Work Plan for Fall 2008 Remedial Investigation Activities, Former Communications Site (Taku Gardens), Fort Wainwright, Alaska

PREPARED FOR:	USACE, Alaska District
PREPARED BY:	CH2M HILL
COPIES:	Unites States Army, Directorate of Public Works, Fort Wainwright Jacobs Engineering
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This technical memorandum has been developed by CH2M HILL, under contract to the United States Army Corps of Engineers (USACE), Alaska District, to assist in planning and guiding additional remedial investigation (RI) activities at the Former Communications Site (FCS) (Taku Gardens) at Fort Wainwright, Alaska.

The purpose of these activities is to collect additional information that will complement the existing dataset. We intend to collect this additional information in time for inclusion in the Draft RI Report and Draft Baseline Risk Assessment Report, due next spring. To enable inclusion of these data in those reports, the field activities presented in this technical memorandum are planned to begin the week of September 29, 2008.

The activities presented in this technical memorandum include the following:

- Additional Sub-Slab Soil Gas/Ambient Air Investigation
- Additional Monitoring Well Installations and Sub-Surface Soil Sampling
- Additional Groundwater Sampling

Details associated with these activities are discussed in subsequent sections of this technical memorandum. This technical memorandum is an addendum to the *Remedial Investigation Management Plan*, which includes the *Risk Assessment Work Plan, Quality Assurance Program Plan*, *Field Sampling Plan*, *Munitions and Explosives of Concern Support Work Plan*, and *Work Plan Addenda* already developed for this RI (CH2M HILL, 2008a).

1.0 Additional Sub-Slab Soil Gas/Ambient Air Investigation

The purpose of this additional investigation is to assess whether soil-gas data of acceptable quality can be collected to provide chemical-concentration data for the baseline risk assessment. Once data of acceptable quality are collected, the results will be used to estimate the degree of attenuation between sub-slab soil gas and indoor air quality. This information will be important for interpretation of sitewide, sub-slab sampling results to assess indoor air exposures and risks at the site, providing a realistic alternative to conservative default

modeling approaches. This investigation is planned as a support activity to the RI. The reviewed analytical data (with data qualifiers) will be incorporated into the RI project geo-database and analytical results will be included as part of the RI Report.

1.1 Background Information

The historical activities at FCS include chemical spills from maintenance practices; leaks from tanks, pipelines, and transformers; and burial of drums and other debris. Therefore, it is necessary to assess whether volatile contaminant exposure through vapor intrusion poses a potential for unacceptable risk to human health. Inhalation risk estimates and additional information on exposure pathways are included in the Risk Assessment Work Plan, Section 3.4.3. The migration of volatile organic compounds (VOCs) from underlying contaminated soil to indoor air is described as vapor intrusion and is the risk migration pathway that will be investigated in this additional investigation.

Preliminary Source Evaluation Phase II Investigation

A passive soil gas investigation was conducted at the FCS in 2006 as part of the Preliminary Source Evaluation (PSE) Phase II Investigation (Northwind, 2007). The 2006 soil gas investigation was conducted in the northwest potion of the site and near Building 49. It consisted of passive soil gas samples collected in 35 locations using Gore™ Sorber technology. The sample locations selected in the PSE II Investigation were generally widespread within the northwest portion of the site to confirm the presence or absence of VOCs and not to define nature and extent. Petroleum-derived constituents (total petroleum hydrocarbons [TPH]; C-11, C-13, and C-15 hydrocarbons; naphthalenes; and trimethylbenzenes) were detected in almost all sample locations (33 of 35), suggesting these compounds were ubiquitous throughout the area of investigation. Benzene, toluene, ethylbenzene, and xylene (BTEX) compounds were detected less frequently (6 of 35 locations) along the northern border of the FCS. Of the chlorinated solvents, only trichloroethene (TCE) and tetrachloroethane (PCE) were detected, and they appeared in fewer locations than petroleum constituents (5 of 35 locations). The source of the PCE and TCE was assumed to be solvent used at the former motor pool. Tentatively identified compounds (TICs) detected appeared to be limited to chlorofluorocarbons (CFCs). The CFC source is suspected to be associated with building materials (insulation) and is believed to be unrelated to the petroleum source. The sample results from the PSE II Investigation are qualitative and cannot be used to determine actual concentrations of VOCs in a given location.

Remedial Investigation 2007 Sampling

CH2M HILL conducted active soil gas sampling in 2007 to evaluate the nature and extent of VOCs in soil and provide a preliminary indication of the potential for vapor intrusion. A total of 110 semi-permanent sub-slab soil gas probes were installed in the 55 constructed duplexes on the FCS. The sub-slab sampling points were installed in the garages of each duplex (2 per duplex). The sub-slab sampling points were installed and sampled in accordance with the procedures described in the *Draft RI Work Plan, Addendum 3* (CH2M HILL, 2008a). The sampling was done over two periods: August 22 to 30, 2007, and October 11 to 26, 2007. Six analytes detected in soil gas were identified as contaminants of potential concern (COPCs) for indoor air based on comparison of the soil gas data to the

ambient air screening levels. Twenty-two additional analytes were undetected but had method detection limits (MDLs) that exceeded the risk-based screening level. The MDLs for many of these analytes were elevated due to the unanticipated presence of high levels of Freon-related compounds in the soil gas. These Freon compounds were not considered target analytes for the RI; however, their presence required increased dilution. As such, uncertainty was introduced with the levels of detection and interferences encountered during the soil gas investigation. This additional investigation in 2008 will determine if the inference of the Freon compounds can be overcome, if lower MDLs can be achieved, and if additional data collection may be helpful in evaluating the potential presence of compounds that could not be detected previously. The exceedance of screening levels is shown in Figure 1-1. The distribution of Freon-related compounds in shown in Figure 1-2.

1.2 Sample Locations

Ten pairs of sub-slab/indoor air samples and one pair of field duplicates will be collected. The sample locations were selected to provide coverage of all FCS subareas. Table 1-1 lists the proposed sampling locations and sampling rationale. The sample locations are shown on Figure 1-3.

In order to evaluate possible indoor VOC contributions unrelated to subsurface vapor intrusion (such as, from building materials), sample location SG040 was chosen to serve as a possible control location. In past sampling events, no target compounds were detected in the sub-slab sample taken at this location. However, because reporting limits were considerably higher than screening levels for some VOCs, there is no guarantee that VOCs will not be detected at this location using the lower reporting limits. Nonetheless, it is considered the best location to obtain background data, based on the best available data.

One outdoor ambient air sample may be taken to determine if there is any contribution of VOCs from regional background sources (such as, airport, power plant, gas station, etc.). The proposed location is on the western fence line, as in the prior sampling rounds.

The windows and doors have not been opened at the duplexes for approximately 2 years, creating the possibility of unrealistic indoor air quality that is not representative of normal conditions. To help mitigate this, 9 days prior to sampling, each location will be vented by opening windows for 2 days to remove stagnant air. After 2 days, the windows will be closed tightly again for the following 7 days. The 7-day period prior to sampling should be sufficient for indoor air to reach steady-state conditions, providing a more current snapshot of vapor intrusion from subsurface sources (if any).

To further simulate normal living conditions, the heating systems at each duplex may be adjusted to 68° Fahrenheit (°F) 7 days prior to sampling.

TABLE 1-1
Sample Locations and Sample Rationale

Subarea	Field Location ID	Physical Address	Sample ID	Sample Type	Sample Rationale
A	SG023-L	4742-1	08FWASG023S	Sub-slab	Previous sample was diluted 371X
A	SG023-LIA	4742-1	08FWAIA023S	Indoor Air	Corresponding indoor air sample
A	SG014-L	4710-1	08FWBSG014S	Sub-slab	Over TCE/PCE Plume
A	SG014-LIA	4710-1	08FWBIA014S	Indoor Air	Corresponding indoor air sample
A	SG034-R	4735-2	08FWASG034S	Sub-slab	Previous sample 300 ug/m3 PCE
A	SG034-RIA	4735-2	08FWAIA034S	Indoor Air	Corresponding indoor air sample
A	SG049-R	4724-2	08FWASG049S	Sub-slab	Drums under house
A	SG049-RIA	4724-2	08FWAIA049S	Indoor Air	Corresponding indoor air sample
A	SG025-L	4745-1	08FWASG025S	Sub-slab	Previous sample had Benzene and Xylene
A	SG025-LIA	4745-1	08FWAIA025S	Indoor Air	Corresponding indoor air sample
B	SG007-R	4717-2	08FWBSG007S	Sub-slab	Over POL source area
B	SG007-RIA	4717-2	08FWBIA007S	Indoor Air	Corresponding indoor air sample
C	SG002-L	4722-1	08FWCSG002S	Sub-slab	Previous sample was diluted 12X
C	SG002-LIA	4722-1	08FWCIA002S	Indoor Air	Corresponding indoor air sample
U	SG042-L	4728-1	08FWFSG042S	Sub-slab	Previous sample Chloroform 170 ug/m3
U	SG042-LIA	4728-1	08FWFIA042S	Indoor Air	Corresponding indoor air sample
E	SG040-L	4751-1	08FWESG040S	Sub-slab	Possible control sample
E	SG040-LIA	4751-1	08FWEIA040S	Indoor Air	Corresponding indoor air sample
D	SG063-L	4760-1	08FWDSG063S	Sub-slab	Previous sample Benzene
D	SG063-LIA	4760-1	08FWDIA063S	Indoor Air	Corresponding indoor air sample
Field Duplicate	SG023-L	4742-1	08FWASG023S	Sub-slab field duplicate	Previous sample was diluted 371X
Field Duplicate	SG023-LIA	4742-1	08FWAIA023S	Indoor Air field duplicate	Corresponding indoor air sample
Ambient Air Sample (on fence)		Fence			

1.3 Field Sample Collection Procedures

The sub-slab sampling points installed in the garages of each duplex building in 2007 will be used for the 2008 sub-slab sampling. Sub-slab samples will be collected over a 30-minute duration in accordance with the CH2M HILL Standard Operation Procedure (SOP) (Attachment 1). Sub-slab sampling points will be leak-tested using a helium leak-check procedure before sampling, and failing sample points will be re-sealed. There is the possibility that over the winter some garage floor-slab cracks could have developed and compromised the sub-slab sampling points. These sampling points will be avoided, if possible. For example, if the sub-slab sampling point at location SG014-L is not useable the first alternative will be to sample SG014-R, in the other half of the duplex unit.

Indoor and outdoor air samples will be collected over a 24-hour duration in accordance with the CH2M HILL SOP (Attachment 2). Indoor air samples will be collected at breathing level height of the same duplex unit from which the sub-slab samples are collected (Table 1-1).

1.4 Analytical Method

Both the ambient and sub-slab samples will be analyzed by U.S. Environmental Protection Agency (EPA) Method TO-15 using a mass spectrometer in both Low Level Scan and SIM modes to achieve the reporting limits listed in Attachment 3. Modifications to the method may be made by using a solvent delay or other similar technique to help mitigate potential Freon interference. Analytical results will be provided on an expedited basis. The target analyte list will be limited to that provided in Attachment 3.

2.0 Additional Monitoring Well Installations and Sub-Surface Soil Sampling

The purpose of this section is to present the plan for the installation of five new groundwater monitoring wells as part of the RI. This section will provide the appropriate references to previously approved FCS Work Plans, applicable to the groundwater monitoring well installation and soil sampling, and describe any deviations from those approved plans. The new monitoring well locations are shown on Figure 2-1 and the rationale for installation is provided in Table 2-1 below.

TABLE 2-1
New Monitoring Well Installation Rationale

Subarea	Monitoring Well	Depth	Rationale
Undefined	MW77	Shallow	Delineate northern extent of TCE plume
A	MW78	Deep	Additional characterization within supply well capture zone
A	MW79	Shallow	Additional characterization near supply well capture zone
A	MW80	Deep	Vertical delineation of TCE plume
E	MW81	Shallow	PCB excavation sample location where groundwater encountered during removal action

PCB = ychlorinated biphenyl
TCE = trichloroethene

2.1 Monitoring Well Installation

Monitoring wells will be installed using a truck- or all terrain vehicle-mounted drill rig with a hollow stem auger drill for installation of 2-inch-diameter groundwater monitoring wells. Installation methods will comply with *Recommended Practices for Monitoring Well Design, Installation, and Decommissioning* (ADEC, 1992).

Soil Sampling During Installation

During installation, split-spoon samplers will be driven every 2.5 feet of depth drilled from ground surface until the groundwater table is encountered. Split-spoon soil samples will be logged following United Soil Classification System guidelines. Analytical soil samples will be collected from a split-spoon sample within the following intervals:

- 1 to 2 feet below ground surface (bgs); surface soil sample (this is a deviation from *Draft RI Management Plan, Addendum 4* (CH2M HILL. 2008a), which defined a near surface sample from 0 to 4 feet bgs).
- 4 to 10 feet bgs; in the vadose zone at a location likely to contain contamination (based on photoionization detector (PID) field screening results).
- Depth interval directly above groundwater table (smear zone), estimated at 11 to 14 feet bgs.
- A fourth sample may be collected, at the rig geologist's discretion, where visual, PID field screening, or olfactory evidence of contamination is encountered.

Screening and collection of soil samples for laboratory analysis will be processed as follows:

- PID screening immediately upon opening the split-barrel sampler, followed by heated head space PID screening using procedures outlined in the *Draft RI Management Plan, Field Sampling Plan* (CH2M HILL, 2008a).
- Samples to be analyzed for VOCs and gasoline-range organic (GRO) compounds will be collected and quickly placed into prepared 4-ounce containers, followed by preservation with methanol.
- Samples from the entire sampling interval to be analyzed for all other analytes will be homogenized in a stainless-steel bowl prior to placing in the appropriate containers. These sample containers will be filled to the top, taking care to prevent soil from remaining in the lid threads prior to being sealed to prevent potential contaminant migration from or to the sample.

Pertinent observations made during sampling, such as the presence of odor, staining debris, or non-native fill soil, will be recorded in the field logbook and on sample record forms. The field geologist or engineer will describe each sample section and record the results on standard soil boring log forms. The field geologist or engineer will be responsible for directing activities, logging the lithology, and selecting the appropriate intervals for sampling.

Modifications for Wells in Subarea A

Draft RI Management Plan, Addendum 4 (CH2M HILL, 2008a) does not address installation of wells in Subarea A. However, the process described in the *2007 Field Data Report* (CH2M HILL, 2008b), briefly described below, will be followed:

- A Jacob's Engineering unexploded ordnance (UXO) team member will screen the surface of the proposed monitoring well location per the *Munitions and Explosives of Concern Support Work Plan* (CH2M HILL, 2008c).
- With the UXO team member's approval, excavation will commence. A backhoe will be used to excavate to approximately 2 feet below grade. Soil in excavator bucket will screened by UXO team member. A sampler will then screen the soil with a PID and collect a 0-2 ft interval soil sample from the excavator bucket. Both VOC and non-VOC samples will be collected from the excavator bucket.
- The excavation will continue in lifts deemed appropriate by the UXO team member until the excavation is cleared. A second soil sample may be collected between 4 and 10 feet from the excavator bucket.
- The excavation will then be backfilled with native/removed soil and well installation will commence as described above and in the Field Sampling Plan, with split-barrel sampling beginning at the depth of the excavation (i.e., split barrel sampling of replaced fill not required).

Well Completion

The three shallow wells (MW-77, MW-79, and MW-81) shall be installed to a depth of approximately 20 feet bgs with a 10-foot screen installed such that the midpoint of the screen resides at or near the observed depth of the groundwater table.

MW-78 should be installed to a total depth approximately 20 feet below the groundwater table and with a 10-foot screen spanning the depth interval 10 to 20 feet below the groundwater table. This will provide the best data for the existing groundwater model of the supply well.

MW-80 should be completed with an approximate screen interval of 40 to 50 feet bgs.

The wells will be protected from site activities with an aboveground, protective-steel enclosure with a locking cap.

Well Development

Well development will be accomplished a minimum of 24 hours after installation. Monitoring well development procedures were modified from the *Draft RI Management Plan, Field Sampling Plan* (CH2M HILL, 2008a) by the project team in early October 2007. During the development process, only turbidity was monitored. Wells were developed until stable turbidity measurements were observed or until measurements less than 5 nephelometric turbidity units (NTUs) were recorded.

2.2 Subsurface Soil Sample Field Sample Collection Procedures and Analytical Methods

Soil sample collection will be conducted in accordance with the *Field Sampling Plan* (CH2M HILL 2008d). The sample collection summary is provided in Table 2-2. The analytical suites are based on subarea designation as described in the *Draft RI Management Plan, Addendum 4*(CH2M HILL 2008a).

QA/QC samples will be collected in accordance with the *Draft RI Management Plan, Field Sampling Plan* (CH2M HILL 2008a).

3.0 Additional Groundwater Sampling

The purpose of this section is to present the proposed 2008 Fall Groundwater Sampling Plan as part of the RI. This section will provide the appropriate references to previously approved FCS Work Plans (CH2M HILL 2008a) applicable to the groundwater sampling event and describe any deviations from those approved plans.

3.1 Well Selection and Analytical Methods

The proposed wells and the rationale for their selection are provided in Table 3-1 below. This includes the same monitoring wells sampled in Spring 2008 and five new wells to be installed in Fall 2008. The locations of the wells selected for sampling are provided in Figure 3-1, Fall 2008 Groundwater Sample Locations.

Groundwater samples will be analyzed based on Subarea designation as described in Addendum 4 to the Remedial Investigation Work Plan (CH2M HILL, 2008) with the following changes:

- Extractable petroleum hydrocarbons (EPH)/volatile petroleum hydrocarbons (VPH) will be collected only from MW35, MW58, MW37, MW64, MW6A, MW12, MW33, and MW32 since these wells are within, near, or downgradient of the POL source and plume area
- Subarea A and D will not be analyzed for SVOC TICs. The TIC data from the 2007 groundwater sampling event is sufficient for the risk assessment.
- For the COPCs 1,1,2,2-Tetrachloroethane, 1,2,3-Trichloropropane, TCE, and the possible COPC Vinyl Chloride, the analytical method SW8260-SIM will be used.
- Addendum 4 incorrectly lists SW8330 as the method used for explosives analysis. The 2007 groundwater samples were analyzed by method SW8321A and the 2008 groundwater samples will also be analyzed by SW8321A.

A sample collection summary by Subarea is provided in Table 3-2.

TABLE 2-2

Soil Boring Sample Collection Summary

Location ID	Subarea[a]	Sample ID[b]	Proposed Sample Depth Range (feet bgs)	Sample Type/Method	Comments	AK101 GRO	AK102/ DRO/RRO AK103	Metals SW6010B/SW6020/SW7000	Pesticides SW8081A	PCB SW8082	Herbicides SW8151A	VOC SW8260B	Low-level VOC SW8260B	SVOC SW8270C	PAH 8270C-SIM	Explosives SW8321
MW77	U	08FWBMW77XX-XX	1-2	soil/grab		X	X	X	X		X	X	X	X	X	X
MW77	U	08FWBMW77XX-XX	2-10	soil/grab		X	X	X	X		X	X	X	X	X	X
MW77	U	08FWBMW77XX-XX	11-14	soil/grab		X	X	X	X		X	X	X	X	X	X
MW78	A	08FWAMW78XX-XX	1-2	soil/grab		X	X	X	X		X	X	X	X	X	X
MW78	A	08FWAMW78XX-XX	2-10	soil/grab		X	X	X	X		X	X	X	X	X	X
MW78	A	08FWAMW78-XX-XX	11-14	soil/grab		X	X	X	X		X	X	X	X	X	X
MW78	A	08FWAMW78XX-XXFD		soil/grab	field duplicate	X	X	X	X		X	X	X	X	X	X
MW78	A	08FWAMW78XX-XXMS		soil/grab	matrix spike (explosive analysis only)											X
MW78	A	08FWAMW78XX-XXSD		soil/grab	matrix spike duplicate (explosive analysis only)			X			X					X
MW79	A	08FWAMW79XX-XX	1-2	soil/grab		X	X	X	X		X	X	X	X	X	X
MW79	A	08FWAMW79XX-XX	2-10	soil/grab		X	X	X	X		X	X	X	X	X	X
MW79	A	08FWAMW79XX-XX	11-14	soil/grab		X	X	X	X		X	X	X	X	X	X
MW80	A	08FWAMW80XX-XX	1-2	soil/grab		X	X	X	X		X	X	X	X	X	X
MW80	A	08FWAMW80XX-XX	2-10	soil/grab		X	X	X	X		X	X	X	X	X	X
MW80	A	08FWAMW80XX-XX	11-14	soil/grab		X	X	X	X		X	X	X	X	X	X
MW81	E	08FWEMW81XX-XX	1-2	soil/grab		X	X	X	X	X	X	X	X	X	X	
MW81	E	08FWEMW81XX-XX	2-10	soil/grab		X	X	X	X	X	X	X	X	X	X	
MW81	E	08FWEMW81XX-XX	11-14	soil/grab		X	X	X	X	X	X	X	X	X	X	
MW81	E	08FWEMW81-XX-XXFD		soil/grab	field duplicate	X	X	X	X	X	X	X	X	X	X	
MW81	E	08FWEMW81XX-XXMS		soil/grab	matrix spike	X	X	X	X	X	X	X	X	X	X	
MW81	E	08FWEMW81XX-XXSD		soil/grab	matrix spike duplicate	X	X	X	X	X	X	X	X	X	X	
Equipment Blank	E	08FWAEB01				X	X	X	X	X	X	X	X	X	X	X

a "U" or undefined area is analyzed for the same analytes as subarea B

b "XX-XX" is placeholder for field team to include sample interval

bgs = Below ground surface

DRO = Diesel-range organics

EPH = Extractable petroleum hydrocarbon

GRO = Gasoline-range organics

RRO = Residual-range organics

SVOC = semivolatile organic compound

VOC = volatile organic compound

VPH = volatile petroleum hydrocarbon

TABLE 3-1
Monitoring Wells to Be Sampled During Fall 2008 Groundwater Monitoring Event

Well	Rationale for Sampling	Subarea
MW08	Capture zone, 1,2,3-TCP exceedance	A
MW39	Capture zone deep	A
MW45	East of TCE plume	A
MW47	Capture zone, 1,2,3-TCP exceedance	A
MW48	Capture zone	A
MW53	TCE exceedance	A
MW56	TCE & PCE exceedances	A
MW57	Site coverage, southeastern site boundary	A
MW61	TCE & PCE exceedances (max detects)	A
MW62	TCE exceedance in GW and shallow PAHs/pesticides in soil	A
MW69	BAP and DBAA exceedances	A
MW70	1,2 DCA exceedance	A
MW40	Capture zone deep	A
MW43	TCE Plume slough channel	A
MW06A	Explosives exceedances	B
MW12	Explosives exceedances	B
MW33	POL Source Area (max detects)	B
MW64	TCE exceedance, POL plume	B
MW32	POL plume boundary	C
MW13	Downgradient of anomaly and near soil gas exceedances	D
MW03	Dieldrin exceedance	E
MW76	Perimeter of exclusion zone	E
MW26	Site coverage, western site boundary	Undefined[a]
MW36	Perimeter nearest surface water	Undefined[a]
MW37	POL & TCE plume downgradient	Undefined[a]
MW38	TCE plume downgradient boundary	Undefined[a]
MW58	POL plume (SAS)	Undefined[a]
MW35	POL plume downgradient	Undefined[a]
MW77[b]	Northern extent TCE plume	Undefined[a]
MW78[b]	Additional characterization within supply well capture zone	A
MW79[b]	Additional characterization near supply well capture zone	A
MW80[b]	Vertical delineation TCE plume	A
MW81[b]	PCB excavation to groundwater at this location	E

[a]Per Addendum 4, Dated 18 Sep 2007, wells in the "undefined area" are analyzed for the same chemicals as Subarea B wells

[b]New monitoring wells to be installed/sampled in Fall 2008

BAP = Benzo(a)pyrene
DBA = Dibenzo(a,h)anthracene
GW = Groundwater
PAH = polynuclear aromatic hydrocarbon
PCE = tetrachloroethene
POL = Petroleum, oil, and lubricant
SAS = School-Age Services
TCE = trichloroethene
1,2,3-TCP = 1,2,3-Trichloropropane

TABLE 3-2
2008 Spring Groundwater Sample Summary Table

Location ID	Subarea	Sample ID	Depth feet bgs	Sample Date	Sample Type/Method	Comments	GRO/ AK101	DRO/RRO AK 102/AK103	Metals SW6010/SW6020/SW7000	Pesticides SW8081A	PCB SW8082	Herbicides SW8151A	VOC SW8260	Low-level VOC SW8260B-SIMa	SVOC SW8270C	PAH SW 8270C-SIM	Explosives SW8321A	NW EPH	NW VPH
MW08	A	08FWAMW08-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW39	A	08FWAMW39-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW39	A	08FWAMW39-GWBF	-		groundwater/grab	field dup	X	X	X	X		X	X	X	X	X	X		
MW39	A	08FWAMW39-GWMSF	-		groundwater/grab	matrix spike	X	X	X	X		X	X	X	X	X	X		
MW39	A	08FWAMW39-GWSBF	-		groundwater/grab	matrix spike duplicate	X	X	X	X		X	X	X	X	X	X		
MW40	A	08FWAMW40-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW43	A	08FWAMW43-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW45	A	08FWAMW45-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW47	A	08FWAMW47-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW48	A	08FWAMW48-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW53	A	08FWAMW53-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW56	A	08FWAMW56-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW57	A	08FWAMW57-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW61	A	08FWAMW61-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW62	A	08FWAMW62-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW69	A	08FWAMW69-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW70	A	08FWAMW70-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW78	A	08FWAMW78-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW79	A	08FWAMW79-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW80	A	08FWAMW80-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW06A	B	08FWBMW06A-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X	X	X
MW12	B	08FWBMW12-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X	X	X
MW12	B	08FWBMW12-GWBF	-		groundwater/grab	field dup	X	X	X	X		X	X	X	X	X	X	X	X
MW26	B	08FWTMW26-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW33	B	08FWBMW33-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X	X	X
MW35	B	08FWTMW35-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X	X	X
MW36	B	08FWTMW36-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW37	B	08FWTMW37-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X	X	X
MW38	B	08FWTMW38-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X		
MW58	B	08FWTMW58-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X	X	X
MW64	B	08FWBMW64-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X	X	X
MW64	B	08FWBMW64-GWBF	-		groundwater/grab	field dup	X	X	X	X		X	X	X	X	X	X	X	X
MW64	B	08FWBMW64-GWMSF	-		groundwater/grab	matrix spike	X	X	X	X		X	X	X	X	X	X	X	X
MW64	B	08FWBMW64-GWSDF	-		groundwater/grab	matrix spike duplicate	X	X	X	X		X	X	X	X	X	X	X	X
MW77	B	08FWBMW77-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X	X	X
MW32	C	08FWCMW32-GWF	-		groundwater/grab		X	X	X	X		X	X	X	X	X	X	X	X
MW13	D	08FWDMW13-GWF	-		groundwater/grab		X	X	X	X	X	X	X	X	X	X			
MW03	E	08FWEMW03-GWF	-		groundwater/grab		X	X	X	X	X	X	X	X	X	X			
MW03	E	08FWEMW03-GWBF	-		groundwater/grab	field dup (PCB only)					X								
MW76	E	08FWEMW76-GWF	-		groundwater/grab		X	X	X	X	X	X	X	X	X	X			
MW81	E	08FWEMW81-GWF	-		groundwater/grab		X	X	X	X	X	X	X	X	X	X			

bgs = below grade surface
GRO = gasoline range organics
DRO = diesel range organics
RRO = residual range organics
EPH = extractable hydrocarbon speciation
VPH = volatile hydrocarbon speciation
VOC = volatile organic compound
SVOC = semivolatile organic compund

[a]COPCs 1,1,2,2-Tetrachloroethane, 1,2,3-Trichloropropane, Trichloroethene (TCE), and the possible COPC Vinyl Chloride the analytical method SW8260-SIM will be used

3.2 Field and Sampling Procedures

Groundwater sampling will be accomplished in accordance with section 2.5.2.3 of the *Field Sampling Plan*. This section describes the criteria for stabilization of parameters during purging prior to sample collection. All wells sampled during the Fall 2008 sampling event will be included in a water level survey as described in section 2.6 of the *Field Sampling Plan.* Decontamination will be accomplished according to Section 2.8 of the *Field Sampling Plan* (CH2M HILL, 2008a).

3.3 Quality Assurance

The sample analysis and data management will be accomplished in accordance with the existing *Quality Assurance Program Plan* (CH2M HILL, 2008a).

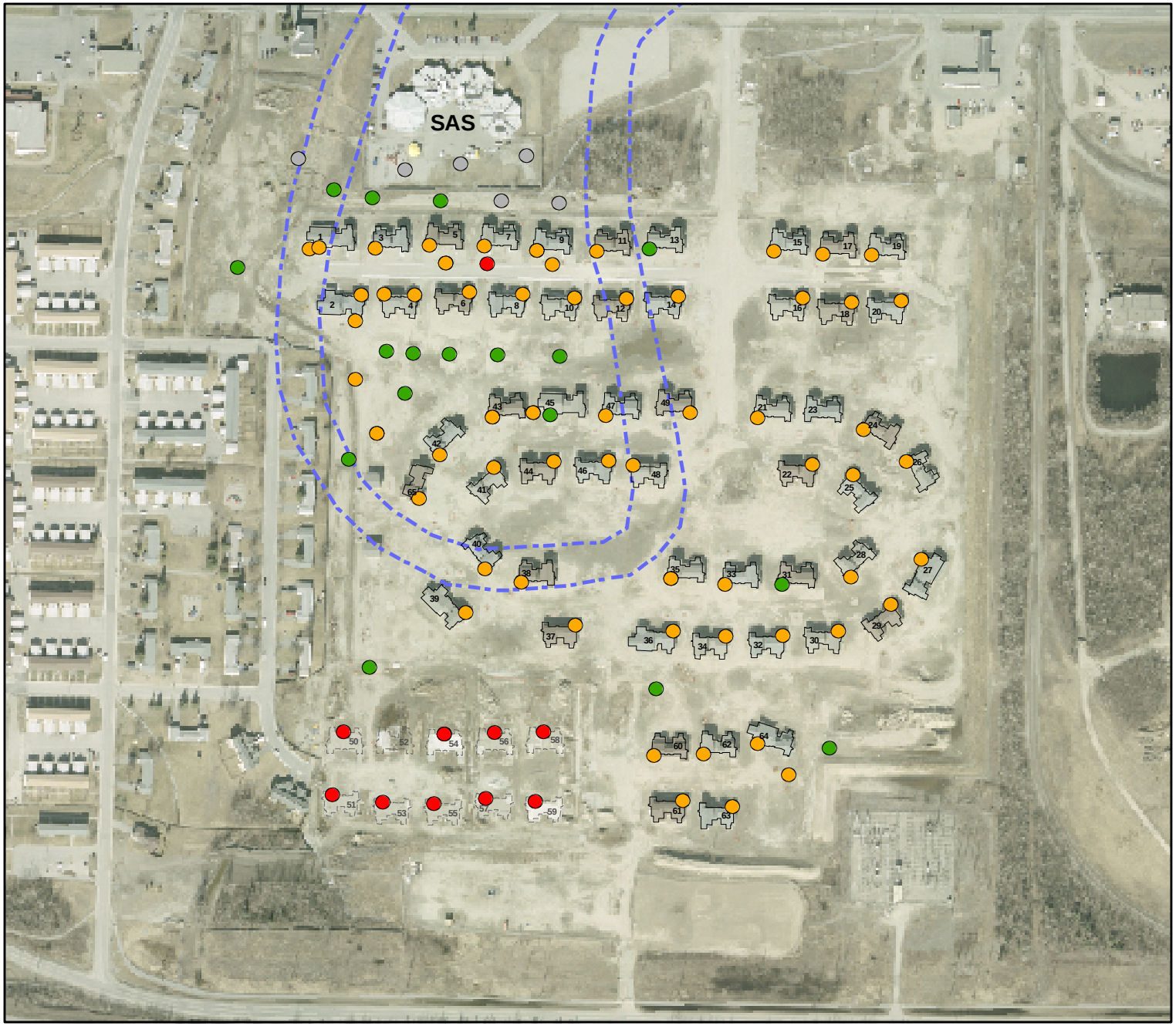
4.0 References

CH2M HILL. 2008a *Revised Interim Draft Remedial Investigation Management Plan*. January 2008.

CH2M HILL. 2008b. *2007 Field Data Report, Taku Gardens Former Communications Site, Fort Wainwright, Alaska.* February 2008.

Northwind, Inc. 2007. *Preliminary Source Evaluation II Report. Taku gardens, Fort Wainwright, Alaska (Final)*.

FIGURE 1-1
Soil Gas Sample Locations with Exceedances of Screening Levels
Former Communications Site
Fort Wainwright, Alaska



LEGEND

Former Hoppe's Slough

Freon Concetration - Soil Gas (ug/m^3)

- 92 - 1,000
- 1,300 - 10,000
- 12,000 - 100,000
- 110,000 - 500,000

N

0 375

Feet

FIGURE 1-2
Soil Gas Sample Locations with Freon
Former Communications Site
Fort Wainwright, Alaska

LEGEND

Building Proposed for Fall 2008 Sub-slab Soil Gas and Indoor Ambient Air Sampling

Former Hoppe's Slough

0 375
Feet

N

FIGURE 1-3
Proposed Fall 2008 Sample Locations
Former Communications Site
Fort Wainwright, Alaska

CH2MHILL

File Path: \\Simba\Proj\USArmyCorpsOfEnginee\357465TakuGardens\GIS\MapFiles\WorkPlan_2008\SoilGasSampleLocs_Fall2008.mxd, Date: September 23, 2008

LEGEND

- 1,000 gpm Pumping Rate Water Supply Capture Zone
- 1,700 gpm Pumping Rate Water Supply Capture Zone
- TCE/PCE Plume
- 2007 Drum and Debris Excavation Area
- 2007 PCB Investigation Area
- POL Plume
- POL Source Area
- Former Hoppe's Slough

Monitoring Well

- New Monitoring Well Installation
- Existing Monitoring Well

March 2007 Magnetic Data
EM61 Results (mV)

- -1500
- -20
- 20
- 30
- 50
- 75
- 100
- 200
- 300
- 500
- 1000
- 2000

0 275
Feet

N

FIGURE 2-1
Additional Groundwater Monitoring WellLocations
Former Communications Site
Fort Wainwright, Alaska

LEGEND

1,000 gpm Pumping Rate Water Supply Capture Zone

1,700 gpm Pumping Rate Water Supply Capture Zone

TCE/PCE Plume

2007 Drum and Debris Excavation Area

2007 PCB Investigation Area

POL Plume

POL Source Area

Former Hoppe's Slough

Monitoring Well

Monitoring Wells To Be Sampled Fall 2008

Other Existing Wells (Not To Be Sampled)

March 2007 Magnetic Data
EM61 Results (mV)

-1500
-20
20
30
50
75
100
200
300
500
1000
2000

0 275
Feet

FIGURE 3-1
Fall 2008 Groundwater Sample Locations
Former Communications Site
Fort Wainwright, Alaska

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