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FINAL RCRA FACILITY INVESTIGATION FOR MULTIPLE BUILDINGS PART 1 NAS FORT  
WORTH TX  
4/1/2001  
INTERNATIONAL TECHNOLOGIES



**NAVAL AIR STATION  
FORT WORTH JRB  
CARSWELL FIELD  
TEXAS**

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**ADMINISTRATIVE RECORD  
COVER SHEET**

AR File Number 629

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FINAL

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**RCRA Facility Investigation Report for  
Buildings 1015, 1027, 1060, 1064, 1190, 1191,  
1194, 1414, 1602, 1643, 3358, 4146, and 4210  
NAS Fort Worth JRB, Texas**

**Prepared for:  
U.S. Air Force Center for Environmental Excellence  
Brooks AFB, TX**



**CONTRACT NO. F41624-94-D-8047, DELIVERY ORDER D0039**

**Project No. 768579  
April 2001**

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**FINAL**

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**RCRA FACILITY INVESTIGATION REPORT FOR BUILDINGS  
1015, 1027, 1060, 1064, 1190, 1191, 1194, 1414, 1602, 1643,  
3358, 4146, AND 4210  
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Buildings 1015, 1027, 1060, 1064, 1190, 1191, 1194, 1414,  
1602, 1643, 3358, 4146, and 4210  
NAS Fort Worth JRB, Texas**

**Prepared for:**

**Air Force Center for Environmental Excellence  
HSC/PKVCB  
Headquarters Human Systems Center  
Brooks Air Force Base, Texas 78235-5353**

**Prepared by:**

**IT Corporation  
312 Directors Drive  
Knoxville, Tennessee 37923**

**April 2001**

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## List of Acronyms

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AFB	Air Force Base
AFBCA	Air Force Base Conversion Agency
AFCEE	Air Force Center for Environmental Excellence
AFP	Air Force Plant
AOC	area(s) of concern
bgs	below ground surface
BTEX	benzene, toluene, ethyl benzene, and xylene
CAM	Continuous Automated Monitoring
CFR	Code of Federal Regulations
CRA	Carswell Redevelopment Authority
CWA	Clean Water Act
DCE	dichloroethene
DPT	direct-push technology
DQSR	data quality summary report
DRO	diesel range organic
EPA	U.S. Environmental Protection Agency
°F	degrees Fahrenheit
GFAA	graphite furnace atomic absorption
GRO	gasoline range organic
HGL	Hydrogeologic, Inc.
ICP	inductively coupled plasma
IRP	Installation Restoration Program
IT	IT Corporation
Jacobs	Jacobs Engineering
JP-4	jet propulsion fuel 4
JRB	Joint Reserve Base
Law	Law Environmental, Inc.
M&E	Metcalf & Eddy
MDL	method detection limit
MGD	million gallons per day

**List of Acronyms (Continued)**

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mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MQL	method quantitation limit
MS	matrix spike
MSC	media-specific concentration
msl	mean sea level
NAS	Naval Air Station
NFA	no further action
OWS	oil/water separator
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyl
PET	polyethylene terephthalate
ppm	parts per million
PQL	practical quantitation limit
QA/QC	quality assurance/quality control
Radian	Radian Corporation
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RRP	Risk Reduction Program
RRS	Risk Reduction Standard
SAC	Strategic Air Command
SPLP	synthetic precipitation leaching procedure
SVOC	semi-volatile organic compound
SWMU	Solid Waste Management Unit
TAC	Texas Administrative Code
TCA	trichloroethane
TCE	trichloroethene

**List of Acronyms** (Continued) 

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TCLP	toxicity characteristic leaching procedure
TIC	tentatively identified compound
TNRCC	Texas Natural Resource Conservation Commission
TPH	total petroleum hydrocarbons
TWC	Texas Water Commission
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
UTL	upper tolerance limit
VOC	volatile organic compound
WSA	Weapons Storage Area

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## **1.0 Introduction**

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The Air Force Center for Environmental Excellence (AFCEE) contracted IT Corporation (IT) to perform a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) at 13 oil/water separator (OWS) sites to determine whether these units released hazardous constituents into the environment. This RFI report demonstrates that these OWSs pose no significant risk to human health or the environment and should be considered for no further action (NFA) under the Texas Natural Resource Conservation Commission (TNRCC) Risk Reduction Program (RRP). Some of the OWS sites (Building 1602, Building 3358, and Building 4146) are not included as Solid Waste Management Units (SWMUs) or Areas of Concern (AOC) in the RCRA permit (HW-50289); however, they are being investigated as part of the Sanitary Sewer System (SWMU 66) that is currently being investigated by the Air Force Base Conversion Agency (AFBCA)

This RFI report presents the results of various investigations, demonstrates that OWS sites at Buildings 1015, 1027, 1060, 1064, 1190, 1191, 1194, 1414, 1602, 1643, 3358, 4146, and 4210 pose no significant risk to human health or the environment, and provides justification for NFA and regulatory site closure under either TNRCC RRP Risk Reduction Standard (RRS) 1 or RRS 2. The OWSs at Buildings 1643, 3358, and 4146 meet requirements for closure under RRS 1. The remaining sites (Buildings 1015, 1027, 1060, 1064, 1190, 1191, 1194, 1414, 1602, and 4210) are recommended for closure under RRS 2. The investigations at these OWS sites were managed under the Environmental Restoration Account. The primary regulatory programs that oversee the investigation and closure of these sites are RCRA and the TNRCC RRS program.

### **1.1 Project Background**

Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB) is a parcel of the former Carswell Air Force Base (AFB) that has been transferred from the U.S. Air Force (USAF) to U.S. Navy management following the closure of Carswell AFB on September 30, 1993. To complete the transfer of the property, environmental investigations are required to identify potential contamination relating to USAF activities prior to September 30, 1993. Contaminated sites identified must then be remediated to concentrations that are protective of human health and the environment under the TNRCC RRP and in accordance with the RCRA Hazardous Waste Permit (HW-50289).

The Texas Water Commission (TWC), now known as the TNRCC, issued a RCRA hazardous waste permit (HW-50289) to ~~the former~~ Carswell AFB on February 7, 1991. The permit requires that a RFI be conducted at all SWMUs and AOCs listed in Permit Provision VIII in order to determine whether any of the constituents, listed in 40 Code of Federal Regulations (CFR) Part 264, Appendix IX, have been released into the environment. Seven of the OWS sites presented in this report have been designated as SWMUs [Building 1015 OWS (SWMU 47), Building 1027 OWS (SWMU 44), Building 1190 OWS (SWMU 52), Building 1191 OWS (SWMU 37), Building 1194 OWS (SWMU 35), Building 1414 OWS (SWMU 41) and Building 1643 OWS (SWMU 40)], three have been designated as AOCs [Building 1060 OWS (AOC 11), Building 1064 OWS (AOC 10), and Building 4210 OWS (AOC 12)], and three OWS sites have not been designated as either a SWMU or AOC on the permit [Building 1602 OWS, Building 3358 OWS, and Building 4146 OWS].

The RFI was conducted to collect the physical and chemical soil and groundwater data necessary to achieve site closure under the TNRCC RRS (30 Texas Administrative Code [TAC] 335 subchapters §335.554 and §335.555). Analytical data from 9 of the 13 OWS sites presented in this RFI report were collected by Law Environmental, Inc. (Law, 1995) during an initial OWS assessment in 1994 and by IT Corporation during Phases 1 through 3 of the RFI field activities.

IT collected the Phase 1 RFI data as part of the RFI of the Sanitary Sewer System (SWMU 66) in 1997 and 1998. During the Phase 1 Sanitary Sewer System RFI, IT collected soil, groundwater, and geotechnical data to characterize soil and groundwater conditions at the 13 OWS sites. Because the OWS investigation was an outgrowth of the Sanitary Sewer System RFI, there was agreement between the USAF and TNRCC that a surface soil sample (0 to 2 feet in vegetated areas and 1 to 3 feet in areas with impervious surfaces such as asphalt or concrete) and a subsurface sample collected just above the water table would be adequate to characterize each OWS site to determine whether there had been a release of contamination to the environment. Results of the Sanitary Sewer System RFI were previously reported in the draft Sanitary Sewer System RFI (IT, 1997) and were also included in the draft OWS RFI addendum report (IT, 1998).

The Phase 2 and Phase 3 RFI data were collected from March through November 2000 to address data gaps from previous investigations. The data collected by IT and Law (1995) will be summarized for each site in Chapters 4.0 through 16.0 to show that the 13 OWS sites meet the requirements for closure under the TNRCC RRP.

## **1.2 Site Identification**

The OWS sites are located at the NAS Fort Worth JRB, a parcel of the former Carswell AFB, in Fort Worth, Texas (Figure 1-1). Figure 1-2 displays the locations of the 21 OWS sites that were investigated by IT (1998) during the OWS RFI addendum. Table 1-1 presents a summary of the 23 OWSs that are located at the 21 OWS sites. The purpose of this RFI report is to document investigations conducted at 13 of the 21 sites. RFI results indicate that the OWS units meet the requirements for closure under TNRCC RRS 1 or RRS 2 (TNRCC, 1996). The thirteen sites that are included in this report are:

- Building 1015 OWS (SWMU 47)
- Building 1027 OWS (SWMU 44)
- Building 1060 OWS (AOC 11)
- Building 1064 OWS (AOC 10)
- Building 1190 OWS (SWMU 52)
- Building 1191 OWS (SWMU 37)
- Building 1194 OWS (SWMU 35)
- Building 1414 OWS (SWMU 41)
- Building 1602 OWS (part of SWMU 66)
- Building 1643 OWS (SWMU 40)
- Building 3358 OWS (part of SWMU 66)
- Building 4146 OWS (part of SWMU 66)
- Building 4210 OWS (AOC 12).

The remaining eight OWS sites discussed in the NAS Fort Worth OWS RFI addendum report (IT, 1998) have either been presented for closure in earlier reports or require additional sampling to confirm and/or delineate contaminant concentrations detected during previous investigations. Five of these sites (OWS Buildings 1101, 1320, 1423, 1656, and 4210) were presented for closure under RRS 1 in an earlier RFI report (IT, 2000). Two additional sites (OWS Building 1145 [AOC 13] and OWS Building 1628 [SWMU 7]) are being investigated by HydroGeoLogic, Inc. (HGL). The remaining OWS site, Building 1655 – a part of SWMU66, requires additional sampling to delineate manganese concentrations identified during Phases 1 and 3 of the RFI activities. Delineation of manganese at the Building 1655 OWS site will be conducted under a separate contract and will not be part of this RFI report.

Site descriptions and operational histories of the 13 OWS sites are presented in Chapters 4.0 through 16.0 of this RFI report

04 5154 STARTING DATE 3/20/96 DATE LAST REV 04/23/01  
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 INITIATOR W CARTER PROJ MGR W CARTER  
 DRAFT CHCK BY C TUMLIN ENGR CHCK BY W CARTER  
 DRAWN BY K BLAIR

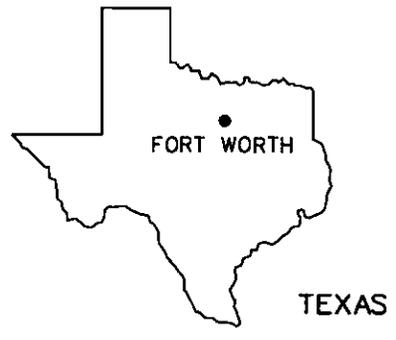
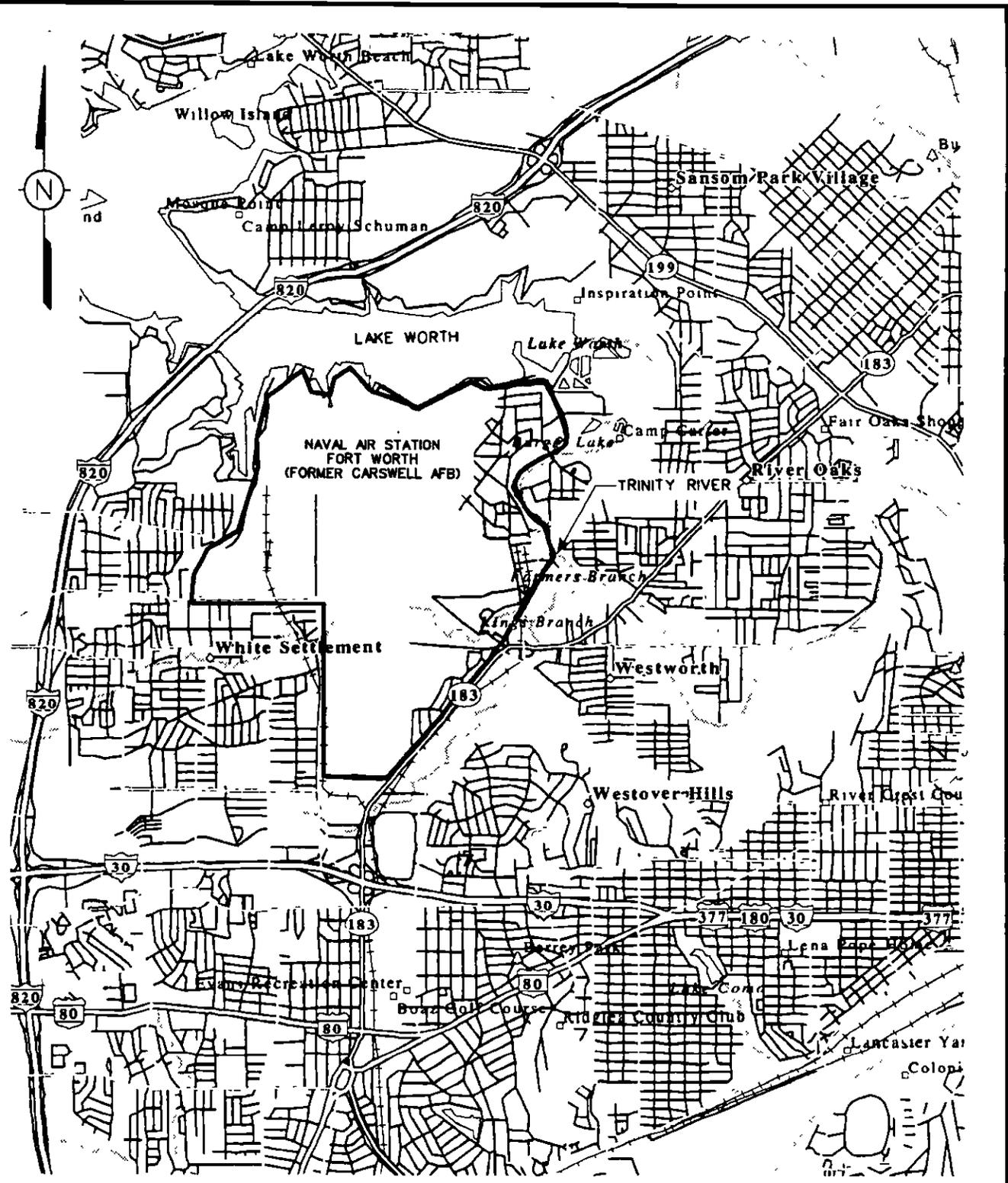


FIGURE 1-1  
 BASE LOCATION MAP

NAS FORT WORTH JRB  
 FORT WORTH, TEXAS





Table 1-1

**Oil/Water Separator Summary List  
 NAS Fort Worth JRB, Texas**

Building Number	AOC/ SWMU No.	Previous Site Investigation	Type	Capacity (gallons)	Year of Installation
1015	SWMU 47	LAW and IT	A	1,500	1967
1027	SWMU 44	LAW and IT	A	1,500	1985
1060	AOC 11	LAW and IT	A	750	1985
1064	AOC 10	LAW and IT	A	18,000	1988
1101	N/A	IT	B	4,000	1983
1145	AOC 13	LAW and IT	A	1,500	1982
1190	SWMU 52	LAW and IT	A	2,000	1959
1191	SWMU 37	LAW and IT	A	1,000	1982
1191	N/A	IT	B	500	Unknown
1194	SWMU 35	LAW and IT	A	2,000 + 1,500	1983
1320	N/A	IT	B	1,000	Unknown
1414	SWMU 41	LAW and IT	A	1,000	1970
1423	N/A	IT	A	3,000	1994
1602	N/A	IT	B	500	Unknown
1628	SWMU 7	IT	A	4,380	1980
1628	SWMU 8	IT	A	2,000	1980
1643	SWMU 40	IT	A	20,000	1982
1643	SWMU 40	IT	A	20,000	1982
1655	N/A	IT	A	18,000	1985
1656	N/A	IT	A	1,600	1989
3358	N/A	IT	B	N/D	Unknown
4146	N/A	IT	A	20,000	1983
4160	N/A	IT	B	N/D	1984
4210	AOC 12	IT	A	4,500	1985

**Legend:**

A - Oil/Water Separator

B - Grit/Oil Interceptor

N/A - Not applicable. These OWSs are being investigated as part of SWMU 66 (Sanitary Sewer System)

N/D - Not determined

Law - Law Environmental, Inc

IT - IT Corporation.

SWMU - Solid Waste Management Unit

AOC - Area of concern

Shaded rows indicate the OWS sites that are included in this RFI Report.

### **1.3 Regulatory Requirements**

Analytical data collected at the 13 OWS sites presented in this RFI report were evaluated and compared to the TNRCC RRSs. The TNRCC RRSs (30 TAC 335 Subchapter S) specify a consistent risk management policy to define the cleanup actions necessary to protect human health and the environment. The RRSs define the following three tiers of cleanup standards:

- RRS 1 requires cleanup to laboratory nondetectable levels or site-specific levels. Cleanup of RRS 1 levels is commonly referred to as "clean closure." Deed certification on the property and post-closure care is not required under this standard.
- RRS 2 requires a cleanup to default health-based levels such that any substantial threat to human health or the environment is reduced to acceptable levels. These cleanup standards are termed media-specific concentrations (MSCs). Examples of MSCs for selected chemicals are tabulated in the regulations (30 TAC §335.568 Appendix II), and equations are prescribed for use in calculating MSCs for chemicals not listed. Delineation of soil and groundwater concentrations to site background concentrations is required for RRS 2 closure. No cleanup is required in the event that detected concentrations do not exceed MSCs. Deed certification on the property is required. Post-closure care may be required to monitor groundwater concentrations that exceed RRS 2. Post-closure care is not required for soil concentrations that exceed site background (RRS 1) but are less than MSCs (RRS 2).
- RRS 3 requires a site-specific baseline risk assessment to define alternative cleanup levels based on health effects. Cleanup under RRS 3 standards may also require performing a corrective measures study to evaluate appropriate cleanup alternatives. Deed certification is required for cleanup under this standard and post-closure care may be required as well.

Soil and groundwater sample analysis results for inorganic compounds were compared to the approved base-specific background upper tolerance limits (UTLs) as presented in the final basewide background study (Jacobs Engineering [Jacobs], 1998) (Table 1-2) to determine if a release has occurred from a particular OWS. Analytical results for organic compounds were compared to method quantitation limits (MQL) and MSCs to determine whether any detected contaminants pose a threat to the shallow groundwater aquifer. Table 1-3 presents a summary of the MSCs used for this project. Based on the RFI results, no further sampling is required to delineate detected contaminants to background or MQLs, as required by the TNRCC RRP.

Table 1-2

**Soil and Groundwater Background Inorganic Concentrations  
 NAS Fort Worth JRB, Texas**

Analyte	Surface Soils UTL (mg/kg)	Subsurface Soils UTL (mg/kg)	Groundwater UTL (mg/L)
ALUMINUM	22035	20260	1.332
ANTIMONY	0.56	0.712	ND at 0.002
ARSENIC	5.85	6.58	ND at 0.0049
BARIUM	233	128.1	0.587
BERYLLIUM	1.02	1.13	0.0003
CALCIUM	167788	272000	266.3
CADMIUM	0.556	0.59	ND at 0.0005
CHROMIUM	25.86	16.31	0.006
COBALT	11.05	6.19	ND at 0.0089
COPPER	17.37	13.72	0.0028
IRON	17717	17469	0.224
LEAD	30.97	12.66	ND at 0.0016
MAGNESIUM	3003	2420	37.8
MANGANESE	849	351.7	0.175
MERCURY	0.14	ND at 0.035	ND at 0.0001
MOLYBDENUM	1.46	1.93	ND at 0.0144
NICKEL	14.6	19.76	0.0204
POTASSIUM	2895	1717	15.03
SELENIUM	0.907	0.3130	0.0077
SILVER	0.213	0.128	0.0002
SODIUM	37300	53200	167
THALLIUM	2.43	1.5	ND at 0.0632
VANADIUM	46.3	37.4	0.012
ZINC	38.8	31.3	0.118

Source: (Jacobs, 1998).  
 mg/kg = Milligrams per kilogram.  
 mg/L = Milligrams per liter.  
 ND = Not detected  
 UTL = Upper tolerance limit.

Table 1-3

**TNRCC Risk Reduction Standard 2  
Media-Specific Concentrations**

Parameter	Surface Soil <sup>a</sup> MSC (mg/kg)	Subsurface Soil <sup>b</sup> MSC (mg/kg)	Groundwater <sup>c</sup> MSC (mg/L)
<b>Metals</b>			
ALUMINUM	10000	10000	100
ANTIMONY	0.6	0.6	0.006
ARSENIC	5	5	0.05
BARIUM	200	200	2
BERYLLIUM	0.4	0.4	0.004
CADMIUM	0.5	0.5	0.005
CALCIUM	Essential Nutrient	Essential Nutrient	Essential Nutrient
CHROMIUM	10	10	0.1
COBALT	610	610	6.1
COPPER	130	130	1.3
IRON	Essential Nutrient	Essential Nutrient	Essential Nutrient
LEAD	1.5	1.5	0.015
MAGNESIUM	Essential Nutrient	Essential Nutrient	Essential Nutrient
MANGANESE	1400	1400	14
MERCURY	0.2	0.2	0.002
MOLYBDENUM	51	51	0.51
NICKEL	200	200	2
POTASSIUM	Essential Nutrient	Essential Nutrient	Essential Nutrient
SELENIUM	5	5	0.05
SILVER	51	51	0.51
SODIUM	Essential Nutrient	Essential Nutrient	Essential Nutrient
THALLIUM	0.2	0.2	0.002
VANADIUM	72	72	0.72
ZINC	3100	3100	31
<b>Semivolatile Organics</b>			
1,2,4-TRICHLOROBENZENE	7	7	0.07
1,2-DICHLOROBENZENE	60	60	0.6
1,3-DICHLOROBENZENE <sup>d</sup>	60	60	0.6
1,4-DICHLOROBENZENE	7.5	7.5	0.075
2,4,5-TRICHLOROPHENOL	1000	1000	10
2,4,6-TRICHLOROPHENOL	2.6	2.6	0.026
2,4-DICHLOROPHENOL	31	31	0.31
2,4-DIMETHYLPHENOL	200	200	2
2,4-DINITROPHENOL	20	20	0.2
2,4-DINITROTOLUENE	0.042	0.042	0.00042
2,6-DINITROTOLUENE	0.042	0.042	0.00042
2-CHLORONAPHTHALENE	820	820	8.2

Table 1-3

**TNRCC Risk Reduction Standard 2  
 Media-Specific Concentrations**

Parameter	Surface Soil <sup>a</sup> MSC (mg/kg)	Subsurface Soil <sup>b</sup> MSC (mg/kg)	Groundwater <sup>c</sup> MSC (mg/L)
2-CHLOROPHENOL	51	51	0.51
2-METHYLPHENOL	510	510	5.1
o-CRESOL	510	510	5.1
4-CHLOROANILINE	41	41	0.41
4-METHYLPHENOL	51	51	0.51
p-CRESOL	51	51	0.51
ACENAPHTHENE	610	610	6.1
ANTHRACENE	3100	3100	31
BENZO(A)ANTHRACENE	0.039	0.039	0.00039
BENZO(A)PYRENE	0.02	0.02	0.0002
BENZO(B)FLUORANTHENE	0.039	0.039	0.00039
BENZO(K)FLUORANTHENE	0.39	0.39	0.0039
BENZOIC ACID	41000	41000	410
BIS(2-CHLOROETHYL)ETHER	0.026	0.026	0.00026
BIS(2-CHLOROISOPROPYL)ETHER	410	410	4.1
BIS(2-ETHYLHEXYL)PHTHALATE	0.6	0.6	0.006
CHRYSENE	3.9	3.9	0.039
DI-N-BUTYL PHTHALATE	1000	1000	10
DI-N-OCTYL PHTHALATE	200	200	2
DIBENZO(A,H)ANTHRACENE	0.02	0.02	0.0002
DIETHYL PHTHALATE	8200	8200	82
FLUORANTHENE	410	410	4.1
FLUORENE	410	410	4.1
HEXACHLOROENZENE	0.1	0.1	0.001
HEXACHLOROBUTADIENE	2	2	0.02
HEXACHLOROETHANE	10	10	0.1
INDENO(1,2,3-CD)PYRENE	0.039	0.039	0.00039
N-NITROSO-DI-N-PROPYLAMINE	0.0041	0.0041	0.000041
N-NITROSODIPHENYLAMINE	5.8	5.8	0.058
NAPHTHALENE	200	200	2
NITROBENZENE	5.1	5.1	0.051
PENTACHLOROPHENOL	0.1	0.1	0.001
PHENANTHRENE	310	310	3.1
PHENOL	6100	6100	61
PYRENE	310	310	3.1
<b>Volatile Organics</b>			
1,1,1,2-TETRACHLOROETHANE	11	11	0.11
1,1,1-TRICHLOROETHANE	20	20	0.2
1,1,2,2-TETRACHLOROETHANE	1.4	1.4	0.014
1,1,2-TRICHLOROETHANE	0.5	0.5	0.005
1,1-DICHLOROETHANE	1000	1000	10
1,1-DICHLOROETHENE	0.0041	0.0041	0.00041
1,2,3-TRICHLOROPROPANE	0.0041	0.0041	4.10E-05
1,2,4-TRICHLOROBENZENE	7	7	0.07
1,2-DIBROMO-3-CHLOROPROPANE	0.02	0.02	0.0002
1,2-DICHLOROENZENE	60	60	0.6

Table 1-3

**TNRCC Risk Reduction Standard 2  
 Media-Specific Concentrations**

Parameter	Surface Soil <sup>a</sup> MSC (mg/kg)	Subsurface Soil <sup>b</sup> MSC (mg/kg)	Groundwater <sup>c</sup> MSC (mg/L)
1,2-DICHLOROETHANE	0.5	0.5	0.005
1,2-DICHLOROPROPANE	0.5	0.5	0.005
1,3,5-TRIMETHYLBENZENE	310	310	3.1
1,3-DICHLOROBENZENE	60	60	0.6
1,4-DICHLOROBENZENE	7.5	7.5	0.075
ACETONE	1000	1000	10
BENZENE	0.5	0.5	0.005
BROMODICHLOROMETHANE	10	10	0.1
BROMOFORM	10	10	0.1
BROMOMETHANE	14	14	0.14
CARBON TETRACHLORIDE	0.5	0.5	0.005
CHLOROBENZENE	10	10	0.1
CHLOROETHANE	4100	4100	41
CHLOROFORM	0.51	0.51	0.1
CIS-1,2-DICHLOROETHENE	7	7	0.07
DIBROMOCHLOROMETHANE	10	10	0.1
DICHLORODIFLUOROMETHANE	2000	2000	20
ETHYL BENZENE	70	70	0.7
HEXACHLOROBUTADIENE	2	2	0.02
ISOPROPYLBENZENE	1000	1000	10
M+P-XYLENE	1000	1000	10
METHYLENE CHLORIDE	0.5	0.5	0.005
NAPHTHALENE	200	200	2
N-BUTYLBENZENE *	102	102	1.02
N-PROPYLBENZENE *	102	102	1.02
O-XYLENE	1000	1000	10
STYRENE	10	10	0.1
TETRACHLOROETHENE	0.5	0.5	0.005
TOLUENE	100	100	1
TRANS-1,2-DICHLOROETHENE	10	10	0.1
TRICHLOROETHENE	0.5	0.5	0.005
TRICHLOROFLUOROMETHANE	3100	3100	31
VINYL CHLORIDE	0.2	0.2	0.002
<b>Organochlorine Pesticides and PCBs</b>			
4,4'-DDD	0.12	0.12	0.0012
4,4'-DDE	0.084	0.084	8.40E-04
4,4'-DDT	0.084	0.084	8.40E-04
ALDRIN	0.0017	0.0017	1.75E-05
ALPHA-BHC	0.0014	0.0014	4.50E-05
ALPHA-CHLORDANE	0.2	0.2	0.002
AROCLOR-1016 <sup>o</sup>	0.05	0.05	5.00E-04
AROCLOR-1221 <sup>o</sup>	0.05	0.05	5.00E-04
AROCLOR-1232 <sup>o</sup>	0.05	0.05	5.00E-04
AROCLOR-1242 <sup>o</sup>	0.05	0.05	5.00E-04
AROCLOR-1248 <sup>o</sup>	0.05	0.05	5.00E-04
AROCLOR-1254 <sup>o</sup>	0.05	0.05	5.00E-04
AROCLOR-1260 <sup>o</sup>	0.05	0.05	5.00E-04
BETA-BHC	0.16	0.16	1.60E-03

Table 1-3

**TNRCC Risk Reduction Standard 2  
 Media-Specific Concentrations**

Parameter	Surface Soil <sup>a</sup> MSC (mg/kg)	Subsurface Soil <sup>b</sup> MSC (mg/kg)	Groundwater <sup>c</sup> MSC (mg/L)
DELTA-BHC (technical)	0.016	0.016	1.60E-04
DIELDRIN	0.00183	0.00183	1.83E-05
ENDOSULFAN I	61	61	0.61
ENDOSULFAN II <sup>f</sup>	61	61	0.61
ENDOSULFAN SULFATE	61	61	0.61
ENDRIN	0.2	0.2	0.002
ENDRIN ALDEHYDE <sup>g</sup>	0.2	0.2	0.002
GAMMA-BHC (LINDANE)	0.02	0.02	2.00E-04
GAMMA-CHLORDANE (alpha)	0.2	0.2	0.002
HEPTACHLOR	0.04	0.04	4.00E-04
HEPTACHLOR EPOXIDE	0.02	0.02	2.00E-04
METHOXYCHLOR	4	4	0.04
TOXAPHENE	0.3	0.3	0.003

## Notes

Reference: TNRCC Risk Reduction Standards, TNRCC, 1993, "Final Standards Chapter 335, Subchapter S Risk Reduction Standards," *Texas Register* 18 3842-3872

\*Calculated MSC

<sup>a</sup> Surface soil is the lower MSC of soil ingestion/inhalation for industrial sites and groundwater protection for industrial sites (SAI-Ind and GWP-Ind)

<sup>b</sup> Subsurface soil MSC is the groundwater protection for industrial soil (GWP-Ind)

<sup>c</sup> Groundwater MSC is industrial groundwater (GW-Ind)

<sup>d</sup> 1,2-Dichlorobenzene used as surrogate

<sup>e</sup> PCBs used as a surrogate

<sup>f</sup> Endosulfan I used as surrogate

<sup>g</sup> Endrin used as surrogate

MSC - Media-specific concentration

mg/kg - Milligrams per kilogram

mg/L - Milligrams per liter

PCB - Polychlorinated biphenyl

#### **1.4 Report Organization**

Chapter 2.0 describes the background and existing site information for NAS Fort Worth JRB. Chapter 3.0 presents a summary of the analytical data collected during previous investigations at the OWS sites and a discussion of various findings that affect recommendations for closure at many of the OWS sites. Chapters 4.0 through 16.0 present descriptions of each OWS site presented in this RFI report, along with the investigation activities and analytical results required to obtain closure under the TNRCC RRP. Chapter 17.0 summarizes the conclusions for the 13 OWS sites presented in this RFI report and Chapter 18.0 provides the references used in generation of this report.

Tables and figures are included within the text of the report. Appendices provided in support of this RFI report include: Appendix A, RFI Boring/Probe Logs; Appendix B, Analytical Detection Summary Tables; Appendix C, Phase 1 RFI Soil and Groundwater Analytical Data; Appendix D, Phase 2 Data Quality Summary Report (DQSR); and Appendix E, Phase 3 DQSR

# TAB

*2.0*

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## **2.0 Background and Existing Site Information**

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### **2.1 Site Description**

NAS Fort Worth JRB is located in Tarrant County, 8 miles west of downtown Fort Worth, Texas (Figure 1-1). The Base is located at approximately 32 degrees north latitude and 97 degrees west longitude. The NAS Fort Worth JRB property, totaling 2,555 acres, consists of the main Base and two noncontiguous parcels. The main Base comprises 2,264 acres and is bordered by Lake Worth to the north, the West Fork of Trinity River and Westworth Village to the east, Fort Worth to the northeast and southeast, White Settlement to the west and southwest, and Air Force Plant (AFP) 4 to the west. The area surrounding NAS Fort Worth is mostly suburban, including the residential areas of the cities, with their respective populations from the 1990 census. Fort Worth (447,600), Westworth Village (2,350), Sansom Park Village (3,928), River Oaks (6,580), and White Settlement (15,472). The OWSs are located throughout the industrialized areas of NAS Fort Worth JRB (see Figure 1-2).

### **2.2 Environmental Setting**

#### **2.2.1 Climate**

The climate in the Fort Worth region is subhumid with mild winters and hot, humid summers. The average annual precipitation is 31.5 inches, with the majority falling between April and October. The average annual temperature is 66 degrees Fahrenheit (°F). July is the hottest month with an average monthly temperature of 86°F, while January is the coldest month with an average monthly temperature of 45°F. Temperature changes are rapid and often change 20 to 30 degrees in several hours. The average annual relative humidity is 63 percent.

Prevailing winds are primarily southerly from March through November and northerly from December through February; the average wind speed is eight knots. Severe thunderstorms with wind speeds of 65 knots and hail storms are common. Climate conditions in summer make tornado formations possible, although there is more property damage each year due to hail than to tornadoes.

#### **2.2.2 Sensitive Habitats**

Sensitive habitats include those areas that can potentially restrict the reuse of the land, such as wetlands under the jurisdiction of the Clean Water Act (CWA), plant communities that are

designated as unusual or of limited distribution, and important seasonal use areas for wildlife (e.g., migration route, breeding areas, or crucial summer/winter habitat that are of agency concern). This includes areas associated with a protected species, or those areas critical to a species of population.

The shore of Lake Worth is considered a sensitive habitat due to its importance to migratory birds, including state- and federal-listed species. The great blue heron rookeries by the Fort Worth Nature Center are sensitive nesting areas along the northern banks of Lake Worth. The birds are especially vulnerable to human intrusion during the nesting season. These rookeries are protected as sensitive wildlife areas by the Texas Department of Parks and Wildlife.

### **2.2.3 Wetlands**

NAS Fort Worth has a total of 0.6 acres of jurisdictional wetlands designated by U.S. Army Corps of Engineers (USACE), Fort Worth. Wetlands are defined by USACE as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” Areas that are periodically wet, but do not meet all three criteria (hydrophytic vegetation, hydric soils, and wetland hydrology), may still be jurisdictional wetlands subject to Section 404 of the federal CWA if they qualify as problem wetlands.

Drainage ditches are not considered as “waters of the United States” and are not classified as “jurisdictional” for protection under Section 404 of the CWA by the Fort Worth USACE. Although water flows through Farmers Branch Creek and is found in various small ponds on the golf course, very little wetland vegetation is associated with these areas. Likewise, wetland vegetation along Lake Worth is infrequent and usually emergent when present. These areas do not support enough wetland cover to be classified as jurisdictional wetlands

Jurisdictional wetland areas on station are found in the natural drainage stream southeast of AFP-4, totaling approximately 0.5 acre, and on the west side of the Off-Site Weapons Storage Area (WSA), totaling approximately 0.1 acre.

### **2.2.4 Surface Waters**

NAS Fort Worth and all of Tarrant County are located within the Trinity River watershed. Surface water resources in the vicinity of the station include the West Fork and Kings Branch of the Trinity River, Farmers Branch Creek, Lake Worth, two ponds located in the golf course area, and one small pond in the WSA.

The amount of water the Trinity River receives is controlled by the watershed runoff from impervious areas during storms, by releases and overflows from the series of man-made reservoirs along the forks and tributaries by natural runoff, and by the discharge of effluent from sewage treatment plants. Lake Worth, a man-made reservoir constructed in 1914 on the West Fork of the Trinity River, is located north of NAS Fort Worth and is owned and operated by the City of Fort Worth. The West Fork of the Trinity River flows southeastward from the Lake Worth dam and spillway and flows along the eastern boundary of NAS Fort Worth. These waters are used for public water supply and recreation. The Lake Worth spillway elevation is 594 feet above mean sea level (msl) and has a maximum discharge capacity of 55,000 cubic feet per second. Lake Worth averages 6 feet in depth, with a maximum depth of 28 feet, and covers an area of 3,558 acres. It is 12 miles long and its drainage area covers approximately 2,064 square miles. The lake has a conservation storage capacity of 38,130 acre-feet (or approximately 12.4 billion gallons).

Surface water is the main source of potable water in the vicinity of NAS Fort Worth. The City of Fort Worth Water Department is the primary supplier to the areas surrounding and including the station. Water from the Farmers Branch Creek is used to irrigate the on-station golf course. White Settlement and Sansom Park obtain water from 12 and 9 groundwater wells, respectively, but when required, they purchase surface water from Fort Worth to supplement their water supplies. NAS Fort Worth purchased 0.93 million gallons per day (MGD), 0.77 MGD, and 0.76 MGD of water from Fort Worth in 1989, 1990, and 1991, respectively.

Surface drainage at NAS Fort Worth is collected by the storm drainage system and routed into the sewer system, or as outfall into Lake Worth. An underground drainage culvert conducts surface runoff generated from areas west of the NAS Fort Worth eastward to Farmers Branch Creek. After exiting the underground culvert, Farmers Branch Creek flows eastward through the on-Base golf course before flowing into Kings Branch Creek and eventually discharging into the West Fork of the Trinity River at the southeastern part of the Base. Farmers Branch is an intermittent stream that receives most of its flow from surface water runoff discharged into the

creek from storm drains, culverts, and overland flow. Several springs discharge into Farmers Branch Creek as it flows through the on-Base golf course.

The North Central Texas Council of Governments has implemented the Continuous Automated Monitoring (CAM) system. Two monitoring stations are located along the West Fork of the Trinity River, downstream from NAS Fort Worth. Current results of analyses of water from the first CAM station downstream from NAS Fort Worth showed that 100 percent of the samples were below the criteria value of 5.5 milligrams per liter (mg/L) for dissolved oxygen, and that measure of acidity and alkalinity (pH) values range from 6.6 to 9.8 due to the presence of substantial attached algal communities. The U.S. Environmental Protection Agency (EPA) secondary drinking water standard for pH is a range from 6.5 to 8.5; this range is a guideline, not a requirement.

Storm water runoff from the NAS Fort Worth that is not routed to the Base or city sewer system is discharged into Lake Worth. The outfall is permitted under the National Pollutant Discharge Elimination System and monitoring results document compliance with permit discharge limitations.

The water quality of Lake Worth is moderately hard, and contains slightly elevated salt levels during the warm summer season. Historically, Lake Worth has experienced problems with high sediment loads. Lake Worth was included in the 1990 nonpoint source report for having known problems with sedimentation from agricultural and vacant lands. The sedimentation problems have been reduced by using Eagle Mountain Lake as a sediment trap.

The potential for contamination of surface water is present at several locations on NAS Fort Worth. Potential for migration of hazardous contaminants through the surface water is considered high, primarily due to the proximity of identified sites to the West Fork of the Trinity River, Farmers Branch Creek, and Lake Worth. In addition, shallow groundwater carrying dissolved contaminants may discharge to these surface waters.

### ***2.2.5 Geography and Physiography***

NAS Fort Worth is located within the Grand Prairie section of the Central Lowlands Physiographic Province. The area is characterized by broad terrace surfaces sloping gently eastward, interrupted by westward-facing escarpments. The topography of the Base is fairly flat, except for

areas near Farmers Branch Creek and the Trinity River. Elevations average 650 feet above msl and range from 550 feet above msl in the east to 690 feet above msl in the southwest.

Soils in the area generally consist of the Aledo-Bolar-Sanger Association, which is defined as gently sloping to moderately steep, very shallow to deep, loamy and clayey soils on uplands.

The land uses west of the NAS Fort Worth are predominantly residential and industrial. These include single-family residences, commercial centers, AFP-4, and an industrial complex in White Settlement.

The predominant development south of the NAS Fort Worth is the commercial area located at the Interstate 30 and State Highway 183 interchange. This area includes a discount retail center, a regional shopping mall, and a convenience center.

Various types of residential development occur southeast of the NAS Fort Worth, north of Interstate 30. South of River Oaks Boulevard and Roaring Springs Road are country club estates and upscale townhouses. Further south are middle- to upper-income, single-family housing, and multi-family units mixed with commercial office development. Single-family housing is also found on the eastern side of the NAS Fort Worth, from the Kings Branch housing tract north to Meandering Road.

Public/recreational land uses occur north of the NAS Fort Worth, surrounding Lake Worth. Public access along the southern shore of Lake Worth is currently restricted due to NAS Fort Worth JRB activities. A fish hatchery, YMCA camp, and private recreation lands occur along the West Fork of the Trinity River, northeast of the NAS Fort Worth.

### **2.2.6 Regional Geology**

Quaternary alluvium is found at the surface through most of the NAS Fort Worth area. The alluvium consists of floodplain and fluvial terrace deposits of gravel, sand, silt, and clay that occur as a veneer on the eroded surface of Upper Cretaceous strata. The Quaternary alluvium found throughout the area was deposited by the Trinity River in terrace deposits along the river valley banks as a result of changing sea level during the Pleistocene and Holocene (Recent) Epochs. Reworking and deposition of these deposits by the ancestral and present Trinity River has created a series of Pleistocene age "terraced" river alluvium deposits of varying elevations placed by the river at various elevations due to its corresponding level influence by sea level

changes during Quaternary continental glaciation. The Pleistocene terrace deposits, consisting of gravel, sand, and silt, are found at higher topographic elevations than the Holocene age alluvial deposits located in the alluvial-filled valleys of present streams.

Previous drilling activities at the NAS indicate that the alluvial deposits vary in thickness from less than 10 feet to about 50 feet in thickness and generally thicken in an east to southeastern direction toward the Trinity River. The irregular thickness of the alluvium is due to depositional events, stream channeling, and erosion. In general, silt and clay with varying amounts of sand and gravel occur at the land surface down to depths of 5 to 10 feet. Underlying the silt and clay is a sand and gravel unit that normally increases in grain size with increasing depth. The sand deposits are fine- to coarse-grained, tan to rust in color, and composed predominantly of quartz grains. Gravel is mostly limestone and fossilized limestone shell fragments ranging in size from fine to cobbles. The gravels were deposited as channel lag deposits on the scoured upper surface of the underlying Cretaceous strata. The alluvial deposits are heterogeneous in nature, with changes in stratigraphy occurring over very short distances due to their depositional environment.

Underlying the Quaternary alluvium are the Cretaceous-aged Goodland and Walnut Formations. Both formations consist of interbedded, fossiliferous, hard limestone and calcareous shale. The rock is fractured and there is considerable jointing and flaking, which gives the limestone a fractured appearance. The Goodland Limestone is comprised of white, chalky, fossiliferous, thinly to massively bedded resistant limestone and gray to yellow-brown silty marl. Underlying the Goodland is the Walnut Formation. The Walnut Formation, about 20 to 30 feet thick in the vicinity of NAS Fort Worth, consists of indurated fossiliferous limestone interbedded brown sandy clay, thinly bedded fossiliferous clay, fissile shale, and iron-stained earthy limestone. These strata are generally dry, although small amounts of water are occasionally present in the shale and clay units (Radian Corporation [Radian], 1991).

The Cretaceous-aged strata have a regional dip to the southeast. The surface elevation of the Cretaceous strata surface varies considerably across the area of the NAS due to erosion of the Trinity River and its ancient stream course. The Goodland and Walnut Formations have been removed by erosion of the Trinity River to the west of NAS Fort Worth and along the erosional valley of the Trinity River to the north and the east of the site. The locally irregular topography of the top of the bedrock is characteristic of an erosional surface modified by fluvial processes, which is characterized by the variable nature and thickness of the overlying sequence of Quaternary alluvial sediments.

Unconformably underlying the Goodland and Walnut Formations is the Cretaceous-aged Paluxy Formation. Regionally, the Paluxy Formation is divided into upper and lower sand members by a shale unit. The sands in the upper part of the Paluxy are reported to be fine-grained with shale interbeds. The lower sand member generally consists of two separate and distinct sand strata, but the individual sand beds do not maintain constant thickness or lithology over long distances. The lower part of the Paluxy Formation generally consists of coarse-grained sand that grades upward into fine-grained sand with variable amounts of shale and limestone. The sandstone, composed of fine- to coarse-grained white quartz, is well-sorted, poorly consolidated, and cross-bedded. Iron and pyrite nodules occur in the sandstone, and lignite is locally present. The Paluxy Formation thickness ranges from 140 to 190 feet, averaging 160 feet in Tarrant County (Radian, 1991).

The Paluxy is exposed along the southern shore of Lake Worth at the northern boundary of the facility and along the erosional channel of the Trinity River. The Paluxy Formation either is aerially exposed or is in contact with overlying Quaternary alluvium where the Goodland and Walnut Formations have been removed by erosion.

### **2.2.7 Hydrogeology**

Three hydrogeologic units exist beneath NAS Fort Worth that are relevant to subsurface conditions. From the shallowest to the deepest, they are: (1) the Quaternary alluvium aquifer containing unconfined groundwater associated with the Pleistocene terrace and the Trinity River alluvial deposits, (2) an aquitard of predominantly dry limestone of the Goodland and Walnut Formations, and (3) an aquifer in the Paluxy Formation. All groundwater samples for this investigation were collected from depths of 15 to 25 feet deep in the Quaternary alluvium aquifer.

The Quaternary alluvial groundwater is found under unconfined conditions at NAS Fort Worth. Isolated areas of apparent semiconfined conditions at transition zones between stratigraphic terrace units were encountered during the field investigation. Low permeability is typical of the alluvium because of the large amounts of clay and silt. However, there are zones of greater permeability in the saturated sands and gravels of former channel deposits. Recharge to the water-bearing sediments is local, from rainfall and infiltration from stream channels and drainage ditches. The direction of groundwater flow is generally controlled either by bedrock topography or discharge zones at primary or secondary streams. Previous reports indicate that the

groundwater flow in these sediments across the facility is generally toward Farmers Branch Creek or eastward toward the Trinity River located at the eastern boundary of the facility. Quaternary alluvium river channel deposits at the western boundary of NAS Fort Worth had a measured hydraulic conductivity of  $2.9 \times 10^{-1}$  from a 1991 pump test (Radian, 1991). This test was conducted in an area of higher permeability due to the well being located in a former river channel gravel deposit at the western end of White Settlement Road. Additional aquifer tests conducted during investigation of the Installation Restoration Program (IRP) Site ST-14 (the Petroleum, Oil, and Lubricants Tank Farm) indicated hydraulic conductivities for these sediments in the range of  $2 \times 10^{-5}$  to  $2.4 \times 10^{-2}$  feet per minute (Parsons Engineering Science, 1996).

Groundwater leakage may occur to the underlying Paluxy Formation in areas where the Walnut Formation aquitard is significantly thinned by erosion or eroded away. The Walnut Formation is absent along the station, where the West Fork of the Trinity River has removed the unit due to erosion. The unconfined groundwater found in the Quaternary alluvium is generally separated from the underlying Paluxy Aquifer by the low permeability limestones and calcareous shales where the Goodland and Walnut Formations are present. The aquitard is composed of moist clay and shale layers interbedded with dry limestone beds.

Vertical hydraulic conductivity of the Walnut Formation was measured on core samples collected during the AFP-4 remedial investigation. The calculated logarithmic mean of the hydraulic conductivity values is  $7.0 \times 10^{-10}$  centimeters per second. Hydrographs from paired upper zone Quaternary alluvium and Paluxy Formation monitoring wells indicate there is little flow from the overlying alluvial aquifer to the Paluxy Formation in those areas where the Walnut Formation is not deeply eroded. In those areas where erosion has cut into the Walnut Formation, the potential exists for downward migration of recharge to the Paluxy Aquifer (Kuniasky et al., 1996).

The Paluxy Aquifer is the shallowest Cretaceous-aged aquifer underlying NAS Fort Worth. In the area, water in the uppermost part of the Paluxy Formation would occur under confined conditions beneath the Goodland and Walnut Formations, except where these units have been eroded away. However, extensive groundwater pumping in the Fort Worth area, including the cities of White Settlement and Samson Park, has lowered the Paluxy Aquifer potentiometric surface below the top of the formation, resulting in unconfined conditions.

Recharge to the Paluxy Aquifer occurs where the formation crops out. The Paluxy Formation crops out west of AFP-4, and north of NAS Fort Worth in the bed of Lake Worth. Lake Worth is a major recharge area for the aquifer and creates a potentiometric high in its vicinity. Regional groundwater flow is southeastward in direction of the regional dip. Transmissivities in the Paluxy Aquifer range from 1,263 to 13,808 gallons per day per foot, and average 3,700 gallons per day per foot (Radian, 1991).

## **2.3 Site History and Operations**

### **2.3.1 Ownership**

The facility known as NAS Fort Worth JRB was originally a modest dirt runway built to service an aircraft manufacturing plant located where AFP-4 is now located. When it was established in 1942, the installation was referred to as the Tarrant Field Airdrome and was originally under the jurisdiction of the Gulf Coast Army Air Field Training Command. The Strategic Air Command (SAC) assumed control of the installation in 1946 and the NAS Fort Worth served as headquarters of the Eighth Air Force. At that time, the 7th Bomber Wing became the NAS Fort Worth host unit. The NAS Fort Worth was renamed Carswell AFB in 1948 in honor of Fort Worth native, Major Horace S. Carswell.

In 1951, Headquarters 19 Air Division was located at Carswell AFB, where it remained until September 1988. The Air Combat Command assumed control of the NAS Fort Worth in 1992 when SAC's mission was ended. On October 1, 1994, the U.S. Navy assumed responsibility for the facility and the name changed from Carswell AFB to NAS Fort Worth Joint Reserve Base. All further references to the facility in this document will appear as "NAS Fort Worth."

AFBCA is currently the on-site responsible party for IRP sites and the RCRA Part B permit holder for SWMUs. The AFBCA operating location is tasked with coordinating closure activities, maintaining a caretaker force, and serving as an Air Force liaison supporting NAS Fort Worth property disposal and interim leases. AFBCA will remain the on-site responsible party for areas outside the 301 Tactical Fighter Wing area until the disposal of all NAS Fort Worth properties is complete (Jacobs, 1995).

### **2.3.2 Operation**

Before the construction of the initial airfield facilities in 1942, the area now occupied by NAS Fort Worth was pasture land and woods. The majority of the NAS Fort Worth property was

acquired in the 1940s, with most of the property acquired from the city of Fort Worth in 1941. Additional property, including most of the south Base, the hospital area, and the Off-Site WSA, was acquired during the 1950s. Kings Branch and south Base residential areas were acquired in 1960. Several miscellaneous additional properties totaling less than 10 acres have been acquired since 1970 (Jacobs, 1995).

After 1941, the former Carswell AFB mission was a bomber training base. Carswell AFB was realigned as NAS Fort Worth in 1994. Wastes have been generated and disposed of at NAS Fort Worth since the beginning of industrial operations in 1942. The major industrial operations at NAS Fort Worth included: maintenance of jet engines, aerospace ground equipment, fuel systems, weapons systems, hydraulic systems, general and special purpose vehicles, aircraft corrosion control, and nondestructive inspection activities (Jacobs, 1995).

Waste oils generally refer to lubricating fluids, such as crankcase oils and synthetic turbine oils. Hydraulic fluids have also been included in this category. Recoverable fuels refer to fuel drained from aircraft tanks and vehicles, such as jet propulsion fuel 4 (JP-4) and motor gasoline. Spent solvents and cleaners refer to liquid used for degreasing and general cleaning of aircraft, aircraft systems, electronic components, and vehicles. This category includes PD-680 and various chlorinated organic compounds, such as carbon tetrachloride, trichloroethene (TCE), and 1,1,1-trichloroethane (TCA).

Specific types of solvents used by the Air Force have changed over the years. In the 1950s, carbon tetrachloride was in common use. Its use was replaced by TCE around 1960. Since then, TCE and 1,1,1-TCA have been commonly used; however, TCE usage has decreased in favor of 1,1,1-TCA. Currently, PD-680 Type II, 1,1,1-TCA, and TCE are used.

Waste paint solvents or thinners and strippers are generated by corrosion control activities. Typical thinners include isobutyl acetate, toluene, methyl ethyl ketone, isopropanol, naphtha, and xylene. Paint strippers generally contain such compounds as methylene chloride, toluene, ammonium hydroxide, and phenolics (CH2M Hill, Inc., 1996). All of these operations generated waste materials, primarily oils, recoverable fuels, spent solvents, and cleaners. Most waste oils, recovered fuels, spent solvents, and cleaners were either burned at fire training areas on NAS Fort Worth, reused on NAS Fort Worth, or processed through the Defense Property Disposal Office. An undetermined amount of these materials were discharged through the OWS to the Sanitary Sewer System at NAS Fort Worth (Jacobs, 1995).

## 2.4 Discussion of Previous Site Investigations

Since 1984, Air Force IRP studies have been conducted by several contractors, focussing on identifying and characterizing SWMUs and AOCs identified in the TNRCC Hazardous Waste Permit (HW-50289) and those regulated units identified by the installation and added to the permit after it was issued in 1991. In an RCRA Facility Assessment (RFA) report (A.T. Kearney, 1989), eight OWSs [OWS Building 1015 (SWMU 47), OWS Building 1027 (SWMU 44), OWS Building 1190 (SWMU 52), OWS Building 1191 (SWMU 37), OWS Building 1194 (SWMU 35), OWS Building 1414 (SWMU 41), OWS Building 1628 (SWMUs 7 and 8), and Building 1643 (SWMU 40)] were designated as SWMUs and four were designated as AOCs [OWS Building 1060 (AOC 11), OWS Building 1064 (AOC 10), OWS Building 1145 (AOC 13), and OWS Building 4210 (AOC 12)]. The OWS at Building 1320 (SWMU 67) was the only OWS site with a documented release of contaminants (hydrocarbons) into the environment (A.T. Kearney, 1989) and has subsequently been investigated by the AFBCA and received closure from the TNRCC. The nondesignated OWSs were then investigated to document any contamination when they are transferred to the U.S. Navy.

In 1995, an investigation of 11 of the 21 OWSs was performed (Law, 1995) to assess contamination associated with the OWSs and to evaluate the present condition for future use of these OWSs. This report indicated that two of the OWSs, located at Building 1015 (SWMU 47) and Building 1194 (SWMU 35), were connected to the Sanitary Sewer System system. The discharge connections of the remaining OWSs investigated [Unnamed Stream at Building 38A, OWS Building 1027 (SWMU 44), OWS Building 1060 (AOC 11), OWS Building 1064 (AOC 10), OWS Building 1145 (AOC 13), OWS Building 1190 (SWMU 52), OWS Building 1191 (SWMU 37), OWS Building 1414 (SWMU 41), and OWS Building 4210 (AOC 12)] were also assumed to be connected to the Sanitary Sewer System (Law, 1995). During this investigation, surface and subsurface soil samples were collected at the 11 OWS sites and analyzed for volatile organic compounds (VOC) and RCRA metals (except mercury). No groundwater samples were analyzed. No samples exceeded TNRCC RRSs for VOCs; however, some soils in the immediate area of each of the 11 OWSs were contaminated with metals concentrations exceeding TNRCC RRSs (Law, 1995). The analytical results from the Law (1995) investigation for 9 of the 13 OWS sites [OWS Building 1015 (SWMU 47), OWS Building 1027 (SWMU 44), OWS Building 1060 (AOC 11), OWS Building 1064 (AOC 10), OWS Building 1190 (SWMU 52), OWS Building 1191 (SWMU 37), OWS Building 1194 (SWMU 35), OWS Building 1414 (SWMU 41), and OWS Building 4210 (AOC 12)] are presented later in this RFI report.

In 1997, IT conducted an RFI for the entire Sanitary Sewer System (SWMU 66), which included OWS sites [OWS Building 1015 (SWMU 47), OWS Building 1027 (SWMU 44), OWS Building 1060 (AOC 11), OWS Building 1064 (AOC 10), OWS Building 1101, OWS Building 1145 (AOC 13), OWS Building 1190 (SWMU 52), OWS Building 1191 (SWMU 37), OWS Building 1194 (SWMU 35), OWS Building 1320, OWS Building 1414 (SWMU 41), OWS Building 1423, OWS Building 1602, OWS Building 1628 (SWMUs 7 and 8), OWS Building 1643 (SWMU 40), OWS Building 1655, OWS Building 1656, OWS Building 3358, OWS Building 4146, OWS Building 4160, and OWS Building 4210 (AOC 12)]. At the nine OWS sites investigated previously by Law and presented in this report, IT collected soil samples for semi-volatile organic compound (SVOC) and pesticide/polychlorinated biphenyl (PCB) analyses. Monitoring wells were installed and groundwater was sampled and analyzed for VOCs, SVOCs, and inorganics. At OWSs not previously investigated by Law [OWS Building 1101, OWS Building 1320, OWS Building 1423, OWS Building 1602, OWS Building 1628 (SWMUs 7 and 8), OWS Building 1643 (SWMU 40), OWS Building 1655, OWS Building 1656, OWS Building 3358, OWS Building 4146, and OWS Building 4160], IT collected and analyzed surface and subsurface soils for VOCs, SVOCs, pesticides/PCBs, and inorganics. Monitoring wells were installed and groundwater was collected and analyzed for VOCs, SVOCs, and inorganics. Results of this investigation were published by IT in the draft Sanitary Sewer System RFI Report in September 1997 (IT, 1997). The draft OWS RFI addendum report (IT, 1998) presented the combined investigation findings from the draft Sanitary Sewer System RFI Report and additional investigation of 21 OWSs completed in January 1998.

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### ***3.0 Presentation and Discussion of RFI Analytical Data***

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This chapter discusses investigation activities that have been completed at the 13 OWS sites presented in this RFI report. Analytical summary tables from the Law (1995) investigation and the results from the Phase 1, 2, and 3 RFIs are presented during the discussions for each OWS site in Chapters 4.0 through 16.0 of this RFI report. This chapter also discusses various data findings that will be used to recommend NFA at each of the 13 OWS sites presented in this RFI report.

#### ***3.1 Presentation of Analytical Data***

The majority of the physical and chemical data presented in this report was collected during the following investigations:

- Law (1995) performed an initial site investigation during April 1994 at nine of the OWS sites presented in this RFI report.
- IT (1998) collected soil and/or groundwater data at the 13 OWS sites during March and April 1997 as part of the Phase 1 RFI for the Sanitary Sewer System (SWMU 66)
- IT collected soil and groundwater data as part of the Phase 2 RFI activities during June 1999 and April and May 2000.
- IT collected soil and groundwater data in November 2000 as part of the Phase 3 RFI activities.

The Law (1995) and the 1997 Phase 1 IT data were previously reported in both the draft Sanitary Sewer System RFI report (IT, 1997) and the draft OWS RFI addendum report (IT, 1998). The following sections provide an overview of the soil and groundwater analytical results for each of these investigations. Analytical data summary tables are presented in Chapters 4.0 through 16.0 when each OWS site is discussed in detail.

##### ***3.1.1 Data from Initial Site Investigation***

Law (1995) collected and analyzed surface and subsurface soil samples from nine of the thirteen OWS sites presented in this RFI report during their initial site investigation conducted in 1994. The OWS sites investigated by Law (1995) included: Building 1015, Building 1027, Building 1060, Building 1064, Building 1190, Building 1191, Building 1194, Building 1414, and Building 4210. The samples were analyzed for VOCs (EPA Method SW8240) and for inorganics (EPA

Method SW6010). A summary of the quality assurance/quality control (QA/QC) samples collected during the initial site investigation can be found in the Law (1995) report.

### **3.1.2 Data from Phase 1 Sanitary Sewer System RFI**

IT collected soil and groundwater data from the 13 OWS sites presented in this RFI report during the Phase 1 Sanitary Sewer System (SWMU 66) RFI between April 1997 and January 1998. At the nine OWS sites previously investigated by Law (1995), IT collected supplemental soil samples for analysis of SVOCs and pesticides/PCBs and installed monitoring wells for collection of groundwater samples for analysis of VOCs, SVOCs, and inorganics. At three of the four OWSs not previously investigated by Law (Buildings 1602, 1643, and 4146), IT collected surface and subsurface soil samples for VOCs, SVOCs, pesticides/PCBs, and inorganics analyses and installed monitoring wells for sampling groundwater for VOCs, SVOCs, and inorganics. Results of this investigation were published by IT in the Draft Sanitary Sewer RFI in August 1997. Additional sampling was performed at Building 3358 in January 1998 and results were included, along with the data from each of the 13 OWSs presented in this report, in the RFI addendum report for the OWS connected to the Sanitary Sewer System at NAS Fort Worth JRB (IT, 1998). Appendix A contains the soil boring logs and monitoring well installation diagrams completed during the Phase 1 Sanitary Sewer System RFI at the 13 OWS sites presented in this RFI report.

Ten percent of the analytical data were validated at a Level III based on the EPA Contract Laboratory Program national functional guidelines for inorganic review (EPA, 1994a) and EPA Contract Laboratory Program national functional guidelines for organic data review (EPA, 1994b). Data were evaluated to verify the achievement of precision, accuracy, completeness, comparability and representativeness goals established for the project. Overall, the data were considered representative of site conditions and usable for their intended purpose. Please see Section 4.0 of the draft Sanitary Sewer System RFI (IT, 1997) for a more detailed discussion of the QA/QC evaluation.

Appendix B contains analytical detection summary tables for soil and groundwater samples collected during the Phase 1 RFI at each of the 13 OWS sites presented in this RFI report.

Appendix C contains a summary of analytical results for soil and groundwater samples collected during the Phase 1 RFI at each of the 13 OWS sites presented in this RFI report. The data will be discussed in more detail in Chapters 4.0 through 16.0.

### **3.1.3 Phase 2 RFI Laboratory Methodology**

IT collected soil and/or groundwater samples at the 13 OWS sites during April and May 2000 to confirm and/or delineate elevated inorganic concentrations detected during the Phase 1 RFI activities. The soil and groundwater samples were submitted for analysis of various inorganics using EPA method SW6010B/SW7000. Additionally, synthetic precipitation leaching procedure (SPLP) analysis was performed on a portion of the samples, which were predefined in the Phase 2 RFI work plan to determine if contaminant concentrations exceeding MSCs in soil present a potential to leach into groundwater at concentrations exceeding MSCs for groundwater (IT, 1999). The DQSR report for the Phase 2 sampling event is provided in Appendix D and includes the analytical results from the Phase 2 RFI samples. Ten percent of the Phase 2 samples were validated and the data was deemed representative of site conditions and usable for the intended purpose.

### **3.1.4 Phase 3 RFI Laboratory Methodology**

In November 2000, IT collected additional soil and/or groundwater samples at the 13 OWS sites during the Phase 3 RFI activities to confirm and/or delineate elevated inorganic concentrations detected during the Phase 1 RFI activities (IT, 2000). Inorganic concentrations in soil and groundwater samples were analyzed using EPA method SW6010B/SW7000. Selected VOCs were analyzed for using EPA Method SW8260. Additionally, SPLP analysis was performed on selected soil samples, which contained inorganic concentrations exceeding TNRCC MSCs. The DQSR for the Phase 3 sampling event is provided in Appendix E and includes the analytical results from the Phase 3 RFI samples. Ten percent of the Phase 3 samples were validated and the data was deemed representative of site conditions and usable for their intended purpose.

## **3.2 Discussion of Analytical Data Results**

The following sections discuss some findings in the analytical data that have been collected at the 13 OWS sites presented in this RFI report. These findings include random detections of silver in soil samples above background concentrations, the low-level detections of toluene in soil samples collected during the Phase 1 Sanitary Sewer System RFI, high concentrations of arsenic and cadmium detected in soil samples collected during the Law (1995) site investigation, and the presence of chlorinated solvents in groundwater related to the TCE plume originating from AFP-4. The following discussion of analytical data will also be presented on a site-specific basis in Chapters 4.0 through 16.0.

### **3.2.1 Discussion of Silver Detections in Soil**

The silver data reported from the 1997 Phase I Sanitary Sewer System RFI were generated using inductively coupled plasma (ICP) emission spectroscopy (EPA Method SW6010B). The silver results reported in the Phase I investigation ranged from nondetections to low-level, estimated (i.e., B-flagged) detections below the practical quantitation limit (PQL), but slightly above the method detection limit (MDL). All reported silver detections were above the background UTL for silver determined by graphite furnace atomic absorption (GFAA) spectroscopy (EPA Method SW7761) during the Jacobs Basewide background study (Jacobs, 1998), but there is reason to believe that the low-level silver detections in the Phase I Sanitary Sewer System RFI were due to matrix interferences rather than to the presence of silver at the sites above background UTLs. These matrix interferences may not have manifested themselves in the Jacobs background study data because certain site-specific matrix effects can affect ICP results without affecting GFAA results, due to differences in the analytical principles underlying each method. These differences and their potential effects are outlined below.

Analysis of metals by ICP involves the interpretation of multiple spectral lines for a suite of analytes. ICP analysis involves the ionization of all metals in a sample aliquot by a plasma torch. These ionized metal atoms emit spectra characteristic of each element. All elemental spectra are detected simultaneously, with overlapping spectral lines resolved using corrective algorithms. In analysis by GFAA, the metals in a sample aliquot are atomized without ionization. Analysis is performed by passing through the atomized sample a light beam of the specific wavelength that will excite only those atoms of the element to be analyzed. As a single spectral line is examined for a single element, the method is less subject to interference from other metals due to spectral overlap.

Generally, matrix effects can have a large impact on the analytical results when metals concentrations that are not significantly above the MDL are reported in soil. For metals, MDLs are determined using analyte-free water, with standards that undergo the complete sample preparation process. The resulting analyte-specific MDLs represent the concentration of analyte where there is 99 percent confidence that the compound is actually present in the sample, and not a false positive due to noise in the baseline signal. Soil MDLs are calculated based on water MDLs due to the difficulty in obtaining analyte-free solid matrices that realistically simulate environmental soils. These calculated values do not take into account the potential complexity of actual environmental soil samples and the potential effect of this complexity on the instrument baseline. Consequently, although the Phase I analytical results may have reported silver

concentrations that would be above the 99 percent confidence level in an interference-free matrix, the reported concentration in an environmental soil sample may in fact be below that confidence level if matrix interferences have elevated the level of noise in the baseline in the spectral response region for silver. Note that although matrix spike (MS) analyses are routinely performed on environmental samples, the spiking levels are very large compared to the analyte MDLs. MS analysis is designed to determine if the matrix has an effect on analytical accuracy at significant analyte concentrations (usually near the PQL), and any minor effects that have an impact near the MDL are lost due to the small size of these effects relative to the size of the MS signal.

Silver is not a typical waste associated with the 13 OWS sites presented in this RFI report, which mainly handled petroleum-type wastes and solvents. Based upon the information previously presented and the fact that silver was not detected at concentrations above background UTLs in the groundwater samples, it is evident that the silver concentrations detected in soil samples at the sites presented in this closure report are not an indication of a release of contaminants from a respective OWS.

### ***3.2.2 Discussion of Toluene Detections in Soil***

Because toluene was detected at a high frequency in soil samples collected during the Phase I Sanitary Sewer System RFI, but at generally low concentrations, there appeared to have been a systematic introduction of trace levels of toluene in the field or during the decontamination process. The best explanation was that the toluene concentrations detected above MQLs were likely the result of the direct-push technology (DPT) sample liners used during the Phase I RFI. The DPT sample liners were made of polyethylene terephthalate (PET), which was an AFCEE-accepted sampling material at the time of the RFI in 1997. As discussed in the draft Sanitary Sewer System RFI report (IT, 1997), toluene was detected in 15 of 27 equipment rinsate samples, which were generated by collecting the final deionized water rinse from the equipment decontamination process. The presence of toluene in a high number of the equipment rinsates indicates that the DPT sample liners were the likely source of the detected toluene concentrations in the 1997 Phase I RFI soil samples.

### **3.2.3 Discussion of Elevated Arsenic and Cadmium Concentrations in Soil Samples Collected by Law (1995)**

Many of the OWS sites presented in this RFI report are recommended for closure under RRS 2, even though arsenic and cadmium concentrations detected above background and MSCs during the initial site investigation conducted by Law (1995) have not been confirmed or remediated. However, as will be discussed in Chapters 4.0 through 16.0 of this RFI report, the confirmation samples collected during Phases 2 and 3 of the RFI adjacent to the former Law (1995) borings with the highest concentrations of arsenic and cadmium concentrations indicated that arsenic and cadmium concentrations were at or below background concentrations (i.e., RRS 1). The results collected by IT indicate that the arsenic and cadmium results detected by Law (1995) may have been biased high, possibly due to the sensitivity of the laboratory equipment/methodology available in 1994.

An example that the arsenic and cadmium results detected by Law (1995) may have been biased high can be seen from the soil analytical results found at Building 4210. Cadmium concentrations detected in the eight soil samples collected by Law ranged from 0.81 milligrams per kilogram (mg/kg) to 1.8 mg/kg, all above the background concentrations for cadmium. Cadmium concentrations detected in 2 of the Phase 2 RFI soil samples and in 16 soil samples collected during Phase 3 at Building 4210 were all below the background concentrations for cadmium in surface and subsurface soil, respectively. Similarly, arsenic was detected above background in six of the eight soil samples collected by Law (1995) at Building 4210, with concentrations ranging from 8.2 to 19 mg/kg. Arsenic was detected at or below background in the 11 soil samples collected by IT during Phases 2 and 3 of the RFI, with a maximum concentration (7.43 mg/kg) that was likely an extreme but true background concentration (6.58 mg/kg).

All concentrations of arsenic and cadmium detected above background or MSCs by Law in 1995 have been delineated to background in subsequent investigations by IT in 1997, 1999, and 2000. In addition, all confirmation samples collected in the locations of the highest concentrations of these metals were below background. Analytical results presented for each site will show that there is no clear pattern of arsenic or cadmium contamination in the soils. These soil data, combined with groundwater results at each site, supports site closure under RRS 2.

### **3.2.4 Air Force Plant 4 Discussion of Chlorinated Solvents in Groundwater**

The TCE groundwater plume beneath many of the OWS sites [OWS Building 1027 (SWMU 44), OWS Building 1060 (AOC 11), OWS Building 1064 (AOC 10), OWS Building 1191 (SWMU 37), OWS Building 1414 (SWMU 41), OWS Building 1602, OWS Building 1643 (SWMU 40), OWS Building 4146, and OWS Building 4210 (AOC 12)] presented in this RFI report. TCE and its breakdown byproducts were detected in several OWS monitoring wells (WITCTA005, WITCTA006, WITCTA011, WITCTA016, WITCTA020, WITCTA021, WITCTA022, WITCTA031, WITCTA035, WITCTA037, and WITCTA039), but are not related to OWS site activities. Since the TCE groundwater plume is being managed by APF-4 under their Superfund Cleanup Program, the presence of TCE and its breakdown products in groundwater samples collected within the extent of the plume boundaries will not be considered as evidence of a release from the OWS sites.

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## **4.2 Site Characterization Activities at Building 1015**

A summary of the soil samples that have been collected at the Building 1015 site is provided in Table 4-1. The analytical methods associated with each soil sample collected at Building 1015 are also presented in Table 4-1. The locations of the soil borings are shown in Figure 4-1. The following sections discuss the investigation activities that have been performed to characterize environmental impacts relating to the OWS at Building 1015.

### **4.2.1 Initial Site Investigation – Law 1994**

Law Engineering (Law, 1995) collected soil samples in 1994 from three borings adjacent to the OWS at Building 1015 (Figure 4-1). Proximity of the OWS to the building and a fire suppression system prevented the installation of borings to the south and east of the OWS. Soil borings were advanced to depths ranging from 4 to 8 feet below ground surface (bgs). Surface soil samples were collected from the surface to 2 feet bgs and subsurface soil samples were collected from the depths shown in Table 4-1. The soil samples were submitted for analysis of VOCs (EPA Method SW8240) and inorganics (EPA Method SW6010) (Law, 1995).

### **4.2.2 Phase 1 RFI Activities – IT 1997**

IT collected soil samples during the Phase 1 Sanitary Sewer System RFI in 1997 from two borings located adjacent to the OWS at Building 1015 (Figure 4-1). Surface soil samples were collected from surface to 2 feet in depth. A subsurface soil sample was collected from the 2-foot interval directly above the water table (17 to 19 feet). The soil samples were analyzed for SVOCs (EPA Method SW8270) and pesticides/PCBs (EPA Method SW8080) to supplement soil data collected during the Law (1995) investigation (Table 4-1).

Due to the proximity of the OWS at Building 1015, a boring for the installation of a monitoring well was installed south of the OWS. The boring, WITCTA038, did not yield groundwater due to the absence of permeable soils and was plugged with bentonite grout (IT, 1998).

Table 4-1

Summary of Previous Environmental Samples  
 Collected at Building 1015  
 NAS Fort Worth JRB, Texas

Sample Location	Sample Date	Sample Number	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Analysis	Analytical Method
<b>Law Engineering - Initial Site Investigation (1994)</b>						
1015-SB01	4/22/94	101501SBA	0	2	Inorganics, VOCs	EPA SW6010, SW8240
		101501SBC	4	6	Inorganics, VOCs	EPA SW6010, SW8240
1015-SB02	4/22/94	101502SBA	0	2	Inorganics, VOCs	EPA SW6010, SW8240
		101502SBB	2	4	Inorganics, VOCs	EPA SW6010, SW8240
		1015DPSB01	2	4	Inorganics, VOCs	EPA SW6010, SW8240
1015-SB03	4/22/94	101503SBC	4	6	Inorganics, VOCs	EPA SW6010, SW8240
		101503SBD	6	8	Inorganics, VOCs	EPA SW6010, SW8240
<b>IT Corporation - Phase 1 RFI (1997)</b>						
SB101501	4/3/97	MS1243	0	2	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
		MS1244	0	2	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
SB101502	4/3/97	MS1241	0	2	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
		MS1242	17	19	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
<b>IT Corporation - Phase 2 RFI (2000)</b>						
SB101503	4/13/00	BG0001	0	2	Cd	EPA SW6010B
		BG0002	16.5	18.5	Cd	EPA SW6010B
SB101504	4/13/00	BG0003	0	2	As	EPA SW6010B
		BG0004	16.5	18.5	As	EPA SW6010B
SB101505	4/13/00	BG0038	0	2	Cd	EPA SW6010B
		BG0039	17	19	Cd	EPA SW6010B
SB101506	4/13/00	BG0040	0	2	As	EPA SW6010B
		BG0041	16.6	18.6	As	EPA SW6010B
<b>IT Corporation - Phase 3 RFI (2000)</b>						
SB101507	11/29/00	BG0048A	0	2	As, Cd, Cu	EPA SW6010B
		BG0049	4	6	As, Cd, Cu	EPA SW6010B
	11/28/00	BG0050	4	6	As, Cd, Cu	EPA SW6010B
		BG0113	10	12	As, Cd, Cu	EPA SW6010B
SB101508	11/27/00	BG0051	0	2	As, Cd, Cu	EPA SW6010B
		BG0052	4	6	As, Cd, Cu	EPA SW6010B
		BG0114	10	12	As, Cd, Cu	EPA SW6010B

Table 4-1

Summary of Previous Environmental Samples  
 Collected at Building 1015  
 NAS Fort Worth JRB, Texas

Sample Location	Sample Date	Sample Number	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Analysis	Analytical Method
<b>IT Corporation - Phase 3 RFI (2000) (Continued)</b>						
SB101509	11/27/00	BG0053	0	4	As, Cd, Cu	EPA SW6010B
		BG0115	7	9	As, Cd, Cu	EPA SW6010B
		BG0116	7	9	As, Cd, Cu	EPA SW6010B
SB101510	11/27/00	BG0054	0	2	Cu	EPA SW6010B
		BG0117	6	8	As, Cd, Cu	EPA SW6010B
SB101511	11/27/00	BG0118	0	2	As, Cu	EPA SW6010B
		BG0119	5	7	As, Cu	EPA SW6010B

As - Arsenic  
 Cd - Cadmium  
 Cu - Copper  
 VOCs - Volatile Organic Compounds  
 SVOCs - Semivolatile Organic Compounds  
 PCBs - Polychlorinated Biphenyls

#### **4.2.3 Phase 2 RFI Activities – IT 1999, 2000**

Additional soil sampling was performed by IT during the Phase 2 RFI in April 2000 to confirm or delineate inorganic concentrations that were identified during the Law (1995) investigation (Table 4-1). Soil borings were located northeast (SB101504), east (SB101506), southeast (SB101505), and southwest (SB101503) of the Building 1015 OWS (Figure 4-1). Surface (0 to 2 feet bgs) and subsurface (2 feet above the water table) soil samples were collected from each boring location and submitted for analysis of either arsenic or cadmium using EPA Method SW6010B (Table 4-1).

#### **4.2.4 OWS Closure in Place – U.S. Navy 2000**

The OWS at Building 1015 was closed in place in September 2000. The OWS was constructed of concrete, not steel, and could not be removed as originally planned. The contents of the OWS were pumped out and the interior was steam-cleaned at the beginning of the closure activities. The top of the OWS was then broken off with a jackhammer and the OWS was backfilled, leaving the four 6-inch-thick concrete sides and bottom in place. The three floor drains in Building 1015 that drained to the OWS were sealed with grout. No confirmation soil samples were collected during the closure of the OWS at Building 1015.

#### **4.2.5 Phase 3 RFI Activities – IT 2000**

Five additional soil borings were sampled by IT using DPT during Phase 3 of the RFI in November 2000. Four of the soil borings (SB101507, SB101508, SB101510, and SB101511) were placed at locations required to delineate arsenic, cadmium, and copper concentrations that exceeded basewide background concentrations in surface and subsurface soil samples collected during the Law (1995) investigation (Figure 4-1). The final boring, SB101507, was placed adjacent to former Law (1995) boring 1015-SB01, which indicated the highest concentrations of arsenic and cadmium in surface and subsurface soil samples during the initial site assessment. The purpose of the soil samples collected from SB101507 was to replicate the arsenic and cadmium concentrations that exceeded MSCs during the Law (1995) investigation, and perform the SPLP analysis to determine the potential for the contaminants to leach into groundwater.

The Phase 3 RFI soil samples were collected from the sample intervals that exceeded background concentrations during the Law (1995) investigation. In addition, soil samples were collected from intervals 5 feet above and 5 feet below the intervals that exhibited elevated concentrations of arsenic, cadmium, and copper during the Law investigation, if applicable. The number of samples collected at each boring location and the parameters analyzed are presented in Table 4-1.

### **4.3 Site-Specific Conditions**

The following subsections briefly discuss the site-specific geology and hydrogeology characteristics that were encountered during the investigation activities at the OWS Building 1015 site. Appendix A contains the soil boring log from the RFI activities at Building 1015.

**Geology.** Quaternary alluvium is found at the surface through most of the NAS Fort Worth area. The alluvium consists of floodplain and fluvial terrace deposits of gravel, sand, silt, and clay that occur as a veneer on the eroded surface of Upper Cretaceous strata. Soil borings at Building 1015 indicated brown to yellow-brown sandy clay from the surface to 17 feet bgs. From 17 feet bgs to refusal at the top of the Walnut Formation encountered at 21 feet bgs, the soil changed to either a well-graded, fine- to medium-grained, saturated, brown sand or a yellow, very moist, sandy clay. No odors or staining was observed in the soil samples

The alluvial soils rest unconformably on the top of the weathered Walnut Formation. Underlying the Quaternary alluvium is the Cretaceous-aged Walnut Formations, with 20 to 30 feet of indurated fossiliferous limestone interbedded with brown sandy clay, thinly bedded fossiliferous clay, and fissile shale. Unconformably underlying the Walnut Formation is the Cretaceous-aged Paluxy Formation. The Paluxy Formation generally consists of coarse-grained sand that grades upward into fine-grained sand with variable amounts of shale and limestone. The sandstone, composed of fine- to coarse-grained white quartz, is well-sorted, poorly consolidated, and cross-bedded. The Paluxy Formation thickness ranges from 140 to 190 feet, averaging 160 feet in Tarrant County (Radian, 1991).

**Hydrogeology.** A soil boring drilled for the installation of monitoring well WITCTA038 was found to not have permeable aquifer materials to yield sufficient groundwater to install a well. Therefore, the boring was plugged with bentonite grout. The boring for monitoring well WITCTA038 was located to the south of the OWS at Building 1015 to be downgradient of the OWS. In the area of Building 1015 where shallow groundwater is found, the groundwater flows east and south toward the Trinity River and Farmers Branch Creek. The basal sands and gravels of former channel deposits and these basal sands and gravels were not present at this location.

#### **4.4 Results From Initial Site Investigation (1994)**

The following sections presents the analytical results from surface and subsurface soil samples that were collected by Law (1995) during the initial site investigation at Building 1015. Table 4-2 contains a summary of the analytes detected in the samples collected by Law (1995) and compares the detected concentrations to basewide background concentrations and MSCs. Detected analyte concentrations, which exceeded background concentrations, are shown on Figure 4-1.

##### **4.4.1 Surface Soil**

Law (1995) collected surface soil samples from two locations (1015-SB01 and 1015-SB02) for analysis of VOCs (EPA Method SW8240) and inorganics (EPA Method SW6010) during the OWS site investigation in April 1994. The following paragraphs discuss analytical results from the surface soil samples collected by Law (1995).

**VOCs.** Two VOCs were detected in surface soil samples 101501SBA and 101502SBA (Table 4-2). Acetone was detected in the sample from 1015-SB01 at an estimated concentration of 0.01 J mg/kg. Methylene chloride was detected in both surface soil samples at a concentration of 0.012 B mg/kg in both samples. However, the methylene chloride results were qualified as blank contaminated. The reported concentrations of methylene chloride are below its MSC of 0.5 mg/kg and the reported concentration of acetone is below its MSC of 1,000 mg/kg. Considering that acetone and methylene chloride were detected at low concentrations and are considered to be laboratory contaminants, it is likely that the detected concentrations were the result of laboratory contamination.

**Inorganics.** The following inorganics were detected in surface soil samples collected by Law (1995): aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc (Table 4-2). As shown in Table 4-2 and Figure 4-1, arsenic and cadmium concentrations exceeded both background and MSCs in the surface soil sample from 1015-SB01. Calcium also exceeded background in the surface soil sample from 1015-SB01. However, calcium is a naturally essential nutrient and the detected concentration is likely an extreme but true background concentration.

Table 4-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1015 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
<b>Building 1015 - Surface Soil - Location 1015-SB01</b>												
1015-SB01	101501SBA	4/22/94	0	2	ACETONE	0.011	0.011		0.01	No	1000	Yes
1015-SB01	101501SBA	4/22/94	0	2	METHYLENE CHLORIDE	0.012	0.012	JB		No	0.5	Yes
1015-SB01	101501SBA	4/22/94	0	2	ALUMINUM		5100		22035	Yes	10000	NA
1015-SB01	101501SBA	4/22/94	0	2	ARSENIC		10		5.85	No	5	No
1015-SB01	101501SBA	4/22/94	0	2	BARIIUM		44		233	Yes	200	NA
1015-SB01	101501SBA	4/22/94	0	2	BERYLLIUM		1.5		1.02	No	0.4	No
1015-SB01	101501SBA	4/22/94	0	2	CADMIUM		1.1		0.566	No	0.5	No
1015-SB01	101501SBA	4/22/94	0	2	CALCIUM		280000		167788	No	Essential Nutrient	Yes
1015-SB01	101501SBA	4/22/94	0	2	CHROMIUM, TOTAL		18		25.86	Yes	10	NA
1015-SB01	101501SBA	4/22/94	0	2	COBALT		3.4		11.05	Yes	610	NA
1015-SB01	101501SBA	4/22/94	0	2	COPPER		17		17.37	Yes	130	NA
1015-SB01	101501SBA	4/22/94	0	2	IRON		7100		17717	Yes	Essential Nutrient	NA
1015-SB01	101501SBA	4/22/94	0	2	LEAD		6.3		30.97	Yes	1.5	NA
1015-SB01	101501SBA	4/22/94	0	2	MAGNESIUM		3000		3003	Yes	Essential Nutrient	NA
1015-SB01	101501SBA	4/22/94	0	2	MANGANESE		260		849	Yes	1400	NA
1015-SB01	101501SBA	4/22/94	0	2	NICKEL		6.0		14.6	Yes	200	NA
1015-SB01	101501SBA	4/22/94	0	2	POTASSIUM		700		2895	Yes	Essential Nutrient	NA
1015-SB01	101501SBA	4/22/94	0	2	SODIUM		210		37300	Yes	Essential Nutrient	NA
1015-SB01	101501SBA	4/22/94	0	2	VANADIUM		8.9		46.3	Yes	72	NA
1015-SB01	101501SBA	4/22/94	0	2	ZINC		12	JH	38.8	Yes	3100	NA
<b>Building 1015 - Subsurface Soil - Location 1015-SB01</b>												
1015-SB01	101501SBC	4/22/94	4	6	ACETONE	0.011	0.011		0.01	No	1000	Yes
1015-SB01	101501SBC	4/22/94	4	6	METHYLENE CHLORIDE	0.013	0.013			No	0.5	Yes
1015-SB01	101501SBC	4/22/94	4	6	ALUMINUM		7600		20260	Yes	10000	NA
1015-SB01	101501SBC	4/22/94	4	6	ARSENIC		11		6.58	No	5	No
1015-SB01	101501SBC	4/22/94	4	6	BARIIUM		48		128.1	Yes	200	NA
1015-SB01	101501SBC	4/22/94	4	6	BERYLLIUM		1.8		1.13	No	0.4	No
1015-SB01	101501SBC	4/22/94	4	6	CADMIUM	1.8	1.2		0.59	No	0.5	No
1015-SB01	101501SBC	4/22/94	4	6	CALCIUM		310000		272000	No	Essential Nutrient	Yes
1015-SB01	101501SBC	4/22/94	4	6	CHROMIUM, TOTAL		8.9		16.31	Yes	10	NA
1015-SB01	101501SBC	4/22/94	4	6	COBALT		3.2		6.19	Yes	610	NA
1015-SB01	101501SBC	4/22/94	4	6	COPPER		25		13.72	No	130	Yes
1015-SB01	101501SBC	4/22/94	4	6	IRON		8100		17469	Yes	Essential Nutrient	NA
1015-SB01	101501SBC	4/22/94	4	6	LEAD		6.2		12.66	Yes	1.5	NA
1015-SB01	101501SBC	4/22/94	4	6	MAGNESIUM		3600		2420	No	Essential Nutrient	Yes
1015-SB01	101501SBC	4/22/94	4	6	MANGANESE		7.0		3517	Yes	1400	NA
1015-SB01	101501SBC	4/22/94	4	6	NICKEL		1100		19.76	Yes	200	NA
1015-SB01	101501SBC	4/22/94	4	6	POTASSIUM		190		53200	Yes	Essential Nutrient	NA
1015-SB01	101501SBC	4/22/94	4	6	SODIUM		15		37.4	Yes	72	NA
1015-SB01	101501SBC	4/22/94	4	6	VANADIUM		26	JH	31.3	Yes	3100	NA

Table 4-2  
 Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1015 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
<b>Building 1015 - Surface Soil - Location 1015-SB02</b>												
1015-SB02	101502SBA	4/22/94	0	2	ACETONE	0.01	0.01	J	0.01	No	1000	Yes
1015-SB02	101502SBA	4/22/94	0	2	METHYLENE CHLORIDE	0.012	0.012	JB		No	0.5	Yes
1015-SB02	101502SBA	4/22/94	0	2	ALUMINUM	19000	19000		22035	Yes	10000	NA
1015-SB02	101502SBA	4/22/94	0	2	ARSENIC	4.9	4.9		5.95	Yes	5	NA
1015-SB02	101502SBA	4/22/94	0	2	BARIIUM	140	140		233	Yes	200	NA
1015-SB02	101502SBA	4/22/94	0	2	BERYLLIUM	0.69	0.69		1.02	Yes	0.4	NA
1015-SB02	101502SBA	4/22/94	0	2	CADMIUM	2.3	2.3		0.556	No	0.5	NA
1015-SB02	101502SBA	4/22/94	0	2	CALCIUM	70000	70000		167788	Yes	Essential Nutrient	NA
1015-SB02	101502SBA	4/22/94	0	2	CHROMIUM TOTAL	18.0	18.0		25.86	Yes	10	NA
1015-SB02	101502SBA	4/22/94	0	2	COBALT	5.8	5.8		11.05	Yes	610	NA
1015-SB02	101502SBA	4/22/94	0	2	COPPER	12	12		17.37	Yes	130	NA
1015-SB02	101502SBA	4/22/94	0	2	IRON	17000	17000		17717	Yes	Essential Nutrient	NA
1015-SB02	101502SBA	4/22/94	0	2	LEAD	14.0	14.0		30.97	Yes	1.5	NA
1015-SB02	101502SBA	4/22/94	0	2	MAGNESIUM	2600	2600		3003	Yes	Essential Nutrient	NA
1015-SB02	101502SBA	4/22/94	0	2	MANGANESE	240	240		849	Yes	1400	NA
1015-SB02	101502SBA	4/22/94	0	2	NICKEL	13.0	13.0		14.6	Yes	200	NA
1015-SB02	101502SBA	4/22/94	0	2	POTASSIUM	1900	1900		2895	Yes	Essential Nutrient	NA
1015-SB02	101502SBA	4/22/94	0	2	SODIUM	110	110		37300	Yes	Essential Nutrient	NA
1015-SB02	101502SBA	4/22/94	0	2	VANADIUM	30	30		48.3	Yes	72	NA
1015-SB02	101502SBA	4/22/94	0	2	ZINC	28	28	JH	38.8	Yes	3100	NA
<b>Building 1015 - Subsurface Soil - Location 1015-SB02</b>												
1015-SB02	101502SBB	4/22/94	2	4	ACETONE	0.011	0.011		0.01	No	1000	Yes
1015-SB02	101502SBB	4/22/94	2	4	METHYLENE CHLORIDE	0.011	0.011	JB		No	0.5	Yes
1015-SB02	101502SBB	4/22/94	2	4	ALUMINUM	14000	14000		20260	Yes	10000	NA
1015-SB02	101502SBB	4/22/94	2	4	ARSENIC	10	10		6.58	No	5	NA
1015-SB02	101502SBB	4/22/94	2	4	BARIIUM	120	120	J	128.1	Yes	200	NA
1015-SB02	101502SBB	4/22/94	2	4	BERYLLIUM	1.7	1.7		0.59	No	0.4	NA
1015-SB02	101502SBB	4/22/94	2	4	CADMIUM	1.8	1.8		0.59	No	0.5	NA
1015-SB02	101502SBB	4/22/94	2	4	CALCIUM	170000	170000	J	272000	Yes	Essential Nutrient	NA
1015-SB02	101502SBB	4/22/94	2	4	CHROMIUM TOTAL	15.0	15.0		16.31	Yes	10	NA
1015-SB02	101502SBB	4/22/94	2	4	COBALT	5.3	5.3		6.19	Yes	610	NA
1015-SB02	101502SBB	4/22/94	2	4	COPPER	17	17		13.72	No	130	Yes
1015-SB02	101502SBB	4/22/94	2	4	IRON	14000	14000	J	17469	Yes	Essential Nutrient	NA
1015-SB02	101502SBB	4/22/94	2	4	LEAD	11.0	11.0		12.66	Yes	1.5	NA
1015-SB02	101502SBB	4/22/94	2	4	MAGNESIUM	300	300	J	2420	Yes	Essential Nutrient	NA
1015-SB02	101502SBB	4/22/94	2	4	MANGANESE	240	240		351.7	Yes	1400	NA
1015-SB02	101502SBB	4/22/94	2	4	NICKEL	10.0	10.0		19.76	Yes	200	NA
1015-SB02	101502SBB	4/22/94	2	4	POTASSIUM	1800	1800		1717	No	Essential Nutrient	Yes
1015-SB02	101502SBB	4/22/94	2	4	SODIUM	150	150		53200	Yes	Essential Nutrient	NA
1015-SB02	101502SBB	4/22/94	2	4	VANADIUM	2.4	2.4	J	37.4	Yes	72	NA
1015-SB02	101502SBB	4/22/94	2	4	ZINC	26	26	JH	31.3	Yes	3100	NA

**Table 4-2**  
**Summary of 1994 Soil Analytical Detections Compared to Background and MSCs**  
**OWS Building 1015 - Law Environmental (1995)**  
**NAS Fort Worth JRB, Texas**

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
1015-SB02	1015DP-SB01	4/22/94	2	4	ACETONE	0.011	0.011		0.01	No	1000	Yes
1015-SB02	1015DP-SB01	4/22/94	2	4	METHYLENE CHLORIDE	0.01	0.01	JB		No	0.5	Yes
1015-SB02	1015DP-SB01	4/22/94	2	4	ALUMINUM		11000		20260	Yes	10000	NA
1015-SB02	1015DP-SB01	4/22/94	2	4	ARSENIC		8.5		6.58	No	5	No
1015-SB02	1015DP-SB01	4/22/94	2	4	BARIUM		67	J	128.1	Yes	200	NA
1015-SB02	1015DP-SB01	4/22/94	2	4	BERYLLIUM	16	1.6		1.13	No	0.4	NA
1015-SB02	1015DP-SB01	4/22/94	2	4	CADMIUM		1.5		0.59	No	0.5	No
1015-SB02	1015DP-SB01	4/22/94	2	4	CALCIUM		240000	J	272000	Yes	Essential Nutrient	NA
1015-SB02	1015DP-SB01	4/22/94	2	4	CHROMIUM TOTAL		12.0		16.31	Yes	10	NA
1015-SB02	1015DP-SB01	4/22/94	2	4	COBALT		3.9		6.19	Yes	6.10	NA
1015-SB02	1015DP-SB01	4/22/94	2	4	COPPER		16		13.72	No	130	Yes
1015-SB02	1015DP-SB01	4/22/94	2	4	IRON		1100	J	17469	Yes	Essential Nutrient	NA
1015-SB02	1015DP-SB01	4/22/94	2	4	LEAD		8.0		12.66	Yes	1.5	NA
1015-SB02	1015DP-SB01	4/22/94	2	4	MAGNESIUM		3200	J	2420	No	Essential Nutrient	Yes
1015-SB02	1015DP-SB01	4/22/94	2	4	MANGANESE		210		351.7	Yes	1400	NA
1015-SB02	1015DP-SB01	4/22/94	2	4	NICKEL		9.3		19.76	Yes	200	NA
1015-SB02	1015DP-SB01	4/22/94	2	4	POTASSIUM		1500		171.7	Yes	Essential Nutrient	NA
1015-SB02	1015DP-SB01	4/22/94	2	4	SODIUM		200		53200	Yes	Essential Nutrient	NA
1015-SB02	1015DP-SB01	4/22/94	2	4	VANADIUM		14	J	37.4	Yes	72	NA
1015-SB02	1015DP-SB01	4/22/94	2	4	ZINC		23	JH	31.3	Yes	3100	NA
<b>Building 1015 - Subsurface Soil - Location 1015-SB03</b>												
1015-SB03	101503SBC	4/22/94	4	6	ACETONE	0.01	0.01		0.01	No	1000	Yes
1015-SB03	101503SBC	4/22/94	4	6	METHYLENE CHLORIDE	0.01	0.01	JB		No	0.5	Yes
1015-SB03	101503SBC	4/22/94	4	6	ALUMINUM		3600		20260	Yes	10000	NA
1015-SB03	101503SBC	4/22/94	4	6	ARSENIC		8.7		6.58	No	5	No
1015-SB03	101503SBC	4/22/94	4	6	BARIUM		26		128.1	Yes	200	NA
1015-SB03	101503SBC	4/22/94	4	6	BERYLLIUM	16	1.6	JL	1.13	No	0.4	No
1015-SB03	101503SBC	4/22/94	4	6	CADMIUM		0.85		0.59	No	0.5	No
1015-SB03	101503SBC	4/22/94	4	6	CALCIUM		340000		272000	No	Essential Nutrient	Yes
1015-SB03	101503SBC	4/22/94	4	6	CHROMIUM TOTAL		5.4		16.31	Yes	10	NA
1015-SB03	101503SBC	4/22/94	4	6	COBALT		2.5		6.19	Yes	6.10	NA
1015-SB03	101503SBC	4/22/94	4	6	COPPER		22		13.72	No	130	Yes
1015-SB03	101503SBC	4/22/94	4	6	IRON		5900		17469	Yes	Essential Nutrient	NA
1015-SB03	101503SBC	4/22/94	4	6	LEAD		5.1		12.66	Yes	1.5	NA
1015-SB03	101503SBC	4/22/94	4	6	MAGNESIUM		3300		2420	No	Essential Nutrient	Yes
1015-SB03	101503SBC	4/22/94	4	6	MANGANESE		190		351.7	Yes	1400	NA
1015-SB03	101503SBC	4/22/94	4	6	NICKEL		4.7		19.76	Yes	200	NA
1015-SB03	101503SBC	4/22/94	4	6	POTASSIUM		6100		171.7	No	Essential Nutrient	Yes
1015-SB03	101503SBC	4/22/94	4	6	SODIUM		340		53200	Yes	Essential Nutrient	NA
1015-SB03	101503SBC	4/22/94	4	6	VANADIUM		10		37.4	Yes	72	NA
1015-SB03	101503SBC	4/22/94	4	6	ZINC		12	JH	31.3	Yes	3100	NA
1015-SB03	101503SBD	4/22/94	6	8	ACETONE	0.011	0.011		0.01	No	1000	Yes

Table 4-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1015 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
1015-SB03	1015035BD	4/22/94	6	8	METHYLENE CHLORIDE	0.012	0.012	JB		No	0.5	Yes
1015-SB03	1015035BD	4/22/94	6	8	ALUMINIUM	3100	3100		20260	Yes	10000	NA
1015-SB03	1015035BD	4/22/94	6	8	ARSENIC	7.4	7.4		6.58	No	5	No
1015-SB03	1015035BD	4/22/94	6	8	BARIUM	23	23		128.1	Yes	200	NA
1015-SB03	1015035BD	4/22/94	6	8	BERYLLIUM	1.6	1.6		1.13	No	0.4	No
1015-SB03	1015035BD	4/22/94	6	8	CADMIUM	0.80	0.80		0.59	No	0.5	No
1015-SB03	1015035BD	4/22/94	6	8	CALCIUM	320000	320000		272000	No	Essential Nutrient	Yes
1015-SB03	1015035BD	4/22/94	6	8	CHROMIUM, TOTAL	4.6	4.6		16.31	Yes	10	NA
1015-SB03	1015035BD	4/22/94	6	8	COBALT	2.4	2.4		6.19	Yes	610	NA
1015-SB03	1015035BD	4/22/94	6	8	COPPER	22	22		13.72	No	130	Yes
1015-SB03	1015035BD	4/22/94	6	8	IRON	4400	4400		17469	Yes	Essential Nutrient	NA
1015-SB03	1015035BD	4/22/94	6	8	LEAD	3.0	3.0		12.66	Yes	1.5	NA
1015-SB03	1015035BD	4/22/94	6	8	MAGNESIUM	3200	3200		2420	No	Essential Nutrient	Yes
1015-SB03	1015035BD	4/22/94	6	8	MANGANESE	170	170		351.7	Yes	1400	NA
1015-SB03	1015035BD	4/22/94	6	8	NICKEL	4.7	4.7		19.76	Yes	200	NA
1015-SB03	1015035BD	4/22/94	6	8	POTASSIUM	540	540		1717	Yes	Essential Nutrient	NA
1015-SB03	1015035BD	4/22/94	6	8	SODIUM	280	280		53200	Yes	Essential Nutrient	NA
1015-SB03	1015035BD	4/22/94	6	8	VANADIUM	8.0	8.0		37.4	Yes	72	NA
1015-SB03	1015035BD	4/22/94	6	8	ZINC	9.1	9.1	JH	31.3	Yes	3100	NA

MSC = Media-Specific Concentration

NA = not applicable

MQL = Method Quantitation Limit

RRS 1 = Risk Reduction Standard 1

RRS 2 = Risk Reduction Standard 2

TNRCC = Texas Natural Resources Conservation Commission

UTL = Upper Tolerance Limit

Footnotes

<sup>1</sup>UTLs for organics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte

<sup>2</sup>TNRCC, 1999, "Updated Examples of Standard No. 2 Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Qualifier Definitions

= The analyte was positively identified

J = For organics, the associated value is an estimated quantity. For organics the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample

JB = Estimated quantitation - possible biased high based upon blank contamination

JH = Estimated quantitation - possible biased high based upon GC data

#### **4.4.2 Subsurface Soil**

Law (1995) collected subsurface soil samples from various depths at three locations with DPT and hollow-stem auger drilling methods. The Law subsurface soil samples were collected for analysis of VOCs (EPA Method SW8260) and inorganics (EPA Method SW6010). The following paragraphs discuss analytical results from the subsurface soil samples collected by Law (1995).

**VOCs.** Methylene chloride was detected in all of the subsurface soil samples collected by Law (1995). The detected concentrations ranged from 0.01 mg/kg to 0.103 mg/kg. Only one out of the five detected concentrations was not qualified as being affected by methylene chloride in the associated method blank. The reported concentrations of methylene chloride are below its MSC of 0.5 mg/kg. Considering that the detected methylene chloride concentrations are low and that methylene chloride is a common laboratory contaminant, it is likely that the detected concentrations were the result of laboratory contamination.

**Inorganics.** The following inorganics were detected in the subsurface samples collected by Law (1995): aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc (Table 4-2). The four subsurface soil samples analyzed contained several inorganic constituents that exceeded the background UTLs established by Jacobs (1998). Arsenic, cadmium, and copper exceeded their background concentrations for all four subsurface samples. Arsenic and cadmium also exceeded TNRCC MSC limits in all four subsurface soil samples. In addition, calcium and magnesium also exceeded background concentrations for subsurface samples from 1015-SB01 and 1015-SB03. Potassium also exceeded its background concentration in subsurface soil samples from 1015-SB02 and 1015-SB03. Calcium, magnesium, and potassium are considered essential nutrients and do not present risk to human health or the environment.

#### **4.5 Results from Phase 1 RFI Activities (1997)**

The following subsections present the analytical results from surface and subsurface soil samples that were collected by IT (1997) during the Phase 1 RFI. A discussion of the Phase 1 groundwater investigation is also included. The purpose of the Phase 1 RFI soil samples was to supplement the analytical data for VOCs and inorganics that was collected by Law (1995) during the initial site investigation.

Table 4-3 contains a summary of the analytes detected in the Phase 1 RFI soil samples collected by IT at Building 1015. Analytical detection summary tables for the Phase 1 RFI soil samples collected at Building 1015 are shown in Appendix B.

#### **4.5.1 Surface Soil**

During the Phase 1 RFI in April 1997, IT (1997) collected surface soil samples from two locations (SB101501 and SB101502) for analysis of pesticides/PCBs (EPA Method SW8080) and SVOCs (EPA Method SW8270). The following paragraphs discuss the analytical results for the Phase 1 RFI surface soil samples.

**SVOCs.** All SVOC detections from the Phase 1 RFI surface soil samples were tentatively identified compounds (TICs) that were detected at estimated concentrations below the PQLs (Table B-1). These SVOCs include unidentified and saturated hydrocarbon compounds. Although no detection limits were established for these compounds in the laboratory analysis, the values are within the PQL range for SVOCs described in EPA Method SW8270 (EPA, 1997) of 0.660 to 3.30 mg/kg. Therefore, because the reported concentrations of these compounds are within the range of PQL values for the analytical method used, they are below background concentrations for organics, as defined by the TNRCC RRP.

**Pesticides/PCBs.** No pesticides/PCBs were detected above MQLs in surface soil samples collected during the Phase 1 RFI at the Building 1015 site.

#### **4.5.2 Subsurface Soil**

IT collected a subsurface soil sample from boring SB101503 from 17 to 19 feet bgs, or directly above the unconfined water table, during the Phase 1 RFI for analysis of SVOCs (EPA Method SW8270) and pesticides/PCBs (EPA Method SW8080) to supplement the previous Law samples analyzed for VOCs and metals. The following paragraphs discuss the analytical results from the subsurface soil sample collected from boring SB101503.

**SVOCs.** Analysis of SVOC compounds were reported below MQLs in the subsurface soils sampled by IT during the Phase 1 RFI activities.

Table 4-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1015 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27?
Phase 1 - Surface Soil - Location SB101501													
SB101501	MS1243	3-Apr-97	0	2	Pcb-1254	11	0.044	J	J	1	Yes	0.05	NA
SB101501	MS1244	3-Apr-97	0	2	Pcb-1254	12	0.11	J	J	1	Yes	0.05	NA
Phase 1 - Surface Soil - Location SB101502													
SB101502	MS1241	3-Apr-97	0	2	4,4'-ddt	0.0089	0.0045	J	J	0.0083	Yes	0.084	NA
Phase 1 - Subsurface Soil - Location SB101502													
SB101502	MS1242	3-Apr-97	17	19	Bis(2-ethylhexyl)phthalate	0.84	0.092	J		0.72	Yes	0.6	NA
Phase 2 - Surface Soil - Location SB101503													
SB101503	BG0001	13-Apr-00	0	2	Cadmium	0.12	0.234		nv	0.556	Yes	0.5	NA
Phase 2 - Subsurface Soil - Location SB101503													
SB101503	BG0002	13-Apr-00	16.5	18.5	Cadmium	0.12	0.165		nv	0.59	Yes	0.5	NA
Phase 2 - Surface Soil - Location SB101504													
SB101504	BG0003	13-Apr-00	0	2	Arsenic	1.1	5.55		nv	5.85	Yes	5	NA
Phase 2 - Subsurface Soil - Location SB101504													
SB101504	BG0004	13-Apr-00	16.5	18.5	Arsenic	1.2	4.18		nv	6.58	Yes	5	NA
Phase 2 - Surface Soil - Location SB101505													
SB101505	BG0038	13-Apr-00	0	2	Cadmium	0.12	0.225		nv	0.556	Yes	0.5	NA
Phase 2 - Subsurface Soil - Location SB101505													
SB101505	BG0039	13-Apr-00	17	19	Cadmium	0.12	0.0591	F	nv	0.59	Yes	0.5	NA
Phase 2 - Surface Soil - Location SB101506													
SB101506	BG0040	13-Apr-00	0	2	Arsenic	1.2	5.67		nv	5.85	Yes	5	NA
Phase 2 - Subsurface Soil - Location SB101506													
SB101506	BG0041	13-Apr-00	16.6	18.6	Arsenic	1.2	5.3		nv	6.58	Yes	5	NA

Table 4-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1015 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC (mg/kg)	Does Result Support Closure Under RRS 27
<b>Phase 3 - Surface Soil - Location SB101507</b>													
SB101507	BG0048A	29-Nov-00	0	2	Arsenic	1.2	5.99		nv	5.85	Yes	5	NA
SB101507	BG0048A	29-Nov-00	0	2	Cadmium	0.12	0.1	F	nv	0.556	Yes	0.5	NA
SB101507	BG0048A	29-Nov-00	0	2	Copper	2.4	7.08		nv	17.37	Yes	130	NA
<b>Phase 3 - Subsurface Soil - Location SB101507</b>													
SB101507	BG0049	29-Nov-00	4	6	Arsenic	1.1	4.05		nv	6.58	Yes	5	NA
SB101507	BG0049	29-Nov-00	4	6	Cadmium	0.11	0.14		nv	0.59	Yes	0.5	NA
SB101507	BG0049	29-Nov-00	4	6	Copper	2.2	3.87		nv	13.72	Yes	130	NA
SB101507	BG0050	28-Nov-00	4	6	Arsenic	1.1	2.75		nv	6.58	Yes	5	NA
SB101507	BG0050	28-Nov-00	4	6	Cadmium	0.11	0.096	F	nv	0.59	Yes	0.5	NA
SB101507	BG0050	28-Nov-00	4	6	Copper	2.2	2.42		nv	13.72	Yes	130	NA
SB101507	BG0113	28-Nov-00	10	12	Arsenic	1.1	3.16		nv	6.58	Yes	5	NA
SB101507	BG0113	28-Nov-00	10	12	Cadmium	0.11	0.0935	F	nv	0.59	Yes	0.5	NA
SB101507	BG0113	28-Nov-00	10	12	Copper	2.2	2.32		nv	13.72	Yes	130	NA
<b>Phase 3 - Surface Soil - Location SB101508</b>													
SB101508	BG0051	27-Nov-00	0	2	Arsenic	1.2	3.95		nv	5.85	Yes	5	NA
SB101508	BG0051	27-Nov-00	0	2	Cadmium	0.12	0.205		nv	0.556	Yes	0.5	NA
SB101508	BG0051	27-Nov-00	0	2	Copper	2.4	5.88		nv	17.37	Yes	130	NA
<b>Phase 3 - Subsurface Soil - Location SB101508</b>													
SB101508	BG0052	27-Nov-00	4	6	Arsenic	1.1	2.95		nv	6.58	Yes	5	NA
SB101508	BG0052	27-Nov-00	4	6	Cadmium	0.11	0.106		nv	0.59	Yes	0.5	NA
SB101508	BG0052	27-Nov-00	4	6	Copper	2.2	2.92		nv	13.72	Yes	130	NA
SB101508	BG0114	27-Nov-00	10	12	Arsenic	1.1	4.21		nv	6.58	Yes	5	NA
SB101508	BG0114	27-Nov-00	10	12	Cadmium	0.11	0.11	U	nv	0.59	Yes	0.5	NA
SB101508	BG0114	27-Nov-00	10	12	Copper	2.1	2.59		nv	13.72	Yes	130	NA
<b>Phase 3 - Surface Soil - Location SB101509</b>													
SB101509	BG0053	27-Nov-00	0	4	Arsenic	1.1	5.2		nv	6.58	Yes	5	NA
SB101509	BG0053	27-Nov-00	0	4	Cadmium	0.11	0.232		nv	0.59	Yes	0.5	NA
SB101509	BG0053	27-Nov-00	0	4	Copper	2.3	6.51		nv	13.72	Yes	130	NA
<b>Phase 3 - Subsurface Soil - Location SB101509</b>													
SB101509	BG0115	27-Nov-00	7	9	Arsenic	1.2	4.43		nv	6.58	Yes	5	NA
SB101509	BG0115	27-Nov-00	7	9	Cadmium	0.12	0.193		nv	0.59	Yes	0.5	NA
SB101509	BG0115	27-Nov-00	7	9	Copper	2.4	5.92		nv	13.72	Yes	130	NA
SB101509	BG0116	27-Nov-00	7	9	Arsenic	1.2	4.84		nv	6.58	Yes	5	NA
SB101509	BG0116	27-Nov-00	7	9	Cadmium	0.12	0.164		nv	0.59	Yes	0.5	NA
SB101509	BG0116	27-Nov-00	7	9	Copper	2.4	5.11		nv	13.72	Yes	130	NA

Table 4-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1015 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27?
Phase 3 - Surface Soil - Location SB101510													
SB101510	BG0054	27-Nov-00	0	2	Copper	2.4	7.12		nv	17.37	Yes	130	NA
Phase 3 - Subsurface Soil - Location SB101510													
SB101510	BG0117	27-Nov-00	6	8	Arsenic	1.1	3.23		nv	6.58	Yes	5	NA
SB101510	BG0117	27-Nov-00	6	8	Cadmium	0.11	0.119		nv	0.59	Yes	0.5	NA
SB101510	BG0117	27-Nov-00	6	8	Copper	2.2	7.86		nv	13.72	Yes	130	NA
Phase 3 - Surface Soil - Location SB101511													
SB101511	BG0118	27-Nov-00	0	2	Arsenic	1.2	5.71		nv	5.85	Yes	5	NA
SB101511	BG0118	27-Nov-00	0	2	Copper	2.4	7.75		nv	17.37	Yes	130	NA
Phase 3 - Subsurface Soil - Location SB101511													
SB101511	BG0119	27-Nov-00	5	7	Arsenic	1.1	3.35		nv	6.58	Yes	5	NA
SB101511	BG0119	27-Nov-00	5	7	Copper	2.1	2.89		nv	13.72	Yes	130	NA

MSC = Media-Specific Concentration

NA = not applicable

MQL = Method Quantitation Limit

RRS 1 = Risk Reduction Standard 1

RRS 2 = Risk Reduction Standard 2

TNRCC = Texas Natural Resources Conservation Commission

UTL = Upper Tolerance Limit

Footnotes

<sup>1</sup>UTLs for organics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte.

<sup>2</sup>TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Qualifier Definitions

= The analyte was positively identified

J = For organics, the associated value is an estimated quantity

U - The analyte was not detected

F = The analyte was positively identified but the associated numerical value is below the reporting limit

nv = not validated

For organics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample

**Pesticides/PCBs.** Analysis of pesticide and PCB compounds were reported below MQLs in the subsurface soils sampled by IT during the Phase 1 RFI activities.

#### **4.5.3 Groundwater Investigation**

One downgradient monitoring well, WITCTA038, was installed during the Phase 1 RFI; however, the well was dry and this prevented the collection of groundwater samples at the Building 1015 OWS.

#### **4.6 Results from Phase 2 RFI Activities (2000)**

Four surface soil samples were collected by IT during the Phase 2 RFI activities in April 2000 to confirm and delineate arsenic and cadmium concentrations that were detected by Law (1995) during the initial OWS investigation. The Phase 2 sampling locations and analytical results are shown in Figure 4-1. Phase 2 soil results and their comparison to basewide background concentrations and MSCs are included in Table 4-3. A summary of RFI SPLP results is shown in Table 4-4.

##### **4.6.1 Surface Soil**

The surface soil sample from SB101503 had a detection of 0.234 mg/kg, below the basewide surface soil background concentration for cadmium (0.556 mg/kg); the surface soil sample from SB101505 also detected cadmium at a concentration of 0.225 mg/kg, also below the background concentration. A subsurface soil detection in the Phase 2 soil boring SB101504 was 5.55 mg/kg, below the subsurface background concentration for arsenic (5.85 mg/kg). The arsenic detected in the Phase 2 soil boring SB101506 was 5.67 mg/kg, also below the subsurface background concentration for arsenic.

##### **4.6.2 Subsurface Soil**

The results from the Phase 2 RFI subsurface soil samples are presented in Table 4-3 and shown on Figure 4-1. The cadmium concentrations detected in the subsurface soil samples from SB101503 and SB101505 were below the background concentration for cadmium (0.556 mg/kg). The arsenic concentrations detected in the Phase 2 soil borings SB101504 and SB101506 were also below the background concentration for arsenic (5.85 mg/kg).

Table 4-4

Summary of RFI SPLP Results Compared to Background and MSCs  
 OWS Building 1015 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/L)	Result (mg/L)	Laboratory Qualifier	Validation Qualifier	Background UTL <sup>1</sup> (mg/L)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/L)	Does Result Support Closure Under RRS 2?
Phase 2 - Location SB101503													
SB101503	BG0001	13-Apr-00	0	2	Cadmium	1	0.000178	F	nv	0.0005	Yes	0.005	NA
SB101503	BG0002	13-Apr-00	16.5	18.5	Cadmium	1	0	U	nv	0.0005	Yes	0.005	NA
Phase 2 - Location SB101505													
SB101505	BG0038	13-Apr-00	0	2	Cadmium	1	0	U	nv	0.0005	Yes	0.005	NA
SB101505	BG0039	13-Apr-00	17	19	Cadmium	1	0	U	nv	0.0005	Yes	0.005	NA
Phase 2 - Location SB101506													
SB101506	BG0040	13-Apr-00	0	2	Arsenic	2	0.0055		nv	0.0049	No	0.05	Yes
SB101506	BG0041	13-Apr-00	16.6	18.6	Arsenic	2	0.014		nv	0.0049	No	0.05	Yes

ft bgs = feet below ground surface

mg/L = milligrams per liter

UTL = upper tolerance limit

TNRCC MSC = Texas Natural Resource Conservation Commission Media Specific Concentrations

NA = not applicable

RRS 1 = Risk Reduction Standard 1, result is less than background

RRS 2 = Risk Reduction Standard 2, result is less than TNRCC MSC

SPLP = Synthetic Precipitation Leaching Procedure

Footnotes:

<sup>1</sup> - UTLs derived from Final Basewide Background Study, Jacobs Engineering, 1998

<sup>2</sup> - TNRCC Risk Reduction Standard Media Specific Concentration (MSC) - Industrial Setting

Laboratory Qualifier Definitions.

" " = The analyte was positively identified

"U" = The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL

"F" = The analyte was positively identified but the associated numerical value is below the reporting limit

"nv" = not validated

#### **4.7 Results from Phase 3 RFI Activities (2000)**

Upon further review of the analytical results for inorganics collected during the Law (1995) investigation and the Phase 2 RFI, it was determined that additional sampling was required to delineate arsenic, cadmium, and copper concentrations to basewide background concentrations in accordance with the TNRCC RRP. Additionally, three confirmation soil samples were collected adjacent to a former Law boring (SB101504) in an attempt to replicate the highest arsenic and cadmium concentrations, which exceeded their respective MSCs. The elevated arsenic and cadmium that were detected were then submitted for SPLP analysis to determine the potential for the contaminants to leach into groundwater. At each soil boring location, samples were collected 5 feet above and below the former sample intervals that showed elevated concentrations of arsenic, cadmium, and/or copper.

Table 4-3 includes the analytical results from the soil samples collected at Building 1015 during the Phase 3 field activities. The following sections discuss the analytical results for surface and subsurface soil samples collected during the Phase 3 RFI at Building 1015.

##### **4.7.1 Surface Soil**

IT collected five surface soil samples for analysis of arsenic, cadmium, and/or copper during the Phase 3 RFI activities in November 2000 (Figure 4-1). Four of the surface soil samples were collected at locations selected to delineate the inorganic contaminants to basewide background concentrations. Additionally, one surface soil sample was collected near the former Law (1995) boring 1015-SB01 where the highest arsenic and cadmium concentrations were detected, and SPLP analysis was performed to determine the potential for the contaminants to leach into groundwater. The following paragraphs discuss the analytical results for arsenic, cadmium, and copper detections in surface soil at Building 1015.

**Arsenic.** Arsenic concentrations detected in two of the three delineation samples collected during the Phase 3 RFI (SB101508 and SB101511) were below the background concentration for arsenic. However, arsenic was detected in the surface soil sample from boring SB101507 at a concentration of 5.99 mg/kg, that slightly exceeds the background concentration. Considering the small deviation from the background concentration, the arsenic concentration detected in the surface soil sample from SB101507 is likely an extreme but true background concentration. The arsenic analytical results for surface soil samples from borings SB101507 and SB101508 delineated arsenic concentrations identified by Law (1995) (to the north and west, respectively).

Arsenic was detected at a concentration of 5.2 mg/kg in the surface soil sample from SB101507, that is located adjacent to former Law boring 1015-SB01. Therefore, the arsenic detected in surface soil during the Law investigation could not be replicated and no SPLP analysis was performed.

**Cadmium.** Cadmium concentrations detected in the three surface soil samples collected during the Phase 3 RFI for delineation purposes were all below the background concentration for cadmium (0.556 mg/kg). Cadmium was detected at a concentration of 0.232 mg/kg in the surface soil sample from SB101509, which was located adjacent to former Law boring 1015-SB01 (Figure 4-1). Therefore, the highest cadmium concentration detected in surface soil during the Law investigation could not be replicated and no SPLP analysis was performed.

**Copper.** Analysis of copper was performed on five surface soil samples collected during the Phase 3 RFI activities as part of the delineation of elevated copper concentrations identified in subsurface soil samples collected by Law. The detected concentrations of copper in the five surface soil samples were all below the background concentration for copper (17.37 mg/kg).

#### **4.7.2 Subsurface Soil**

IT collected seven additional subsurface soil samples from five soil boring locations (SB101507 through SB101511) during the Phase 3 RFI activities in November 2000. Four of the soil borings (SB101507, SB101508, SB101510 and SB101511) were located to delineate arsenic, cadmium, and/or copper concentrations to basewide background concentrations. Additionally, a soil sample was collected near the former Law (1995) boring 1015-SB01 in an attempt to replicate the highest arsenic and cadmium concentrations so that SPLP analysis could be performed to determine the potential for the contaminants to leach into groundwater. The following subsections discuss the Phase 3 RFI results for arsenic, cadmium, and copper.

**Arsenic.** Arsenic detected in the subsurface samples collected from 4 to 6 feet and 10 to 12 feet bgs at Phase 3 borings SB101507 and SB101508 were all below the background concentration for arsenic. Similarly, the arsenic detected in the sample from 6 to 8 feet bgs at SB101510 was also below the background concentrations, as was the arsenic concentration detected in the soil sample from 5 to 7 feet bgs at SB101511.

Phase 3 RFI soil boring SB101509, which is located adjacent to former Law boring 1015-SB01, was sampled from 0 to 4 feet bgs and from 7 to 9 feet bgs in an attempt to replicate the highest

arsenic concentrations detected by Law (1995) so that the SPLP analysis could be performed to determine the potential for arsenic to leach into groundwater. The detected concentrations of arsenic in the samples from 0 to 4 feet bgs and 7 to 9 feet bgs at boring location from SB101509 were below the background concentration for arsenic. Therefore, IT was unable to replicate the elevated concentrations of arsenic and no SPLP analysis for arsenic was performed on the Phase 3 RFI subsurface samples at Building 1015.

**Cadmium.** Cadmium concentrations detected in the subsurface samples collected from 4 to 6 feet and from 10 to 12 feet bgs at Phase 3 borings SB101507 and SB101508 were all below the background concentration for cadmium. Similarly, the cadmium that was detected in the sample from 6 to 8 feet bgs at SB101510 was also below the background concentration, as was the cadmium concentration detected in the sample from 5 to 7 feet bgs at SB101511.

Phase 3 RFI soil boring SB101509, which is located adjacent to former Law boring 1015-SB01, was sampled from 0 to 4 feet bgs and from 7 to 9 feet bgs in an attempt to replicate the highest cadmium concentrations detected by Law (1995) such that the SPLP analysis could be performed to determine the potential for cadmium to leach into groundwater. The detected concentrations of cadmium in the samples from 0 to 4 feet bgs and 7 to 9 feet bgs at boring location from SB101509 were below the background concentration for cadmium. Therefore, IT was unable to replicate the elevated concentrations of cadmium, so no SPLP analysis for cadmium was performed on the Phase 3 RFI subsurface samples at Building 1015.

**Copper.** The copper concentrations detected in the seven subsurface soil samples collected during the Phase 3 RFI were all below the background concentration for copper (13.72 mg/kg). Considering that copper concentrations were below background in all 12 soil samples (5 surface and 7 subsurface) collected during the Phase 3 RFI activities, there does not appear to be a pattern of elevated copper concentrations at the Building 1015 OWS site.

#### **4.8 Summary**

Law collected soil samples from three soil borings for analysis of VOCs and inorganics during the initial site investigation of the OWS at Building 1015. IT collected surface and subsurface soil samples for analysis of SVOCs and pesticides/PCBs during the Phase 1 Sanitary Sewer System RFI in 1997. Monitoring well WITCTA038 was drilled, but did not produce sufficient groundwater and was abandoned during the Phase 1 activities.

IT collected surface and subsurface soil samples from four borings (SB101503 Through SB101506) during the Phase 2 RFI in April 2000 to confirm/delineate the elevated concentrations of arsenic or cadmium identified in the Law borings. IT collected surface and subsurface soil samples from five additional borings (SB101507 through SB101511) during the Phase 3 RFI to confirm/delineate inorganic compounds identified in the Law borings. The following sections summarize the results of these investigations.

#### **4.8.1 Surface Soil**

No SVOCs or pesticides were detected above MQLs in the surface soil samples collected at the Building 1015 OWS site. Two VOCs, methylene chloride and acetone, were detected above MQLs in the surface soil samples, but because these compounds are common laboratory contaminants, the detected concentrations were likely the result of laboratory contamination. Arsenic and cadmium were detected above their respective background concentrations and MSCs in the surface soil samples collected by Law (1995). IT collected surface soil samples during the Phase 2 and Phase 3 RFIs to confirm and delineate arsenic and cadmium concentrations. The results from the Phase 2 and Phase 3 RFI samples delineated these inorganics to their respective background concentrations. However, as discussed in Section 3.2.3, IT was unable to confirm the elevated concentrations of arsenic and cadmium in one (1015-SB01) of the former Law borings.

#### **4.8.2 Subsurface Soil**

Methylene chloride was the only VOC detected in the subsurface soil samples collected during the initial site investigation (Law, 1995). The concentrations of methylene chloride were low and most (6 out of 7 samples) were qualified as laboratory contaminants. Considering that methylene chloride is a common laboratory contaminant and that methylene chloride was detected in the associated method blanks, the detected concentrations were likely the result of laboratory contamination. No SVOCs or pesticides/PCBs were detected above MQL in the surface soil samples collected at the Building 1015 OWS site.

Arsenic and cadmium were detected during the Law (1995) site investigation at concentrations that exceeded both the respective basewide background concentrations and TNRCC MSCs. Copper was detected in the subsurface samples collected by Law (1995) at concentrations that slightly exceeded the basewide background concentration for copper (13.72 mg/kg), but the detected copper concentrations were below the MSC for copper (130 mg/kg). IT collected additional surface and subsurface soil samples to delineate arsenic, cadmium, and copper

concentrations to their respective background concentrations during Phase 2 and Phase 3 RFI activities. As shown in Figure 4-1, the analytical results from the four Phase 2 borings (SB101503 through SB101506) and the five Phase 3 borings (SB101507 through SB101511) adequately delineate arsenic, cadmium, and copper concentrations to background concentrations per the requirements for closure under RRS 2.

IT also collected subsurface soil samples from Phase 3 soil boring SB101507 in an attempt to replicate arsenic and cadmium concentrations detected above MSCs at former Law boring 1015-SB01 during the initial site investigation. However, the concentrations detected in the surface and subsurface samples at this Phase 3 boring were below background concentrations for both arsenic and cadmium. Arsenic concentrations were also below background in the surface and subsurface samples collected from Phase 2 soil boring SB101504, which is also adjacent to former Law boring 1015-SB01. Considering that IT was unsuccessful in confirming the elevated concentrations of arsenic and cadmium from the Law boring with the highest concentration and that arsenic and cadmium concentrations were at or below background in all of the Phase 2 and Phase 3 RFI soil samples, it appears that the arsenic and cadmium concentrations detected during the Law (1995) investigation are consistently higher than those detected by IT.

#### **4.8.3 Groundwater**

The lack of available water and aquifer materials in monitoring well WITCTA038 prevented collection of groundwater samples at the Building 1015 site. ~~Therefore,~~ <sup>However,</sup> the existence of groundwater contaminants at Building 1015 ~~from a release from the OWS is unlikely due to the~~ <sup>is unlikely due to the</sup> low concentrations of inorganic contaminants ~~and the absence of organic (fuel-related)~~ <sup>and the absence of organic (fuel-related)</sup> compounds detected in soil samples at the site.

#### **4.9 Conclusions**

Since compounds present in hydraulic fluid, engine lubricating oil, and other petroleum byproduct handled by the OWS were not elevated in soil samples collected at Building 1015, there appears to have been no releases from the OWS that have significantly impacted the environment. The inorganics that were detected above background in the subsurface soil samples collected by Law (1995) have been delineated to background. Additionally arsenic and cadmium concentrations exceeded both background and MSCs in the Law (1995) samples and could not be replicated in the soil samples collected by IT, which indicates that the concentrations of these inorganics detected by Law (1995) were extreme, but true, background concentrations.

Considering that no clear pattern of inorganic concentrations exceeding MSCs was observed in the subsurface samples collected by IT during Phases 1 through 3 of the RFI and that all inorganic concentrations have been delineated to basewide background concentrations by the results from Phase 2 and Phase 3 samples, NFA is warranted for the OWS at Building 1015 and the site is recommended for closure under RRS 2. Should this recommendation be accepted, a letter stating that closure of SWMU 47 (OWS at Building 1015) was carried out in accordance with TAC §335.555, and signed by an Air Force representative, will be transmitted to TNRCC, along with a metes and bounds description of SWMU 47. The metes and bounds description will correspond to surveyed coordinates of the affected area shown in Figure 4-1.

# TAB

5.0

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## **5.0 OWS Building 1027**

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The following sections provide a description of the OWS at Building 1027, a summary of the site characterization activities, a discussion of the site-specific geology and hydrology, discussions of the analytical results from each characterization event, and recommendations based upon the physical and chemical data collected at the site.

### **5.1 Site Description**

The OWS at Building 1027 is located adjacent to the south corner of Building 1027 (Figure 5-1) and is designated SWMU No. 44 on the RCRA Hazardous Waste Permit for NAS Fort Worth JRB. The unit was installed to receive waste from operations within Building 1027, and has been in operation since 1985. The system consists of a network of floor drains in the hangar, underground trenches, and the OWS. The hangar floor is paved with concrete and the drainage system is reportedly constructed of concrete (A. T. Kearney, 1989). The OWS is a cylindrical, below-ground, gravity separator with a 1,500-gallon capacity consisting of a 1,000-gallon oil storage chamber and a 500-gallon effluent chamber (Law, 1995). The area surrounding the OWS is covered with soil, gravel, and grass.

NAS Fort Worth maintenance personnel noted overflow problems with the lift station adjacent to the OWS, as well as excessive sludge buildup in the sludge chamber (Law, 1995). A recommendation was made in the Law report to thoroughly inspect the OWS and lift station and clean out sludge buildup and replace parts if needed. Pumping and steam cleaning of the OWS at Building 1027 was completed August 4, 1995 (CRA, 1995). It is not known if samples were taken during this project. The OWS was also included in a pumping and steam cleaning effort by D. D. and Beauty, a non-hazardous liquid waste removal company, during April and May 1993. The content of the OWS at Building 1027 was drummed and sampled (CB, 1994).

A sample collected September 27, 1994 of the content of the OWS at Building 1027 was analyzed by Huntingdon/Southwestern Engineering & Environmental, Inc., for TPH (EPA Method 418.1), toxicity characteristics leaching procedure (TCLP) metals (SW846), and benzene, toluene, ethyl benzene, and xylenes (BTEX) (EPA Method SW8020).

**LEGEND**

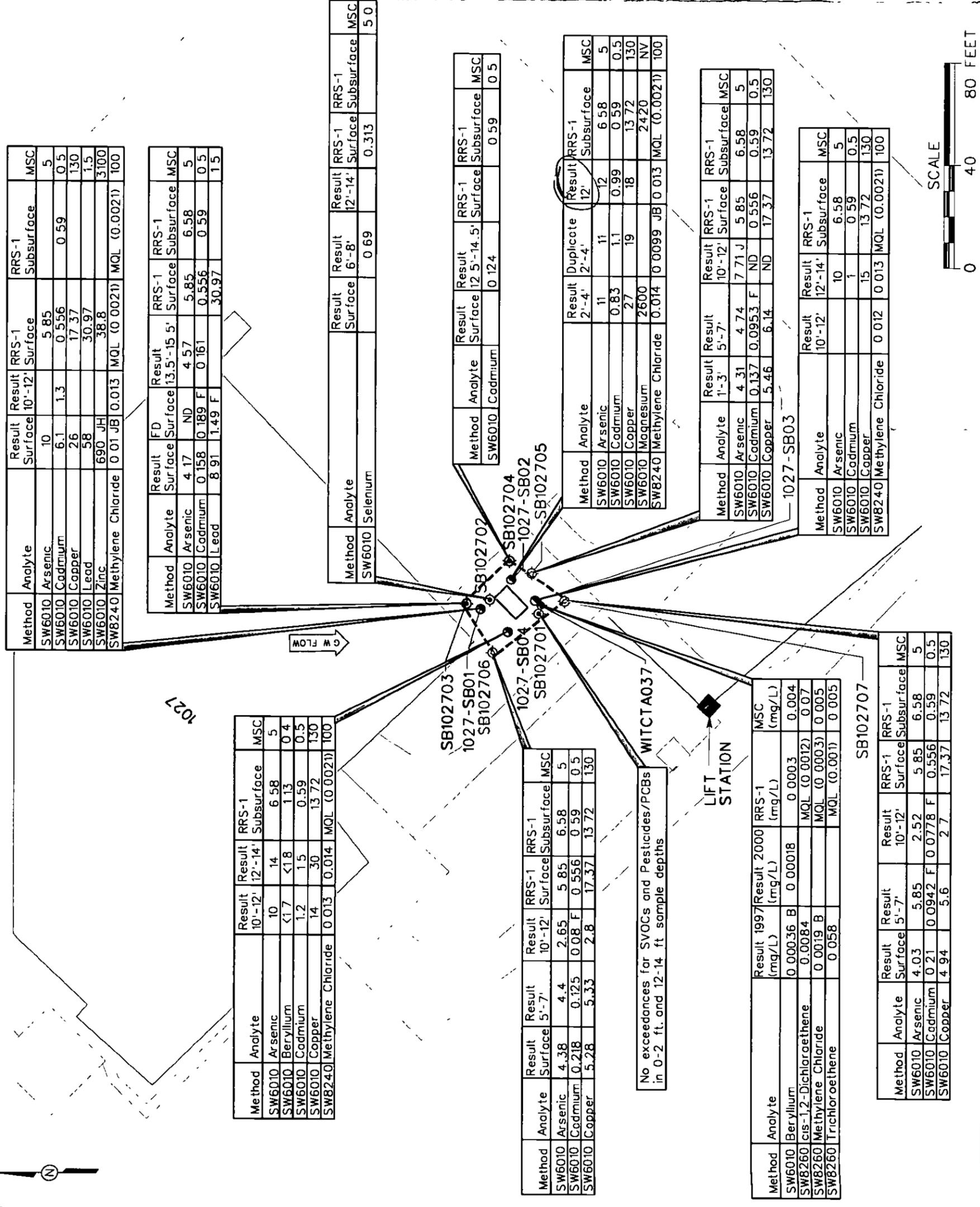
- BUILDING 1027 INDUSTRIAL WASTE OIL/WATER SEPARATOR UNIT
- IT CORP. SOIL BORING (1997)
- IT CORP. PHASE 2 BORING (2000)
- IT CORP. PHASE 3 BORING (2000)
- IT CORP. MONITORING WELL
- LAW ENGINEERING SOIL BORING (VOCs AND METALS)
- GROUNDWATER FLOW DIRECTION
- SEWER LINE AND DIRECTIONAL FLOW
- FENCE
- RRS 2 SURVEY BOUNDARY
- PHASE 1 > BACKGROUND
- PHASE 2 RESULTS
- PHASE 3 RESULTS
- ANALYTE DETECTED ABOVE MSC. SPLP NOT PERFORMED

**NOTES:**

CONCENTRATIONS REPORTED IN MG/KG.  
 MSC - MEDIA-SPECIFIC CONCENTRATION.  
 NV - NO VALUE  
 B - FOR INORGANICS, THE QUANTITATION IS AN ESTIMATED CONCENTRATION BETWEEN THE MDL AND PQL FOR ORGANICS, THE CONSTITUENT WAS ALSO DETECTED IN THE ASSOCIATED METHOD BLANK  
 J - THE ANALYTE WAS POSITIVELY IDENTIFIED, THE QUANTITATION IS AN ESTIMATION.  
 SOURCE: DRAFT RCRA FACILITIES INVESTIGATION SANITARY SEWER SYSTEM, SEPTEMBER 1997, IT CORPORATION

**FIGURE 5-1  
 SITE MAP SHOWING  
 INVESTIGATION RESULTS  
 OWS BUILDING 1027 (SWMU 44)**

DRAFT RFI REPORT  
 MAS FORT WORTH JRB  
 FORT WORTH, TEXAS



TPH was detected at a concentration of 47.4 mg/L. Barium and silver were detected at concentrations of 0.253 and 0.024 mg/L, respectively. No other metals were detected in excess of the detection limit. BTEX constituents were not detected in excess of the detection limit.

## **5.2 Site Characterization Activities**

A summary of the soil and groundwater samples that have been collected at the Building 1027 site is provided in Table 5-1. The analytical methods associated with each soil sample collected at Building 1027 are also presented in Table 5-1. The locations of the soil borings are shown in Figure 5-1. The following sections discuss the investigation activities that have been performed to characterize environmental impacts relating to the OWS at Building 1027.

### **5.2.1 Initial Site Investigation – Law 1994**

Law (1995) collected soil samples in 1994 from four borings located at all four sides of the OWS at Building 1027 (Figure 5-1). Soil borings were advanced to depths ranging from 12 to 14 feet bgs. One surface soil sample was collected from surface to 2 feet in depth at boring 1027-SB01. Subsurface soil samples were collected from 2 to 4 feet, 6 to 8 feet, 10 to 12 feet, and 12 to 14 feet in depth. Samples were analyzed for VOCs (EPA Method SW8240) and inorganics (EPA Method SW6010) (Law, 1995). A summary of all soil sampling and analysis performed at the Building 1027 site throughout the RFI and previous investigations is provided in Table 5-1.

### **5.2.2 Phase 1 RFI Activities**

IT collected soil samples during the Phase 1 Sanitary Sewer System RFI in 1997 (Table 5-1) from two borings located on the north and south sides of the OWS at Building 1027 (Figure 5-1). Surface soil samples were collected from surface to 2 feet in depth. Subsurface soil samples were collected from the 2-foot interval directly above the water table or refusal (6 to 8 feet and 12 to 14 feet). Soil samples were analyzed for SVOCs (EPA Method SW8270) and pesticides/PCBs (EPA Method SW8080) to supplement soil data collected during the Law (1995) investigation (IT, 1998).

Monitoring well WITCTA037 was installed, during the Phase 1 RFI in April 1997, immediately adjacent to boring SB102701 (Figure 5-1). The well was completed to a total depth of 21 feet bgs, with a screen interval from 13.5 to 21 feet bgs. Well WITCTA037 was developed and groundwater sample MS1566 was collected from the well in April 1997.

**Table 5-1**  
**Summary of Previous Environmental Samples**  
**Collected at Building 1027**  
**NAS Fort Worth JRB, Texas**

Sample Location	Sample Date	Sample Number	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Analysis	Analytical Method
<b>Law Engineering - Initial Site Investigation (1994)</b>						
1027-SB01	4/22/94	102701SBA	0	2	Inorganics, VOCs	EPA SW6010, SW8240
		102701SBF	10	12	Inorganics, VOCs	EPA SW6010, SW8240
1027-SB02	4/22/94	102702SBB	2	4	Inorganics, VOCs	EPA SW6010, SW8240
		1027DPSB1	2	4	Inorganics, VOCs	EPA SW6010, SW8240
		102702SBG	12	14	Inorganics, VOCs	EPA SW6010, SW8240
1027-SB03	4/22/94	102703SBF	10	12	Inorganics, VOCs	EPA SW6010, SW8240
		102703SBG	12	14	Inorganics, VOCs	EPA SW6010, SW8240
1027-SB04	4/22/94	102704SBD	6	8	Inorganics, VOCs	EPA SW6010, SW8240
		102704SBF	10	12	Inorganics, VOCs	EPA SW6010, SW8240
<b>IT Corporation - Phase 1 RFI (1997)</b>						
SB102701	3/14/97	MS1111	0	2	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
SB102702	3/14/97	MS1113	0	2	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
		MS1116	6	8	VOCs, TPH, DRO/GRO	EPA SW8240, SW8015M
		MS1115	12	14	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
WITCTA037	4/29/97	MS1566	GW	GW	Inorganics, VOCs, SVOCs	EPA SW6010, SW8260, SW8270
<b>IT Corporation - Phase 2 RFI (2000)</b>						
SB102703	4/20/00	BG005	0	2	As, Cd, Pb	EPA SW6010B
		BG006	13.5	15.5	As, Cd	EPA SW6010B
SB102704	4/20/00	BG007	12.5	13.5	Cd	EPA SW6010B
WITCTA037	5/1/00	BG3001	GW	GW	Be	EPA SW6010B
<b>IT Corporation - Phase 3 RFI (2000)</b>						
SB102705	11/28/00	BG0055	1	3	As, Cd, Cu	EPA SW6010B
		BG0056	10	12	As, Cd, Cu	EPA SW6010B
		BG0120	5	7	As, Cd, Cu	EPA SW6010B
SB102706	11/28/00	BG0057	10	12	As, Cd, Cu	EPA SW6010B
		BG0121	0	2	As, Cd, Cu	EPA SW6010B
		BG0122	5	7	As, Cd, Cu	EPA SW6010B
SB102707	11/28/00	BG0058	10	12	As, Cd, Cu	EPA SW6010B
		BG0123	0	2	As, Cd, Cu	EPA SW6010B
		BG0124	5	7	As, Cd, Cu	EPA SW6010B

VOCs - Volatile Organic Compounds  
 SVOCs - Semivolatile Organic Compounds  
 ORO - Diesel Range Organics  
 GRO - Gasoline Range Organics  
 As - Arsenic  
 Cd - Cadmium  
 Cu - Copper  
 Pb - Lead  
 TPH - Total Petroleum Hydrocarbons

Sample MS1566 was analyzed for VOCs (EPA Method SW8260), SVOCs (EPA Method SW8270), and inorganics (EPA Methods SW6010/7000 and SW7471 for mercury) (IT, 1998).

### **5.2.3 Phase 2 RFI Activities**

Additional soil sampling was performed by IT during the Phase 2 RFI in April 2000 (Table 5-1). Soil borings were located to the north (SB102703) and to the east (SB102704) of the OWS at Building 1027 (Figure 5-1). Samples BG0005 and BG0006 were collected from SB102703 from surface to two feet in depth and 13.5 to 15.5 feet in depth, respectively. These samples were analyzed for arsenic, cadmium, and lead (EPA Method SW6010B) to confirm concentrations of these inorganics detected in former Law (1995) boring 1027-SB01. Sample BG0007 was collected from SB102704 from 12.5 to 13.5 feet in depth and analyzed for arsenic and cadmium (EPA Method SW6010B) to confirm concentrations of these inorganics detected in former Law (1995) boring 1027-SB02. An additional groundwater sample was collected from WITCTA037 during the Phase 2 RFI in April 2000 and analyzed for beryllium (EPA Method SW6010B) to confirm the beryllium concentration detected during the Phase 1 RFI.

### **5.2.4 Phase 3 RFI Activities**

Soil samples were collected by IT at three depths (0 to 3 feet, 5 to 7 feet, and 10 to 12 feet) from soil borings SB102705, SB102706, and SB102707 (Figure 5-1) during Phase 3 of the RFI in November 2000 (Table 5-1). All samples were collected to delineate elevated concentrations of arsenic, cadmium, and copper (EPA Method SW6010B) identified during the previous investigations.

## **5.3 Site-Specific Conditions**

The following subsections discuss the site-specific geology and hydrogeology characteristics that were encountered during the investigation activities at the Building 1027 site.

**Geology.** Quaternary alluvium is found at the surface through most of the NAS Fort Worth area. The alluvium consists of floodplain and fluvial terrace deposits of gravel, sand, silt, and clay that occur as a veneer on the eroded surface of Upper Cretaceous strata. Soil boring logs from Building 1027 (Appendix A) indicate generally fine-grained alluvial soils from ground surface to approximately 10 feet bgs. Soils containing various mixtures of clay, silt, fine sand and small gravels or caliche nodules are found in this interval. Below 10 feet bgs, boring logs indicated silty or clayey fine to coarse sand, changing to gravelly sand or sandy gravel below 12

to 14 feet bgs. Soils were generally brown or yellowish-brown in color, and saturated soils were indicated below 14.5 to 16.5 feet bgs. SB102701 was the deepest soil boring driven at the Building 1027 site, to a total depth of 19 feet bgs.

The alluvial soils rest unconformably on the top of the weathered Walnut Formation. Underlying the Quaternary alluvium is the Cretaceous-aged Walnut Formation, which consists of 20 to 30 feet of indurated fossiliferous limestone interbedded with brown sandy clay, thinly bedded fossiliferous clay, and fissile shale. Unconformably underlying the Walnut Formation is the Cretaceous-aged Paluxy Formation. The Paluxy Formation generally consists of coarse-grained sand that grades upward into fine-grained sand with variable amounts of shale and limestone. The sandstone, composed of fine- to coarse-grained white quartz, is well-sorted, poorly consolidated, and cross-bedded. The Paluxy Formation thickness ranges from 140 to 190 feet, averaging 160 feet in Tarrant County (Radian, 1991).

**Hydrogeology.** Shallow groundwater within the Quaternary alluvium occurs in fluvial terrace deposits of sand and gravel, which occur as a veneer on the eroded surface of the Walnut Formation. Soil description logs (Appendix A) from borings SB102701 and SB102702 on the south side of Building 1027 indicated gravel and sand below 14 feet bgs, and saturated conditions below 14.5 to 16.5 feet bgs. Monitoring well WITCTA037 was installed south of Building 1027 to screen the gravel and sand down to the top of the Walnut Formation, at approximately 21 feet depth. Groundwater flow at the Building 1027 site is to the east and southeast toward Farmers Branch Creek and the Trinity River.

#### **5.4 Results from Initial Site Investigation**

The following sections present the analytical results from surface and subsurface soil samples that were collected by Law (1995) during the initial site investigation at Building 1027. Table 5-2 contains a summary of the analytes detected in the samples collected by Law (1995) and compares the detected concentrations to basewide background concentrations and MSCs. Detected analyte concentrations, which exceeded background concentrations, are shown on Figure 5-1. The following subsections presents the analytical results from surface and subsurface soil samples that were collected by Law (1995) during the initial site investigation at Building 1027.

**Table 5-2**  
**Summary of 1994 Soil Analytical Detecticons Compared to Background and MSCs**  
**OWS Building 1027 - Law Environmental (1995)**  
**NAS Fort Worth JRB, Texas**

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
<b>Building 1027 - Surface Soil - Location 1027-SB01</b>												
1027-SB01	102701SBA	4/22/94	0	2	METHYLENE CHLORIDE	0.01	0.01	JB	0.5	No	0.5	Yes
1027-SB01	102701SBA	4/22/94	0	2	ALUMINIUM	6800	6800		22035	Yes	10000	NA
1027-SB01	102701SBA	4/22/94	0	2	ARSENIC	10	10		5 85	No	5	No
1027-SB01	102701SBA	4/22/94	0	2	BARIUM	60	233		200	Yes	200	NA
1027-SB01	102701SBA	4/22/94	0	2	BERYLLIUM	16	1.6		1.02	No	0.4	No
1027-SB01	102701SBA	4/22/94	0	2	CADMIUM	6.10	6.10		0.556	No	0.5	No
1027-SB01	102701SBA	4/22/94	0	2	CALCIUM	180000	180000		187788	Yes	Essential Nutrient	NA
1027-SB01	102701SBA	4/22/94	0	2	CHROMIUM TOTAL	17.0	17.0		25 86	Yes	10	NA
1027-SB01	102701SBA	4/22/94	0	2	COBALT	4.2	4.2		11 05	Yes	6.10	NA
1027-SB01	102701SBA	4/22/94	0	2	COPPER	26	26		17 37	No	130	Yes
1027-SB01	102701SBA	4/22/94	0	2	IRON	8000	8000		17717	Yes	Essential Nutrient	NA
1027-SB01	102701SBA	4/22/94	0	2	LEAD	58.0	58.0		30 97	No	1.5	No
1027-SB01	102701SBA	4/22/94	0	2	MAGNESIUM	2400	2400		3003	Yes	Essential Nutrient	NA
1027-SB01	102701SBA	4/22/94	0	2	MANGANESE	2.40	2.40		848	Yes	1400	NA
1027-SB01	102701SBA	4/22/94	0	2	NICKEL	9.3	9.3		14 6	Yes	200	NA
1027-SB01	102701SBA	4/22/94	0	2	POTASSIUM	11000	11000		2895	Yes	Essential Nutrient	NA
1027-SB01	102701SBA	4/22/94	0	2	SODIUM	89	89		37300	Yes	Essential Nutrient	NA
1027-SB01	102701SBA	4/22/94	0	2	VANADIUM	8.9	8.9		46 3	Yes	72	NA
1027-SB01	102701SBA	4/22/94	0	2	ZINC	850	850	JH	38 8	No	3100	Yes
<b>Building 1027 - Subsurface Soil - Location 1027-SB01</b>												
1027-SB01	102701SBF	4/22/94	10	12	METHYLENE CHLORIDE	0.013	0.013		0.5	No	0.5	Yes
1027-SB01	102701SBF	4/22/94	10	12	ALUMINIUM	2000	2000		20260	Yes	10000	NA
1027-SB01	102701SBF	4/22/94	10	12	ARSENIC	3.4	3.4		6 58	Yes	5	NA
1027-SB01	102701SBF	4/22/94	10	12	BARIUM	17	17		128 1	Yes	200	NA
1027-SB01	102701SBF	4/22/94	10	12	BERYLLIUM	0.24	0.24		0.59	Yes	0.4	NA
1027-SB01	102701SBF	4/22/94	10	12	CADMIUM	1.30	1.30		0.5	No	0.5	No
1027-SB01	102701SBF	4/22/94	10	12	CALCIUM	22000	22000		272000	Yes	Essential Nutrient	NA
1027-SB01	102701SBF	4/22/94	10	12	CHROMIUM TOTAL	4.4	4.4		16 31	Yes	10	NA
1027-SB01	102701SBF	4/22/94	10	12	COBALT	4.6	4.6		6 19	Yes	6.10	NA
1027-SB01	102701SBF	4/22/94	10	12	COPPER	4.9	4.9		13 72	Yes	130	NA
1027-SB01	102701SBF	4/22/94	10	12	IRON	8700	8700		17469	Yes	Essential Nutrient	NA
1027-SB01	102701SBF	4/22/94	10	12	LEAD	5.3	5.3		12 66	Yes	1.5	NA
1027-SB01	102701SBF	4/22/94	10	12	MAGNESIUM	430	430		2420	Yes	Essential Nutrient	NA
1027-SB01	102701SBF	4/22/94	10	12	MANGANESE	140	140		3517	Yes	1400	NA
1027-SB01	102701SBF	4/22/94	10	12	NICKEL	5.3	5.3		19 76	Yes	200	NA
1027-SB01	102701SBF	4/22/94	10	12	POTASSIUM	320	320		1717	Yes	Essential Nutrient	NA
1027-SB01	102701SBF	4/22/94	10	12	SODIUM	27	27		53200	Yes	Essential Nutrient	NA
1027-SB01	102701SBF	4/22/94	10	12	VANADIUM	12	12		37 4	Yes	72	NA
1027-SB01	102701SBF	4/22/94	10	12	ZINC	12	12	JH	31 3	Yes	3100	NA

Table 5-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1027 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
Building 1027 - Subsurface Soil - Location 1027-SB02												
1027-SB02	102702SBB	4/22/94	2	4	METHYLENE CHLORIDE	0.014	0.014			No	0.5	Yes
1027-SB02	102702SBB	4/22/94	2	4	ALUMINIUM	6000	6000		20260	Yes	10000	NA
1027-SB02	102702SBB	4/22/94	2	4	ARSENIC	11	11		6.58	No	5	No
1027-SB02	102702SBB	4/22/94	2	4	BARIIUM	48	48		128.1	Yes	200	NA
1027-SB02	102702SBB	4/22/94	2	4	BERYLLIUM	17	17		1.13	No	0.4	No
1027-SB02	102702SBB	4/22/94	2	4	CADMIUM	0.83	0.83		0.59	No	0.5	No
1027-SB02	102702SBB	4/22/94	2	4	CALCIUM	190000	190000		272000	Yes	Essential Nutrient	NA
1027-SB02	102702SBB	4/22/94	2	4	CHROMIUM, TOTAL	7.4	7.4		16.31	Yes	10	NA
1027-SB02	102702SBB	4/22/94	2	4	COBALT	5.1	5.1		6.19	Yes	610	NA
1027-SB02	102702SBB	4/22/94	2	4	COPPER	27	27		13.72	No	130	Yes
1027-SB02	102702SBB	4/22/94	2	4	IRON	78	78	J	17469	Yes	Essential Nutrient	NA
1027-SB02	102702SBB	4/22/94	2	4	LEAD	8.9	8.9		12.66	Yes	1.5	NA
1027-SB02	102702SBB	4/22/94	2	4	MAGNESIUM	2600	2600		2420	No	Essential Nutrient	Yes
1027-SB02	102702SBB	4/22/94	2	4	MANGANESE	310	310		351.7	Yes	1460	NA
1027-SB02	102702SBB	4/22/94	2	4	NICKEL	9.1	9.1		19.76	Yes	200	NA
1027-SB02	102702SBB	4/22/94	2	4	POTASSIUM	910	910		1717	Yes	Essential Nutrient	NA
1027-SB02	102702SBB	4/22/94	2	4	SODIUM	100	100		53200	Yes	Essential Nutrient	NA
1027-SB02	102702SBB	4/22/94	2	4	VANADIUM	15	15		37.4	Yes	72	NA
1027-SB02	102702SBB	4/22/94	2	4	ZINC	24	24	JH	31.3	Yes	3100	NA
1027-SB02	102702SBB	4/22/94	2	4	METHYLENE CHLORIDE	0.0099	0.0099	JB		No	0.5	Yes
1027-SB02	102702SBB	4/22/94	2	4	ALUMINIUM	6100	6100		20260	Yes	10000	NA
1027-SB02	102702SBB	4/22/94	2	4	ARSENIC	11	11		6.58	No	5	No
1027-SB02	102702SBB	4/22/94	2	4	BARIIUM	41	41		128.1	Yes	200	NA
1027-SB02	102702SBB	4/22/94	2	4	BERYLLIUM	16	16		1.13	No	0.4	No
1027-SB02	102702SBB	4/22/94	2	4	CADMIUM	1.10	1.10		0.59	No	0.5	No
1027-SB02	102702SBB	4/22/94	2	4	CALCIUM	160000	160000		272000	Yes	Essential Nutrient	NA
1027-SB02	102702SBB	4/22/94	2	4	CHROMIUM, TOTAL	8.1	8.1		16.31	Yes	10	NA
1027-SB02	102702SBB	4/22/94	2	4	COBALT	5.1	5.1		6.19	Yes	610	NA
1027-SB02	102702SBB	4/22/94	2	4	COPPER	19	19		13.72	No	130	Yes
1027-SB02	102702SBB	4/22/94	2	4	IRON	10000	10000	J	17469	Yes	Essential Nutrient	NA
1027-SB02	102702SBB	4/22/94	2	4	LEAD	10.0	10.0		12.66	Yes	1.5	NA
1027-SB02	102702SBB	4/22/94	2	4	MAGNESIUM	2200	2200		2420	Yes	Essential Nutrient	NA
1027-SB02	102702SBB	4/22/94	2	4	MANGANESE	250	250		351.7	Yes	1460	NA
1027-SB02	102702SBB	4/22/94	2	4	NICKEL	7.6	7.6		19.76	Yes	200	NA
1027-SB02	102702SBB	4/22/94	2	4	POTASSIUM	880	880		1717	Yes	Essential Nutrient	NA
1027-SB02	102702SBB	4/22/94	2	4	SODIUM	90	90		53200	Yes	Essential Nutrient	NA
1027-SB02	102702SBB	4/22/94	2	4	VANADIUM	18	18		37.4	Yes	72	NA
1027-SB02	102702SBB	4/22/94	2	4	ZINC	16	16	JH	31.3	Yes	3100	NA
1027-SB02	102702SBB	4/22/94	12	14	METHYLENE CHLORIDE	0.013	0.013			No	0.5	Yes

**Table 5-2**  
**Summary of 1994 Soil Analytical Detections Compared to Background and MSCs**  
**OWS Building 1027 - Law Environmental (1995)**  
**NAS Fort Worth JRB, Texas**

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
1027-SB02	1027025SBG	4/22/94	12	14	ALUMINIUM		1800		20260	Yes	10000	NA
1027-SB02	1027025SBG	4/22/94	12	14	ARSENIC		12		6.58	No	5	No
1027-SB02	1027025SBG	4/22/94	12	14	BARIUM		36		128.1	Yes	200	NA
1027-SB02	1027025SBG	4/22/94	12	14	BERYLLIUM	16	1.6		1.13	No	0.4	No
1027-SB02	1027025SBG	4/22/94	12	14	CADMIUM		0.99		0.59	No	0.5	No
1027-SB02	1027025SBG	4/22/94	12	14	CALCIUM		180000		2720000	Yes	Essential Nutrient	NA
1027-SB02	1027025SBG	4/22/94	12	14	CHROMIUM, TOTAL		4.7		16.31	Yes	10	NA
1027-SB02	1027025SBG	4/22/94	12	14	COBALT		4.2		6.19	Yes	610	NA
1027-SB02	1027025SBG	4/22/94	12	14	COPPER		18		13.72	No	130	Yes
1027-SB02	1027025SBG	4/22/94	12	14	IRON		6200		17469	Yes	Essential Nutrient	NA
1027-SB02	1027025SBG	4/22/94	12	14	LEAD		7.0		12.66	Yes	1.5	NA
1027-SB02	1027025SBG	4/22/94	12	14	MAGNESIUM		1600		2420	Yes	Essential Nutrient	NA
1027-SB02	1027025SBG	4/22/94	12	14	MANGANESE		7.7		351.7	No	1400	Yes
1027-SB02	1027025SBG	4/22/94	12	14	NICKEL		280		19.76	Yes	200	NA
1027-SB02	1027025SBG	4/22/94	12	14	POTASSIUM		100		53200	Yes	Essential Nutrient	NA
1027-SB02	1027025SBG	4/22/94	12	14	SODIUM		11		37.4	Yes	72	NA
1027-SB02	1027025SBG	4/22/94	12	14	VANADIUM		22	JH	31.3	Yes	3100	NA
1027-SB02	1027025SBG	4/22/94	12	14	ZINC		0.012		0.5	No	0.5	Yes
<b>Building 1027 - Subsurface Soil - Location 1027-SB03</b>												
1027-SB03	1027035SBF	4/22/94	10	12	METHYLENE CHLORIDE		0.012		0.5	No	0.5	Yes
1027-SB03	1027035SBF	4/22/94	10	12	ALUMINIUM		3700		20260	Yes	10000	NA
1027-SB03	1027035SBF	4/22/94	10	12	ARSENIC		6.0		6.58	Yes	5	NA
1027-SB03	1027035SBF	4/22/94	10	12	BARIUM		20		128.1	Yes	200	NA
1027-SB03	1027035SBF	4/22/94	10	12	BERYLLIUM	16	1.6		1.13	No	0.4	No
1027-SB03	1027035SBF	4/22/94	10	12	CADMIUM		0.39		0.59	Yes	0.5	NA
1027-SB03	1027035SBF	4/22/94	10	12	CALCIUM		160000		2720000	Yes	Essential Nutrient	NA
1027-SB03	1027035SBF	4/22/94	10	12	CHROMIUM, TOTAL		5.2		16.31	Yes	10	NA
1027-SB03	1027035SBF	4/22/94	10	12	COBALT		1.6		6.19	Yes	610	NA
1027-SB03	1027035SBF	4/22/94	10	12	COPPER		8.6		13.72	Yes	130	NA
1027-SB03	1027035SBF	4/22/94	10	12	IRON		3200		17469	Yes	Essential Nutrient	NA
1027-SB03	1027035SBF	4/22/94	10	12	LEAD		4.9		12.66	Yes	1.5	NA
1027-SB03	1027035SBF	4/22/94	10	12	MAGNESIUM		1700		2420	Yes	Essential Nutrient	NA
1027-SB03	1027035SBF	4/22/94	10	12	MANGANESE		120		351.7	Yes	1400	NA
1027-SB03	1027035SBF	4/22/94	10	12	NICKEL		2.6		19.76	Yes	200	NA
1027-SB03	1027035SBF	4/22/94	10	12	POTASSIUM		530		1717	Yes	Essential Nutrient	NA
1027-SB03	1027035SBF	4/22/94	10	12	SODIUM		80		53200	Yes	Essential Nutrient	NA
1027-SB03	1027035SBF	4/22/94	10	12	VANADIUM	7.8	7.8		37.4	Yes	72	NA
1027-SB03	1027035SBF	4/22/94	10	12	ZINC		7.2	JH	31.3	Yes	3100	NA
1027-SB03	1027035SBG	4/22/94	12	14	METHYLENE CHLORIDE		0.013		0.5	No	0.5	Yes
1027-SB03	1027035SBG	4/22/94	12	14	ALUMINIUM		8200		20260	Yes	10000	NA
1027-SB03	1027035SBG	4/22/94	12	14	ARSENIC		10.0		6.58	No	5	No
1027-SB03	1027035SBG	4/22/94	12	14	BARIUM		36		128.1	Yes	200	NA

**Table 5-2**  
**Summary of 1994 Soil Analytical Detecticons Compared to Background and MSCs**  
**OWS Building 1027 - Law Environmental (1995)**  
**NAS Fort Worth JRB, Texas**

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27?
1027-SB03	102703SBG	4/22/94	12	14	BERYLLIUM	17	1.7		1.13	No	0.4	No
1027-SB03	102703SBG	4/22/94	12	14	CADMIUM		1.0		0.59	No	0.5	No
1027-SB03	102703SBG	4/22/94	12	14	CALCIUM	200000	200000		272000	Yes	Essential Nutrient	NA
1027-SB03	102703SBG	4/22/94	12	14	CHROMIUM, TOTAL		8.9		16.31	Yes	10	NA
1027-SB03	102703SBG	4/22/94	12	14	COBALT		3.1		6.19	Yes	610	NA
1027-SB03	102703SBG	4/22/94	12	14	COPPER		15.0		13.72	No	130	Yes
1027-SB03	102703SBG	4/22/94	12	14	IRON		7800		17469	Yes	Essential Nutrient	NA
1027-SB03	102703SBG	4/22/94	12	14	LEAD		7.7		12.66	Yes	1.5	NA
1027-SB03	102703SBG	4/22/94	12	14	MAGNESIUM		2300		2420	Yes	Essential Nutrient	NA
1027-SB03	102703SBG	4/22/94	12	14	MANAGANESE		160		351.7	Yes	1400	NA
1027-SB03	102703SBG	4/22/94	12	14	NICKEL		6.7		19.78	Yes	200	NA
1027-SB03	102703SBG	4/22/94	12	14	POTASSIUM		1100		1717	Yes	Essential Nutrient	NA
1027-SB03	102703SBG	4/22/94	12	14	SODIUM		88		53200	Yes	Essential Nutrient	NA
1027-SB03	102703SBG	4/22/94	12	14	VANADIUM		15.0		37.4	Yes	72	NA
1027-SB03	102703SBG	4/22/94	12	14	ZINC		15	JH	31.3	Yes	3100	NA
<b>Building 1027 - Subsurface Soil - Location 1027-SB04</b>												
1027-SB04	102704SBD	4/22/94	6	8	METHYLENE CHLORIDE		0.013			No	0.5	Yes
1027-SB04	102704SBD	4/22/94	6	8	ALUMINIUM		7400		20260	Yes	10000	NA
1027-SB04	102704SBD	4/22/94	6	8	ARSENIC		10.0		6.58	No	5	No
1027-SB04	102704SBD	4/22/94	6	8	BARIUM		43		128.1	Yes	200	NA
1027-SB04	102704SBD	4/22/94	6	8	BERYLLIUM	17	1.7		1.13	No	0.4	No
1027-SB04	102704SBD	4/22/94	6	8	CADMIUM		1.2		0.59	No	0.5	No
1027-SB04	102704SBD	4/22/94	6	8	CALCIUM		160000		272000	Yes	Essential Nutrient	NA
1027-SB04	102704SBD	4/22/94	6	8	CHROMIUM, TOTAL		9.2		16.31	Yes	10	NA
1027-SB04	102704SBD	4/22/94	6	8	COBALT		2.9		6.19	Yes	610	NA
1027-SB04	102704SBD	4/22/94	6	8	COPPER		14.0		13.72	No	130	Yes
1027-SB04	102704SBD	4/22/94	6	8	IRON		7500		17469	Yes	Essential Nutrient	NA
1027-SB04	102704SBD	4/22/94	6	8	LEAD		6.6		12.66	Yes	1.5	NA
1027-SB04	102704SBD	4/22/94	6	8	MAGNESIUM		2900		2420	No	Essential Nutrient	Yes
1027-SB04	102704SBD	4/22/94	6	8	MANAGANESE		150		351.7	Yes	1400	NA
1027-SB04	102704SBD	4/22/94	6	8	NICKEL		6.4		19.78	Yes	200	NA
1027-SB04	102704SBD	4/22/94	6	8	POTASSIUM		1200		1717	Yes	Essential Nutrient	NA
1027-SB04	102704SBD	4/22/94	6	8	SODIUM		100		53200	Yes	Essential Nutrient	NA
1027-SB04	102704SBD	4/22/94	6	8	VANADIUM		8.4		37.4	Yes	72	NA
1027-SB04	102704SBD	4/22/94	6	8	ZINC		31	JH	31.3	Yes	3100	NA
1027-SB04	102704SBF	4/22/94	10	12	METHYLENE CHLORIDE		0.014			No	0.5	Yes
1027-SB04	102704SBF	4/22/94	10	12	ALUMINIUM		4600		20260	Yes	10000	NA
1027-SB04	102704SBF	4/22/94	10	12	ARSENIC		14.0		6.58	No	5	No
1027-SB04	102704SBF	4/22/94	10	12	BARIUM		32		128.1	Yes	200	NA
1027-SB04	102704SBF	4/22/94	10	12	BERYLLIUM	18	1.8		1.13	No	0.4	No
1027-SB04	102704SBF	4/22/94	10	12	CADMIUM		1.5		0.59	No	0.5	No
1027-SB04	102704SBF	4/22/94	10	12	CALCIUM		170000		272000	Yes	Essential Nutrient	NA
1027-SB04	102704SBF	4/22/94	10	12	CHROMIUM, TOTAL		6.1		16.31	Yes	10	NA

**Table 5-2**  
**Summary of 1994 Soil Analytical Detectons Compared to Background and MSCs**  
**OWS Building 1027 - Law Environmental (1995)**  
**NAS Fort Worth JRB, Texas**

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
1027-SB04	102704SBF	4/22/94	10	12	COBALT	3.6	3.6		6.19	Yes	610	NA
1027-SB04	102704SBF	4/22/94	10	12	COPPER	30.0	30.0		13.72	No	130	Yes
1027-SB04	102704SBF	4/22/94	10	12	IRON	8100	8100		17469	Yes	Essential Nutrient	NA
1027-SB04	102704SBF	4/22/94	10	12	LEAD	7.3	7.3		12.66	Yes	1.5	NA
1027-SB04	102704SBF	4/22/94	10	12	MAGNESIUM	1800	1800		2420	Yes	Essential Nutrient	NA
1027-SB04	102704SBF	4/22/94	10	12	MANGANESE	260	260		351.7	Yes	1400	NA
1027-SB04	102704SBF	4/22/94	10	12	NICKEL	7.4	7.4		19.76	Yes	200	NA
1027-SB04	102704SBF	4/22/94	10	12	POTASSIUM	660	660		1717	Yes	Essential Nutrient	NA
1027-SB04	102704SBF	4/22/94	10	12	SODIUM	82	82		53200	Yes	Essential Nutrient	NA
1027-SB04	102704SBF	4/22/94	10	12	VANADIUM	20.0	20.0		37.4	Yes	72	NA
1027-SB04	102704SBF	4/22/94	10	12	ZINC	29	29	JH	31.3	Yes	3100	NA

MSC = Media Specific Concentration

NA = not applicable

MQL = Method Quantitation Limit

RRS 1 = Risk Reduction Standard 1

RRS 2 = Risk Reduction Standard 2

TNRCC = Texas Natural Resources Conservation Commission

UTL = Upper Tolerance Limit

Fabrics

<sup>1</sup>UTLs for inorganics derived from Final Draft Basewide Background Study Jacobs Engineering 1988. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte

<sup>2</sup>TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Qualifier Definitions

= The analyte was positively identified

J = For inorganics the associated value is an estimated quantity. For organics, the analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample

JB = Estimated quantitation - possible biased high based upon blank contamination

JH = Estimated quantitation - possible biased high based upon QC data

#### **5.4.1 Surface Soil**

Law (1995) collected one surface soil sample from boring 1027-SB01 (Figure 5-1) for analysis of VOCs (EPA Method SW8240) and inorganics (EPA Method SW6010) during the initial site investigation in April 1994. The results from this surface soil sample are discussed in the following paragraphs.

**VOCs.** Methylene chloride was detected at 0.01 JB mg/kg in the surface soil sample collected by Law from boring 1027-SB01. The result was qualified as an estimated quantitation that was affected by contamination in the associated method blank. Considering that the detected concentration is well below the established MSC of 0.5 mg/kg and that methylene chloride is considered a common laboratory contaminant, the detection is likely the result of laboratory contamination.

**Inorganics.** Arsenic, cadmium, and lead were detected at concentrations above their respective background UTLs and MSCs in the surface soil sample from 1027-SB01. Copper and zinc were detected above their respective background UTLs, but at concentrations below their respective MSC values. The detected zinc concentration (690 JH mg/kg) was qualified as biased high due to QC data. Considering the absence of elevated zinc concentrations in the other soil samples collected at Building 1027, the zinc concentration identified in the surface soil sample from 1027-SB01 was likely an extreme, but true, background concentration.

#### **5.4.2 Subsurface Soil**

Law (1995) collected subsurface soil samples from various depths at three locations with DPT and hollow-stem auger drilling methods. The Law subsurface soil samples were collected for analysis of VOCs (EPA Method SW8260) and inorganics (EPA Method SW6010). The following paragraphs discuss analytical results from the subsurface soil samples collected by Law (1995).

**VOCs.** Methylene chloride was detected at low levels in all the subsurface soil samples submitted by Law from the Building 1027 site. Methylene chloride is considered a common laboratory contaminant. The detected concentrations (maximum concentration of 0.014 mg/kg) are well below the established MSC of 0.5 mg/kg for methylene chloride in subsurface soils (IT, 1997). Therefore, it is likely that the methylene chloride detections are the result of laboratory contamination.

**Inorganics.** Inorganic constituents detected above their background UTLs in subsurface soil samples included arsenic, cadmium, copper, magnesium, and manganese. Cadmium (1.3 mg/kg) in the 10- to 12-foot interval from boring 1027-SB01 exceeded both its background concentration (0.59 mg/kg) and MSC (0.5 mg/kg).

Arsenic and cadmium exceeded both background and MSCs in the 2 to 4 feet bgs and 12 to 14 feet bgs intervals at boring 1027-SB01. Copper exceeded background in both sample intervals from 1027-SB02, but the concentrations were below the MSC for copper. Magnesium was detected at a concentration slightly above background in the regular sample from 2 to 4 feet bgs at 1027-SB02, but was below background in the field duplicate sample. Manganese was detected at a concentration (600 mg/kg) slightly above background (351.7 mg/kg) in the 12 to 14 feet bgs at 1027-SB02. Considering that this manganese concentration was less than twice the background concentration and is below the MSC (1,400 mg/kg), along with the fact that manganese concentrations were below background in all other soil samples collected by Law (1995), the detected manganese concentration in the 12- to 14-foot interval at 1027-SB02 is likely an extreme but true background concentration

Arsenic and cadmium were detected above their respective background concentrations and MSCs in the 12- to 14-foot sample from 1027-SB03. Copper was detected slightly above background in the 12- to 14-foot sample from 1027-SB03. The arsenic and cadmium concentrations detected in the 12- to 14-foot sample are suspicious, considering that these constituents were detected below background concentrations in the sample from 10 to 12 feet bgs in the same boring

Arsenic and cadmium were also detected above their respective background and MSCs in the 6- to 8-foot and 10- to 12-foot sample intervals from 1027-SB04. Copper was detected above background in both subsurface intervals from 1027-SB04, but at concentrations below the MSC for copper (130 mg/kg).

### **5.5 Results from Phase 1 RFI Activities**

The following sections presents the analytical results from surface and subsurface soil samples that were collected by IT (1997) during the Phase 1 RFI. A discussion of the Phase 1 groundwater investigation is also included. The purpose of the Phase 1 RFI soil samples was to supplement the analytical data for VOCs and inorganics that was collected by Law (1995) during the initial site investigation. Table 5-3 contains a summary of the analytes detected in the Phase

1 RFI soil samples collected by IT and Table 5-4 contains a summary of the analytes detected in the Phase 1 RFI groundwater samples. Analytical detection summary tables for the soil samples collected at Building 1027 are shown in Appendix B.

### **5.5.1 Surface Soil**

Surface soil samples from borings SB102701 and SB102702 were collected and submitted for analysis of SVOCs (EPA Method SW8270) and pesticides/PCBs (EPA Method SW8080).

Figure 5-1 shows the Phase 1 RFI soil sampling locations

**SVOCs.** All SVOC detections in surface soil samples were tentatively qualified as estimated concentrations below the PQLs (Table B-2). Although no detection limits were established for these compounds in the laboratory analysis, the values are within the PQL range for SVOCs described in SW846 Method 8270 (EPA, 1997) of 0.660 to 3.30 mg/kg. Therefore, all SVOC concentrations were below background concentrations as defined by the TNRCC RRP.

**Pesticides/PCB.** No pesticides or PCBs were detected above MQLs in surface soil samples collected during the Phase 1 RFI at the Building 1027 site.

### **5.5.2 Subsurface Soil**

IT collected subsurface soil samples from borings SB102701 and SB102702 during the Phase 1 RFI in March 1997. The subsurface soil samples were collected from 12 to 14 feet bgs, or directly above the unconfined water table. The samples from 12 to 14 feet bgs were submitted for analysis of SVOCs (EPA Method SW8270) and pesticides/PCBs (EPA Method SW8080) to supplement the previous Law samples analyzed for VOCs and inorganics. IT also collected a subsurface soil sample from 6 to 8 feet bgs at boring SB102702 for analysis of VOCs (EPA Method 8240), inorganics (EPA Method SW6010), TPH-gasoline range organics (GRO), and TPH-diesel range organics (DRO) (EPA Method 8015).

Table 5-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1027 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
Phase 1 - Surface Soil - Location SB102701													
SB102701	MS1111	14-Mar-97	0	2	Benzo(a)pyrene	0.81	0.089	J		0.72	Yes	0.02	NA
SB102701	MS1111	14-Mar-97	0	2	Benzo(b)fluoranthene	0.81	0.089	J		0.72	Yes	0.039	NA
SB102701	MS1111	14-Mar-97	0	2	Benzo(k)fluoranthene	0.81	0.089	J		0.72	Yes	0.39	NA
Phase 1 - Surface Soil - Location SB102702													
SB102702	MS1113	14-Mar-97	0	2	Benzo(a)pyrene	0.8	0.081	J		0.72	Yes	0.02	NA
SB102702	MS1113	14-Mar-97	0	2	Benzo(b)fluoranthene	0.8	0.083	J		0.72	Yes	0.039	NA
SB102702	MS1113	14-Mar-97	0	2	Benzo(k)fluoranthene	0.8	0.083	J		0.72	Yes	0.39	NA
SB102702	MS1113	14-Mar-97	0	2	Fluoranthene	0.8	0.18	J		0.72	Yes	4.10	NA
SB102702	MS1113	14-Mar-97	0	2	Phenanthrene	0.8	0.11	J		0.72	Yes	3.10	NA
SB102702	MS1113	14-Mar-97	0	2	Pyrene	0.8	0.12	J		0.72	Yes	3.10	NA
Phase 1 - Subsurface Soil - Location SB102702													
SB102702	MS1116	14-Mar-97	6	8	Acetone	0.024	0.0057	J	J	0.021	Yes	1000	NA
SB102702	MS1116	14-Mar-97	6	8	Toluene	0.0059	0.005	J	J	0.0053	Yes	100	NA
SB102702	MS1116	14-Mar-97	6	8	Arsenic	1.2	3.5	J		6.58	Yes	5	NA
SB102702	MS1116	14-Mar-97	6	8	Barium	1.2	12.7			128.1	Yes	200	NA
SB102702	MS1116	14-Mar-97	6	8	Chromium	1.2	4.1			16.31	Yes	10	NA
SB102702	MS1116	14-Mar-97	6	8	Lead	0.35	3.9	J		12.66	Yes	1.5	NA
SB102702	MS1116	14-Mar-97	6	8	Selenium	0.59	0.69			0.313	No	5	Yes
SB102702	MS1116	14-Mar-97	6	8	Diesel	4.7	4.3	qrBJ		4.2	No	6130	Yes
Phase 2 - Surface Soil - Location SB102703													
SB102703	BG0005	20-Apr-00	0	2	Arsenic	1.1	4.17		nv	5.85	Yes	5	NA
SB102703	BG0005	20-Apr-00	0	2	Cadmium	0.11	0.158		nv	0.556	Yes	0.5	NA
SB102703	BG0005	20-Apr-00	0	2	Lead	1.1	8.91		nv	30.97	Yes	1.5	NA
Phase 2 - Subsurface Soil - Location SB102703													
SB102703	BG0006	20-Apr-00	13.5	15.5	Arsenic	1.1	4.57			6.58	Yes	5	NA
SB102703	BG0006	20-Apr-00	13.5	15.5	Cadmium	0.11	0.161			0.59	Yes	0.5	NA
Phase 2 - Subsurface Soil - Location SB102704													
SB102704	BG0007	20-Apr-00	12.5	13.5	Cadmium	0.11	0.124		nv	0.59	Yes	0.5	NA

Table 5-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1027 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
<b>Phase 3 - Surface Soil - Location SB102705</b>													
SB102705	BG0055	28-Nov-00	1	3	Arsenic	1.1	4.31		nv	5.85	Yes	5	NA
SB102705	BG0055	28-Nov-00	1	3	Cadmium	0.11	0.137		nv	0.556	Yes	0.5	NA
SB102705	BG0055	28-Nov-00	1	3	Copper	2.3	5.46		nv	17.37	Yes	130	NA
<b>Phase 3 - Subsurface Soil - Location SB102705</b>													
SB102705	BG0120	28-Nov-00	5	7	Arsenic	1.2	4.74		nv	6.58	Yes	5	NA
SB102705	BG0120	28-Nov-00	5	7	Cadmium	0.12	0.0953	F	nv	0.59	Yes	0.5	NA
SB102705	BG0120	28-Nov-00	5	7	Copper	2.3	6.14		nv	13.72	Yes	130	NA
SB102705	BG0056	28-Nov-00	10	12	Arsenic	5.3	7.71	M	J	6.58	No	5	No
SB102705	BG0056	28-Nov-00	10	12	Cadmium	0.11	0.105	F	U	0.59	Yes	0.5	NA
SB102705	BG0056	28-Nov-00	10	12	Copper	2.1	4.33		U	13.72	Yes	130	NA
<b>Phase 3 - Surface Soil - Location SB102706</b>													
SB102706	BG0121	28-Nov-00	0	2	Arsenic	1.1	4.38		nv	5.85	Yes	5	NA
SB102706	BG0121	28-Nov-00	0	2	Cadmium	0.11	0.218		nv	0.556	Yes	0.5	NA
SB102706	BG0121	28-Nov-00	0	2	Copper	2.3	5.28		nv	17.37	Yes	130	NA
<b>Phase 3 - Subsurface Soil - Location SB102706</b>													
SB102706	BG0122	28-Nov-00	5	7	Arsenic	1.2	4.4		nv	6.58	Yes	5	NA
SB102706	BG0122	28-Nov-00	5	7	Cadmium	0.12	0.125		nv	0.59	Yes	0.5	NA
SB102706	BG0122	28-Nov-00	5	7	Copper	2.4	5.33		nv	13.72	Yes	130	NA
SB102706	BG0057	28-Nov-00	10	12	Arsenic	1.1	2.65		nv	6.58	Yes	5	NA
SB102706	BG0057	28-Nov-00	10	12	Cadmium	0.11	0.08	F	nv	0.59	Yes	0.5	NA
SB102706	BG0057	28-Nov-00	10	12	Copper	2.3	2.8		nv	13.72	Yes	130	NA
<b>Phase 3 - Surface Soil - Location SB102707</b>													
SB102707	BG0123	28-Nov-00	0	2	Arsenic	1.1	4.03		nv	5.85	Yes	5	NA
SB102707	BG0123	28-Nov-00	0	2	Cadmium	0.11	0.21		nv	0.556	Yes	0.5	NA
SB102707	BG0123	28-Nov-00	0	2	Copper	2.3	4.94		nv	17.37	Yes	130	NA

Table 5-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1027 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
<b>Phase 3 - Subsurface Soil - Location SB102707</b>													
SB102707	BG0124	28-Nov-00	5	7	Arsenic	1.2	5.85		nv	6.58	Yes	5	NA
SB102707	BG0124	28-Nov-00	5	7	Cadmium	0.12	0.0942	F	nv	0.59	Yes	0.5	NA
SB102707	BG0124	28-Nov-00	5	7	Copper	2.3	5.6		nv	13.72	Yes	130	NA
SB102707	BG0058	28-Nov-00	10	12	Arsenic	1.1	2.52		nv	6.58	Yes	5	NA
SB102707	BG0058	28-Nov-00	10	12	Cadmium	0.11	0.0778	F	nv	0.59	Yes	0.5	NA
SB102707	BG0058	28-Nov-00	10	12	Copper	2.3	2.7		nv	13.72	Yes	130	NA

MSC = Media-Specific Concentration

NA = not applicable

MQL = Method Quantitation Limit

RRS 1 = Risk Reduction Standard 1

RRS 2 = Risk Reduction Standard 2

TNRCC = Texas Natural Resources Conservation Commission

UTL = Upper Tolerance Limit

Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte

<sup>2</sup> TNRCC, 1999. "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Qualifier Definitions

= The analyte was positively identified

J = For inorganics, the associated value is an estimated quantity. For organics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the s

BJ = Estimated quantitation - possible biased high based upon blank contamination

M = A matrix effect was present

U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL

F = The analyte was positively identified but the associated numerical value is below the reporting limit

R = The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria

Table 5-4

Summary of RFI Groundwater Analytical Detections Compared to Background and MSCs  
 OWS Building 1027 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Parameter	Reporting Limit (mg/L)	Result (mg/L)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/L)	Does Result Support Closure Under RRS 1	TNRCC MSC <sup>2</sup> (mg/L)	Does Result Support Closure Under RRS 2?
Phase 1 - Groundwater - Location WITCTA037											
WITCTA037	MS1566	29-Apr-97	Cis-1,2-dichloroethene	0.006	0.0084		nv	0.0012	No	0.07	Yes
WITCTA037	MS1566	29-Apr-97	Methylene chloride	0.0015	0.0019	B	nv	0.0003	No	0.005	Yes
WITCTA037	MS1566	29-Apr-97	Trichloroethene	0.005	0.058		nv	0.001	No	0.005	No
WITCTA037	MS1566	29-Apr-97	Barium	0.02	0.0742		nv	0.587	Yes	2	NA
WITCTA037	MS1566	29-Apr-97	Beryllium	0.003	0.00036	B	nv	0.0003	No	0.004	Yes
WITCTA037	MS1566	29-Apr-97	Calcium	0.1	119		nv	266.3	NA	Essential Nutrient	NA
WITCTA037	MS1566	29-Apr-97	Magnesium	0.3	4.78		nv	37.8	NA	Essential Nutrient	NA
WITCTA037	MS1566	29-Apr-97	Manganese	0.02	0.0018	B	nv	0.175	Yes	14	NA
WITCTA037	MS1566	29-Apr-97	Potassium	5	0.538	B	nv	15.03	NA	Essential Nutrient	NA
WITCTA037	MS1566	29-Apr-97	Sodium	0.3	9.56		nv	167	NA	Essential Nutrient	NA
WITCTA037	MS1566	29-Apr-97	Zinc	0.02	0.0052	B	nv	0.118	Yes	31	NA
Phase 2 - Groundwater - Location WITCTA037											
WITCTA037	BG3001	1-May-00	Beryllium	3	0.00018	F	nv	0.0003	Yes	0.004	NA

MSC = Media Specific Concentration  
 NA = Not Applicable  
 MQL = Method Quantitation Limit  
 RRS 1 = Risk Reduction Standard 1  
 RRS 2 = Risk Reduction Standard 2  
 TNRCC = Texas Natural Resource Conservation Commission  
 UTL = Upper Tolerance Limit  
 mg/L = milligrams per liter  
 Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte.  
<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media Specific Concentrations (MSCs) - Industrial Setting", July 14. Validated Qualifier Definitions.  
 B = For inorganics, the reported value is an estimated quantity.  
 F = The analyte was positively identified but the associated numerical value is below the reporting limit.  
 nv = not validated.

Figure 5-1 shows the location of subsurface soil samples collected for the Phase I RFI activities. The following paragraphs discuss the results of the subsurface samples collected during the Phase I RFI activities.

**VOCs.** The subsurface soil sample collected from 6 to 8 feet depth at soil boring SB102702 indicated that toluene and acetone were detected at concentrations that were below their respective MQLs (Table 5-3). TPH-GRO was not detected in the Modified 8015 analysis, but TPH-DRO was detected at an estimated quantity (4.3 qrBJ) that slightly exceeded the MQL (4.2 mg/kg). However, TPH-DRO was also identified in the associated method blank and the detected concentration was likely due to laboratory contamination. Therefore, the detected VOC concentrations are below background concentrations as defined by the TNRCC RRP.

**SVOCs.** The SVOC detections in subsurface soil samples from SB102701 and SB102702 were TICs that were qualified at estimated concentrations below the PQLs. No detection limits were established for these TICs in the SW8270 laboratory analysis, and they included unknown compounds, oxygenated hydrocarbons, and other named compounds (Table B-2). The reported concentrations of the TICs were within the PQL range of 0.66 to 3.3 mg/kg provided in SW846 Method 8270 (EPA, 1997). Therefore, the reported concentrations of these compounds are below background concentrations for organics per the TNRCC RRP.

**Pesticide/PCBs.** No pesticides or PCBs were detected above MQLs in subsurface soil samples collected at the Building 1027 site.

**Inorganics.** Arsenic, barium, chromium, lead, and selenium were the only inorganics detected in the sample collected from 6 to 8 feet bgs from SB102702 (Table 5-3). Of these inorganics, only the detected concentration of selenium (0.69 mg/kg) exceeded its background concentration (0.313 mg/kg) (Figure 5-1). Considering that the detected selenium concentration is roughly two times the background concentration and is well below the MSC for selenium (5 mg/kg), the detected concentration is likely an extreme but true background concentration.

### 5.5.3 Groundwater

Monitoring well WITCTA037 was installed in April 1997 immediately adjacent to boring SB102701 (Figure 5-1). A groundwater sample was collected for analysis of VOCs, SVOCs, and inorganics. Summaries of the detected concentrations are listed in Table B-3 and are compared

to background/MSCs in Table 5-4. The following subsections discuss the results of these analyses.

**VOCs.** TCE and cis-1,2-dichloroethene (DCE) were detected in the groundwater sample from WITCTA037 at concentrations above their respective MQLs. TCE was also detected above its tabulated MSC. However, because the extent of the AFP-4 TCE groundwater plume includes the area of Building 1027 and the contaminants from this plume are managed under the AFP-4 Superfund Cleanup Program, the chlorinated solvents (i.e., TCE and its breakdown products, such as cis-1,2-DCE) detected in monitoring well WITCTA037 are not considered as evidence of a release from the OWS at Building 1027.

Methylene chloride was detected at a concentration of 0.0019 B mg/L in the April 1997 groundwater sample from WITCTA037. However, the result was qualified as being affected by contamination in the associated method blank. Considering that methylene chloride is a common laboratory contaminant and that the detected concentration is below the MSC (0.005 mg/L), the methylene chloride is likely the result of laboratory contamination and is not indicative of a release from the OWS at Building 1027.

**SVOCs.** No SVOCs were detected above their respective MQLs in the groundwater sample from WITCTA037.

**Inorganics.** Inorganic constituents detected in the April 1997 groundwater sample from WITCTA037 included barium, beryllium, calcium, magnesium, manganese, potassium, sodium, and zinc. All of the detected concentrations were below their respective groundwater background UTLs with the exception of beryllium (0.00037 mg/L), which was slightly greater than its background UTL (0.0003 mg/L). However, the beryllium concentration is well below the established MSC of 0.004 mg/L.

### **5.6 Results from Phase 2 RFI Activities**

IT collected soil samples from two boring locations (SB102703 and SB102704) to confirm and delineate inorganic concentrations detected during the Law (1995) investigation. A groundwater sample was also collected from WITCTA037 to confirm the beryllium concentration detection in the Phase 1 RFI. Table 5-3 and Table 5-4 include the analytical results for the Phase 2 soil and groundwater samples, respectively, and their comparison to basewide background concentrations and MSCs. A summary of SPLP results is shown in Table 5-5. Figure 5-1 shows the locations

of the Phase 2 samples. The following sections discuss the results of soil and groundwater samples collected during the Phase 2 RFI activities.

### **5.6.1 Surface Soil**

IT collected a surface soil sample from Phase 2 boring SB102703 for analysis of arsenic, cadmium, and lead. As shown in Table 5-3 and Figure 5-1, the detected concentrations of arsenic, cadmium, and lead were all below their respective background concentrations.

### **5.6.2 Subsurface Soil**

IT collected subsurface soil samples from the 2-foot interval directly above the water table at Phase 2 soil borings SB102703 and SB102704. As shown in Table 5-3 and Figure 5-1, the detected concentrations of arsenic and cadmium in the sample from 13.5 to 15.5 feet bgs from SB102703 were below their respective background concentrations. Similarly, the detected concentration of cadmium (0.124 mg/kg) in the soil sample from 12.5 to 13.5 feet bgs from boring SB102704 was below the background concentration for cadmium (0.59 mg/kg).

### **5.6.3 Groundwater**

A groundwater sample was collected from monitoring well WITCTA037 in April 2000 for analysis of beryllium to confirm the elevated beryllium concentration identified during the Phase 1 RFI. As shown in Table 5-4 and Figure 5-1, the beryllium concentration detected during the Phase 2 RFI (0.00018 mg/L) was below the background concentration for beryllium (0.0003 mg/L). Therefore, the beryllium concentration detected in the Phase 1 sample was likely an extreme, but true, background concentration and was not an indication of a release from the OWS at Building 1027.

## **5.7 Results from Phase 3 RFI Activities**

IT collected soil samples from three additional boring locations (SB102705 through SB102707) during the Phase 3 RFI to provide further delineation of inorganic contaminants detected above basewide background concentrations during the Law (1995) investigation. The results from the Phase 3 soil samples at Building 1027 are presented in Table 5-5 and shown in Figure 5-1.

Table 5-5  
 Summary of RFI SPLP Results Compared to Background and MSCs  
 DWS Building 1027 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/L)	Result (mg/L)	Laboratory Qualifier	Validation Qualifier	Background UTL <sup>1</sup> (mg/L)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/L)	Does Result Support Closure Under RRS 2?
Phase 2 - Location SB102703													
SB102703	BG0005	20-Apr-00	0	2	Arsenic	2	0	U	nv	0.0049	Yes	0.05	NA
SB102703	BG0005	20-Apr-00	0	2	Cadmium	1	0.000189	F	nv	0.0005	Yes	0.005	NA
SB102703	BG0005	20-Apr-00	0	2	Lead	5	0.00149	F	nv	0.0016	Yes	0.015	NA
SB102703	BG0006	20-Apr-00	13.5	15.5	Arsenic	2	0	U	U	0.0049	Yes	0.05	NA
SB102703	BG0006	20-Apr-00	13.5	15.5	Cadmium	1	0.000178	F	J	0.0005	Yes	0.005	NA

ft bgs = feet below ground surface

mg/L = milligrams per liter

UTL = upper tolerance limit

TNRCC MSC = Texas Natural Resource Conservation Commission Media Specific Concentrations

NA = not applicable

RRS 1 = Risk Reduction Standard 1, result is less than background.

RRS 2 = Risk Reduction Standard 2, result is less than TNRCC MSC

SPLP = Synthetic Precipitation Leaching Procedure

Footnotes:

<sup>1</sup> - UTLs derived from Final Basewide Background Study, Jacobs Engineering, 1998

<sup>2</sup> - TNRCC Risk Reduction Standard Media Specific Concentration (MSC) - Industrial Setting

Laboratory Qualifier Definitions:

" " = The analyte was positively identified

"U" = The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL

"F" = The analyte was positively identified but the associated numerical value is below the reporting limit

"J" = The analyte is present, but reported value may not be accurate or precise

"nv" = not validated

At each boring location, soil samples were collected 5 feet above and below the former sample intervals that showed elevated concentrations of arsenic, cadmium, and copper. The following sections discuss the results of the surface and subsurface soil samples collected during the Phase 3 RFI at Building 1027.

### **5.7.1 Surface Soil**

IT collected three surface soil samples for analysis of arsenic, cadmium, and copper during the Phase 3 RFI in November 2000. The following subsections discuss the arsenic, cadmium, and copper detections in surface soil at Building 1027.

**Arsenic.** Arsenic concentrations detected in surface soil samples from three Phase 3 boring locations (SB102705 through SB102707) were all below the background concentration for arsenic. Therefore, as shown in Figure 5-1, the elevated concentrations of arsenic identified during the Law (1995) investigation have been delineated by arsenic analytical results from Phase 2 boring SB102703 and Phase 3 borings SB102705 through SB102707.

**Cadmium.** Cadmium concentrations detected in surface soil samples from three Phase 3 boring locations were all below the background concentration for cadmium. Therefore, as shown in Figure 5-1, the elevated concentrations of cadmium identified during the Law (1995) investigation have been delineated by cadmium results from Phase 2 boring SB102703 and Phase 3 borings SB102705 through SB102707.

**Copper.** The detected copper concentrations identified in surface soil samples from the Phase 3 soil borings were all below the background concentration for copper. Therefore, it appears that the copper concentration detected in the surface sample from Law boring 1027-SB01 (26 mg/kg) was an extreme, but true, background concentration, and there does not appear to be a definite plume of copper in surface soil in the vicinity of Building 1027.

### **5.7.2 Subsurface Soil**

IT collected subsurface soil samples at depths of 5 to 7 feet bgs and 10 to 12 feet bgs from the Phase 3 soil borings (SB102705 through SB102707) for analysis of arsenic, cadmium, and copper. The following subsections discuss the arsenic, cadmium, and copper concentrations detected in surface soil at Building 1027.

**Arsenic.** Arsenic in all but one subsurface sample were below the basewide background concentration for arsenic. Arsenic was detected in the sample from 10 to 12 feet bgs from SB102705 at an estimated arsenic concentration of 7.71 J mg/kg. Considering that arsenic was below the background concentration in the 5- to 7-foot interval at this location and that the result from 10 to 12 feet bgs is only slightly above background, it appears that the arsenic concentration detected in the sample from 10 to 12 feet bgs is an extreme, but true, background concentration. Therefore, as shown in Figure 5-1, the elevated concentrations of arsenic identified during the Law (1995) investigation in subsurface soils have been delineated by arsenic results from Phase 2 boring SB102703 and Phase 3 borings SB102705 through SB102707.

**Cadmium.** The cadmium concentrations detected in the subsurface soil samples collected from the Phase 3 soil borings were all below the background concentration. Therefore, as shown in Figure 5-1, the elevated concentrations of cadmium identified during the Law (1995) investigation in subsurface soils have been delineated by cadmium results from Phase 2 boring SB102703 and Phase 3 borings SB102705 through SB102707.

**Copper.** The detected copper concentrations identified in the subsurface soil samples from the Phase 3 soil borings were all below the background concentration for copper. Therefore, as shown in Figure 5-1, the elevated concentrations of copper identified during the Law (1995) investigation in subsurface soils are delineated by the copper results from Law (1995) boring 1027-SB01 and Phase 3 borings SB102705 through SB102707.

Considering that the copper concentration detected in the surface sample from Law boring 1027-SB01 (26 mg/kg) was not significantly greater than background, there does not appear to be a definite plume of copper in surface soil in the vicinity of the Building 1027 site.

### **5.8 Summary and Discussion**

Law (1995) collected soil samples for analysis of VOCs and inorganics at four locations (1027-SB01 through 1027-SB04) adjacent to the OWS at Building 1027 during their initial site investigation in 1994. The analytical results from the Law investigation indicated that arsenic, cadmium, and copper concentrations exceeded the basewide background concentrations determined by Jacobs (1998). IT collected surface and subsurface soil samples from two locations (SB102701 and SB102702) for SVOCs and pesticides/PCBs analyses during the Phase 1 Sanitary Sewer System RFI in 1997. IT also installed and sampled monitoring well

WITCTA037 as part of the Phase 1 RFI to determine if groundwater had been impacted at the site.

In April 2000, IT collected soil samples from two soil borings (SB102703 and SB102704) as part of the Phase 2 RFI in an attempt to confirm and delineate inorganic concentrations identified during the Law investigation. Additionally, a groundwater sample was collected from monitoring well WITCTA037 for analysis of beryllium to confirm the elevated beryllium concentration detected during the Phase 1 RFI. IT collected surface and subsurface soil samples from three additional soil borings (SB102705 through SB102707) during the Phase 3 RFI in November 2000 to delineate arsenic, cadmium, and copper concentrations to basewide background levels.

Figure 5-1 displays the analytical results exceeding background from the Law (1995) investigation and the Phase 1 RFI. Additionally, Figure 5-1 displays the analytical results obtained from samples collected during Phase 2 and Phase 3 of the RFI to show that contaminant concentrations have been delineated to basewide background concentrations. The following sections summarize the analytical results for surface soil, subsurface soil, and groundwater samples collected at the Building 1027 site.

### **5.8.1 Surface Soil**

One VOC, methylene chloride, was detected in surface soil at a concentration that is likely the result of laboratory contamination. No SVOCs or pesticides/PCBs were detected above MQLs in the surface soil samples collected by IT in 1997. However, several inorganic contaminants, including arsenic, cadmium, copper, lead, and zinc were detected above background in the surface soil sample collected at former Law (1995) boring 1027-SB01. The zinc concentration detected in the surface soil at this location was qualified as biased high. Considering that zinc was below background in all other soil samples collected at the site, the elevated zinc concentration in this sample was likely an extreme, but true, background concentration.

The detected lead concentration (58 mg/kg) in the surface soil sample from 1027-SB01 was less than two times the background concentration (30.97 mg/kg). Considering that lead was detected at concentrations below background in the surface soil sample from Phase 2 confirmation boring SB102703 and in the sample from 6 to 8 feet bgs in Phase 1 boring SB102702, it is likely that the detected lead concentration in the surface soil sample from 1027-SB01 was an extreme variation in the basewide background concentration.

Elevated concentrations of arsenic, cadmium, and/or copper concentrations were either confirmed or delineated during the Phase 2 and Phase 3 RFI activities (Figure 5-1). All inorganic concentrations detected during the Phase 2 and Phase 3 RFIs were at or below the respective background UTLs for inorganics.

### **5.8.2 Subsurface Soil**

One VOC, methylene chloride, was detected in subsurface soil samples at concentrations that were likely the result of laboratory contamination. No SVOCs or pesticides/PCBs were detected above MQLs in the subsurface soil samples collected by IT in 1997. Inorganics that were consistently detected above background in the subsurface soil samples collected by Law (1995) included arsenic, cadmium, and copper. The elevated concentrations of these inorganics were delineated by the analytical results from subsurface samples collected from Phase 2 and Phase 3 RFI soil borings (SB102703 through SB102704).

### **5.8.3 Groundwater**

Chlorinated solvents, including TCE and its breakdown products, were detected in the groundwater sample collected during the Phase 1 RFI from WITCTA037. However, because the extent of the AFP-4 TCE groundwater plume includes the area of the Building 1027 site and the contaminants from this plume are managed under the AFP-4 Superfund Cleanup Program, the chlorinated solvents (i.e., TCE and its breakdown products, such as cis-1,2-DCE) detected in monitoring well WITCTA037 are not considered as evidence of a release from the OWS at Building 1027.

Beryllium was detected at a concentration (0.00036 B mg/L) slightly above background (0.0003 mg/L) in the Phase 1 groundwater sample from WITCTA037. However, beryllium was detected at a concentration (0.00018 mg/L) below the background concentration in the groundwater sample collected during Phase 2 RFI activities in March 2000. Therefore, the beryllium concentration identified in groundwater during the Phase 1 activities was likely an extreme, but true, background concentration.

## 5.9 Conclusions

The analytical results from soil and groundwater samples collected in the vicinity of the OWS at the Building 1027 site indicate that a significant release of hazardous substances has not occurred. Considering that the influent to the OWS contains aircraft rinsate carrying detergent and PD-680, as well as grease (A. T. Kearney, 1989), the lack of elevated concentrations of VOCs and SVOCs in soil and groundwater samples provides evidence that a significant release of contaminants has not occurred. •

Several inorganics including arsenic, cadmium, and copper were detected at concentrations exceeding basewide background concentrations in the soil samples collected by Law (1995). Arsenic and cadmium concentrations detected during the Law (1995) investigation also exceeded their respective MSCs. The elevated concentrations of these inorganics were delineated by samples collected during Phase 2 and Phase 3 RFI. Although the arsenic and cadmium concentrations detected during the Law investigation exceeded MSCs, it was shown that the concentrations of these inorganics detected during the Law (1995) investigation are consistently higher than the concentrations detected in soil samples collected by IT.

Considering that no clear pattern of inorganic concentrations exceeding MSCs was observed in the subsurface samples collected by IT during Phases 1 through 3 of the RFI and that all inorganic concentrations have been delineated to basewide background concentrations by the Phase 2 and Phase 3 RFI results, NFA is warranted for the OWS at Building 1027 and the site is recommended for closure under RRS 2. Should this recommendation be accepted, a letter stating that closure of SWMU 44 was carried out in accordance with TAC §335.555, and signed by an Air Force representative, will be transmitted to TNRCC, along with a metes and bounds description of SWMU 44. The metes and bounds description will correspond to surveyed coordinates of the affected area shown in Figure 5-1.

# TAB

6.0

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## **6.0 OWS Building 1060**

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The following sections provide a description of the OWS at Building 1060, a summary of the site characterization activities, a discussion of the site-specific geology and hydrology, discussions of the analytical results from each characterization event, and recommendations based upon the physical and chemical data collected at the site.

### **6.1 Site Description**

The OWS at Building 1060 is located adjacent to the west corner of Building 1060 (Figure 6-1) and is designated as AOC 11 on the RCRA Hazardous Waste Permit for NAS Fort Worth JRB. The OWS has a 500-gallon capacity and is connected to a 250-gallon below-ground overflow tank. The OWS was installed in 1985 to service Building 1060 operations, which included the discharge of wash water containing petroleum products. The OWS discharges into the Sanitary Sewer System.

Pumping and steam cleaning of the OWS at Building 1060 was completed August 4, 1995 (CRA, 1995). It is not known if samples were taken during this project. The OWS was also included in a pumping and steam cleaning effort by D. D and Beauty, a nonhazardous liquid waste removal company, during April and May 1993 (CB, 1994).

A sample collected September 27, 1994 of the contents of the OWS was analyzed by Huntington/Southwestern Engineering & Environmental Inc., for TPH (EPA Method 418.1), TCLP metals (SW846), and BTEX (EPA Method SW8020). TPH was detected at a concentration of 7810 mg/L. Barium and silver were detected at concentrations of 0.877 and 0.04 mg/L, respectively. No other metals were detected in excess of the detection limit. Total BTEX was measured at 0.11 mg/L. Toluene and total xylenes were detected at 0.07 and 0.04 mg/L, respectively. Benzene and ethyl benzene were not detected in excess of the detection limit. Visual observation, personnel interviews, and record reviews did not indicate a need for replacement or repair of the OWS (Law, 1995).

08 57 18 STARTING DATE 10/24/00 DRAWN BY M CRAFT REVISION NO 0 ENGR CHCK BY K HURLEY DRAFT CHCK BY D HALL DATE LAST REV 12/21/00 INITIATOR K HURLEY DWG NO. 768579es 251  
 04/24/01 DRAWN BY M CRAFT REVISION NO 0 ENGR CHCK BY K HURLEY DRAFT CHCK BY D HALL DATE LAST REV 12/21/00 INITIATOR K HURLEY DWG NO. 768579es 251  
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**LEGEND**

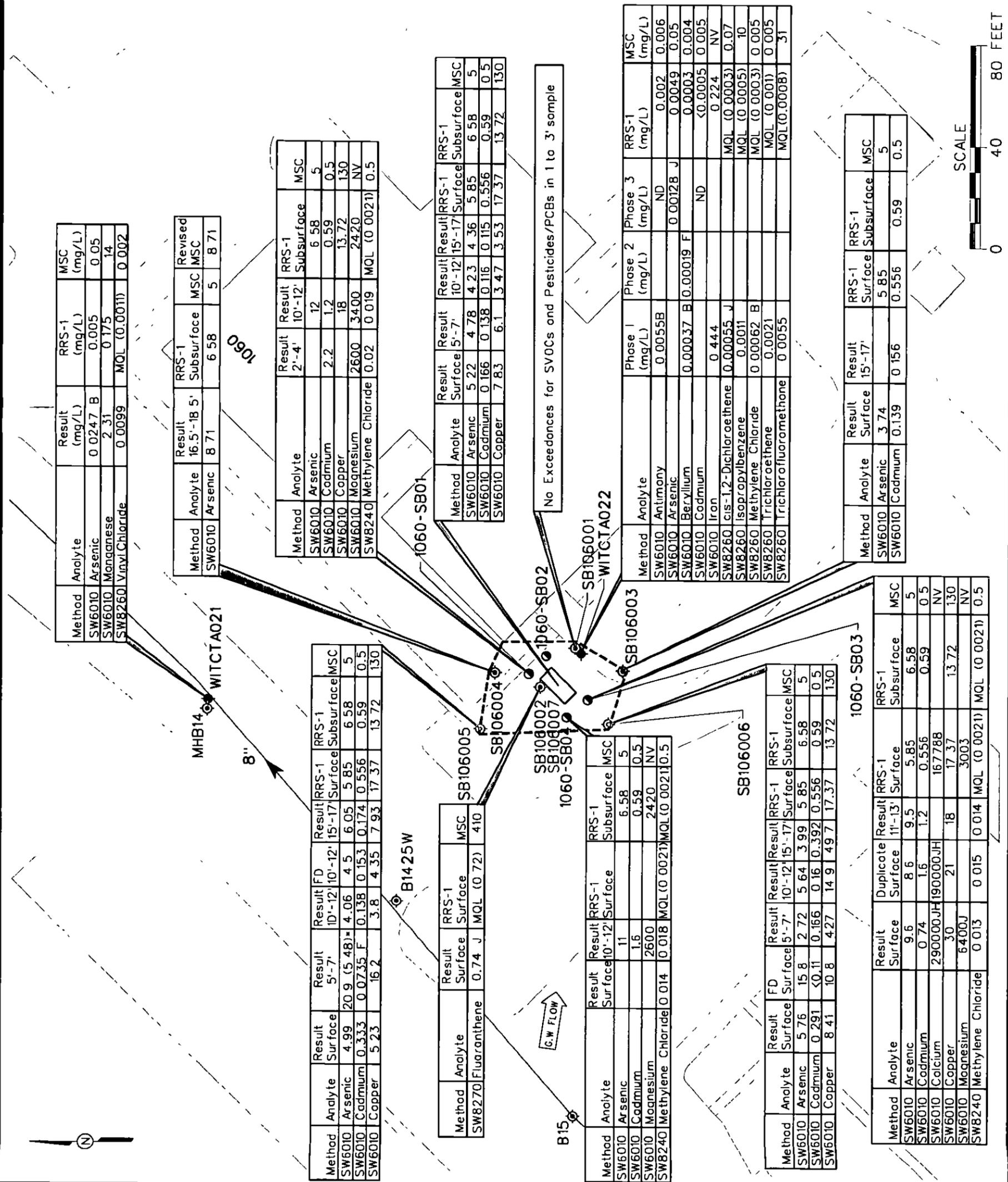
- BUILDING 1060 INDUSTRIAL WASTE OIL/WATER SEPARATOR UNIT
- IT CORP SOIL BORING (1997)
- IT CORP. PHASE 2 BORING (2000)
- IT CORP. PHASE 3 BORING (2000)
- IT CORP MONITORING WELL
- LAW ENGINEERING SOIL BORING
- GROUNDWATER FLOW DIRECTION
- SEWER LINE AND DIRECTIONAL FLOW
- FENCE
- RRS 2 SURVEY BOUNDARY
- PHASE 1 RESULTS > BACKGROUND
- PHASE 2 RESULTS
- PHASE 3 RESULTS
- ANALYTE DETECTED ABOVE MSC SPLP NOT PERFORMED
- ANALYTE DETECTED ABOVE MSC IN SOIL, BUT DETECTED BELOW MSC IN SPLP EXTRACT

**NOTES:**

- C - CONCENTRATIONS REPORTED IN MG/KG UNLESS NOTED OTHERWISE
- MSC - MEDIA-SPECIFIC CONCENTRATION
- REVISED MSC - VALUE BASED ON SPLP RESULT
- NV - NO VALUE
- B - FOR INORGANICS, THE QUANTITATION IS AN ESTIMATED CONCENTRATION BETWEEN THE MDL AND PQL FOR ORGANICS, THE CONSTITUENT WAS ALSO DETECTED IN THE ASSOCIATED METHOD BLANK
- J - THE ANALYTE WAS POSITIVELY IDENTIFIED, THE QUANTITATION IS AN ESTIMATION
- RESULTS FROM RE-ANALYSIS (SPLIT SAMPLE).
- SOURCE: DRAFT RCRA FACILITIES INVESTIGATION SANITARY SEWER SYSTEM, SEPTEMBER 1997, IT CORPORATION

**FIGURE 6-1**  
**SITE MAP SHOWING**  
**INVESTIGATION RESULTS**  
**OWS BUILDING 1060 (AOC 11)**

DRAFT RFI REPORT  
 NAS FORT WORTH JRB  
 FORT WORTH, TEXAS



Method	Analyte	Result (mg/L)	RRS-1 (mg/L)	MSC (mg/L)
SW6010	Arsenic	0.0247 B	0.005	0.05
SW6010	Manganese	2.31	0.175	14
SW8260	Vinyl Chloride	0.0099	ML (0.0011)	0.002

Method	Analyte	Result	RRS-1 Subsurface	MSC
SW6010	Arsenic	16.5-18.5	6.58	5
SW6010	Cadmium	8.71	0.59	8.71

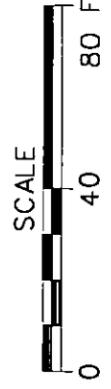
Method	Analyte	Result	RRS-1 Subsurface	MSC
SW6010	Arsenic	12	6.58	5
SW6010	Cadmium	2.2	0.59	0.5
SW6010	Copper	18	13.72	130
SW6010	Magnesium	2600	2420	NV
SW8240	Methylene Chloride	0.02	ML (0.0021)	0.5

Method	Analyte	Result	RRS-1 Surface	RRS-1 10'-12'	RRS-1 15'-17'	RRS-1 Subsurface	MSC
SW6010	Arsenic	5.22	4.78	4.23	4.36	5.85	5
SW6010	Cadmium	0.166	0.138	0.116	0.115	0.556	0.5
SW6010	Copper	7.83	6.1	3.47	3.53	17.37	130

No Exceedences for SVOCs and Pesticides/PCBs in 1 to 3' sample

Method	Analyte	Phase 1 (mg/L)	Phase 2 (mg/L)	Phase 3 (mg/L)	RRS-1 (mg/L)	MSC (mg/L)
SW6010	Antimony	0.0055B		ND	0.002	0.006
SW6010	Arsenic			0.0012B J	0.0049	0.05
SW6010	Beryllium				0.0003	0.004
SW6010	Cadmium	0.00037 B	0.00019 F		<0.0005	0.005
SW6010	Iron	0.444			0.224	NV
SW8260	cis-1,2-Dichloroethene	0.00055 J			ML (0.0003)	0.07
SW8260	isopropylbenzene	0.0011			ML (0.0005)	10
SW8260	Methylene Chloride	0.00062 B			ML (0.0003)	0.005
SW8260	Trichloroethene	0.0021			ML (0.001)	0.005
SW8260	Trichlorofluoromethane	0.0055			ML(0.0008)	31

Method	Analyte	Result	RRS-1 Surface	RRS-1 Subsurface	MSC
SW6010	Arsenic	3.74	5.85	0.59	5
SW6010	Cadmium	0.139	0.556	0.59	0.5



## **6.2 Site Characterization Activities**

A summary of the soil and groundwater samples that have been collected at the Building 1060 site is provided in Table 6-1. The analytical methods associated with each soil sample collected at Building 1027 are also presented in Table 6-1. The locations of the soil borings are shown in Figure 6-1. The following sections discuss the investigation activities that have been performed to characterize environmental impacts relating to the OWS at Building 1060.

### **6.2.1 Initial Site Investigation – Law 1994**

Law (1995) collected soil samples in 1994 from three borings (1060-SB01, 1060-SB03, and 1060-SB04) located at the northeast and southwest sides of the OWS at Building 1060 (Figure 6-1). Soil samples were not collected from a fourth boring, 1060-SB02, because of poor sample recovery. Soil borings were advanced to depths ranging from 10.5 to 13 feet bgs. One surface soil sample was collected from surface to two feet in depth at boring 1060-SB03. Five subsurface soil samples were collected from depths ranging from 1 to 13 feet bgs. Samples were analyzed for VOCs (EPA Method SW8240) and inorganics (EPA Method SW6010) (Law, 1995). A summary of all soil sampling and analysis performed at Building 1060 throughout the RFI and previous investigations is provided in Table 6-1.

### **6.2.2 Phase 1 RFI Activities – IT Corporation 1997**

During the Phase 1 Sanitary Sewer System RFI in 1997 (Table 6-1), IT collected two soil samples from boring SB106001 located on the southeast side of the OWS at Building 1060 (Figure 6-1). Surface soil samples were collected from surface to 2 feet and 1 to 3 feet in depth. The soil samples were analyzed for SVOCs to supplement soil data collected during the Law (1995) investigation. Soil boring SB106002 met concrete refusal at 4 feet bgs and no subsurface soil samples were collected (IT, 1998).

Monitoring wells WITCTA021 and WITCTA022 were installed, during the Phase 1 RFI in April 1997, in the vicinity of the OWS at Building 1060 (Figure 6-1). The wells were completed to total depths of 25 and 24.4 feet bgs, with screen intervals from 14.6 to 24.6 and 14.4 to 24.4 feet bgs. Both wells were developed and groundwater samples were collected from the wells in April and May 1997. Groundwater samples were analyzed for VOCs, SVOCs, and inorganics (IT, 1998).

Table 6-1

Summary of Previous Environmental Samples  
 Collected at Building 1060  
 NAS Fort Worth JRB, Texas

Sample Location	Sample Date	Sample Number	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Analysis	Analytical Method
<b>Law Engineering - Initial Site Investigation (1994)</b>						
1060-SB01	4/23/94	106001SBB	2	4	Inorganics, VOCs	EPA SW6010, SW8240
		106001SBF	10	12	Inorganics, VOCs	EPA SW6010, SW8240
1060-SB02	4/23/94	No Sample	#	#	Poor Recovery	EPA SW6010, SW8240
1060-SB03	4/23/94	106003SBA	0	2	Inorganics, VOCs	EPA SW6010, SW8240
		1060DPSB1	0	2	Inorganics, VOCs	EPA SW6010, SW8240
		106003SBF	11	13	Inorganics, VOCs	EPA SW6010, SW8240
1060-SB04	4/23/94	106004SBB	1	3	Inorganics, VOCs	EPA SW6010, SW8240
		106004SBF	10	12	Inorganics, VOCs	EPA SW6010, SW8240
<b>IT Corporation - Phase 1 RFI (1997)</b>						
SB106001	3/14/97	MS1109	1	3	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
SB106002	3/14/97	MS1108	0	2	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
WITCTA021	5/1/97	MS1584	GW	GW	Inorganics, VOCs, SVOCs	EPA SW6010, SW8260, SW8270
WITCTA022	4/29/97	MS1565	GW	GW	Inorganics, VOCs, SVOCs	EPA SW6010, SW8260, SW8270
<b>IT Corporation - Phase 2 RFI (2000)</b>						
SB106003	4/20/00	BG008	0	2	As, Cd	EPA SW6010B
		BG009	15	17	Cd	EPA SW6010B
SB106004	4/20/00	BG010	16.5	18.5	As	EPA SW6010B
WITCTA022	5/1/00	BG3002	GW	GW	Be	EPA SW6010B
<b>IT Corporation - Phase 3 RFI (2000)</b>						
SB106005	11/29/00	BG0059	15	17	As, Cd, Cu	EPA SW6010B
		BG0125	0	2	As, Cd, Cu	EPA SW6010B
		BG0126	5	7	As, Cd, Cu	EPA SW6010B
		BG0127	10	12	As, Cd, Cu	EPA SW6010B
		BG0128	10	12	As, Cd, Cu	EPA SW6010B

Table 6-1

Summary of Previous Environmental Samples  
 Collected at Building 1060  
 NAS Fort Worth JRB, Texas

Sample Location	Sample Date	Sample Number	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Analysis	Analytical Method
SB106006	11/29/00	BG0060	0	2	As, Cd, Cu	EPA SW6010B
		BG0061	0	2	As, Cd, Cu	EPA SW6010B
		BG0062	10	12	As, Cd, Cu	EPA SW6010B
		BG0129	5	7	As, Cd, Cu	EPA SW6010B
		BG0130	15	17	As, Cd, Cu	EPA SW6010B
SB106007	11/29/00	BG0131	0	2	As, Cd, Cu	EPA SW6010B
		BG0132	5	7	As, Cd, Cu	EPA SW6010B
		BG0133	10	12	As, Cd, Cu	EPA SW6010B
		BG0134	15	17	As, Cd, Cu	EPA SW6010B
WITCTA022	12/1/00	BG3017	GW	GW	As, Cd, Sb	EPA SW6010B

As - Arsenic  
 Cd - Cadmium  
 Cu - Copper  
 VOCs - Volatile Organic Compounds  
 SVOCs - Semivolatile Organic Compounds  
 PCBs - Polychlorinated Biphenols  
 Sb - Antimony

### **6.2.3 Phase 2 RFI Activities – IT Corporation 2000**

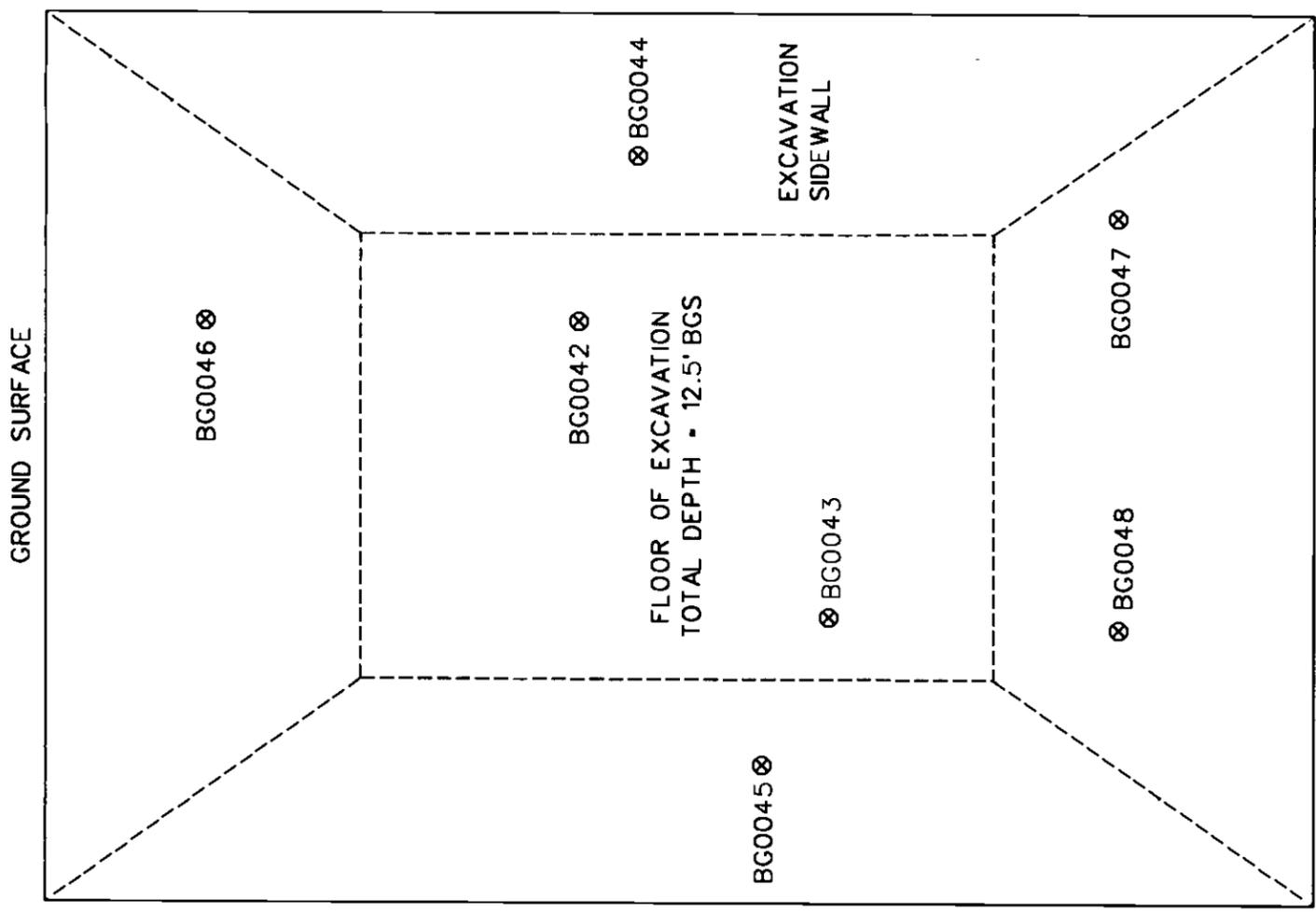
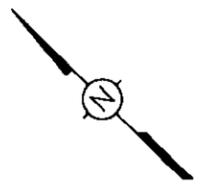
Additional soil sampling was performed by IT during the Phase 2 RFI in April 2000 (Table 6-1). Two soil borings were located north (SB106004) and south (SB106003) of the OWS at Building 1060 (Figure 6-1). Soil samples were collected from SB106003 at depths of 2 feet and 15 to 17 feet for analysis of arsenic and cadmium to delineate concentrations of these inorganics detected in former Law (1995) borings 1060-SB03 and 1060-SB04. Sample BG0010 was collected from SB106003 from 16.5 to 18.5 feet in depth and analyzed for arsenic to delineate a concentration detected in 1060-SB01. An additional groundwater sample was collected by IT from WITCTA022, during the Phase 2 RFI in April 2000, and analyzed for beryllium to confirm a beryllium concentration detected during the Phase 1 RFI activities.

### **6.2.4 OWS Removal – U.S. Navy 2000**

The OWS at Building 1060 was removed by U.S. Navy contractors on September 7, 2000. IT personnel were on site to oversee the removal activities and collected confirmation soil samples. The excavation was approximately 14.8 feet by 10.5 feet by 12.5 feet deep (Figure 6-2). No abnormal soil discolorations were encountered during the excavation. A total of seven soil samples were collected from the floor and walls of the excavation. Each soil sample was analyzed for arsenic and cadmium by EPA Method SW6010B. An SPLP extract was taken from each sample and also analyzed for arsenic and cadmium by EPA Methods SW7060A and SW6010B, respectively.

### **6.2.5 Phase 3 RFI Activities – IT Corporation 2000**

Additional sampling was performed during Phase 3 of the RFI (Table 6-1) to delineate arsenic, cadmium, and copper concentrations (EPA Method SW6010B) exceeding background/MSCs during previous investigations. Additionally, samples were collected from a confirmation soil boring located in the center of the former OWS site since excavated soils were backfilled into the excavation. In each of the three borings (SB106005, SB106006, and SB106007), samples were collected at intervals of surface to 2 feet, 5 to 7 feet, 10 to 12 feet, and 15 to 17 feet bgs (Figure 6-1). A groundwater sample was also collected from monitoring well WITCTA022 to confirm arsenic and cadmium concentrations in groundwater.



**LEGEND:**

- MONITORING WELL
- ⊗ SIDEWALL SAMPLES COLLECTED AT 7.5 FEET BELOW GROUND SURFACE
- ⊗ FLOOR SAMPLES COLLECTED AT 12.5 FEET BELOW GROUND SURFACE

**NOTE:**

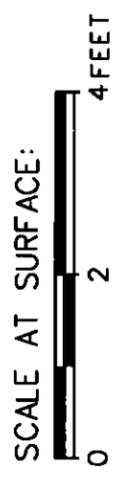
1. EXCAVATION AREA IS 14.8' X 10.5'
2. ALL CONFIRMATION SAMPLES WERE ANALYZED FOR ARSENIC AND CADMIUM BY EPA METHOD SW6010B
3. ALL DETECTED CONCENTRATIONS WERE BELOW SITEWIDE BACKGROUND CONCENTRATIONS FOR ARSENIC AND CADMIUM.

**FIGURE 6-2**  
**LOCATION OF CONFIRMATION SOIL SAMPLES COLLECTED DURING OWS REMOVAL AT BUILDING 1060**

NAS FORT WORTH JRB  
 FORT WORTH, TEXAS



**IT CORPORATION**  
 A Member of The IT Group



SCALE AT SURFACE:

● WITCTA022

10 27 33	STARTING DATE 2/2/01	DATE LAST REV 04/24/01	DRAFT CHK BY D HALL	INITIATOR J FISHER	DWG NO 1768579es 264
04/24/01	DRAWN BY M HALL	REVISION NO 0	ENGR CHK BY J FISHER	PROJ MGR W CARTER	PROJ NO 768579

### **6.3 Site-Specific Conditions**

The following subsections discuss the site-specific geology and hydrogeology characteristics that were encountered during the investigation activities at Building 1060 site.

**Geology.** Quaternary alluvium is found at the surface through most of the NAS Fort Worth area. The alluvium consists of floodplain and fluvial terrace deposits of gravel, sand, silt, and clay that occur as a veneer on the eroded surface of Upper Cretaceous strata. Soil boring logs from Building 1060 (Appendix A) indicate fill material consisting of silty and clayey sand and gravel and concrete debris from ground surface to approximately 10.5 feet bgs on the north side of the OWS. This material was described for soil from ground surface to approximately five feet bgs on the south side of the OWS. Below the fill material, boring logs indicate varying mixtures of fine sand, silt, and clay, with coarser sands and gravel becoming more predominant with greater depth. Soils were generally brown or yellowish-brown in color, and saturated soils were indicated below 18.5 feet bgs. SB106001 was the deepest soil boring driven at the Building 1060 site, to a total depth of 22.8 feet bgs.

The alluvial soils rest unconformably on the top of the weathered Walnut Formation. Underlying the Quaternary alluvium is the Cretaceous-aged Walnut Formation, which consists of 20 to 30 feet of indurated fossiliferous limestone interbedded with brown sandy clay, thinly bedded fossiliferous clay, and fissile shale. Unconformably underlying the Walnut Formation is the Cretaceous-aged Paluxy Formation. The Paluxy Formation generally consists of coarse-grained sand that grades upward into fine-grained sand with variable amounts of shale and limestone. The sandstone, composed of fine- to coarse-grained white quartz, is well-sorted, poorly consolidated, and cross-bedded. The Paluxy Formation thickness ranges from 140 to 190 feet, averaging 160 feet in Tarrant County (Radian, 1991).

**Hydrogeology.** Shallow groundwater within the Quaternary alluvium occurs in fluvial terrace deposits of sand and gravel, which occur as a veneer on the eroded surface of the Walnut Formation. Soil description logs from borings at Building 1060 indicated gravel and sand below approximately 12 feet bgs, and saturated conditions below 18.5 feet bgs. Monitoring wells WITCTA021 and WITCTA022 were installed to the northwest and east of Building 1060, respectively, with well screens placed across the top of the gravel and sand down to the top of the Walnut Formation, at approximately 25 feet bgs.

Water level elevations measured in wells WITCTA021 and WITCTA022 in April 1997 indicated that the water level elevation in WITCTA022 is between 0.5 and 1 foot lower than the water level elevation in WITCTA021 to the north. This indicates a groundwater flow direction to the south and east toward Farmers Branch Creek.

#### **6.4 Results from Initial Site Investigation**

The following sections present the analytical results from surface and subsurface soil samples that were collected by Law (1995) during the initial site investigation at Building 1060. Table 6-2 contains a summary of the analytes detected in the samples collected by Law (1995) and compares the detected concentrations to basewide background concentrations and MSCs. Detected analyte concentrations which exceeded background concentrations are shown on Figure 6-1. The following sections present the results from surface and subsurface soil samples that were collected by Law (1995) during the initial site investigation at the Building 1060 site.

##### **6.4.1 Surface Soil**

Law (1995) collected surface soil samples from soil borings 1060-SB03 and 1060-SB04 (Figure 6-1). The surface soil samples were submitted for analysis of VOCs and inorganics. The results from these surface soil samples are discussed in the following subsections.

**VOCs.** Methylene chloride was detected in the surface soil samples from 1060-SB03 and 1060-SB04 at concentrations of 0.013 mg/kg and 0.014 mg/kg, respectively. Considering that the results are well below the established MSC (0.5 mg/kg) and that methylene chloride is a common laboratory contaminant, the results are likely the result of laboratory contamination. The absence of other VOCs in the surface soil provides evidence that the methylene chloride detections were not the result of a release from the OWS considering that washwater entering the OWS contained petroleum products.

**Inorganics.** Arsenic, cadmium, calcium, copper, and magnesium detections in the surface soil sample from 1060-SB03 were above their respective background concentrations (Table 6-2 and Figure 6-1). Arsenic and cadmium were detected at concentrations above their respective MSCs. Calcium and magnesium are naturally occurring essential nutrients and the detected concentrations are likely natural variations in background.

Table 6-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1060 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
<b>Building 1060 - Subsurface Soil - Location 1060-SB01</b>												
1060-SB01	106001SBB	4/23/94	2	4	METHYLENE CHLORIDE	0.02	0.02			No	0.5	Yes
1060-SB01	106001SBB	4/23/94	2	4	ALUMINUM	14000	14000		20280	Yes	10000	NA
1060-SB01	106001SBB	4/23/94	2	4	ARSENIC	5.9	5.9		6.58	Yes	5	NA
1060-SB01	106001SBB	4/23/94	2	4	BARIIUM	94	94		128.1	Yes	200	NA
1060-SB01	106001SBB	4/23/94	2	4	BERYLLIUM	1.8	1.8		1.13	No	0.4	No
1060-SB01	106001SBB	4/23/94	2	4	CADMIUM	2.2	2.2		0.59	No	0.5	No
1060-SB01	106001SBB	4/23/94	2	4	CALCIUM	95000	95000	JH	272000	Yes	Essential Nutrient	NA
1060-SB01	106001SBB	4/23/94	2	4	CHROMIUM, TOTAL	15.0	15.0		16.31	Yes	10	NA
1060-SB01	106001SBB	4/23/94	2	4	COBALT	5.6	5.6		6.19	Yes	610	NA
1060-SB01	106001SBB	4/23/94	2	4	COPPER	14.0	14.0		13.72	No	130	Yes
1060-SB01	106001SBB	4/23/94	2	4	IRDN	16000	16000	JH	17469	Yes	Essential Nutrient	NA
1060-SB01	106001SBB	4/23/94	2	4	LEAD	11.0	11.0		12.66	Yes	1.5	NA
1060-SB01	106001SBB	4/23/94	2	4	MAGNESIUM	2600	2600		2420	No	Essential Nutrient	Yes
1060-SB01	106001SBB	4/23/94	2	4	MANGANESE	340	340		351.7	Yes	1400	NA
1060-SB01	106001SBB	4/23/94	2	4	NICKEL	12.0	12.0		19.76	Yes	200	NA
1060-SB01	106001SBB	4/23/94	2	4	POTASSIUM	1500	1500		1717	Yes	Essential Nutrient	NA
1060-SB01	106001SBB	4/23/94	2	4	SODIUM	150	150		53200	Yes	Essential Nutrient	NA
1060-SB01	106001SBB	4/23/94	2	4	VANADIUM	32.0	32.0		37.4	Yes	72	NA
1060-SB01	106001SBB	4/23/94	2	4	ZINC	29	29	JH	31.3	Yes	3100	NA
1060-SB01	106001SBB	4/23/94	10	12	METHYLENE CHLORIDE	0.019	0.019			No	0.5	Yes
1060-SB01	106001SBB	4/23/94	10	12	ALUMINUM	8000	8000		20260	Yes	10000	NA
1060-SB01	106001SBB	4/23/94	10	12	ARSENIC	12.0	12.0		6.58	No	5	No
1060-SB01	106001SBB	4/23/94	10	12	BARIIUM	56	56		128.1	Yes	200	NA
1060-SB01	106001SBB	4/23/94	10	12	BERYLLIUM	1.8	1.8		1.13	No	0.4	No
1060-SB01	106001SBB	4/23/94	10	12	CADMIUM	1.2	1.2		0.59	No	0.5	No
1060-SB01	106001SBB	4/23/94	10	12	CALCIUM	210000	210000	JH	272000	Yes	Essential Nutrient	NA
1060-SB01	106001SBB	4/23/94	10	12	CHROMIUM, TOTAL	9.2	9.2		16.31	Yes	10	NA
1060-SB01	106001SBB	4/23/94	10	12	COBALT	4.2	4.2		6.19	Yes	610	NA
1060-SB01	106001SBB	4/23/94	10	12	COPPER	18.0	18.0		13.72	No	130	Yes
1060-SB01	106001SBB	4/23/94	10	12	IRON	12000	12000	JH	17469	Yes	Essential Nutrient	NA
1060-SB01	106001SBB	4/23/94	10	12	LEAD	9.0	9.0		12.66	Yes	1.5	NA
1060-SB01	106001SBB	4/23/94	10	12	MAGNESIUM	3400	3400		2420	No	Essential Nutrient	Yes
1060-SB01	106001SBB	4/23/94	10	12	MANGANESE	280	280		351.7	Yes	1400	NA
1060-SB01	106001SBB	4/23/94	10	12	NICKEL	9.1	9.1		19.76	Yes	200	NA
1060-SB01	106001SBB	4/23/94	10	12	POTASSIUM	1200	1200		1717	Yes	Essential Nutrient	NA
1060-SB01	106001SBB	4/23/94	10	12	SODIUM	170	170		53200	Yes	Essential Nutrient	NA
1060-SB01	106001SBB	4/23/94	10	12	VANADIUM	23.0	23.0		37.4	Yes	72	NA
1060-SB01	106001SBB	4/23/94	10	12	ZINC	18	18	JH	31.3	Yes	3100	NA
<b>Building 1060 - Surface Soil - Location 1060-SB03</b>												
1060-SB03	106003SBA	4/23/94	0	2	METHYLENE CHLORIDE	0.013	0.013			No	0.5	Yes

Table 6-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1060 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TMRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
1060-SB03	106003SBA	4/23/94	0	2	ALUMINUM		1900	J	22035	Yes	10000	NA
1060-SB03	106003SBA	4/23/94	0	2	ARSENIC		9.6		5.85	No	5	No
1060-SB03	106003SBA	4/23/94	0	2	BARIIUM		30	J	233	Yes	200	NA
1060-SB03	106003SBA	4/23/94	0	2	BERYLLIUM	15	1.5		1.02	No	0.4	No
1060-SB03	106003SBA	4/23/94	0	2	CADMIUM		0.74		0.556	No	0.5	No
1060-SB03	106003SBA	4/23/94	0	2	CALCIUM		290000	JH	167788	No	Essential Nutrient	Yes
1060-SB03	106003SBA	4/23/94	0	2	CHROMIUM, TOTAL		4.1	J	25.86	Yes	10	NA
1060-SB03	106003SBA	4/23/94	0	2	COBALT		2.3		11.05	Yes	610	NA
1060-SB03	106003SBA	4/23/94	0	2	COPPER		30.0		17.37	No	130	Yes
1060-SB03	106003SBA	4/23/94	0	2	IRON		3100	JH	17717	Yes	Essential Nutrient	NA
1060-SB03	106003SBA	4/23/94	0	2	LEAD		12.0		30.97	Yes	1.5	NA
1060-SB03	106003SBA	4/23/94	0	2	MAGNESIUM		6400	J	3003	No	Essential Nutrient	Yes
1060-SB03	106003SBA	4/23/94	0	2	MANGANESE		220		849	Yes	1400	NA
1060-SB03	106003SBA	4/23/94	0	2	NICKEL		6.6		14.6	Yes	200	NA
1060-SB03	106003SBA	4/23/94	0	2	POTASSIUM		440	J	2895	Yes	Essential Nutrient	NA
1060-SB03	106003SBA	4/23/94	0	2	SODIUM		95		37300	Yes	Essential Nutrient	NA
1060-SB03	106003SBA	4/23/94	0	2	VANADIUM		6.7		46.3	Yes	72	NA
1060-SB03	106003SBA	4/23/94	0	2	ZINC		16	JH	38.8	Yes	3100	NA
1060-SB03	1060DPSB1	4/23/94	0	2	METHYLENE CHLORIDE		0.015			No	0.5	Yes
1060-SB03	1060DPSB1	4/23/94	0	2	ALUMINUM		8100	J	22035	Yes	10000	NA
1060-SB03	1060DPSB1	4/23/94	0	2	ARSENIC		8.6		5.85	No	5	No
1060-SB03	1060DPSB1	4/23/94	0	2	BARIIUM		56	J	233	Yes	200	NA
1060-SB03	1060DPSB1	4/23/94	0	2	BERYLLIUM	17	1.7		1.02	No	0.4	No
1060-SB03	1060DPSB1	4/23/94	0	2	CADMIUM		1.6		0.556	No	0.5	No
1060-SB03	1060DPSB1	4/23/94	0	2	CALCIUM		190000	JH	167788	No	Essential Nutrient	Yes
1060-SB03	1060DPSB1	4/23/94	0	2	CHROMIUM, TOTAL		9.6	J	25.86	Yes	10	NA
1060-SB03	1060DPSB1	4/23/94	0	2	COBALT		4.0		11.05	Yes	610	NA
1060-SB03	1060DPSB1	4/23/94	0	2	COPPER		21.0		17.37	No	130	Yes
1060-SB03	1060DPSB1	4/23/94	0	2	IRON		11000	JH	17717	Yes	Essential Nutrient	NA
1060-SB03	1060DPSB1	4/23/94	0	2	LEAD		8.6		30.97	Yes	1.5	NA
1060-SB03	1060DPSB1	4/23/94	0	2	MAGNESIUM		2700	J	3003	Yes	Essential Nutrient	NA
1060-SB03	1060DPSB1	4/23/94	0	2	MANGANESE		240		849	Yes	1400	NA
1060-SB03	1060DPSB1	4/23/94	0	2	NICKEL		8.0		14.6	Yes	200	NA
1060-SB03	1060DPSB1	4/23/94	0	2	POTASSIUM		930	J	2895	Yes	Essential Nutrient	NA
1060-SB03	1060DPSB1	4/23/94	0	2	SODIUM		120		37300	Yes	Essential Nutrient	NA
1060-SB03	1060DPSB1	4/23/94	0	2	VANADIUM		20.0		46.3	Yes	72	NA
1060-SB03	1060DPSB1	4/23/94	0	2	ZINC		18	JH	38.8	Yes	3100	NA
<b>Building 1060 - Subsurface Soil - Location 1060-SB03</b>												
1060-SB03	106003SBF	4/23/94	11	13	METHYLENE CHLORIDE		0.014			No	0.5	Yes
1060-SB03	106003SBF	4/23/94	11	13	ALUMINUM		1300		20260	Yes	10000	NA
1060-SB03	106003SBF	4/23/94	11	13	ARSENIC		9.5		5.58	No	5	No
1060-SB03	106003SBF	4/23/94	11	13	BARIIUM		80		128.1	Yes	200	NA

Table 6-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1060 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
1060-SB03	106003SBF	4/23/94	11	13	BERYLLIUM	16	16		113	No	0.4	No
1060-SB03	106003SBF	4/23/94	11	13	CADMIUM	1.2	1.2		0.59	No	0.5	No
1060-SB03	106003SBF	4/23/94	11	13	CALCIUM	180000	180000	JH	272000	Yes	Essential Nutrient	NA
1060-SB03	106003SBF	4/23/94	11	13	CHROMIUM, TOTAL	49	49		16.31	Yes	10	NA
1060-SB03	106003SBF	4/23/94	11	13	COBALT	7.0	7.0		6.19	No	610	Yes
1060-SB03	106003SBF	4/23/94	11	13	COPPER	18.0	18.0		13.72	No	130	Yes
1060-SB03	106003SBF	4/23/94	11	13	IRDN	6600	6600	JH	17469	Yes	Essential Nutrient	NA
1060-SB03	106003SBF	4/23/94	11	13	LEAD	5.2	5.2		12.66	Yes	1.5	NA
1060-SB03	106003SBF	4/23/94	11	13	MAGNESIUM	1800	1800		24.20	Yes	Essential Nutrient	NA
1060-SB03	106003SBF	4/23/94	11	13	MANGANESE	1100	1100		351.7	No	1400	Yes
1060-SB03	106003SBF	4/23/94	11	13	NICKEL	12.0	12.0		19.76	Yes	200	NA
1060-SB03	106003SBF	4/23/94	11	13	POTASSIUM	240	240		1717	Yes	Essential Nutrient	NA
1060-SB03	106003SBF	4/23/94	11	13	SODIUM	100	100		53200	Yes	Essential Nutrient	NA
1060-SB03	106003SBF	4/23/94	11	13	VANADIUM	19.0	19.0		37.4	Yes	72	NA
1060-SB03	106003SBF	4/23/94	11	13	ZINC	11	11	JH	31.3	Yes	3100	NA
<b>Building 1060 - Surface Soil - Location 1060-SB04</b>												
1060-SB04	106004SBB	4/23/94	1	3	METHYLENE CHLORIDE	0.014	0.014			No	0.5	Yes
1060-SB04	106004SBB	4/23/94	1	3	ALUMINUM	6700	6700		22035	Yes	10000	NA
1060-SB04	106004SBB	4/23/94	1	3	ARSENIC	3.9	3.9		5.85	Yes	5	NA
1060-SB04	106004SBB	4/23/94	1	3	BARIUM	50	50		233	Yes	200	NA
1060-SB04	106004SBB	4/23/94	1	3	BERYLLIUM	0.33	0.33		1.02	Yes	0.4	NA
1060-SB04	106004SBB	4/23/94	1	3	CADMIUM	1.6	1.6		0.556	No	0.5	NA
1060-SB04	106004SBB	4/23/94	1	3	CALCIUM	42000	42000	JH	167788	Yes	Essential Nutrient	NA
1060-SB04	106004SBB	4/23/94	1	3	CHROMIUM TOTAL	10.0	10.0		26.86	Yes	10	NA
1060-SB04	106004SBB	4/23/94	1	3	COBALT	4.4	4.4		11.05	Yes	610	NA
1060-SB04	106004SBB	4/23/94	1	3	COPPER	8.0	8.0		17.37	Yes	130	NA
1060-SB04	106004SBB	4/23/94	1	3	IRON	10000	10000	JH	17717	Yes	Essential Nutrient	NA
1060-SB04	106004SBB	4/23/94	1	3	LEAD	12.0	12.0		30.97	Yes	1.5	NA
1060-SB04	106004SBB	4/23/94	1	3	MAGNESIUM	1300	1300		3903	Yes	Essential Nutrient	NA
1060-SB04	106004SBB	4/23/94	1	3	MANGANESE	230	230		849	Yes	1400	NA
1060-SB04	106004SBB	4/23/94	1	3	NICKEL	9.3	9.3		14.6	Yes	200	NA
1060-SB04	106004SBB	4/23/94	1	3	POTASSIUM	1100	1100		2895	Yes	Essential Nutrient	NA
1060-SB04	106004SBB	4/23/94	1	3	SODIUM	62	62		37300	Yes	Essential Nutrient	NA
1060-SB04	106004SBB	4/23/94	1	3	VANADIUM	21.0	21.0		46.3	Yes	72	NA
1060-SB04	106004SBB	4/23/94	1	3	ZINC	16	16	JH	38.8	Yes	3100	NA
<b>Building 1060 - Subsurface Soil - Location 1060-SB04</b>												
1060-SB04	106004SBF	4/23/94	10	12	METHYLENE CHLORIDE	0.018	0.018			No	0.5	Yes
1060-SB04	106004SBF	4/23/94	10	12	ALUMINUM	11000	11000		20260	Yes	10000	NA
1060-SB04	106004SBF	4/23/94	10	12	ARSENIC	11.0	11.0		6.58	No	5	NA
1060-SB04	106004SBF	4/23/94	10	12	BARIUM	44	44		128.1	Yes	200	NA
1060-SB04	106004SBF	4/23/94	10	12	BERYLLIUM	1.8	1.8		1.13	No	0.4	NA
1060-SB04	106004SBF	4/23/94	10	12	CADMIUM	1.6	1.6		0.59	No	0.5	NA
1060-SB04	106004SBF	4/23/94	10	12	CALCIUM	130000	130000	JH	272000	Yes	Essential Nutrient	NA
1060-SB04	106004SBF	4/23/94	10	12	CHROMIUM TOTAL	11.0	11.0		16.31	Yes	10	NA

Table 6-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1060 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
1060-SB04	106004SBF	4/23/94	10	12	COBAL T		4.7		6.19	Yes	610	NA
1060-SB04	106004SBF	4/23/94	10	12	COPPER		13.0		13.72	Yes	130	NA
1060-SB04	106004SBF	4/23/94	10	12	IRON		11000	JH	17469	Yes	Essential Nutrient	NA
1060-SB04	106004SBF	4/23/94	10	12	LEAD		9.8		12.66	Yes	1.5	NA
1060-SB04	106004SBF	4/23/94	10	12	MAGNESIUM		2600		2420	No	Essential Nutrient	Yes
1060-SB04	106004SBF	4/23/94	10	12	MANGANESE		220		351.7	Yes	1400	NA
1060-SB04	106004SBF	4/23/94	10	12	NICKEL		9.3		19.76	Yes	200	NA
1060-SB04	106004SBF	4/23/94	10	12	POTASSIUM		1500		1717	Yes	Essential Nutrient	NA
1060-SB04	106004SBF	4/23/94	10	12	SODIUM		120		53200	Yes	Essential Nutrient	NA
1060-SB04	106004SBF	4/23/94	10	12	VANADIUM		20.0		37.4	Yes	72	NA
1060-SB04	106004SBF	4/23/94	10	12	ZINC		18	JH	31.3	Yes	3100	NA

MSC = Media-Specific Concentration

NA = not applicable

MQL = Method Quantitation Limit

RRS1 = Risk Reduction Standard 1

RRS2 = Risk Reduction Standard 2

TNRCC = Texas Natural Resources Conservation Commission

UTL = Upper Tolerance Limit

Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte

<sup>2</sup> TNRCC, 1999. "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Qualifier Definitions

= The analyte was positively identified

J = For inorganics the associated value is an estimated quantity. For organics the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample

JB = Estimated quantitation - possible biased high based upon blank contamination

JH = Estimated quantitation - possible biased high based upon QC data

No inorganic concentrations detected in the surface soil sample from 1060-SB04 exceeded their respective background concentrations.

#### **6.4.2 Subsurface Soil**

Law (1995) collected subsurface soil samples from three locations (1060-SB01, 1060-SB03, and 1060-SB04) during their initial site investigations in April 1994. The sampling depths ranged between 10 and 13 feet bgs. Each soil sample was submitted for analysis of VOCs (EPA Method SW8240) and inorganics (EPA Method SW6010). The following subsections discuss the analytical results from the subsurface soil samples collected by Law (1995).

**VOCs.** Methylene chloride was detected at low levels in all the subsurface soil samples submitted by Law from the Building 1060 site. Considering that the detected concentrations are well below the established MSC for methylene chloride (0.5 mg/kg) and the fact that methylene chloride is a common laboratory contaminant, the detected concentrations were likely the result of laboratory contamination. The absence of other VOCs in the subsurface soil sample provides evidence that the methylene chloride detections were not the result of a release from the OWS considering that washwater entering the OWS contained petroleum products.

**Inorganics.** Inorganic constituents detected above their respective background concentrations in subsurface soil samples at Building 1060 included arsenic, cadmium, cobalt, copper, iron, magnesium, and manganese (Table 6-2). Arsenic and cadmium exceeded TNRCC MSCs in all three of the subsurface soil samples collected by Law (1995) at Building 1060.

Iron and magnesium are essential nutrients and the reported concentrations probably represents naturally occurring concentrations in the soil. The soil concentrations of cobalt and copper (Table 6-2) are below their respective MSCs for subsurface soil. Cobalt was detected above the background concentration (6.19 mg/kg) in only one location at a concentration (7.0 mg/kg) that is likely an extreme but true background concentration. Copper was detected above background in two of the three subsurface soil samples collected during the investigation.

Manganese was detected above the background concentration (351.7 mg/kg) in only one subsurface sample (11 to 13 feet bgs at 1060-SB03) at a concentration of 1,100 mg/kg that is below its MSC (1,400 mg/kg). Considering the lack of VOCs detected in this sample and the fact that manganese was not detected above background in the groundwater sample collected

from adjacent monitoring well WITCTA022, it is likely that the manganese concentration detected above background is an extreme but true background concentration.

### **6.5 Results from Phase 1 RFI Activities**

The following sections presents the analytical results from surface and subsurface soil samples that were collected by IT (1997) during the Phase 1 RFI at Building 1060. A discussion of the Phase 1 groundwater investigation is also included. The purpose of the Phase 1 RFI soil samples was to supplement the analytical data for VOCs and inorganics that were collected by Law (1995) during the initial site investigation. Table 6-3 contains a summary of the analytes detected in the Phase 1 RFI soil samples collected by IT and Table 6-4 contains a summary of the analytes detected in the Phase 1 RFI groundwater samples. Analytical detection summary tables for the Phase 1 RFI soil and groundwater samples collected at Building 1060 are shown in Tables B-4 and B-5, respectively. The purpose of the Phase 1 RFI soil samples was to supplement the analytical data for VOCs and inorganics that was collected by Law (1995) during the initial site investigation.

#### **6.5.1 Surface Soil**

Surface soil samples from borings SB106001 and SB106002 were collected for analysis of SVOCs (EPA Method SW8270) and pesticides/PCBs (EPA Method SW8080). Figure 6-1 shows the locations of the Phase 1 RFI boring locations. The following subsections discuss the analytical results of the surface soil samples.

**SVOCs.** One SVOC, fluoranthene, was detected in the surface soil sample from SB06002 at a concentration (0.74 J mg/kg) that exceeded its MQL (0.72 mg/kg). However, considering that the detected concentration is only marginally above its MQL and the concentration was below the PQL, the detected concentration of fluoranthene is not considered to be above the background concentration for organics.

All other SVOCs detected in surface soil samples from borings SB106001 and SB106002 were tentatively qualified as estimated concentrations below the MQLs. These SVOCs include polynuclear aromatic hydrocarbon (PAH) compounds, which are all qualified as estimated below the MQLs. These SVOCs also included several unidentified hydrocarbons, saturated and unsaturated hydrocarbon compounds (Table B-4).



Table 6-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1060 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27?
<b>Phase 3 - Surface Soil - Location SB106006</b>													
SB106005	BG0128	29-Nov-00	10	12	Arsenic	1.2	1.2		nv	6.58	Yes	5	NA
SB106005	BG0128	29-Nov-00	10	12	Cadmium	0.12	0.12		nv	0.59	Yes	0.5	NA
SB106005	BG0128	29-Nov-00	10	12	Copper	2.3	2.3		nv	13.72	Yes	130	NA
SB106005	BG0059	29-Nov-00	15	17	Arsenic	1.2	1.2		nv	6.58	Yes	5	NA
SB106005	BG0059	29-Nov-00	15	17	Cadmium	0.12	0.12		nv	0.59	Yes	0.5	NA
SB106005	BG0059	29-Nov-00	15	17	Copper	2.4	2.4		nv	13.72	Yes	130	NA
<b>Phase 3 - Surface Soil - Location SB106006</b>													
SB106006	BG0060	29-Nov-00	0	2	Arsenic	1.1	1.1		J	5.85	Yes	5	NA
SB106006	BG0060	29-Nov-00	0	2	Cadmium	0.11	0.11			0.556	Yes	0.5	NA
SB106006	BG0060	29-Nov-00	0	2	Copper	2.2	2.2			17.37	Yes	130	NA
SB106006	BG0061	29-Nov-00	0	2	Arsenic	1.1	1.1		nv	5.85	Yes	5	NA
SB106006	BG0061	29-Nov-00	0	2	Cadmium	0.11	0.11	U	nv	0.556	Yes	0.5	NA
SB106006	BG0061	29-Nov-00	0	2	Copper	2.2	2.2		nv	17.37	Yes	130	NA
<b>Phase 3 - Subsurface Soil - Location SB106006</b>													
SB106006	BG0129	29-Nov-00	5	7	Arsenic	1.1	1.1		nv	6.58	Yes	5	NA
SB106006	BG0129	29-Nov-00	5	7	Cadmium	0.11	0.11		nv	0.59	Yes	0.5	NA
SB106006	BG0129	29-Nov-00	5	7	Copper	2.2	2.2		nv	13.72	Yes	130	NA
SB106006	BG0129	29-Nov-00	5	7	Copper	2.2	4.71			13.72	No	130	No
SB106006	BG0062	29-Nov-00	10	12	Arsenic	1.2	1.2		nv	6.58	Yes	5	NA
SB106006	BG0062	29-Nov-00	10	12	Cadmium	0.12	0.12		nv	0.59	Yes	0.5	NA
SB106006	BG0062	29-Nov-00	10	12	Copper	2.4	2.4		nv	13.72	Yes	130	NA
SB106006	BG0130	29-Nov-00	15	17	Arsenic	1.1	1.1		nv	6.58	Yes	5	NA
SB106006	BG0130	29-Nov-00	15	17	Cadmium	0.11	0.11		nv	0.59	Yes	0.5	NA
SB106006	BG0130	29-Nov-00	15	17	Copper	2.3	2.3		nv	13.72	Yes	130	NA
SB106006	BG0130	29-Nov-00	15	17	Copper	2.3	49.2			13.72	No	130	Yes
<b>Phase 3 - Surface Soil - Location SB106007</b>													
SB106007	BG0131	29-Nov-00	0	2	Arsenic	1.2	1.2		nv	5.85	Yes	5	NA
SB106007	BG0131	29-Nov-00	0	2	Cadmium	0.12	0.12		nv	0.556	Yes	0.5	NA
SB106007	BG0131	29-Nov-00	0	2	Copper	2.3	2.3		nv	17.37	Yes	130	NA
<b>Phase 3 - Subsurface Soil - Location SB106007</b>													
SB106007	BG0132	29-Nov-00	5	7	Arsenic	1.1	1.1		nv	6.58	Yes	5	NA
SB106007	BG0132	29-Nov-00	5	7	Cadmium	0.11	0.11		nv	0.59	Yes	0.5	NA
SB106007	BG0132	29-Nov-00	5	7	Copper	2.2	2.2		nv	13.72	Yes	130	NA
SB106007	BG0133	29-Nov-00	10	12	Arsenic	1.1	1.1		nv	6.58	Yes	5	NA

Table 6-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1060 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
SB106007	BG0133	29-Nov-00	10	12	Cadmium	0.11	0.11		nv	0.59	Yes	0.5	NA
SB106007	BG0133	29-Nov-00	10	12	Copper	2.1	2.1		nv	13.72	Yes	130	NA
SB106007	BG0134	29-Nov-00	15	17	Arsenic	1.1	1.1		nv	6.58	Yes	5	NA
SB106007	BG0134	29-Nov-00	15	17	Cadmium	0.11	0.11		nv	0.59	Yes	0.5	NA
SB106007	BG0134	29-Nov-00	15	17	Copper	2.2	2.2		nv	13.72	Yes	130	NA

MSC = Media-Specific Concentration  
 NA = not applicable  
 MQL = Method Quantitation Limit  
 RRS 1 = Risk Reduction Standard 1  
 RRS 2 = Risk Reduction Standard 2  
 TNRCC = Texas Natural Resources Conservation Commission  
 UTL = Upper Tolerance Limit

Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte.  
<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Qualifier Definitions

= The analyte was positively identified  
 J = For inorganics, the associated value is an estimated quantity. For organics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample matrix.  
 M = A matrix effect was present.  
 U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.  
 F = The analyte was positively identified but the associated numerical value is below the reporting limit.  
 R = The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria.

Table 6-4  
 Summary of RFI Groundwater Analytical Detections Compared to Background and MSCs  
 DWS Building 1060 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Parameter	Reporting Limit (mg/L)	Result (mg/L)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup>	Does Result support closure under RRS 17	TNRCC MSC <sup>2</sup> (mg/L)	Does Result support closure under RRS 27
Phase 1 - WITCTA021											
WITCTA021	MS1584	1-May-97	Aluminum	0.5	0.0941	B	nv	1.332	Yes	100	NA
WITCTA021	MS1584	1-May-97	Arsenic	0.6	0.0247	B	nv	0.0049	No	0.05	Yes
WITCTA021	MS1584	1-May-97	Barium	0.02	0.578		nv	0.587	Yes	2	NA
WITCTA021	MS1584	1-May-97	Barium	0.1	0.566		nv	0.587	Yes	2	NA
WITCTA021	MS1584	1-May-97	Calcium	0.1	118		nv	266.3	NA	Essential Nutrient	NA
WITCTA021	MS1584	1-May-97	Iron	0.07	0.13		nv	0.2239	NA	Essential Nutrient	NA
WITCTA021	MS1584	1-May-97	Magnesium	0.3	6.84		nv	37.8	NA	Essential Nutrient	NA
WITCTA021	MS1584	1-May-97	Manganese	0.02	2.31		nv	0.175	No	14	Yes
WITCTA021	MS1584	1-May-97	Nickel	0.15	0.0056	B	nv	0.0204	Yes	0.002	NA
WITCTA021	MS1584	1-May-97	Potassium	5	1.51	B	nv	15.03	NA	Essential Nutrient	NA
WITCTA021	MS1584	1-May-97	Sodium	0.3	25.5		nv	167.2	NA	Essential Nutrient	NA
WITCTA021	MS1584	1-May-97	Zinc	0.02	0.0046	B	nv	0.118	Yes	31	NA
WITCTA021	MS1584	1-May-97	Methylene chloride	0.0003	0.00029	J,B	nv	0.0003	Yes	0.04	NA
WITCTA021	MS1584	1-May-97	Trichloroethene	0.001	0.00043	J	nv	0.001	Yes	0.005	NA
WITCTA021	MS1584	1-May-97	Vinyl chloride	0.0011	0.0099		nv	0.0011	No	0.002	No
WITCTA021	MS1584	1-May-97	Bis(2-ethylhexyl)phthalate	0.01	0.0023	J	nv	0.01	Yes	0.006	NA
Phase 1 - WITCTA022											
WITCTA022	MS1565	29-Apr-97	Aluminum	0.5	0.107	B	nv	1.332	Yes	100	NA
WITCTA022	MS1565	29-Apr-97	Antimony	0.01	0.0055	B	nv	0.002	No	0.006	Yes
WITCTA022	MS1565	29-Apr-97	Arsenic	0.01	0.0031	B	nv	0.0049	Yes	0.05	NA
WITCTA022	MS1565	29-Apr-97	Barium	0.02	0.115		nv	0.587	Yes	2	NA
WITCTA022	MS1565	29-Apr-97	Barium	0.1	0.116		nv	0.587	Yes	2	NA
WITCTA022	MS1565	29-Apr-97	Beryllium	0.003	0.00037	B	nv	0.0003	No	0.000004	No
WITCTA022	MS1565	29-Apr-97	Calcium	0.1	133		nv	266.3	NA	Essential Nutrient	NA
WITCTA022	MS1565	29-Apr-97	Iron	0.07	0.444		nv	0.2239	NA	Essential Nutrient	NA
WITCTA022	MS1565	29-Apr-97	Magnesium	0.3	5.49		nv	37.8	NA	Essential Nutrient	NA
WITCTA022	MS1565	29-Apr-97	Manganese	0.02	0.17		nv	0.175	Yes	14	NA
WITCTA022	MS1565	29-Apr-97	Potassium	5	1.82	B	nv	15.03	NA	Essential Nutrient	NA
WITCTA022	MS1565	29-Apr-97	Sodium	0.3	13.9		nv	167.2	NA	Essential Nutrient	NA
WITCTA022	MS1565	29-Apr-97	Zinc	0.02	0.0186	B	nv	0.118	Yes	31	NA
WITCTA022	MS1565	29-Apr-97	Cis-1,2-dichloroethene	0.0012	0.00055	J	nv	0.0012	Yes	0.07	NA
WITCTA022	MS1565	29-Apr-97	Isopropylbenzene	0.0005	0.0011		nv	0.0005	No	10	Yes

Table 6-4  
 Summary of RFI Groundwater Analytical Detections Compared to Background and MSCs  
 OWS Building 1060 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Parameter	Reporting Limit (mg/L)	Result (mg/L)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup>	Does Result support closure under RRS 1?	TNRCC MSC <sup>2</sup> (mg/L)	Does Result support closure under RRS 2?
WITCTA022	MS1565	29-Apr-97	Methylene chloride	0.0003	0.00062	B	nv	0.0003	No	0.04	Yes
WITCTA022	MS1565	29-Apr-97	N-butylbenzene	0.0011	0.00044	J	nv	0.0011	Yes	1.02	NA
WITCTA022	MS1565	29-Apr-97	Sec-butylbenzene	0.0013	0.00039	J	nv	0.0013	Yes	1.02	NA
WITCTA022	MS1565	29-Apr-97	Trichloroethene	0.001	0.0021		nv	0.001	No	0.005	Yes
WITCTA022	MS1565	29-Apr-97	Trichlorofluoromethane	0.0008	0.0055		nv	0.0008	No	0.031	Yes
WITCTA022	MS1565	29-Apr-97	Bis(2-ethylhexyl)phthalate	0.01	0.0017	J,B	nv	0.01	Yes	0.006	NA

Phase 2 - WITCTA022											
WITCTA022	BG3017	1-Dec-00	Antimony	0.005	0.005	U	nv	0.002	Yes	0.006	NA
WITCTA022	BG3017	1-Dec-00	Arsenic	0.005	0.00128	F	J	0.0049	Yes	0.05	NA
WITCTA022	BG3017	1-Dec-00	Cadmium	0.001	0.0003	F	U	0.0005	Yes	0.005	NA

MSC = Media Specific Concentration

NA = Not Applicable

MQL = Method Quantitation Limit

RRS 1 = Risk Reduction Standard 1

RRS 2 = Risk Reduction Standard 2

TNRCC = Texas Natural Resource Conservation Commission

UTL = Upper Tolerance Limit

mg/L = milligrams per liter

Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte.

<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media Specific Concentrations (MSCs) - Industrial Setting", July 14.

Validated Qualifier Definitions

J = For inorganics, the associated value is an estimated quantity. For organics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.

B = For inorganics, the reported value is an estimated quantity.

F = The analyte was positively identified but the associated numerical value is below the reporting limit.

nv = not validated

Although no detection limits were established for these compounds in the laboratory analysis, the values are below the PQL range (0.660 to 3.30 mg/kg) for SVOCs described in SW846 Method 8270 (EPA, 1997). Because all reported concentrations for these compounds (Table B-4) are below the range for the method used, they meet the requirements of RRS 1.

**Pesticides/PCBs.** No pesticides or PCBs were detected in the surface soil samples collected at Building 1060.

### 6.5.2 Groundwater

Monitoring wells WITCTA021 and WITCTA022 were installed in April 1997 in the vicinity of the OWS at Building 1060 (Figure 6-1). Groundwater samples were collected from these wells and analyzed for VOCs, SVOCs, and inorganics. Table 6-4 compares the detected groundwater concentrations to background concentrations and MSCs. The following subsections summarize the results from the Phase I RFI groundwater samples.

**VOCs.** Methylene chloride was detected at a concentration of 0.00062 B mg/L in the groundwater sample from WITCTA022. The result was qualified as blank contamination. Methylene chloride is considered a common laboratory contaminant and the concentrations in the samples are low levels likely to result from laboratory contamination.

TCE (0.0021 mg/L) and cis-1,2-DCE (0.55 mg/L) were detected above their respective MQLs in the groundwater sample from WITCTA022. However, because the extent of the AFP-4 TCE groundwater plume includes the area of Building 1060 and contaminants from this plume are managed under the AFP-4 Superfund Cleanup Program, the detected concentrations of TCE and its breakdown products are not considered as a result from releases from the OWS at Building 1060. Therefore, TCE and its breakdown products, such as cis-1,2-DCE, are considered to not be site-related.

N-butylbenzene, sec-butylbenzene, and isopropylbenzene were detected in the sample from WITCTA022 at concentrations between 0.00039 J mg/L and 0.00011 mg/L. Of these organics, isopropylbenzene (0.0011 mg/L) exceeded its MQL (0.0005 mg/L), but the concentration is well below its MSC (10 mg/L). Trichlorofluoromethane was detected at a concentration (0.0055 mg/L) that also exceeded its MQL (0.0008 mg/L), but is below its MSC (31 mg/L). Considering that the detected concentrations of isopropylbenzene and trichlorofluoromethane are only

marginally above their respective MQLs and are well below their respective MSCs, no additional delineation of these constituents should be required

Several TICs were also identified in the groundwater sample from WITCTA022 (Table B-5). No detection limits were established for these compounds in the SW8260 laboratory analysis. The TICs were detected at estimated concentrations below PQLs. They include unknown compounds, saturated hydrocarbons, and other named compounds. The origin of the TIC and unidentified hydrocarbon compounds is uncertain, but may originate from releases of petroleum-related products from the OWS. The PQL values anticipated for analysis of VOCs in groundwater by EPA Method SW8260 is approximately 0.005 mg/L. The PQL is described as highly dependent on the sample matrix and may not always be achievable (EPA, 1997). Because the maximum estimated concentration of these compounds is within 2 mg/L of the anticipated PQL, the concentrations are judged to be consistent with the PQL for the method used. As such, these compounds meet the requirements of RRS 1.

**Inorganics.** All reported concentrations of inorganic constituents in the groundwater sample from WITCTA022 were below background UTLs with the exception of antimony, beryllium, and iron (Table 6-4 and Figure 6-1). Antimony was detected at an estimated concentration (0.0055 B mg/L) that slightly exceeded its background concentration (0.002 mg/L), but is below MSC (0.006 mg/L). The beryllium concentration (0.00037 B mg/L) was slightly above its background UTL (0.0003 mg/L), but well below its MSC (0.004 mg/L). Iron is considered to be an essential nutrient and the reported concentration probably represents a slightly elevated natural groundwater concentration.

## **6.6 Results from Phase 2 Activities**

IT collected soil samples from two borings (SB106003 and SB106004) during the Phase 2 RFI in April 2000 to confirm and delineate arsenic and cadmium concentrations detected during the Law (1995) investigation. Additionally, a groundwater sample was collected from monitoring well WITCTA022 to confirm the elevated concentration of beryllium detected in the Phase 1 groundwater sample. Table 6-3 and Table 6-4 include the analytical results for the Phase 2 soil and groundwater samples, respectively. A summary of RFI SPLP results is shown in Table 6-5. Figure 6-1 shows the locations of the Phase 2 RFI samples. The following sections discuss the results of Phase 2 soil and groundwater samples.

Table 6-5

Summary of RFI SPLP Results Compared to Background and MSCs  
 OWS Building 1060 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/L)	Result (mg/L)	Laboratory Qualifier	Validation Qualifier	Background UTL <sup>1</sup> (mg/L)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/L)	Does Result Support Closure Under RRS 27
<b>Phase 2 - Location SB106003</b>													
SB106003	BG0008	20-Apr-00	0	2	Arsenic	2	0.0034		nv	0.0049	Yes	0.05	NA
SB106003	BG0008	20-Apr-00	0	2	Cadmium	1	0.0005	F	nv	0.0005	Yes	0.005	NA
SB106003	BG0009	20-Apr-00	15	17	Cadmium	1	0.000522	F	nv	0.0005	No	0.005	Yes
<b>Phase 2 - Location SB106004</b>													
SB106004	BG0010	20-Apr-00	16.5	18.5	Arsenic	2	0.0027		nv	0.0049	Yes	0.05	NA
<b>Phase 3 - Location SB106005</b>													
SB106005	BG0126	29-Nov-00	5	7	Arsenic	0.005	0.0052		nv	0.0049	No	0.05	Yes
<b>Phase 3 - Location SB106006</b>													
SB106006	BG0129	29-Nov-00	5	7	Copper		0.0361		nv	0.0028	No	1.3	Yes

ft bgs = feet below ground surface

mg/L = milligrams per liter

UTL = upper tolerance limit

TNRCC MSC = Texas Natural Resource Conservation Commission Media-Specific Concentrations

NA = not applicable

RRS 1 = Risk Reduction Standard 1, result is less than background

RRS 2 = Risk Reduction Standard 2, result is less than TNRCC MSC

SPLP = Synthetic Precipitation Leaching Procedure

Footnotes:

<sup>1</sup> - UTLs derived from Final Basewide Background Study, Jacobs Engineering, 1998

<sup>2</sup> - TNRCC Risk Reduction Standard media Specific Concentration (MSC) - Industrial Setting

Laboratory Qualifier Definitions:

" " = The analyte was positively identified

"U" = The analyte was analyzed for, but not detected

"F" = The analyte was positively identified but the associated numerical value is below the reporting limit

"J" = The analyte is present, but reported value may not be accurate or precise

"nv" = not validated

The associated numerical value is at or below the MDL

### **6.6.1 Surface Soil**

A surface soil sample was collected from Phase 2 boring SB106003 for analysis of arsenic and cadmium. As shown in Table 6-3 and Figure 6-1, the arsenic and cadmium concentrations detected in the surface soil sample from SB106003 were below their respective background concentrations.

### **6.6.2 Subsurface Soil**

Subsurface soil samples were collected from the 2-foot interval directly above the water table at Phase 2 soil borings (Figure 6-1). The cadmium concentration (0.156 mg/kg) detected in the sample collected from 15 to 17 feet bgs at SB106003 was below the background concentration for cadmium (0.59 mg/kg)

Arsenic was detected at a concentration (8.71 mg/kg) that exceeded its background concentration (6.58 mg/kg) in the sample collected from 16.5 to 18.5 feet bgs at SB106004. The SPLP analysis was performed on the sample and the SPLP result (0.0027 mg/L) was below the background concentration (0.0049 mg/L) and the MSC (0.05 mg/L) for arsenic. Therefore, a revised MSC of 8.71 mg/kg for arsenic in soil at the Building 1060 site was established.

### **6.6.3 Groundwater**

The groundwater sample collected during the Phase 2 RFI from WITCTA022 was submitted for analysis of beryllium. The beryllium concentration (0.00019 mg/L) in the Phase 2 groundwater sample was below the background concentration for beryllium (Table 6-4 and Figure 6-1). Therefore, the beryllium concentration detected in the Phase 1 groundwater sample from WITCTA022 was likely an extreme, but true, background concentration.

## **6.7 Results from OWS Removal Activities**

As shown in Table 6-6, the detected concentrations of arsenic and cadmium in each of the seven confirmation soil samples were below their respective background concentrations. Because the detected concentrations of arsenic and cadmium concentrations were below background, the results of the SPLP analysis were not required to determine revised MSCs for these inorganics

Table 6-6

Summary of Soil Analytical Detections from Confirmation Soil Samples  
 OWS Building 1060 - IT Corporation (September 2000)  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS2?
Building 1060 - OWS Excavation - Location #1 North Wall												
#1 North Wall	BG0046	8-Sep-00	7	8	Arsenic	1.1	4.05		6.58	Yes	5	Yes
#1 North Wall	BG0046	8-Sep-00	7	8	Cadmium	0.11	0.134		0.59	Yes	0.5	Yes
#1 North Wall	BG0046/SPLP	8-Sep-00	7	8	Arsenic	0.002 mg/L	0.0023 mg/L		0.005 mg/L	Yes	0.05 mg/L	Yes
#1 North Wall	BG0046/SPLP	8-Sep-00	7	8	Cadmium	0.001 mg/L	ND	U	0.0005 mg/L	Yes	0.005 mg/L	Yes
Building 1060 - OWS Excavation - Location #2 South Wall												
#2 South Wall	BG0047	8-Sep-00	7	8	Arsenic	1.1	1.88		6.58	Yes	5	Yes
#2 South Wall	BG0047	8-Sep-00	7	8	Cadmium	0.11	0.178		0.59	Yes	0.5	Yes
#2 South Wall	BG0047/SPLP	8-Sep-00	7	8	Arsenic	0.002 mg/L	0.004 mg/L		0.005 mg/L	Yes	0.05 mg/L	Yes
#2 South Wall	BG0047/SPLP	8-Sep-00	7	8	Cadmium	0.001 mg/L	0.00025 mg/L	F	0.0005 mg/L	Yes	0.005 mg/L	Yes
Building 1060 - OWS Excavation - Location #3 East Wall												
#3 East Wall	BG0044	8-Sep-00	7	8	Arsenic	1.1	0.982 F		6.58	Yes	5	Yes
#3 East Wall	BG0044	8-Sep-00	7	8	Cadmium	0.11	0.0641 F		0.59	Yes	0.5	Yes
#3 East Wall	BG0044/SPLP	8-Sep-00	7	8	Arsenic	0.002 mg/L	0.0033 mg/L		0.005 mg/L	Yes	0.05 mg/L	Yes
#3 East Wall	BG0044/SPLP	8-Sep-00	7	8	Cadmium	0.001 mg/L	ND	U	0.0005 mg/L	Yes	0.005 mg/L	Yes
Building 1060 - OWS Excavation - Location #4 West Wall												
#4 West Wall	BG0045	8-Sep-00	7	8	Arsenic	1.1	4.59		6.58	Yes	5	Yes
#4 West Wall	BG0045	8-Sep-00	7	8	Cadmium	0.11	0.143		0.59	Yes	0.5	Yes
#4 West Wall	BG0045/SPLP	8-Sep-00	7	8	Arsenic	0.002 mg/L	0.0044 mg/L		0.005 mg/L	Yes	0.05 mg/L	Yes
#4 West Wall	BG0045/SPLP	8-Sep-00	7	8	Cadmium	0.001 mg/L	ND	U	0.0005 mg/L	Yes	0.005 mg/L	Yes
Building 1060 - OWS Excavation - Location #5 East Floor												
#5 East Floor	BG0042	8-Sep-00	12	13	Arsenic	1.1	0.692 F		6.58	Yes	5	Yes
#5 East Floor	BG0042	8-Sep-00	12	13	Cadmium	0.11	ND	U	0.59	Yes	0.5	Yes
#5 East Floor	BG0042/SPLP	8-Sep-00	12	13	Arsenic	0.002 mg/L	ND	U	0.005 mg/L	Yes	0.05 mg/L	Yes
#5 East Floor	BG0042/SPLP	8-Sep-00	12	13	Cadmium	0.001 mg/L	0.0029 mg/L	F	0.0005 mg/L	No	0.005 mg/L	Yes
Building 1060 - OWS Excavation - Location #6 West Floor												
#6 West Floor	BG0043	8-Sep-00	12	13	Arsenic	1.1	1.46		6.58	Yes	5	Yes
#6 West Floor	BG0043	8-Sep-00	12	13	Cadmium	0.11	0.0957 F		0.59	Yes	0.5	Yes
#6 West Floor	BG0043/SPLP	8-Sep-00	12	13	Arsenic	0.002 mg/L	0.0021 mg/L		0.005 mg/L	Yes	0.05 mg/L	Yes
#6 West Floor	BG0043/SPLP	8-Sep-00	12	13	Cadmium	0.001 mg/L	ND	U	0.0005 mg/L	Yes	0.005 mg/L	Yes
Building 1060 - OWS Excavation - Location #7 South Wall												
#7 South Wall	BG0048	8-Sep-00	7	8	Arsenic	1.1	3.73		6.58	Yes	5	Yes
#7 South Wall	BG0048	8-Sep-00	7	8	Cadmium	0.11	0.294		0.59	Yes	0.5	Yes
#7 South Wall	BG0048/SPLP	8-Sep-00	7	8	Arsenic	0.002 mg/L	0.0042 mg/L		0.005 mg/L	Yes	0.05 mg/L	Yes
#7 South Wall	BG0048/SPLP	8-Sep-00	7	8	Cadmium	0.001 mg/L	0.00055	F	0.0005 mg/L	No	0.005 mg/L	Yes

MSC = Media-Specific Concentration  
 NA = not applicable  
 MQL = Method Quantitation Limit  
 RRS1 = Risk Reduction Standard 1  
 RRS2 = Risk Reduction Standard 2  
 TNRCC = Texas Natural Resources Conservation Commission  
 UTL = Upper Tolerance Limit  
 Footnotes  
 1 UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte.  
 2 TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Laboratory Qualifier Definitions  
 = The analyte was positively identified  
 F = The analyte was positively identified but the associated numerical value is below the reporting limit (RL)  
 U = The material was analyzed for, but not detected. The associated numerical value is at or below the method detection limit (MDL)  
 Mg/Kg - Milligram per Kilogram  
 Mg/L - Milligram per liter

## **6.8 Results from Phase 3 RFI Activities**

IT collected soil samples from three additional soil borings (SB106005 through SB106007) and also collected an additional groundwater sample from monitoring well WITCTA022 during the Phase 3 RFI in November 2000. At two of the soil boring locations (SB106005 and SB106006), soil samples were collected 5 feet above and below the former sample intervals, which indicated elevated concentrations of arsenic, cadmium, and copper. At confirmation soil boring SB106007, that was located in the middle of the former OWS excavation, soil samples were collected at 5-foot intervals from the surface to the water table and analyzed for arsenic, cadmium, and copper. A groundwater sample was also collected from WITCTA022 for analysis of antimony, arsenic, and cadmium.

The results from the Phase 3 soil samples at Building 1060 are shown in Table 6-2 and the results from SPLP analyses are shown in Table 6-5. The Phase 3 groundwater results are shown in Table 6-4. The Phase 3 analytical results are also shown in Figure 6-1. The following sections discuss the analytical results from soil and groundwater samples collected during the Phase 3 RFI activities.

### **6.8.1 Surface Soil**

IT collected three surface soil samples for analysis of arsenic, cadmium, and copper during the Phase 3 RFI in November 2000. The following subsections discuss the arsenic, cadmium, and copper detections in surface soil at the Building 1060 site.

**Arsenic.** Arsenic concentrations detected in surface soil samples from three Phase 3 boring locations (SB106005 through SB106007) were all below the background concentration for arsenic (5.85 mg/kg). Therefore, as shown in Figure 6-1, the elevated concentrations of arsenic identified during the Law (1995) investigation have been delineated by arsenic results from Phase 2 boring SB106003 and Phase 3 borings SB106005 and SB106006. The results from SB106007 indicates that the excavated material located at the surface of the former OWS excavation does not contain arsenic at elevated concentrations.

**Cadmium.** Cadmium detections in surface soil samples from three Phase 3 boring locations were all below the background concentration for cadmium (0.556 mg/kg). Therefore, as shown in Figure 6-1, the elevated concentrations of arsenic identified during the Law (1995) investigation have been delineated by cadmium results from Phase 2 boring SB106003 and Phase 3 borings SB106005 and SB106006. The results from SB106007 indicates that the excavated

material located at the surface of the former OWS excavation does not contain cadmium at elevated concentrations.

**Copper.** The detected copper concentrations identified in surface soil samples from the Phase 3 soil borings were all below the background concentration for copper (17.37 mg/kg).

### **6.8.2 Subsurface Soil**

IT collected subsurface soil samples from depths of 5 to 7 feet bgs and from 10 to 12 feet bgs at Phase 3 soil borings SB106005 and SB106006 for analysis of arsenic, cadmium, and copper. The purpose of these samples was to delineate inorganic concentrations detected above background during the Law (1995) investigation and the Phase 2 RFI. Three subsurface soil samples (5 to 7, 10 to 12, and 15 to 17 feet bgs) were collected soil boring SB106007 to confirm whether arsenic, cadmium, and copper concentration actually exceed background concentrations within the former OWS excavation. The following subsections discuss the analytical results from subsurface soil samples collected during the Phase 3 RFI activities.

**Arsenic.** The arsenic concentrations in all but one subsurface sample were below the basewide background concentration for arsenic (6.58 mg/kg). Arsenic was detected in the sample from 5 to 7 feet bgs at SB106005 at a concentration of 20.9 mg/kg. Considering that arsenic concentrations detected in the samples from 0 to 2 feet and 10 to 12 feet bgs were below background, the sample from 5 to 7 feet bgs was reanalyzed to confirm the elevated arsenic concentration. The arsenic concentration detected during the reanalysis for sample from 5 to 7 feet bgs at SB106005 (5.48 mg/kg) was below background (6.58 mg/kg).

The results from Phase 3 subsurface soil samples indicate the variability of arsenic concentrations within the same sample aliquot. Arsenic was detected at concentrations of 20.9 and 5.48 mg/kg in the sample collected from 5 to 7 feet bgs at SB106005. Another example of the variability of arsenic concentrations at the site can be seen in the surface soil sample collected at SB106006. Arsenic was detected in the regular sample at a concentration of 5.76 mg/kg, but was detected in the field duplicate at a concentration of 15.8 mg/kg. Therefore, it appears that elevated arsenic detections were extreme, but true, background concentrations.

**Cadmium.** The cadmium concentrations detected in the subsurface soil samples collected from the Phase 3 soil borings were all below background.

**Copper.** The detected copper concentrations identified in the subsurface soil samples from the Phase 3 soil borings were below the background concentration for copper except for the concentrations detected in the subsurface sample from 5 to 7 feet bgs from SB106005 and all three subsurface samples collected from boring SB106006. The copper concentration detected in the 5- to 7-foot interval from SB106005 (16.2 mg/kg) is only slightly higher than background and is likely an extreme, but true, background concentration. The copper concentrations detected in samples from 5 to 7 feet bgs (427 mg/kg), 10 to 12 feet bgs (14.9 mg/kg), and 15 to 17 feet bgs (49.7 mg/kg) at SB106006 also exceeded the background concentration (13.72 mg/kg). The concentration in the 5- to 7-foot sample interval also exceeded the MSC for copper (130 mg/kg). Reanalysis of the samples from 5 to 7 feet (471 mg/kg) and 15 to 17 feet (49.2 mg/kg) from SB106006 confirmed the original results. The SPLP procedure was performed on the sample from 5 to 7 feet bgs at SB106006 to determine the potential for copper to leach into groundwater. As shown in Table 6-5, the SPLP concentration detected in this sample (0.0361 mg/L) was below the MSC for copper in groundwater (1.3 mg/L). Therefore, a revised MSC of 471 mg/kg was established for copper at Building 1060.

The elevated copper concentrations detected in the subsurface soil samples from SB106006 are not likely the result of a release from the OWS at Building 1060 considering that copper concentrations detected in the four samples from the boring (SB106007) located in the center of the former OWS excavation were below background. As shown in Figure 6-1, the copper concentrations increase from the samples collected at SB106007 to former Law boring 1060-SB03 and finally SB106006. This pattern of copper concentrations suggest that a release from the OWS is not the source of the elevated copper concentrations.

### **6.8.3 Groundwater**

As shown in Table 6-4, arsenic and cadmium detections from the groundwater sample collected from WITCTA022 were below their associated background concentrations. Antimony was not detected in the Phase 3 groundwater sample from WITCTA022. Therefore, the antimony concentration detected in the Phase 1 sample was likely an extreme variation in the background concentration.

## **6.9 Summary and Discussion**

Law (1995) collected soil samples for analysis of VOCs and inorganics at three locations adjacent to the OWS at Building 1060 during their initial site investigation in 1994. The analytical results from the Law investigation indicated that arsenic, cadmium, and copper

concentrations exceeded the basewide background concentrations determined by Jacobs (1998). IT collected surface and subsurface soil samples from two locations (SB106001 and SB106002) for analysis of SVOCs and pesticides/PCBs during the Phase 1 Sanitary Sewer System RFI in 1997. IT also installed and sampled monitoring well WITCTA022 as part of the Phase 1 RFI activities to determine if groundwater had been impacted at the site.

In April 2000, IT collected soil samples from two soil borings (SB106003 and SB106004) as part of the Phase 2 RFI in an attempt to confirm/delineate inorganic compounds identified during the Law investigation. Additionally, a groundwater sample was collected from monitoring well WITCTA022 for analysis of beryllium to confirm the elevated beryllium concentration detected in the Phase 1 RFI.

Seven confirmation soil samples were collected from the OWS excavation during removal activities in September 2000. The confirmation soil samples were submitted for analysis of arsenic and cadmium. IT collected surface and subsurface soil samples from three additional soil borings (SB106005 through SB106006) during the Phase 3 RFI activities in November 2000 to delineate arsenic, cadmium, and copper to basewide background levels. A groundwater sample was also collected from WITCTA022 in November 2000 to confirm antimony, arsenic, and cadmium concentrations.

Figure 6-1 displays the analytical results exceeding background from the Law (1995) investigation and the Phase 1 RFI. Additionally, Figure 6-1 displays the analytical results obtained from samples collected during the Phase 2 and Phase 3 RFIs to show that contaminant concentrations have been delineated to basewide background concentrations. The following sections summarize the analytical results for surface soil, subsurface soil, and groundwater samples collected at the Building 1060 site.

### **6.9.1 Surface Soil**

One VOC, methylene chloride, was detected in surface soil at a concentration that is likely the result of laboratory contamination. No SVOCs or pesticides/PCBs were detected above MQLs in the surface soil samples collected by IT in 1997. However, several inorganics, including arsenic, cadmium, calcium, copper, and magnesium were detected above background concentrations in the surface soil samples collected in the former Law (1995) borings.

The copper concentration detected above background, but below the MSC for copper, in the surface soil sample from former Law (1995) boring 1060-SB03 has been delineated by the results from Phase 3 borings SB106005 and SB106006. Considering that copper was not detected above background in any of the intervals from the Phase 3 confirmation boring (SB106007), located within the former OWS excavation, it does not appear that the copper concentrations detected by Law were the result of a release from the OWS at Building 1060.

Elevated concentrations of arsenic and cadmium in surface soil were delineated during the Phase 2 and Phase 3 RFI (Figure 6-1). All inorganic detections during the Phase 2 and Phase 3 RFI were at or below the respective background concentrations for inorganics.

### **6.9.2 Subsurface Soil**

One VOC, methylene chloride, was detected in subsurface soil samples by Law (1995) at concentrations that were likely the result of laboratory contamination. No SVOCs or pesticides/PCBs were detected above MQLs in the subsurface soil samples collected by IT in 1997. Inorganic compounds that were consistently detected above background in the subsurface soil samples collected by Law (1995) included arsenic, cadmium, and copper.

Arsenic and cadmium were not detected above background concentrations in the seven confirmation soil samples collected during the OWS removal at Building 1060. The arsenic and cadmium concentrations were all below background in the Phase 3 confirmation soil boring (SB106007) at depths of 5 to 7, 10 to 12, and 15 to 17 feet bgs. Considering the analytical results of the samples collected by IT in the Phase 2 and Phase 3 RFI subsurface soil samples, along with the results from the samples collected during the OWS closure, there does not appear to be a pattern of elevated arsenic and cadmium concentrations in soil at Building 1060. The concentrations detected by Law appear to have been biased high based upon the results from samples collected by IT.

The elevated copper concentrations detected in the subsurface soil samples at Building 1060 are not likely the result of a release from the OWS at Building 1060 considering that copper concentrations detected in the four samples from the boring (SB106007) located in the center of the former OWS excavation were below background. As shown in Figure 6-1, the copper concentrations increase from the samples collected at SB106007 to former Law boring 1060-SB03 and finally SB106006. This pattern of copper concentrations suggests that a release from the OWS is not the source of the elevated copper concentrations. The copper concentrations

detected in subsurface soil samples do not exceed the revised MSC of 471 mg/kg, which was established because the SPLP concentration detected in the sample from 5 to 7 feet bgs at SB106006 (0.0361 mg/L) was below the MSC for copper in groundwater (13 mg/L).

### **6.9.3 Groundwater**

Chlorinated solvents, including TCE and its breakdown products, were detected in the groundwater sample collected during the Phase 1 RFI at WITCTA022. However, because the extent of the AFP-4 TCE groundwater plume includes the area of Building 1060 and the contaminants from this plume are managed under the AFP-4 Superfund Cleanup Program, the chlorinated solvents (i.e., TCE and its breakdown products, such as cis-1,2-DCE) detected in monitoring well WITCTA022 are not considered as evidence of a release from the OWS at Building 1060.

Isopropylbenzene and trichlorofluoromethane were detected at concentrations marginally above their respective MQLs, but were four orders of magnitude below their respective MSCs. Methylene chloride was detected at a concentration that was likely the result of laboratory contamination. No other VOCs or SVOCs were detected above MQLs.

Beryllium was detected at a concentration (0.00037 mg/L) slightly above background (0.0003 mg/L) in the Phase 1 groundwater sample. However, beryllium was detected at a concentration (0.00018 mg/L) below the background concentration in the sample collected during Phase 2 RFI activities in April 2000. Similarly, antimony was detected above background in the Phase 1 RFI groundwater sample but was not detected in the sample collected during the Phase 3 RFI. Therefore, the antimony and beryllium concentrations identified in groundwater during the Phase 1 activities were likely extreme, but true, background concentrations.

### **6.10 Conclusions**

The analytical results from soil and groundwater samples collected in the vicinity of the OWS at Building 1060 indicate that a significant release of hazardous substances has not occurred. Considering that the influent to the OWS contained petroleum-type products, the absence of elevated concentrations exceeding RRS 2 for VOCs and SVOCs in soil and groundwater samples provides evidence any release of contaminants that may have occurred from the OWS at Building 1060 has not significantly impacted the environment.

Several inorganics including arsenic, cadmium, and copper were detected at concentrations exceeding basewide background concentrations in the soil samples collected by Law (1995). Arsenic and cadmium concentrations detected during the Law (1995) investigation also exceeded their respective MSCs. The elevated concentrations of these inorganics were delineated by analytical results from the Phase 2 and Phase 3 RFIs. Although the arsenic and cadmium concentrations detected during the Law investigation exceeded MSCs, it has been shown that the concentrations of these inorganics detected by Law (1995) are consistently higher than the concentrations detected in soil samples collected by IT.

Considering that no clear pattern of inorganic concentrations exceeding MSCs was observed in the subsurface samples collected by IT during Phases 1 through 3 of the RFI and that all inorganic compounds have been delineated to basewide background concentrations by the results from Phase 2 and Phase 3 samples, NFA is warranted for the OWS at Building 1060 and the site is recommended for closure under RRS 2. Should this recommendation be accepted, a letter stating that closure of AOC 11 (OWS at Building 1060) was carried out in accordance with TAC §335.555, and signed by an Air Force representative, will be transmitted to TNRCC, along with a metes and bounds description of AOC 11. The metes and bounds description will correspond to surveyed coordinates of the affected area shown in Figure 6-1.

# TAB

7.0

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## **7.0 OWS Building 1064**

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The following sections provide a description of the OWS at Building 1064, a summary of the site characterization activities, a discussion of the site-specific geology and hydrology, discussions of the analytical results from each characterization event, and recommendations based upon the physical and chemical data collected at the site.

### **7.1 Site Description**

The OWS at Building 1064 is located adjacent to the south edge of Building 1064 in a grassy area, and is designated AOC 10 (Figure 7-1). The OWS was installed in 1988 and has a 18,000 gallon capacity designed to treat spills from refueling operations at the truck refueling station (Building 1064). The OWS unit is a below-ground rectangular concrete pit with concrete baffles and is covered by steel grates. The OWS is equipped with a leak detection monitoring well on each corner. The Building 1064 storm sewer contributes influent to the separator unit. The influent travels through the OWS by gravity flow and passes through the baffle system. Fuel products are separated from the flow, and the water is discharged into the Sanitary Sewer System (Law, 1995)

Pumping and steam cleaning of the OWS at Building 1064 was completed July 31, 1995 (CRA, 1995). A total of 19,811 gallons of waste was removed from the OWS during the decontamination process. Prior to decontamination activities, the contents of the OWS were sampled on September 27, 1994 and submitted to Huntingdon/Southwestern Engineering & Environmental Inc., for analysis for TPH (EPA Method 418.1), TCLP metals (SW846), and BTEX (EPA Method SW8020). TPH was detected at a concentration of 3.5 mg/L. Barium was detected at a concentration of 0.417 mg/L. No other metals were detected in excess of the detection limit. Total BTEX was measured at 0.031 mg/L. Toluene and total xylenes were detected at 0.016 and 0.015 mg/L, respectively. Benzene and ethyl benzene were not detected in excess of the detection limit.

The OWS at Building 1064 was also included in a pumping and steam cleaning effort by D. D. and Beauty, a nonhazardous liquid waste removal company, during April and May 1993. The contents of the OWS were pumped from the unit, drummed, sampled, and disposed of (CB, 1994). The inside of the OWS was steam-cleaned and photographed.

**LEGEND**

- BUILDING 1064 INDUSTRIAL WASTE OIL/WATER SEPARATOR UNIT
- IT CORP. SOIL BORING (1997) (SVOCs AND PESTICIDES/PCBs)
- IT CORP. PHASE 2 BORING (2000)
- IT CORP. PHASE 3 BORING (2000)
- IT CORP. MONITORING WELL
- LAW ENGINEERING SOIL BORING (VOCs & METALS)
- GROUNDWATER FLOW DIRECTION
- SEWER LINE AND DIRECTIONAL FLOW
- FENCE
- RRS 2 SURVEY BOUNDARY
- PHASE 1 RESULTS > BACKGROUND
- PHASE 2 RESULTS
- PHASE 3 RESULTS
- ANALYTE DETECTED ABOVE MSC. SPLP NOT PERFORMED

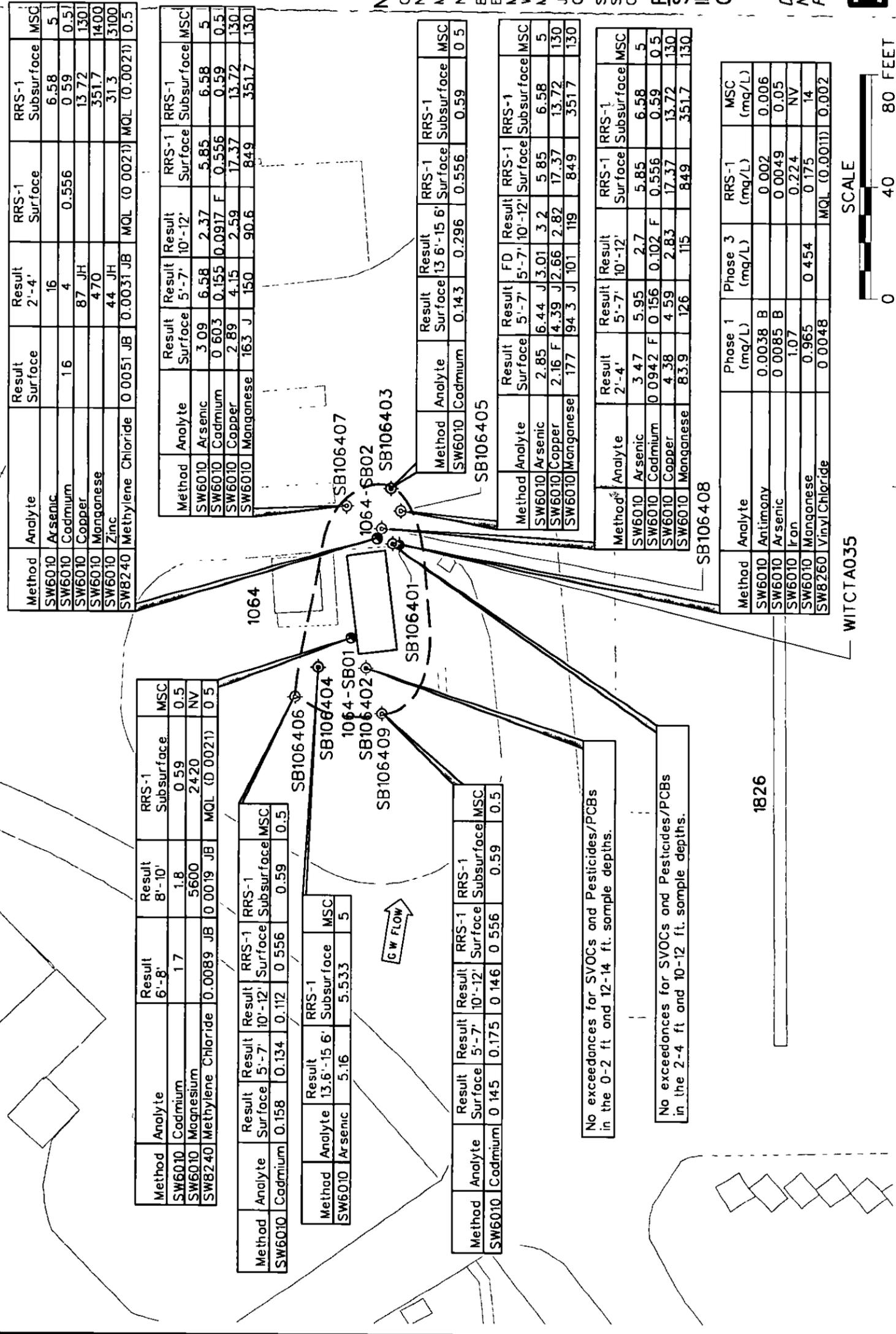
**NOTES:**

CONCENTRATIONS REPORTED IN MG/KG UNLESS NOTED OTHERWISE.  
 MSC - MEDIA-SPECIFIC CONCENTRATION.  
 NV - NO VALUE  
 B - FOR INORGANICS, THE QUANTITATION IS AN ESTIMATED CONCENTRATION BETWEEN THE MDL AND PQL FOR ORGANICS, THE CONSTITUENT WAS ALSO DETECTED IN THE ASSOCIATED METHOD BLANK.  
 J - THE ANALYTE WAS POSITIVELY IDENTIFIED, THE QUANTITATION IS AN ESTIMATION.  
 SOURCE: DRAFT RCRA FACILITIES INVESTIGATION SANITARY SEWER SYSTEM, SEPTEMBER 1997, IT CORPORATION.

**FIGURE 7-1**

**SITE MAP SHOWING INVESTIGATION RESULTS OWS BUILDING 1064 (AOC 10)**

DRAFT RFI REPORT  
 MAS FORT WORTH JRB  
 FORT WORTH, TEXAS



No exceedances for SVOCs and Pesticides/PCBs in the 0-2 ft and 12-14 ft. sample depths.

No exceedances for SVOCs and Pesticides/PCBs in the 2-4 ft and 10-12 ft. sample depths.

1826

WITCTA035

SCALE



Visual observation and personnel interviews did not indicate a need for replacement or repair of the OWS (Law, 1995).

## **7.2 Site Characterization Activities**

A summary of the soil and groundwater samples that have been collected at the Building 1064 site is provided in Table 7-1. The analytical methods associated with each soil sample collected at Building 1064 are also presented in Table 7-1. The locations of the soil borings are shown in Figure 7-1. The following sections discuss the investigation activities that have been performed to characterize environmental impacts relating to the OWS at Building 1064.

### **7.2.1 Initial Site Investigation – Law 1994**

Law (1995) collected soil samples in 1994 from two borings located on the north and east sides of the OWS at Building 1064 (Figure 7-1). Soil borings 1064-SB02 and 1064-SB01 were advanced to depths of four and 10 feet bgs, respectively. One surface soil sample was collected from surface to two feet in depth at boring 1064-SB02. A total of three subsurface soil samples were collected from both borings, at depths ranging from 2 to 10 feet. Samples were analyzed for VOCs (EPA Method SW8240) and inorganics (EPA Method SW6010) (Law, 1995). A summary of all soil sampling and analysis performed at the Building 1064 site throughout the RFI and previous investigations is provided in Table 7-1.

### **7.2.2 Phase 1 RFI Activities – IT Corporation 1997**

IT collected soil samples during the Phase 1 Sanitary Sewer System RFI (Table 7-1) in 1997 from borings SB106401 and SB106402 located adjacent to the southeast and northwest corners of the Building 1064 OWS (Figure 7-1). One surface soil sample was collected from surface to 2 feet in depth at boring SB106402. Three subsurface soil samples were collected at the 2-foot interval directly above the water table or refusal (2 to 14 feet bgs). These soil samples were analyzed for SVOCs (EPA Method SW8270) and pesticides/PCBs (EPA Method SW8080) to supplement soil data collected during the Law (1995) investigation (IT, 1998).

Table 7-1

Summary of Previous Environmental Samples  
 Collected at Building 1064  
 NAS Fort Worth JRB, Texas

Sample Location	Sample Date	Sample Number	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Analysis	Analytical Method
<b>Law Engineering - Initial Site Investigation (1994)</b>						
1064-SB01	4/27/94	106401SBD	6	8	Inorganics, VOCs	EPA SW6010, SW8240
		106401SBE	8	10	Inorganics, VOCs	EPA SW6010, SW8240
1064-SB02	4/27/94	106402SBA	0	2	Inorganics, VOCs	EPA SW6010, SW8240
		106402SBB	2	4	Inorganics, VOCs	EPA SW6010, SW8240
<b>IT Corporation - Phase 1 RFI (1997)</b>						
SB106401	3/24/97	MS1175	2	4	Pesticides/PCBs, SVOCs	EPA SW8081, SW8270
		MS1176	10	12	Pesticides/PCBs, SVOCs	EPA SW8081, SW8270
SB106402	3/24/97	MS1173	0	2	Pesticides/PCBs, SVOCs	EPA SW8081, SW8270
		MS1174	12	14	Pesticides/PCBs, SVOCs	EPA SW8081, SW8270
WITCTA035	5/1/97	MS1585	GW	GW	Inorganics, VOCs, SVOCs	EPA SW6010, SW8260, SW8270
<b>IT Corporation - Phase 2 RFI (2000)</b>						
SB106403	4/20/00	BG011	0.5	2	Cd	EPA SW6010B
		BG012	13.6	15.6	Cd	EPA SW6010B
SB106404	4/20/00	BG013	13.6	15.6	As	EPA SW6010B
		BG014	13.6	15.6	As	EPA SW6010B
<b>IT Corporation - Phase 3 RFI (2000)</b>						
SB106405	12/4/00	BG0063	10	12	As, Cu, Mn	EPA SW6010B
		BG0135	0	2	As, Cu, Mn	EPA SW6010B
		BG0136	5	7	As, Cu, Mn	EPA SW6010B
		BG0137	5	7	As, Cu, Mn	EPA SW6010B
SB106406	12/4/00	BG0064	10	12	Cd	EPA SW6010B
		BG0138	0	2	Cd	EPA SW6010B
		BG0139	5	7	Cd	EPA SW6010B
SB106407	12/4/00	BG0065	10	12	As, Cd, Cu, Mn	EPA SW6010B
		BG0140	0	2	As, Cd, Cu, Mn	EPA SW6010B
		BG0141	5	7	As, Cd, Cu, Mn	EPA SW6010B

Table 7-1

Summary of Previous Environmental Samples  
 Collected at Building 1064  
 NAS Fort Worth JRB, Texas

Sample Location	Sample Date	Sample Number	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Analysis	Analytical Method
SB106408	12/4/00	BG0066	2	4	As, Cd, Cu, Mn	EPA SW6010B
		BG0143	10	12	As, Cd, Cu, Mn	EPA SW6010B
SB106409	12/4/00	BG0144	0	2	Cd	EPA SW6010B
		BG0145	5	7	Cd	EPA SW6010B
		BG0146	10	12	Cd	EPA SW6010B
WITCTA035	12/1/00	BG3019	GW	GW	Mn	EPA SW6010B
		BG3020	GW	GW	Mn	EPA SW6010B

VOCs - Volatile Organic Compounds  
 SVOCs - Semivolatile Organic Compounds  
 PCBs - Polychlorinated Biphenols

As - Arsenic  
 Cd - Cadmium  
 Cu - Copper  
 Mn - Manganese

Monitoring well WITCTA035 was installed during the Phase 1 RFI in April 1997 immediately adjacent to boring SB106401 (Figure 7-1). The well was completed to a total depth of 19.4 feet bgs, with a screen interval from 9.4 to 19.4 feet bgs. Well WITCTA035 was developed and groundwater sample MS1585 was collected from the well in May 1997. Sample MS1585 was analyzed for VOCs, SVOCs, and inorganics (IT, 1998).

### **7.2.3 Phase 2 RFI Activities – IT Corporation 2000**

Additional soil sampling was performed by IT during the Phase 2 RFI in April 2000 (Table 7-1). Two soil borings were advanced, one northwest (SB106404) and one southeast (SB106405) of the OWS at Building 1064 (Figure 7-1). Samples BG0011 and BG0012 were collected from SB106403 from 0.5 to 2 feet in depth and 13.6 to 15.6 feet in depth, respectively. These samples were analyzed for cadmium to delineate a concentration detected in 1064-SB02. Sample BG0013 was collected at SB106404 from 13.6 to 15.6 feet in depth and analyzed for arsenic.

### **7.2.4 Phase 3 RFI Activities – IT Corporation 2000**

Additional sampling was completed by IT, during Phase 3 of the RFI in November 2000 (Table 7-1), to delineate arsenic, cadmium, copper, and/or manganese concentrations that exceeded background concentrations in subsurface samples. Additionally, a confirmation soil boring was sampled to confirm/replicate arsenic and cadmium concentrations detected above MSCs, and to confirm elevated concentrations of copper and manganese detected during the Law (1995) investigation. In each of the five borings (Figure 7-1), soil samples were collected at 5-foot intervals until the water table was encountered. Samples were collected from 0 to 2, 5 to 7, and 10 to 12 feet bgs at SB106405 and analyzed for arsenic, copper, and manganese. Samples were collected from 0 to 2, 5 to 7, and 10 to 12 feet bgs at SB106406 and analyzed for cadmium. Samples were collected from 0 to 2, 5 to 7, and 10 to 12 feet bgs at SB106407 and analyzed for arsenic, cadmium, copper, and manganese. Samples were collected from 2 to 4, 5 to 7, and 10 to 12 feet bgs at SB106408 and analyzed for arsenic, cadmium, copper, and manganese. Samples were collected from 0 to 2, 5 to 7, and 10 to 12 feet bgs at SB106409 and analyzed for cadmium. Additionally, a groundwater sample was collected from monitoring well WITCTA035 to confirm the manganese concentration detected during the Phase 1 investigation.

### **7.3 Site-Specific Conditions**

The following subsections discuss the site-specific geology and hydrogeology characteristics that were encountered during the investigation activities at Building 1064.

**Geology.** Quaternary alluvium is found at the surface through most of the NAS Fort Worth area. The alluvium consists of floodplain and fluvial terrace deposits of gravel, sand, silt, and clay that occur as a veneer on the eroded surface of Upper Cretaceous strata. Soil boring logs from Building 1064 (Appendix A) indicate fill material containing a loose, varied mixture of silt, sand, and gravel, extending down to an approximate depth of 10 feet bgs at the southeast corner of the OWS. Fill material extends down to approximately 6 feet bgs at the northeast corner of the OWS. Below the fill material, boring logs indicate moist, stiff clayey gravel with varying amounts of sand and silt. Soils below the fill material were generally yellow or brownish-yellow in color, and saturated soils were indicated below approximately 14 feet bgs. Borings SB106401 and SB106402 were advanced to total depths of 16 feet bgs.

The alluvial soils rest unconformably on the top of the weathered Walnut Formation. Underlying the Quaternary alluvium is the Cretaceous-aged Walnut Formation, which consists of 20 to 30 feet of indurated fossiliferous limestone interbedded with brown sandy clay, thinly bedded fossiliferous clay, and fissile shale. Unconformably underlying the Walnut Formation is the Cretaceous-aged Paluxy Formation. The Paluxy Formation generally consists of coarse-grained sand that grades upward into fine-grained sand with variable amounts of shale and limestone. The sandstone, composed of fine- to coarse-grained white quartz, is well-sorted, poorly consolidated, and cross-bedded. The Paluxy Formation thickness ranges from 140 to 190 feet, averaging 160 feet in Tarrant County (Radian, 1991).

**Hydrogeology.** Shallow groundwater within the Quaternary alluvium occurs in fluvial terrace deposits of sand and gravel, which occur as a veneer on the eroded surface of the Walnut Formation. The soil description log from boring SB106401 adjacent to monitoring well WITCTA035 (Appendix A) indicated gravel and sand throughout the boring, and saturated conditions below 14 feet bgs. Monitoring well WITCTA035 was installed southeast of Building 1064 (Figure 7-1). The well screen was placed below the fill material and across the undisturbed gravel and sand resting on the top of the Walnut Formation, at approximately 20 feet bgs. Groundwater flow at the Building 1064 site is to the east and southeast toward Farmers Branch Creek and the Trinity River.

## **7.4 Results from Initial Site Investigation**

Law (1995) collected soil samples in 1994 from two borings (1064-SB01 and 1064-SB02) located on the north and east sides of the OWS at Building 1064 (Figure 7-1). Table 7-2 contains a summary of the analytes detected in the samples collected by Law (1995) and compares the detected concentrations to basewide background concentrations and MSCs. Detected analyte concentrations, which exceeded background concentrations, are shown on Figure 7-1. The following sections present the results from surface and subsurface soil samples that were collected by Law (1995) during the initial site investigation at Building 1064.

### **7.4.1 Surface Soil**

One surface soil sample was collected from surface to 2 feet in depth at boring 1064-SB02 and submitted for analysis of VOCs and inorganics. The following subsections discuss the analytical results from the surface soil sample collected during the initial site assessment.

**VOCs.** The only VOC detected above the PQL in surface soil samples was methylene chloride (0.0051 JB mg/kg). Considering that the detected concentration was qualified as blank contamination and is well below the established MSC of 0.5 mg/kg for methylene chloride, the results are likely the result of laboratory contamination. Methylene chloride is a common laboratory contaminant.

**Inorganics.** Inorganics detected in the Law (1995) surface samples detected aluminum, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc (Table 7-2). Of these inorganics, only the detected concentration of cadmium (1.6 mg/kg) exceeded background. The cadmium concentration also exceeded its MSC of 0.5 mg/kg.

### **7.4.2 Subsurface Soil**

Three subsurface soil samples were collected by Law from 2 to 4 feet bgs at boring 1064-SB02, and from 6 to 8 and 8 to 10 feet bgs at boring 1064-SB02. The subsurface soil samples were submitted for analysis of VOCs and inorganics. The following subsections discuss the analytical results from the subsurface soil samples collected by Law (1995).

Table 7-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 DWS Building 1064 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
Building 1064 - Subsurface Soil - Location 1064-SB01												
1064-SB01	106401SBD	4/27/94	6	8	METHYLENE CHLORIDE	0.0089	0.0089	JB		No	0.5	Yes
1064-SB01	106401SBD	4/27/94	6	8	ALUMINIUM	1900	1900		20260	Yes	10000	NA
1064-SB01	106401SBD	4/27/94	6	8	ARSENIC	4.3	4.3		5.58	Yes	5	NA
1064-SB01	106401SBD	4/27/94	6	8	BARIUM	42	42		128.1	Yes	200	NA
1064-SB01	106401SBD	4/27/94	6	8	CADMIUM	1.7	1.7		0.59	No	0.5	No
1064-SB01	106401SBD	4/27/94	6	8	CALCIUM	110000	110000		272000	Yes	Essential Nutrient	NA
1064-SB01	106401SBD	4/27/94	6	8	CHROMIUM, TOTAL	3.1	3.1		16.31	Yes	10	NA
1064-SB01	106401SBD	4/27/94	6	8	COBALT	3.4	3.4		6.19	Yes	610	NA
1064-SB01	106401SBD	4/27/94	6	8	COPPER	12.0	12.0	JH	13.72	Yes	130	NA
1064-SB01	106401SBD	4/27/94	6	8	IRON	6100	6100		17469	Yes	Essential Nutrient	NA
1064-SB01	106401SBD	4/27/94	6	8	LEAD	6.9	6.9		12.66	Yes	1.5	NA
1064-SB01	106401SBD	4/27/94	6	8	MAGNESIUM	880	880		2420	Yes	Essential Nutrient	NA
1064-SB01	106401SBD	4/27/94	6	8	MANGANESE	240	240		351.7	Yes	1400	NA
1064-SB01	106401SBD	4/27/94	6	8	NICKEL	5.2	5.2		19.76	Yes	200	NA
1064-SB01	106401SBD	4/27/94	6	8	POTASSIUM	350	350		1717	Yes	Essential Nutrient	NA
1064-SB01	106401SBD	4/27/94	6	8	SODIUM	76	76		53200	Yes	Essential Nutrient	NA
1064-SB01	106401SBD	4/27/94	6	8	VANADIUM	7.1	7.1		37.4	Yes	72	NA
1064-SB01	106401SBD	4/27/94	6	8	ZINC	16	16	JH	31.3	Yes	3100	NA
Building 1064 - Subsurface Soil - Location 1064-SB01												
1064-SB01	106401SBE	4/27/94	8	10	METHYLENE CHLORIDE	0.0019	0.0019	JB		No	0.5	Yes
1064-SB01	106401SBE	4/27/94	8	10	ALUMINIUM	3700	3700		20260	Yes	10000	NA
1064-SB01	106401SBE	4/27/94	8	10	ARSENIC	3.4	3.4		6.58	Yes	5	NA
1064-SB01	106401SBE	4/27/94	8	10	BARIUM	48	48		128.1	Yes	200	NA
1064-SB01	106401SBE	4/27/94	8	10	CADMIUM	1.8	1.8		0.59	No	0.5	No
1064-SB01	106401SBE	4/27/94	8	10	CALCIUM	27000	27000		272000	Yes	Essential Nutrient	NA
1064-SB01	106401SBE	4/27/94	8	10	CHROMIUM, TOTAL	6.7	6.7		16.31	Yes	10	NA
1064-SB01	106401SBE	4/27/94	8	10	COBALT	2.6	2.6		6.19	Yes	610	NA
1064-SB01	106401SBE	4/27/94	8	10	COPPER	6.5	6.5	JH	13.72	Yes	130	NA
1064-SB01	106401SBE	4/27/94	8	10	IRON	6000	6000		17469	Yes	Essential Nutrient	NA
1064-SB01	106401SBE	4/27/94	8	10	LEAD	11.0	11.0		12.66	Yes	1.5	NA
1064-SB01	106401SBE	4/27/94	8	10	MAGNESIUM	5600	5600		2420	No	Essential Nutrient	NA
1064-SB01	106401SBE	4/27/94	8	10	MANGANESE	130	130		351.7	Yes	Essential Nutrient	NA
1064-SB01	106401SBE	4/27/94	8	10	NICKEL	4.7	4.7		19.76	Yes	200	NA
1064-SB01	106401SBE	4/27/94	8	10	POTASSIUM	560	560		1717	Yes	Essential Nutrient	NA
1064-SB01	106401SBE	4/27/94	8	10	SODIUM	22	22		53200	Yes	Essential Nutrient	NA
1064-SB01	106401SBE	4/27/94	8	10	VANADIUM	12.0	12.0		37.4	Yes	72	NA
1064-SB01	106401SBE	4/27/94	8	10	ZINC	13	13	JH	31.3	Yes	3100	NA

Table 7-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1064 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
<b>Building 1064 - Surface Soil - Location 1064-SB02</b>												
1064-SB02	106402SBA	4/27/94	0	2	METHYLENE CHLORIDE		0.0051	JB		No	0.5	Yes
1064-SB02	106402SBA	4/27/94	0	2	ALUMINIUM		4300		22035	Yes	10000	NA
1064-SB02	106402SBA	4/27/94	0	2	ARSENIC	3.2	3.2		5.85	Yes	5	NA
1064-SB02	106402SBA	4/27/94	0	2	BARIUM		50		233	Yes	200	NA
1064-SB02	106402SBA	4/27/94	0	2	CADMIUM		1.6		0.556	No	0.5	No
1064-SB02	106402SBA	4/27/94	0	2	CALCIUM		84000		167788	No	Essential Nutrient	Yes
1064-SB02	106402SBA	4/27/94	0	2	CHROMIUM, TOTAL		6.0		25.86	Yes	10	NA
1064-SB02	106402SBA	4/27/94	0	2	COBALT		2.7		11.05	Yes	610	NA
1064-SB02	106402SBA	4/27/94	0	2	COPPER		6.8	JH	17.37	Yes	130	NA
1064-SB02	106402SBA	4/27/94	0	2	IRON		5600		17717	No	Essential Nutrient	Yes
1064-SB02	106402SBA	4/27/94	0	2	LEAD		7.2		30.97	Yes	1.5	NA
1064-SB02	106402SBA	4/27/94	0	2	MAGNESIUM		1100		3003	No	Essential Nutrient	Yes
1064-SB02	106402SBA	4/27/94	0	2	MANGANESE		67		849	Yes	1400	NA
1064-SB02	106402SBA	4/27/94	0	2	NICKEL		5.3		14.6	Yes	200	NA
1064-SB02	106402SBA	4/27/94	0	2	POTASSIUM		550		2895	No	Essential Nutrient	Yes
1064-SB02	106402SBA	4/27/94	0	2	SODIUM		43		37300	Yes	Essential Nutrient	NA
1064-SB02	106402SBA	4/27/94	0	2	VANADIUM		99		46.3	Yes	72	NA
1064-SB02	106402SBA	4/27/94	0	2	ZINC		10	JH	38.8	Yes	3100	NA
<b>Building 1064 - Subsurface Soil - Location 1064-SB02</b>												
1064-SB02	106402SBB	4/27/94	2	4	METHYLENE CHLORIDE		0.0031	JB		No	0.5	Yes
1064-SB02	106402SBB	4/27/94	2	4	ALUMINIUM		1300		20260	Yes	10000	NA
1064-SB02	106402SBB	4/27/94	2	4	ARSENIC		16.0		6.58	No	5	No
1064-SB02	106402SBB	4/27/94	2	4	BARIUM		43		128.1	Yes	200	NA
1064-SB02	106402SBB	4/27/94	2	4	CADMIUM		4.0		0.59	No	0.5	No
1064-SB02	106402SBB	4/27/94	2	4	CALCIUM		210000		272000	No	Essential Nutrient	Yes
1064-SB02	106402SBB	4/27/94	2	4	CHROMIUM, TOTAL		4.4		16.31	Yes	10	NA
1064-SB02	106402SBB	4/27/94	2	4	COBALT		5.5		6.19	Yes	610	NA
1064-SB02	106402SBB	4/27/94	2	4	COPPER		87.0	JH	13.72	No	130	Yes
1064-SB02	106402SBB	4/27/94	2	4	IRON		13000		17469	No	Essential Nutrient	Yes
1064-SB02	106402SBB	4/27/94	2	4	LEAD		8.1		12.66	Yes	1.5	NA
1064-SB02	106402SBB	4/27/94	2	4	MAGNESIUM		1700		2420	No	Essential Nutrient	Yes
1064-SB02	106402SBB	4/27/94	2	4	MANGANESE		470		3517	Yes	1400	NA
1064-SB02	106402SBB	4/27/94	2	4	NICKEL		7.8		19.76	Yes	200	NA
1064-SB02	106402SBB	4/27/94	2	4	POTASSIUM		200		1717	No	Essential Nutrient	Yes
1064-SB02	106402SBB	4/27/94	2	4	SODIUM		91		53200	Yes	Essential Nutrient	NA
1064-SB02	106402SBB	4/27/94	2	4	VANADIUM		13.0		37.4	Yes	72	NA
1064-SB02	106402SBB	4/27/94	2	4	ZINC		4.4	JH	31.3	No	3100	Yes

Table 7-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1064 - Law Environmental (1995)

NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
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MSC = Media-Specific Concentration

NA = not applicable

MLL = Method Quantitation Limit

RRS 1 = Risk Reduction Standard 1

RRS 2 = Risk Reduction Standard 2

TNRCC = Texas Natural Resources Conservation Commission

UTL = Upper Tolerance Limit

Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte

<sup>2</sup> TNRCC 1999, "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting" July 14

Qualifier Definitions

J = The analyte was positively identified

JB = For inorganics the associated value is an estimated quantity. For organics the analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample

JH = Estimated quantitation - possible biased high based upon blank contamination

JL = Estimated quantitation - possible biased high based upon QC data

**VOCs.** VOCs were not detected above PQLs in subsurface soil samples with the exception of methylene chloride. Methylene chloride was detected at low levels in all three subsurface soil samples submitted by Law from the Building 1064 site. Methylene chloride concentrations were all qualified as blank contamination and were well below the established MSC of 0.5 mg/kg. Considering that methylene chloride is a common laboratory contaminant, it is likely the detected concentrations were the result of laboratory contamination.

**Inorganics.** Cadmium was detected above its background concentration of 0.59 mg/kg in the subsurface soil samples collected from 6 to 8 feet bgs (1.7 mg/kg) and 8 to 10 feet bgs (1.8 mg/kg) at 1060-SB01. The cadmium concentrations also exceeded the MSC for cadmium. Magnesium was also detected at a concentration (5,600 mg/kg) above background (2,420 mg/kg) in the sample collected from 8 to 10 feet bgs at 1064-SB01. However, magnesium is a natural occurring essential nutrient and the detected concentration is likely a natural variation in background concentrations at the site.

Arsenic, cadmium, copper, manganese, and zinc were detected at concentrations above their respective background concentrations in the sample from 2 to 4 feet bgs at 1064-SB02. Arsenic and cadmium concentrations also exceeded MSCs. The zinc concentration detected in the subsurface sample at 1064-SB02 (44 JH mg/kg) is within two times its background concentration and is likely an extreme but true background concentration, considering all other zinc concentrations were below background at the site.

### **7.5 Results from Phase 1 RFI Activities**

The following sections present the analytical results from surface and subsurface soil samples that were collected by IT (1997) during the Phase 1 RFI at Building 1064. A discussion of the Phase 1 groundwater investigation is also included. The purpose of the Phase 1 RFI soil samples was to supplement the analytical data for VOCs and inorganics that were collected by Law (1995) during the initial site investigation. Table 7-3 contains a summary of the analytes detected in the Phase 1 RFI soil samples collected by IT and Table 7-4 contains a summary of the analytes detected in the Phase 1 RFI groundwater samples. Analytical detection summary tables for the Phase 1 soil and groundwater samples collected at Building 1064 are shown in Tables B-6 and B-7, respectively.

Table 7-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1064 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
<b>Phase 1 - Subsurface Soil - Location SB106401</b>													
SB106401	MS1175	24-Mar-97	2	4	Alpha-chlordane	0.017	0.0084	J	J	0.015	Yes	0.2	NA
SB106401	MS1175	24-Mar-97	2	4	Gamma-chlordane	0.017	0.012	J	J	0.015	Yes	0.2	NA
<b>Phase 1 - Subsurface Soil - Location SB106402</b>													
SB106402	MS1174	24-Mar-97	12	14	Bis(2-ethylhexyl)phthalate	0.78	0.24	J		0.72	Yes	0.6	NA
<b>Phase 2 - Surface Soil - Location SB106403</b>													
SB106403	BG0011	20-Apr-00	0.5	2	Cadmium	0.11	0.143		nv	0.556	Yes	0.5	NA
<b>Phase 2 - Subsurface Soil - Location SB106403</b>													
SB106403	BG0012	20-Apr-00	13.6	15.6	Cadmium	0.11	0.296		nv	0.59	Yes	0.5	NA
<b>Phase 2 - Subsurface Soil - Location SB106404</b>													
SB106404	BG0013	20-Apr-00	13.6	15.6	Arsenic	11	5.16		nv	6.58	Yes	5	NA
SB106404	BG0014	20-Apr-00	13.6	15.6	Arsenic	11	3.73		nv	6.58	Yes	5	NA
<b>Phase 3 - Surface Soil - Location SB106405</b>													
SB106405	BG0135	4-Dec-00	0	2	Arsenic	11	2.85		nv	5.85	Yes	5	NA
SB106405	BG0135	4-Dec-00	0	2	Copper	22	2.16		nv	17.37	Yes	130	NA
SB106405	BG0135	4-Dec-00	0	2	Manganese	22	177		nv	849	Yes	1400	NA
<b>Phase 3 - Subsurface Soil - Location SB106405</b>													
SB106405	BG0136	4-Dec-00	5	7	Arsenic	11	6.44		J	6.58	Yes	5	NA
SB106405	BG0136	4-Dec-00	5	7	Copper	22	4.39		J	13.72	Yes	130	NA
SB106405	BG0136	4-Dec-00	5	7	Manganese	22	94.3		J	351.7	Yes	1400	NA
SB106405	BG0137	4-Dec-00	5	7	Arsenic	11	3.01		nv	6.58	Yes	5	NA
SB106405	BG0137	4-Dec-00	5	7	Copper	22	2.66		nv	13.72	Yes	130	NA
SB106405	BG0137	4-Dec-00	5	7	Manganese	22	101		nv	351.7	Yes	1400	NA
SB106405	BG0063	4-Dec-00	10	12	Arsenic	11	3.2		nv	6.58	Yes	5	NA
SB106405	BG0063	4-Dec-00	10	12	Copper	23	2.82		nv	13.72	Yes	130	NA
SB106405	BG0063	4-Dec-00	10	12	Manganese	23	119		nv	351.7	Yes	1400	NA

Table 7-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1064 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
Phase 3 - Surface Soil - Location SB106406													
SB106406	BG0138	4-Dec-00	0	2	Cadmium	0.11	0.158		nv	0.556	Yes	0.5	NA
Phase 3 - Subsurface Soil - Location SB106406													
SB106406	BG0139	4-Dec-00	5	7	Cadmium	0.11	0.134		nv	0.59	Yes	0.5	NA
SB106406	BG0064	4-Dec-00	10	12	Cadmium	0.11	0.112		nv	0.59	Yes	0.5	NA
Phase 3 - Surface Soil - Location SB106407													
SB106407	BG0140	4-Dec-00	0	2	Arsenic	1.5	3.09			5.85	Yes	5	NA
SB106407	BG0140	4-Dec-00	0	2	Cadmium	0.15	0.603			0.556	No	0.5	No
SB106407	BG0140	4-Dec-00	0	2	Copper	3.1	2.89			17.37	Yes	130	NA
SB106407	BG0140	4-Dec-00	0	2	Manganese	3.1	163	M	J	849	Yes	1400	NA
Phase 3 - Subsurface Soil - Location SB106407													
SB106407	BG0141	4-Dec-00	5	7	Arsenic	1.1	6.58		nv	6.58	No	5	No
SB106407	BG0141	4-Dec-00	5	7	Cadmium	0.11	0.155		nv	0.59	Yes	0.5	NA
SB106407	BG0141	4-Dec-00	5	7	Copper	2.3	4.15		nv	13.72	Yes	130	NA
SB106407	BG0141	4-Dec-00	5	7	Manganese	2.3	150		nv	351.7	Yes	1400	NA
SB106407	BG0065	4-Dec-00	10	12	Arsenic	1.1	2.37		nv	6.58	Yes	5	NA
SB106407	BG0065	4-Dec-00	10	12	Cadmium	0.11	0.0917	F	nv	0.59	Yes	0.5	NA
SB106407	BG0065	4-Dec-00	10	12	Copper	2.3	2.59		nv	13.72	Yes	130	NA
SB106407	BG0065	4-Dec-00	10	12	Manganese	2.3	90.6		nv	351.7	Yes	1400	NA
Phase 3 - Subsurface Soil - Location SB106408													
SB106408	BG0066	4-Dec-00	2	4	Arsenic	1.1	3.47		nv	6.58	Yes	5	NA
SB106408	BG0066	4-Dec-00	2	4	Cadmium	0.11	0.0942	F	nv	0.59	Yes	0.5	NA
SB106408	BG0066	4-Dec-00	2	4	Copper	2.3	4.38		nv	13.72	Yes	130	NA
SB106408	BG0066	4-Dec-00	2	4	Manganese	2.3	83.9		nv	351.7	Yes	1400	NA
SB106408	BG0142	4-Dec-00	5	7	Arsenic	1.1	5.95		nv	6.58	Yes	5	NA
SB106408	BG0142	4-Dec-00	5	7	Cadmium	0.11	0.156		nv	0.59	Yes	0.5	NA
SB106408	BG0142	4-Dec-00	5	7	Copper	2.3	4.59		nv	13.72	Yes	130	NA
SB106408	BG0142	4-Dec-00	5	7	Manganese	2.3	126		nv	351.7	Yes	1400	NA
SB106408	BG0143	4-Dec-00	10	12	Arsenic	1.1	2.7		nv	6.58	Yes	5	NA
SB106408	BG0143	4-Dec-00	10	12	Cadmium	0.11	0.102	F	nv	0.59	Yes	0.5	NA
SB106408	BG0143	4-Dec-00	10	12	Copper	2.3	2.83		nv	13.72	Yes	130	NA
SB106408	BG0143	4-Dec-00	10	12	Manganese	2.3	115		nv	351.7	Yes	1400	NA

Table 7-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1064 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
Phase 3 - Surface Soil - Location SB106409													
SB106409	BG0144	4-Dec-00	0	2	Cadmium	0.11	0.145		nv	0.556	Yes	0.5	NA
Phase 3 - Subsurface Soil - Location SB106409													
SB106409	BG0145	4-Dec-00	5	7	Cadmium	0.11	0.175		nv	0.59	Yes	0.5	NA
SB106409	BG0146	4-Dec-00	10	12	Cadmium	0.11	0.146		nv	0.59	Yes	0.5	NA

MSC = Media-Specific Concentration  
 NA = not applicable  
 MQL = Method Quantitation Limit  
 RRS 1 = Risk Reduction Standard 1  
 RRS 2 = Risk Reduction Standard 2  
 TNRCC = Texas Natural Resources Conservation Commission  
 UTL = Upper Tolerance Limit  
 Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte.  
<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Qualifier Definitions

= The analyte was positively identified  
 J = For inorganics, the associated value is an estimated quantity. For organics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample matrix.  
 M = A matrix effect was present.  
 U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.  
 F = The analyte was positively identified but the associated numerical value is below the reporting limit.  
 nv = not validated

Table 7-4

Summary of RFI Groundwater Analytical Detections Compared to Background and MSCs  
 OWS Building 1064 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Parameter	Reporting Limit (mg/L)	Result (mg/L)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/L)	Does Result Support Closure Under RRS 1 <sup>2</sup>	TNRCC MSC <sup>2</sup> (mg/L)	Does Result Support Closure Under RRS 2?
Phase 1 - WITCTA035											
WITCTA035	MS1585	1-May-97	Antimony	0.01	0.0038	B		0.002	No	0.006	Yes
WITCTA035	MS1585	1-May-97	Arsenic	0.01	0.0085	B		0.0049	No	0.05	Yes
WITCTA035	MS1585	1-May-97	Barium	0.02	0.353			0.587	Yes	2	NA
WITCTA035	MS1585	1-May-97	Barium	0.1	0.35			0.587	Yes	2	NA
WITCTA035	MS1585	1-May-97	Calcium	0.1	141			266.3	NA	Essential	NA
WITCTA035	MS1585	1-May-97	Iron	0.07	1.07			0.2239	NA	Essential	NA
WITCTA035	MS1585	1-May-97	Magnesium	0.3	7.4			37.8	NA	Essential	NA
WITCTA035	MS1585	1-May-97	Manganese	0.02	0.965			0.175	No	14	Yes
WITCTA035	MS1585	1-May-97	Potassium	5	2.18	B		15.03	NA	Essential	NA
WITCTA035	MS1585	1-May-97	Sodium	0.3	19.6			167.2	NA	Essential	NA
Phase 3 - WITCTA035											
WITCTA035	MS1585	1-May-97	Cis-1,2-dichloroethene	0.0012	0.00037	J		0.0012	Yes	0.07	NA
WITCTA035	MS1585	1-May-97	Methylene chloride	0.0003	0.00028	J,B		0.0003	Yes	0.04	NA
WITCTA035	MS1585	1-May-97	Vinyl chloride	0.0011	0.0048			0.0011	No	0.002	No
WITCTA035	BG3019	1-Dec-00	Manganese	3	0.454			0.175	No	14	Yes
WITCTA035	BG3020	1-Dec-00	Manganese	3	0.387		nv	0.175	No	14	Yes

MSC = Media Specific Concentration

NA = Not Applicable

MQL = Method Quantitation Limit

RRS 1 = Risk Reduction Standard 1

RRS 2 = Risk Reduction Standard 2

TNRCC = Texas Natural Resource Conservation Commission

UTL = Upper Tolerance Limit

mg/L = milligrams per liter

Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Baseline Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte.

<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media Specific Concentrations (MSCs) - Industrial Setting", July 14

Validated Qualifier Definitions

J = For inorganics, the associated value is an estimated quantity. For organics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.

B = For inorganics, the reported value is an estimated quantity.

F = The analyte was positively identified but the associated numerical value is below the reporting limit.

nv = not validated

### **7.5.1 Surface Soil**

One surface soil sample was collected from surface to 2 feet in depth at boring SB106402 for analysis of SVOCs (EPA Method SW8270) and pesticides/PCBs (EPA Method SW8080). Figure 7-1 shows the locations of the Phase 1 RFI boring locations. The following subsections discuss the analytical results for this surface soil sample.

**SVOCs.** All SVOC detections from surface soil samples were tentatively qualified as estimated concentrations below the PQLs (Table B-6). These SVOCs include unidentified hydrocarbon compounds. Although no detection limits were established for these compounds in the laboratory analysis, the values are below the PQL range (0.660 to 3.30 mg/kg) for SVOCs described in SW846 Method 8270 (EPA, 1997). Therefore, the detected concentrations are below the background concentrations for organics as defined by the TNRCC RRP.

**Pesticides/PCBs.** Pesticides/PCBs were not detected above MQLs in the surface soil sample from SB106402.

### **7.5.2 Subsurface Soil**

Subsurface soil samples were collected at depths of 2 to 4 feet bgs and 10 to 12 feet bgs at SB106401 and from 12 to 14 feet bgs at SB106402. The subsurface soil samples were analyzed for SVOCs and pesticides/PCBs to supplement soil data collected by Law at the OWS. The following subsections discuss the analytical results for the subsurface soil samples collected during the Phase 1 RFI at Building 1064.

**SVOCs.** The majority of SVOC detections in the subsurface soil samples collected from borings SB106401 and SB106402 were TICs that were qualified as estimated concentrations below the PQLs (Table B-6). These TICs include unidentified hydrocarbon compounds. Although no detection limits were established for these compounds in the laboratory analysis, the values are below the PQL range (0.66 to 3.30 mg/kg) for SVOCs described in SW846 Method 8270 (EPA, 1997).

bis(2-Ethylhexyl)phthalate was detected in subsurface soil sample from 12 to 14 feet bgs at SB106402 at a concentration (0.24 mg/kg) estimated as below the MQL (0.72 mg/kg).

**Pesticides/PCB.** As shown in Table 7-3, no pesticides or PCB compounds were detected above MQLs in subsurface soil samples at the Building 1064 site.

### **7.5.3 Groundwater**

Monitoring well WITCTA035 was installed in April 1997 immediately adjacent to boring SB106401 (Figure 7-1). Well WITCTA035 was developed and a groundwater sample was collected from the well in May 1997 for analysis of VOCs, SVOCs, and inorganics. The following subsections discuss the analytical results from monitoring well WITCTA035.

**VOCs.** Vinyl chloride was detected at a concentration of 0.0037 mg/L in the groundwater sample from WITCTA035, which is greater than its MQL (0.0011 mg/L) and MSC (0.002 mg/L). However, because the extent of the AFP-4 TCE groundwater plume includes Building 1064 and the contaminants from this plume (TCE and its breakdown products, such as vinyl chloride) are managed under the AFP-4 Superfund Cleanup Program, the vinyl chloride concentration is not considered as a result of a release from the OWS at Building 1064. All other VOCs were below their respective MQLs.

An unknown VOC was tentatively identified in the SW8260 analysis of the groundwater sample from WITCTA035 (Table B-7). No detection limit was established for this compound in the SW8260 laboratory analysis (Table B-7). The reported concentration (0.0021 mg/L) is below the PQL of 0.005 mg/L provided in the SW846 Method description (EPA, 1997). Therefore, the concentration of the unidentified compound meets the requirements of RRS 1.

**SVOCs.** No SVOCs were detected above their respective MQLs in the groundwater sample collected from WITCTA035.

**Inorganics.** Inorganic compounds detected in the groundwater sample from WITCTA064 included antimony, arsenic, barium, calcium, iron, magnesium, manganese, sodium, and potassium (Table 7-4). Of the inorganics detected, only antimony, arsenic, iron, and manganese exceeded their respective background concentrations.

Antimony was detected at an estimated concentration (0.0038 B mg/L) that slightly exceeded its background value (0.002 mg/L) but was below its MSC (0.006 mg/L). Similarly, arsenic was detected at an estimated concentration (0.0085 B mg/L) that slightly exceeded its background

value (0.0049 mg/L) but was below its MSC (0.05 mg/L). Considering that these inorganic detections are within two times their respective background concentrations, it is likely that they are extreme, but true, background concentrations.

Iron was detected above the established groundwater UTLs but is not considered to exceed the normal range of detections for these compounds in groundwater samples at the Base. Iron is considered to be an essential nutrient. Manganese was also detected at a concentration above the established groundwater background UTL (0.965 mg/L); however, it was well below the TNRCC MSC (14 mg/L).

### **7.6 Results from Phase 2 Activities**

IT collected soil samples from two borings (SB106403 and SB106404) during the Phase 2 RFI in April 2000 to delineate arsenic or cadmium concentrations detected during the Law (1995) investigation. Additionally, a groundwater sample was collected from WITCTA035 to confirm the manganese concentration detected in the Phase 1 RFI sample. Tables 7-3 and 7-4 present the analytical results for the Phase 2 RFI soil and groundwater samples, respectively. A summary of RFI SPLP results is shown in Table 7-5. Figure 7-1 shows the locations of the Phase 2 samples. The following sections discuss the results of Phase 2 soil samples.

#### **7.6.1 Surface Soil**

One surface soil sample was collected from Phase 2 soil boring SB106403 for analysis of cadmium to delineate the cadmium result identified in Law boring 1064-SB02. As shown in Table 7-3, the detected cadmium concentration (0.143 mg/kg) in this surface soil sample was below the background concentration for cadmium.

#### **7.6.2 Subsurface Soil**

A subsurface soil sample was also collected from 13.6 to 15.6 feet bgs from SB106403 for analysis of cadmium to delineate the cadmium result identified in Law boring 1064-SB02. As shown in Table 7-3, the detected concentration of cadmium (0.296 mg/kg) in this subsurface sample was below the background concentration for cadmium.

Table 7-5

Summary of RFI SPLP Results Compared to Background and MSCs  
 OWS Building 1064 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/L)	Result (mg/L)	Laboratory Qualifier	Validation Qualifier	Background UTL <sup>1</sup> (mg/L)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/L)	Does Result Support Closure Under RRS 2?
Phase 2 - Location SB106403													
SB106403	BG0011	20-Apr-00	0.5	2	Cadmium	1	0.000211	F	NV	0.0005	Yes	0.005	NA
SB106403	BG0012	20-Apr-00	13.6	15.6	Cadmium	1	0.000511	F	NV	0.0005	No	0.005	Yes

ft bgs = feet below ground surface

mg/L = milligrams per liter

UTL = upper tolerance limit

TNRCC MSC = Texas Natural Resource Conservation Commission Media Specific Concentrations

NA = not applicable

RRS1 = Risk Reduction Standard 1, result is less than background

RRS2 = Risk Reduction Standard 2, result is less than TNRCC MSC

SPLP = Synthetic Precipitation Leaching Procedure

Footnotes:

<sup>1</sup> - UTLs derived from Final Basewide Background Study, Jacobs Engineering, 1998

<sup>2</sup> - TNRCC Risk Reduction Standard Media-Specific Concentration (MSC) - Industrial Setting

Laboratory Qualifier Definitions:

" " = The analyte was positively identified

"U" = The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL

"F" = The analyte was positively identified but the associated numerical value is below the reporting limit

"J" = The analyte is present, but reported value may not be accurate or precise

"NV" = not validated

A subsurface soil sample was also collected from 13.6 to 15.6 feet bgs from SB106404 for analysis of arsenic to delineate the arsenic result identified in Law boring 1064-SB02. The detected arsenic concentration in this sample (5.16 mg/kg) was below the background concentration for arsenic.

### **7.7 Results from Phase 3 RFI Activities**

After an intensive review of the analytical data from the Law (1995) investigation and the Phase 2 RFI, it was determined that additional data were required to delineate inorganic compounds detected in soil to basewide background concentrations. Additionally, data were required to confirm arsenic and cadmium concentrations that exceeded MSCs in the Law borings and to perform the SPLP analysis to determine the potential of the elevated concentrations to leach into groundwater. Additionally, a groundwater sample was collected from monitoring well WITCTA035 to confirm the elevated concentration of manganese detected during the Phase 1 RFI at Building 1064. The Phase 3 RFI activities were intended to provide sufficient data to prove that the site meets the requirements for closure under RRS 2 of the TNRCC RRP.

Table 7-3 includes the results from the Phase 3 soil samples collected at Building 1064. A summary of RFI SPLP results is shown in Table 7-5. The Phase 3 groundwater results are shown in Table 7-4. The Phase 3 analytical results are also shown in Figure 7-1. The following sections discuss the analytical results from soil and groundwater samples collected during the Phase 3 RFI activities.

#### **7.7.1 Surface Soil**

IT collected surface soil samples from four boring locations during the Phase 3 RFI activities for analysis of arsenic, cadmium, copper, and/or manganese. The borings (SB106405, SB106406, SB106407, and SB106409) were sampled to delineate inorganic concentrations detected during the Law (1995) investigation. The following subsections discuss the analytical results for arsenic, cadmium, copper, and manganese concentrations detected in surface soil at the Phase 3 RFI soil borings.

**Arsenic.** The surface soil samples collected from borings SB106405 and SB106407 were analyzed for arsenic. As shown in Table 7-3, the arsenic concentrations detected in the surface soil samples were below the background concentration for arsenic. Therefore, considering that

arsenic was not detected above background in any of the surface soil samples collected at the Building 1064 site, there is no widespread arsenic contamination in surface soil at the site.

**Cadmium.** The surface soil samples from borings SB106406, SB106407, and SB106409 were analyzed for cadmium. As shown in Table 7-3 and Figure 7-1, the cadmium concentrations detected in the surface soil samples from borings SB106406 and SB106409 were below the background concentration for cadmium. The cadmium concentration detected in boring SB106407 (0.603 mg/kg) slightly exceeded background and the concentration is likely an extreme but true background concentration. Therefore, the elevated cadmium concentration detected in surface soil at former Law boring 1064-SB02 has been delineated by results obtained from Phase 2 boring SB106403 and Phase 3 borings SB106406, SB106407, and SB106409.

**Copper.** Copper concentrations detected in the surface soil samples from SB106405 and SB106407 were below the background concentration for copper.

**Manganese.** Manganese concentrations detected in the surface soil samples from SB106405 and SB106407 were below the background concentration for manganese.

### **7.7.2 Subsurface Soil**

IT collected subsurface soil samples from 5 to 7 feet bgs and from 10 to 12 feet bgs at four soil borings (SB106405, SB106406, SB106407, and SB106409) to delineate arsenic, cadmium, copper, and/or manganese concentrations detected during the initial site investigation to background. Additionally, subsurface soil samples were collected at depths of 2 to 4 feet bgs, 5 to 7 feet bgs, and 10 to 12 feet bgs at boring SB106408 to confirm the elevated concentrations of these inorganics that were detected at former Law boring 1064-SB02. SPLP analysis had been planned to determine the potential for the arsenic and cadmium concentrations at SB106408 because the concentrations of these inorganics had exceeded MSCs in the samples collected by Law. The following subsections discuss the analytical results from subsurface soil samples collected during the Phase 3 RFI activities.

**Arsenic.** All of the arsenic concentrations detected in the subsurface soil samples collected from the Phase 3 RFI borings were below the background concentration for arsenic, including the concentrations detected near former Law boring 1064-SB02. Therefore, the elevated arsenic concentration detected at 1064-SB02 has been delineated by the results from Law boring 1064-

SB01, Phase 2 RFI boring SB106404, and Phase 3 RFI borings SB106405 and SB106407 (Figure 7-1). However, because the elevated concentrations at 1064-SB02 were not replicated in the three subsurface soil samples from SB106405, it appears the arsenic concentration detected in the sample 2 to 4 feet bgs at 1064-SB02 was an extreme, but true, background concentration.

**Cadmium.** Cadmium concentrations detected in the subsurface soil samples from the Phase 3 RFI borings (SB106406, SB106407 and SB106409) were below the background concentration for cadmium, including the concentrations near former Law boring 1064-SB02. Therefore, the elevated cadmium concentrations detected at 1064-SB01 and 1064-SB02 have been delineated by the results from the Phase 2 and Phase 3 RFIs (Figure 7-1). Additionally, because the elevated cadmium concentrations detected at 1064-SB02 were not replicated in the three subsurface soil samples from SB106405, it appears the elevated cadmium concentrations detected in the Law (1995) samples were extreme, but true, background concentrations. In summary, there is no pattern of cadmium concentrations above background at the Building 1064 site.

**Copper.** The copper concentrations detected from the Phase 3 soil borings were below background. Therefore, the elevated copper concentration detected in the sample from 2 to 4 feet bgs at former Law boring 1064-SB02 has been delineated to background concentrations.

**Manganese.** All of the manganese concentrations detected from the Phase 3 soil borings were below background. Therefore, the elevated manganese concentration detected in the sample from 2 to 4 feet bgs at former Law boring 1064-SB02 has been delineated to background concentrations.

### **7.7.3 Groundwater**

As shown in Table 7-4, manganese concentrations were detected at concentrations of 0.454 mg/L and 0.387 mg/L in the groundwater sample and field duplicate, respectively, collected from WITCTA035. Considering that concentrations vary slightly from the background concentration for manganese (0.175 mg/L) but are below the MSC (14 mg/L), along with the fact that no manganese contamination was identified in soil samples collected at the site, it appears that the manganese concentrations detected in WITCTA035 are likely natural variations in the background concentration.

## **7.8 Summary and Discussion**

Law (1995) collected soil samples for analysis of VOCs and inorganics at two locations (1064-SB01 and 1064-SB02) adjacent to the OWS at Building 1064 during their initial site investigation in 1994. The analytical results from the Law investigation indicated that arsenic, cadmium, copper, and manganese concentrations exceeded the basewide background concentrations determined by Jacobs (1998). IT collected surface and subsurface soil samples from two locations (SB106401 and SB106402) for analysis of SVOCs and pesticides/PCBs during the Phase 1 Sanitary Sewer System RFI in 1997. IT also installed and sampled monitoring well WITCTA035 as part of the Phase 1 RFI activities to determine if groundwater had been impacted at the site.

In April 2000, IT collected soil samples from two soil borings (SB106403 and SB106404) as part of the Phase 2 RFI in an attempt to confirm and delineate inorganic concentrations identified during the Law investigation. IT collected surface and subsurface soil samples from five additional soil borings during the Phase 3 RFI in November 2000 to delineate inorganic concentrations to basewide background levels. A groundwater sample was also collected from WITCTA035 during the Phase 3 RFI to confirm the manganese concentration detected above background during the Phase 1 RFI.

Figure 7-1 displays the analytical results exceeding background from the Law (1995) investigation and the Phase 1 RFI. Additionally, Figure 7-1 displays the analytical results obtained from samples collected during the Phase 2 and Phase 3 RFIs to show that contaminant concentrations have been delineated to basewide background concentrations. The following sections discuss the relevance of the parameters detected in surface soil, subsurface soil, and groundwater during investigations at the Building 1064 site.

### **7.8.1 Surface Soil**

One VOC, methylene chloride, was detected in surface soil at a concentration that is likely the result laboratory contamination. No SVOCs or pesticides/PCBs were detected above MQLs in the surface soil sample collected by IT in 1997. Cadmium was detected above background in the surface soil sample from 1064-SB02. The cadmium concentration detected above background at this location has been delineated by samples collected during the Phase 2 and Phase 3 RFIs.

### **7.8.2 Subsurface Soil**

One VOC, methylene chloride, was detected in subsurface soil samples at concentrations that were likely the result of laboratory contamination. No SVOCs or pesticides/PCBs were detected above MQLs in the subsurface soil samples collected by IT in 1997. Inorganics that were consistently detected at concentrations significantly above background in the subsurface soil samples collected by Law (1995) included arsenic, cadmium, copper, and manganese. The elevated concentrations of these inorganics were delineated by the concentrations detected in subsurface samples collected during the Phase 2 and Phase 3 RFIs. Additionally, the detected concentrations of these inorganics at SB106408, adjacent to former Law boring 1064-SB02, were all below background. Therefore, because the inorganic concentrations detected during Law (1995) investigation have been delineated to background and the highest inorganic concentrations detected by Law (1995) could not be replicated, it appears that the OWS has not released inorganic concentrations into subsurface soils at unacceptable levels.

### **7.8.3 Groundwater**

Chlorinated solvents, including TCE and its breakdown products, were detected in the groundwater sample collected during the Phase 1 RFI. However, because the extent of the AFP-4 TCE groundwater plume includes the area of Building 1064 and the contaminants from this plume are managed under the AFP-4 Superfund Cleanup Program, the chlorinated solvents (i.e., TCE and its breakdown products, such as cis-1,2-DCE) detected in monitoring well WITCTA035 are not considered as evidence of a release from the OWS at Building 1064.

Antimony and arsenic were detected in the Phase 1 groundwater from WITCTA035 at estimated concentrations that were slightly above their respective background concentrations, but below their respective MSCs. These concentrations were likely extreme but true background concentrations. Manganese was detected at a concentration (0.965 mg/L) above background in the Phase 1 groundwater sample. Manganese was also detected at a concentration (0.454 mg/L) above background in the Phase 3 groundwater sample from WITCTA035. These manganese concentrations are well below the MSC for manganese (14 mg/L). Considering that no pattern of elevated manganese concentrations was identified in soil samples collected at the Building 1064 site, it appears the manganese concentrations detected in groundwater at the site are the result of extreme variations in the background concentration.

## **7.9 Conclusions**

Considering that no pattern of VOCs, SVOCs, pesticides/PCBs, or inorganics has been identified in the soil and groundwater samples collected in the vicinity of Building 1064, it is recommended that the site be presented for closure under RRS 2 of the TNRCC RRP. The site is recommended for closure under RRS 2 because the inorganic concentrations detected in surface and subsurface soil samples have been delineated to background. Although the cadmium concentrations detected in former Law (1995) boring 1064-SB02 were not confirmed, the fact that arsenic and cadmium were detected at concentrations below background in all three sample depths at Phase 3 boring SB106408 indicates that the elevated concentrations of these inorganics detected by Law (1995) are consistently higher than the results obtained by IT.

The absence of detected concentrations of petroleum-related constituents in soil and groundwater at the site indicates any releases from the OWS have not significantly impacted the adjacent soil and groundwater. Therefore, closure is recommended under RRS 2 for the OWS at Building 1064. Should this recommendation be accepted, a letter stating that closure of AOC 10 (i.e., the OWS at Building 1064) was carried out in accordance with TAC §335.555, and signed by an Air Force representative, will be transmitted to the TNRCC, along with a metes and bounds description of AOC 10. The metes and bounds description will correspond to surveyed coordinates of the affected area shown in Figure 7-1

# TAB

8.0

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## **8.0 OWS Building 1190**

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The following sections provide a description of the OWS at Building 1190, a summary of the site characterization activities, a discussion of the site-specific geology and hydrology, discussions of the analytical results from each characterization event, and recommendations based upon the physical and chemical data collected at the site.

### **8.1 Site Description**

The OWS system at Building 1190 (Hazardous Waste Storage Area) is located to the north of Building 1190 (Figure 8-1) and is designated as SWMU 52 on the RCRA Hazardous Waste Permit for NAS Fort Worth JRB. The OWS system is a two-stage unit consisting of an equalization tank and an oil separation tank and is designed to provide final separation for wastewater from the storm sewer system. The 2,000-gallon OWS unit was installed in 1959. The wastewater handled by the OWS may have been contaminated with engine oil, PD-680, fuel, hydraulic fluid, antifreeze, transmission fluid, etc. (A. T. Kearney, 1989). The wastewater is received and the oily material is separated out and directed to either of two oil sumps. The remaining water drains in pipes to the lower level where it is retained until discharge. Both parts of the OWS and the oil sumps are constructed of six inch thick concrete. The upper level of the OWS consists of a rectangular basin, 5 feet deep, 7 feet wide, and 10 feet long. The lower level is a rectangular basin, 16 feet deep, 18 feet long, and 8 feet wide. Surface runoff from the area surrounding Building 1190 collects in a basin adjacent to the upper level. This basin is 12 feet long, 10 feet wide, and 3 feet deep. It has an open side, which it shares with the separator; its bottom is only 4 inches lower than the top of the separator. This allows free flow of basin contents into the separator. Wastewater from other parts of the facility is pumped in directly to the separator upper level (AT Kearney, 1989). The separated water is discharged to the Sanitary Sewer System.

NAS Fort Worth maintenance personnel reported in 1994 that the OWS had experienced overflows in the past resulting from problems with the OWS pumping mechanism. The Law (1995) visual observation did not identify any obvious structural deficiencies. The Law report recommended reevaluating the pumping system and making any necessary repairs or replacements

**LEGEND**

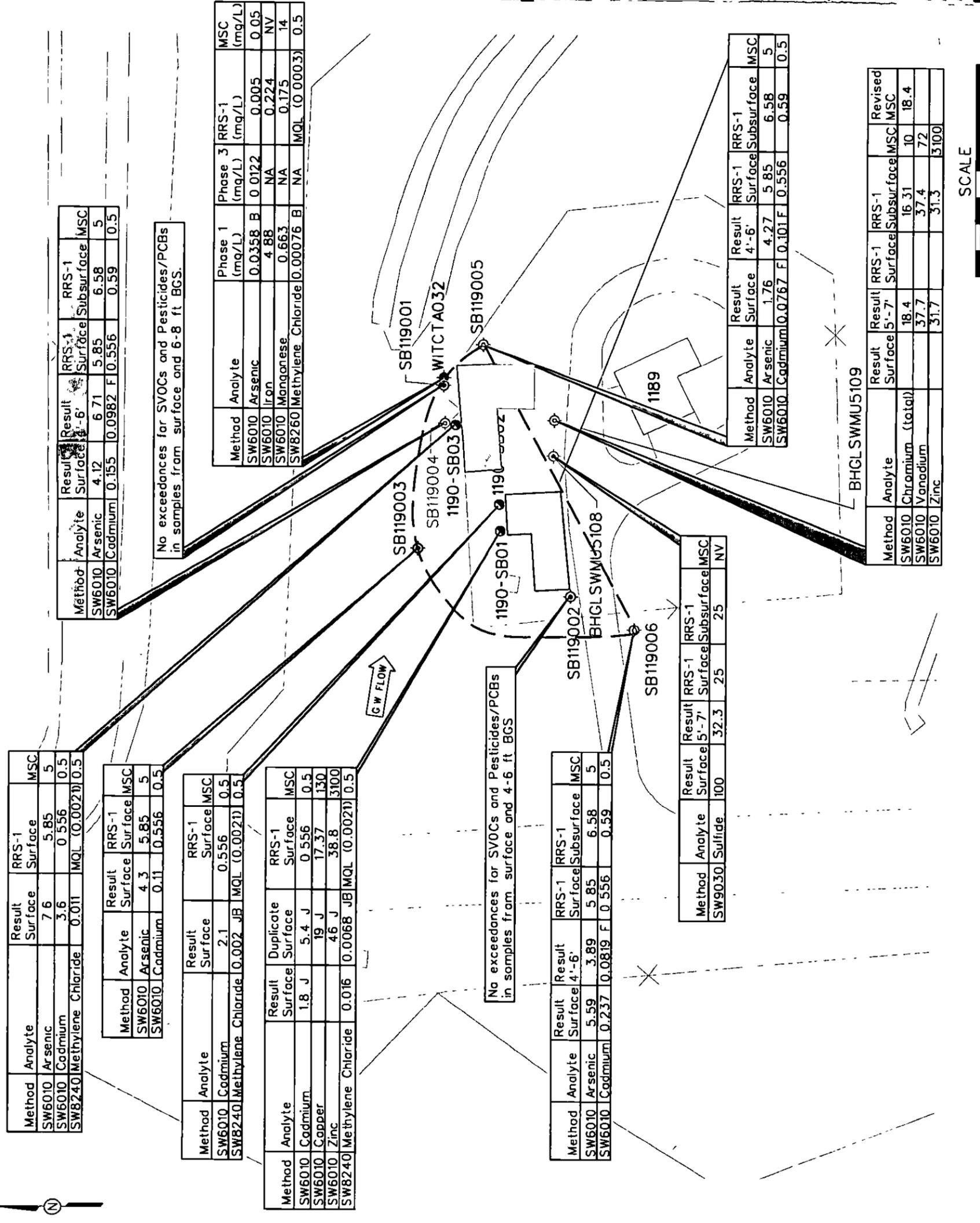
- BUILDING 1190 INDUSTRIAL WASTE OIL/WATER SEPARATOR UNIT
- IT CORP. SOIL BORING (1997) (SVOCs AND PESTICIDES/PCBs)
- IT CORP. PHASE 2 BORING (2000)
- IT CORP. PHASE 3 BORING (2000)
- IT CORP. MONITORING WELL
- HGL SOIL BORING
- LAW ENGINEERING SOIL BORING (VOCs & METALS)
- GROUNDWATER FLOW DIRECTION
- SEWER LINE AND DIRECTIONAL FLOW
- FENCE
- RRS 2 SURVEY BOUNDARY
- PHASE 1 RESULTS > BACKGROUND
- PHASE 2 RESULTS
- PHASE 3 RESULTS
- ANALYTE DETECTED ABOVE MSC SPLP NOT PERFORMED
- ANALYTE DETECTED ABOVE MSC IN SOIL, BUT DETECTED BELOW MSC IN SPLP EXTRACT.

**NOTES:**

CONCENTRATIONS REPORTED IN MG/KG UNLESS NOTED OTHERWISE  
 MSC - MEDIA-SPECIFIC CONCENTRATION.  
 REVISED MSC - VALUE BASED ON SPLP RESULT  
 NV - NO VALUE  
 NA - NOT ANALYZED  
 B - FOR INORGANICS, THE QUANTITATION IS AN ESTIMATED CONCENTRATION BETWEEN THE MDL AND PQL FOR ORGANICS, THE CONSTITUENT WAS ALSO DETECTED IN THE ASSOCIATED METHOD BLANK.  
 J - THE ANALYTE WAS POSITIVELY IDENTIFIED, THE QUANTITATION IS AN ESTIMATION.  
 SOURCE: DRAFT RCRA FACILITIES INVESTIGATION SANITARY SEWER SYSTEM, SEPTEMBER 1997, IT CORPORATION

**FIGURE 8-1**  
**SITE MAP SHOWING**  
**INVESTIGATION RESULTS**  
**OWS BUILDING 1190 (SWMU 52)**

DRAFT RFI REPORT  
 WAS FORT WORTH, JRB  
 FORT WORTH, TEXAS



Method	Analyte	Result Surface	RRS-1 Surface	MSC
SW6010	Arsenic	7.6	5.85	5
SW6010	Cadmium	3.6	0.556	0.5
SW8240	Methylene Chloride	0.011	ML (0.0021)	0.5

Method	Analyte	Result Surface	RRS-1 Surface	MSC
SW6010	Arsenic	4.3	5.85	5
SW6010	Cadmium	0.11	0.556	0.5

Method	Analyte	Result Surface	RRS-1 Surface	MSC
SW6010	Cadmium	2.1	0.556	0.5
SW8240	Methylene Chloride	0.002 JB	ML (0.0021)	0.5

Method	Analyte	Result Surface	Duplicate Surface	RRS-1 Surface	MSC
SW6010	Cadmium	1.8 J	5.4 J	0.556	0.5
SW6010	Copper	19 J	17.37	130	
SW6010	Zinc	46 J	38.8	3100	
SW8240	Methylene Chloride	0.016	0.0068 JB	ML (0.0021)	0.5

No exceedances for SVOCs and Pesticides/PCBs in samples from surface and 4-6 ft BGS

Method	Analyte	Result Surface	RRS-1 Surface	RRS-1 Subsurface	MSC
SW6010	Arsenic	4.12	6.71	5.85	6.58
SW6010	Cadmium	0.155	0.0982 F	0.556	0.59
					0.5

No exceedances for SVOCs and Pesticides/PCBs in samples from surface and 6-8 ft BGS.

Method	Analyte	Phase 1 (mg/L)	Phase 3 (mg/L)	RRS-1 (mg/L)	MSC (mg/L)
SW6010	Arsenic	0.0358 B	0.0122	0.005	0.05
SW6010	Iron	4.88	NA	0.224	NV
SW6010	Manganese	0.663	NA	0.175	14
SW8260	Methylene Chloride	0.00076 B	NA	ML (0.0003)	0.5

Method	Analyte	Result Surface	RRS-1 Surface	RRS-1 Subsurface	MSC
SW6010	Arsenic	1.76	4.27	5.85	6.58
SW6010	Cadmium	0.0767 F	0.101 F	0.556	0.59
					0.5

Method	Analyte	Result Surface	RRS-1 Surface	RRS-1 Subsurface	Revised MSC
SW6010	Chromium (total)	18.4	16.31	10	18.4
SW6010	Vanadium	37.7	37.4	72	
SW6010	Zinc	31.7	31.3	3100	

SCALE



Pumping and steam cleaning of the OWS at Building 1190 was completed November 15, 1995 (CRA, 1995). The contents of the OWS were sampled and analyzed for inorganics (EPA Method 200.7), purgeable organics (EPA Method 624), and TPH (EPA Method 418.1) prior to disposal. Barium was the only inorganic detected at a concentration (0.047 mg/L) above the detection limit. No purgeable organics were detected above the detection limit. TPH was detected at a concentration of 1.5 mg/L.

The OWS at Building 1190 was also included in a pumping and steam cleaning effort by D.D. and Beauty, a nonhazardous liquid waste removal company, during April and May 1993. The contents of the OWS were pumped from the unit, drummed, sampled, and disposed of (CB, 1994). The inside of the OWS was also steam-cleaned and photographed.

## **8.2 Site Characterization Activities**

A summary of the soil and groundwater samples that have been collected at the Building 1190 site is provided in Table 8-1. The analytical methods associated with each soil sample collected at Building 1064 are also presented in Table 8-1. The locations of the soil borings are shown in Figure 8-1. The following sections discuss the investigation activities that have been performed to characterize environmental impacts relating to the OWS at Building 1190.

### **8.2.1 Initial Site Investigation – Law 1994**

Law (1995) collected soil samples in 1994 from two borings located on the north side of the OWS at Building 1190 (Figure 8-1). Soil borings 1190-SB01, 1190-SB02, and 1190-SB03 were advanced with a hand auger to depths of 4, 2, and 2.25 feet bgs, respectively. Surface soil samples were collected from surface to 2 feet in depth at all three borings. Samples were analyzed for VOCs (EPA Method SW8240) and inorganics (EPA Method SW6010) (Law, 1995). A summary of all soil sampling and analysis performed at the Building 1190 site is provided in Table 8-1.

### **8.2.2 Phase 1 RFI Activities – IT Corporation 1997**

IT collected soil samples, during the Phase 1 Sanitary Sewer System RFI in 1997, from borings SB119001 and SB119002, located adjacent to the northeast and southwest corners of the OWS at Building 1190 (Figure 8-1). Surface soil samples MS1168 and MS1171 were collected from surface to two feet bgs at borings SB119001 and SB119002, respectively (Table 8-1).

**Table 8-1**  
**Summary of Previous Environmental Samples**  
**Collected at Building 1190**  
**NAS Fort Worth JRB, Texas**

Sample Location	Sample Date	Sample Number	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Analysis	Analytical Method
<b>Law Engineering - Initial Site Investigation (1994)</b>						
1190-SB01	4/26/94	119001SBA	0	2	Inorganics, VOCs	EPA SW6010, SW8240
		1190DPSB1	0	2	Inorganics, VOCs	EPA SW6010, SW8240
1190-SB02	4/26/94	119002SBA	0	2	Inorganics, VOCs	EPA SW6010, SW8240
1190-SB03	4/26/94	119003SBA	0	2	Inorganics, VOCs	EPA SW6010, SW8240
<b>IT Corporation - Phase 1 RFI (1997)</b>						
SB119001	3/24/97	MS1168	0	2	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
		MS1169	0	2	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
		MS1170	6	8	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
SB119002	3/24/97	MS1171	0	2	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
		MS1172	4	6	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
WITTA032	4/30/97	MS1575	GW	GW	Inorganics, VOCs, SVOCs	EPA SW6010, SW8260, SW8270
<b>IT Corporation - Phase 2 RFI (2000)</b>						
SB119003	6/2/99	BG0020	0	0.5	As, Cd	EPA SW6010B
<b>IT Corporation - Phase 3 RFI (2000)</b>						
SB119004	12/4/00	BG0067	0	2	As, Cd	EPA SW6010B
		BG0147	4	6	As, Cd	EPA SW6010B
SB119005	12/4/00	BG0068	0	2	As, Cd	EPA SW6010B
		BG0148	4	6	As, Cd	EPA SW6010B
SB119006	12/4/00	BG0069	0	2	As, Cd	EPA SW6010B
		BG0149	4	6	As, Cd	EPA SW6010B
WITTA032	12/1/00	BG3018	GW	GW	As	EPA SW6010B

VOCs - Volatile Organic Compounds  
 SVOCs - Semivolatile Organic Compounds  
 As - Arsenic  
 Cd - Cadmium  
 PCBs - Polychlorinated Biphenols

MS1169 was collected as a field duplicate of MS1168. Subsurface soil samples MS1170 and MS1172 were collected at borings SB119001 and SB119002, respectively, from the 2-foot interval directly above the water table (4 to 8 feet bgs). Soil samples were analyzed for SVOCs (EPA Method SW8270) and pesticides/PCBs (EPA Method SW8080) to supplement soil data collected during the Law (1995) investigation (IT, 1998).

During the Phase 1 RFI in April 1997, monitoring well WITCTA032 was installed immediately adjacent to boring SB119001 (Figure 8-1). The well was completed to a total depth of 13.0 feet bgs, with a screen interval from 5.5 to 13.0 feet bgs. Well WITCTA032 was developed and groundwater sample MS1575 was collected from the well in April 1997. Sample MS1575 was analyzed for VOCs (EPA Method SW8260), SVOCs (EPA Method SW8270), and inorganics (EPA Methods SW6010/7000 and SW7471 for mercury) (IT, 1998).

### **8.2.3 Phase 2 RFI Activities – IT Corporation 2000**

An additional soil sample was collected by IT during the Phase 2 RFI in June 1999 (Table 8-1). Soil boring SB119003 was located northwest of the OWS at Building 1190 (Figure 8-1). Sample BG0020 was collected from surface to 0.5 foot in depth and analyzed for arsenic and cadmium to delineate concentrations of these inorganics detected in Law borings 1190-SB01, 1190-SB02, and 1190-SB03.

### **8.2.4 Phase 3 RFI Activities – IT Corporation 2000**

Additional sampling was performed by IT, during the Phase 3 RFI in November 2000 (Table 8-1), to delineate arsenic and cadmium concentrations (EPA Method SW6010) detected previously in surface and subsurface soils. Additionally a surface soil sample was collected to confirm/replicate arsenic and cadmium concentrations detected above background and MSCs. Soil samples were collected at surface to 2 feet and 4 to 6 feet bgs at SB119004, SB119005, and SB119006 (Figure 8-1) to adequately characterize the extent of elevated concentrations of arsenic and cadmium. Additionally, a groundwater sample was collected from monitoring well WITCTA032 to confirm the arsenic concentration detected during the Phase 1 investigation.

## **8.3 Site-Specific Conditions**

The following subsections discuss the site-specific geology and hydrogeology characteristics that were encountered during the investigation activities at Building 1190 site.

**Geology.** Quaternary alluvium is found at the surface through most of the NAS Fort Worth area. The alluvium consists of floodplain and fluvial terrace deposits of gravel, sand, silt, and clay that occur as a veneer on the eroded surface of Upper Cretaceous strata. Soil boring logs (Appendix A) on the north side of the OWS at Building 1190 indicated various mixtures of clay, silt, fine to coarse sand, and gravel, generally brown in color. The boring log from SB119002 to the southwest of the OWS indicates a similar mixture down to 6 feet bgs, below which a dark gray clayey gravel was indicated. Soils were saturated below 6 to 8 feet bgs. SB119001 was the deepest soil boring at the site, advanced to 10 feet bgs.

The alluvial soils rest unconformably on the top of the weathered Walnut Formation. Underlying the Quaternary alluvium is the Cretaceous-aged Walnut Formation, which consists of 20 to 30 feet of indurated fossiliferous limestone interbedded with brown sandy clay, thinly bedded fossiliferous clay, and fissile shale. Unconformably underlying the Walnut Formation is the Cretaceous-aged Paluxy Formation. The Paluxy Formation generally consists of coarse-grained sand that grades upward into fine-grained sand with variable amounts of shale and limestone. The sandstone, composed of fine- to coarse-grained white quartz, is well-sorted, poorly consolidated, and cross-bedded. The Paluxy Formation thickness ranges from 140 to 190 feet, averaging 160 feet in Tarrant County (Radian, 1991).

**Hydrogeology.** Shallow groundwater within the Quaternary alluvium occurs in fluvial terrace deposits of sand and gravel, which occur as a veneer on the eroded surface of the Walnut Formation. The soil description log from boring SB119001 adjacent to monitoring well WITCTA032 (Appendix A) indicates sandy, gravelly clay below 4 feet bgs with sand content increasing below 6 feet bgs, and saturated conditions below 8 feet bgs. Monitoring well WITCTA032 was installed northeast of the OWS at Building 1190 with the well screen placed down to the top of the Walnut Formation, at approximately 13 feet bgs. Groundwater flow at the Building 1190 site is to the east toward the Trinity River.

#### **8.4 Results from Initial Site Investigation**

Law Engineering collected soil samples in 1994 from three borings (1190-SB01 through 1190-SB03) located near the OWS at Building 1190 (Figure 8-1). Table 8-2 contains a summary of the analytes detected in the samples collected by Law (1995) and a comparison of the detected concentrations to basewide background concentrations and MSCs.

**Table 8-2**  
**Summary of 1994 Soil Analytical Detections Compared to Background and MSCs**  
**OWS Building 1190 - Law Environmental (1995)**  
**NAS Fort Worth JRB, Texas**

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC (mg/kg)	Does Result Support Closure Under RRS 27
<b>Building 1190 - Surface Soil - Location 1190-SB01</b>												
1190-SB01	119001SBA	4/26/94	0	2	METHYLENE CHLORIDE		0.016			No	0.5	Yes
1190-SB01	119001SBA	4/26/94	0	2	ALUMINUM		3200	J	22035	Yes	10000	NA
1190-SB01	119001SBA	4/26/94	0	2	ARSENIC	37	37		5.85	Yes	5	NA
1190-SB01	119001SBA	4/26/94	0	2	BARIUM		36	J	233	Yes	200	NA
1190-SB01	119001SBA	4/26/94	0	2	BERYLLIUM	0.18	0.18		1.02	Yes	0.4	NA
1190-SB01	119001SBA	4/26/94	0	2	CADMIUM		1.8	J	0.556	No	0.5	No
1190-SB01	119001SBA	4/26/94	0	2	CALCIUM		150000		167788	Yes	Essential Nutrient	NA
1190-SB01	119001SBA	4/26/94	0	2	CHROMIUM, TOTAL		6.3	J	25.86	Yes	10	NA
1190-SB01	119001SBA	4/26/94	0	2	COBALT		2.0		11.05	Yes	610	NA
1190-SB01	119001SBA	4/26/94	0	2	COPPER		7.5	J	17.37	Yes	130	NA
1190-SB01	119001SBA	4/26/94	0	2	IRON		5300		17717	Yes	Essential Nutrient	NA
1190-SB01	119001SBA	4/26/94	0	2	LEAD		8.8	J	30.97	Yes	1.5	NA
1190-SB01	119001SBA	4/26/94	0	2	MAGNESIUM		1200		3003	Yes	Essential Nutrient	NA
1190-SB01	119001SBA	4/26/94	0	2	MANGANESE		180		849	Yes	1400	NA
1190-SB01	119001SBA	4/26/94	0	2	NICKEL		5.9		14.6	Yes	200	NA
1190-SB01	119001SBA	4/26/94	0	2	POTASSIUM		460	J	2895	Yes	Essential Nutrient	NA
1190-SB01	119001SBA	4/26/94	0	2	SODIUM		67		37300	Yes	Essential Nutrient	NA
1190-SB01	119001SBA	4/26/94	0	2	VANADIUM		12.0		46.3	Yes	72	NA
1190-SB01	119001SBA	4/26/94	0	2	ZINC		10	J	38.9	Yes	3100	NA
1190-SB01	11900PSS1	4/26/94	0	2	METHYLENE CHLORIDE		0.0088	JB		No	0.5	Yes
1190-SB01	11900PSS1	4/26/94	0	2	ALUMINUM		5600	J	22035	Yes	10000	NA
1190-SB01	11900PSS1	4/26/94	0	2	ARSENIC		4.4		5.85	Yes	5	NA
1190-SB01	11900PSS1	4/26/94	0	2	BARIUM		61	J	233	Yes	200	NA
1190-SB01	11900PSS1	4/26/94	0	2	BERYLLIUM	0.16	0.16		1.02	Yes	0.4	NA
1190-SB01	11900PSS1	4/26/94	0	2	CADMIUM		5.4	J	0.556	No	0.5	No
1190-SB01	11900PSS1	4/26/94	0	2	CALCIUM		110000		167788	Yes	Essential Nutrient	NA
1190-SB01	11900PSS1	4/26/94	0	2	CHROMIUM, TOTAL		17.0	J	25.86	Yes	10	NA
1190-SB01	11900PSS1	4/26/94	0	2	COBALT		3.1		11.05	Yes	610	NA
1190-SB01	11900PSS1	4/26/94	0	2	COPPER		19.0	J	17.37	No	130	Yes
1190-SB01	11900PSS1	4/26/94	0	2	IRON		7600		17717	Yes	Essential Nutrient	NA
1190-SB01	11900PSS1	4/26/94	0	2	LEAD		86.0	J	30.97	No	1.5	No
1190-SB01	11900PSS1	4/26/94	0	2	MAGNESIUM		1400		3003	Yes	Essential Nutrient	NA
1190-SB01	11900PSS1	4/26/94	0	2	MANGANESE		200		849	Yes	1400	NA
1190-SB01	11900PSS1	4/26/94	0	2	NICKEL		7.6		14.6	Yes	200	NA
1190-SB01	11900PSS1	4/26/94	0	2	POTASSIUM		870	J	2895	Yes	Essential Nutrient	NA
1190-SB01	11900PSS1	4/26/94	0	2	SODIUM		54		37300	Yes	Essential Nutrient	NA
1190-SB01	11900PSS1	4/26/94	0	2	VANADIUM		16.0		46.3	Yes	72	NA
1190-SB01	11900PSS1	4/26/94	0	2	ZINC		46	J	38.9	No	3100	Yes

**Table 8-2**  
**Summary of 1994 Soil Analytical Detections Compared to Background and MSCs**  
**OWS Building 1190 - Law Environmental (1995)**  
**NAS Fort Worth JRB, Texas**

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
<b>Building 1190 - Surface Soil - Location 1190-SB02</b>												
1190-SB02	119002SBA	4/26/94	0	2	METHYLENE CHLORIDE	0.002	0.002	JB		No	0.5	Yes
1190-SB02	119002SBA	4/26/94	0	2	ALUMINUM	6600	6600		22035	Yes	10000	NA
1190-SB02	119002SBA	4/26/94	0	2	ARSENIC	4.3	4.3		5.85	Yes	5	NA
1190-SB02	119002SBA	4/26/94	0	2	BARIUM	57	57		233	Yes	200	NA
1190-SB02	119002SBA	4/26/94	0	2	BERYLLIUM	0.16	0.16		1.02	Yes	0.4	NA
1190-SB02	119002SBA	4/26/94	0	2	CADMIUM	2.1	2.1		0.556	No	0.5	No
1190-SB02	119002SBA	4/26/94	0	2	CALCIUM	87000	87000		167788	Yes	Essential Nutrient	NA
1190-SB02	119002SBA	4/26/94	0	2	CHROMIUM, TOTAL	9.8	9.8		25.86	Yes	10	NA
1190-SB02	119002SBA	4/26/94	0	2	COBALT	2.5	2.5		11.05	Yes	610	NA
1190-SB02	119002SBA	4/26/94	0	2	COPPER	5.1	5.1		17.37	Yes	130	NA
1190-SB02	119002SBA	4/26/94	0	2	IRON	6800	6800		17717	Yes	Essential Nutrient	NA
1190-SB02	119002SBA	4/26/94	0	2	LEAD	10.0	10.0		30.97	Yes	1.5	NA
1190-SB02	119002SBA	4/26/94	0	2	MAGNESIUM	1100	1100		3003	Yes	Essential Nutrient	NA
1190-SB02	119002SBA	4/26/94	0	2	MANGANESE	92	92		849	Yes	1400	NA
1190-SB02	119002SBA	4/26/94	0	2	NICKEL	5.8	5.8		14.6	Yes	200	NA
1190-SB02	119002SBA	4/26/94	0	2	POTASSIUM	680	680		2895	Yes	Essential Nutrient	NA
1190-SB02	119002SBA	4/26/94	0	2	SODIUM	39	39		37300	Yes	Essential Nutrient	NA
1190-SB02	119002SBA	4/26/94	0	2	VANADIUM	20.0	20.0		46.3	Yes	72	NA
1190-SB02	119002SBA	4/26/94	0	2	ZINC	18	18		38.8	Yes	3100	NA
<b>Building 1190 - Surface Soil - Location 1190-SB03</b>												
1190-SB03	119003SBA	4/26/94	0	2	METHYLENE CHLORIDE	0.011	0.011			No	0.5	Yes
1190-SB03	119003SBA	4/26/94	0	2	ALUMINUM	10000	10000		22035	Yes	10000	NA
1190-SB03	119003SBA	4/26/94	0	2	ARSENIC	7.6	7.6		5.85	No	5	No
1190-SB03	119003SBA	4/26/94	0	2	BARIUM	76	76		233	Yes	200	NA
1190-SB03	119003SBA	4/26/94	0	2	BERYLLIUM	0.33	0.33		1.02	Yes	0.4	NA
1190-SB03	119003SBA	4/26/94	0	2	CADMIUM	3.6	3.6		0.556	No	0.5	No
1190-SB03	119003SBA	4/26/94	0	2	CALCIUM	46000	46000		167788	Yes	Essential Nutrient	NA
1190-SB03	119003SBA	4/26/94	0	2	CHROMIUM, TOTAL	11.0	11.0		25.86	Yes	10	NA
1190-SB03	119003SBA	4/26/94	0	2	COBALT	5.2	5.2		11.05	Yes	610	NA
1190-SB03	119003SBA	4/26/94	0	2	COPPER	5.9	5.9		17.37	Yes	130	NA
1190-SB03	119003SBA	4/26/94	0	2	IRON	12000	12000		17717	Yes	Essential Nutrient	NA
1190-SB03	119003SBA	4/26/94	0	2	LEAD	12.0	12.0		30.97	Yes	1.5	NA
1190-SB03	119003SBA	4/26/94	0	2	MAGNESIUM	160	160		3003	Yes	Essential Nutrient	NA
1190-SB03	119003SBA	4/26/94	0	2	MANGANESE	260	260		849	Yes	1400	NA
1190-SB03	119003SBA	4/26/94	0	2	NICKEL	10.0	10.0		14.6	Yes	200	NA
1190-SB03	119003SBA	4/26/94	0	2	POTASSIUM	1200	1200		2895	Yes	Essential Nutrient	NA

Table 8-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1190 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
1190-SB03	119003SBA	4/26/94	0	2	SODIUM		45		37300	Yes	Essential Nutrient	NA
1190-SB03	119003SBA	4/26/94	0	2	VANADIUM		19.0		46.3	Yes	72	NA
1190-SB03	119003SBA	4/26/94	0	2	ZINC		17		38.8	Yes	3100	NA

MSC = Media-Specific Concentration

NA = not applicable

MQL = Method Quantitation Limit

RRS 1 = Risk Reduction Standard 1

RRS 2 = Risk Reduction Standard 2

TNRCC = Texas Natural Resources Conservation Commission

UTL = Upper Tolerance Limit

Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1988. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte

<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No. 2 - Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Qualifier Definitions

= The analyte was positively identified

J = For inorganics, the associated value is an estimated quantity. For organics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample

JB = Estimated quantitation - possible biased high based upon blank contamination

JH = Estimated quantitation - possible biased high based upon QC data

Analyte concentrations that exceeded background concentrations are shown on Figure 8-1. The following sections present the results from surface and subsurface soil samples that were collected by Law (1995) during the initial site investigation at Building 1190.

#### **8.4.1 Surface Soil**

Law (1995) collected soil samples in 1994 from three borings located on the north side of the OWS at Building 1190 (Figure 8-1). Soil borings 1190-SB01, 1190-SB02, and 1190-SB03 were advanced with a hand auger to depths of 4, 2, and 2.25 feet bgs, respectively. Surface soil samples were collected from surface to 2 feet in depth at all three borings for analysis of VOCs and inorganics. The results from these surface soil samples are discussed in the following subsections.

**VOCs.** Methylene chloride was detected at concentrations below 0.02 mg/kg in the surface soil samples collected during the initial site investigation (Table 8-2). Considering that the reported concentrations are well below the MSC for methylene chloride (0.5 mg/kg) and the fact that methylene chloride is a common laboratory contaminant, these concentrations were likely the result of laboratory contamination. No other VOCs were detected in the surface soil samples collected by Law (1995).

**Inorganics.** Arsenic and cadmium were detected above their respective background concentrations and their MSCs in surface soil samples. Cadmium was detected above background and its MSC (0.5 mg/kg) in all three surface soil samples collected during the Law (1995) investigation, with the maximum concentration of 3.6 mg/kg detected at 1190-SB03. The detected arsenic concentration at boring SB1190-SB03 (7.6 mg/kg) exceeded the background concentration for arsenic as well as the MSC (5 mg/kg). Copper and zinc were detected at concentrations slightly above background in the field duplicate from 1190-SB01, but the concentrations likely represent natural variations in the background concentrations for these inorganics.

#### **8.4.2 Subsurface Soil**

No subsurface soil samples were collected during the initial site investigation performed by Law (1995).

## **8.5 Results from Phase 1 RFI Activities**

The following sections present the analytical results from surface and subsurface soil samples that were collected by IT (1997) during the Phase 1 RFI at the Building 1190 site. A discussion of the Phase 1 groundwater investigation is also included. The purpose of the Phase 1 RFI soil samples was to supplement the analytical data for VOCs and inorganics that were collected by Law (1995) during the initial site investigation. Table 8-3 includes a summary of the analytes detected in the Phase 1 RFI soil samples collected by IT and Table 8-4 includes a summary of the analytes detected in the Phase 1 RFI groundwater samples. Analytical detection summary tables for the soil and groundwater samples collected at Building 1190 are presented in Tables B-8 and B-9, respectively.

### **8.5.1 Surface Soil**

Surface soil samples from borings SB119001 and SB119002 were collected for analysis of SVOCs and pesticides/PCBs during the Phase 1 RFI. The purpose of the Phase 1 RFI samples was to supplement the analytical data for VOCs and inorganics that were collected by Law (1995) during the initial site investigation. Figure 8-1 shows the locations of the Phase 1 RFI boring locations. The following subsections discuss the analytical results of the surface soil samples.

**SVOCs.** The SVOC detections in surface soil samples from the OWS at the Building 1190 site are TICs. No detection limits were established for these compounds in the SW8270 laboratory analysis, and they include unidentified hydrocarbons (Table B-8). The reported concentrations of the unidentified compounds were below the PQL range (0.66 to 3.3 mg/kg) provided in SW846 Method 8270 (EPA, 1997). Because the reported concentrations of these compounds are within the range of PQL values for the analytical method used, the detected concentrations are below the background concentration for organics, as defined by the TNRCC RRP.

**Pesticides/PCBs.** No pesticides or PCBs were detected in the surface soil samples collected from borings SB119001 and SB119002.

Table 8-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1190 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
Phase 1 Location SB119001 - No Detections for SVOCs or Pesticides/PCBs													
Phase 1 Location SB119002 - No Detections for SVOCs or Pesticides/PCBs													
Phase 2 - Surface Soil - Location SB119003													
SB119003	BG0020	21-Jun-99	0	0.5	Arsenic	0.8	4.3			5.85	Yes	5	NA
SB119003	BG0020	21-Jun-99	0	0.5	Cadmium	0.2	0.11	B	U	0.556	Yes	0.5	NA
Phase 3 - Surface Soil - Location SB119004													
SB119004	BG0067	4-Dec-00	0	2	Arsenic	1.2	4.12		nv	5.85	Yes	5	NA
SB119004	BG0067	4-Dec-00	0	2	Cadmium	0.12	0.155		nv	0.556	Yes	0.5	NA
Phase 3 - Subsurface Soil - Location SB119004													
SB119004	BG0147	4-Dec-00	4	6	Arsenic	1.1	6.71		nv	6.58	No	5	No
SB119004	BG0147	4-Dec-00	4	6	Cadmium	0.11	0.0982	F	nv	0.59	Yes	0.5	NA
Phase 3 - Surface Soil - Location SB119005													
SB119005	BG0068	4-Dec-00	0	2	Arsenic	1.2	1.76		nv	5.85	Yes	5	NA
SB119005	BG0068	4-Dec-00	0	2	Cadmium	0.12	0.0767	F	nv	0.556	Yes	0.5	NA
Phase 3 - Subsurface Soil - Location SB119005													
SB119005	BG0148	4-Dec-00	4	6	Arsenic	1.2	4.27		nv	6.58	Yes	5	NA
SB119005	BG0148	4-Dec-00	4	6	Cadmium	0.12	0.101	F	nv	0.59	Yes	0.5	NA
Phase 3 - Surface Soil - Location SB119006													
SB119006	BG0069	4-Dec-00	0	2	Arsenic	1.2	5.59		nv	5.85	Yes	5	NA
SB119006	BG0069	4-Dec-00	0	2	Cadmium	0.12	0.237		nv	0.556	Yes	0.5	NA
Phase 3 - Surface Soil - Location SB119006													
SB119006	BG0149	4-Dec-00	4	6	Arsenic	3.89	1.1		nv	6.58	Yes	5	NA
SB119006	BG0149	4-Dec-00	4	6	Cadmium	0.0819	0.11	F	nv	0.59	Yes	0.5	NA

Table 8-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1190 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS <sup>17</sup>	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS <sup>27</sup>
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MSC = Media-Specific Concentration  
 NA = not applicable  
 MQL = Method Quantitation Limit  
 RRS 1 = Risk Reduction Standard 1  
 RRS 2 = Risk Reduction Standard 2  
 TNRCC = Texas Natural Resources Conservation Commission  
 UTL = Upper Tolerance Limit  
 Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte

<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Qualifier Definitions

= The analyte was positively identified      nv = not validated

B = the associated value is an estimated quantity between the MDL and RL

U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL

F = The analyte was positively identified but the associated numerical value is below the reporting limit

Table 8-4

Summary of RFI Groundwater Analytical Detections Compared to Background and MSCs  
 Ows Building 1190 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Parameter	Reporting Limit (mg/L)	Result (mg/L)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/L)	Does Result Support Closure Under RRS 1	TNRCC MSC <sup>2</sup> (mg/L)	Does Result Support Closure Under RRS 2 <sup>7</sup>
Phase 1 - WITCTA032											
WITCTA032	MS1575	30-Apr-97	Aluminum	0.5	0.278	B		1.332	Yes	100	NA
WITCTA032	MS1575	30-Apr-97	Arsenic	0.6	0.0358	B		0.0049	No	0.05	Yes
WITCTA032	MS1575	30-Apr-97	Barium	0.02	0.18			0.587	Yes	2	NA
WITCTA032	MS1575	30-Apr-97	Calcium	0.1	113			266.3	NA	Essential Nutrient	NA
WITCTA032	MS1575	30-Apr-97	Iron	0.07	4.88			0.2239	NA	Essential Nutrient	NA
WITCTA032	MS1575	30-Apr-97	Magnesium	0.3	7			37.8	NA	Essential Nutrient	NA
WITCTA032	MS1575	30-Apr-97	Manganese	0.02	0.663			0.175	No	14	Yes
WITCTA032	MS1575	30-Apr-97	Nickel	0.15	0.005	B		0.0204	Yes	0.002	NA
WITCTA032	MS1575	30-Apr-97	Potassium	5	0.849	B		15.03	NA	Essential Nutrient	NA
WITCTA032	MS1575	30-Apr-97	Sodium	0.3	21.9			167.2	NA	Essential Nutrient	NA
WITCTA032	MS1575	30-Apr-97	Zinc	0.02	0.0054	B		0.118	Yes	31	NA
WITCTA032	MS1575	30-Apr-97	Methylene chloride	0.0003	0.00076	B		0.0003	No	0.04	Yes
WITCTA032	MS1575	30-Apr-97	P-isopropyltoluene	0.0012	0.001	J		0.0012	Yes	204	NA
WITCTA032	MS1575	30-Apr-97	Sec-butylbenzene	0.0013	0.00066	J		0.0013	Yes	1.02	NA
Phase 3 - WITCTA032											
WITCTA032	BG3018	1-Dec-00	Arsenic	0.005	0.0122	F	nv	0.0049	No	0.05	Yes

MSC = Media Specific Concentration  
 NA = Not Applicable  
 MQL = Method Quantitation Limit  
 RRS 1 = Risk Reduction Standard 1  
 RRS 2 = Risk Reduction Standard 2  
 TNRCC = Texas Natural Resource Conservation Commission  
 UTL = Upper Tolerance Limit  
 mg/L = milligrams per liter  
 Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte.  
<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media Specific Concentrations (MSCs) - Industrial Setting", July 14  
 Validated Qualifier Definitions  
 J = For inorganics, the associated value is an estimated quantity. For organics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample.  
 U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.  
 B = For inorganics, the reported value is an estimated quantity.  
 F = The analyte was positively identified but the associated numerical value is below the reporting limit.  
 nv = not validated

### **8.5.2 Subsurface Soil**

Two subsurface soil samples were collected by IT with DPT at the Building 1190 site: from 6 to 8 feet bgs at SB119001 and from 4 to 6 feet bgs at SB119002. The samples were collected directly above the saturated zones in soil borings SB119001 and SB119002. The subsurface soil samples were submitted for analysis of SVOCs and pesticides/PCBs. The following subsections discuss the analytical results of the surface soil samples

**SVOCs.** All SVOC detections from subsurface soil samples at Building 1190 were TICs that were qualified as estimated concentrations below the PQLs (Table B-8). These SVOCs include unidentified hydrocarbon compounds, pentamide, and 1,1,2,2-tetrachloroethane (Table B-8). Although no detection limits were established for these compounds in the SW8270 laboratory analysis, the values are below the PQL range (0.660 to 3.30 mg/kg) for SVOCs described in EPA Method SW8270 (EPA, 1997). Because the reported concentrations of these compounds are within the range of PQL values for the analytical method used, the detected concentrations are below the background concentration for organics, as defined by the TNRCC RRP.

**Pesticides/PCBs.** No pesticides or PCBs were detected in the subsurface soil samples collected from borings SB119001 and SB119002.

### **8.5.3 Groundwater**

Monitoring well WITCTA032 was installed in April 1997 immediately adjacent to boring SB119001 (Figure 8-1). The well was completed to a total depth of 13.0 feet bgs, with a screen interval from 5.5 to 13.0 feet depth. Well WITCTA032 was developed and a groundwater sample was collected in April 1997 for analysis of VOCs, SVOCs, and inorganics. The following subsections discuss the results of the Phase 1 groundwater sample from WITCTA032.

**VOCs.** Methylene chloride was detected above the MQL at a concentration of 0.00076 mg/L in the Phase 1 groundwater sample from WITCTA032. The methylene chloride concentration was qualified as blank contamination. Methylene chloride is a common laboratory contaminant and the concentration in the sample was well below the established MSC of 0.005 mg/L. All other VOCs detections were below their respective MQLs.

**SVOCs.** One SVOC, 4-(2,2,3,3-tetramethyl)phenol was detected in the groundwater sample from WITCTA032 at an estimated concentration of 0.015 J mg/L (Table B-9). This

concentration is consistent with the range of PQL values (0.01 to 0.02 mg/L) described for other alkylated phenols in the SW846 Method 8270 (EPA, 1997). Therefore, the detected concentration is below the background concentration for organics, as defined by the TNRC RRP.

**Inorganics.** Arsenic, iron, and manganese were detected above background in the groundwater sample from WITCTA032. The reported arsenic concentration of 0.0358 mg/L is less than the MSC of 0.05 mg/L. Manganese was detected at a concentration (0.663 mg/L) that slightly exceeds its background concentration, but is well below its MSC. Considering that elevated manganese concentrations were not identified in soil samples collected at the site, the manganese concentration was likely an extreme but true background concentration. Iron was reported at a concentration above its background UTL concentration. Iron is considered to be an essential nutrient and the reported concentration probably represents an extreme but true background concentration.

### **8.6 Results from HydroGeoLogic's Investigation at SWMU 51**

HGL (2000) collected surface and subsurface soil samples from two soil borings adjacent to the OWS at Building 1190 during their RFI investigation at SWMU 51, the Central Waste Storage Area. The two soil borings (BHGLSWMU5108 and BHGLSWMU5109) were sampled at the surface (0 to 2 feet bgs) and from 5 to 7 feet bgs for analysis of Appendix IX constituents. Table 8-5 presents a summary of the analytical detections from these two borings. The following sections discuss the results from the HGL samples.

#### **8.6.1 Surface Soil**

No VOCs, SVOCs, or inorganics were detected above background concentrations in the surface soil samples collected from HGL borings BHGLSWMU5108 and BHGLSWMU5109. Because arsenic and cadmium concentrations were below their respective background concentrations in these surface soil samples, the HGL results provide delineation of inorganics in surface soil to the southeast of the OWS system at Building 1190.

Table 8-5

Summary of Analytical Detections in Soil Samples Collected During RFI at SWMU 51  
 OWS at Building 1190 - HydroGeoLogic, Inc.  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS1?		Does Result Support Closure Under RRS2?	
											Yes	No	Yes	No
SWMU52 - Surface Soil-Location BHGLSWMU5108-00'														
BHGLSWMU5108-00'			0	2	Antimony	--	--			0.56	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Arsenic	3.5	99.7		F	5.85	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Barium	99.7	99.7			233	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Beryllium	0.95	0.25			1.02	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Cadmium	0.25	0.25		F	0.556	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Chromium, total	19.1	5.1			25.86	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Cobalt	5.1	10.4		F	11.05	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Copper	10.4	15.3			17.37	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Lead	15.3	12.5		J	30.97	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Nickel	12.5	--			14.6	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Tin	--	--			10	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Vanadium	33.7	30.9			46.3	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Zinc	30.9	--			38.8	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Mercury	--	0.19			0.14	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Thallium	0.19	--		F	2.43	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Ancenaphthene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Anthracene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Benzo(a)anthracene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Benzo(e)pyrene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Benzo(b)fluoranthene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Benzo(g,h,i)perylene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Benzo(k)fluoranthene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Chrysene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Dibenz(a,h)anthracene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Dibenzofuran	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Fluoranthene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Fluorene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Indeno(1,2,3-c,d)pyrene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Naphthalene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Phenanthrene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Pyrene	--	--			0.33	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	2,3,7,8-Tetrachlorodibenzofuran	--	--			0.00003	Yes	Yes	Yes	Yes
BHGLSWMU5108-00'			0	2	Sulfide	100	--			25	No	No	NV	NV

Table 8-5

Summary of Analytical Detections in Soil Samples Collected During RFI at SWMU 51  
 OWS at Building 1190 - HydroGeologic, Inc.  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under	
											RRS1?	RRS2?
SWMU52 - Surface Soil-Location BHGLSWMU6108-05'												
BHGLSWMU5108-05'			5	7	Antimony	--	--			0.712	Yes	Yes
BHGLSWMU5108-05'			5	7	Arsenic	3.3	3.3		F	6.58	Yes	Yes
BHGLSWMU5108-05'			5	7	Barium	681	681			128.1	Yes	Yes
BHGLSWMU5108-05'			5	7	Beryllium	0.6	0.6			1.13	Yes	Yes
BHGLSWMU5108-05'			5	7	Cadmium	0.31	0.31		F	0.59	Yes	Yes
BHGLSWMU5108-05'			5	7	Chromium, total	14.1	14.1			16.31	Yes	Yes
BHGLSWMU5108-05'			5	7	Cobalt	3.3	3.3		F	6.19	Yes	Yes
BHGLSWMU5108-05'			5	7	Copper	7.8	7.8		F	13.72	Yes	Yes
BHGLSWMU5108-05'			5	7	Lead	9.4	9.4		J	12.66	Yes	Yes
BHGLSWMU5108-05'			5	7	Nickel	8.3	8.3			19.76	Yes	Yes
BHGLSWMU5108-05'			5	7	Tin	--	--			10	Yes	Yes
BHGLSWMU5108-05'			5	7	Vanadium	25.1	25.1			37.4	Yes	Yes
BHGLSWMU5108-05'			5	7	Zinc	26.1	26.1			31.3	Yes	Yes
BHGLSWMU5108-05'			5	7	Mercury	--	--			0.035	Yes	Yes
BHGLSWMU5108-05'			5	7	Selenium	0.15	0.15		F	0.313	Yes	Yes
BHGLSWMU5108-05'			5	7	PCB-1260 (Aroclor)	--	--			1	Yes	Yes
BHGLSWMU5108-05'			5	7	Zinophos	--	--			0.067	Yes	Yes
BHGLSWMU5108-05'			5	7	Fluoranthene	--	--			0.33	Yes	Yes
BHGLSWMU5108-05'			5	7	Sulfide	32.3	32.3			25	No	Yes
SWMU52 - Surface Soil-Location BHGLSWMU6109-00'												
BHGLSWMU5109-00'			0	2	Antimony	--	--			0.56	Yes	Yes
BHGLSWMU5109-00'			0	2	Arsenic	5.3	5.3			5.85	Yes	Yes
BHGLSWMU5109-00'			0	2	Barium	160	160			233	Yes	Yes
BHGLSWMU5109-00'			0	2	Beryllium	0.96	0.96			1.02	Yes	Yes
BHGLSWMU5109-00'			0	2	Cadmium	0.24	0.24			0.566	Yes	Yes
BHGLSWMU5109-00'			0	2	Chromium, total	17.5	17.5			25.86	Yes	Yes
BHGLSWMU5109-00'			0	2	Cobalt	6.5	6.5			11.05	Yes	Yes
BHGLSWMU5109-00'			0	2	Copper	8.3	8.3			17.37	Yes	Yes
BHGLSWMU5109-00'			0	2	Lead	11.4	11.4		J	30.97	Yes	Yes
BHGLSWMU5109-00'			0	2	Nickel	12.9	12.9			14.6	Yes	Yes
BHGLSWMU5109-00'			0	2	Tin	--	--			10	Yes	Yes
BHGLSWMU5109-00'			0	2	Vanadium	33.6	33.6			46.3	Yes	Yes
BHGLSWMU5109-00'			0	2	Zinc	26.9	26.9			38.8	Yes	Yes
BHGLSWMU5109-00'			0	2	Mercury	--	--			0.14	Yes	Yes

Table 8-5

Summary of Analytical Detections in Soil Samples Collected During RFI at SWMU 51  
 OWS at Building 1190 - HydroGeologic, Inc.  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under	
											RRS1?	RRS2?
BHGLSWMU5109-00'			0	2	Thallium	0.22			F	2.43	Yes	Yes
BHGLSWMU5109-00'			0	2	Acenaphthene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Anthracene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Benzo(a)anthracene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Benzo(a)pyrene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Benzo(b)fluoranthene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Benzo(g,h,i)perylene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Benzo(k)fluoranthene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Chrysene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Dibenz(a,h)anthracene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Dibenzofuran	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Fluoranthene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Fluorene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Indeno(1,2,3-c,d)pyrene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Naphthalene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Phenanthrene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Pyrene	--				0.33	Yes	Yes
BHGLSWMU5109-00'			0	2	Tetrachlorodibenzofuran	--				0.00003	Yes	Yes
BHGLSWMU5109-00'			0	2	Sulfide	--				25	Yes	Yes
SWMU52 - Surface Soil-Location BHGLSWMU5109-05'												
BHGLSWMU5109-05'			5	7	Antimony	--				0.712	Yes	Yes
BHGLSWMU5109-05'			5	7	Arsenic	6.2				6.58	Yes	Yes
BHGLSWMU5109-05'			5	7	Barium	94.7				128.1	Yes	Yes
BHGLSWMU5109-05'			5	7	Beryllium	0.87				1.13	Yes	Yes
BHGLSWMU5109-05'			5	7	Cadmium	0.42				0.59	Yes	Yes
BHGLSWMU5109-05'			5	7	Chromium, total	18.4				16.31	No	No
BHGLSWMU5109-05'			5	7	Cobalt	6				6.19	Yes	Yes
BHGLSWMU5109-05'			5	7	Copper	8.5				13.72	Yes	Yes
BHGLSWMU5109-05'			5	7	Lead	10.7			J	12.66	Yes	Yes
BHGLSWMU5109-05'			5	7	Nickel	13.1				19.76	Yes	Yes
BHGLSWMU5109-05'			5	7	Tin	--				10	Yes	Yes
BHGLSWMU5109-05'			5	7	Vanadium	37.7				37.4	No	Yes
BHGLSWMU5109-05'			5	7	Zinc	31.7				31.3	No	Yes
BHGLSWMU5109-05'			5	7	Mercury	--				0.035	Yes	Yes
BHGLSWMU5109-05'			5	7	Selenium	--				0.313	Yes	Yes

Table 8-5

Summary of Analytical Detections in Soil Samples Collected During RFI at SWMU 51  
 OWS at Building 1190 - HydroGeologic, Inc.  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS27
BHGLSWMU5109-05'			5	7	PCB-1260 (Aroclor)	--	--			1	Yes	0.05	Yes
BHGLSWMU5109-05'			5	7	Zinophos	--	--			0.067	Yes	NV	Yes
BHGLSWMU5109-05'			5	7	Fluoranthene	--	--			0.33	Yes	410	Yes
BHGLSWMU5109-05'			5	7	Sulfide	--	--			25	Yes	NV	Yes

-- Indicates that constituent was not detected above the method detection limit

MSC = Media-Specific Concentration

NA = not applicable

PQL = Practical Quantitation Limit

RRS1 = Risk Reduction Standard 1

RRS2 = Risk Reduction Standard 2

TNRCC = Texas Natural Resources Conservation Commission

UTL = Upper Tolerance Limit

Footnotes:

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte

<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Laboratory Qualifier Definitions

= The analyte was positively identified

F = The analyte is present but the value is below the PQL

J = The analyte was positively identified, the quantitation is an estimation

### **8.6.2 Subsurface Soil**

No VOCs or SVOCs were detected above MQLs in the subsurface soil samples collected from 5 to 7 feet bgs at HGL borings BHGLSWMU5108 and BHGLSWMU5109. As shown in Figure 8-1, chromium, vanadium, and zinc were detected at concentrations slightly above their respective background concentrations and are likely extreme variations in the background concentrations. The lack of elevated concentrations of VOCs, SVOCs, and inorganics in the two HGL borings adjacent to the OWS units provides evidence that any potential releases of oil substances contaminated with engine oil, PD-680, fuel, hydraulic fluid, transmission fluid, etc has not adversely impacted the subsurface soils surrounding the units.

### **8.7 Results from Phase 2 Activities**

IT collected a surface soil sample from boring SB119003 during the Phase 2 RFI in April 2000 to delineate arsenic and cadmium concentrations detected during the Law (1995) investigation. As shown in Table 8-3 and Figure 8-1, the arsenic and cadmium concentrations detected in the surface soil sample from SB119003 were below their respective background concentrations. Therefore, Phase 2 boring SB119003 delineates arsenic and cadmium concentrations detected in the Law (1995) borings to the north-northwest of the OWS units.

### **8.8 Results from Phase 3 RFI Activities**

IT collected surface and subsurface soil samples from three additional soil borings (SB119004 through SB119006) during the Phase 3 RFI in November 2000 to confirm or delineate arsenic and cadmium concentrations detected above background concentrations during the Law (1995) investigation. Additionally, a groundwater sample was collected from monitoring well WITCTA032 to confirm the arsenic concentration detected in the Phase 1 groundwater sample.

The results from the Phase 3 soil samples at Building 1190 are included in Table 8-3 and the Phase 3 groundwater results are included in Table 8-4. The Phase 3 analytical results are also shown in Figure 8-1. The following sections discuss the analytical results from soil and groundwater samples collected during the Phase 3 RFI activities.

#### **8.8.1 Surface Soil**

IT collected three surface soil samples for analysis of arsenic and cadmium during the Phase 3 RFI in November 2000. Boring location SB119004 was sampled to confirm or replicate the elevated arsenic and cadmium concentrations detected at Law boring 1190-SB03 so the SPLP

analysis could be performed to determine the potential for the concentrations to leach into groundwater. The two other borings (SB119105 and SB119106) were intended to delineate arsenic and cadmium concentrations detected by Law (1995). The following subsections discuss the arsenic and cadmium concentrations detected in surface soil at Building 1190.

**Arsenic.** Arsenic concentrations detected in the three surface soil samples collected during Phase 3 RFI at Building 1190 were below background (Table 8-3). Therefore, the arsenic concentration detected in Law (1995) boring 1190-SB03 has been delineated to the east and southwest of the OWS units. Additionally, because the arsenic concentration detected in Phase 3 surface soil sample from SB119004 was below background, it appears that the arsenic detection in 1190-SB03 was an extreme, but true, background concentration.

**Cadmium.** Cadmium concentrations detected in the three surface soil samples collected during Phase 3 RFI at Building 1190 were below background (Table 8-3). Therefore, the cadmium concentration detected in Law (1995) boring 1190-SB03 has been delineated to the east and southwest of the OWS units. Additionally, because the cadmium concentration detected in the Phase 3 surface soil sample from SB119004 was below background, it appears that the cadmium detection from 1190-SB03 was an extreme, but true, background concentration. Furthermore, considering that the cadmium concentrations detected by Law (1995) were consistently higher than those detected by IT, and that IT has been unable to replicate the maximum cadmium detections at many of the OWS sites, it is likely that the cadmium detections at former Law boring 1190-SB01 are not the result of a release from the OWS units.

### **8.8.2 Subsurface Soil**

The following subsections discuss the analytical results from subsurface soil samples collected during the Phase 3 RFI.

**Arsenic.** Arsenic was detected in the sample from 4 to 6 feet bgs at SB119004 at a concentration (6.71 mg/kg) that is likely an extreme variation in the background concentration. Arsenic concentrations detected in the subsurface samples at SB119005 and SB119006 were below the background concentration.

**Cadmium.** Cadmium concentrations detected in the three subsurface soil samples collected during Phase 3 RFI at Building 1190 were below background (Table 8-3). The fact that elevated

cadmium concentrations were not detected in either the surface or subsurface soil samples from SB119004 indicates that the cadmium detections from the Law (1995) investigation were likely extreme, but true, background concentrations.

### **8.8.3 Groundwater**

As shown in Table 8-4, the detected arsenic concentration (0.0122 mg/L) in the Phase 3 groundwater sample collected from WITCTA032 exceeded background. However, considering that arsenic concentration is below the MSC for arsenic (0.05 mg/L) and that soil samples collected by HGL during the RFI at SWMU 51 and by IT during the Phase 2 and Phase 3 RFI did not contain arsenic concentrations significantly above background, the detected arsenic concentration is likely due to natural levels of arsenic in groundwater.

## **8.9 Summary and Discussion**

Law (1995) collected soil samples for analysis of VOCs and inorganics at three locations (1190-SB01 through 1190-SB03) adjacent to the OWS at Building 1190 during their initial site investigation in 1994. The analytical results from the Law investigation indicated that arsenic and cadmium detections exceeded background and MSCs in surface soil samples. IT collected surface and subsurface soil samples from two locations (SB119001 and SB119002) for analysis of SVOCs and pesticides/PCBs during the Phase 1 Sanitary Sewer System RFI in 1997 to supplement the data collected by Law (1995). IT also installed and sampled monitoring well WITCTA032 as part of the Phase 1 RFI to determine if groundwater had been impacted at the site.

HGL collected surface and subsurface soil samples from two soil borings (BHGLSWMU5108 and BHGLSWMU5109) located adjacent to the OWS units during their RFI at SWMU 51 in 1999. In April 2000, IT collected a surface soil sample from one soil boring (SB119003) as part of the Phase 2 RFI in an attempt to delineate inorganic concentrations identified during the Law investigation. IT collected surface and subsurface soil samples from three additional soil borings (SB119004 through SB119006) during the Phase 3 RFI in November 2000 to confirm the maximum concentrations of arsenic and cadmium detected by Law (1995) and to delineate inorganic concentrations to basewide background levels. A groundwater sample was also collected from WITCTA035 during the Phase 3 RFI to confirm the arsenic concentration detected above background during the Phase 1 RFI.

Figure 8-1 displays the analytical results exceeding background from the Law (1995) investigation, the Phase 1 RFI, and the samples collected by HGL. Additionally, Figure 8-1 displays the analytical results obtained from samples collected during Phase 2 and Phase 3 RFIs to show that contaminant concentrations have been delineated to basewide background concentrations. The following sections discuss the relevance of the parameters detected in surface soil, subsurface soil, and groundwater during investigations at the Building 1190 site

### **8.9.1 Surface Soil**

No SVOCs, pesticides, or PCBs were detected above background in the surface soil samples collected by Law (1995) or HGL (2000). One VOC, methylene chloride, was detected in surface soil during the Law investigation. However, the detected methylene chloride concentrations were likely the result of laboratory contamination. Two inorganics, arsenic and cadmium, were detected at concentrations significantly above background in the samples collected by Law (1995).

As shown in Figure 8-1, the elevated concentrations of arsenic and cadmium detected in surface soil samples collected by Law (1995) have been delineated to background concentrations by the results from borings SB119003, SB119005, BHGLSWMU5108, BHGLSWMU5109, and SB119006. Additionally, arsenic and cadmium concentrations were below background in the surface soil sample collected from SB119004, that is adjacent to former Law boring 1190-SB03. The lack of elevated arsenic and cadmium concentrations in the surface soil samples from SB119003 and the two HGL borings indicates that the elevated arsenic and cadmium concentrations detected by Law (1995) were not indicative of a release from the OWS.

### **8.9.2 Subsurface Soil**

No VOCs, SVOCs, or pesticides/PCBs were detected above background in the subsurface soil samples collected by HGL (2000) or by IT during the Phase 1 RFI in 1997. Additionally, arsenic and cadmium concentrations were at or below background in the three subsurface soil samples collected during the Phase 3 RFI in November 2000.

### **8.9.3 Groundwater**

One VOC, methylene chloride, was detected above its MQL in the groundwater sample from WITCTA032. However, the concentration was affected by contamination in the associated method blank and was likely the result of laboratory contamination.

Arsenic, iron, and manganese were detected at concentrations above background, but below MSCs in the Phase 1 groundwater from WITCTA032. The iron and manganese concentrations were indicative of extreme, but true, background concentrations. Arsenic was also detected above background in the Phase 3 RFI groundwater sample from WITCTA032 at a concentration (0.0122 mg/L) that exceeds background. Considering that no pattern of arsenic contamination was identified in soil at the site, the detected arsenic concentrations identified in groundwater are likely extreme, but true, background concentrations.

### **8.10 Conclusions**

Considering that no pattern of VOCs, SVOCs, pesticides/PCBs, or inorganics has been identified above TNRCC MSCs in the soil and groundwater samples collected in the vicinity of Building 1190, it is recommended that the site be presented for closure under RRS 2 of the TNRCC RRP. The site is recommended for closure under RRS 2 because the inorganic concentrations detected in surface and subsurface soil samples have been delineated to background. Although all of the arsenic and cadmium concentrations detected above background/MSCs in former Law (1995) boring 1190-SB03 were not confirmed, the fact that arsenic and cadmium were detected at concentrations at or below background in all of the samples collected by IT and HGL indicates that the elevated detections from the Law (1995) investigation were extreme, but true, background concentrations.

The absence of detected concentrations of compounds contained in the influent to the OWS (e.g., engine oil, fuel, antifreeze, etc.) in the soil and groundwater samples collected at the site indicates any releases from the OWS have not significantly impacted the environment. Therefore, closure is recommended under RRS 2 for the OWS at Building 1190. Should this recommendation be accepted, a letter stating that SWMU 52 (the OWS at Building 1190) was carried out in accordance with TAC §335.555, and signed by an Air Force representative, will be transmitted to the TNRCC, along with a metes and bounds description of SWMU 52. The metes and bounds description will correspond to surveyed coordinates of the affected area shown in Figure 8-1.

# TAB

9.0

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## **9.0 OWS Building 1191**

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The following sections provide a description of the OWS at Building 1191, a summary of the site characterization activities, a discussion of the site-specific geology and hydrology, discussions of the analytical results from each characterization event, and recommendations based upon the physical and chemical data collected at the site.

### **9.1 Site Description**

The OWS at Building 1191 (Vehicle Maintenance Shop) is located along Haile Road north of the Flight Line Drainage Ditch (SD-10) and is designated SWMU No. 37 on the RCRA Hazardous Waste Permit for NAS Fort Worth JRB (Figure 9-1). The primary OWS serving the Vehicle Maintenance Shop is located immediately adjacent to the western wall beneath an asphalt area, and the secondary OWS is located immediately adjacent to the southern wall of Building 1191. The primary OWS is a 1,000-gallon capacity unit installed in 1982 and is operated by gravity flow. The primary OWS unit consists of a main trench floor drain, underground conduits, and the OWS. Reportedly, the conduits are also constructed of concrete. The building floor is paved with concrete and slopes towards the drain. The trench is approximately 1 foot deep, 18 inches wide, and 80 yards long. The OWS is a below-ground concrete box divided into two 500-gallon chambers, one for separation and one for storing the skimmed oil. A pressure gauge sticking out of the ground indicates the oil level, and thus, the need for pumping it out (A. T. Kearney, 1989). The secondary OWS unit has a capacity of 500 gallons and its date of installation is unknown.

The separator units receive wastewater contaminated with chemicals used in vehicle maintenance. The contaminants include thinners and solvents, waste oil from gas and diesel engines, fuel, and antifreeze. There has been no documented history of releases from this unit and no evidence of a release was noted in the visual site inspection performed by A. T. Kearney (1989) during the RFA. The OWS at Building 1191 was included in a pumping and steam cleaning effort by D.D. and Beauty, a nonhazardous liquid waste removal company, during April and May 1993.

**LEGEND**

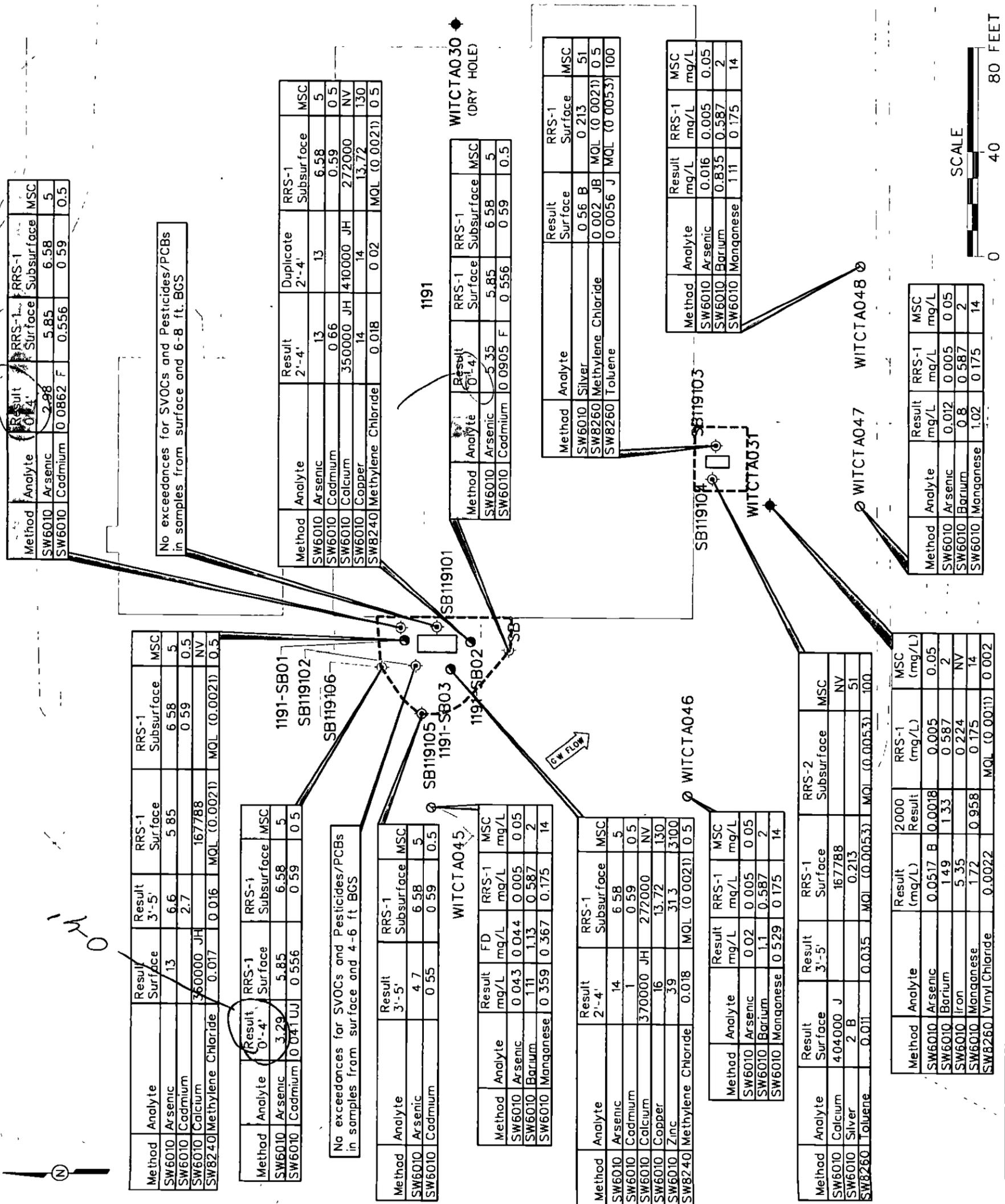
- BUILDING 1191 INDUSTRIAL WASTE OIL/WATER SEPARATOR UNIT
- IT CORP SOIL BORING (1997)
- IT CORP. PHASE 2 BORING (2000)
- IT CORP PHASE 3 BORING (2000)
- IT CORP MONITORING WELL
- IT CORP MONITORING WELL LOCATION-PHASE 2
- LAW ENGINEERING SOIL BORING (VOCs & METALS)
- GROUNDWATER FLOW DIRECTION
- SEWER LINE AND DIRECTIONAL FLOW
- FENCE
- RRS 2 SURVEY BOUNDARY
- PHASE 1 RESULTS > BACKGROUND
- PHASE 2 RESULTS
- PHASE 3 RESULTS
- ANALYTE DETECTED ABOVE MSC SPLP NOT PERFORMED.

**NOTES:**

- CONCENTRATIONS REPORTED IN MG/KG UNLESS NOTED OTHERWISE
- MSC - MEDIA-SPECIFIC CONCENTRATION
- NV - NO VALUE
- B - FOR INORGANICS, THE QUANTITATION IS AN ESTIMATED CONCENTRATION BETWEEN THE MDL AND PQL FOR ORGANICS, THE CONSTITUENT WAS ALSO DETECTED IN THE ASSOCIATED METHOD BLANK
- J - THE ANALYTE WAS POSITIVELY IDENTIFIED, THE QUANTITATION IS AN ESTIMATION.
- SOURCE DRAFT RCRA FACILITIES INVESTIGATION SANITARY SEWER SYSTEM, SEPTEMBER 1997, IT CORPORATION

**FIGURE 9-1**  
**SITE MAP SHOWING**  
**INVESTIGATION RESULTS**  
**OWS BUILDING 1191 (SWMU 37)**

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## **9.2 Site Characterization Activities**

A summary of the soil and groundwater samples that have been collected at the Building 1190 site is provided in Table 9-1. The analytical methods associated with each soil sample collected at Building 1191 are also presented in Table 9-1. The locations of the soil borings are shown in Figure 9-1. The following sections summarize the investigation activities that have been performed to characterize environmental impacts relating to the OWS at Building 1191.

### **9.2.1 Initial Site Investigation – Law 1994**

Law (1995) collected soil samples in 1994 from three soil borings along the perimeter of the western OWS at Building 1191 (Figure 9-1). Soil borings 1191-SB01, 1191-SB02, and 1191-SB03 were advanced to a depth of 5 feet bgs. No surface soil samples were collected. Three subsurface soil samples were collected from 1 to 3, 2 to 4, and 3 to 5 feet in depth. Samples were analyzed for VOCs (EPA Method SW8240) and inorganics (EPA Method SW6010). No inspection of the southern OWS was performed (Law, 1995).

### **9.2.2 Phase 1 RFI Activities – IT Corporation 1997**

IT collected soil samples during the Phase 1 Sanitary Sewer System RFI in 1997 (Table 9-1) from two soil borings (SB119101 and SB119102) adjacent to both the western and southern OWSs at Building 1191 (Figure 9-1). Surface soil samples were collected from one to three feet in depth. Subsurface soils were collected from the 2-foot interval directly above the water table (3 to 5 feet). The soil samples collected at the western OWS (SB-119101) were analyzed for SVOCs (EPA Method SW8270) and pesticides/PCBs (EPA Method SW8080) to supplement soil data collected during the Law (1995) investigation. Samples collected at the OWS on the southern side of Building 1191 (SB119102) were analyzed for VOCs, inorganics, SVOCs, and pesticides/PCBs (IT, 1998).

Two monitoring wells were installed during Phase 1 of the Sanitary Sewer System RFI (Figure 9-1); WITCTA031 was located on the southern side of Building 1191 and WITCTA030 was located on the east side of Building 1191. WITCTA030 did not yield groundwater and was plugged and abandoned. Monitoring well WITCTA031 was developed and sample MS1586 was collected and analyzed for VOCs, SVOCs, and inorganics (IT, 1998).

**Table 9-1**  
**Summary of Previous Environmental Samples**  
**Collected at Building 1191**  
**NAS Fort Worth JRB, Texas**

Sample Location	Sample Date	Sample Number	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Analysis	Analytical Method
<b>Law Engineering - Initial Site Investigation (1994)</b>						
1191-SB01	4/25/94	119101SBB	1	3	Inorganics, VOCs	EPA SW6010, SW8240
		119101SBC	3	5	Inorganics, VOCs	EPA SW6010, SW8240
1191-SB02	4/25/94	119102SBB	2	4	Inorganics, VOCs	EPA SW6010, SW8240
		1191DPSB1	2	4	Inorganics, VOCs	EPA SW6010, SW8240
1191-SB03	4/25/94	119103SBB	2	4	Inorganics, VOCs	EPA SW6010, SW8240
<b>IT Corporation - Phase 1 RFI (1997)</b>						
SB119101	3/19/97	MS1150	1	3	Pesticides/PCBs, SVOCs	EPA SW8081, SW8270
SB119101	3/19/97	MS1151	3	5	Pesticides/PCBs, SVOCs	EPA SW8081, SW8270
SB119102	3/19/97	MS1148	1	3	Pesticides/PCBs, SVOCs	EPA SW8081, SW8270
SB119102	3/19/97	MS1149	3	5	Pesticides/PCBs, SVOCs	EPA SW8081, SW8270
SB119103	3/19/97	MS1158	1	3	Inorganics, Pesticides/PCBs, VOCs, SVOCs	EPA SW6010, SW8080, SW8260, SW8270
SB119104	3/19/97	MS1159	1	3	Inorganics, Pesticides/PCBs, VOCs, SVOCs	EPA SW6010, SW8080, SW8260, SW8270
SB119104	3/19/97	MS1160	3	5	Inorganics, Pesticides/PCBs, VOCs, SVOCs	EPA SW6010, SW8080, SW8260, SW8270
WITCTA031	5/1/97	MS1586	GW	GW	Inorganics, VOCs, SVOCs	EPA SW6010, SW8260, SW8270
<b>IT Corporation - Phase 2 RFI (2000)</b>						
SB119105	4/24/00	BG0021	3	5	As, Cd	EPA SW6010B
WITCTA031	5/5/00	BG3008	GW	GW	As, Ba, Mn	EPA SW7060A, SW6010B
WITCTA045	4/28/00	BG3009	GW	GW	As, Ba, Mn	EPA SW7060A, SW6010B
		BG3010	GW	GW	As, Ba, Mn	EPA SW7060A, SW6010B
WITCTA046	4/28/00	BG3011	GW	GW	As, Ba, Mn	EPA SW7060A, SW6010B
WITCTA047	4/28/00	BG3012	GW	GW	As, Ba, Mn	EPA SW7060A, SW6010B
WITCTA048	4/28/00	BG3013	GW	GW	As, Ba, Mn	EPA SW7060A, SW6010B
<b>IT Corporation - Phase 3 RFI (2000)</b>						
SB119107	12/4/00	BG0073	0	4	As, Cd	EPA SW6010B
SB119108	12/4/00	BG0075	0	4	As, Cd	EPA SW6010B

VOCs - Volatile Organic Compounds  
 SVOCs - Semivolatile Organic Compounds  
 PCBs - Polychlorinated Biphenols  
 As - Arsenic  
 Cd - Cadmium  
 Ba - Barium  
 Mn - Manganese

### **9.2.3 Phase 2 RFI Activities – IT Corporation 2000**

An additional soil sample was collected by IT during the Phase 2 RFI in April 2000 (Table 9-1). Soil boring SB119105 was located west of the northern OWS (Figure 9-1). Sample BG0021 was collected from three to five feet bgs and analyzed for arsenic and cadmium to delineate the extent of these inorganics detected in former Law borings 1191-SB01, 1191-SB02, and 1191-SB03. An additional groundwater sample was collected from WITCTA031 during the Phase 2 RFI in May 2000 and analyzed for arsenic, barium, and manganese (EPA Method SW6010B) to confirm concentrations detected during Phase 1

### **9.2.4 Phase 3 RFI Activities – IT Corporation 2000**

Additional sampling was performed by IT, during the Phase 3 RFI in November 2000 (Table 9-1), to delineate arsenic and cadmium detections in the surface to 5-foot interval. Additionally, confirmation soil samples were collected to confirm arsenic and cadmium concentrations that exceeded background and MSCs during previous investigations. Samples were collected from surface to four feet bgs at the three soil borings (SB119106, SB119107, and SB119108) (Figure 9-1) because groundwater is typically encountered at 4 feet bgs in this area.

## **9.3 Site-Specific Conditions**

The following subsections discuss the site-specific geology and hydrogeology characteristics that were encountered during the investigation activities at Building 1191 site.

**Geology.** Quaternary alluvium is found at the surface through most of the NAS Fort Worth area. The alluvium consists of floodplain and fluvial terrace deposits of gravel, sand, silt, and clay that occur as a veneer on the eroded surface of Upper Cretaceous strata. Soil colors ranged from pale yellow to reddish-yellow from the surface to a depth of 6 feet. Four feet of fill consisting of silty fine sand with gravel and wood debris was encountered in one soil boring by Law. Other soils encountered in the soil borings (Appendix A) were slightly silty-fine to coarse sands to a depth of about 6 feet to the top of the Walnut Formation. Petroleum vapors (approximately 1 part per million [ppm]) were detected in the 3- to 5-foot depth range from one soil boring by IT. Law (1995) reported similar petroleum vapor concentrations in the same soil interval.

The alluvial soils rest unconformably on the top of the weathered Walnut Formation. Underlying the Quaternary alluvium is the Cretaceous-aged Walnut Formation, which consists of 20 to 30

feet of indurated fossiliferous limestone interbedded with brown sandy clay, thinly bedded fossiliferous clay, and fissile shale. Unconformably underlying the Walnut Formation is the Cretaceous-aged Paluxy Formation. The Paluxy Formation generally consists of coarse-grained sand that grades upward into fine-grained sand with variable amounts of shale and limestone. The sandstone, composed of fine- to coarse-grained white quartz, is well-sorted, poorly consolidated, and cross-bedded. The Paluxy Formation thickness ranges from 140 to 190 feet, averaging 160 feet in Tarrant County (Radian, 1991).

**Hydrogeology.** Shallow groundwater within the Quaternary alluvium occurs in fluvial terrace deposits of sand and gravel, which occur as a veneer on the eroded surface of the Walnut Formation. Ground water was detected in each soil boring at an approximate depth of 3 to 5 feet below the ground surface. Two monitoring wells were installed; WITCTA031 was located on the southern side of the building, while WITCTA030 was located on the eastern side to be downgradient of the west wall OWS. WITCTA030 did not yield groundwater and was plugged and abandoned. WITCTA031 was screened from 6.5 feet bgs to 1.5 feet bgs across the water table. Refusal was encountered at a depth of 6 to 6.5 feet bgs. Groundwater flows to the south and east toward Farmers Branch Creek and the Trinity River.

#### **9.4 Results from Initial Site Investigation**

Law (1995) collected soil samples in 1994 from three borings (1191-SB01 through 1191-SB03) located on the north, west, and south sides of the northern OWS at Building 1191 (Figure 9-1). Table 9-2 contains a summary of the analytes detected in the samples collected by Law (1995) and compares the analytical results to basewide background concentrations and MSCs. Detected analyte concentrations that exceed background concentrations are shown on Figure 9-1. The following subsections present the analytical results from surface and subsurface soil samples that were collected during the Law (1995) investigation at Building 1191.

##### **9.4.1 Surface Soil**

Law (1995) collected a surface soil sample from 1 to 3 feet bgs from soil boring 1190-SB01 during the initial site investigation for analysis of VOCs and inorganics. The results from this surface soil sample are discussed in the following subsections.

Table 9-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1191 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
<b>Building 1191 - Surface Soil - Location 1191-SB01</b>												
1191-SB01	119101SBB	4/25/94	1	3	METHYLENE CHLORIDE	0.017				No	0.5	Yes
1191-SB01	119101SBB	4/25/94	1	3	ALUMINUM		550		22035	Yes	10000	NA
1191-SB01	119101SBB	4/25/94	1	3	ARSENIC		13.0		5.85	No	5	NA
1191-SB01	119101SBB	4/25/94	1	3	BARIUM		4.9		233	Yes	200	NA
1191-SB01	119101SBB	4/25/94	1	3	CADMIUM		0.38		0.556	Yes	0.5	NA
1191-SB01	119101SBB	4/25/94	1	3	CALCIUM		360000	JH	167788	No	Essential Nutrient	Yes
1191-SB01	119101SBB	4/25/94	1	3	CHROMIUM, TOTAL		2.1		25.86	Yes	10	NA
1191-SB01	119101SBB	4/25/94	1	3	COBALT		2.3		11.05	Yes	610	NA
1191-SB01	119101SBB	4/25/94	1	3	COPPER		9.2		17.37	Yes	130	NA
1191-SB01	119101SBB	4/25/94	1	3	IRON		1900	JH	17717	Yes	Essential Nutrient	NA
1191-SB01	119101SBB	4/25/94	1	3	LEAD	2.8	2.8		30.97	Yes	1.5	NA
1191-SB01	119101SBB	4/25/94	1	3	MAGNESIUM		1900		3003	Yes	Essential Nutrient	NA
1191-SB01	119101SBB	4/25/94	1	3	MANGANESE		120		849	Yes	1400	NA
1191-SB01	119101SBB	4/25/94	1	3	NICKEL	1.9	1.9		14.6	Yes	200	NA
1191-SB01	119101SBB	4/25/94	1	3	POTASSIUM		110		2895	Yes	Essential Nutrient	NA
1191-SB01	119101SBB	4/25/94	1	3	SODIUM		110		37300	Yes	Essential Nutrient	NA
1191-SB01	119101SBB	4/25/94	1	3	VANADIUM	7.7	7.7		46.3	Yes	72	NA
1191-SB01	119101SBB	4/25/94	1	3	ZINC		5.1		38.8	Yes	3100	NA
<b>Building 1191 - Subsurface Soil - Location 1191-SB01</b>												
1191-SB01	119101SBC	4/25/94	3	5	METHYLENE CHLORIDE	0.016				No	0.5	Yes
1191-SB01	119101SBC	4/25/94	3	5	ALUMINUM		3600		20260	Yes	10000	NA
1191-SB01	119101SBC	4/25/94	3	5	ARSENIC		6.6		6.58	No	5	NA
1191-SB01	119101SBC	4/25/94	3	5	BARIUM		38		128.1	Yes	200	NA
1191-SB01	119101SBC	4/25/94	3	5	CADMIUM		2.70		0.59	No	0.5	NA
1191-SB01	119101SBC	4/25/94	3	5	CALCIUM		39000	JH	272000	Yes	Essential Nutrient	NA
1191-SB01	119101SBC	4/25/94	3	5	CHROMIUM TOTAL		5.7		16.31	Yes	10	NA
1191-SB01	119101SBC	4/25/94	3	5	COBALT		4.1		6.19	Yes	610	NA
1191-SB01	119101SBC	4/25/94	3	5	COPPER		11000	JH	13.72	Yes	130	NA
1191-SB01	119101SBC	4/25/94	3	5	IRON		7.9		17469	Yes	Essential Nutrient	NA
1191-SB01	119101SBC	4/25/94	3	5	LEAD		660		12.66	Yes	1.5	NA
1191-SB01	119101SBC	4/25/94	3	5	MAGNESIUM		660		2420	Yes	Essential Nutrient	NA
1191-SB01	119101SBC	4/25/94	3	5	MANGANESE		330		351.7	Yes	1400	NA
1191-SB01	119101SBC	4/25/94	3	5	NICKEL		6.2		19.76	Yes	200	NA
1191-SB01	119101SBC	4/25/94	3	5	POTASSIUM		540		1717	Yes	Essential Nutrient	NA
1191-SB01	119101SBC	4/25/94	3	5	SODIUM		45		53200	Yes	Essential Nutrient	NA
1191-SB01	119101SBC	4/25/94	3	5	VANADIUM		14.0		37.4	Yes	72	NA
1191-SB01	119101SBC	4/25/94	3	5	ZINC		20.0		31.3	Yes	3100	NA

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**Table 9-2**  
**Summary of 1994 Soil Analytical Detections Compared to Background and MSCs**  
**OWS Building 1191 - Law Environmental (1995)**  
**NAS Fort Worth JRB, Texas**

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
<b>Building 1191 - Subsurface Soil - Location 1191-SB02</b>												
1191-SB02	119102SBB	4/25/94	2	4	METHYLENE CHLORIDE	0.018	0.018		0.5	No	0.5	Yes
1191-SB02	119102SBB	4/25/94	2	4	ALUMINUM	630	630		20260	Yes	10000	NA
1191-SB02	119102SBB	4/25/94	2	4	ARSENIC	13.0	13.0		6.58	No	5	No
1191-SB02	119102SBB	4/25/94	2	4	BARIUM	5.3	5.3		128.1	Yes	200	NA
1191-SB02	119102SBB	4/25/94	2	4	CADMIUM	0.66	0.66		0.59	No	0.5	No
1191-SB02	119102SBB	4/25/94	2	4	CALCIUM	350000	350000	JH	272000	No	Essential Nutrient	Yes
1191-SB02	119102SBB	4/25/94	2	4	CHROMIUM, TOTAL	2.7	2.7		16.31	Yes	10	NA
1191-SB02	119102SBB	4/25/94	2	4	COBALT	1.7	1.7		6.19	Yes	610	NA
1191-SB02	119102SBB	4/25/94	2	4	COPPER	14.0	14.0		13.72	No	130	Yes
1191-SB02	119102SBB	4/25/94	2	4	IRON	1900	1900	JH	17469	Yes	Essential Nutrient	NA
1191-SB02	119102SBB	4/25/94	2	4	LEAD	2.7	2.7		12.66	Yes	1.5	NA
1191-SB02	119102SBB	4/25/94	2	4	MAGNESIUM	2300	2300		2420	Yes	Essential Nutrient	NA
1191-SB02	119102SBB	4/25/94	2	4	MANGANESE	130	130		351.7	Yes	1400	NA
1191-SB02	119102SBB	4/25/94	2	4	NICKEL	1.8	1.8		19.76	Yes	200	NA
1191-SB02	119102SBB	4/25/94	2	4	POTASSIUM	120	120		1717	Yes	Essential Nutrient	NA
1191-SB02	119102SBB	4/25/94	2	4	SODIUM	100	100		53200	Yes	Essential Nutrient	NA
1191-SB02	119102SBB	4/25/94	2	4	VANADIUM	7.3	7.3		37.4	Yes	72	NA
1191-SB02	119102SBB	4/25/94	2	4	ZINC	5.1	5.1		31.3	Yes	3100	NA
1191-SB02	1191DPSB1	4/25/94	2	4	METHYLENE CHLORIDE	0.02	0.02		0.5	No	0.5	Yes
1191-SB02	1191DPSB1	4/25/94	2	4	ALUMINUM	530	530		20260	Yes	10000	NA
1191-SB02	1191DPSB1	4/25/94	2	4	ARSENIC	13.0	13.0		6.58	No	5	No
1191-SB02	1191DPSB1	4/25/94	2	4	BARIUM	6.8	6.8		128.1	Yes	200	NA
1191-SB02	1191DPSB1	4/25/94	2	4	CADMIUM	0.45	0.45		0.59	Yes	0.5	NA
1191-SB02	1191DPSB1	4/25/94	2	4	CALCIUM	410000	410000	JH	272000	No	Essential Nutrient	Yes
1191-SB02	1191DPSB1	4/25/94	2	4	CHROMIUM, TOTAL	2.3	2.3		16.31	Yes	10	NA
1191-SB02	1191DPSB1	4/25/94	2	4	COBALT	2.1	2.1		6.19	Yes	610	NA
1191-SB02	1191DPSB1	4/25/94	2	4	COPPER	14.0	14.0	J	13.72	No	130	Yes
1191-SB02	1191DPSB1	4/25/94	2	4	IRON	180	180		17469	Yes	Essential Nutrient	NA
1191-SB02	1191DPSB1	4/25/94	2	4	LEAD	2.8	2.8		12.66	Yes	1.5	NA
1191-SB02	1191DPSB1	4/25/94	2	4	MAGNESIUM	2400	2400		2420	Yes	Essential Nutrient	NA
1191-SB02	1191DPSB1	4/25/94	2	4	MANGANESE	130	130		351.7	Yes	1400	NA
1191-SB02	1191DPSB1	4/25/94	2	4	NICKEL	1.9	1.9		19.76	Yes	200	NA
1191-SB02	1191DPSB1	4/25/94	2	4	POTASSIUM	100	100		1717	Yes	Essential Nutrient	NA
1191-SB02	1191DPSB1	4/25/94	2	4	SODIUM	100	100		53200	Yes	Essential Nutrient	NA
1191-SB02	1191DPSB1	4/25/94	2	4	VANADIUM	7.5	7.5		37.4	Yes	72	NA
1191-SB02	1191DPSB1	4/25/94	2	4	ZINC	7.6	7.6		31.3	Yes	3100	NA

**Table 9-2**  
**Summary of 1994 Soil Analytical Detections Compared to Background and MSCs**  
**OWS Building 1191 - Law Environmental (1995)**  
**NAS Fort Worth JRB, Texas**

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
<b>Building 1191 - Subsurface Soil - Location 1191-SB03</b>												
1191-SB03	119103SBB	4/25/94	2	4	METHYLENE CHLORIDE	0.018				No	0.5	Yes
1191-SB03	119103SBB	4/25/94	2	4	ALUMINUM	690	690		20260	Yes	10000	NA
1191-SB03	119103SBB	4/25/94	2	4	ARSENIC	14.0	14.0		6.58	No	5	NA
1191-SB03	119103SBB	4/25/94	2	4	BARIUM	8.9	8.9		128.1	Yes	200	NA
1191-SB03	119103SBB	4/25/94	2	4	CADMIUM	1.0	1.0		0.59	No	0.5	No
1191-SB03	119103SBB	4/25/94	2	4	CALCIUM	370000	370000	JH	272000	No	Essential Nutrient	Yes
1191-SB03	119103SBB	4/25/94	2	4	CHROMIUM, TOTAL	2.7	2.7		16.31	Yes	10	NA
1191-SB03	119103SBB	4/25/94	2	4	COBALT	0.23	0.23		6.19	Yes	610	NA
1191-SB03	119103SBB	4/25/94	2	4	COPPER	16.0	16.0		13.72	No	130	Yes
1191-SB03	119103SBB	4/25/94	2	4	IRON	3400	3400	JH	17468	Yes	Essential Nutrient	NA
1191-SB03	119103SBB	4/25/94	2	4	LEAD	2.8	2.8		12.66	Yes	1.5	NA
1191-SB03	119103SBB	4/25/94	2	4	MAGNESIUM	2000	2000		2420	Yes	Essential Nutrient	NA
1191-SB03	119103SBB	4/25/94	2	4	MANGANESE	180	180		351.7	Yes	1400	NA
1191-SB03	119103SBB	4/25/94	2	4	NICKEL	2.6	2.6		19.76	Yes	200	NA
1191-SB03	119103SBB	4/25/94	2	4	POTASSIUM	130	130		1717	Yes	Essential Nutrient	NA
1191-SB03	119103SBB	4/25/94	2	4	SODIUM	120	120		53200	Yes	Essential Nutrient	NA
1191-SB03	119103SBB	4/25/94	2	4	VANADIUM	7.7	7.7		37.4	Yes	72	NA
1191-SB03	119103SBB	4/25/94	2	4	ZINC	39	39		31.3	No	3100	Yes

MSC = Media-Specific Concentration  
 NA = not applicable  
 MQL = Method Quantitation Limit  
 RRS 1 = Risk Reduction Standard 1  
 RRS 2 = Risk Reduction Standard 2  
 TNRCC = Texas Natural Resources Conservation Commission  
 UTL = Upper Tolerance Limit

Footnote:  
<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte.  
<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Qualifier Definitions  
 = The analyte was positively identified  
 J = For inorganics, the associated value is an estimated quantity. For organics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample.  
 JB = Estimated quantitation - possible biased high based upon blank contamination  
 JH = Estimated quantitation - possible biased high based upon QC data

**VOCs.** Methylene chloride was detected at a concentration (0.017 mg/kg) similar to the methylene chloride concentrations detected in all of the soil samples collected by Law (1995) during the initial site investigation at Building 1190. Considering that the concentration is well below the MSC (0.5 mg/kg) and that methylene chloride is a common laboratory contaminant, the detected concentration was likely the result of laboratory contamination.

**Inorganics.** Arsenic and calcium were the only inorganics that were detected above background in the surface soil sample from 1191-SB01. Calcium is a naturally occurring essential nutrient and the detected concentration is likely a natural variation in the basewide background concentration. Arsenic was detected at a concentration (13 mg/kg) that exceeded both background and its MSC.

#### **9.4.2 Subsurface Soil**

Three subsurface soil samples, and one field duplicate, were collected by Law (1995) at the OWS located at the west wall of Building 1191 at depths of up to 5 feet using hollow-stem auger drilling methods. The subsurface soil samples were analyzed for VOCs and inorganics. The following subsections discuss the analytical results from the subsurface soil samples collected by Law (1995).

**VOCs.** Methylene chloride was detected in all soil samples collected and ranged from 0.016 to 0.02 mg/kg. Considering that the methylene chloride concentrations were below the tabulated MSC of 0.5 mg/kg and that methylene chloride is a common laboratory contaminant, the detected concentrations were likely the result of laboratory contamination. No other VOCs were detected in the subsurface soil samples collected during the Law investigation.

**Inorganics.** The detected concentrations of inorganics in the subsurface samples collected by Law (1995) were all below background with the exception of arsenic, cadmium, calcium, copper, and zinc (Table 9-2). Arsenic was detected above background and MSC (5 mg/kg) in all three subsurface samples, and the field duplicate for 1191-SB02, at concentrations ranging from 6.6 to 14 mg/kg. Cadmium was detected above background and MSC in all three subsurface samples at concentrations ranging from 0.66 mg/kg to 2.7 mg/kg.

Calcium was detected above its background concentration (272,000 mg/kg) in three subsurface samples at concentrations ranging from 350,000 to 370,000 mg/kg. Calcium is considered to be

an essential nutrient and the reported concentrations probably represent naturally occurring low concentrations in the soil. Zinc was detected in one sample (1191-SB03) at a concentration (39 mg/kg) that is likely an extreme variation in the background concentration for zinc (31.3 mg/kg). Copper was detected above background in two borings (1191-SB02 and 1191-SB03) at concentrations (14 and 16 mg/kg, respectively) that are likely extreme variations in the background concentration.

### **9.5 Results from Phase 1 RFI Activities**

The following sections present the analytical results from surface soil samples that were collected by IT (1997) during the Phase 1 Sanitary Sewer System RFI at Building 1191. A discussion of the groundwater analytical results collected from monitoring wells installed during the investigation is also included. The purpose of the Phase 1 RFI soil samples was to supplement the analytical data for VOCs and inorganics that were collected by Law (1995) during the initial site investigation near the OWS at the western edge of Building 1191. Additionally, soil samples were collected adjacent to the OWS at the south edge of Building 1191 to determine whether VOCs, SVOCs, pesticides/PCBs, and inorganics have been released from the OWS unit. Table 9-3 contains a summary of the analytes detected in the Phase 1 RFI soil samples collected by IT and Table 9-4 contains a summary of the analytes detected in the Phase 1 RFI groundwater samples. Analytical detection summary tables for the soil and groundwater samples collected at Building 1191 are shown in Tables B-10 and B-11, respectively.

#### **9.5.1 Surface Soil**

Surface soil samples were collected from two locations, SB119101 and SB119102, adjacent to the OWS at the western edge of Building 1191. These surface soil samples were analyzed for SVOCs and pesticides/PCBs to supplement soil data collected by Law at the western OWS. Surface soil samples were also collected from two boring locations (SB119103 and SB119104) adjacent to the OWS on the southern side of Building 1191. These samples were analyzed for VOCs, inorganics, SVOCs, and pesticides/PCBs because environmental impacts relating to the OWS were not investigated during the initial site investigation by Law (1995). The following subsections discuss the analytical results from these surface soil samples.



Table 9-3  
 Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1191 - IT corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
SB119104	MS1159	19-Mar-97	1	3	Calcium	108.62	404000	N	J	272000	NA	Essential Nutrient	NA
SB119104	MS1159	19-Mar-97	1	3	Chromium	1.09	3.8			16.31	Yes	10	NA
SB119104	MS1159	19-Mar-97	1	3	Chromium	7.6	3	B	B	16.31	Yes	10	NA
SB119104	MS1159	19-Mar-97	1	3	Cobalt	7.6	0.56	B	B	6.19	Yes	610	NA
SB119104	MS1159	19-Mar-97	1	3	Copper	6.52	12.6			13.72	Yes	130	NA
SB119104	MS1159	19-Mar-97	1	3	Iron	7.6	2270			17469	NA	Essential Nutrient	NA
SB119104	MS1159	19-Mar-97	1	3	Magnesium	325.87	2450			2420	NA	Essential Nutrient	NA
SB119104	MS1159	19-Mar-97	1	3	Manganese	2.17	44.4	N	J	351.7	Yes	1400	NA
SB119104	MS1159	19-Mar-97	1	3	Molybdenum	8.69	0.58	B	B	1.93	Yes	51	NA
SB119104	MS1159	19-Mar-97	1	3	Nickel	16.29	2.1	B	B	19.76	Yes	200	NA
SB119104	MS1159	19-Mar-97	1	3	Potassium	543.12	206	B	B	1717	NA	Essential Nutrient	NA
SB119104	MS1159	19-Mar-97	1	3	Silver	1.09	0.14	B	B	0.128	No	51	Yes
SB119104	MS1159	19-Mar-97	1	3	Silver	7.6	2	B	B	0.128	No	51	Yes
SB119104	MS1159	19-Mar-97	1	3	Sodium	32.59	109			53200	NA	Essential Nutrient	NA
SB119104	MS1159	19-Mar-97	1	3	Zinc	2.17	3.8	E	J	31.3	Yes	3100	NA
SB119104	MS1160	19-Mar-97	3	5	M,p-xylenes	0.0078	0.0035	J		0.0074	Yes	1000	NA
SB119104	MS1160	19-Mar-97	3	5	Methylene chloride	0.0022	0.0012	J		0.0021	Yes	0.5	NA
SB119104	MS1160	19-Mar-97	3	5	Toluene	0.0056	0.035			0.0053	No	100	Yes
SB119104	MS1160	19-Mar-97	3	5	Alpha-chlordane	0.017	0.004	J	J	0.015	Yes	0.2	NA
SB119104	MS1160	19-Mar-97	3	5	Dieldrin	0.011	0.0035	J	J	0.01	Yes	0.0018	NA
SB119104	MS1160	19-Mar-97	3	5	Gamma-chlordane	0.017	0.0027	J	J	0.015	Yes	0.2	NA
SB119104	MS1160	19-Mar-97	3	5	Aluminum	55.93	5580			20260	Yes	10000	NA
SB119104	MS1160	19-Mar-97	3	5	Barium	2.24	37.6			128.1	Yes	200	NA
SB119104	MS1160	19-Mar-97	3	5	Beryllium	0.34	0.39			1.13	Yes	0.4	NA
SB119104	MS1160	19-Mar-97	3	5	Calcium	11.19	5510	N		272000	NA	Essential Nutrient	NA
SB119104	MS1160	19-Mar-97	3	5	Chromium	7.83	8.3			16.31	Yes	10	NA
SB119104	MS1160	19-Mar-97	3	5	Cobalt	7.83	2.9	B		6.19	Yes	610	NA
SB119104	MS1160	19-Mar-97	3	5	Copper	6.71	3.9	B		13.72	Yes	130	NA
SB119104	MS1160	19-Mar-97	3	5	Iron	7.83	8720			17469	NA	Essential Nutrient	NA
SB119104	MS1160	19-Mar-97	3	5	Lead	55.93	3.6	B		12.66	Yes	1.5	NA
SB119104	MS1160	19-Mar-97	3	5	Magnesium	33.56	629			2420	NA	Essential Nutrient	NA
SB119104	MS1160	19-Mar-97	3	5	Manganese	2.24	167	N		351.7	Yes	1400	NA
SB119104	MS1160	19-Mar-97	3	5	Mercury	0.11	0.01	B		0.035	Yes	0.2	NA
SB119104	MS1160	19-Mar-97	3	5	Nickel	16.78	5.7	B		19.76	Yes	200	NA
SB119104	MS1160	19-Mar-97	3	5	Potassium	559.28	821			1717	NA	Essential Nutrient	NA
SB119104	MS1160	19-Mar-97	3	5	Sodium	33.56	41.6			53200	NA	Essential Nutrient	NA
SB119104	MS1160	19-Mar-97	3	5	Vanadium	8.95	13.3			37.4	Yes	72	NA
SB119104	MS1160	19-Mar-97	3	5	Zinc	2.24	14.4	E		31.3	Yes	3100	NA

Table 9-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1191 - IT corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
Phase 2 - Subsurface Soil - Location SB119105													
SB119105	BG0021	24-Apr-00	3	5	Arsenic	1.2	4.7			6.58	Yes	5	NA
SB119105	BG0021	24-Apr-00	3	5	Cadmium	0.12	0.155			0.59	Yes	0.5	NA
Phase 3 - Subsurface Soil - Location SB119106													
SB119106	BG0071	4-Dec-00	0	4	Arsenic	1.1	3.29			6.58	Yes	5	NA
SB119106	BG0071	4-Dec-00	0	4	Cadmium	0.11	0.041	F	UJ	0.59	Yes	0.5	NA
Phase 3 - Subsurface Soil - Location SB119107													
SB119107	BG0073	4-Dec-00	0	4	Arsenic	1.1	5.35			6.58	Yes	5	NA
SB119107	BG0073	4-Dec-00	0	4	Cadmium	0.11	0.0905	F	nv	0.59	Yes	0.5	NA
Phase 3 - Subsurface Soil - Location SB119108													
SB119108	BG0075	4-Dec-00	0	4	Arsenic	1.1	2.98			6.58	Yes	5	NA
SB119108	BG0075	4-Dec-00	0	4	Cadmium	0.11	0.0862	F	nv	0.59	Yes	0.5	NA

MSC = Media-Specific Concentration  
 NA = not applicable  
 MQL = Method Quantitation Limit  
 RRS 1 = Risk Reduction Standard 1  
 RRS 2 = Risk Reduction Standard 2  
 TNRCC = Texas Natural Resources Conservation Commission  
 UTL = Upper Tolerance Limit

Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte

<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Qualifier Definitions

- = The analyte was positively identified
- B = The analyte was positively identified but the associated numerical value is at or below the MDL
- U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL
- F = The analyte was positively identified but the associated numerical value is below the reporting limit
- J = For organics, the associated value is an estimated quantity. For inorganics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the same sample.
- BJ = Estimated quantitation - possible biased high based upon blank contamination
- nv = not validated

Table 9-4

Summary of RFI Groundwater Analytical Detections Compared to Background and MSCs  
 OWS Building 1191 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Parameter	Reporting Limit (mg/L)	Result (mg/L)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/L)	Does Result Support Closure Under RRS 1	TNRCC MSC <sup>2</sup> (mg/L)	Does Result Support Closure Under RRS 2?
Phase 1 - WITCTA031											
WITCTA031	MS1586	1-May-97	Cis-1,2-dichloroethene	0.0012	0.00069	J	nv	0.0012	Yes	0.07	NA
WITCTA031	MS1586	1-May-97	Methylene chloride	0.0003	0.00029	J,B	nv	0.0003	Yes	0.005	NA
WITCTA031	MS1586	1-May-97	Vinyl chloride	0.0011	0.0022		nv	0.0011	No	0.002	No
WITCTA031	MS1586	1-May-97	Arsenic	0.6	0.0517	B	nv	0.0049	No	0.05	No
WITCTA031	MS1586	1-May-97	Barium	0.02	1.49		nv	0.587	No	2	Yes
WITCTA031	MS1586	1-May-97	Calcium	0.1	111		nv	266.3	NA	Essential Nutrient	NA
WITCTA031	MS1586	1-May-97	Iron	0.07	5.35		nv	0.224	NA	Essential Nutrient	NA
WITCTA031	MS1586	1-May-97	Magnesium	0.3	8.4		nv	37.8	NA	Essential Nutrient	NA
WITCTA031	MS1586	1-May-97	Manganese	0.02	1.72		nv	0.175	No	14	Yes
WITCTA031	MS1586	1-May-97	Molybdenum	0.08	0.0029	B	nv	0.0144	Yes	0.51	NA
WITCTA031	MS1586	1-May-97	Potassium	5	1.31	B	nv	15.03	NA	Essential Nutrient	NA
WITCTA031	MS1586	1-May-97	Sodium	0.3	42.7		nv	167	NA	Essential Nutrient	NA
WITCTA031	MS1586	1-May-97	Zinc	0.02	0.0056	B	nv	0.118	Yes	31	NA
Phase 2 - WITCTA031											
WITCTA031	BG3008	5-May-00	Arsenic	2	0.018	nv		0.0049	No	0.05	Yes
WITCTA031	BG3008	5-May-00	Barium	5	1.33	nv		0.587	No	2	Yes
WITCTA031	BG3008	5-May-00	Manganese	3	0.958	nv		0.175	No	14	Yes
Phase 2 - WITCTA045											
WITCTA045	BG3009	28-Apr-00	Arsenic	2	0.043			0.0049	No	0.05	Yes
WITCTA045	BG3009	28-Apr-00	Barium	5	1.11			0.587	No	2	Yes
WITCTA045	BG3009	28-Apr-00	Manganese	3	0.359			0.175	No	14	Yes
WITCTA045	BG3010	28-Apr-00	Arsenic	2	0.044		nv	0.0049	No	0.05	Yes
WITCTA045	BG3010	28-Apr-00	Barium	5	1.13		nv	0.587	No	2	Yes
WITCTA045	BG3010	28-Apr-00	Manganese	3	0.367		nv	0.175	No	14	Yes



**VOCs.** Toluene and methylene chloride were the only VOCs detected above their respective MSCs in the surface soil samples collected near the OWS at the southern edge of Building 1191. Toluene was detected in the surface soil sample from SB119404 at a concentration (0.0011 mg/kg) above its MQL but well below the established MSC of 100 mg/kg. Considering that the RFI soil samples were collected with sample liners constructed of PET, which contains toluene, and the fact that toluene was detected in the majority of the equipment blanks collected using these sample liners, it is likely the detected toluene concentration was the result of cross contamination from the sample liner.

Methylene chloride was detected in the surface soil sample collected from SB119103 at a concentration (0.002 B mg/kg) that was affected by the presence of the compound in the associated method blank. Therefore, considering that the concentration is well below the MSC for methylene chloride (0.5 mg/kg), the detection was probably the result of laboratory contamination.

**SVOCs.** The majority of SVOC detections from surface soil samples were TICs that were qualified at estimated concentrations below PQLs (Table B-10). These SVOCs include unidentified hydrocarbon compounds. Although no detection limits were established for these compounds in the laboratory analysis, the values are below the PQL range (0.660 mg/kg to 3.30 mg/kg) for SVOCs described in SW846 Method 8270 (EPA, 1997). Therefore, the detected concentrations of the TIC compounds identified by the SVOC analyses are below the background concentrations for organics, as defined by the TNRCC RRP.

All other SVOCs detected in the surface soil samples at borings SB119101 through SB119104 were below the respective MQLs.

**Pesticides/PCBs.** No pesticide/PCBs were detected above MQLs in the surface soils sampled during the Phase 1 RFI at the Building 1191 site.

**Inorganics.** The results for the surface soil samples indicated that silver and calcium were the only inorganic constituents detected above background concentrations (IT, 1997). Silver was detected above background in the surface soil samples from SB119103 and SB119104 at concentrations of 0.56 B and 2 B mg/kg, respectively. These concentrations of silver are well below the MSC of 51 mg/kg. However, there is reason to believe that the low-level silver

detections in the IT study are due to matrix interferences. These matrix interferences may not have manifested themselves in the background study data, which used the GFAA method (EPA Method SW7761) in determining the background concentrations, because certain site-specific matrix effects can affect ICP results (i.e., SW6010B) without affecting GFAA results, due to differences in the analytical principles underlying each method. Additional discussion of silver concentrations detected during the RFI was addressed in Chapter 3.0 of this RFI report.

### **9.5.2 Subsurface Soil**

IT collected subsurface soil samples from the two borings (SB119101 and SB119102) located adjacent to the OWS at the western end of Building 1191. These soil samples were submitted for SVOC analysis and pesticides/PCBs to supplement the Law (1995) data. A subsurface soil sample was collected from 3 to 5 feet bgs at boring SB119104, adjacent to the OWS on the southern side of Building 1191 for VOCs, inorganics, SVOCs, and pesticides/PCBs analyses (EPA Method SW8080) because environmental impacts relating to the OWS were not investigated during the initial site investigation. The following subsections discuss the analytical results from the subsurface soil samples collected during the Phase I RFI at the Building 1191 site.

**VOCs.** All VOCs detected in the subsurface soil sample from SB119104 were below PQLs with the exception of toluene (0.035 mg/kg). The concentration of toluene was well below the established MSC (100 mg/kg) for subsurface soil, and was likely introduced into the sample from the sample liner, which was constructed of PET.

**SVOCs.** SVOCs were below quantitation and reporting limits in the subsurface soils sampled at the western OWS. At the southern OWS, the tentatively identified compound 1,1,2,2-tetrachloroethane was detected at 0.18 mg/kg, and one unidentified oxygenated hydrocarbon was detected at 0.37 J mg/kg. No MQLs or MSCs are available for these compounds, but the detected concentrations are below the PQL range (0.66 to 3.3 mg/kg) provided in SW846 Method 8270 (EPA, 1997). Therefore, these concentrations are below the background concentrations for organics, as defined by the TNRCC RRP.

**Pesticides/PCBs.** Pesticides/PCBs were not detected above MQLs in subsurface soil samples from the Building 1191 site. Dieldrin, alpha-chlordane, and gamma-chlordane were detected at

estimated concentrations below their respective MQLs in the subsurface sample from SB119104 (Table 9-3).

**Inorganics.** All inorganic compounds detected in the subsurface soil sample from SB119104 were below background concentrations.

### **9.5.3 Groundwater**

A groundwater sample was collected from monitoring well WITCTA031, located by the OWS at the south wall of Building 1191, and analyzed for VOCs, SVOCs, and inorganics. The following subsections discuss the analytical results for this groundwater sample.

**VOCs.** cis-1,2-DCE and vinyl chloride were detected in the groundwater sample from WITCTA031. Vinyl chloride was detected above its MQL and MSC at a concentration of 0.0022 mg/L. cis-1,2-Dichloroethane was detected at 0.00069 mg/L and is qualified as an estimated concentration below its MQL. Because the extent of the AFP-4 TCE groundwater plume includes the area of Building 1191 and the contaminants from this plume are managed under the AFP-4 Superfund Cleanup Program, the results for TCE and its breakdown products, such as cis-1,2-DCE and vinyl chloride, are not considered as related to the OWS at Building 1191. No other VOCs, SVOCs, or pesticides/PCBs were detected above MQLs in groundwater at this site.

**Inorganics.** Inorganic constituents detected in the groundwater sample from monitoring well WITCTA031 included arsenic, barium, calcium, iron, magnesium, manganese, molybdenum, potassium, sodium, and zinc (Table 9-4). All detections were below the background with the exception of arsenic, barium, iron, and manganese. Arsenic was detected at a concentration (0.0517 mg/L) that also exceeded its MSC (0.05 mg/L). The barium and manganese concentrations were below their respective MSCs and considering that these constituents were not identified in soil samples collected near the OWS units, the detections were likely extreme variations in their respective background concentrations.

### **9.6 Results from Phase 2 Activities**

IT collected soil samples from one boring (SB119105) during the Phase 2 RFI in April 2000 to delineate arsenic or cadmium concentrations detected during the Law (1995) investigation. Additionally, a groundwater sample was collected from WITCTA031 to confirm the arsenic,

barium, and manganese concentrations detected in the Phase 1 RFI groundwater sample. Tables 9-3 and 9-4 include the analytical results from the Phase 2 soil and groundwater samples, respectively. A summary of Phase 2 RFI SPLP results are shown in Table 9-5. Figure 9-1 shows the locations of the Phase 2 RFI samples. The following sections present the results of soil and groundwater samples collected during the Phase 2 RFI at Building 1191.

### **9.6.1 Soil**

IT collected a subsurface soil sample from 3 to 5 feet bgs from SB119105 during the Phase 2 RFI in April 2000 to delineate arsenic and cadmium concentrations detected during the Law (1995) investigation. As shown in Table 9-3 and Figure 9-1, arsenic and cadmium detections were below their respective background concentrations. Therefore, the elevated arsenic and cadmium detections from the Law (1995) samples (1191-SB01 through 1191-SB03) located at the western end of Building 1191 have been delineated to the west.

### **9.6.2 Groundwater**

A groundwater sample was also collected from WITCTA031 during the Phase 2 RFI to confirm arsenic, barium, and manganese concentrations that were detected above background and MSCs during the Phase 1 RFI. Additionally, four new monitoring wells (WITCTA045 through WITCTA048) were installed to characterize the extent of arsenic, cadmium, and manganese concentrations in groundwater at the Building 1191 site.

As shown in Table 9-4 and Figure 9-1, the arsenic concentration detected in the Phase 2 groundwater sample (0.0018 mg/L) was below the background concentration for arsenic. Therefore, the arsenic concentration detected at WITCTA031 during the Phase 1 RFI appears to have been an extreme, but true, background concentration and not indicative of a release from the OWS at Building 1191. Barium and manganese concentrations detected in the Phase 2 groundwater sample from WITCTA031 were above their respective background concentrations, but well below MSCs.

The detected concentrations identified in groundwater samples from the four new monitoring wells were all above the background concentrations for arsenic, barium, and manganese. However, all of the detected concentrations were below the respective MSCs.

Table 9-5

Summary of RFI SPLP Results Compared to Background and MSCs  
 OWS Building 1191 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/L)	Result (mg/L)	Laboratory Qualifier	Validation Qualifier	Background UTL <sup>1</sup> (mg/L)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/L)	Does Result Support Closure Under RRS 2?
Phase 2 - Location SB119105													
SB119105	BG0021	24-Apr-00	3	5	Arsenic	2	0	U	U	0.0049	Yes	0.05	NA
SB119105	BG0021	24-Apr-00	3	5	Cadmium	1	0	U	U	0.0005	Yes	0.005	NA

ft bgs = feet below ground surface

mg/L = milligrams per liter

UTL = upper tolerance limit

TNRCC MSC = Texas Natural Resource Conservation Commission Media Specific Concentrations

NA = not applicable

RRS 1 = Risk Reduction Standard 1; result is less than background

RRS 2 = Risk Reduction Standard 2; result is less than TNRCC MSC

SPLP = Synthetic Precipitation Leaching Procedure

Footnotes:

<sup>1</sup> - UTLs derived from Final Basewide Background Study, Jacobs Engineering, 1998

<sup>2</sup> - TNRCC Risk Reduction Standard media Specific Concentration (MSC) - Industrial Setting

Laboratory Qualifier Definitions.

" " = The analyte was positively identified

"U" = The analyte was analyzed for, but not detected The associated numerical value is at or below the MDL

"nv" = not validated

Considering that these inorganics were not detected at elevated concentrations in soil samples, the detected concentrations of arsenic, barium, and manganese are likely extreme variations in their respective background concentrations.

### **9.7 Results from Phase 3 RFI Activities**

IT collected soil samples from 0 to 4 feet bgs at three soil borings (SB119106 through SB119108) to confirm or delineate arsenic and cadmium concentrations detected above background during the Law (1995) investigation. The samples collected from borings SB119106 and SB119107 were intended to delineate the elevated arsenic and cadmium concentrations to the north and south of the OWS unit, respectively. The sample from SB119108 was intended to confirm the inorganic detections at former Law (1995) boring 1191-SB01. SPLP analysis was planned for arsenic or cadmium concentration detected above MSCs in the Phase 3 samples to determine the potential of the concentrations to leach into groundwater.

The results from the Phase 3 soil samples at Building 1191 are shown in Table 9-3. The Phase 3 analytical results are also shown in Figure 9-1. The following subsections present the Phase 3 RFI sample results for arsenic and cadmium.

**Arsenic.** Arsenic was detected below its background concentration in each of the three soil samples collected during the Phase 3 RFI. Therefore, the arsenic concentrations detected in the Law (1995) borings are delineated to the north and south of the northern OWS by the results from Phase 3 borings SB119106 and SB119107. No SPLP analyses were performed because the arsenic concentrations identified in the sample from boring SB119108 were below background. The results from boring SB119108 indicate that the arsenic results from the Law (1995) samples were likely extreme variations in the background concentration for arsenic.

**Cadmium.** Cadmium was detected below background in each of the three soil samples collected during the Phase 3 RFI. Therefore, the cadmium concentrations detected in the Law (1995) borings are delineated to the north and south of the northern OWS by the results from Phase 3 borings SB119106 and SB119107. No SPLP analyses were performed because the cadmium concentrations identified in the sample from boring SB119108 were below background. The results from boring SB119108 indicate that the cadmium results from the Law (1995) samples were likely extreme variations in the background concentration for cadmium.

## **9.8 Summary and Discussion**

Law (1995) collected soil samples for analysis of VOCs and inorganics at three locations (1191-SB01 through 1191-SB03) adjacent to the northern OWS at Building 1191 during their initial site investigation in 1994. The analytical results from the Law investigation indicated that arsenic and cadmium concentrations exceeded the basewide background concentrations and MSCs in soil samples between 0 and 5 feet bgs. IT collected surface and subsurface soil samples from two locations (SB119101 and SB119102) adjacent to the northern OWS for analysis of SVOCs and pesticides/PCBs during the Phase 1 Sanitary Sewer System RFI in 1997 to supplement the data collected by Law (1995). IT also collected soil samples from two borings (SB119103 and SB119104) located adjacent to the southern OWS at Building 1191 for analysis of VOCs, SVOCs, pesticides/PCBs, and inorganics because the southern OWS had not been characterized during the Law (1995) investigation. IT also installed and sampled monitoring well WITCTA031 during the Phase 1 RFI to determine if groundwater had been impacted at the site.

In April 2000, IT collected a subsurface soil sample from one soil boring (SB119105) during the Phase 2 RFI in an attempt to delineate inorganic concentrations identified during the Law investigation. Four additional monitoring wells (WITCTA045 through WITCTA048) were also installed and sampled during the Phase 2 RFI to delineate the arsenic, barium, and manganese concentrations detected above background during the Phase 1 RFI. Finally, IT collected soil samples from three additional soil borings (SB119106 through SB119108) during the Phase 3 RFI in November 2000 to confirm the maximum concentrations of arsenic and cadmium detected by Law (1995) and to delineate inorganic concentrations to basewide background levels.

The following sections discuss the relevance of the parameters detected in surface soil, subsurface soil, and groundwater during investigations at the Building 1191 site.

### **9.8.1 Surface Soil**

No SVOCs, pesticides, or PCBs were detected above background in the surface soil samples collected by Law (1995) or IT (2000). One VOC, methylene chloride, was detected above MQLS in surface soil during the Law investigation. However, the detected methylene chloride concentrations were well below the MSC and were likely the result of laboratory contamination. Silver was detected above background in the two surface soil samples collected by IT near the southern OWS. However, the silver concentrations were estimated (i.e., B-flagged) and matrix interferences may have affected these results.

Arsenic was detected at concentrations significantly above background in the samples collected by Law (1995). As shown in Figure 9-1, the elevated concentrations of arsenic detected in surface soil samples collected by Law (1995) have been delineated to background by the results from Phase 3 RFI borings SB119105 through SB119107.

### **9.8.2 Subsurface Soil**

No SVOCs or pesticides/PCBs were detected above background in the subsurface soil samples collected near the OWS units at Building 1191. Two VOCs, methylene chloride and toluene, were detected above MQLs in subsurface samples but the results were not likely the result of releases from the OWS units. Methylene chloride detections were likely the result of laboratory contamination, and toluene detections were likely the result of cross-contamination from the sample liner, which was made of PET.

Arsenic and cadmium were detected in the subsurface samples collected by Law (1995) at concentrations that exceeded both background and MSCs. As shown in Figure 9-1, the elevated concentrations of arsenic and cadmium detected in the subsurface soil samples collected by Law (1995) have been delineated to background by the results from borings SB119105 through SB119107. Furthermore, because arsenic and cadmium concentrations could not be replicated near former Law boring 1191-SB01, it appears that the arsenic and cadmium detections from the Law investigation were likely extreme, but true, background concentrations

### **9.8.3 Groundwater**

cis-1,2-DCE and vinyl chloride were detected in the Phase 1 RFI groundwater sample from WITCTA031. However, because the extent of the AFP-4 TCE groundwater plume includes the area of Building 1191 and the contaminants from this plume are managed under the AFP-4 Superfund Cleanup Program, the results for TCE and its breakdown products, such as cis-1,2-DCE and vinyl chloride, are not considered as related to the OWS at Building 1191. No other VOCs, SVOCs, or pesticides/PCBs were detected above MQLs in groundwater at this site.

Four inorganics (arsenic, barium, iron, and manganese) were detected above their respective background concentrations in the Phase 1 groundwater sample from WITCTA031. The arsenic concentration also exceeded its MSC. However, the arsenic concentration was below background in the Phase 2 sample from WITCTA031. Arsenic was detected above background

in the four monitoring wells (WITCTA045 through WITCTA048), but the detected concentrations were below the MSC for arsenic. Barium and manganese were detected above background, but below MSCs in all five wells sampled during the Phase 2 RFI.

Because no pattern of elevated concentrations for arsenic, barium, and manganese were identified in soil, and because the detections are below MSCs, it appears that the detected inorganics in groundwater at the Building 1191 site are likely extreme variations in natural background levels.

### **9.9 Conclusions**

Considering that no pattern of VOCs, SVOCs, pesticides/PCBs, or inorganics above TNRCC MSCs has been identified in the soil and groundwater samples collected in the vicinity of Building 1191, it is recommended that the site be presented for closure under RRS 2 of the TNRCC RRP. The site is recommended for closure under RRS 2 because the inorganic concentrations detected in surface and subsurface soil samples have been delineated to background. Although the arsenic and cadmium concentrations detected in former Law (1995) borings were not confirmed, the fact that arsenic and cadmium were detected at concentrations at or below background in all of the samples collected by IT during the RFI activities in the vicinity of Building 1191 indicates that the elevated concentrations of these inorganics detected by Law (1995) are consistently higher than the results obtained by IT.

The absence of compounds contained in the influent to the OWS (e.g., thinners and solvents, waste oil, fuel, and antifreeze) in the soil and groundwater samples collected at the site indicates any releases from the OWS have not significantly impacted the environment. Therefore, closure is recommended under RRS 2 for the OWS at Building 1191. Should this recommendation be accepted, a letter stating that closure of SWMU 37 (the OWS at Building 1191) was carried out in accordance with TAC §335.555, and signed by an Air Force representative, will be transmitted to the TNRCC, along with a metes and bounds description of SWMU 37. The metes and bounds description will correspond to surveyed coordinates of the affected area shown in Figure 9-1.

# TAB

*10.0*

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## **10.0 OWS Building 1194**

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The following sections provide a description of the OWS at Building 1194, a summary of the site characterization activities, a discussion of the site-specific geology and hydrology, discussions of the analytical results from each characterization event, and recommendations based upon the physical and chemical data collected at the site.

### **10.1 Site Description**

The OWS at Building 1194 is located at the intersection of Haile Drive and Jennings Drive (Figure 10-1) and is designated SWMU No. 35 on the RCRA Hazardous Waste Permit for NAS Fort Worth JRB. The system was installed in 1983 and consists of a main trench floor drain, underground conduits, and the OWS. The floor in the building is paved with concrete and slopes towards the drain. The trench is approximately 1 foot deep, 18 inches wide, and 30 feet long. Reportedly, the underground conduits are also constructed of concrete (A. T. Kearney, 1989). The OWS is located immediately adjacent to the south side of Building 1194 and the area is paved with 8-inch thick reinforced concrete. The OWS has a 3,500-gallon capacity and is operated by gravity flow. The separator unit was installed to receive waste liquids, including diesel fuel, JP-4, and other petroleum-related compounds from Building 1194 (Law, 1995). It is comprised of two main units, one for separation (2,000-gallon capacity) and one for storing the skimmed oil (1,500 gallons). A pressure gauge sticking out of the ground indicates the oil level in the holding tank and thus the need for pumping it out. The effluent from the OWS is discharged into the sanitary sewer (Law, 1995).

The OWS at Building 1194 was included in a pumping and steam cleaning effort by D.D. and Beauty, a nonhazardous liquid waste removal company, during April and May 1993 (CB, 1994). In 1993, Law (1995) performed a visual inspection of the OWS unit, interviewed Base personnel and reviewed maintenance records, and determined that the OWS was intact and required no replacement or repair.

**LEGEND**

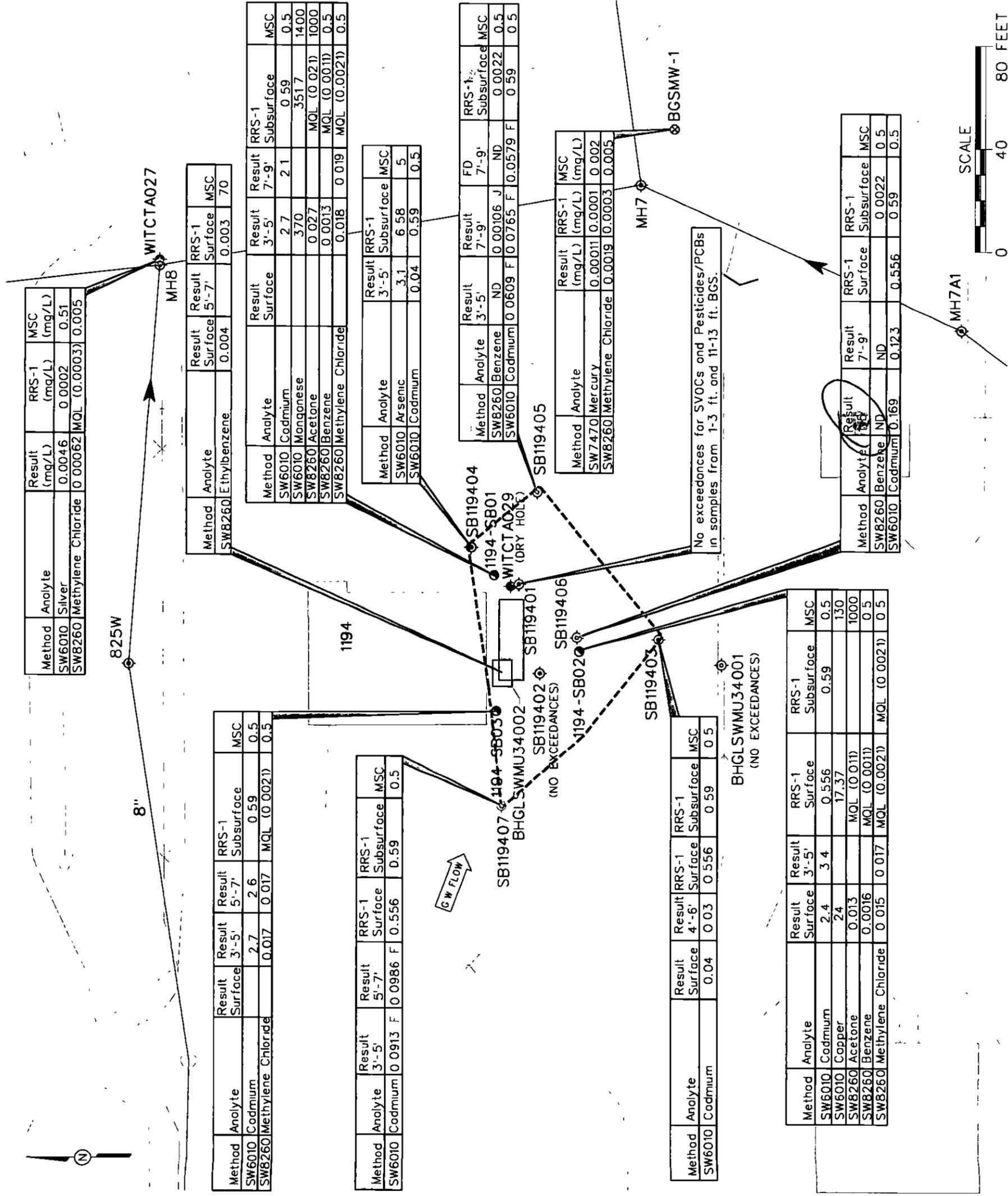
- BUILDING 1194 INDUSTRIAL WASTE OIL/WATER SEPARATOR UNIT
- WASTE ACCUMULATION AREA (SWMU 34)
- IT CORP. SOIL BORING (1997) (SVOCs AND PESTICIDES/PCBs)
- IT CORP PHASE 2 BORING (2000)
- IT CORP PHASE 3 BORING (2000)
- IT CORP MONITORING WELL
- LAW ENGINEERING SOIL BORING (VOCs AND METALS)
- EXISTING MONITORING WELL
- HGL BORING LOCATION (SWMU 34)
- GROUNDWATER FLOW DIRECTION
- SEWER LINE AND DIRECTIONAL FLOW
- FENCE
- RRS 2 SURVEY BOUNDARY
- PHASE 1 RESULTS > BACKGROUND
- PHASE 2 RESULTS
- PHASE 3 RESULTS
- ANALYTE DETECTED ABOVE MSC. SPLP NOT PERFORMED.

**NOTES:**

CONCENTRATIONS REPORTED IN MG/KG UNLESS NOTED OTHERWISE.  
 MSC - MEDIA-SPECIFIC CONCENTRATION  
 NV - NO VALUE  
 NA - NOT ANALYZED  
 IB - FOR INORGANICS, THE QUANTITATION IS AN ESTIMATED CONCENTRATION BETWEEN THE MDL AND PQL FOR ORGANICS, THE CONSTITUENT WAS ALSO DETECTED IN THE ASSOCIATED METHOD BLANK  
 J - THE ANALYTE WAS POSITIVELY IDENTIFIED, THE QUANTITATION IS AN ESTIMATION  
 SOURCE: DRAFT RCRA FACILITIES INVESTIGATION SANITARY SEWER SYSTEM, SEPTEMBER 1997, IT CORPORATION

**FIGURE 10-1**  
**SITE MAP SHOWING**  
**INVESTIGATION RESULTS**  
**OWS BUILDING 1194 (SWMU 35)**

DRAFT RFI REPORT  
 NAS FORT WORTH JRB  
 FORT WORTH, TEXAS  
 IT CORPORATION  
 A Member of The IT Group



Method	Analyte	Result (mg/L)	RRS-1 (mg/L)	MSC (mg/L)
SW6010	Silver	0.0046	0.0002	0.51
SW8260	Methylene Chloride	0.00062	ML (0.0003)	0.005

Method	Analyte	Result Surface	RRS-1 Surface	MSC
SW8260	Ethylbenzene	0.004	0.003	70

Method	Analyte	Result Surface	RRS-1 Surface	RRS-1 Subsurface	MSC
SW6010	Cadmium	2.7	2.1	0.59	0.5
SW6010	Manganese	370	351.7	1400	1400
SW8260	Acetone	0.027	ML (0.021)	1000	1000
SW8260	Benzene	0.0013	ML (0.0011)	0.5	0.5
SW8260	Methylene Chloride	0.018	0.019	ML (0.0021)	0.5

Method	Analyte	Result RRS-1 Surface	RRS-1 Subsurface	MSC
SW6010	Arsenic	3.1	6.58	5
SW6010	Cadmium	0.04	0.59	0.5

Method	Analyte	Result 3'-5'	Result 7'-9'	FD 7'-9'	RRS-1 Subsurface	MSC
SW8260	Benzene	ND	0.00106	ND	0.0022	0.5
SW6010	Cadmium	0.0609	0.0765	0.0579	0.59	0.5

Method	Analyte	Result (mg/L)	RRS-1 (mg/L)	MSC (mg/L)
SW7470	Mercury	0.00011	0.0001	0.002
SW8260	Methylene Chloride	0.0019	0.0003	0.005

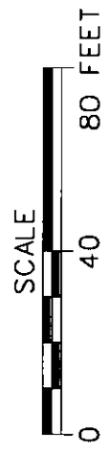
Method	Analyte	Result 7'-9'	RRS-1 Surface	RRS-1 Subsurface	MSC
SW8260	Benzene	ND	0.0022	0.5	0.5
SW6010	Cadmium	0.169	0.556	0.59	0.5

Method	Analyte	Result Surface	Result 3'-5'	Result 5'-7'	RRS-1 Surface	RRS-1 Subsurface	MSC
SW6010	Cadmium	2.7	2.6	0.59	0.59	0.5	0.5
SW8260	Methylene Chloride	0.017	0.017	ML (0.0021)	0.5	0.5	0.5

Method	Analyte	Result 3'-5'	Result 5'-7'	RRS-1 Surface	RRS-1 Subsurface	MSC
SW6010	Cadmium	0.0913	0.0986	F 0.556	D.59	0.5

Method	Analyte	Result Surface	Result 4'-6'	Result 3'-5'	RRS-1 Surface	RRS-1 Subsurface	MSC
SW6010	Cadmium	0.04	0.03	0.556	0.59	0.5	0.5

Method	Analyte	Result Surface	Result 3'-5'	Result 4'-6'	Result 5'-7'	RRS-1 Surface	RRS-1 Subsurface	MSC
SW6010	Cadmium	2.4	3.4	0.556	0.59	0.5	0.5	0.5
SW6010	Copper	24	17.37	130	1000	1000	1000	1000
SW8260	Acetone	0.013	ML (0.011)	ML (0.011)	ML (0.011)	0.5	0.5	0.5
SW8260	Benzene	0.0016	ML (0.0021)	ML (0.0021)	ML (0.0021)	0.5	0.5	0.5
SW8260	Methylene Chloride	0.015	0.017	ML (0.0021)	ML (0.0021)	0.5	0.5	0.5



## **10.2 Site Characterization Activities**

A summary of the soil and groundwater samples that have been collected at the Building 1190 site is provided in Table 10-1. The analytical methods associated with each soil sample collected at Building 1194 are also presented in Table 10-1. The locations of the soil borings are shown in Figure 10-1. The following sections discuss the investigation activities that have been performed to characterize environmental impacts relating to the OWS at Building 1194.

### **10.2.1 Initial Site Investigation – Law 1994**

Law (1995) collected soil samples from three soil borings (1194-SB01 through 1194-SB03) on the east, south, and west sides of the OWS at Building 1194 in 1994 (Figure 10-1). Soil borings 1194-SB01 through 1194-SB03 were collected and sampled at surface and subsurface depths and analyzed for VOCs (EPA Method 8240) and inorganics (EPA Method 6010). The depth of the soil borings ranged from 5 feet bgs in 1194-SB02 to 9 feet bgs in 1194-SB01 (Law, 1995). A summary of all soil sampling and analysis performed at the Building 1194 site is provided in Table 10-1.

### **10.2.2 Phase 1 RFI Activities – IT Corporation 1997**

IT collected soil samples during the Phase 1 Sanitary Sewer System RFI in March 1997 (Table 10-1) from borings SB119401 and SB119402, located adjacent to the OWS at Building 1194 (Figure 10-1). Surface soil sample MS1146 and subsurface soil sample MS1147 were collected from boring SB119401. Surface soil sample MS1146 and subsurface soil sample MS1147 were collected from boring SB119402. Subsurface soil sample MS1147 was collected from the 2-foot interval directly above the water table (11 to 13 feet bgs) in soil boring SB119401. Soil boring SB119402 was advanced from surface to 9 feet bgs and sample MS1146 collected from 4 to 6 feet bgs above a perched water zone. Soil samples were analyzed for SVOCs (EPA Method SW8270) and pesticides/PCBs (EPA Method 8080) to supplement analyses performed by Law (IT, 1998).

Two monitoring wells, labeled MW-36 and MW-37 and of unknown construction date or specifics, are located in the vicinity of the OWS at Building 1194. These shallow monitoring wells were installed previously for the waste oil underground storage tank compliance program and do not yield sufficient quantities of groundwater for sample collection. The depth to groundwater was 4.3 feet below the top of casing in monitoring well MW-37. The wells were pumped dry and did not recharge sufficiently to allow groundwater sample collection (IT, 1998).

Table 10-1

Summary of Previous Environmental Samples  
 Collected at Building 1194  
 NAS Fort Worth JRB, Texas

Sample Location	Sample Date	Sample Number	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Analysis	Analytical Method
<b>Law Engineering - Initial Site Investigation (1994)</b>						
1194-SB01	4/25/94	119401SBB	3	5	Inorganics, VOCs	EPA SW6010, SW8240
		119401SBD	7	9	Inorganics, VOCs	EPA SW6010, SW8240
1194-SB02	4/25/94	119402SBA	1	3	Inorganics, VOCs	EPA SW6010, SW8240
		119402SBB	3	5	Inorganics, VOCs	EPA SW6010, SW8240
1194-SB03	4/25/94	119403SBB	3	5	Inorganics, VOCs	EPA SW6010, SW8240
		119403SBC	5	7	Inorganics, VOCs	EPA SW6010, SW8240
<b>IT Corporation - Phase 1 RFI (1997)</b>						
SB119401	3/18/97	MS1146	1	3	Pesticides/PCBs, SVOCs	EPA SW8081, SW8270
		MS1147	11	13	Pesticides/PCBs, SVOCs	EPA SW8081, SW8270
SB119402	3/18/97	MS1144	1	3	Pesticides/PCBs, SVOCs	EPA SW8081, SW8270
		MS1145	4	6	Pesticides/PCBs, SVOCs	EPA SW8081, SW8270
<b>IT Corporation - Phase 2 RFI (2000)</b>						
SB119403	6/21/99	BG0022	0	2	Cd	EPA SW6010B
		BG0023	4	5	Cd	EPA SW6010B
SB119404	6/21/99	BG0024	3	5	As, Cd	EPA SW6010B
<b>IT Corporation - Phase 3 RFI (2000)</b>						
SB119405	11/30/00	BG0076	3	5	Cd	EPA SW6010B
		BG0077	7	9	Cd	EPA SW6010B
		BG0078	7	9	Cd	EPA SW6010B
SB119406	11/30/00	BG0079	1	5	Cd, Benzéne	EPA SW6010, SW8260B
		BG0080	7	9	Cd	EPA SW6010B
SB119407	11/30/00	BG0081	3	5	Cd	EPA SW6010B
		BG0082	5	7	Cd	EPA SW6010B

VOCs - Volatile Organic Compounds  
 SVOCs - Semivolatile Organic Compounds  
 PCBs - Polychlorinated Biphenyls  
 As - Arsenic  
 Cd - Cadmium

Monitoring well WITCTA029 was drilled to a depth of 13 feet by IT on the east side of the OWS at Building 1194 (Figure 10-1). The area is located on a bedrock high and the monitoring well boring did not encounter sufficient aquifer materials or yield groundwater to allow completion of the well. The boring was plugged with bentonite grout, abandoned, and capped with concrete. Monitoring well WITCTA027, located about 180 feet to the northeast of the OWS at Building 1194 at the intersection of Depot Avenue and Desert Storm Road, was installed in April 1997 where it was located at the intersection of two major Sanitary Sewer System segments. Well WITCTA027 was completed to a total depth of 23 feet bgs, with a screen interval in sand and gravel from 8 to 23 feet in depth. Sample MS1551 from WITCTA027 was collected and analyzed for VOCs, SVOCs, and inorganics. The existing monitoring well BGSMW01, located about 180 feet to the east-southeast of the OWS at Building 1194, was also sampled (sample number MS1528) for the same constituents as WITCTA027 (IT, 1998).

### **10.2.3 Phase 2 RFI Activities – IT Corporation 2000**

Additional soil sampling was performed by IT during the Phase 2 RFI in June 1999 (Table 10-1). Soil borings were located southeast (SB119405), south (SB119406), and northwest (SB119407) of the OWS at Building 1194 (Figure 10-1). Samples BG0022 and BG0023 were collected from SB119403 from surface to 2 feet bgs and 4 to 5 feet bgs, respectively. Sample BG0024 was collected from 4 to 5 feet in depth from SB119403. These samples were analyzed for cadmium to delineate concentrations detected in Law borings 1194-SB01, 1194-SB02, and 1194-SB03. Sample BG0024 (SB119403) was also analyzed for arsenic.

### **10.2.4 Phase 3 RFI Activities – IT Corporation 2000**

Additional sampling was performed by IT, during the Phase 3 RFI in November 2000 (Table 10-1), to delineate cadmium and benzene concentrations in surface and subsurface soils. Additionally, confirmation soil samples were collected to confirm cadmium and benzene concentrations that exceeded background and/or MSCs during the Law (1995) investigation. The soil samples were collected from 0 to 5 feet and 5 to 10 feet bgs intervals from SB119405, SB119406, and SB119407 (Figure 10-1) because groundwater is typically encountered at 9 feet bgs in this area. Samples were collected from 3 to 5 and 7 to 9 feet bgs from SB119405 and analyzed for cadmium. Samples were collected from 1 to 5 feet and 7 to 9 feet bgs from SB119406 and analyzed for cadmium. The sample collected from 1 to 5 feet from SB119406 was also analyzed for benzene. Samples were collected from 3 to 5 feet and 5 to 7 feet bgs at SB119407 and analyzed for cadmium.

### **10.3 Site-Specific Conditions**

The following subsections discuss the site-specific geology and hydrogeology characteristics that were encountered during the investigation activities at the Building 1194 site.

**Geology.** Quaternary alluvium is found at the surface through most of the NAS Fort Worth area. The alluvium consists of floodplain and fluvial terrace deposits of gravel, sand, silt, and clay that occur as a veneer on the eroded surface of Upper Cretaceous strata. Soil borings SB119401/02 at Building 1194 (Appendix A) indicated very dark brown, yellowish-brown, stiff silty clay and sandy silt from the surface to 9 feet bgs. From 9 to 14 feet bgs, the soil changed to a well-graded, fine- to medium-grained, loose, olive-yellow to light-gray or white, partially cemented caliche. A hydrocarbon or petroleum odor was detected at 7 to 9 feet deep in both samples, with vapor concentrations in this strata ranging from 5 to 30 ppm.

The alluvial soils rest unconformably on the top of the weathered Walnut Formation. Underlying the Quaternary alluvium is the Cretaceous-aged Walnut Formation, which consists of 20 to 30 feet of indurated fossiliferous limestone interbedded with brown sandy clay, thinly bedded fossiliferous clay, and fissile shale. Unconformably underlying the Walnut Formation is the Cretaceous-aged Paluxy Formation. The Paluxy Formation generally consists of coarse-grained sand that grades upward into fine-grained sand with variable amounts of shale and limestone. The sandstone, composed of fine- to coarse-grained white quartz, is well-sorted, poorly consolidated, and cross-bedded. The Paluxy Formation thickness ranges from 140 to 190 feet, averaging 160 feet in Tarrant County (Radian, 1991).

**Hydrogeology.** Shallow groundwater within the Quaternary alluvium occurs in fluvial terrace deposits of sand and gravel, which occur as a veneer on the eroded surface of the Walnut Formation. Soil boring SB119402 on the south side of Building 1194 (Figure 10-1) encountered a shallow perched water table at 6 feet bgs. Groundwater was not encountered in soil boring SB119401. An attempt to install monitoring well WITCTA029 adjacent to the OWS at Building 1194 by overdrilling soil boring SB119401 was unsuccessful due to a lack of adequate aquifer materials in the native soils encountered in the boring. Groundwater detected in monitoring wells MW-37 and MW-38 was not of sufficient quantity to allow sampling of these wells. The OWS at Building 1194 is located on a shallow bedrock high where water-bearing sands and gravels were not deposited. Monitoring wells WITCTA027 and BGSMW01 located to the east

of the OWS were sampled to assess groundwater downgradient of the OWS. Monitoring wells WITCTA027 and BGSMW01, located about 180 feet to the east of the OWS at Building 1194, were installed to depths of 22 and 23 feet bgs, indicating significant changes in the alluvium aquifer and its heterogeneous nature over relatively short distances. Groundwater flow in the area is to the east toward the Trinity River.

#### **10.4 Results from Initial Site Investigation**

Law (1995) collected soil samples in 1994 from three borings (1194-SB01 through 1194-SB03) located on the east, west, and south sides of the OWS at Building 1194 (Figure 10-1). Table 10-2 contains a summary of the analytes detected in the samples collected by Law (1995) and compares the analytical detections to basewide background concentrations and MSCs. Detected analyte concentrations that exceed background are shown on Figure 10-1. The following sections present the results from surface and subsurface soil samples that were collected by Law (1995) during the initial site investigation at the Building 1194 site.

##### **10.4.1 Surface Soil**

One surface soil sample was collected by Law from one to three feet bgs at 1194-SB02 for analysis of inorganics and VOCs. The results from this surface soil sample are discussed in the following subsections.

**VOCs.** The VOCs detected in the surface soil sample from 1194-SB02 included acetone, benzene, and methylene chloride (Table 10-2). Acetone and methylene chloride were detected at low concentrations and are considered to be common laboratory contaminants. Both were detected at concentrations well below the established MSCs of 1,020 /kg and 0.5 mg/kg, respectively. The detected benzene concentration of 0.0016 mg/kg is well below the established MSC of 0.5 mg/kg.

**Inorganics.** As shown in Table 10-2, the following 18 inorganic compounds were detected in the surface soil sample from 1194-SB02: aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc. Of these inorganics, cadmium and copper were detected above background. Cadmium was detected at a concentration (2.4 mg/kg) above its MSC.

Table 10-2  
 Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1194 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC (mg/kg)	Does Result Support Closure Under RRS 27
Building 1194 - Subsurface Soil - Location 1194-SB01												
1194-SB01	119401SBB	4/25/94	3	5	ACETONE	0.011	0.027		0.011	No	1000	Yes
1194-SB01	119401SBB	4/25/94	3	5	BENZENE	0.001	0.0013		0.0011	No	0.5	Yes
1194-SB01	119401SBB	4/25/94	3	5	METHYLENE CHLORIDE		0.018			No	0.5	Yes
1194-SB01	119401SBB	4/25/94	3	5	ALUMINIUM		9200		20260	Yes	10000	NA
1194-SB01	119401SBB	4/25/94	3	5	ARSENIC		4.0		6.68	Yes	5	NA
1194-SB01	119401SBB	4/25/94	3	5	BARIUM		90		128.1	Yes	200	NA
1194-SB01	119401SBB	4/25/94	3	5	BERYLLIUM		0.65		1.13	Yes	0.4	NA
1194-SB01	119401SBB	4/25/94	3	5	CADMIUM		2.7		0.59	No	0.5	No
1194-SB01	119401SBB	4/25/94	3	5	CALCIUM		10000	JH	272000	Yes	Essential Nutrient	NA
1194-SB01	119401SBB	4/25/94	3	5	CHROMIUM TOTAL		12.0		16.31	Yes	10	NA
1194-SB01	119401SBB	4/25/94	3	5	COBALT		4.6		6.19	Yes	610	NA
1194-SB01	119401SBB	4/25/94	3	5	COPPER		6.8		13.72	Yes	130	NA
1194-SB01	119401SBB	4/25/94	3	5	IRON		10000	JH	17669	Yes	Essential Nutrient	NA
1194-SB01	119401SBB	4/25/94	3	5	LEAD		11.0		12.66	Yes	1.5	NA
1194-SB01	119401SBB	4/25/94	3	5	MAGNESIUM		1100		2420	Yes	Essential Nutrient	NA
1194-SB01	119401SBB	4/25/94	3	5	MANGANESE		370		351.7	No	1400	Yes
1194-SB01	119401SBB	4/25/94	3	5	NICKEL		9.7		19.76	Yes	200	NA
1194-SB01	119401SBB	4/25/94	3	5	POTASSIUM		910		1717	Yes	Essential Nutrient	NA
1194-SB01	119401SBB	4/25/94	3	5	SODIUM		44		53200	Yes	Essential Nutrient	NA
1194-SB01	119401SBB	4/25/94	3	5	VANADIUM		21.0		37.4	Yes	72	NA
1194-SB01	119401SBB	4/25/94	3	5	ZINC		13		31.3	Yes	3100	NA
1194-SB01	119401SBD	4/25/94	7	9	ACETONE	0.011	0.011		0.011	No	1000	Yes
1194-SB01	119401SBD	4/25/94	7	9	BENZENE	0.001	0.0011		0.0011	No	0.5	Yes
1194-SB01	119401SBD	4/25/94	7	9	METHYLENE CHLORIDE		0.019			No	0.5	Yes
1194-SB01	119401SBD	4/25/94	7	9	ALUMINIUM		7600		20260	Yes	10000	NA
1194-SB01	119401SBD	4/25/94	7	9	ARSENIC	3.6	3.6		6.68	Yes	5	NA
1194-SB01	119401SBD	4/25/94	7	9	BARIUM		80		128.1	Yes	200	NA
1194-SB01	119401SBD	4/25/94	7	9	BERYLLIUM	0.17	0.17		1.13	Yes	0.4	NA
1194-SB01	119401SBD	4/25/94	7	9	CADMIUM		2.1		0.59	No	0.5	No
1194-SB01	119401SBD	4/25/94	7	9	CALCIUM		67000	JH	272000	Yes	Essential Nutrient	NA
1194-SB01	119401SBD	4/25/94	7	9	CHROMIUM, TOTAL		8.0		16.31	Yes	10	NA
1194-SB01	119401SBD	4/25/94	7	9	COBALT		4.3		6.19	Yes	610	NA
1194-SB01	119401SBD	4/25/94	7	9	COPPER		3.4		13.72	Yes	130	NA
1194-SB01	119401SBD	4/25/94	7	9	IRON		8200	JH	17469	Yes	Essential Nutrient	NA
1194-SB01	119401SBD	4/25/94	7	9	LEAD		8.3		12.66	Yes	1.5	NA
1194-SB01	119401SBD	4/25/94	7	9	MAGNESIUM		1100		2420	Yes	Essential Nutrient	NA

Table 10-2  
 Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1194 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27?
<b>Building 1194 - Surface Soil - Location 1194-SB02</b>												
1194 SB01	119401SBD	4/25/94	7	9	MANGANESE	0.011	220		351.7	Yes	1400	NA
1194 SB01	119401SBD	4/25/94	7	9	NICKEL	0.011	6.7		19.76	Yes	200	NA
1194 SB01	119401SBD	4/25/94	7	9	POTASSIUM	0.011	720		1717	Yes	Essential Nutrient	NA
1194 SB01	119401SBD	4/25/94	7	9	SODIUM	0.011	100		53200	Yes	Essential Nutrient	NA
1194 SB01	119401SBD	4/25/94	7	9	VANADIUM	0.011	16.0		37.4	Yes	72	NA
1194 SB01	119401SBD	4/25/94	7	9	ZINC	0.011	12		31.3	Yes	3100	NA
<b>Building 1194 - Surface Soil - Location 1194-SB02</b>												
1194 SB02	119402SBA	4/25/94	1	3	ACETONE	0.011	0.013		0.011	No	1000	Yes
1194 SB02	119402SBA	4/25/94	1	3	BENZENE	0.0011	0.0016		0.0011	No	0.5	Yes
1194 SB02	119402SBA	4/25/94	1	3	METHYLENE CHLORIDE	0.0011	0.015		0.015	No	0.5	Yes
1194 SB02	119402SBA	4/25/94	1	3	ALUMINIUM	0.011	7300		22035	Yes	10000	NA
1194 SB02	119402SBA	4/25/94	1	3	ARSENIC	0.011	5.2		5.85	Yes	5	NA
1194 SB02	119402SBA	4/25/94	1	3	BARIUM	0.011	99		233	Yes	200	NA
1194 SB02	119402SBA	4/25/94	1	3	BERYLLIUM	0.011	0.6		1.02	Yes	0.4	NA
1194 SB02	119402SBA	4/25/94	1	3	CADMIUM	0.011	2.4		0.556	No	0.5	NA
1194 SB02	119402SBA	4/25/94	1	3	CALCIUM	0.011	13000	JH	167788	Yes	Essential Nutrient	NA
1194 SB02	119402SBA	4/25/94	1	3	CHROMIUM, TOTAL	0.011	11.0		25.86	Yes	10	NA
1194 SB02	119402SBA	4/25/94	1	3	COBALT	0.011	11.0		11.05	Yes	610	NA
1194 SB02	119402SBA	4/25/94	1	3	COPPER	0.011	24.0		17.37	No	130	Yes
1194 SB02	119402SBA	4/25/94	1	3	IRON	0.011	9600	JH	17717	Yes	Essential Nutrient	NA
1194 SB02	119402SBA	4/25/94	1	3	LEAD	0.011	12.0		30.97	Yes	15	NA
1194 SB02	119402SBA	4/25/94	1	3	MAGNESIUM	0.011	1000		3003	Yes	Essential Nutrient	NA
1194 SB02	119402SBA	4/25/94	1	3	MANGANESE	0.011	240		849	Yes	1400	NA
1194 SB02	119402SBA	4/25/94	1	3	NICKEL	0.011	9.4		14.6	Yes	200	NA
1194 SB02	119402SBA	4/25/94	1	3	POTASSIUM	0.011	770		2895	Yes	Essential Nutrient	NA
1194 SB02	119402SBA	4/25/94	1	3	SODIUM	0.011	44		37300	Yes	Essential Nutrient	NA
1194 SB02	119402SBA	4/25/94	1	3	VANADIUM	0.011	27.0		46.3	Yes	72	NA
1194 SB02	119402SBA	4/25/94	1	3	ZINC	0.011	18		36.8	Yes	3100	NA
<b>Building 1194 - Subsurface Soil - Location 1194-SB02</b>												
1194 SB02	119402SBB	4/25/94	3	5	ACETONE	0.011	0.011		0.011	No	1000	Yes
1194 SB02	119402SBB	4/25/94	3	5	BENZENE	0.0011	0.0011		0.0011	No	0.5	Yes
1194 SB02	119402SBB	4/25/94	3	5	METHYLENE CHLORIDE	0.0011	0.017		0.011	No	0.5	Yes
1194 SB02	119402SBB	4/25/94	3	5	ALUMINIUM	0.011	5000		20260	Yes	10000	NA
1194 SB02	119402SBB	4/25/94	3	5	ARSENIC	0.011	5.7		6.58	Yes	5	NA
1194 SB02	119402SBB	4/25/94	3	5	BARIUM	0.011	46		128.1	Yes	200	NA
1194 SB02	119402SBB	4/25/94	3	5	BERYLLIUM	0.011	0.15		0.3	Yes	0.4	NA
1194 SB02	119402SBB	4/25/94	3	5	CADMIUM	0.011	3.4		0.59	No	0.5	NA
1194 SB02	119402SBB	4/25/94	3	5	CALCIUM	0.011	33000	JH	272000	Yes	Essential Nutrient	NA
1194 SB02	119402SBB	4/25/94	3	5	CHROMIUM, TOTAL	0.011	9.8		16.31	Yes	10	NA
1194 SB02	119402SBB	4/25/94	3	5	COBALT	0.011	4.6		6.19	Yes	610	NA
1194 SB02	119402SBB	4/25/94	3	5	COPPER	0.011	5.0		13.72	Yes	130	NA
1194 SB02	119402SBB	4/25/94	3	5	IRON	0.011	13000	JH	17469	Yes	Essential Nutrient	NA
1194 SB02	119402SBB	4/25/94	3	5	LEAD	0.011	9.2		12.66	Yes	1.5	NA
1194 SB02	119402SBB	4/25/94	3	5	MAGNESIUM	0.011	1100		2420	Yes	Essential Nutrient	NA

Table 10-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1194 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
<b>Building 1194 - Subsurface Soil - Location 1194-SB03</b>												
1194-SB02	119402SBB	4/25/94	3	5	MANGANESE	0.01	140		3517	Yes	1400	NA
1194-SB02	119402SBB	4/25/94	3	5	NICKEL	0.01	8.4		1976	Yes	200	NA
1194-SB02	119402SBB	4/25/94	3	5	POTASSIUM	0.01	720		1717	Yes	Essential Nutrient	NA
1194-SB02	119402SBB	4/25/94	3	5	SODIUM	0.01	34		53200	Yes	Essential Nutrient	NA
1194-SB02	119402SBB	4/25/94	3	5	VANADIUM	0.01	17.0		37.4	Yes	72	NA
1194-SB02	119402SBB	4/25/94	3	5	ZINC	0.01	16		31.3	Yes	3100	NA
1194-SB03	119403SBB	4/25/94	3	5	ACETONE	0.011	0.011		0.011	No	1000	Yes
1194-SB03	119403SBB	4/25/94	3	5	BENZENE	0.0011	0.0011		0.0011	No	0.5	Yes
1194-SB03	119403SBB	4/25/94	3	5	METHYLENE CHLORIDE	0.017	0.017			No	0.5	Yes
1194-SB03	119403SBB	4/25/94	3	5	ALUMINIUM	3300	3300		20260	Yes	10000	NA
1194-SB03	119403SBB	4/25/94	3	5	ARSENIC	4.7	4.7		6.58	Yes	5	NA
1194-SB03	119403SBB	4/25/94	3	5	BARIUM	27	27		128.1	Yes	200	NA
1194-SB03	119403SBB	4/25/94	3	5	BERYLLIUM	0.24	0.24		1.13	Yes	0.4	NA
1194-SB03	119403SBB	4/25/94	3	5	CADMIUM	2.7	2.7		0.58	No	0.5	No
1194-SB03	119403SBB	4/25/94	3	5	CALCIUM	4500	4500	JH	272000	Yes	Essential Nutrient	NA
1194-SB03	119403SBB	4/25/94	3	5	CHROMIUM, TOTAL	5.9	5.9		16.31	Yes	10	NA
1194-SB03	119403SBB	4/25/94	3	5	COBALT	3.7	3.7		6.19	Yes	610	NA
1194-SB03	119403SBB	4/25/94	3	5	COPPER	3.8	3.8		13.72	Yes	130	NA
1194-SB03	119403SBB	4/25/94	3	5	IRON	11000	11000	JH	17469	Yes	Essential Nutrient	NA
1194-SB03	119403SBB	4/25/94	3	5	LEAD	4.6	4.6		12.65	Yes	1.5	NA
1194-SB03	119403SBB	4/25/94	3	5	MAGNESIUM	540	540		2420	Yes	Essential Nutrient	NA
1194-SB03	119403SBB	4/25/94	3	5	MANGANESE	84	84		351.7	Yes	1400	NA
1194-SB03	119403SBB	4/25/94	3	5	NICKEL	7.1	7.1		19.76	Yes	200	NA
1194-SB03	119403SBB	4/25/94	3	5	POTASSIUM	480	480		1717	Yes	Essential Nutrient	NA
1194-SB03	119403SBB	4/25/94	3	5	SODIUM	23	23		53200	Yes	Essential Nutrient	NA
1194-SB03	119403SBB	4/25/94	3	5	VANADIUM	13.0	13.0		37.4	Yes	72	NA
1194-SB03	119403SBB	4/25/94	3	5	ZINC	13	13		31.3	Yes	3100	NA
1194-SB03	119403SBC	4/25/94	5	7	ACETONE	0.011	0.011		0.011	No	1000	Yes
1194-SB03	119403SBC	4/25/94	5	7	BENZENE	0.0011	0.0011		0.0011	No	0.5	Yes
1194-SB03	119403SBC	4/25/94	5	7	METHYLENE CHLORIDE	0.017	0.017			No	0.5	Yes
1194-SB03	119403SBC	4/25/94	5	7	ALUMINIUM	8900	8900		20260	Yes	10000	NA
1194-SB03	119403SBC	4/25/94	5	7	ARSENIC	5.0	5.0		6.58	Yes	5	NA
1194-SB03	119403SBC	4/25/94	5	7	BARIUM	87	87		128.1	Yes	200	NA
1194-SB03	119403SBC	4/25/94	5	7	BERYLLIUM	0.32	0.32		1.13	Yes	0.4	NA
1194-SB03	119403SBC	4/25/94	5	7	CADMIUM	2.6	2.6		0.58	No	0.5	No
1194-SB03	119403SBC	4/25/94	5	7	CALCIUM	27000	27000	JH	272000	Yes	Essential Nutrient	NA
1194-SB03	119403SBC	4/25/94	5	7	CHROMIUM, TOTAL	11.0	11.0		16.31	Yes	10	NA
1194-SB03	119403SBC	4/25/94	5	7	COBALT	4.8	4.8		6.19	Yes	610	NA
1194-SB03	119403SBC	4/25/94	5	7	COPPER	7.8	7.8		13.72	Yes	130	NA

Table 10-2  
 Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1194 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
1194-SB03	119403SBC	4/25/94	5	7	IRON	10000	10000	JH	17469	Yes	Essential Nutrient	NA
1194-SB03	119403SBC	4/25/94	5	7	LEAD	9.4	9.4		12.66	Yes	1.5	NA
1194-SB03	119403SBC	4/25/94	5	7	MAGNESIUM	1600	1600		2420	Yes	Essential Nutrient	NA
1194-SB03	119403SBC	4/25/94	5	7	MANGANESE	310	310		3517	Yes	1400	NA
1194-SB03	119403SBC	4/25/94	5	7	NICKEL	8.8	8.8		19.76	Yes	200	NA
1194-SB03	119403SBC	4/25/94	5	7	POTASSIUM	1100	1100		1717	Yes	Essential Nutrient	NA
1194-SB03	119403SBC	4/25/94	5	7	SODIUM	87	87		53200	Yes	Essential Nutrient	NA
1194-SB03	119403SBC	4/25/94	5	7	VANADIUM	20.0	20.0		37.4	Yes	72	NA
1194-SB03	119403SBC	4/25/94	5	7	ZINC	16	16		31.3	Yes	3100	NA

MSC = Media-Specific Concentration  
 NA = not applicable  
 MQL = Method Quantitation Limit  
 RRS 1 = Risk Reduction Standard 1  
 RRS 2 = Risk Reduction Standard 2  
 TNRCC = Texas Natural Resources Conservation Commission  
 UTL = Upper Tolerance Limit  
 Footnotes

<sup>1</sup>UTLs for organics derived from Final Draft Baseline Background Study, Jacobs Engineering 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte.  
<sup>2</sup>TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs), Industrial Setting", July 14

Qualifier Definitions  
 J = The analyte was positively identified

JB = For organics the associated value is an estimated quantity. For organics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample.  
 JB = Estimated quantitation, possible biased high based upon blank contamination  
 JH = Estimated quantitation, possible biased high based upon QC data

Copper was detected at a concentration (24 mg/kg) that slightly exceeded background, but was well below its MSC. The detected copper concentration was likely the result of naturally occurring levels in soil.

#### **10.4.2 Subsurface Soil**

Subsurface soil samples were collected from three soil borings (1194-SB01 through 1194-SB03) and analyzed for VOCs and inorganics. The depth of the soil borings ranged from 5 feet bgs in 1194-SB02 to 9 feet bgs in 1194-SB01. The following subsections discuss the analytical results from the subsurface soil samples collected by Law (1995).

**VOCs.** The VOCs detected in subsurface soil samples included acetone, benzene, and methylene chloride (Table 10-2). Acetone and methylene chloride were detected at low concentrations and are considered to be common laboratory contaminants. Both were detected at concentrations well below the established MSCs of 1,020 and 0.5 mg/kg, respectively. Benzene was detected above the MQL in the sample from 3 to 5 feet bgs at 1194-SB01 at a concentration (0.0013 mg/kg) that is below the MSC of 0.5 mg/kg. Benzene was not detected in the sample from 7 to 9 feet bgs at boring 1194-SB01.

**Inorganics.** Eighteen inorganic compounds were detected in the subsurface soil samples and included: aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc. Cadmium was detected above background and MSC in all of the subsurface soil samples collected by Law (1995). Manganese was detected in the subsurface soil sample from 3 to 5 feet bgs at a concentration (370 mg/kg) that was slightly above background, but well below the MSC. All other inorganic compounds were detected at concentrations below background.

#### **10.5 Results from Phase 1 RFI Activities**

The following sections present the analytical results from surface and subsurface soil samples that were collected by IT (1997) during the Phase 1 Sanitary Sewer System RFI at Building 1194. A discussion of the groundwater analytical results collected from monitoring wells sampled during the investigation is also included. The purpose of the Phase 1 RFI soil samples was to supplement the analytical data for VOCs and inorganics that were collected by Law (1995) during the initial site investigation.

Table 10-3 contains a summary of the analytes detected in the Phase 1 RFI soil samples collected by IT and Table 10-4 contains a summary of the analytes detected in the Phase 1 RFI groundwater samples. Analytical detection summary tables for the soil and groundwater samples collected at Building 1194 are shown in Tables B-12 and B-13, respectively.

### **10.5.1 Surface Soil**

IT collected surface soil samples from borings SB119401 and SB119402, both located adjacent to the OWS. The surface soil samples were collected and submitted for analysis of SVOCs and pesticides/PCBs to supplement the Law (1995) data. The subsurface sample from SB119402 was submitted for SVOC analysis but was erroneously not analyzed for these compounds by the laboratory. The following subsections discuss the analytical results of the surface soil samples.

**SVOCs.** The SVOC constituent detected in the surface soil sample from SB119401 at Building 1194 was an unidentified compound tentatively qualified as an estimated concentration below the PQL (Table B-12). Although a detection limit was not established for this compound in the laboratory analysis, the value is below the PQL range (0.660 mg/kg to 3.30 mg/kg) for SVOCs described in SW846 Method 8270 (EPA, 1997). SVOC analysis was not performed on sample MS1144 from SB119402 by the laboratory. No other SVOCs were detected above the MQLs.

**Pesticides/PCBs.** No pesticides or PCBs were detected above MQLs in the surface soil samples collected from borings SB119401 and SB119402.

### **10.5.2 Subsurface Soil**

IT collected subsurface soil samples from borings SB119401 and SB119402, both located adjacent to the OWS. A subsurface soil sample was collected from 11 to 13 feet bgs in soil boring SB119401. The soil sample was collected in dry, clayey materials overlying the Walnut Formation. Soil boring SB119402 was advanced from surface to 9 feet bgs and a sample was collected from 4 to 6 feet bgs above a perched water zone. Soil samples were analyzed for SVOCs and pesticides/PCBs to supplement analyses performed by Law. However, due to a laboratory error, the sample from SB119402 was not analyzed for SVOCs. The following subsections discuss the analytical results of the subsurface soil samples.

Table 10-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1194 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27?
Phase 1 - Subsurface Soil - Location SB119401													
SB119401	MS1147	18-Mar-97	11	13	2-methylnaphthalene	0.84	0.16	J	J	0.72	Yes	410	NA
SB119401	MS1147	18-Mar-97	11	13	Bis(2-ethylhexyl)phthalate	0.84	0.082	J	J	0.72	Yes	0.6	NA
Phase 1 Location SB119402 - No Detections													
Phase 2 - Surface Soil - Location SB119403													
SB119403	BG0022	21-Jun-99	0	2	Cadmium	0.2	0.04	U	nv	0.556	Yes	0.5	NA
Phase 2 - Subsurface Soil - Location SB119403													
SB119403	BG0023	21-Jun-99	4	5	Cadmium	0.1	0.03	U	nv	0.59	Yes	0.5	NA
Phase 2 - Subsurface Soil - Location SB119404													
SB119404	BG0024	21-Jun-99	3	5	Arsenic	0.8	3.1	B	nv	6.58	Yes	5	NA
SB119404	BG0024	21-Jun-99	3	5	Cadmium	0.2	0.04	U	nv	0.59	Yes	0.5	NA
Phase 3 - Subsurface Soil - Location SB119405													
SB119405	BG0076	1-Dec-00	3	5	Benzene	0.0023	0.0023	U	nv	0.0023	Yes	0.5	NA
SB119405	BG0076	1-Dec-00	3	5	Cadmium	0.11	0.0609	F	nv	0.59	Yes	0.5	NA
SB119405	BG0077	1-Dec-00	7	9	Benzene	0.0024	0.00106	F	J	0.0024	Yes	0.5	NA
SB119405	BG0077	1-Dec-00	7	9	Cadmium	0.12	0.0765	F	UJ	0.59	Yes	0.5	NA
SB119405	BG0078	1-Dec-00	7	9	Benzene	0.0024	0.0024	U	nv	0.0024	Yes	0.5	NA
SB119405	BG0078	1-Dec-00	7	9	Cadmium	0.12	0.0579	F	nv	0.59	Yes	0.5	NA
Phase 3 - Subsurface Soil - Location SB119406													
SB119406	BG0079	30-Nov-00	1	5	Benzene	0.0022	0.0022	U	U	0.0022	Yes	0.5	NA
SB119406	BG0079	30-Nov-00	1	5	Cadmium	0.11	0.169			0.59	Yes	0.5	NA
SB119406	BG0080	30-Nov-00	7	9	Benzene	0.0024	0.0023	R	U	0.0023	Yes	0.5	NA
SB119406	BG0080	30-Nov-00	7	9	Cadmium	0.11	0.123			0.59	Yes	0.5	NA

Table 10-3  
 Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1194 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
Phase 3 - Subsurface Soil - Location SB119407													
SB119407	BG0081	30-Nov-00	3	5	Cadmium	0.11	0.0913	F	nv	0.59	Yes	0.5	NA
SB119407	BG0082	30-Nov-00	5	7	Cadmium	0.11	0.0986	F	nv	0.59	Yes	0.5	NA

MSC = Media-Specific Concentration  
 NA = not applicable  
 MQL = Method Quantitation Limit  
 RRS 1 = Risk Reduction Standard 1  
 RRS 2 = Risk Reduction Standard 2  
 TNRCC = Texas Natural Resources Conservation Commission  
 UTL = Upper Tolerance Limit  
 Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte

<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Qualifier Definitions

= The analyte was positively identified

U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL

F = The analyte was positively identified but the associated numerical value is below the reporting limit

J = For inorganics, the associated value is an estimated quantity. For organics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample

BJ = Estimated quantitation - possible biased high based upon blank contamination

R = The data was rejected due to QC limitations

nv = not validated

Table 10-4

Summary of RFI Groundwater Analytical Detections Compared to Background and MSCs  
 OWS Building 1194 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Parameter	Reporting Limit (mg/L)	Result (mg/L)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/L)	Does Result Support Closure Under RRS 1	TNRCC MSC <sup>2</sup> (mg/L)	Does Result Support Closure Under RRS 2?
Phase 1 - Groundwater - Location BGSMW01											
BGSMW01	MS1528	9-Apr-97	Methylene chloride	0.0003	0.0019	B	nv		Yes	0.04	NA
BGSMW01	MS1528	9-Apr-97	Barium	0.02	0.0748		nv	0.587	Yes	2	NA
BGSMW01	MS1528	9-Apr-97	Beryllium	0.003	0.0003	B	nv	0.0003	Yes	0.000004	NA
BGSMW01	MS1528	9-Apr-97	Calcium	0.1	108		nv	266.3	NA	Essential Nutrient	NA
BGSMW01	MS1528	9-Apr-97	Iron	0.07	2.31		nv	0.2239	NA	Essential Nutrient	NA
BGSMW01	MS1528	9-Apr-97	Magnesium	0.3	9.4		nv	37.8	NA	Essential Nutrient	NA
BGSMW01	MS1528	9-Apr-97	Manganese	0.02	0.528		nv	0.175	No	14	Yes
BGSMW01	MS1528	9-Apr-97	Mercury	0.001	0.00011	B	nv	0.0001	No	0.002	Yes
BGSMW01	MS1528	9-Apr-97	Molybdenum	0.08	0.0062	B	nv	0.0144	Yes	0.51	NA
BGSMW01	MS1528	9-Apr-97	Potassium	5	0.596	B	nv	15.03	NA	Essential Nutrient	NA
BGSMW01	MS1528	9-Apr-97	Sodium	0.3	38.5		nv	167.2	NA	Essential Nutrient	NA
BGSMW01	MS1528	9-Apr-97	Zinc	0.02	0.0234		nv	0.118	Yes	31	NA
Phase 1 - Groundwater - Location WITCTA027											
WITCTA027	MS1551	24-Apr-97	Methylene chloride	0.3	0.62	B			Yes	40	NA
WITCTA027	MS1551	24-Apr-97	Trichloroethene	1	0.25	J			No	5	Yes
WITCTA027	MS1551	24-Apr-97	Aluminum	500	65.7	B		1332	Yes	100000	NA
WITCTA027	MS1551	24-Apr-97	Arsenic	10	9.2	B		4.9	No	50	Yes
WITCTA027	MS1551	24-Apr-97	Barium	20	98.2			587	Yes	2000	NA
WITCTA027	MS1551	24-Apr-97	Barium	100	101			587	Yes	2000	NA
WITCTA027	MS1551	24-Apr-97	Calcium	100	151000			266300	NA	Essential Nutrient	NA
WITCTA027	MS1551	24-Apr-97	Iron	70	2870	N		223.9	NA	Essential Nutrient	NA
WITCTA027	MS1551	24-Apr-97	Magnesium	300	8260			37800	NA	Essential Nutrient	NA
WITCTA027	MS1551	24-Apr-97	Manganese	20	161			175	Yes	14000	NA
WITCTA027	MS1551	24-Apr-97	Molybdenum	80	3.4	B		14.4	Yes	510	NA

Table 10-4

Summary of RFI Groundwater Analytical Detections Compared to Background and MSCs  
 OWS Building 1194 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Sample Parameter	Reporting Limit (mg/L)	Result (mg/L)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/L)	Does Result Support Closure Under RRS 1	TNRCC MSC <sup>2</sup> (mg/L)	Does Result Support Closure Under RRS 2?
WITTA027	MS1551	24-Apr-97	Potassium	5000	492	B		15030	NA	Essential Nutrient	NA
WITTA027	MS1551	24-Apr-97	Silver	70	4.6	B		0.2	No	510	Yes
WITTA027	MS1551	24-Apr-97	Sodium	300	55500			167200	NA	Essential Nutrient	NA
WITTA027	MS1551	24-Apr-97	Zinc	20	4.7	B		118	Yes	31000	NA

MSC = Media Specific Concentration

NA = Not Applicable

MQL = Method Quantitation Limit

RRS 1 = Risk Reduction Standard 1

RRS 2 = Risk Reduction Standard 2

TNRCC = Texas Natural Resource Conservation Commission

UTL = Upper Tolerance Limit

mg/L = milligrams per liter

Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte.

<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media Specific Concentrations (MSCs) - Industrial Setting", July 14

Validated Qualifier Definitions

J = For inorganics, the associated value is an estimated quantity. For organics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.

B = For inorganics, the reported value is an estimated quantity.

F = The analyte was positively identified but the associated numerical value is below the reporting limit.

nv = not validated

**SVOCs.** All SVOC detections in the surface soil sample were below MQLs. Several TICs were detected at estimated concentrations below the PQLs (Table B-12). These TICs included unidentified hydrocarbon compounds. Although no detection limits were established for these compounds in the laboratory analysis, the values are below the PQL range (0.660 mg/kg to 3.30 mg/kg) for SVOCs described in SW846 Method 8270 (EPA, 1997). Therefore, the SVOC concentrations detected in the subsurface soil samples collected by IT were below the background concentration for organics, as defined by the TNRCC RRP.

**Pesticides/PCBs.** No pesticides/PCBs compounds were detected above MQLs in subsurface soil samples collected at the Building 1194 site.

### **10.5.3 Groundwater**

Groundwater was not found in monitoring well boring WITCTA030 installed adjacent to the OWS at Building 1194. Groundwater samples from two monitoring wells (BGSMW01 and WITCTA027) installed along sanitary sewer segments to the east and in the general downgradient vicinity of Building 1194 were examined to determine if a release to the groundwater occurred from the OWS. Both wells were sampled and analyzed for VOCs, SVOCs, and inorganics. The following subsections summarize the groundwater analytical results from the Building 1194 site.

**VOCs.** Methylene chloride was the only organic constituent detected above its MQL in the groundwater sample from monitoring well BGSMW01. It was detected at a concentration of 0.0019 B mg/L and was qualified as a laboratory contaminant. The groundwater sample from monitoring well WITCTA027 also contained detected methylene chloride (0.00062 B mg/L) and was also qualified as a laboratory contaminant. These methylene chloride concentrations were well below the established MSC of 0.005 mg/L and are likely the result of laboratory contamination.

**SVOCs.** An unidentified hydrocarbon was tentatively qualified as estimated below the PQL in the WITCTA027 groundwater sample (Table B-13). Although a detection limit was not established for this compound in the laboratory analysis, the value is below the PQL range (0.01-1.0 mg/L) for SVOCs described in EPA Method SW8270 (EPA, 1997). Because the detected concentration was below the PQL for the method used, the concentration is below the

background concentration for organics, as defined by the TNRCC RRP. No other SVOCs were detected above the MQLs.

**Inorganics.** Eleven inorganic compounds were detected in groundwater monitoring well BGSMW01 (Table 10-4). Iron, manganese, and mercury were the only inorganics to exceed background in the groundwater sample from monitoring well BGSMW01. Iron is considered an essential nutrient. Manganese (0.528 mg/L) and mercury (0.00011 mg/L) were detected at concentrations less than the MSCs of 14 and 0.002 mg/L, respectively.

Eleven inorganic compounds were also detected in groundwater monitoring well WITCTA027 (Table 10-4). Iron and silver were the only inorganic compounds detected at levels above their respective background concentrations. Iron is considered an essential nutrient and silver was detected at an estimated concentration (0.0046 B mg/L) that is well below the MSC level of 0.51 mg/L.

### **10.6 Results from Phase 2 Activities**

IT collected soil samples from two borings (SB119403 and SB119404) during the Phase 2 RFI in June 1999 to confirm and delineate concentrations detected during the Law (1995) investigation. Table 10-4 includes the analytical results for the Phase 2 soil samples. Figure 10-1 shows the locations of the Phase 2 samples. The following sections discuss the results of Phase 2 soil samples.

#### **10.6.1 Surface Soil**

A surface soil sample was collected from Phase 2 boring SB119403 to delineate the cadmium concentrations detected in former Law (1995) boring 1194-SB02. The detected cadmium concentration (0.04 mg/kg) detected in the surface soil sample at SB119403 was well below background. Therefore, the cadmium concentration detected in the surface soil sample at former Law boring 1194-SB02 is delineated to the south by the results from SB119403.

#### **10.6.2 Subsurface Soil**

A subsurface soil sample was also collected from Phase 2 boring SB119403 to delineate the cadmium concentrations detected in former Law (1995) boring 1194-SB02. The detected cadmium concentration (0.03 mg/kg) detected in the subsurface soil sample at SB119403 was

below background. Therefore, the cadmium concentration detected in the subsurface soil sample at former Law boring 1194-SB02 is delineated to the south by the results from SB119403.

A subsurface soil sample was collected from 3 to 5 feet bgs at Phase 2 boring SB119404 for analysis of arsenic and cadmium. Cadmium was detected in this sample at a concentration (0.04 mg/kg) that is well below background. Arsenic (3.1 mg/kg) was also detected below background in the subsurface sample from SB119404.

### **10.7 Results from HGL's RFI at SWMU 34**

HGL (2000) collected surface and subsurface soil samples from two boring locations (BHGLSWMU34001 and BHGLSWMU3402) near the OWS at Building 1194 during the RFI for SWMU 34, the waste accumulation area. Soil samples were collected from 0 to 2, 5 to 7, and 10 to 12 feet bgs at BHGLSWMU34001, which is located approximately 80 feet south of the OWS at Building 1194. Soil samples were collected from 0 to 2 and 5 to 7 feet bgs at BHGLSWMU34002, which is located adjacent to the northern side of the OWS at Building 1194. Each of the soil samples collected by HGL were analyzed for Appendix IX constituents, including VOCs, SVOCs, and inorganics.

As shown in Table 10-5 and Figure 10-1, no VOCs, SVOCs, or inorganics exceeded background concentrations in the surface and subsurface soil samples collected from BHGLSWMU34001. One VOC, ethyl benzene, was detected at a concentration (0.004 mg/kg) that slightly exceeded the MQL (0.003 mg/kg) in the surface soil sample from BHGLSWMU34002. However, the detected ethyl benzene concentration is well below the MSC (70 mg/kg). All other detected concentrations of Appendix IX constituents were below background in the soil samples collected from BHGLSWMU34002.

### **10.8 Results from Phase 3 RFI Activities**

IT collected soil samples from three additional borings (SB119405 through SB119407) during the Phase 3 RFI. Two of the borings, SB119405 and SB119407, were intended to delineate cadmium and benzene concentrations detected in the subsurface soil samples collected during the Law (1995) investigation. The other soil boring was located adjacent to former Law boring 1194-SB02 to confirm cadmium and benzene concentrations detected at this location during the

Table 10-5  
 Summary of Analytical Results from Soil Samples Collected During RFI at SWMU 34  
 OWS at Building 1194 - HydroGeologic, Inc.  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Result (mg/kg)	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS2?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS2?
SWMU34 - Surface Soil-Location BHGLSWMU3401-00'											
BHGLSWMU3401-00'			0	2	Antimony	4 8	UJ	0 56	Yes	0 6	No
BHGLSWMU3401-00'			0	2	Arsenic	3 5	F	5 85	Yes	5	Yes
BHGLSWMU3401-00'			0	2	Barium	85		233	Yes	200	Yes
BHGLSWMU3401-00'			0	2	Beryllium	0 88		1 02	Yes	0 4	Yes
BHGLSWMU3401-00'			0	2	Cadmium	0 06	F	0 556	Yes	0 5	Yes
BHGLSWMU3401-00'			0	2	Chromium, total	11 6	J	25 86	Yes	10	Yes
BHGLSWMU3401-00'			0	2	Cobalt	4 9	F	11 05	Yes	610	Yes
BHGLSWMU3401-00'			0	2	Copper	8 3	F	17 37	Yes	130	Yes
BHGLSWMU3401-00'			0	2	Lead	11 1	J	30 97	Yes	1 5	Yes
BHGLSWMU3401-00'			0	2	Nickel	10 5		14 6	Yes	200	Yes
BHGLSWMU3401-00'			0	2	Tin	38 3	U	16	Yes	6100	Yes
BHGLSWMU3401-00'			0	2	Vanadium	27 6	F	46 3	Yes	72	Yes
BHGLSWMU3401-00'			0	2	Zinc	16 1	F	38 8	Yes	3100	Yes
BHGLSWMU3401-00'			0	2	Mercury	0 04	U	0 14	Yes	0 2	Yes
BHGLSWMU3401-00'			0	2	Selenium	0 18	F	0 907	Yes	5	Yes
BHGLSWMU3401-00'			0	2	Silver	0 2	U	0 213	Yes	51	Yes
BHGLSWMU3401-00'			0	2	Thallium	0 98	UJ	2 43	Yes	0 2	Yes
BHGLSWMU3401-00'			0	2	Ancenaphthene	0 41	U	0 33	Yes	610	Yes
BHGLSWMU3401-00'			0	2	Anthracene	0 41	U	0 33	Yes	3100	Yes
BHGLSWMU3401-00'			0	2	Benzo(a)anthracene	0 41	U	0 33	Yes	0 039	No
BHGLSWMU3401-00'			0	2	Benzo(a)pyrene	0 043	F	0 33	Yes	0 02	Yes
BHGLSWMU3401-00'			0	2	Benzo(b)fluoranthene	0 086	F	0 33	Yes	0 039	Yes
BHGLSWMU3401-00'			0	2	Benzo(g,h,i)perylene	0 05	F	0 33	Yes	310	Yes
BHGLSWMU3401-00'			0	2	Benzo(k)fluoranthene	0 41	U	0 33	Yes	0 39	No
BHGLSWMU3401-00'			0	2	Chrysene	0 076	F	0 33	Yes	3 9	Yes
BHGLSWMU3401-00'			0	2	Dibenz(a,h)anthracene	0 41	U	0 33	Yes	0 02	No
BHGLSWMU3401-00'			0	2	Dibenzofuran	0 41	U	0 33	Yes	41	Yes
BHGLSWMU3401-00'			0	2	Fluoranthene	0 07	F	0 33	Yes	410	Yes
BHGLSWMU3401-00'			0	2	Fluorene	0 41	U	0 33	Yes	410	Yes
BHGLSWMU3401-00'			0	2	Indeno(1,2,3-c,d)pyrene	0 055	F	0 33	Yes	0 039	Yes
BHGLSWMU3401-00'			0	2	Naphthalene	0 41	U	0 33	Yes	200	Yes
BHGLSWMU3401-00'			0	2	Phenanthrene	0 41	U	0 33	Yes	310	Yes
BHGLSWMU3401-00'			0	2	Pyrene	0 41	U	0 33	Yes	310	Yes

Table 10-5

Summary of Analytical Results from Soil Samples Collected During RFI at SWMU 34  
 OWS at Building 1194 - HydroGeologic, Inc.  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Result (mg/kg)	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS17		Does Result Support Closure Under RRS27	
									Yes	No	Yes	No
<b>SWMU34 - Surface Soil-Location BHGLSWMU3401-05'</b>												
BHGLSWMU3401-05'			5	7	Antimony	4.6	UJ	0.712	Yes	Yes	0.6	No
BHGLSWMU3401-05'			5	7	Arsenic	2.7	F	6.58	Yes	Yes	5	Yes
BHGLSWMU3401-05'			5	7	Barium	74.4		128.1	Yes	Yes	200	Yes
BHGLSWMU3401-05'			5	7	Beryllium	0.43		1.13	Yes	Yes	0.4	Yes
BHGLSWMU3401-05'			5	7	Cadmium	0.11	F	0.59	Yes	Yes	0.5	Yes
BHGLSWMU3401-05'			5	7	Chromium, total	7.8	F	16.31	Yes	Yes	10	Yes
BHGLSWMU3401-05'			5	7	Cobalt	2.8	F	6.19	Yes	Yes	610	Yes
BHGLSWMU3401-05'			5	7	Copper	3.4	F	13.72	Yes	Yes	130	Yes
BHGLSWMU3401-05'			5	7	Lead	8	J	12.66	Yes	Yes	1.5	Yes
BHGLSWMU3401-05'			5	7	Nickel	5.1	F	19.76	Yes	Yes	200	Yes
BHGLSWMU3401-05'			5	7	Tin	36.4	U	10	Yes	Yes	6100	Yes
BHGLSWMU3401-05'			5	7	Vanadium	21.2	F	37.4	Yes	Yes	72	Yes
BHGLSWMU3401-05'			5	7	Zinc	12.4	F	31.3	Yes	Yes	3100	Yes
BHGLSWMU3401-05'			5	7	Mercury	0.04	U	0.035	Yes	Yes	0.2	Yes
BHGLSWMU3401-05'			5	7	Selenium	0.56	UJ	0.313	Yes	Yes	5	Yes
BHGLSWMU3401-05'			5	7	Silver	0.19	U	0.128	Yes	Yes	51	Yes
BHGLSWMU3401-05'			5	7	Thallium	0.94	UJ	1.5	Yes	Yes	0.2	Yes
BHGLSWMU3401-05'			5	7	Fluoranthene	0.38	U	0.33	Yes	Yes	410	Yes
<b>SWMU34 - Surface Soil-Location BHGLSWMU3401-10'</b>												
BHGLSWMU3401-10'			5	7	Antimony	5	UJ	0.712	Yes	Yes	0.6	No
BHGLSWMU3401-10'			5	7	Arsenic	4.3	F	6.58	Yes	Yes	5	Yes
BHGLSWMU3401-10'			5	7	Barium	27.3	F	128.1	Yes	Yes	200	Yes
BHGLSWMU3401-10'			5	7	Beryllium	0.34		1.13	Yes	Yes	0.4	Yes
BHGLSWMU3401-10'			5	7	Cadmium	0.14	F	0.59	Yes	Yes	0.5	Yes
BHGLSWMU3401-10'			5	7	Chromium, total	8.4	F	16.31	Yes	Yes	10	Yes
BHGLSWMU3401-10'			5	7	Cobalt	2.4	F	6.19	Yes	Yes	610	Yes
BHGLSWMU3401-10'			5	7	Copper	3.6	F	13.72	Yes	Yes	130	Yes
BHGLSWMU3401-10'			5	7	Lead	4.4	J	12.66	Yes	Yes	1.5	Yes
BHGLSWMU3401-10'			5	7	Nickel	4.8	F	19.76	Yes	Yes	200	Yes
BHGLSWMU3401-10'			5	7	Tin	39.8	U	10	Yes	Yes	6100	Yes
BHGLSWMU3401-10'			5	7	Vanadium	10.1	F	37.4	Yes	Yes	72	Yes
BHGLSWMU3401-10'			5	7	Zinc	9.4	F	31.3	Yes	Yes	3100	Yes
BHGLSWMU3401-10'			5	7	Mercury	0.04	U	0.035	Yes	Yes	0.2	Yes
BHGLSWMU3401-10'			5	7	Selenium	0.55	UJ	0.313	Yes	Yes	5	Yes
BHGLSWMU3401-10'			5	7	Silver	0.18	U	0.128	Yes	Yes	51	Yes

Table 10-5  
 Summary of Analytical Results from Soil Samples Collected During RFI at SWMU 34  
 OWS at Building 1194 - HydroGeologic, Inc.  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Result (mg/kg)	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under	
									RRS17	RRS27
BHGLSWMU3401-10'			5	7	Thallium	0.92	UU	1.5	Yes	Yes
BHGLSWMU3401-10'			5	7	Fluoranthene	0.38	U	0.33	Yes	Yes
SWMU34 - Surface Soil-Location BHGLSWMU3402-00'										
BHGLSWMU3402-00'			0	2	Antimony	4.6	UU	0.56	Yes	No
BHGLSWMU3402-00'			0	2	Arsenic	3.6	F	5.85	Yes	Yes
BHGLSWMU3402-00'			0	2	Barium	85.8		233	Yes	Yes
BHGLSWMU3402-00'			0	2	Beryllium	0.78		1.02	Yes	Yes
BHGLSWMU3402-00'			0	2	Cadmium	0.07	F	0.556	Yes	Yes
BHGLSWMU3402-00'			0	2	Chromium, total	11.9	J	25.86	Yes	Yes
BHGLSWMU3402-00'			0	2	Cobalt	5.3	F	11.05	Yes	Yes
BHGLSWMU3402-00'			0	2	Copper	8.8	F	17.37	Yes	Yes
BHGLSWMU3402-00'			0	2	Lead	12.8	J	30.97	Yes	Yes
BHGLSWMU3402-00'			0	2	Nickel	9.4		14.6	Yes	Yes
BHGLSWMU3402-00'			0	2	Tin	36.6	U	10	Yes	Yes
BHGLSWMU3402-00'			0	2	Vanadium	29		46.3	Yes	Yes
BHGLSWMU3402-00'			0	2	Zinc	17.1	F	38.8	Yes	Yes
BHGLSWMU3402-00'			0	2	Mercury	0.04	U	0.14	Yes	Yes
BHGLSWMU3402-00'			0	2	Selenium	0.25	F	0.907	Yes	Yes
BHGLSWMU3402-00'			0	2	Silver	0.18	U	0.213	Yes	Yes
BHGLSWMU3402-00'			0	2	Thallium	0.2	F	2.43	Yes	Yes
BHGLSWMU3402-00'			0	2	Ancenaphthene	0.38	U	0.33	Yes	Yes
BHGLSWMU3402-00'			0	2	Anthracene	0.38	U	0.33	Yes	Yes
BHGLSWMU3402-00'			0	2	Benzo(a)anthracene	0.38	U	0.33	Yes	Yes
BHGLSWMU3402-00'			0	2	Benzo(a)pyrene	0.38	U	0.33	Yes	Yes
BHGLSWMU3402-00'			0	2	Benzo(b)fluoranthene	0.38	U	0.33	Yes	Yes
BHGLSWMU3402-00'			0	2	Benzo(g,h,i)perylene	0.38	U	0.33	Yes	Yes
BHGLSWMU3402-00'			0	2	Benzo(k)fluoranthene	0.38	U	0.33	Yes	Yes
BHGLSWMU3402-00'			0	2	Chrysene	0.38	U	0.33	Yes	Yes
BHGLSWMU3402-00'			0	2	Dibenz(a,h)anthracene	0.38	U	0.33	Yes	Yes
BHGLSWMU3402-00'			0	2	Dibenzofuran	0.38	U	0.33	Yes	Yes
BHGLSWMU3402-00'			0	2	Fluoranthene	0.38	U	0.33	Yes	Yes
BHGLSWMU3402-00'			0	2	Fluorene	0.38	U	0.33	Yes	Yes
BHGLSWMU3402-00'			0	2	Indeno(1,2,3-c,d)pyrene	0.38	U	0.33	Yes	No
BHGLSWMU3402-00'			0	2	Naphthalene	0.38	U	0.33	Yes	Yes
BHGLSWMU3402-00'			0	2	Phenanthrene	0.38	U	0.33	Yes	Yes
BHGLSWMU3402-00'			0	2	Pyrene	0.38	U	0.33	Yes	Yes

Table 10-5

Summary of Analytical Results from Soil Samples Collected During RFI at SWMU 34  
 OWS at Building 1194 - HydroGeoLogic, Inc  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Result (mg/kg)	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under		Does Result Support Closure Under	
									RRS17	RRS27	RRS17	RRS27
SWMU34 - Surface Soil-Location BHGLSWMU3402-05'												
BHGLSWMU3402-05'			5	7	Antimony	4 6	UJ	0 712	Yes	Yes	Yes	No
BHGLSWMU3402-05'			5	7	Arsenic	5 3	J	6 58	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Barium	45 9		128 1	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Beryllium	0 38		1 13	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Cadmium	0 06	F	0 59	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Chromium, total	8 1	F	16 31	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Cobalt	3 2	F	6 19	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Copper	5 4	F	13 72	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Lead	7 2	J	12 66	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Nickel	7	F	19 76	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Tin	37 1	U	10	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Vanadium	21 9	F	37 4	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Zinc	16 1	F	31 3	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Mercury	0 04	U	0 035	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Selenium	0 24	UJ	0 313	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Silver	0 16	U	0 128	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Thallium	0 81	UJ	1 5	Yes	Yes	Yes	Yes
BHGLSWMU3402-05'			5	7	Fluoranthene	0 36	U	0 33	Yes	Yes	Yes	Yes

MSC = Media-Specific Concentration

NA = not applicable

MQL = Method Quantitation Limit

RRS1 = Risk Reduction Standard 1

RRS2 = Risk Reduction Standard 2

TNRCC = Texas Natural Resources Conservation Commission

UTL = Upper Tolerance Limit

Footnotes:

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit f

<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Validated Qualifier Definitions:

F = The analyte is present but the value is below the PQL

J = The analyte was positively identified, the quantitation is an estimation

U = The analyte was not detected, the numerical value is at the PQL

UJ = The analyte was not detected, the numerical value is above the PQL, but is estimated due to deficiencies in the QC criteria

Law (1995) investigation. The results from the Phase 3 soil samples at Building 1194 are shown in Table 10-3. The Phase 3 analytical results are also shown in Figure 10-1. The following subsections discuss the results for benzene and cadmium detected in the Phase 3 RFI samples.

**Benzene.** Benzene was not detected in the subsurface samples collected from SB119405 (3 to 5 and 7 to 9 feet bgs) and SB119407 (3 to 5 and 5 to 7 feet bgs). Therefore, the benzene concentration detected above the MQL in the sample from 3 to 5 feet bgs at former Law (1995) boring 1194-SB01 is delineated to the east and west by the results. Additionally, benzene was not detected in the samples from 1 to 5 and 7 to 9 feet bgs at boring SB119406, near former Law boring 1194-SB02. The results from this sample delineates the benzene concentration from 1194-SB01 in the southern direction.

**Cadmium.** Cadmium was not detected above background in the samples collected during the Phase 3 RFI. Therefore, the cadmium concentration detected above background in the Law (1995) borings (1194-SB01 through 1194-SB03) is delineated to the east and west by the results from SB119405 and SB119407, respectively. Elevated cadmium concentrations to the south are delineated by the results from Phase 2 boring SB119403.

The cadmium results obtained by HGL and IT indicate that the cadmium concentrations detected during the Law (1995) investigation were consistently higher than concentrations detected in these later investigations. Cadmium was not detected above background in the samples from 1 to 5 and 7 to 9 feet bgs at boring SB119406, which is located adjacent to former Law boring 1194-SB02. Therefore, the elevated cadmium concentrations detected at former Law boring 1194-SB02 were not replicated. Cadmium was not detected above background in the sample from HGL boring BHGLSWMU34002, which is adjacent to the OWS. The results obtained by HGL and by IT during the Phase 2 and Phase 3 RFIs show that no pattern of cadmium contamination is present in soils at the Building 1194 site.

### **10.9 Summary and Discussion**

Law (1995) collected soil samples for analysis of VOCs and inorganics at three locations (1194-SB01 through 1194-SB03) adjacent to the OWS at Building 1194 during their initial site investigation in 1994. The analytical results from the Law investigation indicated that cadmium detections exceeded basewide background concentrations and MSCs in soil samples. Benzene

was detected at concentrations slightly above its MQL but well below its MSC in two soil samples collected by Law (1995).

IT collected surface and subsurface soil samples from two locations (SB119401 and SB119402) adjacent to the OWS for analysis of SVOCs and pesticides/PCBs during the Phase 1 Sanitary Sewer System RFI in 1997 to supplement the data collected by Law (1995). IT also installed and sampled monitoring well WITCTA027 and sampled well BGSMW-1 as part of the Phase 1 RFI activities to determine if groundwater had been impacted downgradient of the site. Sufficient groundwater was not encountered in the boring WITCTA029, which is adjacent to the OWS; therefore, a monitoring well was not installed at this location

In June 1999, IT collected a soil sample from two soil borings (SB119403 and SB119404) as part of the Phase 2 RFI in an attempt to delineate cadmium concentrations identified above background during the Law investigation. HGL (2000) collected soil samples from two borings (BHGLSWMU3401 and BHGLSWMU3402) located within the vicinity of the OWS at Building 1194 during their RFI at SWMU 34 in June 1999. Finally, IT collected soil samples from three additional soil borings (SB119405 through SB119407) during the Phase 3 RFI activities in November 2000 to confirm the maximum concentrations of cadmium and benzene detected by Law (1995) and to delineate these constituents to below their respective background levels.

The following sections discuss the relevance of the parameters detected in surface soil, subsurface soil, and groundwater during investigations at the Building 1194 site

### **10.9.1 Surface Soil**

No SVOCs, pesticides, or PCBs were detected above background in the surface soil samples collected by Law (1995). One VOC, methylene chloride, was detected above MQLs in surface soil during the Law investigation. However, the detected methylene chloride concentrations were well below the MSC and were likely the result of laboratory contamination. Cadmium was detected above background in a surface soil sample collected by Law (1995) at 1194-SB02; however, cadmium was detected at a concentration below background at this location (SB119406) during the Phase 3 RFI. Cadmium was detected below background in the surface soil sample from a HGL boring (BHGLSWMU34002) that is adjacent to the OWS. The cadmium concentrations detected in surface soil have been delineated and the results obtained by

IT and HGL indicated that there is no pattern of cadmium contamination in surface soil at the site.

Benzene was detected slightly above its MQL in the surface soil sample from Law boring 1194-SB02. However, the elevated benzene concentration was not confirmed in the Phase 3 surface soil sample collected from this location (SB119406). Given the results from the HGL borings and those collected by IT during the Phase 3 RFI, there does not appear to be a pattern of benzene concentrations above the MQL at the Building 1194 site.

### **10.9.2 Subsurface Soil**

No SVOCs or pesticides/PCBs were detected above background in the subsurface soil samples collected near the OWS unit at Building 1194. Three VOCs, acetone, benzene, and methylene chloride, were detected above MQLs in the subsurface samples. The detected concentrations of acetone and methylene chloride were likely the result of laboratory contamination. The detected benzene concentration detected in the subsurface sample from 1194-SB01 was well below the MSC for benzene and has been delineated by the samples collected by HGL and IT during subsequent investigations.

Cadmium was detected in all of the subsurface samples collected by Law (1995) at concentrations that exceeded both the background and MSC for cadmium. As shown in Figure 10-1, the elevated concentrations of cadmium detected in the subsurface soil samples collected by Law (1995) have been delineated to background concentrations by the results from the HGL borings SB119403 through SB119105 and SB119407. Furthermore, because cadmium concentrations could not be replicated near former Law boring 1194-SB02 and were not detected above background in HGL boring BHGLSWMU34002, it appears that the cadmium concentrations detected by Law were likely extreme, but true, background concentrations.

### **10.9.3 Groundwater**

Iron, manganese, mercury, and silver were detected at concentrations above background but below their respective MSCs in groundwater samples collected at the Building 1194 site. All other inorganics were detected at concentrations below background. No SVOCs or VOCs were detected at concentrations above the MQLs, other than methylene chloride, which was qualified as a blank contaminant and is considered to be a laboratory contaminant.

### **10.10 Conclusions**

Considering that no pattern of VOCs, SVOCs, pesticides/PCBs, or inorganics above TNRCC MSCs has been identified in the soil and groundwater samples collected in the vicinity of Building 1194, it is recommended that the site be presented for closure under RRS 2 of the TNRCC RRP. The site is recommended for closure under RRS 2 because the benzene and cadmium concentrations detected above background in surface and subsurface soil samples have been delineated to background. The cadmium concentrations detected in former Law (1995) borings were not confirmed. Cadmium was detected at concentrations at or below background in all of the samples collected by HGL and IT during the RFI activities in the vicinity of Building 1194. Because this latter sampling was directed at confirming or denying the elevated concentrations of cadmium detected by Law (1995), it should be concluded that the Law results are not representative. Cadmium concentrations therefore are considered to be below background.

Soil and groundwater adjacent to the OWS at Building 1194 have not been impacted above RRS 2 standards by any compounds contained in the influent to the OWS (e.g., waste liquids such as diesel fuel, JP-4, and other petroleum-related compounds) indicating that any releases from the OWS have not significantly impacted the environment. Therefore, closure is recommended under RRS 2 for the OWS at Building 1194. Should this recommendation be accepted, a letter stating that closure of SWMU 35 (the OWS at Building 1194) was carried out in accordance with TAC §335.555, and signed by an Air Force representative, will be transmitted to the TNRCC, along with a metes and bounds description of SWMU 35. The metes and bounds description will correspond to surveyed coordinates of the affected area shown in Figure 10-1.

# TAB

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## **11.0 OWS Building 1414**

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The following sections provide a description of the OWS at Building 1414, a summary of the site characterization activities, a discussion of the site-specific geology and hydrology, discussions of the analytical results from each characterization event, and recommendations based upon the physical and chemical data collected at the site.

### **11.1 Site Description**

The OWS at Building 1414 is located adjacent to the northeast corner of Building 1414 and is designated as SWMU 41 on the RCRA Hazardous Waste Permit for NAS Fort Worth JRB (Figure 11-1). The OWS is a 1,000-gallon capacity, below-ground concrete vault operated by gravity flow. The OWS was installed in 1970 and is located beneath a former concrete runway apron that consists of 18-inch thick reinforced concrete (Law, 1995). Building 1414 has been used as a general maintenance facility for aerospace ground equipment since its conversion from an aircraft hangar used in the 1940s. The OWS was installed to handle wastewater collected in the building floor drains that may contain hydraulic fluid, antifreeze, JP-4, degreasing solvents and other cleaning agents, engine lubricating oil, and petroleum byproducts (A. T. Kearney, 1989).

The OWS system at Building 1414 consists of floor drains, underground conduits, and the OWS. There are three drains in the building. Two of these are trench drains, approximately 1.5 feet wide, along the northwest and southeast walls. The third is a 0.5-foot by 1-foot floor drain in the area of the building used for washing ground equipment. The wash area is approximately 15 feet long by 10 feet wide and is bordered by two walls along its length. The floor within the wash area slopes towards the drain in its center. There is also a vent in the floor for the below-ground conduits, which connect the floor drains to the OWS. The building floor is paved with concrete and the trenches and conduits are reportedly constructed with concrete. The OWS is approximately 8 feet long by 4 feet wide and is divided into two compartments, which can be accessed by a lid-covered manhole. One compartment holds the hydrocarbon-contaminated water, and the other holds the skimmed oil (A. T. Kearney, 1989). The separated water is discharged to the Sanitary Sewer System (Law, 1995).



Pumping and steam cleaning of the OWS at Building 1414 was completed June 7, 1995 (CRA, 1995). The OWS was also included in a pumping and steam cleaning effort by D.D. and Beauty, a nonhazardous liquid waste removal company, during April and May 1993 (CB, 1994). Base personnel have not reported any problems associated with the OWS and visual observations did not indicate any apparent problems associated with the integrity of the separator unit (Law, 1995).

### **11.2 Site Characterization Activities**

A summary of the soil and groundwater samples that have been collected at the Building 1414 site is provided in Table 11-1. The analytical methods associated with each soil sample collected at Building 1414 are also presented in Table 11-1. The locations of the soil borings are shown in Figure 11-1. The following sections discuss the investigation activities that have been performed to characterize environmental impacts relating to the OWS at Building 1414

#### **11.2.1 Initial Site Investigation – Law 1994**

Law (1995) collected samples from three soil borings near the perimeter of the OWS at Building 1414 in 1994 (Figure 11-1). Soil borings 1414-SB01 through 1414-SB03 were advanced to a depth of approximately 9 feet bgs. Surface and subsurface soil samples were collected at 1 to 3, 3 to 5, and 7 to 9 feet bgs intervals. Samples were analyzed for inorganics (EPA Method SW6010/3050) and VOCs (SW8240/5030) (Law, 1995). A summary of all soil sampling and analysis performed at the OWS at Building 1414 is provided in Table 11-1.

#### **11.2.2 Phase 1 RFI Activities – IT Corporation 1997**

IT collected soil samples during the Phase 1 Sanitary Sewer System RFI in 1997 (Table 11-1) from borings SB141401 and SB141402 located adjacent to the northeast and southwest corners of the OWS (Figure 11-1). Surface soil samples were collected from surface to 2 feet in depth at borings SB141401 and SB141402. Two subsurface soil samples were collected from the 2-foot interval directly above the water table (18 to 20 feet). Soil samples were analyzed for SVOCs (EPA Method SW8270) and pesticides/PCBs (EPA Method SW8080) to supplement soil data collected during the Law (1995) investigation (IT, 1998).

**Table 11-1**  
**Summary of Previous Environmental Samples**  
**Collected at Building 1414**  
**NAS Fort Worth JRB, Texas**

Sample Location	Sample Date	Sample Number	Start Depth (ft bgs)	End Depth (ft bgs)	Sample Analysis	Analytical Method
<b>Law Engineering - Initial Site Investigation (1994)</b>						
1414-SB01	4/24/94	DP1701SBA	1	3	Inorganics, VOCs	EPA SW6010, SW8240
		DP1701SBD	7	9	Inorganics, VOCs	EPA SW6010, SW8240
1414-SB02	4/24/94	DP1702SBB	3	5	Inorganics, VOCs	EPA SW6010, SW8240
		DP1702SBD	7	9	Inorganics, VOCs	EPA SW6010, SW8240
1414-SB03	4/24/94	DP1703SBA	1	3	Inorganics, VOCs	EPA SW6010, SW8240
		DP1703SBD	7	9	Inorganics, VOCs	EPA SW6010, SW8240
<b>IT Corporation - Phase 1 RFI (1997)</b>						
SB141401	3/17/97	MS1405	0	2	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
		MS1406	18	20	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
		MS1407	2	4	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
SB141402	3/17/97	MS1408	0	2	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
		MS1409	18	20	Pesticides/PCBs, SVOCs	EPA SW8080, SW8270
WITCTA016	4/29/97	MS1567	GW	GW	Inorganics, VOCs, SVOCs	EPA SW6010, SW8260, SW8270
<b>IT Corporation - Phase 2 RFI (2000)</b>						
SB141403	4/24/00	BG0025	17	19	As	EPA SW6010B
		BG0026	17	19	As	EPA SW6010B
SB141404	4/24/00	BG0027	0	2	As, Cd, Pb	EPA SW6010B
		BG0028	18	20	Cd, Pb	EPA SW6010B
<b>IT Corporation - Phase 3 RFI (2000)</b>						
SB141405	12/1/00	BG0083	10	12	As, Cd, Cu	EPA SW6010B
		BG0150	5	7	As, Cd, Cu	EPA SW6010B
SB141406	12/1/00	BG0084	10	12	As, Cd, Cu	EPA SW6010B
		BG0151	1	3	Cd, Pb	EPA SW6010B
		BG0152	5	7	As, Cd, Cu	EPA SW6010B
SB141407	12/1/00	BG0085	0	2	As, Cd, Pb	EPA SW6010B
		BG0153	5	7	Cd	EPA SW6010B
		BG0154	10	12	Cd	EPA SW6010B

VOCs - Volatile Organic Compounds  
 SVOCs - Semivolatile Organic Compounds  
 PCBs - Polychlorinated Biphenyls

As - Arsenic  
 Cd - Cadmium  
 Cu - Copper  
 Pb - Lead

IT installed monitoring well WITCTA016 and collected a groundwater sample during the Phase 1 RFI in March 1997 adjacent to the OWS to supplement data collected during the Law (1995) investigation (Figure 11-1). Sample MS1567 was analyzed for SVOCs, VOCs, and inorganics (IT, 1998)

### **11.2.3 Phase 2 RFI Activities – IT Corporation 2000**

Additional soil sampling was performed by IT during the Phase 2 RFI in April 2000 (Table 11-1). Soil borings were located east (SB141403) and southwest (SB141404) of the OWS at Building 1414 (Figure 11-1). Samples BG0025 and BG0026 (FD) were collected from 17 to 19 feet in depth at SB141403 and analyzed for arsenic to delineate concentrations detected in Law boring DP1701, DP1702, and DP1703. Samples BG0027 and BG0028 were collected from SB141404 from surface to 2 feet in depth and 18 to 20 feet in depth, respectively. These samples were analyzed for arsenic, cadmium, and lead to delineate concentrations of these inorganics detected in DP1701, DP1702, and DP1703.

### **11.2.4 Phase 3 RFI Activities – IT Corporation 2000**

Additional sampling was performed during the Phase 3 RFI in November 2000 (Table 11-1) to delineate arsenic, cadmium, copper, and lead concentrations in surface and subsurface soil. Additionally, confirmation soil samples were collected to confirm/replicate arsenic, cadmium, copper, and/or lead concentrations that exceeded background and/or MSCs during the Law (1995) investigation. Soil samples were collected from borings SB141405, SB141406, and SB141407 (Figure 11-1) so that the intervals of 5 feet above and below the previous sample depths with elevated concentrations were characterized. Samples were collected from 5 to 7 feet and 10 to 12 feet bgs at SB141405 and analyzed for arsenic, cadmium, and copper. Samples were collected from 1 to 3, 5 to 7, and 10 to 12 feet bgs at SB141406. The surface sample was analyzed for cadmium and lead, and the subsurface samples were analyzed for arsenic, cadmium, and copper. Samples were collected from surface to 2 feet, 5 to 7 feet, and 10 to 12 feet bgs at SB141407. The surface soil sample was analyzed for arsenic, cadmium, and lead, and the subsurface soil samples were analyzed for cadmium.

## **11.3 Site-Specific Conditions**

The following subsections discuss the site-specific geology and hydrogeology characteristics that were encountered during the investigation activities at Building 1414 site.

**Geology.** Quaternary alluvium is found at the surface through most of the NAS Fort Worth area. The alluvium consists of floodplain and fluvial terrace deposits of gravel, sand, silt, and clay that occur as a veneer on the eroded surface of Upper Cretaceous strata. Soil boring logs for SB141401 and SB141402 (Appendix A) indicated dark brown clay grading to yellowish-brown in color from surface to 13 feet bgs. Yellowish-brown silty fine sand was found below the clay and graded into medium- to coarse-grained gravelly sand. No odors were observed in the soil samples. Groundwater was encountered in the soil borings at approximately 20 feet bgs.

The alluvial soils rest unconformably on the top of the weathered Walnut Formation. Underlying the Quaternary alluvium is the Cretaceous-aged Walnut Formation, which consists of 20 to 30 feet of indurated fossiliferous limestone interbedded with brown sandy clay, thinly bedded fossiliferous clay, and fissile shale. Unconformably underlying the Walnut Formation is the Cretaceous-aged Paluxy Formation. The Paluxy Formation generally consists of coarse-grained sand that grades upward into fine-grained sand with variable amounts of shale and limestone. The sandstone, composed of fine- to coarse-grained white quartz, is well-sorted, poorly consolidated, and cross-bedded. The Paluxy Formation thickness ranges from 140 to 190 feet, averaging 160 feet in Tarrant County (Radian, 1991).

**Hydrogeology.** Shallow groundwater within the Quaternary alluvium occurs in fluvial terrace deposits of sand and gravel, which occur as a veneer on the eroded surface of the Walnut Formation. Soil borings (Appendix A) encountered saturated conditions below the 18-foot depth. Monitoring well WITCTA016 was installed adjacent to Building 1414 with the well screen placed from 13 feet bgs to the top of the Walnut Formation, encountered at 28 feet in depth. Monitoring wells adjacent to Building 1414 indicate that the groundwater flow direction is east toward the Trinity River.

#### **11.4 Results from Initial Site Investigation**

Law collected soil samples in 1994 from three borings (1414-SB01 through 1414-SB03) adjacent to the OWS at Building 1414 (Figure 11-1). Table 11-2 contains a summary of the analytes detected in the samples collected by Law (1995) and compares the detected concentrations to basewide background concentrations and MSCs. Detected analyte concentrations, which exceeded background concentrations, are shown on Figure 11-1. The following sections present the results from surface and subsurface soil samples that were collected by Law (1995) during the initial site investigation at the Building 1414 site.

Table 11-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 DWS Building 1414 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17	TNRC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
<b>Building 1414 - Surface Soil - Location 1414-SB01</b>												
1414-SB01	DP1701SBA	4/24/94	1	3	ACETONE	0.012	0.012		0.011	No	1000	Yes
1414-SB01	DP1701SBA	4/24/94	1	3	METHYLENE CHLORIDE	0.012	0.019			No	0.5	Yes
1414-SB01	DP1701SBA	4/24/94	1	3	ALUMINUM		7700		22035	Yes	10000	NA
1414-SB01	DP1701SBA	4/24/94	1	3	ARSENIC		8.7		5.85	No	5	NA
1414-SB01	DP1701SBA	4/24/94	1	3	BARIUM		86		233	Yes	200	NA
1414-SB01	DP1701SBA	4/24/94	1	3	BERYLLIUM		0.73		1.02	Yes	0.4	NA
1414-SB01	DP1701SBA	4/24/94	1	3	CADMIUM		2.2		0.556	No	0.5	NA
1414-SB01	DP1701SBA	4/24/94	1	3	CALCIUM		12000	JH	167788	Yes	Essential Nutrient	NA
1414-SB01	DP1701SBA	4/24/94	1	3	CHROMIUM, TOTAL		8.6		25.86	Yes	10	NA
1414-SB01	DP1701SBA	4/24/94	1	3	COBALT		16.0		11.05	No	610	Yes
1414-SB01	DP1701SBA	4/24/94	1	3	COPPER		7.9		17.37	Yes	130	NA
1414-SB01	DP1701SBA	4/24/94	1	3	IRON		16000	JH	17717	Yes	Essential Nutrient	NA
1414-SB01	DP1701SBA	4/24/94	1	3	LEAD		51.0		30.97	No	1.5	NA
1414-SB01	DP1701SBA	4/24/94	1	3	MAGNESIUM		1200		3003	Yes	Essential Nutrient	NA
1414-SB01	DP1701SBA	4/24/94	1	3	MANGANESE		480		849	Yes	1400	NA
1414-SB01	DP1701SBA	4/24/94	1	3	NICKEL		16.0		14.6	No	200	Yes
1414-SB01	DP1701SBA	4/24/94	1	3	POTASSIUM		820		2985	Yes	Essential Nutrient	NA
1414-SB01	DP1701SBA	4/24/94	1	3	SODIUM		270		37300	Yes	Essential Nutrient	NA
1414-SB01	DP1701SBA	4/24/94	1	3	VANADIUM		25.0		46.3	Yes	72	NA
1414-SB01	DP1701SBA	4/24/94	1	3	ZINC		13	JH	38.8	Yes	3100	NA
<b>Building 1414 - Subsurface Soil - Location 1414-SB01</b>												
1414-SB01	DP1701SBD	4/24/94	7	9	ACETONE	0.012	0.012		0.011	No	1000	Yes
1414-SB01	DP1701SBD	4/24/94	7	9	METHYLENE CHLORIDE	0.021	0.021			No	0.5	Yes
1414-SB01	DP1701SBD	4/24/94	7	9	ALUMINUM		9900		20260	Yes	10000	NA
1414-SB01	DP1701SBD	4/24/94	7	9	ARSENIC	3.3	3.3		6.58	Yes	5	NA
1414-SB01	DP1701SBD	4/24/94	7	9	BARIUM		150		128.1	No	200	Yes
1414-SB01	DP1701SBD	4/24/94	7	9	BERYLLIUM		0.39		1.13	Yes	0.4	NA
1414-SB01	DP1701SBD	4/24/94	7	9	CADMIUM		1.3		0.59	No	0.5	NA
1414-SB01	DP1701SBD	4/24/94	7	9	CALCIUM		46000	JH	272000	Yes	Essential Nutrient	NA
1414-SB01	DP1701SBD	4/24/94	7	9	CHROMIUM, TOTAL		9.4		16.31	Yes	10	NA
1414-SB01	DP1701SBD	4/24/94	7	9	COBALT		4.8		6.19	Yes	610	NA
1414-SB01	DP1701SBD	4/24/94	7	9	COPPER		8.0		13.72	Yes	130	NA
1414-SB01	DP1701SBD	4/24/94	7	9	IRON		9400	JH	17469	Yes	Essential Nutrient	NA
1414-SB01	DP1701SBD	4/24/94	7	9	LEAD		11.0		12.66	Yes	1.5	NA
1414-SB01	DP1701SBD	4/24/94	7	9	MAGNESIUM		2000		2420	Yes	Essential Nutrient	NA
1414-SB01	DP1701SBD	4/24/94	7	9	MANGANESE		190		351.7	Yes	1400	NA
1414-SB01	DP1701SBD	4/24/94	7	9	NICKEL		11.0		19.76	Yes	200	NA

Table 11-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1414 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
<b>Building 1414 - Subsurface Soil - Location 1414-SB02</b>												
1414-SB01	DP1701SBD	4/24/94	7	9	POTASSIUM		1100		1717	Yes	Essential Nutrient	NA
1414-SB01	DP1701SBD	4/24/94	7	9	SODIUM		490		53200	Yes	Essential Nutrient	NA
1414-SB01	DP1701SBD	4/24/94	7	9	VANADIUM		16.0	JH	37.4	Yes	72	NA
1414-SB01	DP1701SBD	4/24/94	7	9	ZINC		16	JH	31.3	Yes	3100	NA
1414-SB02	DP1702SBB	4/24/94	3	5	ACETONE		0.066		0.011	No	1000	Yes
1414-SB02	DP1702SBB	4/24/94	3	5	METHYLENE CHLORIDE		0.018		0.018	No	0.5	Yes
1414-SB02	DP1702SBB	4/24/94	3	5	ALUMINIUM	3.5	11000		20260	Yes	10000	NA
1414-SB02	DP1702SBB	4/24/94	3	5	ARSENIC		3.5		6.58	Yes	5	NA
1414-SB02	DP1702SBB	4/24/94	3	5	BARIUM		67		128.1	Yes	200	NA
1414-SB02	DP1702SBB	4/24/94	3	5	BERYLLIUM		0.75		1.13	Yes	0.4	NA
1414-SB02	DP1702SBB	4/24/94	3	5	CADMIUM		1.2		0.59	No	0.5	No
1414-SB02	DP1702SBB	4/24/94	3	5	CALCIUM		4600	JH	272000	Yes	Essential Nutrient	NA
1414-SB02	DP1702SBB	4/24/94	3	5	CHROMIUM, TOTAL		10.0		16.31	Yes	10	NA
1414-SB02	DP1702SBB	4/24/94	3	5	COBALT		6.1		6.19	Yes	610	NA
1414-SB02	DP1702SBB	4/24/94	3	5	COPPER		5.2		13.72	Yes	130	NA
1414-SB02	DP1702SBB	4/24/94	3	5	IRON		11000	JH	17469	Yes	Essential Nutrient	NA
1414-SB02	DP1702SBB	4/24/94	3	5	LEAD		13.0		12.66	No	1.5	No
1414-SB02	DP1702SBB	4/24/94	3	5	MAGNESIUM		13000		2420	Yes	Essential Nutrient	NA
1414-SB02	DP1702SBB	4/24/94	3	5	MANGANESE		170		351.7	Yes	1400	NA
1414-SB02	DP1702SBB	4/24/94	3	5	NICKEL		9.6		19.76	Yes	200	NA
1414-SB02	DP1702SBB	4/24/94	3	5	POTASSIUM		740		1717	Yes	Essential Nutrient	NA
1414-SB02	DP1702SBB	4/24/94	3	5	SODIUM		480		53200	Yes	Essential Nutrient	NA
1414-SB02	DP1702SBB	4/24/94	3	5	VANADIUM		16.0		37.4	Yes	72	NA
1414-SB02	DP1702SBB	4/24/94	3	5	ZINC		12	JH	31.3	Yes	3100	NA
1414-SB02	DP1702SBD	4/24/94	7	9	ACETONE	0.011	0.011		0.011	No	1000	Yes
1414-SB02	DP1702SBD	4/24/94	7	9	METHYLENE CHLORIDE		0.02		0.011	No	0.5	Yes
1414-SB02	DP1702SBD	4/24/94	7	9	ALUMINIUM		5600		20260	Yes	10000	NA
1414-SB02	DP1702SBD	4/24/94	7	9	ARSENIC		11.0		6.58	No	5	No
1414-SB02	DP1702SBD	4/24/94	7	9	BARIUM		34		128.1	Yes	200	NA
1414-SB02	DP1702SBD	4/24/94	7	9	BERYLLIUM	16	1.6		1.13	No	0.4	No
1414-SB02	DP1702SBD	4/24/94	7	9	CADMIUM		1.2		0.59	No	0.5	No
1414-SB02	DP1702SBD	4/24/94	7	9	CALCIUM		220000	JH	272000	Yes	Essential Nutrient	NA
1414-SB02	DP1702SBD	4/24/94	7	9	CHROMIUM, TOTAL		6.5		16.31	Yes	10	NA
1414-SB02	DP1702SBD	4/24/94	7	9	COBALT		2.8		6.19	Yes	610	NA
1414-SB02	DP1702SBD	4/24/94	7	9	COPPER		17.0		13.72	No	130	Yes
1414-SB02	OP1702SBD	4/24/94	7	9	IRON		6800	JH	17469	Yes	Essential Nutrient	NA

Table 11-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1414 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
1414-SB02	DP1702SBD	4/24/94	7	9	LEAD	6.6	6.6		12.66	Yes	1.5	NA
1414-SB02	DP1702SBD	4/24/94	7	9	MAGNESIUM	270	270		2420	Yes	Essential Nutrient	NA
1414-SB02	DP1702SBD	4/24/94	7	9	MANGANESE	23	23		351.7	Yes	1400	NA
1414-SB02	DP1702SBD	4/24/94	7	9	NICKEL	7.4	7.4		19.76	Yes	200	NA
1414-SB02	DP1702SBD	4/24/94	7	9	POTASSIUM	910	910		1717	Yes	Essential Nutrient	NA
1414-SB02	DP1702SBD	4/24/94	7	9	SODIUM	320	320		53200	Yes	Essential Nutrient	NA
1414-SB02	DP1702SBD	4/24/94	7	9	VANADIUM	13.0	13.0		37.4	Yes	72	NA
1414-SB02	DP1702SBD	4/24/94	7	9	ZINC	12	12	JH	31.3	Yes	3100	NA
<b>Building 1414 - Surface Soil - Location 1414-SB03</b>												
1414-SB03	DP1703SBA	4/24/94	1	3	ACETONE	0.038	0.038		0.011	No	1000	Yes
1414-SB03	DP1703SBA	4/24/94	1	3	METHYLENE CHLORIDE	0.022	0.022			No	0.5	Yes
1414-SB03	DP1703SBA	4/24/94	1	3	ALUMINIUM	6800	6800		22035	Yes	10000	NA
1414-SB03	DP1703SBA	4/24/94	1	3	ARSENIC	4.1	4.1		5.85	Yes	5	NA
1414-SB03	DP1703SBA	4/24/94	1	3	BARIUM	88	88		233	Yes	200	NA
1414-SB03	DP1703SBA	4/24/94	1	3	BERYLLIUM	0.7	0.7		1.02	Yes	0.4	NA
1414-SB03	DP1703SBA	4/24/94	1	3	CADMIUM	1.4	1.4		0.556	No	0.5	NA
1414-SB03	DP1703SBA	4/24/94	1	3	CALCIUM	5200	5200	JH	167788	Yes	Essential Nutrient	NA
1414-SB03	DP1703SBA	4/24/94	1	3	CHROMIUM, TOTAL	8.1	8.1		25.86	Yes	10	NA
1414-SB03	DP1703SBA	4/24/94	1	3	COBALT	7.7	7.7		11.05	Yes	610	NA
1414-SB03	DP1703SBA	4/24/94	1	3	COPPER	9.9	9.9		17.37	Yes	130	NA
1414-SB03	DP1703SBA	4/24/94	1	3	IRON	8100	8100	JH	17717	Yes	Essential Nutrient	NA
1414-SB03	DP1703SBA	4/24/94	1	3	LEAD	11.0	11.0		30.97	Yes	1.5	NA
1414-SB03	DP1703SBA	4/24/94	1	3	MAGNESIUM	1100	1100		3003	Yes	Essential Nutrient	NA
1414-SB03	DP1703SBA	4/24/94	1	3	MANGANESE	110	110		849	Yes	1400	NA
1414-SB03	DP1703SBA	4/24/94	1	3	NICKEL	10.0	10.0		14.6	Yes	200	NA
1414-SB03	DP1703SBA	4/24/94	1	3	POTASSIUM	700	700		2895	Yes	Essential Nutrient	NA
1414-SB03	DP1703SBA	4/24/94	1	3	SODIUM	200	200		37300	Yes	Essential Nutrient	NA
1414-SB03	DP1703SBA	4/24/94	1	3	VANADIUM	17.0	17.0		46.3	Yes	72	NA
1414-SB03	DP1703SBA	4/24/94	1	3	ZINC	13	13	JH	38.8	Yes	3100	NA
<b>Building 1414 - Subsurface Soil - Location 1414-SB03</b>												
1414-SB03	DP1703SBD	4/24/94	7	9	ACETONE	0.011	0.011		0.011	No	1000	Yes
1414-SB03	DP1703SBD	4/24/94	7	9	METHYLENE CHLORIDE	0.018	0.018			No	0.5	Yes
1414-SB03	DP1703SBD	4/24/94	7	9	ALUMINIUM	12000	12000		20260	Yes	10000	NA
1414-SB03	DP1703SBD	4/24/94	7	9	ARSENIC	9.7	9.7		6.58	No	5	NA
1414-SB03	DP1703SBD	4/24/94	7	9	BARIUM	38	38		128.1	Yes	200	NA
1414-SB03	DP1703SBD	4/24/94	7	9	BERYLLIUM	1.7	1.7		1.13	No	0.4	NA
1414-SB03	DP1703SBD	4/24/94	7	9	CADMIUM	1.6	1.6		0.59	No	0.5	NA
1414-SB03	DP1703SBD	4/24/94	7	9	CALCIUM	200000	200000	JH	272000	Yes	Essential Nutrient	NA

Table 11-2

Summary of 1994 Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1414 - Law Environmental (1995)  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 1?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 2?
1414-SB03	DP1703SBD	4/24/94	7	9	CHROMIUM, TOTAL		9.5		16.31	Yes	10	NA
1414-SB03	DP1703SBD	4/24/94	7	9	COBALT		6.1		6.19	Yes	610	NA
1414-SB03	DP1703SBD	4/24/94	7	9	COPPER		18.0		13.72	No	130	Yes
1414-SB03	DP1703SBD	4/24/94	7	9	IRON		12000	JH	17469	Yes	Essential Nutrient	NA
1414-SB03	DP1703SBD	4/24/94	7	9	LEAD		8.0		12.66	Yes	1.5	NA
1414-SB03	DP1703SBD	4/24/94	7	9	MAGNESIUM		3100		2420	No	Essential Nutrient	Yes
1414-SB03	DP1703SBD	4/24/94	7	9	MANGANESE		500		351.7	No	1400	Yes
1414-SB03	DP1703SBD	4/24/94	7	9	NICKEL		11.0		19.76	Yes	200	NA
1414-SB03	DP1703SBD	4/24/94	7	9	POTASSIUM		1400		1717	Yes	Essential Nutrient	NA
1414-SB03	DP1703SBD	4/24/94	7	9	SODIUM		480		53200	Yes	Essential Nutrient	NA
1414-SB03	DP1703SBD	4/24/94	7	9	VANADIUM		22.0		37.4	Yes	72	NA
1414-SB03	DP1703SBD	4/24/94	7	9	ZINC		19	JH	31.3	Yes	3100	NA

MSC = Media-Specific Concentration

NA = not applicable

MQL = Method Quantitation Limit

RRS 1 = Risk Reduction Standard 1

RRS 2 = Risk Reduction Standard 2

TNRCC = Texas Natural Resources Conservation Commission

UTL = Upper Tolerance Limit

Footnotes

<sup>1</sup>UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte

<sup>2</sup>TNRCC, 1999, "Updated Examples of Standard No. 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Qualifier Definitions

= The analyte was positively identified

J = For inorganics, the associated value is an estimated quantity. For organics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample

JB = Estimated quantitation - possible biased high based upon blank contamination

JH = Estimated quantitation - possible biased high based upon QC data

#### **11.4.1 Surface Soil**

Law (1995) collected surface soil samples from soil borings 1414-SB01 and 1414-SB03 below the impervious layer of concrete at the site (Figure 11-1). The surface soil samples were submitted for analysis of VOCs and inorganics. The results from these surface soil samples are discussed in the following subsections.

**VOCs.** Two VOCs, methylene chloride and acetone, were detected in the surface soil samples from 1414-SB01 and 1414-SB03 slightly above the method detection limit as shown in Table 11-2. Both methylene chloride and acetone exceeded their respective MQLs; however, they were well below their MSCs. Methylene chloride and acetone are considered common laboratory contaminants and their detections were likely a result of laboratory contamination.

**Inorganics.** Inorganic constituents detected in the surface soil sample from 1414-SB01 included aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc (Table 11-2). The results for arsenic, cadmium, cobalt, lead, and nickel exceeded their respective background concentrations. Arsenic, cadmium, and lead concentrations also exceeded their respective MSCs. The detected concentrations of cobalt and nickel were only slightly above their background concentrations and were likely extreme, but true, background concentrations.

Inorganic constituents detected in the surface soil sample from 1414-SB03 were the same as detected in sample 1414-SB01. However, only the detected concentration of cadmium exceeded its background MSC.

#### **11.4.2 Subsurface Soil**

Law (1995) collected a subsurface soil sample from 3 to 5 feet bgs with direct-push technology (DPT) at location 1414-SB02 (Figure 11-1). Additionally, subsurface soil samples were collected from 7 to 9 feet bgs from DPT borings 1414-SB01, 1414-SB02, and 1414-SB03. Samples were submitted for analysis of VOCs and inorganics. The following subsections discuss the analytical results from the subsurface soil samples collected by Law (1995).

**VOCs.** Methylene chloride and acetone were detected above the MQLs in subsurface soil samples collected during the initial site investigation. Methylene chloride and acetone are considered common laboratory contaminants and their concentrations were likely a result of

laboratory contamination. Both VOCs were detected at concentrations well below the established MSCs of 0.5 and 1,020 mg/kg, respectively.

**Inorganics.** In the subsurface soil sample from 7 to 9 feet bgs at 1414-SB01, the following inorganics were detected: aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc (Table 11-2). Of these, only barium and cadmium exceeded basewide background concentrations. The detected cadmium concentration (13 mg/kg) exceeded both its background concentration and its MSC. Barium was detected at a concentration (150 mg/kg) slightly above background, but below the MSC for barium (200 mg/kg). Considering that barium was detected above background in this sample only, the detected barium concentration at 1414-SB01 was likely an extreme but true background concentration.

Eighteen inorganics were also detected in the sample from 3 to 5 feet bgs at 1414-SB02. Of the 18 inorganic constituents detected, only cadmium and lead exceed their background UTL limit. The cadmium and lead concentrations detected from 3 to 5 feet bgs at 1414-SB02 also exceeded MSCs. Eighteen inorganics were also detected in the sample from 7 to 9 feet bgs at 1414-SB02. Arsenic, cadmium, and copper were the only inorganics detected above background in the sample from 7 to 9 feet bgs at 1414-SB02. Arsenic and cadmium concentrations also exceeded MSCs.

In the sample collected from 7 to 9 feet bgs at 1414-SB03, the same 18 inorganic constituents were detected as in the previous samples. The results for arsenic, cadmium, copper, magnesium, and manganese exceed their background concentrations. The results for arsenic and cadmium also exceeded MSCs. Magnesium is considered an essential nutrient and the detected concentrations at 1414-SB03 were likely a natural variation in background levels. The detected manganese concentration (500 mg/kg) was only slightly above background and was below the MSC. Considering that manganese concentrations were below background in all other soil samples at the site, it appears that the manganese concentration detected at 1414-SB03 was likely an extreme but true background concentration.

### **11.5 Results from Phase 1 RFI Activities**

The following sections presents the analytical results from surface soil samples that were collected by IT (1997) during the Phase 1 Sanitary Sewer System RFI at Building 1414. A discussion of the groundwater analytical results collected from the monitoring well installed

during the investigation is also included. The purpose of the Phase I RFI soil samples was to supplement the analytical data for VOCs and inorganics that was collected by Law (1995) during the initial site investigation.

Table 11-3 contains a summary of the analytes detected in the Phase I RFI soil samples collected by IT and Table 11-4 contains a summary of the analytes detected in the Phase I RFI groundwater samples. Analytical detection summary tables for the soil and groundwater samples collected at Building 1414 are shown in Tables B-14 and B-15, respectively.

#### **11.5.1 Surface Soil**

Surface soil samples were collected by IT from soil borings SB141401 and SB141402, respectively, and submitted for analysis of SVOCs and pesticides/PCBs to supplement the Law data for VOCs and inorganics. The following subsections discuss the analytical results of the surface soil samples collected by IT during the Phase I RFI.

**SVOCs.** No SVOCs were detected above MQLs in surface soil samples from SB141401 or SB141402. All SVOC detections in the surface soil sample from SB141402 were TICs that were qualified as estimated concentrations below the PQLs (Table B-14). These TICs included unidentified hydrocarbons. Although no detection limits were established for these compounds in the laboratory analysis, the values are below the PQL range (0.660 mg/kg to 3.30 mg/kg) for SVOCs described in SW846 Method 8270 (EPA, 1997). The source of these compounds is most likely from incidental spills from the separator and floor wash down during maintenance activities at Building 1414. Because the detected concentrations are below the PQLs for the method used, all SVOC concentrations are below the background concentration for organics, as defined by the TNRCC RRP.

**Pesticides/PCBs.** No pesticides or PCBs were detected above MQLs in the surface soils sampled during the Phase I RFI activities.

Table 11-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1414 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17?	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27?
<b>Phase 1 - Subsurface Soil - Location SB141401</b>													
SB141401	MS1407	17-Mar-97	2	4	Acetone	0.025	0.0067	J		0.021	Yes	1000	NA
SB141401	MS1407	17-Mar-97	2	4	Toluene	0.0061	0.011			0.0053	No	100	Yes
SB141401	MS1407	17-Mar-97	2	4	Diesel	4.9	2	qrBJ		4.2	Yes	6130	NA
SB141401	MS1407	17-Mar-97	2	4	Gasoline	1.2	0.38	qBJ		1.1	Yes	613	NA
SB141401	MS1407	17-Mar-97	2	4	Arsenic	1.2	4	J		6.58	Yes	5	NA
SB141401	MS1407	17-Mar-97	2	4	Barium	1.2	80.7			128.1	Yes	200	NA
SB141401	MS1407	17-Mar-97	2	4	Chromium	1.2	12.3			16.31	Yes	10	NA
SB141401	MS1407	17-Mar-97	2	4	Lead	0.37	10.8	J		12.66	Yes	1.5	NA
SB141401	MS1407	17-Mar-97	2	4	Mercury	0.041	0.028	J		0.035	Yes	0.2	NA
SB141401	MS1407	17-Mar-97	2	4	Selenium	0.61	0.63			0.313	No	5	Yes
<b>Phase 1 - Location SB141402 - No Detections</b>													
<b>Phase 2 - Subsurface Soil - Location SB141403</b>													
SB141403	BG0025	24-Apr-00	17	19	Arsenic	1.1	5.46			6.58	Yes	5	NA
SB141403	BG0026	24-Apr-00	17	19	Arsenic	1.1	7.62		nv	6.58	No	5	No
<b>Phase 2 - Surface Soil - Location SB141404</b>													
SB141404	BG0027	24-Apr-00	0	2	Arsenic	1.2	5.73		nv	5.85	Yes	5	NA
SB141404	BG0027	24-Apr-00	0	2	Cadmium	0.12	0.0772	F		0.556	Yes	0.5	NA
SB141404	BG0027	24-Apr-00	0	2	Lead	1.2	12.8		nv	30.97	Yes	1.5	NA
<b>Phase 2 - Subsurface Soil - Location SB141404</b>													
SB141404	BG0028	24-Apr-00	18	20	Cadmium	0.11	0.169		nv	0.59	Yes	0.5	NA
SB141404	BG0028	24-Apr-00	18	20	Lead	1.1	9.13		nv	12.66	Yes	1.5	NA
<b>Phase 3 - Subsurface Soil - Location SB141405</b>													
SB141405	BG0150	1-Dec-00	5	7	Arsenic	1.1	3.14		nv	6.58	Yes	5	NA
SB141405	BG0150	1-Dec-00	5	7	Cadmium	0.11	0.139		nv	0.59	Yes	0.5	NA
SB141405	BG0150	1-Dec-00	5	7	Copper	2.3	6.54		nv	13.72	Yes	130	NA
SB141405	BG0083	1-Dec-00	10	12	Arsenic	1.1	3.31		nv	6.58	Yes	5	NA
SB141405	BG0083	1-Dec-00	10	12	Cadmium	0.11	0.088	F		0.59	Yes	0.5	NA
SB141405	BG0083	1-Dec-00	10	12	Copper	2.3	6.68		nv	13.72	Yes	130	NA
<b>Phase 3 - Surface Soil - Location SB141406</b>													
SB141406	BG0151	1-Dec-00	1	3	Cadmium	0.12	0.0732	F		0.556	Yes	0.5	NA
SB141406	BG0151	1-Dec-00	1	3	Lead	1.2	9.46		nv	30.97	Yes	1.5	NA

Table 11-3

Summary of RFI Soil Analytical Detections Compared to Background and MSCs  
 OWS Building 1414 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/kg)	Result (mg/kg)	Laboratory Qualifier	Validation Qualifier	Background UTL or MQL <sup>1</sup> (mg/kg)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/kg)	Does Result Support Closure Under RRS 27
<b>Phase 3 - Subsurface Soil - Location SB141406</b>													
SB141406	BG0152	1-Dec-00	5	7	Arsenic	1.2	4.44		NV	6.58	Yes	5	NA
SB141406	BG0152	1-Dec-00	5	7	Cadmium	0.12	0.0722	F	NV	0.59	Yes	0.5	NA
SB141406	BG0152	1-Dec-00	5	7	Copper	2.3	7.35		NV	13.72	Yes	130	NA
SB141406	BG0084	1-Dec-00	10	12	Arsenic	1.1	4.93		NV	6.58	Yes	5	NA
SB141406	BG0084	1-Dec-00	10	12	Cadmium	0.11	0.0622	F	NV	0.59	Yes	0.5	NA
SB141406	BG0084	1-Dec-00	10	12	Copper	2.2	6.55		NV	13.72	Yes	130	NA
<b>Phase 3 - Surface Soil - Location SB141407</b>													
SB141407	BG0085	1-Dec-00	0	2	Arsenic	1.3	4.85		NV	5.85	Yes	5	NA
SB141407	BG0085	1-Dec-00	0	2	Cadmium	0.13	0.0698	F	NV	0.566	Yes	0.5	NA
SB141407	BG0085	1-Dec-00	0	2	Lead	1.3	9.81		NV	30.97	Yes	1.5	NA
<b>Phase 3 - Subsurface Soil - Location SB141407</b>													
SB141407	BG0153	1-Dec-00	5	7	Cadmium	0.12	0.155		NV	0.59	Yes	0.5	NA
SB141407	BG0154	1-Dec-00	10	12	Cadmium	0.11	0.0976	F	NV	0.59	Yes	0.5	NA

MSC = Media-Specific Concentration  
 NA = not applicable  
 MQL = Method Quantitation Limit  
 RRS 1 = Risk Reduction Standard 1  
 RRS 2 = Risk Reduction Standard 2  
 TNRCC = Texas Natural Resources Conservation Commission  
 UTL = Upper Tolerance Limit  
 Footnotes

<sup>1</sup> UTLs for inorganics derived from Final Draft Basewide Background Study, Jacobs Engineering, 1998. MQLs for organics were derived by taking the most conservative reporting limit for a given analyte

<sup>2</sup> TNRCC, 1999, "Updated Examples of Standard No 2, Appendix II Media-Specific Concentrations (MSCs) - Industrial Setting", July 14

Qualifier Definitions

= The analyte was positively identified

U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL

F = The analyte was positively identified but the associated numerical value is below the reporting limit

J = For inorganics, the associated value is an estimated quantity. For organics, the analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the

B.J = Estimated quantitation - possible biased high based upon blank contamination

NV = not validated



### **11.5.2 Subsurface Soil**

IT collected subsurface soil samples from 18 to 20 feet bgs (i.e., immediately above the water table) at Phase 1 borings locations SB141401 and SB141402 for analysis of SVOCs and pesticides/PCBs to supplement the data for VOCs and inorganics that were collected during the Law (1995) investigation. Additionally, a sample was collected from 2 to 4 feet bgs at SB141401 for analysis of VOCs, TPH-DRO/GRO (EPA Method 8015M), and inorganics. The following subsections discuss the analytical results of the subsurface soil samples collected by IT during the Phase 1 RFI

**VOCs.** Toluene and acetone were the only VOCs detected in the subsurface soil sample collected from 2 to 4 feet bgs at SB141401. Toluene was detected at a concentration (0.011 mg/Kg) above its MQL (0.0053 mg/kg), but well below the MSC (100 mg/kg). This detected concentration was likely the result of toluene leaching from the sample sleeve, which was made of PET. The detected acetone concentration (0.0067 mg/kg) was below its MQL (0.021 mg/kg), and considering that acetone is a common laboratory contaminant, the result was likely the result of laboratory contamination.

**TPH.** TPH-GRO (0.38 BJ mg/kg) and TPH-DRO (2 BJ mg/kg) were detected in the sample from 2 to 4 feet bgs at SB141401 at estimated concentrations below their respective MQLs. The B-qualifiers indicate that the detected concentrations were likely the result of laboratory contamination.

**SVOCs.** No SVOCs were detected above MQLs in subsurface samples at the Building 1414 site

**Pesticides/PCBs.** No pesticides/PCB compounds were detected in subsurface soil samples at the Building 1414 site.

**Inorganics.** Six inorganics (arsenic, barium, chromium, lead, mercury, and selenium) were detected in the sample from 2 to 4 feet bgs at SB141401. Of these, only selenium (0.63 mg/kg) exceeded its background concentration (0.63 mg/kg). Considering that the selenium concentration is well below the MSC of 5 mg/kg and that selenium was not detected above background in the Law (1995) samples, the selenium detection at SB141401 was likely an extreme, but true, background concentration.

### **11.5.3 Groundwater**

Monitoring well WITCTA016 was installed in March 1997 immediately adjacent to the OWS at Building 1414 (Figure 11-1). A groundwater sample was collected from the well and submitted for analysis of VOCs, SVOCs, and inorganics. The following subsections discuss the analytical results from the groundwater sample collected from WITCTA016 during the Phase I RFI.

**VOCs.** cis-1,2-DCE and TCE were detected at concentrations above their MQLs and MSCs in the groundwater sample from WITCTA016. However, because the extent of the AFP-4 TCE groundwater plume includes the area of Building 1414 and contaminants from this plume are managed under the AFP-4 Superfund Cleanup Program, the detected concentrations of TCE and its breakdown products, such as DCE and vinyl chloride, are not considered as an indication of a release from the OWS at Building 1414.

Methylene chloride was detected at a concentration greater than the MQL but was qualified as a laboratory contaminant and was most likely the result of laboratory contamination. The detected concentration of methylene chloride was well below the established MSC of 0.005 mg/L. No other VOCs were detected above MQLs.

**SVOCs.** One unidentified compound was also detected and tentatively qualified as estimated below the PQL in the SW8270 analysis. Although a detection limit was not established for this compound in the laboratory analysis, the value is below the PQL range (0.01 to 1.0 mg/L) for SVOCs described in SW846 Method 8270 (EPA, 1997). No other SVOCs were detected above MQLs.

**Inorganics.** Iron was detected at a concentration (0.229 mg/L) above its background concentration (0.224 mg/L) in the Phase I groundwater sample from WITCTA016. Iron is considered an essential nutrient and the detected concentration likely represents a slight variation in background. No other inorganics were detected above the basewide background concentrations.

## **11.6 Results from Phase 2 Activities**

IT collected soil samples from two borings (SB1414103 and SB141404) during the Phase 2 RFI activities in April 2000 to confirm and delineate arsenic, cadmium, and/or lead concentrations detected during the Law (1995) investigation. Table 11-3 includes the analytical results for the Phase 2 soil samples. A summary of the RFI SPLP results are shown in Table 11-5. Figure 11-1 shows the locations of the Phase 2 samples. The following sections discuss the results of Phase 2 soil samples.

### **11.6.1 Surface Soil**

A surface soil sample was collected from Phase 2 boring SB141403 to delineate arsenic and lead concentrations identified during the Law (1995) investigation. As shown in Table 11-3 and Figure 11-1, the arsenic and lead concentrations detected in the surface soil sample from SB141403 were below their respective background concentrations.

A surface soil sample was also collected from Phase 2 boring SB141404 to delineate arsenic, cadmium, and lead concentrations identified during the Law (1995) investigation. As shown in Table 11-3 and Figure 11-1, the arsenic, cadmium, and lead concentrations detected in the surface soil sample from SB141404 were all below background.

### **11.6.2 Subsurface Soil**

Subsurface soil samples were collected at depths immediately above the water table at Phase 2 borings SB141403 (17 to 19 feet bgs) and SB141404 (18 to 20 feet bgs). As shown in Table 11-3 and Figure 11-1, the detected concentration of arsenic (5.46 mg/kg) was below background in the subsurface soil sample from SB141403. Similarly, the detected concentrations of cadmium (0.169 mg/kg) and lead (9.13 mg/kg) in the subsurface soil sample from SB141404 were also below background.

## **11.7 Results from Phase 3 RFI Activities**

Based upon the results of the Phase 2 samples and reanalysis of the Law (1995) results, it was determined that additional delineation of inorganics in soil was required at Building 1414. Therefore, soil samples were collected from three additional borings, SB141405 through SB141407 during the Phase 3 RFI in November 2000. Two of the Phase 3 borings, SB141405 and SB141406, were sampled for the purpose of delineating arsenic, cadmium, and copper concentrations in soil to the southwest and southeast of Building 1414

Table 11-5

Summary of RFI SPLP Results Compared to Background and MSCs  
 OWS Building 1414 - IT Corporation  
 NAS Fort Worth JRB, Texas

Location	Sample No.	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Parameter	Reporting Limit (mg/L)	Result (mg/L)	Laboratory Qualifier	Validation Qualifier	Background UTL <sup>1</sup> (mg/L)	Does Result Support Closure Under RRS 17	TNRCC MSC <sup>2</sup> (mg/L)	Does Result Support Closure Under RRS 27
Phase 2 - Location SB141404													
SB141404	BG0027	24-Apr-00	0	2	Arsenic	2	0.0037		nv	0.0049	Yes	0.05	NA
SB141404	BG0027	24-Apr-00	0	2	Cadmium	1	0.00019	F	nv	0.0005	Yes	0.005	NA
SB141404	BG0027	24-Apr-00	0	2	Lead	5	0.00575		nv	0.0016	No	0.015	Yes
SB141404	BG0028	24-Apr-00	18	20	Cadmium	1	0.0002	F	nv	0.0005	Yes	0.005	NA
SB141404	BG0028	24-Apr-00	18	20	Lead	5	0.00531		nv	0.0016	No	0.015	Yes

ft bgs = feet below ground surface

mg/L = milligrams per liter

UTL = upper tolerance limit

TNRCC MSC = Texas Natural Resource Conservation Commission Media Specific Concentrations

NA = not applicable

RRS 1 = Risk Reduction Standard 1, result is less than background

RRS 2 = Risk Reduction Standard 2, result is less than TNRCC MSC

SPLP = Synthetic Precipitation Leaching Procedure

Footnotes:

<sup>1</sup> - UTLs derived from Final Basewide Background Study, Jacobs Engineering, 1998

<sup>2</sup> - TNRCC Risk Reduction Standard media Specific Concentration (MSC) - Industrial Setting

Laboratory Qualifier Definitions:

" " = The analyte was positively identified

"F" = The analyte was positively identified but the associated numerical value is below the reporting limit

"nv" = not validated

The final Phase 3 boring, SB141407, was placed adjacent to former Law (1995) boring 1414-SB01 in an attempt to confirm elevated concentrations of arsenic, cadmium, and lead at this location.

The results from the Phase 3 soil samples at Building 1414 are included in Table 11-3. The Phase 3 analytical results are also shown in Figure 11-1. The following sections discuss the results of the Phase 3 RFI samples

### **11.7.1 Surface Soil**

IT collected surface soil samples from borings SB141406 and SB141407 during the Phase 3 RFI. The surface soil sample from SB141406 was analyzed for cadmium and lead to delineate concentrations of these inorganics at former Law (1995) borings 1414-SB02 and 1414-SB03. The surface soil sample from SB141407 was analyzed for arsenic, cadmium, and lead to confirm the detected concentrations of these inorganics at former Law (1995) boring 1414-SB01. The following subsections discuss the arsenic, cadmium, and copper concentrations detected in surface soil at Building 1414.

**Arsenic.** As shown in Table 11-3 and Figure 11-1, the detected concentration of arsenic (4.85 mg/kg) in the surface soil sample from SB141407 was below background. The arsenic concentration detected by Law at this location was not replicated and no SPLP analysis was performed. Therefore, it appears that the arsenic concentration detected by Law (1995) was an extreme, but true, background concentration.

**Cadmium.** The cadmium concentration detected in the surface soil sample from SB141406 was below the background concentration. Therefore, the cadmium concentrations detected in surface soil at former Law (1995) borings 1414-SB01 and 1414-SB03 have been delineated to the southeast by the results from SB141405.

**Lead.** The lead concentration detected in the surface soil sample from SB141406 was below background. Therefore, the lead concentration detected in surface soil from former Law (1995) boring 1414-SB01 has been delineated to the southeast by the results from SB141406.

### **11.7.2 Subsurface Soil**

The following subsections discuss the analytical results from subsurface soil samples collected during the Phase 3 RFI activities.

**Arsenic.** Arsenic concentrations detected in subsurface soil samples collected from 5 to 7 feet bgs and 10 to 12 feet bgs at borings SB141405 and SB141406 were all below the background concentration for arsenic. Therefore, the elevated arsenic concentrations found in former Law (1995) borings 1414-SB02 and 1414-SB03 have been delineated to the southwest and southeast by the results from SB141405 and SB141406, respectively.

**Cadmium.** Cadmium concentrations detected in subsurface soil samples from 5 to 7 feet bgs and 10 to 12 feet bgs at borings SB141405 through SB141407 were all below background. Therefore, the elevated cadmium concentrations found in former Law (1995) borings 1414-SB01 through 1414-SB03 have been delineated to the southwest and southeast by the results from SB141405 and SB141406, respectively. Additionally, because the maximum concentrations of cadmium at former Law (1995) boring 1414-SB01 were not replicated by the results from the Phase 3 boring SB141407, it appears that the cadmium concentrations detected by Law (1995) were extreme, but true, background concentrations and were not the result of a release from the OWS at Building 1414.

**Copper.** Copper concentrations detected in subsurface soil samples collected from 5 to 7 feet bgs and 10 to 12 feet bgs at borings SB141405 and SB141406 were all below background. Therefore, the elevated copper concentrations found in former Law (1995) borings 1414-SB02 and 1414-SB03 have been delineated to the southwest and southeast by the results from SB141405 and SB141406, respectively.

### **11.8 Summary and Discussion**

Law (1995) collected soil samples for analysis of VOCs and inorganics at three locations (1414-SB01 through 1414-SB03) adjacent to the OWS at Building 1414 during their initial site investigation in 1994. The analytical results from the Law investigation indicated that arsenic, cadmium, and lead concentrations exceeded background concentrations and MSCs in soil samples. IT collected surface and subsurface soil samples from two locations (SB141401 and SB141402) adjacent to the OWS for analysis of SVOCs and pesticides/PCBs during the Phase 1 Sanitary Sewer System RFI in 1997 to supplement the data collected by Law (1995). IT also

installed and sampled monitoring well WITCTA016 as part of the Phase 1 RFI activities to determine if groundwater had been impacted downgradient of the site.

In June 1999, IT collected soil samples from two soil borings (SB141403 and SB141404) as part of the Phase 2 RFI to delineate arsenic, cadmium, and lead concentrations identified above background during the Law investigation. Finally, IT collected soil samples from three additional soil borings (SB141405 through SB141407) during the Phase 3 RFI in November 2000 to confirm the maximum concentrations of arsenic, cadmium, and lead detected by Law (1995) and to delineate inorganic concentrations to below background levels.

The following sections discuss the relevance of the parameters detected in surface soil, subsurface soil, and groundwater during investigations at the Building 1414 site.

#### **11.8.1 Surface Soil**

No SVOCs, pesticides, or PCBs were detected above background in the surface soil samples collected by Law (1995). One VOC, methylene chloride, was detected above MQLs in surface soil during the Law investigation. However, the detected methylene chloride concentrations were well below the MSC and were likely the result of laboratory contamination.

Arsenic, cadmium, and lead were detected above background in a surface soil sample collected by Law (1995) at 1414-SB01. However, these inorganics were detected at concentrations below background in the surface soil sample from SB141407, which was located adjacent to former Law (1995) boring 1414-SB01. The elevated concentrations of inorganics in surface soil have been delineated by the results from surface soil samples collected at Phase 2 borings (SB141403 and SB141404) and the results from Phase 3 borings (SB141405 and SB141406). The low concentrations detected in the samples collected by IT during the Phase 2 and Phase 3 RFIs indicates that there is no pattern of arsenic, cadmium, and lead contamination in surface soil at the Building 1414 site.

#### **11.8.2 Subsurface Soil**

No SVOCs or pesticides/PCBs were detected above background in the subsurface soil samples collected near the OWS unit at Building 1194. Three VOCs, acetone, methylene chloride, and toluene, were detected above MQLs in the subsurface samples collected. The detected concentrations of acetone and methylene chloride were likely the result of laboratory

contamination. The toluene concentration detected in the subsurface sample (2 to 4 feet bgs) from SB141401 was well below the MSC for toluene and was likely the result of toluene leaching from the sample sleeve, which was made of PET. The absence of toluene in the samples collected during the Law (1995) investigation provides evidence that there is no pattern of toluene concentrations in subsurface soils at the site.

Arsenic and cadmium were detected in the subsurface samples collected by Law (1995) at concentrations that exceeded background and MSC. Copper was detected at concentrations slightly above background in more than one subsurface sample. As shown in Figure 11-1, the elevated concentrations of arsenic, cadmium, and copper detected in the subsurface soil samples collected by Law (1995) have been delineated to background concentrations by the Phase 2 and Phase 3 results. Furthermore, because arsenic and cadmium concentrations could not be replicated near former Law boring 1414-SB01 and were not detected above background in any of the RFI soil samples collected by IT, it appears that the arsenic and cadmium concentrations detected by Law were likely extreme, but true, background concentrations

### **11.8.3 Groundwater**

Other than methylene chloride, a common laboratory contaminant, and TCE and its breakdown product, *cis*-1,2-DCE, no VOCs were detected above their respective MQLs in the groundwater sample from WITCTA016. As mentioned previously, Building 1414 is located within the extent of the TCE plume originating from AFP-4; therefore, the presence of TCE and its breakdown products in WITCTA016 is not considered as an indication of a release from the OWS at Building 1414. Iron was detected slightly above background in the groundwater sample from WITCTA016. Considering that iron is a naturally occurring essential nutrient, the elevated concentration was likely an extreme variation in background concentrations.

The absence of VOCs and SVOCs contained in petroleum products such as hydraulic fluid, antifreeze, JP-4, etc. in the groundwater sample from WITCTA016 indicates that any releases that may have occurred from the OWS at Building 1414 have not significantly impacted groundwater at the site.

### **11.9 Conclusions**

Considering that no pattern of VOCs, SVOCs, pesticides/PCBs, or inorganics above TNRCC MSCs has been identified in the soil and groundwater samples collected in the vicinity of Building 1414, it is recommended that the site be presented for closure under RRS 2 of the TNRCC RRP. The site is recommended for closure under RRS 2 because the arsenic, cadmium, copper, and lead concentrations detected in surface and subsurface soil samples have been delineated to background. Although the arsenic, cadmium, and lead concentrations detected in former Law (1995) borings were not confirmed, the fact that these inorganics were detected at concentrations at or below background in all of the samples collected by IT during the RFI activities in the vicinity of Building 1414 indicates that the elevated concentrations of arsenic, cadmium, and lead detected by Law (1995) were extreme, but true, background concentrations.

The absence of detected concentrations exceeding MSCs of compounds contained in the influent to the OWS (e.g., hydraulic fluid, antifreeze, JP-4, degreasing solvents and other cleaning agents, engine lubricating oil, and other petroleum byproducts) in the soil and groundwater samples collected at the site indicates any releases from the OWS have not significantly impacted the environment. Therefore, closure is recommended under RRS 2 for the OWS at Building 1414. Should this recommendation be accepted, a letter stating that closure of SWMU 41 (the OWS at Building 1414) was carried out in accordance with TAC §335.555, and signed by an Air Force representative, will be transmitted to the TNRCC, along with a metes and bounds description of SWMU 41. The metes and bounds description will correspond to surveyed coordinates of the affected area shown in Figure 11-1.

**FINAL PAGE**

**PART I**

**ADMINISTRATIVE RECORD**

**PART I**

**FINAL PAGE**