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NAS FORT WORTH
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REQUEST FOR DISMISSAL OF SOLID WASTE MANAGEMENT UNITS 18 AND 63 FROM TEXAS WATER COMMISSION PERMIT NAS FORT WORTH TX
7/25/1991
U S ARMY CORPS OF ENGINEERS

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P.W.

NAVAL AIR STATION FORT WORTH JRB CARSWELL FIELD TEXAS

ADMINISTRATIVE RECORD COVER SHEET

AR File Number 561

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CARSWELL AIR FORCE BASE, TEXAS

RCRA Permit, Part B, Number HW50289

REQUEST FOR DISMISSAL

SWMU NO. 18, FIRE DEPARTMENT TRAINING AREA NO.1
SWMU NO. 63, ENTOMOLOGY DRY WELL

25 July 1991

Prepared By
U.S. Army Corps Of Engineers
F rt W rth District

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1.0 **PURPOSE:** This Request for Dismissal is prepared for Solid Waste Management Unit (SWMU) No. 18, Fire Department Training Area No. 1 and SWMU No. 63, Entomology Dry Well in response to the RCRA Permit, Part B, Number HW50289, issued to Carswell Air Force Base (CAFB) by the Texas Water Commission (TWC), dated 7 February 1991.

2.0 **BACKGROUND:** The RCRA permit issued to CAFB has identified 20 SWMU's that require facility investigations in order to determine whether hazardous constituents listed in Title 40, Code of Federal Regulations (40 CFR) Part 264, Appendix IX have been released into the environment. Under the Air Force's Installation Restoration Program (IRP), remedial investigations have already been conducted at SWMU No's 18 and 63 and there are no confirmed releases or the releases have already been remediated. Per paragraph VIII.A.3 of the permit, these SWMU's are being requested exempt from the RCRA facility investigations required in paragraph VIII of the permit.

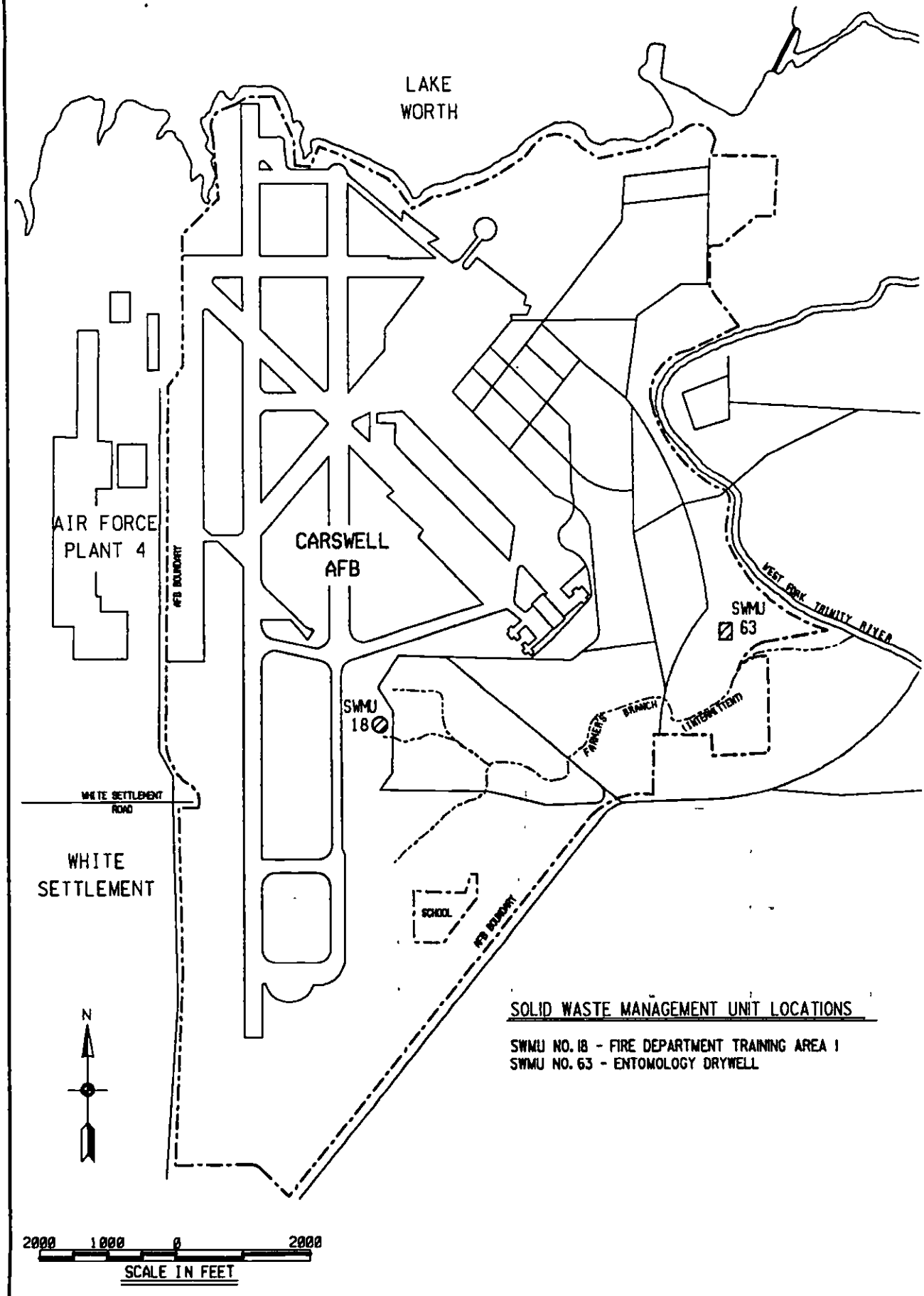
3.0 **SITE DESCRIPTIONS**

3.1 SWMU No. 18, Fire Department Training Area No. 1

SWMU No. 18 is located in the southern part of CAFB just west of Cody Drive and north of White Settlement Road (Figure 2). This training area was probably the primary fire training pit prior to 1963. The pit was reportedly gravel lined and surrounded by a low concrete curb. Fire training exercises were reported to have been conducted several times each month. Waste oils and contaminated fuels were the primary flammable liquids used in the exercises, though small quanities of solvents are also suspected of having been burned. The site now consists of a level, gravel surfaced area on a drainage divide between an unamed tributary of Farmers Branch and Farmers Branch.

3.2 SWMU No. 63, Entomology Dry Well

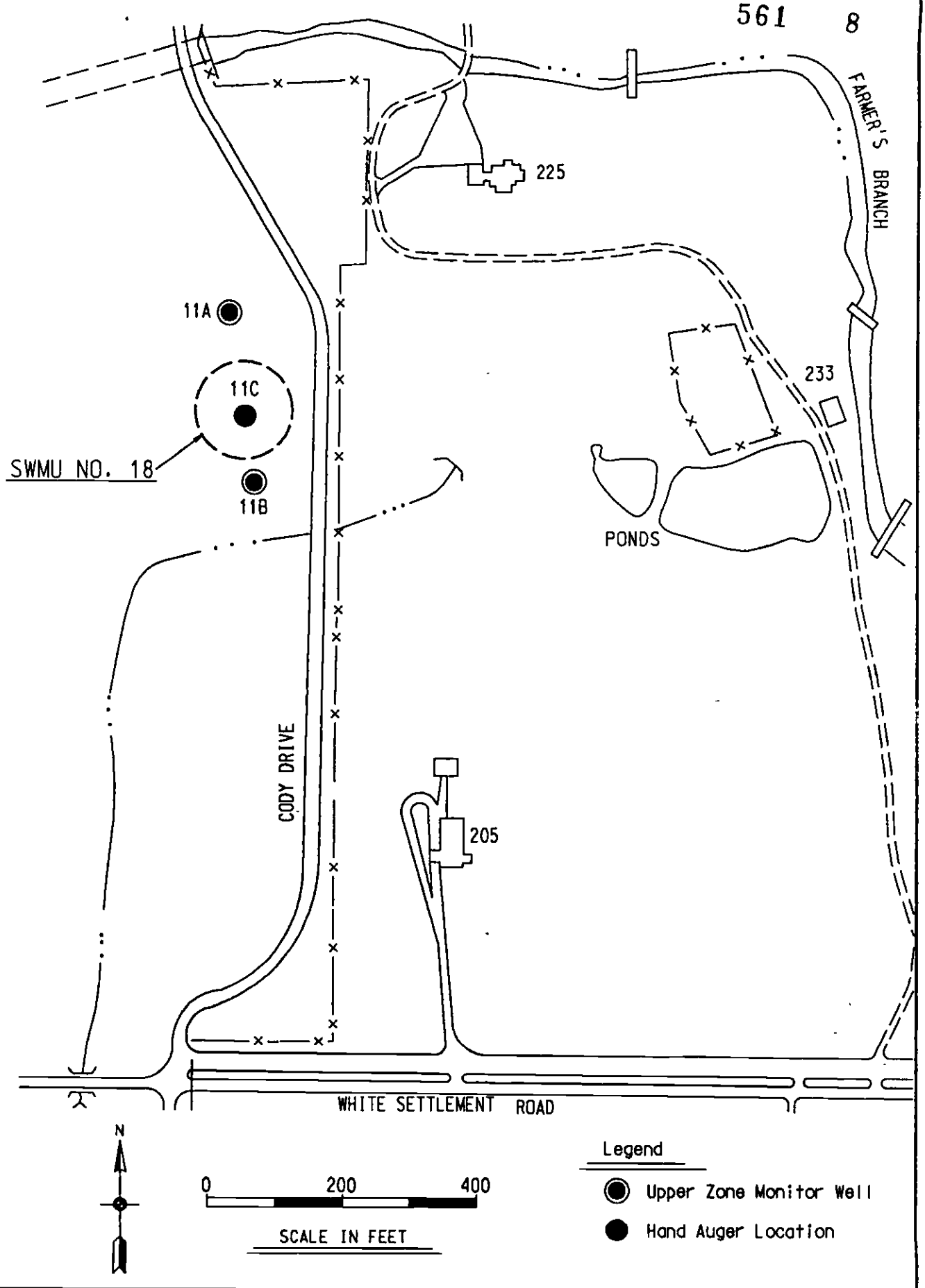
The entomology dry well was located immediately west of the entomology



SOLID WASTE MANAGEMENT UNIT LOCATIONS

SWMU NO. 18 - FIRE DEPARTMENT TRAINING AREA 1
SWMU NO. 63 - ENTOMOLOGY DRYWELL

CARSWELL AIR FORCE BASE, TEXAS
FIGURE 1



SITE MAP, BORING LOCATIONS
SWMU NO. 18, FIRE DEPARTMENT TRAINING AREA NO. 1
FIGURE 2

shed, Building 1338 (Figure 3). The entomology shed has since been removed and now the site occupies a graded, partially paved lot in the vicinity of the communications building, Building 1337. Building 1338 was used for the storage and cleaning of entomology spray equipment. Insecticides known to have been stored in Building 1338 include malathion, diazinon, dursban and chlordane. The Entomology Dry Well was used for the disposal of insecticide rinsate between 1965 and 1981.

4.0 SITE INVESTIGATIONS

The field program at Carswell AFB consisted of geophysical surveying, installation of upper zone monitor wells, and sampling of soil and groundwater. The content of the field program is presented in narrative form in the following subsections. For each of the sites that were investigated, a similar sequence of events was followed.

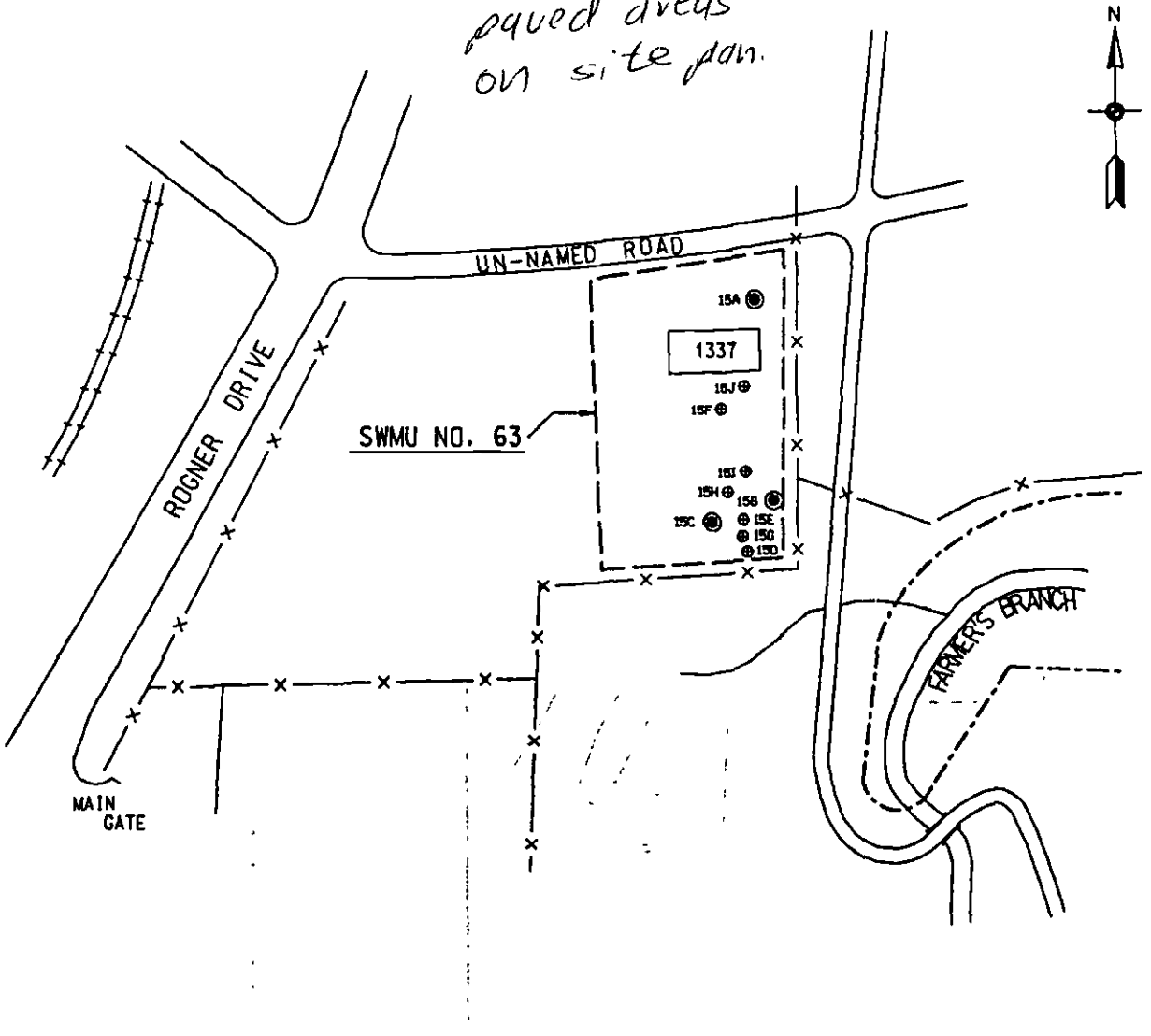
4.1 Fire Department Training Area No. 1, SWMU 18

Work at SWMU 18 included the installation of two upperzone monitor wells and a hand augered soil boring at the center of the site. Figure 2 shows the locations of the monitor wells and the soil boring. Other work included the performance of electromagnetic profiles, vertical electrical soundings, and magnetometer surveys and is discussed in paragraphs 4.3 through 4.3.3.

4.1.1 Monitor Wells

Two monitor wells were installed at the Fire Department Training Area 1. The locations of the wells were selected both in view of the impact of individual sites on the upper zone groundwater and the aggregate impact of the sites on the groundwater. Because there were no groundwater quality or groundwater flow data, the primary criterion for the location of the wells was topographic setting relative to the fire training area. For upgradient wells ("A" series), the location was selected upslope from the training area. The downgradient well was located downslope and as near as practicable to the limits of the training area.

indicate paved areas on site plan.



LEGEND

15A ◉ Monitor Well Location

15D ⊕ Hand Auger Locations

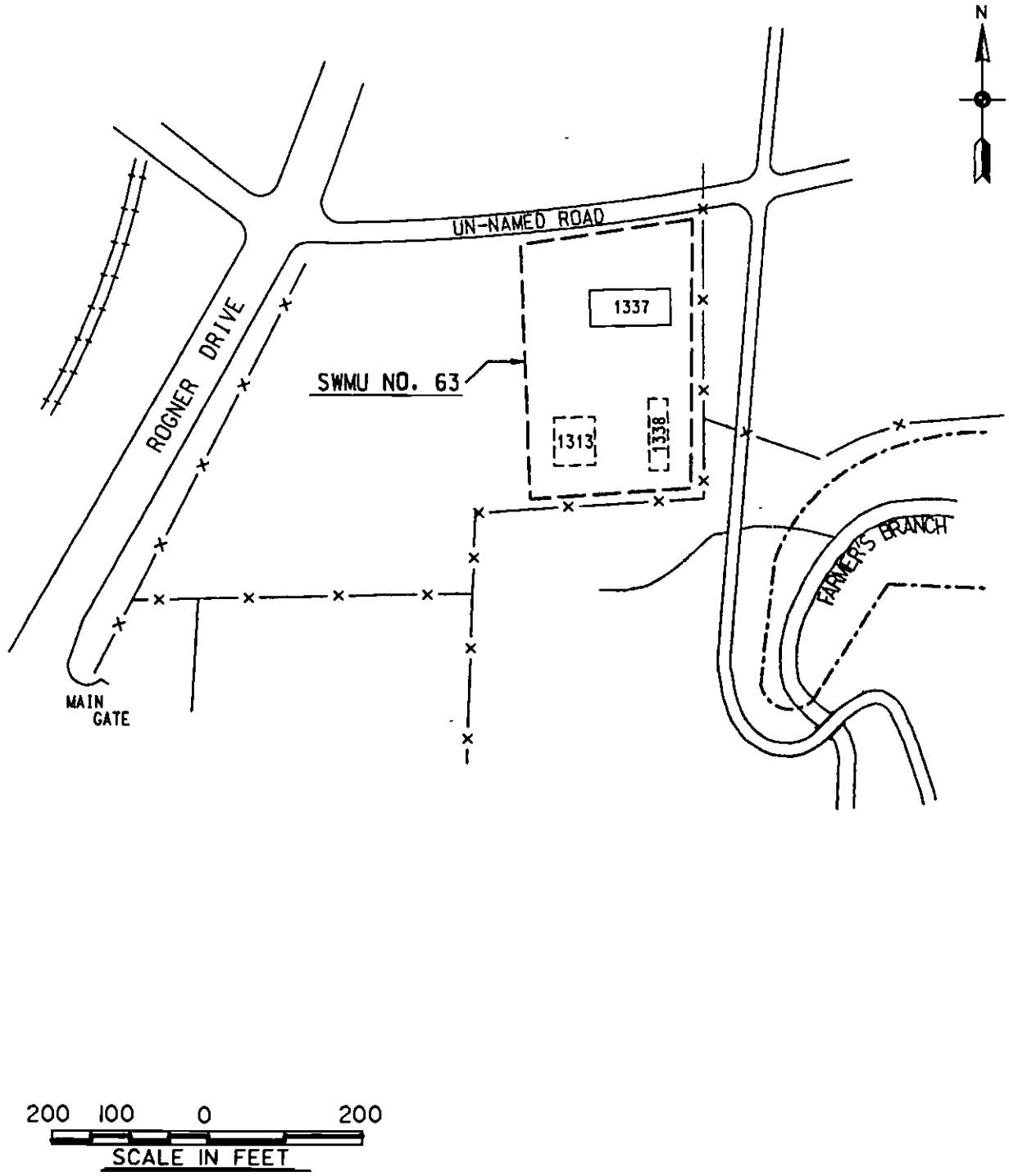
200 100 0 200

SCALE IN FEET

BORING LOCATIONS

SWMU NO. 63, ENTOMOLOGY DRY WELL

FIGURE 4



SITE MAP

SWMU NO. 63, ENTOMOLOGY ORY WELL
FIGURE 3

All upper zone monitor wells were drilled to the base of the upper zone, or until at least 10 feet of saturated material suitable for well construction was encountered. General specifications for monitor wells installed near the flightline area are provided in Table 2.

TABLE 1
GENERAL SPECIFICATIONS FOR MONITOR WELLS
CARSWELL AFB, TEXAS

Monitor Well	Measuring Point Elevation[1]	Ground Level Elevation[2]	Screened Interval[3]	Screen Elevations[2]	Total Depth[3]
11A	608.25	604.75	4-14	600.75-590.75	14.5
11B	608.11	603.56	3.5-13.5	600.06-590.06	15
15A	570.24	570.62	2.5-12.5	568.12-558.12	12.74
15B	568.09	564.14	2-7	562.14-557.14	7.43
15C	567.87	564.17	5.5-10.5	558.67-553.67	10.66

[1]Top of PVC for monitor wells.

[2]Feet, msl to nearest 0.01 foot (Reference Datum = floor of Bldg. 1215).

[3]Feet below ground level.

4.1.2 Monitor Well Sampling

After the completion and initial development of the monitor wells, each one was purged and sampled. Field sampling was conducted by Radian personnel during the periods 4-8 February 1985 and 4-8 March 1985. The groundwater samples were analyzed for the parameters as shown in Table 42 Results of the groundwater analyses are provided in Section 5.0.

TABLE 2
ANALYTICAL SCHEDULE FOR GROUNDWATER SAMPLES
CARSWELL AFB, TEXAS

	Parameter						
Site	TOC	TOX	Oil & Grease	Pesti-cides	Phenols	Heavy Metals	Purgeable Organics
Fire Training Area 1 (18)	X	X	X	X	X	X	X
Entomology Bldg (63)	X						

4.1.3 Soil Sampling

In addition to monitor well sampling, soil samples were collected for analysis. Location of the hand-auger sampling point is shown on Figure 2. The auger, with extensions, was able to retrieve soil samples at a depth of 10 feet below the land surface. The sampling technique involved augering to the desired depth, cleaning the auger with water and acetone, retrieving a sample with the auger, and then continuing with the auger to the next sample depth. At the surface, each sample was placed in a quart mason jar with a Teflon-lined lid and frozen for shipment to the laboratory. Soils were analyzed for parameters listed in Table 3.

TABLE 3
ANALYTICAL SCHEDULE FOR SOIL SAMPLES

Site	Parameters				
	Oil & Grease	Pesticides	Phenols	Heavy Metals	Purgeable Organics
Fire Training Area 2 (18)	X		X	X	X
Entomology Building (63)		X			

4.2 Entomology Dry Well, SWMU 63

Work at SWMU 63 included installation of three upper zone monitor wells and conducting 7 shallow soil borings. Figure 4 shows the locations of the monitor wells and soil borings. Work also included included the performance of electromagnetic profiles, vertical electrical soundings, and magnetometer surveys and is discussed in paragraphs 4.3 through 4.3.3.

4.2.1 Monitor Well Installation and Borehole Drilling

A total of three upper zone monitor wells were installed at SWMU 63. The locations of the wells and borings were considered in view of the impact of individual sites on the upper zone groundwater. There were not groundwater quality or flow data available to aid in the selection of well locations. The primary criterion for the location of the wells was topographic setting relative

to the waste disposal area to be monitored. For upgradient wells ("A" series), the locations were selected upslope from the disposal sites. Downgradient wells were located downslope and as near as practicable to the limits of the waste disposal areas. All upper zone monitor wells were drilled to the base of the upper zone, or until at least 10 feet of saturated zone was encountered. General specifications for monitor wells completed area are provided in Table 1.

After the completion of the monitor wells, samples of groundwater were collected from each of the newly-installed wells. A second set of samples was collected approximately one month after the collection of the first set. Soil samples were collected from wells and borings as drilling progressed.

4.2.2 Sampling Activities

After the completion and initial development of the monitor wells, each one was purged and sampled. Field sampling was conducted by Radian personnel during the period February through March 1988. The groundwater samples were analyzed for the parameters as shown in Table 2. Results of the groundwater testing are provided in Appendix A.

4.3 Geophysical Surveys

Geophysical surveys were performed in order to accurately define the vertical and lateral extent of waste disposal activities, provide a clearer picture of the subsurface conditions at the site, and investigate the potential for buried objects. All survey grids were laid out using a compass and measuring chain. Stations were marked with labelled pin flags or spray paint in areas where asphalt or hard ground discouraged the use of pin flags. Several geophysical techniques were used during the investigations: earth resistivity by direct current Schlumberger soundings (vertical electrical sounds (VES), magnetic and magnetic gradient surveying, and fixed frequency electromagnetic profiling (EMP) conductivity surveys at three different depths (10, 20, 50 feet) of exploration. The Earth Technology Corporation of Golden, Colorado performed the geophysical surveys.

4.3.1 Electrical Resistivity

The Bison Model 2350 Earth Resistivity meter was utilized for the VES measurements. Current electrode separations used were (in meters): 1, 2, 3, 4, 6, 10, 14, 20, 30, 40, and 50. Due to variable ground conductivity, potential electrode separations varied slightly from site to site. The sounding data were processed using the ABEM VES iteration process to obtain a best fit curve and plotted logarithmically as resistivity in ohm-meters versus half the current electrode separation in meters. The plot also includes the layered earth model giving the best match. At most VES sites, orthogonal electrode arrays were used. The reason for this is to test for distortions of the data due to lateral inhomogeneities in the ground.

4.3.2 Electromagnetic Surveys

EMP survey was conducted at SWMU No. 18, Fire Department Training Area No. 1, using two devices: the Geonics EM31 and the Geonics EM34-3 ground conductivity sensors. Both ground conductivity sensors are designed for rapidly obtaining data over large areas. The meters employ magnetic dipoles or magnetic induction loops for transmission and reception of low-frequency electromagnetic waves. The effective depth sampled by the EM31 is 6 meters; the depth sampled by the EM34-3 depends on the coil separation and orientation, applied frequency, and to some extent on the conductivity profile of the subsurface. The techniques and conditions at Carswell AFB resulted in an effective sampling depth of 50 feet with the EM34-3.

4.3.3 Magnetometer Surveys

Magnetometer surveys were accomplished using an EDA PPM500 proton magnetometer. The use of the magnetometer was based on the fact that overburden at Carswell has a low magnetic susceptibility; the buried objects were believed to contain a significant amount of iron that would create a noticeable magnetic anomaly. Readings of the total field and magnetic gradient were taken at each location. The units for these readings are gammas and gammas per 1/2 meter,

respectively.

4.4 Drilling Techniques

Drilling at Carswell AFB was accomplished using a hollow-stem auger rig for the upper zone monitor wells and soil borings. This method were selected on the basis of the anticipated depth of completion, need for water-level observations, and expected geologic conditions. A hollow-stem auger drilling rig, the CME-75, was used to perform shallow soil borings and installation of the upper zone monitor wells. The hollow-stem method allowed for an accurate examination of soil conditions, identification of the position of the water table, and recovery of soil samples. The holes were drilled dry; no drilling fluids or additives were used. Samples of soil were collected with a split-spoon sampler, a hollow tube driven in advance of the auger at 5-foot intervals (ASTM D-1586). The samples were recovered at the surface, described in terms of lithology and moisture, and retained. Selected samples were frozen and shipped to Radian's laboratory for chemical analysis. Parameters for analysis are listed in Table 1.

4.5 Monitor Well Installation Methods

Upper zone groundwater monitor wells were installed immediately upon completion of the drilling operations. Usually, the borehole was observed for a period of time, as necessary, to determine the approximate static water level. Monitor well construction specifications are summarized in Table 4. Appropriate changes in the specifications were made on a site-by-site basis. The decisions relating to the setting of screen and casing, length of screen, and amount of gravel pack for each well were made on the basis of the observed static water level. If appropriate, the borehole was allowed to remain open overnight; there were no difficulties associated with the integrity of the borehole or caving problems.

The monitor wells were installed in the following way: screen and casing sections were cleaned and assembled on the ground, then lowered carefully into the borehole. As the string of screen and casing were lowered, additional

sections of casing were added until the bottom of the screen reached the complete depth of the borehole. Normally, enough casing was attached so as to leave a 2- to 3-foot stick-up at the ground surface. Clean gravel was carefully poured down the annular space until the level of the top of the gravel pack was at least 2 feet above the top of the screen (or as directed by the supervising geologist). Bentonite pellets were added to form a 2-foot thick seal, and if necessary, water from the well was bailed and poured down the annular space to hydrate the bentonite for completion activities that occurred above the water table.

TABLE 4
UPPER ZONE MONITOR WELL CONSTRUCTION SPECIFICATIONS FOR CARSWELL AFB, TEXAS

- Casing: 2-inch diameter, flush joint, Schedule 40 PVC.
- Screen: 2-inch diameter, flush joint, Schedule 40 PVC, 0.010 inch mill slot. Normal screen length was 10 feet, adjusted to 5 feet at the discretion of the supervising geologist.
- Gravel pack: Texas Blastsand No. 1A, emplaced from bottom of hole to 2 feet above top of screen.
- Bentonite seal: 2 feet above top of gravel pack.
- Grout: neat cement (Type I Portland cement) grout tremied from the top of the bentonite seal to the land surface.
- Surface completion: the PVC casing was cut off to provide a 2 to 3 foot stickup and solid cap placed on the casing. A 4-inch diameter guard pipe, 6 feet in length, was placed over the exposed casing and seated in the cement. A locking cap lid was installed on the guard pipe.
- Guard pipes or posts: 3-inch diameter steel posts, 6 feet in length, with a minimum of 2 feet below ground, 3 each installed radially 4 feet from the wellhead.
- After each well was installed, it was developed by hand pumping until a clear stream was produced, or until the supervising geologist determined that development was complete.
- The split-spoon sampler was washed between samples (water, acetone, water) and the drill pipe, bit, and augers cleaned (pressure water wash) between monitor wells.

Neat cement grout was then prepared and tremied from the top of the bentonite seal to the land surface. After completion of grouting, protective 4-

inch diameter steel casing with lockable lids were cemented into place at the surface and three steel guard posts were positioned around the well.

The monitor wells were developed by pumping with a hand-operated pump. This technique involved removing water by means of a 1.7-inch diameter pump, usually with the effect of dewatering the well. The water in the casing was alternately purged and allowed to recover; this process generally took several hours. Most of the upper zone wells had very low yields. Water was removed from the well until the sediment content of the water was visibly reduced.

Southwestern Laboratories of Dallas, Texas performed the upper zone drilling and monitor well installation work.

4.6 Groundwater Sampling

During Phase II efforts at Carswell AFB, groundwater samples were collected for analysis from the groundwater monitor wells. Sampling was conducted twice at each well, approximately one month apart. Field sampling methodologies and equipment are detailed in the following sections.

4.6.1 Water Level Measurements

As the first step of groundwater sampling operations at each monitor well, water level measurements were taken with an Actat Olympic well probe. The probe and associated electrical line were washed with laboratory deionized water between each well to preclude the possibility of cross-contamination. Measurements were taken to the nearest 0.01 foot with respect to the top of the protective steel well casing.

Each well was purged either immediately prior to sample collection or within one day of sample collection (for low-yield wells) to ensure that representative formation water was collected as the sample. Purging operations were conducted using either a 1.7 inch hand pump or a 1.1 liter bottom-discharge Teflon bailer. Purging operations were considered complete when three wetted well volumes had been evacuated.

All down-hole equipment used during the purging of the monitor wells was

carefully washed with laboratory deionized water to prevent cross-contamination. In the case where overt evidence of chemical contamination was noted in a well (color, odor, oil, etc.) the sampling apparatus was washed with technical-grade acetone and thoroughly rinsed with deionized water.

Specific conductance and temperature were determined with the use of a conductivity and temperature meter. Temperature readings were checked using a mercury-in-glass thermometer. The pH of the discharged water was measured with the use of a pH meter. Prior to each pH measurement, the instrument was calibrated against standard solutions for pH values of 4, 7, and 10. Prior to exposure to discharge water, the selective ion probe was thoroughly washed with deionized water.

4.6.2 Sample Capture

After each well was purged of standing water to ensure representative groundwater characteristics, a sample was collected and split into the analytical aliquots. Samples from wells were collected for the analyses shown in Table 2. Samples analyzed for parameters listed on the above table were placed in containers and preserved. All samples were chilled to 4 degrees C after collection. All aspects of the sampling protocol were conducted in accordance with EPA-approved methodologies. Field QA/QC measures were employed to ensure that once collected, sample integrity was maintained during shipping and handling prior to analysis.

4.7 Field Safety

Before the field work was initiated, a Field Safety Plan was prepared. This plan, developed from available data, anticipated likely field hazards and prescribed appropriate personnel protective equipment for the field team. EPA Level C protection (impervious clothing, gloves, boots, and full-face or half-face cartridge respirators) was employed for most drilling and well installation activities. For other activities, EPA Level D protection (same as Level C, except that respirators were carried, but not worn) was deemed appropriate. The

Safety Plan was followed for the complete field effort, and provided adequate protection.

4.8 Surveying

After all wells were installed, wellhead elevations were determined to the nearest 0.01 foot by surveying from the floor of Building 1215 (Civil Engineering). This datum provided a convenient and known reference elevation in the absence of USGS benchmarks. A local surveying firm, Sempco, Inc., accomplished this work.

5.0 RESULTS OF SITE INVESTIGATIONS

5.1 SWMU No. 18, Fire Department Training Area No. 1.

5.1.1 Geology.

Geologic data developed at SWMU No. 18 resulted from three Stage 1 IRP activities: Geologic surveys (EMP and VES), geologic sampling during drilling operations, and observations of water levels during and after monitor well installation. Water levels were also observed during the Stage 2 IRP program.

The geologic picture at SWMU No. 18 is based on an evaluation of drilling logs during the installation of two upper zone monitor wells. Upper zone materials consist of surficial deposits of clayey silt with variable amouints of fine sand and gravel, underlain by sand and gravel deposits. The thickness of the upper zone is approximately 14 feet at both of the monitor wells. Generally, the surficial clay and silt deposits are 5 feet in thickness and the sand and gravel deposits are 8 to 10 feet thick. Shale and limestone of the Goodland Formation underlie the upperzone materials at all locations. Figure ___ illustrates the relationship between the upper zone materials and the underlying limestone and shale.

5.1.2 Hydrogeology

Groundwater occurs in the upper zone materials underlying SWMU No.18 at depths ranging from 6 feet at 11B to 9 feet at 11A. The groundwater exists under unconfined (water table) conditions in the upper zone materials. The occurance and direction of groundwater movement in the upperzone appears to be directly related to the configuration of the bedrock surface.

5.1.3 Chemical Analytical Results

5.1.3.1 Water Quality - Samples of groundwater were collected and analyzed from monitor wells 11A and 11B in two sampling rounds. Parameters analyzed were water-quality indicators, heavy metals, petroleum hydrocarbons, purgeable halocarbons, purgeable aromatics, and extractable priority pollutants (11A only). The results of these tests are presented in Tables A-1 and A-2 (inorganic parameters) and Tables A-3 through A-7 (organic parameters) and are summarized in the following paragraphs. Table A-8 provides the results of field chemistry analyses.

5.1.3.2 Water Quality Indicators - Total disolved solids (TDS) ranged from 570 mg/L to 820 mg/L during the two sampling rounds. Other indicators were within recommended standards and did not display any discernable trend between sampling rounds.

5.1.3.3 Petroleum Hydrocarbons - Petroleum Hydrocarbons were not detected at 11A or 11B.

5.1.3.4 Heavy Metals - Maximum contaminant levels were exceeded by arsenic in the first (0.096 ug/L) and second (0.068 ug/L0 sampling events at monitor well 11B. Chromium (0.053 ug/mL) also surpassed MCLs at 11B in the first sampling round. Iron and manganese were found in levels above the MCL at 11B using the ICP metaal screen, but this was not confirmed with the graphite atomic absorption

test.

Well 11B had a higher concentrations of heavy metals than 11A, but the trend from the first sampling round to the second was a decrease in metal concentrations at well 11B, whereas there was an increase in metals at 11A.

5.1.3.5 Purgeable Halocarbons - Purgeable Halocarbons were not detected in the groundwater at SWMU No. 18.

5.1.3.6 Purgeable Aromatics - Toluene was found in all groundwater samples, ranging from 19 ug/L to 0.6 ug/L. Concentrations increased at both wells from the first to second rounds, but were under the toluene MCLG of 2.0 mg/L.

5.1.3.7 Extractable Priority Pollutants - Several priority pollutants (phthalate compounds) were detected in water samples from 11A. However, the substances detected were at low, sometimes estimated, levels, and occassionally were detected in the reagant blank sample.

5.1.4 Significance of Findings

1. Volatile organic compounds (with the exception of low levels of toulene and phthalate compounds attributable to laboratory contamination) were not detected in the upper zone groundwater.

2. Water quality parameters and metals concentrations were within expected and typical ranges for shallow alluvial aquifers.

5.2 ***SWMU No. 63, Entomology Dry Well***

During the Stage 1 program three well (15A, 15B, 15C) were installed. The Stage 2 program consisted of hand augering and soil sampling at seven locations to determine the occurrence of pesticides and herbicides in shallow soil. Figure

4 shows the locations of the hand auger borings.

5.2.1 Chemical Analytical Results

5.2.1.1 Soil Chemistry

Eight soil samples from the vicinity of the Entomology Dry Well were obtained by hand augering during the period of 29 March through 1 April, 1988. These samples were analyzed for the presence of organic compounds, specifically organochlorine pesticides and PCBs. Results of the analyses are provided in Tables A-9 and A-10.

5.2.1.2 Organochlorine Pesticides and PCBs - Organochlorine pesticides were detected in all soil samples (15D - 15I) except 15J, (hte) furthest upgradient sample. Chlordane was the most prevelent substance encountered, being found in ssamples from 15D, 15G, 15H and 15I. The highest value of 32,000 ug/Kg was in sample 15D, the furthest down gradient sampling location. Other chlordane findings ranged from 21 to 420 ug/Kg, and showed no apparent areal pattern. Location 15D also had the only detection of heptachlor, in a concentration of 980 ug/Kg. Auger locations 15E and 15F, while having no detection of chlordane in soil samples, each had findings of 4,4'-DDD and 4,4'-DDE. 15E had the largest concentrations, 140 ug/Kg (4,4'-DDD) and 29 ug/Kg (4,4'-DDE), while 15F had about 16 ug/Kg of each compound. There are no other organochlorine pesticides detected in the soil at SWMU No. 63.

5.2.2 Significance of Findings

The principal effort for the Stage 2 field program at SWMU No. 63 was to determine if pesticide contaminants occur in the near surface soil at the site of the former Entomology Dry Well. Six locations in the suspected area of the dry well were hand augered and soil samples from the hand-augered holes were collected and analyzed. The following paragraphs contain the significance of the findings for soil contamination.

Soil - Based on a review of the soil chemistry data, the samples collected and analyzed from the Entomology Dry Well area show pesticides occur in the near surface soils. The pesticides detected in soil samples included chlordane, heptachlor, 4,4'-DDD, and 4,4'-DDE.

The occurrence of these pesticides in shallow soil(os consistent with the past usage of the site as a storage area for base pesticides and herbicides. The lack of pattern of distribution of contaminants reflects the likely general usage of hte site, rather than attributing the pesticides to a single of few spill events or disposal operations.

5.2.3 Further Investigations, SWMU No.63, Entomology Dry Well.

An additional investigation was conducted by Maxim Engineers, Inc in March 1990. The purpose of the investigation was to drill 24 soil-borings and analyze the soil samples to determine if pesticide contaminants were present in underlying soils in the vicinity of the Entomology Dry Well.

Drilling activities were conducted on March 22, 23 and 26, 1990. Borings were advanced west and south of Building 1337 as shown in Appendix C. Approximate boring locations were designated by base personnel. Slight changes in boring placement were made to avoid buried utility lines, surface obstructions, and overhead wires.

Borings were continuously sampled with a split-spoon sampler down to depths of 9-10 feet. Soils consisted primarily of varied mixtures of fill material. The upper soil interval (0-5 feet) ranged from clays to sands, while the lower interval consisted primarily of sands and coarse gravels. Fill debris including sheet metal scraps, blocks of wood, and glass fragments were present in several borings. Split-spoon refusal was commonly encountered at depths of approximately 9 feet due to the coarse nature of the constituent gravels. Groundwater was present across the southeast portion of the sample area at depths of 5.5 - 8.5

feet, occurring at progressively shallower intervals toward the southeast.

One sample from each boring was retained for laboratory analysis of pesticide contaminants. Samples were placed in glass jars with teflon-lined lids and stored in a chilled insulated cooler while on site. Nine of the 24 samples were taken from the 3-5 foot depth while all other samples were retained from 8-10 foot depths. Sample depths and locations were selected to provide uniform coverage across the area at both depth intervals.

5.2.3.1 Analytical Results

Samples were analyzed at NRDC Laboratories in Richardson, Texas for Organochlorine Pesticides and PCB's (EPA Method 8080). Analytical results are summarized in Appendix C. Samples from borings B-17, B-19, and B-20 displayed low concentrations of chlordane ranging from 11-16 parts per billion (ppb) while B-24 contained 75 ppb Endrin Aldehyde. All other samples displayed ~~non-~~detectable concentrations of pesticides and PCB's. Except for B-17, all samples containing detectable levels of contaminants were from the 8-9 foot depth interval. In general, remediation action levels for these types of contaminants are in the part-per million (ppm) range.

5.2.3.2 Significance of Findings

The analytical results of the second investigation indicate that 20 of 24 borings contained ~~non-detectable~~ concentrations of pesticides and PCB's. Very low levels of chlordane (11-26 ppb) were encountered in three boring samples from the southeast portion of the property line while one sample in the central part of the site contained low levels of Endrin Aldehyde.

Both investigations (Radian and Maxim) indicate that very low levels of pesticides are found in the shallow soil in the vicinity of the former Entomology Dry Well.

APPENDIX A

Test Data
SWMU No's 18 and 63

TABLE A-1 RESULTS OF INORGANIC ANALYSES FOR WATER SAMPLES, SWMU 18 (FDTA 1), CARSWELL AFB, TEXAS

Primary Results			Monitor Well Sample ID Date Sampled							
			1A 02-151		11A 04-02		11B 02-152		11B 04-03	
PARAMETER	EPA Standards, Criteria (mg/L)		24-Feb-88		05-Apr-88		24-Feb-88		05-Apr-88	
Total Dissolved Solids mg/L										
Filterable Residue (TDS)			570 0	(1 0)	570 0	(1 0)	820 0	(1 0)	732 0	(1 0)
Fluoride mg/L										
Fluoride, SIE			0 25	( )	0 24	( )	0 22	( )	0 20	( )
Chloride mg/L										
Chloride			68 0	( )	8 9	( )	18 0	( )	16 0	( )
Nitrate mg/L as N										
Nitrate, colormetric			0 64	( )	0 59	( )	ND	(0.020)	ND	(0 20)
Orthophosphate mg/L										
Orthophosphate			ND	(0 020)	0.040	(0.020)	ND	(0 020)	ND	(0 020)
Sulfate mg/L										
Sulfate, nephelometry			46 0	( )	46 0	( )	60 0	( )	120 0	( )
Metals ug/mL										
Arsenic, graphite AA	0.050(M)	0.050(R)	0.0020	( )	0 0060^	( )	0 096	( )	0 068	( )
Mercury	0 0020(M)	0.0030(R)	ND	(0 00012)	ND	(0 00012)	ND	(0 00012)	ND	(0 00012)
Lead, graphite AA	0 050(M)	0.020(R)	0 0050R+	( )			0 036	( )		
Selenium, graphite AA	0.010(M)	0.045(R)	NDR+	(0 0050)	ND	(0 0030)	ND	0 0050)	ND	(0 0030)

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL) or R-Recommended Maximum Contaminant Level (RMCL) or other secondary standard (Refer to Tables 4.1-1 and 4.1-2)

R+ Matrix spike recovery and % difference (MS and MS dup) outside control limits

^, Indicates duplicate analysis is not within control limits.

ND Not detected at specified detection limit

( ) Detection limit

TABLE A-2 RESULTS OF INORGANIC ANALYSES FOR WATER SAMPLES, SWMU 18 (FDTA 1), CARSWELL AFB, TEXAS

Primary Results			Monitor Well Sample ID Date Sampled							
			1A		11A		11B		11B	
	EPA Standards,		02-151		04-02		02-152		04-03	
PARAMETER	Criteria (mg/L)		24-Feb-88		05-Apr-88		24-Feb-88		05-Apr-88	
Metal Screen (ICP) ug/mL										
Ag Silver	0 050(M)		ND	(0 0090)	0.0090	(0.0090)	ND	(0 0090)	ND	(0 0090)
Al Aluminum			4.7	(0 20)	13 0	(0.20)	32 0	(0 20)	20 0	(0 20)
As Arsenic	0.050(M)		ND	(0.30)	ND	(0.30)	ND	(0 30)	ND	(0 30)
B Boron			ND	(0 60)	ND	(0.60)	ND	(0 60)	ND	(0 60)
Ba Barium	1 0(M)	1 5(R)	0.18	(0.0090)	0 19	(0.0090)	0 25	(0 0090)	0.20	(0 0090)
Be Beryllium			0.0010	(0.0010)	0.0020	(0.0010)	0 0020	(0 0010)	0 0060	(0 0010)
Ca Calcium			170.0	(0.060)	220 0	(0 060)	350 0	(0.060)	320.0	(0 060)
Cd Cadmium	0 010(M)	0 0050(R)	ND	(0.0030)	ND	(0 0030)	ND	(0 0030)	ND	(0 0030)
Co Cobalt			ND	(0.010)	ND	(0.010)	ND	(0 010)	ND	(0 010)
Cr Chromium	0 050(M)	0.12(R)	0 012	(0.0090)	0 024	(0 0090)	0 053	(0 0090)	0 044	(0 0090)
Cu Copper	1 0(R)		ND	(0.010)	ND	(0.010)	0 040	(0 010)	0 030	(0 010)
Fe Iron	0 30(R)		5 4	(0 030)	13 0	(0 030)	68 0	(0 030)	46 0	(0 030)
K Potassium			5 4	(0 30)	7 4	(0 30)	5 3	(0 30)	3 8	(0 30)
Mg Magnesium			10 0	(0 10)	13 0	(0 10)	13 0	(0.10)	11 0	(0 10)
Mn Manganese	0 050(R)		0.22	(0 0030)	0 29	(0 0030)	1 5	(0 0030)	1 3	(0 0030)
Mo Molybdenum			ND	(0 050)	ND	(0 050)	ND	(0 050)	ND	(0 050)
Na Sodium			14 0	(0 080)	14 0	(0.080)	35 0	(0 080)	36 0	(0 080
Ni Nickel			ND	(0.020)	ND	(0 020)	0 050	(0 020)	0 030	(0 020)
Pb Lead	0.050(M)	0 020(R)	ND	(0 050)	ND	(0.050)	0.10	(0 050)	0 060	(0.050)
Sb Antimony			ND	(0.060)	ND	(0 060)	0 070	(0 060)	ND	(0 060)
Se Selenium			ND	(0 30)	ND	(0.30)	ND	(0 30)	ND	(0 30)
Si Silicon			19 0	(0 30)	30 0	(0 30)	80.0	(0.30)	41 0	(0 30)
Ti Thallium			ND	(0.090)	ND	(0.090)	ND	(0 090)	ND	(0 090)
V Vanadium			ND	(0 020)	0.030	(0 020)	0 11	(0 020)	0 080	(0 020)
Zn Zinc	5 0(R)		0.023	(0 0060)	0 055	(0.0060)	0 098	(0 0060)	0 070	(0 0060)

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL) or R-Recommended Maximum Contaminant Level (RMCL) or other secondary standard (Refer to Tables 4.1-1 and 4.1-2)

R+ Matrix spike recovery and % difference (MS and MS dup) outside control limits

*: Indicates duplicate analysis is not within control limits

ND. Not detected at specified detection limit

( ) Detection limit.

TABLE A-3 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SWMU 18 (FDTA 1), CARSWELL AFB, TEXAS

Primary Results			Monitor Well Sample ID Date Sampled							
			1A 02-151		11A 04-02		11B 02-152		11B 04-03	
PARAMETER	EPA Standards, Criteria (mg/L)		24-Feb-88		05-Apr-88		24-Feb-88		05-Apr-88	
Petroleum Hydrocarbons mg/L										
Hydrocarbons ug/L			ND	(0 20)	ND	(0 20)	ND	(0 20)	ND	(0 20)
Purgeable Halocarbons ug/L										
1,1,1-Trichloroethane	0.20(R)		ND	(0 090)	ND	(0 090)	ND	(0 090)	ND	(0.090)
1,1,2,2-Tetrachloroethane			ND	(0 12)	ND	(0 12)	ND	(0.12)	ND	(0 12)
1,1,2-Trichloroethane			ND	(0 070)	ND	(0 070)	ND	(0 070)	ND	(0 070)
1,1-Dichloroethane			ND	(0.090)	ND	(0 090)	ND	(0 090)	ND	(0 090)
1,1-Dichloroethene	0.0070(M)		ND	(0.10)	ND	(0.10)	ND	(0 10)	ND	(0.10)
1,2-Dichlorobenzene	0 62(R)		ND	(0 50)	ND	(0.50)	ND	(0.50)	ND	(0 50)
1,2-Dichloroethane	0 00000(R)		ND	(0 030)	ND	(0 030)	ND	(0.030)	ND	(0 030)
1,2-Dichloropropane			ND	(0 10)	ND	(0.10)	ND	(0 10)	ND	(0.10)
1,3-Dichlorobenzene	0 40(R)		ND	(0.30)	ND	(0 30)	ND	(0 30)	ND	(0 30)
1,4-Dichlorobenzene	0.75(M)		ND	(0.40)	ND	(0 40)	ND	(0 40)	ND	(0 40)
2-Chloroethylvinyl ether			ND	(0 20)	ND	(0.20)	ND	(0.20)	ND	(0 20)
Bromodichloromethane			ND	(0.10)	ND	(0 10)	ND	(0 10)	ND	(0.10)
Bromoform			ND	(0.30)	ND	(0 30)	ND	(0 30)	ND	(0 30)
Bromomethane			ND	(1.2)	ND	(1 2)	ND	(1 2)	ND	(1 2)
Carbon tetrachloride	0.0050(M)	0 00000(R)	ND	(0.10)	ND	(0.10)	ND	(0 10)	ND	(0 10)
Chlorobenzene	0 060(R)		ND	(0 30)	ND	(0 30)	ND	(0.30)	ND	(0 30)
Chloroethane			ND	(0.50)	ND	(0 50)	ND	(0 50)	ND	(0 50)
Chloroform			ND	(0 050)	ND	(0 050)	ND	(0 050)	ND	(0 050)
Chloromethane			ND	(0 30)	ND	(0 30)	ND	(0 30)	ND	(0 30)
Dibromochloromethane			ND	(0 20)	ND	(0 20)	ND	(0 20)	ND	(0 20)
Methylene chloride			ND	(0 30)	ND	(0 30)	ND	(0 30)	ND	(0 30)

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL) or R-Recommended Maximum Contaminant Level (RMCL) or other secondary standard (Refer to Tables 4 1-1 and 4 1-2)

&: cis-1,3-Dichloropropene cannot be quantitated due to coelution

B, Found in reagent blank; not blank subtracted

J Estimated value (GC test codes).

Q Daily EPA QC recovery outside 95% confidence limit

ND Not detected at specified detection limit

( ) Detection limit.

TABLE A-4 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SWMU 18 (FDTA 1), CARSWELL AFB, TEXAS

Primary Results			Monitor Well Sample ID Date Sampled							
PARAMETER	EPA Standards, Criteria (mg/L)		1A 02-151 24-Feb-88		11A 04-02 05-Apr-88		11B 02-152 24-Feb-88		11B 04-03 05-Apr-88	
Tetrachloroethene	0.0080(R)		ND	(0 030)	ND	(0 030)	ND	(0 030)	ND	(0 030)
Trichloroethene	0.0080(M)		ND	(0 20)	ND	(0 20)	ND	(0 20)	ND	(0 20)
Trichlorofluoromethane			ND	(0.10)	ND	(0 10)	ND	(0 10)	ND	(0 10)
Vinyl chloride	0.0010(M)	0.00000(R)	ND	(0.20)	ND	(0 20)	ND	(0 20)	ND	(0 20)
cis-1,3-Dichloropropene			ND&	( )	ND&	( )	ND&	( )	ND&	( )
trans-1,2-Dichloroethene			ND	(0 20)	ND	(0 20)	ND	(0 20)	ND	(0 20)
trans-1,3-Dichloropropene			ND	(0 30)	ND	(0 30)	ND	(0 30)	ND	(0 30)
Purgeable Aromatics ug/L										
1,2-Dichlorobenzene	0 62(R)		ND	(0.40)	ND	(0.40)	ND	(4 0)	ND	(0 40)
1,3-Dichlorobenzene	0 40(R)		ND	(0.40)	ND	(0 40)	ND	(4 0)	ND	(0 40)
1,4-Dichlorobenzene	0 75(M)		ND	(0 30)	ND	(0 30)	ND	(3 0)	ND	(0 30)
Benzene	0.0050(M)		ND	(0 20)	ND	(0 20)	ND	(2.0)	ND	(0 20)
Chlorobenzene	0 060(R)		ND	(0 30)	ND	(0.30)	ND	(3 0)	ND	(0.30)
Ethylbenzene	0 68(R)		ND	(0 30)	ND	(0 30)	ND	(3 0)	ND	(0 30)
Toluene			0.60	(0.20)	13.0	(0 20)	3 2	(2 0)	19 0	(0 20)
m-Xylene			NDQ	(0.20)	NDQ	(0.20)	ND	(2 0)	NDQ	(0 20)
o-Xylene			ND	(0 10)	ND	(0 10)	ND	(1 0)	ND	(0 10)
p-Xylene			ND	(0 20)	ND	(0 20)	ND	(2 0)	ND	(0 20)
Extractable Priority Pollutants ug/L										
1,2,4-trichlorobenzene			ND	(1.9)	ND	(2 1)				
1,2-dichlorobenzene			ND	(1.9)	ND	(2.1)				
1,3-dichlorobenzene			ND	(1 9)	ND	(2 1)				
1,4-dichlorobenzene	0.75(R)		ND	(4 4)	ND	(4.8)				

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL) or R-Recommended Maximum Contaminant Level (RMCL) or other secondary standard (Refer to Tables 4.1-1 and 4.1-2)

& cis-1,3-Dichloropene cannot be quantitated due to coelution

B Found in reagent blank, not blank subtracted

J Estimated value (GC test codes)

Q Daily EPA QC recovery outside 95% confidence limit

ND. Not detected at specified detection limit

( ) Detection limit

TABLE A-5 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SWMU 18 (FDTA 1), CARSWELL AFB, TEXAS

Primary Results		Monitor Well Sample ID Date Sampled			
PARAMETER	EPA Standards, Criteria (mg/L)	1A 02-151 24-Feb-88	11A 04-02 05-Apr-88	11B 02-152 24-Feb-88	11B 04-03 05-Apr-88
2,4,5-trichlorophenol		ND (19 0)	ND (11 0)		
2,4,6-Trichlorophenol		ND (2.7)	ND (2 9)		
2,4-Dichlorophenol	3.1(R)	ND (2 7)	ND (2.9)		
2,4-Dimethylphenol	2 1(R)	ND (2 7)	ND (2 9)		
2,4-Dinitrophenol		ND (42 0)	ND (46 0)		
2,4-dinitrotoluene		ND (5.7)	ND (6 2)		
2,6-dinitrotoluene		ND (1 9)	ND (2.1)		
2-Chlorophenol		ND (3 3)	ND (3 6)		
2-Nitrophenol		ND (3 6)	ND (3 9)		
2-chloronaphthalene		ND (1 9)	ND (2.1)		
2-methylnaphthalene		ND (10 0)	ND (11 0)		
2-methylphenol		ND (10 0)	ND (11.0)		
2-nitroaniline		ND (50.0)	ND (55 0)		
3,3'-dichlorobenzidine		ND (17 0)	ND (18 0)		
3-nitroaniline		ND (50 0)	ND (55 0)		
4,6-dinitro-2-methylphenol		ND (24 0)	ND (26 0)		
4-Chloro-3-Methylphenol		ND (3 0)	ND (3 3)		
4-Nitrophenol		ND (2 4)	ND (2 6)		
4-bromophenyl-phenylether		ND (1 9)	ND (2 1)		
4-chloroaniline		ND (10 0)	ND (11 0)		
4-chlorophenyl-phenylether		ND (4 2)	ND (4 6)		
4-methylphenol		ND (10 0)	ND (11 0)		
4-nitroaniline		ND (50 0)	ND (55 0)		
Pentachlorophenol	0 22(R)	ND (3 6)	ND (3 9)		
Phenol	3 5(R)	ND (1 5)	ND (1 6)		

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL) or R-Recommended Maximum Contaminant Level (RMCL) or other secondary standard (Refer to Tables 4 1-1 and 4 1-2)

& cis-1,3-Dichloropropene cannot be quanitated due to coelution.

B Found in reagent blank; not blank subtracted

J Estimated value (GC test codes)

Q Daily EPA QC recovery outside 95% confidence limit

ND: Not detected at specified detection limit

( ) Detection limit.

TABLE A-6 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SWMU 18 (FDTA 1), CARSWELL AFB, TEXAS

Primary Results		Monitor Well Sample ID Date Sampled			
PARAMETER	EPA Standards, Criteria (mg/L)	1A 02-151 24-Feb-88	11A 04-02 05-Apr-88	11B 02-152 24-Feb-88	11B 04-03 05-Apr-88
acenaphthene	0.00003(R)	ND (1.9)	ND (2 1)		
acenaphthylene		ND (3 5)	ND (3 8)		
anilene		ND (10 0)			
anthracene		ND (1.9)	ND (2 1)		
benzidine		ND (44 0)			
benzo(a)anthracene		ND (7 8)	ND (8 5)		
benzo(a)pyrene		ND (2 5)	ND (2 7)		
benzo(b)flouranthene		ND (4 8)	ND (5 2)		
benzo(g,h,i)perylene		ND (4 1)	ND (4 5)		
benzo(k)fluoranthene		ND (2 5)	ND (2 7)		
benzoic acid		ND (50 0)	ND (55 0)		
benzyl alcohol		ND (50.0)	ND (55 0)		
bis(2-chloroethoxy)methane		ND (5.3)	ND (5 8)		
bis(2-chloroethyl)ether		ND (5 7)	ND (6 2)		
bis(2-chloroisopropyl)ether		ND (5 7)	ND (6 2)		
bis(2-etghylhexyl)phthalate	15.0(R)	11.0B (2 5)	ND (2.7)		
butylbenzylphthalate	0 94(R)	ND (2.5)	1 8J (2 7)		
chrysene		ND (2 5)	ND (2 7)		
di-n-butylphthalate	35.0(R)	6.1B (2 5)	ND (2 7)		
di-n-octyl phthalate		3 8B (2 5)	2.0J (2 7)		
dibenz(a,h)anthracene		ND (2 5)	ND (2 7)		
dibenzofuran		ND (10 0)	ND (11 0)		
diethylphthalate		ND (1 9)	ND (2 1)		
dimethyl phthalate		ND (1 6)	ND (1.7)		
fluorothene	0 00003(R)	ND (2 2)	ND (2 4)		

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL) or R-Recommended Maximum Contaminant Level (RMCL) or other secondary standard (Refer to Tables 4.1-1 and 4 1-2)

& cis-1,3-Dichloropropene cannot be quanitated due to coelution

B Found in reagent blank, not blank subtracted

J Estimated value (GC test codes)

Q Daily EPA QC recovery outside 95% confidence limit.

ND Not detected at specified detection limit.

( ) Detection limit

TABLE A-7 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SWMU 18 (FDTA 1), CARSWELL AFB, TEXAS

Primary Results		Monitor Well Sample ID Date Sampled			
PARAMETER	EPA Standards, Criteria (mg/L)	1A 02-151 24-Feb-88	11A 04-02 05-Apr-88	11B 02-152 24-Feb-88	11B 04-03 05-Apr-88
fluorene	0.00003(R)	ND (1 9)	ND (2.1)		
hexachlorobenzene		ND (1.9)	ND (2 1)		
hexachlorobutadiene		ND (0.90)	ND (0 98)		
hexachlorocyclopentadiene		ND (6 0)	ND (6 5)		
hexachloroethane		ND (1 6)	ND (1 7)		
indeno(1,2,3-cd)pyrene		ND (3 7)	ND (4 0)		
isophorone	5 2(R)	ND (2 2)	ND (2 4)		
n-nitroso-di-n-propylamine		ND (12 0)	ND (13 0)		
n-nitrosodimethylamine		ND (10 0)			
n-nitrosodiphenylamine (1)		ND (1.9)	ND (2 1)		
napthalene	0 62(R)	ND (1.6)	ND (1 7)		
nitrobenzene		ND (1 9)	ND (2 1)		
phenanthrene	0.00003(R)	ND (5 4)	ND (5 9)		
pyrene	0.00003(R)	ND (1 9)	ND (2 1)		

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL) or R-Recommended Maximum Contaminant Level (RMCL) or other secondary standard (Refer to Tables 4 1-1 and 4.1-2)

&: cis-1,3-Dichloropropene cannot be quantitated due to coelution

B Found in reagent blank, not blank subtracted

J Estimated value (GC test codes)

Q Daily EPA QC recovery outside 95% confidence limit.

ND Not detected at specified detection limit

( ) Detection limit

TABLE A-8 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SWMU 18 (FDTA 1), CARSWELL AFB, TEXAS

Primary Results		Monitor Well			
		Sample ID			
		Date Sampled			
		11A		11B	
		04-02		04-03	
Analyte	Unit of Measure	05-Apr-88		05-Apr-88	
Alkalinity	mg/L			690 0	(5 0)
Specific Conductance	uMHOS/CM	830.0	(1.0)	1100 0	(10 0)
Temperature	C	17 0	(1 0)	16 0	(1 0)
pH	S U.	6 7	(0 010)	6 8	(0.010)

( ) Detection limit

TABLE A-9 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SWMU 63 (ENTOMOLOGY DRY WELL), CARSWELL AFB, TEXAS

Primary Results	Monitor Well Sample ID Date Sampled Beg Depth – End Depth							
	15D CARS-03-068 31-Mar-88		15E CARS-03-045 29-Mar-88		15F CARS-03-046 29-Mar-88		15G CARS-03-069 31-Mar-88	
Parameter	0.01 – 1		1 – 2		2 – 4		1 – 2	
Organochlorine Pesticides and PCBs ug/Kg								
4,4'-DDD	ND	(260 0)	140 0C	(10 0)	17 0C	(2.2)	ND	(2 4)
4,4'-DDE	ND	(260 0)	29.0C	(10 0)	16 0C	(2 2)	ND	(2 4)
4,4'-DDT	ND	(520 0)	ND	(20 0)	ND	(4 4)	ND	(4 8)
Aldrin	ND	(260 0)	ND	(10.0)	ND	(11 0)	ND	(2 4)
Chlordane	32000 0C	(5500 0)	ND	(50 0)	ND	(55 0)	21 0C	(12.0)
Dieldrin	ND	(260.0)	ND	(10.0)	ND	(2 2)	ND	(2 4)
Endosulfan I	ND	(260 0)	ND	(10 0)	ND	(2 2)	ND	(2 4)
Ensodulfan II	ND	(780.0)	ND	(30 0)	ND	(6 6)	ND	(7 2)
Endosulfan Sulphate	ND	(1300.0)	ND	(50.0)	ND	(11 0)	ND	(12 0)
Endrin	ND	(260 0)	ND	(10 0)	ND	(2 2)	ND	(2 4)
Endrin Aldehyde	ND	(520.0)	ND	(20 0)	ND	(4 4)	ND	(4 8)
Endrin Ketone	ND	(1300.0)	ND	(50 0)	ND	(11 0)	ND	(12.0)
Heptachlor	980 0C	(260 0)	ND	(10 0)	ND	(11.0)	ND	(2.4)
Heptachlor Epoxide	ND	(260.0)	ND	(10 0)	ND	(11 0)	ND	(2.4)
Methoxychlor	ND	(1300 0)	ND	(50 0)	ND	(11 0)	ND	(12.0)
PCB-1016	ND	(2600.0)	ND	(100.0)	ND	(110 0)	ND	(24 0)
PCB-1221	ND	(5200 0)	ND	(200 0)	ND	(220 0)	ND	(48.0)
PCB-1232	ND	(5200 0)	ND	(200 0)	ND	(220 0)	ND	(48.0)
PCB-1242	ND	(2600.0)	ND	(100.0)	ND	(110.0)	ND	(24 0)
PCB-1248	ND	(2600 0)	ND	(100 0)	ND	(110 0)	ND	(24 0)
PCB-1254	ND	(5200 0)	ND	(200 0)	ND	(44 0)	ND	(48 0)
PCB-1260	ND	(5200 0)	ND	(200.0)	ND	(44 0)	ND	(48 0)
Toxaphene	ND	(13000 0)	ND	(500 0)	ND	(110 0)	ND	(120 0)
alpha-BHC	ND	(260.0)	ND	(10 0)	ND	(11 0)	ND	(2 4)
beta-BHC	ND	(260.0)	ND	(10 0)	ND	(11 0)	ND	(2 4)
delta-BHC	ND	(260.0)	ND	(10 0)	ND	(11 0)	ND	(2 4)
gamma-BHC (lindane)	ND	(260 0)	ND	(10 0)	ND	(11 0)	ND	(2.4)
Chlorinated Phenoxy Herbicides ug/Kg								
2,4,5-T	ND	(53.0)	ND	(50 0)	ND	(51 0)	ND	(60.0)
2,4,5-TP (Silvex)	ND	(53 0)	ND	(50 0)	ND	(51 0)	ND	(60 0)
2,4-D	ND	(270 0)	ND	(250 0)	ND	(260 0)	ND	(300 0)

C Second Column Confirmed
ND Not detected at specified detection limit
( ) Detection limit

TABLE A-10 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SWMU 63 (ENTOMOLOGY DRY WELL), CARSWELL AFB, TEXAS

Primary Results								
	Monitor Well							
	Sample ID							
	Date Sampled							
	Beg. Depth – End Depth							
	15H		15I		15J		15J	
	CARS-03-070		CARS-03-071		CARS-03-046		CARS-03-073	
	01-Apr-88		01-Apr-88		01-Apr-88		01-Apr-88	
Parameter	0 01 – 1		1 – 2		2 – 4		1 – 2	
Organochlorine Pesticides and PCBs ug/Kg								
4,4'-DDD	ND	(2.4)	ND	(21 0)	ND	(2 1)	ND	(2 2)
4,4'-DDE	ND	(2.4)	ND	(21 0)	ND	(2 1)	ND	(2.2)
4,4'-DDT	ND	(4.8)	ND	(42.0)	ND	(4 2)	ND	(4 4)
Aldrin	ND	(2.4)	ND	(21 0)	ND	(2 1)	ND	(2.2)
Chlordane	42 0C	(12.0)	420.0C	(110.0)	ND	(11 0)	ND	(11.0)
Dieldrin	ND	(2 4)	ND	(21 0)	ND	(2.1)	ND	(2.2)
Endosulfan I	ND	(2 4)	ND	(21.0)	ND	(2 1)	ND	(2 2)
Ensodulfan II	ND	(7.2)	ND	(63 0)	ND	(6 3)	ND	(6 6)
Endosulfan Sulphate	ND	(12 0)	ND	(110 0)	ND	(11 0)	ND	(11 0)
Endrin	ND	(2 4)	ND	(21 0)	ND	(2 1)	ND	(2.2)
Endrin Aldehyde	ND	(4.8)	ND	(42.0)	ND	(4 2)	ND	(4 4)
Endrin Ketone	ND	(12 0)	ND	(110 0)	ND	(11 0)	ND	(11 0)
Heptachlor	ND	(2 4)	ND	(21 0)	ND	(2.1)	ND	(2 2)
Heptachlor Epoxide	ND	(2.4)	ND	(21.0)	ND	(2 1)	ND	(2 2)
Methoxychlor	ND	(12 0)	ND	(110 0)	ND	(11 0)	ND	(11 0)
PCB-1016	ND	(24 0)	ND	(210 0)	ND	(21 0)	ND	(22 0)
PCB-1221	ND	(48 0)	ND	(420 0)	ND	(42 0)	ND	(44 0)
PCB-1232	ND	(48 0)	ND	(420 0)	ND	(42 0)	ND	(44 0)
PCB-1242	ND	(24 0)	ND	(210 0)	ND	(21 0)	ND	(22 0)
PCB-1248	ND	(24 0)	ND	(210 0)	ND	(21 0)	ND	(22 0)
PCB-1254	ND	(48 0)	ND	(420 0)	ND	(42 0)	ND	(44 0)
PCB-1260	ND	(48.0)	ND	(420 0)	ND	(42 0)	ND	(44 0)
Toxaphene	ND	(120 0)	ND	(1100 0)	ND	(110 0)	ND	(110 0)
alpha-BHC	ND	(2 4)	ND	(21.0)	ND	(2 1)	ND	(2 2)
beta-BHC	ND	(2 4)	ND	(21 0)	ND	(2 1)	ND	(2 2)
delta-BHC	ND	(2.4)	ND	(21.0)	ND	(2 1)	ND	(2 2)
gamma-BHC (lindane)	ND	(2 4)	ND	(21 0)	ND	(2 1)	ND	(2 2)
Chlorinated Phenoxy Herbicides ug/Kg								
2,4,5-T	ND	(61.0)	ND	(54.0)	ND	(44 0)	ND	(55 0)
2,4,5-TP (Silvex)	ND	(61 0)	ND	(54 0)	ND	(44 0)	ND	(55 0)
2,4-D	ND	(310 0)	ND	(270 0)	ND	(220 0)	ND	(280 0)

C Second Column Confirmed
ND Not detected at specified detection limit
( ) Detection limit

APPENDIX B

Monitor Well Logs

RADIAN
CORPORATION

Log: Monitor Well 11A

Project Carswell AFB IRP
Location North of FTA 1
Drilled by SWL (CME 75)
Logged by L.M. French

Dates of Drilling/Well Completion 1/15/85
Elevations: Land Surface 604.75 Measuring Point 608.25
Total Depth 14.5 ft.
Drilling, Sampling Methods Hollow-stem auger; split-spoon

Depth (ft)	Sampling Record: Sample Type	Blows per 6 inches	Sample I.D.	Graphic Log	Geologic Description	Notes	Well Completion
+5						(11A destroyed on 1/23/85; replaced as shown at right)	Grout, Seal, Casing
0					CRAVEL; limestone, coarse; and CLAY, dry, light brown; with some silt and fine to coarse grained sand.		
5	SS	4-7	11A1				
					SAND; medium to coarse grained, medium brown, stratified with thin gravel and shell layers.		
10	SS	3-4	11A2 (850841)			Water at 8 ft.	Gravel Pack, Screen
15	SS	13-28	11A3		SHALE; blue-gray, massive, hard. End of boring: 14.5 feet.		
20							
25							
30							
35							
40							

RADIAN CORPORATION

Log: Monitor Well 118

Project Carswell AFB IRP
Location South of FTA 1
Drilled by SWL (CME 75)
Logged by L.M. Franch

Dates of Drilling/Well Completion 1/16/85
Elevations: Land Surface 603.56 Measuring Point 608.11
Total Depth 15 ft.
Drilling, Sampling Methods Muller-stem auger; split-spoon

Depth (ft)	Sampling Record: Sample Type	Blows per 6 inches	Sample I.D.	Graphic Log	Geologic Description	Notes	Well Completion
+5							Grout, Seal, Casing
0					CLAY; dark brown to tan; with silt and fine sand. Trace fine gravel.		
5	SS	4-5	1181		SAND; medium brown, medium to coarse grained; little silt.	Water at 7 ft. Air sample negative.	Gravel Pack, Screen
10	SS	4-7	1182 (850861)				
15	SS	13-25	1183		SHALE, blue-gray, massive, hard. End of boring: 15 ft.		
20							
25							
30							
35							
40							

RADIAN
CORPORATION

Log: Monitor Well 15R

Project Carswell AFR IRP
Location South of Bldg. 1337
Drilled by RVL (CME 75)
Logged by L.M. French

Dates of Drilling/Well Completion 1/18/85
Elevations: Land Surface 564.14 Measuring Point 568.09
Total Depth 9 ft.
Drilling, Sampling Methods Hollow-stem auger; split-spoon

Depth (ft)	Sampling Record: Sample Type	Blows per 6 inches	Sample I.D.	Graphic Log	Geologic Description	Notes	Well Completion
+5							Grout, Casing, Seal, Gravel Pack, Screen
0					FILL; tan, sandy clay, dry.		
5	SS	11-7	1581		SAND; fine to coarse grained, orange-brown, moist; with silt and variable amount of fine to coarse gravel. Increasing gravel in clayey matrix.		
10	SS	50*	1582 (850874)		LIMESTONE; gray, hard, dry. End of boring: 9 ft.	Water at 9 feet. *for 3/4 inch.	
15							
20							
25							
30							
35							
40							

RADIAN
CORPORATION

Log: Monitor Well 15C

Project Caswell AFB IRP
Location South of Bldg. 1337
Drilled by RWL (CME 75)
Logged by L.M. Branch

Dates of Drilling/Well Completion 1/18/85
Elevations: Land Surface 564.17 Measuring Point 567.87
Total Depth 12 ft.
Drilling, Sampling Methods Hollow-stem auger; split-spoon

Depth (ft)	Sampling Record: Sample Type	Blows per 6 inches	Sample I.D.	Graphic Log	Geologic Description	Notes	Well Completion
+5							
0					FILL; asphalt, concrete, sandy gravel, dry.		
5	SS	2-2	15C1		SILT; dark brown, moist; with SAND; fine to medium grained; trace fine gravel and clay.	Hard drilling at 8 ft.	
10	SS	20-28	15C2		SHALE; light gray, dry, with Mn streaks and slightly mottled. End of boring: 12 ft.		
15							
20							
25							
30							
35							
40							

Grout
Casing
Seal
Gravel Pack
Screen

RADIAN
CORPORATION

Log: Monitor Well 15A

Project Carswell AFB IRP
Location Northeast of Bldg. 1137
Drilled by SWL (CME 75)
Logged by L.M. French

Dates of Drilling/Well Completion 1/18/85
Elevations: Land Surface 570.62 Measuring Point 570.24
Total Depth 15 ft.
Drilling, Sampling Methods Hollow-stem auger; split-spoon

Depth (ft)	Sampling Record: Sample Type	Blows per 6 inches	Sample I.D.	Graphic Log	Geologic Description	Notes	Well Completion
+5							Grout, Casing
0					FILL; gravelly sand, clay.		Seal
5	SS	5-5	15A1		SAND; fine to medium grained, brown-gray, dry; little silt and clay; trace fine gravel.		
10	SS	7-10	15A2 (850875)		Interbedded sand and gravel with rounded rock fragments.	Water at 9 ft.	Gravel Pack, Screen
15	SS	50*	15A3		SHALE; gray, weathered near upper contact; few limestone layers. End of boring: 15 ft.	*for 6 inches.	
20							
25							
30							
35							
40							

APPENDIX C

Report, Subsurface Contamination, White House Communications, Bldg 1337, Maxim Engineers, Inc. April 18, 1990

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE