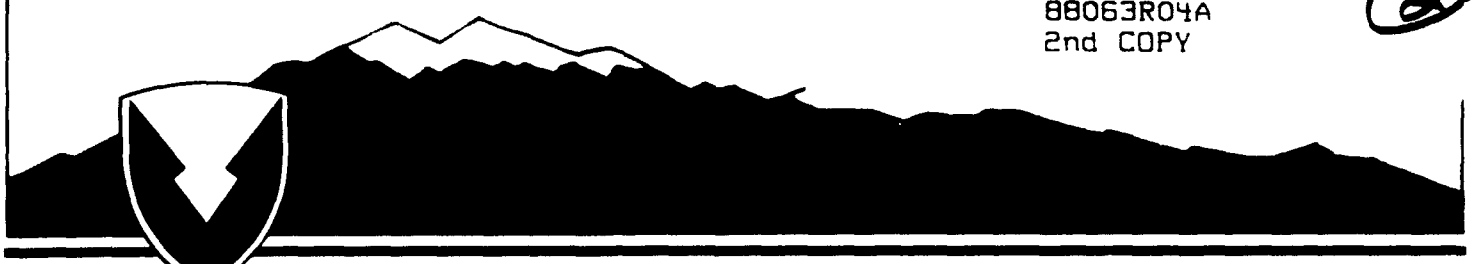

U.S. ARMY
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— COMMITTED TO PROTECTION OF THE ENVIRONMENT —

FINAL PHASE II
DATA ADDENDUM
SITE 36-2: MUNITIONS TEST AREA
AND INCENDIARY DROP SITE

September 1988
Contract Number DAAK11-84-D-0016
(Version 3.1)

Environmental Science And Engineering, Inc.
Harding Lawson Associates

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LITIGATION TECHNICAL SUPPORT AND SERVICES

Rocky Mountain Arsenal

FINAL PHASE II
DATA ADDENDUM
SITE 36-2: MUNITIONS TEST AREA AND INCENDIARY DROP SITE

September 1988
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PREPARED BY

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Harding Lawson Associates

PREPARED FOR

U.S. ARMY PROGRAM MANAGER'S OFFICE FOR ROCKY MOUNTAIN ARSENAL

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THE PHASE II PROGRAM FOR SITE 36-2, A TESTING AREA FOR INCENDIARIES, CONSISTED OF 12 BORINGS YIELDING 15 SAMPLES AND 3 BACKHOE EXCAVATIONS TO INVESTIGATE 3 ANOMALIES. SELECTED SAMPLES WERE ANALYZED FOR ORGANOCHLORINE PESTICIDES, SEMIVOLATILE ORGANICS, METALS, ARMY AGENT DEGRADATION PRODUCTS, AS, AND HG. FC2A, DLDRN, ZN, CU, PB, AND CD WERE THE MOST PREVALENT ANALYTES FOUND WITHIN OR ABOVE INDICATOR RANGES. ALDRN, ISODR, PPDDE, ENDRN, PPDDT, AND CLDAN WERE ALSO DETECTED IN ONE SAMPLE.

RESULTS OF THE PHASE II SAMPLING PROGRAM WILL BE ASSESSED AS PART OF THE OVERALL ANALYSIS FOR THE CENTRAL STUDY AREA REPORT.

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1.0 PHASE_II_PROGRAM

As a result of the Phase I contamination assessment at Rocky Mountain Arsenal (RMA), a Phase II program was initiated at Site 36-2 in March, 1988. The Phase II program was conducted as presented in the Phase I Contamination Assessment Report (CAR), except that three borings were relocated (ESE, 1988, RIC#88063R04).

The sampling program at Site 36-2 consisted of 12 borings yielding 15 samples. Sampling locations were selected to investigate areas that were not fully characterized during the Phase I program. To investigate a Phase I dieldrin detection, three borings (Borings 3724, 3725, and 3726) were drilled in a triangular pattern around Phase I Boring 3277. The borings were placed 50 ft from Boring 3277, not 25 ft as planned in the Phase I CAR. Six samples were collected from the 0- to 1- and 2- to 3-ft intervals of these three borings using a drill rig and the continuous soil sampling method detailed in the Task 14 Technical Plan (ESE, 1987b, RIC#87343R02).

Six 0- to 1-ft samples were obtained using hand-augering methods from the five small burn pits and the open cut along the northeast site perimeter. Two hand-augered samples from the 0- to 1-ft interval were obtained adjacent to Buildings 725 and 726, and one sample was obtained from the 0- to 1-ft interval of the blast vent area northeast of Building 725. All samples were obtained at the predetermined intervals presented in the Phase I CAR.

Geophysical Anomalies D, E, and F were investigated by backhoe excavation. The anomalies were to be sampled only if trench debris was encountered, or if elevated photoionization detector (PID) readings were obtained.

Prior to any Phase II drilling, the Program Managers Office (PMO), Environmental Science and Engineering (ESE), Morrison-Knudsen Engineers (MKE), and Harding Lawson Associates (HLA) formulated procedures for MKE to obtain subsamples from selected soil cores during Phase II drilling. MKE did not request any subsamples from Site 36-2.

The water table was not encountered in any Phase II borings or excavations at Site 36-2. Volcaniclastic bedrock was encountered at a depth of 7 ft in the excavation of geophysical Anomaly F.

The six samples obtained from Borings 3724, 3725, and 3726 were analyzed for organochlorine pesticides (OCP) by gas chromatography electron capture (GCEC). One sample from the 0- to 1-ft interval of Boring 3724 was also analyzed for semivolatile organic (SVO) compounds by gas chromatography/mass spectrometry (GC/MS) for confirmation of GCEC results. The nine 0- to 1-ft hand-augered samples from Borings 3715 to 3723 were analyzed for cadmium, chromium, copper, lead, and zinc by the Inductively Coupled Argon Plasma (ICP) method, for arsenic and mercury by atomic absorption (AA), and for SVO compounds by GC/MS. Three samples were analyzed by ion chromatography (IONCHROM) for the Army Agent Degradation Products (ADP), fluoracetic acid (FC2A), isopropylmethylphosphonic acid (IMPA), and methylphosphonic acid (MPA).

The Phase II samples, except those around Boring 3277, were analyzed for the Phase I suite, because Phase I borings were not located in the pits or near Buildings 725 and 726. The three 0- to 1-ft samples near Buildings 725 and 726 were also analyzed for ADPs by IONCHROM, because historical evidence indicated the possible presence of agents in Buildings 725 or 726. The samples from Borings 3724, 3725, and 3726 were analyzed for OCPs due to the detection of dieldrin in Boring 3277.

In the Phase I program, samples were analyzed for OCPs by GC/MS under the grouping of "semivolatile organic compounds". During the Phase II program, samples were analyzed for OCPs by GCEC and GC/MS methods. The GCEC method is considered quantitative, and the results are reported to two significant figures. In the GC/MS method, results are reported to only one significant figure. Due to these differences, results obtained from the GC/MS and GCEC methods may not be directly comparable. The analytical methods used for ICP metals, SVO compounds, arsenic, and mercury in the Phase I program were also used in the Phase II program. Samples were analyzed for IMPA only in the Phase II program, as the IONCHROM method was not available during the Phase I program. Appendix 36-2-II-A contains a complete list of analytes,

analytical methods, and standard abbreviations used in the Phase I and Phase II investigations.

2.0 PHASE II FIELD OBSERVATIONS

The Phase II field observations at Site 36-2 are consistent with the field observations presented in the Phase I CAR (ESE, 1988, RIC#88063R04). Anomalies D, E, and F were investigated by excavation as stated in the Site 36-2 Phase I CAR. The excavations in these anomalies encountered only natural soil with no PID readings above background; therefore, no samples were taken. Figure 36-2-II-1 in Section 4.0 shows the locations of all Phase I and Phase II borings and the anomalies investigated by trenching.

For safety purposes, air monitoring was conducted using a PID during drilling operations. Air monitoring at this site did not detect measurable levels of contaminants within the breathing zone or from soil samples.

An M18A2 test kit was used at this site to detect the presence of chemical agents in boreholes and soil samples. Specifically at RMA, the M18A2 test kit is used to Sarin (GB), VX, mustard (H), and Lewisite (L), based on the knowledge that these agents were manufactured, stored, or demilitarized at the site. The detection limit for H agents is 0.5 milligrams per cubic meter (mg/m^3), and the detection limit for GB, VX, and L is 0.2 mg/m^3. The detection limits for L and VX in soil are 5 parts per million (ppm) and 5.9 ppm, respectively. All M18A2 field test results for the detection of chemical agents at this site were negative.

Samples at Site 36-2 were tested for chemical agents by the RMA Laboratory because historical evidence indicated possible agent presence. A composite of intervals sampled was initially analyzed for GB, VX, H, and L. If agent had been detected, individual sample intervals from each boring would have been analyzed to identify stratigraphic location. No positive results of chemical agent testing were found at Site 36-2.

3.0 PHASE II GEOPHYSICAL EXPLORATION

Prior to drilling, Borings 3724, 3725, and 3726 were cleared for safety purposes in accordance with the surface geophysical program detailed in the Task 14 Technical Plan (ESE, 1987b, RIC#87343R02). Borehole site clearance was used to ensure that drilling would not encounter buried unexploded ordnance (UXO) or other metal that could pose a significant safety risk. Magnetic intensity readings were obtained with a gradiometer. A 20-ft-square grid was centered on each boring location, and gradiometer readings were obtained at 5-ft intervals throughout the area. A contour map was prepared from the data and was used to place the boring in the safest location within the geophysical plot. Following borehole site clearance, a metal detector was used to check for surficial (0 to 2 ft) metal. The 12 hand-augered boring locations were cleared only by a metal detector survey for shallow (0 to 2 ft) buried metal. None of the Phase II boreholes were relocated as a result of the borehole site clearance conducted at Site 36-2.

4.0 PHASE_II_ANALYTE_LEVELS_AND_DISTRIBUTION

Table 36-2-II-1 contains indicator ranges and a statistical summary of Phase II analytical results. A summary of analytical data for each sample, including lithology and air monitoring results, is presented in Table 36-2-II-2. A tabulation of all analytical data associated with the Phase II investigation from this site is presented in Appendix 36-2-II-B.

To assess the significance of metal and organic analytical values, indicator ranges were established during the Phase I program. For organic compounds, the indicator level is the method detection limit. For metals, a range of values was selected to reflect the upper end of the expected natural range for each metal as normally found in RMA alluvial soil. The procedure for establishing indicator ranges is presented in the Introduction to the Contamination Assessment Reports (ESE, 1987a, RIC#88204R02). Concentrations within or above indicator ranges for Phase I and Phase II data are presented in Figure 36-2-II-1.

Cadmium was detected at a concentration of 2.9 ppm in Boring 3717, located in the blast vent area northeast of Building 725. Boring 3717 also contained fluoroacetic acid (FC2A) at 2.7 ppm. Boring 3715, which is located next to Building 726, contained dieldrin at a concentration of 0.4 ppm and zinc at a concentration of 260 ppm. Boring 3716, adjacent to Building 725, contained dieldrin (3 ppm), cadmium (1.6 ppm), copper (91 ppm), lead (160 ppm), and zinc (170 ppm).

The ICP metals cadmium, copper, and zinc were detected at concentrations within and above the indicator ranges in the six samples from the small pits and the open cut (Boring 3718 through 3723). Cadmium was detected in three of these samples at concentrations ranging from 1.4 to 3.3 ppm. Copper was detected in one sample at a concentration of 24 ppm. Zinc was detected in three samples in concentrations ranging from 61 to 66 ppm.

The three borings (Borings 3724 through 3726) surrounding Boring 3277 all contained dieldrin at concentrations ranging from 0.057 to 0.59 ppm in the 0- to 1-ft interval. Boring 3726, south of Phase I Boring 3277, also

Table 36-2-II-1. Summary of Analytical Results for Site 36-2 Phase II Soil Samples

Constituent	Number of Samples*	Concentrations (ug/g) Range	Mean**	Median**	Standard Deviation**	ESE Detection Limit	Indicator Level
ORGANOCHLORINE PESTICIDES (N=6)+							
Hexachlorocyclopentadiene	0	--	--	--	--	0.0026	DL
Aldrin	2	0.014-0.019	--	--	--	0.0018	DL
Isodrin	2	0.002-0.006	--	--	--	0.0011	DL
DDE,PP'	1	0.012	--	--	--	0.001	DL
Dieldrin	4	0.002-0.59	--	--	--	0012	DL
Endrin	2	0.024-0.090	--	--	--	0.001	DL
DDT,PP'	1	0.014	--	--	--	0.0023	DL
Chlordane	1	>0.21	--	--	--	0.11	DL
IMPA (N=3)+							
Fluoroacetic Acid	1	2.7	--	--	--	2.0	DL
SEMIVOLATILE ORGANICS (N=10)+							
Dieldrin	3	0.4-3	--	--	--	0.3	DL
ICP METALS (N=9)+							
Cadmium	5	1.4-3.3	2.3	3.3	0.83	0.92	DL-2.0
Chromium	7	10-15	12	15	2.2	7.2	25-40
Copper	9	8.9-91	22	17	26	4.8	20-35
Lead	1	160	--	--	--	17	25-40
Zinc	9	37-260	87	65	74	16	60-80
ARSENIC (N=9)+							
None Detected						4.7	DL-10
MERCURY (N=9)+	1	0.13	--	--	--	0.050	DL-0.10

* Number of samples in which constituent was detected. Only these sample results were used in statistical analyses.
** Statistics not calculated when constituent detected in fewer than five samples.
\+ Number of samples analyzed by laboratory.
DL Detection limit.

Source: ESE, 1988.

Table 36-2-II-2. Concentrations of Target Analytes Above Detection Limits in Site 36-2 Phase II Soil Samples

Boring Number	3715	3716	3717	3718	3719	3720	3721	3722	3723	3724	3724	3725	3725	3726	3726
Depth (ft)	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	2-3	0-1	2-3	0-1	2-3
Geologic Material	Sandy Silt	Silty Sand	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt	Sandy Silt
AIR MONITORING															
PID*	BKD	BKD	BKD	BKD	BKD	BKD	BKD	BKD	BKD	BKD	BKD	BKD	BKD	BKD	BKD
SOIL CHEMISTRY															
Organochlorine Pesticides (OCP) (ug/g)															
Hexachlorocyclopentadiene	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	BDL	BDL	BDL	BDL	BDL	BDL
Aldrin	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	0.019	BDL	BDL	BDL	0.014	BDL
Isodrin	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	0.002	BDL	BDL	BDL	0.006	BDL
DDE,PP'	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	BDL	BDL	BDL	BDL	0.012	BDL
Dieldrin	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	0.54	BDL	0.057	BDL	0.59	0.002
Endrin	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	0.024	BDL	BDL	BDL	0.090	BDL
DDT,PP'	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	BDL	BDL	BDL	BDL	0.014	BDL
Chlordane	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	BDL	BDL	BDL	BDL	>0.21	BDL
IMPA (ug/g)															
IMPA	BDL	BDL	BDL	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
Fluoroacetic Acid	BDL	BDL	2.7	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
MPA	BDL	BDL	BDL	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
Semivolatile Organics (SVO) by GC/MS (ug/g)															
Dieldrin	0.4	3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1	NRQ	NRQ	NRQ	NRQ	NRQ
ICP Metals (ug/g)															
Cadmium	BDL	1.6	2.9	3.3	BDL	1.4	2.5	BDL	BDL	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
Chromium	9.3	10	12	15	15	13	BDL	BDL	12	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
Copper	9.2	91	10	24	17	14	10	8.9	11	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
Lead	BDL	160	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
Zinc	260	170	47	66	65	61	46	37	45	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
Arsenic (ug/g)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ
Mercury (ug/g)	BDL	0.13	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NRQ	NRQ	NRQ	NRQ	NRQ	NRQ

< Higher detection limit due to dilution or soil matrix effects.
> Quantitative concentration was not achieved due to dilution constraints.
* As calibrated to an isobutylene standard.
BDL Below detection limit.
BKD No reading above background.
NRQ Analysis not requested.
NA Not analyzed.

Source: ESE, 1988.

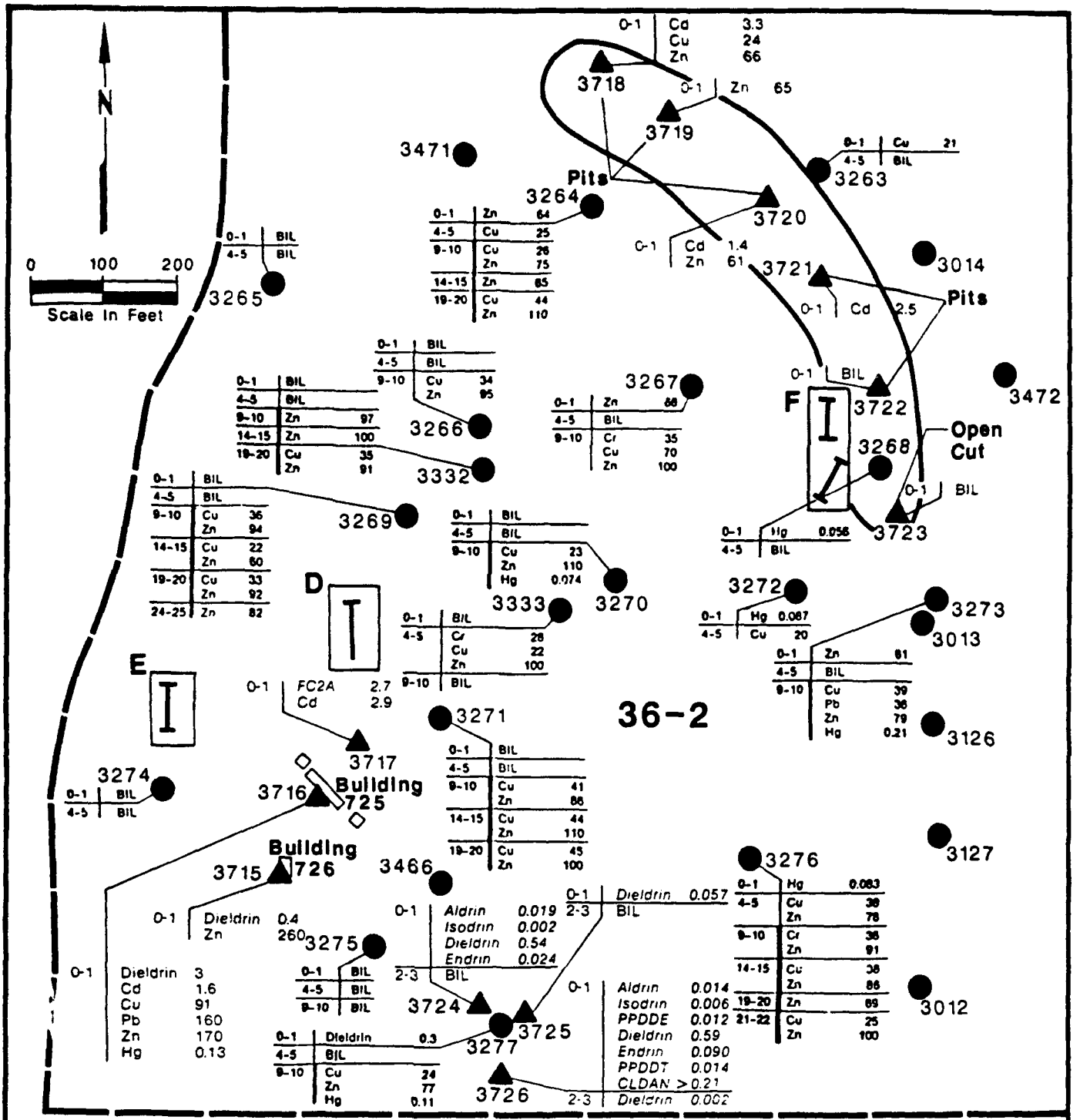

Figure 36-2-II-1
SITE 36-2, PHASE I AND PHASE II INVESTIGATIONS CHEMICAL ANALYSIS RESULTS
SOURCE: HLA, 1988

Prepared for:
U.S. Army Program Manager's Office For Rocky Mountain Arsenal
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contained dieldrin in the 2- to 3-ft interval at a concentration of 0.002 ppm. Aldrin, isodrin, and endrin were detected in the 0- to 1-ft interval of Borings 3724 and 3726, and Boring 3726 (0 to 1 ft) also contained dichlorodiphenylethane (DDE), dichlorodiphenyltrichloroethane (DDT), and chlordane.

The data reporting procedures as described in the Laboratory Quality Assurance Plan for RMA (ESE, 1985, Appendix B, RIC#85127R07) require that all analyses on a sample be completed within the sample's respective holding time and that analytical results be corrected for percent recovery and moisture content. During routine sample analysis, analytical results must also fall within the Certified Range. Samples must also be diluted within the Certified Range provided that holding times have not expired.

During laboratory certification, an analytical method is tested over a certain concentration range to determine the Certified Range. A typical tested concentration range would be 0, 0.5X, 1.0X, 2.0X, 5.0X, and 10.0X, where X is the Target Reporting Limit (TRL). The Certified Reporting Limit (CRL) is determined by comparing the target and actual concentrations of the tested range. The upper Certified Range is the highest target concentration achieved.

If a sample analysis indicates that the sample was not diluted adequately to be within the Certified Range, the result is reported as greater than (>) the upper Certified Range times any dilution factors. If a sample has exceeded its holding time and the result is greater than the Certified Range, the result is reported as greater than the upper Certified Range. If holding times are exceeded in attempting to dilute the sample until all results are within the Certified Range, results that are not identified above the Certified Range but that may be present at concentrations above the certified detection limit are reported as the detection limit times the dilution factor.

Several compounds detected by GC/MS were not included in the target compound list and were not conclusively identified. These compounds are included in

the data presented in Appendix 36-2-II-B. Table 36-2-II-3 summarizes nontarget compounds detected at Site 36-2. It should be noted that an individual compound may have more than one retention time and that a particular retention time may be assigned to more than one compound. Table 36-2-II-3, therefore, provides only a general indication of additional compounds that may be present. Nontarget compounds consisting of alkanes and naturally occurring compounds were discovered in four samples from Site 36-2.

Results of the Phase II sampling program at Site 36-2 will be analyzed as part of the overall analysis for the Central Study Area Report.

Table 36-2-II-3. Tentative Identification of Nontarget Compounds in Site 36 2 Phase II Soil Samples

Boring Number	Interval Depth (ft)	Unknown Number	Concentration Above Background (ppm)*	Sample Number	Lot	Best Fit	Comments+
3718	0-1	609	0.8	36-2-21X7	KXA	Hexadecanoic acid	d,f
		650	1			Unknown alkane	a
3719	0-1	609	1	36-2-21X9	KXA	Hexadecanoic acid	d
		650	1			Unknown alkane	a
		651	1			Unknown alkane	a
3720	0-1	650	2	36-2-21X11	KXA	Unknown alkane	a
3722	0-1	594	0.9	36-2-21X15	KXA	Unknown alkane	a,f
		595	1			Unknown alkane	a
		600	1			Unknown alkane	a
		601	1			Unknown alkane	a
		606	1			Unknown alkane	a

* Values reported are method blank corrected.

\+ a. No positive identification.
b. Surfactant.
c. Plasticizer (Note: *All phthalates and adipates will have this comment*).
d. Derived from natural products.
e. Suspected laboratory contaminant.
f. Low concentration.
g. Low frequency of occurrence.
h. Ubiquitous.
i. Possible column bleed.
j. None detected.

Source: ESE, 1988.

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APPENDIX 36-2-II-A

CHEMICAL NAMES, METHODS, AND ABBREVIATIONS

APPENDIX 36-2-II-A
CHEMICAL NAMES, METHODS, AND ABBREVIATIONS

PHASE I ANALYTES AND CERTIFIED METHODS

Analytes/Methods	Synonymous Names and Abbreviations	Standard Abbreviations
VOLATILE ORGANIC COMPOUNDS/GCMS	VOL	VO
1,1-Dichloroethane	1,1-Dichloroethane	11DCLE
1,2-Dichloroethane	1,2-Dichloroethane	12DCLE
1,1,1-Trichloroethane (TCA)	1,1,1-Trichloroethane	111TCE
1,1,2-Trichloroethane	1,1,2-Trichloroethane	112TCE
Benzene	Benzene	C_6H_6
Bicycloheptadiene	Bicycloheptadiene (BCHD)	BCHPD
Carbon tetrachloride	Carbon tetrachloride	CCL_4
Chlorobenzene	Chlorobenzene	CLC_6H_5
Chloroform	Chloroform	$CHCL_3$
Dibromochloropropane	Dibromochloropropane	DBCP
Dicyclopentadiene	Dicyclopentadiene	DCPD
Dimethyldisulfide	Dimethyldisulfide	DMDS
Ethylbenzene	Ethylbenzene	ETC_6H_5
m-Xylene	meta-Xylene	13DMB
Methylene chloride	Methylene chloride	CH_2CL_2
Methylisobutyl ketone	Methylisobutyl ketone	MIBK
o,p-Xylene	ortho- and/or para-Xylene	XYLEN
Tetrachloroethene (PCE)	Tetrachloroethylene	TCLEE
Toluene	Toluene	MEC_6H_5
Trans 1,2-dichloroethene	Trans 1,2-dichloroethylene	12DCE
Trichloroethene (TCE)	Trichloroethylene	TRCLE
SEMIVOLATILE ORGANIC COMPOUNDS/GCMS	EXTRACTABLE ORGANIC COMPOUNDS (EX)	SVO
1,4-Oxathiane	1,4-Oxathiane	OXAT
2,2-Bis (para-chlorophenyl)-1,1-dichloroethane	Dichlorodiphenylethane	PPDDE
2,2-Bis (para-chlorophenyl) 1,1,1-trichloroethane	Dichlorodiphenyltrichloroethane	PPDDT
Aldrin	Aldrin	ALDRN
Atrazine	Atrazine	ATZ
Chlordane	Chlordane	CLDAN
Chlorophenylmethyl sulfide	p-Chlorophenylmethyl sulfide	CPMS
Chlorophenylmethyl sulfoxide	p-Chlorophenylmethyl sulfoxide	CPMSO
Chlorophenylmethyl sulfone	p-Chlorophenylmethyl sulfone	$CPMSO_2$
Dibromochloropropane	Dibromochloropropane	DBCP
Dicyclopentadiene	Dicyclopentadiene	DCPD
Dieldrin	Dieldrin	DLDRN
Diisopropylmethyl phosphonate	Diisopropylmethyl phosphonate	DIMP

APPENDIX 36-2-II-A
CHEMICAL NAMES, METHODS, AND ABBREVIATIONS

Analytes/Methods	Synonymous Names and Abbreviations	Standard Abbreviations
SEMIVOLATILE ORGANIC COMPOUNDS (CONT)		
Dimethylmethyl phosphonate	Dimethylmethyl phosphonate	DMMP
Dithiane	Dithiane	DITH
Endrin	Endrin	ENDRN
Hexachlorocyclopentadiene	Hexachlorocyclopentadiene (HCPD)	CL_6CP
Isodrin	Isodrin	ISODR
Malathion	Malathion	MLTHN
Parathion	Parathion	PRTHN
Supona	2-Chloro-1(2,4-dichlorophenyl) vinyldiethyl phosphate	SUPONA
Vapona	Vapona	DDVP
METALS/ICP	ICAP	ICP
Cadmium	Cadmium	CD
Chromium	Chromium	CR
Copper	Copper	CU
Lead	Lead	PB
Zinc	Zinc	ZN
SEPARATE ANALYSES		
Arsenic/AA	Arsenic	AS
Mercury/AA	Mercury	HG
Dibromochloropropane/GC	Dibromochloropropane	DBCP

APPENDIX 36-2-II-A
CHEMICAL NAMES, METHODS, AND ABBREVIATIONS

PHASE II ANALYTES AND CERTIFIED METHODS

Analytes/Methods	Synonymous Names and Abbreviations	Standard Abbreviations
VOLATILE ORGANIC COMPOUNDS/GCMS (Same as Phase I)	VOL	VO
SEMIVOLATILE ORGANIC COMPOUNDS/GCMS (Same as Phase I)	EXTRACTABLE ORGANIC COMPOUNDS (EX)	SVO
VOLATILE HALOCARBON COMPOUNDS/GCCON	PURGEABLE HALOCARBONS (PHC)	VHO
1,1-Dichloroethane	1,1-Dichloroethane	11DCLE
1,2-Dichloroethane	1,2-Dichloroethane	12DCLE
1,1-Dichloroethene	1,1-Dichloroethene	11DCE
1,1,1-Trichloroethane (TCA)	1,1,1-Trichloroethane	111TCE
1,1,2-Trichloroethane	1,1,2-Trichloroethane	112TCE
Carbon tetrachloride	Carbon tetrachloride	CCL_4
Chlorobenzene	Chlorobenzene	CLC_6H_5
Chloroform	Chloroform	$CHCL_3$
Methylene chloride	Methylene chloride	CH_2CL_2
Trans 1,2-dichloroethylene	Trans 1,2-dichloroethene	12DCE
Tetrachloroethene (PCE)	Tetrachloroethylene	TCLEE
Trichloroethene (TCE)	Trichloroethylene	TRCLE
VOLATILE HYDROCARBON COMPOUNDS/GCFID	DCPD	HYDCBN
Bicycloheptadiene	Bicycloheptadiene (BCHD)	BCHPD
Dicyclopentadiene	Dicyclopentadiene	DCPD
Methylisobutyl ketone	Methylisobutyl ketone	MIBK
VOLATILE AROMATIC COMPOUNDS/GCPID	PURGEABLE AROMATICS (PAM)	VAO
Benzene	Benzene	C_6H_6
Ethylbenzene	Ethylbenzene	ETC_6H_5
m-Xylene	meta-Xylene	13DMB
o,p-Xylene	ortho- and/or para-Xylene	XYLEN
Toluene	Toluene	MEC_6H_5
ORGANOCHLORINE PESTICIDES/GCEC		OCP
2,2-Bis (para-chlorophenyl)-1,1-dichloroethane	Dichlorodiphenylethane	PPDDE
2,2-Bis (para-chlorophenyl)-1,1,1-trichloreoethane	Dichlorodiphenyltrichloroethane	PPDDT
Aldrin	Aldrin	ALDRN
Chlordane	Chlordane	CLDAN
Dieldrin	Dieldrin	DLDRN
Endrin	Endrin	ENDRN
Hexachlorocyclopentadiene	Hexachlorocyclopentadiene	CL_6CP
Isodrin	Isodrin	ISODR

APPENDIX 36-2-II-A
CHEMICAL NAMES, METHODS, AND ABBREVIATIONS

Analytes/Methods	Synonymous Names and Abbreviations	Standard Abbreviations
ORGANOPHOSPHOROUS PESTICIDES/GCNPD	ORGANOPHOSPHOROUS COMPOUNDS (OPC)	OPP
Atrazine	Atrazine	ATZ
Malathion	Malathion	MLTHN
Parathion	Parathion	PRTHN
Supona	2-Chloro-1(2,4-dichlorophenyl) vinyldiethyl phosphate	SUPONA
Vapona	Vapona	DDVP
ORGANOPHOSPHOROUS COMPOUNDS/GCFPD	DIMP	OPC
Diisopropylmethyl phosphonate	Diisopropylmethyl phosphonate	DIMP
Dimethylmethyl phosphonate	Dimethylmethyl phosphonate	DMMP
ORGANOSULPHUR COMPOUNDS/GCFPD		OSC
1,4-Oxathiane	1,4-Oxathiane	OXAT
Benzothiazole	Benzothiazole	BTZ
Chlorophenylmethyl sulfide	p-Chlorophenylmethyl sulfide	CPMS
Chlorophenylmethyl sulfone	p-Chlorophenylmethyl sulfone	$CPMSO_2$
Chlorophenylmethyl sulfoxide	p-Chlorophenylmethyl sulfoxide	CPMSO
Dimethyldisulfide	Dimethyldisulfide	DMDS
Dithiane	Dithiane	DITH
METALS/ICP	ICAP	ICP
Cadmium	Cadmium	CD
Chromium	Chromium	CR
Copper	Copper	CU
Lead	Lead	PB
Zinc	Zinc	ZN
SEPARATE ANALYSES		
Arsenic/AA	Arsenic	AS
Mercury/AA	Mercury	HG
Dibromochloropropane/GC	Dibromochloropropane	DBCP

APPENDIX 36-2-II-A
CHEMICAL NAMES, METHODS, AND ABBREVIATIONS

Analytes/Methods	Synonymous Names and Abbreviations	Standard Abbreviations
ARMY AGENT DEGRADATION PRODUCTS:		ADP
AGENT PRODUCTS/HPLC	TDGCL	
Chloroacetic Acid	Chloroacetic acid	CLC2A
Thiodiglycol	Thiodiglycol (TDG)	TDGCL
AGENT PRODUCTS/IONCHROM	IMPA	GBDP
Fluoroacetic acid	Fluoroacetic acid	FC2A
Isopropylmethylphosphonic acid	Isopropylmethylphosphonate	IMPA
Methylphosphonic acid	Methylphosphonate	MPA

Methods	Abbreviations
Atomic Absorption Spectroscopy	AA
Gas Chromatography/Conductivity Detector	GCCON
Gas Chromatography/Electron Capture	GCEC
Gas Chromatography/Flame Ionization Detector	GCFID
Gas Chromatography/Flame Photometric	GCFPD
Gas Chromatography/Mass Spectrometry	GCMS
Gas Chromatography/Nitrogen Phosphorous Detector	GCNPD
Gas Chromatography/Photoionizaton Detector	GCPID
High Performance Liquid Chromatography	HPLC
Inductively Coupled Argon Plasma	ICP, ICAP
Ion Chromatography	IONCHROM

APPENDIX 36-2-II-B

PHASE II CHEMICAL DATA

PROJECT NUMBER 87427 0000 PROJECT NAME RMA TASK 21
FIELD GROUP 36-2-21 PROJECT MANAGER
ALL LAB COORDINATOR JOE VONDRICK

PARAMETERS	UNITS	STORET #	METHOD	SAMPLE ID/# 3715A 36-2-21 1	3716A 36-2-21 3	3717A 36-2-21 5	3718A 36-2-21 7	3719A 36-2-21 9	3720A 36-2-21 11	3721A 36-2-21 13	3722A 36-2-21 15	3723A 36-2-21 17	3724A 36-2-21 19	3724B 36-2-21 20	3725A 36-2-21 22	3725B 36-2-21 23	3726A 36-2-21 25	3726B 36-2-21 26
DATE				03/02/88	03/02/88	03/02/88	03/02/88	3/02/88	03/02/88	03/02/88	03/02/88	03/02/88	03/09/88	03/09/88	03/09/88	03/09/88	03/09/88	03/09/88
TIME				13:09	13:13	13:18	13:32	13:36	13:43	13:51	13:58	14:06	11:21	11:25	10:58	11:02	10:32	10:35
SAMPLE TYPE		71999	0	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
SITE TYPE 1		99759	0	BORE	BORE	BORE	BORE	BORE	BORE	BORE	BORE	BORE	BORE	BORE	BORE	BORE	BORE	BORE
SAMPLE DEPTH	FT	99758	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	2
SAMPLING TECHNIQUE		72005	0	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
INSTALLATION CODE	SAMPLE	99720	0	RK	RK	RK	RK	RK	RK	RK	RK	RK	RK	RK	RK	RK	RK	RK
MOISTURE	%WET WT	70320	1	13.4	7.5	14.2	17.7	24.4	18.1	15.6	13.7	13.6	15.4	5.7	17.1	6.4	8.7	6.4
CADMIUM	UG/G- DRY	1028	R9	<0.921	1.62	2.92	3.27	<0.921	1.35	2.52	<0.921	<0.921						
CHROMIUM	UG/G-DRY	99584	R9	9.31	10.1	11.6	14.7	15.3	13.2	<7.16	<7.16	12.2						
COPPER	UG/G- DRY	1043	R9	9.16	90.9	10.1	23.8	17.2	14.4	10.0	8.86	11.1						
LEAD	UG/G-DRY	1052	R9	<16.8	163	<16.8	<16.8	<16.8	<16.8	<16.8	<16.8	<16.8						
ZINC	UG/G-DRY	1093	R9	255	166	46.9	66.1	65.3	60.5	45.6	37.0	45.0						
ARSENIC	UG/G- DRY	1003	T9	<4.70	<4.70	<4.70	<4.70	<4.70	<4.70	<4.70	<4.70	<4.70						
MERCURY	UG/G-DRY	71921	V9	<0.050	0.133	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050						
ALDRIN	UG/G-DRY	98356	Q9	<0.94	<0.94	<0.94	<0.94	<0.94	<0.94	<0.94	<0.94	<0.94	<0.94					
ATRAZINE	UG/G-DRY	98655	Q9	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73	<0.73					
CHLORDANE	UG/G-DRY	98361	Q9	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5					
P-CLPHENYLMETHY-SULFIDE	UG/G-DRY	98653	Q9	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25					
P-CLPHENYLMETHY-SULFOXIDE	UG/G-DRY	98654	Q9	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35					
P-CLPHENYLMETHY-SULFONE	UG/G-DRY	98703	Q9	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29					
DBCP(NEMAGON)	UG/G-DRY	98652	Q9	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33					
DICYCLOPENTADIENE	UG/G-DRY	98651	Q9	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26					
DDE,PP'	UG/G-DRY	98363	Q9	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29	<0.29					
DDT,PP'	UG/G-DRY	98364	Q9	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37					
DIELDRIN	UG/G-DRY	98365	Q9	0.35	2.9	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	1.2					

PARAMETERS	UNITS	STORET #	METHOD	SAMPLE ID/# 3715A 36-2-21 1	3716A 36-2-21 3	3717A 36-2-21 5	3718A 36-2-21 7	3719A 36-2-21 9	3720A 36-2-21 11	3721A 36-2-21 13	3722A 36-2-21 15	3723A 36-2-21 17	3724A 36-2-21 19	3724B 36-2-21 20	3725A 36-2-21 22	3725B 36-2-21 23	3726A 36-2-21 25	3726B 36-2-21 26
DATE				03/02/88	03/02/88	03/02/88	03/02/88	03/02/88	03/02/88	03/02/88	03/02/88	03/02/88	03/09/88	03/09/88	03/09/88	03/09/88	03/09/88	03/09/88
TIME				13:09	13:13	13:18	13:32	13:36	13:43	13:51	13:58	14:06	11:21	11:25	10:58	11:02	10:32	10:35
DIMP		98645		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50					
	UG/G-DRY		Q9															
1,4 DITHIANE		98650		<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25					
	UG/G-DRY		Q9															
DMMP		98657		<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5					
	UG/G-DRY		Q9															
ENDRIN		98369		<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70					
	UG/G-DRY.		Q9															
HEXACHLOROCYCLOPENT-		98647		<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1					
ADIENE	UG/G-DRY		Q9															
ISODRIN		98649		<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33					
	UG/G-DRY		Q9															
MALATHION		98648		<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59	<0.59					
	UG/G-DRY		Q9															
1,4 OXATHIANE		98644		<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26					
	UG/G-DRY		Q9															
ETY'PARATHION		98658		<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63	<0.63					
	UG/G-DRY		Q9															
SUPONA		98656		<0.49	<0.49	<0.49	<0.49	<0.49	<0.49	<0.49	<0.49	<0.49	<0.49					
	UG/G-DRY		Q9															
VAPONA		98646		<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25					
	UG/G-DRY		Q9															
IMPA		97382		<2.10	<2.10	<2.10												
	UG/G		AAA9															
FLUOROACETIC ACID		97381		<2.00	<2.00	2.69												
	UG/G		AAA9															
MPA		97383		<2.00	<2.00	<2.00												
	UG/G		AAA9															
HEXACHLOROCYCLOPENT-		98647											<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
ADIENE	UG/G-DRY		SS9A															
ALDRIN		98356											0.019	<0.002	<0.002	<0.002	0.014	<0.002
	UG/G- DRY		SS9A															
ISODRIN		98649											0.002	<0.001	<0.001	<0.001	0.006	<0.001
	UG/G-DRY		SS9A															
DDE,PP'		98363											<0.001	<0.001	<0.001	<0.001	0.012	<0.001
	UG/G-DRY		SS9A															
DIELDRIN		98365											0.542	<0.001	0.057	<0.001	0.568	0.002
	UG/G-DRY		SS9A															
ENDRIN		98369											0.024	<0.001	<0.001	<0.001	0.090	<0.001
	UG/G-DRY.		SS9A															
DDT,PP'		98364											<0.002	<0.002	<0.002	<0.002	0.014	<0.002
	UG/G-DRY		SS9A															
CHLORDANE		98361											<0.111	<0.111	<0.111	<0.111	>0.210	<0.111
	UG/G- DRY		SS9A															
UNK594		90594									0.9							
	UG/G		Q9															
UNK595		90595									1							
	UG/G		Q9															

PARAMETERS	UNITS	STORET # METHOD	SAMPLE ID/# 3715A 36-2-21 1	3716A 36-2-21 3	3717A 36-2-21 5	3718A 36-2-21 7	3719A 36-2-21 9	3720A 36-2-21 11	3721A 36-2-21 13	3722A 36-2-21 15	3723A 36-2-21 17	3724A 36-2-21 19	3724B 36-2-21 20	3725A 36-2-21 22	3725B 36-2-21 23	3726A 36-2-21 25	3726B 36-2-21 26
DATE			03/02/88	03/02/88	03/02/88	03/02/88	03/02/88	03/02/88	03/02/88	03/02/88	03/02/88	03/09/88	03/09/88	03/09/88	03/09/88	03/09/88	03/09/88
TIME			13:09	13:13	13:18	13:32	13:36	13:43	13:51	13:58	14:06	11:21	11:25	10:58	11:02	10:32	10:35
UNK600		90600								1.0							
	UG/G	Q9															
UNK601		90601								1							
	UG/G	Q9															
UNK606		90606								1.0							
	UG/G	Q9															
UNK609		90609				0.8	1										
	UG/G	Q9															
UNK650		90650				1	1	2									
	UG/G	Q9															
UNK661		90661					1										
	UG/G	Q9															

PROJECT NUMBER 88425 0000 PROJECT NAME RMA TASK 47
FIELD GROUP T47MB1 PROJECT MANAGER
ALL LAB COORDINATOR JOE VONDRICK

PARAMETERS	UNITS	STORET #	METHOD	SAMPLE ID/# BLK T47MB1 4	BLK T47MB1 24	BLK T47MB1 46	BLK T47MB1 83	BLK T47MB1 85	BLK T47MB1 107	BLK T47MB1 123
DATE				02/29/88	02/29/88	02/29/88	03/01/88	03/09/88	03/09/88	02/24/88
TIME										
SAMPLE TYPE		71999	0	SO	SO	SO	SO	SO	SO	SQ
SITE TYPE 1		99759	0	QCMB	QCMB	QCMB	QCMB	QCMB	QCMB	QCMB
SAMPLE DEPTH	FT	99758	0	0	0	0	0	0	0	0
SAMPLING TECHNIQUE		72005	0	G	G	G	G	G	G	G
INSTALLATION CODE	SAMPLE	99720	0	RK	RK	RK	RK	RK	RK	RK
MOISTURE	%WET WT	70320	0	2.4	2.4	2.4	2.4	2.4	2.4	2.4
CADMIUM	UG/G- DRY	1028	R9	<0.921						
CHROMIUM	UG/G-DRY	99584	R9	10.2						
COPPER	UG/G- DRY	1043	R9	8.64						
LEAD	UG/G-DRY	1052	R9	<16.8						
ZINC	UG/G-DRY	1093	R9	34.9						
ARSENIC	UG/G- DRY	1003	T9		<4.70					
MERCURY	UG/G-DRY	71921	V9			<0.050				
ALDRIN	UG/G-DRY	98356	Q9				<0.94	<0.94		
ATRAZINE	UG/G-DRY	98655	Q9				<0.73	<0.73		
CHLORDANE	UG/G-DRY	98361	Q9				<1.5	<1.5		
P-CLPHENYLMETHY-SULFIDE	UG/G-DRY	98653	Q9				<0.25	<0.25		
P-CLPHENYLMETHY-SULFOXIDE	UG/G-DRY	98654	Q9				<0.35	<0.35		
P-CLPHENYLMETHY-SULFONE	UG/G-DRY	98703	Q9				<0.29	<0.29		
DBCP(NEMAGON)	UG/G-DRY	98652	Q9				<0.33	<0.33		
DICYCLOPENTADIENE	UG/G-DRY	98651	Q9				<0.26	<0.26		
DDE,PP'	UG/G-DRY	98363	Q9				<0.29	<0.29		
DDT,PP'	UG/G-DRY	98364	Q9				<0.37	<0.37		
DIELDRIN	UG/G-DRY	98365	Q9				<0.25	<0.25		

PROJECT NUMBER 88425 0000 PROJECT NAME RMA TASK 47
FIELD GROUP T47MB1 PROJECT MANAGER
ALL LAB COORDINATOR JOE VONDRICK

PARAMETERS	UNITS	STORET # METHOD	BLK T47MB1 4	BLK T47MB1 24	BLK T47MB1 46	BLK T47MB1 83	BLK T47MB1 85	BLK T47MB1 107	SAMPLE ID/# BLK T47MB1 123
DATE			02/29/88	02/29/88	02/29/88	03/01/88	03/09/88	03/09/88	02/24/88
TIME									
DIMP		98645				<0.50	<0.50		
	UG/G-DRY	Q9							
1,4 DITHIANE		98650				<0.25	<0.25		
	UG/G-DRY	Q9							
DMMP		98657				<1.5	<1.5		
	UG/G-DRY	Q9							
ENDRIN		98369				<0.70	<0.70		
	UG/G-DRY.	Q9							
HEXACHLOROCYCLOPENT-		98647				<1.1	<1.1		
ADIENE	UG/G-DRY	Q9							
ISODRIN		98649				<0.33	<0.33		
	UG/G-DRY	Q9							
MALATHION		98648				<0.59	<0.59		
	UG/G-DRY	Q9							
1,4 OXATHIANE		98644				<0.26	<0.26		
	UG/G-DRY	Q9							
ETY'PARATHION		98658				<0.63	<0.63		
	UG/G-DRY	Q9							
SUPONA		98656				<0.49	<0.49		
	UG/G-DRY	Q9							
VAPONA		98646				<0.25	<0.25		
	UG/G-DRY	Q9							
HEXACHLOROCYCLOPENT-		98647						<0.003	
ADIENE	UG/G-DRY	SS9A							
ALDRIN		98356						<0.002	
	UG/G- DRY	SS9A							
ISODRIN		98649						<0.001	
	UG/G-DRY	SS9A							
DDE,PP'		98363						<0.001	
	UG/G-DRY	SS9A							
DIELDRIN		98365						<0.001	
	UG/G-DRY	SS9A							
ENDRIN		98369						<0.001	
	UG/G-DRY.	SS9A							
DDT,PP'		98364						<0.002	
	UG/G-DRY	SS9A							
CHLORDANE		98361						<0.111	
	UG/G- DRY	SS9A							
IMPA		97382							<2.10
	UG/G	AAA9							
FLUOROACETIC ACID		97381							4.74
	UG/G	AAA9							
MPA		97383							<2.00
	UG/G	AAA9							
UNK524		90524				1			
	UG/G	Q9							