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INSTALLATION RESTORATION PROGRAM PHASE II - CONFIRMATION/QUANTIFICATION STAGE 2

DULUTH INTERNATIONAL AIRPORT DULUTH, MINNESOTA 55811

DAMES & MOORE 1550 NORTHWEST HIGHWAY PARK RIDGE, ILLINOIS 60068

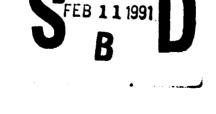
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APPENDIX (28 OCTOBER 1986 TO 13 JANUARY 1987)

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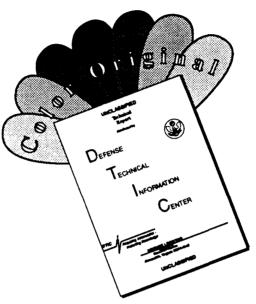
UNITED STATES AIR FORCE OCCUPATIONAL & ENVIRONMENTAL HEALTH LABORATORY (USAFOEHL) TECHNICAL SERVICES DIVISION (TS) BROOKS AIR FORCE BASE, TEXAS 78235-5501



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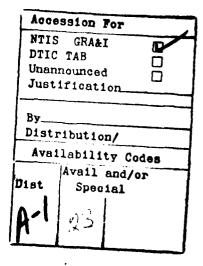
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LIST OF APPENDICES

- A Definitions, Nomenclature, and Units of Measurement
- B Statement of Work
- C Well Numbering System
- D Boring and Well Completion Logs
- E Field Raw Data
- F Field and Laboratory Quality Control Procedures
- G Chain-of-Custody Records
- H Analytical Reports
- I Correspondence with Regulatory Agencies
- J References
- K Biographies of Key Personnel
- L Geophysical Tracings
- M Technical Operations Plan





APPENDIX A

DEFINITIONS, NOMENCLATURE, AND UNITS OF MEASUPEMENT

ANG	Air National Guard
ASTM	American Society for Testing and Materials
Aquifer	zone beneath the earth's surface capable of producing water for a well.
BGS	Below Ground Surface
BOG	A waterlogged area of land, covered by spongy groundmass containing acidic, decaying vegeta- tion which may develop into peat.
CERCLA	Comprehensive Environmental Response Compensation and Liability Act of 1980
cm/s	centimeters per second
DDD	pesticide compound syn: 1,dichloroethane or TDE. Similar to DDT.
DEQPPM	Defense Environmental Quality Program Policy Memorandum
Deranged Drainage	a distinctively disordered drainage pattern in a recently glaciated area whose former surface and preglacial drainage has been remodeled and effaced, and in which the new drainage system shows a complete lack of underlying structural and bedrock control. It is characterized by irregular streams that flow in and out of lakes, by only a few short tributaries, and by swampy interstream areas.
DPDO	Defense Property Disposal Office
DoD	Department of Defense
Duluth IAP	Duluth International Airport
ground water divide	a line on the water table on each side of which the ground water table slopes away from the line.
ground water surface	the level below which the earth is saturated.
GABBRO	a group of dark-colored, basic intrusive igneous rocks.

HARM	Hazard Assessment Rating Methodology. A numerical scoring system used to evaluate potentially con- taminated sites. The system takes into account site and waste characteristics, pathways of migra- tion, and potential receptors of contamination. The HARM system is used to indicate the relative need for follow-up action.
hydraulic gradient	change in pressure or head in the ground water over a given distance of flow
Intrusive Igneous Rocks	Rock of molten origin that has been injected into existing rock and solidified without reaching the ground surface.
IRP	Installation Restoration Program
Kame	a steep-sided hill or ridge, composed chiefly of poorly sorted and stratified sand and gravel de- posited by a subglacial stream as a delta against or upon the terminal margin of a melting glacier.
Lopolith	a large, lens-shaped igneous intrusion.
Marsh	a water-saturated, poorly drained area, inter- mittently or permanently water-covered, having aquatic and grasslike vegetation, essentially without peatlike accumulation.
ug/1	micrograms per liter (equivalent to parts per billion in water).
umho/cm	micromhos per centimeter (units of Specific Conductance).
ug/g	Micrograms per gram (equivalent to parts per million in water).
ug/kg	Micrograms per kilogram (equivalent to parts per billion in water).
mg/l	milligrams per liter (equivalent to parts per million in water).
mgd	million gallons per day

A-2

Moraine	a distinct accumulation of unsorted, unstratified glacial drift, predominantly till, deposited chiefly by direct action of glacier ice.
MSL	Mean Sea Level Datum
Outwash	stratified sand and gravel removed from a glacier by meltwater streams.
рН	negative logarithm of the hydrogen ion concentra- tion in water.
PCB	Polychlorinated Biphenyls
ppb	parts per billion (equivalent to ug/l in water).
ppm	parts per million (equivalent to mg/l in water).
Syncline	a fold in layers of rock that is concave upward.
Swamp	a water-saturated area, intermittently or perma- nently covered with water, having shrub- and tree- type vegetation, essentially without peatlike accumulation.
тос	Total Organic Carbon
тох	Total Organic Halogens, which are organic com- pounds containing any of the elements of Group VII-b of the Periodic Table (F, Cl, Br, I).
Unconsolidated Sediments	sediments that are uncemented and thus contain interconnected void space (primary porosity) that allow for the storage and transmission of ground water.
USAF	United States Air Force
USAF/OEHL	Occupational and Environmental Health Laboratory
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VOA	Volatile Organic Compounds

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APPENDIX B

STATEMENT OF WORK

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Installation Restoration Program Phase II - Stage 2 Duluth International Airport Minnesota

I. DESCRIPTION OF WORK

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

The Phase II Stage 2 effort at Duluth IAP will entail a follow-on investigation for five sites evaluated during Phase II, Stage 1, and an initial monitoring program at six additional sites. The sites which are included in this study are identified in Table 1 and can be located on an installation map, Figure 1. The sites to receive follow-on investigative work are Goose Dump 1, Fire Training Areas, DPDO Storage Area "C" and the Tank Farm Area.

The purpose of this effort at Duluth IAP is to: (1) confirm the presence - absence of contamination within the specifed areas of investigation; (2) - contamination exists, determine the magnitude of contamination, and the potential for and rate of migration of those contaminants in the various environmental media; (3) identify potential environmental and health risk consequences of migrating pollutants; and (4) recommend additional investigations necessary to further define the magnitude, extent, direction and rate of contaminant migration.

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

A. Ceneral

1. Monitor all borehole and well drilling with a photoionization meter or equivalent organic vapor detector to identify the potential generation of hazardous and/or toxic vapors or gases. Include air monitoring results in the boring logs. If soil encountered during drilling or test pit work is suspected to be hazardous because of discoloration, odor or air monitoring, containerize the soil cuttings in new, unused drums. Enter into the boring logs the depth(s) from which suspected contaminated soil cuttings were collected. Test each drum containing suspected contaminated soils by taking a composite sample. Collect a maximum of 15 composite samples and test them for EP Toxicity and Ignitibility. (Ref: 40 CFR Subpart C., 261.21 - Ignitibility and 261.24 - EP Toxicity).

2. Determine the exact field location of all boreholes and monitor wells during the planning/mobilization phase of the field investigation. Consult with base personnel to minimize disruption of base activities, to properly position boreholes with respect to exact locations of spill/leak sites, and to avoid underground utilities. The senior on-site contract representative, in consultation with the USAF OEHL project manager and the base point-of-contact (see Section V), establishes the final borehole and well locations. Direct all drilling and sampling operations and maintain a detailed log of the conditions and materials penetrated during the course of the work.

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TABLE 1

LISTING OF SITES

PHASE I NO.	SITE DESCRIPTION
D-1 (TAC)	Goose Dump 1
FT-1 and FT-2 (ANG)	Fire Training Areas
S-2 (ANG)	DPDO Storage Area "C"
SP-1 (ANG)	Tank Farm Area
D-4 (TAC)	South Goose Dump
D-2 (TAC)	Goose Dump 2
D-6 (TAC)	Runway 13 NE Disposal
S-1 (ANG)	Old DPDO Storage Area
D-9 (TAC)	Disposal Pit
RD-1 (ANG)	Low-Level Radioactive Waste Disposal
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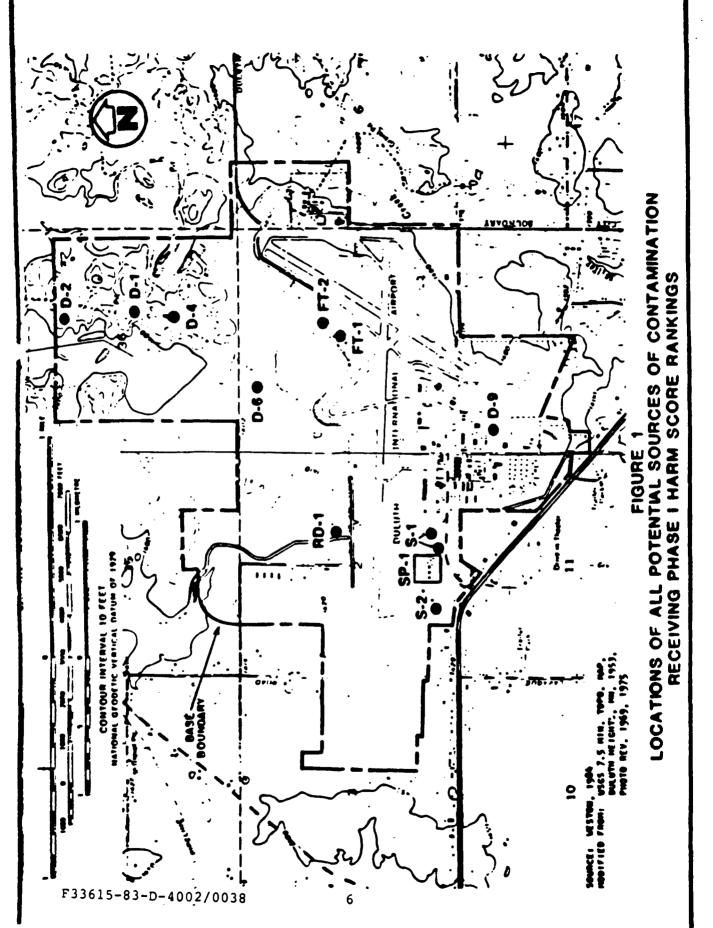
NOTE: ANG: Air National Guard sites TAC: Tactical Air Command sites

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3. Provide on site analysis of pH, temperature, and specific conductance for all water samples collected. Comply with the following references concerning sample collection, maximum holding time, sample preservation, etc: Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), pp. 37-44; ASTM, Section 11, Water and Environmental Technology; Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057; Methods for Chemical Analysis of Waters and Wastes, EPA Manual 600/4-79-020, pp. xiii to xix (1983); and Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 2nd Ed. (USEPA, 1984). Meet the required detection limits of the applicable EPA method identified in Table 4 for all water and soil chemical analyses.

4. Determine the areal extent of the sites by reviewing available aerial photos of the base, both historical and the most recent panchromatic and infrared. Report the sources of this data.

5. Split all water and soil samples. One set of samples shall be analyzed by the contractor and the other set of samples shall be delivered immediately (the same collection day) to the field government Point Of Contact (POC). The field POC will select 10% of the split samples for subsequent shipment and analysis and deliver them to the contractor within 4 hours of receipt. The contractor shall supply all packing and shipping materials for the field POC's use in packaging the split samples. The contractor shall accept from the field POC the packaged samples for immediate shipment (within 24 hours) for analysis through overnight delivery to:

> USAFOEHL/SA Bldg 140 Brooks AFB TX 78235-5501

Include the following information with samples sent to the USAF OEHL:

- a. Purpose of sample (analyte)
- b. Installation name (Base)
- c. Sample number (on container)
- d. Source/location of sample
- e. Contract Task Numbers and Title of Project

f. Method of collection (bailer, suction pump, air-lift pump, etc)

- g. Volumes removed before sample taken
- h. Special Conditions (use of surrogate standard, etc.)
- i. Preservatives used (indicate if nonstandard)
- j. Date and time of sampling
- k. Sampler's name

Forward this information with each sample by properly completing an AF

orm 2752A "Environmental Sampling Data" and/or AF Form 2752B "Environmental ampling Data-Trace Organics," mailed under separate cover. Label each sample container to reflect the data in (a), (b), (c), (i), (j), and (k) bove. In addition, attach copies of field logs which document sample collection.

Complete and maintain chain-of-custody records for all samples, field blanks, and quality control duplicates.

6. Install groundwater monitor wells using the following specifications:

a. Comply with the U.S. EPA Publication 330/9-S1-002, NEIC Manual for Ground Water /Subsurface Investigations at Hazardous Waste Sites for monitor well installation. Also comply with state and local regulatory agency requirements concerning well drilling, development and purging, and groundwater sampling methods.

b. Drill each well using conventional hollow-stem auger techniques. Where refusal is encountered due to boulders before the required well completion depth is achieved, use diamond core drilling to complete the borehole. Take samples for stratigraphic description and logging at five-foot intervals using standard split spoon techniques. I lude each pilot boring log and well completion summary in the Final Report (as specified in Item VI below).

c. Collect soil samples for laboratory analysis from well boreholes as directed in section B. Where the depths and/or boreholes from which soil samples should be collected at a site are not specified in Section B, actual sample locations (borehole and depth) are at the field supervisor's discretion; however, samples should be limited to areas of suspected contamination. At sites where soil samples are specified in Section B to be collected from designated boreholes and at certain depths, variations may occur at the field supervisors discretion to ensure zones of suspected contamination are sampled. Do not collect or analyze more soil samples than authorized in Section B.

d. Install wells at a sufficient depth to collect samples representative of aquifer quality and to intercept floating contaminants. I velop each well as soon as practical after completion by surging with a.. air-lift pump or bailer. Do not introduce foreign materials into the well during development. Continue well development until the discharge water is clear and free of sediment to the fullest extent possible, and the pH, temperature and specific conductance have stablized.

e. Construct a maximum of 30 wells using two-inch inside diameter, stainless steel casing. Use threaded screw-type joints only. Flush thread all connections. Screen 15 feet in each well using two-inch diameter stainless steel casing with up to 0.010 inch slots. Well screening should extend ten feet into the aquifer and five feet above the water table to collect floating contaminants and allow for yearly fluctuations in the water table; however, this may not alway be possible due to site-specific groundwater conditions. Do not extend well screens to the ground surface, a minimum two foot bentonite or cement grout seal is required above all well screens, see paragraph 6.g. below. Cap the bottom of the screen. Well installation shall not exceed 1000 linear feet.

f. Should a confining layer below the saturated zone be encountered while attempting to drill deep enough to install 15 feet of

screen, grout the hole in the confining layer to prevent potential contaminant migration and screen the well above the confining layer.

g. Once the casing is installed, remove the augers and allow the soil formation to collapse around the well screen. Supplement the natural gravel pack with washed and bagged rounded sand or gravel with a grain size distribution compatible with the screen and formation. Place the gravel pack from the bottom of the borehole to two feet above the top of the screen. Tremie a granulated, pelletized, or slurry bentonite seal above the gravel/sand pack. Install the bentonite to a minimum thickness of two feet, and ensure a complete seal forms. Place Type I Portland cement grout from the bentonite seal to the land surface.

h. Complete the wells by extending the well casing a minimum of two feet above land surface. The height of the casing riser must take into account standing surface water depths during the wet season to prevent surface waters from cascading down the well casing. Provide an end-plug or casing cap for each well. Shield the extended stainless steel with a steel guard pipe which is placed over the casing and cap, and seated in a 16-inch by 16-inch by 4-inch concrete surface pad. Slope the pad away from the well casing. Install a lockable cap or lid on the steel guard pipe. Install three four-inch diameter steel guard posts if the base determines the well is in an area which needs such protection. The guard posts shall each be eight feet in total length and installed radially from each wellhead. Recess the guard posts approximately four feet into the ground and insure they are removable to facilitate access for sampling pump installation. Paint the protective steel pipe and clearly number the well on the sleeve exterior.

i. Determine by survey the elevation at the top of the casing of all newly installed monitor wells to an accuracy of 0.01 feet with respect to a base bench mark. Horizontally locate the new wells to an accuracy of 1.0 feet and record the position on both project and site specific maps. Bench marks must have previously been established from and are traceable to a USCGS/USGS survey marker.

j. Measure water levels at all monitor wells as feet below the ground surface or below the top of casing elevation to the nearest 0.01 feet. Report in terms of mean sea level. Measure static water levels in the wells prior to sampling and at well development. After the wells have recovered from water sample collection, measure water levels to confirm previous measurements.

7. Allow wells to stabilize after development for a minimum of 24 hours prior to sampling. Purge wells prior to sampling until a minimum of three well volumes of water have been displaced and the pH, temperature, specific conductance, color, and odor of the discharge have stablized. Use a stainless steel or teflon bailer, or air-lift pump to purge wells. Sample using a bottom-discharge Teflon bailer.

8. If the well(s) cannot be sampled due to well development, well characteristics, or other reason(s), indicate the reason(s) in the report specified in Item VI.

9. Collect and analyze one round of water samples from all groundwater monitor wells. During sample collection from all wells, examine the surface of the water table for the presence of hydrocarbons and, if applicable, measure the thickness of the hydrocarbon layer.

F33615-83-D-4002/0038

10. Soil Borings

a. Conduct 19 soil borings not to exceed a maximum of 250 linear feet. The average estimated boring depth is ten feet except where noted in Section B. Accomplish the borings using hollow-stem auger techniques. Obtain samples using ASTM Method D-1526.

b. During the boring operations, take samples at two and one-half foot intervals to develop lithographic descriptions and stratigraphic logs. Monitor the auger cuttings for signs of changing formations. Place special emphasis on field identification of contaminated soils encountered.

c. Scan all soil samples with a photoionization meter or equivalent organic vapor detector. Include monitoring results in the boring logs.

d. Whenever possible, measure water levels in all boreholes after the water level has stabilized.

e. Grout all boreholes to the surface. It is especially important to ensure that they be adequately resealed to preclude future -igration of contaminants.

f. Permanently mark each location where soil borings are drilled. Record the location on a site specific map.

ll. Collect pond sediment samples using a drop corer device or an Ekman dredge. Obtain surface soil samples using a stainless steel spoon or spade. Decontamination procedures outlined below are applicable.

12. Analyze water and soil samples collected as specified in Section B for those parameters summarized in Table 2. Laboratories conducting the analyses of samples must be certified as required by state or other regulatory agency standards as applicable in the State of Minnesota. The required detection limits and methods for these analyses are delineated in Table 4. Maintain all raw laboratory data for a minimum of five years after project completion and provide raw data to the USAFOEHL upon quest.

13. Methods which employ gas chromatography (GC) as the analytical technique--EPA Methods 601, 602, 608, 615, 8010, 8020, 8080, 8150--require positive confirmation of identity for all analytes having concentrations higher than the Method Detection Limit (MDL). This positive confirmation shall be conducted by second-column GC; however, gas chromatography/mass spectroscopy (GC/MS) can be used for positive confirmation if the quantity of each analyte to be confirmed is above the detection level of the GC/MS instrument. Analytes which cannot be confirmed will be reported as "Not Detected" in the body of the report, but the results of all second-column GC or GC/MS confirmational analyses are to be included in the report appendix along with other raw analytical data. Quantification of confirmed analytes will be based upon the first column analysis. The maximum number of confirmational analyses that will be funded under this delivery order is fifty percent (50%) of actual field samples. The total number of samples for each GC method listed in Table 2 includes this allowance.

14. Analyze an additional 15% of all sample parameters for quality F33615-83-D-4002/0038 10 control purposes. Field blanks must be an integral part of the quality control program. Provide all quality control sample analysis results in the report.

15. Plot and map all field data collected for each site according to surveyed positions. Identify or estimate the nature of contamination, its magnitude, and the potential for contaminant flow to receiving streams and ground water.

16. Remove all borehole cuttings and clean the general area following the completion of each well and boring. Properly containerize cuttings suspected of being contaminated (based on discoloration, odor or organic vapor detection instrument). Test the suspected contaminated waste for EP Toxicity and Ignitibility. The contractor shall be responsible for transporting drums containing suspected contaminated soils. The contractor shall be responsible for the ultimate disposal of contaminated soils in accordance with current Federal, State, and/or local hazardous waste disposal laws. The contractor shall provide a final, completed copy of the hazardous waste manifest document to the HQ TAC/SGPB point of contact ferenced in paragraph V for those borehole cuttings obtained from TAC .tes (Sites 1, 5, 6, 7, and 9) and to the ANGSC/SGB point of contact referenced in paragraph V for those borehole cuttings obtained from ANG sites (Sites 2, 3, 4, 8, and 10).

17. Decontaminate all sampling and well purging equipment prior to use and between samples to avoid cross contamination. As a minimum, wash equipment with a laboratory-grade detergent followed by a distilled water rinse, repeating the rinsing procedure two more times. Where field conditions warrant, follow the laboratory-grade detergent wash with a hexane rinse, rinse with distilled water, and finally wash with dilute nitric acid and rinse again with distilled water. Allow sufficient time for the solvent to evaporate and for the equipment to dry completely. The calibrated water level indicator for measuring well volume and fluid elevation must be decontaminated before use in each well.

18. Thoroughly clean and decontaminate the drilling rig and tools fore initial use and after each borehole completion. As a minimum, steam clean drill bits after each borehole is installed. Drill from the <u>least</u> to the most contaminated areas, if possible.

19. Evaluate available techniques for well abandonment that are applicable to the type of monitor wells and geological conditions at Duluth IAP. Consider that these wells will be abandoned at some future date after the study objectives have been met and they are no longer needed. Recommend a candidate abandonment method or technique, including costs. Ensure abandonment techniques comply with state and local rules. The actual process of well abandonment is not part of this study.

20. Perform an inventory of all on-base wells, to include production, irrigation, abandoned, monitoring, etc.

21. Conduct a literature search of local hydrogeologic conditions to complement the Phase I and Phase II Reports. Use this data to determine optimum well locations. Include the pertinent literature search information in Appendix D of the Final Report. Develop the literature search data using the following guideline:

a. Topographic data

F33615-83-D-4002/0038

b. Geologic data

- (1) Structure
- (2) Stratigraphy
- (3) Lithology

c. Hydrologic data

(1) Location of existing wells, observation holes and springs within a one-mile radius of sites to be investigated.

- (2) Groundwater table and piezometric contours
- (3) Depth to water
- (4) Quality of water

d. Data on existing wells, observation holes, and springs within a one-mile radius of sites to be investigated.

(1) Location, depth, diameter, types of wells, and construction logs

(2) Static and pumping water level, hydrographs, yield, specific capacity, and quality of water

(3) Present and projected groundwater development and

anticipated use (4) Corrosion, incrustation, well interference, and similar operation and mainte ance problems

(5) Location, type, geologic setting, and hydrographs of

- (6) Observation well networks
- (7) Existing water sampling sites

e. Aquifer data

springs

- (1) Type, such as unconfined, artesian, or perched
- (2) Thickness, depth, and formation designation
- (3) Boundaries
- (4) Transmissivity, storativity, and permeability
- (5) Specific retention
- (6) Discharge and recharge
- (7) Ground and surface water relationships
- (8) Aquifer models
- f. Climatic data

(1) Precipitation

F33615-83-D-4002/0038. 12

(2) Evapotranspiration

B. In addition to the general items delineated in A above, conduct the following specific actions at the sites identified in Table 1 and Figure 1 (required analytical parameters are listed in Table 2):

1. Site 1 (TAC) - Goose Dump 1(D-1)

a. Drill and construct a maximum of four monitor wells. Position three of the wells at the site perimeter consistent with the assumed downgradient direction of groundwater flow. To collect ambient water quality information, place the fourth well outside the site perimeter consistent with the assumed upgradient direction of groundwater flow. Collect one groundwater sample from each monitor well. During the borehole drilling collect a maximum of four soil samples for laboratory analysis, see I.A.6.c.

b. Drill one soil boring in the suspected zone of contaminatic and collect soil samples from the ground surface and at each two and one-half foot interval until the estimated final borehole depth of ten feet is reached. Analyze the samples from the surface and at the two and one-half and five foot depths.

c. Designate two sampling points from surface waters located a the site, or from surface waters adjacent to and downstream of the site.

d. Collect both a water sample and a bottom sediment sample from each of these surface water sample points.

e. Analyze all water and soil samples for volatile organic and aromatic compounds (VOA), oil and grease (O&G), pesticides/herbicides (P/H), polychlorinated biphenyls (PCBs), phenols and metals.

2. Site 2 (ANG) - Fire Training Areas 1 and 2 (FT-1 and FT-2)

a. Drill and construct a maximum of five monitor wells. Position one well consistent with the assumed upgradient direction of groundwater flow. Use information from this well to establish ambient water quality. Place four wells in the assumed downgradient direction of groundwater flow; two between FT-1 and FT-2 on either side of the access road and two north of FT-2. Collect one groundwater sample from each monitor well. During the borehole drilling, collect a maximum of five soil samples for laboratory analysis, see I.A.6.c.

b. Drill two soil borings in FT-1 and one soil boring in FT-2. Locate each boring in the center of a burn pit. If the second and older burn pit in FT-1 cannot be defined through aerial photographs or a physical site inspection, only drill one boring in FT-1. Collect soil samples from the ground surface and at each two and one-half foot interval until the estimated final borehole depth of ten feet is reached. Analyze the samples from the ground surface and the two and one-half and five foot depths.

c. Designate sampling points in the drainageway between the western extension of the access road and the southwestern boundry of site FT-2. Collect two surface water samples and two bottom sediment samples from this drainageway.

d. Collect one surface sediment sample and one surface water

F77615-87-D-4007/0078

sample from the swamp to the north and downgradient of FT-2.

e. Collect one round of groundwater samples from the six existing monitor wells at these sites.

f. Analyze all water and soil samples for VOA, O&G and phenols.

3. Site 3 (ANG) - DPDO Storage Area "C" (S-2)

a. Drill and construct a maximum of four monitor wells. The positioning, and soil and water sampling follows that specified at Site 1, para B.I.a.

b. Drill three soil borings positioned along a center-line running north to south in the storage area. Follow the soil sampling plan specified at Site 1, para B.1.b.

c. Designate sampling points in the drainageway which begins on the east side of the storage area and then heads in a northwesterly direction. Collect three surface water samples and three bottom sediment samples from this drainageway. Collect the first sediment and water sample in the approximate location of Sample 2 identified in the Stage 1 study. bsequent sample points should be at 100 foot intervals downgradient along the drainageway.

d. Analyze all water and soil samples for VOA, O&G, P/H, PCBs, phenols and metals.

4. Site 4 (ANG) - Tank Farm Area (SP-1)

a. Perform a geophysical survey using a metal detector and a magnetometer to precisely locate underground pipes. Perform an electromagnetic survey to identify leak sites from these pipes. Survey the entire tank farm to include a minimum 50 foot buffer around the site perimeter. Expand the geophysical survey on the southern side of the tank farm area to the main access road. A former fueling facility is located south of the tank farm.

b. Drill and construct a maximum of four monitor wells. The Il positioning, and soil and water sampling follows that specified at Site 1, ra B.1.a.

c. Drill five soil borings, position them based upon the geophysical survey result and the data generated during the Stage 1 study. Boring depth is estimated to be 15 feet; however, drill until the water table is reached. Collect soil samples at two and one-half foot intervals beginning at ground surface. Analyze the samples collected at two and one-half, five, and seven and one-half foot depths.

d. Designate sample points in the drainageways/culverts around the site, of particular interest is the drainageway heading north to Beaver Creek. Collect four surface water and four sediment samples from the drainageways/culverts.

e. Collect one round of groundwater samples from the four existing monitor wells at this site.

f. Analyze all water and soil samples for VOA and O&G.

5. <u>Site 5 (TAC) - South Goose Dump (D-4)</u>

F33615-83-D-4002/0038

a. This site was originally designated D-4, South Goose Missle Site Dump, in the Phase I report and was not recommended for Phase II Stage 1 evaluation. However, during Phase II Stage 1, it was erroneously confused with D-1, Goose Missle Site Dump, which was recommended for Phase II Stage 1 monitoring. Consequently, this site was studied during the Phase II Stage 1 effort, but referenced as site D-1 throughout the report.

b. Drill and construct three monitor wells. Position two of the wells approximatley 50 feet from the site perimeter and consistent with the assumed downgradient direction of groundwater flow. Place the other monitor well outside the site perimeter and consistent with the assumed upgradient direction of groundwater flow so as to collect ambient water quality information. Collect one groundwater sample from each monitor well. During the borehole drilling, collect a maximum of three soil samples for laboratory analysis, see I.A.6.c.

c. Collect three surface water samples from the pond/swamp 't this site.

d. Collect a maximum of five sediment samples from the bottom of the pond/swamp area and drainageways which exit this site.

e. Analyze all water and soil samples for VOA, O&G, P/H, PCBs, phenols and metals.

6. Site 6 (TAC) - Goose Dump 2 (D-2)

a. Perform a geophysical survey using a metal detector and a magnetometer to locate the dump site drums. Also conduct a detailed examination of available aerial photographs for the same purpose.

b. If the geophysical survey and aerial photographs cannot locate the drums and accurately define the site location, perform no more work.

c. If the site can be located, drill two exploratory soil borings in the zone of contamination. Collect soil samples from the ground surface and at two and one-half foot intervals until the estimated final borehole depth of ten feet is reached. Analyze the samples from the surface and at two and one-half feet for ethylene glycol, O&G and VOA.

7. Site 7 (TAC) - Runway 13 NE Disposal (D-6)

a. Perform a geophysical survey using a metal detector and magnetometer to define as accurately as possible the site bundaries. Also conduct a detailed examination of available aerial photogruphs for the same purpose.

b. Drill and construct three monitor wells. The positioning, and soil and water sampling follows that specified at Site 5, B.5.b.

c. Drill two exploratory soil borings in the zone of contamination. Collect soil samples from the ground surface and at two and one-half foot intervals until the estimated final borehole depth of ten feet is reached. Analyze the samples from the surface and at the two and one-half foot depth.

d. If surface drainage from the site can be located, collect

one each bottom sediment and surface water sample outside, but within 20 feet, of the site boundry.

e. Analyze all water and soil samples for VOA, O&G, P/H, PCBs, phenols and metals.

8. Site 8 (ANG) - Old DPDO Storage Area (S-1)

a. Drill and construct three monitor wells. The positioning, and soil and water sampling follows that specified at Site 5, B.5.b.

b. Drill two exploratory soil borings, one in the center of each of the two former storage area sites. The soil sampling plan follows that specified at Site 1, B.1.b.

c. Collect two surface water and two bottom sediment samples from drainageways at points downstream of the site.

d. Analyze all water and soil samples for VOA, O&G, P/H, PCBs, phenols and metals.

9. Site 9 (TAC) - Disposal Pit (D-9)

a. Perform a geophysical survey using a metal detector and a magnetometer to locate the site. Also conduct a detailed examination of available aerial photographs for the same purpose.

b. If the geophysical survey and aerial photographs cannot accurately define the site location, perform no more work.

c. If the site can be located, drill one exploratory soil boring in the zone of contamination. Collect soil samples at two and one-half foot intervals and analyze the samples at two and one-half feet above and below the water table.

d. If the site can be located, drill and construct one monitor well at the site perimeter consistent with the assumed 'owngradient direction of groundwater flow. Collect one groundwater sample.

acid.

e. Analyze all water and soil samples for acetone and picric

10. <u>Site 10 (ANG) - Low-Level Radioactive Waste Disposal (RD-1)</u>

a. Conduct a geophysical survey (metal detector and magnetometer) and review aerial photographs to accurately locate the site.

b. Drill and construct three monitor wells. Position two of the wells at the site perimeter consistent with the assumed downgradient direction of groundwater flow. Place the third well in the assumed upgradient direction of groundwater flow to collect ambient water quality information. Do not analyze soil samples from these boreholes.

c. Collect one groundwater sample from each well and analyze them for gross alpha, gross beta, radium - 226 and radium - 228.

C. Field Coordination

Notify the Air Force POC's (see section V) at the USAFOEHL and Duluth IAP at least five days in advance of water sample collection dates.

D. Technical Field Operations Plan

Develop a detailed field operations plan based upon the technical requirements specified in this task description for the proposed work effort. Be explicit with regards to field procedures. Include, but do not limit the plan to, field decontamination operations, sampling protocol, QA/QC field procedures, field schedule, etc. A guideline for the plan is provided under separate cover. Reference paragraph VI, Sequence No. 2.

E. Health and Safety

Comply with all applicable USAF, OSHA, EPA, state and local health and safety regulations regarding the proposed work effort. Use EPA guidelines for designating the appropriate levels of personnal protection at "udy sites. Prepare a written Health and Safety Plan for the proposed work ifort and coordinate it directly with regulatory agencies where required. Provide an information copy of the Health and Safety Plan to the USAFOEHL prior to commencing field operations (i.e., drilling and sampling). (Reference paragraph VI, Sequence No. 7)

F. Data Review

1. Tabulate field and analytical laboratory results (including quality control data), and incorporate them into the monthly R&D Status Reports. Forward them to the USAFOEHL for review as soon as they become available as specified in Item VI below. In addition to the results, report the dates of sample collection, extraction (if applicable) and analysis.

2. Upon completion of all analyses, tabulate and incorporate all -esults into an Informal Technical Information Report (Atch 1, Seq 3 as pecified in the contract and in Item VI below) and forward the report to the USAFOEHL for review.

3. Immediately report to the USAFOEHL Program Manager via telephone, data/results generated during this investigation which indicate a potential health risk (for example, a contaminated drinking water aquifer).

G. Reporting

1. Prepare two draft reports following the USAFOEHL-supplied report format (mailed under separate cover). One report shall delineate the findings for the TAC sites (Sites 1, 5, 6, 7, and 9). The second report shall detail the findings at the ANG sites (Sites 2, 3, 4, 8, and 10). Forward the reports to the USAFOEHL (as specified in item VI below) for Air Force review and comment.

2. Review the results, conclusions and recommendations from previous IRP investigations which concern the sites listed in this task. Integrate all investigative work done at each site to date so the report reflects the total available information for each site. Use this cumulative information and data to establish trends and develop conclusions and recommendations.

3. Include in this report a discussion of regional/site-specific hydrogeology, well and borings logs, data from water level surveys, groundwater surface and gradient maps, and avalable hydrogeologic cross sections and geophysical survey data.

4. In the results section, include water and soil analysis results, field quality control sample data (field blanks, duplicates, etc.), internal laboratory quality control data (lab blands, lab spikes, and lab duplicates), and laboratory quality assurance information. Provide secondcolumn confirmation results and include which columns were used, the conditions existing and retention times.

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

6. Summarize the specific collection techniques, analytical method holding time and limit of detection used for each analyte (Standard Methods, EPA, ASTM, etc.).

In the recommendation section, address each site and list them 7. -y category. 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 health or environmental risks. Category II sites are those requiring additional investigation to quantify or further assess the extent of current or future contamination. Category III denotes sites that will require remedial action (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 to 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 -on-carcinogens (Health Advisory or Suggested-No-Adverse-Response Levels) .d target levels for carcinogens (1 x 10° cancer risk level) may be used. If not specifically requested, do not include a comprehensive cost or

technical analyses of 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.

8. For those sites needing additional Phase II study, identify specific requirements, if any, for future monitoring. Identify potential environmental consequences of contamination. Provide estimates of costs by line items for additional investigations beyond this stage along with estimates of time required to accomplish the investigation. Furnish the cost data in a separately bound appendix to the final report. (Reference paragraph VI, Sequence No. 2)

9. Provide an inventory of all on-base wells, to include production, irrigation, abandoned, monitoring, etc.

10. Include in an appendix to the report the names of all local, state or other regulatory personnel and the dates they approved well

drilling, development and purging techniques, well materials, and sampling methods. All well drilling, development, purging, and sampling must conform to State and local regulatory agency requirements.

11. Provide the candidate well abandonment techniques and the recommended techniques most appropriate for Duluth IAP.

H. Meetings

The contractors project leader shall attend two meetings to take place at a time to be specified by the USAF OEHL. Each meeting shall take place at Duluth IAP for a duration of one day (eight hours).

II. SITE LOCATION AND DATES

Duluth IAP MN Date to be established

III. BASE SUPPORT

A. Prior to any contractor digging or drilling, locate underground utilities and issue digging permits.

B. Provide access to the Phase II Stage 1 monitoring wells.

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

D. The base Point Of Contact shall receive from the contractor the split samples, select 10% of them, package them, and then deliver them back to the contractor within 24 hours for subsequent overnight shipment to USAFOEHL/SA as stated in paragraph I.A.5.

E. Provide contractor with a secure staging area for storing quipment and supplies.

F. Provide a paved area where drilling equipment can be cleaned and decontaminated.

G. Base Civil Engineer will prepare and sign any hazardous waste manifest documentation resulting from this effort.

H. Base will store any drums containing suspected hazardous waste until determined to be hazardous/non-hazardous.

IV. GOVERNMENT FURNISHED PROPERTY: None

V. COVERNMENT POINTS OF CONTACT:

- 1. 2Lt Gary Woodrum
 USAFOEHL/TSS
 Brooks AFB TX 78235-5501
 AV 240-2158
 (512) 536-2158
 1-800-821-4528
- 2. Col Jerry Dougherty HQ TAC/SGPB Langley AFB, VA 23665-5001 AV 432-5857 (804) 764-2180

F33615-83-D-4002/0038

3. Lt Col Michael Washeleski ANGSC/SGB Andrews AFB, MD 20331-6008 AV 858-3443/5926 (301) 981-5926 4. Sgt Suzanne Schlies 148 TAC Clinic Duluth IAP MN 55811-5000 AV 825-7223 (218) 723-7224

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.

Seq. No.	Para. No.	Block 10	Block 11	Block 12	Block 13	Block 14
2	I.D.	O/TIME	86 OCT 10	86 OCT 13		15
7	I.E.	0/TIME	86 OCT 10	86 OCT 13		3
3	I.F.1.	O/TIME	٠	• .		3
- 4	I.G.(TAC)	ONE/R	86 DEC 31	87 JAN 16	87 OCT 16	••
4	I.G.(ANG)	ONE/R	86 DEC 31	87 JAN 16	87 OCT 16	
2	I.G.8.	0/TIME	87 Jan 16	87 OCT 16		
14		MONTHLY	86 OCT 27	86 NOV 11		
15		MONTHLY	86 OCT 27	86 NOV 11		

3 Upon completion of the analytical effort and prior to submission of the first draft report.

- Two draft reports and one final report afe required. Incorporate Air Force comments into the second draft and final report as specified by the USAF OEHL. Supply the USAFOEHL with a single copy of the first draft, second draft, and final reports for acceptance prior to distribution. Distribute all report copies as specified by the USAFOEHL. Supply 25 copies of each draft report and 50 copies plus the original camera ready copy of the final report. Distribute the remaining 24 copies of each draft report and 49 copies of the final report as specified by the USAFOEHL.
- Submit cost estimates (five copies) in a separately bound document with the final report only. Provide estimates for only those sites recommended for additional Phase II work (Category II) or Phase IV, long-term monitoring (Category III).

F33615-83-D-4002/0038

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TABLE 2

SAMPLING AND ANALYTICAL REQUIREMENTS

DULUTH IAP

Analyte	Medium		~ ~	e	SIT 4	SITE NUMBERS 5 6	BERS 6	7	8	6	10	(6) VD	Column Confirmation	TOTAL
(1) NOV	Water, (7)	ە	14	~	12	9	•	4	ۍ ا		i 	0		6 3
	Soll (8)	6	17	16	23	8	4	8	11	ı	1	15	53	164
011 & ⁽²⁾	Water	9	14	2	12	9	I	4	S	1	۱	0	ı	63
Grease	Soll	6	17	16	23	8	4	8	11	1	ł	15	ł	111
Metals ⁽³⁾	Water	9	ı	7	ł	9	۱	4	ഹ	ı	1	S	•	33
	Sofl	6	ı	16	ł	8	١	80	11	•	I	6	I	61
Pesticides/ ⁽⁴⁾		9	1	2	•	9	1	4	S	I	ı	ŝ	16	49
Herbicides	Sofl	6	•	16	ł	8	1	80	11	ı	I	6	29	8
PCB		9	1	2	ı	9	1	4	S	1	ı	S	16	49
	Sofl	6	4	16	1	æ	۱	80	11	1	۱	9	29	8
Phenol	Water	9	14	2	ı	9	۱	4	5	1	1	Ø	ı	20
	Sofl	6	17	16	ł	œ	1	80	11	ı	I	11	9	80
Acetone	Water	ı	ł	•	•	ı	1	ı	•	1	ł	1	ı	2
	Sofl	ł	ı	ł	ı	•	1	ı	ı	2	t	1	·	m
Picric Acid	Water	١.	ł	•	1	I	1	1	1	-	•	l	ı	2
	Sofl	1	١	ł	ı	•	I	6	•	2	I	l	ł	ო
Ethylene Glycol	Sofl	I	ł	ı	ı	ı	4	•	ı	ı	ł	-	ı	ŝ
Radiation ⁽⁵⁾	Water	I	ł	I	I	1	1	1	۲	ı	m		ı	4
EP Toxicity (6) Metals	Soil Cuttings	15	San f	ples ied b	samples authorized fied by site	r i zed e	as i	needed	- not	t speci	+	8	·	17
EP Igniti- bility	Soll Cuttings	15	san f	mples fied b	samples authorized fied by site	r1 zed e	as	needed	- not	t spect	+	8	ı	17

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F33615-83-D-4002/0038

TABLE 2 (Continued)

NOTES: (1) See Table 3.

- (2) Use Method 3550 to extract oil and grease from soil.
- (3) Arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver
- (4) See Table 5.
- (5) Includes analysis for Gross Alpha, Gross Beta, Radium-226 and Radium-228.
- (6) Arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver
- (7) Includes both well and surface water samples.
- (8) Includes both borehole and sediment samples.
- (9) QA is 15% of the basic sample load.
- (10) Assumes 50% for Methods 601, 602, 608, 615, 8010, 8020, 8080 and 8150 will require second column confirmation.

F33615-83-D-4002/0038

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TABLE 3

VOLATILE ORGANIC COMPOUNDS (VOA)

PURGEABLE HALOCARBONS EPA Methods 601 and SW 8010.

Bromodichloromethane Bromoform Bromomethane Carbon tetrachloride Chlorobenzene Chloroethane 2-Chloroethylvinyl ether Chloroform Chloromethane Dibromochloromethane¹ 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1.4-Dichlorobenzene Dichlorodifluoromethane 1,1-Dichloroethane 1.2-Dichloroethane 1,1-Dichloroethene trans-1,2-Dichloroethene 1.2-Dichloropropane 1,3-Dichloropropene trans-1,3-Dichloropropene Methylene chloride 1,1,2,2-Tetrachloroethane Tetrachloroethylene 1,1,1-Trichloroethane 1,1,2-Trichloroethane Trichloroethylene Trichlorofluoromethane Vinyl chloride

PURGEABLE AROMATICS EPA Methods 602 and SW 8020

Benzene Chlorobenzene 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene Ethylbenzene Toluene

Also: Xylene

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TABLE 4

ANALYTICAL PARAMETERS, METHODS AND REQUIRED DETECTION LIMITS

PARAMETER	METHOD	DETECTION LIMIT
) Oil and Grease (Using IR)	EPA 413.2	20 µg/g soil ^a 1 mg/l water
Volatile Organic and Aromatic Compounds (VOA)	EPA 601 and 602 SW 8010 and 8020	b b
EP Toxicity	b	c
Ignitibility	SW 1010	đ
Pesticides and/or PCB	EPA 608 SW 3550 and 8080	e 1 µg/g soil
Herbicides	EPA 615 SW 8150	e 1 µg/g soil
Phenol	EPA 420.2	5 µg/l water 5 µg/g soil
Metals		
Arsenic ^f	EPA 206.2 SW 3050 and 706	10 μg/l water 1 μg/g soil
Barium ^f	EPA 208.2 SW 3050 and 6010	200 µg/l water 20 µg/g soil
Cadmium ^f	EPA 213.2 SW 3050 and 6010	10 μg/l water 1 μg/g soil
Chromium ^f	EPA 218.1 SW 3050 and 6010	50 µg/l water 5 µg/, soil
Lead ^f	EPA 239.2 SW 3050 and 6010	20 µg/l water 2 µg/g soil
Mercury ¹	EPA 245.1 SW 7471	1.0 μg/l water 0.1 μg/g soil
Selenium ^f	EPA 270.3 SW 3050 and 7740	10 µg/l water 1 µg/g soil
Silver f	EPA 272.2 SW 3050 and 6010	10 µg/l water 1 µg/g soil

F33615-83-D-4002/0038

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TABLE 4 (Continued)

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PARAMETER	METHOD	DETECTION LIMIT
Acetone	ASTM D 3695-82	-
Pierie Acid	USATHAMA 2B	4
Ethylene Glycol	NIOSH P & CAM 338 Modified for Soil	-
Gross Alpha	Standard Methods: 15th ed, 703	7
Gross Beta	Standard Methods: 15th ed, 703	-
Radium-226	EPA 600/4-80→032, 9	
Radium-228	EPA 600/4-80-032, 9	904.0

F33615-83-D-4002/0038

TABLE 4 (Continued)

^aBased on extracting 50 grams of soil and 100 ml final extract volume.

Detection limits for Purgeable Organics and Aromatics shall be as specified for the compounds by EPA Methods 601=602. Method: Federal Register, Vol. 44, including these items:

- Item 1.4 This method is recommended by EPA for use only by experienced residue analysts or under the close supervision of such qualified persons.
 - Item 2.2 This is most important. If interferences are encountered (as in early peaks such as vinyl chloride), the method provides a secondary chromatographic column that will be helpful in resolving the compounds of interest from interferences. This must be done in the case of vinyl chloride and so noted in the analysis report.

Items 3.3, 7.1-7.3 - These sections must be analyzed within the recommended holding times.

Item 8.3 - All samples must be analyzed within the recommended holding times. This must be followed without exception.

If questions are encountered about certain contaminants, you may be asked to show both chromatograms used to rule out possible interferences.

c <u>Metals</u>	ug/l of Extract
As	0.053
Ba	0.1
Cd	0.005
Cr	0.05
Pb	0.1 0.0002
Hg	
Se	0.075
Ag .	0.01

^dFind if sample is ignitable at 140 degrees Fahrenheit or below. If so, it is a hazardous waste.

^eMethod Detection Limit

^fPrimary Drinking Water Standard, 40 CFR 141.11

F33615-83-D-4002/0038

26

TABLE 5

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Pesticides and PCBs - EPA Methods 608 and SW 8080

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aldrin	a=BHS
dieldrin	D-BHC
chlordane	g-BHC
4,4'-DDT	W-BHC
4,4'ADDE	PCB+1242
4.4*-DDD	PCB-1254
arendosulfan	PCB-1221
b-endosulfan	PCB-1232
endosulfan sulfate	PCB-1248
endrin	PCB-1260
endrin aldehyde	PCB÷1016
heptachlor	toxaphene
heptachlor epoxide	•

Herbicides - EPA Method 615 and SW 8150

2,4-D 2,4,5-T 2,4,5-TP (Silvex)

F33615-83-D-4002/0038

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= 70H /UH Z. SPIIN PROC INSTRUMENT ID NO. (PIIN) 11. PART I SECTION F OF THE SCHEDULE SCHEDULE DATA F33615-83-D-4002 | D038 | PAGE 28 OF 281 5. ACRN 6. 75P 7. MILSTRIP DOC NO. AND SUFFIX 8. CON ITEM SERIAL NO. 9. ENDING SERIAL NO. 10. CLIN IDENT (WHEN APPL) CLIN IDENT SUPPLIES SCHEDULE DATA 4. ITEM NO. 0001 AA 14. SCTY 15. SHIP TO CLAS U FY7624 11. DEL SCHED DATE 12. ENDING DATE (WHEN APPL) 16. MARK FOR 13. DEL SCHEDULE OTY* **A**. A. 87JUL01 A. 1 11. DEL SCHED DATE 12. ENDING DATE {WHEN APPL} 13. DEL SCHEDULE OTV+ D. 8 8. ۵. ٥. D. • ٢. r ε. с. Ε. ٤ 17. DESCRIPTIVE DATA A. SEE SECTION H OF THE BASIC CONTRACT FOR FY7624 ADDRESS. B. TECHNICAL EFFORT SHALL BE COMPLETED NO LATER THAN 87JAN16. 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 87JUN01. D. THE DATA SHALL BE ACCEPTED BY THE GOVERNMENT NOT LATER THAN THE DATE SHOWN IN BLOCK 11A ITEM NO. 5. ACRN 6, TSP 7. MILSTRIP DOC NO. AND SUFFIX 8. CON ITEM SERIAL NO. 4. ITEM NO. 9. ENDING SERIAL NO. 10. CLIN IDENT {WHEN APPL} EXHIBIT 0002 AA 31 DEL SCHED DATE 12. ENDING DATE {WHEN APPL} 13. DEL SCHEDULE OTY . 14. SCTY 15. SHIP TO CLAS 15. MARK FOR U FY7624 . 7JUL01 ۸. A. 1 11. DEL SCHED DATE 12. ENDING DATE 13. DEL SCHEDULE OTY* (WHEN APPL) 8. 8. 8. ٥. ٥. D. ¢., С. c. F Ε. ٤. 17. DESCRIPTIVE DATA A. SEE SECTION H OF THE BASIC CONTRACT FOR FY7624 ADDRESS. B. TECHNICAL EFFORT SHALL BE COMPLETED NO LATER THAN 87JAN16. 4. ITEM NO. 5. ACRN 6. TSP 7. MILSTRIP DOC NO. AND SUFFIX B. CON ITEM SERIAL NO. 9. ENDING SERIAL NO. 10. CLIN IDENT (WHEN APPL) EXMIDIT 204 AA JUM FALL 1.. DEL SCHED DATE 12. ENDING DATE (WHEN APPL) 13. DEL SCHEDULE OTY . 14. SCTY 15. SHIP TO CLAS 15. MARK FOR U FY7624 . 87JUL01 . A. 1 11. DEL SCHED DATE 12. ENDING DATE (WHEN APPL) 13. DEL SCHEDULE OTY+ . 8. . ε. D. с. ç. ٤. 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 87JAN16. C. ALL CHEMICAL ANALYSIS DATA SHALL BE DELIVERED IAW ATTACHMENT# 1 AS IMPLEMENTED BY PARAGRAPH VI OF THE TASK DESCRIPTION NO LATER THAN 87JUN01. D. THE DATA SHALL BE ACCEPTED BY THE GOVERNMENT NOT LATER THAN THE DATE SHOWN IN BLOCK 11A "REPRESENTS A NET INCREASE/DECREASE WHEN NO + OR - APPEARS AFTER THE ITEM NO. E = ESTIMATED - (IN GTY) = DECREASE + OR - (IN ITEM NO.) = ADDITION OR DELETION AFSC TORM 706 PREVIOUS EDITION WILL BE USED. AFSC - Andrews AFB Md 1979 APPENDIX C

WELL NUMBERING SYSTEM

GROUND WATER WELL AND SOIL BORING NUMBERING SYSTEM

GROUND WATER MONITOR WELL

The ground water monitor well numbering system consists of three fields. Field 1 is the abbreviation "GW", which indicates ground water. This distinguishes these monitor wells from the Phase II, Stage 1 monitor wells, which were labeled "MW".

Field 2 indicates the site number of the well location and is as follows:

Site Number	Phase I Number	Site Description
1	D-1 (TAC)	Goose Dump 1
2	FT-1 and FT-2 (ANG)	Fire Training Areas
3	S-2 (ANG)	DPDO Storage Area "C"
4	SP-1 (ANG)	Tank Farm Area
5	D-4 (ANG)	South Goose Dump
6	D-2 (TAC)	Goose Dump 2 (borings only)
7	D-6 (TAC)	Runway 13 NE Disposal
8	S-1 (ANG)	Old DPDO Storage Area
9	D-9 (TAC)	Disposal Pit (no work done)
10	RD-1 (ANG)	Low-Level Radioactive Waste Disposal

Field 3 indicates the sequential order in which the monitor wells are drilled, lettered consecutively beginning with the letter "A".

SOIL BORING

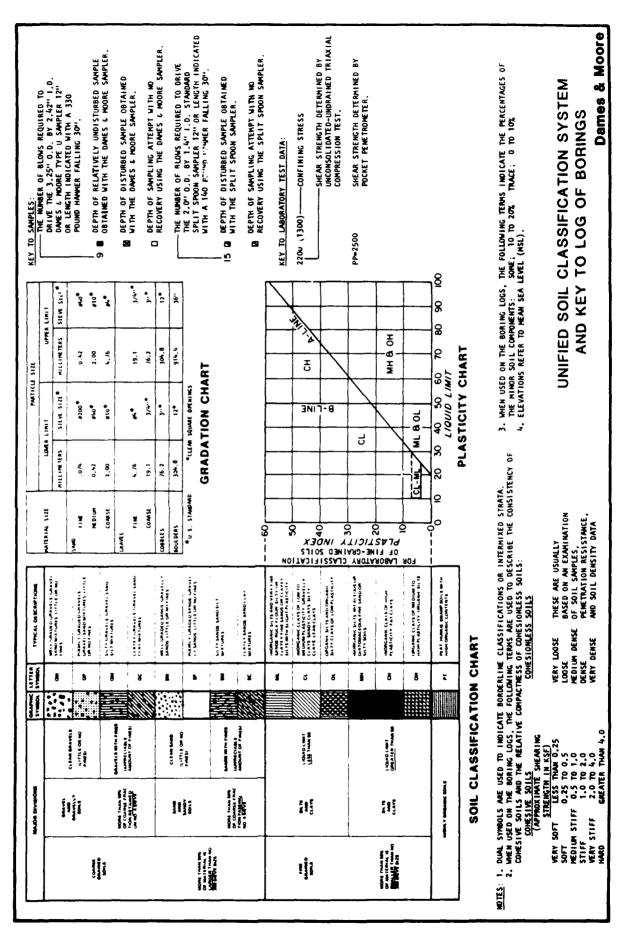
The soil borings are numbered according to a system similar to that used for the ground water monitor wells. Field 1 is the abbreviation "B", which indicates boring. Field 2 indicates the site number of the boring location (i.e., 1). Field 3 indicates the sequential order in which the borings are drilled, lettered consecutively beginning with the letter "A".

APPENDIX D

BORING AND WELL COMPLETION LOGS

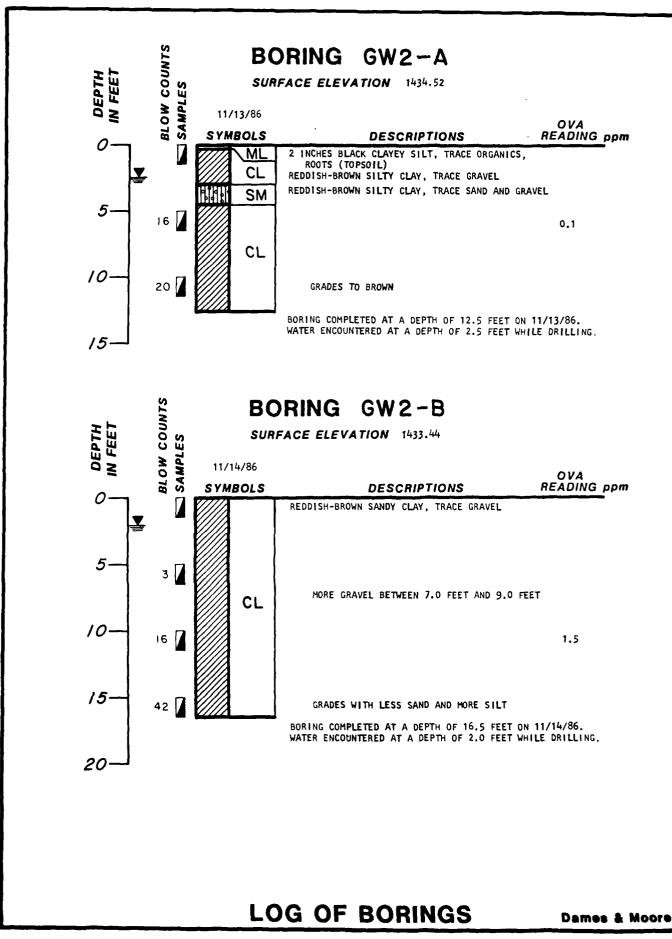
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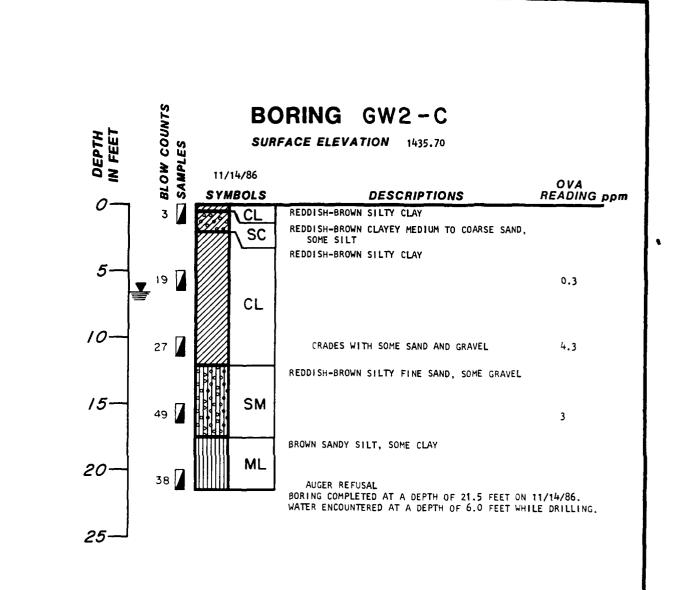
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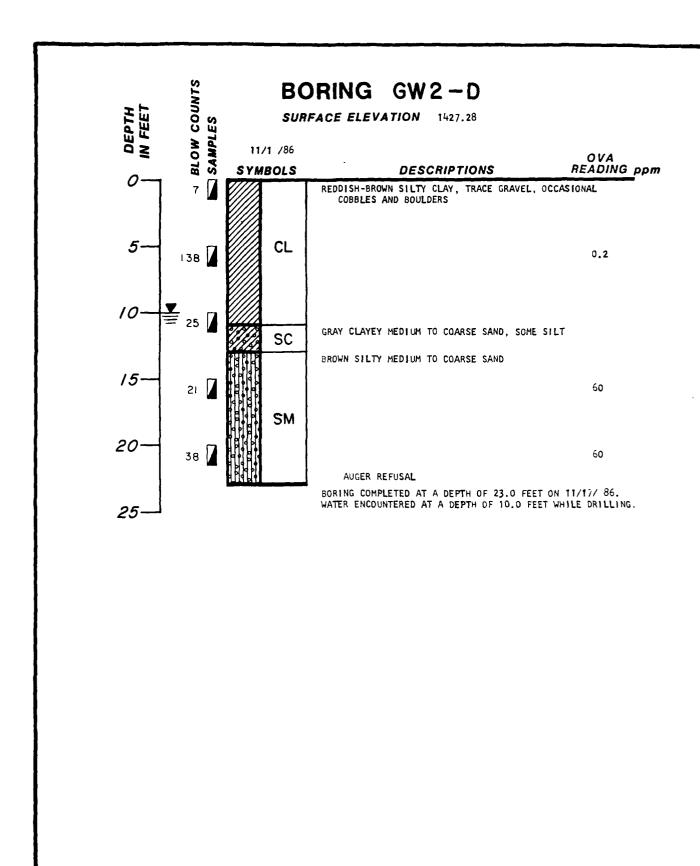


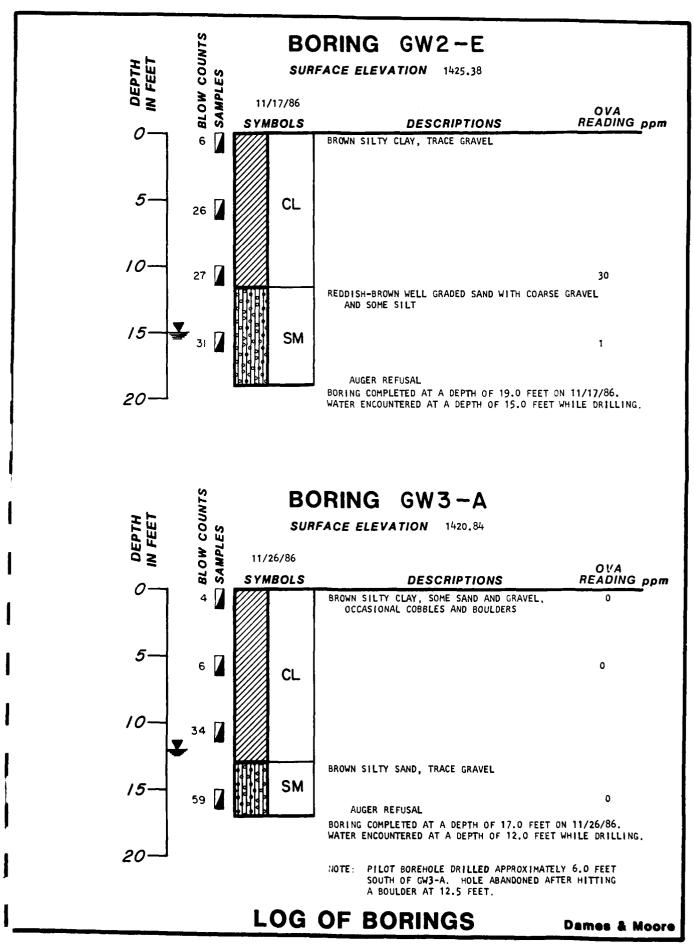
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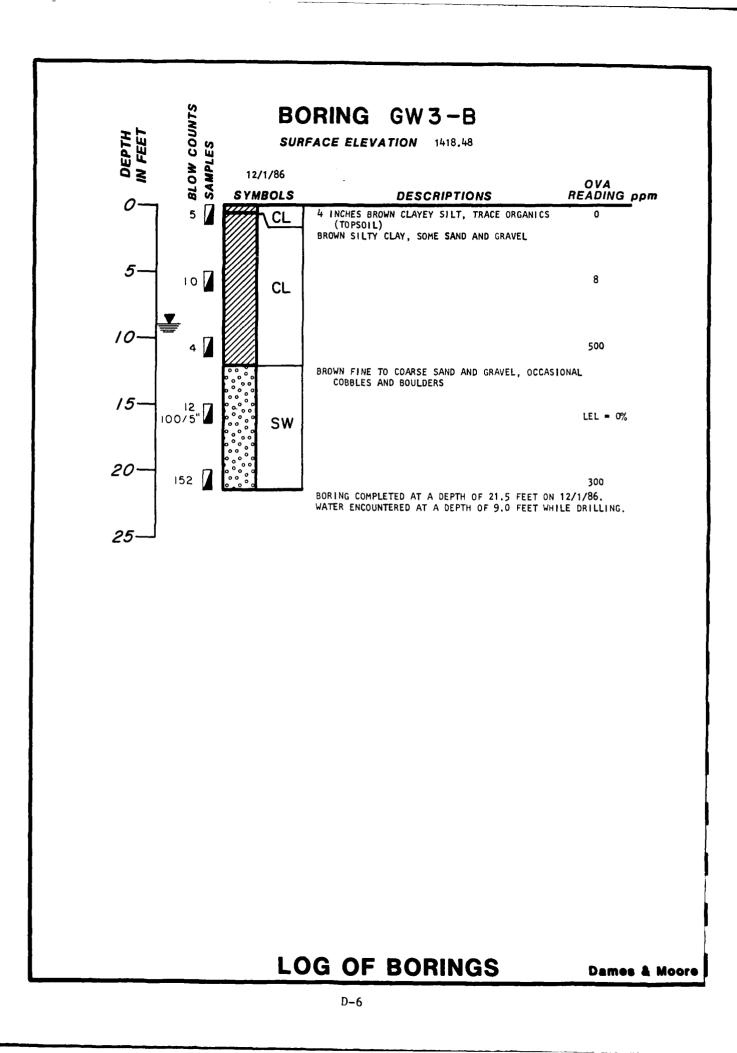
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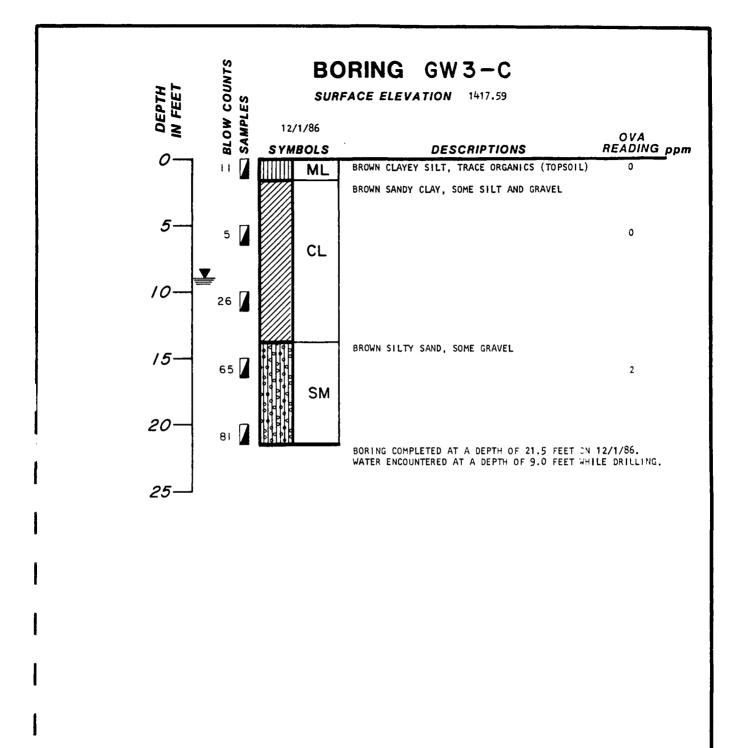




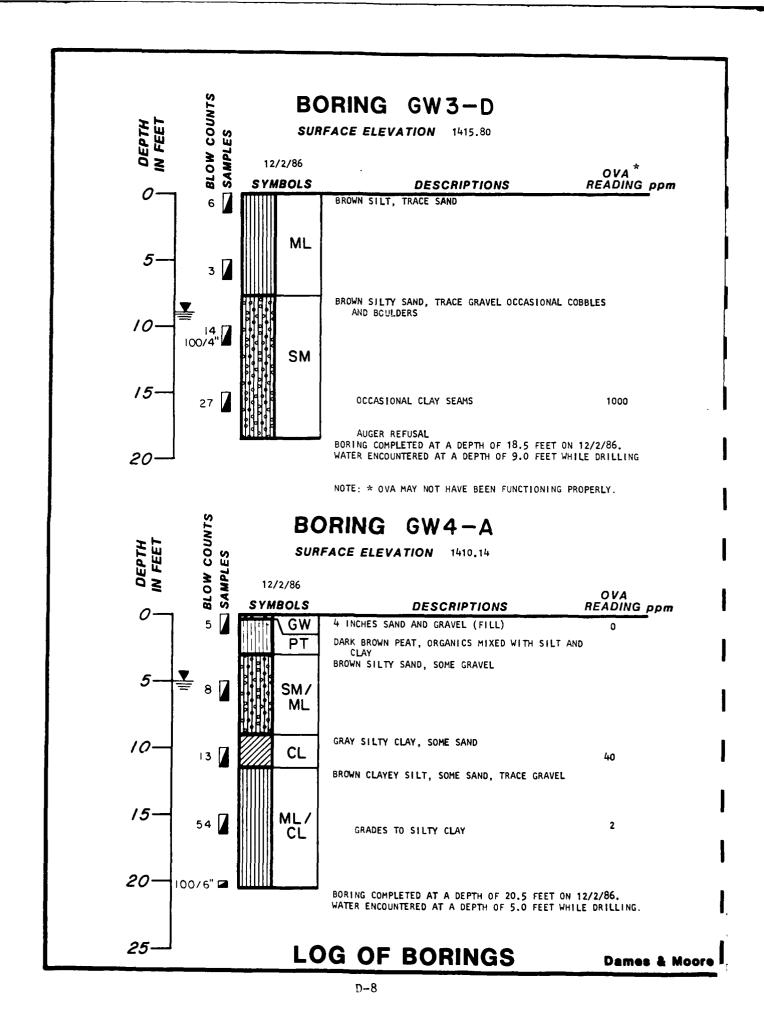


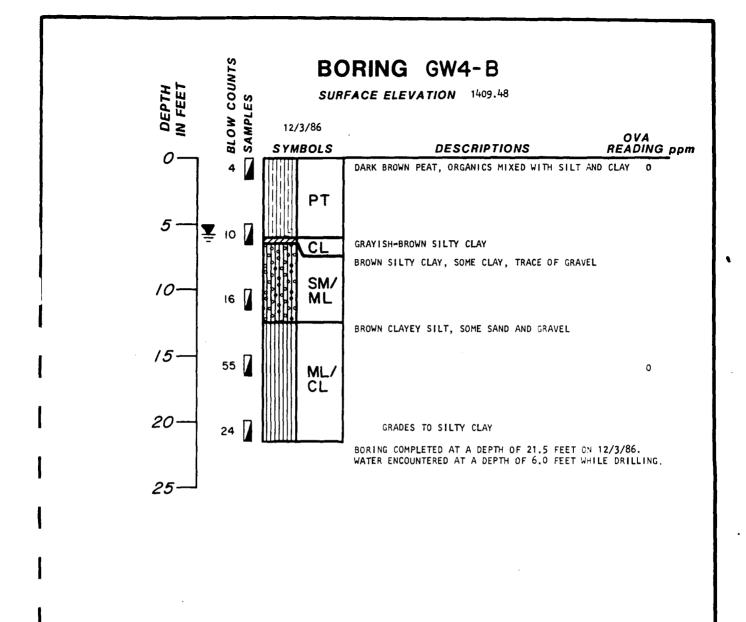




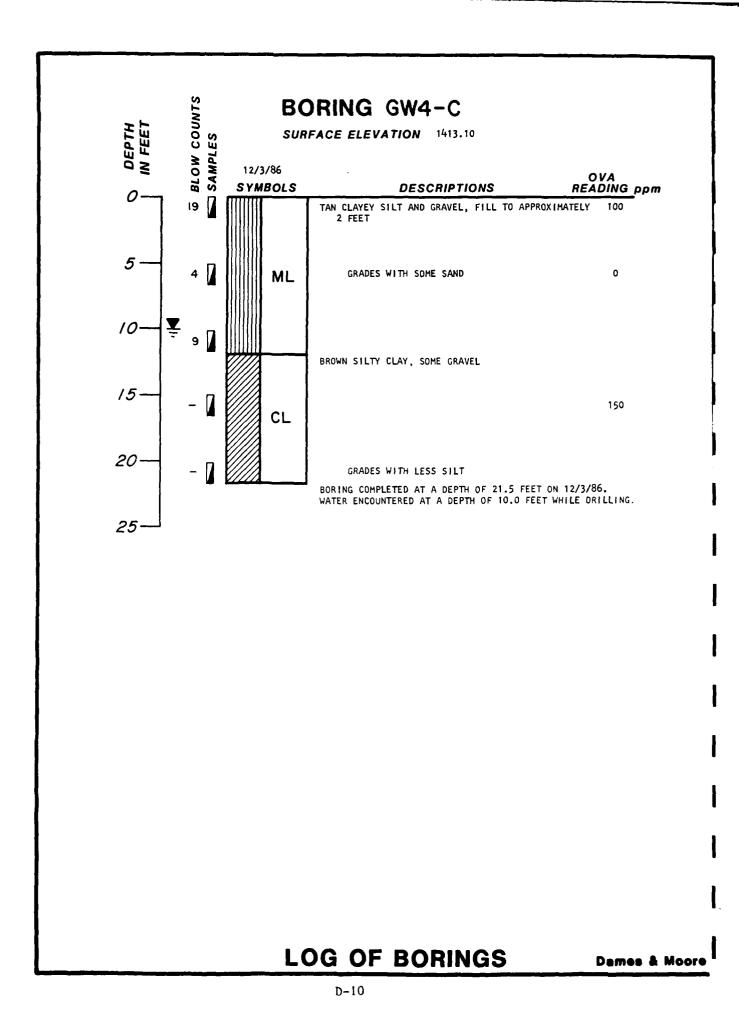


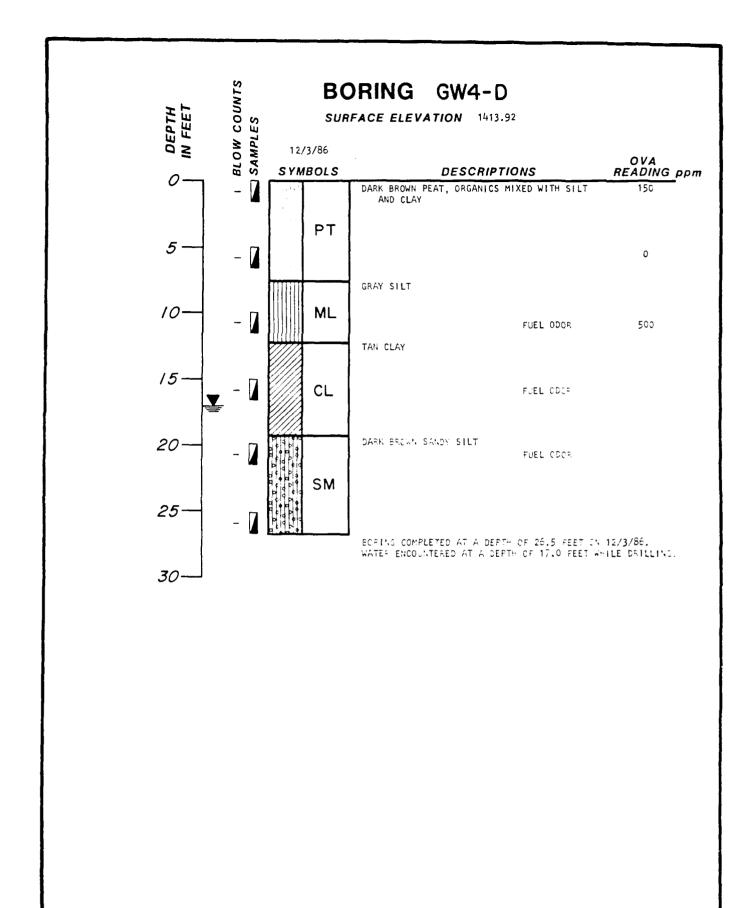
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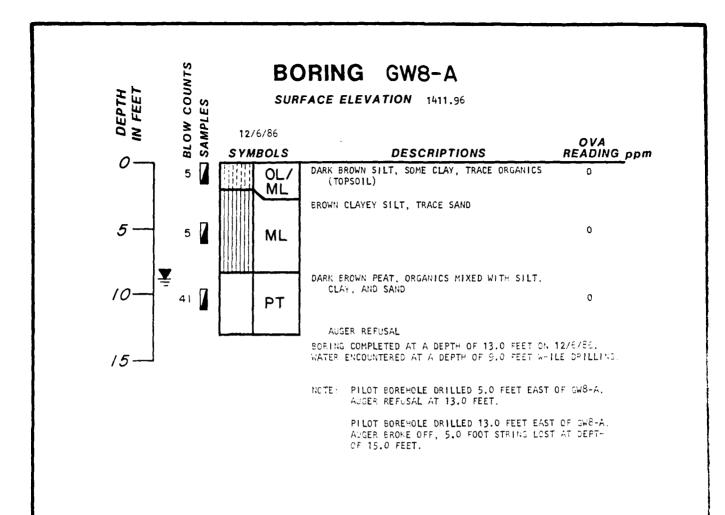


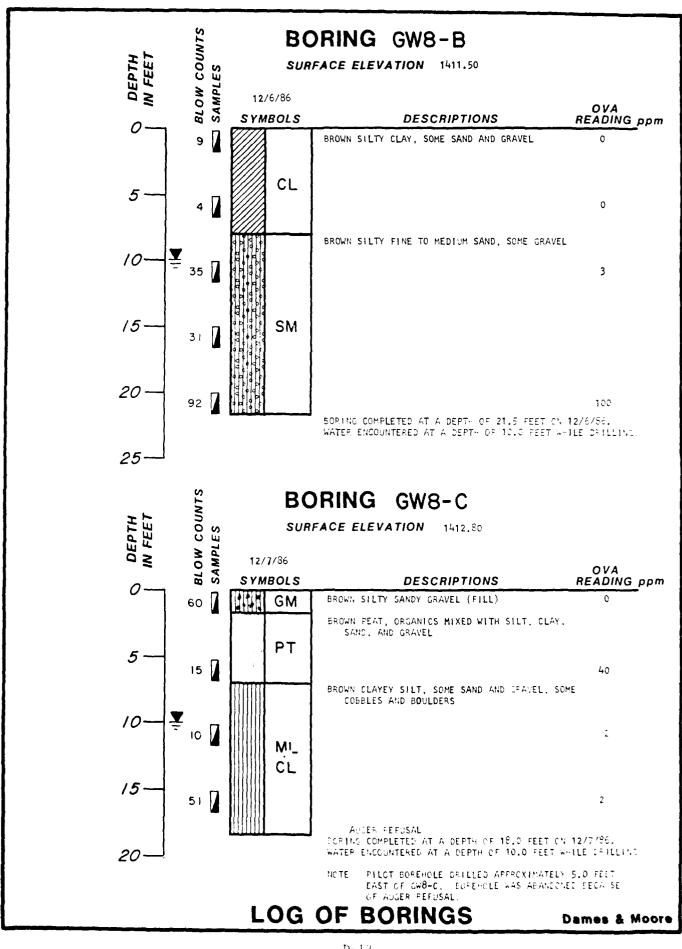


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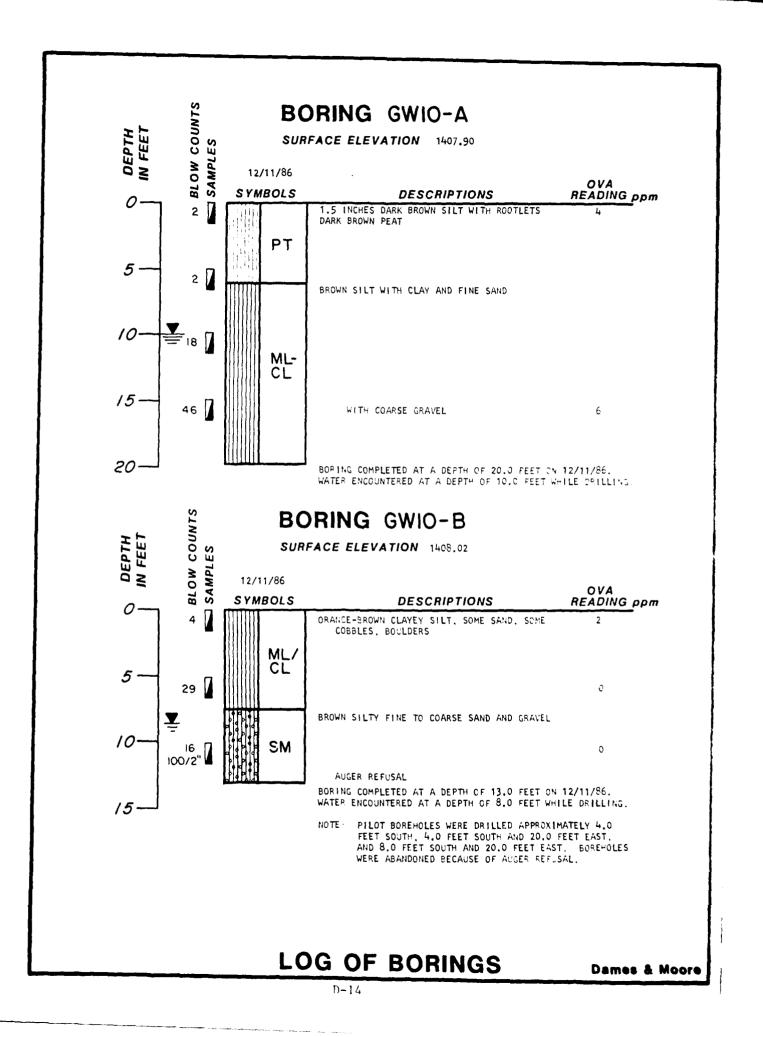


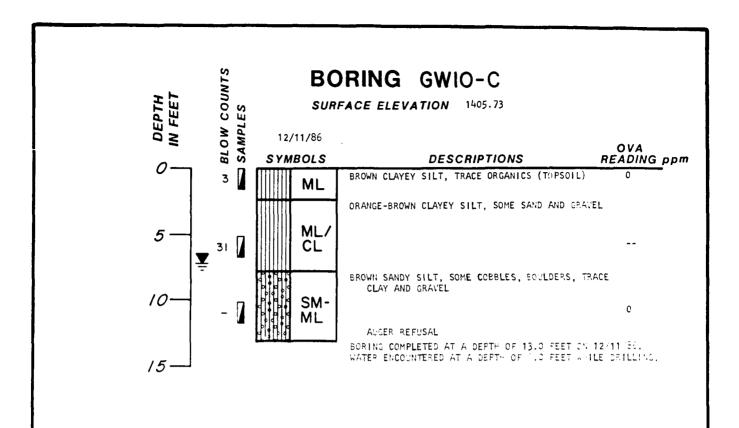




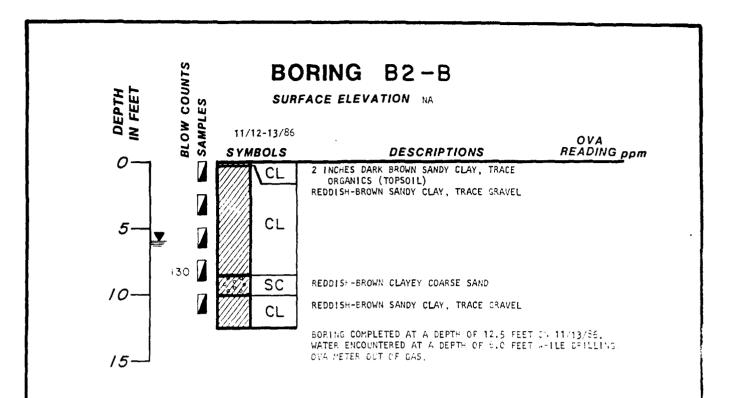


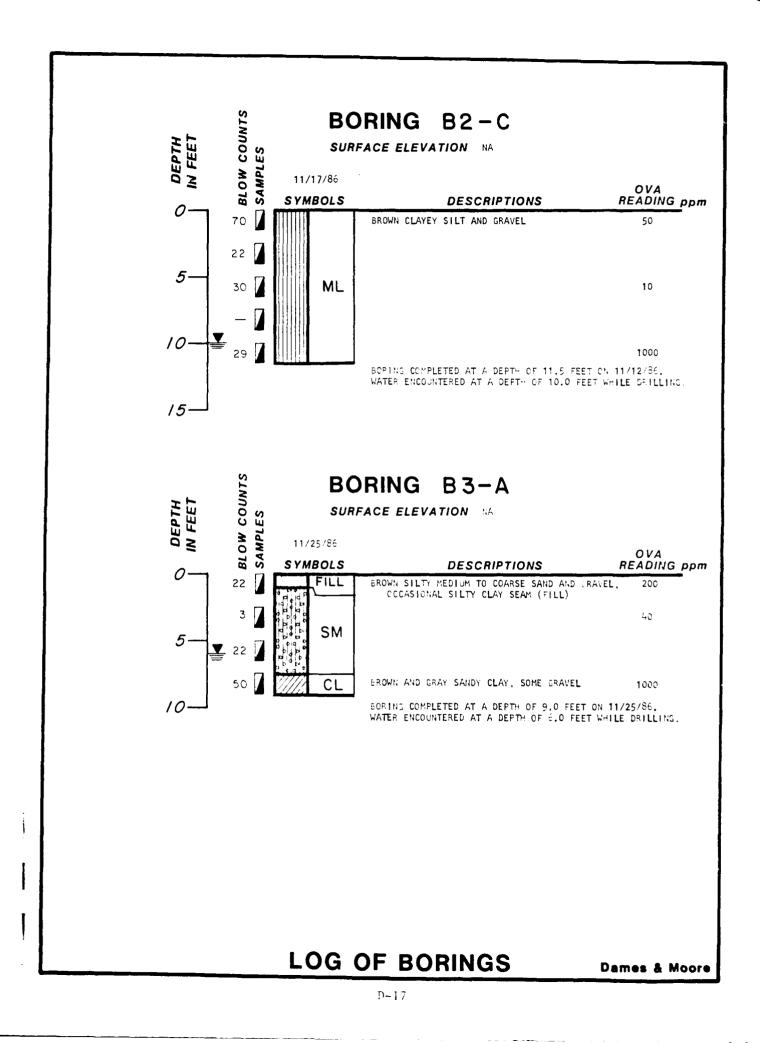
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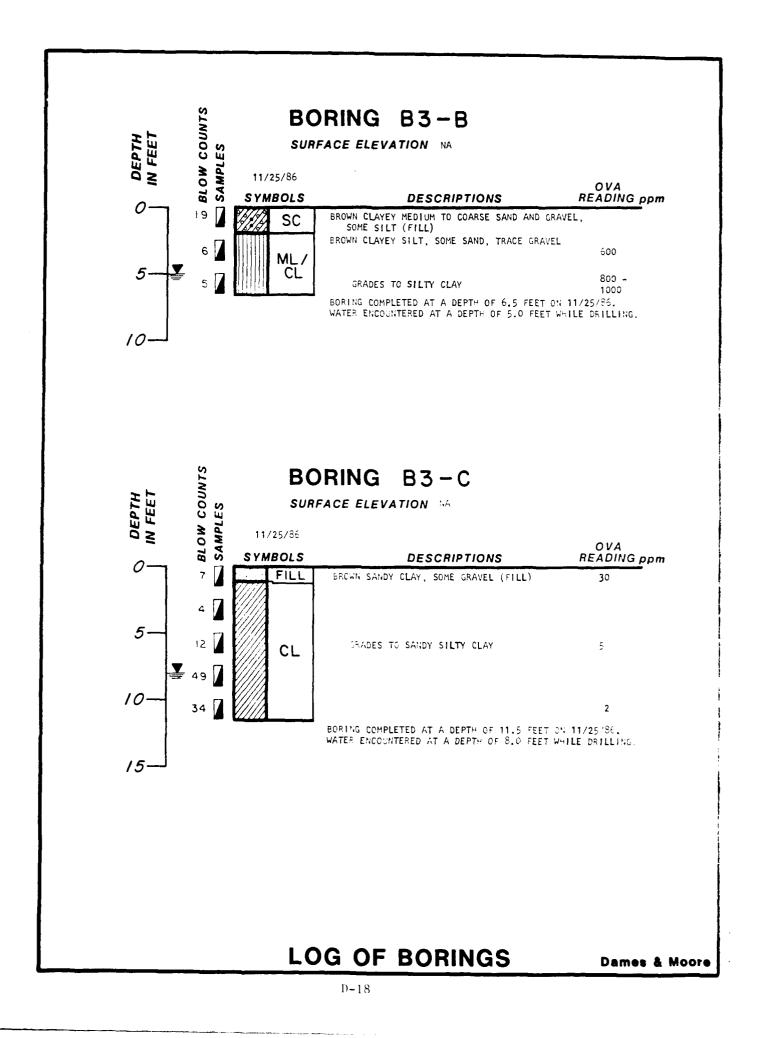


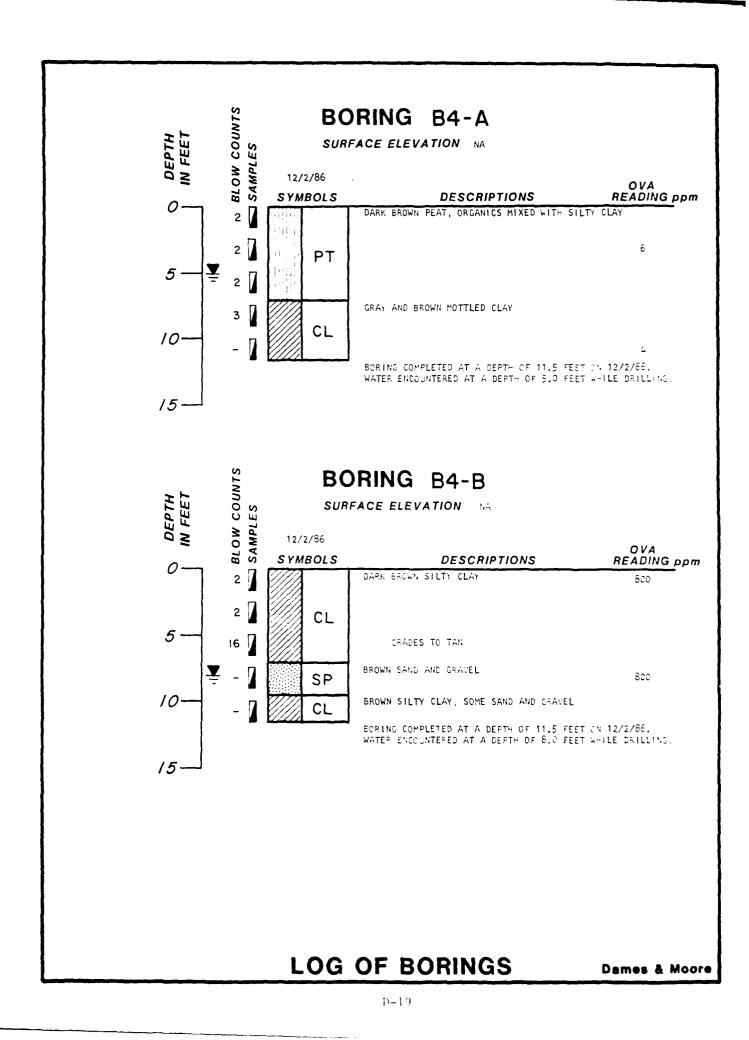


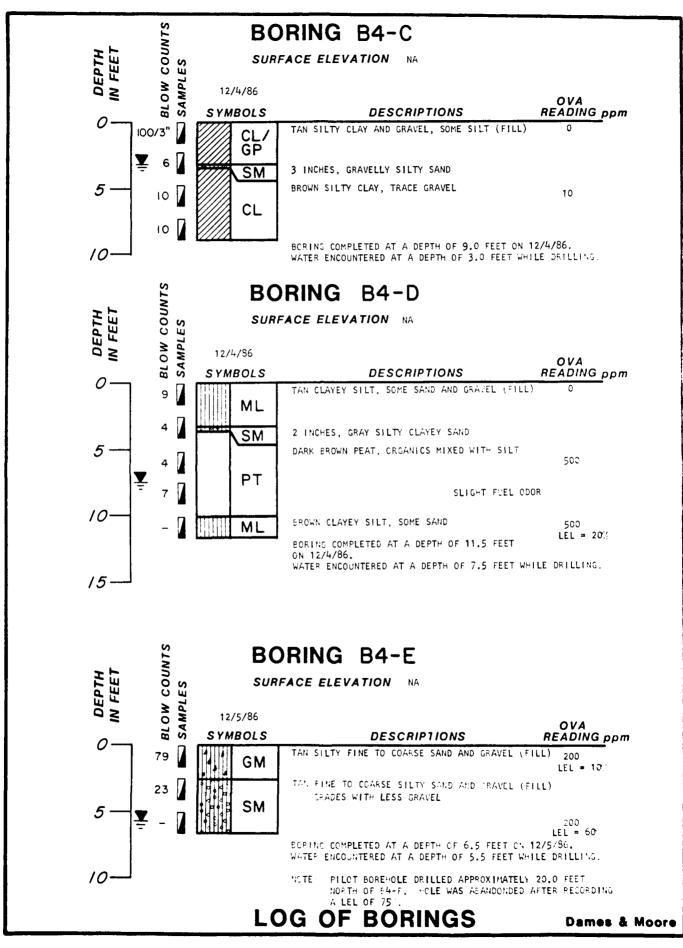
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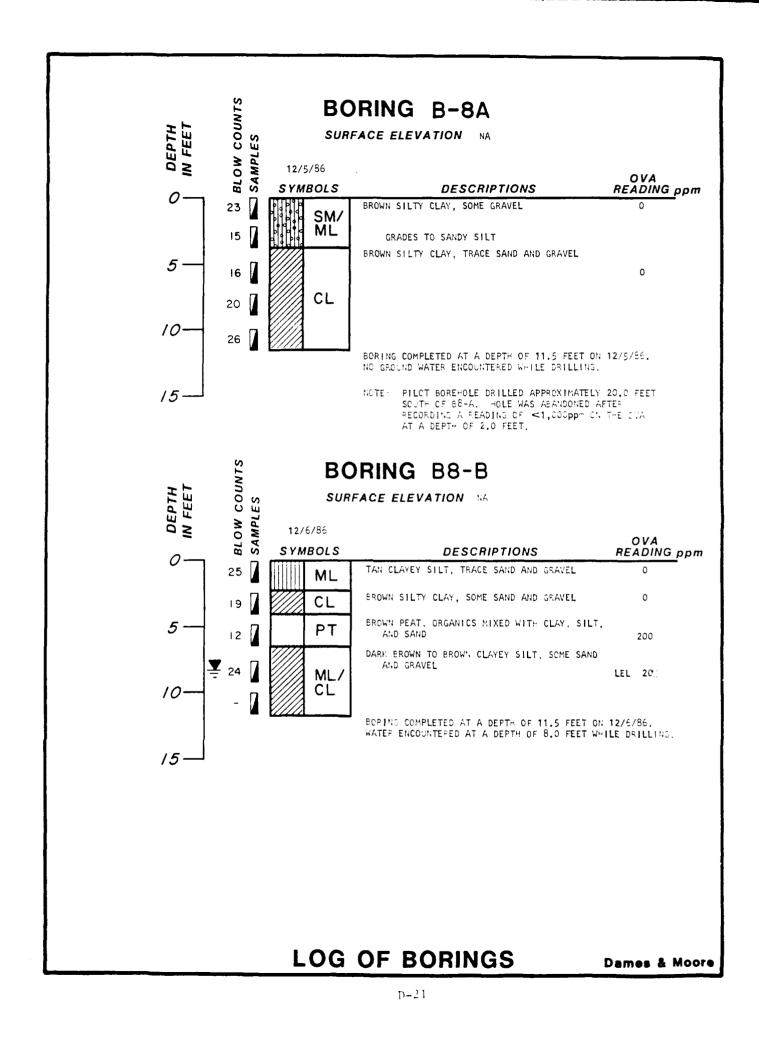


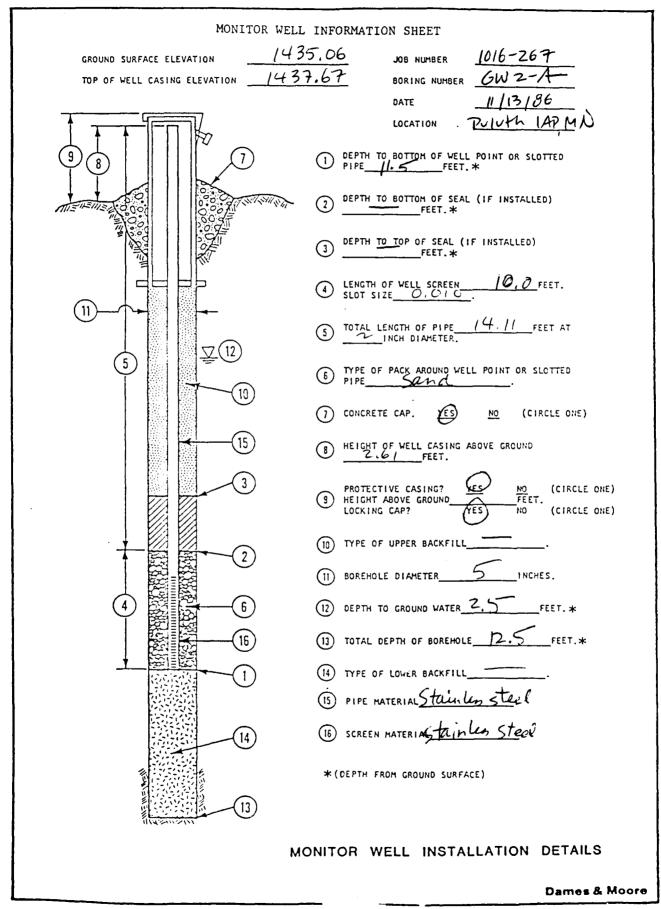


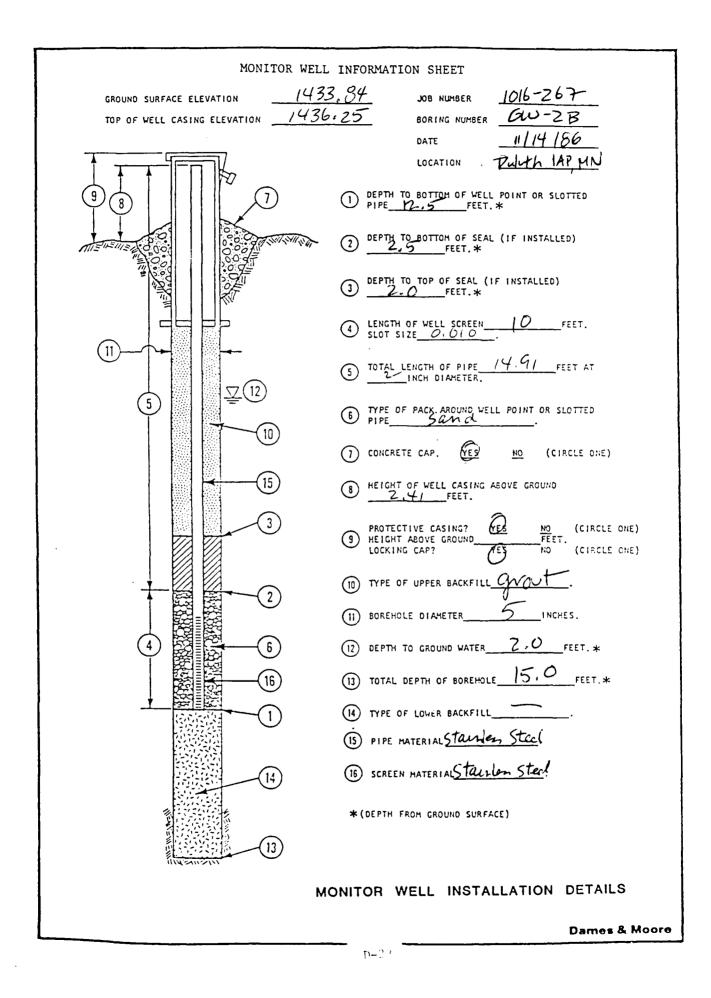


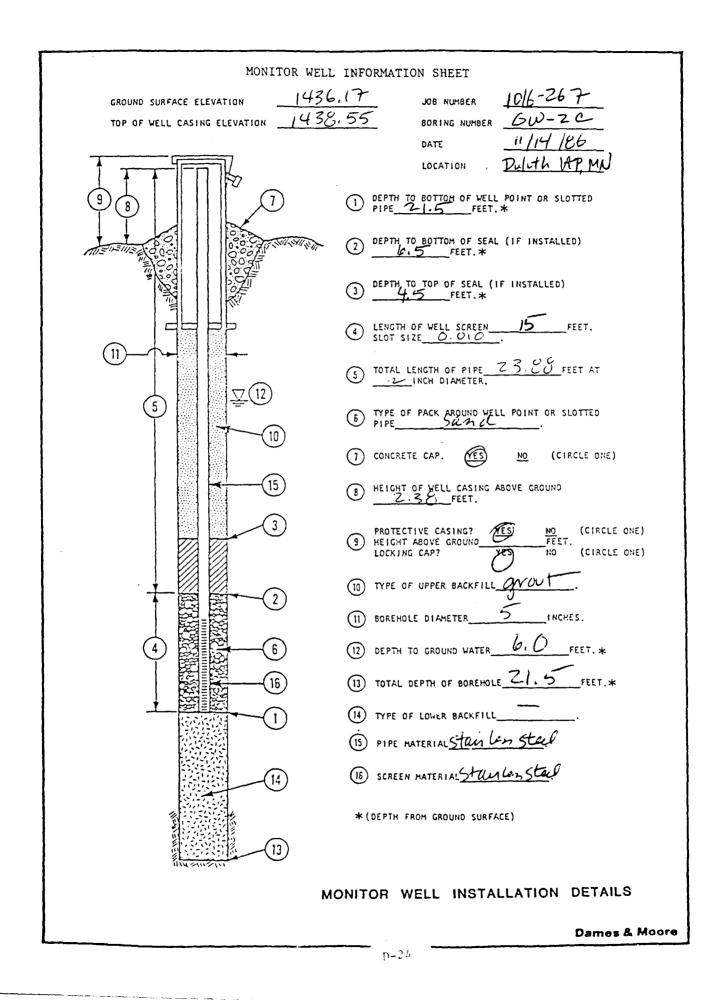


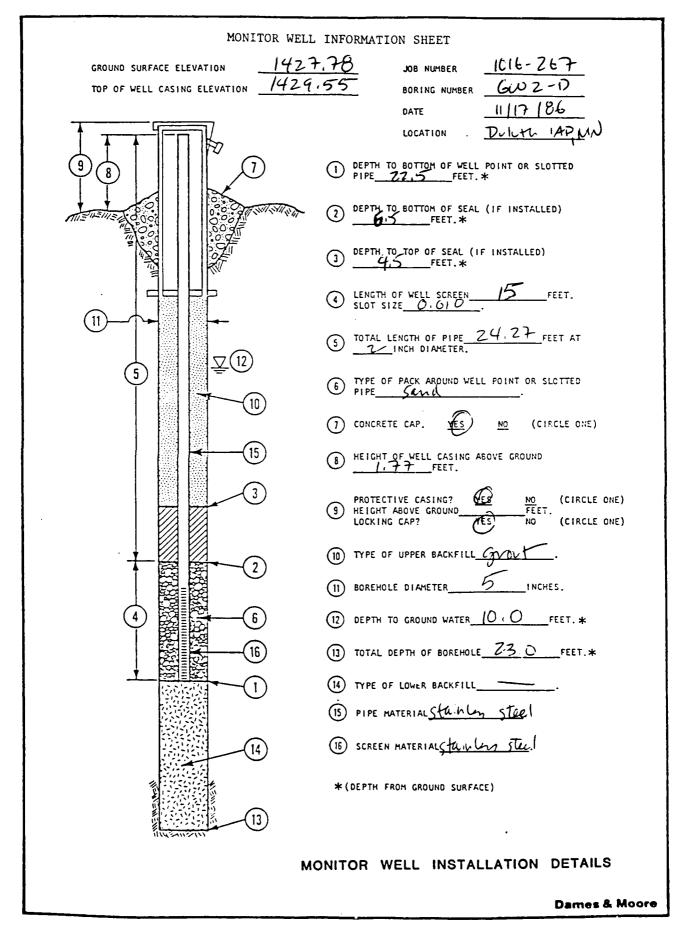


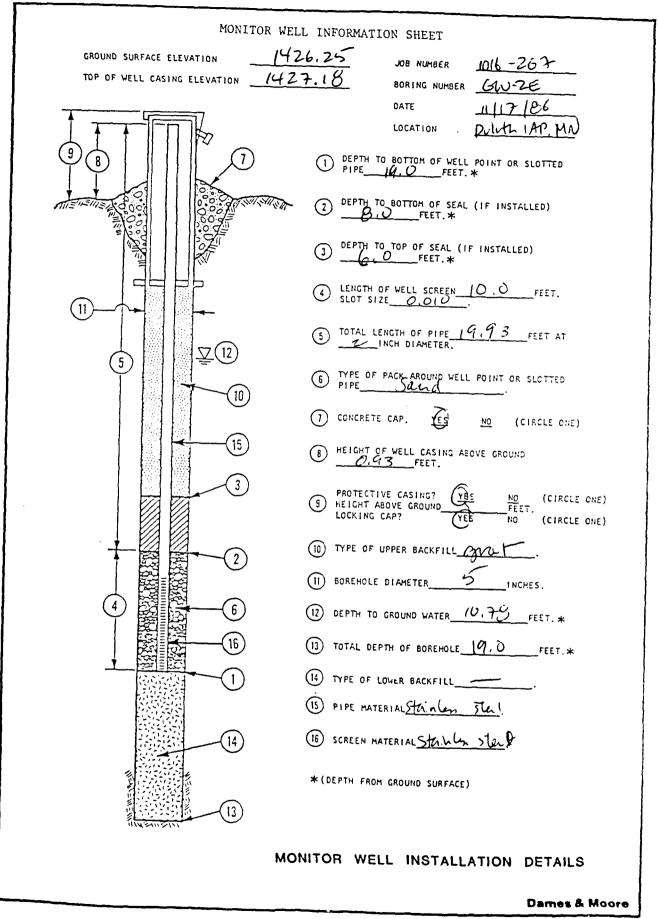


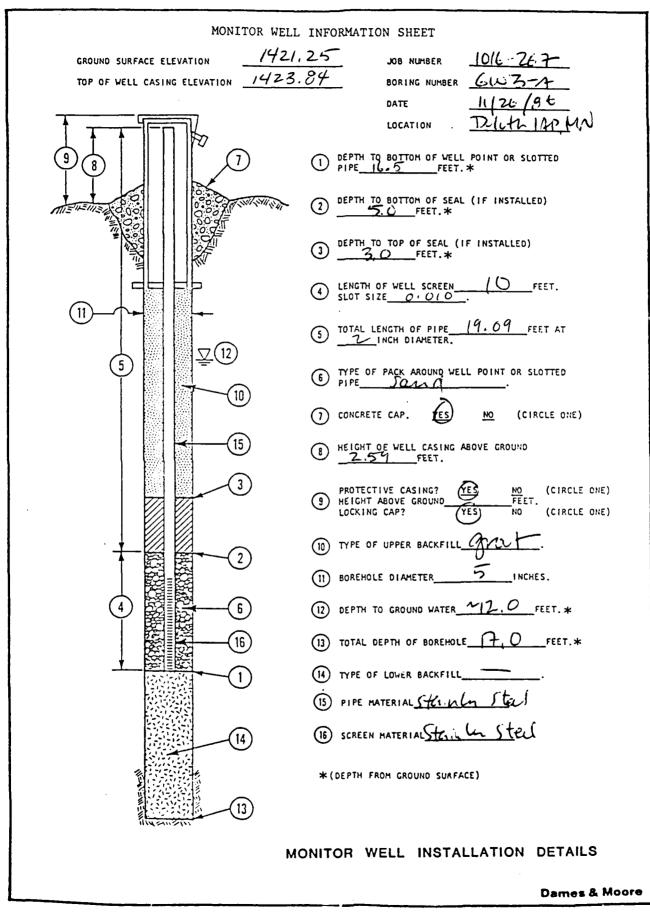


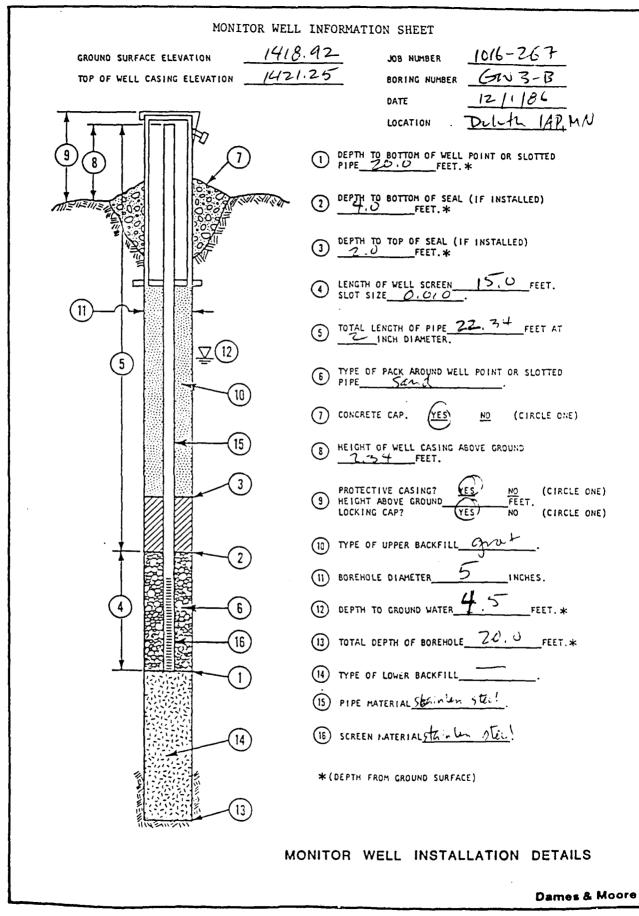




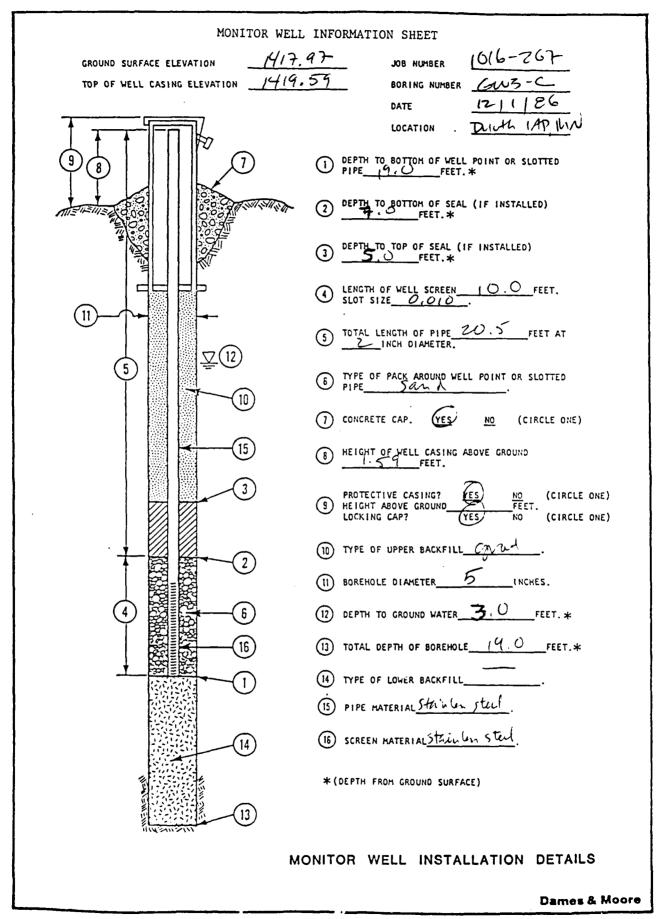








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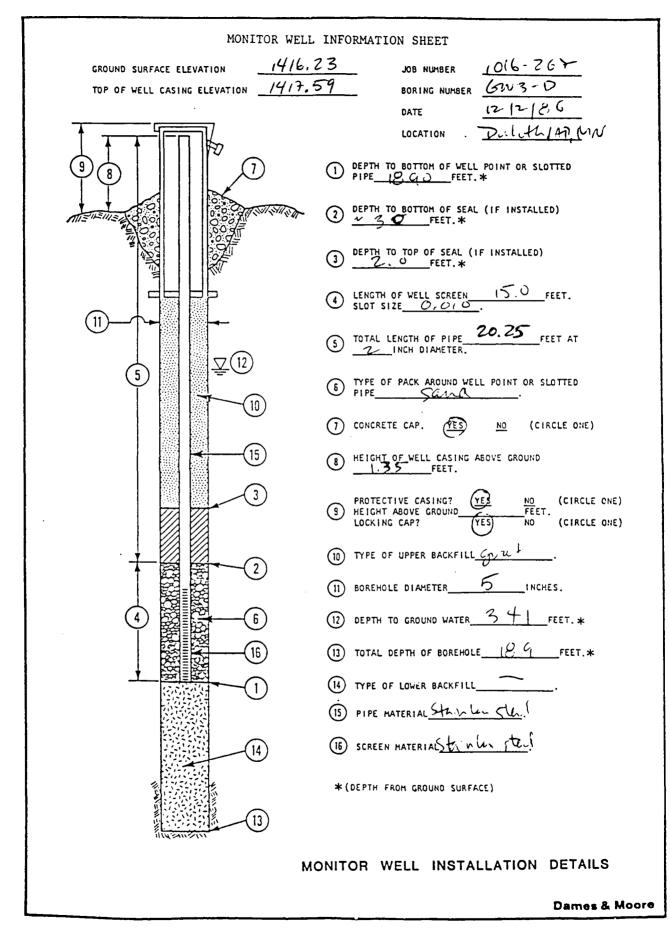
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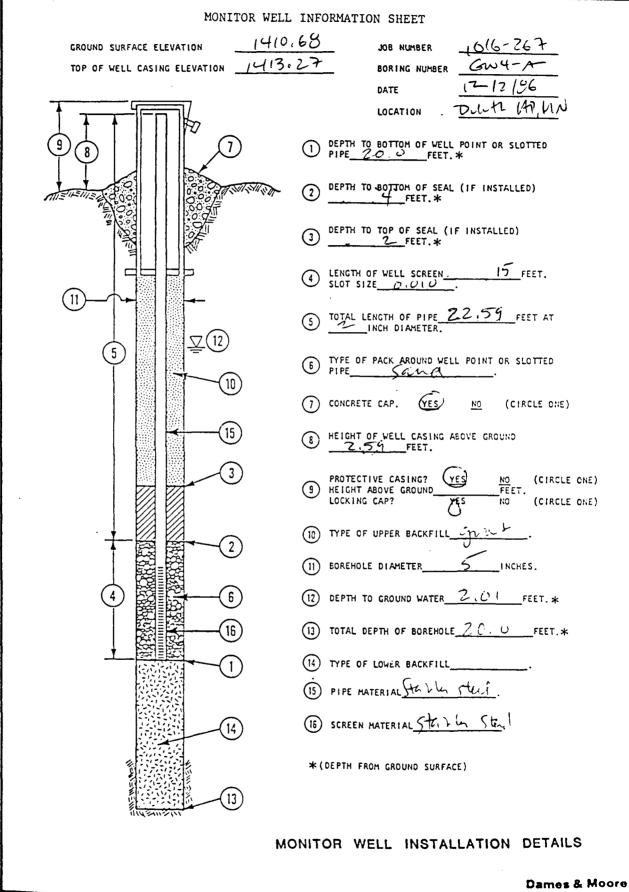
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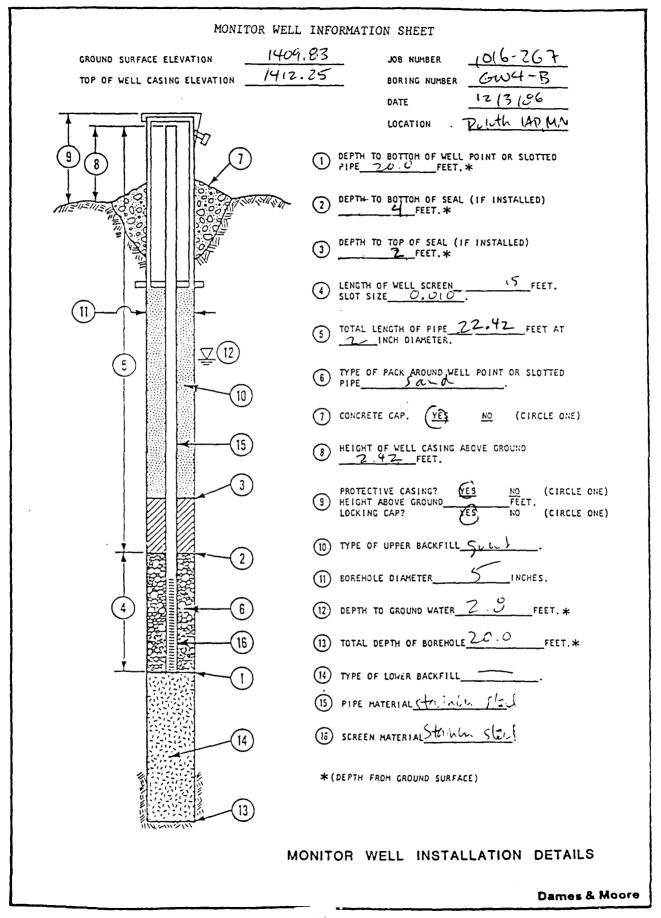
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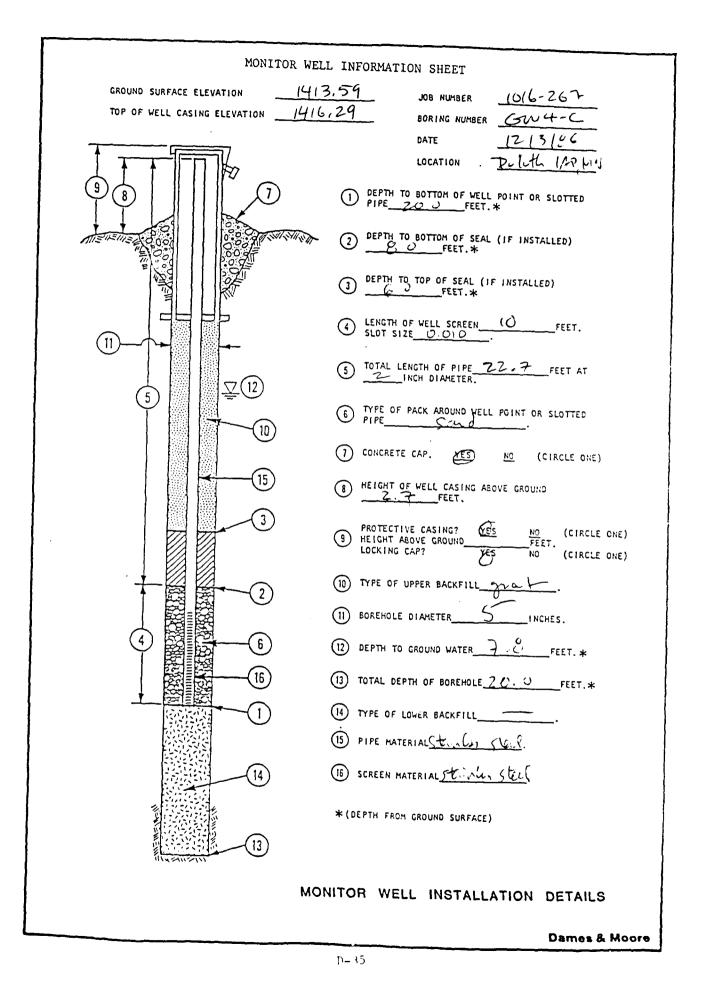
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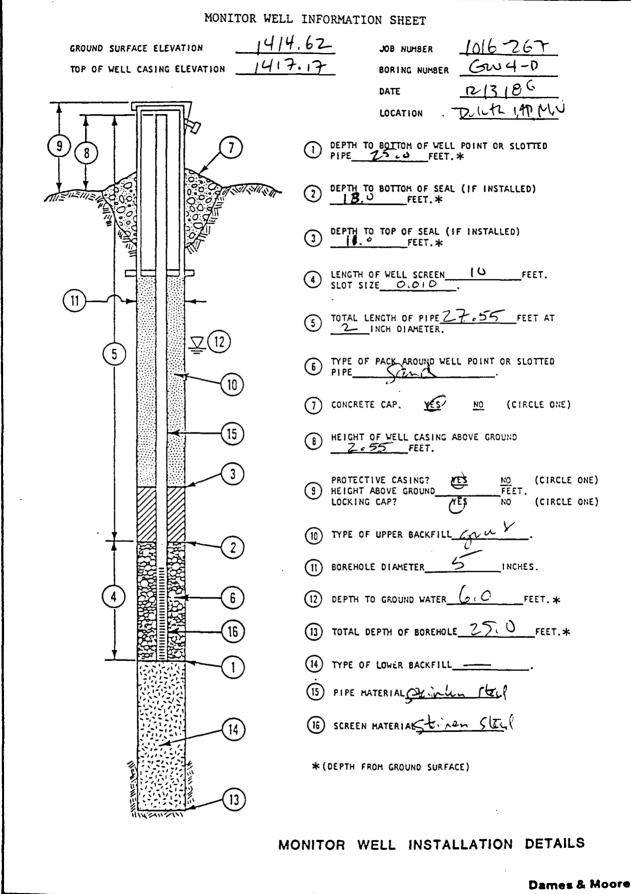




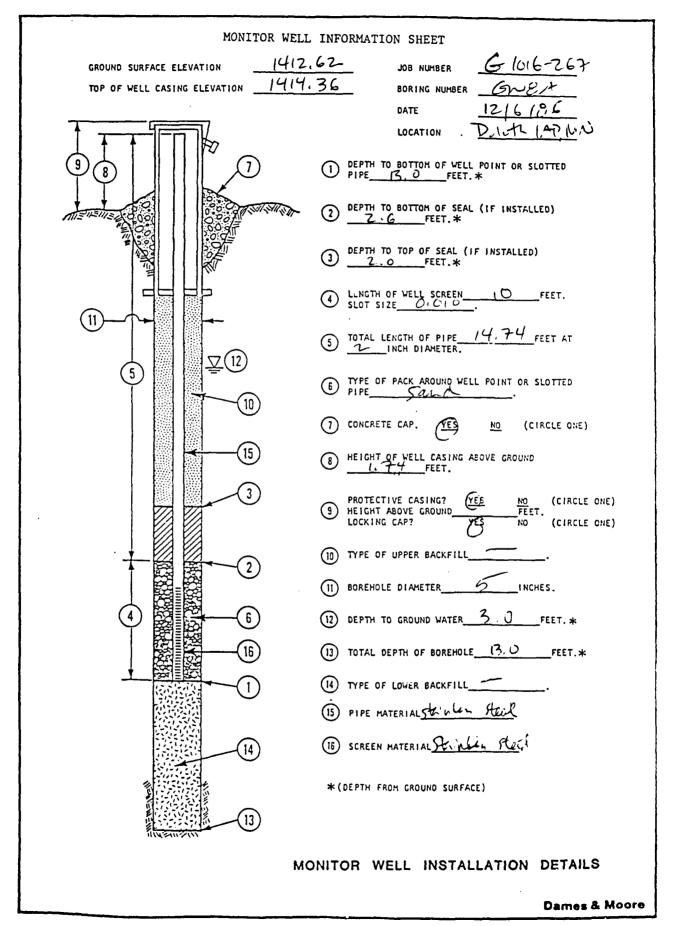




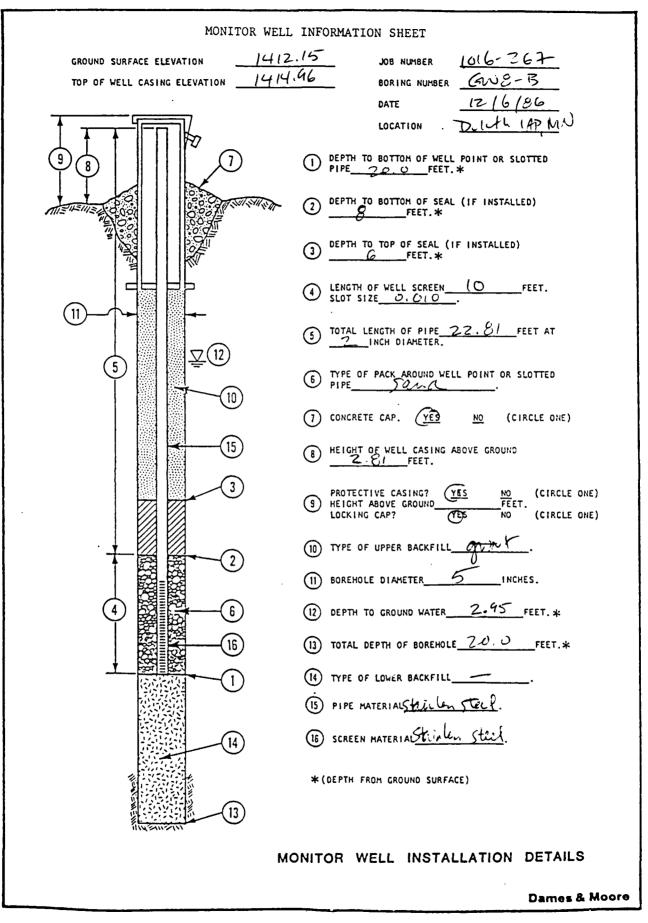
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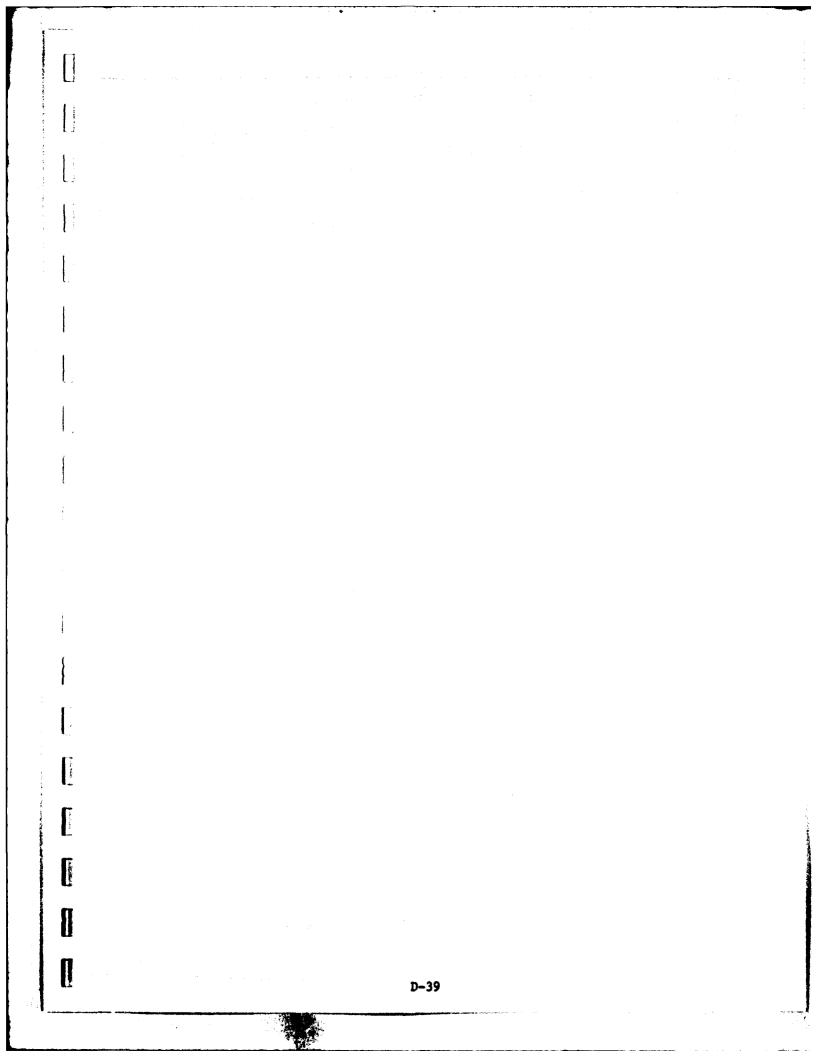
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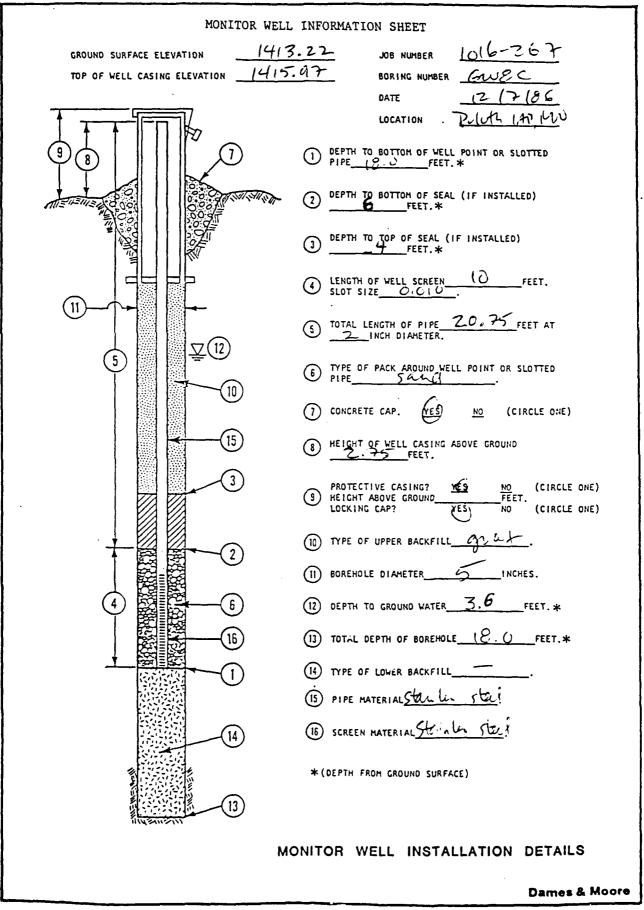


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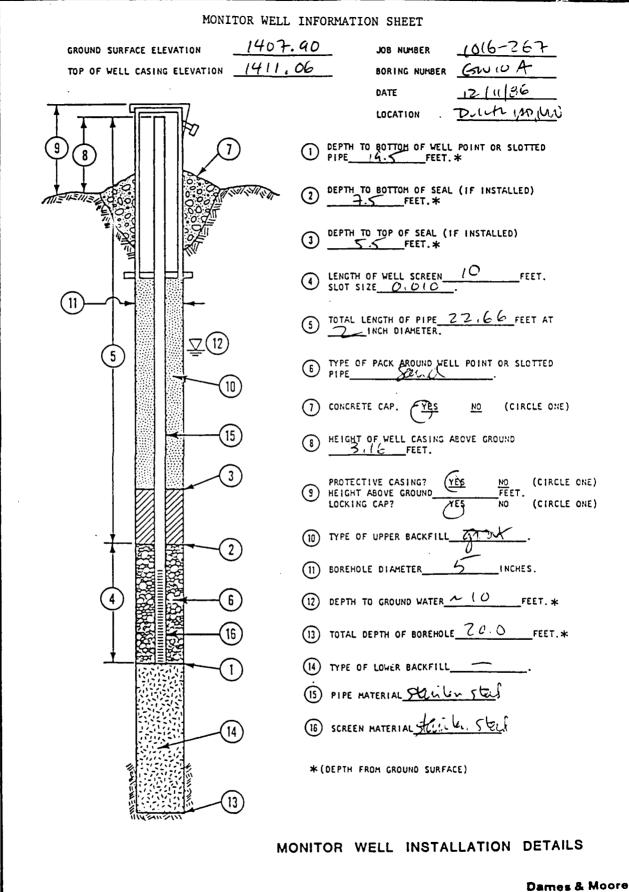


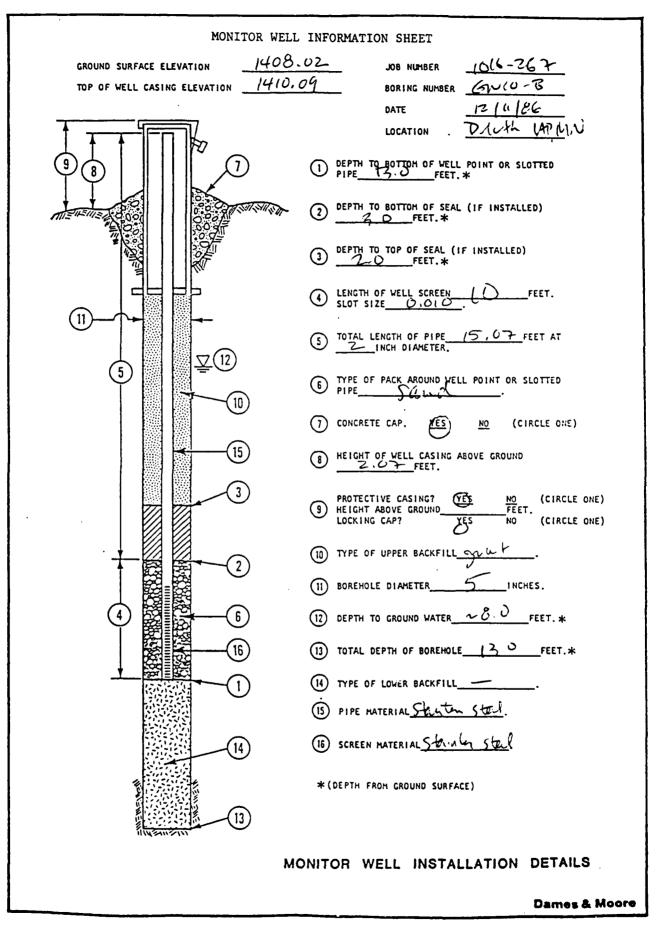
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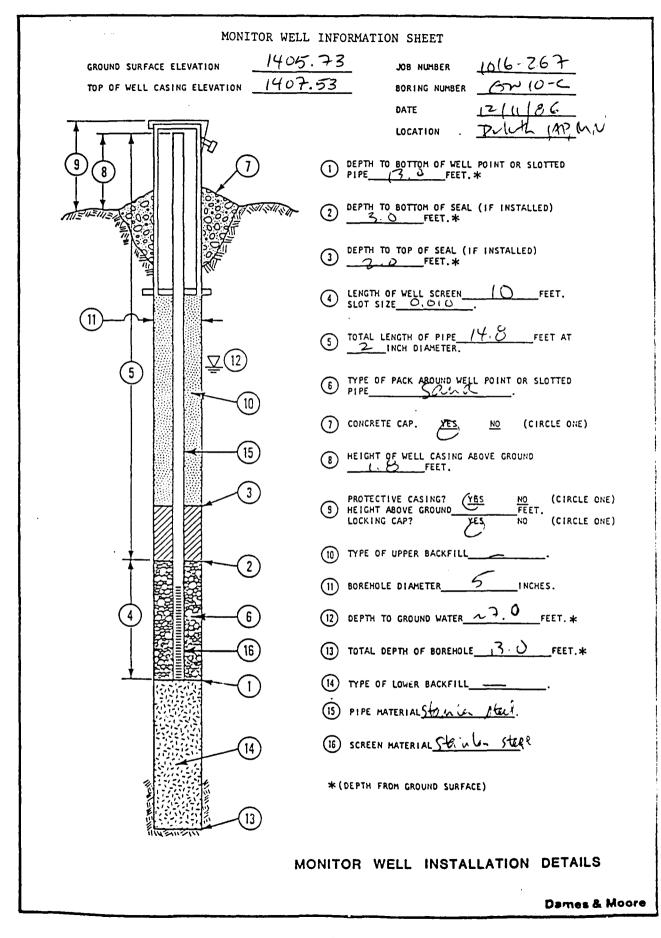


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APPENDIX E

FIELD RAW DATA

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WELL NO. <u>GW-1A</u> STABILIZATION TEST DATE: <u>12/10/86</u> TIME: <u>0947</u>

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			_	WELL	VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: µmhos/cm	160	190	200	215						
рН: <u>+</u> 0.1 pH unit	6.0	6.5	7.0	7.1						
Temperature: <u>+</u> 0.5°C	8.0	8.1	8.5	8.7						
Color	boun	same	same	same						-
Odor of Discharge	nine	none	none	none						

WELL NO. <u>GW-IC</u> STABILIZATION TEST

DATE: 12/11/86 TIME: 1345

				WELL	VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: µmhos/cm	208	220	218							
pH: <u>+</u> 0.1 pH unit	6.2	6.2	6.1							
Temperature: <u>+</u> 0.5°C	7.0	7.0	7.0							
Color	brown cloudy	same	same							-
Odor of Discharge	none	none	none							

WELL NO. GW-ID STABILIZATION TEST DATE: 12/15/84 TIME: 1202

				WELL	VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: Junhos/cm	131	133	134							
pH: <u>+</u> 0.1 pH unit	6.4	6.4	6.4							
Temperature: <u>+</u> 0.5°C	6.9	7.0	7.0							
Color	brown	same	same							
Odor of Discharge	slight oil odor									

WELL NO. <u>GW-IE</u> STABILIZATION TEST

				WELL	VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: µmhos/cm	239	220	213							
pH: <u>+</u> 0.1 pH unit	6.8	7.2	7.1							
Temperature: <u>+</u> 0.5°C	7.9	7.8	7.5							
Color	red- brown	same	light branh							:
Odor of Discharge			none							

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DATE: 12/15/86 TIME: 0940

WELL NO. <u>GW-ZA</u> STABILIZATION TEST DATE: <u>1/1/87</u> TIME: <u>1436</u>

				WELL	VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: µmhos/cm	212	218	222							
pH: <u>+</u> 0.1 pH unit	5.1	5.8	5.9	5.9						
Temperature: <u>+</u> 0.5°C	3.5	4.0	4.2						•	
Color	red brown	Same	same							-
Odor of Discharge	hone	nme	none							

WELL NO. <u>GW-2B</u> STABILIZATION TEST

DATE: 1/2/87 TIME: 0854

				WELL	VOLUM	ÉEXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: junhos/cm	380	375	380	385						
pH: <u>+</u> 0.1 pH unit	6.1	6.45	6.5	6.5						
Temperature: <u>+</u> 0.5°C	3.2	2.9	3.0	3.0						
Color	light brown	same	same	same						-
Odor of Discharge	none		stale	same						

WELL NO. GW-2C STABILIZATION TEST

DATE: 1/2/87 TIME: 1003

				WELL	VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: Jmhos/cm	91	98	90							
рН: <u>+</u> 0.1 рН unit	5.4	5,7	5.75							
Temperature: <u>+</u> 0.5°C	7.0	6.5	6.5							
Color	eight brown	same	same							-
Odor of Discharge	none	Same	same							

WELL NO. <u>GW2-D</u> STABILIZATION TEST

DATE: 1/2/87 TIME: 1456

				WELL	VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: Junhos/cm	482	ኇኇ	505	505						
pH: <u>+</u> 0.1 pH unit	5.85	6.0	6.0	6.0						
Temperature: <u>+</u> 0.5°C	7.0	7.1	7.1							
Color	light brown	sume	same							-
Odor of Discharge	sweet	same	same							

E-8

WELL NO. GW-2E STABILIZATION TEST

DATE: 1/3/87 TIME: 0931

				WELL	VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: Junhos/cm	950	450	930	930						
pH: <u>+</u> 0.1 pH unit	6.0	6.2	6.2	6.2						
Temperature: <u>+</u> 0.5°C	6.4	7.0	6.8	6.8						
Color	light brown	same	same	same						-
Odor of Discharge	sweet	same	same	same						

E-9

WELL NO. <u>GW3A</u> STABILIZATION TEST DATE: <u>1687</u> TIME: <u>0833</u>

				WELL	VOLUM	E EXTR	ACTED	·		
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: Junhos/cm	120	110	113	())						
pH: <u>+</u> 0.1 pH unit	6.69	6.3	6.30	6.30						
Temperature: <u>+</u> 0.5°C	5.8	5.9	5.8	5.3						
Color	red - brown, silty	Same	same	same						-
Odor of Discharge	none	none	none	nome						

WELL NO. GW-3B STABILIZATION TEST

DATE: 1/6/87 TIME: 1234

				WELL	VOLUM	E EXTR	ACTED		<u> </u>	
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: µmhos/cm	459	471	468	469						
pH: <u>+</u> 0.1 pH unit	5.8	5.9	6.0	5.9						
Temperature: <u>+</u> 0.5°C	6.8	6.8	6.4	6.8						
Color	<i>Light</i> brown	same	same	same						-
Odor of Discharge	chemical	same	same	same						

WELL NO. $\underline{GW-3C}$ STABILIZATION TEST DATE: $\underline{1/6/87}$ TIME: <u>(000</u>

				WELL	VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: µmhos/cm	238	210	236							
pH: <u>+</u> 0.1 pH unit	6.2	6.3	6.3							
Temperature: <u>+</u> 0.5°C	6.2	5.9	5.9							
Color	Light brown	same	same							
Odor of Discharge	none	none	hone							

WELL NO. GW-3D STABILIZATION TEST

DATE: 1/7/87 TIME: 1004

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		WELL VOLUME EXTRACTED												
PARAMETER	1	2	3	4	5	6	7	8	9	10				
Field Conductivity: #mhos/cm	557	550	ऽङ्	550										
рН: <u>+</u> 0.1 pH unit	6.1	6.35	6.45	6.51										
Temperature: <u>+</u> 0.5°C	6.0	7.0	6.5	6.5										
Color	dark brown	same	SAME	same										
Odor of Discharge	chemical Sweet	Same	same	Same										

WELL NO. <u>GW-4A</u> STABILIZATION TEST

DATE: 12/18/86 TIME: 1510

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	WELL VOLUME EXTRACTED												
PARAMETER	1	2	3	4	5	6	7	8	9	10			
Field Conductivity: µmhos/cm	390	399	401										
рН: <u>+</u> 0.1 рН unit	6.5	6.4	6.4										
Temperature: <u>+</u> 0.5°C	5.9	6.1	6.3										
Color	brown cloudy	brown	Same										
Odor of Discharge	sulfur odor	same	same										

WELL NO. <u>GW-48</u> STABILIZATION TEST DATE: <u>12/19/86</u> TIME: <u>1319</u>

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	WELL VOLUME EXTRACTED													
PARAMETER	1	2	3	4	5	6	7	8	9	10				
Field Conductivity: punhos/cm	205	251	300	330	329									
рН: <u>+</u> 0.1 рН unit	7.3	6.7	6.5	63	6.3									
Temperature: <u>+</u> 0.5°C	6.0	5.5	5.5	5.1	5.1									
Color	brown, slight red	same	same	same	same					-				
Odor of Discharge	petro. odor	same	Same	same	Same									

WELL NO. <u>GW-4C</u> STABILIZATION TEST DATE: <u>12/19/86</u> TIME: <u>1205</u>

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	WELL VOLUME EXTRACTED												
PARAMETER	1	2	3	4	5	6	7	8	9	10			
Field Conductivity: µmhos/cm	630	630	630										
рН: <u>+</u> 0.1 рН unit	6.8	6.9	6.9			· · · · · · · · · · · · · · · · · · ·							
Temperature: <u>+</u> 0.5°C	8.0	8.0	8.0										
Color	red brown cloudy	red brown											
Odor of Discharge	slight petro. odor	same											

WELL NO. GW-4D STABILIZATION TEST

DATE: 12/19/86 TIME: 0901

	WELL VOLUME EXTRACTED											
PARAMETER	1	2	3	4	5	6	7	8	9	10		
Field Conductivity: µmhos/cm	471	750	760	800	800							
pH: <u>+</u> 0.1 pH unit	5.8	6.3	6.5	6.6	6.6							
Temperature: <u>+</u> 0.5°C	7.0	7.4	7.2	7.3	7.3							
Color	1									_		
Odor of Discharge	5	slight petro. odor										

Note: 1st bailer, yellow-clean colon; 2nd bailer, brown silt.

WELL NO. <u>GW-5A</u> STABILIZATION TEST

DATE: 12/17/86 TIME: 0831

	0851	0950	1042		VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: µmhos/cm	274	290	284							
рН: <u>+</u> 0.1 pH unit	6.8	6.8	6.7							
Temperature: <u>+</u> 0.5°C	7.0	8.0	7.5							
Color	dark red- brown	red brown clearing	same							:
Odor of Discharge	none	none	none							

Note: Very slow recharge.

WELL NO. GW-5B STABILIZATION TEST

DATE: 12/15/86 TIME: 1524

	12/15 1551		0908	1 gal. WELL 0914	1 9 1. VOLUME 0421	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: µmhos/cm	212	385	461	435	438					
pH: <u>+</u> 0.1 pH unit	6.4	6.4	6.6	6.7	6.7					
Temperature: <u>+</u> 0.5°C	7.1	6.9	9.1	6.5	6.9					
Color	red- brown	same	light red brown clewer	cleare	•					=
Odor of Discharge	hone	none	hone	none	nont					

Note: Extremely slow recharge.

WELL NO. <u>GW-5C</u> STABILIZATION TEST

DATE: 12	<u> 16/86</u>	TIME:	1158
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	1230	WELL VOLUME EXTRACTED											
PARAMETER	1	2	3	4	5	6	7	8	9	10			
Field Conductivity: µmhos/cm	630	250	580										
pH: <u>+</u> 0.1 pH unit	6.4	6.6	6.8										
Temperature: <u>+</u> 0.5°C	8.2	11.0	8.1										
Color	dark brown		tan clear							<u>-</u>			
Odor of Discharge	none	hone	none										

Note: Slow recharger.

WELL NO. <u>GW-7</u>A STABILIZATION TEST

DATE: 12/16/86 TIME: 1105

	WELL VOLUME EXTRACTED												
PARAMETER	1	2	3	4	5	6	7	8	9	10			
Field Conductivity: Annhos/cm	103	98	105										
pH: <u>+</u> 0.1 pH unit	5.8	5.65	5.8										
Temperature: <u>+</u> 0.5°C	6.0	5.9	7.8										
Color	tan	light tan	light							-			
Odor of Discharge	none	hone	none										

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WELL NO. <u>GW-7B</u> STABILIZATION TEST

DATE: 12/18/86 TIME: 0925

	WELL VOLUME EXTRACTED											
PARAMETER	1	2	3	4	5	6	7	8	9	10		
Field Conductivity: µmhos/cm	208	200	190									
pH: <u>+</u> 0.1 pH unit	6.6	6.6	6.7									
Temperature: <u>+</u> 0.5°C	6.1	6.0	6.3									
Color	red- brown	Same	same									
Odor of Discharge	none	nom	none									

Note: Rapid recharge.

WELL NO. GW-7C STABILIZATION TEST DATE: 12/17/86 TIME: 1525

	12/17		12/18 0852		VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: µmhos/cm	358	385	345	360						
рН: <u>+</u> О.1 рН unit	6.9	7.0	6.5	6.4						
Temperature: <u>+</u> 0.5°C	3.5	5.0	3.0	4.0					ŀ	
Color	red - brown	Same	red brown clearer							
Odor of Discharge	none	non	none	none						

Note: Extreme ly slow recharge. Recovers at approximate rate of 1ft./hour.

WELL NO. <u>GW-BA</u> STABILIZATION TEST

DATE: 1/9/87 TIME: 1307

PARAMETER	WELL VOLUME EXTRACTED									
	1	2	3	4	5	6	7	8	9	10
Field Conductivity: Jimhos/cm	460	540	580	550	550					
pH: <u>+</u> 0.1 pH unit	6.1	6.3	6.4	6.49	6.50					
Temperature: <u>+</u> 0.5°C	6.8	6.0	6.2	5.9	5.9					
Color	dark gry- brown	same	same	same	same					
Odor of Discharge	slight Sweet	same	Same	same	same					

WELL NO. <u>GW-8B</u> STABILIZATION TEST

DATE: 1/7/87 TIME: 1202

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	WELL VOLUME EXTRACTED											
PARAMETER	1	2	3	4	5	6	7	8	9	10		
Field Conductivity: Aumhos/cm	412	395	372	357	35%							
pH: <u>+</u> 0.1 pH unit	6.7	6.6	6.6	6.6	6.5							
Temperature: <u>+</u> 0.5°C	5.9	6.2	6.8	6.9	7.0							
Color	brown	same	same	same	same					-		
Odor of Discharge	home	none	noni	none	none							

WELL NO. <u>GW-BC</u> STABILIZATION TEST

DATE: 1/9/87 TIME: 1445

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	WELL VOLUME EXTRACTED											
PARAMETER	1	2	3	4	5	6	7	8	9	10		
Field Conductivity: µmhos/cm	487	540	950	540								
pH: <u>+</u> 0.1 pH unit	6.8	6.7	6.7	6.65								
Temperature: <u>+</u> 0.5°C	6.2	6.9	6.9	7.1								
Color	brun	same	same	same						-		
Odor of Discharge	slight scrage	same	same	same								

WELL NO. <u>GW-10A</u> STABILIZATION TEST DATE: <u>12/31/86</u> TIME: <u>1030</u>

	WELL VOLUME EXTRACTED									
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: µmhos/cm	330	335	335	330						
pH: <u>+</u> 0.1 pH unit	6.0	6.2	6.2	625						
Temperature: <u>+</u> 0.5°C	6.01	6.8	6.5	6.8						
Color	light brown	same	same	same						-
Odor of Discharge	none	hong	none	none						

WELL NO. GW-10B STABILIZATION TEST

DATE: 1/1/87 TIME: 1053

	WELL VOLUME EXTRACTED											
PARAMETER	1	2	3	4	5	6	7	8	9	10		
Field Conductivity: µmhos/cm	210	233	242	250	250							
рН: <u>+</u> 0.1 pH unit	5.8	6.1	6.23	6.2								
Temperature: <u>+</u> 0.5°C	4.0	4.8	5.0	5.01								
Color	light brown	same	same	same						-		
Odor of Discharge	none	hone	hone	nme								

WELL NO. GW-IOC STABILIZATION TEST

DATE: 11/87 TIME: 1220

	WELL VOLUME EXTRACTED												
PARAMETER	1	2	3	4	5	6	7	8	9	10			
Field Conductivity: µmhos/cm	210	271	265	268									
pH: <u>+</u> 0.1 pH unit	6.01	6.2	6.25										
Temperature: <u>+</u> 0.5°C	4.8	5.0	5.01										
Color	lign+ brann	same	gray ban	same						-			
Odor of Discharge	none	none	none	none									

Note: Slow recharge.

WELL NO. <u>MW-1</u> STABILIZATION TEST DATE: <u>1/3/87</u> TIME: <u>1423</u>

	WELL VOLUME EXTRACTED											
PARAMETER	1	2	3	4	5	6	7	8	9	10		
Field Conductivity: µmhos/cm	485	600	620	680	680							
pH: <u>+</u> 0.1 pH unit	6.29	6.5	6.5	6.4	6.4							
Temperature: <u>+</u> 0.5°C	7.2	7.8	7.6	8.0	8.0							
Color	light brown	SAME	Same	same	same							
Odor of Discharge	913nt Sweet	same	same	Same	same	<u></u>						

WELL NO. MW-2 STABILIZATION TEST

DATE: 113 187 TIME: 1315

	WELL VOLUME EXTRACTED											
PARAMETER	1	2	3	4	5	6	7	8	9	10		
Field Conductivity: Jumbos/cm	460	600	650	(50								
pH: <u>+</u> 0.1 pH unit	6.1	6.32	6.3	6.3								
Temperature: <u>+</u> 0.5°C	6.8	7.0	7.0	7.0								
Color	yellow brown	same	same	same						_		
Odor of Discharge	slight sweet	same	same	same								

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WELL NO. MW-4	STABILIZATION	TEST
DATE: 1/4/87	TIME: 1253	

	WELL VOLUME EXTRACTED									
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: µmhos/cm	355	365	383	391	398					
pH: <u>+</u> 0.1 pH unit	5.7	6.0	6.1	6.2						
Temperature: <u>+</u> 0.5°C	6.5	7.0	7.0	7.0						
Color	red brank	Same	Same	same						-
Odor of Discharge	stale	Same	same	same						

WELL NO. <u>MW-5</u> STABILIZATION TEST

DATE: 14/87 TIME: 1029

	WELL VOLUME EXTRACTED												
PARAMETER	1	2	3	4	5	6	7	8	9	10			
Field Conductivity: Jumhos/cm	349	335	338										
pH: <u>+</u> 0.1 pH unit	6.6	7.0	7.3										
Temperature: <u>+</u> 0.5°C	7.0	6.8	7.5										
Color	red brown	same	dark brann							-			
Odor of Discharge	state	SAMe	same										

Note: Bailed dry after 26 gallons; slow recharge.

WELL NO. <u>MW-6</u> STABILIZATION TEST DATE: $\frac{14/87}{1523}$ TIME: <u>1523</u>

	1530		1617	WELL VOLUME EXTRACTED							
PARAMETER	1	2	3	4	5	6	7	8	9	10	
Field Conductivity: µmhos/cm	380	410	405								
pH: <u>+</u> 0.1 pH unit	5.8	6.5	6.6								
Temperature: <u>+</u> 0.5°C	6.0	7.0	7.0								
Color	red brown	same	same								
Odor of Discharge	none	slight sweet									

Note: Slow recharge.

WELL NO. MW-7 STABILIZATION TEST DATE: 1/5/87 TIME: 1434

	'15 1440		1/6	WELL	VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: µmhos/cm	365	40Z	392							
рН: <u>+</u> 0.1 pH unit	6.5	6.9	6.5							
Temperature: <u>+</u> 0.5°C	5.2	7.0	7.1							
Color	light brown	brown	same							_
Odor of Discharge	nme	none	none							

Note: Extremely slow recharge.

Well NO. $\underline{MW-B}$ STABILIZATION TEST

DATE: 12/20/86 TIME: 0830

				WELL	VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: punhos/cm	220	238	250	255	253					
pH: <u>+</u> 0.1 pH unit	5.8	5.9	6.0	6.0	6.1					
Temperature: <u>+</u> 0.5°C	6.5	7.2	8.0	8.0	8.0					
Color	tan	red brown, silly	same	Same	same					-
Odor of Discharge	hone	none	none	hone	nme					

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WELL NO. <u>MW-9</u> STABILIZATION TEST

DATE: 12/20/86 TIME: 1126

	1139	(300	1324		VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: Jumbos/cm	471	460	450	455						
рН: <u>+</u> 0.1 pH unit	5.9	6.2	6.2	6.2						
Temperature: <u>+</u> 0.5°C	7.0	7.9	7.0	6.9						
Color	yeilaw- brown		brown	brown						-
Odor of Discharge	petro diesel Od or									

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Note: Slow recharge. Slight foaming during purging.

WELL NO. MW-10 STABILIZATION TEST DATE: 12/20/96 TIME: 1035

				WELL	VOLUM	E EXTR	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: µmhos/cm	430	420	429							
pH: <u>+</u> 0.1 pH unit	6.0	5.9	5.9							
Temperature: <u>+</u> 0.5°C	7.8	7.5	7.2							
Color	yellow- brown	brown- yellow	bronn- yellow							_
Odor of Discharge	strong petro. odor	Same	Same							

WELL NO. <u>MW-II</u> STABILIZATION TEST DATE: 12/20/86 TIME: 1214

	12.28	1253	1403	WELL 1542		e extr	ACTED			
PARAMETER	1	2	3	4	5	6	7	8	9	10
Field Conductivity: jumbos/cm	351	340	329	325						
pH: <u>+</u> 0.1 pH unit	7.1	7.1	6.8	6.8						
Temperature: <u>+</u> 0.5°C	(0.0	9.7	8.0	7.9						
Color	brown	same	Same	same						-
Odor of Discharge	none	none	none	hone						

APPENDIX F

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FIELD AND LABORATORY QUALITY CONTROL PROCEDURES

FIELD AND LABORATORY QUALITY CONTROL PROGRAMS

FIELD INVESTIGATION QUALITY CONTROL PROGRAM

The Technical Operations Plan (TOP) presented in Appendix M describes the methods and procedures that were used to accomplish the tasks defined during the Stage 2 investigation at Duluth IAP. Guidelines of the Occupational Safety and Health Administration (OSHA), United States Environmental Protection Agency (USEPA), and USAF, as well as previous investigations at Duluth IAP, were reviewed to select the methods that would be most appropriate for this investigation. The TOP is designed primarily to give guidance to personnel in the field and to ensure that standard methods of investigation are used.

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) for samples analyzed from Duluth IAP. Procedures that are employed include:

- 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 \pm 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 $8\frac{1}{2}$ - 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 Mathematical models, based upon analysis of standard data processing. 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:

 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.]

[F-4]

- 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 milliabsorbence 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.

[F-5]

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 H, Analytical Reports.

In general, the laboratory QC program produced analyses of duplicate and spiked samples that were satisfactory. Details of the gas chromatographic columns are presented in the transmittal letter from UBTL in Appendix H.

One exception to the acceptable recovery of spike samples is noted in the QC data: the spike of toluene in soil from Sample B2-C, O to 1.5 feet. The recovery was 32 percent, in contrast to the range of 46 to 148 percent allowed by the USEPA Contract Laboratory Program contract.

The analyses of trip blanks indicate that the majority of the blanks were clean. The only exceptions were a concentration of 5.4 μ g/L of chloroform in Trip Blank, Site 7, and a concentration of 0.01 μ g/L of 4,4'-DDT in SW-8B. The concentration of chloroform in the trip blank is very similar to the detected concentration of 7.0 μ g/L in GW-7B; therefore, the reported concentration cannot be considered unequivocal. The presence of 4,4'-DDT in Trip Blank SW-8B presents a similar problem, as this compound is present in Sample SW-8B at the same concentration. This concentration, therefore, cannot be corroborated. For these reasons, these analyses were not taken into account for assessments at Sites 7 and 8.

APPENDIX G

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CHMR-OF-CUSTODY RECORDS

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Project Title	t Title						Job No. /0/6- 26 7	2	40	4. Needon		
Date	Time	Sample I.D. No.	e	Sample Type	No. of Containers	of Iners	Sampling Site	θ		Remarks		
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	ÿ	309		Phenol	-		SW&S					
52/11		311		Herb	-		SWSB					
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Project Title	tle				Job No. / 016 - 267		John N. M. Luk	Ž	
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Date	Time	Sample I.D. No.		Sample Type	No. of Containers	f ers	Sampling Site	C	Shered Rei	Hemarks	
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	250/ # DEU2	136		~		METUS TELBUSH	T
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|                  | Client Let P. P. T. S. | Source & Client Let R. R. S. Z. Z. R. P. Job No. W. 267 | ce & Client & T & T & Z Z Z P Job No. W 267<br>Duwr I AP M. No. of Job No. W 267<br>Sample Sample No. of Sampling Site<br>1.D. No. | Ce & Client & R. R. R. Z. Z. Z. P. Job No. W. C. 267<br>Duwr Z. AP M. No. of Job No. W 267<br>Sample Type No. of Sampling Site<br>1.D. No. Mare / Are / Are | Construction     C | Count Let Lat Lat Lat Late 2 IEP     Job No. M 263     Field Personnel (Signatule Sample Sample Sample Sample Sample No. of Sampling Site       Current Late No.     No. of Sample Sample Sample Sample Sample Sample Containers     Sampling Site       Current Late No.     No. of Sampling Site     Sample Sample Sample Sample Sample Sample Sample Sample Sample Containers     Sample Sample Sample Sample Sampling Site       Current Late No.     No. of Sampling Site     Sampling Site     Sample | Count Letter R. T. S. Z. Z. P. A. Job No. W. C. 263     Field Personnel (Signatule Sample Sample Sample Type Containers       Dur. T. A. M.     Job No. of Sample Type Containers     Job No. W. C. 263     Freid Personnel (Signatule Signatule Signatule Signatule Sample Type Containers       Sample T. No.     Sample Type Containers     No. of Sampling Site     Sampling Site       Sample I.D. 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No.     LiD. No.     M     M     M       Rample     Line     N     M     M       LiD. No.     Line     N     M     M       Rample     Line     N     M     M       LiD. No.     Line     N     M     M       Rample     Line     N     M     M       LiD. No.     Line     N     M       Rample     Line     N     M       LiD. No.     Line     N     M       Rample     Line     N     M       Line     N     M     M       Cuber     N     N     M       Cuber     N     N     M       Cuber     N     N     N       Cuber     N     N     N       Cuber     N     N     N       Cuber     N     N     N</td> <td>Client Letr     Party     Party<td>Client Letter Ratt Sample     No. of Sample     Job No. Luc 26.3     Field Personnel/Signati       Ducuma ZAP Ma     No. of Sample     No. of Sample     Sample     Sample       Sample     Type     Containers     Sampling Site     Steld Personnel/Signati       Sample     Type     Containers     Job No. Luc 26.3     Steld Personnel/Signati       Sample     Type     No. of Sampling Site     Steld Personnel/Signati       Sample     Type     Containers     AB     Steld Personnel/Signati       Subrace     Labrace     Image     No. of Sampling Site     Steld Personnel/Signati       Scubart Holds     Labrace     Image     No. Vice Signati     Steld Personnel/Signati       Culbart Holds     Image     No. of Sampling Site     Steld Personnel     Steld Personnel       Culbart Holds     Image     No. of Sample     No. of Sample     No. of Sample       Culbart Holds     Image     No. of Sample     No. of Sample     No. of Sample       Culbart Holds     Image     No. of Sample     No. of Sample     No. of Sample       Culbart Holds     Image     No. of Sample     No. of Sample     No. of Sample       Culbart Holds     Image     No. of Sample     No. of Sample     No. of Sample       Culbart Holds     Image</td><td>Best     End Market     A. T. A. T. A. T. A. T. A. M.     Job No. <i>Lurra</i> T. A. M.     Field Personnal (Signatule i. D. No.       Sample     Type     No. of     Sampling Site     Sterr Function       Sample     Type     No. of     Sampling Site     Sterr Function       Sample     Type     Containers     Mo. of     Sample       Sample     Type     No. of     Sampling Site     Sterr Function       Sample     Lurra     Type     Containers     Mc.       Sample     Lore     I     Mc.     Mc.       Sample     Lore     I     Mc.     Mc.       Sample     Lore     I     Mc.     Mc.       Cubratics     I     Mc.     Mc.     Mc.       Cubratics     I     I     Mc.     Mc.       Cubratics     I     I     Mc.     Mc.       Cubratics     I     I     Mc.     Mc.</td><td>c. B. Client Letter Part Set ZEP     Job No. <i>Lucra ZAP</i>     Field Personnel/Gignati       Dueura ZAP     No. of Sample     Job No. <i>Lucra ZAP</i>     Sample       Sample     Type     No. of Sampling Site     Sampling Site       Sample     Type     Containers     Sampling Site       Sample     Large     I     #8       Lucra ZAP     No. of Sampling Site     Sample       Sample     Large     I     #8       Sample     Large     I     #8       Cubrit Ecos     Kernel     Kernel       Cubrit Ecos     I     Kernel       Cubrit Ecos     Kernel     Kernel</td><td>ce à Client de Le R S ZEP Job No. <i>Luis - ZE A</i> Field Personnel Agignatt<br/>Dur TAP Mainers Jampie No. of Sampling Site Start Remarks<br/>I.D. No. Type Containors Sampling Site Start Remarks<br/>I.D. No. Type Containors AB New Field Personnel Aginatt<br/>Cultur Kroz Mare / Arre / Arre</td><td>mole Source &amp; Client QL/F     R/A     Job No. L/L     Field Personnel (Signature)       oject Title     Durun TAP     M.     of     Job No. L/L     ZGA       oject Title     Durun TAP     M.     of     Sample     No. of     Sample       oject Title     Durun TAP     M.     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No. Type Containors AB New Field Personnel Aginatt<br/>Cultur Kroz Mare / Arre / Arre</td> <td>mole Source &amp; Client QL/F     R/A     Job No. L/L     Field Personnel (Signature)       oject Title     Durun TAP     M.     of     Job No. L/L     ZGA       oject Title     Durun TAP     M.     of     Sample     No. of     Sample       oject Title     Durun TAP     M.     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	Client	Reum	Sample I.D. No.	EBY # YONS	SUBA #	CUBC#069	CUBAND29	(BN# 127)	CUBCXX63	6901 * 4875	CLER # 1000	₩`	*	0994× 2875	LUX1 * 1087				Date	63	Date	Date	
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Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks Remarks	le Source & Client I/SAF $P_{A}$ II SHZ $T_{A}$ $P_{A}$ II SHZ $T_{A}$ $P_{A}$ II SHZ $T_{A}$ $P_{A}$	le Source & Client I/SAF $Q_h$ IT SHZ $Z/dP$ Field Personnel Gignature ci Title Dulu (MN) MN (MN) AAA bl. ci Title Dulu (MN) MN (MN) AAA bl. 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MM MM Samplo ritle Du M. MM	le Source & Client I/SAF $Q_{h}T$ SH2 $T_{c}P$ field Personnel (Signature le Source & Client I/SAF $Q_{h}T$ SH2 $T_{c}P$ field Personnel (Signature ci Title Zample Tmo Sample Tho. of Sampling Site $M_{h}$ , $M_{h}$ bl. le Tino Sample Typo Cuttainers $Rampling Site = 0.746 GC spirit (Heree) - 2000 fl to Q_{c} is Rampling Site = 0.746 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.746 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 2000 fl to Q_{c} is Rample = 0.740 GC spirit (Heree) - 200$	le Souce à Client I/SAF $D_{\rm el}$ II SHZ $\mathcal{I}$	le Souce à Client USAF $D_{L}T$ SH2 $T_{CP}$ Field Personnel Gignature et Title Duth. 100 MM MM BL et Title Duth. 100 MM MM BL intersonnel Sample Sample Sampling Site 602 CA6 00 Serve 100 10.10.10. Sampling Site 602 CA6 00 Serve 1700 11.0 42 M 2 3 8 602 CA6 00 Serve 1700 11.0 42 M 2 3 8 602 CA6 00 Serve 1700 11.0 42 M 2 3 8 602 CA6 00 Serve 1700 11.0 42 M 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	le Souce & Cient (LAF Da II SH2 IAP cei Title Dalan. (AP Da II Simplo Tino Sample. Typo Tino Sample. Typo Tino Sample. Typo Tino Sample. Typo Tino Sample. Typo Tino Sample. Typo 115L = U = 0 115L = 100 = 0 100 = 0 115L = 100 = 0 100 = 0 10	le Source à Client I/SAF $D_{\rm eff}$ $E_{\rm III}$ $E_{\rm III}$ $D_{\rm eff}$ $D_{\rm III}$ $E_{\rm IIII}$ $D_{\rm eff}$ $D_{\rm III}$ $D_{\rm IIII}$ $D_{\rm IIII}$ $D_{\rm IIII}$ $D_{\rm IIII}$ $D_{\rm IIII}$ $D_{\rm IIII}$ $D_{\rm IIIII}$ $D_{\rm IIIII}$ $D_{\rm IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII$	le Source & Client I/CAF ( $P_{LT}$ ( $P_{T}$ ( $P$	le Source & Client I/SAF (D. H. SH2 $I/D$ ) 100. 101. $(016-267)$ (D.M. M.M. M.M. M.M. M.M. M.M. M.M. M.M	le Source & Client ISAE De H SH2 $\pm I_{C}$ Jon Ho. (old-267 $M_{11}$ , $M_{111}$ , $M_{111}$ , $M_{111}$ , $M_{111}$ ,

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#### APPENDIX H

#### ANALYTICAL REPORTS

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DATACHEN ANALYTICAL REPORT Duluth IAP - Soit Semples

					B1-A	B1-A	B1-A	GW1-A	GW1-B	GW1-E			82 <b>-</b> B
			Detection	Field #:	0-1-5	2.5-4	5-6.5	10-11.5	5-6.5	20-21.5	SS-1A	SS-1B	0-1-5
Parameter	Me thod	Un i ts	Limi+	Site :	ONE	ONE	ONE	ONE	ONE	ONE	ONE	ONE	TWO
Purgeable Halocarbons	EPA 8010 (9)	6/6n	MDL (2)										
Bramodich loromethane	EPA 8010 (9)	6/6n	0,0018		9	9	9	QN	2	9	9	Q	9
Bromotorm	EPA 8010 (9)	6/6n	0,0022		9	9	2	9	9	9	2	2	QN
Brancmethane	EPA 8010 (9)	6/6n	0,0032		Q	QN	Q	QN	Q	Q	2	9	2
Carbon Tetrachloride	EPA 8010 (9)	6/6n	0.0023		9	9	9	9	9	9	9	9	QN
Chi oroben zene	EPA 8010 (9)	6/6n	0,0018		9	Q	2	QN	Q	9	9	9	Q
Chloroethane	EPA 8010 (9)	6/6n	0,0019		9	9	2	9	9	9	9	2	QN
2-Chloroethylvinyi Ether	EPA 8010 (9)	6/6n	0.0022		Q	9	9	Q	Ð	9	9	9	Q
Chloroform	EPA 8010 (9)	6/6n	0,0022		2	Ð	2	9	2	9	9	2	QN
Chloromethane	EPA 8010 (9)	6/6n	0.0024		QN	9	Q	Ð	9	9	Q	9	₽
Dibromochloromethane	EPA 8010 (9)	6/6n	0,0016		9	9	9	9	9	9	9	9	QN
1 "2-Dichlorobenzene	EPA 8010 (9)	6/6n	0.0014		9	9	Q	2	9	Q	QN	2	9
1,3-Dichiorobenzene	(6) 0108 Vd3	6/6n	0.0021		9	9	9	2	9	2	2	9	QN
1,4-01ch1orobenzene	5PA 8010 (9)	6/6n	0.0020		Đ	Ð	Q	9	2	9	9	9	9
Dichlorodifiuoromethane	EPA 8010 (9)	6/6n	0,0016		2	Ŷ	9	2	2	9	9	2	QN
1,1-Dichloroethane	EPA 8010 (9)	6/6n	0.0025		Q	Q	9	9	9	QN	9	2	9
1,2-Dichloroethane	EPA 8010 (9)	6/6n	0,0022		9	2	9	9	9	2	9	2	QN
1,1-Dichloroethene	EPA 8010 (9)	6/6n	0.0025		9	9	Ð	9	9	2	9	9	2
trans-1,2-Dichloroethene	EPA 8010 (9)	6/6n	0.0021		9	9	2	9	9	9	9	9	ON
1,2-Dichloropropane	EPA 8010 (9)	6/6n	0.0010		9	2	9	QN	9	2	9	QN	Q
cis-1,3-Dichloropropene	EPA 8010 (9)	6/6n	127 0000 0		9	ç	Ģ	Q	Q	9	Ş	Ş	Ş
trans-1,3-Dichloropropene	EPA 8010 (9)	6/6n			2	2	2	2	2	2	9	2	2
Me thy tene Chtoride	EPA 8010 (9)	6/6n	0.0017		9	9	Q	2	2	9	Ð	QN	Q
1,1,2,2-Tetrachloroethane	EPA 8010 (9)	6/6n	6100°0		9	2	2	2	2	2	2	2	QN
Tetrachloroethene	EPA 8010 (9)	6/6n	0.0019		9	Q	2	Q	9	9	9	9	Q
1,1,1-Tr ichloroethane	EPA 8010 (9)	6/6n	0,0026		9	9	9	9	9	9	9	9	QN
1,1,2-Trichioroethane	EPA 8010 (9)	6/6n	0.0026		9	9	9	9	9	9	9	9	Ŷ
Trichtoroethene (TCE)	EPA 8010 (9)	6/6n	0.0030		2	9	9	2	9	9	2	2	QN
Trichlorofluoromethane	EPA 8010 (9)	6/6n	0,0022		2	Ð	9	Q	9	9	9	2	9
Vinyi Chioride	EPA 8010 (9)	6/6n	0,0027		9	9	9	9	2	2	9	2	QN
	4	0											
Reviewed and Approved by Ale	m D. K en	t											

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DATACHER MULTTICAL REPORT Duluth IAP - Soil Samples

			Patact ion	Field #	82-8	82-8 5-6 5	B2-C	82-C	82-C	GW2-A 5-6 5	GW2-B 5-6 5	GW2-C	GW2-D 15-16.5
Parameter	Method	Un i ts		Site :	0ML	1WO	ONL	OWL	OML	TWO	OWL	DML	TWO
Purgeable Halocarbons	EPA 8010 (9)	6/6n	MDL (2)										
Bromodich lorome thane	EPA 8010 (9)	6/6n	0.0018		9	9	QN	QN	2	Ð	9	Q	Ð
Bromo form	EPA 8010 (9)	6/6n	0,0022		2	9	9	9	9	9	9	9	QN
Bromomethane	EPA 8010 (9)	6/6n	0.0032		Ð	Q	9	9	Q	9	9	9	Ð
Carbon Tetrachloride	EPA 8010 (9)		0.0023		2	9	9	9	2	9	9	9	QN
Ch I or oben zen e	EPA 8010 (9)		0,0018		Ŷ	9	9	QN	9	2	9	Q	Q
Chloroethane	EPA 8010 (9)		0.0019		9	9	2	9	9	9	9	9	QN
2-Chloroethylviny! Ether	EPA 8010 (9)	6 <i>/</i> 6n	0.0022		Q	9	QN	Ð	9	9	9	Q	9
Chlaroform	EPA 8010 (9)		0,0022		2	9	9	9	9	2	9	2	QN
Ch lor cane than e	EPA 8010 (9)		0.0024		Ð	9	9	Q	2	9	2	9	9
D ibromochi oromethane	EPA 8010 (9)		0.0016		2	9	9	9	9	9	9	9	QN
1,2-0ichiorobenzene	EPA 8010 (9)		0.0014		9	9	9	QN	2	2	9	9	Q
1, 3-Dichloroben zene	EPA 8010 (9)		0.0021		9	9	9	9	9	9	9	9	QN
1 "4Dìchlorobenzene	EPA 8010 (9)		0.0020		9	9	9	QN	2	9	9	2	<b>9</b>
Dichlorodifluoromethane	EPA 8010 (9)		0.0016		9	9	9	2	9	9	9	9	QN
l , i-Dichioroethane	EPA 8010 (9)		0.0025		9	Q	9	QN	9	9	9	Q	9
1 ,2-Dichloroethane	EPA 8010 (9)		0.0022		2	Q	2	QN	2	9	9	2	QN
1,1-Dichtoroethene	EPA 8010 (9)		0.0025		9	Q	9	2	2	Q	9	QN	<b>9</b>
trans-1,2-Dichloroethene	EPA 8010 (9)	6/6n	0,0021		9	2	9	2	2	2	2	ହ	ND
I "2-Dichloropropane	EPA 3010 (9)		0.0010		9	QN	Q	Q	Ŷ	9	9	QN	9
cis-1,3-Dichioropropene	EPA 8010 (9)		0.0048 (3		9	Q	9	2	2	9	9	2	Ð
trans-1,3-Dichloropropene			•			!	!	!	1	!	9	!	9
Methylene Chloride	EPA 8010 (9)	6/6n	0.0017		Ŷ	Ð	Ş	2	Q	2	2	2	2
1,1,2,2-Te trachloroethane	EPA 8010 (9)	6/6n	0.0019		2	9	9	2	2	2	2	9	QN
Tetrach! or oethene	EPA 8010 (9)	5/6n	0.0019		2	9	Q	9	Z	9	2	£	Q
1,1,1-Tr ichloroethane	EPA 8010 (9)	6/6n	0.0026		2	9	2	2	2	9	9	9	QN
1,1,2-Tr ichl aroethane	EPA 8010 (9)	6/6n	0.0026		9	9	9	Q	9	9	9	Ð	Q
Trichloroethene (TCE)	EPA 8010 (9)	6/6n	0.0030		9	9	Ŷ	9	9	9	9	9	QN
Tr ich i arofi uorame thane	EPA 8010 (9)	6/6n	0,0022		9	9	£	9	9	9	9	9	9
Vinyi Chioride	EPA 8010 (9)	6/6n	0.0027		2	2	2	9	9	9	9	9	QN

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#### DATACHEN ANALYFICAL REPORT Dututh IAP - Soil Samples

Samples	
2011	
- dAl	
Dututh	

					GW2-E				83-A	B3-A	B3-A	83-8	83-8
			Detection	Field #:	15-16.5	SS-2A	SS-2B	55-2C	0-1-5	2.5-4	5-6.5	0-1-5	2.5-4
Parameter	Me thod	Units	Limit	Site :	UMU	OML	OML	OML	THREE	THREE	THREE	THREE	THREE
Purgeable Halocarbons	EPA 8010 (9)	6/6n	MDL (2)										
Branodichi oranethane	EPA 8010 (9)	6/6n	0.0018		Î	QN	Q	2	9	9	Ð	9	9
Bromoform	EPA 8010 (9)	6/6n	0,0022		9	9	9	9	9	2	9	9	QN
Bromonethane	EPA 8010 (9)	6/6n	0.0032		2	Q	Q	2	9	9	9	9	9
Carbon Tetrachloride	EPA 8010 (9)	6/6n	0.0023		2	Q	9	9	9	9	9	9	QN
Ch1 or oben zen e	EPA 8010 (9)	6/6n	0.0018		Q	9	9	9	g	9	9	Q	9
Chi oroethane	EPA 8010 (9)		0,0019		Ŷ	9	2	9	9	9	9	9	QN
2-Chloroethylvinyl Ether	EPA 8010 (9)		0.0022		QN	9	2	QN	9	9	Ð	9	9
Chloroform	EPA 8010 (9)		0.0022		Ŷ	9	2	2	2	9	9	9	QN
Ch loromethane	EPA 8010 (9)		0.0024		9	9	9	9	Q	Q	Q	9	Q
Dibromochioromethane	EPA 8010 (9)		0.0016		9	9	9	9	2	9	9	2	QN
1 "2-Dichlorobenzene	EPA 8010 (9)		0.0014		9	9	9	Q	9	2	9	9	Q
1,3-Dichlorobenzene	EPA 8010 (9)		0,0021		9	2	2	9	9	9	2	9	QN
1 "4-Dich! or obenzene	EPA 8010 (9)		0.0020		9	2	2	2	Q	9	9	2	<del>9</del>
Dichlorodifiuoromethane	EPA 8010 (9)		0.0016		9	Q	2	2	Q	2	9	2	QN
1,1-Dichloroethane	EPA 8010 (9)		0.0025		9	9	<del>2</del>	2	9	9	9	2	9
1,2-Dichloroethane	EPA 8010 (9)		0.0022		9	9	9	2	Q	2	9	2	QN
1 ,1-Dich! or oethene	EPA 8010 (9)		0.0025		9	Q	9	9	Ð	9	2	2	9
trans-1,2-0ichioroethene	EPA 8010 (9)		0.0021		9	9	9	2	9	9	2	9	QN
1 "2-Dichloropropane	EPA 8010 (9)		0.0010		2	9	2	2	2	9	Ð	2	9
cis-1,3-Dichloropropene	EPA 8010 (9)		0.0048 (3)	()	9	2	Q	2	2	2	9	9	9
trans-1, 3-Dichloropropene	EPA 8010 (9)	6y6n											
Methylene Chloride	EPA 8010 (9)	6∕6n	0.0017		QN	Q	2	2	2	Q	9	2	Ð
1,1,2,2-Te trachloroethane	EPA 8010 (9)	6/6n	0,0019		9	9	2	2	2	9	2	9	QN
Tetrach! or oethene	EPA 8010 (9)	6/6n	0,0019		2	9	Q	Q	QN	Ð	9	2	2
1 , 1 , 1-Tr i chi oroethane	EPA 8010 (9)	6/6n	0,0026		9	2	2	2	2	0.017	0.083	2	QN
1 .1 .2-Trichloroethane	EPA 8010 (9)	6/6n	0.0026		9	2	2	9	QN	9	9	Q	Q
Trichioroethene (TCE)	EPA 8010 (9)	6/6n	0.0030		9	9	9	9	2	2	2	9	QN
Trichiorofiuoromethane	EPA 8010 (9)	6/6n	0.0022		2	2	9	9	2	9	9	9	9
Vinyl Chloride	EPA 8010 (9)	6/6n	0.0027		9	9	9	2	9	2	Ð	2	QN

4	
Page	n 1

#### DATACHEM ANALYTICAL REPORT Duluth IAP - Soil Samples

					B3-B	B3-C	<b>B3-</b> C	B3-C	B3-C	GW3-A	GW3-B	GM3-D	
			Detection	Field#:	5-6.5	0-1-5	2.5-4	5-6.5	5-6.5	5-6.5	5-6.5	5-6.5	SS-3A
Par aneter	Method	Un i ts	Limit	Site :	THREE	THREE	THREE	THREE	THREE	THREE	THREE	THREE	THREE
Purgeable Halocarbons	EPA 8010 (9)	6/6n	MDL (2)										
Branodich I oramethane	EPA 8010 (9)	6/6n	0.0018		9	2	Q	9	9	9	2	2	Ð
Bromoform	EPA 8010 (9)	6/6n	0,0022		9	9	9	9	2	9	2	2	QN
Bromonethane	EPA 8010 (9)		0.0032		9	9	9	9	2	9	2	9	2
Carbon Tetrachloride	EPA 8010 (9)		0.0023		2	9	9	9	9	9	2	9	QN
Chiorobenzene	EPA 8010 (9)		0.0018		Ð	Q	9	2	2	9	Ð	Q	9
Chloroethane	EPA 8010 (9)		0°0019		2	9	9	9	9	9	9	9	QN
2-Chloroethylvinyl Ether	EPA 8010 (9)		0,0022		QN	QN	9	2	Q	2	9	2	2
Chi or oform	EPA 8010 (9)		0.0022		9	9	9	9	9	9	9	9	ON
Chloromethane	EPA 8010 (9)		0.0024		9	9	9	9	9	9	9	2	2
Dibromochior amethane	EPA 8010 (9)		0_0016		9	9	9	2	2	2	9	2	QN
1 "2-Dichlorobenzene	EPA 8010 (9)		0.0014		9	2	9	9	2	2	Q	₽	9
1, 3-Dichiorobenzene	EPA 8010 (9)		0.0021		9	9	2	9	2	9	9	2	QN
1 _4-Dichtorobenzene	EPA 8010 (9)	6/6n	0.0020		2	9	9	2	9	9	2	2	9
Dichtorodiftuoromethane	EPA 8010 (9)		0,0016		9	9	2	2	9	9	2	9	QN
1,1-Dichloroethane	EPA 8010 (9)		0,0025		QN	9	9	9	9	9	Q	2	0.016
1,2-Dichloroethane	EPA 8010 (9)		0.0022		9	9	9	9	9	9	9	2	Q
1,1-Dichioroethene	EPA 8010 (9)		0,0025		QN	Ð	2	9	9	2	2	2	0.0075
trans-1,2-Dichloroethene	EPA 8010 (9)		0,0021		2	9	9	9	2	2	2	2	0.14
1,2-Dichloropropane	EPA 8010 (9)		0.0010		QN	9	2	9	Q	Ð	2	2	9
cis-1,3-0ichioropropene	EPA 8010 (9)	Ğγ6n	5) AMA (3	_	Q	ŝ	9	9	2	9	Q	2	2
trans-1,3-Dichioropropene	EPA 8010 (9)	£γ6n			2	1	!						1
Methylene Chloride	EPA 8010 (9)	6/6n	0.0017		9	Ð	2	Ð	2	<del>2</del>	2	£	2
1,1,2,2-Tetrachloroethane	EPA 8010 (9)	6/6n	0,0019		2	2	9	9	9	9	2	2	QN
Tetrachl or cethene	EPA 8010 (9)	6/6n	0,0019		Q	Q	9	9	0.38	<del>2</del>	9	QN	ହ
1,1,1-Tr ichloroethane	EPA 8010 (9)	6/6n	0.0026		2	2	2	9	9	2	2	2	0.0042
1.1.2-Trichlaroethane	EPA 8010 (9)	6/6n	0.0026		Q	9	Ð	2	2	9	2	9	2
Trichloroethene (TCE)	EPA 8010 (9)	6/6n	0.0030		9	9	2	9	2	9	9	2	0.010
Trichiorofluoromethane	EPA 8010 (9)	b/bn	0,0022		9	9	9	9	9	9	9	9	9
Vinyi Chioride	EPA 8010 (9)	6/6n	0,0027		9	9	9	9	9	9	2	2	0.027

11-4

# DATACHEM ANALYTICAL REPORT Duluth IAP - Soil Samples

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							84-C	B4-C	<b>B4</b> -C	84-D	<b>B4-</b> D	<b>B4-</b> D	B4-E
			Detection	Field #:	55-3H	SS-3C	2.5-4	5-6.5	7.5-9	2.5-4	5-6.5	7.5-9	2.5-4
Parameter	Mathod	Un its	Limit	Site :	THREE	THREE	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR
Purgeable Halocarbons	EPA 8010 (9)	6/6n	MDL (2)										
Bromodich   oromethane	EPA 8010 (9)	6/6n	0.0018		Q	9	Ð	9	9	Q	9	9	9
Br ano form	EPA 8010 (9)	6/6n	0,0022		9	9	9	9	9	9	9	9	QN
Br cm cm e thàn e	EPA 8010 (9)	6/6n	0,0032		QN	9	9	9	Q	9	9	9	9
Carbon Tetrachloride	EPA 8010 (9)	6/6n	0,0023		9	9	9	9	2	2	9	9	QN
Ch lorobenzene	EPA 8010 (9)	6/6n	0,0018		9	2	Q	Ð	QN	9	9	2	9
Chi or oe than e	EPA 8010 (9)		0,0019		9	9	9	9	9	9	2	9	QN
2-Chloroethylvinyi Ether	EPA 8010 (9)		0,0022		Ð	2	9	9	9	Q	QN	QN	9
Chloroform	EPA 8010 (9)		0,0022		2	0.0053	9	9	2	9	9	9	QN
Chlorome thane	EPA 8010 (9)		0.0024		9	9	9	Q	2	9	9	9	9
Dibromochioromethane	EPA 8010 (9)		0.0016		9	9	9	9	9	9	9	2	QN
1,2-Dichlorobenzene	EPA 8010 (9)	6/6n	0.0014		9	9	9	9	2	9	2	9	9
1, 3-Dichlorobenzene	EPA 8010 (9)		0.0021		9	<b>2</b>	9	9	Ð	9	9	9	QN
1,4-Dichiar obenzene	EPA 8010 (9)		0.0020		QN	9	9	2	9	2	9	9	9
Dichlorodifluoromethane	EPA 8010 (9)	6/6n	0.0016		9	9	9	9	9	9	9	2	QN
1,1-Dichloroethane	EPA 8010 (9)		0.0025		0.033	9	2	9	Q	Ð	Ş	QN	Q
1,2-Dichloroethane	EPA 8010 (9)	6/6n	0.0022		2	9	9	9	9	9	9	2	Q
1,1-Dichloroethene	EPA 8010 (9)	6/6n	0.0025		0.018	Ð	9	2	9	9	2	Ð	QN
trans-1,2-Dichioroethene	EPA 8010 (9)	6/6n	0.0021		0,0029	9	9	9	9	2	9	2	QN
1 "2Dichloropropane	EPA 8010 (9)	6/6n	0.0010		2	Ð	Q	Q	9	9	Ð	2	9
cis-1,3-Dichloropropene	EPA 8010 (9)		0.0048 (3	-	Q	QN	9	2	2	9	Q	2	9
trans-1,3-Dichloropropene	EPA 8010 (9)				2	•							
Methylene Chloride	EPA 8010 (9)	ɓ∕ɓn	0.0017		Û	9	2	9	2	9	9	9	2
1,1,2,2-Tetrachloroethane	EPA 8010 (9)	6/6n	0.0019		2	2	9	9	9	9	2	9	QN
Tetrach! or cethene	EPA 8010 (9)		0.0019		0,0019	9	2	9	QN	9	Q	9	9
1,1,1-Tr ichioroethane	EPA 8010 (9)	6/6n	0.0026		1.5	0.013	9	9	2	9	2	9	QN
1,1,2-Tr ichl or oethane	EPA 8010 (9)	6/6n	0.0026		9	9	9	ę	2	2	2	Ð	9
Trichloroethene (TCE)	EPA 8010 (9)	6/6n	0.0030		0.026	0.0053	9	9	2	9	9	9	QN
Trichlorofiuoromethane	EPA 8010 (9)	6/6n	0.0022		Q	QN	Q	9	₽	9	2	9	9
Viny! Chioride	EPA 8010 (9)	6/6n	0,0027		9	9	2	2	9	9	2	9	QN

#### DATACHEN ANALYTICAL REPORT Duiuth IAP - Soii Samples

					84-E	GW4-A	GW4-B	GW4-C	GW4-D	B4-A	84-A	B4-A	84-8
			Detect ion	Field #:	5-6.5	10-11.5	5-6,5	10-12	5-6.5	2.5-4	5-6.5	7.5-9	2.5-4
Parameter	Mathod	un i ts	Limit	Site :	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR
Purgeable Halocarbons	EPA 8010 (9)	6/6n	MDL (2)										
<b>Branodichloramethane</b>	EPA 8010 (9)	6/6n	0,0018		9	2	9	9	QN	2	9	2	ND(5)
Branoform	EPA 8010 (9)	6/6n	0.0022		9	2	9	9	9	2	2	9	QN
Brananethane	EPA 8010 (9)	6/6n	0.0032		2	Q	9	Q	9	9	9	Ð	9
Carbon Tetrachloride	EPA 8010 (9)	6/6n	0.0023		9	2	9	2	9	9	9	9	QN
Ch1 or obenzene	EPA 8010 (9)	6/6n	0.0018		9	9	Q	9	9	9	9	9	QN
Chloroethane	EPA 8010 (9)	6/6n	0,0019		2	9	9	9	9	9	9	9	QN
2-Chioroethylvinyi Ether	EPA 8010 (9)	6/6n	0.0022		9	Q	9	9	Q	Q	Ð	9	9
Chloroform	EPA 8010 (9)	6/6n	0.0022		9	9	9	9	9	9	9	9	QN
Ch1oramethane	EPA 8010 (9)	6/6n	0.0024		2	9	9	9	Q	9	2	Q	<del>Q</del>
D lbromochloromethane	EPA 8010 (9)	6/6n	0.0016		9	2	9	2	9	2	2	9	QN
I "2-Dichlorobenzene	EPA 8010 (9)	6/6n	0.0014		9	Q	9	QN	Q	9	9	2	Ŷ
1, 3-Dichlorobenzene	EPA 8010 (9)	6/6n	0,0021		9	2	9	9	9	9	9	9	QN
1 "4-Dichioro <del>be</del> nzene	EPA 8010 (9)	6/6n	0.0020		9	9	9	9	QN	9	9	9	9
Dichlorodifluoromethane	EPA 8010 (9)	6/6n	0,0016		9	2	9	2	9	9	2	9	QN
1 ,1-Dichloroethane	EPA 8010 (9)	6/6n	0,0025		9	9	Q	Q	2	9	QN	9	2
1,2-Dichloroethane	EPA 8010 (9)	6/6n	0,0022		9	9	9	9	2	9	9	2	QN
1 ,1-Dichloroethene	EPA 8010 (9)	6∕6n	0.0025		QN	QN	QN	9	Q	QN	9	2	Q
trans-1,2-Dichloroethene	EPA 8010 (9)	6/6n	0.0021		2	2	9	2	9	2	9	9	QN
1 "2-Dichioropropane	EPA 8010 (9)	6/6n	0.0010		Q	9	9	9	9	QN	9	9	2
cis-1,3-0ichloropropene	EPÁ 8010 (9)	6γ6n	E BADO O		ç	ç	ç	9	Ş	5	Ş	Ş	Ş
trans-1, J-Dichloropropene	EPA 8010 (9)	ɓyɓn			2	2	2	2	2	2	2	2	2
Methylene Chloride	EPA 8010 (9)	ɓ∕ɓn	0.0017		9	9	Ð	Ð	0.079	2	Q	9	Q
1, 1, 2, 2-Tetrachl oroethane	EPA 8010 (9)	6/6n	61 00°0		9	2	9	2	9	9	9	2	QN
Tetrach I oroethene	EPA 8010 (9)	ɓ∕ɓn	0.0019		9	9	0.013	Q	2	Q	Ð	9	2
1,1,1-Trichloroethane	EPA 8010 (9)	6/6n	0.0026		Ŷ	9	9	9	9	9	9	2	QN
1 "1 "2-Tr ich I oroethane	EPA 8010 (9)	6/6n	0.0026		9	9	9	QN	Q	9	9	9	Ð
Trichloroethene (TCE)	EPA 8010 (9)	6/6n	0.0030		9	9	9	9	9	2	2	2	QN
Trichtorofluoromethane	EPA 8010 (9)	6/6n	0.0022		Q	Ð	Q	9	9	2	Ð	Q	QN
Viny! Chior ide	EPA 8010 (9)	6/6n	0*0027		Q	9	9	9	9	2	9	9	QN

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DATACHEM MMALYTICAL REPORT Duluth IAP - Soil Samples

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					<b>B4-</b> B	B4-B					GW5-A	GW5-B
			Detection	Field #:		7.5-11.5	•••	SS-4B	SS-4C	SS-4D	5-6,5	9.5-11
Parameter	Method	Un i ts	Limit	Site :		FOUR	FOUR	FOUR	FOUR	FOUR	FIVE	FIVE
Purgeable Halocarbons	EPA 8010 (9)	6/6n	MDL (2)									
Branodichloramethane	EPA 8010 (9)	6/6n	0.0018		(5) ON	9	9	Q	9	9	9	9
Br anoform	EPA 8010 (9)	6/6n	0.0022		9	9	9	9	9	9	2	QN
Brome than e	EPA 8010 (9)	6/6n	0.0032		9	9	9	Ð	QN	2	9	9
Carbon Tetrachloride	EPA 8010 (9)	6/6n	0,0023		2	9	2	9	9	9	2	QN
Chlorobenzene	EPA 8010 (9)	6/6n	0.0018		9	9	9	9	₽	9	2	2
Chi oroethane	EPA 8010 (9)	6/6n	0.0019		2	9	9	9	9	9	9	QN
2-Chioroethylvinyl Ether	EPA 8010 (9)	6/6n	0.0022		QN	QN	Q	QN	9	QN	9	2
Chloroform	EPA 8010 (9)	6/6n	0.0022		9	9	Q	2	2	9	9	QN
Ch I or one thane	EPA 8010 (9)	6∕6n	0.0024		9	QN	9	Ð	Q	9	₽	QN
Dibromochloromethane	EPA 8010 (9)	6/6n	0.0016		9	9	9	9	9	9	9	ON
1,2-Dichiorobenzene	EPA 8010 (9)	6/6n	0.0014		Q	9	9	9	9	2	Ð	9
1, 3-Dichlorobenzene	EPA 8010 (9)	6/6n	0.0021		9	9	Q	9	9	9	9	DN
1 "4-Dichlorobenzene	EPA 8010 (9)	6/6n	0,0020		Q	9	9	Q	9	Q	9	9
Dichlorodifluoramethane	EPA 8010 (9)	6/6n	0.0016		9	9	9	9	2	9	2	Q
1 <b>, 1-</b> Dichloroethane	EPA 8010 (9)	6/6n	0.0025		QN	Q	9	2	9	2	9	9
1,2-Dichloroethane	EPA 8010 (9)	6/6n	0.0022		Q	9	2	9	9	9	9	QN
1,1-Dichtoroethene	EPA 8010 (9)	6/5n	0.0025		9	9	Q	9	9	Q	9	9
trans-1,2-Dichloroethene	EPA 8010 (9)	6/6n	0.0021		9	9	9	9	9	2	9	QN
1,2-Dichloropane	EPA 8010 (9)	6/6n	0.0010		QN	Q	Q	9	9	Ð	Ð	2
cis-1,3-Dichloropropene	EPA 8010 (9)	£γ6n	0,0048 (3	-	QN	9	9	Ð	QN	9	Q	9
trans-1, J-UI chi or opropene Mathaliana (M) an Ma	EPA 6010 (9)	fy6n	100.0		UN	Ş	ç	Ş	2	ç	Ş	S
1 1 2 2-Tetrachloroethane	EPA 8010 (9)	6/6n	0.0019		2	2 2	9 9	9	9	9	2	QN
Tetrach   orosthene	EPA 8010 (9)		0.0019		9	2	ę	QN	Q	Q	2	9
1.1.1-Trichloroethane	EPA 8010 (9)	6/6n	0.0026		9	9	2	9	9	9	9	QN
1,1,2-Tr ichi orosthane	EPA 8010 (9)	6/6n	0.0026		9	9	Q	9	Q	9	Q	QN
Trichloroethene (TCE)	EPA 8010 (9)	6/6n	0.0030		9	2	9	2	2	2	9	QN
Trichlarofluoramethane	EPA 8010 (9)	6/6n	0.0022		9	9	9	QN	Ð	9	Q	Ð
viny! Chioride	EPA 8010 (9)	6/6n	0.0027		2	Ð	9	9	2	2	9	QN

DATACHEM MULTTICAL REPORT Duluth IAP - Soil Samples

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					GW5-C						86-A	B6-A	ዋ 86
			Detection	Field #:	10-11.5	SS-5A	SS-58	SS-5C	SS-5D	SS-5E	0-1-5	2.5-4	0-1-5
Parameter	Method	ch 1 ts	Limit	Site :	FIVE	FIVE	FIVE	FIVE	FIVE	FIVE	SIX	SLX	SIX
Purgeable Halocarbons	EPA 8010 (9)	6/6n	MDL (2)										
<b>Bramodichloramethane</b>	EPA 8010 (9)	6/6n	0.0018		9	9	Q	QN	9	9	9	9	QN
Bromoform	EPA 8010 (9)	6/6n	0,0022		9	9	2	2	9	9	9	9	QN
Bramome than e	EPA 8010 (9)	6/6n	0.0032		Q	9	Q	Q	Q	9	9	9	Q
Carbon Tetrachloride	EPA 8010 (9)	6/6n	0.0023		9	9	9	2	9	9	9	9	QN
Ch I or oben ze ne	EPA 8010 (9)	6/6n	0,0018		9	Q	9	2	Ð	9	2	9	2
Chl or oethane	EPA 8010 (9)	6/6n	0,0019		9	9	9	2	9	9	9	9	QN
2-Chioroethylvinyl Ether	EPA 8010 (9)	6/6n	0.0022		2	9	Q	Ð	9	9	9	9	Q
Chi ar oform	EPA 8010 (9)	6/6n	0,0022		9	9	9	9	9	2	9	9	QN
Chlorome thane	EPA 8010 (9)	6/6n	0.0024		9	9	Ð	QN	9	9	9	9	9
D (bromoch) oromethane	EPA 8010 (9)	6/6n	0,0016		9	9	9	9	9	9	9	9	QN
1 "2-Dichlorobenzene	EPA 8010 (9)	6/6n	0.0014		2	Q	Q	Q	9	9	9	9	9
1, 3-Dichloroben zene	EPA 8010 (9)	6/6n	0,0021		9	9	9	2	2	2	9	2	QN
i "4-Dichlorobenzene	EPA 8010 (9)	6/6n	0,0020		Ð	9	9	9	9	2	9	9	Q
Dichlorodifluoramethane	EPA 8010 (9)	6/6n	0,0016		9	9	9	2	9	2	9	9	QN
1,1-Dichi oroethane	EPA 8010 (9)	6/6n	0,0025		9	Q	9	2	9	2	2	9	9
1,2-Dichloroethane	EPA 8010 (9)	6/6n	0,0022		2	9	9	9	9	2	9	2	QN
1,1-Dichloroethene	EPA 8010 (9)	6/6n	0,0025		Q	9	Q	9	QN	Q	QN	9	Q
trans-1,2-Dichloroethene	EPA 8010 (9)	6/6n	0.0021		9	9	9	9	2	2	9	2	QN
1 "2-Dichloropropane	EPA 8010 (9)	6/6n	0,0010		9	Q	9	Q	9	9	9	9	Q
cis-i, J-Dichloropropene	EPA 8010 (9)	¢y6n	0,0048 (3)	•	Ð	Ð	9	뮻	QN	9	9	9	9
Mathwiene Chioride		e/en	0.0017		ę	9	Ð	QN	2	Q	Q	9	Q
1.1.2-Tetrachloroethane	8010	b/bn	0.0019		9	9	9	9	9	9	2	2	QN
Tetrachi oroethene	EPA 8010 (9)	6/6n	0.0019		Ð	QN	Ð	9	9	Q	<del>9</del>	Ð	Ŷ
1,1,1-Tr ichi oroethane	EPA 8010 (9)	6/6n	0,0026		9	9	9	9	2	9	9	9	QN
1 ,1 ,2-Tr ich I oroethane	EPA 8010 (9)	6/6n	0.0026		QN	Ð	2	9	Q	Q	QN	Q	2
Trichioroethene (TCE)	EPA 8010 (9)	6/6n	0.0030		2	9	9	2	9	9	9	9	QN
Trichiarofiuoromethane	EPA 8010 (9)	6/6n	0,0022		9	9	9	9	9	2	2	Q	9
Viny! Chior ide	EPA 8010 (9)	6/6n	0,0027		9	9	9	9	9	9	9	9	QN

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"ND" indicates that the parameter was not detected.

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DATACHEN MALYFICAL REPORT Duluth IAP - Soil Samples

0.0070 SS-7A* SEVEN 0.024 Q S S Ð ₽ N <del>2</del> 2 Q QN 9 9 9 9 g QN Q Ð 15-16.5 SEVEN GW7-C ⊋ 9 ð Ð 글 글 물 ⊋ ⊋ 2222222 10-11.5 GW7-B SEVEN g **2-11-**0 GW7-A SEVEN 99 2 2229 2929 SEVEN 2.5-4 87<del>-</del>8 <del>2</del> 2 2 2 2 2 2 ₽ 9 Ð Ð Ð Ð 9 ĝ 9 2 2 2 SEVEN 0-1.5 B7+B Ð 물 글 ⊋ ⊋ ₽₽ 2 2 2 2 2 SEVEN 2.5-4 B7 - A Ð Ð Ð ₽ 9 9 9 2 ₽ £ 2 2 Q g Q Ð ₽ ₽ Ş ₽ ₽ ₽ ₽ Ð Ð 9 29 0.0035 **ر.**۱-0 SEVEN 87-A ₽₽ 22222 Ð 2 2 ⊋ ⊋ ĝ ₽ Q ₽₽ Ð 2.54 86-15 SLX Ð 9 <del>9</del> •• Field #: Site 0.0048 (3) Detection 0.0022 Limit 0.0022 0.0018 0.0022 0.0024 0.0021 0.0016 0.0022 0.0021 0.0010 0.0017 0.0019 0.0019 0,0026 0.0019 0.0020 0.0052 0.0023 0.0025 0.0025 0.0026 MDL (2) 0.0018 0.0010 0.0014 0.0030 0,0022 0.0027 Un i ts 6/6n 6∕bn 6/6n 6∕bn 6/6n 6/6n 6/6n ɓ∕ɓn 6/6n 6/bn 6/6n 6∕6n 6/61 6∕6n 6/6n 6∕bn 6/6n 6/6n 6/6n 6 / 6n 6/6n 6/6n 6/6n 6/6n 6/6n 6/6n 6/6n b/bn 6/6n 6/6n 8010 (9) (6) 0108 8010 (9) 8010 (9) EPA 8010 (9) EPA 8010 (9) EPA 8010 (9) 8010 (9) 8010 (9) EPA 8010 (9) 8010 (9) EPA 8010 (9) EPA 8010 (9) 8010 (9) 8010 (9) 8010 (9) 8010 (9) 8010 (9) 8010 (9) 6 EPA 8010 (9) EPA 8010 (9) 8010 (9) 8010 (9) 8010 (9) (6) 0108 8010 (9) 8010 (9) (9, 0108 EPA 8010 (9) Me thod 8010 EPA EPA EPA EPA EPA . EPA EPA EPA EPA EPA EPA 1 EPA trans-1, 3-Dichloropropene 1, 1, 2, 2-Tetrachloroethane trans-1,2-Dichloroethene 2-Chloroethylvinyl Ether cis-1,3-0ichioropropene Dichlorodifiuoromethane Trichlorofluoromethane 1,1,2-Tr ichi oroethane 1,1,1-Trichloroethane Irichloroethene (TCE) Bromodichioromethane Dibromochioromethane Carbon Tetrachloride 1,2-Dichloropropane 1,2-Dichlorobenzene 1,4-Dichlorobenzene 1, 3-Dichlorobenzene Mathylene Chloride 1,1-Dichloroethane 1,1-Dichloroethene 1,2-Dichloroethane Purgeable Halocarbons Tetrachloroethene Parameter Vinyi Chloride Ch I or oben zene Chloromethane Bromome thane Chloroethane Chloroform Bromoform

* Revised 07/10/87

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# DATACHEM ANALYTICAL REPORT Duluth IAP - Soit Samples

					88-A 0-1 5	88-A 5-4	198 - A - A - A	88-8 1-1	88-8 2 5-4	88-8 7, 5	GWB-A 5-6 5	GW8-8	GW8-C 10-11 5
Parameter	Method	Un its		Site :	EIGHT	EIGHT	E GHI	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT
Purgeable Halocarbons	EPA 8010 (9)	6/6n	MDL (2)										
Bramodich Iorame thane	EPA 8010 (9)	ɓ∕ɓn	0.0018		Q	2	9	9	9	9	9	9	Q
Br amotorm	EPA 8010 (9)	6/6n	0,0022		9	9	9	9	9	9	9	2	QN
Bromome thane	EPA 8010 (9)		0,0032		₽	Q	QN	Q	Q	9	9	Q	Q
Carbon Tetrachloride	EPA 8010 (9)		0,0023		9	9	9	2	2	9	9	9	QN
Ch I orobenzene	EPA 8010 (9)		0,0018		ହ	9	Q	Ð	Q	9	9	9	Ð
Chloroethane	EPA 8010 (9)		0,0019		9	9	9	9	9	9	2	9	QN
2-Chloroethylvinyl Ether	EPA 8010 (9)		0.0022		Ð	9	9	Ð	¥	Ð	9	Q	Q
Chloroform	EPA 8010 (9)		0.0022		2	9	9	9	9	9	9	9	ŊŊ
Chiorame thane	EPA 8010 (9)		0.0024		9	QN	9	Ð	Ð	9	9	Q	Ð
Dibromochioromethane	EPA 8010 (9)		0.0016		9	9	9	2	2	9	2	2	QN
1,2-Dichiorobenzene	EPA 8010 (9)		0.0014		9	9	9	QN	9	Ŷ	9	2	9
1, 3-Dichloroben zene	EPA 8010 (9)		0,0021		9	9	9	9	9	2	9	9	QN
1,4-Dichlorobenzene	EPA 8010 (9)		0.0020		9	Q	QN	QN	Q	9	9	Ð	9
Dichlorodifiuoromethane	EPA 8010 (9)		0,0016		2	9	Ð	9	9	9	2	9	QN
1,1-Dichloroethene	EPA 8010 (9)		0,0025		9	Ð	Q	9	9	9	2	9	Q
1,2-Dichloroethane	EPA 8010 (9)	6/6n	0.0022		9	9	Ð	9	2	9	2	2	QN
1,1-Dichloroethene	EPA 8010 (9)		0.0025		QN	Q	9	QN	9	Q	9	Q	9
trans-1,2-Dichloroethene	EPA 8010 (9)	6/6n	0.0021		9	9	2	9	2	9	2	9	QN
1 "2-Dichiaropropane	EPA 8010 (9)	6/6n	0.0010		Ð	Q	Ð	Ð	9	₽	Ð	9	Q
cis-1,3-Dichloropropene	EPA 8010 (9)		0.0048 (3	-	Q	Q	9	QN	2	9	QN	QN	Q
		R/fm	0 0017		Q	9	g	QN	QN	QN	9	£	Q
1.1.2.2-Tetrachloroethane			0,0019		9	9	9	2	9	9	9	9	QN
Tetrachl or oethene	EPA 8010 (9)		0.0019		QN	QN	Ð	9	9	2	9	9	QN
[.].}-Trichloroethane	EPA 8010 (9)		0.0026		9	9	9	9	9	9	2	9	QN
1,1,2-Trichloroethane	EPA 8010 (9)		0,0026		9	Q	Q	9	Q	9	Q	₽	9
Trichloroethene (TCE)	EPA 8010 (9)		0,0030		2	9	2	9	9	9	9	2	QN
Trichlorofluoromethane	EPA 8010 (9)	6/6n	0,0022		9	Q	QN	9	2	9	<del>Q</del>	9	9
Vinyi Chloride	EPA 8010 (9)		0.0027		2	9	2	9	9	2	2	Ð	Q

"NDM indicates that the parameter was not detected.

11-10

## DATACHEN ANALYTICAL REPORT Duluth IAP - Soil Samples

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			Detection	Field #:	SS-8A*	SS-8B*
Parameter	Method	Units	Limit	Site :	EI GHT	EI GHT
Purgeable Halocarbons	EPA 8010 (9)	6∕6n	MDL (2)			
Bramodichioramethane	EPA 8010 (9)	6/6n	0.0018		Ĵ	QN
Branoform	EPA 8010 (9)	6/6n	0.0022		QN	Q
Bromomethene	EPA 8010 (9)	6/6n	0,0032		9	QN
Carbon Tetrachioride	EPA 8010 (9)	6∕6n	0.0023		QN	Q
Chloroben zene	EPA 8010 (9)	6/6n	0.0018		9	QN
Chi oroethane	EPA 8010 (9)	6/6n	0.0019		Q	Q
2-Chloroethylvinyi Ether	EPA 8010 (9)	6/6n	0.0022		9	QN
Chl aroform	EPA 8010 (9)	6/6n	0.0022		Q	Q
Chloromethane	EPA 8010 (9)	6/6n	0.0024		9	QN
Dibramochlorane thane	EPA 8010 (9)	6/6n	0.0016		9	QN
1,2-Dichloroben zene	EPA 8010 (9)	6/6n	0.0014		9	QN
1,3-Dichlorobenzene	EPA 8010 (9)	6/6n	0.0021		Q	QN
1,4-Dichiorobenzene	EPA 8010 (9)	6/6n	0.0020		2	QN
Dichlorodiftuoromethane	EPA 8010 (9)	6/6n	0.0016		Q	QN
1,1-Dichloroethane	EPA 8010 (9)	6/6n	0.0025		9	QN
1 "2-Dichi oroethane	EPA 8010 (9)	6/6n	0.0022		QN	92
1,1-Dichloroethene	EPA 8010 (9)	6/6n	0.0025		9	QN
trans-1,2-Dichloroethene	EPA 8010 (9)	6/6n	0.0021		Q	Q
1,2-Dichloropropane	EPA 8010 (9)	6/6n	0.0010		2	QN
cis-1,3-Dichioropropene	EPA 8010 (9)	6/6n	1 0000		QN	ç
trans-1, 3-Dichloropene	EPA 8010 (9)	6/6n				2
Me thy lene Chi or ide	EPA 8010 (9)	6/6n	0.0017		QN	QN
1,1,2,2-Tetrachloroethane	EPA 8010 (9)	6/6n	0.0019		2	QN
Tetrachl oroethene	EPA 8010 (9)	6/6n	0.0019		QN	9
1,1,1-Tr ichioroethane	EPA 8010 (9)	6/6n	0.0026		Q	QN
1,1,2-Tr ichl oroethane	EPA 8010 (9)	6/6n	0,0026		ÛN	QN
Trichloroethene (TCE)	EPA 8010 (9)	6/6n	0.0030		Q	QN
Trichlorofluoromethane	EPA 8010 (9)	6∕bn	0.0022		0	QN
Vinyl Chloride	EPA 8010 (9)	ɓ∕ɓn	0.0027		9	QN

* Revised 07/10/87

II-II

## DATACHEM MULYTICAL REPORT Duluth IAP - Soil Samples

					B1-A	B1-A	B1-A	GW1-A	GW1-B	GW1-E			82-8
			Detect ion	Fleid#:	0-1.5	2.5-4	5-6.5	10-11.5	56,5	20-21.5	SS-1A	SS-1B	0-1-5
Parameter	Me thod	Un its	Limit	Site :	ONE	ONE	ONE	ONE	ONE	ONE	ONE	ONE	TWO
Purgeable Aromatics	EPA 8020 (9)	6/6n	MD1" (3)										
Benzene	EPA 8020 (9)	6/6n	0.0013		Ð	QN	9	2	Q	2	0.0071	2	Q
Chi oroben zene	EPA 8020 (9)	6/6n	0,0018		9	9	2	2	2	2	9	2	QN
1 "2-Dichlorobenzene	EPA 8020 (9)	6/6n	0.0023		9	QN	9	9	Q	9	Ð	2	9
1,3-Dichlorobenzene	EPA 8020 (9)	6/6n	0.0046		2	9	9	9	9	9	2	9	Q
1,4-Dichlorobenzene	EPA 8020 (9)	6/6n	0.0022		2	9	2	Q	9	2	9	Q	9
Ethy ibenzene	EPA 8020 (9)	6/6n	0,0038		9	9	0.043	2	2	2	Ð	2	QN
Totuene	EPA 8020 (9)	6/6n	0,0032		9	9	0,094	9	Q	9	0,10	1•0	9
m-Xylene	EPA 8020 (9)	6y6n											
o-Xy lene	EPA 8020 (9)	6/6n	0.0061(4)		2	Q	0.043	9	Q	₽	9	9	2
p-Xy lene	EPA 8020 (9)	6γ6 n											

II-12

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### DATACHBA ANALYTICAL REPORT Duluth IAP - Solf Samples

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					B2-B	B2-B	82-C	B2-C	B2-C	GW2-A	GW2-B	GM2-C	GW2-D
			Detect ion	Field #:	2.5-4	5-6.5	0-1-5	2.5-4	5-6,5	5-6.5	5-6.5	15-16.5	15-16.5
Parameter	Mathod	Units	Limit	Site :	OML	OML	OML	OML	0ML	UMO T	OMT	OML	OML
Purgeable Aromatics		6/6n	MDL (2)										
Benzene		6/6n	0.0013		QN	Q	0.014	9	9	QN	Q	9	Q
Chi oroben zene	EPA 8020 (9)	6/6n	0.0018		9	9	9	9	9	2	9	9	QN
1,2-Dichlorobenzene		6/6n	0,0023		Ð	QN	9	9	Q	Ð	9	9	9
1, 3-Dichlorobenzene		6/6n	0.0046		9	9	9	9	9	2	9	9	QN
1 "4-Dichiorobenzene	EPA 8020 (9)	6/6n	0.0022		Q	9	9	QN	Q	QN	QN	9	9
Ethyl benzene		6/6n	0.0038		9	2	0.35	2	0.011	9	9	9	QN
Toluene		6/6n	0.0032		9	Ð	0.54	₽	0.0088	Ð	Q	9	Ð
m-Xy lene		6y6n											
o-Xylene		6/6n	0,0061(4)		QN	9	1 <b>.</b> 8	Q	0.076	2	9	Q2	Q
p-Xy lene		6γ6n											

MALYTICAL REPORT	- Solt Samples
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DATACHEM	Duluth

B. B
BJ-A 7-6.5 NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN
83-A 2.5.4 714REE NO NO NO NO NO NO NO NO NO 0.73
B3-A 0-1.5 ND ND ND ND ND ND ND ND ND ND ND ND ND
R R R R R R R
SS-28 TWO ND ND ND ND ND ND ND ND ND ND ND ND ND
SS-2A B B B B B B B B B B B B B B B B B B B
C 2-E 5-16-5 M M M M M M M M M M M M M M M M M M M
Field #: Site :
Detect Ion Limit 0.0015 0.0025 0.0025 0.0028 0.0028 0.0038 0.0032
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Me thod EPA 8020 (9) EPA 8020 (9)
Parameter Purgesble Aromstics Benzene Chlorobenzene 1,3-01chlorobenzene 1,4-01chlorobenzene 2,4-01chlorobenzene 2,91ene m-Xylene o-Xylene

p-Xy lene

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11-14

Page 14

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#### DATACHEM MMALYTICAL REPORT Duluth IAP - Soit Samples

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					<b>B3-</b> B	B3-C	B3-C	B3-C	B <b>3-</b> C	GW3-A	GM3-B	GM3-D	
			Detect lon	Field #:	5-6.5	0-1-5	2.5-4	5-6.5	5-6.5	5-6.5	5-6,5 Distr	5-6,5 TUDEE	SS-JA TUDEE
Parameter	Method	u ts	Limit	Site :	THREE	THREE	THREE	IHREE		HKE	IHKEE		
Purgeable Aromatics	EPA 8020 (9)	6/6n	MDL (2)									!	4
Benzene	BA 8020 (9)	6/6n	0.0013		Q	2	2	QN	2	2	QN	C) Z	2
Chi oroben zene	EPA 8020 (9)	6/6n	0.0018		9	2	2	2	2	9	2	2	Q
1.2-Dicht arobenzene	EPA 8020 (9)		0,0023		Ð	9	QN	Q	Q	9	9	9	9
1. 3-01 chloroban zane	EPA 8020 (9)		0.0046		9	2	9	9	2	9	2	2	Q
1.4-Dichtorobenzene	EPA 8020 (9)		0,0022		Q	Ð	9	Q	<del>9</del>	Q	Ð	<del>9</del>	9
Ethv   banzene	EPA 8020 (9)		0.0038		9	2	2	9	9	9	9	2	QN
Toluene	EPA 8020 (9)	6/6n	0,0032		9	Q	QN	QN	Ð	9	2	9	0.014
m-Xylene	EPA 8020 (9)	6y6n						I	9	-	4	4	ç
o-Xy lene	EPA 8020 (9)	6/6n	0.0061(4)		2	2	9	g	£	Z	QN	2	2
p-Xy i ene	EPA 8020 (9)	6y6n											

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DATACHEN A Duluth IAP	WALTTICAL REPORT	- Soil Samples
	-	Duluth IAP

							B4-C	<b>B4-</b> C	B4-C	84-D	84-D	B4-D	84-E
Parameter	Method	Un i ts	Detection Limit	Field#t: Site :	SS-3B THREE	SS-3C THREE	2.5-4 FOUR	5-6,5 FOUR	7.5-9 FOUR	2.5-4 FOUR	5-6.5 FOUR	7.5-9 FOUR	2. 5-4 FOUR
Purgeable Aromatics		6/6n	MDL (2)										
Benzene	EPA 8020 (9)	6/6n	0.0013		Q	Q	9	QN	Q	9	Q	Ð	Q
Chlorobenzene	EPA 8020 (9)	6/6n	0.0018		9	9	9	9	9	2	9	9	QN
1 "2-Dichlorobenzene	EPA 8020 (9)	6/6n	0,0023		9	QN	9	9	QN	QN	Q	QN	9
1, J-Dichlorobenzene	EPA 8020 (9)	6/6n	0.0046		9	9	2	9	2	9	9	2	QN
1,4-Dichlorobenzene	EPA 8020 (9)	6/6n	0,0022		Q	Ð	Ð	Q	QN	Ð	Q	9	9
Ethy I benzene	EPA 8020 (9)	6/6n	0.0038		9	2	9	9	9	2	9	9	QN
Toluene	EPA 8020 (9)	6/6n	0.0032		9	9	Ð	9	Ð	Ð	QN	9	9
m-Xy lene	EPA 8020 (9)	6/6n			9	9	9	9	9	9	9	9	QN
o-Xy I ene	EPA 8020 (9)	6/6n	0.0061(4)		QN	2	Ð	<del>Q</del>	2	Q	9	9	9
p-Xy lene	EPA 8020 (9)	6/6n			9	2	9	9	9	9	9	9	QN

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Page 16

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DATACHEM AMALYTICAL REPORT Duluth IAP - Soit Samples

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Parameter	P potter	Un I ts	Detection Limit	Fleid∦: Site :	B4-E 5-6.5 FOUR	GW4-A 10-11.5 FOUR	Gw4-B 5-6.5 FOUR	GM4-C 10-12 FOUR	GN4-D 5-6.5 FOUR	84-A 2.5-4 FOUR	B4-A 5-6.5 FOUR	B4-A 7. 5-9 FOUR	B4-B 2, 5-4 FOUR
Purgeable Arcmatics Benzene Chiorobenzene 1,2-Dichiorobenzene 1,3-Dichiorobenzene 1,4-Dichiorobenzene Ethyibenzene Toiuene m-Xyiene	8020 (9) 8020 (9) 8020 (9) 8020 (9) 8020 (9) 8020 (9) 8020 (9)	6/6n 6/6n 6/6n 6/6n 6/6n 6/6n	MDL (2 0,0013 0,0018 0,0023 0,0022 0,0038 0,0032		<u> </u>	<u></u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	₽₽₽₽₽₽₽₽ ₽	UN UN UN UN UN UN UN UN UN UN UN UN UN U	1.6 (5) ND ND ND 3.2 6.4 6.4
oXy lene pXy lene	EPA 8020 (9)	ñ√ñn	•		ł								

DATACHEM ANALYTICAL REPORT Duluth IAP - Soll Semples

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GW5-A 5-6,5 FIVE	<del>99999999</del> 9
SS-4D FOUR	8°0 88 98 98 98 98 98 98 98 98 98 98 98 98
SS-4C FOUR	8 9 9 9 9 9 7 7 4 • •
SS-4B FOUR	6.8 ND ND ND ND 170 21.2 .5
SS-4A FOUR	2222222
84-8 7,5-11,5 FOUR	0.087 0.087 0.087 0.087
84-8 5-6.5 FOUR	6 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
Fleid #: Site :	^
Detect ion Limit	MDL (2) 0.0013 0.0018 0.0023 0.0026 0.0028 0.0038 0.0038 0.0032
(h i ts	6,6n 6,6n 6,6n 6,6n 6,6n 6,6n 6,6n 6,6n
Me thod	<ul> <li>EPA 8020 (9)</li> </ul>
Parameter	Purgeable Arometics Benzene Chlorobenzene 1,2-Dichiorobenzene 1,4-Dichiorobenzene Ethyibenzene Toluene m-Xyiene p-Xyiene

Page 18

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11-18

"ND" indicates that the parameter was not detected.

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DATACHBA AVALYTICAL REPORT Duluth JAP - Soil Samples

GW5-C

B6-B 0-1.5 SIX Ð B6-A SIX 22222222 Ð 0-1-5 B6-A SIX <del>2</del> 9 9 9 9 9 9 9 9 £ SS-5E FIVE ş SS-50 FIVE 9 SS-5C FIVE 22222222 9 SS-58 FIVE 2222222 9 SS-5A FIVE 2 2 2 2 2 2 2 2 2 Ð 10-11.5 FIVE 9 Field #: •• Site 0.0061(4) Detection 0.0023 0.0018 0,0022 0.0032 0,0013 Limit 0.0046 0°0038 NDL (2) Un i ts 6/6n 6/6n 6/6n 6/6n 6/6n 6/6n 6/6n 6/6n 6∕6n 6y6n 6y6n EPA 8020 (9) Mathod 1,2-Dichiorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene Parameter Purgeable Aromatics Chloroben zene Ethy I ben zene Benzene m-Xy lene o-Xy I ene Toluene p-Xylene

"ND" indicates that the parameter was not detected.

GW7-C

# DATACHEN ANALYTICAL REPORT Duluth IAP - Soli Samples

SS-7A* SEVEN	<u>9 9 9 9 9 9 9</u>	
GW7-C 15-16.5 SEVEN	<u> </u>	9
GW7-B 10-11.5 SEVEN	<u> </u>	Đ
GW7-A 10-11.5 SEVEN	<u> </u>	Q
87-8 2.5-4 SEVEN	2222222	9
87-8 0-1.5 SEVEN	2222222	Ð
87-A 2.5-4 SEVEN	<u> </u>	9
87-A 0-1.5 SEVEN	<u>5 5 5 9 9 5 5</u>	Ŷ
86-8 2.5-4 SIX	<u> </u>	R
Fleid #: Site :		_
Detection Limit	MDL (2) 0,0013 0,0018 0,0023 0,0023 0,0028 0,0038 0,0038	0_0061(4)
un i ts	6/6n 6/6n 6/6n 6/6n 6/6n 6/6n 6/6n	6/6n 6/6n 6/6n
Ma thod	EPA 8020 (9) EPA 8020 (9)	EPA 8020 (9) EPA 8020 (9) EPA 8020 (9)
Parameter	Purgeable Arcmatics Benzene Chiorobenzene 1,2-01chiorobenzene 1,3-01chiorobenzene 1,4-01chiorobenzene Ethyibenzene Toiuene	m-Xy lane o-Xy lane p-Xy lane

* Revised 07/10/87

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#### DATACHER AMALYTICAL REPORT Duluth IAP - Soll Samples

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648-C 10-11.5 E1GHT	9 9 9 9 9 9 9 9	QN
GW8-8 10-11.5 E1GHT	999999999	9
GW8-A 5-6.5 EIGHT	999999999	Ŷ
88-8 5-6,5 EIGHT	<u>9</u> 9 9 9 9 9 9 9	Ð
88-8 2.5-4 EIGHT	<u> </u>	9
88-8 0-1.5 EIGHT	₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽	9
B8-A 5-6,5 EIGHT	99999999	Q
198-A 2.5-4 E1GHT	2222222	9
88-A 0-1.5 EIGHT	<del>2</del> 2 2 2 2 2 2 2	Q
Field #: Site :		
Detection Limit MDL (2)	0,0013 0,0018 0,0023 0,0046 0,0022 0,0038	0,0061 (4)
	<b>q</b> ybn 6/6n 6/6n 6/6n 6/6n 6/6n	
Me thod EPA 8020 (9)	EPA 8020 (9) EPA 4020 (9)	EPA 8020 (9) EPA 8020 (9)
Parameter Purgesble Aromatics	Benzene Chlorobenzene 1,2-Dichiorobenzene 1,3-Dichiorobenzene 1,4-Dichiorobenzene Ethyibenzene Toluene m-Xyiene	o-Xy Iene p-Xy Iene

"ND" indicates that the parameter was not detected.

H-21

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# DATACHEN AVALYTICAL REPORT Duluth IAP - Soll Samples

SS-88* EI GHT

					De tection	Field #:	SS-8A*
Par ane ter	<b>₹</b>	Mathod		un i ts	Limit	Site :	EI GHT
Purgeable Arcmatics	EPA	EPA 8020 (9)	6	6/6n	MDL (2)		
Benzene	EPA	PA 8020 (9)	6	6/6n	0.0013		9
Chl orobenzene	EPA	EPA 8020 (9)	(6)	6/6n	0.0018		QN
1,2-Dichiorobenzene	EPA	EPA 8020 (9)	6)	6/6n	0.0023		9
1 "3-Dichi orobenzene	EPA	8020	(6)	6/6n	0.0046		QN
1,4-Dichlorobenzene	EPA	EPA 8020 (9)	6	6/6n	0.0020		9
Ethy I benzene	EPA 4	8020 (9)	6	6/6n	0.0038		QN
To l uene	EPA 8	8020 (9)	(6)	6/6n	0.0032		9
m-Xy lene	EPA (	8020 (9)	(6)	6∕6n			
o-Xylene	EPA	EPA 8020 (9)	(6)	6/6n	0.0061(4)		9
p-Xylene	EPA	EPA 8020 (9)	6)	6/6n			

QN

* Revised 07/10/87

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DATACHEM AMALYTICAL REPORT Duluth IAP - Soli Semples

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					81-A	B1-A	B1-A	GW1-A	GW1-B	GW1-E		
			Detect ion	Field #:	0-1-5	2 <b>.</b> 5-4	5-6.5	10-11-5	5-6.5	20-21.5	SS-1A	SS-1B
Parameter	Method	Un I ts	Limit	Site :	ONE	ONE	ONE	ONE	ONE	ONE	ONE	ONE
Pest ic ides	EPA 3550/8080 (9)	6/6n	MDL (2)									
Aldrin	EPA 3550/8080 (9)	6/6n	0.002		9	9	Q	9	9	9	2	2
al pha-BHC	EPA 3550/8080 (9)	6/6n	0,0008		9	9	Q	9	Q	9	2	QN
beta-BHC	EPA 3550/8080 (9)	6/6n	0.0002		9	9	QN	9	9	9	2	9
del ta-BHC	EPA 3550/8080 (9)	6/6n	0,0006		9	9	QN	9	9	2	2	QN
Lindane	EPA 3550/8080 (9)	6/6n	0.003		9	9	2	2	9	9	9	9
Chi ordane	EPA 3550/8080 (9)	6/6n	0.05		9	9	9	9	2	9	2	QN
4,4'-D0D	EPA 3550/8080 (9)	6/6n	0.0004		9	0.02	9	9	9	9	2	9
4 .4 DDE	EPA 3550/8080 (9)	6/6n	0.007		2	0,02	9	9	2	9	9	QN
4,4'-D0T	EPA 3550/8080 (9)	6/bn	0.004		9	0,02	9	Q	9	2	9	Q
Di eldr in	EPA 3550/8080 (9)	6/6n	0.003		0.10	9	9	Q	9	9	2	QN
Endosultan I	EPA 3550/8080 (9)	6/6n	0.002		9	9	9	9	2	2	9	Q
Endosulfan 11	EPA 3550/8080 (9)	6/6n	100"0		2	2	2	2	2	2	2	QN
Endosultan Sultate	EPA 3550/8080 (9)	6/6n	0.02		9	9	9	Q	9	2	9	2
Endrin	EPA 3550/8080 (9)	6/6n	0,005		9	2	9	9	Ŷ	9	9	QN
Endrin Aldehyde	EPA 3550/8080 (9)	6/6n	0.02		9	Q	9	Ð	9	2	9	2
Heptachlor	EPA 3550/8080 (9)	6/6n	0.004		9	9	9	2	Q	9	9	QN
Heptachlor Epoxide	EPA 3550/8080 (9)	6/6n	0.002		9	9	9	Q	9	2	Ð	9
Toxaphene	EPA 3550/8080 (9)	6/6n	0.14		9	2	9	9	9	2	2	QN
Arochlor 1016	EPA 3550/8080 (9)	6/6n	0,02		Ŷ	Ð	Q	9	2	2	Ŷ	QN
Arochior 1221	EPA 3550/8080 (9)	6/6n	0.02		9	2	9	9	9	9	2	QN
Arochior 1232	EPA 3550/8080 (9)	6/6n	0.02		9	2	Ŷ	Q	9	9	9	Ð
Arochior 1242	EPA 3550/8080 (9)	6/6n	0.02		Q	2	9	9	Q	9	9	QN
Arochior 1248	EPA 3550/8080 (9)	6/6n	0.02		9	9	9	2	9	9	Ð	Ð
Arochlor 1254	EPA 3550/8080 (9)	6/6n	U.02		9	2	Ð	2	Ð	2	9	QN
Arochior 1260	EPA 3550/8080 (9)	6 <i>/</i> 6n	0.02		9	9	9	2	2	2	9	9

83-C

83--C

B3-C

83-8

83-8

B3--B

B3-A

**B3-A** 

B3-A

DATACHEM ANALYTICAL REPORT Duluth IAP - Soil Samples

5-6.5 THREE 222 2.5-4 THREE 22222222 0-1-5 THREE 2222222 5-6.5 THREE 2222222 2.5-4 THREE 222222<del>2</del>22222222222222 0-1.5 THREE 0.41 9 ⁸ 9 9 9 9 9 9 9 9 9 9 9 * * * * * * * 2222222 5-6.5 THREE 9 9 99 2222222222222222 2222222 THREE 2.5-4 2222222 0-1.5 THREE <u></u> Field #: Si te **Jetect** ion Limit 0.0008 0.0004 MDL (2) 0.0002 0.0006 0.002 0.003 0.007 0.004 0.003 0.002 0,005 0.002 0.05 0,001 0.004 0.02 0.02 0.14 0**.**02 0**.**02 0.02 0.02 0.02 0.02 0.02 Un i ts 6/6n 6∕6n 6/6n ₿/ɓn 6/6n ɓ∕ɓn 6/6n 6/6n 6/6n 6/6n 6/6n 6/6n 6/6n 6/6n ₿/ɓn 6∕6n 6/6n 6/6n 6/6n 6/6n 6/6n 6/6n ɓ∕ɓn 6/6n 6/6n 6/6n 3550/8080 (9) EPA 3550/8080 (9) Method EPA Endosultan Sultate Heptachior Epoxide Parameter Endrin Aldehyde Endosul fan 11 Arochior 1016 Arochior 1232 Arochior 1260 Arochlor 1221 Arochior 1242 Arochior 1248 Arochior 1254 Endosultan 1 Heptachlor Toxaphene Chlordane delta-BHC al pha-BHC 4,41-000 beta-BHC 4,4'-DDE 4,41-D0T Dieldrin Lindane Pesticides Aldrin Endrin

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# DATACHER ANALYTICAL REPORT Duluth IAP - Soil Semples

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			Defection	Field ₩:	BC-3 5-6.5	GW3-A 5-6.5	GW3-B 5-6.5	GW3-D 5-6.5	SS-3A	55-3B	55-30
Parameter	Me thod	Un i ts	Limit	Site :	THREE	THREE	THREE	THREE	THREE	THREE	THREE
Pesticides	EPA 3550/8080 (9)	6/6n	MDL (2)				,	5	5	9	9
Aldrin	EPA 3550/8080 (9)	6/6n	0.002		9	9	2	Ż	2	2 9	2 9
al oba-BHC	EPA 3550/8080 (9)	6/6n	0.0008		2	9	2	2	2	2	CN S
	EPA 3550/8080 (9)	5/bn	0.0002		(IN	9	<del>2</del>	Q	Q	Ż	2
	EPA 3550/R080 (9)	0/01	0_0006		Ŷ	0.002	Ð	2	9	9	QN
	EPA 3550/8080 (9)	0/01	0.003		Ð	9	9	QN	Ð	9	Ð
ene on Li	EPA 3550/8080 (9)	6/0n	0.05		9	9	2	9	Ŷ	Ð	QN
	CDA 3550/8080 (9)		0.0004		0,003	9	9	9	9	9	2
4,41-000	CPA 3550/0000 (9)	6 /01	0.007		2	0.02	9	9	9	2	QN
4,4'	CDA 3550/8080 (9)	6/6n	0.004		0,06	0.04	Ð	0.007	9	9	9
4,4'-UUI	EPA 3550/8080 (9)	6 /60	0.003		9	9	9	Ð	9	9	QN
	EPA 3550/8080 (9)	6 /0n	0.002		9	9	2	9	2	2	2
	EPA 3550/8080 (9)	o/on	100-0		9	9	9	9	9	2	Q
Crucker lan Culfate	EPA 3550/8080 (9)	b/bn	0.02		Q	9	Q	9	0,31	0,06	9
	EPA 3550/8080 (9)	o/on	0,005		9	9	2	9	Q	Ş	QN
	COA 3550/9080 (9)		0.02		Ð	9	2	9	9	2	9
	FNA 3550/0000 (9)	6 /6n	0.004		9	9	9	9	Q	2	QN
Heptachlor	EPA 3550/8080 (9)	5/60	0.002		9	Q	Q	Q	2	9	2
Heptoccion Epoxicie Toxabhene	EPA 3550/8080 (9)	6/6n	0.14		9	9	Ð	Ð	Đ	9	QN
•		-			Q	Ş	Ŷ	2	2	2	2
Arochlor 1016	EPA 3550/8080 (9)	6∕6n	20°0		2	2	2	9	Q	9	QN
Arochlor 1221	EPA 3350/8060 (9)	6/6n	0°0		2	9	Ŷ	9	9	2	9
Arochi or 1232	(9) 0808/0666 Val	6 /6n	0°07		2 9	2	Q	9	Q	9	QN
Arochior 1242	EPA 5550/8060 (9)	6/6n	0.02		9	Q	Q	9	9	Ð	9
Arochior 1248	(4) 0000/0000 (4)	6∕6n	0.02		Ş	2	Q	2	Q	Ð	QN
Arochlor 1254	EPA 3550/8060 (9)	o∕on	0.02		Ð	2	9	Q	1.1	0.17	0.04
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"NOT indicates that the parameter was not detected.

DATACHEN ANALYTICAL REPORT Dututh IAP - Soil Samples

SS-5E FIVE 0.07 9 9 SS-50 0.004 FIVE 2222222222 2222222 SS-5C FIVE 222 2 2 2 2 2 2 2 2 SS--58 FIVE 222222222222222 9 £ 2 2 2 2 2 2 2 2 2 9 2 SS-5A FIVE 2222 22222222222 £ 9 22 2 22222222 10-11.5 GW5-C FIVE g 2 Ð 2 Ð 9 9 2 9 9 22 2222 ₽ ₽ 2222222 9.5-11 GW5-B 0.07 FIVE 222222 22 2222222 5-6.5 GW5-A FIVE <del>2</del> <del>2</del> 22 Ð 22222222222222 Field #: Site Detection MDL (2) Limit 0.0008 0.0002 0.0006 0.0004 0.002 0.003 0.004 0.002 100*0 0.004 0.05 0.007 0,003 0,005 0.002 0.02 0.02 0.14 0.02 0.02 0.02 0.02 0**.**02 0**.**02 0.02 Units 6/6n 6/6n 6/6n 6/6n 6∕6n 6∕6n 6/6n 6/6n 6∕ôn 6/6n 6∕bn 6/6n ₿/ɓn 6/6n 6∕6n 6/6n 6/6n 6/6n 6/6n 6/6n 6/6n 6∕6n 6/6n 6/6n 6/6n 6/6n EPA 3550/8080 (9) PA 3550/8080 (9) EPA 3550/8080 (9) Method Endosultan Sultate Heptachlor Epoxide Par ameter Endrin Aldehyde Arochior 1260 Endosulfan il Arochi or 1232 Arochlor 1242 Arochior 1254 Arochior 1016 Arochior 1221 Arochlor 1248 Endosultan I Heptachlor Toxaphene delta-BHC Chlordane al pha-BHC 4,41-000 4,41-00E 4,4'-DOT beta-BHC Di eldr in Lindane Pesticides Aldrin Endrin

"ND" indicates that the parameter was not detected.

**II-26** 

DATACHEM ANALYTICAL REPORT Duluth IAP - Solt Samples

					B7-A	B7-A	B7 <del>-B</del>	87 <del>.8</del>	GW7-A	GW7-B	GW7-C	
			Detection	Field #:	0-1-5	2.5-4	0-1-5	2.5-4	10-11.5	10-11-5	15-16.5	SS-7A*
Parameter	Method	Un its	Limit	Site :	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN
Pest ic Ides	EPA 3550/8080 (9)		MDL (2)									
Aldrin	EPA 3550/8080 (9)		0,002		Q	QN	9	Ŷ	Ð	Ŷ	Q	2
a I pha-BHC	EPA 3550/8080 (9)		0.0008		Q.	9	9	9	R	9	9	QN
bet <del>a-</del> BHC	EPA 3550/8080 (9)		0,0002		QN	Q	Q	9	Q	Q	9	Q
delta-BHC	EPA 3550/8080 (9)		0.0006		7	9	9	2	9	9	9	QN
L indane	EPA 3550/8080 (9)		0.005		9	QN	Q	9	Q	Ð	Q	Ð
Chlordane	EPA 3550/8080 (9)		0 <b>•</b> 05		9	9	9	9	QN	9	9	QN
4,41-000	EPA 3550/8080 (9)		0.0004		Q	QN	Ð	Q	9	9	Q	Q
4,41-006	EPA 3550/8080 (9)		0.007		Ð	9	9	9	2	2	9	QN
4,41-001	EPA 3550/8080 (9)		0.004		Q	QN	QN	Q	9	Q	QN	9
Di eldr in	EPA 3550/8080 (9)		0.003		9	9	9	9	9	9	9	0N
Endosul fan 1	EPA 3550/8080 (9)		0.002		QN	QN	Q	Q	Ð	Q	Q	QN
Endosulfan li	EPA 3550/8080 (9)		0.001		Ð	Ð	9	9	9	9	2	QN
Endosulfan Sulfate	te EPA 3550/8080 (9)		0.02		QN	Q	9	9	Ð	2	QN	QN
Endr In	EPA 3550/8080 (9)		0.005		9	9	9	9	2	9	9	QN
Endrin Aidehyde	EPA 3550/8080 (9)		0.02		QN	Q	Q	9	9	Q	QN	QN
Heptachlor	EPA 3550/8080 (9)		0.004		Q	2	9	9	9	9	9	QN
Heptachlor Epoxide	1e EPA 3550/8080 (9)		0.002		Q	Q	Q	Q	Q	Q	9	Q
Toxaphene	EPA 3550/8080 (9)		0.14		9	Q	Ð	9	Ð	9	9	QN
Arochior 1016	EPA 3550/8080 (9)	6∕bn	0.02		QN	QN	QN	QN	9	물	QN	Ŷ
Arochlor 1221	EPA 3550/8080 (9)		0.02		Ð	9	9	9	9	9	9	QN
Arochi or 1232	EPA 3550/8080 (9)		0.02		QN	QN	QN	9	9	Q	Q	Q
Arochior 1242	EPA 3550/8080 (9)		0.02		Ð	Q	9	Ð	2	9	9	QN
Arochior 1248	EPA 3550/8080 (9)		0.02		9	Q	Q	QN	9	9	Q	9
Arochior 1254	EPA 3550/8080 (9)		0.02		9	9	Q	2	9	9	9	QN
Arochlor 1260	EPA 3550/8080 (9)		0.02		Q	QN	QN	Q	Q	9	Ð	QN

* Revised 07/10/87

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DATACHEM AVALYTICAL REPORT Duiuth IAP - Soil Samples

			Detect ion	Field #:	B8-A 0-1 <b>.</b> 5	B8-A 2 <b>.</b> 5-4	B8 -A 5-6,5	88-8 0-1 <b>.</b> 5	88-8 2 <b>.</b> 5-4	B8 ₽ 7.6.5	GW8-A 5-6.5	GW8-B 10-11_5	GW8-C 10-11_5
Parameter	Me thod	Un i ts	Limit	Site :	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT
Pest ic ides	EPA 3550/8080 (9)	6/6n	MD1(2)										
Aldrin	EPA 3550/8080 (9)	6/6n	0.002		9	9	Ð	9	9	2	9	9	9
al pha-BHC	EPA 3550/8080 (9)	6/6n	0.0008		9	9	Q	9	9	9	9	9	QN
beta-BHC	EPA 3550/8080 (9)		0.0002		9	9	9	9	9	Q	Ð	9	9
del ta-BHC	EPA 3550/8080 (9)	6/6n	0,0006		2	9	Q	Q	9	9	9	9	QN
Lindane	EPA 3550/8080 (9)		0,003		9	9	9	9	9	9	9	9	9
Chlordane	EPA 3550/8080 (9)		0.05		9	9	9	9	9	9	9	9	QN
4,4'-000	EPA 3550/8080 (9)		0.0004		Q	Q	9	0,006	9	9	9	9	9
4,4'-DCE	EPA 3550/8080 (9)		0.007		Ŷ	2	9	0.007	9	9	2	2	QN
4 ,4 ' -DDT	EPA 3550/8080 (9)		0.004		9	9	9	9	9	2	Ð	9	Ð
Di etdr in	EPA 3550/8080 (9)		0.003		9	9	9	9	9	2	9	9	QN
Endosul fan 1	EPA 3550/8080 (9)		0.002		9	Q	9	₽	2	9	9	Q	9
Endosultan 11	EPA 3550/8080 (9)		0.001		9	9	9	9	9	9	9	9	QN
Endosultan Sultate	EPA 3550/8080 (9)		0.02		9	Ð	Ð	Q	9	9	9	Q	9
Endrin	EPA 3550/8080 (9)		0.005		9	9	9	9	9	2	2	9	QN
Endrin Aidehyde	EPA 3550/8080 (9)	6∕6n	0.02		9	Q	9	Q	2	2	₽	<del>2</del>	2
Heptach! or	EPA 3550/8080 (9)		0.004		9	9	9	9	9	2	9	9	QN
Heptachlor Epoxlde	EPA 3550/8080 (9)	ɓ∕ôn	0.002		Q	Ð	QN	Q	9	9	9	Q	Ð
Tox <b>aphene</b>	EPA 3550/8080 (9)		0.14		9	9	9	9	9	9	9	9	QN
Arochior 1016	EPA 3550/8080 (9)	₿/ɓn	0.02		Q	QN	2	Ŷ	2	2	QN	g	QN
Arochlor 1221	EPA 3550/8080 (9)		0.02		9	2	9	9	9	9	9	9	QN
Arochlor 1232	EPA 3550/8080 (9)		0.02		9	9	9	9	9	2	9	9	Ŷ
Arochior 1242	EPA 3550/8080 (9)		0.02		9	9	9	9	9	9	2	9	QN
Arochlor 1248	EPA 3550/8080 (9)		0.02		9	QN	9	9	9	2	9	9	Q
Arochior 1254	EPA 3550/8080 (9)		0.02		9	9	Q	9	Q	2	2	9	QN
Arochlor 1260	EPA 3550/8080 (9)		0.02		9	Q	Q	Q	Q	2	Ð	Ð	2

II-28

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## DATACHEM AVALYTICAL REPORT Duluth IAP - Soli Samples

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Units         Limit           ug/g         0.002           ug/g         0.002           ug/g         0.0008           ug/g         0.0006           ug/g         0.0005           ug/g         0.0005           ug/g         0.0005           ug/g         0.0006           ug/g         0.001           ug/g         0.002           ug/g         0.002           ug/g         0.014           ug/g         0.014           ug/g         0.014           ug/g         0.014           ug/g         0.014           ug/g         0.02           ug/g         0.02           ug/g         0.02           ug/g         0.02           ug/g         0.02           ug/g         0.02 <tr td="">         0.02      <tr td=""></tr></tr>				Detection	Field #:	SS-BA*	S S-8B*
EPA       3550/8080       (9)       ug/g         C       EPA       3550/8080       (9)       ug/g       0         D       EPA       3550/8080       (9)       ug/g       0         D       EPA       3550/8080       (9)       ug/g       0         D       EPA       3550/8080       (9)       ug/g       0       0         D       EPA       3550/8080       (9)       ug/g       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	Par ane ter	Met hod	un i ts	Limit	Site :	EI GHT	EI GHT
FPA       5550/8080       (9)       ug/g         fan       EPA       5550/8080       (9)       ug/g         fan       L       EPA       5550/8080       (9)       ug/g         fan       Sulfath       EPA       5550/8080       (9)       ug/g         fan       L       EPA       5550/8080       (9)       ug/g         fan       L       EPA       5550/8080       (9)       ug/g         for	Pestic Ides		6∕6n	(2) NDL (2)			
HC       EPA       5550/8080       (9)       ug/g         H       5550/8080       (9)       ug/g       ug/g         H       5550/8080       (9)       ug/g       ug/g         H       EPA       5550/8080       (9)       ug/g         H       EPA       5550/8080       (9)       ug/g         I       I       EPA       5550/8080       (9)       ug/g         I       I       EPA       5550/8080       (9)       ug/g         I       I       I       EPA       5550/8080       (9)       ug/g         I       I       I	Aidrin	3550/8080	6/6n	0.002		Û	NU
C         EPA         3550/8080         (9)         ug/g           IHC         EPA         3550/8080         (9)         ug/g           Ine         EPA         3550/8080         (9)         ug/g           In         In         EPA         3550/808	a I pha-BHC	3550/8080	6/6n	0.0008		Q	Q
HC       EPA       3550/8080       (9)       ug/g         ne       EPA       3550/8080       (9)       ug/g         ne       EPA       3550/8080       (9)       ug/g         D       EPA       3550/8080       (9)       ug/g         D       EPA       3550/8080       (9)       ug/g         D       EPA       3550/8080       (9)       ug/g         IT       EPA       3550/8080       (9)       ug/g         IT       EPA       3550/8080       (9)       ug/g         In       EPA       3550/8080       (9)       ug/g <th>beta-BHC</th> <th>3550/8080</th> <th>6/6n</th> <th>0.0002</th> <th></th> <th>Ĵ</th> <th>()N</th>	beta-BHC	3550/8080	6/6n	0.0002		Ĵ	()N
FPA       5550/8080       (9)       ug/g         FPA       5550/8080       (9)       ug/g         FPA       5550/8080       (9)       ug/g         FF       FPA       3550/8080       (9)       ug/g         fan       FPA       3550/8080       (9)       ug/g         fan       FPA       3550/8080       (9)       ug/g         fan       I       FPA       3550/8080       (9)       ug/g         fan       I       EPA       3550/8080       (9)       ug/g         fan       I       I       A       3550/8080       (9)       ug/g         fan       I       I       A       3550/8080       (9)       ug/g	d el ta-BHC	3550/8080	6∕6n	0.0006		0.001	QN
Ine         EPA         3550/8080         (9)         ug/g           E         EPA         3550/8080         (9)         ug/g           E         EPA         3550/8080         (9)         ug/g           IT         EPA         3550/8080         (9)         ug/g           Ian         I         EPA         3550/8080         (9)         ug/g           Aldehyde         EPA         3550/8080         (9)         ug/g           Ior         Epa         3550/8080         (9)         ug/g           Ior         EPA         3550/8080         (9)         ug/g           Ior         EPA         3550/8080         (9)         ug/g <t< th=""><th>Li ndane</th><th></th><th>6/6n</th><th>0.003</th><th></th><th>Q</th><th>(IN</th></t<>	Li ndane		6/6n	0.003		Q	(IN
D         EPA         3550/8080         (9)         ug/g           T         EPA         3550/8080         (9)         ug/g           Tan         EPA         3550/8080         (9)         ug/g           Fan         11         EPA         3550/8080         (9)         ug/g           Fan         Li         EPA         3550/8080         (9)         ug/g           Andehyde         EPA         3550/8080         (9)         ug/g           Aldehyde         EPA         3550/8080         (9)         ug/g           Aldehyde         EPA         3550/8080         (9)         ug/g           Aldehyde         EPA         3550/8080         (9)         ug/g           Filor         EPA         3550/8080         (9)         ug/g           Filor         EPA         3550/8080         (9)         ug/g           Filor         EPA         3550/8080         (9)         ug/g           Fi	Chi ordane	3550/8080	6∕6n	0.05		QN	()N
E         EPA         3550/8080         (9)         ug/g           n         EPA         3550/8080         (9)         ug/g           fan         I         EPA         3550/8080         (9)         ug/g           fan         Li         EPA         3550/8080         (9)         ug/g           fan         Si         S550/8080         (9)         ug/g           fan         S550/8080         (9)         ug/g           Aldehyde         EPA         3550/8080         (9)         ug/g           Aldehyde         EPA         3550/8080         (9)         ug/g           floor         Epoxide         EPA         3550/8080         (9)         ug/g           floor         Epoxide         EPA         3550/8080         (9)         ug/g           floor         Epoxide         EPA         3550/8080         (9)         ug/g           floor         Epoxi	4,41-000		6/6n	0.0004		Q	QN
NT     EPA     3550/8080     (9)     ug/g       fan     EPA     3550/8080     (9)     ug/g       fan     I     EPA     3550/8080     (9)     ug/g       fan     11     EPA     3550/8080     (9)     ug/g       fan     11     EPA     3550/8080     (9)     ug/g       fan     Li     EPA     3550/8080     (9)     ug/g       fan     Sulfate     EPA     3550/8080     (9)     ug/g       fan     Sulfate     EPA     3550/8080     (9)     ug/g       Aldehyde     EPA     3550/8080     (9)     ug/g       Alderide     EPA     3550/8080     (9)     ug/g       ilor     Epoxide     EPA     3550/8080     (9)     ug/g       ilor     Epoxide     EPA     3550/8080     (9)     ug/g       ine     EPA     3550/8080     (9)     ug/g       ir     1221     EPA     3550/8080     (9)     ug/g       ir     1221     EPA     3550/8080     (9)     ug/g       ir     1222     EPA     3550/8080     (9)     ug/g       ir     1232     EPA     3550/8080     (9)     ug/g	4,41-DDE	3550/8080	6/6n	0.007		QN	QN
In         EPA         3550/8080         (9)         ug/g           fan         I         EPA         3550/8080         (9)         ug/g           fan         Li         EPA         3550/8080         (9)         ug/g           Aldehyde         EPA         3550/8080         (9)         ug/g           Fr         1016         EPA         3550/8080         (9)         ug/g           Fr         1221         EPA         3550/8080         (9)         ug/g      I         1222	4,4'-D0T		6/6n	0.004		9	CIN
fan         EPA         3550/8080         (9)         ug/g           fan         11         EPA         3550/8080         (9)         ug/g           fan         Li         EPA         3550/8080         (9)         ug/g           fan         Sulfate         EPA         3550/8080         (9)         ug/g           fan         Sulfate         EPA         3550/8080         (9)         ug/g           Aldehyde         EPA         3550/8080         (9)         ug/g           Ior         EpA         3550/8080         (9)         ug/g           r         1016         EPA         3550/8080         (9)         ug/g           r         1221         EPA         3550/8080         (9)         ug/g           r         1222         EPA         3550/8080         (9)         ug/g           r         1221         EPA         3550/8080         (9)         ug/g      //d>r	Dieldrin	3550/8080	6/6n	0.003		QN	QN
fan         I         EPA         5550/8080         (9)         ug/g           fan         Sulfate         EPA         3550/8080         (9)         ug/g           fan         Sulfate         EPA         3550/8080         (9)         ug/g           Aldehyde         EPA         3550/8080         (9)         ug/g           Aldehyde         EPA         3550/8080         (9)         ug/g           I or         EPA         3550/8080         (9)         ug/g           I or         EPA         3550/8080         (9)         ug/g           I or         EPA         3550/8080         (9)         ug/g           r         1016         EPA         3550/8080         (9)         ug/g           r         1221         EPA         3550/8080         (9)         ug/g           r         1221         EPA         3550/8080         (9)         ug/g           r         1222         EPA         3550/8080         (9)         ug/g           r         1222         EPA         3550/8080         (9)         ug/g           r         1232         EPA         3550/8080         (9)         ug/g	Endosulfan 1	EPA 3550/8080 (9)	6/6n	0.002		9	10.0
fan         Sulfate         EPA         3550/8080         (9)         ug/g           EPA         3550/8080         (9)         ug/g           Aldehyde         EPA         3550/8080         (9)         ug/g           Aldehyde         EPA         3550/8080         (9)         ug/g           I or         EPA         3550/8080         (9)         ug/g           r         1016         EPA         3550/8080         (9)         ug/g           r         1016         EPA         3550/8080         (9)         ug/g           r         1221         EPA         3550/8080         (9)         ug/g           r         1232         EPA         3550/8080         (9)         ug/g           r         1242         EPA         3550/8080         (9)         ug/g           r         1248         EPA         3550/8080         (9)         ug/g           r         1248         EPA	End os ut fan 11	3550/8080	6∕6n	0.001		QN	(IN
EPA         3550/8080         (9)         ug/g           Aldehyde         EPA         3550/8080         (9)         ug/g           I or         Epoxide         EPA         3550/8080         (9)         ug/g           r         1016         EPA         3550/8080         (9)         ug/g           r         1016         EPA         3550/8080         (9)         ug/g           r         1221         EPA         3550/8080         (9)         ug/g           r         1221         EPA         3550/8080         (9)         ug/g           r         1232         EPA         3550/8080         (9)         ug/g           r         1248         EPA         3550/8080         (9)         ug/g           r         1248         EPA         3550/8080         (9)         ug/g           r         1248         EPA         3550/8080         (9)         ug/g	Endosulfan Sulfate		6/6n	0.02		9	QN
<ul> <li>EPA 3550/8080 (9) ug/g</li> </ul>	Endrin	3550/8080	5/bn	0.005		Q	QN
<ul> <li>EPA 3550/8080 (9) ug/g</li> </ul>	Endrin Aldehyde	EPA 3550/8080 (9)	6/6n	0.02		2	ÛN
EPA 3550/8080 (9) ug/g EPA 3550/8080 (9) ug/g	Heptachior	3550/8080	6/6n	0.004		QN	Q
<ul> <li>EPA 3550/8080 (9) ug/g</li> <li>1016 EPA 3550/8080 (9) ug/g</li> <li>1221 EPA 3550/8080 (9) ug/g</li> <li>1232 EPA 3550/8080 (9) ug/g</li> <li>1242 EPA 3550/8080 (9) ug/g</li> <li>1248 EPA 3550/8080 (9) ug/g</li> <li>1248 EPA 3550/8080 (9) ug/g</li> </ul>	Heptachlor Epoxide	EPA 3550/8080 (9)	6/6n	0.002		Q	QN
1016     EPA     355(./8080     (9)     ug/g       1221     EPA     3550/8080     (9)     ug/g       1232     EPA     3550/8080     (9)     ug/g       1242     EPA     3550/8080     (9)     ug/g       1248     EPA     3550/8080     (9)     ug/g       1248     EPA     3550/8080     (9)     ug/g       1254     EPA     3550/8080     (9)     ug/g	Toxaphene	EPA 3550/8080 (9)	6/6n	0.14		Q	QN
1221         EPA         3550/8080         (9)         ug/g           1232         EPA         3550/8080         (9)         ug/g           1242         EPA         3550/8080         (9)         ug/g           1248         EPA         3550/8080         (9)         ug/g           1248         EPA         3550/8080         (9)         ug/g           1254         EPA         3550/8080         (9)         ug/g	Arochior 1016	EPA 3550/8080 (9)	6/6n	0,02		₽	QN
1232     EPA     3550/8080     (9)     ug/g       1242     EPA     3550/8080     (9)     ug/g       1248     EPA     3550/8080     (9)     ug/g       1254     EPA     3550/8080     (9)     ug/g			6/6n	0.02		9	Q
1242 EPA 3550/8080 (9) ug/g 1248 EPA 3550/8080 (9) ug/g 1254 EPA 3550/8080 (9) ug/g		EPA 3550/8080 (9)	6/6n	0.02		2	QN
1248 EPA 3550/8080 (9) ug/g 1254 EPA 3550/8080 (9) ug/g		EPA 3550/8080 (9)	6∕6n	0.02		QN	QN
1254 EPA 3550/8080 (9) ug/g		EPA 3550/8080 (9)	6/6n	0.02		₽	QN
		EPA 3550/8080 (9)	6/6n	0.02		9	0.52
Arochior 1260 EPA 3550/8080 (9) ug/g 0.02	Arochior 1260	EPA 3550/8080 (9)	6/6n	0.02		9	QN

* Revised 07/10/87

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DATACHBA AVALYTICAL REPORT Duluth IAP - Soll Samples

Parameter	Ma thod	Un its	Detection Its Limit	Fleld #: Site :	B1-A 0-1.5 ONE	81-A 2.5-4 ONE	B1-A 5-6.5 ONE	GW1-A 10-11.5 ONE	GM1-B 5-6.5 ONE	GW1-E 20-21.5 ONE	SS-1A ONF	SS-1B ONF
Herbicides	EPA 8150* (9)	6/6n	MDL (2)									
2,4,5-T		6/6n	0.10		Q	Q	Q	QN	QN	Q	ŪN	ÛN
2 <b>,4-</b> D	8150* (9)	6/6n	0.02		2	9	QN	2	9	9 9	2	Q I
SILVER	EPA 8150* (9)	6∕bn	0.20		Ð	QN	QN	QN	Q	9	9	QN
Noisture	EPA 160.3 (6)	M	-		12.	40.	29.	11.	10.	•6	44.	- 19.
011 å Greese	EPA 413.2 (7)	6∕6n	5.		590	061	110	Q	9	7.	870	67.
Phanolics	EPA 420.2 (7)	6/6n	0.4		9	Q	9	9	Ð	9	9	QN
Arsenic	EPA 3050/7060 (7)	S	-		11.	16.	16.	17.	13.	8.	21.	18.
Barium	EPA 200.7 (7)	6/6n	20.		46.	120	120	64.	31.	24.	80 <b>.</b>	37.
Cadre i une	EPA 200.7 (7)	6/bn	-		QN	QN	¢•	Q	Ð	Q	1.8	QN
Chr. cm I um	EPA 200.7 (7)	6/6n	5.		13.	28.	17.	21.	•6	16.	21.	=
Lead	EPA 200.7 (7)	6/6n	2.		Q	200	-01	Ŷ	Đ	Ð	70.	Q
Mercury	EPA 7471 (7)	6/6n	0.1		9	Q	2	9	<del>Q</del>	ହ	9	QN
Selenium	EPA 3050/7740 (7)	ŝ	0.1		Q	QN	9	Q	QN	ND(16)	Q	Q
Silver	EPA 200.7 (7)	6/6n	_•		Q	<del>G</del>	<del>Q</del>	9	9	9	2	QN

* Revised 07/10/87

II-30

# DATACHEM ANALYTICAL REPORT Oututh IAP - Soil Samples

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	:	:	Detection	field ⊯:	B3-A 0-1.5	B3-A 2.5-4	B3-A 5-6.5 T.055	83-8 0-1.5	83-8 2.5-4	B3-B 5-6,5 7.0.r	83-C 0-1.5	83-C 2.5-4	B3-C 5-6.5
Parameter	Method	un its	+ =	site :		INC			IHE		HKE	- XII	
Herbic Ides	EPA 8150* (9)	6/6n	MDL(2)										
2,4,5-T	EPA 8150* (9)	6/6n	0.10		Q	Q	Q	QN	Q	9	Q	9	<del>2</del>
2,4-0	EPA 8150* (9)	6/6n	0.02		2	9	Ð	Â	9	9	9	9	QN
SIIvex	EPA 8150* (9)	6∕6n	0.20		QN	QN	QN	QN	2	Q	QN	QN	QN
Nol sture	EPA 160.3 (6)	×			•6	10.	•6	17.	19.	13.	27.	20.	13.
011 & Grease	EPA 413.2 (7)	6 <i>/</i> 6n	5.		8800	72 00	1600	061	06	50	1100	9	QN
Phenolics	EPA 420.2 (7)	6/6n	0.4		9	Q	9	9	Q	9	9	9	QN
Arsenic	EPA 3050/7060 (7) ug/g	6/ốn (,	_*		Q	Q	ND (12)	QN	QN	Q	QN	QN	Q
Bar lum	EPA 200.7 (7)	6/6n	20.		39.	45.	4 5 <b>.</b>	54.	49.	34.	48.	39.	29.
Cadm 1 um	EPA 200.7 (7)	6/ôn	-		QN	QN	Q	QN	Ð	Q	2.	QN	•CIN
Chr. an I un	EPA 200.7 (7)	6/6n	5.		22.	20.	20.	20.	25.	26.	17.	23.	15.
Lead	EPA 200.7 (7)	6/6n	2.		Q	Q	Û	QN	9	9	17.	QN	Q
Mercury	EPA 7471 (7)	6/6n	0.1		Ŷ	QN	Q	Ŷ	QN	Q	9	2	QN
Sel en lum	EPA 3050/7740 (7) ug/g	6/6n (.	0.1		QN	QN	(91) (10)	9	Ð	Q	Ð	QN	QN
Silver	EPA 200.7 (7)	6/6n	<u>.</u> •		9	9	9	9	9	9	Ð	9	QN

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H-31

"NU" indicates that the parameter was not detected.

Page 31

DATACHEN ANALYTICAL REPORT Duiuth IAP - Soll Samples GW3-D

GW3-A GW3-B

80-3

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			Detection	Field #:	5-6.5	5-6.5	5-6.5	5-6.5	SS-3A	SS=38	55 <b>-3</b> C
Parameter	Me thod	ch i ts	Llmit	Site :	THREE	THREE	THREE	THREE	THREE	THREE	THREE
Herbicides	EPA 8150* (9)	6/6n	MDL(2)								
2,4,5-T	EPA 8150* (9)	6/6n	0.10		Q	Q	Q	QN	9	Q	QN
2,4-0	EPA 8150* (9)	6/6n	0.02		Ŷ	9	9	9	9	9	QN
Silvex	EPA 81 50* (9)	6/6n	0.20		QN	QN	Q	QN	2	Q	Q
Moi sture	EPA 160.3 (6)	×	-		16.	14.	30.	48.	68.	24.	18.
Oil & Grease	EPA 413.2 (7)	6/6n	5.		220	Q	•06	17 00	1200	270	30 <b>.</b>
Phenolics	EPA 420.2 (7)	6/6n	0.4		Ą	₽	9	9	Q	9	CN
Arsenic	EPA 3050/7060 (7)	6/6n (	-		(51) QN	(21) ON	(51) QN	ND (15)	.61	14.	16.
Bar Ium	EPA 200.7 (7)	6∕6n	20.		44.	35.	50 <b>.</b>	65 <b>.</b>	001	51.	37.
Cada I um	EPA 200.7 (7)	ɓ∕ɓn	-		Q	QN	Q	Q	٦.	3.	:
Chran i un	EPA 200.7 (7)	6/6n	5.		19.	24.	17.	20.	25.	20.	16.
Lead	EPA 200.7 (7)	ɓ∕ɓn	2.		9	QN	<del>Q</del>	Q	.17	5.7	QN
Mercury	EPA 7471 (7)	6/6n	0.1		Ð	9	Ŋ	9	0.1	9	QN
Sel en lum	EPA 3050/7740 (7)	6/6n (	0.1		(S) (N)	(91) (N	(2) QN	(2) (N	Ŷ	9	Ð
SIIver	EPA 200.7 (7)	6/6n	-		9	Ð	Ð	9	Ð	9	DN

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H-32

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Page 32

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DATACHEN ANALYTICAL REPORT Duluth IAP - Soil Semples

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					GW-5A	GW-58	GM-5C					
Parameter	Met hod	1 to 1 to 2	Detection Finit	Field #:	5-6.5 5105	9 <b>.</b> 5-11	10-11.5	SS-5A	SS-5B	SS-5C	SS50	SS-5E
				. 9110		F I VE	FIVE	FIVE	FIVE	FIVE		FIVE
Herbicides	EPA 8150* (9)	6/6n	MDL(2)									
2,4,5-T	EPA 8150* (9)	6/6n	0.10		0N UN	9	QN	Z	GN	QN		ç
2,4-0	EPA 8150* (9)	6/6n	0.02		2	2	9	2		2 2		
Silvex	EPA 8150* (9'	6∕6n	0.20		2	QN	QN	9	2	2 7		Q Q
Moisture	EPA 160.3 (6)	×	-		12.	٦.	15.	18.	23.	35.		25.
0il & Grease	EPA 413.2 (7)	ɓ∕ɓn	5.		Ð	49.	45.	87.	<b>°</b>	170		11.
Phenol I cs	EPA 420.2 (7)	6/6n	0.4		9	9	9	9	Ð	9		QN
Arsenic	EPA 3050/7060 (7)	6∕6n	-		12.	ND (14)	8.	ND (14)	ND (14)	<b>6</b>	<b>6</b>	8,
Barlun	EPA 200,7 (7)	6/6n	20.		80 <b>.</b>	26.	47.	320	41.	53.		42.
Cedm I um	EPA 200.7 (7)	ɓ∕ɓn			Ŋ	GN	QN	1.4	Q	Q		9
Chrow I um	EPA 200.7 (7)		5.		33.	21.	31.	39.	21.	30.		26.
Lead	EPA 200.7 (7)	6/6n	2.		QN	Q	Q	<del>Q</del>	Q	9		Q
Mercury	EPA 7471 (7)		0.1		Ð	Q	Ŷ	Q	Ð	Ð		QN
Selenium	EPA 3050/7740 (7)	6/ɓn	0.1		ND (16)	Q	Q	₽	QN	Q		9
SIIver	EPA 200.7 (7)		<b>.</b> •		9	9	9	9	Q	Ð		QN

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"ND" indicates that the porameter was not detected.

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DATACHER ANALYTICAL REPORT Duluth IAP - Soli Semples

					87-A	B7-A	87 <del>-1</del> 8	87 <del>-8</del>	GH7-A	GW7-B	CM -C	
Parameter	Ma thod	un its		Fleid≇: Site :	0-1.5 SEVEN	2.5-4 SEVEN	0-1-5 SEVEN	2.5-4 SEVEN	10-11.5 SEVEN	10-11.5 SEVEN	15-16.5 SEVEN	SS-IA"
Herbicides 2,4,5-T 2,4-D Silvex	EPA 8150* (9) EPA 8150* (9) EPA 8150* (9) EPA 8150* (9)	6/6n 6/6n 6/6n 6/6n	MDL(2) 0.10 0.20		222	<del>9</del> 99	ଳୁ କୁ କୁ	<u>9</u> 99	222	<u>ə</u> ə 9		<u>9</u> 9
Moisture	EPA 160.3 (6)	×			45,	23.	34.	17.	18.	18.	•	<b>•</b> 16
011 8 Grease	EPA 413.2 (7)	6∕6n			20,	9	ę	QN	63.	9	QN	620
Phenol I cs	EPA 420°2 (7)	6/6n			Ŷ	9	9	Ŷ	9	9	9	Q
Arsen ic	EPA 3050/7060 (7)	6∕ɓn (,			Q	<del>Q</del>	Ð	<del>Q</del>	θ.	13.	2.	ND (15)
Ber i un	EPA 200.7 (7)	6/6n			61.	56.	380	80 <b>.</b>	33.	46.	26.	23.
Cadin lun	EPA 200.7 (7)	ɓ∕ɓn			Ŷ	Ð	Q	Q	Q	QN	2	Q
Citr can i um	EPA 200.1 (1)	6/6n			18.	34.	25.	21.	20.	26.	17.	QN
Lead	EPA 200.7 (7)	6/ɓn			Q	9	9	QN	2	9	9	6 <b>.</b> 8
Mercury	EPA 7471 (7)	6/6n			Ŷ	9	9	9	9			0.2
Seienium	EPA 3050/7740 (7)	5/5n (1	0.1		Q	ND (5)	0 N	Q	ND (16)	(91) ON		ND (5)
Silver	EPA 200.7 (7)	6/6n			£	9	2	9	Ð			Ŷ

* Rew 1 sed 07/10/87

DATACHEN ANALYFICAL REPORT Duluth IAP - Soll Samples

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B CMB-C •5 10-11.5 T ELCHT												
GW8-B 10-11.5 E10HT	222	10.	Ŷ	9	Q	29.	QN	12.	QN	9	QN	Q
GW8-A 5-6.5 E1GHT	ଳି ହି ହି	22,	QN	₽	Û	55.	2	26.	Q	Ð	QN	9
88-8 5-6.5 EIGHT	<del>2</del> 2 2	15.	140	9	Ŷ	43.	Q	20.	Q	Ð	£	9
88-8 2.5.4 EIGHT	<del>2</del> 2 2	•6	40.	9	QN	23.	QN	٦.	Ð	9	QN	æ
B8-8 0-1.5 E1GHT	9 9 9 9 9	15.	80.	Ð	Q	41.	Q	17.	15.	5	QN	2
B8-A 5-6.5 E1GHT	Q A Q	14.	QN	9	QN	73.	QN	34.	Q	2	ÛN	Q
68-A 2.5-4 E10HT	9 9 9	12.	Q	Ð	QN	64.	QN	31.	QN	Ŷ	Q	CN N
138-A 0-1.5 E1GHT	<u>ə</u> <u>ə</u> <u>ə</u>	15.	300	9	(51) (N	170	ÛN	18.	ÛN	5	VD (16)	5
Fleid≇: Site :											-	
Detection Limit MDL(2)	0,10 0,U2 0,20	-	5.	0.4	-	20.	•-	5.	2.	0.1	0.1	-
un 1 + s	6/6n 6/6n 6/6n	w	ɓ∕ɓn	6/6n	6/6n (	6/6n	ɓ∕ɓn	6∕6n	6/6n	ő∕6n	ɓ∕ɓn	6/6n
Mathod EPA 8150* (9)	EPA 8150* (9) EPA 8150* (9) EPA 8150* (9)	EPA 160.3 (6)	EPA 413.2 (7)	EPA 420.2 (7)	EPA 3050/7060 (7) ug/g	EPA 200.7 (7)	EPA 200.7 (7)	EPA 200.7 (7)	EPA 200.7 (7)	EPA 7471 (7)	EPA 3050/7740 (7) ug/g	EPA 200.7 (7)
Parameter Herbicides	2,4-D 2,4-D SII vex	Nol sture	011 & Greese	Phenol I cs	Ar sen ic	Barlum	Cadm i um	Chromilum	Lead	Mercury	Selenium	Silver

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ONTACHEN ANALYTICAL REPORT Duluth IAP - Soil Samples

	-	1	c	Field #: Site	SS-BA* F1GHT	SS-88* EI GHT
Par anoter	Mathod	SLIUN				
Herbicides	EPA 8150* (9)	6/6n	MDL(2)		Ŷ	UN
2,4,5-T	EPA 8150 [#] (9)	₿/ɓn	0.10		2 9	2
2,4-D Silver	EPA 8150# (9) EPA 8150# (9)	6/6n	0.20		2	QN
Noi stur e	EPA 160.3 (6)	×	-		33.	.17
011 & Grease	EPA 413.2 (7)	6/6n	5.		70.	730
Phenol ics	EPA 420.2 (7)	6/6n	0.4		Ð	Q
Arsen ic	EPA 3050/7060 (7) ug/g	6/6n (,	-		(51) (N	QN
Barlum	EPA 200.7 (7)	6∕6n	20.		47.	24.
Codm l um	EPA 200.7 (7)	6/6n	-		9	QN
Chromitum	EPA 200.7 (7)	6/6n	5.		18.	11.
لوعا	EPA 200.7 (7)	6/6n	2.		9	43.
Mercury	EPA 7471 (7)	5/6n	0.1		QN	Q
Sei en 1 un	EPA 3050/1740 (7) ug/g	6/6n (L	0.1		ND (5)	QN
Silver	EPA 200.7 (7)	ɓ∕ôn	-		Ð	QN

* Revised 07/10/87

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### DATACHEM AVALYTICAL REPORT Duluth IAP - Soil Samples

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					B2-B	82-8	B2-B	B2-C	82-C	82-C	GW2-A	GW2-B	GW2-C
			<b>Detection</b>	Field #:		2.5-4	5-6.5	0-1-5	2.5-4	5-6.5	5-6.5	5-6.5	15-16.5
Parameter	Method	Un i ts	Limi+	Si te :	OML	OML	OML	OWL	OML	OWL	OML	OML	TWO
Moisture	EPA 160.3 (6)	×	-		17.	14.	13.	8,	6.	10.	13.	15.	14.
Oil & Grease	EPA 413.2 (7) ug/g	6/6n	5		Ĵ	9	21.	94 00	2000	1700	6.	410	6.
Phenol 1 cs	EPA 420.2 (7) ug/g	6/6n	0.4		9	<b>6</b> •0	5.5	0.6	9	Ð	30 <b>.</b>	9	<b>.</b> 06

"ND" indicates that the parameter was not detected.

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Parameter	Mathod	un its	Detection Limit	Field∦: Site :	GW2-D 15-16.5 TWO	GW2-E 15-16.5 TW0	SS-2A Two	SS-2B TWO	SS-2C TWO	B4-A 2.5-4 FOUR	B4-A 5-6.5 FOUR	B4-A 7.5-9 FOUR	B4-B 2.5-4 FOUR
Moisture	EPA 160.3 (6)	×	-		14.		53.	28.	45.	74.	75.	64.	74 .
011 & Grease	EPA 413.2 (7) ug/g	6/6n	5.		46.	٦.	1200	220	560	1700	510	300	1700
Phenolics	EPA 420.2 (7)	6/6n	0.4		Û	<del>Q</del>	9	9	Q				

"NO" indicates that the parameter was not detected.

Page 38

MALYTICAL REPORT	Solf Samples
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Parameter	Me thod	Units	Detection Limit	Field #: Site :	B4-B 5-6.5 FOUR	B4-B 7.5-11.5 FOUR	84-C 2.5-4 FOUR	B4-C 5-6.5 FOUR	B4-C 7, 5-9 FOUR	84-D 2.5-4 FOUR	84-D 5-6.5 FOUR	84-D 7 <b>.</b> 5-9 FOUR	B4-E 2, 5-4 FOIR
Moi sture	EPA 160.3 (6)	×	-		57.	13.	37.	17.	22.	14.	20.	18.	15.
0il å Grease	EPA 413.2 (7) ug/g	6/6n	5.		580	24.	340	40.	Q	•06	430	•06	9

"ND" indicates that the parameter was not detected.

Page 39

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## DATACHEM MAALYTICAL REPORT Duluth IAP - Soli Semples

								:		GW4-A*	Gwi4-B	GW4-C	GW4-D
			Detection	Fleid #				SS-4C	SS-4D	10-11-5*	v.°4	21-01	5°°°
Parameter	Me thod	Un 1ts	Lim It	Site :	·	1	1	FOUR	FOUR	FOUR *	FOUR	FOUR	FOUR
Moisture	EPA 160.3 (6)	M	-		12.			15.	62.	12.*	44.	27.	73.
0il & Grease	EPA 413.2 (7)	6/6n	5.		Ð			2400	960	580*	130	70	<b>94</b> 0
5 <b>2</b> 0	EPA 160.3 (6) EPA 413.2 (7)	6/6n	5		12 <b>.</b> ND	60 <b>.</b> 480	57 <b>.</b> 10000	15 <b>.</b> 2400	62 <b>.</b> 960	12 <b>.</b> * 580*	<b>44.</b> 130		27 <b>.</b> 70

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* Revised 07/10/87

DATACHEM ANALYTICAL REPORT Duluth IAP - Soit Samples

Parameter	No thod	Units	Detection Limit	Field#: Site :	B6-A 0-1.5 SIX	B6-A 2.5-4 SIX	B6-B 0-1.5 SIX	B6-B 2.54 SIX
Noisture	EPA 160.3 (6)	×	-		22.	•61	•61	•61
0il & Grease	EPA 413.2 (7)	6/6n	5.		9	QN	810	Q
Ethylene Glycol	NI OSH P&C M 338 (8) ug/g	6/6n	6 <b>°</b> 0		9	Ð	9	QN

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Page 41

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#### DATACHER MAALYTICAL REPORT Duluth IAP - Soil Samples

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Parometer	Me thod	Un i ts	Detection Limit	Fleid∦: Site :	Drum 421 Two	Drum 422 THRFF	0-2.5 462 FOLIP	0-2.5 459 6104T	Drum GWB-C
lgnitabili ty	EPA 1010 (9)	ž	N/Y		z	z	z	z	z
Arsenic	EPA 1310/7060 (9)	µg∕L	0.01		QN	QN	9	QN	ND (15)
Berlum	EPA 1310/7080 (9)	mg/L	0.1		0.1	Ŷ	0.1	0.1	QN
Cadmium	EPA 1310/7130 (9)	mg/L	0.01		Q	9	9	QN	₽
Chr an i un	EPA 1310/7190 (9)	mg/L	0*05		₽	z	Ŷ	9	QN
L ead	EPA 1310/7421 (9)	mg∕L	0-05		Q	QN	Q	QN	Q
Mercury	EPA 1310/7470 (9)	mg/L	0.001		9	9	9	9	QN
Seien ium	EPA 1310/7740 (9)	mg∕L	0.01		Q	QN	Q	Q	ND (15)
S I I ver	EPA 1310/7760 (9)	mg/L	10*0		Ð	9	9	Q	QN

"ND" indicates that the parameter was not detected.

# UBTL AVALYTICAL REPORT Duluth IAP - Water Samples

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Par ameter Purgeable Hal ocarbons Ch lor ame thane Methylene Ch lor ide Er amodichi or amethane Dibramochi or amethane Promothane Fra	XI	Units	Limit	Site :	ONE	1	ONC				Two	9	:
						BNO	ONE	ONE	ONE	SNE			OM
		J∕bn	MDL (2)										
		J∕bn	0.49		9	Q.	Q	9	Ð	₽	2	9	Q
		ng∕L	0.34		9	9	9	9	2	2	9	9	QN
	EPA 601 (1)	ng∕L	0.46		9	9	9	Ð	Q	9	9	9	<del>9</del>
	EPA 601 (1)	ng/L	0,35		9	9	9	9	9	9	9	9	QN
	EPA 601 (1)	1∕6n	0.31		QN	9	9	Q	₽	9	9	Ð	9
	EPA 601 (1)	1∕6n	0.63		9	Q	9	2	9	9	9	9	QN
Dichlorodifiuoromethane EPA	EPA 601 (1)		0.33		9	QN	Ð	<del>Q</del>	9	Q	9	2	Q
Trichiorofiuoromethane EPA 601	(1) 109		0.44		9	9	9	9	9	9	9	2	QN
Chloroform EPA 601	(1) 109		0.45		Ð	Q	9	QN	QN	9	2	9	9
Branoform EPA	601 (1)		0.45		2	9	9	9	9	9	2	9	QN
Chiloroethane EPA	(1) 109	ר) חלק	0.38		Q	9	Ð	Q	9	9	2	Đ	9
1, 1-Dichioroethane EPA	(1) 109		0.49		9	9	9	9	9	9	9	9	QN
1 "2-Dichioroethane EPA	(1) 109		0.44		9	9	9	Ð	Q	2	9	9	Q
1,1,1-Tr ichi oroethane EPA	EPA 601 (1)		0.53		9	9	9	9	9	2.9	2	9	QN
1,1,2-Tr ich! oroethane EPA	EPA 601 (1)		0.51		Ð	QN	QN	9	QN	9	2	9	Ð
1,1,2,2-Tetrachioroethane EPA	EPA 601 (1)	ng/L	0, 38		9	9	2	9	9	9	2	9	QN
Vinyi Chloride EPA	EPA 601 (1)		0.54		Q	9	Q	QN	9	9	Ð	9	Q
1,1-Dichloroethene EPA	601 (1)		0.49		9	9	9	2	9	9	9	Ð	QN
trans-1,2-Dichloroethene EPA	(1) 109		0.42		9	9	QN	Q	Ð	9	9	9	Q
Trichloroethene EPA 601	(1) 109		0.60		9	9	9	2	Ð	9	2	9	QN
Tetrach! or oethene EPA	(1) 109	ng/L	0.38		9	9	Q	9	9	9	Q	9	QN
1,2-Dichloropropane EPA	(1) 109		0.20		9	9	9	9	9	2	9	9	QN
cis-1,3-Dichloropropene EPA	EPA 601 (1)		0.58		9	9	Ð	Q	Ð	Ð	9	9	9
trans-1,3-Dichloropropene EPA	601 (1)		0. 39		Ð	9	9	9	9	9	9	9	QN
2-Chloroethylvinyl Ether EPA	EPA 601 (1)		0.44		QN	Q	9	Q	Q	9	Q	2	Q
Chi oroben zene	(1) 109	ng/L	0.37		9	9	9	9	9	9	9	9	QN
1,2-Dichlorobenzene EPA	EPA 601 (1)		0.29		₽	Q	9	g	Q	9	9	Ð	9
1,3-Dichloroben zene EPA	EPA 601 (1)		0.42		9	9	9	9	9	9	9	2	QN
1.4-Dichloropenzene EPA	EPA 601 (1)		0.41		2	QN	9	Q	Q	Q	9	Q	QN

Der man ter Hatthoo			3									
		Detection	Fleid #:	GW2-D	GW2-E	SW-2A	SW-2B	SH-2C	NW-1	<b>Mu-</b> 2	MW-4	NW-5
•	d Units	Limit	Site :	OML	OML	OWL	OML	OWL	TWO	Two	OML	TWO
Purgeable Halocarbons EPA 601 (	1/6n (1)	MDL (2)										
Chloromethane EPA 601 (1)	(1) ng/L	0.49		9	9	QN	9	9	9	9	QN	QN
Mathylene Chioride EPA 601 (	(1) ng/L	0.34		9	9	9	9	7	9	9	9	QN
Carbon Tetrachioride EPA 601 (	(1) ng/L	0.46		QN	QN	9	9	Q	Q	9	9	9
Bromodichioromethane EPA 601 (	(1) ng/L	0.35		9	9	9	9	9	9	9	9	QN
Dibramochioramethane EPA 601 (	(1) ng/L	0.31		Q	QN	9	Q	QN	9	2	9	2
Bromethane EPA 601 (	(1) ng/L	0.63		9	9	9	9	QN	9	9	9	QN
Dichlorodifiuoromethane EPA 601 (	0	0.33		9	9	9	9	Q	9	ÿ	QN	9
Trichlorofluoromethane EPA 601 (	(1) ng/L	0.44		9	9	9	9	₽	9	2	2	QN
Chloroform EPA 601 (	Ξ	0.45		Q	Ð	Q	QN	QN	9	9	Ð	QN
EPA 601	(1) ng/L	0.45		Q	9	Q	9	2	9	9	9	QN
Chloroethane EPA 601 (	0	0.38		2	QN	Q	9	9	9	Û	9	Q
1,1-Dichloroethane EPA 601 (	0	0.49		9	9	9	9	9	9	2	9	QN
EPA 601	Ē	0.44		9	QN	9	Ŷ	Ð	9	9	9	9
1,1,1-Trichioroethane EPA 601 (	(1) ng/L	0.53		Ð	Q.	9	9	9	9	9	2	QN
1,1,2-Trichloroethane EPA 601 (	(1) ng/r	0.51		2	QN	9	Ð	9	9	<del>2</del>	2	9
1,1,2,2-Tetrachloroethane EPA 601 (	(1) ng/L	0.38		9	9	9	2	9	9	9	9	QN
vinyi Chloride EPA 601 (	(1) ng/L	0.54		9	Ð	9	Ð	Q	9	QN	QN	Q
1,1-Dichtoroethene EPA 601 (	(1) ng/L	0.49		9	9	9	9	9	9	9	2	QN
trans-1,2-Dichloroethene EPA 601 (	Ξ	0.42		13.	<b>.</b> 99	QN	9	2.6	2.3	9	Q	2
Trichloroethene EPA 601 (	(1) ng/L	0.60		9	20.	2	2	Ð	9	Q	9	QN
Tetrachloroethene EPA 601 (	0	0.38		9	Q	9	QN	9	9	9	QN	9
1,2-Dichloropropane EPA 601 (	(1) ng/L	0.20		9	9	9	2	Ð	9	9	9	QN
c's-1,3-01 chłoropropene EPA 601 (	(1) ng/L	0.58		2	Q	QN	Q	Q	Q	Ð	Q	Q
trans-1,3-01chloropropene EPA 601 (	Ξ	0. 39		9	9	Q	2	Q	9	9	9	QN
EPA 601	Ξ	0.44		QN	QN	QN	QN	QN	9	2	2	9
Chloroben zene EPA 601 (	(1) ng/L	0.37		9	9	9	2	9	Ŷ	9	2	QN
1,2-Dichlorobenzene EPA 601 (	0	0.29		9	9	9	Ð	9	9	9	ହ	2
1,3-Dichlorobenzene EPA 601 (	(1) ng/L	0.42		9	9	9	9	9	9	9	9	QN
1 "4-Dichlorrobenzene EPA 601 (	(1) ng/L	0.41		9	9	9	QN	9	9	9	9	9

"ND" indicates that the parameter was not detected.

Page 44

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H-44

DATACHEM ANALYTICAL REPORT Duiuth IAP - Water Samples

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			Detection	Field #:	MM-6	MM7	GW3-A	GW3-B	GW3-C	GW3-D	SW-3A	SW-38	SN-3C
Par ameter	Mathod	un ts	Limi+	Site :	DML	TWO	THREE	THREE	THREE	THREE	THREE	THREE	THREE
Purgeable Halocarbons	EPA 601 (1)	ug∕L	MDL (2)										
Chł ar anethane	EPA 601 (1)	η/βn	0.49		9	9	9	2	9	Q	9	QN	QN
Methylene Chloride	EPA 601 (1)	J∕ը	0.34		2	4 <b>.</b> 4	9	9	9	9	9	9	QN
Carbon Tetrachloride	EPA 601 (1)	ng∕L	0.46		9	9	9	Q	Ð	9	9	2	QN
Bromodichioromethane	EPA 601 (1)	ח6µ	0.35		9	9	9	9	9	9	0.87	9	QN
Dibramochi orame thane	EPA 601 (1)	ng/L	0.31		Q	Q	Q	QN	9	ا•0	Ð	9	9
Bromethane	EPA 601 (1)		0.63		2	9	9	2	9	9	9	9	QN
Dichlorodifluoromethane	EPA 601 (1)		0.33		9	Ð	Q	9	QN	<del>Q</del>	Q	9	Ð
Tr ichlorofluoromethane	EPA 601 (1)	ח/6יי	0.44		Đ	0.88	9	9	9	9	2	9	QN
Chl oroform	EPA 601 (1)		0.45		Q	9	Q	3.6	Q.	2.3	Q	1.6	1.4
Bromoform	EPA 601 (1)		0.45		9	9	9	9	9	9	2	9	Q
Chi oroethane	EPA 601 (1)	J∕bn	0.38		9	Q	Ŷ	QN	Q	0.70	Q	Q	QN
1, 1-Dichloroethane	EPA 601 (1)		0.49		9	9	9	310	83.	97.	6 <b>.</b> 8	36.	37.
1 ,2-Dichioroethane	EPA 601 (1)	J∕bn	0.44		9	2	Q	4.7	Q	1.9	9	3.0	2.8
1,1,1-Tr ichioroethane	EPA 601 (1)	J∕bu	0.53		9	9	2	1900	83.	1400	25.	1400	970
1,1,2-Tr ich! oroethane	EPA 601 (1)	J∕bn	0.51		Q	QN	Q	Q	9	2	9	Q	Q
1,1,2,2-Tetrachloroethane	EPA 601 (1)		0.38		9	9	9	9	9	2	2	9	QN
Vinyl Chioride	EPA 601 (1)		0.54		9	9	Q	QN	9	9.1	6.0	4.8	3.0
1,1-Dichloroethene	EPA 601 (1)		0.49		9	9	9	30 <b>.</b>	0.69	47.	5.7	35.	26.
trans-1,2-Dichloroethene	EPA 601 (1)	ר/βn	0.42		9	QN	9	35.	260	68.	82.	70.	55.
Tr ichi oroethene	EPA 601 (1)		0.60		9	9	9	4.4	31.	4.4	740	570	350
Tetrach! or oe thene	EPA 601 (1)		0.38		Ð	QN	Q	490	430	1000	10.	10.	8.1
1,2-Dichloropropane	EPA 601 (1)		0.20		9	2	9	9	₽	9	2	2	Q
cis-1,3-Dichloropropene	EPA 601 (1)		0.58		QN	QN	9	QN	Q	Q	ହ	Q	QN
trans-1,3-Dichloropropene	EPA 601 (1)	J∕bn	0. 39		ŷ	2	9	9	9	9	9	£	QN
2-Chloroethylvinyl Ether	EPA 601 (1)		0.44		Q	9	Q	QN	Q	QN	9	9	QN
Chiorobenzene	EPA 601 (1)		0.37		2	2	9	9	2	9	2	9	QN
1,2-Dichlorobenzene	EPA 601 (1)		0.29		Ð	QN	9	9	9	9	Q	Q	Q
1, 3-Dichlorobenzene	EPA 601 (1)	J∕bn	0.42		Q	9	9	9	2	9	9	9	QN
1 ,4-Dichiorobenzene	EPA 601 (1)		0.41		9	Ð	<del>Q</del>	QN	Q	QN	Ð	Ð	9

#### DATACHBA MULYFICAL REPORT Duluth IAP - Water Samples

			Detection	Field #:	GW4-A	GW4-B	GW4-C	GW4-D	SW-4A	SW-48	07-30	SW-4D	MW-8
Par aneter	Mathod	Un i ts	Limit	Site :	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOLR	FOUR	FOUR
Purgeable Halocarbons	EPA 601 (1)	ng∕L	MDL (2)										
Chi orome thane	EPA 601 (1)	J∕bn	0.49		9	QN	Q	9	Q	9	Q	9	Q
Mathylene Chloride	EPA 601 (1)	ug/L	0, 34		2	9	2	9	2.1	2.3	2 <b>.</b> 8	3.5	QN
Carbon Tetrachloride	EPA 601 (1)	ng/L	0.46		9	9	2	9	2	9	Ð	9	<del>9</del>
Bramodichior anothene	EPA 601 (1)	ոց/և	0.35		9	9	ę	9	9	9	9	9	QN
Dibramochloramethane	EPA 601 (1)	רγ/bn	0.31		QN	QN	QN	9	QN	9	Q	g	Q
Bromomethane	EPA 601 (1)		0.63		9	9	9	9	9	9	9	9	QN
Dichlorodifiuoromethane	EPA 601 (1)		0.33		9	9	9	Q	Q	9	2	ą	ÛN
Tr ichlorofluoromethane	EPA 601 (1)		0.44		2	9	2	2	Ð	2	2	9	5.5
Chi orotorm	EPA 601 (1)		0.45		Q	QN	QN	QN	Q	9	9	Q	9
Br and form	EPA 601 (1)		0.45		9	9	9	9	9	9	9	9	DN
Chl oroethane	EPA 601 (1)		0.38		Q	9	Q	Q	9	9	9	9	Q
1, 1-Dichloroethane	EPA 601 (1)		0.49		2	2	9	9	9	2	9	9	ŊŊ
1,2-Dichloroethane	EPA 601 (1)	ng∕L	0.44		9	Q	9	QN	ą	QN	Q	Q	Q
1,1,1-Tr Ichi oroethane	EPA 601 (1)		0.53		9	9	2	Ð	9	9	.61	10.	QN
1,1,2-Tr ichl oroethane	EPA 601 (1)		0.51		Q	Q	Q	QN	9	QN	2	9	Q
1,1,2,2-Te trachl oroethane	EPA 601 (1)		0.38		9	9	9	2	Q	9	9	Q	QN
Vinyi Chioride	EPA 601 (1)		0.54		Ŷ	Q	Q	QN	QN	QN	9	9	QN
1,1-Dichloroethene	EPA 601 (1)		0.49		9	9	9	2	9	9	9	2	QN
trans-1,2-0) chloroethene	EPA 601 (1)		0.42		9	9	Q	QN	QN	4.0	4.4	2•2	Q
Ir ichioroethene	EPA 601 (1)		0.60		9	9	9	2	9	22.	16.	9 <b>°</b> 6	QN
Tetrachi oroethene	EPA 601 (1)		0.38		2	9	Q	Q	Ð	QN	QN	Ð	Q
},2-Dichloropropane	EPA 601 (1)		0.20		9	Q2	9	9	2	9	2	9	QN
cis-1,3-0ichioropropene	EPA 601 (1)		0.58		QN	QN	Q	Q	Q	9	9	Ð	QN
trans-1, J-Dichloropene	EPA 601 (1)		0, 39		Q	2	9	9	9	2	2	2	QN
2-Chloroethylvinyl Ether	EPA 601 (1)		0.44		Û	Q	9	Q	ହ	QN	Q	9	9
Chloroben zene	EPA 601 (1)		0.37		2	9	2	9	2	96*0	2,2	9	QN
i "2-Dichiorobenzene	EPA 601 (1)	J∕bn	0.29		QN	9	Q	Q	9	9	Q	Q	Q
1, 3-Dichioroben zene	EPA 601 (1)	ղ/ըս	0.42		9	9	9	9	2	9	<del>9</del>	Ð	QN
1,4-Dichlorobenzene	EPA 601 (1)	ng/L	0.41		Ð	Ð	9	9	Ð	Q	9	2	9

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DATACHEM MULYTICAL REPORT Duluth IAP - Water Samples

			Detection	Field #:	6MW	M10	1 I MW	GW5-A	GW5-B	GW5-C	Sel-5A	SW-5B	SH-5C
<u>Par ane ter</u>	Method	Units	ts Limit	site :	FOUR	FOUR	FOUR	FIVE	FIVE	FIVE	FIVE	FIVE	FIVE
Purgeable Halocarbons	EPA 601 (1)	ר/βn	MDL (2)										
Chioromethane	EPA 601 (1)	ר, מ6/ר	0.49		QN	QN	9	QN	9	2	9	9	Q
Mathylane Chioride	EPA 601 (1)	J∕bu	0.34		Q	9	9	9	Ð	9	2	9	QN
Carbon Tetrachloride	EPA 601 (1)	ר) ח∂/ך	0.46		<del>Q</del>	QN	Ţ	Q	Q	9	Ð	Q	QN
Bromodichioromethane	EPA 601 (1)	ng/L	0.35		9	2	9	9	Q	9	9	9	QN
Dibramochl or anothone	EPA 601 (1)	1∕bn	0.31		9	QN	<b>9</b>	2	QN	9	Ð	Q	Q <b>X</b>
Br amomethane	EPA 601 (1)	ng/L	0.63		9	9	9	9	9	9	9	9	QN
Dichlorodifluoromethane	EPA 601 (1)	ng∕L	0.33		9	QN	QN	9	Q	9	Ð	9	Ŷ
Tr i chi or of i uor anethane	EPA 601 (1)	1∕bn	0.44		9	2	1.9	9	9	9	2	9	QN
Ch1 oroform	EPA 601 (1)	ר) ח∂/ך	0.45		<del>Q</del>	Q	Q.	9	9	Q	9	Q	Q
Bromoform	EPA 601 (1)	ען∕£	0.45		Q	Q	9	9	Q	9	9	9	QN
Ch I or oe than e	EPA 601 (1)	ng/L	0.38		9	QN	<del>9</del>	QN	QN	9	g	9	Q
1, 1-Dichloroethane	EPA 601 (1)	ng/L	0.49		9	9	9	Ŷ	9	9	2	2	QN
1 ,2-D1 chl oroethane	EPA 601 (1)	ר/bn	0.44		(N	9	9	Q	2	2	9	Q	Q
1,1,1-Tr ichioroethane	EPA 601 (1)	ng/L	0.53		Ð	Q	9	9	2	9	9	2	QN
1,1,2-Tr ichl oroethane	EPA 601 (1)	ר/βn	0.51		9	9	9	QN	9	ę	9	Q	Q
1, 1, 2, 2-Te trachi oroethane		J∕bn	0. 38		9	9	2	9	9	9	9	2	QN
viny! Chloride	EPA 601 (1)	۲/Gn	0.54		9	Q	Q	Q	9	9	9	Q	Ð
1,1-Dichloroethene	EPA 601 (1)	ng/L	0.49		9	9	9	9	9	Ð	9	9	QN
trans-1,2-Dichloroethene	EPA 601 (1)	ng/L	0.42		Q	5.8	Q	QN	Q	9	9	9	Q
Tr Ichioroethene	EPA 601 (1)	ng/L	0.60		QN	9	Q	9	₽	9	Ð	9	QN
Tetrachl or oe then e	EPA 601 (1)	ng/L	0.38		9	9	2	Ð	Ŷ	9	9	9	QN
1,2-Dichloropropane	EPA 601 (1)	ng/L	0.20		Q	Ŷ	9	9	9	9	9	9	ON
c is-1 ,3-Dichi oropropene	EPA 601 (1)	J∕ɓn	0.58		QN	9	9	QN	9	9	9	Q	Ŷ
trans-1,3-Dichloropropene	EPA 601 (1)	ng/L	0. 39		2	9	9	9	9	2	9	9	QN
2-Chioroethylvinyl Ether	EPA 601 (1)	J∕bn	0.44		9	9	QN	Ð	Ð	9	Q	2	QN
Chi or oben zene	EPA 601 (1)	ng/L	0.37		Q	2	Ð	2	2	9	9	2	QN
1,2-Dichlorobenzene	EPA 601 (1)	רγ/βn	0.29		Q	Q	QN	Q	Ð	9	Q	QN	Đ
1 , 3–D i chi oroben zene	EPA 601 (1)	ng/L	0.42		9	9	9	9	9	9	9	Ð	QN
1,4-Dichl crobenzene	EPA 601 (1)	ng/L	0.41		9	9	Q	Q	Ð	Q	9	9	QN

"ND" indicates that the parameter was not detected.

# DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples

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			Detection	Field #:	GW7-A	GW7-B	GW7-C	VL-15	GW8-A	GW8 -B	GWB-C	SMBA	SM-88
Par ane ter	Mathod	Un i ts	Limit	Site :	SEVEN	SEVEN	SEVEN	SEVEN	EI GHT	EI GHT	EI GHT	EI GHT	EIGHT
Purgeable Halocarbons	EPA 601 (1)	ר) ח/ניי	MDL (2)										
Chi or care thane	EPA 601 (1)	1∕6n	0.49		9	Û	2	Q	Q	9	Ð	9	QN
Methylene Chloride	EPA 601 (1)	ng/L	0.34		9	2.5	2	9	Ŷ	2.8	9	9	QN
Carbon Tetrachloride	EPA 601 (1)	ך מס/ך	0.46		Q	9	9	Q	Ð	9	9	9	Ð
Bramodichioramethane	EPA 601 (1)	ng/L	0.35		9	9	2	9	9	9	9	9	QN
Dibramochi oramethane	EPA 601 (1)		0.31		9	9	9	2.9	9	9	9	9	Ð
Br amamethane	EPA 601 (1)	ng/L	0.63		9	9	2	2	9	9	9	9	QN
Dichlorodifiuoramethane	EPA 601 (1)	J∕bn	0.33		Q	9	9	Q	9	<del>9</del>	9	9	Ð
Tr ichiorofiuoromethane	EPA 601 (1)	ng/L	0.44		9	9	9	2	9	1.2	9	9	QN
Chi aroform	EPA 601 (1)	J∕bn	0.45		Q	7.0	Q	Q.	2	9	9	£	Ð
Branoform	EPA 601 (1)	ng/L	0.45		2	Ŷ	9	9	9	2	9	9	QN
Ch I or oe than e	EPA 601 (1)		0,38		9	9	9	9	9	9	9	9	Q
1, 1-Dichloroethane	EPA 601 (1)		0.49		9	9	9	9	9	9	9	2	QN
1 "2-Dichloroethane	EPA 601 (1)		0.44		9	0.82	9	0.83	9	9	9	ନ୍	Ð
1,1,1-Trichloroethane	EPA 601 (1)		0.53		9	9	9	9	9	9	9	9	QN
1,1,2-Tr ichl oroethane	EPA 601 (1)		0.51		9	9	9	2	9	Ð	ą	2	9
1,1,2,2-Tetrachi oroethane	EPA 601 (1)		0.38		Ð	9	9	9	9	9	9	9	QN
Vinyl Chloride	EPA 601 (1)		0.54		9	9	9	9	9	9	9	9	9
1, 1-Dichloroethene	EPA 601 (1)		0.49		9	9	9	9	9	9	9	9	QN
trans-1,2-Dichloroethene	EPA 601 (1)		0.42		9	Q	9	7.2	7	9	9	2	9
Tr ichioroethene	EPA 601 (1)		0.60		9	220.	1.1	5.1	9	9	9	9	QN
Tetrach! or oethene	EPA 601 (1)	ng∕L	0.38		9	Q	9	7.6	<del>9</del>	9	9	9	9
1,2-Dichloropane	EPA 601 (1)	ng/L	0.20		9	9	9	9	2	2	9	9	QN
ci <del>s</del> -1,3-Dichtoropropene	EPA 601 (1)		0.58		Ð	9	9	Q	Q	9	9	9	9
trans-1,J-Dichloropropene	EPA 601 (1)		0.39		9	9	9	9	9	9	9	2	QN
2-Chloroethylvinyi Ether	EPA 601 (1)	ال مورا	0.44		Q	₽	9	Q	Q	9	2	Ð	Ð
Chi oroben zene	EPA 601 (1)	J∕bn	0.37		G	9	9	9	9	2	9	9	QN
1 "2-Dichiorobenzene	EPA 601 (1)	ר/βn	0.29		QN	<del>2</del>	9	QN	Q	Ð	2	Ð	<del>2</del>
1,3-Dichlorobenzene	EPA 601 (1)	٦/bn	0.42		9	9	9	2	9	9	9	9	QN
1 "4-Dichiorobenzene	EPA 601 (1)	ng/L	0.41		9	9	2	Q	9	9	9	9	9

"ND" indicates that the parameter was not detected.

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Page 48

DATACHEM MULTTICAL REPORT Duluth IAP - Water Samples

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			Dataction	Flaid 4:	TRTP BLANK	TRIP	TR IP BIANK	R I NSE Bi ank
Parameter	Me thod	Un i ts	Limit	Site :	FOUR	SEVEN	EIGHT	THREE
Purgeable Halocarbons	EPA 601 (1)	ng∕L	MDL (2)					
Chloromethane	EPA 601 (1)	ן∕bn	0.49		Q	Ð	9	9
Methylene Chloride	EPA 601 (1)	ug/L	0.34		9	Ŷ	9	35.
Carbon Tetrachloride	EPA 601 (1)	ר/βn	0.46		2	9	9	9
Bramodichloramethane	EPA 601 (1)	ug/L	0.35		Q	9	9	1.5
Dibramochi orane thane	EPA 601 (1)	ng∕L	0.31		Q	Q	9	QN
Bromomethene	EPA 601 (1)	J∕bu	0.63		2	9	Q	QN
Dichiorodi fluoromethane	EPA 601 (1)	ng∕L	0.33		9	Ð	9	Q
Tr ichiorofiuoromethane	EPA 601 (1)	ng/L	0.44		Ŷ	9	9	ÛN
Chi aroform	EPA 601 (1)	ng/L	0.45		9	5.4	2	9 <b>°</b> 8
Bromoform	EPA 601 (1)	٦/bn	0.45		Ð	9	9	QN
Ch I oroethane	EPA 601 (1)	J∕bn	0.38		2	9	9	Q
1 , 1-Dichloroethane	EPA 601 (1)	ng/L	0.49		Ŷ	9	9	QN
l ,2-Di chi oroethane	EPA 601 (1)	ng/L	0.44		9	9	9	QN
1, 1, 1–Tr ichioroethane	EPA 601 (1)	٦/ɓn	0.53		2	ę	2	QN
1,1,2-Tr ichi oroethane	EPA 601 (1)	ng∕L	0.51		2	Q	2	Q
1,1,2,2-Tetrachloroethane	EPA 601 (1)	ոց/Լ	0, 38		9	9	9	QN
Vinyi Chloride	EPA 601 (1)	ug/L	0.54		9	Q	9	9
1, 1-Dichloroethene	EPA 601 (1)	ng/L	0.49		9	9	9	QN
trans-1,2-Dichl oroethene	EPA 601 (1)	ng/L	0.42		Q	7	9	Ð
Tr ichioroethene	EPA 601 (1)	ng/L	0,60		0	9	2	QN
Tetrachi oroethene	EPA 601 (1)	ng/L	0, 38		9	QN	9	0.52
1,2-Dichloropropane	EPA 601 (1)	ng/L	0.20		9	9	9	Q
c is-1 , 3-Dich loropropene	EPA 601 (1)	ng∕L	0.58		9	QN	9	Ð
trans-1,3-Dichloropropene	EPA 601 (1)	J∕bu	0, 39		9	9	9	ON
2-Chioroethylvinyl Ether	EPA 601 (1)	ng∕L	0.44		9	Ð	Q	Ð
Chi oroben zene	EPA 601 (1)	J∕bn	0.37		9	9	9	QN
1,2-Dichlorobenzene	EPA 601 (1)	ng/L	0,29		9	Ŷ	9	Ð
1, J-Dichlorobenzene	EPA 601 (1)	J∕bn	0.42		9	9	9	QN
1 "4Di ch I orobenzene	EPA 601 (1)	רγ/bn	0.41		9	<del>Q</del>	9	2

"ND" Indicates that the parameter was not detected.

Page 49

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# DNTACHEM MULYTICAL REPORT Duluth IAP - Water Samples

GW2-C TWO	<u>9</u> 9 9 9 9 9 9 9 9 9 9
GW2-B TNO	2 2 2 2 2 2 2 2 2 2 2 2
GW2-A TWO	9999999999999
SN-1B ONE	<u> </u>
SW-1A ONE	<u> </u>
GW1-E ONE	9999999999999
GW1-D ONE	<u> </u>
GW1-C	2 9 2 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
GW1-A UNE	<u> </u>
Field #: Site :	
Detection Limit	MDL (2) 0.25 0.64 0.75 0.78 0.45 0.45 0.45 0.45 0.45 0.45
units	7/6n 7/6n 7/6n 7/6n 7/6n 7/6n 7/6n 7/6n
Ne thod	EPA 602 (1) EPA 602 (1)
Per anoter	Purgeable Arcmetics Benzene Toi uene E thy I benzene o-Xy iene m-Xy iene p-Xy iene p-Xy iene ch i orobenzene 1,2-Dichi orobenzene 1,3-Dichi orobenzene

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## DATACHEN ANALYTICAL REPORT Duluth IAP - Water Samples

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			Detection	Field #:	GW2-D	GW2-E	SW-2A	SW-2B	SW-2C	1 - MM	MM2	MM-4	MM5
	Method			5176 :								0ML	2 2
Purgeable Aromatics	EPA 602 (1)		MDL (2)										
Benzene	EPA 602 (1)	ng/L	0.25		9	<del>Q</del>	9	Q	7	9	9	9	9
To luene	EPA 602 (1)		0.64		2	9	9	9	9	9	9	9	QN
Ethy I benzene	EPA 602 (1)		0.75		Ð	9	9	Q	QN	2	9	9	Q
o-Xy lene	EPA 602 (1)		0.78		9	9	9	9	9	9	9	9	QN
m-Xy i ene	EPA 602 (1)		0.45		9	9	Ð	9	Q	9	9	Ð	Q
p-Xy lene	EPA 602 (1)		0.78		9	9	9	9	9	9	9	9	QN
Ch) orobenzene	EPA 602 (1)		0.35		9	Ð	9	Q	9	9	2	9	9
1,2-Dichiorobenzene	EPA 602 (1)		0.47		Q	9	2	2	9	9	9	2	QN
1,3-Dichiorobenzene	EPA 602 (1)		0.93		Q	Ð	9	2	<del>2</del>	Ð	9	9	9
1, 3-Dichlorobenzene	EPA 602 (1)		0.44		Ð	Ð	9	9	9	9	9	9	QN

DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples

SM-3C THREE SH-3B THREE SW-3A THREE GW3-D THREE GW3-C THREE GW3-B THREE GW3-A THREE 1 -- MM OM 0ML **9-W** Field #: •• Site Detection Limit MDL (2) 0.25 0.75 0.45 0,35 0.47 0.64 0.78 0.78 0.93 0.44 un i ts J∕bu ח∂/ר 1/6n 1/6n م/رل ן/bn ۲/fn J∕6n ٦/Gn 1/ճո ۲/Gn EPA 602 (1) Method 1,3-Dichlorobenzene 1,2-Dichlorobenzene 1, 3-Dichiorobenzene Par ameter Purgeable Aromatics Ch I or obenzene Ethy i benzene o-Xylene m-Xylene p-Xylene Benzene To luene

"NO" indicates that the parameter was not detected.

11-52

Page 52

DATACHEN MALYTICAL REPORT Duluth IAP - Water Samples

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MM--8 FOUR SM-4D FOUR SN-4C FOUR SM-4B FOUR SW-4A FOUR GW4-D FOUR GW4-C FOUR 2 2 2 2 2 2 2 2 2 2 2 2 2 GW4-B FOUR GW4-A FOUR Field #: Site : Detection Limi+ MDL (2) 0.25 0.75 0.64 0.78 0.45 0.78 0.35 0.47 0.93 0.44 Units ן∕bn ר,ר ۲/Gn ן/b̂n J∕bn J∕£u ng/L لا 1/6n 1/6n EPA 602 (1)
EPA 602 (1)
EPA 602 (1)
EPA 602 (1)
EPA 602 (1)
EPA 602 (1)
EPA 602 (1) EPA 602 (1) EPA 602 (1) EPA 602 (1) Method 1,2-Dichiorobenzene 1,3-Dichlorobenzene 1,3-Dichlorobenzene Parameter Purgeable Aromatics Ch I or obenzene Ethy! benzene o-Xylene m-Xylene p-Xy lene To l uene Benzene

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# DNTACHEN ANALYTICAL REPORT Duluth IAP - Water Samples

SII-5C FIVE	9 9 9 9 9 9 9 9 9 9 9 9 9
SM-5B FIVE	<u> </u>
SW-5A FIVE	<u>9 9 9 9 9 9 9 9 9 9 9 9</u>
GW5-C FIVE	<u> </u>
GW5-B FIVE	<u> </u>
GW5-A FIVE	9 9 9 9 9 9 9 9 9 9 9 9
FOUR	2 2 2 2 2 2 2 2 2 2 2
MW-10 FOUR	<u> </u>
MM-9 FOUR	<u> </u>
Field #: Site :	
Detection Limit	MDL (2) 0.25 0.64 0.75 0.78 0.78 0.78 0.45 0.45 0.45 0.93
un ts	1/6n 1/6n 1/6n 1/6n 1/6n 1/6n 1/6n 1/6n
Met hod	EPA 602 (1) EPA 602 (1)
Per amoter	Purgeable Aromatics Benzene Toluene Ethylbenzene o-Xylene m-Xylene p-Xylene Chlorobenzene 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,3-Dichlorobenzene

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"ND" indicates that the parameter was not detected.

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#### DATACHEM AVALYTICAL REPORT Duluth IAP - Water Samples

			Detection	Field #:	GW7-A	GW7-B	GW7-C	SW-7A	GW8-A	GWB-B	GWB-C	SW-BA	SW-88
Par ameter	Method	un ts	L imi t	Site :	SEVEN	SEVEN	SE VEN	SEVEN	E1 GHT	EI GHT	EI GHT	EI GHT	EI GHT
Purgeable Aromatics	EPA 602 (1)		MDL (2)										
Benzene	EPA 602 (1)		0.25		7	QN	ÛN	QN	Q	Q	Ð	9	QN
To I uene	EPA 602 (1)		0.64		Q	92	9	<del>Q</del>	9	9	9	2	6.5
Ethy I benzene	EPA 602 (1)		0.75		9	Q	9	ſN	Q	9	9	Q	QN
o-Xy lene	EPA 602 (1)		0.78		Q	R	9	9	9	9	Q	2	ΟN
m-Xylene	EPA 602 (1)		0.45		QN	QN	Ð	ŊN	Q	2	9	Q	Q
p-Xy lene	EPA 602 (1)		0.78		ÛN	Ð	9	9	9	9	2	9	QN
Ch I or obenzene	EPA 602 (1)		0.35		2	ÛN	(IN	QN	QN	9	Q	9	QN
1,2-Dichlorobenzene	EPA 602 (1)	ng/L	0.47		2	Q	9	9	Q	9	Q	9	DN
1 "3-Dichlorobenzene	EPA 602 (1)		<b>60</b>		Ð	QN	QN	Ð	Q	9	Q	9	QN
1,3-Dichlorobenzene	EPA 602 (1)	ng/L	0.44		Ð	9	9	2	Ð	Ð	ଟ୍	9	QN

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# DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples

RINSE BLANK FIVE	<u>9</u> 9 9 9 9 9 9 9 9 9 9 9
TRIP BLANK ELGHT	<u> </u>
TRIP BLANK SEVEN	9 <del>2</del> 9 9 9 9 9 9 9 9 9
THIP BLANK FOUR	2 9 9 9 9 9 9 9 9 9 9 9
Fleid#: Site :	
Detection Limit	MDL (2) 0.25 0.64 0.75 0.78 0.78 0.45 0.45 0.45 0.45 0.45
Units	1/6n 1/6n 1/6n 1/6n 1/6n 1/6n 1/6n
Ne thod	EPA 602 (1) EPA 602 (1)
Parameter	Purgeeble Aromatics Benzene Toluene Ethylbenzene o-Xylene m-Xylene p-Xylene chlorobenzene 1,3-Dichlorobenzene 1,3-Dichlorobenzene 1,3-Dichlorobenzene

"ND" indicates that the parameter was not detected.

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DATACHEM ANALYTICAL REPORT Dututh IAP - Water Samples

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			Dete	ction	-	-	CW1-C	GW1-D	GW1-E	VI-185	81-JS	GW3-A	GW3-B	GW3-C
Parameter M	Method	Units		=i+	Site :		NO	WO	BNO	UNE	NO	THREE	THREE	THREE
ΒPA	EPA 608 (1)	ר/βn	MDL (2)	MDL (†)										
EPA	EPA 608 (1)	ng∕L		0,02		9	Ð	9	Q	(†) N	ND (†)	9	Q	9
EPA	(1) 809	J∕6n		0,004		Ŷ	9	2	2	10.0	0.02	9	2	QN
EPA	608 (1)	J∕bn		0,005		Ð	2	Q	9	9	9	2	Ð	2
EPA	EPA 608 (1)	ղ/ճո		0,006		9	9	9	9	9	2	2	9	QN
EPA	608 (1)	J∕bn		0,005		Q	9	9	9	9	9	9	9	9
EPA	(1) 809	ug/L		0.05		9	9	9	9	Q	9	9	9	Q
ΕÐΑ	608 (1)	J∕bn		0,003		Q	9	9	Ŷ	2	2	2	Ð	Q
EPA	608 (1)	ug/L		<b>0</b> ,006		9	9	9	2	9	2	9	9	QN
ЪA	(1) 809	ng/L		10.0		Q	2	9	9	Q	9	9	Q	Q
EPA	608 (1)	ug/L		0,002		9	2	9	9	9	9	9	9	QN
ΒA	608 (1)	1∕6n		0.036		9	Q	QN	9	Ð	2	2	£	9
EPA	608 (1)	ng∕L		0,012		7	9	9	9	9	9	9	2	QN
Endosulfan Sulfate EPA	EPA 608 (1)	ר/bn		0.01		9	Q	9	9	2	9	9	Ð	2
EPA	EPA 608 (1)	ng/L		0,02		9	9	9	2	9	9	9	9	QN
EPA	EPA 608 (1)	ng∕L		0.01		Ŷ	QN	9	9	9	9	9	9	2
EPA	EPA 608 (1)	J∕bn		0,005		9	9	2	9	9	9	9	2	Q
Heptechtor Epoxide EPA	EPA 608 (1)	J∕bn		0,002		Q	Q	9	9	9	2	2	Q	9
EPA	EPA 608 (1)	J∕bu	0,25	0.25		9	9	9	9	9	9	2	9	QN
6PA	EPA 608 (1)	ן∕bn	<b>60°</b> 0	60 <b>°</b> 0		Ð	Q	9	9	9	9	9	9	2
EPA	EPA 608 (1)	J∕₽u		60°0		9	9	9	9	9	9	9	9	QN
EPA	608 (1)	ך ח6/ך		60 <b>°</b> 0		Q	Ð	QN	Ð	9	9	9	Q	9
EPA	EPA 608 (1)	ng/L		60°0		2	9	2	9	9	9	2	9	QN
EPA	(1) 809	J∕bn		60 <b>°</b> 0		9	2	9	9	9	9	9	2	9
EPA	EPA 608 (1)	ng/L		60°0		9	9	9	2	9	9	9	9	QN
£P≜	608 (1)	ua/L		60 <b>°</b> 0		9	QN	9	2	9	2	2	2	2

(1) This group of samples was analyzed on two instruments. Data collected from the second instrument is indicated by t.

"ND" indicates that the parameter was not detected.

DATACHBH AVALYTICAL REPORT Duiuth IAP - Water Samples

			De te	ction	Fleid #:		SW-3A	SM-3B	SH-3C	GM5-A	GW5-B	GW5-C	SH-5A	SM-5B
Par anotor	Mat hod	Un I ts		mit	Site :		THREE	THREE	THREE*	FIVE	FIVE	FIVE	FIVE	FIVE
Pesticides	EPA 608 (1)	ר) ח/bn	MDL (2)	MDL (†)										
Aldrin	EPA 608 (1)	J∕bn	0.007	0.02		QN	ND (†)	ND (†)	ND (†)	Q	QN	QN	(B) (N	(A) (N)
ai pha-BHC	EPA 608 (1)	Ъl	0,006	0.004		9	QN	9	Q	9	9	9	9	QN
beta-BHC	EPA 608 (1)	J∕ɓn	0,006	0.005		QN	QN	Q	QN	QN	Q	QN	Q	ÛN
del ta-BHC	EPA 608 (1)	ng/L	0.002	0,006		9	2	9	2	9	9	9	9	QN
Lindane	EPA 608 (1)	ר/bn	<b>00</b> 500	0.005		Q	Q	QN	Ð	9	2	QN	QN	QN
Chlordane	EPA 608 (1)	ng/L	0.01	0,05		2	9	Q	2	9	9	9	9	QN
4,4'-D00	EPA 608 (1)	ר/bn	0.004	0.003		QN	QN	Q	Q	Q	Q	Q	QN	Û
4,4'-DDE	EPA 608 (1)	ng/L	0,005	0,006		9	Ð	9	Ð	9	9	9	9	QN
4,4'-DOT	EPA 608 (1)	ר ח∂/ך	0.03	0.01		QN	QN	Q	9	9	Q	9	QN	ÛN
Dieldr In	EPA 608 (1)	ug/L	0,005	0.002		2	9	9	9	9	9	Ð	9	QN
Endosulfan I	EPA 608 (1)	ך/bn	0.01	0.036		QN	Q	Q	QN	9	9	QN	Ð	Ð
Endosul fan 11	EPA 608 (1)	ng/L	10*0	0,012		9	9	9	9	9	9	9	2	NU
Endosulfan Sulfate	EPA 608 (1)	ר חפ∕ר	0.01	0.01		Ð	Q	9	Q	Q	Ð	Q	Q	QN
Endrin	EPA 608 (1)	ng/L	0*006	0,02		9	Ð	9	9	9	9	9	2	QN
Endrin Aidehyde	EPA 608 (1)	۲/бл	0.01	0.01		ð	Q	Ð	Ð	9	9	Ð	Q	Q
Heptachl or	EPA 608 (1)	ng/L	0.007	0,005		9	9	9	9	9	9	9	9	QN
Heptechior Epoxide	EPA 608 (1)	ן∕bn	0.006	0.002		QN	Q	Ð	Ð	Ð	Q	Q	QN	QN
Toxaphene	EPA 608 (1)	ng/L	0.25	0.25		2	Ð	<del>9</del>	Ð	9	9	9	2	QN
Arochior 1016	EPA 608 (1)	uq/L	0,09	00 0 00		QN	Q	QN	QN	Q	Q	Q	Ð	Q
Arochlor 1221	EPA 608 (1)	ng/L	60 <b>°</b> 0	60 <b>°</b> 0		Ð	Q	9	Ð	Ŷ	9	9	2	QN
Arochlor 1232	EPA 608 (1)	۲/bn	0,09	0 <b>°</b> 0		Ŋ	Ð	Q	QN	Q	Q	ÛN.	Q	QN
Arochior 1242		ng/L	60 <b>°</b> 0	60 <b>°</b> 0		9	Ð	2	9	9	9	9	9	QN
Arochior 1248	EPA 608 (1)	۲/bn	<b>0</b> •0	60°0		QN	QN	QN	QN	Q	Q	Q	QN	QN
Arochtor 1254	EPA 608 (1)	ղ/ճո	<b>60°0</b>	60 <b>°</b> 0		Ð	Ð	9	9	9	2	Ð	9	QN
Arochi or 1260	EPA 608 (1)	۲/bn	60 <b>°</b> 0	<b>60°</b> 0		Q	QN	Q	Q	Ð	Q	Q	Ð	Û

* Revised 07/10/87

(1) This group of samples was analyzed on two instruments. Data collected from the second instrument is indicated by t.

DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples

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			Detec	ct ion	Field #:	SW-5C	GW7-A	GW7-B	GW7 -C	AT-WS	GW8-A	GWB-B	GWB-C	SW-8A
Parameter	Method	Un i ts		al t	Site :	FIVE	SEVEN	SEVEN	SEVEN	SEVEN	EIGHT	EIGHT	EI GHT	EIGHT
Pesticides	EPA 608 (1)	ן∕6n	MDL (2)	MDL (†)										
Aldrin	EPA 608 (1)	ר/бл	0,007	0,02		9	Ş	9	£	ND (†)	2	Ð	9	ND (†)
at pha-BHC	EPA 608 (1)	J∕6n	0,006	0.004		9	<del>2</del>	2	2	9	9	9	9	QN
beta-BHC	EPA 608 (1)	ן∕bn	0,006	0,005		9	2	QN	QN	9	9	2	9	9
delta-BHC	EPA 608 (1)	ng/L	0,002	0,006		₽	9	9	9	9	2	9	9	QN
Lindane	EPA 608 (1)	ng/L	0,005	0,005		9	9	9	QN	9	2	9	9	9
Chlordane	EPA 608 (1)	ng/L	0.01	0.05		9	9	2	9	Ð	9	2	9	QN
4.4000	EPA 608 (1)	ng/L	0,004	0,003		GN	Ð	9	Q	9	9	9	9	600°0
4.4006	-	ng/L	0.005	0,006		2	2	9	9	9	9	2	9	Ð
4 41-001	EPA 608 (1)	J/bn	0.03	0.01		ę	9	QN	QN	9	9	9	Ş	9
Dieldrin	EPA 608 (1)	ng/L	0,005	0,002		2	9	9	9	9	9	2	2	QN
Endosulfan 1	EPA 608 (1)	ng/L	0.01	0.036		QN	9	Q	9	2	2	9	9	2
Endosul fan 11	EPA 608 (1)	ng/L	0.01	0,012		Q	9	9	9	9	9	9	2	ON
Endosulfan Sulfate	EPA 608 (1)	ng/L	0.01	0.01		9	Q	9	Ð	9	Q	9	9	9
Endrin	EPA 608 (1)	J/bn	0,006	0,02		9	9	9	9	9	9	9	9	QN
Endrin Aldehvde	EPA 608 (1)	nd/F	0*01	0.01		Q	9	Q	Q	9	9	9	9	9
Heatachlor	EPA 608 (1)	۳d/۲	0.007	0,005		9	9	9	9	9	2	2	9	QN
Heotachior Epoxide	EPA 608 (1)	ר הס/ר	0.006	0,002		9	Q	9	9	2	9	Q	Q	9
Toxaphene	EPA 608 (1)	ng∕L	0.25	0.25		9	9	2	2	9	2	2	2	QN
				00 0		ç	9	Ģ	Q	S	Ģ	ç	GN N	Ŷ
	EPA 606 (1)	- 1/0 				2 2	2 5	2 9	2 2	2	2	2	9	QN
			0.09	0.09		9	9	9	Ð	9	Q	9	2	Ð
Arochlor 1242	608	na/L	60.0	60 0		9	2	9	9	9	9	9	2	QN
Arochior 1248		na/L	0.09	0,09		₽	9	9	9	9	Ð	9	9	Ð
	608	ng/L	0,09	60°0		9	9	9	9	9	2	2	9	QN
Arochlor 1260	EPA 608 (1)	رد مورد	60°0	0.09		9	2	QN	Q	Q	2	Ð	Ð	Ð

(t) This group of samples was analyzed on two instruments. Data collected from the second instrument is indicated by t.

DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples

							TRIP	TRIP
			Dete	Detection	Field#:	SW88	BLANK	BLANK
Parameter	Method	<u>un 15</u>		Limit	Si te :	EIGHT	ONE	SEVEN
Pest ic ides	EPA 608 (1)	ng/L	MDL (2)	MDL (†)				
Aldrin	EPA 608 (1)	ן/b̃n	0.007	0,02		(1) (N	Q	QN
al pha-BHC	EPA 608 (1)	ng∕L	0.006	0.004		9	2	QN
beta-BHC	EPA 608 (1)	ך הק/ר	0.006	0,005		QN	Q	Q
delta-BHC	EPA 608 (1)	J∕bu	0.002	0,006		Q	2	QN
Lindane	EPA 608 (1)	ר/βn	0.005	0,005		Q	2	Q
Chlordane	EPA 608 (1)	ug/L	0.01	0.05		Q	2	QN
4,41-000	EPA 608 (1)	ng∕L	0,004	0.003		•003	QN	Q
4 °4 °00E	EPA 608 (1)	ng/L	0.005	0,006		Q	9	QN
4,4'-00T	EPA 608 (1)	J∕6m	0.03	0.01		0.01	QN	Q
Di el dr in	EPA 608 (1)	ng/L	0,005	0.002		9	2	QN
End as ul fan 1	EPA 608 (1)	۲/бл	0.01	0.036		QN	) N	Q
Endosul fan 11	EPA 608 (1)	ng/L	0*01	0.012		9	9	QN
Endosulfan Sulfate	EPA 608 (1)	ng∕L	0,01	0"01		Q	9	Ð
Endr In	EPA 608 (1)	J∕bu	0,006	0,02		9	9	QN
Endrin Aldehyde	EPA 608 (1)	ng/L	0*01	0.01		Q	Q	QN
Hept ach lor	EPA 608 (1)	ug/L	0,007	0,005		2	9	QN
Heptachlor Epoxide	EPA 608 (1)	ng∕L	0*006	0,002		Q	QN	QN
Toxaphene	EPA 608 (1)	1∕£n	0.25	0.25		g	9	QN
Arochior 1016	EPA 608 (1)	ng/L	60 <b>°</b> 0	0,09		QN	QN	QN
Arochlor 1221	EPA 608 (1)	J/gu	<b>60°0</b>	60°0		g	9	QN
Arochior 1232	EPA 608 (1)	רγ ח/ניי	60 <b>°</b> 0	0°0		Q	Q	Ð
Arochior 1242	EPA 608 (1)	ng/L	60°0	60 <b>°</b> 0		9	9	QN
Arochlor 1248	EPA 608 (1)	J∕bn	0°0	<b>0°</b> 0		9	QN	Q
Arochlor 1254	EPA 608 (1)	J∕bn	60°0	0.09		9	2	QN
Arochior 1260	EPA 608 (1)	ng∕L	<b>0°0</b>	0°0		0 V	ÛN	QN

Revised 07/10/87
 (1) This group of samples was analyzed on two instruments. Data collected from the second instrument is indicated by t.

H-60

Page 60

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#### DATACHEM ANALYTICAL REPORT Duiuth IAP - Water Samples

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Par ana ter	Mathod	un i ts	Detection Limit	Field #: Site :	GWI-A	GW1-C	GW1-D ONE	GW1-E	SW-1A ONE	SW-1B ONE	GM3-A THREE	GW3-B THREE	GW3-C THREE
Herbi cides	EPA 615 (1)	ng/L	MDL (2)										
2,4,5-T	EPA 615 (1)	ng/L	0,08		2	9	Ð	Ð	Q	9	9	2	9
2,4-0	EPA 615 (1)	ng/L	0,08		Q	Q	9	9	Q	9	9	9	QN
SIIvex	EPA 615 (1)	ng/L	0,08		Q	Ŷ	Q	Q	9	9	2	2	9

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### DATACHEM MMALYTICAL REPORT Duluth IAP - Water Samples

CALINUM - JAL MINN

Parameter	Method	Units	Detection Limit	Field #: Site :	GW3-D THREE	SW-3A THREE	SN-38 THREE	SW-3C THREE	GW5-A FIVE	GN5-B FIVE	GM5-C	SN-5A FIVE	SM-5B FIVE
Herbicides	EPA 615 (1)	ן/bn	MDL (2)										
2,4,5-T	EPA 615 (1)	ng/L	0.08		9	Ð	9	£	Ŷ	Ŷ	2	9	9
2,4-0	EPA 615 (1)	ng/L	0,08		Q	9	9	2	9	9	9	2	QN
SIIvex	BA 615 (1)	ng/L	0,08		9	<del>0</del>	9	Ŷ	9	£	2	9	2

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### DATACHEN ANALYTICAL REPORT Duluth IAP - Water Semples

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GHB-C SH-BA	•			ON ON	QN QN
GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-B GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C GWB-C C GWB-C C GWB-C C C C C C C C C C C C C C C C C C C	- 1			2	9
GWB-A		Ş	2	2	9
SM-7A SEVEN		£	<u>;</u>	2	Ŷ
GW7-C SEVEN		Q	-	2	Ð
GW7-B SEVEN		9	ş	2	2
GW7-A SEVEN		0.08	ŝ	2	2
GM-5C FIVE		Q	9		<u>n</u>
Field #: Site :					
Detection Limit	MDL (2)	0.08	0,08	90 Q	00.00
un i ts	1∕bn	J∕bn	ng/L	1/01	, Ŝ
Method	(1) 919 V.J	EPA 615 (1)	EPA 615 (1)	EPA 615 (1)	
Par ameter	Herbicides	2 "4 "5–T	2 <b>,4</b> -D	Silvex	

"NO" indicates that the parameter was not detected.

### DATACHEM MULYTICAL REPORT Duluth IAP - Water Samples

Parameter	Ne thod	un i ts	Detection Limit	Fleid #: Site :	SW-88 E1GHT	TR I P BLANK ONE	TR I P BLANK THREE	TRIP BLANK EIGHT
Harbic ides	EPA 615 (1)	ng/L	MDL (2)					
2,4,5-T	EPA 615 (1)	J∕£n	0,08		Q	Ð	9	Q
2,4-0	EPA 615 (1)	ng∕L	0.08		9	9	9	QN
Silvex	EPA 615 (1)	∩d∕L	0,08		9	Q	9	9

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# DATACHEM MULYTICAL REPORT Duluth IAP - Water Samples

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			Detection	Field #:	GW1-A	GW1-C	GW1-D	GW1-E	SH-1A	SH-18	GW2-A	GW2-B	GW2-C
Par aneter	Method	un ts	Limit	Site :	ONE	ONE	ONE	ONE	ONE	ONE	OWL	OWL	TWO
011 and Grease	EPA 413.2 (7)	J∕E	-		Đ	9	ହ	<del>Q</del>	Ŷ	Đ	£	2.	9
Pheno I I cs	EPA 420.2 (7)	J∕ɓn	5.		Q	Ŷ	9	9	Q	Ð	9	Ŷ	QN
Arsen Ic	EPA 206 _* 2 (7)	J∕E	0.01		(51) (N	(S1) (N	(51) QN	(51) ON	ç	Q			
Berium	EPA 208.1 (7)	mg/L	0.2		1.2	1.2	0.2	0•2	£	QN			
Cadmium	EPA 213.1 (7)	J∕£	0.01		0.01	0.02	9	Q	Ŷ	Ð			
Chromium	EPA 218.1 (7)	mg/L	0*05		1.3	0.64	0.22	0.08	£	QN			
Lead	EPA 239.2 (7)	mg∕L	0.02		0.06	0.03	(E1) QN	(E1) QN	<del>Q</del>	Q			
Mercury	EPA 245.1 (7)	mg/L	0,001		0,001	9	9	2	9	QN			
Selenium	EPA 270.2 (7)	mg∕L	0.01		ND (15) N	(S1) ON	ND (15)	(51) ON	ND (15) N	(51) QN			
S I I var	EPA 272.1 (7)	J∕l	0.01		0.03	0,02	9		Ð	Q			

DATACHEN ANALYFICAL REPORT Duluth IAP - Water Samples

NW-5 Q QN M-4 99 110 110 99 1-MM 22 SH-2C 22 SW-2B 99 SN-2A 22 GW2-E 22 GW2-D 9 9 Field 🕼: Site : Detection Limi+ 0.001 0.02 10.0 0.01 0°05 10.0 0.01 0.2 \$ ч9/г mg/L J/6m Units J/Gm mg/L ₩6/۲ J∕gm ₩9⁄Ľ ng∕L EPA 270+2 (7) GPA 239.2 (7) EPA 245.1 (7) EPA 213.1 (7) EPA 218.1 (7) EPA 208.1 (7) EPA 413.2 (7) EPA 420.2 (7) EPA 206.2 (7) Mathod Par amotor Oil and Grease Phenol I cs Chromitum Selenium Arsenic Cadmium Mercury Barlum Lead

mg∕L

EPA 272.1 (7)

SILVER

Page 66

99-H

"NO" indicates that the parameter was not detected.

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### DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples

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			Detection	Field #:	<b>M</b> -6	NW-7	GW3-A	GW3-B	GM3-C	GM3-D	SW-3A	SH-38	SE-3C
Par ameter	Method	Units	Limit	Site :	0ML	91	THREE	THREE	THREE	THREE	THREE	THREE	INC
011 and Grease	EPA 413.2 (7)		_•		9	Q	Ð	Q	Q	9	-	QN	QN
Phenolics	EPA 420.2 (7)	ng/L	5.		Û	9	Ŷ	16.	12.	Q	2	ę	QN
Arsenic	EPA 206.2 (7)	J∕L	0.01				ND (13)	(£1) (N	(E1) ON	(£1) ON	9	0.02	Q
Bar iun	EPA 208.1 (7)	mg/L	0.2				0.4	-	Q	0.5	9	0•6	0.1
Cada i un	EPA 213.1 (7)	т/Сш	0.01				9	QN	9	9	Q	0.14	0•06
Chromium	EPA 218.1 (7)	mg/L	0.05				0*30	0.71	0*01	0•20	9	0.20	QN
Lead	EPA 239.2 (7)	mg∕L	0.02				QN	0.03	Q	Ŷ	0.04	0.76	0.14
Mercury	EPA 245.1 (7)	mg∕L	0,001				9	9	₽	Ŷ	9	9	QN
Selenium	EPA 270.2 (7)	mg∕L	0.01				Q	QN	2	Q	ND (15)	(51) QN	(51) QN
Sil var	EPA 272,1 (7)	mg/L	0.01				9	9	Q	<del>9</del>	9	9	QN

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DATACHEN NUL'	uth IAP -
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			Detection	Field		GW-4B	GW-4C	GW-4D	44-NS	84-MS	SM-AC	SH-4D	<b>6-MM</b>
Par ameter	Met hod	Units	Limit	Site :	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR
011 and Grease	EPA 413.2 (7)	<b>ч/б</b> ш	-			Q	Ð	Q	9	-	2.	9	Ŷ
Phenoi i cs	EPA 420.2 (7)	ng/L	ur!										
Arsen ic	EPA 206.2 (7)	mg/L	0*01										
Bar I un	EPA 208.1 (7)	mg/L	0.2										
Cade I un	EPA 213.1 (7)	mg/L	10.01										
Chromium	EPA 218.1 (7)	mg/L	0*05										
Lead	EPA 239.2 (7)	mg/L	0•02										
Mercury	EPA 245.1 (7)	mg/L	0*001										
Selenium	EPA 270.2 (7)	mg/L	0.01										

0.01

EPA 272.1 (7) mg/L

Silver

Page 68

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II-68

### DATACHEM MULYFICAL REPORT Duiuth IAP - Water Samples

	:		Detection F	Field #:	6-MW	MM-10	11-MM	GW5-A	GW5-B	GW5-C	SH-5A	SM-5B	S2-5C
Par ameter	Method			5176 :	HIOH	FOUR	FOUR	F I VE	FIVE	FIVE	FIXE		FIVE
Oil and Greese	EPA 413.2 (7)	mg∕L	-		2.	9	Q	QN	9	9	Q	Ð	Q
Phenolics	EPA 420.2 (7)	ng/L	5.					9	₽	9	2	2	QN
Arsen ic	EPA 206.2 (7)	J∕Em	0.01					ND (15)	(51) ON	(SI) (N	ND (15)	(15) UN	(51) ON
Bar i un	EPA 208.1 (7)	mg/L	0.2					9	Ŷ	9	9	9	QN
Cadin i un	EPA 213.1 (7)	mg/L	0.01					QN	9	2	9	Đ	Q
Chromium	EPA 218.1 (7)	mg/L	0.05					Ð	9	<del>Q</del>	9	9	QN

ND (15) ND (15) ND (15) ND (15)

ND (15)

ND (15)

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Selenium

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Lead

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EPA 239.2 (7) EPA 245.1 (7) EPA 270.2 (7) EPA 270.2 (7)

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# DATACHEM MULYTICAL REPORT Duluth IAP - Water Samples

			Detection	Field 🖊 :	GW7-A	GW7-B	GW7-C	SW-7A	GW8-A	GW8 +B	GWB-C	SW-8A	SW-88
Par ameter	Mathod	Un i ts	Limit	Site :	SEVEN	SEVEN	SEVEN	SEVEN	EI GHT	EI GHT	EI GHT	EI GHT	EIGHT
0il and Grease	EPA 413.2 (7)	<b>ш</b> д/Г	-		9	Q	9		9	9	9	9	٦.
Phenol I cs	EPA 420.2 (7)	1/6n	5.		9	Q	28.	2	2	9	2	9	QN
Arsenic	EPA 206.2 (7)	mg/L	0.01		(SI) (N	(51) ON	9	ND (15)	(E1) UN	ND (13)	(£1) ON	(51) ON	(51) ON
Bar I um	EPA 208.1 (7)	mg∕L	0.2		0 <b>.</b> 5	0.5	9	2	0.3	0 <b>•</b> 5	1.0	9	QN
Cadra I um	EPA 213.1 (7)	mg/L	0.01		9	QN	0,02	Q	Ŷ	9	2	2	9
Chromium	EPA 218.1 (7)	J∕lam	0.05		0.11	0,32	9	9	0•10	0*30	0.52	2	QN
Lead	EPA 239.2 (7)	<b>mg/L</b>	0.02		ND (13)	0.11	Q	9	9	2	9	0.04	0.03
Mercury	EPA 245.1 (7)	J∕bm	0.001		9	2	9	9	9	9	2	9	QN
Sel en lum	EPA 270.2 (7)	۳9/L	0.01		(51) (N	ND (15)	Ð	(S1) (N	9	9	Q	ND (15)	ND (15)
Silver	EPA 272.1 (7)	mg/L	0.01		9	0.01	2	2	9	2	9	9	QN

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## DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples

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					TRIP	RIP	THIP	TRIP	TRIP	TRIP	BAILER	RI NSE	BAILER
Parameter	Me thod	Un i ts	Detection Limit	Field #: Site :	BLANK	BLANK THREE	BLANK	BLANK	BLANK	BLANK	RI NSE SEVEN	BLANK	RI NGE EI GHT
Oil and Grease	EPA 413.2 (7)	J∕ɓш	-				9					Ð	
Phenol Ics	EPA 420.2 (7)	ng∕L	5.					9	â			9	9
Arsen Ic	EPA 206.2 (7)	mg∕L	0,01			ND (13)					Q		
Barium	EPA 208.1 (7)	ч <i>/</i> бш	0.2			QN					Ŷ		
Cadmi lum	EPA 213.1 (7)	mg/L	0.01			9					ON		
Chromium	EPA 218.1 (7)	J∕E	0 <b>°</b> 05			Q					Ŷ		
Lead	EPA 239.2 (7)	mg/L	0•02			Q					QN		
Mercury	EPA 245.1 (7)	<b>ч/б</b> ш	0,001		Q	9		Ð		9	Ð		
Seten ium	EPA 270.2 (7)	J∕b‴	0.01			Ŷ					QN		
Silver	EPA 272.1 (7)	mg∕L	0.01			9					Ð		

### DATACHEM MULTICAL REPORT Duluth IAP - Water Samples

Par ameter	Rad lol ogy	Gross Alpha Std. M	Grass Beta Std. M	Radium-226 Std. M	Redium-228 Std. M
Method		Std. Method 703 (11)	Std. Method 703 (11)	Std. Method 706 (11)	Method 708 (11)
(hits		pC1/L	pCi/L	PCI/L	pC1/L
Detection Field #: Limit Site :		-	-	0.6	-
Field#: Site :					
GW10-A TEN		8 ± 6	6±3	3.4 ± 2.0	<del>9</del>
GW10-B TEN		18 ± 8	12 ± 3	5 <b>.</b> 0 ± 2.8	9
GW10-C		8 ± 5	9 ± 3	QN	QN

Footnotes - Analytical Report

- "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater," Federal Register, Volume 49, Number 209, October 26, 1984. Ξ
  - Determined according to the procedure documented in Federal Register, October 26, 1984, Part VIII. (2)
    - Combined analysis of cis and trans isomers with listed detection limit. 3
- Combined analysis of meta, ortho, and para isomers which listed detection limit. £ 6 9
  - Sample diluted 1:100 for analysis with corresponding increase in detection limit.
    - "Leboratory Determination of Moisture Content of Soil," ASTM 02216-71.
- "Methods for Chemical Analysis of Water and Wastes," EPA Manual 600/4-79-020, USEPA, March, 1983.
  - "Monual of Analytical Methods, Third Edition", NIOSH 84-100, 1985, (Modified) 6 8 6
- "Test Methods for Evaluaring Solid Waste, Physical/Chemical Methods," EPA SM-846, Second Edition, USEPA, 1982.
- "Standard Methods for Examination of Water and Wastewater," 16th Edition, American Public Health Associates, 1985. **G D** 
  - sample diluted 1:3 for analysis with corresponding increase in detection limit. (12)
    - Sample diluted 1:5 for analysis with corresponding increase in detection limit. (13)
- Sample diluted 1:8 for analysis with corresponding increase in detection limit. (†)
- Sample diluted 1:10 for analysis with corresponding increase in detection limit. (15)
  - Sample diluted 1:30 for analysis with corresponding increase in detection limit. (91)

			DATAC	DATACHEN ANALYTICAL REPORT	ICAL REPORT						
			OH ING	Hotoling Time Summary	Summary						
		Fleid #:	B1-A 0-1•5	B1-A* 2 <b>-</b> 5-4	81-A 5-6•5	GW1-A 10-11.5	GW1-B 5-6.5	GW1-E 20-21.5	SS-1A	SS-18	В2-В 0-1.5
Parameter	Ma thod( *)	Site :	ONE	ONE	ONE	ONE	ONE	ONE	ONE	ONE	OML
SAMPLING DATE			11/19/86	11/19/86	11/19/86	11/18/86	11/19/86	11/20/86	11/23/86	11/23/86	11/12/86
Purgeable Haiocarbons Date Analvzad	EPA 8010		11/24/86	11/24/86	11/24/86	11/24/86	11/24/86	12/04/86	12/01/86	12/01/86	11/23/86
El apsed Time			5 days	5 days	5 days	6 days	5 days	14 days	8 days	8 days	11 days
Purgeable Arcmatics	EPA 8020									20110/01	20/20/11
Uate Analyzed Elapsed Time			11/24/86 5 days	5 days	11/24/86 5 days	6 days	5 days	12/04/80 14 days	8 days	8 days	08/c7/11
Pesticides/PCBs	EPA 3550/8080										
Date Extracted			11/21/86	11/27/86	11/27/86	11/27/86	11/27/86	11/26/86	11/30/86	11/30/86	
Elapsed Time			8 days 12/01/86	8 days 12/01/86	8 Jays 12/01/86	9 days 12/01/86	8 days 12/01/86	6 days 12/01/86	/ days 12/05/86	/ 0ays 12/05/86	
Elapsed Time			4 days	4 days	4 days	4 days	4 days	5 days	5 days	5 days	
Herbi cides	EPA 3550/8150										
Date Extracted			11/26/86	11/26/86	11/26/86	11/26/86	11/26/86	11/26/86	11/28/86	11/28/86	
Elapsed Time			7 days	7 days	7 days	8 days	7 days	6 days	5 days	2/20/2012	
Uate Analyzed			08/77/71 26 Jane	76 dave	09/77/71	16/22/00 26 dave	76 dave	26 dave	25 dave	25 davs	
Elapsed Ilme			skpn oz	sken oz	sken oz						
Moisture	EPA 160.3										
Date Analyzed			12/11/86	12/11/86	12/11/86	12/11/86	12/11/86	12/02/86	0 4316	0 4 ave	11/24/80
Elapsed Time			22 days	22 days	sken 77	skpn c7	cápn 77	chan 71	ckon c		

* Revised 07/10/87
(*) Methods documented in previous Analytical Report section.

Page 75

7

II-73

			Dulut Ho	DNTACHEN ANALYTICAL REPORT Duluth IAP - Soll Samples Holding Time Summary	AL REPORT Samples ummary						
Parameter Swift INS DATE	Me thod	Field #: Site :	B2-B 2.5-4 TWO 11/12/86	82-8 5-6,5 TWO 11/12/86	B2-C 0-1.5 11/17/86	B2-C 2.5-4 	B2-C 5-6,5 TMO 11/17/86	GW2-A 5-6.5 TW0 11/13/86	GW2-B 5-6.5 11/14/86	GW2-C 15-165 <u>TW0</u> 11/14/86	GW2-D 15-16.5 TWO 11/17/86
Purgeable Halocarbons Date Analyzed Elapsed Time	EPA 8010		11/23/86 11 days	11/23/86 11 days	11/25/86 8 days	11/25/86 8 days	11/25/86 8 days	11/23/86 10 days	11/23/86 9 d <b>ays</b>	11/23/86 9 days	11/25/86 8 days
Purgeable Arcmatics Date Analyzed Elapsed Time	EPA 8020		11/23/86 11 days	11/23/86 11 days	11/25/86 8 days	11/25/86 8 days	11/25/86 8 days	11/23/86 10 days	11/23/86 9 days	11/23/86 9 days	11/25/86 8 days
Pesticides/PCBs Date Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 3550/8080										
Herbicides Date Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 3550/8150										
Moisture Date Analyzed Elapsed Time	EPA 160.3		11/24/86 12 days	11/24/86 12 days	12/02/86 15 days	12/02/86 15 days	12/02/86 15 days	11/24/86 11 days	11/24/86 10 days	11/24/86 10 days	12/02/86 15 days

H-74

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			DATAC	DATACHEN MALYTICAL REPORT Dututh IAP - Soit Samolas	CAL REPORT						
			± ₹	Holding Time Summary	Summary						
		Fleid #:	GW2-E 15-16_5	SS-2A	SS-2B	SS-2C	B3-A 0-1-5	83-A 2_5-4	B3-A 5-6_5	83-8 0-1_5	83-8 2.5-4
Parameter	Method	Site :	TWO	TWO	DWL	OML	THREE	THREE	THREE	THREE	THREE
SAMPLING DATE			11/17/86	11/22/86	11/22/86	11/22/86	11/25/86	11/25/86	11/25/86	11/25/86	11/25/86
Purgeable Halocarbons Date Analyzed Elapsed Time	EPA 8010		11/25/86 8 days	12/01/86 9 days	12/01/86 9 d <b>a</b> ys	12/01/86 9 days	12/06/86 11 days	12/06/86 11 days	12/06/86 11 days	12/06/86 11 days	12/06/86 11 days
Purgeable Arcmatics Date Analyzed Elapsed Time	EPA 8020		11/25/86 8 days	12/01/86 9 days	12/01/86 9 days	12/01/86 9 days	12/06/86 11 days	12/06/86 11 days	12/06/86 11 days	12/06/86 11 days	12/06/86 11 days
Pesticides/PCBs Date Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 3550/8080						12/02/86 7 days 12/05/86 3 days	12/02/86 7 da <b>ys</b> 12/05/86 3 days	12/02/86 7 days 12/05/86 3 days	12/02/86 7 days 12/05/86 3 days	12/02/86 7 days 12/05/86 3 days
Herbicides Date Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 3550/8150						12/02/86 7 days 12/25/86 23 days	12/02/86 7 days 12/25/86 23 days	12/02/86 7 days 12/25/86 23 days	12/02/86 7 days 12/25/86 23 days	12/02/86 7 days 12/25/86 23 days
Moisture Date Analyzed Elapsed Time	EPA 160.3		12/02/86 15 days	12/02/86 10 days	12/02/86 10 days	12/02/86 10 days	12/22/86 27 days	12/22/86 27 da <b>ys</b>	12/22/85 27 days	12/22/86 27 d <b>ays</b>	12/22/86 27 days

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#### CATACHEN ANALYTICAL REPORT Duluth IAP - Soli Semples Holding Time Summary

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SS-3A <u>THREE</u> * 11/22/86	5 12/02/86 10 days	5 12/02/86 10 days	; 11/29/86 7 days 5 12/05/86 6 days	5 11/28/86 6 days 5 12/23/86 1 25 days	5 12/02/86 1 10 days
GM3-D 5-6.5 <u>THREE</u> 12/02/86*	12/10/86 8 days*	12/10/86 8 days*	12/08/86 6 days* 12/14/86 5 days*	12/08/86 6 days* 12/28/86 19 days*	12/22/86 20 days*
GW3-B 5-6,5 <u>THREE</u> 12/02/86*	12/10/86 8 days*	12/10/86 8 days*	12/08/86 6 days* 12/14/86 5 days*	12/08/86 6 days* 12/28/86 19 days*	12/22/86 20 days*
GW3-A 5-6,5 THREE 11/26/86	12/06/86 10 days	12/06/86 10 days	12/02/86 6 d <b>ays</b> 12/05/86 3 days	12/02/86 6 days 12/25/86 23 days	12/22/86 26 days
B3-C 5-6.5 <u>THREE</u> 12/01/86	12/10/86 9 days	12/10/86 9 days	12/08/86 7 days 12/14/86 6 days	12/08/86 7 days 12/28/86 20 days	12/22/86 21 da <b>ys</b>
83-C 5-6.5 <u>THREE</u> 11/25/86	12/06/86 11 days	12/06/68 11 days	12/02/86 7 days 12/05/86 3 days	12/02/86 7 days 12/25/86 23 days	12/22/86 27 days
B3C 2.5-4 THREE 11/25/86	12/06/86 11 days	12/06/86 11 days	12/02/86 7 days 12/05/86 3 days	12/02/86 7 days 12/25/86 23 days	12/22/86 27 days
B3-C 0-1.5 <u>THREE</u> 11/25/86	12/06/86 11 days	12/06/86 11 days	12/02/86 7 days 12/05/86 3 days	12/02/86 7 days 12/25/86 23 days	12/22/86 27 days
B3-B 5-6.5 <u>THREE</u> 11/25/86	12/06/86 11 days	12/06/86 11 days	12/02/86 7 days 12/05/86 3 days	12/02/86 7 days 12/25/86 23 days	12/22/86 27 days
Fleid #: Site :					
Me thod	EPA 8010	EPA 8020	EPA 3550/8080	EPA 3550/8150	EPA 160.3
Parameter SMPLING DATE	Purgeable Halocarbons Date Analyzad Elapsed Time	Purgeable Arcmatics Date Analyzed Elapsed Time	Pesticides/PCBs Date Extracted Elapsed Time Date Analyzed Elapsed Time	Herbicides Date Extracted Elapsed Time Date Analyzed Elapsed Time	Moisture Date Analyzed Elapsed Time

* Revised 07/10/87

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			0 ±	Holding Time Summary	Summary					
Parameter Swepting DATE	Ne thod	Field#: Site :	SS-58 THREE 11/22/86	55-90 THREE 11/22/86	84-A 2.5-4 FOUR 12/02/86	84-A 5-6,5 FOUR 12/02/86	84-A 7,5-9 FOUR 12/02/86	84-8 2.5-4 FOUR 12/02/86	84-8 5-6.5 Four 12/02/86	84-8 7,5-11.5 FOUR 12/02/86
Purgeable Halocarbons Date Analyzed Elapsed Time	EPA 8010		12/02/86 10 days	12/02/86 10 days	12/11/86 9 days	12/11/86 9 days	12/11/86 9 days	12/11/86 9 days	12/11/86 9 days	12/11/86 9 days
Purgeable Arcmatics Date Analyzed Elapsed Time	EPA 8020		12/02/86 10 days	12/02/ <b>86</b> 10 days	12/11/86 9 days	12/11/86 9 days	12/11/86 9 days	12/11/86 9 days	12/11/86 9 days	12/11/86 9 days
Pesticides/PCBs Dete Extracted Elapsed Time Dete Analyzed Elapsed Time	EPA 3550/8080		11/29/86 7 days 12/05/86 6 days	11/29/86 7 days 12/05/86 6 days						
Herbicides Date Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 3550/8150		11/28/86 6 days 12/23/86 25 days	11/28/86 6 days 12/23/86 25 days						
Moisture Date Analyzed Elapsed Time	EPA 160.3		12/02/86 10 days	12/02/86 10 days	12/22/86 20 days	12/22/86 20 days	12/22/86 20 days	12/22/86 20 days	12/22/86 20 days	12/22/86 20 days

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Page 77

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# DATACHEM ANALYTICAL REPORT Duluth IAP - Soil Samples Holding Time Summary

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			B4-C	84-C	84-C	84-D	84-D	84-D	84-E	B4-E	GW4-A
		Field #:	2.5-4	5-6.5	7.5-9	2.5-4	5-6.5	7.5-9	2.5-4	5-6.5	10-11.5
Parameter	Method	Site :	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR
SAMPLING DATE			12/04/86	12/04/86	12/04/86	12/04/86	12/04/86	12/04/86	12/05/86	12/05/86	12/02/86
Purgeable Halocarbons Date Analyzed Elapsed Time	EPA 8010		12/12/86 8 days	12/12/86 8 days	12/12/86 8 days	12/12/86 8 days	12/12/86 8 days	12/12/86 8 days	12/13/86 8 days	12/13/86 8 days	12/11/86 9 days
Purgeable Arcmatics Date Analyzed Elansad Time	EPA 8020		12/12/86 8 davs	12/12/86 8 days	12/12/86 8 days	12/12/86 8 days	12/12/86 8 days	12/12/86 8 days	12/13/86 8 days	12/13/86 8 days	12/11/86 9 days
Pesticides/PCBs Date Extracted Elapsed Time	EPA 3550/8080										
Date Analyzed Elapsed Time Herbicides	EPA 3550/8150										
Dote Extracted Elapsed Time Dote Analyzed Elapsed Time											
Moisture Date Analyzed Elapsed Time	EPA 160.3		12/22/86 18 days	12/22/86 18 days	12/22/86 18 d <b>ays</b>	12/22/86 18 days	12/22/86 18 days	12/22/86 18 days	12/22/86 17 days	12/22/86 17 days	12/22/86 20 days

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	GM5-B 9.5-11 F1VE 11/21/86	12/04/86 13 days	12/04/86 13 days	11/26/86 5 days 12/01/86 5 days	11/28/86 7 days 12/23/86 25 days	12/02/86 11 days
	GW5-A 5-6.5 FIVE 11/21/86	12/04/86 13 days	12/04/86 13 days	11/26/86 5 days 12/01/86 5 days	11/28/86 7 days 12/23/86 25 days	12/02/86 11 days
	55-40 FOUR 11/23/86	12/03/86 10 d <b>ays</b>	12/03/86 10 days			12/02/86 9 days
	55-4C FOUR 11/23/86	12/03/86 10 days	12/03/86 10 days			12/02/86 9 days
	55-48 FOUR 11/23/86	12/03/86 10 days	12/03/86 10 days			12/02/86 9 days
	55-4A FOUR 11/23/86	12/03/86 10 days	12/03/86 10 days			12/02/86 9 days
AL REPORT Samples ummary	GM4-D 5-6.5 FOUR 12/03/86	12/10/86 7 days	12/10/86 7 days			12/22/86 19 days
DATACHERIA MAALYTICAL REPORT Duluth IAP - Soli Samples Holding Time Summary	GM4-C 10-12 FOUR 12/03/86	12/10/86 7 days	12/10/86 7 days			12/22/86 19 days
DATACH Dulutt Hol	GW4-B 5-6,5 FOUR 12/03/86	12/10/86 7 days	12/10/86 7 days			12/22/86 19 days
	Field #: Site :					
	Me thod	EPA 8010	EPA 8020	EPA 3550/8080	EPA 3550/8150	EPA 160.3
	Parameter Swerling DATE	Purgeable Halocarbons Date Analyzed Elapsed Time	Purgeable Arcmatics Date Analyzed Elapsed Time	Pesticides/PCBs Date Extracted Elapsed Time Date Analyzed Elapsed Time	Herbicides Date Extracted Elapsed Time Date Analyzed Elapsed Time	Moisture Date Analyzed Elapsed Time

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sture EPA 160.3 12/02/86 12/02/86 12/02/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86 12/03/86
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		Duluth Duluth Hot	DATACHEN ANALYTICAL REPORT Duluth IAP - Soll Somples Holding Time Summary	AL REPORT Samples Jammery						
Method	Fleid#: Site :	B6-H 2,5-4 51X 11/18/86	B7-A 0-1.5 SEVEN 11/24/86	B7-A 2.5-4 SEVEN 11/24/86	87-8 0-1.5 5EVEN 11/24/86	87-8 2.5-4 SEVEN 11/24/86	GN7-A 10-11.5 <u>SEVEN</u> 11/23/86	GW7-8 10-11.5 SEVEN 11/23/86	GWT-C 15-16.5 SEVEN 11/24/86	SS-7A* SEVEN 11/24/86
EPA 8010		11/24/86 6 days	12/08/86 14 days	12/08/86 14 days	12/08/86 14 days	12/08/86 14 days	12/01/86 8 days	12/01/86 8 days	12/08/86 14 days	12/08/86 14 days
EPA 8020		11/24/86 6 days	12/08/86 14 days	12/08/86 14 days	12/08/86 14 days	12/08/86 14 days	12/01/86 8 days	12/01/86 8 days	12/08/86 14 days	12/08/86 14 days
EPA 3550/8080			12/01/86 7 days 12/05/86 4 days	12/01/86 7 days 12/05/86 4 days	12/01/86 7 days 12/05/86 4 days	12/01/86 7 days 12/05/86 4 days	11/30/86 7 days 12/05/86 5 days	11/30/86 7 days 12/05/86 5 days	12/01/86 7 days 12/05/86 4 days	12/01/86 7 days 12/05/86 4 days
EPA 3550/8150			12/01/86 7 days 12/21/86 26 days	12/01/86 7 days 12/21/86 26 days	12/01/86 7 days 12/27/86 26 days	12/01/86 7 days 12/21/86 26 days	11/28/86 5 days 12/23/86 25 days	1 1/28/86 5 days 12/23/86 25 days	12/01/86 7 days 12/27/86 26 days	12/01/86 7 days 12/27/86 26 days
EPA 160.3		12/03/86 15 days	12/22/86 28 days	12/22/86 28 days	12/22/86 28 days	12/22/86 28 days	12/02/86 9 days	12/02/86 9 days	12/22/86 28 days	12/22/86 28 days

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Page 81

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			DATAC	ONTACHEN ANALYTICAL REPORT	ICAL REPORT						
			Du l ud Ho	Duluth IAP - Soil Samples Holding Time Summary	il Samples Summary						
Parámeter	Method	Fleid #: Site :	B8-A 0-1.5 E1GHT	88-A 2.5-4 EIGHT	B8-A 5-6.5 E1GHT	B8-B 0-1.5 E1GHT	88-8 2.5-4 EIGHT	88-8 5-6.5 EIGHT	GW8-A 5-6.5 ELGHT	GW8-B 10-11.5 E1GHT	GWB-C 10-11.5 E1GHT
SAMPLING DATE			12/05/86	12/05/86	12/05/86	12/06/86	12/06/86	12/06/86	12/06/86	12/06/86	12/07/86
Purgeable Halocarbons Date Analyzed Elapsed Time	EPA 8010		12/12/86 7 days	12/12/86 7 days	12/12/86 7 days	12/12/86 6 days	12/12/86 6 days	12/12/86 6 days	12/12/86 6 days	12/12/86 6 days	12/14/86 7 days
Purgeable Arcmatics Date Analyzed Elapsed Time	EPA 8020		12/12/86 7 days	12/12/86 7 days	12/12/86 7 days	12/12/86 6 days	12/12/86 6 days	12/12/86 6 days	12/12/86 6 days	12/12/86 6 days	12/14/86 7 days
Pesticides/PCBs Date Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 3550/8080		12/09/86 4 days 12/14/86 5 days	12/09/86 4 days 12/14/86 5 days	12/09/86 4 days 12/14/86 5 days	12/09/86 3 days 12/14/86 5 days	12/09/86 3 days 12/14/86 5 days	12/09/86 3 days 12/14/86 5 days	12/09/86 3 days 12/14/86 5 days	12/09/86 3 days 12/14/86 5 days	12/14/86 7 days 01/08/87 25 days
Herbicides Date Extracted Eiapsed Time Date Analyzad Elapsed Time	EPA 3550/8150		12/11/86 6 days 12/24/86 13 days	12/11/86 6 days 12/24/86 13 days	12/11/86 6 days 12/24/86 13 days	12/11/86 5 days 12/24/86 13 days	12/11/86 5 days 12/24/86 13 days	12/11/86 5 days 12/24/86 13 days	12/11/86 5 days 12/24/86 13 days	12/11/86 5 days 12/24/86 13 days	
Moisture Date Analyzed Elapsed Time	EPA 160.3		12/22/86 17 days	12/22/86 17 days	12/22/86 17 days	12/22/86 16 days	12/22/86 16 days	12/22/86 16 days	12/22/86 16 d <b>ays</b>	12/22/86 16 days	12/22/86 15 days

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DNTACHBM ANALYTICAL REPORT Duluth JAP - Soil Samples Holding Time Summary

		Flald .	SS-BA*	SS-86#
Par ameter	Mathod	Si te :	EI GHT	EIGHT
SAMPLING DATE			11/25/86*	11/25/86*
Purgeable Halocarbons Date Analyzed Elapsed Time	EPA 8010		12/08/86 13 days#	12/08/86 13 days*
Purgeable Aromatics Date Analyzed Elapsed Time	EPA 8020		12/08/86 13 days*	12/08/86 13 days <b>*</b>
Pesticides/PCBs Date Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 3550/8080		12/02/86 7 days* 12/05/86 4 days*	12/02/86 7 days* 12/05/86 4 days*
Herbicides De te Extracted Elapsed Time Da te Analyzed Elapsed Time	EPA 3550/8150		12/02/86 7 days* 12/27/86 26 days*	12/02/86 7 days* 12/27/86 26 days*
Moisture Date Analyzad Etapsed Time	EPA 160.3		12/22/86 27 days*	12/22/86 27 days*

* Revised 07/10/87

NALYTICAL REPORT	o - Soll Samples	Time Summary	
DATACHEN MULTIICAL REPORT	Duluth IAP - Soll Samples	Holding Time Summary	

Parameter	Me thod	Fleid∦: Site :	B1-A 0-1.5 ONE	B1-A 2.5-4 ONE	B1-A 5-6.5 ONE	GW1-A 10-11.5 ONE	GW1-B 5-6,5 ONE	GW1-E 20-21.5 ONE	SS-1A ONE	SS-1B ONE	62-8 0-1.5 Two
SAMPLING DATE			11/19/86	11/19/86	11/19/86	11/18/86	11/19/86	11/20/86	11/23/86	11/23/86	11/12/86
0il å Grease Date Analyzed Elapsed Time	EPA 413,2		12/11/86 22 days	12/11/86 22 days	12/11/86 22 days	12/11/86 23 days	12/11/86 22 days	12/09/86 19 days	12/09/86 16 days	12/09/86 16 days	11/26/86 14 days
Phenol Date Analyzed Elapsed Time	EPA 420.2		12/03/86 14 days	12/03/86 14 days	12/03/86 14 days	12/03/86 15 days	12/03/86 14 days	12/03/86 13 days	12/03/86 10 days	12/03/86 10 days	11/26/86 14 days
Arsenic Date Analyzed Elapsed Time	EPA 3050/7060		12/03/86 14 days	12/03/86 14 days	12/03/86 14 days	12/03/86 15 days	12/03/86 14 days	12/09/86 19 days	12/04/86 11 days	12/04/86 11 days	
Ba, Ca, Cr, Pb, Ag Date Analyzed Elapsed Time	EPA 3050/6010/200.7		01/05/87 47 days	01/05/87 47 days	01/05/87 47 days	01/05/87 48 days	01/05/87 47 days	01/12/87 53 days	01/05/87 43 days	01/05/87 43 days	
Mercury Date Analyzed Elapsed Time	EPA 7471		11/26/86 7 days	11/26/86 7 days	11/26/86 7 days	11/26/86 8 days	11/26/86 7 days	12/08/86 18 days	12/04/86 11 days	12/04/86 11 days	
Selenium Date Analyzed Elapsed Time	EPA 3050/7740		12/04/86 15 days	12/04/86 15 days	12/04/86 15 days	12/04/86 16 days	12/04/86 15 days	12/09/86 19 days	12/04/86 11 days	12/04/86 11 days	

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			DATAC	DATACHEN ANALYTICAL REPORT	cal report						
			Du tut Ho	Duiuth IAP - Soil Sammples Holding Time Summary	il Samples Summary						
Parameter SAMPLING DATE	Me thod	Field #: Site :	B2-B 2.5-4 TWO 11/12/86	B2-B 5-6.5 TWO 11/12/86	B2-C 0-1.5 TWO 11/17/86	82-C 2.5-4 TWO 11/17/86	82-C 5-6.5 11/17/86	GW2-A 5-6.5 TWO 11/13/86	GW2-B 5-6.5 TM0 11/14/86	GW2-C 15-16.5 TW0 11/14/86	Gw2-D 15-16.5 TWO 11/17/86
Oil & Greese Date Analyzed Elapsed Time	EPA 413.2		11/26/86 14 days	11/26/96 14 days	12/08/96 21 days	12/08/86 21 days	12/08/86 21 days	11/26/86 13 days	11/26/86 12 days	11/26/86 12 days	12/08/86 21 days
Phenolics Date Analyzed Elapsed Time	EPA 420.2		11/26/86 14 days	11/26/86 14 days	12/03/86 16 days	12/03/86 16 days	12/03/86 16 days	11/26/86 13 days	11/26/86 12 days	11/26/86 12 days	12/03/86 16 days
Arsenic Date Analyzed Elapsed Time	EPA 3050/7060										
Ba, Cd, Cr, Pb, Ag Date Analyzed Elapsed Time	EPA 3050/6010/200.7										
Mercury Date Analyzed Elapsed Time	EPA 7471										
Selenium Date Analyzed Elapsed Time	EPA 3050/7740										

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200-7	Field it. 	Dulut Ho GW2-E 15-16.5 15-16.5 15-16.5 15-16.5 11/17/86 12/08/86 12/03/86 15 days 15 days	Duluth IAP - Soil Samples         Holding Time Summary         E       SS-2A       SS-2B         I.b       TWO       TWO         Modeling Time Summary       11/22/86       11/22/86         /86       11/22/86       11/22/86         /86       12/09/86       12/09/86         /86       12/09/86       12/09/86         /86       12/03/86       12/03/86         /86       12/03/86       12/03/86         /86       12/03/86       12/03/86         /86       12/03/86       11/20/86	Dututh IAP - Soil Samples         Holding Time Summary         E       SS-2A       SS-2B         6.5       SS-2A       SS-2B         Mo       Two       Two         /86       11/22/86       11/22/86         3/86       12/09/86       12/09/86         ays       17       days       17       days         s/86       12/03/86       12/03/86       12/03/86         ays       11       days       11       days	SS-2C TMO 11/22/86 17 days 11 days 11 days	B3-A 0-1.5 THREE 11/25/86 31 days 12/08/86 13 days 13 days 12/09/86 16 days 12/09/86	BJ-A 2.5-4 THREE 11/25/86 31 days 12/08/86 13 days 12/01/86 16 days 12/09/86 14 days	B3-A 5-6.5 THREE 11/25/86 31 days 12/08/86 13 days 12/09/86 16 days 12/09/86 14 days	B3-B 0-1.5 <u>THREE</u> 11/25/86 31 days 12/08/86 13 days 12/11/86 16 days 12/09/86 14 days	B3-B 2.5-4 THREE 11/25/86 31 days 12/08/86 13 days 12/11/86 16 days 12/09/86 14 days
EPA 7471						12/13/86 18 days	12/13/86 18 days	12/13/86 18 days	12/13/86 18 days	12/13/86 18 days
EPA 3050/7740						12/11/86 16 days	12/11/86 16 days	12/11/86 16 days	12/11/86 16 days	12/11/86 16 days

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			DATA	NCHEN MALY	DATACHEN ANALYTICAL REPORT						
			-InQ H	luth IAP - Soil Sampi Holding Time Summary	Duluth tAP - Soil Samples Holding Time Summary						
Parameter SMPLING DATE	Me thod	Field∦: SIte :	B3-8 5-6.5 THREE 11/25/86	B3-C 0-1.5 THREE 11/25/86	B3-C 2,54 THREE 11/25/86	B3-C 5-6,5 THREE 11/25/86	B3-C 5-6.5 THREE 12/01/86	GW3-A 5-6.5 <u>THREE</u> 11/26/86*	GW3-B 5-6,5 THREE 17/07/86#	GW3-U 5-6,5 THREE	SS-3A THREE
011 & Grease Date Analyzed Elapsed Time	EPA 413.2		12/26/86 31 days	12/26/86 31 days	12/26/86 31 days	12/26/86 31 days	12/30/86 29 days	12/26/86 30 davs*	12/30/86	12/30/86	12/09/86
Phenolics Date Analyzed Elapsed Time	EPA 420.2		12/U8/86 13 days	12/08/86 13 days	12/08/86 13 days	12/08/86 13 days	12/11/86 10 days	12/08/86 12 davs*	12/11/86 9 dave*	12/11/86	12/03/86
Arsenic Date Analyzed Elapsed Time	EPA 3050/1060		12/11/86 16 days	12/11/86 16 days	12/11/86 16 days	12/11/86 16 days	12/13/86 12 days	12/11/86 15 days*	12/13/86 11 davs*		12/04/86
Ba, Ca, Cr, Po, Ag Date Analyzed Elapsed Time	EPA 3050/6010/200.7		2/09/86  4 days	12/09/86 14 days	12/09/86 14 days	12/09/86 14 days	78/70/10 78/50/10	12/09/86 13 days*	01/07/87 36 davs*	01/07/87	21/05/87
Mercury Date Analyzed Elapsed Time	EPA 7471		12/13/86 18 days	12/13/86 18 days	12/13/86 18 days	12/13/86 15 days	12/13/86 12 davs	12/13/86 17 dave*	12/13/86	12/13/86	12/04/86
Selenium Date Analyzed Elapsed Time	EPA 3050/7740		12/11/86 16 days	12/11/86 16 days	12/11/86 16 d <b>ays</b>	12/11/86 16 days	12/14/86 13 days	12/11/86 15 days*	12/14/86	11 0 <b>875</b> 12/14/86 12 days*	12 days 12/04/86 12 days
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Page 87

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### DATACHEM AMALYTICAL REPORT Duluth IAP - Soil Semples Holding Time Summary

					B4-A	B4-A	B4-A	8 <b>4</b> -8	B4-B	B4-B
Parameter	Method	Field #: Site :	SS-38 THREE	SS-3C THREE	2.54 FOUR	5-6.5 FOUR	7.5-9 FOUR	2.5-4 FOUR	5-6.5 FOUR	7.5-11.5 FOUR
SAMPLING DATE			11/22/86	11/22/86	12/02/86	12/02/86	12/02/86	12/02/86	12/02/86	12/02/86
0il & Grease Date Analyzed Elapsed Time	EPA 413.2		12/09/86 17 d <b>ays</b>	12/09/86 17 days	12/30/86 28 days	12/30/86 28 days	12/30/86 28 days	12/30/86 28 days	12/30/86 28 days	12/30/86 28 days
Phenolics Date Analyzed Elapsed Time	EPA 420.2		12/03/86 11 days	12/03/86 11 days						
Arsenic Dete Analyzed Elapsed Time	EPA 3050/7060		12/04/86 12 days	12/04/86 12 days						
Ba, Cd, Cr, Pb, Ag Date Analyzed Elapsed Time	EPA 3050/6010/200.7		01/05/87 44 days	01/05/87 44 days						
Mercury Date Analyzad Elapsed Time	EPA 7471		12/04/86 12 days	12/04/86 12 days						
Selenium Dete Analyzed	EPA 3050/7740		12/04/86	12/04/86						

12 days

12 days

Elapsed Time

			DATAC Dutut	DATACHEN ANALYTICAL REPORT Dututh IAP - Soll Semples	<b>CAL REPORT</b> 11 Samptes						
			₽	Holding Time Summary	Summary						
		Field #:	84-C 2.5-4	B4-C 5-6.5	B4-C 7.5-9	84-D 2.5-4	84-D 5-6,5	B4-D 7,5-9	84-E 2.5-4	B4-E 5-6.5	GW4-A 10-11.5
Parameter SAMPLING DATE	Method	Site :	F0UR 12/04/86	FOUR 12/04/86	FOUR 12/04/86	FOUR 12/04/86	FOUR 12/04/86	FOUR 12/04/86	FOUR 12/05/86	FOUR 12/05/86	FOUR 12/02/86
Oil & Grease Date Analyzed Elapsed Time	EPA 413.2		12/31/86 27 days	12/31/86 27 days	12/31/86 27 days	12/31/86 27 days	12/31/86 27 days	12/31/86 27 days	12/31/86 26 days	12/31/86 26 days	12/30/86 28 days
Phenoilcs Date Analyzed Elapsed Time	EPA 420.2										
Arsenic Dote Analyzed Elapsed Time	EPA 3050/7060										
Ba, Cd, Cr, Pb, Ag Dete Analyzed Elapsed Time	EPA 3050/6010/200.7										
Mercury Dote Analyzed Elapsed Time	EPA 7471										
Selenium Date Analyzed Elapsed Time	EPA 3050/7140										

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Ministering Outforting Titals Summary         Ministering Outfort up - Soit Samples           Ministering Outfort Up - Soit Samples         Folding Titals Summary         944-9         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0         044-0	Principal Autrirical Report Outurin I/P - Soil Samples Nolatin I/P - Soil Samples Nolatin I/P - Soil Samples         Principal Report         Principal Report         Princi Report         Principal Report										ã	Page 90
Fleid A:         GMA-B         GMA-C         GMA-D         FoLR	Floid /r.     OH-0 -6.5     OH-0			ATAD Jund	<mark>CHEH MULY</mark> uth IAP - So olding Time	ilCAL REPORT oli Samples Summary						
12/30/86       12/30/86       12/30/86       12/30/86       12/30/86       12/30/86       12/30/86       12/12/96         27       days       27       days       15       days       15       days       15       days       15       days       16       days       27       days       27       days       27       days       27       days       27       days       27       days       16       days       15       days       16       days       15       days       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86       12/09/86 </th <th>1/2/1/86       1/2/1/10       1/2/1/10       1/2/1/10         2/1       30/2       1/2/10/16       1/2/10/16       1/2/10/16         2/1       30/2       1/2/10/16       1/2/10/16       1/2/10/16         2/1       30/2       2/1       30/2       1/2/10/16       1/2/10/16         2/1       30/2       2/1       30/2       1/2/10/16       1/2/10/16         2/1       30/2       2/1       30/2       1/2/10/16       1/2/10/16         2/1       30/2       2/1       30/2       1/2/10/16       1/2/10/16         1/2/10/16       1/2/10/16       1/2/10/16       1/2/10/16       1/2/10/16         2/1       3/1       3/1       3/1       3/1         3/1       3/1       3/1       3/1       3/1         3/1       3/1       3/1       3/1       3/1         3/1       3/1       3/1       3/1       3/1         3/1       3/1       3/1       3/1       3/1         3/1       3/1       3/1       3/1       3/1         3/1       3/1       3/1       3/1       3/1         3/1       3/1       3/1       3/1       3/1</th> <th>Me thod</th> <th>Fleid /: Site :</th> <th>GW4-B 5-6.5 FOUR 12/03/86</th> <th>GW4-C 10-12 FOUR 12/03/86</th> <th>GW4-D 5-6.5 FOUR 12/03/86</th> <th>55-4A FOUR</th> <th>55-48 FOUR</th> <th>SS-4C FOUR</th> <th>SS-4D FOUR</th> <th>GW5-A 5-6.5 FIVE</th> <th>GM5-B 9.5-11 F1VE</th>	1/2/1/86       1/2/1/10       1/2/1/10       1/2/1/10         2/1       30/2       1/2/10/16       1/2/10/16       1/2/10/16         2/1       30/2       1/2/10/16       1/2/10/16       1/2/10/16         2/1       30/2       2/1       30/2       1/2/10/16       1/2/10/16         2/1       30/2       2/1       30/2       1/2/10/16       1/2/10/16         2/1       30/2       2/1       30/2       1/2/10/16       1/2/10/16         2/1       30/2       2/1       30/2       1/2/10/16       1/2/10/16         1/2/10/16       1/2/10/16       1/2/10/16       1/2/10/16       1/2/10/16         2/1       3/1       3/1       3/1       3/1         3/1       3/1       3/1       3/1       3/1         3/1       3/1       3/1       3/1       3/1         3/1       3/1       3/1       3/1       3/1         3/1       3/1       3/1       3/1       3/1         3/1       3/1       3/1       3/1       3/1         3/1       3/1       3/1       3/1       3/1         3/1       3/1       3/1       3/1       3/1	Me thod	Fleid /: Site :	GW4-B 5-6.5 FOUR 12/03/86	GW4-C 10-12 FOUR 12/03/86	GW4-D 5-6.5 FOUR 12/03/86	55-4A FOUR	55-48 FOUR	SS-4C FOUR	SS-4D FOUR	GW5-A 5-6.5 FIVE	GM5-B 9.5-11 F1VE
12/09/86 12/09/86 13 days 13 days 12/09/86 13 days 12/04/86 13 days 12/09/86 12/09/86	12/09/86 13 days 12/09/86 13 days 13 days 13 days 13 days 13 days 13 days 13 days	EPA 413.2		12/30/86 27 days	12/30/86 27 days	12/30/86 27 days	12/09/86 16 days	00/07/1 39/90/21 30/60/31	12/09/86 12/09/86	12/09/86	11/21/86	11/21/86 12/18/86
13 days 12/09/86 18 days 22 days 13 days 13 days 12/09/86 1	13 days 12/09/86 13 days 12/04/86 13 days 13 days 12/09/86 18 days 13 days 13 days 13 days 13 days 13 days 14 days 15 days 15 days 15 days 16 days 17 days 17 days 18 days 19 days 19 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days 10 days	EPA 420,2								sken of	2/ 0 <b>8/5</b> 12/04/86	27 days 12/04/86
13 days 12/09/86 1 12/09/86 1 12/09/86 1	13 days 12/09/86 1 12/09/86 1 12/09/86 1 12/09/86 1	EPA 3050/7060									13 days 12/09/86	13 days 12/09/86
52 days 12/04/86 13 days 12/09/86	52 days 12/04/86 13 days 12/09/86 18 days	EPA 3050/6010/200.7									18 days 01/12/87	18 days 01/12/87
13 days 12/09/86 18 days	13 days 12/09/86 18 days	EPA 7471									52 days 12/04/86	52 days 12/04/86
		EPA 3050/7740									13 days 12/09/86 18 days	13 days 12/09/86

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Paremeter Swerling DATE	Ne trod	Fleich #: Site :	GW5-C 10-11.5 F1VE 11/22/86	55-5A F1VE 11/22/86	55-54 F1VE 11/22/86	55-50 FIVE 11/22/86	55-50 F1VE 11/22/86	55-5E F1VE 11/22/86	86-A 0-1.5 SIX 11/18/86	86-A 2.5-4 S1X 11/18/86*	86-8 0-1.5 51X 11/18/86
0ii & Greesse Date Analyzed Eisepsect ⊺irre	EPA 413.2		12/18/86 26 days	12/18/86 26 days	12/18/86 26 days	12/18/86 26 days	12/18/86 26 days	12/18/86 26 days	12/05/86 17 days	12/05/86 17 da <b>ys</b>	12/05/86 17 days
Phenolics Date Analyzad Elapsed Time	EPA 420.2		12/04/86 12 days	12/04/86 12 days	12/04/86 12 days	12/04/86 12 days	12/04/86 12 days	12/04/86 12 days			
Arsenic Date Analyzed Elapsed Time	EPA 3050/7060		12/09/86 17 days	12/09/86 17 days	12/09/86 17 days	12/09/86 17 days	12/09/86 17 da <b>y</b> s	12/09/86 17 days			
Ba, Col, Cr, Po, Ag Date Analyzad Eleopsed Time	EPA 3050/6010/200.7		01/12/87 51 days	01/12/87 51 days	01/12/87 51 days	01/12/87 51 days	01/12/87 51 days	01/12/87 51 days			
Mercury Date Analyzed Elepsed Time	EPA 7471		12/04/86 12 days	12/04/86 12 days	12/04/86 12 days	12/04/86 12 days	12/04/86 12 days	12/04/86 12 days			
Setenlumn Date Analyzed Elapsed Time	EPA 3050/7140		12/09/86 17 days	12/09/86 17 days	12/09/86 17 days	12/09/86 17 days	12/09/86 17 days	12/09/86 17 days			
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#### DATACHBA ANALYTICAL REPORT Duluth IAP - Soll Samples Holding Time Summary

Parameter SAMPLING DATE SAMPLING DATE Oli & Greese Date Analyzed Elapsed Time Arsenic Date Analyzed Elapsed Time Ba, Cd, Cr, Pb, Ag Date Analyzed Elapsed Time Mercury Date Analyzed	Me thod EPA 413.2 EPA 420.2 EPA 3050/7060 EPA 3050/6010/200.7 EPA 7471	Si te d	86-8 2.5-4 51X 11/18/86 12/05/86 17 days	IJ7-A 0-1.5 SEVEN 11/24/86 12/18/86 24 days 12/10/86 16 days 20 days 20 days 12/04/86 10 days 12/04/86	B7-A 2.5-4 SEVEN 11/24/86 24 days 24 days 12/10/86 16 days 20 days 20 days 12/04/86 10 days 12/04/86	B7-B 0-1.5 <u>SEVEN</u> 11/24/86 24 days 24 days 12/13/86 16 days 20 days 20 days 12/04/86 10 days 12/04/86	B7-B 2.5-4 <u>SEVEN</u> 11/24/86 24 days 24 days 12/13/86 19 days 12/04/86 10 days 12/04/86 10 days	GW7-A 10-11.5 SEVEN 11/23/86 12/18/86 25 days 12/03/86 10 days 12/09/86 16 days 15 days 19 days 11 days	GW7-B 10-11.5 SEVEN 11/23/86 12/18/86 25 days 12/03/86 10 days 16 days 16 days 19 days 11 days	GW7-C 15-16.5 SEVEN 11/24/86 12/18/86 24 days 16 days 12/13/86 19 days 12/04/86 10 days 12/04/86	SS-7A# SEVEN 11/24/86 12/19/86 12/10/86 16 days 12/13/86 19 days 19 days 12/13/86 19 days 12/13/86 20 days
Selenium Date Analyzad Elapsed Time	EPA 3050/7740			12/14/86 20 days	12/14/86 20 days	12/14/86 20 days	12/14/86 20 days	12/09/86 16 days	1 2/09/86 16 days	12/14/86 20 days	1 2/ 1 4/86 20 days

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			DATA DuluC	DATACHEN AMALYTICAL REPORT Duluth IAP - Soil Samples Holding Time Summary	ICAL REPORT I Samples Summary						
Parometer	Me thod	Fleid #: Site :	B8-A 0-1.5 E1GHT	88-A 2.5-4 EIGHT	188-A 5-6.5 EIGHT	B8-8 0-1.5 EIGHT	B8-88 2 <b>.</b> 5-4 E1GHT	88-8 5-6,5 EIGHT	GW8-A 5-6+5 E1GHT	GW8-B 10-11.5 E1GHT	GW8-C 10-11.5 E1GHT
swerling DATE Oil & Greese Date Analyzed Elepsed Time	EPA 413.2		12/05/86 01/02/87 28 days	12/05/86 01/02/87 28 days	12/05/86 01/02/87 28 days	12/06/86 01/02/87 27 days	12/06/86 01/02/87 27 days	12/06/86 01/02/87 27 days	12/06/86 01/02/87 27 days	12/06/86 01/02/87 27 days	12/07/86 01/02/87 26 days
Phenolics Date Analyzed Elapsed Time	EPA 420.2		12/24/86 19 days	12/24/86 19 days	12/24/86 19 days	12/24/86 18 days	12/24/86 18 days	12/24/86 18 days	12/24/86 18 days	12/24/86 18 days	12/31/86 24 days
Arsenic Date Analyzed Elapsed Time	EPA 3050/7060		12/23/86 18 days	12/23/86 18 days	12/23/86 18 days	12/23/86 17 days	12/23/86 17 days	12/23/86 17 days	12/23/86 17 days	12/23/86 17 days	12/23/86 16 days
Ba, Cd, Cr, Pb, Ag Date Analyzed Elapsed Time	EPA 3050/6010/200.7		01/07/87 33 days	01/07/87 33 days	01/07/87 33 days	01/07/87 32 days	01/07/87 32 days	01/07/87 32 days	01/07/87 32 days	01/07/87 32 days	01/05/87 29 days
Mercury Date Analyzed Elapsed Time	EPA 7471		12/24/86 19 days	12/24/86 19 days	12/24/86 19 days	12/24/86 19 days	12/24/86 18 days	12/24/86 18 days	12/24/86 18 days	12/24/86 18 days	12/22/86 15 days
Selenium Date Analyzad Elapsed Time	EPA 3050/7740		12/29/86 24 days	12/29/86 24 days	12/29/86 24 days	12/29/86 23 days	12/29/86 23 days	12/29/86 23 days	12/29/86 23 days	12/29/86 23 days	12/29/86 22 days

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# DATACHEM ANALYTICAL REPORT Duluth IAP - Soll Samples Holding Time Summary

Iter         Mathod         Site         EIGH           EPA 413.2         11/25/966         11/25/966           EPA 413.2         12/19/86         12/19/86           EPA 420.2         12/10/86         12/13/86           EPA 3050/7060         12/13/86         13/13/86           Mg         EPA 3050/7060         12/13/86           Mg         EPA 3050/7060         12/13/86           Mg         EPA 3050/7060         12/13/86           Mg         EPA 3050/7060         12/13/86           Mg         EPA 3050/7000.7         01/07/87           Mg         EPA 3050/6010/2000.7         01/07/87           Mg         EPA 3050/6010/200.7         01/07/87           Mg         EPA 3050/7140         12/13/86           Mg         EPA 3050/7140         12/14/86			Fleid #:	SS-BA*	SS-813*
EPA 413.2       11/25/86*         EPA 413.2       12/19/86         EPA 420.2       12/10/86         EPA 420.2       12/10/86         EPA 3050/7060       12/13/86         EPA 3050/7060       12/13/86         EPA 3050/6010/200.7       01/07/87         EPA 3050/7140       12/13/86         EPA 3050/7740       12/13/86         EPA 3050/7740       12/14/86	Par ameter	Mathod	Site :	EI GHT	EIGHT
EPA 413.2 12/19/86 24 days* EPA 420.2 12/10/86 15 days* EPA 3050/7060 12/13/86 18 days* EPA 3050/6010/200.7 01/07/87 43 days* EPA 3050/7140 12/13/86 18 days* EPA 3050/7140 12/14/86	SMPLING DATE			11/25/86*	11/25/86*
EPA 420.2       12/10/86         EPA 3050/7060       12/13/86         EPA 3050/6010/200.7       12/13/86         EPA 3050/6010/200.7       01/07/87         EPA 3050/6010/200.7       01/07/87         EPA 3050/7140       12/13/86         EPA 3050/7140       12/13/86         EPA 3050/7140       12/14/86	011 & Grease Date Analyzed	EPA 413.2		12/19/86	12/19/86
EPA 420.2 12/10/86 15 days* EPA 3050/7060 12/13/86 18 days* EPA 7471 12/13/86 18 days* 12/13/86 18 days* EPA 7471 12/13/86 18 days* 12/13/86 18 days* 18 days* 12/13/86 18 days* 18 days*	Elapsed Time			24 days*	24 days*
12/10/86 15 days* EPA 3050/7060 12/13/86 18 days* EPA 3050/6010/200.7 01/07/87 43 days* EPA 7471 12/13/86 18 days* EPA 3050/7740 12/14/86	Pheno! i cs	EPA 420.2			
15 days* EPA 3050/7060 12/13/86 18 days* EPA 3050/6010/200.77 01/07/87 43 days* 69 7471 12/13/86 18 days* EPA 3050/7740 12/14/86	Date Analyzed			12/10/86	12/10/86
EPA 3050/7060 12/13/86 18 days* EPA 3050/6010/200.77 63 days* 69A 7471 12/13/86 18 days* EPA 3050/7740 12/14/86	Elapsed Time			15 days*	15 days*
12/13/86 18 days* EPA 3050/6010/200.7 01/07/87 43 days* 43 days* 43 days* 12/13/86 18 days* EPA 3050/7740 12/14/86	Arsenic	EPA 3050/7060			
18 days* EPA 3050/6010/200.7 01/07/87 43 days* EPA 7471 12/13/86 18 days* EPA 3050/7740 12/14/86	Date Analyzed			12/13/86	12/13/86
EPA 3050/6010/200.7 01/07/87 43 days* EPA 7471 12/13/86 18 days* EPA 3050/7740 12/14/86	Elapsed Time			18 days*	18 days*
Image     01/07/87       Image     01/07/87       Image     43 days*       EPA 7471     12/13/86       Image     12/13/86       Image     18 days*       Image     12/14/86       Image     12/14/86       Image     12/14/86	Ba, Ci, Ci, Pa, Ag	EPA 3050/6010/200.7			
ed Time 43 days* 43 days* 12/13/86 12/13/86 18 days* 12/13/86 18 days* 12/13/86 18 days* 12/13/86 18 days* 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 12/146 1200 12/146 12/146 1200 12/146 12000 12000000000000000000000000000000	Date Analyzed			01/07/87	01/07/87
EPA 7471 12/13/86 12/13/86 12/13/86 18 days* 18 days* 12/14/0 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/14/86 12/146 12/186 12/186 12/186 12/186 12/186 12/186 12/186 12/186 12/186 12/186 12/186 1200 12/186 1200 12/186 1200 12/186 1200 12/186 1200 12/186 1200 12/186 1200 12/186 1200 12/186 1200 12/186 1200 12/186 1200 12/186 1200 12/186 1200 12/186 1200 120/186 1200 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 12000 1200000000	Elapsed Time			43 days*	43 days*
Inal y 280 12/13/86 ad Time 18 days* EPA 3050/7740 12/14/86	Mercury	EPA 7471			
EPA 3050/7140 12/14/86	Date Analyzed			12/13/86	12/13/86
EPA 3050/7740 12/14/86 5.000 12/14/86	Elapsed Time			18 days*	18 days*
12/14/86	Seien lum	EPA 3050/1740			
19 days"	Date Analyzed Elapsed Time			12/14/86 19 days*	12/14/86 19 days*

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			Dult Ho	DATACHBH ANALYTICAL REPORT Duiuth IAP - Soil Samples Holding Time Summary	ICAL REPORT il Samples Summary						
Parameter	botta <b>an</b>	Field∦r: Site :	DRUM 421 TWO	drum 422 Three	0-2.5 462 FOLR	02.5 459 FIGHT	GW-8C DRUM FIGHT	B6-A 0-1.5 S1x	B6-A 2.5-4	B6−8 0-1 <b>.</b> 5	B6-B 2 <b>.</b> 5-4
SAMPLING DATE			12/01/86	12/01/86	12/05/86	12/05/86	12/07/86	11/18/86	11/18/86	11/18/86	11/18/86
Ethylene Glycol Date Analyzed Elapsed Time	P&CM 338							11/26/86 6 days	11/26/86 6 days	11/26/86 6 days	11/26/86 6 days
ignitability Date Analyzed Elepsed Time	EPA 1010		12/12/86 11 days	12/12/86 11 days	12/12/86 7 days	12/12/86 7 days	12/26/86 19 days				
EP Tox Extraction Date Extracted Elapsed Time	EPA 1310		12/10/86 9 days	12/10/86 9 days	12/13/86 8 days	12/13/86 8 days	12/17/86 10 days				
Arsenic Date Analyzed Elapsed Time	EPA 7060		12/16/86 6 days	12/16/86 6 days	12/16/86 3 days	12/16/86 3 days	12/23/86 6 days				
Barium Date Analyzed Elapsed Time	EPA 7080		12/17/86 7 days	12/17/86 7 days	12/17/86 4 days	12/17/86 4 days	12/30/86 13 days				
Cadmium Date Analyzed Elapsed Time	EPA 7130		12/17/86 7 days	12/17/86 7 days	12/17/86 4 days	12/17/86 4 days	12/30/86 13 days				

DATACHEM AMALYTICAL REPORT Duluth IAP - Soil Semples Holding Time Summery

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Par amoter	Method	Fleid #: Site :	DRUM 421 TWO	DRUM 422 THREE	0-2.5 462 FOUR	0-2.5 459 EI GHT	GW-8C DRUM EI GHT
SAPLING DATE			12/01/86	12/01/86	12/05/86	12/05/86	12/07/86
Chromium Date Analyzad Elapsed Time	EPA 7190		12/17/86 7 days	12/11/86 7 days	12/17/86 4 days	12/17/86 4 days	12/27/86 10 d <b>a</b> ys
Lead Date Anaiyzad Elapsed Time	EPA 7421		12/17/86 7 days	12/17/86 7 days	12/17/86 4 days	12/17/86 4 days	12/22/86 5 days
Mercury Date Analyzed Elapsed T:me	EPA 7470		12/17/86 7 days	12/17/86 7 days	12/17/86 4 days	12/17/86 4 days	12/24/86 7 days
Selenium Date Analyzed Elapsed Time	EPA 7740		12/16/86 6 days	12/16/86 6 days	12/16/86 3 days	12/16/86 3 days	12/29/86 22 days
Silver Date Analyzed Elapsed Time	EPA 7760		12/17/86 7 days	12/17/86 7 days	12/17/86 4 days	12/17/86 4 days	12/30/86 13 days

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Page 96

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			DATAC	HEN MALYT	DATACHEN ANALYTICAL REPORT						
			17 PG	uth IAP - Water Samp Holding Time Summary	Duluth IAP - Water Samples Holding Time Summary						
Parameter camping para	Mat hod	Field #: Site :	GWI-A ONE	GW1-C	GW1-D ONE	GW1-E ONE	SW-1A ONE	SW-18 ONE	GW2-A TWO	GW2-B TWO	GW2-C TWO
Purgeable Halocarbons	EPA 601		12/10/86	12/11/86	98/61/21	12/15/86	11/23/86	11/23/86	01/01/87	01/02/87	01/02/87
Date Analyzed Elapsed Time			12/11/86 7 days	12/17/86 6 days	12/23/86 8 days	12/23/86 8 days	12/06/86 13 days	12/06/86 13 days	01/12/87 11 days	01/12/87 10 days	01/12/87 10 days
Purgeable Aromatics Date Analyzed Elented Time	EPA 602		12/17/86	12/11/86	12/23/86	12/23/86	12/06/86	12/06/86	01/12/87	01/12/87	01/12/87
Pesticides/PCBs	EPA 608		r days	/ days	8 days	8 days	15 days	13 days	H days	10 days	10 days
Date Extracted Elapsed Time			12/17/86 7 days	12/17/86 6 days	12/20/86 5 days	12/20/86 5 days	11/29/86 6 days	11/29/86 6 days			
Date Analyzed Elapsed Time			01/08/87 22 days	01/08/87 22 days	01/08/87 19 days	01/08/87 19 days	12/02/86 3 days	12/02/86 3 days			
Herbicides Data Extractor	EPA 615			307 6 7 6							
Elapsed Time			7 days	6 days	5 days	5 days	6 days	6 days			
Uate Analyzed Elapsed Time			01/13/87 4 days	01/13/87 4 days	01/13/87 24 days	01/13/87 24 days	12/17/86 18 days	12/16/86 17 days			
0il and Grease	EPA 413.2										
Date Analyzed Elapsed Time			01/06/87 27 days	01/06/87 26 days	01/13/87 29 days	01/13/87 29 days	12/10/86 17 days	12/10/86 17 days	01/22/87 21 days	01/22/67 20 days	01/22/87 20 days

1-97

# DATACHBA ANALYTICAL REPORT Duluth IAP - Water Samples Holding Time Summary

Parameter	Ma thod	Fleid #: Site :	GW2-D TWO	GW2-E TWO	SW-2A TWO	SN-28 Two	SW-2C TWO	AM-1 Two	MH-2 Two	MM-4 TMO	MW-5 Two
SAMPLING DATE			01/02/87	01/03/87*	11/22/86	11/22/86	11/22/86	01/03/87	01/03/87	01/04/87	01/04/87
Purgeable Helocarbons Date Analyzed Elapsed Time	EPA 601		01/12/87 10 days	01/12/87 9 days*	12/04/86 12 days	12/04/86 12 days	12/04/86 12 days	01/12/87 9 days	01/12/87 9 days	01/13/87 9 days	01/13/87 9 days
Purgeable Arcmatics Date Analyzed Elapsed Time	EPA 602		01/12/87 10 days	01/12/87 9 days*	12/04/86 12 days	12/04/86 12 days	12/04/86 12 days	01/12/87 9 days	01/12/87 9 days	01/13/87 8 days	01/13/87 8 days
Pesticides/PCBs Date Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 608										
Herbicides Dete Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 615										
Oil and Grease Date Analyzed Elapsed Time	EPA 413.2		01/22/87 20 days	01/22/87 19 days*	12/10/86 18 days	12/10/86 18 days	12/10/86 18 days	01/22/87 19 da <b>ys</b>	01/22/87 19 days	01/22/87 18 days	01/22/87 18 days

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Page 98

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H-98

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			DATAC Dulut Ho	DATACHEN ANALYTICAL REPORT Duluth IAP - Water Samples Holding Time Summary	ICAL REPORT ter Samples Summary						
<u>Parameter</u> Swerling Date	Method	Field #: Site :	MW-6 TWO 01/04/87	Two Two 01/07/87	GW3-A THREE 01/06/87	GW3-B THREE 01/06/87	GW3-C THREE 01/06/87	GW3-D THREE 01/07/87	SW-3A THREE 11/22/86	SW-3B THREE 11/22/86	SW-3C THREE 11/22/86
Purgeeble Halocerbons Dete Analyzed Elapsed Time	EPA 60		01/13/87 9 days	01/13/87 6 days	01/13/87 7 days	01/13/87 7 days	01/13/87 7 days	01/13/87 6 days	11/28/86 6 days	11/28/86 6 days	11/28/86 6 days
Purgeable Arcmatics Date Analyzed Elapsed Time	EPA 602		01/13/87 9 days	01/13/87 6 days	01/13/87 7 days	01/13/87 7 days	01/13/87 7 days	01/14/87 7 days	11/28/86 6 days	11/28/86 6 days	11/28/86 6 days
Pesticides/PCBs Date Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 608				01/13/87 7 days 01/16/86 3 days	01/13/87 7 days 01/16/86 3 days	01/13/87 7 days 01/16/86 3 days	01/12/87 5 days 01/16/86 4 days	11/29/86 7 days 12/02/86 3 days	11/29/86 7 days 12/02/86 3 days	11/29/86 7 days 12/02/86 3 days
Herbicldes Date Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 615				01/12/87 6 days 01/19/87 7 days	01/12/87 6 days 01/19/87 7 days	01/12/87 6 days 01/19/87 7 days	01/12/87 5 days 01/19/87 7 days	11/29/86 7 days 12/11/86 18 days	11/29/86 7 days 12/17/86 18 days	11/29/86 7 days 12/17/86 18 days
0il and Grease Date Analyzed Elapsed Time	EPA 413.2		01/22/87 18 days	01/26/87 21 days	01/22/87 16 days	01/22/87 16 days	01/22/87 16 days	01/26/87 19 days	12/10/86 12 days	12/10/86 12 days	12/10/86 12 days

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#### DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples Holding Time Summary

		Fleid #:	GW4-A	GW4-B	GW4-C	GW4-D	SW-4A	SM-4B	SW-4C	SM-4D	MB8
Por ameter	Method	Site :	FOUR								
SAMPLING DATE			12/18/86	12/19/86	12/19/86	12/19/86	11/23/86	11/23/86	11/23/86	11/23/86	12/20/86
Purgeable Halocarbons Dete Analyzed Elapsed Time	EPA 60		12/23/86 5 days	12/29/86 10 days	12/29/86 10 days	12/29/86 10 days	12/03/86 10 days	12/03/86 10 days	12/03/86 10 days	12/03/86 10 days	12/29/86 9 days
Purgeable Arcmatics Date Analyzed Elapsed Time	EPA 602		12/23/86 5 days	12/30/86 11 days	12/30/86 11 days	12/30/86 11 days	12/03/86 10 days	12/03/86 10 days	12/03/86 10 days	12/03/86 10 days	12/30/86 10 days
Pesticides/PCBs Date Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 608										
Herbicides Date Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 615										
Oil and Grease Date Analyzed Elapsed Time	EPA 413.2		01/13/87 26 days	01/16/87 28 days	01/16/87 28 days	01/16/87 28 days		12/18/86 25 days	12/18/86 25 days	12/18/86 25 days	01/16/87 27 days

H-100

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Page 100

			DATAC	DATACHEN AVALYTICAL REPORT	CAL REPORT						
			Dulut Ho	()uluth IAP - Water Samples Holding Time Summary	er Samples Summary						
Parameter	Method	Field #: Site :	MM-9 FOUR	MW-10 FOUR	MW-11 FOUR	GW5-A FIVE	GW5-B FIVE	GW5-C FIVE	SW-5A FIVE	Sw-5B F I VE	SW-5C FIVE
SMPLING DATE			12/20/86	12/20/86	12/20/86	12/17/86	12/16/86*	12/16/86*	11/22/86	11/22/86	11/22/86
Purgeable Halocarbons Date Analyzed Elapsed Time	EPA 601		12/29/86 9 days	12/29/86 9 days	12/29/86 9 days	12/23/86 6 days	12/23/86 7 days*	12/23/86 7 days*	12/06/86 14 days	12/06/86 14 days	12/06/86 14 days
Purgeable Arcmatics Date Analyzed Elapsed Time	EPA 602		12/30/86 10 days	12/30/86 10 days	12/30/86 10 days	12/23/86 6 days	12/23/86 7 days*	12/23/86 7 days*	12/06/86 14 days	12/06/86 14 days	12/06/86 14 days
Pestic ides/PCBs Date Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 608					12/24/86 7 days 01/08/87 13 days	12/24/86 8 days* 01/08/87 14 days*	12/24/86 8 days* 01/08/87 14 days*	11/29/86 7 days 12/02/86 3 days	11/29/86 7 days 12/02/86 3 days	11/29/86 7 days 12/02/86 3 days
Herbicides Date Extracted Elapsed Time Date Analyzed Elapsed Time	EPA 615					12/22/86 5 days 01/13/87 22 days	12/22/86 6 days* 01/13/87 23 days*	12/22/86 6 days* 01/13/87 23 days*	11/29/86 7 days 12/17/86 18 days	11/29/86 7 days 12/11/86 18 days	11/29/86 7 days 12/17/86 18 days
Oil and Grease Date Analyzed Elapsed Time	EPA 413.2		01/16/87 27 days	01/16/87 27 days	01/16/87 27 days	01/12/87 26 days	01/12/87 27 days*	01/12/87 27 days*	12/10/86 18 days	12/10/86 18 days	12/10/86 18 days

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DATACHEN MALYTICAL REPOR Duluth IAP - Kater Semple: Holding Time Summary

Field #:         Gw7-A         Gw7-B         Gw7-C         Sw-7A         Gw8-A           Method         Site         :         SEVEN         SEVEN         SEVEN         EIGHT           12/17/86         12/17/86         12/18/86         12/19/86*         11/24/86         01/09/87	EPA 601 12/23/86 12/23/86 12/29/86 12/06/86 01/20/87 6 days 10 days* 12 days 11 days	EPA 602 12/23/86 12/23/86 12/29/86 12/06/86 01/20/87 6 days 5 days 10 days* 12 days 11 days	EPA 608 12/24/86 12/23/86 12/26/86 12/01/86 01/13/87 5 days 5 days 7 days* 7 days 4 days 01/08/87 01/08/87 01/08/87 12/14/86 01/16/87 15 days 16 days 13 days* 13 days 3 days	EPA 615 12/22/86 12/22/86 12/26/86 01/13/87 5 days 4 days 7 days* 4 days 01/13/87 01/13/87 01/14/87 01/19/87 22 days 20 days* 6 days	EPA 413.2 01/13/87 01/13/87 01/09/87 12/23/86 01/26/87 27 days 26 days 21 days* 29 days 17 days
-A GM8-B GM8-C HT ELGHT ELGHT 1/87 01/07/87 01/09/87	01/14/87 7 days	01/14/87 ( 7 days	/87 01/12/87 01/13/87 ys 5 days 4 days /87 01/16/87 01/16/87 ys 4 days 3 days	<ul> <li>'87 01/12/87 01/13/87</li> <li>'87 01/12/87 01/13/87</li> <li>'87 01/19/87 01/19/87</li> <li>*5 7 days 7 days</li> </ul>	187 01/26/87 01/26/87 15 19 days 17 days
-C SM-BA 		-	<ul> <li>(87 12/02/86</li> <li>(87 12/02/86</li> <li>(87 12/14/86</li> <li>(87 12/14/86</li> <li>(12/14/86</li> <li>(12/14/86</li> </ul>	87 12/02/86 5 7 days 81 12/16/86 5 14 days	87 12/23/86 6 28 dave
SW-88 EI GHT 11/25/86	12/06/86	12/06/86 11 days	12/02/86 7 days 12/14/86	12/02/86 7 days 12/16/86	12/23/86 28 dave

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#### DATACHEN ANALYTICAL REPORT Duluth IAP - Water Samples Holding Time Summary

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			TRIP	TRIP	TRIP	TRIP	TRIP	RINSE	RI NSE
		Field #:	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK	BLANK
Par ameter	Method	Site :	ONE	THREE	FOUR	SEVEN	EI GHT		FIVE
SAMPLING DATE			12/15/86	01/01/81	12/23/86	12/19/86	01/12/87	0	12/17/86
			(*)	(*)	(*)	(*)	(*)		(*)
Purgeable Halocarbons	EPA 601								
Date Analyzed					12/31/86	12/29/86	01/21/87	01/14/87	
Elapsed Time					8 days	10 days	9 days	7 days	
Purgeable Aromatics	EPA 602								
Date Analyzed						12/29/87	01/21/87		12/23/86
Elapsect Time						10 days	9 days		6 days
Pesticides/PCBs	EPA 608								
Date Extracted			12/17/86			12/24/86			
Elapsed Time			2 days			5 days			
Date Analyzed			01/08/87			01/08/87			
Elepsed Time			22 days			15 days			
Herbicides	EPA 615								
Date Extracted			12/17/87	01/12/87			01/13/87		
Elapsed Time			2 days	5 days			l day		
Date Analyzed			01/13/87	01/19/87			01/19/87		
Elapsed Time			27 days	7 days			6 days		
0il and Grease	EPA 413.2								
Date Analyzed					01/20/87				
Elapsed Time					28 days				
(#) Data canda rarajvat hv DataCha	v DataChem.								

# (*) Date sample received by DataChem.

			Dulut Dulut Ho	DATACHEM ANALYTICAL REFORT Duiuth iAP - Water Samples Hoidica Time Summary	DATACHEM ANALYTICAL REPORT Duiuth IAP - Water Samples Holdion Time Summary						
			4 - L 1		GW1-D	GW1-E	V 1 - MS	SW-1B	GW2-A	GW2-B	GW2-C
Par anoter SMPLING DATE	Mathod	Site :	0NE 12/10/86	ONE 0NE	ONE 12/15/86	ONE 12/15/86	0NE 11/23/86	0NE 11/23/86	TWO 01/01/87	Two 01/02/87	01/02/87
Phenollcs Date Analyzad Elapsed Time	EPA 420,2		12/24/86 14 days	12/24/86 13 days	01/07/87 23 days	01/07/87 23 days	12/04/86 11 days	12/04/86 11 days	01/14/87 13 days	01/14/87 12 days	01/14/87 12 days
Arsenic Date Analyzed Elapsed Time	EPA 206.2		12/23/86 13 days	12/23/86 12 days	01/12/87 28 days	01/12/87 28 days	12/23/86 20 days	12/13/86 20 days			
Barlum Date Analyzed Elapsed Time	EPA 208.1		12/30/86 20 days	12/30/86 19 days	01/15/87 31 days	01/15/87 31 days	12/03/86 10 days	12/03/86 10 days			
Cadmium Date Analyzed Elapsed Time	EPA 213.1		12/30/86 20 days	12/30/86 19 days	01/09/87 25 days	01/09/87 25 days	12/03/86 10 days	12/03/86 10 days			
Chromium Date Analyzed Eiapsed Time	EPA 218.1		12/27/86 17 days	12/27/86 16 days	01/15/87 31 days	01/15/87 31 days	12/03/86 10 days	12/03/86 10 days			
Lead Date Analyzed Elapsed Time	EPA 239.2		12/22/86 12 days	12/22/86 11 days	01/10/87 26 days	01/10/87 26 <b>days</b>	12/16/86 23 days	12/16/86 23 days			

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Page 104

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#### DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples Hotding Time Summary

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Par ameter	Method	Fleid≱: Site :	GW2-D TMO	GW2-E TW0	SW-2A TWO	Sw-2B Tw0	SW-2C Two	MW1 OMT	MW-2 Two	MM-4 TWO	
SAMPLING DATE			01/02/87	01/03/87*	11/22/86	11/22/86	11/22/86	01/03/87	01/03/87	01/04/87	
Phenolics Date Analyzed Elapsed Time	EPA 420.2		01/14/87 12 days	01/14/87 11 days*	12/04/86 12 days	12/04/86 12 da <b>ys</b>	12/04/86 12 days	01/14/87 11 days	01/14/87 11 days	01/14/87 10 days	
Arsenic Date Anaiyzed Elapsed Time	EPA 206.2										
Barlumn Dorte Analyzed Elapsed Time	EPA 208.1										
Cadmium Date Analyzed Elapsed Time	EPA 213.1										
Chromium Date Analyzed Elapsed Time	EPA 218.1										
Lead Date Anałyzed Elapsed Time	EPA 239.2										

### * Revised 07/10/87

Field J:         Merci Tel d				DATAC Dutut Ho	DATACHBH AMALYFICAL REPORT Duluth IAP - Water Samples Holding Time Summary	ICAL REPORT Ter Samples Summary						
EFA 4202       01/14/81       01/20/81       01/16/81       01/16/81       01/16/81       01/22/81       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86       12/04/86 <t< th=""><th>Par anoter samping nare</th><th>Mathod</th><th>Fleid∦: Site ∶</th><th>MW-6 TWO</th><th>MM-7 TWO</th><th>GW3-A THREE 01706/87</th><th>GW3-B THREE 01 /06 /87</th><th>GW3-C THREE</th><th>GW3-D THREE 01 /07 /87</th><th>SM-3A THREE</th><th>SW-3B THREE 11/22/86</th><th>SM-3C THREE</th></t<>	Par anoter samping nare	Mathod	Fleid∦: Site ∶	MW-6 TWO	MM-7 TWO	GW3-A THREE 01706/87	GW3-B THREE 01 /06 /87	GW3-C THREE	GW3-D THREE 01 /07 /87	SM-3A THREE	SW-3B THREE 11/22/86	SM-3C THREE
EA 206,2         01/21/81         01/21/81         01/21/81         01/21/81         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/15/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86         12/05/86	Phenolics Date Analyzad Elapsed Time	EPA 4202		01/14/87 10 days	01/20/87 13 days	01/16/87 10 days	01/16/87 10 days	01/16/87 10 days	01/22/87 01/22/87 15 days	12/04/86 12 days	12/04/86 12 days	12/04/86 12 days
EPA 206.1         D(1/20/81         D(1/20/81 <thd(1 20="" 81<="" th="">         D(1/20/81         <thd(1 20="" 81<="" th="">         D(1/20/81         <thd(1 20="" 81<="" th=""> <thd(1 20="" 81<="" th=""> <thd(1< th=""><th>Arsenic Date Analyzed Elapsed Time</th><th>EPA 206.2</th><th></th><th></th><th></th><th>01/21/87 15 days</th><th>01/21/87 15 days</th><th>01/21/87 15 days</th><th>01/21/87 14 days</th><th>12/13/86 21 days</th><th>12/13/86 21 days</th><th>12/13/86 21 days</th></thd(1<></thd(1></thd(1></thd(1></thd(1>	Arsenic Date Analyzed Elapsed Time	EPA 206.2				01/21/87 15 days	01/21/87 15 days	01/21/87 15 days	01/21/87 14 days	12/13/86 21 days	12/13/86 21 days	12/13/86 21 days
EPA 213.1       D1/20/81       01/20/81       01/20/81       01/20/81       12/03/86       12/03/86       12/03/86       12/03/86       11       days       11	Barium Date Analyzed Elapsed Time	EPA 208.1				01/20/87 14 days	01/20/87 14 days	01/20/87 14 days	01/20/87 13 days	12/03/86 11 days	12/03/86 11 days	12/03/86 11 days
EPA 218.1       01/20/87       01/20/87       01/20/87       01/20/87       12/03/86       12/03/86         al yzed       01/20/87       01/20/87       01/20/87       01/20/87       12/03/86       12/03/86         al Time       14       days       14       days       14       days       13       days       11       days       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86       12/16/86 <t< th=""><th>Cadmium Date Analyzed Eiapsed Time</th><th>EPA 213.1</th><th></th><th></th><th></th><th>01/20/87 14 days</th><th>01/20/87 14 days</th><th>01/20/87 14 days</th><th>01/20/87 13 days</th><th>12/03/86 11 days</th><th>12/03/86 11 days</th><th>12/03/86 11 days</th></t<>	Cadmium Date Analyzed Eiapsed Time	EPA 213.1				01/20/87 14 days	01/20/87 14 days	01/20/87 14 days	01/20/87 13 days	12/03/86 11 days	12/03/86 11 days	12/03/86 11 days
EPA 239.2 Ite Analyzed absed Time 15 days 15 days 24 days 24 days 24 days 24 days 24 days	Chramium Date Analyzed Elapsed Time	EPA 218.1				01/20/87 14 days	01/20/87 14 days	01/20/87 14 days	01/20/87 13 days	12/03/86 11 days	12/03/86 11 days	12/03/86 11 days
	Lead Date Analyzed Elapsed Time	EPA 239.2				01/21/87 15 days	01/21/87 15 days	01/21/87 15 days	01/21/87 14 days	12/16/86 24 days	12/16/86 24 days	12/16/86 24 days

H-106

Page 106

			Duluth Duluth Hol	DATACHBM AMALYTICAL RBPORT Duluth IAP - Water Samples Holding Time Summary	<b>CAL REPORT</b> er Samples Summary						
Per anoter SAMPLING DATE	Mat hod	Fleid #: Site :	GW4-A FOUR 12/18/86	GW4-B FOUR 12/19/86	GW4-C FOUR 12/19/86	GW4-D FOUR 12/19/86	5W-4A FOUR 11/23/86	SW-4B FOUR 11/23/86	SM-4C FOUR 11/23/86	SW-4D FOUR 11/23/86	MM-8 FOUR 12/20/86
Phenolics Date Analyzed Elapsed Time	EPA 420,2										
Arsenic Date Analyzed Elapsed Time	EPA 206.2										
Barium Date Analyzed Elapsed Time	EPA 208.1										
Cadmium Date Analyzed Elapsed Time	EPA 213.1										
Chromium Date Analyzed Elapsed Time	EPA 218.1										

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H-107

EPA 239.2

Lead Dete Analyzed Elapsed Time

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			Duluth Duluth Hol	DATACHEN ANALYFICAL REPORT Duiuth IAP - Water Samples Holding Time Summary	.AL REPORT ar Samples Summary						
Par ano ter c web just DATE	Nethod	Field#: Site :	FOUR 12/20/86	MM-10 FOUR 12/20/86	MM-11 FOLR 12/20/86	GW5-A F1VE 12/17/86	GW5-B F1VE 12/16/86*	GW5-C FIVE 12/16/86*	SH-5A FIVE 11/22/86	SH-58 F1VE 11/22/86	SM-5C F1VE 11/22/86
Phonolics Date Analyzad Elapsed Time	EPA 420,2					01/07/87 21 days	01/07/87 22 days*	01/07/87 22 days*	12/04/86 12 days	12/04/86 12 days	12/04/86 12 days
Arsenic Date Analyzad Elabsad Time	EPA 206.2					01/12/87 26 days	01/12/87 27 days*	01/12/87 27 days*	12/13/86 21 days	12/13/86 21 days	12/13/86 21 days
Barlum Date Analyzed Eleosed Time	EPA 208.1					01/15/87 29 days	01/15/87 30 days*	01/15/87 30 days*	12/03/86 11 days	12/03/86 11 days	12/03/86 11 days
Cadmaium Date Anaiyzed Elansed Time	EPA 213.1					01/09/87 23 days	01/09/87 24 days*	01/09/87 24 days*	12/03/86 11 days	12/03/86 11 days	12/03/86 11 days
Chromelum Date Analyzed Elaosed Time	EPA 218.1					01/15/87 29 days	01/15/87 30 days*	01/15/87 30 days*	12/03/86 11 days	12/03/86 11 days	12/03/86 11 days
Lead Date Analyzed Elapsed Time	EPA 239.2					01/10/87 24 days	01/10/87 25 days*	01/10/87 25 days*	12/16/86 24 days	12/16/86 24 days	12/16/86 24 days
# Revised 07/10/87											

H-108

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Page 108

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## DATACHBM ANALYTICAL REPORT Duluth IAP - Water Samples Holding Time Summary

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		Field #:	GW7-A	GW7-B	GW7-C	SW-7A	GM8-A	GW8-B	GM8-C	SM-BA	SW-83
Par ane ter	Mathod	Si te :	SE VEN	SEVEN	SE VEN	SE VEN	EI GHT	EI GHT	EI GHT	EI GHT	EI CHT
SAMPLING DATE			12/11/86	12/18/86	12/19/86*	11/24/86	01/09/87	01/01/81	01/09/87	11/25/86*	11/25/86
Phenolics Date Analyzed	EPA 420,2		01/07/87	12/24/86	12/31/86	12/11/86	11/22/87	01/22/87	01/22/87	12/11/86	12/11/86
Elapsed Time			21 days	6 days	12 days*	17 days	13 days	13 days	13 days	16 days#	l6 days
Arsenic Date Analyzed	EPA 206.2		01/12/87	01/12/87	01/07/81	12/23/86	01/21/87	01/21/87	01/21/87	12/23/86	12/23/86
Elapsed Time			26 days	25 days	19 days*	29 days	12 days	14 days	12 days	28 days*	28 days
Barium Date Analyzed	EPA 208.1		01/15/87	01/15/87	01/07/87	12/30/86	01/20/87	01/20/87	01/20/87	12/30/86	12/30/86
Elapsed Time			29 days	28 days	19 days*	36 days	11 days	13 days	11 days	35 days*	35 days
Cadmilum Date Andivzed	EPA 213.1		01/09/87	01/09/87	01/07/87	12/30/86	01/20/86	01/20/87	01/20/87	12/30/86	12/30/86
Elapsed Time			23 days	22 days	19 days*	35 days	ll days	13 days	11 days	35 days*	35 days
Chromium Date Analyzed	37A 218.1		01/15/87	01/15/87	01/07/87	12/27/86	01/20/87	01/20/87	01/20/87	12/27/86	12/27/86
Elapsed Time			29 days	28 days	19 days*	33 days	11 days	13 days	11 days	32 days*	32 days
Lead	EPA 239.2										
Date Anaiyzed Elapsed Time			01/10/87 24 days	01/10/87 23 days	01/07/87 19 days*	12/22/86 28 days	01/21/87 12 da <b>ys</b>	01/21/87 14 days	01/21/87 12 days	12/22/86 27 days*	12/22/86 27 days

* Revised 07/10/87

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SAMPLING DATE Phenolics Date Analyzad Elapsed Time Arsenic Date Analyzad Elapsed Time Date Analyzad Elapsed Time Date Analyzad Elapsed Time Cadmium	EPA 206.2 EPA 206.2 EPA 208.1 EPA 213.1	Field #:	Dulutt Dulutt BLANK THREE 01/07/87 (*) (*) (*) (*) 01/21/87 14 days 01/20/87 13 days 13 days 13 days	Duluth IAP - Mater Semples Holding Time Summary NK BLANK BLANK EE SEVEN EIGHT (*) (*) (*) (*) (*) (*) 12/31/96 01/12/87 (*) (*) (*) 12/31/96 01/22/87 12/31/96 br>12/31/96 01/22/87 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/	er Samples TRIP BLANK EIGHT (*) 01/12/87 (*) 10 days	BALLER RINSE <u>SEVEN</u> 12/22/86 (*) (*) 12/22/86 (*) (*) (*) 12/22/86 (*) (*) 12/22/86 (*) 12/22/86 01/07/87 16 days 01/06/87 15 days
Chromium Date Analyzed Elapsed Time	EPA 218.1		01/20/87 13 days			01/07/87 16 days
Lead Date Analyzed Classed Time	EPA 239.2		01/21/87 14 days			01/07/87 16 days

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(*) Date sample received by DataChem.

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H-110

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			DATAO Duluti Ho	DATACHEM MAALYTICAL REPORT Duluth IAP - Water Samples Holding Time Summary	CAL REPORT er Samples Summary						
Par amotor SMPLING DATE	Nethod	Field . Site :	GW1-A ONE 12/10/86	GW1-C ONE 12/11/86	GW1-D ONE 12/15/86	GW1-E ONE 12/15/86	SW-1A ONE 11/23/86	SN-1B ONE 11/23/86	GW2-A TWO 01/01/87	GM2-B TW0 01/02/87	GW2-C TWO 01/02/87
Mercury Dete Analyzed Elapsed Time	EPA 245J		12/24/86 14 days	12/24/86 13 days	12/23/86 8 days	12/23/86 8 days	12/04/86 11 days	12/04/86 11 days			
Seienium Date Analyzed Elapsed Time	EPA 270.2		12/29/86 19 days	12/29/86 18 days	01/14/87 30 days	01/14/87 30 days	12/14/86 21 days	12/14/86 21 days			
Silver Date Analyzed Elapsed Time	BA 272.1		12/30/86 20 days	12/30/86 19 days	01/09/87 25 da <b>ys</b>	01/09/87 25 days	12/03/86 10 days	12/03/86 10 days			

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			DATAC Dulut Ho	DATACHEN AMALYTICAL REPORT Duiuth IAP – water Samples Holding Time Summary	<b>CAL REPORT</b> er Samples Summary						
Par amoter Swepting Date	Method	Fleid#: Site :	NM-6 7M0 01/04/87	MM-7 TWO 0/01/87	GM3-A THREE 01/06/87	GW3-B THREE 01/06/87	GW3-C THREE 01/06/87	GW3-D THREE 01/07/87	SH-3A THREE 11/22/86	SM-3B THREE 11/22/86	SM-3C THREE 11/22/86
Mercury Dete Analyzed Elapsed Time	EPA 245,J				01/09/87 3 days	01/09/87 3 days	01/09/87 3 days	01/16/87 9 days	12/04/86 12 days	12/04/86 12 days	12/04/86 12 days
Selenium Date Analyzed Eiapsed Time	EPA 270.2				01/21/87 15 days	01/21/87 15 days	01/21/87 15 days	01/21/87 15 d <b>ays</b>	12/14/86 22 days	12/14/86 22 days	12/14/86 22 days
Silver Date Analyzed Elapsed Time	EPA 272.1				01/20/87 14 days	01/20/87 14 days	01/20/87 14 days	01/20/87 13 days	12/03/86 11 days	12/03/86 11 days	12/03/86 11 days

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Page 112

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#### DATACHBA ANALYTICAL REPORT Duluth IAP - Water Samples Holding Time Summary

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Paramatar		Fleid #:	0-MM	MW-10	II-MM	GW5-A	GW5-B	GW5-C	SW-5A	Sel-5B	SW-5C
5-255 5-				HUD1	YOO L	LIVE	F I VE	LIVE		FIVE	FIVE
SAMPLING DATE						12/17/86	12/16/86*	12/16/86*	11/22/86*	11/22/86*	11/22/86*
Mercury	EPA 245.1										
Date Analyzed						12/24/86		12/24/86		12/04/86* 12/04/86*	12/04/86*
El apsed Time						7 days			12 days*	12 days* 12 days*	12 days*
Sel en lum	EPA 270.2										
Date Analyzed						01/14/86	01/14/86	01/14/86	12/14/86*	12/14/86*	12/14/86*
Elapsed Time						18 days	19 days*	19 days*	22 days*	22 days*	22 days*
Silver	EPA 272.1										
Date Analyzed						01/09/87	01/09/87	01/09/87	12/03/86*	12/03/86*	12/03/86*
Elapsed Time						23 days	24 days*	24 days*	11 days*	11 days*	11 days*

* Revised 07/10/87

			Dulut Ho	DATACHBA ANALYTICAL REPORT Duluth IAP - Water Semples Holding Time Summary	ICAL REPORT er Samples Summary						
Parameter SMPLING DATE	Me thod	Field≰: Site :	GW7-A SEVEN 12/17/86	GW7-B SEVEN 12/18/86	GW7-C SEVEN 12/19/86*	SM-7A SEVEN 11/24/86	GM8-A E1 GHT 01/09/87	GM8-8 E1 GHT 01/07/87	GM8-C E1 GHT 01/09/87	SW-8A E1 GHT 11/2 5/86**	SM -88 E1GHT 11/25/86
Mercury Dete Analyzed Elapsed Time	EPA 245,1		12/23/86 14 days	12/23/86 13 days	01/06/87 18 days*	12/04/86 10 days	01/16/87 7 days	01/16/87 9 da <b>ys</b>	01/16/87 7 days	1 2/04/86 8  days**	12/04/86 9 days
Selenium Date Analyzed Elapsed Time	EPA 270.2		01/14/87 28 days	01/14/87 27 days	01/07/87 19 days*	12/29/86 35 days	01/21/87 12 days	01/21/87 14 days	01/21/87 12 days	12/29/86 34 days*	12/29/86 34 days
Silver Date Analyzed Elapsed Time	EPA 272.1		01/09/87 23 days	01/09/87 22 days	01/06/87 18 days*	12/30/86 36 days	01/20/87 11 days	01/20/87 1.5 days	01/20/87 11 days	12/30/86 35 days*	12/30/86 35 days

* SW-BA sample for Mercury taken 11/26/86; holding time calculated from this sampling date * Revised 07/10/87

Page 114

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H-114

### DATACHEN MUALYTICAL REPORT Duluth IAP - Water Samples

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Perameter SwerLING DATE Mercury Date Analyzed Elapsed Time Selenium Date Analyzed Elacentium	Met hod EPA 245, I EPA 270, 2	Field #: Site ::	TRIP BLANK <u>THREE</u> 01/08/87 (*) (*) 01/16/87 8 days 01/21/87	RINSE BLANK FIVE 12/19/86 (*) (*) 12/23/86 4 days	TR IP BLANK SEVEN 12/29/86 (*) 12/24/86 5 days	TR IP BLANK THREE 01/07/87 (*) 01/09/87 2 days	BAI LER RINSE <u>SEVEN</u> 12/22/86 (*) (*) 01/06/87 15 days 01/07/87
Silver Date Analyzad Elapsed Time	EPA 272.1		01/20/87 12 days				01/06/87 15 days

(*) Date sample received by DataChem.

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## DATACHEN ANALYTICAL REPORT Duluth IAP - Water Samples Holding Time Summary

Parameter SAMPLING DATE	Ne thod	Field #: Site :	GW10-A TEN 12/31/86	GW10-B TEN 01/01/87	GW1 0-C TEN 01/01/87
Radiology					
Gross Alpha Date Analyzed Elapsed Time	Std . Nethod 703		01/13/87 13 days	01/13/87 12 days	01/13/87 12 days
Gross Beta Date Analyzed Elapsed Time	Std. Method 703		01/13/87 13 days	01/13/87 12 days	01/13/87 12 days
Radium226 Date Analyzed Elapsed Time	Std. Method 706		01/21/87 21 d <b>ays</b>	01/21/87 20 d <b>a</b> ys	01/21/87 20 days
Radium-228 Date Analyzed Elapsed Time	Std. Mathod 708		01/21/87 21 days	01/21/87 20 days	01/21/87 20 days

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H-116

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DATACHER QUALITY CONTROL REPORT Dul or IAP - Soll Samples

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Par and ter	Met hod	Units	Detection Limit	Spiked Sample	Initial Value	Sp i ke Conc.	Percent Recovered	Spllt Sample	First Value	Second Value	Me thod B lank
Purgeable Halocarbons	EPA 8010 (*)	6/bn	MDL (**)								
Ch I or oben zene	EPA 8010	6/6n	0.0018		9	0.10	<b>%</b> 16	82-8 2.5-4	2	9	9
				B2-C 0-1.5	9	0.10	52%	B2-C 0-1.5	9	Q	
				SS-3A	Q	0.10	75%	SS-3A	2	9	
				B3-B 0-1.5	9	0.10	85%	B3-B 0-1.5	9	QN	
				84-A 2.5-4	9	0.10	365	B4-A 2.5-4	9	9	
				B3-C 5-6.5	9	0.10	945	B3-C 5-6.5	2	QN	
Chloroform	EPA 8010	6/6n	0,0022	82-8 2 <b>.</b> 5-4	2	0.10	<b>3</b> 86	82-8 2.5-4	9	9	9
				82-C 0-1.5	9	0.10	635	B2-C 0-1.5	9	Q	
				SS-3A	2	0.10	110%	SS-3A	9	9	
				83-B 0-1.5	9	0.10	<b>%</b> 66	B3-B 0-1.5	9	QN	
				B4-A 2.5-4	2	0.10	84%	B4-A 2.5-4	2	2	
				83-C 5-6.5	9	0.10	93%	B3-C 5-6.5	9	QN	
1 ,1-Dichloroethene	EPA 8010	6/6n	0.0025	82-8 2°24	9	0.10	<b>3</b> 56	82-8 2 <b>-</b> 5-4	9	9	9
				B2-C 0-1.5	9	0.10	265	B2-C 0-1.5	9	QN	
				SS-3A	0.0075	0.10	108%	SS-3A	0.0075	0,0043	
				B3-B 0-1.5	9	0,10	88%	B3-B 0-1.5	9	Ð	
				84-A 2.5-4	9	0.10	8LL	B4-A 2.5-4	9	9	
				B3-C 5-6.5	Q	0.10	120%	83-C 5-6 <b>.</b> 5	9	QN	
trans-1 ,2-Dichloroethene	EPA 8010	ɓ∕ɓn	0,0021	B3-C 5-6.5	Q	01 *0	348	B3-C 5-6.5	9	9	2
Te trach loroethene	EPA 8010	6/6n	0,0019	82-8 2 <b>-</b> 5-4	9	0.10	<b>3</b> 56	82-8 2.5-4	9	9	QN
				B2-C 0-1.5	9	0.10	518	82-C 0-1.5	9	9	
				SS-3A	9	0.10	68%	SS-3A	9	QN	
				83-8 0-1.5	ହ	0,10	1038	83-8 0-1.5	9	2	
				B4-A 2.5-4	2	0.10	84%	B4-A 2.5-4	9	QN	

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(*) Methods documented in previous Analytical Report Section.
(**) MDL values documented in previous Analytical Report Section.

"ND" indicates that the parameter was not detected.

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DATACHEN QUALITY CONTROL REPORT Duluth IAP - Soil Samples

			Detection	Spiked	In itial	Spike	Percent	Sp11+	First	Second	Method
	Method	Units	Limit	Sample	Value	Conc.	Recover ed	Sample	Value	Value	Blank
Purgeable Halocarbons (continued)											
	EPA 8010	6/6n	0,0026	82-8 2.5-4	9	0.10	101	B2-B 2.5-4	9	9	9
				B2-C 0-1.5	9	0.10	63%	B2-C 0-1.5	2	Q	
				SS-3A	0.0042	0.10	938	SS-3A	0,0042	0.0034	
				B3-B 0-1.5	2	0* 10	92 <b>%</b>	B3-B 0-1.5	2	Q	
				84-A 2.5-4	ହ	0,10	348	B4-A 2.5-4	9	2	
				B3-C 5-6.5	9	0.10	<b>X</b> L6	B3-C 5-6.5	2	QN	
	EPA 8010	6/6n	0,0030	82-8 2.5-4	9	0.10	89%	B2-B 2.5-4	9	9	9
				B2-C 0-1.5	Ð	0, 10	60%	B2-C 0-1.5	2	Q	
				SS-3A	<b>6600</b> *0	0.10	\$16	SS-3A	6600°0	0.0059	
				83-8 0-1.5	2	0•10	103%	B3-B 0-1.5	9	Q	
				B4-A 2.5-4	9	0.10	845	B4-A 2.5-4	9	9	
				B3-C 5-6.5	9	0.10	348	B3-C 5-6.5	9	QN	
	EPA 8020	6/6n	MDL								
	EPA 8020	6/6n	0.0013	B2-B 2.5-4	2	0.10	104%	B2-B 2.5-4	9	9	9
				B2-C 0-1.5	2	0* 10	47%	B2-C 0-1.5	9	QN	
				SS-3A	2	0.10	\$16	SS-3A	9	9	
				B3-B 0-1.5	2	0.10	8 5%	83-8 0-1 <b>.</b> 5	9	QN	
				84-A 2.5-4	9	0.10	95 <b>X</b>	B4-A 2.5-4	9	9	
				B3-C 5-6.5	9	0.10	83%	B3-C 5-6.5	2	Ŋ	
	EPA 8020	6/6n	0,0032	82-8 2 <b>•</b> 5-4	9	0.10	<b>3</b> 96	B2-B 2.5-4	9	9	9
				B2-C 0-1.5	0.54	0.10	32%	B2-C 0-1.5	0.54	0,28	
				S5-3A	0.013	0.10	87%	SS-3A	0.013	0.013	
				B3-B 0-1.5	9	0•10	928	B3-B 0-1.5	9	QN	
				B4-A 2.5-4	9	0.10	<b>%</b> 69	B4-A 2.5-4	9	9	
				83-C 5-6.5	9	0.10	326	B3-C 5-6.5	2	QN	

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> DATACHEN QUALITY CONTROL REPORT Duiuth IAP - Soil Semples

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			Detection	Sp1 ked	In i t i al	Splke	Percent	Spl i t	Flrst	Second	Me thod
Parameter	Method	Units		Samp le	Value	Conc.	Recover ed	Sample	Value	Value	Blank
Pesticides	EPA 3550/8080	6/6n	MOL								
Aldrin	EPA 3550/8080	b∕bn	0,002	B1-A 0-1.5	9	0,08		B3-C 5-6.5	9	9	9
				B8-A 5-6.5	9	0,08	88%	B8-A 2.5-4	9	Q	
				B8-B 0-1.5	9	0,08	88%	GM8-C 11-11.5	9	9	
				GW8-C 11-11.5	9	0•10	<b>\$</b> 06				
L indane	EPA 3550/8080	6/6n	0,003	B1-A 0-1 5	9	0.08	88%	83-C 5-6.5	9	9	2
				B8-A 5-6.5	Ŷ	0,08	88%	B8-A 2.5-4	9	QN	
				B8-B 0-1.5	9	0.08	113%	GWB-C 11-11.5	9	9	
				GW8-C 11-11.5	9	0•10	100%				
4,4'-00T	EPA 3550/8080	6/6n	0,004	B1-A 0-1.5	0.002	0.20	845	B3-C 5-6.5	0,06	10.0	2
				B8-A 5-6.5	9	0.20	<b>3</b> 56	B8-A 2.5-4	9	QN	
				88 <del>-8</del> 0-1.5	9	0.20	100%	GWB-C 11-11.5	2	9	
				GW8-C 11-11.5	2	0.25	1045				
Dieldrin	EPA 3550/8080	6/bn	0,003	81-A 0-1 \$	600*0	0.20	81\$	B3-C 5-6.5	9	2	2
				B8-A 5-6.5	9	0.20	80%	B8-A 2.5-4	9	QN	
				B8-B 0-1.5	9	0.20	75%	GWB-C 11-11.5	2	9	
				GW8-C 11-11.5	9	0.25	100%				
Endrin	EPA 3550/8080	ɓ∕bn	c.005	B1-A 0-1.5	QN	0.20	<b>\$</b> 06	83C 56,5	ę	9	9
				B8-A 5-6.5	9	0.20	105%	B8-A 2.5-4	9	QN	
				B8-B 0-1.5	9	0.20	100%	GWB-C 11-11.5	2	9	
				GW8-C 11-11.5	2	0.25	<b>3</b> 96				
Heptachl or	EPA 3550/8080	6/6n	0,004	B1-A 0-1 5	9	0,08	888	B3-C 5-6.5	9	9	9
				B8-A 5-6.5	9	0,08	100%	B8-A 2.5-4	9	QN	
				88-8 0-1.5	9	0.08	113%	GW8-C 11-11.5	9	9	
				GW8-C 11-11.5	Ŷ	0.10	100				

"ND" indicates that the parameter was not detected.

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DATACHEN	Duluth

Second Value First Value 222222 GM8-B 10-11.5 SW8-C 11-11.5 GW8-A 5-6.5 GW1-B 5-6.5 GW1-B 5-6.5 B3-C 5-6.5 B8-A 2.5-4 Sample Sp1it Recover ed Percent Spike Conc. 0.0.0.0 Value 22222 GW1-A 10-11.5 GW3-D 5-6.5 B8-B 0-1.5 GW8-C 11-11.5 GW1-A 10-11.5 Spiked Sample 88-A 5-6.5 Detection Limit 0.10 0.02 MDL Un i ts 6/bn 6/6n 6/6n EPA 3550/8150 EPA 3550/8150 EPA 3550/8150 Me thod

Parameter

Herbicides

2,4-D

2,4,5-T

Q **Q** 9 9 9 9 9 9 9 9 9999999 375 2 2 2 2 2 2 2 222222 GW8-B 10-11.5 GW8-B 10-11.5 3M8-C 11-11.5 SW8-C 11-11.5 GW8-A 5-6.5 GW8-A 5-6.5 GW1-B 5-6.5 GW3-D 5-6.5 B3-C 5-6.5 B3-C 5-6.5 B8-A 2.5-4 B8-A 2.5-4 **33-C** 5-6.5 B8-A 2.5-4 84-B 5-6.5 54% 76% 80% 78% 80% 64% 80% 95% 76% 0.0.0.0 00000 2 2 2 2 2 2 GW1-A 10-11.5 GWB-C 11-11.5 GW8-C 11-11.5 GW3-D 5-6.5 GW3-D 5-6.5 88-B 0-1.5 88-B 0-1.5 B8-A 5-6.5 B8-A 5-6.5 0.02 _ 6/6n * EPA 3550/8150 EPA 160.3 Silver Molsture

II-120

3W4-C 10-12

B4-E 2.5-4 34-E 5-6.5

"NO" indicates that the parameter was not detected.

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DATACHEM QUALITY CONTROL REPORT Duiuth IAP - Soil Samples

Method         Units         Limit         Sample         Value         Conc.         Recovered         Sample           ••••••         EPA 413.2         ud/9         3.         GNI:A 10-11.5         NO         120         945         GNI:A 10-11.5           •••••         EPA 413.2         ud/9         50         3.         110         935         SS-5.5           B4-6         5-5.5         40         120         935         B4-6         55.5           B4-7         55         40         120         133         B4-6         55.5           B4-7         54         2.4         110         123         644-7.5.4         56.5           B4-7         54         100         120         137         644-7.5.4         56.5           B4-7         5.4         120         120         120         120         120         12				Detection	Spiked	In i tial	Spike	Percent	Sp114	First	Second	Method
FM 413.2         urg         5.         GHA (10-11,5)         N         120         94         GHA (10-11,5)           94-C         5-64         33,         110         103         84-C 5-64         34,         104         104         104           84-A         25-4         40         120         84         55-65         84-A         25-44         84-C 5-65         84-A         25-44         84-C 5-65         84-A         25-44         84-C 5-65         84-A         25-44         84-C 5-65         84-A         26-0         100         103         84-C 5-65         84-A         25-44         84-C 5-65         84-A         26-0         100         113         84-C 5-65         84-A         10-11,5         84-C 5-65         84-A         10-11,5         84-C 5-65         84-A         10-11,5         84-C 5-65         84-C 10-12         84-C 2-65         84-C 2-65         84-C 2-65         84-C 2-65         84-C 2-65 </th <th>Parameter</th> <th>Method</th> <th>Units</th> <th>Limit</th> <th>Sample</th> <th>Value</th> <th>Conc.</th> <th>Recover ed</th> <th>Sample</th> <th>Value</th> <th>Value</th> <th>Blank</th>	Parameter	Method	Units	Limit	Sample	Value	Conc.	Recover ed	Sample	Value	Value	Blank
B-C 2,5-4     N0     120     110     B-C 5-5       S5-5C     33,     110     33     S-55       B4-C 5-5,     40     120     114     B-C 5-5,       B4-C 5-5,     40     120     134     B-C 5-5,       B4-C 5-1,     200     33     B-C 5-5,     64-A 10-11,       S5-6C     86,     110     123     B4-C 5-5,       S5-7E     86,     110     123     B4-C 10-12,       B1-9     5,     10     120     134     B4-C 5-5,       S5-7E     86,     10     123     G4-A 10-11,       S5-7E     86,     10     123     G4-A 10-11,       B1-9     5,     10     120     137     G4-C 10-12       B1-9     110     123     10     123     G4-C 10-12       B1-9     25-34     0     120     137     G4-C 10-12       B1-9     25-34     0     120     123     G4-C 10-12       B1-9     25     24     110     123     G4-C 10-12       B1-9     25     24     10     120     137       B1-9     25     24     10     120     147       B1-9     25     10     120     147 </td <td>0il and Grease</td> <td>EPA 413.2</td> <td>6/bn</td> <td>5.</td> <td>GW1-A 10-11.5</td> <td>9</td> <td>120</td> <th>94 <b>X</b></th> <td>GW1-A 10-11.5</td> <td>9</td> <td>9</td> <td>9</td>	0il and Grease	EPA 413.2	6/bn	5.	GW1-A 10-11.5	9	120	94 <b>X</b>	GW1-A 10-11.5	9	9	9
S-5-1C     33,     110     931     S5-5C       B4-C     5,5-3     400     120     837     84-6     55-55       B4-C     5,5-4     10     120     837     84-6     55-55       B4-C     10-11,5     580     120     837     84-6     10-11,5       S5-5E     86,0     100     123     84-6     10-11,5       S5-9E     86,0     100     120     133     84-6     10-11,5       S5-9E     86,0     100     120     103     85-5       S64     10-11,5     10     120     93     85-5       S64     10-11,5     10     120     93     85-5       S64     10-11,5     10     120     94     10-11,5       S64     10-11,5     10     120     94-5     94-5       S64     10-11,5     10     120     94-5     94-5       S64     10-11,5     10     120     94-5     94-5       S7					B3-C 2.5-4	9	120	5011	B3-C 5-6.5	9	QN	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$					SS-3C	33.	110	<b>3</b> 26	SS-3C	33.	27.	
B4-C 5-6.5     40     120     894     84-6 5-6.5       G44-E 2,5-4     10     120     87     84-6 5-6.5       G44-A 10-11,5     80     100     113     84-6 5-6.5       S5-9C     86.     110     123     64-4 10-11,5       S5-9C     86.     110     123     64-4 10-11,5       S5-9C     86.     100     120     93     S5-9C       B4-A 2,5-4     10     120     93     S5-9C       B4-A 2,5-4     10     120     93     S5-9C       B6-A 1,5-10,5     10     120     93     S5-9C       B7-A 1,5-10,5     10     10,0     103     B1-A 2,5-4       B7-A 1,5-10,5     10     10,0     10,0     10,11,5       B7-A 1,5-10,5     10     0,0     10,0     10,0       B7-A 1,5-10,5     10     0,0     10,0     10,0       B7-A 2,5-4     10,1     10,0     10,0       B7-A 2,5-4     10,1					B4-A 2.5-4	450	610	24 01	B4-A 2.5-4	450	470	
B4-E 2,5-4     N0     120     873     B4-C 5-6.5       S5-FE     86.     110     123     644-A 10-11.5       S5-FE     86.     110     123     644-A 10-11.5       B7-A 0-1.5     24.     110     123     644-A 10-11.5       B7-A 0-1.5     24.     110     123     644-A 10-11.5       B7-A 0-1.5     24.     N0     120     94-E 2,5-4       B7-A 2,5-4     N0     120     93     55-FE       B8-A 2,5-4     N0     120     104     B7-A 2,5-4       B7-A 2,5-4     N0     120     104     B7-A 2,5-4       B8-A 2,5-4     N0     120     104     B7-A 2,5-4       B8-A 2,5-4     N0     60,     107     11,5       B8-A 2,5-4     N0     60,     106     642-B 56,5       B8-A 2,5-5     N0     60,     106     642-B 56,5       B1-A 5,6-5     N0     60,     107     642-B 56,5       B					B4-C 5-6.5	40	120	88%	B4-B 5-6.5	580	770	
(H4-A   10-11,5)         560         1200         114         BH-D 5-6,5           S5-4C         2400         55,0         100         1233         644-C   0-11,5           S5-4C         240         0-1,5         00         100         1033         B4-E 2,5-4           S5-4C         240         0-1,5         0         110         1233         644-C   0-12           B1-A         2,5-4         0         120         1061         85-4C         85-4C           B1-A         2,5-4         0         120         1035         85-4C         86-4         10-11,5           B1-A         2,5-4         0         120         104         87-A         25-4           G69-4         10-11,5         0         120         104         87-A         25-4           B2-A         2,5-4         0         120         104         87-A         25-5           G69-4         10-11,5         0         120         104         87-A         55-4           G69-4         10-11,5         0         120         104         120-15         5           S7-1A         25-1         0         0         0         10-15         5         <					B4-E 2.5-4	9	120	87\$	B4-C 5-6.5	40.	40.	
SS-4C       2400       5900       103       B4-E       2,5-4         B7-A       0-1,1,5       24,       110       123       644-A       10-11,5         B7-A       0-1,1,5       0       10       103       55-4C       646-A       10-11,5         B7-A       2,5-4       0       120       97       55-4C       646-A       10-11,5         B6-A       2,5-4       0       120       103       55-4C       646-A       10-11,5         B6-A       2,5-4       0       120       104       120       97       55-4C         B6-A       2,5-4       0       60       104       10-11,5       86-4       2,5-4         B7-A       2,5-4       0       60       0       97       97-4       2,5-4         B7-A       2,5-4       0       60       0       0       87-4       2,5-4         B7-A       2,5-4       0       0       0       0       0       10-11,5         B7-A       2,5-4       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 <td< td=""><td></td><td></td><td></td><td></td><td>GW4-A 10-11.5</td><td>580</td><td>1200</td><th>1145</th><td>B4-D 5-6.5</td><td>430</td><td>680</td><td></td></td<>					GW4-A 10-11.5	580	1200	1145	B4-D 5-6.5	430	680	
S5-5E     86,     110     1228     044-4 10-11,5       B7-A 0-1,5     24,     110     129     044-6 10-12       B7-A 0-1,5     N     120     104     10-11,5       B7-A 0,5-4     N     120     104     10-11,5       B7-A 2,5-4     N     120     104     10-11,5       B7-A 2,5-4     N     120     104     17-1,5       B7-A 2,5-4     N     120     104     10-11,5       B7-A 2,5-4     N     0     60     9%     55-4       B7-A 2,5-4     N     0     60     9%     87-4       B7-A 2,5-4     N     0     60     104     10-11,5       B7-A 2,5-4     N     0     60     103     87-4       B8-A 2,5-4     N     60     104     10-11,5       B7-A 2,5-4     N     60     103     88-7 2,5-4       B7-A 2,5-4     N     60     103     88-7 2,5-4       B8-A 2,5-5     N     60     104     10-11,5       B7-A 2,5-4     N     60     103     88-7 2,5-4       B7-A 2,5-4     N     60     103     88-7 4,5-5       B7-A 2,5-5     N     60     103     88-7 4,5-5       B7-A					SS-4C	2400	5900	103	B4-E 2.5-4	2	Q	
B7-A 0-1,5     24,     110     123     644-C 10-12       B7-A 0-1,5     N     110     106     55-4C       B6-A 2,5-4     N     120     074     25-4       B7-A 2,5-4     N     120     074     25-4       C60-4     10-11,5     120     074     25-4       C7-A 10-11,5     N     120     074     25-4       C60-7     10-11,5     120     074     25-4       C7-A 10-11,5     N     060     073     25-74       C7-A 10-11,5     N     060     073     25-74       C7-A 10-15     0     060     073     26-15					SS-5E	86.	110	1225	GW4-A 10-11.5	580	1100	
B7-B     0-1.5     ND     110     1085     SS-4C       B8-A     2.5-4     ND     120     975     SS-5E       646-B     10-11.5     ND     120     1045     B7-4     SS-5E       646-B     10-11.5     ND     120     1045     B7-4     SS-5E       646-B     10-11.5     ND     60     975     SS-54       647-B     SS-1A     ND     60     975     SS-54       647-B     SS-1A     ND     60     1075     B7-40.25-4       647-B     SS-1A     ND     60     1075     B8-A     SS-54       647-B     SS-1A     ND     60     1075     B8-A     SS-54       647-B     ND     60     1067     1075     B8-A     SS-74*       B2-B     SS-1A     ND     60     1075     B8-B     SS-7A*       B2-C     O-15     ND     60     1075     B8-B     SS-7A*       B3-C     SS-1A     ND     60     1075     B8-B     SS-7A*       B3-C     SS-1A*     ND     60     1075     B8-B     SS-7A*       B3-C     SS-1A*     ND     60     1075     B8-B     SS-7A*       B3-A <td></td> <td></td> <td></td> <td></td> <td>B7-A 0-1.5</td> <td>24.</td> <td>011</td> <th>1238</th> <td>GW4-C 10-12</td> <td>72.</td> <td>93.</td> <td></td>					B7-A 0-1.5	24.	011	1238	GW4-C 10-12	72.	93.	
BB-A 2.5-4     N0     120     97     SS-5E       GNB-B 10-11.5     N0     120     104     B7-A 2.5-4       GNB-B 10-11.5     N0     120     104     B7-A 2.5-4       GNB-B 10-11.5     N0     120     104     B7-A 2.5-4       GNB-B 10-11.5     N0     60     97     GN7-A 10-11.5       GNB-B 10-11.5     N0     60     97     GN7-B 10-11.5       GNB-B 56.5     SS-1A     N0     60     97     GN2-B 56.5       GNB-E 20-21.5     N0     60     97     GN2-B 56.5       GNB-E 20-21.5     N0     60     107     GN3-D 5-6.5       GNB-E 56.5     N0     60     107     GN3-D 5-6.5       GNB-E 56.5     N0     60     107     GN3-C 15-6.5       GNB-E 56.5     N0     60     107 <td></td> <td></td> <td></td> <td></td> <td>B7-B 0-1.5</td> <td>9</td> <td>011</td> <th>108%</th> <td>SS-4C</td> <td>2400</td> <td>2800</td> <td></td>					B7-B 0-1.5	9	011	108%	SS-4C	2400	2800	
GMB-B     IO-11,5     ND     120     1045     BT-A     2.5-4       BT-A     2.5-4     BT-A     2.5-4     BT-A     2.5-4       GMT-A     10-11,5     BT-A     2.5-4     BT-A     2.5-4       GMT-A     10-11,5     10     10     10-11,5       BT-A     2.5-1     ND     60,     978     GMT-A       GMT-A     10     10,     10     10,     11,5       GMT-A     10     10,     10,     10,     11,5       GMT-A     10,     10,     10,     10,     10,       GMT-A     10,     10,     10,     10,     11,5       GMT-A     10,     10,     10,     10,     10,       GMT-A     10,     10,     10,     10,     10,       GMT-A     10,     10,     10,     10,     1					B8-A 2.5-4	9	120	\$1.6	SS-5E	86.	<b>66.</b>	
EPA 420.2       ug/g       5.       B1-A 2.5-4       GW7-A 10-11.5         GW7-A 10-11.5       GW7-A 10-11.5       GW7-A 10-11.5       GW7-A 10-11.5         CMB-B 10-11.5       S5-1A       ND       60.       9.3       GW3-B 5-6.5         GW1-B 10-11.5       ND       60.       1065       GW3-B 5-6.5       GW7-A 0-1.5         GW1-B 10-11.5       ND       60.       1065       GW3-B 5-6.5       GW7-C 15-16.5         GW1-B 10-11.5       ND       60.       1065       GW7-C 15-16.5       S5-7A*         GW1-B 10-11.5       ND       60.       1075       GW7-C 15-16.5         GW5-A 5-6.5       ND       60.       1075       GW7-C 15-16.5         GW5-A 11.5       ND       60.       1075       GW7-C 15-16.5         GW5-A 10-1.5       ND       60.					GW8-B 10-11.5	9	120	1045	B7-A 2.5-4	9	2	
EPA 420,2       ug/g       5,       B1-A 2,5-4       EB-A 2,5-4         EPA 420,2       ug/g       5,       B1-A 2,5-4       EB-A 2,5-4         EPA 420,2       ug/g       5,       B1-A 2,5-4       EB-A 2,5-4         EPA 420,2       0,       05,       075       EB-A 2,5-4         EPA 420,2       0,       0,       0,       075       EB-A 2,5-4         EPA 420,2       0,       0,       0,       075       EB-A 2,5-4         EPA 420,2       N       0       60,       1065       EB-A 5,5         SS-1A       N       0       60,       1075       EM-C 15-16,5         EPA 0-1,5       N       0       60,       1075       EM-C 15-16,5         EPA 0-1,5       N       0       60,       1075       EM-C 15-16,5         EPA 5-6,5       N       0       60,       1075       EM-C 15-16,5         EM5-15       N       0       60									B7-8 2.5-4	9	QN	
EPA 420.2       ug/g       5.       B1-A 2.5-4       ND       60.       975       GM3-B 5-6.5         GMB-B 10-11.5       ND       60.       975       GM3-B 5-6.5       GM3-B 5-6.5         GM1-E 20-21.5       ND       60.       975       GM3-B 5-6.5       GM3-B 5-6.5         GM1-E 20-21.5       ND       60.       1055       B7-A 0-1.5       B7-A 0-1.5         B2-B 0-1.5       ND       60.       1025       B7-A 0-1.5       B7-A 0-1.5         B2-C 0-1.5       ND       60.       1025       B7-A 0-1.5         B3-C 5-6.5       ND       60.       1025       B8-B 2.5-4         B7-A 0-1.5       ND       60.       1075       B8-B 5-6.5         B8-A 5-6.5       ND       60.       1075       648-C 11-11.5         B8-A 5-6.5       ND       60.       1075       648-C 11-11.5         B8-A 5-6.5       ND									GW7-A 10-11.5	63.	64.	
EPA 420.2       ug/g       5.       B1-A 2.5-4       NO       60.       97       GM3-B 5-6.5         SS-1A       NO       60.       975       GW3-D 5-6.5       GW3-D 5-6.5         GM1-E       20-21.5       NO       60.       1055       GW3-D 5-6.5         GM1-E       20-21.5       NO       60.       1075       B7-A 0-1.5         B2-B       0-1.5       14.       60.       1075       B7-A 0-1.5         SS-2A       NO       60.       1075       B8-B 5-6.5         B3-C 5-6.5       NO       60.       1075       B8-B 5-6.5         B3-C 5-6.5       NO       60.       1075       B8-B 5-6.5         B4-A 0-15       6.       0       60.       1075       GM8-C 15-16.5         B4-A 0-15       6.       0       60.       1075       GM8-C 15-16.5         GM5-A 5-6.5       NO       60.       1075       GM8-C 11-11.5         GM5-A 0-15       6.       0       60.       1075       GM8-C 11-11.5         GM5-B 10-11.5       NO       60.       1075       GM8-C 11-11.5       GM8-C 11-11.5         GM7-C 15-16.5       NO       60.       1075       GM8-C 10-1.5       GM8-C 10									B8-A 2.5-4	2	9	
EPA 420.2       ug/g       5.       B1-A 2.5-4       N0       60.       978       643-B 5-6.5         SS-1A       N0       60.       1056       643-D 5-6.5       643-D 5-6.5         Gw1-E       20-21.5       N0       60.       1075       643-D 5-6.5         Gw1-E       20-21.5       N0       60.       1075       643-D 5-6.5         B2-B       O-1.5       14.       60.       1075       649-2.5-4         B2-C       O-1.5       14.       60.       1075       649-2.5-4         B3-C       5-6.5       N       0       60.       1075       649-C       5-6.5         B3-C       5-6.5       N       0       60.       1075       649-C       5-6.4         B3-C       5-6.5       N       0       60.       1075       <									GW8-B 10-11.5	2	£	
ND         60.         1065         GW3-D 5-6.5           D-21.5         ND         60.         1055         B7-A         0-1.5           1.5         ND         60.         1055         B7-A         0-1.5           1.5         ND         60.         945         SS-7A*           1.5         14.         60.         1025         GW7-C         15-16.5           5.5         ND         60.         1025         GW7-C         15-16.5           5.5         ND         60.         1025         B8-B         2.5-4           5.5         ND         60.         1025         B8-B         5.5-4           6.5         ND         60.         1075         GW8-C         11.1.5           -6.5         ND         60.         1075         GW8-C         11.1.5           -6.5         ND         60.         1075         GW8-C         11.1.5           5.16.5         ND         60.         1075         GW8-C         11.1.5           6.11.5         ND         60.         1075         9.45         1.5           5.16.5         ND         60.         1075         9.45         1.1.5	Phenol I cs	EPA 420.2	6/6n	5.	B1-A 2.5-4	9	60 <b>.</b>	<b>\$</b> 16	GW3-B 5-6.5	9	Ŷ	QN
D-21.5     ND     60.     105%     B7-A     0-1.5       1.5     ND     60.     94%     SS-7A*       1.5     14.     60.     102%     GW7-C     15-16.5       5.5     ND     60.     102%     GW7-C     15-16.5       5.5     ND     60.     102%     B8-B     2.5-4       5.5     ND     60.     102%     B8-B     2.5-4       5.5     ND     60.     102%     B8-B     5.5-4       6.5     ND     60.     107%     GM8-C     11-1.5       -6.5     ND     60.     107%     GM8-C     11-1.5       -6.5     ND     60.     1084     5.6-6.5     5.6       0.11.5     ND     60.     1084     5.6     5.6       5.5     ND     60.     105%     5.6     5.6       5.5     ND     60.     105%     5.6     5.6       5.5     ND     60.     105%     5.6     5.6					SS-1A	9	60 <b>.</b>	106%	GW3-D 5-6.5	Ð	9	
1.5       ND       60.       94\$       SS-7A*         1.5       14.       60.       102\$       GW7-C 15-16.5         6.5       10       60.       102\$       GW7-C 15-16.5         6.5       ND       60.       102\$       BB-B 2.5-4         6.5       ND       60.       102\$       BB-B 5-6.5         5.5       ND       60.       98\$       SS-8A*         -6.5       ND       60.       107\$       GM8-C 11-11.5         -6.5       ND       60.       107\$       GM8-C 11-11.5         -6.5       ND       60.       97\$       SS-8A*         -11.5       ND       60.       107\$       GM8-C 11-11.5         5.16.5       ND       60.       97\$       SS-8A*         5.16.5       ND       60.       97\$       SS-8A*         5.16.5       ND       60.       105\$       SS-8A*         5.5       ND       60.       105\$       SS-8A*         5.5       ND       60.       105\$       SS-8A*					GW1-E 20-21.5	9	60.	105%	87-A 0-1.5	9	QN	
1.5       14.       60.       102%       GW7-C       15-16.5         8.5       ND       60.       106%       B8-B       2.5-4         8.5       ND       60.       102%       B8-B       2.5-4         5.5       ND       60.       102%       B8-B       5.6.5         5.5       ND       60.       102%       B8-B       5-6.5         6.5       ND       60.       98%       SS-8A*         -6.5       ND       60.       107%       GM8-C       11-11.5         1.5       6.       60.       97%       GM8-C       11-11.5         0.11.5       ND       60.       1084       GM8-C       11-11.5         5.16.5       ND       60.       97%       GM8-C       11-11.5         6.11.5       ND       60.       97%       GM8-C       11-1.5         5.16.5       ND       60.       105%       GM8-C       11-1.5         6.5       ND       60.       105%       GM8-C       11-1.5					B2-B 0-1.5	9	60 <b>.</b>	345	SS-7A*	2	Ð	
ND         60.         1065         B8-B         2.5-4           5.5         ND         60.         1025         B8-B         56.5           5.5         ND         60.         1025         B8-B         56.5           5.5         ND         60.         1025         B8-B         56.5           -6.5         ND         60.         1075         B8-B         56.5           -6.5         ND         60.         1075         GM8-C         11-11.5           -6.5         ND         60.         975         GM8-C         11-11.5           1.5         6.         60.         975         GM8-C         11-11.5           0.11.5         ND         60.         975         GM8-C         11-11.5           5.16.5         ND         60.         975         GM8-C         11-1.5           5.5         ND         60.         1055         1075         1075           5.5         ND         60.         1075         1075         1075					B2-C 0-1.5	14.	60.	102%	GW7-C 15-16.5	₽	QN	
5.5     ND     60,     1025     B8-B 5-6.5       5.5     ND     60,     985     SS-BA*       -6.5     ND     60,     1075     GMB-C 11-11.5       -6.5     ND     60,     1075     GMB-C 11-11.5       -6.5     ND     60,     975     GMB-C 11-11.5       -1.5     ND     60,     975     GMB-C 11-11.5       -11.5     ND     60,     1055     975       5-16.5     ND     60,     1055     975       5.1     ND     60,     1075       5.5     ND     60,     1075       1.5     ND     60,     1055					SS-2A	2	60 <b>.</b>	106%	B8-B 2.5-4	Q	9	
5.5     ND     60.     985     SS-8A*       -6.5     ND     60.     10.75     GMB-C     11-11.5       -6.5     ND     60.     10.75     GMB-C     11-11.5       -6.5     ND     60.     975     975       1.5     6.     60.     995       5-16.5     ND     60.     1055       5.5     ND     60.     1055       5.16.5     ND     60.     1055       1.5     ND     60.     1055					H3-H 5-6.5	2	60 <b>.</b>	102%	B8-B 56.5	9	QN	
-6.5 ND 60. 107% GM8-C 11-11.5 -6.5 ND 60. 1084 1.5 6. 60. 97% 3-11.5 ND 60. 99% 5-16.5 ND 60. 105% 5.5 ND 60. 107% 1.5 ND 60. 107%					B3-C 5-6.5	9	60 <b>.</b>	<b>3</b> 86	SS-BA*	Q	Ð	
-6.5 ND 60. 1.5 6. 60. 0-11.5 ND 60. 5.15 ND 60. 1.15 ND 60. 1.5 ND 60.					GW3-D 5-6.5	9	60 <b>.</b>	107%	GWB-C 11-11.5	2	QN	
1.5 6. 60. 1.1.5 ND 60. 1.1.5 ND 60. 1 5.5 ND 60. 1 1.5 ND 60. 1 1.5 ND 60. 1					GW5-A 5-6.5	9	60 <b>.</b>	1084				
ND 60. 1 D-11.5 ND 60. 1 5-16.5 ND 60. 1 5.5 ND 60. 1 1.5 ND 60. 1					B7-A 0-1.5	6.	<b>6</b> 0 <b>.</b>	878				
00000000000000000000000000000000000000					SS-7A*	2	<b>60</b>	<b>3</b> 66				
00 00 00 00 00 00					GW7-B 10-11.5	9	<b>60.</b>	105%				
ND 60.					GW7-C 15-16.5	2	<b>60.</b>	<b>5</b> 66				
ND 60.					B8-A 5-6.5	2	60.	107				
					B8-B 0-1.5	2	<b>60</b>	105%				
SS=8A* ND 60° 99%					SS-8A*	Q	60 <b>.</b>	<b>\$</b> 66				

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"ND" indicates that the parameter was not detected.

DATACHEN QUALITY CONTROL REPORT Duiuth IAP - Soil Samples

Blank	9
Value 8.	57. 24. 66. 100 26. 24. 74. 74. 57.
Value 8.	71. 24. 55. 59. 26. 23. 46. 57.
sp117 Sample GW1-E 20-21.5	GW1-A 10-11.5 GW1-E 20-21.5 SS-1B GW3-D 5-6.5 SS-3A GW3-B 9.5-11 SS-7A* GW7-B 10-11.5 B8-A 2.5-4 SS-8A* SS-8A*
Percent Recover ed 1165 825 825 855 765 855 855 765 685 645	800 800 800 800 800 800 800 800 800 800
۲۵۱ Ka ۲۵۰۰ ۲۵۰ ۲۵۰ ۲۵۰ ۲۵۰ ۲۵ ۲۵۰۰ ۲۵۰ ۲۵۰ ۲۵۰ ۲۵۰ ۲۵۰ ۲۵۰ ۲۵۰ ۲۵۰ ۲۵۰	100 52. 52. 52. 52. 52.
11 11 11 11 11 11 11 11 11 11 11 11 11	
Spiked I Sample Bi-A 0-1.5 GWI-E 20-21.5 SS-1B B3-A 0-1.5 SS-3C GW5-U 9.5-11 SS-7A* GW7-U 9.5-11 SS-7A* GW7-U 2.5-4 SS-88* GW3-U 5-6.5 GW3-U 5-6.5 GW3-U 5-6.5	GW1-A 10-11.5 GW1-E 20-21.5 SS-18 GW3-B 5-6.5 SS-38 SS-38 SS-38 SS-38 BB-A 5-6.5 SS-88* CW8-C 11-11.5
Detection Limit -	20 <b>.</b>
ug/g	6,/bn
Met hod EPA 3050/7060	EPA 200.7
Arsenic	Bar lun
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* Revised 07/10/87

H-122

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DATACHEN QUALITY CONTROL REPORT Dututh IAP - Soil Samples

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			Detection	Spiked	in i ti al	Spike	Percent	Split	First	Second	Method	
Parameter	Method	Un i ts	Limi+	Sample	Value	Conc.	Recover ed	Sample	Value	Value	Blank	
	EPA 200.7	b/bn	2.	GW1-A 10-11.5	9	50 <b>.</b>	<b>3</b> 86	GW1-A 10-11.5	Ð	2	9	
				GW1-E 20-21.5	9	25.	80%	GW1-E 20-21.5	9	9		
				SS-1B	2	50.	84%	SS-18	QN	9		
				GW3-B 5-6.5	Q 2	25.	82%	GW3-D 5-6.5	2	QN		
				SS-3A	78.	50.	1 14%	SS-3A	75.	78.		
				SS-58	9	50.	87%	GW5-B 9.5-11	9	Q		
				SS-7A*	•6	25.	<b>\$</b> 06	SS-7A*	6.	7.		
				B8-A 5-6.5	9	25.	<b>3</b> 06	GW7-B 10-11.5	2	QN		
				SS-88	43.	25.	<b>3</b> 26	B8-A 2.5-4	9	9		
				GW8-C 11-11.5	2	25.	80%	SS-8A*	2	QN		
								GW8-C 11-11.5	9	Q		
Silver	EPA200.7	6/6n	_•	GW1-A 10-11.5	9	100		GW1-A 10-11.5	2	Ð	QN	
		<b>)</b>		GW1-E 20-21.5	2	50.		GW1-E 20-21.5	Ŷ	9		
				SS-1B	9	100		SS-1B	9	QN		
				GW3-B 5-6.5	Ð	50.		GW3-D 5-6.5	9	9		
				SS-3A	9	100	94%	SS-3A	2	QN		
				SS-58	9	50.	<b>3</b> 66	GW5-B 9.5-11	Q	Ð		
				SS-7A*	9	50.	816	SS-7A*	2	QN		
				B8-A 5-6.5	9	50.	865	GW7-B 10-11.5	9	9		
				SS-8B*	₽	50.	928	B8-A 2.5-4	9	QN		
				GW8-C 11-11.5	9	50 <b>.</b>	948	SS-BA*	Q	2		
								GW8-C 11-11.5	9	QN		
Cadm i un	EPA 200.7	b/bn	_	GW1-A 10-11.5	9	5.	878	GW1-A 10-11.5	9	9	QN	
		5		GW1-E 20-21.5	9	2.5	82%	GW1-E 20-21.5	9	Ð		
				SS-1B	Ð	<b>.</b> 2	<b>%</b> 66	SS-1B	9	QN		
				GW3-B 5-6.5	9	2.5	88%	GW3-D 5-6.5	Q	9		
				SS-3A	6.	5.	<b>%</b> 66	SS-3A	<b>8</b>	<b>6</b>		
				SS-5B	9	7.5	88%	GW5-B 9.5-11	Q	9		
				SS-7A*	Q	2•5	348	SS-7A*	9	QN		
				B8-A 5-6.5	9	2.5	103\$	GW7-B 10-11.5	2	Ð		
				SS-88*	2	2.5	87\$	B8-A 2.5-4	2	QN		
				GW8-C 11-11.5	Ð	2.5	107%	SS-8A*	Q	2		
								5 11-11 J-0mJ	9	4		

"ND" indicates that the parameter was not detected.

DATACHEN QUALITY CONTROL REPORT Duluth IAP - Soll Samples

Me thod B lank	9										QN											
Second Value	-6I	15.	. 61	25.	20.	9	25.	33.	18.	25.												
First Value	23.	10 <b>.</b>	20.	24.	21.	Q	26.	28.	18.	25.												
Spiit Sample	GW1-A 10-11.5	GW1-E 20-21.5 SS-18	GW3-D 5-6.5	SS-3A	GW5-B 9.5-11	SS-7A*	GW7-B 10-11.5	B8-A 2.5-4	SS-BA*	GW8-C 11-11.5												
Percent Recovered	845	945 1015	356	948	103%	<b>\$</b> 66	<b>3</b> 96	87\$	<b>3</b> 86		<b>3</b> 86	928	102%	103%	88%	88%	110%	938	110%	83%	89%	<b>3</b> 96
Spike Conc.	50 <b>.</b>	25 <b>.</b>	25.	50.	25.	25.	25.	25.	25.		0.5	0.5	0.5	0.5	0.5	0.5	0.25	0,05	0.5	0.25	0.25	0.5
In itial Value	•61	10.	17.	26.	21.	9	34.	Ξ.	25.		9	9	9	9	9	9	9	9	0.2	9	Ð	Q
Spl ked Samp le	GW1-A 10-11.5	GWI-E ZO-ZI.5 SS-IA	GW3-B 5-6.5	SS-3A	SS-58	SS-7A*	B8-A 5-6.5	SS-88*	GWB-C 11-11.5		GW1-E 20-21.5	SS-1B	B3-A 2.5-4	GW3-B 5-6.5	SS-3C	GW5-B 9.5-11	B7-A 2.5-4	GW7-B 10-11.5	SS-7A*	B8-A 5-6.5	B8-B 5-6.5	SS-8B*
Detection Limit											0.1											
Units	6/6n										6/6n											
Mathod	EPA 200.7										EPA 7471											
Parameter	Chromium										Mercury											

* Revised 07/10/87

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DATACHEM QUALITY CONTROL REPORT Duluth IAP ~ Soil Samples

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			Detection		In i ti al	Spike	Percent	50111	First	Second	Method
Parameter	Method	Units	Limit	Sample	Val ue	Conc.	Recover ed	Samp le	Val ue	Value	Blank
Setenium	EPA 3050/7740	6/6n	-	B1-A 0-1.5	9	5.	386	GW1-E 20-22.5	9	9	2
				GW1-E 20-21.5	Q	5.	945				
				SS-1B	9	5.	888				
				B3-A 0-1.5	2	5.	818				
				SS-3C	2	5.	845				
				GW5-B 9.5-11	2	5.	818				
				SS-7A*	2	•6	108%				
				GW7-A 10-11.5	9	5.	316				
				B7-B 2.5-4	2	<b>.</b> 6	668				
				5S-8B*	9	°,	<b>3</b> 66				
				GW3-D 5-6.5	9	•	1038				
				GW3-B 5-6.5	9	•6	<b>\$6</b> 6				
Ethylene Glycol	P&CAM 338	6/6n	5.	B6-B 0-1.5	Ŷ	36.	84\$	B6-B 2.5-4	Ŷ	9	9
EP Toxicity	EPA 1310										
Arsenic	EPA 7060	µd∕r	0.01	Site 2 DRUM	Ŷ	0.05	82%				2
				Site 4 0-2.5	9	60 <b>°</b> 0	878				
Barium	EPA 7080	mg/L	0.1	Site 4 0-2.5	0.1	0.7	93\$				9
Cadmium	EPA 7130	mg/L	0.01	Site 2 Drum	9	0.1	103%				QN
Chromium	EPA 7190	mq/L	<b>60°</b> 0	Site 2 Drum	2	0.5	<b>%</b> 66				9
pead	EPA 7421	mg/L	0,05	Site 2 Orum	9	0.5	<b>%</b> 16				QN
Mer cur y	EPA 7470	mg/L	0,001	Site 2 Drum Site 3 Drum	99	0.05 0.05	100				2
				Site 4 0-2.5 GWB-C DRUM	2 2 2	0.05 0.05	80% 100%				
				1	1		L.				

* Revised 07/10/87

			DATACHEN ON Duluth	DATACHEN QUALITY CONTROL REPORT Duluth IAP - Soil Samples	<b>REPORT</b> Les						
	Method	units	Detection Limit	Sp1ked Sample	ln i tial Value	Spike Conc.	Percent Recovered	Spilt Sample	First Value	Second Value	Me thod B lank
Par ameter											2
EP Toxicity (continued) Selenium	EPA 7740	J/Gm	0.01	Site 2 Drum Site 8 0-2.5	99	0 <b>.</b> 05 0.05	82 <b>5</b> 93 <b>5</b>				1
Silver	EPA 1760	ng/L	0.01	Site 8 0-2.5	9	0.1	<b>\$</b> 16				2

"NOM indicates that the parameter was not detected.

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H-126

Page 126

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DATACHEN QUALITY CONTROL REPORT Duluth IAP - Water Samples

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Method Blank	2	QN	Q	Q	QN
Second , al ue	0 0 4 4 0 0 0 7 8 8 9 0 0	â	820 320	00 4.4	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
First Value	0 0 0 5 3 4 0 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	2	ND 310	0 4 4 8 8	<b>A A A A A A A A A A</b>
Spl 1 + Sample	SH-2A MM-2 GW3-B GW3-B GW3-D GW3-A MM-8 MM-8 SU5-C	2	MW2 GW3B GW3D	MW-2 GW3-B GW3-D	SW-2A MM-2 MM-2 GW3-B GW3-D GW3-D GW3-D GW3-D SW-5C SW-5C
Percent Recover ad	201 253 255 251 251 250 260 260 260	81 <b>8</b> 86 <b>8</b>		109 <b>%</b> 69 <b>%</b> 1035	868 2711 209 272 272
Spike Conc.	10. 10. 10. 10.	10 <b>.</b> 10.		10. 10.	10. 10. 10.
In I tial Value	0 0 ° ° ° ° 0 0 0 0	<del>2</del> <del>2</del> 9		U 4.1 9.1	22222
Spiked Sample	SW-3A MW-2 GW3-B GW3-B GW3-A MW-8 GW3-C SW5-C SW-5C	MW-2 GW3-B GW3-D		MW2 GW3-B GW3-D	SW-2A GW4-A MW-8 GW5-C SW-5C
Detection Limit MDL	0.45	0.45	0.49	0 <b>.</b> 44	0° 5 7 9 0
Units ug/L	ug/L	ng/L	J∕ɓn	ng/L	J/6n
Method EPA 601	EPA 601	EPA 601	EPA 601	EPA 601	EPA 601
Parameter Purgeable Helocarbons		Branoform	1, I-Dichloroethane	1,2-D1chloroethane	1, 1, 1-Tr i chl oroethane

"ND" indicates that the parameter was not detected.

DATACHEN QUALITY CONTROL REPORT Duiuth IAP - Water Samples

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Me thod Blank	9	QN	9	Ð
Second	M N N N N N N N N N N N N N N N N N N N		9 9 9 <del>9</del> 9	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
First Value	R R R \$ \$ 9 R R		<del>2</del> 2 2 <del>2</del> 2	9 9 <u>8</u> 9 9 9 9 9 9
Spilt Sample	54-2A MM-2 GM3-B GM3-D GM4-A ND ND		SW-2A GW4-A MM-8 GW5-C SW-5C	Sw-2A Mw-2 Gw3-B Gw3-D Gw4-A ND ND
Per cent Recover ed	99% 89% 89% 89% 94% 74% 89% 84% 74% 84% 5-C 5% 5-C	108% 64% 180%	868 8701 87111 8701 8701 8701 898 898	875 1095 1075 1025 1025 MH-8 GW5-C SW-5C
Spike Conc.	20. 10. 10.	13 <b>.</b> 10 <b>.</b>	10. 10. 10. 10.	10° 10°
ln i tial Value	5 2 9 9 9	35 <b>,</b> 35,	8 4 4 9 9 9 9 9 9 7 4 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	2 9 9 9 9 9
Sp1ked Samp1e	5%-2A GW4-A MW-8 GW5-C SW-5C	MW2 GW3-B GW3-D	MM-2 GW3-B GW3-D SW-2A GW4-A MW-8 GW5-C SW-5C	5W-2A GW4-A MW-B GW5-C SW-5C
Detection Limit	0.49	0.42	0.60	0,38
Units		J/ըս	ug/Ł	J/bu
Me thod	EPA 601	EPA 601	EPA 601	EPA 601
Parameter	Purgeable Halocarbons (continued) 1,1-Dichloroethene	trans-1 ,2-Dichloroethene	Trichiaraethene	Tetrach! or cethene

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"NO" indicates that the parameter was not detected.

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DATACHEN QUALITY CONTROL REPORT Duluth IAP - Water Samples

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Method Blank	2	Q	9	
Second	ଟ ଟ ଟ ଟ ଟ	<del>2</del> 2 2	<u> </u>	QN QN QN QN QN
First Value	22222	222	55555 52×5	<del>2</del> 2 <del>2</del> <del>2</del>
Spilt Sample	58-27 684-7 684-7 84-8 685-C 58-5C 58-5C	54-2A MW-2 GM3-B	6413-D 644-A M4-8 645-C 645-C 54-5C 54-5C 54-2A M4-2 643-B 643-D 643-D	GW4-A MH-8 GW5-C SW-5C
Percent Recovered	898 898 898 890 801 810 810 810 840		95% 95% 95% 96% 96% 96% 96%	
Spike Conc.	10. 10. 10. 10. 10. 10.	10°	01 01 00 00 00 00 00 00 00 00 00 00 00 0	10.
Initial Value	99999999999	<u> </u>	୫୫୫୫ ୫୫% ୫୫	2222
Spiked Sample	SW-2A MW-2 MW-2 GW3-B GW3-D GW3-A GW4-A GW4-A GW5-C SW-5C	SW-2A 4W-2 6W3-B 8W3-D	GW4-A MW-B GW5-C GW5-C SW-5C SW-2A SW-2 GW3-D GW3-D GW3-A	1
Detection Limit	0.37	0,25 0,25 MDL	0 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	\$ \$ \$
units ug/L	J/Bn	1∕6n 1∕6n	ng/L	
Method EPA 601	EPA 601	EPA 602 EPA 602	EPA 602	
Parameter Purgeable Helocarbons (continued)	ch lorobenzene	Purgednie Aromatics Benzene	Totuene	

"NDM indicates that the parameter was not detected.

DNTACHEN QUALITY CONTROL REPORT Duluth IAP - Water Samples

:		Detection	Sp1ked	In itial	Spike	Percent	Split Split	Flrst Value	Second	Me thod
Mathod	Units		Sample		- Nonc	Kecovered	ogu bio			Alank
EPA 608	ng/L	MOL								
EPA 608	ng/L	0,007	CHI-C	9	0.2	<b>\$</b> 06	GM1-C	9	9	₽
			GW3-A	2	0.2	8 5 <b>%</b>	GW5-A	9	Q	
			GW 3-B	2	0.2	105%	VL-NS	£	9	
			GW5-A	9	0.2	<b>3</b> 566	SH-BA	2	QN	
							88-J <b>F</b> S	Ŷ	9	
EPA 608	ng/L	0,005	GW1-C	9	0.2	10.5%	CM1-C	2	9	QN
	)		GW3-A	9	0.2	1001	CH5-V	9	9	
			GW3-B	9	0.2	1205	SH-7A	9	QN	
			GW 5-A	9	0.2	100	SM-BA	Q	9	
							99-MS	Ð	QN	
EPA 608	ng/L	0.03	GW1-C	9	0,5	<b>3</b> 86	GW1-C	9	2	QN
			GW3-A	2	0.5	82%	GM5-A	2	2	
			GW3-B	2	0.5	96 <b>%</b>	SW-7A	9	QN	
			GW5-A	9	0.5	102%	SW-8A	9	2	
							88-15S	9	QN	
EPA 608	ng/L	0,005	GW1-C	9	0.5	<b>3</b> 96	GW1-C	9	9	QN
			GW3-A	9	0.5	<b>3</b> 96	GW5-A	9	2	
			GW 3-B	2	0.5	<b>3</b> 96	SH-7A	9	QN	
			GW5-A	2	0.5	5	SH-8A	Ð	9	
							SW-88	2	QN	
EPA 608	ng/L	0,006	24140	2	0.5	1028	GW1-C	Đ	9	QN
			GH3-A	Ð	0.5	66 <b>%</b>	GW5-A	9	9	
			GW3-B	2	0.5	345	St-7A	2	Q	
			GH 5-A	2	0.5	92 <b>8</b>	SH-BA	Ŷ	9	
							58-88 89-15	2	QN	

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"NUD" indicates that the parameter was not detected.

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DATACHEM QUALITY CONTROL REPORT Duluth IAP - Water Samples

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			Dataction	Sniked	In i tial	Snike	Parcent	+   log	Fire +	Carona	Mathod
Par and ter	Method	Units	L Imi +	Sample	Value	Conc.	Recover ed	Sample	Value	Value	Blank
Pesticides (continued)	EPA 608	ng/L	MDL								
	EPA 608	ng/L	0.007	GH1-C	9	0.2	100%	0#1-C	Ð	₽	9
				GW3-A	9	0.2	<b>3</b> 06	GW5-A	2	QN	
				GW 3-B	9	0.2	120%	VL-30	9	9	
				GW5-A	9	0.2	100%	SW-BA	9	QN	
								<b>SE-8</b> B	9	9	
	EPA 615	ng/L	MDL								
	EPA 615	ng/L	0.08	GW1-C	Ð	12.	66%	GW1-C	9	9	Q
				GW3-A	2	12.	74%	GW3-A	9	QN	
				GW7-B	9	12.	73\$	GW7-B	9	9	
				G <b>MB-C</b>	9	12.	60%	GWB-A	9	QN	
	EPA 615	nd/F	0,08	GW1-C	Ð	2,5	64\$	0-1-C	QN	9	£
				GW3-A	2	2.5	306	GW3-A	2	QN	
				GW7-B	9	2.5	72%	GW7-B	9	9	
				6 <b>MB</b> -C	9	2•5	58%	GWB -A	9	QN	
	EPA 615	ng/L	0,08	GM1-C	QN	2.5	78\$	GW1C	2	£	Ð
				GW3-A	2	2.5	100%	GW3-A	2	Q	
				GW7-B	9	2.5	861	GW7-B	Q	9	
				GWB-C	9	2.5	60	GW8-A	2	QN	
	EPA 413.2	mg/L	-	SW-18	9	1.3	\$16	GW2-A	9	9	QN
				GW2-D	2	1.5	<b>36</b>	GW3-A	QN	2	
				SW-2A	9	1.3	<b>\$</b> 66	SW-7A	2.	-	
				SW-3C	9	1.5	<b>5</b> 66	GWB-A	9	9	
				GW 3-C	9	1.3	935	GWB-B	9	QN	
				SW-48	-	1.6	1225	GWB-C	Ð	Ð	
				GW4-B	9	1.3	246	SW-8A	9	QN	
				GW4-C	2	1.3	100				
				SW-5C	9	1.3	105\$				
				Gw8-B	2	1.3	24%				

"NUM" indicates that the parameter was not detected.

II-131

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DATACHEN QUALITY CONTROL REPORT Duiuth IAP - Water Samples

Blank Blank	QN	Q
Value ND ND ND ND ND ND ND ND ND ND ND ND ND	9 <del>2</del> 9	0° 2 ND ND
Value Value Von Vo Von Vo Vo Von Vo Von Vo Von Vo Von Vo	9999	0.5 ND
Sp! 1+ 50mp 10 MM-4 MM-7 GW2-C GW3-B GW3-B GW3-C GW3-C GW3-B GW3-C GW3-C GW3-C GW3-C	GW3-6 GW8-8 SW-88 SW-88	GW1-E GW8-B SW-8B
Percent Recovered 1095 1005 1025 1125 1025 1025 1025 1025 102	82% 98% 86% 50% 92%	998 998 998 918 101 1178
Spike Conc. 60. 60. 60. 60. 60.	0.09 0.09 0.05 0.05 0.05	0,95 0,48 0,95 0,95 0,48 0,48 0,48 0,48
Valua Valua NN NN NN NN NN NN NN NN NN NN NN NN NN	2 2 2 9 9 2 <del>2</del> 2	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
spiked Swiple Sw-za Sw-za Mw-5 Sw-3a Sw-5a Sw-5a Sw5-a Gw5-a Gw5-a Gw3-B	Sw-18 Sw-5A Sw-5A Gw5-8 Sw-8A Sw-8A	54-1A 641-E 54-3C 54-5C 647-A 647-C 54-8A 54-8A 54-8A 54-88
De tect ion Limit 5.	0.0	0,2
LINI ts	mg/L	mg/L
Method EPA 420.2	EPA 206.2	EPA 208. 1
Phenolics	Arsen ic	Barium

11-132

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DNTACHEN QUALITY CONTROL REPORT Duluth IAP - Water Samples

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Method Blank ND		9	Q.	9
Second Value ND		0.08 0.10 0.10	0N 0N 00*0	9 <del>2</del> 9
First Value ND	22	0, 10 0,30 ND	0N 0N 40	<del>2</del> 2 2
Split Sample GWI-E	Gw8 -B Str - 8B	941-E GMB-B SF-83	GW1-E GW8-B SV1-88	GW1-F GM8-B SW-8B
Percent Recovered 107\$	102% 97% 94% 101%	978 1248 1108 978 978 1118 868 1148	120% 85% 97% 85%	1015 948 968 968 968 978 978 978
Splke Conc. 0.10	0,10 0,10 0,05 0,10 0,05	0,48 0,24 0,48 0,48 0,48 0,24 0,24	0.05 0.05 0.05 0.05	0.10 0.10 0.10 0.10 0.10 0.05 0.05 0.05
In Itial Value ND	0.05 ND 0.02 ND	ND 0.10 0.05 0.11 0.14 ND	0,04 ND 0,04 0,03	5 5 <del>5</del> 5 5 5 5 5 5 5
Spiked Sampie Swi-iA	SW-5C SW-5C SW-7A GW7-C SW-88	SII-1A GN1-E SN-3C SN-5C SN-5C GN7-A GN7-C SN-8A SN-8A SN-88 SN-88	SW-3A BAIL RNSE 7 SW-8A SW-88	SW - 1 A SW - 5C SW - 5C SW - 5C SW - 5C SW - 7A SW - 7A SW - 7A SW - 7A
Detection Limit 0.01		0*02	0*03	
Units mg/L		۲) Ge	mg/L	л) Г
Mathod EPA 213.1		EPA 218.1	EPA 239.2	EPA 272.1
Par amoter Cedmium		Ch rom lum	peer	511 ver

"ND" indicates that the parameter was not detected.

Н-133

DATACHEN QUALITY CONTROL REPORT Duluth IAP - Water Samples

Par amater Selenium	Mathod EPA 270.2	lihits mg/L	Detection Limit 0.01	spiked Sample Sw-18 Sw-5A Sw-8A Sw-88 Sw-88		Sp1 ke Conc. 0.09 0.09 0.05 0.05	Percent Recovered 725 725 725 785 805 1075 1075	Spilt Sample GM1-E SM-88 SM-88	First Value ND ND	Second Value ND ND	Blank ND
Mercury	EPA 245, I	Ъ Е	100°0	GW3-A GW3-C GW3-C GW3-D RNSE BLK 5 GW7-B SW-BA GW7-A GW7-A GW8-C DRM GW8-C DRM	<u> </u>	0,002 0,002 0,001 0,001 0,001 0,002 0,001 0,001 0,001	95% 95% 100% 110% 110% 110% 110% 110%	GM1-E SM-7A SM-8B GM8-B GM8-B	2922	99999	9
Radiolagy			-				GW10-B	.81	16.	9	
Gross Alpha	Std. Method 703	p C1/L	<u>.</u> .				GW10-B	12.	8.	QN	
Gross Beta	Std. Mathod 703	p CI/L					GWI O-B	5.0	QN	2	
Rad i um-2.26	Std。Method 706 Std. Method 708		· · ·				GW10-B	18.	9	QN	

H-134

Std. Method 708 p Ci/L

R.ad i um-2.28

"ND" indicates that the parameter was not detected.

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Dututh IAP - Soll Samples Second Column Confirmations

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					81-A	81-A	B1-A	GW1-A		GW1-E	SS-1A	SS-1B	82-8 0-1 <b>.</b> 5
Parometer	Me thod	Un 1 ts	Detection Limit	Field #: Site :	O-1-5	2.5-4 ONE	ONE	ONE	N	ONE	ONE	BN	TWO
Purgeable Halocarbons	EPA 8010 (*) ug/g	6/6n	(##) J@W							ļ	Ş	Ģ	9
	CDA ROID	0/01	0.0018		9	<del>Q</del>	9	Q	Q	9	2	2	2
Bromodicnioromethane (1) Bromodichloromethane (5)	EPA 8010	6/6n	0,0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					Û	Ş	9	Q	9	Z	2	Q	2
Bramoform (f) Bramoform (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG	NEG
					9	G	QN	Q	2	9	Q	9	9
Branchethane (f) Branchethane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0032		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1					ç	Ģ	ũ	G	2	9	9	Q	9
Carbon Tetrachloride (f) Carbon Tetrachloride (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0023 0,0023		NEG NEG	NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG
					ł	9	ç	ç	GN	9	2	9	Q
(f)	EPA 8010	p/pu	0,0018		2	R		2				NEC	NEG
Chlorobenzene (s)	EPA 8010	6/6n	0,0018		NEG	NEG	NEG	NEG	NEG	NEG	NEN		
					ġ.	Q	S	9	9	Ð	9	9	9
Chioroethane (f) Chioroethane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0019 0,0019		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
						(	ŝ	Ģ	Ģ	Ş	9	2	¥
2_Chloromethylvinvi Ether (f)	EPA 8010	6/6n	0,0022		Ð	2		2 8		NEC.	NEG	NEG	NEG
2-Chloroethylvinyl Ether (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	2		2	
					GN	Ş	QN	Q	9	Ð	2	9	2
Chlarafarm (f) Chlarafarm (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0022 0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1					Ċ	Ş	GN	Q	Ð	£	9	QN	9
Chloromethane (f) Chloromethane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0024 0,0024		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					-	ç	Ş	Ŷ	9	Q	Q	9	Q
Dibromochioromethane (f) Dibromochioromethane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0016 0,0016		NEC	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

(*) Methods documented in previous Analytical Reports Section.
(**) MDL values documented in previous Analytical Reports Section.

"ND" indicates that the parameter was not detected.

11-135

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> Duluth IAP - Soll Samples Second Colvan Confirmations

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			Datart ion	Field .	82-8 2.5-4	B2B 5-6.5	B2-C 0-1-5	82-C 2 <b>.</b> 5-4	B2-C 5-6_5	GW2-A 5-6.5	GW2-B 5-6.5	GW2-C 15-16.5	GW2-D 15-16.5
Parameter	Me thod	Un i ts			Two	OFF	0 ML	TWO	OML	ONL	ONL	OML	TWO
Purgeable Halocarbons (cont.)	EPA 8010	6/6n	MQ										
Bromodich (or omethane (f)	EPA 8010	ua/a	0.0018		2	QN	9	Q	2	9	9	9	2
Brownodichioromethane (s)	EPA 8010	6/6n	0.0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	EPA ROID	0/00	0.0022		Ð	Q	9	Ŷ	Ŷ	9	9	Q	Ð
Bromoform (s)	EPA 8010	6/6n	0_0022	•	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	CDA 8010	0/01	0 0032		9	Q	9	9	Ŷ	Ð	Ŷ	QN	9
Bromomethane (s)	EPA 8010	6/6n	0.0032		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	EDA 8010	0/01	0 0023		9	Q	Q	9	£	9	2	2	9
Carbon Tetrachioride (s)	EPA 8010	6/6n	0.0023		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	EDA ANIO	0/01	0 0018		2	9	Q	Ð	£	9	9	Ð	9
Chiorobenzene (s) Chiorobenzene (s)	EPA 8010	6/6n	0,0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
		0/00	0 0019		Q	Q	2	Q	£	£	Ð	Ð	Q
Chloroethane (s) Chloroethane (s)	EPA 8010	6/6n	0.0019		NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG	NEG
	EPA ANTO	0/01	0 0022		Q	Q	9	£	£	9	9	2	9
2-Chloroethylvinyl Ether (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
	EPA ANIO	0/01	0.0022		Q	2	Ð	9	9	9	9	Ð	9
Chloroform (s)	EPA 8010	6/6n	0.0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
		0/01	0 0024		Q	9	9	£	£	2	9	9	9
Chloromethane (s)	EPA 8010	6/6n	0.0024		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG
()) anothermore (f)	EPA A010	0/00	0.0016		9	2	9	Q	Q	2	9	£	9
Dibromochloromethane (s)	EPA 8010	6/6n	0,0016		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

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11-136

"ND" indicates that the parameter was not detected.

Page 13/

DATACHEM ANALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

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					CHOLE				A_50	A50	V	0.10	0-10
			Detection	Field ∦:	15-16.5	SS-2A	SS-2B	SS-2C	0-1-5	2.54	5-6.5	0-1-0	2.5-4
Parameter	Me thod	Un i ts	Limit		Two	TWO	OML	OML	THREE	THREE	THREE	THREE	THREE
Purgeable Halocarbons (cont.)	EPA 8010	6/6n	MQ										
Bromodichioromethania (f)	EPA 8010	6/6n	0,0018		9	Q	QN	Ð	Q	2	2	Q	9
Bromodichioromethane (s)	EPA 8010	6/6n	0.0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Bromotorm (f)	EPA 8010	6/6n	0.0022		9	QN	Q	9	Ŷ	2	9	Q	Q
Bromoform (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Bromomethane (f)	EPA 8010	6/6n	0.0032		Q	QN	9	ᄝ	9	Ð	<del>g</del>	9	9
Bromomethane (s)	EPA 8010	6/6n	0_0032		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Carbon Tetrachioride (f)	EPA 8010	6/6n	0.0023		QN	Q	Ð	Q	Ð	2	9	9	9
Carbon Tetrachloride (s)	EPA 8010	6/6n	0.0023		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chlorobenzene (f)	EPA 8010	₿/ɓn	0.0013		9	Q	Q	Q	9	9	9	2	Q
Chlorobenzene (s)	EPA 8010	6/6n	0.0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chloroethane (f)	EPA 8010	6/6n	0,0019		9	£	2	Q	9	9	9	Ð	9
Chloroethane (s)	EPA 8010	ɓ∕ɓn	0*0019		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
2-Chloroethyivinyi Ether (f)	EPA 8010	6/6n	0.0022		9	Q	9	QN	QN	Q	Q	Q	9
2-Chloroethylvinyl Ether (s)	EPA 8010	6/6n	0.0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chlaroform (†)	EPA 80.0	6/6n	0.0022		9	Q	QN	Ð	QN	Q	9	2	2
Chloroform (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chloromethane (f)	EPA 8010	6/bn	0.0024		9	Q	9	Q	9	Q	Q	Ð	9
Chloromethane (s)	EPA 8010	6/6n	0.0024		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Dibramochioromethane (f)	EPA 8010	6/6n	0.0016		9	Đ	Q	Ð	2	Ð	9	Q	9
Dibromochioromethane (s)	EPA 8010	6/6n	0.0016		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

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"ND" indicates that the parameter was not detected.

Н-137

# **DATACHEN ANALYTICAL REPORT** Duluth IAP - Soil Samples Second Column Confirmations

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5-6.5 SS-3A THREE THREE	ND ND NEG NEG	ND NEG NEG	ND ND NEG NEG	ND ND NEG NEG	ND ND NEG NEG	ND ND NEG NEG	ND ND NEG NEG	ND ND NEG NEG	ND ND NEG NEG	ND KD NEG NEG
CM3-B C	ND	NEG	NEG	ND NEG	N NO	N NO	ND NEG	NEG	UN NEC	D BR
GW3-A 5-6.5 THREE	NEG	NEG	ND	ND	NEG	ND NEC	NEG	NEG	NEG	NEG
B3-C 5-6,5 THREE	ND NEC	ND NEG	ND	NEG N	NEG	N N	ND	NEG	NEG N	ND NEG
B3C 56.5 THREE	ND	NEC N	NEG	NEC NO	ND	ND	ND	ND NEG	ND NEC NEC	ND
B3-C 2,5-4 THREE	NEG D	че <u>с</u> Мес	ND ND	NO	9	Gan ON North	NEC ND	ND	N N	ND
83-C 0-1.5 THREE	ND NFG	Q VEC	N N N	9	Q Q	N N N	NEG ND NEG	ND		NEC NEC
B3-B 5-6.5 THREE	ND NEC	NEC N		N N	VEC VEC	ND EG	ND ND	2 2	N G	NEG ND NEG
Field∦: Site :										
Detection Limit	MCL. 0_0018	0.0018 0.0022	0 <b>.</b> 0022 0.0032	0.0032 0.0023	0,0023 0,0019	0.0019	0.0019	0 <b>.</b> 0022 0 <b>.</b> 0022	0,0022 0,0024	0,0024 0,0016 0,0016
u   ts 		6/6n 6/6n	6/6n 6/6n	6/6n	6/6n	6/6n		6/6n 6/6n		
<b>Ma</b> thod		EPA 8010	EPA 8010 FPA 8010	EPA 8010 EPA 8010	EPA 8010	EPA 8010 EPA 8010	EPA 8010 EPA 8010 EPA 8010	EPA 8010 EPA 8010	EPA 8010	EPA 8010 EPA 8010 EPA 8010
	Purgeable Halocarbons (cont.)	Bromodichioromethane (s) Bromodichioromethane (s)	Bromoform (1) Bromoform (s)	Bromomethane (f) Bromomethane (s)	Carbon Tetrachioride (T) Carbon Tetrachioride (S)	Chlorobenzene (f) Chlorobenzene (s)	Chioroethane (f) Chioroethane (s)	2-Chloroethylvinyl Ether (s) 2-Chloroethylvinyl Ether (s)	Chloroform (f) Chloroform (s)	Chloromethane (f) Chloromethane (s) Dibromochloromethane (f)

"ND" indicates that the parameter was not detected.

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DATACHER ANALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

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							B4-C	94-C	ပု 197	B4-D	B4-D	B4~D	B4-E
			Detection	Fleid 🖊:	SS-38	SS-3C	2.5-4	5-6.5	7.5-9	2.5-4	5-6.5	7.5-9	2.5-4
Parameter	Ma thod	Un i ts	Limit	Site :	THREE	THREE	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR
Purgeable Halocarbons (cont.)	EPA 8010	6/6n	MD										
Branodichioramethane (f)	EPA 8010	6∕6n	0.0018		Q	9	2	9	9	Ŷ	9	£	9
Bromodichioromethane (s)	EPA 8010	6/6n	0.0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Branoform (f)	EPA 8010	₿/bn	0,0022		9	9	2	9	2	Q	9	Q	9
Bromoform (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Brancmethane (f)	EPA 8010	b/bn	0,0032		Q	QN	9	QN	2	2	9	Ð	9
Bromethane (s)	EPA 8010	6/6n	0,0032		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Carbon Tetrachioride (f)	EPA 8010	ua/a	0.0023		Ş	9	9	Q	9	9	9	9	Q
Carbon Tetrachioride (s)	EPA 8010	6/6n	0,0023		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chiorobenzene (f)	EPA 8010	b/bn	0,0018		9	Ŷ	9	Ð	9	2	9	Q	Q
Chlorobenzene (s)	EPA 8010	6/6n	0,0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chilorcrathana (f)	FPA 8010	0/01	0.0019		9	£	9	Ð	9	9	9	9	2
Chloroethane (s)	EPA 8010	6/6n	0.0019		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
2-Chioroethvivinvi Ether (f)	EPA 8010	p/pu	0,0022		ą	Q	Ð	<del>2</del>	Ð	9	Ŷ	Q	2
2-Chloroethylvinyl Ether (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NBG	NEG
Chtorotorm (t)	EPA 8010	b/bn	0,0022		Q	0.0053	2	2	9	9	Ŷ	Q	Ð
Chlorofore (s)	EPA 8010	6/6n	0,0022		NEG	SOH	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chloromethane (f)	EPA 8010	p/pu	0,0024		9	Ð	9	9	9	윷	2	9 2	Q
Chloromethane (s)	EPA 8010	6/6n	0.0024		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Dibramochiarcmethane (f)	EPA 8010	a/a	0.0016		9	Ð	Q	2	9	9	9	9	Q
Dibromochioromethane (s)	EPA 8010	6/6n	0*0016		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG

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"NO" indicates that the parameter was not detected.

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DATACHEM ANALYTICAL REPORT Duluth IAP - Soll Samples Second Column Confirmations

					B4~E	GW4-A	GW4-B	GW4-C	GM4-D	84-A	B4-A	84-A	B4-B
			Detection	Fleid #:	5-6.5	10-11.5	5-6.5	10-12	5-6.5	2.5-4	5-6.5	7.5-9	2 <b>.</b> 5-4
Parameter	Me thod	Un 1ts	Limit	Site :	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR
Purgeable Helocarbons (cont.)	EPA 8010	6/6n	MDL										
Branodichioramethane (f)	EPA 8010	6/6n	0.0018		Ð	QN	Q	9	9	9	2	9	9
Bromodichioromethane (s)	EPA 8010	5/5n			NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Bromeoform (†)	EPA 8010	6/6n	0,0022		Q	Ŷ	9	9	9	9	9	Q	2
Bromotorn (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Bromomethane (f)	EPA 8010	₿/ɓn	0.0032		9	Q	Ð	Q	Q	9	2	9	Q
Bromomethane (s)	EPA 8010	6/6n	0,0032		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Carbon Tetrachloride (f)	EPA 8010	6/6n	0.0023		9	<del>Q</del>	QN	9	9	9	Ŷ	9	2
Carbon Tetrachioride (s)	EPA 8010	6/6n	0,0023		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chilorobenzene (f)	EPA 8010	6/bn	0.0018		Ð	Ð	9	9	9	2	9	Q	9
Chlorobenzene (s)	EPA 8010	6/6n	0.0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chiloroethane (+)	EPA 8010	6/6n	0,0019		2	9	Đ	2	9	Ð	Ŷ	9	₽
Chloronthane (s)	EPA 8010	6/6n	0*0019		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
2-Chloroethylvinyl Ether (f)	EPA 8010	6/6n	0.0022		Q	Q	9	ą	9	9	ହ	Ŷ	2
2-Chloroethylvinyl Ether (s)	EPA 8010	6/6n	0.0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chloroform (f)	EPA 8010	6/6n	0,0022		Ŷ	Ð	Q	9	2	Ŷ	Ŷ	£	9
Chloroform (s)	EPA 8010	6/6n	0_0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chioromethane (f)	E ⁷ A 3010	₿/ɓn	0.0024		9	9	ŷ	2	9	9	Q	9	9
Chloromethane (s)	EFA 8010	6/6n	0,0024		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Dibramochioramethane (f)	EPA 8010	nq/q	0,0016		2	Q	Q	2	9	9	2	Q	9
Dibromochioromethane (s)	EPA 8010	6/6n	0.0016		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

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# DATACHEM ANALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

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					R4-R	R4-R						9-5-P
			Detect ion	Field #:	5-6.5	7.5-11.5	SS-4A	SS-4B	SS-4C	SS-4D	5-6.5	9.5-11
Parameter	Me thod	Un i ts	Limit	Si te :	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FIVE	FIVE
Purgeable Halocarbons (cont.)	EPA 8010	6/6n	Ŋ									
Bromodichioromethane (f)	EPA 8010	6/6n	0.0018		9	9	2	9	9	9	Ð	9
Bromodichioromethane (s)	EPA 8010	6/6n	0,0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Branoform (f)	EPA 8010	6/6n	0,0022		Ð	9	9	9	Q	Ŷ	9	Ŷ
Bramoform (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Branomethane (f)	EPA 8010	6/6n	0,0032		Ð	QN	Ð	9	9	9	2	Ŷ
Bromomethane (s)	EPA 8010	6/6n	0,0032		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Carbon Tetrachloride (f)	EPA 8010	₿∕бn	0,0023		9	9	9	9	Ŷ	2	£	2
Carbon Tetrachior ide (s)	EPA 8010	6/6n	0,0023		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chlorobenzene (f)	EPA 8010	6∕6n	0,0019		Ŷ	9	9	9	9	9	9	Q
Chlorobenzene (s)	EPA 8010	6/6n	0,0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chloroethane (f)	EPA 8010	6/6n	0,0019		9	Q	9	9	9	9	2	9
Chloroethane (s)	EPA 9010	6/6n	0,0019		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
2-Chioroethylvinyl Ether (f)	EPA 8010	6/6n	0,0022		9	Ð	9	9	9	Ð	2	Q
2-Chloroethylvinyl Ether (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chloroform (f)	EPA 8010	6/6n	0,0022		QN	Ð	2	9	Ð	9	9	9
Chloroform (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chloromethane (f)	EPA 8010	6/6n	0,0024		Q	QN	Q	9	9	9	9	2
Chloromethane (s)	EPA 8010	6/6n	0.0024		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Dibromochloromethane (f)	EPA 8010	D/DN	0,0016		£	9	QN	9	Ð	9	9	<del>Q</del>
Dibromochioromethane (s)	EPA 8010	6/6n	0.0016		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

II-141

142	
Page	

### DATACHEM ANALYFICAL REPORT Duluth IAP - Solf Samples Second Column Confirmations

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Paramoter	Me thod	un i ts	Detection Limit	GW5-C Fleid #: 10-11.5 Site : FIVE	5 SS-5A FIVE	SS-58 FIVE	SS-5C FIVE	SS-50 FIVE	SS-5E FIVE	86-A 0-1,5 SIX	B6-A 2.5 4 SIX	B6-B 0-1.5 SIX
Purgeable Helocarbons (cont.) Brandichloramethane (f)	EPA 8010 EPA 8010 EPA 8010	6/6n 6/6n	MJ. 0.0013 0.0018	ND	ND	ND	ND	N N N N N	ND	NEG	N N	N N N N N N N N N N N N N N N N N N N
Bromotorn (f) Bromotorn (f)	EPA 8010 EPA 8010	6/6n	0,0022 0,0022	ND	ND	ND NEG	NEG	NEG	ND	NEC	ND	NEG NEG
Bromomethane (†) Bromomethane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0032 0,0032	ND NEG	ND	ND	ND	NEG	ND	NEG	NEG	ND NEG
Carbon Tetrachioride (f) Carbon Tetrachioride (s)	EPA 8010 EPA 8010	6/6n 6/6n	0 <b>.</b> 0023 0 <b>.</b> 0023	ND	ND NEG	ND	ND	ND	NEG	NEC NO	N NG	NEG
Chiorobenzene (f) Chiorobenzene (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0018 0,0018	ND	ND	NEG NO	NEG	NEG	NEG	NEG N	<b>N</b> EC <b>N</b>	NEG
Chloroethane (f) Chloroethane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0.0019 0.0019	NEG	NEC	ND ND	Nec N	NEG	N NEC	N PO	9 B	NEG D
2-Chioroethyivinyi Ether (†) 2-Chioroethyivinyi Ether (s)	EPA 8010 EPA 8010	6/6n 6/6n	0 <b>.</b> 0022 0 <b>.</b> 0022	UN NEG	NEG	NEG	NEC	NEG	NEG	NEC	NEC	NEG
Chloroform (f) Chloroform (s)	EPA 8010 EPA 8010	6/5n 6/6n	0,0022 0,0022	ND	NEG	NEG	NEG	N B	NEG	N N	N RC	NEG
Chioromethane (f) Chioromethane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0024 0,0024	NEC	NEC	NEG	NEG	NEG	N SH	NEG	9 9 8	
Dibromochioromethane (f) Dibromochioromethane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0016 0,0016	NEG	NEG NO	ND	N EG	NEG	Nee	NEC	NEG	NEG

"ND" indicates that the parameter was not detected.

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DATACHER MALYTICAL REPORT	Duluth IAP - Soll Samples	Second Column Confirmations

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113

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					B6-B	87 - A	B7-A	B7 <b>-</b> B	B7-B	GW7A	GW7-B	GW7-C	
			Detection	Field #:	2.5-4	0-1-5	2.5-4	0-1-5	2.5-4	10-11.5	10-11-5	15-16.5	SS-7A*
Parameter	Me thod	Units	Limit	Site :	SIX	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN
Purgeable Helocarbons (cont.)	EPA 8010	6/6n	MDL										
Browdich) ormethene (f)	EPA 8010	ua/a	0.0018		Q	Ŷ	9	Q	2	9	Q	2	2
Bramodichioramethane (s)	EPA 8010		0.0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	FPA 8010	0/00	0,0022		2	Q	9	QN	9	Q	9	Đ	9
Bromotorm (s)	EPA 8010		0.0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	CDA ROID	0/01	0 0032		£	9	9	9	9	2	2	2	9
Bromomethane (s)	EPA 8010	6/6n	0.0032		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	CDA A010	0/01	0.0075		9	9	2	2	Ŷ	Ð	9	Ð	9
carbon terrachioride (s) Carbon Tetrachioride (s)	EPA 8010	6/6n	0,0023		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	CDA ANTO	0/01	0 0018		2	9	2	9	9	9	9	QN	9
uniorobenzene (1) Chlorobenzene (s)	EPA 8010	6/6n	0,0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	CDA 8010	0/01	0,0019		Q	9	2	Û	2	2	9	ÛN	Ð
Chloroethane (s) Chloroethane (s)	EPA 8010	6/6n	0.0019		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
11)	EDA 0010	6/01	0 0022		G	2	9	9	9	9	9	Ŷ	9
2Chlorcoethylvinyi Ether (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG
		0/011	0 0022		g	9	9	9	Q	2	2	Q	9
Chloroform (s) Chloroform (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	EDA BOID	0/01	0 0024		9	2	Q	9	9	2	9	Q	9
chioromethane (s) Chioromethane (s)	EPA 8010	6/6n	0.0024		NEG	NEG	NEG	NEG	NEG	NEC	NBC	NEG	NEG
	FPA A010	0/01	0.0016		2	2	9	9	2	9	<del>Q</del>	<del>9</del>	9
Dibramochloramethane (s)	EPA 8010	6/6n	0.0016		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

* Revised 07/10/87

"ND" indicates that the parameter was not detected.

H-143

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				DATACHEN MUL		DATACHEM ANALYI ICAL MEPUNI Datatirth (AP - Sait Samples	_						
				Second Co	olumn Con	Second Column Confirmations	S						
			4 - C		88-A 0-1-5	B8-A	88-A 5-6.5	88-8 0-1.5	88-B 2.54	B8-B 5-6.5	G#8-5 5-6.5	GM8-8 10-11.5	GW8-C 10-11,5
Parmeter	Ne thod	units	Limit		EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT
Purgeable Halocarbons (cont.)	EPA 8010	6/6n	<b>MD.</b>							!	ļ	ŝ	ç
		0/01	0 0018		9	Ð	9	2	9	Ð	2	2	2
Bromodichioromethane (f) Bromodichioromethane (s)	EPA 8010	6/6n	0.0018		NEG	NEG	NEG	NEG	NEG	NEG	ŝ	NEG	NEG
					Ş	Ş	GN	QN	ş	2	9	2	Q
Branoform (†) Branoform (s)	EPA 8010 EPA 8010	6/6n 5/6n	0 <b>.</b> 0022 0 <b>.</b> 0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					9	Ş	QN	9	2	9	9	9	2
Bromoethane (f) Bromomethane (s)	EPA 8010 EPA 8010	6/6n 5/6n	0.0052 0.0052		NEG	N EG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
					ç	Ģ	Q	Q	2	9	9	9	2
Carbon Tetrachioride (f) Carbon Tetrachioride (s)	EPA 8010 EPA 8010	6/6n 6/6n	0.0023		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
						(	ŝ	Ş	Ş	2	2	<del>2</del>	9
(h) (orobanzene (†)	EPA 8010	6/6n	0.0018		2	2	<b>2</b> §			NEG	NFG	NEG	NEG
Chlorobenzene (s)	EPA 8010	6/6n	0-0018		NEG	NEG	NEG	NEG		2			
		•			Ģ	9	Q	9	9	9	2	9	9
Chloroethane (†) Chloroethane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0019 0,0019		NEC	NEG	NEC	NEG	NEG	NEG	NEG	NEG	NEG
					Ģ	Ş	GZ	2	9	2	9	2	9
2-Chloroethylvinyl Ether (f) 2-Chloroethylvinyl Ether (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0022		NEC NEC	NEG	NEG	NEG	NEG	NEC	NEG	NBC	NEG
•					9	Ş	S	9	2	9	2	2	2
Chloroform (f) Chloroform (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0022 0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					Ģ	5	2	9	Q	9	2	2	2
Chioramethane (f) chioramethane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0024 0,0024		NEG	NEC	NEG	NEG	NEG	NEG	SB N	NEG	NEG
					ŝ	9	9	9	Ŷ	2	9	9	9
Dibramoch! aramethane { f) Dibramochlor amethene { s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0016 0,0016		N EG	2 22	e en en en en en en en en en en en en en	NES	NEG	NEG	NEG	NEG	NEG

DATACHEN MALYTICAL REPORT

Page 144

"WD" indicates that the parameter was not detected.

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# DATACHEN ANALYTICAL REPORT Duluth IAP - Soli Samples Second Column Confirmations

			Detection	Field #:	SS-8A*	SS-88*
Par aneter	Mathod	Units	Limi+	Site :	EI GHT	EI GHT
Purgeable Halocarbons (cont.)	EPA 8010	6/6n	MDL			
Bromodichioromethane (f)	EPA 8010	6/6n	0,0018		Đ	GN
Branodichioramethane (s)	EPA 8010	6/6n	0.0018		NEG	NEG
Bromotorm (†)	EPA 8010	6/6n	0,0022		9	Q
Branoform (s)	EPA 8010	6/6n	0.0022		NEG	NEG
Bromomethane (f)	EPA 8010	6/6n	0,0032		2	9
Bromomethane (s)	EPA 8010	6∕6n	0.0032		NEG	NEG
Carbon Tetrachloride (f)	EPA 8010	6/6n	0,0023		9	QN
Carbon Tetrachloride (s)	EPA 8010	6/6n	0,0023		NEG	NEG
Chlorobenzene (f)	EPA 8010	6/6n	0,0018		9	QN
Chlorobenzene (s)	EPA 8010	6/6n	0.0018		NEG	NEG
Chloroethane (f)	EPA 8010	6/6n	0,0019		9	đ
Chloroethane (s)	EPA 8010	6∕6n	0,0019		NEG	NEG
2-Chloroethylvinyl Ether (f)	EPA 8010	6/6n	0,0022		QN	Q
2-Chlaroethylvinyl Ether (s)	EPA 8010	6/6n	0.0022		NEG	NEG
Chloroform (1)	EPA 8010	6/6n	0.0022		2	Q
Chloroform (s)	EPA 8010	6/bn	0.0022		NEG	NEG
Chiorcmethane (f)	EPA 8010	6/ <b>6</b> n	0,0024		Q	QN
Chloramethane (s)	EPA 8010	6/6n	0.0024		NEG	NEG
Dibromochioromethane (f)	EPA 8010	6/6n	0.0016		9	G
Dibramochioramethane (s)	EPA 8010	6/bn	0.0016		NEG	NEG

* Revised 07/10/87

Dututh IAP - Soil Samples Second Cotumn Confirmations

Parameter	Ma thod	Un i ts	Detection Limit	Field#: Site :	B1-A 0-1.5 ONE	B1-A 2.5-4 ONE	B1-A 5-6,5 ONE	GW1-A 10-11.5 ONE	GW1-B 5-6.5 ONE	GW1-E 20-21.5 ONE	SS-1A ONE	SS-1B ONE	82-B 0-1.5 Two
Purgeable Halocarbons	EPA 8010	6/6n	MDL										
1,2-Dichlorobenzene (f)	EPA 8010	6/6n	0.0014		9	9	9	9	Q	9	₽	Q	9
1,2-Dichlorobenzene (s)	EPA 8010	ɓ∕ɓn	0_0014		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,3-Dichlorobenzene (f)	EPA 8010	6/6n	0,0021		Ŷ	9	QN	g	QN	2	9	2	9
1,J-D1chlorobenzene (s)	EPA 8010	6/6n	0.0021		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,4-Dichlorobenzene (f)	EPA 8010	6/6n	0.0020		Ð	2	Ð	9	9	9	9	9	Ð
1,4-Dichlorobenzene (s)	EPA 8010	6/6n	0.0020		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Dichlorodifluoromethane (f)	EPA 8010	6/6n	0.0016		2	9	9	Q	9	9	2	Ð	2
Dichlorodifiuoromethene (s)	EPA 8010	6/6n	0.0016		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1-Dichioroethane (f)	EPA 8010	ɓ∕ɓn	g 0,0025		QN	Q	QN	9	9	9	Ð	9	2
1,1-Dichloroethane (s)	EPA 8010	6/6n	0,0025		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichloroethane (f)	EPA 8010	6/6n	0.0022		QN	QN	9	g	₽	9	Ð	2	2
1,2-Dichloroethane (s)	5PA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1-Dichloroethene (f)	EPA 8010	6/6n	0.0025		9	9	Û	9	£	9	9	9	9
1,1-Dichloroethene (s)	EPA 8010	6/6n	0.0025		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
trans-1,2-Dichloroethene (f)	EPA 8010	6/6n	0,0021		Q	Ð	Ð	9	2	9	9	Ð	Ð
trans-1,2-Dichioroethene (s)	EPA 8010	6/6n	0.0021		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichloropropane (f)	EPA 8010	6/6n	0.0010		9	Q	Q	9	9	2	Q	Đ	Q
1,2-Dichloropromne (s)	EPA 8010	6/6n	0.0010		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
cis-1,3-Dichlor, opene (1)	EPA 8010	6/6n	0.0048		2	9	9	9	₽	9	<del>g</del>	Ð	9
cis-1,3-Dichloropropene (s)	E7A 8010	6/ôn	0_0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

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"ND" indicates that the parameter was not detected.

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Duluth IAP - Soll Samples Duluth IAP - Soll Samples Second Column Confirmations

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Paromotor		Un its	Datection Limit	Field∦: Site :	B2-B 2.5-4 Two	82-8 5-6.5 TWO	82-C 0-1.5 TWO	B2-C 2.5-4 TWO	82-C 5-6.5 7M0	GW2-A 5-6.5 TNO	GN2-B 5-6.5 TNO	GW2-C 15-16,5 TWO	GW2-D 15-16.5 TNO
Purgeable Halocarbons (cont.)	EPA 8010	6/6n	MDL 0 0014		9	Ş	QN	Ş	ç	Q	9	9	9
1,2-Dichiorobenzene (†) 1,2-Dichiorobenzene (s)	EPA 8010	6/6n 6/6n	0.0014		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
[ ] Tolichicchedrate ( f)	EPA 8010	0/0n	0,0021		Ð	9	9	9	9	9	9	9	9
1, 3-Dichlarobenzene (s)	EPA 8010	6/6n	0,0021		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
( ) 4-Dicklosterator ( )	FPA 8010	no/a	0.0020		9	Q	QN	Q	9	Q	9	9	9
1,4-Dichlorobenzene (s)	EPA 8010		0,0020		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
(1) and the second fill the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second se	FPA R010	0/01	0,0016		9	9	Ŷ	9	Q	Ð	9	9	9
Dichlorodifluoromethane (s)	EPA 8010	6/6n	0.0016		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
() () () () () () () () () () () () () (	FPA 8010	0/00	0,0025		Q	9	9	ą	9	Ð	9	9	Ŷ
1, 1-Dichloroethane (s)	EPA 8010	6/6n	0,0025		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	EPA BOTO	0/01	0.0022		9	QN	Ð	2	9	9	9	9	9
1,2-Dichioroethane (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	EPA ROID	0/01	0 0025		9	9	9	Q	9	9	9	9	Ŷ
1,1-Dichloroethene (s)	EPA 8010	6/6n	0,0025		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	EPA AUTO	0/01	0 0021		2	Ŷ	Q	QN	9	9	9	Q	9
trans-1,2-Dichloroethene (s)	EPA 8010	6/6n	0,0021		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	FPA ANIO	0/01	0.0010		2	2	9	Q	9	9	9	9	9
1,2-Dichloropropane (s)	EPA 8010	6/6n	0.0010		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG
cient 3-01ch   crossonene (f)	EPA 8010	na/a	0.0048		9	ÛN	QN	Q	9	9	Q	2	2
cis-1, 3-Dichloropropene (s)	EPA 8010	6/6n	0,0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"MDM indicates that the parameter was not detected.

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DATACHEN MALYTICAL REPORT Duiuth IAP - Soli Samples Second Column Confirmations

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					GW2-E				B3-A	B3-A	B⊁-A	83-8	8 <b>3</b> ~8
			Detection	Field∦t:	15-16.5	SS-2A	SS-28	SS-2C	0-1-5	2.5-4	5-6.5	0-1-5	2.5-4
Parameter	Ma thod	Units	Limit	Site :	INO	OWL	OML	TWO	THREE	THREE	THREE	THREE	THREE
Purgeable Halocarbons (cont.)	EPA 8010	6/6n	MDL										
1 .2-Dichlorobenzene (f)	EPA 8010	6/6n	0.0014		9	9	Q	Q	9	9	9	QN	QN
1,2Dichlorobenzene (s)	EPA 8010	6/Bn	0.0014		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1 .3-Dichiorobenzene (†)	EPA 8010	₿/₿n	0.0021		Ŷ	Ð	Q	2	2	2	Ŷ	2	9
1,3Dichlorobenzene (s)	EPA 8010	₿/ɓn	0,0021		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
]_4~Dichicrobenzene (†)	EPA 8010	b∕bn	0.0020		ą	Ð	9	Ð	2	9	9	Ŷ	2
1,4-Dichlorobenzene (s)	EPA 8010	6/6n	0.0020		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Dichlorodifiuoromethane (f)	EPA 8010	6/6n	0.0016		9	Q	Ð	9	9	2	9	2	9
Dichlorodifluoromethane (s)	EPA 8010	6/6n	0.00 16		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1.1-Dichloroethane (f)	EPA 8010	6/bn	0,0025		9	9	Q	9	2	2	0,005	2	2
1,1-Dichloroethane (s)	EPA 8010	6/6n	0,0025		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
1 "2-Olchioroethane (f)	EPA 8010	6/6n	0,0022		Ð	2	Q	9	9	2	2	9	9
1,2-Dichioroethane (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NBC	NEG	NEG	NEG	NEG	NEG	NEG
1,1-Dichioroethene (f)	EPA 8010	6/6n	0,0025		9	9	9	9	9	2	Ŷ	Q	9
1,1-Dichloroethene (s)	EPA 8010	6/6n	0,0025		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
trans-1,2-Dichloroethene (f)	EPA 8010	6/6n	0.0021		9	QN	QN	QN	QN	9	9	9	2
trans-1,2-Dichloroethene (s)	EPA 8010	6/ɓn	0.0021		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichioropropane (1)	EPA 8010	ɓ∕gu	0.0010		9	QN	QN	9	2	9	Ð	9	Q
1,2-Dichloropropane (s)	EPA 8010	6/6n	0*0010		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
c1s-1,3-Dichioropropene (1)	EPA 8010	6/6n	0.0048		9	Ŷ	9	9	2	9	Ð	<del>Q</del>	9
cis-1,3-Dichioropropene (s)	EPA 8010	6/6n	0.0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"NUO" indicates that the parameter was not detected.

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DATACHEM ANALYTICAL REPORT Duiuth IAP - Soil Samples Second Column Confirmations

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			Detection	Fleid #:	83-8 5-6,5	B3-C 0-1,5 Tunce	B3-C 2.5-4 Tubec	В <b>3-</b> С 5-6.5 тирее	83-C 5-6,5 THREE	GW3-A 5-6.5 THRFF	GM3-B 5-6,5 THRFF	GW3-D 5-6.5 THREE	SS-3A THREE
Parameter	Method	Un i ts	Limit	Site :	THREE								
Purgeable Halocarbons (cont.)	EPA 8010	6/6n	Ŵ										
1.2-Dichlorobenzene (f)	EPA 8010	6/6n	0.0014		QN	Q	QN	9	2	9	2	9	9
1,2-Dichlorobenzene (s)	EPA 8010	6/6n	0.0014		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	60 A010	0/01	0.0021		9	Ð	Q	9	Ð	9	9	9	9
1, 3-Dichlorobenzene (1)	EPA 8010	6/6n	0.0021		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	CDA BOID	0/01	0.0020		9	Q	9	9	Ð	9	9	Ð	9
1,4-Uichiorobenzene (1) 1,4-Dichlorobenzene (s)	EPA 8010	6/6n	0.0020		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG
			0016		Q.	Ş	QN	9	9	9	Ð	Q	QN
Dichlorodifiuoramethane (1)	EPA 8010	6/6n	0.0016		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
		n ĥ								ļ	ļ	ç	
1 1-Oichioroethane (f)	EPA 8010	6/6n	0,0025		Q	2	Q	2	9	2	Ì	2	010.0
1,1-Dichloroethane (s)	EPA 8010		0,0025		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	SOH
	EPA A010	0/01	0.0022		2	Q	9	Ð	9	Ð	9	Ð	QN
1,2-Dichioroethane (5) 1,2-Dichioroethane (5)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
		0/01	0 0025		9	Q	QN	9	Ð	9	9	Ð	0.0075
1,1-Dichioroethene (1) 1,1-Dichioroethene (s)	EPA 8010	6/6n	0,0025		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	POS
	CDA 8010	0/01	0.0021		Q	Q	QN	2	2	2	9	Q.	0.14
trans-1,2-Dichloroethene (s) trans-1,2-Dichloroethene (s)	EPA 8010	6∕6n	0.0021		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	POS
	CDA 8010	0/01	0.0010		9	9	Q	Ð	9	Q	9	Q	9
1,2-Dichloropropane (1) 1,2-Dichloropropane (s)	EPA 8010	6/6n	0.0010		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	CDA ROIO	0/00	0.0048		9	Q	9	QN	Ð	Ð	9	Ð	QN
cis=1,3~∪ichioropropene (1) cis=1,3-Dichioropropene (s)	EPA 8010	6/6n	0.0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

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DATACHEM ANALYFICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

							B4-C	-1- 1-	94-C	84-D	B4~D	84-D	B4~E
			Detection	Fleid#:	SS-38	SS-3C	2.5-4	5-6.5	7.5-9	2.5-4	5-6.5	7.5-9 Four	2.5-4 EQID
Parameter	Ma thod	Un 1 ts	Limit	Sì te :	THREE	THREE	FOUR	FOUR	FOUR	FOUR	HOH	YNO1	NOL -
Purgeable Halocarbons (cont.)	EPA 8010	6/6n	Ŋ								1	ŝ	ç
	0100 100		0 001 0		2	ę	QN	₽	2	9	2	Ż	Z
1,2-Dichlorobenzene (f) 1,2-Dichlorobenzene (s)	EPA 8010	6/6n	0.0014		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
					ç	Ş	GN	Q	9	2	Q	Ŷ	9
<pre>1,3-01cht or obenzene (1) 1,3-01cht or obenzene (5)</pre>	EPA 8010 EPA 8010	6/6n 6/6n	0.0021 0.0021		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					9	Ş	Ş	Q	9	2	9	9	ą
1,4-Dichlorobenzene (f) 1,4-Dichlorobenzene (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0020 0,0020		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					ç	Q	Ş	2	2	9	2	9	2
Dichtorodifluoromethane (f) Dichtorodifluoromethane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0.0016 0.0016		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					220 0	Ģ	Q	Ş	2	2	Q	9	2
i,i-Dichioroethane (f) 1,i-Dichioroethane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0,0025 0,0025		POS	Nec 2	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					ŝ	ġ	GN	Ş	9	9	9	9	9
1,2-Dichioroethane (f) 1,2-Dichloroethane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0 <b>.</b> 0022 0 <b>.</b> 0022		NEG		NEG	NEG	NEG	NEG	NEG	NEG	NEG
						9	G	QN	Ð	2	9	Q	Q
1 ,1-Dichioroethene (f) 1 ,1-Dichioroethene (s)	EPA 8010 EPA 8010	6/6n 6/6n	0 <b>.</b> 0025 0 <b>.</b> 0025		POS	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					0000	ç	Ş	Q	2	9	9	Q	Đ
<pre>trans-1,2-Dichloroethene (f) trans-1 2-Dichloroethene (s)</pre>	EPA 8010 EPA 8010	6/6n 6/6n	0.0021 0.0021		POS	NEC	NEG	NEG	NEG	NEG	NEG	NEC	NEG
		,			9	Ş	Ş	9	9	Q	2	R	Q
i,2-0ichloropropane (f) 1,2-0ichloropropane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0.0010 0.0010		NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG
					2	9	Ð	Q	9	9	2	2	2
cis-1,3-Dichloropropene (f) cis-1,3-Dichloropropene (s)	EPA 8010 EPA 8010	6/6n 5/6n	0.0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG

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DATACHEM AWALYTICAL REPORT Duiuth IAP - Soil Samples Second Column Confirmations

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					B4-E	GMA-A	GW4-B	GW4-C	GW4-D	84-A	84-A	84-A	B4-B
			Detection	Field #:	5-6.5	10-11.5	5-6.5	10-12	5-6.5	2.5-4	5-6.5	7.5-9	2.5-4
Dermater	Method	Un its	Limit	Site :	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR
Purgeable Halocarbons (cont.)	EPA 8010	6/6n											1
	CDA 8010	0/01	0 0014		2	Q	Q	9	2	2	2	2	2
1,2-01 chiorobenzene (1) 1,2-01 chiorobenzene (5)	EPA 8010		0.0014		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					1	ŝ	ç	9	9	Ş	2	9	9
1 1_01chlorobanzana (f)	EPA 8010	a/bn	0,0021		2	Z	Ð	2	2	2			
1, 3-Dichlorobenzene (s)	EPA 8010		0_0021		NEG	NEG	NBC	NEG	NEG	NEG	NEG	NEG	NEG
:					Ş	QN	9	9	9	9	Q	9	Q
1 _4-Dichiorobenzene (f) 1 _4-Dichiorobenzene (s)	EPA 8010 EPA 8010	6/6n	0,0020		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
:			2100 0		9	S	QN	Q	9	9	Q	QN	9
Dichlorodifiuoromethane (f)	EPA 8010	6/6n	010000				NEG						
Dichlorodifluoromethane (s)	EPA 8010	6/6n	0,0016		NEG	3							
:	0100	0/01	0 0025		Q	QN	Ŷ	9	9	9	9	Q	2
1,1-Dichloroethane (f) 1 1-Dichloroethane (s)	EPA 8010	Б/бл	0.0025		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG
									1	ģ	9	9	Ş
	504 A010	0/00	0.0022		Ŷ	Q	g	Q	2	2	2	2	2 j
1,2-Dichloroethane (s) 1,2-Dichloroethane (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEC	NEG	NEG	NEG	NEG	NEG
		•	3000 0		QN	S	Q	9	9	2	9	Q	Q
<pre>1,1-Dichloroethene (f) 1,1-Dichloroethene (s)</pre>	EPA 8010 EPA 8010	6/6n 6/6n	0.0025		NEG	NEG	NEC	NEG	NEG	NEG	NEG	NEG	NEG
		•	1000 0		QN	G	9	9	9	9	2	2	Q
trans-1,2-Dichioroethene (f) trans-1,2-Dichloroethene (s)	EPA 8010 EPA 8010	6/6n 6/6n	0.0021		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
		•			Ş	ÛN	GN	2	2	2	Ð	Q	9
1,2-Dichloropropane (f) 1,2-Dichloropropane (s)	EPA 8010 EPA 8010	6/6n 6/6n	0.0010		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
•		•			9	Ş	Ş	9	2	9	Ð	9	2
cis-1,3-0ichioropropene (f) cis-1,3-0ichioropropene (s)	EPA 8010 EPA 8010	6/6n 6/6n	0_0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

DATACHEM ANALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

					Ű	B4-B	<b>B4-B</b>					GW5-A	GW5-B
			Detection	Field #:		5-6.5	7.5-11.5	SS-4A	SS-4B	SS-4C	SS-4D	5-6.5	9.5-11
Par and ter	Me thod	Un its	Limit	SI te	-! 	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FIVE	FIVE
Purgeable Halocarbons (cont.)	EPA 8010	6/6n	MDL										
1,2-Dichlorobenzene (f)	EPA 8010	6/6n	0.0014			9	9	9	Ŷ	9	9	2	9
1,2-Dichlorobenzene (s)	EPA 8010	6/6n	0.0014			NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1 "3-DI ch I or obenzene (1)	EPA 8010	6/6n	0,0021			Ð	QN	QN	9	9	9	9	9
1,3-Dichlorobenzene (s)	EPA 8010	6/6n	0.0021			NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,4-Dichlorobenzene (f)	EPA 8010	6/6n	0.0020			Q.	Q	Q	2	Q	9	9	2
1,4-Dichlorobenzene (s)	EPA 8010	6/6n	0,0020			NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Dichlorodifiuoromethane (f)	EPA 8010	6/6n	0.0016			9	Q	9	9	9	9	9	2
Dichlorodifiuoramethane (s)	EPA 8010	6/6n	0 <b>.</b> 0016		-	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1-Dichloroethane (f)	EPA 8010	6/6n	0.0025			9	9	9	2	9	9	Ŷ	9
1,1-Dichloroethane (s)	EPA 8010	6/6n	0,0025			NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichloroethane (f)	EPA 8010	6/6n	0,0022			Q	Q	9	9	9	9	9	<del>Q</del>
1,2-Dichloroethene (s)	EPA 8010	6/6n	0,0022		-	NEG	NEG	NEG	NBC	NEG	NEG	NEG	NEG
1,1-Dichloroethene (f)	EPA 8010	6/6n	0.0025			9	9	Ð	9	9	9	9	9
1,1-Dichloroethene (s)	EPA 8010	6/6n	0,0025			NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
trans-1,2-Dichloroethene (f)	EPA 8010	6/6n	0,0021			Q	QN	Ŷ	2	9	9	9	9
trans-1,2-Dichloroethene (s)	EPA 8010	6/6n	0,0021			NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichloropropane (f)	EPA 8010	6/6n	0.0010			9	9	ę	9	2	Ð	9	9
1,2-Díchloropropane (s)	EPA 8010	6/6n	0.0010		-	NEG	NEG	NEG	NBC	NEG	NEG	NEG	NEG
cls-1,3-Dichloropropene (f)	EPA 8010	b∕bn	0,0048			Ð	2	Q	9	9	9	9	9
cis-1,3-Dichloropropene (s)	EPA 8010	6/6n	0_0048			NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG

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"ND" indicates that the parameter was not detected.

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DATACHEM ANALYTICAL REPORT Duluth 1AP - Soli Samples Second Column Confirmations

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86-A 86-8 2.5-4 0-1.5 SIX SIX	ND NEG NEG	ND ND NEG NEG	-	-	· –		-	ND ND NEG NEG	ND ND NEG NEG	QN
1.5 0-1.5 \$1X	NEC ND	Q SI	N RO	N ND NEC	ND NEC	ND		NEG ND	ND NEG	9
SS-5E FIVE	ND NEG	NEG N	ND	N NO	ND NEC	NEC NEC	ND	N NO	N ND N EC	0
SS-50 FIVE	ND NEG	NEG	NEG N	ND	NEC	N NO	ND NEC	ND	ND NEC	9 9 9
SS-5C FIVE	NEG	NEG	NEC N	N NO	NEC	NEC	ND NEG	ND NEG	ND	NEC N
SS-58 FIVE	NEG	NEC NO	N N	N N N	ND	ND	ND	NEG	NEG	QN NEC
SS-5A FIVE	ND	ND	ND	ND	ND NEG	N RD	ND	ND	ND	NEG
645-C 10-11.5 FIVE	NEG	ND	ND NEG	ND NEG	ND NEG	NEG	NEG	ND	ND	NEG NEG
Fleid #: Site :										
Detection Limit MQ	0,0014 0,0014	0,0021 0,0021	0.0020 0.0020	0.0016 0.0016	0.0025 0.0025	0,0022 0,0022	0,0025 0,0025	0_0021 0_0021	0,0010 0,0010	0_0048 0_0048
Units ug/g	6/6n 6/6n	6∕6n 5∕6n	6/6n 6/6n	6/6n 5/6n	6/6n 6/6n	6∕6n 6∕6n	6/6n 6/6n	6∕6n 6∕6n	6/6n 6/6n	6/6n 6/6n
Method EPA 8010	EPA 8010 EPA 8010	EPA 8010 EPA 8010	EPA 8010 EPA 8010	EPA 8010 EPA 8010	EPA 8010 EPA 8010	EPA 8010 EPA 8010	EPA 8010 EPA 8010	EPA 8010 EPA 8010	EPA 8010 EPA 8010	EPA 8010 EPA 8010
Parameter Purgeable Halocarbons (cont.)	1,2-Dichlorobenzene (f) 1,2-Dichlorobenzene (s)	ł"3Dichiorobenzene (f) 1"3-Dichiorobenzene (s)	1,4-Dichlarabenzene (f) 1,4-Dichlarabenzene (s)	Dichlorodifluoromethane (f) Dichlorodifluoromethane (s)	l ,l-Dichloroethane (f) l ,l-Dichloroethane (s)	1 ,2-Dichloroethane (f) 1,2-Dichloroethane (s)	l, l-Dichloroethene (f) l, l-Dichloroethene (s)	trans-1,2-Dich! oroethene ( {) trans-1,2-Dichioroethene ( s)	i,2-Dichloropropane (f) 1,2-Dichloropropane (s)	cis-1,3-0ichiaropropene (f) cis-1,3-0ichiaropropene (s)

"ND" indicates that the parameter was not detected.

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DATACHEM ANALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

					B6-8	87-A	B7A	87 <b>-</b> 8	87 <del>-</del> 8	GW7-A	GW7-B	GW7-C	
			Detection	Field #:	2.5-4	0-1-5	2.5-4	0-1-5	2.5-4	10-11.5	10-11.5	15-16.5	SS-7A*
Parameter	Me thod	Un 1 ts	Limit	Site :	SIX	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN
Purgeable Halocarbons (cont.)	EPA 8010	6/6n	MDL										
1,2-Dichiorobenzene (f)	EPA 8010	6/6n	0.0014		Ð	9	9	9	9	2	9	9	Ð
1,2-Dichiorobenzene (s)	EPA 8010	6/6n	0.0014		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,3-Dichtorobenzene (f)	EPA 8010	6/6n	0.0021		Ĩ	Q	2	Ŷ	2	9	9	9	Ð
1,3-Dichlorobenzene (s)	EPA 8010		0.0021		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,4-Dichiorobenzene (f)	EPA 8010	6/6n	0,0020		9	9	9	9	뮻	2	9	Q	Q
1,4-Dichiorobenzene (s)	EPA 8010	6/6n	0.0020		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Dichlorodifluoromethane (f)	EPA 8010	6/6n	0.0016		Q	9	9	9	Ð	9	Ŷ	(IN	Q
Dichlorodifluoromethane (s)	EPA 8010	6/6n	0,0016		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1-Dichloroethane (f)	EPA 8010	6/6n	0.0025		Q	9	9	â	2	9	9	Ð	Ŷ
1,1-Dichloroethane (s)	EPA 8010	6∕6n	0,0025		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichtoroethane (f)	EPA 8010	6/6n	0.0022		9	QN	Ŋ	9	Q	2	2	Q	0.0070
1,2-Dichloroethane (s)	EPA 8010		0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	POS
1,1-Dichloroethene (f)	EPA 8010	6/6n	0.0025		9	9	Ð	9	9	Ð	Q	9	9
1,1-Dichioroethene (s)	EPA 8010	6/6n	0,0025		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
trans-1,2-Dichioroethene (f)	EPA 8010	6/bn	0.0021		2	Ð	9	9	9	2	QN	₽	0.024
trans-1,2-Dichloroethene (s)	EPA 8010	6/6n	0.0021		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	POS
1,2-Dichloropropane (f)	EPA 8010	6/6n	0.0010		Â	9	9	Ģ	9	9	Ð	Ð	Ŷ
1,2-Dichloropropane (s)	EPA 8010	6/6n	0.0010		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
cis-1,3-Dichioropropene (t)	EPA 8010	6/6n	0.0048		QN	Û	9	â	g	9	9	Q	Q
cis-1,3-Dichloropropene (s)	EPA 8010		0.0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

* Revised 07/10/87

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				DMTACHER MML Duluth IAP - Second Column	IAP - Sol	DMTACHER ANALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations	<u>د</u> ه						
Parameter	Me thod	Un Its	Detection Limit	Fleid #: Site :	88-A 0-1.5 EIGHT	88-A 2.5-4 EIGHT	88-A 5-6.5 E1GHT	88-8 0-1.5 EIGHT	88-8 2.5-4 ELGHT	88-8 5-6.5 EIGHT	GWB-A 5-6.5 E1GHT	GW8-B 10-11.5 EIGHT	GWB-C 10-11,5 E1GHT
Purgeable Halocarbons (cont.)	EPA 8010	6/6n	MCL										
1,2-Dichiorobenzene (f) 1,2-Dichiorobenzene (s)	EPA 8010 EPA 8010	6/6n 6/6n	0_0014 0_0014		N NO N EG	N PO	ND	Nec N	NEG	N ND	NEC N	N N N N	NG NEG
	EPA AN10	0/01	0.0021		2	2	9	g	9	QN	9	Q	Ŷ
1,3-Dichlorobenzene (s)	EPA 8010	6,6n	0.0021		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	EPA ANIO	ייט/ט	0.0020		Q	QN	QN	QN	9	Q	Q	9	Ŷ
1,4-UICHIOTODENZENE (1) 1,4-Dichlorobenzene (s)	EPA 8010	6/6n	0.0020		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	EPA A010	0/01	0.0016		2	9	QN	9	9	9	9	9	Q
Dichlorodifiuoromethane (s)	EPA 8010	6/6n	0.0016		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
		0/01	0 0025		9	9	9	9	9	Q	Q	Q	QN
1,1-Dichioroethane (1) 1,1-Dichloroethane (s)	EPA 8010	6/6n	0.0025		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
		e/	0.0022		Ģ	QN	2	9	Q	9	9	9	9
1,2-Dichioroethane (1) 1,2-Dichioroethane (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEC	NEG	NEG	NEG	NEG	NEG	NEG
		0/01	0 0025		9	9	Q	Ð	QN	2	QN	Q	9
1,1-UICHIOTOGINGHE (1) 1,1-Dichiorocthene (s)	EPA 8010	6/6n	0.0025		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	500 001 C	0/01	0 0021		QN	9	Ð	2	Q	9	2	9	9
trans-1,2-01 cm1 or continue (1) trans-1,2-01 chloroethene (5)	EPA 8010	6∕6n	0.0021		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	CDA ANIO	0/01	0,00,0		2	Q	Q	Ð	9	9	9	9	QN
1,2-Ulchioropropane (1) 1,2-Dichloropropane (s)	EPA 8010	6/6n	0.0010		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
	EPA ROID	0/01	0.0048		9	9	Q	Đ	9	Q	9	9	9
cis-is-lucina apraga (s) cis-i,3-Dichloropropene (s)	EPA 8010	6/6n	0.0048		NEG	NEG	NEG	NEG	NEG	NEG	NEC	9BN	NEG

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"ND" indicates that the parameter was not detected.

DATACHEM ANALYTICAL REPORT Duluth IAP - Solt Samples Second Column Confirmations

			Detection	Field #:	SS-8A*	SS-8B#
Par ameter	Method	Un i ts	Limit	Site :	EI GHT	EIGHT
Purgeable Halocarbons (cont.)	EPA 8010	6 <i>/</i> 6n	MDL			
1,2-Dichtorobenzene (f)	EPA 8010	6/6n	0.0014		9	QN
1,2-Dichiorobenzene (s)	EPA 8010	6/6n	0.0014		NEG	NEG
1,3-Dichlorobenzene (f)	EPA 8010	6/6n	0,0021		9	QN
1,3-Dichtorobenzene (s)	EPA 8010	6/6n	0.0021		NEG	NEG
1,4-Dichtorobenzene (f)	EPA 8010	6/6n	0,0020		9	QN
1,4-Dichlorobenzene (s)	EPA 8010	6/6n	0.0020		NEG	NEG
Dichlorodiftuoromethane (f)	EPA 8010	6/6n	0*0016		9	QN
Dichlorodifiuoromethane (s)	EPA 8010	ɓ∕ɓn	0.0016		NEG	NEG
1,1-Dichioroethane (f)	EPA 8010	6/6n	0.0025		9	QN
1 "1-Dichioroethane (s)	EPA 8010	ɓ∕ôn	0,0025		NEG	NEG
1,2-Dichloroethane (f)	EPA 8010	6/6n	0,0022		9	QN
1,2-Dichloroethane (s)	EPA 8010	6/6n	0.0022		NEG	NEG
1,1-Dichloroethene (f)	EPA 8010	6/6n	0,0025		2	QN
1,1-Dichioroethene (s)	EPA 8010	6/6n	0.0025		NEG	NEG
trans-1,2-Dichloroethene (f)	EPA 8010	6/6n	0,0021		Ð	QN
trans-1,2-Dichloroethene (s)	EPA 8010	6/6n	0.0021		NEG	NEG
1,2-Dichloropropane (f)	EPA 8010	6/6n	0.0010		Ð	QN
1,2-Dichloropropane (s)	EPA 8010	6 <i>/</i> 6n	0*0010		NEG	NEG
cis-1,3-Dichioropropene (f)	EPA 8010	6/6n	0.0048		9	QN
cis-1,3-Dichloropene (s)	EPA 8010	6/6n	0.0048		NEG	NEG

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### DATACHEM ANALYTICAL REPORT Duiuth IAP - Soil Samples Second Column Confirmations

			Detect ion	Fleid #:	B1-A 0-1.5	B1-A 2 <b>.</b> 5-4	B1-A 5-6.5	GW1-A 10-11.5	GW1-B 5-6.5	GM1-E 20-21.5	SS-1A	SS-1B	82-8 0-1.5
Parameter	Ma thod	5 1 1 2	Limit	Site :	ONE	SNE N	ONE	ONE	BR	ONE	BN	ONE	
Purgeable Halocarbons	EPA 8010	ɓ∕ɓn	Ţ										
trans-1,3-Dichloropropene (f)	EPA 8010	6/6n	0.0048		9	9	Ð	9	2	9	9	QN	9
trans-1,3-Dichioropropene (s)	EPA 8010	6/6n	0.0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Methylene Chloride (f)	EPA 8010	6/6n	0.0017		QN	QN	Q	Q	9	9	9	Q	Q
Methylene Chloride (s)	EPA 8010	6/6n	0.0017		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,2,2-Tetrach croethane (f)	EPA 8010	6/6n	0,0019		Ŷ	9	Ð	9	9	Ð	Ð	9	9
1,1,2,2-Tetrachloroethane (s)	EPA 8010	6/6n	0,0019		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Tetrachioroethene (f)	EPA 8010	6/6n	0,0019		Ŷ	Q	9	9	9	9	9	2	9
Teirach! oroethene (s)	EPA 8010	6/6n	0*0019		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,1-Tr ichi oroethane (1)	EPA 8010	6∕6n	0.0026		Ð	2	9	9	9	9	Ð	9	9
1,1,1-Trichioroethane (s)	EPA 8010		0,0026		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,2-Tr Ichi oroethene (f)	EPA 8010	6/6n	0.0026		9	Ŷ	QN	9	9	2	Ð	ହ	2
1,1,2-Trichloroethane (s)	EPA 8010	ɓ∕ôn	0,0026		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichtoroethene (TCE) (t)	EPA 8010	6/6n	0.0030		9	Û	Q	<del>Q</del>	9	9	9	Ŷ	<del>9</del>
Trichloroethene (TCE) (s)	EPA 8010	6/6n	0,0030		NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG	NEG
Trichlorofluoromethane (f)	EPA 8010	6/6n	0,0022		9	QN	Q	9	Q	2	Ŷ	9	QN
Trichlorofiuoromethane (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
Vinyi Chioride (f)	EPA 8010	6/6n	0,0027		9	Ŷ	9	9	9	9	9	9	₽
Vinyi Chioride (s)	EPA 8010	6/6n	0.0027		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

# Duluth IAP - Soll Samples Second Column Confirmations

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					82-8	B2-B	B2-C	82-C	B2-C	GW2-A	GW2-B	GM2-C	GW2-D
			Detection	Field #:	2.5-4	5-6.5	0-1.5	2.5-4	5-6.5	5-6.5	5-6.5	15-16.5	15-16.5
Parameter	Me thod	Un its	Limi+	Site :	OM	OML	ONL	OWL	ONL	OM	TNO	ONT	0ML
Purgeable Halocarbons (cont)	EPA 8010	6/6n	MD										
trans-1,3-Dichioropropene (f)	EPA 8010	6/6n	0.0048		9	2	9	9	9	2	9	9	Q
trans-1,3-Dichloropropene (s)	EPA 8010	6/6n	0.0048		NEG	NEG							
Methylene Chloride (f)	EPA 8010	₿/ɓn	0,0017		2	9	9	2	9	9	9	9	Ŷ
Methylene Chloride (s)	EPA 8010	6/6n	0,0017		NEG	NEG							
1,1,2,2-Tetrachloroethane (f)	EPA 8010	6/6n	0,0019		2	9	9	9	9	9	9	Q	9
1,1,2,2-Tetrachloroethane (s)	EPA 8010	6/6n	0,0019		NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG
Tetrachloroethene (1)	EPA 8010	g/pu	0,0019		9	9	2	9	9	2	9	9	9
Tetrachl aroethene (s)	EPA 8010	6/6n	0,0019		NEG	NEC	NEG	NEG	NEG	NEG	NEG	NEC	NEG
1,1,1-Tr Ichl oroethane (f)	EPA 8010	6/6n	0,0026		2	9	9	9	2	9	£	9	9
1,1,1-Trichloroethane (s)	EPA 8010	6/6n	0,0026		NEG	NEC	NEG						
1,1,2-Tr ichi oroethene (f)	EPA 8010	6/6n	0,0026		2	Q	9	9	9	ę	9	9	9
1,1,2-Trichloroethane (s)	EPA 8010	6/6n	0,0026		NEG	NEG	NEG	NBC	NEG	NEG	NBC	NBC	NEG
Trichloroethene (TCE) (f)	EPA 8010	6/6n	0.0030		Q	Q	9	Q	9	9	Ð	9	Ð
Trichloroethene (TCE) (s)	EPA 8010	6/6n	0*0030		NEG	NEG							
Trichlorofinoromethane (f)	EPA 8010	6/6n	0,0022		2	9	QN	9	9	9	9	9	Ŷ
Tr Ichlorofi uoromethane (s)	EPA 8010	6/6n	0,0022		NEG	NEG							
VINVI Chloride (†)	EPA 8010	D/DA	0.0027		9	Ð	Ð	2	9	9	Q	9	2
VINYI Chloride (s)	EPA 8010	6/6n	0.0027		NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG

"ND" indicates that the parameter was not detected.

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DATACHBA ANALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

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					GW2-E				B3-A	B3-A	B3-A	87-8	B3-B
			Detection	Field #:	15-16.5	SS-2A	SS-2B	SS-2C	0-1-5	2.5-4	5-6.5	0-1-5	2.5-4
Parameter	Me thod	Un i ts	Limit	Site :	OWL	UMU	TWO	DWL	THREE	THREE	THREE	THREE	THREE
Purgeable Helocarbons (cont)	EPA 8010	6/6n	MD										
trans-1,3-Dichloropropene (f)	EPA 8010	ɓ∕ɓn	0.0048		Ð	Ð	9	2	9	9	9	9	9
trans-1,3-Dichloropropene (s)	EPA 8010	6/6n	0.0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Methylene Chloride (f)	EPA 8010	p/pu	0.0017		Ŷ	Q	2	9	2	ę	9	Ð	9
Mathylene Chloride (s)	EPA 8010	6/6n	0.0017		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,2,2-Tetrachloroethane (f)	EPA 8010	6/6n	0,0019		9	Q	Ð	9	2	9	9	Q	9
1,1,2,2-Tetrachloroethane (s)	EPA 8010	6/6n	0*0019		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Tetrachloroethene (f)	EPA 8010	6/6n	0.0019		9	2	9	Ð	0,0076	9	9	9	2
Tetrachloroethene (s)	EPA 8010	6/6n	<b>0</b> ,0019		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,1-Tr icht oroethane (f)	EPA 8010	6/6n	0.0026		Q	9	9	<del>Q</del>	0,006	0.017	0,083	Q	9
1,1,1-Trichioroethane (s)	EPA 8010	6/6n	0,0026		NEG	NEG	NEG	NEG	NEG	POS	POS	NEG	NEG
1,1,2-Tr ichi oroethane (f)	EPA 8010	6/6n	0.0026		Ð	Ð	Ŷ	9	9	Ð	9	9	Q
1,1,2-Trichloroethane (s)	EPA 8010	6/6n	0,0026		NEG	NEG	NEG	9 <u>-</u> 1	NEG	NEG	NEG	NEG	NEG
Trichloroethene (TCE) (f)	EPA 8010	6/6n	0,0030		9	Q	Ð	Ð	9	9	9	Q	Ð
Trichloroethene (TCE) (s)	EPA 8010	6/6n	0*0030		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichlorofinoromethane (1)	EPA 8010	6/6n	0.0022		9	Q	9	9	9	9	Ð	9	Đ
Trichloroftuoromethane (s)	EPA 8010	6/6n	0.0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Vinyl Chloride (f)	EPA 8010	6/6n	0.0027		9	9	9	9	9	9	9	Q	9
Viny! Chlor ide (s)	EPA 8010	6/6n	0.0027		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG

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"ND" indicates that the parameter was not detected.

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DATACHEM ANALYTICAL REPORT Duluth IAP - Soil Semples Second Column Confirmations

					R 3-R	B3-C	8 <b>3-</b> C	B3-C	B3-C	A-2 MC)	6-200	GM3-0	
			Detection	Field #:	5-6.5	0-1-5	2.5-4	5-6.5	5-6.5	5-6.5	5-6.5	5-6.5	SS-3A
Parameter	Me thod	Un i ts	Limit	Site :	THREE	THREE	THREE	THREE	THREE	THREE	THREE	THREE	THREE
Purgeable Halocarbons (cont)	EPA 8010	6/6n	Ū										
trans-1,3-0ichioropropene (f)	EPA 8010	6/6n	0.0048		9	9	9	9	9	9	9	9	9
trans-1,3-Dichloropropene (s)	EPA 8010	6/6n	0.0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Methylene Chloride (f)	EPA 8010	6/6n	0.0017		9	QN	QN	0.0085	9	9	9	2	9
Mathylene Chloride (s)	EPA 8010	6/6n	0,0017		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,2,2-Te trachl or oethane (f)	EPA 8010	6/6n	0.0019		9	Ð	9	9	9	9	₽	Ŷ	9
1, 1, 2, 2-Tetrachloroethane (s)	EPA 8010	6/6n	0°0019		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Tetrachioroethene (f)	EPA 8010	6/6n	0,0019		9	9	Q	9	0,38	9	9	Ŷ	£
Tetrachioroethene (s)	EPA 8010	6/6n	0°0019		NEG	NEG	NEG	NEG	POS	NEG	NEG	NEG	NEG
1.1.1-Trichioroethene (f)	EPA 8010	p/pu	0.0026		2	9	9	9	2	2	9	Ð	0.0042
1,1,1-Trichloroethane (s)	EPA 8010	6/6n	0,0026		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	POS
1 .1 .2-Tr ichl oroethane (f)	EPA 8010	₿/bn	0.0026		Q	Ŷ	2	9	2	9	9	9	Đ
1,1,2-Tr Ichioroethane (s)	EPA 8010	6/6n	0,0026		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichioroethene (TCE) (f)	EPA 8010	6/6n	0*0030		Ŷ	2	9	9	9	Q	2	9	0.010
Trichioroethene (TCE) (s)	EPA 8010	6/6n	0*0030		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	POS
Trichiorofinoromethane (t)	EPA 8010	6/6n	0.0022		9	2	Ð	9	9	9	9	Ð	QN
Trichlorofluoromethane (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
Vinyl Chioride (f)	EPA 8010	6/6n	0,0027		9	2	£	Q	9	2	9	Ð	0.027
Vinyi Chioride (s)	EPA 8010	6/6n	0_0027		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	POS

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DATACHEN ANALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

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						;	B4-C	84-C	B4-C	B4-D	B4-D	B4-D	84-E
Par meter	Me thod	Un I ts		Site :	THREE	SS-3C	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	2. 74 FOUR
Purgeable Halocarbons (cont)	EPA 8010	6/6n	MQL										
trans-1,3-Dichloropropene (f)	EPA 8010	6/6n	0.0048		9	9	QN	9	9	Q	Q	9	Ð
trans-1,3-01chloropropene (s)	EPA 8010	6/6n	0.0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Mathylene Chloride (f)	EPA 8010	6/6n	0,0017		9	9	0,062	0.10	0.40	0,082	0.33	0.15	Q
Methylene Chloride (s)	EPA 8010	6/6n	0.0017		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,2,2-Tetrachioroethane (f)	EPA 8010	6/6n	0,0019		9	9	2	Q	9	9	Q	Ð	9
1,1,2,2-Tetrachloroethane (s)	EPA 8010	6∕ôn	0.0019		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Tetrachloroethene (f)	EPA 8010	6/6n	0,0019		0.0019	9	9	9	9	9	9	9	9
Tetrachloroethene (s)	EPA 8010	6/6n	61 00 <b>°</b> 0		POS	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,1-Tr ichl oroethane (f)	EPA 8010	6/6n	0.0026		1.5	0.013	9	Ŷ	2	9	2	9	2
1,1,1-Trichloroethane (s)	EPA 8010	6/6n	0.0026		POS	POS	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,2-Trichioroethane (f)	EPA 8010	6/6n	0.0026		9	9	QN	2	9	2	9	9	9
1,1,2-Tr ichloroethane (s)	EPA 8010	6/6n	0.0026		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichloroethene (TCE) (f)	EPA 8010	6/ɓn	0.0030		0.026	0.0053	QN	9	9	9	9	Q	Ŷ
Trichioroethene (TCE) (s)	EPA 8010	6/6n	0.0030		POS	POS	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichlorofinoromethane (f)	EPA 801-3	6/6n	0.0022		9	9	Q.	9	9	9	9	Q	9
Trichlorofluoromethane (s)	EPA 8010	6/6n	0_0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
viny! Chioride (1)	EPA 8010	6/6n	0,0027		P	9	9	9	9	9	9	Q	9
vinyi Chioride (s)	EPA 8010	6/6n	0.0027		NEG	NEC	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

162	
Page	

DATACHER ANALYTICAL REPORT Duluth 1AP - Soil Samples Second Column Confirmations

					B4-E	GW4-A	GW4-B	GW4-C	GH4-D	B4-A	84-A	B4-A	<b>B4-</b> B
			Detection	Field∦t:	5-6,5	10-11-5	5-6.5	10-12	5-6,5	2.5-4	5-6,5	1.5-9	2.5-4
Parameter	Me thod	Un I ts	Limit	Site :	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR
Purgeable Halocarbons (cont)	EPA 8010	6/6n	MQL										
trans-1,3-Dichioropropene (f)	EPA 8010	6/6n	0.0048		9	£	9	ą	9	9	9	Q	9
trans-1,3-Dichloropropene (s)	EPA 8010	6/6n	0,0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Ne thy lene Chioride (f)	EPA 8010	6/6n	0,0017		Ð	<del>Q</del>	QN	9	0.079	9	2	9	9
Mathyiene Chioride (s)	EPA 8010	6/6n	0,0017		NEG	NEG	NEG	NEG	POS	NEG	NEG	NEG	NEG
1,1,2,2-Tetrachioroethane (f)	EPA 8010	6∕6n	0°0019		9	2	9	9	9	9	2	9	2
1,1,2,2-Tetrachloroethane (s)	EPA 8010	6/6n	0,0019		NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG
Tetrachioroethene (f)	EPA 8010	6/6n	0.0019		Ð	9	0.013	2	9	9	9	9	2
Tetrachloroethene (s)	EPA 8010	6/6n	0°00 19		NEG	NEG	POS	NEG	NEG	NEG	NEG	NEG	NEG
1,1,1-Tr Ichl oroethane (f)	EPA 8010	₿/ɓn	0.0026		9	Đ	2	2	9	9	9	Ŷ	9
1, 1, 1-Tr ichioroethane (s)	EPA 8010	6/6n	0.0026		NEG	NEG	NEG	NEG	NEC	NEG	NEG	NEG	NEG
1,1,2-Tr Ichloroethane (f)	EPA 8010	6/6n	0.0026		9	9	9	Q	Q	9	Q	9	9
1,1,2-Trichloroethane (s)	EPA 8010	6/6n	0.0026		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichloroethene (TCE) (f)	EPA 8010	6/6n	0,0030		9	Ð	₽	9	Đ	ç	9	2	Ŷ
Trichloroethene (TCE) (s)	EPA 8010	6/6n	0*0030		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichlorofivoromethane (f)	EPA 8010	6/6n	0,0022		Ð	9	9	9	Đ	Ð	9	Ð	Ð
Trichlorofluoromethane (s)	EPA 8010	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
vinyi Chioride (f)	EPA 8010	6/6n	0.0027		2	9	9	9	9	Ð	9	Ŷ	9
vinyi Chioride (s)	EPA 8010	6/6n	0.0027		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

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"ND" indicates that the parameter was not detected.

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# DATACHEM AMALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

					<b>B4-</b> B	B4-B					GW5A	GW5-B
·			Detect ion	Fleid 🕼	5-6,5	7.5-11.5	5S-4A	SS-4B	SS-4C	SS-4D	5-6.5	9.5-11
Parameter	Me thod	Un i ts	+   =	Site :	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FIVE	FIVE
Purgeable Halocarbons (cont)	EPA 8010	6/6n	MDL									
trans-1,3-01ch1 oropropene (f)	EPA 8010	6/6n	0.0048		2	9	Ð	9	÷	9	2	2
trans-1,3-Dichloropropene (s)	EPA 8010	6/6n	0.0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Methylene Chloride (f)	EPA 8010	6/6n	0.0017		9	Ŷ	9	9	Ş	ŝ	Ş	Ş
Methylene Chloride (s)	EPA 8010	6/6n	0.0017		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
i, i, 2, 2-Tetrachioroethane (f)	EPA 8010	6/6n	0.0019		9	Q	9	2	9	2	ç	Ş
1,1,2,2-Tetrachioroethane (s)	EPA 8010	6/6n	0°00 19		NEG	NEG	NEG	NEG	NEG	NEG	NEC NEC	NEG
Tetrachl oroethene (1)	EPA 8010	6/6n	0,0019		9	Ŷ	9	9	9	9	9	ç
Tetrachioroethene (s)	EPA 8010	6/6n	61 00°0		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,1-Tr Ichi oroethane (f)	EPA 8010	6∕6n	0.0026		Ð	Ŷ	9	2	9	9	9	9
l,l,l-Irichloroethane (s)	EPA 8010	6/6n	0 <b>.</b> 0026		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,2-Trichloroethane (f)	EPA 8010	6/6n	0,0026		Đ	9	Ð	Ð	9	9	9	9
1,1,2-Trichloroethane (s)	EPA 8010	6/6n	0.0026		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichloroethene (TCE) (f)	EPA 8010	6/6n	0*0030		9	9	9	9	9	9	2	Ð
Trichloroethene (TCE) (s)	EPA 8010	6/6n	0.0030		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichiorofiuoromethane (f)	EPA 8010	6/6n	0.0022		Ð	9	2	9	9	9	9	9
Trichlorofluoromethane (s)	EPA 8010	6/6n	0•0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Vinyl Chloride (f)	EPA 8010	6/6n	0,0027		9	QN	2	9	9	9	2	9
Vinyi Chiaride (s)	EPA 8010	6/6n	0,0027		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

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# DATACHEM ANALYTICAL REPORT Duluth IAP - Soli Samples Second Column Confirmations

	Me thod	Un 1 + s	Detection Limit	Field#: 1 Site :	GW5-C 10-11.5 FIVE	SS-5A FIVE	SS-58 FIVE	SS-5C FIVE	SS-50 FIVE	SS-5E FIVE	86-A 0-1.5 SIX	86-A 2.5-4 SIX	B6-B 0-1.5 SIX
EPA			M0. 0.0048 0.0048		NEG	NEG	NEG	NEG NO	NEG N	NEC	N ND	NEC	NEG
EPA EPA	EPA 8010 EPA 8010 EPA 8010	6/6n 6/6n	0.0017 0.0017		ND	NEG	NEG	ND	ND	N NO	N N N		N N N N
EPA EPA	EPA 8010 EPA 8010	6/6n 6/6n	0.0019 0.0019		ND	N ND	Q 99	Q SE N	NEG N	N N			NEG NEG
EPA EPA	EPA 8010 EPA 8010	6/6n 6/6n	0.0019 0.0019		NEG	NEG	NEG	Neg V	9 99 9		2 99 2		NEC NEC
EPA	EPA 8010 EPA 8010	ნ/ნი ნ/ნი	0_0026 0_0026		ND	NEG N	NEG	e S		Les Les	Ne Ne	ND REC	NEG ND
E7A 8010 EPA 8010	EPA 8010 EPA 8010	6/6n 6/6n	0,0026 0,0026		NEG	NEG	NEG	C Si N	NEC C	2 2 2	Rec N	N NEC	NEG NEG
EPA EPA	EPA 8010 EPA 8010	6/6n 5/6n	0,0030 0,0030		ND	ND	Q B				N REC	N EG	ND NG
EPA EPA	EPA 8010 EPA 8010	6/6n 6/6n	0 <b>.</b> 0022 0 <b>.</b> 0022		NEC N	NEG	e ee			NEG	NEG	NEG NEG	NEG
EPA	EPA 8010 EPA 8010	6/6n 6/6n	0,0027 0,0027		NEG	NEG	NEG	2 22	9 99 99	NEG	NEG	NEG	¥

Duluth IAP - Soll Samples Second Column Confirmations

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			Detection	Field #: si+o	86-8 2.5-4 c.1v	B7-A 0-1,5 seve.	87-A 2.5-4 seven	В7-В 0-1,5 сеvем	87-8 2.5-4 cevea	GW7-A 10-11.5 SEVEN	GW7-8 10-11.5 seven	GW7-C 15-16.5 seven	SS-7A*
Purceable Halocarbons (cont)	EPA 8010		MDL		VIC	JE ACM	JCVEN	JE VEN	JEVEN	JEVEN	JEVEN	JE VEN	JE ACIN
trans-1.3-01ch1 oronromene (f)	FPA ROID		0.0048		Ĩ	Ŷ	9	9	Ş	Q.	Ŷ	5	9
trans-1,3-Dichloropropene (s)	EPA 8010		0.0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Methylene Chloride (f)	EPA 8010	p/pu	0.0017		9	9	9	Ð	9	9	2	2	QN
Mathylene Chioride (s)	EPA 8010	6/6n	0,0017		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,2,2-Tetrachloroethane (f)	EPA 8010	6/6n	0.0019		9	9	9	ŷ	9	9	Ð	2	9
1,1,2,2-Tetrachloroethane (s)	EPA 8010	6/ôn	0,0019		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Tetrachloroethene (f)	EPA 8010	b∕bn	0.0019		*0	0,0035*	Q	Q	9	9	Q	9	Ð
Tetrachloroethene (s)	EPA 8010	6/6n	0*0019		NEG*	*SO4	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1.1.1-Trichioroethane (f)	EPA 8010	p/pu	0.0026		9	2	ହ	Ð	2	9	9	Q	Ð
1,1,1-Trichloroethane (s)	EPA 8010	6/6n	0.0026		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1.1.2-Tr ich loroethane (f)	EPA 8010	p/pu	0.0026		Ð	Q	9	9	9	9	Ð	9	Ð
1,1,2-Trichloroethane (s)	EPA 8010	ɓ∕ɓn	0,0026		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichloroethene (TCE) (f)	EPA 8010	6∕6n	0.0030		Q	Q	Q	Đ	9	Q	2	9	9
Trichloroethene (TCE) (s)	EPA 8010	6/6n	0.0030		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichiorofiuoromethane (f)	EPA 8010	6/6n	0.0022		9	Ð	Q	9	Ŷ	Q	9	2	Ð
Trichlorofluoromethane (s)	EPA 8010		0.0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Viny! Chloride (f)	EPA 8010	₫/₫n	0,0027		9	ÛN	9	9	2	Ð	2	Ð	Ð
Vinyi Chloride (s)	EPA 8010	ɓ∕ɓn	0.0027		NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG	NEG

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# DATACHEDA ANNULYTIECAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

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			Patart Ico	Field .	88-A 0-1 5	88-A 2 5-4	88-A 15 5	88-88 	88 P	67 ¥	GWBA	GWB-B 10-11 5	GW8-C
Parameter	Ma thod	Un its	Limit	Site :	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT
Purgeable Halocarbons (cont)	EPA 8010	6/6n	МД										
trans-1,3-Dichloropropene (f)	EPA 8010	6/6n	0.0048		9	2	9	9	9	9	9	9	9
trans-1,3-Dichloropropene (s)	EPA 8010	6/6n	0,0048		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Methylene Chloride (f)	EPA 8010	6/6n	0.0017		9	0.0074	0.0088	0.019	9	9	0.037	0.036	2
Methylene Chloride (s)	EPA 8010	6/6n	0.0017		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,2,2-Tetrachioroethane (f)	EPA 8010	6/6n	0,0019		2	9	9	9	9	9	2	9	9
1,1,2,2-Tetrachioroethane (s)	EPA 8010	6/6n	0°00 19		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Tetrachl or oethene (f)	EPA 8010	6/6n	0.0019		9	9	9	9	9	Q	9	9	2
Tetrachtoroethene (s)	EPA 8010		0°0019		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
1,1,1-Tr Ichl oroethane (f)	EPA 8010	6∕6n	0.0026		9	9	Ŷ	9	ę	9	9	2	Ŷ
1,1,1-Trichloroethane (s)	EPA 8010		0.0026		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,2-Tr ichl oroethane (1)	EPA 8010	6/6n	0.0026		Ŷ	9	9	Q	2	9	Đ	Q	9
1,1,2-Trichloroethane (s)	EPA 8010	6/6n	0.0026		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichtoroethene (TCE) (f)	EPA 8010	6/6n	0.0030		9	ÛN	9	9	9	9	9	9	9
Trichloroethene (TCE) (s)	EPA 8010	6/6n	0.0030		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichtorofluoromethane (f)	EPA 8010	6/6n	0.0022		9	9	Q	2	9	9	£	9	9
Trichloroftuoromethane (s)	EPA 8010	6/6n	0.0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Vinyi Chioride (f)	6PA 8010	6/6n	0,0027		9	Q	9	9	9	<del>9</del>	9	Ð	Ð
Vinyi Chioride (s)	EPA 8010	6/6n	0.0027		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG

"ND" indicates that the parameter was not detected.

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DATACHEN ANALYFICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

			Detection	Field #:	SS-8A*	SS-88*
Par ame ter	Method	Units	Limit		EI GHT	EI GHT
Purgeable Halocarbons (cont)	EPA 8010	ɓ∕ɓn	MDL			
trans-1,3-Dichloropropene (f)	EPA 8010	6/6n	0.0048		2	QN
trans-1,3-Dichloropropene (s)	EPA 8010	6/ôn	0.0048		NEG	NEG
Mathylene Chloride (f)	EPA 8010	6/6n	0.0017		9	0,0049
<b>Methylene</b> Chloride (s)	EPA 8010	6/6n	0.0017		NEG	NEG
1,1,2,2-Tetrachloroethane (1)	EPA 8010	6/6n	0,0019		9	Q
1,1,2,2-Tetrachioroethane (s)	EPA 8010	6/6n	0.0019		NEG	NEG
Tetrachioroethene (f)	EPA 8010	6/6n	0*0019		2	ÛN
Tetrachioroethene (s)	EPA 8010	6/6n	0.0019		NEG	NEG
1,1,1-Trichloroethane (f)	EPA 8010	6/6n	0,0026		Ŷ	Q
1,1,1-Trichloroethane (s)	EPA 8010	6/6n	0.0026		NEG	NEG
1,1,2-Trichloroethane (f)	EPA 8010	6/6n	0,0026		9	Q
1,1,2-Trichloroethane (s)	EPA 8010	6/6n	0.0026		NEG	NEG
Trichloroethene (TCE) (f)	EPA 8010	6/6n	0-0030		9	R
Trichloroethene (TCE) (s)	EPA 8010	6/6n	0*0030		NEG	NEG
Trichlorofluoromethane (f)	EPA 8010	6/6n	0.0022		9	QN
Trichlorofluoromethane (s)	EPA 8:010	6/6n	0.0022		NEG	NEG
Vinyl Chloride (f)	EPA 8010	6/6n	0.0027		2	Ð
Viny! Chloride (s)	EPA 8010	6/6n	0.0027		NEG	NEG

* Revised 07/10/87

### DATACHEM ANALYTICAL REPORT Duluth IAP - Soil Semples Second Column Confirmations

					81-A	B1-A	81-A	CW1-A	GH1-B	GW1-E			B2-B
Parameter	Me thod	Un I ts	Detection Limit	Field #: Site :	0-1.5 ONE	2.5-4 ONE	5-6.5 ONE	10-11.5 ONE	5-6.5 ONE	20-21.5 ONE	SS-1A ONE	SS-1B ONE	0-1.5 Two
Purgeable Arometics	EPA 8020	6/6n	ŪW										
Benzene (†)	EPA 8020	6/6n	0.0013		QN	9	9	Q	9	9	0.0071	Q	9
Benzene (s)	EPA 8020	6/6n	0,0013		NEG	NEG	NEG	NEG	NEG	NEG	POS	NEG	NEG
Chlorobenzene (f)	EPA 8020	6/bn	0,0018		9	9	Q	Ð	9	9	9	9	Ð
Chlorobenzene (s)	EPA 8020	6/6n	0,0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1 .2-Dichiorobenzene (f)	EPA 8020	6/bn	0,0023		9	2	9	9	Q	9	9	9	Ð
1,2-Dichlorobenzene (s)	EPA 8020	6/6n	0,0023		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1.3-Dichlorobenzene (f)	EPA 8020	p/pu	0.0046		2	9	9	9	9	9	9	9	Đ
1,3-Dichlorobenzene (s)	EPA 8020	6/6n	0,0046		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1 ,4-Dichiorobenzene (1)	EPA 8020	6/6n	0.0022		9	Q	QN	9	9	₽	9	9	Ð
1,4-Dichlorobenzene (s)	EPA 8020	6/6n	0,0022		NEG	NEG	NEG	NEG	NBC	NEG	NEG	NEG	NEG
Ethylbenzene (f)	EPA 8020	₿/bn	0,0038		9	Ð	0.043	9	9	Ð	0,0071	9	Ð
Ethylbenzene (s)	EPA 8020	6/6n	0,0038		NEG	NEG	POS	NEG	NEG	NEG	NEG	NEG	NEG
Toluene (f)	EPA 8020	6/bn	0,0032		9	9	0.094	9	9	9	0.10	1.0	Q
Toluene (s)	EPA 8020	6/6n	0,0032		NEG	NEG	POS	NEG	NEG	NEG	POS	POS	NEG
Xvlenes (f)	EPA 8020	p/pu	0.0061		9	2	0.043	9	9	£	9	9	QN
Xylenes (s)	EPA 8020	6/6n	0.0061		NEG	NEG	POS	NEG	NEG	NEG	NEG	NEG	NEG

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DATACHER AMALYFICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

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					82-8	82-B	B2-C	B2-C	B2-C	GW2-A	GW2-B	GW2-C	GW2-D
Parameter	Mathod	Un i †s	Detection	Field #t: Site ∷	2*5-4	7-6.5	0-1-0 1.0	2.5.4 TWO	5-6.5	740	5-6.5 TWO	15-16.5 Two	15-16.5 Two
Purgeable Aromatics (cont.)	EPA 8020	6/6n	MCL										
Benzene (†)	EPA 8020	6/ôn	0.0013		9	9	0.014	9	9	9	9	2	9
Benzene (s)	EPA 8020	6/6n	0.0013		NEG	NEG	POS	NEG	NEG	NEG	NEG	NEG	NEG
Ch I or obenzene (f)	EPA 8020	₿/ɓn	0.0018		9	Ð	9	9	9	9	9	9	Ð
Chiorobenzene (s)	EPA 8020	6/6n	0.0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichlorobenzene (f)	EPA 8020	6/6n	0,0023		9	9	Ŷ	9	9	9	9	9	2
1,2-Dichlorobenzene (s)	EPA 8020	6/6n	0,0023		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,3-01 chlorobenzene (f)	EPA 8020	6/6n	0.0046		9	9	Ŷ	9	9	9	2	9	2
1,3-Dichlorobenzene (s)	EPA 8020	6/6n	0.0046		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,4-Dichtorobenzene (f)	EPA 8020	6/6n	0,0022		QN	9	9	9	9	9	₽	9	9
1,4-Dichiorobenzene (s)	EPA 8020	6/6n	0,0022		NEG	NEC	NEG	NEG	NEG	NEG	NEG	NBC	NEG
Ethylbenzene (f)	EPA 8020	6/6n	0,0038		9	Ð	0.35	9	0.011	9	2	2	9
Ethylbenzene (s)	EPA 8020	6/6n	0.0038		NEG	NEG	POS	NEG	POS	NEG	NEG	NEG	NEG
Toluene (f)	EPA 8020	6/6n	0,0032		9	Ð	0.54	9	0,0088	9	9	9	9
Toluene (s)	EPA 8020	6/6n	0_0032		NEG	NEG	POS	NEG	POS	NEG	NEG	NEG	NEG
Xylenes (f)	EPA 8020	6/6n	0.0061		Đ	Q	1.8	2	0.076	9	9	9	9
Xylenes (s)	EPA 8020	6/6n	0,0061		NEG	NEG	90d	NEG	POS	NEG	NEG	NEG	NEG

"ND" Indicates that the parameter was not detected.

DATACHER ANALYTICAL REPORT Duluth IAP - Soll Samples Second Column Confirmations

Paraneter	Mathod	units	Detection Limit	Field #: Site :	GW2-E 15-16.5 TWO	55-2A TWO	55-2B TWO	SS-2C TWO	B3-A 0-1,5 THREE	B3-A 2.5-4 THREE	B3-A 5-6.5 THREE	83-8 0-1.5 THREE	B3-B 2.5-4 THREE
Purgeable Arcmatics (cont.) Benzane (†)	EPA 8020 EPA 8020 FPA 8020	6∕bn €∕6n	MD. 0,0013 0,0013		N ND N EG	ND NEG	NEG	NEG	NEC NO	NEC	ND	NEC	N N N
· Benzene (s) Chiorobenzene (f) Chiorobenzene (s)	EPA 8020 EPA 8020	6/6n 6/6n	0.0018 0.0018		Q 99N	NEG	NEG	NEG	ND	NEG	Q S S	9 89 9	
1,2-Dichiorobenzene (†) 1.2-Dichiorobenzene (5)	EPA 8020 EPA 8020	5/6n 5/6n	0_0023 0_023		NEG	ND NEC	NEG N	NEG NG	N N	NEG	2 ²		
1,3-Dichiorobenzene (†)	EPA 8020 EPA 8020	6/6n 6/6n	0_0046 0_0046		NEG	NEG	Q 29	N NO	NEG N	NEG	N N	N NO	NEG
1, 4-Dichlorobenzene (f) 1, 4-Dichlorobenzene (f) 1, 4-Dichlorobenzene (s)	EPA 8020 EPA 8020	6/6n 6/6n	0,0022 0,0022		NO	ND	NEG	N NO	NEG	NEG	NEG N	Q H	NEG NEG
Ethylbenzene (f) Ethylbenzene (f)	EPA 8020 EPA 8020	5/6n 5/6n	0,0038 0,0036		NEG	N NO	N EC	NEC	0. 16 NEG	NEG	Q BU	NEG N	NEG
Toluene (f) Toluene (s)	EPA 8020 EPA 8020	6/6n 6/6n	0_0032 0_0032		ND	NEG	0.018 POS	ND	0,018 POS	NEG ND	NEC NO	NEG	N N N
Xylenes (f) Xylenes (s)	EPA 8020 EPA 8020	6/6n 6/6n	0,0061 0,0061		ND	NEG	NEC	ND	0.057 POS	0.73 POS	0.47 POS	QN 2BN	NEG

"ND" indicates that the parameter was not detected.

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### Dututh IAP - Soli Samples Second Column Confirmations

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					B <b>3-</b> B	B3-C	B <b>3-</b> C	8 <b>3-</b> C	<b>B</b> 3C	GW3-A	GM3B	G-13-D	
Parameter	Me thod	Units	Detection Limit	Fleid#: Site :	5-6.5 THREE	0-1.5 THREE	2.5-4 THREE	5-6.5 THREE	5-6.5 THREE	5-6.5 THREE	5-6.5 THREE	5-6.5 THREE	SS-3A THREE
Purgesble Arcmatics (cont.)	EPA 8020	6/6n	Ū¥										
Benzene (f)	EPA 8020	6/6n	0,0013		9	9	Q	2	Q	Ð	9	9	9
Benzene (s)	EPA 8020	6/6n	0.0013		NEG								
Chlorobenzene (f)	EPA 8020	6/6n	0,0018		9	9	9	£	2	2	9	Ð	Q
Chlorobenzene (s)	EPA 8020	6/6n	0.0018		NEG								
1,2-Dichlorobenzene (f)	EPA 8020	6/6n	0.0023		9	9	2	9	2	9	9	9	9
1,2-Dichlorobenzene (s)	EPA 8020	6/6n	0,0023		NEG								
1,3-Dichlorobenzene (f)	EPA 8020	6/6n	0.0046		9	2	9	9	9	2	9	9	2
1,3-Dichlorobenzene (s)	EPA 8020	6/6n	0.0046		NEG								
1,4-Dichlorobenzene (f)	EPA 8020	6/6n	0,0022		Ŷ	2	<del>Q</del>	2	9	9	9	9	£
1,4-Dichlorobenzene (s)	EPA 8020	6/6n	0,0022		NEG								
Ethylbonzone (f)	EPA 8020	6/6n	0.0038		9	Ð	9	Ŷ	9	9	9	9	9
Ethylbenzene (s)	EPA 8020	6/6n	0,0038		NEG								
Toluene (f)	EPA 8020	6/6n	0,0032		2	Ð	9	9	Q	ą	9	2	0.014
Toluence (s)	EPA 8020	6/6n	0.0032		NEG	POS							
Xvlenes (f)	EPA 8020	p/pu	0,0061		9	9	<del>2</del>	£	2	ę	9	9	9
Xylenes (s)	EPA 8020	6/6n	0,0061		NEG								

L REPORT	Samples	irmation:
DATACHEN MULTTICAL REPORT	Duluth IAP ~ Soll Samples	Second Column Confirmation:

THEN MINILYTICAL REPORT	th IAP - Soll Samples	d Column Confirmations
TWW MAK	th IAP -	d Column

Parameter	Me thod	units	Detection Limit	Field #: Site :	SS-38 THREE	SS-3C THREE	84-C 2.5-4 FOUR	B4-C 5-6.5 FOUR	B4-C 7.5-9 FOUR	84-D 2.5-4 FOUR	84-D 5-6.5 FOUR	B4-D 7.5-9 FOUR	84-E 2,5-4 FOUR
Purgeble Arcmatics (cont.) Benzene (†) Penzme (s)	EPA 8020 EPA 8020 EPA 8020	6/6n 6/6n	MGL 0,0013 0,0013		NEG N	ND	NEG	NEG NEG	ND	NEG	NEG	Q Se	NEG
Chi orobenzene (f) Chi orobenzene (s)	EPA 8020 EPA 8020	6/6n 6/6n	0_0013 0_018		NEG	ND	NEG	N NO	NEC N	ND	NEG	Q Sa N	NEG N
, 2-Dichiorobenzene (f) 1, 2-Dichiorobenzene (f)	EPA 8020 EPA 8020	6/6n 6/6n	0,0023 0,0023		NEG	NEG	NEC	NEG	NEG N	NEG	9 92 V		
1,3-Dichlorobenzene (†) 1,3-Dichlorobenzene (s)	EPA 8020 EPA 8020	6/6n 6/6n	0,0046 0,0046		NEG	NEG NO	NEG ND	N S	N NO	N SE	C S		NEG
1,4-Dichlarobenzene (f) 1,4-Dichlorobenzene (s)	EPA 8020 EPA 8020	6/6n 6/6n	0,0022 0,0022		NEC N	NEG	N RO	NEG N	NEC N	NEC N	N N		N N N
Ethylbenzene (†) Ethylbenzene (s)	EPA 8020 EPA 8020	6/6n 6/6n	0_0038 0_0038		ND	ND NEC	NEG	N N	NEG	NEG N	e e	N B	N N N
Toluene (†) Toluene (s)	EPA 8020 EPA 8020	6∕6n 6∕6n	0 <b>.</b> 0032 0 <b>.</b> 0032		N NO	ND	ND	ND	NEC	N N	N N N	Q X	
Xylenes (f) Xylenes (s)	EPA 8020 EPA 8020	6/6n 6/6n	0_0061 0_0061		NEC N	ND	ND NEC	NEG N	N RG	Q Sev	S S	2 82	NEG

"ND" indicates that the parameter was not detected.

li-172

Page 172

**DATACHEM ANALYTICAL REPORT** Duluth IAP - Soil Samples Second Column Confirmations

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					84-E 5 4 5	GW4-A	GM4-B	GW4-C	GM4-D	84-A	B4=A	84-A	84-8 2 5 4
Parometer	Me thod	Units	Limit	Site :	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR
Purgesble Arcmatics (cont.)	EPA 8020	6/6n	MGL										
Benzene (†)	EPA 8020	5/6n	0,0013		9	9	9	9	Ð	9	9	9	1.6
Benzene (s)	EPA 8020	6/6n	0,0013		NEG	NEG	NEG	NEG	NEC	NEG	NEG	NEG	POS
Chiorobenzene (f)	EPA 8020	6∕bn	0,0018		9	2	9	9	9	Ð	2	2	£
Chiorobenzene (s)	EPA 8020	6/6n	0.0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichlarobenzene (f)	EPA 8020	6/6n	0,0023		9	9	2	9	9	9	9	9	2
1,2-Dichlorobenzene (s)	EPA 8020	6/6n	0,0023		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,3-Dichlorobenzene (f)	EPA 8020	6/6n	0,0046		9	9	9	2	Ð	9	2	9	9
1, 3-Dichlarobenzene (s)	EPA 8020	6/6n	0.0046		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,4-Dichtorobenzene (f)	EPA 8020	6∕bn	0.0022		9	9	QN	9	Ð	9	9	9	9
1,4-Dichlorobenzene (s)	EPA 8020	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Ethylbenzene (f)	EPA 8020	ɓ∕ɓn	0,0038		9	9	9	9	9	9	9	£	3.2
Ethyibenzene (s)	EPA 8020	6/6n	0,0038		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	POS
Tolunane (f)	EPA 8020	6∕bn	0.0032		9	9	9	9	2	2	2	6600*0	6 <b>.</b> 4
Toluene (s)	EPA 8020	6/6n	0,0032		NEG	NEG	NEG	NEG	NEG	NEG	NEG	POS	POS
Xylenes (f)	EPA 8020 .	6/6n	0.0061		9	ę	9	9	9	9	9	0.21	82.
Xylenes (s)	EPA 8020	<b>b/b</b> n	0,0061		NEG	NEG	NEG	NEG	NEG	NEG	NEG	POS	POS

"ND" indicates that the parameter was not detected.

Hage 174

DATACHEN MALYTICAL REPORT Duluth 1AP - Soll Samples Second Column Confirmations

					B4-B	8 <b>4</b> -8					GW5-A	GW5-13
			Detection	Field #:	5-6.5	7.5-11.5	SS-4A	SS-4B	SS-4C	SS-40	5-6.5	9.5-11
Parateter	Method	Un 1 + 5	Limit	Site :	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FIVE	FIVE
Purgesble Arometics (cont.)	EPA 8020	6/6n	đ									
Benzene (f)	EPA 8020	6/6n	0,0013		9	9	9	6 <b>.</b> 8	Q	0.86	9	ę
Benzene (s)	EPA 8020	6/6n	0,0013		NEG	NEG	NEG	POS	NEG	POS	NEG	NEG
Chiorobenzene (1)	EPA 8020	6/6n	0,0018		ð	9	2	ହ	Q	9	Ð	Ŷ
Chiorobenzene (s)	EPA 8020	6/6n	0,0018		NEG	NEG	NEG	N EC	NBC	NEG	NEG	NEG
1,2-Dichlorobenzene (f)	EPA 8020	6/6n	0,0023		2	9	ð	ହ	2	9	2	9
1,2-Dichtorobenzene (s)	EPA 8020	5/6n	0,0025		NEG	NEG	NBC	NEG	NBG	NEG	NEG	NEG
1,3-01ch1 crobenzene (1)	EPA 8020	6/6n	0,0046		9	9	9	Ŷ	2	9	2	2
1,3-Dichlorobenzene (s)	EPA 8020	5/6n	0,0046		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,4-Dichlorobenzene (1)	EPA 8020	6/6n	0,0022		9	2	QN	9	9	2	2	9
1,4-Dichlorobenzene (s)	EPA 8020	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Ethylbenzene (f)	EPA 8020	6/6n	0,0038		2	Ð	9	170	Ŷ	9	9	9
Ethylbenzene (s)	EPA 8020	<b>ð/</b> ðn	0.0038		NEG	NEG	NEG	904 204	NEG	NEG	NEG	NEG
Totuene (f)	EPA 8020	6/6n	0,0032		3.5	0.011	9	21.	2.4	3,5	9	0,0075
Toluene (s)	EPA 8020	6/6n	0,0032		POS	POS	NEG	POS	POS	POS	NEG	POS
Xylenes (f)	<b>BA 8020</b>	6/bn	0,0061		30 <b>.</b>	0,087	9	15.	4.9		2	9
Xylenes (s)	EPA 8020	6/6n	0.0061		POS	50d	NEG	POS	POS	POS	NEG	NEG

H-174

"MD" indicates that the parameter was not detected.

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### DATACHBA ANALYTICAL REPORT Duluth IAP - Soli Samples Second Column Confirmations

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					GW5-C						B6-A	₽-98	8 8
			Detection	Field #:	10-11.5	SS-5A	SS-58	SS-5C	SS-50	5S-5E	0-1-5	2.5-4	0-1-5
Parameter	Method	Un its	Limit	Site :	FIVE	FIVE	FIVE	FIVE	FIVE	FIVE	SIX	SIX	SIX
Purgeable Aromatics (cont.)	EPA 8020	6/6n	Ū,										
Benzene (f)	EPA 8020	6/bn	0,0013		9	9	9	Q	9	2	9	9	Đ
Benzene (s)	EPA 8020	6/6n	0,0013		NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG	NEG
Chlorobenzene (+)	EPA 8020	b/bn	0,0018		9	2	9	9	Q	9	9	2	9
Chiorobenzene (s)	EPA 8020	6/6n	0,0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichioropenzene (1)	EPA 8020	6/6n	0,0023		2	Ŷ	9	9	9	9	9	9	Ð
1,2-Dichiorobenzene (s)	EPA 8020	6/6n	0,0023		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,3-Dichlorobenzene (1)	EPA 8020	6/6n	0,0046		9	₽	9	2	Ð	Ð	9	9	Ŷ
1, 3-Dichlorobenzene (s)	EPA 8020	6/6n			NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,4-Dichiorobenzene (f)	EPA 8020	6/6n	0,0022		9	9	9	9	9	2	9	2	9
1,4-Dichiorobenzene (s)	EPA 8020	6/6n			NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Ethylbenzene (f)	EPA 8020	6/6n	0,0038		9	9	Q	0.045	0.012	0.031	2	9	2
Ethylbenzene (s)	EPA 8020	6/6n	0°0038		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Toluene (f)	EPA 8020	6/6n	0.0032		9	0.012	9	9	Đ	9	Ŷ	Q	9
Toluene (s)	EPA 8020	6/6n	0,0032		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Xylenes (f)	EPA 8020	6/6n	0.0061		9	0,063	9	Q	<del>Q</del>	0.025	2	2	9
Xylenes (s)	EPA 8020	6/6n	0,0061		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

# "NO" indicates that the parameter was not detected.

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DATACHEM ANALYTICAL REPORT Duluth 1AP - Soll Samples Second Column Confirmations

Parameter	Me thod	un its	Detection Limit	Field #: Site :	86-8 2.5-4 SIX	B7-A 0-1.5 SEVEN	87-A 2.5-4 SEVEN	B7-B 0-1.5 SEVEN	B7-B 2.5-4 SEVEN	GW7-A 10-11.5 SEVEN	GW7-B 10-11.5 SEVEN	GW7-C 15-16.5 SEVEN	SS-7A* SEVEN
<u>Purgeable Aromatics</u> (cont.) Benzene (†) Benzene (s)	EPA 8020 EPA 8020 EPA 8020	6/6n 6/6n 6/6n	MDL 0.0013 0.0013		ND	ND	N EG	ND	NEC	N EG N	Q S	N NO	ND
Chlorobenzene (f) Chlorobenzene (s)	EPA 8020 EPA 8020	€,/6n 6,∕6n	0.0018 0.0018		NEG	NEG	ND	ND	N N	ND	NEG	NEC	NEG N
1,2-Dichiorobenzene (f) 1,2-Dichiorobenzene (s)	EPA 8020 EPA 8020	6/6n 6/6n	0 <b>.</b> 0023 0 <b>.</b> 0023		NEC NO	ND	NEG	ND	NEG	NEG NEG	N NO	ND NEG	NEG
1,3-01ch1 arobenzene(f) 1,3-01ch1 orobenzene(s)	EPA 8020 EPA 8020	6/6n 5/bn	0,0046 0,0046		NEG	ND NEG	ND	NEG	ND	N N	NEG	ND NEG	ND NEG
1,4-Dichiorobenzene (f) 1,4-Dichiorobenzene (s)	EPA 8020 EPA 8020	5/6n 6/6n	0 <b>.</b> 0022 0 <b>.</b> 0022		ND	ND	NEG	ND	NEG	N N	N NO	ND NEG	NEG
Ethylbenzene (f) Ethylbenzene (s)	EPA 8020 EPA 8020	6/6n 6/6n	0_0038 0_038		N NG	NO	ND NEG	ND	NEG N	N NE	ND	NEG NEG	NEG
Toluente (∱) Toluente (s)	EPA 8020 EPA 8020	6∕6n 6∕6n	0_0132 0_032		ND NEC	UN NEG	ND	ND	NEG	ND	NEG	NEG N	NEG
Xylenes (f) Xylenes (s)	EPA 8020 EPA 8020	6/6n 6/6n	0_0061 0_0061		NEC	ND	NEG	NEC NO	NEC	NEG	N N N	NEG	NEG

* Revised 07/10/87

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### DATACHEM ANALYTICAL REPORT Duluth IAP - Soil Semples Second Column Confirmations

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			Detection	Field #:	B8-A 0-1-5	88-A 2,5-4	B8-A 5-6.5	88-8 0-1.5	B8-8 2.5-4	88-8 5-6.5	5-6.5	GW8-B 10-11.5	GW8-C 10-11-5
Par ano Tor	Me thod	Un 175		51 76 :		H CH	EGH	FIGHT		EIGHT	EGHI	EIGHT	EIGHI
Purgeable Aromatics (cont.)	EPA 8020	6/6n	MD										
Benzene (†)	EPA 8020	6/6n	0.0013		QN	9	9	9	<del>Q</del>	9	9	9	9
Benzene (s)	EPA 8020	6/6n	0.0013		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chiorobanzana (†)	EPA 8020	6/6n	0.0018		2	9	£	9	9	9	9	9	Q
Chlorobenzene (s)	EPA 8020	6/6n	0.0018		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichlorobenzene (f)	EPA 8020	6/6n	0.0023		9	9	9	9	9	₽	9	9	9
1,2-Dichlorobenzene (s)	EPA 8020	6/6n	0,0023		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,3-D1ch1 or obenzene (f)	EPA 8020	6/6n	0.0046		9	9	9	2	₽	9	9	9	9
1,3-Dichlorobenzene (s)	EPA 8020	6/6n	0.0046		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,4-Dichlorobenzene (f)	EPA 8020	6/6n	0.0022		9	9	9	9	9	2	9	9	9
1,4-Dichlorobenzene (s)	EPA 8020	6/6n	0,0022		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Ethylbenzene (f)	EPA 8020	₿/ɓn	0.0038		9	9	9	2	9	9	9	ę	9
Ethylbenzene (s)	EPA 8020	6/6n	0,0038		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Totuene (f)	EPA 8020	6/6n	0.0032		9	9	9	9	9	₽	9	9	9
Toluene (s)	EPA 8020	6/6n	0.0032		NEG	NEG	NBC	NEG	NEG	NEG	NEG	NEG	NEG
Xylenes (f)	EPA 8020	6/6n	0.0061		9	QN	9	9	9	9	9	₽	Ð
Xylenes (s)	EPA 8020	6/6n	0,0061		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

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# DATACHEN ANALYTICAL REPORT Duiuth IAP - Soil Samples Second Column Confirmations

Par ameter	Mathod	Units	Detection Limit	Field #: Site :	SS-8A* E1GHT	55-88* E1 GHT
Purgeable Arcmatics (cont.)	EPA 8020	6/6n	MDL		9	2
Benzene (†) Benzene (s)	EPA 8020 EPA 8020	6/6n 6/6n	0,0013 0,0013		NEG	NEG
Chiorobenzene (f) Chiorobenzene (s)	EPA 8020 EPA 8020	6/6n 6/6n	0.0018 0.0018		ND	ND
1,2-Dichlorobenzene (†) 1,2-Dichlorobenzene (s)	EPA 8020 EPA 8020	6/6n 6/6n	0,0023 0,0023		ND NEC	ND
1,3-Dichlorobenzene (†) 1,3-Dichlorobenzene (\$)	EPA 8020 EPA 8020	6/6n 6/6n	0,0046 0,0046		NEC	ND
1,4-Dichiorobenzene (f) 1,4-Dichiorobenzene (s)	EPA 8020 EPA 8020	6/6n 6/6n	0,0022 0,0022		NEG	ND
Ethylbenzene (f) Ethylbenzene (s)	EPA 8020 EPA 8020	6/6n 6/6n	0.0038 0.0038		NEG	ND NEG
Toluene (†) Toluene (s)	ЕРА 8020 ЕРА 8020	6/5n 6/5n	0 <b>.</b> 0032 0 <b>.</b> 0032		ND	9.4 POS
Xylenes (f) Xylenes (s)	EPA 8020 EPA 8020	6/6n 6/6n	0,0061 0,0061		ND ND	ND NEG

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* Revised 07/10/87

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"ND" indicates that the parameter was not detected.

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# DATACHEM ANALYTICAL REPORT Duluth IAP - Soll Samples Second Column Confirmations

					B1-A	B1-A	B1-A	GW1-A	GW1-B	GW1-E		
			Detection	Field #:	0-1-5	2-5.4	5-6.5	10-11.5	5-6.5	20-21.5	SS-1A	SS-18
Parameter	Mathod	Uh its	Limit	Site :	ONE	ONE	ONE	ONE	ONE	ONE	ONE	ONE
Pestic Ides	EPA 3550/8080	6/6n	MDL									
Aldrin (f)	EPA 3550/8080	6/6n	0.002		9	Q	9	Ð	9	9	9	9
Aldrin (s)	EPA 3550/8080	6/6n	0.002		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
a Iph <del>a-</del> BHC(f)	EPA 3550/8080	6/6n	0,0008		9	Q	9	9	9	2	9	9
alpha-BHC (s)	EPA 3550/8080	6/6n	0,0008		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
beta-BHC (f)	EPA 3550/8080	6/bn	0,0002		9	9	9	9	2	9	9	9
beta-BHC (s)	EPA 3550/8080	6/6n	0_0002		NEG	NEG	NEG	NBC	NEG	NEG	NEG	NEG
del t <del>a</del> -BHC (f)	EPA 3550/8080	6/6n	0,0006		9	9	9	Q	9	2	2	9
deita-BHC (s)	EPA 3550/8080	6/6n	0,0006		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Lindane (f)	EPA 3550/8080	6/6n	0,003		9	9	9	9	9	9	9	9
Lindane (s)	EPA 3550/8080	6/6n	0,003		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Ch1 ordane (f)	EPA 3550/8080	6∕6n	0,05		2	9	Q	9	Ŷ	9	9	9
Chiordane (s)	EPA 3550/3080	6/6n	0,05		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
4,41-000 (1)	EPA 3550/8080	6/bn	0.0004		9	0.02	0,002	9	Q	Q	2	9
4,4'-000 (s)	EPA 3550/8080	6/6n	0*0004		NEG	POS	NEG	NEG	NEG	NEG	NEG	NEG
4,4'-D0E (f)	EPA 3550/8080	6/6n .	0,007		Q	0.02	9	Ð	9	£	9	9
4,4'00E (s)	EPA 3550/8080	6/6n	0.007		NEG	POS	NEG	NEG	NEG	NEG	NEG	NEG
4,4'-DOT (f)	EPA 3550/8080	6∕6n	0.004		9	0,02	9	9	2	9	9	Đ
4,4'-DDT (s)	EPA 3550/8080	6/6n	0.004		NEG	P05	NEG	NEG	NEG	NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

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DATACHEM ANALYTICAL REPORT Dufuth IAP - Soli Samples Second Column Contirmations

83-C 5-6.5 THREE	ND	N ND NEC		SO4	NEG	Q S S	NEG 0.008	POS 0.02	NEG
83-C 2,5-4 THREE	QN NBN	<b>N N N</b>		0*0000	<b>9</b> 9	Q SH I	2 ²² 2	NEG 0,09	POS
83-C 0-1.5 THREE	N NO	N SB N	n Si	0.006 NEG	NEG.	N N N	9 ⁶³ 9	NEG	POS
83-8 5-6.5 THREE	NEG	ND NEC	N N NEC	N NEC	NEC ND	NEG	0,004 NEG	Nec 2	N N N
83-8 2,5-4 THREE	NEC	NEG	N NO	N N N	NEC	NEG	2.1 POS	NEG	2 9
83-8 0-1.5 THREE	NEG	N NO	NEC N	NEG	N RG	ND SBN	0 <b>.</b> 41 POS	NEG	0°0
B3-A 5-6.5 THREE	N NO	NEG	NEC	NEG	NEC	N N	NEG	NEG N	0.008 NEG
83-A 2,5-4 THREE	NEG N	N N	NEG	NEG NO	N EG	NEG NEG	0.09 NEG	NEG	Q Y
83-A 0-1.5 THREE	N PO	N RO	NEC N	N N	NEG	NEG	QN NEG	ND	0.01 POS
Fleid #: Site :									
Detection Limit	M0. 0,002 0.002	0, 0008 0, 0008	0,0002 0,0002	0,0006 0,0006	0,005 0,005	0°05 0°05	0,0004 0,0004	0 <b>,</b> 007 0 <b>,</b> 007	0,004 0,004
un its	6/6n 6/6n	5/5n 5/5n	6/6n 6/6n	6/6n 5/6n	5/6n 5/5n	6/6n 6/6n	6/6n 6/6n	6/6n 6/6n	6/6n 6/6n
He thod	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080
Par de otor	Pesticides (cont.) Aidrin (f)	Aldrin (s) aiph <del>a</del> -BHC (f) alcha-BHC (s)	betæ-BHC (†) hata-BHC (s)	delte-BHC (f) delta-BHC (s)	Lindane (†)	Lincene (s) Chiordane (f) Chiordane (s)	4,4'-D00 (f) 4,4'-D00 (s)	4,4'-00E (f) 4,4'-00E (s)	4,4'-DOT (f) 4,4'-DOT (s)

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"ND" indicates that the parameter was not detected.

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DATACHEM ANALYTICAL REPORT Duluth IAP - Soll Samples Second Column Confirmations

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					BC-3	GW3-A	GW3-B	GW3-D			
			Detection	Field #:	5-6.5	5-6.5	5-6.5	5-6.5	SS-3A	SS-3B	SS-3C
Par ameter	Method	Units	Limit	SIte :	THREE	THREE	THREE	THREE	THREE	THREE	THREE
Pesticides (cont.)	EPA 3550/8080	6/6n	MDL								
Aldrin (f)	EPA 3550/8080	6/6n	0,002		9	9	9	9	£	2	9
Aidrin (s)	EPA 3550/8080	6/6n	0,002		NEG						
a Ipha-BHC (f)	EPA 3550/8080	6/6n	0,0008		2	Q	9	2	2	9	2
alpha-BHC (s)	EPA 3550/8080	6/6n	0,0008		NEG						
beta-BHC (1)	EPA 3550/8080	6/6n	0.0002		2	0.02	Ð	9	9	Ð	9
bet <del>a-B</del> HC (s)	EPA 3550/8080	6/6n	0,0002		NEG						
del ta-BHC (f)	EPA 3550/8080	6/bn	0,0006		9	0.002	₽	9	9	9	2
delta-BHC (s)	EPA 3550/8080	6/6n	0,0006		NEG	POS	NEG	NEG	NEG	NEG	NEG
Lindane (f)	EPA 3550/8080	6/bn	0°003		2	9	9	Ð	Q	2	2
Lindane (s)	EPA 3550/8080	6/6n	0,003		NEG						
Chilordane (f)	EA 3550/8080	6/6n	0.05		9	9	9	9	Ð	Ð	9
Chlordane (s)	EPA 3550/8080	6/6n	0,05		NEG						
4,41-000 (f)	EPA 3550/8080	6/6n	0,0004		0,003	9	Q	9	₽	9	9
4,4'-DOD (s)	EPA 3550/8080	6/6n	0,0004		POS	NEG	NEG	NEG	NEG	NEG	NEG
4,41-006 (1)	EPA 3550/8080	6∕6n	0,007		9	0,02	9	2	2	9	₽
4,4'-DDE (s)	EPA 3550/8080	6/6n	0,007		NEG	POS	NEG	NEG	NEG	NEG	NEG
4,4'-DOT (f)	EPA 3550/8080	6/6n	0,004		0,06	0.04	2	0.007	9	9	9
4,4'-DOT (s)	EPA 3550/8080	6/6n	0.004		POS	POS	NEG	POS	NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

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### DATACHEM ANALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

		4	Detection	Fleid #:	GW5-A 5-6.5 5105	GW5-B 9.5-11	GW5-C 10-11.5 5145	SS-5A	SS-5B	SS-5C	SS-5D	SS-5E
	DOVI L BW	St III				LIVE						
Pesticides (cont.)	EPA 3550/8080	6/6n	MDL									
Aldrin (f)	EPA 3550/8080	6/6n	0.002		9	9	9	9	9	9	2	Q
Aldrin (s)	EPA 3550/8080	6/6n	0,002		NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG
alpha-BHC (f)	EPA 3550/8080	6/6n	0,0008		9	9	9	9	Ð	9	9	Ð
al pha-BHC (s)	EPA 3550/8080	6/6n	0,0008		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
beta-BHC (f)	EPA 3550/8080	6/6n	0,0002		9	9	9	9	0•06	₽	Q	9
beta-BHC (s)	EPA 3550/8080	ɓ∕ɓn	0,0002		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
del ta-BHC (f)	EPA 3550/8080	6/6n	0,0006		0.02	9	Ð	9	9	9	9	9
delta-BHC (s)	EPA 3550/8080	6/6n	0,0006		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Lindane (f)	EPA 3550/8080	6/6n	0,003		9	9	9	Q	2	9	9	9
Lindane (s)	EPA 3550/8080	₿/ɓn	0-003		NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG
Chlordane (f)	EPA 3550/8080	₿/ɓn	0.05		Q	2	9	Q	9	9	9	9
Chlordane (s)	EPA 3550/8080	ɓ∕ɓn	0.05		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
4,41~000 (f)	EPA 3550/8080	6/6n	0.0004		9	9	Q	9	QN	Ŷ	Ð	9
4,41-000 (s)	EPA 3550/8080	₿/ɓn	0.0004		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
4,41-DDE (f)	EPA 3550/8080	₿/ɓn	0,007		9	9	9	9	9	Q	9	Ŷ
4,41-0DE (s)	EPA 3550/8080	6/6n	0,007		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
4,4'-00T (f)	EPA 3550/8080	6/6n	0.004		Q	0.07	9	9	Ð	* 9	0.004*	0,07*
4,4'-DDT (s)	EPA 3550/8080	₿/ɓn	0.004		NEG	POS	NEG	NEG	NEG	NEG*	POS	FOS*

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"ND" indicates that the parameter was not detected.

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DATACHEM ANALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

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Parameter	Me thod	Un its	Detection Limit	Field #: Site :	0-1.5 SEVEN	2.5-4 SEVEN	0-1.5 SEVEN	2.5-4 SEVEN	10-11.5 SEVEN	10-11.5 SEVEN	15-16.5 SEVEN	SS-7A* SEVEN
Pesticides (cont.)	EPA 3550/8080	6/6n	MDL									
Aldrin (f)	EPA 3550/8080	6/6n	0.002		9	Đ	2	Q	9	9	9	9
Aldrin (s)	EPA 3550/8080	6/6n	0.002		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
alpho-BHC (f)	EPA 3550/8080	6/6n	0,0008		9	9	Q.	9	9	9	9	9
al pha-BHC (s)	EPA 3550/8080	6/6n	0.0008		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
beta-BHC (f)	EPA 3550/8080	6∕6n	0,0002		Q	9	9	9	9	9	9	9
beta-BHC (s)	EPA 3550/8080	6/6n	0.0002		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
deita-BHC (f)	EPA 3550/8080	6/6n	0,0006		Ŷ	Q	9	Q	9	2	Q	9
delta-BHC (s)	EPA 3550/8080	6/6n	0_0006		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Lindane (f)	EPA 3550/8080	6/6n	0,003		Q	9	Ŷ	2	9	Q	2	9
Lindane (s)	EPA 3550/8080	6/ôn	0.003		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chlordane (f)	EPA 3550/8080	6/6n	0.05		Ð	2	9	2	9	9	9	9
Chlordane (s)	EPA 3550/8080	6/6n	0.05		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
4,41-DDD (f)	EPA 3550/8080	6/6n	0.0004		Q	9	9	Ŷ	Q	Q	9	9
4,4'-DDD (s)	EPA 3550/8080	6/6n	0*0004		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
4,41-DDE (f)	EPA 3550/8080	6∕6n	0,007		2	9	9	9	9	9	9	2
4,4'-DDE (s)	EPA 3550/8080	6/6n	0,007		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
4 "41-DDT (†)	EPA 3550/8080	6/6n	0.004		9	9	9	9	9	9	9	9
4,4'-DDT (s)	EPA 3550/8080	6/6n	0.004		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

* Revised 07/10/87

Н-183

		B8→			8 <b>8-</b> 8	99 88	ዋ 88	GW8-A	GM8-B	
	Detection	Field #: 0-1.5			0-1-5	2.5-4	5-6,5	5-6.5	10-11.5	10-11.5
Un its	Limit	Site : EIG	II EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT
EPA 3550/8080 ug/g	MQ									
	0,002	9		Ŷ	9	9	9	9	9	9
	0,002	NEC	-	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	0,0008	2		9	9	2	2	2	£	9
	0,0008	NEG		NEG	NEG	NEG	NEG	NBG	NEG	NEG
	0,0002	9		0,001	Q	9	2	9	9	9
	0,0002	NEG	-	NEG	NEG	NEG	NEG	NBC	NEG	NEG
	0*0006	0*00		£	9	9	2	9	2	9
	0*0006	NEG		NEG	NEG	NEG	NEG	NBG	NEG	NEG
	0,003	9		9	9	9	9	9	2	9
	0,003	NEG		NEG	NEG	NEG	NEG	NEG	NEG	NEG
	0.05	Ŷ		Q	9	2	2	2	9	9
	0,05	NEG		NEG	NEG	NEG	NEG	NEG	NEG	NEG
	0,0004	9		9	0*006	9	2	9	9	9
_	0,0004	NEG		NEG	POS	NEG	NEG	NBC	NEG	NEG
80 ng/g	0,007	9		9	0.007	9	9	9	Đ	Ŷ
5/5n 08	0,007	NEG		NEG	POS	NEG	NEG	NEC	NEG	NEG
80 ng/g	0,004	0*00		9	<del>Q</del>	Û	2	9	9	Q
6/6n 08	0.004	NEG		NEG	NEG	NEG	NEG	NEC	NEG	NEG
	EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550/8080       ug/g         EPA       3550	6/67 6/67 6/67 6/67 6/67 6/67 6/67 7 7 7	ug/g 0.002 ug/g 0.002 ug/g 0.0008 ug/g 0.0008 ug/g 0.0006 ug/g 0.0006 ug/g 0.003 ug/g 0.003 ug/g 0.003 ug/g 0.003 ug/g 0.0004 ug/g 0.0004 ug/g 0.0004 ug/g 0.0004	ug/g       0.002       ND         ug/g       0.002       ND         ug/g       0.002       ND         ug/g       0.0008       ND         ug/g       0.0008       ND         ug/g       0.0002       ND         ug/g       0.0002       ND         ug/g       0.0002       ND         ug/g       0.0006       0.0004         ug/g       0.0006       0.0004         ug/g       0.0005       ND         ug/g       0.0006       0.0004         ug/g       0.0004       NEG         ug/g       0.0004       NEG	ug/g         0.002         ND         ND         ND           ug/g         0.002         0.002         NEG         NEG         NEG           ug/g         0.0008         ND         ND         ND         ND           ug/g         0.0008         NEG         NEG         NEG         NEG           ug/g         0.0002         ND         ND         ND         ND           ug/g         0.0002         NEG         NEG         NEG         NEG           ug/g         0.0006         0.0004         ND         ND         ND           ug/g         0.0003         NEG         NEG         NEG         NEG           ug/g         0.0003         ND         ND         ND         ND         ND           ug/g         0.0004         ND         NEG         NEG         NEG         NEG           ug/g         0.0004         ND         ND         ND         ND         ND           ug/g         0.0004         ND         NEG         NEG         NEG         NEG           ug/g         0.0004         ND         NEG         NEG         NEG         NEG           ug/g         0.00	ug/g         0.002         ND         ND         ND           ug/g         0.002         0.006         ND         ND         ND           ug/g         0.0008         0.0008         ND         ND         ND           ug/g         0.0008         ND         ND         ND         ND           ug/g         0.0008         ND         ND         ND         ND           ug/g         0.0008         ND         ND         ND         ND           ug/g         0.0002         ND         ND         ND         ND           ug/g         0.0006         0.0006         ND         ND         ND           ug/g         0.0006         ND         ND         ND         ND           ug/g	ug/g         0.002         ND         ND         ND         ND           ug/g         0.002         0.006         ND         ND         ND         ND           ug/g         0.0008         0.0008         ND         ND         ND         ND           ug/g         0.0008         0.0008         ND         ND         ND         ND           ug/g         0.0008         0.0002         ND         ND         ND         ND           ug/g         0.0002         0.0006         0.0006         ND         ND         ND           ug/g         0.0002         0.0006         ND         ND         ND         ND           ug/g         0.0006         0.0006         ND         ND         ND         ND           ug/g	wg/g         0,002         ND         ND <t< th=""><th>ug/g         0.002         ND         <t< th=""><th>wg/g         0.002         ND         <t< th=""></t<></th></t<></th></t<>	ug/g         0.002         ND         ND <t< th=""><th>wg/g         0.002         ND         <t< th=""></t<></th></t<>	wg/g         0.002         ND         ND <t< th=""></t<>

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DATACHEN ANALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

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Page 184

"ND" indicates that the parameter was not detected.

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MALYTICAL REPORT	∪uluth IAP ∽ Soil Samples	Second Column Confirmations
DATACHBH ANAL	∪uluth IAP -	Second Column

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Par ameter	Met hod	Units	Detection Limit	Fleid#: Site :	SS-8A* E1GHT	SS-8B* EI GHT
Pesticides (cont.)	EPA 3550/8080	6,⁄6n	MDL			
Aldrin (f)	EPA 3550/8080	6/6n	0,002		2	CN N
Aldrin (s)	EPA 3550/8080	5/6n	0,002		NEG	NEG
al pha-BHC (f)	EPA 3550/8080	6/6n	0,0008		(P	QN
a i pna-BHC (S)	EPA 3550/8080	6/6n	0,0008		NEG	NEG
beta-BHC (f)	EPA 3550/8080	6/6n	0,0002		Ş	0 12
bet <del>a-BHC</del> (s)	EPA 3550/8080	6/6n	0.0002		NEG	NEG
delta-BHC (f)	EPA 3550/8080	b/bn	0,0006		100.0	Û
delta-BHC (s)	EPA 3550/8080	6/6n	0,0006		POS	NEG
Lindane (†)	EPA 3550/8080	6/6n	0,003		Ð	Q
Lindane (s)	EPA 3550/8080	6 <i>/</i> 6n	0.003		NEG	NEG
Chlordane (f)	EPA 3550/8080	6/6n	0,05		9	G
Chiordane (s)	EPA 3550/8080	6 /6n	0.05		NEG	NEG
4,41-D0D (f)	EPA 3550/8080	6/6n	0,0004		ହ	QN
4,4'-UUU (S)	EPA 3550/8080	6/6n	0.0004		NEG	NEG
	EPA 3550/8080	6/6n	0,007		Ð	Q
4,4'-UUE (S)	EPA 3550/8080	6/6n	0.007		NEG	NEG
4,4*-007 (f)	EPA 3550/8080	6/6n	0.004		2	ũ
4,4'-D0T (s)	EPA 3550/8080	6/6n	0.004		NEG	NEG

* Revised 07/10/87

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Duluth IAP - Solf Samples Second Column Confirmations

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					B1-A	81-A	81-A	GW1-A	6-1-19 2	C#1-E	-	01 JJ
Parameter	Me thod	Units		Site :	ONE	one	ONE	ONE	S No	ONE	ONE	ONE
Pesticides (cont.)	EPA 3550/8080	6/6n	Ŋ									
Dieldrin (f)	EPA 3550/8080	6/6n	<b>00°0</b>		0.10	9	9	9	Q	9	9	Q
Dieidrin (s)	EPA 3550/8080	6/6n	0,003		POS	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endosulfan 1 (f)	EPA 3550/8080	6/6n	0,002		2	9	9	9	2	9	9	2
Endosuitan 1 (s)	EPA 3550/8080	6/6n	0,002		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endosultan 11 (f)	EPA 3550/8080	6/6n	0,001		9	9	9	9	9	9	9	9
Endosuifan II (s)	EPA 3550/8080	6/6n	0,001		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endosulfan Sulfate (f)	EPA 3550/8080	6/6n	0,02		9	0•02	2	9	9	9	2	9
Endosultan Sultate (s)	EPA 3550/8080	6/6n	0,02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endrin (f)	EPA 3550/8080	6/6n	0,005		÷	9	2	9	9	9	9	9
Endrin (s)	EPA 3550/8080	6/6n	0,005		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endrin Aidehyde (f)	EPA 3550/8080	6/bn	0,02		2	Q	2	9	9	2	9	Ð
Endrin Aldehyde (s)	EPA 3550/8080	6/6n	0.02		NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
Heptachlor (f)	EPA 3550/8080	6/6n	0.004		9	9	9	9	2	2	9	9
Heptachlor (s)	EPA 3550/8080	6/6n	0°004		NEG	NEG	NEG	NEG	NEG	NEC	NEC	NEG
Heptechlor Epoxide (f)	EPA 3550/8080	6/6n	0,002		9	Ŷ	9	9	9	9	9	9
Heptachior Epoxide (s)	EPA 3550/8080	ɓ∕ɓn	0.002		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Toxaphene (f)	EPA 3550/8080	6/6n	0.14		9	Q	Ð	9	9	9	9	9
Toxaphene (s)	EPA 3550/8080	6/6n	0.14		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

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"ND" indicates that the parameter was not detected.

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## DATACHEM ANALYTICAL REPORT Duluth IAP - Soll Samples Second Column Confirmations

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					B3-A	B3-A	B3-A	B3-B	B <b>3-</b> B	B3-8	B3C	<b>B3-</b> C	B3-C
			Detection	Field #:	0-1-5	2.54	5-6.5	0-1-5	2.5-4	5-6.5	0-1-5	2.5-4	5-6.5
Parameter	Me thod	Un I ts	Limit	Site :	THREE	THREE	THREE	THREE	THREE	THREE	THREE	THREE	THREE
Pesticides (cont.)	EPA 3550/8080	6/6n	MQ										
Dieldrin (f)	EPA 3550/8080	6/6n	0,003		9	9	2	9	Ŷ	9	9	9	9
Dieldrin (s)	EPA 3550/8080	6/6n	0,003		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endosultan ! (f)	EPA 3550/8080	ɓ∕ɓn	0,002		9	Q	0.02	9	9	9	9	9	Ŷ
Endosuitan 1 (s)	EPA 3550/8080	6/6n	0.002		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endosultan 11 (f)	EPA 3550/8080	6/6n	0,001		9	0.05	0,002	Đ	9	Q	<b>600°</b> 0	0,004	0,003
Endosultan II (s)	EPA 3550/8080	6/6n	0,001		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endosulfan Sulfate (f)	EPA 3550/8080	6/6n	0*02		9	Q	9	2	9	2	9	9	9
Endosulfan Sulfate (s)	EPA 3550/8080	6/6n	0,02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endrin (f)	EPA 3550/8080	6/6n	0,005		9	₽	0,002	9	9	9	2	Ŷ	9
Endrin (s)	EPA 3550/8080	6/6n	0*005		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endrin Aldehyde (f)	EPA 3550/8080	6∕6n	0,02		9	2	9	2	2	9	9	9	9
Endrin Aldehyde (s)	EPA 3550/8080	6/6n	0*02		NEC	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Heptachior (f)	EPA 3550/8080	6/6n	0.004		9	9	9	9	9	9	0,001	9	Ð
Heptachlor (s)	EPA 3550/8080	6/6n	0.004		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Heptachlor Epoxide (f)	EPA 3550/8080	6/6n	0,002		9	9	9	9	9	Ŷ	9	2	9
Heptechlor Epoxide (s)	EPA 3550/8080	6/6n	0,002		NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG
Toxaphene (†)	EPA 3550/8080	6/6n	0.14		9	9	9	2	9	9	9	9	9
Toxapiene (s)	EPA 3550/8080	6/6n	0.14		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG

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"NO" indicates that the parameter was not detected.

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Duluth IAP - Soil Samples Second Column Confirmations

					BC-3	GW3-A	GW3-B	GW 3-D			
			Detection	Fleid #:	5-6.5	5-6.5	5-6.5	5-6.5	SS-3A	SS-3B	SS-3C
Par aneter	Mathod	un its	L Imit	Site :	THREE	THREE	THREE	THREE	THREE	THREE	THREE
Pesticides (cont.)	EPA 3550/8080	6/6n	MOL								
Dieldrin (f)	EPA 3550/8080	6/6n	0.003		2	Q	9	9	9	9	9
Dieldrin (s)	EPA 3550/8080	6/6n	0,003		NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endosultan 1 (f)	EPA 3550/8080	6/6n	0*002		9	Ŷ	9	9	2	9	2
Endosulfan I (s)	EPA 3550/8080	6/6n	0,002		NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endosulfan 11 (f)	EPA 3550/8080	6/bn	0,001		2	0,004	Q	9	£	2	2
Endosulfan II (s)	EPA 3550/8080	6/6n	100*0		NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endosultan Sultate (f)	EPA 3550/8080	6/bn	0,02		9	2	Ð	9	0.31	0,06	0*01
Endosultan Sultate (s)	EPA 3550/8080	6/6n	0,02		NEG	NEG	NEG	NEG	POS	POS	NEG
Endrin (f)	EPA 3550/8080	6/5n	0,005		9	9	2	9	9	9	9
Endrin (s)	EPA 3550/8080	6/6n	0*005		NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endrin Aidehyde (†)	EPA 3550/8080	6/6n	0,02		Ð	Q	9	9	2	9	2
Endrin Aidehyde (s)	EPA 355C/8080	6/6n	0,02		NEG	NEG	NEG	NEG	NEC	NEG	NEG
Heptachlor (f)	EPA 3550/8080	6/6n	0,004		9	Ð	Q	9	Ŷ	9	9
Heptachlor (s)	EPA 3550/8080	6/6n	0*004		NEG	NEG	NEG	NEG	NEG	NEG	NEG
Heptachior Epoxide (f)	EPA 3550/8080	6/6n	0,002		9	9	Q	Q	2	9	9
Heptachior Epoxide (s)	EPA 3550/8080	6/6n	0,002		NEG	NEG	NEG	NEG	NEG	NEC	NEG
Toxaphene (f)	EPA 3550/8080	ɓ∕ɓn	0.14		9	QN	9	9	9	9	2
Toxaphene (s)	EPA 3550/8080	6/6n	0.14		NEG	NEG	NEG	NEC	NEG	NEC	NEG

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DATACHBA ANALYFICAL REPORT Duiuth IAP - Soil Samples Second Column Confirmations

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SS-5A SS-5B SS-5C SS-5D SS-5E FIVE FIVE FIVE FIVE	•	ND ND ND ND ND ND NEG NEG NEG NEG	ND ND ND ND ND ND ND NEG NEG NEG	ND ND ND ND ND NEG NEG NEG NEG	ND ND ND ND 0.02 NEG NEG NEG NEG	ND ND ND ND ND ND ND NEG NEG NEG NEG	ND ND ND ND ND ND NEG NEG NEG NEG	ND ND ND ND ND ND NEG NEG NEG NEG	ND ND ND ND ND NEG NEG NEG NEG	
GW5-C 10-11,5 S		N RC N RC	NEG	N EG	Q SI N	QN SBN	QN SBN	ND NEC	N ND	
GW5-B 9,5-11 FIVE		Nec N	NEG	NEG	ND	NEG	NEG	N ND	ND	
GW5-A 5-6.5 FIVE		NEC N	NEG	ND NEG	NEG	N NG	ND NEG	NEG	NEG	
Field #: Site :										
Detection Limit	Ŋ	0 <b>.0</b> 03 0 <b>.0</b> 03	0 <b>.</b> 002 0 <b>.</b> 002	0,001 0,001	0 <b>.</b> 02 0 <b>.</b> 02	0,005 0,005	0 <b>.</b> 02 0 <b>.</b> 02	0.004 0.004	0 <b>.</b> 002 0 <b>.</b> 002	
(h) ts	6/6n	6/6n 6/6n	6/6n 6/6n	6/6n 6/6n	6/6n 6/6n	6/6n 6/6n	6/6n 6/6n	6/6n 5/6n	6/6n 6/6n	
Method	EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	
Par ameter	Pesticides (cont.)	Dieldrin (f) Dieldrin (s)	Endosultan   (f) Endosultan   (s)	Endosulfan II (f) Endosulfan II (s)	Endosuiten Sultate (t) Endosulten Sultate (s)	Endrin (†) Endrin (s)	Endrin Aidehyde (f) Endrin Aidehyde (s)	Heptachlor (f) Heptachlor (s)	Heptachlor Epoxide (f) Heptachlor Epoxide (s)	•

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# DATACHEM AMALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

					87-A	B7-A	87 <del>-</del> 8	B7-B	GW7 -A	GW7-B	GW1-C	
			Detection	Field #:	0-1-5	2.5-4	0-1-5	2.5-4	10-11-5	10-11.5	15-16.5	SS-7A*
Paraneter	Method	un i ts	Limit	Site	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN
Pesticides (cont.)	EPA 3550/8080	6/6n	MDL									
Dieldrin (f)	EPA 3550/8080	6/6n	0.003		Q	9	9	Q	Q	Ð	9	9
Dieldrin (s)	EPA 3550/8080	6/6n	0,003		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endosultan I (t)	EPA 3550/8080	₫/bn	0,002		Ŷ	2	Ð	Q	2	Ŷ	QN	9
Endosuitan ! (s)	EPA 3550/8080	6/6n	0,002		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endosuitan il (f)	EPA 3550/8080	p/pu	0,001		Ð	9	9	Q	2	9	2	9
Endosultan II (s)	EPA 3550/8080	6/6n	0,001		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endosultan Sultate (f)	EPA 3550/8080	6/6n	0.02		QN	QN	9	QN	9	2	9	9
Endosuitan Suitate (s)	EPA 3550/8080	6/6n	0,02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endrin (f)	EPA 3550/8080	b/bn	0,005		QN	9	₽	9	Ŷ	Ð	2	2
Endrin (s)	EPA 3550/8080	₿/Ნn	0,005		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endrin Aldehyde (f)	EPA 3550/8080	b/bn	0,02		Q	Ð	2	2	Q	Ŷ	2	9
Endrin Aldehyde (s)	EPA 3550,8080	6/6n	0.02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Heptachlor (f)	EPA 3550/8080	6/6n	0,004		<del>Q</del>	Q	Q	ą	9	QN	9	Q
Heptachlor (s)	EPA 3550/8080	b/ɓn	0.004		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Heptachlor Epoxide (f)	EPA 3550/8080	6/6n	0.002		QN	QN	2	Q	9	Q	9	9
Heptechlor Epoxide (s)	EPA 3550/8080	6/6n	0.002		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Toxaphene (f)	EPA 3550/8080	6/6n	0.14		g	9	9	CIN	Q	Ð	Q	Q
Toxaphene (s)	EPA 3550/8080	6/6n	0.14		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

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* Revised 07/10/87

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Page

# DATACHER ANALYTICAL REPORT Dututh IAP - Soft Samples Second Column Confirmations

					A-A	88-A	R8-A	88-8	98 98	<del>8</del> 8	CMBA	G#8-B	GWB-C
			Detection	Field #:	0-1-5	2.5-4	5-6.5	0-1-5	2.5-4	5-6.5	5-6.5	10-11.5	10-11.5
Parameter	Me thod	Un its	Limit	Site :	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT
Pesticides (cont.)	EPA 3550/8080	6/6n	Ţ										
Dieldrin (f)	EPA 3550/8080	6∕6n	0,003		9	9	9	Q	9	2	9	9	9
Dieldrin (s)	EPA 3550/8080	6/6n	0.003		NEG	NEG	NEC	NEG	NEG	NEG	NEG	NEG	NEG
Endosuitan   (t)	EPA 3550/8080	b/bn	0,002		£	9	£	9	9	9	9	9	9
Endosultan 1 (s)	EPA 3550/8080	6/6n	0,002		NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG
Endosultan [] (f)	EPA 3550/8080	5/6n	0,001		0,001	9	QN	Ð	9	Q	2	9	9
Endosultan (1 (s)	EPA 3550/8080	6/6n	0,001		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endosulfan Sulfate (f)	EPA 3550/8080	b/bn	0.02		0,002	9	0,005	9	9	0,002	0.001	9	9
Endosultan Sultate (s)	EPA 3550/8080	6/6n	0.02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endrin (f)	EPA 3550/8080	b/bn	0,005		9	9	9	9	9	9	9	9	Ð
Endrin (s)	EPA 3550/8080	6/6n	0,005		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Endrin Aldehvde (f)	EPA 3550/8080	b/bn	0,02		9	9	9	2	9	9	9	Đ	9
Endrin Aldehyde (s)	EPA 3550/8080	6/6n	0.02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Hen tachior (f)	EPA 3550/8080	b/bn	0.004		ę	Ð	9	9	9	Ð	9	9	9
Heptachlor (s)	EPA 3550/8080	6/6n	0.004		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Heotachtor Enoxide (f)	EPA 3550/8080	b/bn .	0,002		Q	9	Q	9	9	9	9	9	9
Heptechlor Epoxide (s)	EPA 3550/8080	6/6n	0,002		NEG	NEG	NEG	NEG	NEC	NEG	NEG	NEG	NEG
Toxanhana (†)	EPA 3550/8080	b/bn	0.14		9	Q	9	9	2	9	9	9	9
Toxaphene (s)	EPA 3550/8080	6/6n	0.14		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG

"MO" indicates that the parameter was not detected.

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DATACHBA ANALYTICAL REPORT Duluth IAP - Soil Semples Second Column Confirmations

Par ameter	Method	Units	Detection Limit	Fleid #: Site :	SS-8A*	SS-88* EIGHT
Pesticides (cont.)	EPA 3550/8080	6 <i>/</i> 6n	MDL			
Dieldrin (f)	EPA 3550/8080	6/6n	0,003		9	QN
Dieldrin (s)	EPA 3550/8080	6/6n	0,003		NEG	NEG
Endosultan (f)	EPA 3550/8080	6/6n	0,002		Ð	0.01
Endosultan 1 (s)	EPA 3550/8080	6/6n	0,002		NEG	POS
Endosuifan 11 (f)	EPA 3550/8080	6/6n	0,001		9	QN
Endosulfan 11 (s)	EPA 3550/8080	6/6n	0.001		NEG	NEG
Endosultan Su!tate (f)	EPA 3550/8080	6/6n	0.02		9	QN
Endosuitan Suitate (s)	EPA 3550/8080	6/6n	0.02		NEG	NEG
Endrin (†)	EPA 3550/8080	6/6n	0,005		9	Ð
Endrin (s)	EPA 3550/8080	6/6n	0*005		NEG	NEG
Endrin Aldehyde (f)	EPA 3550/8080	6/6n	0,02		9	QN
Endrin Aidehyde (s)	EPA 3550/8080	6/6n	0.02		NEG	NEG
Heptachior (f)	EPA 3550/8080	6/6n	0.004		9	QN
Heptachior (s)	EPA 3550/8080	6/6n	0.004		NEG	NEG
Heptachlor Epoxide (f)	EPA 3550/8080	6/6n	0,002		9	QN
Heptachior Epoxide (s)	EPA 3550/8080	6∕ôn	0,002		NEG	NEG
Toxaphene (f)	EPA 3550/8080	6/6n	0.14		9	QN
Toxaphene (s)	EPA 3550/8080	6 <i>/</i> 6n	0.14		NEG	NEG

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* Revised 07/10/87

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Н-192

### DATACHER ANALYT ICAL REPORT Duluth IAP - Soli Samples Second Column Confirmations

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					B1A	81-A	B1-A	GW1-A	GW1-B	3-1-E		
			Detection	field∦:	0-1-5	2-5.4	5-6.5	10-11.5	5-6.5	20-21.5	SS-1A	SS-1B
Parameter	Method	Un i ts	Limit	Site :	ONE	ONE	ONE	ONE	ONE	ONE	ONE	ONE
Pesticides (cont.)	EPA 3550/8080	6/6n	MDL									
Arochior 1016 (f)	EPA 3550/8080	6/6n	0,02		9	9	2	9	9	9	9	Q
Arochlor 1016 (s)	EPA 3550/8080	6/6n	0•02		NEG	NEG	NEG	NEG	NEG	NBG	NEG	NEG
Arochlor 1221 (f)	EPA 3550/8080	6∕6n	0.02		9	9	2	9	9	9	Ð	9
Arochlor 1221 (s)	EPA 3550/8080	6/6n	0.02		NEG	NEG	NEG	NEC	NEG	NEG	NEG	NEG
Arochior 1232 (f)	EPA 3550/8080	6/6n	0.02		9	9	8	Ð	9	9	9	2
Arochlor 1232 (s)	EPA 3550/8080	6/6n	0•02		NEG	NEG	NEG	NEG	NEG	NBG	NEG	NEG
Arochior 1242 (f)	EP4 3550/8080	6/6n	Q.02		9	9	9	9	9	9	9	9
Arochior 1242 (s)	EPA 3550/8080	6/6n	0,02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochior 1248 (f)	EPA 3550/8080	6/6n	0,02		9	9	Q	9	9	9	9	Ð
Arochlor 1248 (s)	EPA 3550/8080	6/6n	0-02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochlor 1254 (f)	EPA 3550/8080	6/6n	0.02		9	Q	9	9	2	9	9	9
Arochlor 1254 (s)	EPA 3550/8080	6/6n	0.02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochior 1260 (f)	EPA 3550/8080	6/6n	0.02		9	QN	9	9	9	2	9	Q
Arochior 1260 (s)	EPA 3550/8080	6/6n	0.02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

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Н-193

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DATACHEN MAL	Duluth IAP - Soil Samples	Second Column Confirmations

11-194

wWDm indicates that the parameter was not detected.

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Page 194

## DATACHBA ANALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

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					BC-3	GW3-A	GW 3-B	GW 3-D			
			Detection	Fleid 🕼:	5-6.5	5-6.5	5-6.5	°−6 <b>°</b> 5	SS-3A	SS-38	5S-3C
Par amater	Method	Un i ts	L Imi +	SIte :	THREE	THREE	THREE	THREE	THREE	THREE	THREE
Pesticides (cont.)	EPA 3550/8080		MDL								
Arochior 1016 (1)	EPA 3550/8080		<b>0</b> •02		9	9	Q	9	9	9	9
Arochior 1016 (s)	EPA 3550/8080	6/6n	0,02		NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochior 1221 (f)	EPA 3550/8080	6/bn	0,02		9	9	9	Q	9	9	9
Arochlor 1221 (s)	EPA 3550/8080	6/6n	0,02		NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochior 1232 (f)	EPA 3550/8080	6/6n	0,02		9	Q	9	9	2	9	Ŷ
Arochlor 1232 (s)	EPA 3550/8080	6/6n	0_02		NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochior 1242 (f)	EPA 3550/8080	6/6n	0,02		9	9	Q	9	Q	9	9
Arochior 1242 (s)	EPA 3550/8080	6/6n	0,02		NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochior 1248 (f)	EPA 3550/8080	6/6n	0"02		2	Ð	9	Ð	9	9	Q
Arochlor 1248 (s)	EPA 3550/8080	6/6n	0,02		NEG	NBC	NEG	NEG	NEG	NEG	NEG
Arochior 1254 (f)	EPA 3550/8080	6/6n	0,02		9	QN	Đ	9	Ð	9	9
Arochior 1254 (s)	EPA 3550/8630	6/6n	0•02		NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochior 1260 (f)	EPA 3550/8080	6/6n	0,02		9	<del>Q</del>	9	Ŷ	1-1	0.17	0.04
Arochlor 1260 (s)	EPA 3550/8080	6/6n	0*02		NEG	NEG	NEG	NEG	POS	POS	POS

"ND" indicates that the parameter was not detected.

# Dututh IAP - Soll Samples Dututh IAP - Soll Samples Second Column Confirmations

SS-5E FIVE	NEG	NE G	NEG N	Ne C	NG G	NEG	ND
55-50 F1VE	ND ND	ND	NEG	<b>Q</b> 89	NEC 20	NEG	NEG
SS-5C FIVE	NEG	ND	NEG N	Q SH	9 99 N 99	9 9 9	NEG
55-58 F1VE	N NO	ND	ND	NEG	9 93 9	NEG ND	NEG
SS-5A FIVE	ND	NEC	ND	ND	NEC NO	NEG	ND
GW5-C 10-11.5 FIVE	NEG	NEG	ND NEC	ND	Q NEC	9 9 9	NEG
GW5-B 9,5-11 FIVE	NEG	N ND	Q Sa N	N N	NEG	NEC NO	NEG
GW5-A 5-6.5 F1VE	NEG	NEG	N N	NEG N	NEC NO	ND	N N
Field#: Site :							
Detection Limit	MDL 0,02 0,02	0 <b>.</b> 02 0.02	0 <b>.</b> 02 0 <b>.</b> 02	0,02 0,02	0.02 0.02	0.02 0.02	0,02 0,02
Units	6/6n 6/6n 6/6n	6/6n 6/6n	6/6n 6/6n	5/6n 6/6n	6/6n 6/6n	6/6n 6/6n	6/6n 6/6n
Method	EPA 3550/8080 EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080	EPA 3550/8080 EPA 3550/8080
Par ama tar	Pesticides (cont.) Arochior 1016 (†) Arochior 1016 (s)	Arochlor 1221 (†) Arochlor 1221 (5)	Arochlor 1232 (f) Arochlor 1232 (s)	Arochi ar 1242 (f) Arochior 1242 (s)	Arochior 1248 (f) Arochior 1248 (s)	Arachiar 1254 (t) Arachiar 1254 (s)	Arochior 1260 (t) Arochior 1260 (s)

DATACHEM ANALYFICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

Ma thod EPA 3550/8080 EPA 3550/8080 EPA 3550/8080 EPA 3550/8080 EPA 3550/8080
6/6n 6/6n
EPA 3550/8080 ug/g 0.02 EPA 3550/8080 ug/g 0.02

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* Revised 07/10/87

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DATACHBA ANALYTICAL REPORT Duluth IAP - Soll Samples Second Column Confirmations

_,	Parameter	Me thod	Units	Detection Limit	Fleid #: Site :	88-A 0-1.5 EIGHT	88-A 2.5-4 EIGHT	B8-A 5-6.5 E1GHT	B8-8 0-1.5 E1GHT	88-8 2.5-4 EIGHT	88-8 5-6.5 EI GHT	GM8-A 5-6.5 E1 GHT	GM8-B 10-11.5 EIGHT	GH8-C 10-11.5 E1GHT
Pesticides (cont.)	(cont.)	EPA 3550/8080	6/6n	Ū					Ş	ç	ç	Ş	2	2
Arochior 1016 (f) Arochior 1016 (s)	016 (f) 016 (s)	EPA 3550/8080 EPA 3550/8080	6/6n 6/6n	0 <u>0</u> 2 002		NEG	NEG N	N EG	NEG	NEC N	NEG	NEC	NEG	NEG
Arochlor 1221 (f)	221 (†) 221 (s)	EPA 3550/8080 EPA 3550/8080	6/6n 5/6n	0.02 0.02		N N	NEG	NEG	ND NEC	NEG	NEC N	Q SE	Q 99	NEG
Arachlar 1232 (f)	232 (†) 232 (6)	EPA 3550/8080 EPA 3550/8080	6/6n 6/5n	0.02 0.02		ND	ND NEC	ND	N N	NEG	ND ND	N N	NEG	NEG
Arochlor 1242 (f)	1242 (f) 243 (f)	EPA 3550/8080 FPA 3550/8080	6/6n 6/6n	0 <b>.</b> 02 0 <b>.</b> 02		NEG	ND NEC	NEG	NEG N	ND	NE	Q B	N NO	ND
Arochior 1242 (5) Arochior 1248 (f) Arochior 1248 (s)	1248 (f) 1248 (f) 1248 (s)	EPA 3550/8080 EPA 3550/8080	6/6n 6/6n	0,02 0,02		QU SU	ND	ND	ND	N N NEC	NEG	QU SBN	ND	NEG
Arochlor 1254 (f) Arochlor 1254 (s)	1254 (f) 1254 (s)	EPA 3550/8080 EPA 3550/8080	6/6n 6/6n	0 <b>.</b> 02 0 <b>.</b> 02		ND	Q N N	ND NEC	NEG	NEC N	NEG R	NEG	NEC N	NEG
Ar ochi or 1260 (f) Arochior 1260 (s)	1260 (f) 1260 (s)	EPA 3550/8080 EPA 3550/8080	6/6n 6/6n	0 <b>.</b> 02 0 <b>.</b> 02		NEG	N SS N	ND NEG	N EG	NEG	N SS N	NEG	NEG NEG	NEG

H-198

"MD" Indicates that the parameter was not detected.

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DATACHEN AVALYTICAL REPORT Duluth IAP - Soil Samples Second Column Confirmations

			Detect ion	Field #:	5S-8A*	SS-88*
Par ane ter	Method	Un i ts	Limit	Site :	EI GHT	EIGHT
Pesticides (cont.)	EPA 3550/8080	6/6n	MDL			
Arochior 1016 (f)	EPA 3550/8080	6/6n	0,02		9	QN
Arochior 1016 (s)	EPA 3550/8080	6/6n	0•02		NEG	NEG
Arochlor 1221 (f)	EPA 3550/8080	6/6n	0,02		9	Q
Arochior 1221 (s)	EPA 3550/8080	6/6n	0.02		NEG	NEG
Arochior 1232 (f)	EPA 3550/8080	6/6n	0,02		9	QN
Arochior 1232 (s)	EPA 3550/8080	6/6n	0.02		NEG	NEG
Arochior 1242 (f)	EPA 3550/8080	6/6n	0,02		9	â
Arochior 1242 (s)	EPA 3550/8080	6/6n	0.02		NEG	NEG
Arochtor 1248 (f)	EPA 3550/8080	6/6n	0,02		Ŷ	CIN
Arachiar 1248 (s)	EPA 3550/8080	6/6n	0.02		NEG	NEG
Arochlor 1254 (f)	EPA 3550/8080	6/6n	0.02		Ð	0.52
Arochlor 1254 (s)	EPA 3550/8080	6/6n	0,02		NEG	POS
Arochlor 1260 (1)	EPA 3550/8080	6/6n	0.02		9	CIN
Arochior 1260 (s)	EPA 3550/8080	6/6n	0.02		NEG	NEG

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* Revised 07/10/87

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# Duluth IAP - Soil Samples Second Column Confirmations

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Me thod EPA 3550/8150 EPA 3550/8150 EPA 3550/8150 EPA 3550/8150 EPA 3550/8150	6/6n 6/6n 6/6n
550 550	EPA 3550/8150 ug/g 0.10 EPA 3550/8150 ug/g 0.10 EPA 3550/8150 ug/g 0.02 EPA 3550/8150 ug/g 0.02 EPA 3550/8150 ug/g 0.02

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Duluth IAP - Solt Samples Second Column Confirmations

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83-8 83-C 83-C 83-C 5-6.5 0-1.5 2.5-4 5-6.5 THREE THREE THREE	ND ND ND ND NEG NEG NEG	ND ND ND ND Neg neg neg	ND ND ND ND NEG NEG NEG NEG
B3-B 2 <b>.</b> 5-4 THREE	N R	NEC	0.23 NEG
B3-B 0-1.5 THREE	NEG	NEC	0 <b>,</b> 18 NEG
B3-A 5-6.5 THREE	ND	ND ND	NEC N
B3-A 2,5-4 THREE	NEG	ND	NEC
B3-A 0-1.5 THREE	NEG NO	NEG	N NO
Field∦: Site :			
Detection F Limit	MD. 0,10	0 <b>.</b> 02 0 <b>.</b> 02	0 <b>.</b> 02 0 <b>.</b> 02
Un i ts	б/бл б/бл б/бл	6/6n 6/6n	b/bn b/bn
Me thod	EPA 3550/8150 EPA 3550/8150 EPA 3550/8150	EPA 3550/8150 EPA 3550/8150	EPA 3550/8150 EPA 3550/8150
Parometer	<u>Herbicides</u> 2,4,5-T (f) 2,4,5-T (s)	2,4-D (f) 2,4-D (s)	Silvex (f) Silvex (e)

"NO" indicates that the parameter was not detected.

# DATACHEM ANALYFICAL REPORT Duiuth 1AP - Soil Samples Second Column Confirmations

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SS-3C THREE	ND NEG	NEG	NEG
SS-38	ND	NEC NO	N NO
SS-3A THREE	ND NEG	NEG N	NEG
GW3-D 5-6.5 THREE	N N N N	NEC	Q BN
GW3-B 5-6.5 THREE	NEC N	N NO NEC	NEG
GW3-A 5-6.5 THREE	N RO	N N N	Nec N
BC-3 5-6.5 THREE	NEG	ND	NEG ND
Field #: Site :			
Detection Limit	MDL 0,10 0,10	0.02 0.02	0 <b>.</b> 02 0 <b>.</b> 02
un its	6/6n 6/6n 6/6n	6/6n 6/6n	6/6n 6/6n
Met hod	EPA 3550/8150 EPA 3550/8150 EPA 3550/8150	EPA 3550/8150 EPA 3550/8150	EPA 3550/8150 EPA 3550/8150
Par amotor	<u>Herbicides</u> 2.4.5-T (†) 2.4.5-T (s)	2,4-D (f) 2,4-D (s)	Silvex (f) Silvex (s)

"ND" indicates that the parameter was not detected.

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# Duluth IAP - Soil Samples Second Column Confirmations

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					GW5A	GW5-B	GM2-C						B7 - A
			Detection	Field #:	5-6.5	9°5-11	10-11.5	SS-5A	SS-58	SS-5C	SS-50	SS-5E	0-1-5
Parameter	Method	un i ts	Limi+	Site :	FIVE	FIVE	FIVE	FIVE	FIVE	FIVE	FIVE	FIVE	SEVEN
Herbic Ides	EPA 3550/8150	6/6n	Å										
2,4,5-T (f)	EPA 3550/8150	6/6n	0.10		9	Ð	9	9	9	9	9	9	9
2,4,5-T (s)	EPA 3550/8150	6/6n	0•10		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
2,4-0 (f)	EPA 3550/8150	6/6n	0,02		2	9	9	Ð	9	9	2	2	2
2,4-D (s)	EPA 3550/8150	6/6n	0.02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Silvex (f)	EPA 3550/8150	6/6n	0•02		9	QN	9	9	9	9	2	9	9
Silvex (s)	EPA 3550/8150	6/6n	0,02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

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SS-88* EIGHT	N N N N	ND	N N
SS-BA*	N NO	NEG	NEC
SS-7A* SEVEN	ND	9 8	NE NO
GW7-C 15-16.5 SEVEN	N NO	N N N	NEG
GW7-B 10-11.5 SEVEN	NEC NO	N NO	NEG
GW7-A 10-11.5 SEVEN	O S	NEC N	NEG
B7-B 2.5-4 SEVEN	Ŷ	ND ND NEC	ND
B7-B 0-1.5 SEVEN	9	NEG NEG NEG	ND
87-A 2.5-4 SEVEN	9	NEG 0. 12 NEG	ND NEG
Fleid#: Site :			
Datection Limit	MDL 0, 10	0.10 0.02 0.02	0,02 0,02
Un i ts	6/6n 6/6n	6/6n 6/6n	6/6n 6/6n
Method	EPA 3550/8150 EPA 3550/8150	EPA 3550/8150 EPA 3550/8150 FPA 3550/8150	EPA 3550/8150 EPA 3550/8150
Parameter	Herbicides 2.4.5-T (f)	2,4.5-T (s) 2,4-0 (f)	Silver (f) Silver (s)

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* Revised 07/10/87

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«NOW indicates that the parameter was not detected. ]

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DATACHEM ANALYTICAL REPORT Dututh IAP - Soll Samples Second Column Confirmations

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Tection         Field #:         0-1.5         2.5.34         5-0.5           Limit         Site         :         ELGHT         ELGHT         ELGHT         ELGHT           MD.         ND         ND         ND         ND         ND         ND           0.10         ND         ND         ND         ND         ND         ND           0.10         NEG         NEG         NEG         NEG         NE           0.02         ND         ND         ND         ND         ND           0.02         NEG         NEG         NEG         NEG         NEG						B8-A	B8-A	B8-A	88 <del>-</del> 9	88 B	88-9	GW8-A	048-89 10 11 1	GWB-C
Serate         Mathod         Units         Limit         Site         E1GHT         E1GHT <t< th=""><th></th><th></th><th></th><th>Detection</th><th>Field 🥂:</th><th>0-1-5</th><th>2.54</th><th>5-6.5</th><th><b>6-1-</b>0</th><th>2.54</th><th>۲<b>0</b> ۳</th><th>0°0 4</th><th><b>C</b>•11-01</th><th></th></t<>				Detection	Field 🥂:	0-1-5	2.54	5-6.5	<b>6-1-</b> 0	2.54	۲ <b>0</b> ۳	0°0 4	<b>C</b> •11-01	
EPA 3550/8150         ug/g         M.L.           BPA 3550/8150         ug/g         0,10         ND         ND         ND           BPA 3550/8150         ug/g         0,10         ND         ND         ND         ND           BPA 3550/8150         ug/g         0,10         ND         ND         ND         ND           BPA 3550/8150         ug/g         0,010         NG5         ND         ND         ND           BPA 3550/8150         ug/g         0,02         ND         ND         ND         ND	Parameter	Me thod	Un I ts	Limit	Site :	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	EIGHT	
BPA 3550/8150         ug/g         0,10         ND	b ic ides	EPA 3550/8150	6/6n	MD										
EPA 3550/8150         ug/g         0.10         NES	.5-1 (+)	EPA 3550/8150	6/6n	0.10		9	QN	9	9	9	9	9	9	
EPA 3550/8150         ug/g         0.02         ND         NEG         ND         ND <t< th=""><th>(s) 1-2,</th><th>EPA 3550/8150</th><th>6/6n</th><td>0" 10</td><td></td><td>NEG</td><td>NEG</td><td>NEG</td><td>NEG</td><td>NEG</td><td>NEG</td><td>NEG</td><td>N BC</td><td></td></t<>	(s) 1-2,	EPA 3550/8150	6/6n	0" 10		NEG	NEG	NEG	NEG	NEG	NEG	NEG	N BC	
EPA 3550/8150 ug/g 0.02 NEG NEG NEG NEG EPA 3550/8150 ug/g 0.02 ND ND ND ND ND EPA 3550/8150 ug/g 0.02 NEG NEG NEG NEG	-D ( <del>1</del> )	EPA 3550/8150	b/bn	0_02		9	Ŷ	9	ð	2	Ð	QN	9	
EPA 3550/8150 ug/g 0.02 ND ND ND EPA 3550/8150 ug/g 0.02 NEG NEG NEG	-D (s)	EPA 3550/8150	6/6n	0*02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	
EPA 3550/8150 ug/g 0.02 NEG NEG NEG	vex (f)	EPA 3550/8150	6/6n	0,02		9	ę	9	2	9	9	9	Q	
	vex (s)	EPA 3550/8150	6/6n	0,02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	

DNTACHEN ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations GW2-C OWL Q y N RC NEG Q ų NEG ဥားမှိ **P** e se စွယ္စိ 9 9 GW2-B £ 9 ¥ <u>9</u> 99 9 8 9 ¥ <u>9</u> 9.8 P B 99 <del>S</del> B GW2-A 01 <u>9</u> 9 8 e S 9 8 9 g 2 g <u>9</u> 9 ¥ 98 9 8 SM-1B W 9 ¹⁰/₂ 9 8 9 ¥ 9 ¥ 9 ¥ 9 ¹⁰/₂ g y g y 9 8 2 Q Q SW-1A BNO g y g y 9 8 9 ¥ 9 g g y g y e ä Q Q S R GW1-E W 2 8 g y **Q** 9 g 9 ÿ ទត្ត 9 ¥ ဥာမ္ဘာ චිසි ₽ÿ GW1-D BN 9 ¥ 9 g 9 g 9 ÿ 9 8 <del>2</del> 🛱 2 월 9 ¥ S B Q Y GW1-C WO Q Y 9 g g g 9 g Q Q S R Ы Ц 9 ¥ <u>8</u> ê ñ 9 GW1-A **N**O Q Sq 9 8 g g 9 ¥ 9 ÿ 9 ¥ 9 9 2 9 ²² 9 ¥ Q Q Field∦t: •• Site Detection Llmit 0.49 0.49 0.34 0.34 0.46 0.46 0.35 0.35 0.63 0.63 0.33 0.33 0.44 0.45 0.45 0.45 0.45 0.31 0.31 0.44 ğ Units J∕6n ٦/бл J∕gu ۲/бл J∕bu νfin J∕bu ۲/gu √gu ۲<mark>ر</mark> J∕bu ۲ سو/L ug/L ۲/Gn ٦/gu J∕bn ng/L ۲ Gn J∕6n ן∕Бn ng/L EPA 601 EPA 601 EPA 601 EPA 601 EPA 601 EPA 601 601 EPA 601 EPA 601 EPA 601 Method EPA 601 EPA 601 EFA 601 EPA 601 EPA 601 EPA 601 EPA 601 EPA 601 EPA 601 EPA 601 EPA 601 EPA Dichlorodifluoromethane (f) Dichlorodifiuoromethane (s) Trichlorofluoromethane (f) Tr Ichlorofluoromethane (s) Carbon Tetrachloride (f) Carbon Tetrachloride (s) Brandichloramethane (f) Dibromochloromethane (1) Dibromochioromethane (s) Bromodichloromethane (s) Methylene Chloride (f) Methylene Chloride (s) Purgeable Halocarbons Par anater Chloromethane (s) Chloromethane (f) Bromethane (s) Bromethane (f) Chlorotorm (f) Chloroform (s) Branoform (f) Bramotorm (s)

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"ND" indicates that the parameter was not detected.

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### DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

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			00;+00+00	. # Plais	GH7-D	GW 2 - F	SW-2A	SW-219	SE-2C	1-MW	MW-2	Mu-4	С-М
Par ane ter	Method	Units		Site :	9 <u>1</u>	1¥0	OML	1WO	OWL	OWL	ONL	0ML	TWO
Purgeable Halocarbons	EPA 601	J∕bu	MDL										
		1/011	0.49		9	ą	9	2	2	2	2	7	2
Chloromothane (s) Chloromothane (s)	EPA 601	ng/L	0.49		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	CDA 601	1/ 01	0 34		QN	Q	2	6.0	£	9	Ŷ	9	Ð
Methylene Chloride (1) Methylene Chloride (s)	EPA 601	ug/L ug/L	0.34		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	104 601	2	0 A6		Ş	9	2	9	9	9	9	2	Ð
Carbon Tetrachloride (1) Carbon Tetrachloride (s)	EPA 601	ng∕r ug∕r	0.46		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
:			32.0		Ş	GFI	Ŷ	2	2	9	Ð	9	9
Bramodichloramethane (f) Pramodichloramethane (s)	EPA 601	ng/L ug/L	0.35		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
		t.			9	<u>G</u>	£	g	2	2	Q	Ŷ	9
Dibromochloromethane (f) Dibromochloromethane (s)	EPA 601	ng/L ug/L	0.31		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
		•	•		Ş	9	CN	9	Ş	9	9	9	9
Bramamethane (†)	EPA 601 FPA 601	ug/L ug/L	0.63 0.63		e e	NEC N	S S	NEC	NEG	NEG	NBC	NEG	NEG
		þ										1	9
01 obt occel () increasthand ()	EPA 601	uq/L	0.33		9	9	2	Ð	9	2	9	2	2 j
Dichlorodifluoromethane (s)	EPA 601	- 1/6n	0,53		NEG	NEG	NEG	NEG	NEG	NEG	NEG	SHR	NEG
	FPA 601	1/01	0.44		2	2	9	9	2	9	9	9	9
Trichlorofluoromethane (s)	EPA 601	- 1/6n	0.44		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
:	EDA 601	1	0 45		9	2	£	2	2	Ð	QN	2	9
Chloroform (s) Chloroform (s)	EPA 601	ng∕L	0.45		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	109 P03	1/01	0.45		2	2	2	9	2	Q	9	9	9
Bramotorm (t) Bramotorm (s)	EPA 601	ug/L	0.45		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

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REPORT	Water Samples	
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Water Samples	l Column Confirmations
Duluth IAP -	Column
Duluth	Second

			Detection	Field #:	MW-6	V-MW	GW3-A	GW3-B	GW3-C	GW3-D	SH-3A	SW-3B	SN-3C Tubec
Par anoter	Method	Units	L  m  +	Site :	0ML	140	THREE	THREE	THEE	THREE	THE	INCE	
Purgeable Halocarbons	EPA 601	J/Gn	NDL										
	109 443	() si	0.49		2	9	9	2	9	9	9	2	9
Chioromethene (t) Chioromethene (s)	EPA 601	ng∕L	0.49		NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG	NEG
:		5			Ş	4.4	ÛN	2	2	Ð	2	2	9
Nathylene Chloride (f) Mathylene Chloride (s)	EPA 601	ר עם∕ר	0.34		NEG	POS	NEG	NEG	NEG	NEG	NEG	NEG	NEG
		i.	<b>21</b> 0		Ş	QN	Q.	Q	2	2	2	9	9
Carbon Tetrachloride (f) Carbon Tetrachloride (s)	EPA 601	ng/L ug/L	0.46 0.46		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
			51 U		ç	g	9	9	2	Ð	0.87	£	9
Branodichioranethane (f) Pranodichioranethane (s)	EPA 601	ng/L ug/L	0.35 0		NEG	NEG	NEG	NEG	NEG	NEG	POS	NEG	NEG
			11 0		Ş	Ŷ	Q	9	9	1.0	9	Ð	9
Dibromochloromethane (f) Dibromochloromethane (s)	EPA 601	ר ח6ח,ר	15.0		NEG	NEG	NEG	NEG	NEG	POS	NEC	NEG	NEG
:		()	190		£	Q	9	9	9	9	2	2	9
Bramaethane (f) Bramaethane (s)	EPA 601	ug/L	0.63		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	103 103	0.5	11 0		Ş	(N	9	2	2	9	Ð	£	<del>9</del>
Dichlorodifluoromethane (t) Dichlorodifluoromethane (s)	EPA 601	ng/L ug/L	0.33		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
:			~ ~ ~		ç	0.88	Q	2	9	9	ହ	2	9
Trichlorofluoromethane (f) Trichlorofluoromethane (s)	EPA 601	l/βn	0.44		NEG	POS	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	109 <b>-</b>	() S.	0.45		GN	2	9	3.6	9	2.3	9	1.6	1.4
Chloroform (f) Chloroform (s)	EPA 601	ug/L	0.45		NEG	NEG	NEG	POS	NEG	POS	NEG	POS	POS
:	504 601	1/01	0.45		2	Q	2	9	9	Ŷ	9	Q	9
Branoforms (†) Brannoforms (s)	EPA 601	ug/L ug/L	0.45		NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG	NEG

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			Detection	Field #:		Gw4-B	GW4-C	GW4-D	SW-4A	SW-4B	08-4C	SM-40	MM-8
Par ane ter	Method	Un i ts	Limit	Site :	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR
Purgeable Halocarbons	EPA 601	n∂/L	MDL										
Chloromethane (f)	EPA 601	ng∕Ľ	0.49		2	9	9	9	9	9	Ð	9	9
Chloromethane (s)	EPA 601	ng/L	0.49		NEG	NEG	NEG	NEG	NEC	NEG	NEG	NEG	NEG
Methylene Chioride (f)	EPA 601	ng∕L	0.34		9	Ð	9	Ð	2.1	2.3	2.8	3.5	9
Methylene Chloride (s)	EPA 601	J∕bu	0.34		NEG	NEG	NEG	NEG	POS	POS	POS	POS	NEG
Carbon Tetrachioride (f)	EPA 601	ng/L	0.46		9	9	9	9	9	÷	9	9	Ð
Carbon Tetrachloride (s)	EPA 601	ng∕L	0.46		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Bromodichloromethane (f)	EPA 601	ng/L	0,35		9	9	9	9	9	<b>.</b> 94	•55	•58	2
Bromodichloromethane (s)	EPA 601	ng/L	0.35		NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG	NEG
Dibromochloromethane (f)	EPA 601	nd/r	0.31		2	Q	9	9	9	2	2	9	9
Dibromochioromethane (s)	EPA 601	ng/L	0.31		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Browomethane (f)	EPA 601	uq/L	0.63		9	9	9	9	Ð	₽	2	2	2
Bromonthane (s)	EPA 601	ng/L	0.63		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Dichlorodifluoromethane (f)	EPA 601	ng/L	0.33		9	Q	Q	9	9	9	9	9	9
Dichlorodifiuoromethane (s)	EPA 601	J∕6n	0,33		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichlorofluoromethane (f)	EPA 601	ng/L	0.44		9	9	9	9	9	9	9	9	5•5
Trichlorofluoromethane (s)	EPA 601	ng/L	0.44		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	POS
Chlorotorm (t)	EPA 601	ng/L	0.45		9	ŷ	9	9	9	Ŷ	9	9	2
Chloroform (s)	EPA 601	ng/L	0.45		NEG	NEG	NEG	NEC	NEG	NEG	NEG	NEG	NEG
Branoform (f)	EPA 601	ng/L	0.45		9	9	9	9	Ð	Ŷ	Q	9	9
Bromoform (s)	EPA 601	ng/L	0.45		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"NO" indicates that the parameter was not detected.

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DATACHER ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

			Detect ion	Fleid #:	6-MW	01-MW	1 1 - MM	GW5-A	Qer5-B	GW5-C	SM-5A	<b>SM-</b> 58	SE-5C
Par ane ter	Method	units	Limit	Site :	FOUR	FOUR	FOUR	FIVE	FIVE	FIVE	FIVE	FIVE	
Purgeable Halocarbons	EPA 601	ng/L	MDL										ļ
	EPA 601	1/00	0.49		9	9	2	2	뮻	2	9	2	Ð
Chloromethane (s)	EPA 601	ng/L	0.49		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
			47 U		ç	9	2	9	9	2	2.7	2.9	9
Methylene Chioride (f) Methylene Chioride (s)	EPA 601	ng∕r ng∕r	5 <b>7</b> 0		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
		:			ç	QN N	ŝ	ç	9	9	9	9	9
Carbon Tetrachloride (f)	EPA 601	1/6m	0,40 0,46		e Se	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Carbon lett acht of tue (S)		, ,	•							ļ	9	ŝ	ç
Deceeding ( )	FPA 601	ua/L	0.35		9	2	2	2	9	Z	₹	2	2
Brownodichioromethane (s)	EPA 601	ng/L	0.35		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
			12 0		Ş	g	9	2	2	2	Q	9	9
Dibromochloromethane (f)	EPA OUI	ng/t			2		0.11	0.514	NEC	NEC	NEC	NFC	NEG
Olbramochlaramethane (s)	EPA 601	u9/L	0.31		NEG	NEG	NEG	NEG	MEG	3		2	
:	104 £01	1/01	0 65		9	2	9	9	Ð	9	2	9	9
Brownethane (†) Brownethane (s)	EPA 601	uq/L سارک	0.63		NEC	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
		•											
	CDA 601	1/01	0.33		2	9	9	9	9	9	9	2	₽
Dichlorodifiuoromethane (s)	EPA 601	ug/L	0.33		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					Ş	S	1.9	2	2	9	9	9	9
Trichlorofluoromethane (f) Trichlorofluoromethane (s)	EPA 601	ng/L	0.44		NEG	NEG	POS	NEG	NEG	NEG	NEG	NEG	NEG
			4 7		UN	(JN	ĝ	9	2	Ð	2	9	<del>9</del>
Chlorotorm (f) Chlorotorm (s)	EPA 601	ng/L Ug/L	0.45		NEC	NEG	NEG	NEG	NEG	NEG	NEG	88 N	NEG
:			0.45		2	9	9	9	9	9	Q	9	9
Branoform (f) Branoform (s)	EPA 601	ng/L ug/L	0.45		NEG	NEG	NEG	NEC	NEG	NEG	NEG	NEG	NEG

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Par anotor	Method	Units		Site :	SEVEN	SEVEN	SEVEN	SEVEN	EI GHT	EI GHT	EI GH	EI GHT	EI GHT
Purgeable Helocarbons	EPA 601	ng/L	MDL										
Chloromethane (f)	EPA 601	J∕bn	0.49		9	Ð	9	9	Q	9	Q	9	9
Chloromethane (s)	EPA 601	J∕bn	0.49		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Nethylene Chloride (f)	EPA 601	ng/L	0.34		9	2.5	9	9	9	2.8	9	9	2
Methylene Chloride (s)	EPA 601	J∕βn	0.34		NEG	POS	NEG	NEG	NEG	POS	NEG	NEG	NEG
Carbon Tetrachloride (f)	EPA 601	ng/L	0.46		9	Q	9	9	9	9	9	Q	9
Carbon Tetrachioride (s)	EPA 601	ng/L	0.46		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Bramodichioramethane (f)	EPA 601	J∕bn	0.35		9	9	2	9	9	9	QN	9	9
Branodichtoranethene (s)	EPA 601	ng/L	0.35		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Dibramochioramethane (t)	EPA 601	ng/L	0.31		9	9	9	2.9	9	9	9	9	9
Dibromochloromethane (s)	EPA 601	ng/L	0.31		NEG	NEG	NEG	POS	NEG	NEG	NEG	NEG	NEG
Brancmethane (f)	EPA 601	ng/L	0.63		9	Q	9	9	9	9	9	Q	2
Bromethane (s)	EPA 601	∿gu	0.63		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Dichlorodifluoromethane (f)	EPA 601	ng/L	0.33		2	9	ÛN	9	9	9	9	Ŷ	9
Dichlorodifiuoromethane (s)	EPA 601	ng/L	0.33		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Trichtoroftuoromethane (f)	EPA 601	ng/L	0.44		9	ÛN	9	9	9	1.2	Ð	Ð	Ð
Trichiorofiuoromethane (s)	EPA 601	ng/L	0.44		NEG	NEG	NEG	NEG	NEG	POS	NEG	NEG	NEG
Chilarotorm (f)	EPA 601	ng/L	0.45		Q2	7.0	9	9	9	Q	9	9	9
Chloroform (s)	EPA 601	∿g⊔	0.45		NEG	POS	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Bromotorm (1)	EPA 601	ng/L	0.45		9	9	9	9	9	9	9	9	9
Branoform (s)	EPA 601	ng/L	0.45		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"NO" indicates that the parameter was not detected.

### DATACHEN ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

					TRIP	TR IP	TRIP	<b>RI NSE</b>
			Detection	Field #:	BLANK	BLANK	BLANK	BLANK
Par ameter	Nethod	Units	L imit	SIte :	FOUR	SEVEN	<b>EI GHT</b>	THREE
Purgesble Helocarbons	EPA 601	J∕bn	MDL					
Chloromethane (f)	EPA 601	ng/L	0.49		9	9	9	QN
Chloromethane (s)	EPA 601	J∕bn	0.49		NEG	NEG	NEG	NEG
Mathylene Chloride (f)	EPA 601	ng/L	0.34		9	9	9	35.
Methylene Chloride (s)	EPA 601	ng/L	0.34		NEG	NEG	NEG	POS
Carbon Tetrachloride (f)	EPA 601	ng/L	0.46		2	9	9	QN
Carbon Tetrachioride (s)	EPA 601	J∕Gn	0.46		NEG	NEG	NEG	NEG
Bromodichioromethane (f)	EPA 601	ng/L	0.35		2	9	2	1.5
Bramodichioramethane (s)	EPA 601	ng∕L	0, 35		NEG	NEG	NEG	POS
Dibromochioromethane (f)	EPA 601	J∕₽'n	0.31		9	9	9	Ð
Dibramochloromethane (s)	EPA 601	ng/L	0.31		NEG	NEG	NEG	NEG
Bromethane (1)	EPA 601	ng/L	0.63		9	9	9	QN
Bra <b>ment</b> hane (s)	EPA 601	ng/L	0.63		NEG	NEG	NEG	NEG
Dichlorodi fluoramethane (f)	EPA 601	ug/L	0,33		9	9	9	QN
Dichlorodifluoromethane (s)	EPA 601	ng∕L	0,33		NEG	NEG	NEG	NEG
Trichlorofluoromethane (f)	EPA 601	J∕bu	0.44		9	9	9	Q
Trichlorofluoromethene (s)	BPA 601	ng/L	0.44		NEG	NEG	NEG	NEG
Chlorotorm (t)	EPA 601	ng/L	0.45		9	5.4	9	9 <b>°</b> 8
Chlaroform (s)	EPA 601	ng/L	0.45		NEG	POS	NEG	POS
Branoform (f)	EPA 601	νgu	0.45		9	9	9	QN
Branoform (s)	EPA 601	ng/L	0.45		NEG	NEG	NEG	NEG

"MD" Indicates that the parameter was not detected.

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### DATACHEN AMALYFICAL REPURT Duluth IAP - Water Samples Second Column Confirmations

			Detection	Field #:	GW1-A	0- <b>1</b> -0	Gw1-D	GW1-E	SM-1A	SW-18	GW2-A	Gw2-B	GM2-C
Par amoter	Method	Units	Linit	Site :	ONE	ONE	ONE	ONE	ONE	ONE	0ML	OWL	OML
Purgeable Halocarbons	EPA 601	ng∕L	MDL										
Chi oroethane (f)	EPA 601	۲/6n	0, 38		9	2	QN	9	9	9	Q	2	9
Chloroethane (s)	EPA 601	1∕6n	0, 38		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1-Dichloroethane (f)	EPA 601	ng/L	0.49		9	Q	Q	9	Q	9	Q	Ð	9
1,1-Dichloroethane (s)	EPA 601	√bn	0.49		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichloroethane (1)	EPA 601	J∕bn	0.44		9	2	9	9	9	Q	9	£	9
1,2-Dichloroethane (s)	EPA 601	ng∕L	0.44		NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEC	NEG
1,1,1-Trichloroethane (f)	EPA 601	J∕bn	0.53		9	9	Ð	9	9	2.9	Q	QN	9
1,1,1-Trichloroethane (s)	EPA 601	J∕£n	0.53		NEG	NEG	NEG	NEG	NEG	POS	NEG	NEG	NEG
1,1,2-Tr ichl oroethane (f)	EPA 601	ng/t	0.51		9	QN	Q	9	2	9	9	2	9
1,1,2-Trichloroethane (s)	EPA 601	ng/L	0.51		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,2,2-Tetrachioroethane (f)	EPA 601	ng/L	0, 38		9	Ð	Q	9	9	9	9	9	9
1,1,2,2- ⁻ strachloroethane (s)	EPA 601	1/6n	0.38		NEC	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Vinyl Chloride (1)	EPA 601	ng/L	0.54		9	9	ŷ	Ð	Q	9	Ð	Ð	9
vinyi Chioride (s)	EPA 601	1∕6n	0.54		NEG	NEG	NEG	NEG	NEG	NEC	NEC	NEG	NEG
1,1-Dichtoroethene (f)	EPA 601	ng/L	0.49		9	Ð	Q	Q	9	9	9	Ð	<del>g</del>
1 , 1-Dichtoroethene (s)	EPA 601	1∕6n	0.49		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
trans-1,2-Dichloroethene (f)	EPA 601	ng/L	0.42		9	9	œ	Q	9	9	9	9	9
trans-1,2-Dichloroethene (s)	EPA 601	ng∕L	0.42		NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEC	NEG
Trichloroethene (f)	EPA 501	ng/L	0.60		9	Ð	9	9	9	9	Ð	9	9
Trichioroethene (s)	EPA 601	1∕6n	0.60		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

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DATACHEM MALYTICAL REPORT Dujuth IAP - Water Samples Second Column Confirmations

Por anotor	Method	Units	Detection Limit	Field #: Site :	GW2-D TWO	GW2-E TWO	SH-2A TWO	SM-2B TWO	SW-2C TWO	Two	MW-2 TWO	1100 TWO	Two
Purgeable Halocarbons	EPA 601	J∕bu	MDF										ł
Chloroethane (f)	EPA 601	ng/L	0,38		9	2	Q	9	9	Q 8	9	9 9	NEC NEC
Chloroethane (s)	EPA 601	J∕bn	0.38		NEG	NEG	NEG	NEG	NEG	NEC		â	
			0 0		Ş	Q	2	2	Ģ	9	9	2	2
1,1-Dichioroethane (f) 1,1-Dichioroethane (s)	EPA 601	ng/L Ugu	0.49		NEC NEC	NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG
					(N	(Z	ç	9	2	2	9	9	Q
) "2-D) chi oroethane(f) 1 "2-Dichioroethane(s)	EPA 601	۰/وس ۱/وس	0.44		N SI	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
			2 5 2		Ş	4.8	Q	9	2	9	2	9	2
1,1,1-Trichi oroethane(t) 1,1,1-Trichloroethane(s)	EPA 601	ng/L ug/L	0°23		NEG	NEG	NEG	NEG	NEG	NEG	NBC	NBC	NEG
		:			ç	Ş	QN	2	2	2	Ð	9	9
, ,2-Tr ichi oroethane(t)  ,1,2-Tr ichi oroethane(s)	EPA 601 EPA 601	ч/бл г	0.51		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					ç	ģ	ç	ç	Q	2	2	2	9
1,1,2,2-Tetrachloroethane (f) 1,1,2,2-Tetrachloroethane (s)	EPA 601 EPA 601	ng/⊦ ug/⊦	0, 38 0, 38		Nec a	NEG	NEG	NEG	NEG	NEG	NEG	NBG	NEG
		I			ļ	ŝ	9	9	Ş	9	Q	9	2
Viny! Chloride (f) vinvi Chloride (s)	EPA 601 EPA 601	ן∕6n	0 <b>.</b> 54 0 <b>.</b> 54		N S	2 22	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					ç	Ş	Ŷ	9	9	9	9	9	9
1,1-Dichloroethene (f) 1,1-Dichloroethene (s)	EPA 601 EPA 601	ng∕L ug∕L	0.49 0.49		NEG	NEC	NEG	NEG	NEG	NEG	NEG	NEG	NEG
		1) T.	C 7 0		51	66.	Ŷ	2	2.6	2.3	Ð	9	9
trans-1,2-Dichloroethene (f) trans-1,2-Dichloroethene (s)	EPA 601	ng/L ug/L	0.42		POS	POS	NEG	NEG	POS	POS	NEG	NEG	NEG
	109 YU	1/41	0.60		9	20.	9	9	9	9	9	9	Q
Trichl oroethene (t) Trichloroethene (s)	EPA 601	ug∕L ug∕L	0.60		NEG	POS	NEG	NEG	NEG	NEG	NEG	NEG	NEG

wwDw indicates that the parameter was not detected.

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			Detection	Fleid #:	9-MW	NW-7	C.W.3-A	GW3-B	GW3-C	G#(3-D	Sel-3A	<u>8</u> -38	Set-3C
Par anot er	Mathod	Units	Limit	Site :	OWL	OML	THREE	THREE	THREE	THREE	THREE	THREE	THREE
Purgeable Halocarbons	EPA 601	ng∕L	MDL										
Ch1 aroethane (f)	EPA 601	1∕6n	0.38		9	ହ	Ð	9	Q	0.70	9	Ð	9
Chloroethane (s)	EPA 601	ng/L	0, 38		NEG	NEG	NEG	NEG	NEG	POS	NEG	NBC	NEG
1,1-Dichloroethane (1)	EPA 601	ng/L	0.49		9	Ŷ	9	310	83.	97.	6.8	36.	37.
1,1-Dichtoroethane (s)	EPA 601	√bn	0.49		NEG	NEG	NEG	POS	POS	POS	POS	POS	POS
1,2-Dichioroethane (1)	EPA 601	ng/L	0.44		2	2	Ð	4.7	ĝ	1.9	9	3.0	2.8
1,2-Dichloroethane (s)	EPA 601	ng∕L	0.44		NEG	NEG	NEG	POS	NEG	SOd	NEG	POS	POS
1,1,1-Trichl croethane (1)	EPA 601	ng/L	0.53		9	Ŷ	9	0061	83.	1400	25.	1400	970
1,1,1-Trlchloroethane (s)	EPA 601	ng∕L	0.53		NEG	NEG	NEG	POS	SOH	SOd	P0S	POS	POS
1,1,2-Tr Ichl oroethane (f)	EPA 601	ng/L	0.51		9	Ð	2	Ŷ	9	9	Ŷ	2	9
1,1,2-Trichioroethane (s)	EPA 601	ng/L	0.51		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,2,2-Tetrach! or oethane (f)	EPA 601	ng/L	0.38		2	Q	Q	2	9	9	2	Ŷ	9
1,1,2,2-Tetrachioroethane(s)	EPA 601	J∕ɓn	0, 38		NEC	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Vinyl Chloride (1)	EPA 601	الر M	0.54		9	9	9	9	9	9.1	6.0	4.8	3.0
Vinyi Chloride (s)	EPA 601	ng∕L	0 <b>.</b> 54		NEG	NEG	NEG	NEG	NEG	POS	POS	POS	POS
1,1-Dichloroethene (f)	EPA 601	J∕bn	0.49		2	QN	9	30.	0.69	47.	5.7	35.	26.
1,1-Dichloroethene (s)	EPA 601	J∕6n	0.49		NEG	NEG	NEG	POS	POS	POS	POS	POS	FOS
trans-1,2-Dichloroethene (f)	EPA 601	ng∕L	0.42		Ð	<b>R</b>	9	35.	260	68 <b>.</b>	82 <b>.</b>	70.	55.
trans-1,2-Dichloroethene (s)	EPA 601	√6n	0.42		NEG	NEG	NEG	POS	POS	POS	POS	POS	POS
Trichtaroethene (t)	EPA 601	ng∕L	0,60		2	9	9	4.4	31.	4.4	740	570	350
Tr ichioroethene (s)	EPA 601	ng∕L	0°00		NEG	NEG	NEG	POS	POS	POS	POS	POS	POS

"ND" indicates that the parameter was not detected.

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### **DATACHEM ANALYTICAL REPORT** Duluth IAP - Water Samples Second Column Confirmations

			Detection	Fiald ".	A-AMC)	Gw4 - R	0-4MG)	GM4 -0	SW-4A	SW-4R	04-100	(19-14)	8- <b>W</b> M
Par amoter	Method	Units	Limit	Site :	FOUR	FOUR	FOLR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR
Purgeable Halocarbons	EPA 601	ng∕L	MDL										
Chloroethane (f)	EPA 601	J/bu	0.38		2	2	Ŷ	9	9	9	9	2	9
Chloroethane (s)	EPA 601	ng∕L	0, 38		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1-Dichi proethane (f)	EPA 601	ng/L	0.49		9	QN	CIN	Ŷ	2	9	Ð	9	Q
1, 1-Dichloroethane (s)	EPA 601	ng/L	0.49		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichlaraethane (f)	EPA 601	ng/L	0.44		Ŷ	Î	Ŷ	9	9	9	Q	Ð	9
1,2-Dichloroethane (s)	EPA 601	νgυ	0.44		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,1-Trichloroethane (1)	EPA 601	ng/L	0.53		9	QN	2	9	Q	9	.61	10.	QN
1, 1, 1-Tr Ichloroethane (s)	EPA 601	ı∕£u	0.53		NEG	NEG	NEG	NEG	NEG	NEG	POS	POS	NEG
1,1,2-Trichioroethane (f)	EPA 601	ng/L	0.51		9	Q	9	9	QN	9	9	9	Ŷ
l, l, 2-Tr ichloroethane (s)	EPA 601	1/6n	0.51		NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG
1,1,2,2-Tetrachloroethane (f)	EPA 601	J∕bn	0.38		2	2	Q	Q	9	9	Q	9	9
1,1,2,2-Tetrachloroethane (s)	EPA 601	Vgu	0, 38		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Viny! Chloride (f)	EPA 601	ng/L	0.54		9	£	Û	9	Đ	9	Q	9	9
Vinyi Chloride (s)	EPA 601	J∕bu	0.54		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1-Dichlorcothene (f)	EPA 601	ng/L	0.49		9	9	Ð	9	9	9	9	9	Ð
1,1-Dichloroethene (s)	EPA 601	J∕bn	0.49		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
trans-1,2-Dichloroethene (f)	EPA 601	ng/L	0.42		Ð	(ja)	QN	2	9	4.0	4.4	2.2	Q
trans-1,2-Dichloroethene (s)	EPA 601	J∕bu	0.42		NEG	NEG	NEG	NEG	NEG	Pos	POS	POS	NEG
Trichtoroethene (t)	EPA 601	ng/L	0.60		9	9	2	9	9	22.	16.	9*6	9
Trichloroethene (s)	EPA 601	√6n	0°60		NEG	NEG	NEG	NEG	NEG	POS	POS	POS	NEG

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			Detection	Field #∕:	6-MW	MW-10	MW-11	GW5-A	GW5-B	GW5-C	SW-5A	SM-58	SH-5C
Par ameter	Mathod	Units	Limit	Site :	FOUR	FOUR	FOUR	FIVE	FIVE	FIVE	FIVE	FIVE	FIVE
Purgeable Halocarbons	EPA 601	J∕bn	MDL										
Chloroethane (f)	EPA 601	רγ חלγ	0.38		9	ŊN	9	9	Ð	9	9	9	9
Chloroethane (s)	EPA 601	J∕ɓn	0. 38		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1-Dichioroethane (f)	EPA 601	الر Up	0.49		9	9	Ŷ	9	9	Q	QN	9	9
1,1-Dichloroethane(s)	EPA 601	ng∕L	0.49		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichloroethene (f)	EPA 601	ר, שין ע	0.44		9	9	Ŷ	9	9	9	9	9	9
1,2-Dichloroethane (s)	EPA 601	ng/L	0.44		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,1-Trichloroethane (f)	EPA 601	ng/L	0.53		Ŷ	9	Ð	9	9	9	9	9	9
1 <b>,1,1-Tr Ichioroethane (s)</b>	EPA 601	√bn	0.53		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
1,1,2-Tr Ichi oroethane (f)	EPA 601	ng/L	0.51		9	9	QN	9	Q	9	9	9	2
1,1,2-Tr Ichloroethane (s)	EPA 601	ng/L	0.51		NEG	NEG	NEG	NEG	NEG	NEG	NBG	NEG	NEG
1,1,2,2-Tetrachl oroethane (f)	EPA 601	ng/L	0.38		9	9	2	9	9	9	9	9	9
1,1,2,2-Tetrachloroethane (s)	EPA 601	1∕6n	0, 38		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Vinyt Chloride (f)	EPA 601	ng∕L	0.54		9	9	9	9	QN	9	Ð	9	Ð
Vinyi Chloride (s)	EPA 601	J∕bn	0.54		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
1,1-Dichloroethene (f)	EPA 601	ך/bn	0.49		9	9	9	9	Ð	9	9	9	9
1,1-Dichloroethene (s)	EPA 601	ng/L	0.49		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
trans-1,2-Dichloroethene (f)	EPA 601	ן∕bn	0.42		9	5.8	9	9	Ð	9	9	Q	₽
trans-1,2-Dichloroethene (s)	EPA 601	1∕6n	0.42		NEG	POS	NEG						
Trichioroethene (f) Trichioroethene (s)	EPA 601 EPA 601	1/6n T/6n	0.60 0.60		Q Q	NEC N	NEC	NEC N	NEG N	NEC N	Q S	Q 9	NEG NEG
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"ND" indicates that the parameter was not detected.

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DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

Par and or	Method	Units	Detection Limit	Field#: Site :	GM7-A SEVEN	GW7-B SEVEN	GW7-C SEVEN	SM-7A SEVEN	GWB-A EI GHT	GWB-B EI GHT	GM8-C EI GH	SH-8A EI GHT	SW-8B EI GHT
Purgeable Helocarbons	EPA 601	1∕6n	MDL										
	FPA 601	1/00	0.38		9	9	2	Q	9	9	9	2	9
Chloroethane (s) Chloroethane (s)	EPA 601		0. 38		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
:		1	0 0 0		Q	QN	2	QN	Q	2	Q	9	Q
1,1-Dichioroethane (f) 1,1-Dichioroethane (s)	EPA 601	J∕6n	0.49		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
:					9	0.82	Q	0.83	QN	9	Ð	9	9
1,2-Dichi oroethane (f) 1,2-Dichi oroethane (s)	EPA 601	ng∕L ug∕L	0.44		NEG	POS	NEG	SO4	NEG	NEG	NEG	NEG	NEG
	i	1	0 E 1		ç	Ģ	9	QN	9	9	2	9	<del>9</del>
1,1,1-Tr ichi oroethane(f) 1,1,1-Tr ichioroethane(s)	EPA 601 EPA 601	ug/L رون	0.53		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
			i		ç	Q	GN	9	9	Q	2	9	9
1,1,2-Tr ichloroethane (f)	EPA 601	، fon	16.0		2 5	NEC	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1,2-Trichloroethane (s)	EPA 601	ng∕L	0,51		NEC NEC		3	2					
	504 601	1/011			9	Q	9	Q	9	9	9	9	9
1,1,2,2-Tetrachi oroethane (1) 1,1,2,2-Tetrachi oroethane (s)	EPA 601	ug/L	0, 38		NEG	NEG	NEG	NEG	NEC	NEC	NEG	NEG	NEG
		17 m	63.0		9	QN	2	9	9	9	9	9	9
vinyl Chloride (f) vinyl Chloride (s)	EPA 601	ug/L	0.54		NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG	NEG
			07 0		9	9	9	9	2	9	9	9	9
1,1-Dichioroethene (f) 1,1-Dichioroethene (s)	EPA 601	ng/L	0.49		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
::			C ¥ V		ŝ	Q	2	7.2	£	9	9	9	9
trans-1,2-Dichioroethene (t) trans-1,2-Dichloroethene (s)	EPA 601	ng∕L J∕gu	0.42		NEG	NEG	NEG	POS	NEG	NEG	NEC	NBC	NEG
		1	0.60		g	220	1.1	5.1	9	9	9	9	9
Trichioroethene (f) Trichioroethene (s)	EPA 601	ng∕L ug∕L	0.60		NEG	904 204	POS	POS	NEG	NEG	NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

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DATACHEN ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

					41 RT	TRIP	TRIP	RINSE
		lh i ts	Detection Limit	Fleid #: Site :	BLANK FOUR	BLANK	BLANK EI GHT	BLANK
Par amerar		1/01	ign					
Purgeable Halocarbons		З. Г	1		ŝ	G	9	QN
	EPA 601	ng/L	0, 38		2			un
Chicrostnare (s)	EPA 601	7/6n	0.38		NEG	NEG	NES	L S
			QV Q		Q	2	9	CIN
1_1_1_Dichloroethane (f)	EPA 601	ng/L	64°0			NFG	NEG	NEG
1,1-D1 chl ar oethane (s)	EPA 601	J∕ɓn	0.49		NEG	MCO	2	
			0 AA		2	9	9	Q
1,2-Dichloroethane (f) 1 2-Dichloroethane (s)	EPA 601	ng∕r ng∕r	0.44		NEG	NEG	NEG	NEG
					Ŷ	2	2	CN
· · · · Te testorosthana (f)	EPA 601	1∕6n	cc•0		2		MCC.	NFG
1,1,1-Trichloroethane (s)	EPA 601	ng/L	0.53		NEG	NHC.	Daw	
;	107 FUJ	1/01:	0.51		9	2	9	QN
1,1,2-Tr ichloroethane (f)		ng/ c			NEG	NEG	NEG	NEG
1,1,2-Trichloroethane (s)	EPA 601	ng/L	- c • n					
			82 0		2	2	2	QN
1,1,2,2-Tetrachloroethane (f)	EPA OUT	יים/ו יים/ו	0. 18 87 - 0		NEG	NEG	NEG	NEG
1,1,2,2-Tetrachi oroethane (s)		ч (fa	•					
	109 003	1/ UN	0.54		2	9	2	Q
vinyi Chioride (f) vinyi Chioride (s)	EPA 601	ng/L	0.54		NEG	NEG	NEG	NEG
•		10.	0 <b>4</b> 9		9	2	Ð	QN
1,1-Dichloroethene (f) 1,1-Dichloroethene (s)	EPA 601	ng/L			NEG	NEG	NEG	NEG
	103 403	Von			9	2	9	QN
<pre>trans-1,2-Dichioroethene (1) +</pre>	EPA 601	-1/6n	0.42		NEG	NEG	NEG	NEG
					9	2	9	QN
Tr (chioroathene (f)	EPA 601				NFG	NEG	NEG	NEG
frichloroethene (s)	EPA 601	ng∕L	0.60					

"ND" indicates that the parameter was not detected.

Н-219

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### DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Conflemations

Par anoter	Ma thod	un its	Detection Limit	Field #: Site :	GW1-A ONE	GW1-C	GW1-D ONE	GW1-E	SM-IA ONE	SW-1B ONE	GW2-A	GW2-B TWO	GW2-C TWO
Purgeable Halocarbons	EPA 601	J∕bn	MDL										ļ
	102 401	1/ 011	47 U		9	<u>g</u>	2	9	Ð	Ð	9	Q	2
Tetrachioroethene (f) Tetrachioroethene (s)	EPA 601	ug/L	0°.38		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
			00.0		Ş	Ŷ	2	2	9	Ð	9	9	9
1,2-Dichioropropane (f) 1,2-Dichioropropane (s)	EPA 601	ug/L ug/L	0.20		NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEC	NEG
			0 5 U		9	9	2	2	2	9	2	2	9
cis-1,3-Dichioropropene (f) cis-1,3-Dichloropropene (s)	EPA 601	ug/L ug/L	0.58		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	i		01 0		ç	9	6	9	9	2	2	2	Q
trans-1,3-Dichiarapropene (f) trans-1,3-Dichloropropene (s)	EPA 601 EPA 601	ng/L	95 °0		NEG	NEG	NEC	NEG	NEG	NEG	NEG	NEG	NEG
		1			Ş	S	9	Q	2	9	9	9	9
2-Chioroethylvinyl Ether (f) 2-Chioroethylvinyl Ether (s)	EPA 601 EPA 601	ng/L	0.44		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					Ş	2	2	2	Ŷ	Ð	9	9	Ŷ
Chlorobenzene (f) Chlorobenzene (s)	EPA 601	ng/L ug/L	0.57		NEG	NEC	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					Ş	Ĩ	2	2	2	9	9	9	9
1,2-Dichiorobenzene (f) 1.2-Dichiorobenzene (s)	EPA 601 EPA 601	ng∕L ug∕L	62°0		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	105 401	1	0.42		Ŷ	QN	9	2	Ð	9	9	2	Q
1,3Dichiorobenzene (1) 1,3Dichiorobenzene (5)	EPA 601	ug/L ug/L	0.42		NEG	NEC	NEG	NEG	NEG	NEG	NEG	NEG	NEG
	104 601		1 0		2	2	Q	9	9	9	9	9	q
1,4-Dichiorobenzene (1) 1,4-Dichlorobenzene (5)	EPA 601	ug/L	0.41		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

11-220

"ND" indicates that the parameter was not detected.

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### **DATACHEM ANALYTICAL REPORT** Duluth IAP - Water Samples Second Column Confirmations

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			Detection	Field #:	GW2-D	GW2-E	SW-2A	SM-2B	SW-2C	1 – MW	<b>M</b> -2	A-MM	<b>NW-5</b>
Par anoter	Method	un i ts		Site :	OWL	OML	TWO	OML	OML	Two	OWL	Two	DMU
Purgeable Halocarbons	EPA 601	ng/L	MDL										
Tetrachioroethene (†)	EPA 601	ng/L	0.38		2	Q	9	Q	QN	QN	9	9	9
Te trachloroethene (s)	EPA 601	ng/L	0. 38		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1 "2-Dichloropropane (f)	EPA 601	ר/bn	0,20		9	QN	9	9	Ŷ	9	9	9	9
1,2-Dichioropropane (s)	EPA 601	J∕6n	0.20		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
cis-1,3-Dichloropropene (f)	EPA 601	۲/бл	0,58		9	9	Q	9	9	9	9	9	9
cis-1,3Dichloropropene (s)	EPA 601	ng/L	0.58		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
trans-1,3-Dichloropropene (f)	EPA 601	ng/L	0, 39		2	2	9	9	9	9	9	9	9
trans-1,3-Dichloropropene (s)	EPA 601	ng∕L	0. 39		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
2-Chloroethylvlnyl Ether (f)	EPA 601	ng/L	0.44		9	Q	2	9	9	9	9	9	Ð
2-Chloroethylvinyl Ether (s)	EPA 601	J∕gu	0.44		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chlorobenzene (f)	EPA 601	ng/L	0.37		9	2	Ð	9	9	2	9	9	Ð
Chiorobenzene (s)	EPA 601	ng∕L	0.37		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichlorobenzene (f)	EPA 601	ng/L	0.29		₽	9	Ð	Q	9	9	Ð	Q	Ŷ
1,2-D1chlorobenzene (s)	EPA 601	J∕bn	0. 29		NEG	NEG	NEG	NEG	NEC	NEG	NEG	NEG	NEG
1,3-D1 chl orobenzene (f)	EPA 601	ng/L	0.42		Ð	9	Ð	9	QN	2	Ŷ	9	9
1,3-Dichlorobenzene (s)	EPA 601	ng/L	0.42		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,4-Dichlorobenzene (1)	EPA 601	ng/L	0.41		9	Ŷ	9	9	2	₽	Ð	9	Ð
1,4-Dichlorobenzene (s)	EPA 601	ng/L	0.41		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

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"ND" indicates that the parameter was not detected.

Н-221

DATACHEN MULYTICAL REPORT	Oututh IAP - Water Samples	Second Column Confirmations
DATACHE	Dututh	Second

Par ane ter	Mathod	units	Detection Limit	Fleid #: Site :	9-MM	T-MM TWO	GW3-A THREE	GW3-B THREE	GW3-C THREE	GW3-D THREE	SW-3A THREE	SM-38 THREE	SH-3C THREE
Purgeable Hal ocarbons Tetrachi oroethene (1)	EPA 601 EPA 601 EPA 601	J∕bn 1/bn	MUL 0,38 0,38		N NO	NEC NEC	ND NEG	490 POS	430 POS	1000 POS	10. POS	10. POS	8 <b>.</b> 1 POS
Tetrachioroethene (s) 1,2-Dichioroethene (f) 1,2-Dichioroeropane (s)	EPA 601 EPA 601		0.20 0.20		NEG	ND NEG	NG NEG	NEC	ND	NEC NEC	N RC N RC	CN SB	NO NEG
cis-1,3-0ichioropropene (f) cis-1,3-0ichioropropene (s)	EPA 601 EPA 601	ng∕L ug∕L	0 <b>.</b> 58 0 <b>.</b> 58		NEC	ND	ND	NEC	N RC N		Q SB Q	Q 99 Q	N NEG
trans-1,3-Dichloropropene (f) trans-1,3-Dichloropropene (s)	EPA 601 EPA 601	ng/L ug/L	0.39 0.39		NEC	ND NEG	N N NEC	NEG ND	NEC	2 23 2	NEG	NEC N	NEG N
2-Chloroethylvinyl Ether (f) 2-Chloroethylvinyl Ether ^(s)	EPA 601 EPA 601	ng∕L ug∕L	0.44 0.44		NEG	NEG	NEG ND	NEC	NEG		e ee e	Se Se Se Se Se Se Se Se Se Se Se Se Se S	ND G
Chil or obenzene (f) Chil or oben zene (s)	EPA 601 EPA 601	אן/bu ח9∕ר	0.37 0.37		NEC	ND	NEG	ND	NEG	NEC	N SE S	N N N	NEC NEC
1,2-Dichlorobenzene (f) 1,2-Dichlorobenzene (s)	EPA 601 EPA 601	1∕6n ∩∂∕⊦	0.29 0.29		NEC N	ND	NEC	ND NEC	NEG	NEC NO	N N N	NEC N	N N N
1,3-Dichtorobenzene (f) 1,3-Dichtorobenzene (s)	EPA 601 EPA 601	ng/L ug/L	0 <b>.</b> 42 0 <b>.</b> 42		NEG	C S	Q 93N	N N	N EG		9 9 9 9 9	N NEC	ND ND
1 "4-Dichiarobenzene (f) 1 "4-Dichiarobenzene (s)	EPA 001 EPA 601	√6n 1/in	0.41 0.41		NEC	NEG	NEG	NEG	N S	NEG	NEC	NEG	NEG

H-222

"NO" indicates that the parameter was not detected.

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**CATACHER AWALYTICAL REPORT** Duluth IAP - Water Samples Second Column Confirmations

			Detection	Field #:	GW4-A	GW4-B	<b>GW4</b> -C	GW4-D	SW-4A	SW-4B	SW-4C	54-4D	MM-8
Par ameter	Method	Un i ts	Limit	Site :	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FUR	FOUR	FOUR
Purgeable Halocarbons	EPA 601	ng/L	MDL										
Tetrachloroethene (f)	EPA 601	J∕L	0, 38		2	9	Q	9	9	Ð	QN	9	9
Te trachioroethene (s)	EPA 601	ng∕L	0, 38		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
1,2-Dichloropropane (f)	EPA 601	۲/bn	0.20		9	9	9	Ð	9	2	9	Ð	9
1,2-Dichloropropane (s)	EPA 601	J∕bu	0.20		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
cls-1,3-0ichioropropene (f)	EPA 601	ng/L	0,58		9	9	9	2	9	9	9	9	2
cis-l,}-Dichioropene (s)	EPA 601	J∕bn	0.58		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
trans-1,3-Dichloropropene (f)	EPA 601	ר) חס/ר	0,39		2	9	Q	9	9	2	9	Ð	9
trans-1,3-Dichloropropene (s)	EPA 601	ng/L	0. 39		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
2-Chloroethylvinyl Ether (f)	EPA 601	ר) ח/ני	0.44		2	9	9	9	₽	9	9	9	Q
2-Chloroethyivinyl Ether (s)	EPA 601	1∕6n	0.44		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chiorobenzene (f)	EPA 601	ng/L	0.37		9	Q	Ð	9	₽	0.98	2.2	9	9
Chiorobenzene (s)	EPA 601	ղ/ըս	0.37		NEG	NEG	NEG	NEG	NEG	POS	POS	NEG	NEG
1,2-Dichlorobenzene (f)	EPA 601	ng/L	0.29		9	9	9	9	Q	9	9	9	Ð
1,2-Dichlorobenzene (s)	EPA 601	ng/L	0• 29		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,3-Dichiorobenzene (f)	EPA 601	ng/L	0.42		9	9	Ŷ	9	9	Ð	9	9	<del>Q</del>
1,3-01chlorobenzene (s)	EPA 601	1∕bn	0.42		NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG	NEG
1,4-Dichlorobenzene (f)	EPA 601	ng/L	0.41		Q	Ð	Ŷ	9	9	9	9	9	9
1,4-Dichlorobenzene (s)	EPA 601	ng/L	0.41		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

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# DATACHBA MMALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

Par amotor	Method	Units	Detection Limit	Field #: Site :	MM-9 FOUR	MM-10 FOUR	FOUR	GN5-A FIVE	GN5-B FIVE	G#5-C FIVE	SH-5A FIVE	SW-58 FIVE	SH-5C FIVE
Purgeable Halocarbons Tetrachloroethene (f)	EPA 601 EPA 601 EPA 601	ng/L ug/L	MDL 0, 38 0, 38		NEG	NEC N	ND	NEG	ND	N ND	ND NEG	N ND	ND NEG
Tetrachioroethene (s) 1,2-Dichioropropane (f) 1,2-Dichioropropane (s)	EPA 601 EPA 601	ng/L ug/L	0 <b>.</b> 20 0 <b>.</b> 20		ND	ND	NEG	NEG N	NEG	ND	N EC NO	NEC NO	NEG N
cls-1,3-Dichloropropene (f) cls-1,3-Dichloropropene (s)	EPA 601 EPA 601	ng/L ug/L	0 <b>.</b> 58 0 <b>.</b> 58		N N	NEG	ND	NEC	N N N	N S S	9 ⁹⁹ 9		9 9 9 9 9 9
trans-1,j-Dichloropropene (†) trans-1,j-Dichloropropene (s)	EPA 601 EPA 601	ng/L ug/L	0 <b>.</b> 39 0 <b>.</b> 39		N P	NEC	ND	Q S	NEC	e e	2 Sa		NEG
2-Chloroethyivinyi Ether (f) 2-Chloroethyivinyi Ether (s)	EPA 601 EPA 601	ı∕bu J∕bu	0.44 0.44		NEG	NEC NO	N EG	NEG	NEC NO	NEC N	NEC	N S	NEG NEG
Chlorobenzene (f) Chlorobenzene (s)	EPA 601 EPA 601	רן, מ∂∕ר	0.37 0.37		ND	ND	ND ND	NEC N	NEC	NEC	Q B	N NO	2 y i
1,2-Dichlorobenzene (†) 1,2-Dichlorobenzene (s)	EPA 601 EPA 601	√6n 1/6n	0, 29 0, 29		NEG	ND	N N N N	N N N	NEC	N RC	N NO	9 9 9 9	
1,3-Dichlorobenzene (f) 1,3-Dichlorobenzene (s)	EPA 601 EPA 601	1∕6n 1∕6n	0 <b>.4</b> 2 0 <b>.4</b> 2		NEG	ND	ND	NEC	N Sec			2 <u>2</u> 2 <u>2</u> 2 <u>2</u>	NEG
1,4-Dichlorobenzene (1) 1,4-Dichlorobenzene (s)	EPA 601 EPA 601	√gu √L	0.41 0.41		NEG	N RC	Q 29	C N N N N	N SI	N SI	NEC	S SS	N N N N N N N N N N N N N N N N N N N

H-224

"ND" indicates that the parameter was not detected.

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				DATACHE		DATACHEM ANALYFICAL REPORT	, سر						
				Second C	olumin Cor	burun un maren sempres Second Column Confirmations	۲ ۲						
Por áme ter	Method	Un i ts	Detection Limit	Field#: Site :	GW7-A SEVEN	GW7-B SEVEN	GW7-C SEVEN	SW-7A SEVEN	GWB-A E1 GHT	GW8-B EIGHT	GWB-C EI GHT	SW-8A E1 GHT	SW-88 EI GHT
Purgeable Halocarbons		1/6n	MDL										
Tetrachioroethene (1)	EPA 601	רγ ng/ך	0.38		Q	ÛN	9	7.6	9	9	9	2	9
Tetrachloroethene (s)	EPA 601	ng∕L	0.38		NEG	NEG	NEG	POS	NEG	NEG	NEG	NEG	NEG
1.2-Dichioropropane (f)	EPA 601	۱/وu	0.20		Q	QN	2	9	Q	9	QN	9	Q
1,2-Dichloropropane (s)	EPA 601	J∕bn	0.20		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
cis-i,3-Dichioropropene (f)	EPA 601	ng∕1	0,58		9	R	Ð	9	9	QN	9	9	9
cis-1,3-Dichloropropene (s)	EPA 601	γĥ	0,58		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NBG	NEG
trans-1,3-Dichloropropene (f)	EPA 601	ר (ק	0.39		9	2	Ð	2	9	9	Ð	Ŷ	Ð
trans-1,J-Dichloropropene (s)	EPA 601	ng∕L	0, 39		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
2-Chloroethylvinyl Ether (f)	EPA 601	ng∕L	0.44		9	2	ହ	Ð	9	2	9	2	9
2-Chloroethylvinyl Ether (s)	EPA 601	J∕bn	0.44		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chlorobenzene (f)	EPA 601	ng/د ال	0.37		9	9	9	9	Ð	Ð	2	Ð	Ð
Chłorobenzene (s)	EPA 601	√bn	0.57		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichlorobenzene (1)	EPA 601	ng/L	0.29		9	<u>n</u>	Ð	QN	Q	2	Q	Ð	Ð
1,2-Dichlorobenzene (s)	EPA 601	ng/L	0, 29		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,3-Dichiorobenzene (f)	EPA 601	J∕bu	0.42		9	9	Ð	9	9	2	Ð	2	9
1,3-Dichlorobenzene (s)	EPA 601	J∕bu	0.42		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,4-Dichiorobenzene (f)	EPA 601	ng∕L	0.41		<del>Q</del>	QN	Ŷ	9	2	Q	2	9	9
1,4-Dichlorobenzene (s)	EPA 601	ng/L	0.41		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

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"ND" indicates that the parameter was not detected.

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# ONTACHEN ANALYTICAL REPORT Duluth iAP - Water Samples Second Column Confirmations

			Detection	field #:	TR IP BLANK	TRIP	TR IP BLANK	RI NSE BLANK TUDEF
Par ameter	Mathod	Un i ts	Limit	Site :	FOUR	SEVEN	1011	
burnear la Hajocarbons	EPA 601	ng/L	MDL			(	ŝ	0 57
Tetrachloroethene (f)	EPA 601 6PA 601	ר אליע	0 <b>.</b> 38 0 <b>.</b> 38		<b>P</b>	NEG	NEG	POS
Tetrechloroethene (S)	604 601	ua/L	0,20		9	2	Ner Ner	ND NEG
1,2-Dichloropropane (1) 1,2-Dichloropropane (5)	EPA 601	1/6n	0.20		NEG	NEG		
cis-t,J-Dichloropropene (f)	EPA 601 EPA 601	1/6n 1/6n	0 <b>.</b> 58 0 <b>.</b> 58		NEG D	NEG N	C SH	NEG
trans-1,3-01chioropropene { f}	EPA 601 EPA 601	ן∕ני שין/ני	0 <b>.</b> 39 0 <b>.</b> 39		NEG	NO	ND	ND
2-Chlorosthylvinyl Ether (f)	EPA 601 EPA 601	1/6n 1/6n	0.44 0.44		Nec Nec	Neg	NEG N	ND
Chiorobenzene (f) Chiorobenzene (f)	EPA 601 EPA 601	1/6n 1/6n	0 <b>.</b> 37 0 <b>.</b> 37		NEG	ND NEG	NEG	NO NEG
1,2-Dichlorobenzene (†) 1,2-Dichlorobenzene (†)	EPA 601 EPA 601	1/6n 1/6n	0, 29 0, 29		NEG NO	ND	ND	ND
1, 3-01chiorobenzene (†) 1,3-01chiorobenzene (†)	EPA 601 EPA 601	ng∕r J∕gu	0.42 0.42		NEG	NEG NEG	NEG	NE NO
1,4-Dichlorobenzene (f) 1,4-Dichlorobenzene (s)	EPA 601 EPA 601	ר/פֿח ר/פֿח	0.41		Nee Nee	NEG	ND	ND

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wyour indicates that the parameter was not detected.

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DATACHEN ANALYFICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

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			Detection	Field #:	GW1-A	GW1-C	Gw1-D	GW1-E	V1-35	91- <b>7</b> 5	GM2-A	GM2-B	GW2-C
Par anater	Mathod	Units	Limit	Site :	ONE	ONE	ONE	ONE	ONE	ONE	OML	OFL.	Two
Purgeable Arcmatics	EPA 602	ng/L	NDL										
Benzene (f)	EPA 602	ר) הס/ר	0.25		2	Q	9	Ð	9	9	9	9	Ŷ
Benzene (s)	EPA 602	J∕ɓn	0.25		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Toluene (f)	EPA 602	ר, שין∕ם	0.64		9	Q	Ð	9	9	9	9	9	9
Toluence (s)	EPA 602	γɓn	0.64		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Ethylbanzene (f)	EPA 602	ng/L	0 <b>.</b> 75		9	Ŷ	9	2	9	Ð	9	9	QN
Ethylbenzene (s)	EPA 602	J∕bn	0,75		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG
o-Xylene (†)	EPA 602	ng/L	0.78		9	Ð	9	9	9	9	9	9	9
o-Xylene (s)	EPA 602	ng/L	0.78		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
m-Xylene (f)	EPA 602	ng/L	0.45		2	9	Q	Q	9	Ŷ	9	2	2
m-Xylene (s)	EPA 602	J∕bu	0.45		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
p-Xylene (f)	EPA 602	ng/L	0,78		9	Ŷ	9	9	9	9	2	9	9
p-Xylene (s)	EFA 602	ng/L	0.78		NEG	NEG	NEC	NEG	NEG	NEG	NEG	NEG	NEG
Chil or obenzene (f)	EPA 602	ug/L	0,35		9	9	9	9	9	9	9	9	9
Chlorobenzene (s)	EPA 602	ng/L	0.35		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1-Dichtorobenzene (f)	EPA 602	J∕bn	0.47		9	9	QN	9	9	9	9	Ð	9
1,1-Dichlorobenzene (s)	EPA 602	ng/L	0.47		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichlorobenzene (f)	EPA 602	ng/L	0,93		9	9	9	9	9	9	9	9	9
1,2-Dichlorobenzene (s)	EPA 602	ug/L	0, 93		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,3-Dichiorobenzene (f)	EPA 602	ng/L	0.44		9	9	9	9	9	9	9	9	<del>9</del>
1, 3-Dichiorobenzene (s)	EPA 602	ng/L	0.44		NEG	NEC	NEG	NEG	NEG	NEG	NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

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### DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

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		_	Detection	Field #:	GW2-D	GW2-E	5W-2A	SW-2B	SW-2C	MW-1	M-2	4-4	<b>MW-5</b>
Par ameter	Method	Uh i ts	Limit		TWO	OML	OWL	OML	0ML	140	ONL	OML	OMT
Purgeable Arcmatics (cont.)	EPA 602	J∕bn	NDL										
Benzene (f)	EPA 602	ng/L	0.25		Ð	ÛN	Q	9	9	Q	Ð	Q	9
Benzene (s)	EPA 602	ng∕L	0*25		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Toluene (f)	EPA 602	ug/L	0.64		9	Ð	9	9	9	Ð	9	₽	2
Toluene (s)	EPA 602	ng/L	0.64		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Ethylbenzene (f)	EPA 602	ng/L	0.75		2	9	9	9	9	2	9	9	Ð
Ethylben zane (s)	EPA 602	ng∕L	0.75		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
o-Xylene (f)	EPA 602	ng/L	0.78		9	Ĵ	9	9	2	2	9	9	9
o-Xylene (s)	EPA 602	J∕ɓn	0.78		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
m-Xylene (f)	EPA 602	ng/L	0.45		9	ç	9	9	9	2	9	9	2
m-Xylene (s)	EPA 602	ng/L	0.45		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NBG	NEG
p-Xylene (f)	EPA 602	ng/د	0.78		9	9	QN	9	£	2	Ŷ	9	QN
p-Xylene (s)	EPA 602	J∕6n	0,78		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chlorobenzene (f)	EPA 602	ng∕L	čč <b>.</b> 0		9	QN	9	9	9	QN	9	9	9
Chlorobenzene (s)	EPA 602	ng∕L	0,35		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1-Dichiorobenzene (1)	EPA 602	ng∕L	0.47		9	Q	9	Ð	9	9	9	Q	9
I,1-Dichiorobenzene (s)	EPA 602	ng/L	0.47		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
1,2-Dichior obenzene (1)	EPA 602	ug∕i.	0 <b>.</b> 95		2	<u>Q</u>	9	Q	QN	Ð	2	9	9
1,2-Dichlorobenzene (s)	EPA 602	ng∕L	<b>0</b> •93		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG
1,3-Dichlorobenzene (1)	EPA 602	ng/L	0.44		9	Đ	9	2	2	9	Ð	9	9
1, J-DI chi oroben zen e (s)	EPA 602	¶/6n	0.44		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG

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			Detection	Field #:	9-М	7-WM	GW3-A	GW3-B	C#3-C	GW3-D	SW-3A	SM-3B	SH-3C
Parameter	Mathod	Units	Limit	Site :	04		THREE	THREE	THE	THREE	THREE	THREE	THREE
Purgeable Arguatics (cont.)	EPA 602	ng/L	MDL										
Benzene (†)	EPA 602	J∕bn	0.25		Q	2	Ð	9	9	9	Ð	Q	Ð
Benzene (s)	EPA 602	ng∕L	0.25		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Toluene (f)	EPA 602	ng∕L	0.64		Ð	9	9	36.	2	9	9	9	2
Toluene (s)	EPA 602	ng/L	0.64		NEG	NEG	NEG	POS	NEG	NEG	NEG	NEG	NEG
Ethylbenzene (f)	EPA 602	ng/L	0.75		Ŷ	9	9	9	2	Ŷ	Ŷ	Q	9
Ethylbenzene (s)	EPA 602	ng/L	0.75		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
o-Xytene (t)	EPA 602	ng/L	0.78		9	9	Q	Q	9	2	Q	₽	9
o-Xylene (s)	EPA 602	ng∕L	0.78		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
m-Xylene (†)	EPA 602	ng/L	0.45		9	QN	9	9	9	2	9	9	9
R-Xylene (s)	EPA 602	ν _b υ	0.45		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
p-Xylene (†)	EPA 602	ng/L	0.78		2	9	9	9	Ð	9	9	9	9
p-Xylene (s)	EPA 602	ng/L	0,78		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chlorobenzene (f)	EPA 602	ng/L	0,35		9	9	Q	Ð	9	2	9	9	Ð
Chlorobenzene (s)	EPA 602	1∕6n	0.35		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1-Dichioropenzene (f)	EPA 602	ng/L	0.47		2	Q	2	9	9	9	Ŷ	9	Ð
1,1-Dichiorobenzene (s)	EPA 602	J∕bu	0.47		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichiorobenzene (f)	EPA 602	J∕bn	0,93		Q	Ŷ	£	Ð	₽	9	9	9	9
1,2-Dichlorobenzene (s)	EPA 602	ng/L	0.93		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1, 3-Dichlorobenzene (f)	EPA 602	J∕bu	0.44		9	Q	QN	9	9	9	9	9	9
1,3-Dichlorobenzene (s)	EPA 602	ng/L	0.44		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

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"ND" indicates that the parameter was not detected.

250	
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DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

				. A biolog	A-AMA	(3w(4-13	GW4-C	GW4-D	SM-4A	SW-4B	SM-4C	SM-4D	<b>MM-8</b>
Paramater	Method	Units			FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR	FOUR
Purgesble Argmatics (cont.)	EPA 602	۰/J	MDL								ç	0	C 2
Benzene (†)	EPA 602 EPA 602	ng∕L ug∕L	0.25 0.25		NEC NO	NEC	N N	N N N N N N N N N N N N N N N N N N N	NEG	- c1 POS	• 50 • 00	904 904	NEG
		4			5	9	2	9	9	9	2.0	9	2
Toluens (f) Toluense (s)	EPA 602 EPA 602	√bn √bn	0°0		NEG	NEG	NEG	NEG	NEG	NEG	P.05	NBC	NEG
		:	35.0		Ŵ	Ð	9	9	2	g	9	9	Q
Ethylbonzono (f) Ethylbonzono (s)	EPA 602 EPA 602	√6n ∕F	0,75		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
		:	0 T U		S	Q	Q	9	9	9	Q	9	9
o-Xylene (†) o-Xylene (s)	EPA 602 EPA 602	ng∕L ug∕L	0.78		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
					Ş	9	Ĩ	Ð	2	9	73.	2	9
ma−Xylene (f) a−-Xulane (s)	EPA 602 EPA 602	√6n √6n	0.45 0.45		NEG	NEC N	NEG	NEG	NEG	NEG	POS	NBC	NEG
					ļ	ç	ģ	Ş	Ŷ	9	9	Q	2
p-Xylene (f)	EPA 602 FPA 602	ng∕L Ugu	0.78 0.78		NEC N		NEC 2	NEG	NEG	NEG	NEG	NEG	NEG
p-Xylene (S)		)				4	ç	ģ	Ş	1-6	2.8	2	9
Chlorobenzene (†)	EPA 602 EPA 602	1∕6n 1∕6n	0 <b>.</b> 35 0 <b>.</b> 35		Q 9	NEC	N SI	NEG	NEG	POS	Sol	NEG	NEG
		•			Ş	Ŷ	2	9	9	2	9	QN	2
1,1-Dichiorobenzene (f) 1,1-Dichiorobenzene (s)	EPA 602 EPA 602	ng∕t ug∕t	0.47		NEG	NEG	NEG	NEG	NEG	NEG	SB N	NEC	NE C
1 2-Dicklorohanzana (f)	EPA 602	ng/L	0 <b>.</b> 93		9	9	<b>D</b>	Q V	Q Q	9 9 9	9 9 9	9 8 2	NeG NeG
1,2-Dichlorobenzene (s)	EPA 602	ng/L			NEG	NEC	NEG	NEG	400	2	9	9	ŝ
1,3-Dichiorobenzene (f) 1,3-Dichiorobenzene (s)	EPA 602 EPA 602	ng/L ug/L	0.44 0.44		NEG	NEC	N NG	NEC	NEG	N NG	NEG	2 H	S S

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"ND" indicates that the parameter was not detected.

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# DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

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			Detection	Fleid #:	6-MW	Mw-10	1 LMW	GW5-A	GW5-B	GW5-C	SM-5A	SM-5B	SW-5C
Parameter	Method	Units	L Imit	Site :	FOUR	FOUR	FOUR	FIVE	FIVE	FIVE	FIVE	FIVE	FIVE
Purgeable Arcmatics (cont.)	EPA 602	J∕bn	MDL										
Benzene (f)	EPA 602	ng/L	0,25		9	QN	9	Ŷ	Ð	9	9	9	Ŷ
Benzene (s)	EPA 602	J∕bn	0,25		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Toluene (f)	EPA 602	ng/L	0.64		9	QN	7	Ð	9	9	2	9	9
Toluene (s)	EPA 602	ng∕L	0.64		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
Ethylbenzene (f)	EPA 602	ng∕L	0 <b>.</b> 75		9	9	9	9	9	9	9	9	9
Ethylbenzene (s)	EPA 602	ng/L	0,75		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
o-Xylene (f)	EPA 602	ug/L	0.78		9	Q	9	Ŷ	9	Ð	9	Ð	9
o-Xylene (s)	EPA 602	ng∕L	0,78		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
m-Xylene (f)	EPA 602	ng/L	0.45		Q	QN	9	9	Ð	9	2	₽	QN
m-Xylene (s)	EPA 602	ng∕L	0.45		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
p-Xylene (f)	EPA 602	ng/L	0.78		9	9	QN	Q	Ð	9	2	9	QN
p-Xylene (s)	EPA 602	ng/L	0,78		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Ch I or obenzene (f)	EPA 602	ug/L	0.35		9	9	Q	Q	Q	<del>Q</del>	9	Ð	9
Chloroben zene (s)	EPA 602	ng/L	0.35		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1-Dichlorobenzene (f)	EPA 602	J∕bn	0.47		9	QN	9	2	Ð	Ð	9	9	9
1, 1-Dichlorobenzene (s)	EPA 602	ng∕L	0.47		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichiorobenzene (f)	EPA 602	ng/L	0,93		QN	Ð	Q	Q	Q	9	QN	9	QN
1,2-Dichlorobenzene (s)	EPA 602	ng/L	0,93		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,3-Dichlorobenzene (f)	EPA 602	ng/L	0.44		9	Q	Ŷ	Ð	Q	9	9	Ð	9
1, 3-Dichlorobenzene (s)	EPA 602	ng/L	0.44		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

### DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

			Detection	Field #:	GW7-A	GW7-B	GW7-C	AT-N2	GWB-A	GwB-B		SW-BA	5MNS
Par ameter	Method	Units	Limit	Site :	SEVEN	SE VEN	SEVEN	SEVEN	EIGHT	EI GHT	EIGHT	EIGHT	EIGHT
Purgeable Aromatics (cont.)	EPA 602	J∕En	MDL										
Benzene (f)	EPA 602	ng/t	0.25		Ð	Q	Ŷ	9	9	ą	Q	9	9
Benzene (s)		ug/L	0.25		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Toluene (†)	EPA 602	ng/ل	0.64		9	9	QN	2	9	Q	Q	Q	6 <b>.</b> 5
Toluene (s)		ug/L	0.64		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	POS
Ethyłbenzene (f)	EPA 602	J∕Ęu	0,75		9	ę	9	9	9	9	QN	QN	Ŷ
Ethylbenzene (s)	EPA 602	ng/L	0.75		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
o-Xylene (f)	EPA 602 (	J/bu	0.78		9	QN	Q	2	Ð	9	QN	9	Ŷ
o-Xylene (s)	EPA 602	ng/L	0.78		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
m—Xylene (†)	EPA 602	ng/L	0.45		9	QN	9	2	Q	9	Ð	Q	9
a-Xylene (s)	EPA 602	ug∕L	0.45		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
p-Xylene (f)	EPA 602 1	ng∕L	0.78		9	Q	Ð	9	9	Ð	Q	9	9
p-Xylene (s)	EPA 602	ng∕L	0.78		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chlorobenzene (f)	EPA 602	ng∕L	0.35		Q	Ð	9	9	Ð	9	9	QN	Ð
Chlorobenzene (s)	EPA 602	ng/L	0,35		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,1-Dichiorobenzene (1)	EPA 602	J/bu	0.47		2	Ð	Ð	Ð	Q	Q	QN	9	Ð
1,1-Dichlorobenzene (s)	EPA 602	1∕6n	0.47		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,2-Dichtorobenzene (1)	EPA 602	ען. עלי	<b>60</b>		9	Q	9	Ð	9	Q	Ð	Q	Q
1,2-Dichlorobenzene (s)	EPA 602	ng∕L	0, 93		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
1,3-Dichiorobenzene (1)	EPA 602	ug/L	0.44		9	9	9	2	9	9	Q	9	Ŷ
1, 3-Dichlorobenzene (s)		ng/L	0.44		NEG	NEG	NEG	NEG	NEG	NBC	NEC	NEC	NEG

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# DATACHBA ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

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Par ano ter	Mathod	un ts	Detection Limit	Fleid #: BLANK Site : FOUR	TR IP BLANK SEVEN	EI GHT	RI NSE BLANK THREE
Purgeable Aromatics (cont.) Benzene (f)	EPA 602 EPA 602 EPA 602	1/6n 1/6n	<b>W</b> DL 0,25 0,25	NEG D	ND NEG	ND	ND NEG
Genzene (*) Toluene (*) Toluene (s)	EPA 602 EPA 602	1/6n 1/6n	0 <b>.</b> 64 0 <b>.</b> 64	ND NE(5	ND	NEG	NEG
Ethylbenzene (f) c+hulhenzene (s)	EPA 602 EPA 602	ח/נע ח/נע	0 <b>.</b> 75 0 <b>.</b> 75	NEG	Nec 0	NEG NEG	NEG
o-Xylene (†) 	EPA 602 EPA 602	ղ/նո ոց/Լ	0.78 0.78	ND NEG	ND NEG	ND	ND
m-Xylene (†)	EPA 602 EPA 602	1/6n 1/6n	0 <b>.4</b> 5 0 <b>.</b> 45	NEG NEG	ND	ND	ND
m-Xylene (f) p-Xylene (f) d-Xylene (s)	EPA 602 EPA 602	ng/L ug/L	0_78 0_78	ND	ON DEN	NEG D	NEG
Chlorobenzene (†) Chlorobenzene (5)	EPA 602 EPA 602	n∂∕L ug/L	0,35 0,35	ND	ND NEG	NG NEG	ND
1,1-Dichloroben zene (f) 1,1-Dichlorobenzene (s)	EPA 602 EPA 602	1∕6n 1∕F	0.47 0.47	NG	ND	NEG	NEG
1,2-Dichlorobenzene (f) 1,2-Dichlorobenzene (s)	EPA 602 EPA 602	1∕bn 1∕bn	0,93 0,93	NEG		NEG NEG	NEG N
1,3-01chlorobenzene {	EPA 602 EPA 602	1/6n 1/6n	0.44	REG	NEG	NEG	NEG

"NO" indicates that the parameter was not detected.

254	
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**DATACHEM ANALYTICAL REPORT** Duluth IAP - Water Samples Second Column Confirmations

			Detect	ction	Field #:	GW1-A	O-LWO	G-1-D	GW1-E	SW-1A	SW-18	GW3A	GW3-B	GW3-C
Par amoter	Method	Units	Limi	ni +	Site :	ONE	ONE	ONE	ONE	ONE	ONE	THREE	THREE	THREE
Pesticides	EPA 608	ng∕L	(V) TOM	MDL (†)										
Aidrin (f)	EPA 608	ng/L	0,007	0.02		Q	QN	QN	QN	9	Q	QN	QN	ÛN
Aidrin (s)	EPA 608	ոց/Լ	0,007	0.02		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
a ipha-BHC (†)	EPA 608	ng/L	0,006	0.004		QN	QN	QN	QN	0.01	0.02	Ŷ	0.06	0.02
alpha-BHC (s)	EPA 608	ոց/է	0,006	0.004		NEG	NEG	NEG	NEG	POS	POS	NEG	NEG	NEG
bete-BHC (f)	EPA 608	ug/L	0,006	0,005		Q	ÛN	Q	QN	60 <b>°</b> 0	0.19	Ŷ	Q	Đ
beta-BHC (s)	EPA 608	սց/Լ	0,006	0°005		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
del ta-BHC (f)	EPA 608	η/βn	0,002	0,006		Q	Ģ	QN	QN	Ð	QN	QN	QN	ÛN
delta-BHC (s)	EPA 608	ug/L	0,002	0,006		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Lîndane (f)	EPA 608	ng/L	0,005	0.005		9	QN	9	QN	Ð	Q	QN	Q	Q
Lindane (s)	EPA 608	√6n	0°005	0,005		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Chlordane (f)	EPA 608	ng/L	0.01	0,05		9	QN	Q	QN	QN	g	QN	QN	QN
Chiordane (s)	EPA 608	1∕6n	10*0	0,05		NEG	NEG	NEG	NEG	NEG	NEG	NEG	N EG	NEG
4,41-DDD (f)	EPA 608	J∕bn	0,004	0,005		9	QN	QN	QN	QN	Ŷ	QN	Ŷ	QN
4,4'-D0D (s)	EPA 608	ոց/է	0,004	0,003		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
4 ⁴ 4'-DDE (f)	EPA 608	ng/L	0,005	0,006		Ş	QN	QN	QN	QN	Ð	Q	2	Q
4,4°-00E (s)	EPA 608	ug/L	0,005	0,006		NEG	NEG	NEG	NEC	NEG	NEG	NEG	NEG	NEG
4,4'-D0T (f)	EPA 608	1/6n	0,03	0.01		QN	CIN	()N	QN	QN	ÛN	QN	0.02	ÛN
4,4'-DOT (s)	EPA 608	ng∕L	0.03	10.0		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

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"NO" indicates that the parameter was not detected.

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235	
Page	

**DATACHEN ANALYTICAL REPORT** Dulutn IAP - Water Samples Second Column Confirmations

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Par anater	Method	Units	Detec Lim	)etection Limit	field∦: Site :	GW3-D THREE	SW-3A THREE	SW38 THREE	SW-3C THREE	GW5-A FIVE	SW5-B Five	GW5-C	SW-5A	SM - 58
Pesticides (cont.)	EPA 608	ng∕L	(V) TQM	MDL (†)										LIVE
Aldrin (†) Aidrin (s)	EPA 608 EPA 608	1/6n 1/6n	0 <b>.</b> 007 0 <b>.</b> 007	0 <b>.</b> 02 0 <b>.</b> 02		NEG ND	ND	N ND	ND	ND	NEG	N ND N EC	ND	ND
a Iph <del>a-BHC</del> (f) alpha-BHC (s)	EPA 608 EPA 608	1∕6n 1∕6n	0 <b>,</b> 006 0 <b>,</b> 006	0 <b>.</b> 004 0 <b>.</b> 004		NEG	ND	ND	ND	N ND	N ND N EG	ND	NEC ND	ND NEG
beta-BHC (f) beta-BHC (s)	EPA 608 EPA 608	1∕6r 1∕6n	0 <b>,</b> 006 0 <b>,</b> 006	0 <b>.</b> 005 0 <b>.</b> 005		ND	ND	ND NEG	ND	ND	N NO	N ND	N ND	NEG NEG
del tæ-BHC (f) del tæ-BHC (s)	EPA 608 EPA 608	ען גען	0,002 0,002	0 <b>.</b> 006 0 <b>.</b> 006		ND	NEG	ND	ND	ND NEG	NEG Å	ND NEG	NEG	NEG N
Lindane (†) Lindane (s)	EPA 608 EPA 608	ng∕L J∕gu	0,005 0,005	0,005 0,005		ND	ND NEC	ND NEC	ND	ND NEG	NEG N	N ND	NEG ND	NEG
Chiordane (f) Chiordane (s)	EPA 608 EPA 608	1∕6n 1∕6n	0°01	0 <b>.</b> 05 0.05		ND	ND	ND NEG	ND NEG	ND	ND	ND NEG	NEG	ND
4,4'-000 (f) 4,4'-000 (s)	EPA 608 EPA 608	1/6n 1/6n	Λ <b>.</b> 004 V.004	0 <b>.</b> 003 0 <b>.</b> 003		NEG NEG	ND	ND NEG	ND	ND	NEG ND	ND NEG	N ND N RD	ND
4,4'-DDE (f) 4,4'-DDE (s)	EPA 608 EPA 608	ոց/է սց/է	0 <b>.</b> 005 0 <b>.</b> 005	0 <b>.</b> 006 0 <b>.</b> 006		ND NEG	ND	ND NEG	ND	NEG NEG	NEG	NEG	ND	ND NEG
4,4'-D0T (f) 4,4'-D0T (s)	EPA 608 EPA 608	ng/L ug/L	0.03 0.03	0.01 0.01		ND NEG	ND NEG	ND	ND	NEC	ND	ND	ND	ND NEG

"ND" indicates that the parameter was not detected.

					DATACHB Duluth Second C	DATACHEN ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations	AL REPORT r Samples firmations	A						
Par anater	Met hod	units	Detection Limit	it ion	Fleid #: Site :	SM-5C FIVE	GM7-A SEVEN	GW7-B SEVEN	GW7 -C SEVEN	SM-7A SEVEN	GWB-A EI GHT	GWB-B EI GHT	GWB-C EI GHT	SW-BA EI GHT
Pesticides (cont.) Aldrin (†) Aldrin (s)	EPA 608 EPA 608 EPA 608	ng/L ug/L	MDL (A) 0.007 0.007	MDL (†) 0.02 0.02		ND	ND	ND	NEG	ND NEG	ND	Q H	NEG	ND
alpha-BHC (†) alpha-BHC (s)	EPA 608 EPA 608	J∕gu J∕L	0 <b>.</b> 006 0 <b>.</b> 006	0,004 0,004		ND NEG	CIN NEG	NEC N ND	ND	ND	ND	ON NO SECOND	<u>9 8</u> 9	NEG NEG
beta-BHC (f) beta-BHC (s)	EPA 608 EPA 608	1∕6n √L	0,006 0,006	0 <b>.</b> 005 0 <b>.</b> 005		N NO	ND NEG	NEG	NEG	NEG	ND ND ND			NEG
deita-BHC (f) deita-BHC (s)	EPA 608 EPA 608	1/6n 1/6n	0 <b>,</b> 002 0,002	0 <b>,</b> 006 0,006		ND	NEG	NEC NEC	NEG	NEG	NEG	NEG	NEC	REG S
Lindane (f) Lindane (s)	EPA 608 EPA 608	1/6n 1/6n	0,005 0,005	0,005 0,005		NEG	NEG	NEG	NEG	NEG	NEG	C S S	ON NO N	N N N
Chlordane (f) Chlordane (s)	EPA 608 EPA 608	ng/L Ugu	0°01	0,05 0,05		NEG	ND	NEG	ND	NEG	N S S	NEC N	N REC	NEG 0.009
4,4'-D00 (f) 4,4'-D00 (s)	EPA 608 EPA 608	ng∕L ug∕L	0 <b>.</b> 004 0 <b>.</b> 004	0_003 0_003		ND	NEG	N EG	ND	N N N				SO4
4,4'-DDE (†) 4,4'-DDE (s)	EPA 608 EPA 608	ng/L Ug/L	0 <b>,</b> 005 0 <b>,</b> 005	0 <b>.</b> 006 0 <b>.</b> 006		ND NEG	ND NEG	ND	NEC NO	NEG N				N NEG
4,4'-D0T (f) 4,4'-0DT (s)	EPA 608 EPA 608	1∕6n ∩∂∕L	0.03 0.03	0°01		NEC	ND NEG	NEC N	NEG	NEG	2 SI	NEC	NEG	NEG

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www.indicates that the parameter was not detected.

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Page 256

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**CATACHEM ANALYTICAL REPORT** Duluth IAP - Water Samples Second Column Confirmations

			i i c	-		ie ie	TRIP	TRIP
Parameter	Me thod	Un i ts		Limit	Site :	EI GHT	ONE	SEVEN
Pesticides (cont.)	EPA 608	ng/L	MDL (A)	MDL (†)				
Aldrin (f)	EPA 608	ng/L	0,007	0.02		Q	QN	QN
Aldrin (s)	EPA 608	ng/L	0,007	0.02		NEG	NEG	NEG
alph <del>a-</del> BHC (f)	EPA 608	ng/L	0,006	0.004		Q	9	QN
alpha-BHC (s)	EPA 608	ng/L	0*006	0.004		NEG	NEG	NEG
beta-BHC (f)	EPA 608	ng/L	0,006	0,005		QN	Q	9
beta-BHC (s)	EPA 608	ng∕L	0,006	0*005		NEG	NEG	NEG
del ta-BHC (f)	EPA 608	ug/t	0.002	0,006		9	QN	Q
deita-BHC (s)	EPA 608	1∕6n	0,002	0*006		NEG	NEG	NEG
Lindane (†)	EPA 608	ng/L	0,005	0,005		9	2	QN
Lindane (s)	EPA 608	ng/L	0,005	0,005		NEG	NEG	NEG
Chlordane (f)	EPA 608	ng/L	0.01	0*02		9	QN	Q
Chlordane (s)	EPA 608	ng/L	0.01	0*05		NEG	NEG	NEG
4,41-000 (f)	EPA 608	J∕bn	0,004	0,003		0,003	Q	QN
4,41-000 (s)	EPA 608	ng/L	0,004	0,003		P05	NEG	NEG
4,41-DDE (f)	EPA 608	J∕bu	0,005	0,006		Đ	Ð	Q
4,4'-DDE (s)	EPA 608	1∕bn	0*005	0,006		NEG	NEG	NEG
4,4'-DDT (f)	EPA 608	ug/L	0,03	0.01		0.01	Ð	QN
4,4'-DDT (s)	EPA 608	ng/L	0*03	0.01		POS	NEG	NEG

Page 257

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DATACHER ANNLYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

Par ameter	Mathod	uni ts	Detection Limit	letection Limit	Fleid #: Site :	GW1-A ONE	GW1-C ONE	Gw1-D ONE	GW I-E ONE	SW-IA ONE	SW-1B ONE	GN3-A THREE	GW3-B THREE	GW3-C THREE
Pesticides (cont.) Dieldrin (f) Dieldrin (s)	EPA 608 EPA 608 EPA 608	1∕6n 1∕fn	MDL (A) 0,005 0,005	MUL (†) 0.002 0.002		ND	ND NEG	ND	ND	ND	NEG	ND	ND	0.006 NEG
Endosultan   (f) Endosultan   (s)	EPA 608 EPA 608	1∕6n 1∕6n	0°01	0 <b>.</b> 036 0 <b>.</b> 036		ND	ND	ND NEG	ND NEG	N ND	ND	NEG	NEG	NEG
Endosultan 11 (f) Endosultan 11 (s)	EPA 608 EPA 608	ng/L ug/L	0.01 0.01	0.012 0.012		ND	ND	NEG N	ND NEG	NEG	NEG	NEG	NEC	ND NEG
Endosultan Sultate (f) Endosultan Sultate (s)	EPA 608 EPA 608	J∕gu J∕L	0.01	0.01		NEC ND	ND	NEC N	ND	ND	NEG	NEC NO	N RC N	ND NEG
Endrin (†) Endrin (s)	EPA 608 EPA 608	J∕bn 1∕bn	0,006 0,006	0.02 0.02		ND	NEG	Ne N	Q SH	NEC NO	NEG NO	ON SEN	NEC	ND
Endrin Aldehyde (f) Endrin Aldehyde (s)	EPA 608 EPA 608	√6n 1∕6n	0.01 0.01	0.01 0.01		NEG ND	ND NEG	ON SE	ND	NEG NO	NEG	N NO	NEC	NEG
Heptachlor (f) Heptachlor (s)	EPA 606 EPA 608	1∕6n ∏	0 <b>.</b> 007 0 <b>.</b> 007	0_005 0_005		ND NEG	<b>NEG</b>	ND	ND	NEG	ND	ND	0.04 NEG	ND
Heptachl or Epoxide (f) Heptachior Epoxide (s)	EPA 608 EPA 608	ng/L ug/L	0 <b>.</b> 006 0 <b>.</b> 006	0_002 0_02		NEG	N ND	NEG	NEC	ND	ND	NEG.	ND	ND
Toxaphene (†) Toxaphene (s)	EPA 608 EPA 608	<b>1/6n</b> 1/6n	0.25 0.25	0.25 0.25		ND	ND	NEC	N NO	ND	ND	N NO	ON DI NEC	ND

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ww.Dm indicates that the parameter was not detected.

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DATACHBA ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

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Paramater	Method	units	Detect Limi	vo	Field∦t: Sitea :	GW3-D THREE	SW-3A THREE	SW-38 THREE	SW-3C THREE	GW5-A FIVE	CHIS-B FLVE	GW5-C FIVE	SW-5A FIVE	SW-5B FIVE
P <u>esticides</u> (cont.) Dieldrin (f) Dieldrin (s)	EPA 608 EPA 608 EPA 608	J∕6n n∂∕L ng∕L	MDL (A) 0.005 0.005	MDL (†) 0.002 0.002		ND	ND	ND	NEG ND	N ND N EG	NEG	NEG	Q SI SI	NEG
Endosulfan 1 (f) Endosulfan 1 (f)	EPA 608 EPA 608	J∕bn n∂∕L	0.01 0.01	0.036 0.036		N N N N	ND	ND NEG	ND	NEG	ND	N EG	N N N	ND NEG
Endosultan 11 (f) Endosultan 11 (s)	EPA 608 EPA 608	√gu 1∕gu	0°01	0.012 0.012		N SI N	NEG.	ND	ND NEB	NEG	NEC NO	NEC	CN SB N	NEG
Endosulfan Sulfate (f) Endosulfan Sulfate (s)	EPA 608 EPA 608	ng∕L ug∕L	0.01 0.01	0.01 0.01		NEG	NEG	NEG	N N	N ND N EC	Nec N	ND	ND	NEG
Endrin (†) Endrin (s)	EPA 608 EPA 608	J∕bn ∖/Gn	0,006 0,006	0.02 0.02		NEC N	ND		NEG	N RC N RC	Q Q	NEC	N NO	NEG
Endrin Aldehyde (f) Endrin Aldehyde (s)	EPA 608 EPA 608	1/6n 1/5n	0.01 0.01	0.01 0.01		NEG	ND NEC	ND	NG ND	NEC	Q SB	ND	N N N N N N N N N N N N N N N N N N N N	NGG
Heptachlor (f) Heptachlor (s)	EPA 608 EPA 608	אן/bu שיור	0 <b>.</b> 007 0 <b>.</b> 007	0 <b>.</b> 005 0 <b>.</b> 005		ND	ND NEG	ND	NEG	NEG	NEG	QN NEC	CP SB	NEG
Heptachlor Epoxide (f) Heptachlor Epoxide (s)	EPA 608 EPA 608	√6n ng∕L	0 <b>.</b> 006 0 <b>.</b> 006	0 <b>.</b> 002 0.002		N NO	N NO	ND	NEC N	NEC NO	ND	QN SHIN	NEG	N N N
Toxapherie (f) Toxapherie (s)	EPA 608 EPA 608	1∕bn 1∕bn	0.25 0.25	0.25 0.25		ND	N N	NEC	NEG N	NEG NEG	ND	NEG	N N N N	NEG

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### **DATACHBA ANALYTICAL REPORT** Dututh IAP - Water Samples Second Column Confirmations

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Mathod EPA 608 EPA 608	ug/L ug/L ug/L	Detec L1mi MDL (A) 0,005 0,005	ction mit 0.002 0.002	Field#: Site :	SW-5C FIVE ND	GW7-A SEVEN ND NF5	SEVEN NG	GW7-C SEVEN ND	SW-7A SEVEN ND	GMB-A EI GHT	CAR - B	GWB -C EEI GHT ND	SW-BA EIGHT ND
EPA 608 EPA 608	ng/L ug/L	0°01 0°01	0 <b>.</b> 036 0 <b>.</b> 036		Ne N	N ND	ND	NEG	N ND ND	er of Sa	N N N	N N N	NEG ND NFG
EPA 608 EPA 608	1∕6n ∖/	0°01 0°01	0.012 0.012		NE N	QN NNN	9 8	ND	0.004 NEG	ND NEG	9 9 N	Q B	O U U
EPA 608 EPA 608	√6n √7	0°01 0°01	0.01 0.01	-	NEC NO	NEC NO	NEG NEG	ND NEC	NEC	NEG N	NEC ND	ON SEN	NEG
EPA 608 EPA 608	1∕6n 1∕6n	0,006 0,006	0.02 0.02	-	N B	NEC N	NEG NEG	ND	NEC NO	NEC 10	Nec N	NEG N	NEG N
	1∕6n 1∕6n	0.01 0.01	0.01 0.01	L	NEC D	NEG NO	ŝ. Nec	Q NO	NEG NO	NEC P	Q SE	9 8 2 8	ND NEG
	ng/L ug/L	0_007 0_007	0 <b>-</b> 005 0 <b>-</b> 005	2	N RO	ON SH	NEG N	NEG	N R	NEG NO	NEC NO	NE NO	NE C NE C
EPA 608 EPA 608	ng/L ug/L	0 <b>.</b> 006 0 <b>.</b> 006	0.002 0.002	Z	NEG	NBC	NEG	NEG	NEC	N NO NEG	O SI	NEG	NEG NEG
	て て い	0,25 0,25	0.25 0.25	- 2	ND	N NO	NEC	NEG N	NEG	NEG ND	Q NO NBC	Q B	NEG NO

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			Detec	Datection	Field #:	SW- 89	TR IP BI ANK	TRIP Biank
Parameter	Me thod	Un its	Lin	Limit	Site :	EIGHT	ONE	SEVEN
Pesticides (cont.) Dieldrin (f)	EPA 608 EPA 608	ug∕L ug∕L	MDL (A) 0.005	MDL (†) 0.002		2	9	Q
Dieldrin (s)	EPA 608	J/Gn	0.005	0,002		NEG	NEG	NEG
Endosultan 1 (f)	EPA 608	ng/L	0.01	0.036		9	Q	Ð
Endosulfan 1 (s)	EPA 608	ng/L	0.01	0*036		NEG	NEG	NEG
Endosulfan 11 (f)	EPA 608	ng/L	0.01	0.012		0,004	9	QN
Endosulfan II (s)	EPA 608	J∕Bn	0.01	0.012		NEG	NEG	NEG
Endosultan Sultate (f)	EPA 608	ng∕L	0.01	0.01		đ	QN	Q
Endosulfan Sulfate (s)	EPA 608	J∕bn	0.01	0-01		NEG	NBC	NEG
Endrin (f)	EPA 608	ng/L	0,006	0,02		9	9	9
Endrin (s)	EPA 608	ng/L	0,006	0.02		NEG	NEG	NEG
Endrin Aidehyde (f)	EPA 608	J∕bn	0.01	0.01		9	Q	9
Endrin Aidehyde (s)	EPA 608	J∕6n	0.01	0•01		NEG	NBC	NEG
Heptachlor (f)	BDA 608	ng/L	0,007	0,005		9	QN	9
Heptachlor (s)	EPA 608	J∕ɓn	0.007	0*005		NEG	NEG	NEG
Heptachlor Epoxide (f)	EPA 608	J∕bn	0,006	0,002		9	QN	Ð
Heptachlor Epoxide (s)	EPA 608	J∕ɓn	0,006	0,002		NEG	NEG	NEG
Toxaphene (f)	EPA 608	ng/L	0.25	0.25		9	9	QN
Toxaphene (s)	EPA 608	J∕ɓn	0.25	0.25		NEG	NEG	NEG

"ND" indicates that the parameter was not detected.

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DATACHBH ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

			De tect lon	Fleid #:	A-140	0 <b>-1</b> -0	0-1-10	GW1-E	V1-35	SH-1B	CM3-A	GW3-B	GM3-C
Par ana ter	Method	Un i ts	L [m] +	Site :	ONE	ONE	ONE	ONE	ONE	ONE	THREE	THREE	THREE
Pesticides (cont.)	EPA 608	ng∕L	MDL										
Arochior 1016 (1)	EPA 608	ר, קע	0,09		9	Q	9	9	2	2	2	2	9
Arochior 1016 (s)	EPA 608	ng∕L	60°0		NEG	NBC	NEG	NEG	NEG	NEG	N EG	NEG	NEG
Arochior 1221 (f)	EPA 608	ng/L	60 <b>°</b> 0		9	₽	9	9	9	2	9	2	9
Arochior 1221 (s)	EPA 608	νĝν	60°0		NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG	NEG
Arochior 1232 (f)	EPA 608	J/bu	60°0		9	QN	Ð	9	2	2	9	9	9
<b>Fochlor</b> 1232 (s)	EPA 608	ng/L	60°0		NEG	NBC	NEG	NBG	NBS	NEC	SBN	NEG	NEG
Arochior 1242 (f)	BPA 608	ng∕Ŀ	60°0		2	Q	9	9	£	9	9	₽	9
Arochior 1242 (s)	EPA 608	ng/L	60°0		NEC	NEC	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochior 1248 (f)	EPA 608	ר/bn	60 <b>°</b> 0		9	£	9	9	2	2	9	9	9
Arochior 1248 (s)	EPA 608	J∕bn	60°0		NEG	NEG	NEG	NEG	NEG	NEC N	NEG	SB N	NEG
Arochlor 1254 (f)	EPA 608	J∕bn	60 <b>°</b> 0		9	£	9	9	9	9	9	ş	Ð
Arochlor 1254 (s)	EPA 608	ng/L	60°0		NEG	NBG	NEG	NEG	NEG	NEC	N EC	NEG	NEG
Arochior 1260 (f)	EPA 608	ng/L	60°0		Q NO	QN H	NED	9 9	9 5	9	9 8	9 H	Q U
		ug/ r	<b>60</b>		3	B	3	3	3	3	}	3	

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### DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

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			Detection	Field #:	GM3-D	SW-3A	SM-38	SW-3C	GW5-A	GW5-B	GW5-C	SW-5A	<b>SM-5</b> B
Por ano ter	Method	Un i ts	Limi+	Site :	THREE	THREE	THREE	THREE	FIVE	FIVE	FIVE	FIVE	FIVE
Pesticides (cont.)	EPA 608	ng/L	Ð										
Arochior 1016 (f)	EPA 608	J∕bu	0*09		9	Q	9	9	9	9	9	9	9
Arochior 1016 (s)	EPA 608	ng/L	<b>60°0</b>		NEG	NEG	NEG	NEG	NEG	NEC	NEG	NEG	NEG
Arochi or 1221 (+)	EPA 608	ng/L	60 <b>°</b> 0		9	QN	9	2	2	9	Ŷ	9	2
Arochior 1221 (s)	EPA 608	1∕6n	60°0		NEG	SI N	NEG	NEG	NEG	NEG	SB N	NEG	NEG
Arochior 1232 (f)	EPA 608	1/6n	60 <b>°</b> 0		9	£	9	9	9	9	Ð	9	9
Arochior 1232 (s)	EPA 608	1∕6n	60 <b>°</b> 0		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochior 1242 (f)	EPA 608	J/gu	60 <b>°</b> 0		9	Ð	9	9	9	9	9	Q	9
Arochior 1242 (s)	EPA 608	1∕6n	60°0		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochi ar 1248 (f)	EPA 608	J∕bn	60 <b>°</b> 0		9	9	9	9	9	9	9	9	9
Arochior 1248 (s)	EPA 608	1∕bn	60°0		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEC	NEG
Arochiar 1254 (f)	EPA 608	J∕bu	60 <b>°</b> 0		9	9	Q	9	9	9	9	Ŷ	9
Arochior 1254 (s)	EPA 608	√Gu	60 <b>°</b> 0		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochior 1260 (f)	EPA 608	J/bu	60 <b>°</b> 0		2	Ð	9	9	9	9	9	9	9
Arochior 1260 (s)	EPA 608	ng∕L	60°0		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG

DATACHEM ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

Par ameter	Met hod	Lh i ts	Detection Limit	Fleid#: Site :	SH-5C FIVE	GM7 - A SEVEN	GW7-B SEVEN	GW7-C SEVEN	SM-7A SEVEN	GW8-A EI GHT	GM8-B EI GHT	GWB-C EI GHT	SW-8A EIGHT
Pesticides (cont.)	EPA 608	۲, M	ថ្										
Arochi or 1016 (1)	EPA 608	,00√L	60 <b>°</b> 0		9	2	9	9	9	2	2	9	9
Arochlor 1016 (s)	EPA 608	ng/L	60°0		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochlor 1221 (f)	EPA 608	uq/L	60 <b>°</b> 0		9	ĝ	9	9	2	9	9	ę	9
Arochlor 1221 (s)	EPA 608	ng/L	60°0		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochi or 1232 (+)	EPA 608	ng/L	0*09		2	9	9	9	2	9	9	9	9
Arochior 1232 (s)	EPA 608	ng/L	60°0		NEG	NBC	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochlor 1242 (f)	EPA 608	ng/L	0,09		2	Ð	9	2	9	9	9	2	9
Arochlor 1242 (s)	EPA 608	ng/L	60°0		NEG	NEG	NEG	NEG	NEG	NEG	NBC	NEG	NEG
Arochior 1248 (f)	EPA 608	ng∕L	0°0		9	£	9	9	9	9	9	9	9
Arochior 1248 (s)	EPA 608	ng/L	60°0		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochior 1254 (f)	EPA 608	ng/L	<b>0</b> •09		9	2	9	9	9	2	9	Ð	Q
Arochlor 1254 (s)	EPA 608	ug∕L	60 <b>°</b> 0		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Arochior 1260 (f)	EPA 608	J∕bn	0°0		9	Q	9	9	9	9	9	9	9
Arochlor 1260 (s)	EPA 608	ng/L	60 <b>°</b> 0		NEG	NEG	NEG	NEG	NBC	NEC	NEC	NEG	NEG

"NO" indicates that the parameter was not detected.

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						TRIP	TRIP
			Detection	Field #:	S#-88	BLANK	BLANK
Paranater	Ne thod	Un i ts	Limi+	Site :	EIGHT	ONE	SEVEN
Pesticides (cont.)	EPA 608	ng/L	<b>N</b> DL				
	EPA 608	uq/L	0°0		9	9	2
Arochlor 1016 (s)	EPA 608	ng/L	0°0		NEG	NEG	NEG
1000 100 1001 (1)	EPA 608	na/L	0,09		2	QN	Ð
Arochlor 1221 (s)	EPA 608	ng/L	60°0		NEG	NBC	NEG
111 1323 [1]	EPA 608	na/r	0,09		9	Q	9
Arochior 1232 (s)	EPA 608	1∕6n	<b>60</b> *0		NEG	NEG	NEG
	FPA 608	ua/L	0,09		QN	Q	9
Arochlor 1242 (s)	EPA 608	ng/L	60°0		NEG	NEG	NEG
	EPA 608	ua/L	0°0		9	2	9
Arochlor 1248 (s)	EPA 608	ng/L	60°0		NEG	NEC	NEG
4-004   05 1354 (4)	EPA 608	uq/۲	60 <b>°</b> 0		9	9	9
Arochlor 1254 (s)	EPA 608	,00√L	60°0		NEG	NBS	NEG
4	EPA 608	uq/L	0,09		9	Ð	9
Arochlor 1260 (s)	EPA 608	¶√l	60°0		NEG	NEG	NEG

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### DATACHBH ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

Par ano ter	Me thod	Un 1 ts	Detection Limit	Field#: Site :	GW1-A ONE	ONE ONE	GM1-D ONE	GW1-E ONE	St-1A	SN-1B ONE	GM3-A THREE	GW3-B THREE	GM3-C THREE
Herbicides	EPA 615	ug/L	MDL										
2,4,5-T (†) 2,4,5-T (s)	EPA 615 EPA 615	J∕bn ∖L	0,08 0,08		NEC N	N NO	NEG	NEG N	NEC NO	N ND N ND	N N N	NEC N	NEG
2,4-D (f) 2,4-D (s)	EPA 615 EPA 615	1∕6n ∖/Γ	0,08 0,08		9 8	NEC	NEC N	NEG	9 99 N	Q Hay	Q XB	98	NGG NEG
Silvex (f) Silvex (s)	EPA 615 EPA 615	1/6n 1/6n	0°08 0.08		Q SI	N ND N ND	N RO	N NO	Q SI N N	N NO	OF SHA	9 89 N	NEG

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			Detection	Field #:	GM3-D	SW-3A	SW-3B	SH-3C	GW5-A	GM5-B	GM5-C	SH-5A	SW-5B
Par and ter	Mathod		Limit	Site :	THREE	THREE	THREE	THREE	FIVE	FIVE	FIVE	FIVE	FIVE
Herbl cides	EPA 615	¶/βn	MDL										
2,4,5-T (f)	BPA 615	ng/L	0,08		9	9	9	9	9	2	2	9	9
2,4,5-T (s)	EPA 615	ng∕t	0,08		NEG	NEC	NEG	NEG	NEG	NEG	NEG	NEG	NEG
2,4-D (f)	EPA 615	J∕bn	0,08		9	Ð	2	9	9	9	9	9	9
2 <b>,4-</b> 0 (s)	EPA 615	ng∕L	0,08		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Silvex (f) Silvex (s)	EPA 615 EPA 615	ng∕L ug∕L	0,08 0,08		e e	N NO	Q SH	N NO	NEC N	NEC NO	ON SH	9 99 9	NEG N

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### DATACHEN ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

			Detection	Field #:	SM-5C	GW7-A	64 LMO	0#1-C	SM-7A	GWB-A	G#849	GMB-C	SH-8A
<u>Par ameter</u>	Met hod	Units	L imi +	Site :	FIVE	SEVEN	SEVEN	SEVEN	SEVEN	EI GHT	EI GHT	EIGHT	EI GHT
Herbicides	EPA 615	ng/L	NOL										
2,4,5-T (f)	EPA 615	J∕bn	0,08		9	0,08	9	9	9	2	9	9	2
2,4,5-T (s)	EPA 615	J∕bu	0,08		NEG	POS	NEG	NEG	NEG	NEG	NBC	NEG	NEG
2,4-D (f)	EPA 615	ng/L	0,08		9	9	9	9	2	<b>60°</b> 0	2	Q	9
2,4-D (s)	EPA 615	ng/L	0°08		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Silvex (f) Silvex (s)	EPA 615 EPA 615	ng∕L ug∕L	0 <b>.</b> 08 0.08		NEG	NEC	NEG	N NO	NEG O	NEC N	NEC NO	N NO	ND NEG

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Page 249

# DATACHER ANALYTICAL REPORT Duluth IAP - Water Samples Second Column Confirmations

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						TRIP	TRIP	TRIP
Par amoter	Mathod	Units	L  m +	Site :	EI GHT	ONE	THREE	EIGHT
Herbicides	EPA 615	ng/L	MDL					
2,4,5-T (f)	EPA 615	J∕6n	0,08		9	9	2	QN
2,4,5-T (s)	BA 615	ng/L	0,08		NEG	NEG	NEG	NEG
2,4-0 (f)	EPA 615	ug/L	0,08		9	2	2	QN
2 <b>,4-</b> D (s)	BPA 615	ng/L	0,08		NEG	NEG	NEG	NEG
Silvex (f)	EPA 615	ng/L	0,08		9	9	9	Q
Silvecx (s)	BPA 615	ng/L	0,08		NEG	NEG	NEG	NEG

APPENDIX I

## CORRESPONDENCE WITH REGULATORY AGENCIES

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NESOTA UNIQUE WEILL NO. LOLATION OF WELL 194748 TER WELL RECORD for Water Sample St. Louis J. PROPERTY OWNER'S NAME 50 9 Air Natr'l Guard DULL, MN 55811 Marp かっ VII DEPTH len 12/11/86 13.0 ž ×-10 Contra sent 4 7 Ε GWIDE Marris Marris s🗆 🗤 a D Barred ...... T 5------6 Jested \$ 414.5 Los Munther فمسلا يتفسر 🗖ه 7C) Industry . Che 5**---**a Dem FORMATION LOU HARINIASS OF FROM COLOR O grang. 0 HOLE DIAM 5:11 7.5 Soft -XITAM anen I Black 2**0 cm**. s weider Gravery Sand 75 B X5.Stel brown hard ) Plastic 13 L SCREEN Or open he from fi. ie Ste Stachlen 2 ind Type 0-0 - 13 3 •. STATIC WATER LEVEL 4.51 PUMPING LEVEL R. after II. WELL HEAD COMPLETION 1 Pytiess adapter, m 2 At least SIT shows grade net officet 18 WELL GROUTED? ¢ (v. □ no Where Coment CAR λ**γ**ω P bertonife ... 2 2 2 heat and 14. NEARLEST BOURCES OF POSSIBLE CONTAMINATION AMP intrain Site 10 ۷... ta. Pump DL. L. Turb s C Ran · C • 4**0**0m Ω. 10 Int 14. WATER WELL CONTRACTOR'S CERTIFICATION Split Spoon Smples Taken This well was defined un e my jurisi in true to a said ballet. ut of my he an Bautann Manne Linear Ho. Authorized Representative IMPORTANT: 194748 FILE WITH DIED - WELL OWNER COPY HE-01386-0 I-1

LOCATION OF WELL 194749 TER WELL RECORD for Wester Sample St Lais FROPERTY OWNER'S NAME SWINE Air Natolt Grand <u>.</u> Duth, MN 55811 National quard Base WELL DEPTH KO te of Completion 12/11/86 200 K-K-K . Collegende samt 10CDmg 40 8 mm 200 Ε M 5**0** A.F a Danad 'nО 20) Hollow and T •X~~~ ^~~ 2 Rockery 4D Jetted -7C Industry nOr CNIDA 5**0** Marak 2**17 inter** JOTen W HARIMESS OF FORMATION LOG FROM COLOR TO • HOLE DIAL dark 7 soft 0 -Pert Black man s: webbed 2**0 Gaiv**. alayan Sandy Silf 7 Higher 20 brown Soft ) Plantic Weight _ Or open hole L SCREEN ft. 10 The Staplen inch 0.01 19.5 no 9.5 n STATIC WATER LEY 1/12/87 riner Cabon R. sfler fl. efter _ het. pump IT. WELL HEAD COMPLETION 1 Patiens adapter, man J At least 12" above grade 2 accord office 12 WELL GROUTED? Xr. 010 Here Comment 3×1 , O <u>_.5.5</u> - bentonite 2.0 com-bant. 5.5 heat ant 2 IS NEAREST SOURCES OF POSSIBLE CONTAMINATION ~200 non Y------14. PUM ×----, . . . 2 Contententi JOL & Turbing **سو ت**کر ا ┛. **2**0 ke 16. WATER WELL CONTRACTOR'S CERTIFICATION Split Spoon Samples Taka 15 REMARKS. ELEVATION, BOU the best of my he Licenses Business Name License No. IMPORTANT: 法制 194749 HE ALIMAN

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FREE WERT Sample LOUATION OF WELL 194750 WATER WELL RECORD 37. Lais es ( 56.4.43 - 198 PROPERTY OWNER'S NAME \$ 15 Air National grand 50 Durth, MN 55811 ational Grand Bose, Duth LL DEPTH (completed) 12/7/86 18-0 Old PPDO Stange -x-x-x-x-x-x-3. 1000 Dag 40 Remme 7 Ε March Humber s 🗖 Air 2 Hollow rad a Barred нΟ_ 5w82 , **T**____, -3 6 Jetted 4195 -1 Industry Washington St s Manktipel *-----2 HARINISS OF FROM CASING FORMATION LOG COLOR 10 0 HOLE DIAM Fill Bravel D 2 tan Medi 1 Bleck 2**0 c...**. s: weided 7 Soft 2 Peat bran \$5.500 Plastic B. Z Clayer Gravely Silt 7 ·P Mal brown Weight _ H./R. A. SCREEN Or open hole ton ___ ft. 10 Stanley Steel z in. 0.01 n_18_ n.m _8 ft. and . STATIC WATER LEVEL 1/12/87 10456.3 A Minterer Datarr Date Ma 0. PUMPING LEVEL (below land surface) ft. after _ ft. ofter _ 11. WELL HEAD COMPLETION ( Philos adapter, manufe 2 Basement office 3 IL WELL GROUTED? XYm 010 MAN COMMEAP **b** <u>bentanite</u> Com-bent. hear alm 13. NEARINET BOURCES OF POSSIBLE CONTAMINATION unturner Site8 SSE N 100 m Yee 14. PUM .... CL.S. Tubio 1 Retteretation 0 Ω. aClus 16. WATER WELL CONTRACTOR S CERTIFICATION 15. REMARKS. SLEVATION, BOL This well was defined one any Jurisi in and this m Split Spoon Samples taken. the bost of my knowledge and ballef. License He. Licenses Business Home and of Dellas IMPORTANT: 194750 HE OLIMAN FILE WITH DEED - WELL OWNER COPY I-3

NATER WELL RECORD 194784 St Loris for Water Sample u Summer 1364 01.00 50 ª Air National Grand TR.I.M. MN 55811 Nation grad WELL DEPTH ( CWBB R/6/86 20. O Old PPDO Strage CCalle and ε -メー<u>メ</u>ーメ___メ_ 2CHARTING Ford 5**0** Air •••• nD. ind. J Retary barrel Co • Xraaa aaaa 1144 Washington St ıÜn •**O**n ما **1**0 •**D**u FORMATION LOG HANDNESS OF FROM COLOR Èr. Silly Sandy Clay Soft HOLE DIAN 8.5 brown 0 ¥17.... C Mart 30 Gale. s wated Sand Silly Gravely Med 85 brown 20 15.5tal ) Plantic 7Ø. Ba./R. S. SCREEN TOr ease hold Make them _ R. 10 110 Stainles Steel in 0,01 - 20_ n.m _10_ _R. ft. and ____ •. STATES WATER LEVEL 12/87 Date M . PUMPING LEVEL O _ ft.sher __ I. WELL HEAD COMPLETION 1 - Pillen af 2**0 e**u JCJ At least 12" above gra A WELL OROUTED? Jern Dr. ATHIN COMP _;¢A - bentonite com.-bent. hast-emen IS. MEARERT BOURCES OF POSSIBLE CONTAIN introken N250m Site 8 we de infected upon com Yee 🖸 14. PUMP Kine washe .... JOL & Tutles s Norte 1**0**5 2Dm 400 Ω. IA. WATER WELL CONTRACTOR'S CERTIFICATION IS REMARKS. ELEVATION. SOURCE OF DATA, MA This case in the local sector Split Spoon samples taken Licenses Budents Haras Lines He Authenterd Representative IMPORTANT: <u>194784</u> 協盟 FILE WITH DEED - WELL OWNER COPY ....I-4 ...

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DEFARIMENT OF HEALTH ATE OF MINNESOFA MINNESOTA UNIQUE WELL NO. LOUATION OF WELL 194785 WATER WELL RECORD for Water Somple 5 Lais ROPERTY OWNER'S NAME Air National guard 15 ´S₩'£" 2 57) PULL, MN 55811 Base National grand WELL DEPTH (comple 13.0 12/6/86 GUISA OLL DIDU -X-X-X-X-X 10 Dag Colle Band 40 Revenue 7**11**0m Ε 2 Hellow rad -۰**ロ**_ T 3 Hotary 6 Jened Washington Rd يو معمد الله TCI Industry 2 പ Tora we HARDNESS OF FROM FORMATION LOG COLOR 10 40 AF C -HOLE DIAL 5:1+ 13 anna 0 Suf-1 Block a Kronen trown 3CGaire. s: -95. Stel A. SCREEN 1.0 ft. 10 Tro Stanlas Stee 2 in 13 .... 10 FF 3 ft. and STATIC WATER LEVEL 4.8 1. Deter Cater Date Housers 1/12/87 . PUMPING LEVEL ON . ft. after hrs. .... TI. WELL HEAD COMPLETION 1 Pittens adapter. m. 2 Besement office 3 At least 12" shove grade 12. WELL GROUTED? XY ... DNo JANNIE COMME CAP 200 Ð ---- bartonite . hear aner 13. NEAREST BOURCES OF POSSIBLE CONTAMINATION uknown Sitc 8 ~ 100 int ¥--□ m= Well disinfected upon c 14. PUMP .... -Type: 10754 JOL & Turbles Ω. 4 Consertional 3**0**3et 14. WATER WELL CONTRACTOR'S CERTIFICATION IS. REMARKS, ELEVATION, SOURCE OF DATA, ML Split Spon sample taken the best of my knowle Licensee Business Home Authorized Repe of Della IMPORTANT: FILE WITH DEED - WELL OWNER COPY 194785 HE ALBORNA I-5

for Well's Sampler | 194786 WATER WELL RECORD St Lais 18 SHOWNY I SAA.01.00 15 Air National grand ZNEESW Duch MN 55BH e award Base Doluth Nation LL DEPTH (com 12/3/86 25.0 CJ40 I O Deg tOCatte seet 40 Rev 700 Ε 5**0** A# 6 ..... ..0_ 2 C Handlann and T 6 Janual 0 10 intentry ıΩn 4 Public Supply <u>رم</u> - 24 HARINIESS OF FORMATION LOG COLON TO 2 Tree w -HOLE DIAN dork 75 0 Pear ×1----Soft (C) Black brown . سی 🗖 د s...... 12.5 75 gran JS. geel Plastic 57 19. tan hacd 125 25.0 19.5 Sand brown . SCREEN 11.10 Staila stal こう PITTINGE: , 15_1 11. 204 . STATIC WATER LEVEL 1/12/87 ft. after IL WELL HEAD COMPLETION 1 C Philese edenter, ment 2 Bearment office 3 At least 12" above grade 18 WELL GROUTED? Ava 0100 1) Heat Coment CAR 30 Kpen **b** 13 - bartonite Com. -bent. neat amt Y-D IA. PUMP .... -CL & Tethe Ο. سد 🗖 د A. WATER WELL CONTRACTOR & CERTIFICATION 14. REMARKS, ELEVATION, BOUT OF DATA. HA any herital This walk was defined as Spit Spon Sungle taken and bullef. the best of my be Linemar He. Licenses Business Hume Name of Ortho **济 !M?ORTANT:** 194786 FILE WITH DEED - WELL OWNER COPY I-6

STATE OF MIRPHY MINNESOTA UNIQUE WELL NU. LOCATION OF WELL 194787 WATER WELL RECORD for Water Sample Long -----50 9 15 Έsω! Air Natone guard ZINE National guard Poluth, MN 55811 Base. <u>210th</u> WELL DEPTH (comple 12/3/86 20.0 GW4C 4**0** Rem 100 Des 700 Primes ╋ Ε 5**----**10 Barrel »D» T -2 6Clented  $\mathcal{O}\mathcal{O}$ 6 iOr -7 Industry s Hunicipal HARINITES OF FORMATION LOG COLOR FROM TO ASTen Well -0 Sravel Silt HOLE DIAM .2 a Tronsdo tan  $\bigcap$ 1 O Black F11 20Gar. s we 125 Soft Silt .2 brown Plantic AS.Stal nt Ym. 20. 12.5 brown tagh 20 ft. Weight A SCREEN Or ease hide from S. 10 The Stailer Steel 0.01 m 20 n.m 10 6. and STATIC WATER LEVEL 8.5 112/87 not and a star Caste M. 10. PUMPING LEVEL O ft. sfter . TI. WELL HEAD COMPLETION 1 Philom adapter, manufa 2 Besement offset J At least 12" above grade 18. WELL GROUTED? 1 Yes 0 No 1 New Coment AP 200 <u>ں</u> - partonile Cem-bent heat amet 14 NEAREST BOURCES OF POSSIBLE CONTAMINATION Barn ¥--Well distance and the second states of the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the second states and the s 14. PUMP ..... DLS.Twite s Rarry Type: IDSubm 2**0**2m • County Ω. IS. WATER WELL CONTRACTOR'S CERTIFICATION IS. REMARKS. ELEVATION, SOURCE OF DATA. IN Split Spon sample taken. IMPORTANT: 逐至 <u>194787</u> FILE WITH DEED - WELL OWNER COPY

LOCATION OF WELL 194788 WATER WELL RECORD far Weser Sample St Covis OPERTY OWNER'S NAME 9 15 Ar National guar 57) DULL, MN 55811 Q Othard th ation LL OFFTH (canale 20.0 12/3/86 . aCleatha anns <0 ...... 10 Dag **____** ¥ £ 5¹ a ..... »Ωн ..0_ ----T . Krow -----4 Jenet (w 1 4-8 :0n -1**CT sur** 2 Intern 5**0** Manta NORMATION LOC HARIMESS OF COLOR FROM 10 C1 dark 6 HOLE DIAL × ..... with clay Saft Year Ô C Black brain Giaty. 6 6.2 gray bran Ŵ 25. Steel icii fianti 53 20. 6.2 126 work ty Sanda Soft 26 C SCREEN form 26 ft. 60 The Stainly Steel 0.01 20 1.11 5 ft. and STATIC WATER LEVEL , 3.0 Antonio Dates 12/87 Date Ma . PUMPING LEVEL (MIN ft. after 11. WELL HEAD COMPLETION 1 This states, manufa 2 n offici At least SE above grade LE WELL OROUTEDT NYn Dro IN THEM COMPANY AND STATEMAN Ω my bentarite heat comet 2 0 IS. NEAREST BOURCES OF POSSIBLE CONTAMINATION Latter ... N-250 m unknown Site 4 well disinfected upon com 14. PUMP 7 CL & Tuttes 105-100 2**0**2m · C. WATER WELL CONTRACTOR & CERTIFICATION DATA. OL This well was drift. spoon samples takes. at of my he Indian had Constant Business He and Rear IMPORTANT: 遊覧 194788 FILE WITH DEED - WELL OWNER COPY

TER WELL RECORD 194/89 St. Lon's SHITEME 1 SAA.41 National guard SF SW Q 50 Z Air Darth, MN National 55811 Air mad LL DEPTH ( 20,0 12/3/86 0 00╓─┬─┬─┬ 40 ton 7**0** 0.000 10 Dag است ماهد کا 🗋 ا E 10 Anna March Num 5**0** A.M ·O+ JO Heatery •Direted LIER Giv4A . Dn ------TC Industry Wash e. 5**0** Marak 2**0** |s •-----FORMATION LOG COLON HANIMASS OF FROM TO STAT TOTAL ATT A 10 O • HT: AGA/B HOLE DIAM -Soft О 0.3 Fill & macadam brown 1 OBlack 25 **G**G#•. Silt-Pat 033,5 SOA an bonn tor the Йĥ らけれ Sand Solt 2.5 fron 1.5 gran 19.5 SCREEK Transa his an Make from qua Stanle bonn Soft 20 115 Tree 57 STATIC WATER LEVEL 1/12/87 28 Date M A PUMPING LEVEL ft. after WELL HEAD COMPLETION a Tillen at 2 ------LE WELL GROUTEDT X1- 0m Ð berton 2 Reat cemet LE CONTAMINATIO S. NEAREST SOURCES OF PO LAMMA ~<u>1000</u>m intensi Y-0 N Well distafacted upon on 14. PUMP -5 CL.S. Turbine ·D1 Ω. 4**0**07 WELL CONTRACTOR'S CERTIFICATION IA. WATER 18. REMARKS. SLEVATION. BOURCE OF DATA. Split Spoon sample baken Lines He IMPORTANT: 逐步 194789 FILE WITH DEED - WELL OWNER COPY MR.411 I-9

LOCATION OF WELL ATER WELL RECORD 194790 for Wester Somple Lais HE SHEWKE | SAA. 87-08 Air National Ghard 50 \$ SWIJESW 152 2 Drum, MN Ľ 55811 0 Onar lation -6W3-D 18.9 12/2/86 ^{5.} ( C)('1994) 1996) 100 140 Dug DPDO £ A Salards Bd Storage Area "C" مىر سىمىدا 🖸 د 50 AM -C) -----**пО**, **ا** Ωد 6 • Kana ..... -101 4**0 mail** TCI Industry sОн •Oc ATION LOC COLOR HARINILSS OF FROM TO --0 HOLE DIAM Ball 0 6 Clarce Silt brown (Ó.). , s⊡w 6 bro 6.3 ୨୦ \$ 5. Stal ans Plastic 80 bonn 13 born 85 15,2 tun bronn STATIC WATER LEVE <u>2/8-</u> 02 . 🗆 🖬 6. sfler .... 11. WELL HEAD COMPLETION 1 C Philese adapter, and 20. ) IL WELL GROUTEDT ¥ ... I Create CAR 200 Ð pontonite _ 3.5 . 2.0 near ant Z LA MEANERT BOUNCES OF POSSEBLE CONTAMINATION chasser. inthorn 14. PUM ) francisco de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la company JOLS THE -**D**er 2**0** Jee Ω. 14. WATER WELL CONTRACTOR'S CERTIFICATION 15. REMARKS. ELEVATION. BOURCE OF DATA. et Split Spon Samples taken. and Bauchtern Ma IMPORTANT: 流星 194790 FILE WITH DEED - WELL OWNER COPY I-10

ATER WELL RECORD 194/91 SA Lons 50 : 15 p 2 SM Air Netrone guard Duth, MN 55B11 Opraid base 19.0 186 Z . 40 R.mm 1000 10**0**00 Ε Δ VPP 0 -201 Hallow rad 5**0** A.W ..... Storen L 3 . ÷. Trust iOn 1 industry 2 Interiori a Cleve HARINNISS OF FROM COLOR 10 MTest We HORMATION LOG • HOLE DIAN Claren Silt Sit 0 5 X 1 Hart brom ,62. 2**0 Gair**. 15 5 NS. Steel Geodes Sol brown J Plast 53 brown 808 9 5 -SCREEK ft. 10 TIM Stacile Steel 22 LOLO FITTINGS: 1910 n.m. 9.0. . . STATIC WATER LEVEL 1/12/87 4.3 Anter Dat <u>n</u>2 Date Mer MPING LEVEL O ft. after .... 11. WELL HEAD COMPLETION 1 Polloge add 3 At least SF above grade 2 Berement offset A WELL OROUTED? 200 1 Nest Coment <u>م</u>د "bentonit am,-bent. heatanert 2 13. NEAREST SOURCES OF POS IBLE CONTAMINATION NIS conson, Site YmC) Well disinfected upon co 14. PUMP N 144 1444 Value . ..... JOL. S. Turbles s Cleans 103 ┛. 7**1**1 40 Cress 16. WATER WELL CONTRACTOR & CERTIFICATION 18. REMARKS, ELEVATION, SOURCE OF DATA. This well was defined under my jurisd Split Spoon samples taken. the best of my knowledge and belief. Lieman Me Licenses Budness Harts Authorized Representative 逐漸 IMPORTANT: 194791 FILE WITH DEED - WELL OWNER COPY I-11

TER WELL RECORD 194/92 for Weser Sample St Lons J. PROPERTY OWNER'S NAME 50 :15 Air National Gua SE'SW' Doluth, MN 5581 National anad Air LLL DEPTH (con GW3B 12/1/86 20,0 a Cathe sunt 40 Remm 100 1000mg DPPO Ε Storage near C. 2 Claimer and s 🗆 🗤 a Diama T ------6 James L USE 1 44 (C)n 103 Industry 20 Inter ملاأه PORMATION LOG COLOR HARINNESS OF FROM Ston Well 10 -•••• HOLE DIAM Sill Clar 0 1 Heck Solt pron 3**0 C.e**. ren-tan જિ a1 Pro C Plastic \$ Ster 20 53. 2 125 10 brown Sand ምእኑ Gravel ..... A SCREEN I Or open he ft. 10 from The Stanley Stee Zin 15:0 DOI Sector 2000 n.m. 520n. . A. and _ . STATIC WATER LEVEL 5.63 Alerter Dates rks 10. PUMPING LEVEL (below I ft. after bes. pu .... bet. pu ____ ft. ofter ___ 11. WELL NEAD COMPLETION . ( Thisse star 3 2 12 WELL GROUTEDT Ans 📿 Ma herte neat achief IL NEAREST SOURCES OF POSSIBLE CONTAMINATION topsal. intrain Site 3 Yn□ Ny**k**[ بحمد محجد أنماك 14. PUM **۲** R. cm JOL & Turble SCI Racigencolling 1.74 ₽. 2010 IA. WATER WELL CONTRACTOR & CERTIFICATION IS REMARKS, ELEVATION, BOURCE OF DATA, 45. Spit Scoon Sample collected a sed bellef. Licensee Business Name Linese No. of Res 湖臺 IMPORTANT: 194792 FILE WITH DEED - WELL OWNER COPY HE-01000-01 I-12

NNESOTA UNIQUE WELL NO. | LOCATION OF WELL WATER WELL RECORD 194793 for Weser Sumple St. Laris u Saabaar ( SAA. 81 - 88 IF & MAME Air National 50 9 15 1 2 WY quard Druth, MN guard Box National 5581 WELL DEPTH (com 11/26/86 17.0 D700 5. 1 Colde sont 10004 40 8 mm 7 - -- ÷ -Ε Storace 5**----**المحر مستقسات 🗖 د سيدو 🗖 ه HO. ī Ŵ • Krowe Auger D Rotory i ..... -404 1164 ıΩn 10 tedatory GW3-A+ s Municipal 2**0** kr HARININES OF FROM FORMATION LOG COLOR 10 0 Alt Cre Xree wee •0 HOLE DIAM 9 Soft 0 Silty Sandy ( brown I Hatt Jai 20 Ger. 13 9 Sandy 800 Stanter and the brown 5.11 Plastic IT. 53... Soft 13 17 mon . SCREEN Or open he from . R. 10 Stairlen Stee 2 in 10.0 0.0 - 16.5 n.m. 6.5 n. ft. and ____ n. 1/2/87 Date Mar . PUMPING LEVEL O ft. after .... ...... . B. sfler _ I. WELL HEAD COMPLETION 1 7 Palace adapter, man 3 At least 12" above grade 1 Barement offset IL WELL GROUTEDT IN Heat Commic AP 20 Brat Ð hertonik neat conit. CARASSON .... VO not internant Well distanced waves come 14. PUMP  $z_{\rm est} = V {\rm obs}$ ..... JOL S. Turbine Trans (CSah 2 16. WATER WELL CONTRACTOR'S CERTIFICATION 15. REMARKS. ELEVATION. SOURCE OF DATA. etc. This wall was defined under my horized es and this res Split Sporn Samples takes. pe and ballef. the best of my haswled Linester Bullante Name Linese No. Authorized Representative IMPORTANT: 函数 194793 HEAL FILE WITH DEED - WELL OWNER COPY I-13

LOCATION OF WILL ] HUNDER St. Lovis MINNESOTA UNIQUE WELL NO. WATER WELL RECORD 194794 for Weter Sample n Smeure I SAA.01.... TROPERTY OWNERS HAME Air Command 9 15 36 SWNWSE Taluth, MN National grad Base truth 55811 LL DEPTH (completed) 11/22/86 20.0 d/GW5C L. 40 Rener 100 -÷-Ε 2 5**0** A.W a Barred Ţ - X ...... 4 · 10 Industry r Cho فسينه متنجح أأله ·C)--**с**Пы. **•** MORMATION LOG HARINIESS OF FROM 2 Ton 100 COLOR TÔ • 4 🗆 A 🗆 Cost HOLE DIAN 8017-1 6 Hy Sand 0 bran . . Ru aΩc . sOw Soft 10 red-brown G \$S. Ste JCI Plastic 5.3 .... 10. 2 8.17 20 brown 10 . SCREEN ft. 10 Stink とう OLO1 20 5 . STATIC WATER LEVEL 12/07 5.45 1. Karton Dabare ft. after 11. WELL HEAD COMPLETION 1 Pitless adapter, manufe 3 Basement offset JC At least 12" above grade 18. WELL GROUTEDT Direct Commercial Stan _D 4 . 2 2 heat comot 12. NEAREST BOURCES OF POSSIBLE CONTAINTIATION CHANSEADun Enous v--⊡ myZ I.G. PLIMA ..... CL.S. Tutles 105 مستحبيب 204 •••• 2044 16. WATER WELL CONTRACTOR & CERTIFICATION Split Spoon Sample taken This wall was defined under my hole the best of my hoaveledge and bellef. License He. Licenses Budgets Home IMPORTANT: 涵影 194794 I-14 FILE WITH DEED - WELL OWNER COPY HE-01908-01

NESUIA UNIQUE MEIL NU. LOLATION OF WELL WATER WELL RECORD 194795 St Lais Summer 1564.01.00 PROPERTY OWNER'S NAME 15 36 5W W TE 51 Tactical Ar command Trin, M National Ch Base Duth 55811 Air ELL DEPTH (com <u>11/</u>21/86 16.0 · -700 (e)] p. Ε 20 Hallow rad nO. Τ. 3 a Jonned .X.... USE GW5 B ،0n 1 Industry 20 Internation -110 HARENIES OF FROM COLOR · 10 HORMATION LOG ممدن بدم 🗖 ه -KEIGHT NOLF DIAN 0 Soft 3.5 Sand pron XTan much OBlack -. س  $\mathcal{B}$ Laner Silt 5A 35 brown D Plasti Sand B 13 সিন্থ branch 16 (3 SCREEN brown mad И ft. 10 STZ. trul in 0.01 14.B n.m 4.B. . STATIC WATER LEVEL . 5.63 1/12/07 Date Man ft. after IT. WELL HEAD COMPLETION : Philese adapter, ma 2 Belement offset At least If" share grade IL WELL GROUTEDT gra Dra 1 Heat Cameral 4 2 Section Ð 1.9 3.9 bontonitie .... 1.9 West Cent 13. NEAREST BOURCES OF POSSIBLE CONTAMINATION W danse N100 ¥++ 14 80.00 .... DL.L.Turbies s Recto **.** 2**1**0 Jun 16. WATER WELL CONTRACTOR'S CERTIFICATION IS REMARKS. ELEVATION, SOURCE OF DATA, 41 This wall was defined a Split Spon samples takes. the best of my La lue and bellef. License Budents Name Lintente He. IMPORTANT: 194795 FILE WITH DEED - WELL OWNER COPY HE-01300-01 I-15

LOCATION OF WELL MINNESOTA UNIQUE WELL NO. <u>194796</u> ATER WELL RECORD St. Lovis for Weter Sample 51915 36 GW NWSE" Tactical Air Command Air National Guard Box, Duth MN Dun 55811 11/21/86 D 22 «C .... 7**11** () (1) (1) -----ε 5**0** A# 2014 a Danuel T Ð int. **،** Ω, a Jones (C)n و منتخب 🗖 ه 1 20 mg s 🗆 H a Close MATION LOC COLO FROM 0 Clayer Silty Sand HOLE DIAM 0 1125 brown Solf 3 2.48 2**0 c**..... sOw. 80 10.5 12 mon an Stal 22 (8.5 Sith )an brown 8 12 22 JAN 185 20 R 10 F wow ୪ Stainly Ster 0.01 22 . STATIC WATER LEVEL 6.4 1/12/8 1. Ventres and . PUMPING LEVEL O e. I. WELL HEAD COMPLETION 1 C Pitture adapter, 1 2 Basement office Al local II" above grade & WELL OROUTED? Arn Du 10 mm cram CAP 200 mm **D** 4.1 reat amount 19 IS. NEAREST SOURCES OF POSSIBLE CONTAMINATIO CHARAMAN . N 200 m E 4. PUNI A ..... CL.S. Turbin - Careta 105 <del>س</del> •• WELL CONTRACTOR & CERTIFICATION IA REMARKS, ELEVATION, SOURCE OF DATA, MA This well was dell Split Spon samples taken H of my k ad Bertennet IMPORTANT: 194796 FILE WITH DEED - WELL OWNER COPY I-16

UPARIMERI UT DEALIN ATE OF MINNESOTA MINNESOTA UNIQUE WELL NO. LOUATHIN OF WELL 194797 WATER WELL RECORD for Weter Sample St caris Mine J. PROPERTY OWNER'S NAME 50 9 15 SEINIM Tactical Air Comman Air National Qued Base Dulth Duth, MN 5581 WELL DEPTH (completed) 11/24/06 15.0 . ICohie soul -1000m 7000 landfill ε 2 Classificare and 5**0** A# e Da 6 Jensed USE 100 والتنبيح TO Industry GN7-C s 🗆 M COLOR HARINISS OF FROM NORMATION LOG TO A ..... HOLE DEAM Sand Q 15h 7 brown Silh -1 C Blarb 253 ست ال **•** red-trom 7 801 13 AS Stel aat Yas Gandy San JC) Pie K. 1 bran Soft 13 yi lti 6 A. SCREEN Or open he from . ft. 10 Stanin 2" 0.01 10 pr 13.75 n. w 3.75 n. ft. and ____ . STATIC WATER LEVEL 1.96 Barting Dates Date Massard 1/12/87 . PUMPING LEVEL O ft. after .... 11. WELL HEAD COMPLETION 1 C Philane adapter, mar 2 Basement offset ) 18 WELL GROUTEDT X ... DNo Storen Concres CAP Storenname 30 _ rea avera beartorite rea 3 o Z heat centre 2 0 . R. CL Ym. LE NEAREST SOURCES OF POSSIBLE CONTAMINATION gassfith VO ME Site 7 Well disinfected upon completion? 14. PUMP ..... JCIL & Turbine S Ractgrocoting 103 ο. 201 16. WATER WELL CONTRACTOR'S CERTIFICATION La REMARKA ELEVATION BOUNCE OF DATA ME Sphit Soon Sample toka. This well was defined under the best of my knowledge and bellef. Licensee Business Name Literate He. Authorized Representative in of Dellar IMPORTANT: 法制 194797 FIT WITH DEED-WELL OWNER COPY HE-01806-01 1-17

MINNESOTA UNIQUE WELL NO. 194798 STATE OF MINNESOTA ULIANIMENI ULIEALIA COLATION OF WELL WATER WELL RECORD St. Lavis PROPERTY OWNER'S NAME KE WWW 9 15 50 Tacticere Air Command Dint. MN National grad Air En 5581 Dur LL DEPTH 1/23/86 W7-B 20.  $\mathcal{O}$ tOCalify sund 40 Rmm 100mm Ε + kendfill 5**0** A 8 سيد 🖓 2 C Hattan and ••• T 4 m. J ..... . UR ıΩn **____** 7**1**] Jack 5**0** H •Ocm ملآ 2**0** ing FORMATION LOG HARINHESE OF COLOR FROM 10 ی جم 🖵 ہ • 5:12 HOLE DIAN Clarey Soft 0 bonin 1 aut ·Jon-s week 3.5 Silt red-ovan st istel J Plastic 20, Gravely Scr Soft 13 brown 35 20 The sind bon 201 B K-RNN Or eases have ft. 10 m Stanle <u>9,8</u> n.... 4.77 Differen Com 12/8-Date M ft. after TL. WELL HEAD COMPLETION 1 Pitters adapter, manuf 2 Basement offset 3 At least 12" above grade A WELL GROUTED? Gra Cino -CAP AT Ð her tonit ~ m hart ant 0 Knok Site 7 YenC) Well dista fortad anon 14. PUMP Jan . **14-8**. JOL S. Turking -101 жDк -Ocum ₽. IS. WATER WELL CONTRACTOR & CERTIFICATION IS. REMARKS. ELEVATION, SOL E OF DATA, ML This well was define Split Spoon Samples Taken the best of my be p and bellef. and Realizable Sta ed Res IMPORTANT: 194798 FILE WITH DECL - WELL OWNER COPY **I-18** 

LOCATION OF WELL 10.00 WATER WELL RECORD 194/99 for Water Samala The statistics NE SW NW Tactice Ar Comman 16 Down, MN 55811 Duth Euse Arr Nation *160 VIII DEPTH 11/23/06 19. Ď pandfill 1 Catte sant -C 800 7C Determ 10 Dag ε -------3 Hotary 6() Jen 1188 ı 🗆 n و بيديو 🗖 ه 1Cl Industry s Che പ്പം. •**O**c... HARINASS OF FROM FORMATION LOG COLON ta  $\mathbf{\dot{\times}}$ -0 Soft 0 HOLE DIAM Silt 6 2 Trans bom i C Binet a Conte 8 6 શ્વ્ય 2 Plantic Z brown 23-19. B 19 511 brown A. SCREEN Or even he Make Stinles Stee Zin 10 H 0.01 9 ft. and STATIC WATER LEVEL 3.85 ribter ab 1/12/87 O. PUMPING LEVEL ( ft. after _ R.after ____ .... IL WELL HEAD COMPLETION 1 Philess adapter. m 2 3 At least 12" above grade LE WELL GROUTEDT These Coment CAP 2005 þ bentonit-6 Com. - bout heat am IS. NEAREST SOURCES OF PO LE CONTAMINAT 1010000 NW N150 Yee 14. PUMP JOL.S. Turbine (D) Ω. 20 201 4. WATER WELL CONTRACTOR'S CERTIFICATION IA REMARKS. ELEVATION, SOURCE OF DATA, MA. This walk was drilled as Split Spon samples taken. at of my h newledge and build. Licensee Budness Home Linner He. Authorized Representative IMPORTANT: 194799 FILE WITH DEED - WELL OWNER COPY I-19

LOCATION OF WILL | 194800 WATER WELL RECORD for Wester Sample 0 36 WW WWE Tochical Av Comma 15 Pulit, MN 55811 atro Ø (base Jul Ti) 11/20/86 25.0 Cotte test -10 Dag 7**0** Noisea pond E 5**0** A.B. »Шн a 🖾 Barrad ..0 T . aL. -----3**C)** # a Director 2 119.0 i D n VC Industry TGWI-E 224 2**1)** Im 5**—** 14-Do COLOR HARINESS OF FROM PORMATION LOG TO 0 HOLE DIAM Soht brown Clay 0 Silt 2 2**0 c...**, 13 red-brow JCI Plantic ム 13 brown 23 Cla Graves st. a. Weight 23 green brown 81 25 SCREEN Or open had an trem ft. 10 ste <u>2in</u> Tree O.Ó 520 ñ. ..... . STATIC WATER LEVEL 1/12/83 16 . PUMPING LEVEL O tt. after I. WELL HEAD COMPLETION 1 C Pitters adaptar, ma 2Ci Ban JC At least 12" above grade at office IL WELL GROUTEDT dera Dro CAP ALC: N b bentonite Con. - bat. heat anot intern Goore Dung 1 YmD Well distant state of the 14. PUMP ine کچ CL.S. Tatles 1**0**1.... 101 Type: •Creating at ю. 2044 16. WATER WELL CONTRACTOR & CERTIFICATION IS. REMARKS. ELEVATION. BOURCE OF DATA, ML Split Spoon Samples Taken nt of the b a and ballet. Licensee Business Hart IMPORTANT: 194800 FILE WITH DEED - WELL OWNER COPY I-20

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Air National gr	and base	Delt	5	TUNTA, MN SSB11
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IA REMARKS. ELEVATION. SOURCE OF DATA, etc.	abart, If anoded		l	16. WATER WELL CONTRACTOR'S CERTIFICATION This well was delind under my jurisdiction and this report is true to
Split Spoon Sa	mph Tal	en.		the best of my basededge and bellef.
	l			Licences Business Home Elevenen He.
				Signed Dete Dete
IMPORTANT FILE WITH DEED - WELL		194	309	Hume of Defler
	- THEN GOL		-21	HE-01886-01 2/02 1996

MINNESOTA UNIQUE WELL NO. 194810 LOCATION OF WILL WATER WELL RECORD PROPERTY OWNER'S NAME 51 9 15 \$ 36 W W 2. Tachcal Ar Commad Air National ghad Base Duth DUM, MN 55011 . WELL DEPTH (completed) 11/19/86 17.5 6WI-C 100 Dag S. 1 Cohie und pond ε 2 Hollow red 2**0 8 m m** ..0 N JO Notary 4 6 USE 4 Public Suppl 1C Industry 8**0**0m 2**1)**1ml STATES Well PORMATION PROM COLOR HORMATION LOG 10 -0 6 Ale Cuedle HOLE DIAH 03.5 Clay Silti 8A (C) Black bonn 4 (Tannad 20 Gair. s welded 897- 3.5 9.5 (lanel brown s^[] Plastic Z AS. Ster ~~_ IZ 507-9.5 13 bran fl. Weishi ... soft 17.5 brown 13 lap-in SCREEN -<u>کر</u> Typ Stailin Steel ft. 80 Zih 0.01 10 17-211 borners 17.5 n.m. 7.5 n. . ft. and _ . STATIC WATER LEVEL 1/12/07 4.32 North Dater Date Me 0. PUMPING LEVEL (below land surface) ft. after ____ _ R.after ___ 11. WELL HEAD COMPLETION 1 Pitters adapter, manufacter 3 2 Besement offset 12. WELL OROUTED? half am. 4.5 0 13. NEAREST SOURCES OF POSSIBLE CONTAMINATION inthan m <u>se</u> ~100 im Voi not goose Day 1 Well distafacted upon comp 14. PUMP ------..... JOL.S. Tutles Type: 10 Same +Constituent •**O** ... 2020 A WATER WELL CONTRACTOR'S CERTIFICATION 15 REMARKS. BLEVATION. BOURCE OF DATA. ML This wall was delived under my jurisdi Split spoon sample taken. the best of my knowledge and bellef. Liorna No. Lizensee Business Name Authorized Representative IMPORTANT: 海影 194810 FILE WITH DEED - WELL OWNER COPY ME-01988-01 I-22

LIRATION OF WELL WATER WELL RECORD 194811 Str. Conis fotor Sample PROPERTY OWNER'S NAME WE "NW'SE" 511: 15 36 Jactical Ar Command MN 5581 Don ti ith guid Hr lation bose WELL DEPTH 4 29.0 186 18 GWI-A-^{8.} 100Cable and 40 R.m 70 miles 10 Ε ÷ March N 2 Hallow en 5**0** A.W a anna nΟ, Ţ, Streem Auge ----a la sened 1165 Los N (Do Contrastic 1 -2**0** mj 5**0** Me a🗆 ca PORMATION LOG COLOR FROM 70 -0 HOLE DIAL brinn 9 Siltv Clay 8017 D (C) Black **A**77 20 Catr. 19 brown Sol 22 Som anei pon 22 29 Sol ′} A. SCREEN Or anna hail (te Stank 5 Туре 0 29 . STATIC WATER LEVEL /12/8 11.28 -A PUMPING LEVEL O _ ft. after _ Brs. pt .... 11. WELL HEAD COMPLETION 2 Thurse edepter. m 2 Basement office J At least 12" above grade IL WELL GROUTED? Ven DNo Diver Comes CAP . Demonste Ð banton te m 12 R. C. Ye Ú. Com-bent. heat comer 2 12. NEAREST BOURCES OF POSSIBLE CONTAMINATION in tron goox Day 1 Yee 🖸 Well disinfected upon completion? 14. PUMP . Vala ... ____ JOL S. Turbine sCI Rette Type: (CSube •**–**(w 101 IA. WATER WELL CONTRACTOR & CERTIFICATION IS. REMARKS, ELEVATION, SOURCE OF DATA. etc This well was defined under my ju art in terms to the best of my knowledge and bellaf. Split Spor samples fater Licensee Budeam Home Linense He Authorized Researchetive IMPORTANT: 遊覧 194811 FILE WITH DEED - WELL OWNER COPY HE-DIAM-D I-23

NINNESOTA UNIQUE WELL NO. LOCATION OF WELL 194812 WATER WELL RECORD Sa Loris for Water Sample hr Natrone gn ... 0 SW'NE 15 57 Dulut, MN 55811 National Quard Base Duch GWZE 17/86 19.0 FIK Trainin Contra sund يو 🗖 که 10 3 + -5**1** A.W ----2011-1----110 T a farma an •**I** temm -----4195 ¥.T. 1C) Industry ŝ ية منتخبة 🗖 ه 5**—** 144 **_**___ HANNING OF FROM MATION LOC COLOR τO • 🗆 🗤 😋 HOLE DIAM 0 80/7 brace Gravel -125 t Dittert brown 92 2**0 Gab**. s: week 12.5/19 SA x Plantic \$15.50 red-borow L SCREEN Or open had ŧ. .. Zin Ste Hand 0.01 0 ft. and . STATIC WATER LEVEL <u>///2/197</u> 10,82 1000 - 0.... PUMPING LEVEL ft. after . WELL HEAD COMPLETION -J Al Jourt 12" shore grade 2**1 8 a**a ment offset 12. WELL GROUTEDT den One IPTiest Coment CAP 25 'n ~ bestonite Cen-bent heart amet in known Fire Training Yes C 14. PUM Are man ..... -----JOL & Tubles Ω. • Com 201 Une a second about, if an 14. WATER WELL CONTRACTORY CERTIFICATION 15. REMARKS, ELEVATION, SOURCE OF DATA, etc. and the second This was firme with Split spoon samples taken. p and ballet. the best of my he Linense He Linemate Budham Name IMPORTANT: 194812 FILE WITH DEED - WELL OWNER COPY HE-01806-01 I-24

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Ar National yned	bose, D	ruth	ich map of y	al location.	4. WELL DEPTH (completed) Date of Completion
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LOX ATHIN OF WELL MINNESOTA UNIQUE WELL NO. WATER WELL RECORD 194814 A. for Mater Sample Lons -----J. PROPERTY OWNER'S NAME Gen SW NE Air Nationel , r L gnard SU 15 National 11-101-Quad Bese Dulut Zluth MN 5811 L DEPTH & 11/14/86 21. 5 Fire Trainit Calife teat 7**1**771944 (aC) Day ¥ Ε 20) Hallina rad 5**0** ar 4**17** 84444 Ţ GUZC J Hostory Κ. • Diened ı Qı 1CI Industry **D**e 2C) ange متأهدا s Montried -Closes MARINIE SO FORMATION LOG COLON FROM 10 Tree 0 0 NOLE BLAM red-brown 0,5 172 C Reck <del>次</del> :0Can. S. Webbed 0,5 and redborn ळ 1.0 \$7.5th Plastic 217 led-brown 50 60 12 مغطياتك æ. red-bom Ì8 SCREEN 12 11. In Ste 乙山 Silt 18 mile &Y} brown 21.5 Tree 01 6.5 в. STATIC WATER LEVE 6.55 1/12/87 2 PUMPING LEVEL ft. sfler ..... 1. WELL HEAD COMPLETION 1 🖾 Pitlene adapter, m 20 844 3 At least 12" above grade ment affect IL WELL GROUTEDT Xra 0.00 CAP AT O bantonite Center t. .5 heat anet IS. NEAREST BOURCES OF POSSIBLE CONTAMINATION 250 mann Fire Tracking Y ... Well distantant 14. PUMP eea. JOL S. Tertine 1 ante يعيدو 🖸 ر •**O**(** Ω. 20m 14. WATER WELL CONTRACTOR & CERTIFICATION 13 REMARKS. ELEVATION. BOURCE OF DATA, MR. ns delled und in true to a and halfed. Sample take the best of the ba 51.7 spon Linemas No. Licenses Business Home of Res IMPORTANT: 194814 FILE WITH DEED - WELL OWNER COPY HE-01986-01 **I-26** 

DEPARTMENT OF HEALTH STATE OF MINNESOTA MINNESOTA UNIQUE WELL NO. LOCATION OF WELL 194815 WATER WELL RECORD for Water Samale St Loris Q. SW SWNE" National grad 50 Ai~ Duth Air National Guard Base, MN 5381 Julut LL DEPTH (ce 15.0 186 Fire maining S. | Colde hand 40 R.m 700 10CDug £ GW2-B . N را يوسيان 5**—**]..... 2**0**3448499 **•O**•• ... T 3 4 Jette d. . ..... ..... 'Æ: ı C na و منتخب ا 🗅 که 70 100 sC) Me a Chan 2C) Imig 1 11/14 DOTON We FORMATION LOG COLOR 1 HARINA BO FROM **TO** --HOLE DIAM red-brown 8 1 2 Time 7 4 s Dy 50 U reation Xà ) Plastic 7 S3. . 15. 7 red -bran ଟ୍ୟ 10 (S A. SCREEN Or open he from . R. 10 Make Ste TIM Stall 2 77 Ô 0+01 - 12.5 n.m Zas _n. f). and . STATIC WATER LEVEL 1/12/87 2.4 _ fl thether Dat Date M . PUMPING LEVEL ( ft. after II. WELL HEAD COMPLETION ( Pitiess adapter, mana 2 Besement offset 3 IL WELL GROUTED? dra Dro Atien Comme CAP 20 Bean Ωد <u>bartority</u> - 2.5 .2 A. C. neat cemet. 2-13. NEAREST SOURCES OF POSSIBLE CONTAMINATION in Known N75 m Fix Thaili Well distafacted upon com Yes 0 14 14. PUNP CL.S. Turbie -105 Type ••• -**سد** Ωد 14. WATER WELL CONTRACTOR & CERTIFICATION 15 REMARKS. ELEVATION. BOURCE OF DATA. ML This wall was defined as ad ballef. supportate Split Spon License Business Name License No. Anthoniand Representative The set Deally IMPORTANT: 図覧 194815 FILE WITH DEED-WELL OWNER COPY I-27

MINNESOTA UNIQUE WELL NO. LOLATION OF WELL WATER WELL RECORD 194816 A. Lais for Weter Sample HE SHOWN I SAA. BI . DE 50 N: 75W Air National great SE SE M lational guard Box Dl m Julith. 55811 11/13/86 444 12. Training CC Cable sunt 40 Revenu 70 Ortoge بيت المر Ε March No. a Dannel Da 2 Hollow red 5**11** A.B <u>Т</u> қ.ж. 2 Postary • Jennel USE iOn 1 - Cirva F6W2-A 201-5**0**14 un •**D**Cm FORMATION LOU FROM Tore V COLOR 70 - CALC 3 NOLE DIAN Õ red-boon Soft Clar Silh Torestor 1 Dillart 2.61 s Web SAM 3 82 5 X. 9 brown C Plantic 125 1 74 Soft 5 ns bon . SCREEN Maha The Staten La Zie 0.0  $\overline{0}$ 10.5 nm 0.5 ft. and STATIC WATER LEVEL 1/12/87 7.51 Kontres Datas Date M 6. PUMPING LEVEL O ft. after I. WELL HEAD COMPLETION 1 Pitters starts, mar 2 Besennens offices At least 12" shows grade IL WELL GROUTEDT Arn Dra 1) Heat Coment SAT 20 Brate <u>م</u> hast ant _ 0.5 . 0 R. O. 12 NEARBET BOLINCES OF POSSIBLE CONTAMINATION intuda Fire Trasic Yan 14. PUMP JOLS. Tuttes SCI Rectantications 105 **.** 2**0** Im A. WATER WELL CONTRACTOR'S CERTIFICATION IS REMARKS, ELEVATION, SOURCE OF DATA 444 Split spon saugh tele and hadded. the best of my lu License He. Linease Budgers Nume A Bes Nome of Driller IMPORTANT: 194816 FILE WITH DEED - WELL OWNER COPY HE-01000-01 1 - 28

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APPENDIX J REFERENCES

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#### REFERENCES

- Adolphson, D.G., Ruhl, J.F., and Wolf, R.J., 1981, Designation of principal water supply aquifers in Minnesota. Water Resources Investigation 81-51, U.S. Geological Survey and U.S. Environmental Protection Agency,
- Anderson, H.W., Jr., 1986, Hydrogeologic and water quality characteristics of crystalline rock aquifers of Archean and Proterozoic age, Minnesota. Water Resources Investigations Report 86-4033, U.S. Geological Survey, St. Paul, Minnesota.
- Bonnichson, W., 1971, Outcrop map of southern part of Duluth complex and associated Keweenawan rocks, St. Louis and Lake Counties, Minnesota. Miscellaneous Map Series, Map M-11, University of Minnesota, St. Paul.
- Carlson, M.O., MSgt., MANG, Duluth IAP, Minnesota, 1985, Personal communications (May 23 and June 25).
- Engineering-Science, 1982, Installation Restoration Program, Phase I Records Search, Duluth International Airport, Minnesota (USAF Contract No. F08637-80-G0009, Call No. 0012). Engineering-Science, Atlanta, Georgia (March).
- Gunard, K.T., Hess, J.H., Zirbel, J.L., and Cornelius, C.E., 1983, Water resources data, Minnesota, Volume 1: Great Lakes and Souris-Red-Rainy river basins. USGS Water Data Report No. MN-83-1, U.S. Geological Survey, Minnesota Department of Natural Resources, Division of Waters, Minnesota Department of Transportation, and other state, municipal, and federal agencies.
- _____, 1983, Water resources data, Minnesota, Volume 2: upper Mississippi and Missouri river basins. USGS Water Data Report MN-83-2, U.S. Geological Survey.
- Hill, S., K. I. Sawyer AFB, Michigan, 1985, Personal communication (May 23).
- Hobbs, H.C., and Goebel, J.E., 1982, Geologic map of Minnesota Quaternary geology. Minnesota Geologic Survey, State Map Series S-1, University of Minnesota, scale 1:500,000.
- Kanivetsky, R., undated, An appraisal of ground water resources for the new Natural Resources Research Institute in Duluth, Minnesota. University of Minnesota, Physical Planning Office.
- ____, 1978, Hydrogeologic map of Minnesota bedrock hydrogeology. Map S-2, University of Minnesota, St. Paul.

_____, 1979, Hydrogeologic map of Minnesota quaternary hydrogeology. Map S-3, University of Minnesota, St. Paul.

- Lindholm, G.F., Ericson, D.W., Brounard, W.L., and Hult, M.F., 1979, Water resources of the St. Louis River watershed, northeastern Minnesota. Hydrologic Investigations Atlas HA-586, U.S. Geological Survey and Minnesota Department of Natural Resources, Division of Waters.
- Little, C., HQ TAC, Langley AFB, Virginia, 1985, Personal communication (May 21).
- Manns, J.D., Maj., MANG, Duluth IAP, Minnesota, 1985, Personal communication (May 24).

Minnesota Department of Health, 1984, Water well construction code 4725.0100.

- Minnesota Pollution Control Agency, 1985, Letter to Capt. D. Bradford, USAF, Director, Environmental Planning Division, AFESC, signed by T. J. Kalitowski, Executive Director (January 30).
- Moghissi, A.A., et al., 1978, Radioactivity in consumer products. NUREG/CP-0001.
- Public Health Service, U.S. Department of Health, Education and Welfare, 1970, Radiological health handbook. HEW/PHS, Rockville, Maryland.
- Rogers, J.E., 1962, Reconnaissance of ground water conditions in the Duluth Municipal Airport area, Minnesota. U.S. Geological Survey, St. Paul, Minnesota.
- Roy F. Weston, Inc., 1984, Installation Restoration Program, Final Report, Phase II Stage 1, Problem Confirmation Study, Duluth International Airport, Duluth, Minnesota (USAF Contract No. F33615-80-D-4006, Task Order 0025). Roy F. Weston, Inc., West Chester, Pennsylvania (October).
- Sabel, G.V., and Clark, T.P., 1985, Procedures for ground water monitoring: Minnesota Pollution Control Agency Guidelines. MPCA, Roseville (April).
- Schwartz, G.M., 1949, The geology of the Duluth metropolitan area. Bulletin 33, University of Minnesota and Minnesota Geological Survey.
- Siegel, D.I., and Ericson, D.W., undated, Hydrology and water quality of the copper-nickel study region, northeastern Minnesota. Water Resources Investigations 80-739, U.S. Geological Survey, Minnesota Environmental Quality Board, and Copper-Nickel Study Staff.
- Sims, P.K., and Morey, G.B., 1972, Geology of Minnesota: a centennial volume. Minnesota Geological Survey.
- Taylor, R.R., 1963, Geologic map of Duluth and vicinity, St. Louis County, Minnesota, bedrock geology. University of Minnesota Press, Minneapolis.

_____, 1964, Bedrock geology of Duluth and vicinity, St. Louis County, Minnesota. Geologic Map Series GM-1, University of Minnesota and Minnesota Geological Survey, Minneapolis. ____, 1964, Geology of the Duluth gabbro complex near Duluth, Minnesota. Bulletin 44, University of Minnesota and Minnesota Geological Survey, Minneapolis.

- Thiel, G.A., 1947, The geology and underground waters of northeastern Minnesota. Bulletin 32, University of Minnesota and Minnesota Geological Survey, Minneapolis.
- Thornbury, W.D., 1965, Regional geomorphology of the United States. John Wiley & Sons, Inc., New York, p. 607.
- U.S. Department of the Interior, Geological Survey, 1975, Duluth Heights guadrangle, Minnesota, St. Louis County. AMS 7577 1 SW Series V872.
- U.S. Environmental Protection Agency, 1983, Field monitoring and sampling of hazardous materials (January).
- _____, 1985, Letter to Capt. D. Bradford, USAF, Director, Environmental Planning Division, AFESC, signed by J. Plucinski, Remedial Project Manager, Region V (February 6).

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## TABLE 4-1

### WATER QUALITY RESULTS FIRE TRAINING AREAS

Well No.	Oil and Grease (mg/l)	TOX (ug/l)	TOC (mg/1)	Nitrates (mg/l)	Temp (C-)	рH	Specific Cond. (umhos-cm)
-							
MW-1	0.19	44.3	35.0	0.48	9	7.08	816
M₩-2	0.53	602.6	67.5	0.55	6	7.10	820
MW-3	0.86	81.7	66.2	0.93	9	6.91	1107
MW-4	0.42	15.9	5.6	0.39	5	7.10	574
MW-5	0.75	28.0	44.6	0.35	9	7.40	360
MW-6	0.27	15.4	24.6	0.38	7	7.30	636
MW-7	0.38	126.3	17.0	0.47	7	7.50	657
Detect Limit	. 0.1	5.0	1.0	0.1			

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	SUN	SUMMARY OF WATER QUALITY RESULTS FUEL STORAGE AREA, DIAP	UALITY RESU AREA, DIAP	ILTS		
	1	SAMPLED 15 NOVEMBER				-
	TOC (mg/1)	Oil & Grease (mg/l)	Pb (mg/1)	Temp. ¹ (C°)	рн ¹	Specific ¹ Conductance µmhos/cm
Monitoring Wells						
MW8	49.3	0.36	< .020	° 8	6.90	578
6-MM	70.0	1.46	< .020	5°	7.25	782
MW-10	49.0	49.80	< .020	° 8	7.18	608
MW-11	17.0	< .10	< .020	° 8	6.55	716
Test Pit 2	140	3240	0.031			
Drainage S-l	<1.0	47.20	< .020			
S-2	20.5	48.00	< .020			
Detection Limits	1.0	.10	< .020			
-		•				

TABLE 4-2

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1 - Determined in the field at time of sampling

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SUMMARY OF SURFACE WATER AND BOTTOM SEDIMENT ANALYTICAL DATA GOOSE MISSILE SITE DISPOSAL AREA (Sampled 16 November 1983) TABLE 4-3

-	BOTTOM	BOTTOM SOIL SAMPLES		SURFACE WATER SAMPLES	MPLES	
sampling Location	Pestici	Pesticides in Soils	Pestici	Pesticides in Water	TOC	TOX
	(б. /бл) •0•0•0	Arochlor-1260 ¹ (µg/g)	.0.0.0	Arochlor-1260 ¹ μg/l	l/gm	1/6rl
_	0.139	0.450	<0.1	<0.1	10.9	12.6
2	0.112	0.070	<0.1	<0.1	8.8	11.0
3	0.092	0.360	<0.1	<0.1	9.7	13.9
4	0.100	1.200	<0.1	<0.1	9.7	5.9
2	0.001	0.020		D R Y	• • • • •	
6	0.215	1.300	. 0.18	0.2	11.5	24.1
7	0.132	0.320	<0.1	≤0 <b>.</b> 1	11.0	16.5
8	0.016	0.080	<0.1	<0.1	8.85	< 5.0
6	0.056	0.160	<0.1	<0.1	10.7	29.1
01	0.001	0.010		D R Y	• • • •	•
1	0.001	0.010	•	D R Y	• • • •	• • • •
Detection Limit	0.001	0.010	0.1	0.1	1.0	5.0
NF = Not Found						

J-6

Pro comprised detected in pesticide analysis by EPA Method 608

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						DPDO	DPDO STORAGE AREA "C"	EA ''C''	_			
	Depth (in ft.)	0il and Grease <u>vg/2m</u>	Chloro- form ug/ <u>om</u>	Trichloro- ethylene ug/gm	1,1,1- Trichloro- ethane ug/gm	Bromodi- chloro- methane ug/gm	Dibromo- chloro- methane ug/gm	Tetra- chloro- ethylene ug/gm	Trans-1,2- Dichloro- ethylene ug/gm	1,2- Díchíoro- ethane ug/gm	1,1- Dichloro- ethylene ug/gm	1,1- Dichloro- ethane ug/gm
	0-1 1-2	16,700 16,700	0.025	::		::	::	::	::	::	::	::
C-2	0-1 1-2	23,400 5,700	0.120	::	::	0.001	::	::	::	::	::	::
C-3	0-1 -5	23,400 5,600	0.047	::	::	::	::	0.002	::	::	0.006	: :
4-5 C-1	0-1 -2	35,400 14,500	0.315	0.005	0.003	0.008 	::	0.001	::	::	::	::
с-2	0-1 1-2	13,400 3,660	0.076 0.048	0,210	::	::	::	::	::	::	::	::
ç-6	0-1 1-2	41.800 13.400	0.061 0.073	0.002	0.011 0.210	::	::	0.300 0.220	::	::	::	::
C-7	0-1 1-2	40,600 13,100	0.055 0.018	::	::	::	::	::	0.006	::	::	::
6-3	0-1 1-2	49.500 16,900	::	::	0.014	::		::	::	::	0.015	::
6-0	0-1 1-2	7.325 243	::	::	::	::	::	100.0	::	0.003 0.018	0.032 0.037	0.012 0.013
C- 10	0-1 1-2	191 161	::	::	::	::	::	::	0.014	0.003 0.003	0.015 0.012	0.022 0.007
1-5	05	000'11	0.240	0,140	0.001	0.016	:	:	0.500	:	:	:
2-S	o5	3,470	0.720	0.020	0.001	0.006	:	;	:	ł	:	:
Dutection Limits [lelow m	10-tection Iimits 0.1 0 Nelcu:mum detoction lindt.	0.1 xtion lind	0.001 It.	100.0	100.0	100.0	0.001	0.001	0.001	100.0	100.0	0.001

SUMMARY OF SOIL CHEMISTRY DATA DPD0 STORAGE AREA "C" TABLE 4- 4

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#### TABLE 4-5

# COMPARISON OF DIAP WATER QUALITY RESULTS WITH APPLICABLE STANDARDS, GUIDELINES AND CRITERIA ¹

Detected Paramters	Drinking Water Standards Minnesota and Federal	Quality Cri- teria for Water	Monitoring Points Exceeding Stand- ard
TOC	-	-	-
TOX	-	-	-
OIL & GREASE	-	0.01 2	ALL
LEAD	0.05 ³	0.05 3	NONE
DDD	-	0.000 ³	SW-6 ⁴
NITRATE	10.0	-	NONE
SPECIFIC CONDUCTANCE	1000 5	-	MW-3

1 mg/l unless otherwise noted.

2 Virtually free of oil and grease for domestic water supply.

3 Health related.

4 Surface Water sample No. 6, Goose Missile Site Disposal Area.
5 u mhos/cm, Wildlife related.

### APPENDIX K

### BIOGRAPHIES OF KEY PERSONNEL

#### MICHAEL W. ANDER

Title

UI 11X6-2

Senior Environmental Scientist/Associate

Expertise Environmental Analysis/Impact Assessment Environmental Auditing

Experience With Firm Conducts and manages hazardous waste contamination studies for industrial and government clients throughout the United States. Joined Dames & Moore in 1973.

Senior Environmental Scientist/Associate

- Environmental audits and risk assessments for several industrial facilities in the Midwest.
- Geohydrologic assessment of a chemically contaminated plant site in Michigan, including evaluation of containment and treatment measures.
- Geohydrologic assessment of a chemical waste disposal facility in Michigan.
- Environmental studies and development of remedial actions for over thirty PCBcontaminated industrial sites throughout the Midwest.
- Environmental analysis and impact assessment report for a 600-megawatt electric coal-fired power plant in Missouri.
- Assessment of the impact to benthic and fish communities generated by the increase of industrial effluent to a river in northern Illinois.
- Land reclamation study for a highly acidic, abandoned coal strip mine in north-central Illinois.
- Evaluation of the environmental enhancement resulting from the dredging of polluted sediments from the Little Calumet River in Illinois.
- Study of the economic and environmental implications of developing low-head hydroelectric power on the Fox River in Illinois.
- Environmental assessment of lead in the soils and ground water near a battery reprocessing plant in Illinois.
- Environmental assessment of selected river basins, tributary to the Illinois River, for a statewide stream survey for the Illinois Environmental Protection Agency. Project involved the analysis of nearly 2,000 benthic samples.

Assistant Project Manager

- Environmental baseline studies and impact assessment of copper/zinc mine in northern Wisconsin, including analysis and evaluation of fisheries, plankton, and periphitic algae with special emphasis on water chemistry and benthis macroinvertebrates.
- Preparation and coordination of final safety analysis report and an environmental report of a nuclear power plant in Missouri.

Principal Investigator/Aquatic Ecologist

- Environmental studies required for the preparation of permit applications and reclamation plans for several coal mines and a coal preparation plant in eastern Kentucky.
- Environmental assessment of dredging an estuary and salt marsh for a chemical plant in South Carolina. Project included an analysis and evaluation of fisheries, plankton, and water chemistry with special emphasis on the collection and analysis of benthic macroinvertebrates.

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K-1

Project Quality Assurance Coordinator
Management of numerous projects requiring quality assurance in compliance with Nuclear Regulatory Commission regulations.
Implementation of Dames & Moore's quality assurance manual on all nuclear-related

• Implementation of Dames & Moore's quality assurance manual on all nuclear-related projects.

Past Experience

Academic Background

Proficiency

Four years experience in aviation electronics.

Aviation Electronics Technican, U.S. Navy (1969-1973)

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

M.S. (1970), biological sciences, and B.S. (1967), biological sciences. Northern Illinois University

Citizenship United States

Countries United States Worked In

Langugage English

ProfessionalNorth American Benthological Society; International Oceanographic Foundation: IllinoisAffiliationsAssociation of Environmental Professionals; Ecological Society of America.

Registrations Certified SCUBA Diver

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#### **BEVERLY J. HARPER**

Title Project Ecologist

Expertise Environmental Analysis and Impact Assessment Aquatic Ecology

Experience with Firm Conducts and manages environmental studies and impact assessments for industrial and government clients throughout the United States. Joined Dames & Moore in 1973 and rejoined the firm in 1985 after a 2-year absence.

Principal Investigator/Aquatic Ecologist

- o Evaluation of the environmental enhancement resulting from the dredging of polluted sediments from the Little Calumet River in Illinois.
- o Coordination of environmental baseline studies and impact assessment for a copper/zinc mine in northern Wisconsin.
- o Environmental assessment of potential chemical contamination in the Menominee River, Wisconsin.
- o Environmental site assessments of various sites throughout the country for purposes of acquisition.
- o Assessment of the impact to aquatic communities by the increase of industrial effluent to a river in northern Illinois.
- o Zooplankton specialist with experience in environmental studies in Florida, Maryland, South Carolina, Texas, and Wisconsin.
- o Supervision of the Environmental Laboratory, Park Ridge office. Implemented laboratory quality assurance program.
- Supervision of the analysis of data from several environmental studies.
- o Team leader for various environmental field investigations.
- o Technical reviewer for biology sections for a nuclear power plant biological monitoring study.
- o Biological studies and environmental monitoring for various nuclear power plant projects construction and operating licensing.

Assistant Project Manager

- o Preparation and coordination of Final Safety Analysis and Environmental Reports for a nuclear power plant in Kansas and other nuclear plants nationwide.
- o Environmental baseline studies and impact assessment for a 600-megawatt electric coal-fired power plant in Missouri.
- o Hazardous waste field investigations, feasibility studies, and cleanup strategies for numerous U.S. Air Force facilities throughout the United States.

#### Dames & Moore

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**BEVERLY J. HARPER** Page Two

Academic<br/>BackgroundB.S., Biology, Northern Illinois University, 1971.<br/>Coursework completed towards M.S. with emphasis in Ecology,<br/>Northern Illinois University.CitizenshipUnited StatesCountries<br/>Worked InUnited StatesLanguage<br/>ProficiencyEnglishProfessional<br/>AffiliationsNorth American Benthological Society<br/>International Oceanographic Foundation<br/>National Audubon Society

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### THOMAS E. JENSEN

Title	Senior Geologist/Geophysicist
Expertise	Engineering Geophysics Applied Instrumentation General Geology
Experience With Firm	<ul> <li>Principal Investigator <ul> <li>Seismic investigations to develop engineering properties using combinations of seismic retraction, uphole/downhole, crosshole, surface wave, and ambient motion studies; conducted for nuclear and fossil-fueled power plants, nuclear fuel storage reprocessing and research facilities, fault investigations, and correctional facilities.</li> <li>Reconnaissance and feasibility studies for depth of bedrock, bedrock topography, water table, and rippability using seismic refraction methods.</li> <li>Evaluation of soil improvement through geophysical testing.</li> <li>Geotechnical investigation for water bottom and subsurface conditions for a pipeline river crossing using high resolution reflection, side-scan sonar, and bottom probes.</li> <li>Vibration control and attenuation studies of production quarrying and excavation blasting operations; conducted for nuclear power plants, a nuclear fuel processing facility, a petroleum pipeline and sewer interceptor, and residential and commercial structures.</li> <li>Vibration monitoring of production and excavation blasting operations for smoothwall excavations.</li> <li>Borehole geophysical logging.</li> <li>Electrical resistivity profiling and depth sounding.</li> <li>Rock mechanics studies for a longwall coal mining demonstration.</li> <li>Geologic and hydrogeologic studies for baseline data to prepare environmental impact assessment and permit applications.</li> <li>Structure evaluation by high resolution seismic reflection surveys, test drilling, borehole logging and uphole surveys for a field scale test site for aquifer storage and for compressed air energy storage.</li> </ul> </li> <li>Project Manager</li> <li>Preparation of soils, geology, hydrology, and sociocultural baseline reports for an environmental impact assessment.</li> <li>Rock mechanics studies for a longwall coal mining demonstration.</li> </ul>

### Dames & Moore

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**Technical Reviewer** • Provide technical review of seismic investigations for nuclear-related projects. • Review of high resolution marine reflection and refraction surveys. • Review of test blasting, blast monitoring, and attenuation studies. Past Geophysicist, Texaco Incorporated, Houston, Texas and New Orleans, Louisiana Experience • Involved in interpretation of offshore Gulf of Mexico seismic refraction data. • Participated in preparation of map packages for lease sales. B.S. and M.S., geology, Northern Illinois University Academic Background Seminar and workshops on engineering geophysics, Colorado School of Mines Professional Society of Exploration Geophysicists Affiliations Registrations Geophysicist, California

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K-6

AMY D. LAMBORG

- Title Assistant Geologist
- Expertise Geology, Geohydrology

Experience o Supervised field investigations of several large hydrogeologic/hazardous with Firm o Supervised field investigations of several large hydrogeologic/hazardous waste projects for U.S. Air Force. Field efforts included monitor well installation and sampling, soil boring description and sampling, and surface water and surface soil sampling for bases in Fairbanks, Clear, and Anchorage, Alaska and Duluth, Minnesota.

- o Completed geohydrological field investigation at a hazardous waste landfill in Plymouth, Indiana, which included monitor well installation, soil sampling, and slug testing.
- o Performed site assessment at a plastics manufacturing plant in northcentral Illinois. Program included collecting composite soil and water samples for analyses.
- o Logged test pits, collected soil and water samples, and installed monitor wells for railroad yards in Chicago, Illinois.
- o Sampled drums of hazardous waste at an industrial site in Elgin, Illinois.

Past Experience Geologist, Amoco Production Company

o Evaluated wells for recompletion potential, southeastern New Mexico. Geologist, Wayne Pryor and Associates

- o Constructed structure and isopach maps for Mississippian formations in south-central Illinois.
- Geological Technician, Gulf Oil Company
  - o Constructed regional cross sections, structure and isopach maps from computer data base for offshore Gulf Coast.

Academic M.S., Geology, University of Cincinnati, 1986. Thesis topic: "Development Background and Distribution of Primary and Secondary Porosity in the Salem Limestone, South-Central Illinois." B.A., Geology, Earlham College, 1980

Awards Amoco Production Company Fellowship, 1983 University Graduate Scholarship, 1982 Teaching Assistantship, 1982 Weber Scholar - Athlete Award, 1980

Countries United States Worked in Argentina

Language English Proficiency Spanish

Professional Affiliations

American Association of Petroleum Geologists

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Dames & Moore

Managing Partner (Ltd.), Chicago Office

#### GLENN D. MARTIN

Title

Expertise Waste Management

. Project Management

Experience with Firm

#### Waste Management

 Directed risk assessments for potentially leaking underground storage tanks at 56 sites nationwide. More than 250 tanks containing 18 different products were addressed in the study. Assessments included analyses of hydrogeology, potential contaminant receptors, and the likely behavior of contaminants under a variety of ground water conditions. Program included development of leak response protocols and cleanup protocols.

- o Directed petroleum contamination assessment at an abandoned tank farm in a tidally controlled embayment in Massachusetts.
- o Directed remedial investigation/feasibility study (RI/FS) at an abandoned salvage yard in northern Ohio contaminated with PCBs.
- o Directed remedial investigation at coal mine in south-central Illinois contaminated by organic solvents and PCBs.
- o Directed hydrogeological investigations at a sanitary landfill in Kansas City, Kansas.
- o Directed hydrogeological investigation at a sanitary landfill in western Missouri.
- o Directed hydrogeological assessment at the Four County Hazardous Waste Landfill in Fulton County, Indiana.
- o Directed remedial investigation at abandoned railyard in downtown Chicago proposed for commercial/residential development.
- o Directed remedial investigation at active railyard in suburban Chicago.
- o Directed site contamination assessment at oil terminal near Griffith, Indiana.
- o Directed PCP ground water contamination assessment at a wood treatment facility in Wisconsin.
- o Prepared ground water assessment at a proposed coal ash landfill in southwestern Ohio.
- o Directed ground water contamination assessment at an industrial facility in west-central Ohio.
- o Directed ground water contamination assessment at a gray water spray irrigation field in west-central Ohio.

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#### Dames & Moore

GLENN D. MARTIN Page Two

Other Experience

- o Directed ground water supply studies in Four Mile Creek outwash valley for the City of Oxford, Ohio. Program involved extensive use of test borings, geophysics, and pump tests to identify and confirm the supply potential. Program required public presentation of findings.
- Directed multiyear, multidisciplinary studies for the Abu Dhabi National Oil Company. Studies entailed extensive field investigations pertaining to marine environment involving more than 30 Dames & Moore professional and support personnel. Studies included development of waste management guidelines for a major industrial complex.

Academic Background

B.A., Geology, University of Cincinnati

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#### **Carol Jean Scholl**

- Title Project Geologist
- Expertise Geology Ground-Water Hydrology

**Experience** Provides consultation on geologic and ground-water aspects of the firm's hazardous waste, With Firm 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 A total of ten years experience in geology education and research.

Experience

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

Citizenship United States

Countries United States Worked In

Language English Proficiency

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

Emp-No: 06046 Vers-No: 01 Date: 06/26/87

#### BETH J. SCHOEPKE

Title Assistant Hydrogeologist

Expertise	Hydrogeology
	Geology

- Experience o Conducted hydrogeologic survey on waste disposal site in Michigan. Included total ground water discharge to river, contaminant concentrations of discharge, annual loading to river, and final river concentration after dilution.
  - o Used pumping test data to determine transmissivity, storativity, and permeability of confined aquifer.
  - o Performed resistivity survey for contaminant plume and stratigraphic analysis of waste disposal site in Michigan.
  - o Analyzed data and prepared a site assessment report for a site in Minnesota.
  - o Performed two site assessment investigations on adjacent areas and devised a plan to interface and simplify the data.
  - o Mapped the piezometric surface of an area in Duluth, Minnesota.
  - o Developed original topographic and geologic maps, as well as stratigraphic columns, for various projects.
  - o Performed grain size analysis of soil in the laboratory.

AcademicCoursework completed toward M.S. with emphasis on Hydrogeology,BackgroundNortheastern Illinois UniversityB.S., Earth Science, Geology, 1985, Northeastern Illinois University

Seminars Participated in Dames & Moore Health and Safety Seminar (1987)

Citizenship United States

Countries Worked In United States

Language Proficiency English

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#### **Dames & Moore**

APPENDIX L

## GEOPHYSICAL TRACINGS

### EM SURVEY DATA TABULATION

		<b>F</b> _11	M 53		
E-W	N-5	E-W READING	N-S	EW/NS	EW/NS
STATION	STATION		KEADING	AVERAGE	DIFFER.
	••••••	····		(mmhos/m)	(mmhos/m)
		* * * * * * * *	• • • • • • • •	• • • • • • • •	• • • • • • • •
Ü	Ù	24.00	24.40	24.20	14
0	-20	24.60	2.1.10 ∠+.ଏଏ	24.00	6.40
Ø	-40	24.60	24.20	24.00 24.40	6.40 6.40
Ø	-60	23.20	23.40	23.30	U.20
0	-80	22.40	22.60	22.50	0.20
0	-100	24.80	24.60	24.70	0.20
0	-120	27.20	26,40	26.80	0.20
0	-140	27.40	27.80	27.60	0.40
0	-160	24.40	24.20	24.30	0.20
0	-180	21.20	20.80	21.00	0.40
0	-200	20.80	21.00	20.90	0.20
0	-220	29.60	30.00	29.80	0.40
0	-240	19.80	8.60	14.20	11.20
0	~260	41.60	30.80	36.20	10.80
0	-280	21.40	11.40	16.40	10.00
0	-300	24.00	23.80	23.90	0.20
0	~320	32.40	34.60	33.50	2.20
9	-340	50.80	32.20	41.50	18.60
0	-360	46.00	43.80	44.90	2,20
0	-380	33.60	34.20	33.90	0.60
0	~400	37.80	3.20	20.50	34.60
0	-420	38.80	37.20	38.00	1.60
0	-440	26.40	26.80	26.60	0.40
0	-460	24.80	24.80	24.80	0.00
0	-480	24.80	25.60	25.20	0.80
0	-500	26.20	26.00	26.10	0.20
0	-520	25.80	25.80	25.80	0.00
6	-540	26.80	25.80	20.30	1.00
Ø	~580	38.40	39.40	38.90	1.00
Ø	-600	20.60	29.20	28.90	0.00
0	-620	26.20	20.00	26.10	0.20
Ø	-640	23.60	23.40	23.50	0.20
0	-660	20.00	19.20	12.00	6.90
0	-680	26.20	20.00	20.40	6.46
0	~700	1.40	14.20	7.80	12.80
20	-700	37.60	30.20	33.90	1 · +0
20	~680	22.40	21.20	21.80	1.20
20	-660	22.00	22.20	22.10	0.20
20	-640	26.20	26.40	26.30	0.20
20	-620	28.00	27.40	27.70	0.60
20	-600	34.80	54.40	44.60	19.60
20	-560	37.60	42.20	39.90	4.60
20	-540	27.00	25.00	26.00	2.00
20	~520	24.20	24.80	24.50	0.60
20	~500	24.20	23.80	24.00	0.40
20	-480	25.00	24.60	24.80	0.40
20	-460	25.00	25.20	25.10	0.20

Site 4 L-1

20	-440	24.20	22.80	23.50	1.40
20	-420	30.20	32.00	31.40	2.40
20	-400	23.00	4.60	13.30	18.40
20	-390	32.20	33.40	32.00	1.20
20	-360	31.00	39.00	30.40	2.00
20	-340	34.00	17.40	25.70	16.60
20	-320	32.40	31.40	31.90	1.60
20	-300	26.20	26.20	26.20	0.00
20	-280	32.80	38.40	35.60	5.60
20	-260	17.60	3.00	10.30	14.60
20	-240	34.60	34.60	34.60	0.00
20	-220	27.60	26.80	27.20	0.80
20	-200	24.40	24.40	24.40	0.00
20	-180	25.60	24.20	24.90	1.40
20	-160	24.80	24.80	24.80	0.00
20	-140	25.80	25.40	25.60	0.40
20	-120	27.20	26.80	27.00	0.40 0.60
20	-100	25.00	25.60	25.30	0.60
20	-80	22.60	22.00	22.30	0.40
20	-60	22.00	21.60	21.80	0.00
20	-40	23.80	23.80	23.80	0.00
20	-20	24.00	23.40	23.70 23.80	0.00
20	0	23.80	23.80		1.00
40	0	22.80	23.80	23.30	0.60
40	-20	22.80	22.20	22.50	1.60
40	-40	25.60	27.20	26.40 60.60	14.00
40	-60	67.60	53,60	60.60 71 60	18.40
40	-80	80.80	62.40	71.60	11.00
40	-100	73.20	62.20	67.70	18.40
40	-120	85.40	67.00	76.20 75.00	16.00
-10	-140	83.00	67.00	(2.70	8.20
40	-160	76.80	68.60	03.20	9.20
ΗŬ	-180	73.80	04.00 04.00	63.70	11.00
40	-200	75.80	60.40	(5.50 10.50	14.20
40	-220	82.60	61.40	10.00	17.20
40	-240	78.60 55.60	50.00	53.20	4.00
40	-260	21.80	28.00	24.90	6.20
40	-280 -300	31.00	31.00	31.00	0.00
40 40	-320	31.80	33.00	32.40	1.20
40	-340	57.80	15.60	36.70	42.20
40	-360	32.60	33.20	32.90	0.60
40	-380	27.80	28.00	27.90	0.20
40	-400	44.00	15.40	29.70	28.60
40	-420	40.00	41.80	40.90	1.80
40	-440	24.20	24.20	24.20	0.00
40	-460	22.60	22.80	22.70	0.20
40	-480	23.80	24.00	23.90	0.20
40	-500	24.60	23.80	24.20	0.80
40	-520	24,60	24.60	24.60	0.00
40	-540	27.60	28.00	27.80	0.40
40	-560	29.20	31.00	30.10	1.80
-10	-580	216.00	88.60	152.30	127.40
40	-600	32,60	33.80	33.20	1.20
40	-620	33.40	34.00	33.70	0.60
40	-640	40.60	41.20	40.90	0.60
70	040	10.00			

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Site 4 L-2

40	-660	172.80	71.20	122.00	101.00
40	-700	30.20	91.00	60.60	60.80
40	-720	14.80	48.80	31.80	34.00
40	-740	34.80	3.00	18,90	31.80
60	-740	36.60	3.80	20.20	32.80
60	-720	26.80	33.40	30.10	6.60
60	-700	18.80	18.60	18.70	0.20
60	-680	30.40	32.20	31.30	1.80
60	-660	79.00	114.80	96.90	35.80
6 <b>0</b>	-640	168.00	110.80	139.40	57.20
60	-620	91.40	399.40	245.40	308.00
60	-600	206.80	103.60	155.20	103.20
60	-580	57.20	56.20	56.70	1.00
60	-560	38.40	37.00	37.70	1.40
60	-540	30.80	32.80	31.80	2.00
60	-520	27.40	27.40	27.40	0.00
60	-500	28.60	28.80	28.70	0.20
60	-480	27.80	27.80	27.80	0.00
60	-460	26.00	25,80	25.90	0.20
60	-440	27.40	28.40	27.90	1.00
60	-420	19.20	33.80	26.50	14.60
60	-400	45.80	36.40	41.10	9.40
60	-380	23.80	25.00	24.40	
60 60	-360	23.00 31.00			1.20 2.00
60	-340		29.00	30.00	
		114.60	13.60	64.10	101.00
60 50	-320	34.20	35.40	34.00	1.20
60 60	-300	34.00	24.00	29.80	10.00
	-280	41.80	48.00	44.90	6.20
୪0 ୪0	-280	38.80	20.00	32.40	12.00
	-300	42.00	47.60	44.80	5.00
80	-320	37.40	45.00	41.20	7.00
80	-340	27.00	21.20	24.10	5.80
80	-360	37.80	38.40	38.10	0.60
80	-380	24.40	23.00	23.70	1.40
80	-400	41.60	37.60	39.60	4.00
80	-420	48.80	35,00	41.90	13.80
80	-440	28.60	28.00	28.30	0.60
80	-460	27.60	26.40	27.00	1.20
80	-480	28.80	29.20	29.00	0.40
80	-500	39.60	43.40	41.50	3.80
80	-520	64.00	58.80	61.40	5.20
80	-540	157.80	133.20	145.50	24.60
80	-560	263.60	368.20	315.90	104.60
80	-580	225.40	257.80	241.60	32.40
80	-600	76.80	59.00	67.90	17.80
80	-620	38.80	35.80	37.30	3.00
80	-640	29.40	28.80	29.10	0.60
80	-660	32.00	29.30	30.90	2.20
80	-680	27.00	24.60	25.80	2.40
80	-700	19.60	19.80	19.70	0.20
80	-720	19.20	19.20	19.20	0.00
80	-740	20.20	19.80	20.00	0.40
100	-740	20.00	21.00	20.50	1.00
100	-720	19.00	19.00	19.00	0.00
100	-700	21.20	21.00	21.50	0.60
100	-680	24.00	<b>∠</b> 3.6⊎	23.00	0.40

100	-660	25.20	25.20	25.20	0.00
100	-640	25.60	26.00	25.80	0.40
100	-620	27.80	27.00	27.40	0.80
100	-600	29.40	29.00	29.20	0.40
100	-580	32.60	32.20	32.40	0.40
100	-560	47.20	48.00	47.60	0.80
100	-540	93.00	73.20	83.10	19.80
100	-520	194.20	225.40	209.80	31.20
100	-500	399.20	399.40	399.30	0.20
100	-480	213.40	99,80	156.60	113.60
100	-460	55.40	55.20	55.30	0.20
100	-440	41.80	42.40	42.10	0.60
100	-420	37.40	7.20	22.30	30.20
100	-400	34.40	33.00	33.70	1.40
100	-380	30.00	31.20	30.60	1.20
100	-360	32.80	34.20	33.50	1.40
100	-340	59.60	17.20	38.40	42.40
100	-320	44.00	46.20	45.50	1.40
100	-300	32.00	36.60	34.70	3.00
100	-280	30.00	3 <b>5.</b> 00	37.80	2.00
120	-200	33.00	31.60	30.00	2.00
120	-300	32.00	31.00	31.30	6.40
120	-320	41.60	ゴム・ムリ	30.50	5.00
120	-340	61.60	0.46	34.00	55.20
120	-360	39.20	39.00	22.14	6.20
120	-380	36.20	30.30	30.50	0.00
120	-400	63.20	62.00	62.60	1.20
120	-420	130.20	114.20	122.20	16.00
120	-440	399.60	399,80	399.70	0.20
120	-460	272.20	389.60	330,90	117.40
120	-480	89,60	55.80	72.70	33,80
120	-500	39.00	38.00	38.50	1.00
120	-520	40.20	39.40	39.80	0.80
120	-540	44.60	47.60	46.10	3.00
120	-560	38.40	39.60	39.00	1.20
120	-580	28.00	27.40	27.70	0.60
120	-600	25.00	24.60	24.80	0.40
120	-620	23.80	22.80	23.30	1.00
120	-640	27.00	27.00	27.00	0.00
120	-660	25.20	25.00	25.10	0.20
120	-680	23.80	24.20	24.00	0.40
120	-700	22.20	22.00	22.10	0.20
120	-720	19.20	19.60	19.40	0.40
120	-740	17.60	18.00	17.80	0.40
120	-760	22.20	23.00	22,60	0.80
140	-760	26.60	26.60	26.60	0.00
140	-740	20.20	19.60	19.90	0.60
140	-720	20.80	20.00	20.40	0.80
140	-700	22.00	22.40	22.20	0.40
140	-680	22.80	23.00	23.20	0.80
140	-000	24.80	23.80	24.30	1.60
140	-640	24.40	23.40	23.90	1.00
140	-620	20.00	20.00	20.00	9.99
140	-600	25.20	22.00	25.50	0.60
140	-580	24.40	24.00	24.20	6.40
140	-560	29,20	26.40	27.00	2.80

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140	-540	25 20	24 60	24 00	0.00
140	-520	35.20 25.60	34.60	34.90	0.60
140	-500		24.20	24.90	1.40
140	-480	23.20	22.40	22.80	0.80
140	-460	22.80	23.40	23.10	0.60
140		31.60	31.80	31.70	0.20
140	-440	55.80	51.20	53.50	4.60
	-420	118.60	70.00	94.30	48.60
140	-400	182.80	305.60	244.20	122.80
140	-380	292.80	277.80	285.30	15.00
140	-360	269.00	210.40	239.70	58.60
140	-340	86.00	68.60	77.30	17.40
140	-320	58.80	56.20	57.50	2.60
140	-300	51.00	50.20	50.60	0.80
140	-280	59.00	61.60	60.70	1.80
160	-360	73.20	73.20	73.20	0.00
160	-380	36.80	36.80	30.00	0.00
160	-400	23.00	29.00	29.00	0.00
160	-420	49.80	49.80	49.80	0.00
160	-440	49.00	49.00	49.00	0.00
160	-460	27.80	27.80	27.80	0.00
160	-480	19.00	19.00	19.00	0.00
160	-500	22.20	22.20	22.20	0.00
160	-520	23.60	23.60	23.60	0.00
160	-540	24.40	24.40	24.40	0.00
160	-560	32.20	32.20	32.20	0.00
160	-580	31.00	31.00	31.00	0.00
160	-600	29.60	29.60	29.60	0.00
160	-620	27.40	27.40	27.40	0.00
160	-640	24.80	24.80	24.80	0.00
160	-660	27,20	27.20	27.20	0.00
160	-680	27.20	27.20	27.20	0.00
160	-700	27.00	27.00	27.00	0.00
160	-720	28.20	28.20	28.20	0.00
160	-740	27.40	27.40	27.40	0.00
160	-760	19.40	19.40	19.40	0.00
160	-780	29.00	29.00	29.00	0.00
180	-780	20.20	20.20	20.20	0.00
180	-760	23.60	23.60	23.60	0.00
180	-740	30.40	30.40	30.40	0.00
180	-720	26.60	26.60	26.60	0.00
180	-700	38.80	38.80	38.80	0.00
180	-680	29.00	29.00	29.00	0.00
180	-660	30.40	26.40	26.40	0.00
180	-640	26.40	20.40	26.40	0.00
180	-620	29.20	29.20	29.20	0.00
180	-600	30.00	30.00	30.00	0.00
180	-580	10.80	10.00	10.00	0.00
180	-560	27.40	27.40	27.40	0.00
180	-540	23.60	23.60	23.00	0.00
180	-520	23.60	23.60	23.60	0.00
180	-500	23.20	23.20	23.20	0.00
180	-480	23.80	23.80	23.80	0.00
180	-460	29.80	29.80	29.80	0.00
180	-440	25.20	25.20	25.20	0.00
180	-420	29.20	29.20	29.20	
180	-400	23.60	23.60	23.60	0.00
			20100	20.00	0.00

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180	-380	27.20	27.20	27.20	0.00
180	-360	41.80	41.80	41.80	0.00
200	-380	29.60	29.60	29.60	0.00
200	-400	24.60	24.60	24.60	0.00
200	-420	25.00	25.00	25.00	0.00
200	-440	0.40	6.40	0.40	0.00
200	-460	34.80	34.60	34.00	0.00
200	-480	24.00	24.00	24.00	0.00
200	-500	22.20	22.20	22.20	0.00
200	-520	22.20	22.20	22.20	0.00
200	-540	23.60	23.00	23.00	0.00
200	-560	25.00	25.00	25.00	0.00
200	-580	28.20	28.20	20.20	0.00
200	-600	27.40	27.40	27.40	0.00
200	-620	27.00	27.00	27.00	0.00
200	-640	28.40	28.40	28.40	0.00
200	-660	30.40	30.40	30.40	0.00
200	-680	33.20	33.20	33.20	0.00
200	-700	30.00	30.00	30.00	0.00
200	-720	34.80	34.80	34.80	0.00
200	-740	26.60	26.60	26.60	0.00
200	-760	22.60	22.60	22.60	0,00
200	-780	19.20	19.20	19.20	0.00
220	-780	23.00	23.00	23.00	0.00
220	-760	24.20	24.20	24.20	0.00
220	-740	26.40	26.40	26.40	0.00
220	-720	28.00	28.00	28.00	0.00
220	-700	30.00	30.00	30.00	0.00
220	-680	36.60	36.60	36.60	0.00
220	-660	4.60	4.60	4.60	0.00
220	-640	35.00	35.00	35.00	0.00
220	-620	25.80	25.80	25.80	0.00
220	-600	26.20	26.20	26.20	0.00
220	-580	28.40	28.40	28.40	0.00
220	-560	25.00	25.00	25.00	0.00
220	-540	24.00	24.00	24.00	0.00
220	-520	22.60	22.60	22.00	0.00
220	-500	24.00	24.00	24.60	0.00
220	-400	24.40	24.40	24.40	0.00
220	-400	40.00	40.00	46.00	0.00
220	-440	24.20	24.20	24.20	0.00
220	-420	23.80	23.00	23.00	0.00
220	-400	31.60	31.60	31.00	0.00
220	-380	115,80	115.80	115.80	0.00
240	-380	215.40	215.40	215.40	0.00
240	-400	40.00	40.00	40.00	0.00
240	-420	23.60	23.60	23.60	0.00
240	-440	30.40	30.40	30.40	0.00
240	-460	64.00	64.00	64.00	0.00
240	-480	24.60	24.60	24.60	0.00
240	~500	23.80	23.80	23.80	0.00
240	-520	20.60	20.60	20.60	0.00
240	~540	22.60	22.60	22.60	0.00
240	~560	23.00	23.00	23.00	0.00
240	-580	23.00	23.00	23.00	0.00
240	-600	23.40	23.40	23.40	0.00
240	-000	20140			

Site 4 L-6

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240	-620	1.00	1.00	1.00	0.00
240	-640	35.20	35.20	35.20	0.00
240	-660	29.60	29.60	29.00	0.00
240	-690	27.00	21.00	27.00	0.00
240	-700	27.20	21.20	27.20	0.00
240	-720	28.40	20.40	28.40	0.00
240	-740	26.60	20.60	20.00	0.00
240	-760	24.60	24.60	24.60	0.00
240	-780	22.60	22.60	22.60	0.00
260	-760	24.00	24.00	24.00	-
260	-740	25.00	25.00	25.00	0.00
260	-720	25.80	25.80	25.80	0.00
260	-700	25.80	25.80	25.80	0.00
260	-680	26.60	26.60		0.00
260	-660	25.40	25.40	26.60	0.00
260	-640	23.00		25.40	0.00
260	-620	21.60	23.00	23.00	0.30
260	-600		21.60	21.60	0.00
260		21.80	21.80	21.80	0.00
260	-580	19.60	19.60	19.60	0.00
260	-560	20.60	20.60	20.60	0.00
	-540	21.00	21.00	21.00	0.00
260	-520	19.00	19.00	19.00	0.00
260	-500	22.40	22.40	22.40	0.00
260	-480	26.40	26.40	26.40	0.00
260	-460	19.20	19.20	19.20	0.00
260	-440	29.40	29.40	29.40	0.00
260	-420	24.20	24.20	24.20	0.00
260	-400	36.00	36.00	36.00	0.00
260	-380	399.80	399.80	399.80	0.00
280	-380	371.00	213.80	292.40	157.20
280	-400	46.40	43.00	44.70	3.40
280	-420	25.40	25.00	25.60	
280	-440	20.00	20.20	20.10	0.40
280	-400	16.00	27.60	21.80	0.20
280	-480	30.00	28.20		11.60
280	-500	23.80	23.00	29.10	1.00
280	-520	22.80	22.20	23.80	0.00
280	-540	22.80		22.50	0.00
280	-560	23.00	23.00	22.90	0.20
280	-580	23.00	22.40	22.70	0.60
280	-600	21.20	22.80	22.90	0.20
280	-620	22.40	21.40	21.30	0.20
280	-640	24.00	22.60	22.50	0.20
280	-660		24.20	24.10	0.20
280		25.60	25.80	25.70	0.20
	-680	26.80	27.00	26.90	0.20
280	-700	28.60	28.40	28,50	0.20
280	-720	25.80	25.60	25.70	0.20
280	-740	12.20	18.20	15.20	6.00
300	-720	22.80	23.00	22.90	0.20
300	-700	24.60	23.40	24.00	1.20
300	-680	26.00	25.40	25.70	0.60
300	-660	21.40	23.40	22.40	2.00
300	-640	20.00	21.20	20.60	1.20
300	-620	20.00	20.40	20.20	0.40
300	-600	19.20	19.40	19.30	
300	-580	20.20	19.80	20.00	0.20
				20.00	0.40

300	-560	19.20	18.80	19.00	0.40
300	-540	18.00	18.20	18.10	0.20
300	-520	19.20	19.40	19.30	0.20
300	-500	21.20	21.20	21.20	0.00
300	-480	35.00	32.80	33.90	2.20
300	-460	89,60	12.20	50.90	77.40
300	-440	25.00	25.00	25.00	0.00
300	-420	24.60	25.00	24.80	0.40
300	-400	46.80	41.20	44.00	5.60
300	-380	400.20	219.80	310.00	180.40
320	-380	400.60	400.20	400.40	0.40
320	-400	48,20	44.80	46.50	3.40
320	-420	25.00	25.40	25.20	0.40
320	-440	24.00	24.40	24.20	0.40
320	-460	65.40	55.60	60.50	9.80
320	-480	39.00	42.40	40.70	3.40
				23.10	0.20
320	-500	23.20	23.00		
320	-520	19.60	20.20	19.90	0.60
320	-540	19.60	19.60	19.60	0.00
320	-560	19.60	20.00	19.80	0.40
320	-580	19.00	19.40	19.20	0.40
320	-600	19.80	20.00	19.90	0.20
320	-620	20.80	20.80	20.80	0.00
320	-640	22.20	21.00	22.00	0.40
320	-660	23.40	23.04	23.50	10.20
320	-680	23.40	23.60	23.20	1.40
320	-700	23.00	22.00	1.1.1 · 381	ہا، جاتا
340	-680	21.00	22.00	21.50	1.00
340	-660	21.00	21.40	61.20	전 • 41년
340	-640	20.40	20.20	20.30	0.20
340	-620	19.80	20.20	20.00	0.40
340	-600	19.40	18.80	19.10	0.60
340	-580	18.60	18.40	18.50	0.20
340	-560	18.80	19.20	19.00	0.40
340	-540	17.80	18.40	18.10	0.60
340	-520	19.60	20.00	19.80	0.40
340	-500	23.40	24.00	23.70	0.60
340	-480	43.20	18.60	30.90	24.60
340	-460	41.20	45.00	43.10	3.80
340	-440	21.60	22.60	22.10	1.00
340	-420	22.80	23.60	23.20	0.80
340	-400	43.80	42.00	42.90	1.80
340	-380	281.20	150.60	215.90	130.60
360		399.20	294.20	346.70	105.00
360	-380	38.40	37.00	37.70	1.40
	-400		21.80	21.80	
360	-420	21.80			0.00
360	-440	20.00	20.40	20.20	0.40
360	-460	31.40	34.20	32.80	2.80
360	-480	15.00	16.20	15.60	1.20
360	-500	26.60	25.40	26.00	1.20
360	-520	21.00	20.80	20.90	0.20
360	-540	19.00	19.00	19.00	0.00
360	-560	19.00	19.40	19.20	0.40
SON	-580	19.90	20.80	19.80	2.00
360	-600	19.80	20.00	20.20	0.00
300	-020	20.20	24.04	20.40	0.40

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360	-640	19.80	19.80	19.80	0.00
360	-660	19.40	20.00	19.70	0.60
360	-680	19.20	19.00	19.10	0.20
380	-660	19.20	20.60	19.90	1.40
380	-640	18.80	19.00	18.90	0.20
380	-620	19.40	19.40	19.40	0.00
380	-600	20.60	20.60	20.60	0.00
380	-580	20.20	19.40	19.80	0.80
380	-560	19.20	19.20	19.20	0.00
380	-540	19.80	20.20	20.00	0.40
380	-520	21.40	21.80	21.60	0.40
380	-500	32.60	32.60	32.60	0.00
380	-480	57.00	6.80	31.90	50.20
380	-460	25.80	25.20	25.50	0.60
380	-440	18.80	19.00	18.90	0.20
380	-420	20.80	20.60	20.70	0.20
380	-400	37.20	36.60	36.90	0,60
380 400	-380	399.20	399.20	399.20	0.00
400 400	-380	399.00	399.00	399.00	0.00
400	-400	34.00	33.20	33.00	0.80
400	-420 -440	18.00	19.00	19.70	0.20
400	-460	10.00	11.00	17.80	0.40
400	-480	23.20 55.80	24.20	23.10	1.00
400	-500	36.40	32.60	44.70	24.20
400	-520	21.60	40.00	38.20	3.00
400	-540	20.40	21.40 20.20	21.50	0.20
400	-560	20.40	20.20	20.30	0.20
400	-580	20.80	20.60	20.40	0.00
400	-600	19.80	20.00	20.70	0.20
400	-620	19.60	19.40	19.90 19.50	0.20
-100	-640	17.60	10.80	14.20	0.20
420	-620	18.60	19.00	18.80	6.80 0.40
420	-600	19.60	19.20	19.40	0.40
420	-580	20.20	20.00	20.10	0.20
420	-560	21.60	21.60	21.60	0.00
420	-540	21.20	21.60	21.40	0.40
420	-520	23.80	24.40	24.10	0.60
420	-500	32.40	10.20	21.30	22.20
420	-480	33.40	32.40	32.90	1.00
420	-460	22.60	22.60	22.60	0.00
420	-440	18.00	18.20	18.10	0.20
420	-420	20.80	20.80	20.80	0.00
420	-400	36.20	36.80	36.50	0.60
420 440	-380	399.00	399.20	399.10	0.20
440	-380	399.00	399.40	399,20	0.40
440	-400	40.00	38.20	39.10	1.80
440	-420	23.00	21.40	22.20	1.60
440	-440	19.80	19.20	19.50	0.60
440	-400 -400	23.20	23.00	23.40	0.40
440	-400 -500	30.00	32.20	31.20	1.40
440	-520	22.20	2.00	12.40	13.00
440	-520 -540	20.00	27.20	21.00	0.00
440	-500	23.00 22.00	23.00	23.00	0.00
440	-580	22.20	22.80	22.14	0.20
		22120	21.60	21.90	0.00

Site 4 L-9

440	-600	21.00	20.40	20.70	0.60
460	-600	24.60	23.00	23.80	1.60
460	-580	27.20	27.00	27.10	0.20
460	-560	27.60	27.80	27.70	0.20
460	-540	29.00	28.40	28.70	0.60
460	-520	35.80	37.60	36.70	1.80
460	-500	46.20	6.60	26.40	39.60
460	-480	33.20	35.60	34.40	2.40
460	-460	29.80	30.00	29.90	0.20
460	-440	25.20	26.00	25.60	0.80
460	-420	28.20	28.20	28.20	0.00
460	-400	47.20	47.20	47.20	0.00
460	-380	399.20	399.20	399.20	0.00
480	-360	39 <b>9</b> ∙∑≬	399.40	399.30	0.20
480	-400	1++	54.00	21.10	52.60
480	-+20	2.20	24.80	13.50	22.00
480	-440	2.20	21.00	11.00	10.00
480	-460	21.00	40.00	31.10	19.00
480	-480	3.40	27.00	15.20	23.00
480	-500	33.40	32.60	33.00	0.80
480	-520	24.60	42.80	33.70	18.20
480	-540	9.60	27.20	18.40	17.60
480	-560	5.00	28.00	16.50	23.00
480	-580	0.80	39.00	19.90	38.20
500	-580	29.40	27.80	28,60	1.60
500	-560	32.40	32.40	32.40	0.00
500	-540	34.80	33.80	34.30	1.00
500	-520	43.80	29.60	36.70	14.20
500	-500	38.40	47.40	42.90	9.00
500	-480	40.60	39.80	40.20	0.80
500	-460	45.80	43.40	44.60	2.40
500	-440	34.40	34.00	34.20	0.40
500	-420	40.00	38.20	39.10	1.80
500	-400	61.20	60.80	61.00	0.40
500	-380	400.20	400.40	400.30	0.20
520	-380	291.20	243.20	267.20	48.00
520	-400	49,00	47.80	48.40	1.20
520	-420	31.60	30.00	30.80	1.60
520	-440	29.00	27.80	28.40	1.20
520	-460	35.40	36.00	35.70	0.60
520	-480	31.60	32.60	32.10	1.00
520	-500	39.20	40.40	39.80	1.20
520	-520	22.60	9.60	16.10	13.00
520	-540	27.40	20.00	21.00	0.80
520	-560	25.20	24.00	25.00	0.40
540	-500	22.00	24.40	23.50	1.00
540	-540	23.20	25.40	24.50	2.20
540	-520	20.00	17.00	10.00	2.41
540	-500	10.60	28.60	19.00	10.00
540	-480	9.60	23.00	16.30	13.40
540	-460	8.20	34.20	21.20	25.00
540	-440	7.20	29.00	18.10	21.80
540	-420	12.00	30.20	21.10	18.20
540	-400	24.20	52.80	38.50	28.60
540	-380	401.00	262.80	331.90	138.20
560	-380	400.40	400.40	400.40	0.00
000	500	700170			0.00

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560	-400	41.00	41.60	41.30	0.60
560	-420	25.40	25.20	25.30	0.20
560	-440	23.60	22.00	22.80	1.60
560	-460	29.80	30.80	30.30	1.00
560	-480	25.60	25.40	25.50	0.20
560	-500	27.00	26.00	26.50	1.00
560	-520	25.40	24.40	24.90	1.00
560					
	-540	24.00	20.00	22.80	4.00
580	-540	19.00	17.20	10.10	1.00
580	-520	24.00	24.410	24.00	0.00
580	-500	22.20	21.40	21.00	0.00
580	-480	21.60	22.40	22.00	0.00
580	-460	28.80	29.20	29.00	0.40
580	-440	21.80	21.60	21.70	0.20
580	-420	23.80	23.80	23.80	0.00
580	-400	39.00	40.60	39.80	1.60
580	-380	350.20	109.20	229.70	241.00
580	-360	39.80	40.40	40.10	0.60
580	-340	27.00	26.80	26.90	0.20
580	-320	21.60	21.20	21.40	0.40
580	-300	22.00	21.40	21.70	0.60
580	-280	25.20	24.80	25.00	0.40
580	-260	25.80	25.20	25.50	0.60
580	-240	31.60	30.00	30.80	1.60
			33.60	35.70	
580	-220	37.80			4.20
580	-200	33.60	33.20	33.40	0.40
580	-180	36.60	10.60	23.60	26.00
580	-160	30.60	30.60	30.60	0.00
580	-140	24.00	23.40	23.70	0.60
580	-120	23.00	22.20	22.60	0.80
580	-100	23.60	13.80	18.70	9.80
580	-80	23.00	23.80	23.40	0.80
580	-60	22.20	21.40	21.80	0.80
580	-40	23.00	22.40	22.70	0.60
580	-20	24.20	24.60	24.40	0.40
580	U	24.00	23.60	23.80	0.40
560	6	24.40	24.20	24.30	0.20
560	-20	24.80	24.60	24.70	0.20
560	-+0	25.40	24.40	24.90	1.00
560	-60	37.60	34.00	35.00	3.60
560	-00	49.60	44.80	41.20	4.00
560	-100	55.60	28.00	41.80	27.60
560	-120	37.40		35.30	4.20
560	-140	29.20	33.20 25.80		3.40
				27.50	
560	-160	33.20	30.40	31.80	2.80
560	-180	45.00	39.40	42.20	5.60
560	-200	42.60	38.40	40.50	4.20
560	-220	131.40	125.40	128.40	6.00
560	-240	80.60	130.80	105.70	50.20
560	-260	40.60	39.20	39,90	1.40
560	-280	32.80	31.20	32.00	1.60
560	-300	28.80	28.60	28.70	0.20
560	-320	26.60	25.80	26.20	0.80
560	-340	34.00	33.80	33.90	0.20
560	-360	54.40	58.60	56.50	4.20
540	-360	125.20	121.80	123.50	3.40
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540	-340	88.80	54,00	71.80	34.00
540	-320	47.20	85.20	66.20	38.00
540	-300	25.00	35.40	30.00	9.60
540	-280	72.80	50.00	80.60	14.00
540	-260	232.60	110.00	114.00	110.00
600	۵ ا	26.20	20.40	20.30	0.20
600	-20	6.00	18.60	12.30	12.00
600	-40	21.80	14.80	19.30	7.00
600	-60	21.80	22.00	21.90	0.20
600	-80	35.00	24.40	29.70	10.60
600	-100	45.60	27.00	36.30	18.60
600	-120	33.80	43.60	38.70	9.80
600	-140	15.00	23.00	19.00	8.00
600	-160	19.20	29.80	24.50	10.60
600	-180	27.80	9.60	18.70	18.20
600	-200	26.40	40.40	33.40	14.00
600	-220	31.40	31.00	31.20	0.40
60 <b>0</b>	-240	28.20	27.80	28.00	0.40
600	-260	24.60	24.60	24.60	0.00
600 600	-280	30.20	33.00	31.60	2.80
6 <b>00</b>	-300	23.80	25.60	24.70	1.80
60 <b>0</b>	-320	24.40	27.00	25.70	2.60
600 600	-340	30.40	33.20	31.80	2.80
600 600	-360	37.40	39.80	38.60	2.40
600 500	-380	227.40	72.20	149.80	155.20
600 600	-400	48.00	48.00	48.00	0.00
600 600	-420	29.20	32.40	30.80	3.20
600 600	-440	28.80	28,80	28.80	0.00
600 600	-460	33.60	33.00	33.30	0.60
600 600	-480	26.60	26.40	26.50	0.20
600 600	-500 -520	21.40	21.20	21.30	0.20
600	-240	23.60	24.40	24.00	0.80
560	0	21.20 25.00	22+40 25+00	21.00	1.20
540	U U	26.20	20.00	25.00 20,10	0.00
520	ů V	27.00	20.00	20.10	10 · 210
500	อั	28.00	27,60	27.00	0.40 0.00
480	õ	28.80	27.80	28.30	1.00
460	ø	28.60	28.00	28.30	0.60
440	õ	29.80	29.00	29.40	0.80
420	õ	29.80	29,20	29.50	0.60
400	õ	31.00	30.80	30.90	0.20
380	ø	31.60	31.20	31.40	0.40
360	0	42.80	39.80	41.30	3.00
340	0	33.40	33.20	33.30	0.20
320	Ō	33.60	33.40	33.50	0.20
300	0	33.60	32.80	33.20	0.80
280	0	32.80	32.60	32.70	0.20
260	0	33.40	32.60	33.00	0.80
240	0	33.00	32.60	32.80	0.40
220	0	31.40	30.20	30.80	1.20
200	0	30.60	30.40	30.50	0.20
180	0	30.20	29.20	29.70	1.00
160	0	27.00	26.40	26.70	0.60
140	0	24.80	20.40	22.60	4.40
120	õ	24.80	24.80	24.80	0.00
	-				3.00

100	ю	21.60	24.60	23.10	3.00
80	0	25.40	25.20	25.30	0.20
60	Ø	25.00	24,80	24.90	0.20
40	0	25.80	25.60	25.70	0.20
20	Ø	27.00	26.40	26.70	0.60
0	0	26.40	26.40	26.40	0.00
0	-20	26.60	26.40	26.50	0.20
20	-20	26.20	26.20	26.20	0.00
40	-20	24.40	25.60	25.00	1.20
60	-20	26.00	25.40	25.70	0.60
80	-20	27.20	27.00	27.10	0.20
100	-20	29.60	29.20	29.40	0.40
120	-20	30.20	29.40	29.80	0.80
140	-20	30.40	29.80	30.10	0.60
160	-20	34.80	33.60	34.20	1.20
180	-20	35.00	36.40	35.70	1.40
200	-20	36.40	37.20	36,80	0.80
220	-20	33.80	32.00	32.90	1.80
240	-20	33.80	33.80	33.80	0.00
260	-20	34.00	33.00	33.50	1.00
280	-20	34.60	33.80	34.20	0.80
300	-20	35.20	34.80	35.00	0.40
320	-20	35.80	35.40	35,60	0.40
340	-20	35.60	35.40	35.50	0.20
360	-20	32.00	32.40	35.50	0.20
380	-20	32.00	32.00	32.00	0.00
400	-20	33.00	33.40	33.20	6.40
420	-20	32.00	32.80	32.70	0.20
440	-20	32.80	32.80	32.00	0.00
460	-20	15.00	45.00	30.00	30.00
480	-20	33.20	33.00	33.10	0.20
500	-20	31.20	31.80	31.50	0.60
520	-20	30.40	30.20	30.30	0.20
540	-20	27.20	27.80	27.50	0.60
560	-20	25.00	25.00	25.00	0.00
560	-40	26.20	24.60	25.40	1.60
540	-40	52.80	76.60	64.70	23.80
520	-40	79.40	103.60	91.50	24.20
500	-40	105.60	149.00	127.30	43.40
480	-40 -40	103.00	119.20	111.10	16.20
460 440	-40	127.60	142.20	134.90	14.60
420	-40	124.80 88.80	137.80	131.30 94.90	13.00 12.20
400	-40	90.40	101.00 117.20	103.80	26.80
380	-40	86.40		94.10	15.40
360	-40	99.80	101.80 139.20	119.50	39.40
340	-40	93.40	112.20	102.80	18.80
320	-40	93.60	113.40	103.50	19.80
	-40	89.60	106.20	97.90	16.60
300 280	-40	90.60	102.60	96.60	12.00
260	-40	96.40	102.00	100.80	8.80
240	-40 -40	97.60	105.80	101.70	8.20
220	-40	97.00 87.40	105.00	94.40	
200	-40	24.90 01.40	135.40	115.10	14.00
100		94.00 02.00	101.40	92.00	40.60
100	-40	02.00 00.00	102.20		18.80
100	-40	00.00	102.20	34.50	15.40

### Site 4 L-13

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140	-40	67.40	78.80	73.10	11.40
120	-40	80.80	90.80	85.80	10.00
100	-40	80.40	101.00	90.70	20.60
80	-40	67.60	81.60	74.60	14.00
60	-40	48.40	58.40	53.40	10.00
40	-40	28.40	29.00	28.70	0.60
20	-40	26.40	26.20	26.30	0.20
0	-40	26.80	26.40	26.60	0.40

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EAST	NORTH	LOWER	UPPER	
	COORDINATE		INTENSITY	GRADIENT
• • • • • • • • • • • •	• • • • • • • • • •	• • • • • • • • • • • • •	•••••	••••
0.0	0.0	58854.9	58833.0	21.8
-5.0	0.0	58755.4	58757.8	-2.4
-10.0	0.0	58778.1	58773.6	4.5
-15.0	0.0	58797.8	58790.8	7.1
-20.0	0.0	58799.5	58792.5	7.0
-25.0	0.0	58803.0	58793.1	9.9
-30.0	0.0	58798.3	58793.0	5.3
-35.0	0.0	58813.8	58806.0	7.9
-40.0	0.0	58816.6	58801.0	15.0
-45.0	0.0	58831.2	58826.5	4.7
-45.0	5.0	58721.0	58741.0	-19.9
-40.0	5.0	58779.2	58771.4	7.9
-35.0	5.0	58783.0	58772.6	10.4
-30.0	5.0	58776.8	58767.3	9.5
-25.0	5.0	58763.5	58759.4	4.1
-20.0	5.0	58776.3	58771.0	5.2
-15.0	5.0	58769.5	58764.7	4.8
-10.0	5.0	58762.3	58757.9	4.4
-5.0	5.0	58759.8	58756.4	3.1
0.0	5.0	58831.4	58812.4	19.0
0.0	10.0	58860.7	58827.7	33.1
~5.0	10.0	58773.7	58769.7	4.0
-10.0 -15.0	10.0 10.0	58797.1 58796.1	58783.2	14.0
-20.0	10.0	58766.0	58786.3 58764.9	9.8
-25.0	10.0	58753.4	58753.9	1.1 -0.4
-30.0	10.0	58778.9	58771.9	7.0
-35.0	10.0	58793.1	58784.1	9.1
-40.0	10.0	58770.0	58768.1	1.9
-45.0	10.0	58721.5	58733.3	-11.8
-50.0	15.0	58815.2	58801.6	13.6
-45.0	15.0	58756.6	58752.7	3.9
-40.0	15.0	58752.5	58751.4	1.1
-35.0	15.0	58769.3	58762.0	7.3
-30.0	15.0	58763.7	58753.9	9.8
-25.0	15.0	58742.4	58739.2	3.2
-20.0	15.0	58759.9	58755.3	4.6
-15.0	15.0	58781.4	58773.1	8.3
-10.0	15.0	58773.5	58764.6	8.8
-5.0	15.0	58734.5	58741.2	-6.8
0.0	15.0	58825.3	58805.1	20.3
0.0	20.0	58825.8	58802.3	23.5
-5.0	20.0	58732.3	58734.4	-2.1
-10.0	20.0	58763.2	58751.9	11.3
-15.0	20.0	58780.9	58763.0	17.8
-20.0	20.0	58740.0	58739.6	0.4
-25.0	20.0	58722.3	58723.0	-0.7
-30.0	20.0	58740.6	58737.7	2.9
-35.0	20.0	58746.2	58744.4	1.8
-40.0	20.0	58756.0	58754.1	1.8

### Site 10 L-15

EAST	NORTH	LOWER	UPPER	
			INTENSITY	
• • • • • • • • • •	• • • • • • • • • •	• • • • • • • • • • • •	• • • • • • • • • • • •	
-45.0	20.0	58761.4	58762.1	-0.7
-50.0	20.0	58826.3		9.0
-50.0	25.0	58815.8		3.4
-45.0	25.0	58772.4		8.7
-40.0	25.0	58764.5		9.6
-35.0	25.0	58743.0	58737.5	5.4
-30.0	25.0	58730.2		7.0
-25.0	25.0	58716.9	58716.1	0.8
-20.0	25.0	58754.5	58744.1	10.3
-15.0	25.0	58757.7	58747.9	9.8
-10.0	25.0	58750.6	58741.2	9.4
-5.0	25.0	58706.5	58715.8	-9.4
0.0	25.0	58794.4	58779.1	15.3
0.0	30.0	58782.5	58765.1	17.4
-5.0	30.0	58702.4	58704.7	-2.3
-10.0	30.0	58724.6	58716.7	7.9
-15.0	30.0	58731.7	58720.2	11.5
-20.0	30.0	58719.7	58713.7	6.1
-25.0	30.0	58699.3	58698.1	1.3
-30.0	30.0	58692.9	58694.5	-1.6
-35.0	30.0	58711.3	58709.6	1.8
-40.0	30.0	58743.3	58734.3	9.1
-45.0	30.0	58762.5	58761.9	0.7
-50.0	30.0	58832.4	58825.8	6.6
-50.0	35.0	58831.0	58828.1	2.9
-45.0	35.0	58789,8	58771.4	18.3
-40.0	35.0	58738.5	58727.8	10.7
-35.0	35.0	58708.9	58702.2	6.6
-30.0	35.0	58705.3		10.1
-25.0	35.0	58695.3	58689.3	6.0
-20.0	35.0	58693.2	58686.4	6.9
-15.0	35.0	58716.5		8.6
-10.0	35.0	58722.2		10.1
-5.0	35.0	58705.9	58705.0	0.9
0.0	35.0	58783.6	58762.6 58751.5	21.1 21.9
0.0 ~5.0	40.0	58773.4 58677.4		1.0
-10.0	40.0 40.0	58693.9	58676.4 58683.0	10.8
-15.0	40.0	58695.0	58681.7	13.3
-20.0	40.0	58650.9	58654.7	-3.7
-25.0	40.0	58651.3	58655.3	-4.0
-30.0	40.0	58676.2	58675.5	0.7
-35.0	40.0	58703.7	58697.0	6.7
-40.0	40.0	58715.5	58711.1	4.5
-45.0	40.0	58752.4	58745.6	6.8
-50.0	40.0	58781.8	58783.6	-1.8
-55.0	40.0	58891.6	58883.5	8.1
-55.0	45.0	58796.3	58807.6	-11.3
-50.0	45.0	58718.4	58724.7	-6.3
-45.0	45.0	58684.1	58688.2	-4.1

Site 10 L-16

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EAST	NORTH	LOWER	UPPER	
	COORDINATE	INTENSITY	INTENSITY	GRADIENT
				• • • • • • • • • •
				-7.5
-40.0	45.0	58658.3	58665.8 58685.0	5.7
-35.0	45.0	58690.7		7.7
-30.0	45.0	58686.1	58678.4	-0.4
-25.0	45.0	58655.5	58655.9	2.4
-20.0	45.0	58652.3	58649.9	1.3
-15.0	45.0	58660.7	58659.4	-1.2
-10.0	45.0	58654.0	58655.2	-1.2
-5.0	45.0	58647.9	58646.6 58727.6	17.7
0.0	45.0	58745.3	58732.0	25.0
0.0	50.0	58757.0	58648.9	-3.9
-5.0	50.0	58645.0		7.6
-10.0	50.0	58673.2	58665.6 58677.4	13.6
-15.0	50.0	58691.0		2.2
-20.0	50.0	58666.1	58664.0	8.6
-25.0	50.0	58684.9	58676.3	15.6
-30.0		58707.7	58692.2	10.3
-35.0		58688.5	58678.2	
- 40 . 0		58654.1	58657.1	-3.0 3.5
-45.0	_	58684.7	58681.2	3.5 5.5
-50.0		58724.4	58718.9	-4.8
-55.0		58777.0	58781.8	
-60.0		58873.2		30.6 -3.4
-55.0		58733.2		12.4
-50.0		58711.6		11.8
-45.0		58675.1	58663.3	-0.4
-40.0		55628.5		10.7
-35.0				11.9
-30.0				13.7
-25.0				12.4
-20.0	-			11.4
-15.0				14.6
-10.0				3.9
-5.0				13.7
0.0				21.4
0.0				1.4
-5.0			000.000	16.1
-10.0				57.7
-15.0				11.8
-20.0 -25.0				5.2
-30.0				5.1
-35.0				4.9
-40.0				-5.7
-45.0				1.0
-50.0				6.5
-55.0				-16.2
-60.0				8.4
				-6.5
-60.0				-23.7
-55.0 -50.0				3.2
-20.6	, 05.6			

### Site 10 L-17

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EAST	NORTH	LOWER	UPPER	
	COORDINATE	INTENSITY		GRADIENT
	• • • • • • • • • •	• • • • • • • • • • • •	• • • • • • • • • • • • •	• • • • • • • • • •
-45.0	65.0	58643.2	58640.5	2.6
-40.0	65.0	58649.2	58645.0	4.2
-35.0	65.0	58641.1	58640.1	1.0
-30.0	65.0	58641.4	58641.5	-0.1
-25.0	65.0	58651.2	58647.6	3.6
-20.0	65.0	58662.3	58655.2	7.1
-15.0	65.0	58559.3	58607.4	-48.2
-10.0	65.0	58683.0	58667.4	15.6
-5.0	65.0	58679.1	58673.4	5.8
0.0	65.0	58701.3	58693.2	8.2
0.0	70.0	58767.0	58738.5	28.5
-5.0	70.0	58706.0	58694.6	11.5
-10.0	70.0	58696.3	58688.4	7.8
-15.0	70.0	58678.7	58674.9	3.8
-20.0	70.0	58673.1	58668.8	4.3
-25.0	70.0	58688.4	58679.4	9.0
-30.0	70.0	58669.3	58667.1	2.2
-35.0	70.0	58683.6	58677.1	6.5
-40.0	70.0	58690.9	58681.1	9.7
-45.0	70.0	58688.0	58678.0	10.0
-50.0	70.0	58658.1	58652.0	6.1
-55.0	70.0	58635.3	58642.0	-6.7
-60.0	70.0	58690.1	58690.0	0.1
-60.0	75.0	58764.3	58743.1	21.1
-55.0	75.0	58702.9	58698.6	4.2
-50.0	75.0	58675.8	58679.9	-4.1
-45.0	75.0	58706.4	58696.2	10.2
-40.0	75.0	58735.2	58717.7	17.5
-35.0	75.0	58728.2	58714.1	14.2
-30.0	75.0	58746.1	58725.8	20.3
-25.0	75.0	58726.3	58710.8	15.5
-20.0	75.0	58645.0	58661.8	-16.8
-15.0	75.0	58718.5	58702.3	16.2
-10.0	75.0	58739.8	58712.9	27.0
-5.0	75.0	58697.4	58680.9	16.5
0.0	75.0	58702.0	58687.6	14.4
0.0	80.0	58589.7	58608.0	-18.4
-5.0	80.0	58635.9	58642.0	-6.1
-10.0	80.0	58718.0	58700.1	17.9
-15.0	80.0	58731.3	58717.9	13.4
-20.0	80.0	58721.7	58708.1	13.6
-25.0	80.0	58718.1	58711.8	6.3
-30.0	80.0	58754.4	58737.1	17.3
-35.0	80.0	58760.6	58743.2	17.3
-40.0	80.0	58774.9	58753.1	21.8
-45.0	80.0	58745.4	58737.0	8.4
-50.0 -55.0	80.0	58742.4	58730.2	12.1
	80.0	58756.5	58749.5	7.0
-60.0 -65.0	80.0 85.0	58812.5	58794.6	17.9
-00.0	0.5.0	58853.6	58831.0	22.6

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Site 10 L-18

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COORDINATE         INTENSITY         INTENSITY         GRADIENT           -60.0         85.0         58800.9         58767.6         13.3           -55.0         85.0         58764.6         5873.7         10.9           -45.0         85.0         58764.6         58735.0         3.6           -40.0         85.0         58757.5         58747.3         10.2           -35.0         85.0         58757.5         58747.3         10.2           -35.0         85.0         58757.5         58747.3         10.2           -30.0         85.0         58726.1         58729.5         -3.4           -25.0         85.0         58726.2         58768.5         1.77           -10.0         85.0         58727.9         58695.0         8.0           0.0         85.0         5872.9         58635.0         2.1           -10.0         90.0         5873.2         874.9         23.1           0.0         90.0         5873.2         8635.8         -3.8           -15.0         90.0         58753.2         82.3         -3.8           -20.0         90.0         58753.2         82.3         -3.8           -20.0	EAST	NORTH	LOWER	UPPER	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				INTENSITY	GRADIENT
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	•••••	• • • • • • • • • •		•••••	••••
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-60.0	85.0	58800.9	58787.6	13.3
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-55.0	85.0	58764.6	58753.7	10.9
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-50.0	85.0	58754.2	58740.4	13.9
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-45.0	85.0	58738.6	58735.0	3.6
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-40.0	85.0	58757.5	58747.3	10.2
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-35.0	85.0	58767.3	58749.9	
-20.0 $85.0$ $58705.7$ $58699.6$ $6.1$ $-15.0$ $85.0$ $58726.2$ $58707.6$ $577$ $-10.0$ $85.0$ $58707.0$ $58701.6$ $5.4$ $-5.0$ $85.0$ $58707.0$ $58701.6$ $5.4$ $-5.0$ $85.0$ $58783.2$ $58747.3$ $23.1$ $0.0$ $90.0$ $58783.2$ $58745.9$ $28.3$ $-5.0$ $90.0$ $58723.6$ $58707.8$ $15.6$ $-10.0$ $90.0$ $58723.6$ $58707.8$ $15.6$ $-10.0$ $90.0$ $58723.6$ $58707.8$ $22.3$ $-20.0$ $90.0$ $58738.9$ $58716.6$ $22.3$ $-25.0$ $90.0$ $58723.6$ $28755.8$ $22.4$ $-33.0$ $90.0$ $58753.6$ $28755.8$ $22.4$ $-35.0$ $90.0$ $58762.1$ $58753.7$ $15.8$ $-40.0$ $90.0$ $58762.5$ $58753.7$ $15.8$ $-40.0$ $90.0$ $58762.8$ $58753.6$ $9.1$ $-50.0$ $90.0$ $58762.8$ $58753.6$ $9.1$ $-60.0$ $90.0$ $58762.8$ $58753.1$ $19.9$ $-55.0$ $90.0$ $58753.9$ $58743.0$ $10.9$ $-55.0$ $95.0$ $58772.6$ $58753.1$ $19.5$ $-50.0$ $95.0$ $58772.6$ $58724.0$ $17.6$ $-60.0$ $95.0$ $58742.4$ $58724.0$ $17.6$ $-75.0$ $95.0$ $58729.9$ $58721.3$ $7.6$ $-22.0$ $95.0$ $58729.9$	-30.0	85.0	58726.1	58729.5	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-25.0	85.0	58715.0	58711.1	4.0
-10.0 $85.0$ $58707.0$ $58701.6$ $5.4$ $-5.0$ $85.0$ $58702.9$ $58695.0$ $8.0$ $0.0$ $90.0$ $58736.8$ $58731.7$ $23.1$ $0.0$ $90.0$ $58746.2$ $58725.0$ $21.2$ $-10.0$ $90.0$ $58746.2$ $58707.8$ $15.8$ $-15.0$ $90.0$ $58723.6$ $58707.8$ $15.8$ $-20.0$ $90.0$ $58723.6$ $58713.7$ $9.8$ $-20.0$ $90.0$ $58723.6$ $58713.7$ $9.8$ $-30.0$ $90.0$ $58723.6$ $58753.8$ $22.4$ $-35.0$ $90.0$ $58758.2$ $58753.7$ $15.8$ $-40.0$ $90.0$ $58762.1$ $58747.1$ $15.0$ $-40.0$ $90.0$ $58762.6$ $58747.1$ $15.0$ $-55.0$ $90.0$ $58762.6$ $58753.6$ $9.1$ $-60.0$ $90.0$ $58762.6$ $58753.6$ $9.1$ $-60.0$ $90.0$ $58762.6$ $58753.6$ $9.1$ $-60.0$ $90.0$ $58753.7$ $19.5$ $-55.0$ $90.0$ $58753.7$ $19.5$ $-56.0$ $95.0$ $58753.9$ $58743.0$ $10.9$ $-60.0$ $95.0$ $58753.9$ $58743.0$ $10.9$ $-55.0$ $95.0$ $58722.6$ $58753.1$ $19.5$ $-56.0$ $95.0$ $58742.4$ $58729.0$ $34.2$ $-56.0$ $95.0$ $58742.4$ $58729.0$ $13.4$ $-57.0$ $95.0$ $58742.4$ $58729.0$ $13.4$ </td <td>-20.0</td> <td>85.0</td> <td>58705.7</td> <td>58699.6</td> <td>6.1</td>	-20.0	85.0	58705.7	58699.6	6.1
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-10.0	85.0	58707.0	58701.6	5.4
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-5.0	85.0	58702.9	58695.0	8.0
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0.0	85.0	58736.8	58713.7	23.1
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0.0	90.0	58783.2	58754.9	28.3
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-5.0	90.0	58746,2	58725.0	21.2
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-10.0	90.0	58723.6	58707.8	15.8
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-15.0	90.0	58679,9	58683.8	-3.8
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-20.0	90.0	58738.9	58716.6	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-25.0	90.0	58723.6	58713.7	9.8
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-30.0	90.0	58758.2	58735.8	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-35.0	90.0	58775.2	58755.4	19.8
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-40.0	90.0	58769.5	58753.7	15.8
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-45.0		58762.1	58747.1	15.0
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$\begin{array}{cccccccccccccccccccccccccccccccccccc$					
0.0         95.0         58798.7         58768.9         29.8           0.0         100.0         58766.3         58738.7         27.7           -5.0         100.0         58698.6         58693.6         5.1           -10.0         100.0         58731.4         58709.2         22.2           -15.0         100.0         58779.5         58681.2         98.2           -20.0         100.0         58616.5         58638.6         -22.1           -25.0         100.0         58645.5         58671.1         -25.6           -30.0         100.0         58650.6         58678.1         -27.5           -35.0         100.0         58729.4         58707.1         22.3					
0.0         100.0         58766.3         58738.7         27.7           -5.0         100.0         58698.6         58693.6         5.1           -10.0         100.0         58731.4         58709.2         22.2           -15.0         100.0         58779.5         58681.2         98.2           -20.0         100.0         58616.5         58638.6         -22.1           -25.0         100.0         58645.5         58671.1         -25.6           -30.0         100.0         58650.6         58678.1         -27.5           -35.0         100.0         58729.4         58707.1         22.3					
-5.0100.058698.658693.65.1-10.0100.058731.458709.222.2-15.0100.058779.558681.298.2-20.0100.058616.558638.6-22.1-25.0100.058645.558671.1-25.6-30.0100.058650.658678.1-27.5-35.0100.058729.458707.122.3					
-10.0100.058731.458709.222.2-15.0100.058779.558681.298.2-20.0100.058616.558638.6-22.1-25.0100.058645.558671.1-25.6-30.0100.058650.658678.1-27.5-35.0100.058729.458707.122.3					
-15.0100.058779.558681.298.2-20.0100.058616.558638.6-22.1-25.0100.058645.558671.1-25.6-30.0100.058650.658678.1-27.5-35.0100.058729.458707.122.3					
-20.0100.058616.558638.6-22.1-25.0100.058645.558671.1-25.6-30.0100.058650.658678.1-27.5-35.0100.058729.458707.122.3					
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-30.0 100.0 58650.6 58678.1 -27.5 -35.0 100.0 58729.4 58707.1 22.3					
-35.0 100.0 58729.4 58707.1 22.3					
-40.0 100.0 58753.6 58729.8 23.8	-35.0				22.3
	-40.0	100.0	58753.6	58729.8	23.8

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<b>CACT</b>	NORTH		UDDED	
EAST	NORTH	LOWER	UPPER	CRADIENT
		INTENSITY	INTENSITY	GRHDIENI
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-45.0	100.0	58705.8	58709.0	-3.2
-50.0	100.0	58715.7		1.4
-55.0	100.0	58762.3	58744.9	17.4
-60.0	100.0	58729.0	58733.3	-1.3
-65.0	100.0	58805.6	58790.1	15.5
-70.0	100.0	58826.0	58802.8	23.1
-70.0	105.0	58791.2	58767.8	23.4
-65.0	105.0	58765.3	58747.3	18.0
-60.0	105.0	58715.1	58712.7	2.4
-55.0	105.0	58752.6	58734.0	18.6
-50.0	105.0	58723.1	58713.6	9.4
-45.0	105.0	58724.3	58714.3	10.0
-40.0	105.0	58717.4	58705.8	11.6
-35.0	105.0	58649.7	58658.5	-8.8
-30.0	105.0	59027.5	58867.5	160.0
-25.0	105.0	58745.4	58737.2	8.2
-20.0	105.0	58465.4	58580.6	-115.2
-15.0	105.0	58609.9	58619.2	-9.3
-10.0	105.0	58685.8	58675.5	10.3
-5.0	105.0	58685.2	58675.5	9,6
0.0	105.0	58715.4	58699.3	16.1
0.0	110.0	58691.4	58673.1	18.3
-5.0	110.0	58708.4	58682.0	26.3
-10.0	110.0	58675.1	58665.4	9.7
-15.0	110.0	58642.6	58640.3	2.3
-20.0	110.0	58693.9	58665.7	28.3
-25.0	110.0	58821.2	58746.0	75.2
-30.0	110.0	58756.0	58745.4	10.6
-35.0	110.0	58746.2	58717.9	28.3
-40.0	110.0	58696.1	58691.8	4.2
-45.0	110.0	58735.4	58733.0	2.4
-50.0	110.0	58715.5	58714.9	0.7
-55.0	110.0	58712.2	58709.7	2.5
-60.0	110.0	58726.5	58723.8	2.7
-65.0	110.0	58727.4	58730.4	-3.0
-70.0	110.0	58752.5		17.8
-75.0	115.0	58612.7	58623.7	-11.1
-70.0	115.0	58532.1	58566.0	-33.9
-65.0	115.0	58541.2	58572.4	-31.3
-60.0	115.0	58594.6	58607.1	-12.5
-55.0	115.0	58616.3	58621.8	-5.5
-50.0	115.0	58652.6	58645.4	7.2
-45.0	115.0	58670.3	58657.7	12.6
-40.0	115.0	58687.6	58677.7	9.9
-35.0	115.0	58671.7	58667.3	4.3
-30.0	115.0	58656.2	58656.3	0.0
-25.0	115.0	58654.0	58647.6	6.4
-20.0	115.0	58549.1	58590.5	-41.4
-15.0	115.0	58670.4	58653.6	16.8
-10.0	115.0	58615.6	58609.6	6.0

EAST	NORTH	LOWER	UPPER	
	COORDINATE	INTENSITY	INTENSITY	GRADIENT
• • • • • • • • • •				
-5.0	115.0	58563.1	58572.7	-9.6
0.0	115.0	58557.9	58562.3	-4.5
0.0	120.0	58098.7	58225.7	-127.0
-5.0	120.0	58294.6	58364.0	-69.4
-10.0	120.0	58380.6	58437.0	-56.5
-15.0	120.0	58451.0	58488.1	-37.1
-20.0	120.0	58514.1	58534.4	-20.3
-25.0	120.0	58637.1	58603.9	33.3
-30.0	120.0	58476.5	58513.4	-36.9
-35.0	120.0	58465.8	58502.9	-37.1
-40.0	120.0	58474.5	58502.1	-27.6
-45.0	120.0	58486.1	58512.5	-26.4
-50.0	120.0	58465.8	58508.3	-42.6
-55.0	120.0	58417.0	58470.9	-53,9
-60.0	120.0	58457.5	58490.0	-32.5
-65.0	120.0	58398.0	58452.4	-54.4
-70.0		583 <b>70.</b> 8	58420.2	-49.4

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# APPENDIX M

# DAMES & MOORE TECHNICAL OPERATIONS PLAN (TOP) AND HEALTH AND SAFETY PLAN

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#### INSTALLATION RESTORATION PROGRAM PHASE II - CONFIRMATION/QUANTIFICATION STAGE 2

TECHNICAL OPERATIONS PLAN

FOR

DULUTH INTERNATIONAL AIRPORT, MINNESOTA

TACTICAL AIR COMMAND AND AIR NATIONAL GUARD

PREPARED FOR

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

NOVEMBER 21, 1986

#### INSTALLATION RESTORATION PROGRAM PHASE II - CONFIRMATION/QUANTIFICATION STAGE 2

TECHNICAL OPERATIONS PLAN

FOR

DULUTH INTERNATIONAL AIRPORT, MINNESOTA

TACTICAL AIR COMMAND AND AIR NATIONAL GUARD

NOVEMBER 21, 1986

PREPARED BY

DAMES & MOORE 1550 NORTHWEST HIGHWAY PARK RIDGE, ILLINOIS 60068

CONTRACT NO. F33615-83-D-4002, Order 0038

OEHL TECHNICAL MONITOR: 2nd Lt. Gary Woodrun

PREPARED FOR

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

D&M Job No. 01016-267-07

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### TABLE OF CONTENTS

1.0	INTRO	ODUCTIO	N	1
	1.1	PURPOS	SE AND SCOPE	1
	1.2	INSTAL	LATION DESCRIPTION AND HISTORY	6
		1.2.1 1.2.2	Location and Host Organizations Hydrogeology	6 6
	1.3	INDIVID	UAL SITES	8
		1.3.1 1.3.2	Site 1: D-1 Goose Site Dump Site 2: FT-1 Fire Training Area (1951 to Early 1960s) and FT-2 Fire Training Area (Early 1960s to Present)	8 8
		1.3.3	Site 3: S-2 DPDO Storage Area "C"	9
		1.3.4	Site 4: SP-1 Tank Farm Area	10
		1.3.5	Site 5: D-4 South Goose Bunker Dump	10
		1.3.6	Site 6: D-2 Goose Site Dump	11
		1.3.7	Site 7: D-6 Runway 13 NE Disposal Area	11
		1.3.8	Site 8: S-1 Old DPDO Storage Area	11
		1.3.9	Site 9: D-9 Disposal Pit	11
		1.3.10	Site 10: RD-1 Low-Level Radioactive Waste Disposal	12
2.0	SITE	INVESTIC	GATION SUMMARY	13
	2.1	OVERA	LL FACILITY	13
	2.2	INVEST	IGATION OF INDIVIDUAL SITES	13
		2.2.1	Site 1: D-1 Goose Site Dump	13
		2.2.2	Site 2: FT-1 Fire Training Area (1951 to Early 1960s) and FT-2 Fire Training Area (Early 1960s to Present)	14
		2.2.3	Site 3: S-2 DPDO Storage Area "C"	15
		2.2.4	Site 4: SP-1 Tank Farm Area	15
		2.2.5	Site 5: D-4 South Goose Bunker Dump	17
		2.2.6	Site 6: D-2 Goose Site Dump	17
		2.2.7	Site 7: D-6 Runway 13 NE Disposal Area	18
		2.2.8	Site 8: S-1 Old DPDO Storage Area	18
		2.2.9	Site 9: D-9 Disposal Pit	19
		2.2.10	Site 10: RD-1 Low-Level Radioactive Waste Disposal	19

•

			PAGE
3.0	FIELI	D SETUP	20
	3.1	DETAILED WORK PLAN	20
		<ul><li>3.1.1 Planning</li><li>3.1.2 Mobilization</li><li>3.1.3 On-Site Setup</li></ul>	20 20 21
	3.2	DAMES & MOORE HEALTH AND SAFETY PLAN	22
	3.3	SUBCONTRACTOR INFORMATION	53
		<ul><li>3.3.1 Chemistry Subcontractor</li><li>3.3.2 Surveying Subcontractor</li><li>3.3.3 Drilling Subcontractor</li></ul>	53 53 53
4.0	CALI	BRATION OF FIELD EQUIPMENT	54
	4.1	ELECTROMAGNETICS TERRAIN CONDUCTIVITY METER	54
	4.2	MAGNETOMETER	55
	4.3	METAL LOCATOR	55
	4.4	HAND PUMP	55
	4.5	TOTAL ORGANIC VAPOR ANALYZER	56
	4.6	EXPLOSIMETER	56
	4.7	CONDUCTIVITY METER	56
	4.8	pH METER	57
	4.9	THERMOMETER (THERMOCOUPLE)	57
	4.10	BAILERS	57
	4.11	DECONTAMINATION SUPPLIES	57
	4.12	RESPIRATORS, CARTRIDGES, AND FILTERS	58
	4.13	LOCKS	58
5.0	PREV	ENTIVE MAINTENANCE OF FIELD EQUIPMENT	59
	5.1	ELECTROMAGNETICS TERRAIN CONDUCTIVITY METER	59
	5.2	MAGNETOMETER	59

M-4

}

1

A DESCRIPTION OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE

	5.3	METAL LOCATOR	60
	5.4	HAND PUMP	60
	5.5	TOTAL ORGANIC VAPOR ANALYZER	60
	5.6	EXPLOSIMETER	60
	5.7	CONDUCTIVITY METER	61
	5.8	pH METER	61
	5.9	THERMOCOUPLE	61
	5.10	BAILERS	61
6.0	FIELI	ANALYTICAL PROCEDURES AND DATA REPORTING	62
	6.1	CHEMICAL DATA	62
	6.2	HYDRAULIC DATA	62
	6.3	SOIL BORING DATA	62
	6.4	SURVEYING DATA	62
	6.5	FIELD LOG	63
7.0	SAME	PLE NUMBERING SYSTEM	64
	7.1	PROJECT IDENTIFICATION	64
	7.2	SITE IDENTIFICATION	64
	7.3	SEQUENCE NUMBER	64
	7.4	SAMPLE DEPTH	64
	7.5	SAMPLE TYPE	64
	7.6	EXAMPLES	65
	7.7	BLANKS, KNOWNS, SPIKES, SPLITS, AND DUPLICATES	65

			PAGE
8.0	DRILI	LING AND INSTALLATION OF GROUND WATER MONITOR WELLS	67
	8.1	DRILLING	67
	8.2	SOIL SAMPLING	67
	8.3	MONITOR WELL CONSTRUCTION AND COMPLETION	69
	8.4	WELL DEVELOPMENT	69
	8.5	GEOPHYSICAL LOGGING	71
9.0	PUMP	P TEST	72
10.0	GROU	UND WATER MONITORING AND SAMPLING	73
	10.1	GROUND WATER LEVEL MEASUREMENT	73
	10.2	SURVEYING OF WELLS	73
	10.3	ON-SITE ANALYSIS	73
	10.4	SAMPLING FOR OFF-SITE ANALYSIS	74
11.0	DECO	NTAMINATION PROCEDURES	76
	11.1	DRILLING, SOIL SAMPLING, AND MONITOR WELL INSTALLATION	76
	11.2	WELL DEVELOPMENT	76
	11.3	WATER LEVEL MEASUREMENT	76
	11.4	WATER SAMPLING	77
	11.5	SEDIMENT SAMPLING	77
	11.6	PERSONNEL DECONTAMINATION	77
	11.7	SAMPLE HANDLING	77
12.0	SAMP	PLE HANDLING AND PACKAGING	78
	12.1	SPLIT SAMPLE PROCEDURES	78
	12.2	SAMPLE CONTAINERS	78

				PAGE
	12.3	SAMPL	E HANDLING AND DECONTAMINATION	78
	12.4	PROCE SAMPL	DURES FOR PACKING LOW CONCENTRATION ES	78
	12.5	PROCE SAMPL	DURES FOR PACKING MEDIUM CONCENTRATION ES	82
13.0	SAME	PLE CUS	TODY AND DOCUMENTATION	83
	13.1	SAMPL	E IDENTIFICATION DOCUMENTS	83
	13.2	CHAIN-	OF-CUSTODY RECORDS	83
	13.3	FIELD	LOG BOOKS	85
	13.4	CORRE	CTIONS TO DOCUMENTATION	85
	13.5	TRAFF	IC REPORTS	88
	13.6	SHIPPIN	IG OF SAMPLES	88
14.0	SITE	CLEANU	P	89
15.0	FIEL	D TEAM	ORGANIZATION AND RESPONSIBILITIES	90
	15.1	ORGAN	IZATION	90
	15.2	RESPON	NSIBILITIES	90
	15.3	TRAINI	NG	91
		15 <b>.3.</b> 1 15 <b>.3.2</b>	Dames & Moore Personnel Subcontractors	91 91
16.0	SCHE	DULE		92
17.0	REFE	RENCES	-	94

M-7

3

# LIST OF TABLES

NUMBER	TITLE	PAGE
1-1	LISTING OF SITES	3
1-2	ANALYTICAL PROGRAM	5
3-1	EXPOSURE LIMITS AND RECOGNITION QUALITIES	24
3-2	SYMPTOMS OF OVEREXPOSURE, POTENTIAL CHRONIC EFFECTS, AND FIRST-AID TREATMENT	25
3-3	HAZARD MONITORING METHOD, ACTION LEVELS, AND PROTECTIVE MEASURES	41
3-4	PROTECTIVE EQUIPMENT REQUIRED FOR ON-SITE ACTIVITIES	43
12-1	SAMPLE HANDLING PROCEDURES	79

# LIST OF FIGURES

NUMBER	TITLE	PAGE
1-1	LOCATION OF ALL POTENTIAL SOURCES OF CONTAMINATION RECEIVING PHASE I HARM SCORE RANKINGS	4
8-1	DAMES & MOORE LOG	68
8-2	TYPICAL MONITOR WELL CONSTRUCTION	70
10-1	STABILIZATION TEST	75
13-1	DAMES & MOORE CHAIN-OF-CUSTODY RECORD	84
13-2	DAMES & MOORE FIELD MEMORANDUM	86
13-3	PIEZOMETER INSTALLATION DETAILS	87
16-1	PROPOSED SCHEDULE FOR PHASE II, STAGE 2 INVESTIGATION AT DULUTH IAP, MINNESOTA	93

i.

#### TECHNICAL OPERATIONS PLAN INSTALLATION RESTORATION PROGRAM, PHASE II, STAGE 2 DULUTH INTERNATIONAL AIRPORT, MINNESOTA

#### 1.0 INTRODUCTION

This Technical Operations Plan (TOP) describes the methods and procedures that will be used to accomplish the objectives of the Phase II, Stage 2 field investigation of the United States Air Force (USAF) Installation Restoration Program (IRP) for Duluth International Airport (IAP), Minnesota. The IRP is a nationwide effort intended to identify, evaluate the extent of, and mitigate environmental contamination potentially induced by the mobilization and migration of hazardous or toxic chemicals from past disposal or other handling practices at USAF facilities. On the basis of the findings of the Phase I Records Search (Engineering-Science, 1982) and the Phase II, Stage 1 Problem Confirmation Study (Roy F. Weston, Inc., 1984), the USAF Occupational and Environmental Health Laboratory (OEHL) retained Dames & Moore under Contract No. F33615-83-D-4002, Order No. 0038, to conduct the Phase II, Stage 2 study at Duluth IAP.

The Phase I and Phase II, Stage 1 contractors' reports were carefully reviewed, and their recommendations for the Phase II, Stage 2 program were considered. A site visit/briefing at Duluth IAP was undertaken on May 15, 1985, to discuss and inspect the sites to be investigated during the Phase II, Stage 2 study. A presurvey was conducted to determine the approach to be used in accomplishing the requirements of Phase II, Stage 2 of the IRP. Additionally, written comments provided by U.S. Environmental Protection Agency Region V (USEPA, 1985) and the Minnesota Pollution Control Agency (MPCA, 1985) generated by review of the above cited reports were discussed. Attendees at the meeting included:

Col. Jerry P. Dougherty	HQ TAC/SGPB, Langley AFB, VA
Lt. Col. Edward Barnes	USAF OEHL/TS, Brooks AFB, TX
Lt. Col. Curtis P. Jones	148 CSS/CC MN ANG, Duluth IAP, MN
Maj. Joel D. Manns	Base Civil Engineering ANG Duluth IAP, MN
MSgt. Merlin O. Carlson	148 TAC Clinic/SGPB, Duluth IAP, MN
Mr. Larry Livesay	MPCA, Roseville, MN
Mr. Tim Musick	MPCA, Duluth, MN
Dr. Kenneth J. Stimpfl	Dames & Moore, Park Ridge, IL
•	

#### 1.1 PURPOSE AND SCOPE

The purpose of the TOP is to detail the methods and procedures that will be used to accomplish the tasks defined during the Stage 2 Investigation at Duluth IAP.

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M-9

Guidelines of the MPCA, Occupational Safety and Health Administration (OSHA), USEPA, and USAF, as well as previous investigations at Duluth IAP, were reviewed to select the methods that would be most appropriate for this investigation. The TOP is designed primarily to give guidance to personnel in the field and to ensure that standard methods of investigation are used. However, not all field problems can be anticipated, and the field personnel must exercise professional judgment when applying the guidelines.

The purpose of the Phase II, Stage 2 investigation at Duluth IAP, as described in this TOP, is to conduct a field investigation, with subsequent laboratory analysis of collected samples, data interpretation, and reporting, to accomplish the following objectives:

- o Confirm the presence or absence of contamination within the specified areas of investigation;
- o Determine the magnitude of contamination and the potential for and rate of migration of those contaminants in various environmental media;
- o Identify potential environmental and health risk consequences of migrating pollutants based on state or federal standards for those contaminants; and
- o Delineate additional investigations required beyond this stage to reach the Phase II objectives.

The Phase II, Stage 2 effort at Duluth IAP will entail a follow-up investigation of sites evaluated during Phase II, Stage 1, and an initial monitoring program at six additional sites. The sites included in this study are identified in Table 1-1 and can be located in Figure 1-1. The sites to receive follow-up investigative work are Goose Dump 1, the Fire Training Areas, DPDO Storage Area "C", and the Tank Farm Area. The two fire training areas (FT-1 and FT-2) have been consolidated into one site.

The recommended program requires the installation of 30 additional ground water monitor wells and 19 soil borings. Sampling for chemical constituent analysis will be conducted at the 30 new monitor wells and 10 existing monitor wells for the parameters listed in Table 1-2. In addition, geophysical surveys will be performed using a metal detector and a magnetometer at Site 4 to locate underground pipes; at Site 6 to locate the dump site drums; and at Sites 7, 9, and 10 to accurately define the site boundaries. At Site 4, an electromagnetic survey will also be performed to identify leak sites from the underground pipes. A detailed study of the aerial photographs will be performed at Sites 6, 7, 9, and 10 to accurately locate the contaminated areas.

[2] M-10

### TABLE 1-1

# LISTING OF SITES

Site Number	Phase I Number	Site Description
1	D-1 (TAC)	Goose Dump 1
2	FT-1 and FT-2 (ANG)	Fire Training Areas
3	S-2 (ANG)	DPDO Storage Area "C"
4	SP-1 (ANG)	Tank Farm Area
5	D-4 (TAC)	South Goose Dump
6	D-2 (TAC)	Goose Dump 2
7	D-6 (TAC)	Runway 13 NE Disposal
8	S-1 (ANG)	Old DPDO Storage Area
9	D-9 (TAC)	Disposal Pit
10	RD-1 (ANG)	Low-Level Radioactive Waste Disposal

Note: ANG = Air National Guard sites, TAC = Tactical Air Command sites.

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M-11

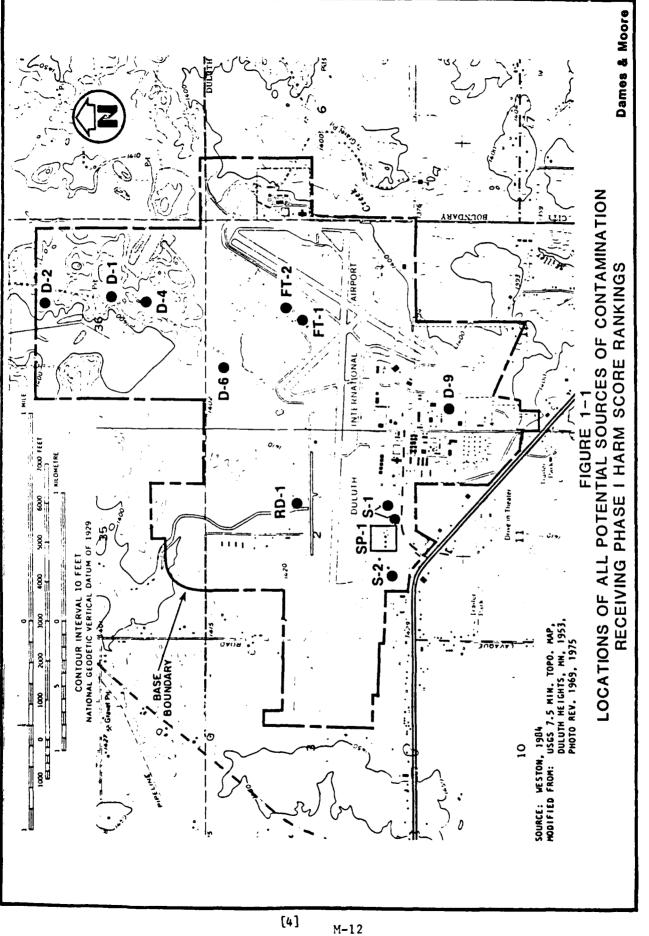


	TABLE	1-2
ANAL Y	TICAL	PROGRAM

						WATER								
PARAME TER	NE THOD/ EXTRACTION_HE THOD	SI TE 1 D-1	SITE 2 FT-1, FT-2	51 FE 3 SP-2	SI TE 4 	51 1E 5	51 TE 6	St TE 7	51 TE 8	51 TE 9 0-9	SITE 10 PD-1	JF JF 34MPLES	<u>эс</u> ь	10"4L 54MPLES
Purgeable Halocarbona	E 601	6	14	7	12	6	-	4	5	-	-	54	9	93c
Purgeable Aromatics	E 602	6	14	7	12	6	-	4	5	-	-	54	9	93c
Oil and Grease (IR)	E 413.2	6	14	7	12	6	-	4	5	-	•	54	9	63
Arsenic	E 206.2	6	-	7	-	6	-	4	5	-	-	28	5	33
Berium	E 208.2	6	-	7	-	6	-	4	5	-	-	29	5	33
Cadmium	£ 213.2	6	-	7	-	6	•	4	5	-	-	28	5	33
Chromium	E 218.1	6	-	7	-	6	-	4	5	-	-	28	5	33
Lead	E 239.2	6	-	7	-	6	-	4	5	-	-	28	5	33
Mercury	£ 245.1	6	-	7	-	6	-	4	5	-	-	28	5	33
Selenium	E 270.3	6	-	7	-	6	-	4	5	-	•	28	5	33
Silver	E 272.2	6	-	7	-	6	-	4	5	-	•	28	5	33
Pesticides/ PCBa	E 608	6	-	7	-	6	•	4	5	-	-	29	5	49c
Herbicides	E 615	6	-	7	-	6	-	4	5	-	-	28	5	490
Phenol	£ 420.2	6	14	7	-	6	-	4	5	-	-	4Z	8	50
Acetone	ASTN D 3695-82	-	-	-	-	-	•	-	-	1	-	1	1	Z
Picric Acid	USATHAMA 28	-	-	-	-	-	-	•	-	1	-	1	1	2
Gross Alpha	Standard Methods, 16th ed., 703	-	-	-	•	-	-	-	•	-	3	3	1	•
Gross Beta	Standard Methods, 16th ed., 703	-	-	-	-	-	-	-	-	-	3	3	1	٠
Radium-226	£600/4-80-032, 903.0	-	-	-	-	-	-	-	-	-	,	3	1	4
Radium-228	E600/4-80-032, 904.0	-	-	-	-	-	-	-	-	-	3	3	1	4

PARAME TE R	HE THOD/ EXTRACTION HE THOD	SITE 1 D-1	SITE 2 FT-1, S FT-2	51 TE 3		SITE 5 D-4	51 TE 6 0-2	51 TE 7 2-6	SITE 8	SITE 9 D-9	SI TE 10 PD-1	OF SAMPLES	6C.p	TOT N.
Purgeable Halocarbone	SW 8010*	9	17	16	23	8	4	8	11	-	-	%	15	164°
Purgeable Aromatic#	SW 8020*	9	17	16	23	8.	4	8	11	-	-	96	15	164°
Oil and Grease (IR)	SH 3550 and 413.2	9	17	16	23	8	4	8	11	-	-	96	15	111
Arsenic	SM 3050 and 7060	9	-	16	-	8	-	8	11	-	-	52	9	61
Barium	SW 3050 and 6010	9	-	16	-	8	-	6	11	-	-	52	9	61
Cadmium	SW 3050 and 6010	9	-	16	-	8	-	8	11	-	-	52	9	61
Chromaum	SH 3050 and 6010	9	•	16	-	8	-	8	11	-	-	52	9	61
Leed	SW 3050 and 6010	9	-	16	-	8	-	8	11	-	-	52	9	61
Mercury	SW 7471	9	-	16	-	8	-	8	11	-	-	52	9	ଣ
Selenium	SW 3050 and 7740	9	-	16	-	8	-	8	11	-	-	52	9	61
Silver	S₩ 3050 and 6010	9	-	16	-	8	-	8	11	-	-	52	9	61
Pesticides/ PC8s	SW 3550 and 8080	9	-	16	-	8	•	8	11	-	-	52	9	90°
Herbicides	SW 8150	9	-	16	-	6	-	8	11	-	-	52	9	90°
Phenol	E 420.2 modified	9	17	16	-	8	-	8	11	-	-	69	11	90
Acetone	Water extr. and ASTM D 3695-82	-	-	-	-	•	-	-	-	Z	-	2	1	,
Picric Acid	USATHAMA 2C	-	-	-	•	-	-	-	-	2	-	2	1	3
E thy Lene Glycol	NIOSH P & CAN 338 Modified for soil			-	-	-	٩	•	-	-	-	٩	1	\$
Sail Maisture Determination		9	17	16	23	8	4	8	21	2	-	98	15	113
EP Toxicity	40 CFR 261.24		SAMPLES	S AS N	CEDED AND NO	I SPECIF	IED BY SE	TE (TOTAL	NUMBER	= 15)		15	z	17
Ignitability	40 CFR 261.21		SAMPLES	S AS NE	EEDED AND NO	T SPECIF	1ED 87 51	TE (TOTAL	NUMBER	. 15)		15	2	17

SOLL

The methods cited in the analysis protocols come from the following sources:

"E" Methods <u>E 100 through E 500</u>: Methods for Chemical Analysis of Water and Wastes, EPA-607/4-79-020 (USEPA, 1983). (Water Only) <u>E 600</u>: Methods for Organic Chemical Analysis of Municipal and Industrisi Wastewater (USEPA, 49 FR 209, 10/26/84).

"SM" Methods - Test Methods for Evaluating Solid Maste, Physical/Chemical Methods, SW-846, 2nd ed. (USEPA, 1984). (Water & Soll)

"Includes both well and surface water samples.

bgC field sample includes duplicates, trip blanks, and rinse (field) blanks.

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

dincludes both borehole and sediment samples.

"Extraction included in method.

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⁴Samples to be analyzed to be collected from soil cuttings.

#### 1.2 INSTALLATION DESCRIPTION AND HISTORY

#### 1.2.1 Location and Host Organizations

The Duluth IAP is located in St. Louis County, Minnesota, approximately 7 miles northwest of the city of Duluth, at the western end of Lake Superior. Opened in 1948 as the Williamson-Johnson Airport, this 1995-acre installation has been jointly operated by the USAF, the Minnesota Air National Guard (MANG), and the City of Duluth. Duluth IAP has hosted a variety of operational USAF activities during the period 1948 through 1981. Although USAF operational missions were terminated at Duluth IAP in December 1981, this Tactical Air Command (TAC) installation continues as a site of both commercial civilian and ANG activities. The host organization is the 148th Tactical Reconnaissance Group (MANG).

#### 1.2.2 Hydrogeology

Duluth IAP is located on the Superior Upland, an extension of the Laurentian Upland of the Canadian Shield. The synclinal Lake Superior basin is a major structural feature of this region.

At Duluth IAP, the bedrock is composed of the Duluth Complex, consisting of Precambrian gabbro and several other igneous intrusive rock types. The Duluth gabbro extends beneath the Lake Super or basin in the form of a lopolith, a large lenticular centrally sunken intrusive mass. At Duluth, the lopolith is 12,000 feet thick (Thornbury, 1965). The Duluth Complex is located on the western limb of the Superior Syncline, the axis of which corresponds roughly to the axis of Lake Superior (Weston, 1984).

Surface deposits at Duluth IAP consist of Pleistocene age Late Wisconsinan glacial deposits. Topography in the vicinity of Duluth IAP reflects its recent glacial history as poorly defined deranged drainage dominates; numerous shallow lakes, swamps and bogs exist; and irregular low relief typifies the area.

The naturally occurring unconsolidated surface deposits at the base were glacial outwash. The Mille Lacs-Highland Moraine Association, a sandy, stony till, is present as ground moraine to the southeast of the base and end moraine to the northwest of the base (Hobbs and Goebel, 1982). Surface deposits have been modified at the base due to earthmoving activities. All four sites investigated during the Phase II, Stage 1 effort are located on structural fill or otherwise disturbed ground (Weston, 1984). Unconsolidated sediments are believed to range in thickness from 10 to 60 feet at Duluth IAP (Engineering-Science, 1982). Surface elevations at Duluth IAP vary from approximately 1390 feet above mean sea level (msl) along the northern installation boundary to approximately 1430 feet msl near the developed south-central portion of the base.

Ground water at the base occurs both in the unconsolidated glacial sediments under water table (unconfined) conditions and in the underlying crystalline bedrock within fractures and voids.

The glacial drift aquifer, consisting of a heterogeneous mixture of sand, silt, clay, gravel, and cobbles, etc., is unstratified and locally very compact. This aquifer, which supplies adequate yields for farm and domestic consumption and is the most productive local aquifer, is in hydraulic communication with the underlying bedrock aquifer. Ground water in the glacial drift aquifer is generally encountered at depths of 3 to 25 feet below ground surface. Within the bedrock aquifer, wells drilled to depths of 100 to 700 feet generally encounter water at depths of 10 to 30 feet. Yields from the bedrock aquifer are usually poor (i.e., 5 gallons per minute or less). Water quality from both aquifers is generally good (Engineering-Science, 1982).

Within the Duluth IAP region, ground water, primarily from small capacity glacial drift wells, is utilized by individual domestic or agricultural consumers in isolated areas. City of Duluth water from Lake Superior is supplied to the Duluth IAP and adjacent communities.

Recharge to local aquifers consists of precipitation falling on the unsaturated portion of the aquifer or, in the case of the bedrock aquifer, percolation through a communicating unit in contact with the aquifer.

It has been postulated that Duluth IAP appears to lie within a ground water discharge zone, as evidenced by typically high soil unit water levels, perennial stream flow on and adjacent to the base, and the presence of numerous large, permanent wetlands in the area (Engineering-Science, 1982).

The hydraulic head in the bedrock and the overlying glacial drift near Duluth IAP are similar, whereas the permeability of the bedrock is generally much lower than the permeability in the glacial aquifer. Although the two aquifers are hydraulically connected, the vertical flow from the sediments to the bedrock is believed to be low (Engineering-Science, 1982). Because of these conditions, the principal flow path of ground water in the area has been interpreted to be direct recharge from the ground surface to the shallow water table in the glacial drift, then horizontal flow in the water table to discharge to local streams and ponds (Weston, 1984). The water table, where not perched, is continuous with marsh and bog areas.

> [7] M-15

Surface drainage at the base flows to two drainage systems. A ground water divide is suspected to exist paralleling the main runway (Engineering-Science, 1982). To the north of the runway, drainage from the northern and western portions of the base drains to Beaver Creek and eventually to Wild Rice Lake, located north of the base. This drainage system includes drainage ditches from the fuel storage area, DPDO Storage Area "C", and the fire training areas. North of the runway in the vicinity of the Goose dump sites, a largely marshy area drains into two unnamed drainageways that flow into Wild Rice Lake. Southeast of the runway, drainage flows south to Miller Creek, which feeds into the St. Louis River (Weston, 1984).

#### **1.3 INDIVIDUAL SITES**

#### 1.3.1 Site 1: D-1 Goose Site Dump

Site D-1 is located in a pocket swamp north of the abandoned Goose Site bunkers and to the east of the access road. The period of operation for this site is unknown. The Phase I report notes that approximately 15 empty and rusty 20% DDT drums were observed scattered throughout an approximately 100- by 75-foot area. The barrels appeared empty, and they were not recently discarded.

A potential for migration of pollutants from this site to Wild Rice Lake exists, either by surface water drainage or by ground water flow.

#### 1.3.2 Site 2: FT-1 Fire Training Area (1951 to Early 1960s) and FT-2 Fire Training Area (Early 1960s to Present)

During the site visit/briefing, it was decided that both fire training areas should be investigated as one site. Both fire training areas, located north of the main runway, are situated in the V shape formed by the two smaller runways.

Site FT-1, in use from 1951 to the early 1960s, is located south of the access road. The activities were conducted in two excavated pits, approximately 40 feet wide, 50 feet long, and 3 to 4 feet in depth, and contained about 2 feet of standing water. For fire training exercises, 300 to 1000 gallons of flammable materials were placed in the pits, ignited, and extinguished with a protein-based foam, aqueous film-forming foam (AFFF), or chlorobromomethane (CB). Carbon tetrachloride may have been used as an extinguishing agent during the early years of pit operation. Materials burned included JP-4 and drummed materials that were not accepted by DPDO for disposal. Waste materials and residue remained in the pits following the fire training exercises. The fire training exercises were held as frequently as once per week, although once per month was more typical. The pits at Site FT-1 were abandoned, leveled, and filled in the early 1960s (Engineering-Science, 1982).

From the early 1960s to the present, Site FT-2, located north of the access road, has been in use. Fire training activity was originally conducted in an excavated area of the site; the original perimeter berm was removed and the area graded in the early 1970s. Fire training activities are now conducted in a bermed circular area approximately 100 feet in diameter. Runoff from this site is uncontained. Drainage off site to the north eventually reaches Wild Rice Lake.

During the time of the Phase I report, two training exercises per month were carried out. Before the exercise, the ground was saturated with water to minimize infiltration. Up to 500 gallons of JP-4 fuel are burned during a typical training exercise. Formerly, contaminated fuels and drummed POL (waste oils, paint thinners, and solvents) were also burned in the pit. The burn is extinguished with approximately 30 gallons of AFFF. In the past, a protein-based foam and CB were used. After the burn, residual materials remaining in the area infiltrate into the ground or contribute to surface runoff.

Analyses of ground water carried out during the Phase II, Stage I investigation indicate that concentrations of total organic carbon (TOC), total organic halogens (TOX), and oil and grease were found in all seven wells installed in the fire training area.

#### 1.3.3 Site 3: S-2 DPDO Storage Area "C"

Waste POL, waste solvents, and chemicals were stored in Area "C" of the DPDO Storage Site S-2 from 1965 to 1980. The site, approximately 90 feet long by 75 feet wide, is unfenced, unlined, and borders a drainage ditch that eventually drains to Wild Rice Lake. This site, no longer used for storage, was the location of minor drum leaks in the past, although no major spills have been recorded. In 1980, several drums of waste oil contaminated soil were removed from this site and spread within Site FT-2.

The proximity of Area "C" to the drainage ditch creates a potential for contaminant migration to exist. No other areas within the present DPDO Storage Area were used for liquid storage.

By means of ten soil borings and two sediment grab samples, the Phase II, Stage 1 investigation found levels of oil and grease and volatile organic aromatics (VOAs) in the unsaturated soil collected to a depth of 2 feet at the storage area.

#### 1.3.4 Site 4: SP-1 Tank Farm Area

The tank farm area, located in the northwest portion of the base and in operation during the 1980s, occupies approximately 5 acres of land bordering the east-west runway. The facility consists of three above-ground storage tanks, fuel loading docks, associated outbuildings, and two small buried tanks: one for fuel oil and one holding tank for waste oil. The tanks are enclosed within earth dikes capable of retaining 110 percent of the tank capacities. Both open and covered drainageways bound the tank farm and loading dock area. These drainageways carry surface runoff from the site to a culvert, which runs from the northwest corner of the site, under the runway, and emerges north of the runway to discharge into Beaver Creek.

During repair of a water line in 1980, oil was observed at a depth of 6 to 7 feet about 100 feet outside the diked area. This excavation revealed diesel fuel No. 2 in the soil and ground water approximately 150 feet from Tank No. 3. Tank No. 3 was taken out of service because a leak was believed to originate with this tank or its feeder lines. The Phase II, Stage 1 report notes that the drainage ditches to the north of the dikes and adjacent to the loading area contain oily seepage. Oily ground water seepage has been observed as discharge from a sump pump operating in a valve box near the loading area. Contaminated soil from the excavation was removed and disposed off site.

#### 1.3.5 Site 5: D-4 South Goose Bunker Dump

The south Goose bunker dump is located south of the abandoned Goose site marker in a swampy area. Several empty drums of unknown materials were deposited along the southern margin of a small body of water. The time of dumping into this area, which is approximately 25 by 35 feet, is unknown. As drainage from this unclosed dump area is northward to Wild Rice Lake, the potential for contaminant migration exists.

Bottom soil samples and one surface water sample from an adjacent pond were found to contain DDD during the Phase II, Stage 1 investigation. A PCB compound, Arochlor-1260, was reported from the same soil and water samples.

#### 1.3.6 Site 6: D-2 Goose Site Dump

According to the Phase I report, approximately ten empty and rusty 55-gallon drums of deicing agent were observed in October 1981 at this site, a wooded ravine area located north of the abandoned Goose missile site and to the west of the access road.

As no other waste materials were observed in this area, it is unlikely that the area contains waste materials covered by fill. There exists a potential for contaminant migration, as drainage from this swampy locality is northward to Wild Rice Lake.

#### 1.3.7 Site 7: D-6 Runway 13 NE Disposal Area

The D-6 disposal site was in use during the 1950s through 1970s. Located northeast of Runway 13, this less than 1-acre site has been closed with local soil cover to an approximate fill depth of 3 to 4 feet. General rubbish, hardfill, aircraft parts, empty drums, and possibly drums containing unburnable and unrecoverable chemicals are believed to have been disposed here. Some debris is still located on the surface. Although no leachate has been detected at this site, there exists a potential for leachate generation due to the shallow water table and, hence, migration of contaminants to local swamps and eventually to Wild Rice Lake.

#### 1.3.8 Site 8: S-1 Old DPDO Storage Area

The base salvage yard area and old DPDO storage area were located north of Washington Street near Building 147. The period of operation for this site was 1950 through 1964. Materials handled through the DPDO storage area included DDT drums, waste fuel oil/solvents, and PCB transformers (Engineering-Science, 1982). Because minor leakage of drums of waste materials was likely to have occurred at this site, a potential for contamination exists.

#### 1.3.9 Site 9: D-9 Disposal Pit

A small pit, approximately 8 by 7 feet, was used during the mid-1960s for the disposal of small amounts of picric acid and acetone from the medics clinic. The identification of percuric acid in the Phase I report (Engineering-Science, 1982) appeared incorrect. Through inquiries made by MANG personnel of the biomedical technician formerly employed at the medics clinic, it was learned that the material disposed of was picric acid (Carlson, 1985). This pit, which also contains small amounts of garbage, was closed with local soil cover.

Although the quantities of wastes disposed at this site are believed to be small, the nature of the materials and the location of the site indicate there is a potential for contaminant migration. Surface drainage in this area is to Miller's Creek.

#### 1.3.10 Site 10: RD-1 Low-Level Radioactive Waste Disposal

At Site RD-1, during the 1950s, low-level radioactive materials such as cathode ray tubes, scopes, and instrument dials were deposited in a 15-foot deep trench approximately 40 feet long. General refuse and garbage covered these low-level radioactive wastes. Local soil cover was used to fill in this area. To insure that no contaminants are migrating from this site, it would be prudent to investigate this disposal area.

A review of the literature and discussions with knowledgeable personnel indicate that the wastes believed to be buried in this disposal area (i.e., cathode ray tubes and oscilloscopes) from this period were large instruments (approximately 2 by 3 feet) housed in metal cabinets containing transformers and, in many cases, small fans. The three radionuclides used for radioluminous dials were tritium, promethium-147, and radium-226.

Radionuclide	Half-Life (years)	Radiations	Average Activity/Dial			
Tritium	12.3	Beta	1 mCi			
Promethium-147	2.62	Beta	41 μCi			
Radium-226	1600	Alpha, Gamma	0.5 μCi			

Sources: Moghissi et al., 1978; Public Health Service, 1970.

#### 2.0 SITE INVESTIGATION SUMMARY

#### 2.1 OVERALL FACILITY

The recommended program addresses five original sites evaluated under the Phase II, Stage 1 investigation, and an additional monitoring at six additional sites. The two fire training areas (FT-1 and FT-2) have been consolidated into one site. These sites, listed in Table 1-1, will be investigated under Phase II, Stage 2 by means of 30 new monitor wells, 10 existing monitor wells, 19 borings, 18 surface water samples, and 20 sediment samples. Geophysical surveys are proposed to locate Sites 7, 9, and 10 and to investigate buried pipelines at Site 4 and drums at Site 6. An electromagnetic survey will be conducted to identify leak sites at Site 4. A detailed examination of existing aerial photographs will be performed at Sites 6, 7, 9, and 10.

#### 2.2 INVESTIGATION OF INDIVIDUAL SITES

#### 2.2.1 Site 1: D-1 Goose Site Dump

To assess the potential for migration of pollutants from this site, four monitor wells will be installed, one soil boring will be drilled, and two sediment and two water samples will be taken from the standing water, if present.

The monitor wells -- one assumed upgradient and three assumed downgradient -will be located in the field as determined by site conditions. The wells will be drilled to a depth no greater than 30 feet, and the screened interval will extend from 5 feet above to 10 feet below the water table. A maximum of four soil samples will be collected and analyzed. The actual sample locations (borehole and depth) will be at the field supervisor's discretion. From each well, one water sample will be collected and analyzed.

One soil boring will be drilled to a depth of 10 feet or to the water table, whichever is shallower, in the vicinity of the highest concentration of barrels. Soil samples from the ground surface and at the  $2\frac{1}{2}$ - and 5-foot depths will be analyzed.

Two sampling points will be designated from surface waters located at the site, or from surface waters adjacent to and downstream of the site. Both a water and a sediment sample from each of these surface water sample points will be collected. All water and soil samples will be analyzed for volatile organics and aromatic compounds, oil and grease, pesticides and herbicides, polychlorinated biphenyls (PCBs), phenols, and metals. In addition, soil moisture determination will be performed on the soil samples.

> [13] M-21

### 2.2.2 Site 2: FT-1 Fire Training Area (1951 to Early 1960s) and FT-2 Fire Training Area (Early 1960s to Present)

To more thoroughly define the potential level of contaminants at the fire training areas and to investigate possible migration of contaminants from the area, five monitor wells will be installed in the vicinity of the fire training areas. One well, in the assumed upgradient direction south of Site FT-1, will be used to provide information for the ambient water quality of the area. This well will be located in the field, and the intent is to position the well on the north side of the ground water divide as noted in the Phase II, Stage 1 report (Weston, 1984). Two wells will be placed downgradient of Site FT-1 on either side of the access road to investigate possible contaminants from Site FT-1. The final two wells will be positioned to the north and downgradient of Site FT-2. The wells will be drilled to a total depth of no greater than 30 feet, with a screened interval extending from 5 feet above to 10 feet below the water table. During the borehole drilling, a maximum of five soil samples will be collected and analyzed. The actual sample locations (borehole and depth) will be at the field supervisor's discretion. From each well, one water sample will be collected and analyzed.

Two soil borings, one in each fire training area, will be drilled to a total depth of 10 feet. If aerial photographs of Site FT-1 taken during the 1950s can be located to permit identification of the two separate pits, then an additional soil boring will be drilled in Site FT-1; each boring in the fire training burn pits will be centrally located. The soil sampling scheme will follow that outlined for the soil boring at Site 1.

In addition to the monitor wells and soil borings, sediment and surface water samples will be taken to investigate the character of surface runoff from the fire training areas. Dames & Moore concurs with the recommendation made in the Phase II, Stage 1 report regarding sampling the drainageway between the western extension of the access road and the southwestern boundary of Site FT-2. Two sediment and two surface water samples will be obtained from the drainageway, and one sediment and one surface water sample will be obtained from the swamp to the north and downgradient of Site FT-2.

In order to confirm the results of the previous analyses, one ground water sample will be taken from each of the six existing monitor wells. Water level readings will also be read at these wells.

All water and soil samples will be analyzed for volatile organics, aromatic compounds, oil and grease, and phenol. In addition, soil moisture determination will be performed on the soil samples.

Monitor wells that exhibit a layer of floating fuel will be measured for the thickness of the fuel.

#### 2.2.3 Site 3: S-2 DPDO Storage Area "C"

To further define the vertical and horizontal extent of surface and subsurface contamination at this site, three soil borings will be drilled, four monitor wells will be installed, and three sediment samples and three water samples will be collected from the drainageway north of the area.

The monitor wells will be positioned in the field such that one is upgradient and three are downgradient. The exact locations of these wells will be determined by site conditions. The wells will be drilled to a total depth of 30 feet, and the sampling scheme will follow the program for Site 1.

Three soil borings, positioned approximately along a line running north-south in the center of the storage area, will be drilled to a total depth of 10 feet. The soil sampling scheme will follow that outlined for the soil boring at Site 1.

To trace the possible migration of contaminants along the drainageway north of the storage area, three sediment and three surface water samples will be collected in the drainageway. The first sediment and water sample will be taken in the approximate position of Sample 2 (Phase II, Stage 1 study) to confirm the results already obtained. The next two sets of samples will be taken at 100-foot intervals along the drainageway. It is believed that sampling locations thus positioned will investigate off-site migration by surface flow.

All water and soil samples will be analyzed for volatile organics, aromatic compounds, oil and grease, pesticides and herbicides, PCBs, phenols, and metals. In addition, soil moisture determination will be performed on the soil samples.

#### 2.2.4 Site 4: SP-1 Tank Farm Area

Before field investigations commence, a geophysical survey will be conducted using a metal locator and/or magnetometer to locate underground pipes. A grid system will be constructed and tied into local ground coordinates so that pipeline locations can be verified for information provided by MANG personnel. An electromagnetic mapping (EM) survey will also be performed to identify leak sites from these pipes. The entire tank farm will be surveyed to include a minimum 50-foot buffer around the site perimeter. In addition, the survey will be expanded on the southern side of the tank farm area to the main access road. The Phase II, Stage 1 study, by means of four monitor wells, two test pits, and 20 well points, revealed that free-floating fuel oil was observed in the soil borings, test pits, and drainage water in the immediate vicinity of the fuel storage area. Water levels obtained from the well points and monitor wells permitted construction of a water table map for the storage area. The gradient is towards the northwest in the western portion of the storage area and towards the northeast in the eastern portion of the site.

An additional four monitor wells will be installed, five soil borings will be drilled, and four sediment and four surface water samples will be taken to more clearly define contaminant migration from this site. One monitor well will be placed south of the present Well MW-8, in the assumed upgradient direction. Three wells will be placed downgradient of the storage tanks to intercept a plume if it exists. If feasible, one well will be placed within the area south of the "Y" formed by the drainage culverts as they exit the site to the north. The wells will be installed and sampled as outlined for Site 1.

Five soil borings will be drilled to a total depth of 15 feet each or to the water table. Samples will be taken at  $2\frac{1}{2}$ -foot intervals beginning at ground surface. Samples at  $2\frac{1}{2}$ , 5, and  $7\frac{1}{2}$  feet will be analyzed.

As noted in the Phase II, Stage 1 study, it appears that the ground water surface around the entire site is intercepted by surface drainageways or buried culverts, which act as discharge lines for the upper several feet of the ground water table. Therefore, additional sediment and water samples are warranted from the drainageway/culverts as they exit the fuel storage area. Four sediment and four surface water samples will be taken, beginning at the joint between the drainageways and continuing at 100-foot intervals along the northern route of this system.

The four existing monitor wells will be used for determination of water levels, and samples will be taken for analysis. If floating fuel is encountered in the wells, the fuel product thickness will be measured.

All water and soil samples will be analyzed for volatile organics, aromatic compounds, and oil and grease. In addition, soil moisture determination will be performed on the soil samples.

#### 2.2.5 Site 5: D-4 South Goose Bunker Dump

Three monitor wells, three surface water, and five sediment samples will be used to investigate this site. One monitor well will be positioned outside the site perimeter and consistent with the assumed upgradient direction of ground water flow. Two wells, situated approximately 50 feet from the site perimeter, will be located in the assumed downgradient direction. Because of local topographic features, the exact gradient at this site is uncertain. The intent of the triangular positioning of the wells is to assess both upgradient and downgradient water quality. Wells will be constructed to a total depth no greater than 30 feet, and installation procedures will follow those outlined for Site 1. During the borehole drilling, a maximum of three soil samples will be collected and analyzed. The actual sample locations (borehole and depth) will be at the field supervisor's discretion. From each well, one water sample will be collected and analyzed.

Three surface water samples from the pond/swamp will be collected, as well as a maximum of five sediment samples from the bottom of the pond/swamp area and drainageways that exit this site. These samples will serve to confirm the analyses performed during the Phase II, Stage 1 investigation and to help clarify the pesticide and PCB analyses results.

All water and soil samples will be analyzed for volatile organics, aromatic compounds, oil and grease, pesticides and herbicides, PCBs, phenols, and metals. In addition, soil moisture determination will be performed on the soil samples.

#### 2.2.6 Site 6: D-2 Goose Site Dump

Before field investigations commence, a geophysical survey will be conducted using a metal detector and a magnetometer to locate the dump site drums. To further aid in locating the drums and defining the site location, a detailed examination of available aerial photographs will be performed.

If this site can be located during the planning/mobilization phase of the study, then two soil borings will be drilled to investigate the site. One boring will be located in the immediate vicinity of the drums, and the other boring will be placed at a distance of 25 feet in the assumed downgradient direction. Soil samples will be collected at  $2\frac{1}{2}$ -foot intervals to a total depth of 10 feet or to the water table. Samples at the ground surface and  $2\frac{1}{2}$  feet will be analyzed.

The samples will be analyzed for volatile organics, aromatic compounds, oil and grease, ethylene glycol, and soil moisture determination.

#### 2.2.7 Site 7: D-6 Runway 13 NE Disposal Area

Before field investigations commence, a geophysical survey will be conducted using a metal detector and a magnetometer to define the site boundaries. In addition, a detailed examination of available aerial photographs will be performed.

Three monitor wells will be installed to investigate possible migration of contaminants from this site. Well construction will follow the procedure outlined for Site 1. The wells will be positioned in the field, one in the assumed upgradient and two in the downgradient direction. Sampling procedures will be the same as those for Site 5.

Two soil borings will be drilled to a total depth of 10 feet. Samples will be taken from the ground surface at  $2\frac{1}{2}$ -foot intervals, extending to 10 feet. Soil samples from the ground surface and the  $2\frac{1}{2}$ -foot depth will be analyzed.

If surface drainage from the site can be located, one sediment sample and one surface water sample will be collected outside but within 20 feet of the site boundary.

All water and soil samples will be analyzed for volatile organics, aromatic compounds, oil and grease, pesticides and herbicides, PCBs, phenols, and metals. In addition, soil moisture determination will be performed on the soil samples.

#### 2.2.8 Site 8: S-1 Old DPDO Storage Area

Three monitor wells, two soil borings, two surface water samples, and two sediment samples will be used to investigate this site. The three wells will be constructed to a total depth of 30 feet, and installation procedures will follow those outlined for Site 1. Sampling procedures will be the same as those for Site 5. Because of uncertainty about the local gradient at this site, exact positioning of wells will be located in the field, with the intention being to locate one upgradient and two downgradient. The soil borings drilled to a depth of 10 feet will be placed in the centers of the two areas, one in the northeast and one in the southwest quadrant. Soil samples will be analyzed from samples taken at ground surface, 2½, and 5 feet. The surface water and sediment samples will be collected from drainageways at points downstream of the site.

All water and soil samples will be analyzed for volatile organics, aromatic compounds, oil and grease, pesticides and herbicides, PCBs, phenols, and metals. In addition, soil moisture determination will be performed on the soil samples.

#### 2.2.9 Site 9: D-9 Disposal Pit

A geophysical survey will be conducted during the planning/mobilization stage of the study to attempt to locate this site by the response of a metal locator and/or magnetometer to the assumed metallic refuse interred in this pit. A grid system will be constructed and tied into local ground coordinates so that the boundaries of the burial pit can be defined. To further aid in defining the site boundaries, a detailed examination of available aerial photographs will be performed.

If this site can be identified, one monitor well will be installed near the assumed downgradient boundary of the pit. The well will be constructed and installed according to those procedures outlined for Site 1. One water sample will be collected and analyzed.

In addition, one boring will be drilled in the immediate vicinity of contamination. Soil samples will be collected at  $2\frac{1}{2}$ -foot intervals to a total depth of 10 feet or to the water table. Samples at  $2\frac{1}{2}$  feet above and  $2\frac{1}{2}$  feet below the water table will be analyzed. Water and soil samples will be analyzed for acetone and picric acid.

#### 2.2.10 Site 10: RD-1 Low-Level Radioactive Waste Disposal

A geophysical survey (metal detector and magnetometer) and a review of available aerial photographs will be performed to accurately locate this disposal area.

If the disposal area can be located, then three monitor wells will be installed, one upgradient and two downgradient. From each well, one water sample will be collected and analyzed. The waste, reported to be buried at a depth of 15 feet and higher elevations, is assumed to be below the water table. The purpose of the well installations is to obtain ground water samples downgradient of the burial trench and analyze for gross alpha, gross beta, and radium-226 and radium-228. The results of analyses of these samples will be compared with the ambient ground water quality and the USEPA drinking water standards for radiation.

#### 3.0 FIELD SETUP

#### 3.1 DETAILED WORK PLAN

#### 3.1.1 Planning

- o Contact MANG and TAC regarding meeting time and place.
- o MANG and TAC contact station POC to establish meeting specifics.
- o Contact surveyor subcontractor regarding survey start date.
- o Contact drilling subcontractor regarding start date.
- o Notify chemistry laboratory subcontractor to prepare bottles (cleaning, preservatives, etc.) and shipping containers.
- o Make travel arrangements.
- o Write purchase orders for drilling subcontractor, surveyor subcontractor, chemistry subcontractor.
- o Assemble and assess condition of all field equipment and supplies.
- o Replace, repair, and supplement field equipment and supplies.
- o Prepare Technical Operations Plan and submit to MANG and TAC.
- o Brief field personnel on Statement of Work (SOW); provide with TOP.
- o Order health and safety equipment.

#### 3.1.2 Mobilization

- o Senior geologist and field engineers mobilize from Chicago; geophysicist mobilizes from Santa Barbara.
- o Survey crew mobilizes from Duluth.
- o Drilling subcontractor mobilizes from Minneapolis.
- o Field equipment is sent from California and Chicago.
- o Field supplies are sent from California and Chicago. Remaining supplies are purchased in Minnesota.
- o Rent vehicles, locate housing.
- o Field equipment, supplies, chemistry bottles, and shipping containers are stored in base temporary office area (SOW, p. 16, III).
- o Decontamination area is tested (i.e., water pressure, electrical hookups, etc.) (SOW, p. 16, III.F).

[20]

o Dames & Moore personnel review existing engineering plans, drawings, diagrams, aerial photographs, etc. to evaluate sites to be investigated.

#### 3.1.3 On-Site Setup

- Senior engineer meets with MANG and TAC officials, base POC, and USAFOEHL Technical Monitor. Statement of Work reviewed; boring locations for wells/borings are discussed, and tentative locations are staked and numbered. Underground utilities are located and access problems resolved.
- o MANG personnel brief Dames & Moore personnel, drilling and surveying crews on rules and regulations involved with working on base. Briefings may involve several meetings, as mobilization of personnel is staggered (geophysics first, drilling and sampling second, survey third).
- MANG issues personnel identification badges and vehicle passes and/or entry permits.
- o Geophysicist is briefed on site-specific conditions for Sites 4, 6, 7, 9, and 10 by consulting with MANG personnel and surveyor. Geophysicist and assistant establish grids for geophysical survey. USAF clearance on work granted.
- o Orientation of drilling crew to site conditions, discussion of well/boring locations.
- o Finalizing well/boring locations with base POC. MANG gives clearance and sign-off on digging permits.
- o Senior geologist orients field engineer to site conditions and proposed boring locations.
- o Discussion with base POC regarding handling procedures and 10 percent selection process of samples to be sent to OEHL, San Antonio.
- o Commence drilling operations.

[21] M-29

### 3.2 DAMES & MOORE HEALTH AND SAFETY PLAN

Project Name and Number: Phase II, Stage 2 Installation Restoration Program 01016-267-07 Project Site Location: Duluth International Airport, Duluth, Minnesota Project Leader: Carol J. Scholl Site Project Manager and On-Site Safety Officer: Amy D. Lamborg Plan Preparer: Michael W. Ander Plan Reviewer: David Dahlstrom Preparation Date: June 28, 1985

#### Plan Approvals:

Office Safety Coordinator

Michael W. Ander

(date)

Managing Principal-in-Charge

Glenn D. Martin

(date)

Project Manager

Carol J. Scholl

(date)

M-30

#### 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. Site Project Manager (SPM)

The SPM shall direct on-site investigation and operational efforts. At the site, the SPM, 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, and are instructed in the work practices necessary to ensure safety and planned procedures for dealing with emergencies.
- 3. Assuring that personnel are aware of the potential hazards associated with site operations (see Tables 3-1 and 3-2).
- 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.

M-31

### TABLE 3-1

### EXPOSURE LIMITS AND RECOGNITION QUALITIES

	Exposure	Reco	gnition Qualities			
Compound	Standarda	Color	Odor	State		
Gasoline	300 ppm	None to pale brown or pink	Gasoline (0.25 ppm)b	Liquid		
Benzene	l ppm	None	Aromatic	Liquid		
Xylene	100 ppm	None	Aromatic	Liquid		
Toluene	200 ppm	None	Aromatic	Liquid		
Picric Acid ^C	0.1 mg/m ³	None to yellow	Odorless	Solid or liquid		
Acetone	1000 ppm	None	Ether-like	Liquid		
DDT	1 mg/m ³	None	Weak chemical odor	Solid		
Chlorobromomethane	200 ppm	None to pale yellow	Sweet	Liquid		
Carbon Tetrachloride	10 ppm	None	Ether-like	Liquid		
PCBs	1 mg/m ³	None	Odorless	Liquid		
Radium	1x10-12 µCi/ml	White	Odorless	Solid		
Ethylene Glycol	50 ppm	None	Odorless	Liquid		
Chloroform	50 ppm	None	Sweet	Liquid		
Trichloroethylene	100 ppm	None	Sweet	Liquid		
1,1,1-Trichloroethane (Methyl Chloroform)	350 ppm	None	Sweet	Liquid		
Tetrachloroethylene	100 ppm	None	Sweet	Liquid		
1,2-Dichloroethane (Ethylene Dichloride)	50 ppm	None	Sweet	Liquid		
1,1-Dichloroethane	100 ppm	None	Sweet	Liquid		

^aOSHA permissible exposure limit or ACGIH Threshold Limit Value.

^bOdor detection threshold.

^CDOT designated Class A explosive: possible detonation upon rapid heating or mechanical shock; not a problem if dissolved in water.

			ſ	TABLE 3-2	Page 1 of 3
	SYMPTOMS OF	S OF OVEREXPOSURE,	SURE, POTENTI	POTENTIAL CHRONIC EFFECTS, AND FIRST-AID TREATMENT	AID TREATMENT
	COMPOUND	EYE	SYMPTOMS OF SKIN	SYMPTOMS OF OVEREXPOSURE SKIN INHALATION/INGESTION	POTENTIAL CHRONIC EFFECTS
	Gasoline	Irritation	Irrítatíon, drying	Irritation of mucous membranes, dizziness, uncoordination, coughing, gagging.	
	Benzene	Irritation	Dermatitis	Giddiness, headache, nausea, fatigue, staggering gait.	Aplastic anemia, leukemia.
	Xylene	Irritation	Dermatitis	Dizziness, uncoordination, nausea.	Central nervous system, liver, and kidney damage.
[25]	Toluene	ł	Dermatitis	Fatigue, confusion, dizziness, headache.	Central nervous system, liver, and kidney damage.
	Picric Acid	Irritation	Dermatitis	Yellow-stained teeth, weakness, bitter taste, gastrointestinal distress, nephritis.	Kidney, liver, blood, skin, and eye damage.
	Acetone	Irritation	Dermatitis	Irritation of nose and throat, dizziness.	Respiratory system and skin damage.
	DDT	Irritation	Irritation	Paresthesias of tongue, lips, and face, tremors, apprehension, dizziness, confusion, headache, malaise, vomiting, partial paralysis of hands.	Central nervous system, kidney, liver, skin, and peripheral nervous system damage.

[25]

Weight, jaundice, edema, abdominal pain. 52 Radium Lung cancer, bone cancer, 0stefris, skin democe	Irritation Irritation Irritation Irritation Irritation Irritation	COMPOUND Chlorobromomethane Carbon Tetrachloride PCBs PCBs Radium Ethylene Glycol Ethylene Glycol Chloroform Trichloroethylene Trichloroethylene
OSLETTIS, SV	tation tation ation ation	Ethylene Glycol Chloroform Trichloroethylene Tetrachloroethylene
	1	PCBs
depressant, nausea, vomiting. Chloracne Nausea, vomiting, loss of	ł	Carbon Tetrachloride
on Tetrachloride Irritation Central nervous system depressant, nausea, vomiting. Chloracne Nausea, vomiting, loss of	Irritation	Chlorobromome thane
robromomethane Irritation Irritation Disorientation, dizziness, irritation of throat, pulmonary edema. on Tetrachloride Irritation Central nervous system depressant, nausea, vomiting. Chloracne Nausea, vomiting, loss of	EYE	COMPOUND
weight, jaundice, edema, abdominal pain. 		YE tation tation ation I ation

# TABLE 3-2 (continued)

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Page 3 of 3

		SYMPTOMS OF	SYMPTOMS OF OVEREXPOSURE	
COMPOUND	EYE	SKIN	INHALATION/INGESTION	POTENTIAL CHRONIC EFFECTS
l,l-Díchloroethane	ł	Irritation	Central nervous system depression, drowsiness, unconsciousness.	Skin, liver, and kidney damage.
l,l,l-Tríchloroethane (Methyl Chloroform)	Irritation	Dermatitis	Headache, lassitude, central nervous system depression, poor equilibrium, cardiac arrhythmias.	Skin, central nervous system, eye, and cardio- vascular system damage.
l,2-Dichloroethane (Ethylene Dichloride)	Irritation	Dermatitis	Central nervous system depression, nausea, vomiting, corneal opacity.	Kidney, liver, eye, skin, and central nervous system damage.

# **GENERAL FIRST-AID TREATMENT**

Irrigate immediately.	p wash promptly.	e to fresh air.	medical attention.
Irr	Soap	Move	Get
1	I	1	1
Eye	Skin	Inhalation	Ingestion

:

[27]

#### ACCIDENT REPORT FORM

SUPERVISOR'S REPORT OF	ACCIDENT	DO NOT USE FOR MO OR AIRCRAFT ACCI	
10	FROM		
	TELEPHONE (include area co	ode)	
NAME OF INJURED OR ILL EMPLOYEE			
DATE OF ACCIDENT TIME OF ACCIDENT	EXACT LOCATION OF ACCIDE	NT	
NARRATIVE DESCRIPTION OF ACCIDENT		**	
NATURE OF ILLNESS OR INJURY AND PART C	F BODY INVOLVED	LOST TIME YES	
		123	
PROBABLE DISABILITY (check one)			
FATAL LOST WORK DAY WITH DAYS AWAY FROM WORK	LOST WORK DAY WITH DAYS OF RESTRICTED	NO LOST Work Day	FIRST AID ONLY
		Ц	П
CORRECTIVE ACTION TAKEN BY REPORTING L			
CORRECTIVE ACTION THAT REMAINS TO BE	AKEN (by whom and by when)		
NAME OF SUPERVISOR	TITLE		
SIGNATURE	DATE		

[28] M-36

#### 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. 01016-267-07

Project: Phase II, Stage 2 Environmental Investigation Duluth International Airport, Minnesota

Rev. No. 0

Date 06/28/85

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

[29] M-37

#### PLAN FEEDBACK FORM

Problems with plan requirements:

Unexpected situations encountered:

Recommendations for future revisions:

#### PLEASE RETURN TO THE FIRMWIDE HEALTH AND SAFETY OFFICE - NY

[30] M-38

#### 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 SPM 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 SPM.

#### IV. BACKGROUND

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#### A. Site History

Based on preliminary site evaluation of Duluth International Airport (IAP), Minnesota, there appear to be ten (10) areas that may have generated significant environmental contamination over the lifetime of the facility. Suspected contaminants have been identified, and at some sites a preliminary estimate of concentrations has been made. 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.

Site 1: D-1 Goose Site Dump -- Potential contaminants at this site include DDT (and its breakdown product, DDD) and PCBs. The Phase I report noted that approximately 15 empty 20% DDT drums were observed at the site. Soil and water analyses conducted during the Phase II, Stage 1 investigation found low levels of DDD and the PCB compound Arochlor-1260.

Site 2: FT-1 and FT-2 Fire Training Areas -- During fire training exercises at these sites, 300 to 1000 gallons of flammable materials were placed in pits, ignited, and extinguished with a protein-based foam, AFFF, or chlorobromomethane. Carbon tetrachloride may also have been used during the early years of pit operation. Materials burned included JP-4, waste oils, paint thinners, and solvents. Area FT-1 was in use from 1951 to the early 1960s. Activities then were switched to Area FT-2 and continue to the present time.

> [31] M-39

Site 3: S-2 DPDO Storage Area "C" -- Waste POL, waste solvents, and chemicals were stored in Area "C" of the DPDO Storage Site S-2 from 1965 to 1980. Although minor drum leaks have occurred, no major spills have been recorded. The Phase II, Stage 1 investigation at this site found the following chemicals in soil at the site at or below the given concentrations: oil and grease (50 mg/g), chloroform (0.315  $\mu$ g/g), trichloroethylene (0.940  $\mu$ g/g), trichloroethane (0.210  $\mu$ g/g), bromochloromethane (0.016  $\mu$ g/g), dibromochloromethane (0.003  $\mu$ g/g), dichloroethylene (0.037  $\mu$ g/g), and dichloroethane (0.018  $\mu$ g/g).

Site 4: SP-1 Tank Farm Area -- The tank farm facility consists of three above-ground fuel storage tanks, fuel loading docks, associated outbuildings, and two small buried tanks, one for fuel oil and one holding tank for waste oil. During repair of a water line in 1980, diesel fuel No. 2 was observed at a depth of 6 to 7 feet. The fuel is believed to have originated from a leak in Tank No. 3 or its feeder line.

Site 5: D-4 South Goose Bunker Dump -- Two empty drums of unknown origin were found at this site along with some miscellaneous trash. The Phase I report stated that water samples from this site were analyzed but no contaminants were detected.

Site 6: D-2 Goose Site Dump -- Approximately 10 empty and rusty 55-gallon drums of deicing agent (ethylene glycol) were observed at this site in October 1981. No other waste materials are known to be present.

<u>Site 7: D-6 Runway 13 NE Disposal Area</u> -- General rubbish, hardfill, aircraft parts, empty drums, and possibly drums containing unburnable and unrecoverable chemicals are believed to have been disposed of at this less-than-1-acre site. No leachate has been observed, although there is a potential for leachate generation due to the shallow water table.

<u>Site 8: S-1 Old DPDO Storage Area</u> -- Materials handled through the DPDO Storage Area during the period from 1950 through 1964 included DDT drums, waste fuel oil/solvents, and PCB transformers (Engineering-Science, 1982). There is a potential for leakage of drums to have caused contamination at this site.

> [32] M-40

Site 9: D-9 Disposal Pit -- A small pit at this site, approximately 7 by 8 feet, was used during the mid-1960s for the disposal of small amounts of picric acid and acetone from the medics clinic. Small amounts of garbage were also disposed of here. The exact location of the pit is unknown.

Site 10: RD-1 Low-Level Radioactive Waste Disposal -- During the 1950s, low-level radioactive materials such as cathode ray tubes, scopes, and instrument dials were deposited in a 15-foot deep trench approximately 40 feet long. General refuse and garbage covered the radioactive wastes, and local soil was used to cap the pit. The three radionuclides most commonly used for instrument dials were radium-226, promethium-147, and tritium.

#### B. Dames & Moore Activity

Dames & Moore will be conducting the following activities at Duluth IAP:

#### 1. Site 1: D-1 Goose Site Dump

- a. Drill and construct a maximum of four monitor wells. Position three of the wells at the site perimeter consistent with the assumed downgradient direction of ground water flow. To collect ambient water quality information, place the fourth well outside the site perimeter consistent with the assumed upgradient direction of ground water flow. Collect one ground water sample from each monitor well. During the borehole drilling, collect a maximum of four soil samples for laboratory analysis.
- b. Drill one soil boring in the suspected zone of contamination and collect soil samples from the ground surface and at each 2½-foot interval until the estimated final borehole depth of 10 feet is reached. Analyze the samples from the surface and at the 2½- and 5-foot depths.
- c. Designate two sampling points from surface waters located at the site, or from surface waters adjacent to and downstream of the site.
- d. Collect both a water sample and a bottom sediment sample from each of these surface water sample points.

[33] M-41 e. Analyze all soil and water samples for volatile organics (USEPA 601 and SW 8010), aromatic compounds (E 602 and SW 8020), oil and grease (USEPA 413.2), pesticides (E 608 and SW 3550 and 8080), herbicides (E 615 and SW 8150), polychlorinated biphenyls (PCBs) (E 608 and SW 3550 and 8080), phenols (E 420.2 and E 420.2 modified), arsenic (E 206.2 and SW 3050 and 7060), barium (E 208.2 and SW 3050 and 6010), cadmium (E 213.2 and SW 3050 and 6010), chromium (E 218.1 and SW 3050 and 6010), lead (E 239.2 and SW 3050 and 6010), mercury (E 245.1 and SW 7471), selenium (E 270.3 and SW 3050 and 7740), and silver (E 272.2 and SW 3050 and 6010).

### 2. <u>Site 2: FT-1 Fire Training Area (1951 to Early 1960s)</u> and FT-2 Fire Training Area (Early 1960s to Present)

- a. Drill and construct a maximum of five monitor wells. Position one well consistent with the assumed upgradient direction of ground water flow. Use information from this well to establish ambient water quality. Place four wells in the assumed downgradient direction of ground water flow: two between FT-1 and FT-2 on either side of the access road, and two north of FT-2. Collect one ground water sample from each monitor well. During the borehole drilling, collect a maximum of five soil samples for laboratory analysis.
- b. Drill two soil borings in FT-1 and one soil boring in FT-2. Locate each boring in the center of a burn pit. If the second and older burn pit in FT-1 cannot be defined through aerial photographs or a physical site inspection, only drill one boring in FT-1. Collect soil samples from the ground surface and at each 2½-foot interval until the estimated final borehole depth of 10 feet is reached. Analyze the samples from the ground surface and the 2½- and 5-foot depths.
- c. Designate sampling points in the drainageway between the western extension of the access road and the southwestern boundary of FT-2. Collect two surface water samples and two bottom sediment samples from this drainageway.
- d. Collect one surface sediment sample and one surface water sample from the swamp to the north and downgradient of FT-2.

[34] M-42

- e. Collect one ground water sample from each of the six existing monitor wells at this site.
- f. Analyze all water and soil samples for volatile organics (USEPA 601 and SW 8010), aromatic compounds (E 602 and SW 8020), oil and grease (USEPA 413.2), and phenols (E 420.2 and E 420.2 modified).

#### 3. Site 3: S-2 DPDO Storage Area "C"

- a. Drill and construct a maximum of four monitor wells. The positioning and soil and water sampling follow that specified for Site 1.
- b. Drill three soil borings positioned along a centerline running north to south in the storage area. Follow the soil sampling plan specified for Site 1.
- c. Designate sampling points in the drainageway that begins on the east side of the storage area and then heads in a northeasterly direction. Collect three surface water samples and three bottom sediment samples from this drainageway. Collect the first sediment and water samples in the approximate location of Sample 2 identified in the Stage I study. Subsequent sample points should be at 100-foot intervals downgradient along the drainageway.
- d. Analyze all water and soil samples as specified for Site 1.

#### 4. Site 4: SP-1 Tank Farm Area

- a. Perform a geophysical survey using a metal detector and a magnetometer to precisely locate underground pipes. Perform an electromagnetic survey to identify leak sites from these pipes. Survey the entire tank farm to include a minimum 50-foot buffer around the site perimeter. Expand the geophysical survey on the southern side of the tank farm area to the main access road. A former fueling facility is located south of the tank farm.
- b. Drill and construct a maximum of four monitor wells. The well positioning and soil and water sampling follow that specified for Site 1.

- c. Drill five soil borings, positioning them based on the geophysical survey results and the data generated during the Stage 1 study. Boring depth is estimated to be 15 feet; however, drill until the water table is reached. Collect soil samples at  $2\frac{1}{2}$ -foot intervals beginning at ground surface. Analyze the samples collected at  $2\frac{1}{2}$ -, 5-, and  $7\frac{1}{2}$ -foot depths.
- d. Designate sample points in the drainageways/culverts around the site. Of particular interest is the drainageway heading north to Beaver Creek. Collect four surface water and four sediment samples from the drainageways/culverts.
- e. Collect one round of ground water samples from the four existing monitor wells at this site.
- f. Analyze all water and soil samples for volatile organics (USEPA 601 and SW 8010), aromatic compounds (E 602 and SW 8020), and oil and grease.

#### 5. Site 5: D-4 South Goose Bunker Dump

- a. Drill and construct three monitor wells. Position two of the wells approximately 50 feet from the site perimeter and consistent with the assumed downgradient direction of ground water flow. Place the other monitor well outside the site perimeter and consistent with the assumed upgradient direction of ground water flow. Collect one ground water sample from each monitor well. During the borehole drilling, collect a maximum of three soil samples for laboratory analysis.
- b. Collect three surface water samples from the pond/swamp at this site.
- c. Collect a maximum of five sediment samples from the bottom of the pond/swamp area and drainageways that exit this site.
- d. Analyze all water and soil samples as specified for Site 1.

#### 6. Site 6: D-2 Goose Site Dump

a. Perform a geophysical survey using a metal detector and a magnetometer to locate the dump site drums. Also conduct a detailed examination of available aerial photographs for the same purpose.

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[36] M-44

- b. If the geophysical survey and aerial photographs cannot locate the drums and accurately define the site location, perform no more work.
- c. If the site can be located, drill two exploratory soil borings in the zone of contamination. Collect soil samples from the ground surface and at  $2\frac{1}{2}$ -foot intervals until the estimated final borehole depth of 10 feet is reached. Analyze the samples from the surface and at  $2\frac{1}{2}$  feet.
- d. Analyze all soil samples for ethylene glycol (NIOSH P and CAM 338), oil and grease (USEPA 413.2), volatile organics (USEPA 601 and SW 8010), and aromatic compounds (E 602 and SW 8020).

#### 7. Site 7: D-6 Runway 13 NE Disposal Area

- a. Perform a geophysical survey using a metal detector and magnetometer to define as accurately as possible the site boundaries. Also conduct a detailed examination of available aerial photographs for the same purpose.
- b. Drill and construct three monitor wells. The positioning and soil and water sampling follow that specified for Site 5.
- c. Drill two exploratory soil borings in the zone of contamination. Collect soil samples from the ground surface and at  $2\frac{1}{2}$ -foot intervals until the estimated final borehole depth of 10 feet is reached. Analyze the samples from the surface and at the  $2\frac{1}{2}$ -foot depth.
- d. If surface drainage from the site can be located, collect one bottom sediment and one surface water sample outside but within 20 feet of the site boundary.
- e. Analyze all water and soil samples as specified for Site 1.

#### 8. Site 8: S-1 Old DPDO Storage Area

a. Drill and construct three monitor wells. The positioning and soil and water sampling follow that specified for Site 5.

**[37]** M-45

- b. Drill two exploratory soil borings, one in the center of each of the two former storage area sites. The soil sampling plan follows that specified for Site 1.
- c. Collect two surface water and two bottom sediment samples from drainageways at points downstream of the site.
- d. Analyze all water and soil samples as specified for Site 1.

#### 9. Site 9: D-9 Disposal Pit

- a. Perform a geophysical survey using a metal detector and a magnetometer to locate the site. Also conduct a detailed examination of available aerial photographs for the same purpose.
- b. If the geophysical survey and aerial photographs cannot accurately define the site location, perform no more work.
- c. If the site can be located, drill one exploratory soil boring in the zone of contamination. Collect soil samples at  $2\frac{1}{2}$ -foot intervals and analyze the samples at  $2\frac{1}{2}$  feet above and below the water table.
- d. If the site can be located, drill and construct one monitor well at the site perimeter consistent with the assumed downgradient direction of ground water flow. Collect one ground water sample.
- e. Analyze all water and soil samples for acetone (ASTM D 3695-82) and picric acid (USATHAMA 2B and 2C).

#### 10. Site 10: RD-1 Low-Level Radioactive Waste Disposal

- a. Conduct a geophysical survey (metal detector and magnetometer) and review aerial photographs to accurately locate the site.
- b. Drill and construct three monitor wells. Position two of the wells at the site perimeter consistent with the assumed downgradient direction of ground water flow. Place the third well in the assumed upgradient direction of ground water flow to collect ambient water quality information. Do not analyze

soil samples from these boreholes. Collect one water sample from each well.

c. Analyze all water samples for gross alpha (Standard Methods, 16th ed., 703), gross beta (Standard Methods, 16th ed., 703), radium-226 (EPA-600/4-80-032, 903.0) and radium-228 (EPA-600/4-80-032, 903.0).

#### C. Suspected Hazards

There is a potential for exposure to the chemicals listed in Tables 3-1 and 3-2. Because past analyses have indicated that the chemicals, if present, are at very low concentrations, and because Dames & Moore will not be drilling directly in the areas of waste disposal but only upgradient and downgradient, it is expected that the potential exposures will be at very low concentrations. Picric acid is a DOT designated Class A explosive that is subject to possible detonation upon rapid heating or mechanical shock; this is not a problem if it is dissolved in water.

#### 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 Leader	Amy Lamborg	(office) (home)	312-297-6120 312-328-0671
D&M Industrial Hygiene and Safety Director	David Dahlstrom	(office) (home)	404-262-2915
Police	MANG		218-723-7280
Fire	MANG		218-723-7233
Emergency	Commercial Ambulance		218-722-0807
Safety		-	
TAC Clinic	Sgt. Suzanne Grage		218-723-7224
Civil Engineering	Capt. Gary Niemi	(office)	218-723-7339

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:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on scene.
- 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 SPM.
- 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 SPM 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, MONITORING METHODS, 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 3-1.

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 3-2.

Monitoring Methods, Action Levels and Protective Measures

Methods for monitoring for suspected contaminants, action levels, and protective measures to be used for various contaminant concentration levels are presented in Table 3-3.

[40]

TABLE 3-3	ΤA	BLE	3-3
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# HAZARD MONITORING METHOD, ACTION LEVELS, AND PROTECTIVE MEASURES

Hazard	Monitoring Method	Action Level	Protective Measures
Explosive A tmosphere	Explosimeter or Combustible	< 10% LEL	Continue working
Aunosphere	Gas Meter	10 - 25% LEL	Continue working with continuous monitoring
		> 25% LEL	EVACUATE the area; EXPLOSION HAZARD
Organic Vapors	Photoionization	< 50 ppm	Continue working
Vapors	Detector (HNU)	50 - 1000 ppm	Continue working with half-face respirator with organic vapor cartridges
		> 1000 ppm	EVACUATE the area

[41] M-49

### 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. Table 3-4 specifies protective equipment required for each on-site activity.

## TABLE 3-4

# PROTECTIVE EQUIPMENT REQUIRED FOR ON-SITE ACTIVITIES

Activity/Location	Protective Equipment
During drilling and sampling	Half-face respirator with organic vapor cartridges*
	Nitrile gloves
	Rubber boots (steel toed)
	Hard hat with splash shield
	Disposable Tyvek coveralls

*If photoionization detector reading is greater than 50 ppm.

#### 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:

[45]

#### 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.)

> [46] M-54

#### 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 (<u>all senses</u>) 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.

[47] M-55

#### 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 value and inspect the seat and value 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

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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.

[48]

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.

[49]

- 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

[50]

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.

[51] M-59

#### 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.

[52] M-60

# 3.3 SUBCONTRACTOR INFORMATION

# 3.3.1 Chemistry Subcontractor

UBTL, Inc. 520 Wakara Way Salt Lake City, Utah 84108 Telephone: 801/584-3232

# 3.3.2 Surveying Subcontractor

Jack D. Salo Inc. 15 East First Street Duluth, Minnesota 55802 Telephone: 218/727-8796

#### 3.3.3 Drilling Subcontractor

Braun Engineering Testing, Inc. 6800 South County Road 18 P. O. Box 35108 Minneapolis, Minnesota 55435-0108 Telephone: 612/941-5600

> [53] M-61

#### 4.0 CALIBRATION OF FIELD EQUIPMENT

All field equipment will be calibrated according to the manufacturers' specifications, as described below. The personnel assigned to take measurements in the field will assemble as much equipment as feasible in the laboratory prior to mobilization to the site. The personnel will become familiar with the calibration of all instruments, as outlined in the respective manuals, and will make all calibrations that can be made at that time. Pertinent sections of the respective manuals will be photocopied for reference in the field, and all equipment that will be necessary for field calibration, such as buffer solutions and calibration gases, will be assembled.

#### LIST OF FIELD EQUIPMENT

- 4.1 Electromagnetics Terrain Conductivity Meter
- 4.2 Magnetometer
- 4.3 Metal Locator
- 4.4 Hand Pump
- 4.5 Total Organic Vapor Analyzer
- 4.6 Explosimeter
- 4.7 Conductivity Meter
- 4.8 pH Meter
- 4.9 Thermometer (Thermocouple)
- 4.10 Bailers
- 4.11 Decontamination Supplies
- 4.12 Respirators, Cartridges, and Filters
- 4.13 Locks

#### 4.1 ELECTROMAGNETICS TERRAIN CONDUCTIVITY METER

The Geonics EM-31D is a one-man instrument consisting of a control unit and transmitter and receiver coils. The system permits measurements of terrain conductivity to be made without the need for direct earth coupling and to an effective depth of exploration of 20 feet. The EM-31D is equipped for output to a digital data logger. The instrument requires no field calibration or adjustment.

Verification of system repeatability is obtained by residing at a calibration station at the start, middle, and end of each survey day. Normally, readings should fall within a range of 10 percent; however, changes in soil moisture content (e.g., following a prolonged period of rain) may affect the natural reading value.

> [54] M-62

#### 4.2 MAGNETOMETER

The EDA OMNI proton precision magnetometer is a microprocessor-based unit capable of reading total magnetic field intensity and vertical magnetic gradient. The OMNI-IV consists of two parts: one is the reading/recording module, and the other is the sensor. These are interconnected by cable.

Proper system operation is tested at the start of a field investigation and before each field day of recording in accordance with the procedures detailed in the Instrument Operations Manual. Using the "TEST" and "DUMP" modes, the following tests are made:

- o Total field test;
- o Error calculation test; and
- o Software diagnostics.

In the course of the "total field test," approximately 85 percent of the OMNI-IV electronics are tested. As a result of this test, there is an 80 percent probability that the OMNI-IV is operating satisfactorily. Further verification of system performance is obtained by comparing the <u>total</u> field intensity value obtained at the base station with published iso-intensity maps of the total intensity of the earth's magnetic field.

#### 4.3 METAL LOCATOR

The Discovery Electronics TF-600 is a ground-reject metal locator capable of screening out spurious responses produced by metal litter and variations in soil conditions. The TF-600 requires that an instrument nulling procedure be followed to optimize survey results. This is accomplished at the start of a survey using the mode selector and two nulling controls present on the instrument panel, following the procedures prescribed in the Instrument Operations Manual. Frequently, once set, the nulling controls need not be changed throughout the course of the entire survey. As a standard practice, the nulling process is performed at the start of each survey day.

Systems performance is verified by passing the TF-600 over a visible metallic object and noting the tone response of the instrument.

#### 4.4 HAND PUMP

A Brainard-Kilman 1.7-inch hand pump will be used for well development and purging. This is a PVC pump with a 2.75-gpm pumping rate. An external power source is not required to operate this manual pump. The only calibration applicable

for this type of equipment is an initial measurement of the length and internal diameter of the pump piping to confirm the stated volume capacity. Prior to use, the threads and check valve will be inspected to ensure a tight seal. The performance of the "O" ring seal will also be tested. During purging, the evacuated water will be placed in containers to determine the volume of water removed.

#### 4.5 TOTAL ORGANIC VAPOR ANALYZER

The analyzer used will be an HNU Model P1-101. The HNU is a quantitative instrument that measures the total concentration of numerous organic vapors in the air. The instrument is used primarily as a safety or screening device to determine the presence and concentration of organic vapors. The HNU is battery operated and lightweight, making it very useful in actual field monitoring projects. The instrument is calibrated by introducing pressurized gas from a cylinder with a known organic concentration into the detector. Once the concentration has stabilized, the display of the instrument is adjusted to match the known concentration. Α calibration of this type is performed prior to each usage of the instrument. If the output differs greatly from the known concentration, the initial procedure to remedy the problem is a thorough cleaning of the instrument. The cleaning process normally removes foreign materials that affect the calibration of the instrument. If this procedure does not remedy the problem, further troubleshooting is performed until the problem is resolved. If the problem cannot be resolved by Dames & Moore technicians, the instrument is returned to the manufacturer for repair.

#### 4.6 **EXPLOSIMETER**

An MSA Model 2A explosimeter will be used to determine the presence of explosive gases or vapors in ambient air. The instrument is used primarily as a safety device to determine whether the atmosphere contains vapors or gases in sufficient quantities to be explosive. The explosimeter is calibrated by plumbing a small quantity of explosive gases into the instrument and comparing the instrument's output with the known gas concentration. This calibration is performed before each field use. The instrument is cleaned after each field assignment. All components are checked for proper working order and replaced as necessary.

#### 4.7 CONDUCTIVITY METER

A YSI Model 33 S-C-T meter will be used to measure water conductivity. To calibrate, the meter is turned off and the level indicator is adjusted to zero on the readout face. Next, the meter switch is set to "RED LINE" and the level indicator is adjusted to the red line marking on the readout face.

#### 4.8 pH METER

An L. G. Nester Model 47 mini pH meter will be used to measure water pH. The meter has a gel-filled combination electrode so that no reference refilling is required. To calibrate, the electrode is first immersed in a 6.86 pH buffer and the "CALIBRATE" knob is turned until the meter reads 6.86. The electrode is rinsed in distilled water and then immersed in a 4.01 pH buffer. Next, the "TEMP" knob is turned so that the meter reads 4.01, and the span is then adjusted. However, the meter should be calibrated to within 3 pH of the sample value. Therefore, for the 0 to 10 pH range, the meter should be set to read 8.86 and 6.01 versus 6.86 and 4.01 in the calibration procedure. For pH readings in the 4 to 14 range, the meter must be set to read 4.86 and 2.01 in the calibration procedure.

#### 4.9 THERMOMETER (THERMOCOUPLE)

A Fluke Model 80TK will be used to measure the temperature of gases and liquids. This device has a range of  $-50^{\circ}$ C to  $1000^{\circ}$ C to an accuracy of  $\pm 1.0^{\circ}$ C. This instrument is calibrated by comparison with a Hewlett-Packard Model 2804A quartz thermometer standard. The calibration is performed by placing the standard's probe and the probe of the thermocouple in identical water baths. The output of the thermocouple is adjusted to correspond with the standard. The calibration is performed once a year but is more frequently checked with respect to other thermometers.

#### 4.10 BAILERS

Teflon[®] bottom discharge bailers will be used for well sampling. The only calibration applicable for this type of equipment is an initial measurement of the length and internal diameter of the bailer to confirm the stated volume capacity. Prior to use, the threads will be inspected to ensure that connections are tight. The bailer will be inspected for scratches or dents that could also affect the integrity of the equipment. The operation of the discharge mechanism will be tested prior to use. The bailer will be packaged for transport to minimize the effects of jostling.

#### 4.11 DECONTAMINATION SUPPLIES

All sampling equipment will be decontaminated prior to use and between samples to avoid cross-contamination. As specified in the Statement of Work, decontamination supplies will include hexane, laboratory-grade detergent, nitric acid, and distilled water. Certified grade hexane will be used to ensure high purity. Alconox laboratory-grade detergent (Fisher Scientific Company) will be used due to its low sudsing and low residue properties. The final rinsing of equipment will be

[57]

done using laboratory-grade distilled deionized water. All decontamination supplies will be transported sealed in unbreakable containers. The containers will be visually inspected for leaks or contamination prior to each use.

#### 4.12 RESPIRATORS, CARTRIDGES, AND FILTERS

Half mask, combination filter/cartridge respirators will be donned by sampling personnel when field situations warrant. The respirators will be fitted with GMA cartridges with Type F filters for removal of organic vapors, dusts, and mists. These are NIOSH (National Institute for Occupational Safety and Health) tested, and NIOSH and MSHA (Mine Safety and Health Administration) approved. The GMA cartridge is approved for use in atmospheres containing at least 19.5 percent oxygen and less than 0.1 percent organic vapors by volume.

#### 4.13 LOCKS

Good quality, reasonably priced padlocks will be placed on each monitor well to discourage tampering and vandalism. The locks will be purchased from a locksmith supplier and will be performance tested at the time of purchase and when placed on a well. The locks will be keyed alike to avoid the possibility of confusion among keys.

#### 5.0 PREVENTIVE MAINTENANCE OF FIELD EQUIPMENT

All field equipment will be maintained according to manufacturers' specifications, as discussed below. As described in Section 4.0, all equipment will be assembled in the laboratory, if feasible, for calibration prior to mobilization. At this time, the equipment will be checked to ensure that it is in proper working order, and any required maintenance will be performed. Tools and equipment that may be needed for field maintenance will be assembled, and pertinent sections of the manuals will be photocopied for reference in the field.

#### LIST OF FIELD EQUIPMENT REQUIRING PREVENTIVE MAINTENANCE

- 5.1 Electromagnetics Terrain Conductivity Meter
- 5.2 Magnetometer
- 5.3 Metal Locator
- 5.4 Hand Pump
- 5.5 Total Organic Vapor Analyzer
- 5.6 Explosimeter
- 5.7 Conductivity Meter
- 5.8 pH Meter
- 5.9 Thermocouple
- 5.10 Bailers

#### 5.1 ELECTROMAGNETICS TERRAIN CONDUCTIVITY METER

Field maintenance of the EM-31D and accessory logger consists of the following:

- o Battery replacement when low power is indicated; and
- o Inspection of the data logger interconnect cable and connector for visible evidence of damage.

Verification of stored data validity is obtained by periodic notation of instrument reading and data logger record number for comparison against the printout of the record values following a data dump.

#### 5.2 MAGNETOMETER

Field maintenance of the OMNI-IV normally consists of the following tasks:

• Replacement of discharged battery pack with freshly charged battery pack when the battery descriptor indicates low power;

> **[59]** M-67

- o Inspection of sensor cable and battery pack cable (for belt pack) and connectors for visible evidence of damage; and
- o Checking the sensor bath fluid level for the presence of an adequate level of fluid as evidenced by a sloshing sound when the sensor is gently shaken.

#### 5.3 METAL LOCATOR

Instrument field maintenance consists solely of battery replacement when the battery indicator meter shows low power.

#### 5.4 HAND PUMP

The hand pump is packed and handled to minimize dents to the piping or damage to the pipe threads or check valve. When stored, the "O" rings should be kept in darkness to prevent deterioration so that a tight seal will be maintained when in use. When in use, it is important that the inner pump cylinder is not jammed down hard or pushed down into the sediment in the bottom of the well. This action has the potential to cause damage to the check valve, "O" ring seal assembly, and/or pump cylinder. A "holding dog" will be used to hold the pump assembly up in the well a safe distance (typically 2 feet) from the sediments at the bottom of the well.

#### 5.5 TOTAL ORGANIC VAPOR ANALYZER

The detector must be kept clean for accurate operation. Foreign materials can be rinsed or wiped off or blown out of the detector. The cord between the analyzer and the recorder should not be wound tightly, and will be visually inspected for integrity before going into the field. A new cord will be ordered from the manufacturer if problems are found. A battery check indicator is included on the equipment and will be checked prior to going into the field and prior to use. The batteries will be charged if found to be weak. The analyzer, probe, and meter are packed securely and handled so as to minimize the chance of damaging parts.

#### 5.6 EXPLOSIMETER

This instrument is cleaned after each field use and is calibrated before each field use. At the time of calibration, all components of the explosimeter are checked for proper working order and are replaced as necessary. Batteries are checked before going into the field and before use and are replaced as necessary. The explosimeter is packed and handled to prevent damage.

[60] M-68

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#### 5.7 CONDUCTIVITY METER

The conductivity meter and detector are transported in a protective foam-lined case. The cell is tested before going into the field using the test feature and is repaired by the manufacturer as necessary. The contact between the detector and the recorder must be kept clean and can be wiped, rinsed, or blown out. The detector is cleaned with distilled water rinses after each use.

## 5.8 pH METER

The electrode probe should be kept clean and stored in a protective plastic boot. The probe and meter are packed in a foam-padded case for transport. Prior to use, the batteries are checked by sliding the "BATT CHK" switch to the right and noting whether the dial moves to the green "BATT CHK" area. Extra 9-volt batteries will be on hand in the event the batteries do not check.

#### 5.9 THERMOCOUPLE

The thermocouple is checked annually for accuracy. If erroneous readings are shown during calibration, or suspected while in the field, the thermocouple will be either repaired or replaced. No other preventive maintenance is required except for care during handling.

# 5.10 BAILERS

The bailers will be visually inspected to ensure that connections are not stripped and that there are no holes or dents. The operation of the check valve will be tested before going into the field and cleaned, repaired, or replaced as necessary.

#### 6.0 FIELD ANALYTICAL PROCEDURES AND DATA REPORTING

#### 6.1 CHEMICAL DATA

Sections 10.3 and 10.4 describe field chemical analysis and sampling for off-site analysis, respectively. Field chemical data, including pH, temperature, conductivity, HNU, and LEL readings, will be tabulated for presentation in the investigation report. Results of chemical analysis by Dames & Moore's subcontractor, UBTL, will be presented as received from the subcontractor. A typical report will include the method used for analysis of each parameter, units, and detection limits. Water and soil quality control reports will accompany the analytical results and will include data on percent recovery on spiked samples (10 percent), duplicate sample analysis (10 percent), and trip and field blank analysis.

### 6.2 HYDRAULIC DATA

Hydraulic data regarding the glacial aquifer and bedrock aquifer will be obtained from the field program investigation and supplemented with information obtained from the literature review.

#### 6.3 SOIL BORING DATA

Soil boring data will be collected in the field by an experienced Dames & Moore geologist or soils specialist, as described in Section 8.2. During boring operations, lithologic descriptions and stratigraphic logs will be developed. Special emphasis will be placed on field identification of contaminated soils that are encountered. The edited Dames & Moore logs (Figure 8-1) will be included in the appendix of the report, and the significance of soil conditions relative to contaminant migration will be discussed on a site-by-site basis. If a correlation exists between borings, scaled cross sections may be drafted to illustrate these correlations.

# 6.4 SURVEYING DATA

Surveying data will be presented in the appendix of the report as received from the Dames & Moore surveying subcontractor. The data will include elevations and locations of all wells installed during the field effort using benchmarks traceable to USCGS or USGS survey markers, if available. Elevations of significant bodies of standing water and elevations and locations of preexisting wells will also be included. The survey data, in conjunction with water level measurements (Section 10.1), will be used to construct contour maps of the ground water surface. Individual figures will be drafted for each site showing the locations of monitoring wells, borings, sampling points, known dumping locations, and inferred direction of ground water flow.

[62]

# 6.5 FIELD LOG

A daily field log will be maintained documenting weather conditions during field work and sampling.

**[63]** M-71

#### 7.0 SAMPLE NUMBERING SYSTEM

#### 7.1 PROJECT IDENTIFICATION

The project shall be identified on sample labels as Duluth IAP with assigned Dames & Moore job number for the project.

#### 7.2 SITE IDENTIFICATION

The sites shall be identified according to the following list, which is consistent with the Phase I identification except that the two fire training areas, FT-1 and FT-2, have been consolidated into one site.

- 1. D-1, Goose Site Dump
- 2. FT-1 and FT-2, Fire Training Areas
- 3. S-2, DPDO Storage Area "C"
- 4. SP-1, Tank Farm Area
- 5. D-4, South Goose Site Dump
- 6. D-2, Goose Site Dump
- 7. D-6, Runway 13 NE Disposal
- 8. S-1, Old DPDO Storage Area
- 9. D-9, Disposal Pit
- 10. RD-1, Low-Level Radioactive Waste Disposal

#### 7.3 SEQUENCE NUMBER

Each sample shall be numbered sequentially as it is logged in the field in the master sample log.

#### 7.4 SAMPLE DEPTH

Identification of soil samples shall include the depth interval (in feet from the ground surface) from which the sample was taken.

#### 7.5 SAMPLE TYPE

The following abbreviations will be used to indicate sample type:

SW = Surface water W = Ground water SS = Surface sediment B = Soil from boring BW = Soil from well

> [64] M-72

# 7.6 EXAMPLES

Sample labels will contain the following information:

D&M Job Number Location: Duluth IAP Date Time Sampler's Initials Sample Type Sample Number

The sample number consists of four to five fields. Field 1 indicates the sample type, as given in Section 7.5. Field 2 indicates the site, as numbered in Section 7.2. Field 3 will be lettered consecutively starting with A for each set of samples of a given type at a given site. Field 4 gives the depth from which the sample was obtained. This field applies only to soil from borings and wells (sample types B and BW). Field 5 (Field 4 for sample types SW, W, and SS) is the sequence number (see Section 7.3).

# Example 1: B 9-A, 0-1.5', 53

Field 1:	В	The sample type is a soil from a boring
Field 2:	9	The sample is from Site 9, D-9 Disposal Pit
Field 3:	Α	This sample is from the first soil boring drilled at Site 9
Field 4:	0-1.5'	The sample was obtained from a depth of 0 to 1.5 feet
Field 5:	53	This was the 53rd sample to be logged in the master sample log

## Example 2: W 3-C, 63

Field 1:	W	The sample type is a ground water sample
Field 2:	3	The sample is from Site 3, S-2 DPDO Storage Area "C"
Field 3:	С	The sample was obtained from the third well drilled at Site 3
Field 4:	63	This was the 63rd sample to be logged in the master sample log

#### 7.7 BLANKS, KNOWNS, SPIKES, SPLITS, AND DUPLICATES

Water sample field blanks, trip blanks, and duplicates will aggregate to an additional 15 percent of the sampling effort. Trip blanks will be prepared by UBTL, the laboratory subcontractor, using field sample collection containers and double distilled/deionized water. The trip blanks will accompany the sample bottles through the entire sampling history. This type of blank permits a determination of the laboratory's cleaning procedures of sample containers; these bottles will remain

> [65] M-73

sealed until opened for analysis. Field blanks will be prepared in the field with distilled water rinsed through the decontaminated bailer. This type of blank serves as a check on the field cleaning procedures.

Trip blanks and field blanks will be identified using the same numbering system as for standard samples to ensure that no preferential treatment is given to quality control samples. In general, quality control samples will be labeled as such only in the Dames & Moore master sample log, and will be identified by their sequence numbers.

Field duplicate water sampling will also be conducted for quality control purposes. Duplicate samples will be collected by sequentially filling two sample bottles with water from a single sample collection. All duplicate water samples will receive identical treatment, and will be identified using the same numbering system established for standard samples.

Laboratory spiked samples will be prepared and analyzed by UBTL for all chemical analyses performed. Laboratory duplicate analyses will also be performed. The laboratory spiked samples and laboratory duplicate samples will each comprise an additional 10 percent of individual sampling parameters. Results of laboratory spiked samples will be identified by UBTL and labeled with the standard sample numbering sequence, plus an additional identifier denoting that results reported are laboratory spike and duplicate analyses.

# 8.0 DRILLING AND INSTALLATION OF GROUND WATER MONITOR WELLS

# 8.1 DRILLING

The choice of drilling methods is influenced by two main factors: (1) the need to minimize the introduction of foreign material that may influence the results of chemical analyses; and (2) the need to penetrate diverse geologic materials.

All borings will be initiated using hollow-stem augers and will be extended by this method to auger refusal or to the required total depth. Data from a previous investigation at the site indicate that till containing abundant boulders may be present. If boulders are encountered, the hole may be moved a few feet and redrilled, or the boulder may be penetrated using diamond core drilling, at the discretion of the field technician. If boulders are encountered at a depth of less than 20 feet, the hole would typically be grouted to the surface and another attempt would be made a few feet away.

# 8.2 SOIL SAMPLING

Subsurface soil samples will be obtained at 5-foot intervals in borings that will be drilled for the installation of monitor wells. Subsurface soil samples will be obtained at 2½-foot intervals in soil borings. Samples will be obtained using a standard split spoon driven 18 inches using a standard 140-pound hammer.

Each soil sample will be logged in the field by a Dames & Moore geologist or soils specialist. The standard Dames & Moore field drilling log is shown in Figure 8-1. Information recorded on this form includes sample descriptions using the Unified Soil Classification System, boring location, drilling and sampling method, sampling interval, and hammer blows per 6-inch advance of the split spoon. All unusual characteristics, such as discoloration of soil, odor, or air monitoring results, will be noted in the field logs.

Split spoon decontamination and sample shipping are discussed in Sections 11.1 and 12.0, respectively.

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M-76

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# 8.3 MONITOR WELL CONSTRUCTION AND COMPLETION

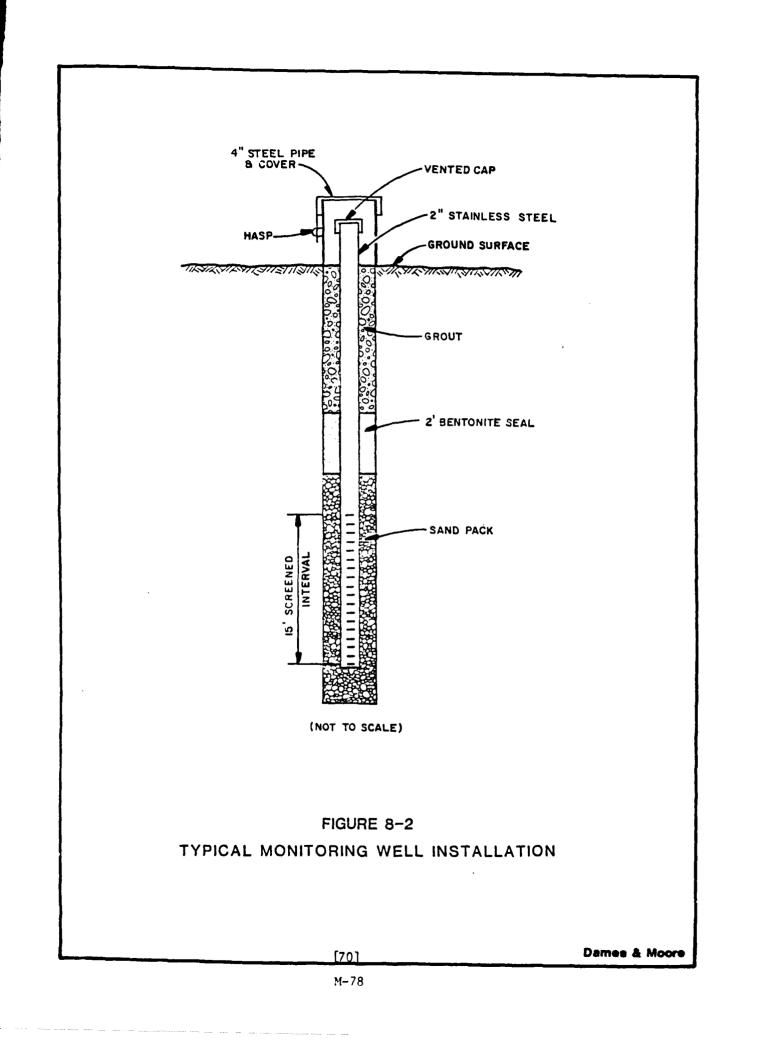
Monitor wells shall be constructed according to Minnesota Department of Health (MDH) and Minnesota Pollution Control Agency (MPCA) guidelines. Two-inch I.D. stainless steel will be used for casing and screen material. A screen slot size of 0.010 inch is considered most appropriate for this site because it is expected that a wide range of grain sizes will be encountered, and this screen size will prevent excessive silting while allowing proper well development. A sand pack will be placed around the well screen using tremie pipes, taking care to ensure that the pack is placed uniformly around the well. In most cases, the sand pack will extend from the bottom of the borehole to approximately 2 feet above the screened section. However, if a confining layer is encountered below the section to be screened, the hole through the confining layer will be grouted to prevent migration of contamination. A bentonite seal with a minimum thickness of 2 feet will be placed above the sand pack. The bentonite, either granulated, pelletized, or slurried, will be tremied in place to ensure a complete seal.

It is anticipated that an average screen length of 15 feet will be used. Actual screen length and depth of setting will depend upon conditions found in the field and will be determined with reference to the following considerations. The screened section should extend 10 feet into the aquifer of interest and 5 feet above the water table to allow for fluctuations in water table elevation. This may not be possible in locations where the depth to the water table is less than 3 to 5 feet because of the requirements for grouting the annulus to prevent seepage of surface water into the well. A neat cement grout containing less than 2 percent bentonite will be placed in the annulus around the well casing from a depth of 1 to 2 feet above the well screen to the surface.

A protective steel collar with locking cap shall be cemented in place over the stainless steel casing to prevent damage to the well. The wells will be seated in a 16- by 16- by 4-inch concrete surface pad. If the well is located in an area frequented by vehicular traffic, three steel posts will be placed around the well. Each well will be permanently labeled with its assigned number. Typical well construction is illustrated in Figure 8-2.

# 8.4 WELL DEVELOPMENT

All wells will be developed after completion to insure that relatively sedimentfree water samples can be obtained. The method of development will depend upon the equipment available, but methods involving a foreign source of water will not be used. Air-lift pumping or mechanical surging with a bailer may be used.



# 8.5 GEOPHYSICAL LOGGING

Geophysical logging of borings will not be performed at Duluth IAP because the heterogeneous nature of the geologic material present at the site will make the logs difficult to interpret and because the close spacing of split spoon samples will provide adequate information.

[71] M-79

# 9.0 PUMP TEST

Pump tests, per se, will not be conducted during this investigation.

# 10.0 GROUND WATER MONITORING AND SAMPLING

#### 10.1 GROUND WATER LEVEL MEASUREMENT

The depth to ground water will be measured in each well from the top of the stainless steel casing. This measurement will be made to the closest 0.01 foot using a ploper device or an electronic water level indicator. The distance from the top of the stainless steel casing to the ground surface will be recorded to the nearest 0.1 foot.

Water levels will be measured once each day on 3 consecutive days of the field effort in each well. These triplicate measurements will be useful for confirming that the wells have stabilized, or for recognizing the magnitude of short-term ground water fluctuations.

## 10.2 SURVEYING OF WELLS

In order to establish ground water flow patterns, a survey will be made of all newly installed monitor wells and of key surface water elevations. The elevations of the top of the stainless steel casing will be measured to an accuracy of 0.01 foot, and horizontal locations will be accurate to 1 foot. The survey will be tied to a reference datum point (base benchmark) and will be traceable to a USCGS/USGS survey marker.

### 10.3 ON-SITE ANALYSIS

Before water samples are collected for shipment to the laboratory, and after the wells have stabilized, a separate water sample from each well and surface water sampling location will be analyzed in the field for pH, conductivity, temperature, and color. Meters will be calibrated and maintained as described in Sections 4.0 and 5.0. The pH meter will be calibrated before each set of measurements using standard buffer solutions. Calibration of the thermometer and the conductivity meter will be checked in the laboratory before commencement of the field effort. All instrument probes will be rinsed with distilled water between measurements. The sample will be placed in a clean container against a white background when determining color. Since temperature can affect conductivity and pH readings, all measurements will be taken consecutively on the same sample. Precautions will be taken to obtain a representative sample as described in Section 10.4.

Soil samples will be monitored in the field for organic vapors using an HNU photoionization meter or an organic vapor analyzer (OVA). The readings will be taken immediately after opening the split spoon and will be recorded directly on the boring logs. The boreholes will be monitored with both the HNU and the explosimeter during drilling.

[73] M-81

#### 10.4 SAMPLING FOR OFF-SITE ANALYSIS

Ground water samples will be obtained from monitor wells after proper well development (Section 8.4) using a Teflon bailer. Prior to sample collection, a stabilization test will be performed on each well to ensure that standing water in the well casing has been removed and that the sample will be representative of the aquifer. To perform the test, the well will be air-lift pumped or bailed while monitoring the pH, temperature, and specific conductance of the discharge. When three successive readings (taken at intervals of one well volume) give equivalent values, the well is considered to have stabilized. Values are considered stabilized by the MPCA if they fall within the following ranges:

Specific conductance (temperature corrected): ± 10 µmhos/cm pH: ± 0.1 pH unit Temperature: ± 0.5°C

A form to be filled out during the stabilization test is given in Figure 10-1. The sample will be transferred directly from the bailer to the sample container supplied by the laboratory. Turbulence will be minimized during the transfer operation to prevent the loss of volatile organics. Containers will be filled to capacity to minimize the loss of volatile constituents to the head space.

Surface water samples will be obtained by grab sampling. Since the shipping containers provided by the laboratory will contain preservatives, a separate sampling container will be used to collect the sample and prevent the loss of the preservative. The sampling device will be decontaminated between samples, as described in Section 11.4, and will be rinsed with the water to be sampled immediately before sampling.

Subsurface soil samples will be obtained using standard split spoon methods, as described in Section 8.2. After the sample has been logged, a stainless steel spoon will be used to transfer the sample to a glass sample jar with a Teflon-lined cap. As much of the sample as possible will be placed in the jar, but if the jar does not have the capacity, the greatest concentration of contamination, as indicated by visual examination or HNU readings, will be selectively collected.

Surface soil samples will be collected in a similar manner, using a stainless steel sampling spoon or spade.

Sediment samples from the ponds near the Goose site dumps will be collected using a drop corer device or an Ekman dredge. The sampler will be operated from a boat or through holes cored in the ice, depending on site conditions at the time of the field effort.

> [74] M-82

# FIGURE 10-1

# STABILIZATION TEST

				WELL	VOLUM	E EXT	RACTE	D		
PARAMETER	1	2	3	4	5	6	7	8	9	10
Specific conductance (temperature corrected) <u>+</u> 10 µmhos/cm								-		
pH: <u>+</u> 0.1 pH unit										
Temperature: <u>+</u> 0.5°C										
Color										
Odor of Discharge										

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#### 11.0 DECONTAMINATION PROCEDURES

# 11.1 DRILLING, SOIL SAMPLING, AND MONITOR WELL INSTALLATION

Precautions will be taken not to introduce contaminants into the well during drilling and well installation. The rear end of the drill rig, augers, and rods will be steam cleaned between holes except in the case where the hole is moved only a short distance because of refusal on boulders.

Split spoon samplers will be decontaminated after each sample according to the following procedure:

- 1. Wash with laboratory-grade detergent; and
- 2. Rinse three times with distilled water, the final rinse with reagent-grade water.

Where field conditions warrant more extensive decontamination procedures, the following will be employed:

- 1. Wash with detergent, rinse with distilled water;
- 2. Wash with hexane, rinse with distilled water; and
- 3. Wash with dilute nitric acid, rinse three times with distilled water, the final rinse with reagent-grade water.

#### 11.2 WELL DEVELOPMENT

Wells will be developed by bailing or by air-lift or hand pumping, as described in Section 8.4. Any part of the air-lift equipment, hand pump, or Teflon bailer that is placed down the hole will be decontaminated after developing each well using the following procedure:

- 1. Wash with laboratory-grade detergent, rinse with distilled water; and
- 2. Rinse three times with distilled water, the final rinse with reagent-grade water.

Where field conditions warrant, the more extensive decontamination procedure outlined above will be followed.

# 11.3 WATER LEVEL MEASUREMENT

The probe used for water level measurements will be decontaminated between wells by rinsing with distilled water. Full decontamination procedures, described in Section 11.1, will be used if the probe or line becomes exposed to observed high concentrations of contaminants.

[76]

#### 11.4 WATER SAMPLING

Water samples will be obtained by bailing using a Teflon bailer on a dedicated monofilament line, as described in Section 10.4. The bailer will be decontaminated between wells as described above.

# 11.5 SEDIMENT SAMPLING

Sediment sampling devices, including stainless steel spoons, shovels, and drop samplers, shall be decontaminated after collection of each sample using the same procedures as for split spoon samplers, described in Section 11.1.

#### 11.6 PERSONNEL DECONTAMINATION

A personnel decontamination station shall be established at a location approved by base personnel. Persons working on the site shall report to the station for decontamination before leaving the base. In most instances, removal of protective clothing will suffice for decontamination. The station will have facilities for storage of reusable protective clothing and for the disposal of clothing contaminated beyond reuse. Also, facilities for decontaminating hands, boots, and gloves, consisting of detergent wash and tap water rinse, shall be provided. Facilities for sanitizing respirators using manufacturers' instructions shall be provided.

## 11.7 SAMPLE HANDLING

Samples will be handled by personnel wearing nitrile gloves to avoid contamination. The sample containers will be well cushioned with packing materials when they are placed in the insulated cooling chests for transportation to the laboratories. Care will be taken to seal bottle/vial caps tightly. Extra insurance against opening in transit will be provided by sealing the caps with filament tape for medium concentration samples.

### 12.0 SAMPLE HANDLING AND PACKAGING

# 12.1 SPLIT SAMPLE PROCEDURES

In order for split sample analysis to be valid, the split sample must be as homogeneous as possible. Split spoon samples should be split vertically so that vertical stratification of contaminants will be equally distributed between the samples.

Split ground water samples will be collected at the same time using the same bailer. MPCA personnel may participate in split sample acquisition. Half the bailer volume will be poured into each jar until the jars are full. Sample containers, preservatives, and handling will be identical for each member of the split sample.

# 12.2 SAMPLE CONTAINERS

Sample containers will be provided by UBTL. The containers will be either plastic or glass with Teflon-lined lids and will be pretreated with the preservatives listed in Table 12-1 (taken from Sabel and Clark, 1985).

# 12.3 SAMPLE HANDLING AND DECONTAMINATION

After collection in the field, all samples will be brought to an area adjacent to the personnel decontamination area for decontamination of sample containers. The sample containers will be handled with gloves until decontaminated with a detergent wash and tap water rinse if spills have occurred on the outside of the container. Care must be taken to avoid damaging the label during decontamination. The samples will be stored on ice and will be shipped to the laboratory at the end of each day's sampling via overnight delivery.

#### 12.4 PROCEDURES FOR PACKING LOW CONCENTRATION SAMPLES

Packing procedures will follow recommendations given in the USEPA manual, "Field Monitoring and Sampling of Hazardous Materials," Section 2, Part 5 (January 1983), as described for environmental samples, which are those samples obtained from upgradient and downgradient of the site (not at the actual site) and do not have any indications of gross contamination. These samples will be packaged as follows:

o Place the labeled and sealed sample container in a polyethylene bag and seal the bag;

# TABLE 12-1

Parameter	Container ^a	Preservative ^{b,C}	Maximum Holding Time ^d
Metals ^e			
(except Cr ⁺⁶ and Hg)	P, G	$HNO_3$ to pH < 2	6 months
Mercury	P, G	HNO ₃ to pH < 2	28 days
Petroleum Hydrocarbons	G	Cool, 4°C; H ₂ SO4 to pH < 2	28 days
Organic Tests ^f			
Purgeable halocarbons	G, Teflon- lined septum	Cool, 4°C; 0.008%	l4 days
Purgeable aromatics	G, Teflon- lined septum	Cool, 4°C; 0.008% Na ₂ S ₂ O ₃ 8; HCl to pH < 2 ^h	14 days
Acrolein and acrylonitrile	G, Teflon- lined septum	Cool, 4°C; 0.008% Na2S2O38; adjust pH to 4-5 ⁱ	14 days
Phenols	G, Teflon- lined septum	Cool, 4°C; 0.008% Na ₂ S ₂ O ₃ g	7 days until extraction, 40 days after extraction
Benzidines	G, Teflon- lined septum	Cool, 4°C; 0.008% Na2S2O38	7 days until extraction, 40 days after extraction
Phthalate esters	G, Teflon- lined cap	Cool, 4°C	7 days until extraction, 40 days after extraction
Nitrosaminesj	G, Teflon- lined cap	Cool, 4°C; store in dark; 0.008% Na ₂ S ₂ O ₃ g	7 days until extraction, 40 days after extraction

# SAMPLE HANDLING PROCEDURES

[79] M-87

# TABLE 12-1 (continued)

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Parameter	Containera	Preservative ^{b,C}	Maximum Holding Time ^d
PCBs	G, Teflon- lined cap	Cool, 4°C; pH 5-9	7 days until extraction, 40 days after extraction
Nitroaromatics and isophorone	G, Teflon- lined cap	Cool, 4°C	7 days until extraction, 40 days after extraction
Polynuclear aromatic hydrocarbons	G, Teflon- lined cap	Cool, 4°C; 0.008% Na2S2O3B; store in dark	7 days until extraction, 40 days after extraction
Haloethers	G, Teflon- lined cap	Cool, 4°C; 0.008% Na ₂ S ₂ O ₃ g	7 days until extraction, 40 days after extraction
Chlorinated hydro- carbons	G, Teflon- lined cap	Cool, 4°C	7 days until extraction, 40 days after extraction
TCDD	G, Teflon- lined cap	Cool, 4°C; 0.008% Na ₂ S ₂ O ₃ g	7 days until extraction, 40 days after extraction
Pesticides Test			
Pesticides	G, Teflon- lined septum	Cool, 4°C; pH 5_9 ^k	7 days until extraction, 40 days after extraction
Radiological Tests			
Alpha, beta and radium	P, G	$HNO_3$ to $pH < 2$	6 months

[80]

^aPolyethylene (P) or glass (G).

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^bSample preservation should be performed immediately upon sample collection. For composite samples, each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.

^CWhen any sample is to be shipped by common carrier or sent through the United States Mails, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for transportation is responsible for ensuring such compliance. For the preservation requirements of this section, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: hydrochloric acid (HCl) in water solutions at concentrations of 0.04% or less by weight (pH about 1.96 or greater); nitric acid (HNO₃) in water solutions at concentrations of 0.15% or less by weight (pH about 1.62 or greater); sulfuric acid (H₂SO₄) in water solutions at concentrations of 0.35% or less by weight (pH about 1.15 or greater); and sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% or less by weight (pH about 12.30 or less).

dSamples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that the specific types of samples under study are stable for the longer time. Some samples may not be stable for the maximum time period given in the table. A permittee, or monitoring laboratory, is obligated to hold the sample for a shorter time if knowledge exists to show this is necessary to maintain sample stability.

eSamples should be filtered immediately on site before adding preservatives for dissolved metals.

^fGuidance applies to samples to be analyzed by GC, LC, or GC/MS for specific compounds.

8Should only be used in the presence of residual chlorine.

^hSample receiving no pH adjustment must be analyzed within 7 days of sampling. ⁱSamples for acrolein receiving no pH adjustment must be analyzed within 3 days of sampling.

JFor the analysis of diphenylnitrosamine, add 0.008% Na₂S₂O₃ and adjust pH to 7-10 with NaOH within 24 hours of sampling.

^kThe pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are extracted within 72 hours of collection. For the analysis of aldrin, add 0.008% Na₂S₂O₃.

Reference: Sabel and Clark, 1985.

[81]

- o Place the sample in a metal or plastic picnic cooler containing a waterproof container of ice or an ice substitute and dividers to keep sample jars separated to minimize the possibility of breakage; and
- o Seal the cooler with the latch and with packaging tape.

# 12.5 PROCEDURES FOR PACKING MEDIUM CONCENTRATION SAMPLES

Medium concentration samples will be packed in the same manner as described in Section 12.4 for low concentration samples. However, an effort will be made to identify, by visual examination in the field, any samples suspected of having elevated contaminant concentrations. These samples will be segregated and packed in a separate container, to the extent allowed by prevailing field conditions. Containers for these samples will be sealed with tape in addition to the normal processing used on all samples collected.

# 13.0 SAMPLE CUSTODY AND DOCUMENTATION

#### **13.1 SAMPLE IDENTIFICATION DOCUMENTS**

Each sample shall be identified using the sample numbering system described in Section 7.0. A label on each sample container will contain the following information:

- Dames & Moore Job Number ٥
- Location of Collection ٥
- Time of Collection 0
- Date of Collection 0
- Sample Type 0
- Sampler's Initials 0
- 0 Purpose of Sample
- Preservatives Used 0

At the end of each day's sampling effort, and before the samples are shipped to the analytical laboratory, this information will be recorded in the master sample log. Each sample will be assigned a unique sequence number, to be recorded both in the log and on the label, that will be used to identify the samples and to correlate with laboratory sample numbers assigned by UBTL.

# 13.2 CHAIN-OF CUSTODY RECORDS

A sample chain-of-custody form to be used during this investigation is illustrated in Figure 13-1. Chain-of-custody procedures will be followed so that the possession of a sample can be traced from the time of collection until the data are used in legal proceedings. One or more chain-of-custody forms will accompany each set of samples shipped from the site. Each time the custody of the samples is transferred, the form is signed by both the person relinquishing and the person receiving the samples. A copy of the form will be retained by the sampler, who will fill in the information on sample identity and who will also be the first person to relinquish the sample. If the sample containers appear to have been opened or tampered with, this should be noted by the person receiving the samples under the section entitled "Remarks."

DAMES & MOORE CHAIN-OF-CUSTODY RECORD

ampl	Sample Source &	& Client							Fiel	Field Personnel (Signature)	gnature	
ojec	Project Title						Job No.		<b></b>			
Date	Time	Sample I.D. No.	ые 10.	Sample Type	No. of Containers	f ers	Sampling Site	le	 	Remarks	S	
сн												
DA												
M	FIG											
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8 1												
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1 ngu S1gn	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time 1	Time Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
1 ngu S1gn	Relinquished by: (Signatur,e)	Date	Tine	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date 1	Time	Received by: (Signature)	Date	Time
1 ngu S18n	Relinquished by: (Signature)	Date	Time	kccelved by: (Signature)	Date	Time R	Relinquished by: (Signature)	by: Date 1	Time	Received by: (Signature)	Date	Time

[84]

#### 13.3 FIELD LOG BOOKS

Each Dames & Moore professional shall maintain a personal field log book while on the site. Information recorded in the log book shall be written in an objective, factual manner so that persons reading the entries will be able to determine the sequence of events as they occurred in the field. If notes are made in the log book by someone other than the owner of the book, this should be indicated by the writer's signature and date. Information to be recorded in the field log book will include:

- o Date and time of entry;
- o Sample number;
- o Sample description;
- o Method of sampling;
- o Location of sampling;
- o Sketch of sample location;
- o Field measurements such as pH, conductivity, HNU, and temperature;
- o Names and phone numbers of field contacts, drillers, and persons on site;
- o Materials used in well construction;
- o Driller's standby and drilling time; and
- o Weather and field conditions during drilling and sampling.

In addition to the above information, the following forms will be used to record detailed data:

- o Dames & Moore Boring Log (Figure 8-1) used in the field to record detailed sample descriptions and drilling methods;
- o Field Memorandum (Figure 13-2) used to outline daily activities for information of project manager and file records; and
- o Monitor Well Detail Information Sheet (Figure 13-3) used to record details of well installation.

Other forms are described in appropriate sections of this plan.

## 13.4 CORRECTIONS TO DOCUMENTATION

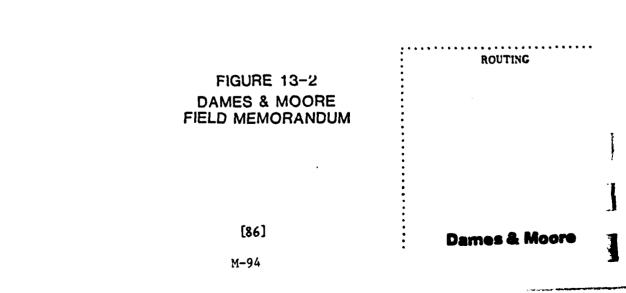
Any errors or mistakes in original field data shall be crossed out with a single line, and the person making the correction shall initial it. No data shall be erased.

**[85]** M-93

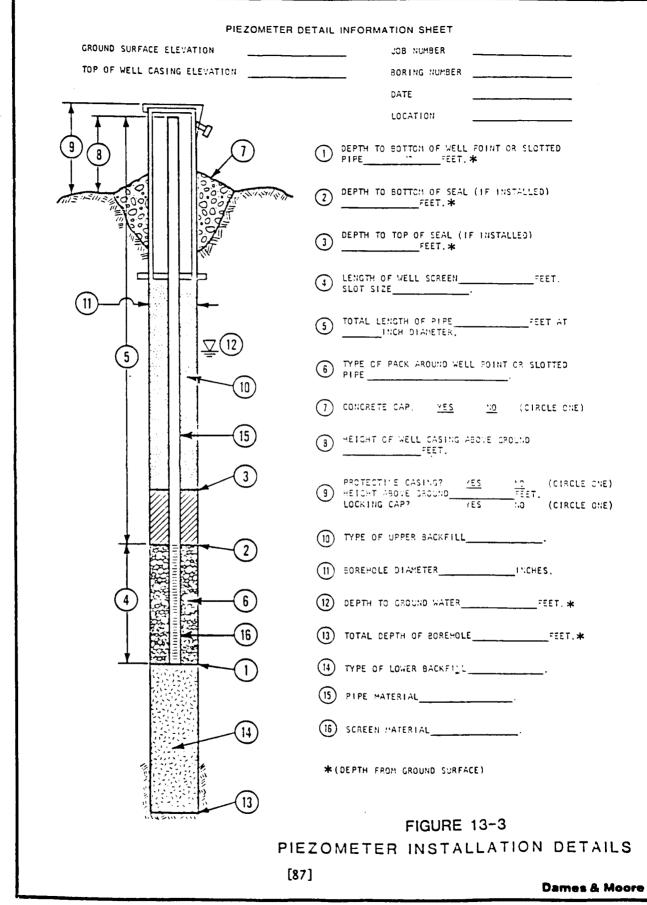
INFO	
1	File:
	X-Ref:
	Date:
	Reply Required By:

Subject:

Reference(s):



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In some circumstances, original documents may be transcribed, making appropriate changes and eliminating errors. In these cases, the successive documents shall be dated and numbered as sequential drafts.

# 13.5 TRAFFIC REPORTS

Knowledge of sample status will be maintained through review and evaluation of Dames & Moore field engineer reports, discussions with field personnel, and through contact with UBTL on a periodic basis. In this way, a working knowledge of sample traffic will be available through the project.

# 13.6 SHIPPING OF SAMPLES

Samples will be shipped at the end of each day's sampling efforts via overnight delivery to UBTL and OEHL. Sample packing procedures are given in Section 12.4.

### 14.0 SITE CLEANUP

A certain amount of trash will be generated from site investigation activities, including protective clothing, gloves, and cement bags. This material, assuming it has not been contaminated, will be disposed of in the proper locations (dumpsters, rubbish disposal areas) on site. Each site will be policed after completion of activities to ensure that no trash remains.

Soil wastes will be generated from drilling activities, but because drilling will not be conducted directly in the areas of dumping, it is expected that the soil will have only very low concentrations of contaminants. The soil from each hole will be monitored with the HNU and explosimeter. Any soil showing an organic vapor reading of less than 50 ppm and an LEL reading of less than 25 percent and having no unusual colors or odors will be considered uncontaminated and will be disposed of by spreading on site. Samples exceeding these criteria will be sealed in new 55-gallon drums. The same criteria will be used to determine if protective clothing has been contaminated. Any such contaminated clothing will be drummed along with the soil. The drums will become the temporary property of the base.

The suspected contaminated waste will be tested for EP Toxicity and ignitability. Dames & Moore shall be responsible for transporting drums containing suspected contaminated soils. Dames & Moore shall be responsible for the ultimate disposal of contaminated soils in accordance with current federal, state, and/or local hazardous waste disposal laws. Dames & Moore shall provide a final, completed copy of the hazardous waste manifest document to the HQ TAC/SGPB point of contact referenced in paragraph V for those borehole cuttings obtained from TAC sites (Sites 1, 5, 6, 7, and 9) and to the ANGSC/SGB point of contact referenced in paragraph V for those borehole cuttings obtained from ANG sites (Sites 2, 3, 4, 8, and 10).

### 15.0 FIELD TEAM ORGANIZATION AND RESPONSIBILITIES

#### 15.1 ORGANIZATION

The Dames & Moore project organization for the Phase II, Stage 2 investigation at Duluth IAP will be as follows:

- o Project Director: Mr. Glenn D. Martin, Managing Principal-in-Charge
- o Principal Investigator: Mr. Michael W. Ander, Associate
- o Project Manager: Ms. Carol J. Scholl, Staff Geologist
- o Principal Staff Assistant: Ms. Beverly J. Harper, Environmental Scientist
- o Field Manager: Ms. Amy D. Lamborg, Assistant Geologist
- o Geophysicist: Mr. Thomas E. Jensen, Senior Geophysicist

A number of additional Dames & Moore staff level personnel will assist in field operations, data interpretation and report preparation as necessary.

#### 15.2 RESPONSIBILITIES

Responsibilities for the individuals identified in Section 15.1 will be as follows:

- Project Director -- Responsible for overall project direction and surveillance.
- o Principal Investigator -- The primary point of contact with OEHL and other Dames & Moore personnel, and the principal senior investigator responsible for project technical activities.
- Project Manager Assistant to Principal Investigator in project management and a secondary point of contact with OEHL. Responsible for technical oversight of all project chemistry activities during data collection and analysis.
- Principal Staff Assistant Assistant to Principal Investigator and Project Manager in project management, coordination, and operation.
- Field Manager -- Responsible for organization and direction of field investigations. Will mobilize "the field" team, to include Dames & Moore assistant professionals or technicians and drilling and surveying subcontractors. Will stake locations of all sampling points and boring locations in consultation with the OEHL manager and the Project Director,

review the site safety plan with site personnel, and monitor the initial drilling activities. In addition, will be responsible for proper recording and transmittal of field records, and shipment of samples to UBTL for analysis.

o Geophysicist — Will conduct all site geophysical surveys and be responsible for all geophysical data interpretation and analysis.

### 15.3 TRAINING

# 15.3.1 Dames & Moore Personnel

The Dames & Moore personnel of staff level and above to be utilized on this job all have professional degrees in relevant fields, and previous experience in similar types of investigations. All field personnel will be thoroughly briefed on the appropriate safety measures specific to work on this project, and will have received safety training in accordance with Dames & Moore's firmwide Health and Safety Program.

# 15.3.2 Subcontractors

All site subcontractors will be thoroughly briefed on the following key aspects of project work:

- o Project scope of work pertaining to the subcontractor's anticipated role;
- o Site Health and Safety Considerations; and
- o Timetable, cost, and other limitations pertinent to successful completion of the project within contractual scope.

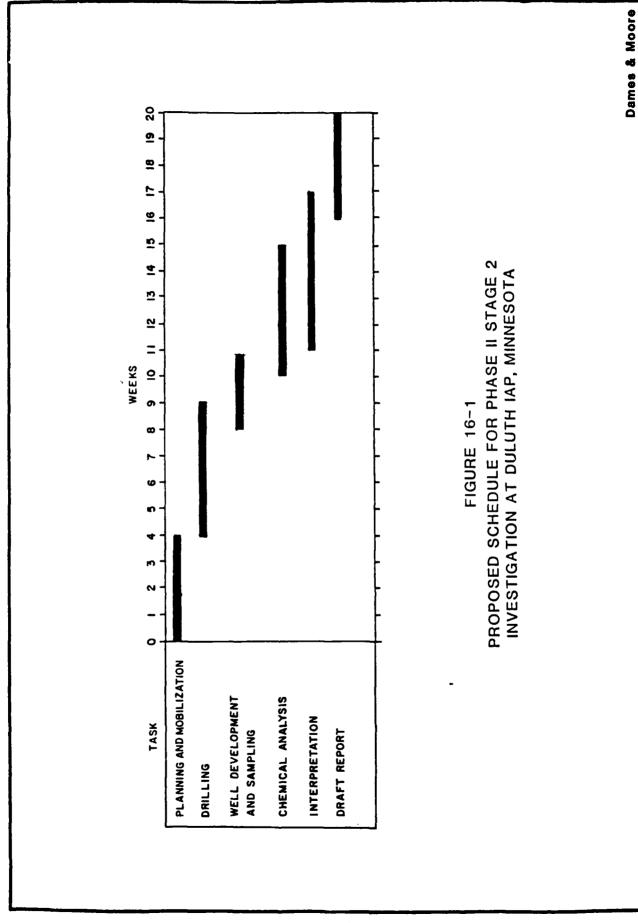
Subcontractors selected will be experienced in related types of investigation, and have a demonstrated technical ability to complete their designated tasks.

[91]

# 16.0 SCHEDULE

Dames & Moore would be in a position to commence field work on this project within 4 weeks of receipt of the Work Order for Phase II, Stage 2. Figure 16-1 presents the milestone chart of the proposed schedule. The schedule assumes that drilling will commence immediately upon completion of the geophysical investigation. The project duration from time of receipt of the Work Order to submittal of the draft report is estimated to be 18 weeks (i.e., submittal of the first draft to USAFOEHL the week of January 26, 1987). It is anticipated that subsequent drafts will be submitted 4 weeks after receipt of review comments.

> [92] M-100



[93] M-101

#### 17.0 REFERENCES

- Adolphson, D.G., Ruhl, J.F., and Wolf, R.J., 1981, Designation of principal water supply aquifers in Minnesota. Water Resources Investigation 81-51, U.S. Geological Survey and U.S. Environmental Protection Agency,
- Anderson, H.W., Jr., 1986, Hydrogeologic and water quality characteristics of crystalline rock aquifers of Archean and Proterozoic age, Minnesota.
   Water Resources Investigations Report 86-4033, U.S. Geological Survey, St. Paul, Minnesota.
- Bonnichson, W., 1971, Outcrop map of southern part of Duluth complex and associated Keweenawan rocks, St. Louis and Lake Counties, Minnesota. Miscellaneous Map Series, Map M-11, University of Minnesota, St. Paul.
- Carlson, M.O., MSgt., MANG, Duluth IAP, Minnesota, 1985, Personal communications (May 23 and June 25).
- Engineering-Science, 1982, Installation Restoration Program, Phase I Records Search, Duluth International Airport, Minnesota (USAF Contract No. F08637-80-G0009, Call No. 0012). Engineering-Science, Atlanta, Georgia (March).
- Gunard, K.T., Hess, J.H., Zirbel, J.L., and Cornelius, C.E., 1983, Water resources data, Minnesota, Volume 1: Great Lakes and Souris-Red-Rainy river basins. USGS Water Data Report No. MN-83-1, U.S. Geological Survey, Minnesota Department of Natural Resources, Division of Waters, Minnesota Department of Transportation, and other state, municipal, and federal agencies.
- _____, 1983, Water resources data, Minnesota, Volume 2: upper Mississippi and Missouri river Lasins. USGS Water Data Report MN-83-2, U.S. Geological Survey.
- Hill, S., K. I. Sawyer AFB, Michigan, 1985, Personal communication (May 23).
- Hobbs, H.C., and Goebel, J.E., 1982, Geologic map of Minnesota Quaternary geology. Minnesota Geologic Survey, State Map Series S-1, University of Minnesota, scale 1:500,000.
- Kanivetsky, R., undated, An appraisal of ground water resources for the new Natural Resources Research Institute in Duluth, Minnesota. University of Minnesota, Physical Planning Office.
- _____, 1978, Hydrogeologic map of Minnesota bedrock hydrogeology. Map S-2, University of Minnesota, St. Paul.

_____, 1979, Hydrogeologic map of Minnesota quaternary hydrogeology. Map S-3, University of Minnesota, St. Paul. Lindholm, G.F., Ericson, D.W., Brounard, W.L., and Hult, M.F., 1979, Water resources of the St. Louis River watershed, northeastern Minnesota. Hydrologic Investigations Atlas HA-586, U.S. Geological Survey and Minnesota Department of Natural Resources, Division of Waters.

Little, C., HQ TAC, Langley AFB, Virginia, 1985, Personal communication (May 21).

Manns, J.D., Maj., MANG, Duluth IAP, Minnesota, 1985, Personal communication (May 24).

Minnesota Department of Health, 1984, Water well construction code 4725.0100.

- Minnesota Pollution Control Agency, 1985, Letter to Capt. D. Bradford, USAF, Director, Environmental Planning Division, AFESC, signed by T. J. Kalitowski, Executive Director (January 30).
- Moghissi, A.A., et al., 1978, Radioactivity in consumer products. NUREG/CP-0001.
- Public Health Service, U.S. Department of Health, Education and Welfare, 1970, Radiological health handbook. HEW/PHS, Rockville, Maryland.
- Rogers, J.E., 1962, Reconnaissance of ground water conditions in the Duluth Municipal Airport area, Minnesota. U.S. Geological Survey, St. Paul, Minnesota.
- Roy F. Weston, Inc., 1984, Installation Restoration Program, Final Report, Phase II Stage 1, Problem Confirmation Study, Duluth International Airport, Duluth, Minnesota (USAF Contract No. F33615-80-D-4006, Task Order 0025). Roy F. Weston, Inc., West Chester, Pennsylvania (October).
- Schwartz, G.M., 1949, The geology of the Duluth metropolitan area. Bulletin 33, University of Minnesota and Minnesota Geological Survey.
- Siegel, D.I., and Ericson, D.W., undated, Hydrology and water quality of the copper-nickel study region, northeastern Minnesota. Water Resources Investigations 80-739, U.S. Geological Survey, Minnesota Environmental Quality Board, and Copper-Nickel Study Staff.
- Sims, P.K., and Morey, G.B., 1972, Geology of Minnesota: a centennial volume. Minnesota Geological Survey.
- Taylor, R.R., 1963, Geologic map of Duluth and vicinity, St. Louis County, Minnesota, bedrock geology. University of Minnesota Press, Minneapolis.
- ____, 1964, Bedrock geology of Duluth and vicinity, St. Louis County, Minnesota. Geologic Map Series GM-1, University of Minnesota and Minnesota Geological Survey, Minneapolis.
- ____, 1964, Geology of the Duluth gabbro complex near Duluth, Minnesota. Bulletin 44, University of Minnesota and Minnesota Geological Survey, Minneapolis.

[95]

- Thiel, G.A., 1947, The geology and underground waters of northeastern Minnesota. Bulletin 32, University of Minnesota and Minnesota Geological Survey, Minneapolis.
- Thornbury, W.D., 1965, Regional geomorphology of the United States. John Wiley & Sons, Inc., New York, p. 607.
- U.S. Department of the Interior, Geological Survey, 1975, Duluth Heights quadrangle, Minnesota, St. Louis County. AMS 7577 1 SW Series V872.
- U.S. Environmental Protection Agency, 1985, Letter to Capt. D. Bradford, USAF, Director, Environmental Planning Division, AFESC, signed by J. Plucinski, Remedial Project Manager, Region V (February 6).

# APPENDIX A

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7.

HEALTH AND SAFETY PLAN (SEE SECTION 3.2)



APPENDIX B

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# STATEMENT OF WORK

M-106

#### Installation Restoration Program Phase II - Stage 2 Duluth International Airport Minnesota

### 30 JUL 1965

DAMES & MOORE

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#### I. DESCRIPTION OF WORK

PARK RIDGE II

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

The Phase II Stage 2 effort at Duluth IAP will entail a follow-on investigation for five sites evaluated during Phase II, Stage 1, and an initial monitoring program at six additional sites. The sites which are included in this study are identified in Table 1 and can be located on an installation map, Figure 1. The sites to receive follow-on investigative work are Goose Dump 1, Fire Training Areas, DPDO Storage Area "C" and the Tank Farm Area.

The purpose of this effort at Duluth IAP is to: (1) confirm the presence or absence of contamination within the specifed areas of investigation; (2) if contamination exists, determine the magnitude of contamination, and the potential for and rate of migration of those contaminants in the various environmental media; (3) identify potential environmental and health risk consequences of migrating pollutants; and (4) recommend additional investigations necessary to further define the magnitude, extent, direction and rate of contaminant migration.

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

A. General

1. Monitor all borehole and well drilling with a photoionization meter or equivalent organic vapor detector to identify the potential generation of hazardous and/or toxic vapors or gases. Include air monitoring results in the boring logs. If soil encountered during drilling or test pit work is suspected to be hazardous because of discoloration, odor or air monitoring, containerize the soil cuttings in new, unused drums. Enter into the boring logs the depth(s) from which suspected contaminated soil cuttings were collected. Test each drum containing suspected contaminated soils by taking a composite sample. Collect a maximum of 15 composite samples and test them for EP Toxicity and Ignitibility. (Ref: 40 CFR Subpart C., 261.21 - Ignitibility and 261.24 - EP Toxicity).

2. Determine the exact field location of all boreholes and monitor wells during the planning/mobilization phase of the field investigation. Consult with base personnel to minimize disruption of base activities, to properly position boreholes with respect to exact locations of spill/leak sites, and to avoid underground utilities. The senior on-site contract representative, in consultation with the USAF OEHL project manager and the base point-of-contact (see Section V), establishes the final borehole and well locations. Direct all drilling and sampling operations and maintain a detailed log of the conditions and materials penetrated during the course of the work.

# TABLE 1

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# LISTING OF SITES

SITE NO.	PHASE I NO.	SITE DESCRIPTION
1	D-1 (TAC)	Goose Dump 1
2	FT-1 and FT-2 (ANG)	Fire Training Areas
3	S-2 (ANG)	DPDO Storage Area "C"
4	SP-1 (ANG)	Tank Para Area
5	D-4 (TAC)	South Goose Dump
6	D-2 (TAC)	Goose Dump 2
7	D-6 (TAC)	Runway 13 ME Disposal
8	S-1 (ANG)	Old DPDO Storage Area
9	D-9 (TAC)	Disposal Pit
10	RD-1 (ANG)	Low-Level Radioactive Waste Disposal
NOTE: ANG:	-	

OTE: ANG: AIR NATIONAL GUARD SITES TAC: Tactical Air Command sites

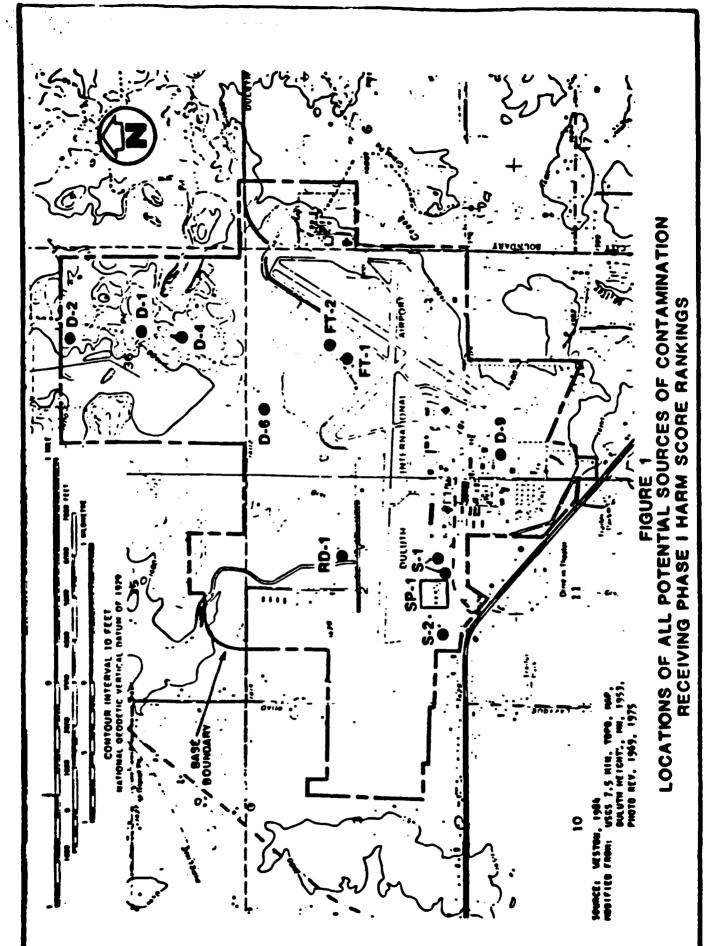
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2 M-108

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3. Provide on site analysis of pH, temperature, and specific conductance for all water samples collected. Comply with the following references concerning sample collection, maximum holding time, sample preservation, etc: Standard Methods for the Examination of Water and Wastewater, 16th Ed. (1985), pp. 37-44; ASTM, Section 11, Water and Environmental Technology; Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057; Methods for Chemical Analysis of Waters and Wastes, EPA Manual 600/4-79-020, pp. xiii to xix (1983); and Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 2nd Ed. (USEPA, 1984). Meet the required detection limits of the applicable EPA method identified in Table 4 for all water and soil chemical analyses.

4. Determine the areal extent of the sites by reviewing available aerial photos of the base, both historical and the most recent panchromatic and infrared. Report the sources of this data.

5. Split all water and soil samples. One set of samples shall be analyzed by the contractor and the other set of samples shall be delivered immediately (the same collection day) to the field government Point Of Contact (POC). The field POC will select 10% of the split samples for subsequent shipment and analysis and deliver them to the contractor within 24 hours of receipt. The contractor shall supply all packing and shipping materials for the field POC's use in packaging the split samples. The contractor shall accept from the field POC the packaged samples for immediate shipment (within 24 hours) for analysis through overnight delivery to:

> USAFOEHL/SA Bldg 140 Brooks AFB TX 78235-5501

Include the following information with samples sent to the USAF OEHL:

- a. Purpose of sample (analyte)
- b. Installation name (Base)
- c. Sample number (on container)
- d. Source/location of sample
- e. Contract Tas.: Numbers and Title of Project
- f. Method of collection (bailer, suction pump, air-lift pump, etc)
- g. Volumes removed before sample taken
- h. Special Conditions (use of surrogate standard, etc.)
- i. Preservatives used (indicate if nonstandard)
- j. Date and time of sampling
- k. Sampler's name

Forward this information with each sample by properly completing an AF

- 4 -

Form 2752A "Environmental Sampling Data" and/or AF Form 2752B "Environmental Sampling Data-Trace Organics," mailed under separate cover. Label each sample container to reflect the data in (a), (b), (c), (i), (j), and (k) above. In addition, attach copies of field logs which document sample collection.

Complete and maintain chain-of-custody records for all samples, field blanks, and quality control duplicates.

6. Install groundwater monitor wells using the following specifications:

a. Comply with the U.S. EPA Publication 330/9-S1-002, NEIC Manual for Ground Water /Subsurface Investigations at Hazardous Waste Sites for monitor well installation. Also comply with state and local regulatory agency requirements concerning well drilling, development and purging, and groundwater sampling methods.

b. Drill each well using conventional hollow-stem auger techniques. Where refusal is encountered due to boulders before the required well completion depth is achieved, use diamond core drilling to complete the borehole. Take samples for stratigraphic description and logging at five-foot intervals using standard split spoon techniques. Include each pilot boring log and well completion summary in the Final Report (as specified in Item VI below).

c. Collect soil samples for laboratory analysis from well boreholes as directed in section B. Where the depths and/or boreholes from which soil samples should be collected at a site are not specified in Section B, actual sample locations (borehole and depth) are at the field supervisor's discretion; however, samples should be limited to areas of suspected contamination. At sites where soil samples are specified in Section B to be collected from designated boreholes and at certain depths, variations may occur at the field supervisors discretion to ensure zones of suspected contamination are sampled. Do not collect or analyze more soil samples than authorized in Section B.

d. Install wells at a sufficient depth to collect samples representative of aquifer quality and to intercept floating contaminants. Develop each well as soon as practical after completion by surging with an air-lift pump or bailer. Do not introduce foreign materials into the well during development. Continue well development until the discharge water is clear and free of sediment to the fullest extent possible, and the pH, temperature and specific conductance have stablized.

e. Construct a maximum of 30 wells using two-inch inside diameter, stainless steel casing. Use threaded screw-type joints only. Flush thread all connections. Screen 15 feet in each well using two-inch diameter stainless steel casing with up to 0.010 inch slots. Well screening should extend ten feet into the aquifer and five feet above the water table to collect floating contaminants and allow for yearly fluctuations in the water table; however, this may not alway be possible due to site-specific groundwater conditions. Do not extend well screens to the ground surface, a minimum two foot bentonite or cement grout seal is required above all well screens, see paragraph 6.g. below. Cap the bottom of the screen. Well installation shall not exceed 1000 linear feet.

f. Should a confining layer below the saturated zone be encountered while attempting to drill deep enough to install 15 feet of screen, grout the hole in the confining layer to prevent potential contaminant migration and screen the well above the confining layer.

g. Once the casing is installed, remove the augers and allow the soil formation to collapse around the well screen. Supplement the natural gravel pack with washed and bagged rounded sand or gravel with a grain size distribution compatible with the screen and formation. Place the gravel pack from the bottom of the borehole to two feet above the top of the screen. Tremie a granulated, pelletized, or slurry bentonite seal above the gravel/sand pack. Install the bentonite to a minimum thickness of two feet, and ensure a complete seal forms. Place Type I Portland cement grout from the bentonite seal to the land surface.

h. Complete the wells by extending the well casing a minimum of two feet above land surface. The height of the casing riser must take into account standing surface water depths during the wet season to prevent surface waters from cascading down the well casing. Provide an end-plug or casing cap for each well. Shield the extended stainless steel with a steel guard pipe which is placed over the casing and cap, and seated in a 16-inch by 16-inch by 4-inch concrete surface pad. Slope the pad away from the well casing. Install a lockable cap or lid on the steel guard pipe. Install three four-inch diameter steel guard posts if the base determines the well is in an area which needs such protection. The guard posts shall each be eight feet in total length and installed radially from each wellhead. Recess the guard posts approximately four feet into the ground and insure they are removable to facilitate access for sampling pump installation. Paint the protective steel pipe and clearly number the well on the sleeve exterior.

i. Determine by survey the elevation at the top of the casing of all newly installed monitor wells to an accuracy of 0.01 feet with respect to a base bench mark. Horizontally locate the new wells to an accuracy of 1.0 feet and record the position on both project and site specific maps. Bench marks must have previously been established from and are traceable to a USCGS/USGS survey marker.

j. Measure water levels at all monitor wells as feet below the ground surface or below the top of casing elevation to the nearest 0.01 feet. Report in terms of mean sea level. Measure static water levels in the wells prior to sampling and at well development. After the wells have recovered from water sample collection. measure water levels to confirm previous measurements.

7. Allow wells to stabilize after development for a minimum of 24 hours prior to sampling. Purge wells prior to sampling until a minimum of three well volumes of water have been displaced and the pH, temperature, specific conductance, color, and odor of the discharge have stablized. Use a stainless steel or teflon bailer, or air-lift pump to purge wells. Sample using a bottom-discharge Teflon bailer.

8. If the well(s) cannot be sampled due to well development, well characteristics, or other reason(s), indicate the reason(s) in the report specified in Item VI.

9. Collect and analyze one round of water samples from all groundwater monitor wells. During sample collection from all wells, examine the surface of the water table for the presence of hydrocarbons and, if applicable, measure the thickness of the hydrocarbon layer. 10. Soil Borings

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a. Conduct 19 soil borings not to exceed a maximum of 250 linear feet. The average estimated boring depth is ten feet except where noted in Section B. Accomplish the borings using hollow-stem auger techniques. Obtain samples using ASTM Method D-1526.

b. During the boring operations, take samples at two and one-half foot intervals to develop lithographic descriptions and stratigraphic logs. Monitor the auger cuttings for signs of changing formations. Place special emphasis on field identification of contaminated soils encountered.

c. Scan all soil samples with a photoionization meter or equivalent organic vapor detector. Include monitoring results in the boring logs.

d. Whenever possible, measure water levels in all boreholes after the water level has stabilized.

e. Grout all boreholes to the surface. It is especially important to ensure that they be adequately resealed to preclude future migration of contaminants.

f. Permanently mark each location where soil borings are drilled. Record the location on a site specific map.

11. Collect pond sediment samples using a drop corer device or an Ekman dredge. Obtain surface soil samples using a stainless steel spoon or spade. Decontamination procedures outlined below are applicable.

12. Analyze water and soil samples collected as specified in Section B for those parameters summarized in Table 2. Laboratories conducting the analyses of samples must be certified as required by state or other regulatory agency standards as applicable in the State of Minnesota. The required detection limits and methods for these analyses are delineated in Table 4. Maintain all raw laboratory data for a minimum of five years after project completion and provide raw data to the USAFOEHL upon request.

13. Methods which employ gas chromatography (GC) as the analytical technique--EPA Methods 601, 602, 608, 615, 8010, 8020, 8080, 8150--require positive confirmation of identity for all analytes having concentrations higher than the Method Detection Limit (MDL). This positive confirmation shall be conducted by second-column GC; however, gas chromatography/mass spectroscopy (GC/MS) can be used for positive confirmation if the quantity of each analyte to be confirmed is above the detection level of the GC/MS instrument. Analytes which cannot be confirmed will be reported as "Not Detected" in the body of the report, but the results of all second-column GC or GC/MS confirmational analyses are to be included in the report appendix along with other raw analytical data. Quantification of confirmed analytes will be based upon the first column analysis. The maximum number of confirmational analyses that will be funded under this delivery order is fifty percent (50%) of actual field samples. The total number of samples for each GC method listed in Table 2 includes this allowance.

14. Analyze an additional 15% of all sample parameters for quality

**- 7 -** M-113

control purposes. Field blanks must be an integral part of the quality control program. Provide all quality control sample analysis results in the report.

15. Plot and map all field data collected for each site according to surveyed positions. Identify or estimate the nature of contamination, its magnitude, and the potential for contaminant flow to receiving streams and ground water.

16. Remove all borehole cuttings and clean the general area following the completion of each well and boring. Properly containerize cuttings suspected of being contaminated (based on discoloration, odor or organic vapor detection instrument). Test the suspected contaminated waste for EP Toxicity and Ignitibility. The contractor shall be responsible for transporting drums containing suspected contaminated soils. The contractor shall be responsible for the ultimate disposal of contaminated soils in accordance with current Federal, State, and/or local hazardous waste disposal laws. The contractor shall provide a final, completed copy of the hazardous waste manifest document to the HQ TAC/SGPB point of contact referenced in paragraph V for those borehole cuttings obtained from TAC sites (Sites 1, 5, 6, 7, and 9) and to the ANGSC/SGB point of contact referenced in paragraph V for those borehole cuttings obtained from ANG sites (Sites 2, 3, 4, 8, and 10).

17. Decontaminate all sampling and well purging equipment prior to use and between samples to avoid cross contamination. As a minimum, wash equipment with a laboratory-grade detergent followed by a distilled water rinse, repeating the rinsing procedure two more times. Where field conditions warrant, follow the laboratory-grade detergent wash with a hexane rinse, rinse with distilled water, and finally wash with dilute nitric acid and rinse again with distilled water. Allow sufficient time for the solvent to evaporate and for the equipment to dry completely. The calibrated water level indicator for measuring well volume and fluid elevation must be decontaminated before use in each well.

18. Thoroughly clean and decontaminate the drilling rig and tools before initial use and after each borehole completion. As a minimum, steam clean drill bits after each borehole is installed. Drill from the <u>least</u> to the <u>most</u> contaminated areas, if possible.

19. Evaluate available techniques for well abandonment that are applicable to the type of monitor wells and geological conditions at Duluth IAP. Consider that these wells will be abandoned at some future date after the study objectives have been met and they are no longer needed. Recommend a candidate abandonment method or technique, including costs. Ensure abandonment techniques comply with state and local rules. The actual process of well abandonment is not part of this study.

20. Perform an inventory of all on-base wells, to include production, irrigation, abandoned, monitoring, etc.

21. Conduct a literature search of local hydrogeologic conditions to complement the Phase I and Phase II Reports. Use this data to determine optimum well locations. Include the pertinent literature search information in Appendix D of the Final Report. Develop the literature search data using the following guideline:

a. Topographic data

- b. Geologic data
  - (1) Structure
  - (2) Stratigraphy
  - (3) Lithology
- c. Hydrologic data

(1) Location of existing wells, observation holes and springs within a one-mile radius of sites to be investigated.

- (2) Groundwater table and piezometric contours
- (3) Depth to water
- (4) Quality of water

d. Data on existing wells, observation holes, and springs withi a one-mile radius of sites to be investigated.

(1) Location, depth, diameter, types of wells, and construction logs

(2) Static and pumping water level, hydrographs, yield, specific capacity, and quality of water

(3) Present and projected groundwater development and

anticipated use (4) Corrosion, incrustation, well interference, and similar operation and maintenance problems

(5) Location, type, geologic setting, and hydrographs of

springs

- (6) Observation well networks
- (7) Existing water sampling sites

e. Aquifer data

- (1) Type, such as unconfined, artesian, or perched
- (2) Thickness, depth, and formation designation
- (3) Boundaries
- (4) Transmissivity, storativity, and permeability
- (5) Specific retention
- (6) Discharge and recharge
- (7) Ground and surface water relationships
- (8) Aquifer models
- f. Climatic data
  - (1) Precipitation

**- 9 -** M-115

#### (2) Evapotranspiration

B. In addition to the general items delineated in A above, conduct the following specific actions at the sites identified in Table 1 and Figure 1 (required analytical parameters are listed in Table 2):

#### 1. Site 1 (TAC) - Goose Dump 1(D-1)

a. Drill and construct a maximum of four monitor wells. Position three of the wells at the site perimeter consistent with the assumed downgradient direction of groundwater flow. To collect ambient water quality information, place the fourth well outside the site perimeter consistent with the assumed upgradient direction of groundwater flow. Collect one groundwater sample from each monitor well. During the borehole drilling collect a maximum of four soil samples for laboratory analysis, see I.A.6.c.

b. Drill one soil boring in the suspected zone of contaminatio and collect soil samples from the ground surface and at each two and one-hal foot interval until the estimated final borehole depth of ten feet is reache. Analyze the samples from the surface and at the two and one-half and five foot depths.

c. Designate two sampling points from surface waters located a the site, or from surface waters adjacent to and downstream of the site.

d. Collect both a water sample and a bottom sediment sample from each of these surface water sample points.

e. Analyze all water and soil samples for volatile organic as a romatic compounds (VOA), oil and grease (O&G), pesticides/herbicides (P/H), polychlorinated biphenyls (PCBs), phenols and metals.

#### 2. Site 2 (ANG) - Fire Training Areas 1 and 2 (FT-1 and FT-2)

a. Drill and construct a maximum of five monitor wells. Position one well consistent with the assumed upgradient direction of groundwater flow. Use information from this well to establish ambient water quality. Place four wells in the assumed downgradient direction of groundwater flow; two between FT-1 and FT-2 on either side of the access road and two north of FT-2. Collect one groundwater sample from each monitor well. During the borehole drilling, collect a maximum of five soil samples for laboratory analysis, see I.A.6.c.

b. Drill two soil borings in FT-1 and one soil boring in FT-2. Locate each boring in the center of a burn pit. If the second and older burn pit in FT-1 cannot be defined through aerial photographs or a physical site inspection, only drill one boring in FT-1. Collect soil samples from the ground surface and at each two and one-half foot interval until the estimated final borehole depth of ten feet is reached. Analyze the samples from the ground surface and the two and one-half and five foot depths.

c. Designate sampling points in the drainageway between the western extension of the access road and the southwestern boundry of site FT-2. Collect two surface water samples and two bottom sediment samples from this drainageway.

d. Collect one surface sediment sample and one surface water

sample from the swamp to the north and downgradient of FT-2.

e. Collect one round of groundwater samples from the six existing monitor wells at these sites.

f. Analyze all water and soil samples for VOA, O&G and phenols.

#### 3. Site 3 (ANG) - DPDO Storage Area "C" (S-2)

a. Drill and construct a maximum of four monitor wells. The positioning, and soil and water sampling follows that specified at Site 1, para B.1.a.

b. Drill three soil borings positioned along a center-line running north to south in the storage area. Follow the soil sampling plan specified at Site 1, para B.1.b.

c. Designate sampling points in the drainageway which begins on the east side of the storage area and then heads in a northwesterly direction. Collect three surface water samples and three bottom sediment samples from this drainageway. Collect the first sediment and water sample in the approximate location of Sample 2 identified in the Stage 1 study. Subsequent sample points should be at 100 foot intervals downgradient along the drainageway.

d. Analyze all water and soil samples for VOA, O&G, P/H, PCBs, phenols and metals.

#### 4. Site 4 (ANG) - Tank Farm Area (SP-1)

a. Perform a geophysical survey using a metal detector and a magnetometer to precisely locate underground pipes. Perform an electromagnetic survey to identify leak sites from these pipes. Survey the entire tank farm to include a minimum 50 foot buffer around the site perimeter. Expand the geophysical survey on the southern side of the tank farm area to the main access road. A former fueling facility is located south of the tank farm.

b. Drill and construct a maximum of four monitor wells. The well positioning, and soil and water sampling follows that specified at Site 1, para B.1.a.

c. Drill five soil borings, position them based upon the geophysical survey result and the data generated during the Stage 1 study. Boring depth is estimated to be 15 feet; however, drill until the water table is reached. Collect soil samples at two and one-half foot intervals beginning at ground surface. Analyze the samples collected at two and one-half, five, and seven and one-half foot depths.

d. Designate sample points in the drainageways/culverts around the site, of particular interest is the drainageway heading north to Beaver Creek. Collect four surface water and four sediment samples from the drainageways/culverts.

e. Collect one round of groundwater samples from the four existing monitor wells at this site.

f. Analyze all water and soil samples for VOA and O&G.

5. Site 5 (TAC) - South Goose Dump (D-4)

a. This site was originally designated D-4, South Goose Missle Site Dump, in the Phase I report and was not recommended for Phase II Stage ! evaluation. However, during Phase II Stage 1, it was erroneously confused with D-1, Goose Missle Site Dump, which was recommended for Phase II Stage 1 monitoring. Consequently, this site was studied during the Phase II Stage 1 effort, but referenced as site D-1 throughout the report.

b. Drill and construct three monitor wells. Position two of the wells approximatley 50 feet from the site perimeter and consistent with the assumed downgradient direction of groundwater flow. Place the other monitor well outside the site perimeter and consistent with the assumed upgradient direction of groundwater flow so as to collect ambient water quality information. Collect one groundwater sample from each monitor well. During the borehole drilling, collect a maximum of three soil samples for laboratory analysis, see I.A.6.c.

c. Collect three surface water samples from the pond/swamp at this site.

d. Collect a maximum of five sediment samples from the bottom of the pond/swamp area and drainageways which exit this site.

e. Analyze all water and soil samples for VOA, O&G, P/H, PCBs, phenols and metals.

6. <u>Site 6 (TAC) - Goose Dump 2 (D-2)</u>

a. Perform a geophysical survey using a metal detector and a magnetometer to locate the dump site drums. Also conduct a detailed examination of available aerial photographs for the same purpose.

b. If the geophysical survey and aerial photographs cannot locate the drums and accurately define the site location, perform no more wor :

c. If the site can be located, drill two exploratory soil borings in the zone of contamination. Collect soil samples from the ground surface and at two and one-half foot intervals until the estimated final borehole depth of ten feet is reached. Analyze the samples from the surface and at two and one-half feet for ethylene glycol, O&G and VOA.

7. Site 7 (TAC) - Runway 13 NE Disposal (D-6)

a. Perform a geophysical survey using a metal detector and magnetometer to define as accurately as possible the site boundaries. Also conduct a detailed examination of available aerial photographs for the same purpose.

b. Drill and construct three monitor wells. The positioning, and soil and water sampling follows that specified at Site 5, B.5.b.

c. Drill two exploratory soil borings in the zone of contamination. Collect soil samples from the ground surface and at two and one-half foot intervals until the estimated final borehole depth of ten feet is reached. Analyze the samples from the surface and at the two and one-half foot depth.

d. If surface drainage from the site can be located, collect

- 12 - M-118

one each bottom sediment and surface water sample outside, but within 20 feet, of the site boundry.

e. Analyze all water and soil samples for VOA, O&G, P/H, PCBs, phenols and metals.

8. Site 8 (ANG) - Old DPDO Storage Area (S-1)

a. Drill and construct three monitor wells. The positioning, and soil and water sampling follows that specified at Site 5, B.5.b.

b. Drill two exploratory soil borings, one in the center of each of the two former storage area sites. The soil sampling plan follows that specified at Site 1, B.1.b.

c. Collect two surface water and two bottom sediment samples from drainageways at points downstream of the site.

d. Analyze all water and soil samples for VOA, O&G, P/H, PCBs, phenols and metals.

9. Site 9 (TAC) - Disposal Pit (D-9)

a. Perform a geophysical survey using a metal detector and a magnetometer to locate the site. Also conduct a detailed examination of available aerial photographs for the same purpose.

b. If the geophysical survey and aerial photographs cannot accurately define the site location, perform no more work.

c. If the site can be located, drill one exploratory soil boring in the zone of contamination. Collect soil samples at two and one-half foot intervals and analyze the samples at two and one-half feet above and below the water table.

d. If the site can be located, drill and construct one monitor well at the site perimeter consistent with the assumed downgradient direction of groundwater flow. Collect one groundwater sample.

e. Analyze all water and soil samples for acetone and picric acid.

10. Site 10 (ANG) - Low-Level Radioactive Waste Disposal (RD-1)

a. Conduct a geophysical survey (metal detector and magnetometer) and review aerial photographs to accurately locate the site.

b. Drill and construct three monitor wells. Position two of the wells at the site perimeter consistent with the assumed downgradient direction of groundwater flow. Place the third well in the assumed upgradient direction of groundwater flow to collect ambient water quality information. Do not analyze soil samples from these boreholes.

c. Collect one groundwater sample from each well and analyze them for gross alpha, gross beta, radium - 226 and radium - 228.

C. Field Coordination

Notify the Air Force POC's (see section V) at the USAFOEHL and Duluth IAP at least five days in advance of water sample collection dates.

#### D. Technical Field Operations Plan

Develop a detailed field operations plan based upon the technical requirements specified in this task description for the proposed work effort. Be explicit with regards to field procedures. Include, but do not limit the plan to, field decontamination operations, sampling protocol, QA/QC field procedures, field schedule, etc. A guideline for the plan is provided under separate cover. Reference paragraph VI, Sequence No. 2.

E. Health and Safety

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

F. Data Review

1. Tabulate field and analytical laboratory results (including quality control data), and incorporate them into the monthly R&D Status Reports. Forward them to the USAFOEHL for review as soon as they become available as specified in Item VI below. In addition to the results, report the dates of sample collection, extraction (if applicable) and analysis.

2. Upon completion of all analyses, tabulate and incorporate all results into an Informal Technical Information Report (Atch 1, Seq 3 as specified in the contract and in Item VI below) and forward the report to the USAFOEHL for review.

3. Immediately report to the USAFOEHL Program Manager via telephone, data/results generated during this investigation which indicate a potential health risk (for example, a contaminated drinking water aquifer).

G. Reporting

1. Prepare two draft reports following the USAFOEHL-supplied report format (mailed under separate cover). One report shall delineate the findings for the TAC sites (Sites 1, 5, 6, 7, and 9). The second report shall detail the findings at the ANG sites (Sites 2, 3, 4, 8, and 10). Forward the reports to the USAFOEHL (as specified in item VI below) for Air Force review and comment.

2. Review the results, conclusions and recommendations from previous IRP investigations which concern the sites listed in this task. Integrate all investigative work done at each site to date so the report reflects the total available information for each site. Use this cumulative information and data to establish trends and develop conclusions and recommendations. 3. Include in this report a discussion of regional/site-specific hydrogeology, well and borings logs, data from water level surveys, groundwater surface and gradient maps, and avalable hydrogeologic cross sections and geophysical survey data.

4. In the results section, include water and soil analysis results, field quality control sample data (field blanks, duplicates, etc.), internal laboratory quality control data (lab blands, lab spikes, and lab duplicates), and laboratory quality assurance information. Provide secondcolumn confirmation results and include which columns were used, the conditions existing and retention times.

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

6. Summarize the specific collection techniques, analytical method holding time and limit of detection used for each analyte (Standard Methods, EPA, ASTM, etc.).

7. In the recommendation section, address each site and list them by category. 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 health or environmental risks. Category II sites are those requiring additional investigation to quantify or further assess the extent of current or future contamination. Category III denotes sites that will require remedial action (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 to 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 non-carcinogens (Health Advisory or Suggested-No-Adverse-Response Levels) and target levels for carcinogens (1 x 10⁻⁶ cancer risk level) may be used. If not specifically requested, do not include a comprehensive cost or technical analyses of 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.

8. For those sites needing additional Phase II study, identify specific requirements, if any, for future monitoring. Identify potential environmental consequences of contamination. Provide estimates of costs by line items for additional investigations beyond this stage along with estimates of time required to accomplish the investigation. Furnish the cost data in a separately bound appendix to the final report. (Reference paragraph VI, Sequence No. 2)

9. Provide an inventory of all on-base wells, to include production, irrigation, abandoned, monitoring, etc.

10. Include in an appendix to the report the names of all local, state or other regulatory personnel and the dates they approved well

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drilling, development and purging techniques, well materials, and sampling methods. All well drilling, development, purging, and sampling must conform to State and local regulatory agency requirements.

11. Provide the candidate well abandonment techniques and the recommended techniques most appropriate for Duluth IAP.

H. Meetings

The contractors project leader shall attend two meetings to take place at a time to be specified by the USAF OEHL. Each meeting shall take place at Duluth IAP for a duration of one day (eight hours).

**II. SITE LOCATION AND DATES** 

Duluth IAP MN Date to be established

III. BASE SUPPORT

A. Prior to any contractor digging or drilling, locate underground utilities and issue digging permits.

B. Provide access to the Phase II Stage 1 monitoring wells.

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

D. The base Point Of Contact shall receive from the contractor the split samples, select 10% of them, package them, and then deliver them back to the contractor within 24 hours for subsequent overnight shipment to USAFOEHL/SA as stated in paragraph I.A.5.

E. Provide contractor with a secure staging area for storing equipment and supplies.

F. Provide a paved area where drilling equipment can be cleaned and decontaminated.

G. Base Civil Engineer will prepare and sign any hazardous waste manifest documentation resulting from this effort.

H. Base will store any drums containing suspected hazardous waste until determined to be hazardous/non-hazardous.

IV. GOVERNMENT FURNISHED PROPERTY: None

V. GOVERNMENT POINTS OF CONTACT:

1. 2Lt Gary Woodrum
 USAFOEHL/TSS
 Brooks AFB TX 78235-5501
 AV 240-2158
 (512) 536-2158
 1-800-821-4528

2. Col Jerry Dougherty HQ TAC/SGPB Langley AFB, VA 23665-5001 AV 432-5857 (804) 764-2180

- 16 - M-122

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3. Lt Col Michael Washeleski ANGSC/SGB Andrews AFB, MD 20331-6008 AV 858-3443/5926 (301) 981-5926

4. Sgt Suzanne Schlies 148 TAC Clinic Duluth IAP MN 55811-5000 AV 825-7223 (218) 723-7224

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.

Seq. No.	Para. No.	Block 10	Block 11	Block 12	Block 13	Block 14
219	I.D. Techn. Op. Plan.	O/TIME	86 OCT 10	86 OCT 13		15
7	I.E.	O/TIME	86 OCT 10	86 OCT 13		3
3	I.F.1.	O/TIME	٠	٠		3
- 4	I.G.(TAC)	ONE/R	86 DEC 31	87 JAN 16	87 OCT 16	
4	I.G.(ANG)	ONE/R	86 DEC 31	87 JAN 16	87 OCT 16	
2	I.G.8.	O/TIME	87 Jan 16	87 OCT 16		
14		MONTHLY	86 OCT 27	86 NOV 11		
15		MONTHLY	86 OCT 27	86 NOV 11		

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Upon completion of the analytical effort and prior to submission of the first draft report.

Two draft reports and one final report are required. 3.3 Incorporate Air Force comments into the second draft and final report as specified by the USAF OEHL. Supply the USAFOEHL with a single copy of the first draft, second draft, and final reports for acceptance prior to distribution. Distribute all report copies as specified by the USAFOEHL. Supply 25 copies of each draft report and 50 copies plus the original camera ready copy of the final report. Distribute the remaining 24 copies of each draft report and 49 copies of the final report as specified by the USAFOEHL.

Submit cost estimates (five copies) in a separately bound 333 document with the final report only. Provide estimates for only those sites recommended for additional Phase II work (Category II) or Phase IV, long-term monitoring (Category III).

- 17 - M-123

TABLE 2

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# SAMPLING AND ANALYTICAL REQUIREMENTS

# DULUTH IAP

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												~	2nd (10)	
Analyte	Medium	-	2	Э	SITE 4	SITE NUMBERS	ERS 6	7	8	9 10		04 ⁽⁹⁾	mn irmation	TOTAL
VOA (1)	Mater, (7)	و	14	2	12	9		4	5			6	30	63
	Soll (8)	σ	17	16	3	8	4	8	11	1	•	2	53	164
011 & ⁽²⁾	Water	9	14	2	12	9	ı	4	ŝ		1	6	ı	63
Grease	Sofl	6	17	16	23	80	4	œ	11	1	-	5	ı	111
Metals ⁽³⁾	Water	9	ı	2	,	9	•	4	ŝ	1		S	·	33
	Sofl	9	Ŧ	16	ı	æ	I	œ	11	1	•	თ	•	61
Pesticides/ ⁽⁴⁾		9	8	2	•	9	1	4	ŝ	•	•	2	16	49
Herbicides	Sofl	6		16	I	œ	I	œ	11	•		6	29	8
PCB		9	ł	2	1	9	1	4	ŝ	ı	•	S	16	49
•	Sol1	9	•	16	•	œ		80	11	1	•	6	29	6
Phenol	Water	9	14	2	ı	9		4	S	•		æ	ı	50
·	Sofl	6	17	16	ł	œ	8	œ	11	•			ı	80
Acetone	Water	1	ł	•	•	ı	8	1	•		•	-1	I	2
	Sofl	ł	1	•	1	I	1	ı	•	2	1		ı	m
Picric Acid	Water	•	8	1	ŧ	1		1	ŧ			1	I	~
		1	t	I	•	ŧ	I	1	•	2	ł		I	ო
Ethylene Glycol	Sofl	ı		ŧ	ł	1	4	•	ı	1	1	-	1	S
Radiation ⁽⁵⁾	Water	1	•	1	•		ŧ	1	1	1	m	-	•	4
EP Toxicity ⁽⁶⁾ Metals	Soil Cuttings	15	R S A H	samples a fied by	author y site	Ized	as 1	needed	- not	spec	<u>_</u>	8	ŀ	17
EP Igniti- bility	Sof1 Cuttings	15	EBS F	nples a fied by	samples author fied by site	Ized	5	needed	- not	speci	<u> </u>	~	·	17
NOTES: (See following page	lowing page)													

, M-124

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#### TABLE 2 (Continued)

NOTES: (1) See Table 3.

- (2) Use Method 3550 to extract oil and grease from soil.
- (3) Arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver
- (4) See Table 5.
- (5) Includes analysis for Gross Alpha, Gross Beta, Radium-226 and Radium-228.
- (6) Arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver
- (7) Includes both well and surface water samples.
- (8) Includes both borehole and sediment samples.
- (9) QA is 15% of the basic sample load.
- (10) Assumes 50% for Methods 601, 602, 608, 615, 8010, 8020, 8080 and 8150 will require second column confirmation.

# TABLE 3

#### VOLATILE ORGANIC COMPOUNDS (VOA)

## PURGEABLE HALOCARBONS EPA Methods 601 and SW 8010

PURGEABLE AROMATICS EPA Methods 602 and SW 8020

**Bromodichloromethane** Bromoform Bromomethane Carbon tetrachloride Chlorobenzene Chloroethane 2-Chloroethylvinyl ether Chloroform **Chloromethane** Dibromochloromethane 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1.4-Dichlorobenzene Dichlorodifluoromethane 1.1-Dichloroethane 1,2-Dichloroethane 1.1-Dichloroethene trans-1,2-Dichloroethene 1.2-Dichloropropane 1,3-Dichloropropene trans-1,3-Dichloropropene Methylene chloride 1,1,2,2-Tetrachloroethane Tetrachloroethylene 1,1,1-Trichloroethane 1,1,2-Trichloroethane Trichloroethylene Trichlorofluoromethane

Vinyl chloride

Benzene Chlorobenzene 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene Ethylbenzene Toluene

Also: Xylene

ANALYTICAL PARAMETERS. METHODS AND REQUIRED DETECTION LIMITS PARAMETER METHOD DETECTION LIMIT 20  $\mu$ g/g soil ^a Oil and Grease (Using IR) EPA 413.2 1 mg/l water Volatile Organic and EPA 601 and 602 Ъ Aromatic Compounds (VOA) SW 8010 and 8020 ь **EP** Toxicity Þ С SW 1010 d Ignitibility EPA 608 Pesticides and/or PCB SW 3550 and 8080 1 µg/g soil EPA 615 Herbicides SW 8150 1 µg/g soil EPA 420.2 5 µg/l water Phenol 5 µg/g soil Metals Arsenic ^r EPA 206.2 10 µg/l water SW 3050 and 706 1 µg/g soil Barium ^f 200  $\mu$ g/l water EPA 208.2 20 µg/g soil SW 3050 and 6010 Cadmium f EPA 213.2 10 µg/l water SW 3050 and 6010 1 µg/g soil Chromium f EPA 218.1 50 µg/1 water SW 3050 and 6010 5 µg/g soil Lead f EPA 239.2 20  $\mu$ g/1 water SW 3050 and 6010 2 µg/g soil Mercury r EPA 245.1 1.0 µg/l water SW 7471 0.1 µg/g soil Selenium ^f EPA 270.3 10 µg/l water SW 3050 and 7740 1 µg/g soil Silver f EPA 272.2 10 µg/l water

#### TABLE 4

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SW 3050 and 6010

1 µg/g soil

TABEL 4 (Continued)

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PARAMETER	METHOD	DETECTION LIMIT
Acetone	ASTM D 3695-82	<u>-</u>
Picric Acid	USATHAMA 2B	4
Ethylene Glycol	NIOSH P & CAM 338 Modified for Soil	-
Gross Alpha	Standard Methods: 15th ed, 703	-
Gross Beta	Standard Methods: 15th ed, 703	-
Radium∺226	EPA 600/4-80-032, 903.0	-
Radium-228	EPA 600/4-80-032, 904.0	

**??** M-128

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#### TABLE 4 (Continued)

^aBased on extracting 50 grams of soil and 100 ml final extract volume.

^bDetection limits for Purgeable Organics and Aromatics shall be as specified for the compounds by EPA Methods 601=602. Method: Federal Register, Vol. 44, including these items:

- Item 1.4 This method is recommended by EPA for use only by experienced residue analysts or under the close supervision of such qualified persons.
  - Item 2.2 This is most important. If interferences are encountered (as in early peaks such as vinyl chloride), the method provides a secondary chromatographic column that will be helpful in resolving the compounds of interest from interferences. This must be done in the case of vinyl chloride and so noted in the analysis report.

Items 3.3, 7.1-7.3 - These sections must be analyzed within the recommended holding times.

Item 8.3 - All samples must be analyzed within the recommended holding times. This must be followed without exception.

If questions are encountered about certain contaminants, you may be asked to show both chromatograms used to rule out possible interferences.

C	<u>Metals</u>	<u>µg/l of Extract</u>
	As	0.053
	Ba	0.1
	Cđ	0.005
	Cr	0.05
	Pb	0.1 0.0002
	Hg	
	Se	0.075
	Ag .	0.01

^dFind if sample is ignitable at 140 degrees Fahrenheit or below. If so, it is a hazardous waste.

^eMethod Detection Limit

^fPrimary Drinking Water Standard, 40 CFR 141.11

TABLE	5
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Pesticides and PCBs - EPA Methods 608 and SW 8080

aldrin	a=BHS
dieldrin	b∺BHC
chlordane	g-BHC
4,4'-DDT	w-BHC
4,4'#DDE	PCB≈1242
4,4*-DDD	PCB-1254
a≺endosulfan	PCB-1221
b-endosulfan	PCB-1232
endosulfan sulfate	PCB=1248
endrin	PCB-1260
endrin aldehyde	PCB≒1016
heptachlor	toxaphene
heptachlor epoxide	

Herbicides - EPA Method 615 and SW 8150

2,4-D 2,4,5⁴T 2,4,5-TP (Silvex)

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