



**POINT LONELY SRRS
ALASKA**

**ADMINISTRATIVE RECORD
COVER SHEET**

AR File Number 06

INSTALLATION RESTORATION PROGRAM
PHASE II - CONFIRMATION/QUANTIFICATION
STAGE 2

DEW LINE STATIONS ALASKA

DAMES & MOORE
1550 NORTHWEST HIGHWAY
PARK RIDGE, ILLINOIS 60068

JANUARY 29, 1988

FINAL REPORT, AUGUST 17 THROUGH AUGUST 20, 1986

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

PREPARED FOR

HEADQUARTERS TACTICAL AIR COMMAND
COMMAND SURGEON'S OFFICE (HQ TAC/SGPB)
BIOENVIRONMENTAL ENGINEERING DIVISION
LANGLEY AIR FORCE BASE, VIRGINIA 23665

UNITED STATES AIR FORCE
OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (USAFOEHL)
BROOKS AIR FORCE BASE, TEXAS 78235-5501

INSTALLATION RESTORATION PROGRAM
PHASE II - CONFIRMATION/QUANTIFICATION
STAGE 2

FINAL REPORT

FOR

DEW LINE STATIONS, ALASKA

TACTICAL AIR COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA 23665

JANUARY 29, 1988

PREPARED BY

DAMES & MOORE
1550 NORTHWEST HIGHWAY
PARK RIDGE, ILLINOIS 60068

USAF CONTRACT NO. F33615-83-D-4002, DELIVERY ORDER NO. 0035

USAF O E H L TECHNICAL PROGRAM MANAGER
Major Richard Carmichael, USAF

USAF OCCUPATIONAL & ENVIRONMENTAL HEALTH LABORATORY (USAF O E H L)
TECHNICAL SERVICES DIVISION (TS)
BROOKS AIR FORCE BASE, TEXAS 78235-5501

3

NOTICE

This report has been prepared for the United States Air Force by Dames & Moore, for the purpose of aiding in the implementation of the Air Force Installation Restoration Program. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency, the United States Air Force, nor the Department of Defense.

Copies of this report may be purchased from:

National Technical Information Services
5285 Port Royal Road
Springfield, Virginia 22161

Federal Government agencies and their contractors registered with Defense Technical Information Center should direct requests for copies of this report to:

Defense Technical Information Center
Cameron Station
Alexandria, Virginia 22314

REPORT DOCUMENTATION PAGE

1a REPORT SECURITY CLASSIFICATION Unclassified		1b RESTRICTIVE MARKINGS None	
2a SECURITY CLASSIFICATION AUTHORITY Not applicable		3 DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release distribution unlimited	
7b DECLASSIFICATION/DOWNGRADING SCHEDULE Not applicable		5 MONITORING ORGANIZATION REPORT NUMBER(S) Not applicable	
4 PERFORMING ORGANIZATION REPORT NUMBER(S) Not applicable		7a NAME OF MONITORING ORGANIZATION U.S. Air Force-Occupational and Environmental Health Laboratory/TSS	
6a NAME OF PERFORMING ORGANIZATION Dames & Moore	6b OFFICE SYMBOL (If applicable)	7b ADDRESS (City, State, and ZIP Code) Brooks Air Force Base San Antonio, TX 78235-5501	
8a ADDRESS (City, State, and ZIP Code) 1550 Northwest Hwy. Park Ridge, IL 60068		9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER F33615-83-D-4002/0035	
8a NAME OF FUNDING/SPONSORING ORGANIZATION USAFOEHL/TSS	8b OFFICE SYMBOL (If applicable)	10 SOURCE OF FUNDING NUMBERS	
8c ADDRESS (City, State, and ZIP Code) Brooks Air Force Base San Antonio, TX 78235-5501		PROGRAM ELEMENT NO	PROJECT NO
11 TITLE (Include Security Classification) Installation Restoration Program, Phase II, Confirmation/Quantification, Stage 2, DEW LINE Stations, Alaska		TASK NO	WORK UNIT ACCESSION NO
12 PERSONAL AUTHOR(S) Dames & Moore			
13a TYPE OF REPORT Final Draft	13b TIME COVERED FROM 8/86 TO 8/86	14 DATE OF REPORT (Year, Month, Day) 1988 Jan. 28	15 PAGE COUNT 175
16 SUPPLEMENTARY NOTATION			
17 COSATI CODES		18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP	
19 ABSTRACT (Continue on reverse if necessary and identify by block number)			
<p>Thirteen sites distributed among five DEW Line Stations, Alaska, were investigated during Phase II Stage 2 of the Installation Restoration Program following initial field studies during Phase II Stage 1 of the IRP conducted during 1984. Eight of the sites investigated are old dump sites, two are current dump sites, two are petroleum storage or spill sites, and the remaining site is a wastewater discharge area. Soil grab samples at one site were obtained and subjected to analysis for PCBs. Surface water samples from all thirteen sites were subjected to chemical analysis for volatile halocarbons; surface water samples from selected sites were analyzed for lead, phenols, PCBs, and petroleum hydrocarbons. PCB's were detected at Site 1 in surface soils. Trichloroethene, detected at 4 sites, was found in the highest concentrations at Site 1. Both phenols at two sites and petroleum hydrocarbons at two other sites were detected in surface waters.</p> <p>The results of the study indicate minor surface water quality degradation caused by station landfills and petroleum storage and handling facilities. Additional sampling and analysis is recommended for Site 1, BAR-M Station, to define the source of trichloroethene.</p>			
20 DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS		21 ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a NAME OF RESPONSIBLE INDIVIDUAL Major Richard Carmichael, USAF		22b TELEPHONE (Include Area Code) 512/536-2158	22c OFFICE SYMBOL USAFOEHL/TSS

6 5

PREFACE

As part of the U.S. Air Force Installation Restoration Program (IRP), investigations were undertaken at five DEW Line stations, Alaska, to determine whether hazardous material contamination is present. This report, prepared by Dames & Moore under Contract No. F33615-83-D-4002, Order 0035 presents the results of the Phase II, Stage 2 IRP investigations. The period of work reported on herein was 17 August through 20 August 1986. The field investigations were directed by Mr. Michael Ander. Mr. J. Michael Stanley, Senior Engineering Geologist, supervised field activities and collected surface water and soil samples. Ms. Carol J. Scholl, Project Geologist and Mr. Robert Quinlan, Staff Biologist, assisted in data interpretation and report preparation. Major Richard Carmichael, USAF, Technical Services Division, USAF Occupational and Environmental Health Laboratory (USAFOEHL), was the Technical Manager.

APPROVED:



GLENN D. MARTIN
CONTRACT PROGRAM MANAGER

TABLE OF CONTENTS

	<u>PAGE</u>
SUMMARY	1
I. INTRODUCTION	14
A. BACKGROUND	14
B. PURPOSE AND SCOPE	14
C. HISTORY OF THE DEW LINE AND WASTE DISPOSAL OPERATIONS	17
D. DESCRIPTION OF SITES	18
1. BAR-M	
a. Site 1 - Old Dump Site	19
b. Site 3 - Waste Petroleum Disposal	19
c. Site 4 - Current Dump Site	21
d. Site 8 - Drainage Cut Contamination	21
e. Site 9 - Old Dump Site, N.W.	21
2. POW-3	
Site 13 - Old Dump Site, East	22
3. POW-2	
Site 16 - Old Dump Site, N.W.	22
4. POW-1	
a. Site 28 - POL Storage Area	22
b. Site 31 - Old Dump Site	26
c. Site 32 - Husky Oil Dump	26
5. LIZ-2	
a. Site 40 - Current Dump Site	26
b. Site 43 - Old Dump Site, North	28
c. Site 44 - Suspected Dump Site	28
E. IDENTIFICATION OF POLLUTANTS SAMPLED	29
F. IDENTIFICATION OF THE FIELD TEAM	29
II. ENVIRONMENTAL SETTING	32
A. PHYSICAL GEOGRAPHY	32
B. REGIONAL AND HYDROGEOLOGY	32
C. GENERAL HYDROLOGY	33

TABLE OF CONTENTS (continued)

	<u>PAGE</u>
D. HISTORIC GROUND WATER PROBLEMS	33
E. LOCATION OF WELLS ON AND OFF BASE	33
III. FIELD PROGRAM	34
A. FIELD PROGRAM DEVELOPMENT	34
B. SITE-SPECIFIC SAMPLING LOCATIONS	34
1. BAR-M	34
a. Site 1	34
b. Site 3	34
c. Site 4	35
d. Site 8	35
e. Site 9	35
2. POW-3 Site 13	35
3. POW-2 Site 16	36
4. POW-1	
a. Site 28	36
b. Site 31	36
c. Site 32	36
5. LIZ-2	
a. Site 40	37
b. Site 43	37
c. Site 44	37
C. FIELD PROGRAM IMPLEMENTATION	38
IV. DISCUSSION OF RESULTS AND SIGNIFICANCE OF FINDINGS	39
A. DISCUSSION OF RESULTS	39
1. BAR-M	
a. Site 1	39
b. Site 3	45
c. Site 4	46
d. Site 8	47
e. Site 9	47
2. POW-3 Site 13	48

TABLE OF CONTENTS (continued)

	<u>PAGE</u>
3. POW-2 Site 16	48
4. POW-1	
a. Site 28	49
b. Site 31	49
c. Site 32	50
5. LIZ-2	
a. Site 40	51
b. Sites 43 and 44	52
b. Background Concentrations	52
B. SIGNIFICANCE OF FINDINGS	53
1. BAR-M	
a. Site 1	53
b. Site 3	54
c. Site 4	54
d. Site 8	54
e. Site 9	55
2. POW-3 Site 13	55
3. POW-2 Site 16	55
4. POW-1	
a. Site 28	56
b. Site 31	56
c. Site 32	56
5. LIZ-2	
a. Site 40	57
b. Sites 43 and 44	57
V. ALTERNATIVE MEASURES AND CONCLUSIONS	58
A. ALTERNATIVE MEASURES	58
1. BAR-M	
a. Site 1	58
2. POW-1	
a. Site 31	59

TABLE OF CONTENTS (continued)

	<u>PAGE</u>
B. CONCLUSIONS	59
VI. RECOMMENDATIONS	62
A. SITES WHERE FURTHER ACTIONS ARE DEEMED UNWARRANTED	62
B. SITES WARRANTING FURTHER INVESTIGATION	62
1. BAR-M Site 1	62
2. POW-1 Site 31	62

LIST OF APPENDICES

APPENDIX A	DEFINITIONS, NOMENCLATURE, AND UNITS OF MEASUREMENT
APPENDIX B	SCOPE OF WORK
APPENDIX C	FIELD RAW DATA
APPENDIX D	FIELD AND LABORATORY QUALITY CONTROL PROGRAMS
APPENDIX E	CHAIN-OF-CUSTODY FORMS
APPENDIX F	ANALYTICAL DATA
APPENDIX G	REFERENCES AND TABULATION OF CHEMICAL DATA, PHASE II, STAGE 1 IRP
APPENDIX H	BIOGRAPHIES OF KEY PERSONNEL
APPENDIX I	SAFETY PLAN

LIST OF TABLES

<u>NUMBER</u>	<u>TITLE</u>	<u>PAGE</u>
1	IRP PHASE II SAMPLING PARAMETERS, ALASKAN DEW LINE STATIONS	30
2	CHEMICAL ANALYSIS REPORT, DEW LINE - WATER ANALYSES	40
3	CHEMICAL ANALYSIS REPORT, DEW LINE - SOIL ANALYSES	43

LIST OF PLATES

<u>NUMBER</u>	<u>TITLE</u>	<u>PAGE</u>
1	VICINITY MAP, DEW LINE SITES, ALASKA	15
2	GENERALIZED NORTH-SOUTH GEOLOGIC SECTION, DEW LINE SITES	16
3	LOCATIONS OF WASTE DISPOSAL AND SPILL SITES AND SAMPLING LOCATIONS, BAR-M	20
4	LOCATIONS OF WASTE DISPOSAL SITE AND SAMPLING LOCATION, POW-3	23
5	LOCATIONS OF WASTE DISPOSAL SITE AND SAMPLING LOCATION, POW-2	24
6	LOCATIONS OF WASTE DISPOSAL AND SPILL SITES AND SAMPLING LOCATIONS, POW-1	25
7	LOCATIONS OF WASTE DISPOSAL SITES AND SAMPLING LOCATIONS, LIZ-2	27

SUMMARY

The Distant Early Warning (DEW) Line Stations investigated in this study are located along the seacoast of the North Slope, Alaska. The Alaskan section of the DEW Line went into operation in 1953. The DEW Line system is part of the Tactical Air Command (TAC). The stations have been operated under a TAC supervised civilian contractor since 1957. At present, FELEC Service, Inc. operates the sites, under the supervision of TAC personnel.

The Phase II field evaluation of the Installation Restoration Program (IRP) consisted of investigations at the following 13 sites that were identified during Phase I.

BAR-M Station Kaktovik/Barter Island

- Site 1 - Old Dump Site
- Site 3 - Waste Petroleum Disposal
- Site 4 - Current Dump Site
- Site 8 - Drainage Cut Contamination
- Site 9 - Old Dump Site N.W.

POW-3 Station Bullen Point/Flaxman Island

- Site 13 - Old Dump Site, East

POW-2 Station Point OIktok

- Site 16 - Old Dump Site, N.W.

POW-1 Station Point Lonely

- Site 28 - POL Storage Area
- Site 31 - Old Dump Site
- Site 32 - Husky Oil Dump Site

LIZ-2 Station Point Lay

- Site 40 - Current Dump Site
- Site 43 - Old Dump Site North
- Site 44 - Suspected Dump Site

Stage 1 field investigations involved the collection of soil grab samples at Site 1 and Site 4 and the collection of surface water samples at the remaining sites. Based on the result of Stage 1 investigations, a Stage 2 field investigation was recommended and designed (1) to confirm the presence of suspected contamination within the specified areas of investigation; (2) to determine the magnitude of contamination and the potential for migration of those contaminants in the various environmental

media; (3) identify public health and environmental hazards of migrating pollutants based on State and Federal standards for those contaminants; and (4) delineate additional investigations required beyond this stage to reach the Phase II objectives.

Stage 2 investigations consisted of collecting soil grab samples upgradient and downgradient of Site 1 and collecting surface water samples upgradient and downgradient of Sites 1, 3, 4, 8, 9, 16, 28, 32, 40, and 43. Surface water was also collected from Sites 13, 31, and 44.

Water samples from all sites were analyzed for volatile halocarbons. Additionally, samples from Sites 3 and 28 were analyzed for petroleum hydrocarbons, samples from Sites 32 and 40 were analyzed for phenols, and samples from Sites 13 and 16 were analyzed for lead. Soil samples were analyzed for PCBs and percent moisture at Site 1.

CHEMICAL ANALYSIS RESULTS ABOVE DETECTION LIMITS
DEW LINE - WATER ANALYSIS

PARAMETER	METHOD	UNITS	DETECTION LIMIT	SW1E5 (UP) SITE 1	SW1F19 (DOWN) SITE 1	SW3B14 (UP) SITE 3	SW3A11 (DOWN) SITE 3	SW4A3 (UP) SITE 4	SW4B4 (DOWN) SITE 4	SW8A12 (UP) SITE 8	SW8B13 (DOWN) SITE 8
<u>Purgeable Halocarbons</u>											
Bromomethane	EPA 601 (1)	ug/L	0.63 (2)	15	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	EPA 601 (1)	ug/L	0.31 (2)	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	EPA 601 (1)	ug/L	0.49 (2)	4.1	1.9	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	EPA 601 (1)	ug/L	0.44 (2)	ND	ND	ND	ND	ND	1.9	ND	ND
Trans-1,2-Dichloroethene	EPA 601 (1)	ug/L	0.42 (2)	2.0	0.60	ND	0.43	ND	ND	ND	ND
1,2-Dichloropropane	EPA 601 (1)	ug/L	0.20 (2)	ND	ND	ND	ND	ND	ND	ND	0.62
Methylene Chloride	EPA 601 (1)	ug/L	0.34 (2)	16	5.9	ND	ND	ND	5.1	ND	ND
Tetrachloroethene	EPA 601 (1)	ug/L	0.38 (2)	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	EPA 601 (1)	ug/L	0.53 (2)	1.1	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	EPA 601 (1)	ug/L	0.60 (2)	290	110	ND	0.76	ND	ND	ND	ND
Trichlorofluoromethane	EPA 601 (1)	ug/L	0.44 (2)	4.6	3.1	1.6	3.2	1.1	3.1	1.3	1.5
Petroleum Hydrocarbons	EPA 418.1 (3)	mg/L	0.2 (4)	NA	NA	4.4	2.2	NA	NA	NA	NA
Temperature (field)	-	°C	-	4.5	5.5	7.5	6.5	4.8	4.0	6.5	6.0
pH (field)	-	-	-	6.30	6.61	7.40	7.20	6.60	6.15	7.51	7.09
Salinity (field)	-	‰	-	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0
Conductivity (field)	-	umhos/cm	-	490	520	680	650	360	2550	325	420

CHEMICAL ANALYSIS RESULTS ABOVE DETECTION LIMITS
DEW LINE - WATER ANALYSIS

PARAMETER	METHOD	UNITS	DETECTION LIMIT	SW9A1 (DOWN) SITE 9	SW9B2 (UP) SITE 9	SW13A15 SITE 13	SW16A16 (UP) SITE 16	SW16B17 (DOWN) SITE 16	SW28A21 (UP) SITE 28	SW28B22 (DOWN) SITE 28	SW31A20 SITE 31
<u>Purgeable Halocarbons</u>											
Bromomethane	EPA 601 (1)	ug/L	0.63 (2)	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	EPA 601 (1)	ug/L	0.31 (2)	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	EPA 601 (1)	ug/L	0.49 (2)	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	EPA 601 (1)	ug/L	0.44 (2)	ND	ND	ND	ND	ND	ND	ND	ND
Trans-1,2-Dichloroethene	EPA 601 (1)	ug/L	0.42 (2)	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	EPA 601 (1)	ug/L	0.20 (2)	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	EPA 601 (1)	ug/L	0.34 (2)	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethane	EPA 601 (1)	ug/L	0.38 (2)	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	EPA 601 (1)	ug/L	0.53 (2)	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	EPA 601 (1)	ug/L	0.60 (2)	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	EPA 601 (1)	ug/L	0.44 (2)	1.2	ND	ND	0.67	0.53	0.81	0.76	0.73
<u>Petroleum Hydrocarbons</u>											
Temperature (field)	-	°C	-	3.7	4.2	11.5	6.8	5.5	5.5	5.7	5.2
pH (field)	-	-	-	6.00	6.35	7.40	8.10	7.90	8.60	8.15	8.10
Salinity (field)	-	‰	-	0.0	0.0	15.5	13.0	15.1	0.6	0.4	2.53
Conductivity (field)	-	umhos/cm	-	90	265	20,000	13,800	15,000	780	680	25,200

CHEMICAL ANALYSIS RESULTS ABOVE DETECTION LIMITS
DEM LINE - WATER ANALYSIS

PARAMETER	METHOD	UNITS	DETECTION LIMIT	SW32A18 (UP) SITE 32	SW32B19 (DOWN) SITE 32	SW40A26 (DOWN) SITE 40	SW40B27 (UP) SITE 40	SW43A24 (DOWN) SITE 43	SW43B25 (UP) SITE 43	SW44A23 (DOWN) SITE 44
<u>Purgeable Halocarbons</u>										
Dibromochloroethane	EPA 601 (1)	ug/L	0.31 (2)	0.65	0.31	ND	ND	ND	ND	ND
1,1-Dichloroethane	EPA 601 (1)	ug/L	0.49 (2)	ND	ND	1.2	ND	ND	ND	ND
1,2-Dichloroethane	EPA 601 (1)	ug/L	0.44 (2)	2.5	1.9	ND	ND	ND	ND	ND
1,2-Dichloropropane	EPA 601 (1)	ug/L	0.20 (2)	3.8	2.7	6.2	ND	ND	ND	ND
Methylene Chloride	EPA 601 (1)	ug/L	0.34 (2)	0.37	ND	17	ND	ND	ND	ND
Tetrachloroethane	EPA 601 (1)	ug/L	0.38 (2)	1.4	1.1	6.4	ND	ND	ND	ND
1,1,1-Trichloroethane	EPA 601 (1)	ug/L	0.53 (2)	ND	ND	1.2	ND	ND	ND	ND
Trichloroethane	EPA 601 (1)	ug/L	0.60 (2)	ND	ND	ND	2.1	ND	ND	ND
Trichlorofluoromethane	EPA 601 (1)	ug/L	0.44 (2)	ND	0.78	9.3	1.4	1.0	ND	ND
<u>Phenols</u>										
4-Chloro-3-methyl phenol	EPA 604 (1)	ug/L	0.62 (2)	ND	ND	ND	ND	NA	NA	NA
4-Chloro-3-methyl phenol	EPA 625 (1)	ug/L	3.0 (1)	--	--	--	--	NA	NA	NA
2-Chlorophenol	EPA 604 (1)	ug/L	0.51 (2)	ND	ND	ND	ND	NA	NA	NA
2-Chlorophenol	EPA 625 (1)	ug/L	3.3 (1)	--	--	--	--	NA	NA	NA
2,4-Dichlorophenol	EPA 604 (1)	ug/L	0.57 (2)	--	ND	--	ND	NA	NA	NA
2,4-Dichlorophenol	EPA 625 (1)	ug/L	2.7 (1)	ND	--	ND	--	NA	NA	NA
2,4-Dimethylphenol	EPA 604 (1)	ug/L	0.83 (2)	ND	--	--	ND	NA	NA	NA
2,4-Dimethylphenol	EPA 625 (1)	ug/L	2.7 (1)	--	ND	ND	--	NA	NA	NA
2,4-Dinitrophenol	EPA 604 (1)	ug/L	31. (2)	--	--	--	--	NA	NA	NA
2,4-Dinitrophenol	EPA 625 (1)	ug/L	42. (1)	ND	ND	ND	ND	NA	NA	NA
2-Methyl-4,6-dinitrophenol	EPA 604 (1)	ug/L	9.2 (2)	--	--	--	--	NA	NA	NA
2-Methyl-4,6-dinitrophenol	EPA 625 (1)	ug/L	24. (1)	ND	ND	ND	ND	NA	NA	NA
2-Nitrophenol	EPA 604 (1)	ug/L	0.51 (2)	--	--	ND	ND	NA	NA	NA
2-Nitrophenol	EPA 625 (1)	ug/L	3.6 (1)	ND	ND	--	--	NA	NA	NA
4-Nitrophenol	EPA 604 (1)	ug/L	2.6 (2)	ND	ND	ND	ND	NA	NA	NA
4-Nitrophenol	EPA 625 (1)	ug/L	2.4 (1)	--	--	--	--	NA	NA	NA
Pentachlorophenol	EPA 604 (1)	ug/L	11. (2)	--	--	--	ND	NA	NA	NA
Pentachlorophenol	EPA 625 (1)	ug/L	3.6 (1)	9.6	9.5	4.4	--	NA	NA	NA
Phenol	EPA 604 (1)	ug/L	0.33 (2)	ND	--	--	ND	NA	NA	NA
Phenol	EPA 625 (1)	ug/L	1.5 (1)	--	ND	7.2	--	NA	NA	NA
2,4,6-Trichlorophenol	EPA 604 (1)	ug/L	1.1 (2)	--	--	--	ND	NA	NA	NA
2,4,6-Trichlorophenol	EPA 625 (1)	ug/L	2.7 (1)	ND	ND	ND	--	NA	NA	NA
Temperature (field)	-	°C	-	4.3	3.7	7.1	6.9	9.9	6.1	6.1
pH (field)	-	-	-	8.40	8.60	7.05	7.65	7.90	8.00	7.85
Salinity (field)	-	‰	-	2.8	2.8	1.2	0.2	0.2	0.0	0.6
Conductivity (field)	-	umhos/cm	-	3110	2850	1400	348	357	128	170

FOOTNOTES

- (1) Federal Register, Vol. 49, No. 209, Friday, October 26, 1984.
- (2) UBTL method detection limit (MDL) calculated according to reference (1).
- (3) EPA 600/4-79-020 (March 1983).
- (4) UBTL practical detection limit (PDL).

ND - Not Detected

NA - Not Analyzed

-- - Result Obtained by Alternate List Method

SOIL ANALYSIS RESULTS ABOVE DETECTION LIMITS
DEW LINE

PARAMETER	METHOD	UNITS	DETECTION LIMIT	SS1A6 (DOWN) SITE 1	SS1B7 (DOWN) SITE 1	SS1C8 (UP) SITE 1	SS1D9 (DOWN) SITE 1
PCB 1254	SW3550/8080 ^a	mg/kg	0.02 ^b	0.34	ND	ND	0.06
Moisture	ASTM D2216-71	%	-	38.	16.	7.4	17.

Note: 1) Results corrected for percent moisture
2) ND denotes values less than the detection limit

^aSW-846, second edition, July 1982.

^bDUBTL method detection limit (MDL) calculated for PCB 1242 according to Federal Register Vol. 49, No. 209, Friday, October 26, 1984, and applied to all of the PCBs.

The water quality analyses from the surface water samples indicate that trichloroethene concentrations were present both upgradient (290 ug/L) and downgradient (110 ug/L) of Site 1. Trichlorofluoromethane was detected in all water samples, excluding the upgradient samples at Sites 9, 32, and 43 and the samples at Sites 13 and 44. Trichlorofluoromethane is commonly used as a fire extinguishing agent, chemical intermediate, and blowing agent. Concentrations of this purgeable halocarbon ranged from 0.53 ug/L at Site 16 (downgradient) to 4.6 ug/L at Site 1 (upgradient). Ambiguous concentrations of trichlorofluoromethane detected throughout the DEW Line Stage 2 samples have left uncertainty as to whether the samples were contaminated during transport, were contaminated during laboratory analysis, or are truly reflective of site conditions. Confirmation analyses for nine phenols resulted in pentachlorophenol concentrations of 9.6 ug/L at Site 32-upgradient, 9.5 ug/L at Site 32-downgradient, and 4.4 ug/L at Site 40-downgradient. A phenol concentration of 7.2 ug/L was also detected at Site 40-downgradient. During Stage 1, levels of oil and grease were detected at 36 mg/L and 7 mg/L, for Sites 3 and 28, respectively, and were in close agreement with petroleum hydrocarbon analysis results for the same sites during Stage 2. Lead does not appear to be contaminating the surface waters sampled during this investigation. Soils analyses indicated a PCB concentrations of 0.34 mg/kg and 0.06 mg/kg downgradient of Site 1.

These results indicate minor surface water quality degradation caused by station landfills and petroleum storage and handling facilities. No drinking water supplies are threatened by contamination at these sites, since all drinking water is obtained from fresh water lakes upgradient of these sites.

Recommendations and rationale for further investigations, where deemed necessary at the DEW Line Stations, are presented in the following table and are based on Stage 1 and Stage 2 water and soil analysis results.

|
|
|
|
|
|
|

<u>SITE</u>	<u>RECOMMENDED ACTION</u>	<u>RATIONALE</u>
Category I - Sites NOT Warranting Further Investigation		
BAR-M Station Kaktovik/ Barter Island Site 3 - Waste Petroleum Disposal	No further investigation	Results indicate minor contributions of purgeable halocarbons from the Waste Petroleum Disposal Site, however, these are considered negligible based on concentration and potential receptors.
BAR-M Station Kaktovik/ Barter Island Site 4 - Current Dump Site	No further investigation	Results indicate minor concentrations of purgeable halocarbons from the Current Dump Site, however, these contaminants are considered negligible based on concentration and potential receptors.
BAR-M Station Kaktovik Barter Island Site 8 - Drainage Cut Contaminations	No further investigation	Results indicate minor concentrations of purgeable halocarbons from the drainage cut, however, these contaminants are considered negligible based on concentration and potential receptors.
BAR-M Station Kaktovik/ Barter Island Site 9 - Old Dump Site, N.W.	No further investigation	Results indicate no detectable contaminants from Old Dump Site, N.W.
POW-3 Station Bullen Point/ Flaxman Island Site 13 - Old Dump Site, East	No further investigation	Results indicate no detectable contaminants from Old Dump Site, East.

<u>SITE</u>	<u>RECOMMENDED ACTION</u>	<u>RATIONALE</u>
POW-2 Station Point Oliktok Site 16 - Old Dump Site, N.W.	No further investigation	Results indicate no detectable contaminants at the Old Dump Site, N.W.
POW-1 Station Point Lonely Site 28 - POL Storage Area	No further investigation	Results indicate minor contributions of petroleum hydrocarbons from the POL Storage Area, however, these contaminants are considered negligible based on concentration and potential receptors.
POW-1 Station Point Lonely Site 32 - Husky Oil Dump Site	No further investigation	Results indicate minor contributions of purgeable halocarbons from the Husky Oil Dump Site, however, these contaminants are considered negligible based on concentration and potential receptors.
LIZ-2 Station Point Lay Site 40 - Current Dump Site	No further investigation	Results indicate minor contributions of purgeable halocarbons, phenols, and petroleum hydrocarbons from the Current Dump Site, however, these contaminants are considered negligible based on concentration and potential receptors.
LIZ-2 Station Point Lay Site 43 - Old Dump Site, North	No further investigation	Results indicate no detectable contaminants from the Old Dump Site, North.

<u>SITE</u>	<u>RECOMMENDED ACTION</u>	<u>RATIONALE</u>
LIZ-2 Station Point Lay Site 44 - Suspected Dump Site	No further investigation	Results indicate no detectable contaminants from the Suspected Dump Site.

<u>SITE</u>	<u>RECOMMENDED ACTION</u>	<u>RATIONALE</u>
Category II - Sites Warranting Further Investigation		
BAR-M Station Kaktovik/ Barter Island Site 1 - Old Dump Site	Six surface water and soil samples upgradient and three surface water and soil samples down- gradient of Site 1 be collected and analyzed for volatile halocarbons.	To determine the source of trichloroethene detected during Stage 2 analyses.

Based on the available data, the source from which trichloroethene is originating upgradient from Site 1 cannot be identified. Therefore, it is recommended that three surface water and soil samples be collected 300 feet west and three 300 feet south of the Stage 2 upgradient Site 1 sampling location. Additionally, three surface water and soil samples should be collected at 100-foot intervals downgradient from the Stage 2 sampling location to determine contaminant concentrations downgradient of Site 1 and prior to discharge into the Beaufort Sea. These samples should be analyzed for volatile halocarbons (USEPA 601).

<u>SITE</u>	<u>RECOMMENDED ACTION</u>	<u>RATIONALE</u>
POW-1 Point Lonely Site 31- Old Dump Site	Additional records search	To investigate the existence and location of 55-gallon drums reported to have been buried at this landfill.

Subsequent to the findings of the Phase II, Stage 2, additional information became available on specific site conditions of the DEW Line Stations. This information is based, in part, on site visits conducted during August, 1987 by personnel from the USEPA Region X, ADEC, and USAFOEHL, and recently discovered historical aerial photographs and other agency file data. In the interest of completeness, a generalization of their recommendations are presented here. Many of the recommendations fall into Phase IV, remediation, activities.

1. BAR-M

a. Site 1

Erosion control along the ocean shoreline east of the landfill is recommended to inhibit the potential for contaminants to enter the sea.

b. Site 3

Additional sampling is recommended to quantify the extent of spillage resulting from the reported break in the dike wall surrounding the POL storage tanks.

c. Site 4

Drainage diversion around the landfill area as well as additional sediment and water samples to characterize leachate are recommended for this site.

2. POW-3

a. Site 13

A transformer spill and improper storage of solvents and paint thinners in a shed were located during the 1987 site visit. Sampling of the spill for PCB's and proper handling and disposal of the solvents and thinners have been recommended.

3. POW-1

a. Site 28

Additional sampling has been recommended to investigate a reported fuel spill on the south side of the old Husky oil tanks located at the west end of the airstrip.

b. Site 32

Additional investigations to determine if this landfill is adversely impacting the environment as well as repair of the cover over the fill have been recommended.

4. LIZ-2

a. Site 40

Drainage diversion around the landfill to prevent leachate generation of the fill material is recommended.

I. INTRODUCTION

A. BACKGROUND

The U.S. Department of Defense (DOD) initiated the Installation Restoration Program (IRP) to investigate and mitigate any environmental contamination that may be present at DOD facilities as a result of handling or disposing of hazardous materials. The IRP was issued in 1981 as Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5. The U.S. Air Force (USAF) implemented DEQPPM 81-5 as a four-phased program:

Phase I	Problem Identification/Records Search
Phase II	Problem Confirmation and Quantification (Several stages, as necessitated by field and laboratory results)
Phase III	Technology Base Development
Phase IV	Corrective Action Development

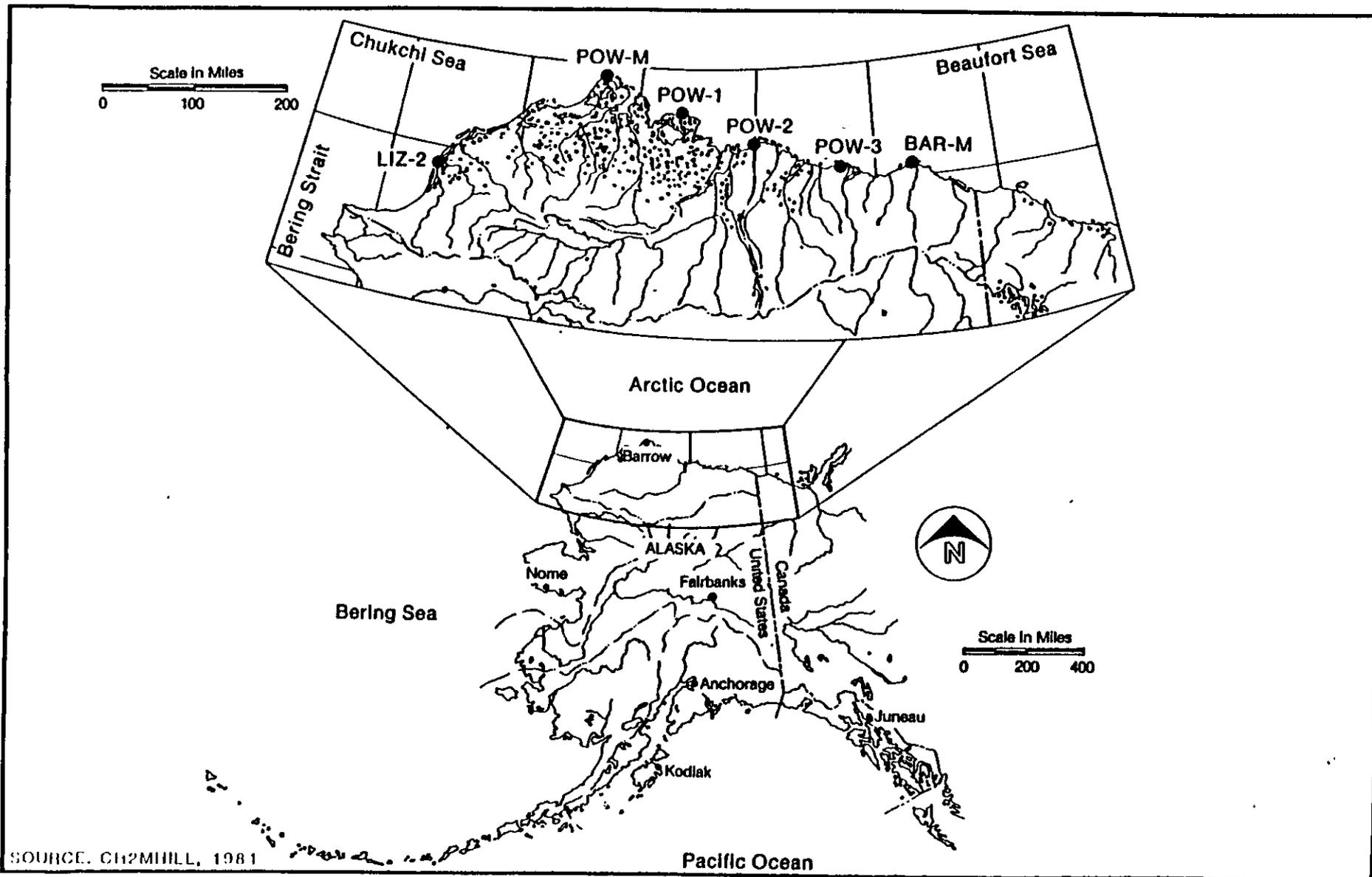
The Phase I study at the Distant Early Warning (DEW) Line Sites, North Slope, Alaska, was completed by CH2M Hill (1981). Dames & Moore was retained by the USAF under Contract Number F33615-83-D-4002, Order 0021, to conduct the Phase II, Stage 1, field evaluation, which was completed in February 1986. Dames & Moore was retained again under the same contract, Order 0035, to conduct the Phase II, Stage 2, field evaluation in July 1986.

The location of the DEW Line sites is provided on the Vicinity Map, Plate I and a generalized geologic cross section of the DEW Line Sites is presented in Plate 2. This report presents the results of Dames & Moore's field and laboratory investigations in the vicinity of waste disposal and handling areas of the DEW Line sites. Chemical analyses were performed by UBTL, Inc., of Salt Lake City, Utah, as subcontractor to Dames & Moore.

B. PURPOSE AND SCOPE

The purposes of the field evaluation portion of Phase II, Stage 2, of the IRP were to:

1. Confirm the presence of suspected contamination within the specified areas of investigation;



SOURCE: CH2MHILL, 1981

VICINITY MAP
DEW LINE SITES, ALASKA

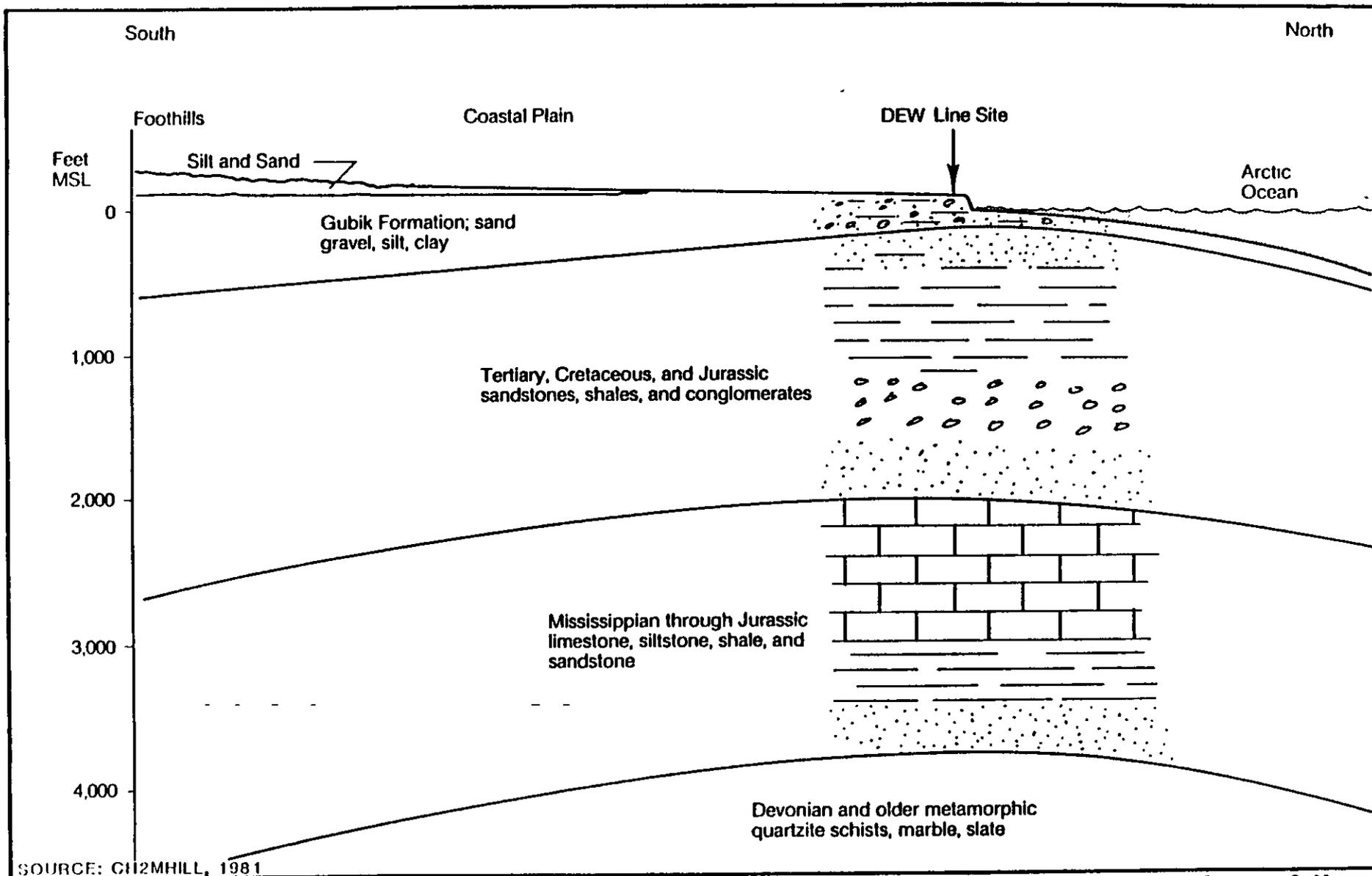
Dames & Moore

15

PLATE 1

6

26



GENERALIZED NORTH-SOUTH GEOLOGIC SECTION
DEW LINE SITES, ALASKA

2. Determine the magnitude of contamination and the potential for migration of those contaminants in the various environmental media;
3. Identify public health and environmental hazards of migrating pollutants based on State or Federal standards for those contaminants; and
4. Delineate additional investigations required beyond this stage to reach the Phase II objectives.

The scope of work as outlined for Phase II, Stage 2, of the IRP consisted of the following activities:

1. Collection of surface water samples from shallow ponds and streams and surface soil samples near the sites identified;
2. Analysis of selected soil samples for polychlorinated biphenyls (PCBs);
3. Analysis of selected water samples for volatile halocarbons, lead, phenols, PCBs, and petroleum hydrocarbons; and
4. Preparation of this report which presents our findings.

Field work began on 17 Aug 86 and continued through 20 Aug 86.

C. HISTORY OF THE DEW LINE AND WASTE DISPOSAL OPERATIONS

The Alaska section of the Dew Line went into operation in 1953. After successful operation of the Alaska section, the remainder of the line extending across Canada and Greenland was constructed. The DEW Line is designed to detect and report all airborne vehicles operating within the designated detection capabilities of the surveillance radars (a total of 31, of which 6 are located in Alaska). Also included is the operation and maintenance of the DEW Communications System. The DEW System is part of the Tactical Air Command (TAC); however, the system has been operated by a civilian contractor since 1957. At present, ITT/FELEC Services, Inc., operates the sites under the supervision of TAC personnel.

Wastes generated at the DEW Line sites include Klystron tubes; mercury and low-level radioactive tubes; lead storage batteries; solvents (such as 1,1,1-trichloroethane, dichloroethane, methyl ethyl ketone, trichloroethylene, and acetone); dielectric fluids containing PCBs; waste petroleum, oil and lubricants (POL); spilled POL; paint thinners; and miscellaneous scrap metals. In the past, these wastes were disposed of in

landfills or shoreline ravines or dumped on the sea ice (where they sank when the ice melted in the spring). Now liquid or solid wastes inappropriate for incineration and/or landfilling are drummed or packaged and shipped to Seattle for disposal or are transferred to the Defense Property Disposal Office (DPDO) at Elmendorf Air Force Base (near Anchorage, Alaska) (CH2M Hill, 1981). Some open burning continued at a few of the sites at least until 1984 but no evidence of open burning was seen during the 1986 field work.

D. DESCRIPTION OF SITES

CH2M Hill (1981) identified 44 sites along the Alaska DEW Line at which hazardous materials were generated, disposed of, or used in some activity. Each site was rated during the Phase I study using the Hazard Assessment Rating Methodology (HARM) developed by JRB Associates, Inc. (1980). This rating procedure utilizes site characteristics, waste characteristics, the potential for contaminant migration, and waste management practices to identify sites warranting further investigation. Ranking scores of 13 of the sites were deemed sufficiently high to warrant field investigation. A scope of work was issued to Dames & Moore on 19 July 1984 under Contract F33615-83-D-4002, Order 0021, for Phase II, Stage 1, investigations and on 21 July 1986 under Order 0035 for Phase II, Stage 2, investigations at the following 13 sites:

Bar-M Kaktovik/Barter Island

- Site 1 - Old Dump Site
- Site 3 - Waste Petroleum Disposal
- Site 4 - Current Dump Site
- Site 8 - Drainage Cut Contamination
- Site 9 - Old Dump Site, N.W.

POW-3 Bullen Point/Flaxman Island

- Site 13 - Old Dump Site, East

POW-2 Point Oliktok

- Site 16 - Old Dump Site, N.W.

POW-1 Point Lonely

- Site 28 - POL Storage Area
- Site 31 - Old Dump Site
- Site 32 - Husky Oil Dump Site

LIZ-2 Point Lay

- Site 40 - Current Dump Site
- Site 43 - Old Dump Site, North
- Site 44 - Suspected Dump Site

These sites are shown on Plates 1, 2, 3, 4, 5, 6, and 7 and are described below.

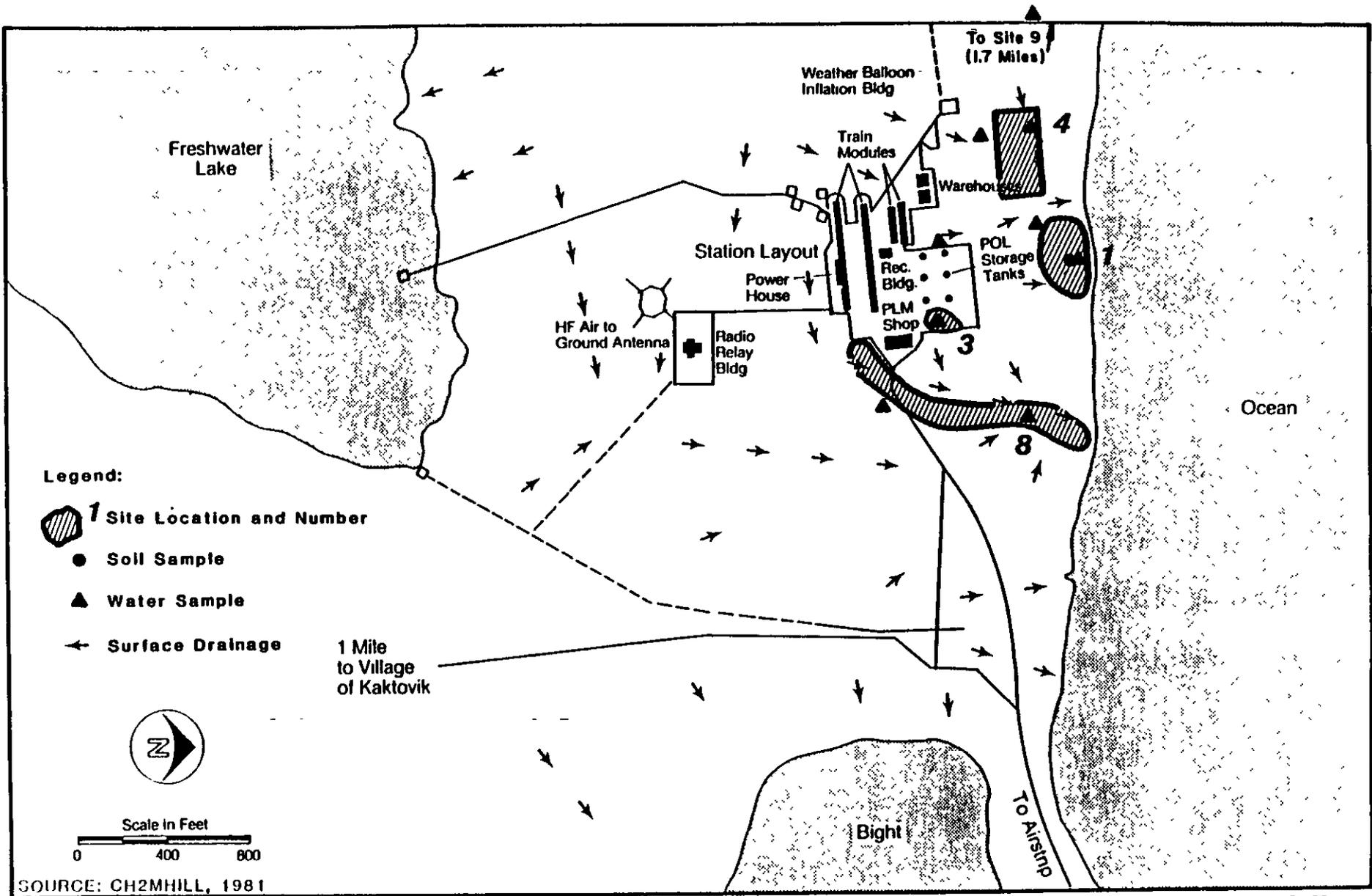
1. BAR-M

a. Site 1 - Old Dump Site

This is the site of a closed dump that received all wastes generated at BAR-M and the nearby village of Kaktovik from 1956 to 1978 (Plate 3). The wastes included domestic garbage, human and animal waste, waste POL products, scrap metal, batteries, drums, vehicles, electronic equipment, food waste, and trash. In addition to land disposal, wastes were also dumped onto the Beaufort Sea ice. The site, approximately 2 to 3 acres in size, was cleaned up in 1979, when most of the materials dumped at the site were reportedly removed. In fact, it appears that the materials in place at the site were covered with fill rather than removed. At present, there is still considerable scattered debris around the site and a large number of drums of waste (probably human sewage) are stored on the surface of the fill. This site appears to be closed except for the drum storage.

b. Site 3 - Waste Petroleum Disposal

This site is described in the Phase I IRP report (CH2M Hill, 1981) as a small, circular pond approximately 20 feet in diameter, 2 to 3 feet deep, and saturated with diesel fuel and waste oil products. The location of this site was not apparent to the field team during the Phase II, Stage 1, investigation. Instead, a pond inside the POL storage tank farm containment berm downgradient of the tanks was investigated. It appeared that water and contaminants from inside the bermed area had, in the past, discharged directly onto the tundra surface through a breach in the dike



SOURCE: CH2MHILL, 1981

Dames & Moore

LOCATIONS OF WASTE DISPOSAL, SPILL SITES, AND SAMPLING LOCATIONS
BAR-M

20

PLATE 3

near the northeast corner of the bermed area. A sheen was observed on the water surface of the pond located inside the berm. During the Phase II, Stage 2, investigation, it was noted that the breach in the dike had been repaired. No sheen on the water was evident during sampling and none was produced by disturbing the sediments under the water.

c. Site 4 - Current Dump Site

The current dump site, approximately 1 to 2 acres in size, is used by both BAR-M personnel and the villagers of Kaktovik. It has been in operation since June 1978. The disposal of wastes at this site by BAR-M personnel is in accordance with appropriate regulations but the use of the site by the villagers is uncontrolled. Because of this, it is likely that hazardous wastes have been and are disposed of at this site. Wastes are burned and covered with excavated or imported materials or simply covered. At the time of the Phase II, Stage 2, investigation, no evidence of uncontrolled burning was observed. Although considerable wind-blown debris was apparent on the ground surface at and near the site, the wastes appear to have been covered with imported material on a regular basis.

d. Site 8 - Drainage Cut Contamination

This is the site of wastewater discharge to a natural drainage that flows to the Beaufort Sea. It has been reported that contaminated liquid, possibly antifreeze, is discharged into the ditch. At the time of the Phase II, Stage 1, investigation, no obvious contaminants (other than natural iron staining) were observed in the water. There was a considerable amount of wind-blown debris in the ditch and along the banks. During the Phase II, Stage 2, investigation, no change in conditions was observed.

e. Site 9 - Old Dump Site, N. W.

This locality, approximately 1 mile by road west of BAR-M, was used briefly by station personnel for disposal of crushed drums and steel from a burned building. The site was less than 1 acre in size and was reportedly cleaned up in 1979. During the Phase II, Stage 1, site visit, numerous crushed and uncrushed barrels were found in a stream gully that ends at the Beaufort Sea. No evidence of contamination (other than natural iron staining) was observed in the water. During the Phase II, Stage 2, investigation, no change in conditions was observed.

2. POW-3

Site 13 - Old Dump Site, East

This is the location of the station dump from 1956 to 1971 (when the station was deactivated) and is less than 1 acre in size. This dump site was evidently located on the shoreline of a lagoon that is open to the sea (Plate 4). Little debris was observed above water but some debris was seen under the water surface. During the Phase II, Stage 2, investigation, no substantial change in conditions was observed.

3. POW-2

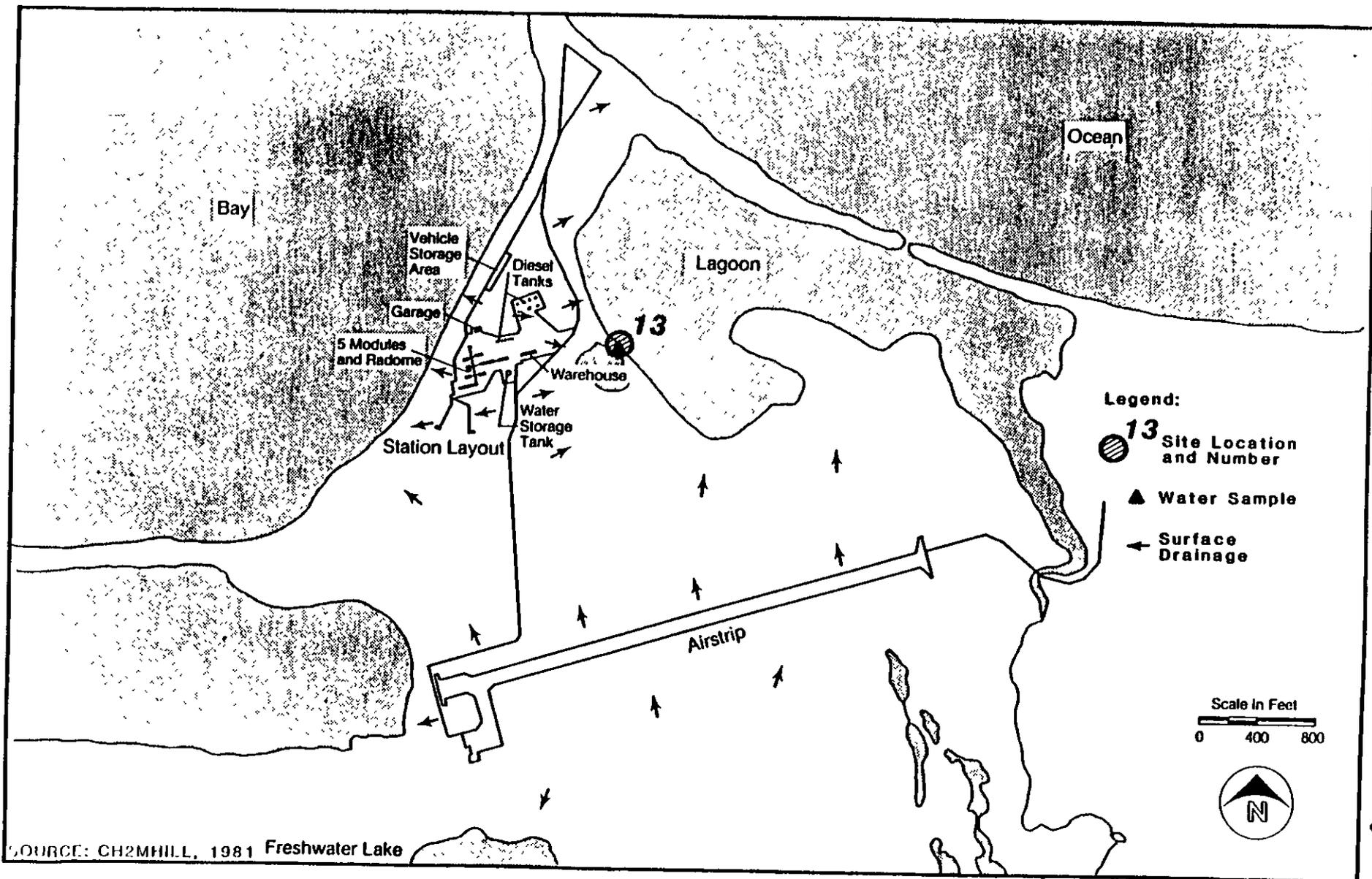
Site 16 - Old Dump Site, N.W.

This old dump site received all wastes generated by the station that were not incinerated from 1956 to approximately 1978 (Plate 5). It was cleaned up in 1978, 1979, and 1980. The site was less than 1 acre in size. At the time of the Phase II, Stage 1, site visit, open burning was ongoing and wastes from the current dump site were entering the lagoon adjacent to the site. Therefore, water samples were taken between Sites 16 and 17 in an attempt to get a representation of the current problems, if any, at this station. During the Phase II, Stage 2, investigation, it was obvious that considerable efforts had been taken to control the dispersal of litter at the site by covering the debris with fill material on a regular basis. However, wastes are still being placed in a fashion that will allow pollutants to readily enter the lagoon adjacent to the site.

4. POW-1

a. Site 28 - POL Storage Area

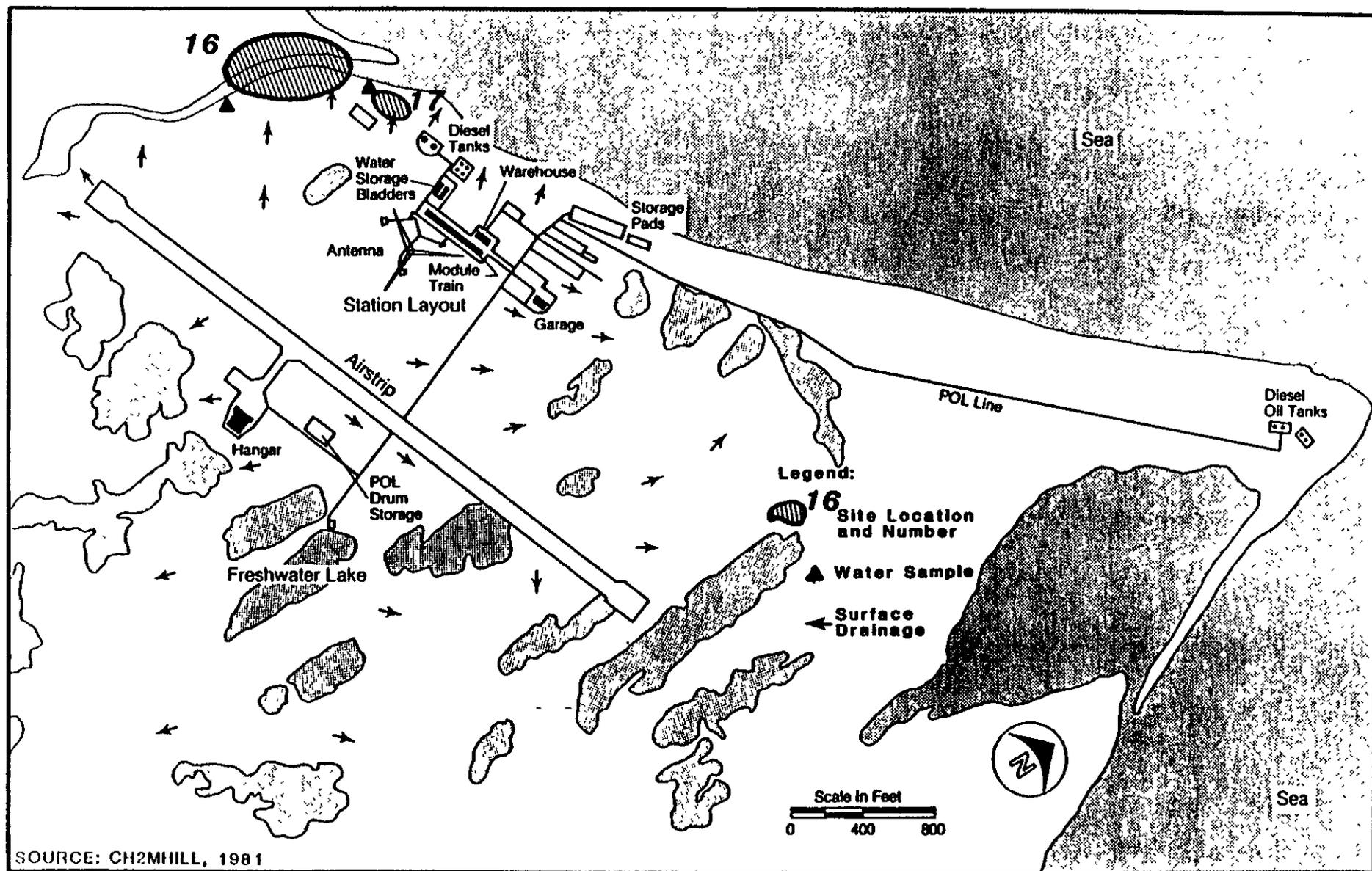
The petroleum storage area is comprised of several medium-size tanks west of the main site (Plate 6). Fuel/oil has been observed collecting in an adjacent pond next to the storage tanks (CH2M Hill, 1981). At the time of the Phase II, Stage 1, site visit, no fuel/oil sheens were noted in the vicinity of the tank farm but some evidence was found that clean up attempts had been made to the west of the farm adjacent to the gravel pad and dikes. It was not certain that the location sampled was that identified in the cited report but it should be representative of the site. During the Phase II, Stage 2, investigation, no substantial change in conditions was observed.



SOURCE: CH2MHILL, 1981 Freshwater Lake

Dames & Moore

LOCATION OF WASTE DISPOSAL SITE AND SAMPLING LOCATION POW-3



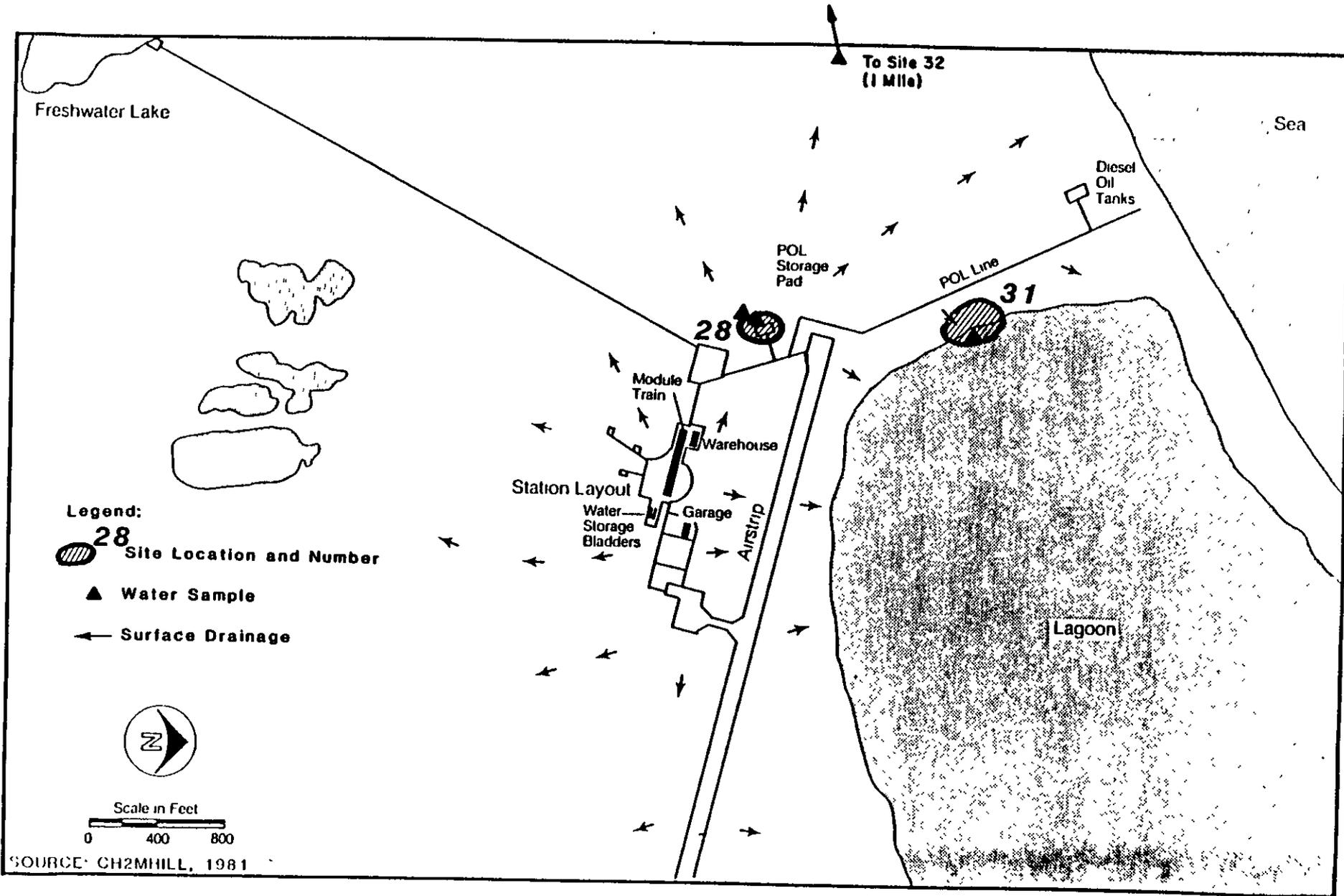
SOURCE: CH2MHILL, 1981

Dames & Moore

LOCATIONS OF WASTE DISPOSAL SITE AND SAMPLING LOCATION
POW-2

24

PLATE 5



LOCATIONS OF WASTE DISPOSAL, SPILL SITES, AND SAMPLING LOCATIONS
POW-1

Dames & Moore

b. Site 31 - Old Dump Site

The POW-1 dump, in use prior to about 1976, received all of the wastes generated by the station and is less than 1 acre in size. At the time of the Phase II, Stage 1, site visit, the site had been covered with gravel and graded flat. There was considerable waste exposed in the filled area at and above the water's edge adjacent to the lagoon. It appeared that wave action in the lagoon may have been eroding the bank at the site and exposing the waste material. During the Phase II, Stage 2, investigation, conditions at the site were substantially the same except for some additional erosion of the fill.

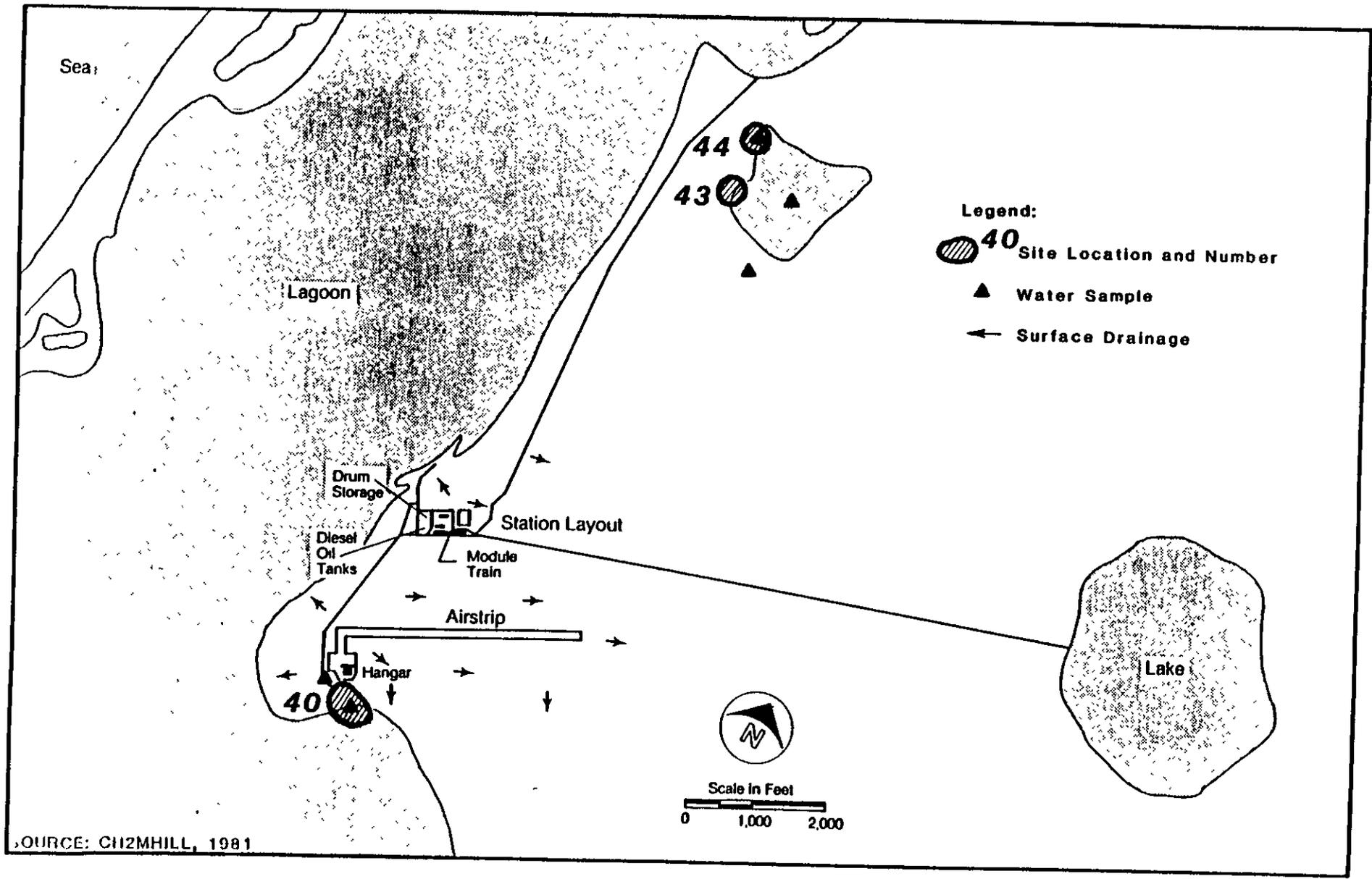
c. Site 32 - Husky Oil Dump

The POW-1 Husky Oil dump receives wastes from the site that are not incinerated and all of the other wastes generated in the area. It is located approximately 1.5 miles by road west of the main station on USAF property and was operated and maintained by Husky Oil Company. It has been in use since 1976 and is less than 1 acre in size. At the time of the Phase II, Stage 1, site visit, there was ongoing open-burning of waste and it was evident that all wastes were being placed in or on the edge of a fresh water lake at the west edge of Husky Oil's camp. Some putrefaction of the lake was apparent and an oil sheen was observed on the water surface. During the Phase II, Stage 2, investigation, conditions at the site had been substantially improved in that the waste at the dump had been covered with imported or excavated fill material and no evidence of open burning was seen. Wastes are apparently still being placed at the edge of the fill, however, where pollutants can readily enter the surface water.

5. LIZ-2

a. Site 40 - Current Dump Site

The current dump receives wastes generated at the station that are not incinerated and all those generated by the village of Point Lay that are not dumped on the ground outside of the villager's doors (Plate 7). The site is located immediately behind the airport hangar. At the time of the Phase II, Stage 1, site visit, the wastes were being dumped over a bank into a lagoon and burned. As the dump was not being covered on a regular basis, wind-blown debris was scattered over a wide area around the dump. A small stream was observed running through the dump and discharging into the



SOURCE: CHIZMILL, 1981

LOCATIONS OF WASTE DISPOSAL, SPILL SITES, AND SAMPLING LOCATIONS
LIZ-2

Dames & Moore

lagoon. During the Phase II, Stage 2 investigation, conditions at the site had been substantially improved in that the waste at the dump had been covered with imported or excavated fill material and no evidence of open burning was seen. Wastes are apparently still being placed at the edge of the fill, however, where pollutants can readily enter the surface waters of the lagoon and the stream still runs through the dump.

b. Site 43 - Old Dump Site, North

This old dump site was used by the station and villagers from about 1956 until 1978. It was cleaned up in 1979-1980. The site, which has no established road access, is located on the bank of a lake that has partially filled in with vegetation. Only two small portions of the lake area indicated in the CH2M Hill (1981) report actually have water at the surface. At the time of the Phase II, Stage 1, site visit, a few pieces of scrap metal and some debris on the surface were the only evidence that this had been a dump site. It apparently had originally been a ravine into which garbage was dumped. Vegetation has grown back over the site. During the Phase II, Stage 2, investigation, no substantial change in conditions was observed.

c. Site 44 - Suspected Dump Site

This is the suspected site of a dump used by villagers and the DEW station from about 1956 to 1980. It was reportedly located near the northeastern portion of the marshy lake shown in Plate 7 and was cleaned up in 1979-1980. The site has no established road access. At the time of the Phase II, Stage 1, site visit, the field team was unable to determine the location of this site. However, subsequent review of photographs taken from the air during the visit indicate that a trail was once used that extended from the village to the northwest tip of the marshy lake just north of Site 43. The location reported by CH2M Hill (1981) for Site 44 is thought to be in error. It is suspected, if this site exists at all, that garbage was dumped over the edge of the embankment surrounding the lake and that vegetation has since grown over the debris, as it appears to have done at Site 43. During the Phase II, Stage 2, site investigation, the suspected site was again observed from the air and landmarks which would allow identification of the site on the ground were noted. The field team went to the suspected dump site but observed nothing on the ground which would indicate the area had been used as a dump. Aerial photographs at a scale of 1 inch = 500 feet, obtained after the site visit, were also carefully examined and no evidence of a dump site was found on them either.

E. IDENTIFICATION OF POLLUTANTS SAMPLED

Based on the wastes present in the above sites and the results of chemical analyses of samples from the Phase II, Stage 1, investigation, potential contaminants include petroleum hydrocarbons, volatile halocarbons, PCBs, phenols, and lead. The analytical program is provided in Table 1.

F. IDENTIFICATION OF THE FIELD TEAM

The field work for Phase II, Stage 2, was accomplished by Mr. J. Michael Stanley, Senior Engineering Geologist. Accompanying Mr. Stanley on the trip was LTC David A. Nuss, HQ AAC/SGPB, Elmendorf AFB, Alaska. Air charter services were provided by Audi Air Service of Kaktovik, Prudhoe Bay, and Fairbanks, Alaska. Appendix H contains biographies of key personnel.

TABLE 1

ANALYTICAL PROGRAM

PARAMETER	METHOD	UNITS	DETECTION LIMIT	BAR-M			PON-3			PON-2			PON-1			LIZ-2			PRIMARY DRINKING WATER STANDARD	SECONDARY DRINKING WATER STANDARD	
				SITE 1	SITE 3	SITE 4	SITE 5	SITE 6	SITE 8	SITE 9	SITE 15	SITE 16	SITE 26	SITE 31	SITE 32	SITE 40	SITE 43	SITE 44			
Purgeable Halocarbons																					
Bromodichloromethane	EPA 601 (1)	ug/L	0.35 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W								
Bromoform	EPA 601 (1)	ug/L	0.45 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
Bromoethane	EPA 601 (1)	ug/L	0.63 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
Carbon Tetrachloride	EPA 601 (1)	ug/L	0.46 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
Chlorobenzene	EPA 601 (1)	ug/L	0.37 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
2-Chloroethylvinylether	EPA 601 (1)	ug/L	0.44 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
Chloroform	EPA 601 (1)	ug/L	0.45 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
Chloromethane	EPA 601 (1)	ug/L	0.49 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
Dibromochloromethane	EPA 601 (1)	ug/L	0.31 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
1,2-Dichlorobenzene	EPA 601 (1)	ug/L	0.29 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
1,3-Dichlorobenzene	EPA 601 (1)	ug/L	0.42 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
1,4-Dichlorobenzene	EPA 601 (1)	ug/L	0.41 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
Dichlorodifluoromethane	EPA 601 (1)	ug/L	0.33 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
1,1-Dichloroethane	EPA 601 (1)	ug/L	0.49 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
1,2-Dichloroethane	EPA 601 (1)	ug/L	0.44 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
trans-1,2-Dichloroethane	EPA 601 (1)	ug/L	0.49 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
cis-1,3-Dichloropropene	EPA 601 (1)	ug/L	0.20 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
trans-1,3-Dichloropropene	EPA 601 (1)	ug/L	0.36 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
Methylene Chloride	EPA 601 (1)	ug/L	0.34 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
1,1,2,2-Tetrachloroethane	EPA 601 (1)	ug/L	0.38 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
1,1,1-Trichloroethane	EPA 601 (1)	ug/L	0.51 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
1,1,2-Trichloroethane	EPA 601 (1)	ug/L	0.51 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
Trichloroethene	EPA 601 (1)	ug/L	0.60 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
Trichlorofluoromethane	EPA 601 (1)	ug/L	0.44 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
Vinyl Chloride	EPA 601 (1)	ug/L	0.54 (2)	2M	2M	2M	2M	2M	2M	2M	2M	2M	2M	1W							
Petroleum Hydrocarbons	EPA 418.1 (3)	mg/L	0.2 (4)	2M																	
Lead	EPA 239.2 (3)	ug/L	0.6 (5)																		
PCBs																					
PCB 1016	EPA 608 (1)	ug/L	0.09 (6)																		
PCB 1221	EPA 608 (1)	ug/L	0.09 (6)																		
PCB 1252	EPA 608 (1)	ug/L	0.09 (6)																		
PCB 1242	EPA 608 (1)	ug/L	0.09 (6)																		
PCB 1248	EPA 608 (1)	ug/L	0.09 (6)																		
PCB 1254	EPA 608 (1)	ug/L	0.09 (6)																		
PCB 1240	EPA 608 (1)	ug/L	0.09 (6)																		
Phenols																					
4-Chloro-3-methyl phenol	EPA 604 (1)	ug/L	0.62 (2)																		
2-Chlorophenol	EPA 604 (1)	ug/L	0.51 (2)																		
2,4-Dichlorophenol	EPA 604 (1)	ug/L	0.57 (2)																		
2,4-Dimethylphenol	EPA 604 (1)	ug/L	0.63 (2)																		
2,4-Dinitrophenol	EPA 604 (1)	ug/L	31. (2)																		
2-Nitro-4,6-dinitrophenol	EPA 604 (1)	ug/L	9.2 (2)																		
2-Nitrophenol	EPA 604 (1)	ug/L	0.51 (2)																		
4-Nitrophenol	EPA 604 (1)	ug/L	2.6 (2)																		
Pentachlorophenol	EPA 604 (1)	ug/L	11. (2)																		
Phenol	EPA 604 (1)	ug/L	0.33 (2)																		
2,4,6-Trichlorophenol	EPA 604 (1)	ug/L	1.1 (2)																		

90

TABLE 1
ANALYTICAL PROGRAM

PARAMETER	METHOD	UNITS	DETECTION LIMIT	BAR-M					POW-3		POW-2			POW-1			LIZ-2			PRIMARY DRINKING WATER STANDARD	SECONDARY DRINKING WATER STANDARD
				SITE 1	SITE 3	SITE 4	SITE 8	SITE 9	SITE 13	SITE 16	SITE 28	SITE 31	SITE 32	SITE 40	SITE 43	SITE 44					
Moisture Determination	ASTM D2216-71 (7)	%	-	4S																	
Temperature (field)	FLUKE 80TK (7)	°C	-	2W	2W	2W	2W	2W	1W	2W	2W	1W	2W	2W	2W	1W					
pH (field)	FISHER 107 (7)	-	-	2W	2W	2W	2W	2W	1W	2W	2W	1W	2W	2W	2W	1W					
Salinity (field)	YSI 33 S-C-T (7)	‰	-	2W	2W	2W	2W	2W	1W	2W	2W	1W	2W	2W	2W	1W					6.5-8.5
Specific Conductance	YSE 33 S-C-T (7)	umhos/cm	-	2W	2W	2W	2W	2W	1W	2W	2W	1W	2W	2W	2W	1W					

S - Surface Soil Samples

W - Surface Water Samples

(1) Federal Register, Vol. 49, No. 209, Friday, October 26, 1984.

(2) UBTL method detection limit (MDL) calculated according to reference (1).

(3) EPA 600/4-79-020 (March 1983).

(4) UBTL practical detection limit (PDL).

(5) UBTL instrument detection limit (IDL) calculated according to reference (3).

(6) UBTL method detection limit (MDL) calculated for PCB 1242 according to reference (1) and applied to all of the PCBs.

(7) Instrument

II. ENVIRONMENTAL SETTING

A. PHYSICAL GEOGRAPHY

The Alaska DEW Line stations are located on the western and northern coasts of Alaska in the Arctic region. Of the sites addressed in this report, two are located near native villages, with the villages established after the station was constructed, and three are at remote locations. BAR-M encompasses approximately 4353 acres, POW-3 approximately 620 acres, POW-2 approximately 2325 acres, POW-1 approximately 2830 acres, and LIZ-2 approximately 1442 acres. Land surface elevations are within a few tens of feet of sea level at all of the stations investigated.

The stations are located on the Arctic Coastal Plain, a smooth surface showing little relief, which slopes downward to the north from the foothills of the Brooks Range. The coastline is characterized by low banks with narrow gravel and sand beaches. All regional drainage is north and west toward the coast.

The average annual precipitation at the stations ranges from 5 to 7 inches (which includes 12 to 45 inches of snow), making this area an Arctic desert. The average monthly temperatures range from a maximum of 46°F at BAR-M and 53°F at LIZ-2 to a minimum of -20°F at BAR-M and -27°F at LIZ-2. Extreme temperatures range from -59°F to 75°F at BAR-M and -55°F to 78°F at LIZ-2 (CH2M Hill, 1981).

B. REGIONAL GEOLOGY AND HYDROGEOLOGY

The Arctic Coastal Plain is underlain by poorly-indurated Pleistocene and Recent sand, gravel, silt, and clay. Beneath these deposits, Tertiary, Cretaceous, and Jurassic sandstones, siltstones, shales, and conglomerates form a 2000- to 12,000-foot thick sequence that thickens toward the mountains to the south. At greater depths, limestone, siltstone, shale, and sandstone give way to metamorphic rocks of Devonian and older periods. These older systems of rocks, predominantly quartzite schists, marble, and slate, form the regional basement rock. A generalized north-south geologic section is presented on Plate 2.

Thin accumulations of peat and silty loam overlie the bedrock deposits. Polygonal ground, beaded drainage, thermokarst lakes, and other periglacial features are common throughout the area, all indicative of fine-grained, permanently frozen ground.

Due to the presence of permafrost throughout the area to great depths (as much as 2,000 feet), ground water is generally absent except under and at the margins of lakes, rivers, and large streams (CH2M Hill, 1981).

C. GENERAL HYDROLOGY

Numerous rivers, originating in the Brooks Range and the northern foothills, cross the coastal plain and drain into the Arctic Ocean. Surface drainage occurs as sheetflow and shallow creek runoff to rivers or directly to the ocean. Infiltration to very shallow depths occurs during summer months when the active layer thaws.

Numerous large and small lakes occur on the coastal plain. They are generally less than 10 feet deep and most remain frozen during the winter and early summer months. Very few wells are used on the North Slope due to the general absence of ground water. Nearly all water supplies are drawn from nearby freshwater lakes.

The estimated permeability of the near-surface soils within the active layer ranges from 1×10^{-1} to 1×10^{-4} cm/sec (CH2M Hill, 1981).

D. HISTORIC GROUND WATER PROBLEMS

No ground water problems have been identified in this area because of the very few wells that have been developed. No problems, other than salt water contamination, have been identified for surface water supplies at any of the sites (CH2M Hill, 1981).

E. LOCATIONS OF WELLS ON AND OFF BASE

No wells have been located in the vicinity of these sites. Most of the fresh water lakes used for water supplies are identified on Plates 3, 4, 5, 6, and 7.

III. FIELD PROGRAM

A. FIELD PROGRAM DEVELOPMENT

The field program portion of the Phase II, Stage 2, study consisted of:

1. Collection of surface water samples from shallow ponds and streams and collection of soil samples from near 13 sites at five DEW Line stations on the north and west coasts of Alaska; and
2. Measurement of pH, temperature, salinity, and specific conductance in the field on all water samples.

B. SITE-SPECIFIC SAMPLING LOCATIONS

1. BAR-M

a. Site 1

This is the location of the old dump at BAR-M which was in use from 1956 to 1978. During the Phase II, Stage 1 program, one soil sample was collected near the edge of a small stream adjacent to the landfill in fill material and one sample was collected from sand and gravel in the stream channel. No water samples were collected from this site during Stage 1. During the Phase II, Stage 2, program, three surface soil samples were collected from the fill material near the edge of the small stream sampled during Stage 1 and one background surface soil sample was collected from the far bank of the stream in an undisturbed area. In addition, one surface water sample was collected from the stream upgradient of the site and one surface water sample was collected from downgradient of the site.

b. Site 3

This is the location of a pond adjacent to the petroleum storage tanks for this site. Sand and gravel fill material has been placed directly on the tundra mat to form a pad for the tanks and to form berms for POL spill containment. During the Stage 1 investigation, one water sample was collected from the ponded surface water. An oil sheen was present on the surface and more petroleum products were released from disturbed sediments at the water's edge. During Stage 2, one surface water sample was collected from the same location, however, no oil sheen was noticed on the water surface and disturbed sediments released no apparent petroleum products at this site. In addition, one surface water sample was collected from a small pond immediately upgradient of the tank farm.

c. Site 4

This is the location of the current dump that has been in operation since 1978. During the Stage 1 investigation, two surface soil samples were taken approximately 25 feet north of the edge of the dump in a swampy area downgradient of the site, one sample at approximately 1 foot below the ground surface and one at approximately 2 feet below the surface. The soil consisted of a peaty loam. Permafrost with a very high ice content was encountered at approximately 2 feet below the surface. During the Stage 2 investigation, one surface water sample was collected from water flowing from the site near the location of the Stage 1 soil sampling program and one surface water sample was collected from surface water flowing toward the site from the southwest, upgradient of the site.

d. Site 8

This is the site of a wastewater discharge to a natural, deeply-incised drainage that flows to the Beaufort Sea. During Stage 1, one water sample was collected from the stream. No evidence of contamination was noted other than debris in the water and along the stream banks. During Stage 2, one surface water sample was collected at or near the location sampled during Stage 1 and one sample was taken from upgradient above culverts carrying the stream under the access road to the station from the east.

e. Site 9

This is the location of an old dump site approximately 1.7 miles west of the station. During Stage 1, one water sample was taken near the mouth of this deeply-incised stream that empties into the Beaufort Sea. During Stage 2, one water sample was taken near the location sampled during Stage 1 and one sample was taken upgradient on the stream above the disposal site. No evidence of contamination was found, other than rusted barrels (some of which are crushed) in the stream channel and along its banks.

2. POW-3

Site 13

This is the location of an old dump that was in use from 1956 to 1978. During Stage 1, one water sample was taken from lagoon waters adjacent to the site where debris was observed in the water. No evidence of contamination was noted other than the submerged debris. During Stage 2, one water sample was collected from lagoon waters at or near the site sampled during Stage 1.

3. POW-2

Site 16

This is the location of an old dump that was in use from 1956 to 1978. During Stage 1, one water sample was collected from lagoon waters between Sites 16 and 17 since waste disposal operations at the current dump site at that time included dumping into the water and burning of wastes. Considerable debris was found in the lagoon water but no oil sheens were observed at this site. During Stage 2, one water sample was collected from at or near the location sampled during Stage 1 and one water sample was collected from a location upgradient in the lagoon from the dump site. Little debris was present on the surface and no oil sheens were noted during sampling.

4. POW-1

a. Site 28

This is the location of the POL tank farm. During Stage 1, one water sample was collected from ponded water adjacent to the dike and pad around the tank farm, however, no direct evidence of contamination was noted. During Stage 2, one water sample was collected from at or near the location sampled during Stage 1 and one water sample was collected from a location upgradient of the site. No oil sheens or other direct evidence of contamination were noted.

b. Site 31

This is the location of an old dump used prior to 1976. During Stage 1, one water sample was collected from the lagoon waters adjacent to the site. No evidence of contamination was observed other than debris on the beach and exposed in the fill bank. During Stage 2, one water sample was taken from the lagoon waters at or near the location sampled during Stage 1. No substantial change in conditions from Stage 1 was noted.

c. Site 32

This is the site of the Husky Oil Company dump which is currently used by the DEW Line station and others. During Stage 1, one water sample was collected from the pond adjacent to the site. An oil sheen was observed on the water surface and was released from disturbed shore sediments. Considerable debris was observed in the water and ongoing operations

apparently included burning and pushing waste into the water. During Stage 2, one water sample was collected from the pond at or near the location sampled during Stage 1 and one water sample was collected from an area assumed to be upgradient of the site. Little debris was noted on the surface and no oil sheens were noted during sampling.

5. LIZ-2

a. Site 40

This is the location of the active dump for the station and the village of Point Lay. During Stage 1, one water sample was collected from water ponded at the edge of the dump and adjacent to a lagoon. An oil sheen was observed on the water surface and wind-blown debris and other trash were entering the water from the dump. During Stage 2, one water sample was collected from a location at or near the site sampled during Stage 1. Although considerable efforts had been taken to cover the materials in the dump with excavated and/or imported fill and considerably less debris was evident on the site, the water in the pond was obviously being contaminated with surface water runoff and with trash from the dump, and an oil sheen was again observed on the water surface. In addition to the pond sample, one sample was taken upgradient of the dump in a small stream that flows near and through the dump.

b. Site 43

This is the location of an old dump in use from about 1956 to 1978. Debris was believed to be dumped over the edge of an embankment that appears to have enclosed a large thaw lake. The lake has apparently had one wall breached and has partially drained and filled with vegetation. During Stage 1, one water sample was collected downgradient of the site from a depression in the tundra mat created by pulling up peat moss and allowing the excavation to fill with water. In addition, a water sample was collected from one of two small lakes inside the basin. It was believed that any contamination from either Sites 43 or 44 would ultimately enter those waters. During Stage 2, one water sample was collected from a location at or near the site sampled during the Stage 1 program. In addition, one water sample was collected from a small lake located on the uplands above the basin and upgradient of Sites 43 and 44.

c. Site 44

This is the site of a suspected dump used from about 1956 to 1980. The Stage 1 field team was unable to locate the site and instead sampled a small lake within the basin as described above in the text for Site 43. As

noted in Section I.D., the Stage 2 field team was again unable to locate the site, however, one water sample was collected from the second small lake inside the basin as it is downgradient of the most likely location for a dump in the immediate vicinity.

C. FIELD PROGRAM IMPLEMENTATION

All water samples were taken by placing prepared sampling containers directly into the stream or pond. The sample containers were immediately stored in insulated shipping containers. Soil samples were taken by excavation with a stainless steel spoon. The soil samples were placed in prepared glass containers and immediately placed in insulated shipping containers. At the end of each of the two sampling days, the water and soil samples were shipped via air freight to the testing laboratories (UBTL in Salt Lake City, Utah, and USAFOEHL at Brooks AFB, Texas), where the samples were to be received the following day. Due to charter aircraft breakdowns and errors on the part of the air freight shippers, however, the USAFOEHL samples failed to arrive at their destination until three and four days after they were sampled. Of the shipments to USAOEHL, one arrived four days after sampling and one was lost in shipping.

The field instruments were calibrated before and during use to ensure accuracy. The pH meter functioned well throughout the program but the cover on the meter of the temperature-salinity-conductivity gauge was broken while sampling the first site at BAR-M. It is believed that the subsequent readings taken at BAR-M and POW-3 are reasonably accurate, however, breezes caused deflection of the needle and it was not possible to totally block them out while taking readings. A new cover was fabricated which eliminated the problem at the remaining sites. The instruments and containers used during field testing were thoroughly rinsed with distilled water before and after each use.

Chain-of-custody forms were prepared and accompanied the samples from the field to the laboratory. These records document the integrity of the samples at each point of transfer, from field personnel to shippers and couriers to the laboratory staff. The signatures of the individuals relinquishing and accepting custody of the samples and the date and time appear on the records at each point of transfer (see Appendix E).

The soil and surface water samples were analyzed in accordance with U.S. Environmental Protection Agency (USEPA) methods. Table 1 lists each parameter and its analytical method. Details of the analytical procedures are provided in Appendix D.

IV. DISCUSSION OF RESULTS AND SIGNIFICANCE OF FINDINGS

This section presents a discussion of the chemical analyses of surface water and soil samples collected during field investigations at 13 sites along the DEW Line, as illustrated in Plates 3, 4, 5, 6, and 7. Field investigations are described in Section III.

As listed in Table 1, water samples were analyzed for purgeable halocarbons, petroleum hydrocarbons, lead, PCBs, phenols, temperature, pH, salinity, and specific conductance. Table 2 lists results of water analyses that were above detection limits. Soil samples were analyzed for PCBs and percent moisture (Table 1). Table 3 lists results of soil analyses that were above detection limits.

The Secondary Drinking Water Standard of 6.5-8.5 for pH (40 CFR 143, 1979) was occasionally exceeded at sampling stations along the DEW LINE. Unlike Primary Drinking Water Standards, SDWS are not enforceable. Low pH detected in the DEW LINE area may reflect the natural decomposition of tundra vegetation and not necessarily the introduction of man-made chemical contaminants.

Finally, the comparison of Stage 1 TOX and Stage 2 halocarbon analysis revealed inconsistent results between the two findings. The Stage 1 analysis for TOX could possibly have been affected by elevated concentrations of inorganic chlorides. These chlorides have caused interferences detected during Stage 1 TOX analysis and not detected during the Stage 2 halocarbon analysis. Elevated concentrations of chlorides would be expected near saline waters, such as the Beaufort Sea, where the chloride would be transported by sea spray to the terrestrial environment and accumulate in the surface waters.

A. DISCUSSION OF RESULTS

1. BAR-M

a. Site 1 - Upgradient

One surface water sample was collected from the stream upgradient of Site 1 to represent possible background conditions (Plate 3).

The pH was slightly acidic at 6.30. Field measurements for temperature, salinity, and specific conductance were 4.5°C, 0.0‰, and 490 $\mu\text{hos/cm}$, respectively. Six purgeable halocarbons were found at levels above the limit of detection, including bromomethane, at a concentration of 16 $\mu\text{g/L}$, 1,1-dichloroethene, at a concentration of 2.0 $\mu\text{g/L}$, methylene chloride, at a concentration of 16 $\mu\text{g/L}$, 1,1,1-trichloroethane, at a

TABLE 2
CHEMICAL ANALYSIS RESULTS ABOVE DETECTION LIMITS
DEW LINE - WATER ANALYSIS

PARAMETER	METHOD	UNITS	DETECTION LIMIT	SW1E5 (UP) SITE 1	SW1F19 (DOWN) SITE 1	SW3B14 (UP) SITE 3	SW3A11 (DOWN) SITE 3	SW4A3 (UP) SITE 4	SW4B4 (DOWN) SITE 4	SW8A12 (UP) SITE 8	SW8B13 (DOWN) SITE 8
<u>Purgeable Halocarbons</u>											
Bromomethane	EPA 601 (1)	ug/L	0.63 (2)	15	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	EPA 601 (1)	ug/L	0.31 (2)	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	EPA 601 (1)	ug/L	0.49 (2)	4.1	1.9	ND	ND	ND	1.9	ND	ND
1,2-Dichloroethane	EPA 601 (1)	ug/L	0.44 (2)	ND	ND	ND	ND	ND	ND	ND	ND
Trans-1,2-Dichloroethane	EPA 601 (1)	ug/L	0.42 (2)	2.0	0.60	ND	0.43	ND	ND	ND	0.62
1,2-Dichloropropane	EPA 601 (1)	ug/L	0.20 (2)	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	EPA 601 (1)	ug/L	0.34 (2)	16	5.9	ND	ND	ND	5.1	ND	ND
Tetrachloroethane	EPA 601 (1)	ug/L	0.38 (2)	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	EPA 601 (1)	ug/L	0.53 (2)	1.1	ND	ND	ND	ND	ND	ND	ND
Trichloroethane	EPA 601 (1)	ug/L	0.60 (2)	290	110	ND	0.76	ND	ND	ND	1.5
Trichlorofluoromethane	EPA 601 (1)	ug/L	0.44 (2)	4.6	3.1	1.6	3.2	1.1	3.1	1.3	1.5
Petroleum Hydrocarbons	EPA 418.1 (3)	mg/L	0.2 (4)	NA	NA	4.4	2.2	NA	NA	NA	NA
Temperature (field)	-	°C	-	4.5	5.5	7.5	6.5	4.8	4.0	6.5	6.0
pH (field)	-	-	-	6.30	6.61	7.40	7.20	6.60	6.15	7.51	7.09
Salinity (field)	-	‰	-	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0
Conductivity (field)	-	umhos/cm	-	490	520	680	650	360	2550	325	420
PARAMETER	METHOD	UNITS	DETECTION LIMIT	SW9A1 (DOWN) SITE 9	SW9B2 (UP) SITE 9	SW13A15 SITE 13	SW16A16 (UP) SITE 16	SW16B17 (DOWN) SITE 16	SW28A21 (UP) SITE 28	SW28B22 (DOWN) SITE 28	SW31A20 SITE 31
<u>Purgeable Halocarbons</u>											
Bromomethane	EPA 601 (1)	ug/L	0.63 (2)	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	EPA 601 (1)	ug/L	0.31 (2)	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	EPA 601 (1)	ug/L	0.49 (2)	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	EPA 601 (1)	ug/L	0.44 (2)	ND	ND	ND	ND	ND	ND	ND	ND
Trans-1,2-Dichloroethane	EPA 601 (1)	ug/L	0.42 (2)	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	EPA 601 (1)	ug/L	0.20 (2)	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	EPA 601 (1)	ug/L	0.34 (2)	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethane	EPA 601 (1)	ug/L	0.38 (2)	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	EPA 601 (1)	ug/L	0.53 (2)	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethane	EPA 601 (1)	ug/L	0.60 (2)	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	EPA 601 (1)	ug/L	0.44 (2)	1.2	ND	ND	0.67	0.53	0.81	0.76	0.73
Petroleum Hydrocarbons	EPA 418.1 (3)	mg/L	0.2 (4)	NA	NA	NA	NA	NA	1.5	2.0	NA
Temperature (field)	-	°C	-	3.7	4.2	11.5	6.8	5.5	5.5	5.7	5.2
pH (field)	-	-	-	6.00	6.15	7.40	8.10	7.90	8.60	8.15	8.10
Salinity (field)	-	‰	-	0.0	0.0	15.5	13.0	15.1	0.6	0.4	2.53
Conductivity (field)	-	umhos/cm	-		265	20,000	13,800	15,000	780	680	25,200

5
10

TABLE 2 (continued)
 CHEMICAL ANALYSIS RESULTS ABOVE DETECTION LIMITS
 DEW LINE - WATER ANALYSIS

PARAMETER	METHOD	UNITS	DETECTION LIMIT	SW32A18 (UP) SITE 32	SW32B19 (DOWN) SITE 32	SW40A26 (DOWN) SITE 40	SW40B27 (UP) SITE 40	SW43A24 (DOWN) SITE 43	SW43B25 (UP) SITE 43	SW44A23 (DOWN) SITE 44
Purgeable Halocarbons										
Dibromochloroethane	EPA 601 (1)	ug/L	0.31 (2)	0.65	0.31	ND	ND	ND	ND	ND
1,1-Dichloroethane	EPA 601 (1)	ug/L	0.49 (2)	ND	ND	1.2	ND	ND	ND	ND
1,2-Dichloroethane	EPA 601 (1)	ug/L	0.44 (2)	2.3	1.9	ND	ND	ND	ND	ND
1,2-Dichloropropane	EPA 601 (1)	ug/L	0.20 (2)	3.8	2.7	6.2	ND	ND	ND	ND
Methylene Chloride	EPA 601 (1)	ug/L	0.34 (2)	0.37	ND	17	ND	ND	ND	ND
Tetrachloroethane	EPA 601 (1)	ug/L	0.38 (2)	1.4	1.1	6.4	ND	ND	ND	ND
1,1,1-Trichloroethane	EPA 601 (1)	ug/L	0.53 (2)	ND	ND	1.2	ND	ND	ND	ND
Trichloroethane	EPA 601 (1)	ug/L	0.60 (2)	ND	ND	ND	2.1	ND	ND	ND
Trichlorofluoroethane	EPA 601 (1)	ug/L	0.44 (2)	ND	0.78	9.3	1.4	1.0	ND	ND
Phenols										
4-Chloro-3-methyl phenol	EPA 604 (1)	ug/L	0.62 (2)	ND	ND	ND	ND	NA	NA	NA
4-Chloro-3-methyl phenol	EPA 625 (1)	ug/L	3.0 (1)	--	--	--	--	NA	NA	NA
2-Chlorophenol	EPA 604 (1)	ug/L	0.51 (2)	ND	ND	ND	ND	NA	NA	NA
2-Chlorophenol	EPA 625 (1)	ug/L	3.3 (1)	--	--	--	--	NA	NA	NA
2,4-Dichlorophenol	EPA 604 (1)	ug/L	0.57 (2)	--	ND	--	ND	NA	NA	NA
2,4-Dichlorophenol	EPA 625 (1)	ug/L	2.7 (1)	ND	--	ND	--	NA	NA	NA
2,4-Dimethylphenol	EPA 604 (1)	ug/L	0.83 (2)	ND	--	--	ND	NA	NA	NA
2,4-Dimethylphenol	EPA 625 (1)	ug/L	2.7 (1)	--	ND	ND	--	NA	NA	NA
2,4-Dinitrophenol	EPA 604 (1)	ug/L	31. (2)	--	--	--	--	NA	NA	NA
2,4-Dinitrophenol	EPA 625 (1)	ug/L	42. (1)	ND	ND	ND	ND	NA	NA	NA
2-Methyl-4,6-dinitrophenol	EPA 604 (1)	ug/L	9.2 (2)	--	--	--	--	NA	NA	NA
2-Methyl-4,6-dinitrophenol	EPA 625 (1)	ug/L	24. (1)	ND	ND	ND	ND	NA	NA	NA
2-Nitrophenol	EPA 604 (1)	ug/L	0.51 (2)	--	--	ND	ND	NA	NA	NA
2-Nitrophenol	EPA 625 (1)	ug/L	3.6 (1)	ND	ND	--	--	NA	NA	NA
4-Nitrophenol	EPA 604 (1)	ug/L	2.6 (2)	ND	ND	ND	ND	NA	NA	NA
4-Nitrophenol	EPA 625 (1)	ug/L	2.4 (1)	--	--	--	--	NA	NA	NA
Pentachlorophenol	EPA 604 (1)	ug/L	11. (2)	--	--	--	ND	NA	NA	NA
Pentachlorophenol	EPA 625 (1)	ug/L	3.6 (1)	9.6	9.9	4.4	--	NA	NA	NA
Phenol	EPA 604 (1)	ug/L	0.33 (2)	ND	--	--	ND	NA	NA	NA
Phenol	EPA 625 (1)	ug/L	1.5 (1)	--	ND	7.2	--	NA	NA	NA
2,4,6-Trichlorophenol	EPA 604 (1)	ug/L	1.1 (2)	--	--	--	ND	NA	NA	NA
2,4,6-Trichlorophenol	EPA 625 (1)	ug/L	2.7 (1)	ND	ND	ND	--	NA	NA	NA
Temperature (field)	-	°C	-	4.3	3.7	7.1	6.9	5.9	6.1	6.1
pH (field)	-	-	-	8.40	8.60	7.05	7.65	7.90	8.00	7.85
Salinity (field)	-	‰	-	2.8	2.8	1.2	0.2	0.2	0.0	0.6
Conductivity (field)	-	umhos/cm	-	3110	2850	1400	348	357	128	770

41

6
52

FOOTNOTES (FOR TABLE 2)

- (1) Federal Register, Vol. 49, No. 209, Friday, October 26, 1984.
 - (2) UBTL method detection limit (MDL) calculated according to reference (1).
 - (3) EPA 600/4-79-020 (March 1983).
 - (4) UBTL practical detection limit (PDL).
- ND - Not Detected
- NA - Not Analyzed
- - Result Obtained by Alternate List Method

TABLE 3
SOIL ANALYSIS RESULTS ABOVE DETECTION LIMITS
DEW LINE

PARAMETER	METHOD	UNITS	DETECTION LIMIT	SS1A6 (DOWN) SITE 1	SS1B7 (DOWN) SITE 1	SS1C8 (UP) SITE 1	SS1D9 (DOWN) SITE 1
PCB 1254	SW3550/8080 ^a	mg/kg	0.02 ^b	0.34	ND	ND	0.06
Moisture	ASTM D2216-71	%	-	38.	16.	7.4	17.

Note: 1) Results corrected for percent moisture
2) ND denotes values less than the detection limit

^aSW-846, second edition, July 1982.

^bUBTL method detection limit (MDL) calculated for PCB 1242 according to Federal Register, Vol. 49, No. 209, Friday, October 26, 1984, and applied to all of the PCBs.

concentration of 1.1 ug/L, and trichlorofluoromethane, at a concentration of 4.6 ug/L. Trichloroethene was also present at this location at a concentration of 290 ug/L, well above the detection limit of 0.60 ug/L. This concentration was confirmed by a second gas chromatographic column analysis.

It is believed that the presence of trichlorofluoromethane has not been substantiated at the DEW Line Stations during the Stage 2 study (see Section IV,B). The results received from the analytical laboratory are listed in the interest of presenting a complete report.

Site 1, as presented below, exhibited trichloroethene concentrations of 290 ug/L upgradient and 110 ug/L downgradient. Both concentrations are noticeably greater than any other trichloroethene concentrations detected during this investigation. Neither Primary nor Secondary Drinking Water Standards exist for trichloroethene. As of January, 1989, the NPDWRs will include eight volatile synthetic organic chemicals (VOC), with specific Maximum Contaminant Levels (MCL) for each VOC. Trichloroethene is among the groups of eight VOCs. The MCL will be an enforceable standard when finalized. The MCL for a chemical is based upon treatment technologies, costs (affordability), and other feasibility factors such as availability of analytical methods, treatment technology, and costs for achieving various levels of removal. The proposed MCL for trichloroethene is 0.005 mg/L or 5.0 ug/L. The trichloroethene concentration of 290 ug/L exceeds the proposed MCL for trichloroethene (5.0 ug/L).

An explanation as to why trichloroethene concentrations upgradient exceeded those downgradient cannot be validated based on available data. However, two explanations can be offered for consideration. This site has historically received a variety of wastes. During attempts to remove this waste or cover it with fill, considerable debris was apparently scattered around the outlying areas of the site, and, since the site's disturbance, the upgradient sampling location may be receiving contaminants that are originating from the scattered debris. Secondly, the upgradient sampling location is somewhat downgradient from Site 4 - Current Dump Site which could be contributing trichloroethene to the stream. Concentrations of trichloroethene may become diluted by surface and ground water contributions before reaching the Site 1 downgradient sampling location.

One soil sample was collected from the far bank of the stream in an undisturbed area and was submitted for analysis of PCB concentrations. All PCBs were below the level of detection at this location.

b. Site 1 - Downgradient

One surface water sample was collected downstream from Site 1 representing conditions of surface water possibly affected by seepage from the Old Dump (Plate 3). Temperature, salinity, pH, and specific conductance were 5.5°C, 0.0%, 6.61, and 520 umhos/cm, respectively. Purgeable halocarbons were detected downgradient of Site 1, however, each concentration was consistently lower than those found upgradient of Site 1. The purgeable halocarbons include 1,1-dichloroethane, at a concentration of 1.9 ug/L, trans-1,2-dichloroethene, at a concentration of 0.60 ug/L, methylene chloride, at a concentration of 5.9 ug/L, and trichlorofluoromethane, at a concentration of 3.1 ug/L. Trichloroethene was also present at 110 ug/L well above the detection limit of 0.60 ug/L. At this concentration, trichloroethene is also well above the proposed MCL of 5 ug/L.

Three soil samples were collected from fill material adjacent to the landfill and near the edge of the small stream which flows adjacent to Site 1. Chemical analyses revealed a detectable PCB 1254 concentration of 0.34 mg/kg and 0.06 mg/kg in two samples while the third sample had concentrations of PCBs below the level of detection. These concentrations are generally higher than the PCB concentrations found upgradient of Site 1. During Stage 1 investigations, soil samples collected adjacent to the land fill contained PCB and lead concentrations of 0.72 mg/kg and 76. mg/kg, respectively. Levels of PCBs and lead were below the detection limits both adjacent to the landfill and in the stream channel during Stage 1 investigations.

c. Site 3 - Upgradient

One surface water sample was collected from a small pond immediately upgradient of the tank farm to represent background conditions of the area near Site 3 (Plate 3).

Temperature, salinity, and pH were measured at 7.5°C, 0.0%, and 7.40, respectively, and were within expected background levels for these parameters. Specific conductance was found to be slightly elevated at 680 umhos/cm. One purgeable halocarbon, trichlorofluoromethane, was detected at this sampling location, at a concentration of 1.6 ug/L. Additionally, petroleum hydrocarbons were detected at 4.4 mg/L.

d. Site 3 - Downgradient

One surface water sample was collected from ponded surface water adjacent to petroleum storage tanks (Plate 3). During sampling, no oil sheen was noticed on the water surface and disturbed sediments released no apparent petroleum products.

At the time of Stage 2 sampling, water temperature, pH, and salinity were measured at 6.5°C, 7.2, and 0.0‰, respectively and within expected background levels. During Stage 1 and Stage 2 investigations, specific conductance was found at 720 umhos/cm and 650 umhos/cm, respectively. During Stage 2, purgeable halocarbons detected within the ponded area include trans-1,2-dichloroethene, at a concentration of 0.43 ug/L, slightly above the detection limit of 0.42 ug/L, and trichlorofluoromethane, at a concentration of 3.2 ug/L. Additionally, trichloroethene was measured at 0.76 ug/L, slightly above the detection limit of 0.60 ug/L and below the proposed MCL of 5 ug/L. During Stage 1 sampling, TOX and oil and grease were found to be present at concentrations of 120 ug/L and 36 mg/L, respectively.

e. Site 4 - Upgradient

One sample was collected from surface water flowing toward Site 4 from the southwest and upgradient from the site to represent background conditions near Site 4 (Plate 3).

Temperature, salinity, pH, and specific conductivity were measured at 4.8°C, 0.0‰, 6.60, and 360 umhos/cm, respectively. Only one purgeable halocarbon, trichlorofluoromethane was detected upgradient of Site 4 at a concentration of 1.1 ug/L, slightly above the detection limit of 0.44 ug/L.

f. Site 4 - Downgradient

One surface water sample was collected from water flowing from Site 4 in a swampy area approximately 25 feet north and downgradient of the site (Plate 3).

Temperature and pH was measured at 4.0°C and 6.15. Salinity and specific conductance were measured at 1.5‰ and 2500 umhos/cm, both higher than those levels indicated upgradient. A portion of the increased salinity and specific conductance are believed to be due to the effects of sea spray. Of the three purgeable halocarbons detected downgradient, 1,1-dichloroethane, at a concentration of 1.9 ug/L, and methylene chloride,

at a concentration of 5.1 ug/L, were elevated compared to those levels upgradient which were below the limits of detection. The trichlorofluoromethane concentration was only slightly greater downgradient (3.1 ug/L) than upgradient (1.1 ug/L).

g. Site 8 - Upgradient

One surface water sample was collected upgradient above culverts carrying a stream under the access road to the station from the east (Plate 3). Temperature, salinity, pH, and specific conductance were 6.5°C, 0.0‰, 7.51, and 325 umhos/cm respectively. Trichlorofluoromethane was measured at 1.3 ug/L, slightly above the detection limit of 0.44 ug/L.

h. Site 8 - Downgradient

One surface water sample was collected downgradient from the wastewater discharge (Plate 3). The pH level of this sample was 7.09. Purgeable halocarbon levels detected at this site include trans-1,2-dichloroethane of 0.62 ug/L. (Detection limit of 0.42 ug/L), trichlorofluoromethane of 1.5 ug/L, and trichloroethene of 1.5 ug/L. The trichlorofluoromethane concentration was comparable to that found upgradient. Primary or Secondary Drinking Water Standards have not been established for either of these purgeable halocarbons; however, the proposed MCL for trichloroethene (5.0 ug/L) is well above the concentration found downgradient of this site (1.5 ug/L). Results of Stage 1 investigations have previously indicated a TOX concentration of 180 ug/L at this location.

i. Site 9 - Upgradient

One surface water sample was collected upgradient of the stream above the disposal site (Plate 3). The level of pH (6.35) was only slightly acidic. Temperature, salinity, and specific conductance of 4.2°C, 0.0‰, and 265 umhos/cm, respectively, were within expected normal conditions. No purgeable halocarbons were detected at this site.

j. Site 9 - Downgradient

One water sample was collected near the mouth of a deeply incised stream which empties into the Beaufort Sea, and which would receive possible contaminants from the old dump site (Plate 3). The level of pH (6.00) was lower than that measured upgradient (6.35).

Trichlorofluoromethane was measured at 1.2 ug/L, a concentration slightly greater than that found upgradient where trichlorofluoromethane was below the limit of detection (0.44 ug/L). During Stage 1, water samples collected downgradient of the old dump site also indicated 190 ug/L of TOX.

2. POW-3

a. Site 13

One surface water sample was collected from lagoon waters adjacent to the site (Plate 4). Temperature and pH were measured at 11.5°C and 7.40, respectively, and were within expected normal background levels. Salinity was elevated at 15.5% corresponding to elevated salinity during Stage 1 investigations (7.5%). Specific conductance was also elevated at 20,000 umhos/cm, as compared to those results of the Stage 1 investigations showing 11,496 umhos/cm. No purgeable halocarbons were detected at this site during Stage 2 investigations, despite those findings of the Stage 1 investigations which indicated an elevated level of TOX (1100 ug/L). The elevated TOX concentration is believed to be due to chloride interference during TOX analysis. Likewise, the high salinity at this site contributes significantly to the elevated specific conductance. Also, during Stage 1 investigations, lead concentrations were at the maximum level permitted (0.05 mg/L) by the Primary Drinking Water Standards. Analysis of this sample indicated no concentration of lead above the detection limit of 0.60 ug/L.

3. POW-2

a. Site 16 - Upgradient

One surface water sample was collected from a location upgradient from the dump site (Plate 5). Temperature and pH were measured at 6.8°C and 8.1. Salinity was measured at 13.0% while specific conductance was elevated at 13,800 umhos/cm, reflecting the brackish water or sea spray effects near the Beaufort Sea. Trichlorofluoromethane was measured at 0.67 ug/L, slightly above the detection limit of 0.44 ug/L. Analysis of this sample revealed no levels of lead above the detection limit of 0.6 ug/L.

b. Site 16 - Downgradient

One surface water sample was collected from lagoon waters downgradient of Site 16 and near the Beaufort Sea (Plate 5). Temperature, pH, salinity, and specific conductance were measured at 5.5°C, 7.9, 15.1% and 15,000 umhos/cm. The elevated specific conductance and salinity represented

brackish conditions near the Beaufort Sea. Trichlorofluoromethane the only purgeable halocarbon detected, was measured at a concentration of 0.53 ug/L, slightly above the detection limit of 0.44 ug/L and below the concentration of 0.67 ug/L found upgradient of the site. During Stage 1 sampling, moderately high levels of TOX (890 ug/L) were found downgradient of the dump site and lead was elevated (0.03 mg/L) but below the Primary Drinking Water Standard. The TOX concentrations can be attributed to the relatively high salinity found at this site. Analysis of this sample revealed no lead concentration above the limit of detection of 0.60 ug/L.

4. POW-1

a. Site 28 - Upgradient

One surface water sample was collected upgradient of the POL tank farm (Plate 6). The level of pH was measured at 8.60. Temperature was measured at 5.5°C, while other physical parameters including salinity and specific conductance at 0.6% and 780 umhos/cm, respectively, were slightly elevated. Trichlorofluoromethane was measured at 0.8 ug/L, slightly above the detection limit of 0.44 ug/L while petroleum hydrocarbons were measured at 1.5 mg/L.

b. Site 28 - Downgradient

One surface water sample was collected from ponded water adjacent to the dike and pad around the tank farm (Plate 6). Temperature was measured at 5.7°C while salinity and specific conductance were measured at 0.4%, and 680 umhos/cm, respectively, and comparable to those levels found upgradient. The level of pH was measured at 8.15. The purgeable halocarbon, trichlorofluoromethane was measured at 0.76 ug/L which was slightly lower than that measured upgradient (0.81 ug/L). Petroleum hydrocarbon concentrations were slightly higher (2.0 mg/L) at this location compared to 1.5 mg/L detected upgradient. Levels of TOX (170 ug/L) and oil and grease (7 mg/L) were also reported at this location during Stage 1 sampling.

c. Site 31

One water sample was collected from lagoon waters adjacent to the old dump (Plate 6). Physical parameters measured included temperature, at 5.2°C, and pH at 8.10. Elevated levels of salinity at 2.53%, and specific conductance at 25,200 umhos/cm. The elevated salinity and conductance is a result of saline conditions created by the lagoon's direct connection with the Beaufort Sea. Stage 1 results indicated a slightly acidic

condition with pH at 6.85, while specific conductance was 2414 umhos/cm. Trichlorofluoromethane was found at 0.73 ug/L slightly above the detection limit of 0.44 ug/L. Stage 1 investigations revealed a moderately high level of TOX (950 ug/L) which accompanied the conductivity of 2414 umhos/cm.

d. Site 32 - Upgradient

One surface water sample was collected upgradient from Husky Oil Company dump (Plate 6). Temperature and pH were measured at 4.3°C and 8.40, while salinity and specific conductance were found to be elevated at 2.8‰ and 3110 umhos/cm, respectively. The purgeable halocarbons dibromochloromethane at a concentration of 0.65 ug/L, 1,2-dichloroethane at a concentration of 2.3 ug/L, 1,2-dichloropropane at a concentration of 3.8 ug/L, methylene chloride at a concentration of 0.37 ug/L, and tetrachloroethene at a concentration of 1.4 ug/L, were present at this location upgradient from Site 32.

Samples for both Sites 32 and Site 40 were analyzed for eleven phenols. A confirmation analysis was performed when phenols were detected during the initial analysis. The initial analysis utilized a gas chromatographic (GC) procedure which would primarily indicate the presence of a phenol above a given detection limit for that particular phenol. In some instances, this procedure was insufficient for determining the actual phenol concentrations. The confirmation analysis involved the use of gas chromatography (GC) and mass spectroscopy (MS). The values obtained from the GC/MS confirmation analysis generally were lower than those found in the initial GC analysis. Accordingly, the data reported for phenols in Table 2 are a combination of GC and GC/MS results.

The surface water sample was analyzed for eleven phenols, and only one, pentachlorophenol (9.6 ug/L) was detectable during the confirmation analysis.

e. Site 32 - Downgradient

One surface water sample was collected from a pond adjacent to the site of the Husky Oil Company dump (Plate 6). The pH level (8.60) was slightly higher than the level measured upgradient (8.40). Temperature was measured at 3.7°C. Salinity and specific conductance were both elevated at 2.8‰ and 2850 umhos/cm, respectively. During Stage 1 investigations, both pH (9.2) and specific conductance (1856 umhos/cm) were also above anticipated background levels. However, both downgradient specific

conductance measurements were lower than that of the Stage 2 upgradient specific conductance measurement. Purgeable halocarbons, excluding trichlorofluoromethane, detected at this location were all at levels lower than those detected at the upgradient location. These halocarbons include dibromochloromethane, at a concentration of 0.31 ug/L, 1,2-dichloroethane, at a concentration of 1.9 ug/L, 1,2-dichloropropane, at a concentration of 2.7 ug/L, and tetrachloroethene at a concentration of 1.1 ug/L. Methylene chloride was below the limits of detection. The trichlorofluoromethane concentration of 0.78 ug/L, was slightly above the limit of detection (0.44 ug/L) whereas trichlorofluoromethane was below the limit of detection in the sample collected upgradient of the site. Analysis indicated a concentration of 8400 ug/L TOX at this location during the Stage 1 investigation.

The surface water sample was analyzed for eleven phenols, only one of which was detected during the confirmation analysis. Pentachlorophenol was found at 9.5 ug/L which is comparable to that found upgradient. The phenol analysis data reported in Table 2, as explained earlier for Site 32 data, are a combination of gas chromatography and gas chromatography/mass spectroscopy results.

5. LIZ-2

a. Site 40 - Upgradient

One surface water sample was collected upgradient of the active dump in a small stream that flows near and through the dump (Plate 7). Temperature, pH, salinity, and specific conductance were measured at 6.9°C, 7.65, 0.2‰ and 348 umhos/cm, respectively. Trichlorofluoromethane was measured at a concentration of 1.4 ug/L. Trichloroethene measured at a concentration of 2.1 ug/L, was less than the proposed MCL of 5.0 ug/L.

b. Site 40 - Downgradient

One surface water sample was collected from ponded water at the edge of the dump and adjacent to the lagoon (Plate 7). Temperature and pH were measured at 7.1°C and 7.05, respectively. Salinity (1.2‰) and specific conductance (1400 umhos/cm) were above expected background levels. An elevated TOX concentration of 1400 ug/L, which paralleled the elevated salinity, was measured at this location during the Stage 1 investigation. All purgeable halocarbons, excluding trichloroethene were present at greater concentrations at the downgradient location as compared to the upgradient location. The downgradient purgeable halocarbons include 1,1-dichloroethane, at a concentration of 1.2 ug/L, 1,2-dichloropropane, at

a concentration of 6.2 ug/L, methylene chloride, at a concentration of 6.4 ug/L, 1,1,1-trichloroethane at a concentration of 1.2 ug/L, and trichlorofluoromethane at a concentration of 9.3 ug/L. Trichloroethene was below the limits of detection at the downgradient location.

Two phenols were detected during confirmation analysis at this downgradient location. Pentachlorophenol and phenol were detected at 4.4 ug/L and 7.2 ug/L, respectively.

c. Site 43 - Upgradient

One surface water sample was collected from a small lake located on the uplands above the basin and upgradient of sites 42 and 44 (Plate 7). Temperature, pH, salinity, and specific conductance were measured at 6.1°C, 8.00, 0.0% and 128 umhos/cm, respectively. No purgeable halocarbons were detected at this upgradient location.

d. Site 43 - Downgradient

One surface water sample was collected downgradient of the old dump from a depression in the tundra map (Plate 7). Temperature, pH, salinity, and specific conductance were measured at 5.9°C, 7.90, 0.2%, and 357 umhos/cm, respectively. Trichlorofluoromethane was detected at a concentration of 1.0 ug/L, slightly greater than the detection limit of 0.44 ug/L.

e. Site 44 - Downgradient

One surface water sample was collected from a small lake inside the basin and downgradient from the most likely location for a dump in the immediate vicinity. Temperature, pH, salinity, and specific conductance were measured at 6.1°C, 7.85, 0.6%, and 770 umhos/cm, respectively. No purgeable halocarbons were detected at this location.

6. Background Concentration

The only concentrations of organic indicator parameters, metals, phenols, oil and grease, PCBs, and physical parameters available for use as background concentrations at the DEW Line stations include the previous Phase II, Stage 1 study data (Dames & Moore, 1986) which are provided in Appendix G and results from upgradient (control) locations sampled during Phase II, Stage 2. Generally, all upgradient sampling locations, where applicable, were used to represent background concentrations. Exceptions

included Site 1 and Site 32 where water analysis results for each site revealed higher levels of contamination upgradient than downgradient. The sample location assumed to be upgradient of Site 32, in fact, may be downgradient as it appears to be receiving minor contaminants from Site 32.

B. SIGNIFICANCE OF FINDINGS

Based on the results previously described, this section will estimate the extent of contamination at 13 sites associated with DEW Line installations located along the seacoast of the North Slope of Alaska, and the risk to human health, if any, that the contamination poses.

1. BAR-M

a. Site 1 - Old Dump Site

The analysis of water samples from the downgradient location at Site 1 revealed the presence of five organic contaminants; 1,1-dichloroethane (1.9 ug/L), trans-1,2-dichloroethene (0.60 ug/L), methylene chloride (5.9 ug/L), trichloroethene (110 ug/L), and trichlorofluoromethane (3.1 ug/L). The presence of these purgeable halocarbons, excluding trichloroethene, is indicative of low level contamination. The concentrations of four of the compounds were near the limits of detection for the analyses. The presence of the fifth compound, trichloroethene, at the above concentration is, however, indicative of contamination, especially as this compound has been categorized by the USEPA as a possible human carcinogen. All five contaminants may migrate off-base into the Beaufort Sea, but do not appear to be potential contaminants of the potable freshwater supply.

Compared with the downgradient location the analysis of water samples from the upgradient location at Site 1 indicated higher concentrations of organic contaminants including bromomethane (15 ug/L), 1,1-dichloroethane (4.1 ug/L), trans-1,2-dichloroethene (2.0 ug/L), methylene chloride (16 ug/L) 1,1,1-trichloroethane (1.1 ug/L), trichloroethene (290 ug/L), and trichlorofluoromethane (4.6 ug/L). The presence of all the above purgeable halocarbons, with the exception of trichloroethene, were near the limits of detection for the analyses. However, the presence of trichloroethene is indicative of contamination as stated previously for the downgradient sample. It is possible that these elevated concentrations dissipate or become diluted as they migrate downgradient toward the Beaufort Sea. As indicated by the lower concentrations downgradient of Site 1. Again, these constituents do not appear to be potential contaminants of local potable fresh water supplies.

Results of the soils analyses indicate the presence of PCB 1254 downgradient of Site 1. The concentrations ranged from 0.06 to 0.34 mg/kg which are near the level of detection (0.02 mg/kg) indicating low levels of PCB contamination. PCBs were also measured at a concentration of 0.72 mg/kg during Stage 1 investigations. PCBs were not detected in the sample collected upgradient from Site 1.

b. Site 3 - Waste Petroleum Disposal

The analysis of water samples from Site 3 revealed the presence of four organic contaminants; trans-1,2-dichloroethene (0.43 ug/L), trichloroethene (0.76 ug/L), trichlorofluoromethane (3.2 ug/L), and petroleum hydrocarbon (2.2 ug/L). The presence of these organic compounds are indicative of minor contamination, particularly since the concentrations were near the limits of detection. The proposed MCL for trichloroethene is 5.0 ug/L, and was not exceeded by the 0.74 ug/L concentration at this site. It is believed that these minor concentrations would dissipate with migration to below the limit of detection at a short distance from this site. Previous sampling results (Stage 1) indicate oil and grease at a concentration of 36 mg/L and TOX at a concentration of 1200 ug/L. The TOX concentration may be resulting from the influence of sea spray. The upgradient sample indicated minor contamination by trichlorofluoromethane (1.6 ug/L) and petroleum hydrocarbon (4.4 ug/L). Seepage from these areas would possibly result in the contaminants migrating downgradient to the Beaufort Sea and there does not appear to be a potential for contamination of potable water supplies by either the upgradient or downgradient contaminants.

c. Site 4 - Current Dump Site

The analysis of water samples from the downgradient location at Site 4 revealed the presence of three organic contaminants: 1,1-dichloroethane (1.9 ug/L), methylene chloride (5.1 ug/L), and trichlorofluoromethane (3.1 ug/L). The upgradient sample indicated only minor concentrations of trichlorofluoromethane (1.3 ug/L). These concentrations were all near the limits of detection indicating low contamination levels. All of these contaminants may migrate to the Beaufort Sea, but they do not appear to be potential contaminants of any potable water supply.

d. Site 8 - Drainage Cut Contamination

Analysis of water samples from the downgradient location at Site 8 indicate the presence of three organic contaminants: trans-1,2-dichloroethene (0.62 ug/L), trichloroethene (1.5 ug/L), and

trichlorofluoromethane (1.5 ug/L). Additionally, during Stage 1 investigations, TOX concentrations were measured at 180 ug/L indicating moderate contamination of the surface water and reflecting the influence of sea spray from the Beaufort Sea. Upgradient sampling results indicate only minor concentrations of trichlorofluoromethane (1.3 ug/L). All contaminants were near the level of detection indicating low contamination levels. Contaminants from these areas would possibly migrate downgradient to the Beaufort Sea and would not appear to affect any potable water supply.

e. Site 9 - Old Dump Site N.W.

Water samples analyzed from Site 9 revealed only minor concentrations of trichlorofluoromethane (1.2 ug/L) downgradient of the site. This concentration is near the limit of detection and, therefore, indicates a low level of contamination. This contamination may migrate off base into the Beaufort Sea.

Since potable water supplies for BAR-M are obtained from fresh water lakes upgradient of the sites, human health is not directly affected by the minor contamination detected in this investigation. There is a possibility that these contaminants found at BAR-M may migrate off base into the Beaufort Sea.

2. POW-3

a. Site 13 - Old Dump Site East

Lead levels at the maximum concentration levels permitted by the Primary Drinking Water Regulations and high TOX concentrations were detected at this sample location during Stage 1 investigations. Contrary to the Stage 1 results, Stage 2 results indicated no detectable levels of purgeable halocarbons and no detectable levels of lead. Any seepage from the dump site would appear to migrate off base and into the salt water lagoon which is connected to the open sea. The potable water supply from freshwater lakes is not affected by these contaminants; however, the lagoon environment may possibly be affected.

3. POW-2

a. Site 16

Water samples analyzed at Site 16 during Stage 2 investigations revealed only minor contamination by trichlorofluoromethane at both the

downgradient (0.53 ug/L) and upgradient (0.67 ug/L) sampling locations. These concentrations were near the limit of detection. Earlier investigations (Stage 1) revealed relatively high levels of TOX (890 ug/L) and lead (0.03 mg/L). The TOX concentrations are likely influenced by sea spray from the lagoon and Beaufort Sea. These contaminants may be affecting lagoon waters and possibly migrating off base. Freshwater lakes, the potable water supply, do not appear to be affected by this site.

4. POW-1

a. Site 28 POL Storage Area

Oil and grease at 7 mg/L and TOX at 170 ug/L detected during Stage 1 investigations and trichlorofluoromethane (0.7 ug/L downgradient, 0.08 ug/L upgradient) and petroleum hydrocarbons (2.0 mg/L downgradient, 1.5 mg/L upgradient) detected during Stage 2 investigations in the ponded water adjacent to the POL storage pad, do not appear to be a potential source of contamination to the potable water supply. TOX concentrations are most likely influenced by salt water from sea spray. Contamination from this site could possibly drain northeast to the salt water lagoon adjacent to the site or west and eventually north where it would drain into the Beaufort Sea. The freshwater lake is approximately three-quarters of a mile southwest of the site and does not appear to be threatened by any contamination originating at the site.

b. Site 31 - Old Dump Site

Water sample analysis from Site 31 revealed only minor concentrations of trichlorofluoromethane (0.73 ug/L), slightly above the limit of detection, whereas Stage 1 analysis indicated TOX values of 950 ug/L.

c. Site 32 - Husky Oil Dump

The analysis of water samples collected from both (upgradient - downgradient) of the pond adjacent to the Husky Oil Company dump (Site 32) revealed low levels of five organic contaminants: dibromochloromethane (0.65 - 0.31 ug/L), 1,2-dichloroethane (2.3 - 1.9 ug/L), 1,2-dichloropropane (3.8 - 2.7 ug/L), methylene chloride (0.37 - ND ug/L), tetrachloroethene (1.4 - 1.1 ug/L), trichlorofluoromethane (0.78 - ND ug/L). Additionally, moderate levels of pentachlorophenol (9.6-9.5 ug/L) were detected during confirmation analysis. TOX (8400 ug/L) and phenols (25

ug/L) were also detected during the earlier Stage 1 investigations. The elevated TOX concentrations are most likely reflecting the influence of salt water (sea spray). These contaminants may migrate off base to the Beaufort Sea but they do not appear to be a potential contaminant of the potable fresh water supply.

5. LIZ-2

a. Site 40 - Current Dump Site

Comparison of the analysis of water samples from Site 40 upgradient with those from Site 40 downgradient indicate greater contamination below the current dump site. Upgradient results revealed minor concentrations of trichloroethene (2.1 ug/L), and trichlorofluoromethane (1.4 ug/L). Analysis of the surface water sample collected downgradient of the current dump revealed moderate levels of six organic contaminants and two phenols: 1,1-dichloroethane (1.2 ug/L), 1,2-dichloropropane (6.2 ug/L), methylene chloride (17 ug/L), tetrachloroethene (6.4 ug/L), 1,1,1-trichloroethane (1.2 ug/L), trichlorofluoromethane (9.3 ug/L), pentachlorophenol (4.4 ug/L), and phenol (7.2 ug/L). Water samples collected from water ponded near the edge of the dump during Stage 1 investigations also had high levels of TOX (1400 ug/L), most likely reflecting salt water influence, and phenols (13 ug/L). These contaminants, by virtue of their location, could potentially migrate off base and enter Kasegaluk Lagoon. It is unlikely that the station water supply would be affected by this site.

b. Site 43 and 44 - Old Dump Site North and Suspected Dump Site

Analysis of water samples collected during Stage 2 revealed contaminants only downgradient from Site 43. The sample was collected from a small lake nearest Site 43 and it was believed that any contamination from either Site 43 or Site 44 would ultimately migrate to this lake. Analysis of this sample revealed only a minor concentration of trichlorofluoromethane (1.0 ug/L) only. Samples collected at Site 44 and upgradient of Site 43 reveal no detectable contaminants. The water samples collected during Stage 1 investigations from both of these sites revealed elevated TOX values (130 ug/L and 150 ug/L), reflecting sea spray influence. Although the water supply does not appear to be threatened by this contaminant, the possibility exists that the contaminant may migrate off base and affect the Kasegaluk Lagoon.

V. ALTERNATIVE MEASURES AND CONCLUSIONS

Based on the surface water and soil analysis results from Phase II, Stage 1 and Phase II, Stage 2 investigations, it is evident that none of the five DEW Line stations present any immediate potential for human health hazards. Although most sites within the stations indicate minor contamination, all are downgradient of potable water supplies. One site, however, does exhibit concentrations of trichloroethene well above levels expected for background. Trichloroethene was detected at higher concentrations upgradient of this site than downgradient. Trichloroethene has been defined by the USEPA as a possible human carcinogen. Additional investigations may be necessary to better define the source of this contaminant. Further investigations of the remaining 12 sites does not appear to be warranted.

A. ALTERNATIVE MEASURES

1. BAR-M

a. Site 1 - Old Dump Site

Analysis of water samples from Site 1, the old dump site, revealed levels of trichloroethene concentrations above expected background levels at both the upgradient sample location and the downgradient sample location. Furthermore, trichloroethene concentrations at the upgradient sample location (290 ug/L) were higher than those concentrations detected downgradient (110 ug/L) indicating a possible unidentified source of contamination. As of January 9, 1989, a maximum contaminant level (MCL) of 5.0 ug/L will be in effect and trichloroethene will be incorporated into the NPDWRs.

To better define the source of this contamination, additional sample collection and analysis for volatile halocarbons should be undertaken. Surface water and sediment samples should be collected from three locations approximately 300 feet west of the Site 1 upgradient sample location to test for possible contaminant migration from the current dump site (Site 4). Also three surface water and sediment samples should be taken at locations approximately 300 feet south of the Site 1 upgradient sample location to test for possible contaminant migration from the BAR-M central facilities. Three surface water and sediment samples, located at 100-foot intervals downgradient of the Stage 2 sampling locations, should be collected to detect contaminant concentrations downgradient of this site and prior to flow into the ocean.

2. POW-1

a. Site 31

Presently, the physical and chemical parameters measured during Stages 1 and 2 do not indicate that this site is contributing to environmental pollution. However, archival photographs reviewed by Alaska Department of Environmental Conservation (ADEC) indicate that a large number of 55 gallon drums were buried at this site. An additional records search could be used to provide more specific information regarding the existence and location of these drums.

B. CONCLUSIONS

This section contains a summary of the conclusions reached after completion of Stage 2 of the IRP. Recommendations for additional investigation and action are given in Section VI, and attendant costs are presented under separate cover in Appendix J.

The potential for contamination at DEW Line is moderated by the absence of refueling and defueling as part of the station's mission and by the fact that an ongoing clean-up program has been in effect for the past several years.

The potential for risk to potable water supplies is small because fresh water lakes are used as a potable source rather than ground water. These lakes are located inland and, hence, upgradient of the dump sites. Trichloroethene concentrations were present both upgradient and downgradient of Site 1. Site 32 had concentrations of dibromochloromethane, 1,2-dichloroethane, 1,2-dichloropropane, methylene chloride, tetrachloroethene, and trichlorofluoromethane all slightly above expected background levels. Similarly Site 1 had levels of bromomethane, 1,1-dichloroethane, trans-1,2-dichloroethene, methylene chloride, 1,1,1-trichloroethane, and trichlorofluoromethane above expected background concentrations in addition to the high concentrations of trichloroethene previously described. PCBs were found at low concentrations in soils at Site 1 during both Stage 1 and Stage 2 investigations.

Stage 2 results also indicated organic contaminants at Sites 3, 32, and 40 slightly above expected background concentrations.

Stage 1 water analyses consistently detected high levels (130 ug/L to 8400 ug/L) of TOX (total organic halogens) at all five stations. This is most likely the result of salt water (sea spray) influence. The highest total value of purgeable halocarbons detected during Stage 2 investigations for any one site (excluding Site 1) was only 41.3 ug/L which occurred downgradient of Site 40 and disagrees with a Stage 1 TOX concentration of 1400 ug/L. Stage 1 analysis at Site 32 revealed a TOX concentration of 8400 ug/L while Stage 2 analysis resulted to total purgeable halocarbons of only 6.79 ug/L.

Low levels of trichlorofluoromethane were generally persistent throughout the DEW Line stations during Stage 2 investigations. Concentrations ranged from a high of 9.3 ug/L downgradient from Site 40 to levels near or below the limit of detection (0.44 ug/L) elsewhere. Furthermore, trichlorofluoromethane was consistently present in samples when all other purgeable halocarbons were below the limits of detection. The laboratory that performed the analysis on water samples does not utilize trichlorofluoromethane as a solvent or refrigerant and the method blanks analyzed had no detectable concentrations of this halocarbon. However, trichlorofluoromethane is commonly used as a refrigerant. When trichlorofluoromethane is present in an environment which does not promote volatilization, it will remain detectable for some time. The low levels of trichlorofluoromethane detected at the DEW Line Stations do not present an immediate hazard to human health.

The levels of oil and grease detected at Site 3 and Site 28 during Stage 1 analysis parallel those levels of petroleum hydrocarbon detected during Stage 2 investigations at the same locations. The presence of oil and grease/petroleum hydrocarbons is most likely resulted from the inadvertent spillage and seepage of petroleum products within the POL storage area and from the waste disposal area (Site 3). As stated earlier, any of these contaminants migrating off site are not expected to present a hazard to human health.

Analysis of water samples collected during Stage 1 investigations indicated lead concentrations of 50 ug/L at Site 13 and 30 ug/L at Site 16. In contrast, analysis of water samples collected during Stage 2 failed to detect lead concentrations above the limit of detection (0.6 ug/L). Analytical procedures differed from Stage 1 to Stage 2 samples with a more sophisticated or refined procedure applied to Stage 2 samples. Therefore, Stage 2 results are considered more reliable and, accordingly, lead is considered not to be detectable at Site 13 and Site 16.

Certain hydrologic and geologic conditions at the DEW Line stations may promote lateral transport of contaminants off site. These include moderately low permeability soils, and impermeable permafrost layer occurring only several feet below ground surface, and surface drainage of many of the sites into the seas or lagoons. Sites 1, 4, 8, 9, 13, 16, 31, 32, 40, 43, and 44 have a higher probability of discharging contaminants off site.

VI. RECOMMENDATIONS

The recommendations presented in this section primarily serve to identify site(s) at which further action is deemed warranted.

A. SITES WHERE FURTHER ACTIONS ARE DEEMED UNWARRANTED

Based on the results of sampling and analysis of water and soil samples at the DEW Line stations, it is recommended that no further investigations be considered at Sites 3, 4, 8, 9, 13, 16, 28, 31, 32, 40, 43, and 44.

B. SITES WARRANTING FURTHER INVESTIGATION

1. BAR-M

a. Site 1

It is recommended that three surface water and sediment samples be collected 300 feet west of the upgradient Site 1 sample location and three surface water and soil samples be collected 300 feet south of the upgradient Site 1 sample location. Also, three surface water and sediment samples at 100-foot intervals downgradient from the Stage 2 sampling location should be collected to determine contaminant concentrations downgradient of Site 1 and prior to discharge into the ocean. The purpose of this sampling effort is to define the source or sources from which trichloroethene is originating upgradient of Site 1 during Stage 2 investigations. These samples should be analyzed for volatile halocarbons (USEPA 601).

2. POW-1

a. Site 31

A further records search is recommended to investigate the possibility of 55-gallon drums reportedly buried in this landfill. The records search should encompass review of archival photographs and interviews with ADEC personnel who have knowledge of this site.

Subsequent to the findings of the Phase II, Stage 2, additional information became available on specific site conditions of the DEW Line Stations. This information is based, in part, on site visits conducted during August, 1987 by personnel from the USEPA Region I, ADEC, and

USAFOEHL, and recently discovered historical aerial photographs and other agency file data. In the interest of completeness, a generalization of their recommendations are presented here. Many of the recommendations fall into Phase IV, remediation, activities.

1. BAR-M

a. Site 1

Erosion control along the ocean shoreline east of the landfill is recommended to inhibit the potential for contaminants to enter the sea.

b. Site 3

Additional sampling is recommended to quantify the extent of spillage resulting from the reported break in the dike wall surrounding the POL storage tanks.

c. Site 4

Drainage diversion around the landfill area as well as additional sediment and water samples to characterize leachate are recommended for this site.

2. POW-3

a. Site 13

A transformer spill and improper storage of solvents and paint thinners in a shed were located during the 1987 site visit. Sampling of the spill for PCB's and proper handling and disposal of the solvents and thinners have been recommended.

3. POW-1

a. Site 28

Additional sampling has been recommended to investigate a reported fuel spill on the south side of the old Husky oil tanks located at the west end of the airstrip.

b. Site 32

Additional investigations to determine if this landfill is adversely impacting the environment as well as repair of the cover over the fill have been recommended.

4. LIZ-2

a. Site 40

Drainage diversion around the landfill to prevent leachate generation of the fill material is recommended.

APPENDIX A
DEFINITIONS, NOMENCLATURE, AND UNITS OF MEASUREMENT

DEFINITIONS, NOMENCLATURE, AND UNITS OF MEASUREMENT

AAC	Alaskan Air Command
AFB	Air Force Base
alluvium	Unconsolidated sediments deposited during comparatively recent geologic time by a stream or other body of running water.
alluvial fan	Alluvial material deposited as a cone or fan at the base of a mountain slope.
aquifer	A geologic formation, group of formations, or part of a formation that is capable of yielding water to a well or spring.
aquiclude	A body of relatively impermeable rock that is capable of absorbing water slowly but functions as an upper or lower boundary of an aquifer and does not transmit ground water rapidly enough to supply a well or spring.
aquitard	A confining bed that retards but does not prevent the flow of water to or from an adjacent aquifer.
aromatic	Designating cyclic organic compounds characterized by a high degree of stability in spite of their apparent unsaturated bonds and best exemplified by benzene and related structures, but also evident in other compounds.
artesian	Ground water confined under hydrostatic pressure.
as N	As weight of nitrogen
AVGAS	Aviation gasoline
Bromomethane	CH ₃ Br (Methyl bromide)
cm/sec	Centimeter(s) per second
cone of depression	A depression in the potentiometric surface of a body of water that has the shape of an inverted cone and develops around a well from which water is being withdrawn.
conglomerate	The consolidated equivalent of gravel, both in size range and in the essential roundness and sorting of its constituent particles.

Cretaceous	A period of geologic time thought to have covered the span between 144 and 66.4 million years ago. Also, the corresponding system of rocks.
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DESEP	Civil Engineering/Environmental Planning
Devonian	A period of geologic time thought to have covered the span between 408 and 360 million years ago. Also, the corresponding system of rocks.
DEW	Distant Early Warning
1,1-Dichloroethane	CH_3CHCl_2 (Ethylidene chloride)
1,2-Dichloroethane	$\text{ClCH}_2\text{CH}_2\text{Cl}$ (Ethylene dichloride)
trans-1,2-Dichloroethene	CHClCHCl (Dichloroethylene)
2,4-Dichlorophenol	$\text{Cl}_2\text{C}_6\text{H}_3\text{OH}$
1,2-Dichloropropane	$\text{CH}_3\text{CHClCH}_2\text{Cl}$ (Propylene dichloride)
2,4-Dimethylphenol	$(\text{CH}_3)_2\text{C}_6\text{H}_3\text{OH}$
2,4-Dinitrophenol	$\text{C}_6\text{H}_3\text{OH}(\text{NO}_2)_2$
DOD	Department of Defense
downgradient	In the direction of decreasing hydraulic static head; the direction in which ground water flows.
effluent	A liquid waste discharge from a manufacturing or treatment process, in its natural state, or partially or completely treated, that discharges into the environment.
°F	Degrees Fahrenheit
FSI	Felec Services, Inc.
ft	Foot, feet

gpd/ft	Gallon(s) per day per foot
gpm	Gallon(s) per minute
HNU	A type of photoionization detector for measurement of organic vapors
hydraulic gradient	In an aquifer, the rate of change of pressure head per unit of distance of flow at a given point and in a given direction.
in	Inch, inches
IRP	Installation Restoration Program
Jurassic	A period of geologic time thought to have covered the span between 208 and 144 million years ago. Also, the corresponding system of rocks.
LEL	Lower explosive limit
Methylene Chloride	CH ₂ Cl (methylene dichloride)
2-Methyl-4,6-Dinitrophenol	CH ₃ C ₆ H ₃ OH(NO ₂) ₂
mg/g	Milligram(s) per gram
mg/L	Milligram(s) per liter
ml	Milliliter(s)
μg/g	Microgram(s) per gram
μg/L	Microgram(s) per liter
MOGAS	Motor gasoline
monitor well	A well used to measure ground water levels and to obtain samples.
msl	Mean sea level
2-Nitrophenol	NO ₂ C ₆ H ₄ OH
No.	Number
NPDES	National Pollutant Discharge Elimination System
OEHL	Occupational and Environmental Health Laboratory

OEHL/TS	Occupational and Environmental Health Laboratory/ Technical Services
Pentachloro- phenol	C_6Cl_5OH (PCP)
pH	Negative logarithm of hydrogen ion concentration; measurement of acids and bases.
Phenol	C_6H_5OH A class of aromatic organic compounds in which one or more hydroxy groups are attached directly to the benzene ring.
PCB	Polychlorinated biphenyl; highly toxic to aquatic life; PCBs persist in the environment for long periods of time and are biologically accumulative.
PCBs	Polychlorinated biphenyls
PDWS	Primary drinking water standard(s)
percolation	Movement of moisture by gravity or hydrostatic pressure through interstices of unsaturated rock or soil.
permafrost	Any soil, subsoil, or other surficial deposit, or even bedrock, occurring in arctic or subarctic regions at a variable depth beneath the earth's surface in which a temperature below freezing has existed continuously for 2 years to tens of thousands of years.
permeability	The property or capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure.
Petroleum Hydrocarbons	An indicator parameter used to assess hydrocarbons from petroleum sources.
phenols	Any of various acidic compounds analogous to phenol and regarded as hydroxyl derivatives of aromatic hydrocarbons.
Pleistocene	An epoch of geologic time thought to have covered the span between 1.6 million and 10,000 years ago.
POL	Petroleum, oil and lubricants
porosity	The property of a rock, soil, or other material of containing interstices.

potentiometric surface	An imaginary surface representing the static head of ground water and defined by the level to which water will rise in a well.
ppm	Part(s) per million
Precambrian age	Geologic time before the beginning of the Paleozoic; it is equivalent to about 90 percent of geologic time and ended approximately 570 million years ago.
PVC	Polyvinyl chloride
QC	Quality control
RCRA	Resource Conservation and Recovery Act
Recent	An epoch of geologic time thought to have covered the last 10,000 years.
specific capacity	The rate of discharge of a water well per unit of drawdown, commonly expressed as gallons per minute per foot.
specific conductivity	With reference to the movement of water in soil, a factor expressing the volume of transported water per unit of time in a given area.
STP	Sewage treatment plant
TAC	Tactical Air Command
TAC/NORAD	Tactical Air Command/North American Air Defense Command
TCE	Trichloroethylene
TDS	Total dissolved solids
Tertiary	The first period of the Cenozoic era, thought to have covered the span of time between 66 and 3 to 2 million years ago.
Tetrachloro-ethene	CCl_2CCl_2
TFWC	Tactical Fighter Weapons Center
TOC	Total organic carbon
TOX	Total organic halogens

transmissivity	The rate at which water is transmitted through a unit width under a unit hydraulic gradient.
1,1,1-Tri-chloroethane	CH_3CCl_3 (Methyl chloroform)
Trichloro-ethene	$\text{CHCl}:\text{CCl}_2$ (Trichloroethylene)
Trichloro-fluoromethane	CCl_3F (Fluorotrichloromethane)
2,4,6-Tri-chlorophenol	$\text{C}_6\text{H}_2\text{Cl}_3\text{OH}$
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
water table	That surface of a body of unconfined ground water at which the pressure is equal to that of the atmosphere.

APPENDIX B
SCOPE OF WORK

ORDER FOR SUPPLIES OR SERVICES					1. PAGE 1 OF 15	
2. PROC INSTRUMENT ID NO. (PIINI) F33615-83-D-4002		3. CALL/ORDER NO. 0035	4. DATE OF ORDER* 86JUL21	5. REQUISITION/PURCHASE REQUEST PROJECT NO. FY7624-86-01009		6. CERTIFIED FOR NATIONAL DEFENSE UNDER DO-S1
7. ISSUED BY DEPARTMENT OF THE AIR FORCE AIR FORCE SYSTEMS COMMAND AERONAUTICAL SYSTEMS DIV/PMRSC WRIGHT-PATTERSON AFB OH 45433-6503 CONTRACT NEGOTIATOR: 1LT GLENNITH C. JOHNSON PHONE: (513)-255-3042			8. ADMINISTERED BY DCASMA CHICAGO O'HARE INTERNATIONAL AIRPORT P.O. BOX 66911 CHICAGO IL 60666-0911			
9. CONTRACTOR NAME AND ADDRESS DAMES & MOORE 1550 NORTHWEST HIGHWAY PARK RIDGE IL 60068 PHONE: (312)-297-6120 COUNTY: COOK			10. MAIL INVOICES TO		11. DISCOUNT FOR PROMPT PAYMENT	
12A. PURCHASE OFFICE POINT OF CONTACT LRX/L72/LRX			13. PAYMENT WILL BE MADE BY DCASR CHICAGO O'HARE INTERNATIONAL AIRPORT P.O. BOX 66475 CHICAGO IL 60666-0475			
14. TYPE CONTRACTOR A		15. SECURITY A. CLAS U B. DATE OF DD 254		16. M. MAILING DATE SEP 11 1986 DUPLICATE ORIGINAL		
21. APPROPRIATION AND ACCOUNTING DATA A. ACTY U B. ACRN AA C. APPROPRIATION 5763400 D. LIMIT SUBHEAD E. SUPPLEMENTAL ACCOUNTING CLASSIFICATION 306 4740 5H4499 10N004 07000 592000 528500 F. CPN RECEIPT DODAAD F28500 G. OBLIGATION AMOUNT \$53,031.00 H. NON-CLIN/ELIN PAYMENT PRGY I. SVC AGENCY USE FY7624-86-01009			17. (RESERVED)	18. SVC/AGENCY USE	19. SURV CRIT C	
22A. TYPE OF ORDER DELIVERY X PURCHASE		B. NON-DOD CONTRACT NO. This delivery order is subject to instructions contained on this side of form only and is issued in accordance with and subject to terms and conditions of above numbered contract, or Non-DOD Contract No.				
15 CHECKED AND NO 15 IF THIS BOX IS CHECKED, special provisions and delivery as indicated. This purchase is negotiated under authority of 10 USC 2304(a)(6) or as specified in the schedule if within the U.S., its possessions or Puerto Rico, if otherwise, under 2304(a)(6). If checked Additional General Provisions apply, supplier shall sign "Acceptance of DD Form 1155" and return.						
24. TOTAL		25. QUANTITY ORDERED HAS BEEN <input type="checkbox"/> INSPECTED <input type="checkbox"/> RECEIVED <input type="checkbox"/> ACCEPTED, AND CONFORMS TO THE CONTRACT EXCEPT AS STATED		26. SHIP NO.	27. D.O. VOUCHER NO.	
26. DIFFERENCES		28. SIGNATURE OF AUTHORIZED GOVERNMENT REPRESENTATIVE HOWARD E. MARKS JR. 9/3/86 BY: NAME OF CONTRACTING/ORDERING OFFICER AND DATE		29. INITIALS	30. PAYMENT <input type="checkbox"/> COMPLETE <input type="checkbox"/> PARTIAL <input type="checkbox"/> FINAL	
29. AMOUNT VERIFIED CORRECT FOR		31. PAID BY		32. CHECK NUMBER	33. BILL OF LADING NO.	
34. CHECK NUMBER		35. I CERTIFY THIS AMOUNT IS CORRECT AND PROPER FOR PAYMENT SIGNATURE AND TITLE OF CERTIFYING OFFICER		36. RECEIVED AT	37. RECEIVED BY	
36. RECEIVED AT		38. DATE RECEIVED		39. TOTAL CONTAINERS	40. S/R ACCOUNT NUMBER	
37. RECEIVED BY		39. TOTAL CONTAINERS		41. S/R VOUCHER NO.	42. S/R VOUCHER NO.	

PART I SECTION B OF THE SCHEDULE SUPPLIES LINE ITEM DATA			1. PROC INSTRUMENT ID NO. (PIIN) F33615-83-D-4002		2. SPIIN 0035	3. PAGE 2 OF 15	
4. ITEM NO.	5. QUANTITY*	6. PURCH UNIT	7. UNIT PRICE	8. TOTAL ITEM AMOUNT*			
0001	1	LO	\$ N	\$ N			
9. SCTY/NO. ACRN CLAS U AA	11. NSN N	12. FSCM AND PART NUMBER		13. CIRR			
14. SITE CODES A. POA B. ACP C. FOR D D D		15. NOUN AIR SAMPLING, ANALYSIS, AND DATA		16. SVC/AGENCY USE			
17. PR/MIPR DATA FY7624-86-01009-0001		18. AUTHORIZED RATE A. PROGRESS PAY B. RECOUP		19. CONTRACT PERCENT FEE		20. SVC ID NO.	
22. 1ST DISCOUNT A. B. DAYS		23. 2ND DISCOUNT A. B. DAYS		24. 3RD DISCOUNT A. B. DAYS		25. NET 25. QUANTITY VARIANCE DAYS A. OVER B. UNDER	
29. DESCRIPTIVE DATA						21. ITEM/PROJ MGR FY7624 27. TYPE CONTRACT Y	

CONDUCT WORK IAW THE TASK DESCRIPTION OF THIS ORDER AND SECTION C, THE DESCRIPTION/SPECIFICATIONS OF THE BASIC CONTRACT. SUBMIT DATA IAW ATTACHMENT# 1, THE CONTRACT DATA REQUIREMENTS LIST OF THE BASIC CONTRACT, AS IMPLEMENTED BY PARAGRAPH VI OF THE TASK DESCRIPTION.

THIS DELIVERY ORDER CONFIRMS THE VERBAL AUTHORITY TO PROCEED GIVEN BY THE CONTRACTING OFFCER TO THE CONTRACTOR ON 86 JUL 10 PURSUANT TO THE "EMERGENCY SERVICES" CLAUSE OF THE BASIC CONTRACT. DO NOT DUPLICATE.

4. ITEM NO.	5. QUANTITY*	6. PURCH UNIT	7. UNIT PRICE	8. TOTAL ITEM AMOUNT*			
0002	1	LO	\$ N	\$ N			
9. SCTY/NO. ACRN CLAS U AA	11. NSN N	12. FSCM AND PART NUMBER		13. CIRR			
14. SITE CODES A. POA B. ACP C. FOR D D D		15. NOUN SUPPORT		16. SVC/AGENCY USE			
17. PR/MIPR DATA FY7624-86-01009-0002		18. AUTHORIZED RATE A. PROGRESS PAY B. RECOUP		19. CONTRACT PERCENT FEE		20. SVC ID NO.	
22. 1ST DISCOUNT A. B. DAYS		23. 2ND DISCOUNT A. B. DAYS		24. 3RD DISCOUNT A. B. DAYS		25. NET 25. QUANTITY VARIANCE DAYS A. OVER B. UNDER	
29. DESCRIPTIVE DATA						21. ITEM/PROJ MGR FY7624 27. TYPE CONTRACT Y	

PROVIDE SUPPORT IN ACCORDANCE WITH THE TASK DESCRIPTION OF THIS ORDER AND SECTION C, THE DESCRIPTION/SPECIFICATIONS OF THE BASIC CONTRACT.

THIS DELIVERY ORDER CONFIRMS THE VERBAL AUTHORITY TO PROCEED GIVEN BY THE CONTRACTING OFFCER TO THE CONTRACTOR ON 86 JUL 10 PURSUANT TO THE "EMERGENCY SERVICES" CLAUSE OF THE BASIC CONTRACT. DO NOT DUPLICATE.

*REPRESENTS NET AMOUNT OF INCREASE/DECREASE WHEN MODIFYING EXISTING ITEM NO
 N = NOT APPLICABLE
 U = UNDEFINIZED
 NSP = NOT SEPARATELY PRICED
 E = ESTIMATED
 - (IN QTY AND \$) = DECREASE
 + OR - (IN ITEM NO) = ADDITION OR DELETION
 CIRR CONTROLLED ITEM RPT RQMT

SITE CODES
 S = SOURCE
 D = DESTINATION
 O = INTERMEDIATE

3 JUN 1983

INSTALLATION RESTORATION PROGRAM
PHASE II - CONFIRMATION/QUANTIFICATION (STAGE 2)
Defense Early Warning (DEW) Line Sites
BAR-M, POW-3, POW-2, POW-1, LIZ-2

I. DESCRIPTION OF WORK

The overall objective of the Phase II investigation is to define the magnitude, extent, direction and rate of movement of identified contaminants. A series of staged field investigations may be required to meet this objective.

During the initial survey (Stage 1) performed at the DEW Line sites, a total of thirteen sites on five stations were investigated: BAR-M, Sites 1, 3, 4, 8 and 9; POW-3, Site 13; POW-2, Site 16, POW-1, Sites 28, 31, and 32; and LIZ-2, Sites 40, 43, and 44. Samples of surficial soil and surface water were analyzed for basic screening parameters (i.e., Total Organic Carbon, Total Organic Halogens, etc.).

This Stage 2 effort will build on the information gathered for all the sites previously investigated in Stage 1 to completely characterize site contamination. Additional water and soil samples will be obtained, and specific chemical analyses (i.e., volatile halocarbons by gas chromatography, etc.) performed to identify any contamination present at the sites.

The purpose of this task is to undertake a field investigation at DEW Line Sites, Alaska: (1) to confirm the presence of suspected contamination within the specified areas of investigation; (2) to determine the magnitude of contamination and the potential for migration of those contaminants in the various environmental media; (3) identify public health and environmental hazards of migrating pollutants based on State or Federal standards for those contaminants; and (4) delineate additional investigations required beyond this stage to reach the Phase II objectives.

The Phase I and Phase II, Stage 1 IRP Reports (mailed under separate cover) incorporate the background, description and previous studies of all the sites for this task. To accomplish this survey effort, the contractor shall take the following actions:

A. Technical Operations Plan

Develop a Technical Operations Plan (TOP) based on the technical requirements specified in this task description for the proposed work effort. (See Sequence No. 19, Item VI below). This plan shall be explicit with regard to field procedures. The format for the TOP is provided under separate cover. The TOP shall be mailed to the USAFOEHL POC within two (2) weeks after Notice to Proceed for this delivery order.

6 87

B. Health and Safety

Comply with USAF, OSHA, EPA, state and local health and safety regulations regarding the proposed work effort. Use EPA guidelines for designating the appropriate levels of protection at study sites. Prepare a written Health and Safety Plan for the proposed work effort and coordinate it directly with applicable regulatory agencies prior to commencing field operations (i.e., drilling and sampling) as specified in Sequence No. 7, Item VI below). Provide an information copy of the Health and Safety Plan to the USAFOEHL after coordination with the regulatory agencies.

C. General Field Work

1. Sampling and Analysis

a. Monitor ambient air during all sampling work with a photoionization meter or equivalent organic vapor detector to identify the generation of potentially hazardous and/or toxic vapors or gases. Include air monitoring results in the sampling logs.

b. Strictly comply with the sampling techniques, maximum holding times, and preservation of samples as specified in the following references: Standard Methods for the Examination of Water and Wastewater, 16th Edition (1985), pages 37-44; ASTM, Section 11, Water and Environmental Technology; Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 2nd Edition (USEPA, 1984); and Methods for Chemical Analysis of Waters and Wastes, EPA Manual 600/4-79-020, pages xiii to xix (1983). All chemical analyses (water and soil) shall meet the required limits of detection for the applicable EPA method identified in Appendix 1.

c. Split all water and soil samples. Analyze one set and immediately ship (within 24 hours) the other set of samples through overnight delivery to:

USAFOEHL/SA
Bldg 140
Brooks AFB TX 78235-5501

the USAFOEHL: Include the following information with the samples sent to

- (1) Purpose of sample (analyte and sample group)
- (2) Installation name (base)
- (3) Sample number
- (4) Source/location of sample
- (5) Contract Task Numbers and Title of Project

- (6) Method of collection (bailer, suction pump, air-lift pump, etc.)
- (7) Volumes removed before sample taken
- (8) Special Conditions (use of surrogate standard, special nonstandard preservations, etc.)
- (9) Preservatives used
- (10) Date and time collected
- (11) Collector's name or initials

Forward this information with each sample by properly completing an AF Form 2752A "Environmental Sampling Data" and/or AF Form 2752B "Environmental Sampling Data - Trace Organics", working copies of which have been provided under separate cover. Label each sample container to reflect the data in (1), (2), (3), (4), (9), (10), and (11). In addition, copies of field logs documenting sample collection should accompany the samples.

Maintain chain-of-custody records for all samples, field blanks, and quality control samples.

d. Analyze an additional 10% of all samples, for each parameter, for field quality control purposes (field duplicates), as indicated in Appendix 1. Include all quality control procedures and data in draft and final reports. Duplicates shall be indistinguishable from other analytical samples so that the analytical personnel cannot determine which samples are duplicates.

e. For those methods which employ gas chromatography (GC) as the analytical technique (i.e., E602, SW8080, etc.) positive confirmation of identity is required for all analytes having concentrations higher than the Method Detection Limit (MDL); confirm positive concentrations by second-column GC. Analytes which cannot be confirmed will be reported as "Not Detected" in the body of the report. Include the results of all second-column GC confirmational analyses in the report appendix along with other raw analytical data. Base the quantification of confirmed analytes upon the first-column analysis.

The maximum number of second-column confirmational analyses shall not exceed fifty percent (50%) of actual number of field samples (to include field QA/QC samples). The total number of samples for each GC method listed in Appendix 1 includes this allowance.

f. Analyze water and soil samples collected as specified in Section D for those parameters summarized in Appendix 3. The required detection limits and methods for these analyses are delineated in Appendix 1.

5 89

g. All chemical/physical analyses shall conform to state and other applicable federal and local regulatory agency legal requirements. If a regulatory agency requires that an analysis or analyses be performed in a certified laboratory, assure compliance with the requirement by furnishing documentation showing laboratory certification with the first analyses results to USAFOEHL/TS.

2. Decontamination Procedures

Decontaminate all sampling equipment prior to use and between samples to avoid cross contamination. Wash equipment with a laboratory-grade detergent followed by clean water, solvent (methanol) and distilled water rinses. Allow sufficient time for the solvent to evaporate and the equipment to dry completely.

3. Plot and map all field data collected for each site. Identify or estimate the nature of contamination and the magnitude and potential for contaminant flow within each site to receiving streams and groundwater.

D. Specific Site Work

In addition to items delineated above, conduct the following specific actions at the sites listed below:

1. Bar M

a. Site 1

(1) Collect three surface soil samples from the fill material near the edge of the small stream sampled during Stage 1. Collect one background soil sample from a nearby undisturbed area. Analyze each sample (4 total) for PCBs.

(2) Collect one surface water sample upgradient of the dump. Collect one surface water sample downgradient of the dump. Analyze both samples for volatile halocarbons (E601) and PCBs.

b. Site 3

Collect one surface water sample downgradient of the site and one upgradient. Analyze the samples for volatile halocarbons (E601) and petroleum hydrocarbons.

c. Site 4

Collect one surface water sample upgradient of the site and one downgradient of the site. Analyze both samples for volatile halocarbons (E601) and PCBs.

d. Site 8

Collect one surface water sample downgradient of the site and one upgradient. Analyze both samples for volatile halocarbons (E601).

e. Site 9

Collect one surface water sample downgradient of the site and one upgradient. Analyze both samples for volatile halocarbons (E601).

2. POW-3

Site 13

Collect one surface water sample from the lagoon adjacent to the site. Analyze the sample for volatile halocarbons (E601) and lead.

3. POW-2

Site 16

Collect one surface water sample from the lagoon adjacent to the site and one surface water sample upgradient from the site. Analyze both samples for volatile halocarbons (E601) and lead.

4. POW-1

a. Site 28

Collect one surface water sample from the pond adjacent to the site and one surface water sample upgradient from the site. Analyze both samples for volatile halocarbons (E601) and petroleum hydrocarbons.

b. Site 31

Collect one surface water sample from the lagoon adjacent to the site. Analyze the sample for volatile halocarbons.

c. Site 32

Collect one surface water sample from the pond adjacent to the dump and one surface water sample upgradient of the dump. Analyze both samples for volatile halocarbons (E601) and phenols (E604).

5. LIZ-2

a. Site 40

Collect one surface water sample from the pond adjacent to the active dump and one surface water sample upgradient of the dump. Analyze both samples for volatile halocarbons (E601) and phenols (E604).

b. Site 43

Collect one surface water sample downgradient from the site and one upgradient. Analyze both samples for volatile halocarbons (E601).

6 91 c. Site 44

Collect one surface water sample downgradient from the site. Analyze the sample for volatile halocarbons (E601).

E. General Site Guidance

1. Be cognizant of and observe the AF station rules and regulations while working in the area.
2. A minimum of 7 days advance notice prior to arrival on a station/site must be given to the AAC/SGPB. Clearance must be granted prior to arrival at the station.

F. Data Review

1. Tabulate field and analytical laboratory results, including field and laboratory parameters and QA/QC data, and incorporate them into the next monthly R&D Status Reports to be forwarded to the USAFOEHL. In addition to the results, report the following: the time and dates for sample collection, extraction (if applicable) and analysis; the methods used and method detection limits achieved; a cross-reference for laboratory sample numbers and field sample numbers; a cross-reference of field sample numbers to sites; and include the chain-of-custody form for those sample data.
2. Upon completion of all analyses, tabulate and incorporate all results into an Informal Technical Information Report (Sequence No. 3, Item VI below) and forward the report to USAFOEHL for review prior to submission of the draft report.
3. Immediately report to the USAFOEHL Program Manager via telephone, data/results generated during this investigation which indicate a potential health risk (for example, contaminated drinking water). Follow the telephone notification with a written notice and lab raw data (e.g., chromatograms, etc.) within three days.

G. Reporting

1. Prepare a draft report delineating all findings of this field investigation and forward it to the USAFOEHL (as specified in Sequence No. 4, Item VI below) for Air Force review and comment. Draft reports are considered "drafts" only in the sense that they have not been reviewed and approved by Air Force officials. In all other respects, "drafts" must be complete, in the proper format, and free of grammatical and typographical errors. Include a discussion of the regional/site specific hydrology, water quality and soil analysis results, and laboratory and field QA/QC information. Follow the USAFOEHL supplied format (mailed under separate cover). The format is an integral part of this delivery order.
2. Results, conclusions and recommendations concerning the sites listed in this task which were produced in the technical report(s) of the previous staged work of IRP Phase II (mailed under separate cover), shall be

used in the data reduction to plot any trends and arrive at the conclusions and recommendations of this effort's technical report (Sequence 4, Item VI below). The technical report of this effort shall be accomplished so that the report will reflect the combined up-to-date trend of each of the IRP Phase II sites listed herein.

3. In the results section, include water and soil analysis results, field quality control sample data, internal laboratory quality controlled data (lab blanks, lab spikes, and lab duplicates), and laboratory quality assurance information. Provide second column confirmation results and include which columns were used, the conditions existing, and retention times. Summarize the specific collection techniques, analytical method, holding time, and limit of detection for each analyte (Standard Methods, EPA, etc.) in the Appendix.

4. Make estimates of the magnitude, extent and direction which detected contaminants are moving. Identify potential environmental consequences of discovered contamination, where known, based upon State or Federal standards.

5. In the recommendation section, address each site and list them by category:

a. Category I consists of sites where no further action (including remedial action) is required. Data for these sites are considered sufficient to rule out unacceptable public health or environmental hazards.

b. Category II sites are those requiring additional Phase II effort to determine the direction, magnitude, rate of movement and extent of detected contaminants. Identify potential environmental consequences of discovered contamination, where known.

c. Category III sites are those that will require remedial actions (ready for IRP Phase IV). In the recommendations for Category III sites, include any possible influence on sites in Categories I and/or II due to their connection with the same hydrological system. Clearly state any dependency between sites in different categories. Include a list of candidate remedial action alternatives, including Long Term Monitoring (LTM) as remedial action, and the corresponding rationale that should be considered in selecting the remedial action for a given site. List all alternatives that could potentially bring the site into compliance with environmental standards. For contaminants that do not have standards, EPA recommended safe levels for noncarcinogens (Health Advisory or Suggested-No-Adverse-Response Levels) and target levels for carcinogens (1×10^{-6} cancer risk level) may be used. Unless specifically requested, do not perform any cost analyses, including a cost/benefit review for remedial action alternatives. However, in those situations where field survey data indicate immediate corrective action is necessary, present specific, detailed recommendations.

For each category above, summarize the results of field data, environmental or regulatory criteria, or other pertinent information supporting conclusions and recommendations.

6 93

6. Provide cost estimates by line item for future efforts recommended for Category II sites and LTM Category III sites. Submit these estimates concurrently with the approved final technical report in a separately bound document. For Category II sites, develop detailed site-specific estimates using prioritized costing format (i.e., cost of conducting the required work on: the highest priority site only; the first two highest priority sites only; the first three highest priority sites only; etc., until all required work is discretely costed) for the proposed work effort. The Air Force determines the priority of sites by using contractor recommendations as a decision basis. Consider the type of contaminants, their magnitude, the direction and rate of their migration, and their subsequent potential for environmental and health consequences when prioritizing sites. For Category III sites slated for long-term monitoring, develop site-specific estimates which detail the costs associated with annual sample collections and laboratory chemical analyses of surface water. Only the cost requirement outlined in Sequence No. 2, Item VI, need be submitted.

H. Meetings

The contractor's project leader shall attend one meeting to take place at a time to be specified by the USAFOEHL. This meeting shall last for a duration of two eight hour days. Meeting location is anticipated to be Anchorage AK.

II. SITE LOCATIONS AND DATES:

Bar-M
POW-3
POW-2
POW-1
LIZ-2

Dates to be established.

III. COMMAND SUPPORT:

A. Provide the contractor with existing engineering plans, drawings, diagrams, aerial photographs, etc., as needed to evaluate sites under investigation.

B. Provide escort into restricted areas.

C. Arrange for and have available prior to the start-up of field work, the following services, materials, work space, and items of equipment to support the contractor conducting the survey:

Personnel identification badges and vehicle passes and/or entry permits.

IV. GOVERNMENT FURNISHED PROPERTY: None

V. GOVERNMENT POINTS OF CONTACT:

1. USAFOEHL Program Manager
Ms Dee A. Sanders
USAFOEHL/TSS
Brooks AFB TX 78235-5501
(512) 536-2158
AUTOVON 240-2158/2159
1-800-821-4528

2. MAJCOM Monitor
Lt Col David A. Nuss
AAC/SGPB
Elmendorf AFB AK 99506-5000
(907) 552-4282
AUTOVON 317-552-4282

VI. In addition to sequence numbers 1, 5 and 11 listed in Attachment 1 to the contract, and which apply to all orders, the sequence numbers listed below are applicable to this order. Also shown are dates applicable to this order.

<u>Sequence No.</u>	<u>Para No.</u>	<u>Block 10</u>	<u>Block 11</u>	<u>Block 12</u>	<u>Block 13</u>	<u>Block 14</u>
(TOP)*	I.A	OTIME	86AUG04	86AUG04		15
7 (Health & Safety)	I.B	OTIME	86AUG04	86AUG04		3
3 (Prelim Data)	I.F.2	OTIME	***	***		3
4 (Tech. Rpt)	I.F.1	ONE/R	86NOV21	87JAN21	87APR21	**
2 (Cost Est)	I.G.6	O/TIME				*****
14		Monthly	86AUG21	86AUG21	****	3
15		Monthly	86AUG21	86AUG21	****	3

*The Technical Operations Plans (TOP) required for this stage is due within 2 weeks of the Notice to Proceed (NTP).

**Two draft reports (25 copies of each) and one final report (50 copies plus the original camera ready copy) are required. Incorporate Air Force comments into the second draft and final reports as specified by the USAFOEHL. Supply the USAFOEHL with a copy of the first draft, second draft, and final reports for acceptance prior to distribution. Distribute remaining 24 copies of each draft report and 49 copies of the final report as specified by the USAFOEHL.

***Upon completion of the total analytical effort before submission of the first draft report.

****Submit monthly hereafter.

*****Submit with final report only.

§ 95

Appendix 1

Analytical Methods, Detection Limits, and Number of Samples

<u>Parameter^a</u>	<u>Method^b Extraction/ Analysis)</u>	<u>Detection Limit</u>	<u>No. of Samples</u>	<u>QC</u>	<u>Total Samples</u>
Petroleum hydrocarbons	E418.1	100)g/L	4	1	5
Volatile Halocarbons	E601	c	23	2	38 ^e
PCBs	E608	c	4 (water)	1	8 ^e
	SW3550/SW8080	c	4 (soil)	1	8 ^e
Phenols	E604	c	4	1	8 ^e
Lead	E239.2	0.005 mg/L ^d	3	1	4

^aSpecific analytes for Volatile Halocarbons, PCBs and phenols are listed in Appendix 2.

^bThe methods cited in the analysis protocols come from the following sources:

"E" Methods (Water Only) E100 through E500 Methods
 Methods for Chemical Analysis of Water and Wastes,
 EPA Manual 600/4-79-020 (USEPA, 1983)

E600 Series Methods
 Methods for Organic Chemical Analysis of Municipal
 and Industrial Wastewater
 USEPA
 Federal Register, Vol 49, No 209, 26 Oct 1984

"SW" Methods (Water & Soils) Test Methods for Evaluating Solid Waste, Physical/Chemical
 Methods, SW-846, 2nd Edition (USEPA, 1984)

^cDetection limits for all parameters analyzed by GC shall be as stated in the respective methods. Report results for organics in water as)g/l; in soil as mg/kg. Positive identification is required for all analytes having concentration higher than the method detection limit; confirm positive concentrations by second-column GC. Analytes which cannot be confirmed shall be reported as "Not Detected" in the body of the report. Include the results of both first and second-column data in the appendix of the report. Base the quantification of confirmed analytes upon the first-column analysis.

^dReport results as mg/L. Report no more than two significant figures for any concentrations.

^eTotal number of samples includes second-column confirmation on 50% of field samples (to include field QC samples).

Appendix 1

Volatile Halocarbons - EPA Method 601

Bromodichloromethane	trans-1,2-Dichloroethene
Bromoform	1,2-Dichloropropane
Bromomethane	cis-1,3-Dichloropropene
Carbon tetrachloride	trans-1,3-Dichloropropene
Chlorobenzene	Methylene chloride
Chloroethane	1,1,2,2-Tetrachloroethane
2-Chloroethylvinyl ether	Tetrachloroethene
Chloroform	1,1,1-Trichloroethane
Chloromethane	1,1,2-Trichloroethane
Dibromochloromethane	Trichloroethene (TCE)
1,2-Dichlorobenzene	Trichlorofluoromethane
1,3-Dichlorobenzene	Vinyl chloride
1,4-Dichlorobenzene	
Dichlorodifluoromethane	
1,1-Dichloroethane	
1,2-Dichloroethane	
1,1-Dichloroethene	

PCBs - Methods E608 and SW8080

PCB-1016
PCB-1221
PCB-1232
PCB-1242
PCB-1248
PCB-1254
PCB-1260

Phenols - EPA Method 604

4-Chloro-3-methylphenol
2-Chlorophenol
2,4-Dichlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
2-Methyl-4,6-dinitrophenol
2-Nitrophenol
4-Nitrophenol
Pentachlorophenol
Phenol
2,4,6-Trichlorophenol

Appendix 3

Analyses by Site
ALASKAN DEW LINE STATIONS

	BAR-M					POW-3	POW-2	POW-1			LIZ-2		
	Site 1	Site 3	Site 4	Site 8	Site 9	Site 13	Site 16	Site 28	Site 31	Site 32	Site 40	Site 43	Site 44
Volatile Halocarbons (E601)	2W	2W	2W	2W	2W	1W	2W	2W	1W	2W	2W	2W	1W
Lead	--	--	--	--	--	1W	2W	--	--	--	--	--	--
Phenols (E604)	--	--	--	--	--	--	--	--	--	2W	2W	--	--
PCBs (E608, SW8080)	4S/2W	--	2W	--	--	--	--	--	--	--	--	--	--
Petroleum Hydrocarbons	--	2W	--	--	--	--	--	2W	--	--	--	--	--

S - soil sample, W - water sample.

REF 70H

PART I SECTION F OF THE SCHEDULE SUPPLIES SCHEDULE DATA				1. PROC INSTRUMENT ID NO. (PIIN)	2. SPIIN	3. PAGE	15 OF 15
4. ITEM NO.	5. ACRN	6. TSP PRI	7. MILSTRIP DOC NO. AND SUFFIX	8. CON ITEM SERIAL NO.	9. ENDING SERIAL NO. (WHEN APPL)	10. CLIN IDENT EXHIBIT	
0001	AA						
11. DEL SCHED DATE	12. ENDING DATE (WHEN APPL)	13. DEL SCHEDULE QTY*	14. SCTY CLAS	15. SHIP TO	16. MARK FOR		
A. 87MAY21	A.	A. 1	U	FY7624			
B.	B.	B.	D.	D.	D.		
C.	C.	C.	E.	E.	E.		
17. DESCRIPTIVE DATA							
A. SEE SECTION H OF THE BASIC CONTRACT FOR FY7624 ADDRESS.							
B. TECHNICAL EFFORT SHALL BE COMPLETED NO LATER THAN 86NOV21.							
C. ALL DATA SHALL BE DELIVERED IAW ATTACHMENT# 1 OF THE BASIC CONTRACT AS IMPLEMENTED BY PARAGRAPH VI OF THE TASK DESCRIPTION NO LATER THAN 87APR21.							
D. THE DATA SHALL BE ACCEPTED BY THE GOVERNMENT NOT LATER THAN THE DATE SHOWN IN BLOCK 11A							
4. ITEM NO.	5. ACRN	6. TSP PRI	7. MILSTRIP DOC NO. AND SUFFIX	8. CON ITEM SERIAL NO.	9. ENDING SERIAL NO. (WHEN APPL)	10. CLIN IDENT EXHIBIT	
0002	AA						
11. DEL SCHED DATE	12. ENDING DATE (WHEN APPL)	13. DEL SCHEDULE QTY*	14. SCTY CLAS	15. SHIP TO	16. MARK FOR		
A. 87MAY21	A.	A. 1	U	FY7624			
B.	B.	B.	D.	D.	D.		
C.	C.	C.	E.	E.	E.		
17. DESCRIPTIVE DATA							
A. SEE SECTION H OF THE BASIC CONTRACT FOR FY7624 ADDRESS.							
B. TECHNICAL EFFORT SHALL BE COMPLETED NO LATER THAN 86NOV21.							
4. ITEM NO.	5. ACRN	6. TSP PRI	7. MILSTRIP DOC NO. AND SUFFIX	8. CON ITEM SERIAL NO.	9. ENDING SERIAL NO. (WHEN APPL)	10. CLIN IDENT EXHIBIT	
11. DEL SCHED DATE	12. ENDING DATE (WHEN APPL)	13. DEL SCHEDULE QTY*	14. SCTY CLAS	15. SHIP TO	16. MARK FOR		
A.	A.	A.					
B.	B.	B.	D.	D.	D.		
C.	C.	C.	E.	E.	E.		
17. DESCRIPTIVE DATA							

* REPRESENTS A NET INCREASE/DECREASE WHEN NO + OR - APPEARS AFTER THE ITEM NO.
 E = ESTIMATED
 - (IN QTY) = DECREASE
 + OR - (IN ITEM NO) = ADDITION OR DELETION

APPENDIX C
FIELD RAW DATA

INDEX

Page No.	Sample Site
1	BAR-M
2	POW-3
3	POW-2
4	POW-1
5	LIZ-2

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING
 Roadway of any Width. Side Slopes 1 1/2 to 1.

In the figure below opposite 7 under "Cut or Fill" and under .3 read 11.0, the distance out from the side stake at left. Also, opposite 11 under "Cut or Fill" and under .1 read 16.7 the distance out from the side stake at right.

Cut or Fill	Distances out from Side or Shoulder Stake										Slope Stake	
	0	.1	.2	.3	.4	.5	.6	.7	.8	.9		
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	1.4	1.4
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	2.9	2.9
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	4.4	4.4
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	5.9	5.9
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	7.4	7.4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	8.9	8.9
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	10.4	10.4
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	11.9	11.9
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	13.4	13.4
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	14.9	14.9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	16.4	16.4
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	17.9	17.9
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	19.4	19.4
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	20.9	20.9
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	22.4	22.4
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	23.9	23.9
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	25.4	25.4
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	26.9	26.9
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	28.4	28.4
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	29.9	29.9
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	31.4	31.4
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	32.9	32.9
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	34.4	34.4
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	35.9	35.9
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	37.4	37.4
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	38.9	38.9
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	40.4	40.4
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	41.9	41.9
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	43.4	43.4
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	44.9	44.9
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	46.4	46.4
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	47.9	47.9
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	49.4	49.4
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	50.9	50.9
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	52.4	52.4
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	53.9	53.9
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	55.4	55.4
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	56.9	56.9
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	58.4	58.4

Sample No.	Date	Time	Sample Type	Sample Location	No. of Bottles	Temperature	pH	Salinity	Conductivity
SW-9-A-1	8/18/86	1031	Surface Water	Confluence of stream & Arctic Ocean	3-UBTL 3-OEHL	3.7°C	6.00	0.0	90
SW-9-B-2	8/18/86	1052	Surface Water	Upstream of mouth 100 yards W of dump	3-UBTL 3-OEHL	4.2°C	6.35	0.0	265
SW-7-A-3	8/18/86	1133	Surface Water	Upgradient	4-UBTL 3-OEHL	4.8°C	6.60	0.0	360
SW-4-B-4	8/18/86	1150	Surface Water	Downgradient	3-UBTL 3-OEHL	4.0°C	6.15	1.57	2550
SW-1-E-5	8/18/86	1215	Surface Water	Upgradient Site 1	4-UBTL 4-OEHL	4.5°C	6.30	0.0	490
SS-1-A-6	8/18/86	1245	Soil	Down gradient 2m from Orig Hole	2-UBTL 1-OEHL	soil sample			
SS-1-B-7	8/18/86	1245	Soil	Orig Hole	1-UBTL 1-OEHL	soil sample			
SS-1-C-8-0.5'	"	1245	Soil	Up from Orig Undisturbed	1-UBTL 1-OEHL	soil sample			
SS-1-D-9-0.5'	"	1245	Soil	Up from Orig Hole	2-UBTL 2-OEHL	soil sample			
SW-1-A-10	"	1245	Surface Water	"	4-UBTL 4-OEHL	5.5°C	6.61	0.0	520
SW-3-A-11	8/18/86	1310	Surface Water	East End Oil Tank Dike	3-UBTL 3-OEHL	6.5°C	7.20	0.0	650
SW-8-A-12	8/18/86	1400	Surface Water	Upgradient Site B	3-UBTL 3-OEHL	6.5°C	7.51	0.0	325
SW-8-B-13	8/18/86	1415	Surface Water	Downgradient Site B	3-UBTL 3-OEHL	6.0°C	7.09	0.0	420
SW-3-B-14	8/18/86	1425	Surface Water	Upgradient Site 3	4-UBTL 4-OEHL	7.5°C	7.40	0.0	680
SW-13-A-15	8/18/86	1635	Surface Water	End of Dike Floxmond Island W of Camp	4-UBTL 4-OEHL	11.5°C	7.40	15.5	20,000
SW-16-A-16	8/19/86	0840	Surface Water	Upgradient	4-UBTL 4-OEHL	6.8°C	8.10	13.0	13,800
SW-16-B-17	8/19/86	0850	Surface Water	Downgradient	7-UBTL 5-OEHL	5.5°C	7.90	15.1	15,000
SW-28-A-18	8/19/86	1105	Surface Water	Upgr	4-UBTL 4-OEHL	4.3°C	8.40	2.8	3110
SW-32-B-18	"	1125	Surface Water	Downgr	4-UBTL 4-OEHL	3.7°C	8.60	2.8	2850
SW-31-A-20	"	1150	Surface Water	Upgr	3-UBTL 3-OEHL	5.2°C	8.10	2.53	2550
SW-28-A-21	"	1205	Surface Water	Upgr	4-UBTL 4-OEHL	5.5°C	8.60	0.6	780
SW-28-B-22	"	1220	Surface Water	Upgr	5-UBTL 5-OEHL	5.7°C	8.15	0.4	680
SW-44-A-23	"	1545	Surface Water	500' downgr	3-UBTL 3-OEHL	6.1°C	7.85	0.6	770
SW-43-A-24	"	1600	Surface Water	Old dump	3-UBTL 3-OEHL	6.9°C	7.90	0.2	357
SW-43-B-25	"	1615	Surface Water	Upgradient	3-UBTL	6.1°C	8.70	0.0	0

Sample No.	Date	Time	Sample Type	Sample Location	No. of Bottles	Temperature	pH	Salinity	Conductivity
SN-40-A-26	8/19/86	1645	Water	Behind Bangan	22-4187L	7.1°C	7.05	1.2	1900
SN-40-B-27	8/19/86	1720	Water	Behind Bangan	9-4187L	6.9°C	7.65	0.2	348

APPENDIX D
FIELD AND LABORATORY QUALITY CONTROL PROGRAMS

FIELD AND LABORATORY QUALITY CONTROL PROGRAMS

FIELD INVESTIGATION QUALITY CONTROL PROGRAM

Quality control of field activities consists of following established procedures during the conduct of the work. In those cases that require the drilling of test borings, installation of piezometers or monitor wells, and taking of soil and water samples, the procedures include the preparation of records to document the compliance with these procedures. These field records include boring logs, monitor well installation records, daily field memoranda, sample shipment and test instruction forms for soil sample testing, and chain-of-custody records for all soil and water samples intended for chemical analyses. The nature of water sample tests was established in advance so that plans could be made to ship samples in an appropriate and timely manner.

The pH and specific conductivity meters used for field water quality measurements were calibrated with known standards immediately before the measurements were made. The HNU photoionization detector and explosimeter used to monitor vapors generated while drilling have internal calibration routines that were followed when the meters were turned on. A detailed description of sampling procedures is located in Section III.

LABORATORY QUALITY CONTROL PROGRAM

UBTL is an accredited laboratory of the American Industrial Hygiene (AIHA) Association (No. 17) and, as such, participates in an extensive interlaboratory proficiency analytical testing program sponsored by the National Institute for Occupational Safety and Health (NIOSH). In addition, UBTL is currently licensed by the Center for Disease Control (CDC) to perform chemical and clinical analyses of biological specimens and is State of Utah/USEPA approved for environmental analyses. The comprehensive internal quality control program at UBTL is detailed as follows.

Introduction

UBTL has implemented an effective system for Quality Control (QC). Procedures that are employed include:

1. Services of a full-time Quality Control/Quality Assurance Section;
2. Preparation of internal quality control samples;
3. Collection and evaluation of quality control data;
4. Generation of quality control charts; and
5. Instrument calibration and maintenance.

Sample Analyses

At least one blank sample and one reagent blank are included with each set of analyses and processed through the complete analytical procedure in order to detect any contamination in either collection media or reagents. In addition, duplicate analyses are accomplished on a minimum of 10 percent of all samples submitted from the field. Internal quality control samples, generated in the laboratory and containing known quantities of specified analyte(s), are run at the rate of 10 percent of the total field sample workload. At the completion of the analysis of a sample set, each chemist calculates his results and reports the results on the Analytical Report Form. Results for replicated samples and internal quality control samples are reported on the computer-generated Quality Control Data Sheet. Before the results are submitted to the Group Leader, another peer chemist analyst is assigned to check results for possible errors in the calculations. He must approve results reported on both the quality control sheet and the sample sheet. The Group Leader, after his evaluation of the data, gives the report sheets to the Quality Assurance Specialist (QAS) for his evaluation and implementation of any required action.

Specific steps are followed when any one QC sample result is determined to be out of control in connection with the analysis of a field sample set. QC charts with adjusted control limits of ± 3 standard deviations will generally be used to determine whether a result is out of control. If QC results are in control, the QAS signs off the report. It is then reviewed by the Section Head for accuracy of the results. Upon final approval of the reports by the QAS and the Section Head, the reports are sent to the sponsor.

The paperwork containing the raw data for a sample set (i.e., chart paper, computer readouts, paper tapes, calibration curves, tables of data, etc.) is collected and placed in an 8-1/2-inch by 11-inch envelope that has been labeled with sample numbers, analyst, date, and other pertinent information. The envelopes are filed by laboratory number for possible future reference and data retrieval. Raw data for each sample analysis are therefore readily available, if needed.

Quality Control Sample Data Analysis

A record of the preparation of internal QC samples is detailed in the QC log book maintained by the QAS. As appropriate, a set of QC samples is distributed to the chemist along with each sample set at an average rate of

at least 10 percent of the submitted samples. The analyses and data evaluations are performed for these QC samples, along with the submitted samples, and results are tabulated on the computer-generated Quality Control Data Sheet. At least duplicate results are reported for each internal QC sample.

QC charts are generated for each analyte through the analysis of QC sample results. Each result is divided by the theoretical value to standardize results so that data from all concentrations can be directly compared for accuracy and precision. When a control data set of N sample results has been accumulated, the following statistics are calculated: mean percent recovery, replicate standard deviation, and set standard deviation. These statistics are then used to determine accuracy and precision QC limits.

The control data set is updated after evaluation of 20 successive QC samples and includes data on the 50 most recent results. Any control sample analysis that is beyond accuracy or precision limits is not used in the subsequent determination of new limits.

External Quality Control Programs

In addition to internally generated QC data, other information concerning QC is provided by the participation of UBTL in four interlaboratory QC programs: NIOSH Proficiency Analytical Testing (PAT) Program; two CDC Blood Lead QC Programs; and State of Utah Environmental Quality Control Program. The PAT Program and the CDC Blood Lead Programs involve the participation of more than 100 laboratories on a nationwide basis. The PAT Program addresses the analysis of filter samples for lead, cadmium, zinc, free silica, and asbestos and the analysis of charcoal tubes for various organic solvents.

Laboratory Data Reduction

A significant fraction of the Chemistry Department's work involves data processing. Mathematical models, based upon analysis of standard solutions or samples, are generated in order to determine the quantity of analyte present in the samples. Considerable time and effort are saved by the utilization of automated data processing procedures. Data processing by the computer can include, for example, calculations, generation of standard calibration curves, mathematical modeling of standard curves, statistical analyses, and the generation of hard copy output. Advantages intrinsic to the use of an automated system include more accurate

calculations, immediate and accurate generation of data plots, fewer transcription errors, and no calculation errors after programs have been verified and documented. In general, the types of data that are processed are those derived from the following techniques: atomic absorption and flame emission spectroscopy, gas and liquid chromatography, optical absorbance spectrophotometry, specific ion electrode, fluorescence spectroscopy, and wet chemistry determinations. Similar functions are employed for QC data. In addition, the data system is utilized to store QC data, provide statistical analyses, and generate and update QC charts. The advantage of the provision for statistical analyses and the production of QC charts by automation is that the charts may be easily updated with minimal effort. QC data and any required action may, therefore, be provided on a daily basis.

Reporting Procedures

The analytical data are reported to the sponsor at the completion of each sample set. The report includes the following items:

1. A memorandum describing the sample set; the condition and appearance (i.e., homogeneity, integrity, etc.) of the samples upon receipt at UBTL; the method, equipment, and technique used in the determination; any interferences that were observed; and any unusual circumstances that may have occurred during the analysis. [The limit(s) of detection are also reported.]
2. UBTL Analytical Report Form, including field ID number, laboratory ID number, identification of the analytes, results of each determination, limit(s) of detection, and comments.
3. Other items, such as copies of strip chart recorder output, computer printout sheets, and other raw data (to be included as required).

Instrumentation

Each major equipment item at the UBTL Chemistry Department undergoes a routine preventive maintenance check on a regular schedule. This check is accomplished by a trained engineer. In addition, performance checks are made by the analyst prior to the analysis of each set of samples. This involves the analysis of one or more standards and a comparison of the values obtained with previous results and conditions. This information is recorded in an instrumentation log.

When an instrument or apparatus malfunctions and the problem is not readily corrected, the appropriate Section Head is notified. If it is determined that a visit by the service representative is required, a service call is scheduled and the QAS is notified. Action by the service representative is recorded by the QAS in the Instrument Maintenance Log, and the appropriate customer field and service order forms are filed, by instrument, in the Instrument Maintenance Log Supplement File. In an effort to monitor and maintain instrument specifications, logs for each of the AA spectrophotometers, the gas chromatographs (GC), the X-ray diffractometer (X-ray), and the mass spectrometers (MS) have been provided for the analytical chemists' use each time an analysis is performed. The AA instrumentation logs contain entries for date, analyst, lamp number (if more than one lamp is available), standard concentration (recommended in manual), reading in milliabsorbance units, and a column for when instrumental parameters differ from the recommended conditions listed in the manual. The GC, X-ray, and MS logs contain entries for date, time, analyst, set identification number, and comments on parameters or performance.

Training

UBTL has established a continuing program of training of current personnel with respect to QC procedures. In addition, an intensive program for the training of recently recruited personnel in both analytical methods and techniques and QC policies has been implemented. It is the responsibility of the QAS and the Laboratory Director to train all laboratory personnel.

Results of the Laboratory QC Program

The results of the QC analyses for soil and ground water samples are presented in Appendix G, Chemical Analysis Data.

Soil Analysis

The laboratory QC program for soils included one duplicate and one spike analysis for PCB's, the only soils analyte in this program. The percent recovered was acceptable at 100%. The difference, 48%, between the two duplicate analyses is attributed to soil inhomogeneities and low concentrations of the analyte near the limit of detection.

Surface Water Analyses

The laboratory QC program for surface water analysis consisted of performing analyses on spiked samples for six purgeable halocarbons (analysis on each analyte was performed on two separate samples), on three lead samples, one PCB sample, and nine phenol samples. The percent recovery for the purgeable halocarbons, lead, and PCB analyses were acceptable. The percent recovery on the spiked phenols varied widely, from a low of 26% to a high of 355%. Some of the higher recoveries have been attributed to co-eluting interfering peaks during the GC analyses. The 26% recovery on the phenol spike, although low, is within the acceptable EPA range of 23% to 108%.

Eighteen duplicate analyses were performed on purgeable halocarbons, with differences between the analyses ranging between 0% and 29%. In general, the duplicate analyses are acceptable. The duplicate analysis on PCB's was acceptable below the limit of detection. Duplicate analysis were based on the first column, GC analyses, on phenols.

APPENDIX E
CHAIN-OF-CUSTODY FORMS

DAMES & MOORE CHAIN-OF-CUSTODY RECORD

Sample Source & Client						Project Title						Field Personnel (Signature)					
DEW Line / U.S. Air Force						Phase II, Stage 2, IRP						Job No. 1016-262-007					
Date	Time	Sample I.D. No.	Sample Type	No. of Containers	Sampling Site	Remarks											
8/18/81	1245	SS-1-A-6-05	Soil	2	BAR-M Site 1												
8/18/81	1245	SS-1-B-7-05	Soil	1													
8/18/81	1245	SS-1-C-8-05	Soil	1													
	1245	SS-1-D-9-05	Soil	2													
	1215	SS-1-E-5	Water	4													
		SS-1-E-5 MS	Water MS	4 MS		12:15 - broken (12:0)											
	1245	SS-1-F-10	Water	4													
		SS-1-F-10 MS	Water MS	3 MS													
	1340	SS-3-A-11	Water	3		BAR-M - Site 3											
		SS-3-A-11 MS	Water MS	3 MS													
		SS-3-B-13 MS	Water MS	1 MS													
	1135	SS-3-B-14	Water	4													
	1133	SS-4-A-3	Water	4	Site 3.												
	1150	SS-4-B-4	Water	9	Site 4												
	1400	SS-B-A-12	Water	3	Site 8												
Relinquished by: (Signature)		Date	Time	Received by: (Signature)			Date	Time	Relinquished by: (Signature)		Date	Time	Received by: (Signature)		Date	Time	
J. Michael Steyer		18 Aug 81	1445										D. Ward (a. c. w.)		18 Aug 81	1445	
Relinquished by: (Signature)		Date	Time	Received by: (Signature)			Date	Time	Relinquished by: (Signature)		Date	Time	Received by: (Signature)		Date	Time	
Relinquished by: (Signature)		Date	Time	Received by: (Signature)		Date	Time	Relinquished by: (Signature)		Date	Time	Received by: (Signature)		Date	Time		

DAMES & MOORE CHAIN-OF-CUSTODY RECORD

Sample Source & Client <i>DEW Line / U.S. Air Force</i>						Field Personnel (Signature) <i>J. Michael Staley</i>									
Project Title <i>Phase II, Stage 2, IRP</i>						Job No. <i>1016-262-007</i>									
Date	Time	Sample I.D. No.	Sample Type	No. of Containers	Sampling Site	Remarks									
<i>8/19/86</i>	<i>0840</i>	<i>SW-16-A-16</i>	<i>Water</i>	<i>4</i>	<i>DEW Line POW-2</i>	<div style="display: flex; flex-direction: column; align-items: center;"> ↓ POW-1 ↓ LIZ-2 </div>									
	<i>0850</i>	<i>SW-16-B-17</i>		<i>6</i>											
	<i>1205</i>	<i>SW-28-A-21</i>		<i>4</i>											
	<i>12:20</i>	<i>SW-28-B-22</i>		<i>8</i>											
	<i>11:50</i>	<i>SW-31-A-20</i>		<i>3</i>											
	<i>11:05</i>	<i>SW-32-A-18</i>		<i>4</i>											
	<i>11:25</i>	<i>SW-32-B-19</i>		<i>4</i>											
	<i>16:45</i>	<i>SW-40-A-26</i>		<i>4</i>											
Relinquished by: (Signature)		Date	Time	Received by: (Signature)		Date	Time	Relinquished by: (Signature)		Date	Time	Received by: (Signature)		Date	Time
<i>J. Michael Staley</i>		<i>8/20/86</i>	<i>0110</i>									<i>Donald F. ...</i>		<i>8-22-86</i>	<i>11:50am</i>
Relinquished by: (Signature)		Date	Time	Received by: (Signature)		Date	Time	Relinquished by: (Signature)		Date	Time	Received by: (Signature)		Date	Time
Relinquished by: (Signature)		Date	Time	Received by: (Signature)		Date	Time	Relinquished by: (Signature)		Date	Time	Received by: (Signature)		Date	Time

112

DAMES & MOORE CHAIN-OF-CUSTODY RECORD

Sample Source & Client <u>DEW Line / U.S. Air Force</u>					Field Personnel (Signature) <i>J. Michael Stutz</i>	
Project Title <u>Phase II, Stage 2, IRP</u>			Job No. <u>1016-262-007</u>			
Date	Time	Sample I.D. No.	Sample Type	No. of Containers	Sampling Site	Remarks
<u>8/19/86</u>	<u>16:45</u>	<u>SW-40-A-26</u>	<u>Water</u>	<u>18</u>	<u>DEW Line LIZ-2</u>	
	<u>17:20</u>	<u>SW-40-B-27</u>		<u>4</u>		
	<u>16:00</u>	<u>SW-43-A-24</u>		<u>3</u>		
	<u>16:15</u>	<u>SW-43-B-25</u>		<u>3</u>		
	<u>15:45</u>	<u>SW-44-A-23</u>		<u>3</u>		

Relinquished by: (Signature) <i>J. Michael Stutz</i>	Date <u>8/20/86</u>	Time <u>0910</u>	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature) <i>Daniel [unclear]</i>	Date <u>6-22-86</u>	Time <u>1:30 PM</u>
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

DAMES & MOORE CHAIN-OF-CUSTODY RECORD

G 114

Sample Source & Client: DEW Line / U.S. Air Force						Field Personnel (Signature)	
Project Title: Phase II, Stage 2, IRP				Job No. 1016-262-007			
Date	Time	Sample I.D. No.	Sample Type	No. of Containers	Sampling Site	Remarks	
8/18/84	1153	SS-4-A-	Water	1	BAR-M Site 4		
	1150	SS-4-B-	Water	6			
	1635	SS-13-A-	Water	1	POW-3 Site 13		
		SS-16-A-	Water	1 cns			
		SS-16-B-	Water	3 cns			

Relinquished by: (Signature) <i>J. Michael Stealy</i>	Date <i>18 Aug 84</i>	Time <i>1845</i>	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature) <i>W. R. ...</i>	Date <i>18 Aug 84</i>	Time <i>1845</i>
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

DAMES & MOORE CHAIN-OF-CUSTODY RECORD

Sample Source & Client						DEW Line / U.S. Air Force		Field Personnel (Signature)				
Project Title				Phase II, Stage 2, IRP		Job No.		1016-262-007				
Date	Time	Sample I.D. No.	Sample Type	No. of Containers	Sampling Site		Remarks					
8/10/86	1031	SS-8-B-13	Water	3	BAR-M Site 8							
	1031	SS-9-A-1	Water	3	BAR-M Site 9							
	1052	SS-9-B-2	Water	3	BAR-M Site 9							
	1632	SS-13-A-15	Water	MS/4	Pow-3 Site 13							
	1425M											
		SS-16-A MS	Water MS	3 MS								
		SS-16-B MS	Water MS	3 MS								

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
<i>J. Michael</i>	18 Aug	1045					8-22-86	1425M			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

APPENDIX F
ANALYTICAL DATA



UBTL, INC.
520 WAKARA WAY • SALT LAKE CITY, UTAH 84108 • 801 / 583-3600

November 25, 1986
Refer to: 86D768

Mr. Michael W. Ander
Dames & Moore
1550 Northwest Highway
Park Ridge, Illinois 60068

Re: F33615-83-D-4002, DEW Line Sites

Dear Mr. Ander:

Enclosed with this letter is a copy of UBTL's report of the analysis of water and soil samples from the DEW Line Sites.

Comments upon the analyses are offered in the following paragraphs.

Purgeable Halocarbons in Water by EPA Method 601

A 5 mL sample of water was purged with helium. Any analytes present were collected on a trap consisting of activated charcoal, Tenax, and silica gel. The trap was then heated to 180 °C and the analytes were flushed onto a 8' x 2 mm i.d. glass column packed with 1% SP-1000 on Carbopack B. A temperature program starting at 45 °C and proceeding at 6 °C/minute to 225 °C was used to separate the analytes. A Hall 700A electroconductivity detector in the halogen mode was used for detection and quantification of the analytes.

Any samples that were found to contain target analytes at or above the UBTL method detection limit (MDL) were re-analyzed using an 8' x 2 mm glass second column packed with 0.2% Carbowax 1500 on Carbopack C with temperature programming from 45 °C to 175 °C at 6 °C per minute. A total of 19 of the 23 field samples were re-analyzed using the second column.

Petroleum Hydrocarbons in Water by EPA Method 418.1

An insufficient volume of sample for QC purposes was received from the field. Therefore, only field data are reported for samples which required petroleum hydrocarbon analyses.

PCB's in Water by EPA Method 608

The analysis was performed on a Hewlett-Packard Model 5730A gas chromatograph equipped with an electron capture detector and accessories

Mr. Michael W. Ander
November 25, 1986
Refer to: 86D768

Page 2

for capillary column capability. A 25 m x 0.31 mm fused silica WCOT capillary column coated internally with DB-5 was used with temperature programming from 210 °C (held for two minutes) to 310 °C at a rate of 8 °C/minute. Five percent methane in argon was used as the carrier gas. The injector was operated in the splitless mode of operation.

Phenols in Water by EPA Method 604

The analysis was performed on a Hewlett-Packard Model 5711A gas chromatograph equipped with a flame ionization detector. A 6' x 1/4" glass column packed with 1% SP1240-DA on 100/120 mesh Supelcoport was used with a temperature program which started at 70 °C for two minutes then increased to 200 °C at a rate of 8 °C per minute with a final hold at 200 °C for 16 minutes.

Three of the four samples required a confirmation analysis. The EPA 604 method permits the use of GC/MS as a confirmation step. GC/MS was chosen because of the large number of peaks observed in the chromatograms of the samples. The confirmation analysis followed EPA 625 methodology. A separation of the compounds of interest was obtained with a DB-5 fused silica capillary column and oven temperature programming from 40 degrees centigrade for 4 minutes to 300 degree centigrade at 10 degrees centigrade per minute. A 40 second splitless injection interval was used. The analysis of each sample was performed using a Finnigan 5100 GC/MS/DS system.

The values obtained from the GC/MS confirmation analysis generally were lower (much lower in some cases) than those found in the initial GC analysis. This indicates the presence of co-eluting interfering peaks in the GC analysis. Accordingly, the data reported for phenols are a combination of the GC and GC/MS results. The quality control data in the report are for the initial GC analysis.

PCBs in Soil by EPA Method 3550/8080

The gas chromatographic analysis was performed on a Hewlett-Packard Model 5730A gas chromatograph equipped with an electron capture detector and accessories for capillary column capabilities. A 25 m x 0.31 mm fused silica WCOT capillary column coated internally with DB-5 was used with temperature programming from 210 °C (held for two minutes) to 310 °C at a rate of 8 °C/minute. Five percent methane in argon was used as the carrier gas. The injector was operated in the splitless mode of operation.

The presence of Aroclor 1254 in two samples (SS1A6 and SS109) was confirmed on a Tracor 222 gas chromatograph equipped with an electron capture detector. A 6' x 2 mm ID glass column packed with a mixed phase of 1.5% OV17 and 1.95% QF1 with temperature of 186 °C. Five percent

Mr. Michael W. Ander
November 25, 1986
Refer to: 86D768

6 119
Page 3

methane in argon was used as a carrier gas at a rate of
31 milliliters/minute.

The original chain of custody sheets are enclosed.

Sincerely,



Sim D. Lessley, Ph.D.
Associate Director

SDL:jno

Enclosures

UBTL ANALYTICAL REPORT
DEW Line Sites - Water Analyses

Parameter	Method	Units	Detection Limit	SW1E5 Site 1	SW1F10 Site 1	SW3A11 Site 3	SW3B14 Site 3	SW4A3 Site 4	SW4B4 Site 4	SW8A12 Site 8	SW8B13 Site 8	SW9A1 Site 9
Organic Halocarbons												
Bromodichloromethane	EPA 601 (1)	µg/L	0.35 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	EPA 601 (1)	µg/L	0.45 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	EPA 601 (1)	µg/L	0.63 (2)	15.	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	EPA 601 (1)	µg/L	0.46 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	EPA 601 (1)	µg/L	0.37 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	EPA 601 (1)	µg/L	0.38 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethylvinylether	EPA 601 (1)	µg/L	0.44 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	EPA 601 (1)	µg/L	0.45 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	EPA 601 (1)	µg/L	0.49 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	EPA 601 (1)	µg/L	0.31 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	EPA 601 (1)	µg/L	0.29 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	EPA 601 (1)	µg/L	0.42 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	EPA 601 (1)	µg/L	0.41 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	EPA 601 (1)	µg/L	0.33 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	EPA 601 (1)	µg/L	0.49 (2)	4.1	1.9	ND	ND	ND	1.9	ND	ND	ND
1,2-Dichloroethane	EPA 601 (1)	µg/L	0.44 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	EPA 601 (1)	µg/L	0.49 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	EPA 601 (1)	µg/L	0.42 (2)	2.0	0.60	0.43	ND	ND	ND	ND	0.62	ND
1,2-Dichloropropane	EPA 601 (1)	µg/L	0.20 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	EPA 601 (1)	µg/L	0.58 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	EPA 601 (1)	µg/L	0.39 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	EPA 601 (1)	µg/L	0.34 (2)	16.	5.9	ND	ND	ND	5.1	ND	ND	ND
1,1,2,2-Tetrachloroethane	EPA 601 (1)	µg/L	0.38 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	EPA 601 (1)	µg/L	0.38 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	EPA 601 (1)	µg/L	0.53 (2)	1.1	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	EPA 601 (1)	µg/L	0.51 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	EPA 601 (1)	µg/L	0.60 (2)	290	110	0.76	ND	ND	ND	ND	1.5	ND
Trichlorofluoromethane	EPA 601 (1)	µg/L	0.44 (2)	4.6	3.1	3.2	1.6	1.1	3.1	1.3	1.5	1.2
Vinyl Chloride	EPA 601 (1)	µg/L	0.54 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Gasoline Hydrocarbons	EPA 418.1 (3)	mg/L	0.2 (4)			2.2	4.4					
Lead	EPA 239.2 (3)	µg/L	0.6 (5)									

Reviewed and Approved by Jim D. Lessley

UBTL ANALYSIS REPORT
DEW Line Sites - Water Analyses

<u>Parameter</u>	<u>Method</u>	<u>Units</u>	<u>Detection Limit</u>	<u>SW1E5 Site 1</u>	<u>SW1F10 Site 1</u>	<u>SW3A11 Site 3</u>	<u>SW3B14 Site 3</u>	<u>SW4A3 Site 4</u>	<u>SW4B4 Site 4</u>	<u>SW8A12 Site 8</u>	<u>SW8B13 Site 8</u>	<u>SW9A1 Site 9</u>
<u>PCBs</u>												
PCB 1016	EPA 608 (1)	µg/L	0.09 (6)	(7)	ND			ND	ND			
PCB 1221	EPA 608 (1)	µg/L	0.09 (6)	(7)	ND			ND	ND			
PCB 1232	EPA 608 (1)	µg/L	0.09 (6)	(7)	ND			ND	ND			
PCB 1242	EPA 608 (1)	µg/L	0.09 (6)	(7)	ND			ND	ND			
PCB 1248	EPA 608 (1)	µg/L	0.09 (6)	(7)	ND			ND	ND			
PCB 1254	EPA 608 (1)	µg/L	0.09 (6)	(7)	ND			ND	ND			
PCB 1260	EPA 608 (1)	µg/L	0.09 (6)	(7)	ND			ND	ND			
<u>Phenols</u>												
4-Chloro-3-methyl phenol	EPA 604 (1)	µg/L	0.62 (2)									
2-Chlorophenol	EPA 604 (1)	µg/L	0.51 (2)									
2,4-Dichlorophenol	EPA 604 (1)	µg/L	0.57 (2)									
2,4-Dimethylphenol	EPA 604 (1)	µg/L	0.83 (2)									
2,4-Dinitrophenol	EPA 604 (1)	µg/L	31. (2)									
2-Methyl-4,6-dinitrophenol	EPA 604 (1)	µg/L	9.2 (2)									
2-Nitrophenol	EPA 604 (1)	µg/L	0.51 (2)									
4-Nitrophenol	EPA 604 (1)	µg/L	2.6 (2)									
Pentachlorophenol	EPA 604 (1)	µg/L	11. (2)									
Phenol	EPA 604 (1)	µg/L	0.33 (2)									
2,4,6-Trichlorophenol	EPA 604 (1)	µg/L	1.1 (2)									

UBTL ANALYTICAL REPORT
DEW Line Sites - Water Analyses

Parameter	Method	Units	Detection Limit	SW9B2 Site 9	SW13A15 Site 13	SW16A16 Site 16	SW16B17 Site 16	SW28A21 Site 28	SW28B22 Site 28	SW31A20 Site 31	SW32A18 Site 32	SW32B19 Site 32	122
Surgeable Halocarbons													
Bromodichloromethane	EPA 601 (1)	µg/L	0.35 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Bromoform	EPA 601 (1)	µg/L	0.45 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Bromomethane	EPA 601 (1)	µg/L	0.63 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Carbon Tetrachloride	EPA 601 (1)	µg/L	0.46 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Chlorobenzene	EPA 601 (1)	µg/L	0.37 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Chloroethane	EPA 601 (1)	µg/L	0.38 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
2-Chloroethylvinylether	EPA 601 (1)	µg/L	0.44 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Chloroform	EPA 601 (1)	µg/L	0.45 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Chloromethane	EPA 601 (1)	µg/L	0.49 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Dibromochloromethane	EPA 601 (1)	µg/L	0.31 (2)	ND	ND	ND	ND	ND	ND	ND	0.65	0.31	
1,2-Dichlorobenzene	EPA 601 (1)	µg/L	0.29 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,3-Dichlorobenzene	EPA 601 (1)	µg/L	0.42 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,4-Dichlorobenzene	EPA 601 (1)	µg/L	0.41 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Dichlorodifluoromethane	EPA 601 (1)	µg/L	0.33 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,1-Dichloroethane	EPA 601 (1)	µg/L	0.49 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,2-Dichloroethane	EPA 601 (1)	µg/L	0.44 (2)	ND	ND	ND	ND	ND	ND	ND	2.3	1.9	
1,1-Dichloroethene	EPA 601 (1)	µg/L	0.49 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
trans-1,2-Dichloroethene	EPA 601 (1)	µg/L	0.42 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,2-Dichloropropane	EPA 601 (1)	µg/L	0.20 (2)	ND	ND	ND	ND	ND	ND	ND	3.8	2.7	
cis-1,3-Dichloropropene	EPA 601 (1)	µg/L	0.58 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
trans-1,3-Dichloropropene	EPA 601 (1)	µg/L	0.39 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Methylene Chloride	EPA 601 (1)	µg/L	0.34 (2)	ND	ND	ND	ND	ND	ND	ND	0.37	ND	
1,1,2,2-Tetrachloroethane	EPA 601 (1)	µg/L	0.38 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Tetrachloroethene	EPA 601 (1)	µg/L	0.38 (2)	ND	ND	ND	ND	ND	ND	ND	1.4	1.1	
1,1,1-Trichloroethane	EPA 601 (1)	µg/L	0.53 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,1,2-Trichloroethane	EPA 601 (1)	µg/L	0.51 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Trichloroethene	EPA 601 (1)	µg/L	0.60 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Trichlorofluoromethane	EPA 601 (1)	µg/L	0.44 (2)	ND	ND	0.67	0.53	0.81	0.76	0.73	ND	0.78	
Vinyl Chloride	EPA 601 (1)	µg/L	0.54 (2)	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Petroleum Hydrocarbons	EPA 418.1 (3)	mg/L	0.2 (4)					1.5	2.0				
Lead	EPA 239.2 (3)	µg/L	0.6 (5)		ND	ND	ND						

UBTL ANALYSIS REPORT
DEW Line Sites - Water Analyses

<u>Parameter</u>	<u>Method</u>	<u>Units</u>	<u>Detection Limit</u>	<u>SW9B2 Site 9</u>	<u>SW13A15 Site 13</u>	<u>SW16A16 Site 16</u>	<u>SW16B17 Site 16</u>	<u>SW28A21 Site 28</u>	<u>SW28B22 Site 28</u>	<u>SW31A20 Site 31</u>	<u>SW32A18 Site 32</u>	<u>SW32B19 Site 32</u>
PCBs												
PCB 1016	EPA 608 (1)	µg/L	0.09 (6)									
PCB 1221	EPA 608 (1)	µg/L	0.09 (6)									
PCB 1232	EPA 608 (1)	µg/L	0.09 (6)									
PCB 1242	EPA 608 (1)	µg/L	0.09 (6)									
PCB 1248	EPA 608 (1)	µg/L	0.09 (6)									
PCB 1254	EPA 608 (1)	µg/L	0.09 (6)									
PCB 1260	EPA 608 (1)	µg/L	0.09 (6)									
Phenols (†)												
4-Chloro-3-methyl phenol	EPA 604 (1)	µg/L	0.62 (2)								ND	ND
4-Chloro-3-methyl phenol	EPA 625 (1)	µg/L	3.0 (1)								-	-
2-Chlorophenol	EPA 604 (1)	µg/L	0.51 (2)								ND	ND
2-Chlorophenol	EPA 625 (1)	µg/L	3.3 (1)								-	-
2,4-Dichlorophenol	EPA 604 (1)	µg/L	0.57 (2)								-	ND
2,4-Dichlorophenol	EPA 625 (1)	µg/L	2.7 (1)								ND	-
2,4-Dimethylphenol	EPA 604 (1)	µg/L	0.83 (2)								ND	-
2,4-Dimethylphenol	EPA 625 (1)	µg/L	2.7 (1)								-	ND
2,4-Dinitrophenol	EPA 604 (1)	µg/L	31. (2)								-	-
2,4-Dinitrophenol	EPA 625 (1)	µg/L	42. (1)								ND	ND
2-Methyl-4,6-dinitrophenol	EPA 604 (1)	µg/L	9.2 (2)								-	-
2-Methyl-4,6-dinitrophenol	EPA 625 (1)	µg/L	24. (1)								ND	ND
2-Nitrophenol	EPA 604 (1)	µg/L	0.51 (2)								-	-
2-Nitrophenol	EPA 625 (1)	µg/L	3.6 (1)								ND	ND
4-Nitrophenol	EPA 604 (1)	µg/L	2.6 (2)								ND	ND
4-Nitrophenol	EPA 625 (1)	µg/L	2.4 (1)								-	-
Pentachlorophenol	EPA 604 (1)	µg/L	11. (2)								-	-
Pentachlorophenol	EPA 625 (1)	µg/L	3.6 (1)								9.6	9.5
Phenol	EPA 604 (1)	µg/L	0.33 (2)								ND	-
Phenol	EPA 625 (1)	µg/L	1.5 (1)								-	ND
2,4,6-Trichlorophenol	EPA 604 (1)	µg/L	1.1 (2)								-	-
2,4,6-Trichlorophenol	EPA 625 (1)	µg/L	2.7 (1)								ND	ND

UBTL ANALYTICAL REPORT
DEW Line Sites - Water Analyses

<u>Parameter</u>	<u>Method</u>	<u>Units</u>	<u>Detection Limit</u>	<u>SW40A26 Site 40</u>	<u>SW40B27 Site 40</u>	<u>SW43A24 Site 43</u>	<u>SW43B25 Site 43</u>	<u>SW44A23 Site 44</u>
Purgeable Halocarbons								
Bromodichloromethane	EPA 601 (1)	µg/L	0.35 (2)	ND	ND	ND	ND	ND
Bromoform	EPA 601 (1)	µg/L	0.45 (2)	ND	ND	ND	ND	ND
Bromomethane	EPA 601 (1)	µg/L	0.63 (2)	ND	ND	ND	ND	ND
Carbon Tetrachloride	EPA 601 (1)	µg/L	0.46 (2)	ND	ND	ND	ND	ND
Chlorobenzene	EPA 601 (1)	µg/L	0.37 (2)	ND	ND	ND	ND	ND
Chloroethane	EPA 601 (1)	µg/L	0.38 (2)	ND	ND	ND	ND	ND
2-Chloroethylvinylether	EPA 601 (1)	µg/L	0.44 (2)	ND	ND	ND	ND	ND
Chloroform	EPA 601 (1)	µg/L	0.45 (2)	ND	ND	ND	ND	ND
Chloromethane	EPA 601 (1)	µg/L	0.49 (2)	ND	ND	ND	ND	ND
Dibromochloromethane	EPA 601 (1)	µg/L	0.31 (2)	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	EPA 601 (1)	µg/L	0.29 (2)	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	EPA 601 (1)	µg/L	0.42 (2)	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	EPA 601 (1)	µg/L	0.41 (2)	ND	ND	ND	ND	ND
Dichlorodifluoromethane	EPA 601 (1)	µg/L	0.33 (2)	ND	ND	ND	ND	ND
1,1-Dichloroethane	EPA 601 (1)	µg/L	0.49 (2)	1.2	ND	ND	ND	ND
1,2-Dichloroethane	EPA 601 (1)	µg/L	0.44 (2)	ND	ND	ND	ND	ND
1,1-Dichloroethene	EPA 601 (1)	µg/L	0.49 (2)	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	EPA 601 (1)	µg/L	0.42 (2)	ND	ND	ND	ND	ND
1,2-Dichloropropane	EPA 601 (1)	µg/L	0.20 (2)	6.2	ND	ND	ND	ND
cis-1,3-Dichloropropene	EPA 601 (1)	µg/L	0.58 (2)	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	EPA 601 (1)	µg/L	0.39 (2)	ND	ND	ND	ND	ND
Methylene Chloride	EPA 601 (1)	µg/L	0.34 (2)	17.	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	EPA 601 (1)	µg/L	0.38 (2)	ND	ND	ND	ND	ND
Tetrachloroethene	EPA 601 (1)	µg/L	0.38 (2)	6.4	ND	ND	ND	ND
1,1,1-Trichloroethane	EPA 601 (1)	µg/L	0.53 (2)	1.2	ND	ND	ND	ND
1,1,2-Trichloroethane	EPA 601 (1)	µg/L	0.51 (2)	ND	ND	ND	ND	ND
Trichloroethene	EPA 601 (1)	µg/L	0.60 (2)	ND	2.1	ND	ND	ND
Trichlorofluoromethane	EPA 601 (1)	µg/L	0.44 (2)	9.3	1.4	1.0	ND	ND
Vinyl Chloride	EPA 601 (1)	µg/L	0.54 (2)	ND	ND	ND	ND	ND
Petroleum Hydrocarbons	EPA 418.1 (3)	mg/L	0.2 (4)					
Lead	EPA 239.2 (3)	µg/L	0.6 (5)					

UBTL ANALYSIS REPORT
DEW Line Sites - Water Analyses

<u>Parameter</u>	<u>Method</u>	<u>Units</u>	<u>Detection Limit</u>	<u>SW40A26 Site 40</u>	<u>SW40B27 Site 40</u>	<u>SW43A24 Site 43</u>	<u>SW43B25 Site 43</u>	<u>SW44A23 Site 44</u>
<u>PCBs</u>								
PCB 1016	EPA 608 (1)	ug/L	0.09 (6)					
PCB 1221	EPA 608 (1)	ug/L	0.09 (6)					
PCB 1232	EPA 608 (1)	ug/L	0.09 (6)					
PCB 1242	EPA 608 (1)	ug/L	0.09 (6)					
PCB 1248	EPA 608 (1)	ug/L	0.09 (6)					
PCB 1254	EPA 608 (1)	ug/L	0.09 (6)					
PCB 1260	EPA 608 (1)	ug/L	0.09 (6)					
<u>Phenols (†)</u>								
4-Chloro-3-methyl phenol	EPA 604 (1)	ug/L	0.62 (2)	ND	ND			
4-Chloro-3-methyl phenol	EPA 625 (1)	ug/L	3.0 (1)	-	-			
2-Chlorophenol	EPA 604 (1)	ug/L	0.51 (2)	ND	ND			
2-Chlorophenol	EPA 625 (1)	ug/L	3.3 (1)	-	-			
2,4-Dichlorophenol	EPA 604 (1)	ug/L	0.57 (2)	-	ND			
2,4-Dichlorophenol	EPA 625 (1)	ug/L	2.7 (1)	ND	-			
2,4-Dimethylphenol	EPA 604 (1)	ug/L	0.83 (2)	-	ND			
2,4-Dimethylphenol	EPA 625 (1)	ug/L	2.7 (1)	ND	-			
2,4-Dinitrophenol	EPA 604 (1)	ug/L	31. (2)	-	-			
2,4-Dinitrophenol	EPA 625 (1)	ug/L	42. (1)	ND	ND			
2-Methyl-4,6-dinitrophenol	EPA 604 (1)	ug/L	9.2 (2)	-	-			
2-Methyl-4,6-dinitrophenol	EPA 625 (1)	ug/L	24. (1)	ND	ND			
2-Nitrophenol	EPA 604 (1)	ug/L	0.51 (2)	ND	ND			
2-Nitrophenol	EPA 625 (1)	ug/L	3.6 (1)	-	-			
4-Nitrophenol	EPA 604 (1)	ug/L	2.6 (2)	ND	ND			
4-Nitrophenol	EPA 625 (1)	ug/L	2.4 (1)	-	-			
Pentachlorophenol	EPA 604 (1)	ug/L	11. (2)	-	ND			
Pentachlorophenol	EPA 625 (1)	ug/L	3.6 (1)	4.4	-			
Phenol	EPA 604 (1)	ug/L	0.33 (2)	-	ND			
Phenol	EPA 625 (1)	ug/L	1.5 (1)	7.2	-			
2,4,6-Trichlorophenol	EPA 604 (1)	ug/L	1.1 (2)	-	ND			
2,4,6-Trichlorophenol	EPA 625 (1)	ug/L	2.7 (1)	ND	-			

† Revised 08/11/87

UBTL ANALYTICAL REPORT
DEW Line Sites - Soil Analyses

<u>Parameter</u>	<u>Method</u>	<u>Units</u>	<u>Detection Limit</u>	<u>SS1A6</u>	<u>SS1B7</u>	<u>SS1C8</u>	<u>SS8D9</u>
PCBs							
PCB 1016	SW 3550/8080 (10)	mg/kg	0.02 (2)	ND	ND	ND	ND
PCB 1221	SW 3550/8080 (10)	mg/kg	0.02 (2)	ND	ND	ND	ND
PCB 1232	SW 3550/8080 (10)	mg/kg	0.02 (2)	ND	ND	ND	ND
PCB 1242	SW 3550/8080 (10)	mg/kg	0.02 (2)	ND	ND	ND	ND
PCB 1248	SW 3550/8080 (10)	mg/kg	0.02 (2)	ND	ND	ND	ND
PCB 1254	SW 3550/8080 (10)	mg/kg	0.02 (2)	0.21	ND	ND	0.05
PCB 1260	SW 3550/8080 (10)	mg/kg	0.02 (2)	ND	ND	ND	ND
Moisture	ASTM D2216-71	%	-	38.	16.	7.4	17.

UBTL QUALITY CONTROL REPORT
Dew Line Sites - Soil Samples

	<u>Method</u>	<u>Units</u>	<u>Detection Limit</u>	<u>Spiked Sample</u>	<u>Initial Value</u>	<u>Spike Conc.</u>	<u>Percent Recovered</u>	<u>Split Sample</u>	<u>First Value</u>	<u>Second Value</u>	<u>Method Blank</u>
PCBs	SW846-3550	µg/g	0.02	SS1A6	0.21	1.0	100%	SS1A6	0.21	0.11	ND

- (1) Federal Register, Vol. 49, No. 209, October 26, 1984.
- (2) UBTL method detection limit (MDL) calculated according to reference (1).
- (3) EPA 600/4-79-020 (March 1983).
- (4) UBTL practical detection limit (PQL)
- (5) UBTL instrument detection limit (IDL) calculated according to reference (3).
- (6) UBTL method detection limit (MDL) calculated for PCB 1242 according to reference (1) and applied to all of the PCBs.
- (7) Sample broken in transit to the laboratory.
- (8) SW-846, Second Edition, July 1982.

UBTL QUALITY CONTROL REPORT
DEW Line Sites - Water Samples

	<u>Method</u>	<u>Units</u>	<u>Detection Limit</u>	<u>Spiked Sample</u>	<u>Initial Value</u>	<u>Spike Conc.</u>	<u>Percent Recovered</u>	<u>Split Sample</u>	<u>First Value</u>	<u>Second Value</u>	<u>Method Blank</u>
<u>Phenols</u>											
4-Chloro-3-Methylphenol	EPA 604 (1)	µg/L	0.62 (2)	SW40A26	ND	100	157%	SW40A26	ND	ND	ND
2-Chlorophenol	EPA 604 (1)	µg/L	0.51 (2)	SW40A26	34.	100	63%	SW40A26	34.	28.	ND
2,4-Dichlorophenol	EPA 604 (1)	µg/L	0.57 (2)	SW40A26	110	100	112%	SW40A26	110	100	ND
2,4-Dimethylphenol	EPA 604 (1)	µg/L	0.83 (2)	SW40A26	9.3	100	85%	SW40A26	9.3	9.1	ND
2-Nitrophenol	EPA 604 (1)	µg/L	0.51 (2)	SW40A26	ND	99.	355%	SW40A26	ND	ND	ND
4-Nitrophenol	EPA 604 (1)	µg/L	2.6 (2)	SW40A26	ND	100	59%	SW40A26	ND	ND	ND
Pentachlorophenol	EPA 604 (1)	µg/L	11. (2)	SW40A26	620	100	143%	SW40A26	620	590	ND
Phenol	EPA 604 (1)	µg/L	0.33 (2)	SW40A26	12.	100	26%	SW40A26	12.	ND	ND
2,4,6-Trichlorophenol	EPA 604 (1)	µg/L	1.1 (2)	SW40A26	110	99.	104	SW40A26	110	110	ND

UBTL QUALITY CONTROL REPORT
DEW Line Sites - Water Samples

	Method	Units	Detection Limit	Spiked Sample	Initial Value	Spike Conc.	Percent Recovered	Split Sample	First Value	Second Value	Method Blank				
<u>Surgeable Organohalogenes (cont.)</u>															
trans-1,3-Dichloropropene	EPA 601 (1)	µg/L	0.39 (2)												
Methylene Chloride	EPA 601 (1)	µg/L	0.34 (2)					SW1E5 SW13A15 SW40A26	16. ND 17.	16. ND 12.	ND				
1,1,2,2-Tetrachloroethane	EPA 601 (1)	µg/L	0.38 (2)								ND				
Tetrachloroethene	EPA 601 (1)	µg/L	0.38 (2)					SW1E5 SW13A15 SW40A26	ND ND 6.4	ND ND 5.5	ND				
1,1,1-Trichloroethane	EPA 601 (1)	µg/L	0.53 (2)					SW1E5 SW13A15 SW40A26	1.1 ND 1.2	1.3 ND 1.2	ND				
				SW13A15 SW40A26	ND 1.2	10. 10.	102% 92%								
1,1,2-Trichloroethane	EPA 601 (1)	µg/L	0.51 (2)					SW13A15 SW40A26	ND ND		ND				
				SW13A15 SW40A26	ND ND	10. 10.	121% 70%								
Trichloroethene (TCE)	EPA 601 (1)	µg/L	0.60 (2)					SW1E5 SW13A15 SW40A26	290 ND ND	290 ND ND	ND				
Trichlorofluoromethane	EPA 601 (1)	µg/L	0.44 (2)					SW1E5 SW13A15 SW40A26	4.6 ND 9.3	4.1 ND 8.3	ND				
Vinyl Chloride	EPA 601 (1)	µg/L	0.54 (2)								ND				
Petroleum Hydrocarbons	EPA 418.1	mg/L	0.5								ND				
Lead	EPA 239.2	µg/L	0.6					SW13A15 SW16A16 SW16B17	ND ND ND	1.0 1.0 1.0	92% 93% 81%				
CBs	EPA 608	µg/L	0.09					SW1F10	ND	0.4	80%	SW4B4	ND	ND	ND

UBTL ANALYTICAL REPORT
DEW Line Sites - Soil Sample Holding Time Summary

<u>Parameter</u>	<u>Method</u>	<u>Units</u>	<u>Detection</u>				
			<u>Limit</u>	<u>SS1A6</u>	<u>SS1B7</u>	<u>SS1C8</u>	<u>SS8D9</u>
Sampling Date				08/18/86	08/18/86	08/18/86	08/18/86
PCBs	EPA 3550/8080						
Date Extracted				08/23/86	08/23/86	08/23/86	08/23/86
Elapsed Time				5 days	5 days	5 days	5 days
Date Analyzed				09/08/86	09/08/86	09/08/86	09/08/86
Elapsed Time				21 days	21 days	21 days	21 days
Moisture	ASTM D2216-71						
Date Analyzed				11/19/86	11/19/86	11/19/86	11/19/86
Elapsed Time				93 days	93 days	93 days	93 days

UBTL ANALYTICAL REPORT
DEW Line Sites - Water Sample Holding Time Summary

<u>Parameter</u>	<u>Method</u>	<u>Detection</u>		<u>SW40A26</u>	<u>SW40B27</u>	<u>SW43A24</u>	<u>SW43B25</u>	<u>SW44A23</u>
		<u>Units</u>	<u>Limit</u>					
Sampling Date				08/19/86	08/19/86	08/19/86	08/19/86	08/19/86
Purgeable Halocarbons	EPA 601							
Date Analyzed				08/25/86	08/25/86	08/25/86	08/25/86	08/25/86
Elapsed Time				6 days				
Petroleum Hydrocarbons	EPA 418.1							
Date Analyzed								
Elapsed Time								
Lead	EPA 239.2							
Date Analyzed								
Elapsed Time								
PCBs	EPA 608							
Date Extracted								
Elapsed Time								
Date Analyzed								
Elapsed Time								
Phenols	EPA 604							
Date Extracted				08/23/86	08/23/86			
Elapsed Time				4 days	4 days			
Date Analyzed				09/07/86	09/07/86			
Elapsed Time				15 days	15 days			

6
132

UBTL ANALYTICAL REPORT
DEW Line Sites - Water Sample Holding Time Summary

Parameter	Method	Detection		SW9B2	SW13A15	SW16A16	SW16B17	SW28A21	SW28B22	SW31A20	SW32A18	SW32B19
		Units	Limit									
Sampling Date				08/18/86	08/18/86	08/19/86	08/19/86	08/19/86	08/19/86	08/19/86	08/19/86	08/19/86
Surgeable Halocarbons	EPA 601											
Date Analyzed				08/25/86	08/25/86	08/25/86	08/25/86	08/25/86	08/25/86	08/25/86	08/25/86	08/25/86
Elapsed Time				7 days	7 days	6 days						
Petroleum Hydrocarbons	EPA 418.1											
Date Analyzed								09/11/86	09/11/86			
Elapsed Time								23 days	23 days			
Lead	EPA 239.2											
Date Analyzed				09/03/86	09/03/86	09/03/86						
Elapsed Time				17 days	16 days	16 days						
PCBs	EPA 608											
Date Extracted												
Elapsed Time												
Date Analyzed												
Elapsed Time												
Phenols	EPA 604											
Date Extracted										08/23/86	08/23/86	
Elapsed Time										4 days	4 days	
Date Analyzed										09/07/86	09/07/86	
Elapsed Time										15 days	15 days	

UBTL ANALYTICAL REPORT
 DEW Line Sites - Water Sample Holding Time Summary

<u>Parameter</u>	<u>Method</u>	<u>Detection</u>										
		<u>Units</u>	<u>Limit</u>	<u>SW1E5</u>	<u>SW1F10</u>	<u>SW3A11</u>	<u>SW3B14</u>	<u>SW4A3</u>	<u>SW4B4</u>	<u>SW8A12</u>	<u>SW8B13</u>	<u>SW9A1</u>
Sampling Date				08/18/86	08/18/86	08/18/86	08/18/86	08/18/86	08/18/86	08/18/86	08/18/86	08/18/86
Purgeable Halocarbons	EPA 601											
Date Analyzed				08/25/86	08/25/86	08/25/86	08/25/86	08/25/86	08/25/86	08/25/86	08/25/86	08/25/86
Elapsed Time				7 days	7 days	7 days	7 days	7 days	7 days	7 days	7 days	7 days
Petroleum Hydrocarbons	EPA 418.1											
Date Analyzed						09/17/86	09/17/86					
Elapsed Time						30 days	30 days					
Lead	EPA 239.2											
Date Analyzed												
Elapsed Time												
PCBs	EPA 608											
Date Extracted				NA*	08/23/86			08/23/86	08/23/86			
Elapsed Time				NA*	5 days			5 days	5 days			
Date Analyzed				NA*	09/08/86			09/08/86	09/08/86			
Elapsed Time				NA*	21 days			21 days	21 days			
Phenols	EPA 604											
Date Extracted												
Elapsed Time												
Date Analyzed												
Elapsed Time												

3
134

Sample broken in transit (not analyzed).

UBTL ANALYTICAL REPORT
 DEW Line Sites - Soil Samples
 Second Column Confirmations

<u>Parameter</u>	<u>Method</u>	<u>Units</u>	<u>Detection</u>				
			<u>Limit</u>	<u>SS1A6</u>	<u>SS1B7</u>	<u>SS1C8</u>	<u>SS8D9</u>
<u>PCBs</u>							
PCB 1016 (f)	SW3550/8080	mg/kg	0.02	ND	ND	ND	ND
PCB 1016 (s)	SW3550/8080	mg/kg		Neg	Neg	Neg	Neg
PCB 1221 (f)	SW3550/8080	mg/kg	0.02	ND	ND	ND	ND
PCB 1221 (s)	SW3550/8080	mg/kg		Neg	Neg	Neg	Neg
PCB 1232 (f)	SW3550/8080	mg/kg	0.02	ND	ND	ND	ND
PCB 1232 (s)	SW3550/8080	mg/kg		Neg	Neg	Neg	Neg
PCB 1242 (f)	SW3550/8080	mg/kg	0.02	ND	ND	ND	ND
PCB 1242 (s)	SW3550/8080	mg/kg		Neg	Neg	Neg	Neg
PCB 1248 (f)	SW3550/8080	mg/kg	0.02	ND	ND	ND	ND
PCB 1248 (s)	SW3550/8080	mg/kg		Neg	Neg	Neg	Neg
PCB 1254 (f)	SW3550/8080	mg/kg	0.02	0.21	ND	ND	0.05
PCB 1254 (s)	SW3550/8080	mg/kg		Pos	Neg	Neg	Pos
PCB 1260 (f)	SW3550/8080	mg/kg	0.02	ND	ND	ND	ND
PCB 1260 (s)	SW3550/8080	mg/kg		Neg	Neg	Neg	Neg

UBTL ANALYTICAL REPORT
 DEW Line Sites - Water Samples
 Second Column Confirmations

<u>Parameter</u>		<u>Method</u>	<u>Units</u>	<u>Detection Limit</u>	<u>SW32A18</u>	<u>SW32B19</u>	<u>SW40A26</u>	<u>SW40B27</u>
<u>Phenols (f)</u>								
4-Chloro-3-methyl phenol	(first)	EPA 604	µg/L	0.62	ND	ND	ND	ND
4-Chloro-3-methyl phenol	(GC/MS)	EPA 625	µg/L	3.0	Neg	Neg	Neg	Neg
2-Chlorophenol	(first)	EPA 604	µg/L	0.51	ND	ND	31	ND
2-Chlorophenol	(GC/MS)	EPA 625	µg/L	3.3	Neg	Neg	<3.3	Neg
2,4-Dichlorophenol	(first)	EPA 604	µg/L	0.57	4.7	ND	110	ND
2,4-Dichlorophenol	(GC/MS)	EPA 625	µg/L	2.7	<2.7	Neg	<2.7	Neg
2,4-Dimethylphenol	(first)	EPA 604	µg/L	0.83	ND	6.2	9.2	ND
2,4-Dimethylphenol	(GC/MS)	EPA 625	µg/L	2.7	Neg	<2.7	<2.7	Neg
2,4-Dinitrophenol	(first)	EPA 604	µg/L	31.	*	*	*	*
2,4-Dinitrophenol	(GC/MS)	EPA 625	µg/L	42.	<42.	<42.	<42.	<42.
2-Methyl-4,6-dinitrophenol	(first)	EPA 604	µg/L	9.2	*	*	*	*
2-Methyl-4,6-dinitrophenol	(GC/MS)	EPA 625	µg/L	24.	<24.	<24.	<24.	<24.
2-Nitrophenol	(first)	EPA 604	µg/L	0.51	2.1	8.4	ND	ND
2-Nitrophenol	(GC/MS)	EPA 625	µg/L	3.6	<3.6	<3.6	Neg	Neg
4-Nitrophenol	(first)	EPA 604	µg/L	2.6	ND	ND	ND	ND
4-Nitrophenol	(GC/MS)	EPA 625	µg/L	2.4	Neg	Neg	Neg	Neg
Pentachlorophenol	(first)	EPA 604	µg/L	11.	73.	120.	620	ND
Pentachlorophenol	(GC/MS)	EPA 625	µg/L	3.6	9.6	9.5	4.4	Neg
Phenol	(first)	EPA 604	µg/L	0.33	ND	1.4	12	ND
Phenol	(GC/MS)	EPA 625	µg/L	1.5	Neg	<1.5	7.2	Neg
2,4,6-Trichlorophenol	(first)	EPA 604	µg/L	1.1	38.	49.	110	ND
2,4,6-Trichlorophenol	(GC/MS)	EPA 625	µg/L	2.7	<2.7	<2.7	<2.7	Neg

S 136

ND - Not detected using the first column.

* - Analysis could not be completed using the first column, second column GC/MS results reported.

UBTL ANALYTICAL REPORT
DEW Line Sites - Water Samples
Second Column Confirmations

<u>Parameter</u>	<u>Method</u>	<u>Units</u>	<u>Detection Limit</u>	<u>SW40A26 Site 40</u>	<u>SW40B27 Site 40</u>	<u>SW43A24 Site 43</u>	<u>SW43B25 Site 43</u>	<u>SW44A23 Site 44</u>
<u>Purgeable Halocarbons</u>								
1,1-Dichloroethene (f)	EPA 601	µg/L	0.49	ND	ND	ND	ND	ND
1,1-Dichloroethene (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
trans-1,2-Dichloroethene (f)	EPA 601	µg/L	0.42	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
1,2-Dichloropropane (f)	EPA 601	µg/L	0.20	6.2	ND	ND	ND	ND
1,2-Dichloropropane (s)	EPA 601	µg/L		Pos	Neg	Neg	Neg	Neg
cis-1,3-Dichloropropene (f)	EPA 601	µg/L	0.58	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
trans-1,3-Dichloropropene (f)	EPA 601	µg/L	0.39	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
Methylene Chloride (f)	EPA 601	µg/L	0.34	17.	ND	ND	.57	ND
Methylene Chloride (s)	EPA 601	µg/L		Pos	Neg	Neg	NEG	Neg
1,1,2,2-Tetrachloroethane (f)	EPA 601	µg/L	0.38	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
Tetrachloroethene (f)	EPA 601	µg/L	0.38	6.4	ND	ND	ND	ND
Tetrachloroethene (s)	EPA 601	µg/L		Pos	Neg	Neg	Neg	Neg
1,1,1-Trichloroethane (f)	EPA 601	µg/L	0.53	1.2	ND	ND	ND	ND
1,1,1-Trichloroethane (s)	EPA 601	µg/L		Pos	Neg	Neg	Neg	Neg
1,1,2-Trichloroethane (f)	EPA 601	µg/L	0.51	ND	ND	ND	ND	ND
1,1,2-Trichloroethane (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
Trichloroethene (f)	EPA 601	µg/L	0.60	ND	2.1	ND	ND	ND
Trichloroethene (s)	EPA 601	µg/L		Neg	Pos	Neg	Neg	Neg
Trichlorofluoromethane (f)	EPA 601	µg/L	0.44	9.3	1.4	1.0	.61	ND
Trichlorofluoromethane (s)	EPA 601	µg/L		Pos	Pos	Pos	NEG	Neg
Vinyl Chloride (f)	EPA 601	µg/L	0.54	ND	ND	ND	ND	ND
Vinyl Chloride (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg

UBTL ANALYTICAL REPORT
DEW Line Sites - Water Samples
Second Column Confirmations

5
138

<u>Parameter</u>	<u>Method</u>	<u>Units</u>	<u>Detection Limit</u>	<u>SW40A26 Site 40</u>	<u>SW40B27 Site 40</u>	<u>SW43A24 Site 43</u>	<u>SW43B25 Site 43</u>	<u>SW44A23 Site 44</u>
<u>Purgeable Halocarbons</u>								
Bromodichloromethane (f)	EPA 601	µg/L	0.35	ND	ND	ND	ND	ND
Bromodichloromethane (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
Bromoform (f)	EPA 601	µg/L	0.45	ND	ND	ND	ND	ND
Bromoform (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
Bromomethane (f)	EPA 601	µg/L	0.63	ND	ND	ND	ND	ND
Bromomethane (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
Carbon Tetrachloride (f)	EPA 601	µg/L	0.46	ND	ND	ND	ND	ND
Carbon Tetrachloride (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
Chlorobenzene (f)	EPA 601	µg/L	0.37	ND	ND	ND	ND	ND
Chlorobenzene (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
Chloroethane (f)	EPA 601	µg/L	0.38	ND	ND	ND	ND	ND
Chloroethane (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
2-Chloroethylvinylether (f)	EPA 601	µg/L	0.44	ND	ND	ND	ND	ND
2-Chloroethylvinylether (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
Chloroform (f)	EPA 601	µg/L	0.45	ND	ND	ND	ND	ND
Chloroform (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
Chloromethane (f)	EPA 601	µg/L	0.49	ND	ND	ND	ND	ND
Chloromethane (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
Dibromochloromethane (f)	EPA 601	µg/L	0.31	ND	ND	ND	ND	ND
Dibromochloromethane (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
1,2-Dichlorobenzene (f)	EPA 601	µg/L	0.29	ND	ND	ND	ND	ND
1,2-Dichlorobenzene (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
1,3-Dichlorobenzene (f)	EPA 601	µg/L	0.42	ND	ND	ND	ND	ND
1,3-Dichlorobenzene (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
1,4-Dichlorobenzene (f)	EPA 601	µg/L	0.41	ND	ND	ND	ND	ND
1,4-Dichlorobenzene (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
Dichlorodifluoromethane (f)	EPA 601	µg/L	0.33	ND	ND	ND	ND	ND
Dichlorodifluoromethane (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg
1,1-Dichloroethane (f)	EPA 601	µg/L	0.49	1.2	ND	ND	ND	ND
1,1-Dichloroethane (s)	EPA 601	µg/L		Pos	Neg	Neg	Neg	Neg
1,2-Dichloroethane (f)	EPA 601	µg/L	0.44	ND	ND	ND	ND	ND
1,2-Dichloroethane (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg

UBTL ANALYTICAL REPORT
 DEW Line Sites - Water Samples
 Second Column Confirmations

Parameter	Method	Units	Detection Limit	SW9B2		SW13A5		SW16B16		SW16B17		SW28A21		SW28B22		SW31A20		SW32A18		SW32B19		
				Site 9	Site 13	Site 16	Site 16	Site 28	Site 28	Site 28	Site 31	Site 32	Site 32	Site 31	Site 32							
Purgeable Halocarbons																						
1,1-Dichloroethene (f)	EPA 601	µg/L	0.49	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene (s)	EPA 601	µg/L	0.42	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
trans-1,2-Dichloroethene (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene (s)	EPA 601	µg/L	0.20	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,2-Dichloropropane (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane (s)	EPA 601	µg/L	0.58	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
cis-1,3-Dichloropropene (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene (s)	EPA 601	µg/L	0.39	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
trans-1,3-Dichloropropene (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene (s)	EPA 601	µg/L	0.34	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Methylene Chloride (f)	EPA 601	µg/L	0.38	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Methylene Chloride (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane (f)	EPA 601	µg/L	0.38	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,1,2,2-Tetrachloroethane (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (f)	EPA 601	µg/L	0.53	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Tetrachloroethene (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane (f)	EPA 601	µg/L	0.51	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,1,1-Trichloroethane (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane (f)	EPA 601	µg/L	0.60	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,1,2-Trichloroethane (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene (f)	EPA 601	µg/L	0.44	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Trichloroethene (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane (f)	EPA 601	µg/L	0.54	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Trichlorofluoromethane (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride (f)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Vinyl Chloride (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg

UBRTL ANALYTICAL REPORT
 DEM Line Sites - Water Samples
 Second Column Confirmations

Parameter	Method	Units	Detection Limit	Site													
				SW9B2 Site 9	SW13A5 Site 13	SW16A16 Site 16	SW16B17 Site 16	SW28A21 Site 28	SW28B22 Site 28	SW31A20 Site 31	SW32A18 Site 32	SW32B19 Site 32					
Purgeable Halocarbons																	
Bromodichloromethane (f)	EPA 601	µg/L	0.35	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform (f)	EPA 601	µg/L	0.45	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Bromoform (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane (f)	EPA 601	µg/L	0.63	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Bromomethane (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride (f)	EPA 601	µg/L	0.46	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Carbon Tetrachloride (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene (f)	EPA 601	µg/L	0.37	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Chlorobenzene (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane (f)	EPA 601	µg/L	0.38	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Chloroethane (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethylvinylether (f)	EPA 601	µg/L	0.44	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
2-Chloroethylvinylether (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform (f)	EPA 601	µg/L	0.45	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Chloroform (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane (f)	EPA 601	µg/L	0.49	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Chloromethane (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane (f)	EPA 601	µg/L	0.31	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Dibromochloromethane (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene (f)	EPA 601	µg/L	0.29	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,2-Dichlorobenzene (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene (f)	EPA 601	µg/L	0.42	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,3-Dichlorobenzene (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene (f)	EPA 601	µg/L	0.41	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,4-Dichlorobenzene (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane (f)	EPA 601	µg/L	0.33	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Dichlorodifluoromethane (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane (f)	EPA 601	µg/L	0.49	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,1-Dichloroethane (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane (f)	EPA 601	µg/L	0.44	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,2-Dichloroethane (s)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

UBTL ANALYTICAL REPORT
DEW Line Sites - Water Samples
Second Column Confirmations

<u>Parameter</u>	<u>Method</u>	<u>Units</u>	<u>Detection Limit</u>	<u>SW1E5 Site 1</u>	<u>SW1F10 Site 1</u>	<u>SW3A11 Site 3</u>	<u>SW3B14 Site 3</u>	<u>SW4A3 Site 4</u>	<u>SW4B4 Site 4</u>	<u>SW8A12 Site 8</u>	<u>SW8B13 Site 8</u>	<u>SW9A1 Site 9</u>
<u>Purgeable Halocarbons</u>												
1,1-Dichloroethene (f)	EPA 601	µg/L	0.49	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
trans-1,2-Dichloroethene (f)	EPA 601	µg/L	0.42	2.0	0.60	0.43	ND	ND	ND	ND	0.62	ND
trans-1,2-Dichloroethene (s)	EPA 601	µg/L		Pos	Pos	Pos	Neg	Neg	Neg	Neg	Pos	Neg
1,2-Dichloropropane (f)	EPA 601	µg/L	0.20	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
cis-1,3-Dichloropropene (f)	EPA 601	µg/L	0.58	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
trans-1,3-Dichloropropene (f)	EPA 601	µg/L	0.39	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Methylene Chloride (f)	EPA 601	µg/L	0.34	16.	5.9	ND	ND	ND	5.1	ND	ND	ND
Methylene Chloride (s)	EPA 601	µg/L		Pos	Pos	Neg	Neg	Neg	Pos	Neg	Neg	Neg
1,1,2,2-Tetrachloroethane (f)	EPA 601	µg/L	0.38	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Tetrachloroethene (f)	EPA 601	µg/L	0.38	1.1	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (s)	EPA 601	µg/L		Pos	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,1,1-Trichloroethane (f)	EPA 601	µg/L	0.53	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,1,2-Trichloroethane (f)	EPA 601	µg/L	0.51	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Trichloroethene (f)	EPA 601	µg/L	0.60	290	110	0.76	ND	ND	ND	ND	1.5	ND
Trichloroethene (s)	EPA 601	µg/L		Pos	Pos	Pos	Neg	Neg	Neg	Neg	Pos	Neg
Trichlorofluoromethane (f)	EPA 601	µg/L	0.44	4.6	3.1	3.2	1.6	1.1	3.1	1.3	1.5	1.2
Trichlorofluoromethane (s)	EPA 601	µg/L		Pos	Pos	Pos	Pos	Pos	Pos	Pos	Pos	Pos
Vinyl Chloride (f)	EPA 601	µg/L	0.54	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride (s)	EPA 601	µg/L		Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg

UBTL ANALYTICAL REPORT
DEW Line Sites - Water Samples
Second Column Confirmations

Parameter	Method	Units	Detection Limit	SW1E5 Site 1	SW1F10 Site 1	SW3A11 Site 3	SM3B14 Site 3	SM4A3 Site 4	SM4B4 Site 4	SM8A12 Site 8	SM8B13 Site 8	SM9A1 Site 9
<u>Purgeable Halocarbons</u>												
Bromodichloromethane (f)	EPA 601	µg/L	0.35	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane (s)	EPA 601	µg/L	0.45	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Bromoform (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform (s)	EPA 601	µg/L	0.63	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Bromomethane (f)	EPA 601	µg/L		15.	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane (s)	EPA 601	µg/L	0.46	Pos	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride (f)	EPA 601	µg/L		ND	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Carbon Tetrachloride (s)	EPA 601	µg/L	0.37	ND	ND	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Chlorobenzene (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene (s)	EPA 601	µg/L	0.38	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Chloroethane (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane (s)	EPA 601	µg/L	0.44	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
2-Chloroethylvinylether (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethylvinylether (s)	EPA 601	µg/L	0.45	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Chloroform (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform (s)	EPA 601	µg/L	0.49	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Chloromethane (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane (s)	EPA 601	µg/L	0.31	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Dibromochloromethane (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane (s)	EPA 601	µg/L	0.29	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,2-Dichlorobenzene (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene (s)	EPA 601	µg/L	0.42	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,3-Dichlorobenzene (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene (s)	EPA 601	µg/L	0.41	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,4-Dichlorobenzene (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene (s)	EPA 601	µg/L	0.33	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
Dichlorodifluoromethane (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane (s)	EPA 601	µg/L	0.49	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg	Neg
1,1-Dichloroethane (f)	EPA 601	µg/L		4.1	1.9	ND	ND	Neg	Neg	Neg	Neg	Neg
1,1-Dichloroethane (s)	EPA 601	µg/L	Pos	Pos	Neg	Neg	Neg	1.9	Pos	Neg	Neg	Neg
1,2-Dichloroethane (f)	EPA 601	µg/L		ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane (s)	EPA 601	µg/L	0.44	Neg	Neg	Neg	Neg	Pos	ND	Neg	Neg	Neg

APPENDIX G
REFERENCES AND TABULATION OF CHEMICAL DATA,
PHASE II, STAGE 1 IRP

TABLE 3*

CHEMICAL ANALYSIS RESULTS
DEW LINE - WATER ANALYSES

PARAMETER	METHOD	UNITS	DETECTION LIMIT	BAR-M			POW-3	POW-2	POW-1			LIZ-2		
				SITE 3	SITE 8	SITE 9	SITE 13	SITE 16	SITE 28	SITE 31	SITE 32	SITE 40	SITE 43	SITE 44
TOC	415.1 ^a	mg/L	1.	51.	19.	31.	6.	13.	20	4.	52.	44.	15.	16.
TOX	9020 ^b	µg/L	10.	1200.	180.	190.	1,100.	890.	170	950.	8400.	1400.	130.	150.
Lead	239.2 ^a	mg/L	0.01	--	0.01	d	0.05	0.03	--	d	d	d	d	d
Phenols	420.2 ^a	µg/L	10.	--	d	--	d	d	--	d	25.	13.	d	d
Oil and Grease	413.2 ^a	mg/L	5.	36.	d	--	--	--	7	--	--	--	--	--
PCBs	608 ^c	µg/L	0.5	--	d	d	d	--	--	d	d	--	--	--
pH (Field)	--	--	--	7.70	7.05	7.10	8.05	8.50	--	6.85	9.2	7.35	7.25	7.65
Specific Conductance @ 25°C	--	µmhos/cm	--	720.	315.	275.	11,496.	7818.	--	2414.	1856.	952.	294.	364.
Salinity	--	%	--	--	--	--	7.5	5.2	--	17.2	1.3	--	--	--

^aEPA SW-846, modified for use with an O.I. Model 610 TOX Analyzer.

^bEPA Manual 600/4-82-057, July 1982, "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater."

^cEPA 600/4-79-020, March 1983, "Methods for Chemical Analysis of Water and Wastes."

^dDenotes value less than the limit of detection.

* Dames & Moore, 1986, Installation Restoration Program, Phase II-Confirmation/Quantification, Stage 1, DEW Line Stations, Alaska. Contract No. F33615-83-D-4002 0021, Park Ridge, Illinois.

REFERENCES

- CH2M Hill, 1981, Installation Restoration Program Records Search for Alaska DEW Line Stations. Contract No. F0863780 G0010 004, Gainesville, Florida.
- Dames & Moore, 1986, Installation Restoration Program, Phase II - Confirmation/Quantification, Stage 1. Contract No. F33615-83-D-4002 0021, Park Ridge, Illinois.
- JRB Associates, Inc., 1980, Methodology for rating the hazard potential of waste disposal sites. McLean, Virginia.
- U.S. Environmental Protection Agency, 1985, National Interim Primary Drinking Water Regulations. 40 CFR 141 and 40 CFR 142.

TABLE 4 *

SOIL ANALYSIS RESULTS^a
BAR-M STATION, DEW LINE

PARAMETER	METHOD	UNITS	DETECTION LIMIT	SITE 1 0'	SITE 1 STREAM BED	SITE 4 1.0'	SITE 4 2.0'
Lead	239.1 ^{b,c}	µg/g	10.	76.	8	8	52
Phenols	420.2 ^b	µg/g	1.	8	8	8	8
TOX	9020 ^d	µg/g	5.	8	8	8	8
% Moisture	grav.	%	--	26.	9.3	76	75
PCB	608 ^e	µg/g	0.5 ^f	0.72	8	--	--
PCB	608 ^e	µg/g	5. ^f	--	--	8	8

^aResults corrected for percent moisture.

^bMethods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020, Revised March 1983, modified for use with soil samples.

^cSoil samples were acid digested for lead analysis.

^dTest Methods for Evaluating Solid Waste, SW-846, 2nd Ed., July 1982, modified for use on O.I. Corp. Model 610 TOX Analyzer, with soil samples.

^eEPA Manual 600/4-82-057, July 1982, modified for use with soil samples.

^fBecause of interferences, the following dilutions were made to analyze the samples:

Site 1, 0'	1:10
Site 1, stream bed	1:10
Site 4, 1.0'	1:100
Site 4, 2.0'	1:100

⁸Denotes value less than the limit of detection.

* Dames & Moore, 1986, Installation Restoration Program, Phase II-Confirmation/Quantification, Stage 1, DEW Line Stations, Alaska. Contract No. F33615-83-D-4002 0021, Park Ridge, Illinois.

APPENDIX H
BIOGRAPHIES OF KEY PERSONNEL

Curriculum Vitae

MICHAEL W. ANDER

- Title** Environmental Scientist
- Expertise** Environmental Analysis and Impact Assessment
Aquatic Ecology
Mine Reclamation
Environmental Auditing and Risk Assessment
- Experience with Firm**
- Project Manager**
- o Environmental audits and risk assessments for several industrial facilities in the Midwest.
 - o Geohydrologic assessment of a chemically contaminated plant site in Michigan, including evaluation of containment and treatment measures.
 - o Geohydrologic assessment of a chemical waste disposal facility in Michigan.
 - o Environmental studies and development of remedial actions for over 30 PCB-contaminated industrial sites throughout the Midwest.
 - o Environmental analysis and impact assessment report for a 600-MWe coal-fired power plant in Missouri.
 - o Assessment of the impact to benthic and fish communities generated by the increase of industrial effluent to a river in northern Illinois.
 - o Land reclamation study for a highly acidic, abandoned coal strip mine in north-central Illinois.
 - o Evaluation of the environmental enhancement resulting from the dredging of polluted sediments from the Little Calumet River in Illinois.
 - o Study of the economic and environmental implications of developing low-head hydroelectric power on the Fox River in Illinois.
 - o Environmental assessment of lead in the soils and ground water near a battery reprocessing plant in Illinois.
 - o Environmental assessment of potential chemical contamination of a chemical plant site in Michigan.
 - o Environmental assessment of selected river basins, tributary to the Illinois River, based on the analysis of nearly 2000 benthic samples.
- Assistant Project Manager**
- o Environmental baseline studies and impact assessment of copper/zinc mine in northern Wisconsin, including analysis and evaluation of fisheries, plankton, and periphytic algae with special emphasis on water chemistry and benthic macro-invertebrates.

MICHAEL W. ANDER
Page Two

- o Preparation and coordination of Final Safety Analysis Report and Environmental Report for a nuclear power plant in Missouri.

Principal Investigator/Aquatic Ecologist

- o Environmental studies required for the preparation of permit applications and reclamation plans for several coal mines and a coal preparation plant in eastern Kentucky.
- o Environmental assessment of dredging an estuary and salt marsh for a chemical plant in South Carolina, including analysis and evaluation of fisheries, plankton, and water chemistry with special emphasis on the collection and analysis of benthic macroinvertebrates.
- o Environmental baseline studies for nuclear power plants in Florida, Wisconsin, Missouri, Texas, and Washington with the responsibility for the collection and analysis of benthic samples.
- o Environmental baseline studies for the phosphate mining industry in Florida.

Project Quality Assurance Coordinator

- o Management of all projects requiring quality assurance in compliance with NRC regulations.
- o Implementation of Dames & Moore's quality assurance manual on all nuclear-related projects.

Past Experience

Aviation Electronics Technician, U.S. Navy

- o Maintenance of electronic systems of A-7 attack aircraft.
- o Counselor, Naval Drug Rehabilitation Center.

Academic Background

M.S., Biological Sciences, Northern Illinois University, 1970
B.S., Biological Sciences, Northern Illinois University, 1967

Professional Affiliations

North American Benthological Society
International Oceanographic Foundation
Illinois Association of Environmental Professionals
Ecological Society of America

Registration

Certified SCUBA Diver

Curriculum Vitae

JON MICHAEL STANLEY .

- | | |
|-----------------------------|--|
| Title | Senior Engineering Geologist |
| Expertise | Engineering Geology
Geotechnical Engineering
Project Management |
| Experience with Firm | <ul style="list-style-type: none"> o Engineering aspects of transportation corridors, port sites, and mining facilities and dams for a lead/zinc mine in northwestern Alaska. Regional engineering geology, quantification of potential engineering problems along alternative routes and offshore geotechnical engineering for a port site. o Engineering geology, foundation design, and wastewater treatment and disposal systems design for a U.S. Navy building on Adak, Alaska. o Engineering geology for a runway extension for the State of Alaska and the City of Unalaska at Dutch Harbor, Alaska. o Coordination of a drilling program covering 460 miles of the Trans-Alaska Pipeline System including drilling operations, laboratory testing, engineering analyses, and reporting. o Review of hazardous waste disposal areas and preparation and implementation of an investigation program at three major U.S. Air Force installations and five DEW Line sites in Alaska. o Coordination of onshore logistics for an offshore geotechnical investigation utilizing a 195-foot drill-equipped vessel operating in the Bering, Chukchi, and Beaufort seas. o Assessment of geohazards along State Route 178 in the Kern River Canyon, Kern County, California. o Soil and ground water contamination assessment for Chevron's Bakersfield, California refinery. o Assessment of hydrogeologic conditions in conjunction with a soil and ground water assessment at the Kodak Distribution Center, San Ramon, California. o Assessment of gasoline spills at a San Mateo, California gas station. |
| Past Experience | <ul style="list-style-type: none"> o Senior Civil Engineer, Alyeska Pipeline Service Company. General civil engineering including engineering project management, soils investigations, below-ground pipeline stability monitoring, field visual surveillance of below-ground pipeline, development of computer systems for below-ground pipeline monitoring and stability analysis, and coordination of field test hole drilling and monitoring device installation programs. Mapping of ground water flow and flow control planning including through pump testing and water level monitoring. |

JON MICHAEL STANLEY

Page - 2 -

- o Owner, Geological Engineering Services. General geological and civil engineering including soils investigations, subdivision development engineering, water supply and sewage treatment and disposal systems design, road design, construction inspection, and environmental engineering.
- o Manager of Kenai District Field Office, Alaska Department of Environmental Conservation. Responsible for review of plans for subdivisions, water supply systems and sewage treatment and disposal systems, inspection of public water supplies and wastewater treatment and disposal systems, enforcement of DEC regulations, and preparation of legal actions. Reviewed both chemical and oil waste disposal practices in the Sterling hazardous waste disposal area and plans for sewage disposal facilities in several areas on the Kenai Peninsula. Reviewed plans for fish waste disposal facilities in several areas on the Kenai Peninsula. Provided supervision for oil spill monitoring for south-central and southwest Alaska.
- o Senior and Staff Engineer, R&M Consultants. Coordination of soils investigations, computer processing of data, preparation of numerous technical and data presentation reports, foundation investigations, and subdivision investigations.

**Academic
Background**

Postgraduate courses in engineering and business management and arctic engineering, 1980-1982
 B.S., Geological Engineering, University of Alaska, Fairbanks, 1974
 Washington State University, Pullman, 1966-1967
 University of Alaska, Fairbanks, 1965-1966

Registration

Professional Geologist, Alaska, License No. AA 0059, 1982

**Professional
Affiliations**

American Institute of Professional Geologists, 1982, CPGS No. 6082
 Association of Engineering Geologists
 Association of Ground Water Scientists and Engineers
 Alaska Section, American Water Resources Association
 Alaska Ground Water Association (Secretary/Treasurer, 1983-1984)
 Alaska Geological Society

Publications

Thomas, H.P., E.R. Johnson, J.M. Stanley, J.A. Shuster, and S.W. Pearson, "Pipeline Stabilization Project at Atigun Pass," in Proceedings of the Third International Symposium on Ground Freezing, Hanover, New Hampshire, June 1982.

Curriculum Vitae

JON MICHAEL STANLEY
Page - 3 -

Stanley, J.M., and J.E. Cronin, "Investigation and Implications of Subsurface Conditions Beneath the Trans-Alaska Pipeline in Atigun Pass," in Proceedings of the Fourth International Conference on Permafrost, July 1983 (in preparation).

nh-tl

Curriculum Vita

ROBERT E. QUINLAN

Title	Staff Biologist
Expertise	Aquatic Biology
Experience With Firm	<ul style="list-style-type: none"> ● Co-Principal Investigator assessing aquatic concerns for a coal-to-methanol facility feasibility study in Dunn County, North Dakota including off-site product pipeline route environmental assessment. ● Co-Principal Investigator evaluating impacts to fishery resources for an environmental impact statement regarding water supply systems for a lignite mine and sythetics plant in east Texas. ● Evaluation of impacts to fishery resources for an environmental impact statement regarding expansion of sewage treatment facilities in Missoula, Montana. ● Evaluation of impacts to aquatic resources in Clear Creek in the Denver metropolitan area for an assessment of impacts due to sewage treatment facilities expansion in Golden, Colorado. ● Aquatic species evaluation and analysis of potential impacts for alternative coal-fired generating facility sites established by the Los Angeles Department of Water and Power in White Pine County, Nevada. ● Principal Investigator assessing aquatic and hydrologic concerns for dredge and fill permutting in Polk County, Florida. ● Performed "Instream Flow Incremental Analysis" on streams in northwest Alaska to formulate a predictive model for the assessment of possible mining related impacts-induced changes in stream flow regimes on Arctic grayling and Arctic char populations.
Past Experience	<p>Assistant Fisheries Biologist, Wyoming Game and Fish Department, Pinedale, Wyoming.</p> <ul style="list-style-type: none"> ● Evaluated fish habitat quality and fisheries exploitation on the Upper Green River. <p>Assistant Fisheries Biologist, Wyoming Game and Fish Department, Laramie, Wyoming.</p> <ul style="list-style-type: none"> ● Evaluated brown and rainbow trout populations in the Upper North Platte River. <p>Research Assistant, University of Wyoming, Laramie, Wyoming.</p> <ul style="list-style-type: none"> ● Researched the reproductive biology of the Colorado River cutthroat trout (<i>Salmo clarki pleuriticus</i>) in the Sierra Madre Mountains of southcentral Wyoming. ● Research included evaluating age-growth, population (inter-action, fecundity, egg mortality, and physical and chemical parameters) associated with this State-listed sensitive species.
Academic Background	<p>A.S., biology, Casper College, Casper, Wyoming.</p> <p>B.S., zoology, fisheries management, University of Wyoming, Laramie, Wyoming.</p> <p>M.S., zoology, aquatic biology, University of Wyoming, Laramie, Wyoming.</p>
Professional Background	American Fisheries Society, Colorado-Wyoming Chapter of the American Fisheries Society.
Publications	Thesis: A study of the Biology of the Colorado River Cutthroat Trout (<i>Salmo clarki pleuriticus</i>) Population in the North Fork of the Little Snake River Drainage in Wyoming.

* * *

Curriculum Vita

Carol Jean Scholl

Title Project Geologist

Expertise Geology
Ground-Water Hydrology

Experience With Firm Provides consultation on geologic and ground-water aspects of the firm's hazardous waste, nuclear and mining projects. Joined Dames & Moore in 1973 and rejoined the firm in 1983.

Project Geologist

- Performed cost-effectiveness analyses of alternate disposal methods for hazardous waste contaminated soils.
- Designed and managed hazardous waste field investigations at U.S. Air Force installations in seven states. The program involved the analysis and evaluation of hazardous materials in soil and ground water including fuels, solvents and trace metals.
- Managed field investigations to assess the environmental impacts of the uncontrolled disposal of heavy metals and industrial wastes in till plain soils.

Staff Geologist

- Planned and managed a hydrogeologic investigation of a waste management facility for a petrochemical firm.
- Performed environmental assessments on the impacts of landfills to the environment.
- Designed and managed a field investigation involving the impact of a chemical process facility on ground water and surface water quality.
- Prepared personnel safety plans for investigations at hazardous waste sites.
- Served as Dames & Moore's group contact coordinator for the Electric Power Research Institute's Seismic Risk Hazard Analysis Program performed in the eastern United States.
- Prepared responses to questions posed by the Nuclear Regulatory Commission concerning faulting studies for a nuclear power plant in southern Indiana.

Assistant Geologist

- Assisted in the compilation and reduction of ground-water data for preliminary safety analysis reports for three potential nuclear power plant sites in Kansas, Missouri and

Dames & Moore

Illinois.

- Participated in detailed field structural geological studies of a potential nuclear power plant site in Pennsylvania.
- Performed engineering geological duties for a rock coring and soil sampling program at a nuclear power plant site in northwestern Illinois.
- Assisted in the reduction of ground-water data for a hydrologic study of a proposed coal strip mine in eastern Montana.

**Past
Experience**

A total of ten years experience in geology education and research.

Head of Group Programs/Instructor of Geology, Field Museum of Natural History, Chicago

- Supervised professional and clerical staff members of a division of the Department of Education.
- Participated in planning and decisions regarding departmental policies, budgets and procedures.
- Instructed school groups, adult volunteers and other adult groups in geology.
- Trained adult volunteers to present geology tours.
- Supervised a manned exhibit featuring a hands-on environment of natural history specimens.

Graduate Teaching Fellow and Associate/Graduate Teaching Assistant, Miami University, Oxford, Ohio

- Studies course work toward Ph.D., with emphasis on geochemistry and mineralogy.

**Academic
Background** M.S. (1970), geology, Miami University, Oxford, Ohio
B.S. (1966), geology, Kent State University, Ohio

Citizenship United States

**Countries
Worked In** United States

**Language
Proficiency** English

**Professional
Affiliations** American Association for the Advancement of Science; Mineralogical Society of America;
National Water Well Association.

APPENDIX I
SAFETY PLAN

DAMES & MOORE
HEALTH AND SAFETY PLAN

Project Name and Number: Phase IIb Environmental Investigation - 01016-207-07
Project Site Location: Dew Line Sites, Alaska
Project Manager: J. Michael Stanley
On-Site Safety Officer: J. Michael Stanley
Plan Preparer: Michael W. Ander
Plan Reviewer: Dara Gray
Preparation Date: July 24, 1984

Plan Approvals:

Office Safety Coordinator

Michael W. Ander 7/25/84
Michael W. Ander (date)

Managing Principal-in-Charge

George W. Nicholas 7/25/84
George W. Nicholas (date)

Project Manager

J. Michael Stanley 21 Aug 84
J. Michael Stanley (date)

I. PURPOSE

The purpose of this Plan is to assign responsibilities, establish personnel protection standards, specify mandatory operating procedures, and provide for contingencies that may arise while operations are being conducted at the site.

II. APPLICABILITY

The provisions of the Plan are mandatory for all on-site Dames & Moore employees and subcontractors engaged in hazardous material management activities including but not limited to initial site reconnaissance, preliminary field investigations, mobilization, project operations, and demobilization.

III. RESPONSIBILITIES

A. Project Manager

The PM shall direct on-site investigation and operational efforts. At the site, the PM, assisted by the on-site Safety Officer, has the primary responsibility for:

1. Assuring that appropriate personnel protective equipment is available and properly utilized by all on-site personnel.
2. Assuring that personnel are aware of the provisions of this plan, are instructed in the work practices necessary to ensure safety, and in planned procedures for dealing with emergencies.
3. Assuring that personnel are aware of the potential hazards associated with site operations (see Tables 1 and 2).
4. Monitoring the safety performance of all personnel to ensure that the required work practices are employed.
5. Correcting any work practices or conditions that may result in injury or exposure to hazardous substances.
6. Preparing any accident/incident reports (see attached Accident Report Form).
7. Assuring the completion of Plan Acceptance and Feedback forms attached herein.

B. Project Personnel

Project personnel involved in on-site investigations and operations are responsible for:

1. Taking all reasonable precautions to prevent injury to themselves and to their fellow employees.

2. Implementing Project Health and Safety Plans, and reporting to the PM for action any deviations from the anticipated conditions described in the Plan.
3. Performing only those tasks that they believe they can do safely, and immediately reporting any accidents and/or unsafe conditions to the PM.

IV. BACKGROUND

A. Site History

Based on preliminary site evaluations of the five Dew Line Sites, Alaska, there appear to be twelve (12) areas that may have generated significant environmental contamination over the lifetime of the facilities. Suspected contaminants have been identified; quantification awaits further investigation based on sampling and analysis. Dames & Moore anticipates that site conditions are such that only relatively low levels of contaminants may be encountered during the proposed drilling and soil and water sampling.

BAR-M Site No. 1 - Old Dump Site

This site, located north of the fuel storage area at BAR-M between the sewage pond and the Beaufort Sea, received all wastes generated at BAR-M and the village of Kaktovik from 1956 to 1978. Materials disposed of included domestic garbage, human and animal waste, waste POL products, scrap metal, batteries, drums, vehicles, electronic equipment, food waste, and trash. Disposal also included dumping directly into the Beaufort Sea. This site was included in an environmental clean-up project where most of the materials dumped at the site were removed.

Site No. 3 - Waste Petroleum Disposal

This site, a small circular pond measuring approximately 20 feet in diameter and 2 to 3 feet deep, is saturated with diesel fuel and waste oil products. This site appears to be a disposal site for these products.

Site No. 4 - Current Dump Site

This site measuring approximately 2 acres in areal extent, has been in operation since June, 1978. It is used by both BAR-M and the village of Kaktovik. Disposal of materials by BAR-M personnel is controlled and in compliance with DEW Line Instruction 825.620 dated May 11, 1979. Disposal by village inhabitants is uncontrolled.

Site No. 8 - Drainage Cut Contamination

The site power house discharges washwater to this natural drainage cut which flows to the sea. There appears to be contaminated liquid, possibly antifreeze, discharged to the drainage cut.

Site No. 9 - Old Dump Site, N.W.

This site, less than 1 acre in size, was used briefly by BAR-M for disposal of crushed drums and steel from a burned building. The site was cleaned up in 1979 when approximately 15 tons of scrap metal was removed.

POW - 3 Site No. 13, Old Dump Site, East

This site, less than 1 acre in size, was used from 1956 to 1971, when the station was deactivated.

POW - 2 Site No. 16, Old Dump Site, N.W.

This location received all waste generated by the site from 1956 to approximately 1978. It was cleaned up in 1978, 1979, and 1980. The site was less than 1 acre in size.

POW - 1 Site No. 28, POL Storage Area

This petroleum storage area is adjacent to a small pond. Fuel/oil was observed to be collecting in this pond.

Site No. 31, Old Dump Site

This site was used prior to approximately 1976. This site is less than 1 acre in size.

Site No. 32, Husky Oil Dump Site

This current dump site, located approximately 1 mile southwest of POW-1, is maintained and operated by Husky Oil Company. This refuse site has been in use since 1976 and is less than 1 acre in size.

LIZ - 2 Site No. 40, Current Dump Site

This site has been in use since 1978. It is located southeast of the hanger. From the figure presented in the Phase I contractor's report, it appears that refuse disposal occurs both on land and in adjacent Kasegaluk lagoon.

Site No. 43 and 44, Old Dump Sites.

Both these old dump sites were cleaned up in 1979-80. Site No. 43 was used by LIZ-2 personnel from 1956 to 1978. Site No. 44 was used by villagers and site personnel from 1956 to 1980.

B. Dames & Moore Activity

Monitoring wells will be installed and soil samples will be taken at all 5 prioritized sites.

C. Suspected Hazards

Suspected hazards are presented in as much detail as is currently available. These are POL (waste petroleum, oils, and solvents) products, JP-4 fuel, AVGAS, MOGAS, paint, and unknown pesticides.

V. EMERGENCY CONTACTS AND PROCEDURES

Should any situation or unplanned occurrence require outside or support services, the appropriate contact from the following list should be made:

Agency	Person to Contact	Telephone
D&M Project Manager	J. M. Stanley	(office) 907-279-0673 (home) 907-338-0634
D&M Industrial Hygiene and Safety Director	Dara Gray	(office) 914-761-6323 (home) 914-962-5423
Police		
Fire		
Ambulance		
Hospital		
Command Post		

In the event that an emergency develops on site, the procedures delineated herein are to be immediately followed. Emergency conditions are considered to exist if:

- o Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on scene.

TABLE 1
EXPOSURE LIMITS AND RECOGNITION QUALITIES

COMPOUND	EXPOSURE STANDARD ^a	IDLH ^b LEVEL	RECOGNITION QUALITIES		
			COLOR	ODOR	STATE
PCB (42% chlorine)	1 mg/m ³	10 mg/m ³	None to dark brown	Mild hydrocarbon	Liquid
PCB (54% chlorine)	0.5 mg/m ³	5 mg/m ³	Pale yellow	Mild hydrocarbon	Viscous liquid

^aOSHA permissible exposure limit or ACGIH Threshold Limit Value.

^bIDLH = immediately dangerous to life or health.

TABLE 2
 SYMPTOMS OF OVEREXPOSURE, POTENTIAL CHRONIC EFFECTS,
 AND FIRST-AID TREATMENT

COMPOUND	SYMPTOMS OF OVEREXPOSURE			POTENTIAL CHRONIC EFFECTS
	EYE	SKIN	INHALATION/INGESTION	
PCB (42% chlorine)	Irritation	Chloro-acne*	Nausea; edema of the face and hands; abdominal pain; anorexia	
PCB (54% chlorine)	Irritation	Chloro-acne,* brown pigment	Jaundice, dark urine	

GENERAL FIRST-AID TREATMENT

Eye - Irrigate immediately
 Skin - Soap wash promptly
 Inhalation - Move to fresh air
 Ingestion - Get medical attention

*Absorbs through the skin.

- o A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

The following emergency procedures should be followed:

- a. In the event that any member of the field crew experiences any adverse effects or symptoms of exposure while on scene, the entire field crew should immediately halt work and act according to the instructions provided by the Project Manager.
- b. The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated should result in the evacuation of the field team and reevaluation of the hazard and the level of protection required.
- c. In the event that an accident occurs, the PM is to complete an Accident Report Form for submittal to the MPIC of the office, with a copy to the Health and Safety Program Office. The MPIC should assure that followup action is taken to correct the situation that caused the accident.

VI. HAZARD CHARACTERISTICS AND PROTECTION REQUIRED

Exposure Limits and Recognition Qualities

Information concerning exposure limits and recognition qualities of the contaminants that are suspected to be on site is presented in Table 1.

Symptoms of Overexposure, Potential Chronic Effects and First Aid Treatment

Symptoms of overexposure to the suspected contaminants, potential chronic effects of these substances, and first aid treatment information are presented in Table 2.

Protective Equipment Required for On-Site Activities

The protective equipment required may vary, depending on the concentrations and dispersion of contaminants encountered during each phase of the work. Based on the scope of work it is understood that shallow soil samples will be collected utilizing a hand-auger or shovel. It is not expected that significant contamination will be encountered. Chemical resistant gloves are recommended. Chemical resistant boots and disposal chemical resistant coveralls may be worn at the discretion of the field engineer.

ATTACHMENT 1

PROTECTIVE EQUIPMENT

I. INTRODUCTION

When field investigation activities are conducted where atmospheric contamination is known or suspected to exist, where there is a potential for the generation of vapors or gases, or where direct contact with toxic substances may occur, equipment to protect personnel must be worn. Respirators are used to protect against inhalation and ingestion of atmospheric contaminants. Protective clothing is worn to protect against contact with and possible absorption of chemicals through the skin. In addition to protective clothing and respiratory protection, safe work practices must be followed. Good personal hygiene practice prevents ingestion of toxic materials.

Personnel equipment to be used has been divided into two categories commensurate with the degree of protection required, namely Levels C and D protection.

II. LEVELS OF PROTECTION

A. Level C

1. Personal Protective Equipment

- o Air-purifying respirator (MSHA/NIOSH approved)
- o Disposable chemical resistant coveralls
- o Gloves, outer, working gloves
- o Gloves, inner, chemical resistant
- o Boots, steel toe and shank
- o Hard hat (face shield)
- o Rubber boots, outer, chemical resistant (disposable)

2. Criteria for Selection

- a. Air concentrations of identified substances are such that reduction to at or below the substance's exposure limit is necessary and the concentration is within the service limit of the cartridge.
- b. Atmospheric contaminant concentrations do not exceed the Immediately Dangerous to Life or Health (IDLH) levels.
- c. Contaminant exposure to unprotected areas (head and neck) are within skin exposure guidelines, or dermal hazards do not exist.
- d. Job functions have been determined not to require a higher level of protection.

B. Level D**1. Personal Protective Equipment**

- o Coveralls
- o Boots/shoes, safety or chemical resistant, steel toe and shank
- o Boots, outer (chemical resistant disposables)
- o Hard hat (face shield)
- o Gloves

2. Criteria for Selection

- a. No indication of any atmospheric hazards.
- b. Work function precludes dusting, splashes, immersion, or potential for exposure to any chemicals.

3. Guidance on Selection Criteria

- a. Level D protection is primarily a work uniform and should not be worn in any area where the potential for contamination exists.
- b. In situations where respiratory protection is not necessary, but site activities are needed, chemical resistant garments — high quality or disposable — must be worn.

III. RESPIRATORY PROTECTION

The following procedures should be used for respiratory protection:

- A. Inspect all washers, diaphragms, and facepiece-to-face seal area for any tears, pinholes, deformation, or brittleness. Should any of these exist, use a different respirator.
- B. Place the respirator on the face, tighten and use both a positive and a negative pressure test, prior to entering the site, to assure a proper fit. Checking for proper fit involves the following:

1. Negative Pressure Test

Close off the inlet opening of the cartridge or the breathing tube by covering it with the palm of the hand or by replacing the tap seal. Gently inhale so that the facepiece collapses slightly, and hold the breath for 10 seconds. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is satisfactory.

2. Positive Pressure Test

Remove the exhalation valve cover. Close off the exhalation valve with the palm of the hand. Exhale gently so that a slight positive

pressure is built up in the facepiece. If no outward leakage of air is detected at the periphery of the facepiece, the face fit is satisfactory. (Note: With certain devices, removal of the exhaust valve cover is very difficult, making the test almost impossible to perform.)

ATTACHMENT 2

DAMES & MOORE STANDARD OPERATING PROCEDURES

WORK PRACTICES

1. Smoking, eating, drinking, and chewing tobacco are prohibited in the contaminated or potentially contaminated area.
2. Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling on the ground, leaning or sitting on equipment or ground. Do not place monitoring equipment on potentially contaminated surface (i.e., ground, etc.).
3. All field crew members should make use of their senses (all senses) to alert them to potentially dangerous situations (i.e., presence of strong and irritating or nauseating odors).
4. Prevent, to the extent possible, spillages. In the event that a spillage occurs, contain liquid if possible.
5. Prevent splashing of the contaminated materials.
6. Field crew members shall be familiar with the physical characteristics of investigations, including:
 - o wind direction
 - o accessibility to associates, equipment, vehicles
 - o communication
 - o hot zone (areas of known or suspected contamination)
 - o site access
 - o nearest water sources
7. The number of personnel and equipment in the contaminated area should be minimized consistent with site operations.
8. All wastes generated during D&M and/or subcontractor activities on site should be disposed of as directed by the Field Activity Leader.

HALF-FACE RESPIRATORS

Inspection Procedure

1. Look for breaks or tears in the headband material. Also stretch to check the elasticity.
2. Make sure all headbands, fasteners, and adjusters are in place and not bent.

3. Check the facepiece for dirt, cracks, tears, or holes. The rubber should be flexible, not stiff.
4. Look at the shape of the facepiece for possible distortion that may occur if the respirator is not protected during storage.
5. Check the exhalation valve located near the chin between the cartridges by the following:
 - Unsnap the cover;
 - Lift the valve and inspect the seat and valve for cracks, tears, dirt, and distortion; and
 - Replace the cover. It should spin freely.
6. Check both inhalation valves (inside the cartridge holders). Look for same signs as above.
7. Check the yoke for cracks.
8. Make sure the cartridge holders are clean. Make sure the gaskets are in place and the threads are not worn. Also look for cracks and other damage.
9. Check the cartridges for dents or other damage, especially in the threaded part.

Donning Procedure

1. Screw the cartridge into the holder hand-tight so there is a good seal with the gasket in the bottom of the holder, but don't force it. If the cartridge won't go in easily, back it out and try again.

Always use cartridges made by the same manufacturer who made the respirator.
2. Place the facepiece over the bridge of your nose and swing the bottom in so that it rests against your chin.
3. Hold the respirator in place and fasten the top strap over the crown of your head.
4. Fit the respirator on your face and fasten the strap around your neck. Don't twist the straps. Use the metal slide to tighten or loosen the fit, but not too tight.
5. Test the fit by:
 - Lightly covering the exhalation valve with the palm of your hand. Exhale. If there is a leak, you will feel the air on your face.

- Covering the cartridges with the palms of your hands. Again, don't press too hard. Inhale. The facepiece should collapse against your face.
- If there is a leak with either test, adjust the headbands or reposition the facepiece and test until no leakage is detected.

Sanitizing Procedure

1. Remove all cartridges, plugs, or seals not affixed to their seats.
2. Remove elastic headbands.
3. Remove exhalation cover.
4. Remove speaking diaphragm or speaking diaphragm/exhalation valve assembly.
5. Remove inhalation valves.
6. Wash facepiece and breathing tube in cleaner/sanitizer powder mixed with warm water, preferably at 120° to 140°F. Wash components separately from the facemask, as necessary. Remove heavy soil from surfaces with a hand brush.
7. Remove all parts from the wash water and rinse twice in clean warm water.
8. Air dry parts in a designated clean area.
9. Wipe facepieces, valves, and seats with a damp lint-free cloth to remove any remaining soap or other foreign materials.

MONITORING EQUIPMENT INSTRUCTIONS

A. Combustible Gas Indicators (CGIs)/Explosimeters

In addition to the instructions found below, all CGIs should be calibrated prior to use, in an uncontaminated, fresh air environment. Furthermore, units incorporating an aspirator bulb or other air-drawing device should be checked for leaks in the following manner:

- o Attach all hoses, probes, and other air-drawing devices to CGI.
- o Place a finger over probe or hose end.
- o Operate pump or squeeze aspirator bulb.

In a leak-free system, bulb remains collapsed or pump labors. In a leaking system, bulb regains its shape or pump does not labor.

1. MSA Explosimeter Combustible Gas Indicator
 - a. Turn explosimeter on by lifting end of "on-off" bar on "rheostat" knob and rotating "rheostat" knob clockwise 1/4 turn.
 - b. Flush instrument with fresh air by squeezing and releasing aspirator bulb about five times.
 - c. Rotate "rheostat" knob until meter needle rests at zero (Avoid large clockwise rotation, which sends large current through filament, perhaps shortening its useful life.)
 - d. To sample, place hose or probe end in atmosphere to be measured and operate aspirator bulb about five times.
 - e. Read percent of lower explosive limit (LEL) as meter needle fluctuates from a steady-state level to a higher level each time the aspirator bulb is flexed. The steady-state reading indicates the "true" value.
 - f. Turn explosimeter off by lifting end of "on-off" bar on "rheostat" knob and rotating it counterclockwise until it "clicks." "On-off" bar retracts into "rheostat" knob.

B. Photoionization Detector

1. Before attaching the probe, check the function switch on the control panel to make sure it is in the off position.
2. Attach the probe by plugging in the 12-pin plug to the interface on the readout module.
3. Turn the 6-position function switch to the battery check position. The needle on the meter should read within or above the green battery arc on the scale. If not, recharge the battery. If the red indicator comes on, the battery should be recharged.
4. Turn the function switch to any range setting. Look into the end of the probe briefly to see if the lamp is on. If it is on, it will give a purple glow. Do not stare into the probe for any length of time, as UV light can damage your eyes. The instrument is now ready for operation.
5. To zero the instrument, turn the function switch to the standby position and rotate the zero potentiometer until the meter reads zero. Clockwise rotation of the span pot produces a downscale deflection, while counterclockwise rotation yields an upscale deflection. Note: No zero gas is needed, since this is an electronic zero adjustment. If the span adjustment setting is changed after the zero is set, the zero should be rechecked and adjusted, if necessary. Wait 15 to 20 seconds to ensure that the zero reading is stable. If necessary, readjust the zero.

6. Turn function switch to the 0-20, 0-200, or 0-2000 position.
7. Place probe in the atmosphere to be monitored. If the needle moves to the upper limit of the scale, change the function switch to the next position.

ENVIRONMENTAL SAMPLES

Environmental samples must be packaged and shipped according to the following procedure:

1. Packaging

- a. Place sample container, properly identified and with a sealed lid, in a polyethylene bag, and seal bag.
- b. Place sample in a fiberboard container or metal picnic cooler that has been lined with a large polyethylene bag.
- c. Pack with enough noncombustible, absorbent, cushioning material to minimize the possibility of the container breaking.
- d. Seal large bag.
- e. Seal or close outside container.

Environmental samples may also be packaged following the procedures outlined later for samples classified as "flammable liquids" or "flammable solids." Requirements for marking, labeling, and shipping papers do not apply.

2. Marking/Labeling

Sample containers must have a completed sample identification tag, and the outside container must be marked "Environmental Sample." The appropriate side of the container must be marked "This End Up," and arrows should be drawn accordingly. No DOT marking and labeling is required.

3. Shipping Papers

No DOT shipping papers are required.

4. Transportation

There are no DOT restrictions of mode of transportation.

FORM #IHST-1
REVIEW RECEIPT
PROJECT HEALTH AND SAFETY PLAN

Instructions: This form is to be completed by each person to work on the site and returned to the Program Director-Industrial Hygiene and Safety.

Job No. 01016-207-07

Project: Phase IIb Environmental Investigation
Dew Line Sites, Alaska

Rev. No. 0

Date 07/24/84

I represent that I have read and understand the contents of the above plan and agree to perform my work in accordance with it.

Signed _____

Date _____

PLAN FEEDBACK FORM

Problems with plan requirements:

Unexpected situations encountered:

Recommendations for future revisions:

PLEASE RETURN TO THE FIRMWIDE HEALTH AND SAFETY OFFICE - WP

ACCIDENT REPORT FORM

SUPERVISOR'S REPORT OF ACCIDENT		DO NOT USE FOR MOTOR VEHICLE OR AIRCRAFT ACCIDENTS	
TO		FROM	
		TELEPHONE (include area code)	
NAME OF INJURED OR ILL EMPLOYEE			
DATE OF ACCIDENT	TIME OF ACCIDENT	EXACT LOCATION OF ACCIDENT	
NARRATIVE DESCRIPTION OF ACCIDENT			
NATURE OF ILLNESS OR INJURY AND PART OF BODY INVOLVED			LOST TIME YES <input type="checkbox"/> NO <input type="checkbox"/>
PROBABLE DISABILITY (check one)			
FATAL <input type="checkbox"/>	LOST WORK DAY WITH DAYS AWAY FROM WORK <input type="checkbox"/>	LOST WORK DAY WITH DAYS OF RESTRICTED ACTIVITY <input type="checkbox"/>	NO LOST WORK DAY <input type="checkbox"/> FIRST AID ONLY <input type="checkbox"/>
CORRECTIVE ACTION TAKEN BY REPORTING UNIT			
CORRECTIVE ACTION THAT REMAINS TO BE TAKEN (by whom and by when)			
NAME OF SUPERVISOR		TITLE	
SIGNATURE		DATE	

[13hsp-f3]

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE