.0000	0.0005	2.310
Fluoranthene	1.46	53.2	38000	0.0014	1.54	0.419	0.1	0.319	6E-06	0.0003	0.206	10.973
Fluorene	1.46	10.22	7300	0.0014	1.54	0.419	0.1	0.319	6E-05	0.0027	1.69	17.382
Indeno(1,2,3-CD)pyrene	0.000117	2240	1600000	0.0014	1.54	0.419	0.1	0.319	7E-08	0.0000	0.00053	1.187
Naphthalene	1.46	1.82	1300	0.0014	1.54	0.419	0.1	0.319	0.0013	0.0538	30	56.882
Pyrene	1.1	53.2	38000	0.0014	1.54	0.419	0.1	0.319	5E-06	0.0002	0.13	6.924

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SITE PRIORITIZATION

PRIORITY 1 SITES

NAPL present? ■ yes ☐ no Evaluate all information on site soils, vapors, groundwater, surface water, and other impacts and check all boxes which match site conditions. The lowest value is the site priority. If priority cannot be determined, the assessment is inadequate.

	PRIORITY	ACTIONS
☐ 1.1	Explosive levels, or concentrations of vapors that could cause acute health effects are present in a residence or other building. (Ensure the local fire authority or State Fire Marshal (512/918-7100) and the local TNRCC Region Office have been notified.)	**Emergency Actions**: Notify appropriate authorities, property owners, and potentially affected parties. Mitigate vapor impact. **Additional Actions**: Conduct receptor survey. Conduct assessment of contaminant plumes. Determine target cleanup levels. Conduct remediation as necessary.
☐ 1.2	An active public water supply well, public water supply line, or public surface water intake is affected or immediately threatened by the release. (Ensure the public authority and the local TNRCC Region Office have been notified.)	**Emergency Actions:** Notify appropriate authorities, well users, and property owners. Prevent further migration. Mitigate impact. Discontinue use of water supply. **Additional Actions:** Provide alternative water sourceH. Conduct receptor survey. Conduct assessment of contaminant plumes in relation to water supply impact. Determine target cleanup levels. Conduct remediation as necessary.
☐ 1.3	A sole-source domestic water supply well or line, or sole-source domestic surface water intake is affected or immediately threatened by the release. (Ensure the well user or surface water user and the local TNRCC Region Office have been notified.)	**Emergency Actions:** Notify appropriate authorities, well users, and property owners. Prevent further migration. Mitigate impact. Discontinue use of water supply. **Additional Actions:** Provide alternative water sourceH. Conduct receptor survey. Conduct assessment of contaminant plumes in relation to water supply impact. Determine target cleanup levels. Conduct remediation as necessary.
☐ 1.4	Explosive vapors are present in a subsurface utility system, but no building or residence is affected. (Ensure the utility authority and the local TNRCC Region Office have been notified.)	**Emergency Actions:** Notify appropriate authorities, property owners, and affected parties. Mitigate vapor impact. **Additional Actions:** Conduct receptor survey. Conduct assessment of contaminant plumes. Determine target cleanup levels. Conduct remediation as necessary.
☐ 1.5	NAPL is present at the ground surface, on surface water bodies, surface water runoff, or in utilities other than water supply lines. (Ensure the utility authority is notified if utilities are affected. Ensure NAPL is removed as required pursuant to 30 TAC 334.79.)	**Emergency Actions:** Notify appropriate authorities, property owners, and affected parties. Secure area. **Additional Actions:** Conduct NAPL removal activities. Prevent migration of NAPL. Conduct assessment in relation to impact. Conduct receptor survey. Determine target cleanup levels. Conduct remediation as necessary.
☐ 1.6	The Edwards aquifer, recharge zone or transition zone is affected.	**Emergency Actions:** Recover NAPL if present. **Additional Actions:** Initiate assessment activities. Conduct assessment in relation to impact. Conduct receptor survey. Determine target cleanup levels. Conduct remediation as necessary. If NAPL is present, conduct removal activities.
☐ 1.7	Concentrations of vapors/particulates that could cause acute health affects, or safety concerns are present in outdoor air.	**Emergency Actions:** Notify appropriate authorities, property owners, and affected parties. Mitigate immediate impacts. **Additional Actions:** Conduct sufficient assessment to determine exposure pathways, receptors and their locations, and target cleanup goals. If NAPL is present, conduct removal activities.

H Reimbursement is contingent upon 30 TAC 334.308 (c)(3).

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PRIORITY 2 SITES

	PRIORITY	ACTIONS
☐ 2.1	Soils or water contaminated by the release are exposed and unsecured from public access and dwellings, playgrounds, parks, day care centers, schools, or similar use facilities are located within 500 feet of those soils.	Remove, cover, or otherwise secure exposed soils or water. Fill open excavations. Conduct actions necessary to contain contamination or prevent impact or exposure.
☐ 2.2	A former vapor impact is associated with this site, or NAPL is present in close proximity to subsurface utilities or other natural or man-made conduit and there is potential for the accumulation of explosive vapors or vapors that could cause acute effects in a building or other structure.	Remediate/remove vapors, NAPL, or contaminated soils. Determine migration pathways and remove/prevent migration pathways. Conduct assessment of contaminant plumes in relation to the potential vapor pathway. Determine target cleanup levels. Conduct actions necessary to contain contamination or prevent impact or exposure.
☐ 2.3	A domestic water supply well or line, or a domestic surface water intake is affected or immediately threatened by the release, but the user has access to another public or private water supply. (Ensure the user and the local TNRCC Region Office have been notified.)	Notify proper authorities, users, and property owners. Prevent migration to water intake. Provide alternative water supply if necessary. Conduct assessment to identify contaminant plumes and exposure pathways in relation to water intake. Determine appropriate target cleanup goals based on site conditions. Conduct actions necessary to contain contamination or prevent impact or exposure.
☐ 2.4	A non-public or non-domestic water supply well is affected or immediately threatened. (Do not consider monitor wells.) (Ensure the user and the local TNRCC Region Office have been notified.)	Notify proper authorities, well users, and property owners. Prevent migration to water well. Provide alternative water supply if necessary. Plug water well if necessary. Conduct assessment to identify contaminant plumes and exposure pathways in relation to water well. Determine appropriate target cleanup goals based on site conditions. Conduct actions necessary to contain contamination or prevent impact or exposure.
☐ 2.5[1]	Groundwater is affected and a public or domestic water supply well is located within 0.25 miles of the UST/AST system or source area. (Check if a well is present, but the well use is unknown). (See footnote 1 before responding.)	Determine completion data and usage of well(s) if not already known. Conduct receptor survey to locate additional wells and other potential receptors (if not already done). Evaluate well impact potential. Determine appropriate cleanup goals based on site conditions. Conduct actions necessary to contain contamination or prevent impact or exposure.
☐ 2.6	Groundwater or storm water runoff is affected and discharges within 500 feet of the known extent of contamination to a surface water body used for human drinking water, contact recreation, habitat to a protected or listed endangered plant and animal species.	Conduct assessment which addresses the contaminant plumes in relation to the surface water. Determine target cleanup levels. Conduct actions necessary to contain contamination or prevent impact or exposure. Notify property owners if impact is documented.
☐ 2.7	A public or domestic water supply well that produces from a groundwater zone which is not affected or threatened is located within the known extent of contamination. (Check if a well is present, but the well use is unknown.)	Notify well users and property owners. Determine completion data and usage of water well(s). Conduct receptor survey to locate additional sensitive receptors. Investigate well impact or cross-contamination potential. Plug well(s) if necessary. Determine target cleanup levels. Conduct actions necessary to contain contamination or prevent impact or exposure. Monitor water well for groundwater quality.

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PRIORITY 3 SITES

	PRIORITY	ACTIONS
☐ 3.1[1]	Groundwater is affected and a public or domestic water supply well is located between 0.25 and 0.5 miles from the UST/AST system or source area. (Check if a well is present in this interval, but the well use is unknown.) (See footnote 1 before responding.)	Determine completion data and usage of well(s) if not already known. Conduct receptor survey to locate additional wells and other potential receptors (if not already done). Evaluate well impact potential. Evaluate need for remediation.
☐ 3.2	Groundwater is affected and the affected groundwater zone may discharge between 500 feet and 0.25 miles of the UST/AST or source area to a surface water body used for human drinking water, contact recreation, or habitat to a protected or listed endangered plant and animal species.	Conduct assessment which evaluates potential to impact the surface water. Evaluate need for remediation.
☐ 3.3[1]	Groundwater is affected and a non-public or non-domestic water supply well is located within 0.25 miles of the UST/AST system or source area. (See footnote 1 before responding.)	Determine completion data and usage of well(s) if not already known. Conduct receptor survey to locate additional wells and other potential receptors (if not already done). Monitor water well for groundwater quality. Evaluate need for remediation.
☐ 3.4	A non-community or non-domestic water supply well that produces from a groundwater zone which is not affected or threatened is located within the known extent of contamination. (If a well is present, but the use of the well is unknown, check 2.7 instead.)	Notify well users and property owners. Determine completion data and usage of well(s) if not already known. Conduct receptor survey to locate additional wells and other potential receptors (if not already done). Investigate well impact or cross-contamination potential. Monitor water well for groundwater quality. Evaluate need for remediation.
☐ 3.5[2]	A designated major or minor groundwater aquifer is affected or immediately threatened. (See footnote 2 before responding.)	Conduct assessment of soil and groundwater contaminant plumes in relation to major or minor aquifer. Conduct receptor survey and water well inventory. Evaluate need for remediation.

PRIORITY 4 SITES

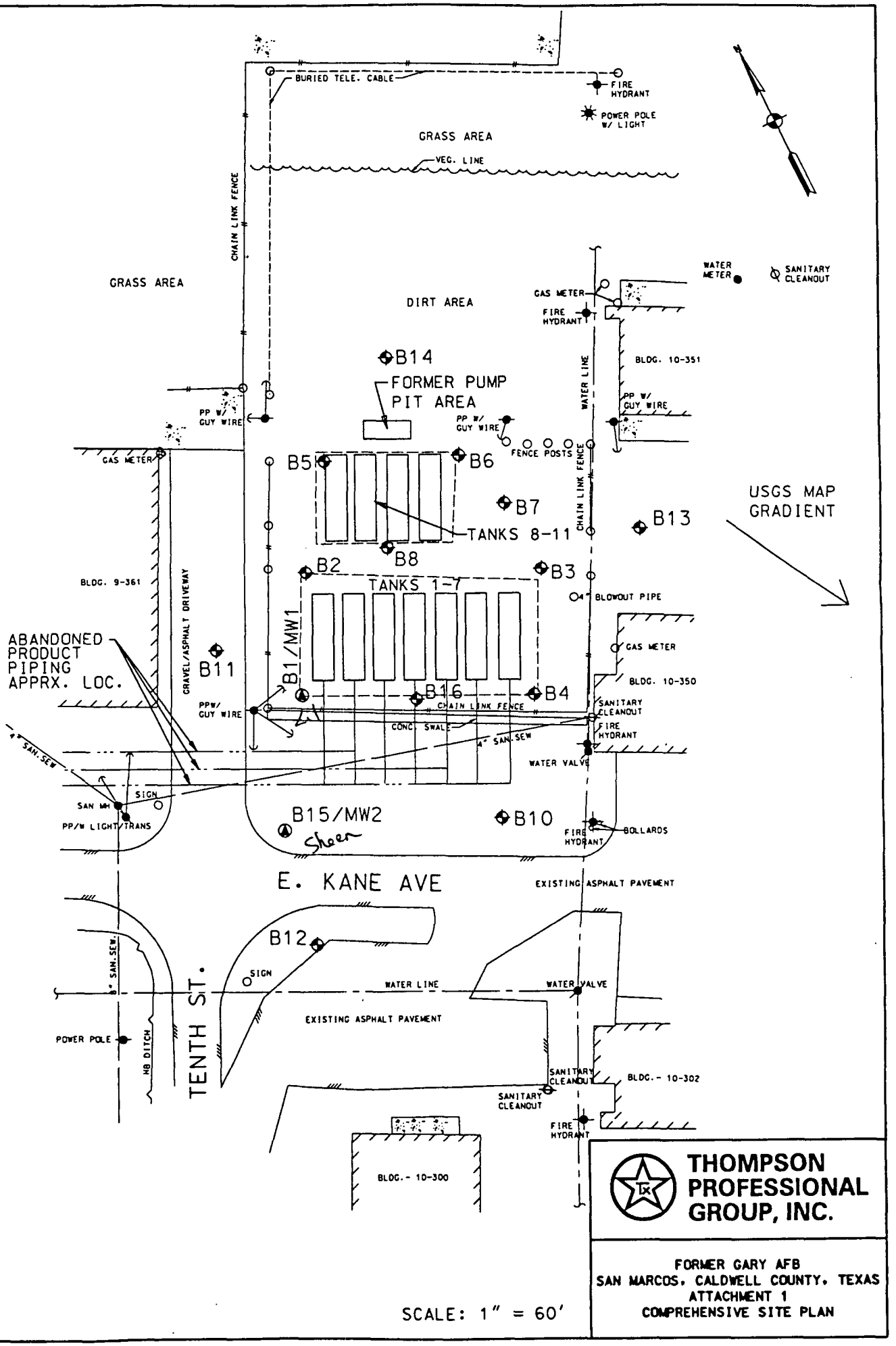
	PRIORITY	ACTIONS
■ 4.1	Groundwater is affected.	Conduct assessment of soil and groundwater contaminant plumes. Conduct receptor survey and water well inventory. Evaluate site conditions to determine need for additional corrective actions.
☐ 4.2	The vertical extent of contamination has been defined and the assessment results document that groundwater is not affected.	Conduct assessment of soil contaminant plume. Conduct receptor survey and water well inventory. Evaluate site conditions to determine need for additional corrective actions.

1. Consider only wells producing from the same interval as the affected groundwater zone at the release site, wells which may provide a cross-contamination pathway, or wells where completion details are unknown.

2. Refer to Major and Minor Aquifers of Texas Maps prepared by Texas Water Development Board, September 1990. Do not consider the low permeability Beaumont clays of the Beaumont Formation for the Gulf Coast aquifer. Do not consider a perched groundwater zone overlaying the principal producing portion of the aquifer unless the two are hydrologically connected.

Abbreviations	Definition
%	percent
AST	Aboveground Storage Tank
AV	aviation
BGS	below ground surface
C	celius
CAP	corrective action plan
CAT	category
CH_4	methane
cm	cubic centimeter
cm^2/cm^2	square centimeter per square centimeter
CO_2	carbon dioxide
coml.	commercial
conc.	concentration
cont.	continue
EPA	Environmental Protection Agency
Fe	iron
ft.	feet
$ft.^2$	square feet
gal.	gallons
g/g	gram per gram
g/m^3	gram per cubic meter
gpd	gallons per day
ID	identification
in.	inches
Lab.	laboratory
LPST	Leaking Petroleum Storage Tank
LSA	Limited Site Assessment
Max.	maximum
MCL	maximum contaminant level
mg/kg	milligram per kilogram
mg/P	milligram per liter
NAPL	non-aqueous phase liquids
No.	number
O_2	oxygen
ppm	parts per million
PST	Petroleum Storage Tank
RP	Responsible Party
RPR	Responsible Party Remediation
TAC	Texas Administrative Code
TEX	toluene, ethylbenzene, and total xylenes
TNRCC	Texas Natural Resource Conservation Commission
TPH	total petroleum hydrocarbons
UST	Underground Storage Tank

Attachment 1
Site Plan



THOMPSON PROFESSIONAL GROUP, INC.

FORMER GARY AFB
SAN MARCOS, CALDWELL COUNTY, TEXAS
ATTACHMENT 1
COMPREHENSIVE SITE PLAN

SCALE: 1" = 60'

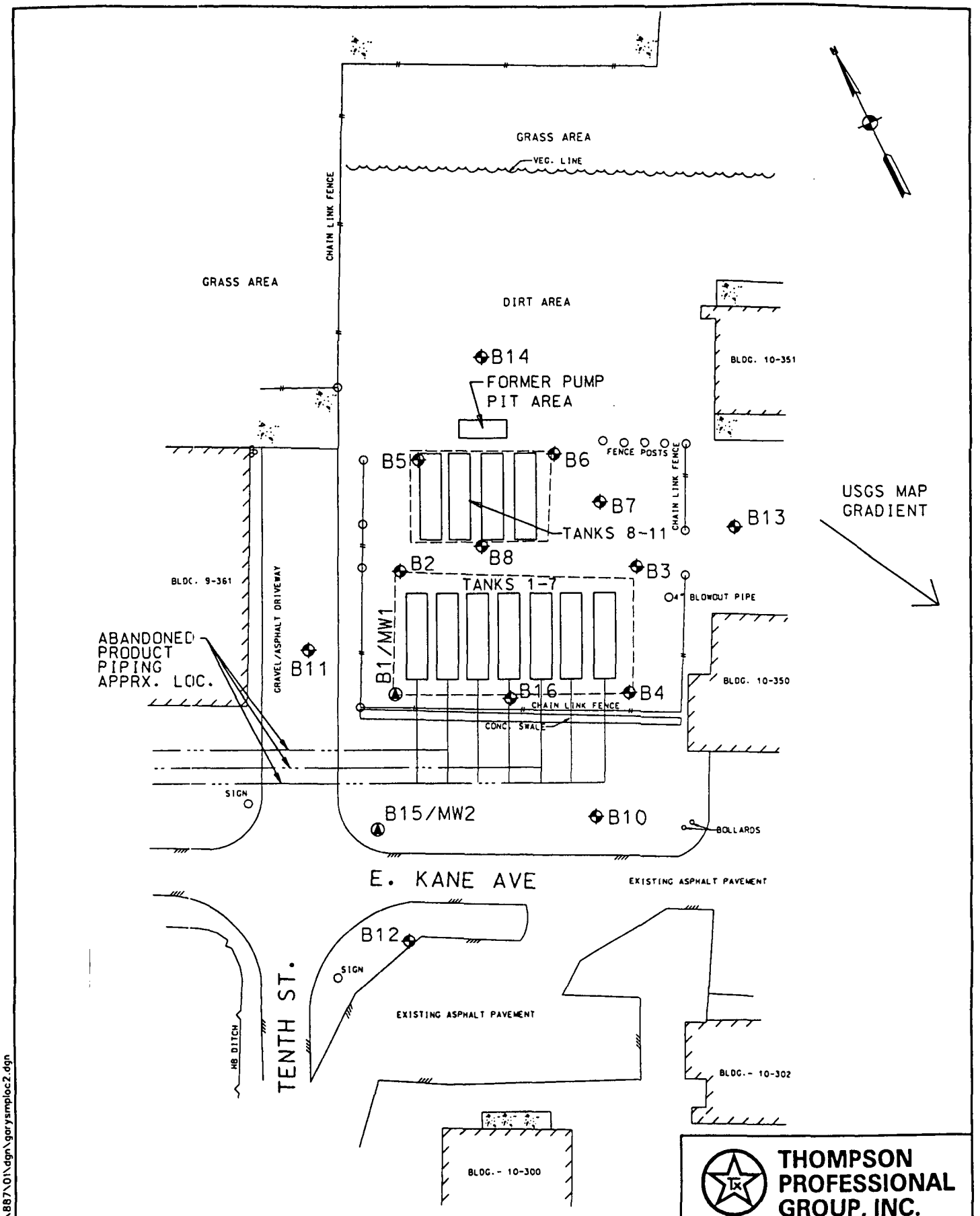
User: $(USERNAME
Plotted On: 02 DEC @ 15:30:05
FILENAME: d:\projects\887\01\dgn\garynwatt1.dgn

Attachment 2
Vicinity Map

Attachment 3
USGS Map with Water Well Locations

Attachment 4
Well Completion Details

Attachment 5
Sampling Locations



SCALE: 1" = 60'

THOMPSON PROFESSIONAL GROUP, INC.

FORMER GARY AFB
SAN MARCOS, CALDWELL COUNTY, TEXAS
ATTACHMENT 5
SAMPLING LOCATIONS

User: $USERNAME
Plotted On: 02 DEC @ 15:45:40
FILENAME: d:\projects\887\01\dgn\garysmploc2.dgn

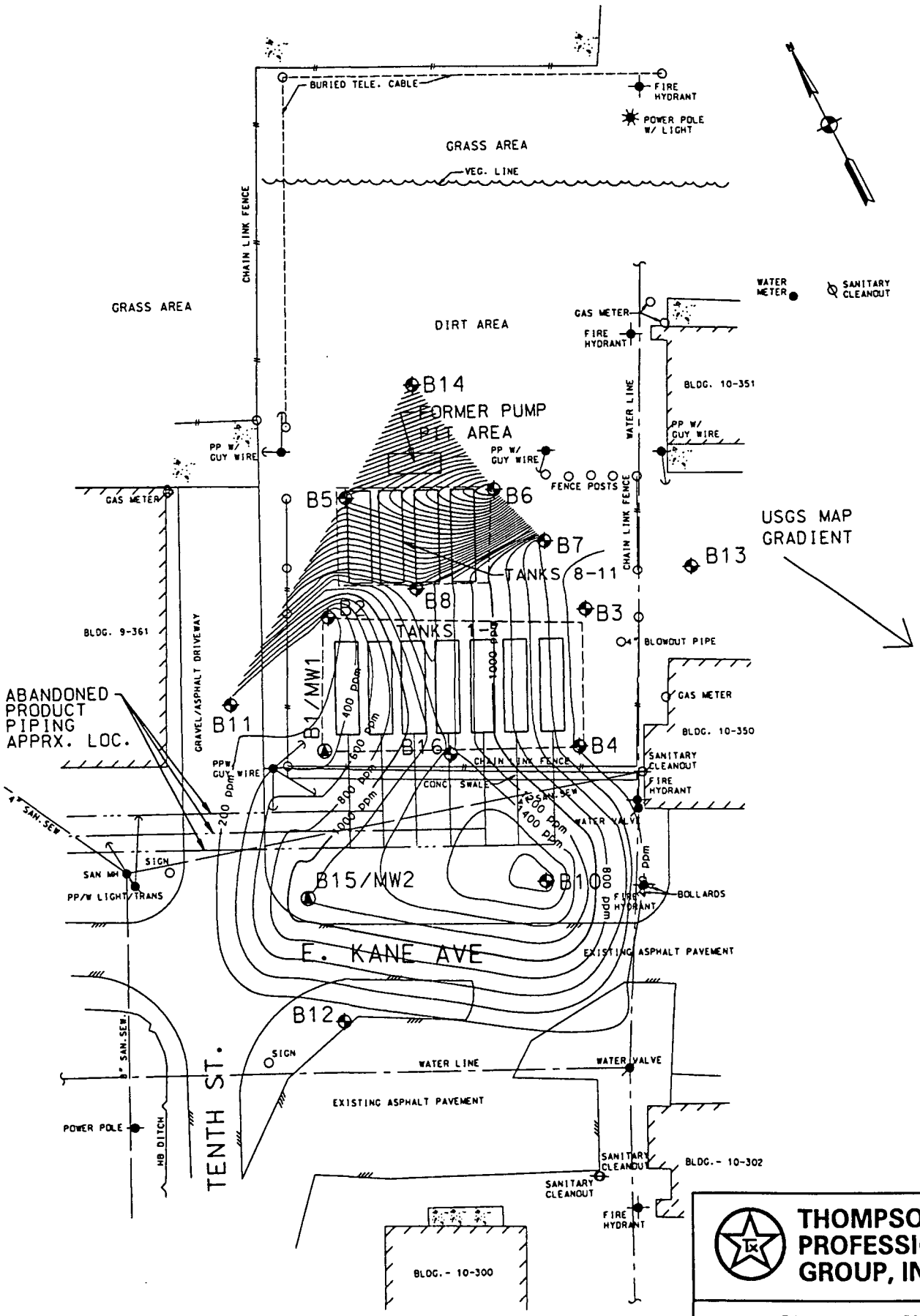
NAME	LAT.	LONG.	ELEV.
B1/MW1	29°53'22.49747"N	097°51'34.78142"W	573.06 (TOC)
B2	29°53'23.01825"N	097°51'37.55867"W	571.39
B3	29°53'22.54020"N	097°51'36.43703"W	571.02
B4	29°53'22.03825"N	097°51'36.77647"W	571.48
B5	29°53'23.43550"N	097°51'37.20427"W	571.55
B6	29°53'23.17596"N	097°51'36.55129"W	571.72
B7	29°53'22.88338"N	097°51'36.45201"W	571.14
B8	29°53'22.95155"N	097°51'37.11283"W	571.55
B10	29°53'21.59931"N	097°51'37.22742"W	572.33
B11	29°53'22.89112"N	097°51'38.19054"W	572.57
B12	29°53'21.47680"N	097°51'38.40835"W	572.42
B13	29°53'22.49891"N	097°51'35.88034"W	569.05
B14	29°53'23.74336"N	097°51'36.65329"W	572.75
B15/MW2	29°53'22.00597"N	097°51'38.28617"W	572.49 (TOC)
B16	29°53'22.27692"N	097°51'37.33649"W	571.63

User: $(USERNAME)
Plotted On: 02 DEC 97 @ 16:03:41
FILENAME: d:\projects\887\01\dgn\boriation.dgn

THOMPSON PROFESSIONAL GROUP, INC.

FORMER GARY AFB
SAN MARCOS, CALDWELL COUNTY, TEXAS
ATTACHMENT 5
SAMPLING POINT COORDINATES

Attachment 6
Soil TPH Contamination Concentration Map



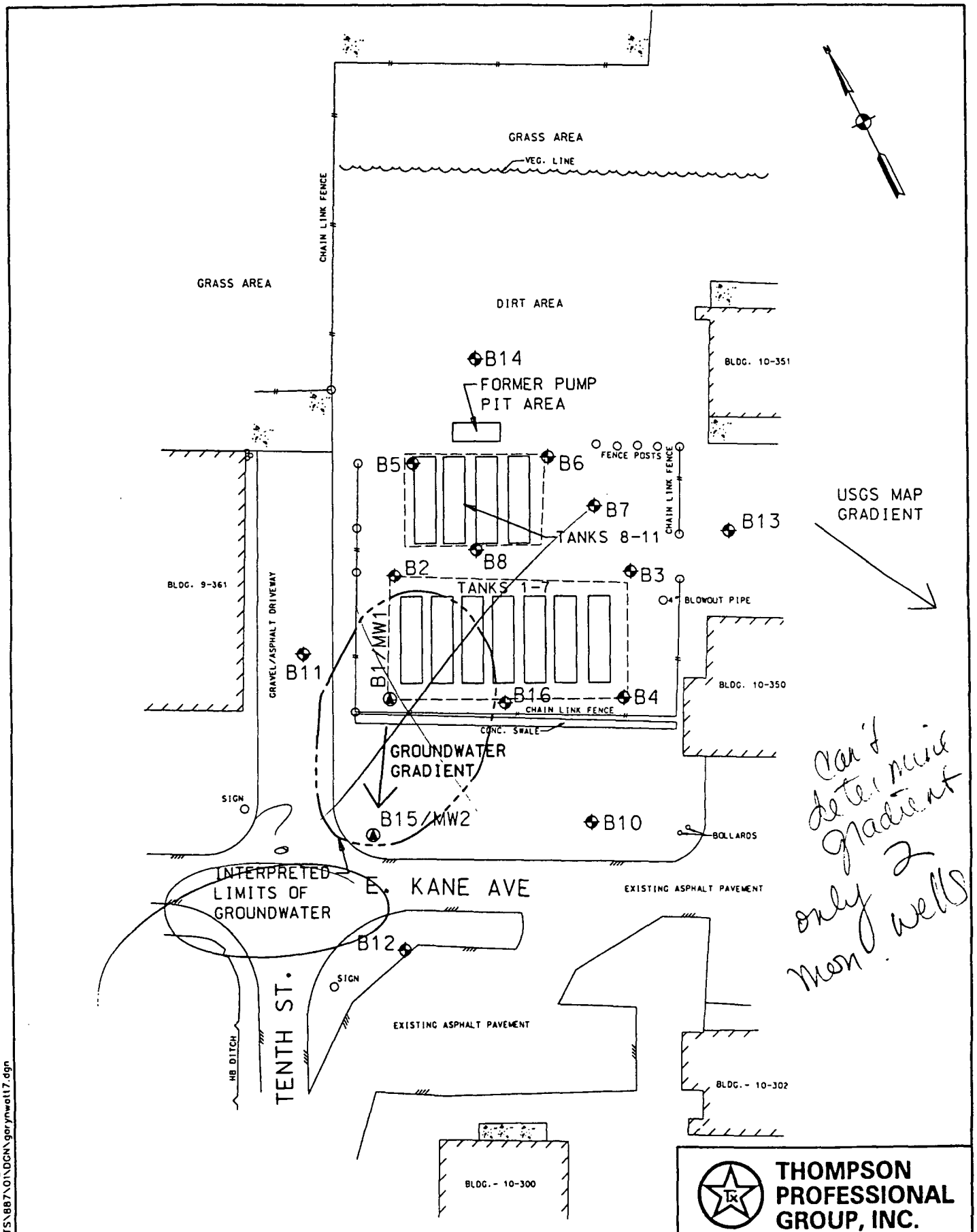
SCALE: 1" = 60'

THOMPSON PROFESSIONAL GROUP, INC.

FORMER GARY AFB
SAN MARCOS, CALDWELL CO. TEXAS
ATTACHMENT 6
SOIL TPH CONTAMINATION CONCENTRATION MAP

User: $(_USTN_USEF $TIME$
Plotted On: $DATE$
FILENAME: $FILE$

Attachment 7
Groundwater Gradient Maps



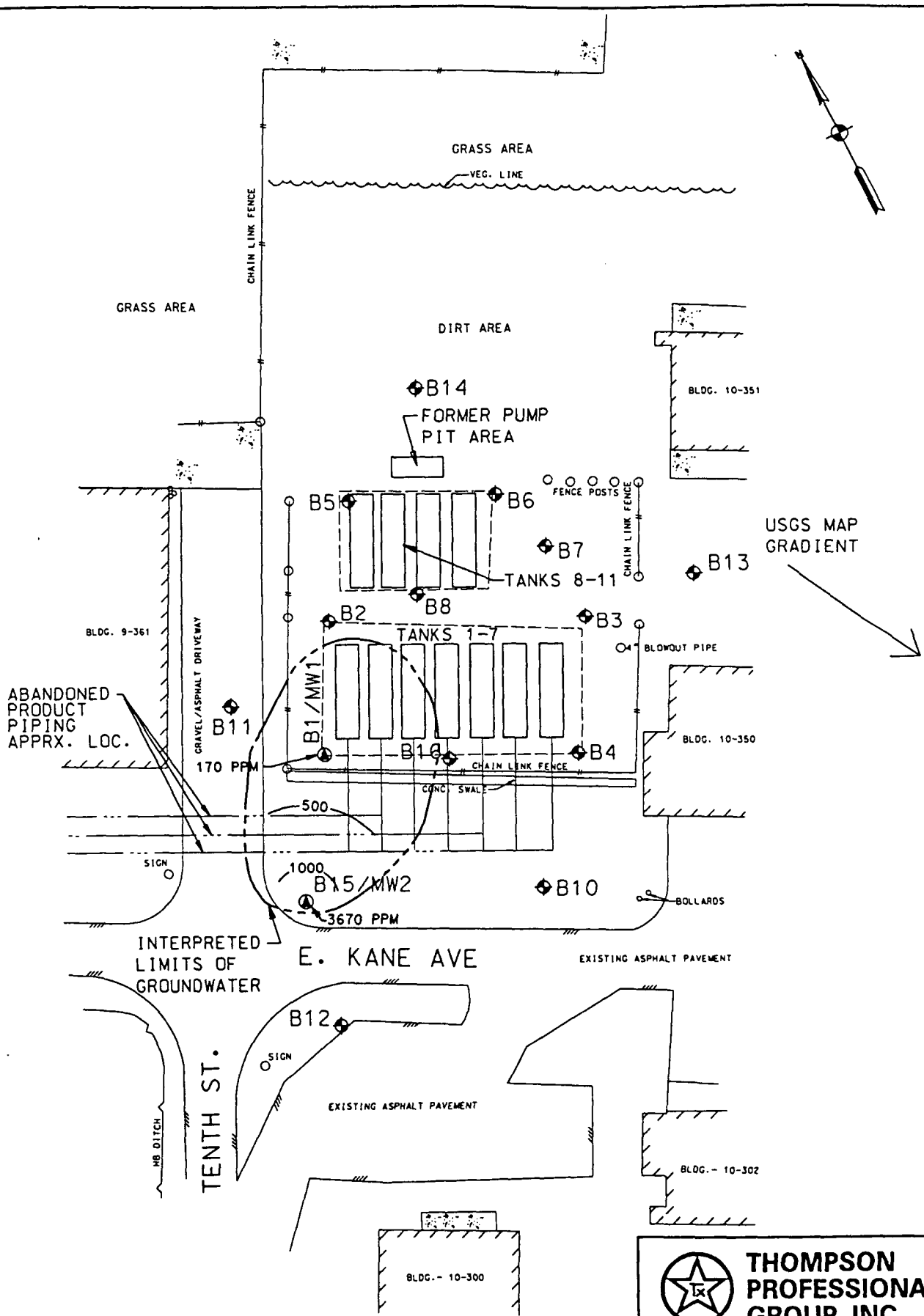
SCALE: 1" = 60'

THOMPSON PROFESSIONAL GROUP, INC.

FORMER GARY AFB
SAN MARCOS, CALDWELL COUNTY, TEXAS
ATTACHMENT 7
Groundwater Gradient Map

User: $USERNAME
Plotted On: 03 DEC @ 10:26:14
FILENAME: D:\PROJECTS\887\01\DGN\garynwall7.dgn

Attachment 8
Groundwater Contaminant Concentration Maps

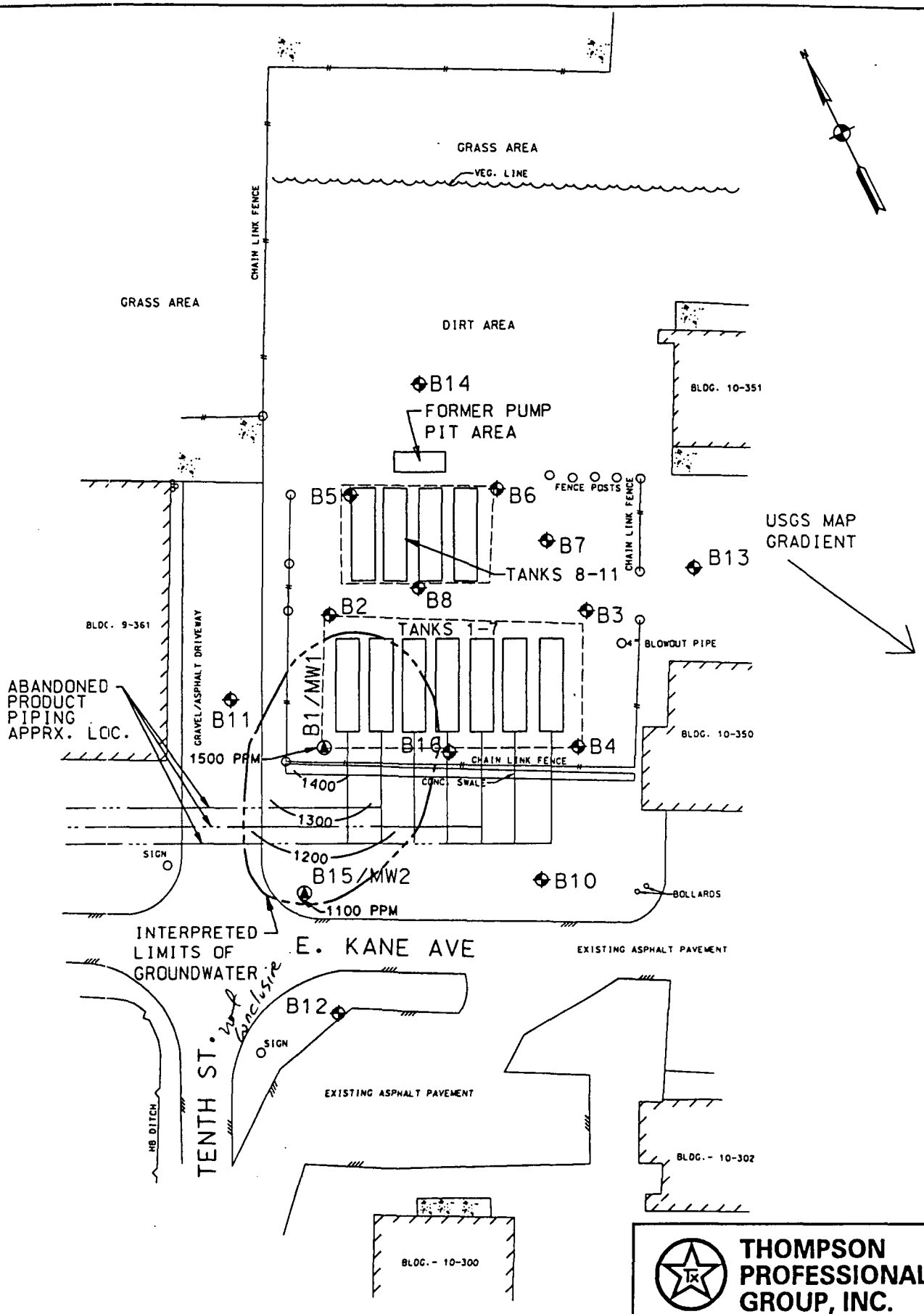


SCALE: 1" = 60'

THOMPSON PROFESSIONAL GROUP, INC.

FORMER GARY AFB
SAN MARCOS, CALDWELL COUNTY, TEXAS
ATTACHMENT 8
GROUNDWATER CONTAMINATION
NAPTHALENE CONCENTRATIONS

User: $USERNAME
Plotted On: 03 DEC @ 15:29:28
FILENAME: d:\projects\a87\01\dgn\garynwat8b.dgn



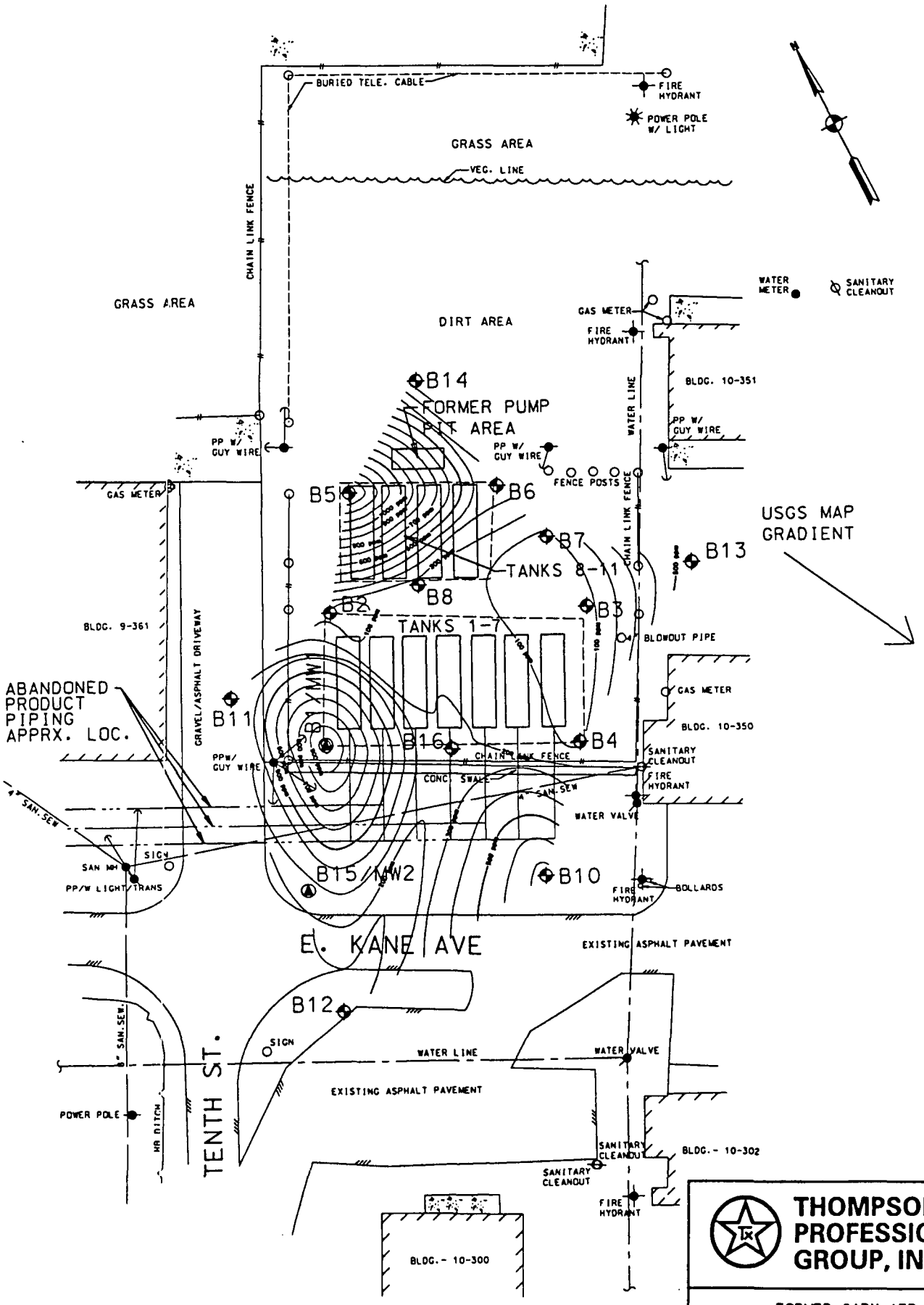
SCALE: 1" = 60'

THOMPSON PROFESSIONAL GROUP, INC.

FORMER GARY AFB
SAN MARCOS, CALDWELL COUNTY, TEXAS
ATTACHMENT 8
GROUNDWATER CONTAMINATION
BENZENE CONCENTRATIONS

User: $(USERNAME.
Plotted On: 03 DEC @ 13:50:43
FILENAME: d:\projects\887\01\dgn\garynwatt8.dgn

Attachment 11
Soil Vapor Contaminant Concentration Map



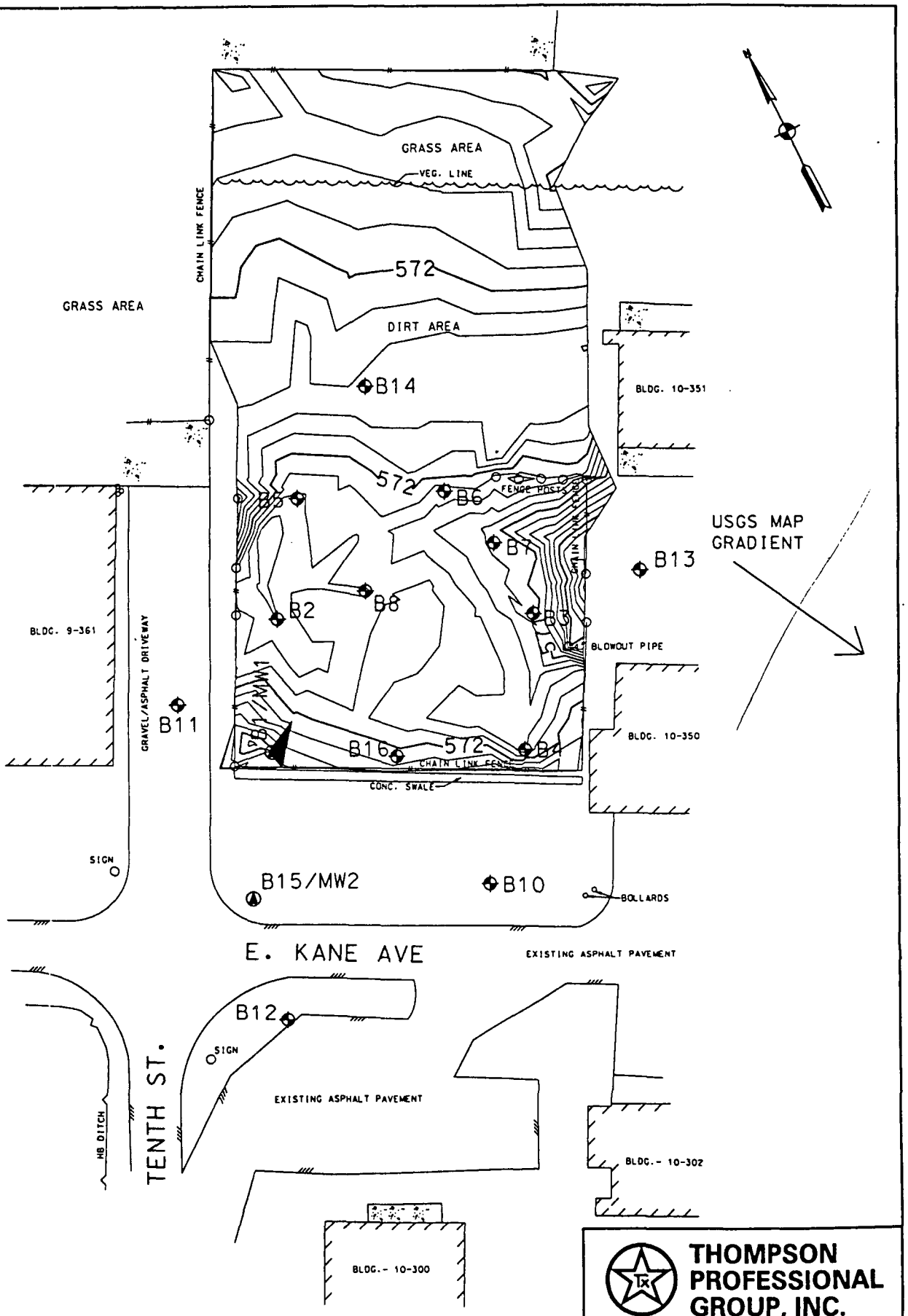
SCALE: 1" = 60'

THOMPSON PROFESSIONAL GROUP, INC.

FORMER GARY AFB
SAN MARCOS, CALDWELL CO, TEXAS
ATTACHMENT 11
VAPOR CONTAMINANT CONCENTRATION MAP

User: $(_USTN_US
Plotted On: $DATE
FILENAME: $FILE$
(E) @ $TIME$

Attachment 13
Surface Water Runoff



THOMPSON PROFESSIONAL GROUP, INC.

FORMER GARY AFB
SAN MARCOS, CALDWELL COUNTY, TEXAS
ATTACHMENT 13
SURFACE WATER RUNOFF

SCALE: 1" = 60'

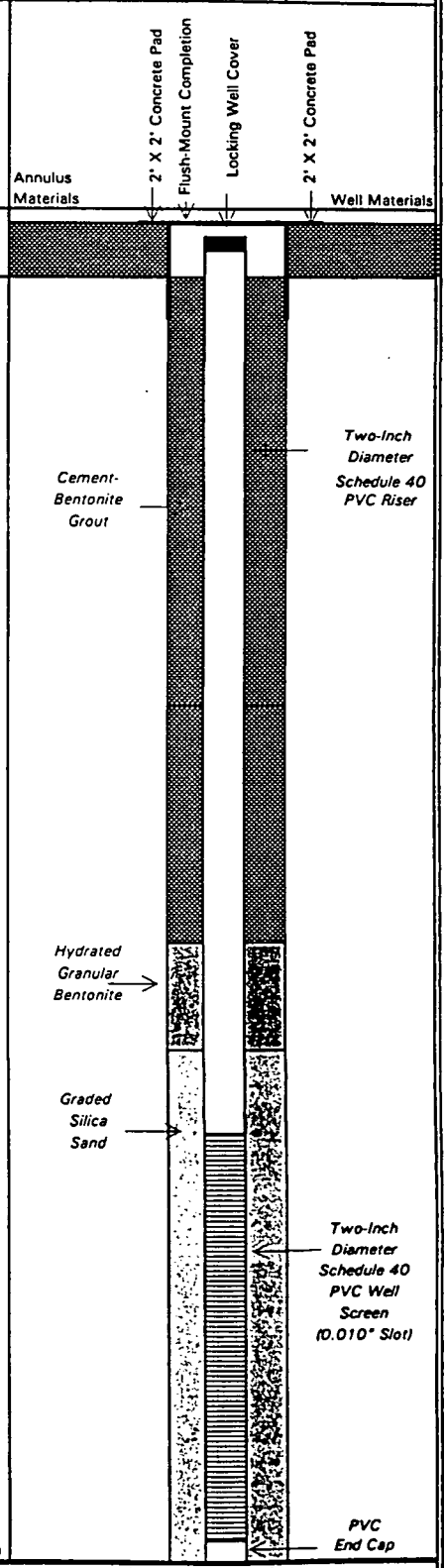
User: $USERNAME
Plotted On: 04 DE @ 07:53:25
FILENAME: D:\PROJECTS\887\01\DGN\garynwatt13.dgn

Attachment 14
Soil Boring Logs

LOG OF BORING 15/MONITORING WELL NO. MW-2

Depth in Feet	Stratigraphy	Sample Method/ Ft. Rec(")	DESCRIPTION OF STRATUM	Submitted For Analysis(*)	Pocket Penetrometer	Odor(*)	Depth in Feet
0							0
		ss 1.3	Grass and base material of sand and clayey gravel.				
		ss 1.4	SILTY CLAY - high to medium plasticity, hard, dry to moist, very dark gray. SIMILAR TO ABOVE (STA) - moist, trace of fine-grained gravel.		5.0+		
5		ss 2.0	STA - moist.		5.0+		5
		ss 2.0	SILTY, SANDY CLAY with GRAVEL -medium stiff, moist to dry, very pale brown to white. SILTY, SANDY CLAY to SILTY, CLAYEY SAND - medium to high plasticity, very fine-grained sand, uniform, hard, medium gray mottled pale brown,				
10		ss 2.0	gravel layer 8 to 8.5 feet, trace of calcified zones, sandy clayey layer 9.5 feet to 10 feet.				10
		ss 2.0	CLAYEY SAND - loose, moist, very pale brown, no gravel, remains very clayey. SANDY CLAY - medium stiff, moist, very pale brown, no gravel.		4.0		
		ss 2.0	SANDY CLAY with GRAVEL - medium to high plasticity in clay, very fine-grained sand, fine to coarse-grained gravel, loose, moist to dry, very pale brown, gravel is rounded chert.				
15		ss 1.3	STA - moist to dry. SANDY CLAY - medium to high plasticity, very fine-grained sand, soft, moist, very pale brown.		2.0		15
		ss 2.0	STA - soft, moist, few sand pockets <1" in diameter which are moist.				
20		ss 1.5	SILTY CLAY with GRAVEL - low to medium plasticity, stiff, moist, light gray to white to rust, weathered calcified appearance, gravel is weathered limestone.			*	20
		ss 1.5	Grades to SILTY, SANDY CLAY with GRAVEL - stiff, dry to moist, very pale brown, no calcified zones, slight hydrocarbon odor 20 feet to 22 feet.	*		*	
		ss 2.0	SANDY CLAY - low to medium plasticity, very fine-grained sand, soft, moist, light gray to very pale brown, slight hydrocarbon odor 22 feet to 24 feet, few sand partings, increase percent sand at 23.5 feet.	*	2.0	*	
25		ss 2.0	SANDY, GRAVELLY CLAY - medium to high plasticity, very fine-grained sand, fine to coarse grained gravel, stiff, moist to wet at 25.5 to 26 feet, moderate to strong hydrocarbon odor 24 to 26 feet.			*	25
		ss 2.0	SILTY CLAY - high plasticity, very stiff, moist, very pale brown mottled rust, blocky texture, no odors, few silt/sand partings, black dendritic iron-oxide staining.	*	3.0-4.0		
		ss 2.0	STA - moist, blocky.				
30							30

Monitoring Well Completion Data



Client:	Thompson Professional Group	Drilling Method:	Hollow Stem Auger
Project No:	1409704622.00	Top of Casing Elev:	572.49
Date Drilled:	9/23/97	Groundwater Data	Date: 9-26-97 Elev: 550.27
Driller:	Geo Projects International	Comments:	Logged by JDH-Maxim
Total Depth:	30 feet	*ss = split spoon, rc = rock core st = shelby tube	

LOG OF BORING NO. SB-10

Depth in Feet	Stratigraphy	Sample Method/ Ft. Rec(*)	DESCRIPTION OF STRATUM	Submitted For Analysis(*)	Pocket Penetrometer	Odor (*)	Depth in Feet	Remarks
0							0	
		ss 1.3	SILTY CLAY - high to medium plasticity, hard, dry, very dark gray, blocky texture, grass roots, gravel lense one-inch thick at 0.5 feet.		5.0+			
		ss 2.0	SIMILAR TO ABOVE (STA) - dry, trace of fine-grained gravel, roots.		5.0+			
5		ss 2.0	STA - dry.		5.0+		5	
		ss 2.0	SILTY, SANDY CLAY - high to medium plasticity, very fine-grained sand, hard, dry, very pale brown to white, homogeneous, abundant calcified zones, few sand partings.					
		ss 2.0	STA - dry to moist, trace of iron-oxide staining.		4.0			
10		ss 2.0	STA				10	
		ss 2.0	CLAYEY GRAVEL - 0.2 feet thick, dry.					Fine to Coarse-grained chert gravel.
		ss 2.0	CLAYEY SAND TO SANDY CLAY - low plasticity, uniform sand, very fine-grained sand, loose, dry to moist, very pale brown.		2.0			Trace of clay lenses < 1/4 inch thick. Pockets of clay and sand.
15		ss 2.0	STA - dry to moist.		2.5-5.0+		15	Trace of fine to coarse-grained gravel.
		ss 2.0	SANDY CLAY - high plasticity, very fine-grained sand, medium stiff, very moist to moist, very pale brown mottled very dark brown.		2.0-3.0	* * * * *		Slight Hydrocarbon odor 15.5'-16.0' Probe refusal at 16.0 feet. Slight hydrocarbon odor 16.0'-18.0'
20		ss 2.0	SANDY, CLAYEY GRAVEL TO SANDY, GRAVELLY CLAY - high plasticity, fine to coarse-grained gravel, hard, moist, very pale brown, gravel is well rounded chert.	*	5.0	* * * * * * * * * * * *	20	Slight hydrocarbon odor 18.0' to 24.0' Few sand lenses <1/4 inch thick.
		ss 1.5	STA - dry to moist.					
		ss 2.0	CLAYEY SAND - low plasticity, uniform, loose, moist to very moist, very pale brown.		1.0-2.0	* * * * * * * * * * * *		
25		ss 2.0	STA - very moist.		1.0	* * * * * * * * * * * *	25	Very slight hydrocarbon odor 24.0' to 26.0'
		ss 2.0	STA - moist to very moist.					
		ss 2.0	SANDY CLAYEY GRAVEL TO SANDY GRAVELLY CLAY - medium to high plasticity, very stiff, moist.		4.0-5.0	* *		Slight hydrocarbon odor 27.0' to 28.0'
		ss 2.0	SILTY CLAY - high plasticity, very stiff, moist, very pale brown mottled rust, blocky texture.		5.0			No odor, few iron-oxide partings
30		ss 2.0	STA - few sand partings, moist, black dendritic staining (pyrolusite).				30	
		ss 2.0	STA - grades to SANDY, SILTY CLAY - medium to low plasticity, very fine-grained sand, medium stiff, moist, very pale brown mottled light gray to rust, becoming less blocky.					No odor.
35		ss 1.0	STA - moist, few sand partings.	*	3.5		35	

Client:	Thompson Professional Group, Inc.	Drilling Method:	Direct Push and Hollow Stem Auger
Project No:	1409704622	Comments:	Boring left open for approximately 1.5 hours with no groundwater accumulation.
Date Drilled:	9/22/97		
Driller:	Geo Projects International		Logged by JDH-Maxim
Total Depth:	35 feet	ss = split spoon rc = rock core st = shelby tube	

LOG OF BORING NO. SB-11

Depth in Feet	Stratigraphy	Sample Method/ Ft. Rec(*)	DESCRIPTION OF STRATUM	Submitted For Analysis(*)	Pocket Penetrometer	Odor (*)	Depth in Feet	Remarks
0							0	
		ss 0.5	Asphalt and clayey gravel road base material. SILTY CLAY - high plasticity, hard, moist, very dark brown, homogenous, grass roots.		5.0+			
		ss 2.0	SIMILAR TO ABOVE (STA) - stiff, moist.		4.0			
5		ss 2.0	STA - grades to SILTY CLAY with GRAVEL at 5.0 feet. SILTY CLAY with GRAVEL - medium to high plasticity, stiff, moist, very pale brown to white, fine to coarse-grained gravel, calcified zones.		4.0		5	
		ss 2.0	STA - decrease percent gravel at 7.0 feet.					
10		ss 2.0	STA - very little gravel, moist, very pale brown, trace black dendritic staining (pyrolusite).	*	4.0		10	
		ss 1.0	SANDY CLAY TO CLAYEY SAND - medium plasticity, uniform, very fine-grained sand, loose, moist, very pale brown to rust.		1.0			Trace of clay lenses < 1/4 inch thick
		ss 1.0	STA - moist.					
15		ss 1.2	STA - moist.		1.0		15	
		ss 1.8	STA - grades to CLAYEY SAND - uniform, very fine-grained, loose, moist.		0.5-1.0			
20		ss 1.0	SANDY, CLAYEY GRAVEL TO SANDY, GRAVELLY CLAY - high plasticity, very fine-grained sand, fine to coarse grained gravel, hard, moist, pale brown, with gray mottling.		4.5	* * * * * * * * * * * * * * *	20	Gravel is rounded chert and limestone. Slight hydrocarbon odor 20.0' to 26.0'
		ss 2.0	STA - moist.		3.0			
		ss 2.0	STA - decrease percent gravel, grades to SANDY CLAY TO CLAYEY SAND - medium stiff, moist.					
25		ss 2.0	STA - gravel layer 25.5' to 26.0 ', medium stiff, moist, grades to greenish gray.		3.0		25	
		ss 1.9	Grades to SANDY CLAY TO CLAY - medium plasticity, medium stiff, moist, pale brown to gray, black iron-oxide lenses.		3.5			No odor
30		ss 1.5	CLAY - high plasticity, hard, moist to dry, pale brown to gray.		5.0		30	No odor
		ss 2.0	CLAY TO SILT CLAY - high to medium plasticity, hard, moist to dry, pale brown to gray.		5.0			Few sand partings, no odor
		ss 2.0	STA - dry to moist.					No odor
35		ss 1.0	STA - dry to moist.	*			35	

Client:	Thompson Professional Group, Inc.	Drilling Method:	Hollow Stem Auger
Project No:	1409704622	Comments:	
Date Drilled:	9/22/97		
Driller:	Geo Projects International		Logged by JDH-Maxim
Total Depth:	35 feet	ss = split spoon rc = rock core st = shelby tube	

LOG OF BORING NO. SB-12

Depth in Feet	Stratigraphy	Sample Method/ Ft. Rec(*)	DESCRIPTION OF STRATUM	Submitted For Analysis(*)	Pocket Penetrometer	Odor (*)	Depth in Feet	Remarks
0							0	
		ss 0.5	Asphalt and road base material. SILTY CLAY - high plasticity, hard, moist, very dark gray, grass roots.		5.0+			
		ss 1.9	SIMILAR TO ABOVE (STA) - decrease percent silt, moist, medium gray, trace of fine-grained gravel.		5.0+			
5		ss 2.0	STA Grades to SILTY CLAY WITH GRAVEL - high plasticity, fine-grained gravel, hard, moist, medium gray, gravel is calcified and weathered.		5.0+		5	
		ss 1.2	SILTY, SANDY, CLAY with GRAVEL - high to medium plasticity, very fine-grained sand, medium stiff, dry to moist, very pale brown to white.		3.0			Abundant calcified zones. Possible slight hydrocarbon odor 6.5' to 8.0'.
10		ss 2.0	STA - decrease percent gravel, moist, STA		5.0+		10	Decrease percent calcified zones. No odor.
		ss 2.0	Grades to SANDY CLAY to CLAYEY SAND - moist, very pale brown, fine to coarse-grained chert and limestone gravel.		2.0			Possible slight hydrocarbon odor 11.0' 12.0'. No odor.
15		ss 2.0 ss 0.8	STA - abundant fine to coarse-grained gravel, medium stiff to soft, moist, chert and limestone rounded to angular gravel, few clay seams. STA - moist.				15	
		ss 1.0	STA with slight increase in percent sand with abundant gravel, high plasticity, very fine-grained sand, soft, moist, color change to grayish brown at 16.0 feet.		4.0			Possible slight hydrocarbon odor 16.0' to 32.0'
20		ss 2.0	SANDY CLAYEY GRAVEL TO SANDY GRAVELLY CLAY - high plasticity, very fine-grained sand, very stiff, moist, greenish gray to grayish green, abundant sand partings.	*			20	Brownish yellow mottled in part.
		ss 2.0	SILTY CLAY - high to medium plasticity, very stiff, dry, light gray to greenish gray.		4.0			
		ss 1.5	STA - grades to SILTY, SANDY CLAY - medium plasticity, moist to dry, light gray mottled rust, abundant sand partings.					
25		ss 2.0	SANDY, GRAVELLY CLAY - fine to coarse-grained sand, stiff, moist, very pale brown. CLAY TO SILTY CLAY - high plasticity, hard, moist, very pale brown mottled light gray,		5.0+		25	
		ss 1.0	STA - moist, blocky texture.		5.0+			
30		ss 2.0	STA - moist, few silt/sand partings.	*			30	
		ss 2.0	STA - moist, rust mottling, abundant iron-oxide staining.		5.0			
35			Terminate boring at 32 feet due to soil sampling mechanism malfunction.				35	

Client:	Thompson Professional Group, Inc.	Drilling Method:	Hollow Stem Auger
Project No:	1409704622	Comments:	
Date Drilled:	9/23/97		
Driller:	Geo Projects International		Logged by JDH-Maxim
Total Depth:	32 feet	ss = split spoon rc = rock core st = shelby tube	

LOG OF BORING NO. SB-13

Depth in Feet	Stratigraphy	Sample Method/ Ft. Rec(*)	DESCRIPTION OF STRATUM	Submitted For Analysis(*)	Pocket Penetrometer	Odor (*)	Depth in Feet	Remarks
0							0	
		ss 1.5	Grass and gravelly clay base material. SILTY CLAY with GRAVEL - high to medium plasticity, fine to coarse-grained gravel, hard, dry		5.0+			
		ss 0.5	SILTY SANDY CLAY with GRAVEL - medium to high plasticity, very fine-grained sand, hard, dry, very pale brown to white, abundant calcified zones.					
5		ss 1.0	SIMILAR TO ABOVE (STA) - increase percent clay, decrease percent gravel, dry to moist, few silt/sand partings.		5.0+		5	
		ss 1.5	STA - grades to SILTY, SANDY CLAY - moist, very pale brown to yellowish red, no gravel, few silt/sand partings.					
10		ss 2.0	STA - increase percent sand, low to medium plasticity, very fine-grained sand, soft, moist,		2.0		10	
		ss 2.0	STA - decrease percent sand to SILTY, SANDY CLAY - few sand partings, trace of fine grained-limestone gravel, trace of iron-oxide staining.					
		ss 2.0	STA - increase percent sand to SILTY, CLAYEY, SAND TO SILTY, SANDY CLAY - low to high plasticity, soft, moist.					
15		ss 2.0	STA - increase percent clay, moist. SILTY CLAY - low to medium plasticity, medium stiff, dry, light gray mottled rust, trace of gravel.		3.0		15	
		ss 2.0	SANDY CLAY TO CLAYEY SAND - none to low plasticity, uniform very fine-grained sands, loose, moist, very pale brown to yellowish red.					Possible slight hydrocarbon odor 16.0' to 17.5'.
		ss 2.0	SILTY CLAY (17.8') - medium to high plasticity, stiff to very stiff, moist, light gray mottled very pale brown, few iron-oxide stainings.		4.0			No odor.
20		ss 2.0	SILTY CLAY TO CLAY - slight shaley appearance.				20	
		ss 2.0	STA - moist, blocky texture, few black iron-oxide staining.					
		ss 1.5	STA - moist.					
25		ss 1.0	STA - moist.				25	
		ss 2.0	STA - hard, moist, blocky texture, trace white calcified pockets < 1/2" diameter.		4.5			
		ss 2.0	STA - few silt partings.					
30		ss 2.0	STA.		5.0		30	
		ss 2.0	STA - low to medium plasticity, very stiff to stiff, moist, few silt partings.	*	4.0-4.5			
35		ss 2.0	STA - very stiff to hard, moist, few iron-oxide pockets < 1/2" diameter.				35	

Client:	Thompson Professional Group, Inc.	Drilling Method:	Hollow Stem Auger
Project No:	1409704622	Comments:	
Date Drilled:	9/23/97		
Driller:	Geo Projects International		Logged by JDH-Maxim
Total Depth:	50 feet	ss = split spoon rc = rock core st = shelby tube	

LOG OF BORING NO. SB-13

Depth in Feet	Stratigraphy	Sample Method/ Ft. Rec(*)	DESCRIPTION OF STRATUM	Submitted For Analysis(*)	Pocket Penetrometer	Odor (*)	Depth in Feet	Remarks
35							35	
		ss 2.0	SILTY CLAY - moist, blocky texture,		3.5-5.0			
		ss 2.0	STA - moist					
		ss 2.0	STA - moist, few calcified pockets < 1/2" diameter, few horizontal gypsum seams < 1/4" thick.					
40							40	
		ss 2.0	STA - few silt/sand partings, dry.					
		ss 2.0	STA - few bivalves present.					
45		ss 2.0	SILTY CLAY - low to medium plasticity, hard to stiff, dry to moist, color change to dark gray, blocky texture, alternating layers of light gray and pale brown with dark gray.				45	
		ss 2.0	STA - low plasticity, hard, dry to moist, dark gray, blocky texture, shaley appearance.	*				
		ss 2.0	STA - low plasticity.					
50							50	

Client:	Thompson Professional Group, Inc.	Drilling Method:	Hollow Stem Auger
Project No:	1409704622	Comments:	
Date Drilled:	9/23/97		
Driller:	Geo Projects International		Logged by JDH-Maxim
Total Depth:	50 feet	ss = split spoon rc = rock core st = shelby tube	

LOG OF BORING NO. SB-14

Depth in Feet	Stratigraphy	Sample Method/ Ft. Rec(*)	DESCRIPTION OF STRATUM	Submitted For Analysis(*)	Pocket Penetrometer	Odor (*)	Depth in Feet	Remarks
0							0	
		ss 1.0	SILTY CLAY with GRAVEL - fill material.					
		ss 0.8	SILTY CLAY - medium to high plasticity, hard, dry, very dark brown with rust mottling. SIMILAR TO ABOVE (STA) - dry.		5.0+			
5		ss 2.0	STA - dry to moist.				5	Trace of fine-grained gravel
		ss 2.0	SILTY, SANDY CLAY - medium to high plasticity, very fine-grained sand, very stiff, dry, very pale brown to white, trace of fine-grained gravel, abundant calcified zones, few sand/silt partings.		4.0-5.0+			
		ss 2.0	STA - decrease percent sand and silt, dry to moist, few sand and silt partings.					
10		ss 2.0	STA - increase percent sand and silt partings, very stiff, moist, decrease percent calcified zones.		4.0		10	
		ss 1.5	STA - stiff, moist, no calcified zones.					
15		ss 2.0	STA with GRAVEL - low to medium plasticity, fine to coarse-grained chert and limestone gravel, soft, moist.		2.0		15	
		ss 2.0	STA.					
20		ss 2.0	SILTY CLAY - high to medium plasticity, very stiff to hard, moist, very pale brown and light gray mottling, calcified pockets < 1/4" diameter, few silt partings.		4.0-5.0+		20	
		ss 2.0	STA - moist.					
		ss 2.0	STA - increase percent silt, very stiff, moist, abundant silt partings.	*				
25		ss 2.0	SILTY, SANDY CLAY - moist, tan. SANDY CLAYEY GRAVEL to SANDY GRAVELLY CLAY - medium to high plasticity, very fine-grained sand, very stiff, moist, very pale brown.				25	Possible very slight hydrocarbon odor 22 feet to 24 feet.
		ss 2.0	SILTY CLAY - medium to high plasticity, very stiff, moist, very pale brown and light gray mottling, blocky texture, few iron-oxide pockets < 1/4" diameter.					
30		ss 2.0	STA - moist, few coarse-grained gravel.				30	
		ss 2.0	STA - moist.					
		ss 1.0	STA - moist, few bivalves.	*				
35		ss 1.0	STA - moist.				35	

Client:	Thompson Professional Group, Inc.	Drilling Method:	Hollow Stem Auger
Project No:	1409704622	Comments:	
Date Drilled:	9/24/97		
Driller:	Geo Projects International		Logged by JDH-Maxim
Total Depth:	35 feet	ss = split spoon rc = rock core st = shelby tube	

LOG OF BORING NO. SB-16

Depth in Feet	Stratigraphy	Sample Method/ Ft. Rec(*)	DESCRIPTION OF STRATUM	Submitted For Analysis(*)	Pocket Penetrometer	Odor (*)	Depth in Feet	Remarks
0							0	
		ss 2.0	Grass and top soil (loam). SILTY CLAY with SAND - low to medium plasticity, very fine-grained sand, hard, dry to moist, very pale brown to yellowish red, trace of fine-grained gravel and gastropods, few white calcified pockets <1/4" diameter.		5.0+			
		ss 1.1						
5		ss 2.0	STA - increase percent sand, dry to moist, abundant sand/silt partings, gastropods and bivalves.		5.0+		5	
		ss 1.3	STA. SILTY, CLAYEY GRAVEL to SILTY, GRAVELLY CLAY - medium to high plasticity, fine to coarse-grained gravel, very stiff, moist, dark brown with rust and very dark gray mottling, few sand partings, gravel is rounded chert and limestone.		4.0			
10		ss 2.0	STA.				10	
		ss 2.0	SILTY, SANDY CLAY - medium to high plasticity, very fine-grained sand, soft to medium stiff, moist, very pale brown to dark brown, trace of fine-grained gravel, abundant sand/silt partings.		2.0-3.0			
		ss 2.0	STA - increase percent sand, soft, moist.					
15		ss 2.0	SILTY, SANDY CLAY with trace of GRAVEL - medium to high plasticity, soft, moist to very moist, dark brown with very pale brown mottling.			*	15	Moderate hydrocarbon odor 15 feet to 18 feet with possible black hydrocarbon stain.
		ss 2.0	Increase percent sand at 17 feet to SANDY CLAY TO CLAYEY SAND - fine-grained sand, soft, very moist 17 feet to 18 feet.			*		
20		ss 1.2	CLAYEY, GRAVELLY SAND TO CLAYEY, SANDY GRAVEL - uniform, fine-grained sand, fine to coarse-grained gravel, loose, moist, lt. green to pale brown.	*		*	20	Sand pockets 1" to 3" diameter. Moderate to strong hydrocarbon odor. CLAY seam 19 feet to 19.3 feet.
		ss 1.1	SILTY, SANDY CLAY with GRAVEL - low plasticity, very fine-grained sand, fine to coarse-grained gravel, loose, dry, very pale brown. STA - moist, (very moist 22.5 feet to 23 feet).			*		Moderate hydrocarbon odor 20 feet to 23 feet.
		ss 2.0	SILTY CLAY - medium to high plasticity, very stiff, moist, very pale brown mottled gray to rust, blocky texture.		4.0			No hydrocarbon odor.
25		ss 2.0	STA - stiff, moist, abundant sand/silt partings.				25	
		ss 2.0	STA - moist, trace black iron-oxide staining.					
30		ss 2.0	STA - moist.	*			30	
35							35	

Client:	Thompson Professional Group, Inc.	Drilling Method:	Hollow Stem Auger
Project No:	1409704622	Comments:	
Date Drilled:	9/24/97		
Driller:	Geo Projects International		Logged by JDH-Maxim
Total Depth:	30 feet		ss=split spoon rc=rock core st=shelby tube

SOIL BORING FIELD SCREENING RESULTS
PID READINGS - Organic Vapors in PPM

Sampling Interval	Soil Boring B10	B11	B12	B13	B14	B15*	B16
0' - 2'	0.0	4.8	0.0	0.0	0.4	0.4	0.0
2' - 4'	0.0	376.0	0.0	0.0	0.1	0.6	7.8
4' - 6'	0.0	90.0	0.0	0.0	1.3	0.8	0.0
6' - 8'	0.0	180.0	0.0	25.0	1.0	0.7	0.0
8' - 10'	0.0	119.0	0.0	28.5	3.1	0.5	0.0
10' - 12'	0.0	138.0	0.0	50.0	1.3	0.1	0.0
12' - 14'	8.7	107.0	0.0	72.5	1.8	0.6	5.4
14' - 16'	110.0	88.0	0.0	79.0	5.4	0.3	5.7
16' - 18'	178.2	83.0	0.0	128.5	3.2	0.1	33.0
18' - 20'	698.5	78.0	0.0	162.0	0.7	0.1	1.1
20' - 22'	757.0	75.0	0.0	171.1	0.0	0.0	228.0
22' - 24'	250.0	71.5	0.0	33.4	12.3	0.0	110.0
24' - 26'	75.0	69.5	0.0	180.2	0.5	0.0	3.1
26' - 28'	356.0	66.5	0.0	157.3	0.2	0.0	1.8
28' - 30'	80.2	65.0	0.0	45.3	0.0	0.0	6.5
30' - 32'	199.5	64.4	0.0	140.3	0.0		
32' - 34'	320.0	65.3		72.5	0.3		
34' - 36'	657.0	66.0		580.1			
36' - 38'				76.2			
38' - 40'				70.5			
40' - 42'				59.5			
42' - 44'				50.5			
44' - 46'				41.2			
46' - 48'				20.7			
48' - 50'				52.5			

* Suspected instrument malfunction

Send original copy by certified mail to: TDLR, P.O. Box 12157, Austin, TX 78711

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ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 9

1) **OWNER** U.S. ARMY CORPS OF ENGINEERS (NAME) **ADDRESS** 819 TAYLOR STREET (Street or RFD) FT. WORTH (City) TX (State) 76102 (Zip)

2) **ADDRESS OF WELL:** County CALDWELL — FORMER GARY AIR FORCE BASE ON HWY 21 (Street or RFD) SAM MARCOS (City) TX (State) 78617 (Zip) **STATE GRID #** 67-02-7

3) **TYPE OF WORK (Check):**
[X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) **PROPOSED USE (Check):** [ ] Monitor [X] Environmental Soil Boring [ ] Domestic [ ] Industrial [ ] Irrigation [ ] Injection [ ] Public Supply [ ] De-watering [ ] Testwell
If Public Supply well, were plans submitted to the TNRCC ? [ ] Yes [ ] No

5)

6) **WELL LOG:** SB-10
Date Drilling
Started: 9/22 19 97
Completed: 9/22 19 97

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8	0.0	35.0

7) **DRILLING METHOD (Check):** [ ] Driven [ ] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [X] Other HSA

N

From(ft.)	To(ft.)	Description and color of formation material
0.0	5.0	SILTY CLAY, DARK GREY
5.0	10.0	SILTY SANDY CLAY, VERY PALE BROWN
10.0	11.0	CLAYEY GRAVEL
11.0	18.0	CLAYEY SAND TO SANDY CLAY, VERY PALE BROWN
18.0	22.0	GRAVEL WITH SAND AND CLAY, VERY PALE BROWN
22.0	27.0	CLAYEY SAND, VERY PALE BROWN
27.0	28.0	GRAVEL WITH SAND AND CLAY, VERY PALE BROWN
28.0	35.0	SILTY CLAY, VERY PALE BROWN

8) **Borehole Completion (Check):** N/A [ ] Open Hole [ ] Straight Wall [ ] Underreamed [ ] Gravel Packed [ ] Other
If gravel packed give interval ... from ____ ft. to ____ ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen

9) **CEMENTING DATA** [RULE 338.44(1)]
Cemented from 0.0 ft. to 35.0 ft. No. of sacks used ____
____ ft. to ____ ft. No. of sacks used ____
Method used ____
Cemented by BENNY HINOJOSA
Distance to septic system field lines ____ ft.
Method of verification of above distance ____

10) **SURFACE COMPLETION**
[ ] Specified Surface Slab Installed [Rule 338.44(2)(A)]
[ ] Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
[ ] Pitless Adapter Used [Rule 338.44(3)(b)]
[X] Approved Alternative Procedure Used [Rule 338.71]

11) **WATER LEVEL:** N/A
Static level ____ ft. below land surface Date ____
Artesian flow ____ gpm. Date ____

12) **PACKERS:** N/A Type Depth

13) **TYPE PUMP:** N/A
[ ] Turbine [ ] Jet [ ] Submersible [ ] Cylinder [ ] Other
Depth to pump bowls, cylinder, jet, etc., ____ ft.

14) **WELL TESTS:** N/A
Type test: [ ] Pump [ ] Bailer [ ] Jetted [ ] Estimated
Yield: ____ gpm with ____ ft. drawdown after ____ hrs.

15) **WATER QUALITY:**
Did you knowingly penetrate any strata which contained undesirable constituents?
[ ] Yes [X] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ____ Depth of strata ____
Was a chemical analysis made? [ ] Yes [ ] No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL INC. (Type or print) **WELL DRILLER'S LICENSE NO.** 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) BENNY HINOJOSA (Licensed Well Driller) **(Signed)** ____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 09-01-93) TNRCC COPY

Send original copy by certified mail to: TDLR, P.O. Box 12157, Austin, TX 78711

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 9

1) OWNER: U.S. ARMY CORPS OF ENGINEERS (NAME) ADDRESS: 819 TAYLOR STREET (Street or RFD) FT. WORTH (City) TX (State) 76102 (Zip)

2) ADDRESS OF WELL: County CALDWELL — FORMER GARY AIR FORCE BASE ON HWY 21 (Street or RFD) SAM MARCOS (City) TX (State) 78617 (Zip) STATE GRID # 67-02-7

3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [ ] Monitor [X] Environmental Soil Boring [ ] Domestic [ ] Industrial [ ] Irrigation [ ] Injection [ ] Public Supply [ ] De-watering [ ] Testwell
If Public Supply well, were plans submitted to the TNRCC ? [ ] Yes [ ] No

5)

6) WELL LOG: SB-11
Date Drilling
Started: 9/22 19 97
Completed: 9/22 19 97

DIAMETER OF HOLE		
Dia. (in.)	From (ft.)	To (ft.)
8	0.0	35.0

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [X] Other HSA

From(ft.)	To(ft.)	Description and color of formation material
0.0	0.5	ASPHALT
0.5	10.5	SILTY CLAY, SOME GRAVEL WITH DEPTH, BROWN
10.5	18.5	SANDY CLAY TO CLAYEY SAND, PALE BROWN TO RUST
18.5	29.0	SANDY CLAYEY GRAVEL TO SANDY CLAY TO CLAY
29.0	35.0	CLAY TO SILTY CALY, PALE BROWN TO GREY

8) Borehole Completion (Check): N/A [ ] Open Hole [ ] Straight Wall [ ] Underreamed [ ] Gravel Packed [ ] Other
If gravel packed give interval ... from ____ ft. to ____ ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen

9) CEMENTING DATA [RULE 338.44(1)]
Cemented from 0.0 ft. to 35.0 ft. No. of sacks used ____
____ ft. to ____ ft. No. of sacks used ____
Method used ____
Cemented by BENNY HINOJOSA
Distance to septic system field lines ____ ft.
Method of verification of above distance ____

10) SURFACE COMPLETION
[ ] Specified Surface Slab Installed [Rule 338.44(2)(A)]
[ ] Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
[ ] Pitless Adapter Used [Rule 338.44(3)(b)]
[X] Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL: N/A
Static level ____ ft. below land surface Date ____
Artesian flow ____ gpm. Date ____

12) PACKERS: N/A Type Depth

13) TYPE PUMP: N/A
[ ] Turbine [ ] Jet [ ] Submersible [ ] Cylinder [ ] Other ____
Depth to pump bowls, cylinder, jet, etc., ____ ft.

14) WELL TESTS: N/A
Type test: [ ] Pump [ ] Bailer [ ] Jetted [ ] Estimated
Yield: ____ gpm with ____ ft. drawdown after ____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[ ] Yes [X] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ____ Depth of strata ____
Was a chemical analysis made? [ ] Yes [ ] No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME: GEOPROJECTS INTERNATIONAL INC. (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS: 8631 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) BENNY HINOJOSA (Licensed Well Driller) (Signed) ____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 09-01-93) TNRCC COPY

Send original copy by certified mail to: TDLR, P.O. Box 12157, Austin, TX 78711

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State of Texas
WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 9

1) OWNER: U.S. ARMY CORPS OF ENGINEERS (NAME) ADDRESS: 819 TAYLOR STREET (Street or RFD) FT. WORTH (City) TX (State) 76102 (Zip)

2) ADDRESS OF WELL: County CALDWELL — FORMER GARY AIR FORCE BASE ON HWY 21 (Street or RFD) SAM MARCOS (City) TX (State) 78617 (Zip) STATE GRID # 67-02-7

3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [ ] Monitor [X] Environmental Soil Boring [ ] Domestic [ ] Industrial [ ] Irrigation [ ] Injection [ ] Public Supply [ ] De-watering [ ] Testwell
If Public Supply well, were plans submitted to the TNRCC ? [ ] Yes [ ] No

5)

6) WELL LOG: SB-12
Date Drilling Started: 9/23 19 97 Completed: 9/23 19 97

DIAMETER OF HOLE		
Dia. (in.)	From (ft.)	To (ft.)
8	0.0	32.0

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [X] Other HSA

From(ft.)	To(ft.)	Description and color of formation material
0.0	0.5	ASPHALT
0.5	11.0	SILTY CLAY, SOME GRAVEL/SAND WITH DEPTH,GREY/BROWN
11.0	18.0	SANDY CLAY TO CLAYEY SAND, VERY PALE BROWN
18.0	20.0	SANDY CLAYEY GRAVEL TO GRAVELLY SANDY CLAY
20.0	24.0	SILTY CLAY, LIGHT GREY/GREENISH
24.0	25.0	SANDY GRAVELLY CLAY, VERY PALE BROWN
25.0	32.0	CLAY TO SILTY CLAY, LIGHT GREY

8) Borehole Completion (Check): N/A [ ] Open Hole [ ] Straight Wall [ ] Underreamed [ ] Gravel Packed [ ] Other
If gravel packed give interval ... from ____ ft. to ____ ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting	Gage Screen

9) CEMENTING DATA [RULE 338.44(1)]
Cemented from 0.0 ft. to 32.0 ft. No. of sacks used ____
____ ft. to ____ ft. No. of sacks used ____
Method used ____
Cemented by BENNY HINOJOSA
Distance to septic system field lines ____ ft.
Method of verification of above distance ____

10) SURFACE COMPLETION
[ ] Specified Surface Slab Installed [Rule 338.44(2)(A)]
[ ] Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
[ ] Pitless Adapter Used [Rule 338.44(3)(b)]
[X] Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL: N/A
Static level ____ ft. below land surface Date ____
Artesian flow ____ gpm. Date ____

12) PACKERS: N/A Type Depth

13) TYPE PUMP: N/A
[ ] Turbine [ ] Jet [ ] Submersible [ ] Cylinder [ ] Other ____
Depth to pump bowls, cylinder, jet, etc., ____ ft.

14) WELL TESTS: N/A
Type test: [ ] Pump [ ] Bailer [ ] Jetted [ ] Estimated
Yield: ____ gpm with ____ ft. drawdown after ____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[ ] Yes [X] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ____ Depth of strata ____
Was a chemical analysis made? [ ] Yes [ ] No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME: GEOPROJECTS INTERNATIONAL INC. (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS: 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) BENNY HINOJOSA (Licensed Well Driller) (Signed) ____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

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Send original copy by certified mail to: TDLR, P.O. Box 12157, Austin, TX 78711 — *Please use black ink.*

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State of Texas
WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 9

1) OWNER U.S. ARMY CORPS OF ENGINEERS (NAME) ADDRESS 819 TAYLOR STREET (Street or RFD) FT. WORTH (City) TX (State) 76102 (Zip)

2) ADDRESS OF WELL: County CALDWELL — FORMER GARY AIR FORCE BASE ON HWY 21 (Street or RFD) SAM MARCOS (City) TX (State) 78617 (Zip) STATE GRID # 67-02-7

3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [ ] Monitor [X] Environmental Soil Boring [ ] Domestic [ ] Industrial [ ] Irrigation [ ] Injection [ ] Public Supply [ ] De-watering [ ] Testwell
If Public Supply well, were plans submitted to the TNRCC ? [ ] Yes [ ] No

5)

6) WELL LOG: SB-13
Date Drilling Started: 9/23 19 97 Completed: 9/23 19 97

DIAMETER OF HOLE		
Dia. (in.)	From (ft.)	To (ft.)
8	0.0	50.0

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [X] Other HSA

From(ft.)	To(ft.)	Description and color of formation material
0.0	0.5	TOP SOIL AND BASE MATERIALS
0.5	15.0	SILTY SANDY CLAY WITH GRAVEL DECREASING W/ DEPTH
15.0	16.0	SILTY CLAY
16.0	17.0	SANDY CLAY TO CLAYEY SAND
17.0	50.0	SILTY CLAY TO CLAY TO SILTY CLAY

8) Borehole Completion (Check): N/A [ ] Open Hole [ ] Straight Wall [ ] Underreamed [ ] Gravel Packed [ ] Other
If gravel packed give interval ... from ____ ft. to ____ ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen

9) CEMENTING DATA [RULE 338.44(1)]
Cemented from 0.0 ft. to 50.0 ft. No. of sacks used ____
____ ft. to ____ ft. No. of sacks used ____
Method used ____
Cemented by BENNY HINOJOSA
Distance to septic system field lines ____ ft.
Method of verification of above distance ____

10) SURFACE COMPLETION
[ ] Specified Surface Slab Installed [Rule 338.44(2)(A)]
[ ] Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
[ ] Pitless Adapter Used [Rule 338.44(3)(b)]
[X] Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL: N/A
Static level ____ ft. below land surface Date ____
Artesian flow ____ gpm. Date ____

12) PACKERS: N/A Type Depth

13) TYPE PUMP: N/A
[ ] Turbine [ ] Jet [ ] Submersible [ ] Cylinder [ ] Other
Depth to pump bowls, cylinder, jet, etc., ____ ft.

14) WELL TESTS: N/A
Type test: [ ] Pump [ ] Bailer [ ] Jetted [ ] Estimated
Yield: ____ gpm with ____ ft. drawdown after ____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[ ] Yes [X] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ____ Depth of strata ____
Was a chemical analysis made? [ ] Yes [ ] No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL INC. (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) BENNY HINOJOSA (Licensed Well Driller) (Signed) ____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

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Texas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 9

1) OWNER U.S. ARMY CORPS OF ENGINEERS (NAME) ADDRESS 819 TAYLOR STREET (Street or RFD) FT. WORTH (City) TX (State) 76102 (Zip)

2) ADDRESS OF WELL: County CALDWELL FORMER GARY AIR FORCE BASE ON HWY 21 (Street or RFD) SAM MARCOS (City) TX (State) 78617 (Zip) STATE GRID # 67-02-7

3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [ ] Monitor [X] Environmental Soil Boring [ ] Domestic [ ] Industrial [ ] Irrigation [ ] Injection [ ] Public Supply [ ] De-watering [ ] Testwell
If Public Supply well, were plans submitted to the TNRCC ? [ ] Yes [ ] No

5)

6) WELL LOG: SB-14
Date Drilling Started: 9/24 19 97 Completed: 9/24 19 97

DIAMETER OF HOLE		
Dia. (in.)	From (ft.)	To (ft.)
8	0.0	35.0

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [X] Other HSA

From(ft.)	To(ft.)	Description and color of formation material
0.0	0.5	SILTY CLAY, GRAVEL FILL MATERIAL
0.5	6.0	SILTY CLAY, VERY DARK BROWN
6.0	18.5	SILTY SANDY CLAY, SOME GRAVEL WITH DEPTH
18.5	24.0	SILTY CLAY, PALE BROWN
24.0	25.0	SILTY SANDY CLAY, TAN
25.0	26.0	SANDY CLAYEY GRAVEL
26.0	35.0	SILTY CLAY, PALE BROWN

8) Borehole Completion (Check): N/A [ ] Open Hole [ ] Straight Wall [ ] Underreamed [ ] Gravel Packed [ ] Other
If gravel packed give interval ... from ____ ft. to ____ ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting	Gage Screen

9) CEMENTING DATA [RULE 338.44(1)]
Cemented from 0.0 ft. to 35.0 ft. No. of sacks used ____
____ ft. to ____ ft. No. of sacks used ____
Method used ____
Cemented by BENNY HINOJOSA
Distance to septic system field lines ____ ft.
Method of verification of above distance ____

10) SURFACE COMPLETION
[ ] Specified Surface Slab Installed [Rule 338.44(2)(A)]
[ ] Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
[ ] Pitless Adapter Used [Rule 338.44(3)(b)]
[X] Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL: N/A
Static level ____ ft. below land surface Date ____
Artesian flow ____ gpm. Date ____

12) PACKERS: N/A Type Depth

13) TYPE PUMP: N/A
[ ] Turbine [ ] Jet [ ] Submersible [ ] Cylinder [ ] Other
Depth to pump bowls, cylinder, jet, etc., ____ ft.

14) WELL TESTS: N/A
Type test: [ ] Pump [ ] Bailer [ ] Jetted [ ] Estimated
Yield: ____ gpm with ____ ft. drawdown after ____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[ ] Yes [X] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ____ Depth of strata ____
Was a chemical analysis made? [ ] Yes [ ] No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL INC. (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) BENNY HINOJOSA (Licensed Well Driller) (Signed) ____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 09-01-93) TNRCC COPY

Send original copy by certified mail to: TDLR, P.O. Box 12157, Austin, TX 78711

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 12157
Austin, Tx. 78711
1 800 803 9202 EXT. 9

1) OWNER U.S. ARMY CORPS OF ENGINEERS (NAME) ADDRESS 819 TAYLOR STREET (Street or RFD) FT. WORTH (City) TX (State) 76102 (Zip)

2) ADDRESS OF WELL: County CALDWELL FORMER GARY AIR FORCE BASE ON HWY 21 (Street or RFD) SAM MARCOS (City) TX (State) 78617 (Zip) STATE GRID # 67-02-7

3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [X] Monitor [ ] Environmental Soil Boring [ ] Domestic [ ] Industrial [ ] Irrigation [ ] Injection [ ] Public Supply [ ] De-watering [ ] Testwell
If Public Supply well, were plans submitted to the TNRCC ? [ ] Yes [ ] No

5)

6) WELL LOG: MW-2
Date Drilling Started: 9/24 19 97 Completed: 9/24 19 97

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8	0.0	40.0

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [X] Other HSA

From(ft.)	To(ft.)	Description and color of formation material
0.0	1.5	SOILS AND BASE MATERIALS
1.5	6.0	SILTY CLAY, DARK GREY
6.0	10.0	SILTY, SANDY CLAY WITH GRAVEL, PALE BROWN TO WHITE
10.0	11.0	CLAYEY SAND, VERY PALE BROWN
11.0	18.5	SANDY CLAY, SOME GRAVEL, VERY PALE BROWN
18.5	22.0	SILTY CLAY WITH GRAVEL SOME SAND WHITE -PALE BROWN
22.0	26.0	SANDY CLAY TURNS GRAVELLY, LT. GREY-PALE BROWN
26.0	30.0	SILTY CLAY, VERY PALE BROWN

8) Borehole Completion (Check): [ ] Open Hole [ ] Straight Wall [ ] Underreamed [X] Gravel Packed [ ] Other
If gravel packed give interval ... from 18.0 ft. to 30.0 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
2.0	N	SCH 40 PVC RISER	0.0	20.0	
2.0	N	SCH 40 PVC RISER	20.0	30.0	0.010

9) CEMENTING DATA [RULE 338.44(1)]
Cemented from 0.0 ft. to 15.5 ft. No. of sacks used
HOLE PLUG 15.5 ft. to 18.0 ft. No. of sacks used
Method used
Cemented by BENNY HINOJOSA
Distance to septic system field lines ft.
Method of verification of above distance

10) SURFACE COMPLETION
[ ] Specified Surface Slab Installed [Rule 338.44(2)(A)]
[ ] Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
[ ] Pitless Adapter Used [Rule 338.44(3)(b)]
[X] Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL: N/A
Static level ft. below land surface Date
Artesian flow gpm. Date

12) PACKERS: N/A Type Depth

13) TYPE PUMP: N/A
[ ] Turbine [ ] Jet [ ] Submersible [ ] Cylinder [ ] Other
Depth to pump bowls, cylinder, jet, etc., ft.

14) WELL TESTS: N/A
Type test: [ ] Pump [ ] Bailer [ ] Jetted [ ] Estimated
Yield: gpm with ft. drawdown after hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[ ] Yes [X] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Depth of strata
Was a chemical analysis made? [ ] Yes [ ] No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

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Please attach electric log, chemical analysis, and other pertinent information, if available.

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State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 12157
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1 800 803 9202 EXT. 9

1) OWNER U.S. ARMY CORPS OF ENGINEERS (NAME) ADDRESS 819 TAYLOR STREET (Street or RFD) FT. WORTH (City) TX (State) 76102 (Zip)

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3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [ ] Monitor [X] Environmental Soil Boring [ ] Domestic [ ] Industrial [ ] Irrigation [ ] Injection [ ] Public Supply [ ] De-watering [ ] Testwell
If Public Supply well, were plans submitted to the TNRCC ? [ ] Yes [ ] No

5)

6) WELL LOG: SB-16
Date Drilling Started: 9/24 19 97 Completed: 9/24 19 97

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8	0.0	30.0

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [ ] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [X] Other HSA

From(ft.)	To(ft.)	Description and color of formation material
0.0	0.5	TOP SOIL
0.5	6.5	SILTY CLAY WITH SAND
6.5	10.0	SILTY CLAYEY GRAVEL TO SITY GRAVELLY CLAY
10.0	18.5	SILTY SANDY CLAY, SOME GRAVEL AT DEPTH
18.5	20.0	CLAYEY GRAVELLY SAND TO CLAYEY SANDY GRAVEL
20.0	23.0	SILTY SANDY CLAY, WITH GRAVEL, PALE BROWN
23.0	30.0	SILTY CLAY, PALE BROWN TO RUST

8) Borehole Completion (Check): N/A [ ] Open Hole [ ] Straight Wall [ ] Underreamed [ ] Gravel Packed [ ] Other
If gravel packed give interval ... from ____ ft. to ____ ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if Commercial	Setting (ft.) From	Setting (ft.) To	Gage Casing Screen

9) CEMENTING DATA [RULE 338.44(1)]
Cemented from 0.0 ft. to 30.0 ft. No. of sacks used ____
____ ft. to ____ ft. No. of sacks used ____
Method used ____
Cemented by BENNY HINOJOSA
Distance to septic system field lines ____ ft.
Method of verification of above distance ____

10) SURFACE COMPLETION
[ ] Specified Surface Slab Installed [Rule 338.44(2)(A)]
[ ] Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
[ ] Pitless Adapter Used [Rule 338.44(3)(b)]
[X] Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL: N/A
Static level ____ ft. below land surface Date ____
Artesian flow ____ gpm. Date ____

12) PACKERS: N/A Type Depth

13) TYPE PUMP: N/A
[ ] Turbine [ ] Jet [ ] Submersible [ ] Cylinder [ ] Other
Depth to pump bowls, cylinder, jet, etc., ____ ft.

14) WELL TESTS: N/A
Type test: [ ] Pump [ ] Bailer [ ] Jetted [ ] Estimated
Yield: ____ gpm with ____ ft. drawdown after ____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[ ] Yes [X] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ____ Depth of strata ____
Was a chemical analysis made? [ ] Yes [ ] No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

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Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 09-01-93) TNRCC COPY

Attachment 15
Sample Summary Tables

Soil Sample Tables - Risk-Based Site Assessment*

*Compiled from data gathered by Thompson Professional Group, Inc., from samples collected May 16, 1996 through July 17, 1996, and September 22-25, 1997.

Phase 1 Soil Sample Descriptions
LPST 108133

Boring Location	Depth (ft. BGS)	Field ID#	Lab ID#	Date Sampled	Time Sampled	Parameters Analyzed	PID Reading
Boring 1	22	B1-1022	9605D61-01	5/14/96	10:58 AM	BTEX, TPH, PAHs	1041ppm
Boring 1	26.5	B1-1026	9605D61-03	5/14/96	11:04 AM	BTEX, TPH, PAHs	836 ppm
Boring 1	35	B1-1035	9605D61-02	5/14/96	11:20 AM	BTEX, TPH, PAHs	195 ppm
Boring 2	17	B2-2117	9605D61-05	5/15/96	11:43 AM	BTEX, TPH, PAHs	34.7 ppm
Boring 2	21.5	B2-2121	9605D61-06	5/15/96	9:15 AM	BTEX, TPH, PAHs	51.2 ppm
Boring 2	30	B2-2130	9605D61-04	5/15/96	11:25 AM	BTEX, TPH, PAHs	4.4 ppm
Boring 3	17	B3-3217	9605D61-08	5/15/96	3:34 PM	BTEX, TPH, PAHs	5.9 ppm
Boring 3	22	B3-3222	9605D61-09	5/15/96	3:35 PM	BTEX, TPH, PAHs	15.6 ppm
Boring 3	30	B3-3230	9605D61-07	5/15/96	11:25 AM	BTEX, TPH, PAHs	4.2 ppm
Boring 4	16	B4-4316	9605D61-11	5/15/96	4:25 PM	BTEX, TPH, PAHs	42.0 ppm
Boring 4	18.5	B4-43.8	9605D61-12	5/15/96	2:50 PM	BTEX, TPH, PAHs	70.9 ppm
Boring 4	30	B4-4330	9605D61-10	5/15/96	3:10 PM	BTEX, TPH, PAHs	25.5 ppm
Boring 5	14	B5-5414	9605D61-15	5/16/96	8:55 AM	BTEX, TPH, PAHs	686 ppm
Boring 5	17	B5-5417	9605D61-14	5/16/96	11:44 AM	BTEX, TPH, PAHs	1437 ppm
Boring 5	20.5	B5-5420	9605D61-16	5/16/96	9:15 AM	BTEX, TPH, PAHs	124 ppm
Boring 5	30	B5-5430	9605D61-13	5/16/96	10:55 AM	BTEX, TPH, PAHs	49.1 ppm
Boring 6	17	B6-6517	9605D61-18	5/16/96	1:37 PM	BTEX, TPH, PAHs	178 ppm
Boring 6	20	B6-6520	9605D61-19	5/16/96	10:55 AM	BTEX, TPH, PAHs	382 ppm
Boring 6	30 ft.	B6-6530	9605D61-17	5/16/96	10:45 AM	BTEX, TPH, PAHs	42.8 ppm
Boring 7	17	B7-7617	9605952-03	5/16/96	5:08 PM	BTEX, TPH, PAHs	31.0 ppm
Boring 7	22	B7-7622	9605952-01	5/16/96	2:33 PM	BTEX, TPH, PAHs	68.7 ppm
Boring 7	30	B7-7630	9605952-02	5/16/96	2:47 PM	BTEX, TPH, PAHs	23.6 ppm
Boring 8	5	B8-8705	9605952-07	5/17/96	8:45 AM	BTEX, TPH, PAHs	150 ppm
Boring 8	17	B8-8717	9605952-05	5/16/96	5:50 PM	BTEX, TPH, PAHs	75 ppm
Boring 8	20.5	B8-8720	9605952-06	5/16/96	4:30 PM	BTEX, TPH, PAHs	52 ppm
Boring 8	30	B7-8730	9605952-04	5/16/96	4:47 PM	BTEX, TPH, PAHs	9 ppm

Phase 2 Soil Sample Descriptions
LPST 108133

Boring Location	Depth (ft. BGS)	Field ID#	Lab ID#	Date Sampled	Time Sampled	Parameters Analyzed	PID Reading
Boring 10	20	SB10-20	31153.01	9/22/97	4:35 PM	BTEX, TPH	757 ppm
Boring 10	35	SB10-35	31153.02	9/22/97	1:37 PM	BTEX, TPH	657 ppm
Boring 11	10	SB11-10	31175.01	9/23/97	11:55 AM	BTEX, TPH	138 ppm
Boring 11	35	SB11-35	31153.03	9/22/97	3:20 PM	BTEX, TPH	66 ppm
Boring 12	20	SB12-20	31175.02	9/23/97	4:23 PM	BTEX, TPH	0 ppm
Boring 12	30	SB12-30	31175.03	9/23/97	4:25 PM	BTEX, TPH	0 ppm
Boring 13	34	SB13-34	31175.04	9/23/97	3:20 PM	BTEX, TPH	580 ppm
Boring 13	34 (Dup.)	SB13-56	31175.05	9/23/97	3:25 PM	BTEX, TPH	580 ppm
Boring 13	48	SB13-48	31175.06	9/23/97	2:45 PM	BTEX, TPH	52.5 ppm
Boring 14	22	SB14-22	31189.06	9/24/97	4:15 PM	BTEX, TPH	12.3 ppm
Boring 14	22 (Dup.)	SB14-24	31189.07	9/24/97	4:15 PM	BTEX, TPH	12.3 ppm
Boring 14	34	SB14-34	31179.08	9/24/97	3:15 PM	BTEX, TPH	0.3 ppm
Boring 15	22	SB15-22	31189.02	9/24/97	8:45 AM	BTEX, TPH	
Boring 15	24	SB15-24	31189.01	9/24/97	8:55 AM	BTEX, TPH	
Boring 15 MW2	28	SB15-28	31189.03	9/24/97	10:05 AM	BTEX, TPH	
Boring 16	20	SB16-20	31189.05	9/24/97	2:55 PM	BTEX, TPH	228 ppm
Boring 16	28	SB16-28	31189.04	9/24/97	12:20 PM	BTEX, TPH	6.5 ppm

Phase 1 Ground Water Sample Descriptions
LPST 108133

Monitoring Well	Field ID#	Lab ID#	Date Sampled	Time Sampled	Other Notes	Parameters Analyzed
MW 1	G1-1234	9605D61-20	5/16/96	11:05 AM	Inital Well Sample	BTEX
MW 1	G1-3234	9605D61-21	5/16/96	3:15 PM	Rinsate Blank	BTEX
MW 1	G1-4234	9605D61-22	5/16/96	11:25 AM	Rinsate Blank	BTEX
MW 1	G1-5234	9605D61-23	5/16/96	11:10 AM	Inital Well Sample	TPH
MW 1	G1-7234	9605D61-24	5/16/96	3:20 PM	Rinsate Blank	TPH
MW 1	G1-8234	9605D61-25	5/16/96	11:25 AM	Rinsate Blank	TPH
MW 1	MW-1-7471	9605F42-01	5/30/96	1:13 PM	Well Sample	BTEX
MW 1	MW-1-7472	9605F42-02	5/30/96	1:15 PM	Duplicate of 7471	BTEX
MW 1	MW-1-7473	9605F42-03	5/30/96	1:18 PM	Well Sample	PAHs
MW 1	MW1-7480	9607861-01	7/17/96	2:30 PM	Blank	TDS
MW 1	MW1-7481	9607861-02	7/17/96	3:00 PM	Well Sample	TDS

Phase 2 Ground Water Sample Descriptions
LPST 108133

Monitoring Well	Field ID#	Lab ID#	Date Sampled	Time Sampled	Other Notes	Parameters Analyzed
MW 2	MW2-25	31204.03	9/25/97	2:04 PM	Well Sample	BTEX, TPH, PAH, TDS
MW 2	MW2-30	31204.04	9/25/97	2:05 PM	Duplicate of MW2-25	BTEX, TPH, PAH, TDS
MW 2	TB-1	31204.01	9/25/97	2:06 PM	Trip Blank	BTEX
MW 2	MW2-35	31204.02	9/25/97	2:06 PM	Equipment Blank	BTEX, TPH, PAH, TDS

SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133				Soil Boring No.1/Ground Water Monitoring Well No. 1								Caldwell County, Texas
Compound	Soil Samples			Groundwater Samples								
	B1-1022	B1-1035	B1-1026	G1-1234	Rinsate	Rinsate	G1-5234	Rinsate	Rinsate	MW-1-7471	Duplicate	MW-1-7473
BTEX	[µg/kg]	[µg/kg]	[µg/kg]	[µg/L]	[µg/L]	[µg/L]				[µg/L]	[µg/L]	
Benzene	< 1	39	300	1500	<1	<1				1000	1100	
Toluene	< 1	<5	<50	8	<1	<1				9	7	
Ethylbenzene	2	180	1700	170	<1	<1				110	110	
Total Xylene	6	77	1750	<5	<1	1				<5	<5	
Total BTEX	8	296	3750	1678	<1	1				1119	1217	
TPH	[mg/kg]	[mg/kg]	[mg/kg]				[mg/L]	[mg/L]	[mg/L]			
	17	34	270				7	<0.5	<0.5			
PAH	[µg/kg]	[µg/kg]	[µg/kg]									
Naphthalene	<60	32	900									170
Acenaphthylene	<30	< 1.5	<150									<10
Acenaphthene	<100	< 5	<500									<20
Fluorene	<112	< 5.6	<560									<40
Phenanthrene	<104	< 5.2	<520									<40
Anthracene	<90	< 4.5	<450									<20
Fluoranthene	<76	< 3.8	<380									<20
Pyrene	<70	< 3.5	<350									<20
Chrysene	<54	< 2.7	<270									<16
Benzo a anthracene	<54	< 2.7	<270									<16
Benzo b fluoranthene	<44	< 2.2	<220									<12
Benzo k fluoranthene	<48	< 2.4	<240									<14
Benzo a pyrene	<22	< 1.1	<110									<6
Dibenzo a,h anthracene	<48	< 2.4	<240									<14
Benzo g,h,i perylene	<70	< 3.5	<350									<20
Indeno 1,2,3-cd pyrene	<52	< 2.6	<260									<16

SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133			Soil Boring No. 2	Caldwell County, Texas
Compound	Soil Samples			Groundwater Samples
	B2-2130	B2-2117	B2-2121	
BTEX	[µg/kg]	[µg/kg]	[µg/kg]	
Benzene	< 1	2	< 1	
Toluene	< 1	2	< 1	
Ethylbenzene	< 1	4	< 1	
Total Xylene	< 1	3	< 1	
Total BTEX	< 1	11	< 1	
TPH	[mg/kg]	[mg/kg]	[mg/kg]	
	13	32	<10	
PAH	[µg/kg]	[µg/kg]	[µg/kg]	
Naphthalene	< 3	< 3	< 3	
Acenaphthylene	< 1.5	< 1.5	< 1.5	
Acenaphthene	< 5	< 5	< 5	
Fluorene	< 5.6	< 5.6	< 5.6	
Phenanthrene	< 5.2	< 5.2	< 5.2	
Anthracene	< 4.5	< 4.5	< 4.5	
Fluoranthene	< 3.8	< 3.8	< 3.8	
Pyrene	< 3.5	< 3.5	< 3.5	
Chrysene	< 2.7	< 2.7	< 2.7	
Benzo a anthracene	< 2.7	< 2.7	< 2.7	
Benzo b fluoranthene	< 2.2	< 2.2	< 2.2	
Benzo k fluoranthene	< 2.4	< 2.4	< 2.4	
Benzo a pyrene	< 1.1	< 1.1	< 1.1	
Dibenzo a,h anthracene	< 2.4	< 2.4	< 2.4	
Benzo g,h,i perylene	< 3.5	< 3.5	< 3.5	
Indeno 1,2,3-cd pyrene	< 2.6	< 2.6	< 2.6	

SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133				Soil Boring No. 3	Caldwell County, Texas
Compound	Soil Samples			Groundwater Samples	
	B3-3230	B3-3217	B3-3222		
BTEX	[µg/kg]	[µg/kg]	[µg/kg]		
Benzene	< 1	< 1	< 1		
Toluene	< 1	< 1	< 1		
Ethylbenzene	< 1	< 1	2		
Total Xylene	< 1	< 1	ND		
Total BTEX	< 1	< 1	2		
TPH	[mg/kg]	[mg/kg]	[mg/kg]		
	<10	<10	<10		
PAH	[µg/kg]	[µg/kg]	[µg/kg]		
Naphthalene	< 3	< 15	< 15		
Acenaphthylene	< 1.5	< 7.5	< 7.5		
Acenaphthene	< 5	< 25	< 25		
Fluorene	< 5.6	< 28.0	< 28.0		
Phenanthrene	< 5.2	< 26.0	< 26.0		
Anthracene	< 4.5	< 22.5	< 22.5		
Fluoranthene	< 3.8	< 19.0	< 19.0		
Pyrene	< 3.5	< 17.5	< 17.5		
Chrysene	< 2.7	< 13.5	< 13.5		
Benzo a anthracene	< 2.7	< 13.5	< 13.5		
Benzo b fluoranthene	< 2.2	< 11.0	< 11.0		
Benzo k fluoranthene	< 2.4	< 12.0	< 12.0		
Benzo a pyrene	< 1.1	< 5.5	< 5.5		
Dibenzo a,h anthracene	< 2.4	< 12.0	< 12.0		
Benzo g,h,I perylene	< 3.5	< 17.5	< 17.5		
Indeno 1,2,3-cd pyrene	< 2.6	< 13.0	< 13.0		

SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133				Soil Boring No. 4	Caldwell County, Texas
Compound	Soil Samples			Groundwater Samples	
	B4-4330	B4-4316	B4-4318		
BTEX	[µg/kg]	[µg/kg]	[µg/kg]		
Benzene	< 1	< 1	<5		
Toluene	< 1	< 1	<5		
Ethylbenzene	< 1	< 1	110		
Total Xylene	2	< 1	135		
Total BTEX	2	< 1	245		
TPH	[mg/kg]	[mg/kg]	[mg/kg]		
	<10	12	150		
PAH	[µg/kg]	[µg/kg]	[µg/kg]		
Naphthalene	< 15	< 3	<60		
Acenaphthylene	< 7.5	< 1.5	<30		
Acenaphthene	< 25	< 5	<100		
Fluorene	< 28.0	< 5.6	<112		
Phenanthrene	< 26.0	< 5.2	<104		
Anthracene	< 22.5	< 4.5	<90		
Fluoranthene	< 19.0	< 3.8	<76		
Pyrene	< 17.5	< 3.5	<70		
Chrysene	< 13.5	< 2.7	120		
Benzo a anthracene	< 13.5	< 2.7	<54		
Benzo b fluoranthene	< 11.0	< 2.2	<44		
Benzo k fluoranthene	< 12.0	< 2.4	<48		
Benzo a pyrene	< 5.5	< 1.1	<22		
Dibenzo a,h anthracene	< 12.0	< 2.4	<48		
Benzo g,h,i perylene	< 17.5	< 3.5	<70		
Indeno 1,2,3-cd pyrene	< 13.0	< 2.6	<52		

Dan Gradient

SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133					Soil Boring No. 5	Caldwell County, Texas
Compound	Soil Samples				Groundwater Samples	
	B5-5430	B5-5417	B5-5414	B5-5420		
BTEX	[µg/kg]	[µg/kg]	[µg/kg]	[µg/kg]		
Benzene	18	630	67	10		
Toluene	19	1700	660	<10		
Ethylbenzene	5	11000	580	160		
Total Xylene	25	20200	2100	1880		
Total BTEX	67	33530	3407	2050		
TPH	[mg/kg]	[mg/kg]	[mg/kg]	[mg/kg]		
	<10	4300	62	610		
PAH	[µg/kg]	[µg/kg]	[µg/kg]	[µg/kg]		
Naphthalene	< 15	2000	<300	1700		
Acenaphthylene	< 7.5	<30	<150	<30		
Acenaphthene	< 25	<100	<500	<100		
Fluorene	< 28.0	<112	<560	<112		
Phenanthrene	< 26.0	<104	1900	<104		
Anthracene	< 22.5	<90	480	<90		
Fluoranthene	< 19.0	<76	2200	<76		
Pyrene	< 17.5	<70	1300	<70		
Chrysene	< 13.5	74	590	<54		
Benzo a anthracene	< 13.5	<54	780	<54		
Benzo b fluoranthene	< 11.0	<44	500	<44		
Benzo k fluoranthene	< 12.0	<48	<240	<48		
Benzo a pyrene	< 5.5	<22	<110	<22		
Dibenzo a,h anthracene	< 12.0	<48	<240	<48		
Benzo g,h,i perylene	< 17.5	<70	<350	<70		
Indeno 1,2,3-cd pyrene	< 13.0	<52	<260	<52		

SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133			Soil Boring No. 6	Caldwell County, Texas
Compound	Soil Samples			Groundwater Samples
	B6-6530	B6-6517	B6-6520	
BTEX	[µg/kg]	[µg/kg]	[µg/kg]	
Benzene	15	<10	60	
Toluene	<5	<10	<50	
Ethylbenzene	<5	14	2500	
Total Xylene	<5	41	2630	
Total BTEX	15	55	5190	
TPH	[mg/kg]	[mg/kg]	[mg/kg]	
	15	190	6300	
PAH	[µg/kg]	[µg/kg]	[µg/kg]	
Naphthalene	4	<150	2100	
Acenaphthylene	< 1.5	<75	<375	
Acenaphthene	< 5	<250	<1250	
Fluorene	< 5.6	<280	<1400	
Phenanthrene	< 5.2	<260	<1300	
Anthracene	< 4.5	<225	<1125	
Fluoranthene	< 3.8	<190	<950	
Pyrene	< 3.5	<175	<875	
Chrysene	< 2.7	<135	<675	
Benzo a anthracene	< 2.7	<135	<675	
Benzo b fluoranthene	< 2.2	<110	<550	
Benzo k fluoranthene	< 2.4	<120	<600	
Benzo a pyrene	< 1.1	<55	<275	
Dibenzo a,h anthracene	< 2.4	<120	<600	
Benzo g,h,i perylene	< 3.5	<175	<875	
Indeno 1,2,3-cd pyrene	< 2.6	<130	<650	

SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133			Soil Boring No. 7	Caldwell County, Texas
Compound	Soil Samples			Groundwater Samples
	B7-7622	B7-7630	B7-7617	
BTEX	[µg/kg]	[µg/kg]	[µg/kg]	
Benzene	<10	< 1	< 1	
Toluene	24	< 1	< 1	
Ethylbenzene	190	< 1	3	
Total Xylene	230	< 1	8	
Total BTEX	444	< 1	11	
TPH	[mg/kg]	[mg/kg]	[mg/kg]	
	330	<10	<10	
PAH	[µg/kg]	[µg/kg]	[µg/kg]	
Naphthalene	< 3	< 3	< 3	
Acenaphthylene	< 1.5	< 1.5	< 1.5	
Acenaphthene	< 5	< 5	< 5	
Fluorene	< 5.6	< 5.6	< 5.6	
Phenanthrene	< 5.2	< 5.2	< 5.2	
Anthracene	< 4.5	< 4.5	< 4.5	
Fluoranthene	< 3.8	< 3.8	< 3.8	
Pyrene	< 3.5	< 3.5	< 3.5	
Chrysene	< 2.7	< 2.7	< 2.7	
Benzo a anthracene	< 2.7	< 2.7	< 2.7	
Benzo b fluoranthene	< 2.2	< 2.2	< 2.2	
Benzo k fluoranthene	< 2.4	< 2.4	< 2.4	
Benzo a pyrene	< 1.1	< 1.1	< 1.1	
Dibenzo a,h anthracene	< 2.4	< 2.4	< 2.4	
Benzo g,h,i perylene	10	< 3.5	< 3.5	
Indeno 1,2,3-cd pyrene	< 2.6	< 2.6	< 2.6	

SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133					Soil Boring No. 8	Caldwell County, Texas
Compound	Soil Samples				Groundwater Samples	
	B8-8730	B8-8717	B8-8720	B8-8705		
BTEX	[µg/kg]	[µg/kg]	[µg/kg]	[µg/kg]		
Benzene	< 1	<10	<200	<5		
Toluene	32	<10	790	<5		
Ethylbenzene	2	<10	44000	<5		
Total Xylene	3	<10	25000	<5		
Total BTEX	37	<10	69790	<5		
TPH	[mg/kg]	[mg/kg]	[mg/kg]	[mg/kg]		
	<10	130	1800	46		
PAH	[µg/kg]	[µg/kg]	[µg/kg]	[µg/kg]		
Naphthalene	< 15	<30	6200	<3000		
Acenaphthylene	< 7.5	<15	<750	<1500		
Acenaphthene	< 25	<50	<2500	<5000		
Fluorene	< 28.0	<56	<2800	<5600		
Phenanthrene	< 26.0	<52	<2600	<5200		
Anthracene	< 22.5	<45	<2250	<4500		
Fluoranthene	27	<38	<1900	<3800		
Pyrene	24	<35	<1750	3600		
Chrysene	< 13.5	<27	<1350	<2700		
Benzo a anthracene	< 13.5	<27	<1350	<2700		
Benzo b fluoranthene	< 11.0	<22	<1100	5900		
Benzo k fluoranthene	< 12.0	<24	<1200	3100		
Benzo a pyrene	< 5.5	<11	<550	<1100		
Dibenzo a,h anthracene	< 12.0	<24	<1200	<2400		
Benzo g,h,i perylene	< 17.5	<35	<1750	3500		
Indeno 1,2,3-cd pyrene	< 13.0	<26	<1300	<2600		

SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133		Soil Boring No. 10	Caldwell County, Texas
Compound	Soil Samples SB10-20	SB10-35	Groundwater Samples
BTEX	[µg/kg]	[µg/kg]	
Benzene	189	1.3 U	
Toluene	517	0.65 J	
Ethylbenzene	1540	1.3 U	
Total Xylene	1300	1.17 J	
Total BTEX	NR	NR	
TPH	[mg/kg]	[mg/kg]	
	1920	13 U	
PAH	[µg/kg]	[µg/kg]	
Naphthalene	NA	NA	
Acenaphthylene	NA	NA	
Acenaphthene	NA	NA	
Fluorene	NA	NA	
Phenanthrene	NA	NA	
Anthracene	NA	NA	
Fluoranthene	NA	NA	
Pyrene	NA	NA	
Chrysene	NA	NA	
Benzo a anthracene	NA	NA	
Benzo b fluoranthene	NA	NA	
Benzo k fluoranthene	NA	NA	
Benzo a pyrene	NA	NA	
Dibenzo a,h anthracene	NA	NA	
Benzo g,h,i perylene	NA	NA	
Indeno 1,2,3-cd pyrene	NA	NA	

U = Under PQL, J = Estimated Value, Under PQL, NR = Not Reported, NA = Not Analyzed.

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SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133	Soil Boring No. 11	Caldwell County, Texas

Compound	Soil Samples		Groundwater Samples
	SB11-35	SB11-10	
BTEX	[µg/kg]	[µg/kg]	
Benzene	1.28 U	1.2 U	
Toluene	1.28 U	1.2 U	
Ethylbenzene	1.28U	1.2U	
Total Xylene	1.15 J	1.2 U	
Total BTEX	NR	NR	
TPH	[mg/kg]	[mg/kg]	
	12.8 U	11.9 U	
PAH	[µg/kg]	[µg/kg]	
Naphthalene	NA	NA	
Acenaphthylene	NA	NA	
Acenaphthene	NA	NA	
Fluorene	NA	NA	
Phenanthrene	NA	NA	
Anthracene	NA	NA	
Fluoranthene	NA	NA	
Pyrene	NA	NA	
Chrysene	NA	NA	
Benzo a anthracene	NA	NA	
Benzo b fluoranthene	NA	NA	
Benzo k fluoranthene	NA	NA	
Benzo a pyrene	NA	NA	
Dibenzo a,h anthracene	NA	NA	
Benzo g,h,i perylene	NA	NA	
Indeno 1,2,3-cd pyrene	NA	NA	

U = Under PQL, J = Estimated Value, Under PQL, NR = Not Reported, NA = Not Analyzed.

SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133		Soil Boring No.12	Caldwell County, Texas
Compound	Soil Samples SB12-20 SB12-30	Groundwater Samples	
BTEX	[µg/kg] [µg/kg]		
Benzene	1.1 U 1.4		
Toluene	1.1 U 1.2 U		
Ethylbenzene	1.1 U 1.4		
Total Xylene	1.1 U 0.72 J		
Total BTEX	NR NR		
TPH	[mg/kg] [mg/kg]		
	11.5 U 12 U		
PAH	[µg/kg] [µg/kg]		
Naphthalene	NA NA		
Acenaphthylene	NA NA		
Acenaphthene	NA NA		
Fluorene	NA NA		
Phenanthrene	NA NA		
Anthracene	NA NA		
Fluoranthene	NA NA		
Pyrene	NA NA		
Chrysene	NA NA		
Benzo a anthracene	NA NA		
Benzo b fluoranthene	NA NA		
Benzo k fluoranthene	NA NA		
Benzo a pyrene	NA NA		
Dibenzo a,h anthracene	NA NA		
Benzo g,h,i perylene	NA NA		
Indeno 1,2,3-cd pyrene	NA NA		

U = Under PQL, J = Estimated Value, Under PQL, NR = Not Reported, NA = Not Analyzed.

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SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133				Soil Boring No. 13	Caldwell County, Texas
Compound	Soil Samples			Groundwater Samples	
	SB13-56	SB13-48	SB13-34		
BTEX	[µg/kg]	[µg/kg]	[µg/kg]		
Benzene	1.3 U	0.75 J	1.2 U		
Toluene	1.3 U	3	1.2 U		
Ethylbenzene	1.3 U	2.7	1.2 U		
Total Xylene	1.3 U	7	1.2 U		
Total BTEX	NR	NR	NR		
TPH	[mg/kg]	[mg/kg]	[mg/kg]		
	13.4	12.4 U	12.1 U		
PAH	[µg/kg]	[µg/kg]	[µg/kg]		
Naphthalene	NA	NA	NA		
Acenaphthylene	NA	NA	NA		
Acenaphthene	NA	NA	NA		
Fluorene	NA	NA	NA		
Phenanthrene	NA	NA	NA		
Anthracene	NA	NA	NA		
Fluoranthene	NA	NA	NA		
Pyrene	NA	NA	NA		
Chrysene	NA	NA	NA		
Benzo a anthracene	NA	NA	NA		
Benzo b fluoranthene	NA	NA	NA		
Benzo k fluoranthene	NA	NA	NA		
Benzo a pyrene	NA	NA	NA		
Dibenzo a,h anthracene	NA	NA	NA		
Benzo g,h,i perylene	NA	NA	NA		
Indeno 1,2,3-cd pyrene	NA	NA	NA		

U = Under PQL, J = Estimated Value, Under PQL, NR = Not Reported, NA = Not Analyzed.

SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133			Soil Boring No. 14	Caldwell County, Texas
Compound	Soil Samples			Groundwater Samples
	SB14-22	SB14-34	SB14-24	
BTEX*	[µg/kg]	[µg/kg]	[µg/kg]	
Benzene	1.26 U	1.2 U	1.28 U	
Toluene	1.26 U	1.2 U	1.28 U	
Ethylbenzene	1.26 U	1.2 U	1.28 U	
Total Xylene	1.26 U	1.2 U	1.28 U	
Total BTEX	NR	NR	NR	
TPH	[mg/kg]	[mg/kg]	[mg/kg]	
	163	23.6	171	
PAH	[µg/kg]	[µg/kg]	[µg/kg]	
Naphthalene	NA	NA	NA	
Acenaphthylene	NA	NA	NA	
Acenaphthene	NA	NA	NA	
Fluorene	NA	NA	NA	
Phenanthrene	NA	NA	NA	
Anthracene	NA	NA	NA	
Fluoranthene	NA	NA	NA	
Pyrene	NA	NA	NA	
Chrysene	NA	NA	NA	
Benzo a anthracene	NA	NA	NA	
Benzo b fluoranthene	NA	NA	NA	
Benzo k fluoranthene	NA	NA	NA	
Benzo a pyrene	NA	NA	NA	
Dibenzo a,h anthracene	NA	NA	NA	
Benzo g,h,i perylene	NA	NA	NA	
Indeno 1,2,3-cd pyrene	NA	NA	NA	

U = Under PQL, J = Estimated Value, Under PQL, NR = Not Reported, NA = Not Analyzed.

* BTEX analyzed by laboratory outside of recommended hold time.

SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133	Soil Boring No. 15/Groundwater Monitoring Well #2	Caldwell County, Texas

Compound	Soil Samples			Groundwater Samples			
	SB15-24	SB15-22	SB15-28	MW2-25	MW2-30	Trip Blank	Eq. Blank
BTEX*	[µg/kg]	[µg/kg]	[µg/kg]	[µg/l]	[µg/l]	[µg/l]	[µg/l]
Benzene	11.3*	1.24 U	1.33 U	1100	850	1 U	1 U
Toluene	52.1*	0.8 J	1.33 U	30 J	25 U	1 U	1 U
Ethylbenzene	26.2*	1.24 U	1.33 U	50 U	25 U	1 U	1 U
Total Xylene	21.8*	1.24 U	1.33 U	50 U	25 U	1 U	1 U
Total BTEX	NR	NR	NR	NR	NR	NR	NR
TPH	[mg/kg]	[mg/kg]	[mg/kg]	[mg/L]	[mg/L]	[µg/L]	[µg/L]
	1240	31	16.6	203	287	NA	10
PAH	[µg/kg]	[µg/kg]	[µg/kg]	[µg/L]	[µg/L]	[µg/L]	[µg/L]
Naphthalene	NA	NA	NA	3670	90 U	NA	90 U
Acenaphthylene	NA	NA	NA	85 U	85 U	NA	85 U
Acenaphthene	NA	NA	NA	90 U	90 U	NA	90 U
Fluorene	NA	NA	NA	39.4	10.5 U	NA	10.5 U
Phenanthrene	NA	NA	NA	20 U	20 U	NA	20 U
Anthracene	NA	NA	NA	0.5 U	0.5 U	NA	0.5 U
Fluoranthene	NA	NA	NA	9.5 U	9.5 U	NA	9.5 U
Pyrene	NA	NA	NA	13.5 U	13.5 U	NA	13.5 U
Chrysene	NA	NA	NA	7.5 U	7.5 U	NA	7.5 U
Benzo a anthracene	NA	NA	NA	0.65 U	0.65 U	NA	0.65 U
Benzo b fluoranthene	NA	NA	NA	0.9 U	0.9 U	NA	0.9 U
Benzo k fluoranthene	NA	NA	NA	0.85 U	0.85 U	NA	0.85 U
Benzo a pyrene	NA	NA	NA	1.15 U	1.15 U	NA	1.15 U
Dibenzo a,h anthracene	NA	NA	NA	4.35 U	4.35 U	NA	NA
Benzo g,h,i perylene	NA	NA	NA	3.6 U	3.6 U	NA	3.6 U
Indeno 1,2,3-cd pyrene	NA	NA	NA	3.6 U	3.6 U	NA	3.6 U

U = Under PQL, J = Estimated Value, Under PQL, NR = Not Reported, NA = Not Analyzed.

* BTEX analyzed by laboratory outside of recommended hold time.

SOIL & GROUNDWATER SAMPLING ANALYTICAL RESULTS

Former Gary Air Force Base LPST # 108133		Soil Boring No. 16	Caldwell County, Texas
Compound	Soil Samples SB16-28	 SB16-20	Groundwater Samples
BTEX*	[µg/kg]	[µg/kg]	
Benzene	1.32 U	140 U	
Toluene	1.32 U	317	
Ethylbenzene	1.32 U	965	
Total Xylene	1.32 U	1200	
Total BTEX	NR	NR	
TPH	[mg/kg] 27.6	[mg/kg] 1450	
PAH	[µg/kg]	[µg/kg]	
Naphthalene	NA	NA	
Acenaphthylene	NA	NA	
Acenaphthene	NA	NA	
Fluorene	NA	NA	
Phenanthrene	NA	NA	
Anthracene	NA	NA	
Fluoranthene	NA	NA	
Pyrene	NA	NA	
Chrysene	NA	NA	
Benzo a anthracene	NA	NA	
Benzo b fluoranthene	NA	NA	
Benzo k fluoranthene	NA	NA	
Benzo a pyrene	NA	NA	
Dibenzo a,h anthracene	NA	NA	
Benzo g,h,i perylene	NA	NA	
Indeno 1,2,3-cd pyrene	NA	NA	

U = Under PQL, J = Estimated Value, Under PQL, NR = Not Reported, NA = Not Analyzed.

* BTEX analyzed by laboratory outside of recommended hold time.

Downgradient

Attachment 16
Summary Tables of Gauging Data

Groundwater Gauging Data for LPST 108133

Well	Date	Time	Total Depth	Depth to Water	Depth to Product	Product Thickness	Casing Elevation	Water Elevation
MW 1	5/15/96	14:10	36.47	27.70	NA	NA	576.11	548.41
MW 1	5/16/96	10:00	36.53	27.73	NA	NA	576.11	548.38
MW 1	5/16/96	13:59	36.53	27.74	NA	NA	576.11	548.37
MW 1	5/30/96	10:18	36.55	27.85	NA	NA	576.11	548.26
MW 1	9/24/97	13:00	36.24	27.78	27.09	0.69	576.11	548.33
MW 2	9/25/97	10:56	29.97	22.22	NA	NA	572.49	550.27
MW 2	11/12/97	9:50	29.97	24.33	NA	NA	572.49	548.16
MW 1	11/12/97	10:00	36.24	27.66	27.16	0.60	576.11	548.45
MW 1	11/12/97	13:39	36.24	27.19	27.18	0.01	576.11	548.92
MW 2	11/12/97	13:56	29.97	24.31	NA	NA	572.49	548.18
MW 2	12/1/97	12:01	29.97	24.35	NA	NA	572.49	548.14
MW1	12/1/97	12:26	36.24	27.10	27.01	0.09	576.11	549.01

Attachment 17
Analytical Report Data

Analytical Report Data – Risk-Based Site Assessment*

*Compiled from data gathered by Thompson Professional Group, Inc., from samples collected May 16, 1996 through July 17, 1996, and September 22-25, 1997.

SOUTHWEST LABORATORY
OF OKLAHOMA, INC.

November 14, 1997

Mr. Jason Miller
THOMPSON PROFESSIONAL GROUP, INC.
6110 Clarkson Lane
Houston, TX 77055

Project: FORMER GARY AFB
SWLO #: 31204.01 - 31204.04

Dear Mr. Miller:

Enclosed, please find the analytical results and diskette deliverable for your samples received in our laboratory on September 27, 1997, for the above captioned project.

If, in your review, you should have any questions or require additional information, please do not hesitate to call.

Sincerely,

Mike Butler
Project Officer

MB/crl

Enclosures

1700 WEST ALBANY • BROKEN ARROW, OK 74012-1421 • OFFICE (918) 251-2858 • FAX (918) 251-2599

SOUTHWEST LABORATORY OF OKLAHOMA
CASE NARRATIVE
November 13, 1997

CLIENT : TPGINC
EPISODE(S): 31204
FRACTION : PAH
SAMPLE(S) : MW2-35, MW2-25, MW2-30

This case consisted of 3 water samples for PAH analysis. The samples, blanks and spikes were extracted and analyzed according to EPA protocol, SW-846, method 8310.

Variable programmable UV detector and a Fluorescence detector were used for this method whereby the detectors were connected in a series and one detector was used for confirmation of another detector. Compounds which are within 40 % D between the two detectors are reported as confirmed compounds. All the samples were diluted by a factor of two prior to analysis in order to be the same consistency as the mobile phase.

"P" flags were used when the appropriate compound with sufficient response exceeded 40% deviation, possibly due to interference between quantitation and confirmation detectors.

The first five eluted compounds have good UV absorbance but somewhat poor fluorescent absorbance. The remainder of the compounds have good fluorescent response and somewhat good UV absorbance.

Throughout the package the UV detector has been distinguished by three i.e. 2AH1024 and the fluorescence detector has been distinguished by 4AH1024.

The first five compounds including the surrogate 2-Fluorobiphenyl are reported from the UV detector. The remaining of the analytes are reported from the fluorescence detector.

CASE SUMMARY:

Naphthalene was detected above the linear calibration range in the sample MW2-25. Since the sample required 10X dilution, the remainder of the samples were inadvertently diluted by a factor of 10X. Therfore, all of the samples are reported based on 10X dilution dilution.

Due to low recovery of both surrogates in the sample MW2-30, the sample has been re-extracted which the data for the re-extracted sample will be reported at a later date. In the same sample, phthalene was detected above the PQL. However, the analyte was not confirmed in the fluorescence detector.

In the sample MW2-35, Terphenyl (fluorescence detector surrogate) was out of the QC limits. However, the other surrogate 2-fluorobiphenyl(UV detector surrogate) was within the QC limits.

We use the following flags where appropriate. "J" - indicates a quantitated result which is below the quantitation limit, but above the detection limit and has been confirmed by the second column. "E"- indicates an out of range value, i.e., a peak that is off-scale or out of the linear calibration range of the detector. The value reported is not to be used. The sample must be diluted and re-run. "D" - indicates a value derived from a secondary dilution. "U" - indicates the compound that is undetected above the quantitation limit. "X" - indicates a comment which is explained in the case narrative. "P" flag indicates the compound exceeded 40 % deviation between the UV and the fluorescence detectors.

TAHRIAR SHAHREZA

Thompson Professional Group, Inc.
6110 Clarkson Lane
Houston, Texas 77055
(713) 956-4100
www.thompson-grp.com

Analysis Request and Chain of Custody Record

Former Gary Air Force Base, LPST # 108133
Caldwell County, Texas

~~Soil Boring~~/Ground Water Monitoring Well No. 2

Project Number: 887-01 | TPG Contact: Jason Miller | Phone Number: (713) 956-4100

Sample Information								Analytical Parameters Requested					
Sample ID	Date Taken	Time Taken	Sample Type (Soil, Waste, Groundwater)	Grab Sample	Comp	Number of Containers	Preservative	TPH by 418.1	BTEX by 8020	TDS by 160.1	PAH by 8310		Remarks
MW 2-35	9-25-97	2:06 P	Groundwater	✓		5	HCL	✓	✓	✓	✓		

Sampler Signature: [signature]	Relinquished by: (Signature) [signature]	Date: 9-26-97 Time: 11:00A	Received by: (Signature) (Fed Ex)	Date 9-26-97 Time:	Intact?
Affiliation: Thompson Professional Group, Inc.	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact?
Sampler Remarks:			Laboratory Receipt: (Signature) [signature]	Date: 9-27-97 Time: 0915	Intact?
Seal Number	Shipping Agency: Fed Ex UPS Lone Star Other:		Laboratory Remarks:		

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(713) 956-4100
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Analysis Request and Chain of Custody Record

Former Gary Air Force Base, LPST # 108133
Caldwell County, Texas

~~Soil Boring~~/Ground Water Monitoring Well No. 2

Project Number: 887-01 | TPG Contact: Jason Miller | Phone Number: (713) 956-4100

Sample Information								Analytical Parameters Requested					
Sample ID	Date Taken	Time Taken	Sample Type (Soil, Waste, Groundwater)	Grab Sample	Comp	Number of Containers	Preservative	TPH by 418.1	BTEX by 8020	TDS by 160.1	PAH by 8310		Remarks
MW2-25	9-25-97	2:04P	Groundwater	✓		5	HCL	✓	✓	✓	✓		
MW 2-30	"	2:05P	"	✓		5	HCL	✓	✓	✓	✓		

Sampler Signature: [signature]	Relinquished by: (Signature) [signature] Date: 9-26-97 Time: 11:00A	Received by: (Signature) (Fed Ex)	Date: 9-26-97 Time:	Intact?
Affiliation: Thompson Professional Group, Inc.	Relinquished by: (Signature) Date: Time:	Received by: (Signature)	Date: Time:	Intact?
Sampler Remarks:		Laboratory Receipt: (Signature) [signature]	Date: 9-27-97 Time: 0915	Intact?
Seal Number	Shipping Agency: Fed Ex UPS Lone Star Other:	Laboratory Remarks:		

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Houston, Texas 77055
(713) 956-4100
www.thompson-erp.com

Analysis Request and Chain of Custody Record
Former Gary Air Force Base, LPST # 108133
Caldwell County, Texas

~~Soil Boring~~/Ground Water Monitoring Well No. 2

Project Number: 887-01 | TPG Contact: Jason Miller | Phone Number: (713) 956-4400

Sample Information								Analytical Parameters Requested					
Sample ID	Date Taken	Time Taken	Sample Type (Soil, Waste, Groundwater)	Grab Sample	Comp	Number of Containers	Preservative	TPH by 418.1	BTEX by 8020	TDS by 160.1	PAH by 8310		Remarks
TB-1	9-25-97	2067	water	x		3	HCl		✓				Prepped By Lab

Sampler Signature: John Lasseter	Relinquished by: (Signature) John Lasseter	Date: 9-26-97 Time: 11:00 A	Received by: (Signature) (Fed Ex)	Date: 9-26-97 Time:	Intact?
Affiliation: Thompson Professional Group, Inc.	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact?
Sampler Remarks: TRIP Blanks filled in Laboratory, Shipped with Empty Containers and went with Volatile Samples (Groundwater)			Laboratory Receipt: (Signature) D Allison	Date: 9-27-97 Time: 915	Intact?
Seal Number	Shipping Agency: ~~Fed Ex~~ UPS Lone Star Other:		Laboratory Remarks:		

SAMPLE LOG-IN SHEET

Lab Name: SOUTHWEST LABORATORY OF OKLAHOMA Page 1 of 1

Received By (Print Name): KIM WILLISON/SARAH HODSON Log-in Date: 9-27-97

Received By: (Signature): Sarah Hodson.

Case Number:

Sample Delivery Group No:

SAS Number:

REMARKS:

1. Custody Seal(s) Present/Absent* Intact/Broken
2. Custody Seal Nos.:
3. Chain-of-Custody Records Present/Absent*
4. Traffic Reports or Packing List Present/Absent*
   Airbill Airbill/Sticker Present/Absent*
5. Airbill No: 3236530916
7. Sample Tags Present/Absent
   Sample Tag Numbers Listed/Not Listed on Chain-of-Custody
8. Sample Condition: Intact/Broken*/Leaking
9. Does information on custody records, traffic reports, and sample tags agree? Yes/No*
10. Date Received at Lab 9-27-97
11. Time Received 9:15

Sample Transfer

Fraction:

Area #: ~~9 Shtt~~ Shtt

On:

EPA SAMPLE #	CORRESPONDING SAMPLE TAG #	CORRESPONDING ASSIGNED LAB #	REMARKS: CONDITION OF SAMPLE SHIPMENT, ETC.
TB-1		31204.01	Intact 2°
MW2-35		.02	
MW2-25		.03	
MW2-30		.04	

* Contact SMO and attach record of resolution

Received By:

Date:

Logbook No:

Logbook Page No:

FORM DC-1

SOUTHWEST LABORATORY OF OKLAHOMA, INC.
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SOUTHWEST LABORATORY OF OKLAHOMA, INC.

METHODOLOGY

SM = Standard Methods, 17th Edition, 1989
EPA = #EPA600/4-79-020, March 1983
SW = EPA Methodology, "#SW846", 3rd Edition, July, 1992

GENERAL QUALIFIER FLAGS

B — Analyte is detected in blank as well as sample.
J — Estimated value: concentration is below limit of quantitation
T — Trace Amount.
U — Not detected above quantitation limit
> — Concentration greater than value reported
E — Compound exceeds calibration range
D — Sample dilution run or surrogates diluted out sample run at secondary dilution
I — Not quantifiable due to matrix interference
* — Surrogate outside of QC limits on both original and re-analysis

TEST SPECIFIC FOOTNOTES

TPH 8015

1 — Analysis shows miscellaneous peaks which cannot be identified as any specific pattern. Response factor for nearest eluting hydrocarbon standard was used to calculate concentration. Numbers indicate the approximate carbon chain length.
2 — Pattern is similar to, but not identical to standard.
3 — May be a weathered gasoline.

APPENDIX IX SEMIVOLATILES

1 — Detected as Diphenylamine
2 — Coelute on GC Column

TCLP SEMIVOLATILES

1 — 2-Methyl Phenol
2 — Compounds Co-elute (3&4-Methylphenol)
3 — Combination of O,M, & P Cresols

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THOMPSON PROFESSIONAL GROUP
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31204.01

DATE: 11/14/97

WLO # : 31204.01
SAMPLE #: TB-1
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFG
LOCATION:
METHOD REFERENCE: SW 8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/25/97
DATE RECEIVED : 09/27/97
DATE PREPARED :
DATE ANALYZED : 10/01/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/l

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1	U	ETHYLBENZENE	1	U
TOLUENE	1	U	XYLENE (TOTAL)	1	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(71-127)	85%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

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THOMPSON PROFESSIONAL GROUP
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31204.02

DATE: 11/14/97

SWLO # : 31204.02
SAMPLE #: MW2-35
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFG
LOCATION:
METHOD REFERENCE: SW 8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/25/97
DATE RECEIVED : 09/27/97
DATE PREPARED :
DATE ANALYZED : 09/30/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/l

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1	U	ETHYLBENZENE	1	U
TOLUENE	1	U	XYLENE (TOTAL)	1	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(71-127)	92%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31204.02

DATE: 11/14/97

SWLO # : 31204.02
SAMPLE #: MW2-35
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFG
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/25/97
DATE RECEIVED : 09/27/97

MISCELLANEOUS

PARAMETER	RESULTS**		UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	10		mg/l	10/24/97	10/24/97	EPA 418.1
TDS	10	U	mg/l	/ /	10/13/97	EPA 160.1

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

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THOMPSON PROFESSIONAL GROUP
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON-MILLER

REPORT: 31204.02

DATE: 11/14/97

SWLO # : 31204.02
SAMPLE #: MW2-35
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFG
LOCATION:
METHOD REFERENCE: SW846-8310

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/25/97
DATE RECEIVED : 09/27/97
DATE PREPARED : 09/29/97
DATE ANALYZED : 10/23/97
DILUTION FACTOR: 10.00

POLYNUCLEAR AROMATIC HYDROCARBONS
RESULTS REPORT IN ug/l

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
NAPHTHALENE	90	U	BENZO(A)ANTHRACENE	0.65	U
ACENAPHTHYLENE	85	U	CHRYSENE	7.5	U
ACENAPHTHENE	90	U	BENZO(B)FLUORANTHENE	0.9	U
FLUORENE	10.5	U	BENZO(K)FLUORANTHENE	0.85	U
PHENANTHRENE	20	U	BENZO(A)PYRENE	1.15	U
ANTHRACENE	0.5	U	BENZO(G,H,I)PERYLENE	3.6	U
FLUORANTHENE	9.5	U	INDENO(1,2,3-CD)PYRENE	3.6	U
PYRENE	13.5	U			

QA/QC SURROGATE RECOVERIES

2-FLUOROBIPHENYL	(20-131)	43%	P-TERPHENYL	(43-139)	29% *

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP
[redacted]10 CLARKSON LANE
[redacted]OUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31204.03

DATE: 11/14/97

[redacted]NLO # : 31204.03
[redacted]AMPLE #: MW2-25
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFG
[redacted]OCATION:
[redacted]ETHOD REFERENCE: SW846-8310

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/25/97
DATE RECEIVED : 09/27/97
DATE PREPARED : 09/29/97
DATE ANALYZED : 10/24/97
DILUTION FACTOR: 10.00

POLYNUCLEAR AROMATIC HYDROCARBONS
RESULTS REPORT IN ug/l

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
NAPHTHALENE	3670	P	BENZO(A)ANTHRACENE	0.65	U
[redacted]CENAPHTHYLENE	85	U	CHRYSENE	7.5	U
[redacted]CENAPHTHENE	90	U	BENZO(B)FLUORANTHENE	0.9	U
FLUORENE	39.4		BENZO(K)FLUORANTHENE	0.85	U
PHENANTHRENE	20	U	BENZO(A)PYRENE	1.15	U
[redacted]THRACENE	0.5	U	DIBENZ(A,H)ANTHRACENE	4.35	U
[redacted]UORANTHENE	9.5	U	BENZO(G,H,I)PERYLENE	3.6	U
PYRENE	13.5	U	INDENO(1,2,3-CD)PYRENE	3.6	U

QA/QC SURROGATE RECOVERIES

2-FLUOROBIPHENYL	(20-131)	0% I	P-TERPHENYL	(43-139)	101%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31204.03

DATE: 11/14/97

SWLO # : 31204.03
SAMPLE #: MW2-25
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFG
LOCATION:
METHOD REFERENCE: SW 8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/25/97
DATE RECEIVED : 09/27/97
DATE PREPARED :
DATE ANALYZED : 09/30/97
DILUTION FACTOR: 50.00

BTEX
RESULTS REPORT IN ug/l

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1100		ETHYLBENZENE	50	U
TOLUENE	30	J	XYLENE (TOTAL)	50	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(71-127)	93%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

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THOMPSON PROFESSIONAL GROUP
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31204.03

DATE: 11/14/97

SWLO # : 31204.03
SAMPLE #: MW2-25
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFG
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/25/97
DATE RECEIVED : 09/27/97

MISCELLANEOUS

PARAMETER	RESULTS**	UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	203	mg/l	10/24/97	10/24/97	EPA 418.1
TDS	137	mg/l	/ /	10/02/97	EPA 160.1

**RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

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THOMPSON PROFESSIONAL GROUP
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31204.04

DATE: 11/14/97

SWLO # : 31204.04
SAMPLE #: MW2-30
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFG
LOCATION:
METHOD REFERENCE: SW846-8310

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/25/97
DATE RECEIVED : 09/27/97
DATE PREPARED : 09/29/97
DATE ANALYZED : 10/23/97
DILUTION FACTOR: 10.00

POLYNUCLEAR AROMATIC HYDROCARBONS
RESULTS REPORT IN ug/l

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
NAPHTHALENE	90	U	BENZO(A)ANTHRACENE	0.65	U
ACENAPHTHYLENE	85	U	CHRYSENE	7.5	U
ACENAPHTHENE	90	U	BENZO(B)FLUORANTHENE	0.9	U
FLUORENE	10.5	U	BENZO(K)FLUORANTHENE	0.85	U
PHENANTHRENE	20	U	BENZO(A)PYRENE	1.15	U
[illegible]THRACENE	0.5	U	DIBENZ(A,H)ANTHRACENE	4.35	U
[illegible]ORANTHENE	9.5	U	BENZO(G,H,I)PERYLENE	3.6	U
[illegible]ENE	13.5	U	INDENO(1,2,3-CD)PYRENE	3.6	U

QA/QC SURROGATE RECOVERIES

2-FLUOROBIPHENYL	(20-131)	17% *	P-TERPHENYL	(43-139)	8% *

[illegible]ESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

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THOMPSON PROFESSIONAL GROUP
6110 CLARKSON LANE
OUSTON, TX 77055
ttn: JASON MILLER

REPORT: 31204.04

DATE: 11/14/97

SWLO # : 31204.04
AMPLE #: MW2-30
AMPLE MATRIX : WATER
PROJECT : FORMER GARY AFG
OCATION:
ETHOD REFERENCE: SW 8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/25/97
DATE RECEIVED : 09/27/97
DATE PREPARED :
DATE ANALYZED : 10/02/97
DILUTION FACTOR: 25.00

TEX
RESULTS REPORT IN ug/l

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	850		ETHYLBENZENE	25	U
TOLUENE	25	U	XYLENE (TOTAL)	25	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(71-127)	94%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31204.04

DATE: 11/14/97

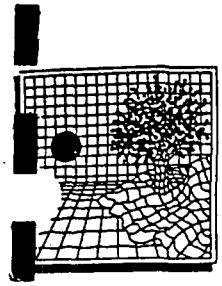
SWLO # : 31204.04
SAMPLE #: MW2-30
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFG
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/25/97
DATE RECEIVED : 09/27/97

MISCELLANEOUS

PARAMETER	RESULTS**	UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	287	mg/l	10/24/97	10/24/97	EPA 418.1
TDS	44	mg/l	/ /	10/02/97	EPA 160.1

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES



SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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QUALITY CONTROL SECTION

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP
5110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31204

DATE: 11/14/97

SWLO QAQC#: BB0929WF
SAMPLE #: PAH BLK LB1
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFG
LOCATION: LABQC
METHOD REFERENCE: SW846-8310

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : / /
DATE RECEIVED : / /
DATE PREPARED : 09/29/97
DATE ANALYZED : 10/23/97
DILUTION FACTOR: 10.00

POLYNUCLEAR AROMATIC HYDROCARBONS
RESULTS REPORT IN ug/l

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
NAPHTHALENE	90	U	BENZO(A)ANTHRACENE	0.65	U
ACENAPHTHYLENE	85	U	CHRYSENE	7.5	U
ACENAPHTHENE	90	U	BENZO(B)FLUORANTHENE	0.9	U
FLUORENE	9.5	U	BENZO(K)FLUORANTHENE	0.85	U
PHENANTHRENE	20	U	BENZO(A)PYRENE	1.15	U
ANTHRACENE	0.5	U	DIBENZ(A,H)ANTHRACENE	4.35	U
FLUORANTHENE	9.5	U	BENZO(G,H,I)PERYLENE	3.6	U
PYRENE	13.5	U	INDENO(1,2,3-CD)PYRENE	3.6	U

QA/QC SURROGATE RECOVERIES

2-FLUOROBIPHENYL	(20-131)	93%	P-TERPHENYL	(43-139) 105%

**RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA
LIQUID CHROMATOGRAPHY LABORATORY

PAH LABORATORY CONTROL SPIKE RECOVERY FORM

LIENT : TPGINC
LIENT SAMPLE ID: LD0929WF

CONTROL SPIKE INFO:

LENT ID : LD0929WF
K SAMPLE ID : LD0929WF
LENAME : 2 2AH1024,12,1
MPLE MATRIX : WATER
. EXTRACTED : 1000
. VOLUME : 5
LUTION FACTOR : 10
E EXTRACTED : 09/29/97
E ANALYZED : 11/12/97

RECOVERY DATA

	SPIKE ADDED ug/L	AMT FOUND SMP. ug/L	AMT FOUND LCS ug/L	%REC. LCS	QC LIMITS
PHTHALENE	12.5	0	13.2	106	10-139
APHTHYLENE	12.5	0	12.10	97	32-136
APHTHENE	25.0	0	24.7	99	34-138
ORENE	2.50	0	1.51	60	27-141
NANTHRENE	2.50	0	2.47	99	40-132
NTHRACENE	.125	0	.116	93	16-126
ORANTHENE	1.25	0	1.21	97	58-128
RENE	5.00	0	4.98	100	50-136
ENZO(a)ANTHRACENE	1.25	0	1.02	82	45-144
HRYSENE	3.75	0	3.51	94	55-147
NZO(b)FLUORANTHENE	.500	0	.789	158	34-165
NZO(k)FLUORANTHENE	.125	0	.105	84	45-123
ENZO(a)PYRENE	1.00	0	.845	85	24-123
BENZO(a,h)ANTHRACENE	5.00	0	4.70	94	26-160
NZO(g,h,i)PERYLENE	5.00	0	4.79	96	40-145
NDENO(1,2,3-cd)PYRENE	1.25	0	1.13	90	59-130

		LCS	
FLUOROBIPHENYL SURROGATE REC	=	91	(20-131)
-TERPHENYL SURROGATE REC	=	99	(43-139)

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31204

DATE: 11/13/97

SWLO QAQC#: 6B093097
SAMPLE #: BTEX BLK1 LB1
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFG
LOCATION: LABQC
METHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : / /
DATE RECEIVED : / /
DATE PREPARED :
DATE ANALYZED : 09/30/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/l

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1	U	ETHYLBENZENE	1	U
TOLUENE	1	U	XYLENE (TOTAL)	1	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(71-127)	84%

**RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP
[redacted]110 CLARKSON LANE
[redacted]OUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31204

DATE: 11/13/97

[redacted]ROJECT : FORMER GARY AFG
PREPARED: / /
SAMPLE : BTEX BLK1
[redacted]PIKE SAMPLE : BTEX LCS1
[redacted]PIKE DUP SAMPLE: BTEX LCSD1

SAMPLE MATRIX : WATER
ANALYZED: 09/30/97

[redacted]TEX
[redacted]PIKE/SPIKE DUPLICATE RECOVERY

Parameter	SPIKE (ug/l) AMOUNT	SAMPLE CONC.	SPIKE CONC.	SPIKE %Rec	SPIKE DUP.	DUP %Rec	RPD	MAX RPD	LIMITS %Rec.
[redacted]BENZENE	20	0	20.4	102	20.9	105	2.42	12	76-129
TOLUENE	20	0	19.9	100	20.2	102	1.5	13	78-122
[redacted]ETHYLBENZENE	20	0	19.9	100	20.6	104	3.46	13	82-124
[redacted]XYLENE (TOTAL)	60	0	60.7	102	63.3	106	4.19	14	83-127

QA/QC Surrogates

Parameter	SPK %Rec	DUP %Rec	LIMITS
[redacted]BROMOFLUOROBENZENE	98	100	71-127

= VALUES OUTSIDE OF QC LIMITS

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THOMPSON PROFESSIONAL GROUP
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31204

DATE: 11/13/97

SWLO QAQC#: 6B100197
SAMPLE #: BTEX BLK2 LB1
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFG
LOCATION: LABQC
METHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : / /
DATE RECEIVED : / /
DATE PREPARED :
DATE ANALYZED : 10/01/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/l

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1	U	ETHYLBENZENE	1	U
TOLUENE	1	U	XYLENE (TOTAL)	1	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(71-127)	86%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP
110 CLARKSON LANE
OUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31204

DATE: 11/13/97

ROJECT : FORMER GARY AFG
PREPARED: / /
SAMPLE : BTEX BLK2
PIKE SAMPLE : BTEX LCS2
PIKE DUP SAMPLE: BTEX LCSD2

SAMPLE MATRIX : WATER
ANALYZED: 10/01/97

TEX
PIKE/SPIKE DUPLICATE RECOVERY

arameter	SPIKE (ug/l)	SAMPLE AMOUNT	SPIKE CONC.	SPIKE %Rec	SPIKE DUP.	DUP %Rec	RPD	MAX RPD	LIMITS %Rec.
BENZENE		20	0	20.4	102	20.2	102	< 1	12	76-129
TOLUENE		20	0	20.2	102	19.9	100	1.5	13	78-122
THYLBENZENE		20	0	20.5	103	20.2	102	1.47	13	82-124
YLENE (TOTAL)		60	0	62.1	104	61.8	104	< 1	14	83-127

QA/QC Surrogates

Parameter	SPK %Rec	DUP %Rec	LIMITS
ROMOFLUOROBENZENE	94	94	71-127

= VALUES OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31204

DATE: 11/13/97

SWLO QAQC#: 6B100297
SAMPLE #: BTEX BLK3 LB1
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFG
LOCATION: LABQC
METHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : / /
DATE RECEIVED : / /
DATE PREPARED :
DATE ANALYZED : 10/02/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/l

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1	U	ETHYLBENZENE	1	U
TOLUENE	1	U	XYLENE (TOTAL)	1	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(71-127)	89%

**RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP
10 CLARKSON LANE
USTON, TX 77055
Attn: JASON MILLER

REPORT: 31204

DATE: 11/13/97

OJECT : FORMER GARY AFG
PREPARED: / /
SAMPLE : BTEX BLK3
PIKE SAMPLE : BTEX LCS3
PIKE DUP SAMPLE: BTEX LCSD3

SAMPLE MATRIX : WATER
ANALYZED: 10/02/97

EX
PIKE/SPIKE DUPLICATE RECOVERY

arameter	(ug/l)	SPIKE AMOUNT	SAMPLE CONC.	SPIKE CONC.	SPIKE %Rec	SPIKE DUP.	DUP %Rec	RPD	MAX RPD	LIMITS %Rec.
ENZENE		20	0	20.7	104	20.9	105	< 1	12	76-129
OLUENE		20	0	20.2	102	20.1	101	< 1	13	78-122
THYLBENZENE		20	0	20.6	104	20.5	103	< 1	13	82-124
YLENE (TOTAL)		60	0	62.4	105	63	106	< 1	14	83-127

QA/QC Surrogates

arameter	SPK %Rec	DUP %Rec	LIMITS
ROMOFLUOROBENZENE	94	98	71-127

= VALUES OUTSIDE OF QC LIMITS

IN122/07-11-97

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

GENERAL CHEMISTRY
INORGANICS QUALITY CONTROL DATA SHEET
LCS/LCSD

MATRIX WATER

EPISODE 31204
CLIENT TPGINC

PARAMETER	TEST CODE	UNITS	METHOD BLANK AMT. FOUND	METHOD BLANK DET. LIMIT	LCS KNOWN CONC.	LCS AMT. FOUND	LCS %REC	LCS %REC LIMITS		LCS FLAG	LCS DUPLICATE AMT. FOUND	LCS DUPLICATE %REC.	LCS DUPLICATE FLAG	RPD RPD	RPD LIMIT	RPD FLAG	BATCHID	DATE ANALYZED	ANA-LYST INI.
TDS	IN270	mg/l	<10.0	10.0	396.0	388.0	98	80	120		394.0	99		1.5	20		9710022701	02-Oct-97	JMS
TDS	IN270	mg/l	<10.0	10.0	396.0	388.0	98	80	120		388.0	98		0.0	20		9710132701	13-Oct-97	JMS
TPH	IN210	mg/l	<0.5	0.5	20.0	18.1	91	80	120		17.0	85		6.3	20		97242101	24-Oct-97	PHP

NARRATIVE: TDS Batch 9710022701 is assoicated with samples 31204.03 and 31204.04 / Batch 9710132701 is assoicated with sample 31204.02

* = OUTSIDE QC LIMITS

31204
/GLCSW REV 4.2
14-Nov-97 jr

IN126/07-11-97

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

GENERAL CHEMISTRY
INORGANICS QUALITY CONTROL DATA SHEET

MATRIX **WATER**

DUPLICATE PRECISION

EPISODE 31204
CLIENT TPGINC

SAMPLE# 31205.11
DUPLICATE # 31205.14

PARAMETER	TEST CODE	UNITS	METHOD BLANK </FOUND	METHOD BLANK DET LIMIT	SAMPLE CONC.	DUPL. CONC.	RPD	RPD LIMIT	RPD FLAG	BATCHID	DATE ANALYZED	ANALYST INITIALS
TDS	IN270	mg/l	<10.0	10.0	400.0	418.0	4.4	20		9710022701	02-Oct-97	JMS

NARRATIVE:
* = OUTSIDE QC LIMITS

31204
/GDUPW REV 4.2
21-Oct-97 BL

SOUTHWEST LABORATORY
OF OKLAHOMA, INC.

November 06, 1997

Mr. Jason Miller
THOMPSON PROFESSIONAL GROUP, INC.
6110 Clarkson Lane
Houston, TX 77055

Project: FORMER GARY AFB
SWLO #: 31189.01 - 31189.08

Dear Mr. Miller:

Enclosed, please find the analytical results and diskette deliverable for your samples received in our laboratory on September 26, 1997, for the above captioned project.

Per our conversation, the BTEX analysis was performed outside of the required hold time. Due to this oversight, we are providing these results to you at no cost. We apologize for any inconvenience.

If, in your review, you should have any questions or require additional information, please do not hesitate to call.

Sincerely,

Mike Butler
Project Officer

MB/krs

Enclosures

1700 West Albany • Broken Arrow, OK 74012-1421 • (918) 251-2858 • Fax (918) 251-2599

SAMPLE LOG-IN SHEET

Lab Name: SOUTHWEST LABORATORY OF OKLAHOMA Page 1 of 1

Received By (Print Name): KIM WILLISON/SARAH HODSON Log-in Date: 9-26-97

Received By: (Signature): Sarah Hodson

Case Number: _____

Sample Delivery Group No: _____

DAS Number: _____

REMARKS:

1. Custody Seal(s) — Present/Absent* Intact/Broken
2. Custody Seal Nos.: _____ _____
3. Chain-of-Custody Records — Present/Absent*
4. Traffic Reports or Packing List — Present/Absent
   Airbill — Airbill/Sticker Present/Absent*
5. Airbill No: 32365730920 _____
7. Sample Tags — Present/Absent
   Sample Tag Numbers — Listed/Not Listed on Chain-of-Custody
8. Sample Condition: Intact/Broken*/Leaking
9. Does information on custody records, traffic reports, and sample tags agree? Yes/No*
10. Date Received at Lab: 9/24/97
11. Time Received: 10:5

Sample Transfer

Fraction: _____ _____

Area #: SLA SLA

On: _____ _____

	CORRESPONDING		
EPA SAMPLE #	SAMPLE TAG #	ASSIGNED LAB #	REMARKS: CONDITION OF SAMPLE SHIPMENT, ETC.
SB15-24		31189.01	26
SB15-22		.02	
SB15-28		.03	
SB16-28		.04	
SB16-20		.05	
SB14-22		.06	
SB14-34		.07	
SB14-24		.08	

* Contact SMO and attach record of resolution

Received By: _____

Date: _____

Logbook No: _____

Logbook Page No: _____

FORM DC-1

Thompson Professional Group, Inc.
6110 Clarkson Lane
Houston, Texas 77055
(713) 956-4100
www.thompson-erp.com

Analysis Request and Chain of Custody Record

Former Gary Air Force Base, LPST # 108133
Caldwell County, Texas

Soil Boring/~~Ground Water Monitoring Well~~ No. 16

Project Number: 887-01 | TPG Contact: Jason Miller | Phone Number: (713) 956-4100

Sample Information								Analytical Parameters Requested					
Sample ID	Date Taken	Time Taken	Sample Type (Soil, Waste, Groundwater)	Grab Sample	Comp	Number of Containers	Preservative	TPH by 418.1	BTEX by 8020	TDS by 160.1	PAH by 8310		Remarks
SB16-28	9-24-97	12:20P	Soil	✓		2	None	✓	✓				
SB16-20	"	2:55P	"	✓		2	"	✓	✓				

Sampler Signature: Julie Lasen	Relinquished by: (Signature) Julie Lasen	Date: 9-25-97 Time: 7:30A	Received by: (Signature) (Fed Ex)	Date: 9-25-97 Time:	Intact?
~~Affiliation:~~ Thompson Professional Group	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact?
Sampler Remarks:			Laboratory Receipt: (Signature)	Date: 9 26-97 Time: 1015	Intact?
Seal Number	Shipping Agency: Fed Ex UPS Lone Star Other:		Laboratory Remarks:		

Thompson Professional Group, Inc.
6110 Clarkson Lane
Houston, Texas 77055
(713) 956-4100
www.thompson-grp.com

Analysis Request and Chain of Custody Record
Former Gary Air Force Base, LPST # 108133
Caldwell County, Texas

Soil Boring/~~Ground Water Monitoring Well~~ No. 15

Project Number: 887-01 | TPG Contact: Jason Miller | Phone Number: (713) 956-4100

Sample Information								Analytical Parameters Requested					
Sample ID	Date Taken	Time Taken	Sample Type (Soil, Waste, Groundwater)	Grab Sample	Comp	Number of Containers	Preservative	TPH by 418.1	BTEX by 8020	TDS by 160.1	PAH by 8310		Remarks
SB15-24	9-24-97	8:55A	Soil	✓		2	None	✓	✓				
SB15-22	"	8:45A	"	✓		2	"	✓	✓				
SB15-28	"	10:05A	"	✓		2	"	✓	✓				

Sampler Signature: [signature]	Relinquished by: (Signature) [signature]	Date: 9-25-97 Time: 7:30A	Received by: (Signature) (Fed Ex)	Date: 9-25-97 Time:	Intact?
Affiliation: Thompson Professional Group	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact?
Sampler Remarks:			Laboratory Receipt: (Signature) [signature]	Date: 9-26-97 Time: 1015	Intact?
Seal Number	Shipping Agency: Fed Ex UPS Lone Star Other:		Laboratory Remarks:		

Thompson Professional Group, Inc.
6110 Clarkson Lane
Houston, Texas 77055
(713) 956-4100
www.thompson-grp.com

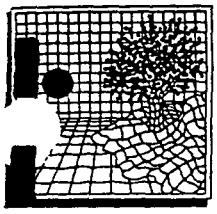
Analysis Request and Chain of Custody Record
Former Gary Air Force Base, LPST # 108133
Caldwell County, Texas

Soil Boring/~~Ground Water Monitoring Well~~ No. 14

Project Number: 887-01 | TPG Contact: Jason Miller | Phone Number: (713) 956-4100

Sample Information								Analytical Parameters Requested					
Sample ID	Date Taken	Time Taken	Sample Type (Soil, Waste, Groundwater)	Grab Sample	Comp	Number of Containers	Preservative	TPH by 418.1	BTEX by 8020	TDS by 160.1	PAH by 8310		Remarks
SB14-22	9-24-97	4:15P	Soil	✓		2	None	✓	✓				
SB14-34	"	3:50P	"	✓		2	"	✓	✓				
SB14-24	"	4:20P	"	✓		2	"	✓	✓				

Sampler Signature: Jason Miller	Relinquished by: (Signature) Jason Miller	Date: 9-25-97 Time: 7:30A	Received by: (Signature) (Fed Ex)	Date: 9-25-97 Time:	Intact?
Affiliation: Thompson Professional Group	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact?
Sampler Remarks:			Laboratory Receipt: (Signature)	Date: Time:	Intact?
Seal Number	Shipping Agency: Fed Ex UPS Lone Star Other:		Laboratory Remarks:		



SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
110 CLARKSON LANE
OUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.01

DATE: 11/06/97

WLO # : 31189.01
AMPLE #: SB15-24
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
OCATION:
ETHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97
DATE PREPARED :
DATE ANALYZED : 11/03/97
DILUTION FACTOR: 5.00

BTEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**	PARAMETER	RESULTS**
BENZENE	11.3	ETHYLBENZENE	26.2
TOLUENE	52.1	XYLENE (TOTAL)	21.8

QA/QC SURROGATE RECOVERIES
BROMOFLUOROBENZENE (23-143) 101%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
5110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.01

DATE: 11/06/97

SWLO # : 31189.01
SAMPLE #: SB15-24
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**	UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	1240	mg/kg	/ /	10/16/97	EPA 418.1

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
110 CLARKSON LANE
OUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.02

DATE: 11/06/97

WLO # : 31189.02
AMPLE #: SB15-22
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:
METHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97
DATE PREPARED :
DATE ANALYZED : 11/03/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1.24	U	ETHYLBENZENE	1.24	U
TOLUENE	0.8	J	XYLENE (TOTAL)	1.24	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(23-143)	91%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.02

DATE: 11/06/97

SWLO # : 31189.02
SAMPLE #: SB15-22
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**	UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	31	mg/kg	/ /	10/16/97	EPA 418.1

ESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
[redacted]10 CLARKSON LANE
[redacted]USTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.03

DATE: 11/06/97

[redacted]LO # : 31189.03
[redacted]MPLE #: SB15-28
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
[redacted]OCATION:
[redacted]ETHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97
DATE PREPARED :
DATE ANALYZED : 11/03/97
DILUTION FACTOR: 1.00

[redacted]TEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1.33	U	ETHYLBENZENE	1.33	U
[redacted]OLUENE	1.33	U	XYLENE (TOTAL)	1.33	U

QA/QC SURROGATE RECOVERIES

[redacted]ROMOFLUOROBENZENE	(23-143)	70%

[redacted]ESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.03

DATE: 11/06/97

SWLO # : 31189.03
SAMPLE #: SB15-28
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**	UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	16.6	mg/kg	/ /	10/16/97	EPA 418.1

**RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
5110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.04

DATE: 11/06/97

SWLO # : 31189.04
SAMPLE #: SB16-28
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:
METHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97
DATE PREPARED :
DATE ANALYZED : 11/03/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1.32	U	ETHYLBENZENE	1.32	U
TOLUENE	1.32	U	XYLENE (TOTAL)	1.32	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(23-143)	86%

**RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.04

DATE: 11/06/97

SWLO # : 31189.04
SAMPLE #: SB16-28
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**	UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	27.6	mg/kg	/ /	10/16/97	EPA 418.1

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
5110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.05

DATE: 11/06/97

SWLO # : 31189.05
SAMPLE #: SB16-20
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:
METHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97
DATE PREPARED :
DATE ANALYZED : 11/03/97
DILUTION FACTOR: 125.00

TEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		PARAMETER	RESULTS**
BENZENE	140	U	ETHYLBENZENE	965
TOLUENE	317		XYLENE (TOTAL)	1200

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(23-143)	93%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.05

DATE: 11/06/97

SWLO # : 31189.05
SAMPLE #: SB16-20
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**	UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	1450	mg/kg	/ /	10/16/97	EPA 418.1

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.06

DATE: 11/06/97

SILO # : 31189.06
SAMPLE #: SB14-22
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:
METHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97
DATE PREPARED :
DATE ANALYZED : 11/03/97
DILUTION FACTOR: 1.00

TEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1.26	U	ETHYLBENZENE	1.26	U
TOLUENE	1.26	U	XYLENE (TOTAL)	1.26	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(23-143)	90%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.06

DATE: 11/06/97

SWLO # : 31189.06
SAMPLE #: SB14-22
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**	UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	163	mg/kg	/ /	10/16/97	EPA 418.1

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.07

DATE: 11/06/97

SWLO # : 31189.07
SAMPLE #: SB14-34
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:
METHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97
DATE PREPARED :
DATE ANALYZED : 11/03/97
DILUTION FACTOR: 1.00

INDEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1.2	U	ETHYLBENZENE	1.2	U
TOLUENE	1.2	U	XYLENE (TOTAL)	1.2	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(23-143)	91%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
3110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.07

DATE: 11/06/97

SWLO # : 31189.07
SAMPLE #: SB14-34
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**	UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	23.6	mg/kg	/ /	10/16/97	EPA 418.1

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.08

DATE: 11/06/97

SWLO # : 31189.08
SAMPLE #: SB14-24
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:
METHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97
DATE PREPARED :
DATE ANALYZED : 11/03/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1.28	U	ETHYLBENZENE	1.28	U
TOLUENE	1.28	U	XYLENE (TOTAL)	1.28	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(23-143)	84%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189.08

DATE: 11/06/97

SWLO # : 31189.08
SAMPLE #: SB14-24
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/24/97
DATE RECEIVED : 09/26/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**	UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	171	mg/kg	/ /	10/16/97	EPA 418.1

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.
1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

QUALITY CONTROL

SECTION

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 W. Albany • Broken Arrow, Oklahoma 74012-1421 • 918-251-2858 • FAX: 918-251-2599

LABORATORY QUALITY CONTROL SEQUENCE

METHOD : SW 8020
SEQUENCE DATE : 11/03/97
INSTRUMENT ID : 6B

QA Sequence: 6B110397

LABORATORY BLANK

MATRIX : W
SAMPLE ID : BLANK
SAMPLE AMOUNT : 5.0 g
ANALYSIS DATE : 11/03/97
ANALYSIS TIME : 09:12

AATS NO : BLANK
FILENAME : 006R0601.D
DILUTION FACTOR: 1.00

COMPOUND	QUANTITATION LIMIT (ug/Kg)	AMOUNT FOUND (ug/Kg)
BENZENE	1.0	ND
TOLUENE	1.0	ND
ETHYLBENZENE	1.0	ND
TOTAL XYLENES	1.0	ND

SURROGATE RECOVERY (BFB): 89 %

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

SPIKE COMPOUND	SPIKE CONC(ug/Kg)	BLANK SAMPLE CONC. (ug/Kg)	CONTROLMS MATRIX SPIKE CONC. (ug/Kg)	MS PERCENT RECOVERY	CONTROLMD SPIKE DUPLICATE CONC. (ug/Kg)	MSD PERCENT RECOVERY	RECOVERY PERCENT DIFFERENCE
BENZENE	20.0	0.0	20.6	103.0	20.4	102.0	0.98 %
TOLUENE	20.0	0.0	19.5	97.5	19.5	97.5	0.00 %
ETHYLBENZENE	20.0	0.0	19.6	98.0	19.8	99.0	1.02 %
TOTAL XYLENES	60.0	0.2	58.8	97.7	59.4	98.7	1.02 %

4 Nov 97

11-4-97

SOUTHWEST LABORATORY OF OKLAHOMA, INC.
1700 W. Albany • Broken Arrow, Oklahoma 74012-1421 • 918-251-2858 • FAX: 918-251-2599

LABORATORY QUALITY CONTROL SEQUENCE

METHOD : SW 8020
SEQUENCE DATE : 11/03/97
INSTRUMENT ID : 6B

QA Sequence: 6B110397

LABORATORY BLANK

MATRIX : W
SAMPLE ID : BLANK
SAMPLE AMOUNT : 5.0 g
ANALYSIS DATE : 11/03/97
ANALYSIS TIME : 09:12

AATS NO : BLANK
FILENAME : 006R0601.D
DILUTION FACTOR: 1.00

COMPOUND	QUANTITATION LIMIT (ug/Kg)	AMOUNT FOUND (ug/Kg)
BENZENE	1.0	ND
TOLUENE	1.0	ND
ETHYLBENZENE	1.0	ND
TOTAL XYLENES	1.0	ND

SURROGATE RECOVERY (BFB): 89 %

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

SPIKE COMPOUND	SPIKE CONC(ug/Kg)	31189.03 SAMPLE CONC. (ug/Kg)	31189.03MS MATRIX SPIKE CONC. (ug/Kg)	MS PERCENT RECOVERY	31189.03MD SPIKE DUPLICATE CONC. (ug/Kg)	MSD PERCENT RECOVERY	RECOVERY PERCENT DIFFERENCE
BENZENE	20.0	0.2	19.0	94.0	20.8	103.0	9.14 %
TOLUENE	20.0	0.2	17.6	87.0	19.7	97.5	11.38 %
ETHYLBENZENE	20.0	0.0	17.8	89.0	19.8	99.0	10.64 %
TOTAL XYLENES	60.0	0.2	53.1	88.2	59.9	99.5	12.08 %

4 Nov 97

11-4-97

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31189

DATE: 11/06/97

SWLO QAQC#: 9710162101
SAMPLE #: TPH BLK LB1
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION: LAB QC
METHOD REFERENCE: EPA 418.1

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : / /
DATE RECEIVED : / /
DATE PREPARED :
DATE ANALYZED : 10/16/97
DILUTION FACTOR: 1.00

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		UNITS
TOTAL PETROLEUM HYDROCARBONS	10	U	mg/kg

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

HOMPSON PROFESSIONAL GROUP, INC.
110 CLARKSON LANE
OUSTON, TX 77055
ttn: JASON MILLER

REPORT: 31189

DATE: 11/06/97

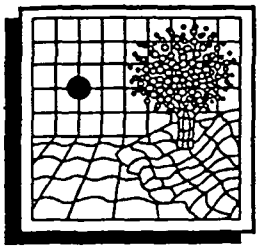
ROJECT : FORMER GARY AFB
REPARED: / /
PIKE SAMPLE : TPH LCS
PIKE DUP SAMPLE: TPH LCSD

SAMPLE MATRIX : SOIL
ANALYZED: 10/16/97

ISCELLANEOUS
PIKE/SPIKE DUPLICATE RECOVERY

arameter	(mg/kg)	SPIKE AMOUNT	SAMPLE CONC.	SPIKE CONC.	SPIKE %Rec	SPIKE DUP.	DUP %Rec	RPD	MAX RPD	LIMITS %Rec.
OTAL PETROLEUM HYDROC		667	0	634	96	630	95	< 1	0	80-120

= VALUES OUTSIDE OF QC LIMITS



SOUTHWEST LABORATORY OF OKLAHOMA, INC.

October 16, 1997

Mr. Jason Miller
THOMPSON PROFESSIONAL GROUP, INC.
6110 Clarkson Lane
Houston, TX 77055

Project: FORMER GARY AFB
SWLO #: 31175.01 - 31175.06

Dear Mr. Miller:

Enclosed, please find the analytical results and diskette deliverable for your samples received in our laboratory on September 25, 1997, for the above captioned project.

If, in your review, you should have any questions or require additional information, please do not hesitate to call.

Sincerely,

Mike Butler
Project Officer

MB/krs

Enclosures

1700 West Albany • Broken Arrow, OK 74012-1421 • (918) 251-2858 • Fax (918) 251-2599

SAMPLE LOG-IN SHEET

Name: SOUTHWEST LABORATORY OF OKLAHOMA Page 1 of 1

Received By (Print Name): KIM WILLISON/SARAH HODSON Log-in Date: 9-25-97

Received By: (Signature): K Willison

Case Number:

Sample Delivery Group No:

SAS Number:

REMARKS: 9-25 KW

Custody Seal(s) Present/Absent* Intact/Broken

Custody Seal Nos.:

Chain-of-Custody Records Present/Absent*

Traffic Reports or Packing List Present/Absent*

Airbill Airbill/Sticker Present/Absent*

Airbill No: 323653094 2

Sample Tags Present/Absent

Sample Tag Numbers ~~Listed/Not Listed on Chain-of-Custody~~

Sample Condition: Intact/Broken*/ Leaking

9. Does information on custody records, traffic reports, and sample tags agree? Yes/No*

10. Date Received at Lab: 9-25-97

11. Time Received 1030

Sample Transfer

Fraction:

Area #:

By:

	CORRESPONDING		
EPA SAMPLE #	SAMPLE TAG #	ASSIGNED LAB #	REMARKS: CONDITION OF SAMPLE SHIPMENT, ETC.
SB11-10		31175.01	2 c
SB12-20		.02	
SB12-30		.03	
SB13-56		.04	
SB13-48		.05	
SB13-34		.06	

* Contact SMO and attach record of resolution

Received By:

Date:

Logbook No:

Logbook Page No:

FORM DC-1

3/90

Thompson Professional Group, Inc.
6110 Clarkson Lane
Houston, Texas 77055
(713) 956-4100
www.thompson-grp.com

Analysis Request and Chain of Custody Record

Former Gary Air Force Base, LPST # 108133
Caldwell County, Texas

Soil Boring/~~Ground Water Monitoring Well~~ No. 12

Project Number: 887-01 | TPG Contact: Jason Miller | Phone Number: (713) 956-4100

Sample Information								Analytical Parameters Requested					
Sample ID	Date Taken	Time Taken	Sample Type (Soil, Waste, Groundwater)	Grab Sample	Comp	Number of Containers	Preservative	TPH by 418.1	BTEX by 8020	TDS by 160.1	PAH by 8310		Remarks
SB12-20	9-23-97	4:30	Soil	✓		2	None	✓	✓				
SB12-30	9-23-97	4:25	"	✓		2	"	✓	✓				

Sampler Signature: [signature]	Relinquished by: (Signature) [signature]	Date: 9-24-97 Time: 7:30A	Received by: (Signature) (Fed Ex)	Date: 9-24-97 Time:	Intact?
Affiliation: Thompson Professional Group	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact?
Sampler Remarks:			Laboratory Receipt: (Signature) [signature]	Date: 9-25-97 Time: 1030	Intact?
Seal Number	Shipping Agency: Fed Ex UPS Lone Star Other:		Laboratory Remarks:		

2

Thompson Professional Group, Inc.
6110 Clarkson Lane
Houston, Texas 77055
(713) 956-4100
www.thompson-grp.com

Analysis Request and Chain of Custody Record

Former Gary Air Force Base, LPST # 108133
Caldwell County, Texas

Soil Boring/~~Ground Water Monitoring Well~~ No. 13

Project Number: 887-01 | TPG Contact: Jason Miller | Phone Number: (713) 956-4100

Sample Information								Analytical Parameters Requested					
Sample ID	Date Taken	Time Taken	Sample Type (Soil, Waste, Groundwater)	Grab Sample	Comp	Number of Containers	Preservative	TPH by 418.1	BTEX by 8020	TDS by 160.1	PAH by 8310		Remarks
SB13-56	9-23-97	3:25P	Soil	✓		2	None	✓	✓				
SB13-48	"	2:45P	"	✓		2	"	✓	✓				
SB13-34	"	3:20P	"	✓		2	"	✓	✓				

Sampler Signature: [signature]	Relinquished by: (Signature) [signature]	Date: 9-24-97 Time: 7:30 A	Received by: (Signature) (Fed Ex)	Date: 9-24-97 Time:	Intact?
Affiliation: Thompson Professional Group	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact?
Sampler Remarks:			Laboratory Receipt: (Signature) [signature]	Date: 9-25-97 Time: 1030	Intact?
Seal Number	Shipping Agency: Fed Ex UPS Lone Star Other:		Laboratory Remarks:		

Thompson Professional Group, Inc.
6110 Clarkson Lane
Houston, Texas 77055
(713) 956-4100
www.thompson-grp.com

Analysis Request and Chain of Custody Record
Former Gary Air Force Base, LPST # 108133
Caldwell County, Texas

Soil Boring/~~Ground Water Monitoring Well~~ No. 11

Project Number: 887-01 | TPG Contact: Jason Miller | Phone Number: (713) 956-4100

Sample Information								Analytical Parameters Requested					
Sample ID	Date Taken	Time Taken	Sample Type (Soil, Waste, Groundwater)	Grab Sample	Comp	Number of Containers	Preservative	TPH by 418.1	BTEX by 8020	TDS by 160.1	PAH by 8310		Remarks
SB11-10	9-23-97	11:55P	Soil	✓		2	None	✓	✓				

Sampler Signature: [signature]	Relinquished by: (Signature) [signature]	Date: 9-24-97 Time: 7:30A	Received by: (Signature) (Fed Ex)	Date: 9-24-97 Time:	Intact?
Affiliation: Thompson Professional Group	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact?
Sampler Remarks:			Laboratory Receipt: (Signature) [signature]	Date: 9.25.97 Time: 1030	Intact?
Seal Number	Shipping Agency: Fed Ex UPS Lone Star Other:		Laboratory Remarks:		

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175.01

DATE: 10/16/97

SWLO # : 31175.01
SAMPLE #: SB11-10
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:
METHOD REFERENCE: SW 8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/23/97
DATE RECEIVED : 09/25/97
DATE PREPARED :
DATE ANALYZED : 09/29/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1.2	U	ETHYLBENZENE	1.2	U
TOLUENE	1.2	U	XYLENE (TOTAL)	1.2	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(23-143)	89%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175.01

DATE: 10/16/97

SWLO # : 31175.01
SAMPLE #: SB11-10
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/23/97
DATE RECEIVED : 09/25/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	11.9	U	mg/kg	/ /	10/06/97	EPA 418.1
% MOISTURE	15.9		%	/ /	09/29/97	

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
110 CLARKSON LANE
OUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175.02

DATE: 10/16/97

WLO # : 31175.02
AMPLE #: SB12-20
SAMPLE MATRIX : SOIL
ROJECT : FORMER GARY AFB
OCATION:
METHOD REFERENCE: SW 8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/23/97
DATE RECEIVED : 09/25/97
DATE PREPARED :
DATE ANALYZED : 09/29/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1.1	U	ETHYLBENZENE	1.1	U
TOLUENE	1.1	U	XYLENE (TOTAL)	1.1	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(23-143)	64% *

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175.02

DATE: 10/16/97

SWLO # : 31175.02
SAMPLE #: SB12-20
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/23/97
DATE RECEIVED : 09/25/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	11.5	U	mg/kg	/ /	10/06/97	EPA 418.1
% MOISTURE	13.2		%	/ /	09/29/97	

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
[illegible]10 CLARKSON LANE
[illegible]USTON, TX 77055
Attn: JASON MILLER

REPORT: 31175.03

DATE: 10/16/97

[illegible]LO # : 31175.03
[illegible]MPLE #: SB12-30
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
[illegible]CATION:
[illegible]ETHOD REFERENCE: SW 8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/23/97
DATE RECEIVED : 09/25/97
DATE PREPARED :
DATE ANALYZED : 09/29/97
DILUTION FACTOR: 1.00

[illegible]TEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

[illegible]ARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1.4		ETHYLBENZENE	1.4	
[illegible]OLUENE	1.2	U	XYLENE (TOTAL)	0.72	J

QA/QC SURROGATE RECOVERIES

[illegible]BROMOFLUOROBENZENE	(23-143)	87%

[illegible]ESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175.03

DATE: 10/16/97

SWLO # : 31175.03
SAMPLE #: SB12-30
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/23/97
DATE RECEIVED : 09/25/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	12	U	mg/kg	/ /	10/06/97	EPA 418.1
% MOISTURE	17		%	/ /	09/29/97	

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
[redacted]110 CLARKSON LANE
[redacted]OUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175.04

DATE: 10/16/97

[redacted]WLO # : 31175.04
[redacted]AMPLE #: SB13-56
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
[redacted]OCATION:
[redacted]ETHOD REFERENCE: SW 8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/23/97
DATE RECEIVED : 09/25/97
DATE PREPARED :
DATE ANALYZED : 09/29/97
DILUTION FACTOR: 1.00

[redacted]TEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1.3	U	ETHYLBENZENE	1.3	U
[redacted]TOLUENE	1.3	U	XYLENE (TOTAL)	1.3	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(23-143)	83%

[redacted]ESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175.04

DATE: 10/16/97

SWLO # : 31175.04
SAMPLE #: SB13-56
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/23/97
DATE RECEIVED : 09/25/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	13.4	U	mg/kg	/ /	10/06/97	EPA 418.1
% MOISTURE	25.1		%	/ /	09/29/97	

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175.05

DATE: 10/16/97

SWLO # : 31175.05
SAMPLE #: SB13-48
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:
METHOD REFERENCE: SW 8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/23/97
DATE RECEIVED : 09/25/97
DATE PREPARED :
DATE ANALYZED : 10/03/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		PARAMETER	RESULTS**
BENZENE	0.75	J	ETHYLBENZENE	2.7
TOLUENE	3		XYLENE (TOTAL)	7

QA/QC SURROGATE RECOVERIES
BROMOFLUOROBENZENE (23-143) 45%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175.05

DATE: 10/16/97

SWLO # : 31175.05
SAMPLE #: SB13-48
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/23/97
DATE RECEIVED : 09/25/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	12.4	U	mg/kg	/ /	10/06/97	EPA 418.1
% MOISTURE	19.6		%	/ /	09/29/97	

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
110 CLARKSON LANE
OUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175.06

DATE: 10/16/97

WLO # : 31175.06
AMPLE #: SB13-34
SAMPLE MATRIX : SOIL
ROJECT : FORMER GARY AFB
OCATION:
METHOD REFERENCE: SW 8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/23/97
DATE RECEIVED : 09/25/97
DATE PREPARED :
DATE ANALYZED : 09/29/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1.2	U	ETHYLBENZENE	1.2	U
TOLUENE	1.2	U	XYLENE (TOTAL)	1.2	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(23-143)	79%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175.06

DATE: 10/16/97

SWLO # : 31175.06
SAMPLE #: SB13-34
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/23/97
DATE RECEIVED : 09/25/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	12.1	U	mg/kg	/ /	10/06/97	EPA 418.1
% MOISTURE	17.6		%	/ /	09/29/97	

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.
1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

QUALITY CONTROL

SECTION

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175

DATE: 10/16/97

SWLO QAQC#: 6B092997
SAMPLE #: BTEX BLK LB1
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFB
LOCATION: LAB QC
METHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : / /
DATE RECEIVED : / /
DATE PREPARED :
DATE ANALYZED : 09/29/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/kg

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1	U	ETHYLBENZENE	1	U
TOLUENE	1	U	XYLENE (TOTAL)	1	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(71-127)	84%

**RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
110 CLARKSON LANE
OUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175

DATE: 10/16/97

ROJECT : FORMER GARY AFB
PREPARED: / /
PIKE SAMPLE : BTEX LCS
PIKE DUP SAMPLE: BTEX LCSD

SAMPLE MATRIX : SOIL
ANALYZED: 09/29/97

BTEX
PIKE/SPIKE DUPLICATE RECOVERY

Parameter	(ug/kg)	SPIKE AMOUNT	SAMPLE CONC.	SPIKE CONC.	SPIKE %Rec	SPIKE DUP.	DUP %Rec	RPD	MAX RPD	LIMITS %Rec.
ENZENE		20	0	19.7	99	20.2	102	2.51	12	76-129
OLUENE		20	0	19.2	96	19.6	98	2.06	13	78-122
THYLBENZENE		20	0	19.1	96	19.5	98	2.07	13	82-124
YLENE (TOTAL)		60	0	58.3	98	59.5	100	2.04	14	83-127

QA/QC Surrogates

ameter	SPK %Rec	DUP %Rec	LIMITS
ROMOFLUOROBENZENE	96	92	23-143

= VALUES OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175

DATE: 10/16/97

SWLO QAQC#: 6B100397
SAMPLE #: BTEX BLK LB1
SAMPLE MATRIX : WATER
PROJECT : FORMER GARY AFB
LOCATION: LAB QC
METHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : / /
DATE RECEIVED : / /
DATE PREPARED :
DATE ANALYZED : 10/03/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/kg

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1	U	ETHYLBENZENE	1	U
TOLUENE	1	U	XYLENE (TOTAL)	1	U

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(71-127)	84%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
10 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175

DATE: 10/16/97

PROJECT : FORMER GARY AFB
PREPARED: / /
SPIKE SAMPLE : BTEX LCS
SPIKE DUP SAMPLE: BTEX LCSD

SAMPLE MATRIX : SOIL
ANALYZED: 10/03/97

BTEX
SPIKE/SPIKE DUPLICATE RECOVERY

Parameter	SPIKE (ug/kg) AMOUNT	SAMPLE CONC.	SPIKE CONC.	SPIKE %Rec	SPIKE DUP.	DUP %Rec	RPD	MAX RPD	LIMITS %Rec.
BENZENE	20	0	20.4	102	20.3	102	< 1	12	76-129
TOLUENE	20	0	19.3	97	19.3	97	< 1	13	78-122
ETHYLBENZENE	20	0	18.9	95	18.6	94	1.6	13	82-124
XYLENE (TOTAL)	60	0	57.3	96	56.5	95	1.41	14	83-127

QA/QC Surrogates

Parameter	SPK %Rec	DUP %Rec	LIMITS
BROMOFLUOROBENZENE	96	96	23-143

= VALUES OUTSIDE OF QC LIMITS

THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175

DATE: 10/16/97

SWLO QAQC#: 9710062101
SAMPLE #: TPH BLK LB1
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION: LAB QC
METHOD REFERENCE: EPA 418.1

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : / /
DATE RECEIVED : / /
DATE PREPARED :
DATE ANALYZED : 10/06/97
DILUTION FACTOR: 1.00

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		UNITS
TOTAL PETROLEUM HYDROCARBONS	10	U	mg/kg

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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THOMPSON PROFESSIONAL GROUP, INC.
10 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31175

DATE: 10/16/97

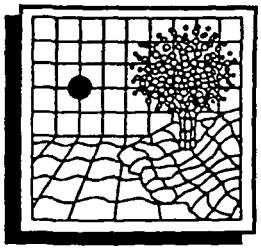
OJECT : FORMER GARY AFB
PREPARED: / /
IKE SAMPLE : TPH LCS
IKE DUP SAMPLE: TPH LCSD

SAMPLE MATRIX : SOIL
ANALYZED: 10/06/97

MISCELLANEOUS
IKE/SPIKE DUPLICATE RECOVERY

Parameter	(mg/kg)	SPIKE AMOUNT	SAMPLE CONC.	SPIKE CONC.	SPIKE %Rec	SPIKE DUP.	DUP %Rec	RPD	MAX RPD	LIMITS %Rec.
OTAL PETROLEUM HYDROC		667	0	667	100	654	99	1.97	0	80-120

= VALUES OUTSIDE OF QC LIMITS



SOUTHWEST LABORATORY OF OKLAHOMA, INC.

October 16, 1997

Mr. Jason Miller
THOMPSON PROFESSIONAL GROUP, INC.
6110 Clarkson Lane
Houston, TX 77055

Project: FORMER GARY AFB
SWLO #: 31153.01 - 31153.03

Dear Mr. Miller:

Enclosed, please find the analytical results and diskette deliverable for your samples received in our laboratory on September 24, 1997, for the above captioned project.

If, in your review, you should have any questions or require additional information, please do not hesitate to call.

Sincerely,

Mike Butler
Project Officer

MB/krs

Enclosures

1700 West Albany • Broken Arrow, OK 74012-1421 • (918) 251-2858 • Fax (918) 251-2599

SAMPLE LOG-IN SHEET

Lab Name: SOUTHWEST LABORATORY OF OKLAHOMA Page 1 of 1

Received By (Print Name): KIM WILLISON/SARAH HODSON Log-in Date: 9-24-97

Received By: (Signature): K Willison

Case Number: _____

Sample Delivery Group No: _____

SAS Number: _____

REMARKS:

1. Custody Seal(s) Present/Absent* Intact/Broken
2. Custody Seal Nos.: AA
3. Chain-of-Custody Records Present/Absent*
4. Traffic Reports or Packing List Present/Absent*
   Airbill Airbill/Sticker Present/Absent*
5. Airbill No: 323653O953
7. Sample Tags Present/Absent*
   Sample Tag Numbers Listed/Not Listed on Chain-of-Custody
8. Sample Condition: Intact/Broken*/Leaking
9. Does information on custody records, traffic reports, and sample tags agree? Yes/No*
10. Date Received at Lab: 9-24-97
11. Time Received 1130

Sample Transfer

Fraction: _____

Area #: _____

Y: _____

On: _____

	CORRESPONDING		
EPA SAMPLE #	SAMPLE TAG #	ASSIGNED LAB #	REMARKS: CONDITION OF SAMPLE SHIPMENT, ETC.
SB10-35		31153.01	1°c
SB10-20		02	
SB11-35		03	

* Contact SMO and attach record of resolution

Received By: _____

Date: _____

Logbook No: _____

Logbook Page No: _____

FORM DC-1

Thompson Professional Group, Inc.
6110 Clarkson Lane
Houston, Texas 77055
(713) 956-4100
www.thompson-grp.com

Analysis Request and Chain of Custody Record
Former Gary Air Force Base, LPST # 108133
Caldwell County, Texas

Soil Boring/~~Ground Water Monitoring Well~~ No. 11

Project Number: 887-01 | TPG Contact: Jason Miller | Phone Number: (713) 956-4100

Sample Information								Analytical Parameters Requested					
Sample ID	Date Taken	Time Taken	Sample Type (Soil, Waste, Groundwater)	Grab Sample	Comp	Number of Containers	Preservative	TPH by 418.1	BTEX by 8020	TDS by 160.1	PAH by 8310		Remarks
SB 11-35	9-22-97	3:20P	Soil	✓		2	None	✓	✓				

Sampler Signature: Jason Miller	Relinquished by: (Signature) Jason Miller	Date: 9-23-97 Time: 7:00 AM	Received by: (Signature) (Fed Ex)	Date: 9-23-97 Time:	Intact?
Affiliation: Thompson Professional Group	Relinquished by: (Signature)	Date: Time:	Received by: (Signature) HW 9-24	Date: Time:	Intact?
Sampler Remarks:			Laboratory Receipt: (Signature)	Date: 9-24-97 Time: 1030	Intact?
Seal Number	Shipping Agency: Fed Ex UPS Lone Star Other:		Laboratory Remarks:		

Thompson Professional Group, Inc.
6110 Clarkson Lane
Houston, Texas 77055
(713) 956-4100
www.thompson-grp.com

Analysis Request and Chain of Custody Record
Former Gary Air Force Base, LPST # 108133
Caldwell County, Texas

Soil Boring/~~Ground Water Monitoring Well No.~~ 10

Project Number: 887-01 | TPG Contact: Jason Miller | Phone Number: (713) 956-4400

Sample Information								Analytical Parameters Requested					
Sample ID	Date Taken	Time Taken	Sample Type (Soil, Waste, Groundwater)	Grab Sample	Comp	Number of Containers	Preservative	TPH by 418.1	BTEX by 8020	TDS by 160.1	PAH by 8310		Remarks
SB10-35	9-22-97	1:37P	Soil	✓		2	None	✓	✓				
SB10-20	"	4:35P	"	"		"	"	✓	✓				

Sampler Signature: [signature]	Relinquished by: (Signature) [signature]	Date: 9-23-97 Time: 7:00 AM	Received by: (Signature) (Fed Ex)	Date: 9-23-97 Time:	Intact?
Affiliation: Thompson Professional Group	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact?
Sampler Remarks:			Laboratory Receipt: (Signature) [signature]	Date: 9-24-97 Time: 1030	Intact?
Seal Number	Shipping Agency: Fed Ex UPS Lone Star Other:		Laboratory Remarks:		

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31153.01

DATE: 10/16/97

SWLO # : 31153.01
SAMPLE #: SB10-35
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:
METHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/22/97
DATE RECEIVED : 09/24/97
DATE PREPARED :
DATE ANALYZED : 09/29/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1.3	U	ETHYLBENZENE	1.3	U
TOLUENE	0.65	J	XYLENE (TOTAL)	1.17	J

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(23-143)	86%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
10 CLARKSON LANE
USTON, TX 77055
Attn: JASON MILLER

REPORT: 31153.01

DATE: 10/15/97

WLO # : 31153.01
AMPLE #: SB10-35
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
OCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/22/97
DATE RECEIVED : 09/24/97

ISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
OTAL PETROLEUM HYDROCARBONS	13	U	mg/kg	/ /	09/25/97	EPA 418.1
% MOISTURE	22.8		%	/ /	09/26/97	

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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'HOMPSON PROFESSIONAL GROUP, INC.
110 CLARKSON LANE
IOUSTON, TX 77055
\ttn: JASON MILLER

REPORT: 31153.02

DATE: 10/16/97

;WLO # : 31153.02
;AMPLE #: SB10-20
;AMPLE MATRIX : SOIL
'ROJECT : FORMER GARY AFB
.OCATION:
IETHOD REFERENCE: SW 8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/22/97
DATE RECEIVED : 09/24/97
DATE PREPARED :
DATE ANALYZED : 09/29/97
DILUTION FACTOR: 125.00

3TEX
'ESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**	PARAMETER	RESULTS**
BENZENE	189	ETHYLBENZENE	1540
TOLUENE	517	XYLENE (TOTAL)	1300

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(23-143)	99%

ESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
[redacted]10 CLARKSON LANE
[redacted]OUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31153.02

DATE: 10/15/97

[redacted]NLO # : 31153.02
[redacted]AMPLE #: SB10-20
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
[redacted]OCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/22/97
DATE RECEIVED : 09/24/97

[redacted]ISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**	UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
[redacted]OTAL PETROLEUM HYDROCARBONS	1920	mg/kg	/ /	09/25/97	EPA 418.1
% MOISTURE	16.9	%	/ /	09/26/97	

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31153.03

DATE: 10/16/97

SWLO # : 31153.03
SAMPLE #: SB11-35
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:
METHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/22/97
DATE RECEIVED : 09/24/97
DATE PREPARED :
DATE ANALYZED : 09/29/97
DILUTION FACTOR: 1.00

BTEX
RESULTS REPORT IN ug/kg ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1.28	U	ETHYLBENZENE	1.28	U
TOLUENE	1.28	U	XYLENE (TOTAL)	1.15	J

QA/QC SURROGATE RECOVERIES

BROMOFLUOROBENZENE	(23-143)	81%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31153.03

DATE: 10/15/97

SWLO # : 31153.03
SAMPLE #: SB11-35
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION:

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : 09/22/97
DATE RECEIVED : 09/24/97

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		UNITS	DATE PREPARED	DATE ANALYZED	REFERENCE METHOD
TOTAL PETROLEUM HYDROCARBONS	12.8	U	mg/kg	/ /	09/25/97	EPA 418.1
MOISTURE	21.7		%	/ /	09/26/97	

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.
1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

QUALITY CONTROL

SECTION

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
OUSTON, TX 77055
ttn: JASON MILLER

REPORT: 31153

DATE: 10/15/97

SWLO QAQC#: 6B092997
AMPLE #: BTEX BLK LB1
AMPLE MATRIX : WATER
PROJECT : FORMER GARY AFB
OCATION: LAB QC
ETHOD REFERENCE: SW846-8020

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : / /
DATE RECEIVED : / /
DATE PREPARED :
DATE ANALYZED : 09/29/97
DILUTION FACTOR: 1.00

TEX
RESULTS REPORT IN ug/l

PARAMETER	RESULTS**		PARAMETER	RESULTS**	
BENZENE	1	U	ETHYLBENZENE	1	U
TOLUENE	1	U	XYLENE (TOTAL)	1	U

QA/QC SURROGATE RECOVERIES
EROMOFLUOROBENZENE (71-127) 84%

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31153

DATE: 10/16/97

PROJECT : FORMER GARY AFB
PREPARED: / /
SPIKE SAMPLE : BTEX LCS
SPIKE DUP SAMPLE: BTEX LCSD

SAMPLE MATRIX : SOIL
ANALYZED: 09/29/97

BTEX
SPIKE/SPIKE DUPLICATE RECOVERY

Parameter	SPIKE (ug/kg) AMOUNT	SAMPLE CONC.	SPIKE CONC.	SPIKE %Rec	SPIKE DUP.	DUP %Rec	RPD	MAX RPD	LIMITS %Rec.
BENZENE	20	0	19.7	99	20.2	102	2.51	12	76-129
TOLUENE	20	0	19.2	96	19.6	98	2.06	13	78-122
ETHYLBENZENE	20	0	19.1	96	19.5	98	2.07	13	82-124
XYLENE (TOTAL)	60	0	58.3	98	59.5	100	2.04	14	83-127

QA/QC Surrogates

Parameter	SPK %Rec	DUP %Rec	LIMITS
BROMOFLUOROBENZENE	96	92	23-143

* = VALUES OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

THOMPSON PROFESSIONAL GROUP, INC.
6110 CLARKSON LANE
HOUSTON, TX 77055
Attn: JASON MILLER

REPORT: 31153

DATE: 10/16/97

SWLO QAQC#: 9709252102
SAMPLE #: TPH BLK LB1
SAMPLE MATRIX : SOIL
PROJECT : FORMER GARY AFB
LOCATION: LAB QC
METHOD REFERENCE: EPA 418.1

DEPTH FROM : 0.00
DEPTH TO : 0.00
DATE SAMPLED : / /
DATE RECEIVED : / /
DATE PREPARED :
DATE ANALYZED : 09/25/97
DILUTION FACTOR: 1.00

MISCELLANEOUS ON A DRY WEIGHT BASIS

PARAMETER	RESULTS**		UNITS
TOTAL PETROLEUM HYDROCARBONS	10	U	mg/kg

RESULTS REPORTED TO A MAXIMUM OF 3 SIGNIFICANT FIGURES

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany • Broken Arrow, Oklahoma 74012 • Office (918) 251-2858 • Fax (918) 251-2599

HOMPSON PROFESSIONAL GROUP, INC.
110 CLARKSON LANE
OUSTON, TX 77055
:tn: JASON MILLER

REPORT: 31153

DATE: 10/16/97

ROJECT : FORMER GARY AFB
REPARED: / /
PIKE SAMPLE : TPH LCS
PIKE DUP SAMPLE: TPH LCSD

SAMPLE MATRIX : SOIL
ANALYZED: 09/25/97

ISCELLANEOUS
PIKE/SPIKE DUPLICATE RECOVERY

arameter	(mg/kg)	SPIKE AMOUNT	SAMPLE CONC.	SPIKE CONC.	SPIKE %Rec	SPIKE DUP.	DUP %Rec	RPD	MAX RPD	LIMITS %Rec.
OTAL PETROLEUM HYDROC		667	0	658	99	656	99	< 1	0	80-120

- VALUES OUTSIDE OF QC LIMITS

Attachment 18
Waste Manifest Documentation

Arr: 10:27A
Depart: 11:37A

RECEIVING TICKET

ALAMO PETROLEUM EXCHANGE
4 SOLEDAD, STE. 100
SAN ANTONIO, TX 78205
1-800-322-5085
(210) 225-0888
TXD 987991866 TWC 41654

ALAMO
PETROLEUM EXCHANGE

NO. R 054308

12-1 19 97

P.O. NUMBER _____

WORK ORDER # 30576

START TIME _____ AM/PM

STOP TIME _____ AM/PM

TOTAL TIME _____

GAUGE

OPEN _____ FT. _____ IN.

CLOSE _____ FT. _____ IN.

TOTAL _____ FT. _____ IN.

FROM: Dairy Jct Corp Ctr.

ADDRESS: _____

CITY: San Marcos

BILL TO: Covel

_____

LEASE NAME: _____ LEASE#: _____

GROSS BBLS. _____ - BS & W _____ % _____ QTY. = NET BBLS. _____

GROSS GALLONS _____ - BS & W _____ % _____ QTY. = NET GAL. _____

TEMPERATURE _____ GRAVITY _____ FACTOR _____ TANK NO. _____

PRODUCT	GROSS QTY.	NET QTY.	UNIT (G/B/D)	UNIT PRICE	TOTAL
Contaminated Soil		13	YDS		
Hydro Water		6	" "		
Septic Pumping		2	" "		
Contaminated Soil		2	" "		

THE ABOVE LISTED PRODUCT(S) HAS BEEN ACCURATELY DESCRIBED TO THE BEST OF MY KNOWLEDGE AND IS NON-HAZARDOUS ACCORDING TO 40 CFR 262.11 AND CONTAINS NO PCBs.

COMPANY REPRESENTATIVE

ALAMO REPRESENTATIVE

60
TRUCK NO.

ALL SALES SUBJECT TO CONDITIONS ON REVERSE SIDE

WHITE - OFFICE CANARY - BILLING PINK - FILE GOLD - CUSTOMER

"I certify that the waste I delivered to this facility on this date does not contain any regulated hazardous, toxic, radioactive wastes or substances, or other non-allowable wastes. I also agree to remove any non-allowable wastes I bring to this facility, or pay all costs for proper removal of such wastes, upon request from this facility."

Printed on recycled paper

DRIVER: PLEASE SIGN HERE

EL GARDENS RDF
10-623-8800
11 COVEL RD
ANTONIO, TX 78252-0000

TICKET REPRINT DATE
Page: 01 of 01

TICKET NUMBER
12/02/97
0702787

REPRINT

CUSTOMER NAME	TRUCK #	OPERATOR	TIME IN	TIME OUT	TICKET DATE
Y CORP OF ENGINEERS	01	PAUL	1:23PM	2:29PM	12/01/97

RMY CORP OF ENGINEERS

USTON, TX 00000-0000

MY CORP OF ENGINEERS 0004807

CERTIFY THAT THE WASTE I DELIVERED TO
OVEL GARDENS RDF ON THIS DATE DOES NOT
NTAIN ANY REGULATED HAZARDOUS, TOXIC
RADIOACTIVE WASTES OR SUBSTANCES, OR
THER NON-ALLOWABLE WASTES.

GROSS LBS : 26,380.00IN-2
TARE LBS : 16,280.00OUT-1
NET LBS : 10,100.00
ADJUSTED LBS : 10,100.00

SOURCES

THOMPSON PROFESSIONAL GRP

Corrected Ticket

OTHER INFORMATION

THOMPSON PROFESSIONAL GRP

01562787
CELL GRID: COVEL GARDENS

MATERIAL CODE/DESCRIPTION	QUANTITY	MEASURE	RATE	AMOUNT
59 -CONT. SOIL (CLASS I)	2.00	DRUMS	$70.000	$140.00
NO TAX				
OTAL AMOUNT				$140.00

"I certify that the wastes I delivered to this facility on this date does not contain any regulated hazardous, toxic, radioactive wastes or substances, or other non-allowable wastes. I also agree to remove any non-allowable wastes I bring to this facility, or pay all costs for proper removal of such wastes, upon request from this facility."
Printed on recycled paper

DRIVER: PLEASE SIGN HERE

COVEL GARDENS RDF
210-623-8800
8611 COVEL RD
SAN ANTONIO, TX 78252-0000

TICKET REPRINT DATE
Page: 01 of 01

TICKET NUMBER
12/01/97
0702790

REPRINT
MANUAL

HAULER NAME	TRUCK #	OPERATOR	TIME IN	TIME OUT	DATE
ARMY CORP OF ENGINEERS	01	TONI	2:29PM	2:31PM	12/01/97

ARMY CORP OF ENGINEERS

HOUSTON, TX 00000-0000

ARMY CORP OF ENGINEERS 0004807

I CERTIFY THAT THE WASTE I DELIVERED TO COVEL GARDENS RDF ON THIS DATE DOES NOT CONTAIN ANY REGULATED HAZARDOUS, TOXIC OR RADIOACTIVE WASTES OR SUBSTANCES, OR OTHER NON-ALLOWABLE WASTES.

GROSS LBS : 26,380.00IN-1
TARE LBS : 16,280.00OUT-0
NET LBS : 10,100.00
ADJUSTED LBS : 10,100.00

SOURCES	OTHER INFORMATION
THOMPSON PROFESSIONAL GRP	THOMPSON PROFESSIONAL GRP

Corrected ticket

40125
CELL GRID: COVEL GARDENS

MATERIAL CODE/DESCRIPTION	QUANTITY	MEASURE	RATE	TAX AMOUNT
681 -FULL DRUMS SPECIAL WASTE	15.00	UNIT	$35.000	$525.00
NO TAX				
TOTAL AMOUNT				$525.00

"I certify that the waste I delivered to this facility on this date does not contain any regulated hazardous, toxic, radioactive wastes or substances, or other non-allowable wastes. I also agree to remove any non-allowable waste I bring to this facility, or pay all costs for proper removal of such wastes, upon request from this facility."
Printed on recycled paper

DRIVER: PLEASE SIGN HERE

COVEL GARDENS RDF
210-623-8800
8611 COVEL RD
SAN ANTONIO, TX 78252-0000

TICKET REPRINT DATE
Page: 01 of 01

TICKET #
0702791

REPRINT
MANUAL

HAULER NAME	TRUCK #	OPERATOR	TIME IN	TIME OUT	DATE
ARMY CORP OF ENGINEERS	01	TONI	2:31PM	2:31PM	12/01/97

ARMY CORP OF ENGINEERS

HOUSTON, TX 00000-0000

ARMY CORP OF ENGINEERS 0004807

I CERTIFY THAT THE WASTE I DELIVERED TO COVEL GARDENS RDF ON THIS DATE DOES NOT CONTAIN ANY REGULATED HAZARDOUS, TOXIC OR RADIOACTIVE WASTES OR SUBSTANCES, OR OTHER NON-ALLOWABLE WASTES.

GROSS LBS	:	26,380.00IN-1
TARE LBS	:	16,280.00OUT-1
NET LBS	:	10,100.00
ADJUSTED LBS	:	10,100.00

SOURCES	OTHER INFORMATION
THOMPSON PROFESSIONAL GRP	THOMPSON PROFESSIONAL GRP

Corrected Ticket

CELL GRID: COVEL GARDENS

MATERIAL CODE/DESCRIPTION	QUANTITY	MEASURE	RATE	AMOUNT
691 -DRUMS (SOLIDIFICATION)	6.00	DRUMS	$45.000	$270.00
NO TAX				
TOTAL AMOUNT				$270.00

CONSERVATION COMMISSION
P.O. Box 13087
Austin, Texas 78711-3087

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form approved. OMB No. 2050-0039.

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. N/A	Manifest Document No.	2. Page 1 of	Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address: Army Corps Of Engineers, 10th St. & Kane, San Marcos, TX 78667
4. Generator's Phone (713) 956-4100

A. State Manifest Document Number: 01562787
B. State Generator's ID: N/A

5. Transporter 1 Company Name: Alamo Petroleum Exchange
6. US EPA ID Number:
C. State Transporter's ID: 4165
D. Transporter's Phone: 210/225-0888

7. Transporter 2 Company Name:
8. US EPA ID Number:
E. State Transporter's ID:
F. Transporter's Phone:

9. Designated Facility Name and Site Address: Covel GArdens RDF, 8611 Covel Rd., San Antonio, TX 78252
10. US EPA ID Number:
G. State Facility's ID: MSW 209
H. Facility's Phone: 210/623-8800

11A. HM	11. US DOT Description (including Proper Shipping Name, Hazard Class, ID Number and Packing Group)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
	a. Contaminated Soil (PETROLEUM)	2	DM	2	DM
	b.				
	c.				
	d.				

J. Additional Descriptions for Materials Listed Above
K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
COVEL # 494009

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packaged, marked, and labeled/placarded, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations, including applicable state regulations.
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

GENERATOR

Printed/Typed Name	Signature	Month	Day	Year
JOHN A. LASER		11	26	97

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials — Date

Printed/Typed Name	Signature	Month	Day	Year
Domingo Maldonado		11	26	97

18. Transporter 2 Acknowledgement of Receipt of Materials — Date

Printed/Typed Name	Signature	Month	Day	Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Covel Gardens Ltd — Date

Printed/Typed Name	Signature	Month	Day	Year
Sylvia Lopez		11	26	97

TNRCC-0311 (Rev. 07/01/97) White - original Pink-TSD Facility Yellow-Transporter Green-Generator's first copy

Covel Gardens Landfill and
Recycling Facility
8611 Covel Road
San Antonio, TX 78252
(210) 623-8800
(210) 623-8780 (Fax)

A Waste Management Company

40125

NON-HAZARDOUS MANIFEST

GENERATOR

Generator Army Corps of Engineers
Address 10th St. & Kane
San Marcos, TX 78667
Phone (713)956-4100

I.D. # N/A
Shipping Location SAME
Address
Phone

Description of Waste Materials	Profile Number	Total Quantity	Unit of Measure	Container Type
Contaminated Soil (PETROLEUM)	494009	13	Drums	
Decontaminated WAter	494009	6	Drums	
Plastic Sheeting	494009	2	Drums	

I hereby certify that the above-described materials are not hazardous wastes as defined by 40 CPR, Part 261 or any applicable state law, have been fully and accurately described, classified and packaged, and are in proper condition for transportation according to applicable regulations.

John Laser
Generator Authorized Agent Name (Print)

[signature] 11-26-97
Signature Delivery Date

TRANSPORTER

Transporter Name Alamo Petroleum Exchange
Address 454 Soledad, Suite 100
San Antonio, TX 78205

Driver Name Domingo Maldonado
Truck Number 60
Truck Type Box

I hereby acknowledge receipt of the above described materials for transport from the generator site listed above.

[signature]
Driver Signature Shipment Date

I hereby acknowledge that the above described materials were received from the generator site were transported without incident to the destination listed below.

[signature] 12-1-97
Driver Signature Delivery Date

DESTINATION

Site Name COVEL GARDENS LANDFILL Phone Number (210) 623-8800

Address 8611 COVEL ROAD, SAN ANTONIO, TX 78252

Disposal Location: North _____ East _____ Level _____

I hereby acknowledge receipt of the above described materials.

Sylvia Lopez
Name of Authorized Agent (Print)

[signature] 12/01/97
Signature Receipt Date

White - Original Canary - Disposer Retain Pink - Transporter Retain Goldenrod - Generator Retain

GRAY BUSINESS FORMS (210) 622-6984 D 37868

Attachment 20
Proposal for Action and Site Closure Request

Proposal for Action
&
Site Closure Request

Based on the results of the site assessment as detailed on Worksheet 12, this site has been assigned a priority of 4.1. Since some NAPL was discovered in the monitoring wells, efforts to remove the NAPL to the most practical extent possible should be continued. Since the groundwater is considered a beneficial use Category IV, after NAPL removal is complete, this exposure pathway should be able to be closed.

Only one of the 15 borings showed a contaminant concentration above Plan A target concentrations, and for only one compound. With an institutional control preventing excavation, this exposure pathway could also be closed. In addition, the concentration is less than the target soil concentration for construction workers based on the RG-36 clarifications and amendments of March 6, 1997.