N83447.AR.000113
NAS FORT WORTH
5090.3a

DRAFT SAMPLING AND ANALYSIS PLAN FOR REMEDIAL INVESTIGATION FEASIBILITY STUDY VOLUME 3 OF 3 NAS FORT WORTH TX

6/1/1993

LAW ENGINEERING AND ENVIRONMENTAL

File: 17G
A.F.

151000

NAVAL AIR STATION
FORT WORTH JRB
CARSWELL FIELD
TEXAS

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 151

D.B. MA-41
151
151001

DRAFT

CARSWELL AIR FORCE BASE

RI/FS Sampling and Analysis Plan

Volume III - Tables

June 1993

Prepared for:

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TABLE 1-1

POTENTIAL CONTAMINANTS
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

Volatile Organics (34)
Acetone
Benzene +
Bromodichloromethane
Bromoform
Bromomethane
2-Butanone (MEK)
Carbon Disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
Dibromochloromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
trans-1,2-Dichloroethene
1,2-Dichloropropane
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
Ethylbenzene +
2-Hexanone
Methylene chloride
4-Methyl-2-pentanone
Styrene
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Toluene +
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Vinyl acetate
Vinyl chloride
Xylenes +

+ = Aromatic

Extractable Organics (65)
Acenaphthene
Acenaphthylene
Anthracene
Benzo[a]anthracene
Benzo[b]fluoranthene
Benzo[k]fluoranthene
Benzoic Acid
Benzo[ghi]perylene
Benzo[a]pyrene
Benzyl alcohol
bis(2-Chloroethoxy)methane
bis(2-Chloroethyl)ether
bis(2-Chloroisopropyl)ether
bis(2-ethylhexyl)phthalate
4-Bromophenyl phenyl ether
Butyl benzyl phthalate
4-Chloro-3-methylphenol
2-Chloronaphthalene
2-Chlorophenol
4-Chlorophenyl phenyl ether
Chrysene
Dibenzo [a,h] anthracene
Dibenzofuran
Di-n-butylphthalate
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
3,3'-Dichlorobenzidine
2,4-Dichlorophenol
Diethylphthalate
3,3'-Dimethylphthalate
2,4-Dimethylphenol
Dimethylphthalate
4,6-Dinitro-2-methylphenol
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Di-n-octylphthalate
Fluoranthene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Indeno[1,2,3-cd]pyrene
Isophorone
2-Methylnaphthalene
2-Methylphenol
4-Methylphenol
Naphthalene
2-Nitroaniline
3-Nitroaniline
4-Nitroaniline
Nitrobenzene
2-Nitrophenol
4-Nitrophenol
n-Nitrosodiphenylamine
n-Nitrosodipropylamine
Pentachlorophenol
Phenanthrene
Phenol
Pyrene
1,2,4-Trichlorobenzene
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol

151004

TABLE 1-1

POTENTIAL CONTAMINANTS
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

Metals (24)
Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Magnesium
Manganese
Molybdenum
Mercury
Nickel
Potassium
Selenium
Silver
Sodium
Thallium
Vanadium
Zinc

Total Recoverable Petroleum Hydrocarbons
Oil
Grease

Purgeable Aromatic Volatiles
Benzene
Chlorobenzene
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Ethylbenzene
Toluene
Xylenes

Nonhalogenated Volatile Organics
Diethyl ether
Ethanol
Methyl ethyl ketone (MEK)
Methyl isobutyl ketone (MIBK)

Total Recoverable Oil and Grease
Oil
Grease

Purgeable Halocarbons
Bromobenzene
Bromodichloromethane
Bromoform
Bromomethane
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
1-Chlorohexane
2-Chloroethyl vinyl ether
Chloromethane
Dibromochloromethane
Dibromoethane
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
trans-1,2-Dichloroethene
Cis-1,3-Dichloropropene
1,2-Dichloropropane
trans-1,3-Dichloropropene
Methylene chloride
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichlorofluoromethane
Trichloropropane
Vinyl Chloride

151095

TABLE 1-2

PARAMETERS OF INTEREST BY SITE
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

		ORGANIC							INORGANIC					OTHER
No.	SITE NAME	AROMATIC VOLATILE ORGANICS	VOLATILE ORGANICS	EXTRACTABLE ORGANICS	TOTAL RECOVERABLE PETROLEUM HYDROCARBONS	PETROLEUM HYDROCARB.	OIL & GREASE	PURGEABLE HALOCARBONS	SCREEN FOR 24 METALS	ARSENIC	MERCURY	LEAD	SELENIUM	TCLP
GROUND WATER / HYDROPUNCH SURVEY														
1	Unnamed Stream		X		X		X	X	X	X	X	X	X	X
2	POL Tank Farm	X				X						X		
SURFACE WATER														
1	Unnamed Stream	X	X		X		X							
SUB-SURFACE SOIL														
1	Unnamed Stream	X	X		X									X
SEDIMENT														
1	Unnamed Stream								X					

15005

TABLE 1-3

ANALYTICAL LEVELS
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

ANALYTICAL LEVEL	DATA USES	DATA QUALITY	LIMITATIONS	FIELD ACTIVITIES
Level I	– Site characterization – Monitoring during implementation	– If instruments calibrated and data interpreted correctly, can provide indication of contamination	– Instruments respond to naturally-occurring compounds	– HNu – Explosimeter – Draeger tubes – Geophysical survey – Hydropunch survey
Level II	– Site characterization – Evaluation of alternatives – Engineering design – Monitoring during implementation	– Dependent on QA/QC steps employed – Data typically reported in concentration ranges	– Tentative ID – Techniques/instruments limited mostly to volatiles, metals	– Temperature – Turbidity – Water level – pH – Specific conductance
Level III	– Risk assessment – PRP determination – Site characterization – Evaluation of alternatives – Engineering design – Monitoring during implementation	– Similar detection limits to CLP – Less rigorous QA/QC	– Tentative ID in some cases – Can provide data of same quality as Level IV	– Ground-water samples – Soil samples: surface – Soil samples: subsurface – Surface water samples – Sediment samples – Containerized Waste Material
Level IV			– Tentative Identification of non-HSL parameters – Some time may be required for validation of packages	Not Applicable
Level V			– May require method development/modification – Mechanism to obtain services requires special lead time	Not Applicable

SOURCE: USEPA, 1987a

151002

TABLE 1-4

DATA QUALITY OBJECTIVES: SOIL AND SEDIMENT
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

PARAMETER	PRECISION (a) (RSD)	ACCURACY (b) (% Bias)	COMPLETENESS (c) (% Complete)
VOLATILE ORGANICS:			
Acceptance Limits (d)	35%	50%	95%
Action Limits (d)	70%	80%	90%
AROMATIC VOLATILE ORGANICS:			
Acceptance Limits (d)	35%	50%	95%
Action Limits (d)	70%	90%	90%
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS:			
Acceptance Limits (d)	35%	50%	95%
Action Limits (d)	70%	80%	90%
TCLP:			
Acceptance Limits (d)	35%	50%	95%
Action Limits (d)	70%	80%	90%
METALS, total:			
Acceptance Limits (d)	35%	30%	95%
Action Limits (d)	60%	55%	90%

NOTES:

(a) "Precision" is assessed through the relative standard deviation (RSD) of a series of measurements.
(b) "Accuracy" is assessed through the bias from the correct result, expressed as a percentage.
(c) "Completeness" is assessed through the ratio of acceptable data obtained to the amount of data intended to be collected, expressed as a percentage.
(d) Data judged to be within the acceptance limits will be used without qualification. Data judged to be outside of the acceptance limits but within the action limits will be used with qualifications, if possible. Data outside of the action limits will be considered of insufficient quality and/or quantity to be used.

TABLE 1-5

DATA QUALITY OBJECTIVES: GROUND WATER AND SURFACE WATER
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

PARAMETER	PRECISION (a) (RSD)	ACCURACY (b) (% Bias)	COMPLETENESS (c) (% Complete)
VOLATILE ORGANICS:			
Acceptance Limits (d)	30%	40%	95%
Action Limits (d)	60%	70%	90%
EXTRACTABLE ORGANICS:			
Acceptance Limits (d)	30%	50%	95%
Action Limits (d)	60%	90%	90%
AROMATIC VOLATILE ORGANICS:			
Acceptance Limits (d)	30%	40%	95%
Action Limits (d)	60%	70%	90%
PETROLEUM HYDROCARBONS:			
Acceptance Limits (d)	30%	50%	95%
Action Limits (d)	60%	80%	90%
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS:			
Acceptance Limits (d)	30%	50%	95%
Action Limits (d)	60%	80%	90%
OIL AND GREASE:			
Acceptance Limits (d)	30%	50%	95%
Action Limits (d)	60%	80%	90%
PURGEABLE HALOCARBONS:			
Acceptance Limits (d)	30%	50%	95%
Action Limits (d)	60%	80%	90%
METALS, total:			
Acceptance Limits (d)	20%	25%	95%
Action Limits (d)	40%	55%	90%
ARSENIC:			
Acceptance Limits (d)	20%	25%	95%
Action Limits (d)	40%	55%	90%
MERCURY:			
Acceptance Limits (d)	20%	25%	95%
Action Limits (d)	40%	55%	90%
SELENIUM:			
Acceptance Limits (d)	20%	25%	95%
Action Limits (d)	40%	55%	90%

TABLE 1-5

DATA QUALITY OBJECTIVES: GROUND WATER AND SURFACE WATER
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

PARAMETER	PRECISION (a) (RSD)	ACCURACY (b) (% Bias)	COMPLETENESS (c) (% Complete)
LEAD:			
Acceptance Limits (d)	20%	25%	95%
Action Limits (d)	40%	55%	90%
TCLP:			
Acceptance Limits (d)	30%	50%	95%
Action Limits (d)	60%	80%	90%

NOTES:

(a) "Precision" is assessed through the relative standard deviation (RSD) of a series of measurements.
(b) "Accuracy" is assessed through the bias from the correct result, expressed as a percentage.
(c) "Completeness" is assessed through the ratio of acceptable data obtained to the amount of data intended to be collected, expressed as a percentage.
(d) Data judged to be within the acceptance limits will be used without qualification. Data judged to be outside of the acceptance limits but within the action limits will be used with qualifications, if possible. Data outside of the action limits will be considered of insufficient quality and/or quantity to be used.

TABLE 1-6

ANALYTICAL REQUIREMENTS - SOIL AND SEDIMENT SAMPLES
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

ANALYTICAL PARAMETER (a)	METHOD (b)	HOLDING TIME (c)
Volatile Organics	8240	A: 14d
Aromatic Volatile Organics	8020	A: 14d
Total Recoverable Petroleum Hydrocarbons	418.1	P: 14d A: 40d
Metals, total:		A: 6m (unless noted)
1. Aluminum	3050/6010	
2. Antimony	3050/6010	
3. Arsenic	3050/7060 (d)	
4. Barium	3050/6010	
5. Beryllium	3050/6010	
6. Cadmium	3050/6010	
7. Calcium	3050/6010	
8. Chromium	3050/6010	
9. Cobalt	3050/6010	
10. Copper	3050/6010	
11. Iron	3050/6010	
12. Lead	3050/7421 (d)	
13. Mercury	7471	A: 28d
14. Magnesium	3050/6010	
15. Manganese	3050/6010	
16. Molybdenum	3050/6010	
17. Nickel	3050/6010	
18. Potassium	3050/6010	
19. Selenium	3050/7740 (d)	
20. Silver	3050/6010	
21. Sodium	3050/6010	
22. Thallium	3050/7841 (d)	
23. Vanadium	3050/6010	
24. Zinc	3050/6010	

TABLE 1-6

ANALYTICAL REQUIREMENTS - SOIL AND SEDIMENT SAMPLES
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

ANALYTICAL PARAMETER (a)	METHOD (b)	HOLDING TIME (c)
TCLP	1311	See Below

	From: Field Collection to: TCLP extraction	From: TCLP extraction to: Preparative extraction	From: Preparative extraction to: determinative analysis	Total elapsed time
Volatiles	14d	NA	14d	28d
Semivolatiles	14d	7d	40d	61d
Mercury	28d	NA	28d	56d
Metals, except Mercury	180d	NA	180d	360d

NOTES:

(a) For list of analytes and reporting limits, see Table 1-8.
(b) Test Methods for Evaluating Solid Waste SW-846, 3rd Edition, November 1986 (unless otherwise noted)
(c) holding time from date of sampling to preparation (P) or analysis (A)
d = days m = months h = hours
(d) Screening results by method 3050/6010 are acceptable if sample result is greater than 10 times the method detection limit (before correction to dry weight)

TABLE 1-7

ANALYTICAL REQUIREMENTS - GROUND AND SURFACE WATER SAMPLES
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

ANALYTICAL PARAMETER (a)	METHOD (b)	HOLDING TIME (c)
Volatile Organics	8240	A: 14d
Aromatic Volatile Organics	8020	A: 14d
Extractable Organics	3010 or 3020/8270	P: 7d A: 40d (d)
Petroleum Hydrocarbons	8015 M	A: 14d
Total Recoverable Petroleum Hydrocarbons	418.1	A: 28d (d)
Oil and Grease	9070	A: 28d
Purgeable Halocarbons	5030/8010	A: 14d
Metals, total:		A: 6m (unless noted)
1. Aluminum	3005/6010	
2. Antimony	3005/6010	
3. Arsenic	7060 (e)	
4. Barium	3005/6010	
5. Beryllium	3005/6010	
6. Cadmium	3005/6010	
7. Calcium	3005/6010	
8. Chromium	3005/6010	
9. Cobalt	3005/6010	
10. Copper	3005/6010	
11. Iron	3005/6010	
12. Lead	3020/7421 (e)	
13. Mercury	7470	A: 28d
14. Magnesium	3005/6010	
15. Manganese	3005/6010	
16. Molybdenum	3005/6010	
17. Nickel	3005/6010	
18. Potassium	3005/6010	
19. Selenium	7740 (e)	
20. Silver	3005/6010	
21. Sodium	3005/6010	
22. Thallium	3020/7841 (e)	
23. Vanadium	3005/6010	
24. Zinc	3005/6010	

TABLE 1-7

ANALYTICAL REQUIREMENTS - GROUND AND SURFACE WATER SAMPLES
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

ANALYTICAL PARAMETER (a)	METHOD (b)	HOLDING TIME (c)
TCLP	1311	See Below

	From: Field Collection to: TCLP extraction	From: TCLP extraction to: Preparative extraction	From: Preparative extraction to: determinative analysis	Total elapsed time
Volatiles	14d	NA	14d	28d
Semivolatiles	14d	7d	40d	61d
Mercury	28d	NA	28d	56d
Metals, except Mercury	180d	NA	180d	360d

NOTES:

(a) For list of analytes and reporting limits, see Table 1-9.
(b) Test Methods for Evaluating Solid Waste SW-846, 3rd Edition, November 1986 (unless otherwise noted)
(c) holding time from date of sampling to preparation (P) or analysis (A)
d = days m = months h = hours
(d) Extracts to be analyzed within 40 days of date of extraction.
(e) Screening results by method 3005/6010 are acceptable if sample result is greater than 10 times the method detection limit (before correction to dry weight)

TABLE 1–8

PROJECT–REQUIRED REPORTING LIMITS – SOIL/SEDIMENT
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

ANALYTICAL METHOD	COMPOUND	UNITS	REPORTING LIMIT MDL	REPORTING LIMIT MQL
6010 (SW846)	Aluminum	mg/kg	NE	50
	Antimony	mg/kg	NE	15
	Arsenic	mg/kg	NE	30
	Barium	mg/kg	NE	10
	Beryllium	mg/kg	NE	1
	Cadmium	mg/kg	NE	0.5
	Calcium	mg/kg	NE	100
	Chromium	mg/kg	NE	5
	Cobalt	mg/kg	NE	5
	Copper	mg/kg	NE	5
	Iron	mg/kg	NE	5
	Lead	mg/kg	NE	5
	Magnesium	mg/kg	NE	100
	Manganese	mg/kg	NE	2
	Molybdenum	mg/kg	NE	10
	Nickel	mg/kg	NE	15
	Potassium	mg/kg	NE	100
	Selenium	mg/kg	NE	50
	Silver	mg/kg	NE	5
	Sodium	mg/kg	NE	100
	Thallium	mg/kg	NE	7
	Vanadium	mg/kg	NE	10
	Zinc	mg/kg	NE	2
7060 (SW846)	Arsenic	mg/kg	NE	0.5
7421 (SW846)	Lead	mg/kg	NE	0.5
7740 (SW846)	Selenium	mg/kg	NE	0.5
7841 (SW846)	Thallium	mg/kg	NE	7
7471 (SW846)	Mercury	mg/kg	NE	0.1
8240 (SW846)	Acetone	mg/kg	NE	0.01
	Benzene	mg/kg	NE	0.005
	Bromodichloromethane	mg/kg	NE	0.005
	Bromoform	mg/kg	NE	0.005
	Bromomethane	mg/kg	NE	0.01
	2–Butanone (MEK)	mg/kg	NE	0.01
	Carbon disulfide	mg/kg	NE	0.005
	Carbon tetrachloride	mg/kg	NE	0.005
	Chlorobenzene	mg/kg	NE	0.005
	Chloroethane	mg/kg	NE	0.01
	2–Chloroethyl vinyl ether	mg/kg	NE	0.01
	Chloroform	mg/kg	NE	0.005
	Chloromethane	mg/kg	NE	0.01
	Dibromochloromethane	mg/kg	NE	0.005
	1,1–Dichloroethane	mg/kg	NE	0.005
	1,2–Dichloroethane	mg/kg	NE	0.005
	1,1–Dichloroethene	mg/kg	NE	0.005

TABLE 1–8

PROJECT–REQUIRED REPORTING LIMITS – SOIL/SEDIMENT
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

ANALYTICAL METHOD	COMPOUND	UNITS	REPORTING LIMIT MDL	REPORTING LIMIT MQL
8240 (SW846) (Continued)	trans–1,2–Dichloroethene	mg/kg	NE	0.005
	1,2–Dichloropropane	mg/kg	NE	0.005
	cis–1,3–Dichloropropene	mg/kg	NE	0.005
	trans–1,3–Dichloropropene	mg/kg	NE	0.005
	Ethylbenzene	mg/kg	NE	0.005
	2–Hexanone	mg/kg	NE	0.01
	Methylene chloride	mg/kg	NE	0.005
	4–Methyl–2–pentanone (MIBK)	mg/kg	NE	0.01
	Styrene	mg/kg	NE	0.005
	1,1,2,2–Tetrachloroethane	mg/kg	NE	0.005
	Tetrachloroethene	mg/kg	NE	0.005
	Toluene	mg/kg	NE	0.005
	1,1,1–Trichloroethane	mg/kg	NE	0.005
	1,1,2–Trichloroethane	mg/kg	NE	0.005
	Trichloroethene	mg/kg	NE	0.005
	Vinyl acetate	mg/kg	NE	0.01
	Vinyl chloride	mg/kg	NE	0.01
	Xylenes (total)	mg/kg	NE	0.005
	1,2–Dichloroethane–d4 (surrogate)	mg/kg	NE	
	Toluene–d8 (surrogate)	mg/kg	NE	
	4–Bromofluorobenzene (surrogate)	mg/kg	NE	
8020 (SW846)	Benzene	mg/kg	NE	0.01
	Toluene	mg/kg	NE	0.02
	Ethylbenzene	mg/kg	NE	0.04
	Xylenes	mg/kg	NE	0.02
	Fluorobenzene (surrogate)	mg/kg	NE	
	4–Chlorotoluene (surrogate)	mg/kg	NE	
9070/418.1 (EPA600)	Total Recoverable Petroleum Hydrocarbons	mg/kg	NE	10

NA – Not applicable.
NE – Not established at this time.

TABLE 1-9

PROJECT-REQUIRED REPORTING LIMITS - GROUND WATER/SURFACE WATER
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

ANALYTICAL METHOD	COMPOUND	UNITS	REPORTING LIMIT MDL	REPORTING LIMIT MQL
6010 (SW846)	Aluminum	mg/L	NE	0.5
	Antimony	mg/L	NE	0.5
	Arsenic	mg/L	NE	0.3
	Barium	mg/L	NE	0.1
	Beryllium	mg/L	NE	0.01
	Cadmium	mg/L	NE	0.005
	Calcium	mg/L	NE	1
	Chromium	mg/L	NE	0.05
	Cobalt	mg/L	NE	0.05
	Copper	mg/L	NE	0.05
	Iron	mg/L	NE	0.05
	Lead	mg/L	NE	0.2
	Magnesium	mg/L	NE	1
	Manganese	mg/L	NE	0.02
	Molybdenum	mg/L	NE	0.1
	Nickel	mg/L	NE	0.15
	Potassium	mg/L	NE	5
	Selenium	mg/L	NE	1
	Silver	mg/L	NE	0.05
	Sodium	mg/L	NE	1
	Thallium	mg/L	NE	0.4
	Vanadium	mg/L	NE	0.1
	Zinc	mg/L	NE	0.02
7060 (SW846)	Arsenic	mg/L	NE	0.005
7421 (SW846)	Lead	mg/L	NE	0.005
7740 (SW846)	Selenium	mg/L	NE	0.005
7841 (SW846)	Thallium	mg/L	NE	0.4
7471 (SW846)	Mercury	mg/L	NE	0.001
8270 (SW846) (acids)	Benzoic acid	µg/L	NE	50
	4-Chloro-3-methylphenol	µg/L	NE	10
	2-Chlorophenol	µg/L	NE	10
	2,4-Dichlorophenol	µg/L	NE	10
	2,4-Dimethylphenol	µg/L	NE	10
	4,6-Dinitro-2-methylphenol	µg/L	NE	50
	2,4-Dinitrophenol	µg/L	NE	50
	2-Methylphenol	µg/L	NE	10
	4-Methylphenol	µg/L	NE	10
	2-Nitrophenol	µg/L	NE	10
	4-Nitrophenol	µg/L	NE	50
	Pentachlorophenol	µg/L	NE	30
	Phenol	µg/L	NE	10
	2,4,5-Trichlorophenol	µg/L	NE	50
	2,4,6-Trichlorophenol	µg/L	NE	10
	2-Fluorophenol (surrogate)	µg/L	NE	
	Phenol-d6 (surrogate)	µg/L	NE	
	2,4,6-Tribromophenol (surrogate)	µg/L	NE	

TABLE 1-9

PROJECT-REQUIRED REPORTING LIMITS - GROUND WATER/SURFACE WATER
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

ANALYTICAL METHOD	COMPOUND	UNITS	REPORTING LIMIT MDL	REPORTING LIMIT MQL
8270 (SW846) (base/neutral)	Acenaphthene	µg/L	NE	10
	Acenaphthylene	µg/L	NE	10
	Anthracene	µg/L	NE	10
	Benzo(a)anthracene	µg/L	NE	10
	Benzo(b)fluoranthene	µg/L	NE	10
	Benzo(k)fluoranthene	µg/L	NE	10
	Benzo(ghi)perylene	µg/L	NE	10
	Benzo(a)pyrene	µg/L	NE	10
	Benzyl alcohol	µg/L	NE	10
	bis(2-Chloroethoxy)methane	µg/L	NE	10
	bis(2-Chloroethyl)ether	µg/L	NE	10
	bis(2-Chloroisopropyl)ether	µg/L	NE	10
	bis(2-Ethylhexyl)phthalate	µg/L	NE	10
	4-Bromophenyl phenyl ether	µg/L	NE	10
	Butylbenzylphthalate	µg/L	NE	10
	4-Chloroaniline	µg/L	NE	10
	2-Chloronaphthalene	µg/L	NE	10
	4-Chlorophenyl phenyl ether	µg/L	NE	10
	Chrysene	µg/L	NE	10
	Dibenzo(a,h)anthracene	µg/L	NE	10
	Dibenzofuran	µg/L	NE	10
	Di-n-butylphthalate	µg/L	NE	10
	1,2-Dichlorobenzene	µg/L	NE	10
	1,3-Dichlorobenzene	µg/L	NE	10
	1,4-Dichlorobenzene	µg/L	NE	10
	3,3'-Dichlorobenzidine	µg/L	NE	20
	Diethylphthalate	µg/L	NE	10
	Dimethylphthalate	µg/L	NE	10
	2,4-Dinitrotoluene	µg/L	NE	10
	2,6-Dinitrotoluene	µg/L	NE	10
	Di-n-octylphthalate	µg/L	NE	10
	Fluoranthene	µg/L	NE	10
	Fluorene	µg/L	NE	10
	Hexachlorobenzene	µg/L	NE	10
	Hexachlorobutadiene	µg/L	NE	10
	Hexachlorocyclopentadiene	µg/L	NE	10
	Hexachloroethane	µg/L	NE	10
	Indeno[1,2,3-cd]pyrene	µg/L	NE	10
	Isophorone	µg/L	NE	10
	2-Methylnaphthalene	µg/L	NE	10
	Naphthalene	µg/L	NE	10
	2-Nitroaniline	µg/L	NE	50
	3-Nitroaniline	µg/L	NE	50
	4-Nitroaniline	µg/L	NE	50
	Nitrobenzene	µg/L	NE	10
	n-Nitrosodiphenylamine	µg/L	NE	10
	n-Nitrosodipropylamine	µg/L	NE	10
	Phenanthrene	µg/L	NE	10
	Pyrene	µg/L	NE	10
	1,2,4-Trichlorobenzene	µg/L	NE	10

TABLE 1–9

PROJECT–REQUIRED REPORTING LIMITS – GROUND WATER/SURFACE WATER
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

ANALYTICAL METHOD	COMPOUND	UNITS	REPORTING LIMIT MDL	REPORTING LIMIT MQL
8270 (SW846) (base/neutral) (Continued)	Nitrobenzene–d5 (surrogate)	µg/L	NE	
	2–Fluorobiphenyl (surrogate)	µg/L	NE	
	Terphenyl–d14 (surrogate)	µg/L	NE	
8240 (SW846)	Acetone	µg/L	NE	10
	Benzene	µg/L	NE	5
	Bromodichloromethane	µg/L	NE	5
	Bromoform	µg/L	NE	5
	Bromomethane	µg/L	NE	10
	2–Butanone (MEK)	µg/L	NE	10
	Carbon disulfide	µg/L	NE	5
	Carbon tetrachloride	µg/L	NE	5
	Chlorobenzene	µg/L	NE	5
	Chloroethane	µg/L	NE	5
	2–Chloroethyl vinyl ether	µg/L	NE	10
	Chloroform	µg/L	NE	10
	Chloromethane	µg/L	NE	5
	Dibromochloromethane	µg/L	NE	10
	1,1–Dichloroethane	µg/L	NE	5
	1,2–Dichloroethane	µg/L	NE	5
	1,1–Dichloroethene	µg/L	NE	5
	trans–1,2–Dichloroethene	µg/L	NE	5
	1,2–Dichloropropane	µg/L	NE	5
	cis–1,3–Dichloropropene	µg/L	NE	5
	trans–1,3–Dichloropropene	µg/L	NE	5
	Ethylbenzene	µg/L	NE	5
	2–Hexanone	µg/L	NE	10
	Methylene chloride	µg/L	NE	5
	4–Methyl–2–pentanone (MIBK)	µg/L	NE	10
	Styrene	µg/L	NE	5
	1,1,2,2–Tetrachloroethane	µg/L	NE	5
	Tetrachloroethene	µg/L	NE	5
	Toluene	µg/L	NE	5
	1,1,1–Trichloroethane	µg/L	NE	5
	1,1,2–Trichloroethane	µg/L	NE	5
	Trichloroethene	µg/L	NE	5
	Vinyl acetate	µg/L	NE	10
	Vinyl chloride	µg/L	NE	10
	Xylenes (total)	µg/L	NE	5
	1,2–Dichloroethane–d4 (surrogate)	µg/L	NE	
	Toluene–d8 (surrogate)	µg/L	NE	
	4–Bromofluorobenzene (surrogate)	µg/L	NE	
8020 (SW846)	Benzene	µg/L	NE	1
	Toluene	µg/L	NE	2
	Ethylbenzene	µg/L	NE	4
	Xylenes	µg/L	NE	2
	Fluorobenzene (surrogate)	µg/L	NE	
	4–Chlorotoluene (surrogate)	µg/L	NE	
8015M (SW846)	Diesel	mg/L	0.072	0.2
	Gasoline	mg/L	0.074	0.5

TABLE 1–9

PROJECT–REQUIRED REPORTING LIMITS – GROUND WATER/SURFACE WATER
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

ANALYTICAL METHOD	COMPOUND	UNITS	REPORTING LIMIT MDL	REPORTING LIMIT MQL
9070 (SW846)	Oil & Grease	µg/L		
8010 (SW846)	Bromobenzene	µg/L	0.4	5
	Bromodichloromethane	µg/L	0.5	1
	Bromoform	µg/L	0.5	2
	Bromomethane	µg/L	0.9	10
	Carbon tetrachloride	µg/L	1	1
	Chlorobenzene	µg/L	0.4	2.5
	Chloroethane	µg/L	0.7	5
	Chloroform	µg/L	0.8	0.5
	1–Chlorohexane	µg/L	0.5	5
	2–Chloroethyl vinyl ether	µg/L	0.6	10
	Chloromethane	µg/L	0.8	1
	Dibromochloromethane	µg/L	0.5	1
	Dibromomethane	µg/L	0.5	5
	1,2–Dichlorobenzene	µg/L	0.3	2
	1,3–Dichlorobenzene	µg/L	0.3	3
	1,4–Dichlorobenzene	µg/L	0.4	2
	Dichlorodifluoromethane	µg/L	0.5	9
	1,1–Dichloroethane	µg/L	0.7	1
	1,2–Dichloroethane	µg/L	0.7	1
	1,1–Dichloroethene	µg/L	0.7	1
	trans–1,2–Dichloroethene	µg/L	0.7	1
	cis–1,3–Dichloropropene	µg/L	0.7	5
	1,2–Dichloropropane	µg/L	0.5	1
	trans–1,3–Dichloropropene	µg/L	0.5	3
	Methylene chloride	µg/L	2	2
	1,1,1,2–Tetrachloroethane	µg/L	0.6	5
	1,1,2,2–Tetrachloroethane	µg/L	0.8	1
	Tetrachloroethene	µg/L	0.4	1
	1,1,1–Trichloroethane	µg/L	1	1
	1,1,2–Trichloroethane	µg/L	0.8	1
	Trichloroethene	µg/L	0.9	1
	Trichlorofluoromethane	µg/L	0.8	1
	1,2,3–Trichloropropane	µg/L	0.6	10
	Vinyl chloride	µg/L	0.9	2
	Bromochloromethane	µg/L	NA	NA
	1,4–Dichlorobutane	µg/L	NA	NA

NA – Not applicable.
NE – Not established at this time.

TABLE 1-10

DATA EVALUATION CATEGORIES
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

CATEGORY	QC DATA EVALUATED
LABORATORY QC:	
1. Sample Integrity	Sample container condition; preservation performance and applicability; condition upon receipt at laboratory
2. Instrument Set-up/Method Applicability	Correct method; detection/quantitation limits achieved; method applicability for analytes and matrix, instrument set-up
3. Calibration Accuracy and Precision *	Standard preparation; accuracy verification, precision achieved
4. Calibration Stability *	Stability verification; frequency of performance
5. Laboratory Contamination	Laboratory blanks
6. Method Accuracy and Precision	Method accuracy and precision data
7. Sample Preparation	Procedures; holding times
8. Sample Analysis	Procedures and sequences; holding times; sample-specific accuracy and precision; interferences; dilutions
FIELD QC:	
1. Sample Integrity	Sample container condition; preservation performance and applicability; condition prior to shipment; custody
2. Location Installation	Sampling location installation
3. Sampling Procedures	Sampling protocols
4. Contamination From Sampling	Rinsates
5. Contamination From Site	Field blanks (volatile organics only)
6. Contamination From Shipping	Trip blanks (volatile organics only)
7. Sampling Precision	Field duplicates
8. Miscellaneous +	Blind QC samples; performance evaluation data; split sample data

* These categories are assumed to be correct and will not be provided for evaluation.
\+ No blind data for QC samples, blind performance evaluation samples, or split samples will be collected.

TABLE 1-11

DATA QUALIFICATION FLAGS
Remedial Investigation/Feasibility Study
Carswell AFB, Texas

FLAG	POSITIVE RESULTS	NEGATIVE RESULTS
FLAGS FOR DATA WITHIN ACCEPTANCE LIMITS (Usable as Reported)		
(no flag)	{Use datum without qualification}	{Use datum without qualification}
FLAGS FOR DATA WITHIN ACTION LIMITS (Usable With Qualifications)		
J	Estimated quantitation based upon QC data	Estimated quantitation based upon QC data
JB	Estimated quantitation: possible biased high or false positive based upon blank data	(Not applicable)
JH	Estimated quantitation-possibly biased high based upon QC data	(Not applicable)
JL	Estimated quantitation-possibly biased low based upon QC data	Possible false negative based upon QC data
Jd	Estimated result due to dilution	Reporting limit raised due to dilution
FLAGS FOR DATA OUTSIDE OF ACTION LIMITS (Unusable)		
R	Datum rejected based upon QC data: do not use	Datum rejected based upon QC data: do not use
MISCELLANEOUS FLAGS		
t	Tentatively identified compound; identity not confirmed with standard and quantitation estimated[a]	(Not applicable)

[a] Applicable to GC/MS data only

TABLE 1–12

ANALYSIS SUMMARY: SUB–SURFACE SOIL FROM BORINGS
Remedial Investigation Feasibility Study – Carswell Air Force Base, Texas

PARAMETER	TOTAL NO. FIELD LOCATIONS	TOTAL NO. FIELD SAMPLES	LAB QC SAMPLES					2ND COLUMN CONFIRM. ANALYSES	TOTAL NO. LAB SAMPLES
			MS	MSD	Lab Duplicate	Spiked Blank (b)	Hold Blank (a)		
Volatile Organics									
Unnamed Stream	3	10	1	1	0	1	0	0	13
TOTALS	3	10	1	1	0	1	0	0	13
Aromatic Volatiles									
Unnamed Stream	3	10	1	1	0	1	0	1	14
TOTALS	3	10	1	1	0	1	0	1	14
Total Recoverable Petroleum Hydrocarbons									
Unnamed Stream	3	8	1	1	0	1	0	0	11
TOTALS	3	8	1	1	0	1	0	0	11
Toxicity Characteristic Leaching Procedure									
Unnamed Stream	3	3	1	1	0	0	0	0	5
TOTALS	3	3	1	1	0	0	0	0	5

Note: Analytical methodologies are presented in the Sampling and Analysis Plan.
(a) Volatile Organics only; number to be initiated will depend upon number of shipments.
(b) Estimated; number to be determined by batch preparation.

TABLE 1-13

ANALYSIS SUMMARY: GROUND WATER – MONITORING WELLS
Remedial Investigation Feasibility Study – Carswell Air Force Base, Texas

PARAMETER	TOTAL NO. FIELD LOCATIONS	TOTAL NO. FIELD SAMPLES	LAB QC SAMPLES					2ND COLUMN CONFIRM. ANALYSES	TOTAL NO. LAB SAMPLES
			MS	MSD	Lab Duplicate	Spiked Blank (b)	Hold Blank (a)		
Volatile Organics									
Unnamed Stream	11	28	2	2	0	2	0	0	34
TOTALS	11	28	2	2	0	2	0	0	34
Total Recoverable Petroleum Hydrocarbons									
Unnamed Stream	11	26	2	2	0	2	0	0	32
TOTALS	11	26	2	2	0	2	0	0	32
Oil and Grease									
Unnamed Stream	11	26	2	2	0	2	0	0	32
TOTALS	11	26	2	2	0	2	0	0	32
Screen for 24 Metals									
Unnamed Stream	11	26	2	2	0	2	0	0	32
Unnamed Stream Total Dissolved	11	26	2	2	0	2	0	0	32
TOTALS	22	52	4	4	0	4	0	0	64
Arsenic									
Unnamed Stream	11	26	2	2	0	2	0	0	32
Unnamed Stream Total Dissolved	11	26	2	2	0	2	0	0	32
TOTALS	22	52	4	4	0	4	0	0	64
Mercury									
Unnamed Stream	11	26	2	2	0	2	0	0	32
Unnamed Stream Total Dissolved	11	26	2	2	0	2	0	0	32
TOTALS	22	52	4	4	0	4	0	0	64
Selenium									
Unnamed Stream	11	26	2	2	0	2	0	0	32
Unnamed Stream Total Dissolved	11	26	2	2	0	2	0	0	32
TOTALS	22	52	4	4	0	4	0	0	64
Lead									
Unnamed Stream	11	26	2	2	0	2	0	0	32
Unnamed Stream Total Dissolved	11	26	2	2	0	2	0	0	32
TOTALS	22	52	4	4	0	4	0	0	64
Toxicity Characteristic Leaching Procedure									
Unnamed Stream	5	6	1	1	0	0	0	0	8
TOTALS	5	6	1	1	0	0	0	0	8

Note: Analytical methodologies are presented in the Sampling and Analysis Plan.
(a) Volatile Organics only; number to be initiated will depend upon number of shipments.
(b) Estimated; number to be determined by preparation batch.

TABLE 1-14

ANALYSIS SUMMARY: GROUND WATER – HYDROPUNCH SURVEY
Remedial Investigation Feasibility Study – Carswell Air Force Base, Texas

PARAMETER		TOTAL NO. FIELD LOCATIONS	TOTAL NO. FIELD SAMPLES	LAB QC SAMPLES					2ND COLUMN CONFIRM. ANALYSES	TOTAL NO. LAB SAMPLES
				MS	MSD	Lab Duplicate	Spiked Blank (b)	Hold Blank (a)		
Aromatic Volatiles										
POL Tank Farm		9	18	1	1	0	1	0	0	21
Reserve (c)		1	1	1	1	0	0	0	0	3
	TOTALS	10	19	2	2	0	1	0	0	24
Petroleum Hydrocarbons										
POL Tank Farm		22	24	2	2	0	1	0	20	49
Reserve (c)		3	4	1	1	0	1	0	0	7
	TOTALS	25	28	3	3	0	2	0	20	56
Lead										
POL Tank Farm		9	17	1	1	0	1	0	0	20
Reserve (c)		1	1	0	0	0	0	0	0	1
	TOTALS	10	18	1	1	0	1	0	0	21

Note: Analytical methodologies are presented in the Sampling and Analysis Plan.
(a) Volatile Organics only; number to be initiated will depend upon number of shipments.
(b) Estimated; number to be determined by preparation batch.
(c) Three Hydropunch sampling locations will be reserved for discretionary use during the implementation of the field work.

TABLE 1-15

ANALYSIS SUMMARY: SURFACE WATER
Remedial Investigation Feasibility Study – Carswell Air Force Base, Texas

PARAMETER	TOTAL NO. FIELD LOCATIONS	TOTAL NO. FIELD SAMPLES	LAB QC SAMPLES					2ND COLUMN CONFIRM. ANALYSES	TOTAL NO. LAB SAMPLES
			MS	MSD	Lab Duplicate	Spiked Blank (b)	Hold Blank (a)		
Volatile Organics									
Unnamed Stream	3	7	1	1	0	1	0	0	10
TOTALS	3	7	1	1	0	1	0	0	10
Total Recoverable Petroleum Hydrocarbons									
Unnamed Stream	3	5	1	1	0	1	0	0	8
TOTALS	3	5	1	1	0	1	0	0	8
Oil and Grease									
Unnamed Stream	3	5	1	1	0	1	0	0	8
TOTALS	3	5	1	1	0	1	0	0	8

Note: Analytical methodologies are presented in the Sampling and Analysis Plan.
(a) Volatile Organics only; number to be initiated will depend upon number of shipments.
(b) Estimated; number to be determined by preparation batch.

TABLE 1-16

ANALYSIS SUMMARY: SEDIMENT
Remedial Investigation Feasibility Study – Carswell Air Force Base, Texas

PARAMETER	TOTAL NO. FIELD LOCATIONS	TOTAL NO. FIELD SAMPLES	LAB QC SAMPLES MS	MSD	Lab Duplicate	Spiked Blank (b)	Hold Blank (a)	2ND COLUMN CONFIRM. ANALYSES	TOTAL NO. LAB SAMPLES
Screen for 24 Metals									
Unnamed Stream	3	5	1	1	0	0	0	0	7
TOTALS	3	5	1	1	0	0	0	0	7

Note: Analytical methodologies are presented in the Sampling and Analysis Plan.
(a) Volatile Organics only; number to be initiated will depend upon number of shipments.
(b) Estimated; number to be determined by preparation batch.

TABLE 2-1

FIELD TASKS
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

SITE	FIELD TASKS	RATIONALE
POL TANK FARM	1. Perform geophysical survey	1. Determine the location of any pipechase or utilities.
	2. Perform ground-water screening. Collect twenty five upper zone ground-water samples and screen for contamination.	2. Determine the nature and extent of ground-water contamination and expand ground-water data base.
UNNAMED STREAM	1. Perform geophysical survey	1. Determine locations of USTs, piping and utilities.
	2. Install three new monitoring wells (MW-01 through MW-03). Screen soils with HNu. Collect two soils samples per boring for lab analyses, one from the zone of the highest HNu reading and one from the ground-water interface.	2. Assess the hydrocarbon impact to native soils.
	3. Sample ground water on the three new monitoring wells and sample eight existing wells.	3. Determine the nature and extent of ground-water contamination and expand the ground-water data base.
	4. Surface water/sediment sampling.	4. Determine the extent of contamination related to the oil/water separator
	5. Aquifer Testing (In-Situ hydraulic conductivity)	5. Determine hydraulic characteristics of the upper zone aquifer.

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TABLE 2-2

FIELD EQUIPMENT CHECKLIST
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

General

_____ 1. Investigation Work Plan
_____ 2. Sampling and Analysis Plan
_____ 3. Health and Safety Plan
_____ 4. Site base map
_____ 5. Hand calculator
_____ 6. Brunton compass
_____ 7. Personal clothing and equipment

Safety Equipment

_____ 1. Work gloves
_____ 2. Barrier rope
_____ 3. Plastic flagging tape
_____ 4. Drinking water container
_____ 5. Gatorade or equivalent
_____ 6. First aid kit
_____ 7. Eyewash kit
_____ 8. Spill control (Vermiculite)
_____ 9. Knife
_____ 10. Flashlight or lantern
_____ 11. Personal locator beacon (sound, radio or light)
_____ 12. Radio, two-way
_____ 13. Safety belt, harness, and lifeline

Personal Protective Equipment

_____ 1. Long cotton underwear
_____ 2. Coveralls, cotton
_____ 3. Coveralls, Tyvek
_____ 4. Surgical gloves
_____ 5. Protective gloves (polypropylene/nitrile/viton)
_____ 6. Protective boots (rubber, steel toe/shank)
_____ 7. Hard hat
_____ 8. Face shield
_____ 9. Safety glasses
_____ 10. Air-purifying respirator
_____ 11. Respirator spectacle kit

TABLE 2-2

FIELD EQUIPMENT CHECKLIST
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

Sampling Equipment

_____ 1. Tool box with assorted tools (pipe wrenches, screwdrivers, socket set and driver, open and box end wrenches, hacksaw, hammer, vise grips)
_____ 2. Geologic hammer
_____ 3. Trowel
_____ 4. Stainless steel and/or Teflon spatula
_____ 5. Hand auger
_____ 6. Dames & Moore Type U split-spoon sampler with liners (stainless steel, brass)
_____ 7. Engineer's tape
_____ 8. Steel tape
_____ 9. Electric water level sounder
_____ 10. Petroleum interface probe
_____ 11. Batteries
_____ 12. Bailers (Teflon, stainless steel, acrylic, PVC)
_____ 13. Slug test water displacement tube
_____ 14. Vacuum hand pump
_____ 15. Electric vacuum pump
_____ 16. Displacement hand pump
_____ 17. Mechanical pump (centrifugal, submersible, bladder)
_____ 18. Portable generator
_____ 19. Gasoline for generator
_____ 20. Hose
_____ 21. Calibrated buckets
_____ 22. Stop watch
_____ 23. Orifice plate or equivalent flow meter
_____ 24. Data logger and pressure transducers
_____ 25. Sample bottles
_____ 26. Sample preservatives (nitric, hydrochloric, sodium hydroxide)
_____ 27. Heavy-duty aluminum foil
_____ 28. Coolers
_____ 29. Ice (not reusable ice packs ["Blue Ice"])
_____ 30. Large "Ziploc" freezer bags
_____ 31. Miscellaneous garbage bags
_____ 32. Duct tape
_____ 33. Strapping tape
_____ 34. Paper towels
_____ 35. "Bubble" pack
_____ 36. Vermiculite
_____ 37. Clear tape
_____ 38. Containers for field tests (pH, SC, temp.)
_____ 39. Transfer pipets (glass) and bulbs
_____ 40. Polyethylene rope for bailers
_____ 41. Teflon tubing to cover bailer rope

TABLE 2-2

FIELD EQUIPMENT CHECKLIST
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

Environmental Monitoring Equipment

_____ 1. Shovels
_____ 2. Keys to well caps
_____ 3. pH meter (with calibration solutions)
_____ 4. pH paper
_____ 5. Thermometer
_____ 6. Conductivity meter (with calibrating solution)
_____ 7. Organic vapor analyzer or photoionization detector with calibration gas
_____ 8. Explosimeter
_____ 9. Oxygen meter
_____ 10. Turbidimeter

Decontamination Equipment

_____ 1. Potable water
_____ 2. Alconox, Liquinox, or equivalent
_____ 3. Methanol, pesticide-grade
_____ 4. Hexane, pesticide-grade
_____ 5. Nitric acid
_____ 6. Distilled, deionized water, Type II reagent grade
_____ 7. Teflon squeeze bottles
_____ 8. Stainless steel garden sprayers
_____ 9. Buckets and containers for decontamination fluids
_____ 10. Scrub and bottle brushes
_____ 11. Waste containers (plastic trash cans/55-gallon hazardous waste containment drums)
_____ 12. Steam cleaner (generally provided by subcontractor)

Documentation Supplies

_____ 1. Field log book
_____ 2. Daily quality control report
_____ 3. Soil test boring record
_____ 4. Monitoring well installation log forms
_____ 5. Well development data forms
_____ 6. Aquifer test data forms
_____ 7. Sample chain-of-custody forms
_____ 8. Custody seals
_____ 9. Cooler labels ("This side up," "Hazardous Material," "Fragile")
_____ 10. Courier labels/airbills
_____ 11. Request for analysis forms
_____ 12. Sample bottle labels
_____ 13. Camera and film
_____ 14. Paper
_____ 15. Pens/pencils
_____ 16. Indelible ink pens

TABLE 2-3

SAMPLE CONTAINERS, AMOUNTS, AND PRESERVATION
SOIL AND SEDIMENT SAMPLES
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

PARAMETER (a)	SAMPLE CONTAINER (b)	AMOUNT	PRESERVATION
Volatile Organics (includes samples for Aromatic Volatiles analysis)	Two 2 oz. G septa jars	Full; no headspace	Cool to 4°C
Total Recoverable Petroleum Hydrocarbons	One 8 oz. G jar (c)	Full	Cool to 4°C
Metals, total	One 8 oz. G jar	Full	Cool to 4°C
Toxicity Characteristic Leaching Procedure	One 8 oz. G jar (c)	Full	Cool to 4°C

NOTES:

(a) Hold times are presented in Section 1.8
(b) All containers to have Teflon®-lined lids except for vials for volatile organics which will have Teflon®-lined septa. Container codes: G = glass AG = amber glass P = polyethylene
(c) Samples chosen for MS/MSD and/or Laboratory Duplicate require double the number of containers indicated.

TABLE 2-4

SAMPLE CONTAINERS, AMOUNTS, AND PRESERVATION-
GROUND WATER AND SURFACE WATER SAMPLES
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

PARAMETER (a)	SAMPLE CONTAINER (b)	AMOUNT	PRESERVATION
Volatile Organics (includes samples for Aromatic Volatiles analysis)	Three 40 mL G vials	Full; no headspace	HCl to pH < 2; Cool to 4°C
Extractable Organics	Two 1 L AG bottles (c)	7/8 full	Cool to 4°C
Petroleum Hydrocarbons	Three 40 mL G vials	Full; no headspace	H_2SO_4 to pH <2; Cool to 4°C
Total Recoverable Petroleum Hydrocarbons	Two 1 L AG bottles(c)	7/8 full	H_2SO_4 to pH <2; Cool to 4°C
Metals, total & dissolved	One 1 L P bottle	7/8 full	HNO_3 to pH<2; Cool to 4°C
Arsenic	One 1 L P bottle (c)	7/8 full	HNO_3 to pH<2; Cool to 4°C
Mercury	One 1 L P bottle	7/8 full	HNO_3 to pH<2; Cool to 4°C
Selenium	One 1 L P bottle	7/8 full	HNO_3 to pH<2; Cool to 4°C
Lead	One 1 L P bottle	7/8 full	HNO_3 to pH<2; Cool to 4°C
Oil and Grease	One 1 L G bottle (c)	7/8 full	H_2SO_4 to pH<2; Cool to 4°C
Purgeable Halocarbons	One 1 L G bottle (c)	7/8 full	H_2SO_4 to pH<2; Cool to 4°C
Toxicity Characteristic Leaching Procedure	One 1 L G bottle (c)	7/8 full	Cool to 4°C

NOTES:

(a) Hold times are presented in Section 1.8
(b) All containers to have Teflon®-lined lids except for vials for volatile organics which will have Teflon®-lined septa. Container codes: G = glass AG = amber glass P = polyethylene
(c) Samples chosen for MS/MSD and/or Laboratory Duplicate require double the number of containers indicated.
(d) If necessary

TABLE 2–5

SAMPLING SUMMARY: SUB–SURFACE SOIL FROM BORINGS
Remedial Investigation Feasibility Study – Carswell Air Force Base, Texas

PARAMETER	TOTAL NO. FIELD LOCATIONS	FIELD QC SAMPLES					TOTAL NO. FIELD SAMPLES
		Field Duplicate	Equipment Blank	Amb Cond Blank	Blind QC	Trip Blank (a)	
Volatile Organics							
Unnamed Stream	3	1	1	1	0	1	10
TOTALS	3	1	1	1	0	1	10
Aromatic Volatiles							
Unnamed Stream	3	1	1	1	0	1	10
TOTALS	3	1	1	1	0	1	10
Total Recoverable Petroleum Hydrocarbons							
Unnamed Stream	3	1	1	1	0	0	8
TOTALS	3	1	1	1	0	0	8
Toxicity Characteristic Leaching Procedure							
Unnamed Stream	3	0	0	0	0	0	3
TOTALS	3	0	0	0	0	0	3

Note: Analytical methodologies are presented in the Sampling and Analysis Plan.
(a) Volatile Organics only; number to be initiated will depend upon number of shipments.

TABLE 2-6

SAMPLING SUMMARY: GROUND WATER – MONITORING WELLS
Remedial Investigation Feasibility Study – Carswell Air Force Base, Texas

PARAMETER	TOTAL NO. FIELD LOCATIONS	FIELD QC SAMPLES					TOTAL NO. FIELD SAMPLES
		Field Duplicate	Equipment Blank	Ambient Blank	Blind QC	Trip Blank (a)	
Volatile Organics							
Unnamed Stream	11	2	2	1	0	1	28
TOTALS	11	2	2	1	0	1	28
Total Recoverable Petroleum Hydrocarbons							
Unnamed Stream	11	2	2	0	0	0	26
TOTALS	11	2	2	0	0	0	26
Oil and Grease							
Unnamed Stream	11	2	2	0	0	0	26
TOTALS	11	2	2	0	0	0	26
Screen for 24 Metals							
Unnamed Stream	11	2	2	0	0	0	26
Unnamed Stream Total Dissolved	11	2	2	0	0	0	26
TOTALS	22	4	4	0	0	0	52
Arsenic							
Unnamed Stream	11	2	2	0	0	0	26
Unnamed Stream Total Dissolved	11	2	2	0	0	0	26
TOTALS	22	4	4	0	0	0	52
Mercury							
Unnamed Stream	11	2	2	0	0	0	26
Unnamed Stream Total Dissolved	11	2	2	0	0	0	26
TOTALS	22	4	4	0	0	0	52
Selenium							
Unnamed Stream	11	2	2	0	0	0	26
Unnamed Stream Total Dissolved	11	2	2	0	0	0	26
TOTALS	22	4	4	0	0	0	52
Lead							
Unnamed Stream	11	2	2	0	0	0	26
Unnamed Stream Total Dissolved	11	2	2	0	0	0	26
TOTALS	22	4	4	0	0	0	52
Toxicity Characteristic Leaching Procedure							
Unnamed Stream	5	1	0	0	0	0	6
TOTALS	5	1	0	0	0	0	6

Note: Analytical methodologies are presented in the Sampling and Analysis Plan.
(a) Volatile Organics only; number ot be initiated will depend upon number of shipments.

TABLE 2–7

SAMPLING SUMMARY: GROUND WATER – HYDROPUNCH SURVEY
Remedial Investigation Feasibility Study – Carswell Air Force Base, Texas

PARAMETER		TOTAL NO. FIELD LOCATIONS	FIELD QC SAMPLES					TOTAL NO. FIELD SAMPLES
			Field Duplicate	Equipment Blank	Amb Cond Blank	Blind QC	Trip Blank (a)	
Aromatic Volatiles								
POL Tank Farm		9	3	2	2	0	2	18
Reserve (b)		1	0	0	0	0	0	1
	TOTALS	10	3	2	2	0	2	19
Petroleum Hydrocarbons								
POL Tank Farm		22	5	2	2	0	0	31
Reserve (b)		3	0	1	1	0	0	5
	TOTALS	25	5	3	3	0	0	36
Lead								
POL Tank Farm		9	5	3	0	0	0	17
Reserve (b)		1	0	0	0	0	0	1
	TOTALS	10	5	3	0	0	0	18

Note: Analytical methodologies are presented in the Sampling and Analysis Plan.
(a) Volatile Organics only; number to be initiated will depend upon number of shipments.
(b) One or three Hydropunch sampling locations will be reserved for discretionary use during the implementation of the field work.

TABLE 2-8

SAMPLING SUMMARY: SURFACE WATER
Remedial Investigation Feasibility Study – Carswell Air Force Base, Texas

PARAMETER	TOTAL NO. FIELD LOCATIONS	FIELD QC SAMPLES					TOTAL NO. FIELD SAMPLES
		Field Duplicate	Equipment Blank	Ambient Blank	Blind QC	Trip Blank (a)	
Volatile Organics							
Unnamed Stream	3	1	1	1	0	1	7
TOTALS	3	1	1	1	0	1	7
Total Recoverable Petroleum Hydrocarbons							
Unnamed Stream	3	1	1	0	0	0	5
TOTALS	3	1	1	0	0	0	5
Oil and Grease							
Unnamed Stream	3	1	1	0	0	0	5
TOTALS	3	1	1	0	0	0	5

Note: Analytical methodologies are presented in the Sampling and Analysis Plan.
(a) Volatile Organics only; number to be initiated will depend upon number of shipments.

TABLE 2–9

SAMPLING SUMMARY: SEDIMENT
Remedial Investigation Feasibility Study – Carswell Air Force Base, Texas

PARAMETER	TOTAL NO. FIELD LOCATIONS	FIELD QC SAMPLES					TOTAL NO. FIELD SAMPLES
		Field Duplicate	Equipment Blank	Amb Cond Blank	Blind QC	Trip Blank (a)	
Screen for 24 Metals							
Unnamed Stream	3	1	1	0	0	0	5
TOTALS	3	1	1	0	0	0	5

Note: Analytical methodologies are presented in the Sampling and Analysis Plan.
(a) Volatile Organics only; number to be initiated will depend upon number of shipments.

TABLE 2-10

FIELD CORRECTIVE ACTION PROCEDURES
Remedial Investigation/Feasibility Study
Carswell Air Force Base, Texas

SITUATION	CALIBRATION STABILITY	FREQUENCY	FIELD OBJECTIVE AFFECTED	CORRECTIVE ACTION RESPONSE
Equipment malfunction			Equipment is calibrated and operating properly	- Notification of site supervisory personnel - Repair or replace malfunctioning parts - Recalibrate and/or replace standards - Resample or repeat task if necessary - Document to Project Manager
pH	- Stability checked with two buffer solutions that bracket expected sample pH	- Before well purging and before final value is measured		
SC	- Stability checked with two standards in expected range of sample SC	- Daily		
Temperature	- Stability checked within expected temperature range of samples	- Monthly		
Turbidity	- Stability checked within expected range of sample turbidity	- Daily		
PID	- Stability checked with a 100 ppm level of isobutylene	- Daily		
Incorrect measurement procedure	NA	NA	Measurements are conducted according to standard operating procedures	- Notification of site supervisory personnel - Review of situation and correct procedures - Document to Project Manager
Incorrect sample collection procedures	NA	NA	Samples are taken according to standard operating procedures	- Notification of site supervisory personnel - Review of situation and correct procedures - Document to Project Manager
Insufficient sample volume collection	NA	NA	Sufficient sample volume is provided to maintain sample integrity and so that all required analyses can be conducted	- Notification of site supervisory personnel - Review site affected and impact of samples on site characterization - correct procedures - Document to Project Manager and AFCEE TPM

NA - Not Applicable

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