AD-A160 094 INSTALLATION RESTORATION PROGRAM PHASE II CONFIRMATION/QUANTIFICATION STA..(U) RADIAN CORP AUSTIN TX D A SANDERS ET AL. SEP 85 1/6

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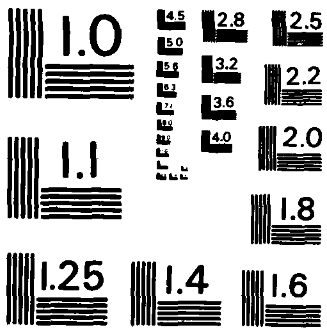

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

1

DCN 84-212-027-04-02

Volume II

INSTALLATION RESTORATION PROGRAM
PHASE II - CONFIRMATION/QUANTIFICTAION
STAGE 1

APPENDICES

FOR

TINKER AFB, OKLAHOMA

AIR FORCE LOGISTICS COMMAND
WRIGHT-PATTERSON AFB, OHIO

SEPTEMBER, 1985

PREPARED BY

RADIAN CORPORATION
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BROOKS AIR FORCE BASE, TEXAS 78235

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APPENDIX A

Definitions, Nomenclatures and Units

- AFB - Air Force Base
- Aquifer - geologic unit capable of storing and transmitting significant quantities of water.
- DOD - Department of Defense
- EPA - Environmental Protection Agency
- GC - Gas Chromatography
- GC-MS - Gas Chromatography-Mass Spectrometry
- Indurated - rendered hard, as by heat, pressure or cementation
- IRP - Installation Restoration Program
- mg/l - milligrams per liter
- POL - Petroleum, oil and lubricants
- PVC - Polyvinyl Chloride
- RCRA - The Resource Conservation and Recovery Act
- RWDS - Radiological Waste Disposal Site
- μg/L - Micrograms per liter
- USAF - United States Air Force

APPENDIX B

Scope of Work

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APPENDIX A

Definitions, Nomenclatures and Units

STAGED

14 Dec 83

INSTALLATION RESTORATION PROGRAM
Phase IIB Field Evaluation
Tinker AFB, Oklahoma

I. Description of Work

The purpose of this task is to determine if environmental contamination has resulted from waste disposal practices ~~at Tinker AFB OK~~ to provide estimates of the magnitude and extent of contamination, should contamination be found; to identify potential environmental consequences of migrating pollutants; to identify any additional investigations and their attendant costs necessary to identify the magnitude, extent and direction of movement of discovered contaminants.

Ambient air monitoring of hazardous and/or toxic material for the protection of contractor and Air Force personnel shall be accomplished when necessary, especially during the drilling operation.

The presurvey report (mailed under separate cover) and Phase I IRP report (mailed under separate cover) incorporated background and description of the sites for this task. To accomplish the survey effort, the contractor shall take the following steps:

A. General

1. The areal extent of each zone shall be determined by reviewing available aerial photos of the base, both historical and the most recent panchromatic and infrared.

2. All water samples collected shall be analyzed on site by the contractor for pH, temperature and specific conductance. Sampling, maximum holding time and preservation of samples shall strictly comply with the following references: Standard Methods for The Examination of Water and Wastewater, 15th Ed. (1980), pp. 35-42; ASTM, Part 31, pp. 76-86, (1980), Method D-3370; and Methods for Chemical Analysis of Waters and Wastes, EPA Manual 600/4-79-020, pp. xiii to xix (1979). All pesticide analyses shall be performed according to Standard Methods. Minimum detection limits for analysis are shown in Attachment 1.

3. Wells shall be of sufficient depth to collect samples representative of aquifer quality and to intercept contaminants present in the aquifer being investigated. The average depth of shallow aquifer wells is anticipated to be approximately 30 feet deep. The average depth of the deep aquifer wells is anticipated to be approximately 125 feet.

4. All contractor installed wells shall be developed, water levels measured, and locations recorded on a project map and for Zones 1 and 2 on a specific zone map.

5. Field data collected for each zone shall be plotted and mapped. The nature, magnitude and potential for contaminant flow within each zone to receiving streams and groundwaters shall be estimated. Upon completion of the sampling and analysis, the data shall be tabulated in the next R&D Status report as specified in Item VI below.

*Highlights of modification underscored

B. In addition to items delineated in A above, conduct the following specific actions at sites identified on Tinker AFB:

1. Zone 1 - Landfill No. 1, Landfill No. 2, Landfill No. 3, Landfill No. 4, Fire Training Area No. 1 and RWDS-1030W

a. Install a maximum of three deep aquifer monitoring wells and a maximum of one deep exploratory boring (150 deep maximum depth) around the perimeter and downgradient of the zone. Collect one sample from each well.

b. Collect one water sample from each of the eight existing groundwater monitoring wells along Crutcho Creek.

c. Collect a maximum of four leachate samples from seeps discharging from landfills within the zone.

d. Collect one sample from each of four locations in the impoundment overlying the sites Landfill No. 2 and RWDS-1030W, and composite the samples into a single composite sample. Split the composite sample into two portions. Ship one portion to the USAF OEHL for radionuclide analysis. Ship the other portion to the contractor laboratory for analysis.

e. Perform the following analyses on samples collected within this zone: oils and greases (IR), total organic halogen (TOX), total organic carbon (TOC), iron, manganese, heavy metals (cadmium, chromium, nickel, copper, zinc, lead and mercury), cyanide, phenol, and the following pesticides--DDT isomers, 2,4-D, 2,4,5-T, aldrin, dieldrin, lindane, methoxychlor, heptachlor, heptachlor epoxide. Analyze one (1) sample from each new well [total of three (3)] and two (2) selected samples from the existing wells by GC/MS (modified EPA Method 625).

2. Zone 2 - Landfill No. 5 and Landfill No. 6

a. Install two deep aquifer monitoring wells, one downgradient of each landfill. Collect two groundwater samples, one from each well.

b. Collect one sample from the leachate stream discharging from landfill No. 5.

c. Analyze samples for oils and greases (IR), total organic carbon(TOC), total organic halogen (TOX), pesticides listed in I.B.1.e., cyanide, phenol and heavy metals (cadmium, chromium, nickel, copper, zinc, lead and mercury, iron and barium. Analyze one (1) sample from each new well by GC/MS (modified EPA Method 625).

3. Zone 3 - Industrial Waste Pit 2

a. Perform geophysical testing using electro magnetics (EM) to define subsurface conditions and site boundaries.

b. Install five soil borings 30 feet deep within the site boundary. Collect soil samples at five foot intervals and select up to ten (10) samples for analysis. Two of the borings shall be completed as shallow monitoring wells.

c. Install one deep aquifer monitoring well immediately adjacent to and downgradient of the site.

d. Collect water samples from each of the two shallow monitoring wells. Collect one water sample from the deep aquifer well.

e. Analyze the samples for O&G (IR), TOC, TOX, cyanide, phenol and heavy metals (cadmium, chromium, nickel, copper, zinc, lead and mercury). Analyze one (1) sample from each well by GC/MS (modified EPA Method 625). Analyze one (1) field-selected soil sample by GC-MS (modified EPA Method 625). Conduct a seven-day, distilled water extraction of a sample of the PVC well casing and analyze the extract by GC-MS (modified EPA Method 625).

4. Zone 4 - Industrial Waste Pit 1

a. Perform geophysical testing using electro magnetics (EM) to define subsurface conditions and site boundaries.

b. Install five soil borings 30 feet deep within the site boundary. Collect soil samples at five foot intervals and select up to ten (10) samples for analysis. Two of the borings shall be completed as shallow monitoring wells.

c. Install one deep aquifer monitoring well immediately adjacent to and downgradient of the site.

d. Collect water samples from each of the two shallow monitoring wells. Collect one water sample from the deep aquifer well.

e. Analyze the samples for O&G (IR), TOC, TOX, cyanide, phenol and heavy metals (cadmium, chromium, nickel, copper, zinc, lead and mercury). Analyze one (1) sample from each well by GC/MS (modified EPA Method 625). Analyze one (1) field-selected soil sample by GC-MS (modified EPA Method 625).

5. Zone 5 - Base Water Supply Wells.

a. Collect one (1) sample from each base water supply well (27 wells).

b. Analyze all samples for volatile hydrocarbons by GC (EPA Method 601) and total organic carbon (TOC).

c. Based on the above results, analyze up to fourteen (14) samples for volatile organic priority pollutants by GC-MS (EPA Method 624) and up to fourteen (14) samples for extractable organic priority pollutants (modified EPA Method 625).

6. Zone 6 - Building 3001 Production Wells

a. Inspect the two contaminated wells and their immediate surroundings. Review the results of previous Air Force investigations. These results shall be provided under separate cover.

b. Inventory past and present nearby industrial operations for possible TCE sources. Evaluate the possibility of an off-base source of contamination. Evaluation shall be performed by reviewing available data, provided under separate cover, and by field reconnaissance.

c. Test the wellheads and surrounding areas for cracks or other failures, using steam-cleaning and probing, as appropriate.

d. Test-pump and sample the contaminated wells. Analyze a maximum of 40 samples for TCE by EPA Method 601.

e. Develop a work plan and cost estimates for follow-on (including subsurface) investigations. Submit this information in the monthly R & D Status report (Item VI below) prepared after the analyses in Item I.B.6.d. above are completed.

C. Well Installation and Cleanup

Well and boring locations shall be cleaned following the completion of the well. Drill cuttings shall be removed from the boring/shallow well areas and the general area cleaned up.

D. Data Review

Results of all sampling and analysis shall be tabulated and incorporated in the Informal Technical Information report (Sequence 3 Atch 1 and Sequence 2 Atch 3 as reflected in Item VI below) and forwarded to USAF OEHL/CVT for review. Results shall also be forwarded as available in the next monthly R&D status report.

E. Reporting

1. A draft report delineating all findings of this field investigation shall be prepared and forwarded to the USAF OEHL as specified in Item VI below for Air Force review and comment. This report shall include a discussion of the regional hydrogeology, well logs of all project wells, data from water level surveys, water quality analysis results, EM survey results and maps, available geohydrologic cross sections, groundwater surface and gradient vector maps, and Laboratory quality assurance information. The report shall follow the USAF OEHL supplied format (mailed under separate cover).

2. Estimates shall be made of the magnitude, extent and direction of movement of contaminants discovered. Potential environmental consequences of discovered contamination must be identified. Where survey data are insufficient to properly determine or estimate the magnitude, extent and direction of movement of discovered contaminants, specific recommendations, fully justified, shall be made for additional efforts required to properly evaluate contamination migration and included in a separately bound appendix to the draft final report (see F below).

3. Specific requirements, if any, for future groundwater and surface water monitoring must be identified.

F. Cost Estimates

Detailed cost estimates for all additional work recommended to properly determine or estimate the magnitude, extent and direction of movement of discovered contaminants at sites being investigated shall be provided along with an estimate of the time required to accomplish the proposed effort. This information shall be provided in a separately bound appendix to the draft final report.

II. Site Location and Dates

Tinker AFB OK
USAF Clinic/SGB
Dates to be established

III. Base Support: None

IV. Government Furnished Property: None

V. Government Points of Contact

1. Dr Dee Ann Sanders
USAF OEHL/CVT
Brooks AFB TX 78235
(512) 536-2158
AV 240-2158

2. Col Harry Russell
HQ AFLC/SGPB
Wright-Patterson AFB OH 45433
(513) 257-6210
AV 787-6210

3. Capt Darrel Cornell
USAF Hospital/SGB
Tinker AFB OK 73145
(405) 734-7844
AV 735-7844

VI. In addition to sequence numbers 1, 5 and 10 which are applicable to all orders, the reference numbers below are applicable to this order. Also shown are data applicable to this order.

Sequence No.	Block 10	Block 11	Block 12	Block 13	Block 14
Atch 1					
4	ONE/R	9 MAC	9.5 MAC	14 MAC	*
3	ONE/T	**	**		2
Atch 3					
2	ONE/T	**	**		2

*A minimum of two draft reports will be required. After incorporating Air Force comments concerning the first draft report, the contractor shall supply the USAF OEHL with a second draft report. The report shall be forwarded to the applicable regulatory agencies for their comments. Contractor shall supply the USAF OEHL with 25 copies of each draft report and 50 copies plus the original camera ready copy of the final report.

**Upon completion of analysis.

ATTACHMENT 1
REQUIRED SAMPLE DETECTION LIMITS

*Total Organic Halogen (TOX)	5 micrograms/L
*Total Organic Carbon (TOC)	1 milligram/L
Oils and Grease IR Method 412.3	0.1 milligram/L (water); 100 microgram/gram (soil)
GC/MS (EPA Methods 624 & modified 625)	**
Pesticides Analyses	***
Specific Conductance	1 micromho
Total Dissolved Solids	1 milligram/L
TCE (Trichloroethylene)	****

Chemicals

Nickel	100 milligrams/L
Copper	50 micrograms/L
Lead	20 micrograms/L
Zinc	50 micrograms/L
Chromium	50 micrograms/L
Cadmium	10 micrograms/L
Phenol	1 microgram/L
Cyanide	10 micrograms/L
Mercury	1 microgram/L
Total Iron	100 micrograms/L
Manganese	50 micrograms/L
Barium	200 micrograms/L

*Detection levels for TOC and TOX must be 3 times the noise level of the instrument. Laboratory distilled water must show no response; if it shows a response, corrections of positive results must be made.

**Detection limits for volatile organics and acid and neutral extractable compounds shall be as specified for compounds listed in EPA Methods 624 and Modified 625.

***For waters, analyze samples for chlorinated hydrocarbon and organophosphate type insecticides. Analyze for the following specific pesticides.

****As specified in EPA Method 601.

aldrin	.02 microgram/L
DDT isomer	.02 microgram/L
dieldrin	.02 microgram/L
endrin	.02 microgram/L
heptachlor	.02 microgram/L
heptachlor epoxide	.02 microgram/L
lindane	.01 microgram/L
methoxychlor	.02 microgram/L
2,4-D	.06 microgram/L
2,4,5-T	.06 microgram/L

REPORT FORMAT FOR IRP PHASE IIB AND IIC EFFORT

(ATCH 1, SEQ 4)

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Summary

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II. ENVIRONMENTAL SETTING

III. FIELD PROGRAM

IV. DISCUSSION OF RESULTS AND SIGNIFICANCE OF FINDINGS

V. ALTERNATIVE MEASURES

VI. RECOMMENDATIONS

Appendices (when applicable, not necessarily in the following order)

A. Definitions, Nomenclatures and Units of Measurement

B. Scope of Work

C. Well Numbering System

D. U.S. Geological Survey Well Logs, Well Completion Logs, and Geological Drilling Logs

E. Field Raw Data

F. Sampling and Analytical Procedures including field and laboratory QA/QC plans utilized for this project.

G. Chain of Custody Forms

H. Analytical Data

I. Correspondence with Federal, State and/or Local Regulatory Agencies

J. References

K. Biographies of Key Personnel

L. Geophysical Tracings

M. Safety Plan utiliized on this project.

SUMMARY

This is a brief, executive-type summary of IRP Phase II results including overall summary tables. After reviewing the summary, a reader should know if the particular IRP Phase II results are of interest, and are applicable to his particular needs. Specific items included in the summary are:

1. Location of sites

2. Type and number of tests conducted

3. Number of related tests (e.g., ground penetrating radar)

4. Summary of final results in applicable units

5. Comparison with applicable standards, if any

6. Conclusions

7. Recommendations (see recommendations section for detail), in tabular form, such as the following:

Problem Area or Site No	Recommended Action	Rationale
1	______	____
2	______	____
3	______	____

I. INTRODUCTION

This section should answer who, what, where, when and why type questions concerning the program. Specific information in the introduction includes:

1. Purpose of program

2. Duration of program

3. Brief history of base and sites including history of contamination

4. Description of sites including site-scaled drawings/photographs (using care for securities)

5. Identification of the pollutants sampled

6. Identification of the field team

7. Other pertinent information which should be called to the reader's attention. For example: Base overlies sole source aquifer.

II. ENVIRONMENTAL SETTING

A detail environmental setting is necessary to enable the reader to review the reported program in a proper perspective. Dividing the base into different disciplinary systems and/or subsystems is required. Specifically, this section should include applicable discussion of the following settings:

1. Physical geography

2. Regional geology and hydrogeology

3. General hydrogeology

4. Historic disposal and storage areas including site descriptions and site specific geology and geohydrology

5. Historic groundwater problems

6. Location of wells on and off base

7. Any other pertinent information applicable for the particular program.

III. FIELD PROGRAM

This section should include applicable experimental designs including quality assurance/quality control plans concerning field tests in addition to the field work. Information in this section includes:

1. Details of development of the field program

2. Implementation of field program

3. Details of instrumentation and/or system used, including schematic diagrams.

4. Sampling procedures and sample preservation, including referenced methods.

5. A discussion of pertinent facts and conclusions pertaining to the reliability of the sampling procedures, sample representation and sample integrity.

6. When applicable, cross-reference this to other sections of the report.

IV. DISCUSSION OF RESULTS AND SIGNIFICANCE OF FINDINGS

This section should be divided into two subsections:

1. Discussion of Results: This subsection should include tabular summaries of pertinent test results and test parameters. Comparison to allowable compliance standards and/or limits should be stated.

A discussion of pertinent facts and conclusions pertaining to the reliability of the results and their relation to the contaminants should be presented. Comparison to normal background levels should be mentioned.

This subsection should be as concise as possible. However, important comments and observations should be fully expressed and should not be limited in favor or brevity.

2. Significance of Findings: The highest technical capabilities and a broad range of experience are needed to derive the information needed in this subsection. The subsection should be introduced with a paragraph stating that based on the results of the effort, the following information can be derived:

a. Extent of Contamination: Extensive discussion and graphic displays of actual or estimated contamination of each site, or group of sites, should be provided. Contaminated areas, depth of contamination, movement of contamination (plume movement) and total volume of contaminated material exceeding applicable standards and/or guidelines should be tabulated in detail.

b. Evaluation of Contamination: The basis for evaluation, assumption used, and when possible calculated health risk assessments should be summarized. If deducible, health risk ratings should be clearly stated.

V. ALTERNATIVE MEASURES

This section should detail all the major possible options by site excluding migration and/or cleanup measures and including monitoring actions

For identified sites requiring future monitoring, proposed monitoring requirements including method(s) and duration should be discussed.

VI. RECOMMENDATIONS

This multidisciplinary section should provide the highest technical conclusions for the completed program. When applicable, future monitoring recommendations shall be discussed here and tabulated in the Summary section.

Recommendations, whether they are straightline extrapolations of either obvious results or highly complicated nonlinear mathematical modeling, should be precise, clear and technically defendable.

This section should clearly define the base from which IRP future phases, if any, will be initiated. Hence, prioritizing the sites for the next phase should be recommended.

APPENDIX C

Well Numbering System

The wells drilled and cores taken for the Tinker Air Force Base Installation Restoration Program, Phase IIB, were designated by Zone Number and sequential letters within zones. Designators were assigned in the order in which the drilling locations were established. For example, Well 1A is the first well drilled at Zone 1. Table C-1 contains a list of all wells and cores for the project, listed by zone of investigation.

TABLE C-1. LIST OF WELLS AND CORES

Zone 1	
Well 1A	
Well 1B	
Well 1C	
Existing Well 1	
" " 2	
" " 3	
" " 4	
" " 5	
" " 6	
" " 7	
" " 8	
Core ID	
Zone 2	
Well 2A	
Well 2B	
Zone 3	
Well 3F	Core 3A
Well 3G	" 3A(A)
	" 3B, 3B(A)
	" 3C
	" 3D
	" 3F(A)
Zone 4	
Well 4A	Core 4B
Well 4F	" 4C
Well 4G	" 4D
	" 4E

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APPENDIX D

Well Logs

This Appendix contains the logs of drilling and well completion activities for the project. Table C-1 (Appendix C) contained a list of all wells and cores for the project, listed by zone of investigation.

RADIAN
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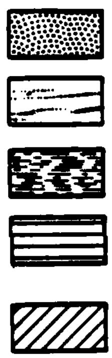
Logs of Drilling Operations

Lithologic Symbols Symbols Utilized



Massive sandstone, fine-grained

Sandstone beds with shale partings

Sandstone lenses in shale

Shale

Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays

C1212

Lithologic Log.

RADIAN CORPORATION

Sheet 1 of 1

Log of Drilling Operations

Boring or Well No. 1A

Location Zone 1, west of Landfill 1

Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB

Beginning 10 November 1983 and end 10 November 1983 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250, Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0		N/A	grab at dis-charge	CLAY, brown-red, slightly plastic; with silt, trace fine to coarse sand. Decreasing moisture at 3', clay grades to shale at 3-5'.	
5				SHALE, red-brown, silty, dry; interbedded with thin sandstone layers.	
10					
15				SANDSTONE, fine-medium grained, light orange, moist, friable; some silt lenses.	Driller reports water (mist in dis-charge) at 17.8'.
20				SHALE, red-brown, soft; some fine-medium sand in clay matrix; increasing moisture.	
25				SANDSTONE, fine-medium grained, red-brown, friable, saturated.	Water produced in discharge, approx. 2 gpm at 26'.
30					
35				Increasing indurated sandstone fragments. END OF BORING - 35'.	Tougher drilling at 33'.
40					

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RADIAN CORPORATION

Log of Drilling Operations

Boring or Well No. 1B

Location Zone 1, south of Landfill 4

Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB

Beginning 14 November 1983 and end 14 November 1983 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250 Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0		N/A	grab at discharge	CLAY, with silt; slightly plastic, dark brown, slightly moist, organic fragments; grades to:	
5				SHALE, red-brown; trace sand, trace fine gravel, moderately indurated.	
10					
15					
20					
25					
30				SANDSTONE, light orange-white, fine grained, soft; interbedded with thin layers of shale.	
				SHALE, red-brown; trace fine sand, indurated with occasional friable zones.	
35					
40					

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RADIAN CORPORATION

Sheet 2 of 2

Log of Drilling Operations

Boring or Well No. 1B

Location Zone 1, south of Landfill 4

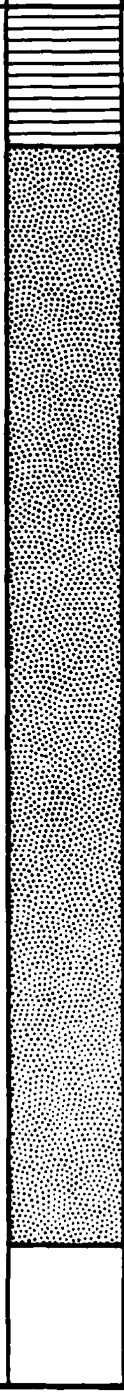
Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB

Beginning 14 November 1983 and end 14 November 1983 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250 Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
45					
50				SANDSTONE, light gray, fine grained, friable, dry sandstone changes color to orange-brown, increasing moisture @ 52'.	
55					
60				Increasing moisture, silt content.	
65					No return of cuttings, driller blows out water. No cuttings return past 68'.
70					
75					
80				END OF BORING - 81'.	
85					

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RADIAN CORPORATION

Log of Drilling Operations

Sheet 1 of 2

Boring or Well No. 1C

Location Zone 1, west of Landfill 4

Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB

Beginning 16 November 1983 and end 16 November 1983 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250 Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0		N/A	grab at discharge	CLAY, dark brown, slightly plastic; some silt and fine sand; few organic fragments; moist; grades to SHALE/SILTSTONE, red-brown, soft; some fine to coarse sand. Decreasing moisture, occasional zones of fine sand.	
5					
10				Shale is thinly stratified.	
15				1' layer of sandstone at 16'; fine-grained, red-brown, dry.	
20					
25					
30				SANDSTONE layer at 31-33'; fine grained, light gray-white, dry.	
35				SANDSTONE, orange-brown, fine grained, friable (with pieces of inundated sandstone), slightly moist; some silt.	Easy drilling; driller reports soft sand. Drill reports small quantity of water @ 40'.
40					

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RADIAN
CORPORATION

Log of Drilling Operations

Sheet 2 of 2

Boring or Well No. 1C

Location Zone 1, west of Landfill 4

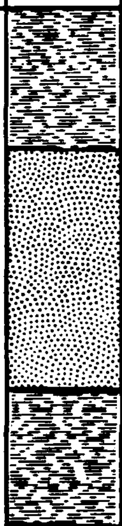
Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB

Beginning 16 November 1983 and end 16 November 1983 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250 Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40					
				Some shale lenses at 43'.	
45					Increasing water at 45-46'.
50					Drilling stopped at 50'; water level recovers in borehole, drill to 55'.
				Interbedded shale at 53.5'.	
55				END OF BORING - 55'.	Driller produces water at 1-2 gpm. No gases detected.

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RADIAN CORPORATION

Sheet 1 of 5

Log of Drilling Operations

Boring or Well No. 1D*

Location Zone 1, east of Reserve Road

Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB

Beginning 14 February 1984 and end 14 February 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1500; Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0		N/A	Grab at discharge	CLAY, medium brown, plastic, moist; some silt. Rock fragments at surface.	4-inch drag bit
5				Grades to red-brown silty clay by 5 ft., decreasing moisture.	
10					Water noted at 8 ft; saturated interval is probably several feet thick. Dry conditions below 15 ft.
15				SHALE, red-brown, dry; with some silt and fine sand. Occasional zones of thin, indurated sandstone.	
20					
25					
30					
35					

*Borehole was grouted to surface.

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RADIAN CORPORATION

Log of Drilling Operations

Boring or Well No. 1D*

Location Zone 1, east of Reserve Road

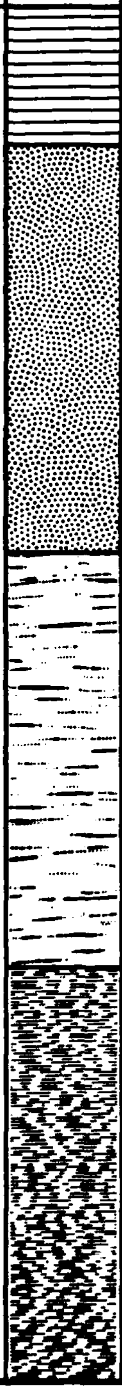
Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB

Beginning 14 February 1984 and end 14 February 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1500; Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
35					
40				SANDSTONE, gray-white, friable, fine grained; some silt; trace coarse sand.	Water influx at 39 ft.; water added to air stream to lift cuttings.
45				Grades to red sandstone at 44 ft. increasing thin shale layers with indurated calcite-cemented sandstone.	
50					
55					
60					
65				SHALE, red-brown, few sandstone layers.	
70					

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Log of Drilling Operations

Sheet 3 of 5

Boring or Well No. 1D*

Location Zone 1, east of Reserve Road

Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB

Beginning 14 February 1984 and end 14 February 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1500; Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
70					
				SANDSTONE, fine-medium grained, red-brown.	Increased water production, est. 15 gpm.
75					
80					
85					
90				Interbedded layers (1-3 ft) of red shale.	
95					
100					
105					

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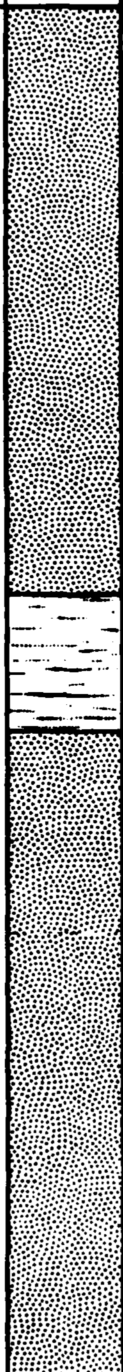
Log of Drilling Operations

Boring or Well No. 1D*
Location Zone 1, east of Reserve Road
Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB
Beginning 14 February 1984 and end 14 February 1984 of drilling operation
Sampling Interval (Estimated) variable (ft)
Type Drill Rig and Operator Failing 1500; Jim Winnek, Inc.



Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
105					
				Indurated sandstone from 108 ft. to 117 ft.	
110					
115					
120					
				Lenses/layers of shale.	
125					
					Increase in water production, est. 20-25 gpm. Decreasing silt in water.
130					
135					
140					
145					

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Sheet 5 of 5

Log of Drilling Operations

Boring or Well No. 1D*

Location Zone 1, east of Reserve Road

Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB

Beginning 14 February 1984 and end 14 February 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1500; Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
145–150				SANDSTONE, white-gray, trace silt.	Increased production of water at 148 ft., water is clear.
150				END OF BORING - 150 ft.	
155					
				NOTE: Water level measured at 55 ft. below land surface 3 hours after completion of hole.	

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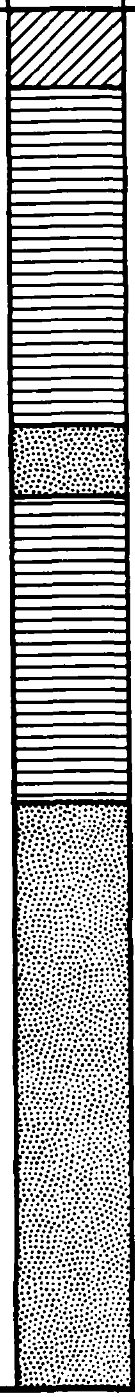
RADIAN CORPORATION

Sheet 1 of 2

Log of Drilling Operations

Boring or Well No. 2A
Location Zone 2, south of Landfill 6
Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB
Beginning 17 November 1983 and end 17 November 1983 of drilling operation
Sampling Interval (Estimated) variable (ft)
Type Drill Rig and Operator Failing 1250 Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0		N/A	grab at discharge	CLAY, dark brown, moderately plastic; some silt and fine sand, moist.	
				SHALE/SILTSTONE, red-brown, soft; trace fine to coarse sand and fine gravel.	
5				Decreasing moisture below 5'.	
10					
				Thin sandstone (approx. 6") at 13'; light gray-white, fine grained, dry.	
15					
20					
				SANDSTONE, light gray-white, friable(with some indurated fragments), fine grained; some silt and clay, dry.	
25				Grades to red sandstone, then pink sand at 28'.	Fast drilling from 28 to 35'.
30					
				Sandstone is interbedded with shale at 38'; sandstone is indurated, red-brown.	
35					
40					

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Log of Drilling Operations

Boring or Well No. 2A
Location Zone 2, south of Landfill 6
Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB
Beginning 17 November 1983 and end 17 November 1983 of drilling operation
Sampling Interval (Estimated) variable (ft)
Type Drill Rig and Operator Failing 1250 Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40					Driller reports small amount of water at 42'.
45				END OF BORING - 45.5'.	Stop drilling at 45.5'; water blown from borehole; water level remains to 37.5'.
50					

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RADIAN CORPORATION

Sheet 1 of 2

Log of Drilling Operations

Boring or Well No. 2B
Location Zone 2, south of Landfill 5
Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB
Beginning 20 November 1983 and end 20 November 1983 of drilling operation
Sampling Interval (Estimated) variable (ft)
Type Drill Rig and Operator Failing 1250 Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0		N/A	grab at discharge	CLAY, dark brown, plastic, moist; come silt and fine sand; decreasing moisture; medium brown.	
5				SHALE, red-brown, moderately plastic, slightly moist; some silt (weathered zone to 8') unweathered, dry, shale/siltstone at 8'.	
10					
15					
				Increasing silt and fine sand (white) at 18'.	Fast drilling from 18-20'.
20					
25				SANDSTONE, fine with some medium to coarse grains, red-brown with zones of white-light gray sand, friable with some indurated pieces; some lenses of shale.	Driller reports water at 26'.
30					
35					Stop drilling at 35' not much water accumulates.
40					

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RADIAN CORPORATION

Sheet 2 of 2

Log of Drilling Operations

Boring or Well No. 2B

Location Zone 2, south of Landfill 5

Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB

Beginning 20 November 1983 and end 20 November 1983 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250 Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40				Increasing silt content.	
45				Indurated sandstone at 48'.	Slower drilling; fewer cuttings return to surface. Driller blows out water at 50'; relatively low yield. Increased water at 52.5'.
50					
55				END OF BORING - 55'.	

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Log of Drilling Operations

Boring or Well No. 3A

Location Zone No. 3

Log Recorded By Rick Belan

Project Tinker AFB IRP Phase IIB

Beginning 21 November 1983 and end 21 November 1983 of drilling operation

Sampling Interval (Estimated) 5 (ft)

Type Drill Rig and Operator Mobile B-50
Bobby Holland/Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0	FILL			CLAY, fill, brown, sandy.	
				CLAY, fill, sandy, gray, soft, slight odor.	
5		3Aa	SS	CLAY, brown & red, hard, dry.	BC* = 14/30/33.
10		3Ab	SS	CLAY, red (brighter), hard, dry.	BC = 28/55/92
				Shale, bright red, hard, dry.	TD-Augered to refusal. Open hole dry 11/28/83.
15					
20					
25					
				*BC-Denotes split-spoon blow counts each 6" with standard 140 lb. weight.	Open hole grouted using 3/4" tremie pipe 11/30/83.

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Sheet 1 of 1

Log of Drilling Operations

Boring or Well No. 3A (A)
Location Zone No. 3
Log Recorded By Rick Belan

Project Tinker AFB IRP Phase IIB
Beginning 29 November 1983 and end 29 November 1983 of drilling operation
Sampling Interval (Estimated) 5 (ft)
Type Drill Rig and Operator Mobile B-50
Don Clements/Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0	FILL			CLAY FILL, red.	
		3Aa(A)	SS	WASTE/CLAY FILL, dark grayish red, soft, water, odor. CLAY (fill?)	BC*=2/5/10 TD
5					
10					
15					11/30/83 Water level in open hole @ 1.5' BGL.
20					
25					
30					
35				*BC-Denotes split-spoon blow counts each 6" with standard 140 lb. weight.	Open hole grouted using 3/4" tremie pipe 11/30/83.
40					

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Sheet 1 of 1

Log of Drilling Operations

Boring or Well No. 3B and 3B(A)
Location Zone No. 3
Log Recorded By Rick Belan

Project Tinker AFB IRP Phase IIB
Beginning 22 November 1983 and end 22 November 1983 of drilling operation
Sampling Interval (Estimated) 5 (ft)
Type Drill Rig and Operator Mobile B-50
Bobby Holland/Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0	FILL			CLAY FILL, sandy, reddish brown.	
				CLAY FILL, gray brown, soft.	
		3Ba	SS	CLAY, red, hard, dry.	BC*=6/16/27, partial recovery.
5					
		3Bb	SS	CLAY, rust red, hard, dry.	BC=30/47/72
10					Hollow stem augering very difficult.
		3Bc	SS	SHALE, red, hard, dry.	BC=38/100 for 3".
15					Moved forward to location 3B(A)/ switched to solid stem augers. BC= 40/100 for 2".
		3Bd	SS	SHALE, dark red, hard, dry.	
20					
		3Be	SS	SHALE, dark red, hard, dry.	BC=47/100 for 5". TD
25					
					Both open holes dry 11/28/83.
				*BC-Denotes split-spoon blow counts each 6" with standard 140 lb. weight.	Open holes grouted using 3/4" tremie pipe 11/30/83.

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Sheet 1 of 1

Log of Drilling Operations

Boring or Well No. 3C
Location Zone No. 3
Log Recorded By Rick Belan

Project Tinker AFB IRP Phase IIB
Beginning 22 November 1983 and end 22 November 1983 of drilling operation
Sampling Interval (Estimated) 5 (ft)
Type Drill Rig and Operator Mobile B-50 Bobby Holland/Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0	F I L L			CLAY FILL, brown.	
		3Ca	SS	WASTE/CLAY FILL, sandy, dark gray, plastic, wet, odor-	BC*=8/6/12.
5					
		3Cb	SS	CLAY, dark rust red, hard, dry. SHALE.	BC=30/70/100 for 4". TD
10					
15					11/28/83 Water level in open hole @ 1.2' BGL, grab sample pH= 7.57 (12/7/83) Cond=7.4x10^4 µmhos/cm @ 25°C. (12/7/83)
20					
25					
				*BC-Denotes split-spoon blow counts each 6" with standard 140 lb. weight.	Open hole grouted using 3/4" tremie pipe 11/30/83.

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Sheet 1 of 1

Log of Drilling Operations

Boring or Well No. 3D

Location Zone No. 3

Log Recorded By Rick Belan

Project Tinker AFB IRP Phase IIB

Beginning 22 November 1983 and end 22 November 1983 of drilling operation

Sampling Interval (Estimated) 5 (ft)

Type Drill Rig and Operator Mobile B-50 Bobby Holland/Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0	FILL				
5		3Da	SS	CLAY (fill?), dark reddish brown, hard, dry, no odor.	*BC=14/30/08.
10		3Db	SS	SHALE (?) and sandstone, dark reddish brown, hard, dry.	BC=60 for 5". TD
15					
20					11/28/83 Water level in open hole @ 7.7' BGL.
25					
				*BC-Denotes split-spoon blow counts each 6" with standard 140 lb. weight.	Open hole grouted using 3/4" tremie pipe, 11/30/83.

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RADIAN CORPORATION

Sheet 1 of 2

Log of Drilling Operations

Boring or Well No. 3E
Location Zone 3, southwest of IWP 3
Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB
Beginning 22 November 1983 and end 22 November 1983 of drilling operation
Sampling Interval (Estimated) variable (ft)
Type Drill Rig and Operator Failing 1250 Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0		N/A	grab at discharge	CLAY, dark brown, grading to red-brown at depth, moist, plastic, organic matter near surface; some silt with zones of fine sand and sandstone fragments.	
5				SHALE/SILTSTONE, red-brown, dry, friable, soft; some fine to coarse sand in thin zones.	Driller noticed "ammonia" odor at 8'; stopped drilling-- air tests negative.
10					
15					Easy drilling from 10-20'.
20					
25					
30				SANDSTONE, white-light gray, friable with some indurated fragments, dry; some thin shale layers/lenses from 32-42'.	
35					
40				Grades to soft, red-brown sandstone.	

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RADIAN CORPORATION

Log of Drilling Operations

Boring or Well No. 3E

Location Zone 3, southwest of IWP 3

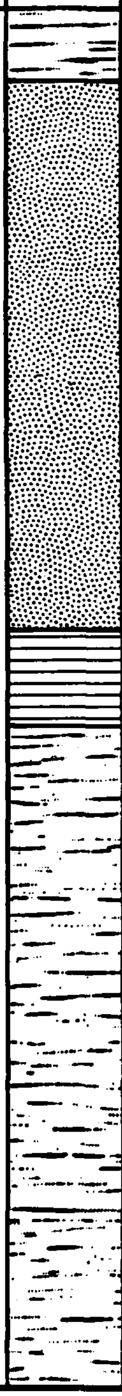
Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB

Beginning 22 November 1983 and end 22 November 1983 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250 Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40				Occasional indurated sandstone fragments, increasing moisture at 43'.	
45				Grades from red to pink-white sandstone from 46 to 50'.	
50					
55				Abrupt change in color; red-brown sandstone (partially indurated).	
				SHALE, red-brown, soft, slightly moist; some fine sand.	
60				SANDSTONE, red-brown (mottled), fine-medium grained, some SHALE fragments, moist.	Driller reports small amounts of water at 63 and 68'; few cuttings.
65					
70					Pause in drilling; water recovers 3-4' in borehole, but at a slow rate. No cuttings returned from 71-80'.
75					
80				END OF BORING - 80'.	D-27

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Sheet 1 of 1

Log of Drilling Operations

Boring or Well No. 3F
Location Zone No. 3
Log Recorded By Rick Belan

Project Tinker AFB IRP Phase IIB
Beginning 23 November 1983 and end 23 November 1983 of drilling operation
Sampling Interval (Estimated) N/A (ft)
Type Drill Rig and Operator Failing-1250
Don Clements/Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0				CLAY, red, moist.	4 3/4" test hole w/air rotary rig; completed 11/29/83 as a monitor well w/6 3/4" bit.
5					No direct evidence of ground water.
10				SHALE, silty to sandy, red, dry.	
15				SANDSTONE, white.	
20				SHALE, sandy, red, hard, dry.	
25					
30					TD 11/28/83 W.L. in open hole @ 16.3' BGL, bailed;next day W.L. back to ∿16' BGL, grab sample from 11/28/83. pH=7.10 (12/7/83). Cond=910 µmhos/cm @ 25°C (12/7/83).
35					
40					

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Sheet 1 of 1

Log of Drilling Operations

Boring or Well No. 3F(A)
Location Zone No. 3
Log Recorded By Rick Belan

Project Tinker AFB IRP Phase IIB
Beginning 29 November 1983 and end 29 November 1983 of drilling operation
Sampling Interval (Estimated) 5 (ft)
Type Drill Rig and Operator Mobile B-50
Don Clements/Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0	FILL				
		3Fa(A)	SS	CLAY, fill & waste(?), reddish brown.	*BC=8/13/83.
5		3Fb(A)	SS	CLAY, rust red, sandy, hard, dry	*BC=27/50/80.
		3Fc(A)	SS	CLAY, rust red, sandy, hard, dry.	TD
10					
15					
20					
25					
30					
				*BC-Denotes split-spoon blow counts each 6" with standard 140 lb. weight	Open hole grouted using 3/4" tremie pipe 11/30/83.
35					
40					

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Sheet 1 of 2

Log of Drilling Operations

Boring or Well No. 4A

Location Zone 4, Ind. Waste Pit 1

Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB

Beginning 10 February 1984 and end 10 February 1984 of drilling operation

Sampling Interval (Estimated) as appropriate (ft)

Type Drill Rig and Operator Failing 1500; Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0			Grab @ discharge	CLAY, medium brown, plastic, moist, some silt with organic fragments; grades to red-brown clay with decreasing organic material.	
5					
				SHALE, red, dry, uniform texture; some silt and fine sand.	
10					
15				Thin sandstone strata at 15 ft. and 17 ft.	
20				SANDSTONE, white, fine to medium grained, quartz and feldspar grains, slightly moist. White sandstone grades to orange silty sand.	
25					
30				Thin lenses of shale.	
35				Indurated sandstone.	Rig vibration at 34 ft.
				Increasing moisture, silt content.	

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RADIAN CORPORATION

Sheet 2 of 2

Log of Drilling Operations

Boring or Well No. 4A

Location Zone 4, Ind. Waste Pit 1

Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB

Beginning 10 February 1984 and end 10 February 1984 of drilling operation

Sampling Interval (Estimated) as appropriate (ft)

Type Drill Rig and Operator Failing 1500; Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40				Poorly consolidated sand, with shale fragments.	Few cuttings returned below 40 ft. due to water. Water level after drilling measured at 39' 8½" below land surface.
45					
50					
				End of boring - 51 ft.	
55					

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RADIAN CORPORATION

Sheet 1 of 1

Log of Drilling Operations

Boring or Well No. 4B
Location 125'W. 100'S of 0.0
Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB
Beginning 8 February 1984 and end 9 February 1984 of drilling operation
Sampling Interval (Estimated) variable (ft)
Type Drill Rig and Operator Mobile B-50; Jim Winnek, Inc.

Depth (ft)	N-blows/ft	ID No. of Sample Taken	Type of Sample Taken *	Stratigraphy	Remarks
0	2/5/11 2/3/4 3/5/8	4B.4 4B.5 4B.6	SS SS SS	CLAY, dark brown with isolated zones of light brown-gray silt, soft, plastic, roots. Grades to mottled-red clay at 4 ½ ft.	Samples (4B.4-6) collected in shallow borehole ∿5 ft. south of deeper samples.
5	5/13/24	4B.1	SS	Clay becomes red, decreasing moisture.	
10	29/61/100	4B.2	SS	SHALE, red, hard, massive.	
15					Driller notes "soft layer" at 15 ft.
20	100 (3 in)	4B.3	SS	End of boring - 20 ft.	
25					
30					
35					
40					

*SS - split spoon.

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RADIAN CORPORATION

Sheet 1 of 1

Log of Drilling Operations

Boring or Well No. 4C
Location 175'E and 200'S of 0,0
Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB
Beginning 9 February 1984 and end 9 February 1984 of drilling operation
Sampling Interval (Estimated) variable (ft)
Type Drill Rig and Operator Mobile B-50; Jim Winnek, Inc.

Depth (ft)	N-blows/ft	ID No. of Sample Taken*	Type of Sample Taken	Stratigraphy	Remarks
0					
	1/3/7	4C.1	SS	CLAY, brown to red, mottled, roots; with variable amounts of silt, sand, and gravel. Gravel clasts up to 1-inch in size.	Continuous sampling to 4 1/2 ft.
	3/8/7	4C.2	SS		
	4/7/13	4C.3	SS		
5					
		4C.4	Auger returns	Grades to medium brown silt, with some sand and gravel.	
	4/10/13	4C.5	SS		
10					
	12/25/43	4C.6	SS	Clay grades to red, plastic, with small organic fragments; little silt, slightly moist.	
15					
	22/42/63 (4")	4C.7	SS	SHALE, reddish-brown, blocky texture, massive; some silt	
20					
	51/51/(3")	4C.8	SS	Shale mixed with sandstone; white, fine-grained. End of boring - 24 ft.	
25					
30					
35					
40					

*SS - split spoon.

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Sheet 1 of 1

Log of Drilling Operations

Boring or Well No. 4D
Location 100'N and 125'W of 0,0
Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB
Beginning 9 February 1984 and end 9 February 1984 of drilling operation
Sampling Interval (Estimated) variable (ft)
Type Drill Rig and Operator Mobil B-50; Jim Winnek, Inc.

Depth (ft)	N-blows/ft	ID No. of Sample Taken*	Type of Sample Taken	Stratigraphy	Remarks
0	2/6/8 3/4/7	4D.1 4D.2	SS SS	CLAY, medium-dark brown to red, moist, plastic; some silt, roots. Charred framents (wood?) in thin black layer at 1 ft. Asphalt and gravel from 2-4 ft., underlain by red clay.	Continuous sampling to 4 1/2 ft.
5	8/4/4	4D.3	SS		
	13/27/43	4D.4	SS	Clay becomes reddish brown, moist, uniform texture.	
10					
	26/70/85	4D.5	SS	Decreasing moisture. SHALE, red, hard, dry.	
15					
20	32/79	4D.6	SS	End of boring - 22 ft.	Hard drilling below 20 ft.; no progress past 22 ft.
25					
30					
35					
40					

*SS - split spoon

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RADIAN CORPORATION

Sheet 1 of 1

Log of Drilling Operations

Boring or Well No. 4E
Location 200'E and 175'S of 0,0
Log Recorded By

Project Tinker AFB IRP Phase IIB
Beginning 10 February 1984 and end 10 February 1984 of drilling operation
Sampling Interval (Estimated) variable (ft)
Type Drill Rig and Operator Mobile B-50; Jim Winnek, Inc.

Depth (ft)	N-blows/ft	ID No. of Sample Taken*	Type of Sample Taken	Stratigraphy	Remarks
0	2/3/7 3/3/4	4E.1 4E.2	SS SS	CLAY, brown, abundant roots; underlain by red-brown plastic clay with some silt, trace fine gravel and coarse sand. Fine grained light brown-gray sand @ 4 ft.; some organic debris and coarse gravel.	Continuous sampling to 4½ ft.
5	6/9/16	4E.3	SS		
10	5/11/15	4E.4	SS	Medium brown clay grades to red clay.	
15	15/35/37			SHALE, red-brown, hard, few sandstone clasts.	
20				End of boring - 18 ft.	Driller reports tough drilling at 18 ft.; probably sandstone.
25					

*SS - split spoon.

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Sheet 1 of 1

Log of Drilling Operations

Boring or Well No. 4F
Location 100'S of 0,0
Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB
Beginning 10 February 1984 and end 10 February 1984 of drilling operation
Sampling Interval (Estimated) variable (ft)
Type Drill Rig and Operator Mobile B-50; Jim Winnek, Inc.

Depth (ft)	N-blows/ft	ID No. of Sample Taken *	Type of Sample Taken	Stratigraphy	Remarks
0	2/3/4 2/3/5	4F.1 4F.2	SS SS	CLAY, red-brown mottled, moist, plastic, abundant organic material (roots); much silt with some zones of fine sand. Black silt (char or sludge?) in 6 in. layer at 2 ft.	Continuous sampling to 4½ ft.
	5/9/9	4F.3	SS		
5					
10	7/17/27	4F.4	SS	SHALE, red, hard, abundant black (organic?) partings.	
15	36/69	4F.5	SS	Occasional fine-coarse gravel.	
20	43/68 for 5"	4F.6	SS	End of boring - 20 ft.	Auger refused.
25				NOTE: After completion of 4F, rig was moved east 5 ft. to auger an 8 ft. borehole 4G.	
30					
35					
40					

*SS - split spoon.

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RADIAN CORPORATION

Log of Drilling Operations

Boring or Well No. 4G
Location 100' S. of 0.0
Log Recorded By L.N. French

Project Tinker AFB IRP Phase IIB
Beginning 10 February 1984 and end 10 February 1984 of drilling operation
Sampling Interval (Estimated) variable (ft)
Type Drill Rig and Operator Mobile B-50. Jim Winnek, Inc.

Depth (ft)	Sampling Interval	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
0				No log, same as 4F.	
5					
10					
15					
20					
25					
30					
35					
40					

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RADIAN
CORPORATION

Well Completion Logs

TABLE D-1. SPECIFICATION SHEET FOR GRAVEL PACK USED

Screen	Typical Grading Average	Typical Grading Range	Effective Size (mm) Average	Effective Size (mm) Range	Uniformity Coefficient
6	0%	0	1.25	1.18-1.30	1.53
8	3.7%	2.1-5.1			
10	22.9%	18.0-25.6			
12	51.4%	45.6-62.3			
14	72.8%	66.5-79.0			
16	94.6%	89.8-99.4			
20	98.4%	96.0-99.9			
25	98.6%	96.5-99.9			

RADIAN CORPORATION

Well Completion Log: Sheet 1/2

Boring or Well No. 1A

Project Tinker AFB IRP Phase IIB

Location Zone No. 1, west of Patrol Rd. and Landfill 1

Log Recorded By L.N. French

Construction started 11/11/83 completed 11/11/83

Development started 11/14/83 completed 11/14/83

Total depth drilled (ft) 35

Hole diameter 6 3/4 in.

Drilling method Air rotary

Problems encountered during drilling None

Water source for drilling and completion procedures N/A

Number and type of samples collected Samples collected from discharge; not retained.

Sample interval (ft-ft) Variable

Storage method(s) N/A

Casing type PVC Schedule 80 Diameter 4 in.

Depth of casing (ft) 0-25 ft.

Screen type PVC Schedule 80 Diameter 4 in.

Slot size ____ Screen interval (ft-ft) 25-35 ft.

Type(s) of glue used to join casing N/A; threaded casing

Type of gravel pack used 8-12 sand

Amount of gravel pack used (see next page)

Grain size distribution of gravel pack see specification sheet

Lithology of gravel pack Quartz, trace rock fragments

Source (company and quarry/pit) Arkhola Sand & Gravel, Fort Smith, Arkansas

Interval of gravel pack (ft-ft) 24-35 ft.

Interval of bentonite seal (ft-ft) 22-24 ft.

Interval of grouting (ft-ft) 0-22 ft.

Description of security measures 8-in. steel protective casing and lid; secured by padlock.

Padlock ID No. P5 Location of key(s) ____

RADIAN CORPORATION

Well Completion Log: Sheet 2/2

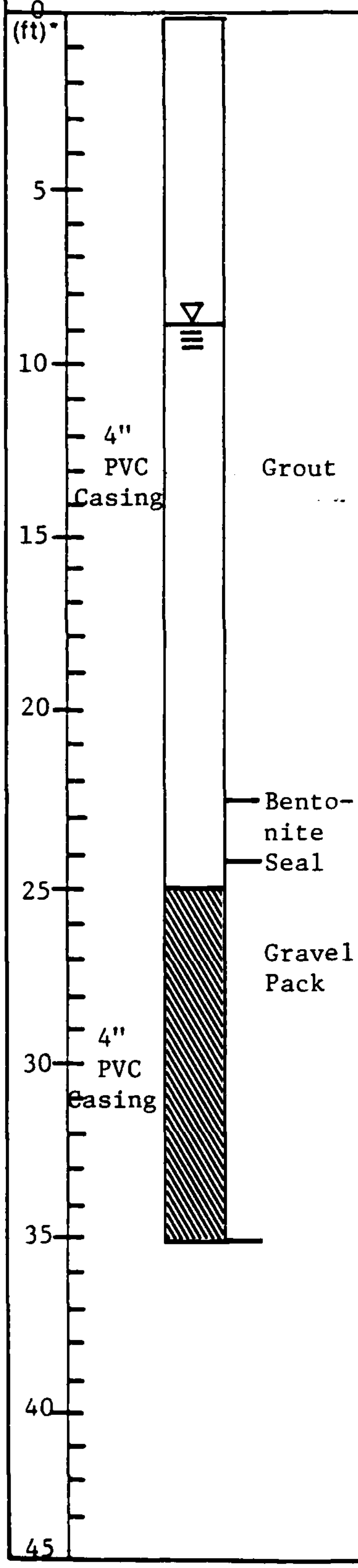
Boring or Well No. 1A

Project Tinker AFB IRP Phase IIB

Location Zone No. 1, west of Patrol Rd. and Landfill 1

Log Recorded By L.N. French

Construction Schematic



Construction schematic should include bottom of boring, screen location, coupling location, granular backfill, description of seals and grout, cave-in, height of riser, and protective casing design. Also note composition of grout, seals and backfill used.

Static level of water before est. 8'7" (ft)* and after 8'9 3/4" (ft)* development

Development started 11/14/83

Development ended 11/14/83

Quantity of water discharged during development 150 gal. (est.)

Type, size/capacity of pump or bailer used for development Air lift at variable rate.

Depth of open hole inside well

Before development (ft)*

After development (ft)*

Development Record

Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph [2]	Conductivity [1,2]	Remarks
915	Cloudy; red-brown	None	Trace fine sand, some silt	--	--	"Film" on surface of water
1030	Clear-trace cloudy	None	No sediment	--	--	Very little "film"

1. Use EPA 120 1-Methods for Chemical Analysis or Equivalent
2. Measurements to be taken ... and on 30 minute intervals during development

* (Express in feet and tenths ...

RADIAN CORPORATION

Well Completion Log: Sheet 1/2

Boring or Well No. 1B

Project Tinker AFB IRP Phase IIB

Location Zone No. 1, south of Landfill 4

Log Recorded By L.N. French

Construction started 11/15/83 completed 11/15/83

Development started 11/16/83 completed 11/16/83

Total depth drilled (ft) 81 ft.

Hole diameter 6 7/8 in.

Drilling method Air rotary

Problems encountered during drilling None

Water source for drilling and completion procedures N/A

Number and type of samples collected Samples collected from discharge; not retained.

Sample interval (ft-ft) Variable

Storage method(s) N/A

Casing type PVC Schedule 80 Diameter 4 in.

Depth of casing (ft) 0-65 ft.

Screen type PVC Schedule 80 Diameter 4 in.

Slot size 0.010 Screen interval (ft-ft) 65-75 ft.

Type(s) of glue used to join casing N/A; threaded casing

Type of gravel pack used 8-12 sand

Amount of gravel pack used (see next page)

Grain size distribution of gravel pack See specification sheet

Lithology of gravel pack Quartz, trace rock fragments

Source (company and quarry/pit) Arkhola Sand & Gravel, Fort Smith, Arkansas

Interval of gravel pack (ft-ft) 62-80 ft.

Interval of bentonite seal (ft-ft) 60-62 ft.

Interval of grouting (ft-ft) 0-60 ft.

Description of security measures 8-in. steel protective casing and lid; secured by padlock.

Padlock ID No. P5 Location of key(s)

RADIAN CORPORATION

Well Completion Log: Sheet 2/2

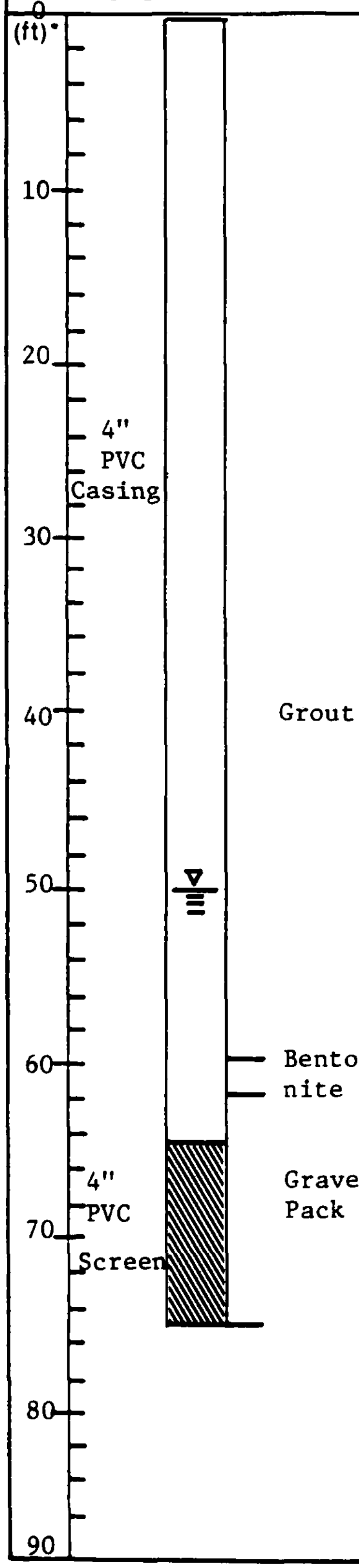
Boring or Well No. 1B

Project Tinker AFB IRP Phase IIB

Location Zone No. 1, south of Landfill 4

Log Recorded By L.N. French

Construction Schematic



Construction schematic should include bottom of boring, screen location, coupling location, granular backfill, description of seals and grout, cave-in, height of riser, and protective casing design. Also note composition of grout, seals and backfill used.

Static level of water before 49'10" (ft)* and after 50'8 3/4" (ft)* development

Development started 11/16/83

Development ended 11/16/83

Quantity of water discharged during development 90 gal. est.

Type, size/capacity of pump or bailer used for development

Air lift at variable rate.

Depth of open hole inside well

Before development (ft)*

After development (ft)*

Development Record

Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph [2]	Conductivity [1,2]	Remarks
7:30	Turbid; red-brown	None	Silt, some fine sand	--	--	Slight "film" on water surface
8:45	Cloudy; red-brown	None	Trace silt	--	--	Slight film
10:15	Slightly cloudy	None	No sediment	--	--	Slight film

1. Use EPA 120.1-Methods for Chemical Analysis or Equivalent
2. Measurements to be taken b and on 30 minute intervals during development

* (Express in feet and tenths o

RADIAN
CORPORATION

Well Completion Log: Sheet 1/2

Boring or Well No. 1C

Project Tinker AFB IRP Phase IIB

Location Zone No. 1, west of Landfill 4

Log Recorded By L.N. French

Construction started 11/17/83 completed 11/17/83

Development started 11/18/83 completed 11/18/83

Total depth drilled (ft) 55 ft.

Hole diameter 6 7/8 in.

Drilling method Air rotary

Problems encountered during drilling None

Water source for drilling and completion procedures N/A

Number and type of samples collected Samples collected from discharge; not retained.

Sample interval (ft-ft) Variable

Storage method(s) N/A

Casing type PVC Schedule 80 Diameter 4 in.

Depth of casing (ft) 0-45 ft.

Screen type PVC Schedule 80 Diameter 4 in.

Slot size 0.010 Screen interval (ft-ft) 45-55 ft.

Type(s) of glue used to join casing N/A; threaded casing

Type of gravel pack used 8-12 sand

Amount of gravel pack used (see next page)

Grain size distribution of gravel pack see specification sheet

Lithology of gravel pack Quartz, few rock fragments

Source (company and quarry/pit) Arkhola Sand & Gravel, Fort Smith, Arkansas

Interval of gravel pack (ft-ft) 38-55 ft.

Interval of bentonite seal (ft-ft) 36-38 ft.

Interval of grouting (ft-ft) 0-36 ft.

Description of security measures 8-in. steel protective casing and lid; secured by padlock.

Padlock ID No. P5 Location of key(s)

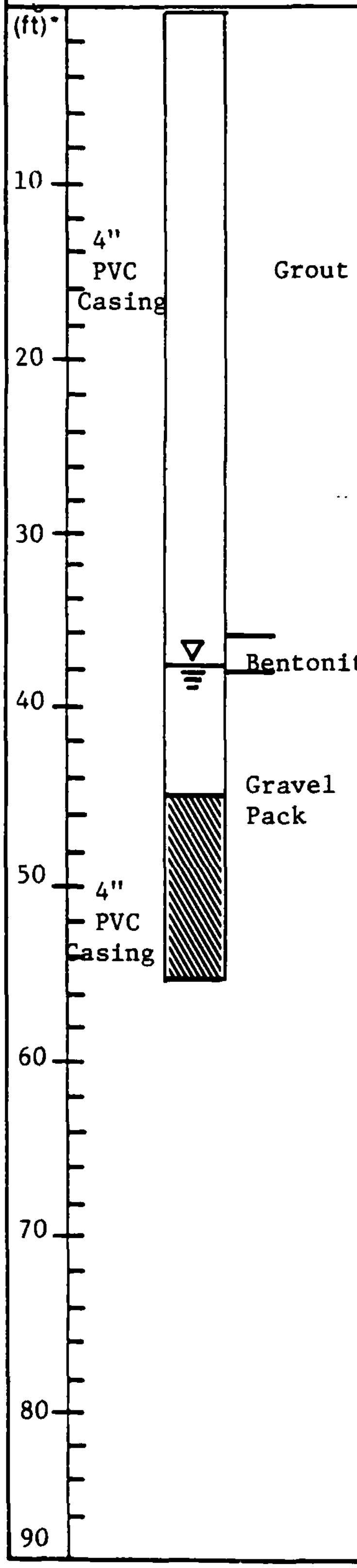
RADIAN CORPORATION

Well Completion Log: Sheet 2/2

Boring or Well No. 1C Project Tinker AFB IRP Phase IIB

Location Zone No. 1, west of landfill Log Recorded By L.N. French

Construction Schematic



Construction schematic should include bottom of boring, screen location, coupling location, granular backfill, description of seals and grout, cave in, height of riser, and protective casing design. Also note composition of grout, seals and backfill used.

Static level of water before 37.5 (ft)* and after ______ (ft)* development ______

Development started 11/18/83

Development ended 11/18/83

Quantity of water discharged during development ______

Type, size/capacity of pump or bailer used for development ______
Air lift with variable discharge.

Depth of open hole inside well ______

Before development ______ (ft)*

After development ______ (ft)*

Development Record

Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph [2]	Conductivity [1,2]	Remarks
11:30	Turbid, red-brown	Slight hydrocarbon?	Silt	--	--	Small yield; noticeable film on water
12:00	Cloudy, red-brown	No odor	Silt			
12:45 - 1:45 -- Break for meeting with Base officials.						
3:00	Slightly cloudy faint brown	Slight hydrocarbon	No sediment	--	--	Film visible on water

1 Use EPA 120.1 Methods for Chemical Analysis or Equivalent

2. Measurements to be taken b[...] and on 30 minute intervals during development

* (Express in feet and tenths of [...]

RADIAN CORPORATION

Well Completion Log: Sheet 1/2

Boring or Well No. 2A
Project Tinker AFB IRP Phase IIB
Location Zone No. 2, south of Landfill 6
Log Recorded By L.N. French

Construction started 11/18/83 completed 11/18/83
Development started ______ completed ______

Total depth drilled (ft) 45.5 ft.
Hole diameter 6 7/8 in.
Drilling method Air rotary
Problems encountered during drilling None

Water source for drilling and completion procedures N/A

Number and type of samples collected Samples collected from discharge; not retained.

Sample interval (ft-ft) Variable
Storage method(s) N/A

Casing type PVC Schedule 80 Diameter 4 in.
Depth of casing (ft) 0-35.5 ft.
Screen type PVC Schedule 80 Diameter 4 in.
Slot size 0.010 Screen interval (ft-ft) 35.5-45.5 ft.
Type(s) of glue used to join casing N/A; threaded casing

Type of gravel pack used 8-12 sand
Amount of gravel pack used (see next page)
Grain size distribution of gravel pack see specification sheet
Lithology of gravel pack Quartz, few rock fragments
Source (company and quarry/pit) Arkhola Sand & Gravel, Fort Smith, Arkansas

Interval of gravel pack (ft-ft) 34-45.5 ft.
Interval of bentonite seal (ft-ft) 32-34 ft.
Interval of grouting (ft-ft) 0-32 ft.

Description of security measures 8-in. steel protective casing and lid; secured by padlock.

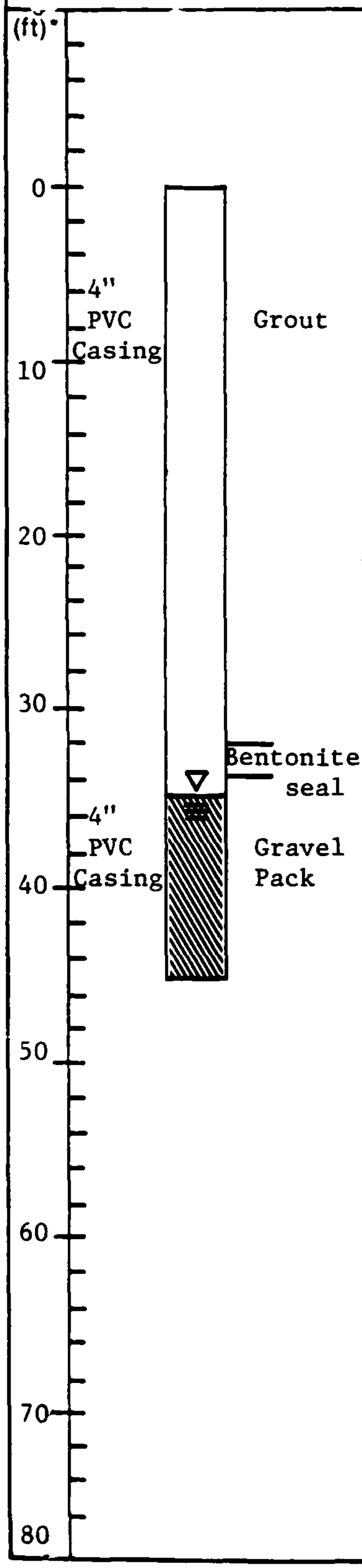
Padlock ID No. ______ Location of key(s) ______

RADIAN CORPORATION

Well Completion Log: Sheet 2/2

Boring or Well No. 2A
Project Tinker AFB IRP Phase IIB
Location Zone No. 2, south of Landfill 6
Log Recorded By L.N. French

Construction Schematic



Construction schematic should include bottom of boring, screen location, coupling location, granular backfill, description of seals and grout, cave-in, height of riser, and protective casing design. Also note composition of grout, seals and backfill used.

Static level of water before approx. 37 ft. (ft)* and after 37.5 ft. (ft)* development

Development started 21 November 1983

Development ended 21 November 1983

Quantity of water discharged during development air lift

Type, size/capacity of pump or bailer used for development

Depth of open hole inside well 45.5 feet

Before development (ft)*

After development (ft)*

Development Record

Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph [2]	Conductivity [1,2]	Remarks
11:45a (1 hr. after start)	Slightly cloudy	Slight odor	Little silt			Flow less than 1 gpm.
1:00p	Slightly cloudy	--	Little silt, fine sand			Very low yield; well pumped dry & allowed to recover
2:30p	Slightly cloudy	--	Trace silt			

1. Use EPA 120.1 Methods for Chemical Analysis or Equivalent
2. Measurements to be taken b[illegible] and on 30 minute intervals during development
* (Express in feet and tenths of [illegible]

RADIAN CORPORATION

Well Completion Log: Sheet 1/2

Boring or Well No. 2B
Project Tinker AFB IRP Phase IIB
Location Zone No. 2, south of Landfill 5
Log Recorded By L.N. French

Construction started 11/20/83 completed 11/20/83
Development started 11/21/83 completed 11/22/83

Total depth drilled (ft) 55
Hole diameter 6 3/4"
Drilling method Air rotary
Problems encountered during drilling None

Water source for drilling and completion procedures N/A

Number and type of samples collected Samples collected from discharge; not retained.

Sample interval (ft-ft) Variable
Storage method(s) N/A

Casing type PVC Schedule 80 Diameter 4 in.
Depth of casing (ft) 0-45
Screen type PVC Schedule 80 Diameter 4 in.
Slot size 0.010 Screen interval (ft-ft) 45-55
Type(s) of glue used to join casing N/A; threaded casing

Type of gravel pack used 8-12 sand
Amount of gravel pack used (see next page)
Grain size distribution of gravel pack see specification sheet
Lithology of gravel pack Quartz, trace rock fragments
Source (company and quarry/pit) Arkhola Sand & Gravel, Fort Smith, Arkansas

Interval of gravel pack (ft-ft) 40-55 ft.
Inte al of bentonite seal (ft-ft) 38-40 ft.
Interval of grouting (ft-ft) 0-38 ft.

Description of security measures 8-in. steel protective casing and lid; secured by padlock.

Padlock ID No. P5
Location of key(s)

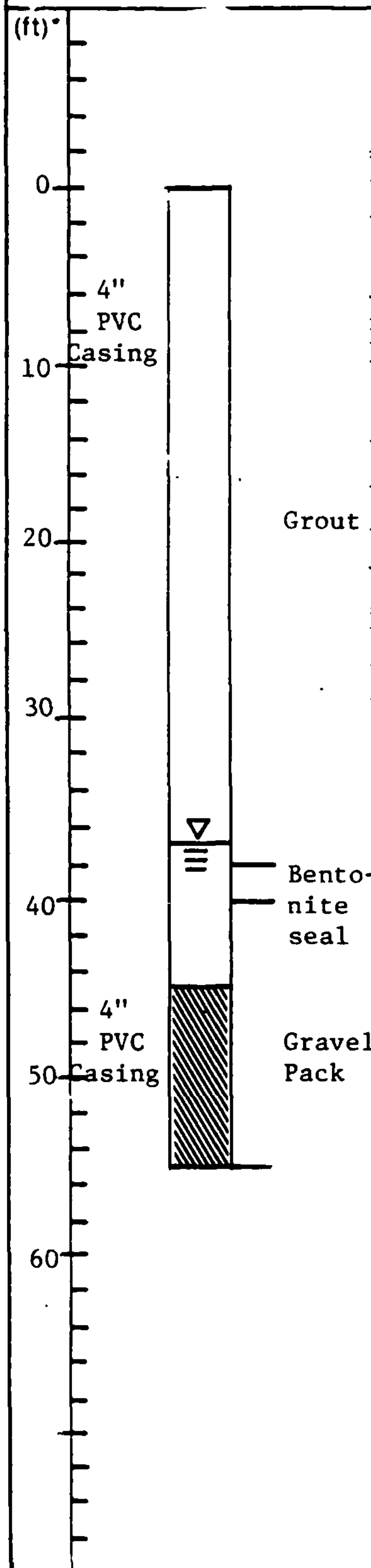
RADIAN
CORPORATION

Well Completion Log: Sheet 2/2

Boring or Well No. 2B Project Tinker AFB IRP Phase IIB

Location Zone No. 2, south of Landfill 5 Log Recorded By L.N. French

Construction Schematic



Construction schematic should include bottom of boring, screen location, coupling location, granular backfill, description of seals and grout, cave-in, height of riser, and protective casing design. Also note composition of grout, seals and backfill used.

Static level of water before 37 ft. (ft)* and after 34 ft. (ft)* development

Development started 21 November 1983

Development ended 21 November 1983

Quantity of water discharged during development

Type, size/capacity of pump or bailer used for development Air lift

Depth of open hole inside well 54 ft.

Before development (ft)*

After development (ft)*

Development Record

Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph [2]	Conductivity [1,2]	Remarks
11/21/83 3:00	Turbid, red-brown.	Very slight "oily" odor, slight film.	Silt	--	--	Very low yield, <1 gpm (pump @ 15 min. intervals)
5:00	Cloudy, light red-brown.	Same.	Silt			Stop for day.
11/22/83 7:00	Cloudy, light red-brown.	Same.	Less silt.	--	--	
8:30	Less cloudy.		Less silt.			Rain; move to next site.

1 Use EPA 120.1 Methods for Ch... Analysis or Equivalent
2. Measurements to be taken b... and on 30 minute intervals during development
* (Express in feet and tenths o

RADIAN CORPORATION

Well Completion Log: Sheet 1/2

Boring or Well No. 3E
Project Tinker AFB IRP Phase IIB
Location Zone No. 3, southwest of IWP2
Log Recorded By L.N. French

Construction started 11/22/83 completed 11/22/83
Development started 11/23/83 completed

Total depth drilled (ft) 80 ft.
Hole diameter 6 3/4 in.
Drilling method Air rotary
Problems encountered during drilling None

Water source for drilling and completion procedures N/A

Number and type of samples collected Samples collected from discharge; not retained.

Sample interval (ft-ft) Variable
Storage method(s) N/A

Casing type PVC Schedule 80 Diameter 4 in.
Depth of casing (ft) 0-4.5 ft.
Screen type PVC Schedule 80 Diameter 4 in.
Slot size 0.010 Screen interval (ft-ft) 64.5-74.5 ft.
Type(s) of glue used to join casing N/A; threaded casing

Type of gravel pack used 8-12 sand
Amount of gravel pack used (see next page)
Grain size distribution of gravel pack see specification sheet
Lithology of gravel pack Quartz, trace rock fragments
Source (company and quarry/pit) Arkhola Sand & Gravel, Fort Smith, Arkansas

Interval of gravel pack (ft-ft) 64-75.5 ft.
Interval of bentonite seal (ft-ft) 62-64 ft.
Interval of grouting (ft-ft) 0-62 ft.

Description of security measures 8-in. steel protective casing and lid; secured by padlock.

Padlock ID No. P5 Location of key(s)

5 81 35/9

RADIAN CORPORATION

Well Completion Log: Sheet 2/2

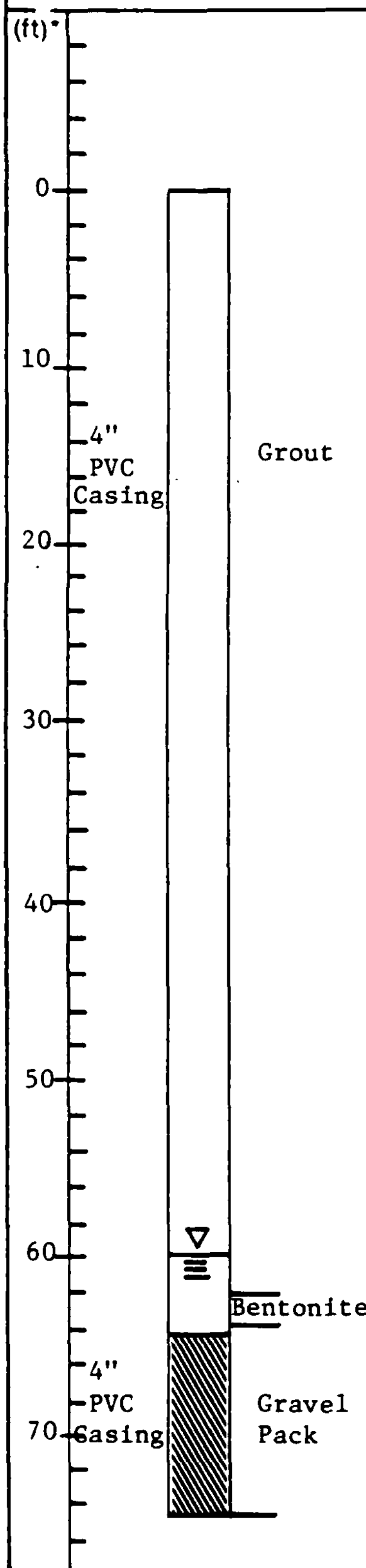
Boring or Well No. 3E

Project Tinker AFB IRP Phase IIB

Location Zone No. 3, southwest of IWP 2

Log Recorded By L.N. French

Construction Schematic



Construction schematic should include bottom of boring, screen location, coupling location, granular backfill, description of seals and grout, cave-in, height of riser, and protective casing design. Also note composition of grout, seals and backfill used.

Static level of water before 60.08 (ft)* and after ___ (ft)* development ___

Development started 23 November 1983

Development ended 28 November 1983

Quantity of water discharged during development ___

Type, size/capacity of pump or bailer used for development Air lift

Depth of open hole inside well 75.5 ft.

Before development ___ (ft)*

After development ___ (ft)*

Development Record

Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph [2]	Conductivity [1,2]	Remarks
8:40a	Reddish-brown, cloudy	--	Silt, some fine sand	--	--	Very low yield (.25 gpm)
9:30a	Cloudy		Trace silt	--	--	

Continued development until mid-day; resumed development and completed on 28 November.

1. Use EPA 120.1 Methods for Ch... ...alysis or Equivalent
2. Measurements to be taken b... and on 30 minute intervals during development

* (Express in feet and tenths of

RADIAN CORPORATION

Well Completion Log: Sheet 1/2

Boring or Well No. 3F
Project Tinker AFB IRP 212-027-04
Location Zone No. 3
Log Recorded By Rick Belan

Construction started 23 November 1983 completed 29 November 1983
Development started ______ completed ______

Total depth drilled (ft) 30.4
Hole diameter 6 1/4-inch; 4 3/4-inch test hole 11/23/83
Drilling method Air rotary (Failing #1250)
Problems encountered during drilling None

Water source for drilling and completion procedures Base potable supply, and distilled water for hydrating ∿1/2 gal. bentonite pellets.

Number and type of samples collected None.

Sample interval (ft-ft) --
Storage method(s) --

Casing type Robintech 2" PVC Sch. 80 Diameter 2-inch
Depth of casing (ft) 30.4
Screen type Robintech 2" PVC Sch. 80 Diameter 2-inch
Slot size 0.01"x1 5/16"@∿270 slots/ft. Screen interval (ft-ft)* 15.4-30.4
Type(s) of glue used to join casing None--threaded flush joint couplings.

Type of gravel pack used #8-12 sand
Amount of gravel pack used ∿28 gallons.
Grain size distribution of gravel pack see specification sheet
Lithology of gravel pack 92% silica, ∿5% alumina, ∿3% potassium oxide,
Source (company and quarry/pit) Arkhola sand & gravel, Ft. Smith, Arkansas.

Interval of gravel pack (ft-ft) 14-33.4
Interval of bentonite seal (ft-ft) 13-14 (pellets); 12-13 (hydrated pellets)
Interval of grouting (ft-ft) 0-12

Description of security measures 8" diameter steel guard pipe and 3 protective posts set in Portland cement grout; locking cap and steel padlock.

NOTE: Final M.P. is top of 2" PVC = 2.9' AGL.

Padlock ID No. FE 1206 Location of key(s) ______

RADIAN CORPORATION

Well Completion Log: Sheet 2/2

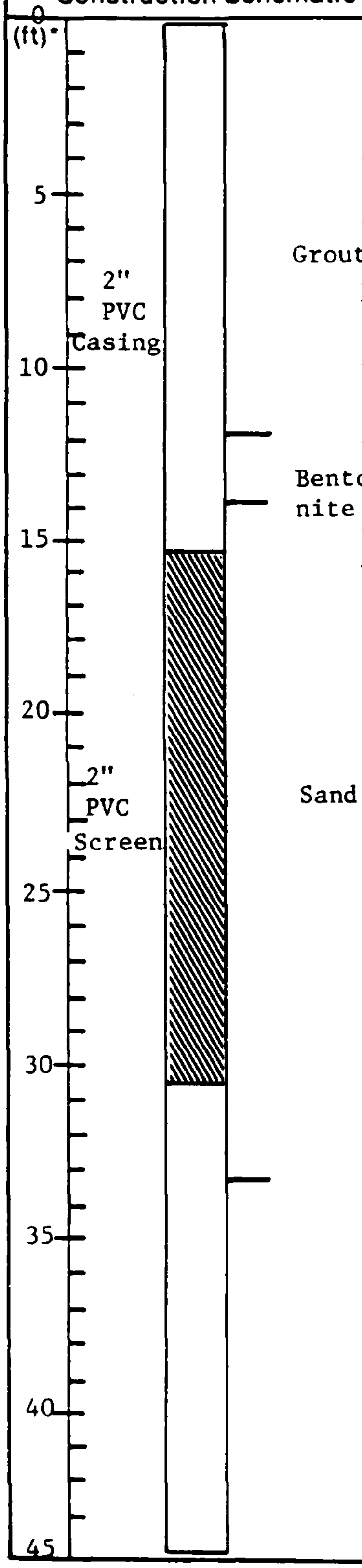
Boring or Well No. 3F

Project Tinker AFB IRP 212-027-04

Location Zone No. 3

Log Recorded By Rick Belan

Construction Schematic



Construction schematic should include bottom of boring, screen location, coupling location, granular backfill, description of seals and grout, cave in, height of riser and protective casing design. Also note composition of grout, seals and backfill used.

Static level of water before 16.3 BGL (ft)* and after ____ (ft)* development ____

Development started ____

Development ended ____

Quantity of water discharged during development ____

Type, size/capacity of pump or bailer used for development ____

Depth of open hole inside well ____

Before development 30.4 (ft)*

After development ____ (ft)*

Development Record

Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph [2]	Conductivity [1,2]	Remarks

Formation was low producer and the monitor well was completed dry. Further development occurred during ground-water sampling.

1 Use EPA 120 1 Methods for Ch... ...alysis or Equivalent

2. Measurements to be taken be... ...and on 30 minute intervals during development

* (Express in feet and tenths of...

RADIAN CORPORATION

Well Completion Log: Sheet 1/2

Boring or Well No. 3G
Project Tinker AFB IRP Phase IIB
Location Zone No. 3
Log Recorded By L.N. French

Construction started 13 February 1984 completed 13 February 1984
Development started ______ completed ______

Total depth drilled (ft) 8 ft.
Hole diameter 6 inches
Drilling method Hollow-stem auger
Problems encountered during drilling None

Water source for drilling and completion procedures None

Number and type of samples collected No samples at 3G; refer to geologic log of Well 3C (adjacent to 3G)
Sample interval (ft-ft) N/A
Storage method(s) N/A

Casing type PVC Schedule 40 Diameter 2-inch
Depth of casing (ft) 3 ft.
Screen type PVC Schedule 40 Diameter 2-inch
Slot size 0.010 inch Screen interval (ft-ft) 3 ft.-8 ft.
Type(s) of glue used to join casing N/A; threaded casing

Type of gravel pack used ______
Amount of gravel pack used (see next page)
Grain size distribution of gravel pack N/A
Lithology of gravel pack Silica, trace rock fragments.
Source (company and quarry/pit) Local source.

Interval of gravel pack (ft-ft) 2 ft.-8 ft.
Interval of bentonite seal (ft-ft) 1 1/2 ft.-2 ft.
Interval of grouting (ft-ft) 0-1 1/2 ft.

Description of security measures 8-in. steel protective casing and lid; secured by padlock.

Padlock ID No. P5 Location of key(s) ______

RADIAN CORPORATION

Well Completion Log: Sheet 2/2

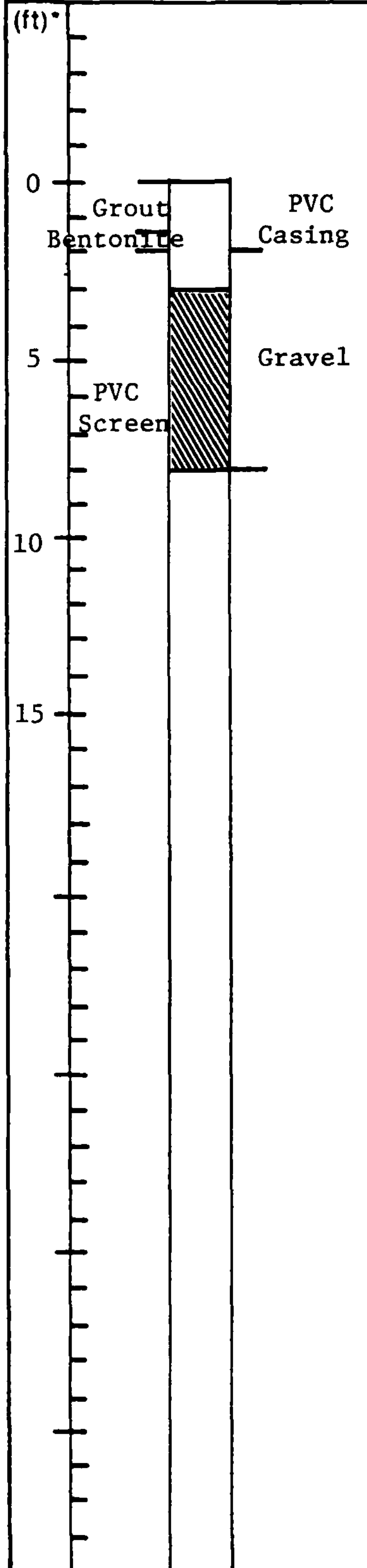
Boring or Well No. 3G

Project Tinker AFB IRP Phase IIB

Location Zone No. 3

Log Recorded By L.N. French

Construction Schematic



Construction schematic should include bottom of boring, screen location, coupling location, granular backfill, description of seals and grout, cave-in, height of riser, and protective casing design. Also note composition of grout, seals and backfill used.

Static level of water before ________ (ft)* and after ________ (ft)* development ________

Development started ________

Development ended ________

Quantity of water discharged during development ________

Type, size/capacity of pump or bailer used for development Submersible pump

Depth of open hole inside well 8 ft.

Before development ________ (ft)*

After development ________ (ft)*

Development Record *

Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph [2]	Conductivity [1,2]	Remarks

* Well developed by purging for sample collection. Very low production rate noted.

1. Use EPA 120.1 Methods for Chem[illegible] Analysis or Equivalent
2. Measurements to be taken befc[illegible] on 30 minute intervals during development

* (Express in feet and tenths of fe[illegible]

RADIAN CORPORATION

Well Completion Log: Sheet 1/2

Boring or Well No. 4A

Project Tinker AFB IRP Phase IIB

Location Zone No. 3

Log Recorded By L.N. French

Construction started 11 February 1984 completed 13 February 1984

Development started 12 February 1984 completed 12 February 1984

Total depth drilled (ft) 51 ft.

Hole diameter 7 in.

Drilling method Air rotary

Problems encountered during drilling None

Water source for drilling and completion procedures None required.

Number and type of samples collected

Sample interval (ft-ft)

Storage method(s)

Casing type PVC Schedule 80 Diameter 4 in.

Depth of casing (ft) 0-41 ft.

Screen type PVC Schedule 80 Diameter 4 in.

Slot size 0.010-inch Screen interval (ft-ft) 41 ft.-51 ft.

Type(s) of glue used to join casing N/A; threaded casing

Type of gravel pack used --

Amount of gravel pack used (see next page)

Grain size distribution of gravel pack N/A

Lithology of gravel pack Silica, some rock fragments

Source (company and quarry/pit) Local source

Interval of gravel pack (ft-ft) 39 ft.-51 ft.

Interval of bentonite seal (ft-ft) 38 ft.-39 ft.

Interval of grouting (ft-ft) 0-38 ft.

Description of security measures 8-in. steel protective casing and lid; secured by padlock.

Padlock ID No. P5 Location of key(s)

581 35/9

RADIAN CORPORATION

Well Completion Log: Sheet 2/2

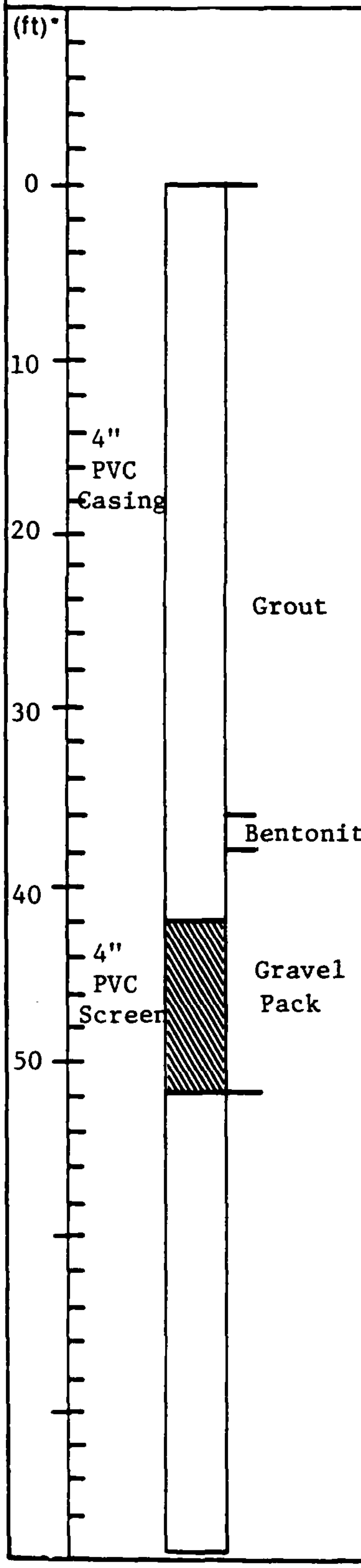
Boring or Well No. 4A

Project Tinker AFB IRP Phase IIB

Location Zone No. 4

Log Recorded By L.N. French

Construction Schematic



Construction schematic should include bottom of boring, screen location, coupling location, granular backfill, description of seals and grout, cave-in, height of riser, and protective casing design. Also note composition of grout, seals and backfill used.

Static level of water before 39.75 ft. (ft)* and after 39.5 ft. (ft)* development

Development started 12 February 1984

Development ended 12 February 1984

Quantity of water discharged during development

Type, size/capacity of pump or bailer used for development

Air lift.

Depth of open hole inside well 51 ft.

Before development (ft)*

After development (ft)*

Development Record

Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph [2]	Conductivity [1,2]	Remarks
10:30a	Reddish-brown, turbid	None	Silt, no sand	--	--	Low yield; pump intermittently
11:30a	Reddish-brown, very cloudy	--	Silt	--	--	
12:00	Light brown, cloudy	--	Trace silt	--	--	
1:00p	Slightly cloudy	--	Very little silt	--	--	

1. Use EPA 120.1 Methods for C... ...alysis or Equivalent
2. Measurements to be taken b... and on 30 minute intervals during development

* (Express in feet and tenths o...

5 81 35/9

RADIAN CORPORATION

Well Completion Log: Sheet 1/2

Boring or Well No. 4F
Project Tinker AFB IRP Phase IIB
Location Zone No. 4
Log Recorded By L.N. French

Construction started 10 February 1984 completed 10 February 1984
Development started -- completed

Total depth drilled (ft) 19.5 ft.
Hole diameter 6 in.
Drilling method Hollow-stem auger
Problems encountered during drilling None

Water source for drilling and completion procedures None

Number and type of samples collected Six split-spoon samples

Sample interval (ft-ft) 5 ft. (continuous from surface to 4.5 ft.)
Storage method(s) Quart glass jars with Teflon® lined lids; samples held at ambient temperature except for analytical samples.
Casing type PVC Schedule 40 Diameter 2 in.
Depth of casing (ft) 0-5.75 ft.
Screen type PVC Schedule 40 Diameter 2 in.
Slot size 0.010 in. Screen interval (ft-ft) 5.75 ft-15.75 ft.
Type(s) of glue used to join casing N/A; threaded casing

Type of gravel pack used --
Amount of gravel pack used (see next page)
Grain size distribution of gravel pack N/A
Lithology of gravel pack Silica, some rock fragments
Source (company and quarry/pit) local source

Interval of gravel pack (ft-ft) 4.75 ft.-15.75 ft.
Interval of bentonite seal (ft-ft) 3.75 ft.-4.75 ft.
Interval of grouting (ft-ft) 0-3.75 ft.

Description of security measures 8-in. steel protective casing and lid; secured by padlock.

Padlock ID No. P5
Location of key(s)

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Well Completion Log: Sheet 2/2

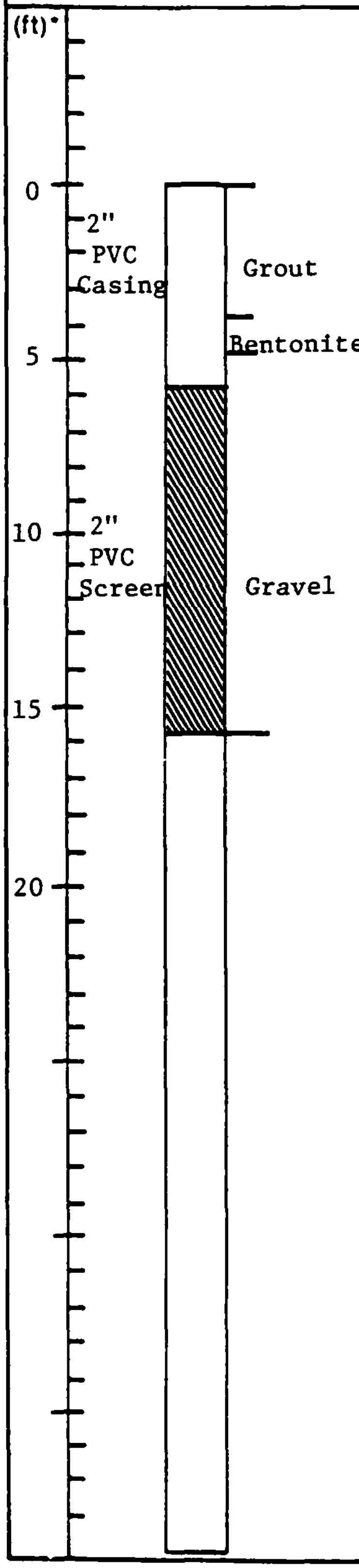
Boring or Well No. 4F

Project Tinker AFB IRP Phase IIB

Location Zone No. 4

Log Recorded By L.N. French

Construction Schematic



Construction schematic should include bottom of boring, screen location, coupling location, granular backfill, description of seals and grout, cave-in, height of riser, and protective casing design. Also note composition of grout, seals and backfill used.

Static level of water before -- (ft)* and after -- (ft)* development --

Development started --

Development ended --

Quantity of water discharged during development --

Type, size/capacity of pump or bailer used for development --

Depth of open hole inside well 19.5 ft.

Before development (ft)*

After development (ft)*

Development Record

Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph [2]	Conductivity [1,2]	Remarks

Well was dry; completed to serve as a comparison to adjacent Well 4G.

1. Use EPA 120 1-Methods for Chemical Analysis or Equivalent
2. Measurements to be ta ... ifter, and on 30 minute intervals during development
* (Express in feet and ter

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CORPORATION

Well Completion Log: Sheet 1/2

Boring or Well No. 4G
Project Tinker AFB IRP Phase IIB
Location Zone No. 4
Log Recorded By L.N. French

Construction started 12 February 1984 completed 12 February 1984
Development started 14 February 1984 completed 14 February 1984

Total depth drilled (ft) 8 ft.
Hole diameter 6 in.
Drilling method Hollow-stem auger
Problems encountered during drilling None

Water source for drilling and completion procedures None

Number and type of samples collected None; refer to log of adjacent Well 4F.

Sample interval (ft-ft) --
Storage method(s) --

Casing type PVC Schedule 40 Diameter 2 in.
Depth of casing (ft) 0-3 ft.
Screen type PVC Schedule 40 Diameter 2 in.
Slot size 0.010 in. Screen interval (ft-ft) 3 ft.-8 ft.
Type(s) of glue used to join casing N/A; threaded casing

Type of gravel pack used --
Amount of gravel pack used (see next page)
Grain size distribution of gravel pack N/A
Lithology of gravel pack Silica, some rock fragments
Source (company and quarry/pit) Local source

Interval of gravel pack (ft-ft) 2 ft.-8 ft.
Interval of bentonite seal (ft-ft) 1.5 ft-2 ft.
Interval of grouting (ft-ft) 0-1.5 ft.

Description of security measures 8-in. steel protective casing and lid; secured by padlock.

Padlock ID No. P5 Location of key(s)

5 81 35/9

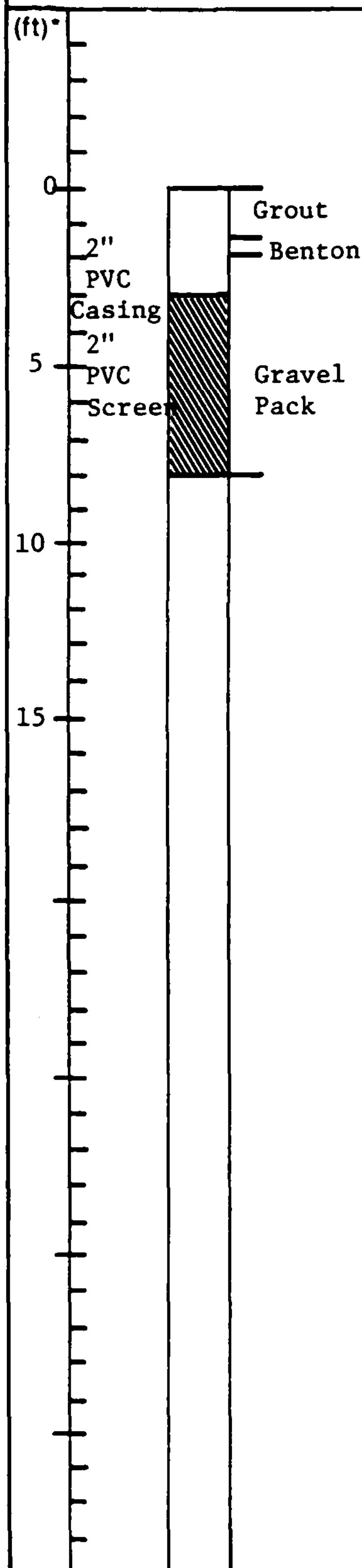
RADIAN CORPORATION

Well Completion Log: Sheet 2/2

Boring or Well No. 4G　　Project Tinker AFB IRP Phase IIB

Location Zone No. 4　　Log Recorded By L.N. French

Construction Schematic



Construction schematic should include bottom of boring, screen location, coupling location, granular backfill, description of seals and grout, cave-in, height of riser and protective casing design. Also note composition of grout, seals and backfill used.

Static level of water before approx. 1 ft. (ft)* and after 1.5 ft. (ft)* development

Development started 14 February 1984

Development ended 14 February 1984

Quantity of water discharged during development --

Type, size/capacity of pump or bailer used for development Bailer

Depth of open hole inside well 8 ft.

Before development (ft)*

After development (ft)*

Development Record *

Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph [2]	Conductivity [1,2]	Remarks
*Well developed by bailing as part of purging operation before sampling.						

1. Use EPA 120.1 Methods for Ch... ...alysis or Equivalent.
2. Measurements to be taken be... ...nd on 30 minute intervals during development
* (Express in feet and tenths of...

RADIAN CORPORATION

APPENDIX E

Raw Field Data

RADIAN CORPORATION

CALCULATION SHEET

CALC. NO. --

SIGNATURE R. A. Belan RAB DATE 11/22/83 CHECKED -- DATE 11/22/83

PROJECT Tinker Air Force Base, IRP Phase IIB JOB NO. 212-027-04

SUBJECT Sample Log - Zone 3 Soils SHEET 1 OF 1 SHEETS

Sample Number	Sample Type	Depth	Date	Sample	Comment
3Aa	Soil	(3.5-4.5)	11/21/83	SS	For Chem. Analysis
3Ab	Soil	(8.5-10.0)	11/21/83	SS	For Chem. Analysis
3Ba	Soil	(3.5-3.7)	11/22/83	SS	
3Bb	Soil	(8.0-9.5)	11/22/83	SS	For Chem. Analysis
3Bc	Soil	(13.0-14.1)	11/22/83	SS	
3Bd	Soil	(18.0-14.1)	11/22/83	SS	For Chem. Analysis
3Ca	Waste?	(3.0-4.4)	11/22/83	SS	For Chem. Analysis
3Cb	Soil	(8.0-9.4)	11/22/83	SS	For Chem. Analysis
3Da	Soil	(3.0-4.5)	11/22/83	SS	
3Db	Soil	(8.0-8.5)	11/22/83	SS	
3A(Spec)	Waste?	-	11/22/83	Grab	
3Be	Soil	(20.5-21.5)	11/22/83	SS	For Chem. Analysis
3Fa (Alt)	Waste?	(2.5-3.8)	11/29/83	SS	
3Fb (Alt)	Waste?	(4.5-4.8)	11/29/83	SS	For Chem. Analysis
3Fe (Alt)	Soil	(5.4-5.8)	11/29/83	SS	For Chem. Analysis
3Aa (Alt)	Waste/soil	(2.5-3.8)	11/29/83	SS	For Chem. Analysis
3C-	Water	Open hole	11/28/83	Bail	Cond-74,000; pH 7.6
3F-	Water	Open hole	11/28/83	Bail	Cond-910; pH 7.1
3PVC	PVC Casing		11/30/83	N/A	Section of new 2" PVC casing

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RADIAN
CORPORATION

CALC. NO. ____

SIGNATURE L.N. French DATE ____ CHECKED ____ DATE ____

PROJECT Tinker Air Force Base, IRP Phase IIB JOB NO. 212-027-04

SUBJECT Sample Log SHEET ____ OF ____ SHEETS

Sample Number	Sample Type	Depth (ft)	Date	Sample	Comment
4B.1	Soil	5-6.5	2/8/84	SS	
4B.2	Shale	10-11.5	2/8/84	SS	
4B.3	Shale	18-19.5	2/9/84	SS	
4B.4	Soil	0-1.5	2/9/84	SS	
4B.5	Soil	1.5-3	2/9/84	SS	For Chem. Analysis
4B.6	Soil	3-4.5	2/9/84	SS	For Chem. Analysis
4C.1	Soil	0-1.5	2/9/84	SS	
4C.2	Soil	1.5-3	2/9/84	SS	
4C.3	Fill	3-4.5	2/9/84	SS	
4C.4	Fill	6	2/9/84	Grab	
4C.5	Soil	8.5-10	2/9/84	SS	For Chem. Analysis
4C.6	Soil	13.5-15	2/9/84	SS	
4C.7	Shale	18.5-20	2/9/84	SS	
4C.8	Shale/Sand.	23.5-25	2/9/84	SS	
4D.1	Fill	0-1.5	2/9/84	SS	
4D.2	Fill	1.5-3	2/9/84	SS	For Chem. Analysis
4D.3	Fill	3-4.5	2/9/84	SS	
4D.4	Soil	8-9.5	2/9/84	SS	
4D.5	Shale	13-14.5	2/9/84	SS	
4D.6	Shale	18-19.5	2/9/84	SS	
4E.1	Soil	0-1.5	2/10/84	SS	
4E.2	Fill	1.5-3	2/10/84	SS	For Chem. Analysis
4E.3	Fill	3-4.5	2/10/84	SS	For Chem. Analysis
4E.4	Soil	8-9.5	2/10/84	SS	For Chem. Analysis
4E.5	Shale	13-14.5	2/10/84	SS	For Chem. Analysis
4F.1	Soil	0-1.5	2/10/84	SS	
4F.2	Fill	1.5-3	2/10/84	SS	For Chem. Analysis
4F.3	Fill	3-4.5	2/10/84	SS	For Chem. Analysis
4F.4	Shale	8-9.5	2/10/84	SS	
4F.5	Shale	13-14.5	2/10/84	SS	
4F.6	Shale	18-19.5	2/10/84	SS	

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RADIAN CORPORATION

CALCULATION SHEET

CALC. NO. ______

SIGNATURE F.B. Blood/K.A. Ferland DATE ______ CHECKED ______ DATE ______

PROJECT Tinker Air Force Base, IRP Phase IIB JOB NO. 212-027-04

SUBJECT Sample Log - Zones 1-4 SHEET ______ OF ______ SHEETS

Well Number	Depth to Water	Depth to Bottom	Stickup (inches)		Field pH	Field Cond.	Temp. (°C)	Sampler	Comments
1A	14'8"	41'2"	36"	2/13/84	6.5	1100	22	FBB/KAF	
1B	52'4½"	78'6"	31"	2/13/84	7.1	600	24	"	
1C	40'½"	58'1½"	35"	2/14/84	6.8	650	17	"	
4A	41',8½"	52'6"	26½"	2/14/84	7.3	900	16	"	
4F	Dry	18'8"	29½"	2/14/84					
4G	3'5"	10'2"	23½"	2/15/84	7.0	1200	14	"	
				2/16/84	8.0	600	12	"	Took many trips to fill bottles - slow recovery
3E	62'1½"	77'1"	31½	2/15/84	6.5	400	16	"	
3G	6'11½"	9'5½"	28	2/15/84	8.0	4000	11	"	Took several trips to fill bottles - slow recovery
3F	13'2½"	33'7½"	35½	2/15/84	7.0	600		"	
2A	39'2"	48'5½"	32½	2/15/84	6.5	650	17	"	
1	32'1"	42'10½"	34½	2/15/84	6.5	600	15½	"	Well 1 pumped dry at night (2/14) sampled next morning
2	11'7½"	42'7½"	35½	2/15/84	6.5	900	-	"	Wells 2-7 pumped dry 2/15 - sampled following day, 2/16
3	7'7"	34'4"	31	2/15/84	6.5	850	-	"	
4	6'10½"	40'3½"	39	2/15/84	7.0	1000	14	"	
5	8'6"	32'3"	35½	2/15/84	6.8	750	13	"	
2B	46'10½"	58'1"	31	2/15/84	6.8	800	18	"	Pumped 3 pore volumes, following day 1 pore volume and sampled
6	7'11"	32'3"	35½	2/15/84	7.0	700	15	"	
7	14'10½"	25'8½"	32	2/15/84	7.0	600	19	"	
8	20'2"	22'11"	30½	2/16/84	NOT MEASURED			"	Pumped dry in a.m. had not recovered in p.m. - 5 hours
Pond	-	-	-		6.0	190	10	"	Sample collected 3/26 - DLR

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CALCULATION SHEET

CALC. NO. ______

SIGNATURE K. A. Ferland DATE ______ CHECKED ______ DATE ______

PROJECT Tinker Air Force Base, IRP Phase IIB JOB NO. 212-027-04

SUBJECT Sample Log - Zone 5, Base Water Supply Wells SHEET 1 OF 1 SHEETS

Sample Number	Well Number	Date Sampled	Field pH	Field Cond. (umhos)	Field Temp. (°F)	Sampler	Comments
T5-001	1	2/9/84	6.8	200	54	KAF	
002	2	2/9/84	7.0	225	60	"	
-	3	OUT OF SERVICE					
004	4	2/9/84	6.5	240	58	"	
005	5	2/9/84	7.0	210	60	"	
006	6	OUT OF SERVICE					
007	7	OUT OF SERVICE					
-	8	OUT OF SERVICE					
009	9	2/8/84	7.4	200	50	"	Ran 5 mins. only
-	10	PLUGGED AND ABANDONED					
011	11	2/8/84	7.0	240	58	"	Ran 30 mins.
-	12	OUT OF SERVICE					
013	13	2/8/84	6.6	250	62	"	
014	14	2/8/84	7.0	270	60	"	
015	15	2/8/84	6.6	270	60	"	Duplicate samples
016	16	2/8/84	6.6	290	60	"	
-	17	OUT OF SERVICE					
018	18	2/9/84	6.5	430	66	"	Ran 5 mins. only
018r	18	2/17/84	6.5	550	61	"	Ran 5 mins. only (resample)
019	19	2/9/84	6.1	260	64	"	Ran 5 mins. only
019r	19	2/17/84	6.0	300	58	"	Ran 5 mins. only (resample)
020	20	2/8/84	6.8	260	50	"	Duplicate samples
021	21	2/7/84	7.1	260	64	"	
022	22	2/7/84	7.0	250	64	"	
023	23	2/7/84	5.5	190	60	"	
024	24	2/9/84	6.5	275	64	"	Air in discharge
025	25	2/7/84	6.9	270	60	"	Air in discharge
026	26	2/7/84	5.9	250	60	"	Duplicate samples
027	27	2/7/84	6.5	220	66	"	
028	28	OUT OF SERVICE					

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CALC. NO. ____

SIGNATURE W. M. Little DATE 3/6/84 CHECKED ____ DATE ____

PROJECT Tinker Air Force Base, IRP Phase IIB JOB NO. 212-027-04

SUBJECT Sample Log - Well 18 Test Pump SHEET ____ OF ____ SHEETS

Sample Number	Sample Type	Location	Date	Sampler	Comment	
					Time after pump on - 0806 hrs	
T6-001	Groundwater	Well 18	5 Mar 84	WML	10 mins.	0816
2	"	"	"		20	0826
3	"	"	"	"	30	0836
4	"	"	"	"	45	0851
5	"	"	"	"	1:00 hr	0906
5	"	"	"	"	1:15	0921
7	"	"	"	"	1:35	0941
8	"	"	"	"	2:00	1006
9	"	"	"	"	2:30	1036
10	"	"	"	"	3:00	1106
11	"	"	"	"	3:35	1140
12	"	"	"	"	4:15	1220
13	"	"	"	"	5:00	1305
14	"	"	"	"	6:00	1405
15	"	"	"	"	7:00	1505
16	"	"	"	"	8:10	1615
17	"	"	"	"	9:35	1740
18	"	"	"	"	11:00	1905
19	"	"	"	"	13:00	2105
20	"	"	"	"	16:00	2400
21	"	"	"	"	7:00 (625 sample)	
T6-022	"	"	5 Mar 84	"	Trip Blanks	

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DEPARTMENT OF THE AIR FORCE
USAF HOSPITAL, TINKER (AFLC)
TINKER AIR FORCE BASE, OKLAHOMA 73145

29 MAR 1984

REPLY TO
ATTN OF: SGB

SUBJECT: Monitoring Well Elevations

TO: Radian Corporation
P.O.Box 9948
Austin,TX 78766
Attn: William Little

1. Well elevations measured by 2854 CES in support of Phase II of Tinker AFB Installation Restoration Program are provided per your request:

Well	Elevation(ft)
1	1219.16
2	1222.09
3	1223.37
4	1225.10
5	1227.78
6	1243.63
7	1247.63
11	1241.82
1A	1223.09
1B	1256.03
1C	1242.49

2. Well head or floor elevations are enclosed as attachment one for the base's drinking water wells.

3. If this is insufficient data please feel free to contact me at (405-734-7844).

DARREL R. CORNELL, Capt, USAF, BSC
Bioenvironmental Engineering Div

1 Attachment
Water Level Data

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APPENDIX F

Sampling and Analytical Procedures

Field Procedures

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QUALITY ASSURANCE

The bulk of the field sampling procedures were presented in Section 3.0 of the report. The purpose of this Appendix Section is to describe the quality control and quality assurance aspects of the field program.

Many of the traditional quality assurance techniques (duplicate or spiked samples, for instance) are designed to test instrument or analyst performance and do not address the needs of a field program of monitoring well installation. In lieu of such techniques, field practices are built around a principal of "do it right the first time", and procedures are developed to insure this. The three main elements of the field QA program are:

- Record-keeping;
- Peer review; and
- Technical staff management review.

Eash is discussed below.

Record-Keeping

Each supervising geologist kept field notes as the coring and well installation activities progressed. In addition, the drilling subcontractor's team chief also kept field notes. These two sets of notes were compared to develop the logs of drilling activities shown in Appendix D. Discrepancies were resolved by reference to the geologic samples collected.

Ground-water samples were collected in accordance with a written list. The servicing laboratory prepared sample containers and provided them to the field team, who were working from the same list. After the samples were logged into the laboratory, the log-in sheets were compared against the original analytical schedule. All samples were shipped or hand-carried to the laboratory, accompanied by chain-of-custody forms (Appendix G).

Peer Review

Each of the supervising geologists served overlapping tours of duty in the field. This provided all with the opportunity to participate in broad portions of the study, rather than focusing on a single zone. Each person overlapped with his successor to insure a smooth transition. Once the field effort was concluded, the supervising geologists were assigned to write up separate zones. These writing assignments provided for close coordination with other members of the field team, so that observations during drilling and sampling were incorporated into the text. After the drilling logs and report text were prepared, they were reviewed for completeness and accuracy by other members of the field team. Thus, each portion of the report was subjected to peer review before entering the formal review process.

Technical Staff Management Review

After the complete report was finalized by the Project Director, it was formally reviewed by a senior member of Radian's technical staff management. This review focused on quality of presentation and soundness of discussion and recommendations.

FIELD EQUIPMENT CALIBRATION

This program utilized very little in the way of field instrumentation. The four items of equipment were:

- pH meter (Corning Model 610A with a combination electrode), standardized daily against pH 7.00 and 10.00 or 4.00 buffers.

- Conductivity meter (YSI Model 33), calibrated before deployment against an 800 μmho standard and daily internal calibration check ("red line"):

- Water level probe (Soiltest Model 762A), no calibration required; and

- Threshold Limit Value Detector - "TLV meter" (Bacharach Model 23-7231), zeroed with organic-free air and spanned with hexane standards. Not used for emissions level data determinations, but only for field drilling safety.

Laboratory Quality Assurance Program

Quality Assurance/Quality Control Program for Radian Analytical Services

THE QUALITY ASSURANCE/QUALITY CONTROL PROGRAM FOR RADIAN ANALYTICAL SERVICES

Radian Analytical Services' (RAS) objective is to provide high quality chemical analyses to all clients regardless of the size of the analytical task. To aid in achieving this goal, a strong quality assurance program and rigid quality control practices are integral parts of all analyses. This document describes these quality assurance/quality control protocols for the Radian Analytical Services laboratories.

The basic quality control program includes procedures for sample handling, calibration, spiking and replicate analyses, analysis of QC test samples, equipment maintenance, and supplies control. These procedures can be integrated with a client's additional requirements, such as spiking studies, analysis of replicate samples, linearity determinations, and stability studies.

The quality assurance program consists of the frequent submission of blind QA samples, duplicates, and spiked sample splits. Also included are personnel training, analytical methodologies, sample control procedures, data handling, and equipment maintenance and calibrations.

1.0 QA Organization/Policy

The objective of Radian's quality assurance/quality control program is to assure, assess, and document the precision, accuracy, and adequacy of data obtained from chemical analysis and to assure the technical accuracy of the results obtained for all samples.

Radian has organized the quality assurance function within the company to allow complete independence of program review. Radian's Quality Assurance Director reports directly to the Vice President of the Technical Staff. This position provides independent reviews at all levels of the technical staff and laboratory organization and allows immediate access to Radian's top management on QA-related matters.

The QA Director's involvement may be limited to a review of quality control practices or as extensive as active development and implementation of quality control procedures and statistical data analysis. The QA Director may be asked to contribute expertise and assistance when a need is perceived by either the client, the technical staff, or the management staff.

Because of the large number of samples analyzed by RAS, a QA coordinator has been assigned to monitor and maintain an effective QA/QC program for these laboratories. The RAS Quality Assurance Coordinator, directly responsible to the Corporate QA Director, serves as an independent auditor of all RAS laboratories. The responsibilities of the RAS QA Coordinator are as follows:

- Monitor QA/QC within RAS laboratories,

- Supervise the preparation of blind audit samples,

- inform the Director of RAS and the corporate QA Director of quality assurance problems,
- summarize and report QA activities in the laboratories,
- document all QA and QC procedures within RAS,
- act as liaison between the corporate QA Director and RAS,
- provide QA data to the corporate QA Director for inclusion in the corporate QA reports.

The RAS laboratory managers function as the quality control coordinators in each particular analytical area. Their efforts are coordinated and monitored by the QA Coordinator.

Quality control coordinators serve as a focal point for all QC activities pertaining to each RAS laboratory. They work as a committee coordinated by the RAS Quality Assurance Coordinator. Their activities include the following:

- monitor the QA/QC activities of the laboratory area,
- inform the Director of Analytical Services and the QA coordinator of QC problems and needs.
- summarize, document, and report quality control activities and data generated in the laboratory,

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- provide documentation of all QC procedures in the laboratory,

- maintains summaries of QC activities and data in a form suitable for client review upon request.

2.0 Quality Control for Laboratory Analyses

Radian Analytical Services has developed and implemented quality control procedures for all of the analyses performed in the laboratory. The laboratory quality control program provides an effective and efficient laboratory protocol for QC regardless of the size or scope of the analytical requirements. Approved analytical methods are used whenever available. When approved methods are not available, a method is developed by the Radian technical staff, and a technical note written describing the method. The quality control procedures are designed to insure that the standard operating procedures and quality control protocols are being followed and accurate results are obtained.

The general quality control program utilized in each laboratory includes consideration of the following areas:

- personnel training and certification,
- analytical methodology documentation,
- sample handling and control,
- laboratory facilities and equipment,
- calibration and standards,
- data handling and documentation,
- quality control check samples,

The general approach to quality control in each of these areas is discussed in the remainder of this section.

2.1 Personnel Training and Certification

The successful implementation of any QA/QC program is determined by the training and dedication of the laboratory personnel. The quality and consistency of data should be independent of the analyst. With the proper training and supervision, an analyst will be able to obtain quality data by the use of proven methodology. Periodic assessment of training requirements and certification are performed to maintain a high level of laboratory awareness.

The training and certification methods employed in the RAS laboratories are briefly described below:

- study of laboratory standard operating procedures,
- study of QA manual,
- observation of experienced operators/analysts,
- study of operating manuals,
- instruction by the laboratory manager on all aspects of the analysis,
- perform the analysis under the direct supervision of the laboratory manager,
- perform analysis under supervision of experienced personnel,
- analysis of blind QC samples prepared by laboratory QC coordinator,
- participation in in-house seminars on laboratory methods and procedures.

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PERSONNEL TRAINING RECORD

Employee ____________________

Employee Number ____________________

Date of Employment ____________________

Laboratory Orientation:

Upon completion of each phase of personnel training the employee and Laboratory Manager will initial and date the step completed.

- The RAS laboratory Standard Operating Procedures have been read and understood.

  Employee ______ Lab Mgr. ______ Date ______

- The RAS Quality Assurance manual has been read and the procedures for the laboratory in which the employee worker have been explained.

  Employee ______ Lab Mgr. ______ Date ______

- Operation manuals for instruments with which the employee performs analyses have been studied and the procedures for operation and maintenance are understood.

Instrument	Employee	Lab Mgr.	Date	Instrument	Employee	Lab Mgr.	Date

Figure 2-1.

Test Specific Training:

Each specific test performed in the RAS laboratories involves procedures which may be unique. The steps involved in training an employee are:

- Instruction by the Laboratory Manager on all aspects of the analysis,
- Observation of experienced operators/analysts,
- Perform the analysis under supervision of the laboratory manager,
- Perform analysis of QA samples submitted by the QA coordinator, and
- Participation in in-house seminars on laboratory methods and procedures.

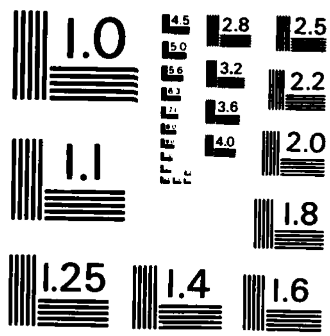
The following table is to be completed by dating and initialing by the employee and Laboratory Manager upon completion of each step.

Method	Instruction	Observation	Perform the Analysis	Analysis of QA samples	Seminars

Figure 2-1. (Cont'd)

AD-A160 094 INSTALLATION RESTORATION PROGRAM PHASE II CONFIRMATION/QUANTIFICATION STA..(U) RADIAN CORP AUSTIN TX D A SANDERS ET AL. SEP 85 2/6

UNCLASSIFIED RAD-DCN-84-212-027-04-02-VOL-2 F/G 13/2 NL


1.0
4.5
5.0
5.6
6.3
2.8
3.2
3.6
4.0
2.5
2.2
2.0
1.1
1.8
1.25
1.4
1.6

All RAS personnel must complete a quality control training program. This system includes motivation toward producing data of acceptable quality and involves "practice work" by new employees. New personnel are made aware of the quality standards established by RAS and the reasons for those standards. They are made aware of the various ways of achieving and maintaining quality data. After an employee has been trained to use a method and the work validated by the laboratory manager, the employee is certified to perform the analysis. As these people progress to higher degrees of proficiency, their accomplishments are reviewed and then documented. Documentation of proficiency training is maintained by the QC Coordinator for each laboratory technician using the two-page form shown in Figure 2-1.

2.2 Analytical Methodologies

All analytical procedures followed in the RAS laboratories are documented in a methods manual for the specific laboratory. A set of standard operating procedures (SOP) has been established for each analysis to insure consistency. Most methods used are directly from an approved analytical manual, e.g., EPA methods, APHA Standard Methods for Water and Wastewater, ASTM, etc.

Methodologies may contain the following information:

- method title,
- scope of method,
- summary of interferences, and applications,
- concentration ranges and detection limits,
- safety precautions,
- required equipment and materials,
- standardization directions,
- detailed analytical procedure,
- calculations, with examples,
- reporting method,
- precision and accuracy statement,
- references.

2.3 Sample Control and Record Keeping

The Radian Analytical Services Sample Control Center is a controlled access area. Only employees of the Sample Control Center have access to sample receiving, sample storage, documentation files, and the computer terminals. Analysts check out samples under the supervision of the sample control personnel. All samples are stored in locked storage areas. Sample tracking is maintained by a computerized laboratory management system and a sample checkout logbook. The RAS Sacramento laboratory is linked to the central processing unit of the computer in Austin via a dedicated phone line. This insures that the laboratories are in constant communication. All sample information and data entries can be immediately accessed at either location.

Detailed record keeping and control of samples are essential for effective laboratory operation. All samples received for analysis in the Radian Analytical Service laboratories are processed through the Sample and Analysis Management System (SAM). Radian Corporation's SAM is a software and hardware system for controlling and handling information for the analytical laboratory. SAM provides a dynamic, easy-to-use method for tracking, scheduling, reporting, and laboratory management. The system has been designed to accommodate and promote good laboratory management practices by providing high visibility of the information laboratory managers need to make good decisions regarding schedules and priority. The system is designed around a Data General Nova-IV computer with a 64K-byte memory. It also includes a 65M-byte disk drive and a line printer with plotting capabilities. Data is entered via a TEC terminal and CRT. All data stored on the disk is backed up on magnetic tape to prevent loss in the event of a system malfunction. The system is designed so that an individual designated as the principal operator can process the required paperwork for a large laboratory with little difficulty. The approach centralizes information input and data retrieval, and provides the mechanism for organized, up-to-date laboratory performance monitoring.

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SAM maintains complete client information files, generates laboratory status reports, flags sample analyses which are overdue, accepts analysis results manually or automatically, and generates reports and invoices.

The Sample Control Center and SAM have six basic functions:

- sample receipts and logging,
- sample storage and maintenance of sample integrity,
- laboratory status reporting,
- document control,
- data compilation and reporting, and
- invoicing.

In order to assure the integrity of a sample and the accompanying documentation, a security plan has been established. This plan consists of three parts:

- chain of custody,
- secured refrigerated storage, and
- document control.

The progression of samples and documentation through the Sample Control Center and the analytical laboratories is presented in Figure 2-2. Detailed descriptions of each sample control function are presented below:

- Samples are received from the commercial carrier at Radian's shipping and receiving facilities by the receiving clerk.

- Within one hour of arrival, the samples are accepted by RAS sample control personnel.

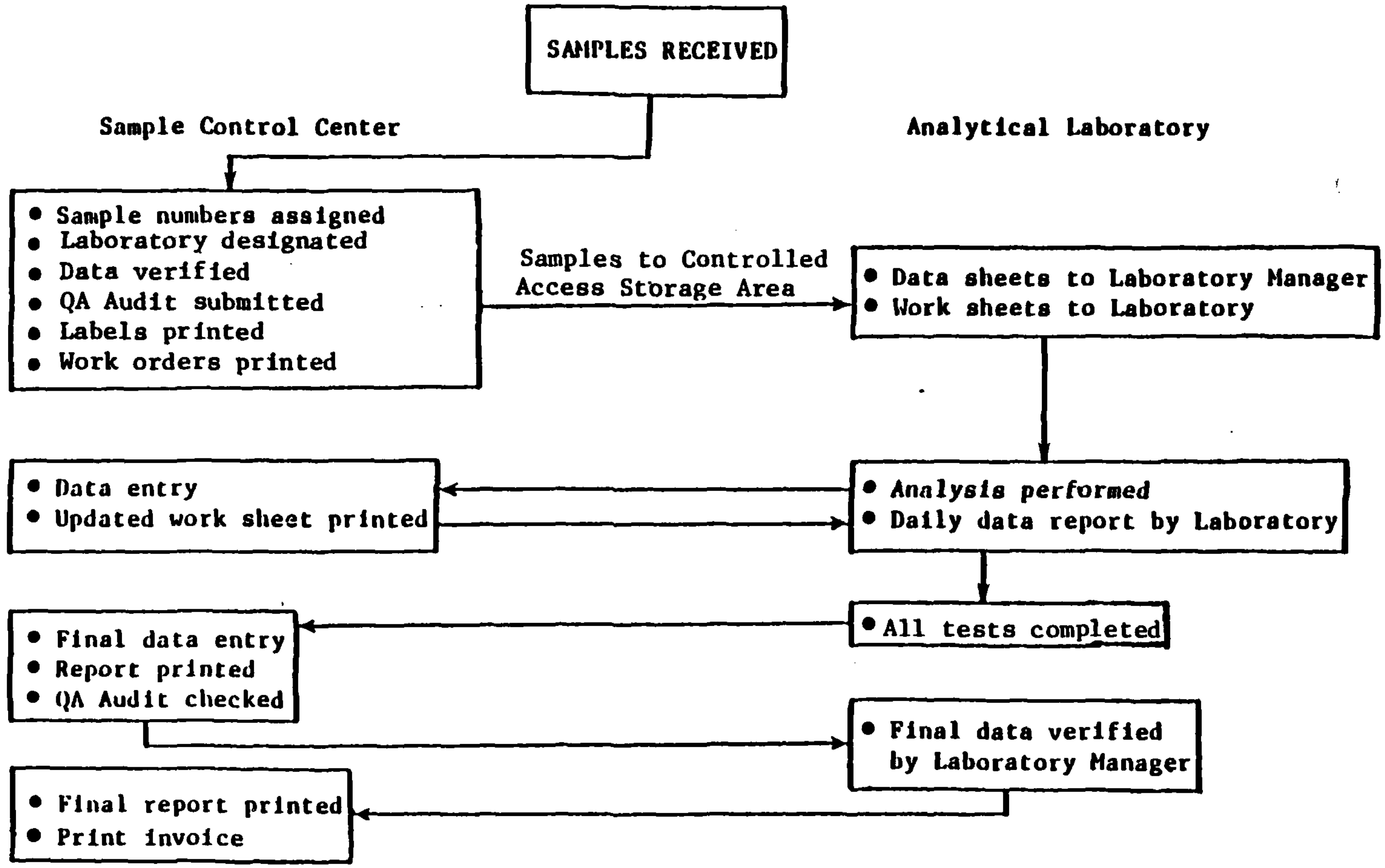

Figure 2-2. SAM Laboratory Management System

- All shipping containers and security seals, when appropriate, are inspected for physical damage or evidence of tampering.

- The samples are unpacked in the sample receiving area by the RAS sample custodian. The method of shipment, shipping container integrity, condition of samples, the number of samples/container, integrity of the security seal, and accompanying documentation are noted. Sample identification is verified against custody documents. The enclosed chain-of-custody forms, Figure 2-3, when required, are completed and filed with the shipping and receiving documentation. In the event that peculiarities are noted, the project officer or client is immediately advised of the irregularity.

- Samples are logged into a bound sample logbook, Figure 2-4. Again, sample identity is verified. All discrepancies are noted in the logbook.

- The handwritten logbook and all documentation are transferred to the Sample Control Center.

- The samples are logged into the SAM system. Each batch of samples is assigned a consecutive work order number by the system. Analytical requirements for each sample are entered into the computer.

- Hard copy of the work order and other information is printed and filed with the received documentation in the Sample Control Center.

- Labels are printed and secured to each sample. Label information includes sample number, identification, storage location, and analytical requirements.

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CHAIN OF CUSTODY RECORD

Field Sample No. ____________

Company Sampled/Address ____________
Sample Point Description ____________

Stream Characteristics:
Temperature ____________ Flow ____________ pH ____________
Visual Observations/Comments ____________

____

Collector's Name ____________ Date/Time Sampled ____________
Amount of Sample Collected ____________
Sample Description ____________
Store at: ☐ Ambient ☐ 5°C ☐ −10°C ☐ Other ____________

☐ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards ____________

____

____

☐ Hazardous sample (see below) ☐ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive

☐ Other ____________

Sample Allocation/Chain of Possession:
Organization Name ____________
Received By ____________ Date Received ____________ Time ____________
Transported By ____________ Lab Sample No. ____________
Comments ____________
Inclusive Dates of Possession ____________

Organization Name ____________
Received By ____________ Date Received ____________ Time ____________
Transported By ____________ Lab Sample No. ____________
Comments ____________
Inclusive Dates of Possession ____________

Organization Name ____________
Received By ____________ Date Received ____________ Time ____________
Transported By ____________ Lab Sample No. ____________
Comments ____________
Inclusive Dates of Possession ____________

Figure 2-3. Chain or Custody Record

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Lab No. ________

Company ________
Facility ________
____
Rep ________
Phone ________
Report ________
to ________
____
____
Attn ________
Inv ________
to ________
____
____
Attn ________
P.O. # ________
Expires ________

Quoted $ ________
Sample $ ________
Misc $ ________
Total $ ________
Inv by (CPR) ________
% Surcharge ________
% Disc: All ________

Contact ________
Received ________
Date Due ________
Samples ________
Keep for ________
Keep til ________
Disp (RD) ________

Reports ________ # Invoices ________

Work ID ________
Taken ________
Trans ________
Type ________
Condition ________
Comments:

Location: ________

Dash No.	Sample Description	Analysis Required	QA

Figure 2-4. Sample Log Sheet

- Data sheets and work sheets are printed for each batch of samples and distributed to the appropriate laboratory managers. The work sheets list sample numbers, sample identification, storage location, and analytical requirements. Data sheets are for results and contain only the parameters to be determined by a given laboratory.

- Following sample logging, the samples are placed in the designated locked storage area.

- Subsequent sample custody is documented and all transactions witnessed by sample control personnel.

- The analyst retrieves the samples from the Sample Control Center by sample number and storage location.

- The Sample checkout log (Figure 2-5) is completed by the analyst, noting the laboratory to which the sample is being removed.

- After analysis, or when the required aliquot is removed, the sample is returned to the Sample Control Center and return is noted in the sample checkout log.

- The sample is returned to the designated storage location.

- When requested, addition chain-of-custody documentation can be provided using a SAM-generated document (Figure 2-6). This document can be retained by sample control to provide a more easily retrievable record of sample custody within the analytical laboratory.

- The sample is stored until the assigned time or written permission is given to either properly dispose of or return the sample to the client.

RAS SAMPLE CHECK OUT LOG

WORK ORDER	SPLITS REMOVED	CHECK-OUT INFORMATION				RETURN INFORMATION		
		DATE	TIME	DESTINATION	INITIALS	DATE	TIME	INITIALS

7S/196 (Water and Prep. Labs)

7S/194 (Extraction & Water Labs

7S/180 (ICP and AA Labs)

7S/191 (TOX, TCC)

7S/195 (Technician)

7S/171 (GC)

Figure 2-5. Sample Checkout Log

RADIAN

PAGE 1 Analytical Serv CHAIN OF CUSTODY LAB # 83-02-A67
RCVD: 02/26/83 DUE: 03/19/83 04/21/83 09:56:49 KEEP: 05/09/83 DISP: D

DASH	SAMPLE IDENTIFICATION	LOCATION	TESTS						
01A-B	Number 001	Ref 2	CAUSTY	CO3_A	HARD_B	HCO3_A	MHO_A	ONG_A	PH_A
			PO4_B	SO3_TA	TANNIN				
02A	Number 002	Ref 2	ACFS						
02B	Number 002	Ref 2	ICP_40						
03A	Super soil	Ref 2	ANFS						
04A	Boiler scale 222	Ref 2	CA_E	CL_TA	CO3_A	FE_E	HCO3_A	MG_E	NA_E
			P_E	SO4_NA	S_E	ZN_E			
05A	Sample AV56	Shelf 13	B_MET	C_MET					
06A	Water #164	Ref. 023	AG_E	AS_HA	BA_E	CD_E	CR_E	FE_E	HG_CA
			MN_E	NA_E	PB_GA	SE_HA			
06B	Water #164	Ref. 023	CL_TA	F_SIEA	MHO_A	NO3_A	PH_A	SO4_NA	TDS_A
06C	Water #164	Ref. 023	H1RCRA	P1RCRA					
06D	Water #164	Ref. 023	ALPHA	BETA	RA_TOT				

RECEIVED BY	DATE	RETURNED TO	DATE	FRACTION NUMBERS.

Figure 2-6. Laboratory Chain of Custody

- All documentation, including shipping documents, field sampling documents, computer-generated log sheets, chain-of-custody forms, laboratory data sheets, final computer reports, and other documents, are maintained in the sample control area. All reports are kept in locked filing cabinets. As with the sample storage area, the document storage area is limited-access.

All storage areas are within the Sample Control Center and are locked when not in use. Access to the storage area is limited to sample control personnel or other RAS employees accompanied by sample control personnel. There are four storage locations that are used depending on the sample and the required analyses. They are:

- ambient storage for samples that do not require refrigeration,
- $4^{\circ}C$ storage for most samples requiring water quality analysis and extractable organics,
- $4^{\circ}C$ storage for samples requiring volatile organic analysis, and
- $-20^{\circ}C$ storage for extracts and samples that require freezing.

A temperature log is maintained to monitor the cold storage facilities.

2.4 Laboratory Facilities and Equipment

A clean well-lighted, and well maintained laboratory is essential for accurate analytical results. Each laboratory is well-lighted, air conditioned and equipped with chemical fume hoods. Instrumentation that may emit noxious odors is vented externally.

Quality Control of Equipment and Supplies

Each laboratory QC program includes detailed requirements for equipment and supplies. Reagents, solvents, and standards with specific levels of purity are used as specified by the analytical protocol. Specific GC column materials, glassware and sample handling equipment are also specified. The quality control procedures for equipment and supplies generally include the following items:

- operator checklists for required supplies,
- documentation and reporting of all deviations from specified instrument performance,
- procedures for testing for purity of reagents,
- tolerances for calibrated glassware where applicable,
- monitoring of refrigerated storage space,
- maintenance logbooks,
- service contracts on analytical instrumentation.

Quality control procedures during sample preparation include the preparation of reagent or solvent blanks. Additional quality control techniques implemented in sample preparation include:

- deionized water piped into all laboratories, monitored daily,
- purchasing high purity distilled-in-glass solvents in large quantities from a single lot,

- use of Ultrex acids in trace metal digestion,

- cleaning of organic glassware with chromic acid or firing in a kiln at 450°C,

- cleaning of trace metal glassware with nitric acid,

- use of organic-free water prepared at Radian by distillation over alkaline permanganate under nitrogen atomsphere in all-glass still,

- use of volatile-free water prepared by purging organic-free water with nitrogen,

- sample preparation performed by experienced technical personnel under the supervision of senior level analysts.

2.5 Quality Control for Standards and Calibration

The quality of all test results is greatly impacted by the calibration procedures used. Calibration procedures and standards should be specified for all equipment and supplies used in the test procedure. Traceability to common standards is essential for test procedures to be used in multiple laboratories. Quality control procedures for standards and calibrations include the following considerations:

- written, detailed calibration instructions,

- preparation procedures for secondary standards, when applicable,

- requirements for frequency of calibration,

- recordkeeping of all calibrations and standards used,

- quality control charts for recording results from multiple calibrations,
- evaluation of internal standards, and
- tolerances for calibration requirements.

All calibration standards are prepared from NBS-traceable, EPA certified, or primary standard materials. Daily logs are maintained to monitor instrument response to a given standard.

Quality Control Test Samples

Routine quality control samples to be analyzed concurrently with client samples are a significant portion of the RAS laboratory quality control programs. The purpose of these checks is twofold: 1) to assure that samples being analyzed satisfy predetermined standards of accuracy, and 2) to measure and document achieved levels of accuracy and precision.

There are many different types of quality control samples which could be used for these purposes. The correct combination of these will depend on the complexity of the test method and the desired degree of accuracy. The following quality control parameters are general considerations for Radian's quality control for test methods.

Interferences

The analytical results of a test method might be affected by interferences from the glassware, solvents, reagents, or the sample matrix. Blank samples which are subjected to conditions similar to samples being analyzed are used to evaluate the purity of laboratory reagents. The frequency of blank analysis is method dependent. For example, a laboratory or field blank is analyzed after each GC/MS volatile organic analysis with high levels for any of the pollutants. Ten percent of the samples from a given sample batch are spiked with a known standard. Spike recovery data are calculated to determine matrix interference.

Precision

The precision or repeatability of a test method is required for proper interpretation and weighting of the data. Replicate samples or standards are used to determine the precision on a regular basis. The precision of multiple analyses are compared against predetermined precision limits to determine their acceptability. The precision is usually reported as a standard deviation or repeatability statistic and often depends on the concentration of the parameters analyzed. Replicate analyses are defined as separate digestions or extractions of the same sample, when possible. The percentage difference or range between replicate analyses is also used to monitor precision.

Reproducibility

The reproducibility of a test method refers to the repeatability over a period of time. How well will analytical results repeated a month later agree with today's results? Reproducibility can be measured by the repeated analysis of samples from a previous time period or by analysis by more than one laboratory or laboratory technician.

Qualitative Specificity

In the analysis of complex sample matrices containing multiple components, the use of a single method can lead to misidentification of compounds. The misidentification can be detected by repeated analysis of standards containing the compounds of interest or by independent analysis by a more specific method. For example, mass spectral confirmation can be used to evaluate misidentification problems in the GC laboratory.

2.6 Documentation and Data Handling

Documentation of methods, procedures, and results is an essential aspect of a QA/QC program.

Adequate documentation is required for an instrument maintenance system. RAS laboratories use an individual logbook, which is kept at each instrument, to record all calibration and maintenance activities. This logbook gives a chronology of that instrument's installation, operation, calibrations, maintenance, malfunction, and repairs. An accompanying binder includes all pertinent manufacturing information, service manuals, and similar reference materials.

Directions for calibrations and maintenance, along with appropriate forms and checklists, are maintained in a manual accompanying the logbook. The directions specify the required frequency for calibrations and maintenance, the tolerances for calibrations, and the action to be taken when calibration requirements are not met.

In this system, there is a single source for reference purposes as well as record keeping. All the instrument logbooks are reviewed periodically by the quality assurance coordinator and laboratory manager. A record of these logbook checks is maintained by the QA coordinator.

Work sheets have been developed to insure consistent laboratory data entry for most parameters determined in the laboratories. These sheets are designed to organize the data in a clear and logical manner, and to simplify calculations. The work sheets are divided into various sections including a section for reporting calibration standards and blank values and a section for plotting calibration curves. These work sheets are usually a standard data entry form which the laboratory technician enters in his/her bound lab notebook. When automated calibration is not applicable, electronic calculators are available in the laboratories to generate calibration curves by the method of least squates. Thus errors in reading calibration curves and calculating data are minimized. After an analysis is completed and a data sheet filled out, the laboratory manager checks the data for completeness and approves the data sheet. After the data have been entered into the SAM system, an updated data sheet is issued to the laboratory manager. When the work is complete, a preliminary report is printed and distributed to the contributing laboratory managers for the final data check and approval. A final report is printed, certified by the laboratory manager, and forwarded to the client.

Proper documentation of quality assurance and quality control activities is an essential requirement. Documentation is needed to demonstrate that quality control activities were completed as scheduled and to communicate the results of the QC tests to laboratory managers and clients. Documentation of QA results is required to provide feedback for improvement of quality control programs.

Quality control documentation should be timely in order for feedback to occur. Daily reporting to laboratory managers is mandatory. Forms are designed to organize the QC data in a clear and logical manner, and to simplify calculations. Control charts are another excellent tool for summarizing quality control test results.

As part of Radian's QA audit program weekly reports summarizing audit results in the laboratories are prepared and distributed to QC coordinators.

3.0 Quality Assurance Audits

The quality assurance audit program of the RAS laboratories is conducted by the RAS QA Coordinator in conjunction with the corporate QA Director. The program consists of the following:

- QA standards are prepared using EPA certified standards, NBS standards, primary standard materials, and NBS-traceable compounds. All standards preparations are recorded in the QA Sample logbook (Figure 3-1).

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Standard No. QAS ____________

QA type ________________________

Prep date ____________ Prepared by _______________ Verified by ____________

Standard source ____

____

Sample matrix ____

Parameters

Preparation method   Final vol ____________

Figure 3-1. Standards preparation logbook

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QAS ____________

Prep method (con't)

Calculations

Sample Distribution

Date	SAM No.	Client	Remarks

Figure 3-1. (Cont.)

- An inventory of stock standards is maintained within the limits of published stability data. This decreases the time required for daily standard preparation.

- Duplicate samples are requested from clients. These are blind to the laboratory and the client is not billed for the duplicate.

- Blind QA samples are submitted through the Sample Control Center to all laboratories. The parameters and concentration levels are selected by the RAS Quality Assurance Coordinator.

- Laboratory managers submit, via a "QA Alert Form" (Figure 3-2). a list of the types of QA samples needed the following week. This insures that the parameters with which there have been problems are included in the sample.

- Monthly reports are issued from the RAS QA Coordinator (Fig. 3-3). These are submitted to the corporate QA Director, laboratory managers and Director of RAS. Managers are notified immediately of major problems with the results of analysis of a QA sample.

- The results of the program are summarized on a quarterly basis for Radian's management.

In addition to the continuous audit program, provisions for third party review are made with each client's work. Radian Analytical Services welcomes onsite audits, performance samples, and independent evaluations.

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QA ALERT FORM

QA standard for the week of______________

NPDES
Form A water __
Form B water __
metals __
Form C water __
metals __
organics __

TOC __ TOX __

RCRA metals __ pesticide
anions __ OC __ OP __
herbicide __

EPA 601 __ 624 __
602 __ 625 __

B/N __ Acids __ A/N __

MS VOA __ GC VOA __

PCB __

Matrix requirements: ______________________________

Concentration requirements: ______________________________

Special Standards/Instructions	Individual Parameters

Date ______________ Mgr ______________________

Figure 3-2. QA alert form

ANALYTICAL SERVICES
MONTHLY QA REPORT

QA prep report for the month of ______________

Order No.	Lab	Parameter	Certified Value	Analyzed Value	% Recovery	Date Reported

Figure 3-3. Monthly QA Report

3.1 Data Review and Validation

All analysis results are entered into the SAM computer system. Following completion of the analyses, a preliminary report is printed and returned to the appropriate laboratory manager for review and validation. A final report is printed after the certification by the manager. This report is signed and approved by the laboratory manager before being forwarded to the client. The following diagram (Fig. 3-4) illustrates the data flow for a typical sample analysis.

Upon completion of the analysis and before the final data are issued, the results of the QA audit samples are compared to the certified values. These results are plotted on control charts. Separate control charts are maintained for each analysis. If results are outside the accepted control limits, the analytical results are held until the problem is resolved.

3.2 Control Charts

Quality control charts are maintained for both accuracy and precision. Both charts are structured as shown in Figure 3-5. The main portions of the chart are the center line and the two control limits. The center line is the 100% or total recovery/total agreement of analytical results. The upper and lower control limits are calculated from historical data.

Control charts for accuracy are constructed as follows:

Precent recovery of standards (P_{ST}):

$$P_{ST} = 100 \times \frac{\text{analyzed value}}{\text{certified value}}$$

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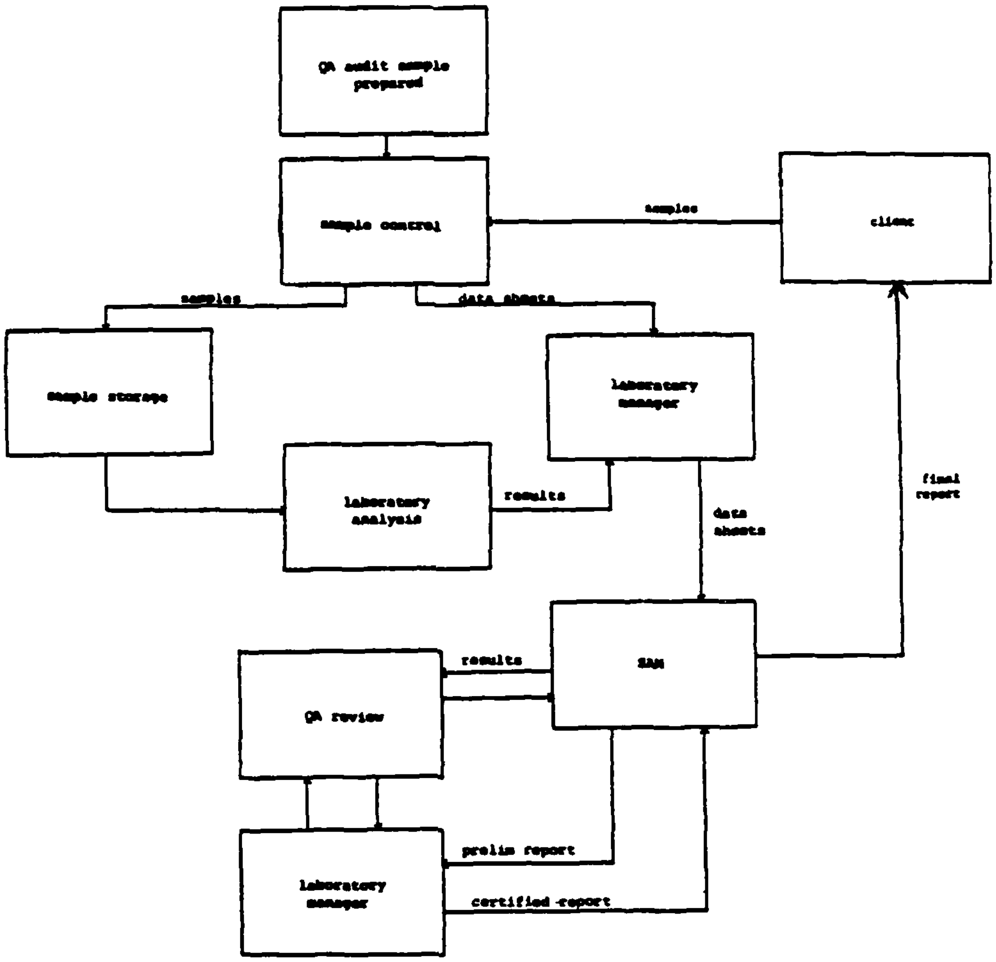

Figure 3-4. Data Flow

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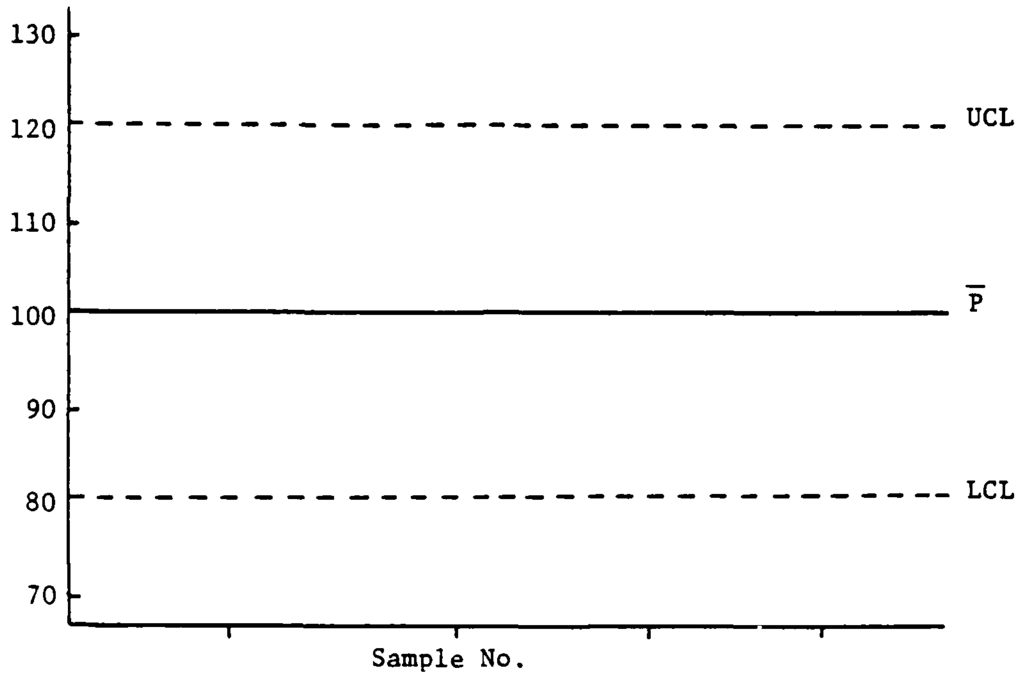

Figure 3-5. Control Chart

Percent recovery of spikes in samples (P_{SP}):

$$P_{SP} = 100 \times \frac{\text{analyzed value - background value}}{\text{spike}}$$

From a set of analyses, the average percent recovery ($\overline{P}$):

$$\overline{P} = \frac{\sum_{i=1}^{n} P_i}{n}$$

The standard deviation for percent recovery (S_R):

$$S_R = \sqrt{\frac{\sum_{i=1}^{n} P_i^2 - \left(\sum_{i=1}^{n} P_i\right)^2 \Big/ n}{n-1}}$$

The upper and lower control limits are therefore

$$UCL = \overline{P} + 3S_R$$
$$LCL = \overline{P} - 3S_R$$

An analysis is out of control when either of the two conditions apply:

1) Any results outside the control limits
2) Seven successive results on the same side of the control line.

Control charts for precision are also constructed. Precision is a function of the concentration range of the analyte. The closer the result is to the analytical detection limit, the more imprecise the data become on a percentage scale. Figure 3-6 illustrates the relationship between detection limit and precision for a typical methodology. Because of this concentration dependence, precision control charts need to be developed for specific concentration ranges for each analyte. For duplicate samples A and B, the ratio of the values of A and B are plotted.

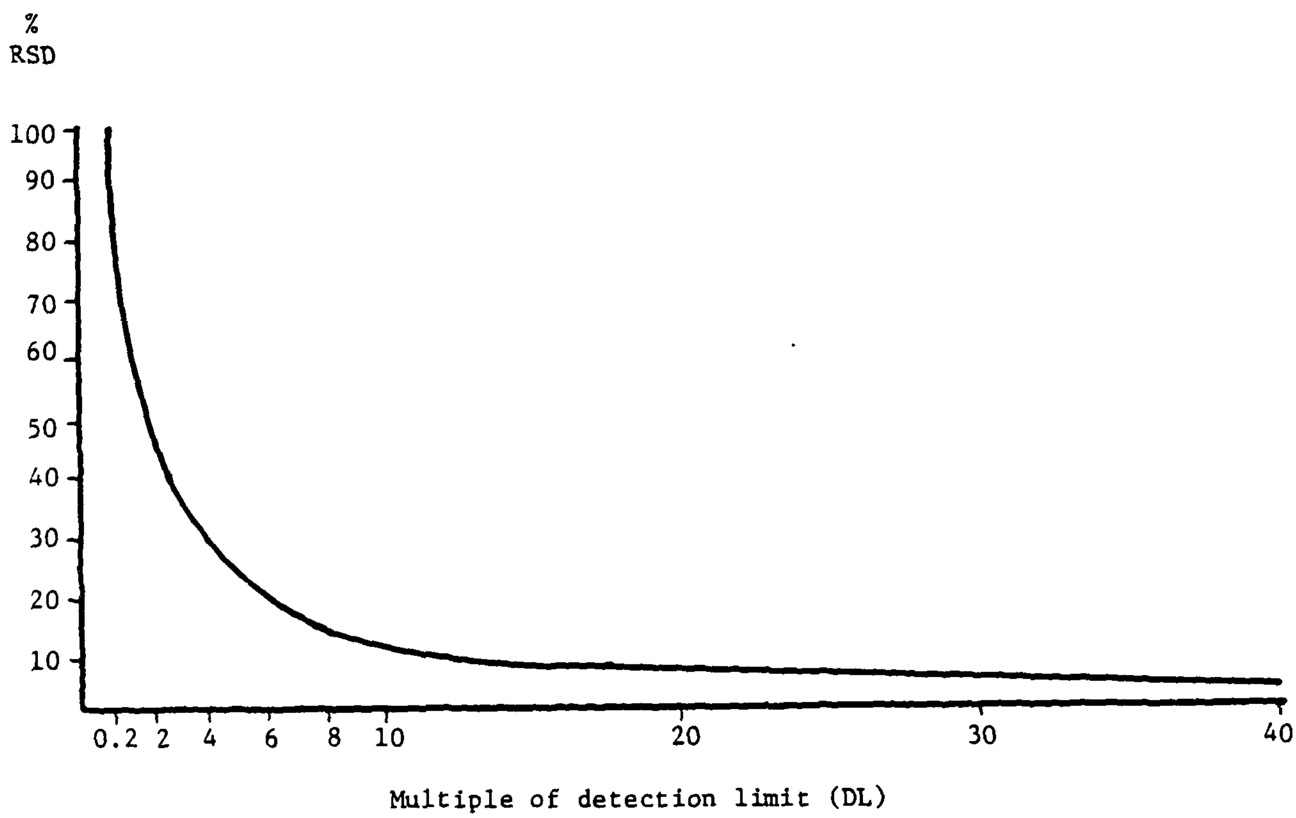

Figure 3-6. Relationship between Detection Limit and Precision

3.3 Concurrent Review

Upon review of analytical results of QA audit samples, the QA Coordinator will schedule a meeting with the laboratory manager if there are any tests out of control or which are deviant from an expected precision/accuracy norm. The purpose of this meeting is to:

- review raw data and determine if there is an explanation for the deviance.
- outline analyses of quality control and/or quality assurance samples to further define the problem and its solution.
- establish a schedule for monitoring the analysis after a solution is implemented, to assure that the problem does not recur.

Involvement of the laboratory manager in the problem assessment and solution is essential to a mutual committment to a quality analytical laboratory.

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APPENDIX G

Chain of Custody Forms

RADIAN CORPORATION

CHAIN OF CUSTODY RECORD

FIELD SAMPLE NO. Sheet 1

COMPANY SAMPLED/ADDRESS Tinker AFB, Oklahoma

SAMPLE POINT DESCRIPTION ZONE-3 test holes

STREAM CHARACTERISTICS:

TEMPERATURE — FLOW — pH —

VISUAL OBSERVATIONS/COMMENTS Several Samples have Odor.

COLLECTOR'S NAME RICK BELAN DATE/TIME SAMPLED 11/21/83 + 11/22/83

AMOUNT OF SAMPLE COLLECTED 7 QRT Jars

SAMPLE DESCRIPTION Soil and Waste (?) SAMPLES

STORE AT: ☐ AMBIENT ☐ 5°C ☒ -10°C ☐ OTHER

☐ CAUTION - NO MORE SAMPLE AVAILABLE ☐ RETURN ALL PORTIONS ☒ RETURN UNUSED PORTION OF SAMPLE

OTHER INSTRUCTIONS - SPECIAL HANDLING - HAZARDS Possible WASTE SAMPLES Composition UNKNOWN

☒ HAZARDOUS SAMPLE ~~[illegible]~~ + Soil Sample ☐ NON-HAZARDOUS SAMPLE

☐ TOXIC ☐ SKIN IRRITANT ☐ FLAMMABLE (FP 40°C)

☐ PYROPHORIC ☐ LACHRYMATOR ☐ SHOCK SENSITIVE

☐ ACIDIC ☐ BIOLOGICAL ☐ CARCINOGENIC - SUSPECT

☐ CAUSTIC ☐ PEROXIDE ☐ RADIOACTIVE

☐ OTHER

SAMPLE ALLOCATION / CHAIN OF POSSESSION:

ORGANIZATION NAME RICK BELAN RADIAN CORP.

RECEIVED BY RICK BELAN DATE RECEIVED 11/21-22/83

LAB SAMPLE NO. — COMMENTS —

INCLUSIVE DATES OF POSSESSION

ORGANIZATION NAME Radian analytical Services

RECEIVED BY Jane Lindsey DATE RECEIVED

LAB SAMPLE NO. 84-01-17 COMMENTS

INCLUSIVE DATES OF POSSESSION

ORGANIZATION NAME

RECEIVED BY DATE RECEIVED

LAB SAMPLE NO. COMMENTS

INCLUSIVE DATES OF POSSESSION

RADIAN CORPORATION

CHAIN OF CUSTODY RECORD

FIELD SAMPLE NO. —

COMPANY SAMPLED/ADDRESS USAF TINKER AFB

SAMPLE POINT DESCRIPTION SOIL SAMPLES FROM TINKER AFB ZONE 3 for Chemical Analysis; Water sample not for analysis.

STREAM CHARACTERISTICS:

TEMPERATURE — FLOW — pH —

VISUAL OBSERVATIONS/COMMENTS Some waste solids

COLLECTOR'S NAME Rick BELAN DATE/~~TIME~~ SAMPLED 11/29/83

AMOUNT OF SAMPLE COLLECTED ~ 4 Qrts solids; ~ 2 Qrts liquid for referance only

SAMPLE DESCRIPTION

STORE AT: ☐ AMBIENT ☐ 5°C ☐ -10°C ☒ OTHER Ice

☐ CAUTION - NO MORE SAMPLE AVAILABLE ☐ RETURN ALL PORTIONS ☒ RETURN UNUSED PORTION OF SAMPLE

OTHER INSTRUCTIONS - SPECIAL HANDLING - HAZARDS

☒ HAZARDOUS SAMPLE (SEE BELOW) ☐ NON-HAZARDOUS SAMPLE

☐ TOXIC ☐ SKIN IRRITANT ☐ FLAMMABLE (FP 40°C)

☐ PYROPHORIC ☐ LACHRYMATOR ☐ SHOCK SENSITIVE

☐ ACIDIC ☐ BIOLOGICAL ☐ CARCINOGENIC - SUSPECT

☐ CAUSTIC ☐ PEROXIDE ☐ RADIOACTIVE

☒ OTHER UNKNOWN

SAMPLE ALLOCATION / CHAIN OF POSSESSION

ORGANIZATION NAME COLLECTED WENT BY R. BELAN RADIAN CORPORATION

RECEIVED BY [signature] DATE RECEIVED 11-30-83

LAB SAMPLE NO. 84-01-171 COMMENTS

INCLUSIVE DATES OF POSSESSION

ORGANIZATION NAME

RECEIVED BY DATE RECEIVED

LAB SAMPLE NO. COMMENTS

INCLUSIVE DATES OF POSSESSION

ORGANIZATION NAME

RECEIVED BY DATE RECEIVED

LAB SAMPLE NO. COMMENTS

INCLUSIVE DATES OF POSSESSION

RADIAN CORPORATION

CHAIN OF CUSTODY RECORD

FIELD SAMPLE NO. 3PVC

COMPANY SAMPLED/ADDRESS Tinker AFB, Oklahoma

SAMPLE POINT DESCRIPTION Sample of PVC (2-inch) from stick up at Monitor Well F

STREAM CHARACTERISTICS:

TEMPERATURE N/A FLOW — pH —

VISUAL OBSERVATIONS/COMMENTS —

COLLECTOR'S NAME Rick Belan DATE/TIME SAMPLED 11/30/83, 0834

AMOUNT OF SAMPLE COLLECTED 0.71 feet

SAMPLE DESCRIPTION 2-INCH PVC CASING

STORE AT: ☒ AMBIENT ☐ 5°C ☐ -10°C ☒ OTHER WRAPPED IN Aluminum Foil w/ Dull side out

☐ CAUTION - NO MORE SAMPLE AVAILABLE ☐ RETURN ALL PORTIONS ☑ RETURN UNUSED PORTION OF SAMPLE

OTHER INSTRUCTIONS - SPECIAL HANDLING - HAZARDS N/A

☐ HAZARDOUS SAMPLE (SEE BELOW) ☒ NON-HAZARDOUS SAMPLE

☐ TOXIC ☐ SKIN IRRITANT ☐ FLAMMABLE (FP 40°C)

☐ PYROPHORIC ☐ LACHRYMATOR ☐ SHOCK SENSITIVE

☐ ACIDIC ☐ BIOLOGICAL ☐ CARCINOGENIC - SUSPECT

☐ CAUSTIC ☐ PEROXIDE ☐ RADIOACTIVE

☐ OTHER

SAMPLE ALLOCATION / CHAIN OF POSSESSION:

ORGANIZATION NAME RAS

RECEIVED BY [signature] DATE RECEIVED 1/23/84

LAB SAMPLE NO. 84-01-172 COMMENTS

INCLUSIVE DATES OF POSSESSION

ORGANIZATION NAME

RECEIVED BY DATE RECEIVED

LAB SAMPLE NO. COMMENTS

INCLUSIVE DATES OF POSSESSION

ORGANIZATION NAME

RECEIVED BY DATE RECEIVED

LAB SAMPLE NO. COMMENTS

INCLUSIVE DATES OF POSSESSION

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 4B.5

Company Sampled/Address Tinker AFB

Sample Point Description Zone 4, B rehole B

Stream Characteristics:

Temperature — Flow — pH —

Visual Observations/Comments

Collector's Name LN French Date/Time Sampled 2-9-84

Amount of Sample Collected quart jar

Sample Description Soil

Store at: ☐ Ambient ☐ 5°C ☒ −10°C ☐ Other

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards

☒ Hazardous sample (see below) ☐ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive

☐ Other collected at site of former industrial waste pond

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible signature] Date Received 2-14-~~83~~84 Time 9.30

Transported By Fed Ex Lab Sample No. 8402037-01

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 4B.6

Company Sampled/Address Tinker AFB

Sample Point Description Zone 4, Bore hole B

Stream Characteristics:

Temperature — Flow — pH —

Visual Observations/Comments

Collector's Name LN French Date/Time Sampled 2-9-84

Amount of Sample Collected quart jar

Sample Description Soil

Store at: ☐ Ambient ☐ 5°C ☒ −10°C ☐ Other

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards

☒ Hazardous sample (see below) ☐ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other collected at site of former industrial waste pond		

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible] Date Received 2-14-84 Time 9:30

Transported By Fed Ex Lab Sample No. 8402087-02

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 4C.5

Company Sampled/Address Tinker AFB

Sample Point Description Zone 4, Borehole C

Stream Characteristics:

Temperature — Flow — pH —

Visual Observations/Comments

Collector's Name LN French Date/Time Sampled 2-9-84

Amount of Sample Collected quart jar

Sample Description soil

Store at: ☐ Ambient ☐ 5°C ☒ −10°C ☐ Other

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards

☒ Hazardous sample (see below) ☐ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)

☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive

☐ Acidic ☐ Biological ☐ Carcinogenic - suspect

☐ Caustic ☐ Peroxide ☐ Radioactive

☐ Other collected at site of former industrial waste pond

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible] Date Received 2-14-84 Time 9:30

Transported By Fed Ex Lab Sample No. 8402087-03

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

RADIAN CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 4D, 2

Company Sampled/Address Tinker AFB

Sample Point Description Zone 4, Borehole D

Stream Characteristics:

Temperature — Flow — pH —

Visual Observations/Comments

Collector's Name LN French Date/Time Sampled 2-9-84

Amount of Sample Collected quart jar

Sample Description Soil

Store at: ☐ Ambient ☐ 5°C ☒ −10°C ☐ Other

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards

☒ Hazardous sample (see below) ☐ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)

☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive

☐ Acidic ☐ Biological ☐ Carcinogenic - suspect

☐ Caustic ☐ Peroxide ☐ Radioactive

☐ Other collected at site of former industrial waste pond

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible] Date Received 2-14-84 Time 9.30

Transported By Fed Ex Lab Sample No. 8402087-04

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 4E.2

Company Sampled/Address Tinker AFB

Sample Point Description Zone 4, Borehole E

Stream Characteristics:

Temperature — Flow — pH —

Visual Observations/Comments

Collector's Name LN French Date/Time Sampled 2-10-84

Amount of Sample Collected quart jar

Sample Description Soil

Store at: ☐ Ambient ☐ 5°C ☒ −10°C ☐ Other

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards

☒ Hazardous sample (see below) ☐ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive

☐ Other collected at site of former industrial waste pond

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible] Date Received 2-14-84 Time 9:30

Transported By Fed Ex Lab Sample No. 8402087-05

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 4E.3

Company Sampled/Address Tinker AFB

Sample Point Description Zone 4, Borehole E

Stream Characteristics:

Temperature — Flow — pH —

Visual Observations/Comments

Collector's Name LN French Date/Time Sampled 2-10-84

Amount of Sample Collected quart jar

Sample Description Soil

Store at: ☐ Ambient ☐ 5°C ☒ –10°C ☐ Other

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards

☒ Hazardous sample (see below) ☐ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)

☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive

☐ Acidic ☐ Biological ☐ Carcinogenic - suspect

☐ Caustic ☐ Peroxide ☐ Radioactive

☐ Other collected at site of former industrial waste pond

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible] Date Received 2-14-84 Time 9:30

Transported By Fed Ex Lab Sample No. 8402087-06

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 4E.4

Company Sampled/Address Tinker AFB

Sample Point Description Zone 4, Borehole E

Stream Characteristics:

Temperature — Flow — pH —

Visual Observations/Comments

Collector's Name LN French Date/Time Sampled 2-10-84

Amount of Sample Collected quart jar

Sample Description Soil

Store at: ☐ Ambient ☐ 5°C ☒ −10°C ☐ Other

☒ Caution · No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions · Special Handling · Hazards

☒ Hazardous sample (see below) ☐ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)

☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive

☐ Acidic ☐ Biological ☐ Carcinogenic · suspect

☐ Caustic ☐ Peroxide ☐ Radioactive

☐ Other collected at site of former industrial waste pond

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible] Date Received 2-14-84 Time 9:30

Transported By Fed Ex Lab Sample No. 8402087-07

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 4E.5

Company Sampled/Address Tinker AFB
Sample Point Description Zone 4, Borehole E

Stream Characteristics:
Temperature — Flow — pH —
Visual Observations/Comments

Collector's Name LN French Date/Time Sampled 2-10-84
Amount of Sample Collected quart jar
Sample Description Soil
Store at: ☐ Ambient ☐ 5°C ☒ −10°C ☐ Other

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards

☒ Hazardous sample (see below) ☐ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)
☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive
☐ Acidic ☐ Biological ☐ Carcinogenic - suspect
☐ Caustic ☐ Peroxide ☐ Radioactive
☐ Other collected at site of former industrial waste pond

Sample Allocation/Chain of Possession:
Organization Name Radian Analytical Services
Received By [illegible signature] Date Received 2-14-84 Time 9.30
Transported By Fed Ex Lab Sample No. 8402087-08
Comments
Inclusive Dates of Possession

Organization Name
Received By Date Received Time
Transported By Lab Sample No.
Comments
Inclusive Dates of Possession

Organization Name
Received By Date Received Time
Transported By Lab Sample No.
Comments
Inclusive Dates of Possession

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 4F, 2

Company Sampled/Address Tinker AFB
Sample Point Description Zone 4, Borehole F

Stream Characteristics:
Temperature — Flow — pH —
Visual Observations/Comments

Collector's Name LN French Date/Time Sampled 2-10-84
Amount of Sample Collected quart jar
Sample Description Soil
Store at: ☐ Ambient ☐ 5°C ☒ −10°C ☐ Other

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards

☒ Hazardous sample (see below) ☐ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)
☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive
☐ Acidic ☐ Biological ☐ Carcinogenic - suspect
☐ Caustic ☐ Peroxide ☐ Radioactive
☐ Other collected at site of former industrial waste pond

Sample Allocation/Chain of Possession:
Organization Name Radian Analytical Services
Received By Jane Lindsay Date Received 2-14-84 Time 9:30
Transported By Fed Ex Lab Sample No. 8402087-09
Comments
Inclusive Dates of Possession

Organization Name
Received By Date Received Time
Transported By Lab Sample No.
Comments
Inclusive Dates of Possession

Organization Name
Received By Date Received Time
Transported By Lab Sample No.
Comments
Inclusive Dates of Possession

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 4F, 3

Company Sampled/Address Tinker AFB

Sample Point Description Zone 4, Borehole F

Stream Characteristics:

Temperature — Flow — pH —

Visual Observations/Comments

Collector's Name LN French Date/Time Sampled 2-10-84

Amount of Sample Collected quart jar

Sample Description Soil

Store at: ☐ Ambient ☐ 5°C ☒ −10°C ☐ Other

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards

☒ Hazardous sample (see below) ☐ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive

☐ Other Collected at site of former industrial waste pond

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By Jane Kindsey Date Received 2-14-84 Time 9:30

Transported By Fed Ex Lab Sample No. 8402087-10

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

Organization Name

Received By Date Received Time

Transported By Lab Sample No.

Comments

Inclusive Dates of Possession

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 4 A

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name EBB Date/Time Sampled 2/14 ~~/4~~ 2 00

Amount of Sample Collected 7 jars

Sample Description well

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards ~~HOLD~~ 625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other		

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By Jane Lindsey Date Received 2-15-84 Time 4:30

Transported By Fed Ex Lab Sample No. 8402103-01

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 2A, 3E, 3F, 3G, 4G

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name EBB Date/Time Sampled 2/15/84

Amount of Sample Collected 7 bottles 2A; 6 bottles 3E, 6 bottles 3F, 4 bottles 4G, 1 bottle 3G

Sample Description ground H2O

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)
☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive
☐ Acidic ☐ Biological ☐ Carcinogenic - suspect
☐ Caustic ☐ Peroxide ☐ Radioactive
☐ Other ______

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services
Received By [illegible signature] Date Received 2-16-84 Time 9:15
Transported By Fed Ex Lab Sample No. 8402107, 8402108, 8402109
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ Date Received ______ Time ______
Transported By ______ Lab Sample No. ______
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ Date Received ______ Time ______
Transported By ______ Lab Sample No. ______
Comments ______
Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. T1 - 2 / T1 - 1 / ~~T4 - G~~

Company Sampled/Address: Tinker AFB

Sample Point Description: ~~gw~~ well

Stream Characteristics:

Temperature ________ Flow ________ pH ________

Visual Observations/Comments ________

Collector's Name: FBB Date/Time Sampled ________

Amount of Sample Collected: well 1

Sample Description: 4 G: TOC + 625; zone 1, well 2: pest + org; zone 1, 7 jars

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ________

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards: HOLD 625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other ________		

Sample Allocation/Chain of Possession:

Organization Name: Radian Analytical Services

Received By: [illegible signature] Date Received: 2-20-84 Time: 8:30

Transported By: Fed Ex Lab Sample No. 8402140, 8402144

Comments ________

Inclusive Dates of Possession ________

Organization Name ________

Received By ________ Date Received ________ Time ________

Transported By ________ Lab Sample No. ________

Comments ________

Inclusive Dates of Possession ________

Organization Name ________

Received By ________ Date Received ________ Time ________

Transported By ________ Lab Sample No. ________

Comments ________

Inclusive Dates of Possession ________

RADIAN
CORPORATION

O&G metals
Pest CN
625
TOC/Ø
TOX

Zone 1
7 Jars ea

CHAIN OF CUSTODY RECORD

Field Sample No. 3, 4, 5, 6

Company Sampled/Address TAFB OK City OK

Sample Point Description Zone 1, Groundwater

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name F Blood Kathy Fertend Date/Time Sampled 17 Feb 89

Amount of Sample Collected ______

Sample Description ______

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☐ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards ______

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)
☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive
☐ Acidic ☐ Biological ☐ Carcinogenic - suspect
☐ Caustic ☐ Peroxide ☐ Radioactive
☐ Other ______

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible] Date Received 2-20-84 Time 8:30

Transported By Fed Ex Lab Sample No. 8402140

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

TS-019
TS-018

Field Sample No. zone 2, well 7 ; zone 2, well 3 ; zone 2, b

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description well

Stream Characteristics:

Temperature ______ **Flow** ______ **pH** ______

Visual Observations/Comments ______

Collector's Name ______ **Date/Time Sampled** ______

Amount of Sample Collected TS-019 + 018: 2 625, 6 VOA, 2 TOC; wells 1,7 and 1,3: 14 jars; zone 2,b: 6 jars

Sample Description gw

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 625/624

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)
☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive
☐ Acidic ☐ Biological ☐ Carcinogenic - suspect
☐ Caustic ☐ Peroxide ☐ Radioactive
☐ Other ______

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services
Received By [illegible signature] **Date Received** 2-20-84 **Time** 4:30
Transported By Fed Ex **Lab Sample No.** 8402141, 8402142, 8402145
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ **Date Received** ______ **Time** ______
Transported By ______ **Lab Sample No.** ______
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ **Date Received** ______ **Time** ______
Transported By ______ **Lab Sample No.** ______
Comments ______
Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

LEACHATE

Sample No. 36

Company Sampled/Address THFB

Sample Point Description Groundwater

Stream Characteristics:

Temperature ______ **Flow** ______ **pH** ______

Visual Observations/Comments ______

Collector's Name RBB/KAF **Date/Time Sampled** 15 Feb / 17 Feb

Amount of Sample Collected ______

Sample Description ______

Store at: ☐ Ambient ☐ 5°C ☒ −10°C ☐ Other ______

☐ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards ______

☒ Hazardous sample (see below) Possibly ☒ Non-hazardous sample

☒ Toxic	☒ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☒ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive

☐ Other ______

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services
Received By [illegible signature] **Date Received** 2-20-84 **Time** 3:30
Transported By Fed Ex **Lab Sample No.** 8402143
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ **Date Received** ______ **Time** ______
Transported By ______ **Lab Sample No.** ______
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ **Date Received** ______ **Time** ______
Transported By ______ **Lab Sample No.** ______
Comments ______
Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. TS-001

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description GW well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name KAF Date/Time Sampled 2/9 9:00

Amount of Sample Collected 1 quart, 3 VOA, 1 TOC

Sample Description ground H_2O

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive

☐ Other ______

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible signature] Date Received 2-10-84 Time 10:00

Transported By Fed Ex Lab Sample No. 3402061-01

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. TS-002

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name KAF Date/Time Sampled 2/9/84 10:30

Amount of Sample Collected 1 quart, 3 VOA, 1 TOC

Sample Description ground H_2O

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other ______		

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible signature] Date Received 2-10-84 Time 10:00

Transported By Fed Ex Lab Sample No. 8402061-02

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. TS-004

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name KAF Date/Time Sampled ______

Amount of Sample Collected 1 quart, 3 VOA 1 TOC

Sample Description groundwater

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other ______		

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By Jane Tindsey Date Received 2-10-84 Time 10:00

Transported By Fed Ex Lab Sample No. 8402061-03

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. TS-005

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name KAF Date/Time Sampled 2/9/84 11:00

Amount of Sample Collected 1 quart, 3 VOA, 1 TOC

Sample Description ground H_2O

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other ______		

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By Jane Lindsey Date Received 2-10-84 Time 10:00

Transported By Fed Ex Lab Sample No. 8402061-04

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. T5-009

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description Well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name KAF Date/Time Sampled 3:00 2/8/84

Amount of Sample Collected 1 quart, 3 VOA, 1 TOC

Sample Description groundwater

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive

☐ Other ______

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By Jane Lindsey Date Received 2-10-84 Time 10:00

Transported By Fed Ex Lab Sample No. 8402061-05

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. T5-011

Company Sampled/Address Tinker AFB-212-027-04

Sample Point Description well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name KAF Date/Time Sampled 2/8/84 10:00

Amount of Sample Collected 1 quart, 3 VOAs, 1 TOC

Sample Description groundwater

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other ______		

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By Jane Lindsey Date Received 2-10-84 Time 10:00

Transported By Fed Ex Lab Sample No. 8402061-06

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. TS-013

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description Well

Stream Characteristics:

Temperature ______ **Flow** ______ **pH** ______

Visual Observations/Comments ______

Collector's Name KAF **Date/Time Sampled** 2/8/84 11^00

Amount of Sample Collected 1 quart 3 VOAs, 1 TOC

Sample Description groundwater

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive

☐ Other ______

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services
Received By Carrie Lindsey **Date Received** 2-10-84 **Time** 10:00
Transported By Fed Ex **Lab Sample No.** 8402061-07
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ **Date Received** ______ **Time** ______
Transported By ______ **Lab Sample No.** ______
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ **Date Received** ______ **Time** ______
Transported By ______ **Lab Sample No.** ______
Comments ______
Inclusive Dates of Possession ______

RADIAN CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. IS-014

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name KAF Date/Time Sampled 2/8/84 900

Amount of Sample Collected 1 quart, 3 VOAs, 1 ~~quart~~ TOC

Sample Description groundwater

Store at: ☐ Ambient ☒ 5°C ☐ -10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other ______		

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By Gary Lindsey Date Received 2-10-84 Time 10:00

Transported By Fed Ex Lab Sample No. 8402061-08

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN CORPORATION

Mw

CHAIN OF CUSTODY RECORD

Field Sample No. TS-015

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description Well

Stream Characteristics:

Temperature ____ Flow ____ pH ____

Visual Observations/Comments ____

Collector's Name KAF Date/Time Sampled 2/8/84 100

Amount of Sample Collected 1 quart, 3 VOAs, 1 TOC

Sample Description groundwater

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ____

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other ____		

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible] Date Received 2-10-84 Time 10:00

Transported By Fed Ex Lab Sample No. 8402062-01 and -02

Comments ____

Inclusive Dates of Possession ____

Organization Name ____

Received By ____ Date Received ____ Time ____

Transported By ____ Lab Sample No. ____

Comments ____

Inclusive Dates of Possession ____

Organization Name ____

Received By ____ Date Received ____ Time ____

Transported By ____ Lab Sample No. ____

Comments ____

Inclusive Dates of Possession ____

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. TS-016

Company Sampled/Address Tinker AFB - 212-027-04

Sample Point Description Well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name KAF   Date/Time Sampled 2/8/84 2:30

Amount of Sample Collected 1 Quart, 3 VOAs, 1 TOC

Sample Description Ground H_2O

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below)   ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive

☐ Other ______

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible signature]   Date Received 2-10-84   Time 10:00

Transported By Fed Ex   Lab Sample No. 8402062-03

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. TS-018

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name ______ Date/Time Sampled ______

Amount of Sample Collected 1 quart, 3 VOA, 1 TOC

Sample Description ground H_2O

Store at: ☐ Ambient ☒ 5°C ☒ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)

☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive

☐ Acidic ☐ Biological ☐ Carcinogenic - suspect

☐ Caustic ☐ Peroxide ☐ Radioactive

☐ Other ______

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible] Date Received 2-10-84 Time 10:00

Transported By Fed Ex Lab Sample No. 8402062-04

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. TS-019

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name KAF Date/Time Sampled 2/9/84 2:30

Amount of Sample Collected 1 quart, 3 VOA, 1 TOC

Sample Description Ground H_2O

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)
☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive
☐ Acidic ☐ Biological ☐ Carcinogenic - suspect
☐ Caustic ☐ Peroxide ☐ Radioactive
☐ Other ______

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible] Date Received 2-10-84 Time 10:00

Transported By Fed Ex Lab Sample No. 8402062-05

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

dup

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. TS-020

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name KAF Date/Time Sampled 2/8/84 8:00

Amount of Sample Collected 2 quarts, 6 VOAs, 2 TOC

Sample Description ground H_2O

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)

☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive

☐ Acidic ☐ Biological ☐ Carcinogenic - suspect

☐ Caustic ☐ Peroxide ☐ Radioactive

☐ Other ______

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By Jane Lindsey Date Received 2-10-84 Time 10:00

Transported By Fed Ex. Lab Sample No. 8402062-06 and -07

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. TS-021

Company Sampled/Address Tinker AFB 212-027-04
Sample Point Description Well

Stream Characteristics:
Temperature 64°F Flow ______ pH 7.1
Visual Observations/Comments cond = 260

Collector's Name KAF Date/Time Sampled 2/7/84 3:30
Amount of Sample Collected 1 quart, 3 VOAs + 1 TOC
Sample Description groundwater
Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions
Other Instructions - Special Handling - Hazards Hold 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)
☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive
☐ Acidic ☐ Biological ☐ Carcinogenic - suspect
☐ Caustic ☐ Peroxide ☐ Radioactive
☐ Other ______

Sample Allocation/Chain of Possession:
Organization Name Radian Analytical Services
Received By [illegible] Date Received 2-10-84 Time 10:00
Transported By [illegible] Lab Sample No. 8402062-08
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ Date Received ______ Time ______
Transported By ______ Lab Sample No. ______
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ Date Received ______ Time ______
Transported By ______ Lab Sample No. ______
Comments ______
Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. T5-022

Company Sampled/Address TINKer AFB 212-027-04

Sample Point Description Well

Stream Characteristics:

Temperature ______ **Flow** ______ **pH** ______

Visual Observations/Comments ______

Collector's Name KAF **Date/Time Sampled** 2/7/84 3:00

Amount of Sample Collected 1 quart, 3 VOAS, 1 TOC

Sample Description ground H_2O

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)
☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive
☐ Acidic ☐ Biological ☐ Carcinogenic - suspect
☐ Caustic ☐ Peroxide ☐ Radioactive
☐ Other ______

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services
Received By [illegible signature] **Date Received** 2-10-84 **Time** 10:00
Transported By Fed Ex **Lab Sample No.** 8402063-01
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ **Date Received** ______ **Time** ______
Transported By ______ **Lab Sample No.** ______
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ **Date Received** ______ **Time** ______
Transported By ______ **Lab Sample No.** ______
Comments ______
Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. T5-023

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description well

Stream Characteristics:

Temperature 60°F Flow ______ pH ~~5.8~~

Visual Observations/Comments COND 190

Collector's Name KAF Date/Time Sampled 2/7/84 1100

Amount of Sample Collected 1 quart, 3 VOAs 1 TOC

Sample Description groundwater

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other ______		

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [signature] Date Received 2-10-84 Time 10:00

Transported By Fed Ex Lab Sample No. 4402063-02

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. TS-024

Company Sampled/Address Tinker AFB 212-027-04
Sample Point Description well

Stream Characteristics:
Temperature ______ Flow ______ pH ______
Visual Observations/Comments ______

Collector's Name KAF Date/Time Sampled 3⁰⁰ 2/9/84
Amount of Sample Collected 1 quart, 3 VOA, 1 TOC
Sample Description groundwater
Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions
Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)
☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive
☐ Acidic ☐ Biological ☐ Carcinogenic - suspect
☐ Caustic ☐ Peroxide ☐ Radioactive
☐ Other ______

Sample Allocation/Chain of Possession:
Organization Name Radian Analytical Services
Received By [illegible signature] Date Received 2-10-84 Time 10:00
Transported By Fed Ex Lab Sample No. 8402063-03
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ Date Received ______ Time ______
Transported By ______ Lab Sample No. ______
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ Date Received ______ Time ______
Transported By ______ Lab Sample No. ______
Comments ______
Inclusive Dates of Possession ______

dup

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. T5-025

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description well

Stream Characteristics:

Temperature ______ **Flow** ______ **pH** ______

Visual Observations/Comments ______

Collector's Name KAF **Date/Time Sampled** 2/7/84 10:00

Amount of Sample Collected 2 quarts 6 VOA, 2 TOC

Sample Description groundwater

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards hold 624 \ 625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other ______		

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible signature] **Date Received** 2-10-84 **Time** 10:00

Transported By Fed Ex **Lab Sample No.** 8402063-04 and -05

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ **Date Received** ______ **Time** ______

Transported By ______ **Lab Sample No.** ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ **Date Received** ______ **Time** ______

Transported By ______ **Lab Sample No.** ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. T5-026

Company Sampled/Address Tinker AFB 212-027-04
Sample Point Description Well

Stream Characteristics:
Temperature ______ **Flow** ______ **pH** ______
Visual Observations/Comments ______

Collector's Name KAF **Date/Time Sampled** 2/7/84 900
Amount of Sample Collected 1 quart, 3 VOA, 1 TOC
Sample Description groundwater
Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions
Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)
☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive
☐ Acidic ☐ Biological ☐ Carcinogenic - suspect
☐ Caustic ☐ Peroxide ☐ Radioactive
☐ Other ______

Sample Allocation/Chain of Possession:
Organization Name Radian Analytical Services
Received By [illegible signature] **Date Received** 2-10-84 **Time** 10:00
Transported By Fed Ex **Lab Sample No.** 8402063-06
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ **Date Received** ______ **Time** ______
Transported By ______ **Lab Sample No.** ______
Comments ______
Inclusive Dates of Possession ______

Organization Name ______
Received By ______ **Date Received** ______ **Time** ______
Transported By ______ **Lab Sample No.** ______
Comments ______
Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. T5-027

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description Well

Stream Characteristics:

Temperature ____ Flow ____ pH ____

Visual Observations/Comments ____

Collector's Name KAF Date/Time Sampled 8:30 ; 2/7/84

Amount of Sample Collected 1 quart, 3 VOA, 1 TOC

Sample Description groundwater

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ____

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 624/625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other ____		

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible signature] Date Received 2-10-84 Time 10:00

Transported By Fed Ex Lab Sample No. 8402063-07

Comments ____

Inclusive Dates of Possession ____

Organization Name ____

Received By ____ Date Received ____ Time ____

Transported By ____ Lab Sample No. ____

Comments ____

Inclusive Dates of Possession ____

Organization Name ____

Received By ____ Date Received ____ Time ____

Transported By ____ Lab Sample No. ____

Comments ____

Inclusive Dates of Possession ____

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 1A

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name FBB Date/Time Sampled 2/13 1^00 ; 2/14

Amount of Sample Collected 7 jars, + 4 VOAS

Sample Description ground H'20

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards ~~HOLD 625~~ + VOAS

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other ______		

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible signature] Date Received 2-15-84 Time 9:30

Transported By Fed Ex Lab Sample No. 8402102-01

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 1B

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name EBB Date/Time Sampled ~~2/13~~ 2/14 2⁰⁰

Amount of Sample Collected 7 jars + 4 VOAS

Sample Description ground H20

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards ~~HOLD 625~~ / VOAS

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic ☐ Skin irritant ☐ Flammable (FP< 40°C)
☐ Pyrophoric ☐ Lachrymator ☐ Shock sensitive
☐ Acidic ☐ Biological ☐ Carcinogenic - suspect
☐ Caustic ☐ Peroxide ☐ Radioactive
☐ Other ______

Sample Allocation/Chain of Possession:

Organization Name Radian analytical Services

Received By [illegible signature] Date Received 2-15-84 Time 9:30

Transported By Fed Ex Lab Sample No. 8402102-02

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. 1C

Company Sampled/Address Tinker AFB 212-027-04

Sample Point Description ~~ground H2~~ well

Stream Characteristics:

Temperature ______ Flow ______ pH ______

Visual Observations/Comments ______

Collector's Name FBB Date/Time Sampled 2/14/84 900

Amount of Sample Collected 7 jars

Sample Description ground H2O

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards HOLD 625

☐ Hazardous sample (see below) ☒ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive

☐ Other ______

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By Jane Lindsey Date Received 2-15-84 Time 9:30

Transported By Fed Ex Lab Sample No. 8402102-03

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

T6-001

Field Sample No. thm-022

Company Sampled/Address Tinker AFB OK, Zone 6, 212-027-04

Sample Point Description Well 18 - pump test

Stream Characteristics:

Temperature ______ **Flow** ______ **pH** ______

Visual Observations/Comments ______

Collector's Name W. M. Little **Date/Time Sampled** 5 8 March 84

Amount of Sample Collected 20 VOA vials, 4 trip blanks, 1-lit glass

Sample Description time series samples

Store at: ☐ Ambient ☒ 5°C ☐ −10°C ☐ Other ______

☒ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards VOAs for 601 (TCE + tetrachloroethylene)
quart for Modified 625 (A/N) - HOLD

☒ Hazardous sample (see below) ☐ Non-hazardous sample

☒ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other ______		

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible] **Date Received** 3-8-84 **Time** 10:00

Transported By [illegible] **Lab Sample No.** 8403042

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ **Date Received** ______ **Time** ______

Transported By ______ **Lab Sample No.** ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ **Date Received** ______ **Time** ______

Transported By ______ **Lab Sample No.** ______

Comments ______

Inclusive Dates of Possession ______

RADIAN
CORPORATION

CHAIN OF CUSTODY RECORD

Field Sample No. MW-8

Company Sampled/Address Tinker AFB

Sample Point Description MW-8

Stream Characteristics:

Temperature 17° C Flow ______ pH 6

Visual Observations/Comments Clear, no odor or visible evidence of contamination

Collector's Name D. L. Eichmann Date/Time Sampled 3/26/84 10:45a

Amount of Sample Collected 7 samples

Sample Description Ground-water

Store at: ☐ Ambient ☑ 5°C ☐ −10°C ☐ Other ______

☑ Caution - No more sample available ☐ Return unused portion of sample ☐ Discard unused portions

Other Instructions - Special Handling - Hazards ______

☐ Hazardous sample (see below) ☐ Non-hazardous sample

☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other ______		

Sample Allocation/Chain of Possession:

Organization Name Radian Analytical Services

Received By [illegible signature] Date Received 3 27 84 Time 3:30

Transported By DLR Lab Sample No. 3403179

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

Organization Name ______

Received By ______ Date Received ______ Time ______

Transported By ______ Lab Sample No. ______

Comments ______

Inclusive Dates of Possession ______

RADIAN CORPORATION

APPENDIX H

Analytical Data

All samples for chemical analysis were submitted to Radian Analytical Services' laboratory in Austin. The samples were logged in, and the data reported out, in "batches". The following pages contain the analytical data reports for the various batches of samples. Table H-1 is a key for assigning the samples to the proper batch. Table H-2 is a cross-reference between zones and corresponding laboratory sample batches.

Also included in this Appendix are data submitted by the Oklahoma State Department of Health.

TABLE H-1. LABORATORY BATCH BREAKOUT KEY

<u>Lab #84-01-171, November 30, 1983</u>
Zone 3 soils

<u>Lab #84-01-172, January 30, 1984</u>
PVC casing for extraction

<u>Lab #84-02-061, February 10, 1984</u>
T5-001, T5-002, T5-004, T5-005, T5-009, T5-011, T5-013, T5-014

<u>Lab #84-02-062, February 10, 1984</u>
T5-015, T5-015dup, T5-016, T5-018, T5-019, T5-020, T5-020dup, T5-021

<u>Lab #84-02-063, February 10, 1984</u>
T5-022, T5-023, T5-024, T5-025dup, T5-026, T5-027

<u>Lab #84-02-087, February 14, 1984</u>
Zone 4 soils

<u>Lab #84-02-102, February 15, 1984</u>
1A, 1B, 1C

<u>Lab #84-02-103, February 15, 1984</u>
4A

<u>Lab #84-02-107, February 16, 1984</u>
2A

<u>Lab #84-02-108, February 16, 1984</u>
3E, 3F, 3G

<u>Lab #84-02-109, February 16, 1984</u>
4G

<u>Lab #84-02-140, February 20, 1984</u>
Existing wells 1-6

<u>Lab #84-02-141, February 20, 1984</u>
Existing Well 7, Landfill 4 leachate, pond

<u>Lab #84-02-142, February 20, 1984</u>
2B

<u>Lab #84-02-143, February 20, 1984</u>
3G

<u>Lab #84-02-144, February 20, 1984</u>
4G, same split as 84-02-109

<u>Lab #84-02-145, February 20, 1984</u>
T5-018, T5-019, trip blank

<u>Lab #84-02-162, February 23, 1984</u>
3C(A) soil for mod 625

<u>Lab #84-02-163, February 23, 1984</u>
T5-005, T5-014, T5-016, T5-018, T5-019 (resubmission for mod 625)

<u>Lab #84-02-209, February 28, 1984</u>
4E.3 soil for mod 625

<u>Lab #84-03-042, March 8, 1984</u>
T6-001 to T6-021, trip blank

<u>Lab #84-03-130, March 20, 1984</u>
Existing Well 2, 4 (mod 625)

<u>Lab #84-03-179, March 27, 1984</u>
Existing Well 8

TABLE H-2. CROSS REFERENCE

Phase II (Stage 1) Wells	Lab #84-
Zone 1A	02-102
B	02-102
C	02-102
Zone 2A	02-107
B	02-142
Zone 3E	02-108
F	02-108
G	02-143
Zone 4A	02-103
G	02-109, 144
Zone 5 001 (Base Wells)	02-061
002	02-061
004	02-061
005	02-061, 163
009	02-061
011	02-061
013	02-061
014	02-061, 163
015, dup	02-062
016	02-062, 163
018	02-062, 163, 145
019	02-062, 163, 145
020, dup	02-062
021	02-062
022	02-063
023	02-063
024	02-063
025, dup	02-063
026	02-063
027	02-063
Existing Wells	
1	02-140
2	02-140, 03-130
3	02-140
4	02-140, 03-130
5	02-140
6	02-140
7	02-141
8	03-179

(Continued)

TABLE H-2. (Continued)

Landfill 4 leachate	02-141
Pond	02-141
Zone 3 (soils)	01-171
Zone 4 (soils)	02-087
Zone 3 (625 soil)	02-162
Zone 4 (625 soil)	02-209
PVC Casing	01-172
Zone 6	03-042

RADIAN CORPORATION

CORPORATION

PAGE 1 Analytical Serv REPORT LAB # 84-01-171

RECEIVED: 11/30/83 07/23/84 09:14:42

REPORT TO: Radian
Bl. 4
Austin

ATTEN: William Little

CLIENT: TINKER SAMPLES: 10
COMPANY: Tinker AFB
FACILITY:

PREPARED BY: Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN:
PHONE: (512) 454-4797

CERTIFIED BY

CONTACT: CONOVER

WORK ID: soil samples zone 3
TAKEN:
TRANS: hand
TYPE:
P.O. #: 212-027-04-05
INV. #: 2658

SAMPLE IDENTIFICATION

01	3Aa
02	3Aa (alt)
03	3Ab
04	3Bb
05	3Bd
06	3Be
07	3Ca
08	3Cb
09	3Fb
10	3Fc

Analytical Serv TEST CODES and NAMES used on this report

CD E	Cadmium, ICPES
CNTOTA	Total Cyanide
CR E	Chromium, ICPES
CU E	Copper, ICPES
HG CA	Mercury, Cold Vapor
NI E	Nickel, ICPES
ONG IR	Oil and Grease, Infrared
PB GA	Lead, low level
PHEN A	Total Phenolics
PREP W	Special Digestion Method
PREP X	Special Digestion Method
TOC	Total Organic Carbon
TOX 1	TOX Single Analysis
ZN E	Zinc, ICPES

RECEIVED: 11/30/83

Analytical Serv REPORT
RESULTS BY TEST

LAB # 84-01-171

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
CD_E ug/ml	3.2 ug/g	2.0 ug/g	0.49 ug/g	0.25 ug/g	0.20 ug/g
CNTOTA mg/L	<.2 ug/g	<.2 ug/g	<.2 ug/g	<.2 ug/g	<.2 ug/g
CR_E ug/ml	8.9 ug/g	6.2 ug/g	4.5 ug/g	3.8 ug/g	2.9 ug/g
CU_E ug/ml	7.1 ug/g	4.1 ug/g	11 ug/g	5.6 ug/g	5.6 ug/g
HG_CA ug/ml	4.0 ug/g	4.5 ug/g	4.1 ug/g	3.5 ug/g	3.4 ug/g
NI_E ug/ml	38 ug/g	13 ug/g	13 ug/g	7.2 ug/g	5.4 ug/g
ONG_IR mg/L	2000 ug/g	5000 ug/g	2500 ug/g	500 ug/g	1500 ug/g
PB_GA ug/ml	5.2 ug/g	2.5 ug/g	2.9 ug/g	2.5 ug/g	1.8 ug/g
PHEN_A mg/L	<.05 ug/g	<.05 ug/g	<.05 ug/g	<.05 ug/g	<.05 ug/g
PREP_W date complete	02/02/84	02/02/84	02/08/84	02/08/84	02/08/84
PREP_X date complete	02/02/84	02/02/84	02/02/84	02/02/84	02/02/84
TOC mg/L	0.11 %	0.32 %	0.02 %	0.02 %	0.02 %
TOX_1 mg/L	<1 ug/g	12 ug/g	<1 ug/g	<1 ug/g	<1 ug/g
ZN_E ug/ml	9.2 ug/g	3.0 ug/g	12 ug/g	5.9 ug/g	5.0 ug/g

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)	Sample 10 (entered units)
CD_E	<.15	23	1.2	0.24	<.020
ug/ml	ug/g	ug/g	ug/g	ug/g	ug/g
CNTOTA	<.2	<.2	<.2	<.2	<.2
mg/L	ug/g	ug/g	ug/g	ug/g	ug/g
CR_E	4.0	750	5.7	15	4.0
ug/ml	ug/g	ug/g	ug/g	ug/g	ug/g
CU_E	5.7	130	13	5.1	2.3
ug/ml	ug/g	ug/g	ug/g	ug/g	ug/g
HG_CA	4.0	3.5	3.5	3.8	3.8
ug/ml	ug/g	ug/g	ug/g	ug/g	ug/g
NI_E	6.0	40	11	7.1	5.7
ug/ml	ug/g	ug/g	ug/g	ug/g	ug/g
ONG_IR	500	6000	1000	1500	1000
mg/L	ug/g	ug/g	ug/g	ug/g	ug/g
PB_GA	1.9	41	3.3	9.2	1.6
ug/ml	ug/g	ug/g	ug/g	ug/g	ug/g
PHEN_A	<.05	<.05	<.05	<.05	<.05
mg/L	ug/g	ug/g	ug/g	ug/g	ug/g
PREP_W	02/08/84	02/08/84	02/08/84	02/08/84	02/08/84
date_complete					
PREP_X	02/02/84	02/02/84	02/02/84	02/02/84	02/02/84
date_complete					
TOC	0.04	0.52	0.03	0.19	0.02
mg/L	%	%	%	%	%
TOX_1	<1	14	<1	<1	<1
mg/L	ug/g	ug/g	ug/g	ug/g	ug/g
ZN_E	8.2	36	7.6	16	5.7
ug/ml	ug/g	ug/g	ug/g	ug/g	ug/g

CORPORATION

PAGE 1 Analytical Serv REPORT LAB # 84-01-172
RECEIVED: 01/30/84 03/20/84 12:15:36

REPORT TO Radian
Bl. 4
Austin

ATTEN William Little

CLIENT TINKER SAMPLES 1
COMPANY Tinker AFB
FACILITY

WORK ID PVC pipe
TAKEN
TRANS hand
TYPE
P.O. # 212-027-04-05
INVOICE under separate cover

PREPARED BY Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN
PHONE (512) 454-4797

CERTIFIED BY

CONTACT CONOVER

SAMPLE IDENTIFICATION
01 PVC well casing

Analytical Serv TEST CODES and NAMES used on this report
ANFS Method 625 Acid/Neutrals

CORPORATION

RECEIVED: 01/30/84

Analytical Serv REPORT
Results by Sample

LAB # 84-01-172

SAMPLE ID PVC well casing FRACTION 01B TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category EXTRACT

DATA FILE A17201AN DATE EXTRACTED 03/07/84 ANALYST MSF VERIFIED BY CKT
CONC. FACTOR 980 DATE INJECTED 03/16/84 INSTRUMENT COMPOUNDS DETECTED 1

NPDES	SCAN EPA	COMPOUND	RESULT	NPDES	SCAN EPA	COMPOUND	RESULT
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

Analytical Serv REPORT LAB # 84-01-172

RECEIVED: 01/30/84 Results by Sample Continued From Above

SAMPLE ID PVC well casing FRACTION 01B TEST CODE ANFS NAME Method 625 Acid/Neutrals

Date & Time Collected not specified Category EXTRACT

35B		53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	372	54B	isophorone	3.7	3A	34A	2,4-dimethylphenol	ND
39B		55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B		66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B		67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B		68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B		69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B		70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B		71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/l

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

SAMPLE ID PVC well casing FRACTION 01B TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category EXTRACT

B = anthracene and phenanthrene co-elute.

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

01A : LOG_IN

CORPORATION

ANALYTICAL SERV REPORT — LAB # 84-02-061

02/20/84 10:46:09

PREPARED BY: Radian Analytical Services
8501 MoPac Blvd
P.O. Box 9948
Austin, Texas 78766

CERTIFIED BY

ATTEN

PHONE (512) 454-4797

CONTACT CONOVER

SAMPLES 6

under separate cover

SAMPLE IDENTIFICATION

Analytical Serv TEST CODES and NAMES used on this report

GC 601 EPA Method 601/GC
TOC Total Organic Carbon

CORPORATION

REPORT — Lab # 84-02-0[illegible]

RESULTS BY TEST

Test Code	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
[illegible]	<1	<1	<1	<1	[illegible]

Test Code	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)
[illegible]	<1	<1	<1

CORPORATION

[illegible] ANALYTICAL [illegible] REPORT LAB # 84-02-061

Results by Sample

SAMPLE ID [illegible] FRACTION 01B TEST CODE GC 601 NAME EPA Method 601 GC

Date & Time Collected not specified Category

[illegible] DATE INJECTED 02/19/84 ANALYST MCL VERIFIED BY [illegible]

INSTRUMENT b COMPOUNDS DETECTED [illegible]

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	[illegible]-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	[illegible]-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	[illegible]	[illegible]			
	[illegible]	[illegible]			
	[illegible]	[illegible]			
	[illegible]				

CORPORATION

REPORT

Results by Sample

Continued from

FRACTION 01B TEST CODE 601 NAME EPA Method 601

Date & Time Collected not specified Category

REPORT

retention time on chromatogram.

Results reported in ug/L unless otherwise specified

not detected at EPA detection limit method 601, (Federal Register, 12/3/79)

CORPORATION

[illegible] [illegible] [illegible] LAB # [illegible]

[illegible] Results by Sample

[illegible] [illegible]

FRACTION 02B TEST CODE [illegible] NAME EPA Method 601/602
Date & Time Collected not specified Category [illegible]

[illegible] [illegible] DATE ANALYZED 02/19/84 ANALYST MCL VERIFIED [illegible]
[illegible] INSTRUMENT 5 COMPOUNDS [illegible]

[illegible]	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	[illegible]
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	[illegible]		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	[illegible]
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	[illegible]
	Chloroform	ND		[illegible]-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		[illegible]-Dichlorobenzene	ND
	1,1,1-Trichloroethane	[illegible]		[illegible]-Dichlorobenzene	[illegible]
	Carbon Tetrachloride	[illegible]			
	[illegible]	[illegible]			
	[illegible]	[illegible]			
	[illegible]	[illegible]			

CORPORATION

REPORT

Results by Sample

Continued From

FRACTION 02B TEST CODE GC 601 NAME EPA Method 601 GC

Date & Time Collected not specified Category

DEFINITIONS FOR THIS REPORT

... retention time on chromatogram.

... Results reported in ug/L unless otherwise specified.

ND not detected at EPA detection limit method 601. (Federal Register, 12/3/79)

CORPORATION

[illegible] REPORT [illegible]

[illegible] By Sample

FRACTION [illegible] TEST CODE [illegible] NAME [illegible]

Date & Time Collected not [illegible] Category [illegible]

[illegible] 07/19/84 ANALYST MCL [illegible]

INSTRUMENT b COMPOUNDS Detected [illegible]

COMPOUND	RESULT	SCAN	COMPOUND	RESULT
Chloromethane	ND		Trichloroethene	ND
Bromomethane	ND		Dibromochloromethane	ND
Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
Chloroethane	ND		cis-1,3-Dichloropropene	ND
Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
Trichlorofluoromethane	ND		Bromoform	ND
1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
1,1-Dichloroethane	ND		Tetrachloroethylene	ND
trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
Chloroform	ND		1,3-Dichlorobenzene	ND
1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
[illegible]	ND		1,4-Dichlorobenzene	ND
[illegible]	ND			
[illegible]	[illegible]			
[illegible]	[illegible]			
[illegible]	[illegible]			

CORPORATION

REPORT — Lab # 84-02-081

Results by Sample — Continued From Above

FRACTION 03B TEST CODE 0_ 601 NAME EPA Method 601 GC

Date & Time Collected not specified Category

... chromatogram

... unless otherwise specified

... detection limit method 601, (Federal Register, 12/3/79)

CORPORATION

REPORT — LAB # 84-02-061

Results by Sample

FRACTION 04B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category ______

DATE INJECTED 02/19/84 ANALYST MCL VERIFIED BY [illegible]

INSTRUMENT a COMPOUNDS DETECTED 1

COMPOUND	RESULT	SCAN	COMPOUND	RESULT
Chloromethane	ND	____	Trichloroethene	ND
Bromomethane	ND	____	Dibromochloromethane	ND
Vinyl Chloride	ND	____	1,1,2-Trichloroethane	ND
Chloroethane	ND	____	cis-1,3-Dichloropropene	ND
Methylene Chloride	ND	____	2-Chloroethylvinyl Ether	ND
Trichlorofluoromethane	ND	____	Bromoform	ND
1,1-Dichloroethene	ND	____	1,1,2,2-Tetrachloroethane	ND
1,1-Dichloroethane	ND	____	Tetrachloroethylene	ND
trans-1,2-Dichloroethene	1.7	____	Chlorobenzene	ND
Chloroform	ND	____	1,3-Dichlorobenzene	ND
1,2-Dichloroethane	ND	____	1,2-Dichlorobenzene	ND
[illegible]ichloroethane	ND	____	1,4-Dichlorobenzene	ND
[illegible]	ND			
[illegible]	ND			
[illegible]	ND			
[illegible]	ND			

CORPORATION

REPORT

Lab # 84-02-061

Results by Sample

Continued From Above

FRACTION 04B TEST CODE GC 601 NAME EPA Method 601 GC

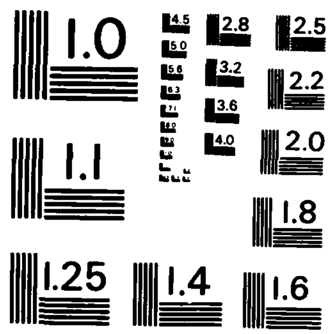
Date & Time Collected not specified Category

otherwise specified.

method 601. (Federal Register, 12/3/79).

AD-A160 094 INSTALLATION RESTORATION PROGRAM PHASE II CONFIRMATION/QUANTIFICATION STA..(U) RADIAN CORP AUSTIN TX D A SANDERS ET AL. SEP 85 3/6

UNCLASSIFIED RAD-DCN-84-212-027-04-02-VOL-2 F/G 13/2 NL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1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0

CORPORATION

REPORT LAB # 84-02-061

Results by Sample

[illegible] TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

Date Analyzed 02/19/84 ANALYST MGL VERIFIED BY [illegible]

INSTRUMENT 6 COMPOUNDS DETECTED [illegible]

COMPOUND	RESULT	SCAN	COMPOUND	RESULT
Chloromethane	ND		Trichloroethene	ND
Bromomethane	ND		Dibromochloromethane	ND
Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
Chloroethane	ND		cis-1,3-Dichloropropene	ND
Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
Trichlorofluoromethane	ND		Bromoform	ND
1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
1,1-Dichloroethane	ND		Tetrachloroethylene	ND
trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
Chloroform	1		1,3-Dichlorobenzene	ND
1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
[illegible]	[illegible]		1,4-Dichlorobenzene	ND
[illegible]	[illegible]			
[illegible]	[illegible]			
[illegible]	[illegible]			

CORPORATION

REPORT | LAB # 84-02-061

Results by Sample | Continued From Above

STATION 05B   TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified   Category

chromatogram

otherwise specified

method 601, (Federal Register, 12/3/79)

CORPORATION

REPORT — LAB # 84-02-061

Results by Sample

SAMPLE ID [illegible] — FRACTION 06B — TEST CODE GC 601 — NAME EPA Method 601/GC

Date & Time Collected not specified — Category

DATE [illegible] 02/19/84 — ANALYST MCL — VERIFIED BY [illegible]

INSTRUMENT a — COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	[illegible]	ND			
	[illegible]	ND			
	[illegible]	[illegible]			
	[illegible]	[illegible]			

CORPORATION

REPORT

LAB # 84-02-061

Results by Sample

Continued From Above

TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

chromatogram.

ug/L unless otherwise specified.

detection limit method 601, (Federal Register, 12/3/79)

CORPORATION

[illegible] REPORT LAB # 84-02-061

Results by Sample

[illegible]

FRACTION 07B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

DATE INJECTED 02/19/84 ANALYST MGL VERIFIED BY JSG

INSTRUMENT b COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropane	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	[illegible]	ND			
	[illegible]	[illegible]			
	[illegible]	[illegible]			
	[illegible]	[illegible]			

CORPORATION

[illegible] ANALYTICAL SERV REPORT LAB # 84-02-061
[illegible] Results by Sample Continued From Above

SAMPLE ID 15-013 FRACTION 07B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT

SCAN = scan number or retention time on chromatogram

All results reported in ug/L unless otherwise specified

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79)

CORPORATION

[illegible] REPORT LAB # 84-02-061

Results by Sample

[illegible] FRACTION 08B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

[illegible] DATE ANALYZED 02/19/84 ANALYST MCL VERIFIED BY JSC

[illegible] INSTRUMENT a COMPOUNDS DETECTED 2

COMPOUND	RESULT	SCAN	COMPOUND	RESULT
Chloromethane	ND	1	Trichloroethene	0.7
Bromomethane	ND		Dibromochloromethane	ND
Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
Chloroethane	ND		cis-1,3-Dichloropropene	ND
Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
Trichlorofluoromethane	ND		Bromoform	ND
1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
1,1-Dichloroethane	ND	2	Tetrachloroethylene	0.3
trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
Chloroform	ND		1,3-Dichlorobenzene	ND
1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
[illegible]	ND		1,4-Dichlorobenzene	ND
[illegible]	ND			
[illegible]	[illegible]			
[illegible]				
[illegible]	[illegible]			

CORPORATION

[illegible] ANALYTICAL [illegible] REPORT LAB # 84-02-061

[illegible] Results by Sample Continued From Above

[illegible] FRACTION 08B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

[illegible] REPORT

[illegible] number or retention time on chromatogram.

[illegible] reported in ug/L unless otherwise specified.

[illegible] not detected at EPA detection limit method 601. (Federal Register, 12/3/79)

CORPORATION

[illegible] Analytical Serv REPORT LAB # 84-02-061

[illegible] NonReported Work

[illegible] TEST CODES FOR WORK NOT REPORTED ELSEWHERE

[illegible]	[illegible]	01D : LOG_IN	01E : LOG_IN
[illegible]	[illegible]	02D : LOG_IN	02E : LOG_IN
[illegible]	[illegible]	03D : LOG_IN	03E : LOG_IN
[illegible]	[illegible]	04D : LOG_IN	04E : LOG_IN
[illegible]	[illegible]	05D : LOG_IN	05E : LOG_IN
[illegible]	[illegible]	06D : LOG_IN	06E : LOG_IN
[illegible]	[illegible]	07D : LOG_IN	07E : LOG_IN
[illegible]	[illegible]	08D : LOG_IN	08E : LOG_IN

CORPORATION

PAGE 1 Analytical Serv REPORT LAB # 84-02-062

RECEIVED: 02/10/84 02/22/84 09:41:34

REPORT TO Radian
Bl. 4
Austin

ATTEN William Little

CLIENT TINKER SAMPLES 8
COMPANY Tinker AFB
FACILITY

WORK ID zone 5 groundwater
TAKEN KAF
TRANS Fed Ex
TYPE
P.O. # 212-027-04-05
INVOICE under separate cover

PREPARED BY Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN
PHONE (512) 454-4797

CERTIFIED BY

CONTACT CONOVER

Note: 1,1,2,2-tetrachloromethane and tetrachloroethylene coelute.

SAMPLE IDENTIFICATION

01	T5-015
02	T5-015 dup
03	T5-016
04	T5-018
05	T5-019
06	T5-020
07	T5-020 dup
08	T5-021

Analytical Serv TEST CODES and NAMES used on this report

GC 601	EPA Method 601/GC
TOC	Total Organic Carbon

Analytical Serv REPORT LAB # 84-02-062

RECEIVED: 02/10/84

RESULTS BY TEST

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
TOC mg/L	<1	<1	<1	<1	<1

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)
TOC mg/L	<1	<1	<1

CORPORATION

Analytical Serv REPORT LAB # 84-02-062

RECEIVED: 02/10/84 Results by Sample

SAMPLE ID T5-015 FRACTION 01B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 02/19/84 ANALYST MCL VERIFIED BY JSG

CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

CORPORATION

 Analytical Serv REPORT LAB # 84-02-062

RECEIVED: 02/10/84 Results by Sample Continued From Above

SAMPLE ID T5-015 FRACTION 01B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category ____

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

CORPORATION

PAGE 5 Analytical Serv REPORT LAB # 84-02-062

RECEIVED: 02/10/84 Results by Sample

SAMPLE ID T5-015 dup FRACTION 02B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

DATA FILE A DATE INJECTED 02/19/84 ANALYST MCL VERIFIED BY JSG

CONC. FACTOR INSTRUMENT a COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichlorcethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

SAMPLE ID T5-015 dup FRACTION 02B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category ______

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

CORPORATION

RECEIVED: 02/10/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-062

SAMPLE ID T5-016

FRACTION 03B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B
CONC. FACTOR

DATE INJECTED 02/20/84

ANALYST RGS
INSTRUMENT b

VERIFIED BY JSG
COMPOUNDS DETECTED 3

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	2	Trichloroethene	2.2
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND	3	Tetrachloroethylene	0.7
1	trans-1,2-Dichloroethene	1.2		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

SAMPLE ID T5-016 FRACTION 03B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

CORPORATION

RECEIVED: 02/10/84

Analytical Serv REPORT

Results by Sample

LAB # 84-02-062

SAMPLE ID T5-018 FRACTION 04B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

DATA FILE 8 DATE INJECTED 02/20/84 ANALYST RGS VERIFIED BY JSG

CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 9

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	7	Trichloroethene	1750
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
1	Methylene Chloride	1.1		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
2	1,1-Dichloroethene	0.2		1,1,2,2-Tetrachloroethane	ND
3	1,1-Dichloroethane	1.4	8	Tetrachloroethylene	30.1
4	trans-1,2-Dichloroethene	31.7	9	Chlorobenzene	7.9
	Chloroform	ND		1,3-Dichlorobenzene	ND
5	1,2-Dichloroethane	25.8		1,2-Dichlorobenzene	ND
6	1,1,1-Trichloroethane	1.8		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

CORPORATION

Analytical Serv REPORT
LAB # 84-02-062

RECEIVED: 02/10/84
Results by Sample
Continued From Above

SAMPLE ID T5-018 FRACTION 04B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

CORPORATION

RECEIVED: 02/10/84

Analytical Serv REPORT LAB # 84-02-062
Results by Sample

SAMPLE ID T5-019 FRACTION 05B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 02/20/84 ANALYST MCL VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
1	Methylene Chloride	0.6		2-Chloroethylvinyl Et'er	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND	2	Tetrachloroethylene	7.8
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

SAMPLE ID T5-019 FRACTION 05B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

CORPORATION

RECEIVED: 02/10/84

Analytical Serv REPORT LAB # 84-02-062

Results by Sample

SAMPLE ID T5-020

FRACTION 06B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

DATA FILE A DATE INJECTED 02/21/84 ANALYST RGS VERIFIED BY JSQ

CONC. FACTOR INSTRUMENT a COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

RECEIVED: 02/10/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-062
Continued From Above

SAMPLE ID T5-020

FRACTION 06B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601. (Federal Register, 12/3/79).

Analytical Serv REPORT LAB # 84-02-062

RECEIVED: 02/10/84 Results by Sample

SAMPLE ID T5-020 dup FRACTION 07B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 02/21/84 ANALYST RGS VERIFIED BY JSG

CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

CORPORATION

PAGE 16 Analytical Serv REPORT LAB # 84-02-062
RECEIVED: 02/10/84 Results by Sample Continued From Above

SAMPLE ID T5-020 dup FRACTION 07B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category ______

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

CORPORATION

PAGE 17 Analytical Serv REPORT LAB # 84-02-062

RECEIVED: 02/10/84 Results by Sample

SAMPLE ID T5-021 FRACTION 08B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

DATA FILE A DATE INJECTED 02/21/84 ANALYST RGS VERIFIED BY JSG

CONC. FACTOR INSTRUMENT a COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

SAMPLE ID T5-021 FRACTION 08B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

01C	:	DUP601	01D	:	LOG_IN	01E	:	LOG_IN
02C	:	DUP601	02D	:	LOG_IN	02E	:	LOG_IN
03C	:	DUP601	03D	:	LOG_IN	03E	:	LOG_IN
04C	:	DUP601	04D	:	LOG_IN	04E	:	LOG_IN
05C	:	DUP601	05D	:	LOG_IN	05E	:	LOG_IN
06C	:	DUP601	06D	:	LOG_IN	06E	:	LOG_IN
07C	:	DUP601	07D	:	LOG_IN	07E	:	LOG_IN
08C	:	DUP601	08D	:	LOG_IN	08E	:	LOG_IN

CORPORATION

Analytical Serv REPORT

LAB # 84-02-063

RECEIVED: 02/10/84

02/22/84 09:49:32

REPORT TO: Radian
Bl. 4
Austin

ATTEN: William Little

CLIENT: TINKER

SAMPLES: 7

COMPANY: Tinker AFB

FACILITY:

PREPARED BY: Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN:

PHONE: (512) 454-4797

CERTIFIED BY

CONTACT: CONOVER

WORK ID: zone 5 groundwater
TAKEN: KAF
TRANS: Fed Ex
TYPE:
P.O. #: 212-027-04-05
INVOICE: under separate cover

SAMPLE IDENTIFICATION

01 T5-022
02 T5-023
03 T5-024
04 T5-025
05 T5-025 dup
06 T5-026
07 T5-027

Analytical Serv TEST CODES and NAMES used on this report

GC 601 EPA Method 601/GC
TOC Total Organic Carbon

CORPORATION

RECEIVED: 02/10/84

Analytical Serv REPORT

RESULTS BY TEST

LAB # 84-02-063

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
TOC mg/L	<1	<1	<1	<1	<1

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)
TOC mg/L	<1	<1

Analytical Serv REPORT LAB # 84-02-063

RECEIVED: 02/10/84

Results by Sample

SAMPLE ID T5-022 FRACTION 01B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 02/21/84 ANALYST RGS VERIFIED BY JSG

CONC. FACTOR INSTRUMENT 6 COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

SAMPLE ID T5-022 FRACTION 01B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

CORPORATION

Analytical Serv REPORT LAB # 84-02-063

RECEIVED: 02/10/84 Results by Sample

SAMPLE ID T5-023 FRACTION 02B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

DATA FILE A DATE INJECTED 02/21/84 ANALYST RGS VERIFIED BY JSG

CONC. FACTOR INSTRUMENT a COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

CORPORATION

 Analytical Serv REPORT LAB # 84-02-063
RECEIVED: 02/10/84 Results by Sample Continued From Above

SAMPLE ID T5-023 FRACTION 02B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601. (Federal Register, 12/3/79).

Analytical Serv REPORT LAB # 84-02-063
RECEIVED: 02/10/84 Results by Sample

SAMPLE ID T5-024 FRACTION 03B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE A DATE INJECTED 02/21/84 ANALYST RGS VERIFIED BY JSG
CONC. FACTOR INSTRUMENT a COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

RECEIVED: 02/10/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-063
Continued From Above

SAMPLE ID T5-024

FRACTION 03B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category ________

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

CORPORATION

PAGE 9 Analytical Serv REPORT LAB # 84-02-063
RECEIVED: 02/10/84 Results by Sample

SAMPLE ID T5-025 FRACTION 04B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE A DATE INJECTED 02/21/84 ANALYST RGS VERIFIED BY JSG
CONC. FACTOR INSTRUMENT a COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

SAMPLE ID T5-025 FRACTION 04B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601. (Federal Register, 12/3/79).

CORPORATION

RECEIVED: 02/10/84

Analytical Serv REPORT

Results by Sample

LAB # 84-02-063

SAMPLE ID T5-025 dup FRACTION 05B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

DATA FILE A DATE INJECTED 02/21/84 ANALYST RGS VERIFIED BY JSG

CONC. FACTOR INSTRUMENT a COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

SAMPLE ID T5-025 dup FRACTION 05B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category ______

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

CORPORATION

RECEIVED: 02/10/84

Analytical Serv REPORT

Results by Sample

LAB # 84-02-063

SAMPLE ID T5-026

FRACTION 06B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

DATA FILE A
CONC. FACTOR

DATE INJECTED 02/21/84

ANALYST RGS
INSTRUMENT a

VERIFIED BY JSG
COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

CORPORATION

Analytical Serv REPORT
LAB # 84-02-063

RECEIVED: 02/10/84
Results by Sample
Continued From Above

SAMPLE ID T5-026
FRACTION 06B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

CORPORATION

Analytical Serv REPORT LAB # 84-02-063

RECEIVED: 02/10/84 Results by Sample

SAMPLE ID T5-027 FRACTION 07B TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 02/21/84 ANALYST MCL VERIFIED BY JSG

CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

RECEIVED: 02/10/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-063
Continued From Above

SAMPLE ID T5-027

FRACTION 07B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

01C	!	DUP601	01D	!	LOG_IN	01E	!	LOG_IN
02C	!	DUP601	02D	!	LOG_IN	02E	!	LOG_IN
03C	!	DUP601	03D	!	LOG_IN	03E	!	LOG_IN
04C	!	DUP601	04D	!	LOG_IN	04E	!	LOG_IN
05C	!	DUP601	05D	!	LOG_IN	05E	!	LOG_IN
06C	!	DUP601	06D	!	LOG_IN	06E	!	LOG_IN
07C	!	DUP601	07D	!	LOG_IN	07E	!	LOG_IN

CORPORATION

PAGE 1 Analytical Serv REPORT LAB # 84-02-087
RECEIVED: 02/14/84 02/24/84 12:13:27

REPORT TO: Radian
Bl. 4
Austin

ATTEN: William Little

CLIENT: TINKER SAMPLES: 10
COMPANY: Tinker AFB
FACILITY:

WORK ID: soils zone 4
TAKEN: L. French
TRANS: Fed Ex
TYPE:
P.O. #: 212-027-04-05
INVOICE: under separate cover

PREPARED BY: Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN:
PHONE: (512) 454-4797

CERTIFIED BY

CONTACT: CONOVER

SAMPLE IDENTIFICATION

01	4B.5
02	4B.6
03	4C.5
04	4D.2
05	4E.2
06	4E.3
07	4E.4
08	4E.5
09	4F.2
10	4F.3

Analytical Serv TEST CODES and NAMES used on this report

CD E	Cadmium, ICPES
CNTOTA	Total Cyanide
CR E	Chromium, ICPES
CU E	Copper, ICPES
HG CA	Mercury, Cold Vapor
NI E	Nickel, ICPES
ONG IR	Oil and Grease, Infrared
PB GA	Lead, low level
PHEN A	Total Phenolics
PREP W	Special Digestion Method
PREP X	Special Digestion Method
TOC	Total Organic Carbon
TOX 1	TOX Single Analysis
ZN E	Zinc, ICPES

Analytical Serv REPORT LAB # 84-02-087

RECEIVED: 02/14/84

RESULTS BY TEST

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
CD_E ug/ml	<.21 ug/g	<.20 ug/g	1.7 ug/g	17 ug/g	1.7 ug/g
CNTOTA mg/L	<1 ug/g	<1 ug/g	<1 ug/g	<1 ug/g	<1 ug/g
CR_E ug/ml	4.9 ug/g	8.5 ug/g	11 ug/g	42 ug/g	9.1 ug/g
CU_E ug/ml	4.2 ug/g	7.1 ug/g	8.5 ug/g	16 ug/g	15 ug/g
HG_CA ug/ml	10 ug/g	<.05 ug/g	<.05 ug/g	<.05 ug/g	<.05 ug/g
NI_E ug/ml	3.0 ug/g	11 ug/g	8.3 ug/g	11 ug/g	14 ug/g
ONG_IR mg/L	780 ug/g	410 ug/g	290 ug/g	206 ug/g	1070 ug/g
PB_GA ug/ml	6.4 ug/g	8.9 ug/g	8.4 ug/g	85 ug/g	2.9 ug/g
PHEN_A mg/L	<.2 ug/g	<.2 ug/g	<.2 ug/g	<.2 ug/g	<.2 ug/g
PREP_W date complete	02/16/84	02/16/84	02/16/84	02/16/84	02/16/84
PREP_X date complete	02/16/84	02/16/84	02/16/84	02/16/84	02/16/84
TOC mg/L	0.12 %	0.10 %	0.08 %	0.15 %	0.10 %
TOX_1 mg/L	0.20 ug/g	<.10 ug/g	<.10 ug/g	<.10 ug/g	<.10 ug/g
ZN_E ug/ml	5.3 ug/g	9.4 ug/g	7.4 ug/g	57 ug/g	14 ug/g

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)	Sample 10 (entered units)
CD_E ug/ml	340 ug/g	<.20 ug/g	1.5 ug/g	2.7 ug/g	5.0 ug/g
CNTOTA mg/L	<1 ug/g	<1 ug/g	<1 ug/g	<1 ug/g	<1 ug/g
CR_E ug/ml	78 ug/g	5.6 ug/g	6.3 ug/g	230 ug/g	32 ug/g
CU_E ug/ml	47 ug/g	3.8 ug/g	9.2 ug/g	24 ug/g	9.7 ug/g
HG_CA ug/ml	<.05 ug/g	<.05 ug/g	<.05 ug/g	<.05 ug/g	<.05 ug/g
NI_E ug/ml	39 ug/g	5.4 ug/g	9.6 ug/g	22 ug/g	8.0 ug/g
ONG_IR mg/L	140 ug/g	240 ug/g	550 ug/g	200 ug/g	150 ug/g
PB_GA ug/ml	660 ug/g	7.4 ug/g	0.99 ug/g	150 ug/g	18 ug/g
PHEN_A mg/L	<.2 ug/g	<.2 ug/g	<.2 ug/g	<.2 ug/g	<.2 ug/g
PREP_W date complete	02/16/84	02/16/84	02/16/84	02/16/84	02/16/84
PREP_X date complete	02/16/84	02/16/84	02/16/84	02/16/84	02/16/84
TOC mg/L	0.13 %	0.10 %	0.12 %	0.08 %	0.05 %
TOX_1 mg/L	<.10 ug/g	<.10 ug/g	<.10 ug/g	<.10 ug/g	<.10 ug/g
ZN_E ug/ml	1400 ug/g	6.6 ug/g	7.8 ug/g	75 ug/g	17 ug/g

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RECEIVED 02/15/84 | 03/14/84 08:33:22

REPORT TO Radian
01 3
Austin

ATTEN William Little

CLIENT TINKER SAMPLES 3
COMPANY Tinker AFB
FACILITY

WORK ID zone 1 groundwater
TAKEN FBB, LF
TRANS Fed Ex
TYPE
P.O. # 212-027-04-05
INVOICE under separate cover

PREPARED BY Radian Analytical Services
8501 MoPac Blvd
P.O. Box 9948
Austin, Texas 78766

ATTEN
PHONE (512) 454-4797

CERTIFIED BY

CONTACT CONOVER

SAMPLE IDENTIFICATION

01 1A
02 1B
03 1C

Analytical Serv TEST CODES and NAMES used on this report

ANFS	Method 625 Acid/Neutrals
CD E	Cadmium, ICPES
CNTOTA	Total Cyanide
CR E	Chromium, ICPES
CU E	Copper, ICPES
FE E	Iron, ICPES
HERBES	Herbicides EC
HG CA	Mercury, Cold Vapor
MN E	Manganese, ICPES
NI E	Nickel, ICPES
ONG IR	Oil and Grease, Infrared
PB GA	Lead, low level
PESTES	EPA 608 Pesticides by EC
PHEN A	Total Phenolics
TOC	Total Organic Carbon
TOX 1	TOX Single Analysis
ZN E	Zinc, ICPES

CORPORATION

PAGE 2 Analytical Serv REPORT LAB # 84-02-102

RECEIVED 02/15/84 RESULTS BY TEST

TEST CODE (default units)	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)
CD_E ug/ml	0.008	<.002	<.002
CNTOTA mg/L	<.01	<.01	<.01
CR_E ug/ml	0.008	0.007	<.001
CU_E ug/ml	0.009	<.001	<.001
FE_E ug/ml	0.025	<.008	0.017
HG_CA ug/ml	0.0005	0.0006	0.0005
MN_E ug/ml	0.23	0.013	0.007
NI_E ug/ml	0.008	<.003	<.003
O&G_IR mg/L	<1	<1	<1
PB_GA ug/ml	<.002	<.002	<.002
PHEN_A mg/L	<.005	<.005	<.005
TOC mg/L	[illegible]	<1	<1
TOX_I mg/L	0.08	0.06	0.06
ZN_E ug/ml	.003	<.003	<.003

CORPORATION

PAGE [illegible] Analytical Serv REPORT LAB # 84-02-102
RECEIVED: 02/15/84 Results by Sample

SAMPLE ID 1A FRACTION 01F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

DATA FILE B10201AN DATE EXTRACTED 02/29/84 ANALYST LK VERIFIED BY CKT
CONC FACTOR DATE INJECTED 03/12/84 INSTRUMENT COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES	SCAN	EPA	RESULT
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
[illegible]	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
[illegible]	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
[illegible]	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
[illegible]	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
[illegible]	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
[illegible]	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
[illegible]	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
[illegible]	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
[illegible]	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
[illegible]	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
[illegible]	41B	4-bromophenyl phenyl ether	ND	4?B	84B	pyrene	ND
[illegible]	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
[illegible]	43B	bis(2-chloroethoxy)methane	ND	[illegible]	22A	p-chloro-m-cresol	ND
[illegible]	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

CORPORATION

RECEIVED 02/15/84

Analytical Serv REPORT

Results by Sample

LAB # 84-02-102

Continued From Above

SAMPLE ID 1A

FRACTION 01F TEST CODE ANFS NAME Method 625 Acid/Neutrals

Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
1[illegible]B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15[illegible]	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
[illegible]9B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
[illegible]4B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT

SCAN = scan number or retention time on chromatogram

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute

A = benzo(a)anthracene and chrysene co-elute

CORPORATION

PAGE ? Analytical Serv REPORT LAB # 84-02-102
RECEIVED 02/15/84 Results by Sample Continued From Above

SAMPLE ID 1A FRACTION 01F TEST CODE ANF5 NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

b - anthracene and phenanthrene co-elute

CORPORATION

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RECEIVED 02/15/84 | Results by Sample

SAMPLE ID 1A | FRACTION 01G TEST CODE HERBES NAME Herbicides EC
Date & Time Collected not specified Category

DATE EXTRACTED 02/22/84 | DATE INJECTED 02/28/84 | VERIFIED BY CKT
CONCENTRATION FACTOR | ANALYST DL

COMPOUND	RESULT	DET LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND	5 ppb			
2,4,5-TP (Silvex)	55	5 ppb			

NOTES AND DEFINITIONS FOR THIS REPORT

ND = not detected at the specified detection limit.
All results reported in micrograms/liter unless otherwise specified.

RADIAN CORPORATION

RECEIVED: 02/15/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-102

SAMPLE ID 1A

FRACTION 01G TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

DATA FILE 840210201
CONC. FACTOR 200

DATE EXTRACTED 02/25/84
DATE INJECTED 02/28/84

ANALYST DL

VERIFIED BY CKT
COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4'-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4'-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4'-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
15P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

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Analytical Serv REPORT
Results by Sample

LAB # 84-02-102
Continued From Above

RECEIVED: 02/15/84

SAMPLE ID 1A

FRACTION 01G TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

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RECEIVED: 02/15/84 Results by Sample

SAMPLE ID 1B FRACTION 02F TEST CODE ANFS NAME Method 625 Acid/Neutrals

Date & Time Collected not specified Category

DATA FILE B10202AN DATE EXTRACTED 02/29/84 ANALYST LK VERIFIED BY CKT

CONC. FACTOR DATE INJECTED 03/12/84 INSTRUMENT COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES	SCAN		EPA
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RADIAN CORPORATION

RECEIVED: 02/15/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-102
Continued From Above

SAMPLE ID 1B

FRACTION 02F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

SAMPLE ID 1B FRACTION 02F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

B = anthracene and phenanthrene co-elute.

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-102

Results by Sample

RECEIVED: 02/15/84

SAMPLE ID 1B

FRACTION 02G TEST CODE HERBES NAME Herbicides EC

Date & Time Collected not specified Category

DATE EXTRACTED 02/25/84 DATE INJECTED 02/28/84 VERIFIED BY CKT

CONCENTRATION FACTOR ANALYST DL

COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND	5 ppb			
2,4,5-TP (Silvex)	ND	5 ppb			

NOTES AND DEFINITIONS FOR THIS REPORT.

ND = not detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified.

RADIAN CORPORATION

PAGE 13 Analytical Serv REPORT LAB # 84-02-102
RECEIVED: 02/15/84 Results by Sample

SAMPLE ID 1B FRACTION 02G TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

DATA FILE 840210202 DATE EXTRACTED 02/25/84 ANALYST DL VERIFIED BY CKT
CONC. FACTOR 200 DATE INJECTED 02/28/84 COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4'-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4'-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4'-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
15P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

SAMPLE ID 1B FRACTION 02G TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

RECEIVED: 02/15/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-102

SAMPLE ID 1C

FRACTION 03F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

DATA FILE B10203AN DATE EXTRACTED 02/29/84 ANALYST LK VERIFIED BY CKT
CONC. FACTOR DATE INJECTED 03/12/84 INSTRUMENT COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RADIAN CORPORATION

PAGE 16 Analytical Serv REPORT LAB # 84-02-102
RECEIVED: 02/15/84 Results by Sample Continued From Above

SAMPLE ID 1C FRACTION 03F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

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RECEIVED: 02/15/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-102
Continued From Above

SAMPLE ID 1C

FRACTION 03F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

B = anthracene and phenanthrene co-elute.

RADIAN CORPORATION

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RECEIVED: 02/15/84 Results by Sample

SAMPLE ID 1C FRACTION 03G TEST CODE HERBES NAME Herbicides EC
Date & Time Collected not specified Category

DATE EXTRACTED 02/25/84
CONCENTRATION FACTOR
DATE INJECTED 02/28/84
ANALYST DL
VERIFIED BY CKT

COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND	5 ppb			
2,4,5-TP (Silvex)	ND	5 ppb			

NOTES AND DEFINITIONS FOR THIS REPORT.
ND = not detected at the specified detection limit.
All results reported in micrograms/liter unless otherwise specified.

RECEIVED: 02/15/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-102

SAMPLE ID 1C

FRACTION 03G TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

DATA FILE 840210203
CONC. FACTOR 200

DATE EXTRACTED 02/25/84
DATE INJECTED 02/28/84

ANALYST DL

VERIFIED BY CKT
COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4'-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4'-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4'-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
15P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

SAMPLE ID 1C FRACTION 03G TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

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NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-102

RECEIVED: 02/15/84 NonReported Work

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

01H	:	LOG_IN	01I	:	LOG_IN	01J	:	LOG_IN	01K	:	LOG_IN
02H	:	LOG_IN	02I	:	LOG_IN	02J	:	LOG_IN	02K	:	LOG_IN

RADIAN CORPORATION

PAGE 1 Analytical Serv REPORT LAB # 84-02-103

RECEIVED: 02/15/84 03/14/84 08:41:54

REPORT TO	Radian Bl. 4 Austin	PREPARED BY	Radian Analytical Services 8501 MoPac Blvd. P.O. Box 9948 Austin, Texas 78766
ATTEN	William Little	ATTEN	
		PHONE	(512) 454-4797

CERTIFIED BY

CONTACT CONOVER

CLIENT TINKER SAMPLES 1
COMPANY Tinker AFB
FACILITY

WORK ID zone 4 groundwater
TAKEN FBB
TRANS Fed Ex
TYPE
P.O. # 212-027-04-05
INVOICE under separate cover

SAMPLE IDENTIFICATION

01 4A

Analytical Serv TEST CODES and NAMES used on this report

ANFS	Method 625 Acid/Neutrals
CD E	Cadmium, ICPES
CNTOTA	Total Cyanide
CR E	Chromium, ICPES
CU E	Copper, ICPES
HG CA	Mercury, Cold Vapor
NI E	Nickel, ICPES
ONG IR	Oil and Grease, Infrared
PB GA	Lead, low level
PHEN A	Total Phenolics
TOC	Total Organic Carbon
TOX 1	TOX Single Analysis
ZN E	Zinc, ICPES

RADIAN CORPORATION

RECEIVED: 02/15/84

Analytical Serv REPORT
RESULTS BY TEST

LAB # 84-02-103

TEST CODE default units	Sample 01 (entered units)
CD_E ug/ml	<.002
CNTOTA mg/L	<.01
CR_E ug/ml	0.014
CU_E ug/ml	0.021
HG_CA ug/ml	0.0004
NI_E ug/ml	0.009
ONG_IR mg/L	<1
PB_GA ug/ml	0.006
PHEN_A mg/L	<.005
TOC mg/L	<1
TOX_1 mg/L	0.06
ZN_E ug/ml	1.2

RADIAN CORPORATION

PAGE 3 Analytical Serv REPORT LAB # 84-02-103
RECEIVED: 02/15/84 Results by Sample

SAMPLE ID 4A FRACTION 01F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

DATA FILE B10301 DATE EXTRACTED 02/29/84 ANALYST MF VERIFIED BY CKT
CONC. FACTOR DATE INJECTED 03/12/84 INSTRUMENT COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN			EPA
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RADIAN CORPORATION

PAGE 4 Analytical Serv REPORT LAB # 84-02-103
RECEIVED: 02/15/84 Results by Sample Continued From Above

SAMPLE ID 4A FRACTION 01F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

RECEIVED: 02/15/84 Results by Sample Continued From Above

SAMPLE ID 4A FRACTION 01F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

B = anthracene and phenanthrene co-elute.

RECEIVED: 02/15/84 NonReported Work

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

01G : LOG_IN

RADIAN CORPORATION

Analytical Serv REPORT

LAB # 84-02-107

RECEIVED: 02/16/84

03/14/84 08:44:38

REPORT TO Radian
B1. 4
Austin

ATTEN William Little

CLIENT TINKER SAMPLES 1
COMPANY Tinker AFB
FACILITY

WORK ID zone 2 groundwater
TAKEN FBB
TRANS Fed Ex
TYPE
P.O. # 212-027-04-05
INVOICE under separate cover

PREPARED BY Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN
PHONE (512) 454-4797

CERTIFIED BY

CONTACT CONOVER

SAMPLE IDENTIFICATION

01 2A

Analytical Serv TEST CODES and NAMES used on this report

ANFS	Method 625 Acid/Neutrals
BA E	Barium, ICPES
CD E	Cadmium, ICPES
CNTOTA	Total Cyanide
CR E	Chromium, ICPES
CU E	Copper, ICPES
FE E	Iron, ICPES
HERBES	Herbicides EC
HG CA	Mercury, Cold Vapor
NI E	Nickel, ICPES
ONG IR	Oil and Grease, Infrared
PB GA	Lead, low level
PESTES	EPA 608 Pesticides by EC
PHEN A	Total Phenolics
TOC	Total Organic Carbon
TOX 1	TOX Single Analysis
ZN E	Zinc, ICPES

RADIAN CORPORATION

RECEIVED: 02/16/84

Analytical Serv REPORT
RESULTS BY TEST

LAB # 84-02-107

TEST CODE default units	Sample 01 (entered units)
BA_E ug/ml	0.21
CD_E ug/ml	0.006
CNTOTA mg/L	<.01
CR_E ug/ml	<.001
CU_E ug/ml	<.001
FE_E ug/ml	0.23
HG_CA ug/ml	0.0004
NI_E ug/ml	<.003
ONG_IR mg/L	<1
PB_GA ug/ml	<.002
PHEN_A mg/L	<.005
TOC mg/L	<1
TOX_1 mg/L	<.01
ZN_E ug/ml	0.34

PAGE 3 Analytical Serv REPORT LAB # 84-02-107
RECEIVED: 02/16/84 Results by Sample

SAMPLE ID 2A FRACTION 01F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

DATA FILE B10701F DATE EXTRACTED 02/29/84 ANALYST MF VERIFIED BY CKT
CONC. FACTOR DATE INJECTED 03/12/84 INSTRUMENT COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN			EPA
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RADIAN CORPORATION

RECEIVED: 02/16/84 — Analytical Serv REPORT — Results by Sample — LAB # 84-02-107 Continued From Above

SAMPLE ID 2A — FRACTION 01F — TEST CODE ANFS — NAME Method 625 Acid/Neutrals

Date & Time Collected not specified — Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

RECEIVED: 02/16/84 Analytical Serv REPORT Results by Sample LAB # 84-02-107 Continued From Above

SAMPLE ID 2A FRACTION 01F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

B = anthracene and phenanthrene co-elute.

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-107
RECEIVED: 02/16/84
Results by Sample

SAMPLE ID 2A
FRACTION 01G TEST CODE HERBES NAME Herbicides EC
Date & Time Collected not specified Category

DATE EXTRACTED 02/25/84
CONCENTRATION FACTOR 200
DATE INJECTED 03/01/84
ANALYST DRL
VERIFIED BY CKT

COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND	0.1			
2,4,5-TP (Silvex)	ND	0.1			

NOTES AND DEFINITIONS FOR THIS REPORT.
ND = not detected at the specified detection limit.
All results reported in micrograms/liter unless otherwise specified.

RADIAN CORPORATION

RECEIVED: 02/16/84

Analytical Serv REPORT

Results by Sample

LAB # 84-02-107

SAMPLE ID 2A

FRACTION 01G TEST CODE PESTES NAME EPA 608 Pesticides by EC

Date & Time Collected not specified Category

DATA FILE 8402107
CONC. FACTOR 200

DATE EXTRACTED 02/17/84
DATE INJECTED 03/01/84

ANALYST DRL

VERIFIED BY CKT
COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4'-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4'-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4'-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
15P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

RADIAN CORPORATION

RECEIVED: 02/16/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-107
Continued From Above

SAMPLE ID 2A

FRACTION 01G TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

RADIAN CORPORATION

Analytical Serv REPORT

LAB # 84-02-108

RECEIVED: 02/16/84

03/14/84 08:48:23

REPORT TO: Radian
Bl. 4
Austin

ATTEN: William Little

CLIENT: TINKER
SAMPLES: 3
COMPANY: Tinker AFB
FACILITY:

PREPARED BY: Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN:
PHONE: (512) 454-4797

CERTIFIED BY

CONTACT: CONOVER

WORK ID: zone 3 groundwater
TAKEN: FBB
TRANS: Fed Ex
TYPE:
P.O. #: 212-027-04-05
INVOICE: under separate cover

SAMPLE IDENTIFICATION

01	3E
02	3F
03	3G

Analytical Serv TEST CODES and NAMES used on this report

ANFS	Method 625 Acid/Neutrals
CD E	Cadmium, ICPES
CNTOTA	Total Cyanide
CR E	Chromium, ICPES
CU E	Copper, ICPES
HG CA	Mercury, Cold Vapor
NI E	Nickel, ICPES
ONG IR	Oil and Grease, Infrared
PB GA	Lead, low level
PHEN A	Total Phenolics
TOC	Total Organic Carbon
TOX 1	TOX Single Analysis
ZN E	Zinc, ICPES

RADIAN CORPORATION

RECEIVED: 02/16/84

Analytical Serv REPORT
RESULTS BY TEST

LAB # 84-02-108

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)
CD_E ug/ml	<.002	<.002
CNTOTA mg/L	<.01	<.01
CR_E ug/ml	<.001	<.001
CU_E ug/ml	<.001	<.001
HG_CA ug/ml	0.0004	0.0006
NI_E ug/ml	<.003	<.003
ONG_IR mg/L	<1	<1
PB_GA ug/ml	<.002	<.002
PHEN_A mg/L	<.005	<.005
TOC mg/L	<1	3
TOX_1 mg/L	<.01	<.01
ZN_E ug/ml	0.016	0.024

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-108

RECEIVED: 02/16/84 Results by Sample

SAMPLE ID 3E FRACTION 01F TEST CODE ANFS NAME Method 625 Acid/Neutrals

Date & Time Collected not specified Category

DATA FILE B10801F DATE EXTRACTED 03/01/84 ANALYST LAK VERIFIED BY CKT

CONC. FACTOR DATE INJECTED 03/12/84 INSTRUMENT COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RADIAN CORPORATION

Analytical Serv REPORT
Results by Sample
LAB # 84-02-108
Continued From Above

RECEIVED: 02/16/84

SAMPLE ID 3E FRACTION 01F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

SAMPLE ID 3E FRACTION 01F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

B = anthracene and phenanthrene co-elute.

RADIAN CORPORATION

PAGE 6 Analytical Serv REPORT LAB # 84-02-108
RECEIVED: 02/16/84 Results by Sample

SAMPLE ID 3F FRACTION 02F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

DATA FILE B10802AN DATE EXTRACTED 03/01/84 ANALYST LAK VERIFIED BY CKT
CONC. FACTOR DATE INJECTED 03/12/84 INSTRUMENT COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RECEIVED: 02/16/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-108
Continued From Above

SAMPLE ID 3F   FRACTION 02F   TEST CODE ANFS   NAME Method 625 Acid/Neutrals
Date & Time Collected not specified   Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

SAMPLE ID 3F FRACTION 02F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

B = anthracene and phenanthrene co-elute.

RADIAN CORPORATION

Analytical Serv REPORT

LAB # 84-02-108

RECEIVED: 02/16/84

NonReported Work

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

03A : LOG_IN

RADIAN CORPORATION

PAGE 1 | Analytical Serv REPORT | LAB # 84-02-109
RECEIVED: 02/16/84 | 02/28/84 09:10:47

REPORT TO: Radian
Bl. 4
Austin

ATTEN: William Little

PREPARED BY: Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN:
PHONE: (512) 454-4797

CERTIFIED BY

CONTACT: CONOVER

CLIENT: TINKER
SAMPLES: 1
COMPANY: Tinker AFB
FACILITY:

WORK ID: zone 4 groundwater
TAKEN: FBB
TRANS: Fed Ex
TYPE:
P.O. #: 212-027-04-05
INVOICE: under separate cover

SAMPLE IDENTIFICATION

01 4G

Analytical Serv TEST CODES and NAMES used on this report

CD E	Cadmium, ICPES
CNTOTA	Total Cyanide
CR E	Chromium, ICPES
CU E	Copper, ICPES
HG CA	Mercury, Cold Vapor
NI E	Nickel, ICPES
ONG IR	Oil and Grease, Infrared
PB GA	Lead, low level
PHEN A	Total Phenolics
TOC	Total Organic Carbon
TOX 1	TOX Single Analysis
ZN E	Zinc, ICPES

RECEIVED: 02/16/84 Analytical Serv REPORT LAB # 84-02-109

RESULTS BY TEST

TEST CODE default units	Sample 01 (entered units)
CD_E ug/ml	<.002
CNTOTA mg/L	<.01
CR_E ug/ml	<.001
CU_E ug/ml	<.001
HG_CA ug/ml	<.0002
NI_E ug/ml	0.008
ONG_IR mg/L	<1
PB_GA ug/ml	0.022
PHEN_A mg/L	<.005
TOC mg/L	43
TOX_1 mg/L	<.01
ZN_E ug/ml	1.4

RADIAN CORPORATION

PAGE 1 | Analytical Serv REPORT | LAB # 84-02-140

RECEIVED: 02/20/84 | 03/15/84 09:53:34

REPORT TO: Radian
Bl. 4
Austin

ATTEN: William Little

CLIENT: TINKER | SAMPLES: 6
COMPANY: Tinker AFB
FACILITY:

WORK ID: zone 1
TAKEN: FBB
TRANS: Fed Ex
TYPE:
P.O. #: 212-027-04-05
INVOICE: under separate cover

PREPARED BY: Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN:
PHONE: (512) 454-4797

CERTIFIED BY

CONTACT: CONOVER

SAMPLE IDENTIFICATION

01	groundwater 1
02	groundwater 2
03	groundwater 3
04	groundwater 4
05	groundwater 5
06	groundwater 6

Analytical Serv TEST CODES and NAMES used on this report

CD E	Cadmium, ICPES
CNTOTA	Total Cyanide
CR E	Chromium, ICPES
CU E	Copper, ICPES
FE E	Iron, ICPES
HERBES	Herbicides EC
HG CA	Mercury, Cold Vapor
MN E	Manganese, ICPES
NI E	Nickel, ICPES
ONG IR	Oil and Grease, Infrared
PB GA	Lead, low level
PESTES	EPA 608 Pesticides by EC
PHEN A	Total Phenolics
TOC	Total Organic Carbon
TOX 1	TOX Single Analysis
ZN E	Zinc, ICPES

RADIAN CORPORATION

RECEIVED: 02/20/84

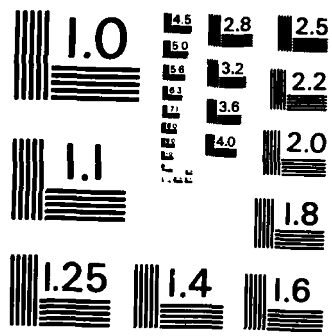
Analytical Serv REPORT
RESULTS BY TEST

LAB # 84-02-140

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
CD_E ug/ml	<.002	<.002	<.002	<.002	<.002
CNTOTA mg/L	<.01	<.01	<.01	<.01	<.01
CR_E ug/ml	<.001	<.001	<.001	<.001	<.001
CU_E ug/ml	<.001	<.001	<.001	<.001	<.001
FE_E ug/ml	<.008	<.008	<.008	<.008	<.008
HG_CA ug/ml	<.0005	<.0005	<.0005	<.0005	<.0005
MN_E ug/ml	0.76	0.71	1.2	1.1	0.053
NI_E ug/ml	<.003	<.003	<.003	<.003	<.003
ONG_IR mg/L	<1	<1	<1	<1	<1
PB_GA ug/ml	<.002	<.002	<.002	<.002	<.002
PHEN_A mg/L	<.005	<.005	<.005	<.005	<.005
TOC mg/L	9	37	17	33	5
TOX_1 mg/L	0.05	0.04	<.01	0.20	<.01
ZN_E ug/ml	<.003	<.003	<.003	0.044	<.003

AD-A160 094 INSTALLATION RESTORATION PROGRAM PHASE II CONFIRMATION/QUANTIFICATION STA..(U) RADIAN CORP AUSTIN TX D A SANDERS ET AL. SEP 85 4/6

UNCLASSIFIED RAD-DCN-84-212-027-04-02-VOL-2 F/G 13/2 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

TEST CODE default units	Sample 06 (entered units)
CD_E ug/ml	<.002
CNTDTA mg/L	<.01
CR_E ug/ml	<.001
CU_E ug/ml	<.001
FE_E ug/ml	<.008
HG_CA ug/ml	<.0005
MN_E ug/ml	0.26
NI_E ug/ml	<.003
ONG_IR mg/L	<1
PB_GA ug/ml	<.002
PHEN_A mg/L	<.005
TOC mg/L	14
TOX_1 mg/L	<.01
ZN_E ug/ml	<.003

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-140
RECEIVED 02/20/84
Results by Sample

SAMPLE ID groundwater 1
FRACTION 01F TEST CODE HERBES NAME Herbicides EC
Date & Time Collected not specified Category

DATE EXTRACTED 02/29/84
CONCENTRATION FACTOR 200
DATE INJECTED 03/11/84
ANALYST BWS
VERIFIED BY CKT

COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND	1 ppb			
2,4,5-TP (Silvex)	ND	1 ppb			

NOTES AND DEFINITIONS FOR THIS REPORT.
ND = not detected at the specified detection limit.
All results reported in micrograms/liter unless otherwise specified.

RADIAN CORPORATION

PAGE 5 Analytical Serv REPORT LAB # 84-02-140
RECEIVED: 02/20/84 Results by Sample

SAMPLE ID groundwater 1 FRACTION 01F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

DATA FILE 840214001 DATE EXTRACTED 02/28/84 ANALYST DRL VERIFIED BY CKT
CONC. FACTOR 200 DATE INJECTED 03/13/84 COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4'-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4'-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4'-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
15P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

RADIAN CORPORATION

Analytical Serv REPORT
Results by Sample

RECEIVED: 02/20/84

LAB # 84-02-140
Continued From Above

SAMPLE ID groundwater 1

FRACTION 01F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

RADIAN CORPORATION

PAGE 7 Analytical Serv REPORT LAB # 84-02-140
RECEIVED: 02/20/84 Results by Sample

SAMPLE ID groundwater 2 FRACTION 02F TEST CODE HERBES NAME Herbicides EC
Date & Time Collected not specified Category

DATE EXTRACTED 02/29/84 DATE INJECTED 03/01/84 VERIFIED BY CKT
CONCENTRATION FACTOR 200 ANALYST BWS

COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND	1 ppb			
2,4,5-TP (Silvex)	ND	1 ppb			

NOTES AND DEFINITIONS FOR THIS REPORT.
ND = not detected at the specified detection limit.
All results reported in micrograms/liter unless otherwise specified.

RADIAN CORPORATION

PAGE 8 Analytical Serv REPORT LAB # 84-02-140
RECEIVED: 02/20/84 Results by Sample

SAMPLE ID groundwater 2 FRACTION 02F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

DATA FILE 840214002 DATE EXTRACTED 02/28/84 ANALYST DRL VERIFIED BY CKT
CONC. FACTOR 200 DATE INJECTED 03/11/84 COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4'-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4'-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4'-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
15P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

RADIAN CORPORATION

Analytical Serv REPORT
RECEIVED: 02/20/84
Results by Sample
LAB # 84-02-140
Continued From Above

SAMPLE ID groundwater 2

FRACTION 02F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-140
RECEIVED: 02/20/84 Results by Sample

SAMPLE ID groundwater 3 FRACTION 03F TEST CODE HERBES NAME Herbicides EC
Date & Time Collected not specified Category

DATE EXTRACTED 02/29/84 DATE INJECTED 03/11/84 VERIFIED BY CKT
CONCENTRATION FACTOR 200 ANALYST BWS

COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND	1 ppb			
2,4,5-TP (Silvex)	ND	1 ppb			

NOTES AND DEFINITIONS FOR THIS REPORT.
ND = not detected at the specified detection limit.
All results reported in micrograms/liter unless otherwise specified.

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-140

RECEIVED: 02/20/84 Results by Sample

SAMPLE ID groundwater 3 FRACTION 03F TEST CODE PESTES NAME EPA 608 Pesticides by EC

Date & Time Collected not specified Category

DATA FILE 840214003 DATE EXTRACTED 02/28/84 ANALYST DRL VERIFIED BY CKT

CONC. FACTOR 200 DATE INJECTED 03/13/84 COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4'-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4'-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4'-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
15P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

RADIAN CORPORATION

Analytical Serv REPORT
Results by Sample

LAB # 84-02-140
Continued From Above

RECEIVED: 02/20/84

SAMPLE ID groundwater 3

FRACTION 03F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

RADIAN CORPORATION

RECEIVED: 02/20/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-140

SAMPLE ID groundwater 4

FRACTION 04F TEST CODE HERBES NAME Herbicides EC
Date & Time Collected not specified Category ____

DATE EXTRACTED 02/29/84
CONCENTRATION FACTOR 200

DATE INJECTED 03/11/84
ANALYST BWS

VERIFIED BY CKT

COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND	1 ppb			
2,4,5-TP (Silvex)	ND	1 ppb			

NOTES AND DEFINITIONS FOR THIS REPORT.
ND = not detected at the specified detection limit.
All results reported in micrograms/liter unless otherwise specified.

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-140

RECEIVED: 02/20/84

Results by Sample

SAMPLE ID groundwater 4 FRACTION 04F TEST CODE PESTES NAME EPA 608 Pesticides by EC

Date & Time Collected not specified Category

DATA FILE 840214004 DATE EXTRACTED 02/28/84 ANALYST DRL VERIFIED BY CKT

CONC. FACTOR 200 DATE INJECTED 03/13/84 COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4'-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4'-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4'-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
15P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

SAMPLE ID groundwater 4 FRACTION 04F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

RADIAN CORPORATION

PAGE 16 Analytical Serv REPORT LAB # 84-02-140
RECEIVED: 02/20/84 Results by Sample

SAMPLE ID groundwater 5 FRACTION 05F TEST CODE HERBES NAME Herbicides EC
Date & Time Collected not specified Category ______

DATE EXTRACTED 02/29/84 DATE INJECTED 03/11/84 VERIFIED BY CKT
CONCENTRATION FACTOR 200 ANALYST BWS

COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND	1 ppb			
2,4,5-TP (Silvex)	ND	1 ppb			

NOTES AND DEFINITIONS FOR THIS REPORT.
ND = not detected at the specified detection limit.
All results reported in micrograms/liter unless otherwise specified.

RADIAN CORPORATION

RECEIVED: 02/20/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-140

SAMPLE ID groundwater 5 FRACTION 05F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

DATA FILE 840214005 DATE EXTRACTED 02/28/84 ANALYST DRL VERIFIED BY CKT
CONC. FACTOR 200 DATE INJECTED 03/13/84 COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4'-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4'-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4'-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
15P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

RADIAN CORPORATION

Analytical Serv REPORT
Results by Sample

LAB # 84-02-140
Continued From Above

RECEIVED: 02/20/84

SAMPLE ID groundwater 5 FRACTION 05F TEST CODE PESTES NAME EPA 608 Pt.ticides by EC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

RADIAN CORPORATION

PAGE 19 Analytical Serv REPORT LAB # 84-02-140
RECEIVED: 02/20/84 Results by Sample

SAMPLE ID groundwater 6 FRACTION 06F TEST CODE HERBES NAME Herbicides EC
Date & Time Collected not specified Category

DATE EXTRACTED 02/29/84
CONCENTRATION FACTOR 200
DATE INJECTED 03/11/84
ANALYST DRL
VERIFIED BY CKT

COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND	1 ppb			
2,4,5-TP (Silvex)	ND	1 ppb			

NOTES AND DEFINITIONS FOR THIS REPORT.
ND = not detected at the specified detection limit.
All results reported in micrograms/liter unless otherwise specified.

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-140
Results by Sample

RECEIVED: 02/20/84

SAMPLE ID groundwater 6 FRACTION 06F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

DATA FILE 840214006
CONC. FACTOR 200
DATE EXTRACTED 02/28/84
DATE INJECTED 03/13/84
ANALYST DRL
VERIFIED BY CKT
COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4′-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4′-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4′-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
15P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

RADIAN CORPORATION

RECEIVED: 02/20/84 Analytical Serv REPORT Results by Sample LAB # 84-02-140 Continued From Above

SAMPLE ID groundwater 6 FRACTION 06F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

RADIAN CORPORATION

Analytical Serv REPORT
LAB # 84-02-140
RECEIVED: 02/20/84
NonReported Work

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

01G	:	LOG_IN
02G	:	LOG_IN
03G	:	LOG_IN
04G	:	LOG_IN
05G	:	LOG_IN
06G	:	LOG_IN

Analytical Serv REPORT LAB # 84-02-141

RECEIVED: 02/20/84 04/11/84 13:11:52

REPORT TO Radian
Bl. 4
Austin

ATTEN William Little

CLIENT TINKER SAMPLES 3
COMPANY Tinker AFB
FACILITY

PREPARED BY Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN
PHONE (512) 454-4797

CERTIFIED BY

CONTACT CONOVER

WORK ID zone 1
TAKEN FBB
TRANS Fed Ex
TYPE
P.O. # 212-027-04-05
INVOICE under separate cover

SAMPLE IDENTIFICATION

01 groundwater 7
02 landfill 4 leachate
03 pond-1

Analytical Serv TEST CODES and NAMES used on this report

CD E	Cadmium, ICPES
CNTOTA	Total Cyanide
CR E	Chromium, ICPES
CU E	Copper, ICPES
FE E	Iron, ICPES
HERBES	Herbicides EC
HG CA	Mercury, Cold Vapor
MN E	Manganese, ICPES
NI E	Nickel, ICPES
ONG IR	Oil and Grease, Infrared
PB GA	Lead, low level
PESTES	EPA 608 Pesticides by EC
PHEN A	Total Phenolics
TOC	Total Organic Carbon
TOX 1	TOX Single Analysis
ZN E	Zinc, ICPES

CORPORATION Analytical Serv REPORT LAB # 84-02-141

RECEIVED: 02/20/84

RESULTS BY TEST

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)
CD_E ug/ml	<.002	<.002	<.002
CNTOTA mg/L	<.01	<.01	<.01
CR_E ug/ml	<.001	0.023	<.001
CU_E ug/ml	<.001	<.001	<.001
FE_E ug/ml	<.008	5.0	0.25
HG_CA ug/ml	<.0005	<.0005	<.0005
MN_E ug/ml	2.3	0.33	0.010
NI_E ug/ml	<.003	0.73	<.003
ONG_IR mg/L	<1	<1	<1
PB_GA ug/ml	<.002	<.002	<.002
PHEN_A mg/L	<.005	0.21	<.005
TOC mg/L	7	340	5
TOX_1 mg/L	<.01	1.5	<.01
ZN_E ug/ml	<.003	<.003	<.003

CORPORATION

Analytical Serv REPORT LAB # 84-02-141

RECEIVED: 02/20/84

Results by Sample

SAMPLE ID groundwater 7 FRACTION 01F TEST CODE HERBES NAME Herbicides EC

Date & Time Collected not specified Category

DATE EXTRACTED 02/29/84 DATE INJECTED 03/01/84 VERIFIED BY LLN

CONCENTRATION FACTOR ANALYST BB

COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND	1 ug/L			
2,4,5-TP (Silvex)	ND	1 ug/L			

NOTES AND DEFINITIONS FOR THIS REPORT.

ND = not detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified.

Analytical Serv REPORT LAB # 84-02-141
RECEIVED: 02/20/84 Results by Sample

SAMPLE ID groundwater 7 FRACTION 01F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

DATA FILE 1 DATE EXTRACTED 02/29/84 ANALYST DRL VERIFIED BY LLN
CONC. FACTOR DATE INJECTED 03/01/84 COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4'-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4'-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4'-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
3P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

Analytical Serv REPORT
Results by Sample

RECEIVED: 02/20/84

LAB # 84-02-141
Continued From Above

SAMPLE ID groundwater 7 FRACTION 01F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

CORPORATION

Analytical Serv REPORT LAB # 84-02-141

RECEIVED: 02/20/84 Results by Sample

SAMPLE ID landfill 4 leachate FRACTION 02F TEST CODE HERBES NAME Herbicides EC

Date & Time Collected not specified Category

DATE EXTRACTED 02/29/84 DATE INJECTED 03/01/84 VERIFIED BY LLN

CONCENTRATION FACTOR ANALYST BS

COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND	1 ug/L			
2,4,5-TP (Silvex)	ND	1 ug/L			

NOTES AND DEFINITIONS FOR THIS REPORT.

ND = not detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified.

CORPORATION

PAGE 7 Analytical Serv REPORT LAB # 84-02-141

RECEIVED: 02/20/84 Results by Sample

SAMPLE ID landfill 4 leachate FRACTION 02F TEST CODE PESTES NAME EPA 608 Pesticides by EC

Date & Time Collected not specified Category

DATA FILE 2 DATE EXTRACTED 02/29/84 ANALYST DRL VERIFIED BY LLN

CONC. FACTOR DATE INJECTED 03/01/84 COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4'-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4'-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4'-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
15P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

CORPORATION

RECEIVED: 02/20/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-141
Continued From Above

SAMPLE ID landfill 4 leachate FRACTION 02F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

CORPORATION

RECEIVED: 02/20/84

Analytical Serv REPORT LAB # 84-02-141

Results by Sample

SAMPLE ID pond-1 FRACTION 03F TEST CODE HERBES NAME Herbicides EC

Date & Time Collected not specified Category

DATE EXTRACTED 02/29/84 DATE INJECTED 03/01/84 VERIFIED BY LLN

CONCENTRATION FACTOR ANALYST BS

COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND	1 ug/L			
2,4,5-TP (Silvex)	ND	1 ug/L			

NOTES AND DEFINITIONS FOR THIS REPORT.

ND = not detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified.

CORPORATION

PAGE 10 Analytical Serv REPORT LAB # 84-02-141
RECEIVED: 02/20/84 Results by Sample

SAMPLE ID pond-1 FRACTION 03F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

DATA FILE 3 DATE EXTRACTED 02/29/84 ANALYST DRL VERIFIED BY LLN
CONC. FACTOR DATE INJECTED 03/01/84 COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4'-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4'-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4'-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
15P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

SAMPLE ID pond-1

FRACTION 03F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category ______

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

```
01G  |  LOG_IN
02G  |  LOG_IN
03H  |  COMPOS  03I  |  COMPOS  03J  |  COMPOS  03G  |  LOG_IN
```

RADIAN CORPORATION

PAGE 1 — Analytical Serv REPORT — LAB # 84-02-142

RECEIVED: 02/20/84 — 03/16/84 07:01:22

REPORT TO	Radian Bl. 4 Austin	PREPARED BY	Radian Analytical Services 8501 MoPac Blvd. P.O. Box 9948 Austin, Texas 78766
ATTEN	William Little	ATTEN	
		PHONE	(512) 454-4797
CLIENT	TINKER SAMPLES 1	CERTIFIED BY	
COMPANY	Tinker AFB	CONTACT	CONOVER
FACILITY			

WORK ID	zone 2
TAKEN	FBB
TRANS	Fed Ex
TYPE	
P.O. #	212-027-04-05
INVOICE	under separate cover

SAMPLE IDENTIFICATION

01 groundwater B

Analytical Serv TEST CODES and NAMES used on this report

ANFS	Method 625 Acid/Neutrals
BA E	Barium, ICPES
CD E	Cadmium, ICPES
CNTOTA	Total Cyanide
CR E	Chromium, ICPES
CU E	Copper, ICPES
FE E	Iron, ICPES
HERBES	Herbicides EC
HG CA	Mercury, Cold Vapor
NI E	Nickel, ICPES
ONG IR	Oil and Grease, Infrared
PB GA	Lead, low level
PESTES	EPA 608 Pesticides by EC
PHEN A	Total Phenolics
TOC	Total Organic Carbon
TOX 1	TOX Single Analysis
ZN E	Zinc, ICPES

RADIAN CORPORATION

Analytical Serv REPORT

LAB # 84-02-142

RECEIVED: 02/20/84

RESULTS BY TEST

TEST CODE default units	Sample 01 (entered units)
BA_E ug/ml	0.45
CD_E ug/ml	<.002
CNTOTA mg/L	<.01
CR_E ug/ml	<.001
CU_E ug/ml	<.001
FE_E ug/ml	<.008
HG_CA ug/ml	<.0005
NI_E ug/ml	<.003
ONG_IR mg/L	<1
PB_GA ug/ml	<.002
PHEN_A mg/L	<.005
TOC mg/L	9
TOX_1 mg/L	<.01
ZN_E ug/ml	<.003

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-142

RECEIVED: 02/20/84 Results by Sample

SAMPLE ID groundwater B FRACTION 01G TEST CODE ANFS NAME Method 625 Acid/Neutrals

Date & Time Collected not specified Category

DATA FILE B14201AN DATE EXTRACTED 02/28/84 ANALYST MSF VERIFIED BY CKT

CONC. FACTOR 1000 DATE INJECTED 03/12/84 INSTRUMENT COMPOUNDS DETECTED 1

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RECEIVED: 02/20/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-142
Continued From Above

SAMPLE ID groundwater B FRACTION 01G TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B		53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B		54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B		55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B		66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	1215	67B	butyl benzyl phthalate	2.3	5A	59A	2,4-dinitrophenol	ND
26B		68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B		69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B		70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B		71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

RADIAN CORPORATION

PAGE 5 Analytical Serv REPORT LAB # 84-02-142
RECEIVED: 02/20/84 Results by Sample Continued From Above

SAMPLE ID groundwater B FRACTION 01G TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

B = anthracene and phenanthrene co-elute.

RADIAN CORPORATION

RECEIVED: 02/20/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-142

SAMPLE ID groundwater B

FRACTION 01F TEST CODE HERBES NAME Herbicides EC
Date & Time Collected not specified Category

DATE EXTRACTED 02/28/84
CONCENTRATION FACTOR 200

DATE INJECTED 03/14/84
ANALYST DRL

VERIFIED BY CKT

COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND	1 ppb			
2,4,5-TP (Silvex)	ND	1 ppb			

NOTES AND DEFINITIONS FOR THIS REPORT.
ND = not detected at the specified detection limit.
All results reported in micrograms/liter unless otherwise specified.

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-142

RECEIVED: 02/20/84 Results by Sample

SAMPLE ID groundwater B FRACTION 01F TEST CODE PESTES NAME EPA 608 Pesticides by EC

Date & Time Collected not specified Category

DATA FILE 840214201 DATE EXTRACTED 02/28/84 ANALYST DRL VERIFIED BY CKT

CONC. FACTOR 200 DATE INJECTED 03/14/84 COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4'-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4'-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4'-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
15P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

RADIAN CORPORATION

RECEIVED: 02/20/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-142
Continued From Above

SAMPLE ID groundwater B
FRACTION 01F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

RADIAN CORPORATION

PAGE 1
RECEIVED: 02/20/84

Analytical Serv REPORT
04/16/84 14:40:23

LAB # 84-02-143

REPORT TO: Radian
Bl. 4
Austin

ATTEN: William Little

CLIENT: TINKER
SAMPLES: 1
COMPANY: Tinker AFB
FACILITY:

WORK ID: zone 3
TAKEN: FBB
TRANS: Fed Ex
TYPE:
P.O. #: 212-027-04-05
INV. #: 2991

PREPARED BY: Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN:
PHONE: (512) 454-4797

CERTIFIED BY

CONTACT: CONOVER

Duplicate of report of 04/06/84.

SAMPLE IDENTIFICATION

01 groundwater G

Analytical Serv TEST CODES and NAMES used on this report

ANFS	Method 625 Acid/Neutrals
CD E	Cadmium, ICPES
CNTOTA	Total Cyanide
CR E	Chromium, ICPES
CU E	Copper, ICPES
HG CA	Mercury, Cold Vapor
NI E	Nickel, ICPES
ONG IR	Oil and Grease, Infrared
PB GA	Lead, low level
PHEN A	Total Phenolics
TOC	Total Organic Carbon
TOX 1	TOX Single Analysis
ZN E	Zinc, ICPES

CORPORATION

RECEIVED: 02/20/84

Analytical Serv REPORT
RESULTS BY TEST

LAB # 84-02-143

TEST CODE default units	Sample 01 (entered units)
CD_E ug/ml	2.2
CNTOTA mg/L	<.01
CR_E ug/ml	12
CU_E ug/ml	0.15
HG_CA ug/ml	<.0005
NI_E ug/ml	82
ONG_IR mg/L	70
PB_GA ug/ml	3.3
PHEN_A mg/L	80
TOC mg/L	4000
TOX_1 mg/L	3.4
ZN_E ug/ml	29

PAGE 3 CORPORATION Analytical Serv REPORT LAB # 84-02-143
RECEIVED: 02/20/84 Results by Sample

SAMPLE ID groundwater G FRACTION 01F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

DATA FILE 2CU02143A01 DATE EXTRACTED 03/01/84 ANALYST MSF VERIFIED BY LAK
CONC. FACTOR DATE INJECTED 04/04/84 INSTRUMENT COMPOUNDS DETECTED 2

NPDES	SCAN	EPA	COMPOUND	RESULT	NPDES	SCAN		EPA
1B		1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B		8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B		9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B		12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B		18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B		20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	475	25B	1,2-dichlorobenzene	20	3B	78B	anthracene B	ND
21B		26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B		27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B		37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B		39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B		40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B		41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B		42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B		43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B		52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RECEIVED: 02/20/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-143
Continued From Above

SAMPLE ID groundwater G FRACTION 01F TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A		31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A		34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A		57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A		58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A		59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A		60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A		64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	420	65A	phenol	220
25B	71B	dimethyl phthalate	ND					

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in mg/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

B = anthracene and phenanthrene co-elute.

RADIAN CORPORATION

PAGE 1 Analytical Serv REPORT LAB # 84-02-144
RECEIVED: 02/20/84 03/14/84 08:52:24

REPORT TO Radian
BI. 4
Austin

ATTEN William Little

CLIENT TINKER SAMPLES 1
COMPANY Tinker AFB
FACILITY

WORK ID zone 4
TAKEN FBB
TRANS Fed Ex
TYPE
P.O. # 212-027-04-05
INVOICE under separate cover

PREPARED BY Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN
PHONE (512) 454-4797

CERTIFIED BY

CONTACT CONOVER

Other splits of this sample logged in on 84-02-109, received 2/16.

SAMPLE IDENTIFICATION
01 groundwater G

Analytical Serv TEST CODES and NAMES used on this report
ANFS Method 625 Acid/Neutrals

RADIAN CORPORATION

PAGE 2 Analytical Serv REPORT LAB # 84-02-144
RECEIVED: 02/20/84 Results by Sample

SAMPLE ID groundwater G FRACTION 01A TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

DATA FILE B14401AN DATE EXTRACTED 03/01/84 ANALYST MSF VERIFIED BY CKT
CONC. FACTOR 1000 DATE INJECTED 03/12/84 INSTRUMENT COMPOUNDS DETECTED 1

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RADIAN CORPORATION

RECEIVED: 02/20/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-144
Continued From Above

SAMPLE ID groundwater G

FRACTION 01A TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A 241	65A	phenol	1.0
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

SAMPLE ID groundwater G
FRACTION 01A TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

B = anthracene and phenanthrene co-elute.

RECEIVED: 02/20/84 NonReported Work

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

01B : LOG_IN

RADIAN CORPORATION

PAGE 1 Analytical Serv REPORT LAB # 84-02-145

RECEIVED: 02/20/84 02/23/84 13:40:26

REPORT TO: Radian
Bl. 4
Austin

ATTEN: William Little

CLIENT: TINKER SAMPLES: 3
COMPANY: Tinker AFB
FACILITY:

WORK ID: zone 5
TAKEN: FBB
TRANS: Fed Ex
TYPE:
P.O. #: 212-027-04-05
INVOICE: under separate cover

PREPARED BY: Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN:
PHONE: (512) 454-4797

CERTIFIED BY

CONTACT: CONOVER

Note: 1,1,2,2-tetrachloroethane and tetrachloroethylene coelute.

SAMPLE IDENTIFICATION

01 T5-018
02 T5-019
03 trip blnk

Analytical Serv TEST CODES and NAMES used on this report

GC 601 EPA Method 601/GC
TOC Total Organic Carbon

RADIAN CORPORATION

RECEIVED: 02/20/84 Analytical Serv REPORT LAB # 84-02-145

RESULTS BY TEST

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)
TOC mg/L	3	<1

RADIAN CORPORATION

RECEIVED: 02/20/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-145

SAMPLE ID T5-018 FRACTION 01B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 02/22/84 ANALYST MCL VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	2	Trichloroethene	1530
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
1	trans-1,2-Dichloroethene	32.8		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

RADIAN CORPORATION

RECEIVED: 02/20/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-145
Continued From Above

SAMPLE ID T5-018

FRACTION 01B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-145
RECEIVED: 02/20/84 Results by Sample

SAMPLE ID T5-019 FRACTION 02B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 02/22/84 ANALYST MCL VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 1

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND	1	Tetrachloroethylene	2.8
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobe[illegible]ene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

RADIAN CORPORATION

PAGE 6 | Analytical Serv REPORT | LAB # 84-02-145
RECEIVED: 02/20/84 | Results by Sample | Continued From Above

SAMPLE ID T5-019 FRACTION 02B TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RADIAN CORPORATION

RECEIVED: 02/20/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-145

SAMPLE ID trip blnk

FRACTION 03A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE 8
CONC. FACTOR

DATE INJECTED 02/22/84

ANALYST MCL
INSTRUMENT b

VERIFIED BY JSG
COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

RADIAN CORPORATION

Analytical Serv REPORT
Results by Sample

LAB # 84-02-145
Continued From Above

RECEIVED: 02/20/84

SAMPLE ID trip blnk

FRACTION 03A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category ______

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-145
RECEIVED: 02/20/84
NonReported Work

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

01C	:	LOG_IN	01D	:	LOG_IN
02C	:	LOG_IN	02D	:	LOG_IN
03B	:	DUP601			

CORPORATION

PAGE 1
RECEIVED: 02/23/84

Analytical Serv REPORT
07/23/84 09:17:22

LAB # 84-02-162

REPORT TO Radian
Bl. 4
Austin

ATTEN William Little

CLIENT TINKER
SAMPLES 1
COMPANY Tinker AFB
FACILITY

PREPARED BY Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN
PHONE (512) 454-4797

CERTIFIED BY

CONTACT CONOVER

Detection limit is 500 ppb or 0.5 ppm.

WORK ID zone 3, 625 (A/N)
TAKEN
TRANS
TYPE
P.O. # 212-027-04-05
INV. # 2992

SAMPLE IDENTIFICATION
01 3Ca

Analytical Serv TEST CODES and NAMES used on this report
ANFS Method 625 Acid/Neutrals

CORPORATION

PAGE 2 Analytical Serv REPORT LAB # 84-02-162
RECEIVED: 02/23/84 Results by Sample

SAMPLE ID 3Ca FRACTION 01A TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

DATA FILE 2CU02162A01 DATE EXTRACTED 03/08/84 ANALYST MF VERIFIED BY LAK
CONC. FACTOR DATE INJECTED 04/06/84 INSTRUMENT COMPOUNDS DETECTED 4

NPDES	SCAN	EPA	COMPOUND	RESULT	NPDES	SCAN		EPA
1B		1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B		8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B		9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B		12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B		18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B		20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	482	25B	1,2-dichlorobenzene	44	3B	78B	anthracene B	ND
21B	447	26B	1,3-dichlorobenzene	1.5	8B	79B	benzo(ghi)perylene	ND
22B	457	27B	1,4-dichlorobenzene	6.6	32B	80B	fluorene	ND
29B		37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B		39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B		40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B		41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B		42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B		43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B		52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

 Analytical Serv REPORT LAB # 84-02-162
RECEIVED: 02/23/84 Results by Sample Continued From Above

SAMPLE ID 3Ca FRACTION 01A TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B		53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B		54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B		55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B		66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B		67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	1557	68B	di-n-butyl phthalate	3.0	4A	60A	4,6-dinitro-o-cresol	ND
29B		69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B		70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B		71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/g

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

B = anthracene and phenanthrene co-elute.

RADIAN CORPORATION

PAGE 1 Analytical Serv REPORT LAB # 84-02-163
RECEIVED: 02/23/84 03/16/84 07:05:04

REPORT TO: Radian
Bl. 4
Austin

ATTEN: William Little

CLIENT: TINKER SAMPLES: 5
COMPANY: Tinker AFB
FACILITY:

WORK ID: zone 5, 624 and 625 (A/N)
TAKEN:
TRANS:
TYPE:
P.O. #: 212-027-04-05
INVOICE: under separate cover

PREPARED BY: Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN:
PHONE: (512) 454-4797

CERTIFIED BY

CONTACT: CONOVER

SAMPLE IDENTIFICATION

01 T5-005
02 T5-014
03 T5-016
04 T5-018
05 T5-019

Analytical Serv TEST CODES and NAMES used on this report

ANFS Method 625 Acid/Neutrals
MS 624 EPA Method 624/GC-MS

RADIAN CORPORATION

RECEIVED: 02/23/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-163

SAMPLE ID T5-005 FRACTION 01B TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

DATA FILE B16301AN DATE EXTRACTED 03/02/84 ANALYST LK VERIFIED BY CKT
CONC. FACTOR DATE INJECTED 03/13/84 INSTRUMENT COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RADIAN CORPORATION

PAGE 3 Analytical Serv REPORT LAB # 84-02-163
RECEIVED: 02/23/84 Results by Sample Continued From Above

SAMPLE ID T5-005 FRACTION 01B TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

SAMPLE ID T5-005 FRACTION 01B TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

B = anthracene and phenanthrene co-elute.

RADIAN CORPORATION

RECEIVED: 02/23/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-163

SAMPLE ID T5-005

FRACTION 01A TEST CODE MS 624 NAME EPA Method 624/GC-MS
Date & Time Collected not specified Category

DATA FILE B16301V DATE INJECTED 02/27/84 ANALYST BWS VERIFIED BY CKT
CONC. FACTOR INSTRUMENT F4 COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1V	2V	acrolein	ND	17V	32V	1,2-dichloropropane	ND
2V	3V	acrylonitrile	ND	18V	33V	cis-1,3-dichloropropylene	ND
3V	4V	benzene	ND	18V	33V	trans-1,3-dichloropropylene	ND
6V	6V	carbon tetrachloride	ND	19V	38V	ethylbenzene	ND
7V	7V	chlorobenzene	ND	22V	44V	methylene chloride	ND
15V	10V	1,2-dichloroethane	ND	21V	45V	methyl chloride	ND
27V	11V	1,1,1-trichloroethane	ND	20V	46V	methyl bromide	ND
14V	13V	1,1-dichloroethane	ND	5V	47V	bromoform	ND
28V	14V	1,1,2-trichloroethane	ND	12V	48V	dichlorobromomethane	ND
23V	15V	1,1,2,2-tetrachloroethane	ND	30V	49V	trichlorofluoromethane	ND
9V	16V	chloroethane	ND	13V	50V	dichlorodifluoromethane	ND
4V	17V	bis (chloromethyl) ether	ND	8V	51V	chlorodibromomethane	ND
10V	19V	2-chloroethylvinyl ether	ND	24V	85V	tetrachloroethylene	ND
11V	23V	chloroform	ND	25V	86V	toluene	ND
16V	29V	1,1-dichloroethylene	ND	29V	87V	trichloroethylene	ND
26V	30V	1,2-trans-dichloroethylene	ND	31V	88V	vinyl chloride	ND

RADIAN CORPORATION

Analytical Serv REPORT
Results by Sample

LAB # 84-02-163
Continued From Above

RECEIVED: 02/23/84

SAMPLE ID T5-005

FRACTION 01A TEST CODE MS 624 NAME EPA Method 624/GC-MS
Date & Time Collected not specified Category ______

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number or retention time on chromatogram.
All results reported in ug/L unless otherwise specified.
ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

Analytical Serv REPORT

Results by Sample

PAGE 7

RECEIVED: 02/23/84

LAB # 84-02-163

SAMPLE ID T5-014

FRACTION 02B TEST CODE ANFS NAME Method 625 Acid/Neutrals

Date & Time Collected not specified Category ____

DATA FILE B16302AN DATE EXTRACTED 03/02/84 ANALYST MF VERIFIED BY CKT

CONC. FACTOR ____ DATE INJECTED 03/13/84 INSTRUMENT ____ COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN			EPA
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	1[illegible]B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RADIAN CORPORATION

RECEIVED: 02/23/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-163
Continued From Above

SAMPLE ID T5-014

FRACTION 02B TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

SAMPLE ID T5-014 FRACTION 02B TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

B = anthracene and phenanthrene co-elute.

RADIAN CORPORATION

RECEIVED: 02/23/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-163

SAMPLE ID T5-014

FRACTION 02A TEST CODE MS 624 NAME EPA Method 624/GC-MS
Date & Time Collected not specified Category

DATA FILE B16302V DATE INJECTED 02/27/84 ANALYST BWS VERIFIED BY CKT
CONC. FACTOR INSTRUMENT F4 COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1V	2V	acrolein	ND	17V	32V	1,2-dichloropropane	ND
2V	3V	acrylonitrile	ND	18V	33V	cis-1,3-dichloropropylene	ND
3V	4V	benzene	ND	18V	33V	trans-1,3-dichloropropylene	ND
6V	6V	carbon tetrachloride	ND	19V	38V	ethylbenzene	ND
7V	7V	chlorobenzene	ND	22V	44V	methylene chloride	ND
15V	10V	1,2-dichloroethane	ND	21V	45V	methyl chloride	ND
27V	11V	1,1,1-trichloroethane	ND	20V	46V	methyl bromide	ND
14V	13V	1,1-dichloroethane	ND	5V	47V	bromoform	ND
28V	14V	1,1,2-trichloroethane	ND	12V	48V	dichlorobromomethane	ND
23V	15V	1,1,2,2-tetrachloroethane	ND	30V	49V	trichlorofluoromethane	ND
9V	16V	chloroethane	ND	13V	50V	dichlorodifluoromethane	ND
4V	17V	bis (chloromethyl) ether	ND	8V	51V	chlorodibromomethane	ND
10V	19V	2-chloroethylvinyl ether	ND	24V	85V	tetrachloroethylene	ND
11V	23V	chloroform	ND	25V	86V	toluene	ND
16V	29V	1,1-dichloroethylene	ND	29V	87V	trichloroethylene	ND
26V	30V	1,2-trans-dichloroethylene	ND	31V	88V	vinyl chloride	ND

RADIAN CORPORATION

 Analytical Serv REPORT LAB # 84-02-163
RECEIVED: 02/23/84 Results by Sample Continued From Above

SAMPLE ID T5-014 FRACTION 02A TEST CODE MS 624 NAME EPA Method 624/GC-MS
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number or retention time on chromatogram.
All results reported in ug/L unless otherwise specified.
ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

RADIAN CORPORATION

RECEIVED: 02/23/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-163

SAMPLE ID T5-016 FRACTION 03B TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

DATA FILE B16303AN DATE EXTRACTED 03/02/84 ANALYST LK VERIFIED BY CKT
CONC. FACTOR DATE INJECTED 03/14/84 INSTRUMENT COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RECEIVED: 02/23/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-163
Continued From Above

SAMPLE ID T5-016 FRACTION 03B TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

RECEIVED: 02/23/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-163
Continued From Above

SAMPLE ID T5-016

FRACTION 03B TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

B = anthracene and phenanthrene co-elute.

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-163

RECEIVED: 02/23/84

Results by Sample

SAMPLE ID T5-016 FRACTION 03A TEST CODE MS 624 NAME EPA Method 624/GC-MS

Date & Time Collected not specified Category

DATA FILE B16303V DATE INJECTED 02/27/84 ANALYST BWS VERIFIED BY CKT

CONC. FACTOR INSTRUMENT F4 COMPOUNDS DETECTED 1

NPDES	SCAN	EPA	COMPOUND	RESULT	NPDES	SCAN	EPA	COMPOUND	RESULT
1V		2V	acrolein	ND	17V		32V	1,2-dichloropropane	ND
2V		3V	acrylonitrile	ND	18V		33V	cis-1,3-dichloropropylene	ND
3V		4V	benzene	ND	18V		33V	trans-1,3-dichloropropylene	ND
6V		6V	carbon tetrachloride	ND	19V		38V	ethylbenzene	ND
7V		7V	chlorobenzene	ND	22V		44V	methylene chloride	ND
15V		10V	1,2-dichloroethane	ND	21V		45V	methyl chloride	ND
27V		11V	1,1,1-trichloroethane	ND	20V		46V	methyl bromide	ND
14V		13V	1,1-dichloroethane	ND	5V		47V	bromoform	ND
28V		14V	1,1,2-trichloroethane	ND	12V		48V	dichlorobromomethane	ND
23V		15V	1,1,2,2-tetrachloroethane	ND	30V		49V	trichlorofluoromethane	ND
9V		16V	chloroethane	ND	13V		50V	dichlorodifluoromethane	ND
4V		17V	bis (chloromethyl) ether	ND	8V		51V	chlorodibromomethane	ND
10V		19V	2-chloroethylvinyl ether	ND	24V		85V	tetrachloroethylene	ND
11V		23V	chloroform	ND	25V		86V	toluene	ND
16V		29V	1,1-dichloroethylene	ND	29V	342	87V	trichloroethylene	2.3
26V		30V	1,2-trans-dichloroethylene	ND	31V		88V	vinyl chloride	ND

RADIAN CORPORATION

RECEIVED: 02/23/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-163
Continued From Above

SAMPLE ID T5-016 FRACTION 03A TEST CODE MS 624 NAME EPA Method 624/GC-MS
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number or retention time on chromatogram.
All results reported in ug/L unless otherwise specified.
ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-163

RECEIVED: 02/23/84 Results by Sample

SAMPLE ID T5-018 FRACTION 04B TEST CODE ANFS NAME Method 625 Acid/Neutrals

Date & Time Collected not specified Category

DATA FILE B16304AN DATE EXTRACTED 03/02/84 ANALYST LK VERIFIED BY CKT

CONC. FACTOR DATE INJECTED 03/14/84 INSTRUMENT COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RADIAN CORPORATION

RECEIVED: 02/23/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-163
Continued From Above

SAMPLE ID T5-018 FRACTION 04B TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute

RADIAN CORPORATION

Analytical Serv REPORT
Results by Sample

LAB # 84-02-163
Continued From Above

RECEIVED: 02/23/84

SAMPLE ID T5-018

FRACTION 04B TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

B = anthracene and phenanthrene co-elute.

KYRDMAN CORPORATION

RECEIVED: 02/23/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-163

SAMPLE ID T5-018 FRACTION 04A TEST CODE MS 624 NAME EPA Method 624/GC-MS
Date & Time Collected not specified Category

DATA FILE B16304V DATE INJECTED 02/27/84 ANALYST BWS VERIFIED BY CKT
CONC. FACTOR INSTRUMENT F4 COMPOUNDS DETECTED 6

NPDES	SCAN	EPA	COMPOUND	RESULT	NPDES	SCAN	EPA	COMPOUND	RESULT
1V		2V	acrolein	ND	17V		32V	1,2-dichloropropane	ND
2V		3V	acrylonitrile	ND	18V		33V	cis-1,3-dichloropropylene	ND
3V		4V	benzene	ND	18V		33V	trans-1,3-dichloropropylene	ND
6V		6V	carbon tetrachloride	ND	19V		38V	ethylbenzene	ND
7V	512	7V	chlorobenzene	6.0	22V		44V	methylene chloride	ND
15V	250	10V	1,2-dichloroethane	26	21V		45V	methyl chloride	ND
27V		11V	1,1,1-trichloroethane	ND	20V		46V	methyl bromide	ND
14V		13V	1,1-dichloroethane	ND	5V		47V	bromoform	ND
28V	355	14V	1,1,2-trichloroethane	4.5	12V		48V	dichlorobromomethane	ND
23V		15V	1,1,2,2-tetrachloroethane	ND	30V		49V	trichlorofluoromethane	ND
9V		16V	chloroethane	ND	13V		50V	dichlorodifluoromethane	ND
4V		17V	bis (chloromethyl) ether	ND	8V		51V	chlorodibromomethane	ND
10V		19V	2-chloroethylvinyl ether	ND	24V	460	85V	tetrachloroethylene	15
11V		23V	chloroform	ND	25V		86V	toluene	ND
16V		29V	1,1-dichloroethylene	ND	29V	341	87V	trichloroethylene	1300
26V	222	30V	1,2-trans-dichloroethylene	71	31V		88V	vinyl chloride	ND

SAMPLE ID T5-018 FRACTION 04A TEST CODE MS 624 NAME EPA Method 624/GC-MS
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number or retention time on chromatogram.
All results reported in ug/L unless otherwise specified.
ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-163

RECEIVED: 02/23/84 Results by Sample

SAMPLE ID T5-017 FRACTION 05B TEST CODE ANFS NAME Method 625 Acid/Neutrals

Date & Time Collected not specified Category

DATA FILE B16305AN DATE EXTRACTED 03/02/84 ANALYST MF VERIFIED BY CKT

CONC. FACTOR DATE INJECTED 03/14/84 INSTRUMENT COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RADIAN CORPORATION

RECEIVED: 02/23/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-163
Continued From Above

SAMPLE ID T5-019 FRACTION 05B TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

SAMPLE ID T5-019 FRACTION 05B TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

B = anthracene and phenanthrene co-elute.

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-163
RECEIVED: 02/23/84
Results by Sample

SAMPLE ID T5-019 FRACTION 05A TEST CODE MS 624 NAME EPA Method 624/GC-MS
Date & Time Collected not specified Category

DATA FILE B16305V DATE INJECTED 02/27/84 ANALYST BWS VERIFIED BY CKT
CONC. FACTOR INSTRUMENT F4 COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1V	2V	acrolein	ND	17V	32V	1,2-dichloropropane	ND
2V	3V	acrylonitrile	ND	18V	33V	cis-1,3-dichloropropylene	ND
3V	4V	benzene	ND	18V	33V	trans-1,3-dichloropropylene	ND
6V	6V	carbon tetrachloride	ND	19V	38V	ethylbenzene	ND
7V	7V	chlorobenzene	ND	22V	44V	methylene chloride	ND
15V	10V	1,2-dichloroethane	ND	21V	45V	methyl chloride	ND
27V	11V	1,1,1-trichloroethane	ND	20V	46V	methyl bromide	ND
14V	13V	1,1-dichloroethane	ND	5V	47V	bromoform	ND
28V	14V	1,1,2-trichloroethane	ND	12V	48V	dichlorobromomethane	ND
23V	15V	1,1,2,2-tetrachloroethane	ND	30V	49V	trichlorofluoromethane	ND
9V	16V	chloroethane	ND	13V	50V	dichlorodifluoromethane	ND
4V	17V	bis (chloromethyl) ether	ND	8V	51V	chlorodibromomethane	ND
10V	19V	2-chloroethylvinyl ether	ND	24V	85V	tetrachloroethylene	ND
11V	23V	chloroform	ND	25V	86V	toluene	ND
16V	29V	1,1-dichloroethylene	ND	29V	87V	trichloroethylene	ND
26V	30V	1,2-trans-dichloroethylene	ND	31V	88V	vinyl chloride	ND

RADIAN CORPORATION

Analytical Serv REPORT
Results by Sample

LAB # 84-02-163
Continued From Above

RECEIVED: 02/23/84

SAMPLE ID T5-019

FRACTION 05A TEST CODE MS 624 NAME EPA Method 624/GC-MS
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number or retention time on chromatogram.
All results reported in ug/L unless otherwise specified.
ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

RADIAN CORPORATION

PAGE 1 Analytical Serv REPORT LAB # 84-02-209

RECEIVED: 02/28/84 04/04/84 15:46:17

REPORT TO Radian
Bl. 4
Austin

ATTEN William Little

CLIENT TINKER SAMPLES 1
COMPANY Tinker AFB
FACILITY

PREPARED BY Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN
PHONE (512) 454-4797

CERTIFIED BY

CONTACT CONOVER

WORK ID soil zone 4, ANFS
TAKEN
TRANS
TYPE
P.O. # 212-027-04-05
INVOICE under separate cover

SAMPLE IDENTIFICATION

01 4E.3

Analytical Serv TEST CODES and NAMES used on this report

ANFS Method 625 Acid/Neutrals

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-02-209

RECEIVED: 02/28/84 Results by Sample

SAMPLE ID 4E.3 FRACTION 01A TEST CODE ANFS NAME Method 625 Acid/Neutrals

Date & Time Collected not specified Category

DATA FILE 2CU02209A01 DATE EXTRACTED 03/07/84 ANALYST BS VERIFIED BY LK

CONC. FACTOR DATE INJECTED 04/02/84 INSTRUMENT COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RADIAN CORPORATION

RECEIVED: 02/28/84

Analytical Serv REPORT
Results by Sample

LAB # 84-02-209
Continued From Above

SAMPLE ID 4E.3 FRACTION 01A TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	6.B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

RADIAN CORPORATION

RECEIVED: 02/28/84 | Analytical Serv REPORT | LAB # 84-02-209
Results by Sample | Continued From Above

SAMPLE ID 4E.3 | FRACTION 01A | TEST CODE ANFS | NAME Method 625 Acid/Neutrals
Date & Time Collected not specified | Category

B = anthracene and phenanthrene co-elute.

RADIAN CORPORATION

PAGE 1 Analytical Serv REPORT LAB # 84-03-042

RECEIVED: 03/08/84 03/16/84 10:57:34

REPORT TO Radian
Bl. 4
Austin

ATTEN William Little

CLIENT TINKER SAMPLES 22
COMPANY Tinker AFB
FACILITY

WORK ID zone 6 groundwater
TAKEN WML
TRANS Fed Ex
TYPE
P.O. # 212-027-04-05
INVOICE under separate cover

PREPARED BY Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766

ATTEN
PHONE (512) 454-4797

CERTIFIED BY

CONTACT CONOVER

Note: Quantitation of trichloroethene and tetrachloroethylene performed, only. Detection limits and 1 ug/L unless otherwise indicated.

SAMPLE IDENTIFICATION

01 T6-001
02 T6-002
03 T6-003
04 T6-004
05 T6-005
06 T6-006
07 T6-007
08 T6-008
09 T6-009
10 T6-010
11 T6-011
12 T6-012
13 T6-013
14 T6-014
15 T6-015
16 T6-016
17 T6-017
18 T6-018
19 T6-019
20 T6-020
21 trip blank

Analytical Serv TEST CODES and NAMES used on this report

GC 601 EPA Method 601/GC

SAMPLE IDENTIFICATION

21 trip blank
22 T6-021

RADIAN CORPORATION

PAGE 3 Analytical Serv REPORT LAB # 84-03-042
RECEIVED: 03/08/84 Results by Sample

SAMPLE ID T6-001 FRACTION 01A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 03/14/84 ANALYST RGS VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	3500
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

RADIAN CORPORATION

RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042
Continued From Above

SAMPLE ID T6-001

FRACTION 01A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category ______

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-03-042
RECEIVED: 03/08/84 Results by Sample

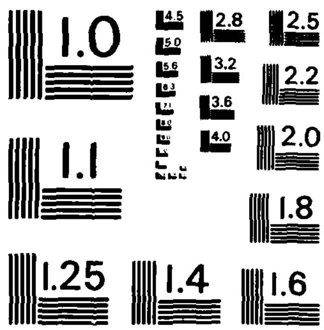
SAMPLE ID T6-002 FRACTION 02A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 03/14/84 ANALYST RGS VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	3300
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

AD-A160 094 INSTALLATION RESTORATION PROGRAM PHASE II CONFIRMATION/QUANTIFICATION STA..(U) RADIAN CORP AUSTIN TX D A SANDERS ET AL. SEP 85 5/6

UNCLASSIFIED RAD-DCN-84-212-027-04-02-VOL-2 F/G 13/2 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

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RECEIVED: 03/08/84 Results by Sample Continued From Above

SAMPLE ID T6-002 FRACTION 02A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

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Analytical Serv REPORT
Results by Sample

LAB # 84-03-042

SAMPLE ID T6-003

FRACTION 03A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B
CONC. FACTOR

DATE INJECTED 03/14/84

ANALYST RGS
INSTRUMENT b

VERIFIED BY JSG
COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	3400
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

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RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042
Continued From Above

SAMPLE ID T6-003 FRACTION 03A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category ______

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RADIAN CORPORATION

Analytical Serv REPORT LAB # 84-03-042

RECEIVED: 03/08/84 Results by Sample

SAMPLE ID T6-004 FRACTION 04A TEST CODE GC 601 NAME EPA Method 601/GC

Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 03/14/84 ANALYST RGS VERIFIED BY JSG

CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	3500
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

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Analytical Serv REPORT
Results by Sample

LAB # 84-03-042
Continued From Above

SAMPLE ID T6-004

FRACTION 04A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601. (Federal Register, 12/3/79).

RADIAN CORPORATION

PAGE 11 Analytical Serv REPORT LAB # 84-03-042
RECEIVED: 03/08/84 Results by Sample

SAMPLE ID T6-005 FRACTION 05A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 03/14/84 ANALYST RGS VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	3000
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

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RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042
Continued From Above

SAMPLE ID T6-005

FRACTION 05A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

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PAGE 13 Analytical Serv REPORT LAB # 84-03-042
RECEIVED: 03/08/84 Results by Sample

SAMPLE ID T6-006 FRACTION 06A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 03/14/84 ANALYST RGS VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	4000
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

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Analytical Serv REPORT
Results by Sample
LAB # 84-03-042
Continued From Above
RECEIVED: 03/08/84

SAMPLE ID T6-006 FRACTION 06A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

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RECEIVED: 03/08/84 | Results by Sample

SAMPLE ID T6-007 | FRACTION 07A | TEST CODE GC 601 | NAME EPA Method 601/GC

Date & Time Collected not specified | Category

DATA FILE B | DATE INJECTED 03/15/84 | ANALYST RGS | VERIFIED BY JSG

CONC. FACTOR | INSTRUMENT b | COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	4600
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

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RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042
Continued From Above

SAMPLE ID T6-007

FRACTION 07A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

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PAGE 17 Analytical Serv REPORT LAB # 84-03-042
RECEIVED: 03/08/84 Results by Sample

SAMPLE ID T6-008 FRACTION 08A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 03/15/84 ANALYST RGS VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	4200
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

SAMPLE ID T6-008 FRACTION 08A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RADIAN CORPORATION

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RECEIVED: 03/08/84 | Results by Sample

SAMPLE ID T6-009 FRACTION 09A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 03/15/84 ANALYST RGS VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichlor ethene	2700
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

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RECEIVED: 03/08/84 Results by Sample Continued From Above

SAMPLE ID T6-009 FRACTION 09A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category ______

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RADIAN CORPORATION

RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042

SAMPLE ID T6-010

FRACTION 10A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B
CONC. FACTOR

DATE INJECTED 03/15/84

ANALYST RGS
INSTRUMENT b

VERIFIED BY JSG
COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	2600
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

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RECEIVED: 03/08/84 Analytical Serv REPORT LAB # 84-03-042
Results by Sample Continued From Above

SAMPLE ID T6-010 FRACTION 10A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

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RECEIVED: 03/08/84 | Results by Sample

SAMPLE ID T6-011 | FRACTION 11A | TEST CODE GC 601 | NAME EPA Method 601/GC
Date & Time Collected not specified | Category

DATA FILE B | DATE INJECTED 03/15/84 | ANALYST RGS | VERIFIED BY JSG
CONC. FACTOR | INSTRUMENT b | COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	2200
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	<10
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

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RECEIVED: 03/08/84 — Analytical Serv REPORT — LAB # 84-03-042

Results by Sample — Continued From Above

SAMPLE ID T6-011 — FRACTION 11A — TEST CODE GC 601 — NAME EPA Method 601/GC

Date & Time Collected not specified — Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RADIAN CORPORATION

RECEIVED: 03/08/84 Analytical Serv REPORT LAB # 84-03-042
Results by Sample

SAMPLE ID T6-012 FRACTION 12A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 03/15/84 ANALYST RGS VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	2200
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

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Analytical Serv REPORT
Results by Sample
LAB # 84-03-042
Continued From Above

RECEIVED: 03/08/84

SAMPLE ID T6-012
FRACTION 12A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

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RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042

SAMPLE ID T6-013

FRACTION 13A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B
CONC. FACTOR

DATE INJECTED 03/15/84

ANALYST RGS
INSTRUMENT b

VERIFIED BY JSG
COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	2000
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042
Continued From Above

SAMPLE ID T6-013

FRACTION 13A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RADIAN CORPORATION

RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042

SAMPLE ID T6-014

FRACTION 14A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE 8
CONC. FACTOR

DATE INJECTED 03/15/84

ANALYST MCL
INSTRUMENT b

VERIFIED BY JSG
COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	2080
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

RECEIVED: 03/08/84 Results by Sample Continued From Above

SAMPLE ID T6-014 FRACTION 14A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RADIAN CORPORATION

PAGE 31 Analytical Serv REPORT LAB # 84-03-042
RECEIVED: 03/08/84 Results by Sample

SAMPLE ID T6-015 FRACTION 15A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 03/15/84 ANALYST MCL VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	1880
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042
Continued From Above

SAMPLE ID T6-015

FRACTION 15A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

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RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042

SAMPLE ID T6-016

FRACTION 16A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Cullected not specified Category

DATA FILE B
CONC. FACTOR

DATE INJECTED 03/15/84

ANALYST MCL
INSTRUMENT b

VERIFIED BY JSG
COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	2090
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

RADIAN CORPORATION

RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042
Continued From Above

SAMPLE ID T6-016

FRACTION 16A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042

SAMPLE ID T6-017 FRACTION 17A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 03/15/84 ANALYST MCL VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	1690
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

SAMPLE ID T6-017 FRACTION 17A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RADIAN CORPORATION

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042

RECEIVED: 03/08/84

SAMPLE ID T6-018 FRACTION 18A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 03/15/84 ANALYST MCL VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	1830
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

SAMPLE ID T6-018 FRACTION 18A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042

SAMPLE ID T6-019

FRACTION 19A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B
CONC. FACTOR

DATE INJECTED 03/15/84

ANALYST MCL
INSTRUMENT b

VERIFIED BY JSG
COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	1770
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

RADIAN CORPORATION

RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042
Continued From Above

SAMPLE ID T6-019

FRACTION 19A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category ______

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RADIAN CORPORATION

PAGE 41 Analytical Serv REPORT LAB # 84-03-042
RECEIVED: 03/08/84 Results by Sample

SAMPLE ID T6-020 FRACTION 20A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 03/15/84 ANALYST MCL VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 2

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND	1	Trichloroethene	1790
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	<10
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042
Continued From Above

SAMPLE ID T6-020

FRACTION 20A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category ______

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

RADIAN CORPORATION

RECEIVED: 03/08/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-042

SAMPLE ID trip blank FRACTION 21A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

DATA FILE B DATE INJECTED 03/15/84 ANALYST MCL VERIFIED BY JSG
CONC. FACTOR INSTRUMENT b COMPOUNDS DETECTED 0

SCAN	COMPOUND	RESULT	SCAN	COMPOUND	RESULT
	Chloromethane	ND		Trichloroethene	ND
	Bromomethane	ND		Dibromochloromethane	ND
	Vinyl Chloride	ND		1,1,2-Trichloroethane	ND
	Chloroethane	ND		cis-1,3-Dichloropropene	ND
	Methylene Chloride	ND		2-Chloroethylvinyl Ether	ND
	Trichlorofluoromethane	ND		Bromoform	ND
	1,1-Dichloroethene	ND		1,1,2,2-Tetrachloroethane	ND
	1,1-Dichloroethane	ND		Tetrachloroethylene	ND
	trans-1,2-Dichloroethene	ND		Chlorobenzene	ND
	Chloroform	ND		1,3-Dichlorobenzene	ND
	1,2-Dichloroethane	ND		1,2-Dichlorobenzene	ND
	1,1,1-Trichloroethane	ND		1,4-Dichlorobenzene	ND
	Carbon Tetrachloride	ND			
	Bromodichloromethane	ND			
	1,2-Dichloropropane	ND			
	trans-1,3-Dichloropropene	ND			

RADIAN CORPORATION

PAGE 44 Analytical Serv REPORT LAB # 84-03-042
RECEIVED: 03/08/84 Results by Sample Continued From Above

SAMPLE ID trip blank FRACTION 21A TEST CODE GC 601 NAME EPA Method 601/GC
Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79).

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

21B : DUP601 21C : DUP601 21D : DUP601
22A : LOG_IN

RADIAN CORPORATION

RECEIVED: 03/20/84

Analytical Serv REPORT 04/10/84 08:47:58

LAB # 84-03-130

REPORT TO Radian
Bl. 4
Austin

ATTEN William Little

CLIENT TINKER SAMPLES 2
COMPANY Tinker AFB
FACILITY

PREPARED BY Radian Analytical Services
8501 MoPac Blvd.
P.O. Box 9948
Austin, Texas 78766
ATTEN
PHONE (512) 454-4797

CERTIFIED BY

CONTACT CONOVER

WORK ID zone 1 groundwater ANFS
TAKEN
TRANS
TYPE
P.O. # 212-027-04-05
INVOICE under separate cover

SAMPLE IDENTIFICATION

01 groundwater 2
02 groundwater 4

Analytical Serv TEST CODES and NAMES used on this report

ANFS Method 625 Acid/Neutrals

RADIAN CORPORATION

RECEIVED: 03/20/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-130

SAMPLE ID groundwater 2 FRACTION 01A TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

DATA FILE 2CU03130A01 DATE EXTRACTED 03/23/84 ANALYST MF VERIFIED BY LAK
CONC. FACTOR DATE INJECTED 04/06/84 INSTRUMENT COMPOUNDS DETECTED 0

NPDES	SCAN EPA	COMPOUND	RESULT	NPDES	SCAN EPA	COMPOUND	RESULT
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RADIAN CORPORATION

RECEIVED: 03/20/84

Analytical Serv REPORT
Results by Sample

LAB # 84-03-130
Continued From Above

SAMPLE ID groundwater 2 FRACTION 01A TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

B = anthracene and phenanthrene co-elute.

RADIAN CORPORATION

RECEIVED: 03/20/84

Analytical Serv REPORT LAB # 84-03-130
Results by Sample

SAMPLE ID groundwater 4 FRACTION 02A TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

DATA FILE 2CU03130A01 DATE EXTRACTED 03/23/84 ANALYST MF VERIFIED BY LAK
CONC. FACTOR DATE INJECTED 04/06/84 INSTRUMENT COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1B	1B	acenaphthene	ND	5B	72B	benzo(a)anthracene A	ND
46B	8B	1,2,4-trichlorobenzene	ND	6B	73B	benzo(a)pyrene	ND
33B	9B	hexachlorobenzene	ND	7B	74B	3,4-benzofluoranthene *	ND
36B	12B	hexachloroethane	ND	9B	75B	benzo(k)fluoranthene *	ND
11B	18B	bis(2-chloroethyl)ether	ND	18B	76B	chrysene A	ND
16B	20B	2-chloronaphthalene	ND	2B	77B	acenaphthylene	ND
20B	25B	1,2-dichlorobenzene	ND	3B	78B	anthracene B	ND
21B	26B	1,3-dichlorobenzene	ND	8B	79B	benzo(ghi)perylene	ND
22B	27B	1,4-dichlorobenzene	ND	32B	80B	fluorene	ND
29B	37B	1,2-diphenylhydrazine	ND	44B	81B	phenanthrene B	ND
31B	39B	fluoranthene	ND	19B	82B	dibenzo(a,h)anthracene	ND
17B	40B	4-chlorophenyl phenyl ether	ND	37B	83B	indeno(1,2,3-cd)pyrene	ND
14B	41B	4-bromophenyl phenyl ether	ND	45B	84B	pyrene	ND
12B	42B	bis(2-chloroisopropyl)ether	ND	11A	21A	2,4,6-trichlorophenol	ND
10B	43B	bis(2-chloroethoxy)methane	ND	8A	22A	p-chloro-m-cresol	ND
34B	52B	hexachlorobutadiene	ND	1A	24A	2-chlorophenol	ND

RADIAN CORPORATION

RECEIVED: 03/20/84 Analytical Serv REPORT Results by Sample LAB # 84-03-130 Continued From Above

SAMPLE ID groundwater 4 FRACTION 02A TEST CODE ANFS NAME Method 625 Acid/Neutrals
Date & Time Collected not specified Category

35B	53B	hexachlorocyclopentadiene	ND	2A	31A	2,4-dichlorophenol	ND
38B	54B	isophorone	ND	3A	34A	2,4-dimethylphenol	ND
39B	55B	naphthalene	ND	6A	57A	2-nitrophenol	ND
13B	66B	bis(2-ethylhexyl)phthalate	ND	7A	58A	4-nitrophenol	ND
15B	67B	butyl benzyl phthalate	ND	5A	59A	2,4-dinitrophenol	ND
26B	68B	di-n-butyl phthalate	ND	4A	60A	4,6-dinitro-o-cresol	ND
29B	69B	di-n-octyl phthalate	ND	9A	64A	pentachlorophenol	ND
24B	70B	diethyl phthalate	ND	10A	65A	phenol	ND
25B	71B	dimethyl phthalate	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L

ND = not detected at EPA detection limits

* = 3,4-benzofluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute.

B = anthracene and phenanthrene co-elute.

CORPORATION

Analytical Serv REPORT LAB # 84-03-179

RECEIVED: 03/27/84 04/25/84 12:36:26

REPORT TO	Radian Bl. 4 Austin	PREPARED BY	Radian Analytical Services 8501 MoPac Blvd. P.O. Box 9948 Austin, Texas 78766
ATTEN	William Little	ATTEN	
		PHONE	(512) 454-4797
CLIENT	TINKER SAMPLES 1		
COMPANY	Tinker AFB		
FACILITY			

CERTIFIED BY

CONTACT CONOVER

WORK ID	zone 1 groundwater
TAKEN	DLR
TRANS	hand
TYPE	
P.O. #	212-027-04-05
INVOICE	under separate cover

SAMPLE IDENTIFICATION

01 MW-8

Analytical Serv TEST CODES and NAMES used on this report

CD E	Cadmium, ICPES
CNTOTA	Total Cyanide
CR E	Chromium, ICPES
CU E	Copper, ICPES
FE E	Iron, ICPES
HERBES	Herbicides EC
HG CA	Mercury, Cold Vapor
MN E	Manganese, ICPES
NI E	Nickel, ICPES
ONG IR	Oil and Grease, Infrared
PB GA	Lead, low level
PESTES	EPA 608 Pesticides by EC
PHEN A	Total Phenolics
TOC	Total Organic Carbon
TOX 1	TOX Single Analysis
ZN E	Zinc, ICPES

RECEIVED: 03/27/84

Analytical Serv REPORT
RESULTS BY TEST

LAB # 84-03-179

TEST CODE default units	Sample 01 (entered units)
CD_E ug/ml	<.002
CNTOTA mg/L	<.02
CR_E ug/ml	0.005
CU_E ug/ml	<.001
FE_E ug/ml	0.021
HG_CA ug/ml	<.0002
MN_E ug/ml	0.110
NI_E ug/ml	<.003
ONG_IR mg/L	<1
PB_GA ug/ml	<.002
PHEN_A mg/L	<.005
TOC mg/L	2
TOX_1 mg/L	0.03
ZN_E ug/ml	0.015

CORPORATION

Analytical Serv REPORT LAB # 84-03-179
Results by Sample

RECEIVED: 03/27/84

SAMPLE ID MW-8 FRACTION 01F TEST CODE HERBES NAME Herbicides EC
Date & Time Collected 03/26/84 Category

DATE EXTRACTED 04/05/84 DATE INJECTED 04/11/84 VERIFIED BY LLN
CONCENTRATION FACTOR ANALYST DRL

COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT
2,4-D	ND				
2,4,5-TP (Silvex)	ND				

NOTES AND DEFINITIONS FOR THIS REPORT.
ND = not detected at the specified detection limit.
All results reported in micrograms/liter unless otherwise specified.

CORPORATION

Analytical Serv REPORT LAB # 84-03-179

RECEIVED: 03/27/84

Results by Sample

SAMPLE ID MW-8 FRACTION 01F TEST CODE PESTES NAME EPA 608 Pesticides by EC

Date & Time Collected 03/26/84 Category

DATA FILE 2140410 DATE EXTRACTED 04/04/84 ANALYST DRL VERIFIED BY LLN

CONC. FACTOR DATE INJECTED 04/10/84 COMPOUNDS DETECTED 0

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
1P	89P	aldrin	ND	2P	102P	alpha BHC	ND
10P	90P	dieldrin	ND	3P	103P	beta BHC	ND
6P	91P	chlordane	ND	4P	104P	gamma BHC	ND
7P	92P	4,4'-DDT	ND	5P	105P	delta BHC	ND
8P	93P	4,4'-DDE	ND	18P	106P	PCB-1242	ND
9P	94P	4,4'-DDD	ND	19P	107P	PCB-1254	ND
11P	95P	alpha endosulfan	ND	20P	108P	PCB-1221	ND
12P	96P	beta endosulfan	ND	21P	109P	PCB-1232	ND
14P	97P	endosulfan sulfate	ND	22P	110P	PCB-1248	ND
14P	98P	endrin	ND	23P	111P	PCB-1260	ND
15P	99P	endrin aldehyde	ND	24P	112P	PCB-1016	ND
16P	100P	heptachlor	ND	25P	113P	toxaphene	ND
17P	101P	heptachlor epoxide	ND				

SAMPLE ID MW-8 FRACTION 01F TEST CODE PESTES NAME EPA 608 Pesticides by EC
Date & Time Collected 03/26/84 Category

NOTES AND DEFINITIONS FOR THIS REPORT.
SCAN = scan number on chromatogram.
All results reported in micrograms/liter unless otherwise specified.
ND = not detected at EPA detection limit method 608, (Federal Register, 12/3/79).

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

01G : LOG_IN

RADIAN
CORPORATION

Oklahoma State Department of

Health Analytical Data

Commissioner

JOAN K. LEAVITT, M.D.

Oklahoma

State Department of Health

1000 Northeast 10th Street
Post Office Box 53551
Oklahoma City, Oklahoma 73152

March 21, 1984

Mr. William Little
Radian Corp
PO Box 9948
Austin, Texas 78766

Dear Mr. Little:

The State Environmental Laboratory Service of the Oklahoma State Department of Health recently split some samples collected from the monitoring wells which your organization has drilled at Tinker Air Force Base. Additionally, we recently sampled wells at the Midwest Maintenance disposal site near Tinker. Capt. Darrell Cornell asked that I provide copies of these analyses to you.

GC/MS scans of both purgables and extractables have been completed for all of the Midwest Maintenance samples. Of the Tinker samples, only sample numbers 108821, 108787, 108786, and 108822 have been analysed for both purgables and extractables. The remainder have only been analysed for purgables. When the extractables analyses are completed we will share this information with you.

Should you have any questions, please contact me. I may be reached at (405) 271-5240.

Very truly yours

Judith A. Duncan, Chief
State Environmental Laboratory Service

JAD/jb

cc: Capt. Darrell Cornell, USAF HOSP/SGB

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 108986 DATE COLLECTED : 2/16/84 REPORT DATE : 2/25/8

RUJECT : MIDWEST MAINTENENCE CODE : PW-XMS

AMPLE DISCRIPTION : SUPPLY WELL

COMPOUND	PPB
DI-N-BUTYL PHTHALATE	1.4
BIS(2-ETHYLHEXYL) PHTHALATE	0.9
BUTYL BENZYL PHTHALATE	

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST : ____________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

SAMPLE # : 108985 DATE COLLECTED : 2/16/84 REPORT DATE : 2/25/84

PROJECT : MIDWEST MAINTENENCE CODE : PW-XMS

SAMPLE DISCRIPTION : SHOP (DRINKING WATER)

COMPOUND	PPB
BIS(2-ETHYLHEXYL) PHTHALATE	7.2
BUTYL BENZYL PHTHALATE	0.3

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST : ______________________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 108984 DATE COLLECTED : 2/16/84 REPORT DATE : 2/25/84

ROJECT : MIDWEST MAINTENENCE CODE : PW-XMS

AMPLE DISCRIPTION : MW # 6

COMPOUND	PPB
DI-N-BUTYL PHTHALATE	1.2
BIS(2-ETHYLHEXYL) PHTHALATE	0.7
DIETHYL PHTHALATE	0.4

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST : ______________________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

SAMPLE # : 108983 DATE COLLECTED : 2/16/84 REPORT DATE : 2/25/84

PROJECT : MIDWEST MAINTENENCE CODE : PW-XMS

SAMPLE DISCRIPTION : MW # 2

COMPOUND	PPB
DI-N-BUTYL PHTHALATE	1.1
BIS(2-ETHYLHEXYL) PHTHALATE	0.5
DIETHYL PHTHALATE	0.2
BUTYL BENZYL PHTHALATE	0.1

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST : ______________________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

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AMPLE # : 108982 DATE COLLECTED : 2/16/84 REPORT DATE : 2/25/84

ROJECT : MIDWEST MAINTENENCE CODE : PW-XMS

AMPLE DISCRIPTION : MW # 1

==

COMPOUND	PPB
NONE DETECTED	

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST : ______________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

===

SAMPLE # : 108981 DATE COLLECTED : 2/16/84 REPORT DATE : 2/25/84

PROJECT : MIDWEST MAINTENENCE CODE : PW-XMS

SAMPLE DISCRIPTION : FISHER WELL

===

COMPOUND	PPB
NONE DETECTED	

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST : ______________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 108980 DATE COLLECTED : 2/16/80 REPORT DATE : 2/25/84

RUJECT : MIDWEST MAINTENENCE CODE : PW-XMS

AMPLE DISCRIPTION : SUPPLY WELL NE OF SITE

COMPOUND	PPB
DI-N-BUTYL PHTHALATE	0.9
BIS(2-ETHYLHEXYL) PHTHALATE	0.3
DIETHYL PHTHALATE	0.4

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST : ______________________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 108787 DATE COLLECTED : 2/13/84 REPORT DATE : 3/13/84

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : MONITOR WELL # 1A

COMPOUND	PPB
1,4-DICHLOROBENZENE	4.8
BIS(2-ETHYLHEXYL) PHTHALATE	1.1
1,2-DICHLOROBENZENE	1.0
DIETHYL PHTHALATE	2.8

INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

NALYST'S COMMENTS :

NALYST : ________________ ________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 108786 DATE COLLECTED : 2/13/84 REPORT DATE : 3/13/84

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : MONITOR WELL # 1B

COMPOUND	PPB
DIETHYL PHTHALATE	0.9
ISOPHORONE	0.4

INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

NALYST'S COMMENTS :

NALYST : ______________________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 108822 DATE COLLECTED : 2/14/84 REPORT DATE : 3/13/84

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : MONITOR WELL #1C

COMPOUND	PPB
TRICHLOROETHENE	210
1,1,2-TRICHLOROETHANE	5.6
BIS(2-ETHYLHEXYL) PHTHALATE	5.0
DIETHYL PHTHALATE	7.8
ISOPHORONE	4.0

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST :

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 108854 DATE COLLECTED : 2/15/84 REPORT DATE :

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : MONITORING WELL # 2A

COMPOUND	PPB
TRICHLOROFLUOROMETHANE	3.8
1,1-DICHLOROETHANE	25
1,1,1-TRICHLOROETHANE	4.2
TRICHLOROETHENE	30.4
TETRACHLOROETHENE	12.2

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST : ______

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

=====

AMPLE # : 109004   DATE COLLECTED : 2/17/84   REPORT DATE :

ROJECT : TINKER   CODE : TF-XMS

AMPLE DISCRIPTION : MONITORING WELL # 2B

=====

COMPOUND	PPB
NO PURGEABLES DETECTED	

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST :

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 108852 DATE COLLECTED : 2/15/84 REPORT DATE :

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : MONITORING WELL # 3E

COMPOUND	PPB
NO PURGEABLES DETECTED	

< INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST : ______________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 108851 DATE COLLECTED : 2/15/84 REPORT DATE :

ROJECT : TINKER CODE : PW-XMS

AMPLE DISCRIPTION : MONITORING WELL # 3F

COMPOUND	PPB
NO PURGEABLES DETECTED	

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST : ______________________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

SAMPLE # : 108853 DATE COLLECTED : 2/15/84 REPORT DATE :

PROJECT : TINKER CODE : TF-XMS

SAMPLE DISCRIPTION : MONITORING WELL # 3G

COMPOUND	PPB
METHYLENE CHLORIDE	786
TRANS-1,2-DICHLOROETHENE	259
1,2-DICHLOROETHANE	2680
TRICHLOROETHENE	2220
1,1,2-TRICHLOROETHANE	86
TOLUENE	132
CHLOROBENZENE	378

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST : ______

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 108821 DATE COLLECTED : 2/14/84 REPORT DATE : 3/13/84

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : MONITOR WELL # 4A

COMPOUND	PPB
1,2-DICHLOROETHANE	2.7
TRICHLOROETHENE	101
DIETHYL PHTHALATE	8.1

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

NALYST'S COMMENTS :

NALYST : ______________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 108850 DATE COLLECTED : 2/15/84 REPORT DATE :

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : MONITOR WELL # 4G

COMPOUND	PPB
NO PURGEABLES DETECTED	

: INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

NALYST'S COMMENTS :

NALYST : ______________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

===

AMPLE # : 109001 DATE COLLECTED : 2/17/84 REPORT DATE :

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : POND (LAND FILL RD & WEST OF RESERVE ROAD)

===

COMPOUND	PPB
NO PURGEABLES DETECTED	

X INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

NALYST'S COMMENTS :

NALYST : ______________________________

STATE ENVIRONMFNTAL LABORATORY
GC/MS REPORT

AMPLE # : 108884 DATE COLLECTED : 2/16/84 REPORT DATE :

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : MONITORING WELL # 1 (OLD WELLS)

COMPOUND	PPB
NO PURGEABLES DETECTED	

INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

NALYST'S COMMENTS :

NALYST :

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 109000 DATE COLLECTED : 2/17/84 REPORT DATE :

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : MONITORING WELL # 3 (OLD WELL)

COMPOUND	PPB
NO PURGEABLES DETECTED	

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST : ____________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 108998 DATE COLLECTED : 2/17/84 REPORT DATE :

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : MONITORING WELL 4

COMPOUND	PPB
— CHLOROBENZENE	118

: INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

NALYST'S COMMENTS :

NALYST : ______________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 108999 DATE COLLECTED : 2/17/84 REPORT DATE :

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : MONITORING WELL # 5

COMPOUND	PPB
NO PURGEABLES DETECTED	

INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

NALYST'S COMMENTS :

NALYST : ______________________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 108997 DATE COLLECTED : 2/17/84 REPORT DATE :

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : MONITOR WELL #5

COMPOUND	PPB
NO PURGEABLES DETECTED	

INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

NALYST'S COMMENTS :

NALYST : ______

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 109002 DATE COLLECTED : 2/17/84 REPORT DATE :

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : MONITORING WELL # 6 (OLD WELL)

COMPOUND	PPB
— TRANS-1,2-DICHLOROETHENE	385
— TRICHLOROETHENE	62.1

* INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST : ___ ______________

STATE ENVIRONMENTAL LABORATORY
GC/MS REPORT

AMPLE # : 109003 DATE COLLECTED : 2/17/84 REPORT DATE :

ROJECT : TINKER CODE : TF-XMS

AMPLE DISCRIPTION : MONITORING WELL # 7

COMPOUND	PPB
TRANS-1,2-DICHLOROETHENE	22.8
TRICHLOROETHENE	12

< INDICATES COMPOUND IS TENTATIVELY IDENTIFIED BY NBS LIBRARY SEARCH !

ANALYST'S COMMENTS :

ANALYST :

RADIAN
CORPORATION

APPENDIX I

Correspondence with Federal, State and/or
Local Regulatory Authorities

RADIAN
CORPORATION

212-027-04

6 October 1983

Mr. James R. Barnett
Executive Director
Oklahoma Water Resources Board
Post Office Box 53585
Oklahoma City, Oklahoma 73152

Dear Mr. Barnett:

Radian Corporation is under contract to the U.S. Air Force Occupational and Environmental Health Laboratory to conduct certain hydrogeologic investigations at Tinker Air Force Base, Oklahoma. The work will include installation of ground-water monitoring wells in the vicinity of known or suspected hazardous waste disposal sites, so the drillers will utilize EPA Level C personal protection equipment (full-face respirators, splash-proof outer clothing, gloves and impervious footgear).

Radian has conducted a diligent search, both by letter and telephone, for an Oklahoma-based firm to subcontract the monitor well drilling effort. We are unable to locate a firm with the required equipment and hazardous waste experience. Consequently, the search has been widened, and suitable firms have been located here in Texas.

This is not, in any way, to be construed as a reflection on the general level of competence of Oklahoma water well drillers. The practice of monitor well installation, even though based on the same technology, is different from that of production well installation. We also need a sub-contractor who is experienced in the safety aspects associated with hazardous waste sites. This project requires personnel who can maintain a satisfactory production rate while maintaining adequate protection for themselves, nearby personnel and the environment.

As we understand it, there is no reciprocity agreement between Texas and Oklahoma for licensing of water well drillers. We further understand that, even though these wells at Tinker AFB are not production wells, you wish them to be installed by a licensed driller. However, we have found no Oklahoma-based, licensed firm with the requisite hazardous waste site experience to undertake the project. Therefore, we request that, for this project at Tinker AFB only, Radian Corporation and its designated drilling subcontractor be exempted from the licensing requirements.

The start of field work is being delayed, pending the outcome of this action. We appreciate your early consideration and response.

Sincerely,

William M. Little

William M. Little
Project Director

WML:sg
cc: Mr. Baladi, OEHL/CVT
Dr. Sanders, OEHL/ECQ
CPT Cornell, Tinker AFB Hospital SGB

RADIAN
CORPORATION

212-027-04

31 October 1983

Mr. Jenkins Dunbar
Oklahoma State Department
 of Health
Industrial and Solid
 Waste Service
Post Office Box 53551
Oklahoma City, Oklahoma 73152

Dear Mr. Dunbar:

Radian Corporation is under contract to the U.S. Air Force Occupational and Environmental Health Laboratory to conduct certain hydrogeologic investigations at Tinker Air Force Base, near Oklahoma City. The Air Force has previously provided you with the Statement of Work for the study. In support of that study, we are preparing to drill two shallow ground-water monitoring wells, three soil borings and six deep ground-water monitoring wells. The purpose of this letter is inform you of the contemplated drilling and well construction procedures. Field work is expected to begin on or about 7 November 1983.

Shallow Monitor Wells

Drilling locations will be specified by Radian. The anticipated average depth of the wells is 30 feet. Actual depth of each well will be determined in the field by the supervising Radian geologist. The cores for installing the wells will be drilled by hollow-stem auger and core samples will be obtained at five-foot intervals with a split-spoon sampler (ASTM D-1536). Drilling and completion logs will be kept and samples retained by the supervising geologist.

Well construction materials will be as follows:

1. Casing: two-inch diameter, flush joint, Schedule 80 PVC.

2. Screen: two-inch diameter, flush joint, Schedule 80 PVC, 0.010-inch continuous slot. Normal screen length will be 10 feet, to be reduced to 5 feet at the discretion of the supervising geologist.

3. Sand/gravel pack: grain size compatible with screen slot size, emplaced from bottom of hole to one foot above top of screen.

4. Bentonite seal: two feet above top of sand pack.

8501 Mo-Pac Blvd. / P.O. Box 9948 / Austin, Texas 78766 / (512)454-4797

5. Grout: neat cement (Type I Portland cement) grout from the top of the bentonite seal to the land surface.

6. Surface completion: The PVC casing is cut off to provide a two to three foot stickup and a coupling with an end plug cemented to the casing. A three-inch diameter guard pipe, four feet in length, is placed over the exposed casing, and seated in the cement. A locking cap lid is installed on the guard pipe.

7. ALTERNATIVE FLUSH SURFACE COMPLETION: The PVC casing is cut off 2-3 inches below the land surface, and a locking cap lid cemented in place. The corehole is over-excavated, if necessary, and a valve box or other flush cover cemented in place with premixed concrete. Care is taken to maintain free drainage within the valve box. Radian will specify the surface completion procedure to be used. Approximately three of the wells will have flush completions.

8. Guard pipes or posts: Three-inch diameter steel posts, six feet in length, with a minimum of 2 feet below ground, 3 feet in length, with a minimum of 2 feet below ground, 3 each installed radially 4 feet from the wellhead (not required for flush surface completion).

<u>Deep Monitor Wells</u>

These wells will be drilled to an approximate total depth of 125 feet at locations to be specified by the supervising geologist. Well specifications are as follows:

1. Drilling method - air rotary.

2. Casing - four-inch diameter, flush joint, Schedule 80 PVC.

3. Screen - four-inch diameter, flush joint, Schedule 80 PVC, ten feet in length, with 0.010-inch continuous slot.

4. Sand/gravel pack: grain size compatible with screen slot size, emplaced from bottom of hole to one foot above top of screen.

5. Bentonite seal: two feet above top of sand pack.

6. Grout: neat cement (Type I Portland cement) grout from the top of the bentonite seal to the land surface.

7. Surface completion and guard posts: same as for two-inch monitor wells.

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CORPORATION

Soil Borings

In addition to the above, there will be three cores to a nominal depth of 30 feet. Actual depth of each core will be determined in the field by the supervising Radian geologist. The cores will be drilled by hollow-stem auger and samples will be obtained at five-foot intervals with a split-spoon sampler (ASTM D-1536). Drilling logs will be kept and samples retained by the supervising geologist. After the cores are advanced to total depth, each will be grouted back to the surface as the augers are withdrawn.

Coordination

A licensed water well driller has been retained to conduct the drilling and well construction. The Water Resources Board will be notified of the drilling locations and appropriate records (Form 424-10 76) will be filed with the Board after the wells are completed.

Please call me if you have any questions.

Sincerely,

William M. Little

William M. Little
Project Director

WML:sg
cc: Duane Smith, OK Water Resources Board
CPT Cornell, Tinker AFB Hospital/SGB
Dr. Sanders, OHEL/ECQ
Mr. Baladi, OEHL/CVT

RADIAN

7 November 1983

212-027-04

Mr. Jenkins Dunbar
Oklahoma State Department
of Health
Industrial and Solid
Waste Service
Post Office Box 53551
Oklahoma City, OK 73152

Dear Mr. Dunbar:

This is to confirm our telephone discussion today, concerning the hydrogeologic investigations at Tinker Air Force Base.

1. Well construction - We note Oklahoma State Department of Health concurrence in the proposed well construction procedures.

2. Well diameter - As we discussed, it is technically and financially inappropriate to increase the proposed well diameter at Industrial Waste Pit No. 2 from two to four inches.

3. Coordination - Radian intends to keep your office fully informed of the progress of the investigation and to provide you with ample opportunity to visit work in progress. However, it will be necessary to schedule field visits at times that are mutually convenient. Please remember that, when you visit the drilling operation, you will need a minimum of EPA Level D personal protection equipment.

Please call me anytime you have questions about the Tinker AFB investigation.

Sincerely,

William M. Little

William M. Little
Project Director

WML:sg
cc: Dr. Sanders, OEHL/ECQ
Mr. Baladi, OEHL/CVT
CPT Cornell, Tinker AFB Hospital/SGB

Blvd. / P.O. Box 9948 / Austin, Texas 78766 / (512)454-4797

RADIAN CORPORATION

APPENDIX J

References

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2. Engineering-Science, Installation Restoration Program, Phase I - Records Search, Tinker AFB, Oklahoma, April, 1982.

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4. Havens, John, 1981, Hydrologist, U.S. Geological Survey Water Resources Division, Oklahoma City, Oklahoma, personal communication, November 17 (quoted in Engineering Science, 1982).

5. McNeill, J.D., 1980, Electromagnetic Terrain Conductivity Measurement at Low Induction Numbers, Geonics, Ltd., Technical Note TN-6.

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9. Wood, P.R., and L.C. Burton, 1968, Ground-Water Resources in Cleveland and Oklahoma Counties, Oklahoma: Oklahoma Geological Survey Circular 71, 75 p. (Geologic map revised by R.O. Fay, 1970).

RADIAN CORPORATION

APPENDIX K

Biographies of Key Personnel

Marshall F. Conover - Program Manager
William M. Little - Project Director
Rick A. Belan - Supervising Geologist
Fred B. Blood - Monitor Well Sampling
Kathey A. Ferland - Monitor Well Sampling
Lawrence N. French - Supervising Geologist
Jill P. Rossi - Cartographer
Ann E. St.Clair - Technical Review

RADIAN
CORPORATION

MARSHALL F. CONOVER, P.E.

EDUCATION:

Graduate Studies, University of California, San Diego, CA.

B.A., Physics, San Diego State University, San Diego, CA, 1963.

PROFESSIONAL EXPERIENCE:

Senior Program Manager, Radian Corporation, 1977-Present.

Assistant Project Manager, TRW Systems Group, 1968-1977.

Group Leader, Grumman Corporation, 1965-1968.

Sr. Flight Test Engineer, General Dynamics, 1958-1965.

FIELDS OF EXPERIENCE:

Mr. Conover is a Program Manager in the Research and Engineering Operations at Radian. He develops new business and manages contracted projects that provide technical multidisciplinary services in failure analysis, research, engineering, corrosion, alternate energy, and energy conservation.

In activities for the electric power industry, Mr. Conover has been responsible for many failure analyses of operational and R&D power plant components, viz: a pump shaft and expansion bellows for a 500 KW R&D plant; and isobutane turbine and heat exchanger tubes for Magma Power; and FGD expansion joint of the City of Springfield, MO; a steam diffuser at The Geysers; and currently, for EPRI, he is managing a project (RP 1195-8) to determine the cause of failures on downhole, high temperature, geothermal production pumps for binary geothermal power plants.

Mr. Conover has managed many corrosion-related studies of geothermal power plants for SDG&E, Heber, CA; DOE, Raft River, ID; a utility consortium in Nevada, and Hawaii Electric, Puna, HI. In addition, Mr. Conover has also directed several EPA projects aimed at determining the energy costs and plant effluents resulting from more stringent national standards for sulfur dioxide emissions from steam-electric power plants.

For five years Mr. Conover has been responsible for a DOE project to determine materials selection guidelines for geothermal power plants. Mr. Conover and Radian staff members established relationships and visited geothermal power plants in Japan, New Zealand, El Salvador, Mexico, Iceland, Italy as well as the United States to gain knowledge of a broad spectrum of corrosion problems, data and experience. From detailed analyses, the concept of site-specific corrosion phenomena was reduced to an emperical concept that all geothermal

Marshall F. Conover

resources fit into six corrosivity classes. Further, Mr. Conover's team determined that only six key chemical species in the fluid were responsible for the preponderance of corrosion.

Prior to joining Radian Corporation, Mr. Conover performed consulting engineering to the United States Energy Research and Development Administration's Office for Fossil Energy Development. In various senior project positions, Mr. Conover conferred with Fossil Energy Project Offices to establish their annual plans for coal liquefaction and gasification, magnetohydrodynamics (MHD), demonstration plants, advanced research, enhanced oil and gas recovery, and in situ oil shale and coal gasification technologies. While in close interaction with the MHD Office, Mr. Conover was instrumental in synthesizing and translating their R&D requirements into procurements for development of critical components for the U.S. coal-fired MHD power generation program. In addition, Mr. Conover played a central role in formulating ERDA's plans for developing natural gas resources from the Western tight gas sands and Eastern gas shales.

As Fleet Command Support Center (FCSC) Assistant Project Manager for Site Engineering, Mr. Conover was responsible for Field Offices at the London, Norfolk, Honolulu, and Pentagon Command Centers (CC) as well as a support office at the customer's offices in Arlington, VA. His Site Engineering group represented the FCSC Project at the user's control centers; translated user requirements into scenarios for system specification input; and provided special support as needed. Site Engineering teams conducted detailed site configuration surveys and developed site-unique specifications delineating the FCSC design requirements for each FCSC facility with supporting television, microfilm, projection, and communications equipment.

For the Space Shuttle, Mr. Conover was responsible for payload accommodation/-interfaces, technical marketing pursuits and studies. He developed customer contacts, made presentations, assisted and/or monitored targeted procurements at NASA Johnson, Marshall and Kennedy Space Centers per Business Development Plan. Also responsible for Shuttle/payload carrier computer interface work, Mr. Conover's major concerns included requirements for implementation of process auditing, function allocation coordination, requirements compliance and system design assessments, and panel/working group participation. As Lead Experiments Engineer for a project that produced the Skylab Experiments Operational Data Book, Mr. Conover's Task Force developed data specifications, acquired data per specifications for all 56 Skylab experiments and validated data via cognizant Principal Investigators/Engineers, and published and updated data as designs progressed. Mr. Conover also organized and staffed a Data Engineering Group which was responsible for the data systems and reporting of the Apollo Lunar Module (LM) thermal-vacuum mission simulation testing at NASA/Johnson Space Center. This group performed instrumentation installation, data processing and analysis, vehicle checkout computer programming requirements, instrumentation calibration data processing, and test evaluation and reporting.

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For a wide range of Atlas Space Launch Vehicle payloads, Mr. Conover was responsible for the flight test evaluations and reports. Extensive failure analyses were conducted using instrumentation/telemetry data, photographic data and laboratory simulations. Mr. Conover also functioned in an associate contractor integrating role which required identification of other contractor's flight hardware problems, determination of corrective action, and communication of the flight problems resolution and status to the client.

PROFESSIONAL ACTIVITIES:

- o Associate Fellow, AIAA, 1970-1974
- o Geothermal Resources Council, 1978-1983
- o Texas Solar Energy Society, 1979
- o ASTM, E45.3, Subcommittee Chairman, 1980
- o ASHRAE, TC 6.8, Research Subcommittee Chairman, 1982

LICENSE:

Registered Professionsl Engineer: Texas - SN 33369.

PAPERS AND PUBLICATIONS:

Conover, Marshall F., et al., Direct Utilization of Geothermal Energy for Space and Water Heating at Marlin, Texas, NTIS DOE/ET/27059-1, Radian Corporation, Austin, TX, May 1983.

Conover, Marshall F., et al., Corrosion Reference for Geothermal Downhole Materials Selection, NTIS DOE/SF/11503-1, Radian Corporation, Austin, TX, March 1983.

Conover, M.F., "Designing Geothermal Power Plants to Avoid Reinventing the Corrosion Wheel," Geothermal Resources Council Bulletin, Vol. 12, No. 3, March 1983.

Conover, M.F., "A Corrosivity Classification System for Geothermal Resources," Geothermal Resources Council Bulletin, Vol. 12, No. 2, February 1983.

Conover, M.F. and P.F. Ellis, "Corrosivity Classes and Materials Selection Guidelines for Geothermal Energy Utilization Systems," AIChE Anaheim, CA Meeting, June 1982.

Ellis, P.F., II and M.F. Conover, Materials Selection Guidelines for Geothermal Energy Utilization Systems, NTIS DOE/RA/27026-1, Radian Corporation, Austin, TX, January 1981.

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Conover, M.F., P.F. Ellis, and A.M. Cruzon, "Materials Selection Guidelines for Geothermal Power Systems," Sourcebook on the Production of Electricity from Geothermal Energy, Joseph Kestin, Editor-in-Chief, DOE/RA/28320-2, GPO: Washington, DC, August 1980.

Conover, M.F., P.F. Ellis, and A.M. Cruzon, "Materials Selectin Guidelines for Geothermal Power Systems--An Overview," Geothermal Scaling and Corrosion, Casper/Pinchback, Eds., ASTM STP 717, Philadelphia, PA, 1980.

Ellis, P.F. and M.F. Conover, "Corrosion Engineering for Geothermal Heating Systems," Special Report No. 9: Commercial Uses of Geothermal Heat, Geothermal Resources Council, Davis, CA, June 1980.

Ellis, P.F. and M.F. Conover, "Materials (Alloys) Selection for High Temperature Downhole Instrumentation," High Temperature Electronics and Instrumentation Seminar Proceedings, December 3-4, 1979, Publication Code SAND-80-0834C, Sandia Laboratories, Albuquerque, NM, May 1980.

Conover, M.F. and R.L. Miller, "Corrosion and Scaling in Direct Applications of Geothermal Fluids," Presented at The Electrochemical Society, Los Angeles, CA Meeting, October 1979.

Conover, M.F., P.F. Ellis, and D.A. Mitchell, "Premature Failure of Residential Geothermal Heating System Fan-Coil Units," Paper No. 274 presented at The Electrochemical Society Los Angeles, CA Meeting, October 1979.

Conover, M.F. and P.F. Ellis, "Materials Selection Guidelines for Geothermal Energy Systems," Geothermal Resource Council Transactions, Vol. 3, September 1979.

Conover, M.F. and L. Bennett, "Compression and R-Wave Detection of ECG/VCG Data," NASA Tech Brief, B72-10391, July 1972.

Hellmann, R.F., M.F. Conover, E. Morrison, and G. Neilson, "Lunar Module Thermal-Vacuum Simulation Utilizing Conformal Thermal Heater Control," AIAA Spacecraft Journal, Vol. 7, No. 2, February 1970.

RADIAN
CORPORATION

WILLIAM M. LITTLE

EDUCATION:

M.S., Civil Engineering, University of California, Berkeley, 1974.

M.S., Hydrology, University of Arizona, Tucson, 1968.

B.S., Hydrology, University of Arizona, Tucson, 1967.

EXPERIENCE:

Senior Engineer and Group Leader, Radian Corporation, Austin, TX, 1982-Present.

Senior Engineer, Radian Corporation, Austin, TX, 1978-1982.

Hydrologist, U.S. Army Environmental Hygiene Agency, 1973-1978.

Research and Technical Operations Officer, U.S. Army Engineer Nuclear Cratering Group, 1969-1971.

Graduate Student in Research, University of Arizona, Tucson, 1968.

FIELDS OF EXPERIENCE:

Mr. Little is a Senior Engineer and Group Leader with a major technical specialty in ground-water pollution studies. He is currently the Project Director for hydrogeologic investigations of multiple waste disposal sites on Kelly Air Force Base, Texas, and Tinker Air Force Base, Oklahoma. These investigations include monitoring well construction, ground-water sampling, and contaminant transport assessment. He is responsible for program design and execution, subcontractor selection, and managing and editing the final report. He has recently completed a hydrogeologic investigation of a Superfund site in western New York state. The project included monitoring well construction, definition of ground-water flow system, assessment of contaminant transport potential, and presentations to regulatory authorities. Mr. Little served as Project Director and principal investigator.

He has served as Project Director and field manager for a large, multidisciplinary characterization of an abandoned hazardous waste disposal site in southern California. The waste materials consist of acid petroleum refinery sludges. Major areas of investigation were: chemical characterization of wastes and geologic materials; quantification of sulfur dioxide and hydrocarbon emissions; and ground-water monitoring. Mr. Little was responsible for managing the field operations and supervising report preparation.

Mr. Little has served as assistant Project Director and field manager for an investigation of the ground-water quality impact of a spill of a coal-distillate liquid at an SRC pilot plant near Tacoma, Washington. The study involved

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detailed unsaturated zone coring and designing and constructing a series of ground-water monitoring wells A Remedial Measures Plan was formulated and adopted to remove contaminated materials and to prevent the further spread of ground-water contamination. Following the evaluation of the spill event, Mr. Little directed an expanded program to evaluate the ground-water quality effects of overall plant operations. The possible sources of contamination were identified and characterized. Mr. Little then developed a ground-water monitoring program and supervised the installation of the monitoring network. He designed and conducted aquifer pump tests to define aquifer performance and interpreted the results.

Mr. Little has also conducted a program to evaluate the extent of ground-water contamination by refinery operations and wastes at an oil refinery near Duncan, Oklahoma. The initial assessment was based on site reconnaissance, interviews with refinery personnel and a study of existing hydrogeologic and process data.

Mr. Little has recently completed two environmental/regulatory fatal flaw studies for lignite mines and associated power plants in East Texas. He was both Project Director, responsible for overall management and preparation of the final report, and hydrology task leader, responsible for assembling data on hydrologic conditions and assessing probable impacts. He has also recently served as task leader for regulations review, impact analysis and permit application preparation for a commercial-scale coal gasification facility in Wyoming and ground-water hydrology task leader for environmental analysis of a major lignite mine and associated synfuels plant in east Texas.

In another program, Mr. Little directed an evaluation of surface-water and ground-water availability in the vicinity of the proposed Solvent Refined Coal-II (SRC-II) demonstration plant and commercial facilities near Morgantown, West Virginia.

For a private industrial client, Mr. Little reviewed and evaluated the environmental monitoring data from the vicinity of an in situ coal gasification test in the Powder River Basin of Wyoming. The water quality impacts of the test burn were assessed, and a program of aquifer restoration and hydrologic testing recommended. Based on available hydrologic and geochemical data, a conceptual model of the test site was developed. He also developed a ground-water monitoring and contingency aquifer restoration program for a proposed future test. The program includes selection of well locations and parameters for monitoring and specification of restoration strategies.

Mr. Little has also participated in an assessment of the environmental behavior of fluidized bed combustion (FBC) waste for EPA, IERL. Mr. Little was responsible for the design, construction and operation of field cells for testing FBC waste disposal alternatives and for the development of a preliminary waste transport model. He has also been project director and hydrology

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task leader in the evaluation of the environmental suitability of an ash/scrubber sludge disposal site. He was responsible for the overall management of the program, evaluated the laboratory and hydrogeologic data and predicted contaminant migration.

As a hydrologist with the Water Quality Engineering Division, U.S. Army Environmental Hygiene Agency, Mr. Little served as a consultant to the Office of the Surgeon General and to major commands and installations on hydrologic aspects of water supply and wastewater disposal. He prepared design criteria for programs of effluent and receiving water monitoring at Army manufacturing and research facilities, evaluated ground-water pollution potential of waste disposal practices, and reviewed draft NPDES discharge permits issued to Army installations. He performed preliminary technical feasibility studies of land treatment of wastewater including field investigations and trial systems design. He conducted environmental impact statement data requirements review and prepared and reviewed portions of environmental impact statements. Mr. Little also managed the Army Medical Department's nationwide Drinking Water Surveillance Program.

With the Corps of Engineers, Mr. Little was assigned as a Research and Technical Operations Officer, U.S. Army Engineer Nuclear Cratering Group. There he conducted a general investigation of hydrologic transport of radionuclides from Plowshare application sites. This work included literature searches, computer simulation, experimental design and conceptual modeling of transport phenomena. He also participated in final preparation of a 1971 Corps of Engineers report on Wastewater Management in the San Francisco Bay Region.

While at the University of Arizona, Mr. Little was a member of the Operations Research Study Group on the Tucson Basin, gathering background hydrologic material, and conducting a literature and data file search. He directed and participated in preliminary adaptation of a two-dimensional, finite difference model of a large, heterogeneous ground-water basin.

HONORARY AND PROFESSIONAL SOCIETIES:

American Geophysical Union, American Water Resources Association, National Water Well Association, Sigma Xi.

CERTIFICATION:

AIPG Certified Professional Geological Scientist No. 6468.

PUBLICATIONS/REPORTS:

Numerous technical reports in the fields of water resources development, ground-water contaminant migration, occurrence of radionuclides in ground water, land treatment feasibility and receiving water monitoring, including:

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William M. Little

Little, W.M., "Hydrogeologic Investigations, Facet Enterprises, Inc., Elmira, New York," Radian Corporation Final Report to Facet Enterprises, Inc., September 1983.

Little, W.M., et al., "McColl Site Investigation - Phase 1," Radian Corporation Report to the Participants Committee, November 1982.

Little, W.M., et al., "Environmental Considerations and Air Quality Modeling for the Freestone County Project," Radian Corporation Report to Tenneco Coal Company, March 1982.

Grimshaw, T.W., et al., "Assessment of Fluidized-Bed Combustion Solid Wastes for Land Disposal," Draft Final Report, Radian Corporation Report to EPA Industrial Environmental Research Laboratory, December 1982.

Little, W.M., et al., "Environmental Considerations and Air Quality Modeling for the Edgewood and Mustang Creek Prospects and Associated Energy Park," Radian Corporation Report to Tenneco Coal Company, November 1981.

Little, W.M., et al., "Ground-Water Impact of SRC Pilot Plant Activities Fort Lewis, Washington," Radian Corporation report to Gulf Mineral Resources Company, January 1981.

Little, W.M., et al., "Ground Water Modeling at an In-Situ Coal Gasification Test," Radian Corporation Report to confidential industrial client, September 1980.

Little, W.M. and H.J. Williamson, "Recommended Ground-Water Monitoring and Aquifer Restoration Programs, Future In-Situ Coal Gasification Test," Radian Corporation Report to confidential industrial client, September 1980.

Little, W.M. and W.C. Micheletti, "Recommended Aquifer Restoration and Hydrologic Testing Program for an In-Situ Coal Gasification Test," Radian Corporation Report to confidential industrial client, August 1980.

Grimshaw, T.W. and W.M. Little, "Remedial Measures Plan for a Spill of Solvent Refined Coal Liquid at the SRC Pilot Plant, Fort Lewis, Washington," Radian Corporation Report to Gulf Mineral Resources Company, August 1980.

Little, W.M., et al., "Hydrologic Evaluation of a Combined Ash/FGD Sludge Storage Site, Craig Station," Radian Corporation Report to Colorado Ute Electric Association, July 1980.

Little, W.M., T.J. Wolterink, and M.H. McCloskey, "Water Availability Appraisal for the Proposed Solvent Refined Coal-II Demonstration Plant, Monongalia County, West Virginia," Radian Corporation Report to U.S. Department of Energy, February 1980.

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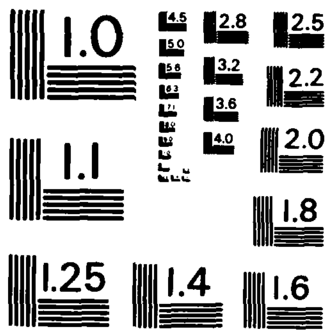

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

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William M. Little

Little, W.M., "Water Quality Geohydrologic Consultation No. 24-0286-77," Twin Cities Army Ammunition Plant, New Brighton, MN, 21-23 July 1976, U.S. Army Environmental Hygiene Agency, 11 January 1977 (six additional geohydrologic consultations; sole author on two, senior on three, junior on one).

Little, W.M., Drinking Water Consultation Visit No. 24-1301-77, Joliet Army Ammunition Plant, Illinois, 2-4 August 1976, USAEHA, 9 February 1977 (four additional drinking water consultations).

Little, W.M., Water Quality Geohydrologic Consultation No. 24-058-75/76, Land Disposal Feasibility Study, Fort Polk, Louisiana, 2-29 April and 9-29 October 1975, USAEHA, 19 August 1976.

Little, W.M., Water Quality Geohydrologic Consultation No. 24-005-76, Land Disposal Feasibility Study, Fort Dix, New Jersey, 21-30 July and 15-23 September 1975, USAEHA, 18 June 1976 (two additional land treatment evaluations as part of water quality engineering special studies).

Little, W.M., Water Quality Monitoring Consultation No. 24-048-74/75, Aberdeen Proving Ground, Maryland, 25-27 February 1974, USAEHA, 17 December 1974 (three additional monitoring consultations).

Little, W.M., Water Quality Engineering Special Study No. 24-017-74, Mixing in Receiving Waters, 7 September-24 October 1973, USAEHA, 3 January 1974.

Little, W.M., Analysis of Hydrologic Transport of Tritium, U.S. Army Engineer Nuclear Cratering Group Technical Memorandum 70-7, Lawrence Radiation Laboratory, Livermore, CA, April 1971.

Little, W.M., An Engineering and Economic Feasibility Study for Diversion of Central Arizona Project Waters from Alternate Sites, M.S. Thesis, Department of Hydrology, University of Arizona, Tucson, AZ, 1968.

RADIAN
CORPORATION

RICK A. BELAN

EDUCATION:

M.S., Hydrology, University of Arizona, Tucson, 1972.

B.S., Geology, Kent State University, OH, 1970.

EXPERIENCE:

Staff Hydrogeologist, Radian Corporation, 1980-Present.

Groundwater Hydrologist, William F. Guyton and Associates, 1977-1980.

Captain, United States Army, 1972-1977.

Environmental Impact Assessment Officer, United States Army, 1975.

Research Associate, University of Arizona, 1970-1972.

FIELDS OF EXPERIENCE:

Mr. Belan is currently conducting field investigations of various hazardous waste sites at Kelly and Tinker Air Force Bases in Texas and Oklahoma, respectively. These efforts, as part of the Air Force's Installation Restoration Program (IRP), entail the installation of monitoring wells and hazardous waste site soil sampling for chemical analysis. The results will be used to define the site hydrogeology and waste site impacts, if any, on the local groundwater system.

Mr. Belan is the hydrogeological project director for an Installation Restoration Program investigating four hazardous waste disposal sites at Hill Air Force Base, Utah. The field phase entailed the direction of the investigation efforts for monitor well installation and completion, soil and ground-water sampling, geophysical resistivity surveys and chemical analysis coordination. The results of this effort were to determine the nature and extent of ground water contamination and define the local hydrogeology.

As part of a remedial actions assessment of the McColl hazardous waste site in California, he conducted the conceptual design and evaluation of a slurry trench wall system. Containment wall materials were selected for laboratory testing. Additional wall materials and installation costing, survivability, and suitability were evaluated.

Mr. Belan conducted, as part of a remedial actions assessment of the Lipari Superfund site in New Jersey, the conceptual design and costing of a dewatering system. This included an impact assessment of the formations dewatering on a slurry trench cutoff wall. The results of this evaluation provided discharge information for a ground-water treatability study.

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He worked on three Environmental Protection Agency Superfund projects. Two projects entailed the hydrogeological evaluations of hazardous waste sites in Louisiana and New Jersey with the results developing and supporting site remedial measures activities. The third EPA Superfund activity was the evaluation of a new potential waste isolation technology which had been tested. The test attempted to isolate a large block of soil by slurry injection at depth areally and vertically using a patented process. Mr. Belan supervised the site investigation for determining the success of the technique to isolate the soil block. This entailed directing a geophysical survey, and confirmation soil borings to determine the soil isolation success of the test.

He coordinated and supervised the air rotary drilling and casing drive completion of a 270-foot monitoring well for an unused waste site containing mainly petroleum refinery waste sludges. This upgradient well located in California was drilled in difficult caving formations. The successful completion of this well permitted the location of a third final downgradient monitoring well for the clients.

In the area of solid waste management, Mr. Belan coordinated, supervised, and documented the disposal of fluidized bed combustion byproducts from a synfuels experiment sponsored by the Environmental Protection Agency. This project entailed the coordination with local agencies for the disposal at an appropriate landfill, and hydration of the wastes to neutralize its exothermic reaction prior to disposal.

Mr. Belan was instrumental in providing a hydrogeological assessment of an inactive hazardous waste site in south central New York. The site is listed by EPA as a priority site for action under Superfund. The result of the assessment was the design and costing of a monitoring well program for the client.

As the environmental baseline task leader and geological/hydrogeological team member, Mr. Belan coordinated, developed and identified environmental constraints or issues for a New Mexico Synfuels Project Feasibility Study. Analysis for this study for an industrial client permitted enumeration of ground-water and surface-water environmental issues associated with two in-mine and two plant sites disposal of hazardous/nonhazardous solid waste from a synfuels plant. The results of the study summarized the regional and site-specific geology, ground-water and surface-water. The study identified mine and plant environmental constraint areas concerning solid and liquid waste disposal and also described the waste disposal options as to which mine or plant sites the solid waste should go.

Mr. Belan conducted as part of a geothermal feasibility study a hydrogeological assessment of two aquifers for potential utilization for each of four U.S. military bases which are located in the vicinity of San Antonio, Texas. This entailed the development of conceptual well depths, productivity estimates, static water levels, water temperatures and water quality. These data

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were used to support benefit/cost analyses of a total geothermal systems package that included costs of well completion and production, heat extraction systems and projected heat demands.

He completed a state-of-the-art review of geopressured/geothermal fluids disposal technologies and environmental problems associated with the disposal techniques for the Texas Energy and Natural Resources Advisory Council (TENRAC). The two primary disposal methods reviewed were injection wells and surface discharge. From this study, Mr. Belan developed areas of geopressured/geothermal fluids gaps to commercialization. This review and subsequent recommendations provided TENRAC with a means to evaluate Texas geothermal/geopressured development especially towards commercialization and of potential technology areas that merit further study with public funds.

Mr. Belan conducted a preliminary assessment of the feasibility of utilizing a deep injection well for disposal of hazardous waste fluids from a prospective lignite gasification plant in East Texas. This entailed identifying aquifer parameters and computing long-term injection affects in order to assess two candidate aquifers for potential injection horizons.

As a staff hydrogeologist at Radian, Mr. Belan has experience in a wide range of ground-water sampling and analysis efforts. He was the field task leader and hydrogeological analyst for an environmental constraint study of a Lurgi coal gasification plant in East Texas. The study was to be the basis of a solid waste management plan for the plant site and the selection of a solid waste disposal site. It provided the client with supporting information to be used in obtaining state permits. Mr. Belan was the task leader for coordinating the air quality, ecology, surface water, and cultural impact portions of the reports, and developing future site-specific environmental studies requirements.

Mr. Belan analyzed aquifer testing methods and parameter data for an in-situ coal gasification project in Wyoming providing regional and vertical characteristics of the coal and overburden aquifers. The results became part of a relicensing application prepared for the U.S. Department of Energy, Laramie, Wyoming.

At refinery waste disposal sites in the area of Kenai, Alaska, Mr. Belan conducted a hydrogeological evaluation. This entailed the field supervision and interpretation of the drilling, geologic sampling, construction, and ground-water sampling of monitor wells in and around the disposal sites. The data obtained was used to define the local ground-water systems, sub-surface geology, and establish if any ground-water contamination had occurred.

Mr. Belan directed and conducted the production and injection testing of two geothermal wells at Navarro College, Corsicana, Texas; one well was to supply geothermal fluid for heat extraction and the other will be used for disposal of the same fluid. He analyzed the test data for well performance, and aquifer parameters; providing a report and recommendations before final geothermal system design.

Mr. Belan, at Radian, conducted an impact assessment of ground-water availability and development quantitatively and qualitatively for a proposed petrochemical complex near the Texas Gulf Coast. His work involved developing a hypothetical well field for producing 6,900 gallons per minute and assessing the ground-water effects with time for varying aquifer conditions. Mr. Belan analyzed the local ground-water qualities to establish present baselines and if sufficient quality plant water could be available for use by the proposed plant.

He assisted in the preparation of the geology and ground-water hydrology sections of an Environmental Information Document for a proposed lignite mine in East Texas. He worked extensively on the supervision of the drilling, electrical logging, sampling, and construction of the test and monitor wells associated with this program with his former employer and, presently, with Radian prepared the study results for inclusion into the report.

As a ground-water hydrologist with W. F. Guyton and Associates, Mr. Belan provided hydrogeological field support for an overland liquid disposal facility for a client in Louisiana. In order to define the hydrogeology in and around the disposal facility, Mr. Belan provided the field supervision and interpretation of the mud rotary drilling, logging, completion, development, and ground-water sampling of a series of monitor wells. This information aided in defining what impacts, if any, the overland disposal would have on the local ground-water system.

Also while Mr. Belan was working for W. F. Guyton and Associates, his varied field tasks took him to Arizona, Nevada, and Texas. He assisted three large utility power companies in the field supervision of the drilling, geophysical logging, construction, pump and aquifer testing, and water quality sampling of over twenty large production water wells along with a number of observation wells. These wells were drilled on the different jobs by cable tool, mud rotary, and reverse drilling methods. These activities were summarized in well completion reports.

Mr. Belan completed with Mr. Guyton an in-depth analysis of the hydrogeology of the property of Texas Electric Service Company for Texas Utilities Services, Inc. for a prospective water supply, along with a well inventory of property outside the client's area of interest. During this study proposed water well field proposal consisting of 38 production water wells for a projected new electrical generating station. This study included estimated pumping rates, depths of wells, and estimated initial water quality for the well field.

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As an officer in the United Stated Army stationed in West Germany in 1975, Mr. Belan initiated, developed and provided Environmental Impact Assessments (EIA) for the U.S. Frankfurt Military Community, and initiated research for 44 U.S. military installations throughout West Germany, which were to be included in the Frankfurt Master Plan. These studies were to define the environmental problems, if any, of the military installations for remedial measures planning and budgeting. His earlier duties included terrain/soils trafficability studies and weather analysis, and the supervision, evaluation, and distribution of tactical information.

As a Graduate Research Assistant in the Department of Soils, Water and Engineering at the University of Arizona, Mr. Belan was responsible for the planning, research, development, and quantifying of Mountain Front Recharge of the Tucson Santa Catalina Mountains under the supervision of his thesis director. The results of the study were published in an Arizona Water Resources periodical.

HONORARY AND PROFESSIONAL SOCIETIES:

Certified Professional Geological Scientist (American Institute of Professional Geologists), Technical Division National Water Well Association, Society of Petroleum Engineers, Sigma Gamma Epsilon Geology Honorary.

PUBLICATIONS/REPORTS:

Belan, R.A., Summary of Extended Water Level and Oil Thickness Measurement Program Vicinity of Chemical Disposal Pits Nos. 1 and 2 Hill AFB, Utah, Radian Corporation, Austin, TX, 1984.

Belan, R.A., Hill Air Force Base, Utah Installation Restoration Program Phase II Hydrogeological Field Investigation, Volumes I, II, and III Draft Report, Radian Corporation, Austin, TX, 1983.

Belan, R.A., W.M. Little, and R. Glaccum, Geophysical and Soil Boring Field Test Evaluation of Block Displacement Method, Whitehouse, Florida, Radian Corporation, Austin, TX, and Technos, Inc., Miami, FL (Published and presented paper at National Water Well Association Technical Conference, St. Louis, MO, 1983).

Stein, N.P., et al., Treatability Study of Contaminated Ground Water from the Lipari Landfill, Pitman, New Jersey - Draft Report, Radian Corporation, 1983 (Developed the hydrology assessment section on the remedial action impacts and costs of a dewatering system).

Belan, R.A., W.M. Little, and R. Glaccum, Draft Report Foster-Miller Test Site Evaluation, Radian Corporation, Austin, TX, and Technos, Inc., Miami, FL, 1982.

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Rick A. Belan

Radian Staff, Remedial Action Alternatives for the McColl Site, Fullerton, California, Radian Corporation, Austin, TX, 1983 (Conducted the remedial action assessment and materials selection for a slurry trench wall system).

Radian Staff, Geothermal Resource Evaluation in the Area of Coso Hot Springs KGRA (exact title client confidential), Radian Corporation, Austin, TX, 1983 (Evaluated geothermal reservoir testing results).

Radian Staff, Technical Review of Reports on Two Hazardous Waste Sites Near Baton Rouge, Louisiana, Austin, TX, 1982 (Developed report evaluation criteria and reviewed reports on hydrogeological investigation results.)

Ajmera, K.T., W.F. Holland, N.P. Stein, R.A. Belan, and L.J. Holcombe, A Report on Waste Disposal/Hydrology Study New Mexico Synfuels Project, Radian Corporation, Austin, TX, 1982 (Environmental task leader, document editior, authored activity impacts and hydrogeological sections).

Belan, R.A., J.C. Lippe, and J.P. Rossi, An Overview of Regional Geology and Hydrology for Solid Waste Disposal Study, Radian Corporation, Austin, TX, 1982 (Environmental task leader and authored geological and ground-water sections and document editor).

Radian Staff, Volume I Final Report Life Cycle Cost-Effectiveness Studies for Direct Utilization of Geothermal Energy at Four Military Installations in South-Central Texas, Austin, TX, 1982 (Authored hydrogeological parameter development and environmental considerations).

Belan, R.A., K.T. Ajmera, An Overview of Earth Resistivity Surveys - Technical Memorandum, Radian Corporation, Austin, TX, 1982.

Belan, R.A., Technical Note, ETSP Soil Samples for Attenuation Capacity Analysis, Radian Corporation, Austin, TX, 1981.

Belan, R.A. and K.T. Ajmera, Technical Note, ETSP Preliminary Geotechnical and Surface Water SWMP Related Field Studies and Preliminary Layout of Solid Waste Disposal Site, Radian Corporation, Austin, TX, 1981.

Belan, R.A. and A.F. Ferguson, Geothermal Injection and Production Well Test Results: Project Title - Water and Space Heating for a College and Hospital by Utilizing Geothermal Energy, Radian Corporation, Austin, TX, 1981.

Belan, R.A., et al., Summary of the ETSP Solid Waste Disposal Area Selection and Trade-Offs, Radian Corporation, Austin, TX, 1981.

Belan, R.A., et al., Summary of Findings for the Fatal Flaw Assessment of the Northern Area, Radian Corporation, Austin, TX, 1981.

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Rick A. Belan

Belan, R.A. et al., Technical Note, Environmental Constraint Screening of Mine Property and Surrounding Areas for Solid Waste Disposal Siting near Troup, Texas, (Environmental section Task Leader and authored ground-water section), Radian Corporation, Austin, TX, 1981.

Radian Staff, Relicensing Application - Hanna Experimental In-situ Coal Gasification Project, Hanna, Wyoming, (Provided analysis of supplied aquifer parameter values pertaining to regional and vertical distributions and ranges of applicability), Radian Corporation, Austin, TX, 1981.

Radian Staff, Compilation of Environmental Information for a Proposed Olefins Complex, Brazoria County, Texas, (Author of ground-water baseline and development), Austin, TX, 1981.

Radian Staff, Evaluation of Hydrogeology and Waste Management Options at Tesoro Alaska Petroleum Company's Kenai, Alaska Refinery, (Author of hydrogeology section), Austin, TX, 1980.

Guyton, W.F., R.A. Belan, and W. Stevens, Report on the Ground-Water Availability for Prospective Coal-Fueled Electric Generating Station in Ward County, Texas, W. F. Guyton and Associates, Austin, TX.

R.A. Belan authored a number of Environmental Impact Assessments for U.S. Military Installations for the Department of the Army, Federal Republic of Germany.

RADIAN
CORPORATION

FRED B. BLOOD

EDUCATION:

M.S., Biology (Aquatic Ecology), Virginia Commonwealth University, 1973.

B.S., General Science (Biology and Chemistry), Virginia Polytechnic Institute, 1969.

EXPERIENCE:

Biologist, Radian Corporation, Austin, TX, 1981-Present.

Senior Consultant, Seagull Environmental Control, 1980-1981.

Technical Field Advisor, U.S. EPA Region V, Law Engineering Contract, 1979.

Aquatic Ecologist, Law Engineering Testing Co., 1976-1979.

Staff Biologist, Virginia Electric and Power Co., 1973-1976.

Visiting Scholar, Smithsonian Institute, 1973.

Teaching Assistant, Virginia Commonwealth University, 1971-1973.

Teacher, Henrico County (Virginia) Public Schools, 1969-1971.

FIELDS OF EXPERIENCE:

At Radian, Mr. Blood is responsible for managing the collection, identification, and interpretation of ecological data. His particular area of expertise involves aquatic ecology and environmental toxicology. The following project experience demonstrates his expertise.

Mr. Blood is currently task director on a U.S. EPA acid rain project. This project was established to collect and analyze water from 3500 lakes to determine the extent and susceptibility of U.S. lakes to acid deposition. This task involves varoius management functions including the preparation of audit samples to verify collection procedures and intralaboratory consistency and accuracy.

Mr. Blood has participated in U.S. Air Force IRP programs. The programs involve interviews, site visits, and environmental monitoring (generally ground water and soils). The purpose of the programs is to evaluate and document potential contamination from past practices of handling of hazardous waste on the bases. These studies have included five bases in Texas, Oklahoma, Utah, and Louisiana.

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Mr. Blood is a task leader to evaluate mining applications for OSM. In this capacity Apparent Completeness Reviews (ACR) and Technical Analyses (TA) are being accomplished. Important issues include highwalls, large raptors, and prey abundance in relation to reclamation plans.

Mr. Blood has also visited several non-ferrous industries to provide environmental assessments in relation to U.S. EPA's Effluent Guidelines development and/or to provide input to Environmental Impairment Liability insurance programs. Included in these studies were beryllium, aluminum, and nickel plants and a circuit board manufacturer.

Mr. Blood was Project Director on a subcontract for the Cummins Creek lignite project. Collection of aquatic ecological data, including analyses of fish, and plankton data was performed. The study was expanded to include 20 stations including rivers, streams, cattle tanks, and SCS reservoirs.

As a task director, Mr. Blood was involved in assessing potential environmental impacts from proposed mitigation procedures at a hazardous waste site in Southern California. This task involved evaluation of ground water, air quality, and transportation for the redisposal of 200,000 yd^3 of hazardous material.

As a task director, Mr. Blood was responsible for evaluating an urban lake below an uncontrolled hazardous waste site (U.S. EPA Superfund Site). This project involves the collection of biotic, water, and sediment samples. Extensive organic and metal analyses have been accomplished to document existing conditions and derive a monitoring program for the future. A cost-effective monitoring program based on empirical data and environmental fate modeling was proposed.

Mr. Blood was Project Director of a study concerning six uranium mine reclamation ponds in Southeast Texas. This study involved the quantification of physico-chemical data, periphyton, fish, macrophytes, phytoplankton, zooplankton, and aquatic macrophytes. Also included are limited chemical analyses of the water column and detailed trace metal and radionuclide determinations of water, sediments, and various aquatic biotic food chains. The evaluation included insights into the relative success and failure of reclamation processes.

As an Ecology Task Leader, Mr. Blood was responsible for input into an environmental assessment for a lignite gasification plant located in Northeast Texas. This study includes all the standard terrestrial and aquatic studies including wetlands, vegetative mapping, wildlife, and aquatic environments.

Mr. Blood has also been involved with environmental studies associated with a synfuels plant on the Ohio River Floodplain in Kentucky. Responsibilities included analyses of endangered and protected species, wetlands, fisheries,

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macroinvertebrates, and plankton. A NEPA-responsive study was accomplished. He also provided input into three other lignite projects, either at an ecological resources or aquatic resources level. These inputs were primarily concerned with "fatal flaw" or other siting programs.

While with Radian, Mr. Blood has provided asbestos inspection services to several VA hospitals and private hospitals, large State hospital in Ohio, air monitoring consultation to many industries throughout Texas, and helped with the training of laborers in several states. This last process provided the attendees of the Northern California Laborers Training Center with official certification by CAL-OSHA as asbestos workers and started a process where the State may require more stringent respiratory protection of asbestos workers. Mr. Blood has also participated in writing/ reviewing specifications, air monitoring, and quality control for asbestos removal contracts throughout the U.S.

As Senior Consultant for the Seagull Environmental Company, Mr. Blood had a variety of responsibilities. Many buildings and structures were inspected and evaluated by Mr. Blood, including work for various school districts, universities, and private industry. Mr. Blood made presentations on asbestos-related problems at seminars and meetings sponsored by state and local environmental health associations in Ohio and Illinois. He oversaw the training of asbestos workers at numerous projects in states ranging from Illinois and Florida to New Hampshire.

Mr. Blood served as Technical Field Advisor to the U.S. EPA asbestos-in-schools program for Region V (Chicago). In this capacity he made over 60 presentations to 2,500 people across the six-state region. He inspected and evaluated more than 100 schools and provided advice to numerous contractors and analytical laboratories in becoming involved in asbestos abatement activities.

As an Aquatic Biologist with Law Engineering Testing Company, Mr. Blood was Project Director for a baseline aquatic survey for a paper mill in the Oconee River, near Dublin, Georgia. The study included physico-chemical data, fisheries, periphyton, and macrobenthos collected at seven stations during four seasons.

Mr. Blood was co-director for a water quality management study for the Corps of Engineers. The study involved two one-year studies of two reservoirs (Carters Lake and Lake Allatoona) in Georgia. These studies involved twice seasonal collections at over 15 stations on both reservoirs. Data collected included: physico-chemical profiles, nutrients, trace metals, and organic pesticides in the water column; fisheries; macrobenthos; zooplankton; periphyton; Hester-Dendy substrates; algal growth potential; and trace metal and organic pollutants in various portions of the aquatic food chain. All data underwent rigorous QA/QC audits and were coded into the U.S. EPA STORET data base.

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As a biologist for Virginia Electric and Power Company, Mr. Blood was responsible for biological analyses of aquatic environments associated with nine operational sites and two site screening studies. The operation studies included six estuarine and three freshwater sites. Mr. Blood studied thermal and velocity discharge effects on macroinvertebrate and fish communities. He also evaluated impingement and entrainment. Two sites, one estuarine and one freshwater, included nuclear power stations and Mr. Blood supervised collections for radionuclide studies.

In the summer and fall following graduate school, Mr. Blood was co-holder of a visiting scholar fellowship to study the freshwater clams (Unionidae) of Virginia. He also attended a biological field camp sponsored by the University of Montana on Flathead Lake, Montana. While in Montana, he studied trophic states in two pot-hole lakes, snow algae, and physical geology.

As a graduate student, Mr. Blood was involved in various studies, including: intensive catfish culture, primary productivity (conventional and as C^{14}); fishery surveys, acid mine drainage, post-impoundment surveys, and his thesis on freshwater clams.

While teaching general, earth, and biological sciences to eighth and ninth graders, Mr. Blood participated in summer research projects. These studies involved pre-impoundment surveys for a large recreational reservoir to be utilized by a nuclear power plant and acid-mine recovery studies.

HONORARY AND PROFESSIONAL SOCIETIES:

Society of Environmental Toxicology and Chemistry, American Fisheries Society (Certified Fisheries Scientist), Ecological Society of America, Sport Fishing Institute.

PUBLICATIONS:

"Environmental Assessment of the Remedial Action Alternatives for the McColl Site," Fullerton, CA, (Radian Report) 1983.

"Direct Utilization of Geothermal Energy for Space and Water Heating at Marlin, Texas" (Radian and DOE/ET 27059-1), 1983.

"Reclamation Impoundment Study: An Analysis of Aquatic Habitats Created in the Reclamation of Uranium Surface Mines in South Central Texas," (Radian Report) 1983.

"Development of a Monitoring Program to Evaluate the Effect of Remedial Actions at the Lipari Landfill on Alcyon Lake, Pitman, New Jersey," (Radian Report) 1983.

Fred B. Blood

Ecology - in "Environmental Consideration and Air Quality Modeling for the Edgewood and Mustang Creek Prospects and Associated Energy Park," (Radian Report) 1981.

Aquatic Resources Chapter - in "Preliminary Environmental Analysis Report for Coal Gasification Plant, Henderson, Kentucky," (Radian Report) 1981.

"Oconee River Biological Baseline Evaluation," (Law Engineering Report) 1980.

"Contract Report - A Water Quality Management Study of Carters Lake, GA," (Law Engineering Report) 1980.

"Contract Report - A Water Quality Management Study of Lake Allatoona, GA," (Law Engineering Report) 1980.

"A 316(b) Study of the Lansing Smith Steam Plant," prepared for Gulf Power Company (Law Engineering Report).

"A Preliminary Comparison of Two Oxidation Ponds with Different Trophic States in Central Virginia," co-authored with J. Reed and G. Samsel, Va. J. Science, 23 (2), 1973.

"A Laboratory Heated Raceway for Studying the Biology of Channel Catfish (Ictalurus punctatus)," co-authored with J. Reed and G. Samsel, Progressive Fish Culturist, 35 (1), 1973.

"A Check List of Unionid Fauna (Mollusca:Bivalvia) in the Pamunkey River System, Virginia," co-authored with M. Riddick, Nautilus, 38 (2), 1973.

PROFESSIONAL PRESENTATIONS:

"Investigation of Nutrient Factors Limiting Phytoplankton Productivity in Two Central Virginia Ponds" (with J. Reed, G. Samsel, and H. Winfrey), Annual Meeting, Association of Southeastern Biologists, Mobile, AL, 1972.

"Preliminary Comparison of Two Oxidation Ponds with Different Trophic States in Central Virginia," (with J. Reed, G. Samsel, and H. Winfrey), Annual Meeting, Association of Southeastern Biologists, Mobile, AL, 1972.

"Unionidae (Mollusca) of the Pamunkey River, Virginia" (with M. Riddick and J. Reed), Annual Meeting, Association of Southeastern Biologists, Savannah, GA, 1974.

"An Effects Assessment of Impingement at the Lansing Smith Steam Plant" (with R.A. Garrett), Annual Meeting, Association of Southeastern Biologists, Tuscaloosa, AL, 1978.

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CORPORATION

Fred B. Blood

"Strategies of Collecting Macro-invertebrates," Annual Meeting, Georgia Fisheries Workers Association,R [illegible], GA, 1978.

"Asbestos in Schools, Its Evaluation, Its Solutions," 65 locations throughout six states (MI, IL, OH, IN, MN, WI), 1979.

RADIAN
CORPORATION

KATHEY A. FERLAND

EDUCATION:

M.A., Regional Planning, University of North Carolina, Chapel Hill, NC, 1983.

B.A., English, University of Texas, Austin, TX, 1976.

EXPERIENCE:

Staff Socioeconomist, Radian Corporation, Austin, TX, 1983-Present.

Survey Coordinator, Center for Health Services, Nashville, TN, 1982.

Research Assistant, Department of City and Regional Planning, Chapel Hill, NC, 1981-1982.

Grants Administrator, American Insititute for Learning, Austin, TX, 1978-1981.

FIELDS OF EXPERIENCE:

Ms. Ferland is in the Policy Analysis Division of Radian Corporation. Her fields of expertise are resource economics, energy policy analysis, socioeconomic impact evaluation, and water resources. While at Radian, Ms. Ferland has participated in projects concerning energy and commodity price forecasts, socioeconomic impact evaluation, and environmental regulations and permitting at hazardous waste sites.

Ms. Ferland was Leader of the commodity and energy price forecasting task for an economic and technical feasibility study of electricity generation technologies for the Air Force. On this project, she reviewed several national energy supply and demand models and regionalized price forecasts to the southern California market. These forecasts served as the basis for industrial gas price projections. At Radian, Ms. Ferland has also participated in several projects related to hazardous waste. One involved assessing the supply and demand for technologies which degrade dioxins. In another study, she assessed research needs in the national hazardous waste site cleanup program.

Ms. Ferland has also conducted policy and project studies for local and state governments and academic departments in the areas of water resources and hazardous waste disposal. These studies include: an evaluation of the impact of industrial location decisions on water supply and effluent treatment capacities; a projection of the impacts of watershed development on phosphorous concentration in High Point Lake, North Carolina; an analysis of the use of utility extension policy as a growth management tool; and evaluation of the technical and financial options for controlling inactive hazardous waste sites in North Carolina.

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Kathey A. Ferland

Her thesis, "Cost-Benefit Analysis and Environmental Standard Setting: A Case Study of the Implementation of Executive Order 12291," examines the use of economic analysis in the setting of water pollution control guidelines. This paper also analyzes the legal and organizational background influencing the standard setting process for the steel industry BAT and BPT guidelines and evaluates the environmental modeling component of EPA's cost-benefit analysis.

Ms. Ferland coordinated a survey to over 1200 people in rural Kentucky to ascertain the health effects of contaminated drinking water. She has experience in the initiation, design, implementation, and analysis of surveys.

Ms. Ferland performed administrative and management functions at the American Institute for Learning, a not-for-profit educational institute. As a Grants Administrator, she was responsible for all aspects of grants management, proposal and budget preparation. and reporting.

PROFESSIONAL SOCIETIES:

American Planning Association.

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RADIAN CORPORATION

LAWRENCE N. FRENCH

EDUCATION:

M.A., Geological Sciences, University of Texas at Austin, 1979.

B.S., Geological Sciences, University of California at Riverside, 1975.

EXPERIENCE:

Group Leader, Radian Corporation, Austin, TX, 1982-Present.

Staff Geologist, Radian Corporation, Austin, TX, 1979-Present.

Geologist, Sargent and Lundy Engineers, Chicago, IL, 1978-1979.

Teaching Assistant, University of Texas at Austin, 1975-1976.

FIELDS OF EXPERIENCE:

At Radian, Mr. French is involved in a variety of hydrogeologic and geologic studies. His roles in these studies range from collecting and analyzing hydrogeologic data, interpreting and reporting results of investigations, to directing interdisciplinary programs.

Mr. French has been involved in various aspects of ground-water investigations at several hazardous waste disposal sites. He recently served as Project Director for a study of PCB-contaminated soils at an industrial site in North Texas. The study involved sampling and analysis of near-surface soils to define the extent of PCB contamination. Remedial measures options were also identified. Mr. French also developed a ground-water monitoring plan in accordance with the Compliance Agreement between the state and the property owner. As Ground-Water Task Leader, he supervised the installation of monitoring wells at an abandoned petroleum products waste dump in Southern California. This effort involved collection and logging of soil samples and collection of water samples for chemical analysis. He later co-authored a technical report on the occurrence and character of ground water at the site. As Radian's involvement in the investigation continued, Mr. French prepared technical designs and specifications for a permanent, post-remedial action ground-water monitoring network. Mr. French has also been responsible for field activities related to the USAF Installation Restoration Program at Tinker AFB, Oklahoma. At Tinker, electromagnetics surveys were performed at closed industrial waste impoundments and monitoring wells were installed near landfills. At England AFB, Louisiana, Mr. French developed a work plan for the evaluation of waste disposal practices at the base.

As part of a comprehensive hydrogeologic evaluation of a solvent refined coal pilot plant in Washington, Mr. French supervised the installation of water quality monitoring wells and conducted pumping tests for the evaluation of

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aquifer characteristics. He also supervised soil coring and sampling efforts at the site of process fluid spill. Mr. French also served as Project Director for a pre-closure evaluation of two hazardous waste impoundments at a wood treatment plant in Washington. The plant had discharged wastewater containing creosote and pentachlorophenol to the unlined impoundments, which are located on floodplain sands and gravels of the Columbia River. A second site was also examined in terms of disposal practices and the character and volume of wastes. Results of the pre-closure survey were used for a definition of areas of concern requiring closure and for the selection of ground-water monitoring parameters based on the character and volume of wastes.

Mr. French has participated in several ground-water studies for Western coal mining programs. For a large surface mine in New Mexico, he was a principal author of the cumulative hydrologic impat assessment conducted for the Office of Surface Mining. Principal hydrologic concerns for individual mines were identified and compared to predicted hydrologic impacts in order to determine if material damage would result from mining. For a proposed commercial underground coal gasification project, Mr. French was involved in the conceptual design of an aquifer restoration program. Ground water would be withdrawn from the burn cavity, treated at the surface, and reinjected into the coal seam. As Task Leader for both geology and ground-water hydrology tasks for a feasibility study of a proposed lignite gasification facility, Mr. French investigated waste disposal and ground-water supply issues. In addition, Mr. French examined the feasibility of a deep well injection system for the disposal of process wastewaters. This initial evaluation included the identification and characterization of possible injection zones, formation water chemistry, probable injection rates and pressures, and subsurface migration of waste fluids.

As a Project Director on a quick-response effort for the Department of Energy, Division of Fossil Fuel Processing, Mr. French evaluated the water availability for a proposed solvent refined coal demonstration plant in northwestern Kentucky. This project consisted of a comprehensive appraisal of existing and future water supplies, demands, and policies that affect water availability in the vicinity of the demonstration plant.

While employed by Sargent and Lundy Engineers, Mr. French was involved in detailed hydrologic and geologic studies for Preliminary and Final Safety Analysis Reports (PSAR and FSAR) for several nuclear power plants. The PSARs and FSARs involved detailed geologic mapping, inventory of water wells, analysis of subsurface flow, and reviews of regional geologic features. In a study conducted with the Illinois and Indiana Geological Surveys, Mr. French analyzed stratigraphic, structural, and hydrologic features at sites in the Illinois Basin for a compressed air energy storage project. Mr. French directed an extensive hydrogeologic and geologic study of potential sites for a lignite-fired electric generation station in Walker County, Texas. Mr. French also conducted the field program for an engineering soils exploration

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effort at a construction site for a lignite-fired power plant in Harrison County, Texas.

Mr. French supervised several field programs at Sargent and Lundy. These programs included: construction and testing of two industrial water wells near Cincinnati; installation and testing of pneumatic piezometers at a nuclear power plant excavation in northern Indiana; and aquifer testing and analysis of hydraulic characteristics of the alluvial-glacial outwash aquifer near Wausau, Wisconsin.

HONORARY AND PROFESSIONAL SOCIETIES:

American Institute of Professional Geologists, CPGS No. 6307; California Registered Geologist No. 3804; Ground-Water Technology Division of the National Water Well Association; Geological Society of America.

PUBLICATIONS/REPORTS:

French, L.N. and J.L. Machin, "Cumulative Hydrologic Impact Assessment for McKinley Mine," Radian Corporation, Austin, TX, January 1984.

Little, W.M. and L.N. French, "Hydrogeologic Aspects of the McColl Site, Fullerton, California," Radian Corporation, Austin, TX, November 1982.

French, L.N., "Pre-Closure Evaluation of the Treated Wood Products Facility and Site C, Longview, Washington," Radian Corporation, Austin, TX, May 1983.

Lacy, J.C., L.N. French, and T.W. Grimshaw, "Regulation of the Hydrologic Impacts of Underground Coal Gasification," in Proc. Sixth Underground Coal Conversion Symposium, Shangri-La, OK, pp. V-79 thru V-88, July 1980.

French, L.N., et al., "Environmental Constraint Analysis of the Proposed Coastal Bend Coal Gasification Project," Radian Corporation, Austin, TX, August 1981.

White, D.M. and L.N. French, "Evaluation, Screening, and Prioritization of Candidate Gulf Coast Lignite Resource Blocks," Radian Corporation, Austin, TX, April 1981.

French, L.N. and J.L. Machin, "Water Availability Appraisal for the Proposed Solvent Refined Coal-I Demonstration Plant, Daviess County, Kentucky," Radian Corporation, Austin, TX, December 1979.

U.S. Bureau of Land Management, "Proposed Camp Swift Lignite Leasing (Draft and Final EIS)," Radian Corporation, Austin, TX, September 1980.

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French, L.N., "Compilation of Environmental Information for a Proposed Olefins Complex, Brazoria County, Texas," Radian Corporation, Austin, TX, July 1981 (author of Ground-Water Hydrology and Topography and Geology chapters).

Skinner, F.D., L.N. French, and D.E. Pusch, "Regulatory Review and Estimated Costs for a Proposed In-Situ Gasification Facility," Radian Corporation, Austin, TX, April 1982.

RADIAN
CORPORATION

JILL P. ROSSI

EDUCATION:

B.A. Geography, The University of Minnesota at Minneapolis, 1972.

EXPERIENCE:

Geographer, Cartographer, Policy and Environmental Analysis Division, Radian Corporation, Austin, TX, 1980-Present.

Drafting and Graphics Assistant, Dam Safety Unit, Texas Department of Water Resources, Austin, TX, 1979-1980.

Cartographer, Continental Map Inc., Austin, TX, 1978-1979.

Teaching Assistant, University College-Geology, University of Minnesota at Minneapolis, 1972.

FIELDS OF EXPERIENCE:

At Radian, Ms. Rossi is responsible for producing maps and coordinating graphics for the Policy and Environmental Analysis Division. She utilizes data from a variety of technical disciplines (geology, hydrology, noise and air monitoring, sociology, soils, and hydrogeology) to create maps which clearly and concisely illustrate the written text. Ms. Rossi has been responsible for work in the following projects:

- Develop base maps and coordinate graphics throughout an Environmental Impact Statement prepared for the U.S. Bureau of Land Management for a central Texas lignite mine;

- Develop color overlay method of mapping for site selection process of commercial waste disposal sites in Texas and southeastern Oklahoma;

- Develop a series of figures used as illustrations in a manual for the Environmental Protection Agency on Remedial Actions at Uncontrolled Hazardous Waste Sites:

- Draft maps and coordinate the graphics for an Environmental Impact Statement for a synfuels plant in Tennessee;

- Create base and thematic maps for Air Force Installation Restoration Programs (Phase I and Phase II) for the following locations: Kelly AFB, Texas; Hill AFB, Utah; Bergstrom AFB, Texas; Cannon AFB, New Mexico; England AFB, Louisiana; Tinker AFB, Oklahoma; and Reese AFB, Texas;

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- o Map limestone deposits, lime plants, and limestone quarries in the United States by county in a series of regional maps for the Electric Power Research Institute;
- o Map compliance/non-compliance with air pollution standards for counties in the United States in a series of EPA regional maps;
- o Map concentrations of selected air pollutants in the El Paso, Texas, area for a Texas Air Control Board study in a series of quarterly and annual reports;
- o Prepare aerial photography history of a wood preserving plant for a commercial client which included extensive research of available aerial photography and interpretation of those photos to determine historical features of interest;
- o Prepare complex permitting schedules for proposed mines, energy facilities, and hazardous waste handling sites;
- o Preparation of base and thematic maps for various feasibility studies, fatal flaw analyses, Environmental Information Documents, and Environmental Impact Statements; and
- o Research of available map resources, aerial photography, remote sensing products, and mapping technologies as required by individual client needs.

While with the Texas Department of Water Resources, Ms. Rossi worked in the graphics section of the Dam Safety Unit, a federal grant program. She prepared maps and exhibits, and laid out phototypset text into camera-ready form according to standards, developed with her assistance, for the technical reports written by the engineering section.

During her employment with Continental Map Incorporated, Ms. Rossi was involved in all phases of four color map production. These included source information procurement and classification, imaging base maps, scribing plates, cutting specialties, sizing and adhering type, designing customer copy panels, indexing streets and points of interest, photo-lab contact reproduction of base plates, and the final compositing of the four negative plates to be sent to the printer. These maps included large metroplex areas, counties, enlarged downtown sections, and simplified principle city thoroughfares.

While employed by the University of Minnesota as a Geology Teaching Assistant, Ms. Rossi taught geology laboratory sessions, prepared geology lab work materials, tutored students, and assisted the professors by preparing classroom presentations and grading and proctoring exams.

RADIAN
CORPORATION

ANN E. ST. CLAIR

EDUCATION:

M.A., Geological Sciences, The University of Texas at Austin, 1979.

B.A., Geology, Trinity University, 1973.

EXPERIENCE:

Department Head, Radian Corporation, Austin, TX, 1982-Present.

Group Leader, Radian Corporation, 1979-1982.

Senior Geologist, Radian Corporation, 1980-Present.

Staff Geologist, Radian Corporation, 1978-1980.

Research Scientist Associate, The University of Texas at Austin, Bureau of Economic Geology, 1975-1978.

Research Scientist Assistant, The University of Texas at Austin, Bureau of Economic Geology, 1973-1975.

FIELDS OF EXPERIENCE:

At Radian, Ms. St. Clair has had extensive experience in studies relating to ground-water geology, waste disposal, and environmental impacts. Her work has included acquisition of data on ground water, assessment of water quality impacts, and compilation and interpretation of geologic data including geophysical and core logs, and evaluation of impacts of waste disposal and other activities. In hazardous waste studies her work has also involved evaluation of remedial action alternatives and interface with engineers, chemists and other specialists regarding various aspects of hazardous waste investigations including engineering design and cost of remedial action, control of emissions and odors, and waste characteristics. As Department Head at Radian Ms. St. Clair supervises the work of geologists, hydrologists, and ecologists and has management and technical review responsibility for programs in these technical areas.

Ms. St. Clair was Project Director for the second phase of a continuing study at the McColl hazardous waste site in the Los Angeles area. In this phase, data collected in Radian's Phase 1 field investigation of the site were evaluated and used in the selection and design of the remedial action plan for the site. The site, which is located adjacent to a residential and recreational area, contains various hydrocarbon wastes, principally acidic refinery sludges and drilling muds. Control of volatile emissions, odors, and the potential for contamination of surface water and ground water were addressed in the remedial action design. The design must meet strict criteria regarding exposure to contaminants both during remedial action implementation and over the long term.

Ms. St. Clair has major responsibility for studies being performed at several uncontrolled hazardous waste sites, including sites identified as priority sites for remedial action under Superfund. She was Project Director for the first phase of a study to evaluate ground-water conditions at a Superfund site in up-state New York which was used for disposal of wastes from a metal plating operation. The study included installation of monitor wells and test borings and collection of soil and ground-water samples in order to define the presence or extent of subsurface contamination. Based on the results of the field investigation, recommendations for further study or remedial action were developed. During the course of this program, Ms. St. Clair has been involved in initial site evaluation and data collection, development of a site field program, and interface with state and federal regulatory agencies.

Ms. St. Clair has had overall technical responsibility for a variety of activities for the EPA Solid and Hazardous Waste Research Division. These studies, generally involving technical support of Superfund activities, have included a field geophysical survey, treatability studies, column absorption/desorption studies, hydrogeologic evaluations, review of feasibility studies, and evaluation of remedial action technologies for approximately ten Superfund sites. Ms. St. Clair's role included project management, technical supervision and review, and agency coordination.

For the Lipari landfill Superfund site near Pitman, New Jersey, Ms. St. Clair was responsible for coordinating a variety of technical activities as support to EPA Region II. The site contains a variety of industrial wastes, of which several volatile organic chemicals known to be extremely hazardous are of primary concern. Leachate seeps enter surface streams adjacent to the site and have resulted in a ban on fishing and boating in a lake 1000 feet downstream. Ms. St. Clair had overall responsibility for coordinating the following activities at this site--cost-effectiveness evaluation of 32 remedial action alternatives, preparation of an Environmental Information Document assessing the environmental impacts of remedial action alternatives, definition of baseline conditions and design of a long-term monitoring program on the lake, and a treatability study of the landfill leachate. For all these activities Ms. St. Clair was the principal interface with EPA and had primary technical review and management responsibility.

In a study for the EPA Municipal Environmental Research Laboratory, Ms. St. Clair supervised development of a methodology for conducting evaluations of cost-effectiveness of remedial actions at uncontrolled hazardous waste sites. Under the Comprehensive Environmental Response, Compensation and Liability Act (Superfund), remedial actions conducted at Superfund sites must be demonstrated to be cost-effective. The study involved review of technical and cost data on remedial technologies, evaluation of methodologies for cost-effectiveness and related types of analyis, assessment of impacts of time and discount rates on the evaluation, and development of the analytical framework and guidance manual to be used by decision makers in selecting remedial measures.

Ms. St. Clair has participated in Radian's activities related to collection of insurance underwriting information for Environmental Impairment Liability (EIL) Insurance. She worked closely with Radian's parent company, Hartford Steam Boiler Inspection and Insurance Company (HSB) in developing procedures for collection of technical and engineering underwriting information and functions in a Quality Assurance role by reviewing results of all Radian investigations of this type. In 1981 Ms. St. Clair was Project Director for a risk assessment of three power plants in the Boston area. The study involved brief site visits and review of corporate and regulatory agency files in order to assess the potential for gradual environmental impairment as a result of plant activities. The study included assessment of ground-water conditions, waste management practices, hazardousness of materials used on-site, population-at-risk, and corporate approach to environmental matters. A report was prepared containing information for use in underwriting Environmental Impairment (EIL) Insurance.

During 1981, Ms. St. Clair was Project Director for a large program to develop a waste management strategy for the Wyoming Coal Gasification Project. The program involved chemical and physical analysis and regulatory classification of power plant and gasification wastes and organic by-products. Based on the results of the testing, recommendations were made for treatment and disposal of wastes to meet applicable regulatory requirements. In addition, the study included column leaching studies to assess impacts of mine disposal of plant wastes, evaluation of ground water impact of disposal facilities at the plant site, and preparation of applicable state and federal permit applications.

In 1980-1981, Ms. St. Clair was Project Director for a program to evaluate waste disposal practices and ground-water conditions at a large petroleum refinery in Kenai, Alaska. The study focused on development of a long-term waste management strategy for disposal of refinery wastes, principally API separator bottoms and crude tank bottoms, which have been designated as hazardous wastes under RCRA. Initially Ms. St. Clair supervised design, installation and sampling of ground-water monitoring wells in the vicinity of existing disposal sites in order to assess the water-quality impacts of past disposal practices. Samples of all refinery waste streams and wastes from existing pits were characterized for the purpose of developing a plan for closure of existing pits and an ultimate waste management plan. Options were evaluated with respect to technical feasibility (particularly in light of climatic factors), environmental acceptability, regulatory compliance, and economics.

In 1979, Ms. St. Clair was Project Director for an investigation of soil/ground-water contamination and remedial action at a pesticide formulation facility in north Texas. The study was aimed at evaluating possible contamination from underground waste storage tanks suspected of leaking. Ms. St. Clair initially conducted sampling of soils in the vicinity of the tanks to determine if leakage had occurred. She also designed and supervised installation of a network of ground-water monitoring wells in order to evaluate ground-water flow at the site and to assess water-quality impacts of the suspected leakage. During drilling, core samples were taken in both the unsaturated and saturated zone for chemical analysis. Ms. St. Clair performed slug tests on the wells to provide data on aquifer properties. She also supervised infiltration tests in order to evaluate the surface infiltration conditions and to qualitatively assess the potential for leachate generation. Based upon the results of this study, recommendations were made for further studies and possible remedial actions.

In a study to determine impacts of a product spill at a Solvent Refined Coal-II demonstration plant in Fort Lewis, Washington, Ms. St. Clair was responsible for portions of the ground-water evaluation, including installation of monitoring wells, measurements of water levels, and interpretation of hydrologic and chemical data. She was also involved in interfacing with state regulatory agencies.

Ms. St. Clair was Project Director of a study for EPA Region III, evaluating the suitability of land around the Cheswick Power Station near Pittsburgh, Pennsylvania, for disposal of coal ash and scrubber sludge. The study was conducted as technical support for enforcement actions brought by EPA Region III concerning alleged violations of air emissions regulations from the coal-fired power plant. In the event that installation of SO_2 scrubbers was to be required by EPA, this study was underaken to document the availability of land for disposal of wastes from the scrubbers. During the study, Ms. St. Clair supervised a multidisciplinary team evaluating the hydrogeology, transportation, land use, ecology, and economic factors affecting the acceptability of sites in the vicinity of the plant for disposal of wastes.

In a study for EPA Region VII, Ms. St. Clair supervosed several protrams concerned with suitability of soils for septic tanks and nitrate contamination of ground water in Missouri. Ms. St. Clair supervised technical efforts on three programs. One program involved detailed soils mapping and field examination of septic tank failures in Greene County, Missouri, and in order to develop a septic-tank suitability map. Another study focused on determination of any relationships between water well construction practices and occurrence of ground water contamination in Howell County, Missouri. It involved a field survey for sampling of ground water and for obtaining information on well construction. A third program was conducted to develop a regional map of nitrate concentrations in ground water in the four-state area of EPA Region VII. In addition to development of technical reports for each of these studies, reports were prepared for lay readers.

RADIAN
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Ann E. St. Clair

Ms. St. Clair was Project Director for a feasibility and site selection study for an in-situ gasification project utilizing Texas lignite. The study focused on evaluation of environmental factors that might affect project feasibility. Ms. St. Clair was involved in overall project coordination as well as studies related to environmental and hydrologic conditions at several candidate sites.

As a research associate at the Bureau of Economic Geology, Ms. St. Clair was involved in numerous studies requiring collection and interpretation of geologic data, sampling and chemical analysis of ground water, and evaluation of environmental and engineering impacts of man's activities. She was responsible for the preparation of maps, technical reports, and presentations, as a part of these programs.

PROFESSIONAL/TECHNICAL SOCIETIES:

American Institute of Profession Geological Scientists, Certified Professional Geological Scientist 4741; National Water Well Association, Ground Water Technology Division; Geological Society of America; Austin Geological Society.

PUBLICATIONS:

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RADIAN CORPORATION

APPENDIX L

Geophysical Tracings

Specifications of Ground Conductivity Meters Utilized for Geophysical Surveys
(from manufacturer's literature, Geonics, Ltd.)

ONE MAN

CONTINUOUS READING

EM31

The Geonics EM31 provides a measurement of terrain conductivity without contacting the ground using a patented inductive electromagnetic technique. The instrument is direct reading in millimhos per meter and surveys are carried out simply by traversing the ground.

The effective depth of exploration is approximately six meters making it ideal for engineering geophysics. By eliminating ground contact, measurements are easily carried out in regions of high resistivity such as gravel, permafrost and bedrock. Over a uniform half space the EM31 reads identically with conventional resistivity and the measurement is analogous to a conventional galvanic resistivity survey *with a fixed array spacing. Interpretation curves supplied with each instrument* often permit an estimate of a layered earth.

The advantages of the EM31 are the speed with which surveys can be carried out, the ability to precisely measure small changes in conductivity, and the continuous readout which provides a previously unobtainable lateral resolution.

Specifications

MEASURED QUANTITY	Apparent conductivity of the ground in millimhos per meter	
PRIMARY FIELD SOURCE	Self-contained dipole transmitter	
SENSOR	Self-contained dipole receiver	
INTERCOIL SPACING	3 66 meters	
OPERATING FREQUENCY	9.8 kHz	
POWER SUPPLY	8 disposable alkaline 'C' cells (approx 20 hrs life continuous use)	
CONDUCTIVITY RANGES	3, 10, 30, 100, 300, 1000 mmhos/meter	
MEASUREMENT PRECISION	±2% of full scale	
MEASUREMENT ACCURACY	±5% at 20 millimhos per meter	
NOISE LEVEL	<0 1 millimhos per meter	
OPERATOR CONTROLS	●Mode Switch ●Conductivity Range Switch ●Phasing Potentiometer ●Coarse Inphase Compensation ●*Fine Inphase Compensation*	
DIMENSIONS	Boom	4 0 meters extended 1 4 meters stored
	Console	24 x 20 x 18 cm
	Shipping Crate	155 x 42 x 28 cm
WEIGHT	Instrument Weight	9 kgm
	Shipping Weight	23 kgm

TWO MAN

VARIABLE DEPTH

EM34-3

Operating on the same principles as the EM31, the EM34-3 is designed to achieve a substantially increased depth of exploration and a readily available vertical conductivity profile.

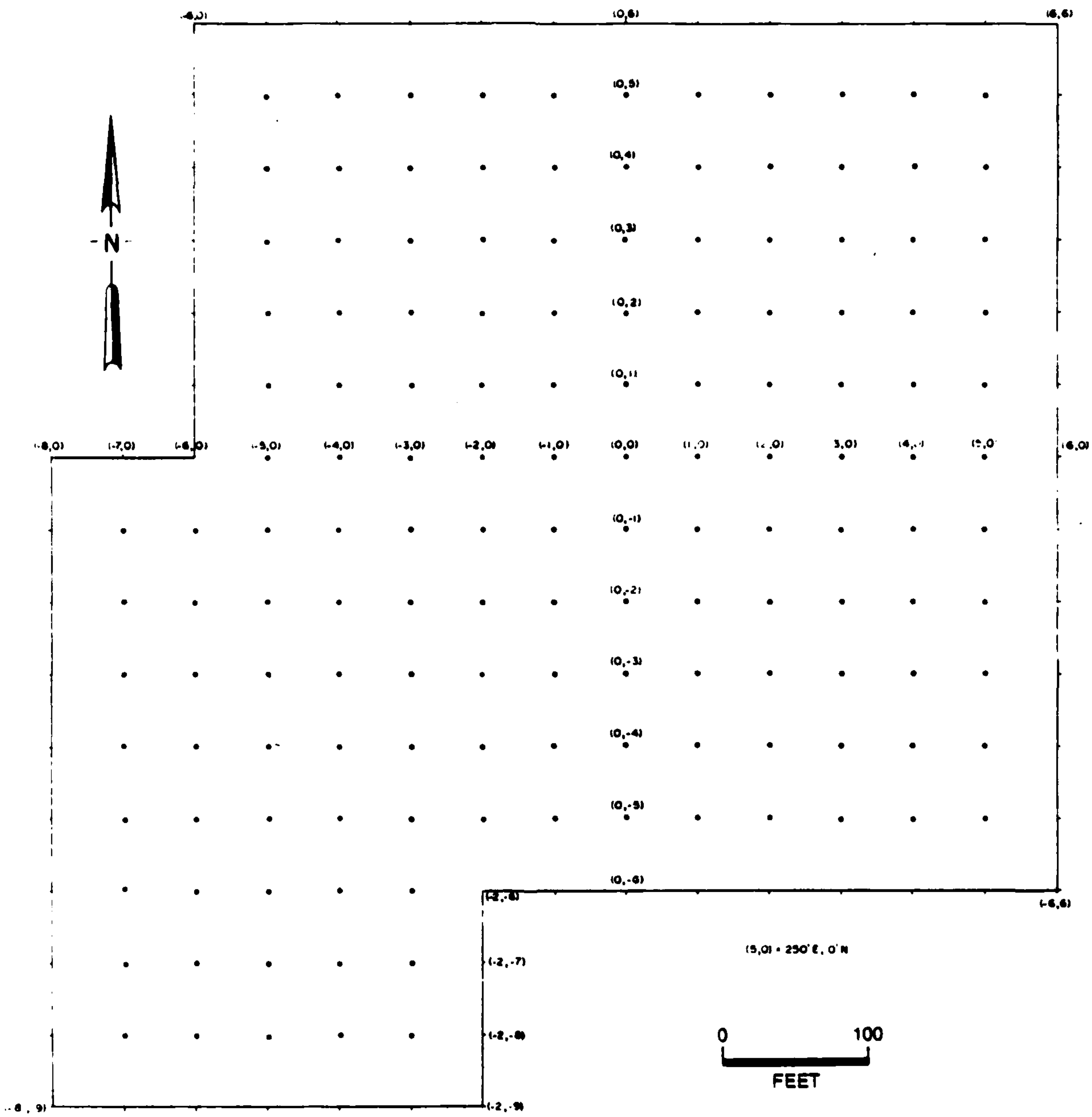
The underlying principle of operation of this patented non contacting method of measuring terrain conductivity is that the depth of penetration is independent of terrain conductivity and is determined solely by the instrument geometry i e the intercoil spacing and coil orientation. The EM34-3 can be used at three fixed spacings of 10, 20, or 40 meters and in the vertical coplanar (as shown) or horizontal coplanar mode. In the vertical coplanar mode, the instrument senses to approx 0 75 of *the intercoil spacing. In the horizontal coplanar mode, the instrument can sense to* 1 5 times the intercoil spacing. For the horizontal coplanar mode, however, coil misalignment errors are more serious than in the vertical mode so greater care must be exercised to achieve the maximum 60 meter depth.

Simple operation, survey speed and straight forward data interpretation makes the EM34-3 a versatile and cost effective tool for the engineering geophysicist

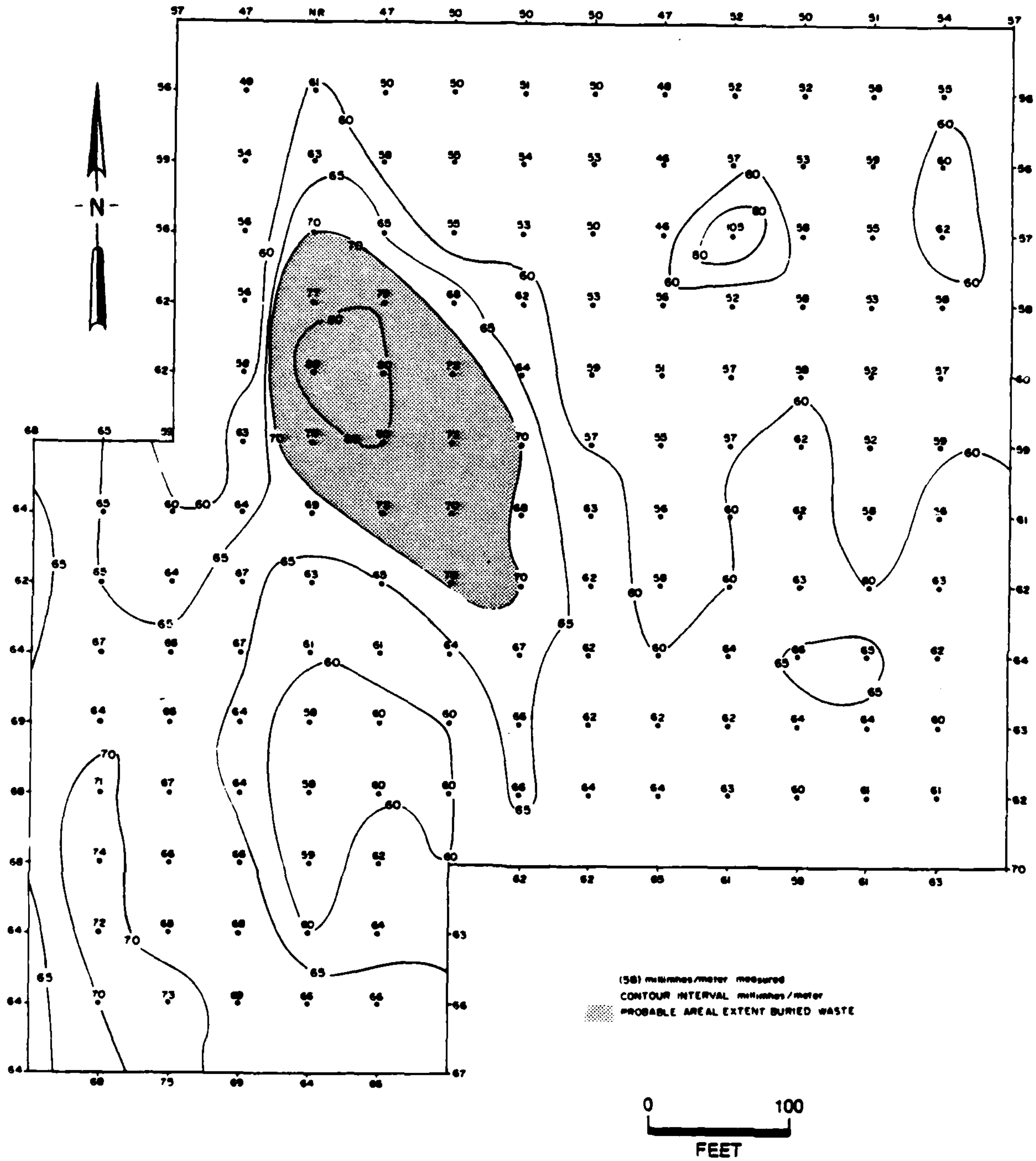
Specifications

MEASURED QUANTITY	Apparent conductivity of the ground in millimhos per meter	
PRIMARY FIELD SOURCE	Self contained dipole transmitter	
SENSOR	*Self contained dipole receiver*	
REFERENCE CABLE	Lightweight, 2 wire shielded cable	
INTERCOIL SPACING & OPERATING FREQUENCY	●10 meters at 6 4 kHz ●20 meters at 1 6 kHz ●40 meters at 0.4 kHz	
POWER SUPPLY	Transmitter	8 disposable 'D' cells
	Receiver	8 disposable 'C' cells
CONDUCTIVITY RANGES	3, 10, 30, 100, 300 mmhos/meter	
MEASUREMENT PRECISION	±2% of full scale deflection	
MEASUREMENT ACCURACY	±5% at 20 millimhos per meter	
NOISE LEVEL	< 0 2 millimhos per meter	
DIMENSIONS	Receiver Console	19 5 x 13 5 x 26cm
	Transmitter Console	15 x 8 x 26cm
	Coils	63cm diameter
WEIGHTS	Receiver Console	3.1 kg
	Receiver Coil	3 2 kg
	Transmitter Console	3 0 kg
	Transmitter Coil	6 0 kg
	Shipping Weight	41 kg

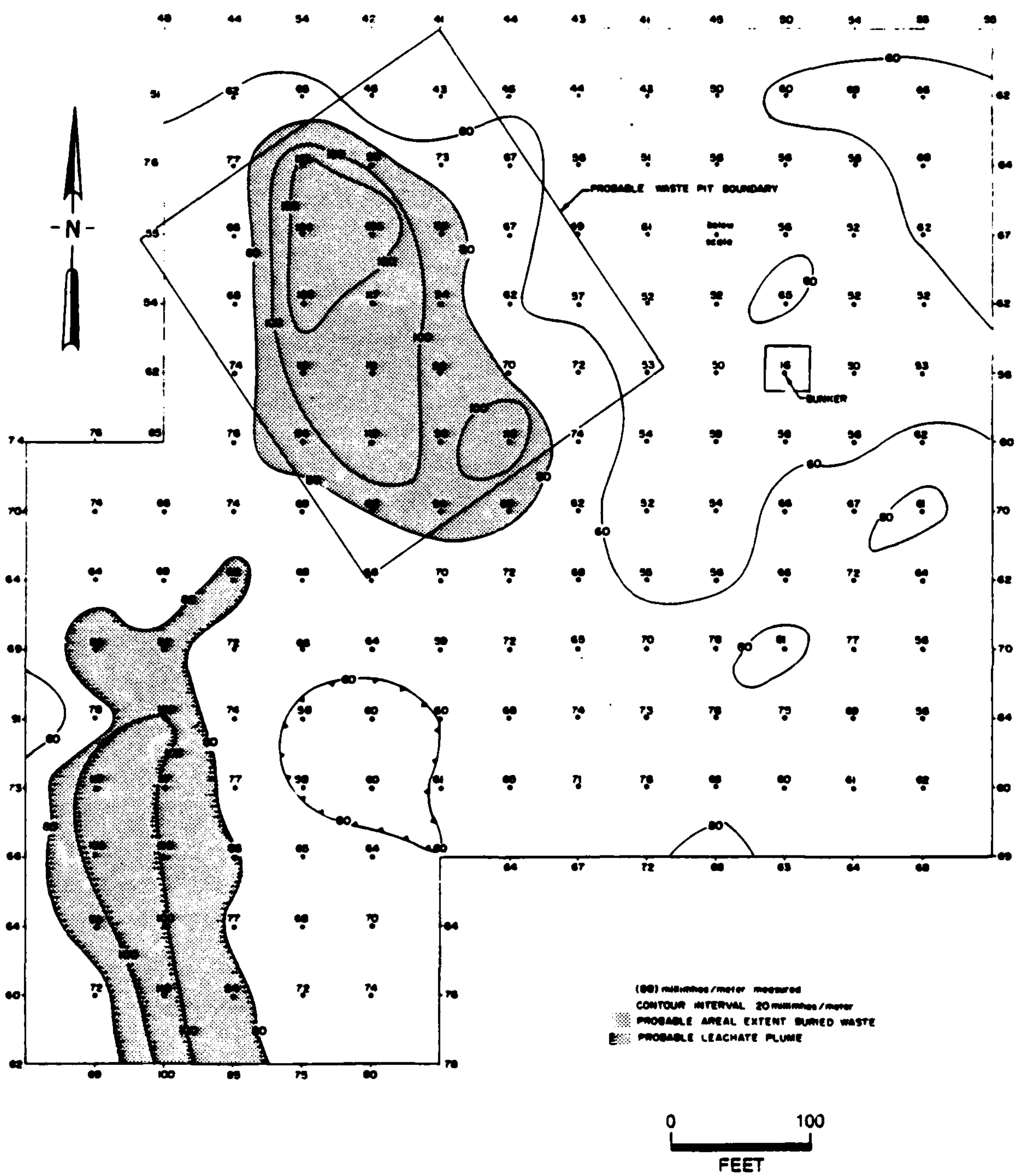
Zone 3 Plots



Data Point Grid - Zone 3.



EM34-3 (20m) Results - Zone 3.



EM31 Results - Zone 3.

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Zone 4 Plots

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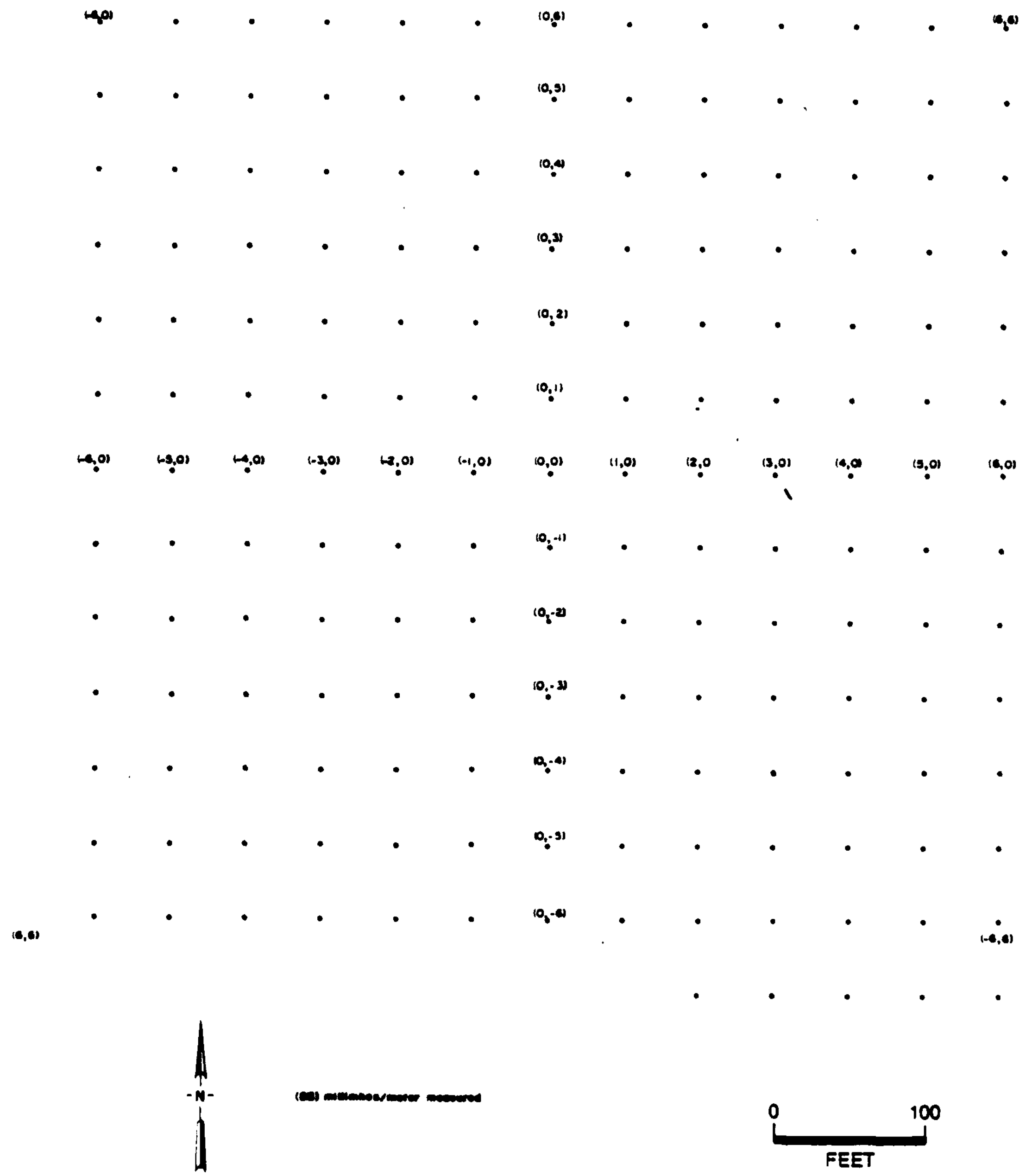
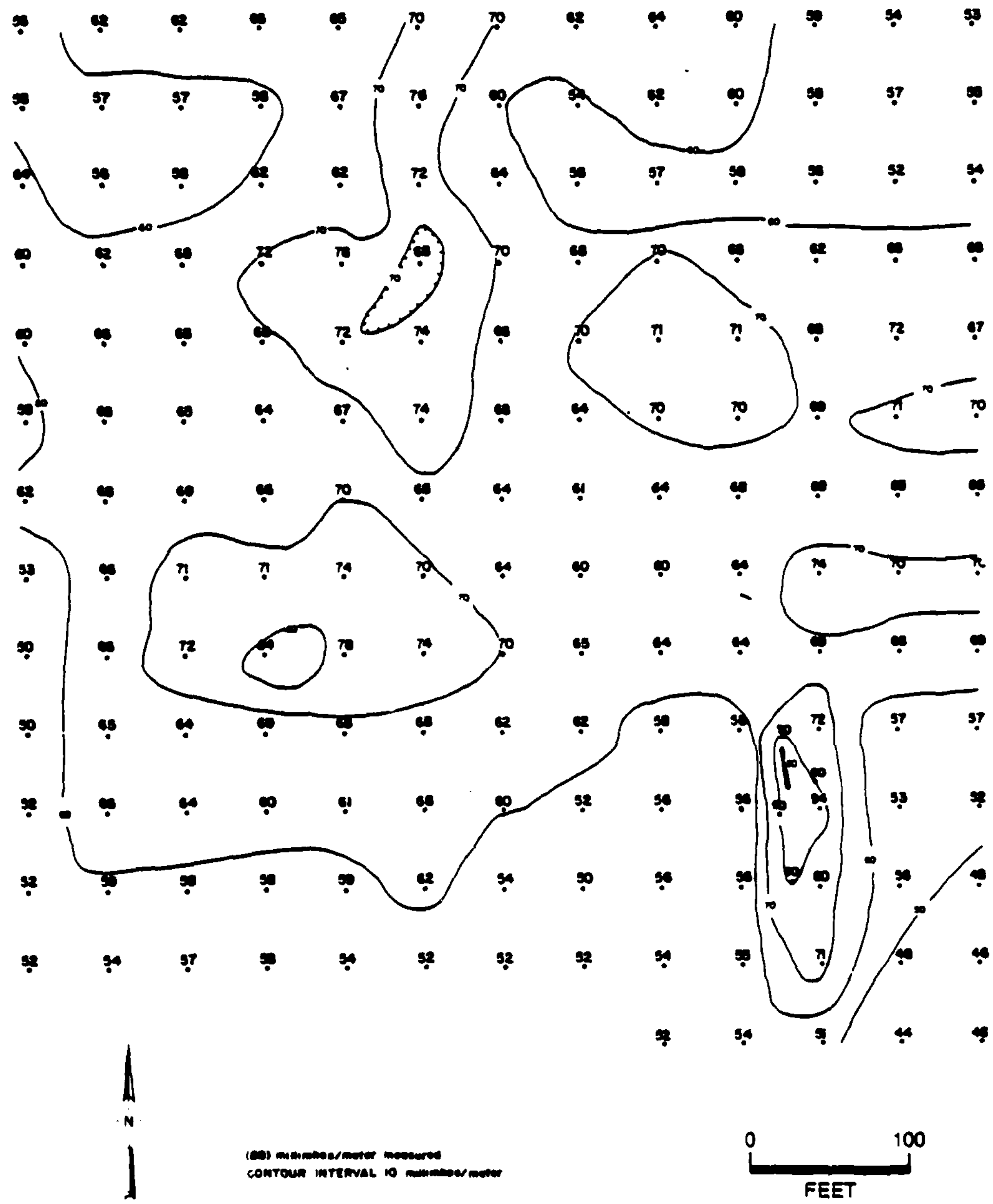
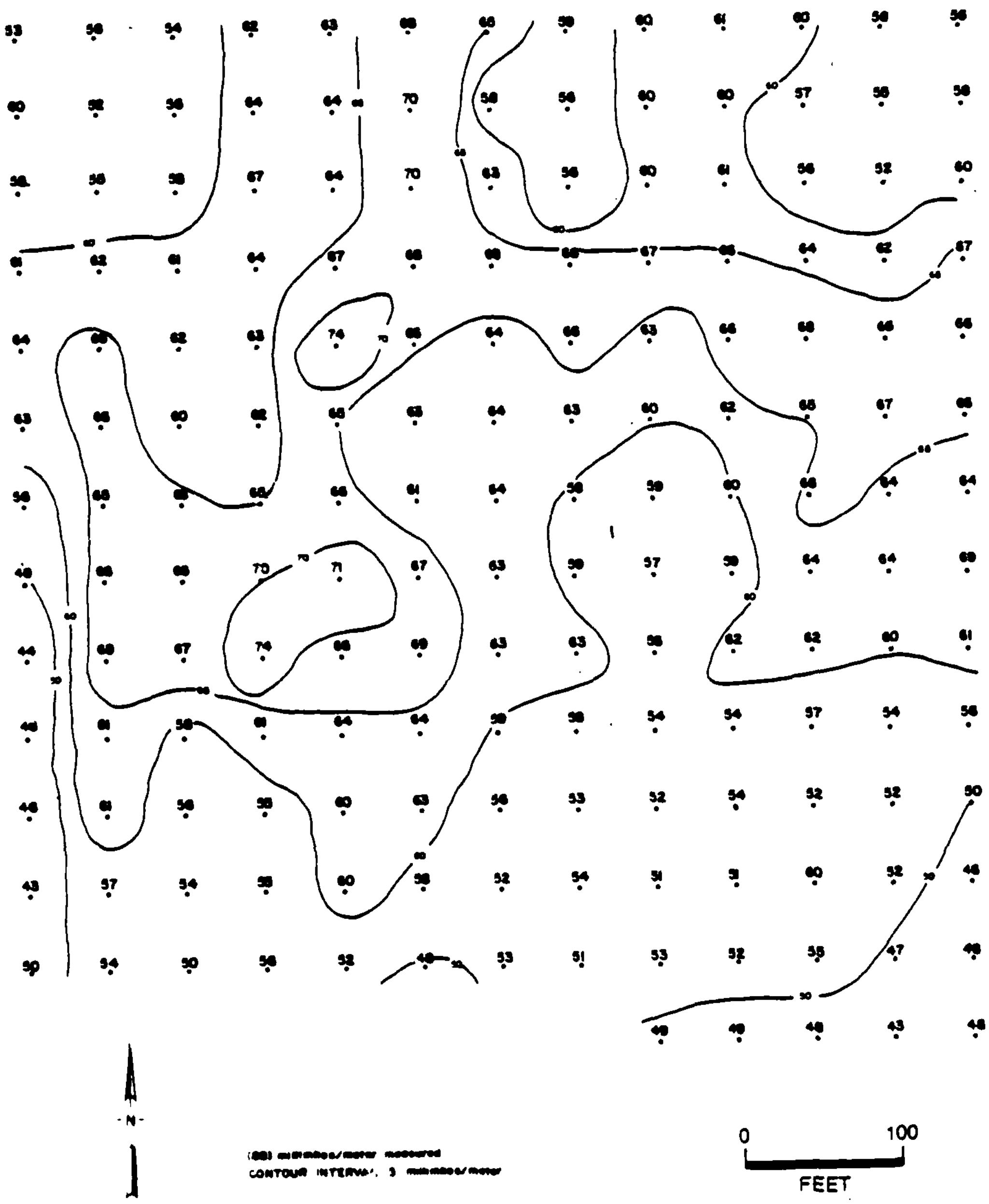


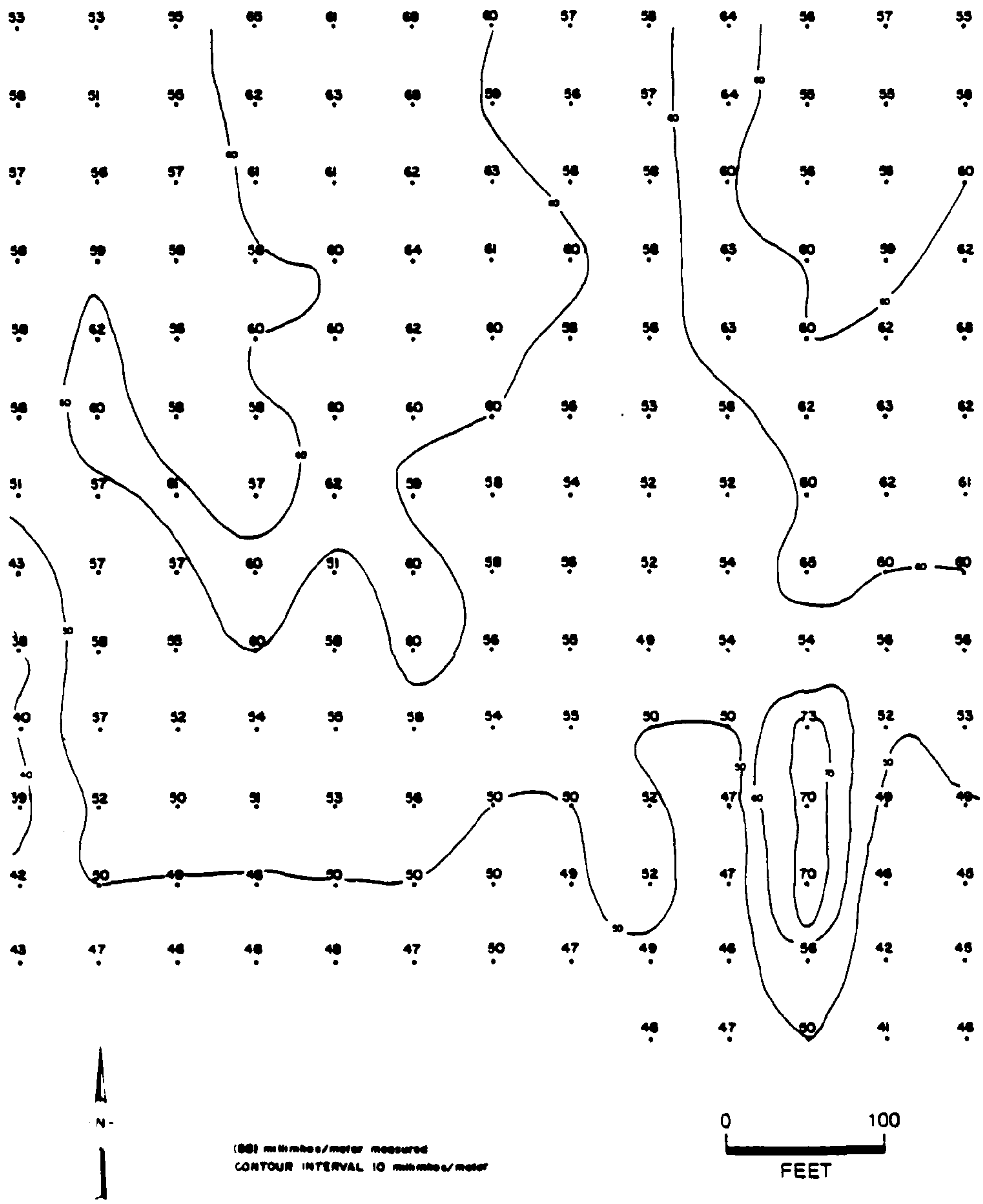
Data Point Grid - Zone 4.



EM 34-3 (20m) Results - Zone 4.



EM34-3 (10m) Results - Zone 4.



EM31 Results - Zone 4.

APPENDIX M

Safety Plan Utilized on this Project

DCN 83-212-027-04-01

TINKER AFB IRP PHASE IIB
SAFETY AND HEALTH PLAN

Prepared by:
Fred B. Blood

25 October 1983

TABLE OF CONTENTS

1.0 PROJECT DESCRIPTION

The purpose of this project is to determine if environmental contamination has occurred from the waste disposal practices at Tinker AFB, OK. The project consists of a variety of field activities; the installation of wells and sample collection, analysis of samples, and reporting. This safety plan is to address the field activities.

The following activities are required in the field portion of the project:

- Installation of six deep sampling wells utilizing an air rotary drilling rig (open hole drilling prior to well casing installation). These wells are not situated directly over the waste site, but they may pass through contaminated ground water.

- Drilling of five soil borings utilizing a hollow-stem auger. These soil borings are directly over a waste site.

- Collection of 16 well water samples, six from the newly completed deep wells, eight from existing shallow ground water wells, and two from the soil boring holes.

- Collection of 30 soil samples from the soil boring holes.

- Collection of five leachate samples from existing seeps.

- o Collection of four water samples from an existing recreational impoundment.

- o Performance of surface geophysical testing.

There exists a reasonable probability that all of these activities, with the exception of the geophysical testing, will result in contact with waste contaminated materials. The waste materials include pesticide containers, a wide variety of solvents (including trichloroethylene), metal plating wastes, fuels and oils and radioactive wastes. It is considered highly improbable that radioactivity will be encountered in any samples except the impoundment water samples, and there in low to background levels.

2.0 RATIONALE OF SAFETY APPROACH

The Supervising Geologist is responsible for the proper execution of the safety plan described herein which is for the prevention of deleterious exposure to hazards associated with the handling of toxic wastes. Additionally, typical safety practices related to drilling activities must also be observed (use of safety hats, shoes, and life vests in boat use, etc.). These safety and health practices are to be observed by all Radian personnel and subcontractor personnel.

The potential for worker exposure to fumes and vapors requires gas-proof eye protection. This is accomplished by using full-face respirators. Respiratory protection must include organic vapor, acid gas, and fume protection. The expected concentrations should be within the capacity of air purifying respirator protection. Ambient air monitoring will be performed to provide an indication of excessive levels, which will then require increased protections. The collection of and working with aqueous samples requires splash protection, to be provided by coveralls and jackets. The handling of samples that may contain a wide range of solvents, including trichloroethylene, requires two-layer hand protection.

This safety program is established as a minimum requirement. Variations from the program for greater protection will not be discouraged. However, decreasing the protection must be authorized by the Supervising Geologist or the Project Director. Program changes will be documented in the after-action report.

3.0 SAFETY TRAINING

Prior to the initiation of site activities, a training session will be held to discuss the proposed work, associated safety and health plans, and emergency response plans. All personnel assigned to drilling activities and water sampling efforts will be instructed regarding the potential health and safety hazards associated with the work and protective measures available. Specifically, the following topics will be covered in the training session:

- Potential routes of contact with toxic and/or corrosive substances
  - skin contact/adsorption
  - eye contact
  - inhalation
  - ingestion

- Types, proper use, limitations and maintenance of applicable protective clothing and equipment
  - safety helmet
  - industrial safety glasses
  - chemical goggles
  - chemical resistant gloves
  - chemical resistant safety-toe boots
  - chemical resistant body coverings (apron, blouse, trousers, coveralls)

- Respiratory protection using half- and full-facepiece air purifying respirator with replaceable filter cartridges
  - Hierarchy of protective controls: engineered, administrative, work practice, personal protective clothing and equipment.

- Forms of respiratory protection: air purifying (disposal/reusable), air supplied, self contained.

- Selection of respiratory protection based on hazard: dust, fume, mist, gas, irritant, warning properties.

- NIOSH certification/approval of respiratory protection equipment.

- Medical/physical/physiological fitness to wear respiratory protection (e.g., spirometry, clean shaven, etc.).

- Reevaluation of respirator selection.

- Use, limitations and maintenance of full-facepiece air-purifying respirator: qualitative fit test, routine inspection, replacement of parts, cleaning/ disinfection, storage.

- Use, limitations and maintenance of half-facepiece air-purifying respirator: qualitative fit test, routine inspection, replacement of parts, cleaning/ disinfection, storage.

o Reporting of accidents and availability of medical assistance.

4.0 PROTECTIVE CLOTHING AND EQUIPMENT

All monitoring well installation work will be performed by persons wearing the following required personal protective equipment:

- PVC bib overalls
- PVC jacket
- Gauntlet style, chemical resistant, Viton gloves over butyl rubber gloves
- Chemical resistant safety toe, steel shank boots
- Respirator (full-facepiece air purifying)
- Safety helmet

Depending on site conditions and drilling conditions, other items may be used for supplemental protection. Such items may include:

- Tyvek® coveralls
- Chemical resistant apron
- Respirator (half-facepiece, air purifying)
- Chemical eye goggles or safety spectacles with side shields

Because of the potential for migration of contaminants into and through the shallow aquifer zone, well-defined disposal site boundaries are uncertain. Several disposal sites have a high potential for migration of contaminants. Most of the monitoring wells will be installed in areas hydraulically down-gradient of known disposal sites or in areas of unknown ground water flow direction. Since the degree of contamination and potential migration patterns of contaminants are not known, respirator use will be required as a precaution during all drilling activities and well installation work. Full-facepiece air purifying respirators will be used with Ultra-Twin GMC Cartridges for acid gases, dust and fume protection, and organic vapors. The Supervising Geologist may decide to implement the use of half-face-piece, air purifying respirators depending on specific site and drilling conditions. Only when well installation work is being performed in areas hydraulically up-gradient of respective sites and when there is considerable confidence that well locations are outside zones of possible cross-contamination, may respirator use be discontinued.

5.0 WORK ZONES AND DECONTAMINATION PROCEDURES

To minimize the transfer of hazardous substance(s) from the site, contamination control procedures are needed. Contaminants must be removed from people and equipment prior to relocation from a work zone.

5.1 Work Zones

Prevention of exposures and spread of contamination will be controlled through the establishment of work zones. Two primary work zones will be utilized and will be referred to as the (1) Exclusion Zone and (2) Decontamination Zone.

The Exclusion Zone is the area where disturbance activities are conducted and where contaminants are or may be present. Only those properly trained individuals attired in the specific protective clothing and equipment will be allowed to enter and work in this zone.

The Decontamination Zone is the area where personnel and equipment will be decontaminated before moving to the next site.

The Exclusion Zone will comprise a 25-foot radius circle around the monitoring well and the Decontamination Zone will comprise a 25-foot wide ring around the Exclusion Zone as shown in Figure 5-1.

5.2 Decontamination Procedures

Personal protective equipment and drilling/sampling equipment can become contaminated in a number of ways including:

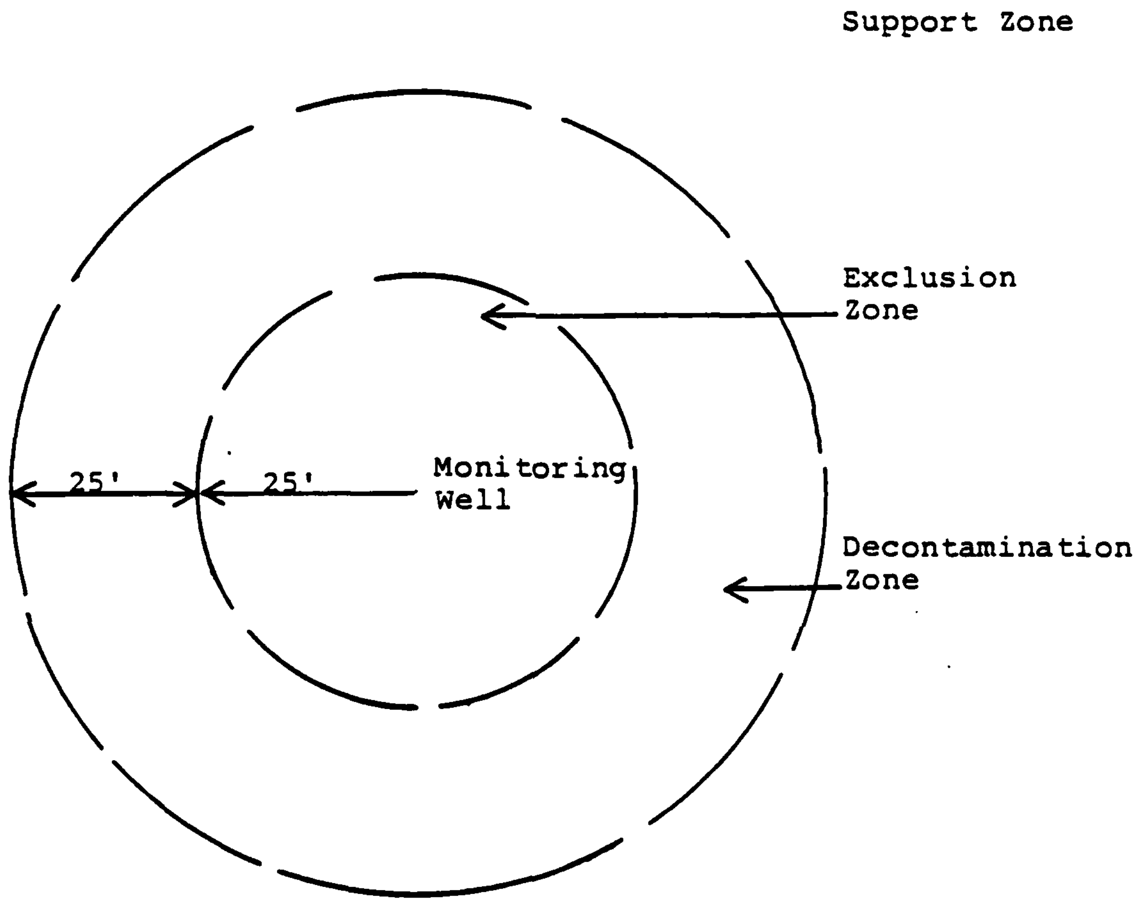


Figure 5-1. Monitoring Well Work Zone.

- Contacting vapors, gases, mists, or particulates in the air.

- Walking through puddles of liquids or on contaminated soil.

- Using contaminated instruments or equipment.

Protective clothing and respirators help prevent the wearer from becoming contaminated or inhaling contaminants, while good work practices help reduce contamination of protective clothing, instruments, and equipment. Even with these safeguards, contamination may occur. Harmful materials can be transferred into clean areas, exposing unprotected personnel. Or in removing contaminated clothing, personnel may contact contaminants on the clothing and/or inhale them.

Decontamination consists of physically removing contaminants. How extensive decontamination must be depends on a number of factors, the most important being the type of contaminants involved. The more harmful the contaminant, the more extensive and thorough the decontamination must be. Combining decontamination, the correct method of doffing personnel protective equipment, and the use of site work zones minimizes cross-contamination from protective clothing to wearer, equipment to personnel, and one area to another.

Decontamination at the monitoring wells will be accomplished by physically removing contaminants from the surfaces of personal protective equipment and drilling/sampling equipment with detergent water followed by rinse with clean water. The process will be repeated (see Figure 5-2).

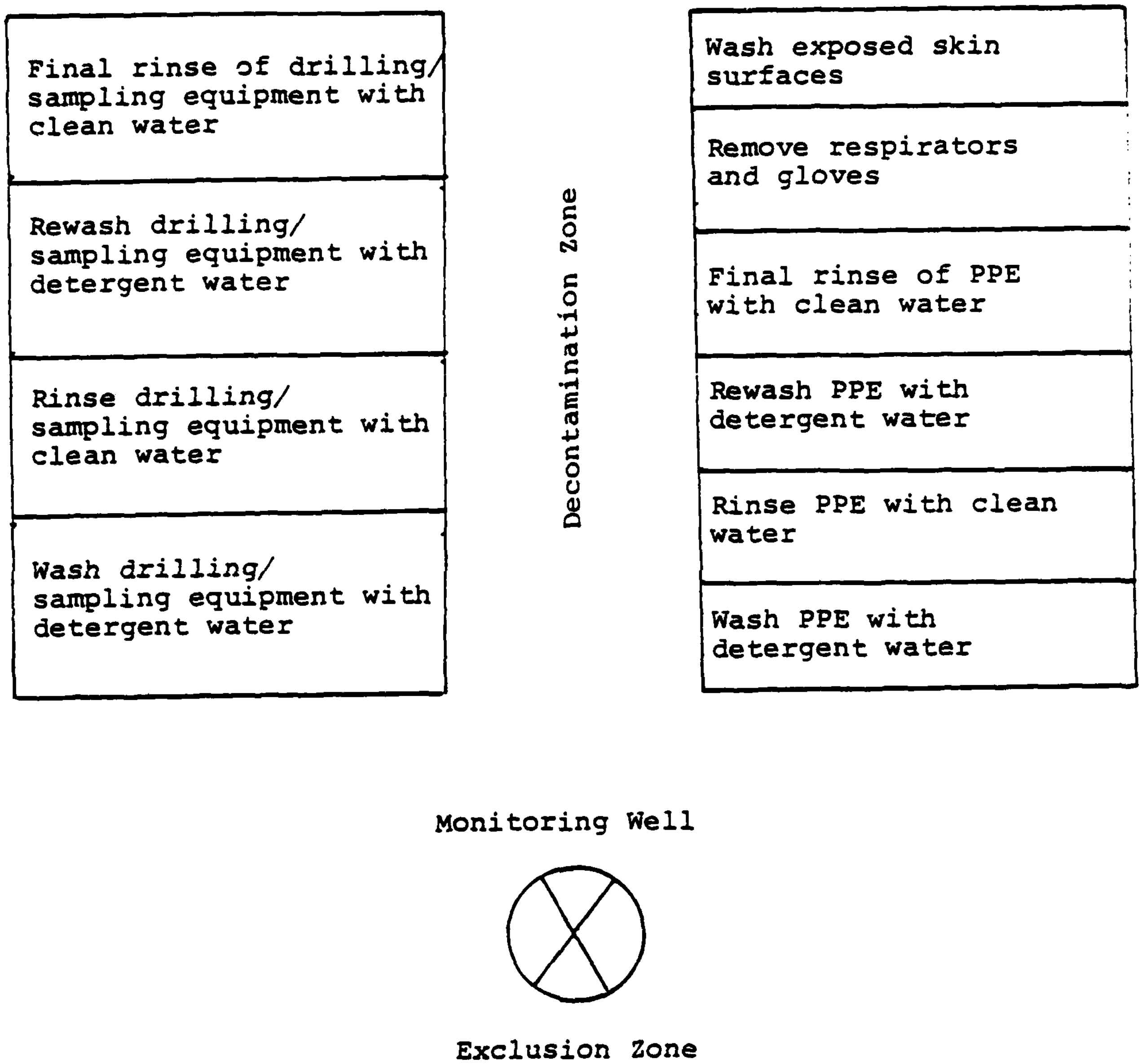


Figure 5-2. Monitoring Well Decontamination Procedures.

6.0 SAFETY MONITORING

In addition to the use of personal protective equipment and respirator protection, safety support plans are also necessary. At Tinker AFB, safety support will constitute ambient air monitoring of hazardous and/or toxic materials for the protection of Radian and Air Force personnel and emergency response in the event of an employee injury or other medical emergency.

6.1 Ambient Air Monitoring

Ambient air monitoring will be performed using two techniques. One technique will use the combustible gas meter (TLV Sniffer) and the other will use colorimetric indicator tubes and the grab-sampling method. All readings must be documented (minimum 2/hole) in field notes.

Air monitoring will be performed during drilling activities to determine if the respiratory protection chosen affords adequate protection from contaminant concentrations found on-site.

6.1.1 TLV Sniffer

A Bacharach Instruments TLV Sniffer will be used to locate on-site organic vapor concentrations that are higher than ambient outdoor air concentrations. The instrument will be used to determine general areas of elevated organic vapor concentrations, and not as a precision analytical instrument. It is an instantaneous measuring instrument and displays concentrations on a meter in parts per million (ppm), referenced to hexane.

The TLV Sniffer displays a meter reading directly in parts per million (ppm) volatile flammable vapor allowing an estimate of combustible gas concentrations. The instrument can be calibrated to read directly in parts per million for any one of many kinds of combustible gases. Factory calibration is for hexane unless otherwise specified, though readings from other gases and vapors may be interpreted easily by means of reading conversion curves (Figure 6-1).

6.1.2 Grab-Sampling Using Colorimetric Indicator Tubes

A Draeger® kit with an assortment of indicator tubes will be used to obtain quick analysis of unknown hazardous substances in air. The Draeger® tubes are colorimetric direct reading detector tubes and function as "real time" hazardous condition indicators. Samples will be collected during drilling activities. An initial screening tube (Polytest®) will be used for a general qualitative test. This tube will give a positive reaction indicating the presence of ethyl acetate, benzene, acetone, alcohol, and/or hydrocarbons. If a positive reaction does occur, more specific tests may be made using more specifically reacting Draeger® tubes. Table 6-1 lists the sampling strategy to be used when obtaining grab-samples via Draeger® tubes at Tinker AFB. In addition to the Polytest®, any of the detector tubes listed in Table 6-1 may be used individually if the presence of that compound is suspected.

The respirators selected for use at Tinker AFB have been assigned protection factors by the National Institute for Occupational Safety and Health (NIOSH). These respirator protection factors are listed in Table 6-2. In event that sampling results indicate that the respective Threshold Limit Values (TLVs) may be exceeded, concentrations should be compared to the Protection

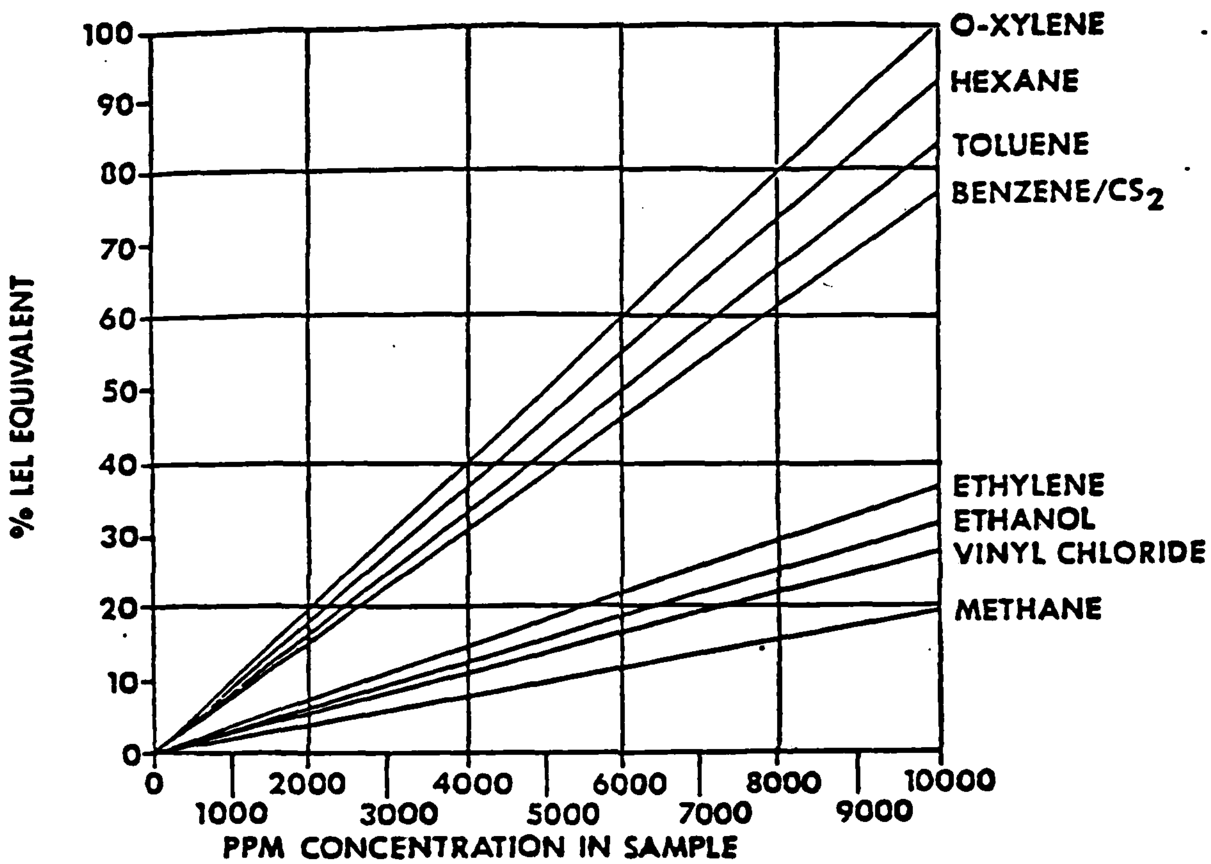


Figure 6-1. Conversion Curves Showing Relationship of PPM Concentrations of Various Gases to Percent L.E.L. Equivalents.

TABLE 6-1. DETECTOR TUBES FOR AMBIENT AIR MONITORING

Detector Tube[1]	Positive Reaction Indicates Presence of	Detection Limit	TLV (ACGIH 1982)	MUC[2]
1. Polytest	2, 3, 4, 5, 6*	50 ppm (benzene) 2000 ppm (acetone)		
2. Ethyl acetate 200/a	Esters, 3, 4, 5	200 ppm	400 ppm	1000 ppm
3. Benzene 0.05	Aromatic H/C	15 ppm	10 ppm	500 ppm
4. Acetone 100/b	Ketones	100 ppm	750 ppm	1000 ppm
5. Alcohol 100/a	Alcohols	100 ppm		
6. Hydrocarbon 0.1%/b	Aliphatic H/C	0.1% (butane)		
7. Sulfur dioxide 1/a	Sulfur dioxide	1 ppm	2 ppm	100 ppm
8. Hydrogen sulfide 1/c	Hydrogen sulfide	1 ppm	10 ppm	500 ppm

[1] List is a modification of the sampling strategy for unknown substances developed by National Draeger, Inc. Tubes are manufactured by National Draeger, Inc.

[2] MUC = Maximum Use Concentration based on full-faced respirators. If levels exceed this value, respiratory protection must be increased.

* A positive test also occurs for arsin, carbon disulfide, nitric oxide, carbon monozide, and methyl bromide.

TABLE 6-2. RESPIRATOR PROTECTION FACTORS

Type Respirator	Facepiece Pressure	Protection Factor
Half- or Quarter-mask, High-Efficiency Air Purifying	negative	10*
Full Facepiece, High Efficiency Air Purifying	negative	50*

* These Protection Factors pertain to properly fitted facepieces with new cartridges and filters.

Factor associated with the particular respirator in use. If the concentrations of contaminants are not conservatively within the listed Protection Factor, work activities will be terminated until satisfactory respiratory protection can be obtained.

6.2 Personal/Site Hygiene

Punctured, internally contaminated, cracked, stubbornly soiled, protective items will be disposed in sealed plastic bags.

Paper, rags, and other disposables used on-site or in equipment/sample container clean up will be disposed of in sealed plastic bags.

No food will be consumed on the exploration site. Employees will thoroughly wash their hands, forearms and face before consuming food or beverages other than water held in disposal cups. Drinking water will be available at the perimeter of the site being investigated. Disposable cups will be used to consume water after protective gauntlet gloves are removed.

Soil cuttings from augering which display contamination will be removed from the site in suitable sealed containers for eventual disposal.

6.3 Emergency Medical Services

In the event of an employee injury or other medical emergency on-site, the Supervising Geologist and other personnel trained in first aid and CPR will immediately provide assistance. An MSA model self-contained breathing apparatus (SCBA) will be nearby for use by the Supervising Geologist and back-up geologist during emergency rescue situations requiring respiratory protection.

A portable eye/face wash unit will be in the immediate proximity of any field work in progress. Flushing of the eyes should be started immediately (within 15 seconds) and should continue for 15 minutes whenever hazardous gas, liquid, dust or particles that may be chemically contaminated, enter the eye.

Because contact lenses tend to hold contaminants in close proximity to the eye ball and inhibit flushing, contact lenses will not be allowed on-site.

Additional first aid supplies will be kept in close proximity to field work activities for quick, easy access.

Medical emergencies that require outside medical assistance will be treated by the medical clinic at Tinker AFB. The clinic is in close proximity to the work site and is staffed with trained medical professionals. Pertinent communications information regarding medical services will be made available to all personnel during the safety training session.

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