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TRUAX

FINAL

Engineering Report
Contamination Evaluation
Truax Field
Madison, Wisconsin

Contract DACA-49-87-D-0003
Delivery No. 9

Prepared for:
U.S. Army Corps of Engineers
Buffalo District
Buffalo, New York

March, 1989

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March 2, 1989
3144-90019

U.S. Army Corps of Engineers
Buffalo District
Attention: NCBED-Headquarters
1776 Niagara Street
Buffalo, New York 14207-3199

Re: Contract DACA-49-87-D-0003
Delivery Order No. 9
Final Engineering Report
Contamination Evaluation for Truax Field
Madison, Wisconsin

Gentlemen:

Enclosed are four copies of the subject document. This report has been revised in response to written comments received from you. The response to comments is summarized in Appendix A. The HRS form is included in Appendix J.

Very truly yours,

Thomas Lachajczyk

Thomas M. Lachajczyk
Program Manager

Craig Jones TL

Craig Jones
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Paul Shetley TL

Paul Shetley
Site Geologist

TML/jam/368
Enclosure

cc: CEHNDED-PM (2)
CEEC-EB (2)
Minneapolis District, Corps of Engineers (2)
CEMRDED-TE (1)
CEMRDED-E (2)
CENRD-ED-GC (1)

TABLE OF CONTENTS

FINAL ENGINEERING REPORT

CONTAMINATION EVALUATION
TRUAX FIELD
MADISON, WISCONSIN

Contract No. DACA-49-87-D-0003
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LIST OF TABLES

LIST OF TABLES
(Continued)

LIST OF FIGURES

LIST OF EXHIBITS

LIST OF APPENDICIES

Appendices

LIST OF SYMBOLS AND ABBREVIATIONS

AA	Atomic absorption
AMSL	Above Mean Sea Level
C	Centigrade
CFR	Code of Federal Regulations
CO_3	Carbonate
COND	Conductivity
Db	Depth from Top of PVC Casing to Bottom of Well
DERA	Defense Environmental Restoration Account
DERP	Defense Environmental Restoration Program
DI	Deionized
DNR	Department of Natural Resources
DOD	Department of Defense
Dw	Depth from Top of PVC Casing to Water Level
EP	Extraction procedure
ft	Foot
gal	Gallon
gpm	Gallons per minute
GC	Gas chromatograph
GC/MS	Gas chromatograph/mass spectrometer
GS	Ground Surface
GW	Groundwater
HCl	Hydrochloric acid
Hg	Mercury
HNO_3	Nitric acid
HRS	Hazardous Ranking System
H_2S	Hydrogen Sulfide
Ht	Height
ICAP	Inductively coupled plasma
ID	Inside diameter
k	Coefficient of permeability
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
ug/g	Micrograms per gram (ppm)
ug/kg	Microgram per kilogram (ppb)
ug/l	Micrograms per liter (ppb)
mg/l	Milligrams per liter (ppm)
ml	Milliliters
MMSD	Madison Metropolitan Sewage District
MRD	Missouri River Division
ng/g	Nanograms per gram (ppb)
N	Normal
PCB	Polychlorinated biphenyl
ppb	Parts per billion
ppm	Parts per million
Pv	Minimum purge volume (gallons)
PVC	Polyvinyl chloride
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
S/A	Sampling/Analysis
SDWA	Safe Drinking Water Act
TOC	Top of PVC Casing
USACOE	U.S. Army Corps of Engineers
USEPA	United States Environmental Protection Agency
WWTP	Wastewater Treatment Plant

1.0 EXECUTIVE SUMMARY

A contamination evaluation was performed at Truax Field in Madison, Wisconsin. The site is currently owned by several entities, including the Dane County Airport Commission, Madison Housing Authority, State of Wisconsin, Madison Area Technical College, and numerous private companies. The contamination evaluation included a records review and visual site inspection; installation of three groundwater monitoring wells; collection of groundwater samples from ten new or previously-existing monitoring wells and water supply wells; collection of soil samples at twelve locations; and collection of surface water samples at four locations. Samples from each site were analyzed for petroleum hydrocarbons, volatile organics, and total metals (including arsenic, selenium, silver, mercury, barium, cadmium, chromium, and lead). In addition, groundwater samples were analyzed for total iron, manganese, and sodium.

During the records review and site inspection, a site map was developed and the locations and uses of the former DOD facilities were identified. Four areas were identified as potential sources of soil, surface water, and/or groundwater contamination. The potential sources included a practice burn pit, landfill, wastewater treatment plant, and JP-4 fuel storage area.

The fireman training area practice burn pit was probably created in the early 1950s by the DOD and was in use by DOD and numerous other organizations until December 1987. The DOD excavated a sand and gravel pit in the 1930s or 1940s and may have disposed of some wastes in this area, which was used by Oscar Mayer as an open burning pit until 1953 and then as a landfill until 1972 by the City of Madison. Numerous parties disposed of wastes in the landfill. The DOD operated the former Burke Wastewater Treatment Plant during the period 1942-1946. Numerous other parties operated the treatment plant before and after the DOD's ownership. The JP-4 fuel area, including four large above-ground fuel tanks, was constructed by the DOD. It has since been used by the Air National Guard and ownership has been transferred to Dane County. The tanks were empty at the time of the site inspection.

Sampling and analysis at each of the areas described above was performed in accordance with the Plan approved by the Corps of Engineers. Sampling sites were chosen to represent areas where chemical contamination would be most likely to occur.

Results of the sampling and analysis programs are presented in the following sections.

1.1 GROUNDWATER

Samples were collected from three newly installed groundwater monitoring wells, four previously existing monitoring wells, and three deep supply wells. These wells were downgradient of the landfill, former wastewater treatment plant, and practice burn pit. Analysis of samples indicated that standards, including Maximum Contaminant Levels (MCLs) or Maximum Contaminant Level Goals (MCLGs), were exceeded for one or more parameters in eight of the ten wells. Contamination was present downgradient of each of the three sources identified. Contaminants for which MCLs and/or MCLGs were exceeded

/368

included chromium, cadmium, mercury, lead, trichloroethylene, vinyl chloride, and xylene. Groundwater samples which exceeded MCLs and/or MCLGs are summarized in Table 1-1. It should be noted that elevated metals levels in groundwater samples may be due to presence of turbidity in the water samples and reflects the presence of these metals in background soils rather than dissolved metals in groundwater. Why didn't you filter

Groundwater near the practice burn pit (Site TG-3) was found to contain numerous organic chemicals present in fuels or solvents, and elevated levels of petroleum hydrocarbons. During installation of TG-3, cuttings from a depth of 24 feet exhibited elevated organic vapor meter readings and the odor of petroleum was noted. During well development and sampling, water in the well exhibited a strong solvent odor.

A relatively shallow monitoring well (TG-2) installed downgradient of the former treatment plant had concentrations of chromium, lead, and cadmium in excess of MCLs and/or MCLGs.

Monitoring wells downgradient of the landfill (TG-1, TG-5, TG-9, TG-10, and TG-11) contained a variety of metals, petroleum hydrocarbons, volatile organics, and chlorinated compounds. Trichloroethylene was found in the two deep Oscar Mayer water supply wells (TG-13 and TG-14) sampled. The City of Madison's water supply well (TG-12) was found to be free of contamination.

1.2 SURFACE WATER

Surface water samples were collected at four locations. A sample of standing water in a ditch near the practice burn pit (TW-3) was found to contain organics present in fuels or solvents (including methylene chloride, benzene, toluene, 1,2-transdichloroethylene, thiobismethane, and tetrachloroethylene). Petroleum hydrocarbons and lead were also found in TW-3. These analytical results further confirmed groundwater and soils analyses which are evidence of contamination related to the practice burn pit.

No contaminants were found in the surface water sample (TW-1) collected from the creek near the practice burn pit.

No contaminants were found in a surface water sample (TW-2) collected in one of the lagoons at the former treatment plant.

A sample was obtained from the culvert which discharges water from the former wastewater treatment plant lagoons to a ditch connected to Starkweather Creek. This sample contained elevated levels of petroleum hydrocarbons (65 mg/l) and a trace of tetrachloroethylene.

1.3 SOILS

Soil samples were collected at twelve locations believed to have the highest potential for contamination. Contaminants were detected at most of the sites. At the burn pit area (soil samples TS-1 and TS-2), elevated levels of petroleum hydrocarbons and detection of numerous organic chemicals confirmed surface contamination related to burning of fuels and solvents. Soil within the diked area at the JP-4 fuel area (samples TS-3 and TS-4) was found to

TABLE 1-1

SUMMARY OF CONTAMINANTS PRESENT IN GROUNDWATER
IN EXCESS OF MCLS AND MCLGS

Well Designation	Site Description	Chromium (120*/50)	Cadmium (5*/10)	Mercury (3*/2)	Lead (20*/50)	TCE[a] (0/5)	Vinyl Chloride (0/2)	Xylene (440*/-)
		Level of Contaminants, (MCLG/MCL), ug/l						
TG-1	Downgradient of landfill				30			
TG-2	Downgradient of WWTP	94	7		124			
TG-3	Near Burn Pit				24			705
TG-5	Well 200S Downgradient of landfill							
TG-9	Well 152 Downgradient of landfill	302	12		333			
TG-10	Well 104 Downgradient of landfill	178	5		157	3.9		
TG-11	Well 101 Downgradient of landfill			2	62		16.7	
TG-12	Madison Well No. 7							
TG-13	Oscar Mayer Well No. 3					11.0		
TG-14	Oscar Mayer Well No. 5					2.2		

* = Proposed
a = TCE = Trichloroethylene
MCLG = Maximum Contaminant Level Goal
MCL = Maximum Contaminant Level
Blank entries indicate MCLs and/or MCLGs were not exceeded

contain elevated levels of petroleum hydrocarbons, lead, and organic chemicals potentially related to leaks or spills from the fuel tanks. Presence of lead may have been due to lead-based paints possibly used in and around the tank farm. A soil sample (TS-5) collected at the drum and container storage area near the JP-4 fuel tanks showed elevated levels of petroleum hydrocarbons, lead, and organics. Three samples collected from sludge drying bed cells (TS-7, TS-8, and TS-9) were found to contain varying levels of organic chemicals and indicated that solvents may have been present in sludges disposed at the former Burke Wastewater Treatment Plant. Sediment samples collected from a lagoon (TS-11) and from near the outfall from the former wastewater plant to a ditch connected to Starkweather Creek (TS-12) showed presence of petroleum hydrocarbons and organic chemicals. Analytical interferences present in samples TS-8, TS-9, TS-11 and TS-12 inhibited identification and quantification of the organic chemicals believed to be present.

1.4 HAZARDOUS RANKING SYSTEM (HRS) SCORE

The Hazardous Ranking System Score for the site (for toxic materials) is 35.59. The score results primarily from detection of trichloroethylene in deep supply wells, and petroleum hydrocarbons in surface water near the former wastewater treatment plant. The form is presented in its entirety in Appendix J.

2.0 GENERAL INFORMATION

2.1 INTRODUCTION

The Department of the Army is responsible for administration of the Defense Environmental Restoration Program (DERP). The objective of this program is to identify and remedy environmental problems at facilities formerly owned and operated by the DOD.

The U.S. Army Corps of Engineers, Buffalo District, contracted with Envirodyne Engineers, Inc. (EEI) in March 1987 (Contract DACA-49-87-D-0003) to survey DERP sites within the boundaries of the North Central Division of the U.S. Army Corps of Engineers.

On March 22, 1988, EEI was authorized to perform Delivery Order No. 9 of this contract, a contamination evaluation of Truax Field, Madison, Wisconsin, Project E05WI004800. The Draft Final Report was submitted in November, 1988. Comments were received from Corps of Engineers representatives in December, 1988. This Final Engineering Report was prepared to present the findings of the contamination evaluation, as specified in Section 4.6 of the Scope of Work.

2.2 PROJECT OBJECTIVES, SCOPE AND APPROACH

The objective of this Contamination Evaluation was to make a preliminary determination of the presence or absence of chemical contamination which may have been caused by DOD-related activities. In order to conduct the contamination evaluation, EEI performed a site inspection, developed Safety, Monitoring Well Installation, and Sampling/Analysis - Quality Assurance/Quality Control (S/A-QA/QC) Plans, and collected and analyzed soils, groundwater and surface water from locations on and adjacent to the property. The work included collection and chemical analysis of soil samples from twelve locations, collection and chemical analysis of groundwater samples from ten wells and sampling and analysis of samples from four surface water locations. The samples were analyzed for volatile organics, petroleum hydrocarbons, and total metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver). In addition, groundwater samples were analyzed for sodium, manganese, and iron.

The sampling and analysis program was designed to ensure, to the greatest extent practical, detection of contaminants potentially present on-site. For example, the sampling locations were selected to correspond with locations where evidence of disposal and/or transport of contaminants was most likely to be present. The project was not intended to allow determination of the extent of contamination or the rate of transport from sources. The analytical program was designed to determine the presence or absence of the most probable pollutants, with quantitative measurements of the concentrations of those found. This approach was reflected in the location of sampling points, number of samples collected, and types of QA/QC procedures followed.

Based on the results of all project tasks, EEI completed a Hazardous Ranking System (HRS) form. The contents of this form include a summarization and evaluation of existing information on the site, including preliminary general information; real estate search information; previous pollution abatement permits; the status of waste storage areas; the presence of hazardous substances; groundwater, surface water and air migration routes; fire and explosion hazards; ordnance and explosive waste risks; and evaluation of debris. Following the procedures specified in 40 CFR Part 300, Appendix A, a Hazard Ranking System score for toxic materials at the site was computed.

2.3 SITE LOCATION AND PHYSIOGRAPHY

2.3.1 Site Location

Truax Field is located in the City of Madison, Dane County, Wisconsin. It lies within Sections 19, 20, 21, 28, 29, 30, 31 and 32, Township 8 North, Range 10 East. Previously, the entire site consisted of more than 2,000 acres.[1] Prior to 1946, the site was used as a communication school and flight training facility by the Department of Army. A topographic map, which shows the location of Truax Field is presented in Figure 2-1.

2.3.2 Physiography

Truax Field lies on relatively flat ground, with elevations ranging from approximately 860 feet AMSL at the south end to approximately 900 AMSL at the north end. However, just north of the study area lies an area of approximately 120 feet of relief. The differences in elevation are due to the remnants of a glacial moraine. The physiography of the area includes glacial deposits of fine gravel, sand, silt and clay of Pleistocene age. Regionally, the thicknesses of these deposits vary with the depth of bedrock. The local stratigraphy consists of sandy or clayey silt for the first 5 to 15 feet followed by silty sand or fine to medium-grained sands down to the top of the water table which lies between twenty-five and thirty feet. Depth to bedrock varies throughout the site.

As seen from data in this report, depth to the uppermost groundwater aquifers at Wells TG-1, TG-2 and TG-3 was between 25 and 30 feet. These depths are believed to vary seasonally. Water levels were also measured in the deeper monitoring wells installed by Kaufmann.[7]

Prior to the presence of Oscar Mayer, the groundwater in the study area is believed to have flowed south or southwest towards what is now the landfill. The landfill is lying on a Pleistocene Age glacial lake bed which was at one time a large marsh. The areas surrounding the marsh were areas of recharge which flowed towards the marsh. Oscar Mayer now pumps several million gallons of groundwater per day. This is believed to have caused a cone of depression in the vicinity of the water supply wells which lie southwest of Truax Field. Although the wells of Oscar Mayer are relatively deep, it is felt that they are creating a drawdown on the upper aquifer. The upper aquifer appears to recharge the lower aquifer through percolation, fractures and faults. Therefore groundwater flow beneath the Truax Field is probably towards the south or southwest with the exception of the WWTP area. Groundwater flow in the wastewater treatment plant area is believed to be towards the west. The WWTP lies on a clay barrier between 30 and 120 feet thick which blocks the effects of the cone of depression created by the Oscar Mayer groundwater wells.

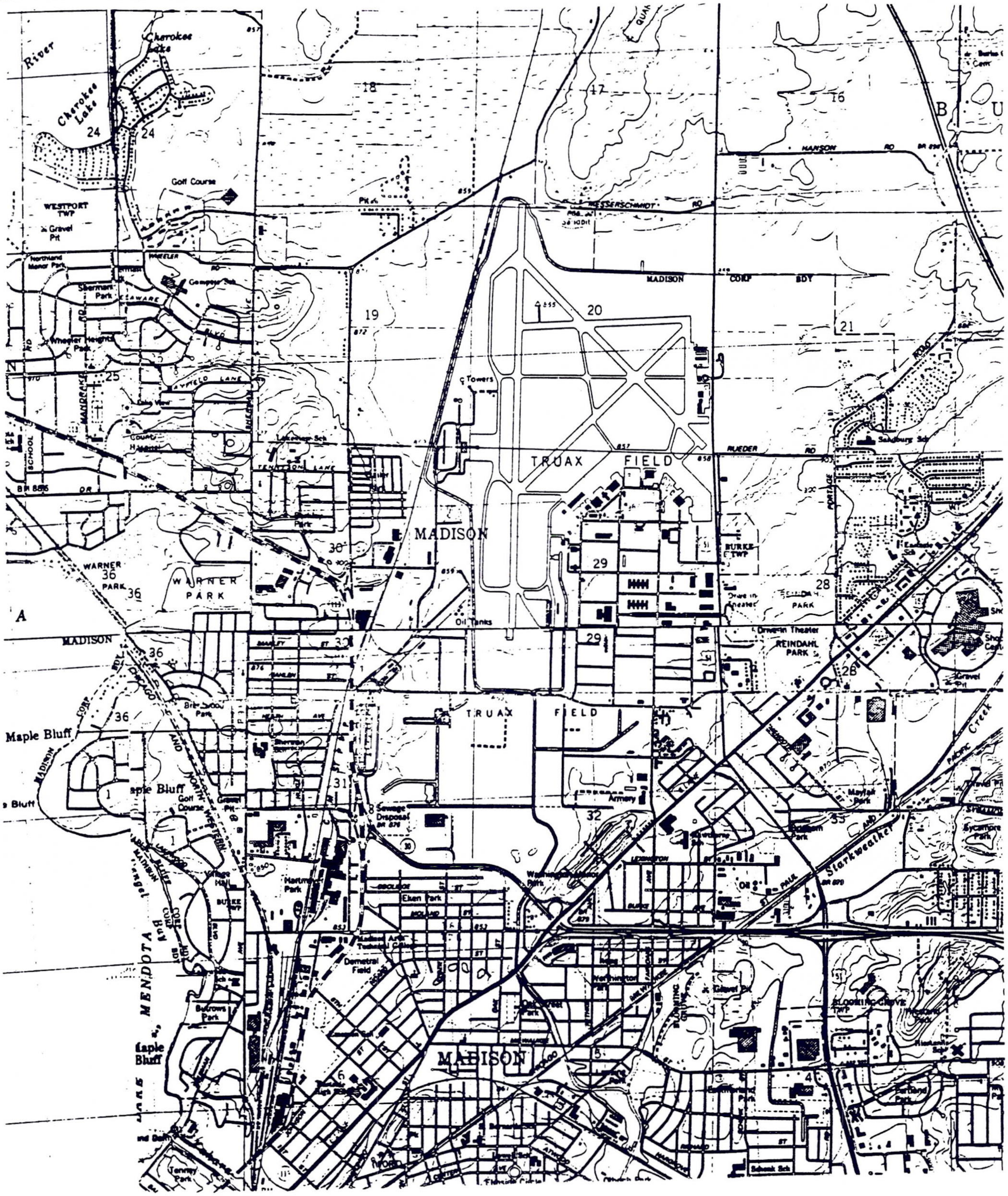

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FIGURE 2-1

TOPOGRAPHIC MAP OF TRUAX FIELD AND VICINITY

3.0 SITE INVESTIGATION

3.1 SITE INVESTIGATION

On Thursday, April 7, and Friday, April 8, 1988 EEI performed an initial site inspection at Truax Field, Madison, Wisconsin. Personnel in attendance included Thomas Lachajczyk (Program Manager), Paul Shetley (Site Geologist), and Craig Jones (Health and Safety Coordinator). EEI personnel met with Peter Drahn (Airport Director), David Benzschawel (City of Madison Principal Civil Engineer), Ken Koscik (Dane County Public Works Director), and Dan Holmes and Bob Hoffman, both representing the Rock Island District Corps of Engineers.

During the site inspection, four areas which had the potential to result in release of toxic or hazardous materials into the environment were identified. These areas include the practice burn pit, the JP-4 fuel storage area, the sanitary landfill, and the former Burke Wastewater Treatment Plant. These locations are shown in Figure 3-1 and information concerning each is presented in the following sections.

3.1.1 Practice Burn Pit

The burn pit is located about 200 feet north of Darwin Road and 400 feet east of International Lane. Its location is shown as Area A in Figure 3-1. According to Mr. William Skinner, Air National Guard Fire Chief, the area was used for fire-fighter training during the period 1953-1987. It may have been used prior to 1953. It is believed to have been constructed by the DOD. Training exercises were conducted by U.S. Air Force personnel during the 1950's and 1960's, by the Air National Guard, and later by the City of Madison, Dane County, and volunteer fire departments. Mr. William Skinner estimated that fire training took place ten to fifteen times per year.[2]

Flammable liquids such as JP-4 jet fuel, kerosene, gasoline, diesel fuel, waste oil, and probably solvents and hydraulic oil were burned. Paints may have also been burned here by the City of Madison. On each day that training occurred, 500 to 1000 gallons or more of liquid were used. It was spilled onto the ground, ignited, and then extinguished. Several fires were started and extinguished each day.[2] The fuel remaining after training exercises soaked into the ground, evaporated or was carried away by surface run-off. It appears possible that some may have entered the creek 400 feet to the east. The practice was terminated in December 1987.[2] More Info? → Were we aware of this practice.

The Burn Pit Area is irregularly shaped and has dimensions of about 200 feet by 100 feet. The area was blackened and void of vegetation. Some standing water was noted in July 1988. The area is a former swamp and has a shallow groundwater table. It appears from surface stains that surface runoff from the Burn Area migrates to the south.

→ Soil borings remediation

3.1.2 JP-4 Fuel Storage Area

The JP-4 Fuel Storage Area is located about 0.25 miles south of the Burn Pit, and about 1000 feet east of International Drive (Area B in Figure 1). The Storage Area was constructed by the DOD. The area is fenced and consists of

→ When?

Surface water flows in a southerly direction by way of man-made ditches and intermittent streams flowing into Starkweather Creek. Starkweather Creek flows into Lake Monona.

2.4 OWNERSHIP AND PRIOR USE

The Department of the Army owned more than 2000 acres at Truax Field during and after World War II. The property was used by the Department of Defense (DOD) as an airfield and a portion of the property is still used as an Air National Guard headquarters. Property previously owned by the DOD has been acquired by the Dane County Airport Commission, Madison Housing Authority, State of Wisconsin, Madison Area Technical College, and numerous private companies.

Truax Field was acquired by the Department of Army during 1942 and 1943. It was used as a communication school and flight training facility until 1946. The Air National Guard and Army Reserve used the site after 1946. In 1948 the City of Madison, Wisconsin purchased the property but still leased portions of the facility to the DOD. A civilian airport was established which was eventually deeded over to Dane County (1974) along with all other lands that made up the original Truax Field. Dane County presently owns all of the study areas (except the WWTP), which are located west and southwest of the air field runways. Most of the WWTP is currently owned by David H. Reynolds and is being demolished for future sale. The remainder of the WWTP is currently owned by Shop-Ko and Oscar Mayer.

Further information concerning the ownership of potentially contaminated areas is presented in Section 3.1.1 through 3.1.4.

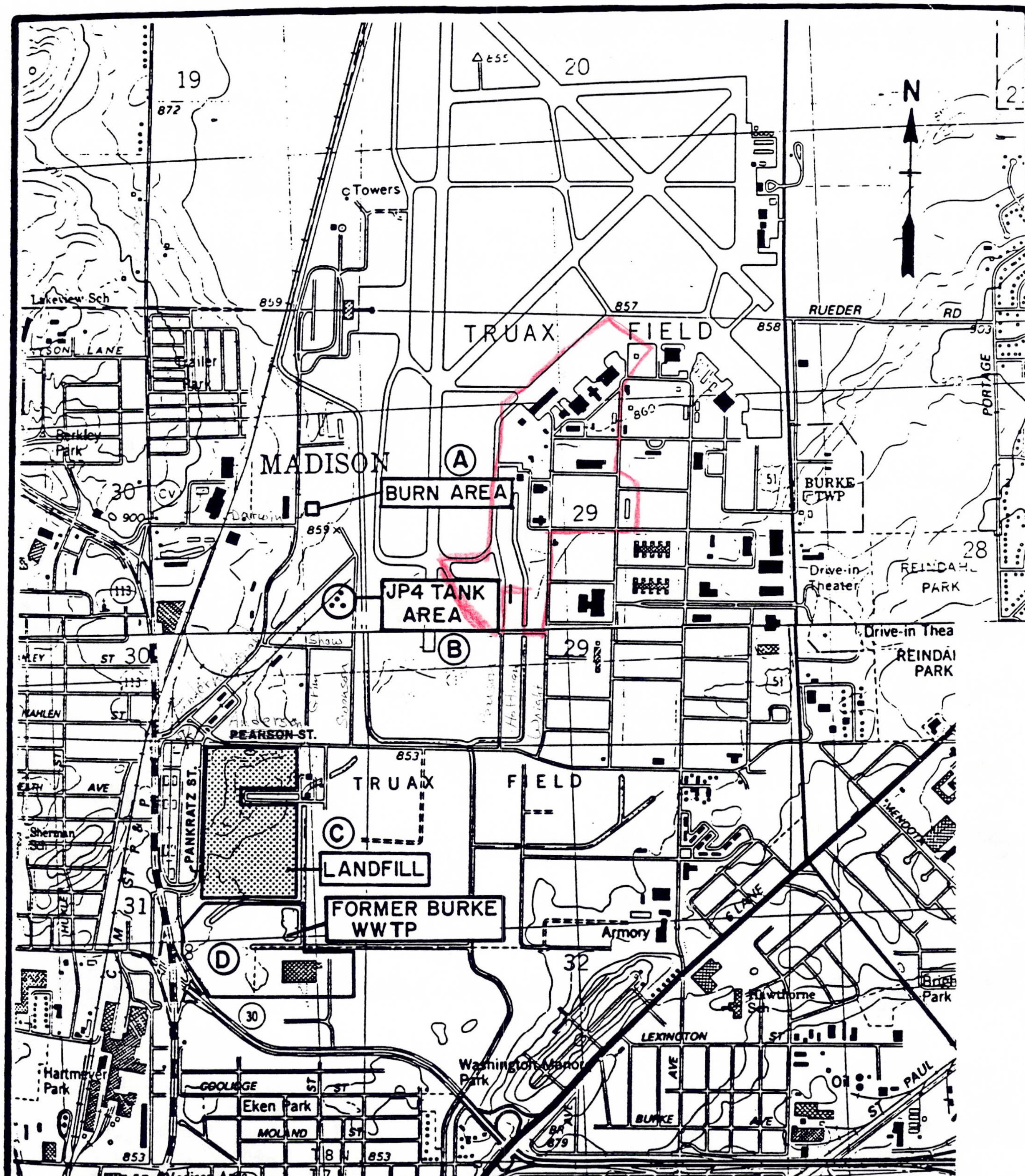

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FIGURE 3-1

Potential Sources of Contamination Truax Field

Madison, Wisconsin

four large JP-4 fuel tanks with a total capacity of 1,000,000 gallons. Large dikes surround the fuel storage area; and the diked area is believed to be lined with plastic. Was this checked?

During the site inspection the four large JP-4 fuel tanks were inspected and were found to be empty or nearly empty. This is consistent with information supplied by Col. Andrew Miller of the Air National Guard (ANG). He stated that the ANG turned the property over to Dane County in 1982. Before this occurred, the ANG hired a contractor to pump out the JP-4 tanks, and to treat the tanks to prevent corrosion. [3]

The diked area had some shallow puddles of standing water in April 1988, possibly attributable to snow melt. No standing water was present in July 1988. There were no obvious spill areas.

Five 55 gallon drums and two 5 gallon containers were present within the fenced area, near the JP-4 fuel tanks. The drums were described as follows: (left to right when facing southwest) ✓

1) Yellow, partially full, no markings
2) Brown, partially full, marked "solvent"
3) Black, partially full, marked "waste oil", corroded with holes What was done?
4) Black, nearly empty, corroded with holes, no markings
5) Yellow, partially full, marked "waste fuel"

Two 5 gallon containers were also found.

1) Yellow, full, no markings
2) Yellow, empty, marked:
   Flash Point - 9°C, 16°F
   Type II Shelf Life
   Test Date, March 1982
   DOT Article, Naptha

Because of the date on one of the 5-gallon containers, these drums were believed to be the responsibility of the ANG or Dane County, rather than DOD. ✓

There are also two small buildings and a small (estimated 500 gallon) fuel tank within the fenced area. The 500 gallon tank was believed to be empty. No access points to the tank were found. This tank was probably installed by the DOD.

3.1.3 Landfill

The landfill was located east of Pankratz Street and south of Pearson Street (Area C in Figure 3-1). It was approximately 3000 feet long (N-S) and 2000 feet wide. The landfill surrounded an active Air National Guard storage depot on three sides. Nuclear weapons were possibly stored at the ANG site at one time. [4]

The landfill was first excavated as a sand and gravel pit by the Air Force in the 1930's or 1940's. It was operated by Oscar Mayer until 1953 as an open-burning dump. Oscar Mayer probably disposed of both office and commercial

/368

wastes at the site. The City of Madison operated the area as a burning dump until about 1960 and as a sanitary landfill until 1972. Almost 1,000,000 cubic yards of wastes were placed in the Truax Landfill during the period from 1953 to 1972.[5]

The types and amounts of waste potentially disposed in the Truax Landfill by the DOD were not documented in the records reviewed. It was speculated that ammunition, air field wastes, or other wastes may have been placed in the Truax Landfill by the DOD. DOD use of the landfill as a disposal site was not clearly documented in any of the records reviewed. A previous study by D'Onofrio and Kottke stated there was no evidence of use of the landfill by the DOD. However, this was contradicted by numerous Madison City officials and staff.[5] A resident of the area who hauled waste to the landfill during the period 1948-1966 stated that to his knowledge the Air Force did not haul waste into the dump during this period.[6)

No records of the specific types of waste disposed in the Traux Landfill were found. Until 1960, the landfill was used as a burning dump and wastes were restricted to combustible materials. In the report "Hydrogeology of Solid Waste Disposal Sites in Madison Wisconsin", construction junk, debris, and refuse are mentioned.[7] A memorandum written during the period when the landfill was operated by the City stated that liquid wastes such as solvents would be accepted and disposed in a portion of the landfill. Specific pollutant parameters found in elevated levels in groundwater in the vicinity of the Truax Landfill during previous monitoring programs included potassium, ammonia, phosphorus, sodium, nitrate-nitrite nitrogen, and chlorides.[7]

The Truax Landfill is believed to be a source of groundwater contamination and methane gas. Organic chemicals found in groundwater samples collected at or adjacent to the landfill during previous monitoring programs included benzene, ethylbenzene, toluene, xylenes, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, 1,2-dichloroethylene, tetrachloroethylene, trichloroethylene, vinyl chloride, and fluorotrichloromethane.[8,9]

During the site inspection, the landfill area was surveyed to search for surface contamination. Methane gas was detected at a monitoring well using an explosive gas meter. No drums, transformers, surface waste piles, underground tanks, pits, sumps or other contamination sources were identified. The wastes were apparently covered with several feet of soil.

3.1.4 Burke Sewage Treatment Plant

The Burke Treatment Plant was located northeast of the intersection of Packers and Aberg Avenues (Area D in Figure 3-1). The properties were owned by Edward S. and David H. Reynolds, Shop-Ko and Oscar Mayer at the time of the site inspection. The treatment plant was operated by the City of Madison (1914-1933), the Madison Metropolitan Sewage District (MMSD) (1933-1936 and 1946-1951), the U.S. Army (1942-1946) and Oscar Mayer (1951-1978). It is estimated that 8% of the total wastewater treated at the plant occurred during the years when the U.S. Army was responsible for its operation, for treatment of wastes from Truax Field.[10]

The treatment plant consisted of a trickling filter, six sludge lagoons, sludge drying beds, and irrigation fields. Four of the six lagoons were on Oscar Mayer property and two on MMSD property. Treated wastewater was apparently discharged to a ditch which is a tributary of Starkweather Creek.

The Oscar Mayer Plant disposed of liquid wastes in the Burke Treatment Plant starting in 1951.[5] Sludge lagoons and irrigation fields associated with the Burke Treatment Plant are a potential source of elevated levels of pollutant parameters such as nitrogen, phosphorus, and potassium compounds.

It was reported that the Oscar Mayer Plant operated a plastics manufacturing operation in conjunction with meat packing operations. Plastics processing is a potential source of solvents such as benzene, toluene, carbon tetrachloride, chloroform, methylene chloride, and 1,1,1-trichloroethane.

Work was underway at the Reynolds property in April-July 1988 to improve its appearance. The work included demolition of the trickling filter, removal of the above-ground tanks, and filling of the lagoons. The schedule for completion of this work was unknown, and it was not completed at the conclusion of EEI's work at the site.

3.2 MONITORING WELL INSTALLATION

In order to evaluate potential groundwater contamination, EEI supervised the installation of three groundwater monitoring wells and conducted sampling and analysis of the three wells. In addition, sampling and analysis was performed on water from the supply well owned by the City of Madison, four monitoring wells installed by Kaufmann in 1970, and two wells owned by Oscar Mayer. In conjunction with the above work, EEI prepared a Monitoring Well Installation Plan, which was approved in May, 1988. Work was done according to this Plan, with certain exceptions to be noted.

3.2.1 Well Locations

Information collected during the on-site inspection and from regional topographical maps indicated that the groundwater flow was toward the west or southwest. The groundwater flow within the study area appeared to be influenced by a localized cone of depression created by a withdrawal of several million gallons of water per day by the Oscar Mayer Meat Packing Plant.

In order to characterize and determine the extent of any groundwater contamination that may have been emanating from the study area, two existing wells owned by Oscar Mayer, four previously existing monitoring wells, a Madison supply well,and three wells installed under the supervision of EEI were all sampled. The locations of the wells are shown in Figures 3-2, 3-3, and 3-4, and the rationale for selection of their locations are described below.

NEWLY INSTALLED WELLS:

TG-1 - This well was installed approximately 600 feet west of the landfill. Its location is shown in Figures 3-2 and 3-3. It was placed within a grassed strip of land on the west side of Highway 30, between Highway 30 and a short city street. The property is owned by the City of Madison. The location of this well was selected to intercept any possible contaminants that may have

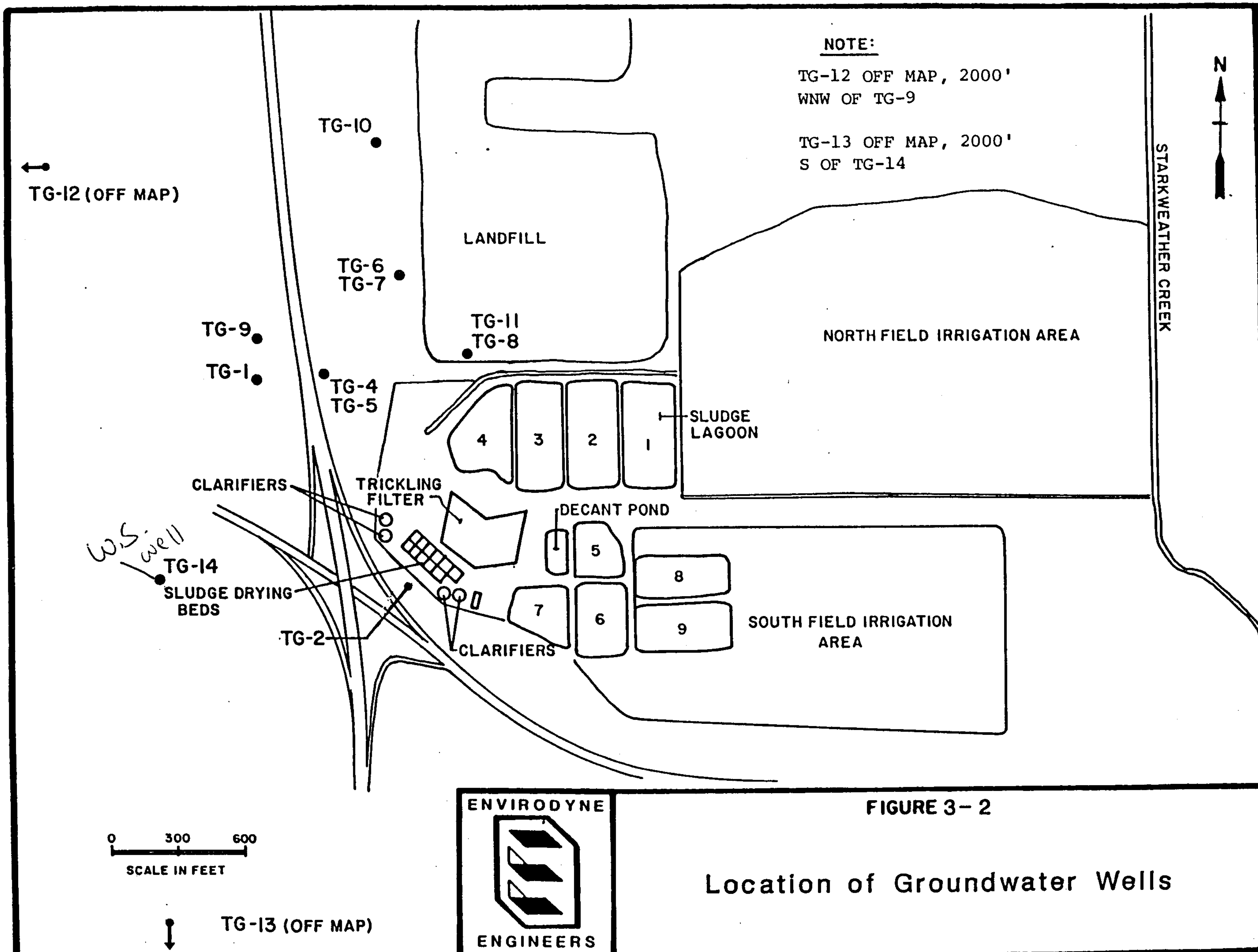

FIGURE 3-2

Location of Groundwater Wells

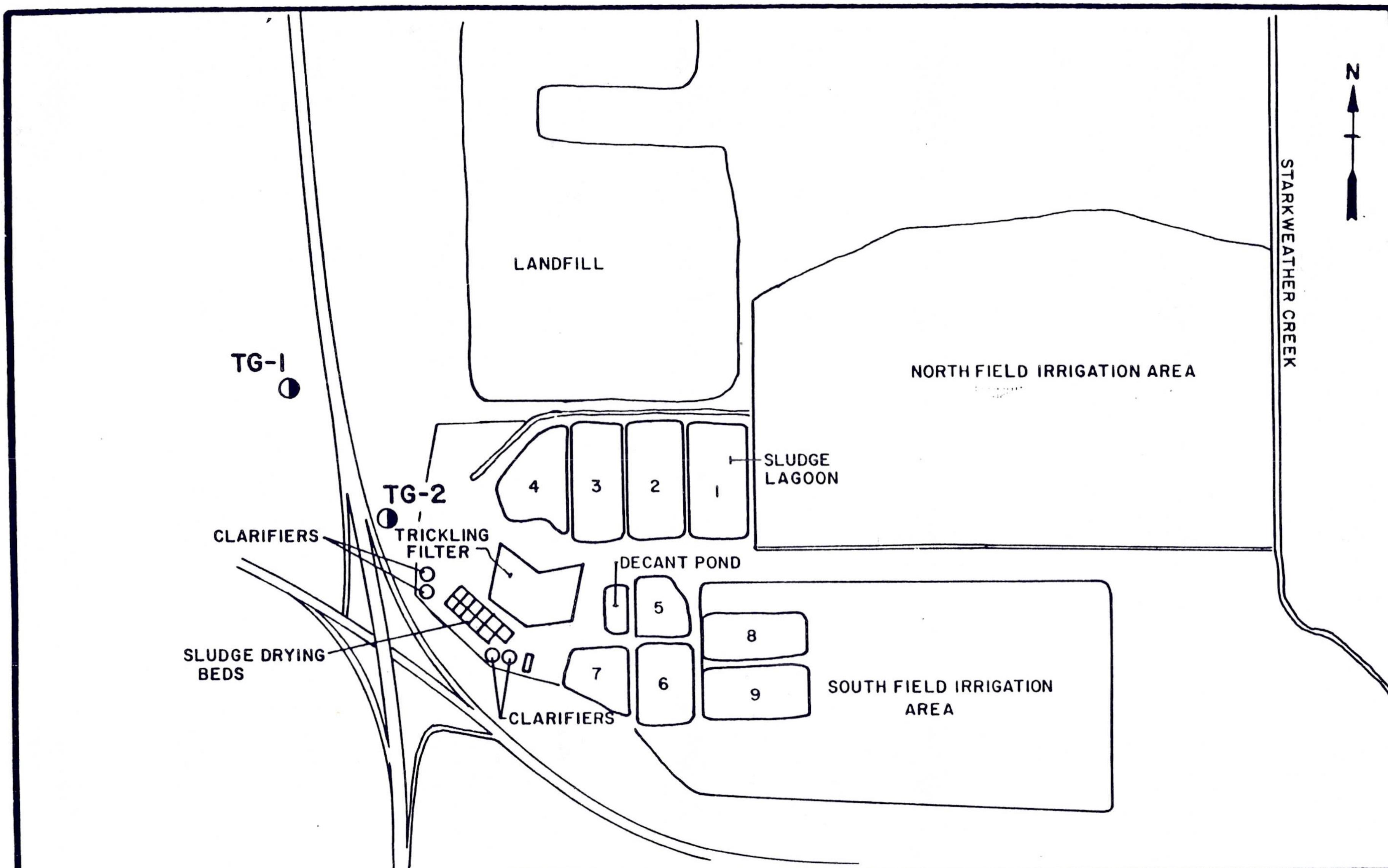

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FIGURE 3 - 3

Location of Monitor Wells TG-1 and TG-2 Truax Field

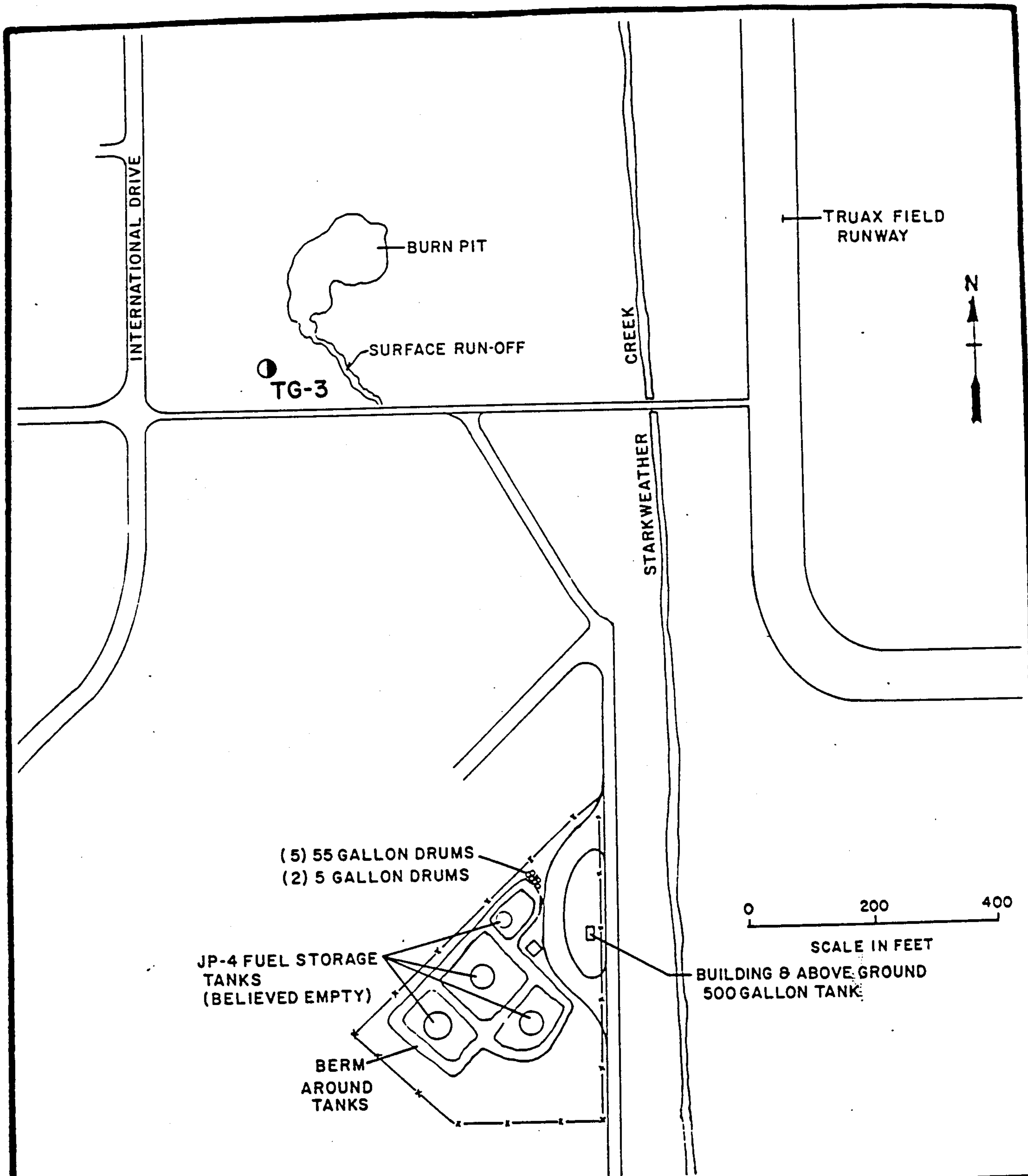

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FIGURE 3-4

Location of Monitor Well TG-3 Truax Field been leaching from the landfill and to provide further information concerning groundwater quality in this area. Contamination had been detected previously in TG-9 (nearby), but TG-9 was believed to be providing a very low yield due to a falling water table.

TG-2 - This well was located approximately 50 feet downgradient (west) of the former Burke WWTP. Its' location is shown in Figures 3-2 and 3-3. It was installed on property that is owned by David Reynolds. Right of entry and permission to install a well on this property was acquired and is presented in Appendix B. This well was positioned to intercept any possible contaminants emanating from the old WWTP. Groundwater movement in the Treatment Plant Area is believed to be influenced by a clay barrier which is roughly circular, varying in depth from 30 to 120 feet and which lays on top of weathered sandstone just south of the Burke Sewage Treatment Plant. This clay deposit, which has a very low permeability, blocks the cone of depression in the Treatment Plant Area. As a result, the direction of groundwater flow at the western edge of the Treatment Plant is believed to be toward the west.

TG-3 - The location of this well was downgradient of the Fire Training Burn Area. Its location is shown in Figure 3-4. Installation of the well was approximately 50 feet southwest of the oil-stained area where the training was performed. The well was installed on Truax Field (Dane County) property. A right of entry for this property was obtained by the COE from the owner. EEI has not been supplied a copy. It is not known whether the cone of depression (created by Oscar Mayer) influences the direction of groundwater flow near the burn pit. The direction of flow at this location may be southwest or possibly east towards Starkweather Creek. However, based on the extent of surface contamination and surface runoff to the south, along with the possible influence of the cone of depression, it was concluded that a groundwater well near the southern edge of the burn pit would intercept possible contamination migrating from this area.

PREVIOUSLY EXISTING MONITORING WELLS AND WATER SUPPLY WELLS

Wells TG-4 thru TG-11 were installed by Kaufmann as part of work done for his doctoral thesis in 1970.[7] Well TG-12 is a City of Madison water supply well.

*TG-4 - This sample was to be collected from the existing City monitoring Well 200D. This well is believed to be 100 feet deep. The bladder pump permanently installed on this well would not function, therefore a sample was not retrieved.

TG-5 (Well 200S) - The well is located in the same nest with 200D, 400 feet west of the southwest corner by the landfill. 200S is believed to be 75 feet deep. The actual depth could not be measured because of a bladder pump permanently installed on this well hindered measurement.

*TG-6 - This sample was to be collected from the existing City Monitoring Well 121A. Its depth is believed to be 37 feet. The diameter of this well was approximately one inch. Due to shifting of the landfill, the riser was crooked and disjointed. A copper bailer was used to attempt to retrieve a sample but the attempt was unsuccessful. The copper bailer became stuck at approximately 3 feet below ground level and was unable to be retrieved until several days later. Smaller bailers were not available.

*TG-7 - This sample was to be collected from the existing City Monitoring Well 121D. Its depth is believed to be 100 feet. The condition of this well was similar to 121A. A Teflon bailer was used but a sample could not be collected. The Teflon bailer was stuck at approximately 8 feet below ground level and was unable to be retrieved until several days later.

*TG-8 - This sample was to be collected from the existing city Monitoring Well 132. However this well was believed to have been destroyed.

TG-9 (Well 152) - This well is located west of the landfill inside a warehouse currently leased by Wisconsin Cheeseman. The well is located in the 9th storage aisle from the east end of the building, 17 feet south of the main aisle. The warehouse was used for cold storage of cheese. The well had a total depth of approximately 58 feet.

TG-10 (Well 104) - This well was located about 40 feet west of the road at the western boundary of the landfill. It was constructed of PVC pipe. Its total depth was approximately 59 feet.

TG-11 (Well 101) - This well was located near the fenceline at the southwestern corner of the landfill. The well had a total depth of 31.6 feet and was constructed of PVC pipe.

TG-12 (Madison Well No. 7) - This well was located at the intersection of Schlimgen and Sherman Avenues, approximately 2,000 feet west-northwest of Well 152. The well was 750 feet deep.

OSCAR MAYER WELLS:

TG-13 (Oscar Mayer Well No. 3) - This well was located approximately 500 feet west of Packers Avenue and 500 feet north of the southern boundary of the Oscar Mayer Plant complex. It is believed to be 750 feet deep.

TG-14 (Oscar Mayer Well No. 5) - This well was located about 50 feet south of Aberg Avenue, west of Packers Avenue, in the northeast corner of the Oscar Mayer complex. The well is believed to be 750 feet deep.

3.2.2 Monitoring Well Construction

Monitoring Wells TG-1, TG-2, and TG-3 were installed in accordance with Section 10 of the Scope of Work.

Drilling and installation of the three monitoring wells was performed by Geotechnology, Inc. of St. Louis, Missouri on June 1 and June 7, 1988 and supervised by Paul Shetley of EEI.

All borings were completed with a 8-3/4-inch outside diameter, hollow stem auger. Split spoon samples were collected from the boring continuously for the first 10 feet, and at 5-foot intervals or stratum changes to the end of the boring. Each split spoon sample was visually classified and logged. In order to verify the classification, two samples from each boring were submitted for physical analysis (grain size, Atterberg limits and moisture content). The samples were analyzed by Geotechnology and results are

*These wells were unable to be sampled.

presented in Appendix C. Logs from each of the three borings are presented in Appendix D. All remaining split spoon samples were placed in glass jars and stored at EEI for future reference or physical laboratory verification, if required.

To avoid any contamination during the drilling and well installation procedure, all augers, bits, rods, stainless steel split spoons and other equipment used were thoroughly steam cleaned prior to drilling at each site. Prior to collection of each split spoon sample, the split spoon samplers were cleaned with an Alconox solution, rinsed with fresh water and rinsed finally with DI water.

Wells TG-1 and TG-2 were installed with the addition of 14 gallons of water at each borehole. At TG-3, approximately 80 gallons of water were added to prevent collapse of the well. The source of this water was the Maple Bluff Country Club irrigation pond 1.5 miles west of the drill site.

At each site, 10 feet of slotted PVC well screen was threaded onto the PVC well casing. The screen consisted of 2-inch schedule 40 PVC casing pre-slotted to 0.010 inch. The entire length of schedule 40 PVC riser was lowered into the boring through the auger center to a depth of 1 foot above the bottom of the boring. The 1 foot open hole and annulus around the well screen to a height of 2 feet above the top of the screen was filled with medium to coarse prewashed filter sand. The augers were successively removed during this process to accommodate the placement of the filter sand.

After the filter sand pack was in place, bentonite pellets were added. To insure a complete seal within the borehole, the pellets were forced out of the bottom of the auger and into the annulus by using a "tamping rod." The pelleted seal had a minimum height of 2 feet above the sand filter. After placement of this seal, the augers were completely removed and the borehole annulus filled with a bentonite cement slurry to the ground surface.

A 5-foot x 6-inch, round steel protector pipe with hinged lid was placed over the PVC riser pipe and allowed to settle for 24 hours. The next day, the cavity created by settling of construction material was filled in and the grout surface was mounded to inhibit puddling of water around the well. Three protective steel guard posts were erected radially around each well. All pipes and posts were painted red for high visibility and protector pipes were locked with a keyed padlock.

3.2.3 Well Development

Geotechnology developed each well after construction was completed. The development program was directed by Paul Shetley of EEI on June 8, 1988.

TG-1 was bailed using a PVC bailer. Approximately 100 gallons were removed from TG-1 during development. The well water remained silty even after completion of development. TG-2 was developed by pumping approximately 175 gallons of water using a centrifugal pump. The well water in TG-2 also remained very silty after completion of development. TG-3 was developed by pumping approximately 500 gallons of water using an air lift pump. The volume of water removed from TG-3 was increased in order to compensate for the addition of approximately 80 gallons of water used during drilling. The well water from TG-3 appeared quite clear, however, a very strong solvent odor was detected and the water effervesced strongly when poured.

3.2.4 Permeability Testing

In-situ permeability testing was conducted by Paul Shetley and Craig Jones of EEI on July 15, 1988. The results are presented in Appendix E and summarized below.

The depth to water from the top of the PVC casing was measured at each well. A PVC bailer (0.14 feet outside diameter x 3.85 feet long) full of water was then lowered into the well. This generated a calculated 2.68 feet instantaneous rise in the water level in the well. The bailer was quickly followed by the water level indicator to measure the rate at which the water level returned to the pre-slug level. This was the first method used for permeability testing. Once the water returned to the pre-slug level, the bailer full of water (the slug) was then quickly pulled out of the well. The water level indicator was used once again to measure the rate at which the water level returned to the pre-slug level. Hence two methods termed "slug-in" and "slug-out" were used for permeability testing.

TABLE 3-1
SUMMARY OF AQUIFER TEST RESULTS

		k, Coefficient of Permeability
Well No.	Trial No.	Cooper, et al. (cm/sec)
TG-1	1	8.91×10^{-4}
TG-1	2	8.50×10^{-4}
TG-2	1	1.02×10^{-3}
TG-2	2	9.23×10^{-4}
TG-3	1	8.47×10^{-4}
TG-3	2	8.85×10^{-4}

3.2.5 Site Survey

After completion of monitoring well installation, a site survey of the three monitoring wells was performed to establish the horizontal and vertical location of each well, in accordance with Section 10 of the Scope of Work. This work was conducted by Weber, Hillemeier, and Fischer, Inc. of Galesburg, Illinois, in July of 1987. The results of the survey and the location of the permanent monuments placed in the project area are presented in Appendix F.

Based on the results of the monitoring well installations and the site survey, groundwater elevations at each monitoring well were compiled and are summarized in Table 3-2.

TABLE 3-2
SUMMARY OF GROUNDWATER ELEVATIONS

Well	GW Elevation (feet)	Stickup	TOC Elevation (feet)	TOC Dw (feet)	GS Elevation (feet)	1988 Date
TG-1	-0.18	2.82'	20.11	20.29	17.29	7/11/88
TG-2	-0.20	2.74'	15.51	15.71	12.77	7/11/88
TG-3	4.00	2.74'	24.38	20.38	21.64	7/12/88

NOTE: Elevations are referenced to Madison City Datum.

3.2.6 Cuttings

Cuttings from Well TG-2 were placed on and covered with plastic sheeting. Cuttings from TG-1 and TG-3 were placed in drums and placed in the JP-4 fuel area which is secured. Two drums full of cuttings were generated at each site (TG-1 and TG-3). The cuttings were placed in drums due to the potential of contamination. EEI communicated with a representative of the Wisconsin DNR concerning a permissible method for disposal of the cuttings.[15] Based on analytical results EEI was advised the wastes are potentially hazardous. Buffalo District, Corps of Engineers disagrees with this classification and is currently negotiating with the Wisconsin DNR concerning an appropriate method of disposal. Their letter to Wisconsin DNR is included in Appendix D.

3.3 SAMPLING PROGRAM

The sampling program consisted of:

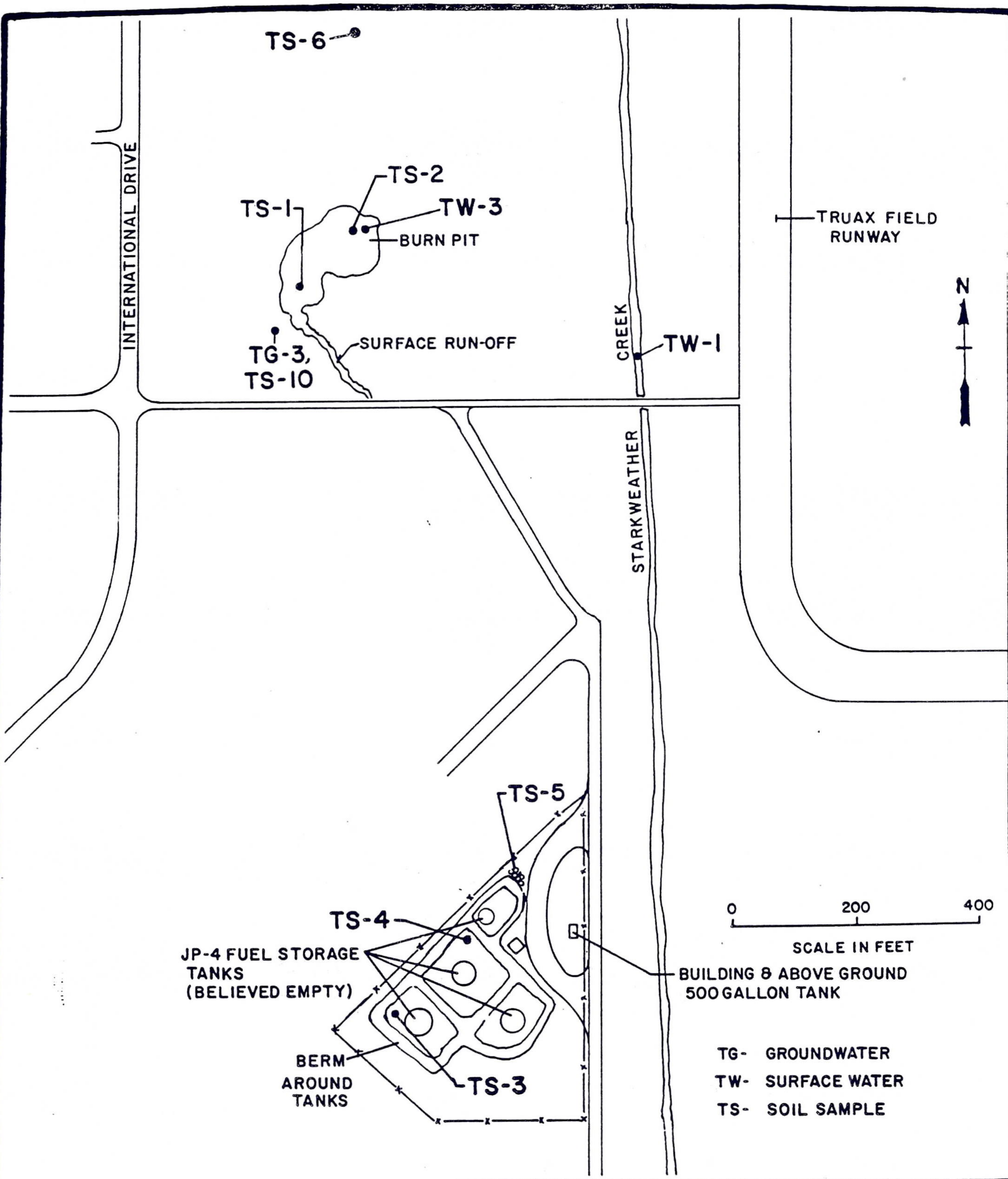
1. Collection of one set of samples taken from each of the three groundwater wells installed by EEI, five of the City of Madison's wells (including one supply well) and two of Oscar Mayer's groundwater wells. In addition, one blind duplicate of a groundwater sample and one set of samples from the source of water added to each of the wells during construction were collected.

2. Collection of soil samples from twelve potentially contaminated locations, plus one background site. A blind duplicate of one of the soil samples was also collected. Most of the samples were collected from near the surface to a maximum depth of one foot.

3. Collection of surface water samples from four potentially contaminated locations. One additional sample was taken as a blind duplicate from one of the four surface water sampling locations.

3.3.1 Sample Locations and Collection Methods

3.3.1.1 Soil Samples - Soil sampling locations were designated TS-1 through TS-13 and are shown in Figures 3-5 and 3-6. These locations were proposed and approved in the Final Supplemental Sampling/Analysis-QA/QC Project Plan. All equipment used for soil sampling was cleaned with Alconox and tap water and then rinsed several times with DI water. Descriptions of locations and collection methods for each soil sample are summarized below. Observations recorded at each site are summarized in Table 3-3.



ENVIRODYNE ENGINEERS

FIGURE 3-5

Sampling Locations
Burn Pit and JP-4 Fuel Storage Areas

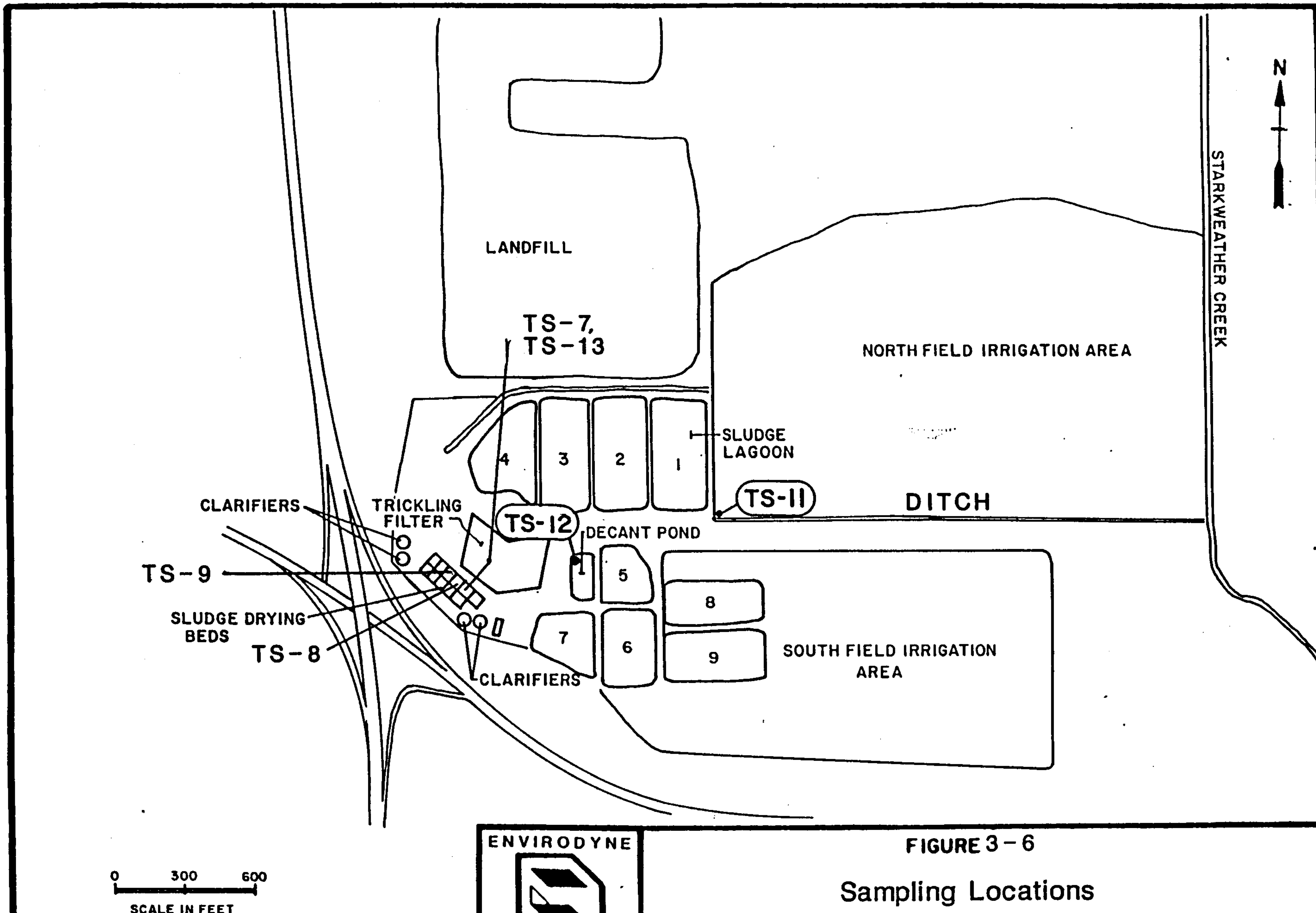


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FIGURE 3-6

Sampling Locations

Burke Wastewater Treatment Plant Area

TABLE 3-3
Summary of Soil Sampling Field Notes

Site	Collection Date	Time (HRS)	Sample Depth (inches)	Location	Soil Description At Sampling Depth	Description of Vegetation
TS-1	07-13-88	1000	0-12	Central west edge of Burn Pit	Black to gray silty sand	Denuded
TS-2	07-13-88	1000	0-12	Northern edge of Burn Pit	Black gravelly silt	Denuded
TS-3	07-13-88	1345	0-3	Below access of Fuel Storage Tank in JP-4 area	Gray silty sand with Fe stains throughout	Sparse grass
TS-4	07-13-88	1400	0-2	Drainage basin in NE corner of diked area in JP-4 area	Organic silt with scattered gravel	Few vines and grasses
TS-5	07-13-88	1315	0-2	Area surrounding drums in JP-4 area	Brown sandy silt	Scattered weeds and grasses - 6" tall
TS-6	07-13-88	0930	0-12	150 feet north of Burn Pit	Light brown silty sand	Tall weeds and grasses up to 2' tall
TS-7	07-12-88	1200	0-12	West edge of a southern sludge drying bed within the WWTP	0-6" - Brown silty sand 6-12" - Brown sand and gravel	Denuded
TS-8	07-12-88	1500	0-12	Center of a central sludge drying bed within the WWTP	Brown silty and gravelly sands	Denuded
TS-9	07-12-88	1515	0-12	A north central sludge drying bed within the WWTP	Black silty peat	Dead weeds up to 4' tall - very sparse
TS-10	06-01-88	1130	24'-25.5'	Borehole/Monitoring Well TG-3 (west of Burn Pit)	Medium sand with little gravel	Not applicable
TS-11	07-12-88	1530	0-6	Below discharge of culvert east of lagoons	Black silty sediment	Duckweed present on water
TS-12	07-12-88	1300	0-9	Decant Pond west of Lagoon #5	Black silty peat	Grasses and weec up to 6"
TS-13	07-12-88	1200	0-12	Same as TS-7	(Blind duplicate of TS-7)	-

/368

TS-1 - This sample was collected from a depth of 0 to 12 inches at the central west end of the burn pit. The sample consisted of black to gray stained sand and gravel with a strong petroleum odor. The sample was collected to assess potential soil contamination at the practice burn pit.

TS-2 - This sample was collected from a depth of 0 to 12 inches at the northern end of the burn pit. This sample also had a strong petroleum odor with the first 10 inches consisting of a black gravelly silt followed by 2 inches of gray clayey silt.

TS-3 - This sample was collected below an access port at the north end of the central west JP-4 Fuel Storage Tank from a depth of 0 to 3 inches. The sample consisted of gray silt and sand with iron staining present. Samples TS-3 (and TS-4) were collected to assess potential soil contamination related to the JP-4 fuel tanks.

TS-4 - This sample was taken from the northeast corner of the diked JP-4 fuel storage area from a collection basin. The silt accumulated within the basin was only 2 inches deep with little vegetation present. The basin was probably used to collect water after heavy rains. The water would collect in the basin and then flow through a small culvert to the other side of the diked area to prevent flooding. However, the culvert would probably remain closed most of the time to contain any spillage or leakage from the fuel oil tanks.

TS-5 - This sample was taken from the dark brown silty soil which had accumulated in the drums located in the JP-4 area. The sample was collected from a depth of 0 to 2 inches of soil lying on top of the concrete pad to assess potential contamination resulting from drum storage.

TS-6 - This sample was the background sample, taken approximately 150 feet north of the burn pit. The sample was collected from a depth of 0 to 12 inches, and consisted of 4 inches of gray organic silt followed by 8 inches of light brown silty sand.

TS-7 - This sample was taken from one of the most southern drying beds within the Wastewater Treatment Plant from a depth of 0 to 12 inches. The top 6 inches was a dark brown silty sand followed by 6 inches of light brown sand and gravel. Samples TS-7, TS-8, and TS-9 were collected to assess potential soil contamination related to sludge drying beds.

TS-8 - This sample was taken from one of the central drying beds within the Wastewater Treatment Plant from a depth of 0 to 12 inches. The top 8 inches consisted of a dark brown silty sand followed by 4 inches of sand and gravel.

TS-9 - This sample was taken from one of the more northern drying beds within the Wastewater Treatment Plant from a depth of 0 to 12 inches. This sample consisted of mostly peat.

TS-10 - This sample was collected from the borehole of Well TG-3 at a depth of 24 to 25-1/2 feet. This sample consisted of medium-grained sands and gravel. The sample was collected in response to elevated HNU readings at this depth during drilling activities. (A sample for volatile organic analysis was not collected.)

TS-11 - This sample was collected from below the discharge of a 48 inch culvert east of the Wastewater Treatment Plant lagoons. Water was approximately 4 inches deep at this location. Black organic silty sediment was collected at a depth between 0 and 6 inches.

TS-12 - This sample was collected from 0 to 9 inches within a decant pond just west of Sludge Lagoon No. 5. The sample was collected to assess potential presence of contaminants in lagoon sediments. The sample was taken approximately 13 feet east of a discharge pipe. The sample consisted of peat.

TS-13 - This sample was a blind duplicate of Sample TS-7, which was collected at one of the southern drying beds located in the Wastewater Treatment Plant.

3.3.1.2 Groundwater Samples - Groundwater sampling locations were designated TG-1 through TG-16 and are shown in Figures 3-2 thru 3-4. However, TG-4, TG-6, TG-7, and TG-8 were not collected for reasons stated later in this section.

The collection of samples from each EEI well took place after the wells were developed. All groundwater sampled were collected on July 12 through 15, 1988 by Paul Shetley and Craig Jones of EEI. Immediately prior to sample collection at TG-1, TG-2, and TG-3, at least five times the volume of standing water in each well was purged from the well using a PVC bailer. The amount to be purged from each well (PV) was computed according to the formula:

$$PV\ (gal) = 5\ [D_b(ft) - D_w\ (ft)] \times 0.163 \text{ or } 0.041\ gal/ft$$

where

PV = Minimum purge volume (gallons)

$D_b(ft)$ = Distance from top of PVC casing to bottom of well

$D_w(ft)$ = Distance from top of PVC casing to water level

0.163 gal/ft = Well volume per foot depth of 2-inch schedule 40 well casing

or

0.041 gal/ft = Well volume per foot depth of 1-inch casing

Water quality measurements (pH, temperature, and conductivity) and observations were recorded at each well and are summarized in Table 3-4.

Samples at TG-1 through TG-3 and TG-16 were collected using a 2-inch Teflon bailer. The sample at TG-5 was collected by using nitrogen gas to work a bladder pump (which was at the bottom of the well). The gas pushes the water to the surface through 1/2-inch Teflon tubing. Samples at TG-9 through TG-11 were collected by using a 1-inch PVC bailer. Samples at TG-12 through TG-14 were collected directly from a tap. Bailers and all other equipment (excluding sample containers) used in collecting the well samples were cleaned with Alconox and tap water and rinsed with DI water prior to collection of each sample. A distilled water rinse was used on the monitoring equipment prior to use at each site. The descriptions of locations and collection methods for each groundwater sample are summarized below.

TABLE 3-4
Monitoring Well Development/Collection Data

Site	1988 Date	Db (feet)	Dw (feet)	Ht (feet)	Pv (gal)	Time	Cumulative Volume Purged (gallon)	Temp •C	Comments	Odor	pH	Conductivity (umhos/cm)
TG-1	07-11	31.1	20.29	10.81	8.86	1715	0	13.0	Turbid	None	6.7	1604
						1800	10	13.0	Turbid	None	6.7	1808
TG-2	07/11	27.5	15.71	11.79	9.67	1615	0	11.9	Very Turbid	None	6.9	872
						1645	12	11.8	Very Turbid	None	7.0	1026
TG-3	07/12	28.9	20.38	8.52	6.99	0830	0	10.6	Clear	Solvent	6.7	1081
						0900	8	10.7	Clear	Solvent	6.9	1093
TG-4		UNABLE TO RETRIEVE A SAMPLE										
TG-5	07/13	NR	NR	-	2 gals were purged	1710	2	13.5	Turbid	H_2S	7.8	686
TG-6		UNABLE TO RETRIEVE A SAMPLE										
TG-7		UNABLE TO RETRIEVE A SAMPLE										
TG-8	N/A	THIS WELL HAS BEEN DESTROYED NO SAMPLE WAS RETRIEVED										
TG-9	07/14	57.83	36.46	21.37	(4.37)	1600	0.6 Slow Recharge	NR	Very Turbid	H_2S	NR	NR
TG-10	07/14	58.58	54.96	3.62	(0.74)	1800	Well not purged due to slow recharge	NR	Turbid	None	NR	NR
TG-11	07/14	31.63	21.77	9.86	(2.01)	1700	0	13.6	Turbid	None	7.1	1650
						1730	2	14.2	Turbid	None	7.1	1674
TG-12	07/14	NR	NR	NR	NR	1400	1.0	NR	Crystal Clear	None	NR	NR
TG-13	07/14	NR	NR	NR	NR	1310	2.0	NR	Very Clear	None	NR	NR
TG-14	07/14	NR	NR	NR	NR	1300	2.0	NR	Very Clear	None	NR	NR
TG-15	06/08	N/A	N/A	N/A	N/A	N/A	N/A (This is not a well sample)	N/A	Somewhat Clear	None	N/A	N/A
TG-16	SEE TG-1 (TG-16 is a Blind Duplicate)											

TG-1 - This sample was collected from the monitoring well located west of the landfill. Five times the volume of water in the well was purged using a 2-inch PVC bailer. The well was then sampled using a 2-inch Teflon bailer. The water clarity was very poor.

TG-2 - This sample was collected from the monitoring well located just west of the former Burke Wastewater Treatment Plant. Five times the volume of water in the well was purged using a 2-inch PVC bailer. The well was then sampled using a 2-inch Teflon bailer. The water was very milky with very fine silt present.

TG-3 - This sample was collected from the monitoring well located south of the practice burn pit. Five times the volume of water in the well was purged using a 2-inch PVC bailer. The well was then sampled using a 2-inch Teflon bailer. The well water was clear but had a very strong solvent odor.

TG-4 - This sample was to be collected from the existing city Monitoring Well 200D. However, the bladder pump would not function, therefore, a sample was not retrieved.

TG-5 - This sample was collected from the existing city Monitoring Well 200S which is located in the same nest as 200D. The water sample was retrieved by using nitrogen gas to operate the bladder pump which is located at the bottom of the well. The sample was collected using Teflon tubing and was very turbid with a slight odor of hydrogen sulfide.

TG-6 - This sample was to be collected from the existing City Monitoring Well 121A. TG-6 (and TG-7) consist of narrow, one-inch black iron pipe and the sections have apparently become crooked due to uneven shifting of the landfill. As a result, it was not possible to lower a bailer to the water level. A small diameter copper bailer was used to attempt to retrieve a sample but the attempt was unsuccessful. The copper bailer became stuck at approximately 3 feet below ground level and was retrieved only after much difficulty.

TG-7 - This sample was to be collected from the existing City Monitoring Well 121D. However, the Teflon bailer was stuck in an attempt to retrieve a sample due to the same type of conditions as described at TG-6. The Teflon bailer hung at approximately 8 feet below ground level and was retrieved with much difficulty.

TG-8 - This sample was to be collected from the existing City Monitoring Well 132. However this well was believed to be destroyed and no longer exist.

TG-9 - This sample was collected from the existing city Monitoring Well 152 which was located within the cheese warehouse west of the landfill. A right-of-entry was obtained and is presented in Appendix B. Five times the volume of water in the well was purged using a 1-inch PVC bailer. The well was also sampled using the same 1-inch PVC bailer. The sample was very turbid with a strong odor present.

TG-10 - This sample was collected from the existing city Monitoring Well 104 which is located across the road on the western edge of the landfill. The well was not purged due to the apparent slow recharge. The sample was collected by using a 1-inch PVC bailer and was clear with no odor present.

/368

TG-11 - This sample was collected from the existing city Monitoring Well 101 which is located near the fenceline at the southwestern corner of the landfill. Only two gallons of water were purged from this well due to the slow recharge. It was sampled using a 1-inch PVC bailer. The sample was quite clear with no odor.

TG-12 - This sample was collected from the City of Madison Municipal Well No. 7. This well was located at the intersection of Schlingen and Sherman Avenues. Approximately one gallon of water was purged before sampling. Water was purged and sampled from a copper spigot with a brass valve. The water was very clear and cold.

TG-13 - This sample was collected from the Oscar Mayer Water Supply Well No. 3 located approximately 500 feet west of Packers Avenue. Approximately 2 gallons of water was purged prior to sampling. Water was purged and sampled from a copper spigot with a brass valve. The water was very clear and cold.

TG-14 - This sample was collected from the Oscar Mayer Water Supply Well No. 5 located approximately 50 feet south of Aberg Avenue and west of Packers Avenue. Approximately 2 gallons of water was purged prior to sampling. Water was purged and sampled from a copper spigot with a brass valve. The water was very clear and cold.

TG-15 - This sample was collected from the spigot of a 500-gallon plastic tank used to haul water. The water was used for steam cleaning and well construction. The source was a small lake at Maple Bluff Country Club located near Warner Park, west of the drilling sites. The water was slightly turbid with no noticeable odor.

TG-16 - This sample was a blind duplicate of TG-3 for volatile organics only. This sample was also a blind duplicate of TG-1 for metals and petroleum hydrocarbons only.

3.3.1.3 Surface Water Samples - Surface water sampling locations were designated TW-1 through TW-5 and their locations are shown in Figures 3-5 and 3-6. The descriptions of locations and collection methods for each surface water sample are summarized below. A summary of field notes is presented in Table 3-5.

TW-1 - This sample was collected from the creek just west of the runway but inside the airport fence. The sample was collected approximately 100 feet upstream of the bridge southeast of the burn pit. The water was quite clear and flowing. Sample containers were dipped directly into the stream. The sample was collected to assess potential contamination resulting from runoff from the burn pit.

TW-2 - This sample was collected from a pool of water at the former location of Lagoon No. 4 at the former Burke Wastewater Treatment Plant. The water was quite clear with a small amount of algae present. The lagoon had been partially filled-in by the owner. The sample was collected by dipping the sample containers directly into the surface water. The sample was collected to assess potential contamination related to the former WWTP.

/368

TABLE 3-5

Summary of Surface Water Sampling Field Notes

Site	Collection Date	Time (HRS)	Depth of Water (inches)	Location of Sample	Description of Liquid	Sampling Technique
TW-1	07-15-88	0830	12	Approximately 200 feet north of bridge east of Burn Pit	Clear, no apparent odor	Grab method
TW-2	07-12-88	1630	12	From former location of Lagoon #4 within the WWTP	Clear water with some algae present	Grab method
TW-3	07-13-88	1600	6	Northeast corner of Burn Pit	Very turbid water with algae present	Grab method
TW-4	07-12-88	1700	8-12	Discharge of culvert east of wastewater lagoons near WWTP	Somewhat clear, but, very stagnant	Grab method
TW-5	Blind	Duplicate of	TW-1			

/368

TW-3 - This sample was planned to be taken in the diked area surrounding the JP-4 Fuel Tanks. Because there was no water present within the diked area in July 1988, the sampling location was changed and the sample was taken from pooled water (approximately 4' x 10' x 0.5') located within the northeast corner of the practice burn pit. The water was very turbid with algae present. Samples were collected by dipping the sample containers directly into the surface water. The sample was collected to assess potential contamination related to the burn pit.

TW-4 - This sample was collected at the discharge of a 48-inch culvert east of the Wastewater Treatment Plant lagoons (the same location as TS-11). The water was somewhat clear with duckweed present. The water was stagnant. The sample was collected by dipping the sample containers directly into the surface water. This sample site was chosen to assess potential contamination resulting from the former WWTP and/or other sources at Truax Field.

TW-5 - This sample was a blind duplicate of TW-1.

3.4 SAMPLE PRESERVATION, TRANSPORTATION, AND CUSTODY

An example of a chain of custody transfer form is presented in Exhibit 3-1. Each sample was identified by affixing a pressure sensitive gummed label on the container. The sample collection date, source of sample, preservative used, the collector's initials, and analyses required were recorded. All records were filled out legibly in ink. Examples of sample identification labels being adapted for use by EEI are illustrated in Exhibit 3-2.

EEI preserved samples in the field at the collection site at the time of collection. The preservatives used and associated sample holding times are described in Tables 3-6 and 3-7.

The sample container(s) were then placed in a transportation case along with the chain of custody record form, pertinent field records, and analysis requests. The samples were then iced and the transportation case was sealed and labeled.

All packages were shipped daily to the laboratory by Federal Express next day delivery and were accompanied by the Chain of Custody Record and other pertinent forms. A copy of these forms was retained by the field crew and transferred to the project files upon completion of the sampling. Completed forms are included in Appendix G.

3.5 SAMPLES SHIPPED TO EXTERNAL QA LABORATORY

Samples shipped to the external QA laboratory conformed with labeling and packing requirements stated in "Sample Handling Protocol for Low, Medium and High Concentration Samples of Hazardous Waste".[11] The procedures were consistent with those specified for low concentration samples.

ENVIRODYNE ENGINEERS

12161 Lackland Rd
St Louis, MO 63146
(314) 434-6960

CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: ____________ DATE WORK IN ____________ REPORT TO ____________ Page __ of __

REQUESTED BY: ____________ RECEIVED BY: ____________ DATE REQUIRED ____________

SPECIAL INSTRUCTIONS: ____

SAMPLE IDENTIFICATION						ANALYSES REQUESTED									
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER										COMMENTS
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER

ENVIRODYNE ENGINEERS

EXHIBIT 3-1

Chain of Custody/Laboratory Analysis Form

Project No. Sample Code	Lab. No.
EEI SOURCE	Parameters:
Date and Time	Preservative:
Sampler	

Project No. Sample Code	Lab. No.
EEI SOURCE	Parameters:
Date and Time	Preservative:
Sampler	

Project No. Sample Code	Lab. No.
EEI SOURCE	Parameters:
Date and Time	Preservative:
Sampler	

Project No. Sample Code	Lab. No.
EEI SOURCE	Parameters:
Date and Time	Preservative:
Sampler	

ENVIRODYNE ENGINEERS

EXHIBIT 3-2

SAMPLE CONTAINER LABELS

TABLE 3-6

SUMMARY OF WATER COLLECTION, PRESERVATION AND STORAGE REQUIREMENTS FOR EACH SAMPLE

Parameter	Preservative	Holding Times	Containers	Container Preparation
Volatile Organics	4°C 1 drop HCl	14 days	Two 40 ml glass vials, with Teflon-lined septum and screw caps	Purchased new (pre-cleaned by Pierce Chemical)
Total Metals	HNO_3, pH<2 4°C	6 months except HG 28 days	32 oz high density polyethelene bottles with Teflon-lined lids	New; rinse with dilute HNO_3 and then with DI water
Petroleum Hydrocarbons	5ml HCL/4°C	28 days	Duplicate 1 liter, wide mouth glass bottles with Teflon-lined lids	Rinse with Freon; rinse with DI water; air dry

/368

TABLE 3-7

SUMMARY OF SOIL COLLECTION, PRESERVATION AND STORAGE REQUIREMENTS FOR EACH SAMPLE

Parameter	Preservative	Holding Times	Containers	Container Preparation
Volatile Organics	4°C	14 days	Two 40 ml glass* vials, with Teflon-lined septum and screw caps	Purchased new (pre-cleaned by Pierce Chemical)*
Total Metals	4°C	6 months except HG 28 days	250 ml amber wide mouth glass with Teflon-lined lid	New; rinse with dilute HNO_3 and then with DI water
Petroleum Hydrocarbons	4°C	28 days	250 ml amber wide mouth glass with Teflon-lined lid	Rinse with Freon; rinse with DI water; air dry

*NOTE: Sample containers used to collect samples TS-7, TS-8, TS-9, TS-11, TS-12, and TS-13 were collected in 2 ounce glass wide-mouth jars with Teflon-lined lids in order to more easily and completely fill the sample container. The jars were cleaned in EEI's laboartory by rinsing with DI water and drying in an oven at 103°C for 90 minutes.

3.6 LABORATORY CUSTODY PROCEDURES

When transferring the possession of the samples, the transferee signed and recorded the date and time on the chain of custody record. Custody transfers account for each individual sample, although samples may be transferred as a group. Every person who took custody filled in the appropriate section of the chain of custody record. To prevent undue proliferation of custody records, the number of persons involved in the chain of custody was limited to those with a direct need to handle samples.

4.0 ANALYTICAL RESULTS

4.1 INTRODUCTION

This chapter contains an identification of the analytical parameters included in the contamination evaluation at Truax Field, Madison, Wisconsin; a description of the analytical methods and QA/QC procedures employed and the lower detection limits associated with these methods; criteria for evaluation of the results; a presentation of the results of the sampling and analysis program; and interpretation of results. Analytical results are provided in their entirety in Appendix H.

With certain exceptions, all samples collected were analyzed for the same parameters, including volatile organics, petroleum hydrocarbons, and total metals (mercury, arsenic, selenium, silver, barium, cadmium, chromium and lead). In addition, groundwater samples were analyzed for iron, manganese, and sodium.

4.1.1 Analytical Methods and Detection Limits

Analytes, analytical methods used, and minimum detection limits for each parameter in the program are summarized in Table 4-1. The specific volatile organics included in the analytical program, and their detection limits in soil and water samples, are identified in Table 4-2.

4.1.2 Quality Assurance/Quality Control

The QA/QC Program was conducted to insure the validity of data generated through the sampling/analytical program. As part of the QA/QC Program, the U.S. Army's Missouri River Division (MRD) Laboratory served as an external QA laboratory. Results of QA analyses are presented in Appendix I. Results of analyses had not been reviewed and accepted by the U.S. Army Corps of Engineers at the time of submittal of this Report.

The specific role of various types of QA/QC procedures are briefly described in the following paragraphs.

1) Travel Blanks - These blanks were duplicate, 40 ml vials, filled in the laboratory with DI water, transported to the site, handled like a sample, and analyzed to determine if contamination was present due to container preparation or shipping procedures (for volatile organics only). Three sets consisting of replicate 40 ml travel blanks were obtained during the sampling program. For each set, one vial was analyzed by EEI and one vial was analyzed by the MRD laboratory. They were labeled TX-1, TX-2, and TX-3.

2) Sampling Blanks - Complete sets of containers were filled with organic-free distilled water. This water was poured into the sampling bailer or other vessels used during sampling and then into sample containers. The blanks were preserved identically to other samples of their type, and analyzed to determine if sampling equipment was a source of contamination. Sampling blanks were collected prior to collection of groundwater and surface water samples and were labeled TY-1 and TY-2.

/368

TABLE 4-1

SUMMARY OF ANALYTICAL METHODS, ANALYTES AND MINIMUM DETECTION LIMITS

Parameter	Analyte	Soil and Groundwater Method	Number	Detection Limit Soil	Water
Total Metals	Mercury	Cold vapor AA	7471/7470[d]	0.1 ug/g	0.2 ug/l
	Arsenic	Furnace AA	3020/3050/7060[f]	0.35 ug/g	3.4 ug/l
	Selenium	Furnace AA	3020/3050/7740	0.20 ug/g	2.0 ug/l
	Silver	Furnace AA	3020/3050/7760	0.16 ug/g	1.4 ug/l
	Barium	ICAP	3010/3050/6010[e]	5.0 ug/g	4.0 ug/l
	Cadmium	ICAP	3010/3050/6010	2.0 ug/g	2.0 ug/l
	Chromium	ICAP	3010/3050/6010	4.0 ug/g	4.0 ug/l
	Lead	ICAP	3010/3050/6010	7.5 ug/g	10.0 ug/l
	Sodium[c]	ICAP	3050/6010	Not Required	10.0 ug/l
	Iron[c]	ICAP	3050/6010	Not Required	4.0 ug/l
	Manganese[c]	ICAP	3050/6010	Not Required	2.0 ug/l
Petroleum Hydrocarbon		Infrared Spectro-photometer	9071[b]/418.1	50.0 ug/g	1.0 mg/l
Volatile Organics	Library Search	GC/MS with purge and trap	8240 plus library search	0.4-5.9 ng/g[a]	0.4-5.9 ug/l[a]

NOTES: [a]Approximate range of values, depending on specific compound. See Table 4-2 for specific detection limits.

[b]Freon was used in the extraction. Method 9071 was followed only through Step 7.11, followed by adjusting the volume with Freon 113 to 100 ml, and then using the analysis steps of Method 418.1.

[c]Sodium, Iron and Manganese analyses required only for groundwater.

[d]Method 7471 is applicable to soil; Method 7470 is applicable to aqueous media.

[e]Method 3050 is used for soils; Method 3010 is for aqueous media.

[f]Method 3020 is used for extraction of aqueous samples, Method 3050 is used for extraction of soil samples. The same extract is then used for all three analytes.

TABLE 4-2

VOLATILE ORGANICS AND
THEIR DETECTION LIMITS IN SOIL AND WATER

Parameter	Detection Limits Soil (ng/g)	Water (ug/L)
Benzene	0.5	0.5
Bromoform	3.2	3.2
Carbon Tetrachloride	1.5	1.5
Chlorobenzene	0.6	0.6
Chlorodibromomethane	2.0	2.0
Chloroethane	2.4	2.4
2-Chloroethylvinyl Ether	5.9	5.9
Chloroform	0.8	0.8
Dichlorobromomethane	1.1	1.1
1,1-Dichloroethane	0.8	0.8
1,2-Dichloroethane	1.5	1.5
1,1-Dichloroethylene	1.9	1.9
1,2-Dichloropropane	1.5	1.5
1,3-cis-Dichloropropylene	1.5	1.5
1,3-trans-Dichloropropylene	1.5	1.5
Ethylbenzene	0.4	0.4
Methyl Bromide	1.5	1.5
Methyl Chloride	1.6	1.6
Methylene Chloride	1.1	1.1
1,1,2,2-Tetrachloroethane	1.4	1.4
Tetrachloroethylene	1.5	1.5
1,3-Dichlorobenzene	3.5	3.5
Trichlorofluoromethane	1.3	1.3
Toluene	1.0	1.0
1,2-trans-Dichloroethylene	1.5	1.5
1,1,1-Trichloroethane	1.2	1.2
1,1,2-Trichloroethane	1.6	1.6
Trichloroethylene	1.3	1.3
Vinyl Chloride	1.2	1.2

NOTE:

The detection limits shown in Table 4-2 have been demonstrated by EEI in a previous laboratory audit. These limits are lower than Practical Quantitation Limits (PQLs) published in Method 8240. PQLs are generally 5 ug/l. The reporting of values below PQLs published by USEPA should be interpretted as an indication that the compound is very likely present, but determination of the actual concentration should be considered semi-quantitative.

Methylene chloride, acetone, 2-butanone, hexane, and toluene are recognized by USEPA in their Contract Laboratory Program (CLP) as common laboratory contaminants due to their usage as solvents. The USEPA CLP Protocol allows detection of up to 25 ug/l of these solvents in laboratory blanks without corrective action. Therefore, detection of these solvents at levels $\leq$25 ug/l must be recognized as potentially due to laboratory contamination.

/368

3) Split Samples - After collection, split samples were divided into two parts and sent to two different laboratories for duplicate analyses. One part was analyzed by EEI while the other part was analyzed by the MRD Lab. Split samples are not possible for volatile organics samples. Split samples were collected at TS-7, TW-1, TG-3, TX-1, TX-2, TX-3, TY-1, TY-2, and TY-3.

4) Field Duplicates - Field duplicates, collected at the same time and location and placed in separate sample containers, were used to assess the precision of the overall sampling and analysis procedures. In addition, field duplicates are substituted for split samples for volatile organics samples. In this project, field duplicates were collected at sites TG-3, TW-1, and TS-7.

5) Laboratory Blanks - Laboratory blanks were analyzed with each group of soil and water samples to determine if laboratory procedures were responsible for introduction of contaminants.

6) Surrogate Analyses - Surrogate analyses involve the introduction into the sample of compounds which behave similarly to the compounds of interest. They were used in purgeable analyses. Surrogates were used to establish control limits for analyses, as well as to estimate the recovery of the target analytes within the sample matrix.

7) Check and Calibration Standards - Check and calibration standards were used for instrument calibration and to establish control limits for analytical parameters.

8) Rinsate Sample - After soil sampling equipment was cleaned and before the sample was collected at site TS-7, distilled water was poured over the sampling equipment into the appropriate sample containers and preserved to determine if sampling equipment was responsible for introduction of contaminants. This sample was designated TY-3.

9) Background Sample - This soil sample (TS-6) was taken from a site on Truax Field property thought to be contaminant-free. The site was selected to be as geologically similar to the other sample sites as possible.

4.1.3 Evaluation Criteria for Analytical Results

4.1.3.1 Resource Conservation and Recovery Act Regulations - The Resource Conservation and Recovery Act (RCRA) established criteria by which wastes are classified as hazardous. Eight of the metals selected for analysis in this program were identical to those metals used in the characterization of EP Toxicity.

The EP Toxicity test involves combination of a solid waste with 16 times its weight of DI water. If the pH of the resulting solution is greater than 5.0, the pH of the solution is lowered to 5.0 by addition of up to 400 ml of 0.5N acetic acid [9]. If pH does not require adustment, 400 additional ml of DI water is added. A solid waste exhibits the characteristic of EP Toxicity if, using the test methods described in 40 CFR 261, Appendix II, the extract from a representative 100 gram sample contains any of the metals listed in Table 4-3 at a concentration equal to or greater than the respective value given in that table. If the waste contains less than 0.5% filterable solids, the waste after filtering is considered to be the extract.

TABLE 4-3

MINIMUM CONCENTRATION OF CONTAMINANTS
FOR CHARACTERISTIC OF EP TOXICITY

Metal	Minimum Concentration (mg/l)
Arsenic	5.0
Barium	100.0
Cadmium	1.0
Chromium	5.0
Lead	5.0
Mercury	0.2
Selenium	1.0
Silver	5.0

/368

Although EP Toxicity testing was not performed, it is possible to estimate whether a soil sample could potentially exhibit EP Toxicity characteristics by computing the maximum amount of each metal which might leach from a 100 gram sample, assuming 100% extraction, and then computing the resulting concentration in 2,000 grams DI water/acetic acid solution.

In addition to toxicity, wastes are classified as hazardous if they exhibit characteristics of ignitability, corrosivity and reactivity. These tests were not included in the Program because it is an initial contamination evaluation.

4.1.3.2 Groundwater Protection Criteria - Regulations published in 40 CFR 264, Subpart F, apply to owners and operators of hazardous waste treatment, storage and disposal facilities. Subpart F establishes groundwater concentration limits for the eight metals included in the analytical program. These limits are presented in Table 4-4 [10]. In addition, hundreds of additional hazardous constituents defined in Appendix VIII of 40 CRF 261 are subject to regulation if detected in groundwater. These hazardous constituents include some of the volatile organics included in the analytical program. If detected in groundwater due to operation of a hazardous waste storage, treatment or disposal facility, it is the responsibility of the USEPA Regional Administrator to set limits for Appendix VIII compounds [10].

4.1.3.3 Evaluation Criteria Related to the Safe Drinking Act - The Safe Drinking Water Act (SDWA) requires the USEPA to establish primary drinking water regulations. These regulations apply to public water systems. They specify contaminants which, in the judgment of the Administrator of the EPA, may have an adverse effect on the health of persons. They also specify for each contaminant either Maximum Contaminant Levels (MCLs) or Maximum Contaminant Level Goals (MCLGs) based on treatment technologies. The regulations are presented in this report as criteria for comparison of analytical results with standards [11].

In accordance with SDWA, the USEPA has promulgated final MCLGs for organic chemicals and proposed MCLGs for inorganic chemicals. MCLGs are defined as "non-enforceable health goals which are to be set at levels which would result in no known or anticipated adverse health effects with an adequate margin of safety." MCLGs have no legal impact on public water system or the public. No system is bound to remove contaminants to this level or take other action regarding contaminants. MCLGs are initial goals used by USEPA in the course of development of MCLs.

MCLs have been promulgated for organic and inorganic chemicals. MCLs are enforceable standards and are to be set as close to the MCLGs (health goals) as is feasible. They are based on treatment technologies, costs, and other feasibility factors such as availability of analytical methods and treatment technology, and costs for achieving various levels of removal.

MCLGs and MCLs currently in effect for organic chemical parameters included in the Truax Field Contamination Evaluation are presented in Table 4-5. RCRA Groundwater Protection Limits, proposed MCLGs and promulgated MCLs for inorganic chemicals evaluated in the project are included in Table 4-6. In each table, maximum concentrations detected in groundwater and Wisconsin Water Quality Standards are compared with the MCLGs and MCLs.

TABLE 4-4

MAXIMUM ALLOWABLE CONCENTRATION OF CONTAMINANTS
FOR GROUNDWATER PROTECTION
(Source: 40 CFR 264, Subpart F)

Constituent	Maximum Concentration (mg/l)
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Lead	0.05
Mercury	0.002
Selenium	0.01
Silver	0.05
Endrin (1,2,3,4,10,10-hexachloro-1,7-epoxy-1,4,4a,5,6,7,8,9-a octahydro-1, 4-endo, endo-5,8-dimethano naphthalene)	0.0002
Lindane (1,2,3,4,5,6-hexachlorocyclohexane, gamma isomer)	0.004
Methoxychlor (1,1,1-trichloro-2,2-bis(p-methoxyphenylethane)	0.1
Toxaphene ($C_{10}H_{10}Cl_6$, Technical chlorinated camphene, 67-69% chlorine)	0.005
2,4-D (2,4-dichlorophenoxyacetic acid)	0.1
2,4,5-TP Silvex (2,4,5-trichlorophenoxypropionic acid)	0.01

/368

TABLE 4-5

FINAL MCLGs AND MCLs AND STATE OF WISCONSIN
DRINKING WATER STANDARDS FOR ORGANIC CHEMICALS AND COMPARISON
WITH MAXIMUM CONCENTRATIONS DETECTED IN GROUNDWATER

Compound	Final MCLG (ug/l)	Final MCL (ug/l)	State of Wisconsin(a) Standards (ug/l)	Highest Observation (ug/l)	Sample
Benzene	0	5	5	Not Detected	
Vinyl Chloride	0	2	2	16.7	TG-11
Carbon Tetrachloride	0	5	5	Not Detected	
1,2-Dichloroethane	0	5	5	Not Detected	
Trichloroethylene	0	5	5	11.0	TG-13
1,1-Dichloroethylene	7	7	7	Not Detected	
1,1,1-Trichloroethane	200	200	200	Not Detected	
p-Dichlorobenzene	75	75	75	Not Detected	
Toluene	-	-	343	452.4	TG-16
Ethylbenzene	-	-	1,360	33.4	TG-16
Xylene	-	-	620	705[b]	TG-3, TG-16
Tetrachloroethylene	-	-	20	8.8	TG-14

NOTES: (a) Current Wisconsin Drinking Water Health Advisory Standards [14]
(b) Two isomers of xylene were found in TG-3 and its blind duplicate TG-13. The concentration reported is the total concentration of the two isomers.

/368

TABLE 4-6

COMPARISON OF MAXIMUM GROUNDWATER CONCENTRATIONS WITH STANDARDS FOR INORGANIC CHEMICALS

Parameter	Proposed MCLG (ug/l)	Promulgated[a] MCLs (ug/l)	Highest Observation (ug/l)	Well Designation
Arsenic	50	50	12.9	TG-10
Barium	1,500	1,000	793	TG-2
Cadmium	5	10	12	TG-9
Chromium	120	50	302	TG-9[b]
Lead	20	50	333	TG-9[c]
Mercury	3	2	2.0	TG-11
Selenium	45	10	<2	All
Silver	-	50	4.62	TG-9

NOTES:

[a]State of Wisconsin Community Drinking Water Standards identical.[14]
[b]Samples TG-2, TG-10 and TG-16 also exceeded 50 ug/l.
[c]Samples TG-2, TG-10, TG-11 and TG-16 were also greater than 50 ug/l.

In addition to the regulations noted above, regulations for other volatile organic compounds are in the process of being developed. Proposed MCLGs for additional synthetic organic chemicals are presented in Table 4-7.

4.1.3.4 Comprehensive Environmental Response Compensation and Liability Act - The purpose of the National Oil and Hazardous Substance Pollution Contingency Plan is to put into effect the response powers and responsibilities created by the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) of 1980. The National Oil and Hazardous Substance Pollution Contingency Plan establishes methods and criteria for determining the appropriate extent of response when hazardous substances are released. The states are encouraged to undertake a series of actions in case of a potential release of hazardous substances. These steps include discovery and notification, preliminary assessment, immediate removal, evaluation and determination of appropriate response, planned removal, remedial action, and documentation and cost recovery [12].

CERCLA requires that the relative potential of uncontrolled hazardous substance facilities to cause health and safety problems or ecological or environmental damage be assessed. Assessment is performed using the Hazardous Ranking System (HRS) form which has been completed and submitted in Appendix J together with this contamination evaluation [12]. The HRS form will be used by the Army to evaluate the results of the contamination evaluation.

Under Section 102a of CERCLA, regulations designate those substances which are considered hazardous, establish reportable quantities for these substances, and set forth the notification requirements for releases of these substances. Reportable quantity means that quantity of release which requires notification pursuant to regulations; the total amount of release, not the amount of contaminant in the release. Several hundred substances are considered hazardous substances and are identified in the Code of Federal Regulations [13]. Results of the contamination evaluation will be interpretted with respect to compounds which may have been spilled and may be hazardous substances.

4.1.3.5 State of Wisconsin Standards State of Wisconsin water-quality regulations [14] are referenced in Tables 4-5 and 4-6.

4.2 GROUNDWATER ANALYSIS RESULTS

Analytical results for metals and petroleum hydrocarbon groundwater samples are presented in Table 4-8. A summary of results of analyses for volatile organics analyses found above the minimum detection limits are presented in Table 4-9. Minimum detection limits during the initial sampling and analysis program for volatile organics are found in Table 4-2. The groundwater samples include samples TG-1, TG-2, TG-3 and TG-16 (collected from monitoring wells installed as a part of this project), TG-5, TG-9, TG-10 and TG-11 (collected from monitoring wells installed by Kaufmann), TG-12 (collected from Madison City Well No. 7), TG-13 and TG-14 (collected from Oscar Mayer wells) and TG-15 (a sample of water used during installation of Wells TG-1, TG-2, and TG-3.

TABLE 4-7

ADDITIONAL PROPOSED MCLGs FOR VOLATILE ORGANIC CHEMICALS
AND COMPARISON WITH MAXIMUM CONCENTRATIONS DETECTED IN GROUNDWATER

Parameter	Proposed MCLG (mg/l)	Maximum Groundwater Concentration Observed	Well
Acrylamide	0	-	
Alachlor	0	-	
Aldicarb, Aldicarb sulfoxide, Aldicarb sulfone	0.009	-	
Carbofuran	0.036	-	
Chlordane	0	-	
cis-1,2-Dichloroethylene	0.07	-	
DBCP	0	-	
1,2-Dichloropropane	0.006	-	
o-Dichlorobenzene	0.62	-	
2,4-D	0.07	-	
EDB	0	-	
Epichlorohydrin	0	-	

Parameter	Proposed MCLG (mg/l)	Maximum Groundwater Concentration Observed	Well
Ethylbenzene	0.68	0.0334	TG-16
Heptachlor	0	-	
Heptachlor Epoxide	0	-	
Lindane	0.0002	-	
Methoxychlor	0.34	-	
Monochlorobenzene	0.06	0.0012	TG-10
Pentachlorophenol	0.22	-	
Styrene	0.14	-	
Toluene	2.0	0.4524	TG-16
2,4,5-TP	0.052	-	
Toxaphene	0	-	
trans-1,2-Dichloroethylene	0.07	0.0276	TG-10
Xylene	0.44	0.501	TG-16

Notes:

TG-3 and TG-16 are field duplicates.

/368

TABLE 4-8

SUMMARY OF METAL AND PETROLEUM HYDROCARBON ANALYSIS
SURFACE WATER AND GROUNDWATER
TRUAX FIELD
MADISON, WISCONSIN

SITE ID	SITE DESCRIPTION	SAMPLE NUMBER	UNITS	AG	AS	BA	CD	CR	FE**	HG	MN	NA**	PB	SE	PETRO* HYDRO
SURFACE WATER SAMPLES:															
TW-1	CREEK EAST OF BURN PIT	7313	UG/L	< 1.4	< 3.4	39	< 2.0	< 4	NR	< 0.2	NR	NR	15	< 2	< 1
TW-2	BURKE WWTP LAGOON #4	7111	UG/L	< 1.4	< 3.4	93	< 2	< 4	NR	< 0.2	NR	NR	< 10	< 2	< 1
TW-3	STANDING WATER IN BURN PIT	7184	UG/L	3.80	42.8	104	< 2	38	NR	< 0.2	NR	NR	112	< 2	2
TW-4	BURKE WWTP OUTFALL TO DITCH	7112	UG/L	< 1.4	< 3.4	22	< 2	< 4	NR	< 0.2	NR	NR	13	< 2	65
TW-5	BLIND DUPLICATE OF TW-1	7314	UG/L	< 1.4	< 3.4	35	< 2	< 4	NR	< 0.2	NR	NR	< 10	< 2	< 1
				< 1.4	< 3.4	34	< 2	< 4					< 10	< 2	
GROUNDWATER SAMPLES:															
TG-1	DOWNGRADIENT OF LANDFILL	7312	UG/L	< 1.4	6.9	430	3	21	108,000	0.22	5320	87,800	30	< 2	< 1
TG-2	DOWNGRAD. OF BURKE WWTP	7311	UG/L	< 1.4	11.6	793	7	94	39,600	0.22	4210	19200	124	< 2	< 1
TG-3	BURN PIT	7117	UG/L	< 1.4	6.9	270	< 2	35	37,400	0.23	1360	13,200	24	< 2	7
										0.21					
TG-5	WELL 200S	7185	UG/L	< 1.4	8.9	35	< 2	< 4	2310	< 0.2	103	50,200	10	< 2	< 1
TG-9	WELL 152	7258	UG/L	4.62	< 3.4	222	12	302	405,000	0.98	3260	17,800	333	< 2	85
TG-10	WELL 104	7259	UG/L	< 1.4	12.9	249	5	178	48,700	< 0.2	1600	21,200	157	< 2	< 1

TABLE 4-8

SUMMARY OF METAL AND PETROLEUM HYDROCARBON ANALYSIS
SURFACE WATER AND GROUNDWATER
TRUAX FIELD
MADISON, WISCONSIN

SITE ID	SITE DESCRIPTION	SAMPLE NUMBER	UNITS	AG	AS	BA	CD	CR	FE**	HG	MN**	NA**	PB	SE	PETRO* HYDRO
TG-11	WELL 101	7260	UG/L	< 1.4	7.1	58	4	29	46,500	2.0	912	50,600	62	< 2	< 1
TG-12	MADISON WELL NO. 7	7261	UG/L	< 1.4	< 3.4	32	< 2	<4	272	< 0.2	24	4570	< 10	< 2	< 1
TG-13	OSCAR MAYER WELL NO. 3	7262	UG/L	< 1.4	< 3.4	40	< 2	<4	894	0.21	94	17,000	< 10	< 2	< 1
TG-14	OSCAR MAYER WELL NO. 5	7263	UG/L	< 1.4	< 3.4	30	< 2	<4	196	0.33	54	31,600	< 10	< 2	< 1
TG-15	WELL CONSTRUCTION WATER	6028	UG/L	< 1.4	< 3.4	29	6	<4	733	0.38	36	13,200	43	< 2	< 1
				< 1.4		32	7	<4	783		40	12,900	48	< 2	
TG-16A	BLIND DUPLICATE OF TG-1	7315	UG/L	3.67	< 3.4	394	9	55	61,300	0.22	5480	91,600	83	< 2	< 1
ADDITIONAL SAMPLES:															
TY-1	GROUNDWATER SAMP. BLANK	7119	UG/L	< 1.4	< 3.4	< 4	< 2	< 4	17	< 0.2	< 2.0	162	< 10	< 2	< 1
									(5)			(110)			
TY-2	SURFACE WATER SAMPLING	7120	UG/L	< 1.4	< 3.4	< 4	< 2	< 4	NR	0.26	NR	NR	< 10	< 2	< 1
	BLANK									< 0.2					
TY-3	SOIL RINSATE	7114	UG/L	< 1.4	< 3.4	< 4	< 2	< 4	NR	0.26	NR	NR	< 10	< 2	< 1

NOTES: NR = NOT REQUESTED
* = ALL RESULTS FOR PETROLEUM HYDROCARBONS ARE IN PPM
(MG/L FOR LIQUIDS AND UG/G FOR SOILS)
**= Indicates the element is included in the list on Table 4-3.

TABLE 4-9

SUMMARY OF VOLATILE ORGANICS FOUND ABOVE MINIMUM DETECTION LIMITS IN WATER SAMPLES
TRUAX FIELD
MADISON, WISCONSIN

SITE ID	SITE DESCRIPTION	ANALYSIS DATE	SAMPLE NUMBER	UNITS	METHYLENE CHLORIDE	BENZENE	TOLUENE	TRANS-1,2-DICHLOROETHYLENE	THIOBISMETHANE *	TETRACHLOROETHYLENE	TRICHLOROFLUOROMETHANE	DICHLOROFLUOROMETHANE *	ETHYLBENZENE	CHLOROBENZENE	CHLOROETHANE	TRICHLOROETHYLENE	VINYL CHLORIDE	ACETONE *	2-BUTANONE *	TETRAHYDROFURAN *	OTHER COMPOUNDS	UNKNOWN
SURFACE WATER SAMPLES:																						
TW-1	CREEK EAST OF BURN PIT	7/27/88	7110	UG/L																		
TW-2	BURKE WWTP LAGOON #4	7/26/88	7111	UG/L																		
TW-3	STANDING WATER IN BURN PIT AREA	7/28/88	7184	UG/L	11.6	1.3	1.2	9.6	27.0	11.5												
TW-4	BURKE WWTP OUTFALL TO DITCH	7/26/88	7112	UG/L						3.2												
TW-5	BLIND DUPLICATE OF TW-1	7/26/88	7113	UG/L																		
GROUNDWATER SAMPLES:																						
TG-1	DOWNGRADIENT OF LANDFILL	7/26/88	7115	UG/L																		
TG-2	DOWNGRAD. OF BURKE WWTP	7/26/88	7116	UG/L																		
TG-3	BURN PIT	7/27/88	7117	UG/L	52.8		223.2														(1) *	
TG-5	WELL 200S	7/28/88	7185	UG/L																		
TG-9	WELL 152	7/29/88	7258	UG/L				1.5			9.7	9.0										
TG-10	WELL 104	7/28/88	7259	UG/L				27.6						1.2	9.1	3.9						
TG-11	WELL 101	7/28/88	7260	UG/L													16.7					
TG-12	MADISON WELL NO. 7	7/28/88	7261	UG/L																		
TG-13	OSCAR MAYER WELL NO. 3	7/28/88	7262	UG/L							10.0					11.0						
TG-14	OSCAR MAYER WELL NO. 5	7/28/88	7263	UG/L						8.8						2.2						
TG-15	WELL CONSTRUCTION WATER	6/15/88	6028	UG/L	5.2													5.0	48.0	23.0		
TG-16	BLIND DUPLICATE OF TG-3	7/27/88	7118	UG/L	55.7		452.4						33.4								(2) *	
ADDITIONAL SAMPLES:																						
TY-1	GROUNDWATER SAMP. BLANK	7/26/88	7119	UG/L																		
TY-2	SURFACE WATER SAMPLING BLANK	7/26/88	7120	UG/L																	(3) (4)	

TABLE 4-9

SUMMARY OF VOLATILE ORGANICS FOUND ABOVE MINIUMUM
DETECTION LIMITS IN WATER SAMPLES
TRUAX FIELD
MADISON, WISCONSIN

SITE ID	SITE DESCRIPTION	ANALYSIS DATE	SAMPLE NUMBER	UNITS	METHYLENE CHLORIDE	BENZENE	TOLUENE	TRANS-1,2-DICHLOROETHYLENE	THIOBISMETHANE	TETRACHLOROETHYLENE	TRICHLOROFLUOROMETHANE	DI-* CHLOROFLUOROMETHANE	ETHYL BENZENE	CHLOROBENZENE	CHLOROETHANE	TRICHLOROETHYLENE	VINYL CHLORIDE	* ACETONE	2-* BUTANONE	TETRA-* HYDROFURAN	OTHER COMPOUNDS	UNKNOWN
TRAVEL BLANKS:																						
TX-1	TRAVEL BLANK	7/26/88	7121	UG/L																		
TX-2	TRAVEL BLANK	7/29/88	7192	UG/L																		
TX-3	TRAVEL BLANK	7/28/88	7264	UG/L	1334.9																	
VOA BLANKS:																						
	VOA BLANK	6/15/88		UG/L	11.6													27.4				
	VOA BLANK	7/26/88		UG/L	6.0																(5)*	
	VOA BLANK	7/26/88		UG/L																		
	VOA BLANK	7/26/88		UG/L																		
	VOA BLANK	7/28/88		UG/L	26.9																	
	VOA BLANK	7/28/88		UG/L																	(6)	
	VOA BLANK	7/28/88		UG/L	11.1																	

NOTES:

(1) The following additional compounds were found in TG-3:

Two Unknowns (76 ug/l and 90 ug/l)
C6H12 hydrocarbon (194 ug/l)
Cylohexane (80 ug/l)
Xylene Isomers (500, 205 ug/l)

Four Ethyl-Methyl Benzene Isomers
(103, 33, 137, 38 ug/l)

Two Methyl (methylethyl, benzene isomers)_
(8.7 ug/l)

Two Tetra Methyl Benzene Isomers (6.5 ug/l)

(2) The following additional compounds were found in TG-16:

Xylene Isomer 501 ug/l
Xylene Isomer 204 ug/l
Ethyl Methyl Benzene Isomer 113 ug/l

(3) Chloroform was found in TX-1 at 5.2 ug/l

(4) Chloroform was found in TX-2 at 5.5 ug/l

(5) Acrylonitrile was found in the lab blank analyzed 6/15/88
at 14.6 ug/l.

(6) 1,1,1-trichloroethane found in the lab blank analyzed on 7/28/88
at 1.3 ug/l.

* Indicates the compound is not included in the list on Table 4-2.

Dates of sample collection are noted on field and custody sheets. Dates of analyses are provided in report tables and data reports in Appendix H.

Results of metals analyses of samples collected from monitoring wells showed evidence of contamination in several wells. Well TG-9 (Kaufmann's Well No. 152) had concentrations of cadmium (12 ug/l), chromium (302 ug/l), and lead (333 ug/l) in excess of MCLGs and MCLs. Well TG-10 (Kaufmann's Well No. 104) had concentrations of lead (157 ug/l) and chromium (178 ug/l) in excess of MCLGs and MCLs. Well TG-11 (Kaufmann's Well No. 101) exceeded standards for lead (62 ug/l) and the concentration of mercury (2.0 ug/l) was equal to the MCL. Wells TG-2 and TG-16 had concentrations of chromium (94 and 55 ug/l, respectively) and lead (124 and 83 ug/l, respectively) higher than the MCLs and MCLGs, and the level of barium (793 ug/l) approached the MCL in TG-2.

As required in the Scope of Work, analyses were performed on unfiltered samples for total (suspended plus dissolved) metals. It was not possible to develop the monitoring wells to clarity. Therefore, it is likely that the levels of metals observed were the result of presence of formation solids present during sampling.

No standards for metals were exceeded in the sample from the City of Madison Water Supply Well (TG-12) or from either of Oscar Mayer's Well (TG-13 and TG-14).

Petroleum hydrocarbons were detected in two monitoring wells (7 mg/l in TG-3 and 85 mg/l in TG-9) but were not found in samples from water supply wells.

Numerous organic chemicals were found in monitoring wells and some of the water supply wells.

Well TG-3 was located near the fireman training burn pit. A blind duplicate of sample TG-3 was collected and labeled TG-16. These samples showed the presence of toluene, ethylbenzene, methylene chloride, xylene isomers, ethyl methyl benzene isomers, methylmethylethyl benzene isomers, tetramethyl benzene isomers, cyclohexane, and unknown organics. The results provide evidence that fuels, solvents or other flammable chemicals used during fireman training exercises have entered the groundwater in the immediate vicinity of the burn pit. The concentrations of xylene isomers detected have the potential to exceed Wisconsin Standards and MCLGs for drinking water supplies, but the same compounds were not detected in other monitoring wells or water supply wells, so evidence of migration was not found.

At TG-9, toluene, trichlorofluoromethane, dichlorofluoromethane, and an unknown organic were found. None of the concentrations exceeded 10 ug/l, and no standards were exceeded.

At TG-10, trans-1,2-dichloroethylene, chlorobenzene, chloroethane, and trichloroethylene were detected. None of the concentrations exceeded MCLs, but the concentration of trichloroethylene (3.9 ug/l) exceeded the MCLG (zero). Chlorobenzene and chloroethane were not found in any other samples.

At TG-11, vinyl chloride was found (16.7 ug/l) and the concentration exceeded the MCL, MCLG, and State Standard (0 to 2.0 ug/l). Vinyl chloride was not found in any other samples.

No organics were found in Monitoring Wells TG-1, TG-2, TG-5 or in the City of Madison Supply Well TG-12.

At TG-13 (Oscar Mayer Well No. 3) trichloroethylene (11.0 ug/l) and trichlorofluoromethane (10.0 ug/l) were found. The level of trichloroethylene exceeds MCLs, MCLGs, and State Drinking Water Standards (zero to 5 ug/l).

At TG-14 (Oscar Mayer Supply Well No. 5) tetrachloroethylene (8.8 ug/l) and trichloroethylene (2.2 ug/l) were detected. The level of trichloroethylene exceeded the MCLG (zero). The level of tetrachloroethylene was less than the State Standard (20 ug/l), and no MCLs or MCLGs have been promulgated for this organic chemical.

Several organics were found in the water used for well construction, but with the exception of methylene chloride, they were not found in any other samples collected from monitoring wells.

4.3 SURFACE WATER SAMPLING AND ANALYSIS RESULTS

Results of surface water sampling and analysis for metals and petroleum hydrocarbons are presented in Table 4-8. Volatile organic analytical results are presented in Table 4-9.

Evidence of contamination related to past use of petroleum products or organic solvents was detected at Site TW-3 (standing water at the fire training pit area). The evidence included elevated levels of lead (112 ug/l), arsenic (42.8 ug/l), petroleum hydrocarbons (2 mg/l), and organic chemicals including thiobismethane (27 ug/l), methylene chloride (11.6 ug/l), tetrachloroethylene (11.5 ug/l), trans 1,2-dichloroethylene (9.6 ug/l), benzene (1.3 ug/l) and toluene (1.2 ug/l). Of these compounds, the levels of lead and benzene exceeded MCLGs but not MCLs. The volume of standing water was approximately 4 feet by 10 feet by 0.5 foot.

A trace of tetrachloroethylene (3.2 ug/l) was found in Sample TW-4, the Burke WWTP outfall to a drainage ditch. ~~The level~~ found was less than State Drinking Water Standards (20 ug/l). This outfall also contained relatively high concentrations of petroleum hydrocarbons (65 mg/l).

Not any more! 1ppb

No volatile organics or petroleum hydrocarbons were detected at TW-1, TW-2, or TW-5 (which was a blind duplicate of TW-1). No metals concentrations at these sites exceeded MCLs, MCLGs, or State Drinking Water Standards.

No other volatile organic contaminants were found in surface water samples.

4.4 SOIL SAMPLING AND ANALYSIS RESULTS

Results of metals and petroleum hydrocarbon analyses of soil samples are presented in Table 4-10. Results of analyses for volatile organics above their detection limits are presented in Table 4-11. Minimum detection limits for volatile organics are found in Table 4-2.

TABLE 4-10

SUMMARY OF METAL AND PETROLEUM HYDROCARBON ANALYSIS
IN SOIL SAMPLES
TRUAX FIELD
MADISON, WISCONSIN

SITE ID	SITE DESCRIPTION	SAMPLE NUMBER	UNITS	AG	AS	BA	CD	CR	FE **	HG	MN **	NA **	PB	SE	PETRO * HYDRO
SOIL SAMPLES:															
TS-1	BURN PIT	7186	UG/G	< 0.16	3.7	111	< 2.0	12.4	NR	1.15	NR	NR	20.4	< 0.24	2300
TS-2	BURN PIT	7187	UG/G	< 0.18	3.5	96	< 2.0	14.3	NR	1.35	NR	NR	46.2	< 0.26	8200
TS-3	JP4 FUEL STORAGE AREA	7188	UG/G	< 0.14	3.8	18	< 2.0	15.9	NR	1.12	NR	NR	2000	< 0.21	550
				< 0.14	3.0									< 0.21	
TS-4	JP4 FUEL STORAGE AREA	7189	UG/G	< 0.30	59.1	77	2.4	12.5	NR	2.4	NR	NR	2631	< 0.45	13000
TS-5	JP4 FUEL STORAGE AREA (DRUM STORAGE AREA)	7191	UG/G	< 0.17	12.2	76	11.7	92.1	NR	1.42	NR	NR	718	< 0.25	600
TS-6	BACKGROUND, 100 YARDS NORTH OF BURN PIT	7190	UG/G	< 0.15	4.3	90	< 2.0	11.2	NR	1.22	NR	NR	13.2	< 0.22	< 50
TS-7	SLUDGE DRYING BEDS	7104	UG/G	0.17	3.1	60	< 2.0	5.3	NR	1.29	NR	NR	8.8	< 0.23	< 50
TS-8	SLUDGE DRYING BEDS	7105	UG/G	< 0.15	1.7	60	< 2.0	6.1	NR	1.21	NR	NR	7.4	< 0.23	< 50
				< 0.15	1.8									< 0.23	
TS-9	SLUDGE DRYING BEDS	7106	UG/G	< 0.27	15.4	190	< 2.0	7.3	NR	0.84	NR	NR	38.0	0.77	90
TS-10	BURN PIT BOREHOLE	7699	UG/G	< 0.22	1.9	23.2	< 2.0	5.2	NR	1.12	NR	NR	< 7.5	0.27	< 50
				< 0.22	1.3	23.8	< 2.0	4.4					< 7.5	0.13	
TS-11	BURKE WWTP, DISCHARGE TO DITCH	7107	UG/G	1.14	12.2	164	3.6	34.7	NR	6.0	NR	NR	900	< 0.68	5500
TS-12	BURKE WWTP DECANT POND	7108	UG/G	1.40	9.8	83	2.3	14.9	NR	2.29	NR	NR	56.9	< 0.27	4200
TS-13	DUPLICATE OF TS-7	7109	UG/G	0.18	1.6	57	< 2.0	4.5	NR	1.0	NR	NR	< 5.7	< 0.23	< 50

NOTES: NR = NOT REQUESTED

* = ALL RESULTS FOR PETROLEUM HYDROCARBONS ARE IN PPM (MG/L FOR LIQUIDS AND UG/G FOR SOILS)

** Not included in Table 4-3.

TABLE 4-11

SUMMARY OF VOLATILE ORGANICS FOUND ABOVE MINIMUM
DETECTION LIMITS IN SOIL SAMPLES
TRUAX FIELD
MADISON, WISCONSIN

SITE ID	SITE DESCRIPTION	ANALYSIS DATE	SAMPLE NUMBER	UNITS	METHYLENE CHLORIDE	TOLUENE	1,1,1 TRICHLOROETHANE	* HEXANE	* UNKNOWN #1	TRICHLOROFLUOROMETHANE	BENZENE	XYLENE	DI* CHLORODIFLUOROMETHANE	* UNKNOWN #2	* UNKNOWN #3	* UNKNOWN #4	OTHER CHEMICALS
SOIL SAMPLES:																	
TS-1	BURN PIT	7/28/88	7186	UG/KG	76.3	1.3	4.2	10.4									
TS-2	BURN PIT	7/28/88	7187	UG/KG	41.7	2.2	6.7		13.1								
TS-3	JP4 FUEL STORAGE AREA	7/28/88	7188	UG/KG	17.9	1.1	1.9	15.0									
TS-4	JP4 FUEL STORAGE AREA	7/28/88	7189	UG/KG	157.0	4.1	4.5	15.1	10.8	26.0							
	RERUN	7/28/88	7189	UG/KG	226.4	5.0	8.3	15.1		27.3							
TS-5	JP4 FUEL STORAGE AREA	7/30/88	7191	UG/KG	19.9	1.3			4.7	12.6	1.6	1.5	308	11.8	11.8	7.1	
	(DRUM STORAGE AREA)	7/28/88	7191	UG/KG	87.8		2.1	5.9									
TS-6	BACKGROUND, 100 YARDS NORTH OF BURN PIT	7/28/88	7190	UG/KG	58.8		1.6	5.2									
TS-7	SLUDGE DRYING BEDS	7/25/88	7104	UG/KG	31.9												
TS-8	SLUDGE DRYING BEDS	8/1/88	7105	UG/KG	93.9	7.4	36.2		13.0		4.5						
TS-9	SLUDGE DRYING BEDS	8/1/88	7106	UG/KG	443.7	7.7	39.7	7.7	61.4	22.4	4.4						(1)
TS-10	BURN PIT BOREHOLE		7699	UG/KG					NOT COLLECTED								
TS-11	BURKE WWTP, DISCHARGE TO DITCH	8/1/88	7107	UG/KG	96.2	6.1	7.5		29.2					19.5			(2)
TS-12	BURKE WWTP DECANT POND	8/1/88	7108	UG/KG	494.6	10.6	20.8			12.8							
TS-13	DUPLICATE OF TS-7	7/26/88	7109	UG/KG	12.7												
TY-3	RINSATE SAMPLE	7/14/88	7114	UG/L													(3)
TRAVEL BLANKS:																	
TX-1	TRAVEL BLANK	7/26/88		UG/L	8.2												
TX-2	TRAVEL BLANK	7/29/88		UG/L													
TX-3	TRAVEL BLANK	7/28/88		UG/L	1334.9												
VOA BLANKS:																	
	VOA BLANK	7/25/88		UG/L	3.9												
	VOA BLANK	7/26/88		UG/L	6.0												
	VOA BLANK	7/26/88		UG/L													

TABLE 4-11

SUMMARY OF VOLATILE ORGANICS FOUND ABOVE MINIMUM
DETECTION LIMITS IN SOIL SAMPLES
TRUAX FIELD
MADISON, WISCONSIN

SITE ID	SITE DESCRIPTION	ANALYSIS DATE	SAMPLE NUMBER	UNITS	METHYLENE CHLORIDE	TOLUENE	1,1,1 TRICHLOROETHANE	HEXANE*	UNKNOWN* #1	TRICHLOROFLUOROMETHANE	BENZENE	XYLENE	DICHLORODIFLUOROMETHANE*	UNKNOWN* #2	UNKNOWN* #3	UNKNOWN* #4	OTHER CHEMICALS
	VOA BLANK	7/26/88		UG/L													
	VOA BLANK	7/28/88		UG/L	11.1												
	VOA BLANK	7/28/88		UG/L	26.9		1.3										
	VOA BLANK	7/28/88		UG/L	-												
	VOA BLANK	7/30/88		UG/L													
	VOA BLANK	8/01/88		UG/L			3.2										

NOTES:

(1) 1,1,2-trichloro-1,2,2-trifluoroethane (13.4 ug/kg) and 1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluorohexane (49.9 ug/kg) were found only in TS-9.

(2) Ethylbenzene (5.6 ug/kg) was found only in TS-11.

(3) Chloroform (6.1 ug/l) and 1,2-dichloroethane (3.9 ug/kg) were found only in TY-3.

* Indicates the compound is not included in the list on Table 4-2.

No contaminants other than mercury and chloroform were found in the rinsate sample TY-3 collected prior to collecting soil samples. The level of mercury found in TY-3 (0.26 ug/l) was slightly higher than the minimum detection limit (0.20 ug/l). Mercury was found in all soil samples. Chloroform was not found in any soil samples.

Methylene chloride was found in some laboratory blanks analyzed in conjunction with soil samples. 1,1,1-trichloroethane was found in low levels (<3.2 ug/l) in two of the lab blanks. No other organics were found in lab blanks.

Methylene chloride was found in two of the three travel blanks (TX-1 and TX-3). The level found in TX-3 (1334.9 ug/l) analyzed on 7/28 was much higher than in any of the samples and was probably due to contamination during sampling or analysis.

The samples collected at the fire training burn pit (TS-1 and TS-2) contained elevated levels of petroleum hydrocarbons (2300 to 8200 ug/g) and also contained methylene chloride (41.7 to 76.3 ug/kg), hexane (10.4 ug/kg), an unknown (13.1 ug/kg) and traces of toluene (≤6.7 ug/kg) and 1,1,1-trichloroethane (≤6.7 ug/kg). (The latter compound was also found in a laboratory blank analyzed the same day.) The results confirmed visual observations; the area was stained with chemicals and residues related to burning of petroleum products and/or solvents. No metals concentrations were high enough to result in the characteristic of EP Toxicity.

Soil samples collected within the diked area at the JP-4 fuel area (TS-3 and TS-4) contained elevated levels of petroleum hydrocarbons (550 to 13,000 ug/g) and also relatively high levels of lead (2000 to 2631 ug/kg). The concentration of lead was much higher than the minimum amount which would result in the EP Toxicity characteristic, although this test was not performed. Organic chemicals detected at these sites included methylene chloride, trichlorofluoromethane, hexane, 1,1,1-trichloroethane, toluene, and an unknown. (1,1,1-trichloroethane was also found in a laboratory blank analyzed on the same day as samples TS-3 and TS-4.) The results suggested that leaks or spills of fuels and/or solvents occurred within this diked area in the past. Concentrations of most of the contaminants were higher at TS-4. This sampling site was a drainage basin in the northeast corner of the diked area. Paint chips were present at the site and may have contributed to elevated lead concentrations. The volume of material within the basin is relatively low (approximately 4 feet by 6 feet by 0.67 feet) and the concentrations found may not be representative of areas surrounding the drainage basin.

The sample collected at the drum storage area near the JP-4 fuel tanks (Site TS-5) had elevated levels of petroleum hydrocarbons (600 ug/g), lead (718 ug/kg) and numerous organics. The volatile organic sample analyzed on 7/28/88 had low surrogate recoveries and the analysis was repeated on 7/30/88 with better recoveries. These results were considered more reliable. Organics detected included dichlorodifluoromethane (308 ug/l), methylene chloride (19.9 ug/l), trichlorofluoromethane (12.6 ug/l), benzene, toluene, xylene (each less than 2.0 ug/l) and four unknowns (each less than 12.0 ug/l). The results provided evidence of potential leaks or spill of the contents of drums in this area.

The background sampling site (TS-6) was found to contain relatively low levels of all metals. The concentration of petroleum hydrocarbons was below the detection limit (<50 ug/l). Volatile organics detected in soil collected at this site included methylene chloride (58.8 ug/kg) and low levels of hexane (5.2 ug/kg) and 1,1,1-trichloroethane (1.6 ug/kg). (This latter compound was also found in the laboratory blank analyzed on the same day at similar levels.

Three samples (TS-7, TS-8, and TS-9) were collected from adjacent cells in the sludge drying bed. In addition, TS-13 was a blind duplicate of sample TS-7. The analytical results indicated concentrations of metals and petroleum hydrocarbons were relatively low at all three sites. Concentrations of most of the inorganics were somewhat higher at TS-9 than at the other two sites.

Only methylene chloride was found in TS-7 and TS-13. TS-8 and TS-9 were analyzed and then re-run due to surrogate recoveries outside limits. Re-runs confirmed that soil matrix effects were interferring with the analyses and inhibiting conclusive results. At TS-8, organic solvents, including 1,1,1-trichloroethane, toluene, benzene and an unknown were found in addition to methylene chloride during one of the analyses. At TS-9, each of the compounds found at TS-8 were found in one of the analyses, and in addition the level of methylene chloride was higher and hexane, trichlorofluoromethane, 1,1,2-trichloro-1,2,2-trifluorothane and a tridecafluorohexane isomer were also detected. The results indicated that solvents may have been present in sludges disposed at the former Burke Treatment Plant.

Soil sample TS-10 was collected from the 24.0 to 25.5 foot depth at Well Site TG-3 in response to elevated organic vapor meter readings. The sample was analyzed for metals and petroleum hydrocarbons only. Analytical results did not confirm contamination; none of the results were appreciably higher than background levels.

Soil samples TS-11 and TS-12 were also re-analyzed due to surrogate recoveries outisde limits. The re-runs were also outside limits and therefore it is concluded that soil matrix problems interfered with the analyses.

A sediment sample (TS-11) was collected from beneath the culvert which discharged from the wastewater treatment lagoons to a ditch connected to Starkweather Creek. The sediment consisted of black silty organic material. The sample contained elevated levels of petroleum hydrocarbons (5500 ug/g) and lead (900 ug/kg). Methylene chloride was found at 87.9 to 96.2 ug/kg and toluene was found at 6.1 to 10.0 ug/kg. 1,1,1-trichloroethane, ethylbenzene, and two unknowns were also found at levels of 29.2 ug/kg or less each in one of the analyses.

A sediment sample (TS-12) was collected from a decantation pond at the former wastewater treatment plant. The contaminants detected included relatively high levels of methylene chloride (161.7 to 494.6 ug/kg) and lower levels of 1,1,1-trichloroethane (20.8 ug/kg), trichlorofluoromethane (12.8 ug/kg) and toluene (10.6 ug/kg). Detection of these contaminants may have been related to disposal of solvents at the former wastewater treatment plant.

5.0 SUMMARY AND CONCLUSIONS

5.1 SUMMARY

As a result of the records review and visual site inspection, several potential sources of environmental contamination were identified at Truax Field, Madison, Wisconsin. These include a practice fire-fighting burn pit, a former open burning grounds and landfill, the former Burke Wastewater Treatment Plant, and the JP-4 fuel storage area. The Department of Defense has formerly owned and has partial responsibility for contamination at each area. However, current and other former owners share responsibility for the contamination.

Sampling and analysis was performed to determine concentrations of total metals, petroleum hydrocarbons, and volatile organics in soil, surface and groundwater. Sampling locations are summarized as follows:

5.1.1 Soil Samples

Soil samples were collected at twelve locations, to evaluate potential contamination at the practice burn pit, near JP-4 fuel tanks, at an outdoor drum storage area, in three sludge drying bed cells, in sediments of the former treatment plant lagoon and its outfall to a ditch, and to define background levels.

5.1.2 Surface Water Samples

Surface water samples were collected in four locations. These included standing water and a creek east of the practice burn pit, water in a lagoon at the former Burke Wastewater Treatment Plant, and at the outfall of the treatment plant to a surface ditch connected to Starkweather Creek.

5.1.1 Groundwater

Three groundwater monitoring wells downgradient of the burn pit, wastewater treatment plant, and landfill were installed by EEI, and samples from these were collected and analyzed. Four previously existing monitoring wells downgradient of the landfill were also sampled. Two water supply wells owned by Oscar Mayer downgradient of the landfill and former Burke Treatment Plant were also sampled. A sample of water from the City of Madison water supply well located about one mile away was collected to determine if contamination at Truax Field has affected municipal water supplies. A sample of water used in well installation was collected to assess whether this source was a source of any contaminants.

5.2 CONCLUSIONS

5.2.1 Contamination at the Fire-Training Burn Pit

The practice burn pit had relatively large dimensions (approximately 200 feet by 100 feet). The soil was contaminated with petroleum hydrocarbons and solvents. A surface water sample collected within the burn pit contained elevated levels of some metals (lead and arsenic), petroleum hydrocarbons, and volatile organics. No contaminants were found in surface water (a creek) east of the burn pit. A monitoring well was installed near the burn pit. Groundwater collected from this well contained methylene chloride, xylene isomers, benzene derivatives, cyclohexane, and unknown organics. The results indicate fuels, solvents, or other chemicals used during fireman training exercises have entered the groundwater. The DOD was partially responsible for this contamination. The Air National Guard, City of Madison, Dane County, and volunteer fire departments were also partially responsible. Fire training exercises took place at frequent intervals at the site from 1953 through 1987.

5.2.2 JP-4 Fuel Area

Four large fuel tanks at the JP-4 fuel area were emptied by the Air National Guard in about 1982. Possible evidence of past spills of fuels or solvents was found in soil and sediment samples within the diked disposal area, including elevated levels of petroleum hydrocarbons and lead and presence of organic solvents.

A small fuel tank (estimated 500 gallons) could not be accessed to determine its contents, but was believed to be empty.

5.2.3 Outdoor Drum Storage Area

Five 55-gallon drums and two 5-gallon containers were found stored out-of-doors near the diked JP-4 fuel area. Contents were not sampled, in accordance with direction from the Corps of Engineers. Markings on these containers indicated they may have contained naptha, solvent, waste oil, waste fuel, and unknown chemicals. Most of the containers were at least partially full of liquid; one was empty. Markings indicated one of the containers may have originated in about 1982 (when ownership of the property was transferred from the Air National Guard to Dane County). It is unlikely that the drums are former DOD property.

5.2.4 Previously Existing Groundwater Monitoring Network

Samples could not be collected from several wells scheduled for sampling under the Scope of Work. These wells were located downgradient of the landfill. Well TG-4 (Kaufmann's Well 200D) could not be sampled due to a non-functioning bladder pump. Wells TG-6 (121A) and TG-7 (121D) could not be accessed due to their very narrow diameters and well sections out of alignment. Well TG-8 was not found and was believed to have been destroyed during excavations at the site.

5.2.5 Former Burke Wastewater Treatment Plant Area

The former Burke WWTP consisted of a trickling filter, sludge lagoons, sludge drying beds and irrigation fields. Portions of the property are currently owned by Reynolds Brothers, Shop-Ko, and Oscar Mayer. At the time of EEI's work on-site, the trickling filter was being demolished, above ground tanks were being removed, and lagoons were being filled with soil.

No contaminants were found in a surface water sample (TW-2) collected in one of the lagoons at the former WWTP.

A sediment sample (TS-12) collected at a former decantation pond at the former WWTP was found to contain petroleum hydrocarbon (4200 ug/g), and organic solvents (including methylene chloride, 1,1,1-trichloroethane, trichlorofluormethane, and toluene). Matrix effects interferred with analysis of sample TS-12, making identification of the organics detected tentative and quantification uncertain.

A sediment sample (TS-11) collected from beneath the surface water discharge point to the ditch which connects with Starkweather Creek was also found to contain petroleum hydrocarbons (5500 ug/g), methylene chloride, toluene, and 1,1,1-trichloroethane, as well as ethylbenzene, unidentified organics, and elevated levels of mercury and lead. Matrix effects also interfered with organic analysis of Sample TS-11.

The surface water discharge (TW-4) from the former Burke lagoons to the ditch connected to Starkweather Creek contained a trace of tetrachloroethylene (3.2 ug/l) and relatively high levels of petroleum hydrocarbons (65 mg/l).

Three soil samples (TS-7, TS-8, and TS-9) collected at sludge drying bed cells showed the presence of methylene chloride at all sites, numerous additional organic chemicals (including toluene, 1,1,1-trichloroethane, hexane, and benzene) at TS-8 and TS-9, and numerous fluorinated organics (trichlorofluoromethane, a trichlorofluoroethane isomer and a tridecafluorohexane isomer) in TS-9. Matrix effects interfered with organic analysis of samples TS-8 and TS-9, making identification of these compounds tentative.

Contaminants detected in a groundwater well (TG-2) positioned downgradient of the former Burke WWTP included lead, chromium, and cadmium. The level of lead exceeded the MCLG and MCL. The level of cadmium exceeded the MCLG but not MCL. The levels of chromium exceeded the MCL but not MCLG. No petroleum hydrocarbons or organics were found in this well.

The contaminants found in surface soil, sediment, and water samples at the former Burke WWTP were not found in the groundwater well (TG-2) positioned downgradient of the WWTP in the surficial aquifer. This may be further evidence that a clay barrier does exist and that contaminants are migrating around the clay barrier toward the Oscar Mayer wells that are responsible for the drawdown.

5.2.6 Groundwater Contamination Downgradient of the Landfill

No organic contaminants were found in TG-1, positioned downgradient of the landfill. The level of lead (30 ug/l) exceeded the MCLG.

No organic or inorganic contamination was found in TG-5 (City Well 200S). No organic contaminants had been detected during previous sampling and analyses performed by the City of Madison at this site.

Monitoring Well TG-9 (City Well 152) was found to contain trichlorofluoromethane (9.7 ug/l), dichlorofluoromethane (9.0 ug/l), and trans-1,2-dichloroethylene (1.5 ug/l). There are no final MCLs or MCLGs for the organic compounds detected. The level of trans-1,2-dichloroethylene was much lower than the proposed MCLG for that compound (70 ug/l). Levels of chromium (302 ug/l), cadmium (12 ug/l) and lead (333 ug/l) exceeded proposed MCLGs and promulgated MCLs. The well also contained elevated levels of petroleum hydrocarbons (85 mg/l). Compounds previously detected by the City of Madison included 1,1-dichloroethylene, fluorotrichloromethane, tetrachloroethylene, and trichloroethylene. This well had a very low yield.

Samples collected from Monitoring Well TG-10 (Well 104) contained trans 1,2-dichloroethylene (27.6 ug/l), chloroethane (9.1 ug/l), trichloroethylene (3.9 ug/l), chlorobenzene (1.2 ug/l), and chromium (178 ug/l). The level of trichloroethylene exceeded the MCLG (zero). The level of trans 1,2-dichloroethylene was less than the proposed MCLG (70 ug/l). Levels of lead (157 ug/l) and chromium (178 ug/l) exceeded proposed MCLGs and promulgated MCLs. Numerous chlorinated organics had previously been detected by the City of Madison in samples from this well, including: 1,2-dichloroethane, 1,1-dichloroethane, 1,2-dichloroethylene, 1,1-dichloroethylene, trans 1,2-dichloroethylene, tetrachloroethylene, trichloroethylene, and vinyl chloride.

Contaminants found in TG-11 (Well 101) included vinyl chloride (16.7 ug/l) and lead (62 ug/l). The concentrations measured exceeded MCLs and MCLGs.

There was a lack of continuity in the levels and identities of contaminants found at the different monitoring wells downgradient of the landfill. The specific contaminants found at individual wells vary over time. The variability in results is attributable to the large volume and variety of wastes disposed in the landfill and the differing depths of the monitoring wells, which intercept different aquifers.

5.2.7 Oscar Mayer Wells

Trichloroethylene was found in TG-13 (Oscar Mayer Well No. 3) at a level (11.0 ug/l), exceeding its MCL (5.0 ug/l) and MCLG (zero). These results confirmed previous analyses performed by the Wisconsin DNR. Trichlorofluoromethane was also detected (10.0 ug/l) but had not been previously found by Wisconsin DNR.

Trichloroethylene was found in TG-14 (Oscar Mayer Well No. 5) at 2.2 ug/l. This level exceeds the MCLG (zero) but not the MCL (5.0 ug/l). Tetrachloroethylene was also found in TG-14 (8.8 ug/l). There are no MCLs or MCLGs for tetrachloroethylene but the level was less than the State of Wisconsin Drinking Water Health Advisory (20 ug/l). Presence of trichloroethylene and tetrachloroethylene confirms results of sampling and analysis performed previously by Wisconsin DNR.

No metals contamination was found in Oscar Mayer wells.

5.2.8 Madison Water Supply Well No. 7

No evidence of organic or inorganic contamination was found in TG-12, the sample collected from the Madison Water Supply Well.

5.2.9 Drill Cuttings

Drill cuttings from TG-2 were stored on and under plastic at the drilling site. Cuttings from TG-1 and TG-3 were stored in drums because of elevated organic meter readings at these sites.

REFERENCES

[1] U.S. Army Corps of Engineers; St. Paul District, Environmental Restoration Defense Account, Findings and Determination of Department of Defense Responsibility.

[2] Personal Communication, Mr. William Skinner, Air National Guard Fire Chief, April 12, 1988.

[3] Personal Communication, Col. Andrew Miller, Air National Guard, April 12, 1988.

[4] Personal Communication, Mr. Peter Drahn, Dane County Airport Director, April 7, 1988.

[5] Scope of Work for Contamination Evaluation at Truax, Wisconsin.

[6] Mr. Vernon Rowe, Personal Communication, June 7, 1988.

[7] Hydrogeology of Solid Waste Disposal Sites in Madison Wisconsin, 1970, Kaufmann, Robert F.

[8] Landfill Monitoring/Truax, July 29, 1987 (Well Sampling Data).

[9] Wells No. 2, 3, and 5 (Oscar Mayer Wells), Analyses for these wells from Opt. Nat. Re.

[10] Letter from David Benzschawel to Tom Scully, July 27, 1987.

[11] U.S. Army Corps of Engineers, "Sample Handling Protocol for Low, Medium, and High Concentration Samples of Hazardous Waste, October 1986.

[12] 40 CFR 300.

[13] 40 CFR 261 Appendix VIII.

[14] Personal Communication, Don Wilson, Wisconsin DNR, Current Wisconsin Drinking Water Health Advisory Standards, (unpublished); February 12, 1988.

[15] Personal Communication, Mr. William Schmuller, Wisconsin DNR, January 20, 1989.

APPENDIX A

RESPONSE TO COMMENTS

CEMRD-ED
GC COMMENTS

1. Comment: Paragraph 1.2 - "1,2-transdichloroethylene" should appear as "trans 1,2-dichloroethylene". This error appears elsewhere in the document.

   Response: EEI agrees with the terminology trans 1,2-dichloroethylene. Appendix H has not been changed but a note has been inserted prior to the results of volatile organic analyses indicating that 1,2-transdichloroethylene refers to trans 1,2-dichloroethylene.

2. Comment: Pargraph 1.3 - The first paragraph sems to suggest that JP-4 may contain lead, this is not the case.

   Response: Reference to lead-based paints possibly used in and around the tank farm was inserted in Section 1.3.

3. Comment: Table 1-1 - What is the difference between an entry of "none" and no entry at all? Please clarify.

   Response: This comment was addressed in Item 2 of the CENCB-ED-HQ comments.

4. Comment: Paragraph 3.1.3 - The listing of 1,2-DCE and trans 1,2-DCE in the second to last paragraph is probably redundant with 1,2-DCE being a total of trans 1,2-DCE and cis 1,2-DCE.

   Response: The pollutants listed in the Draft Report were those listed in numerous analytical reports reviewed. Reference to trans-1,2-DCE has been deleted.

5. Comment: Paragraph 3.3.1.2 - It is not clear why some wells were sampled with a teflon bailer and some were sampled with a PVC bailer. Given the allegations made concerning use of PVC materials and their effect on trace organic water quality, it probably would have been best to use the teflon bailer(s) for all groundwater sampling points.

   Response: PVC pipe is used as the well construction material, so contact with PVC cannot be avoided. EEI's sampling plan incorporated use of Teflon bailers. A special one-inch Teflon bailer was purchased to use in Wells TG-6 thru TG-11 because of the extremely narrow diameter of these wells. Due to bends in Well TG-7, the one-inch Teflon bailer was stuck in TG-7 and could not be removed for several days. Therefore, a PVC bailer was used as a substitute in Wells TG-9, TG-10, and TG-11.

6. Comment: Table 4-1 - The body of the table specifies Method 3010 for sample prepartion of aqueous samples while footnote specifies Method 3005. Method 3005 is used for mild digestion of field filtered samples or when "Total Recoverable Metals" as defined by this procedure are specified. Please clarify which method was specified and which was run.

   Response: Method 3010 was used. Table 4-1 has been corrected.

7. Comment: Table 4-1 - Method 3020 is specified for preparation of samples for As, Se, and Ag analyses. For aqueous samples the analytical method itself contains the sample preparation techniques to be used while soil, sediment, and sludge samples for these parameters are to be prepared using Method 3050.

   Response: Method 3020 was used for preparation of water samples. It is very similar to the techniques presented in analytical Methods 7060, 7740, and 7760. Method 3020 was used because the extraction is used for all three metals. Footnote f was added to explain this.

8. Comment: Tables 4-9 & 10 - Separation of "list" and "non-list" compounds would be helpful from the stand-point of clarity to the non-chemist user of the document.

   Response: By list and non-list, it is believed the comment refers to elements or compounds which are referred to in Tables 4-2 and 4-3. The compounds not listed in these tables are delineated with asterisks (*) in Tables 4-8 through 4-11.

9. Comment: Paragraph 4.2 - In terms of interpreting groundwater data and its implications concerning groundwater contamination, there is a distinct possibility that some major portion of the metal contamination detected in unfiltered groundwater samples is associated with the particulate and is therefore possibly not moving with groundwater and, even more importantly, is not even indicative of contamination but of background conditions. Looking at Table 1-1, Table 3-4, and the observations noted on pages 3-20 and 3-21, one notes a potential correlation between turbid water (i.e., definite particulate content) and metal contamination detected. Also one should note the fact that the only surface water sample that was noted to be turbid, Sample TW-3, showed the only detected Cr and the highest detected Pb of all surface water samples. Also to be noted are the detected levels of Cr and Pb in the background soil samples, TS-6. Additional light could be shed on this issue by looking at metals data from upgradient wells and noting their documented turbidity. Only a dissolved groundwater analysis for metals would resolve the issue as to whether there exists any truly mobil metal contamination at the site. (The most serious error in this type of study would be to identify metals contamination as man-made which were really due to background conditions.)

   Response: EEI agrees with this comment. Additional information has been added to Section 1.1 and 4.2 to clarify this point.

10. Comment: Table H-2 - Please provide the control limits for accuracy that the lab uses to identify a non-conformance situation.

Response: A spike percent recovery which differs from the spike amount by more than 25% is one of the conditions used to identify potential out of control situations. The spike recovery efficiency is also used to assess matrix effects. For example, soil or sediment samples are more prone to recovery efficiencies which differ from the spike amounts by more than 25%. If the results of the spike recovery differ from the known value by more than 25%, the QA/QC manager is notified and the problem is discussed with the project data co-ordinator. The need for re-run is assessed based on the preliminary results and the magnitude of difference between the spike recovery and the spike amount. For example, if the spike recovery is 130%, but the amount in the unspiked sample is below the minimum detection limit, the data co-ordinator and QA/QC manager would decide there is not a need for sample re-run.

CENCB-ED-HQ COMMENTS

1. Comment: Page 1-4, former wastewater plant to a ditch...

   Response: The word "plant" was inserted as stated.

2. Comment: Page 1-3 Table 1-1 - why is the entry "none" used for some of the samples while others are blank?

   Response: The word "none" has been deleted from Table 1-1 and the legend at the bottom has been changed Wherever the entry is blank it is indicated that concentrations in excess of MCLs and MCLGs were not observed.

3. Comment: Page 1-2, paragraph 1.1, Table 3-4 indicates that sample TG-3 actually had a solvent odor. Make note of this fact here to emphasize the degree of contamination at this point.

   Response Further information concerning petroleum and solvent odors noted during installation, development, and sampling of this well has been included.

4. Comment: Page 3-28, paragraph 3.6 - chain of custody?

   Response: The word possession was changed to custody.

5. Comment: Page 4-11, Table 4-7 - note b is with toluene, but refers to chlorobenzene. Note c is with trans-1,2-dichloroethylene yet refers to toluene. I'm not sure what d refers to, and there is no e on the parameter list. Please clean up this table. Would it be better to turn the table 90° and list measured values next to the MCLGs for the comparison? It would be clearer.

   Response: Footnotes were removed and maximum concentrations detected and the well they were found in were included in Table 4-7.

6. Comment: Page 4-16, paragraph 4.2 - In the discussion of metals concentrations in groundwater samples, please reiterate the fact that these analyses were made on unfiltered samples and that it was impossible to develop the wells to clarity. So, it is likely that the low levels of metals observed were the result of analysis of formation solids.

   Response: An additional paragraph was inserted explaining that levels of total metals in monitoring wells were probably due to introduction of formation solids.

7. Comment: Page 4-19 & 20, Table 4-11 - Footnote (2) is placed with sample TS-9, but refers to sample TS-11. Travel blank TX-3 has an unusually high level of methylene chloride. Do your records show high levels of lab contamination on day VOAs were prepared for shipment? Day of analysis? Was there a problem in transportation? Were corrective actions taken? Would it be possible to expand on the explanation of this contamination a little? Methylene chloride was found at relatively high levels in many of the samples from this site, but contamination of the travel blank makes it very difficult to believe the results. At a minimum, you should indicate those samples which were shipped with TX-3.

Response: Footnote 2 was placed with sample TS-12 in the Draft Report and was corrected to be placed with TS-11.

EEI investigated the potential source of methylene chloride in TX-3 and its implications on detection of methylene chloride in many of the other samples analyzed. TX-3 was shipped from the field with Samples TG-3, TG-10, TG-11, TG-12, TG-13, and TG-14. These were water samples. Methylene chloride was not detected in any of these groundwater samples so shipping from the field does not appear to be the source of contamination. TX-3 was re-analyzed and the results confirmed the presence of high levels of methylene chloride.

Many of the soil samples analyzed on 7/28/88 (TS-1 through TS-6) also showed relatively high levels of methylene chloride. In addition, a laboratory blank and soil check standard also contained relatively high levels of methylene chloride on this day. This may indicate contamination was present in the laboratory.

However, Samples TS-1 through TS-5 were all collected near the burn pit or the JP-4 fuel area so methylene chloride was likely present in these areas. Also, water samples analyzed on 7/28 (TW-3, TG-5, TG-10, TG-11, TG-12, TG-13, and TG-14) showed little or no methylene chloride present.

8. Comment: Page 5-2, paragraph 5.2.4 - the landfill.

   Response: Changed as shown.

9. Comment: Page 5-3, paragraph 5.2.5 - decantation.

   Response: Changed as shown.

10. Comment: Page 5-3, paragraph 5.2.5 - You might state that the identifications of the fluorinated organic were tentative!

    Response: This paragraph was modified to clarify results of analyses, including detection of methylene chloride in TS-7, TS-8, and TS-9; detection of organics in TS-8 and TS-9; and detection of fluorinated organics in TS-9. Matrix effects interferred with organic analysis of Samples TS-8 and TS-9, making identification of these compounds tentative.

11. Comment: Page 5-3, paragraph 5.2.5 - Last sentence. Reword to clarify. The Oscar Mayer well creates the drawdown, not the migration of contaminants.

    Response: The last sentence was reworded to state that the Oscar Mayer wells are believed to be responsible for the drawdown.

12. Comment: Page 5-3 - 1,2-dichloro(trans)ethylene.

    Response: EEI believes the proper name for this compound should be trans 1,2-dichloroethylene. The text has been changed to use this nomenclature. EEI's Organic Laboratory Manager, Dr. Margaret Winter, believes 1,2-transdichloroethylene is also correct. EEI disagrees with the nomenclature 1,2-dichlorotransethylene.

13. Comment: Page 5-4, paragraph 5.2.6 re TG-11 - The report of plastics manufacturing at Oscar Mayer could be mentioned here again. How is this report substantiated?

Response: Reference to plastics manufacturing at Oscar Mayer is in the Scope of Work for the delivery order. The plastics processing operation may be related to contaminants found in TG-10 and TG-11 but this is very speculative and beyond the scope of the project.

APPENDIX B

RIGHT OF ENTRY

DEPARTMENT OF THE ARMY

RIGHT-OF-ENTRY FOR SURVEY AND EXPLORATION

DERP Confirmation Study
(Project, Installation or Activity)

Truax Air Field (Reyco Madison Inc.)
~~Reynolds Transfer & Storage Co. Inc.~~
(Tract Number or Other Property Identification)

The undersigned, hereinafter called the "Owner", hereby grants to the UNITED STATES OF AMERICA, hereinafter called the "Government", a permit or right-of-entry upon the following terms and conditions:

1. The Owner hereby grants to the Government an irrevocable right to enter upon the lands hereinafter described at any time within a period of twelve (12) *months from the date of this instrument, in order to survey, make test borings, and carry out such other exploratory work as may be necessary to complete the investigation being made of said lands by the Government.*

2. The permit includes the right of ingress and egress on other lands of the Owner not described below, provided such ingress and egress is necessary and not otherwise conveniently available to the Government.

3. All tools, equipment, and other property taken upon or placed upon the land by the Government shall remain the property of the Government and may be removed by the Government at any time within a reasonable period after the expiration of this permit or right-of-entry.

4. The Government agrees to be responsible for damages arising from the activity of the Government, its officers, employees, or representatives on said land, in the exercise of rights under this permit or right-of-entry, either by repairing such damage or at the option of the Government by making an appropriate settlement with the Owner in lieu thereof.

5. If aircraft flights over said lands, or entry upon the land by means of helicopter or other type aircraft, are necessary, the Government shall inform the Owner, in advance, of each such flight or entry.

6. The land affected by this permit or right-of-entry is located in the State of County of , and is described as follows:

See attached Exhibit "A"

WITNESS MY HAND AND SEAL this 28th *day of* April , 1988

E. J. Reynolds (SEAL)

(SEAL)

UNITED STATES OF AMERICA

By Larry Rhea
Larry Rhea, Acting Chief, Real Estate Divi

ENG FORM 1 APR 74 1258 (ER 405-1-625) EDITION OF 1 DEC 62 IS OBSOLETE.

1401 PACKERS AVENUE

A parcel of land located in SW 1/4 of the NE 1/4 and in the NW 1/4 of the SE 1/4 of Section 31, T8N, R10E, City of Madison, Dane County, Wisconsin, to-wit: Commencing at the East quarter corner of said Section 31: thence N89°39'19"W, along the South line of the NE 1/4 of said Section 31, 1314.35 feet to the point of beginning; thence S00°10'31"E, 662.57 feet; thence N89°39'19"W, 579.60 feet to the point of beginning;thenceS00°10'31"E, 662.57 feet; thence N89°39'19"W, 579.60 feet to the Northeasterly right-of-way of the "Packers Avenue-Aberg Avenue" interchange, thence Northerwesterly along a curve to the right, which is also the said Northeasterly right-of-way, which has a radius of 1896.86 feet and a chord which bears N27°02'12"W, 1240.19 feet; thence continuing along said Northeasterly right-of-way N07°57'45"W, 235.43 feet; thence S89°30'12"E, 1175.89 feet; thence S00°09'55"W, 668.55 feet to the point of beginning. Containing 29.896 acres.

EXHIBIT "A"

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO
ATTENTION OF

27 MAY 1988

Water Quality Section

SUBJECT: Defense Environmental Restoration Program (DERP) Truax Field - Sample Monitoring Well #152, Wisconsin Cheeseman

Mr. Ronald Balfonz
Wisconsin Cheeseman
P.O. Box 1
Madison, Wisconsin 53701

Dear Mr. Balfonz:

As per conversation with Mr. Stanley Chadwick on May 17, 1988, I am confirming the right-of-entry to the Wisconsin Cheeseman Storehouse to sample Monitoring Well #152.

Our Contractors, Envirodyne Engineers will be sampling the well during the last week of June, and not during the 2nd week of June, as I previously stated. You will also be notified by the Staff of Envirodyne Engineers as to the precise date of sampling.

Thank you once again for your cooperation in this matter. A copy of this letter is being sent to Envirodyne Engineers.

My point of contact pertaining to this matter is Sophie Baj who can be reached at 716-876-5454, extension 2271 or by writing to Sophie Baj at the above stated address.

The Buffalo District -- Leadership in Engineering.

Sincerely,

Daniel R. Clark

Daniel R. Clark
Colonel, U.S. Army
Commanding

APPENDIX C

RESULTS OF PHYSICAL ANALYSES OF SOILS

30959

SUMMARY OF LABORATORY TESTING

EEI (Truax Field, Madison, Wi Del Ord #8)
EEI Project # 3144-8000

BORING NO	SAMPLE NO	CLASSIFICATION	WATER CONTENT %	LIMITS LL	PL	PI	SIEVE ANALYSIS	REMARKS
TG-1	2	Sandy, silty CLAY	21	38	17	21	*	
TG-1	5	Sandy, silty CLAY	15	31	20	11		
TG-2	3	Silty SAND	10			NP	*	
TG-2	6	SILT, trace sand	20			NP	*	
TG-3	3	Silty, clayey SAND	16	35	15	20	*	
TG-3	6	SAND, trace silt	10			NP	*	

See Curve Sent Previously

GEOTECHNOLOGY, INC

30959

SUMMARY OF LABORATORY TESTING

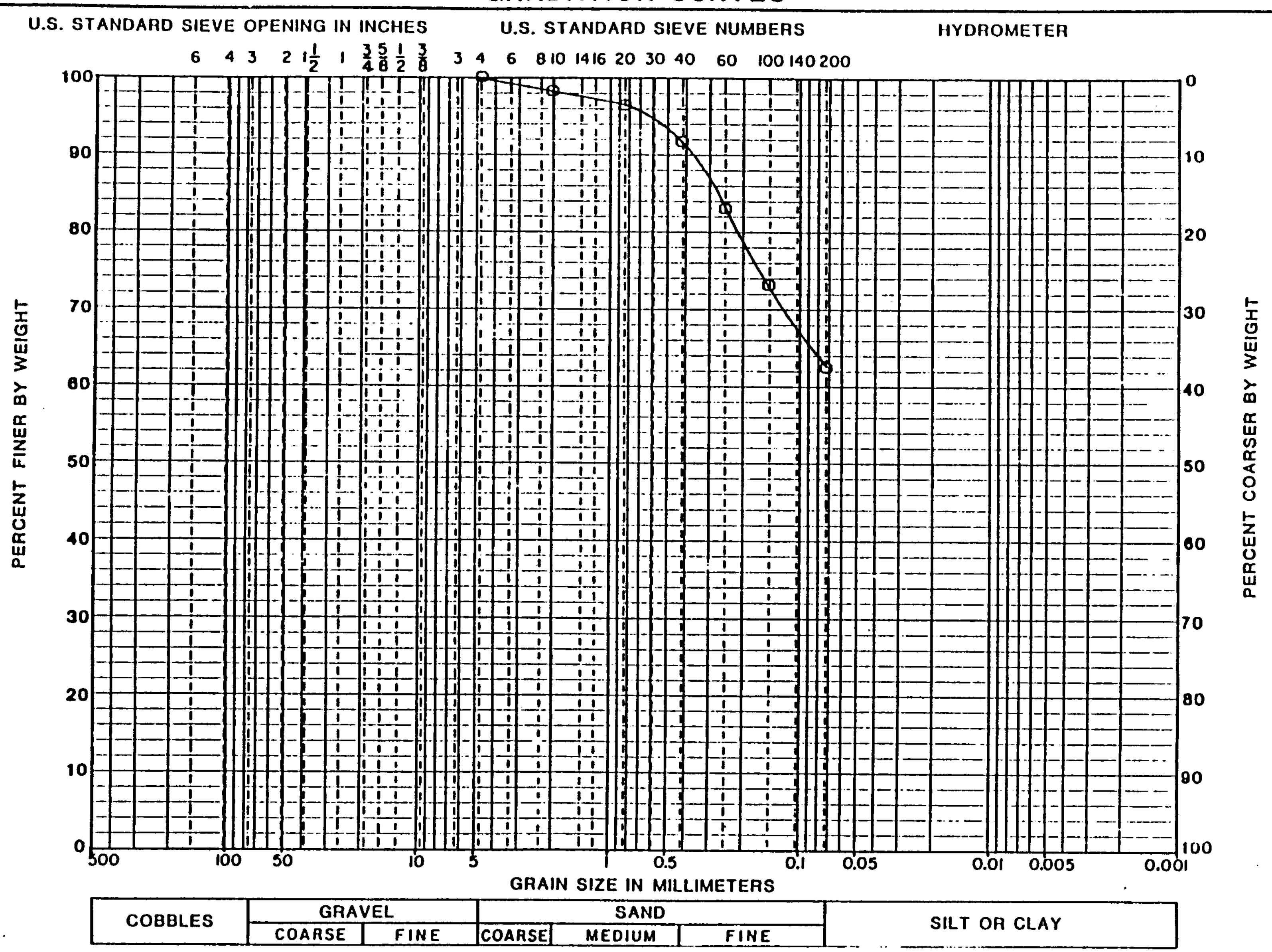
EEI (Truax Field, Madison, Wi Del Ord #8)
EEI Project # 3144-8000

BORING NO	SAMPLE NO	CLASSIFICATION	WATER CONTENT %	LIMITS LL	PL	PI	SIEVE ANALYSIS	REMARKS
TG-1	2	Sandy, silty CLAY	21	38	17	21	*	
TG-1	5	Sandy, silty CLAY	15	31	20	11		
TG-2	3	Silty SAND	10			NP	*	
TG-2	6	SILT, trace sand	20			NP	*	
TG-3	3	Silty, clayey SAND	16	35	15	20	*	
TG-3	6	SAND, trace silt	10			NP	*	

See Curve Sent Previously

GEOTECHNOLOGY, INC

GRADATION CURVES

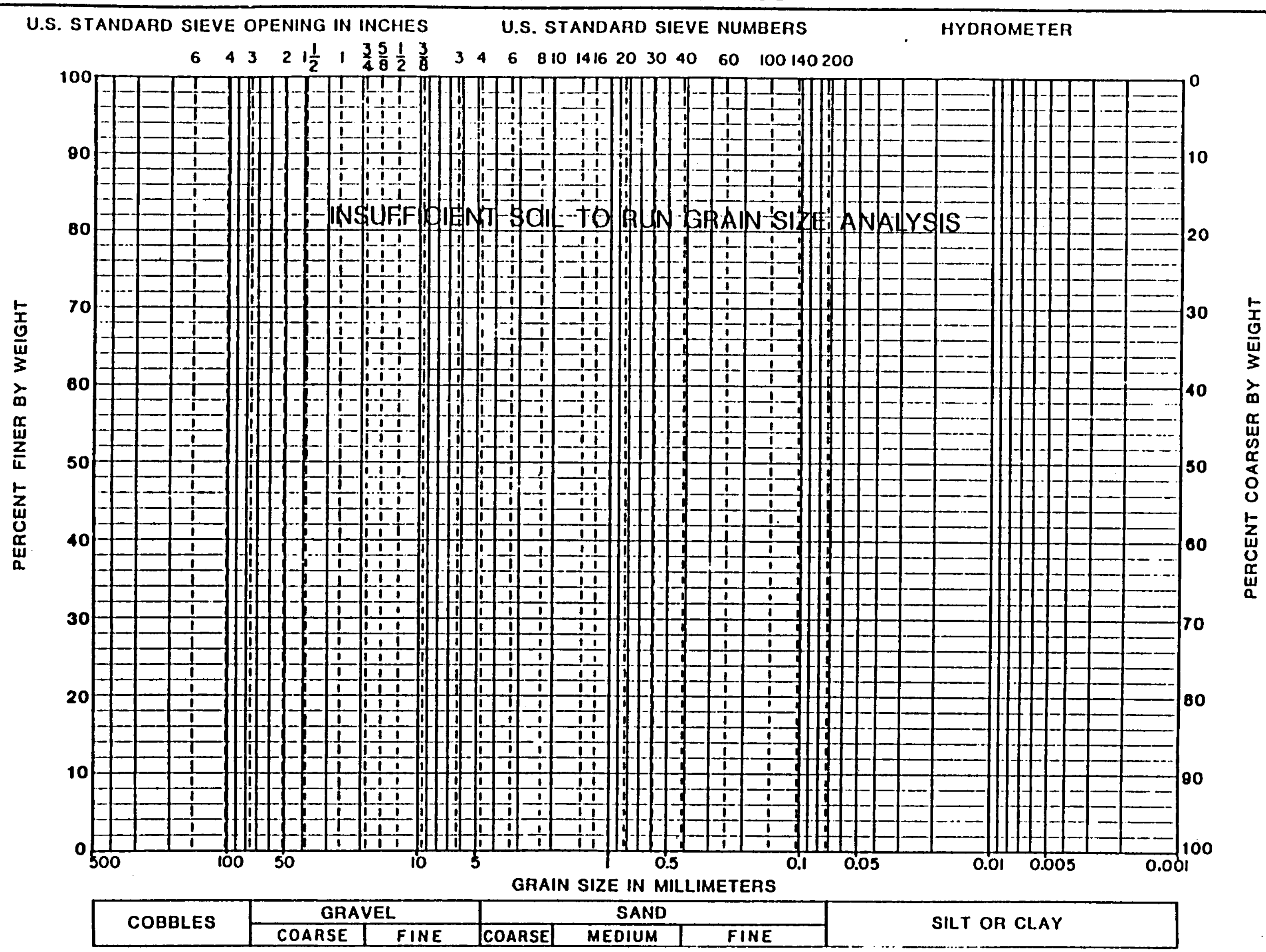


30959

SAMPLE NO.	EL. or DEPTH	CLASSIFICATION	NAT.WT.%	LL	PL	PI	
2		CL	20.9	38	17	21	PROJECT BUFFALO DIST COE DEL ORD #8
							BORING NO. TG-1
							DATE 9-14-88
							GEOTECHNOLOGY ENGINEERING AND ENVIRONMENTAL SERVICES SAINT LOUIS MISSOURI

DI ATC

GRADATION CURVES

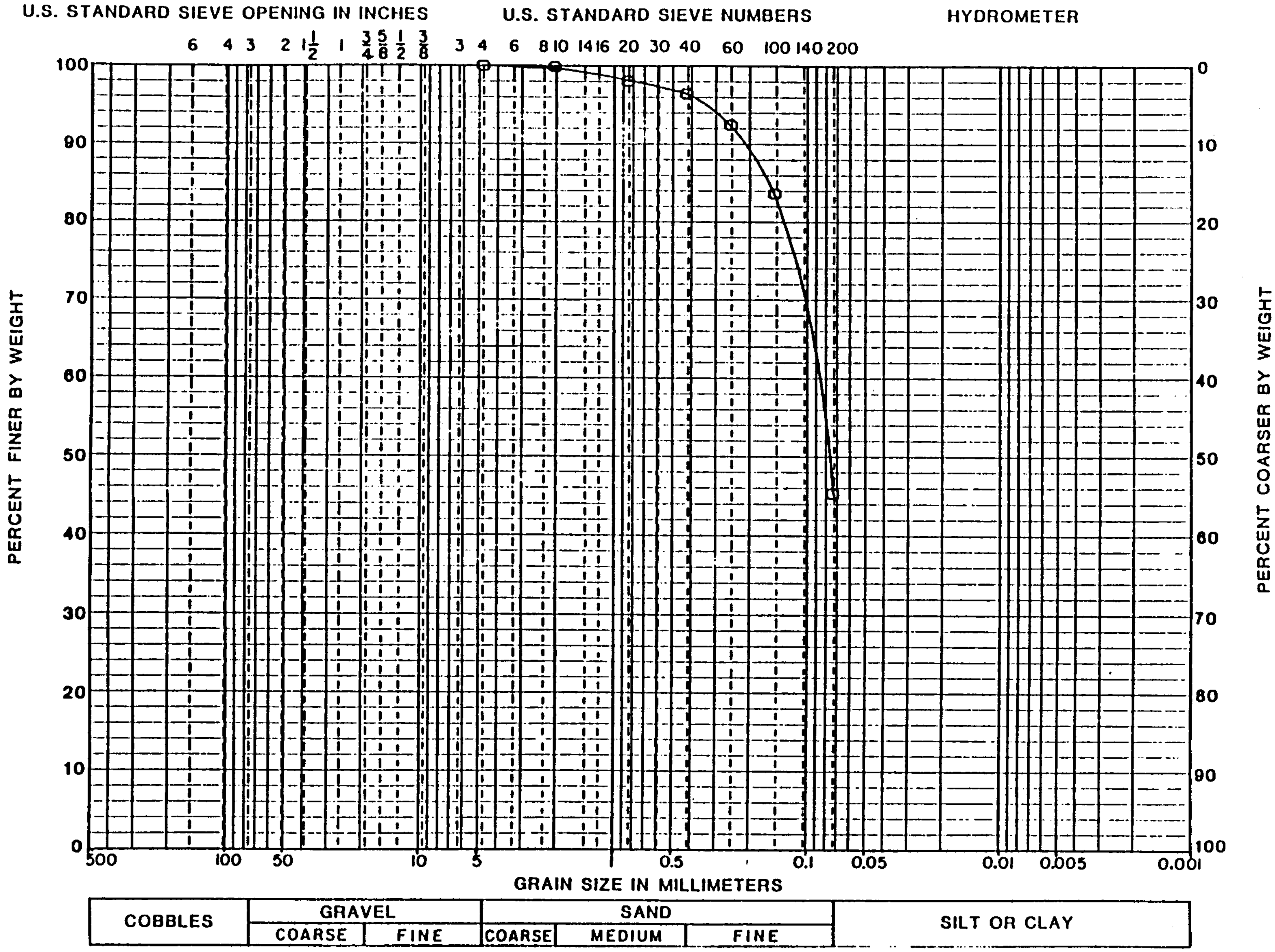


SAMPLE NO.	EL. or DEPTH	CLASSIFICATION	NAT.WT.%	LL	PL	PI	PROJECT BUFFALO DIST COE DEL ORD #8
5		CL	15.1	31	20	11	
							BORING NO. TG-1
							DATE 9-14-88
							GEOTECHNOLOGY ENGINEERING AND ENVIRONMENTAL SERVICES SAINT LOUIS, MISSOURI

PLATE

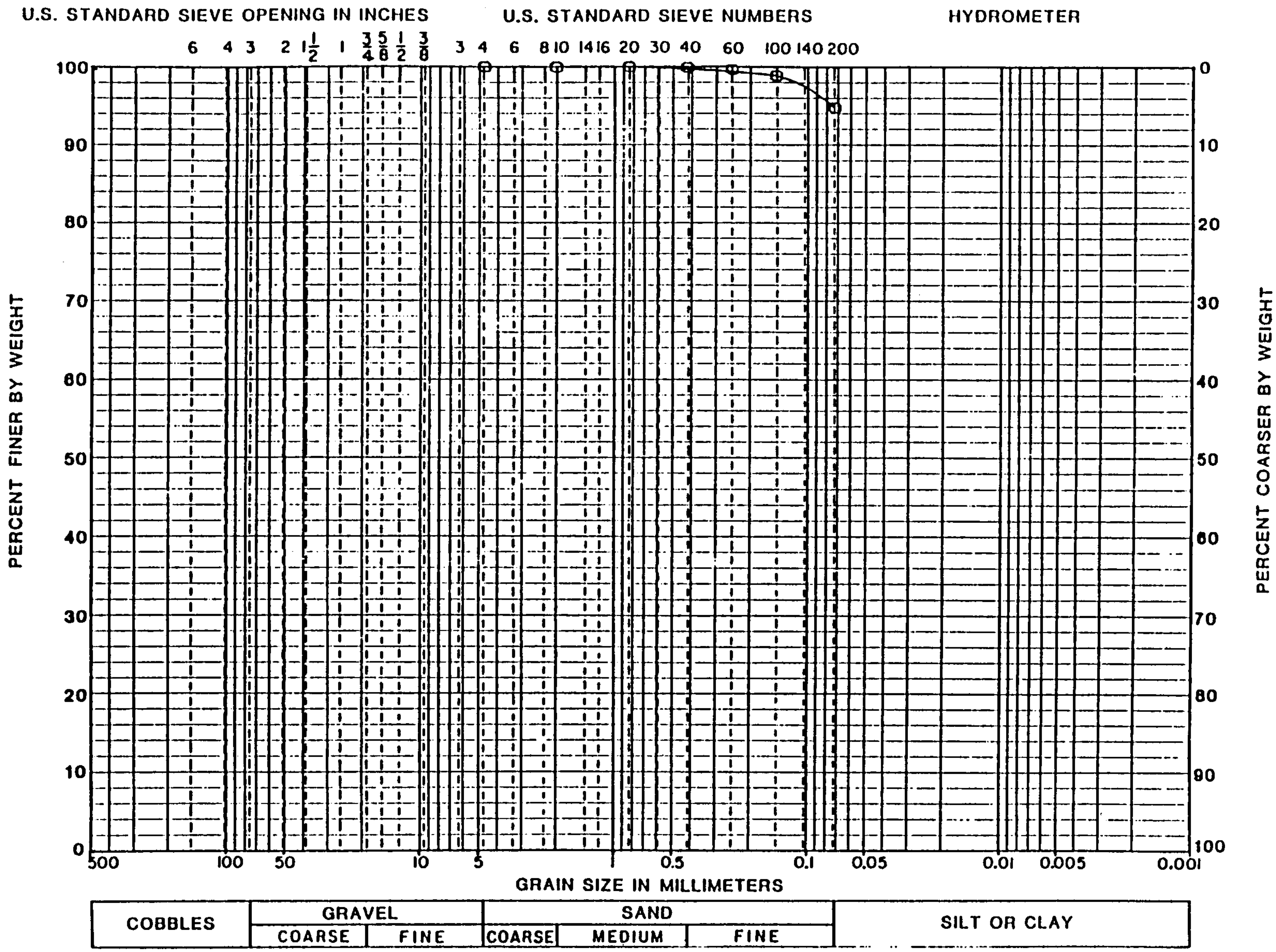
3OE955

GRADATION CURVES



SAMPLE NO.	EL. or DEPTH	CLASSIFICATION	NAT.WT.%	LL	PL	PI	PROJECT BUFFALO DIST COE DEL ORD #8
3		SM	10.0	NP			
							BORING NO. TG-2
							DATE 9-14-88
							GEOTECHNOLOGY ENGINEERING AND ENVIRONMENTAL SERVICES SAINT LOUIS MISSOURI

GRADATION CURVES



30959

SAMPLE NO.	EL. or DEPTH	CLASSIFICATION	NAT.WT.%	LL	PL	PI
6		ML	20.4	NP		

PROJECT BUFFALO DIST COE DEL ORD #8

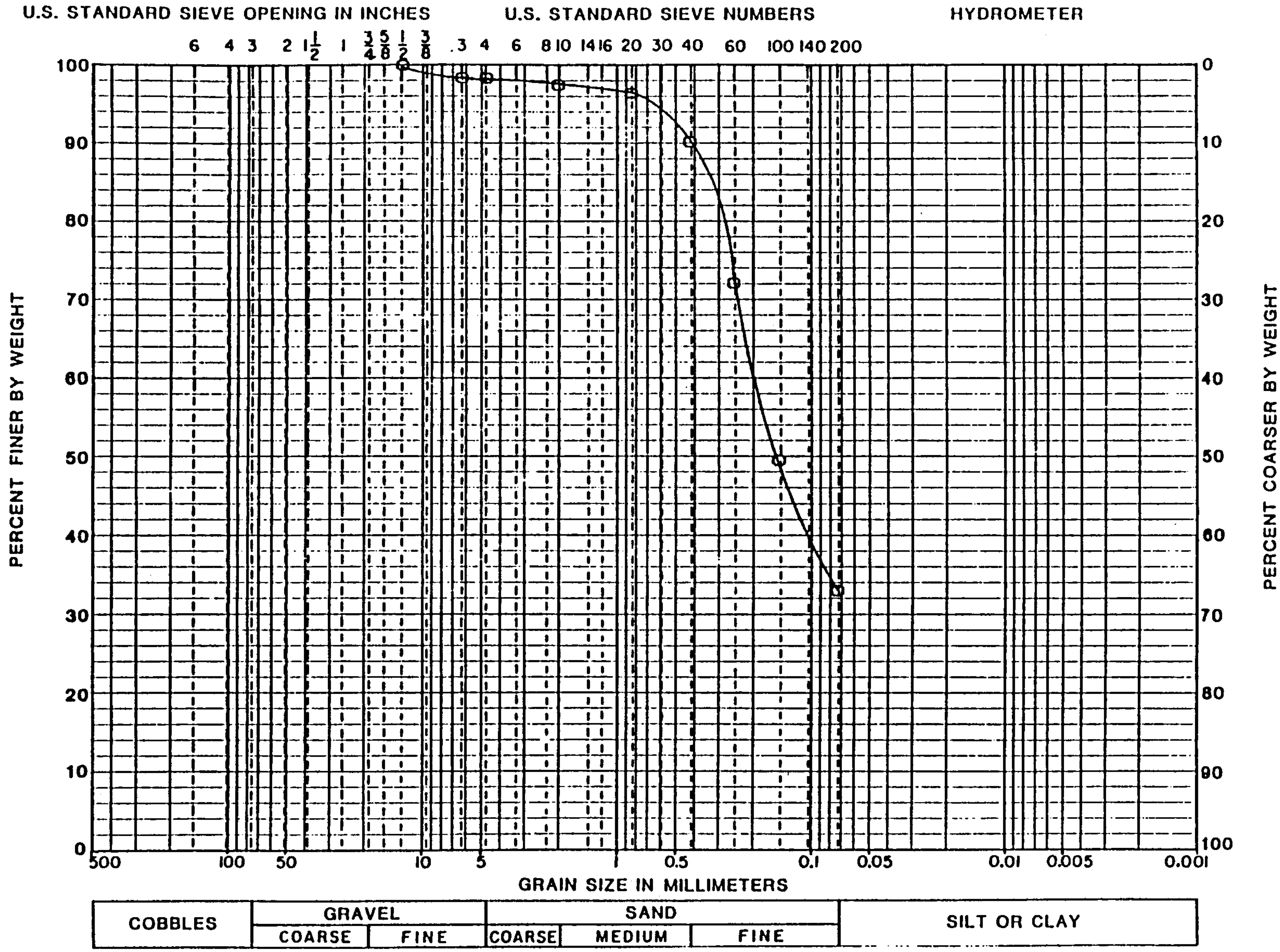
BORING NO. TG-2

DATE 9-14-88

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS MISSOURI

PLATE

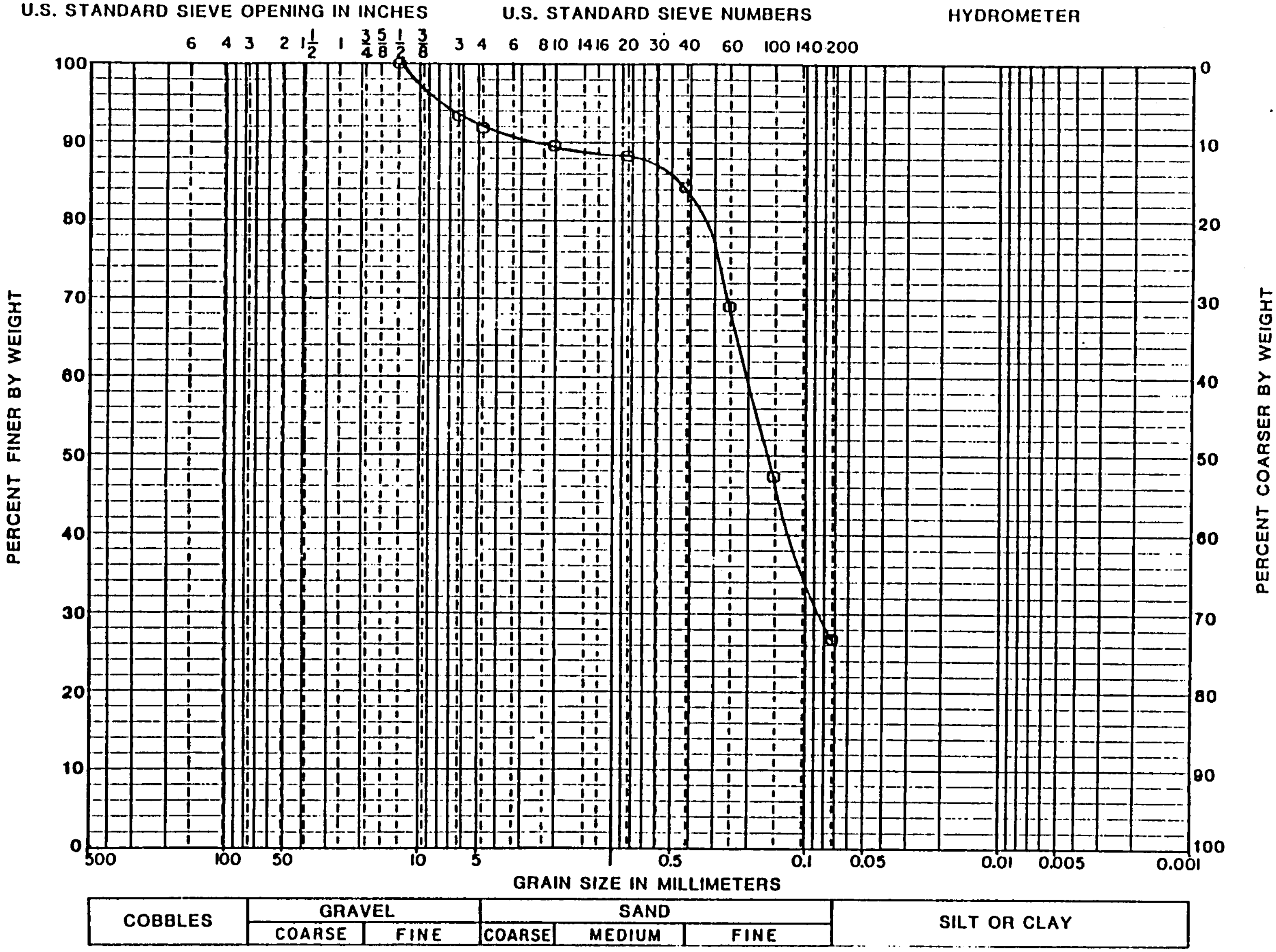
GRADATION CURVES



30959

SAMPLE NO.	EL. or DEPTH	CLASSIFICATION	NAT.WT.%	LL	PL	PI	PROJECT BUFFALO DIST COE DEL ORD #8
3		SP	16.3	35	15	20	
							BORING NO. TG-3
							DATE 9-14-88
							GEOTECHNOLOGY ENGINEERING AND ENVIRONMENTAL SERVICES SAINT LOUIS, MISSOURI

GRADATION CURVES



SAMPLE NO.	EL. or DEPTH	CLASSIFICATION	NAT.WT.%	LL	PL	PI
6		SW	10.1	NP		

PROJECT BUFFALO DIST COE DEL ORD #8

BORING NO. TG-3

DATE 9-14-88

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

PLATE

30959

APPENDIX D

WELL CONSTRUCTION AND BORING LOGS

ENVIRODYNE ENGINEERS
St. Louis, Mo

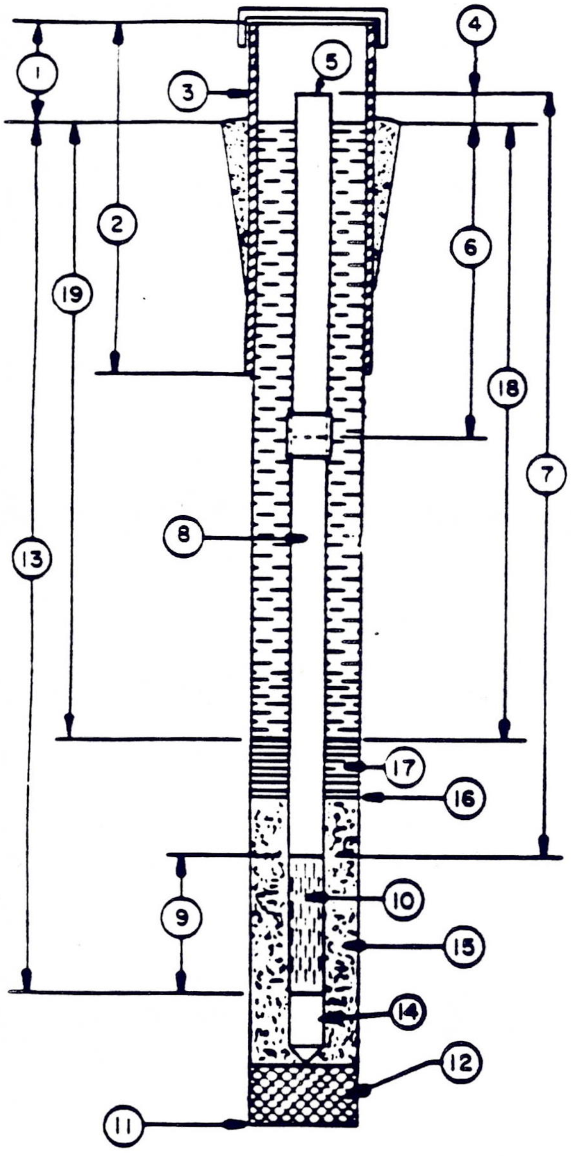
Well Construction Details

Location: Truax Field TG-1, West of Packers/North of Aberg /Job No. 3144 Well No. TG-1

Date of Installation: June 7, 1988 Time Start: 4:45 pm Time Complete: 5:45

Ground Surface Elev.: ______ Drill Firm: Geotechnology Driller: A. Foster

Logger: Craig S. Jones Signature: ______ Water Level: 16.0 at 8:20 am June 8, 1988



1. Height of Protective Casing Above Ground: 3.0'
2. Total Length of Protective Casing: 5.0'
3. Type of Protective Casing: 4" square steel pipe w/locking cap.
4. Height of Well Standpipe Above Ground: 2.8'
5. Type of Stand Pipe Cap: PVC slip cap
6. Depth to First Joint: 3.5
   Interval: 2.5 Type: PVC Flush Thread
7. Total Length of Blank Pipe: 21.1
8. Type of Blank Pipe: Sch 40 PVC Diam.: 2'
9. Length of Screen: 10' Section w/9' of Slots
10. Type of Screen: Sch 40 PVC w/0.010 slots
11. Total Depth of Boring: 28.8' Hole Diam.: 8"
12. Type of Material: NA
13. Depth to Bottom of Screen: 28.3'
14. Well Point Length: 0.5'
15. Type of Screen Filter Pack: WB 35 chert sand
    Quantity Used: 3½ x 100# bags
16. Depth to Top of Filter Pack: 16.8'
17. Type of Seal: ¼" Bentonite Pellets
    Quantity Used: 4/5 of a 50# bucket or 40#
18. Depth to Top of Seal: 14.7'
19. Depth of Concrete Grout: 14.7'
    Type of Grout Mixture: Neat cement w/3% bentonite

All depth measurements of well detail are from ground surface unless otherwise indicated.

Remarks: Generated two barrels of cuttings

ENVIRODYNE ENGINEERS

FIELD BORING LOG

Sheet 1 of 4

FOR DERA - Buffalo Corps of Engineers

JOB NO. 3144

LOCATION TG-1, West of Packers/North of Aberg

ELEV.

BORING NO. TG-1

GROUND WATER: WHILE DRILLING 18.2' · BEFORE DEVELOPMENT · AFTER DEVELOPMENT

DATE June 7, 1988 · TIME START 2:45 pm · TIME END 4:45 pm

DRILL CO. Geotechnology · DRILLER A. Foster · LOGGER C. Jones

S.S. Die 2.0" · Weight 140# · Drop 30"

SAMPLE NO.	BLOWS ON SAMPLER	DRIVE	RECOVERY	VISUAL FIELD CLASSIFICATION	GRAPHIC LOG	WELL CONSTRUCT	REMARKS
1	2/17	1.5	1.4	Dark to medium brown organic silt (OL) very hard and dry			Dry HNU=1.0
				1			
	5/15	1.5	1.5	2			
2				Clayey silt w/Fe and Mn concretions/Fe stains, dark brown (ML)			Moist
	2/7	1.5	1.2	3			
				4			
3	2/5	1.5	1.0	Sand silt mixture, dark brown to black w/¼ gravel present (scattered) (SM)			Moist
				5			
				Silty sand (dark brown) w/¼" scattered gravel (SM) (gravel is sandstone/crystalline) Some Fe staining present			Moist
4	1/6	1.5	1.5	6			
				Silty clay w/Fe and Mn stains, some sand grains present (CL)			Moist HNU=1.5
				7			Moist
	1/6	1.5	1.5				
5				8			
				Brown sandy silt w/Fe stains (SM)			Moist
6	3/20	1.5	1.5	9			
				Well sorted sand (little or no fines) (SM)			Moist
				10 Very clean			

ENVIRODYNE ENGINEERS

FIELD BORING LOG

Sheet 2 of 4

FOR DERA - Buffalo Corps of Engineers

JOB NO. 3144

LOCATION TG-1 West of Packers/North of Aberg

ELEV.

BORING NO. TG-1

GROUND WATER	
WHILE DRILLING	18.2'
BEFORE DEVELOPMENT	
AFTER DEVELOPMENT	

DATE June 7, 1988
TIME START 2:45 pm
TIME END 4:45 pm

DRILL CO. Geotechnology
DRILLER A. Foster
LOGGER C. Jones

S.S. Dia 2.0"
Weight 140#
Drop 30"

SAMPLE NO.	BLOWS ON SAMPLER	DRIVE	RECOVERY		VISUAL FIELD CLASSIFICATION	GRAPHIC LOG	WELL CONSTRUCT	REMARKS
					11			
					12 NOT SAMPLED			Slight odor HNU=10 Driller said it smells like paint.
					13			
7	9/24	1.5	1.5		14 Same as 9-10½", well sorted sand (SM)			Sent Gastech (down hole) @ 14' LEL = 10 H_2S = 2.3 Very Moist
					15 Brown silty sand (much like TG-2) (SM)			Moist
					16			
					17 NOT SAMPLED			
					18			(Down hole) @ 19' LEL = 13 O_2 = 20.8 H_2S = 7.7
	7/15	1.5	1.2		19 Silty sand (free water) brown w/½" scattered gravel (SM)			Water @ 18.2' Wet Added 10 gallons of water
					20			

ENVIRODYNE ENGINEERS

FIELD BORING LOG

Sheet 3 of 4

FOR: DERA - Buffalo Corps of Engineers
JOB NO. 3144
LOCATION: TG-1 West of Packers/North of Aberg
ELEV.
BORING NO. TG-1

GROUND WATER		DATE	June 7, 1988	DRILL CO.	Geotechnology
WHILE DRILLING	18.2'	TIME START	2:45 pm	DRILLER	A. Foster
BEFORE DEVELOPMENT		TIME END	4:45 pm	LOGGER	C. Jones
AFTER DEVELOPMENT					

S.S. Dia 2.0" | Weight 140# | Drop 30"

SAMPLE NO.	BLOWS ON SAMPLER	DRIVE	RECOVERY	DEPTH	VISUAL FIELD CLASSIFICATION	GRAPHIC LOG	WELL CONSTRUCT	REMARKS
				21	NOT SAMPLED			Driller noted more gravel encountered while drilling.
				22				
				23				(Down hole check) H_2S meter = 10 and greater (meter went off)
	5/19	1.5	1.5	24	Silty sand (muddy brown color) very fine grained, well sorted (SM)			WL = 19'10" Wet, free water
				25				
				26	NOT SAMPLED			
				27				
				28				
	4/20	1.5	1.5	29	Silty sand (muddy brown color) same as above, very fine grain, well sorted (SM)			Free water, wet. Added four gallons of water
				30				

ENVIRODYNE ENGINEERS

FIELD BORING LOG

FOR DERA - Buffalo Corps of Engineers

JOB NO. 3144

LOCATION TG-1 West of Packers/North of Aberg ELEV. ______ BORING NO. TG-1

GROUND WATER		DATE June 7, 1988	DRILL CO. Geotechnology
	WHILE DRILLING ______	TIME START 2:45 pm	DRILLER A. Foster
	BEFORE DEVELOPMENT ______	TIME END 4:45 pm	LOGGER C. Jones
	AFTER DEVELOPMENT ______		

SAMPLE NO.	BLOWS ON SAMPLER	DRIVE	RECOVERY		VISUAL FIELD CLASSIFICATION (S.S. Dia 2.0" Weight 140# Drop 30")	GRAPHIC LOG	WELL CONSTRUCT	REMARKS
					31 Auger flight TD @ 28.8', took sample below - 28.8-30.3' (silty sand), set well @ 28.8'			

ENVIRODYNE ENGINEERS

St. Louis, Mo

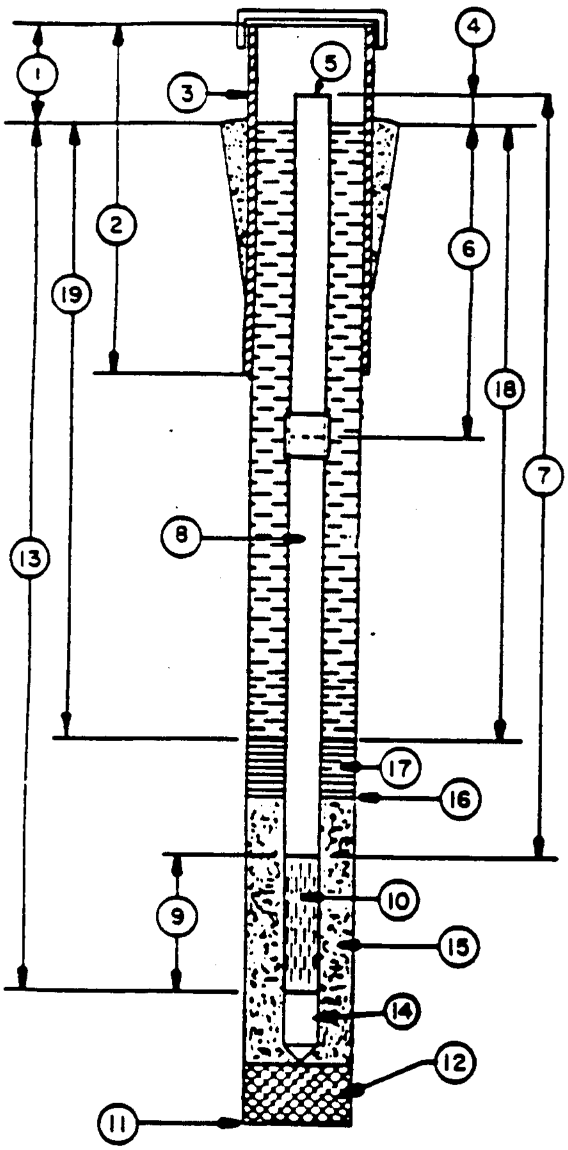
Well Construction Details

Location Truax Field TG-2, West of Wastewater Treatment Facility /Job No. 3144 Well No. TG-2

Date of Installation June 7, 1988 Time Start 10:45 am Time Complete 1:45 pm

Ground Surface Elev. ____ Drill Firm Geotechnology Driller A. Foster

Logger Craig S. Jones Signature ____ Water Level 11'10" at 1:40 pm June 8, 1988



1. Height of Protective Casing Above Ground 3.0'
2. Total Length of Protective Casing 5.0'
3. Type of Protective Casing 4" square steel pipe w/locking cap.
4. Height of Well Standpipe Above Ground 3.0
5. Type of Stand Pipe Cap PVC slip cap
6. Depth to First Joint 4.5'
   Interval 10',5".2½' Type PVC Flush Thread
7. Total Length of Blank Pipe 17.5'
8. Type of Blank Pipe Sch 40 PVC Diam. 2"
9. Length of Screen 10'
10. Type of Screen Sch 40 PVC w/0.010 slots
11. Total Depth of Boring 25½' Hole Diam. 8"
12. Type of Material Filter Sand
13. Depth to Bottom of Screen 24.5'
14. Well Point Length 0.5"
15. Type of Screen Filter Pack WB 35 chert sand
    Quantity Used 3½ bags x 100#
16. Depth to Top of Filter Pack 12.9'
17. Type of Seal ¼" Bentonite Pellets
    Quantity Used 4 gallons (4/5 of 50#) or 40#
18. Depth to Top of Seal 10.9'
19. Depth of Concrete Grout 10.9'
    Type of Grout Mixture Neat cement w/3% bentonite

All depth measurements of well detail are from ground surface unless otherwise indicated.

Remarks: Generated cutting which were stored on plastic, covered with plastic.

ENVIRODYNE ENGINEERS

FIELD BORING LOG

FOR DERA - Buffalo Corps of Engineers JOB NO. 3144

LOCATION TG-2, East of Packers/North of Aberg ELEV.____ BORING NO. TG-2

GROUND WATER: WHILE DRILLING ____ BEFORE DEVELOPMENT ____ AFTER DEVELOPMENT ____

DATE June 7, 1988 | TIME START 9:30 am | TIME END 10:45 am

DRILL CO. Geotechnology | DRILLER A. Foster | LOGGER C. Jones

S.S. Dia 2.0" | Weight 140# | Drop 30"

SAMPLE NO.	BLOWS ON SAMPLER	DRIVE	RECOVERY	DEPTH	VISUAL FIELD CLASSIFICATION	GRAPHIC LOG	WELL CONSTRUCT	REMARKS
	4/15	1.5	1.0		(Limestone) Silty gravel (Fill Material) (GM)			Dry
				1				
1	1/10	1.5	1.0	2	Clayey silt w/Fe stains (dark brown) (ML)			Moist
	2/6	1.5	1.5	3	Clayey silt w/Fe stains and w/Mn stains (ML)			Moist
				4				
	1/9	1.5	1.5					
2				5	Clear sands little or no fines, somewhat sorted (SW)			Very moist
3	4/16	1.5	1.5	6	Fine silty sand, well sorted (SM)			Moist
				7				
	2/14	1.5	1.5					
				8				Moist
	1/10	1.5	1.5	9	Fine silty sand, well sorted (light brown) (SM)			Moist

ENVIRODYNE ENGINEERS

FIELD BORING LOG

Sheet 2 of 3

FOR DERA - Buffalo Corps of Engineers JOB NO. 3144

LOCATION TG-2 Truax Field ELEV. BORING NO. TG-2

GROUND WATER		DATE	June 7, 1988	DRILL CO.	Geotechnology
WHILE DRILLING		TIME START	9:30 am	DRILLER	A. Foster
BEFORE DEVELOPMENT		TIME END	10:45 am	LOGGER	P. Shetley
AFTER DEVELOPMENT					

S.S. Dia 2.0" Weight 140# Drop 30"

SAMPLE NO.	BLOWS ON SAMPLER	DRIVE	RECOVERY		VISUAL FIELD CLASSIFICATION	GRAPHIC LOG	WELL CONSTRUCT	REMARKS
					10			Moist (Very moist on top of clayey silt)
4					3" Clayey silt (slightly plastic) (ML)			Moist
					11			
					12 Not Sampled			
					13			At 13' encountered hard material (6-8")
	5/16	1.5	1.5		14			
					Fine (very clean) silty sand (well sorted) (SM) light brown but w/free water present			5 - HNU @ 14' Wet spoon
					15			
					16 Not Sampled			
					17			
					18			
5	2/7	1.5	1.5		19 Fine silty sand (light brown) (clean) well sorted, very fine grained (SM)			5-HNU @ 19' Wet

ENVIRODYNE ENGINEERS

FIELD BORING LOG

FOR DERA - Buffalo Corps of Engineers — JOB NO. 3144

LOCATION Truax Field — ELEV. — BORING NO. TG-2

GROUND WATER		DATE	June 7, 1988	DRILL CO.	Geotechnology
WHILE DRILLING		TIME START	9:30 am	DRILLER	A. Foster
BEFORE DEVELOPMENT		TIME END	10:45 am	LOGGER	C. Jones
AFTER DEVELOPMENT					

S.S. Dia 2.0" Weight 140# Drop 30"

SAMPLE NO.	BLOWS ON SAMPLER	DRIVE	RECOVERY	VISUAL FIELD CLASSIFICATION	GRAPHIC LOG	WELL CONSTRUCT	REMARKS
5	2/7	1.5	1.5	20 Free water present (same sand as above) (SM)			Adding five gallons of water to hole.
				21			
				22 Not Sampled			
				23			
	4/12	1.5	1.5	24 Fine silty sand (light brown) (clear) well sorted, very fine grained (SM)			Adding five gallons of water Wet
				25			
6	3/11	1.5	1.2				HNU=Ambient Adding four gallons of water.
				26			
				27 Auger flight TD at 25½' sampled 25½-27' for material check. Backfill w/chert sand (25-25½') Set well at 25.0'.			

ENVIRODYNE ENGINEERS
St. Louis, Mo

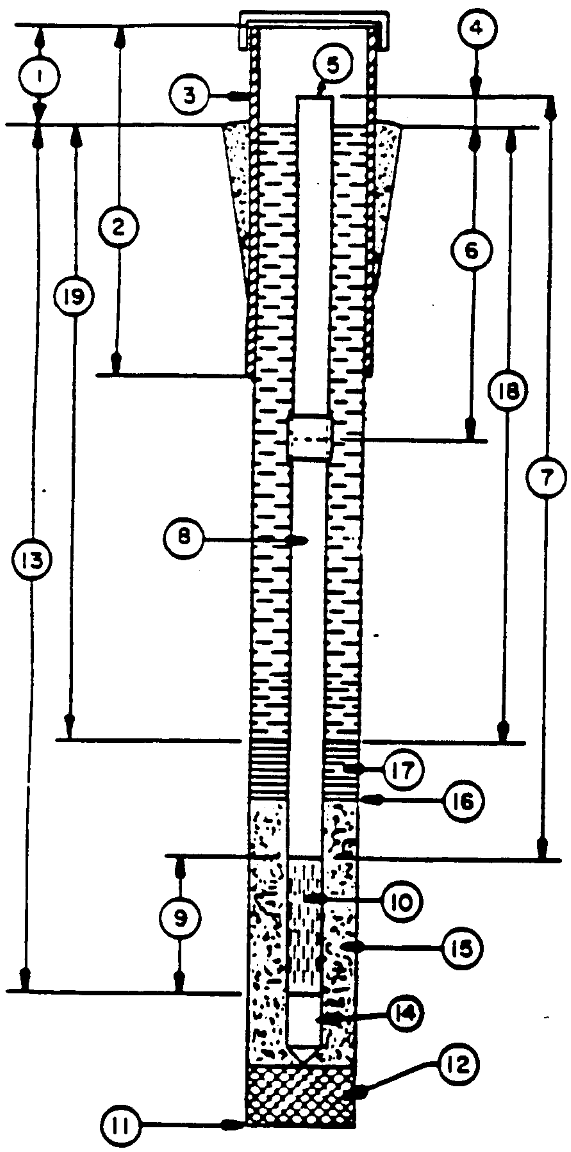
Well Construction Details

Location Truax Field - Burn Area /Job No. 3144 Well No. TG-3

Date of Installation June 1, 1988 Time Start 1:30 pm Time Complete 5:00 pm

Ground Surface Elev. ______ Drill Firm Geotechnology Driller D. Meyer

Logger Paul W. Shetley Signature ______ Water Level 17.0' BG-1 at 1:30 pm



1. Height of Protective Casing Above Ground 3'
2. Total Length of Protective Casing 5.0'
3. Type of Protective Casing 4" square steel pipe w/locking cap.
4. Height of Well Standpipe Above Ground 3.0'
5. Type of Stand Pipe Cap PVC slip cap
6. Depth to First Joint 5.9'
   Interval 10.0 Type PVC Flush Thread
7. Total Length of Blank Pipe 18.9
8. Type of Blank Pipe Sch 40 PVC Diam. 2.0"
9. Length of Screen 10.0' Section 9.0' of Slots
10. Type of Screen Sch 40 PVC w/0.010 slots
11. Total Depth of Boring 29.0' Hole Diam. 8.0"
12. Type of Material Filter Sand
13. Depth to Bottom of Screen 25.9'
14. Well Point Length 0.5'
15. Type of Screen Filter Pack WB 35 chert sand
    Quantity Used 3.5 x 100# bags
16. Depth to Top of Filter Pack 14.9'
17. Type of Seal ¼" Bentonite Pellets
    Quantity Used 1 x 50# bucket
18. Depth to Top of Seal 10.8'
19. Depth of Concrete Grout 10.8'
    Type of Grout Mixture Neat cement w/3% bentonite

All depth measurements of well detail are from ground surface unless otherwise indicated.

Remarks: Added 100 gallons of water to wash down filter sand when it bridged. Bentonite Pellets bridged in augers at about 15' had to remove augers and set seal through open hole. Mixture of cave-in and pellets from 14.9 to 13.9. Then added a bucket of pellets to bring seal to 10.8. Generated two barrels of cuttings.

ENVIRODYNE ENGINEERS

FIELD BORING LOG

FOR DERA - Buffalo Corps of Engineers

JOB NO. 3144

LOCATION Truax Field - Burn Area

ELEV.

BORING NO. IG-3

GROUND WATER	WHILE DRILLING 17.0'	DATE June 1, 1988	DRILL CO. Geotechnology
	BEFORE DEVELOPMENT	TIME START 10:30 am	DRILLER D. Meyer
	AFTER DEVELOPMENT	TIME END 12:00	LOGGER P. Shetley

S.S. Dia 2.0" Weight 140# Drop 30"

SAMPLE NO.	BLOWS ON SAMPLER	DRIVE	RECOVERY	VISUAL FIELD CLASSIFICATION	GRAPHIC LOG	WELL CONSTRUCT	REMARKS
1	15/9	1.5	1.5	Light brown sandy silt (SM), hard and dry			Dry
				1			
2	9/7	1.5	0.5	Reddish brown sandy clay (SC), a few scattered FeMn stains			Moist
				2			
3	1/7	1.5	1.0	3			
				Reddish brown sandy clay (SC) w/zones of rounded gravel up to ½" diameter (limestone gravel)			Moist
				4			
4	5/20	1.5	1.5	Brown fine to medium sand (SP) w/scattered gravel (rounded and angular)			Dry
				5			
Not Recorded				6			
				Same SP as above			Dry
				7			
5				Gravelly medium sand (SP) w/gravel up to 1½" diameter			Dry
	7/22	1.5	1.5				
				8			
				Brown fine to medium sand (SP)			Dry
	16/29	1.5	0.5	9			
				Same SP as above w/shattered limestone gravel, angular up to 1½" diameter			No Recovery, 1st try, Recovered 0.5', 2nd try, dry

ENVIRODYNE ENGINEERS

FIELD BORING LOG

FOR DERA - Buffalo Corps of Engineers | JOB NO. 3144

LOCATION Truax Field - Burn Area | ELEV. | BORING NO. TG-3

GROUND WATER		DATE	June 1, 1988	DRILL CO.	Geotechnology
WHILE DRILLING	17.0'	TIME START	10:30 am	DRILLER	D. Meyer
BEFORE DEVELOPMENT		TIME END	12:00	LOGGER	P. Shetley
AFTER DEVELOPMENT					

S.S. Dia 2.0" Weight 140# Drop 30"

SAMPLE NO.	BLOWS ON SAMPLER	DRIVE	RECOVERY	DEPTH	VISUAL FIELD CLASSIFICATION	GRAPHIC LOG	WELL CONSTRUCT	REMARKS
					Brown sand w/gravel (SP)			Dry
				10				
				11				
				12	NOT SAMPLED			
				13				
6	7/25	1.5	1.4	14	Pinkish fine to medium sand w/large 1½" pieces of gravel at 14.5' (limestone gravel)			Moist
				15				
				16	NOT SAMPLED			
				17				
				18				
				19				

ENVIRODYNE ENGINEERS

FIELD BORING LOG

FOR DERA - Buffalo Corps of Engineers   JOB NO. 3144

LOCATION Truax Field - Burn Area   ELEV.   BORING NO. TG-3

GROUND WATER: WHILE DRILLING ______ BEFORE DEVELOPMENT ______ AFTER DEVELOPMENT ______

DATE June 1, 1988 TIME START 10:30 am TIME END 12:00

DRILL CO. Geotechnology DRILLER D. Meyer LOGGER P. Shetley

S.S. Dia 2.0" Weight 140# Drop 30"

SAMPLE NO.	BLOWS ON SAMPLER	DRIVE	RECOVERY		VISUAL FIELD CLASSIFICATION	GRAPHIC LOG	WELL CONSTRUCT	REMARKS
	11/65	1.5	1.5		19 Pinkish fine to medium sand (SP)w/scattered gravels up to 1½" diameter, gravels rounded			Wet in spoon shoe sample very moist
					20			
					21 NOT SAMPLED 22 23			
7	20/92	1.5	1.5		24 Pinkish fine to medium sand (SP) w/scattered gravel			HNU reading at approximately 50 noticeable odor of petroleum.
					25 Very moist			Work area HNU 1.0 Very moist
					26 27 28			

ENVIRODYNE ENGINEERS

FIELD BORING LOG

FOR DERA - Buffalo Corps of Engineers — JOB NO. 3144

LOCATION Truax Field - Burn Area — ELEV. ____ — BORING NO. TG-3

GROUND WATER		DATE	June 1, 1988	DRILL CO.	Geotechnology
WHILE DRILLING	17.0'	TIME START	10:30 am	DRILLER	D. Meyer
BEFORE DEVELOPMENT		TIME END	12:00	LOGGER	P. Shetley
AFTER DEVELOPMENT					

S.S. Dia 2.0" — Weight 140# — Drop 30"

SAMPLE NO.	BLOWS ON SAMPLER	DRIVE	RECOVERY		VISUAL FIELD CLASSIFICATION	GRAPHIC LOG	WELL CONSTRUCT	REMARKS
					28			
8	7/97	1.5	1.5		29			
					Coarse brown sand (SW) w/specks of black			Spoon wet, sample wet WL = 20' BGL @ 11:30 am WL = 17.0 @ 1:15 pm
					30 Pinkish fine to medium sand (SP) w/ scattered small gravel ½" diameter			
					31 TD 29.0 Augered to 29.0', drove spoon to 31.5'			
					32			
					33 Drilled w/4¼" ID 8" OD hollow stem augers			
					34			
					35			
					36			
					37			

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO
ATTENTION OF
Water Quality Section

FEB - 1 1988

SUBJECT: Disposal of Bore Hole Cuttings, Truax Field

Mr. Mike Schmoller
Environmental Specialist
Wisconsin Department of Natural Resources
3911 Fish Hatchery Road
Fitchburg, Wisconsin 53711

Dear Mr. Schmoller:

In a telephone conversation on January 25 with Mr. Richard Leonard of my Water Quality Section, Mr. Leonard asked that the Corps contractor (Envirodyne) be allowed to dispose of four drums of bore hole cuttings on site or in a municipal landfill without further testing. Data in support of such disposal was discussed. This data is enclosed and is discussed here.

The two bore holes in question are TG-3 and TG-1. Enclosed Tables 4-8 and 4-9 contain data on groundwater samples taken from wells installed at these locations. Table 4-10 contains data on a soil sample (TS-10) collected at approximately 25-foot depth where an elevated HNU meter reading was noted. Although there was a high HNU reading, quantitative chemical analysis measured low petroleum hydrocarbons (< 50 ug/g). Heavy metal content is low and at about soil background level. Volatile organics were not measured on this sample.

The heavy metals content of both groundwater samples (TG-1 and TG-3) were low. Volatile organics were below detection limits for TG-1 and toluene and some miscellaneous hydrocarbons were found in TG-3 at levels below State of Wisconsin standards. We believe the data supports disposal as previously stated. There will be no further sampling or analyses of samples under this confirmation study.

Mr. Leonard also discussed with you the presence of TCE in one of the Oscar Meyer Wells (TG-13) which may possibly be used for food processing or drinking water. This data is contained in Table 4-9.

Water Quality Section
SUBJECT: Disposal of Bore Hole Cuttings, Truax Field

A copy of this letter is being sent to T. Lachajczyk of Envirodyne.

Please contact Mr. Leonard regarding this matter at your earliest convenience. He can be reached at (716) 876-5454, extension 2270. Thank you for your consideration of this matter.

Sincerely,
KENNETH R. HALLOCK

KH
Kenneth R. Hallock, P.E.
Chief, Engineering Division

Enclosures

APPENDIX E

RESULTS OF AQUIFER TESTING

SLUG TEST

Field Procedures

At each well the depth to static water was measured from the top of PVC casing using an electronic water level meter. A teflon bailer filled with DI water (0.15 ft inside diameter X 3.40 ft length) was then lowered into the well. This generated a slug with a displacement volume of 0.06 ft^3 (0.45 gallons).

The slug test was started as soon as the bailer was dropped into the well and the electronic water level meter lowered to the water level. This meter was used to measure the rate at which the water stabilized. Once the well stabilized, the slug was removed and the water level meter was again lowered to the level of the water, and measured the rate at which the water stabilized.

With the slugs displacement volume of 0.06 ft^3 (0.45 gallons) from the well, this would create a calculated 1.60 ft instantaneous use or drop in the water level. Porous soils (silty sands) allowed fast recovery at the sites as two slug tests were done on each well.

Data Reduction Procedures

The method used is described in "Response of a Finite-Diameter Well to an Instantaneous Charge of Water" by Hilton H. Cooper, Jr., John D. Bredehoeft, and Istavros S. Papadopulos, published in Water Resources Research, First Quarter, 1967 (copy enclosed).

This method is a curve matching technique allowing the plotted data to be compared with a series of type curves (copies enclosed).

TABLE 1

SUMMARY OF SLUG TEST RESULTS

		k Coefficient of Permeability Cooper et al (cm/sec)
TG-1	Run 1	8.91×10^{-4}
TG-1	Run 2	8.50×10^{-4}
TG-2	Run 1	1.02×10^{-3}
TG-2	Run 2	9.23×10^{-4}
TG-3	Run 1	8.47×10^{-4}
TG-3	Run 2	8.85×10^{-4}

AQUIFER TESTS - CALCULATION

Method: Cooper et al. (curve matching)

Formula $T = \frac{rc^2}{t}$ when $\frac{H}{Ho}$ vs. t matches

$$\frac{H}{Ho} \text{ vs. } \frac{Tt}{rc^2} = 1$$

Where T = Transmissivity in cm^2/second

rc^2 = Radius of the well casing, squared (cm^2)

t = Time in Seconds

$rc^2 = 6.45\ cm^2$ for all wells installed

Formula $K = \frac{T}{L}$

Where K = Coefficient of permeability in cm/second

T = Transmissivity in cm/second

L = Saturated screen length in cm

Well No.	Run NO.	Matching Point Log t in minutes	t (sec)	T (cm^2/sec)	L (cm)	K (cm/sec)
TG-1	1	0.50	30.0	2.15 X 10-1	241.4	8.91 X 10-4
TG-1	2	0.52	31.5	2.05 X 10-1	241.4	8.50 X 10-4
TG-2	1	0.40	24.0	2.69 X 10-1	264.9	1.02 X 10-3
TG-2	2	0.44	26.4	2.44 X 10-1	264.9	9.23 X 10-4
TG-3	1	0.76	45.5	1.42 X 10-1	167.64	8.47 X 10-4
TG-3	2	0.72	43.5	1.48 X 10-1	167.64	8.85 X 10-4

AQUIFER PERMEABILITY TEST
FIELD LOG FORM

1) Project DERA - Buffalo Corps of Engineers

2) Location Truax Field, West of Landfill

3) Date July 15, 1988

4) Personnel C. Jones/P. Shetley

5) Well or Boring Number TG-1

6) R = Radius of Well 1.00 (in.)

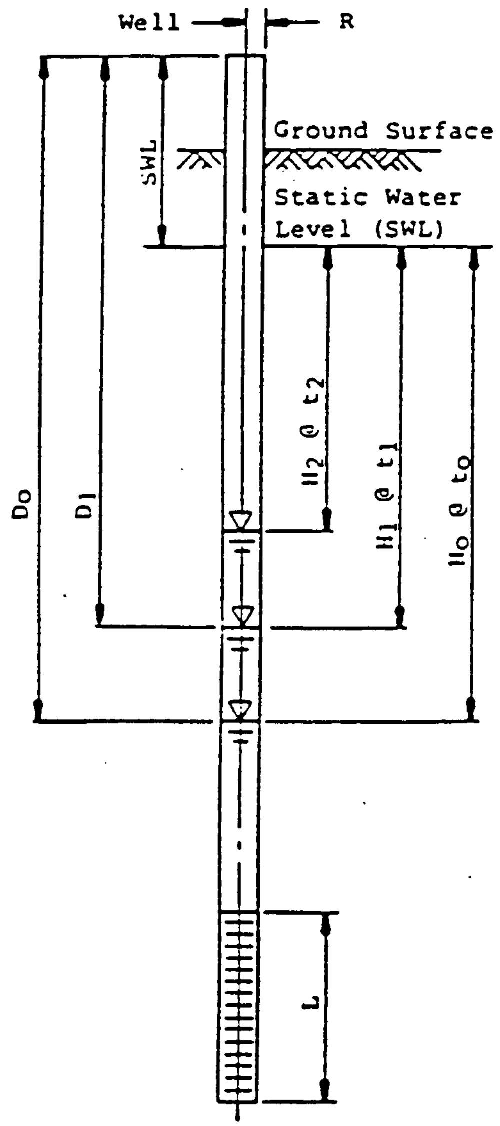
7) L - Length of Screen 10.0 (ft.)
(from well detail sheet)

8) Static Water Level 20.38 (ft.)
(depth to water)

9) Total Well Depth 28.3 (ft.)

10) Slug Volume 0.060 ($ft.^3$)

11) Saturated Screen Length 7.92 (ft.)



Reading*	Time (Start)	Depth to Water (After Baildown) D_t	2** D_t-SWL=Ht	3** Ht/H_o
1	t_0 0	D_o 18.79'	H_o 1.59	
2	t_1 10	D_1 18' 9½"	H_1 1.59	1.50
3	t_2 15	D_2 18' 11"	H_2 1.46	1.38
4	t_3 20	D_3 19' 00"	H_3 1.38	1.31
5	t_4 26	D_4 19' 1"	H_4 1.30	1.23
6	t_5 31	D_5 19' 2"	H_5 1.21	1.15
7	t_6 39	D_6 19' 3"	H_6 1.13	1.07
8	t_7 46	D_7 19' 4"	H_7 1.05	0.99
9	t_8 54	D_8 19' 5"	H_8 0.96	0.91
10	t_9 1:05	D_9 19' 6"	H_9 0.88	0.83
11	t_{10} 1:14	D_{10} 19' 7"	H_{10} 0.80	0.75
12	t_{11} 1:27	D_{11} 19' 8"	H_{11} 0.71	0.67
13	t_{12} 1:40	D_{12} 19' 9"	H_{12} 0.63	0.60
14	t_{13} 1:59	D_{13} 19' 10"	H_{13} 0.55	0.52

*Take readings until well is stabilized, if tight soils - test may be stopped prior to stabilization as necessary.

**Disregard Columns 2 and 3 during baildown test. They are for office calculations.

AQUIFER PERMEABILITY TEST
FIELD LOG FORM
(CONTINUATION SHEET)

Reading*	Time (Start)	Depth to Water (After Baildown) D_t	2**	3**
			D_t-SWL=Ht	Ht/H_o
15	t_{14} 2:17	D_{14} 19' 11"	H_{14} 0.46	0.44
16	t_{15} 2:45	D_{15} 20' 00"	H_{15} 0.38	0.36
17	t_{16} 3:17	D_{16} 20' 1"	H_{16} 0.30	0.28
18	t_{17} 3:58	D_{17} 20' 2"	H_{17} 0.21	0.20
19	t_{18} 5:06	D_{18} 20' 3"	H_{18} 0.13	0.12
20	t_{19} 6:02	D_{19} 20' 3½"	H_{19} 0.08	0.08
21	t_{20} 7:47	D_{20} 20' 4"	H_{20} 0.05	0.04
22	t_{21} 11:30	D_{21} 20' 4½"	H_{21} 0.01	0.01
23	t_{22}	D_{22}	H_{22}	
24	t_{23}	D_{23}	H_{23}	
25	t_{24}	D_{24}	H_{24}	
26	t_{25}	D_{25}	H_{25}	
27	t_{26}	D_{26}	H_{26}	
28	t_{27}	D_{27}	H_{27}	
29	t_{28}	D_{28}	H_{28}	
30	t_{29}	D_{29}	H_{29}	
31	t_{30}	D_{30}	H_{30}	
32	t_{31}	D_{31}	H_{31}	
33	t_{32}	D_{32}	H_{32}	
34	t_{33}	D_{33}	H_{33}	
35	t_{34}	D_{34}	H_{34}	

*Take readings until well is stabilized, if tight soils - test may be stopped prior to stabilization as necessary.

**Disregard Columns 2 and 3 during baildown test. They are for office calculations.

AQUIFER PERMEABILITY TEST
FIELD LOG FORM

1) Project DERA - Buffalo Corps of Engineers

2) Location Truax Field, West of Landfill

3) Date July 15, 1988 5) Well or Boring Number TG-1

4) Personnel C. Jones/P. Shetley 6) R = Radius of Well 1.00 (in.)

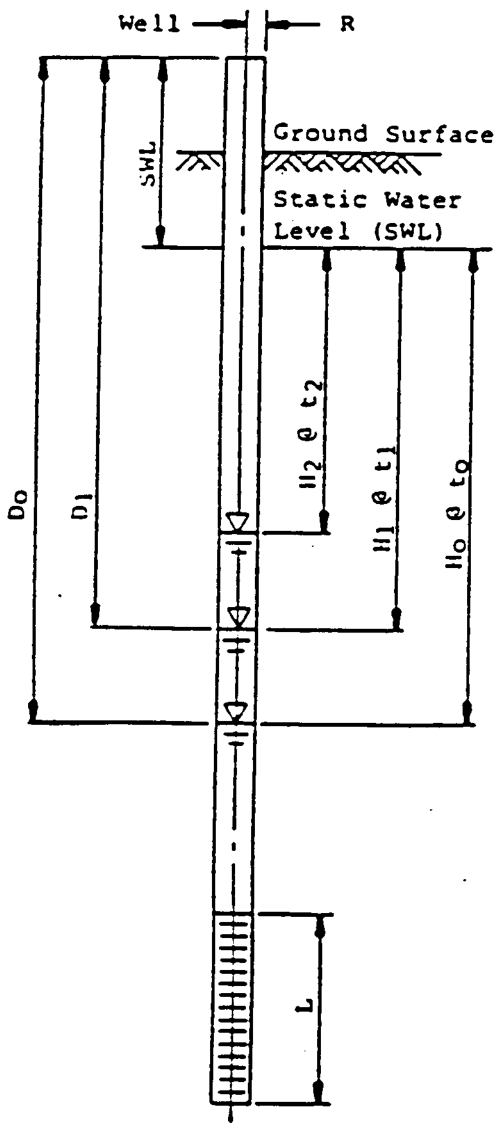
7) L - Length of Screen 10.0 (ft.)
(from well detail sheet)

8) Static Water Level 20.38 (ft.)
(depth to water)

9) Total Well Depth 28.3 (ft.)

10) Slug Volume 0.060 (ft.^{3})

11) Saturated Screen Length 7.92 (ft.)



Reading*	Time (Start)	Depth to Water (After Baildown) D_t	2** D_t-SWL=Ht	3** Ht/H_o
1	t_0	D_o 21.98'	H_o 1.6	
2	t_1 14	D_1 22' 00"	H_1 1.62	1.53
3	t_2 19	D_2 21' 11"	H_2 1.54	1.45
4	t_3 24	D_3 21' 10"	H_3 1.45	1.37
5	t_4 30	D_4 21' 9"	H_4 1.37	1.30
6	t_5 36	D_5 21' 8"	H_5 1.29	1.22
7	t_6 44	D_6 21' 7"	H_6 1.20	1.14
8	t_7 51	D_7 21' 6"	H_7 1.12	1.06
9	t_8 1:01	D_8 21' 5"	H_8 1.04	0.98
10	t_9 1:10	D_9 21' 4"	H_9 0.95	0.90
11	t_{10} 1:21	D_{10} 21' 3"	H_{10} 0.87	0.82
12	t_{11} 1:32	D_{11} 21' 2"	H_{11} 0.79	0.74
13	t_{12} 1:45	D_{12} 21' 1"	H_{12} 0.70	0.67
14	t_{13} 2:01	D_{13} 21' 00"	H_{13} 0.62	0.59

*Take readings until well is stabilized, if tight soils - test may be stopped prior to stabilization as necessary.

**Disregard Columns 2 and 3 during baildown test. They are for office calculations.

AQUIFER PERMEABILITY TEST
FIELD LOG FORM
(CONTINUATION SHEET)

Reading*	Time (Start)	Depth to Water (After Baildown) D_t	2** D_t-SWL=Ht	3** Ht/H_o
15	t_{14} 2:20	D_{14} 20' 11"	H_{14} 0.54	0.51
16	t_{15} 2:40	D_{15} 20' 10"	H_{15} 0.45	0.43
17	t_{16} 3:06	D_{16} 20' 9"	H_{16} 0.37	0.35
18	t_{17} 3:40	D_{17} 20' 8"	H_{17} 0.29	0.27
19	t_{18} 4:32	D_{18} 20' 7"	H_{18} 0.20	0.19
20	t_{19} 5:50	D_{19} 20' 6"	H_{19} 0.12	0.11
21	t_{20} 7:10	D_{20} 20' 5½"	H_{20} 0.08	0.07
22	t_{21} 9:33	D_{21} 20' 5"	H_{21} 0.04	0.03
23	t_{22} 17:14	D_{22} 20' 4½"	H_{22} -0.01	-0.01
24	t_{23}	D_{23}	H_{23}	
25	t_{24}	D_{24}	H_{24}	
26	t_{25}	D_{25}	H_{25}	
27	t_{26}	D_{26}	H_{26}	
28	t_{27}	D_{27}	H_{27}	
29	t_{28}	D_{28}	H_{28}	
30	t_{29}	D_{29}	H_{29}	
31	t_{30}	D_{30}	H_{30}	
32	t_{31}	D_{31}	H_{31}	
33	t_{32}	D_{32}	H_{32}	
34	t_{33}	D_{33}	H_{33}	
35	t_{34}	D_{34}	H_{34}	

*Take readings until well is stabilized, if tight soils - test may be stopped prior to stabilization as necessary.

**Disregard Columns 2 and 3 during baildown test. They are for office calculations.

AQUIFER PERMEABILITY TEST
FIELD LOG FORM

1) Project DERA - Buffalo Corps of Engineers

2) Location Truax Field, West of WWTP

3) Date July 15, 1988

4) Personnel C. Jones/P. Shetley

5) Well or Boring Number TG-2

6) R = Radius of Well 1.00 (in.)

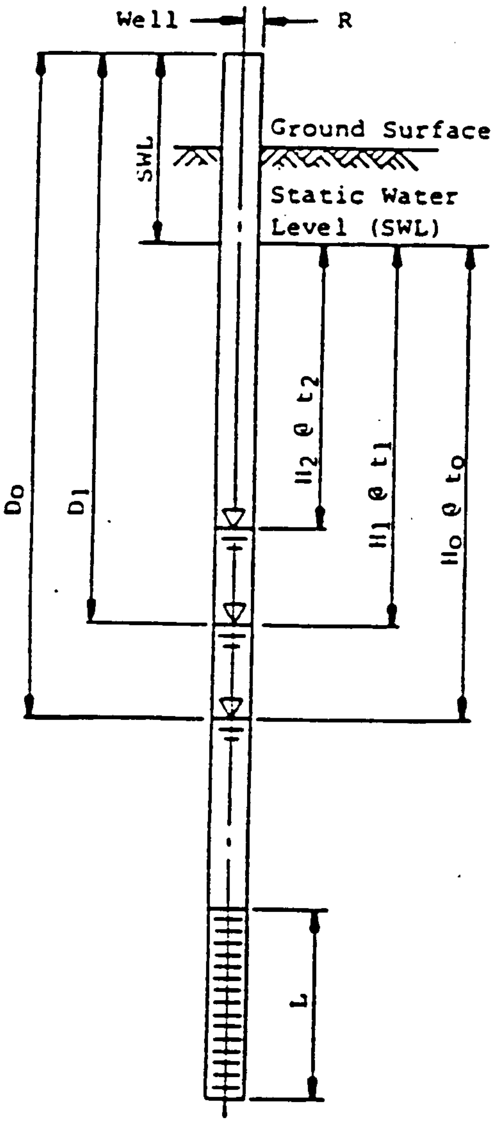
7) L - Length of Screen 10.0 (ft.)
(from well detail sheet)

8) Static Water Level 15.81' (ft.)
(depth to water)

9) Total Well Depth 24.5 (ft.)

10) Slug Volume 0.060 (ft.^{3})

11) Saturated Screen Length 8.69 (ft.)



Reading*	Time (Start)	Depth to Water (After Baildown) D_t	2** D_t-SWL=Ht	3** Ht/H_o
1	t_0 0	D_o 14.21'	H_o 1.60	
2	t_1 09	D_1 14' 6"	H_1 1.31	1.24
3	t_2 14	D_2 14' 7"	H_2 1.23	1.16
4	t_3 19	D_3 14' 8"	H_3 1.14	1.08
5	t_4 21	D_4 14' 9"	H_4 1.06	1.00
6	t_5 26	D_5 14' 10"	H_5 0.98	0.92
7	t_6 31	D_6 14' 11"	H_6 0.89	0.85
8	t_7 37	D_7 15' 00"	H_7 0.81	0.77
9	t_8 43	D_8 15' 1"	H_8 0.73	0.69
10	t_9 51	D_9 15' 2"	H_9 0.64	0.61
11	t_{10} 59	D_{10} 15' 3"	H_{10} 0.56	0.53
12	t_{11} 1:11	D_{11} 15' 4"	H_{11} 0.48	0.45
13	t_{12} 1:22	D_{12} 15' 5"	H_{12} 0.39	0.37
14	t_{13} 1:36	D_{13} 15' 6"	H_{13} 0.31	0.29

*Take readings until well is stabilized, if tight soils - test may be stopped prior to stabilization as necessary.

**Disregard Columns 2 and 3 during baildown test. They are for office calculations.

AQUIFER PERMEABILITY TEST
FIELD LOG FORM
(CONTINUATION SHEET)

Reading*	Time (Start)	Depth to Water (After Baildown) D_t	2** D_t-SWL=Ht	3** Ht/H_o
15	t_{14} 1:58	D_{14} 15' 7"	H_{14} 0.23	0.21
16	t_{15} 2:30	D_{15} 15' 8"	H_{15} 0.14	0.14
17	t_{16} 3:55	D_{16} 15' 9"	H_{16} 0.06	0.06
18	t_{17} 5:21	D_{17} 15' 9¼"	H_{17} 0.02	0.02
19	t_{18} 8:24	D_{18} 15' 9 3/4"	H_{18} 0.00	0.00
20	t_{19}	D_{19}	H_{19}	
21	t_{20}	D_{20}	H_{20}	
22	t_{21}	D_{21}	H_{21}	
23	t_{22}	D_{22}	H_{22}	
24	t_{23}	D_{23}	H_{23}	
25	t_{24}	D_{24}	H_{24}	
26	t_{25}	D_{25}	H_{25}	
27	t_{26}	D_{26}	H_{26}	
28	t_{27}	D_{27}	H_{27}	
29	t_{28}	D_{28}	H_{28}	
30	t_{29}	D_{29}	H_{29}	
31	t_{30}	D_{30}	H_{30}	
32	t_{31}	D_{31}	H_{31}	
33	t_{32}	D_{32}	H_{32}	
34	t_{33}	D_{33}	H_{33}	
35	t_{34}	D_{34}	H_{34}	

*Take readings until well is stabilized, if tight soils - test may be stopped prior to stabilization as necessary.

**Disregard Columns 2 and 3 during baildown test. They are for office calculations.

AQUIFER PERMEABILITY TEST
FIELD LOG FORM

1) Project DERA - Buffalo Corps of Engineers

2) Location Truax Field, West of WWTP

3) Date July 15, 1988

4) Personnel C. Jones/P. Shetley

5) Well or Boring Number TG-2

6) R = Radius of Well 1.00 (in.)

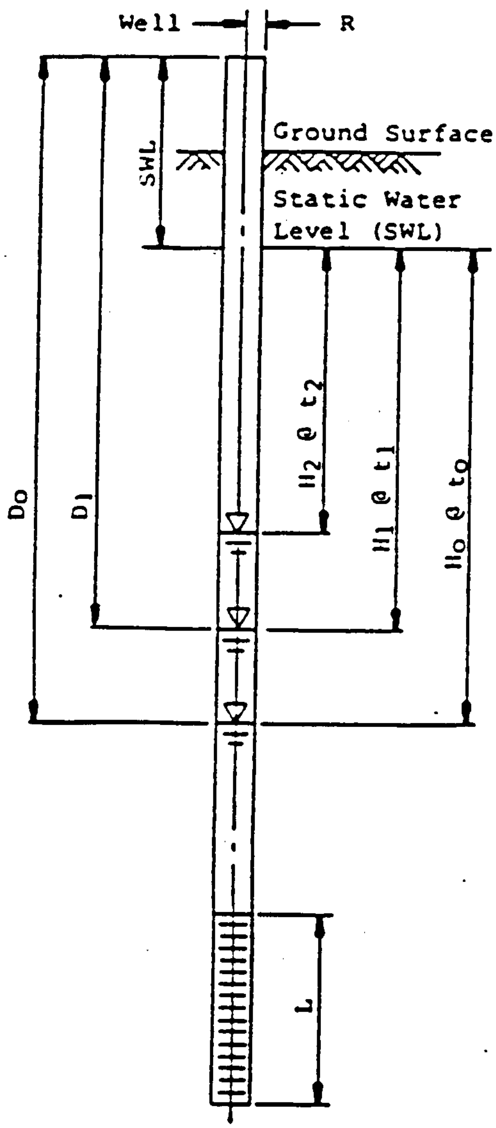
7) L - Length of Screen 10.0 (ft.)
(from well detail sheet)

8) Static Water Level 15.81 (ft.)
(depth to water)

9) Total Well Depth 24.5 (ft.)

10) Slug Volume 0.060 ($ft.^3$)

11) Saturated Screen Length 8.69 (ft.)



Reading*	Time (Start)	Depth to Water (After Baildown) D_t	2** D_t-SWL=Ht	3** Ht/H_o
1	t_0 0	D_o 17.41'	H_o 1.6	
2	t_1 13	D_1 17' 2"	H_1 1.36	1.28
3	t_2 18	D_2 17' 1"	H_2 1.27	1.20
4	t_3 24	D_3 17' 00"	H_3 1.19	1.13
5	t_4 28	D_4 16' 11"	H_4 1.11	1.05
6	t_5 33	D_5 16' 10"	H_5 1.02	0.97
7	t_6 39	D_6 16' 9"	H_6 0.94	0.89
8	t_7 45	D_7 16' 8"	H_7 0.86	0.81
9	t_8 52	D_8 16' 7"	H_8 0.77	0.73
10	t_9 1:01	D_9 16' 6"	H_9 0.69	0.65
11	t_{10} 1:10	D_{10} 16' 5"	H_{10} 0.61	0.57
12	t_{11} 1:21	D_{11} 16' 4"	H_{11} 0.52	0.50
13	t_{12} 1:36	D_{12} 16' 3"	H_{12} 0.44	0.42
14	t_{13} 1:52	D_{13} 16' 2"	H_{13} 0.36	0.34

*Take readings until well is stabilized, if tight soils - test may be stopped prior to stabilization as necessary.

**Disregard Columns 2 and 3 during baildown test. They are for office calculations.

AQUIFER PERMEABILITY TEST
FIELD LOG FORM
(CONTINUATION SHEET)

Reading*	Time (Start)	Depth to Water (After Baildown) D_t	2** D_t-SWL=Ht	3** Ht/H_o
15	t_{14} 2:16	D_{14} 16' 1"	H_{14} 0.27	0.26
16	t_{15} 2:53	D_{15} 16' 00"	H_{15} 0.19	0.18
17	t_{16} 3:52	D_{16} 15' 11"	H_{16} 0.11	0.10
18	t_{17} 5:17	D_{17} 15' 10½"	H_{17} 0.07	0.06
19	t_{18} 15:28	D_{18} 15' 10"	H_{18} 0.02	0.02
20	t_{19}	D_{19}	H_{19}	
21	t_{20}	D_{20}	H_{20}	
22	t_{21}	D_{21}	H_{21}	
23	t_{22}	D_{22}	H_{22}	
24	t_{23}	D_{23}	H_{23}	
25	t_{24}	D_{24}	H_{24}	
26	t_{25}	D_{25}	H_{25}	
27	t_{26}	D_{26}	H_{26}	
28	t_{27}	D_{27}	H_{27}	
29	t_{28}	D_{28}	H_{28}	
30	t_{29}	D_{29}	H_{29}	
31	t_{30}	D_{30}	H_{30}	
32	t_{31}	D_{31}	H_{31}	
33	t_{32}	D_{32}	H_{32}	
34	t_{33}	D_{33}	H_{33}	
35	t_{34}	D_{34}	H_{34}	

*Take readings until well is stabilized, if tight soils - test may be stopped prior to stabilization as necessary.

**Disregard Columns 2 and 3 during baildown test. They are for office calculations.

AQUIFER PERMEABILITY TEST
FIELD LOG FORM

1) Project DERA - Buffalo Corps of Engineers

2) Location Truax Field, West of Burn Area

3) Date July 15, 1988

4) Personnel C. Jones/P. Shetley

5) Well or Boring Number TG-3

6) R = Radius of Well 1.00 (in.)

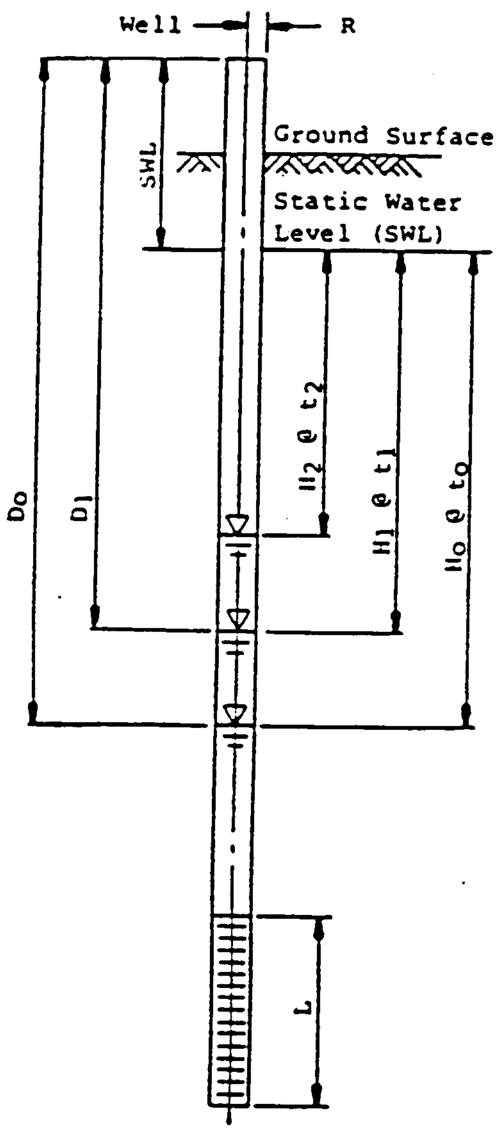
7) L - Length of Screen 10.0 (ft.) (from well detail sheet)

8) Static Water Level 20.40 (ft.) (depth to water)

9) Total Well Depth 35.9 (ft.)

10) Slug Volume 0.060 (ft.^{3})

11) Saturated Screen Length 5.50 (ft.)



Reading*	Time (Start)	Depth to Water (After Baildown) D_t	2** D_t-SWL=Ht	3** Ht/H_o
1	t_0 0	D_o 18.8'	H_o 1.6	
2	t_1 10	D_1 20' 1"	H_1 0.32	0.30
3	t_2 25	D_2 20' 1½"	H_2 0.28	0.26
4	t_3 42	D_3 20' 2"	H_3 0.23	0.22
5	t_4 1:18	D_4 20' 2½"	H_4 0.19	0.18
6	t_5 2:18	D_5 20' 3"	H_5 0.15	0.14
7	t_6 3:43	D_6 20' 3½"	H_6 0.11	0.10
8	t_7 6:10	D_7 20' 4"	H_7 0.07	0.06
9	t_8 8:01	D_8 20' 4½"	H_8 0.05	0.04
10	t_9 10:25	D_9 20' 4½"	H_9 0.03	0.02
11	t_{10} 16:03	D_{10} 20' 4 3/4"	H_{10} 0.00	0.00
12	t_{11}	D_{11}	H_{11}	
13	t_{12}	D_{12}	H_{12}	
14	t_{13}	D_{13}	H_{13}	

*Take readings until well is stabilized, if tight soils - test may be stopped prior to stabilization as necessary.

**Disregard Columns 2 and 3 during baildown test. They are for office calculations.

AQUIFER PERMEABILITY TEST
FIELD LOG FORM

1) Project DERA - Buffalo Corps of Engineers

2) Location Truax Field, West of Burn Area

3) Date July 15, 1988 5) Well or Boring Number TG-3

4) Personnel C. Jones/P. Shetley 6) R = Radius of Well 1.00 (in.)

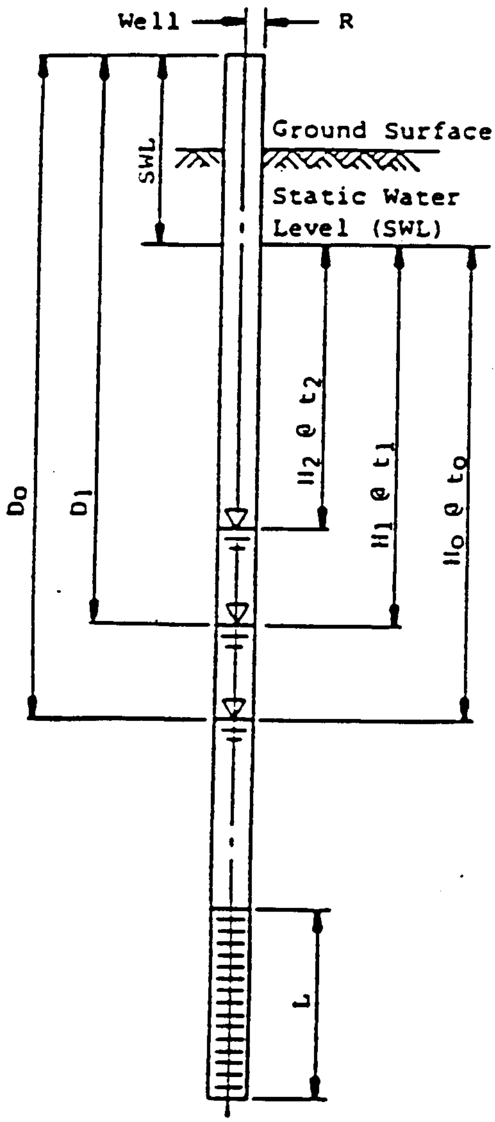
7) L - Length of Screen 10.0 (ft.)
(from well detail sheet)

8) Static Water Level 20.40 (ft.)
(depth to water)

9) Total Well Depth 25.9 (ft.)

10) Slug Volume 0.060 (ft.^{3})

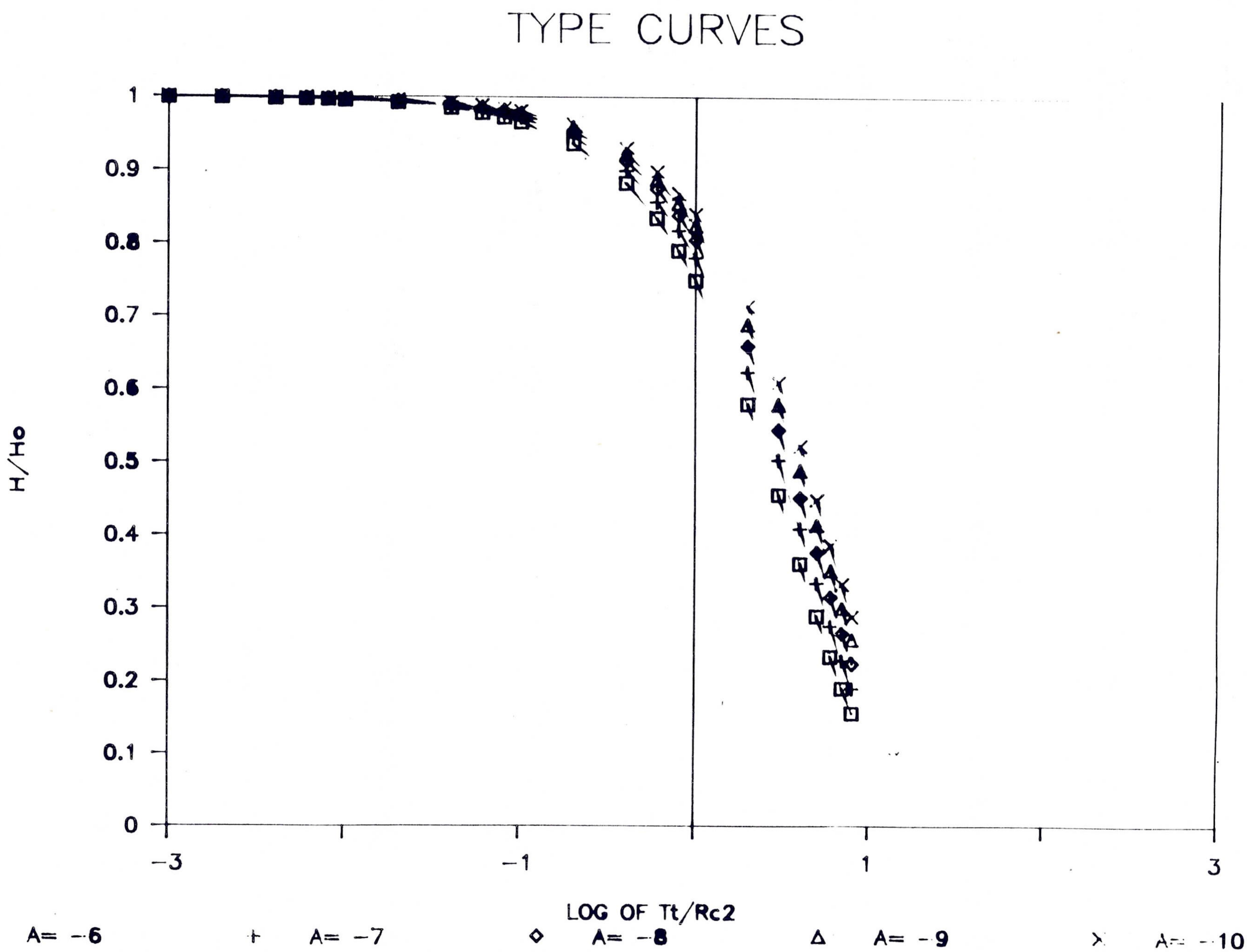
11) Saturated Screen Length 5.50 (ft.)



Reading*	Time (Start)	Depth to Water (After Baildown) D_t	2** D_t-SWL=Ht	3** Ht/H_o
1	t_0 0	D_o 18.8	H_o 1.6	
2	t_1 15	D_1 20' 9¼"	H_1 0.39	0.37
3	t_2 22	D_2 20' 9"	H_2 0.35	0.33
4	t_3 40	D_3 20' 8¼"	H_3 0.31	0.29
5	t_4 1:04	D_4 20' 8"	H_4 0.27	0.25
6	t_5 1:30	D_5 20' 7¼"	H_5 0.23	0.21
7	t_6 2:19	D_6 20' 7"	H_6 0.18	0.17
8	t_7 3:16	D_7 20' 6¼"	H_7 0.14	0.13
9	t_8 4:20	D_8 20' 6"	H_8 0.10	0.09
10	t_9 4:53	D_9 20' 5 3/4"	H_9 0.08	0.07
11	t_{10} 5:47	D_{10} 20' 5½"	H_{10} 0.06	0.05
12	t_{11} 7:03	D_{11} 20' 5¼"	H_{11} 0.04	0.04
13	t_{12} 10:18	D_{12} 20' 5"	H_{12} 0.02	0.02
14	t_{13} 25:30	D_{13} 20' 4 7/8"	H_{13} 0.01	0.01

*Take readings until well is stabilized, if tight soils - test may be stopped prior to stabilization as necessary.

**Disregard Columns 2 and 3 during baildown test. They are for office calculations.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H/Ho
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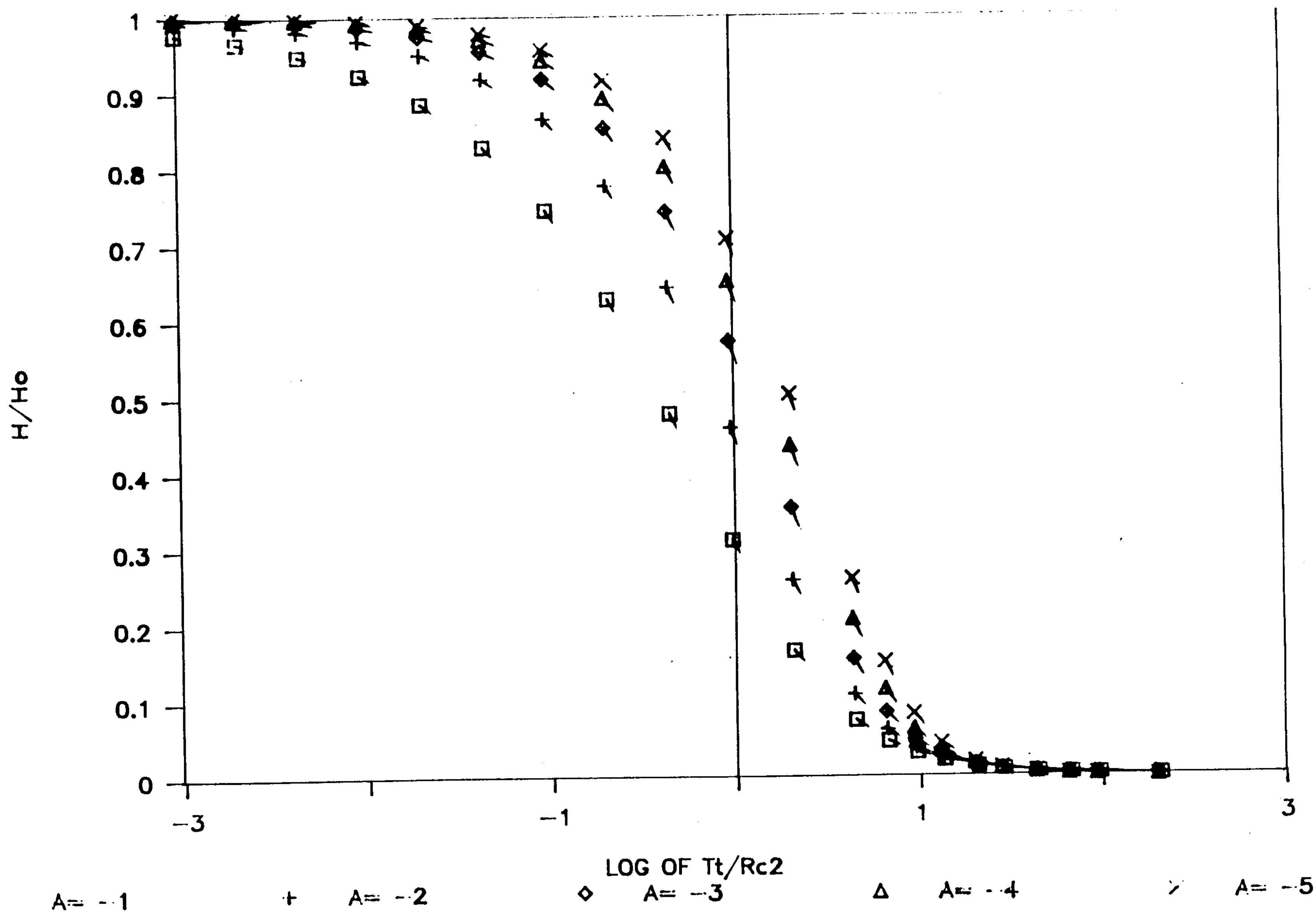
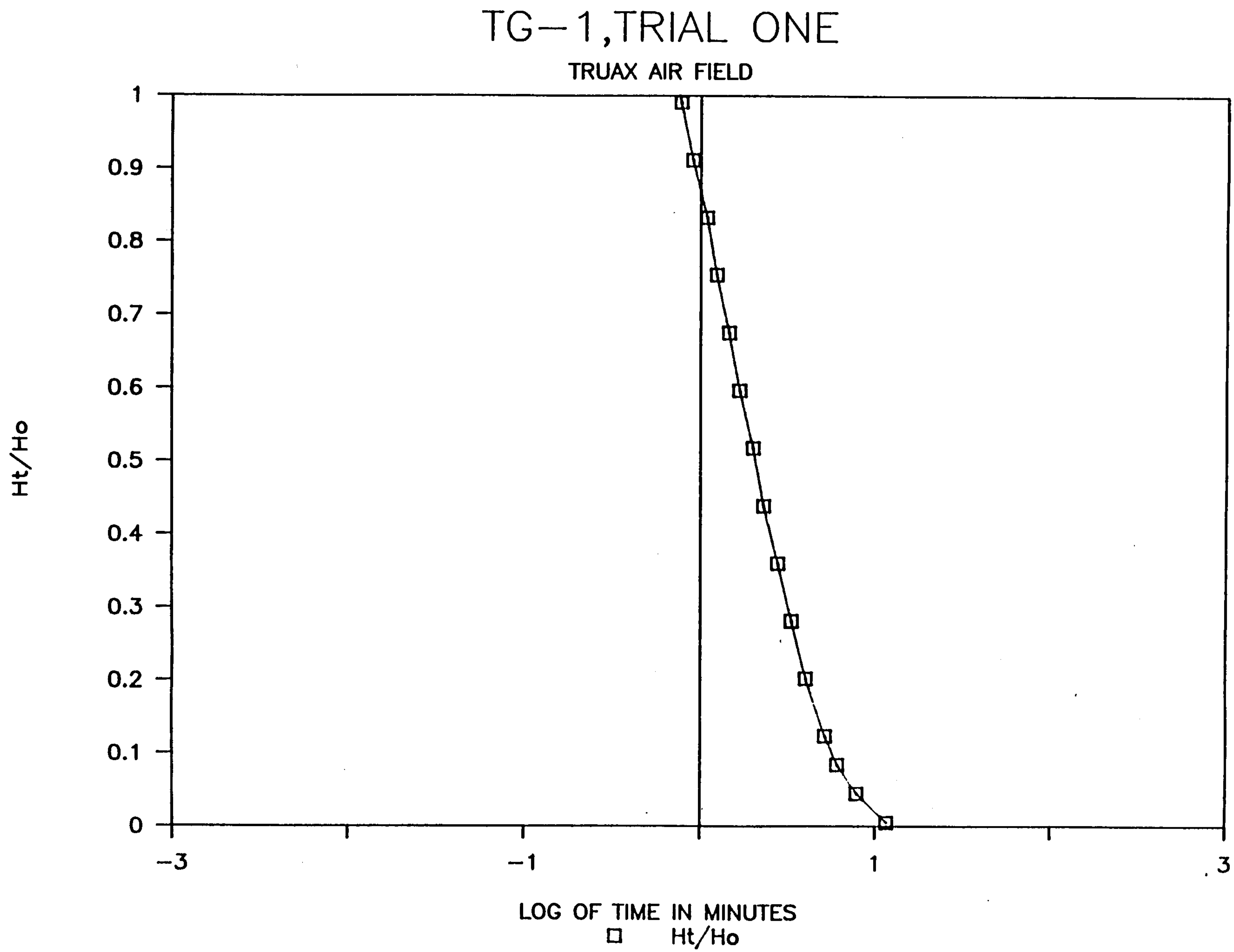
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
−3
−1
1
3
LOG OF Tt/Rc2
A= −6
A= −7
A= −8
A= −9
A= −10

TYPE CURVES

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TRUAX AIR FIELD
Ht/Ho
1
0.9
0.8
0.7
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0.3
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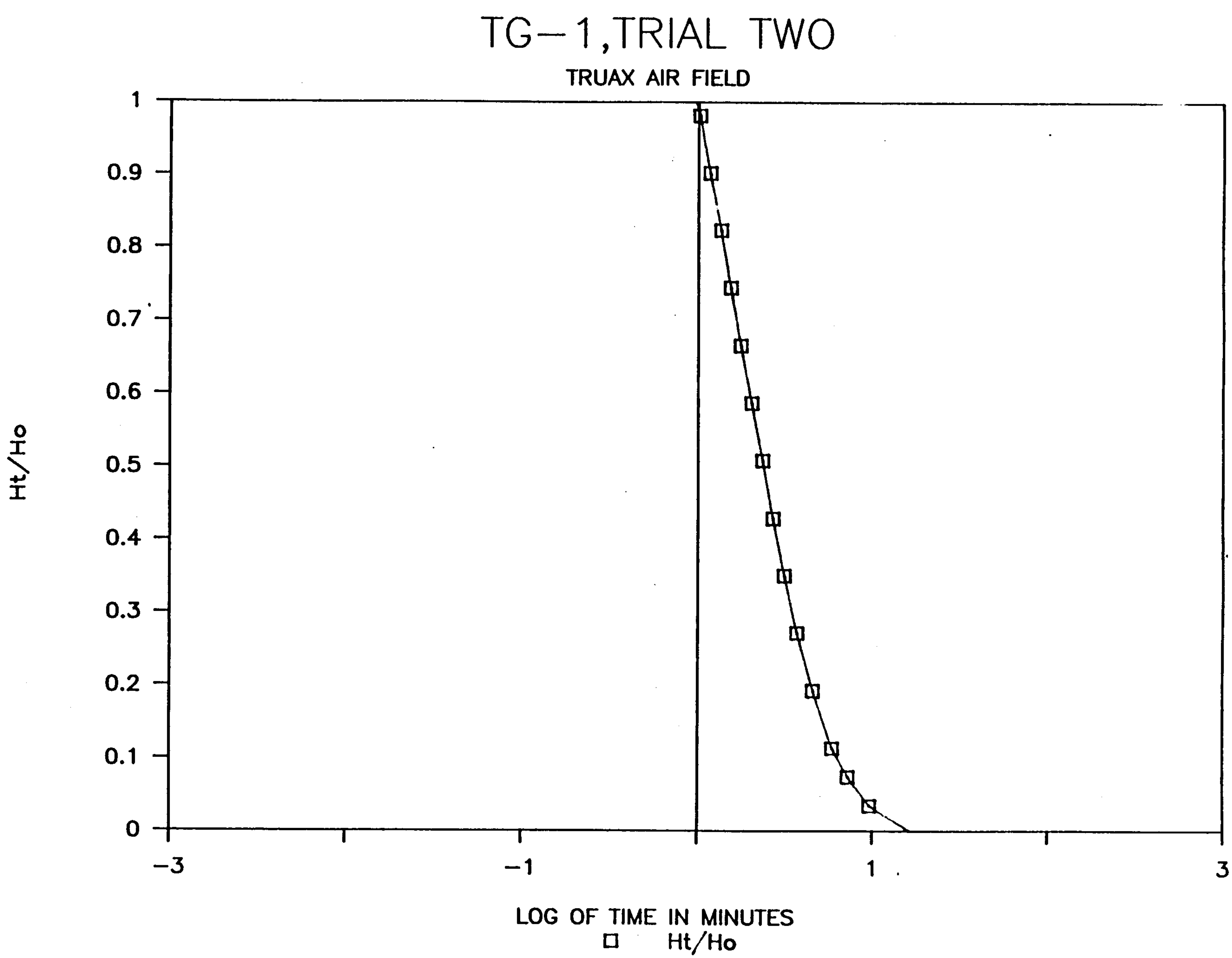
3
LOG OF TIME IN MINUTES
Ht/Ho



TG-1,TRIAL TWO
TRUAX AIR FIELD
Ht/Ho
1
0.9
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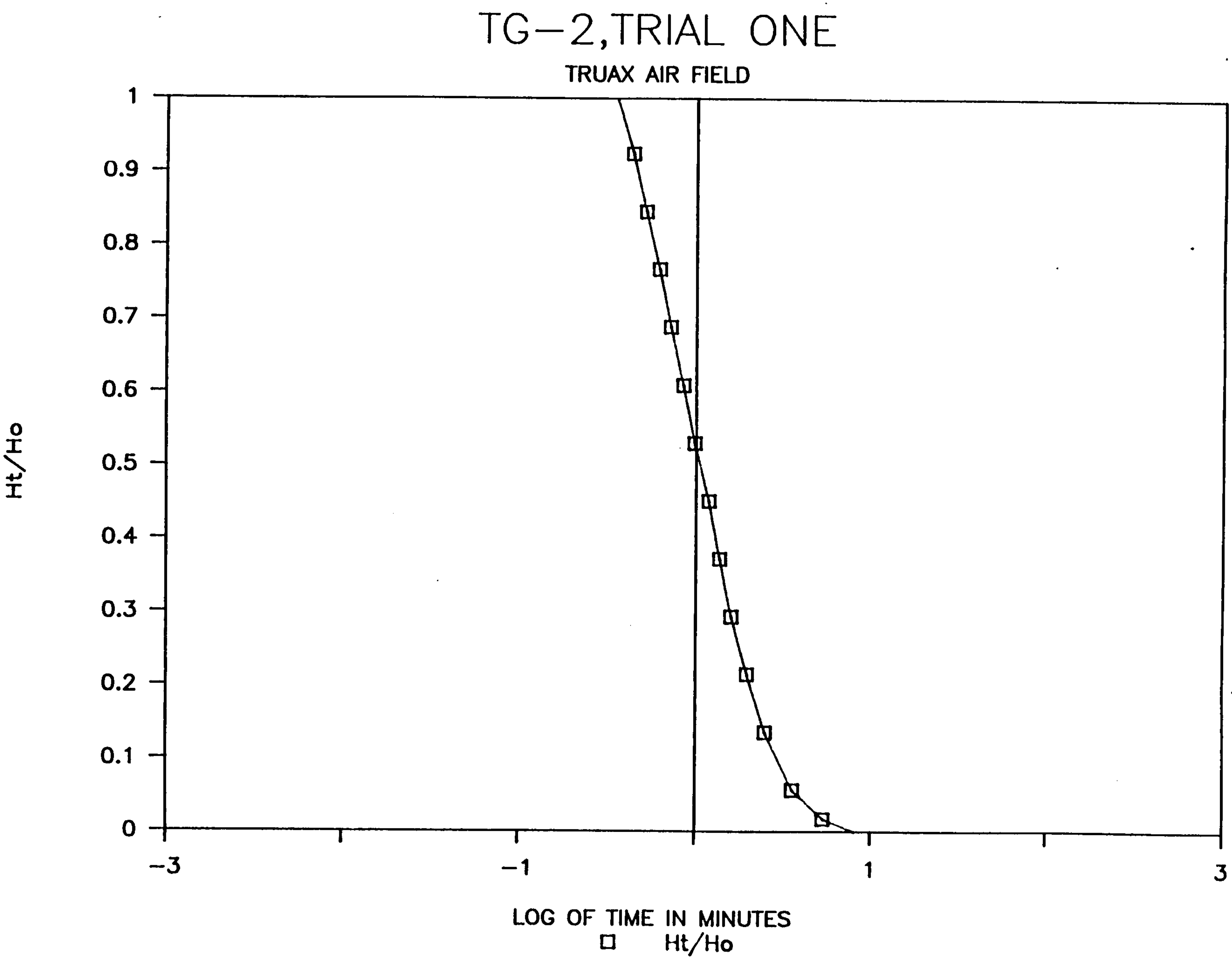
LOG OF TIME IN MINUTES
Ht/Ho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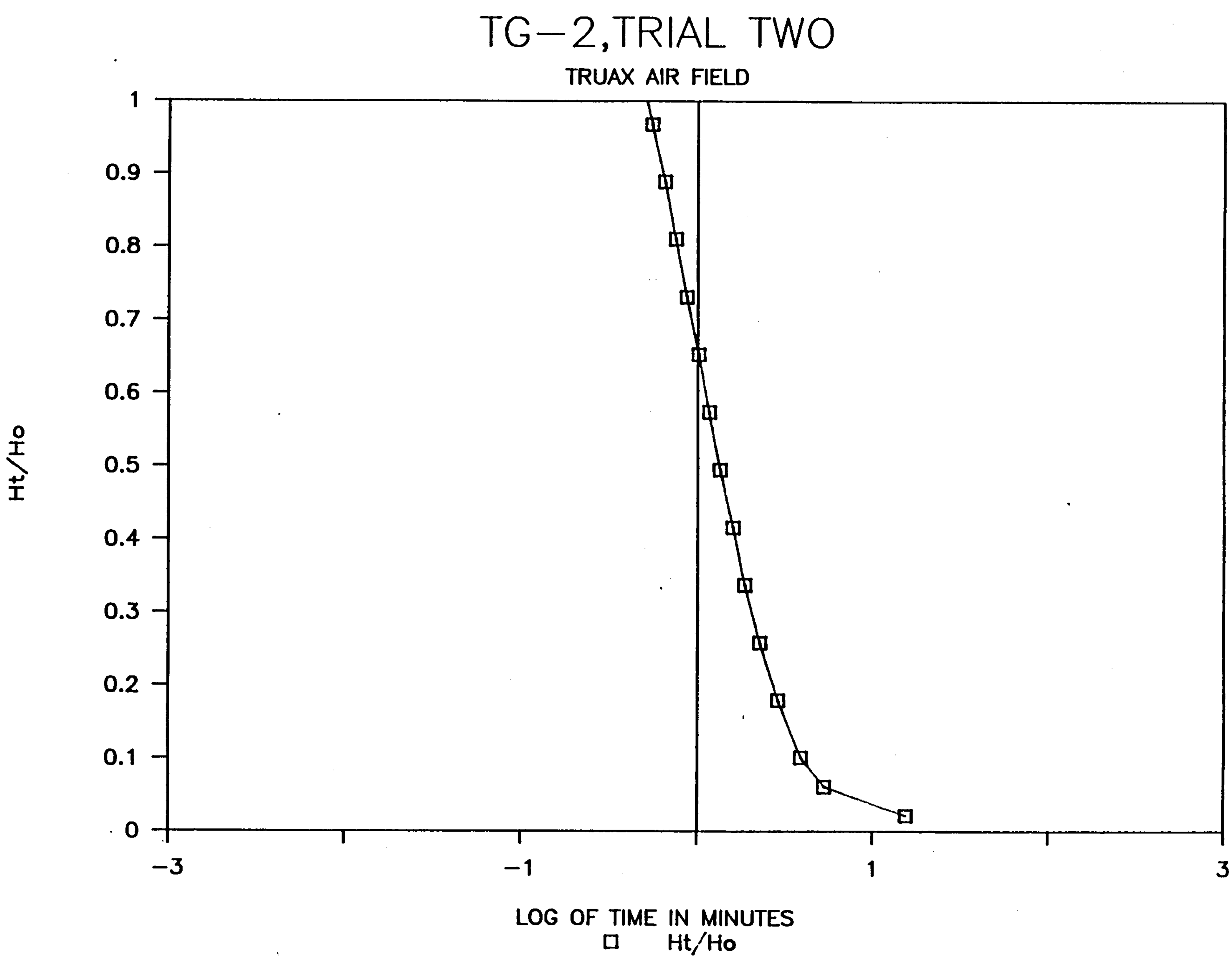
LOG OF TIME IN MINUTES
Ht/Ho


TG—2,TRIAL TWO
TRUAX AIR FIELD
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Ht/Ho
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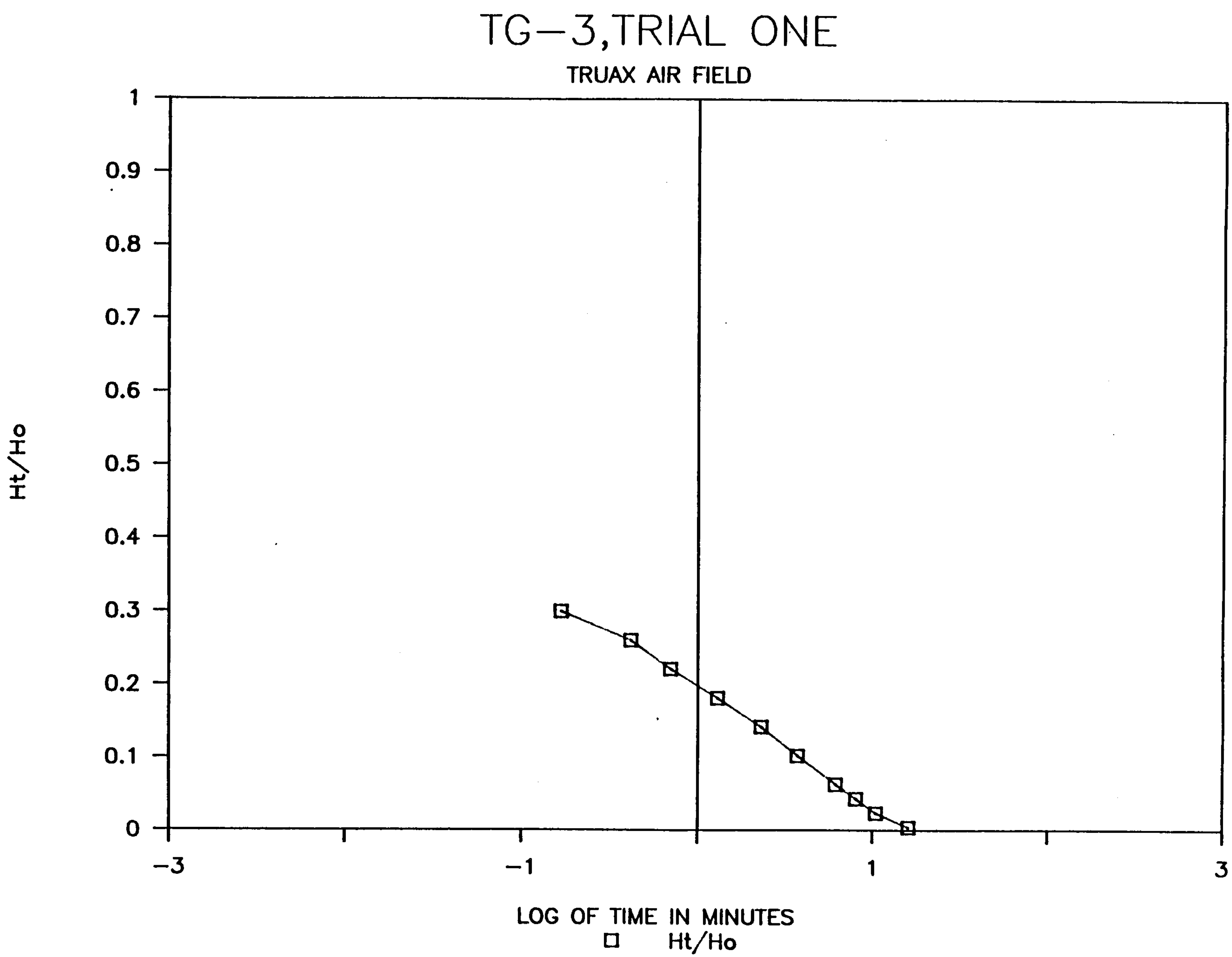
LOG OF TIME IN MINUTES
Ht/Ho



TG-3,TRIAL ONE
TRUAX AIR FIELD
Ht/Ho
1
0.9
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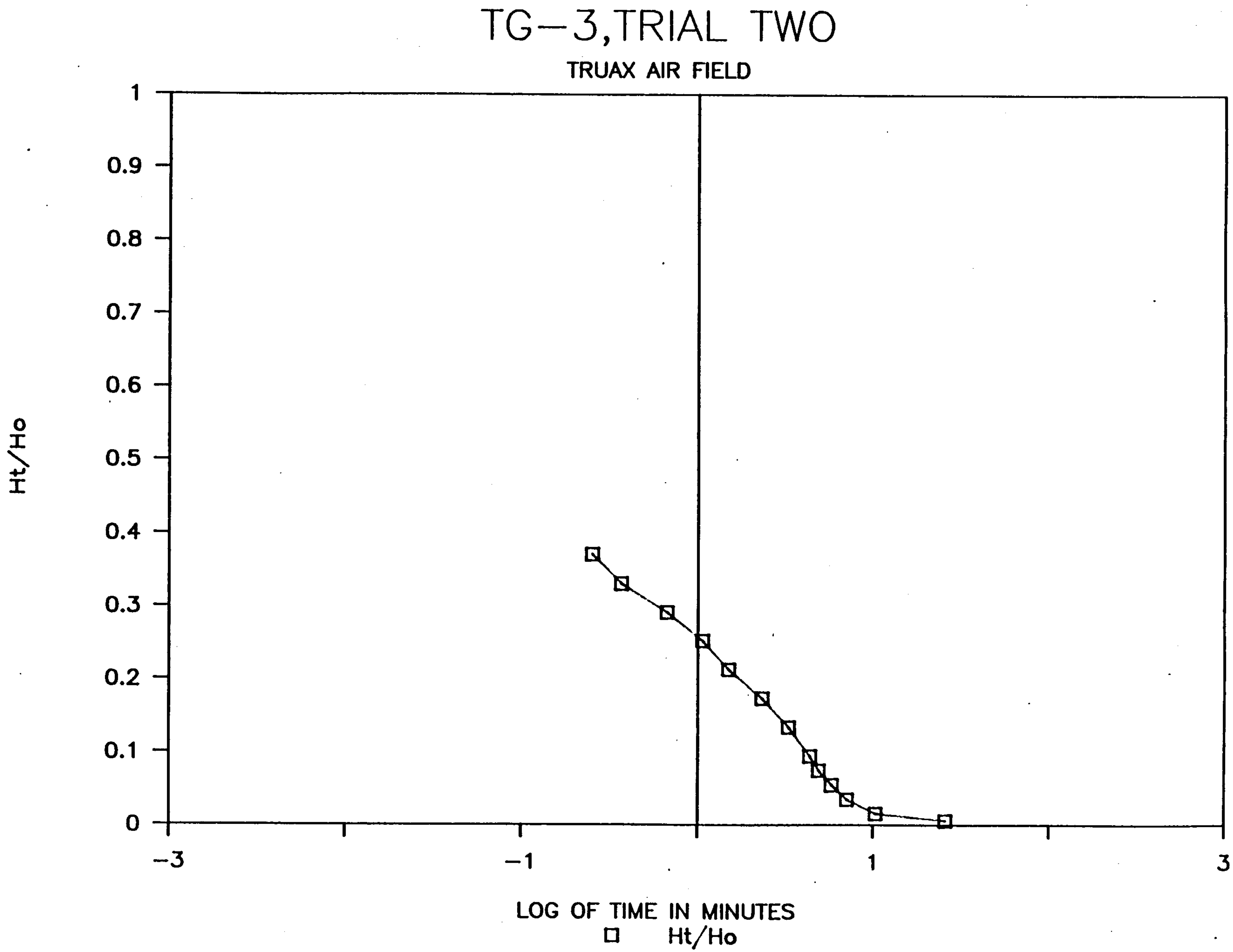
LOG OF TIME IN MINUTES
Ht/Ho


TG—3,TRIAL TWO
TRUAX AIR FIELD
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LOG OF TIME IN MINUTES
Ht/Ho

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Response of a Finite-Diameter Well to an Instantaneous Charge of Water[1]

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Abstract. A solution is presented for the change in water level in a well of finite diameter after a known volume of water is suddenly injected or withdrawn. A set of type curves computed from this solution permits a determination of the transmissibility of the aquifer. (Key words: Aquifer tests; groundwater; hydraulics; permeability)

INTRODUCTION

Ferris and Knowles [1954] introduced a method for determining the transmissibility of an aquifer from observations of the water level in a well after a known volume of water is suddenly injected into the well. (See also *Ferris et al.* [1962]). They reasoned that for practical purposes the well may be approximated by an instantaneous line source in the infinite region, for which the residual head differences due to the injection are described by

$$h = (V/4\pi Tt)e^{-r^2S/4Tt} \qquad (1)$$

where

- h = change in head at distance r and time t due to the injection;
- r = distance from the line source or center of well;
- t = time since instantaneous injection;
- V = volume of water injected;
- T = transmissibility of aquifer;
- S = coefficient of storage of aquifer.

They reasoned further that the head H in the injected well would be described closely by (1) when r is set equal to the effective radius r_e [*Jacob*, 1947, p. 1049] of the screen or open hole. Then, since r_e is small, the exponential approaches unity quickly, so that the equation approaches $H = V/4\pi Tt$, which can be written

$$T = V(1/t)/4\pi H \qquad (2)$$

To the extent that the equation is valid for a well of finite diameter, a determination of the transmissibility can be obtained from the slope of a plot of head H versus the reciprocal of time $(1/t)$.

Since the volume of water injected into the well is $\pi r_c^2 H_0$, where r_c is the radius of the casing in the interval over which the water level fluctuates and H_0 is the initial head increase in the well, equation 1 can be written

$$h/H_0 = (r_c^2/4Tt)e^{-r^2S/4Tt} \qquad (3)$$

and equation 2 can be written

$$H/H_0 = r_c^2/4Tt \qquad (4)$$

Recently *Bredehoeft et al.* [1966] demonstrated by means of an electrical analog model of a well-aquifer system that equation 3 gives a satisfactory approximation of the head in an injected well only after the time t is large enough for the ratio H/H_0 to be very small (see Figure 1). The observed discrepancy appears to arise from the assumption that the injected well can be approximated by a line source.

We present here an exact solution for the head in and around a well of finite diameter after the well is instantaneously charged with a known volume of water.

ANALYSIS

Consider a nonflowing well cased to the top of a homogeneous isotropic artesian aquifer of uniform thickness, and screened (or open) throughout the thickness of the aquifer (Figure 2). Suppose that the well is instantaneously charged with a volume V of water. (We will consider

[1] Publication authorized by the Director, U. S. Geological Survey.

264

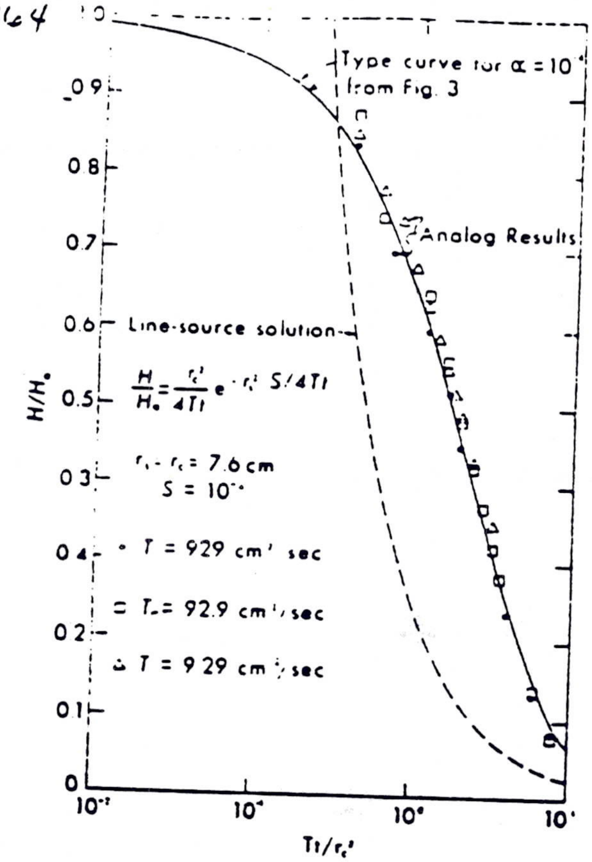

Fig. 1. Comparison of analog results with curve representing line-source solution.

an injection as a positive charge and a withdrawal as a negative one.) The water level in the well instantaneously moves to the height $H_0 = V/\pi r_c^2$ above or below its initial level and immediately begins to return to its initial level according to some function of time $H(t)$. Meanwhile the head in the surrounding aquifer varies according to $h(r, t)$. Our objective is to find a solution for $h(r, t)$ and $H(t)$. The inertia of the column of water in the well will be neglected. (See, in this connection, *Bredehoeft et al.* [1966]). Since the solution to be obtained can be superposed on any initial condition, we can simplify the problem without loss of generality by assuming that the head is initially uniform and constant.

The problem is described mathematically by

$$\partial^2 h/\partial r^2 + 1/r(\partial h/\partial r) = S/T(\partial h/\partial t) \qquad (r > r_s) \qquad (5)$$

$$h(r_s + 0, t) = H(t) \qquad (t > 0) \qquad (5a)$$

$$h(\infty, t) = 0 \qquad (t > 0) \qquad (5b)$$

$$2\pi r_s T[\partial h(r_s + 0, t)]/\partial r = \pi r_c^2(\partial H(t)/\partial t) \qquad (t > 0) \qquad (5c)$$

$$h(r, 0) = 0 \qquad (r > r_s) \qquad (5d)$$

$$H(0) = H_0 = V/\pi r_c^2 \qquad (5e)$$

Equation 5 is the differential equation governing nonsteady radial flow of confined groundwater. (See, for example, *Jacob*, 1950, p. 333.) Boundary condition 5a states that after the first instant the head in the aquifer at the face of the well is equal to that in the well. Boundary condition 5b states that as r approaches infinity the change in head approaches zero. Equation 5c expresses the fact that the rate of flow of water into (or out of) the aquifer is equal to the rate of decrease (or increase) in volume of water within the well. The conditions 5d and 5e state that initially the change in head is zero everywhere outside the well and equal to H_0 inside the well.

By applying the Laplace transform with respect to time the problem is reduced to

$$\partial^2\bar{h}/\partial r^2 + 1/r(\partial\bar{h}/\partial r) = (S/T)(p\bar{h}) \qquad (6)$$

$$\bar{h}(\infty, p) = 0 \qquad (6a)$$

$$[\partial\bar{h}(r_s + 0, p)]/\partial r = (r_c^2/2r_sT)[p\bar{h}(r_s + 0, p) - H_0] \qquad (6b)$$

for which the solution is

$$\bar{h}(r, p) = \frac{r_c S H_0 K_0(rq)}{Tq[r_c q K_0(r_s q) + 2\alpha K_1(r_s q)]} \qquad (7)$$

where $q = (pS/T)^{1/2}$, and $\alpha = r_s^2 S/r_c^2$. The solution $h(r, t)$ is the inverse transform, which is available from the analogous problem in heat flow [*Carslaw and Jaeger*, 1959, p. 342]

$$h = \frac{2H_0}{\pi}\int_0^\infty e^{-\beta u^2/\alpha}\{J_0(ur/r_s) \cdot [uY_0(u) - 2\alpha Y_1(u)] - Y_0(ur/r_s) \cdot [uJ_0(u) - 2\alpha J_1(u)]\}\frac{du}{\Delta(u)} \qquad (8)$$

where $\beta = Tt/r_c^2$ and

$$\Delta(u) = [uJ_0(u) - 2\alpha J_1(u)]^2 + [uY_0(u) - 2\alpha Y_1(u)]^2$$

$y)$ $(t > 0)$ (5c)

$u)$ $(r > r_s)$ (5d)

$= V/\pi r_c^2$ (5e)

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$/\partial r) = (S/T)(p\bar{h})$ (6)

$= 0$ (6a)

$0, p) - H_0]$ (6b)

$_0(rq)$

$+ 2\alpha K_0(r_s q)]$ (7)

$= r_s^2 S/r_c^2$.

se inverse transform,
the analogous problem
Jaeger, 1959, p. 342]

$ur/r_s)$

$- Y_0(ur/r_s)$

$\frac{du}{\Delta(u)}$ (8)

β

$Y_0(u) - 2\alpha Y_1(u)]^2$

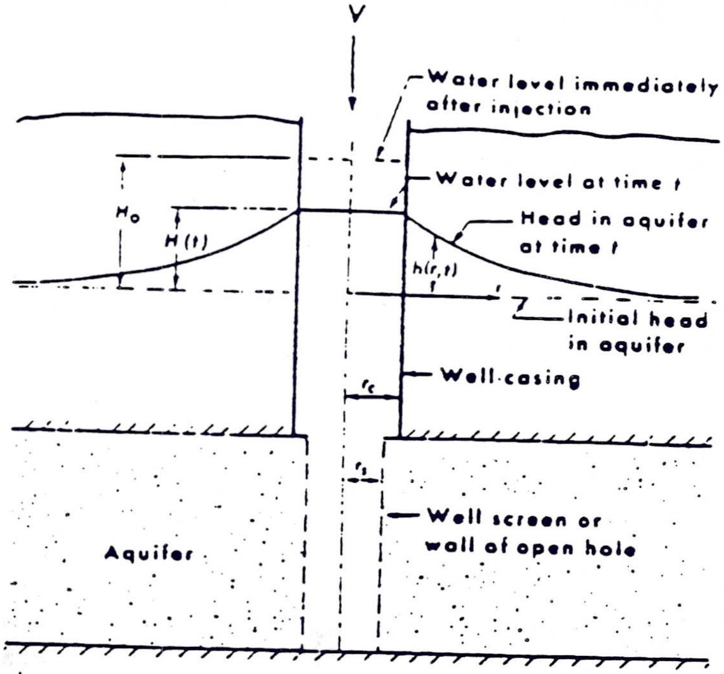

Fig. 2. Idealized representation of a well into which a volume V of water is suddenly injected.

The head $H(t)$ inside the well, obtained by substituting $r = r_s$ in equation 8, is

$$H = (8H_0\alpha/\pi^2) \int_0^\infty e^{-\beta u^2/\alpha}\, du/(u\,\Delta(u)) \quad (9)$$

Values of H/H_0 computed by numerically integrating equation 9 are given in Table 1. Values computed from the line-source solutions, equations 3 and 4, are given in Table 2. In Figure 3 the values from Table 1 are represented as a family of five curves of H/H_0 versus the dimensionless time parameter $\beta = Tt/r_c^2$, one curve for each of five values of the parameter $\alpha = r_s^2S/r_c^2$. Also represented, by a dashed curve, are the values computed from equation 4.

It is apparent from Tables 1 and 2 and from Figure 3 that the line-source solutions 3 and 4 proposed by *Ferris and Knowles* [1954] give a close approximation of the finite-source solution only for large values of the time parameter Tt/r_c^2. The approximation seems to be acceptable for Tt/r_c^2 greater than 100 (or, equivalently, for H/H_0 less than about 0.0025). (In the test at Speedway City, Indiana, used by Ferris and Knowles to exemplify their method, H/H_0 ranged from 0.01 to 0.001, and the value of transmissibility determined from these data agreed fairly well with one obtained by another method.)

A family of type curves plotted on semilogarithmic paper, as in Figure 3, permits a determination of the transmissibility. The method is similar to the Theis graphical method [*Wenzel*, 1942]. A test on a well near Dawsonville, Georgia, will be used to demonstrate the method. This well is cased to 24 m with 15.2-cm (6-inch) casing and drilled as a 15.2-cm open hole to a depth of 122 m. Figure 4 is a reproduction of a chart showing the hydrograph of the well after the sudden withdrawal of a long weighted float from the well. The weight of the float was 10.16 kilograms, and hence by the principle of Archimedes it had displaced a volume of 0.01016 m³ of water when floating in the well. Its withdrawal was therefore equivalent to a negative charge of $V = 0.01016$ m³. From the relation $H_0 = V/\pi r_c^2$ the initial head change is found to be $H_0 = 0.560$ m.

The hydrograph in Figure 4 was recorded electrically from a pressure transducer, which was suspended below the water surface in the well. Table 3 lists data from this chart. To determine the aquifer constants the data are

Table 1. Values of H/H_0 for a Well of Finite diameter

(computed from equation 5)

Tt/r_c^2	H/H_0 $\alpha = 10^{-1}$	$\alpha = 10^{-2}$	$\alpha = 10^{-3}$	$\alpha = 10^{-4}$	$\alpha = 10^{-5}$
1.00×10^{-3}	0.9771	0.9920	0.9969	0.9985	0.9992
2.15×10^{-3}	0.9658	0.9876	0.9949	0.9974	0.9985
4.64×10^{-3}	0.9490	0.9807	0.9914	0.9954	0.9970
1.00×10^{-2}	0.9238	0.9693	0.9853	0.9915	0.9942
2.15×10^{-2}	0.8860	0.9505	0.9744	0.9841	0.9888
4.64×10^{-2}	0.8293	0.9187	0.9545	0.9701	0.9781
1.00×10^{-1}	0.7460	0.8655	0.9183	0.9434	0.9572
2.15×10^{-1}	0.6289	0.7782	0.8538	0.8935	0.9167
4.64×10^{-1}	0.4782	0.6436	0.7436	0.8031	0.8410
1.00×10^{0}	0.3117	0.4598	0.5729	0.6520	0.7080
2.15×10^{0}	0.1665	0.2597	0.3543	0.4364	0.5038
4.64×10^{0}	0.07415	0.1086	0.1554	0.2082	0.2620
7.00×10^{0}	0.04625	0.06204	0.08519	0.1161	0.1521
1.00×10^{1}	0.03065	0.03780	0.04821	0.06355	0.08378
1.40×10^{1}	0.02092	0.02414	0.02844	0.03492	0.04426
2.15×10^{1}	0.01297	0.01414	0.01545	0.01723	0.01999
3.00×10^{1}	0.009070	0.009615	0.01016	0.01083	0.01169
4.64×10^{1}	0.005711	0.005919	0.006111	0.006319	0.006554
7.00×10^{1}	0.003722	0.003809	0.003884	0.003962	0.004046
1.00×10^{2}	0.002577	0.002618	0.002653	0.002688	0.002725
2.15×10^{2}	0.001179	0.001187	0.001194	0.001201	0.001208

plotted on semilogarithmic paper of the same scale as that of the type curves in Figure 3, and this plot is superposed on the type curves. With the arithmetic axes coincident, the data plot is translated horizontally to a position where the data best fit the type curves, as

TABLE 2. Values of H/H_0 for Line-source Approximation of a Well

Tt/r_c^2	H/H_0 from equation 3: $\alpha = 10^{-1}$	$\alpha = 10^{-2}$	$\alpha = 10^{-3}$	$\alpha = 10^{-4}$	$\alpha = 10^{-5}$	H/H_0 from eq. 4
1.00×10^{-3}	0.000000	20.52	194.7	243.8	249.4	250.0
2.15×10^{-3}	0.001035	36.35	103.5	115.0	116.2	116.3
4.64×10^{-3}	0.2463	31.44	51.05	53.59	53.85	53.88
1.00×10^{-2}	2.052	19.47	24.38	24.94	24.99	25.00
2.15×10^{-2}	3.635	10.35	11.50	11.62	11.63	11.63
4.64×10^{-2}	3.144	5.105	5.359	5.385	5.388	5.388
1.00×10^{-1}	1.947	2.438	2.494	2.499	2.500	2.500
2.15×10^{-1}	1.035	1.150	1.162	1.163		1.163
4.64×10^{-1}	0.5105	0.5359	0.5385	0.5388		0.5388
1.00×10^{0}	0.2438	0.2494	0.2499	0.2500		0.2500
2.15×10^{0}	0.1150	0.1162	0.1163			0.1163
4.64×10^{0}	0.05359	0.05385	0.05388			0.05388
7.00×10^{0}	0.03558	0.03570	0.03571			0.03571
1.00×10^{1}	0.02494	0.02499	0.02500			0.02500
1.40×10^{1}	0.01783	0.01786				0.01786
2.15×10^{1}	0.01162	0.01163				0.01163
3.00×10^{1}	0.008326	0.008333				0.008333
4.64×10^{1}	0.005385	0.005388				0.005388
7.00×10^{1}	0.003570	0.003571				0.003571
1.00×10^{2}	0.002499	0.002500				0.002500
2.15×10^{2}	0.001163					0.001163

$\alpha = 10^{-?}$
0.9992
0.9985
0.9970
0.9942
0.9888
0.9781
0.9572
0.9167
0.8410
0.7080
0.5038
0.2620
0.1521
0.08378
0.04426
0.01999
0.01169
0.006554
0.004046
0.002725
0.001208

...cident, the data ... to a position ... type curves, as

H/H_0 from eq. 4
250.0
116.3
53.88
25.00
11.63
5.388
2.500
1.163
0.5388
0.2500
0.1163
0.05388
0.03571
0.02500
0.01786
0.01163
0.008333
0.005388
0.003571
0.002500
0.001163

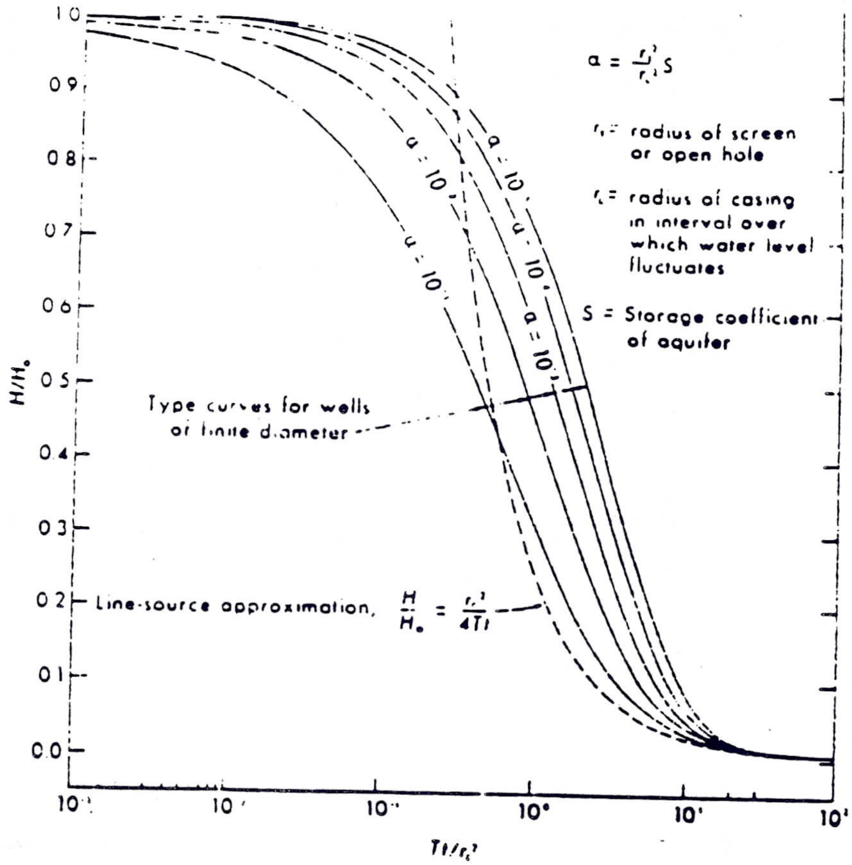

Fig. 3. Type curves for instantaneous charge in well of finite diameter.

shown in Figure 5. In this position the time 11 sec on the data coordinates is found to overlie the value $Tt/r_c^2 = 1.0$ on the type-curve coordinates. Hence the transmissibility is computed to be

$$T = \frac{1.0 r_c^2}{t} = \frac{(1.0)(7.6)^2}{(11)} = 5.3 \text{ cm}^2/\text{sec}$$

In principle the coefficient of storage can be determined by interpolating from its values for the curves that lie on either side of the data plot in the matched position. Thus, in the example just described, the coefficient of storage would be $S = 10^{-4}$, since for this well $r_c = r_s$, so that $\alpha = S$, and the points fall on the curve of $\alpha = 10^{-4}$. However, because the matching of data plot to the type curves depends upon the shapes of the type curves, which differ only slightly when α differs by an order of magnitude, the determination of S by this method has questionable reliability.

The determination of T is not so sensitive to the choice of the curves to be matched. Whereas the determined value of S will change by an

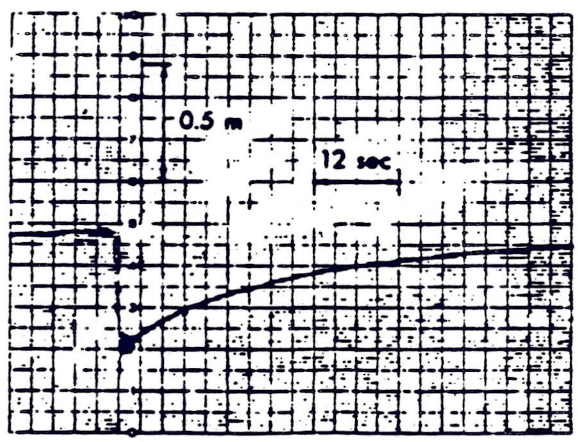

Fig. 4. Hydrograph of well at Dawsonville, Georgia, showing response of water level to the sudden withdrawal of a weighted float.

TABLE 3. Rise of Water Level in Dawsonville Well after Instantaneous Withdrawal of Weighted Float

t (sec)	$1/t$	Head (m)	H (m)	H/H_0
−1		0.896		
0		0.336	0.560	1.000
3	0.333	0.439	0.457	0.816
6	0.167	0.504	0.392	0.700
9	0.111	0.551	0.345	0.616
12	0.0833	0.588	0.308	0.550
15	0.0667	0.616	0.280	0.500
18	0.0556	0.644	0.252	0.450
21	0.0476	0.672	0.224	0.400
24	0.0417	0.691	0.205	0.366
27	0.0370	0.709	0.187	0.334
30	0.0333	0.728	0.168	0.300
33	0.0303	0.747	0.149	0.266
36	0.0278	0.756	0.140	0.250
39	0.0256	0.765	0.131	0.234
42	0.0238	0.784	0.112	0.200
45	0.0222	0.788	0.108	0.193
48	0.0208	0.803	0.093	0.166
51	0.0196	0.807	0.089	0.159
54	0.0185	0.814	0.082	0.146
57	0.0[illegible]75	0.821	0.075	0.134
60	0.0[illegible]57	0.825	0.071	0.127
63	0.0[illegible]59	0.831	0.065	0.116

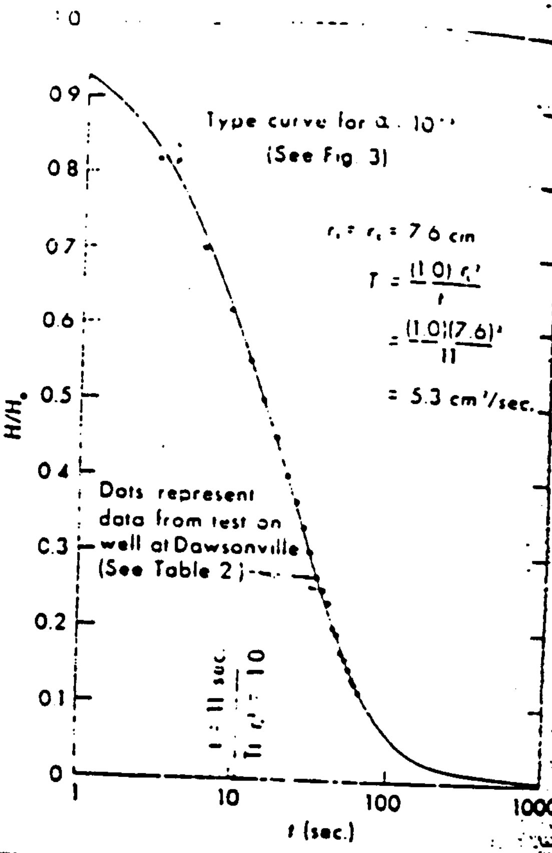

Fig. 5. Plot of data from test at Dawsonville, Georgia, superposed on type curve.

order of magnitude when the data plot is moved from one type curve to another, that of T will change much less. From a knowledge of the geologic conditions and other considerations one can ordinarily estimate S within an order of magnitude and thereby eliminate some of the doubt as to what value of α is to be used for matching the data plot.

Figure 6 shows the data from the test on the Dawsonville well plotted according to the Ferris-Knowles method. The points do not fall along a straight line as postulated in this method but, instead, fall along the trace of the type curve for $\alpha = 10^{-4}$, which has been transferred from Figure 5. Also shown is a straight line through the origin whose slope, when used according to the Ferris-Knowles method, will yield the transmissibility of 5.3 cm²/sec obtained by matching the data to the type curves.

CONCLUSION

The judgment of an experienced hydrologist is needed to decide the significance, if any, of a determination of T by the method of instantaneous charge. As *Ferris et al.* [1962] properly warned

> the duration of a 'slug' test is very short, hence the estimated transmissibility determined from the test will be representative only of the water-bearing material close to the well. Serious errors will be introduced unless the . . . well is fully developed and completely penetrates the aquifer.

Few wells completely penetrate an aquifer, but it is nevertheless possible under some circumstances for a hydrologist to derive useful information from a test on a partially penetrating well. Since the vertical permeabilities of most stratified aquifers are only small fractions of the horizontal permeabilities, the induced flow within the small radius of the cone that develops during the short period of observation is likely to be essentially 2-dimensional. Therefore, the determined value of T would represent approximately the transmissibility of that part

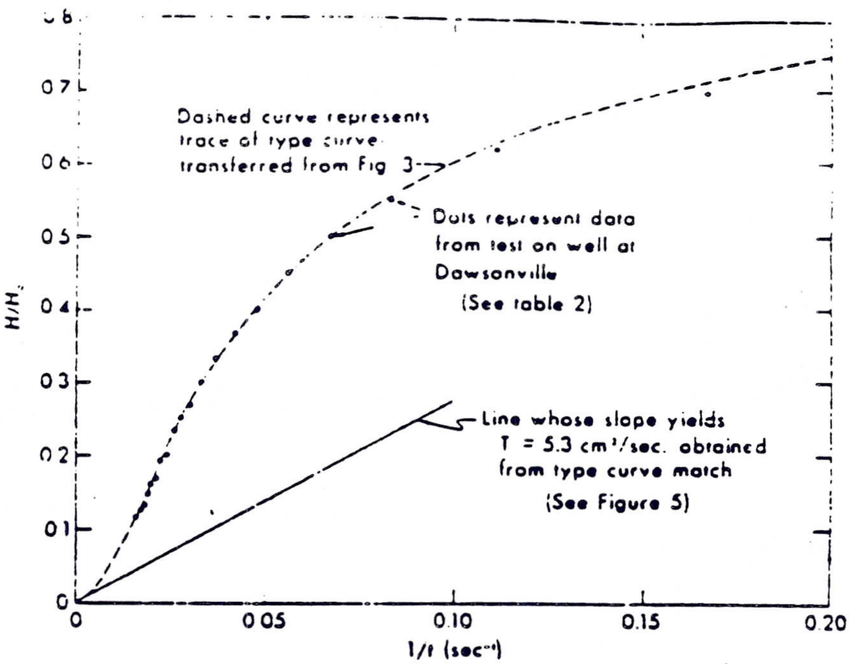

Fig. 6. Data from test on well of Dawsonville, Georgia, plotted according to the Ferris-Knowles method.

of the aquifer in which the well is screened or open, provided that the aquifer is reasonably homogeneous and isotropic in planes parallel to the bedding and provided that the effective radius r_e can be estimated closely.

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(Manuscript received May 12, 1966.)

APPENDIX F

RESULTS OF LAND SURVEY

WEBER, HILLEMEIER & FISCHER

INCORPORATED

:GISTERED PROFESSIONAL ENGINEERS
REGISTERED STRUCTURAL ENGINEERS
REGISTERED LAND SURVEYORS

Consulting Engineers and Land Surveyors

PROFESSIONAL ENGINEER

782 NORTH HENDERSON STREET

GALESBURG, ILLINOIS 61401
PHONE 343-9282

August 11, 1988

Mr. Thomas M. Lachajczyk
Program Manager
Envirodyne Engineers, Inc.
12161 Lackland Road
St. Louis, Missouri 63146

Subject: Surveying Services
Truax Field
Madison, Wisconsin
Our Project No. 18838

Dear Mr. Lachajczyk:

Horizontal coordinates and vertical elevations for ground water monitoring wells in and around Truax Field are as follows:

Well Designation	North	East	Elevation	Comments
TG-1	2907.86	1458.63	20.11	Top well pipe
TG-1	-------	-------	17.29	Top brass survey plate in concrete
TG-2	2553.77	1846.24	15.51	Top well pipe
TG-2	-------	-------	12.77	Top brass survey plate in concrete
TG-3	8068.04	3381.54	24.38	Top well pipe
TG-3	-------	-------	21.64	Top brass survey plate in concrete
101	3249.60	2052.71	22.18	Top well pipe
104	4270.00	1950.00	37.87	Top well pipe
121S	3680.47	2049.92	36.48	Top well pipe
121D	3680.47	2049.92	36.18	Top well pipe
152	3341	1389	25.77	Top well pipe

(coordinates per 1971 Kaufmann Report, well 152 only)

WEBER, HILLEMEIER & FISCHER, INC.
Consulting Engineers & Land Surveyors

Horizontal coordinates for soil sampling locations in and around Truax Field. are as follows:

Soil Sample Designation	North	East	Comments
TS-1	8150.18	3426.30	Burn Area
TS-2	8203.92	3515.92	Burn Area
TS-3	7020.52	3713.84	Fuel Storage Area
TS-4	6950.16	3823.79	Fuel Storage Area
TS-5	7179.77	3767.78	Fuel Storage Area
TS-6	8355.02	3469.68	Burn Area
TS-7	2318.13	2218.48	Sludge Bed Area
TS-8	2365.06	2184.33	Sludge Bed ARea
TS-9	2432.28	2156.64	Sludge Bed Area
TS-10	8068.04	3381.54	Burn Area - Same Area Location as TG-3
TS-11	2667.72	3280.26	Irrigation Area
TS-12	2486.64	2695.08	Decant Pond Area

Horizontal coordinates and vertical elevations for the three (3) survey control monuments set by our firm for subject project are as follows:

Monument Designation	North	East	Elevation	Comments
CM-1	2713.95	1768.78	18.67	WWTP Area
CM-2	7182.53	3927.95	9.03	Fuel Storage Area
CM-3	8174.86	3277.04	23.56	Burn Area

The above horizontal coordinates are based upon re-establishment of the local horizontal grid (Kaufmann, 1971) by the use of existing known coordinates for wells 104 and 121. Vertical elevations are based upon the City of Madison's local datum.

Please find enclosed 1 copy each of all of our field notes and calculation sheets for your use.

It has been a pleasure working with you on this project, and if we may be of any further service on this or any future project, please do not hesitate to call or drop me a line.

Thank you.

Yours very truly,

Stephen M. Bruner

Stephen M. Bruner

SMB:ch
Enclosure

WEBER HILLEMEIER & FISCHER, INC.
Consulting Engineers & Land Surveyors
GALESBURG, ILLINOIS 61401

JOB 18838
SHEET NO. 1 OF
CALCULATED BY S. Brunner DATE 7/14/88
CHECKED BY DATE
SCALE

CHECK HORIZ. ∡ CLOSURE:

FIELD ANGLES	ADJUSTED ∡'S
53°-20'-26"	53°-20'-29"
222°-37'-44"	222°-37'-46"
207°-57'-28"	207°-57'-30"
135°-56'-15"	135°-56'-18"
145°-12'-25"	145°-12'-28"
54°-33'-06"	54°-33'-09"
171°-19'-17"	171°-19'-20"
212°-25'-22"	212°-25'-24"
134°-44'-20"	134°-44'-23"
165°-15'-48"	165°-15'-50"
183°-44'-21"	183°-44'-24"
112°-52'-57"	112°-53'-00"
1,799°-59'-29" (1800°)	1800°-00'-00"

FROM FIELD ∡ CLOSURE PROGRAM,

ERROR CLOSURE = $\frac{0.0637}{13,446.87} = \frac{1}{211,097}$

PRODUCT 204 NEBS Inc. Groton, Mass. 01471

WEBER HILLEMEIER & FISCHER, INC.
Consulting Engineers & Land Surveyors
GALESBURG, ILLINOIS 61401

JOB 18838
SHEET NO 2 OF
CALCULATED BY S. Bowman DATE 7/14/88
CHECKED BY DATE
SCALE

RESECT POINT "C" FROM COORDINATES OF KAUFMANN WELLS 104, 121 & 101 :

$L_1 = 1027.03$ S. 6°-42'-35" E. (KAUFMANN) { N. 5°-44'-52" W. PER OUR SURVEY

L_1 CALC. $= (262.79^2 + 853.33^2 - 2(853.33)(262.79)\cos 124°\text{-}34'\text{-}37")^{1/2}$

$= 1025.55'$ PER OUR SURVEY (CLOSE)

$L_2 = 598.41$ S. 9°-37'-11" E. (KAUFMANN) { USED

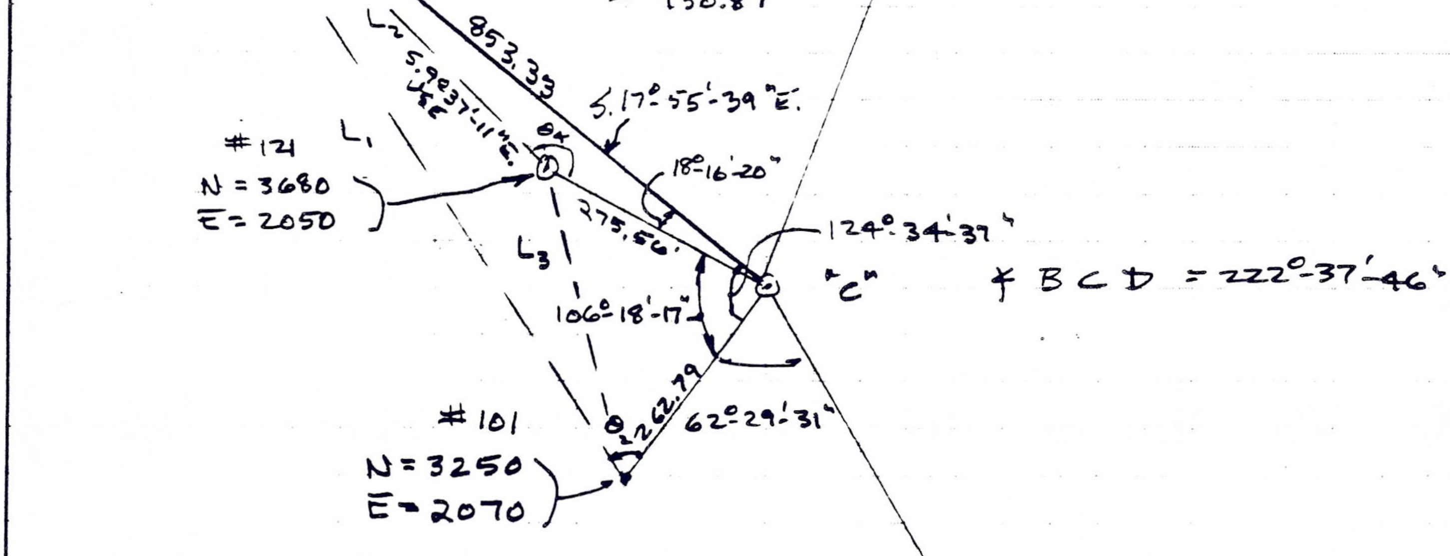
$L_{2\,CALC} = (275.56^2 + 853.33^2 - 2(275.56)(853.33)\cos 18°\text{-}16'\text{-}20")^{1/2}$

$= 597.94$ PER OUR SURVEY (VERY CLOSE)

$L_3 = 430.46$ S. 2°-39'-47" E. (KAUFMANN) { S. 0°-22'-16" E PER OUR SURVEY

L_3 CALC $= (275.56^2 + 262.79^2 - 2(275.56)(262.79)\cos 106°\text{-}18'\text{-}17")$

$= 430.87$



NOTE : ALL DISTANCES ARE CLOSE TO KAUFMANN GRID
⇒ USE BEARING OF L_2 PER KAUFMANN GRID TO TIE IN OUR TRAVERSE & COORDINATES OF POINT 104 AS GOOD

"B"

$$\frac{\sin 124°\text{-}34'\text{-}37"}{1025.55} = \frac{\sin \theta_2}{853.33} = \frac{\sin \theta_1}{262.79}$$

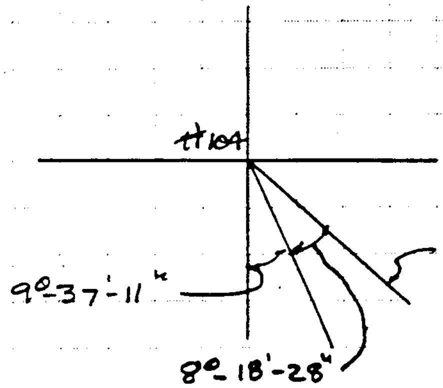
$\theta_2 = 43°\text{-}14'\text{-}36"$ $\theta_1 = 12°\text{-}10'\text{-}47"$

WEBER HILLEMEIER & FISCHER, INC.
Consulting Engineers & Land Surveyors
GALESBURG, ILLINOIS 61401

JOB 18838
SHEET NO. 3 OF
CALCULATED BY S. Brunner DATE 7/14/88
CHECKED BY DATE
SCALE

$$\frac{\sin\theta_3}{275.56} = \frac{\sin\theta_4}{853.33} = \frac{\sin 18^\circ\text{-}16'\text{-}20''}{597.94}$$

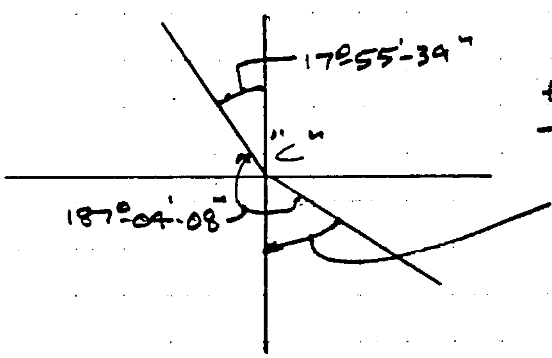
$\theta_4 = 153^\circ\text{-}25'\text{-}12''$
$\theta_3 = 8^\circ\text{-}18'\text{-}28''$



9°-37'-11"
8°-18'-28"
S 17°-55'-39" E. = BEARING TO PT. "C"

∴ COORDINATES TRAVERSE POINT "C":
N = 3458.10 ✓
E = 2212.67 ✓

BEARING LINE $\overline{C\text{-}B}$ =



187°-04'-08"
+ 17°-55'-39"
− 180°-00'-00"
S 24°-59'-47" E. = AZ 155°-00'-13"

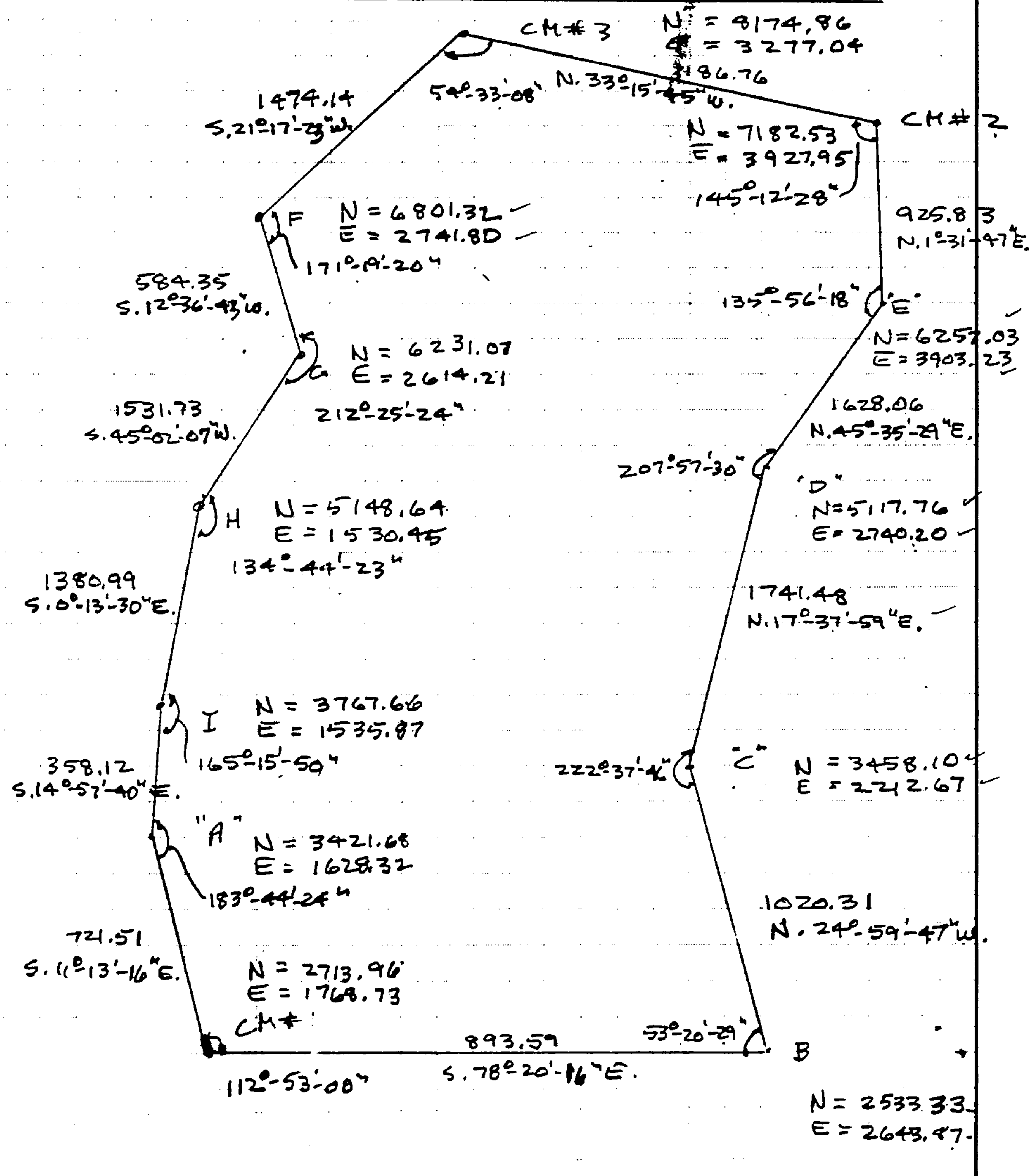
FROM CALCULATOR PROGRAM:

POINT	ADJUSTED COORDINATES N	E
101	3249.60 ✓	2052.71 ✓
121	3680.41 ✓	2049.92 ✓
104	4270.00 ✓	1950.00 ✓
TS5	7179.77	3767.78
TS3	7020.52	3713.84
TS4	6950.16	3823.79
TS6	8355.02	3469.68
TS2	8203.92	3515.92
TS1	8150.18	3426.30

WEBER HILLEMEIER & FISCHER, INC.
Consulting Engineers & Land Surveyors
GALESBURG, ILLINOIS 61401

JOB 18838
SHEET NO. 4 OF
CALCULATED BY S. Brunst DATE 7/15/88
CHECKED BY DATE
SCALE

ADJUSTED TRAVERSE w/ FINAL COORDINATES



WEBER HILLEMEIER & FISCHER, INC.
Consulting Engineers & Land Surveyors
GALESBURG, ILLINOIS 61401

JOB 18838
SHEET NO 5 OF
CALCULATED BY S. Bruner DATE 7/15/88
CHECKED BY DATE
SCALE

POINT	N.	E.
TG 3	8068.04	3381.54
TG. 2	2553.77	1846.24
TG. 1	2907.86	1458.63
TS 11	2667.72	3280.26
TS 12	2486.64	2695.08
TS 7	2318.13	2218.48
TS 8	2365.06	2184.33
TS 9	2432.28	2156.24

INDEX PAGE

JOB NO.	PROJECT	PAGE NUMBER

SURVEY OF
TRUAX FIELD & OLD BURKE
WWTP GROUNDWATER
MONITORING WELLS &
SOIL SAMPLING SITES

FOR

ENVIRODYNE ENGINEERS
12161 LACKLAND ROAD
ST. LOUIS, MISSOURI

BY

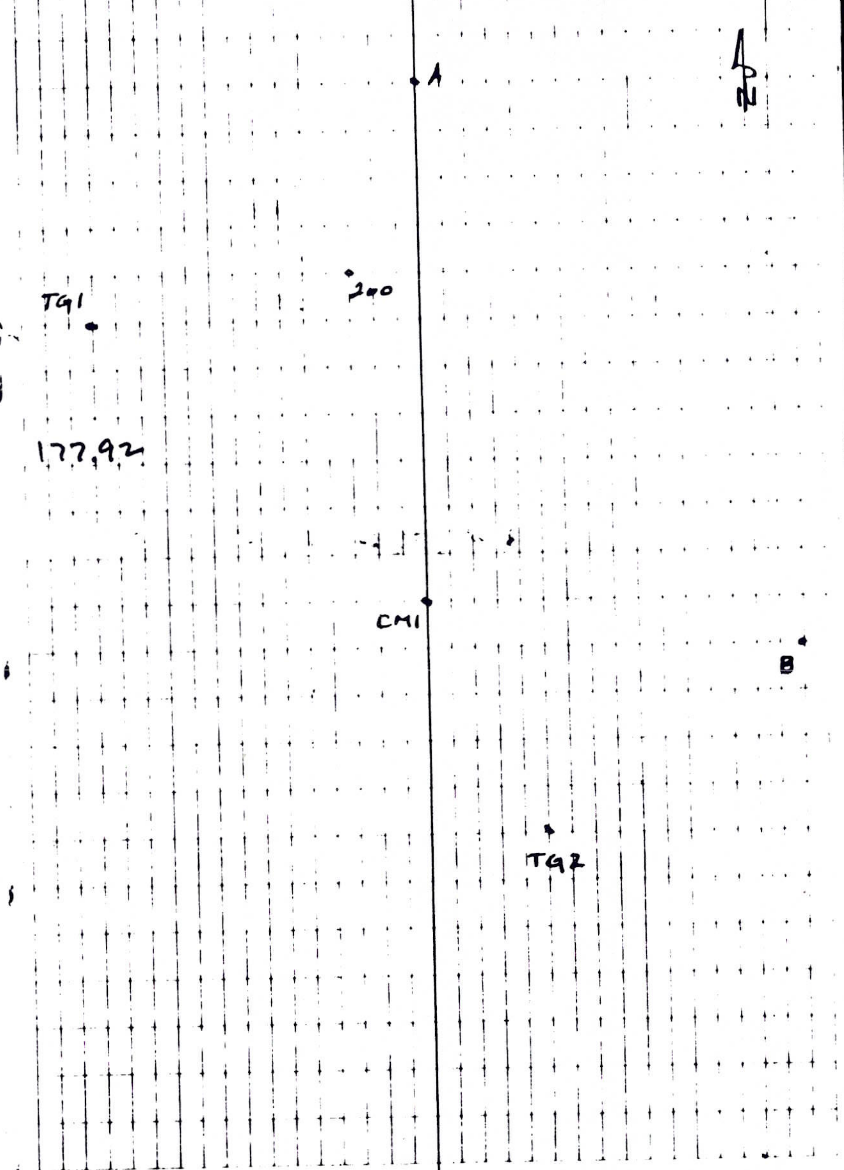
WEBER, HILLEMEIER & FISCHER
782 NORTH HENDERSON ST.
GALESBURG, ILLINOIS

①

7/14/88 MADISON WIS.

TE			BS
CM1	~~∡ A,CM1,B~~		A
	DIST CM1-A	721.74	
	VERT ∡	88°-32'-45"	
	DIST CM1-B	893.60	
	VERT ∡	90°-17'-58"	
HOR	∡ A,CM1,B	112°-52'-57"	
	✓ DIST CM1-TG2	178.05	HD= 177.92
	VERT ∡	92°-09'-04"	
	HORIZ ∡ A,CM1,TG2	165°-24'-45"	
	✓ DIST CM1-TG1	365.79	
	VERT ∡	90°-20'-52"	
	HORIZ ∡ A,CM1,TG1	313°-14'-11"	
	X DIST CM1-T 200	618.86	
	VERT ∡	89°-29'-24"	
	HORIZ ∡ A,CM1-T 200	354°-16'-27"	

WELL LOC. GRST ▯ SMB + ▯ ①



(2)

⊼@ B — BS CM1

HORIZ ∡ CM1,B,C 53°-20'-26"

✓ DIST B-TS9 497.67
VERT ∡ 90°-31'-06"
HORIZ ∡ CM1,B,TS9 336°-37'-25"

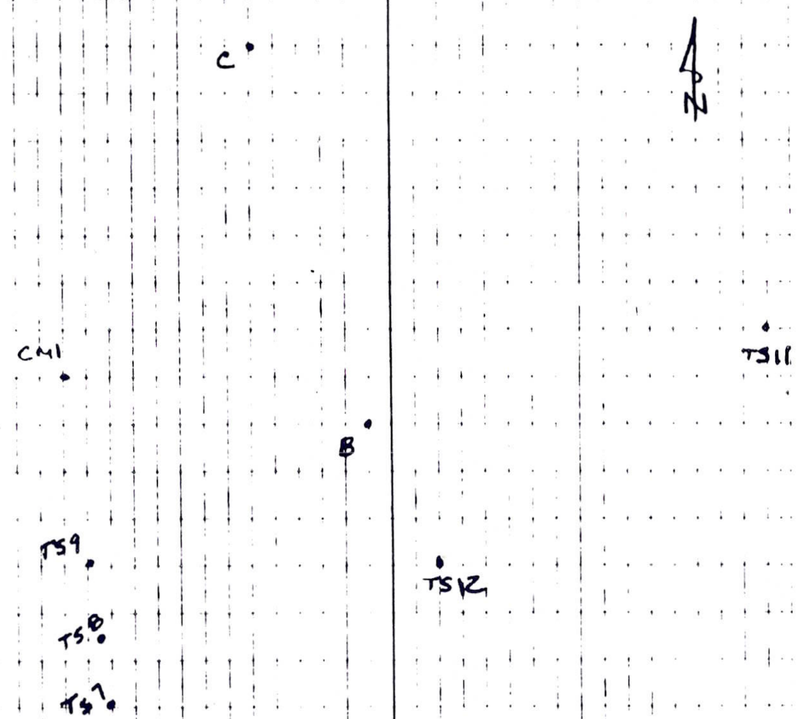
✓ DIST B-TS7 476.78
VERT ∡ 90°-25'-40"
HORIZ ∡ CM1,B,TS7 321°-30'-30"

✓ DIST B-TS8 489.44
VERT ∡ 90°-20'-15"
HORIZ ∡ CM1,B,TS8 328°-13'-48"

✓ DIST B-TS12 69.59 HD = 69.25
VERT ∡ 95°-38'-06"
HORIZ ∡ CM1,B,TS12 210°-43'-21"

✓ DIST B-TS11 648.94 +1.50
VERT ∡ 90°-50'-12"
HORIZ ∡ CM1,B,TS11 156°-24'-45"

(2)

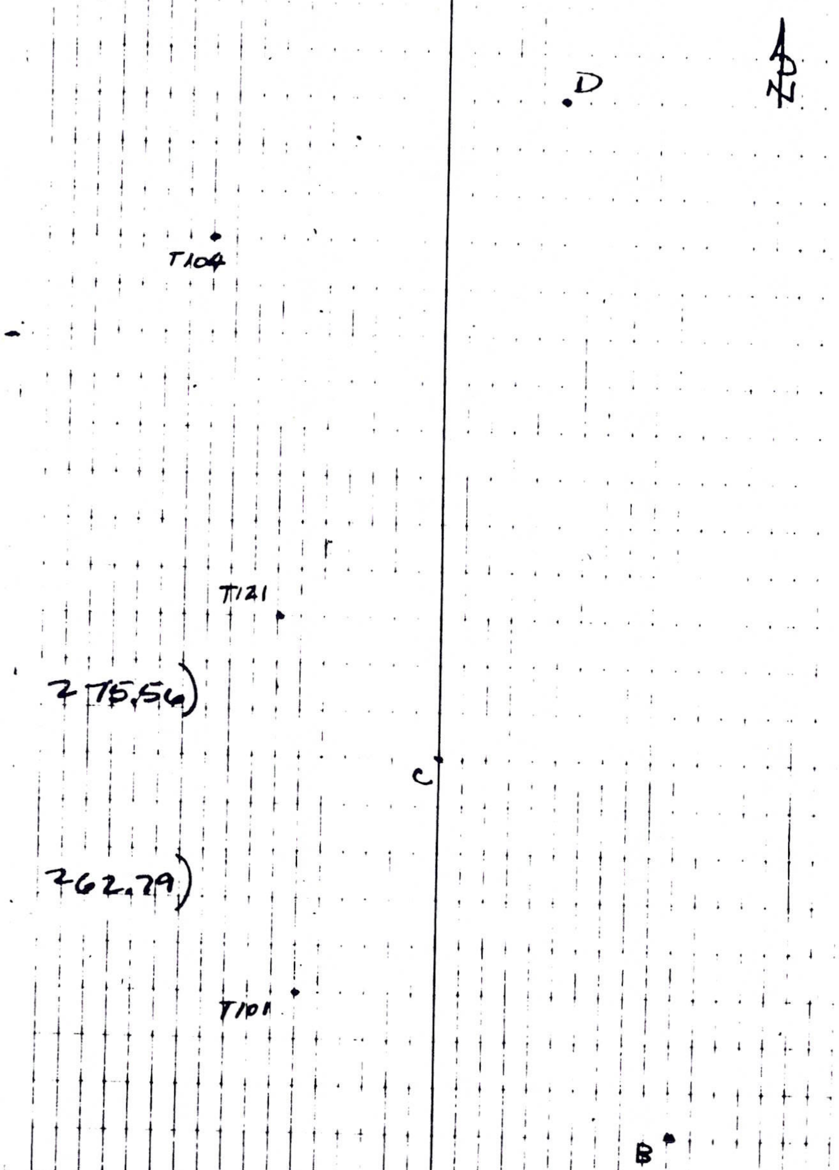


(3)

⊼ @ C — BS B

DIST C-B	1020.59	
VERT ∡	91°19'56"	
DIST C-D	1741.49	
VERT ∡	89°-51'-36"	
HORIZ ∡ B,C,D	222°-37'-44"	
✓ DIST C-T104	853.33	
VERT ∡	89°-58'-51"	
HORIZ ∡ B,C,T104	187°-04'-08"	
✓ DIST C-T121	275.57	(HD = 275.56)
VERT ∡	90°-22'-26"	
HORIZ ∡ B,C,T121	168°-47'-48"	
✓ DIST C-T101	263.07	(HD = 262.79)
VERT ∡	92°-37'-24"	
HORIZ ∡ B,C,T101	62°-29'-31"	

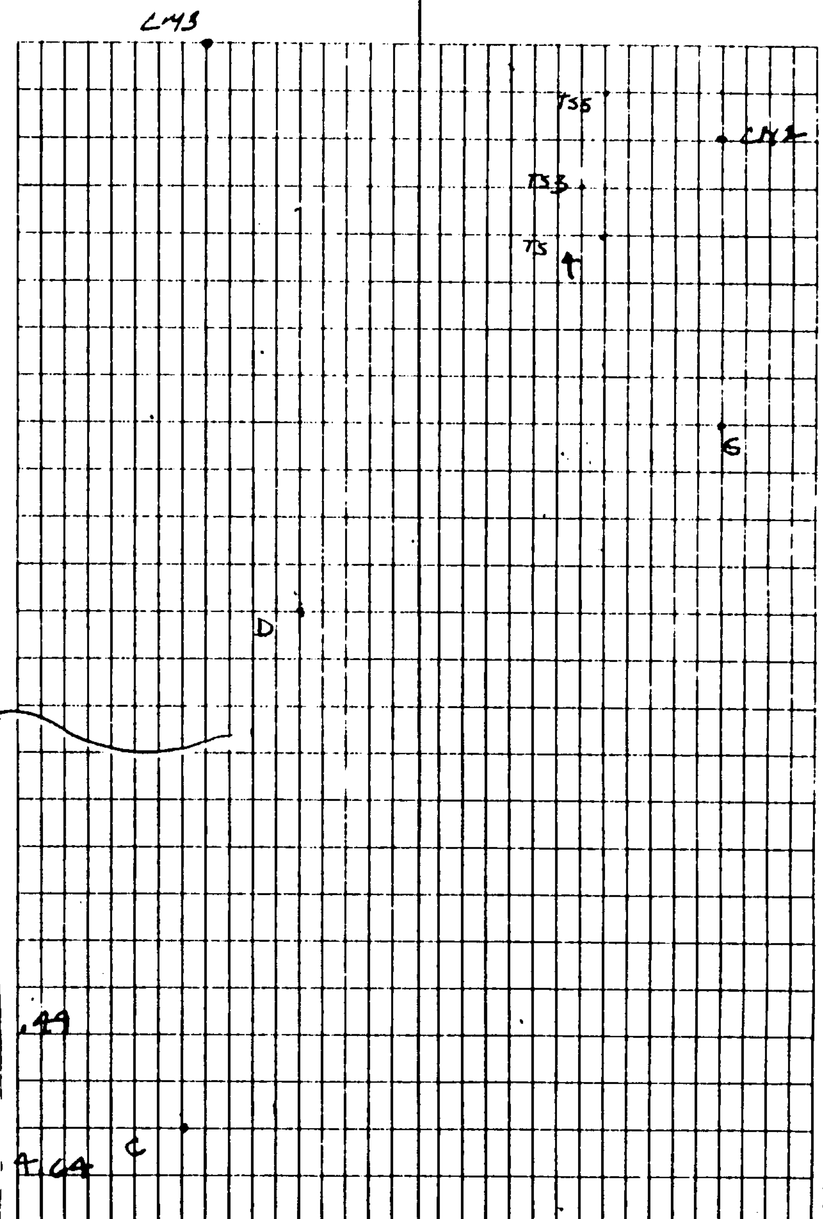
(3)



④

T@	BS		
✓D	C		
	HORIZ ∡ C,D,E	207°-57'-28"	
E	D		
	DIST E-D	1628.38	
	VERT ∡	88°-51'-53"	
	~~Horiz~~		
	DIST E-CM2	925.83	
	VERT ∡	89°-53'-40"	
	HORIZ ∡ D,E,CM2	135°-56'-15"	
CM2	E		
	HORIZ ∡ E,CM2,CM3	145°-12'-25"	
✓	DIST CM2-TS5	160.19	= H.D.
	VERT ∡	89°-40'-54"	
	HORIZ ∡ E,CM2,TS5	87°-29'-03"	
✓	DIST CM2-TS3	268.50	H.D.=268 .49
	VERT ∡	89°-33'-28"	
	HORIZ ∡ E,CM2,TS3	51°-21'-26"	
✓	DIST CM2-TS4	254.65	H.D.=25 4.64
	VERT ∡	89°-36'-50"	
	HORIZ ∡ E,CM2,TS	220°-36'-50"	

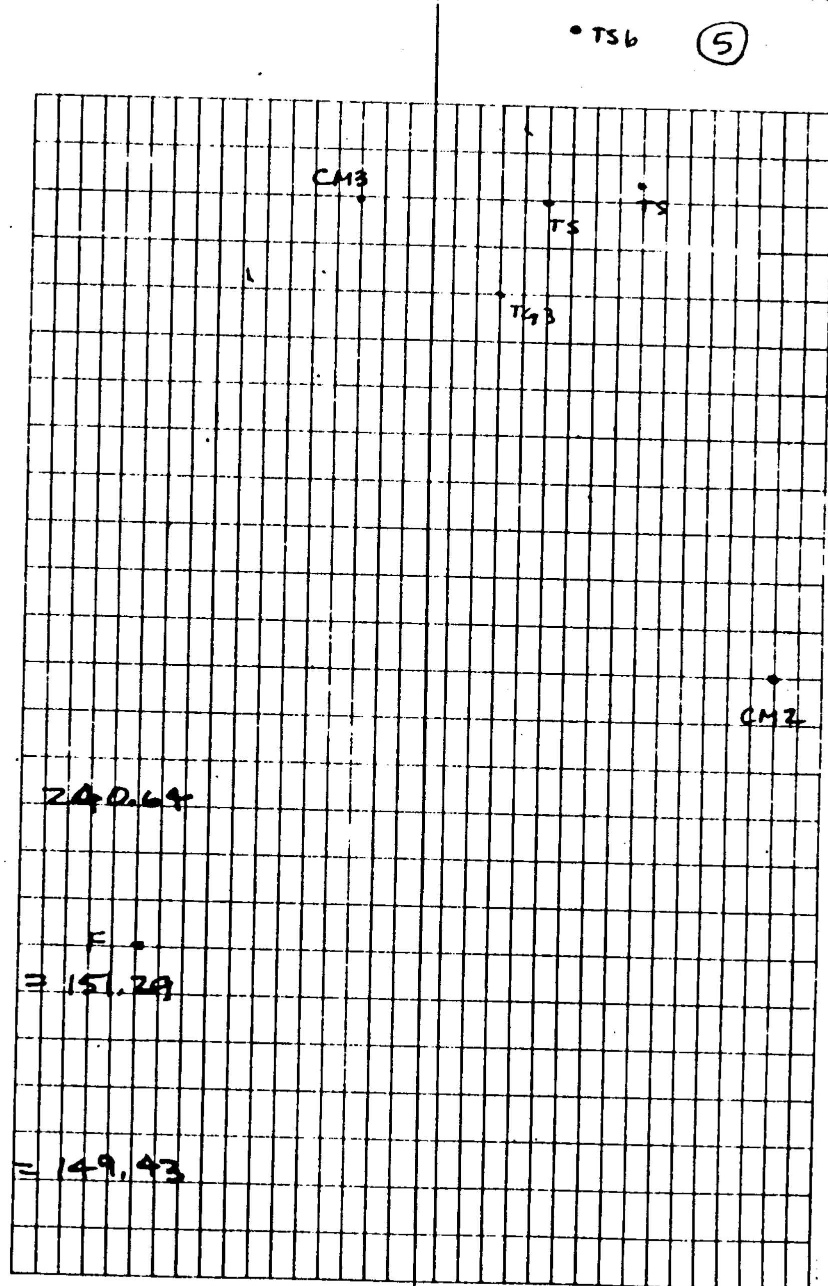
④



(5)

⊼@ LM3	BS CM2		
DIST	CM3-CM2	1186.84	
VERT∡		90°-40'-50"	
DIST	CM3-F	1474.14	
VERT∡		90°-07'-28"	
HORIZ∡	CM2, CM3, F	54°-33'-06"	
✓ DIST	CM3-TS6	263.76	= H.D.
VERT∡		90°-09'-20"	
HORIZ∡	CM2, CM3, TS6	260°-10'-44"	
✓ DIST	CM3-TS2.	240.65	H.D. = 240.64
VERT∡		90°-30'-10"	
HORIZ∡	CM2, CM3, TS2	296°-19'-28"	
✓ DIST	CM3-TS1	151.30	H.D. = 151.29
VERT∡		90°-39'-08"	
HORIZ∡	CM2, CM3, TS1	312°-39'-00"	
✓ DIST	CM3-TG3	149.44	H.D. = 149.43
VERT∡		90°-42'-36"	
HORIZ∡	CM2, CM3, TG3	348°-53'-21"	

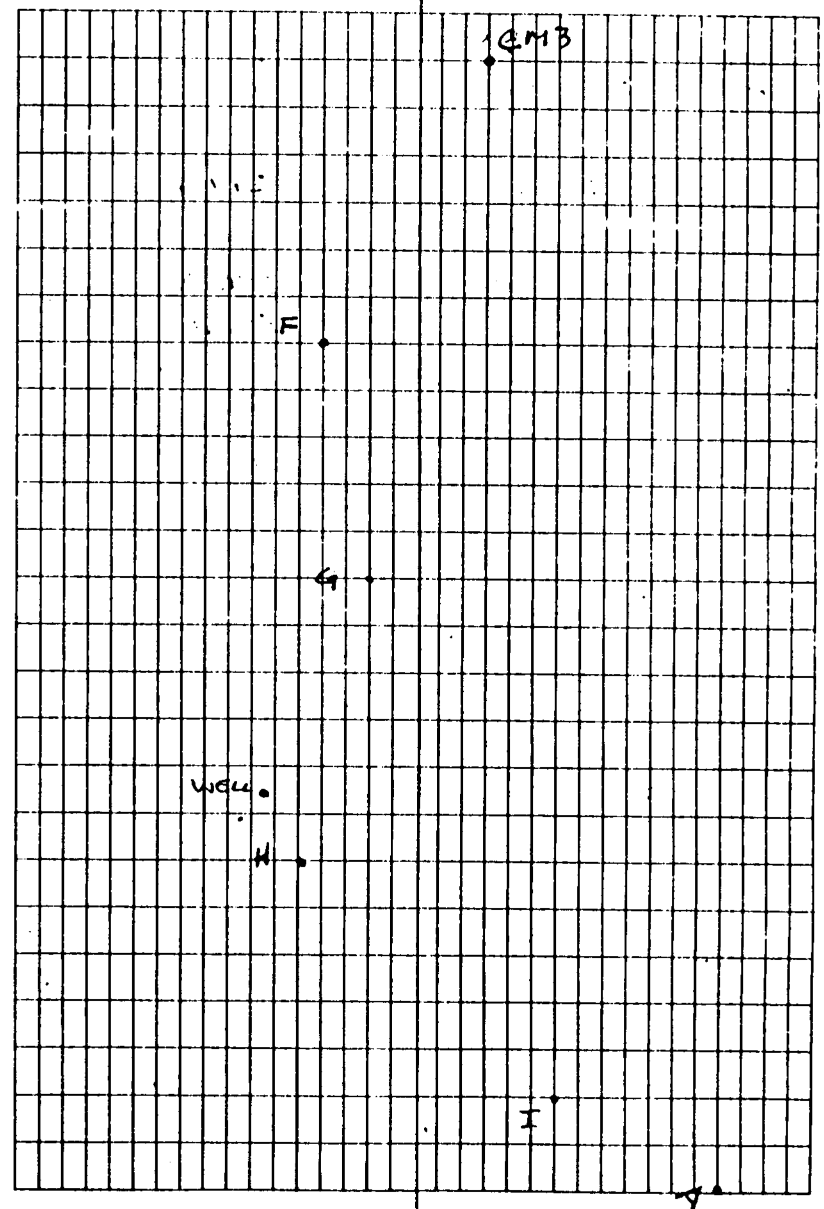
(5)



(6)

I@		BS	
F		CM3	
	HORIZ∡	CM3, F, G	171°-19'-17"
G		F	
	DIST	G-F	584.41
	VERT ∡		90°-44'-14"
	~~HORIZ∡~~	~~F,G,H~~	
	DIST	G-H	1531.81
	VERT∡		89°-24'-12"
	HORIZ∡	FGH	212°-25'-22"
H		G	
	HORIZ∡	GHI	134°-44'-20"
H.	DIST	I-WELL	61.60
	HORIZ∡	GH WELL	312°-19'-00"
I		H	
	DIST	I-H	1381.00
	VERT∡		89°-49'-42"
	DIST.	I-A	358.12
	VERT ∡		89°-55'-45"
	HORIZ∡	HIA	165°-15'-48"
	HORIZ∡	I,A,CM1	183°-44'-21"

(6)



VERTICAL CONTROL

STA	B.S	H.I.	F.S	ELEV		DESCRIPTION
B.M.	1.32	28.53		27.21		TOP NUT F.H. @ DARWIN & INTERNATIONAL
CM3	4.88	28.44	4.97	23.56		CONTROL MONUMENT #3 - SURVEY DISC.
TG3			4.06	24.38		TOP OF WELL PIPE @ NOTCH
TG3	2.07	23.71	6.80	21.64		TOP OF BRASS PLATE
TP	5.19	15.22	13.68	10.03		
CM2	4.44	13.47	6.19	9.03		CONTROL MONUMENT #2 - SURVEY DISC.
TP	6.78	13.94	6.31	7.16		
TP	13.34	27.06	0.22	13.72		
BM	1.67	25.45	3.28	23.78		TOP NUT FH S.E. COR INTERNATIONAL & SHAW
TP	9.88	28.95	6.38	19.07		
TP	5.78	29.93	4.80	24.15		
BM CK			2.74	27.19	(27.21)	TOP NUT FH SW COR DARWIN & INTERNATIONAL
BM	9.39	33.18		23.79	(ADJUSTED)	TOP NUT FH SE COR SHAW & INTERNATIONAL
TP	9.75	41.18	1.75	31.43		
TP	2.48	42.03	1.63	39.55		
TP	4.39	41.82	4.60	37.43		
TP	4.66	41.48	5.00	36.82		
T104			3.61	37.87		TOP PIPE @NOTCH ON SO. SIDE
TP	5.59	41.53	5.54	35.94		
T121S			5.05	36.48		
T121D			5.35	36.18		
T101			19.35	22.18		
TP	1.00	29.83	12.70	28.83		
TP	1.44	26.11	5.16	24.67		

STA	BS	HI	FS	EL		
		26.11				
TG2			10.60	15.51		TOP PIPE @ NOTCH
TG2	12.83	25.60	13.34	12.77		BRASS PLATE
CM1	6.39	25.06	6.93	18.67		CONTROL MONUMENT #1 - SURVEY DISC.
TG1			4.95	20.11		TOP PIPE @ NOTCH
TG1	8.67	25.96	7.77	17.29		BRASS PLATE
TP[x]	5.09	30.72	0.33	25.63		
T152			4.95	25.77		IN CHEESE WAREHOUSE TOP FLOOR
TP[x]	15.21	40.84		25.63		
TP	4.71	41.10	4.45	36.39		
TP	4.92	41.49	4.53	36.57		
TP	4.58	43.06	3.01	38.48		
TP	6.08	44.96	4.18	38.88		
TP	3.73	41.38	7.31	37.65		
TP	2.32	30.57	13.13	28.25		
BM CK			6.78	23.79	(23.79)	TOP NUT FH@ SHAW & INTERNATIONAL

APPENDIX G

CHAIN OF CUSTODY FORMS

ENVIRODYNE ENGINEERS
12161 Lackland Rd.
St. Louis, MO 63146
(314) 434-6960

CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8 DATE WORK IN: ______ REPORT TO: TWL Page 3 of 3

REQUESTED BY: Buffalo COE RECEIVED BY: ______ DATE REQUIRED: ______

SPECIAL INSTRUCTIONS: Truax Fld

SAMPLE IDENTIFICATION

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	Pet Hyd	Metals (a)	Metals (b)								COMMENTS
1		TW-1	7-15-88	HCl	2-Qt Gl	✓										Resample
2		TW-1		HNO3	Qt Pl		✓									Resample
3		TW-5		HCl	2-Qt Gl	✓										"
4		TW-5		HNO3	Qt Pl		✓									"
5		~~TW~~ TG-16		HCl	2-Qt Gl	✓										"
6		TG-16		HNO3	Qt Pl		~~B~~	✓								"
7																Metals (a): As, Se
8																Ag, Hg, Cd, Cr,
9																Pb, Ba
10																
11																Metals (b): As,
12																Se, Ag, Hg, Cd,
13																Cr, PB, Ba, Na,
14																Fe Mn.
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-6	R.L. Shelley	7-15-88	1800	Fed Ex	7-15-88	1800	Shipping
1-6	Fed Ex	7/16/88	0750	DBHeple	7/16/88	0750	

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager YELLOW - Records GOLD - Field Copy

ENVIRODYNE ENGINEERS
12161 Lackland Rd.
ST. Louis, MO 63146
(314) 434-6960

CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-800017 DATE WORK IN: 7-16-88 REPORT TO: TML Page 1 of 1

REQUESTED BY: BUFFALO COE RECEIVED BY: DB Humphries DATE REQUIRED: 8-15-88

SPECIAL INSTRUCTIONS: METALS B: As, Se, Ag, Hg, Cd, Cr, Pb, Ba, Na, Fe, MN
METALS A: As, Se, Ag, Hg, Cd, Cr, Pb, Ba

SAMPLE IDENTIFICATION

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	METALS B	PET HYD	METALS A								COMMENTS
1	88007311	TG-2 Resample	7-15-88	HCL	2xQT GL		✓									
2	↓	↓ ↓	↓	HNO_3	QT PL	✓										
3	7312	TG-1 Resample	↓	HCL	2xQT GL		✓									
4	↓	↓	↓	HNO_3	QT PL	✓										
5	7313	TW-1	↓	HCL	2xQT GL		✓									
6	↓	↓	↓	HNO_3	QT PL			✓								
7	7314	TW-5	↓	HCL	2xQT GL		✓									
8	↓	↓	↓	HNO_3	QT PL			✓								
9	7315	TW-16 ~~TG-16R~~	↓	HCL	2xQT GL		✓									
10	↓	↓	↓	HNO_3	QT PL	✓										
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
2,4,6,8,10	[signature]	7/26/88	1400	M. Schneider	7/26/88	1400	METALS

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-90017 DATE WORK IN: 6/9/88 REPORT TO: TML

REQUESTED BY: DERA RECEIVED BY: J Shelley DATE REQUIRED: 7/8/88

SPECIAL INSTRUCTIONS: * AS, SE, AG; HG, CD, CR, PB, BA, NA
FE, MN

SAMPLE IDENTIFICATION						ANALYSES REQUESTED										
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	* METALS	GCMS VOA	VOA LIBSEARCH	PET/HYD							COMMENTS
1	88006028	TG-15	6-1-88	HNO3	QTP1	X										
2		↓	↓	HCL COLD	2x40ml		X	X								
3				HCl	2xQTG1				X							
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1	DBfoh			a Sing	6/27	1606	Hg

ROUTING

- ☐ GC
- ☑ GCMS ☑ GCMS MGR
- ☐ ORG PREP
- ☑ ORG LAB MGR
- ☑ INORG LAB MGR
- ☑ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8(???) DATE WORK IN: ______ REPORT TO: TML Page 2 of 18

REQUESTED BY: ______ RECEIVED BY: ______ DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ______

SAMPLE IDENTIFICATION

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Petroleum Hydrocarbons	Metals A								COMMENTS
1		TS-8	07/12/88	COLD	2oz glass	✓										Metals A = As, Se, Ag,
2		TS-8	↓	↓	250cc amber		✓									Hg, Cd, Cr, Pb, Ba
3		TS-8	↓	↓	↓			✓								
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	[signature]	07/12/88	1800	Shelley	7/13/88	800 AM	ANALYSES

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE – Sample Custodian PINK – Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-~~00000~~ DATE WORK IN: 7/13/88 REPORT TO: YML Page 3 of 18

REQUESTED BY: ________ RECEIVED BY: J Shelley DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ________

SAMPLE IDENTIFICATION						ANALYSES REQUESTED										
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Petroleum Hydrocarbons	Metals A								COMMENTS
1		TS-9	07/12/88	cold	2oz glass	✓										Metals A = As, Se,
2		↓	↓	↓	250cc amber		✓									Ag, Hg, Cd, Cr, Pb,
3		↓	↓	↓	↓			✓								Ba
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	Craig Jones	07/12/88	1800	J Shelley	7/13/88	800	ANALYSES

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE – Sample Custodian PINK – Project Manager GOLD – Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80080 DATE WORK IN: 7/13/88 REPORT TO: TML

REQUESTED BY: ______ RECEIVED BY: J Shelley DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ______

SAMPLE IDENTIFICATION						ANALYSES REQUESTED										
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Petroleum Hydroc.	Metals A								COMMENTS
1		TS-11	07/12/88	COLD	2oz glass	✓										Metals A = As, Se,
2		↓	↓	↓	250cc amber		✓									Ag, Hg, Cd, Cr, Pb, Ba
3					↓			✓								
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	[signature]	07/12/88	1800	J Shelley	7/13/88	800 AM	ANALYSES

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE – Sample Custodian PINK – Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80000 DATE WORK IN: 7/13/88 REPORT TO: TML Page 5 of 18

REQUESTED BY: ______ RECEIVED BY: Shelley DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ______

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Petroleum Hydrocarbons	Metals A								COMMENTS
1		TS-12	07/12/88	COLD	2oz glass	✓										Metals A = As, Se, Ag,
2		↓	↓	↓	250cc amber		✓									Hg, Cd, Cr, Pb, Ba
3					↓			✓								
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	Craig Jones	07/12/88	1800	Shelley	7/13/88	800	ANALYSES

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE – Sample Custodian PINK – Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80000 DATE WORK IN: 7/13/88 REPORT TO: TML Page 6 of 18

REQUESTED BY: ______ RECEIVED BY: J Shetley DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ______

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Petroleum Hydrocarbons	Metals A								COMMENTS
1		TS-13	07/12/88	COLD	2oz glass	✓										Metals A = As, Se, Ag,
2		↓	↓	↓	250cc amber		✓									Hg, Cd, Cr, Pb, Ba
3					↓			✓								
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	Craig Jones	07/12/88	1800	J Shetley	7/13/88	800	ANALYSES

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 344-8000D DATE WORK IN: 7/13/88 REPORT TO: TML

REQUESTED BY: ______ RECEIVED BY: J Shelley DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ______

SAMPLE IDENTIFICATION						ANALYSES REQUESTED										
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	[illegible]	Metals^{A}								COMMENTS
1		TW-1	07/12/88	HCL	(2) 40ml vials	✓										Metals^{A} = As, Se, Ag
2		↓	↓	↓	(2) Qt Glass		✓									Hg, Cd, Cr, Pb, Ba
3		↓	↓	HNO3	(1) Qt Plastic			✓								
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	Craig Jones	07/12/88	1800	J Shelley	7/13/88	800 AM	ANALYSES

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8000 DATE WORK IN: 7/13/88 REPORT TO: TML Page 8 of 18

REQUESTED BY: ________ RECEIVED BY: J Shelley DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ________

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Ext. Hyd.	MetalsA								COMMENTS
1		TW-2	07/12/88	HCL	(2) 40ml vials	✓										MetalsA = As, Se, Ag,
2		↓	↓	↓	(2) Qt Glass		✓									Hg, Cd, Cr, Pb, Ba
3		↓	↓	HNO_3	(1) Qt Plastic			✓								
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	[signature]	07/12/88	1800	J Shelley	7/13/88	800	ANALYSES

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE – Sample Custodian PINK – Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-B0000 DATE WORK IN: 7/13/88 REPORT TO: TML Page 9 of 18

REQUESTED BY: ______ RECEIVED BY: J Shelley DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ______

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet. Hyd.	Metals A	COMMENTS
1		TW-4	07/12/88	HCL	(2) 40ml vials	✓			Metals A = As, Se, Ag
2		↓	↓	↓	(2) Qt Glass		✓		Hg, Cd, Cr, Pb, Ba
3				HNO_3	(1) Qt Plastic			✓	
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	Craig S. Jones	07/12/88	1800	J Shelley	7/13/88	800	ANALYSES

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80000 DATE WORK IN: 7/13/88 REPORT TO: TWL Page 10 of 18

REQUESTED BY: ______ RECEIVED BY: J Shelley DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ______

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet. Hyd.	Metals A								COMMENTS
1		TW-5	07/12/88	HCL	(2) 40ml vials	✓										Metals A = As, Se, Ag,
2		↓	↓	↓	(2) Qt Glass		✓									Hg, Cd, Cr, Pb, Ba
3		↓	↓	HNO_3	(1) Qt Plastic			✓								
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	[signature]	07/13/88	1800	J Shelley	7/13/88		ANALYSES

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80000 DATE WORK IN: 7/13/88 REPORT TO: TML Page 11 of 18

REQUESTED BY: RECEIVED BY: J Shelley DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS:

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet. Hyd.	Metals B								COMMENTS
1		TG-1	07/11/88	HCL	(2) 40 ml vials	✓										Metals B = As, Se, Ag
2		↓	↓	↓	(2) Qt Glass		✓									Hg, Cd, Cr, Pb, Ba,
3				HNO3	(1) Qt Plastic			✓								Na, Fe, Mn
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	Craig Sford	07/12/88	1800	J Shelley	7/13/88		ANALYSES

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8000 DATE WORK IN: 7/13/88 REPORT TO: TML Page 12 of 18

REQUESTED BY: ______ RECEIVED BY: [signature] DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ______

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet. Hyd	Metals B								COMMENTS
1		TG-2	07/11/88	HCL	(2) 40ml vials	✓										Metals B = As, Se, Ag,
2		↓	↓	↓	(2) qt Glass		✓									Hg, Cd, Cr, Pb, Ba,
3				HNO_3	(1) qt Plastic			✓								Na, Fe, Mn
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	[signature]	07/12/88	1800	[signature]	7/13/88		ANALYSES

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80000 DATE WORK IN: 7/13/88 REPORT TO: TML Page 13 of 18

REQUESTED BY: ______ RECEIVED BY: T Shetley DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ______

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet. Hyd	Metals B								COMMENTS
1		TG-3	07/12/88	HCL	(2) 40 ml vials	✓										Metals B = As, Se, Ag,
2		↓	↓	↓	(2) Qt Glass		✓									Hg, Cd, Cr, Pb, Ba,
3		↓	↓	HNO_3	(1) Qt Plastic			✓								Na, Fe, Mn
4																
5																
6																Please note that
7																this sample may
8																be very contaminated
9																w/ solvents. It
10																has a very strong
11																sweet solvent odor.
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	Craig Spies	07/12/88	1800	T Shetley	7/13/88		ANALYSES

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE – Sample Custodian PINK – Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80000 DATE WORK IN: 7/13/88 REPORT TO: TML

REQUESTED BY: RECEIVED BY: JShotley DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS:

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet. Hyd	Metals B							COMMENTS
1		TG-16	07/12/88	HCL	(2) 40ml vials	✓									Metals B = As, Se, Ag,
2		↓	↓	↓	(2) qt Glass		✓								Hg, Cd, Cr, Pb, Ba,
3		↓	↓	↓	(1) qt Plastic			✓							Na, Fe, Mn
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	Cindy Spears	07/12/88	1800	JShotley	7/13/88		ANALYSES

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3444-80000 DATE WORK IN: 7/13/88 REPORT TO: TML Page 15 of 18

REQUESTED BY: ______ RECEIVED BY: J Shettle DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ______

SAMPLE IDENTIFICATION						ANALYSES REQUESTED										
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's										COMMENTS
1		TX-1	07/12/88	COLD	(2) 40ml vials	✓										#1 only
2		[redacted]	[redacted]													
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1	Craig S. Jones	07/12/88	1800	J Shettle	7/13/88		ANALYSES

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80000 DATE WORK IN: 7/13/88 REPORT TO: TML Page 16 of 18

REQUESTED BY: ______ RECEIVED BY: J Shettle DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ______

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet Hyd	Metals B								COMMENTS
1		TY-1	07/11/88	HCL	(2) 40ml vials	✓										Metals B = As, Se,
2		↓	↓	↓	(2) Qt Glass		✓									As, Hg, Cd, Cr, Pb,
3		↓	↓	HNO_3	(1) Qt Plastic			✓								Ba, Na, Fe, Mn
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	Craig Jones	07/13/88	1800	J Shettle	7/13	8:00	ANALYSES

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE – Sample Custodian PINK – Project Manager

ENVIRODYNE ENGINEERS
12161 Lackland Rd.
ST. Louis, MO 63146
(314) 434-6960

CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8000 DATE WORK IN 7/13/88 REPORT TO YML Page 17 of 18

REQUESTED BY: ______ RECEIVED BY: [signature] DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ______

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet. Hyd	Metals B								COMMENTS
1		TY-2	07/12/88	HCL	(2) 40ml vials	✓										Metals B = As, Se, Ag
2		↓	↓	↓	(2) qt Glass		✓									Hg, Cd, Cr, Pb, Ba
3		↓	↓	HNO_3	(1) qt Plastic			✓								Na, Fe, Mn
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	[signature]	07/12/88	1800	[signature]	7/13		ANALYSES

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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(314) 434-6960

CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-~~B0000~~ DATE WORK IN: 7/13/88 REPORT TO: TML Page 18 of 18

REQUESTED BY: ______ RECEIVED BY: J Shettle DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ______

SAMPLE IDENTIFICATION						ANALYSES REQUESTED										
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet H-C	Metals A								COMMENTS
1		TY-3	07/12/88	HCL	(2) 40ml vials	✓										Metals A = As, Se,
2		↓		↓	(2) Qt. Glass		✓									Ag, Hg, Cd, Cr,
3		↓	↓	HNO_3	(1) Qt. Plastic			✓								Pb, Ba
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	Craig Sforza	07/12/88	1800	J Shettle	7/13		ANALYSES

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8000 DATE WORK IN: 7-14-88 REPORT TO: TML Page 1 of 2

REQUESTED BY: Buffalo Coe RECEIVED BY: DB Humphries DATE REQUIRED: 8-13-88

SPECIAL INSTRUCTIONS: METALS (A): As, Se, Ag, Hg, Cd, Cr, Pb, Ba, Na, Fe, Mn

SAMPLE IDENTIFICATION						ANALYSES REQUESTED										
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	GCMS VOA & LBS	PET HYD	METALS (A)	METALS (B)							COMMENTS
1	88007184	TW-3	7-13-88	HCL	2x40 mL	✓										WATERS
2	↓			HNO_3	QT PL			✓								
3		↓		HCL	2x QT GL		✓									
4	7185	TG-5			2x40 mL	✓										
5				↓	2x QT GL		✓									
6	↓	↓	↓	HNO_3	QT PL			✓								↓
7	7186	TS-1	7-13-88	COLD	2x40 mL	✓										SOIL
8					250 cc		✓									METALS (B):
9	↓	↓			↓				✓							As, Se, Ag, Hg, Cd,
10	7187	TS-2			2x40 mL	✓										Cr, Pb, Ba
11					250 cc		✓									
12	↓	↓			↓				✓							
13	7188	TS-3			2x40 mL	✓										
14					250 cc AMB		✓									
15	↓	↓	↓	↓	↓				✓							↓
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
2, 6, 9, [illegible]	[illegible]	7/25	1400	M Schmid[illegible]	7/25	1400	METALS
9, 12, 15	[illegible]	7/26	1700	[illegible]	7/27	1700	[illegible]

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian, YELLOW - Records, PINK - Project Manager, GOLD - Field Copy

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(314) 434-6960

CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8000 DATE WORK IN: 7-14-88 REPORT TO: TML Page 2 of 2

REQUESTED BY: BUFFALO COE RECEIVED BY: DBHumphries DATE REQUIRED: 8-13-88

SPECIAL INSTRUCTIONS: METALS B: see pg 1

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA GLASS VOA LBS	PEST HYD	METALS B								COMMENTS
1	88007189	TS-4	7-13-88	COLD	2x40 mL	✓										
2	↓	↓	↓	↓	250 cc GL		✓									
3	↓	↓	↓	↓	↓			✓								
4	7190	TS-6	↓	↓	2x40 mL	✓										
5	↓	↓	↓	↓	250 cc AMB		✓									
6	↓	↓	↓	↓	↓			✓								
7	7191	TS-5	↓	↓	2x40 mL	✓										
8	↓	↓	↓	↓	250 cc GL		✓									
9	↓	↓	↓	↓	↓			✓								
10	7192	TX-2	↓	↓	2x40 mL	✓										WATER - TRIP BLANK
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
3,6,9	J Shatley	7/26	1400	VOID	7/26	1400	METALS
3,6,9	J Shatley	7/26	1700	[signature]	7/26	1700	Hg

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian YELLOW - Records PINK - Project Manager GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8 DATE WORK IN: ______ REPORT TO: TML Page 1 of 9

REQUESTED BY: Buffalo COE RECEIVED BY: ______ DATE REQUIRED: 8-13-88

SPECIAL INSTRUCTIONS: Truax Field - DERA

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA	Metals*	Pet. Hyd								COMMENTS
1		TG-5	7-13-88	HCl	2-40ml Vials	✓										
2		"	"	HNO_3	Qt Pl		✓									
3		"	"	HCl	2-Qt Gl			✓								*Metals: As, Se,
4																Ag, Hg, Cd, Cr,
5																Pb, Ba, Na, Fe + Mn.
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	P V. Ahl	7-13-88	1800	Fed Ex	7-13-88	1800	Shipping
1-3	Fed Ex	7/14/88	0830	D B[illegible]	7/14/88	0830	

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian, YELLOW - Records, PINK - Project Manager, GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8 DATE WORK IN: ______ REPORT TO: TML Page 2 of 9

REQUESTED BY: Buffalo COE RECEIVED BY: ______ DATE REQUIRED: 8-13-88

SPECIAL INSTRUCTIONS: DERA- Truax Fld

SAMPLE IDENTIFICATION						ANALYSES REQUESTED									
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA	Metals*	Pet. Hyd							COMMENTS
1		TS-1	7-13-88	Cold	2-40ml Vials	✓									
2		TS-1	"	"	250cc Gl		✓								2
3		TS-1	"	"	250cc Gl			✓							* Metals: As, Se, Ag
4															Cd, Cr, Pb, Ba, Hg
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-3	R.W. [illegible]	7-13-88	1800	Fed Ex	7-13-88	1800	Shipping
1-3	Fed Ex	7/14/88	0830	DB/[illegible]			

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8 DATE WORK IN: ________ REPORT TO: TML Page 3 of 9

REQUESTED BY: Buffalo COE RECEIVED BY: ________ DATE REQUIRED: 8-13-88

SPECIAL INSTRUCTIONS: DERA - Truax Fld

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA	Metals*	Pet. Hyd.								COMMENTS
1		TS-2	7-13-88	Cold	2-40ml vials	✓										
2		TS-2	"	"	250cc		✓									
3		TS-2	"	"	250cc			✓								*Metals: As, Se, Ag, Hg, Cd, Cr, Pb + Ba.
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-3	R.W. Stett	7-13-88	1800	Fed Ex	7-13-88	1800	Shipping
1-3	Fed Ex	7/14/88	0830	DB/[illegible]			

DISTRIBUTION: WHITE - Sample Custodian; YELLOW - Records; PINK - Project Manager; GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8 DATE WORK IN: ______ REPORT TO: TWL Page 4 of 9

REQUESTED BY: Buffalo COE RECEIVED BY: ______ DATE REQUIRED: 8-13-88

SPECIAL INSTRUCTIONS: DERA- Truax Fld.

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA	Metals*	Pet. Hyd.							COMMENTS
1		TS-3	8-13-88	Cold	2-40ml vial	✓	*								
2		TS-3	11	"	250 cc Gl		✓								
3		TS-3	11	11	250cc Gl			✓							*Metals: As, Se, Ag,
4															Hg, Cd, Cr, Pb, Ba,
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-3	PV Abell	7-13-88	1800	Fed Ex	7-13-88	1800	Shipping
1-3	FED Ex	7/14	0830	DBlph			

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager YELLOW - Records GOLD - Field Copy

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St. Louis, MO 63146
(314) 434-6960

CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8 DATE WORK IN: ______ REPORT TO TML Page 5 of 9

REQUESTED BY: Buffalo COE RECEIVED BY: ______ DATE REQUIRED: 8-13-88

SPECIAL INSTRUCTIONS: DERA Truax Fld

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA	Metals*	Pet. Hyd								COMMENTS
1		TS-4	7-13-88	Cold	2-40ml Vials	✓										
2		TS-4	"	"	250 cc Gl		✓									
3		TS-4	"	"	250 cc Gl			✓								*Metals: As, Se, Ag, Hg, Cd, Cr, Pb, Ba.
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-3	PW [illegible]	7-13-88	1800	Fed Ex	7-13-88	1800	Shipping
1-3	Fed Ex	7/14/88	0830	DB[illegible]			

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager YELLOW - Records GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80000 DATE WORK IN ________ REPORT TO TML Page 6 of 9

REQUESTED BY: Buffalo COE RECEIVED BY: ________ DATE REQUIRED 08/13/88

SPECIAL INSTRUCTIONS: ________

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pest Hrb	Metals A								COMMENTS
1		TW-3	07/13/88	HCL	(2) 40 ml vials	✓										Metals A = As, Se
2		↓	↓	↓	(2) qt Glass		✓									Ag, Hg, Cd, Cr, Pb, Ba
3				HNO_3	(1) qt Plastic			✓								Na, Fe & Mn <DBH 7/14/88
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-3	[signature]	07/13/88	1800	DB [signature]	7/14/88	0830	

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager
YELLOW - Records GOLD - Field Copy

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12161 Lockland Rd.
ST. Louis, MO 63146
(314) 434-6960

CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8000 DATE WORK IN: ______ REPORT TO: TML Page 7 of 9

REQUESTED BY: Buffalo COE RECEIVED BY: ______ DATE REQUIRED: 08/13/88

SPECIAL INSTRUCTIONS: ______

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet Hyd	Metals A								COMMENTS
1		TS-6	07/13/88	COLD	(2) 40ml vials	✓										Metals A = As, Se,
2		↓	↓	↓	(1) 250cc amb		✓									Ag, Hg, Cd, Cr,
3					(1) 250cc amb			✓								Pb, Ba
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-3	[signature]	07/13/88	1800				
1-3	Fed Ex	7/14	0830	[signature]			

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8 DATE WORK IN: ________ REPORT TO: TML

REQUESTED BY: Buffalo COE RECEIVED BY: ________ DATE REQUIRED: 8-13-88

SPECIAL INSTRUCTIONS: DERA - Truax Fld.

SAMPLE IDENTIFICATION						ANALYSES REQUESTED										
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA	Metals*	Pet. Hyd.								COMMENTS
1		TS-5	7-13-88	Cold	2-40ml Vials	✓										
2		TS-5	"	"	250cc Gl		✓									*Metals: As, Se,
3		TS-5	"	"	250cc Gl		✓									Ag, Hg Cd, Cr, Pb Ba
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-3	G. W. [illegible]	7-13-88	1800	Fed Ex	7-13-88	1800	Shipping
1-3	Fed Ex	7/14/88	0830	D. [illegible]			

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager
YELLOW - Office Records GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80000 DATE WORK IN: ______ REPORT TO: QML Page 9 of 9

REQUESTED BY: B. Rob Cote RECEIVED BY: ______ DATE REQUIRED: 08/13/88

SPECIAL INSTRUCTIONS: ______

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's									COMMENTS
1		TX-2	07/13/88	COLD	(2) 40ml vials	✓									Trip Blank
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1	Craig S. [illegible]	07/13/88	1800				
1	FED EX	7/14	0830	D.B. [illegible]	7/14	0830	

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager [illegible] GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80017 DATE WORK IN: 7/15/88 REPORT TO: TMI Page 1 of 2

REQUESTED BY: DERA RECEIVED BY: J Shetty DATE REQUIRED: 8/15/88

SPECIAL INSTRUCTIONS: (B) AS, SE, Ag, Hg, CD, CR, Pb, BA, NA, FE (WATERS)
MN * GCMS VOA + LBS

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	* VOAS	PET HYD	METALS (B)								COMMENTS
1	88007258	TG-9	7-14-88	Hcl	2x40Ml	X										
2	↓		↓	↓	2xQTgl		X									
3	↓		↓	HNO3	QT Pl			X								
4	7259	TG-10	↓	Hcl	2x40Ml	X										
5	↓	↓	↓	↓	2xQTgl		X									
6	↓	↓	↓	HNO3	QT Pl			X								
7	7260	TG-11	↓	Hcl	2x40Ml	X										
8	↓	↓	↓	↓	2xQTgl		X									
9	↓	↓	↓	HNO3	QT Pl			X								
10	7261	TG-12	↓	Hcl	2x40Ml	X										
11	↓	↓	↓	↓	2xQTgl		X									
12	↓	↓	↓	HNO3	QT Pl			X								
13	7262	TG-13	↓	Hcl	2x40Ml	X										
14	↓	↓	↓	↓	2xQTgl		X									
15	↓	↓	↓	HNO3	QT Pl			X								
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
3, 6, 9, 12, 15	J Shetty	7/26	1400	M. Schneider	7/26	1400	METALS

ROUTING
- ☐ GC
- ☑ GCMS ☑ GCMS MGR
- ☐ ORG PREP
- ☑ ORG LAB MGR
- ☑ INORG LAB MGR
- ☑ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80017 DATE WORK IN: 7/15/88 REPORT TO: TML Page 2 of 2

REQUESTED BY: DEBA RECEIVED BY: J Shetley DATE REQUIRED: 8/15/88

SPECIAL INSTRUCTIONS: (B) - SEE pg 1
* GCMS + LBS

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	* VOAS	PET HYD	METALS (B)								COMMENTS
1	88007263	TG-14	7-14-88	Hcl	2x40Ml	X										
2	↓	↓	↓	↓	2xQTGl		X									
3				HNO3	QT Pl			X								
4	7264	TX-3		COLD	2x40Ml	X										
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
3	J Shetley	7/26	1400	M Schmale	7/26	1400	METALS

ROUTING
- ☐ GC
- ☑ GCMS ☑ GCMS MGR
- ☐ ORG PREP
- ☑ ORG LAB MGR
- ☑ INORG LAB MGR
- ☑ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian, YELLOW - Records, PINK - Project Manager, GOLD - Field Copy

DISTRIBUTION: WHITE - Sample Custodian, YELLOW - Records, PINK - Project Manager, GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8000 DATE WORK IN: 7/15/88 REPORT TO: TML Page 1 of 7

REQUESTED BY: Buffalo COE RECEIVED BY: J Shetley DATE REQUIRED: 08/14/88

SPECIAL INSTRUCTIONS:

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet Hyd	Metals B							COMMENTS
1		TG-9	07/14/88	HCL	(2) 40ml vials	✓									Metals B = As, Se, Ag
2		↓	↓	↓	(2) Qt Glass		✓								Hg, Cd, Cr, Pb, Ba, Na
3				HNO_3	(1) Qt Plastic			✓							Fe, Mn
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-3	Craig S. Jones	07/14/88	1900	J Shetley	7/14/88	—	ANALYSES

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80000 DATE WORK IN: 7/15/88 REPORT TO: TML Page 2 of 7

REQUESTED BY: Buffalo COE RECEIVED BY: J Shetley DATE REQUIRED: 08/14/88

SPECIAL INSTRUCTIONS:

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet Hyd	Metals B								COMMENTS
1		TG-10	07/14/88	HCL	(2) 40ml vials	✓										Metals B = As, Se, Ag,
2		↓	↓	↓	(2) Qt Glass		✓									Hg, Cd, Cr, Pb, Ba, Na,
3		↓	↓	HNO_3	(1) Qt Plastic			✓								Fe, Mn
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-3	Cindy Jones	07/14/88	1900	J Shetley	7/15/88	800	ANALYSES

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager
YELLOW - Records GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80000 DATE WORK IN 7/15/88 REPORT TO TML Page 3 of 7

REQUESTED BY: Buffalo COE RECEIVED BY: J Shelley DATE REQUIRED 08/14/88

SPECIAL INSTRUCTIONS:

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet. Hyd.	Metals B								COMMENTS
1		TG-11	07/14/88	HCL	(2) 40ml vials	✓										Metals B = As, Se, Ag,
2		↓	↓	↓	(2) Qt Glass		✓									Hg, Cd, Cr, Pb, Ba, Na,
3		↓	↓	HNO3	(1) Qt Plastic			✓								Fe, Mn
4																
5																
6																
7																
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9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-3	Craig S[illegible]	07/14/88	1900	J Shelley	7/15/88	800	ANALYSES

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager
YELLOW - Records GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80000 DATE WORK IN: 7/15/88 REPORT TO: TML

REQUESTED BY: Buffalo COE RECEIVED BY: J Shetley DATE REQUIRED: 08/14/88

SPECIAL INSTRUCTIONS:

SAMPLE IDENTIFICATION						ANALYSES REQUESTED										
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet Hyd	Metals (B)								COMMENTS
1		TG-12	07/14/88	HCL	(2) 40ml vials	✓										Metals^{B} = As, Se, Ag,
2		↓	↓	↓	(2) Qt Glass		✓									Hg, Cd, Cr, Pb, Ba, Na,
3		↓	↓	HNO_3	(1) Qt Plastic			✓								Fe, Mn
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-3	Craig Sfres	07/14/88	1900	J Shetley	7/15/88	800	ANALYSES

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager
YELLOW - Records GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80000 DATE WORK IN: 7/15/88 REPORT TO: TML Page 5 of 7

REQUESTED BY: Buffalo COE RECEIVED BY: J Shetley DATE REQUIRED: 08/14/88

SPECIAL INSTRUCTIONS:

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet Hyd	Metals B								COMMENTS
1		TG-13	07/14/88	HCL	(2) 40ml vials	✓										Metals B = As, Se, Ag
2		↓	↓	↓	(2) Qt Glass		✓									Hg, Cd, Cr, Pb, Ba, Na,
3		↓	↓	HNO3	(1) Qt Plastic			✓								Fe, Mn
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-3	Craig S Jones	07/14/88	1900	J Shetley	7/15/88	800	ANALYSES

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager YELLOW - Records GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80000 DATE WORK IN: 7/15/88 REPORT TO: TML Page 6 of 7

REQUESTED BY: Buffalo COE RECEIVED BY: JShetley DATE REQUIRED: 08/14/88

SPECIAL INSTRUCTIONS:

SAMPLE IDENTIFICATION						ANALYSES REQUESTED										
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Pet Hyd	Metals B								COMMENTS
1		TG-14	07/14/88	HCL	(2) 40ml vials	✓										Metals B = As, Se, Ag,
2		↓	↓	↓	(2) Qt Glass		✓									Hg, Cd, Cr, Pb, Ba, Na,
3		↓	↓	HNO_3	(1) Qt Plastic			✓								Fe, Mn
4																
5																
6																
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11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-3	[signature]	07/14/88	1900	JShetley	7/15/88	800	ANALYSES

DISTRIBUTION: WHITE - Sample Custodian YELLOW - Records PINK - Project Manager GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8000D DATE WORK IN: 7/15/88 REPORT TO: TML Page 7 of 7

REQUESTED BY: Buffalo COE RECEIVED BY: J Shutley DATE REQUIRED: 08/14/88

SPECIAL INSTRUCTIONS:

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's										COMMENTS
1		TX-3	07/14/88	COLD	(2) 40ml vials	✓										
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1	Craig Jones	07/14/88	1900	J Shutley	7/15/88	8:00	ANALYSES

DISTRIBUTION: WHITE - Sample Custodian; YELLOW - Records; PINK - Project Manager; GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8 DATE WORK IN: 07/21/88 REPORT TO: TML Page 1 of 1

REQUESTED BY: Buffalo COE RECEIVED BY: DBlyph DATE REQUIRED: 08/21/88

SPECIAL INSTRUCTIONS: (SOIL)

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	Metals^A	Petroleum Hydrocarbons									COMMENTS
1	88007699	TS-10	06/01/88	COLD	(1) 40ml vial	✓										Metals^A = Hg, As, Se,
2	↓	TS-10	06/01/88	COLD	(1) 250cc amb		✓									Ba, CD, Cr, Pb, Ag
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-2	[illegible]	07/21/88	1030	DBlyph	7/21/88	1030	ANALYSES
~~1~~	[illegible]	7/26	1400		7/26	1400	~~METALS~~ VOID
1	DBlyph	8/1/88	1600	[illegible]			METALS

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80007 DATE WORK IN: 7/13/88 REPORT TO: TML Page 1 of 4

REQUESTED BY: DEBA RECEIVED BY: J Shetley DATE REQUIRED: 8/13/88

SPECIAL INSTRUCTIONS: METALS (A) AS, SE, Ag, Hg, CD, CR, Pb, BA (1) = VOA GCMS + VCALBS

SAMPLE IDENTIFICATION

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA GCMS (1)	PET HYD	METALS (A)	COMMENTS
1	88007104	TS-7	7/12/88	COLD	2oz gl	X			Soils
2		↓	↓	↓	250cc AMB		X		↓
3					↓			X	
4	88007105	TS-8			2oz gl	X			
5		↓			250cc AMB		X		
6					↓			X	
7	88007106	TS-9			2oz gl	X			
8		↓			250cc AMB		X		
9					↓			X	
10	88007107	TS-11			2oz gl	X			
11		↓			250cc AMB		X		
12					↓			X	
13	88007108	TS-12			2oz gl	X			
14		↓			250cc AMB		X		
15			↓	↓	↓			X	↓
16									

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
~~TS-9~~ 1,4,7,10,13	J Shetley	7/26	1100	DRN	7/26	1100	VOA
3,6,9,12,15	J Shetley	7/25/88	1430	VOID	7/25/88	1430	METALS
3,6,9,12,15	J Shetley	7/26	1700	[signature]	7/26	1700	Hg

ROUTING

- ☐ GC
- ☑ GCMS ☑ GCMS MGR
- ☐ ORG PREP
- ☑ ORG LAB MGR
- ☑ INORG LAB MGR
- ☑ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager
YELLOW - Records GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80017 DATE WORK IN: 7/13/88 REPORT TO: TMI Page 2 of 4

REQUESTED BY: DERA RECEIVED BY: J Shelley DATE REQUIRED: 8/13/88

SPECIAL INSTRUCTIONS: METALS (A) - SEE pg 1 (4) = VOA GCMS + VOA LBS

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA GCMS(4)	PET HYD	METALS(A)								COMMENTS
1	88007109	TS-13	7/12/88	COLD	2oz gl	X										SOIL
2		↓		↓	250cc AMB		X									↓
3					↓			X								
4	88007110	TW-1		Hcl	2x40ml	X										WATER
5		~~↓~~		↓	~~2xQT w/M~~		X									DeLete } DBA 7/18/88
6		~~↓~~		~~HNO3~~	~~1xQT Pl~~			X								↓ now "7313"
7	88007111	TW-2		Hcl	2x40ml	X										
8		↓		↓	2xQT w/M		X									
9				HNO3	1xQT Pl			X								
10	88007112	TW-4		Hcl	2x40ml	X										
11		↓		↓	2xQT w/M		X									
12				HNO3	1xQT Pl			X								
13	88007113	TW-5		Hcl	2x40ml	X										
14		~~↓~~		↓	~~2xQT w/M~~		X									DeLete } DBA 7/18/88
15		~~↓~~	↓	~~HNO3~~	~~1xQT Pl~~			X								↓ now "7314"
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1,4,7,10,13	J Shelley	7/26	1100	DRN	7/26	1100	VOA's
8,9,12	J Shelley	7/25/88	1400	M. Schwab	7/25/88	1400	METALS
3	J Shelley	7/26	1700	A Smyl	7/26	1700	[illegible]

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager YELLOW - Records GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80017 DATE WORK IN: 7/13/88 REPORT TO: TMI

REQUESTED BY: DERA RECEIVED BY: J Shetley DATE REQUIRED: 8/13/88

SPECIAL INSTRUCTIONS: METALS (A) - SEE pg 1 (1) = VOA GCMS + VOA LBS
METALS (B) - [redacted] AS, SE, Ag, Hg, CD, CR, Pb, BA, NA, FE, MN

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOAs GCMS (1)	PET HYD	METALS (A)	METALS (B)	COMMENTS	
1	88007114	TY-3	7/12/88	Hcl	2x40ml	X					WATER
2		↓	↓	↓	2xQTgl		X				
3				HNO3	QTPl			X			
4	88007115	TG-1	7/11/88	Hcl	2x40ml	X					
5		~~↓~~	↓	~~↓~~	~~2xQTgl~~		X			Delete } DBW	7/18/88
6		~~↓~~		~~HNO3~~	~~QTPl~~				X	↓ } NOW	"7312"
7	88007116	TG-2		Hcl	2x40ml	X					
8		~~↓~~		~~↓~~	~~2xQTgl~~		X			Delete } DBW 7/18/88	
9		~~↓~~	↓	~~HNO3~~	~~QTPl~~				X	↓ } NOW "7311"	
10	88007117	TG-3 *	7-12-88	Hcl	2x40ml	X				* NOTE - THIS SAMPLE MAY	
11		↓		↓	2xQTgl		X			BE VERY CONT-	
12				HNO3	QTPl				X	AMINATED W/	
13	88007118	TG-16		Hcl	2x40ml	X				SOLVENTS. IT	
14		~~↓~~		~~↓~~	~~2xQTgl~~		X			HAS A VERY STRONG	
15		~~↓~~	↓	~~HNO3~~	~~QTPl~~				X	SWEET SOLVENT	↓
16		Delete 7/18/88 DBW now	"7315"							ODOR.	

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1,4,7,10,13	J Shetley	7/26	1100	DRN	7/26	1100	VOAs
3,12	J Shetley	7/25	1400	M. Schneider	7/25	1400	METALS

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian, YELLOW - Records, PINK - Project Manager, GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-80007 DATE WORK IN: 7/13/88 REPORT TO: TML Page 4 of 4

REQUESTED BY: DERA RECEIVED BY: J Shetley DATE REQUIRED: 8/13/88

SPECIAL INSTRUCTIONS: METALS (B) - SEE PG 3
1 = VOA GCMS + VOA LABS

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOAS GCMS (1)	PET HYD	METALS(B)							COMMENTS
1	88007119	TY-1	7/11/88	Hcl	2x40ml	X									WATER
2	↓	↓	↓	↓	2xQTgl		X								↓
3	↓	↓	↓	HNO3	QT Pl			X							↓
4	88007120	TY-2	7-12-88	Hcl	2x40ml	X									↓
5	↓	↓	↓	↓	2xQTgl		X								↓
6	↓	↓	↓	HNO3	QT Pl			X							↓
7	88007121	TX-1	↓	cold	2x40ml	X									↓
8															
9															
10															
11															
12															
13															
14															
15															
16															

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1,4,7	J Shetley	7/26	1100	DRN	7/26	1100	VOAs
3,6	J Shetley	7/26	1400	M. Schrader	7/26	1400	METALS

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian; YELLOW - Records; PINK - Project Manager; GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

18

PROJECT NUMBER: 3144-80000 DATE WORK IN 7/13/88 REPORT TO TML Page 1 of [illegible]

REQUESTED BY: ________ RECEIVED BY: J Shelley DATE REQUIRED: 08/12/88

SPECIAL INSTRUCTIONS: ________

SAMPLE IDENTIFICATION						ANALYSES REQUESTED											
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA's	Petroleum Hydrocarbons	Metals A								COMMENTS
1		TS-7	07/12/88	Cold	2oz glass	✓										Metals A = As, Se, Ag
2		TS-7	07/12/88	cold	250cc amber		✓									Hg, Cd, Cr, Pb, Ba
3		TS-7	07/12/88	cold	↓			✓								
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	[signature]	07/12/88	1800	J Shelley	7/13/88	800	ANALYSES

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8 DATE WORK IN: ______ REPORT TO: T&L Page 3 of 3

REQUESTED BY: Buffalo COE RECEIVED BY: ______ DATE REQUIRED: ______

SPECIAL INSTRUCTIONS: Truax Fld

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	Pest Hyd	Metals (a)	Metals (b)								COMMENTS
1		TW-1	7-15-88	HCl	2-Qt Gl	✓										Resample
2		TW-1		HNO_3	Qt Pl		✓									Resample
3		TW-5		HCl	2-Qt Gl	✓										"
4		TW-5		HNO_3	Qt Pl		✓									"
5		~~D~~ TG-16		HCl	2-Qt Gl	✓										"
6		TG-16		HNO_3	Qt Pl		~~B~~	✓								"
7																Metals (a): As, Se
8																Ag, Hg, Cd, Cr,
9																Pb, Ba
10																
11																Metals (b): As,
12																Se, Ag, Hg, Cd,
13																Cr, PB, Ba, Na,
14																Fe Mn.
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1-6	B.L. Shelley	7-15-88	1800	Fed Ex	7-15-88	1800	Shipping
1-6	Fed Ex	7/16/88	0750	[signature]	7/16/88	0750	

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager YELLOW - Office Records GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-800017 DATE WORK IN: 7-16-88 REPORT TO: TML Page 1 of 1

REQUESTED BY: BUFFALO COE RECEIVED BY: DBHumphries DATE REQUIRED: 8-15-88

SPECIAL INSTRUCTIONS: METALS B: As, Se, Ag, Hg, Cd, Cr, Pb, Ba, Na, Fe, MN
METALS A: As, Se, Ag, Hg, Cd, Cr, Pb, Ba

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	METALS B	PET HYD	METALS A	COMMENTS
1	88007311	TG-2 Resample	7-15-88	HCL	2xQT GL		✓		
2	↓	↓ ↓	↓	HNO3	QT PL	✓			
3	7312	TG-1 Resample		HCL	2xQT GL		✓		
4	↓	↓		HNO3	QT PL	✓			
5	7313	TW-1		HCL	2xQT GL		✓		
6	↓	↓		HNO3	QT PL			✓	
7	7314	TW-5		HCL	2xQT GL		✓		
8	↓	↓		HNO3	QT PL			✓	
9	7315	TW-16 TG-16A	↓	HCL	2xQT GL		✓		
10	↓	↓ ↓	↓	HNO3	QT PL	✓			
11									
12									
13									
14									
15									
16									

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
2,4,6,8,10	[signature]	7/26/88	1400	M. Schneider	7/26/88	1900	METALS

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE – Sample Custodian PINK – Project Manager YELLOW – Records GOLD – Field Copy

APPENDIX H

RESULTS OF CHEMICAL ANALYSES

Analytical Results

Contamination Evaluation

Truax Field
Madison, Wisconsin

Contract DACA-49-87-D-0003
Delivery No. 9

Prepared for:
U.S. Army Corps of Engineers
Buffalo District
Buffalo, New York

October, 1988

ENVIRODYNE ENGINEERS

12161 Lackland Road St. Louis, Mo 63146
(314)434-6960

ENVIRODYNE
ENGINEERS

12161 Lackland Road
St. Louis, Missouri 63146
314/434-6960

November 2, 1988
3144-90019

Mr. Steve Yaksich
Chief, Water Quality Section
Department of the Army
Buffalo District, Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207-3199

Re: Contract Number DACA 49-87-D-0003
Delivery Order Number 9
Results of Laboratory Analyses
Truax Field
Madison, Wisconsin

Dear Mr. Yaksich,

Enclosed are the results of all laboratory analyses of field samples and QA/QC samples for the subject Delivery Order. We are awaiting the QA/QC laboratory results from the Missouri River Division for inclusions into the Final Engineering Report.

If you have any questions or comments, please call me at (314) 434-6960.

Sincerely,

Albert P. Becker III

Albert P. Becker III
Chemical Engineer

TML/mab/367
Enclosure

cc: HNDED-PM
CE MRD-ED-GC

INORGANIC DATA SUMMARY

TABLE 4-8

SUMMARY OF METAL AND PETROLEUM HYDROCARBON ANALYSIS
SURFACE WATER AND GROUNDWATER
TRUAX FIELD
MADISON, WISCONSIN

SITE ID	SITE DESCRIPTION	SAMPLE NUMBER	UNITS	AG	AS	BA	CD	CR	FE	HG	MN	NA	PB	SE	PETRO HYDRO
SURFACE WATER SAMPLES:															
TW-1	CREEK EAST OF BURN PIT	7313	UG/L	< 1.4	< 3.4	39	< 2.0	< 4	NR	< 0.2	NR	NR	15	< 2	< 1
TW-2	BURKE WWTP LAGOON #4	7111	UG/L	< 1.4	< 3.4	93	< 2	< 4	NR	< 0.2	NR	NR	< 10	< 2	< 1
TW-3	STANDING WATER IN BURN PIT	7184	UG/L	3.80	42.8	104	< 2	38	NR	< 0.2	NR	NR	112	< 2	2
TW-4	BURKE WWTP OUTFALL TO DITCH	7112	UG/L	< 1.4	< 3.4	22	< 2	< 4	NR	< 0.2	NR	NR	13	< 2	65
TW-5	BLIND DUPLICATE OF TW-1	7314	UG/L	< 1.4	< 3.4	35	< 2	< 4	NR	< 0.2	NR	NR	< 10	< 2	< 1
				< 1.4	< 3.4	34	< 2	< 4					< 10	< 2	
GROUNDWATER SAMPLES:															
TG-1	DOWNGRADIENT OF LANDFILL	7312	UG/L	< 1.4	6.9	430	3	21	108,000	0.22	5320	87,800	30	< 2	< 1
TG-2	DOWNGRAD. OF BURKE WWTP	7311	UG/L	< 1.4	11.6	793	7	94	39,600	0.22	4210	19200	124	< 2	< 1
TG-3	BURN PIT	7117	UG/L	< 1.4	6.9	270	< 2	35	37,400	0.23	1360	13,200	24	< 2	7
										0.21					
TG-5	WELL 2008	7185	UG/L	< 1.4	8.9	35	< 2	< 4	2310	< 0.2	103	50,200	10	< 2	< 1
TG-9	WELL 152	7258	UG/L	4.62	< 3.4	222	12	302	405,000	0.98	3260	17,800	333	< 2	85
TG-10	WELL 104	7259	UG/L	< 1.4	12.9	249	5	178	48,700	< 0.2	1600	21,200	157	< 2	< 1

TABLE 4-8

SUMMARY OF METAL AND PETROLEUM HYDROCARBON ANALYSIS
SURFACE WATER AND GROUNDWATER
TRUAX FIELD
MADISON, WISCONSIN

SITE ID	SITE DESCRIPTION	SAMPLE NUMBER	UNITS	AG	AS	BA	CD	CR	FE	HG	MN	NA	PB	SE	PETRO HYDRO
TG-11	WELL 101	7260	UG/L	< 1.4	7.1	58	4	29	46,500	2.0	912	50,600	62	< 2	< 1
TG-12	MADISON WELL NO. 7	7261	UG/L	< 1.4	< 3.4	32	< 2	<4	272	< 0.2	24	4570	< 10	< 2	< 1
TG-13	OSCAR MAYER WELL NO. 3	7262	UG/L	< 1.4	< 3.4	40	< 2	<4	894	0.21	94	17,000	< 10	< 2	< 1
TG-14	OSCAR MAYER WELL NO. 5	7263	UG/L	< 1.4	< 3.4	30	< 2	<4	196	0.33	54	31,600	< 10	< 2	< 1
TG-15	WELL CONSTRUCTION WATER	6028	UG/L	< 1.4	< 3.4	29	6	<4	733	0.38	36	13,200	43	< 2	< 1
				< 1.4		32	7	<4	783		40	12,900	48	< 2	
TG-16A	BLIND DUPLICATE OF TG-1	7315	UG/L	3.67	< 3.4	394	9	55	61,300	0.22	5480	91,600	83	< 2	< 1
ADDITIONAL SAMPLES:															
TY-1	GROUNDWATER SAMP. BLANK	7119	UG/L	< 1.4	< 3.4	< 4	< 2	< 4	17	< 0.2	< 2.0	162	< 10	< 2	< 1
									(5)			(110)			
TY-2	SURFACE WATER SAMPLING	7120	UG/L	< 1.4	< 3.4	< 4	< 2	< 4	NR	0.26	NR	NR	< 10	< 2	< 1
	BLANK									< 0.2					
TY-3	SOIL RINSATE	7114	UG/L	< 1.4	< 3.4	< 4	< 2	< 4	NR	0.26	NR	NR	< 10	< 2	< 1

NOTES: NR = NOT REQUESTED
* = ALL RESULTS FOR PETROLEUM HYDROCARBONS ARE IN PPM (MG/L FOR LIQUIDS AND UG/G FOR SOILS)

TABLE H-2

POST DIGESTION (BENCH) SPIKE RECOVERY RESULTS
TRUAX FIELD
MADISON, WISCONSIN

ANALYTE	SITE ID	SAMPLE NUMBER	SAMPLE RESULT (SR)	SPIKE ADDED (SA)	SPIKE SAMPLE RESULT (SSR)	PERCENT RECOVERY (PR)
AG	TG-15	6028	0.1	5	4.2	82
	TS-10	7699	- 0.25	10	10.60	106
	TS-9	7106	< 0.14	5	6.46	129
	TW-16	7314	- 0.23	5	4.60	92
AS	TS-10	7699	16.76	20.0	34.03	86
	TS-7	7104	2909	10.0	37.93	88
	TS-6	7191	20.69	20.0	36.3	78
	TY-2	7120	- 1.0	20.0	18.8	94
BA	TG-15	6028	0.291	2.5	3.174	115
	TW-2	7111	0.934	1.0	1.866	93
CD	TG-15	6028	0.006	0.200	0.214	104
	TY-2	7120	0.000	0.10	0.009	90
CR	TG-15	6028	0.006	1.0	1.047	104
	TW-2	7111	0.016	0.1	0.101	85
HG	TG-11	7260	0.2	1.0	0.8	60
	TG-3	7117	0.23	1.0	1.0	77
MN	TG-15	6028	0.359	1.0	1.393	103
NA	TG-12	7261	45.67	10	55.36	97
PB	TG-15	6028	0.434	1	1.511	108
	TW-2	7111	0.016	0.2	0.151	68
	TY-1	7119	0.000	0.5	0.365	73
SE	TW-1	7313	0.52	10	9.41	89
	TS-10	7699	2.40	10	11.10	87
	TS-9	7106	4.0	10	7.9	39
	TY-3	7114	- 0.74	10	10.31	103

TABLE 4-10

SUMMARY OF METAL AND PETROLEUM HYDROCARBON ANALYSIS
IN SOIL SAMPLES
TRUAX FIELD
MADISON, WISCONSIN

SITE ID	SITE DESCRIPTION	SAMPLE NUMBER	UNITS	AG	AS	BA	CD	CR	FE	HG	MN	NA	PB	SE	PETRO HYDRO
SOIL SAMPLES:															
TS-1	BURN PIT	7186	UG/G	< 0.16	3.7	111	< 2.0	12.4	NR	1.15	NR	NR	20.4	< 0.24	2300
TS-2	BURN PIT	7187	UG/G	< 0.18	3.5	96	< 2.0	14.3	NR	1.35	NR	NR	46.2	< 0.26	8200
TS-3	JP4 FUEL STORAGE AREA	7188	UG/G	< 0.14	3.8	18	< 2.0	15.9	NR	1.12	NR	NR	2000	< 0.21	550
				< 0.14	3.0									< 0.21	
TS-4	JP4 FUEL STORAGE AREA	7189	UG/G	< 0.30	59.1	77	2.4	12.5	NR	2.4	NR	NR	2631	< 0.45	13000
TS-5	JP4 FUEL STORAGE AREA (DRUM STORAGE AREA)	7191	UG/G	< 0.17	12.2	76	11.7	92.1	NR	1.42	NR	NR	718	< 0.25	600
TS-6	BACKGROUND, 100 YARDS NORTH OF BURN PIT	7190	UG/G	< 0.15	4.3	90	< 2.0	11.2	NR	1.22	NR	NR	13.2	< 0.22	< 50
TS-7	SLUDGE DRYING BEDS	7104	UG/G	0.17	3.1	60	< 2.0	5.3	NR	1.29	NR	NR	8.8	< 0.23	< 50
TS-8	SLUDGE DRYING BEDS	7105	UG/G	< 0.15	1.7	60	< 2.0	6.1	NR	1.21	NR	NR	7.4	< 0.23	< 50
				< 0.15	1.8									< 0.23	
TS-9	SLUDGE DRYING BEDS	7106	UG/G	< 0.27	15.4	190	< 2.0	7.3	NR	0.84	NR	NR	38.0	0.77	90
TS-10	BURN PIT BOREHOLE	7699	UG/G	< 0.22	1.9	23.2	< 2.0	5.2	NR	1.12	NR	NR	< 7.5	0.27	< 50
				< 0.22	1.3	23.8	< 2.0	4.4					< 7.5	0.13	
TS-11	BURKE WWTP, DISCHARGE TO DITCH	7107	UG/G	1.14	12.2	164	3.6	34.7	NR	6.0	NR	NR	900	< 0.68	5500
TS-12	BURKE WWTP DECANT POND	7108	UG/G	1.40	9.8	83	2.3	14.9	NR	2.29	NR	NR	56.9	< 0.27	4200
TS-13	DUPLICATE OF TS-7	7109	UG/G	0.18	1.6	57	< 2.0	4.5	NR	1.0	NR	NR	< 5.7	< 0.23	< 50

NOTES: NR = NOT REQUESTED

* = ALL RESULTS FOR PETROLEUM HYDROCARBONS ARE IN PPM

(UG/L FOR LIQUIDS AND UG/G FOR SOILS)

ORGANIC DATA

Note:

The compound referred to as 1,2-trans-dichloroethylene should be 1,2-dichloroethylene.

TABLE 4-9

SUMMARY OF VOLATILE ORGANICS FOUND ABOVE MINIUMUM
DETECTION LIMITS IN WATER SAMPLES
TRUAX FIELD
MADISON, WISCONSIN

SITE ID	SITE DESCRIPTION	ANALYSIS DATE	SAMPLE NUMBER	UNITS	METHYL-ENE CHLOR-IDE	BEN-ZENE	TOLU-ENE	1,2-TRANS-DICHLOR-ETHYLENE	THIO-BIS-METH-ANE	TETRA-CHLORO-ETHYLENE	TRI-CHLORO-FLUORO-METHANE	DI-CHLORO-FLUORO-METHANE	ETHYL BEN-ZENE	CHLORO-BENZENE	CHLORO-ETHANE	TRI-CHLORO-ETHYLENE	VINYL CHLOR-IDE	ACE-TONE	2-BUT-ANONE	TETRA-HYDRO-FURAN	OTHER COM-POUNDS	UN-KNOWN
SURFACE WATER SAMPLES:																						
TW-1	CREEK EAST OF BURN PIT	7/27/88	7110	UG/L																		
TW-2	BURKE WWTP LAGOON #4	7/26/88	7111	UG/L																		
TW-3	STANDING WATER IN BURN PIT AREA	7/28/88	7184	UG/L	11.6	1.3	1.2	9.6	27.0	11.5												
TW-4	BURKE WWTP OUTFALL TO DITCH	7/26/88	7112	UG/L						3.2												
TW-5	BLIND DUPLICATE OF TW-1	7/26/88	7113	UG/L																		
GROUNDWATER SAMPLES:																						
TG-1	DOWNGRADIENT OF LANDFILL	7/26/88	7115	UG/L																		
TG-2	DOWNGRAD. OF BURKE WWTP	7/26/88	7116	UG/L																		
TG-3	BURN PIT	7/27/88	7117	UG/L	52.8		223.2														(1)	
TG-5	WELL 200S	7/28/88	7185	UG/L																		
TG-9	WELL 152	7/29/88	7258	UG/L				1.5			9.7	9.0										
TG-10	WELL 104	7/28/88	7259	UG/L				27.6						1.2	9.1	3.9						
TG-11	WELL 101	7/28/88	7260	UG/L													16.7					
TG-12	MADISON WELL NO. 7	7/28/88	7261	UG/L																		
TG-13	OSCAR MAYER WELL NO. 3	7/28/88	7262	UG/L							10.0					11.0						
TG-14	OSCAR MAYER WELL NO. 5	7/28/88	7263	UG/L						8.8						2.2						
TG-15	WELL CONSTRUCTION WATER	6/15/88	6028	UG/L	5.2													5.0	48.0	23.0		
TG-16	BLIND DUPLICATE OF TG-3	7/27/88	7118	UG/L	55.7		452.4						33.4								(2)	
ADDITIONAL SAMPLES:																						
TY-1	GROUNDWATER SAMP. BLANK	7/26/88	7119	UG/L																		
TY-2	SURFACE WATER SAMPLING BLANK	7/26/88	7120	UG/L																	(3) (4)	

TABLE 4-9

SUMMARY OF VOLATILE ORGANICS FOUND ABOVE MINIMUM DETECTION LIMITS IN WATER SAMPLES
TRUAX FIELD
MADISON, WISCONSIN

SITE ID	SITE DESCRIPTION	ANALYSIS DATE	SAMPLE NUMBER	UNITS	METHYLENE CHLORIDE	BENZENE	TOLUENE	1,2-TRANS-DICHLOROETHYLENE	THIO-BIS-METHANE	TETRACHLOROETHYLENE	TRICHLOROFLUOROMETHANE	DICHLOROFLUOROMETHANE	ETHYL BENZENE	CHLOROBENZENE	CHLOROETHANE	TRICHLOROETHYLENE	VINYL CHLORIDE	ACETONE	2-BUTANONE	TETRAHYDROFURAN	OTHER COMPOUNDS	UNKNOWN
TRAVEL BLANKS:																						
TX-1	TRAVEL BLANK	7/26/88	7121	UG/L																		
TX-2	TRAVEL BLANK	7/29/88	7192	UG/L																		
TX-3	TRAVEL BLANK	7/28/88	7264	UG/L	1334.9																	
VOA BLANKS:																						
	VOA BLANK	6/15/88		UG/L	11.6													27.4				
	VOA BLANK	7/26/88		UG/L	6.0																(5)	
	VOA BLANK	7/26/88		UG/L																		
	VOA BLANK	7/26/88		UG/L																		
	VOA BLANK	7/28/88		UG/L	26.9																	
	VOA BLANK	7/28/88		UG/L																	(6)	
	VOA BLANK	7/28/88		UG/L	11.1																	

good work

NOTES:

(1) The following additional compounds were found in TG-3:

Two Unknowns (76 ug/l and 90 ug/l)
C6H12 hydrocarbon (194 ug/l)
Cylohexane (80 ug/l)
Xylene Isomers (500, 205 ug/l)

Four Ethyl-Methyl Benzene Isomers
(103, 33, 137, 38 ug/l)

Two Methyl (methylethyl, benzene isomers)_
(8.7 ug/l)

Two Tetra Methyl Benzene Isomers (6.5 ug/l)

(2) The following additional compounds were found in TG-16:

Xylene Isomer 501 ug/l
Xylene Isomer 204 ug/l
Ethyl Methyl Benzene Isomer 113 ug/l

(3) Chloroform was found in TY-1 at 5.2 ug/l

(4) Chloroform was found in TY-2 at 5.5 ug/l

(5) Acrylonitrile was found in the lab blank analyzed 6/15/88 at 14.6 ug/l.

(6) 1,1,1-trichloroethane found in the lab blank analyzed on 7/28/88 at 1.3 ug/l.

TABLE 4-11

SUMMARY OF VOLATILE ORGANICS FOUND ABOVE MINIMUM
DETECTION LIMITS IN SOIL SAMPLES
TRUAX FIELD
MADISON, WISCONSIN

SITE ID	SITE DESCRIPTION	ANALYSIS DATE	SAMPLE NUMBER	UNITS	METHYL-ENE CHLOR-IDE	TOLU-ENE	TRI-CHLORO-ETHANE	HEX-ANE	UN-KNOWN #1	TRI-CHLORO-FLUORO-METHANE	BEN-ZENE	XY-LENE	DI CHLORO-DIFLUORO-METHANE	UN-KNOWN #2	UN-KNOWN #3	UN-KNOWN #4	OTHER CHEM-ICALS
SOIL SAMPLES:																	
TS-1	BURN PIT	7/28/88	7186	UG/KG	76.3	1.3	4.2	10.4									
TS-2	BURN PIT	7/28/88	7187	UG/KG	41.7	2.2	6.7		13.1								
TS-3	JP4 FUEL STORAGE AREA	7/28/88	7188	UG/KG	17.9	1.1	1.9	15.0									
TS-4	JP4 FUEL STORAGE AREA	7/28/88	7189	UG/KG	157.0	4.1	4.5	15.1	10.8	26.0							
	RERUN	7/28/88	7189	UG/KG	226.4	5.0	8.3	15.1		27.3							
TS-5	JP4 FUEL STORAGE AREA	7/30/88	7191	UG/KG	19.9	1.3			4.7	12.6	1.6	1.5	308	11.8	11.8	7.1	
	(DRUM STORAGE AREA)	7/28/88	7191	UG/KG	87.8		2.1	5.9									
TS-6	BACKGROUND, 100 YARDS NORTH OF BURN PIT	7/28/88	7190	UG/KG	58.8		1.6	5.2									
TS-7	SLUDGE DRYING BEDS	7/25/88	7104	UG/KG	31.9												
TS-8	SLUDGE DRYING BEDS	8/1/88	7105	UG/KG	93.9	7.4	36.2		13.0		4.5						
TS-9	SLUDGE DRYING BEDS	8/1/88	7106	UG/KG	443.7	7.7	39.7	7.7	61.4	22.4	4.4						(1)
TS-10	BURN PIT BOREHOLE		7699	UG/KG	NOT COLLECTED												
TS-11	BURKE WWTP, DISCHARGE TO DITCH	8/1/88	7107	UG/KG	96.2	6.1	7.5		29.2					19.5			
TS-12	BURKE WWTP DECANT POND	8/1/88	7108	UG/KG	494.6	10.6	20.8			12.8							(2)
TS-13	DUPLICATE OF TS-7	7/26/88	7109	UG/KG	12.7												
TY-3	RINSATE SAMPLE	7/14/88	7114	UG/L													(3)
TRAVEL BLANKS:																	
TX-1	TRAVEL BLANK	7/26/88		UG/L	8.2												
TX-2	TRAVEL BLANK	7/29/88		UG/L													
TX-3	TRAVEL BLANK	7/28/88		UG/L	1334.9												
VOA BLANKS:																	
	VOA BLANK	7/25/88		UG/L	3.9												
	VOA BLANK	7/26/88		UG/L	6.0												
	VOA BLANK	7/26/88		UG/L													

TABLE 4-11

SUMMARY OF VOLATILE ORGANICS FOUND ABOVE MINIMUM
DETECTION LIMITS IN SOIL SAMPLES
TRUAX FIELD
MADISON, WISCONSIN

SITE ID	SITE DESCRIPTION	ANALYSIS DATE	SAMPLE NUMBER	UNITS	METHYL-ENE CHLOR-IDE	TOLU-ENE	TRI-CHLORO-ETHANE	HEX-ANE	UN-KNOWN #1	TRI-CHLORO-FLUORO-METHANE	BEN-ZENE	XY-LENE	DI CHLORO-DIFLUORO-METHANE	UN-KNOWN #2	UN-KNOWN #3	UN-KNOWN #4	OTHER CHEM-ICALS
	VOA BLANK	7/26/88		UG/L													
	VOA BLANK	7/28/88		UG/L	11.1												
	VOA BLANK	7/28/88		UG/L	26.9		1.3										
	VOA BLANK	7/28/88		UG/L	-												
	VOA BLANK	7/30/88		UG/L													
	VOA BLANK	8/01/88		UG/L			3.2										

NOTES:

(1) 1,1,2-trichloro-1,2,2-trifluoroethane (13.4 ug/kg) and 1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluorohexane (49.9 ug/kg) were found only in TS-9.

(2) Ethylbenzene (5.6 ug/kg) was found only in TS-11.

(3) Chloroform (6.1 ug/l) and 1,2-dichloroethane (3.9 ug/kg) were found only in TY-3.

What method?

VOLATILE ORGANICS ANALYSIS
SITE: 88007115 TG-1
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	103 %
D8-TOLUENE	117 %
4-BROMOFLUOROBENZENE	98 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007116 TG-2
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	104 %
D8-TOLUENE	118 %
4-BROMOFLUOROBENZENE	98 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007117 TG-3
DATE OF ANALYSIS: 7/27/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	53.9
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	52.8
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	223.2
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	104 %
D8-TOLUENE	110 %
4-BROMOFLUOROBENZENE	96 %

LIBRARY SEARCH DATA:

UNKNOWN	76
C6H12 RING HYDROCARBON	194
CYCLOHEXANE	80
XYLENE ISOMER	500
XYLENE ISOMER	205
ETHYL-METHYL BENZENE ISOMER	103
ETHYL-METHYL BENZENE ISOMER	33
ETHYL-METHYL BENZENE ISOMER	137
ETHYL-METHYL BENZENE ISOMER	38
UNKNOWN	90
METHYL-(METHYLETHYL)-BENZENE ISOMER	8
METHYL-(METHYLETHYL)-BENZENE ISOMER	7
TETRAMETHYLBENZENE ISOMER	6
TETRAMETHYLBENZENE ISOMER	5

VOLATILE ORGANICS ANALYSIS
SITE: 88007185 TG-5
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	89.5%
D8-TOLUENE	98.8%
4-BROMOFLUOROBENZENE	101.6%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007258 TG-9
DATE OF ANALYSIS: 7/29/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	9.7
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	89.8%
D8-TOLUENE	98.6%
4-BROMOFLUOROBENZENE	98.5%

LIBRARY SEARCH DATA:

DICHLOROFLUOROMETHANE	9.0

VOLATILE ORGANICS ANALYSIS
SITE: 88007259 TG-10
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	1.2
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	9.1
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	27.6
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	3.9
VINYL CHLORIDE	17.9

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	85.6%
D8-TOLUENE	96.7%
4-BROMOFLUOROBENZENE	98.0%

LIBRARY SEARCH DATA:
UNKNOWN

VOLATILE ORGANICS ANALYSIS
SITE: 88007260 TG-11
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	16.7

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	83.6%
D8-TOLUENE	97.3%
4-BROMOFLUOROBENZENE	98.8%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007261 TG-12
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPRCPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	87.9%
D8-TOLUENE	94.9%
4-BROMOFLUOROBENZENE	102.3%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007262 TG-13
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	10.0
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	11.0
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	85.2%
D8-TOLUENE	102.8%
4-BROMOFLUOROBENZENE	104.4%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007263 TG-14
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	8.8
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	2.2
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	85.2%
D8-TOLUENE	97.6%
4-BROMOFLUOROBENZENE	96.4%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007118 TG-16
DATE OF ANALYSIS: 7/27/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	33.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	55.7
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	452.4
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	105 %
D8-TOLUENE	114 %
4-BROMOFLUOROBENZENE	105 %

LIBRARY SEARCH DATA:

XYLENE ISOMER	501
XYLENE ISOMER	204
ETHYL-METHYL BENZENE ISOMER	113
ETHYL-METHYL BENZENE ISOMER	147

VOLATILE ORGANICS ANALYSIS
SITE: 88006028 TG-15
DATE OF ANALYSIS: 6/15/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	5.2
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	86.3%
D8-TOLUENE	102.3%
4-BROMOFLUOROBENZENE	96.8%

LIBRARY SEARCH DATA:

ACETONE	5.0
2-BUTANONE	48.0
TETRAHYDROFURAN	23.0

VOLATILE ORGANICS ANALYSIS
SITE: 88007186 TS-1
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	76.3
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	1.3
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	4.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	84.8%
D8-TOLUENE	106.7%
4-BROMOFLUOROBENZENE	90.9%

LIBRARY SEARCH DATA:

HEXANE	10.4

VOLATILE ORGANICS ANALYSIS
SITE: 88007187 TS-2
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	41.7
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	2.2
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	6.7
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	85.9%
D8-TOLUENE	99.8%
4-BROMOFLUOROBENZENE	94.7%

LIBRARY SEARCH DATA:

UNKNOWN HYDROCARBON	13.1

VOLATILE ORGANICS ANALYSIS
SITE: 88007188 TS-3
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	17.9
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	1.1
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	1.9
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	82.9%
D8-TOLUENE	106.7%
4-BROMOFLUOROBENZENE	81.9%

LIBRARY SEARCH DATA:

HEXANE	15.0

VOLATILE ORGANICS ANALYSIS
SITE: 88007189 TS-4
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	157.0
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	26.0
TOLUENE	4.1
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	4.5
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	81.3%
D8-TOLUENE	125.6%
4-BROMOFLUOROBENZENE	72.2%

LIBRARY SEARCH DATA:

UNKNOWN	10.8
HEXANE	15.1

VOLATILE ORGANICS ANALYSIS
SITE: 88007189 TS-4
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	226.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	27.3
TOLUENE	5.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	8.3
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	80.2%
D8-TOLUENE	134.1%
4-BROMOFLUOROBENZENE	67.4%

LIBRARY SEARCH DATA:

HEXANE	15.1

VOLATILE ORGANICS ANALYSIS
SITE: 88007191 TS-5
DATE OF ANALYSIS: 7/30/88
ALL RESULTS IN UG/KG

BENZENE	1.6
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	19.9
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	12.6
TOLUENE	1.3
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	80.8%
D8-TOLUENE	120.8%
4-BROMOFLUOROBENZENE	95.4%

LIBRARY SEARCH DATA:

XYLENE	1.5
DICHLORODIFLUOROMETHANE	308.0
UNKNOWN	4.7
UNKNOWN	11.8
UNKNOWN	11.8
UNKNOWN	7.1

VOLATILE ORGANICS ANALYSIS
SITE: 88007191 TS-5
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	82.8
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	2.1
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	79.7%
D8-TOLUENE	142.0%
4-BROMOFLUOROBENZENE	68.4%

LIBRARY SEARCH DATA:

HEXANE	5.9

VOLATILE ORGANICS ANALYSIS
SITE: 88007190 TS-6
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	58.8
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	1.6
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	80.0%
D8-TOLUENE	111.1%
4-BROMOFLUOROBENZENE	81.3%

LIBRARY SEARCH DATA:

HEXANE	5.2

VOLATILE ORGANICS ANALYSIS
SITE: 88007104 TS-7
DATE OF ANALYSIS: 7/25/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	31.9
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	109 %
D8-TOLUENE	115 %
4-BROMOFLUOROBENZENE	88 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007105 TS-8
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	15.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	107 %
D8-TOLUENE	107 %
4-BROMOFLUOROBENZENE	80 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007105 TS-8
DATE OF ANALYSIS: 8/1/88
ALL RESULTS IN UG/KG

BENZENE	4.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	93.9
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	7.4
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	36.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	84.9%
D8-TOLUENE	113.8%
4-BROMOFLUOROBENZENE	151.6%

LIBRARY SEARCH DATA:

UNKNOWN	13.0

VOLATILE ORGANICS ANALYSIS
SITE: 88007106 TS-9
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	93.0
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	13.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	138 %
D8-TOLUENE	100 %
4-BROMOFLUOROBENZENE	64 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007106 TS-9
DATE OF ANALYSIS: 8/1/88
ALL RESULTS IN UG/KG

BENZENE	4.4
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	443.7
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	22.4
TOLUENE	7.7
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	39.7
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	74.7%
D8-TOLUENE	156.0%
4-BROMOFLUOROBENZENE	80.0%

LIBRARY SEARCH DATA:

1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	13.4
UNKNOWN	61.4
HEXANE	7.7
1,1,1,2,2,3,3,4,4,5,5,6,6,-TRIDECAFLUOROHEXANE	49.9

VOLATILE ORGANICS ANALYSIS
SITE: 88007107 TS-11
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	87.9
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	10.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	126 %
D8-TOLUENE	84 %
4-BROMOFLUOROBENZENE	64 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007107 TS-11
DATE OF ANALYSIS: 8/1/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	5.6
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	96.2
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	6.1
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	7.5
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	87.6%
D8-TOLUENE	121.0%
4-BROMOFLUOROBENZENE	72.6%

LIBRARY SEARCH DATA:

UKNOWN	29.2
UKNOWN	19.5

VOLATILE ORGANICS ANALYSIS
SITE: 88007108 TS-12
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	161.7
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	5.9
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	183 %
D8-TOLUENE	145 %
4-BROMOFLUOROBENZENE	61 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007108 TS-12
DATE OF ANALYSIS: 8/1/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	494.6
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	12.8
TOLUENE	10.6
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	20.8
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	72.2%
D8-TOLUENE	238.6%
4-BROMOFLUOROBENZENE	94.8%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007109 TS-13
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/KG

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	12.7
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	108 %
D8-TOLUENE	107 %
4-BROMOFLUOROBENZENE	86 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007110 TW-1
DATE OF ANALYSIS: 7/27/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	106 %
D8-TOLUENE	117 %
4-BROMOFLUOROBENZENE	99 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007111 TW-2
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	105 %
D8-TOLUENE	117 %
4-BROMOFLUOROBENZENE	100 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007184 TW-3
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/L

BENZENE	1.3
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	11.6
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	11.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	1.2
1,2-trans-DICHLOROETHYLENE	9.6
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	78.1%
D8-TOLUENE	98.6%
4-BROMOFLUOROBENZENE	95.4%

LIBRARY SEARCH DATA:

THIOBISMETHANE	27.0

VOLATILE ORGANICS ANALYSIS
SITE: 88007112 TW-4
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	3.2
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	103 %
D8-TOLUENE	112 %
4-BROMOFLUOROBENZENE	100 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007113 TW-5
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	102 %
D8-TOLUENE	115 %
4-BROMOFLUOROBENZENE	101 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007121 TX-1
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	8.2
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	105 %
D8-TOLUENE	114 %
4-BROMOFLUOROBENZENE	101 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007192 TX-2
DATE OF ANALYSIS: 7/29/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	84.4%
D8-TOLUENE	96.2%
4-BROMOFLUOROBENZENE	95.2%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007264 TX-3
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	1334.9
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	87.5%
D8-TOLUENE	98.0%
4-BROMOFLUOROBENZENE	100.6%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007119 TY-1
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	5.2
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	110 %
D8-TOLUENE	114 %
4-BROMOFLUOROBENZENE	101 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007120 TY-2
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	5.5
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	120 %
D8-TOLUENE	114 %
4-BROMOFLUOROBENZENE	102 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: 88007114 TY-3
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	6.1
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	3.9
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	102 %
D8-TOLUENE	116 %
4-BROMOFLUOROBENZENE	99 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: VOA BLANK
DATE OF ANALYSIS: 6/15/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	11.6
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	84.4%
D8-TOLUENE	97.2%
4-BROMOFLUOROBENZENE	95.9%

LIBRARY SEARCH DATA:

ACETONE	27.4
ACRYLONITRILE	14.6

VOLATILE ORGANICS ANALYSIS
SITE: VOA BLANK
DATE OF ANALYSIS: 6/16/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	28.6
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	104.6%
D8-TOLUENE	94.2%
4-BROMOFLUOROBENZENE	105.1%

LIBRARY SEARCH DATA:

ACETONE	1.4
ACRYLONITRILE	9.9

VOLATILE ORGANICS ANALYSIS
SITE: VOA BLANK
DATE OF ANALYSIS: 7/25/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	3.9
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	107 %
D8-TOLUENE	111 %
4-BROMOFLUOROBENZENE	95 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: VOA BLANK
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	6.0
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	108 %
D8-TOLUENE	107 %
4-BROMOFLUOROBENZENE	100 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: VOA BLANK
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	103 %
D8-TOLUENE	113 %
4-BROMOFLUOROBENZENE	96 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: VOA BLANK
DATE OF ANALYSIS: 7/26/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	106 %
D8-TOLUENE	114 %
4-BROMOFLUOROBENZENE	102 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: VOA BLANK
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	26.9
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	1.3
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	85.2%
D8-TOLUENE	96.3%
4-BROMOFLUOROBENZENE	97.6%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: VOA BLANK
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	85.4%
D8-TOLUENE	99.0%
4-BROMOFLUOROBENZENE	101.2%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: VOA BLANK
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	11.1
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	82.4%
D8-TOLUENE	103.3%
4-BROMOFLUOROBENZENE	98.1%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: VOA BLANK
DATE OF ANALYSIS: 7/30/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	87.6%
D8-TOLUENE	98.3%
4-BROMOFLUOROBENZENE	97.2%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: VOA BLANK
DATE OF ANALYSIS: 8/1/88
ALL RESULTS IN UG/L

BENZENE	< 0.5
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	< 0.6
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	< 1.9
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	< 1.0
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	3.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	< 1.3
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	85.8%
D8-TOLUENE	98.6%
4-BROMOFLUOROBENZENE	96.7%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: CHECK STANDARD
DATE OF ANALYSIS: 6/15/88
ALL RESULTS IN UG/L

BENZENE	46.0
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	43.7
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	46.2
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	12.5
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	45.8
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	46.9
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	87.1%
D8-TOLUENE	105.6%
4-BROMOFLUOROBENZENE	91.5%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: WATER CHECK STANDARD
DATE OF ANALYSIS: 7/27/88
ALL RESULTS IN UG/L

BENZENE	40.4
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	45.0
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	29.4
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	46.9
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	41.5
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	105 %
D8-TOLUENE	109 %
4-BROMOFLUOROBENZENE	99 %

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: CHECK STANDARD
DATE OF ANALYSIS: 7/29/88
ALL RESULTS IN UG/L

BENZENE	40.7
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	43.2
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	37.3
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	< 1.4
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	41.4
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	39.5
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	84.9%
D8-TOLUENE	96.3%
4-BROMOFLUOROBENZENE	95.0%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

VOLATILE ORGANICS ANALYSIS
SITE: SOIL CHECK STANDARD
DATE OF ANALYSIS: 7/28/88
ALL RESULTS IN UG/KG

BENZENE	43.2
BROMOFORM	< 3.2
CARBON TETRACHLORIDE	< 1.5
CHLOROBENZENE	47.1
CHLORODIBROMOMETHANE	< 2.0
CHLOROETHANE	< 2.4
2-CHLOROETHYLVINYL ETHER	< 5.9
CHLOROFORM	< 0.8
DICHLOROBROMOMETHANE	< 1.1
1,1-DICHLOROETHANE	< 0.8
1,2-DICHLOROETHANE	< 1.5
1,1-DICHLOROETHYLENE	41.1
1,2-DICHLOROPROPANE	< 1.5
1,3-cis-DICHLOROPROPYLENE	< 1.5
1,3-trans-DICHLOROPROPYLENE	< 1.5
ETHYLBENZENE	< 0.4
METHYL BROMIDE	< 1.5
METHYL CHLORIDE	< 1.6
METHYLENE CHLORIDE	36.7
1,1,2,2-TETRACHLOROETHANE	< 1.4
TETRACHLOROETHYLENE	< 1.5
1,3-DICHLOROBENZENE	< 3.5
TRICHLOROFLUOROMETHANE	< 1.1
TOLUENE	44.8
1,2-trans-DICHLOROETHYLENE	< 1.5
1,1,1-TRICHLOROETHANE	< 1.2
1,1,2-TRICHLOROETHANE	< 1.6
TRICHLOROETHYLENE	39.6
VINYL CHLORIDE	< 1.2

SURROGATE COMPOUND RECOVERIES:

D4-1,2-DICHLOROETHANE	85.1%
D8-TOLUENE	95.7%
4-BROMOFLUOROBENZENE	100.5%

LIBRARY SEARCH DATA:
NO PEAKS TO SEARCH

CHECK STANDARD
RECOVERY DATA

TABLE ___
CHECK STANDARD RECOVERIES
(WATER)

DATE: 6/15/88

COMPOUND	SPIKE ADDED (ug/l)	MS CONCENTRATION (ug/l)	MS % REC #	QC LIMITS REC
1,1-Dichloroethene	50	46.2	92	61-145
Trichloroethene	50	46.9	94	71-120
Benzene	50	46	92	76-127
Toluene	50	45.8	92	76-125
Chlorobenzene	50	43.7	87	75-130

COMMENTS:

TABLE ___
CHECK STANDARD RECOVERIES
(WATER)

DATE: 7/27/88

COMPOUND	SPIKE ADDED (ug/l)	MS CONCENTRATION (ug/l)	MS % REC #	QC LIMITS REC
1,1-Dichloroethene	50	29.4	59	61-145
Trichloroethene	50	41.5	83	71-120
Benzene	50	40.4	81	76-127
Toluene	50	46.9	94	76-125
Chlorobenzene	50	45	90	75-130

COMMENTS:

TABLE ___
CHECK STANDARD RECOVERIES
(SOILS)

DATE: 7/28/88

COMPOUND	SPIKE ADDED (UG/KG)	MS CONCENTRATION (UG/KG)	MS % REC #	QC LIMITS REC
1,1-Dichloroethene	50	41.1	82	61-145
Trichloroethene	50	39.6	79	71-120
Benzene	50	43.2	86	76-127
Toluene	50	44.8	90	76-125
Chlorobenzene	50	47.1	94	75-130

COMMENTS:

TABLE __
CHECK STANDARD RECOVERIES
(WATER)

DATE: 7/29/88

COMPOUND	SPIKE ADDED (ug/l)	MS CONCENTRATION (ug/l)	MS % REC #	(LII I
1,1-Dichloroethene	50	37.3	75	61-
Trichloroethene	50	39.5	79	71-
Benzene	50	40.7	81	76-
Toluene	50	41.4	83	76-
Chlorobenzene	50	43.2	86	75-

COMMENTS:

INITIAL CALIBRATION AND CONTINUING CALIBRATION DATA

6A

VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name:Envirodyne Engineers Contract:3144

Lab Code: EEI Case No.: NA SAS No.: NA SDG No.: NA

Instrument ID: 59852B Calibration Date(s):06/13/88 06/13/88

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) PACK

Min RRF for SPCC(#) = 0.300 (0.250 for Bromoform) Max %RSD for CCC(*) = 30.0

LAB FILE ID: RRF20 =>B9066 RRF50 =>B9064
RRF100=........... RRF150=........... RRF200=>B9067

COMPOUND	RRF20	RRF50	RRF100	RRF150	RRF200	RRF	% RSD
Chloromethane #	1.127	1.239	0.000	0.000	1.241	1.202	5.4
Bromomethane	1.934	1.777	0.000	0.000	3.069	2.260	31.2
Vinyl_Chloride *	1.494	1.510	0.000	0.000	2.423	1.809	29.4
Chloroethane	.985	1.064	0.000	0.000	1.143	1.064	7.4
Methylene_Chloride	2.905	5.179	0.000	0.000	2.229	3.438	45.0
Acetone	1.574	1.489	0.000	0.000	.615	1.226	43.3
Carbon_Disulfide	4.524	5.129	0.000	0.000	4.891	4.848	6.3
1,1-Dichloroethene *	1.354	1.472	0.000	0.000	1.412	1.413	4.2
1,1-Dichloroethane #	2.835	3.180	0.000	0.000	2.937	2.984	5.9
1,2-Dichloroethene_(total)	1.403	1.630	0.000	0.000	1.515	1.516	7.5
Chloroform *	3.164	3.588	0.000	0.000	3.301	3.351	6.5
1,2-Dichloroethane	2.440	2.640	0.000	0.000	2.555	2.545	3.9
2-Butanone	.202	.172	0.000	0.000	.197	.190	8.5
1,1,1-Trichloroethane	.660	.744	0.000	0.000	.683	.696	6.2
Carbon_Tetrachloride	.644	.683	0.000	0.000	.679	.668	3.2
Vinyl_Acetate	.552	.524	0.000	0.000	.632	.569	9.9
Bromodichloromethane	.760	.829	0.000	0.000	.793	.794	4.4
1,2-Dichloropropane *	.409	.455	0.000	0.000	.447	.437	5.6
cis-1,3-Dichloropropene	.842	.962	0.000	0.000	1.020	.942	9.6
Trichloroethene	.422	.478	0.000	0.000	.458	.452	6.3
Dibromochloromethane	.359	.423	0.000	0.000	.467	.416	13.1
1,1,2-Trichloroethane	.326	.362	0.000	0.000	.353	.347	5.5
Benzene	1.041	1.143	0.000	0.000	1.164	1.116	5.9
trans-1,3-Dichloropropene	.842	.962	0.000	0.000	1.020	.942	9.6
Bromoform #	.254	.295	0.000	0.000	.377	.308	20.3#
4-Methyl-2-pentanone	.017	.009	0.000	0.000	.479	.168	160.2
2-Hexanone	.185	.139	0.000	0.000	.488	.271	69.9
Tetrachloroethene	.523	.544	0.000	0.000	.558	.542	3.2
1,1,2,2-Tetrachloroethane	.513	.537	0.000	0.000	.594	.548	7.5
Toluene *	1.443	1.514	0.000	0.000	1.486	1.481	2.4
Chlorobenzene #	1.011	1.000	0.000	0.000	1.031	1.014	1.6#
Ethylbenzene *	1.849	1.918	0.000	0.000	1.858	1.875	2.0*
Styrene	.908	.986	0.000	0.000	.987	.960	4.7
Xylene_(total)	1.421	1.459	0.000	0.000	1.363	1.414	3.4
Toluene-d8	1.306	1.279	0.000	0.000	1.293	1.293	1.0
4-Bromofluorobenzene	.696	.674	0.000	0.000	.681	.684	1.6
1,2-Dichloroethane-d4	2.108	2.219	0.000	0.000	2.481	2.269	8.4

7A
VOLATILE CONTINUING CALIBRATION CHECK

Lab Name:Envirodyne Engineers Contract:3144

Lab Code: EEI Case No.: NA SAS No.: NA SDG No.: NA

Instrument ID: 59852B Calibration Date: 6/16/88 Time: 10:43

Lab File ID: >B9125 Init. Calib. Date(s):06/13/88

Matrix:(soil/water) SOIL Level:(low/med) LOW Column:(pack/cap) PACK

Min RRF50 for SPCC(#) = 0.300 (0.250 for Bromoform) Max %D for CCC(*) = 25.0

COMPOUND		RRF	RRF50	%D	
Chloromethane	#	1.202	1.520	26.4	#
Bromomethane		2.260	2.100	7.1	
Vinyl Chloride	*	1.809	2.206	21.9	*
Chloroethane		1.064	1.133	6.5	
Methylene_Chloride		3.438	5.805	68.9	
Acetone		1.226	.923	24.8	
Carbon_Disulfide		4.848	3.679	24.1	
1,1-Dichloroethene	*	1.413	1.154	18.3	*
1,1-Dichloroethane	#	2.984	2.517	15.6	#
1,2-Dichloroethene_(total)		1.516	1.234	18.6	
Chloroform	*	3.351	2.930	12.6	*
1,2-Dichloroethane		2.545	1.977	22.3	
2-Butanone		.190	.112	41.1	
1,1,1-Trichloroethane		.696	.587	15.7	
Carbon_Tetrachloride		.668	.555	17.0	
Vinyl Acetate		.569	.263	53.7	
Bromodichloromethane		.794	.637	19.8	
1,2-Dichloropropane	*	.437	.353	19.2	*
cis-1,3-Dichloropropene		.942	.661	29.8	
Trichloroethene		.452	.353	22.0	
Dibromochloromethane		.416	.303	27.3	
1,1,2-Trichloroethane		.347	.268	22.9	
Benzene		1.116	.928	16.8	
trans-1,3-Dichloropropene		.942	.661	29.8	
Bromoform	#	.308	.186	39.6	#
4-Methyl-2-pentanone		.168	.015	91.0	
2-Hexanone		.271	.155	42.7	
Tetrachloroethene		.542	.468	13.7	
1,1,2,2-Tetrachloroethane		.548	.392	28.4	
Toluene	*	1.481	1.314	11.3	*
Chlorobenzene	#	1.014	.862	15.0	#
Ethylbenzene	*	1.875	1.695	9.6	*
Styrene		.960	.842	12.4	
Xylene_(total)		1.414	1.331	5.9	
Toluene-d8		1.293	1.269	1.8	
4-Bromofluorobenzene		.684	.369	46.0	
1,2-Dichloroethane-d4		2.269	1.893	16.6	

7A
VOLATILE CONTINUING CALIBRATION CHECK

Lab Name: Envirodyne Engineers Contract: 3144

Lab Code: EEI Case No.: NA SAS No.: NA SDG No.: NA

Instrument ID: 598528 Calibration Date: 6/15/88 Time: 16:13

Lab File ID: >B9112 Init. Calib. Date(s): 06/13/88 06/13/88

Matrix: (soil/water) WATER Level: (low/med) LOW Column: (pack/cap) PACK

Min RRF50 for SPCC(#) = 0.300 (0.250 for Bromoform) Max %D for CCC(*) = 25.0%

COMPOUND		RRF	RRF50	%D	
Chloromethane	#	1.202	1.033	14.1	#
Bromomethane		2.260	1.440	36.3	
Vinyl Chloride	*	1.809	1.365	24.6	*
Chloroethane		1.064	.905	14.9	
Methylene_Chloride		3.438	4.399	28.0	
Acetone		1.226	1.096	10.6	
Carbon_Disulfide		4.848	3.609	25.6	
1,1-Dichloroethene	*	1.413	1.135	19.7	*
1,1-Dichloroethane	#	2.984	2.624	12.1	#
1,2-Dichloroethene_(total)		1.516	1.248	17.7	
Chloroform	*	3.351	2.987	10.9	*
1,2-Dichloroethane		2.545	2.223	12.6	
2-Butanone		.190	.127	33.4	
1,1,1-Trichloroethane		.696	.606	12.8	
Carbon_Tetrachloride		.668	.539	19.4	
Vinyl Acetate		.569	.277	51.3	
Bromodichloromethane		.794	.735	7.4	
1,2-Dichloropropane	*	.437	.396	9.3	*
cis-1,3-Dichloropropene		.942	.782	17.0	
Trichloroethene		.452	.420	7.2	
Dibromochloromethane		.416	.370	11.1	
1,1,2-Trichloroethane		.347	.302	13.0	
Benzene		1.116	.991	11.2	
trans-1,3-Dichloropropene		.942	.782	17.0	
Bromoform	#	.308	.237	23.2	#
4-Methyl-2-pentanone		.168	.007	95.8	
2-Hexanone		.271	.151	44.2	
Tetrachloroethene		.542	.443	18.2	
1,1,2,2-Tetrachloroethane		.548	.375	31.5	
Toluene	*	1.481	1.292	12.8	*
Chlorobenzene	#	1.014	.867	14.5	#
Ethylbenzene	*	1.875	1.641	12.5	*
Styrene		.960	.887	7.7	
Xylene_(total)		1.414	1.263	10.7	
Toluene-d8		1.293	1.235	4.5	
4-Bromofluorobenzene		.684	.668	2.3	
1,2-Dichloroethane-d4		2.269	2.004	11.7	

Case No:

Contractor:

Contract No:

Instrument ID:

Calibration Date: ~~00/00/00~~ 7-15-88

Minimum $\overline{RF}$ for SPCC is

Maximum % RSD for CCC is %

Laboratory ID:	A2830	A2826	A2829	A2828	A2827				
	RF	RF	RF	RF	RF				
Compound	20.00	50.00	100.00	150.00	200.00	$\overline{RF}$	% RSD	CCC	SPCC
Chloromethane	1.72927	1.48464	1.73143	1.47039	1.49712	1.59257	9.421		**
*Vinyl chloride	1.97364	1.65421	2.07091	1.71716	1.70613	1.82541	10.212	*	
*Chloroethane	2.20405	1.56214	2.31198	1.93254	1.93627	1.94940	13.690		
Bromomethane	1.58461	1.41300	1.38019	1.67529	1.60514	1.53165	8.377		
*Trichlorofluoromethane	1.79944	1.27333	1.20243	.91023	.98649	1.21638	25.773		
Acrolein	.36456	.31467	.29503	.22589	.20936	28190	22.769		
*1,1-Dichloroethene	2.07867	1.68423	1.93114	1.33161	1.54101	1.82334	11.928	*	
Acetone	2.29456	1.35623	.87713	.72181	.54446	1.15884	60.661		
Iodomethane	2.79510	3.33149	4.26648	3.76230	3.44429	3.51993	15.448		
Allyl Chloride	4.33208	3.63509	3.48941	2.80469	2.55684	3.36362	20.923		
Carbon Disulfide	6.90292	7.03551	7.76897	7.15110	6.43828	7.05935	6.804		
Propionitrile	.25655	.27374	.26268	.24331	.22987	.25323	6.739		
*Methylene Chloride	9.49926	5.73196	6.11511	3.79978	3.22741	5.67470	43.460		
Acrylonitrile	3.90986	3.84849	4.05817	3.76951	3.31404	3.78001	7.439		
*1,2-Dichloroethene (total)	2.13964	2.17560	2.73603	2.56579	2.41479	2.40037	10.194		
1,1-Dichloroethane	4.84956	4.76993	5.55173	4.75740	4.61428	4.90858	7.526		**
Vinyl Acetate	6.70197	6.57173	6.80071	5.97850	5.72951	6.35652	7.459		
2-Butanone	.25067	22843	.22695	.21846	.19900	.22470	8.305		
Chloroform	4.98984	4.60785	4.59749	4.34021	4.53952	4.61498	5.106	*	
*1,1,1-Trichloroethane	4.03370	3.64713	3.34763	2.99846	3.09949	3.42528	12.332		
*Carbon tetrachloride	3.63189	3.14660	2.92294	2.58055	2.70686	2.99777	13.840		
Methacrylonitrile	.14836	.16993	.16603	.16927	.17932	.16658	6.798		
Benzene	1.34028	1.29318	1.28938	1.25211	1.38062	1.31112	3.805		
1,2-Dichloroethane-d4	.50293	.47791	.48278	.47707	.47244	.48262	2.472		
1,2-Dichloroethane	.69088	.67684	.64876	.64625	.69458	.67146	3.405		
Trichloroethene	.40232	.40484	.40416	.40461	.42525	.40824	2.342		
1,2-Dichloropropane	.57574	.56274	.57365	.56546	.60808	.57714	3.142	*	
Methylmethacrylate	.36663	.39525	.37526	.36594	.36849	.37431	3.278		
Dibromomethane	.43881	.45911	.43594	.43764	.45873	.44605	2.645		
Bromodichloromethane	.79634	.80463	.80288	.79715	.86093	.81239	3.369		
cis-1,3-Dichloropropene	.91067	.88252	91267	.91405	.98640	.92126	4.198		
4-Methyl-2-pentanone	.81020	.79408	.82171	.81853	.82303	.81351	1.469		

(Conc=200.0,500.0,1000.0,1500.0)

(Conc=50.0,50.0,50.0,50.0,50.0)

*These compounds were >10% RSD, & Timefac got calculated manually, rather than from mean RF. BJB 10-2-88

UNDERLINED COMPOUNDS ARE NOT REQUIRED ANALYTES. /BB 8-22-88

RF - Response Factor (Subscript is amount in PPB)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Case No:

Contractor:

Contract No:

Instrument ID:

Calibration Date: ~~08/23/98~~ 7-15-98

Minimum $\overline{RF}$ for SPCC is

Maximum % RSD for CCC is %

Laboratory ID:	A2530	A2826	A2829	A2823	A2827					
	RF	RF	RF	RF	RF					
Compound	20.00	50.00	100.00	150.00	200.00	$\overline{RF}$	% RSD	CCC	SPCC	
Toluene-d3	.99023	.99851	1.01376	.99960	.99697	.99931	.861			(Conc=50.0,50.0,50.0,50.0,50.0
Toluene	.74536	.70803	.72637	.71216	.77369	.73312	3.679	*		
trans-1,3-Dichloropropene	34489	.34556	.35061	.34385	.37387	.35176	3.592			
1,1,2-Trichloroethane	.37310	.36545	.35641	.36105	.37940	.36908	1.952			
Tetrachloroethene	32130	.31325	31987	31324	.34064	.32176	3.492			
2-Hexanone	.50272	.39267	.38020	.36539	.34995	.35819	9.742			
Dibromochloromethane	.52497	.51949	.52349	.50874	.53925	.52299	2.120			
1,2-Dibromoethane	.43944	.46673	.44598	.43688	.43451	.44469	2.931			
Chlorobenzene	1.13973	1.13686	1.15017	1.12957	1.22165	1.15560	3.259		**	
1,1,1,2-Tetrachloroethane	49387	.53999	.52813	.52458	.54997	.52731	4.024			
Ethylbenzene	.59896	.60828	.63655	.63719	.71082	.63836	6.879	*		
Xylene (total)	.56044	65440	.67921	.66655	.72932	.67798	4.444			
Styrene	1.17560	1.17816	1.23378	1.21903	1.35562	1.23244	5.953			
2-Chloroethylvinyl ether	.35540	.36285	.36675	.36223	.38388	.36622	2.917			
Bromoform	.43295	.43797	.45347	.44022	.45738	.44440	2.362		**	
4-Bromofluorobenzene	.87171	.86461	.90652	.89289	.88279	.88370	1.889			(Conc=50.0,50.0,50.0,50.0,50.0
1,1,2,2-Tetrachloroethane	.84785	.83402	.81719	.74161	.72387	.79291	7.106		**	
1,2,3-trichloropropane	.56420	.58563	.56805	.52566	.50554	.54982	6.009			
Trans-1,4-dichloro-2-butene	.26749	.29604	.29144	.26469	.26223	.27638	5.804			
1,3-Dichlorobenzene	1.05758	1.03212	.94474	.97253	.97143	.99568	4.732			

RF - Response Factor (Subscript is amount in PPB)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

VOL Compounds

Case No:

Instrument ID:

Contractor:

Calibration Date: 07/25/88

Contract No:

Minimum $\overline{RF}$ for SPCC is

Maximum % RSD for CCC is %

Compound	RF 20.00	RF 50.00	RF 100.00	RF 150.00	RF 200.00	$\overline{RF}$	% RSD	CCC	SPCC	
Laboratory ID:	-	42936	-	-	-					
Chloromethane	-	.25412	-	-	-	.25412	-		**	
Vinyl chloride	-	.25572	-	-	-	.25572	-	*		
Chloroethane	-	.03231	-	-	-	.03231	-			
Bromomethane	-	.92378	-	-	-	.92378	-			
Trichlorofluoromethane	-	1.30344	-	-	-	1.30344	-			
Acrolein	-	.45699	-	-	-	.45699	-			(Conc=200.0,500.0,1000.0,1500.0,2
1,1-Dichloroethene	-	1.89560	-	-	-	1.89560	-	*		
Acetone	-	1.39375	-	-	-	1.39375	-			
Iodomethane	-	-	-	-	-	-	-			
Allyl Chloride	-	-	-	-	-	-	-			
Carbon Disulfide	-	3.17577	-	-	-	3.17577	-			
Propionitrile	-	-	-	-	-	-	-			
Methylene Chloride	-	9.41032	-	-	-	9.41032	-			
Acrylonitrile	-	4.76385	-	-	-	4.76385	-			
1,2-Dichloroethene (total)	-	1.95255	-	-	-	1.95255	-			
1,1-Dichloroethane	-	4.98394	-	-	-	4.98394	-		**	
Vinyl Acetate	-	6.29558	-	-	-	6.29558	-			
2-Butanone	-	.23261	-	-	-	.23261	-			
Chloroform	-	4.95006	-	-	-	4.95006	-	*		
1,1,1-Trichloroethane	-	1.70660	-	-	-	1.70660	-			
Carbon tetrachloride	-	2.94791	-	-	-	2.94791	-			
Methacrylonitrile	-	-	-	-	-	-	-			
Benzene	-	1.25285	-	-	-	1.25285	-			
1,2-Dichloroethane-d4	-	.47068	-	-	-	.47068	-			(Conc=50.0,50.0,50.0,50.0,50.0)
1,2-Dichloroethane	-	.65895	-	-	-	.65895	-			
Trichloroethene	-	.37498	-	-	-	.37498	-			
1,2-Dichloropropane	-	.60757	-	-	-	.60757	-	*		
Methylmethacrylate	-	-	-	-	-	-	-			
Dibromomethane	-	-	-	-	-	-	-			
Bromodichloromethane	-	.80293	-	-	-	.80293	-			
cis-1,3-Dichloropropene	-	.94882	-	-	-	.94882	-			
4-Methyl-2-pentanone	-	-	-	-	-	-	-			

RF - Response Factor (Subscript is amount in PPB)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Case No:

Instrument ID:

Contractor:

Calibration Date: 07 25 98

Contract No:

Minimum $\overline{RF}$ for SPCC is   Maximum % RSD for CCC is %

Laboratory ID:	-	42986	-	-	-				
Compound	RF 20.00	RF 50.00	RF 100.00	RF 150.00	RF 200.00	$\overline{RF}$	% RSD	CCC	SPCC
Toluene-d8	-	1.00068	-	-	-	1.00068	-		
Toluene	-	.72486	-	-	-	.72486	-	*	
trans-1,3-Dichloropropene	-	.35239	-	-	-	.35239	-		
1,1,2-Trichloroethane	-	.39010	-	-	-	.39010	-		
Tetrachloroethene	-	.30284	-	-	-	.30284	-		
2-Hexanone	-	.15085	-	-	-	.15085	-		
Dibromochloromethane	-	.52454	-	-	-	.52454	-		
1,2-Dibromoethane	-	-	-	-	-	-	-		
Chlorobenzene	-	1.11608	-	-	-	1.11608	-		**
1,1,1,2-Tetrachloroethane	-	-	-	-	-	-	-		
Ethylbenzene	-	.57757	-	-	-	.57757	-	*	
Xylene (total)	-	.64114	-	-	-	.64114	-		
Styrene	-	1.19248	-	-	-	1.19248	-		
2-Chloroethylvinyl ether	-	.37669	-	-	-	.37669	-		
Bromoform	-	.44520	-	-	-	.44520	-		**
4-Bromofluorobenzene	-	.93712	-	-	-	.93712	-		
1,1,2,2-Tetrachloroethane	-	.83060	-	-	-	.83060	-		**
1,2,3-trichloropropane	-	.39810	-	-	-	.39810	-		
Trans-1,4-dichloro-2-butene	-	-	-	-	-	-	-		
1,3-Dichlorobenzene	-	1.08286	-	-	-	1.08286	-		

(Conc=50.0,50.0,50.0,50.0,50.0) — Toluene-d8

(Conc=50.0,50.0,50.0,50.0,50.0) — 4-Bromofluorobenzene

RF - Response Factor (Subscript is amount in PPB)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

CCC - Calibration Check Compounds (*)   SPCC - System Performance Check Compounds (**)

HSL Compounds

Case No: Calibration Date: 07 25 88

Contractor: Time: 11:13

Contract No: Laboratory ID: [illegible]

Instrument ID: Initial Calibration Date: 08/20/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Chloromethane	1.59257	.25412	84.04		**
Vinyl chloride	1.82541	.25572	85.99	*	
Chloroethane	1.74940	.03231	98.34		
Bromomethane	1.53165	.92373	39.69		
Trichlorofluoromethane	1.21638	1.30344	7.16		
Acrolein	.28190	.45699	79.95		
1,1-Dichloroethene	1.82334	1.89560	3.96	*	
Acetone	1.15984	1.39375	20.27		
Iodomethane	3.51993	-	-		
Allyl Chloride	3.56362	-	-		
Carbon Disulfide	7.05935	3.17577	55.01		
Propionitrile	.25323	-	-		
Methylene Chloride	5.67470	9.41032	65.83		
Acrylonitrile	3.78001	4.76385	26.03		
1,2-Dichloroethene (total)	2.40037	1.95255	18 66		
1,1-Dichloroethane	4.90858	4.98394	1.54		**
Vinyl Acetate	6.35652	6.29558	.96		
2-Butanone	.22470	.23261	3.52		
Chloroform	4.61498	4.85006	5.09	*	
1,1,1-Trichloroethane	3.42528	3.40606	.56		
Carbon tetrachloride	2.99777	2.94791	1.66		
Methacrylonitrile	.16658	-	-		
Benzene	1.31112	1.25285	4.44		
1,2-Dichloroethane-d4	.48262	.47068	2.47		
1,2-Dichloroethane	.67146	.65895	1.86		
Trichloroethene	.40824	.37498	8.15		
1,2-Dichloropropane	.57714	.60757	5.27	*	
Methylmethacrylate	.37431	-	-		
Dibromomethane	.44605	-	-		
Bromodichloromethane	.81239	.80293	1.16		
cis-1,3-Dichloropropene	.92126	.94882	2.99		
4-Methyl-2-pentanone	.81351	-	-		

RF - Response Factor from daily standard file at 50.00 PPB

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

VOC COMPOUNDS

Case No:

Contractor:

Contract No:

Instrument ID:

Calibration Date: 07/15/88

Time: 11:15

Laboratory ID: A2936

Initial Calibration Date: 06/13/88

Minimum RF for SPCC is

Maximum % Diff for CCC is

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
Toluene-d8	.99981	1.00068	.09			
Toluene	.73312	.72486	1.13	*		
trans-1,3-Dichloropropene	.35176	.35239	.18			
1,1,2-Trichloroethane	.36908	.39010	5.69			
Tetrachloroethene	.32176	.30234	5.88			
2-Hexanone	.35819	.15085	57.88			
Dibromochloromethane	.52299	.52454	.30			
1,2-Dibromoethane	.44469	-	-			
Chlorobenzene	1.15560	1.11608	3.42		**	
1,1,1,2-Tetrachloroethane	.52731	-	-			
Ethylbenzene	.63936	.57757	9.52	*		
Xylene (total)	.67798	.64114	5.43			
Styrene	1.23244	1.19248	3.24			
2-Chloroethylvinyl ether	.36622	.37669	2.86			
Bromoform	.44440	.44520	.18		**	
4-Bromofluorobenzene	.88370	.93712	6.04			(Conc=50.00)
1,1,2,2-Tetrachloroethane	.79291	.83060	4.75		**	
1,2,3-trichloropropane	.54982	.39910	27.50			
Trans-1,4-dichloro-2-butene	.27638	-	-			
1,3-Dichlorobenzene	.99568	1.08286	5.76			

RF - Response Factor from daily standard file at 50.00 PPB

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

HSL Compounds

Case No: ________________________ Instrument ID: ____________________

Contractor: ______________________ Calibration Date: 07/26/88

Contract No: _____________________

Minimum $\overline{RF}$ for SPCC is   Maximum % RSD for CCC is %

Compound	RF 20.00	RF 50.00	RF 100.00	RF 150.00	RF 200.00	$\overline{RF}$	% RSD	CCC	SPCC		
Laboratory ID:	>A2999	>A2996	-	-	>A2998						
Chloromethane	2.43384	2.16665	-	-	2.01196	2.20415	9.683		**		
Vinyl chloride	2.25693	2.09568	-	-	2.00752	2.12004	5.966	*			
Chloroethane	1.42561	1.78437	-	-	1.96128	1.72375	15.834	—		*	
Bromomethane	1.76217	1.89119	-	-	1.89546	1.84961	4.096				
Trichlorofluoromethane	1.53775	1.24559	-	-	1.13060	1.30465	16.089	—		*	
1,1-Dichloroethene	1.65106	1.95077	-	-	1.70137	1.76773	9.079	*			
Methylene Chloride	4.28840	3.42156	-	-	2.70194	3.47063	22.888	—		*	
1,2-Dichloroethene (total)	1.71433	1.83283	-	-	2.03483	1.86066	8.710				
1,1-Dichloroethane	3.75964	3.75059	-	-	3.81861	3.77628	.978		**		
Chloroform	3.77100	3.46375	-	-	3.59389	3.60955	4.273	*			
1,1,1-Trichloroethane	2.98546	2.70375	-	-	2.70661	2.79861	5.782				
Carbon tetrachloride	2.74294	2.47446	-	-	2.45009	2.55583	6.358				
Benzene	1.21240	1.15917	-	-	1.31314	1.22824	6.367				
1,2-Dichloroethane-d4	.50155	.48118	-	-	.46474	.48249	3.822				(Conc=50.0,50.0,50.0,50.0,50.0
1,2-Dichloroethane	.62390	.55726	-	-	.58138	.58751	5.743				
Trichloroethene	.36792	.34196	-	-	.38313	.36434	5.714				
1,2-Dichloropropane	.51018	.50423	-	-	.43332	.48258	8.861	*			
Bromodichloromethane	.54910	.51881	-	-	.54693	.53828	3.139				
cis-1,3-Dichloropropene	.89222	.77610	-	-	.84308	.83713	6.963				
Toluene-d8	1.20091	1.14710	-	-	1.09531	1.14777	4.688				(Conc=50.0,50.0,50.0,50.0,50.0
Toluene	.71448	.64989	-	-	.69415	.68617	4.813	*			
trans-1,3-Dichloropropene	.32448	.27171	-	-	.29642	.29754	8.875				
1,1,2-Trichloroethane	.34339	.29528	-	-	.31103	.31657	7.748				
Tetrachloroethene	.31917	.28592	-	-	.31588	.30699	5.968				
Dibromochloromethane	.46340	.39518	-	-	.44458	.43439	8.111				
Chlorobenzene	1.04050	.97565	-	-	1.09737	1.03784	5.868		**		
Ethylbenzene	.54821	.51539	-	-	.59159	.55173	6.928	*			
2-Chloroethylvinyl ether	.35281	.30867	-	-	.32500	.32856	6.662				
Bromoform	.39781	.34493	-	-	.38302	.37499	7.188		**		
4-Bromofluorobenzene AV	0.4953 ~~.78287~~	~~.83689~~ .4938			0.5222 ~~1.10807~~	0.5044 ~~.90874~~	~~19.227~~ 3.857				(Conc=50.0,50.0,50.0,50.0,50.0
1,1,2,2-Tetrachloroethane	.75458	.64117	-	-	.65762	.68443	8.947		**		
1,3-Dichlorobenzene	.90683	.87697	-	-	.92892	.90397	2.880				

* These compounds have %RSD's of greater than 10%, & are therefore calculated manually, rather than on the initial RF's.

RF - Response Factor (Subscript is amount in PPB)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

CCC - Calibration Check Compounds (*)   SPCC - System Performance Check Compounds (**)

BLB 10-10-88   Form VI Page 1 of 1

* Several surrogate recoveries, analyzed during this calibration period were outside of CLP ranges, & should have been repeated, to prove that it was matrix effect. This was not done, & corrective action was taken when this was noticed. We believe, however, that the data is valid.

.tor:	Calibration Date: 07/25/88
Time: 11:13

,tract No:	Laboratory ID: >A2986
Instrument ID:	Initial Calibration Date: 07/16/88

Minimum $\overline{RF}$ for SPCC is Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
Toluene-d8	.99981	1.00068	.09			
Toluene	.73312	.72486	1.13	*		
trans-1,3-Dichloropropene	.35176	.35239	.18			
1,1,2-Trichloroethane	.36908	.39010	5.69			
Tetrachloroethene	.32176	.30284	5.88			
2-Hexanone	.35819	.15085	57.88			
Dibromochloromethane	.52299	.52454	.30			
1,2-Dibromoethane	.44469	-	-			
Chlorobenzene	1.15560	1.11608	3.42		**	
1,1,1,2-Tetrachloroethane	.52731	-	-			
Ethylbenzene	.63836	.57757	9.52	*		
Xylene (total)	.67798	.64114	5.43			
Styrene	1.23244	1.19248	3.24			
2-Chloroethylvinyl ether	.36622	.37669	2.86			
Bromoform	.44440	.44520	.18		**	
4-Bromofluorobenzene	.88370	.93712	6.04			(Conc=50.00)
1,1,2,2-Tetrachloroethane	.79291	.83068	4.75		**	
1,2,3-trichloropropane	.54982	.39810	27.60			
Trans-1,4-dichloro-2-butene	.27638	-	-			
1,3-Dichlorobenzene	.99568	1.08286	8.76			

RF - Response Factor from daily standard file at 50.00 PPB

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

HSL Compounds

Case No: ------------------------- Calibration Date: 07/25/88

Contractor: ------------------------- Time: 11:13

Contract No: ------------------------- Laboratory ID: >A2986

Instrument ID: ------------------------- Initial Calibration Date: 07/16/88

Minimum $\overline{RF}$ for SPCC is   Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
* Chloromethane	1.59257	.25412	84.04*		**
* Vinyl chloride	1.82541	.25572	85.99*	*	
* Chloroethane	1.94940	.03231	98.34*		
* Bromomethane	1.53165	.92378	39.69*		
Trichlorofluoromethane	1.21638	1.30344	7.16		
✓ Acrolein	.28190	4.56987	1521.08		
1,1-Dichloroethene	1.82334	1.89560	3.96	*	
✓ Acetone	1.15884	1.39375	20.27		
Iodomethane	3.51993	-	-		
Allyl Chloride	3.36362	-	-		
Carbon Disulfide	7.05935	3.17577	55.01		
Propionitrile	.25323	-	-		
* Methylene Chloride	5.67470	9.41032	65.83	*	
Acrylonitrile	3.78001	4.76385	26.03		
1,2-Dichloroethene (total)	2.40037	1.95255	18.66		
1,1-Dichloroethane	4.90858	4.98394	1.54		**
Vinyl Acetate	6.35652	6.29558	.96		
2-Butanone	.22470	.23261	3.52		
Chloroform	4.61498	4.85006	5.09	*	
1,1,1-Trichloroethane	3.42528	3.40606	.56		
Carbon tetrachloride	2.99777	2.94791	1.66		
Methacrylonitrile	.16658	-	-		
Benzene	1.31112	1.25285	4.44		
1,2-Dichloroethane-d4	.48262	.47068	2.47		
1,2-Dichloroethane	.67146	.65895	1.86		
Trichloroethene	.40824	.37498	8.15		
1,2-Dichloropropane	.57714	.60757	5.27	*	
Methylmethacrylate	.37431	-	-		
Dibromomethane	.44685	-	-		
Bromodichloromethane	.81239	.80293	1.16		
cis-1,3-Dichloropropene	.92126	.94882	2.99		
4-Methyl-2-pentanone	.81351	-	-		

low   OK for TCLP

UNDERLINED CMPDS NOT ANALYTES FOR METHOD 8240

Samples were quanted on mean Rf's.

RF - Response Factor from daily standard file at 50.00 PPB

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*)   SPCC - System Performance Check Compounds (**)

* These compounds were > 20% RSD from initial calibration. The methylene chloride was higher because there was M.C. contamination from a standard (the TCLP std.) Since M.C. is calculated manually & it was the only compd. found, the sam[illegible] BJR

Continuing Calibration Check
HSL Compounds

Case No: --------------------------   Calibration Date: 07/26/88

Contractor: -----------------------   Time: 21:20

Contract No: ----------------------   Laboratory ID: >A3021

Instrument ID: --------------------   Initial Calibration Date: 07/26/88

Minimum $\overline{RF}$ for SPCC is   Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Chloromethane	2.20415	2.18813	.73		**
Vinyl chloride	2.12004	2.06718	2.49	*	
Chloroethane	1.72375	1.86027	7.92		
Bromomethane	1.84961	1.77069	4.27		
Trichlorofluoromethane	1.30465	1.40118	7.40		
1,1-Dichloroethene	1.76773	1.86531	5.52	*	
Methylene Chloride	3.47063	3.56940	2.85		
1,2-Dichloroethene (total)	1.86066	1.83837	1.20		
1,1-Dichloroethane	3.77628	3.83989	1.68		**
Chloroform	3.60955	3.67822	1.90	*	
1,1,1-Trichloroethane	2.79861	2.91047	4.00		
Carbon tetrachloride	2.55583	2.47324	3.23		
Benzene	1.22824	1.19911	2.37		
1,2-Dichloroethane-d4	.48249	.48427	.37		
1,2-Dichloroethane	.58751	.58934	.31		
Trichloroethene	.36434	.35962	1.29		
1,2-Dichloropropane	.48258	.52147	8.06	*	
Bromodichloromethane	.53828	.57734	7.26		
cis-1,3-Dichloropropene	.83713	.83116	.71		
Toluene-d8	1.14777	1.15949	1.02		
Toluene	.68617	.68771	.22	*	
trans-1,3-Dichloropropene	.29754	.29639	.39		
1,1,2-Trichloroethane	.31657	.32027	1.17		
Tetrachloroethene	.30699	.30292	1.33		
Dibromochloromethane	.43439	.43060	.87		
Chlorobenzene	1.03784	1.01227	2.46		**
Ethylbenzene	.55173	.53242	3.50	*	
2-Chloroethylvinyl ether	.32856	.31036	5.54		
Bromoform	.37499	.35683	4.84		**
4-Bromofluorobenzene	~~.90674~~ [illegible]	~~.83908~~ [illegible]	~~7.67~~ 1.88		(Conc=50.00)
1,1,2,2-Tetrachloroethane	.68443	.65641	4.09		**
1,3-Dichlorobenzene	.90397	.88533	2.06		

① The % Recovery of the d8-toluene is greater than the acceptable CLP ranges (in many sample) this may be due to the sample matrix, & they should have been rerun to confirm this. This did not happen, & correct action, that of clarifying requirement is being implemented. However the ~~ranges~~ recoveries are within the ranges acceptable for soils, we believe that the data is val

BJB 10-2

RF - Response Factor from daily standard file at 50.00 PPB

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*)   SPCC - System Performance Check Compounds (**)

HSL Compounds

Case No: ________________________

Calibration Date: 07/26/88

Contractor: ________________________

Time: 08:52

Contract No: ________________________

Laboratory ID: >A3007

Instrument ID: ________________________

Initial Calibration Date: 07/26/88

Minimum $\overline{RF}$ for SPCC is   Maximum % Diff for CCC is %

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
Chloromethane	2.20415	.99638	54.80		**	*
Vinyl chloride	2.12004	2.04655	3.47	*		
Chloroethane	1.72375	1.53848	10.75			
Bromomethane	1.84961	1.68820	8.73			
Trichlorofluoromethane	1.30465	1.32612	1.65			
1,1-Dichloroethene	1.76773	1.73662	1.76	*		
Methylene Chloride	3.47063	3.22091	7.20			
1,2-Dichloroethene (total)	1.86066	1.89322	1.75			
1,1-Dichloroethane	3.77628	4.01359	6.28		**	
Chloroform	3.60955	3.87252	7.29	*		
1,1,1-Trichloroethane	2.79861	2.98609	6.70			
Carbon tetrachloride	2.55583	2.62533	2.72			
Benzene	1.22824	1.29410	5.36			
1,2-Dichloroethane-d4	.48249	.51896	7.56			
1,2-Dichloroethane	.58751	.62993	7.22			
Trichloroethene	.36434	.38652	6.09			
1,2-Dichloropropane	.48258	.55647	15.31	*		
Bromodichloromethane	.53828	.70662	31.27			*
cis-1,3-Dichloropropene	.83713	.89150	6.49			
Toluene-d8	1.14777	1.20090	4.63			
Toluene	.68617	.73567	7.21	*		
trans-1,3-Dichloropropene	.29754	.32460	9.10			
1,1,2-Trichloroethane	.31657	.34930	10.34			
Tetrachloroethene	.30699	.32887	7.13			
Dibromochloromethane	.43439	.47805	10.05			
Chlorobenzene	1.03784	1.04711	.89		**	
Ethylbenzene	.55173	.56542	2.48	*		
2-Chloroethylvinyl ether	.32856	.32797	.18			
Bromoform	.37499	.38488	2.64		**	
4-Bromofluorobenzene	~~.90874~~ 2.5[illegible]	~~.83281~~ 0.[illegible]3	~~8.36~~ 2.82			(Conc=50.00)
1,1,2,2-Tetrachloroethane	.68443	.70515	3.03		**	
1,3-Dichlorobenzene	.90397	.88492	2.11			

* These compounds have %RSD's of >20% but since neither of these compds were found in the samples, the data is acceptable BJB 10-2-88

RF - Response Factor from daily standard file at 50.00 PPB

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*)   SPCC - System Performance Check Compounds (**)

BJB 10-10-88

Form VII Page 1 of 1

② Also, all samples that were run today had a % rec. of d-8-toluene of greater that that in CLP ranges, but because it was very consistant and because no compounds were detected with a R.T. near the d,8-toluene, the data is acceptable BJB 10-2-88

Calibration Check Report

Title: CORPS OF ENGINEER
Calibrated: 880728 22:39

Check Standard Data File: >B9537
Injection Time: 880801 16:16

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
1,2-Dichloroethane-d4	1.32608	1.18716	10.48	Average
Trichlorofluoromethane	1.84938	1.61565	12.64	Average
Chloromethane	1.89677	.07896	95.84	Average
Bromomethane	1.00223	1.13125	12.87	Average
Vinyl Chloride	.99389	.32845	66.95	Average
Chloroethane	.98640	.98811	.17	Average
Methylene Chloride	2.75522	2.56888	6.76	Average
1,1-Dichloroethene	1.54297	1.38220	10.42	Average
1,1-Dichloroethane	3.24723	2.91609	10.20	Average
1,2-Dichloroethene (total)	1.79914	1.49291	17.02	Average
Chloroform	2.82927	2.53848	10.28	Average
1,2-Dichloroethane	1.49306	1.29594	13.20	Average
1,1,1-Trichloroethane	.37536	.33939	9.58	Average
Carbon Tetrachloride	.31954	.28204	11.73	Average
Bromodichloromethane	.55579	.54762	1.47	Average
1,2-Dichloropropane	.50442	.49453	1.96	Average
trans-1,3-Dichloropropene	.91838	.87020	5.25	Average
Trichloroethene	.40116	.38793	3.30	Average
Benzene	1.28425	1.16012	9.67	Average
Dibromochloromethane	.32258	.30849	4.37	Average
1,1,2-Trichloroethane	.36375	.35721	1.80	Average
cis-1,3-Dichloropropene	.91838	.87020	5.25	Average
2-Chloroethylvinyl Ether	.50442	.49453	1.96	Average
Bromoform	.30602	.28122	8.10	Average
Toluene-d8	1.31743	1.29910	1.39	Average
4-Bromofluorobenzene	.63768	.60980	4.37	Average
1,1,2,2-Tetrachloroethane	.74438	.65568	11.91	Average
Tetrachloroethene	.46593	.42246	9.33	Average
Toluene	1.60568	1.49437	6.93	Average
Chlorobenzene	1.03564	.92618	10.57	Average
Ethylbenzene	1.81069	1.66305	8.15	Average
Styrene	1.17022	1.04638	10.58	Average
Xylene (total)	1.30664	1.16048	11.19	Average
1,3-DICHLOROBENZENE	.91855	.73216	20.29	Average

RF - Response Factor from daily standard file at 50.00 PPB

$\overline{RF}$ - Average Response Factor from Initial Calibration

%Diff - % Difference from original average or curve

Calibration Report

Title: CORPS OF ENGINEER
Calibrated: 880728 22:39

Compound	Files: >B9496 RF 20.00	>B9495 RF 50.00	- RF 100.00	- RF 150.00	>B9494 RF 200.00	$\overline{RF}$	% RSD	
1,2-Dichloroethane-d4	1.13948	1.26315	-	-	1.57560	1.32608	16.949	(Conc=50.0,50.0,50.0,50.0,50.0)
Trichlorofluoromethane	1.68931	1.76024	-	-	2.09859	1.84938	11.827	
Chloromethane	1.62317	1.61381	-	-	2.45333	1.89677	25.413	
Bromomethane	1.03608	.85585	-	-	1.11476	1.00223	13.244	
Vinyl Chloride	1.25881	.54751	-	-	1.17536	.99389	39.121	
Chloroethane	1.14763	.76785	-	-	1.04373	.98640	19.898	
Methylene Chloride	4.01401	2.30527	-	-	1.94637	2.75522	40.099	
1,1-Dichloroethene	1.52795	1.46379	-	-	1.63717	1.54297	5.682	
1,1-Dichloroethane	3.09976	3.09572	-	-	3.54623	3.24723	7.974	
1,2-Dichloroethene (total)	1.72437	1.71474	-	-	1.95829	1.79914	7.666	
Chloroform	2.62957	2.72221	-	-	3.13603	2.82927	9.531	
1,2-Dichloroethane	1.34934	1.45188	-	-	1.67797	1.49306	11.262	
1,1,1-Trichloroethane	.37673	.34334	-	-	.40602	.37536	8.356	
Carbon Tetrachloride	.29954	.30592	-	-	.35314	.31954	9.163	
Bromodichloromethane	.55452	.52795	-	-	.58489	.55579	5.126	
1,2-Dichloropropane	.52619	.48593	-	-	.50113	.50442	4.031	
trans-1,3-Dichloropropene	.95569	.89102	-	-	.90844	.91838	3.643	
Trichloroethene	.40835	.38834	-	-	.40680	.40116	2.775	
Benzene	1.31092	1.26887	-	-	1.27297	1.28425	1.805	
Dibromochloromethane	.31894	.32004	-	-	.32876	.32258	1.668	
1,1,2-Trichloroethane	.37753	.35305	-	-	.36068	.36375	3.443	
cis-1,3-Dichloropropene	.95569	.89102	-	-	.90844	.91838	3.643	
2-Chloroethylvinyl Ether	.52619	.48593	-	-	.50113	.50442	4.031	
Bromoform	.29981	.30257	-	-	.31567	.30602	2.768	
Toluene-d8	1.35321	1.28442	-	-	1.31466	1.31743	2.617	(Conc=50.0,50.0,50.0,50.0,50.0)
4-Bromofluorobenzene	.63304	.62378	-	-	.65621	.63768	2.620	(Conc=50.0,50.0,50.0,50.0,50.0)
1,1,2,2-Tetrachloroethane	.76632	.76284	-	-	.70454	.74438	4.636	
Tetrachloroethene	.47441	.47593	-	-	.44745	.46593	3.439	
Toluene	1.66777	1.59775	-	-	1.55128	1.60560	3.652	
Chlorobenzene	1.08649	1.03153	-	-	.98891	1.03564	4.723	
Ethylbenzene	1.81668	1.79952	-	-	1.81587	1.81069	.535	
Styrene	1.14052	1.12121	-	-	1.24889	1.17022	5.880	
Xylene (total)	1.25489	1.27392	-	-	1.39111	1.30664	5.646	
1,3-DICHLOROBENZENE	.98217	.88481	-	-	.88868	.91855	6.002	

RF - Response Factor (Subscript is amount in PPB)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

Calibration Check Report

Title: CORPS OF ENGINEER
Calibrated: 880728 22:39

Check Standard Data File: >E4530
Injection Time: 880730 17:07

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
1,2-Dichloroethane-d4	1.32608	1.22114	7.91	Average
Trichlorofluoromethane	1.84935	1.85184	.13	Average
Chloromethane	1.89677	1.33517	29.61	Average
Bromomethane	1.00223	1.80901	80.50	Average
Vinyl Chloride	.99389	2.04503	105.76	Average
Chloroethane	.98640	1.28351	30.12	Average
Methylene Chloride	2.75522	2.98465	8.33	Average
1,1-Dichloroethene	1.54297	1.65650	7.36	Average
1,1-Dichloroethane	3.24723	3.41892	5.29	Average
1,2-Dichloroethene (total)	1.79914	1.83443	1.96	Average
Chloroform	2.82927	2.88086	1.82	Average
1,2-Dichloroethane	1.49306	1.46856	1.64	Average
1,1,1-Trichloroethane	.37536	.36512	2.73	Average
Carbon Tetrachloride	.31954	.31091	2.70	Average
Bromodichloromethane	.55579	.59777	7.55	Average
1,2-Dichloropropane	.50442	.55303	9.64	Average
trans-1,3-Dichloropropene	.91838	.96895	5.51	Average
Trichloroethene	.40116	.44187	10.15	Average
Benzene	1.28425	1.32983	3.55	Average
Dibromochloromethane	.32258	.33430	3.63	Average
1,1,2-Trichloroethane	.36375	.37948	4.32	Average
cis-1,3-Dichloropropene	.91838	.96895	5.51	Average
2-Chloroethylvinyl Ether	.50442	.55303	9.64	Average
Bromoform	.30602	.30520	.27	Average
Toluene-d8	1.31743	1.26275	4.15	Average
4-Bromofluorobenzene	.63768	.61252	3.94	Average
1,1,2,2-Tetrachloroethane	.74430	.67339	9.53	Average
Tetrachloroethene	.46593	.47896	2.80	Average
Toluene	1.60560	1.66923	3.96	Average
Chlorobenzene	1.03564	1.03678	.11	Average
Ethylbenzene	1.81069	1.84271	1.77	Average
Styrene	1.17022	1.14200	2.41	Average
Xylene (total)	1.30664	1.26332	3.32	Average
1,3-DICHLOROBENZENE	.91855	.82629	10.04	Average

RF - Response Factor from daily standard file at 50.00 PPB

$\overline{RF}$ - Average Response Factor from Initial Calibration

%Diff - % Difference from original average or curve

Calibration Check Report

Title: CORPS OF ENGINEER
Calibrated: 880728 22:39

Check Standard Data File: >B9506
Injection Time: 880728 05:06

Compound	$\overline{\overline{RF}}$	RF	%Diff	Calib Meth
1,2-Dichloroethane-d4	1.32603	1.20176	9.37	Average
Trichlorofluoromethane	1.84936	1.79352	3.02	Average
Chloromethane	1.89677	1.98473	4.64	Average
Bromomethane	1.00223	1.96589	96.15	Average —
Vinyl Chloride	.99389	2.11783	113.08	Average —
Chloroethane	.98640	1.29378	31.16	Average —
Methylene Chloride	2.75522	2.96039	7.45	Average
1,1-Dichloroethene	1.54297	1.64055	6.32	Average
1,1-Dichloroethane	3.24723	3.31817	2.18	Average
1,2-Dichloroethene (total)	1.79914	1.77026	1.60	Average
Chloroform	2.82927	2.79055	1.37	Average
1,2-Dichloroethane	1.49306	1.44521	3.21	Average
1,1,1-Trichloroethane	.37536	.35568	5.24	Average
Carbon Tetrachloride	.31954	.29930	6.33	Average
Bromodichloromethane	.55579	.58097	4.54	Average
1,2-Dichloropropane	.50442	.54711	8.46	Average
trans-1,3-Dichloropropene	.91838	.95464	3.95	Average
Trichloroethene	.40116	.45103	12.43	Average
Benzene	1.28425	1.33965	4.32	Average
Dibromochloromethane	.32258	.32222	.11	Average
1,1,2-Trichloroethane	.36375	.36655	.77	Average
cis-1,3-Dichloropropene	.91838	.95464	3.95	Average
2-Chloroethylvinyl Ether	.50442	.54711	8.46	Average
Bromoform	.30602	.28887	5.60	Average
Toluene-d8	1.31743	1.29997	1.33	Average
4-Bromofluorobenzene	.63768	.66395	4.12	Average
1,1,2,2-Tetrachloroethane	.74430	.58369	21.58	Average —
Tetrachloroethene	.46593	.48538	4.18	Average
Toluene	1.60560	1.72097	7.19	Average
Chlorobenzene	1.03564	1.05113	1.50	Average
Ethylbenzene	1.81069	1.88878	4.31	Average
Styrene	1.17022	1.18402	1.18	Average
Xylene (total)	1.30664	1.31152	.37	Average
1,3-DICHLOROBENZENE	.91855	.81147	11.66	Average

Calibration Report

Title: CORPS OF ENGINEER
Calibrated: 880728 22:39

Compound	RF 20.00	RF 50.00	RF 100.00	RF 150.00	RF 200.00	$\overline{RF}$	% RSD	
Files:	>B9496	>B9495	-	-	>B9494			
1,2-Dichloroethane-d4	1.13948	1.26315	-	-	1.57560	1.32608	16.949	(Conc=50.0,50.0,50.0,50.0,50.0
Trichlorofluoromethane	1.68931	1.76024	-	-	2.09959	1.84938	11.827	
Chloromethane	1.62317	1.61381	-	-	2.45333	1.89677	25.413	
Bromomethane	1.03608	.85585	-	-	1.11476	1.00223	13.244	
Vinyl Chloride	1.25881	.54751	-	-	1.17536	.99389	39.121	
Chloroethane	1.14763	.76785	-	-	1.04373	.98640	19.998	
Methylene Chloride	4.01401	2.30527	-	-	1.94637	2.75522	40.099	
1,1-Dichloroethene	1.52795	1.46379	-	-	1.63717	1.54297	5.682	
1,1-Dichloroethane	3.09976	3.09572	-	-	3.54623	3.24723	7.974	
1,2-Dichloroethene (total)	1.72437	1.71474	-	-	1.95829	1.79914	7.666	
Chloroform	2.62957	2.72221	-	-	3.13603	2.82927	9.531	
1,2-Dichloroethane	1.34934	1.45188	-	-	1.67797	1.49306	11.262	
1,1,1-Trichloroethane	.37673	.34334	-	-	.40602	.37536	8.356	
Carbon Tetrachloride	.29954	.30592	-	-	.35314	.31954	9.163	
Bromodichloromethane	.55452	.52795	-	-	.58489	.55579	5.126	
1,2-Dichloropropane	.52619	.48593	-	-	.50113	.50442	4.031	
trans-1,3-Dichloropropene	.95569	.89102	-	-	.90844	.91838	3.643	
Trichloroethene	.40335	.38834	-	-	.40680	.40116	2.775	
Benzene	1.31092	1.26887	-	-	1.27297	1.28425	1.805	
Dibromochloromethane	.31894	.32004	-	-	.32876	.32258	1.668	
1,1,2-Trichloroethane	.37753	.35305	-	-	.36068	.36375	3.443	
cis-1,3-Dichloropropene	.95569	.89102	-	-	.90844	.91838	3.643	
2-Chloroethylvinyl Ether	.52619	.48593	-	-	.50113	.50442	4.031	
Bromoform	.29981	.30257	-	-	.31567	.30602	2.768	
Toluene-d8	1.35321	1.28442	-	-	1.31466	1.31743	2.617	(Conc=50.0,50.0,50.0,50.0,50.0)
4-Bromofluorobenzene	.63304	.62378	-	-	.65621	.63768	2.620	(Conc=50.0,50.0,50.0,50.0,50.0)
1,1,2,2-Tetrachloroethane	.76632	.76204	-	-	.70454	.74430	4.636	
Tetrachloroethene	.47441	.47593	-	-	.44745	.46593	3.439	
Toluene	1.66777	1.59775	-	-	1.55128	1.60560	3.652	
Chlorobenzene	1.08649	1.03153	-	-	.98391	1.03564	4.723	
Ethylbenzene	1.81668	1.79952	-	-	1.81587	1.81069	.535	
Styrene	1.14057	1.12121	-	-	1.24889	1.17022	5.880	
Xylene (total)	1.25489	1.27392	-	-	1.39111	1.30664	5.646	
1,3-DICHLOROBENZENE	.98217	.88481	-	-	.88868	.91855	6.802	

RF - Response Factor (Subscript is amount in PPB)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

Calibration Check Report

Title: CORPS OF ENGINEER
Calibrated: 880728 22:39

Check Standard Data File: >B9520
Injection Time: 880728 18:15

Compound	$\overline{RF}$	RF	%Diff	Calib Meth
1,2-Dichloroethane-d4	1.32608	1.22673	7.49	Average
Trichlorofluoromethane	1.84938	1.81465	1.88	Average
Chloromethane	1.89677	1.89269	.22	Average
Bromomethane	1.00223	1.86557	86.14	Average —
Vinyl Chloride	.99389	2.23589	124.96	Average —
Chloroethane	.98640	1.32878	34.71	Average —
Methylene Chloride	2.75522	2.92331	6.10	Average
1,1-Dichloroethene	1.54297	1.61129	4.43	Average
1,1-Dichloroethane	3.24723	3.41621	5.20	Average
1,2-Dichloroethene (total)	1.79914	1.73820	3.39	Average
Chloroform	2.82927	2.79596	1.18	Average
1,2-Dichloroethane	1.49306	1.48013	.87	Average
1,1,1-Trichloroethane	.37536	.36456	2.88	Average
Carbon Tetrachloride	.31954	.30848	3.46	Average
Bromodichloromethane	.55579	.58733	5.67	Average
1,2-Dichloropropane	.50442	.54879	8.80	Average
trans-1,3-Dichloropropene	.91838	.93927	2.27	Average
Trichloroethene	.40116	.43268	7.86	Average
Benzene	1.28425	1.33973	4.32	Average
Dibromochloromethane	.32258	.31917	1.06	Average
1,1,2-Trichloroethane	.36375	.36063	.86	Average
cis-1,3-Dichloropropene	.91838	.93927	2.27	Average
2-Chloroethylvinyl Ether	.50442	.54879	8.80	Average
Bromoform	.30602	.28813	5.85	Average
Toluene-d8	1.31743	1.24254	5.68	Average
4-Bromofluorobenzene	.63768	.62743	1.61	Average
1,1,2,2-Tetrachloroethane	.74438	.62248	16.37	Average
Tetrachloroethene	.46593	.45955	1.37	Average
Toluene	1.60560	1.65216	2.90	Average
Chlorobenzene	1.03564	1.03724	.15	Average
Ethylbenzene	1.81069	1.85003	2.17	Average
Styrene	1.17022	1.13890	2.68	Average
Xylene (total)	1.30664	1.26574	3.13	Average
1,3-DICHLOROBENZENE	.91855	.81204	11.60	Average

RF - Response Factor from daily standard file at 50.00 PPB

$\overline{RF}$ - Average Response Factor from Initial Calibration

%Diff - % Difference from original average or curve

HSL Compounds

Case No: ------------------------ Instrument ID: --------------------

Contractor: ---------------------- Calibration Date: 08/30/88 -----------------

Contract No: ---------------------

Minimum $\overline{RF}$ for SPCC is Maximum % RSD for CCC is %

Laboratory ID:	A2830	A2826	A2829	A2828	A2827					
Compound	RF 20.00	RF 50.00	RF 100.00	RF 150.00	RF 200.00	$\overline{RF}$	% RSD	CCC	SPCC	
Chloromethane	1.72927	1.48464	1.78143	1.47039	1.49712	1.59257	9.421		**	
Vinyl chloride	1.97864	1.65421	2.07091	1.71716	1.70613	1.82541	10.212	*		
Chloroethane	2.00405	1.56214	2.31198	1.93254	1.93627	1.94940	13.690			
Bromomethane	1.58461	1.41300	1.38019	1.67529	1.60514	1.53165	8.377			
Trichlorofluoromethane	1.70944	1.27333	1.20243	.91023	.98649	1.21638	25.773			
Acrolein	.36456	.31467	.29503	.22589	.20936	.28190	22.769			(Conc=200.0,500.0,1000.0,1500.0,..
1,1-Dichloroethene	2.07867	1.68428	1.98114	1.93161	1.54101	1.82334	11.928	*		
Acetone	2.29456	1.35623	.97713	.72181	.54446	1.15884	60.661			
Iodomethane	2.79510	3.33149	4.26648	3.76230	3.44429	3.51993	15.448			
Allyl Chloride	4.33208	3.63509	3.48941	2.80469	2.55684	3.36362	20.973			
Carbon Disulfide	6.90292	7.03551	7.76897	7.15110	6.43828	7.05935	6.804			
Propionitrile	.25655	.27374	.26268	.24331	.22987	.25323	6.739			
Methylene Chloride	9.49926	5.73196	6.11511	3.79978	3.22741	5.67470	43.460			
Acrylonitrile	3.90986	3.34849	4.05817	3.76951	3.31404	3.78001	7.438			
1,2-Dichloroethene (total)	2.13964	2.17560	2.70603	2.56579	2.41479	2.40037	10.194			
1,1-Dichloroethane	4.84956	4.76993	5.55173	4.75740	4.61428	4.90858	7.526		**	
Vinyl Acetate	6.70197	6.57193	6.30071	5.97850	5.72951	6.35652	7.459			
2-Butanone	.25067	.22843	.22695	.21846	.19900	.22470	8.305			
Chloroform	4.98984	4.60785	4.59749	4.34021	4.53952	4.61498	5.106	*		
1,1,1-Trichloroethane	4.03370	3.64713	3.34763	2.99846	3.09949	3.42528	12.332			
Carbon tetrachloride	3.63199	3.14660	2.92294	2.58055	2.70686	2.99777	13.840			
Methacrylonitrile	.14836	.16993	.16603	.16927	.17932	.16658	6.798			
Benzene	1.34028	1.29318	1.28938	1.25211	1.38062	1.31112	3.805			
1,2-Dichloroethane-d4	.50293	.47791	.48278	.47707	.47244	.48262	2.472			(Conc=50.0,50.0,50.0,50.0,50.0)
1,2-Dichloroethane	.69088	.67684	.64876	.64625	.69458	.67146	3.405			
Trichloroethene	.40232	.40484	.40416	.40461	.42525	.40824	2.342			
1,2-Dichloropropane	.57574	.56274	.57365	.56546	.60808	.57714	3.142	*		
Methylmethacrylate	.36663	.39525	.37526	.36594	.36849	.37431	3.278			
Dibromomethane	.43881	.45911	.43594	.43764	.45873	.44605	2.645			
Bromodichloromethane	.79634	.80463	.80288	.79715	.86093	.81239	3.369			
cis-1,3-Dichloropropene	.91067	.88252	.91267	.91405	.98640	.92126	4.198			
4-Methyl-2-pentanone	.81020	.79408	.82171	.81853	.82303	.81351	1.469			

RF - Response Factor (Subscript is amount in PPB)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Calibration Report

Title: CORPS OF ENGINEER
Calibrated: 880728 22:39

Compound	Files: >B9496 RF 20.00	>B9495 RF 50.00	- RF 100.00	- RF 150.00	>B9494 RF 200.00	
1,2-Dichloroethane-d4	1.13948	1.26315	-	-	1.57560	(Conc=50.0,50.0,50.0,50.0,50.0)
Trichlorofluoromethane	1.58931	1.76024	-	-	2.09359	
Chloromethane	1.62317	1.61381	-	-	2.45333	
Bromomethane	1.03608	.85595	-	-	1.11476	
Vinyl Chloride	1.25881	.54751	-	-	1.17536	
Chloroethane	1.14763	.76785	-	-	1.04373	
Methylene Chloride	4.01401	2.30527	-	-	1.94637	
1,1-Dichloroethene	1.52795	1.46379	-	-	1.63717	
1,1-Dichloroethane	3.09976	3.09572	-	-	3.54623	
1,2-Dichloroethene (total)	1.72437	1.71474	-	-	1.95829	
Chloroform	2.62957	2.72221	-	-	3.13603	
1,2-Dichloroethane	1.34934	1.45188	-	-	1.67797	
1,1,1-Trichloroethane	.37673	.34334	-	-	.40602	
Carbon Tetrachloride	.29954	.30592	-	-	.35314	
Bromodichloromethane	.55452	.52795	-	-	.58489	
1,2-Dichloropropane	.52619	.48593	-	-	.50113	
trans-1,3-Dichloropropene	.95569	.89102	-	-	.90844	
Trichloroethene	.40835	.38834	-	-	.40690	
Benzene	1.31092	1.26887	-	-	1.27297	
Dibromochloromethane	.31894	.32004	-	-	.32976	
1,1,2-Trichloroethane	.37753	.35305	-	-	.36068	
cis-1,3-Dichloropropene	.95569	.89102	-	-	.90844	
2-Chloroethylvinyl Ether	.52619	.48593	-	-	.50113	
Bromoform	.29981	.30257	-	-	.31567	
Toluene-d8	1.35321	1.28442	-	-	1.31466	(Conc=50.0,50.0,50.0,50.0,50.0)
4-Bromofluorobenzene	.63304	.62378	-	-	.65621	(Conc=50.0,50.0,50.0,50.0,50.0)
1,1,2,2-Tetrachloroethane	.76632	.76204	-	-	.70454	
Tetrachloroethene	.47441	.47593	-	-	.44745	
Toluene	1.66777	1.59775	-	-	1.55128	
Chlorobenzene	1.08649	1.03153	-	-	.98891	
Ethyibenzene	1.81668	1.79952	-	-	1.81587	
Styrene	1.14057	1.12121	-	-	1.24839	
Xylene (total)	1.25489	1.27392	-	-	1.39111	
1,3-DICHLOROBENZENE	.98217	.88491	-	-	.88868	

RF - Response Factor (Subscript is amount in PPB)

Case No:

Contractor:

Contract No:

Instrument ID:

Calibration Date: 05/20 98

Minimum $\overline{RF}$ for SPCC is

Maximum % RSD for CCC is %

Laboratory ID: Compound	A2330 RF 20.00	A2326 RF 50 00	A2329 RF 100.00	A2328 RF 150 00	A2327 RF 200.00	$\overline{RF}$	% RSD	CCC	SPCC	
Toluene-d8	.99023	.99851	1.01576	.99960	.99697	.99981	.361			(Conc=50.0,50.0,50.0,50.0,50.0)
Toluene	.74536	.70803	.72637	.71216	.77369	.73312	3.679	*		
trans-1,3-Dichloropropene	.34489	.34556	.35061	.34385	.37387	.35176	3.592			
1,1,2-Trichloroethane	.37310	.36545	.36641	.36105	.37940	.36908	1.952			
Tetrachloroethene	.32180	.31325	.31987	.31324	.34064	.32176	3.492			
2-Hexanone	.30272	.39267	.38020	.36539	.34995	.35819	9.742			
Dibromochloromethane	.52497	.51849	.52349	.50874	.53925	.52299	2.120			
1,2-Dibromoethane	.43944	.46673	.44588	.43688	.43451	.44469	2.931			
Chlorobenzene	1.13973	1.13686	1.15017	1.12957	1.22165	1.15560	3.259		**	
1,1,1,2-Tetrachloroethane	.49387	.53999	.52813	.52458	.54997	.52731	4.024			
Ethylbenzene	.59896	.60828	.63655	.63719	.71082	.63836	6.879	*		
Xylene (total)	.66044	.65440	.67921	.66655	.72932	.67798	4.444			
Styrene	1.17560	1.17816	1.23378	1.21903	1.35562	1.23244	5.953			
2-Chloroethylvinyl ether	.35540	.36285	.36675	.36223	.38388	.36622	2.917			
Bromoform	.43295	.43797	.45347	.44022	.45738	.44440	2.362		**	
4-Bromofluorobenzene	.87171	.86461	.93652	.89289	.88279	.88370	1.889			(Conc=50.0,50.0,50.0,50.0,50.0)
1,1,2,2-Tetrachloroethane	.94785	.83402	.81719	.74161	.72387	.79291	7.106		**	
1,2,3-trichloropropane	.56420	.58563	.56805	.52566	.50554	.54982	6.009			
Trans-1,4-dichloro-2-butene	.26749	.29604	.29144	.26469	.26223	.27638	5.804			
1,3-Dichlorobenzene	1.05758	1.03212	.94474	.97253	.97143	.99568	4.732			

RF - Response Factor (Subscript is amount in PPB)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

APPENDIX I

RESULTS OF USCOE MISSOURI
RIVER DIVISION LABORATORY ANALYSES

DEPARTMENT OF THE ARMY
MISSOURI RIVER DIVISION, CORPS OF ENGINEERS
P.O. BOX 103, DOWNTOWN STATION
OMAHA, NEBRASKA 68101-0103

REPLY TO
ATTENTION OF

CEMRD-ED-GL (200)

9 December 88

MEMORANDUM FOR: Commander, US Army Engineer District, Buffalo, ATTN: CENCB-ED-HQ (Stephen Yaksich), 1776 Niagara Street, Buffalo, NY 14207-3199

SUBJECT: Truax Field Madison, Wisconsin, QA/QC Final Report

1. This is in response to the request from CENCB-ED-HQ for quality assurance testing.

2. Enclosed is a copy of the QA/QC Final Report, SAB.

3. The contractor's data met the quality assurance criteria as specified in the approved QCP

4. Minor chain-of-custody and sample shipping errors were noted. Two major data disagreements for metals were noted.

5. If there are any questions or comments, please call Joe Solsky, (402) 444-4304.

FOR THE COMMANDER:

1 Encl
QA Report

WILLIAM P. TODSEN, P.E.
Chief, Engineering Division

9 DEC 88 09 14

MAILROOM-NCBIN-S

MRD LAB NO. 88/561

DEPARTMENT OF THE ARMY
MISSOURI RIVER DIVISION, CORPS OF ENGINEERS
DIVISION LABORATORY
OMAHA, NEBRASKA 68102

30 NOV 1988

Subject: QA/QC Final Report

Project: Truax Field, Madison, Wisconsin
Intended Use: DERP Confirmation Study
Source of Material:

Submitted by: Stephen Yaksich, CENCB-ED-HQ, Buffalo District
Date Sampled: ____________, Date Received: 13 & 16 July 88
Method of Test or Specification: See attached Tables 1 - 7

References: Huntsville Project Number: E05WI004800
Huntsville District Request Number: E87880024 chg 4 dated 10 May 88

-- REMARKS --

1. Overall Evaluation: The Quality Assurance data generally agrees with the Contractors data. Several minor and two major data disagreements were encountered. Minor chain-of-custody and sample shipping errors were noted.

2. Contractor Data Evaluation: Proper Quality Control procedures were followed and documented in most cases. Instrument blanks for volatile organics were acceptable. Blanks for petroleum hydrocarbons and metals were not reported. Recoveries of surrogates for volatile organics were acceptable. Four samples had recovery of more than one surrogate compound out of the control range for the original test as well as a duplicate test. Matrix interference may have caused the problem since problems were encountered with both tests. Field duplicates were acceptable except for volatile organic test results for sample TG-3 and TG-16 which showed variation in ethylbenzene content from not detected to 33.4 ug/L. Several additional tentatively compounds were also found in sample TG-16 totaling 818 ug/L with none found in the duplicate, TG-3. Laboratory duplicates were acceptable. Matrix spike recoveries for volatile organics and petroleum hydrocarbons were not reported. Matrix spike recoveries for metals had several out of control range results, one of four for silver, two of two for mercury, two of three for lead and one of four for selenium. Matrix spike duplicates were not reported. Trip blanks and rinsates were free of contamination except for low levels of common metals in rinsates and a common volatile organic contaminant in the trip blank. One rinsate contained low levels of chloroform, 1,1,2,2-tetrachloroethane and trichloroethene.

Solsky/rdk/444-4304

3. QA/QC Data Comparison: Volatile organic data agreed with few exceptions, mostly for common contaminants. Petroleum hydrocarbon data agreed. Metals data had several minor disagreements and two serious disagreements for cadmium and mercury. Trip blank data agreed except for one common laboratory contaminant. Rinsate data agreed except for low levels of some common metals in one sample and low levels of 1,1,2,2-tetrachloroethane and trichloroethene in another.

4. Other Problems: Scopes of Work should be written such that the contents of the Final Data Report are very carefully defined. Several laboratory QC criteria items were not included in the Final Data Package. Custody seals were not used on the sample shipping coolers. Some samples were not preserved or preserved with the wrong preservative. Air bubbles were found in some volatile organic sample vials.

Submitted by:

R. K. SCHLENKER, P.E.
Director, MRD Lab

Table 1

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

COMPARISON OF QA & CONTRACTOR RESULTS

Project: Truax Field, Madison, Wisconsin
QA Sample ID.: TS-7 Split-Soil
Material Description: Soil
Contractor's Sample ID.: TS-7
Date Sampled: 12 July 88

Analysis	QA Lab Result	Contractor Result	Units	Analysis	QA Lab Result	Contractor Result	Units
VOLATILE ORGANICS							
Acetone	BDL	--	ug/kg	1,2-Dichloropropane	<5.0	<1.5	ug/kg
Benzene	<1.0	<0.5	ug/kg	cis-1,3-Dichloropropene	<1.0	<1.5	ug/kg
Bromodichloromethane	<1.0	<1.1	ug/kg	trans-1,3-Dichloropropene	<1.0	<1.5	ug/kg
Bromoform	<2.0	<3 2	ug/kg	Ethylbenzene	<2.0	<0.4	ug/kg
Bromomethane	<2.0	<1.5	ug/kg	2-Hexanone	BDL	--	ug/kg
2-Butanone	BDL	--	ug/kg	Methylene chloride	<2.0	*C 31.9	ug/kg
Carbon disulfide	BDL	--	ug/kg	4-Methyl-2-pentanone	BDL	--	ug/kg
Carbon tetrachloride	<1.0	<1.5	ug/kg	Styrene	<2.0	--	ug/kg
Chlorobenzene	<2.0	<0.6	ug/kg	1,1,2,2-Tetrachloroethane	<2.0	<1.4	ug/kg
Chlorodibromomethane	<2.0	<2.0	ug/kg	Tetrachloroethene	<2.0	<1.5	ug/kg
Chloroethane	<5.0	<2.4	ug/kg	Toluene	<2.0	<1.0	ug/kg
2-Chloroethyl vinyl ether	<5.0	<5.9	ug/kg	1,1,1-Trichloroethane	<1.0	<1.2	ug/kg
Chloroform	<1.0	<0.8	ug/kg	1,1,2-Trichloroethane	<5.0	<1.6	ug/kg
Chloromethane	<10.0	<1.6	ug/kg	Trichloroethene	<2.0	<1.3	ug/kg
1,1-Dichloroethane	<1.0	<0.8	ug/kg	Vinyl acetate	BDL	--	ug/kg
1,2-Dichloroethane	<2.0	<1.5	ug/kg	Vinyl chloride	<10.0	<1.2	ug/kg
1,1-Dichloroethene	<2.0	<1.9	ug/kg	Total Xylenes	<2.0	--	
Total 1,2-Dichloroethene	<2.0	<1.5	ug/kg				

Analysis	QA Lab Result	Contractor Result	Units	Analysis	QA Lab Result	Contractor Result	Units
Metals							
Arsenic	1.4	3.1	mg/kg	Lead	3.27	8.8	mg/kg
Barium	30.4	60	mg/kg	Mercury	<0.075	* 1.29	mg/kg
Cadmium	<5.5	<2.0	mg/kg	Selenium	<0.14	<0.23	mg/kg
Chromium	2.27	5.3	mg/kg	Silver	<3.0	0.17	mg/kg

Analysis	QA Lab Result	Contractor Result	Units
MISCELLANEOUS			
Petroleum Hydrocarbons	66.5	<50	mg/kg

COMMENTS: -: Not analyzed.
*: Data disagreement.
C: Common laboratory contaminant.
BDL: Below detection limits, instrument detection limit not established.

Volatile organics: Data agreed except for a common laboratory contaminant.
Metals: The data disagreement is significant. The mercury level found by the contractor is well above the average range for soils.
Petroleum Hydrocarbons: Data agreed.

Table 2

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

COMPARISON OF QA & CONTRACTOR RESULT

Project: Truax Field, Madison, Wisconsin
QA Sample ID.: TW-1 Split Water
Material Description: Water
Contractor's Sample ID.: TW-1
Date Sampled: 12 July 88

Analysis	QA Lab Result	Contractor Result	Units	Analysis	QA Lab Result	Contractor Result	Units
VOLATILE ORGANICS							
Acetone	BDL	--	ug/L	1,2-Dichloropropane	<5.0	<1.5	ug/L
Benzene	<1.0	<0.5	ug/L	cis-1,3-Dichloropropene	<1.0	<1.5	ug/L
Bromodichloromethane	<1.0	<1.1	ug/L	trans-1,3-Dichloropropene	<1.0	<1.5	ug/L
Bromoform	<2.0	<3.2	ug/L	Ethylbenzene	<2.0	<0.4	ug/L
Bromomethane	<2.0	<1.5	ug/L	2-Hexanone	BDL	--	ug/L
2-Butanone	BDL	--	ug/L	Methylene chloride	<2.0	<1.4	ug/L
Carbon disulfide	BDL	--	ug/L	4-Methyl-2-pentanone	BDL	--	ug/L
Carbon tetrachloride	<1.0	<1.5	ug/L	Styrene	<2.0	--	ug/L
Chlorobenzene	<2.0	<0.6	ug/L	1,1,2,2-Tetrachloroethane	<2.0	<1.4	ug/L
Chlorodibromomethane	<2.0	<2.0	ug/L	Tetrachloroethene	<2.0	<1.5	ug/L
Chloroethane	<5.0	<2.4	ug/L	Toluene	<2.0	<1.0	ug/L
2-Chloroethyl vinyl ether	<5.0	<5.9	ug/L	1,1,1-Trichloroethane	<1.0	<1.2	ug/L
Chloroform	<1.0	<0.8	ug/L	1,1,2-Trichloroethane	<5.0	<1.6	ug/L
Chloromethane	<10.0	<1.6	ug/L	Trichloroethene	<2.0	<1.3	ug/L
1,1-Dichloroethane	<1.0	<0.8	ug/L	Vinyl acetate	BDL	--	ug/L
1,2-Dichloroethane	<2.0	<1.5	ug/L	Vinyl chloride	<10.0	<1.2	ug/L
1,1-Dichloroethene	<2.0	<1.9	ug/L	Total Xylenes	<2.0	--	ug/L
Total 1,2-Dichloroethene	<2.0	<1.5	ug/L				

Analysis	QA Lab Result	Contractor Result	Units	Analysis	QA Lab Result	Contractor Result	Units
Metals							
Arsenic	<1.57	<3.4	ug/L	Lead	<26.7	15	ug/L
Barium	43	39	ug/L	Mercury	<0.28	<0.2	ug/L
Cadmium	48 *	<2.0	ug/L	Selenium	<0.14	<2	ug/L
Chromium	<12.8	<4	ug/L	Silver	<3.0	<1.4	ug/L

Analysis	QA Lab Result	Contractor Result	Units
MISCELLANEOUS			
Petroleum Hydrocarbons	<1.0	<1	mg/L

COMMENTS: -: Not analyzed.
*: Data disagreement.
C: Common laboratory contaminant.
BDL: Below detection limits, instrument detection limit not established.

Volatile organics: Data agreed.
Metals: The data disagreement is significant. The cadmium level found by the QA laboratory is close to the MCL standard of 50 ug/L.
Petroleum Hydrocarbons: Data agreed.

Table 3

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

COMPARISON OF QA & CONTRACTOR RESULTS

Project: Truax Field, Madison, Wisconson
QA Sample ID.: TG-1 Split-water
Material Description: Water

Contractor's Sample ID.: TG-1
Date Sampled: 11 July 88

Analysis	QA Lab Result	Contractor Result	Units	Analysis	QA Lab Result	Contractor Result	Units
VOLATILE ORGANICS							
Acetone	BDL	--	ug/L	1,2-Dichloropropane	<5.0	<1.5	ug/L
Benzene	<1.0	<0.5	ug/L	cis-1,3-Dichloropropene	<1.0	<1.5	ug/L
Bromodichloromethane	<1.0	<1.1	ug/L	trans-1,3-Dichloropropene	<1.0	<1.5	ug/L
Bromoform	<2.0	<3.2	ug/L	Ethylbenzene	<2.0	<0.4	ug/L
Bromomethane	<2.0	<1.5	ug/L	2-Hexanone	BDL	--	ug/L
2-Butanone	BDL	--	ug/L	Methylene chloride	<2.0	<1.4	ug/L
Carbon disulfide	BDL	--	ug/L	4-Methyl-2-pentanone	BDL	--	ug/L
Carbon tetrachloride	<1.0	<1.5	ug/L	Styrene	<2.0	--	ug/L
Chlorobenzene	<2.0	<0.6	ug/L	1,1,2,2-Tetrachloroethane	<2.0	<1.4	ug/L
Chlorodibromomethane	<2.0	<2.0	ug/L	Tetrachloroethene	<2.0	<1.5	ug/L
Chloroethane	<5.0	<2.4	ug/L	Toluene	4.79 *C	<1.0	ug/L
2-Chloroethyl vinyl ether	<5.0	<5.9	ug/L	1,1,1-Trichloroethane	<1.0	<1.2	ug/L
Chloroform	<1.0	<0.8	ug/L	1,1,2-Trichloroethane	<5.0	<1.6	ug/L
Chloromethane	<10.0	<1.6	ug/L	Trichloroethene	<2.0	<1.3	ug/L
1,1-Dichloroethane	<1.0	<0.8	ug/L	Vinyl acetate	BDL	--	ug/L
1,2-Dichloroethane	<2.0	<1.5	ug/L	Vinyl chloride	<10.0	<1.2	ug/L
1,1-Dichloroethene	<2.0	<1.9	ug/L	Total Xylenes	<2.0	--	ug/L
Total 1,2-Dichloroethene	<2.0	<1.5	ug/L				

Analysis	QA Lab Result	Contractor Result	Units	Analysis	QA Lab Result	Contractor Result	Units
Metals							
Arsenic	<1.57 *	6.9	ug/L	Lead	<26.7	30	ug/L
Barium	449 >PQL	430	ug/L	Mercury	<0.28	0.22	ug/L
Cadmium	<5.5	3	ug/L	Selenium	<0.14	<2	ug/L
Chromium	<12.8	21	ug/L	Silver	<3.0	<1.4	ug/L
Sodium	86,900	87,800	ug/L	Iron	40,900 *	108,000	ug/L
Manganese >SS	5400	5320	ug/L				

Analysis	QA Lab Result	Contractor Result	Units
MISCELLANEOUS			
Petroleum Hydrocarbons	<1.0	<1	mg/L

COMMENTS:
- -: Not analyzed.
- *: Data disagreement.
- C: Common laboratory contaminant.
- BDL: Below detection limits, instrument detection limit not established.

Volatile organics: Data agreed except for a common laboratory contaminant.
Metals: Data disagreements are not serious at this level.
Petroleum Hydrocarbons: Data agreed.

Table 4

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

COMPARISON OF QA & CONTRACTOR RESULTS

Project: Truax Field, Madison, Wisconson
QA Sample ID.: TY-1 Ground Water Sample Blank
Material Description: Water

Contractor's Sample ID.: TY-1
Date Sampled: 11 July 88

Analysis	QA Lab Result		Contractor Result	Units	Analysis	QA Lab Result		Contractor Result	Units
VOLATILE ORGANICS									
Acetone	BDL		--	ug/L	1,2-Dichloropropane	<5.0		<1.5	ug/L
Benzene	<1.0		<0.5	ug/L	cis-1,3-Dichloropropene	<1.0		<1.5	ug/L
Bromodichloromethane	<1.0		<1.1	ug/L	trans-1,3-Dichloropropene	<1.0		<1.5	ug/L
Bromoform	<2.0		<3.2	ug/L	Ethylbenzene	<2.0		<0.4	ug/L
Bromomethane	<2.0		<1.5	ug/L	2-Hexanone	BDL		--	ug/L
2-Butanone	BDL		--	ug/L	Methylene chloride	<2.0		<1.4	ug/L
Carbon disulfide	BDL		--	ug/L	4-Methyl-2-pentanone	BDL		--	ug/L
Carbon tetrachloride	<1.0		<1.5	ug/L	Styrene	<2.0		--	ug/L
Chlorobenzene	<2.0		<0.6	ug/L	1,1,2,2-Tetrachloroethane	<2.0		<1.4	ug/L
Chlorodibromomethane	<2.0		<2.0	ug/L	Tetrachloroethene	<2.0		<1.5	ug/L
Chloroethane	<5.0		<2.4	ug/L	Toluene	<2.0		<1.0	ug/L
2-Chloroethyl vinyl ether	<5.0		<5.9	ug/L	1,1,1-Trichloroethane	<1.0		<1.2	ug/L
Chloroform	4.57		5.2	ug/L	1,1,2-Trichloroethane	<5.0		<1.6	ug/L
Chloromethane	<10.0		<1.6	ug/L	Trichloroethene	<2.0		<1.3	ug/L
1,1-Dichloroethane	<1.0		<0.8	ug/L	Vinyl acetate	BDL		--	ug/L
1,2-Dichloroethane	<2.0		<1.5	ug/L	Vinyl chloride	<10.0		<1.2	ug/L
1,1-Dichloroethene	<2.0		<1.9	ug/L	Total Xylenes	<2.0		--	ug/L
Total 1,2-Dichloroethene	<2.0		<1.5	ug/L					

Analysis	QA Lab Result		Contractor Result	Units	Analysis	QA Lab Result		Contractor Result	Units
Metals									
Arsenic	<1.57		<3.4	ug/L	Lead	<26.7		<10	ug/L
Barium	<1.5		<4	ug/L	Mercury	<0.28		<0.2	ug/L
Cadmium	<5.5		<2	ug/L	Selenium	<0.14		<2	ug/L
Chromium	<12.8		<4	ug/L	Silver	<3.0		<1.4	ug/L
Sodium	405	*	162	ug/L	Iron	302	*	17	ug/L
Manganese	<1.5		<2.0	ug/L					

Analysis	QA Lab Result	Contractor Result	Units
MISCELLANEOUS			
Petroleum Hydrocarbons	<1.0	<1	mg/L

COMMENTS: -: Not analyzed.
*: Data disagreement.
C: Common laboratory contaminant.
BDL: Below detection limits, instrument detection limit not established.
Volatile organics: Data agreed.
Metals: Data disagreements are not serious.
Petroleum Hydrocarbons: Data agreed.

Table 5

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

COMPARISON OF QA & CONTRACTOR RESULTS

Project: Truax Field, Madison, Wisconson
QA Sample ID.: TY-2, Surface Water Sample Blank
Material Description: Water

Contractor's Sample ID.: TY-2
Date Sampled: 12 July 88

Analysis	QA Lab Result	Contractor Result	Units	Analysis	QA Lab Result	Contractor Result	Units
VOLATILE ORGANICS							
Acetone	BDL	--	ug/L	1,2-Dichloropropane	<5.0	<1.5	ug/L
Benzene	<1.0	<0.5	ug/L	cis-1,3-Dichloropropene	<1.0	<1.5	ug/L
Bromodichloromethane	<1.0	<1.1	ug/L	trans-1,3-Dichloropropene	<1.0	<1.5	ug/L
Bromoform	<2.0	<3.2	ug/L	Ethylbenzene	<2.0	<0.4	ug/L
Bromomethane	<2.0	<1.5	ug/L	2-Hexanone	BDL	--	ug/L
2-Butanone	BDL	--	ug/L	Methylene chloride	<2.0	<1.4	ug/L
Carbon disulfide	BDL	--	ug/L	4-Methyl-2-pentanone	BDL	--	ug/L
Carbon tetrachloride	<1.0	<1.5	ug/L	Styrene	<2.0	--	ug/L
Chlorobenzene	<2.0	<0.6	ug/L	1,1,2,2-Tetrachloroethane	<2.0	<1.4	ug/L
Chlorodibromomethane	<2.0	<2.0	ug/L	Tetrachloroethene	<2.0	<1.5	ug/L
Chloroethane	<5.0	<2.4	ug/L	Toluene	<2.0	<1.0	ug/L
2-Chloroethyl vinyl ether	<5.0	<5.9	ug/L	1,1,1-Trichloroethane	<1.0	<1.2	ug/L
Chloroform	5.75 > PAL	5.5	ug/L	1,1,2-Trichloroethane	<5.0	<1.6	ug/L
Chloromethane	<10.0	<1.6	ug/L	Trichloroethene	<2.0	<1.3	ug/L
1,1-Dichloroethane	<1.0	<0.8	ug/L	Vinyl acetate	BDL	--	ug/L
1,2-Dichloroethane	<2.0	<1.5	ug/L	Vinyl chloride	<10.0	<1.2	ug/L
1,1-Dichloroethene	<2.0	<1.9	ug/L	Total Xylenes	<2.0	--	ug/L
Total 1,2-Dichloroethene	<2.0	<1.5	ug/L				

Analysis	QA Lab Result	Contractor Result	Units	Analysis	QA Lab Result	Contractor Result	Units
Metals							
Arsenic	<1.57	<3.4	ug/L	Lead	<26.7	<10	ug/L
Barium	<1.5	<4	ug/L	Mercury	<0.28	xx 0.26	ug/L
Cadmium	<5.5	<2	ug/L	Selenium	<0.14	<2	ug/L
Chromium	<12.8	<4	ug/L	Silver	<3.0	<1.4	ug/L

Analysis	QA Lab Result	Contractor Result	Units
MISCELLANEOUS			
Petroleum Hydrocarbons	<1.0	<1	mg/L

COMMENTS:
- -: Not analyzed.
- *: Data disagreement.
- C: Common laboratory contaminant.
- xx: A repeat analysis by the contractors's laboratory indicated <0.2 ug/L mercury.
- BDL: Below detection limits, instrument detection limit not established.

All data agreed.

Table 6

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

COMPARISON OF QA & CONTRACTOR RESULTS

Project: Traux Field, Madison, Wisconson
QA Sample ID.: TY-3 Split Soil Rinsate
Material Description: Water

Contractor's Sample ID.: TY-3
Date Sampled: 12 July 88

Analysis	QA Lab Result	Contractor Result	Units	Analysis	QA Lab Result		Contractor Result	Units
VOLATILE ORGANICS								
Acetone	BDL	--	ug/L	1,2-Dichloropropane	<5.0		<1.5	ug/L
Benzene	<1.0	<0.5	ug/L	cis-1,3-Dichloropropene	<1.0		<1.5	ug/L
Bromodichloromethane	<1.0	<1.1	ug/L	trans-1,3-Dichloropropene	<1.0		<1.5	ug/L
Bromoform	<2.0	<3.2	ug/L	Ethylbenzene	<2.0		<0.4	ug/L
Bromomethane	<2.0	<1.5	ug/L	2-Hexanone	BDL		--	ug/L
2-Butanone	BDL	--	ug/L	Methylene chloride	<2.0		<1.4	ug/L
Carbon disulfide	BDL	--	ug/L	4-Methyl-2-pentanone	BDL		--	ug/L
Carbon tetrachloride	<1.0	<1.5	ug/L	Styrene	<2.0		--	ug/L
Chlorobenzene	<2.0	<0.6	ug/L	1,1,2,2-Tetrachloroethane	5.97	*	<1.4	ug/L
Chlorodibromomethane	<2.0	<2.0	ug/L	Tetrachloroethene	<2.0		<1.5	ug/L
Chloroethane	<5.0	<2.4	ug/L	Toluene	<2.0		<1.0	ug/L
2-Chloroethyl vinyl ether	<5.0	<5.9	ug/L	1,1,1-Trichloroethane	<1.0		<1.2	ug/L
Chloroform	5.00	6.1	ug/L	1,1,2-Trichloroethane	<5.0		<1.6	ug/L
Chloromethane	<10.0	<1.6	ug/L	Trichloroethene	4.85	*	<1.3	ug/L
1,1-Dichloroethane	<1.0	<0.8	ug/L	Vinyl acetate	BDL		--	ug/L
1,2-Dichloroethane	<2.0	3.9	ug/L	Vinyl chloride	<10.0		<1.2	ug/L
1,1-Dichloroethene	<2.0	<1.9	ug/L	Total Xylenes	<2.0		--	ug/L
Total 1,2-Dichloroethene	<2.0	<1.5	ug/L					

Analysis	QA Lab Result	Contractor Result	Units	Analysis	QA Lab Result	Contractor Result	Units
Metals							
Arsenic	<1.57	<3.4	ug/L	Lead	<26.7	<10	ug/L
Barium	<1.5	<4	ug/L	Mercury	<0.28	0.26	ug/L
Cadmium	<5.5	<2	ug/L	Selenium	<0.14	<2	ug/L
Chromium	<12.8	<4	ug/L	Silver	<3.0	<1.4	ug/L

Analysis	QA Lab Result	Contractor Result	Units
MISCELLANEOUS			
Petroleum Hydrocarbons	<1.0	<1	mg/L

COMMENTS: -: Not analyzed.
*: Data disagreement.
C: Common laboratory contaminant.
BDL: Below detection limits, instrument detection limit not established.
Volatile organics: Data agreed except for low levels of two contaminants. These compounds are very unusual in a rinsate.
Metals: Data agreed.
Petroleum Hydrocarbons: Data agreed.

Table 7

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

COMPARISON OF QA & CONTRACTOR RESULTS

Project: Traux Field, Madison, Wisconson
QA Sample ID.: TX-1-Split-Trip Blank
Material Description: Water

Contractor's Sample ID.: TX-1
Date Sampled: 12 July 88

Analysis	QA Lab Result	Contractor Result	Units	Analysis	QA Lab Result		Contractor Result	Units
VOLATILE ORGANICS								
Acetone	BDL	--	ug/L	1,2-Dichloropropane	<5.0		<1.5	ug/L
Benzene	<1.0	<0.5	ug/L	cis-1,3-Dichloropropene	<1.0		<1.5	ug/L
Bromodichloromethane	<1.0	<1.1	ug/L	trans-1,3-Dichloropropene	<1.0		<1.5	ug/L
Bromoform	<2.0	<3.2	ug/L	Ethylbenzene	<2.0		<0.4	ug/L
Bromomethane	<2.0	<1.5	ug/L	2-Hexanone	BDL		--	ug/L
2-Butanone	BDL	--	ug/L	Methylene chloride	<2.0	*C	8.2	ug/L
Carbon disulfide	BDL	--	ug/L	4-Methyl-2-pentanone	BDL		--	ug/L
Carbon tetrachloride	<1.0	<1.5	ug/L	Styrene	<2.0		--	ug/L
Chlorobenzene	<2.0	<0.6	ug/L	1,1,2,2-Tetrachloroethane	<2.0		<1.4	ug/L
Chlorodibromomethane	<2.0	<2.0	ug/L	Tetrachloroethene	<2.0		<1.5	ug/L
Chloroethane	<5.0	<2.4	ug/L	Toluene	<2.0		<1.0	ug/L
2-Chloroethyl vinyl ether	<5.0	<5.9	ug/L	1,1,1-Trichloroethane	<1.0		<1.2	ug/L
Chloroform	<1.0	<0.8	ug/L	1,1,2-Trichloroethane	<5.0		<1.6	ug/L
Chloromethane	<10.0	<1.6	ug/L	Trichloroethene	<2.0		<1.3	ug/L
1,1-Dichloroethane	<1.0	<0.8	ug/L	Vinyl acetate	BDL		--	ug/L
1,2-Dichloroethane	<2.0	<1.5	ug/L	Vinyl chloride	<10.0		<1.2	ug/L
1,1-Dichloroethene	<2.0	<1.9	ug/L	Total Xylenes	<2.0		--	ug/L
Total 1,2-Dichloroethene	<2.0	<1.5	ug/L					

COMMENTS: -: Not analyzed.
*: Data disagreement.
C: Common laboratory contaminant.
BDL: Below detection limits, instrument detection limit not established.
Volatile organics: Data agreed except for a common laboratory contaminant.

MRD LAB NO. 88/561

DEPARTMENT OF THE ARMY
MISSOURI RIVER DIVISION, CORPS OF ENGINEERS
DIVISION LABORATORY
OMAHA, NEBRASKA 68102

Subject: Quality Assurance Test Results

Project: Traux Field, Madison, Wisconsin
Intended Use: DERP Confirmation Study
Source of Material:

Submitted by: Stephen Yaksich, CENCB-ED-HQ, Buffalo District
Date Sampled: ________, Date Received: 13 & 16 July 1988
Method of Test or Specification: See attached report sheets

References: Huntsville Project No. EO5WI004800
Huntsville District Request No. 87880024, Dated 10 May 1988

REMARKS

1. Enclosed please find all preliminary Quality Assurance (QA) testing results on the above referenced project. All samples were contracted out to EHRT for analysis except for the total recoverable petroleum hydrocarbons which were analyzed inhouse.

2. Items included are:
   I. Chain-of-Custody Forms (9 pages)
   II. Detection Limit Table (8 pages)
   III. Test results
      001. Test results for soil sample 'TS-7 Split-Soil' (6 pages)
      002. Test results for water sample 'TW-1 Split Water' (2 pages)
      003. Test results for water sample 'TG-1 Split-water' (2 pages)
      004. Test results for water sample 'TY-1 Sample Blnk' (5 pages)
      005. Test results for water sample 'TY-2, Sample Blnk' (5 pages)
      006. Test results for water sample 'TY-3 Split-water' (5 pages)
      007. Test results for water sample 'TX-1-split-Trip Blank' (2 pages)
      008. Test results for water sample 'TG-1 split' (3 pages)
      009. Test results for water sample 'TW-1 split' (3 pages)
   IV. Laboratory QC results (4 pages)
3. These results should not be shared with the Contractor until after his data has been submitted.
4. A Final QA/QC Report will be written and forwarded to you upon our receipt of the contractor's results.

Submitted by:

R. K. Schlenker

R. K. SCHLENKER, P.E.
Director, MRD Laboratory

Solsky/gm/4304

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Chain-of-Custody Forms (9 pages)

ENVIRODYNE ENGINEERS
12161 Lackland Rd.
ST. Louis, MO 63146
(314) 434-6960

CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8 DATE WORK IN: ______ REPORT TO: ______ Page 2 of 7

REQUESTED BY: Buffalo COE RECEIVED BY: ______ DATE REQUIRED: ______

SPECIAL INSTRUCTIONS: Truax Field

SAMPLE IDENTIFICATION

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA	Metals*	Pet. Hyd.								COMMENTS
1	2	TW-1, split water	7-12-88	HCl	2-40ml Vial	✓										Time 0930
2		" " "	"	HNO_3	Qt. Pl.		✓									
3		" " "	"	HCl	2-Qt. Gl.			✓								Metals: As, Se,
4																Ag, Hg, Cd, Cr,
5																Pb, Ba.
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	PW [signature]	7-12-88	1800	Fed Ex	7-12-88	1800	Shipping
				[signature]	7/13/88	10:00	

ROUTING

- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager
YELLOW - Records GOLD - Field Copy

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ST. Louis, MO 63146
(314) 434-6960

CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144 DATE WORK IN: ______ REPORT TO: ______

REQUESTED BY: Buffalo COE RECEIVED BY: ______ DATE REQUIRED: ______

SPECIAL INSTRUCTIONS: Truax Field

SAMPLE IDENTIFICATION						ANALYSES REQUESTED										
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA	Metals*	Pet. Hyd								COMMENTS
1	3	TG-31, split-Water	7-11-88	HCl	2-40ml Vial	✓										Time: 1800
2		" "	"	HNO_3	Qt. Pl.		✓									
3		" "	"	HCl	2-Qt. Gl			✓								*Metals: As, Se, Ag,
4																Hg, Cd, Cr, Pb, Ba,
5																Ra, Fe, Mn.
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	R.W. Shotts	7-12-88	1800	Fed Ex	7-12-88	1800	Shipping
				C. Cisneros	7-13-88	1000	

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager YELLOW - Records GOLD - Field Copy

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8 DATE WORK IN: ______ REPORT TO: ______ Page 4 of 7

REQUESTED BY: Buffalo COE RECEIVED BY: ______ DATE REQUIRED: ______

SPECIAL INSTRUCTIONS: Truax Field

SAMPLE IDENTIFICATION						ANALYSES REQUESTED											
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA	Metals*	Pet. Hyd.									COMMENTS
1	④	TY-1, sample blnk	7-11-88	HCl	2-40ml Vials	V											Time: 1500
2		" "	"	HNO3	Qt. Pl.		V										
3		" "	"	HCl	2-Qt. Gl			V									*Metals: As, Se, Ag, Hg, Cd, Cr, Pb, Ba, Na, Fe, Mn.
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	P.W. [illegible]	7-12-88	1800	Fed. Ex	7-12-88	1800	Shipping
				[illegible]	7-13-88	10:00	

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian

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CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8 DATE WORK IN: ______ REPORT TO: ______ Page 5 of 7

REQUESTED BY: Buffalo COE RECEIVED BY: ______ DATE REQUIRED: ______

SPECIAL INSTRUCTIONS: Truax Field.

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA	Metals*	Pet. Hyd								COMMENTS
1		(5) TY-2, Sample Blnk	7-12-88	HCl	2-40ml Vial	✓										Time: 0800
2		" "	"	HNO_3	Qt. Pl		✓									
3		" "	"	HCl	2 Qt. Gl			✓								*Metals: As, Se, Ag, Hg, Cd, Cr, Pb, Ba.
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	B W [illegible]	7-12-88	1800	Fed Ex	7-12-88	1800	Shipping
				[illegible]	7-13-88	1000	

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian; YELLOW - Records; PINK - Project Manager; GOLD - Field Copy

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ST. Louis, MO 63146
(314) 434-6960

CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8 DATE WORK IN: ______ REPORT TO: ______ Page 6 of 7

REQUESTED BY: Buffalo COE RECEIVED BY: ______ DATE REQUIRED: ______

SPECIAL INSTRUCTIONS: Truax Field

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA	Metals*	Pet. Hyd.								COMMENTS
1		⑩ TY-3 split-water	7-12-88	HCl	2-40ml Vial	✓										Time: 0800
2		" "	"	HNO_3	Qt. Pl.		✓									
3		" "	"	HCl	2-Qt. Gl.			✓								*Metals: As, Se, Ag, Hg, Cd, Cr, Pb, Ba.
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1-3	B.W. [illegible]	7-12-88	1800	Fed. Ex.	7-12-88	1800	Shipping.
				[illegible signature]	7-13-88	1000	

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian; YELLOW - Records; PINK - Project Manager; GOLD - Field Copy

ENVIRODYNE ENGINEERS
12161 Lackland Rd.
ST. Louis, MO 63146
(314) 434-6960

CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8
DATE WORK IN:
REPORT TO:
REQUESTED BY: Buffalo COE
RECEIVED BY:
DATE REQUIRED:

SPECIAL INSTRUCTIONS: Truax Field

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	VOA	~~Metals~~	~~Pest/PCB~~								COMMENTS
1	7	TX-1 split-Trip blank	7-12-88	HCl	2-40ml Vial	✓										Time: NA
2		~~" " blank~~	~~"~~	~~HNO3~~	~~1 Pl~~		~~✓~~									
3		~~" " "~~	~~"~~	~~HCl~~	~~2 qt. Gl.~~			~~✓~~								
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

ITEMS TRANSFERRED	RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME	REASON FOR TRANSFER
1 only	R.W. [illegible]	7-12-88	1800	Fed Ex	7-12-88	1800	Shipping
				[illegible]	7-13-88	10:00	

ROUTING
- ☐ GC
- ☐ GCMS ☐ GCMS MGR
- ☐ ORG PREP
- ☐ ORG LAB MGR
- ☐ INORG LAB MGR
- ☐ LAB MGR
- ☐ OFFICE MGR

DISTRIBUTION: WHITE - Sample Custodian, YELLOW - Records, PINK - Project Manager, GOLD - Field Copy

ENVIRODYNE ENGINEERS
12161 Lackland Rd.
ST. Louis, MO 63146
(314) 434-6960

CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

PROJECT NUMBER: 3144-8 DATE WORK IN: ______ REPORT TO: ______ Page 1 of 2

REQUESTED BY: Buffalo COE RECEIVED BY: ______ DATE REQUIRED: ______

SPECIAL INSTRUCTIONS: Truax Field

SAMPLE IDENTIFICATION						ANALYSES REQUESTED		
ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	Pet Hyd.	Metals*	COMMENTS
1	2	TG-1 split	7-15-88	HCl	2-Qt Gl	✓		Resample
2		TG-1 split	〃	HNO_3	Qt. Pl.		✓	Resample
3								
4								*Metals: As, Se,
5								Ag, Hg, Cd, Cr,
6								Pb, Ba, Na, Fe, Mn.
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1 & 2	B.W. Abbott	7-15-88	1800	Fed Ex	7-15-88	1800	Shipping
				David Splichal	7/18/88	0900	Receipt at MRD

DISTRIBUTION: WHITE - Sample Custodian PINK - Project Manager YELLOW - Records GOLD - Field Copy

ENVIRODYNE ENGINEERS
12161 Lackland Rd.
ST. Louis, MO 63146
(314) 434-6960

CUSTODY TRANSFER RECORD/LABORATORY WORK REQUEST

Page 2 of 2

PROJECT NUMBER: 3144-8 DATE WORK IN: ________ REPORT TO: ________

REQUESTED BY: Buffalo COE RECEIVED BY: ________ DATE REQUIRED: ________

SPECIAL INSTRUCTIONS: Truax Field

SAMPLE IDENTIFICATION / ANALYSES REQUESTED

ITEM	LAB NO.	SITE CODE/ SAMPLE DESCRIPTION	DATE COLLECTED	PRESERV.	CONTAINER	Pet Hyd	Metals*								COMMENTS
1	@	TW-1 split	7-15-88	HCl	2 Qt Gl	✓									Resample
2		TW-1 split	7-15-88	HNO_3	Qt Pl		✓								Resample
3															
4															*Metals: As, Se,
5															Ag, Hg, Cd, Cr
6															Pb, Ba.
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															

ITEMS TRANSFERRED	RELINQUISHED BY	Date	Time	RECEIVED BY	Date	Time	REASON for TRANSFER
1 & 2	R.W. Hatt	7-15-88	1800	Fed Ex	7-15-88	1800	Shipping
				DE Splichal	7/18/88	0900	Receipt at MRD

DISTRIBUTION: WHITE - Sample Custodian YELLOW - Records PINK - Project Manager GOLD - Field Copy

II

Detection Limit Table (8 pages)

VOLATILE ORGANICS DETECTION LIMITS

	METHOD 624 WATER (ug/L)	METHOD 8240 SOIL (ug/kg)
Chloromethane -	10.0	10.0
Bromomethane -	2.0	2.0
Vinyl Chloride -	10.0	10.0
Chloroethane -	5.0	5.0
Methylene Chloride -	2.0	2.0
Trichlorofluoromethane -	1.0	1.0
1,1-Dichloroethylene -	2.0	2.0
1,1-Dichloroethane -	1.0	1.0
Trans-1,2-Dichloroethylene -	2.0	2.0
Chloroform -	1.0	1.0
1,2-Dichloroethane -	2.0	2.0
1,1,1-Trichloroethane -	1.0	1.0
Carbontetrachloride -	1.0	1.0
Bromodichloromethane -	1.0	1.0
1,2-Dichloropropane -	5.0	5.0
Trans-1,3-Dichloropropene -	1.0	1.0
Trichloroethylene -	2.0	2.0
Cis-1,3-Dichloropropene -	1.0	1.0
Benzene -	1.0	1.0
Chlorodibromomethane -	2.0	2.0
1,1,2-Trichloroethane -	5.0	5.0
2-Chloroethylvinylether -	5.0	5.0
Bromoform -	2.0	2.0
1,1,2,2-Tetrachloroethane -	2.0	2.0

Not acceptable
why were
The detection
limits reported
different.

VOLATILE ORGANICS - CONTINUED

Tetrachloroethylene -	2.0	2.0
Toluene -	2.0	2.0
Chlorobenzene -	2.0	2.0
Ethylbenzene -	2.0	2.0
Styrene -	2.0	2.0
Xylene -	2.0	2.0

PESTICIDES - PCB'S DETECTION LIMITS

	METHOD 608 WATER (ug/L)	METHOD 8080 SOIL (ug/kg)
Aldrin -	0.01	1.0
Dieldrin -	0.01	1.0
Chlordane -	0.05	10.0
4,4'-DDT -	0.01	1.0
4,4'-DDE -	0.01	1.0
4,4'-DDD -	0.01	2.0
Alpha Endosulfan -	0.01	1.0
Beta Endosulfan -	0.005	1.0
Endosulfan Sulfate -	1.0	100.0
Endrin -	0.01	1.0
Endrin Aldehyde -	0.02	2.0
Heptachlor -	0.007	1.0
Heptachlor Epoxide -	0.01	1.0
Alpha BHC -	0.01	1.0
Beta BHC -	0.01	1.0
Gamma BHC -	0.01	1.0
Delta BHC -	0.01	1.0
PCB-1242 -	1.0	150.0
PCB-1254 -	1.0	150.0
PCB-1221 -	1.0	150.0
PCB-1232 -	1.0	150.0
PCB-1248 -	1.0	150.0
PCB-1260 -	1.0	150.0
PCB-1016 -	1.0	150.0
Toxaphene -	1.0	150.0
Methoxychlor -	0.02	5.0

METHOD DETECTION LIMITS GC/MS

	METHOD 625 WATER (ug/L)	METHOD 8270 SOIL (mg/kg)
Phenol -	3.0	0.5
2-Chlorophenol -	2.0	0.5
2-Nitrophenol -	4.0	1.0
2,4-Dimethylphenol -	3.0	0.5
2,4-Dichlorophenol -	4.0	1.0
4-Chloro-3-Methylphenol -	3.0	0.5
2,4,6-Trichlorophenol -	5.0	1.0
2,4-Dinitrophenol -	40.0	10.0
4-Nitrophenol -	20.0	5.0
4,6-Dinitro-2-Methylphenol -	20.0	5.0
Pentachlorophenol -	20.0	5.0
Bis(-2-Chloroethyl)Ether -	2.0	0.5
1,3-Dichlorobenzene -	6.0	1.0
1,4-Dichlorobenzene -	6.0	1.0
1,2-Dichlorobenzene -	6.0	1.0
Bis(2-Chloroisopropyl)Ether -	4.0	1.0
N-Nitroso-Di-N-Propylamine -	4.0	1.0
Hexachloroethane -	6.0	1.0
Nitrobenzene -	3.0	0.5
Isophorone -	2.0	0.5
Bis(-2-Chloroethoxy)Methane -	2.0	0.5
1,2,4-Trichlorobenzene -	6.0	1.0
Naphthalene -	1.0	0.3
Hexachlorobutadiene -	12.0	3.0
Hexachlorocyclopentadiene -	12.0	3.0
2-Chloronaphthalene -	3.0	0.5
Dimethyl Phthalate -	3.0	0.5

GC/MS CONTINUED

	METHOD 625 WATER (ug/L)	METHOD 8270 SOIL (mg/kg)
Acenaphthylene -	2.0	0.5
Acenaphthene -	2.0	0.5
2,4-Dinitrotoluene -	6.0	1.0
2,6-Dinitrotoluene -	6.0	1.0
Diethylphthalate -	2.0	0.5
4-Chlorophenyl-Phenylether -	6.0	1.0
Fluorene -	3.0	0.5
N-Nitrosodiphenylamine -	3.0	0.5
4-Bromophenyl-Phenylether -	6.0	1.0
Hexachlorobenzene -	5.0	1.0
Phenanthrene -	2.0	0.5
Anthracene -	2.0	0.5
Di-n-Butylphthalate -	1.0	0.3
Fluoranthene -	2.0	0.5
Benzidine -	30.0	10.0
Pyrene -	2.0	0.3
Butylbenzylphthalate -	3.0	0.5
3,3'-Dichlorobenzidine -	10.0	5.0
Bis(2-Ethylhexyl)Phthalate -	2.0	0.3
Benzo(a)Anthracene -	3.0	0.5
Chrysene -	3.0	0.5
Di-n-octyl Phthalate -	2.0	0.5
Benzo(b)Fluoranthene -	10.0	2.0
Benzo(k)Fluoranthene -	10.0	2.0
Benzo(a)Pyrene -	6.0	1.0
Indeno(1,2,3-cd)Pyrene -	10.0	2.0
Dibenzo(a,h)Anthracene -	10.0	2.0
Benzo(g,h,i)Perylene -	10.0	2.0

PESTICIDES - DETECTION LIMITS

	METHOD 608 WATER (ug/L)	METHOD 8080 SOIL (ug/kg)
Lindane	0.01	1.0
Endrin	0.01	1.0
Methoxychlor	0.02	2.0
Toxaphene	0.5	5.0

HERBICIDES - DETECTION LIMITS

	EHRT METHOD 232 & 132 (ug/L)
Silvex	0.5
2,4-D	0.5

INSTRUMENT DETECTION LIMIT (IDL*) - mg/L ppm

COMPOUND	ICP DETECTION LIMIT (ug/L)	ICP WAVELENGTH (nm)	AAS DETECTION LIMIT (ug/L)	AAS WAVELENGTH (nm)
Silver	3.0	328.068		
Aluminum	24.6	308.215		
Arsenic	25.9	193.696	1.57	189.0
Barium	1.5	493.404		
Beryllium	1.0	313.042		
Cadmium	5.5	226.502	1.0	228.8
Calcium	10.0	317.933		
Cobalt	6.7	229.616		
Chromium	12.8	267.716		
Copper	5.6	324.754		
Iron	7.6	259.940		
Potassium	130	166.491		
Magnesium	26.7	279.079		
Manganese	1.5	257.610		
Sodium	16.1	588.995		
Nickel	7.8	231.602		
Lead	26.7	220.353	1.63	217.0
Antimony	17.9	206.833		
Selenium	57.1	196.0	0.14	196.0
Strontium	0.3	407.771		
Thallium	300	190.864		
Vanadium	7.3	292.402		
Zinc	2.4	213.856		
Mercury			0.28 (Cold Vapor)	253.7

*The IDL are obtained by multiplying by 3 the σ obtained for 7 runs of a blank injected on 3 non-consecutive days (i.e. total of 21 runs).

DETECTION LIMIT (mg/L)

As: 0.0002 mg/L - Hydride Generation

Ba: 0.001 mg/L - ICP

Cd: 0.006 mg/L - ICP

Cr: 0.013 mg/L - ICP

Pb: 0.027 mg/L - ICP

Se: 0.00014 mg/L - Hydride Generation

Ag: 0.003 mg/L - ICP

Hg: 0.0003 mg/L - Cold Vapor

III

Test results

Part 001

Test results for soil sample 'TS-7 Split-Soil' (6 pages)

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD (DERP) - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: SOIL SAMPLE DATE ANALYZED: 08-15-88

ANALYSIS PERFORMED: Volatile Organics Analysis METHOD NO.: EPA 8240

ANALYST: J. Tobler LAB NOTEBOOK NO.: 82, Pg. 79

CUSTOMER SAMPLE NO.: TS-7 (880713-018) EHRT NO.: 12410

RESULTS (ug/kg)

Chloromethane - BDL

Vinyl Chloride - BDL

Methylene Chloride - BDL

1,1-Dichloroethylene - BDL

1,2-Dichloroethylene - BDL

1,2-Dichloroethane - BDL

Carbontetrachloride - BDL

1,2-Dichloropropane - BDL

Trichloroethylene - BDL

Benzene - BDL

1,1,2-Trichloroethane - BDL

Bromoform - BDL

Tetrachloroethylene - BDL

Chlorobenzene - BDL

Bromomethane - BDL

Chloroethane - BDL

Trichlorofluoromethane - BDL

1,1-Dichloroethane - BDL

Chloroform - BDL

1,1,1-Trichloroethane - BDL

Bromodichloromethane - BDL

Trans-1,3-Dichloropropene - BDL

Cis-1,3-Dichloropropene - BDL

Chlorodibromomethane - BDL

2-Chloroethylvinylether - BDL

1,1,2,2-Tetrachloroethane - BDL

Toluene - BDL

Ethylbenzene - BDL

SURROGATE STANDARDS - % RECOVERIES

1,2-Dichloroethane-d_4 - 101.8%
Toluene-d_8 - 101.12%
Bromofluorobenzene - 100.24%

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD (DERP) SITE - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: SOIL SAMPLE DATE ANALYZED: 08-15-88

ANALYSIS PERFORMED: Volatile Organics Analysis METHOD NO.: EPA 8240

ANALYST: J. Tobler LAB NOTEBOOK NO.: 82, Pg. 79

CUSTOMER SAMPLE NO.: TS-7 (880713-018) EHRT NO.: 12410

RESULTS (ug/kg)

Acetone - BDL

Acrylonitrile - BDL

Carbon Disulfide - BDL

1,4-Dichloro-2-Butene - BDL

Ethanol - BDL

2-Hexanone - BDL

4-Methyl-2-Pentanone - BDL

1,2,3-Trichloropropane - BDL

Xylene - BDL

Acrolein - BDL

2-Butanone - BDL

Dibromomethane - BDL

Dichlorodifluoromethane - BDL

Ethylmethacrylate - BDL

Iodomethane - BDL

Styrene - BDL

Vinyl Acetate - BDL

QUALITY CONTROL OFFICER: [signature]

DATE: 9/5/88

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: SOIL SAMPLE METHOD NO.: EPA 3050

ANALYSIS PERFORMED: Metals Analysis (8) DATE ANALYZED: 08-09-88

ANALYST: G. Luna/A. Sithe/N. Lac LAB NOTEBOOK NO.: SEE BELOW*

CUSTOMER SAMPLE NO.: TS-7 (880713-019) EHRT NO.: 12411

RESULTS (mg/kg)*

Arsenic (As) - 1.40

Barium (Ba) - 30.4

Cadmium (Cd) - BDL

Chromium (Cr) - 2.27

Lead (Pb) - 3.27

Mercury (Hg) - BDL

Selenium (Se) - BDL

Silver (Ag) - BDL

*ALL ELEMENTS ANALYZED BY ICP METHOD 6010 (Notebook #89, Pg. 14)
MERCURY ANALYZED BY COLD VAPOR METHOD 7471 (Notebook #86, Pg. 66)
ARSENIC ANALYZED BY GRAPHITE FURNACE METHOD 7060 (Notebook #87, Pg. 75)
SELENIUM ANALYZED BY GRAPHITE FURNACE METHOD 7740 (Notebook #87, Pg. 75)

QUALITY CONTROL OFFICER: [signature]

DATE: 9/5/88

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Truax Field
Date Sample Taken: 12 Jul 88
Date Sample Received: 13 Jul 88
Sample Description: Soil
Sample Container Used: 1-8oz.

Customer Sample No: TS-7
Lab Sample No: 880713-020

Extraction Proc. No.	Analysis Proc. No.	Analysis	Result	Units	Detection Limits
EPA-9071	EPA-418.1	Petroleum Hydrocarbons	66.5	mg/kg	25.0

BDL: Below Detection Limit

Date sample extracted: 22 Jul 88
Date sample completed: 26 Jul 88

Extracted sample weight: 14.1429 gm
Final extracted volume: 100 mL
Extraction solvent: Freon TF

Moisture Content: 7.2%

Approved By: Prem N. [signature]

Date: 8/2/88

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Truax Field
Date Sample Taken: 12 Jul 88
Date Sample Received: 13 Jul 88
Sample Description: Soil
Sample Container Used: 1-8oz.

Customer Sample No: TS-7
Lab Sample No: 880713-020(DUPLICATE)

Extraction Proc. No.	Analysis Proc. No.	Analysis	Result	Units	Detection Limits
EPA-9071	EPA-418.1	Petroleum Hydrocarbons	60.9	mg/kg	25.0

Sample Concentration = 66.5 mg/kg

Relative Percent Difference = 8.8

BDL: Below Detection Limit

Date sample extracted: 22 Jul 88
Date sample completed: 26 Jul 88

Extracted sample weight: 15.6095 gm
Final extracted volume: 100 mL
Extraction solvent: Freon TF

Moisture Content = 7.2%

Approved By: Prem W. Arora

Date: 8/2/88

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Truax Field
Date Sample Taken: 12 Jul 88
Date Sample Received: 13 Jul 88
Sample Description: Soil
Sample Container Used: 1-8oz.

Customer Sample No: TS-7
Lab Sample No: 880713-020(ACCURACY)

Extraction Proc. No.	Analysis Proc. No.	Analysis	Result	Units	Detection Limits
EPA-9071	EPA-418.1	Petroleum Hydrocarbons	490.5	mg/kg	25.0

Spike Concentration = 7.35 mg/kg

Sample Concentration = 6.90 mg/kg

% Rec = 93.9

BDL: Below Detection Limit

Date sample extracted: 22 Jul 88
Date sample completed: 26 Jul 88

Extracted sample weight: 17.2443 gm
Final extracted volume: 100 mL
Extraction solvent: Freon TF

Moisture Content: 7.2%

ANALYZE AS A MATRIX SPIKE

Approved By: Prem N. [signature]

Date: 8/2/88

Part 002

Test results for water sample 'TW-1 Split Water' (2 pages)

This sample was not analyzed for metals and total recoverable petroleum hydrocarbons as requested since these samples arrived unpreserved.

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD (DERP) - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: WATER SAMPLE DATE ANALYZED: 08-15-88

ANALYSIS PERFORMED: Volatile Organics Analysis METHOD NO.: EPA 8240

ANALYST: J. Tobler LAB NOTEBOOK NO.: 82, Pg. 79

CUSTOMER SAMPLE NO.: TW-1 (880713-021) EHRT NO.: 12412

RESULTS (ug/L)

Chloromethane - BDL	Bromomethane - BDL
Vinyl Chloride - BDL	Chloroethane - BDL
Methylene Chloride - BDL	Trichlorofluoromethane - BDL
1,1-Dichloroethylene - BDL	1,1-Dichloroethane - BDL
1,2-Dichloroethylene - BDL	Chloroform - BDL
1,2-Dichloroethane - BDL	1,1,1-Trichloroethane - BDL
Carbontetrachloride - BDL	Bromodichloromethane - BDL
1,2-Dichloropropane - BDL	Trans-1,3-Dichloropropene - BDL
Trichloroethylene - BDL	Cis-1,3-Dichloropropene - BDL
Benzene - BDL	Chlorodibromomethane - BDL
1,1,2-Trichloroethane - BDL	2-Chloroethylvinylether - BDL
Bromoform - BDL	1,1,2,2-Tetrachloroethane - BDL
Tetrachloroethylene - BDL	Toluene - BDL
Chlorobenzene - BDL	Ethylbenzene - BDL

SURROGATE STANDARDS - % RECOVERIES

1,2-Dichloroethane-d_4 - 98.96%
Toluene-d_8 - 96.96%
Bromofluorobenzene - 114.08%

CUSTOMER NAM

SAMPLE SOURC

WORK ORDER N

SAMPLE TYPE:

ANALYSIS PER

ANALYST: J.

CUSTOMER SAM

Part 003

Test results for water sample 'TG-1 Split-water' (2 p

This sample was not analyzed for metals and total recoverabl hydrocarbons as requested since these samples arrived unp

----

Chloromethan

Vinyl Chlori

Methylene Ch

1,1-Dichloro

1,2-Dichloro

1,2-Dichloro

Carbontetrac

1,2-Dichloro

Trichloroeth

Benzene - BD

1,1,2-Trichl

Bromoform -

Tetrachloroe

Chlorobenzen

Part 004

Test results for water sample 'TY-1 Sample Blnk' (5 pages)

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD (DERP) - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: WATER SAMPLE DATE ANALYZED: 08-15-88

ANALYSIS PERFORMED: Volatile Organics Analysis METHOD NO.: EPA 8240

ANALYST: J. Tobler LAB NOTEBOOK NO.: 82, Pg. 79

CUSTOMER SAMPLE NO.: TY-1 (880713-027) EHRT NO.: 12416

RESULTS (ug/L)

Chloromethane - BDL

Vinyl Chloride - BDL

Methylene Chloride - BDL

1,1-Dichloroethylene - BDL

1,2-Dichloroethylene - BDL

1,2-Dichloroethane - BDL

Carbontetrachloride - BDL

1,2-Dichloropropane - BDL

Trichloroethylene - BDL

Benzene - BDL

1,1,2-Trichloroethane - BDL

Bromoform - BDL

Tetrachloroethylene - BDL

Chlorobenzene - BDL

Bromomethane - BDL

Chloroethane - BDL

Trichlorofluoromethane - BDL

1,1-Dichloroethane - BDL

Chloroform - 4.57

1,1,1-Trichloroethane - BDL

Bromodichloromethane - BDL

Trans-1,3-Dichloropropene - BDL

Cis-1,3-Dichloropropene - BDL

Chlorodibromomethane - BDL

2-Chloroethylvinylether - BDL

1,1,2,2-Tetrachloroethane - BDL

Toluene - BDL

Ethylbenzene - BDL

SURROGATE STANDARDS - % RECOVERIES

1,2-Dichloroethane-d_4 - 101.4%
Toluene-d_8 - 92.92%
Bromofluorobenzene - 112.92%

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD (DERP) SITE - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: WATER SAMPLE DATE ANALYZED: 08-15-88

ANALYSIS PERFORMED: Volatile Organics Analysis METHOD NO.: EPA 8240

ANALYST: J. Tobler LAB NOTEBOOK NO.: 82, Pg. 79

CUSTOMER SAMPLE NO.: TY-1 (880713-027) EHRT NO.: 12416

RESULTS (ug/L)

Acetone - BDL

Acrylonitrile - BDL

Carbon Disulfide - BDL

1,4-Dichloro-2-Butene - BDL

Ethanol - BDL

2-Hexanone - BDL

4-Methyl-2-Pentanone - BDL

1,2,3-Trichloropropane - BDL

Xylene - BDL

Acrolein - BDL

2-Butanone - BDL

Dibromomethane - BDL

Dichlorodifluoromethane - BDL

Ethylmethacrylate - BDL

Iodomethane - BDL

Styrene - BDL

Vinyl Acetate - BDL

QUALITY CONTROL OFFICER: [signature]

DATE: 9/5/88

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: WATER SAMPLE METHOD NO.: EPA 3010

ANALYSIS PERFORMED: Metals Analysis (11) DATE ANALYZED: 08-09-88

ANALYST: G. Luna/A. Sithe/N. Lac LAB NOTEBOOK NO.: SEE BELOW*

CUSTOMER SAMPLE NO.: TY-1 (880713-028) EHRT NO.: 12417

RESULTS (mg/L)*

Arsenic (As) - BDL	Barium (Ba) - BDL
Cadmium (Cd) - BDL	Chromium (Cr) - BDL
Iron (Fe) - 0.302	Lead (Pb) - BDL
Manganese (Mn) - BDL	Mercury (Hg) - BDL
Selenium (Se) - BDL	Silver (Ag) - BDL
Sodium (Na) - 0.405	

*ALL ELEMENTS ANALYZED BY ICP METHOD 6010 (Notebook #89, Pg. 15)
MERCURY ANALYZED BY COLD VAPOR METHOD 7470 (Notebook #86, Pg. 65)
ARSENIC ANALYZED BY GRAPHITE FURNACE METHOD 7060 (Notebook #87, Pg. 77)
SELENIUM ANALYZED BY GRAPHITE FURNACE METHOD 7740 (Notebook #87, Pg. 77)

QUALITY CONTROL OFFICER: [signature]

DATE: 9/5/88

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Truax Field
Date Sample Taken: 12 Jul 88
Date Sample Received: 13 Jul 88
Sample Description: Water
Sample Container Used: 2-1L Glass

Customer Sample No: TY-1
Lab Sample No: 880713-029

Extraction Proc. No.	Analysis Proc. No.	Analysis	Result	Units	Detection Limits
	EPA-418.1	Petroleum Hydrocarbons	BDL	mg/L	1.0

BDL: Below Detection Limit

Date sample extracted: 22 Jul 88
Date sample completed: 26 Jul 88

Extracted sample volume: 910 mL
Final extracted volume: 100 mL
Extraction solvent: Freon TF

Approved By: Prem N. Arora

Date: 8/2/88

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Truax Field
Date Sample Taken: 12 Jul 88
Date Sample Received: 13 Jul 88
Sample Description: Water
Sample Container Used: 2-1L Glass

Customer Sample No: TY-1
Lab Sample No: 880713-029(ACCURACY)

Extraction Proc. No.	Analysis Proc. No.	Analysis	Result	Units	Detection Limits
	EPA-418.1	Petroleum Hydrocarbons	7.73	mg/L	1.0

Spike Concentration = 7.35 mg/L

Sample Concentration = 7.73 mg/L

% Rec = 105.8

BDL: Below Detection Limit

Date sample extracted: 22 Jul 88
Date sample completed: 26 Jul 88

Extracted sample volume: 910 mL
Final extracted volume: 100 mL
Extraction solvent: Freon TF

ANALYZE AS A MATRIX SPIKE

Approved By: Prem.N. Arora

Date: 8/2/88

Part 005

Test results for water sample 'TY-2, Sample Blnk' (5 pages)

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD (DERP) - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: WATER SAMPLE DATE ANALYZED: 08-16-88

ANALYSIS PERFORMED: Volatile Organics Analysis METHOD NO.: EPA 8240

ANALYST: J. Tobler LAB NOTEBOOK NO.: 82, Pg. 79

CUSTOMER SAMPLE NO.: TY-2 (880713-030) EHRT NO.: 12418

RESULTS (ug/L)

Chloromethane - BDL

Vinyl Chloride - BDL

Methylene Chloride - BDL

1,1-Dichloroethylene - BDL

1,2-Dichloroethylene - BDL

1,2-Dichloroethane - BDL

Carbontetrachloride - BDL

1,2-Dichloropropane - BDL

Trichloroethylene - BDL

Benzene - BDL

1,1,2-Trichloroethane - BDL

Bromoform - BDL

Tetrachloroethylene - BDL

Chlorobenzene - BDL

Bromomethane - BDL

Chloroethane - BDL

Trichlorofluoromethane - BDL

1,1-Dichloroethane - BDL

Chloroform - 5.75

1,1,1-Trichloroethane - BDL

Bromodichloromethane - BDL

Trans-1,3-Dichloropropene - BDL

Cis-1,3-Dichloropropene - BDL

Chlorodibromomethane - BDL

2-Chloroethylvinylether - BDL

1,1,2,2-Tetrachloroethane - BDL

Toluene - BDL

Ethylbenzene - BDL

SURROGATE STANDARDS - % RECOVERIES

1,2-Dichloroethane-d_4 - 86.04%
Toluene-d_8 - 99.76%
Bromofluorobenzene - 96.6%

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD (DERP) SITE - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: WATER SAMPLE DATE ANALYZED: 08-16-88

ANALYSIS PERFORMED: Volatile Organics Analysis METHOD NO.: EPA 8240

ANALYST: J. Tobler LAB NOTEBOOK NO.: 82, Pg. 79

CUSTOMER SAMPLE NO.: TY-2 (880713-030) EHRT NO.: 12418

RESULTS (ug/L)

Acetone - BDL

Acrylonitrile - BDL

Carbon Disulfide - BDL

1,4-Dichloro-2-Butene - BDL

Ethanol - BDL

2-Hexanone - BDL

4-Methyl-2-Pentanone - BDL

1,2,3-Trichloropropane - BDL

Xylene - BDL

Acrolein - BDL

2-Butanone - BDL

Dibromomethane - BDL

Dichlorodifluoromethane - BDL

Ethylmethacrylate - BDL

Iodomethane - BDL

Styrene - BDL

Vinyl Acetate - BDL

QUALITY CONTROL OFFICER: Jane Risk

DATE: 9/5/88

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: WATER SAMPLE METHOD NO.: EPA 3010

ANALYSIS PERFORMED: Metals Analysis (8) DATE ANALYZED: 08-09-88

ANALYST: G. Luna/A. Sithe/N. Lac LAB NOTEBOOK NO.: SEE BELOW*

CUSTOMER SAMPLE NO.: TY-2 (880713-031) EHRT NO.: 12419

RESULTS (mg/L)*

Arsenic (As) - BDL	Barium (Ba) - BDL
Cadmium (Cd) - BDL	Chromium (Cr) - BDL
Lead (Pb) - BDL	Mercury (Hg) - BDL
Selenium (Se) - BDL	Silver (Ag) - BDL

*ALL ELEMENTS ANALYZED BY ICP METHOD 6010 (Notebook #89, Pg. 14)
MERCURY ANALYZED BY COLD VAPOR METHOD 7470 (Notebook #86, Pg. 65)
ARSENIC ANALYZED BY GRAPHITE FURNACE METHOD 7060 (Notebook #87, Pg. 75)
SELENIUM ANALYZED BY GRAPHITE FURNACE METHOD 7740 (Notebook #87, Pg. 75)

QUALITY CONTROL OFFICER: [signature]

DATE: 9/5/88

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Truax Field
Date Sample Taken: 12 Jul 88
Date Sample Received: 13 Jul 88
Sample Description: Water
Sample Container Used: 2-1L Glass

Customer Sample No: TY-2
Lab Sample No: 880713-032

Extraction Proc. No.	Analysis Proc. No.	Analysis	Result	Units	Detection Limits
	EPA-418.1	Petroleum Hydrocarbons	BDL	mg/L	1.0

BDL: Below Detection Limit

Date sample extracted: 25 Jul 88
Date sample completed: 26 Jul 88

Extracted sample volume: 920 mL
Final extracted volume: 100 mL
Extraction solvent: Freon TF

Approved By: Premn Arne

Date: 8/2/88

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Truax Field
Date Sample Taken: 12 Jul 88
Date Sample Received: 13 Jul 88
Sample Description: Water
Sample Container Used: 2-1L Glass

Customer Sample No: TY-2
Lab Sample No: 880713-032(DUPLICATE)

Extraction Proc. No.	Analysis Proc. No.	Analysis	Result	Units	Detection Limits
	EPA-418.1	Petroleum Hydrocarbons	BDL	mg/L	1.0

Sample Concentration = BDL mg/L

Relative Percent Difference = 0.0

BDL: Below Detection Limit

Date sample extracted: 25 Jul 88
Date sample completed: 26 Jul 88

Extracted sample volume: 910 mL
Final extracted volume: 100 mL
Extraction solvent: Freon TF

Approved By: Prem. N. Arora

Date: 8/2/88

Part 006

Test results for water sample 'TY-3 Split-water' (5 pages)

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD (DERP) - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: WATER SAMPLE DATE ANALYZED: 08-16-88

ANALYSIS PERFORMED: Volatile Organics Analysis METHOD NO.: EPA 8240

ANALYST: J. Tobler LAB NOTEBOOK NO.: 82, Pg. 79

CUSTOMER SAMPLE NO.: TY-3 (880713-033) EHRT NO.: 12420

RESULTS (ug/L)

Chloromethane - BDL

Vinyl Chloride - BDL

Methylene Chloride - BDL

1,1-Dichloroethylene - BDL

1,2-Dichloroethylene - BDL

1,2-Dichloroethane - BDL

Carbontetrachloride - BDL

1,2-Dichloropropane - BDL

Trichloroethylene - 4.85

Benzene - BDL

1,1,2-Trichloroethane - BDL

Bromoform - BDL

Tetrachloroethylene - BDL

Chlorobenzene - BDL

Bromomethane - BDL

Chloroethane - BDL

Trichlorofluoromethane - BDL

1,1-Dichloroethane - BDL

Chloroform - 5.00

1,1,1-Trichloroethane - BDL

Bromodichloromethane - BDL

Trans-1,3-Dichloropropene - BDL

Cis-1,3-Dichloropropene - BDL

Chlorodibromomethane - BDL

2-Chloroethylvinylether - BDL

1,1,2,2-Tetrachloroethane - 5.97

Toluene - BDL

Ethylbenzene - BDL

SURROGATE STANDARDS - % RECOVERIES

1,2-Dichloroethane-d_4 - 91.12%
Toluene-d_8 - 100.6%
Bromofluorobenzene - 91.48%

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD (DERP) SITE - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: WATER SAMPLE DATE ANALYZED: 08-16-88

ANALYSIS PERFORMED: Volatile Organics Analysis METHOD NO.: EPA 8240

ANALYST: J. Tobler LAB NOTEBOOK NO.: 82, Pg. 79

CUSTOMER SAMPLE NO.: TY-3 (880713-033) EHRT NO.: 12420

RESULTS (ug/L)

Acetone - BDL

Acrylonitrile - BDL

Carbon Disulfide - BDL

1,4-Dichloro-2-Butene - BDL

Ethanol - BDL

2-Hexanone - BDL

4-Methyl-2-Pentanone - BDL

1,2,3-Trichloropropane - BDL

Xylene - BDL

Acrolein - BDL

2-Butanone - BDL

Dibromomethane - BDL

Dichlorodifluoromethane - BDL

Ethylmethacrylate - BDL

Iodomethane - BDL

Styrene - BDL

Vinyl Acetate - BDL

QUALITY CONTROL OFFICER: [signature]

DATE: 9/5/88

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: WATER SAMPLE METHOD NO.: EPA 3010

ANALYSIS PERFORMED: Metals Analysis (8) DATE ANALYZED: 08-09-88

ANALYST: G. Luna/A. Sithe/N. Lac LAB NOTEBOOK NO.: SEE BELOW*

CUSTOMER SAMPLE NO.: TY-3 (880713-034) EHRT NO.: 12421

RESULTS (mg/L)*

Arsenic (As) - BDL

Barium (Ba) - BDL

Cadmium (Cd) - BDL

Chromium (Cr) - BDL

Lead (Pb) - BDL

Mercury (Hg) - BDL

Selenium (Se) - BDL

Silver (Ag) - BDL

*ALL ELEMENTS ANALYZED BY ICP METHOD 6010 (Notebook #89, Pg. 14)
MERCURY ANALYZED BY COLD VAPOR METHOD 7470 (Notebook #86, Pg. 66)
ARSENIC ANALYZED BY GRAPHITE FURNACE METHOD 7060 (Notebook #87, Pg. 75)
SELENIUM ANALYZED BY GRAPHITE FURNACE METHOD 7740 (Notebook #87, Pg. 75)

QUALITY CONTROL OFFICER: [signature]

DATE: 9/5/88

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Truax Field
Date Sample Taken: 12 Jul 88
Date Sample Received: 13 Jul 88
Sample Description: Water
Sample Container Used: 2-1L Glass

Customer Sample No: TY-3
Lab Sample No: 880713-035

Extraction Proc. No.	Analysis Proc. No.	Analysis	Result	Units	Detection Limits
	EPA-418.1	Petroleum Hydrocarbons	BDL	mg/L	1.0

BDL: Below Detection Limit

Date sample extracted: 25 Jul 88
Date sample completed: 26 Jul 88

Extracted sample volume: 930 mL
Final extracted volume: 100 mL
Extraction solvent: Freon TF

Approved By: Prem N. Arora

Date: 8/2/88

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Truax Field
Date Sample Taken: 12 Jul 88
Date Sample Received: 13 Jul 88
Sample Description: Water
Sample Container Used: 2-1L Glass

Customer Sample No: TY-3
Lab Sample No: 880713-035(DUPLICATE)

Extraction Proc. No.	Analysis Proc. No.	Analysis	Result	Units	Detection Limits
	EPA-418.1	Petroleum Hydrocarbons	BDL	mg/L	1.0

Sample Concentration = BDL mg/L

Relative Percent Difference = 0.0

BDL: Below Detection Limit

Date sample extracted: 25 Jul 88
Date sample completed: 26 Jul 88

Extracted sample volume: 920 mL
Final extracted volume: 100 mL
Extraction solvent: Freon TF

Approved By: Prem N. Arora

Date: 8/2/88

Part 007

Test results for water sample 'TX-1-split-Trip Blank' (2 pages)

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD (DERP) - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: WATER SAMPLE DATE ANALYZED: 08-16-88

ANALYSIS PERFORMED: Volatile Organics Analysis METHOD NO.: EPA 8240

ANALYST: J. Tobler LAB NOTEBOOK NO.: 82, Pg. 79

CUSTOMER SAMPLE NO.: TX-1 (880713-036) EHRT NO.: 12422

RESULTS (ug/L)

Chloromethane - BDL

Vinyl Chloride - BDL

Methylene Chloride - BDL

1,1-Dichloroethylene - BDL

1,2-Dichloroethylene - BDL

1,2-Dichloroethane - BDL

Carbontetrachloride - BDL

1,2-Dichloropropane - BDL

Trichloroethylene - BDL

Benzene - BDL

1,1,2-Trichloroethane - BDL

Bromoform - BDL

Tetrachloroethylene - BDL

Chlorobenzene - BDL

Bromomethane - BDL

Chloroethane - BDL

Trichlorofluoromethane - BDL

1,1-Dichloroethane - BDL

Chloroform - BDL

1,1,1-Trichloroethane - BDL

Bromodichloromethane - BDL

Trans-1,3-Dichloropropene - BDL

Cis-1,3-Dichloropropene - BDL

Chlorodibromomethane - BDL

2-Chloroethylvinylether - BDL

1,1,2,2-Tetrachloroethane - BDL

Toluene - BDL

Ethylbenzene - BDL

SURROGATE STANDARDS - % RECOVERIES

1,2-Dichloroethane-d_4 - 90.52%
Toluene-d_8 - 100.08%
Bromofluorobenzene - 93.08%

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD (DERP) SITE - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: WATER SAMPLE DATE ANALYZED: 08-16-88

ANALYSIS PERFORMED: Volatile Organics Analysis METHOD NO.: EPA 8240

ANALYST: J. Tobler LAB NOTEBOOK NO.: 82, Pg. 79

CUSTOMER SAMPLE NO.: TX-1 (880713-036) EHRT NO.: 12422

RESULTS (ug/L)

Acetone - BDL

Acrylonitrile - BDL

Carbon Disulfide - BDL

1,4-Dichloro-2-Butene - BDL

Ethanol - BDL

2-Hexanone - BDL

4-Methyl-2-Pentanone - BDL

1,2,3-Trichloropropane - BDL

Xylene - BDL

Acrolein - BDL

2-Butanone - BDL

Dibromomethane - BDL

Dichlorodifluoromethane - BDL

Ethylmethacrylate - BDL

Iodomethane - BDL

Styrene - BDL

Vinyl Acetate - BDL

QUALITY CONTROL OFFICER: [signature]

DATE: 9/5/88

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Truax Field
Date Sample Taken: 15 Jul 88
Date Sample Received: 16 Jul 88
Sample Description: Water
Sample Container Used: 2-1L Glass

Customer Sample No: TG-1
Lab Sample No: 880718-001(ACCURACY)

Extraction Proc. No.	Analysis Proc. No.	Analysis	Result	Units	Detection Limits
	EPA-418.1	Petroleum Hydrocarbons	5.65	mg/L	1.0

Spike Concentration = 7.35 mg/L

Sample Concentration = 5.65 mg/L

% Rec = 77.8

BDL: Below Detection Limit

Date sample extracted: 25 Jul 88
Date sample completed: 26 Jul 88

Extracted sample volume: 870 mL
Final extracted volume: 100 mL
Extraction solvent: Freon TF

ANALYZE AS A MATRIX SPIKE

Approved By: Dcm.N. Ar[illegible]

Date: 8/2/88

Part 008

Test results for water sample 'TG-1 split' (3 pages)

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: WATER SAMPLE METHOD NO.: EPA 3010

ANALYSIS PERFORMED: Metals Analysis (11) DATE ANALYZED: 08-09-88

ANALYST: G. Luna/A. Sithe/N. Lac LAB NOTEBOOK NO.: SEE BELOW*

CUSTOMER SAMPLE NO.: TG-1 (880718-002) EHRT NO.: 12415

RESULTS (mg/L)*

Arsenic (As) - BDL	Barium (Ba) - 0.449
Cadmium (Cd) - BDL	Chromium (Cr) - BDL
Iron (Fe) - 40.9	Lead (Pb) - BDL
Manganese (Mn) - 5.40	Mercury (Hg) - BDL
Selenium (Se) - BDL	Silver (Ag) - BDL
Sodium (Na) - 86.9	

*ALL ELEMENTS ANALYZED BY ICP METHOD 6010 (Notebook #89, Pg. 15)
MERCURY ANALYZED BY COLD VAPOR METHOD 7470 (Notebook #86, Pg. 65)
ARSENIC ANALYZED BY GRAPHITE FURNACE METHOD 7060 (Notebook #87, Pg. 75)
SELENIUM ANALYZED BY GRAPHITE FURNACE METHOD 7740 (Notebook #87, Pg. 75)

QUALITY CONTROL OFFICER: [signature]

DATE: 9/5/88

Part 009

Test results for water sample 'TW-1 split' (3 pages)

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Truax Field
Date Sample Taken: 15 Jul 88
Date Sample Received: 16 Jul 88
Sample Description: Water
Sample Container Used: 2-1L Glass

Customer Sample No: TW-1
Lab Sample No: 880718-003

Extraction Proc. No.	Analysis Proc. No.	Analysis	Result	Units	Detection Limits
	EPA-418.1	Petroleum Hydrocarbons	BDL	mg/L	1.0

BDL: Below Detection Limit

Date sample extracted: 25 Jul 88
Date sample completed: 26 Jul 88

Extracted sample volume: 920 mL
Final extracted volume: 100 mL
Extraction solvent: Freon TF

Approved By: Prem N. Arora

Date: 8/2/88

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: Truax Field
Date Sample Taken: 15 Jul 88
Date Sample Received: 16 Jul 88
Sample Description: Water
Sample Container Used: 2-1L Glass

Customer Sample No: TW-1
Lab Sample No: 880718-003 (ACCURACY)

Extraction Proc. No.	Analysis Proc. No.	Analysis	Result	Units	Detection Limits
	EPA-418.1	Petroleum Hydrocarbons	6.82	mg/L	1.0

Spike Concentration = 7.35 mg/L

Sample Concentration = 6.82 mg/L

% Rec = 92.8

BDL: Below Detection Limit

Date sample extracted: 25 Jul 88
Date sample completed: 26 Jul 88

Extracted sample volume: 910 mL
Final extracted volume: 100 mL
Extraction solvent: Freon TF

ANALYZE AS A MATRIX SPIKE

Approved By: Prem N. Arora

Date: 8/2/88

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: WATER SAMPLE METHOD NO.: EPA 3010

ANALYSIS PERFORMED: Metals Analysis (8) DATE ANALYZED: 08-09-88

ANALYST: G. Luna/A. Sithe/N. Lac LAB NOTEBOOK NO.: SEE BELOW*

CUSTOMER SAMPLE NO.: TW-1 (880718-004) EHRT NO.: 12413

RESULTS (mg/L)*

Arsenic (As) - BDL	Barium (Ba) - 0.043
Cadmium (Cd) - 0.048	Chromium (Cr) - BDL
Lead (Pb) - BDL	Mercury (Hg) - BDL
Selenium (Se) - BDL	Silver (Ag) - BDL

*ALL ELEMENTS ANALYZED BY ICP METHOD 6010 (Notebook #89, Pg. 14)
MERCURY ANALYZED BY COLD VAPOR METHOD 7470 (Notebook #86, Pg. 66)
ARSENIC ANALYZED BY GRAPHITE FURNACE METHOD 7060 (Notebook #87, Pg. 75)
SELENIUM ANALYZED BY GRAPHITE FURNACE METHOD 7740 (Notebook #87, Pg. 75)

QUALITY CONTROL OFFICER: Evone Risk

DATE: 9/25/88

IV

Laboratory QC results (4 pages)

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: QC - EPA WS #378 for Hg, As, Se - QC (0.05 ppm) For Others

ANALYSIS PERFORMED: INITIAL CAL. VERIFICATION DATE ANALYZED: 08-09-88

ANALYST: G. Luna/A. Sithe/N. Lac LAB NOTEBOOK NO.: SEE BELOW*

CUSTOMER SAMPLE NO.: N/A EHRT NO.: N/A

RESULTS (mg/L)*

Arsenic (As) - 0.0454 (91%)

Barium (Ba) - 0.0510 (102%)

Cadmium (Cd) - 0.0523 (105%)

Chromium (Cr) - 0.0532 (106%)

Iron (Fe) - 0.0539 (108%)

Lead (Pb) - 0.0527 (105%)

Manganese (Mn) - 0.0531 (106%)

Mercury (Hg) - 0.0056 (112%)

Selenium (Se) - 0.0387 (97%)

Silver (Ag) - 0.0500 (100%)

Sodium (Na) - 0.5200 (104%)

*ALL ELEMENTS ANALYZED BY ICP METHOD 6010 (Notebook #89, Pg. 15)
MERCURY ANALYZED BY COLD VAPOR METHOD 7470 (Notebook #86, Pg. 64)
ARSENIC ANALYZED BY GRAPHITE FURNACE METHOD 7060 (Notebook #87, Pg. 75)
SELENIUM ANALYZED BY GRAPHITE FURNACE METHOD 7740 (Notebook #87, Pg. 75)

QUALITY CONTROL OFFICER: [signature]

DATE: 9/5/88

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: QC - EPA WS #378 For Hg, As, & Se - QC (0.05 ppm) For Others

ANALYSIS PERFORMED: CONTINUOUS CAL. VERIFICATION DATE ANALYZED: 08-09-88

ANALYST: G. Luna/A. Sithe/N. Lac LAB NOTEBOOK NO.: SEE BELOW*

CUSTOMER SAMPLE NO.: N/A EHRT NO.: N/A

RESULTS (mg/L)*

Arsenic (As) - 0.0453 (91%)

Barium (Ba) - 0.0516 (103%)

Cadmium (Cd) - 0.0482 (96%)

Chromium (Cr) - 0.0467 (93%)

Iron (Fe) - 0.0479 (96%)

Lead (Pb) - 0.0471 (94%)

Manganese (Mn) - 0.0559 (112%)

Mercury (Hg) - 0.0046 (93%)

Selenium (Se) - 0.0379 (95%)

Silver (Ag) - 0.0545 (109%)

Sodium (Na) - 0.4687 (94%)

*ALL ELEMENTS ANALYZED BY ICP METHOD 6010 (Notebook #89, Pg. 15)
MERCURY ANALYZED BY COLD VAPOR METHOD 7470 (Notebook #86, Pg. 65)
ARSENIC ANALYZED BY GRAPHITE FURNACE METHOD 7060 (Notebook #87, Pg. 75)
SELENIUM ANALYZED BY GRAPHITE FURNACE METHOD 7740 (Notebook #87, Pg. 75)

QUALITY CONTROL OFFICER: [signature]

DATE: 9/5/88

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: QC BLANK METHOD NO.: EPA 3050

ANALYSIS PERFORMED: Metals Analysis (8) DATE ANALYZED: 08-09-88

ANALYST: G. Luna/A. Sithe/N. Lac LAB NOTEBOOK NO.: SEE BELOW*

CUSTOMER SAMPLE NO.: N/A EHRT NO.: N/A

RESULTS (mg/L)*

Arsenic (As) - BDL

Barium (Ba) - BDL

Cadmium (Cd) - BDL

Chromium (Cr) - BDL

Lead (Pb) - BDL

Mercury (Hg) - 0.0002

Selenium (Se) - BDL

Silver (Ag) - BDL

*ALL ELEMENTS ANALYZED BY ICP METHOD 6010 (Notebook #88, Pg. 65)
MERCURY ANALYZED BY COLD VAPOR METHOD 7470 (Notebook #86, Pg. 65)
ARSENIC ANALYZED BY GRAPHITE FURNACE METHOD 7060 (Notebook #87, Pg. 75)
SELENIUM ANALYZED BY GRAPHITE FURNACE METHOD 7740 (Notebook #87, Pg. 75)

QUALITY CONTROL OFFICER: [signature]

DATE: 9/5/88

ENVIRONMENTAL HEALTH RESEARCH AND TESTING, INC.
RESULT SHEET

CUSTOMER NAME: U.S. ARMY CORPS OF ENGINEERS

SAMPLE SOURCE: TRUAX FIELD - DR. JOE SOLSKY

WORK ORDER NO.: 90 PROJECT NO.: 1410

SAMPLE TYPE: QC BLANK METHOD NO.: EPA 3010

ANALYSIS PERFORMED: Metals Analysis (11) DATE ANALYZED: 08-09-88

ANALYST: G. Luna/A. Sithe/N. Lac LAB NOTEBOOK NO.: SEE BELOW*

CUSTOMER SAMPLE NO.: N/A EHRT NO.: N/A

RESULTS (mg/L)*

Arsenic (As) - BDL
Barium (Ba) - BDL
Cadmium (Cd) - BDL
Chromium (Cr) - BDL
Iron (Fe) - 0.024
Lead (Pb) - BDL
Manganese (Mn) - BDL
Mercury (Hg) - 0.0002
Selenium (Se) - BDL
Silver (Ag) - BDL
Sodium (Na) - 0.041

*ALL ELEMENTS ANALYZED BY ICP METHOD 6010 (Notebook #89, Pg. 15)
MERCURY ANALYZED BY COLD VAPOR METHOD 7470 (Notebook #86, Pg. 64)
ARSENIC ANALYZED BY GRAPHITE FURNACE METHOD 7060 (Notebook #87, Pg. 75)
SELENIUM ANALYZED BY GRAPHITE FURNACE METHOD 7740 (Notebook #87, Pg. 75)

QUALITY CONTROL OFFICER: [signature]

DATE: 9/5/88

DERP

INVENTORY REPORT AND HAZARDOUS RANKING SYSTEM EVALUATION

Preliminary General Information

1. DERP Code Number. (11) E05WI004800
2. Site Name (current). (35) Truax Field
3. Site Name when used by DOD. (35) Truax Field
4. Street/Route Number. (25) North of Highway 30, East of Highway 13
5. City. (16) Madison
6. County. (15) Dane
7. State. (2) WI
8. Zip Code. (9) 53704
9. Congressional District Code Number. (2) Unknown
10. Latitude: degrees, minutes, seconds. (6) 43 07'30"
11. Longitude: degrees, minutes, seconds. (7) 89 20'30"
12. Is a large scale, greater than 1 inch equals 200 feet, topograhic map of the site area available to attach to this inventory report? (1) N
    Y = YES N = NO
13. Are site maps or sketches on file with the inventory? (1) Y
    Y = YES N = NO
14. Are there photographs on file with the inventory? (1) Y
    Y = YES N = NO
15. Current Owners Name(s). (45) Dane County and David Reynolds
16. Owner's Street Address. (25) 4000 International Lane
17. Owner's City. (16) Madison

APPENDIX J

INVENTORY REPORT AND HAZARDOUS RANKING SYSTEM EVALUATION

27. Are copies of lease agreements or deeds or other instruments conveying title on file? (Y or N). (1) Not Supplied to EEI

28. Does deed(s) or lease agreement(s) contain any disclaimers or restoration requirements? (Y or N). If yes, decribe. (161)

Not known

29. Date field inspection completed. (6) April 8, 1988

30. Agency performing inspection. (25)

EEI Consultant to US Army COE, Buffalo District

31. Inspection team leader's name. (20) Thomas M. Lachajczyk

32. Title. (25) Program Manager

33. Organization (office symbol). (10) EEI

34. Telephone number(s): Commercial. (10) (314) 434-6960

35. Telephone number(s): FTS. (7) N/A

36. Telephone number(s): AUTOVON. (7) N/A

37. Site Status: A = Active I = Inactive (1) A

38. Years of operation in current status. (2) 15

39. Type(s) of problems found by inspection team. (3) H

USE:
H = H&T
O = OEW
D = Debris

40. Enter the number of buildings on the site. (3) Numerous

41. Describe. (80)

Airport terminal buildings, Air Guard Buildings, Office Buildings, Warehouse Buildings

49. **RCRA. (72) (SAME AS 46)**

Not known

50. **Describe any pertinent environmental protection response actions previously taken at the site. (240)**

Not known

51. **Describe any environmental protection remediation actions previously taken at the site. (240)**

Groundwater monitoring program established by city approximately 1980.

52. **List any court orders, lawsuits, fines or other legal actions that have been taken against any owners/operators of the site since DOD ownership/lease. (160)**

Open burning prohibited approximately 1961. Listed on State Inventory of sites which many threaten to cause environmental pollution - 1987.

53. **Determination of Responsible Party for restoration: (1)** N

DOD **Other** **Not yet determined**

54. **Contract 1. (13)**

55. **Contract 2. (13)**

56. **Contract 3. (13)**

DESCRIPTION OF WASTE AREAS WITH HRS OF WASTE STORAGE AT THE SITE

CONTAINMENT

100. Types of containment found in the individual waste areas: (4) C, P, L, I

Surface impoundment /X/ (I) Waste piles, including contaminated surface soils /X/ (P)

Containers /X/ (C) Landfill, including contaminated subsoils /X/ (L)

101. Present integrity of containment: (25) (Use TABLES 1, 2 or 3 phrases)

Drums-1/Burn Area-2/Landfill-3/Impoundments 3

102. Evaluation of the integrity of containment versus potential groundwater release, before any remedial actions (see TABLE 1 for evaluation considerations). HRS Value - (Groundwater Containment). (1) 3

103. Evaluation of the integrity of containment versus potential surface water release, before any remedial actions (see TABLE 2 for evaluation considerations). HRS Value - (Surface Water Containment). (1) 2

QUANTITY

104. Total quantity of hazardous waste, as deposited and capable of migrating. (Having a non-zero containment value (TABLE 3). The air pathway quantity is to include only those quantities that can be transported by the air: (10) Not known*

105. Total quantity of waste now present: CY, drums and gallons (use only one common unit). (10) 4 of 5 drums ½ full each
also, contents of landfill/and fill, contamination soil at burn pit.

106. Quantity with the potential to migrate by groundwater. (10)

Not known

107. HRS Value (groundwater quantity). (1) (TABLE 3) 8

108. Quantity with the potential to migrate by surface water. (10)

Not known

109. HRS Value (Surface Water Quantity). (1) (TABLE 3) 1
(Minimum)

*970,000 cubic yards of waste disposed in landfill.

121. Highest scoring substance for Air Migration Route. (25)

No significant air migration

122.* Toxicity (ranking number). (1) 0

123.** HRS Value. (2) 0

PHYSICAL STATE

124. Physical state of waste as deposited: (1)

	HRS Value		HRS Value
Solid consoidated or stabilized:	0	Powder or fine material:	2
Solid, unconsolidated or unstabilized:	1	Liquid, sludge or gas:	3

HRS value from item 124. 3

125. Description of current physical state of waste. (15)

Burn Area-denuded soil (black stains), Landfill-covered, 1 foot of soil and vegetation

GROUNDWATER MIGRATION ROUTE

HYDROGEOLOGY

126. Description of strata from surface to the deepest aquifer or condern (names, thickness, type of material). (Refer to TABLE 8) (200)

Silty sands, clays, sand and gravels, silts and sands - various thickness

127. Direction of regional groundwater flow. (3) SW

128. Are there barriers to horizontal migration of groundwater within 3 miles downgradient of the site (e.g., rivers). These barriers should be identified on a map of the site. (1) Y/N Not known

* Use TABLES 4, 5, or 6

**Use TABLE 7

138. Basis of population figure (e.g., census, house count). (10)

N/A

139. HRS value from Distance/Population Matrix (TABLE 9). (2) 0

140. Acres of cropland/pastureland irrigated by water drawn from the aquifer within 3 miles of contamination. (4) 0

COMPARATIVE DOCUMENTATION OF AQUIFERS

(All questions on this page refer to Deeper Aquifer)

141. Name of aquifer. (25)

Yahara River Basin

142. Designation of aquifer use. (10) Residential/Commercial

143. Distance from ground surface (elevation) to highest seasonal water level. (3) 250' (Approx.)

Circle the HRS value corresponding to the use of groundwater drawn from within 3 miles from the source of contamination:

	VALUE
Unusable	0
Commercial, irrigation, or not used but usable	1
Drinking water with alternate source available	2
Sole source, drinking water supply	3

144. HRS value circled. (1) 2

145. Location of nearest drinking or irrigation well within 3 miles downgradient of the source of contamination, give direction. (20)

¼-1 mile west

146. Depth of the nearest well (ft). (3) 720'

147. Distance to the well from nearest point of contamination (critical distance that require careful measurement for HRS purposes are 2000', 1 mile, 2 miles and 3 miles). (5) ½ mile

161. Contaminants detected. (150)

Trichloroethylene, tetrachloroethylene and trichlorofluoromethane

162. Depth of contamination. (3) Unknown

163. Distance from ground surface to highest seasonal water level in this aquifer. (3) Approximately 250'

164. Depth below ground surface of deepest documented waste or of intake of of a contaminated well. (3) 750'

165. Depth from deepest point of documented contamination to the aquifer of concern. (3) (Question 163 minus 164) 500

166. HRS Value. (1) 3

DEPTH	VALUE
0 - 20	3
21 - 75	2
76 -150	1
150	0

167. Inches of normal annual total precipitation (Figure 1). (2) + 30

168. Inches of mean annual lake evaporation (Figure 2). (2) - 20

169. Net precipitation, in inches (if seasonal data is used, show month(s) represented). (2) 10

-10 inches = 0
-10 to + 5 = 1
+ 5 to +15 = 2
15 inches = 3

170. HRS Value (Precipitation). (1) 2

171. Permeability of the least permeable layer between documented contamination and the highest seasonal water level of this aquifer of concern (TABLE 10). (6) 10^{-3} - 10^{-5} cm/sec

172. HRS Value (Permeability) (1) 2

SURFACE WATER MIGRATION

A topographical map is to be attached showing the migration path that run-off would follow from the areas of waste storage to surface waters and thence to targets within 5 miles downstream. All distances are to be measured along the migration path rather than by a straight line.

Indicate sampling points, the most downstream point (or point along migration path) of documented contamination, all water intakes by use, and sensitive environments and critical habitats that lie contiguous to the migration path. Show names of water bodies.

OBSERVED RELEASE

179. Is there analytical evidence of contamination of surface waters above background? (1) N, Go to Item 185 Y, Go to Item 180 — Y

180. **Date of Evidence:** (6) — July, 1988

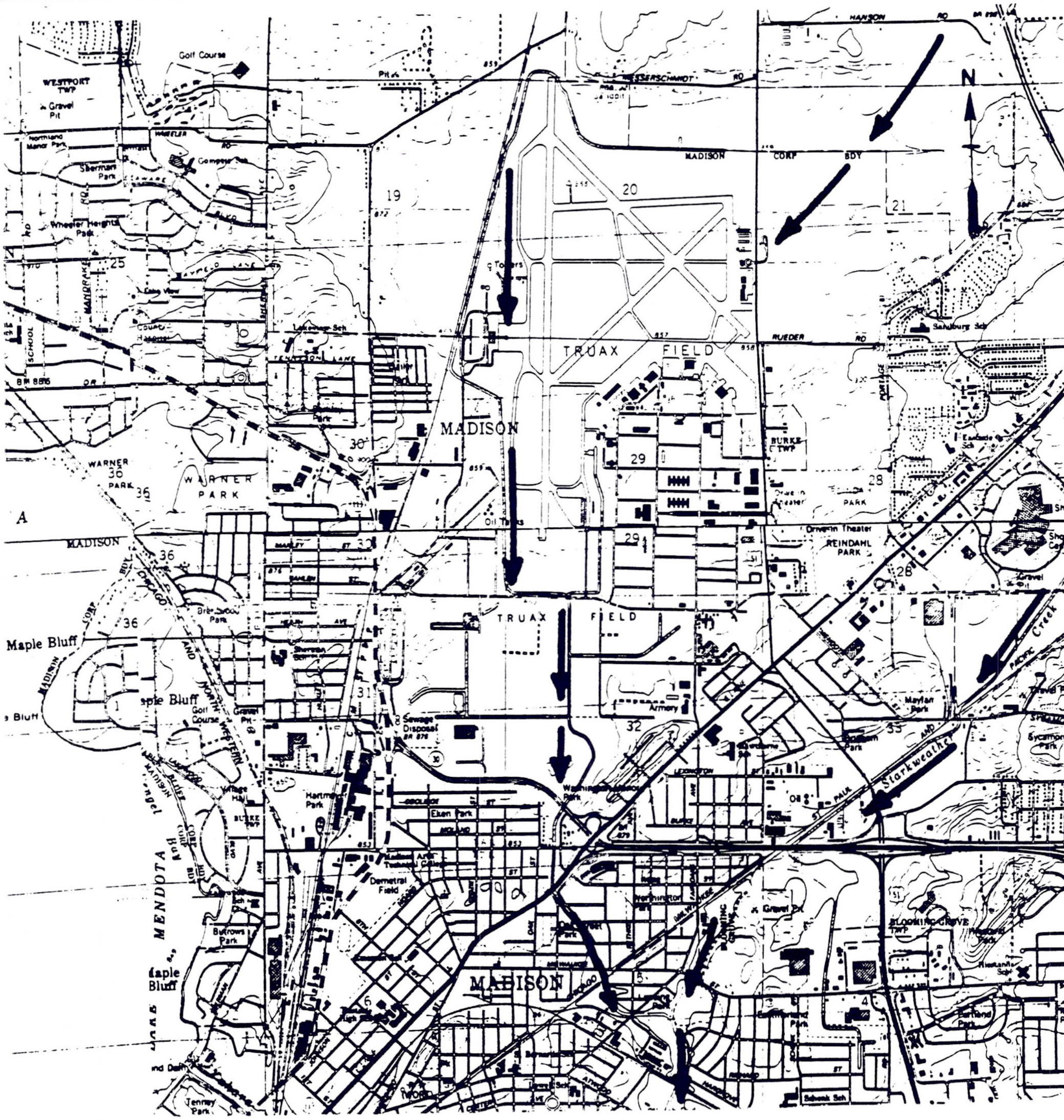
181. **Reference:** (60)
EEI Contamination Evaluation

182. **Background sampling points (list well identification):** (80)
None

183. **Downstream sampling points (list well identification):** (80)
Stream and standing water near burn pit; outfall from former WWTP to ditch; lagoon at former WWTP.

184. **Contaminants detected (5 maximum):** (100)
TW-3 standing water at burn pit contained petroleum hydrocarbons, benzene, methylene chloride, tetrachlorpethylene, toluene, etc. TW-4 at lagoon outfall contained petroleum hydrocarbons, 65 mg/l

185. **HRS Value. Direct evidence of release of surface water (evidence must be quantitative) - HRS value = 45; no evidence - HRS value = 0** (2) 45



NOTE: STARKWEATHER CREEK FLOWS INTO LAKE MONONA

DIRECTION OF FLOW

ENVIRODYNE ENGINEERS

FIGURE

Surface Water Migration Route

SURFACE WATER USE

195. Surface water use within 3 miles (1 mile maximum in static waters) along the migration path from the most downstream point of documented contamination: (1)

HRS Value

Not currently used for reasons unrelated to contamination from site: ------ 0	Irrigation recreation, etc: ---- 2
Commercial or industrial use: ------ 1	Drinking water: ---- 3

HRS Value (Surface Water Use) (Values may be added if water has more than one use). . 2 .

DISTANCE TO A SENSITIVE ENVIRONMENT

196. Name of nearest sensitive environment that is within 2 miles. (20)

Lake Monona

197. Type of Sensitive Environment. (3) 1 = Coastal Wetland . 2 . .
2 = Freshwater Wetland
3 = Critical Habitat (S - State or F - Federal)

198. Distance to a wetland (5 acre minimum) or a critical habitat of a Federal list endangered species that lies contiguous to the migration path. Measure distance from the nearest point of documented surface contamination along the migration path. (6) N/A

199. HRS Value (Distance to Sensitive Environment). (1) Use TABLE 12 . 1.

DISTANCE TO WATER INTAKE

200. Distance to drinking water or irrigation intake, measured from probable point of entry of migration path to surface water. (6) . N/A . . . .

210. Method and equipment: (80)

. . . .
. . . .
. . . .

211. Contaminants detected above background: (150)

. . . .
. . . .
. . . .
. . . .
. . . .

212. Analytical evidence of contaminants. (2) . . 0 .

HRS value - 45 if yes NO evidence - HRS value = 0

REACTIVITY & INCOMPATABILITY

See TABLE 13 and TABLE 14

Most reactive materials onsite are: (List)

213. (25) Materials buried in landfill not specifically known.

214. (25) . . . .

215. (25) . . . .

216. (25) . . . .

217. (25) . . . .

218. (25) . . . .

Most incompatible pairs of material onsite are: (List)

219. (25) N/A . . . .

220. (25) . . . .

221. (25) . . . .

222. (25) . . . .

223. (25) . . . .

DISTANCE TO A SENSITIVE ENVIRONMENT

Coastal wetland   Freshwater wetland   Critical habitat

231. Location and description of wetlands (5 acre minimum): (200)

Lake Monona lies south of the site, water flows into Lake Monona by way of Starkweather Creek.

Location of critical habitat of endangered species, including notation of whether the species is on the Federal list.

232. Distance from volatile substance to the sensitive environment. (6) ....

233. HRS Value - See TABLE 12. (1) 0

LAND USE within 2 miles - See TABLE 14

		DISTANCE/VALUE
234.	Commercial/industrial area. (5)	¼ mile / 3
235.	Residential area. (5)	¼ mile / 3
236.	National/State park, forest, wildlife reserves. (5)	N/A / 0
237.	Prime agricultural land. (5)	N/A / 0
238.	Agricultural land in production within the past 5 years. (5)	N/A / 0

239. Is a historic landmark site within view of the facility or like to be subject to significant impacts from air release? YES/NO (80)
If so, identify, locate and describe expected impacts:

No

240. HRS Value (use TABLE 14, Land Use). (1) 0

253. Are any of the substances that are onsite hazardous in combination and are not segregated or isolated so as to prevent the formation of incompatible mixtures: Y OR N (1) . .

ISOLATED/SEGREGATED	VALUE
YES	1
NO	3

254. HRS Value (Containment). (1) . .

WASTE CHARACTERISTICS:

255. Direct evidence of ignitability or explosion potential, as measured: Y = YES N = NO (1) . .

256. HRS Value (Direct Evidence). VALUE: YES 3 NO 0 (1) . .

257. Ignitability: List the most ignitable substance onsite and indicate the National Fire Protection Agency (NFPA) level assigned this substance (TABLE 15): (25)

. . . .

258. HRS Value (Ignitable). (1) . .

259. Most reactive materials onsite are: See TABLE 16 (25)

. . . .

260. HRS Value (Reactive): (1) . .

261. Most incompatible pairs of material onsite are: See TABLE 13 (40)

. . . .
. . . . . .

262. HRS Value (Incompatible). (1) . .

263. Quantity of materials onsite that are flammable or explosive, including hazardous materials that are flammable or explosive alone or in combination: (9) . . . .

264. HRS (Quantity) - See TABLE 3. (1) . .

TARGETS FOR FIRE AND EXPLOSION:

Land use within 2 miles (note that this item is identical to the air migration pathway, providing the location of the volatilizing substances and the flammable or explosive substance is the same):

(Critical distances requiring measurement for HRS purposes are 1/4 mile, 1/2 mile, 1 mile and 2 miles): See TABLE 14

DISTANCE/VALUE

274. Commercial/industrial area. (5) . . . . / .

275. Residential area. (5) . . . . / .

276. National/State park, forest, wildlife reserves. (5) . . . . / .

277. Prime agricultural land. (5) . . . . / .

278. Agricultural land in production within the past 5 years. (5) . . . . / .

279. Is a historic landmark site within view of the facility or like to be subject to significant impacts from fire or explosion? YES OR NO. Describe (81)

. . . .
. . . .
. . . .

TABLE 14 is used to determine the HRS value. The highest value is to be chosen.

280. HRS Value (Land Use). (1) . .

281. Population with 2 mile radius. (If areial photography is used in making the count, assume 3.8 individuals per dwelling). (6) . . . .

POPULATION	VALUE
0	0
1-100	1
101-1000	2
1001-3000	3
3001-10,000	4
>10,000	5

282. HRS Value (Population). (1) . .

289. Control of entry points: (1)

	VALUE	
YES	0	
NO	1	.0.

Add values from lines 287, 288 and 289 to mark in 291.

290. Have any changes in accessibility been made since the confirmed instance of direct contact? (1) Y/N .N.

291. HRS Value (Access). (1) .1.

292. Indicate if there is <u>Containment</u> of the hazardous materials against direct contact: (6)

CONTAINMENT	VALUE	Y OR N
Surface impound.	15	15 . .
Sealed or unsealed containers	15	.0.
Tanks	15	.0.
Landfill with less than 2' cover	15	15.
Spills	15	.0.
Otherwise	0	.0.

293. HRS Value (Containment) from item 292. (2) . 30.

294. Toxicity of the most hazardous materials that are not adequately contained against direct contact: Refer to TABLES 4 & 5 (60)

Storage Area #

. . . . (20)

Material

. . . . (20)

Toxicity

. . . . .2. (20)

295. HRS Value (Toxicity). (1) .2

ORDNANCE AND EXPLOSIVE WASTE (OEW)

OEW RISK ASSESSMENT:

The OEW risk assessment is based on records searches, reports of Explosive Ordnance Detachment actions, and field observations and measurements. These data are used to assess the risk involved based upon the hazards identified at the site. The risk assessment is composed of two factors, hazard severity and hazard probability.

Hazard Severity. Hazard severity categories are defined to provide a qualitative measure of the worst credible mishap resulting from personnel error, environmental conditions, or other pertinent factors.

Description	Category	Mishap Definition
CATASTROPHIC	1	Explosion, Death, Life-threatening or other injury causing total permanent disability, or Property damage in excess of $500,000.
CRITICAL	2	Major fire, Severe injury which requires doctor or hospital care for 1 or more persons, or Property damage between $100K and $500K.
MARGINAL	3	Minor fire, Minor injury which would require any medical or Property damage between $700 and $100,000.
NEGLIGIBLE	4	No injuries or Property damage less than $700.

400. **The Hazard Category assigned for this site is. (1)** 4

401. **This is based primarily upon the following: (160)**

Explosives are not known to be present. However, they maybe stored in the active Air National Guard facilities adjacent to the landfill.

Risk Assessment. The risk assessment value for this site is to be found by using the following table. Enter with the results of items 400 & 402.

Probability Level	A	B	C	D	E
Severity Category:					
I	20	20	18	14	10
II	20	18	14	10	6
III	18	14	10	6	2
IV	14	10	6	2	0

404. The risk assessment value for this site is. (3) . . . .

405. Ordnance and Explosive Waste Characteristics. Is there any direct or other evidence that OEW is present or could be present based upon former DOD uses of the site? This evidence can be based upon direct observation of the site survey team, reports received from individuals, government agencies, or news media, review of drawings or archive documents relating to DOD operations at the site, or any other pertinent source.

YES (Complete the rest of this question).

NO (Continue starting with Question 422).

If the answer to this question is YES describe briefly the type of evidence and where that evidence is available for detailed review. (161)

. . . .
. . . .
. . . .
. . . .
. . . .

(For Questions 406 through 442 underline, check, circle or otherwise indicate each appropriate answer.)

411. Conventional Ordnance and Ammunition. (11)

	YES VALUE	Y OR N
Small Arms (.22 cal - 20mm)	1	. .
Medium/Large Caliber (over 20mm)	5	. .
Ammunition, Inert	0	. .
Ammunition, Blank or Practice	2	. .
Bombs, Explosive	5	. .
Bombs, Practice, Fuzed	2	. .
Grenades, Mines	5	. .
Grenades, Mines, Practice, Fuzed	2	. .
Detonators, Blasing Caps	5	. .
Rockets, Missiles	5	. .
Demolition Charges	4	. .

412. Other. (15) . . . .

413. Conventional Ordnance and Ammunition ORS Value from item 411 (Maximum of 5). (1) . .

414. Pyrotechnics. (4)

	YES VALUE	Y OR N
White Phosphorus	5	. .
Pyrolusite	4	. .
Flares	3	. .
Smoke Rounds and Bombs	3	. .

415. Other Pyrotechnic Devices. (15) . . . .

416. Pyrotechnics ORS Value (Maximum of 5). (1) . .

423. Other (describe). (22) . . . .

424. Locations of Contamination ORS Value (Maximum of 5). (1) . .

425. Area Contaminated. (6) . . . .

	VALUE
None	0
Less than 1 acre	1
1 to 5 acres	2
5 to 50 acres	3
50 to 250 acres	4
Over 250 acres	5

426. Area Contaminated ORS Value (Maximum of 5). (1) . .

427. Extent of Contamination ORS Value Sum of items (424 + 426) - (Maximum of 10). (2) . . .

428. Weight of OEW materials on site. (7) . . . .

429. Number of rounds (from 428). (7) . . . .

Weight of Bulk Explosives in Rounds	No. of Rounds, Containers, etc.	Value
0	0	0
Less than 10	1 to 9	2
10 to 100	10 to 100	4
101 to 500	101 to 500	6
501 to 1000	501 to 1000	8
Over 1000	Over 1000	10

430. Quantity of OEW ORS Value (Maximum of 10). (2) . . .
Two valves may be figured (e.g., 8 lbs TNT gives value of 2 & 200 rounds a value of 6. Then the ORS value would be 8).

434. Distance to nearest utility system (power, water, or gas) or public highway likely to be at risk from OEW site. (6) . . . .

Distance to Nearest Target	VALUE
Less than 1250 feet	5
1251 feet to 1 mile	3
11 mile to 2 miles	1
Over 2 miles	0

435. Distances to Public Utilities/Highways ORS Value (Maximum of 5). (1) . .

436. Distances ORS Value (433 + 435) - (Maximum of 10). (2) . . .

437. Numbers and types of Buildings within a 2 mile radius measured from the hazardous area, not the installation boundary. (6) . . . .

Numbers of Buildings	VALUE
0	0
1 to 10	1
11 to 50	2
51 to 100	3
101 to 250	4
251 or Over	5

438. Numbers of Buildings ORS Value (Maximum of 5). (1) . .

439. Types of Buildings. (30)

. . . .

	VALUE
Educational, Child Care, etc.	5
Residential, Hospitals, Hotels, etc.	5
Commercial, Shopping Centers, etc.	5

443. ORS Value (Maximum of 5). (1)

444-498. Reserved

499. Remarks. (80)

DEBRIS (CONTINUED)

507. **List items onsite that were not constructed or used by DOD or DOD contractor. (80)**

Some WWTP lagoons and other facilities were not used or constructed by DOD. WWTP was constructed prior to DOD ownership.

508. **List items owner wants to retain. (80)**

Unknown, Reynolds apparently wishes to demolish all WWTP buildings. Desirability of JP fuel tanks and ancillary buildings are unknown.

509. **List items that may have salvage value. (100)**

JP-4 tanks would have salvage value (scrap metal).

510. **Give location of nearest or most economical disposal location. (80)**

Unknown

511. **Give special labor, equipment or methods that will be required for project. (100)**

JP-4 fuel tanks are very large.

512. **List any restrictions on methods of demolition or disposal. (80)**

None known

513. **Describe site grading that will be required for restoration: (include any special requirements or adverse foundation conditions). (40)**

—

514. **Give location for borrow material if required. (40)**

—

DEBRIS (CONTINUED)

520. Describe unusual items that require transformation to structure comparison in Item 519. (100)

. . . .
. . . .
. . . .

521. Ground level debris (less than 3' high) (UD). Foundations, slabs, small piles, etc: (1)

Area Covered by Debris Items	Value	5
No Ground Level Debris	0	
0-20,000 SF	1	
20,000 - 100,000 SF	3	
Over 100,000 SF	5	

522. Briefly describe Item 521 (concrete foundation, rubble etc). (80)

Numerous slabs and foundations in WWTP area.

. . . .
. . . .
. . . .

523. Condition of Debris (UD): (2)

	Value	5
Building or structures very unsightly, such as partially demolished or collapsed or deteriorated beyond any reasonable renovation.	10	
Structures that are in need of considerable maintenance, very large foundations, piles of building rubble, etc.	5	
Small foundations, small debris piles or buildings in good condition that are not compatible with surrounding area.	2	

524. Give basis for value selected in Item 523. (100)

Large JP-4 tanks are very large but not collapsed or deteriorating.

. . . .
. . . .
. . . .

DEBRIS (CONTINUED)

530. <u>Describe Hazardous Debris (HD):</u> (160)

If there is no debris that represents a potential physical or health hazard to persons or is a potential source of damage to surrounding property, enter NONE for this item and 0 for item 540 and do not complete items 531 thru 537.

. . . .
. . . .
. . . .
. . . .
. . . .

531. <u>Probability of Injury or Health Hazard (HD):</u> (2) <u>Value</u> 2

Has occurred frequently or has potential to occur at least annually.	10
Has occurred once and has potential to occur at least once every two years.	8
Has potential to occur every 2-10 years.	6
Has potential to occur every 10-25 years.	4
Unlikely to occur once every 25 years.	2

532. List past occurrences or give basis for value selected in Item 531. (100)

Possible that tresspassers could fall off tanks, but area is fenced.

. . . .
. . . .
. . . .

533. <u>Severity of Potential Hazard (HD):</u> (2) <u>Value</u> 10
(Most probable results from incident involving debris)

Totally disabling or death.	10
Loss of limb, partial sight, hearing, etc.	8
Would require hospitalization or repeated medical treatment.	6
Would require minor medical care.	3
Minor cuts and bruises.	1
No injury.	0

DEBRIS WORKSHEET

539. Unsightly Debris Score:

A. Item No.	Value
518	2
519	6
521	5
523	5
525	10
526	2
TOTAL	30

B. If value for item 528 is 0, multiply total in A. by 0.5 ____—____.

If value for items 528 is 1, multiply totasl in A. by 0.9 ____~____.

If value for item 528 is 6 to 10, add value selected to Total in A. ____40____.

C. Divide B. by 2.10 for Unsightly Debris Score ____19____ (Round to nearest whole number).

540. Hazard Debris Score:

Item No.	Value
531	2
533	10
535	0
537	1

A. Multiply Item 531 value by Item 533	=	20
B. Multiply Item 535 value by Item 537	=	0
TOTAL A + B	=	20
Hazardous Debris Score = Total A+B (Round to nearest whoe number)	=	20

TABLE 1

CONTAINMENT VALUE FOR GROUNDWATER ROUTE

(Use technical judgement of best fit)

Assign containment a value of 0 if: (1) all the hazardous substances at the facility are underlain by an essentially nonpermeable surface (natural or artificial) and adequate leachate collection systems and diversion systems are present; or (2) there is no groundwater in the vicinity. The value "0" does not indicate no risk. Rather, it indicates a significantly lower relative risk when compared with more serious sites on a national level. Otherwise, evaluate the containment for each of the different means of storage or disposal at the facility using the following guidance.

A. Surface Impoundment

	Assigned Value
Sound run-on diversion structure, essentially nonpermeable liner (natural or artificial) compatible with the waste, and adequate leachate collection system.	0
Essentially nonpermeable compatible liner with no leachate collection system; or inadequate freeboard.	1
Potentially unsound run-on diversion structure; or moderately permeable compatible liner.	2
Unsound run-on diversion structure; no liner; or incompatible liner.	3

B. Piles

	Assigned Value
Piles uncovered and waste stabilized; or piles covered, waste unstabilized, and essentially nonpermeable liner.	0
Piles uncovered, waste unstabilized, moderately permeable liner, and leachate collection system.	1
Piles uncovered, waste unstabilized, moderately permeable liner, and no leachate collection system.	2
Piles uncovered, waste unstabilized, and no liner.	3

TABLE 2

CONTAINMENT VALUES FOR SURFACE WATER ROUTE

Assign containment a value of 0 if: (1) all the waste at the site is surrounded by diversion structures that are in sound condition and adequate to contain all runoff, spills, or leaks from the waste; or (2) intervening terrain precludes runoff from entering surface water. Otherwise, evaluate the containment for each of the different means of storage or disposal at the site and assign a value as follows:

A. Surface Impoundment

	Assigned Value
Sound diking or diversion structure, adequate freeboard, and no erosion evident.	0
Sound diking or diversion structure, but inadequate freeboard.	1
Diking not leaking, out potentially unsound.	2
Diking unsound, leaking, or in danger of collapse.	3

B. Waste Piles

	Assigned Value
Piles are covered and surrounded by sound diversion or containment system.	0
Piles covered, wastes unconsolidated, diversion or containment system not adequate.	1
Piles not covered, waste unconsolidated, and diversion or containment system potentially unsound.	2
Piles not covered, wastes unconsolidated, and no diversion or containment or diversion system leaking or in danger or collapse.	3

TABLE 3

QUANTITY RANKING VALUES

Hazardous waste quantity includes all hazardous substances at a facility (as deposited) except that with a containment value of 0 (See items 102 or 103). Do not include amounts of contaminated soil or water; in such cases, the amount of contaminating hazardous substance may be estimated.

On occasion, it may be necessary to convert data to a common unit to combine them. In such cases, 1 ton - 1 cubic yard - 4 drums and for the purposes of converting bulk storage, 1 drum - 50 gallons. Assign a value as follows:

Gallons	Tons/Cubic Yards	No. of Drums	Assigned Value
0	0	0	0
1-2000	1-10	1-40	1
2,050-12,500	11-62	41-250	2
12,550-25,000	63-126	251-500	3
25,050-50,000	126-250	501-1000	4
50,050-125,000	251-625	1001-2500	5
125,050-250,000	626-1250	2501-5000	6
250,050-500,000	1251-2500	5001-10,000	7
500,000	2500	10,000	8

TABLE 5

SAX TOXICITY RATINGS

0 - No Toxicity* (None)**

This designation is given to materials which fall into one of the following categories:

(a) Materials which cause no harm under any conditions of normal use.

(b) Materials which produce toxic effects on humans only under the most unusual conditions or by overwhelming dosage.

1 - Slight Toxicity*(Low)**

(a) Acute Local. Materials which on single exposure lasting seconds, minutes, or hours cause only slight effects on the skin or mucuous membranes regardless of the extent of the exposure.

(b) Acute Systemic. Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which produce only slight effects following a single exposure lasting seconds, minutes, or hours, or following ingestion of a single dose, regardless of the quantity absorbed or the extent of exposure.

(c) Chronic Local. Materials which on continuous or repeated exposure extending over periods of days, months, or years cause only slight and usually reversible harm to the skin or mucuous membranes. The extent of exposure may be great or small.

(d) Chronic Systemic. Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which produce only slight and usually reversible effects extending over days, months, or years. The extent of the exposure may be great or small.

In general, those classified as having "slight toxicity" produce changes in the human body which are readily reversible and which will disappear following termination of exposure, either with or without medical treatment.

TABLE 6

PERSISTENCE (BIODEGRADABILITY) OF
SOME ORGANIC COMPOUNDS*

VALUE = 3 HIGHLY PERSISTENT COMPOUNDS	
ALDRIN	HEPTACHLOR
BENZOPYRENE	HEPTACHLOR EPOXIDE
BENZOTHIAZOLE	1,2,3,4,5,7,7-HEPTACHLORONOR-BORNENE
BENZOTHIOPHENE	HEXACHLOROBENZENE
BENZYL BUTYL PHTHALATE	HEXACHLORO-1,3-BUTADIENE
BROMOCHLOROBENZENE	HEXACHLOROCYCLOHEXANE
BROMOFORM BUTANOL	HEXACHLOROETHANE
BROMOPHENYL PHYNTL ETHER	METHYL BENZOTHIAZOLE
CHLORDANE	PENTACHLOROBIPHENYL
CHLOROHYDROXY BENZOPHENONE	PENTACHLOROPHENOL
BIS-CHLOROISOPROPHYL ETHER	1,1,3,3-TETRACHLOROACETONE
M-CHLORONITROBENZENE	TETRACHLOROPHENYL
DDE	THIOMETHYLBENZOTHIAZOLE
DDT	TRICHLOROBENZENE
DIBROMOBENZENE	TRICHLOROBIPHENYL
DIBUTYL PHTHALATE	TRICHLOROFLUOROMETHANE
1,4-DICHLOROBENZENE	2,4,6-TRICHLOROPHENOL
DIELDRIN	BROMODICHLOROMETHANE
DIETHYL PHTHALATE	BROMOFORM
DI(2-ETHYLHEXYL) PHTHALATE	CARBON TETRACHLORIDE
DIMETHYL PHTHALATE	DIBROMODICHLOROETHANE
4,6-DINITRO-2 AMINOPHENOL	TETRACHLOROETHANE
DIPROPYL PHTHALATE	1,1,2-TRICHLOROETHANE
ENDRIN	

VALUE = 1 SOMEWHAT PERSISTENT COMPOUNDS	
ACETYLENE DICHLORIDE	LIMONENE
BEHENIC ACID, METHYL ESTER	METHYL ESTER OF LIGNOCERIC ACID
BENZENE	METHANE
BENZENE SULFONIC ACID	2-METHYL-5-ETHYL-PYRIDINE
BUTYL BENZENE	METHYL NAPHTHALENE
BUTYL BROMIDE	METHYL PALMITATE
E-CAPROLACTAM	METHYL PHENYL CARBINOL
CARBON-DISULFIDE	METHYL STEARATE
O-CRESOL	NAPHTHALENE
DECANE	NONANE
1,2-DICHLOROETHANE	OCTANE
1,2-DIMETHOXY BENZENE	OCTYL CHLORIDE
1,3-DIMETHYL NAPHTHALENE	PENTANE
1,4-DIMETHYL PHENOL	PHENYL BENSOATE
DIOCTYL ADIPATE	PHTHALIC ANHYDRIDE
N-DODECANE	PROPYLBENZENE
ETHYL BENZENE	1-TERPINEOL
2-ETHYL-N-HEXANE	TOLUENE
O-ETHYLTOLUENE	VINYL BENZENE
ISODECANE	XYLENE
ISOPROPHYL BENZENE	

TABLE 7

Toxicity and Persistence have been combined in the matrix below because of their important relationship. To determine the overall value for this combined factor, evaluate each factor individually as discussed below. Match the individual values assigned with the values in the matrix for the combined rating factor. Evaluate several of the most hazardous substances at the facility independently and enter only the highest score in the matrix on the work sheet.

MATRIX

	VALUE FOR PERSISTENCE			
VALUE FOR TOXICITY	0	1	2	3
0	0	0	0	0
1	3	6	9	12
2	6	9	12	15
3	9	12	15	18

TABLE 9

DISTANCE TO DRINKING WATER OR IRRIGATION INTAKE

Population*	>3 Miles	2-3 Miles	1-2 Miles	2001 FEET to 1 Mile	0-2000 Feet
0	0	0	0	0	0
1-100	0	4	6	8	10
101-1000	0	8	12	16	20
1001-3000	0	12	18	24	30
3001-10,000	0	16	24	32	35
> 10,000	0	20	30	35	40

Determine population by:

*3.8 persons/house and

*1-1/2 persons/acre of irrigated land or by

*census

TABLE 11

VALUES FOR FACILITY SLOPE AND INTERVENING TERRAIN

DEPOSITION SITE		Intervening Terrain				
Facility Slope		Terrain Average Slope 3%; or Site Separated from Water Body by Areas of Higher Elevation	Terrain Average Slope 3-5%	Terrain Average Slope 5-8%	Terrain Average Slope 8%	Site in Surface Water
Facility is closed basin		0	0	0	0	3
Facility has average slope	3%	0	1	1	2	3
Average slope	3-5%	0	1	1	2	3
Average slope	5-8%	0	2	2	3	3
Average slope	8%	0	2	3	3	3

TABLE 14

VALUES FOR LAND USE (AIR ROUTE)

ASSIGNED VALUE =	0	1	2	3
Distance to Commercial-Industrial	1 mile	1/2 - 1 mile	1/4 - 1/2 mile	1/4 mile
Distance to National/State Parks, Forests, Wildlife Reserves, and Residential Areas	2 miles	1 - 2 miles	1/4 - 1 mile	1/4 mile
Distance to Agricultural Lands (in Production within 5 years)				
Ag land	1 mile	1/2 - 1 mile	1/4 - 1/2 mile	1/4 mile
Prime Ag land*	2 miles	1 - 2 miles	1/2 - 1 mile	1/2 mile
Distance to Historic/Landmark Sites (National Register of Historic Register and National Natural Landmarks)			within view of site or if site is subject to significant impacts	

*Defined in the Code of Federal Regulations, 7 CFR 657.5, 1981.

TABLE 13

INCOMPATIBLE MATERIALS

In the lists below, the mixing of Group A material with a Group B material may have the potential consequence as noted.

Group 1-A	Group 1-B
Acetylene sludge	Acid slude
Akaline caustic liquids	Acid and water
Alkaline cleaner	Battery acid
Alkaline corrosive liquids	Chemical cleaners
Alkaline corrosive batter fluid	Electrolyte acid
Caustic wastewater	Etching acid liquid or solvent
Lime sludge and other corrosive alkalies	Pickling liquor and other corrosive acids
Lime wastewater	Spent acid
Lime and water	Spent mixed acid
Spent caustic	Spent sulfuric acid

Potential consequences: Heat generation; violent reaction.

Group 2-A	Group 2-B
Aluminum	Any waste in Group 1-A or 1-B
Berylium	
Calcium	
Lithium	
Potassium	
Sodium	
Zinc powder	
Other reactive metals and metal hydrides	

Potential consequences: Fire or explosion; generation of flammable hydrogen gas.

Group 4-A	Group 4-B
Alcohols	Concentrated Group 1-A or 1-B wastes
Aldehydes	Group 2-A wastes
Halogenated hydrocarbons	
Nitrated hydrocarbons	
Unsaturated hydrocarbons	
Other reactive organic compounds and solvents	

Potential consequences: Fire, explosion, or violent reaction.

Group 5-A	Group 5-B
Spent cyanide and sulfide solutions	Group 1-B wastes

Potential consequences: Generation of toxic hydrogen cyanide or hydrogen sulfide.

Group 6-A	Group 6-B
Chlorates	Acetic acid and other organic acids
Chlorine	Concentrated mineral acids
Chlorites	Group 2-A wastes
Chromic acid	Group 4-A wastes
Hyphochlorites	Other flammable and combustible wastes
Nitrates	
Nitric acid, fuming	
Perchlorates	
Permanganates	
Paroxides	
Other strong oxidizers	

Potential consequences: Fire, explosion or violent reaction.

TABLE 16

NFPA REACTIVITY RATINGS

NFPA LEVEL		ASSIGNED VALUE
0	Materials which are normally stable even under fire exposure conditions and which are not reactive with water.	0
1	Materials which in themselves are normally stable but which may become unstable at elevated temperatures and pressures or which may react with water with some release of energy but not violently.	1
2	Materials which in themselves are normally unstable and readily undergo violent chemical change but do not detonate. Includes materials which can undergo chemical change with rapid release of energy at normal temperatures and pressures or which can undergo violent chemical change at elevated temperatures and pressures. Also includes those materials which may react violently with water or which may form potentially explosive mixtures with water.	2
3	Materials which in themselves are capable of detonation or of explosive decomposition or of explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. Includes materials which are sensitive to thermal or mechanical shock at elevated temperatures and pressures or which react explosively with water without requiring heat or confinement.	3
4	Materials which in themselves are readily capable of detonation or of explosive decomposition or explosive reaction at normal temperature and pressures. Includes materials which are sensitive to mechanical or localized thermal shock.	3

NORMAL ANNUAL TOTAL PRECIPITATION (Inches)

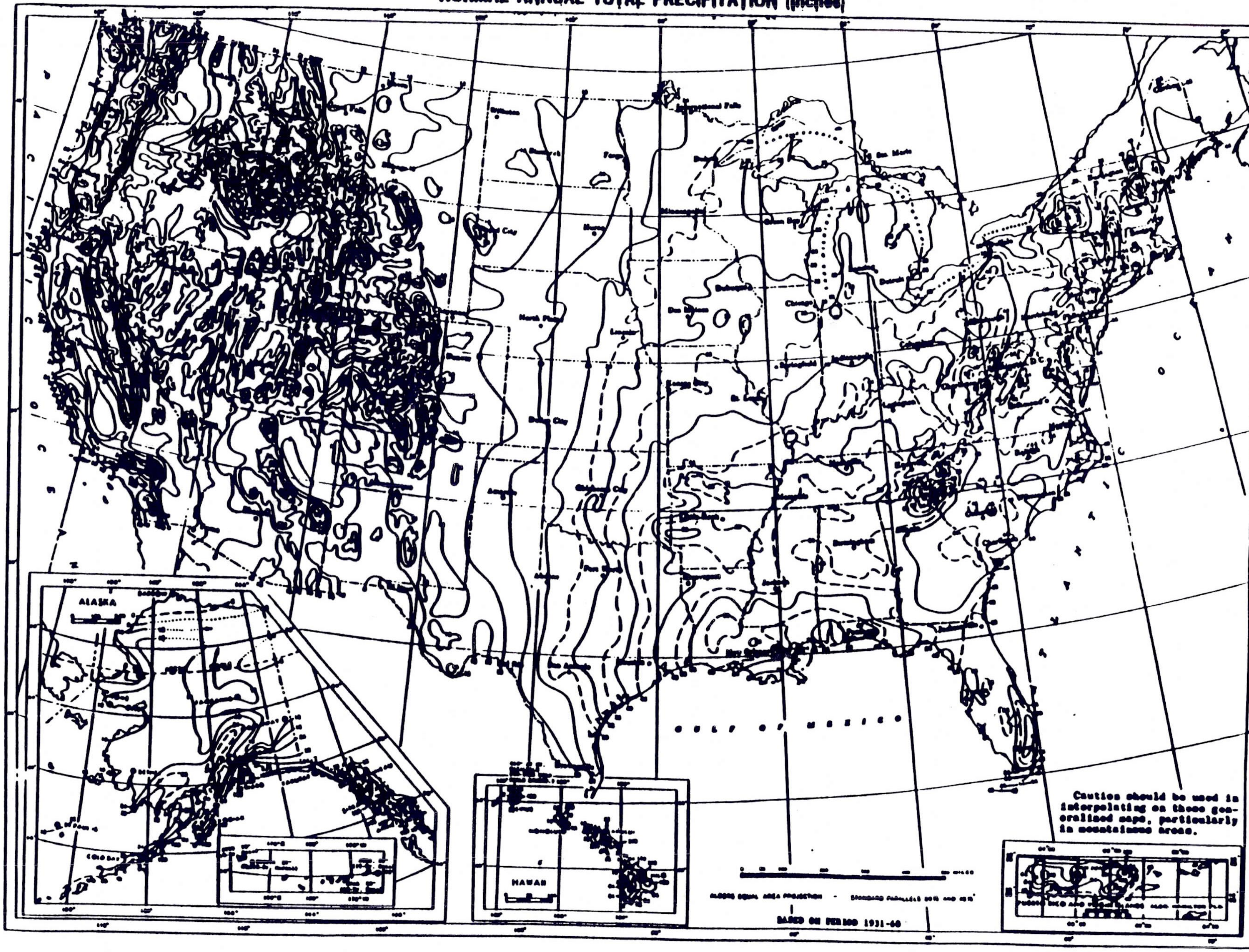


FIGURE 2

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1	45	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 2 3	1		3	
1-yr. 24-hr. Rainfall	0 1 2 3	1		3	
Distance to Nearest Surface Water	0 1 2 3	2		6	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3	1		3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 18	1	12	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	1	8	
Total Waste Characteristics Score			13	26	
5 Targets					4.5
Surface Water Use	0 1 2 3	3	6	9	
Distance to a Sensitive Environment	0 1 2 3	2	2	6	
Population Served/Distance to Water Intake Downstream	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			8	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			4680	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{sw} =	7.27		

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. ✓ If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
	Total Route Characteristics Score			15	
3 Containment	0 1 2 3	1		3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 18	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	1	8	
	Total Waste Characteristics Score		19	26	
5 Targets					3.5
Ground Water Use	0 1 2 3	3	6	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1	35	40	
	Total Targets Score		41	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5	35055 ←			57,330	
7 Divide line 6 by 57,330 and multiply by 100	S_{gw} = 61.15				

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
[1] Observed Release	0 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line [1] is 0, the S_a = 0. Enter on line [5]. If line [1] is 45, then proceed to line [2].					
[2] Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
[3] Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score			39	
[4] Multiply [1] x [2] x [3]				35,100	
[5] Divide line [4] by 35,100 and multiply by 100		S_a =	0		

FIGURE 9
AIR ROUTE WORK SHEET

	s	s^2
Groundwater Route Score (S_{gw})	61.15	3739.08
Surface Water Route Score (S_{sw})	7.27	52.85
Air Route Score (S_a)	0	0
$s_{gw}^2 + s_{sw}^2 + s_a^2$		3791.93
$\sqrt{s_{gw}^2 + s_{sw}^2 + s_a^2}$		61.58
$\sqrt{s_{gw}^2 + s_{sw}^2 + s_a^2}\,/\,1.73 = s_M =$		35.59

FIGURE 10
WORKSHEET FOR COMPUTING S_M