FB 98

DEPARTMENT OF THE ARMY

U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
DIRECT SUPPORT ACTIVITY-WEST
U.S. ARMY GARRISON, FITZSIMONS
AURORA, COLORADO 80045-5001

REPLY TO ATTENTION OF MCHB-AW-EH (40-5f)

5 May 1998

MEMORANDUM FOR Commander, U.S. Army Air Defense Artillery Center and Fort Bliss, ATTN: ATZC-DOE, Directorate of Environment, Fort Bliss, TX 79916-6816

SUBJECT: Sampling Plan Project No. 32-RE-6884-98, Wastewater Feasibility Study, Fort Bliss, Texas.

Enclosed is subject Sample Plan. Please provide comments no later than 30 May 1998. The point of contact is the undersigned at DSN 943-8100 or Commercial (303) 361-3726.

FOR THE COMMANDER:

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MAJ, MS
Chief, Environmental Health Engineering Division

Encl
as

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NMED, ATTN: GWPPS (Ms. Marchell Schuman)

Readiness thru Health

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SAMPLING PLAN
WASTEWATER FEASIBILITY STUDY
FORT BLISS, TEXAS
PROJECT NO. 32-RE-6884-98

1. REFERENCES. Appendix A contains a list of references used to prepare this Sampling Plan.

2. PURPOSE. The purpose of this sampling plan is to collect field data to prepare a Feasibility Study for wastewater treatment alternatives at four wastewater oxidation/evaporation lagoons which have also been designated as Solid Waste Management Units (SWMUs) under the Resource Conservation Recovery Act (RCRA) located at several Fort Bliss range camps in New Mexico. Sample results will be used to characterize the following: the waste stream into each lagoon; the extent of wastewater treatment in the ponds; and the potential impact on ground water. Data collected will also be used to complete a groundwater discharge permit application required by the State of New Mexico.

3. BACKGROUND.

a. The sites consist of four wastewater oxidation lagoons to include the McGregor Range Wastewater Lagoon (SWMU 19), the Meyer Range Wastewater Lagoon (SWMU 76), the Doña Ana Range Wastewater Lagoon (SWMU 27B), and the Orogrande Range Wastewater Lagoon (SWMU 25B). Map locations of these sites are represented in Figure 1. The ponds are located in a desert environment within the State of New Mexico. Each pond was constructed to treat wastewater generated at the range camps. The range camps are isolated from the main Fort Bliss cantonment area and are independent from any other municipal sanitary sewage system. The primary wastewater component at each site is domestic sewage. Secondary sources include drainage from vehicle washing areas and maintenance operations.

b. The area is situated in an arid basin at approximately 4,000 feet in elevation bordered on the west by the Franklin Mountains and bordered on the east by the Hueco Mountains. The basin, named the Hueco Bolson, consists of alluvial deposits washed down from the Franklin and Hueco Mountains. Sediments in the basin are composed of alternating beds of sand, gravel, boulders, silt, clay, and caliche (References 2 and 3). The groundwater system in the region is recharged by precipitation in the surrounding foothills. Recharge generally does not occur unless precipitation is great enough to cause surface flow through ephemeral streams and channels from the surrounding mountains to the basin.

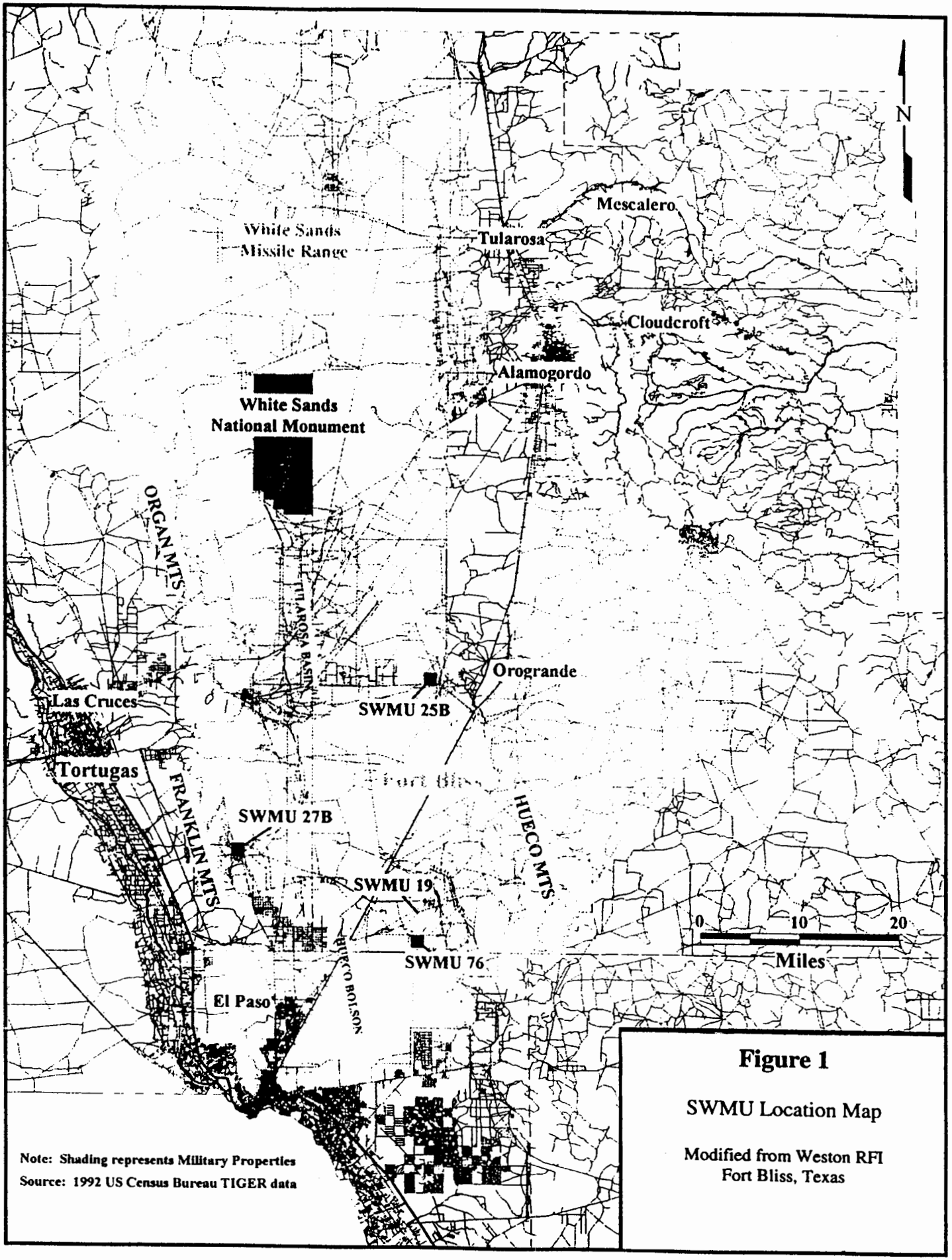

Figure 1

SWMU Location Map

Modified from Weston RFI
Fort Bliss, Texas

The regional groundwater table in the Hueco Bolson is found at depths ranging from 350 to 500 feet.

c. This Study is intended to supplement both a RCRA Facility Investigation (RFI) conducted by Roy F. Weston, Inc. in 1997 (Weston 97) and a follow on subsurface investigation conducted by Tetra Tech EM, Inc. in 1998 (Tetra Tech 98) (References 1 and 2). Laidlaw Environmental Services (FS), Inc. also prepared a sampling program in January 1996 for soil and water analysis at each of the four lagoons (Reference 4). Information from past studies and reports on the sites is included to eliminate possible duplication of effort and present background information that will help in the development of the permit application and possible treatment alternatives. Site maps of each lagoon are displayed in Figures 2 through 5.

4. PREVIOUS INVESTIGATION DATA.

a. The subsurface investigation conducted by Tetra Tech (Reference 2) had two primary objectives: (1) to evaluate the presence and concentration of contaminants in soil and groundwater at three of the four oxidation lagoons (McGregor, Doña Ana, and Orogrande) and (2) to determine the moisture content of subsurface soil and the hydrogeologic profile at each site to provide data for evaluation the potential for water and solutes to migrate downward. Soil and groundwater samples were analyzed for the parameters listed in Table 1. The only contaminants of concern detected above screening criteria were metals in the subsurface soils at each of the three sites and elevated metals in groundwater from the Doña Ana Site. Tetra Tech determined the metals in subsurface soil and groundwater samples are due to relatively high background concentrations. Of the three sites, vadose zone flow modeling indicated that the Doña Ana area has the highest potential for downward migration of moisture and solutes, yet the transit time for moisture to reach the regional aquifer from the surface is estimated at over 1,000 years. The investigation also concluded that:

> "Based on the presence of thick units of dry, hard, clayey silts and silty clays at each of the three sites, the potential for infiltration from the oxidation lagoons to have any impact on the regional aquifer is considered insignificant."

Table 1. Analytical Methods from Subsurface Investigation by Tetra Tech

Analytical Method	Test Method
Volatile Organic Compounds (VOCs),	SW 846 EPA method 8260
Semi-volatile Organic Compounds (SVOCs),	SW 846 EPA method 8270 A
Pesticides and Polychlorinated biphenyls (PCBs)	SW 846 EPA method 8080
RCRA metals	SW 846
Arsenic	EPA method 7060
Barium	EPA method 6010
Cadmium	EPA method 6010
Chromium	EPA method 6010
Lead	EPA method 6010
Mercury	EPA method 7471
Selenium	EPA method 7740
Silver	EPA method 6010

(1) McGregor Range Wastewater Lagoon (SWMU 19)

- Tetra Tech drilled monitoring well MW-1904 at the McGregor Range lagoon (See Figure 1). Four soil samples were collected from the well and submitted for analysis of the parameters shown in Table 1. Tetra Tech terminated drilling at 350 feet below ground service (bgs) when no groundwater was encountered.

- Soil sample results are listed in Tetra Tech's report according to their collection depth. The four samples were collected at: 58-60 ft, 170-172 ft, 240-242 ft, and 291-292 ft. No VOCs, SVOCs, pesticides, or PCBs were found in the soil samples at the McGregor Range Lagoon. The following metals exceeded laboratory detection limits in the soil samples: arsenic (from 1.4 to 8.9 milligrams per kilogram (mg/kg)), barium (from 13 to 298 mg/kg), chromium (from 1.4 to 5.9 mg/kg), lead (from 3.3 to 20.7 mg/kg), mercury (at 0.06 mg/kg), and selenium (from 0.22 to 0.91 mg/kg).

Table 2. Tetra Tech's Soil Sample Results from the McGregor Lagoon – MW 1904

Depth (feet bgs)	58-60	170-172	240-242	291-292	291-292 (DUP)
Parameter (mg/kg):					
Arsenic	8.9	3.1	1.4	4.5	5.0
Barium	112	124	13.0	217	298
Chromium	U	3.9	U	3.9	5.3
Lead	20.7	4.4	3.3	7.1	8.0
Mercury	U	U	U	U	0.06
Selenium	0.91	0.44	0.22	U	U

Note: U = Not detected at given detection limit, J = estimated value

(2) Doña Ana Range Wastewater Lagoon (SWMU 27B)

- Tetra Tech drilled monitoring well MW-27B01 at the Doña Ana lagoon (See Figure 2). Water was encountered at 340 feet bgs and the well was completed at 345 feet bgs. Five soil samples and two groundwater samples were collected from the well and submitted for analysis of the parameters shown in Table 1.

- Two groundwater samples and one duplicate were collected from MW-27B01 at a depth of 340 feet bgs. No Pesticides or PCBs were encountered. The following results exceeded laboratory detection limits as listed in Table 3.

Table 3. Tetra Tech's Aqueous Sample Results from the Doña Ana Lagoon

Sample:	MW-27B01	MW-27B01 (DUP)	MB-27B01 (Hydropunch)
Metals (µg/L)			
Arsenic	33.1	24.6	118
Barium	700	564	1,940
Cadmium	U	U	2.6
Chromium	464	332	834
Lead	73.6	64.7	1,240
Mercury	0.21	0.11	0.22
Selenium	15.2	9.2	U
Silver	1.1	U	U
VOCs (µg/L)			
2-butanone	U	U	11
Acetone	U	U	50
SVOCs (µg/L)			
4-chloro-3-methylphenol	U	U	10
Bis(2-ethylhexyl) phthalate	15	27	33
Di-n-bytyl phthalate	U	4J	22
N-nitrosodiphenylamine	U	U	75

Note: U = Not detected at given detection limit, J = estimated value

- Five soil samples were collected at: 188-190 ft, 228-230 ft, 290-292 ft, 310-311 ft, and 341-342 ft. Methylene chloride was found at 13 micrograms per kilogram (µg/kg) in the 341-342 foot sample. No other VOCs, SVOCs, pesticides or PCBs were found in the soil samples at the Doña Ana Lagoon. The following metals exceeded laboratory detection limits in the soil samples: arsenic (from 1.1 to 7.3 mg/kg), barium (from 9.5 to 59.2 mg/kg), chromium (from 1.5 to 4.7 mg/kg), lead (from 2.4 to 8.8 mg/kg), and selenium (from 0.28 to 0.5 mg/kg).

Table 4. Tetra Tech's Soil Sample Results from the Doña Ana Lagoon

Depth (feet bgs)	188-190	228-230	290-292	310-311	341-342
Parameter (mg/kg):					
Arsenic	1.8	3.3	1.1	7.3	1.4
Barium	9.5	29.4	22.2	59.2	13.3
Chromium	1.5	4.1	1.6	4.7	2.1
Lead	3.1	6.2	2.4	8.8	3.4
Selenium	0.28	0.83	U	U	0.50

Note: U = Not detected at given detection limit, J = estimated value

(3) Orogrande Range Wastewater Lagoon (SWMU 25B)

- Tetra Tech drilled monitoring well MW-25B01 at the Orogrande lagoon (See Figure 3). Three soil samples were collected from the well and submitted for analysis of the parameters shown in Table 1. Drilling was terminated at 320 feet bgs when bedrock was encountered. No groundwater was encountered.

- The three samples were collected at: 54-55 ft, 158-159.5 ft, 188-189.5 ft. No VOCs, SVOCs, pesticides or PCBs were found in the soil samples at the Orogrande Lagoon. The following metals exceeded laboratory detection limits in the soil samples: arsenic (from 2.8 to 7.4 mg/kg), barium (from 13.1 to 30.8 mg/kg), chromium (from 2.1 to 3.9 mg/kg), and lead (from 4.2 to 12.5 mg/kg).

Table 5. Tetra Tech's Soil Sample Results from the Orogrande Lagoon

Depth (feet bgs)	54-55	158-159.5	188-189.5
Parameter (mg/kg):			
Arsenic	2.8	3.5	7.4
Barium	15.6	13.1	30.8
Chromium	2.1	2.8	3.9
Lead	4.2	5.2	12.5

Note: U = Not detected at given detection limit, J = estimated value

b. Weston conducted an RFI to determine if hazardous wastes or constituents were released into the environment from the oxidation lagoons. During the RFI, samples of soil/sediment, subsurface soil, surface water, wastewater, and groundwater were collected and analyzed to determine the nature and extent of contamination. A general summary of Weston's findings is described in the following text. A detailed listing of sample numbers, analytical parameters, and sample matrix is represented in Appendix B. Analytical results from soil and sediment sampling are also included in Appendix B. Site maps with soil boring locations, monitoring wells, and groundwater gradients are depicted in Figures 1 through 4. Table 6 summarizes the analytical methods used for the RFI.

Table 6. Analytical Methods from RFI by Weston

Analytical Parameter	Test Method
VOCs	SW 846 8240
SVOCs	SW 846 8270
PCB/Pesticides	SW 846 8080
TPH	EPA 418.1
Nitrate as Nitrogen (NO_3)	EPA 353.2
Total Kjeldahl Nitrogen (TKN)	EPA 351.3
Ammonia as Nitrogen (NH_3)	EPA 350.2
Biological Oxygen Demand (BOD_5)	EPA 405.1
Chemical Oxygen Demand (COD)	EPA 410.1
Total Organic Carbon (TOC)	EPA 415.1
Total Dissolved Solids (TDS)	EPA 160.1
Metals	SW 846
Arsenic	EPA method 7060
Barium	EPA method 6010A
Cadmium	EPA method 6010A
Chromium	EPA method 6010A
Lead	EPA method 6010A
Mercury	EPA method 7471
Selenium	EPA method 7740
Silver	EPA method 6010A
Cation Exchange Capacity (COC)	SW-846 9081
Fractional Organic Carbon (FOC)	ASTM D2974
Saturated Hydraulic Conductivity	ASTM D5084

(1) RFI Results - Summary by Sample Matrix:

- Weston collected sediment and surface soil samples from the four sites at a depth of 0 to 6 inches. At the McGregor lagoon, Weston collected twelve samples (sample numbers S1901-N through S1912-N). At the Meyer lagoon, Weston collected eight samples (sample numbers S7601-0-N through S7608-0-N). At the Doña Ana lagoon, Weston collected ten samples (sample numbers S27B01-0-N through S27B10-0-N). At the Orogrande lagoon, Weston collected twelve samples (sample numbers S25B01-0-N through S25B12-0-N). At the Doña Ana and Meyer lagoons, all but one of the sediment samples was collected outside the area of standing water. Three of the sediment samples from the Orogrande lagoon were from the area of standing water. All of the McGregor lagoon sediment samples were collected from the bottom of the pond in standing water. Analytical results for soil and sediment samples are located in Appendix B. See Figures 2 through 5 for sample locations. Sediment and surface soil samples were analyzed for VOCs, SVOCs, pesticides/PCBs, total metals (arsenic, barium, cadmium, chromium, lead, silver, mercury, and selenium), TPH, nitrate, and TKN.

- Three surface water samples were collected from the Orogrande lagoon (sample

numbers SW25B01-N through SW25B03-N) and five surface water samples were collected from the McGregor lagoon (sample numbers SW1901-N through1905-N). One surface water sample each was collected from the Meyer (sample number SW7601-N) and Doña Ana (sample number SW27B01-N) lagoons. See Figures 2 through 5 for sample locations. Analytical results for surface water samples are presented in the following section, 4.b.(2). Surface water samples were analyzed for VOCs, SVOCs, pesticides/PCBs, total metals, TPH, and nitrate.

- Wastewater samples were collected using an automatic sampler installed at the closest upstream manhole on the pond influent line. Samples were collected once per hour for a 24-hour period and then combined into one composite sample. Three 24-hour composite samples were collected from the McGregor lagoon (sample numbers WW1901-N through ww1903-N), and one composite wastewater sample each was collected from the Orogrande (sample number WW25B01-N) and Doña Ana (sample number WW27B01-N) lagoons. No wastewater sample was collected at the Meyer lagoon. See Figures 2, 3, and 5 for sample locations. Analytical results for wastewater samples are presented in the following section, 4.b.(2). Wastewater samples were analyzed for VOCs, SVOCs, pesticides/PCBs, total metals, TPH, BOD_5, COD, ammonia, and nitrate.

- Subsurface soil samples were collected at approximately 10-foot intervals from a total of thirty-nine soil borings. See Figures 2 through 5 for soil boring locations. Analytical results for subsurface soil samples are located in Appendix B. Soil boring depths are presented in Table 7. Subsurface soil samples were analyzed for VOCs, SVOCs, pesticides/PCBs, total metals TPH, nitrate, and TKN.

Table 7. Soil Boring Depths

McGregor Station ID	Total Depth (feet bgs)	Meyer Station ID	Total Depth (feet bgs)	Doña Ana Station ID	Total Depth (feet bgs)	Orogrande Station ID	Total Depth (feet bgs)
SB1901	30	SB7601	30	SB27B01	30	SB25B01	30
SB1902	30	SB7602	30	SB27B02	32	SB25B02	30
SB1903	30	SB7605	30	SB27B03	30	SB25B03	30
SB1904	30	SB7606	30	SB27B04	32	SB25B04	30
SB1905	15	SB7607	30	SB27B05	32	SB25B05	30
SB1906	30	SB7608	31	SB27B06	32	SB25B06	30
SB1908	30	SB7609	30	SB27B07	32	SB25B07	30
SB1909	35			SB27B08	42	SB25B08	30
SB1910	32.5					SB25B09	30
SB1911	49					SB25B10	30
						SB25B11	31

- Groundwater samples were collected from monitoring wells, which were developed when Weston encountered groundwater in six of the thirty-nine soil borings. Three monitoring wells are located at the McGregor lagoon (well numbers MW1901-MW1903) and three are at the Meyer lagoon (well numbers MW7601-MW7603). See Figures 2 and 4 for monitoring well locations. Table 8 lists monitoring well depths and identification numbers. Field measurements of groundwater included pH, specific conductivity, and temperature. Analytical results for ground water samples are presented in the following section, 4.b.(2). Groundwater samples were submitted to the laboratory for analysis of VOCs, SVOCs, pesticides/PCBs, total metals, TPH, TDS, TOC, and nitrate.

Table 8. Monitoring Well Details *

Well ID **	Total Depth (feet bgs)	Screened Interval (feet bgs)	Water Level From Top of Casing (feet)	Diameter (inches)
MW1901	67	47-67	59.15	2
MW1902	68	42-68	54.8	2
MW1903	62	42-62	51.3	2
MW7601	36	25.5-36	35.4	2
MW7602	37	22-37	30.45	2
MW7603	32	21.5-32	31.39	2

*This table was modified from Table 3-1 in the Weston RFI (Reference 2)
**The first two digits of the Well ID represent the SWMU number.

(2) RFI Results – Summary by Site:

This section includes sample results for wastewater, surface water, and groundwater that were above MCLs or analytical reporting limits. Analytical results for soil and sediment samples are located in Appendix B due to the large number of samples.

McGregor Range Wastewater Lagoon (SWMU 19).

- Groundwater was encountered at a depth of 50 to 60 feet below grade and is considered a "perched aquifer". The gradient flows toward the southwest. Three monitoring wells were installed at depths ranging from 62 to 67 Feet, numbered MW1901, MW1902, and MW1903. See Figure 2 for monitoring well locations.
- Lead was detected in one well sample, MW1902, above the MCL at 0.026 mg/L. This is consistent with background levels of metals in the area.
- Releases of hazardous constituents to the groundwater do not appear to have occurred.
- Constituents in surface water samples were below maximum contaminant levels.
- VOCs, SVOCs, PCBs, and heavy metals were detected in sediment samples above background concentrations.
- VOCs, SVOCs, pesticides, and PCBs were detected in surface soil samples at the McGregor Range Oxidation Lagoon, but below EPA Region 3 criteria for both the industrial soil ingestion and soil to air transfer scenarios.

Table 9. McGregor Range Oxidation Pond, Analytical Summary of Surface Water, Wastewater, and Groundwater Results Above MCLs, or Analytical Reporting Limit

Sample ID	WW1901	WW1902	WW1903	SW1901	SW1902	SW1903	SW1904	SW1905	MW1901	MW1902	MW1903
Analyte											
VOCs (µg/L)											
Acetone	170	44	19	ND	ND	ND	ND	ND	ND	ND	ND
Toluene (MCL = 1000 µg/L)	2 J	5 U	11	ND	ND	ND	ND	ND	ND	ND	ND
SVOCs (µg/L)											
4-Methylphenol (m-Cresol)	10 U	10 U	11	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-Ethylhexyl)phthalate	2 J	12 J	26	2 J	1 J	2 J	47	1 J	ND	ND	ND
Pesticides	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCBs	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals											
Lead (MCL = 0.015 mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	0.026	0.0081	0.013
General Chemistry (mg/L)											
NH_3	9.2	2.6	10.2	ND	ND	ND	ND	ND	ND	ND	ND
NO_3	0.1	0.15	0.21	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	14.1	8.1	0.53
BOD_5	68	16	74	ND	ND	ND	ND	ND	ND	ND	ND
COD	240	40	120	ND	ND	ND	ND	ND	ND	ND	ND
TPH	0.65	0.84	0.98 J	0.42	0.31	0.35	0.30	0.29	0.84	0.82	0.60

Note: Sample ID beginning with WW = Wastewater, SW = Surface Water, and MW = Groundwater
U = Analyte was not detected above the laboratory reporting limit.
J = Estimated concentration below the analytical reporting limit or due to the independent data validation where it was determined that the laboratory QC criteria was outside of control limits.
ND = Parameters not detected above background.

Meyer Range Wastewater Lagoon (SWMU 76)

- Groundwater was encountered at a depth between 30 and 35 feet below grade and is considered a "perched aquifer". Three monitoring wells were established at depths ranging from 32 to 36 feet. Limited piezometric data suggests that the gradient is directed to the northeast.
- Constituents were not detected in the surface water samples that exceeded MCLs.
- Occasional VOCs, pesticides, and metal constituents are present in sediment samples at concentrations above background, but below EPA Region 3 criteria for both the industrial soil ingestion and soil to air transfer scenarios.

Table 10. Meyer Range Oxidation Pond, Analytical Summary of Surface Water and Groundwater Results Above MCLs, or Analytical Reporting Limit

Sample ID	SW7601-N	MW7601-N	MW7603-N	MW7604-N
Analyte				
VOCs (µg/L)				
Bromodichloromethane (MCL= 100)	9	ND	ND	ND
Bromoform (MCL= 100)	10	ND	ND	ND
Chloroform (MCL= 100)	13	5 U	6	5 U
Dibromochloromethane (MCL= 100)	12	ND	ND	ND
SVOCs (µg/L)	ND	ND	ND	ND
Pesticides	ND	ND	ND	ND
PCBs	ND	ND	ND	ND
Metals	ND	ND	ND	ND
General Chemistry (mg/L)				
NO_3	(not available)	2.7	2.5	0.47
TPH	1.4	0.59	0.46	0.50

Note: Sample ID beginning with WW = Wastewater, SW = Surface Water, and MW = Groundwater
U = Analyte was not detected above the laboratory reporting limit.
J = Estimated concentration below the analytical reporting limit or due to the independent data validation where it was determined that the laboratory QC criteria was outside of control limits.
ND = Parameters not detected above background.

Doña Ana Range Wastewater Lagoon (SWMU 27B)

- Groundwater was not encountered in any of the borings at the Doña Ana Range oxidation lagoon.
- Cadmium and lead levels were detected in the surface water sample at concentrations above MCLs.
- VOCs, pesticides, and metals were detected in several sediment samples above background concentrations but below EPA Region 3 criteria for industrial soil ingestion and soil to air transfer scenarios.

Table 11. Doña Ana Range Oxidation Pond, Analytical Summary of Surface Water, Wastewater, and Groundwater Results Above MCLs, or Analytical Reporting Limit

Sample ID	WW27B01	SW27B01
Analyte		
VOCs (µg/L)	ND	ND
SVOCs (µg/L)		
Bis(2-Ethylhexyl)phthalate	33	10
Pesticides	ND	ND
PCBs	ND	ND
Metals		
Cadmium (MCL = 0.005)	ND	0.031
Lead (MCL = 0.015 mg/L)	ND	0.097
General Chemistry (mg/L)		
NH_3	14	ND
NO_3	0.1 U	0.1 U
BOD_5	3	ND
COD	18	ND
TPH	0.95	131

Note: Sample ID beginning with WW = Wastewater, SW = Surface Water, and MW = Groundwater
U = Analyte was not detected above the laboratory reporting limit.
J = Estimated concentration below the analytical reporting limit or due to the independent data validation where it was determined that the laboratory QC criteria was outside of control limits.
ND = Parameters not detected above background.

Orogrande Range Wastewater Lagoon (SWMU 25B)

- Groundwater was not encountered in any of the borings at the Orogrande oxidation lagoon.
- Lead, acetone, and total petroleum hydrocarbons were detected in surface water samples at concentrations either above MCLs or above reporting limits.
- Total Kjeldahl nitrogen and pesticides were detected in sediment and soil samples above background levels but below EPA Region 3 criteria for industrial soil ingestion and soil to air transfer scenarios.

Table 12. Orogrande Range Oxidation Pond, Analytical Summary of Surface Water and Wastewater Sample Results Above MCLs, or Analytical Reporting Limit

Sample ID	SW25B01-N	SW25B02-N	SW25B03-N	WW25B01-N
Analyte				
VOCs (µg/L)				
Acetone	10 U	17 J	10 U	ND
SVOCs (µg/L)				
Bis(2-Ethylhexyl)phthalate	ND	ND	ND	12
Pesticides				
PCBs	ND	ND	ND	ND
Metals				
Lead (MCL = 0.015 mg/L)	0.0020 U	0.026	0.0082	ND
General Chemistry (mg/L)				
NH_3	ND	ND	ND	1.2
NO_3	0.1 U	0.1 U	5.2	1.2
BOD_5	ND	ND	ND	4
COD	ND	ND	ND	14
TPH	0.49	0.39	0.40	0.67

Note: Sample ID beginning with WW = Wastewater, SW = Surface Water, and MW = Groundwater
U = Analyte was not detected above the laboratory reporting limit.
J = Estimated concentration below the analytical reporting limit or due to the independent data validation where it was determined that the laboratory QC criteria was outside of control limits.
ND = Parameters not detected above background.

c. The oxidation-pond sampling program report prepared by Laidlaw Environmental Services in 1996 tested for contaminants in surface soil and surface water at each site. Figure 5 displays sample location and depth. The Fort Bliss DOE chose sample locations, depth, and analytical parameters. Each sample was analyzed for Benzene, Toluene, Ethyl-benzene, and Xylenes (BTEX) with Method 5030/8020; Total Recoverable Petroleum Hydrocarbons (TRPH), using EPA Method 418.1; and Volatile Organic Compounds (VOCs) with Method 8260. VOCs were not detected in soil or water samples at any of the four sites (Reference 4).

(1) **McGregor Range Wastewater Lagoon (SWMU 19)**

- Four surface water samples were collected from the lagoon, one from each corner of the impoundment. BTEX compounds were non-detectable in the samples.
- One surface water sample test result detected TRPH at the detection limit of 1 mg/L.
- Nine of thirteen soil samples measured TRPH above detection limits. Six of thirteen soil samples reported one or more BTEX parameters above detection limits.

Table 13. Laidlaw's Sample Results from the McGregor Lagoon

Sample ID and Matrix	Benzene (µg/kg, or µg/L for water)	Toluene (µg/kg, or µg/L for water)	Ethlbenz.(µg/kg, or µg/L for water)	Xylene (µg/kg, or µg/L for water)	TRPH(mg/kg, or mg/L for water)
1 (soil)	ND	ND	ND	ND	ND
2 (soil)	ND	ND	ND	ND	ND
3 (soil)	ND	ND	ND	ND	ND
4 (soil)	ND	1	1	6	ND
5 (soil)	ND	1	ND	3	22
6 (soil)	ND	ND	ND	2	21
7 (soil)	ND	ND	ND	ND	23
8 (soil)	ND	ND	ND	1	20
9 (soil)	ND	ND	ND	ND	34
10 (soil)	ND	ND	ND	ND	28
11 (soil)	ND	ND	3	10	29
12 (soil)	ND	ND	ND	2	29
13 (soil)	ND	ND	ND	ND	35
15 (water)	ND	ND	ND	ND	1
16 (water)	ND	ND	ND	ND	ND
17 (water)	ND	ND	ND	ND	ND
18 (water)	ND	ND	ND	ND	ND

ND = Not Detected

(2) Meyer Range Wastewater Lagoon (SWMU 76)

- Thirteen soil samples were collected at depths ranging from 0 to 1 ½ feet. Five samples reported xylene values slightly above the detection limit. All soil samples detected TRPH.
- No water samples were collected

Table 14. Laidlaw's Sample Results from the Meyer Lagoon

Sample ID and Matrix	Benzene (µg/kg, or µg/L for water)	Toluene (µg/kg, or µg/L for water)	Ethlbenz.(µg/kg, or µg/L for water)	Xylene (µg/kg, or µg/L for water)	TRPH(mg/kg, or mg/L for water)
1 (soil)	ND	ND	ND	ND	14
2 (soil)	ND	ND	ND	ND	98
3 (soil)	ND	ND	ND	ND	16
4 (soil)	ND	ND	ND	ND	140
5 (soil)	ND	ND	1	3	86
6 (soil)	ND	ND	ND	2	ND
7 (soil)	ND	ND	ND	2	140
8 (soil)	ND	ND	ND	2	28
9 (soil)	ND	ND	ND	ND	77
10 (soil)	ND	ND	ND	ND	230
11 (soil)	ND	ND	ND	ND	210
12 (soil)	ND	ND	ND	ND	39
13 (soil)	ND	ND	ND	2	30

ND = Not Detected

(3) Doña Ana Range Wastewater Lagoon (SWMU 27B)

- The Doña Ana oxidation pond consists of one active cell and one inactive cell. Thirteen soil samples and four surface water samples were collected from the active side. Ten soil samples and no water samples were collected from the inactive side.
- On the active side, five soil samples reported BTEX and all soil samples reported some TRPH. The water samples reported no BTEX and two detected TRPH.
- On the inactive side, three soil samples detected BTEX and six detected TRPH.

Table 15. Laidlaw's Sample Results from the Active Doña Ana Lagoon

Sample ID and Matrix	Benzene (µg/kg, or µg/L for water)	Toluene (µg/kg, or µg/L for water)	Ethlbenz.(µg/kg, or µg/L for water)	Xylene (µg/kg, or µg/L for water)	TRPH(mg/kg, or mg/L for water)
1 (soil)	ND	ND	ND	5	60
2 (soil)	ND	ND	ND	ND	320
3 (soil)	ND	ND	ND	ND	78
4 (soil)	ND	ND	ND	3	11
5 (soil)	ND	ND	ND	2	23
6 (soil)	ND	ND	ND	ND	39
7 (soil)	ND	ND	ND	ND	630
8 (soil)	ND	ND	ND	ND	36
9 (soil)	ND	ND	ND	4	17
10 (soil)	ND	ND	ND	ND	19
11 (soil)	ND	ND	ND	3	18
12 (soil)	ND	ND	ND	ND	49
13 (soil)	ND	ND	ND	2	18
14 (water)	ND	ND	ND	ND	ND
15 (water)	ND	ND	ND	ND	ND
16 (water)	ND	ND	ND	ND	6
17 (water)	ND	ND	ND	ND	4

ND = Not Detected

Table 16. Laidlaw's Sample Results from the Inactive Doña Ana Lagoon

Sample ID and Matrix	Benzene (µg/kg, or µg/L for water)	Toluene (µg/kg, or µg/L for water)	Ethlbenz.(µg/kg, or µg/L for water)	Xylene (µg/kg, or µg/L for water)	TRPH(mg/kg, or mg/L for water)
1 (soil)	ND	ND	ND	ND	ND
2 (soil)	ND	ND	ND	ND	ND
3 (soil)	ND	ND	ND	ND	ND
4 (soil)	ND	ND	ND	ND	11
5 (soil)	ND	ND	2	5	15
6 (soil)	ND	ND	ND	ND	11
7 (soil)	ND	ND	ND	ND	11
8 (soil)	ND	ND	ND	ND	ND
9 (soil)	1	ND	5	4	14
10 (soil)	ND	ND	2	3	18

ND = Not Detected

(4) Orogrande Range Wastewater Lagoon (SWMU 25B)

- Fourteen soil samples and four surface water samples were collected at the Orogrande oxidation pond.
- Seven soil samples reported one or more BTEX compound and all soil samples reported some level of TRPH.
- Surface water samples reported no BTEX and one sample reported TRPH just above the detection limit.

Table 17. Laidlaw's Sample Results from the Orogrande Lagoon

Sample ID and Matrix	Benzene (µg/kg, or µg/L for water)	Toluene (µg/kg, or µg/L for water)	Ethlbenz (µg/kg, or µg/L for water)	Xylene (µg/kg, or µg/L for water)	TRPH(mg/kg, or mg/L for water)
1 (soil)	ND	ND	ND	ND	10
2 (soil)	ND	2	ND	2	20
3 (soil)	ND	3	2	8	19
4 (soil)	ND	ND	ND	3	34
5 (soil)	ND	ND	2	18	27
6 (soil)	ND	ND	ND	ND	26
7 (soil)	ND	ND	ND	ND	35
8 (soil)	ND	ND	ND	ND	30
9 (soil)	ND	ND	ND	4	46
10 (soil)	ND	ND	ND	ND	40
11 (soil)	ND	ND	ND	ND	39
12 (soil)	ND	ND	ND	ND	54
13 (soil)	ND	ND	ND	2	45
14 (soil)	ND	1	ND	4	57
15 (water)	ND	ND	ND	ND	ND
16 (water)	ND	ND	ND	ND	ND
17 (water)	ND	ND	ND	ND	2
18 (water)	ND	ND	ND	ND	ND

ND = Not Detected

5. SAMPLE COLLECTION RATIONALE. Each of the studies performed by Tetra-Tech, Weston, and Laidlaw conducted extensive groundwater, soil (surface and subsurface), sediment, wastewater, and surface water sampling and analyses for toxic pollutants. These existing data have been summarized in this plan and are thought to be adequate for the purposes of site characterization and fulfilling the requirement by the State of New Mexico to measure and report existing levels of toxic pollutants for the groundwater discharge permit. Thus, this sampling plan will focus on filling small data gaps required to successfully complete the groundwater discharge permit and evaluate the wastewater treatment process provided by the oxidation lagoons for the feasibility study. Based on the studies described in this report, the following conclusions relevant to this sampling plan can be made:

a. **Groundwater.**

(1) Based on the studies previously described, the presence of groundwater at these sites appears to be limited to "perched" aquifers caused by the discharge of the oxidation lagoons, with no apparent or realistic pathway to the regional aquifer. The Weston RFI encountered groundwater between 30 and 60 feet below ground surface at McGregor and Meyer lagoons. A total of 6 monitoring wells were installed and sampled at these locations (3 at each site). The Tetra-Tech study encountered groundwater only at the Doña Ana site, despite drilling to depths approaching 300 feet at Doña Ana, McGregor, and Orogrande. Groundwater sampling and analysis at all sites mentioned was comprehensive (VOCs, metals, TPH, TDS, TOC, pesticides/ PCBs, SVOCs, and nitrate). Results indicated that only very low levels of TPH and metals levels consistent with background concentrations were detected. Conclusions drawn from the Tetra-Tech study stated that "...the potential for infiltration from the oxidation lagoons to have any impact on the regional aquifer is considered insignificant."

(2) As a result, groundwater sampling and analysis for proposed for this study will be limited to wastewater parameters needed to characterize the treatment process for the feasibility study, complete the groundwater discharge application permit required by the state of New Mexico, and fill any minor data gaps from previous studies. These parameters include the following: TKN, total nitrogen (TN), total inorganic nitrogen (TIN), ammonia (NH3), nitrate (NO_3), nitrite (NO_2), biochemical oxygen demand (BOD_5), chemical oxygen demand (COD), total dissolved solids (TDS), total suspended solids (TSS), chloride (Cl), temperature, conductivity, and dissolved oxygen (all field measurements). Obviously, the ability to perform any of the oxygen demand tests will be dictated by the initial level of dissolved oxygen measured in the field. If the groundwater is anoxic or has a very low dissolved oxygen level, the oxygen demand tests (BOD_5 and COD) will not be performed, as the BOD test generally requires a sample size such that 2 mg/l dissolved oxygen is consumed and at least 1 mg/l of dissolved oxygen remains . A sampling matrix is provided in Table 18, which details the purpose of each sample as being process (i.e., needed to evaluate the wastewater treatment process and make recommendations for the feasibility study) or State (i.e., required by the State of New Mexico to complete the

groundwater discharge permit).

b. **Wastewater.**

(1) Based on the wastewater samples taken at Doña Ana, McGregor, and Orogrande during the Weston study (note - no wastewater samples were collected during the other studies or at Meyer lagoon), the influent wastewater characteristics to the oxidation lagoons seem comparable to a very weak domestic sewage concentration, or in some cases, domestic sewage that has been biologically treated. Influent BOD measurements at McGregor ranged between 16-74 mg/l, while Doña Ana and Orogrande both had influent BOD measurements less than 5 mg/l. The NH3-N influent measurements were more typical of weak or medium strength domestic wastewater at all locations sampled. For perspective, a weak, untreated domestic wastewater generally has BOD concentrations of 110 mg/L and NH3-N concentration of 8 mg/l (Reference 7). Most importantly, wastewater samples at all locations were analyzed for numerous toxic contaminants (VOCs, SVOCs, pesticides/ PCBs, heavy metals, and TPH) in addition to traditional wastewater parameters such as BOD, COD, nitrate, and ammonia. Of the toxic constituents, only very minor amounts of acetone and toluene were detected in several of the McGregor samples, and it is suspected that these low-level detections are either laboratory or sampling artifacts. Therefore, based on the data collected in the Weston RFI, the need to further characterize influent wastewater samples for toxic constituents is not necessary.

(2) Wastewater sampling during this study has been designed to more completely characterize the influent flow to support the wastewater feasibility study and develop possible treatment alternatives based on both the influent characteristics and the desired effluent characteristics. Again, because of the characterization performed for VOCs, SVOCs, pesticides/ PCBs, heavy metals, and TPH in the Weston RFI, this sampling effort will concentrate on more traditional wastewater parameters. Another consideration in the development of the wastewater sampling strategy was completion of the State of New Mexico groundwater discharge permit requirements. Specifically, the State of New Mexico has requested that the following wastewater influent parameters be measured: TKN, total dissolved solids (TDS), nitrate, and chloride. A complete matrix of proposed parameters for wastewater monitoring is provided in Table 18.

c. **Lagoon Surface Water.**

(1) Based on the surface water samples taken at Doña Ana, McGregor, Meyer, and Orogrande lagoons during the Weston and Laidlaw studies (note - no surface water samples were collected during the Tetra Tech study), similar conclusions can be drawn concerning the characteristics of the surface water in all the lagoons. The Weston RFI collected a total of 10 surface water samples from all of the lagoons and analyses were performed for VOCs, SVOCs, pesticides/ PCBs, metals, TPH, and nitrate. The Laidlaw study collected a total of 12 surface water samples from McGregor, Doña Ana, and Orogrande, which were analyzed for VOCs and

TPH. Results from each study were basically similar - indicating low-level (1- 5 mg/l) levels of TPH in some of the surface water samples. Analytical results for numerous other toxic contaminants (VOCs, SVOCs, pesticides/ PCBs, heavy metals) in surface water were below detection limits. Therefore, based on the surface water data collected in the Weston RFI and the Laidlaw study, the need to further characterize surface water samples for toxic constituents is not necessary.

(2) Surface water sampling during this study has been designed to more completely assess the degree of treatment provided by the lagoons and develop possible treatment alternatives based on both the influent characteristics and the desired effluent characteristics. Again, because of the characterization performed for VOCs, SVOCs, pesticides/ PCBs, heavy metals, and TPH in the Weston RFI and the Laidlaw study, the surface water sampling effort will concentrate on more traditional wastewater parameters. Another consideration in the development of the wastewater sampling strategy was completion of the State of New Mexico groundwater discharge permit requirements. Specifically, the State of New Mexico has requested that the following surface water parameters be measured at the opposite end of the impoundment from the influent: TKN, total dissolved solids (TDS), nitrate, and chloride. A complete matrix of proposed parameters for surface water monitoring is provided in Table 18.

Table 18. Sample Type and Use

Parameter	Laboratory Analysis	Field Analysis	Wastewater Influent (Grab)	Surfacewater (Grab)	Groundwater (Grab)	Data Use: P = Process* S = State**
TKN	✓		✓	✓	✓	P, S
TN		✓	✓	✓	✓	P
TIN		✓	✓	✓	✓	P
NH_3		✓	✓	✓	✓	P, S
NO_3	✓	✓	✓	✓	✓	P, S
NO_2	✓	✓	✓	✓	✓	P
BOD_5	✓		✓	✓	✓	P
COD	✓	✓	✓	✓	✓	P
TDS	✓	✓	✓	✓	✓	P, S
Cl	✓	✓	✓	✓	✓	P, S
TSS	✓		✓	✓	✓	P
PH		✓	✓	✓	✓	P
Temp.		✓	✓	✓	✓	P
Conductivity		✓	✓	✓	✓	P
Flow		✓	✓			P,S

*Process data collected to evaluate current treatment processes and to propose treatment alternatives.

**State required data collected to complete the groundwater discharge permit.

6. METHODOLOGY. A detailed description of sample collection methodology, analytical methods, decontamination procedures, and record keeping protocol is presented in Appendix C.

Samples collected for BOD and microbiological analysis will be delivered to a state-certified laboratory located at Fort Bliss or El Paso, TX. All other samples will be shipped to either the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) or USACHPPM, Direct Support Activity-West (DSA-W) laboratories via commercial carrier. Project personnel will ensure sample integrity and security until released to the carrier. Chain of custody seals will be placed on sample jars after they are filled and chain of custody forms will be completed. All samples will be shipped to the laboratory on the same day they are collected.

7. SAFETY. A site-specific safety and health plan has been included as Appendix D.

8. SCHEDULE. This Study is scheduled for the June/July time frame. A revised sampling plan will be submitted upon receipt of comments on this sampling plan. The Project Officer should receive analytical results not later than 30 days after their submission to the laboratory. A final report will be prepared within 60 days of receiving laboratory data.

9. TECHNICAL ASSISTANCE/FURTHER INFORMATION. Any questions or comments related to this Study may be directed to any of the undersigned at DSN 943-3734 or Commercial (303) 361-3734.

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REVIEWED AND APPROVED BY:

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APPENDIX A

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APPENDIX B

SAMPLE PARAMETERS AND SOIL SAMPLE RESULTS FROM FINAL RFI, WESTON 1997

Table B-1. McGregor Range Oxidation Pond Surface Soil\Sediment Summary of Analytical Results Above Background

Sample ID	S1901-N	S1902-N	S1903-N	S1904-N	S1905-N	S1906-N
Analyte						
VOCs (µg/kg)						
2-Butanone	44 U	23 U	40 U	130 U	38 U	140 U
Acetone	190 J	24	120	170	120	300
Benzene	22 U	12 U	20 U	47 J	19 U	120
Carbon Disulfide	22 U	12 U	13 J	57 J	19 U	58 J
Chlorobenzene	22 U	12 U	20 U	64 U	19 U	70 U
Methylene Chloride	22 U	12 U	20 U	64 U	19 U	70 U
Toluene	22 U	12 U	20 U	64 U	19 U	70 U
SVOCs (µg/kg)						
Bis(2-Ethylhexyl)phthalate	1700	790	8700	9300	1600	8700
Butylbenzylphthalate	1500 U	770 U	1300 U	4300 U	1200 U	4700 U
Fluoranthene	150 J	770 U	2100	600 J	210 J	480 J
Naphthalene	1500 U	770 U	160 J	4300 U	1200 U	4700 U
Phenanthrene	1500 U	770 U	2700	550 J	180 J	4700 U
Pesticides (µg/kg)						
4,4'-DDD	350 U	180 U	310 U	1000 U	300 U	1100 U
4,4'-DDE	350 U	180 U	97	1000 U	300 U	1100 U
4,4'-DDT	350 U	180 U	310 U	1000 U	300 U	1100 U
Alpha-Chlordane	180 U	92 U	160 U	510 U	150 J	560 U
Gamma-Chlordane	180 U	92 U	160 U	510 U	150 J	560 U
PCBs (µg/kg)						
Aroclor-1254	3500 U	1800 U	3100 U	10000 U	3000 U	11000 U
Metals (mg/kg)						
Barium	161	79.1	199	405	129	443
Cadmium	3.6 U	2.0 U	5.5	9.6 U	3.0 U	10.7 U
Chromium	21.5	10.8	35.3	61.0	17.3	58.6
Lead	24.2	10 U	109	70.9	18.2	61.1
Mercury	0.17 U	0.09 U	1.7	0.75	0.17	0.58
Seleniun	1.0 J	0.34 U	1.8	11.0	3.1	13.7
Silver	3.6 U	2.0 U	3.3 U	9.6 U	3.0 U	10.7 U
General Chemistry						
TKN (mg/kg)	3200	1510	5750	12700	3430	15600
TPH (mg/kg)	568	333	1840	1760	220 U	2310

Note: Sample ID beginning with S = Surface Soil or Sediment sample and SB = Soil Boring sample
U = Analyte was not detected above the laboratory reporting limit.
J = Estimated concentration below the analytical reporting limit or due to the independent data validation where it was determined that the laboratory QC criteria was outside of control limits.
ND = Parameters not detected above background.

Table B-1

Sample ID	S1907-N	S1907-FD	S1908-N	S1909-N	S1910-N	S1911-N
Analyte						
VOCs (µg/kg)						
2-Butanone	37	41	29 U	100 U	150 U	10 U
Acetone	190	200	100	510	400	10 U
Benzene	13 U	10 U	14 J	38 J	75 U	5 U
Carbon Disulfide	9 J	10 J	12 J	77	75 U	5 U
Chlorobenzene	9 J	10	14 U	52 U	75 U	5 U
Methylene Chloride	13 U	10 U	14 U	52 U	75 U	5 U
Toluene	76	37	14 U	52 U	75 U	5 U
SVOCs (µg/kg)						
Bis(2-Ethylhexyl)phthalate	8300	6100	2100	4200	8500	330 U
Butylbenzylphthalate	240 J	860	940 U	3400 U	5000 U	330 U
Fluoranthene	830 U	670	210 J	3400 U	5000 U	330 U
Naphthalene	2300	1800	940 U	3400 U	5000 U	330 U
Phenanthrene	590 J	580 J	170 J	3400 U	5000 U	330 U
Pesticides (µg/kg)						
4,4'-DDD	66	160 U	230 U	810 U	1200 U	8.1 U
4,4'-DDE	70	59	230 U	810 U	1200 U	8.1
4,4'-DDT	200 U	160 U	230 U	810 U	1200 U	3.7
Alpha-Chlordane	100 U	80 U	110 U	400 U	590 U	13
Gamma-Chlordane	100 U	80 U	110 U	400 U	590 U	13
PCBs (µg/kg)						
Aroclor-1254	2000 U	1600 U	2300 U	8100 U	1200 U	81 U
Metals (mg/kg)						
Barium	134	134	136	334	349	67.2
Cadmium	2.6	2.2	1.4 U	8.2 U	11.8 U	1.0
Chromium	33.2	31.4	21.9	44.5	51.2	8.1
Lead	74.0	116	31.6	41.2 U	61.4	23.1
Mercury	0.76	0.53	0.24	0.52	0.62 U	0.07
Seleniun	2.9	2.5	3.8	4.7	10.2	0.23
Silver	2.1 U	1.9	2.4 U	8.2 U	11.8 U	0.80 U
General Chemistry						
TKN (mg/kg)	3550	1780	2990	9390	5690	499
TPH (mg/kg)	3840	1190	423	1410	2350	264

Table B-1

Sample ID	S1911-FD	S1912-N	SB1901-0-N	SB1901-5-N	SB1902-8-N	SB1904-0-N
Analyte						
VOCs (µg/kg)						
2-Butanone	10 U	11 U	12 U	12 U	11 U	10 U
Acetone	10 U	11 U	12 U	12 U	11 U	10 U
Benzene	5 U	6 U	6 U	6 U	6 U	5 U
Carbon Disulfide	5 U	6 U	6 U	6 U	6 U	5 U
Chlorobenzene	5 U	6 U	6 U	6 U	6 U	5 U
Methylene Chloride	5 U	6 U	6 U	6 U	6 U	5 U
Toluene	5 U	6 U	6 U	6 U	6 U	5 U
SVOCs (µg/kg)						
Bis(2-Ethylhexyl)phthalate	340 U	45 J	390 U	91 J	380 U	340 U
Butylbenzylphthalate	340 U	360 U	390 U	380 U	380 U	340 U
Fluoranthene	340 U	360 U	390 U	380 U	380 U	340 U
Naphthalene	340 U	360 U	390 U	380 U	380 U	340 U
Phenanthrene	340 U	360 U	390 U	380 U	380 U	340 U
Pesticides (µg/kg)						
4,4'-DDD	15	8.3	72	0 E	8.8 U	8.0 U
4,4'-DDE	8.6	53	63	0 E	8.8 U	8.0 U
4,4'-DDT	52	16	9.7 U	46 U	8.8 U	8.0 U
Alpha-Chlordane	14	4.4	4.8 U	23 U	4.4 U	4.0 U
Gamma-Chlordane	15	4.0	4.8 U	23 U	4.4 U	4.0 U
PCBs (µg/kg)						
Aroclor-1254	79 U	87 U	100	630	88 U	80 U
Metals (mg/kg)						
Barium	73.1	267	553	232	1440	83.3
Cadmium	1.1	2.2	0.96 U	1.7	0.97 U	1.3 U
Chromium	9.8	27.0	13.5	19.5	13.1	10.7
Lead	25.3	283	17.6	43.3	9.5	8.9
Mercury	0.04	0.32	0.60	1.6	0.05 U	0.06 U
Seleniun	0.26	0.84	0.20 U	1.1	0.38 U	0.29 U
Silver	0.84 U	1.1 U	0.96 U	3.8	0.97 U	1.3 U
General Chemistry						
TKN (mg/kg)	635	2750	206	710	166	70.6
TPH (mg/kg)	292	364	105	120	56.7	120

Table B-1

Sample ID	SB1905-5-N	SB1905-12-N	SB1906-0-N	SB1906-0-FD	SB1907-40-N	SB1908-13-N
Analyte						
VOCs (µg/kg)						
2-Butanone	15 U	11 U	10 U	10 U	12 U	11 U
Acetone	15 U	28	10 U	10 U	16	11 U
Benzene	8 U	5 U	5 U	5 U	6 U	6 U
Carbon Disulfide	8 U	5 U	5 U	5 U	6 U	6 U
Chlorobenzene	8 U	5 U	5 U	5 U	6 U	6 U
Methylene Chloride	11	5 U	5 U	5 U	6 U	6 U
Toluene	8 U	5 U	5 U	5 U	6 U	6 U
SVOCs (µg/kg)						
Bis(2-Ethylhexyl)phthalate	500 U	360 U	340 U	330 U	400 U	380
Butylbenzylphthalate	500 U	360 U	340 U	330 U	400 U	370 U
Fluoranthene	500 U	360 U	340 U	330 U	400 U	370 U
Naphthalene	500 U	360 U	340 U	330 U	400 U	370 U
Phenanthrene	500 U	360 U	340 U	330 U	400 U	370 U
Pesticides (µg/kg)						
4,4'-DDD	12 U	8.8 U	7.0	11	9.8 U	8.8 U
4,4'-DDE	12 U	8.8 U	14	18	9.8 U	8.8 U
4,4'-DDT	12 U	8.8 U	8.0 U	8.0 U	9.8 U	8.8 U
Alpha-Chlordane	6.1 U	4.4 U	1.3	1.7	4.9 U	4.4 U
Gamma-Chlordane	6.1 U	4.4 U	1.0	1.3	4.9 U	4.4 U
PCBs (µg/kg)						
Aroclor-1254	120 U	88 U	80 U	80 U	98 U	88 U
Metals (mg/kg)						
Barium	83.3	123	44.7	45.5	64.9	15 8
Cadmium	1.3 U	0.92 U	0.97 U	1.0 U	0.92 U	1.0 U
Chromium	10 .7	7.6	6.9	6.1	15.1	4.5
Lead	8.9	5.7	8.3	9.0	17.8	5.2 U
Mercury	0.06 U	0.05 U	0.06	0.05	0.05 U	0.05 U
Seleniun	0.29 U	0.15	0.47	0.44	0.20 U	0.19
Silver	1.3 U	0.92 U	0.97 U	1.0 U	0.92 U	1.0 U
General Chemistry						
TKN (mg/kg)	70.6	89.8	1040	1100	92.5	50.4
TPH (mg/kg)	120	76.0	58.6	51.5	65.3	38.5

Table B-1

Sample ID	SB1909-7-N	SB1909-21-N	SB1910-0-FD	SB1910-22-N	SB1910-30-N
Analyte					
VOCs (µg/kg)					
2-Butanone	11 U	10 U	11 U	11 U	10 U
Acetone	11 U	10 U	11 U	11 U	10 U
Benzene	6 U	5 U	5 U	6 U	5 U
Carbon Disulfide	6 U	5 U	5 U	6 U	5 U
Chlorobenzene	6 U	5 U	5 U	6 U	5 U
Methylene Chloride	6 U	8 U	7 U	6 U	8 U
Toluene	6 U	5 U	5 U	6 U	5 U
SVOCs (µg/kg)					
Bis(2-Ethylhexyl)phthalate	380 U	340 U	360 U	360 U	190 U
Butylbenzylphthalate	380 U	340 U	360 U	360 U	340 U
Fluoranthene	380 U	340 U	360 U	360 U	340 U
Naphthalene	380 U	340 U	360 U	360 U	340 U
Phenanthrene	380 U	340 U	360 U	360 U	340 U
Pesticides (µg/kg)					
4,4'-DDD	9.2 U	8.2 U	8.6 U	8.7 U	8.1 U
4,4'-DDE	9.2 U	8.2 U	8.6 U	8.7 U	8.1 U
4,4'-DDT	9.2 U	8.2 U	8.6 U	8.7 U	8.1 U
Alpha-Chlordane	4.6 U	4.1 U	4.3 U	4.4 U	4.0 U
Gamma-Chlordane	4.6 U	4.1 U	4.3 U	4.4 U	4.0 U
PCBs (µg/kg)					
Aroclor-1254	92 U	82 U	86 U	87 U	81 U
Metals (mg/kg)					
Barium	1110	28.3	94.3	95.5	45.6
Cadmium	0.89 U	0.79 U	0.91 U	0.92 U	0.86 U
Chromium	18.9	3.9	6.1	10.7	4.2
Lead	11.8	5.3	4.5 U	11.2	4.3 U
Mercury	0.04 U	0.03 U	0.05 U	0.04 U	0.05 U
Seleniun	0.18 U	0.15 U	0.17 U	0.20 U	0.20 U
Silver	0.89 U	0.79 U	0.91 U	0.92 U	0.86 U
General Chemistry					
TKN (mg/kg)	92.6	31.7 U	71.5	88.8	88.2
TPH (mg/kg)	77.1	68.7	51.1	35.3	63.8

Table B-2. Meyer Range Oxidation Pond Surface Soil\Sediment and Soil Boring Summary of Analytical Results Above Background

Sample ID	S7601-0-N	S7602-0-N	S7603-0-N	S7603-0-FD	S7604-0-N	SB7609-10-N
Analyte						
VOCs (µg/kg)						
2-Butanone	11 U	10 U	13 U	14 U	15	11 U
Acetone	11 U	14	13 U	14 U	86	11 U
Methylene	6 U	5 U	6 U	7 U	10	5 U
Toluene	6 U	5 U	6 U	7 U	7	5 U
Xylenes (total)	6 U	5 U	6 U	7 U	6	5 U
SVOCs (µg/kg)	ND	ND	ND	ND	ND	ND
Pesticides (µg/kg)						
4,4'-DDE	18 U	8.2 U	26	55	8.1 U	8.3 U
PCBs (µg/kg)	ND	ND	ND	ND	ND	ND
Metals (mg/kg)						
Mercury	0.05 U	0.05 U	0.11	0.17	0.05 U	0.04 U
Seleniun	1.9	0.17	2.8	6.3	2.6	0.17 U
General Chemistry						
TKN (mg/kg)	1500	1480	1930	4600	4080	105

Note: Sample ID beginning with S = Surface Soil or Sediment sample and SB = Soil Boring sample
U = Analyte was not detected above the laboratory reporting limit.
J = Estimated concentration below the analytical reporting limit or due to the independent data validation where it was determined that the laboratory QC criteria was outside of control limits.
ND = Parameters not detected above background.

Table B-3. Dona Ana Range Oxidation Pond Surface Soil\Sediment Summary of Analytical Results Above Background

Sample ID	S27B01-0-N	S27B01-0-FD	S27B02-0-N	S27B05-0-N	S27B06-0-N	S27B08
Analyte						
VOCs (µg/kg)						
2-Butanone	12 U	12 U	23 U	10 U	10 U	10 U
Acetone	12 U	12 U	23 U	10 U	10 U	10 U
Trichloroethene	6 U	2 J	12 U	6	5 U	1 J
SVOCs (µg/kg)						
Bis(2-Ethylhexyl)phthalate	390 U	410 U	2400	330 U	330 U	54 J
Pesticides (µg/kg)						
4,4'-DDD	9.5 U	9.6 U	180 J	8.1 U	8.1 U	66
4,4'-DDE	9.5 U	9.6 U	180 J	8.1 U	8.1 U	140
4,4'-DDT	9.5 U	9.6 U	180 J	8.1 U	8.1 U	42 U
Alpha-Chlordane	4.7 U	4.8 U	91 J	5.1 U	4.0 U	530
Gamma-Chlordane	4.7 U	4.8 U	91 J	4.1 U	4.0 U	580
PCBs (µg/kg)	ND	ND	ND	ND	ND	ND
Metals (mg/kg)						
Cadmium	1.0 U	0.98 U	3.3	0.82 U	0.84 U	1.4
Lead	13.9	13.0	15.4	14.0	12.2	27
Mercury	0.04 U	0.05 U	0.10 U	0.04 U	0.05 U	0.08
Seleniun	0.20	0.21 U	1.3	0.17 U	0.17 U	0.88 U
General Chemistry						
TKN (mg/kg)	659	645	3450	469	609	2010
TPH (mg/kg)	49.2	62.4	496	47.6	51.4	92.8

Table B-3

Sample ID	S27B09-0-N	S27B10-0-FD
Analyte		
VOCs (µg/kg)		
2-Butanone	120	10 U
Acetone	12	10 U
Trichloroethene	8	5 U
SVOCs (µg/kg)		
Bis(2-Ethylhexyl)phthalate	220 J	340 U
Pesticides (µg/kg)		
4,4'-DDD	440	20
4,4'-DDE	41	39
4,4'-DDT	25	2.4
Alpha-Chlordane	12	10
Gamma-Chlordane	18	10
PCBs (µg/kg)		
Metals (mg/kg)		
Cadmium	5.6	0.80 U
Lead	71.6	18.3
Mercury	0.19	0.04 U
Seleniun	1.2	0.35 U
General Chemistry		
TKN (mg/kg)	1060	416
TPH (mg/kg)	312	61

Note: Sample ID beginning with S = Surface Soil or Sediment sample and SB = Soil Boring sample
U = Analyte was not detected above the laboratory reporting limit.
J = Estimated concentration below the analytical reporting limit or due to the independent data validation where it was determined that the laboratory QC criteria was outside of control limits.
ND = Parameters not detected above background.

Table B-4. Orogrande Range Oxidation Pond Surface Soil\Sediment and Soil Boring Sample Summary of Analytical Results Above Background

Sample ID	S25B01-0-N	S25B03-0-N	S25B08-0-N	SB25B01-30-N	SB25B03-5-N	SB25B03-10-N
Analyte						
VOCs (µg/kg)	ND	ND	ND	ND	ND	ND
SVOCs (µg/kg)						
Bis(2-Ethylhexyl)phthalate	510 U	570 U	600 U	35 J	360 U	ND
Diethylphthalate	510 U	570 U	600 U	340 U	360 U	ND
Pesticides (µg/kg)						
4,4'-DDD	120 U	140 U	140 U	8.2 U	8.6 U	1.1 J
4,4'-DDE	120 U	140 U	140 U	8.2 U	5.4	8.6 U
4,4'-DDT	120 U	140 U	140 U	8.2 U	8.6 U	8.6 U
Alpha-Chlordane	62 U	31	73 U	4.1 U	4.3 U	4.3 U
Gamma-Chlordane	62 U	33	73 U	4.1 U	4.3 U	4.3 U
PCBs (µg/kg)	ND	ND	ND	ND	ND	ND
Metals (mg/kg)	ND	ND	ND	ND	ND	ND
General Chemistry						
TKN (mg/kg)	2920	1080	2820	142	112	102

Table B-4

Sample ID	S25B03-30-N	S25B10-10-N
Analyte		
VOCs (µg/kg)	ND	ND
SVOCs (µg/kg)		
Bis(2-Ethylhexyl)phthalate	410 U	340 U
Diethylphthalate	77 U	340 U
Pesticides (µg/kg)		
4,4'-DDD	10 U	8.1 U
4,4'-DDE	10 U	1.0 J
4,4'-DDT	10 U	2.0
Alpha-Chlordane	5.0 U	4.0 U
Gamma-Chlordane	5.0 U	4.0 U
PCBs (µg/kg)	ND	ND
Metals (mg/kg)	ND	ND
General Chemistry		
TKN (mg/kg)	67.5	0.21

Note: Sample ID beginning with S = Surface Soil or Sediment sample and SB = Soil Boring sample
U = Analyte was not detected above the laboratory reporting limit.
J = Estimated concentration below the analytical reporting limit or due to the independent data validation where it was determined that the laboratory QC criteria was outside of control limits.
ND = Parameters not detected above background.

APPENDIX C

SAMPLING METHODOLOGY

1. General Requirements for Sampling.

a. Prior notification of facility in order to obtain entry permits for personnel.

b. Field sampling teams will consist of a minimum of two individuals. One person will collect the sample as the other ensures adherence to sampling procedures, records any difficulty encountered, and documents other information pertinent to the investigation.

c. Sample collection for chemical analysis will be performed with either glass or plastic jars. All sampling equipment will be decontaminated in accordance with the procedures outlined later in this Plan.

d. The analytical laboratory will provide pre-cleaned sample containers. All data relative to sample container integrity will be documented in the field logbook.

e. Samples will be representative of the intended matrix.

2. Media Specific Sampling Strategies. A combination of surface water, influent wastewater, and groundwater will be collected at each site (where applicable). This sampling plan is designed to obtain missing data required to successfully complete the groundwater discharge permit and evaluate the wastewater treatment process provided by the oxidation lagoons for the feasibility study. The exact location of all sample point locations will be determined and documented during field activities. Table C-1 indicates the approximate number of samples to be collected at each site. Table C-2 provides a summary of sampling strategy and rational at each location. Refer to the figures 2 through 5 for a graphical display of the influent lines and outflow lines at each lagoon. Actual field/site conditions and the judgment of the field team leader will determine the number of samples and location of sampling sites for this Survey.

Table C-1. Number of Samples Per Location

Location	Influent Wastewater Samples	Surface Water Samples	Groundwater Samples
McGregor Lagoon (SWMU 19)	2	2	1
Meyer Range Lagoon (SWMU 76)	2	2	1
Dona Ana Lagoon (SWMU 27B)	2	2	1
Orogrande Lagoon (SWMU 25B)	2	2	N/A

a. Lagoon Surface Water. Two grab samples will be collected from each lagoon if standing water is present. One sample will be collected from near the influent line and the other will be collected from near the outflow line. The sample collected near the influent line will be representative of wastewater in the initial stage of facultative treatment. Samples will be collected with a plastic dipper and transferred to the sample shipping container. Each sample container will be marked with indelible marker to identify the sample number, sample location, date, and time of collection.

b. Influent Wastewater. Grab samples will be collected from either the nearest upstream manhole or from open concrete channels located on the influent lines. Samples will be representative of the lagoon influent (raw sewage). A long-handled plastic dipper will be lowered into the channel to collect the sample and transfer the wastewater to the sample shipping container. A velocity flow meter will be used to measure flow through the pipe. A multi-parameter meter will be placed in the flow channel to measure pH, conductivity, temperature, and dissolved oxygen (DO). Each sample container will be marked with indelible marker to identify the sample number, sample location, date, and time of collection.

c. Monitoring Well Groundwater. One groundwater sample each will be collected from monitoring wells at the McGregor, Meyer, and Dona Ana oxidation lagoons using a disposable plastic hand bailer. Well number MW1902 at McGregor; well number MW7601 at Meyer, and well MW27B01 at Dona Ana will be sampled. These monitoring wells are located down-gradient from the main lagoon body and provide access to the perched aquifers at each site. Three well volumes will be removed from each well to remove fines. Sample collection will follow purging immediately. In addition, a multi-parameter meter will be lowered it to the well to measure pH, conductivity, temperature, and dissolved oxygen (DO). Samples collected from the monitoring wells will be transferred from the bailer to the sample shipping container with the use of a plastic funnel. Each sample container will be marked with indelible marker to identify the sample number, sample location, date, and time of collection.

Table C-2. GROUND-WATER SAMPLING STRATEGY

SAMPLE	LOCATON	APPROACH	RATIONALE
WW19-01 WW19-02	McGregor Range Camp Oxidation Lagoon	Sample wastewater generated at the Range Camp.	Determine wastewater quality prior to facultative treatment.
GW19-01		Sample perched aquifer for potential wastewater contaminants.	Define the quality of groundwater that potentially leaked from the lagoon.
SW19-01 SW19-02		Sample surface water near the lagoon inflow and outflow.	Define water quality within the oxidation lagoon.
WW76-01 WW76-02	Meyer Range Camp Oxidation Lagoon	Sample wastewater generated at the Range Camp.	Determine wastewater quality prior to facultative treatment.
GW76-01		Sample perched aquifer for potential wastewater contaminants.	Define the quality of groundwater that potentially leaked from the lagoon.
SW76-01 SW76-02		Sample surface water near the lagoon inflow and outflow.	Define water quality within the oxidation lagoon.
WW27B-01 WW27B-02	Dona Ana Range Camp Oxidation Lagoon	Sample wastewater generated at the Range Camp.	Determine wastewater quality prior to facultative treatment.
GW27B-01		Sample regional aquifer for potential wastewater contaminants.	Define the quality of regional groundwater.
SW27B-01 SW27B-02		Sample surface water near the lagoon inflow and outflow.	Define water quality within the oxidation lagoon.
WW25B-01 WW25B-02	Orogrande Range Camp Oxidation Lagoon	Sample wastewater generated at the Range Camp.	Determine wastewater quality prior to facultative treatment.
SW25B-01 SW25B-02		Sample surface water near the lagoon inflow and outflow.	Define water quality within the oxidation lagoon.

3. Quality Assurance/Quality Control (QA/QC). QA/QC samples assess the quality of the sampling effort and analytical data. Sampling and analysis for this survey will incorporate QA/QC procedures in accordance with USACHPPM QA/QC program as part of the Laboratory Accreditation and Certification Program. A brief discussion of each follows.

a. Duplicate Samples. Duplicate samples are grabs collected independently from the same location at the same time. Both the duplicate and the sample will be analyzed for the same parameters. Duplicate samples will be collected at a rate of 10 % of the field grab samples.

b. Container Blanks. Organic-free reagent water is poured into sample container onsite. The container blanks are to be handled the same as the grab samples and transported to the laboratory with the field samples.

c. Filter Blanks. Organic-free reagent water is filtered through a field filtering apparatus and collected in appropriate sample containers. Two filter blanks will be collected on-site for soluble BOD_5 and then shipped to the laboratory.

d. Trip Blanks. Trip blanks are pre-filled sample bottles provided by the laboratory. These blanks are shipped back to the laboratory with field samples

4. Analytical Methods. These methods and parameters are based upon the types of activities currently generating wastewater at the range camps. A list of parameters and environmental analytical method numbers are presented in Table C-3 (References 5 and 6).

a. Temperature, pH, conductivity and dissolved oxygen (DO) will be measured on site with a YSI 600 XL multimeter.

b. Total nitrogen (TN), total inorganic nitrogen (TIN), ammonia (NH_3), and chemical oxygen demand (COD), will be measured on site with a Hach brand, DR 2000 model portable spectrophotometer.

c. The laboratory at USACHPPM, DSA-W will analyze samples for total Kjeldahl Kitrogen (TKN), NH_3, nitrate (NO_3), nitrite (NO_2), COD, total dissolved solids (TDS), total suspended solids (TSS), and chloride (Cl^-).

d. A local state-certified laboratory will analyze samples for Biochemical oxygen demand (BOD_5). Either an over-pressure filter system or disposable filters will be used to filter soluble BOD_5. Sample filtering removes suspended solids from the sample before laboratory analysis. Over-pressure filters are to be soaked in organic-free reagent water for 24-hours before use. Disposable filters will be flushed with organic-free water and then flushed with at least 1,000 ml of sample before filling the sample bottle.

Table C-3. Sample Collection Requirements

Parameter	Matrix	Method	Container P = Plastic G = Glass	Preservative	Recommended Hold Time
TKN	Water	EPA 351.3	1000 ml, P,G	Cool < 4°C, H_2SO_4 < Ph 2	7 days
TN	Water	Hach	25 ml, G	N/A	N/A
TIN	Water	Hach	25 ml,G	N/A	N/A
NH_3	Water	EPA 350.2, and Hach	1000 ml, P,G	Cool < 4°C	7 days
NO_3	Water	EPA 300	1000 ml, P,G	Cool < 4°C	48 hours
NO_2	Water	EPA 300	1000 ml, P,G	Cool < 4°C	48 hours
BOD_5	Water	EPA 405.1	1000 ml, P,G	Cool < 4°C	6 hours
COD	Water	EPA 410.2, and Hach	1000 ml, P,G	Cool < 4°C, H_2SO_4 < pH 2	7 days
TDS	Water	EPA 160.1	1000 ml, P,G	Cool < 4°C	48 hours
Cl^-	Water	EPA 300	1000 ml, P,G	Cool < 4°C	28 days
TSS	Water	EPA 160.2	1000 ml, P,G	Cool < 4°C	48 hours
PH	Water	Multimeter	N/A	N/A	N/A
Temp.	Water	Multimeter	N/A	N/A	N/A
Conductivity	Water	Multimeter	N/A	N/A	N/A

Note: Parameters measured with Hach equipment will use the Hach DR 2000 and applicable reagents for field analysis.

5. Field Activities.

a. Sample Collection. Grab samples will be collected by hand with a plastic dipper for influent wastewater and surface water and with a disposable plastic bailer from the monitoring wells. Personnel conducting sampling operations wear plastic gloves. Samples will be placed in glass jars or flexible plastic cube containers. A plastic funnel will be used to reduce spillage. The funnel will be thoroughly rinsed with a portion of the sample before filling individual laboratory containers. Samples will be preserved as per 40 CFR Part 136 (reference 8).

b. Sample Identification.

(1) A three part code will be used to designate sample identification. The first set of digits represents the sample type and the SWMU number. The second pair of digits represents the day of the month the sample was collected and preserved. The third pair of digits represents the sample number for the specific matrix, site, and date. Sample identification will be expressed as follows:

Example. **WW25-16-01**

WW25	=	Wastewater Sample Type at SWMU number 25
16	=	Date sample was collected (16th day of month)
01	=	The first sample collected for this matrix, site, and date

The following abbreviations represent various sample types:

GW	=	Ground Water
SW	=	Surface Water Bodies (i.e. streams, ponds, and lakes)
WW	=	Wastewater (i.e. sewage and industrial waste)

(2) A two part code will be use to designate quality control samples. The first two digits represent the sample type. The second two digits represent the day of the month the sample was collected. Sample blank identification will be expressed as follows:

Example. **DP16**

DP	=	Duplicate sample type
16	=	Date sample was collected (16th day of month)

The following abbreviations represent various sample blanks:

DP	=	Duplicate Sample
SS	=	Split Sample
EB	=	Equipment Blank
CB	=	Container Blank
TB	=	Travel Blank
FB	=	Filter Blank

c. Sample Packing and Shipping. Waterproof ice chests will be used to ship samples to the USACHPPM Laboratory. Each ice chest will contain a sample container inventory sheet and an original Chain-of Custody (COC) Record. The inventory sheet and COC will be placed within a shipping envelope and secured to the inside of the ice chest. All sample bottles (not plastic sample containers) will be bubble wrapped and packed in such a manner to minimize breakage during shipping. All samples will be sealed within a double lined plastic (two plastic bags). Crushed ice will be placed in a separate double lined bag and placed on top of samples to maintain a temperature of 4°C during shipment. Every ice chest will be sealed with tape and have legible laboratory shipping label on the outside. Project personnel will transport ice chests to Federal Express Office in El Paso, TX. The Project Officer will notify the laboratory of samples shipped for overnight delivery. The ice chests will be shipped each day accept for Saturday and Sunday.

d. Decontamination Procedures. Decontamination will be performed to protect workers and off-site personnel from contaminant exposure, to limit the spread of contamination in the Study areas, and to prevent cross-contamination between sampling locations. Personnel will decontaminate equipment and themselves. Personal protective equipment will be properly removed and disposed of with dedicated equipment. Personnel will further decontaminate

themselves by cleaning and washing their hands. Personnel will be advised to shower at the end of each workday and segregate contaminated clothing (if any).

(1) Reusable equipment (stainless steel bailer, water level indicator and field meters) will be rinsed with potable water and scrubbed using an Alconox soap solution followed by rinses with tap water and deionized water are cleaned by rinsing with potable water. All cleaned equipment is then placed into its original carrying case.

(2) Disposable equipment and material will be placed in large plastic garbage bags and disposed of as regular solid waste.

e. Record Keeping. The Project officer will maintain detailed notes to record the exact location, sample number, date, and time for each sample collected as well as any appropriate observations. A data record table is provided in Appendix G. An inventory of samples will accompany each cooler of samples delivered to the USACHPPM laboratories identifying sample numbers, date, and time of collection, analyses to be performed, and any other appropriate instructions. Chain of custody forms will be kept with the samples.

f. Equipment. Equipment checks will be performed each morning and throughout the day ensure equipment is operating correctly. A list of sampling equipment is included in Appendix F.

APPENDIX D

SITE SAFETY AND HEALTH PLAN

1. Introduction.

a. Plan Purpose. The purpose of this site safety and health plan (SSHP) is to identify the activities to be performed during the Study and to identify the necessary precautions and activities to protect Study personnel.

b. Study Purpose. The purpose of this sampling plan is to collect field data to prepare a Feasibility Study for wastewater treatment alternatives at four wastewater oxidation/evaporation lagoons which have also been designated as Solid Waste Management Units (SWMUs) under the Resource Conservation Recovery Act (RCRA) located at several Fort Bliss range camps in New Mexico.

2. Summary of Proposed Activities. The sample collection activities at each the McGregor, Meyer, Dona Ana, and Orogrande oxidation ponds will be similar in nature. Wastewater samples will be collected from the influent line at each lagoon by access through the nearest upstream manhole using an automatic sampler. Influent flow will be measured at the same location. Groundwater samples will be collected from monitoring wells, if present, using a hand bailer. Surface water samples will be collected using a grab sample, provided standing water is present.

3. Personnel and Responsibilities.

a. MAJ Michael J. Dell'Orco, P.E., Chief, Environmental Health Engineering Division (EHED), USACHPPM, DSA-W. Ensures all EHED personnel are covered by the medical surveillance program and receive all safety training required for job performance. Ensures team personnel prepare and staff project-specific SSHPs. Reviews and approves project SSHPs.

b. CPT Wylie Harper, Project Officer and Site Safety Manager, EHED, USACHPPM, DSA-W. Identifies project safety hazards and prepares a comprehensive plan to preclude hazardous exposures and physical accidents. Ensures that all study team members are aware of the potential hazards, follow established protocols, and are familiar with emergency procedures. Stops work in the event of exposures or increased work site hazards.

c. 2LT Kevin R. Schwall, Sanitary Engineer, EHED, USACHPPM, DSA-W. Provides sampling assistance. Advises site safety manager on proper procedures as required.

d. Mr. Kelly Blough, Environmental Specialist, Fort Bliss Directorate of Environment. Mr. Blough is aware of USACHPPM activities on-site and helps to ensure all site-specific safety threats and procedures are considered prior to site activities.

e. Mr. Creighton Jacobson, USACHPPM Safety and Occupational Health Manager. Ensures all CHPPM personnel are aware of the safety concerns related to their specific duties and are enrolled in an appropriate medical surveillance program.

4. Personnel Training.

a. All Study personnel have successfully completed an accredited 40-hour hazardous waste operations and emergency response (HAZWOPER) course, along with the requisite 8-hour annual refresher training. Each individual will carry a copy of their current certification during site operations. All site visitors must have completed appropriate training to be on the Study site.

b. Tailgate safety meetings will be conducted prior to each day's activities. These meetings are mandatory for all Study personnel. Topics will include, but are not limited to, Study activities and procedures, associated health and safety issues, and required personnel protective equipment (PPE).

c. Medical Surveillance. All USACHPPM personnel involved in field activities participate in the medical surveillance program operated through U.S. Army Garrison, Fitzsimons. Personnel are reassessed on an annual basis.

5. Hazard Assessment.

a. Chemical Hazards. The contaminants of concern for this Study - nitrogen compounds, chloride, total suspended solids, and total dissolved solids- are not expected to create an airborne/inhalation hazard. To prevent dermal contact, incidental ingestion, and removal of site contaminants to other areas, Tyvek®[1] suits, latex gloves, and rubber booties will be worn during sampling activities. Gloves will be changed between sampling locations; Tyvek® and booties will be changed between each site and at the end of each day. No food will be consumed on-site.

b. Physical Hazards. There should be no significant physical hazards encountered during this Study.

c. Biological Hazards. There should be no significant biological hazards encountered during this Study.

6. Personnel Protective Equipment. Based on site history and the hazard assessment completed above, the level of personnel protective equipment to be worn is a modified level D. The Personal Protective Equipment (PPE) to be worn by all personnel while conducting this Study (as described in the hazard assessment) follows disposable, Tyvek® coveralls, latex gloves, and rubber booties or rubber over-boots.

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[1]Tyvek® is a Registered Trademark of E.I. DuPont de Nemours & Co., Inc., Wilmington, Delaware.

7. Site Control Measures. The Study sites to be sampled during this investigation are not "uncontrolled hazardous waste sites" as defined by relevant regulations. Therefore, exclusionary zones will not be established nor maintained during site activities. No personnel, beyond those listed in the SSHP, will be permitted to handle sampling equipment or the samples themselves.

8. Decontamination Procedures.

a. Decontamination involves the controlled removal of chemical contamination from equipment and PPE. It is an essential step to protect worker health, prevent the spread of contamination off-site, and to preclude the cross-contamination of equipment and samples on-site.

b. Latex gloves will be changed between sample collection locations, using care not to touch the glove exteriors during doffing, and placed in a plastic bag. Tyvek® suits will be discarded between Study sites and at the end of each day, using care not to touch the suit exterior during doffing, and placed in a plastic bag. Sampling equipment will be decontaminated by rinsing with potable water, scrubbing with Alconox®[2] soap, and finally rinsing with distilled water.

c. The potential for exposure to contamination by Study personnel is low. Hands will be washed prior to eating and at the end of each day. Disposable cups will be used for drinking water during Study activities.

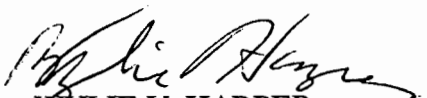
9. Emergency Procedures. Emergency notification procedures will be obtained from Installation personnel before beginning site activities. A map showing the directions to the site of the nearest medical facility will be obtained from Installation personnel at the time of arrival. Emergency notification procedures and a map to the medical facility will be attached to this Plan and available to personnel at the site.

10. Personnel Certification. A pre-entry briefing will be held prior to all sampling activities. This briefing will consist of the familiarization of project personnel with the sample locations and methodologies, site safety procedures, and emergency response procedures. The following individuals acknowledge that they have been notified of the contents of this SSHP, understand its requirements, and agree to comply with the identified procedures:

[2] Alconox® is a Registered Trademark of Alconox Incorporated, New York, New York.

NAME	SIGNATURE	DATE
MAJ Michael J. Dell'Orco	_____	_____
CPT Wylie V. Harper	_____	_____
2LT Kevin R. Schwall	_____	_____
Mr. Kelly Blough	_____	_____

PREPARED BY:



WYLIE V. HARPER
CPT, MS
Environmental Science Officer

DATE 5/11/98

REVIEWED BY:

MICHAEL J. DELL'ORCO, P.E.
MAJ, MS
Chief, Environmental Health Engineering
Division, USACHPPM, DSA-W

DATE 5 May 98

APPENDIX E

WORK SCHEDULE

Date	Time	Tentative Schedule
Sun	Afternoon	Study team arrives. Pick up rental car. Drive to Inn at Fort Bliss
Mon	Morning	Meet at Fort Bliss Environmental Office. In-brief. Organize and check equipment. Purchase ice.
	Afternoon	Collect grab samples. Record insitu sample readings. Preserve, pack, and ice samples. Transport samples to Fed-X, El Paso, TX. Call CHPPM lab. Transport BOD_5 to certified laboratory. Prepare for next day.
Tue	All Day	Collect grab samples. Record insitu sample readings. Preserve, pack, and ice samples. Transport samples to Fed-X, El Paso, TX. Call CHPPM lab. Transport BOD_5 to certified laboratory. Prepare for next day.
Wed	Morning	Collect grab samples. Record insitu sample readings. Preserve, pack, and ice samples. Transport samples to Fed-X, El Paso, TX. Call CHPPM lab. Transport BOD_5 to certified laboratory.
	Afternoon	Check, clean, and pack equipment. Transport equipment to Fed-X, El Paso, TX.
Thurs	Morning	Check out of Billeting. Out-brief. Return car. Depart.

APPENDIX F

EQUIPMENT LIST

Hach DR 2000 spectrophotometer
Applicable Reagents:
- TN
- TIN
- NH_3
- COD

YSI 600 XL multi-meter
Plastic dipper with extension handle
Sample Containers:
- 1 liter plastic cube containers, (30)
- 4 liter plastic cube containers, (4)

Pre-printed sample labels
Weirs for 8" and 10" pipe
Flow meter
Disposable plastic bailers (6)
Nylon cord, 100 ft.
Alconox soap, (1 container)
Deionized water, 6 gallons
Plastic bucket, 5 gallon (2)
Plastic trash bags, (4)
Plastic zip-lock bags, 1 gallon (1 box)
Insulated coolers, (2)
Strapping tape, (1 role)
Clear packing tape, (1 role)
Pre-printed Fed. Ex. Shipping forms, (4)
Utility knife, (1)
Chain of custody forms, (4)
Latex gloves, (1 box)
Rubber hip boots (2 pair)
Rubber gloves, large (2 pair)
Safety glasses, (2 pair)

APPENDIX G

TABLE FOR RECORDING FIELD MEASUREMENTS

Field Data Sheet

Project No. 32-RE-6884-98, Wastewater Feasibility Study, Fort Bliss, Texas.												Project Officer: CPT Harper	
Sample Number	Sample Location	Sample Type	Date	Time	Temp. (°C,°F)	pH	Cond. (umhos/ cm)	Dissol. Oxygen (mg/L)	TN (mg/L)	COD (mg/L)	NH_3 (mg/L)	TIN (mg/L)	Remarks: (For well data, include water level, TOC, and purge volume)

APPENDIX H

IMPORTANT PHONE NUMBERS AND ADDRESSES

Fort Bliss Directorate of Environment Personnel:

Mr. Kelly Blough	DSN: 978-7979
COM: (915) 568-7979	FAX: (915) 568-1333

Hotel Information:

The Inn at Fort Bliss 1744 Victory Ave Fort Bliss, TX 79906	(915) 565-7777

Conformation Number:

Rental Car :

Confirmation Number:

Federal Express: (800) 238-5355

USACHPPM West:

EHED	(303) 361-8100 DSN: 943-8100
Administrative Office:	(303) 361-3737/3726 DSN: 943- FAX: 943-3290
USAG Fitzsimons:	(800) 433-3423

USACHPPM Surface Water and Wastewater Program:

SWWP	(800) 685-3378	800 Number at tone 2288 then 5-3816
Administrative Office	(410) 671-3816 DSN: 584-3816	
Warehouse	(410) 671-3698	

USACHPPM Directorate of Laboratory Sciences Information:

Laboratory Operations Improvement Program (LOIP) Formerly (LCSD)	Gerri Miles Donna Goodman John Sylvestri	(410) 671-3269 DSN 584-3269 (410) 671-2527
Analytical Chemistry Program (ACP) Formerly (MAB & NMAB)	Dr. Boldt Mary Jo George (NMAB) Dave Rosak (MAB)	(410) 671-2810 (410) 671-2810/8313 (410) 671-2619
Military Unique and Special Chemistry Program (MUSCP) Formerly (CAB and rest of SAB)	Rose Mary Gaffney	(410) 671-2208

USACHPPM Sample Shipping Address:

MAJ Brian J. Lukey
U.S. Army Environmental Hygiene Agency
Bldg. E-2100, LCSD
Aberdeen Proving Ground, MD 21010
(410) 671-3269