DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, U.S. ARMY GARRISON, FORT WAINWRIGHT

FINAL, REVISION 1

2007/2008/2009 FORMER COMMUNICATIONS SITE DRUM AND DEBRIS AND PCB INVESTIGATION REPORT

FORT WAINWRIGHT, ALASKA

JANUARY 2011

U.S. Army Corps of Engineers, Alaska District
Environmental Remediation Services
Contract No. W911KB-06-D-0006
Task Order No. 0007

JACOBS

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Appendix D Survey Data (Provided on CD)
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Appendix H Final GORE™ Reports
Appendix I OU6 Documentation

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ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ACM	asbestos-containing material
ADEC	Alaska Department of Environmental Conservation
bgs	below ground surface
CFR	Code of Federal Regulations
COC	contaminant of concern
CRREL	Cold Regions Research and Engineering Laboratory
cy	cubic yard
DDT	dichlorodiphenyltrichloroethane
DERA	Defense Environmental Restoration Account
DFW	definable features of work
DMM	discarded military munitions
DPW	Directorate of Public Works
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DRO	diesel-range organics
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
FCS	Former Communications Site
FS	feasibility study
FSP	Field Sampling Plan
GRO	gasoline-range organics
HAZCAT	Hazardous Characterization and Compatibility Testing
HFD	hazard fragmentation distance
IDW	investigation derived waste
Jacobs	Jacobs Engineering Group Inc.
MD	munitions debris
MEC	munitions and explosives of concern
mg/kg	milligrams per kilogram
MI	multi-incremental

ACRONYMS AND ABBREVIATIONS (CONTINUED)

mV	millivolts
PCB	polychlorinated biphenyl
PID	photoionization detector
POL	petroleum, oil, and lubricants
ppm	parts per million
PRSE	Preliminary Risk Screening Evaluation
PSE	preliminary source evaluation
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
RPM	Remedial Project Manager
RRD	range-related debris
RRO	residual-range organics
SSHP	Site Safety and Health Plan
SVOC	semivolatile organic compound
TCLP	Toxicity Characterization Leaching Procedure
TSA	Transformer Service Area
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
USACE	U.S. Army Corps of Engineers
USAED	U.S. Army Engineer District, Alaska
USC	United States Code
UXO	unexploded ordnance
VOC	volatile organic compound
°F	degrees Fahrenheit

EXECUTIVE SUMMARY

The Fort Wainwright Former Communications Site (FCS) drum, debris, and polychlorinated biphenyls (PCB) Investigation was accomplished over the course of three field seasons, from August 2007 to November 2009. The objectives of the Investigation were to determine if contaminants of concern (COC) were emanating from buried drums and debris identified as anomalies in an electromagnetic-61 (EM61) geophysical survey and to provide information and data for the risk assessment being prepared by CH2M Hill. The geophysical investigation focused on identifying drums and debris near Buildings 49, 48, 15/17, and 22/24 and in Area D. Other geophysical investigations included locating hot spots identified on the EM61 survey with results exceeding 75 millivolts (mV) and a quality control check of the hot spots identified on the EM61 survey with results below 75 mV. The combined investigation efforts of 2007, 2008 and 2009 covered nearly 8 acres. Environmental concerns removed include 1,058 drums, 2,923 munitions-related items, 4,813 cubic yards of contaminated soil and 386 tons of debris.

PCB investigation activities in 2007 and 2008 occurred mainly in Area E (Figure 1-2) around the foundation footprint of Building 52. Additional areas of investigation included the Transformer Service Area to the east of the site and several other smaller hot spots adjacent to Building 52. In 2009, all nine building foundations within Area E were removed and sampled for PCB contamination. All sample results were below site screening criteria (Appendix B). Buried munitions-related items including discarded military munitions, range-related debris, and munitions debris were a concern at the site. In addition to the munitions-related items, COCs such as fuels, solvents, and Resource Conservation and Recovery Act (RCRA) metals were a concern in soil. All activities were conducted in accordance with the approved *Munitions and Explosives of Concern Support, Former Communications Site Drum and Debris Remedial Investigation (RI) Work Plans* (U.S. Army Engineer District, Alaska 2008a and 2008b), and applicable Technical Memorandums prepared for specific activities in 2009 (USAED 2009a-h).

A total of 1,168 tons of Toxic Substances Control Act-regulated PCB-contaminated soil (concentration greater than 50 milligrams per kilogram [mg/kg]) and 691 tons of nonregulated PCB-contaminated soil (concentrations greater than 10 mg/kg and less than 50 mg/kg) was removed and shipped to Arlington, Oregon, for disposal in 2007. Additionally, approximately 1,900 cubic yards of PCB-contaminated soil with concentrations less than 10 mg/kg were removed and disposed of in the Fort Wainwright Landfill in accordance with the disposal permit 2007 through 2009. In addition to the PCB-contaminated soil, soil with concentrations of dichlorodiphenyltrichloroethane (DDT) and petroleum, oil, and lubricants (POL) above the project screening levels were also removed from the FCS. Stockpiles associated with construction and previous investigations were also removed during the 2007, 2008, and 2009 field seasons. Tables ES-1, ES-2, and ES-3 present a summary of the materials removed from the FCS during the 2007, 2008, and 2009 field seasons, respectively. Disposal destination information can be found in Section 7.0 of this report.

Table ES-1
Summary of Materials Removed During the 2007 Investigation

Investigation Area	Area of Investigation (square feet)	Drums	Contaminated Soil (cubic yards)	Contaminant in Soil	Other Materials Removed	Munitions Related Items
Building 49	4,500	186	24	Tar and Paint	Paint, concrete	-
Building 48	32,000	159	150	120 cy – Solvent 30 cy – Lead	Lead-acid batteries, degraded xylene drum, asphalt tar	17 MD 3 RRD
Building 15/17	9,400	75	3	Lead	Asbestos, transformer material, lead-acid batteries, charcoal (contained in gas masks)	230 MD 5 DMM 27 RRD
PCB Removal	12,527	-	972.5 (> 50 mg/kg TSCA) 575 (10-50 mg/kg non-TSCA)	PCB	-	-
Other Areas of Investigation for MEC support including well clearance	-	-	-	-	-	520 RRD 20 MD
Totals	58,427	420	1,724.5	-	-	822

Note: For definitions, see the Acronyms and Abbreviations section.

Table ES-2
Summary of Materials Removed During the 2008 Investigation

Investigation Area	Area of Investigation (square feet)	Drums	Contaminated Soil (cubic yards)	Contaminant in Soil	Other Materials Removed	Munitions Related Items
Building 1	6,161	1	-	-	Concrete, misc. scrap metal	-
Building 9	60	-	3	POL	POL-impacted soil	-
Building 11	4,449	10	15	DDT	Misc. scrap metal, pesticide-impacted soil	-
Building 12	3,563	4	24	Creosote	Misc. scrap metal	-
Building 15/17	75,579	115	238	210 cy – POL 8 cy – Solvent 20 cy - Lead	Lead-impacted soil, POL-impacted soil, paint/thinner impacted soil, drums with residual POL, hydraulic cylinder	503 MD 1 DMM 35 RRD
Buildings 16 and 21	5,262	-	-	-	Misc. scrap metal	-
Building 22/24	66,190	39	34	30 cy – POL 4 cy - Paint	Lead-impacted soil, POL-impacted soil, misc. air tanks, paint-impacted soil	1,147 MD 405 RRD
Building 26	5,587	1	7	Lead	Metals-impacted soil	-
Building 29	3,236	-	-	-	-	-
Building28/31	1,497	-	60	POL	POL-impacted soil	6 MD 1 DMM
Building 38	1,488	-	-	-	Soil/small metal debris	-
Building 40	170	-	60	POL	POL-impacted soil	-
Building 43	1,401	-	-	-	-	-
Building 45	60	-	3	POL	POL-impacted soil	-
Building 49	4,748	-	-	-	-	-
Area D	25,876	415	2	Paint	Drums with residual POL, paint-impacted soil	3 MD
PCB Area E	970	-	1,720 (1-10 mg/kg)[1]	PCB	None	-
Totals	201,549	585	2,166	-	-	2,101

Notes:

[1]1688 cubic yards of this soil was stockpiled in 2007 for removal in 2008. The remaining 32 cubic yards was excavated and removed in 2008.

For definitions, see the Acronyms and Abbreviations section.

Table ES-3
Summary of Materials Removed During the 2009 Investigation

Investigation Area	Area of Investigation (square feet)	Drums	Contaminated Soil (cubic yards)	Contaminant in Soil	Other Materials Removed	Munitions Related Items
Building 9	4,905	-	920	POL	Concrete, misc. scrap metal	-
Building 11	10,575	8	-	-	Misc. scrap metal	-
Building 35	432	-	-	-	Misc. scrap metal	-
Area E Foundation Demolition	30,000	-	-	-	Concrete and rebar	-
Building 15/17	22,050	-	-	-	Misc. scrap metal	-
Building 49	2,500	45	3	POL	Misc. scrap metal	-
Totals	70,462	53	923	-	-	-

Note: For definitions, see the Acronyms and Abbreviations section.

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1.0 INTRODUCTION

This Investigation Report describes the work performed at the Fort Wainwright Former Communications Site (FCS), also called "Taku Gardens", during the 2007, 2008, and 2009 field seasons as part of the ongoing RI/Feasibility Study (FS). The FCS is located on the U.S. Army Post at Fort Wainwright in Fairbanks, Alaska. The U.S. Army Garrison, Alaska, the U.S. Environmental Protection Agency (EPA), and the Alaska Department of Conservation (ADEC) agreed to conduct the FCS RI/FS using systematic planning, dynamic work strategies based on field observations, and real-time data measurement technologies to ensure that all stakeholder concerns are addressed during the planning and execution process. The overall objective of the 2007/2008/2009 Investigation was to investigate appreciable buried metallic anomalies previously identified by geophysical surveys throughout the site, to investigate and excavate known polychlorinated biphenyl (PCB)-contaminated soils and ensure surrounding areas did not exceed 1 mg/kg PCBs; and to investigate and excavate soils with petroleum, oil, and lubricants (POL); and pesticide contamination. Contaminated soils were excavated and disposed of at appropriate facilities. Activities were also performed in support of the overall goal of investigating the site and disposing of investigative-derived waste and debris and to provide information for the risk assessment being prepared by CH2M Hill.

Jacobs Engineering Group Inc. (Jacobs) performed this work for the U.S. Army Engineer District, Alaska (USAED), under Environmental Remediation Services contract W911KB-06-D-0008, Task Order No. 007. Results of the geophysical surveys, soil characterization samples, and other information gathered during the Investigation activities performed by Jacobs have been provided to CH2M Hill for inclusion in their remedial investigation report. The intent of this report is to describe the Investigation activities conducted during these three field seasons and provide the associated geophysical, analytical and survey data. Analytical results are presented in Appendix B, but are not assessed as part of this report. For an assessment of the analytical samples collected during the 2007/2008/2009 Investigation, please refer to the *CH2M Hill RI Report* (USAED 2010). Work completed during the Investigation is presented and described in chronological order in Sections 4.0 through 6.0 of this report.

Investigation activities occurred between 21 August and 12 November 2007, 21 May and 23 October 2008, and 18 May and 13 November 2009. Prior to mobilization in each of the field seasons, a series of comprehensive work plans and technical memorandums detailing Investigation methodology were submitted and approved.

1.1 REPORT ORGANIZATION

This report is organized as follows:

- Section 1.0 presents a general introduction to the project and Data Quality Objectives (DQO).
- Section 2.0 describes the general Investigation methodology.
- Section 3.0 presents an overview of activities performed during the 2007/2008/2009 Investigation.
- Section 4.0 summarizes the site-specific activities performed in 2007.
- Section 5.0 summarizes the site-specific activities performed in 2008.
- Section 6.0 summarizes the site-specific activities performed in 2009.
- Section 7.0 discusses waste management.
- Section 8.0 presents conclusions and recommendations.
- Section 9.0 presents references used to develop this report.

The appendices are organized as follows:

- Appendix A contains the photographic log.
- Appendix B contains the analytical data, Data Quality Assessment, ADEC Laboratory Data Review Checklists, and laboratory documentation.
- Appendix C contains waste documentation.
- Appendix D contains survey data.
- Appendix E contains field notes and borehole logs.
- Appendix F contains munitions and explosives of concern (MEC) data disposal information and the Explosives Safety Plan.
- Appendix G contains the laboratory data deliverables.
- Appendix H contains the final GORE™ Reports from 2008 and 2009.
- Appendix I contains signed Federal Facility Agreement OU6 documents.

1.2 SITE DESCRIPTION AND HISTORY

Fort Wainwright occupies a 1,577,095.91-acre military installation west of Fairbanks, Alaska. The main cantonment is 13,700 acres. The FCS (commonly referred to as "Taku Gardens") is a 54-acre construction site located between Alder and Neely Roads, east of White Street and west of the Fort Wainwright Power Plant. The site is currently occupied by 55 duplex properties and is enclosed by chain-link fencing on all sides. The site has been divided into five separate areas (Areas A to E), based on historical use of the site and observations made during construction activities, potential contaminants of concern (COC), and the potential for munitions-related items. Conceptual models for each of these areas are presented in the *RI/FS Management Plan* (USAED 2007j). Figure 1-1 shows the project location, and Figure 1-2 presents a plan view of the FCS, denoting the boundaries of each area and pertinent site features.

Fort Wainwright is located adjacent to the city of Fairbanks which is located in interior Alaska approximately 350 miles north of Anchorage. Both the Parks and Richardson Highways provide transportation between Anchorage and Fairbanks. The city is also serviced by the Alaska Railroad and the Fairbanks International Airport.

Fairbanks has a variable climate with average temperatures ranging from 65 to 90 degrees Fahrenheit (°F) in summer and from -60 to 30 °F in winter. Average annual precipitation is 11 inches, and average annual snowfall is 70 inches.

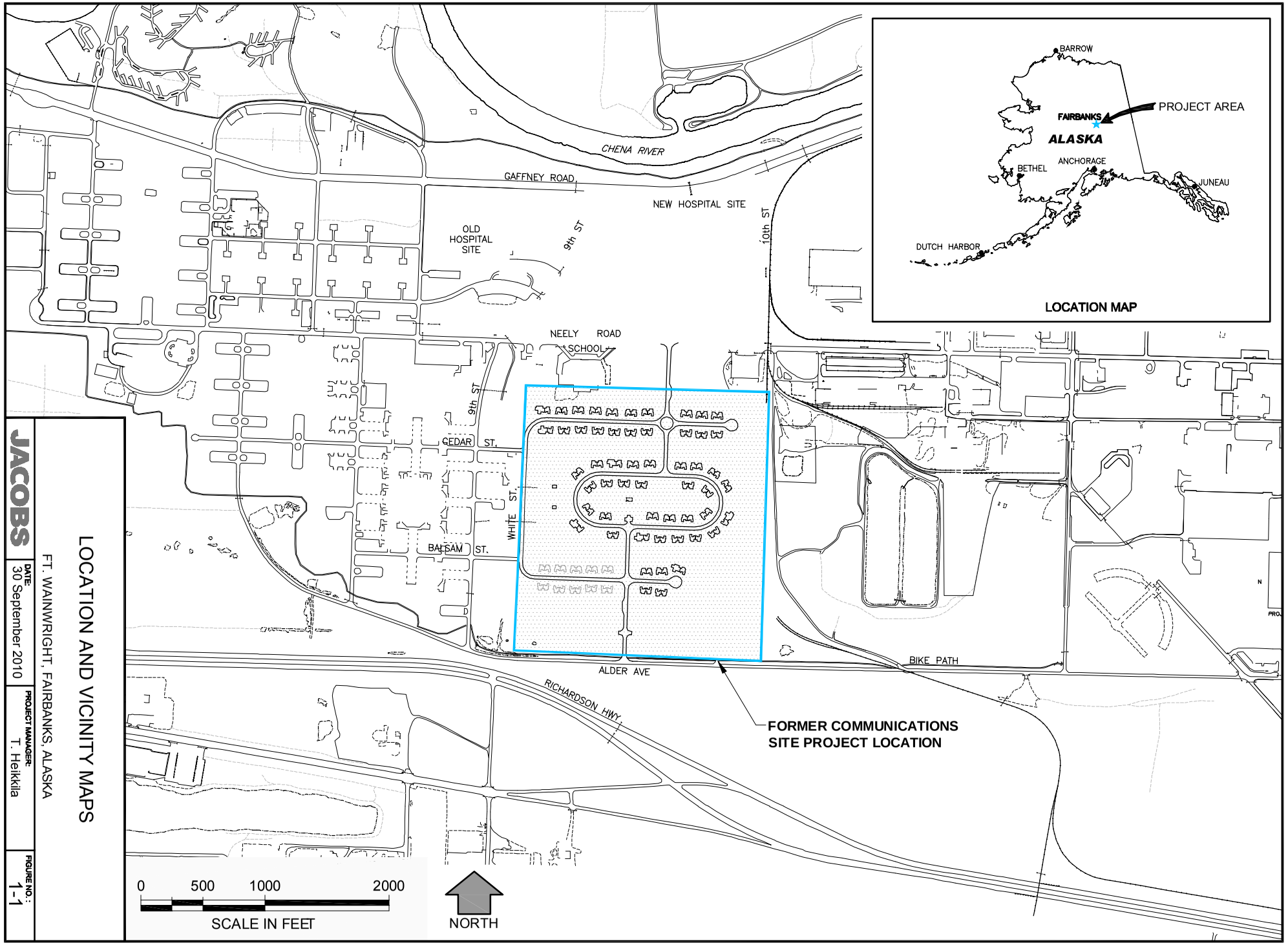
The site is located approximately 460 feet above sea level and the topography is level. Fort Wainwright is located in the Tanana River Valley, a generally flat lowland area between the Yukon-Tanana Upland to the north and the Tanana-Kuskokwim lowland to the south. Soils at Fort Wainwright consist of glacial outwash and fluvial deposits of gravel, sand, and silt. Fort Wainwright lies within the discontinuous permafrost zone of Alaska. Permafrost was encountered during construction in the southeastern portion of the site. Bedrock at the site is anticipated to consist of granite and schist. The depth to bedrock in the area varies from a few feet in upland areas to several hundred feet near the Tanana River. Bedrock was not encountered during the 2007/2008/2009 Investigation.

The groundwater table ranges from approximately 10 to 20 feet below ground surface (bgs) and flows in a west-northwest direction. During investigation activities, groundwater was generally encountered within fluvial gravel. The aquifer supplying Fort Wainwright is the Tanana River Basin alluvium. The Tanana River is approximately 3 miles south of the site, and runs thru the Installation/Tanana Flats Training Area. The Chena River is a tributary to the Tanana and flows in a west-to-east direction through the post. At its nearest point, the Chena River runs 1,500 feet north of the site.

A thorough historical review of the site was undertaken in winter 2005/2006 and is presented as part of the *Preliminary Source Evaluation (PSE) I Report* (USAED 2007a) and *PSE II Report* (USAED 2007b). A brief summary of this information is presented below.

The U.S. military has occupied the general area of the FCS for over 60 years, and during this time a wide variety of land uses have occurred in various areas of the site. Between the late 1940s and late 1950s the site consisted of troop billets, battalion, and wing level operations. Base disposal and salvage occurred in a portion of the site, some of which is likely to be associated with dumping into a loop of a historic river channel associated with the site. Military items associated with both the U.S. Army and the U.S. Air Force are likely to have been deposited during this period. Troop billets built for the arrival of the 3rd Battalion, 4th Infantry Regiment, also occupied a portion of the site from 1951 to 1956. A motor pool associated with the regiment was located onsite during this period. Figure 1-3 presents the historic imagery (aerial photos) from 1948 to 2002 and shows many of the changes described above.

G:\Autocad\ERS-UR\05F50701\2009 RI Rpt\Fig 1-1 Location & Vicinity Maps.dwg Sep 30,2010 -tiedemam

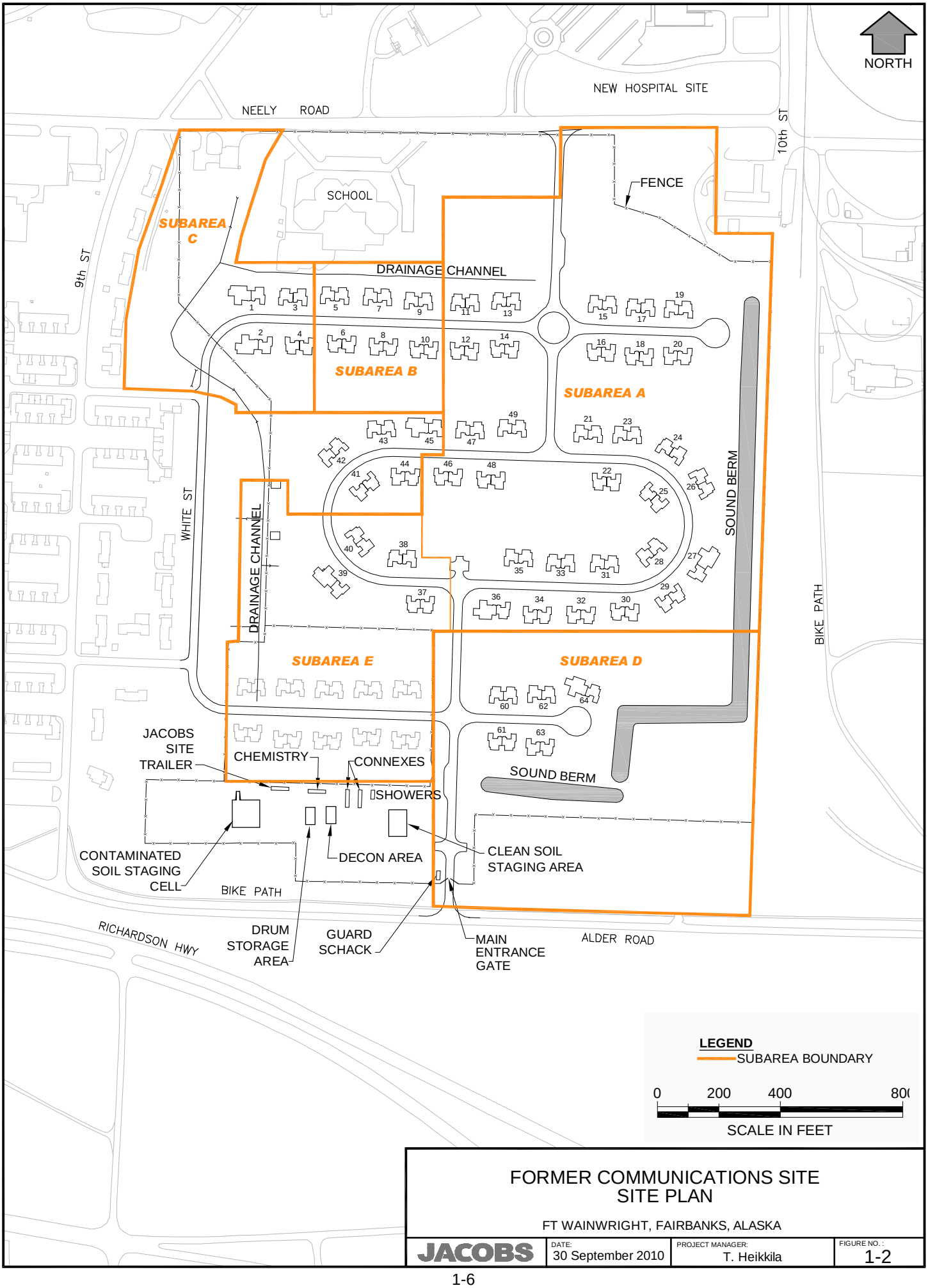


LOCATION AND VICINITY MAPS

FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO.: 1-1

1-5

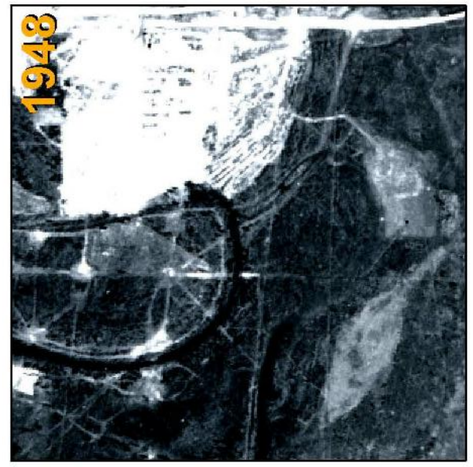


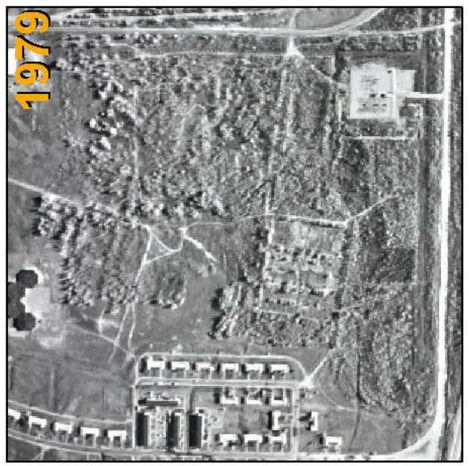
FORMER COMMUNICATIONS SITE
SITE PLAN

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 1-2

G:\Autocad\ERS-UR\05F5070112009 RI Rpt\Fig 1-2 Site Plan.dwg Sep 30,2010 -tiedemam





FORMER COMMUNICATIONS SITE
HISTORICAL IMAGERY

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 1-3

G:\Autocad\ER\S-UR\05F5070\12009 RI Rpt\Fig 1-3 Historical Photos.dwg Sep 30,2010 - ledeman

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1.3 PREVIOUS INVESTIGATIONS

A detailed chronology of the various phases of work undertaken since the FCS was first selected for future military housing in 2002-2003 is presented in both the *PSE I Report* and the *PSE II Report* (USAED 2007a, 2007b) and in the *Corp of Engineers Geotechnical and Chemical Findings Report* (USAED 2004). An initial Electro Magnetic 31 (EM31) geophysical survey was performed by Cold Regions Research and Engineering Laboratory (CRREL) in 2003 for the U.S. Army Garrison Alaska. Data were collected in the upper northeast corner of the site, south of the PX gas station and from areas identified on historical photos that contained debris piles. The objective of this survey was to confirm buried metal and provide a map (but no report) of the area.

Several phases of investigation have occurred at the FCS since July 2005, when concern was initially raised following detection of an odor during excavation for foundations in the southwest corner of the site near Building 52. Once construction and excavation activities ceased in this area, environmental sampling indicated elevated levels of PCB contamination as high as 119,000 milligrams per kilogram (mg/kg). On 8 August 2005, EPA and ADEC were notified of the findings and have been actively involved with the Taku Gardens project ever since.

In winter 2005-2006, a review of construction field notes, photographs, and historical site uses led to a determination by the Army, EPA, and ADEC that a site-wide investigation was required to fully determine the nature and extent of contamination. In 2005, the Army commissioned a PSE I (existing data evaluation) and PSE II (limited field investigation), and in June 2006, North Wind Inc. initiated site investigation and characterization activities in support of the PSE II (USAED 2007b).

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Activities undertaken as part of the PSE II included investigation of debris, soil, soil vapor, and groundwater. During the debris investigation, 30 test pits and 22 stockpiles (created during construction activities) were investigated, and a total volume of 3,600 cubic yards of material was inspected. Eight items from this debris were classified as munitions-related items and disposed of accordingly. These items included an M1A1 20-pound Frag Bomb, four empty M47-Series bombs, a T-85 3.5" rocket, and two M106 8-inch projectiles with inert filler as described in Table 2.4-4 of the 2007 *Draft PSE II Report* (USAED 2007b). A number of ruptured and punctured drums, some containing a tar-like substance, were discovered in Test Pit 14, located adjacent to Building 49. The full extent of these drums was not delineated during this investigation, and the possibility that the drums extended under Building 49 was considered.

In addition to the PCB-contaminated area found during excavation of Building 52, other potential areas of PCB contamination were identified based on historical uses and mainly centered around the Exclusion Zone to the southwest of the site (Area E). This led to an additional investigation conducted in an area identified as the Transformer Service Area (TSA), and in the vicinity of the Sound Berm due east of Buildings 20 and 26 (refer to Figure 1-2, Figures 4-1 to 4-14, and Figures 5-1 to 5-28).

Soil samples recovered from approximately 150 borings advanced to a maximum of 12 feet bgs were primarily analyzed using field screening methods (i.e., HACH Immunoassay PCB Test Kits) although some were submitted for laboratory analysis as a quality check. Field test kits were able to distinguish areas of soil contamination containing greater than the ADEC Method Two residential cleanup level of 1 mg/kg for PCBs. Of the 226 soil samples analyzed using field test kits, 32 yielded positive detects for PCB contamination (greater than 1 mg/kg), indicating a large area of contamination around the footprint of Building 52, with several other isolated locations of contamination in the exclusion zone and TSA. Contamination generally appeared to be confined to the upper 5 feet of the soil column.

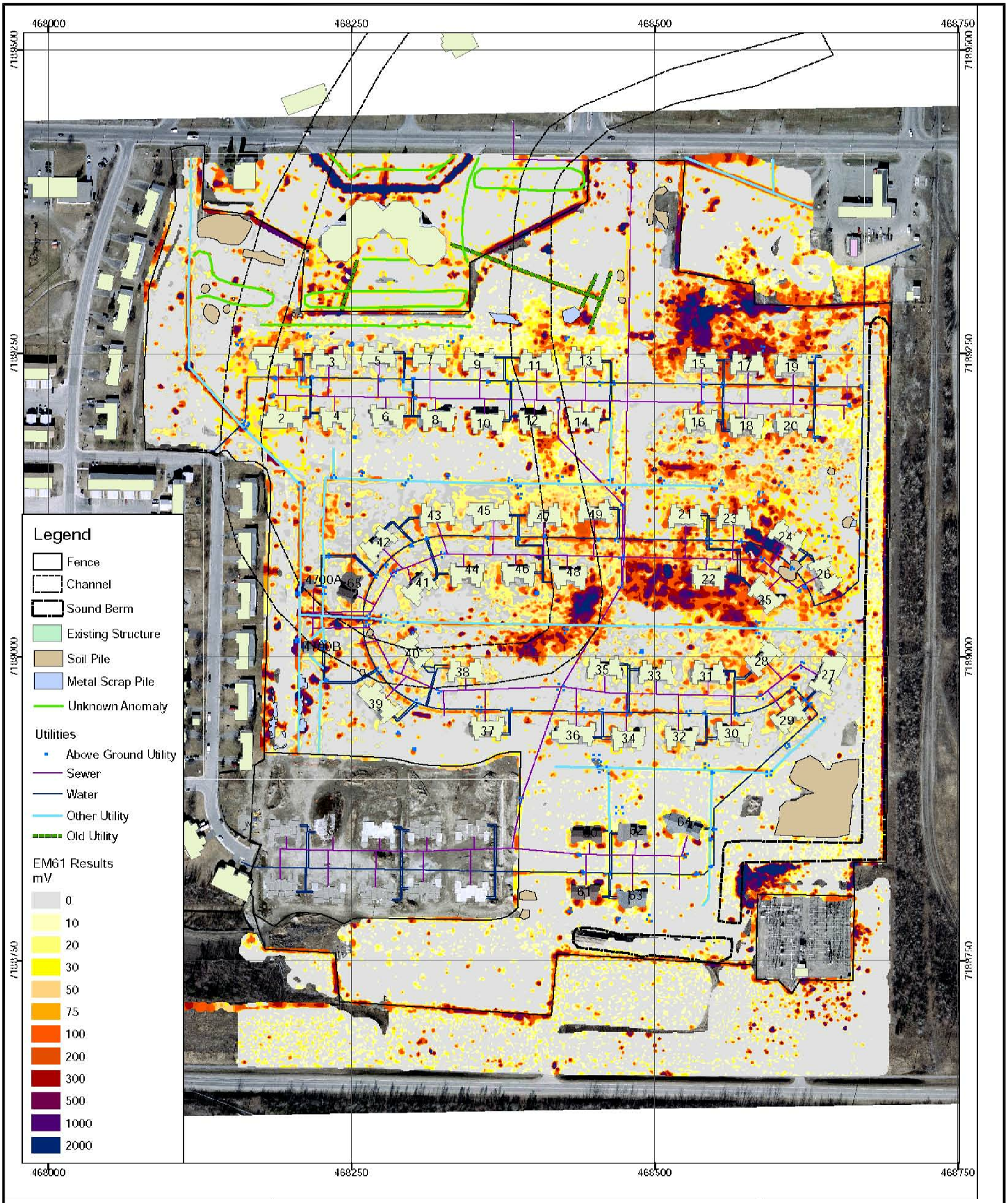
Several wells were installed in areas identified as having significant POL contamination, and a passive gas sampler (GORE^{TM} sorber) was used to detect soil-gas vapor compounds. The classes of analytes detected in the soil-gas vapor were petroleum-related compounds, chlorinated

solvents, chlorofluorocarbons, and some tentatively identified compounds. Further details are presented in the *PSE II Report* (USAED 2007b).

The final PSE II activity was a groundwater investigation to determine groundwater flow and direction and to identify COC within the groundwater. Shallow groundwater beneath the construction site was determined to have been impacted by contamination in select areas.

In 2007, USACE CRREL performed a geophysical survey to delineate the extent of buried debris, including drums and scrap metal, identified in the *PSE I* and *PSE II Reports*. It was also used to help characterize sub-areas and potential munitions areas from the non-munitions portions of the site. This survey was conducted with an EM61 (1 meter by 1 meter coils) and an EM61-MK2 (1 meter by 0.5 meter coils). The towed array method was chosen for efficiency in this reconnaissance survey. This was not intended as an unexploded ordnance (UXO) detection survey. The survey began in March 2007 using a snowmobile to tow the equipment. In July 2007, an all terrain vehicle was used to tow two EM61 MK2 systems. The entire site was surveyed by July 2007 except for the existing metal and soil piles.

Figure 1-4 presents the results of this survey. This figure was used to delineate the extent of the investigation areas during the 2007/2008/2009 Investigation.



NORTH

0 50 100 200

APPROXIMATE SCALE IN FEET

FORMER COMMUNICATIONS SITE
2007 GEOPHYSICAL SURVEY PERFORMED BY CRREL

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 1-4

G:\Autocad\ERS-UR\05F5070112009 RI Rpt\Fig 1-4 Geophysical.dwg Sep 30,2010 - tiedemam

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1.4 2007/2008/2009 REMEDIAL INVESTIGATION PROJECT OBJECTIVES

Sections 1.4 through 2.5 describe the general methodology and procedures used to complete the FCS 2007/2008/2009 Investigation. Sections 4.0 through 6.0 present the findings and results for each year. Both Jacobs and CH2M Hill performed site work in support of the project objectives. In 2007, CH2M Hill collected excavation characterization samples and performed screening and sampling in the PCB area. In 2008 and 2009 this responsibility was transferred to Jacobs. CH2M Hill maintains control of the project database and is the author of the RI currently being prepared (USAED 2010). From 2007 to 2009, Jacobs was responsible for overall site control, excavation activities and waste management. The following sections describe the breakdown of the responsibilities.

The overall project objectives for the 2007, 2008, and 2009 Investigation activities were as follows:

- Determine extent of and remove all PCB-contaminated soil exceeding the residential cleanup value of 1 mg/kg within the footprint of the project area.
- Determine potential COCs contained within or emanating from metallic debris at Buildings 49, 48, 15/17, and 22/24, and Area D, and buried anomalies as determined by EM61 geophysical survey.
- Collect data to support the Risk Assessment and RI being prepared by CH2M Hill.

Six separate work plans were prepared in 2007 to support the project objectives and provide specific details and the definable features of work (DFW). These plans included:

- *Long-Term Soil Stockpile Plan* (USAED 2007c)
- *Communications Plan* (USAED 2007d)
- *Site Safety and Health Plan* (SSHP) (USAED 2007e)
- *Munitions and Explosives of Concern Support Work Plan* (USAED 2007g)
- *2007 Work Plan, Former Communications Site Drum and Debris Investigation* (USAED 2007h)
- *2007 Work Plan, Former Communications Site PCB Removal Action* (USAED 2007i)

Three of these plans were updated for the 2008 and 2009 field seasons:

- *Munitions and Explosives of Concern Support Work Plan* (USAED 2008a)
- *2008 Work Plan, Former Communications Site Drum and Debris Remedial Investigation* (USAED 2008b)
- *Site Safety and Health Plan* (USAED 2008c)

In addition to the work plans the following technical memorandums were also prepared to support specific portions of 2009 field work:

- *2009 Taku Gardens: Investigation of 1,2,3 TCP Contamination Plume* (USAED 2009a)
- *2009 Taku Gardens EM61 Hotspot Excavation* (USAED 2009b)
- *2009 Taku Gardens: Delineation of Northern Groundwater Plumes* (USAED 2009c)
- *2009 Taku Gardens PCB Area Foundation Demolition* (USAED 2009d)
- *2009 Taku Building 49 Drum and Debris Removal* (USAED 2009e)
- *2009 Taku Gardens Installation of Monitoring Wells North of the Site* (USAED 2009f)
- *2009 Taku Gardens Sound Berm Additional Sampling Locations* (USAED 2009g)
- *2009 Taku Gardens Sampling of Contaminated Soil Pile* (USAED 2009h)

All work plans and technical memorandums were developed to support the overall *RI/FS Management Plan* (USAED 2007j).

1.4.1 Polychlorinated Biphenyls Investigation Objectives (2007/2008)

In order to achieve the project objective to determine the extent of and remove all PCB-contaminated soil exceeding the residential cleanup value of 1 mg/kg within the footprint of the project area, CH2M Hill and Jacobs abided by the following DQOs:

- Characterize Toxic Substances Control Act (TSCA)-regulated soil for transportation to an offsite treatment, storage, and disposal facility (TSDF) by collecting samples from the first ten waste containers filled during field activities and analyzing them for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), pesticides, herbicides, and Resource Conservation and Recovery Act (RCRA) metals. This provided waste profiling information for manifesting labeling and disposal facility requirements.
- Characterize soil previously identified as having PCB concentrations greater than 1 mg/kg but less than 10 mg/kg. This was achieved by collecting representative soil samples from stockpiles generated at a frequency of one every 20 cubic yards and analyzing them for VOCs, SVOCs, pesticides, herbicides, RCRA Metals and PCBs.
- Confirm contaminated soil has been removed and only soil below action levels remain (Area E). This was achieved by collecting soil samples from the investigation area and analyzing them for PCBs.

In accordance with the *RI/FS Management Plan* (USAED 2007j), CH2M Hill conducted both field screening (using HACH immunoassay and RaPID PCB screening test kits) and characterization sampling in support of the investigation in 2007. Starting in 2008, Jacobs conducted the characterization sampling activities.

At the request of the disposal facility, soil previously characterized as containing PCB concentrations greater than 1 mg/kg but less than 10 mg/kg required further analytical testing to determine the most appropriate TSDF. Samples were collected and analyzed in accordance with the *Field Sampling Plan* (FSP) addendum to the *PCB Removal Action Plan* (USAED 2007i). Soil containing PCBs below 10 mg/kg was disposed of at the Fort Wainwright Landfill; soil containing PCBs between 10 and 50 mg/kg was disposed of as non regulated TSCA; and soil containing PCBs exceeding 50 mg/kg was disposed of as regulated TSCA waste. Non-regulated and regulated TSCA waste was disposed of at Chemical Waste Management of the Northwest, Arlington, OR. Prior to disposal, soil was stockpiled onsite according to the *Long-Term Soil Stockpile Plan* (USAED 2007c).

1.4.2 Polychlorinated Biphenyls Investigation Objectives (2009)

Removal of the foundations within Area E (the PCB Area) was added to the 2009 scope of work. The objective of this demolition action was to remove all existing building foundations and associated utilities within Area E to prepare the area for future construction and to identify potential contamination within the footprint of each building. The *2009 Taku Gardens PCB Area Foundation Demolition Technical Memorandum* (USAED 2009d) presents a detailed discussion of the objectives.

In addition to the 2007 and 2008 sampling DQOs described in Section 1.4.1, Jacobs abided by the DQO to confirm contaminated soil has been removed and only soil below action levels remain (Area E). This was achieved by collecting soil samples and analyzing them for PCBs. Ten percent of the samples were also analyzed for VOCs and SVOCs.

1.4.3 Drum and Debris Investigation Objectives

This section discusses the objectives of both the waste characterization and sampling activities associated with the drum and debris investigation conducted as part of the 2007/2008/2009 Investigation. Sampling activities were conducted by CH2M Hill and Jacobs.

There were several different objectives for the 2007, 2008, and 2009 field seasons. In 2007, the project objective for the drum debris investigation was to determine potential COCs contained within or emanating from metallic debris at Buildings 15/17, 22/24, 48, and 49 and Area D, as determined by EM61 geophysical survey.

Geophysical evidence and analytical results from soil sampling during the 2007 Investigation suggested that anomalies with an EM61 result of 75 mV and above represented what could be an area containing drums of hazardous materials or waste, MEC, or other COCs. Therefore an additional objective for the 2008 and 2009 field seasons was to determine potential COCs contained within or emanating from metallic debris at designated and hot spots greater than 75 mV.

- Based on historical evidence presented in the *PSE II Report* (USAED 2007b), these areas were understood to represent a significant potential of encountering hazardous materials or potential COCs based upon the strength and area of their signal, proximity to known areas of metallic debris, and comparison against historical maps and photographs. Hotspots associated with building footprints and utilities were not investigated. The *2009 Taku Gardens EM61 Hotspot Excavation Technical Memorandum* (USAED 2009b) presents additional information regarding the hotspots investigated.

1.4.3.1 Drum and Debris Waste Characterization Activities

Jacobs complied with the following DQOs during the 2007 Drum and Debris Investigation in order to properly characterize waste to determine the appropriate transportation and disposal method:

- Characterize drum contents by collecting field screening samples from all drums with contents and analyzing these samples using Hazardous Characterization and Compatibility Testing (HAZCAT) procedures to determine the appropriate waste stream. This was achieved by analyzing samples for pH, fuel presence, miscibility, flash point, and oxidizing potential.
- Characterize drum contents for offsite disposal in accordance with the Code of Federal Regulations (CFR), Title 40, Part 262.1, involving the collection and analysis of samples consolidated in the same waste stream. This was achieved by analyzing samples for reactivity, ignitibility, VOCs, SVOCs, PCBs, RCRA metals, pesticides, and herbicides.
- Characterize soil for offsite disposal purposes by collecting soil samples during investigation activities in accordance with the FSP (Appendix A of the *2007 Work Plan, Former Communications Site Drum and Debris Investigation* [USAED 2007h]).
- Long-Term Soil Stockpile Plan (USAED 2007c), where samples were analyzed for reactivity, ignitibility, VOCs, SVOCs, PCBs, RCRA metals, pesticides, and herbicides. Two samples were collected for the first 50 cubic yards of soil removed and one sample per 50 cubic yards thereafter. The Toxicity Characterization Leaching Procedure (TCLP) analysis was utilized where solid analysis revealed contaminants in excess if the RCRA 20-times rule as describe by the Work Plan (USAED 2007h).

1.4.3.2 Drum and Debris Sampling Activities

In 2007, CH2M Hill collected analytical soil characterization samples in accordance with the *RI/FS Management Plan* (USAED 2007j). In 2008 and 2009, Jacobs collected analytical soil characterization samples in accordance with *RI/FS Management Plan* (USAED 2007j). The sampling characterization activities were performed to support RI and risk assessment objectives.

Jacobs performed all analytical sampling in accordance with the Work Plan, with the exception of the deviations listed in Section 2.2. Investigation-derived waste (IDW) sampling was performed in conjunction with Investigation activities at the site, and excavated soil was field screened for contaminants using a photoionization detector (PID) and visual and olfactory observation. If screening or observations revealed potential COCs within the soil, this soil was removed to the waste stockpile and sampled for waste characterization. This was usually associated with drums or other items of debris in the soil. PID screening and calibration were performed in accordance with the FSP addendum of the *RI/FS Management Plan* (USAED 2007j) and the *Drum and Debris Removal Work Plan* (USAED 2008b).

To encompass the sampling requirements and in addition to the DQOs identified in the *2007 Drums and Debris Work Plan* (USAED 2007h), two additional DQOs were identified in the *2008 Drum and Debris RI Work Plan* (USAED 2008b) as follows:

- Confirm contaminated soil had been removed and only soil below action levels remain (Area D). This was achieved by collecting soil samples and analyzing them for gasoline-range organics (GRO), diesel-range organics (DRO), residual-range organics (RRO), metals (RCRA metals plus mercury, aluminum, boron, calcium, iron, potassium, magnesium, and sodium), pesticides, PCBs, herbicides, VOCs, SVOCs, tentatively identified compounds, and low-level VOCs.
- Confirm contaminated soil had been removed and only soil below action levels remain (Area A). This was achieved by collecting soil samples and analyzing them for GRO, DRO, RRO, metals (RCRA metals plus mercury, aluminum, boron, calcium, iron, potassium, magnesium, and sodium), pesticides, herbicides, VOCs, tentatively identified compounds, low-level VOCs, and explosives.

Analytical data from the 2007/2008/ 2009 Investigation were combined in a chemical database created and maintained by CH2M Hill. CH2M Hill also validated the analytical data in order to develop project screening levels for the forthcoming Risk Assessment. The data is presented in the following reports:

- *CH2M Hill Revised RI Draft* (USAED 2010) presents the 2007, 2008, and 2009 analytical soil characterization results validation
- Appendix B of this Jacobs report presents the 2008 and 2009 analytical soil characterization and the 2007, 2008, and 2009 IDW results

The analytical results will be evaluated in the RI report prepared by CH2M Hill (USAED 2010), in accordance with the *RI/FS Management Plan* (USAED 2007j), and as agreed upon by the Remedial Project Managers (RPM) during Federal Facilities Agreement meetings and weekly "Team Taku" meetings.

1.4.4 Drum and Debris Investigation Methodology

Site work focusing on the drum and debris investigation was performed using a phased approach as identified in the *2008 Drum and Debris Work Plan* (USAED 2008b). The phased approach stated that investigations would be conducted in 6-inch lifts in conjunction with magnetometer sweeps and hand digging (if necessary) between lifts if COCs are encountered. The phased approach also included the following:

a. In investigation areas where the potential COC is chemical in nature (i.e., drums or other containers that may contain hazardous materials or wastes), investigation will continue until contaminants and containers are removed, or until groundwater is encountered, or investigation begins to compromise the structural integrity of onsite structures. Investigation in close proximity to onsite structures will be conducted in accordance with the minimal horizontal distances evaluated by a structural engineer and presented in Figure 3-7 of the Drum and Debris Work Plan (USAED 2008b).
b. In accordance with Army guidance, investigation areas where only MEC or ordnance is a concern (i.e., where no drums other containers or debris that may indicate the presence of hazardous materials or waste are present) will be to a nominal depth of 5 feet below existing ground surface. If only MEC items are found during the investigation, further investigation will be halted pending review and recommendations by the RPM in coordination with the USAED and the contractor's (i.e., Jacobs) field crew. Should there be visible ordnance at the excavation floor, or if there is evidence or reasonable suspicion that significant explosive ordnance items (such as a large or unusual explosive device or group of munitions) may exist under the excavation floor, then the removal effort will continue in accordance with the *MEC Work Plan* (USAED 2007g). The scope of this work plan does not include investigation below groundwater or conducted in a manner that compromises the structural integrity of houses. Investigation in close proximity to onsite structures will be conducted in accordance with the minimal horizontal distances evaluated by a structural engineer and presented in Figure 3-7 of the *Drum and Debris Work Plan* (USAED 2008b).

c. A UXO Technician will perform a Schonstedt sweep of the bottom of all investigations when drums, ordnance, or other contaminants of potential concern are not visible to ensure there are no other hazardous items present in the area that may require removal. An EM61 survey will be performed upon completion of investigations. The EM61 data, as well as photographs and field notes, will be provided to the Army for coordination with RPMs, along with a recommendation as to whether additional investigation is warranted.

d. Excavations will remain open until RPMs have evaluated the need for additional investigation, except for areas where utilities exist. These will be backfilled prior to temperatures below freezing (32° F). Confirmation samples will be collected as described in Section 2.1.2 of the Work Plan. Exhumed containers with potentially hazardous materials or waste shall be sampled in accordance with Section 2.0 of the *Drum and Debris Work Plan* (USAED 2008b).

1.5 WORK PLAN DEVIATIONS

When site conditions differed from anticipated conditions, best professional judgment was used to conduct the work as closely as possible to the appropriate Work Plan as presented in Section 1.4. Work procedures differing from those outlined in the appropriate Work Plan are as follows:

- All PCB-contaminated soil above a concentration of 10 mg/kg was to be classified as a regulated TSCA soil (USAED 2007i). However, the waste generator (U.S. Army Garrison, Alaska) determined that PCB-contaminated soil between 10 and 50 mg/kg was to be reclassified as non-regulated TSCA waste.
- The requirement for composite sampling from five separate locations within intermodal bulk containers containing TSCA-regulated waste was removed from the 2007 Work Plan due to the already homogeneous nature of the waste soil (USAED 2007i). Upon approval of the Army, this change was implemented and a single discrete sample was collected from each container.
- During the installation of long-term soil stockpile cells, 6 inches of compacted D-1 (imported clean fill) material was used instead of sand, as called for in the *Long-Term Soil Stockpile Plan* (USAED 2007c). D-1 was used because it provided a more appropriate material for wheeled equipment to operate on, compacted better, and provided better bottom liner protection.
- The *Long-Term Soil Stockpile Plan* required netting to be placed over soil stockpiles for stability of the top liner; however, these were deemed unnecessary as onsite conditions allowed for the top liners to remain securely in place at all times (USAED 2007c).

- Multi-incremental (MI) sampling was initially required by the *Long-Term Soil Stockpile Plan*, following decommissioning of soil stockpiles; however, collection of discrete soil samples from the stockpile footprint was deemed more appropriate (USAED 2007c).
- The requirement for clean overburden to be segregated from contaminated soil on a 10-millimeter high-density polyethylene liner was removed from the *Long-Term Soil Stockpile Plan* (USAED 2007c). Upon Army approval in 2007, polyethylene liners were not used in Investigation activities and the clean overburden was separately stockpiled.
- A discrepancy was noted between Section 3.1.2 of the 2008 FSP and Table A-2 of the same FSP (USAED 2008b). Section 3.1.2 called for sampling waste soil for GRO, DRO, and RRO, which were not included in Table A-2. This discrepancy was corrected and waste samples were collected from the locations of the highest field screening locations in accordance with the *2009 Taku Gardens Sampling of Contaminated Soil Pile Technical Memorandum* (USAED 2009eh) and sent to the laboratory for GRO, DRO, and RRO in addition to all analyses listed in Table A-2.

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2.0 GENERAL METHODOLOGY

This section describes the general procedures and methodologies followed during the 2007/2008/2009 Investigation activities at Taku Gardens.

2.1 MOBILIZATION

The Army installation provided Jacobs with a landowner right-of-entry permit to work at the Taku Gardens site.

A chain-link security fence surrounds the FCS. Jacobs controlled access to and from the site during the course of the 2007/2008/2009 Investigation. The fenced gate remained locked during non-working hours. During working hours, the gate was manned and a sign-in/sign-out log was maintained in the onsite job trailer. A sign was placed instructing visitors to call for access. In 2007, vehicle access to the site was via the main entrance off Neely Road. In 2008 and 2009, vehicle access to the site was off Alder Road.

Prior to any contractor activities at the site, all personnel attended a site-specific safety briefing during which details of the SSHP (USAED 2007e, 2008c) were discussed along with specific MEC-related information.

In 2007, equipment mobilized to site for the Investigation included: personnel rental vehicles, two Hitachi excavators (200 and 450 class), one John Deere 200 excavator, one Caterpillar D6 dozer, one Kenworth semi dump truck [12 cubic yards (cy)], one Volvo 6-wheeled 20-yard dump truck, one Terex 40-ton rock truck, one Caterpillar 938G loader, one John Deere 344J loader, one water truck, one service truck, and one flat bed trailer used as a bin-tarping station. Jacobs and their subcontractors staged two office trailers onsite equipped with electricity, phone, internet, and a sample managing area. In addition to equipment mobilized in 2007, the following equipment was mobilized to the site in 2008 and 2009: one Caterpillar 350 excavator, one John Deere 350 excavator, one Volvo 290 excavator, one Hitachi 160 excavator, two Sterling semi dump trucks (16 cy), one Caterpillar 6-wheeled dump truck, one Caterpillar 950G loader, one HAMM compactor, one D4 dozer, one Western Star semi dump truck (16 cy), one Caterpillar

936F loader, one Bomag compactor, one John Deere 450 dozer, and one Caterpillar 725 Rock Truck.

2.2 STAGING AND SITE PREPARATION

A staging area for the project site was located in the former laydown yard in the southwest corner of the site. This staging area was used to store heavy equipment and to organize, manage, and store IDW prior to transport by the Defense Reutilization and Marketing Office (DRMO) after profiling and manifesting. Work zones (i.e., exclusion zones, contamination reduction zones, and support zones) were established to ensure safety and to prevent contamination from spreading, should exposure to an uncontrolled substance occur. No releases occurred during the 2007/2008/2009 Investigation.

In 2007, a tarping station consisting of two chassis fitted with scaffolding was also staged in this area. This station facilitated the covering and uncovering of intermodal bulk containers.

Five lined stockpiles were created during field activities in 2007: three within the PCB exclusion zone (Area E) used to stockpile PCB-contaminated waste (less than 10 mg/kg), one larger stockpile in the laydown area to the south of Area E, which was used to store contaminated soil and other material from Investigation activities, and one small stockpile in the staging area used for decontamination in 2007 and temporary storage in 2008 and 2009. The three stockpiles created in 2007 in Area E were removed in 2008. In 2009, three new stockpiles were created in this area in order to store POL soil created during investigation activities at Building 9. These stockpiles were created in accordance with the *Long-Term Stockpile Plan* (USAED 2007c).

2.3 SOIL FIELD SCREENING AND ANALYTICAL SAMPLING

Field screening for the investigation for POL contaminants was conducted using a PID to guide the investigation and segregate clean soil. Excavated soil was screened at an average frequency of one sample per 10 cubic yards of excavated soil. Soil with PID readings exceeding 20 parts per million (ppm) was segregated and considered contaminated. Excavated material was considered to be clean if field screening results were below 20 ppm. Field screening measurements, visual observations, density of metal debris, and presence of drums were used to

determine the lateral and vertical extent of investigation boundaries. After field screening results and observations indicated cleanup levels were likely achieved, the investigation footprint was measured. In 2007, CH2M Hill collected characterization soil samples in accordance with the *RI/FS Management Plan* (USAED 2007j) and the *Quality Assurance Program Plan* (USAED 2007f). In 2008, Jacobs collected characterization soil samples in accordance with the Work Plan (USAED 2008b). Data are presented in the *CH2M Hill RI Report* (USAED 2010). The area of investigation and level of contamination were used to determine the location and frequency of characterization samples required. Characterization samples were submitted for analysis for a range of contaminants including GRO, DRO, RRO, PCBs, VOCs, SVOCs, tentatively identified compounds (TIC), metals, herbicides, pesticides, and explosives. In 2007, stockpiled material was characterized by collecting field screening samples during the process of investigation in accordance with the *RI/FS Management Plan* (USAED 2007j). Samples were collected from the excavator bucket or from sifted soil piles at intervals of one for approximately every 20 excavator bucket loads of soil. Soil characterized by field screening results exceeding 20 ppm was stockpiled on liners for sampling and transport and disposal at appropriate disposal facilities. Clean soil was stockpiled in areas adjacent to the investigation until it was returned upon completion of investigation activities in the area. The *CH2M Hill RI Report* presents the characterization sample results (USAED 2009).

On 14 June 2008, twenty-eight GORE^{TM} modules were installed throughout Area D prior to investigation to screen the presence of potentially hazardous compounds and determine the appropriate level of personal protective equipment (PPE) to be used within Area D. Based on historic documentation (PSE I and PSE II), there was a possibility that MEC containing chemical components was disposed of in this area. The modules were installed for a five-day exposure period, then shipped to W.L. Gore and Associates Inc. for analysis of hazardous compounds in soil gases such as dimethyl disulfide, dimethyl methylphosphonate, 1,4-thioxane, diisopropylmethylphosphonate, 1,4-dithiane, thiodiglycol, benzothiazole, 4-chloroacetophenone, p-chlorophenylmethylsulfide, 2-chloroacetophenone, p-chlorophenyl-methylsulfoxide, and p-chlorophenylmethylsulfone. None of the compounds listed for analysis were detected at any of the sample locations. Final GORE^{TM} reports are presented in Appendix H.

On 20 and 21 October 2009, sixty-seven GORE^{TM} modules were installed in the northeast area of Taku Gardens to attempt to locate a source of 1,2,3 Trichloropropane (TCP) contamination. The modules were installed for a seven-day exposure period, and then shipped to W.L. Gore and Associates Inc. for analysis (refer to Section 6.7). Final GORE^{TM} reports are presented in Appendix H.

2.4 SOIL INVESTIGATION AND BACKFILL CRITERIA

Existing clean soil piles, clean overburden and clean native soil/gravel fill from approved borrow pits (Fairbanks Sand and Gravel and Nordale Pit) were used to backfill investigation areas. Jacobs inspected the fill material to ensure that it was free of trash, debris, wood, ice, and other deleterious materials. Overburden and existing soil piles were placed in the bottom of each investigation footprint, and a minimum of two feet of offsite borrow pit material was placed on the surface.

Following the analysis of confirmation sampling results and direction from the Army, excavations were evaluated for backfilling. In investigation areas where utilities were encountered, backfilling activities were performed in accordance with *Replacement Housing Fort Wainwright Specification 02300, Earthwork* (USAED 2007h). This specification requires D-1 classified fill (coarse aggregate) to be used where structural concerns are an issue, such as in close proximity to housing or around utilities. For all other areas, unclassified fill material was placed in 1-foot lifts in the investigation footprint and compacted with several passes of heavy equipment. In 2007, investigations were backfilled in areas where analytical results showed that PCB concentrations were less than 1 mg/kg. Soil removal occurred concurrently. Backfilling operations were completed at Buildings 1, 11, 12, 26, 28, 31, and 21/16 in 2008, and were also completed to cover utilities exposed within other open investigation boundaries. In 2009, backfilling operations were completed in the Area D and Buildings 11, 15/17, 22/24, and 49.

2.5 DEMOBILIZATION AND WINTERIZATION

In 2009, onsite work continued until Jacobs, USAED, and the Directorate of Public Works (DPW) decided to cease activities for the season. Jacobs winterized the site and demobilized

personnel on 13 November 2009. Responsibility for site security was turned over to DPW. All project equipment and supplies were demobilized from the site within 30 days of completion of project activities.

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3.0 REMEDIAL INVESTIGATIONS

This section presents an introduction to site-specific procedures relating to sampling activities and investigations conducted during the 2007/2008/2009 Investigation. Refer to Figure 3-1 for an overview of the areas of investigation, Appendix A for photographs, and Appendix B for analytical results from 2008 and 2009. The *CH2M Hill RI Report* (USAED 2010), of which this report is an appendix, contains the results and a detailed discussion for 2007, 2008, and 2009. Sections 4.0, 5.0, and 6.0 detail the 2007, 2008, and 2009 field seasons, respectively.

Investigation activities conducted at the FCS can be broadly divided into the following categories:

- **EM61 Investigations** include investigations from 2007, 2008 and 2009 at Buildings 15/17, 22/24, 48, 49, and Area D. Hot spots at these sites are characterized by EM61 results greater than 75 mV.
- **PCB Removal Action** includes removal actions in 2007 and 2008 at Building 52 in Area E, other hotspots in Area E, and the TSA.
- **Surface Sampling and Sound Berm Sampling** include data gaps in the surface soil and soil berm analyses identified in the *Interim Preliminary Risk Screening Evaluation* (PRSE), (USAED 2008d). In 2008 and 2009, additional samples were collected and analyzed from the sound berm
- **Soil Piles** include several potentially contaminated soil piles which had been created during housing construction in 2005 and 2006. During the 2007 and 2008 field seasons. Analytical data was collected from these piles in order to determine appropriate disposal.
- **Foundation Demolition in Area E** includes demolition and removal of nine fully or partially completed foundations in Area E. In 2009 analytical data was collected from the native material beneath the foundations to determine if contamination was present.
- **Other Investigation Activities** include data gaps and hot spots identified in the PRSE (USAED 2008d) or areas of contamination still remaining following the 2007 investigation. These areas were investigated in 2008 and 2009. Investigations included removal of a dichlorodiphenyltrichloroethane (DDT) hot spot at Building 11 and POL contamination at Buildings 9, 40, and 45. Other activities included installation of groundwater monitoring wells and GORE™ modules in 2009 to locate contamination sources.

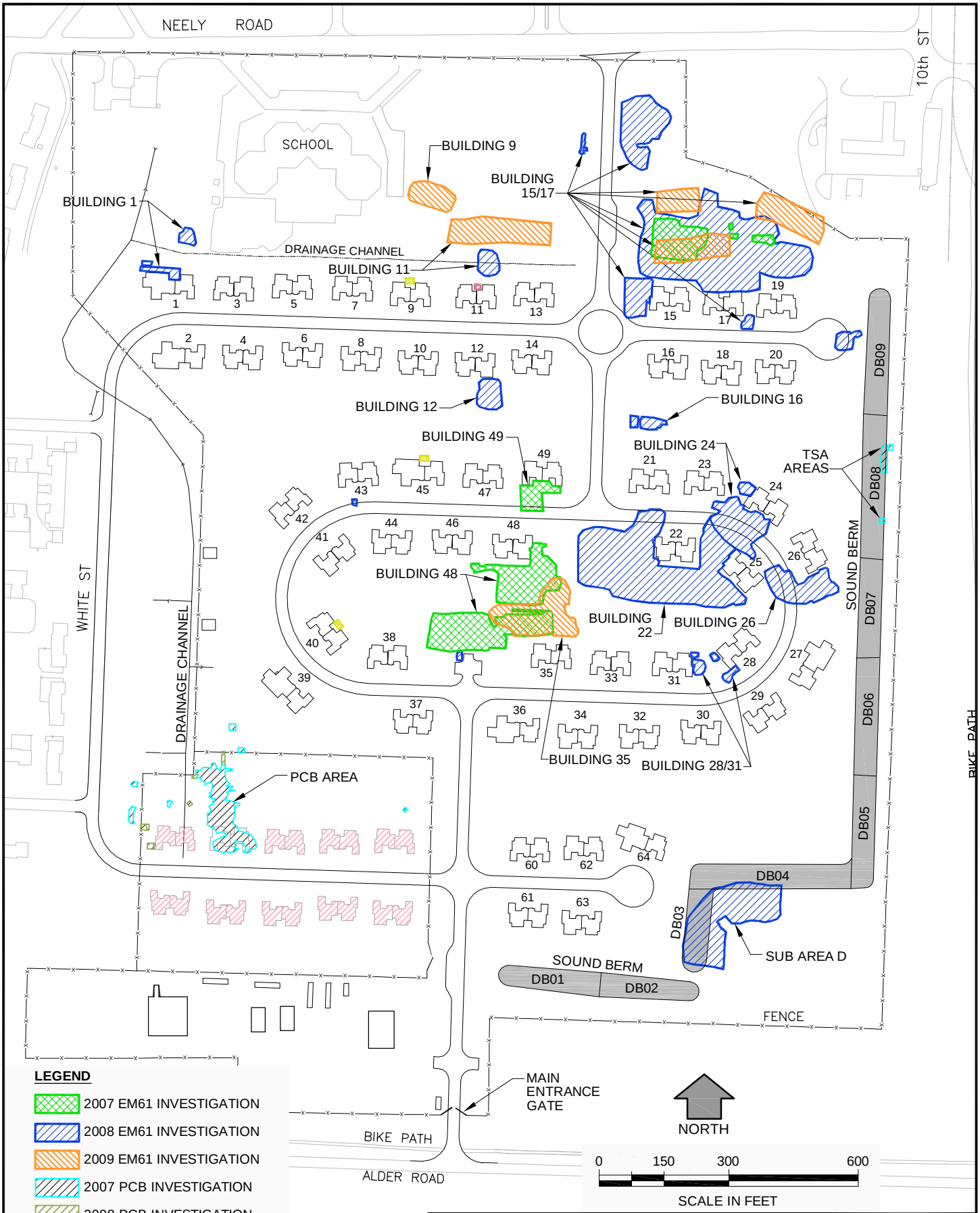
Several geophysical surveys have been conducted at the FCS between 2007 and 2009. A brief description of the purpose and results of the each investigation are listed below:

- Winter 2007 – CRREL conducted a geophysical investigation of the entire site prior to remedial investigation. This guided the 2007/8/9 investigation of appreciable buried metallic anomalies.
- Fall 2007 – CRREL conducted a geophysical investigation of the 2007 investigation areas (B48 and B49). Small anomalies found by CRREL were removed by Jacobs in 2007.
- Fall 2008 – Jacobs conducted a geophysical investigation of the 2008 investigation areas (B15/17, B22/24, Area D, B1, B11, B12, B16, B26, B, 28/31) and PCB area and western drainage ditch. Small anomalies were found and removed after the geophysical investigation areas. The PCB area and drainage ditch were free of anomalies.
- Winter 2009 – Jacobs conducted a geophysical investigation of the 2007 and select 2008 investigation areas (B48, B49, B15/17, B22/24, Area D, B1, B11, B12, B16, and B26). This was conducted since a final survey was not conducted on these previously.
- Summer 2009 – Jacobs conducted a final geophysical investigation of 2009 investigation areas (north of B11 and B15/17). This geophysical effort was conducted during investigation activities. Jacobs removed anomalies as they were found and the geophysics redone until the investigation areas were free of anomalies.

3.1 MUNITIONS AND EXPLOSIVES OF CONCERN

The objective of MEC-related work at Taku Gardens was to allow for the safe execution of the Investigation.

Based on the quantity and configuration (e.g., inert/unfuzed/unfired) of the MEC encountered at Taku Gardens to date, the U.S. Army Garrison Alaska determined that onsite MEC support as described in the *USACE EP 75-1-2 Munitions and Explosives of Concern (MEC) Support during Hazardous, Toxic and Radioactive Waste (HTRW) and Construction Activities* was appropriate for the RI/FS activity because the level of risk of encountering MEC was determined to be “moderate to high” in the northeast side of the FCS (Area A) and “low” in the southeast (Area D) and west (Areas B,C,E and F).



OVERVIEW OF INVESTIGATION ACTIVITIES 2007, 2008, AND 2009

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T.Heikkila	FIGURE NO. : 3-1

G:\Autocad\ERS-UR\05F5070\12009 RI Rpt\Fig 3-1 RI Activities.dwg Sep 30,2010 -tiedemam

All investigation activities in 2007, 2008, and 2009 were performed in accordance with the approved *MEC Work Plans* (USAED 2007g, 2008a) and under the guidance of certified UXO personnel. The *MEC Work Plans* (USAED 2007g, USAED 2008a) and an *Explosives Safety Plan* were reviewed and approved by the USACE Munitions Center of Excellence in Huntsville, Alabama. Appendix F includes the letter of approval. Military munitions-related items were recovered from the investigations at Area A (Buildings 15/17, 22/24, 31/28, and 48), including the test pits, and Area D. Figures in Appendix F show locations of munitions-related items within investigation areas at the FCS.

MEC was discovered during the 2007 and 2008 Investigations, but none was discovered in 2009. The *MEC Report* (Appendix F) describes the different types of munitions, the quantities, and the disposal results of all MEC located at the site. The following descriptions and acronyms are used to describe munitions-related items:

- **MEC:** Specific categories of military munitions that may pose unique explosives safety risks such as: Unexploded Ordnance (UXO) as defined in 10 United States Code (USC) 101(e)(5); Discarded Military Munitions (DMM) as defined in 10 USC 2710(e)(2); or Munitions Constituents (MC) (e.g., TNT, RDX) as defined in 10 USC 2710(e)(3) present in high enough concentrations to pose an explosive hazard.
- **DMM:** Military munitions that have been abandoned without proper disposal or removed from storage from a military magazine or other storage area for the purpose of disposal. The term does not include UXO, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of, consistent with applicable environmental laws and regulations (10 USC 2710(e)(2)).
    - The munitions originally classified as DMM during this project were disposed of by Army Explosive Ordnance Disposal (EOD) personnel and after disposal were re-classified as Munitions Debris because the filler was inert or no filler was present. There were however, two 3.5 inch practice rocket motors classified as DMM that did contain some propellant residue and were disposed of with explosives by Army EOD personnel.
- **Munitions Debris (MD):** Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.
- **Range-Related Debris (RRD):** Debris, other than munitions debris, collected from operational ranges or from former ranges (i.e., target debris, military munitions packaging and crating material).

- **Unexploded Ordnance (UXO):** Military munitions that have been primed, fuzed, armed, or otherwise prepared for action; have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and munitions that remain unexploded whether by malfunction, design, or any other cause (10 USC 101(e)(5)(A) through (C))

3.2 SAMPLING REQUIREMENTS

Section 2.0 presents the sampling and screening objectives in detail, as does Appendix A (FSP) of the *Drum and Debris Investigation Work Plans* (USAED 2007h, 2008b). Characterization sampling was conducted in accordance with the sampling strategy agreed on by the project team in 2007 (Section 1.4).

In 2007, CH2M Hill collected characterization samples and in 2008 and 2009, Jacobs collected characterization samples. CH2M Hill is presenting and analyzing these results (USAED 2010). In addition, CH2M Hill has prepared the ADEC checklists also included as part of the RI Report (USAED 2010). Appendix B of this report presents the 2008 and 2009 results.

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4.0 2007 INVESTIGATIONS

Work performed in 2007 included drum and debris investigations following EM61 surveys at Area A (Buildings 15/17, 48, and 49), an investigation and removal of PCB-contaminated soil in Area E, MEC clearance at the locations of groundwater monitoring wells, and construction soil pile removal. Figure 4-1 shows the schedule of work performed in 2007.

Figure 4-1 2007 Fieldwork Schedule

Sections 4.1 through 4.7 detail the work performed at Taku Gardens during the 2007 field season.

4.1 BUILDING 49 INVESTIGATION

On 6 September 2007, investigation activities began in the area immediately south of Building 49, located in Area A, where the 2004 magnetometer survey diagrams indicated the highest metal concentrations and where a PSE II test pit revealed drums (USAED 2007b). The direction and extent of investigation were guided by visual and olfactory observations, PID field screening samples, presence of drums or other metal debris, underground utilities, and

proximity to the building (Figure 4-2). Magnetometer surveys were performed by UXO support personnel during investigation activities to help confirm the absence of munitions-related items.

Drums were encountered from 5.3 to 9 feet bgs and were removed during the 2007 Building 49 investigation. Most of the drums were empty, did not contain any COCs, or had been punctured. The drums were crushed and discarded during this investigation.

The total area of the Building 49 investigation footprint in 2007 was approximately 4,500 square feet with an average depth of 9 feet bgs. On the eastern edge, where the most drums were observed, the maximum depth of the investigation extended to 13 feet bgs. Approximately 24 cubic yards of tar- and paint-contaminated soil was removed from the investigation footprint. CRREL performed a geophysical survey prior to backfilling (Figure 4-3). Small anomalies identified as a result of the CRREL survey were investigated following the survey by UXO technicians with hand held magnetometers. All anomalies detected in the survey were removed by hand and consisted of small scraps of rusted metal.

Investigation activities revealed that drums were located in close proximity to Building 49 and appeared to extend beneath the southwest corner of the building. Investigation also occurred around underground sewer and water utilities in the area. Drums and debris located near utilities were removed by hand. Investigations underneath or immediately adjacent to buildings or utilities were immediately backfilled with imported coarse aggregate in accordance with *Replacement Housing Fort Wainwright Specification 02300, Earthwork* (USAED 2007h). Clean, stockpiled material was used as backfill in the bottom of the investigation footprint in 2008, and the top two feet of the footprint was backfilled with offsite borrow material. Drums located beneath Building 49 were not removed in 2007, the removal was conducted in 2009 (see section 6.3). No munitions-related items were encountered at Building 49. Figure 4-3 presents geophysical data before and after 2007 investigation activities.

Materials removed during the 2007 investigation activities included:

- A total of 145 crushed and empty drums
- A total of 30 drums containing residual amounts of tar/asphalt material
- A total of 11 drums containing tar or degraded fuel.
- Three degraded 5-gallon paint cans
- Small amounts of metal debris, rubber bladders, concrete, and burnt wood

Section 7.0 presents further details regarding waste streams and disposal locations.

The Investigation continued vertically and horizontally around areas with drums until field screening and visual and olfactory observations indicated that either a natural soil horizon or an uncontaminated area free of debris had been reached. CH2M Hill collected nine characterization samples from the center of each 50-foot by 50-foot square grid across the investigation footprint and from the sloped sidewalls, according to the project objectives described in Section 1.4. Table 4-1 lists sample identifications and depths from which samples were collected to characterize the Building 49 investigation. A discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Figure 4-2 presents the sample locations and investigation boundaries.

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Building 49 – Beginning of Investigation Activities 2007

Building 49 – Drums in Investigation Sidewall 2007

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Building 49 – Example of Drums Removed in 2007

Building 49 – Northern Investigation Boundary at Completion of 2007 Activities

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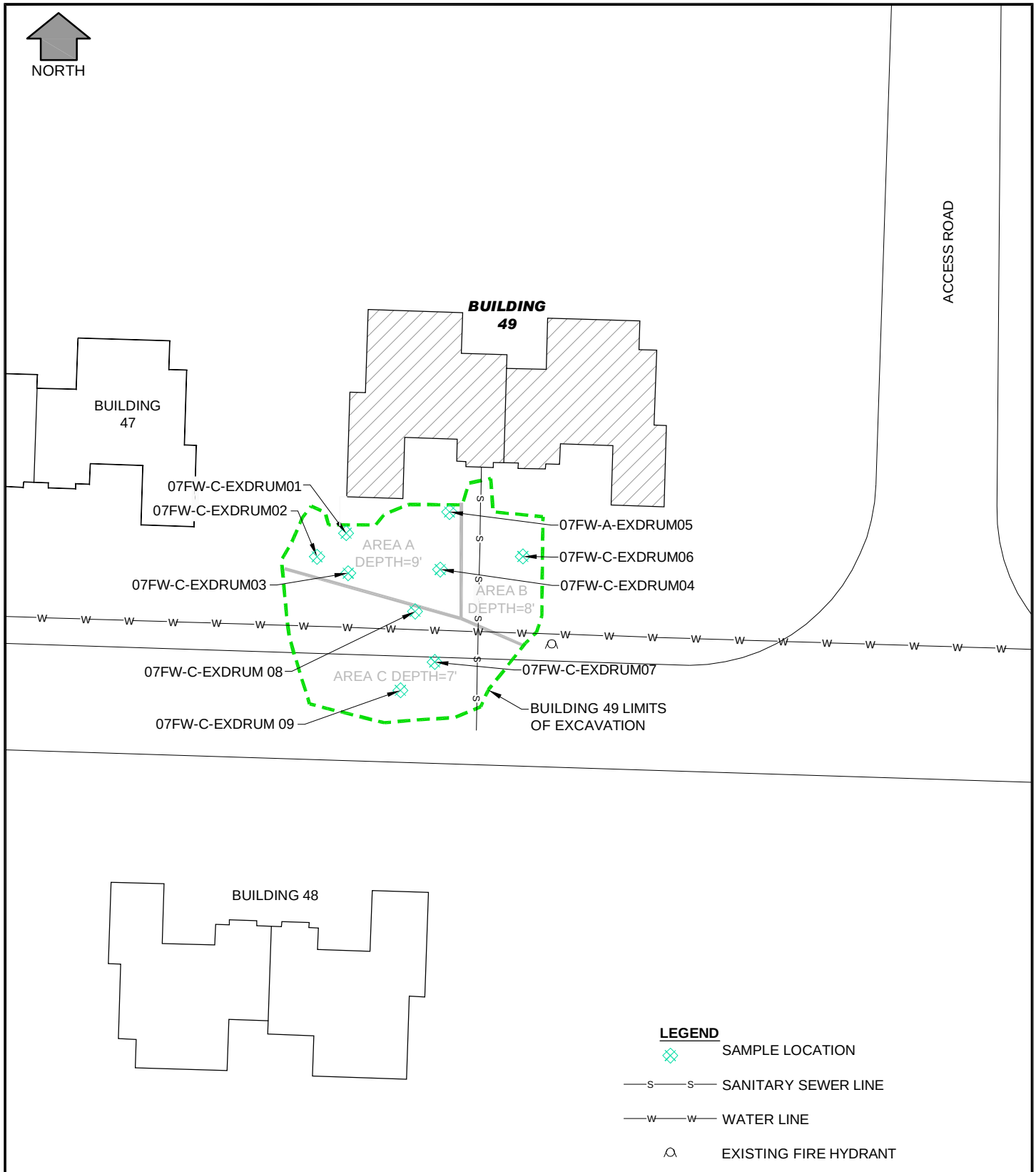

LEGEND

- SAMPLE LOCATION
- SANITARY SEWER LINE
- WATER LINE
- EXISTING FIRE HYDRANT

NOTE

1. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

0 20 40 80

SCALE IN FEET

BUILDING 49 2007 LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 4-2

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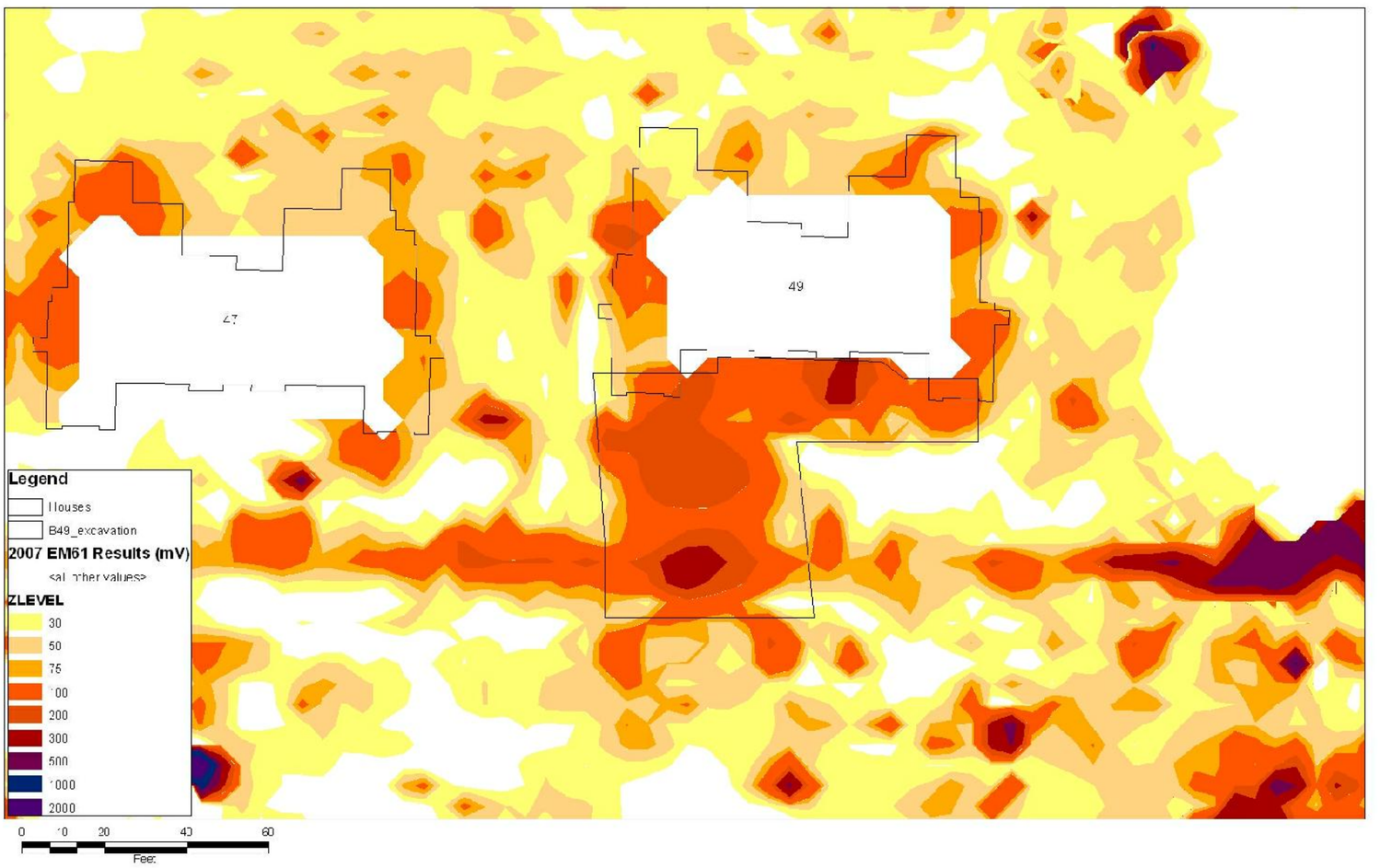
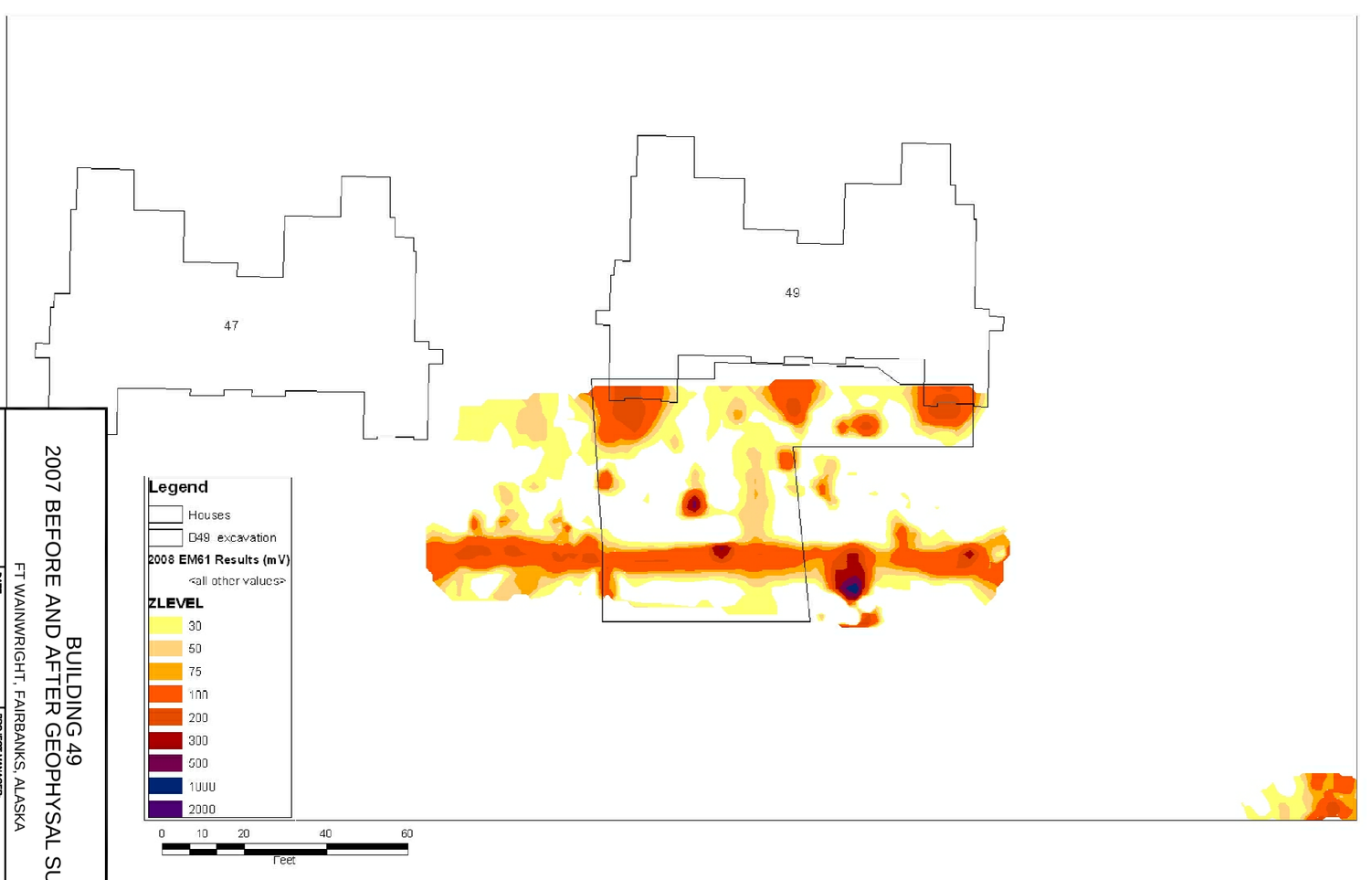
NORTH



2007 EM1 GEOPHYSICAL
PREFORMED BY CRREL



2008 EM1 GEOPHYSICAL PREFORMED BY JACOBS

BUILDING 49
2007 BEFORE AND AFTER GEOPHYSAL SURVEYS
FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS

DATE: 30 September 2010

PROJECT MANAGER: T. Heikkila

FIGURE NO.: 4-3

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Table 4-1
Building 49 Investigation Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
07FW-C-EXDrum01	4.5-5	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8082, SW8151A, SW8321A, SW6010B, SW6020, SW7471A
07FW-C-EXDrum02	4.5-5	
07FW-C-EXDrum03	9-9.5	
07FW-C-EXDrum04	12-12.5	
07FW-C-EXDrum05	4-4.5	
07FW-C-EXDrum06	4.5-5	
07FW-C-EXDrum07	8-8.5	
07FW-C-EXDrum08	8-8.5	
07FW-C-EXDrum09	4-4.5	

Note: For definitions, see the Acronyms and Abbreviations section.

On 14 September 2007, investigation activities were concluded at Building 49. Following the receipt of characterization results and upon direction from the Army, the Building 49 investigation was backfilled with gravel and clean stockpiled overburden to protect the building foundation and exposed utility lines.

4.2 BUILDING 48 INVESTIGATION

On 10 September 2007, investigation activities at Building 48 were initiated in the areas of highest metal concentration, as indicated by EM61 and 2004 magnetometer survey diagrams. An initial geophysical scan was performed by UXO-support personnel in order to confirm the absence of munitions-related items. The investigation began directly east of Building 48, in the northwest corner of the EM61 anomaly (Figure 4-4). The total investigation footprint was approximately 32,000 square feet. Investigation limits were determined by the presence or absence of metal debris, contamination, and the presence of underground utilities. Scrap metal debris and drums were encountered at less than 1 foot bgs and continued to a maximum depth of 8 feet. The average depth of investigation was 7 feet bgs. All debris surrounding underground utilities, including electrical, glycol, communications, and water, was removed by hand. All debris surrounding utility lines was removed.

Materials removed from all 2007 investigation activities included the following:

- A total of 158 crushed and empty drums
- One drum containing approximately 20 gallons of degraded fuel product with primary constituents of xylenes, lead, and benzene-related compounds
- Approximately 120 cubic yards of contaminated soil associated with the fuel drum
- Lead-acid battery plates and 30 cubic yards of lead-contaminated soil
- Dry transformers

Munitions-related items removed from the Building 48 investigation included the following:

- One MK2 practice hand grenade (DMM but reclassified as MD upon detonation)
- An additional 19 items of MD

Section 7.0 presents further details regarding waste streams and disposal locations. Appendix F presents a detailed summary of the munitions-related items removed during the investigation.

CH2M Hill collected fifty-nine characterization samples during the Building 48 investigation, including thirty-five wall samples and twenty-four floor samples. In areas where contamination was encountered, the frequency of sampling was increased to one sample per 10-foot by 10-foot grid (Section 1.4). Table 4-2 presents sample IDs and depths from which samples were collected to characterize the Building 48 investigation. A discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Figure 4-4 shows sample locations and investigation boundaries. Figure 4-5 presents the geophysical data before and after 2007 investigation activities at Building 48.

Building 48 – Drums in Investigation Sidewall 2007

Building 48 – Investigation Activities 2007

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Building 48 – Investigation Near Completion, Magnetometer Survey 2007

Building 48 – Typical Metal Debris Removed From Investigation 2007

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NORTH

ACCESS ROAD

BUILDING 46

BUILDING 48

AREA A
DEPTH=8'

BLD4801

BLD4805

AREA B
DEPTH=6'

BLD4806

UTILITY
VAULT

F20 F21

F11 F17 F18 F19

AREA G
DEPTH=8'

AREA C'
DEPTH=8'

AREA D
DEPTH=7'

AREA F
DEPTH=6'

F10

FL HT04

W35

FL HT05

BUILDING 48
LIMITS OF
EXCAVATION

AREA E DEPTH=6'

FL HT02

FL HT01

FL HT03

DEBRIS 02

F29 F28

W34

W09

DEBRIS 01

F23

AREA OF POL
CONTAMINATION

F16 F15

W30

W08

W07

W33

F12 F13 F14

W31 W32

BUILDING 48
LIMITS OF
EXCAVATION

AREA A DEPTH=8'

W41 W40

W51 W50 W49 00

AREA B
DEPTH=8'

AREA C DEPTH=6'

AREA D² DEPTH=3.5'

W48 F47

DRUM 01

F58

F59

DRUM 02

AREA E
DEPTH=3'

W55 W56 W57

AREA F
DEPTH=6'

F45

F46

W42 W42 W44

UTILITY
VAULT

BUILDING
35

NOTES

1. THE PREFIX 07FW-A-EXBLD48- FOR SAMPLE IDs HAVE BEEN OMITTED FOR CLARITY.
2. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

LEGEND

- SAMPLE LOCATION
- SANITARY SEWER LINE
- WATER LINE
- UNDERGROUND COMMUNICATIONS LINE
- UNDERGROUND ELECTRIC LINE

0 20 40 80

SCALE IN FEET

BUILDING 48 2007 LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO.: 4-4

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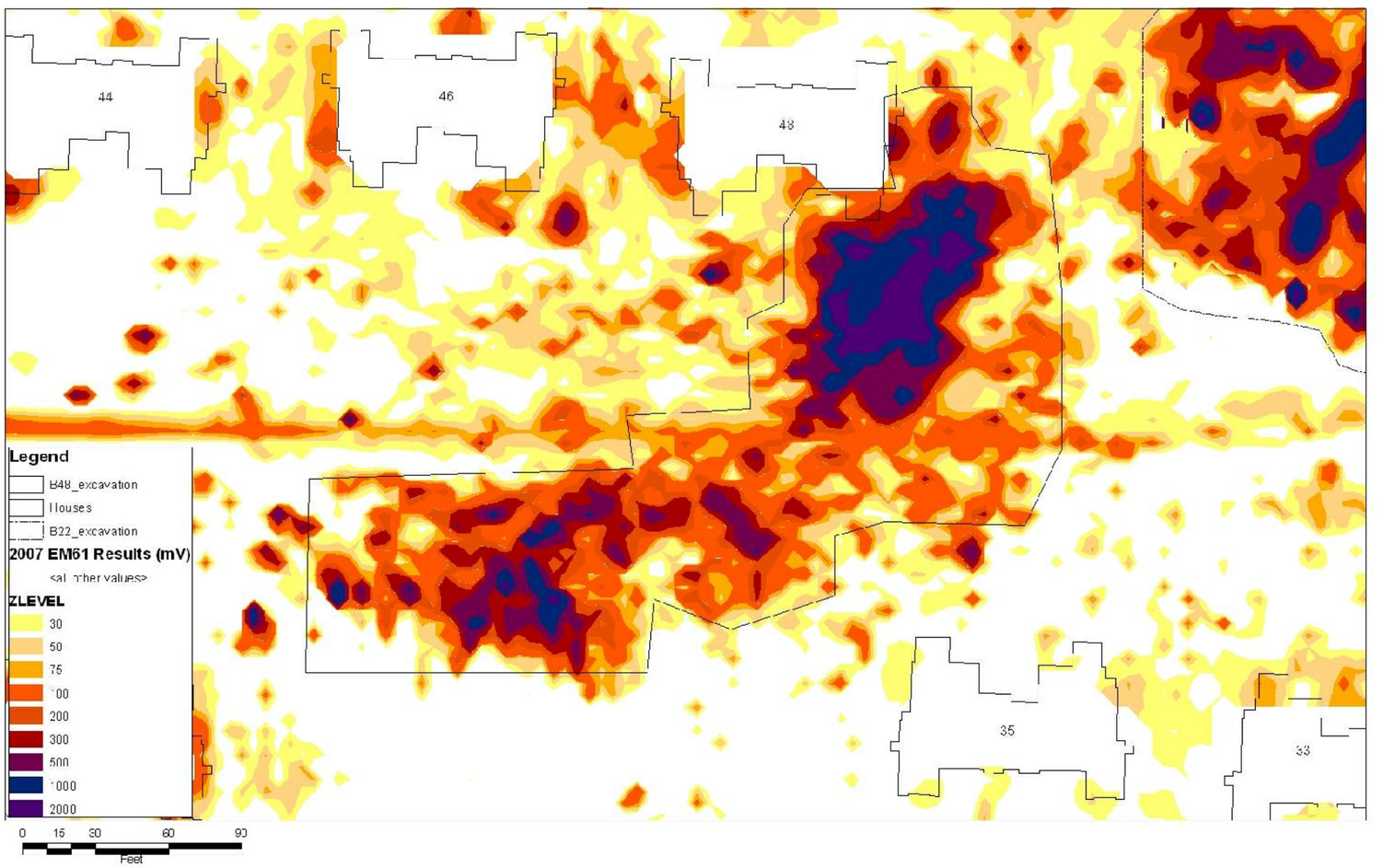
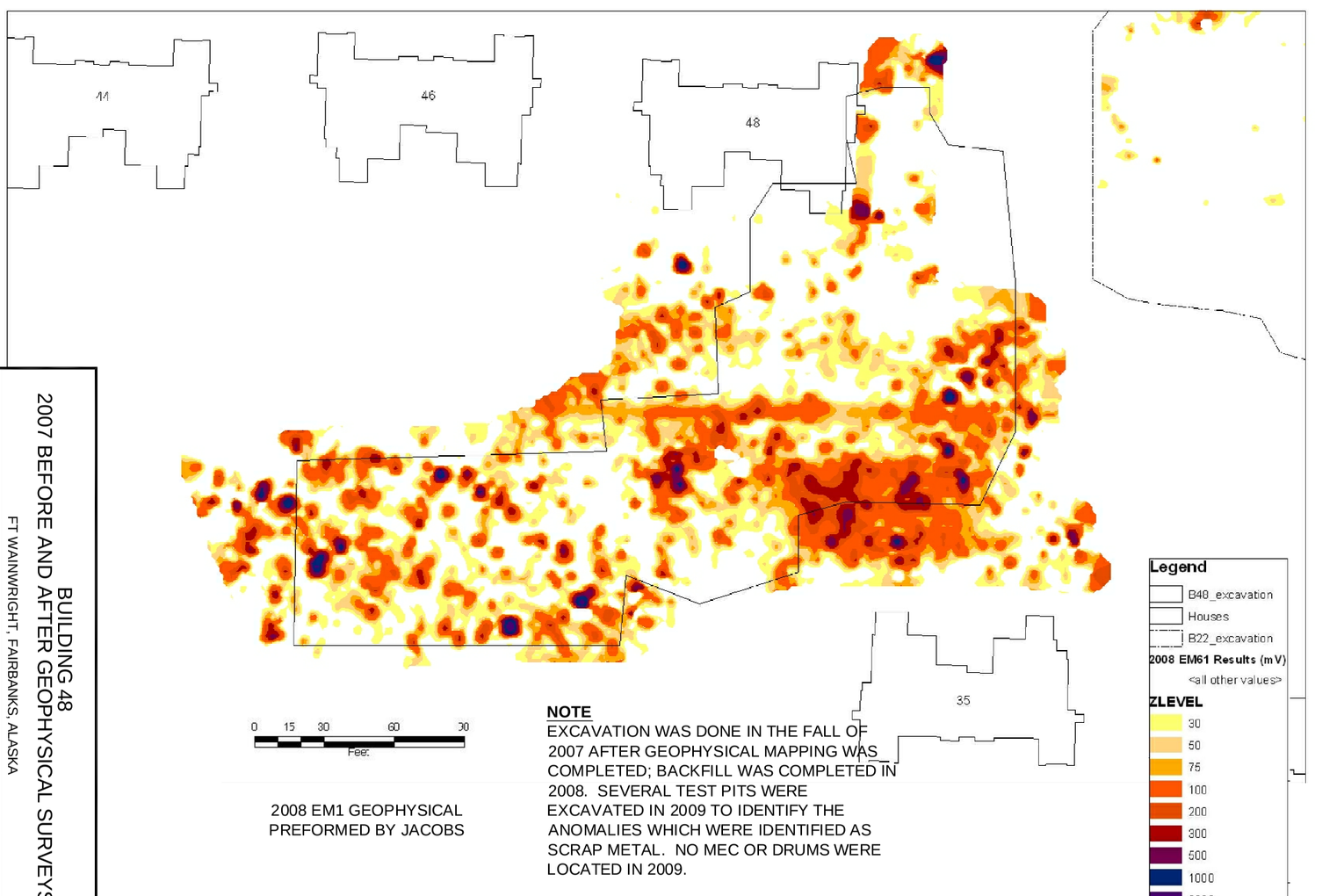
NORTH



2007 EM1 GEOPHYSICAL
PREFORMED BY CRREL



2008 EM1 GEOPHYSICAL
PREFORMED BY JACOBS

NOTE

EXCAVATION WAS DONE IN THE FALL OF 2007 AFTER GEOPHYSICAL MAPPING WAS COMPLETED; BACKFILL WAS COMPLETED IN 2008. SEVERAL TEST PITS WERE EXCAVATED IN 2009 TO IDENTIFY THE ANOMALIES WHICH WERE IDENTIFIED AS SCRAP METAL. NO MEC OR DRUMS WERE LOCATED IN 2009.

BUILDING 48
2007 BEFORE AND AFTER GEOPHYSICAL SURVEYS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS

DATE: 30 September 2010

PROJECT MANAGER: T. Heikkila

FIGURE NO.: 4-5

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Table 4-2
Building 48 Investigation Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
07FW-A-EXBLD48-01	4-5	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8082, SW8151A, SW8321A, SW6010B, SW6020, SW7471A
07FW-A-EXBLD48-02	5-6	
07FW-A-EXBLD48-03	5-6	
07FW-A-EXBLD48-04	6-7	
07FW-A-EXBLD48-05	7-8	
07FW-A-EXBLD48-06	7-8	
07FW-A-EXBLD48-07	2-2.5	
07FW-A-EXBLD48-08	3-3.5	
07FW-A-EXBLD48-09	2-2.5	
07FW-A-EXBLD48-10	3-4	
07FW-A-EXBLD48-11	2-2.5	
07FW-A-EXBLD48-12	9-9.5	
07FW-A-EXBLD48-13	5-5.5	
07FW-A-EXBLD48-14	8-8.5	
07FW-A-EXBLD48-15	10-10.5	
07FW-A-EXBLD48-16	9-9.5	
07FW-A-EXBLD48-17	4-5	
07FW-A-EXBLD48-18	4-5	
07FW-A-EXBLD48-19	3-3.5	
07FW-A-EXBLD48-20	3-3.5	
07FW-A-EXBLD48-21	7-8	
07FW-A-EXBLD48-22	6-7	
07FW-A-EXBLD48-23	5-6	
07FW-A-EXBLD48-24	6-6.5	
07FW-A-EXBLD48-25	7-7.5	
07FW-A-EXBLD48-26	6-6.5	
07FW-A-EXBLD48-27	6-6.5	
07FW-A-EXBLD48-28	5-5.5	
07FW-A-EXBLD48-29	5.5-6	
07FW-A-EXBLD48-30	2.5-3	
07FW-A-EXBLD48-31	2.5-3	
07FW-A-EXBLD48-33	3-3.5	

Table 4-2
Building 48 Investigation Characterization Sample Identification and Depth
(Continued)

Sample ID	Sample Depth (feet bgs)	Analyses
07FW-A-EXBLD48-35	2.5-3	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8082, SW8151A, SW8321A, SW6010B, SW6020, SW7471A
07FW-A-EXBLD48-37	3-3.5	
07FW-A-EXBLD48-38	6-6.5	
07FW-A-EXBLD48-39	2.5-3	
07FW-A-EXBLD48-40	1.5-2	
07FW-A-EXBLD48-41	1.5-2	
07FW-A-EXBLD48-42	1-1.5	
07FW-A-EXBLD48-43	2.5-3	
07FW-A-EXBLD48-44	2-2.5	
07FW-A-EXBLD48-45	5-5.5	
07FW-A-EXBLD48-46	3.5-4	
07FW-A-EXBLD48-47	5-5.5	
07FW-A-EXBLD48-48	3.5-4	
07FW-A-EXBLD48-49	1-1.5	
07FW-A-EXBLD48-50	2.5-3	
07FW-A-EXBLD48-51	2-2.5	
07FW-A-EXBLD48-52	3-3.5	
07FW-A-EXBLD48-53	3.5-4	
07FW-A-EXBLD48-54	5-5.5	
07FW-A-EXBLD48-55	3.5-4	
07FW-A-EXBLD48-56	2-2.5	
07FW-A-EXBLD48-57	3-3.5	
07FW-A-EXBLD48-58	8-8.5	
07FW-A-EXBLD48-59	7.5-8	

Note: For definitions, see the Acronyms and Abbreviations section.

On 10 October 2007, Building 48 investigation activities were completed. Utility lines were backfilled prior to the end of the 2007 field season. CRREL performed a geophysical survey which identified several anomalies determined to be small scraps of metal, which were removed. Figure 4-5 displays geophysical data before and after investigation activities at Building 48.

Following the receipt of characterization results and upon direction from the Army, the Building 48 investigation was backfilled with gravel and stockpiled clean overburden at the start of the 2008 field season.

4.3 BUILDING 15/17 INVESTIGATION

The investigation at Building 15/17 occurred over three field seasons. During the first field season, investigation activities in this area began on 6 October 2007 and were completed 22 October 2007. There were two areas of investigation in 2007: the main investigation just north of Building 15, and a smaller investigation along the former fence line north of Building 17. In addition, three test pits (approximately 100 square feet each and ranging in depth between 4 and 9 feet bgs) were excavated between 20 and 22 October to guide investigation activities in 2008. Figure 4-6 shows the limits of the investigation in this area upon completion of investigation activities in 2007 when weather conditions stopped work and the investigation area was approximately 40% complete.

The total area of the Building 15/17 investigation footprint in 2007 was approximately 9,400 square feet with an average depth of 5.5 feet bgs. Materials removed from the 2007 investigation activities included the following:

- A total of 75 crushed and empty drums
- Three cubic yards of lead-contaminated soil
- An oven transformer with suspect asbestos-containing material (ACM)
- Lead-acid batteries
- Gas masks containing charcoal filters.

Munitions-related items removed from the Building 15/17 investigation included the following:

- A total of 257 items of MD, which includes 27 items of RRD
- Five items classified by EOD as DMM (three M41, 20-pound fragmentation bombs and two M106 8-inch projectiles)

Section 7.0 presents further details regarding waste streams and disposal locations. Appendix F presents a detailed summary of munitions-related items removed during the investigation.

Soil characterization sampling was performed by CH2M Hill. The excavation floor and wall samples were collected at a frequency of one sample per 50-foot by 50-foot grid node. A total of 15 soil characterization samples were collected from the main Building 15/17 investigation footprint. Table 4-3 presents the characterization sample IDs, sample depths, and sample analyses requested. A discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010).

Table 4-3
2007 Building 15/17 Investigation Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
07-FW-A-EXBLD15-01	6-6.5	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8151A, SW8321A, SW6010B, SW6020, SW7471A
07-FW-A-EXBLD15-02	5-5.5	
07-FW-A-EXBLD15-03	5-5.5	
07-FW-A-EXBLD15-04	5-5.5	
07-FW-A-EXBLD15-05	5-5.5	
07-FW-A-EXBLD15-06	3.5-4	
07-FW-A-EXBLD15-07	4-4.5	
07-FW-A-EXBLD15-08	3.5-4	
07-FW-A-EXBLD15-09	3.5-4	
07-FW-A-EXBLD15-10	7-7.5	
07-FW-A-EXBLD15-11	7-7.5	
07-FW-A-EXBLD15-12	7-7.5	
07-FW-A-EXBLD15-13	7-7.5	
07-FW-A-EXBLD15-14	7-7.5	
07-FW-A-EXBLD15-15	7-7.5	

Note: For definitions, see the Acronyms and Abbreviations section.

Building 15-17 – 50-Caliber Links in Investigation 2007

Building 15-17 – Example of Metal Debris Removed in 2007

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Building 15-17 – Investigation Activities 2007

Building 15-17 – Investigation Near Completion in 2007

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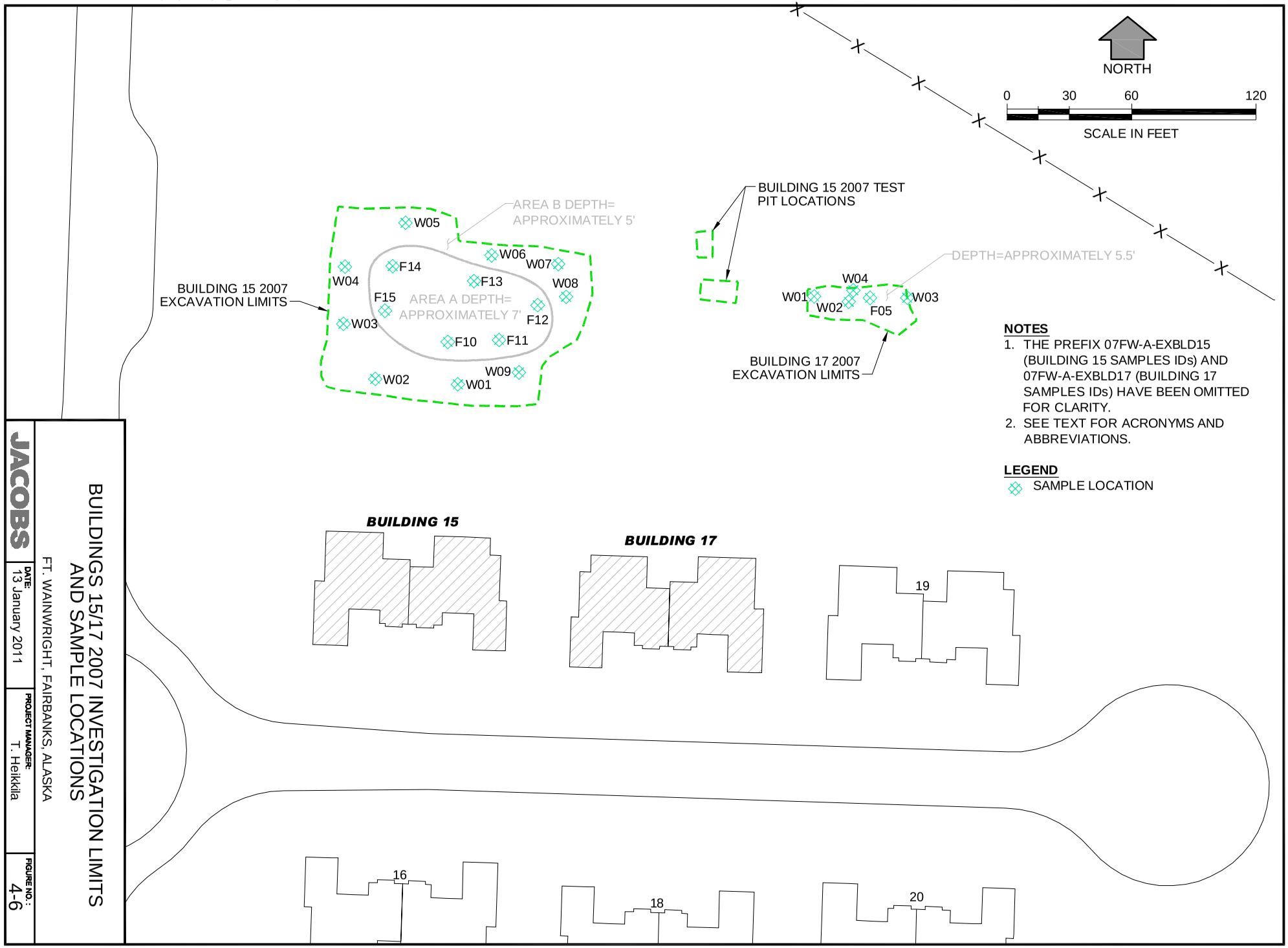

BUILDINGS 15/17 2007 INVESTIGATION LIMITS AND SAMPLE LOCATIONS

FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS

DATE: 13 January 2011

PROJECT MANAGER: T. Heikkila

FIGURE NO.: 4-6

4.4 POLYCHLORINATED BIPHENYLS REMOVAL ACTION

In 2007, PCB-contaminated soil was removed from two general areas within the FCS, as identified during the 2006 PSE II Investigation (USACE 2007c): Area E (Exclusion Zone) and the TSA (Figure 4-7). In 2007, the PCB investigation was conducted from 21 September to 13 November. The primary excavation area was located within Area E around the foundation footprint of Building 52. Hot spots within the Exclusion Zone (locations 06SB134, 06SB140, and 06SB71) and just north of the Exclusion Zone (locations 06SB98 and 06SB105) were removed in 2007. An area of approximately 12,527 square feet was excavated during the 2007 removal action.

Soil was initially excavated to a depth of 1 foot below the deepest sample with PCB contamination above 1 mg/kg and horizontally 5 feet beyond the estimated limits of contamination in each direction determined by the 2006 PSE II Investigation (USACE 2007b). In smaller localized areas, this equated to a 10-foot by 10-foot grid centered on the sample location. Once levels of contamination below 1 mg/kg were believed to have been achieved, field screening was undertaken by CH2M Hill using HACH and RaPID Assay field screening test kits. Based on the results of the field screening sample, either additional excavation was performed or an analytical confirmation sample was collected. Wall samples were collected every 10 feet, and one floor sample was collected for each 10-foot by 10-foot grid. If confirmation samples resulted in a concentration above 1 mg/kg, excavation continued until the area was confirmed less than 1 mg/kg. If a floor confirmation sample exceeded a screening level, the corresponding grid was excavated an additional 1 foot bgs and resampled. If a wall confirmation sample exceeded the screening level, the wall length represented by that sample (i.e., 5 feet on either side of the sample location) was excavated an additional 5 feet into the wall face and resampled. This process continued until PCBs were confirmed below the ADEC Method Two residential cleanup level of 1 mg/kg.

A sample summary table for all 2007 excavation confirmation samples can be found in Table E-03 of Appendix E to the *Draft Final 2008 RI Report*.

Area E – Beginning of excavation activities 2007

Area E – Excavation Sampling Grid 2007

(intentionally blank)

Area E – power pole in excavation near areas of highest contamination 2007

Area E – tarping station for loading PCB-contaminated soil 2007

(intentionally blank)

LEGEND

- BUILDING
- BUILDING FOUNDATION
- BUILDING FOOTPRINT; NO FOUNDATION CONSTRUCTED
- PP POWER POLE
- 2007 LIMITS OF EXCAVATION
- 2008 LIMITS OF EXCAVATION

NORTH

PCB 500 AREA
(06SB105)

PCB 600 AREA
(06SB98)

FENCE

PCB 800 AREA
(06SB140)

PCB NORTHERN 400 AREA

PCB 900 AREA
(06SB71)

EXCAVATION No.02 AREA

PCB CENTRAL 300 AREA

PCB 700 AREA
(06SB134)

PLGSE2

PLGSE1

PCB EASTERN 100 AREA

PCB SOUTHERN 200 AREA

BUILDING 50

BUILDING 52

BUILDING 54

BUILDING 56

BUILDING 58

ACCESS ROAD

BUILDING 51

BUILDING 53

BUILDING 55

0 25 50 100
SCALE IN FEET

06SB15

06SB05, O6SB07, AND 06SB08

SOUND BERM

FENCE

06SB14

0 30 60 120
SCALE IN FEET

DEPTH=2'

EXCAVATION No.05 AREA

PCB INVESTIGATION
2007 AND 2008 LIMITS OF INVESTIGATION
MAIN EXCLUSION ZONE AND HOT SPOTS
FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 4-7

G:\Autocad\ERS--UR\05F50701\2009 R I Rpt\Fig 4-7 PCB Farm.dwg Sep 30,2010 -tedemain

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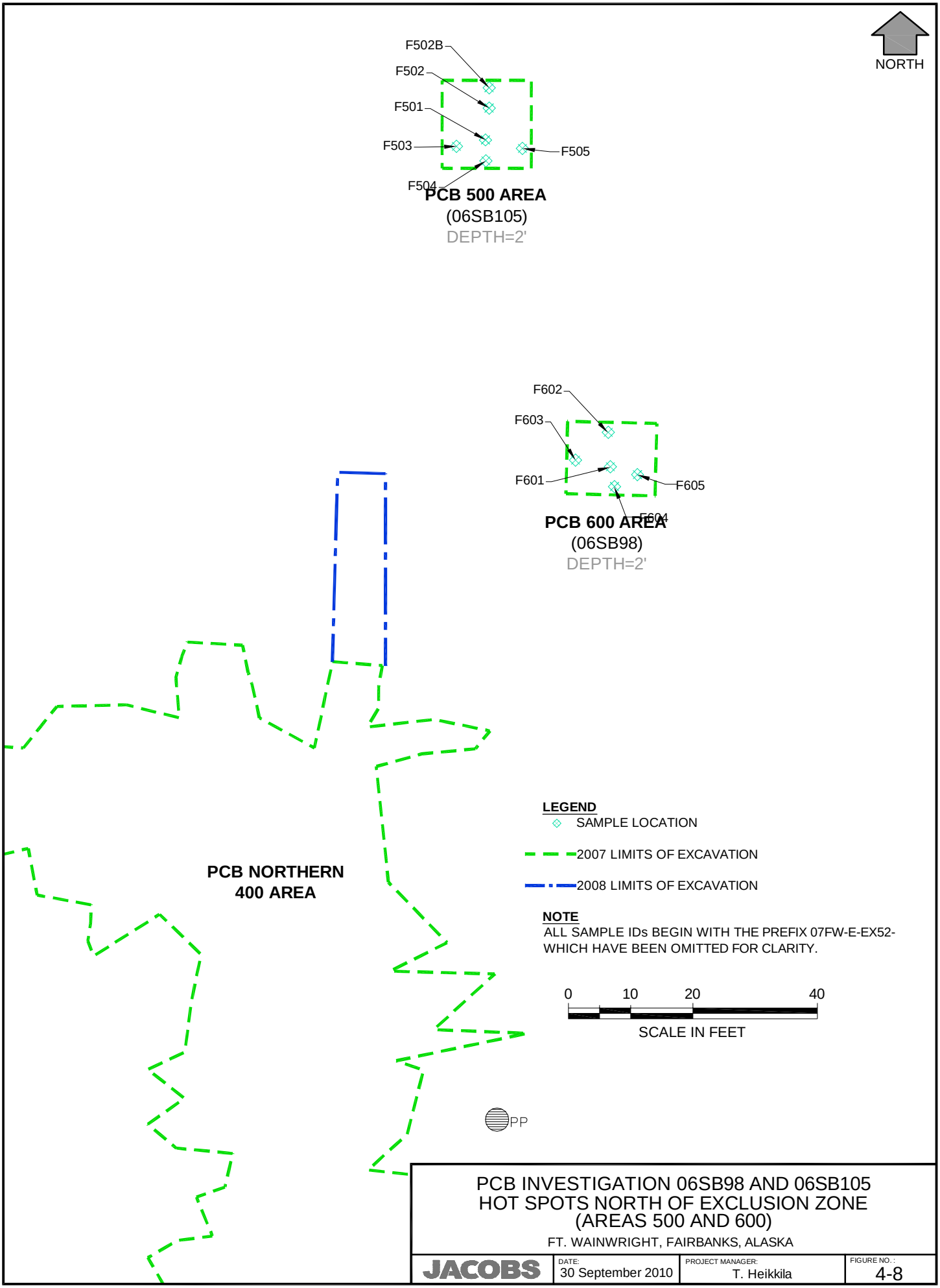
4.4.1 Building 52 Excavation (Area E)

On 21 September 2007, excavation began in the area of the planned Building 52 footprint and proceeded in the manner described in Section 4.4. Figures 4-8 to 4-13 present the locations of the PCB investigation in Area E and the excavation limits. Location references refer to soil borings conducted during this investigation (e.g., 06SB105). CH2M Hill's numbering scheme for these areas is shown in parentheses (e.g., "100"s). As delineated by the *PSE II Report* (USAED 2007b), excavation in this area was separated into four sections. Field screening in the northern, southern, and eastern sections identified PCB contamination between 1 and 10 mg/kg, and the central area contained PCB contamination above 10 mg/kg. Excavation began to the north near 06SB129, and continued in a southerly direction. Backfilling activities only occurred in portions of the excavation where confirmation results indicated that the area was below the 1 mg/kg action level for PCBs. The final depth of the main excavation varied between 3 and 14 feet bgs. The total area of the Building 52 excavation area was 10,579 square feet in 2007. Due to the size of the excavation, excavation and backfilling activities occurred concurrently. Contaminated soil was disposed of as described in Section 7.0.

Several items relating to power generation, historically associated with the Taku Gardens area, were removed during the excavation, including copper wire, ceramic sections of the transformer, and power poles.

The area of excavation was limited to the north and west by underground utilities. During the 2007 field season, two sample areas of PCB contamination (07FW-E-EX52-W403B and 07FW-E-EX52-W428A) were not excavated. These areas contained PCB concentrations of 9.2 and 1.4 mg/kg, respectively. At the conclusion of the 2007 field season, frozen ground prevented hand-excavation around the glycol and steam lines; however, additional excavation occurred in these areas in 2008, and the contaminated areas were removed (refer to Section 5.6 for details). Excavations in Area E concluded for the season on 13 November 2007. The excavation was backfilled using local sand and gravel, in accordance with *Replacement Housing Fort Wainwright Specification 02300, Earthwork* (USAED 2007h).

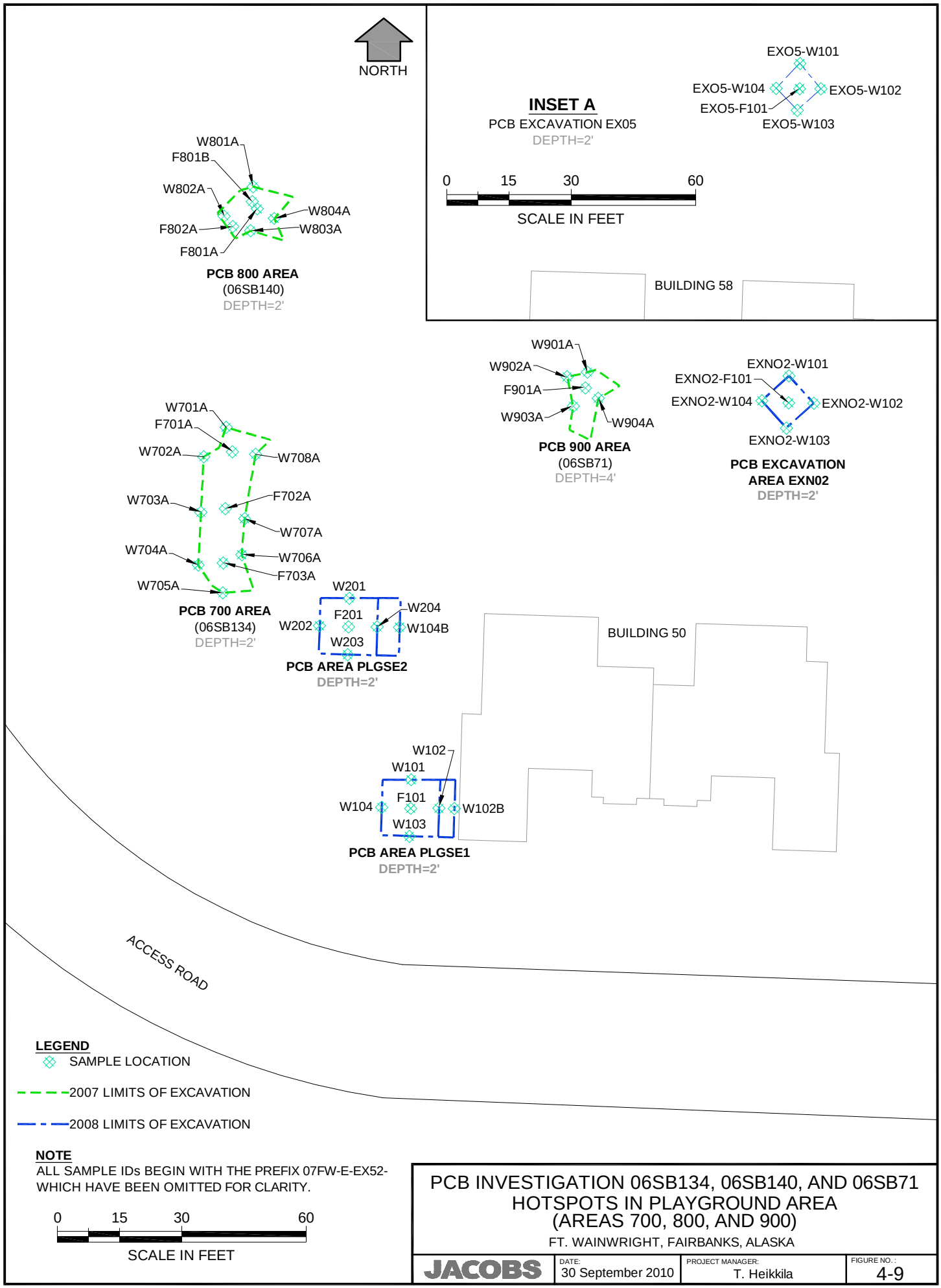


PCB INVESTIGATION 06SB98 AND 06SB105
HOT SPOTS NORTH OF EXCLUSION ZONE
(AREAS 500 AND 600)

FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 4-8

G:\Autocad\ERS-UR\05F50701\2009 RI Rpt\Fig 4-8 PCB Farm-North 500.dwg Sep 30,2010 -tiedemarn

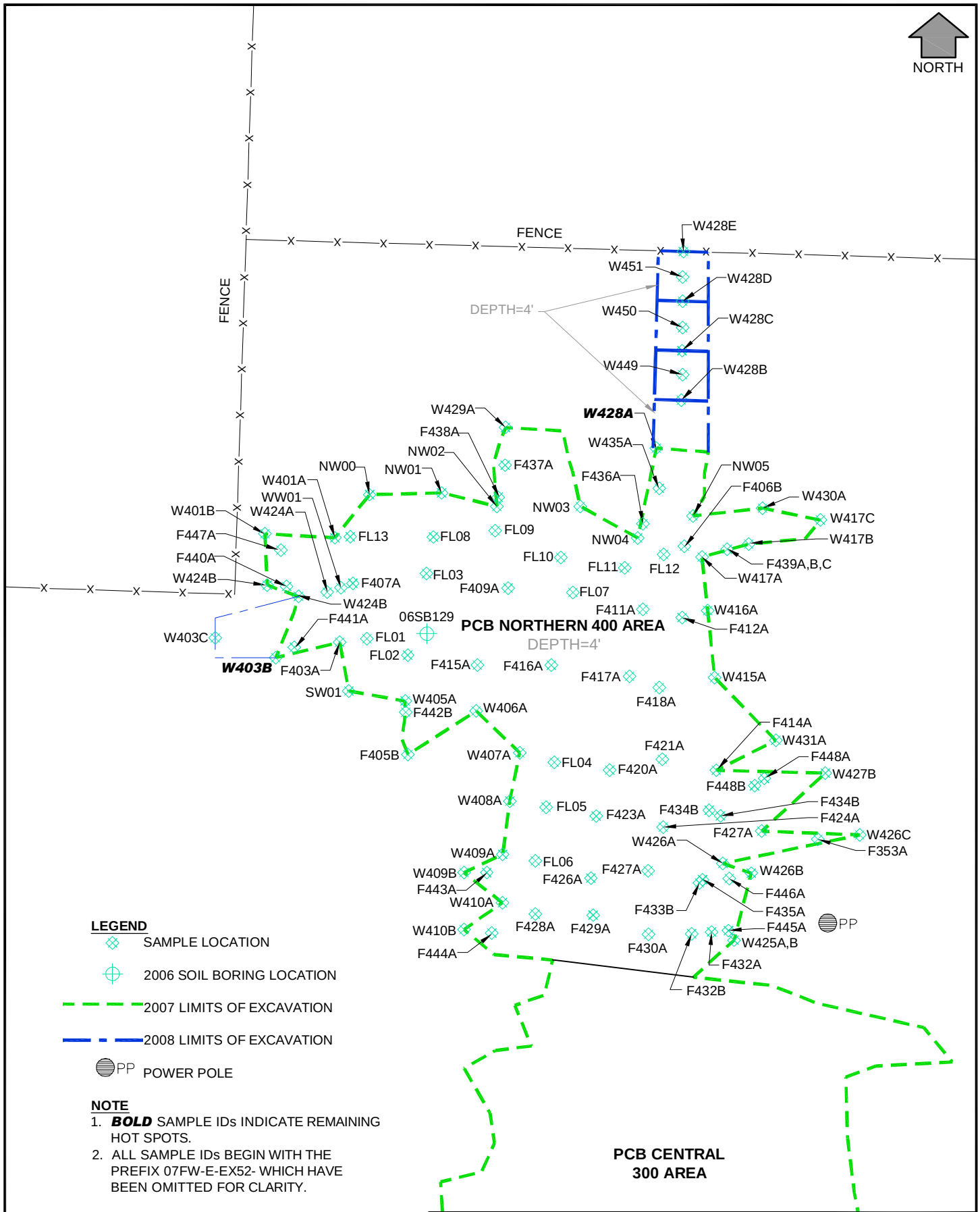


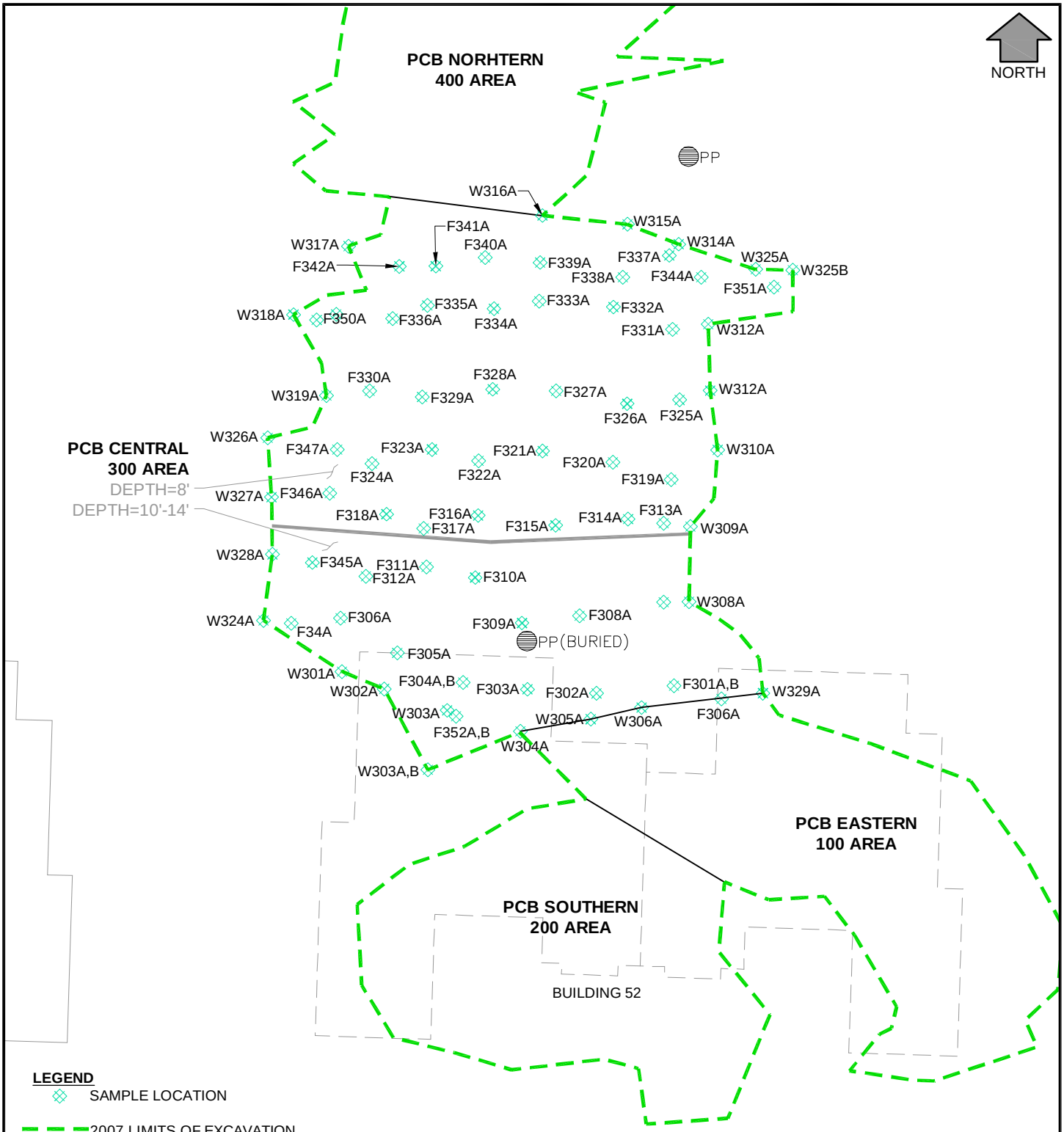
PCB INVESTIGATION 06SB134, 06SB140, AND 06SB71 HOTSPOTS IN PLAYGROUND AREA (AREAS 700, 800, AND 900)

FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 4-9

G:\Autocad\ERS-UR\05F5070\12009 RI Rpt\Fig 4-9 PCB Farm-Playground.dwg Sep 30,2010 -tiedemam


NORTH
FENCE
FENCE
W428E
W451
W428D
DEPTH=4'
W450
W428C
W449
W428B
W428A
W429A
F438A
NW02
NW00
NW01
F437A
W435A
W401A
WW01
W424A
W401B
F447A
F440A
W424B
F436A
NW05
F406B
W430A
NW03
W417C
W417B
NW04
FL13
FL08
FL09
FL10
FL11
FL12
F439A,B,C
W417A
F407A
FL03
F409A
FL07
W424B
F411A
W416A
F441A
06SB129
PCB NORTHERN 400 AREA
F412A
W403C
FL01
DEPTH=4'
FL02
W403B
F403A
F415A
F416A
F417A
W415A
SW01
W405A
F442B
W406A
F418A
F414A
W431A
F405B
W407A
FL04
F421A
F420A
F448A
W427B
F448B
W408A
FL05
F423A
F434B
F434B
F424A
F427A
W426C
W426A
F353A
W409A
FL06
F427A
W426B
W409B
F426A
F443A
F446A
W410A
F433B
F435A
W410B
F428A
F429A
F445A
PP
F430A
W425A,B
F444A
F432A
F432B
PCB CENTRAL
300 AREA
LEGEND
SAMPLE LOCATION
2006 SOIL BORING LOCATION
2007 LIMITS OF EXCAVATION
2008 LIMITS OF EXCAVATION
PP POWER POLE
NOTE
1. BOLD SAMPLE IDs INDICATE REMAINING HOT SPOTS.
2. ALL SAMPLE IDs BEGIN WITH THE PREFIX 07FW-E-EX52- WHICH HAVE BEEN OMITTED FOR CLARITY.
0
10
20
40
SCALE IN FEET
PCB INVESTIGATION
MAIN INVESTIGATION (NORTHERN 400 AREA)
FT WAINWRIGHT, FAIRBANKS, ALASKA
JACOBS
DATE: 13 January 2011
PROJECT MANAGER: T. Heikkila
FIGURE NO. : 4-10
G:\Autocad\ERS-UR\05F50701\2009 RI Rpt\Fig 4-10 PCB Farm-North 400.dwg Sep 30,2010 -tiedemam



LEGEND

SAMPLE LOCATION

2007 LIMITS OF EXCAVATION

PP POWER POLE

NOTE

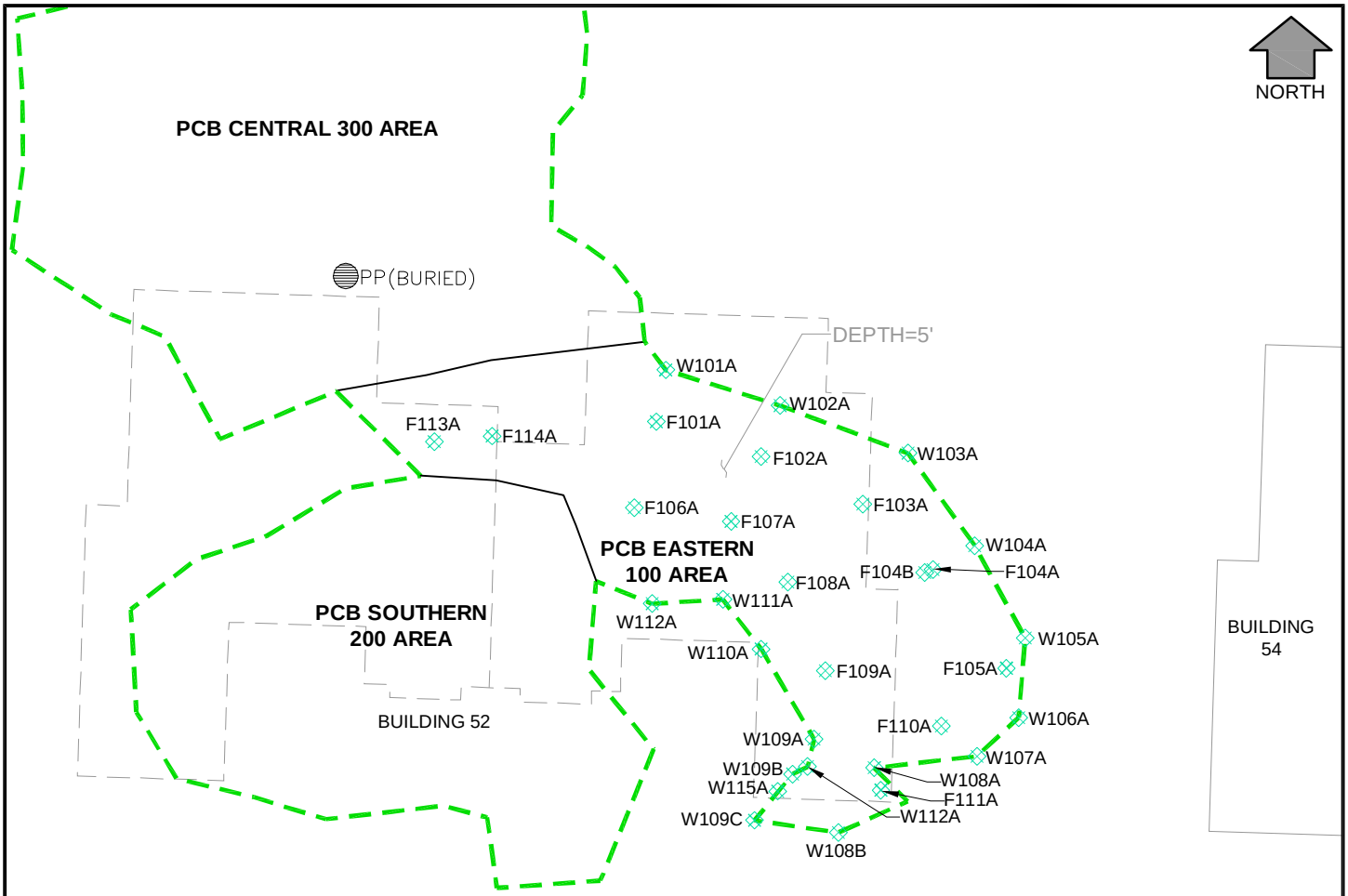
ALL SAMPLE IDs BEGIN WITH THE PREFIX 07FW-E-EX52- WHICH HAVE BEEN OMITTED FOR CLARITY.

PCB INVESTIGATION
2007 MAIN INVESTIGATION (CENTRAL 300 AREA)

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 4-11

G:\Autocad\ERS-UR\05F50701\2009 RI Rpt\Fig 4-11 PCB Farm-Central 300a.dwg Sep 30,2010 -tiedemam

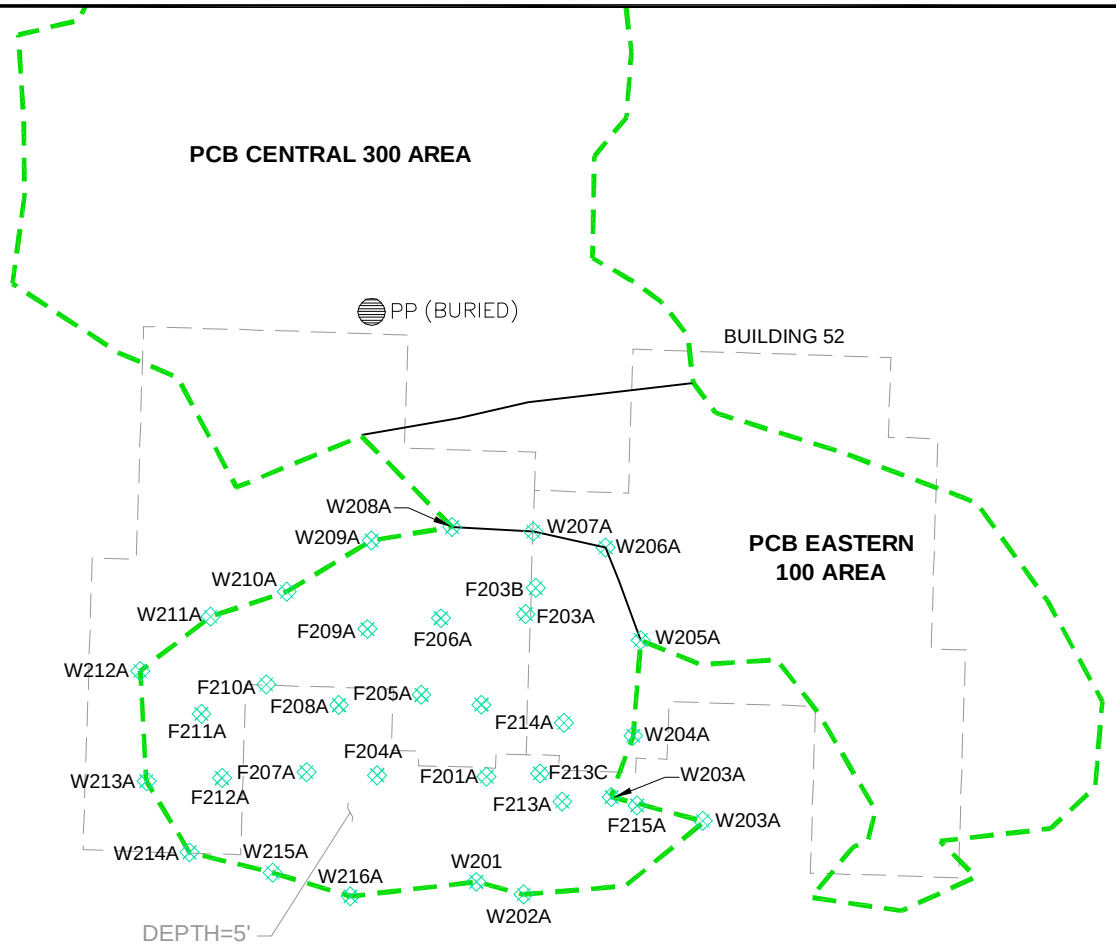


PCB INVESTIGATION
MAIN 2007 INVESTIGATION (EASTERN 100 AREA)

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 4-12

G:\Autocad\ERS-UR\05F5070\12009 RI Rpt\Fig 4-12 PCB Farm-Eastern 100a.dwg Sep 30,2010 -tiedemann



LEGEND

SAMPLE LOCATION

2007 LIMITS OF EXCAVATION

PP POWER POLE

NOTE

ALL SAMPLE IDs BEGIN WITH THE PREFIX 07FW-E-EX52- WHICH HAVE BEEN OMITTED FOR CLARITY.

BUILDING 53

PCB INVESTIGATION
MAIN 2007 INVESTIGATION (SOUTHERN 200 AREA)

FT. Wainwright, Fairbanks, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 4-13

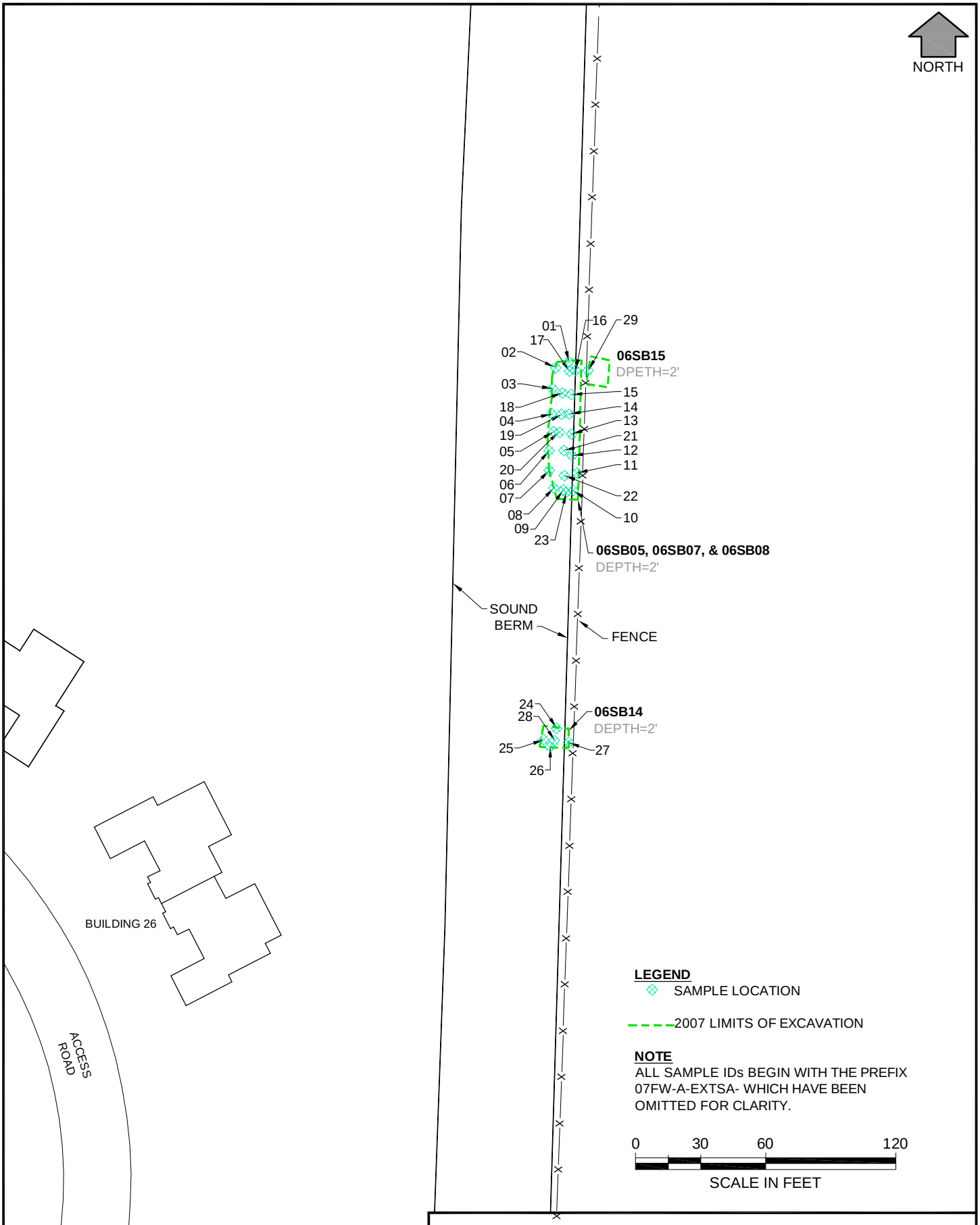
G:\Autocad\ERS-UR\05F5070112009 RI Rpt\Fig 4-13 PCB Main-South 200a.dwg Sep 30,2010 -tiedemann

4.4.2 Area E Hot Spots

In 2007, five additional areas of contamination were investigated outside of the main investigation area—two immediately north of the exclusion zone (represented by samples 06SB98 and 06SB105), one to the west of the main excavation (sample 06SB71), and two within the playground area (represented by samples 06SB140 and 06SB134, as presented in Figure 4-7 and 4-9; 06SS22 and 06SS19 were located in proximity to sample 06SB134 but are not shown on the figure). At 06SB98, a 100 square foot area was excavated to a depth of 2 feet bgs. The total area of excavation at 06SB105 was 100 square feet, with a maximum depth of 2 feet bgs. At 06SB71, screening results undertaken during the PSE II study indicated PCB contamination present at 5 feet bgs. Therefore, excavation centered on this location extended to a depth of 6 feet bgs, and because of clean screening and confirmation results, did not extend beyond the initial 100 square foot grid. The hot spot in the playground area (represented by 06SB134) extended to a depth of 2 feet bgs, and the total area of the excavation was 395 square feet. The total area of the excavation at 06SB140 was 137 square feet, with a maximum depth of 3 feet bgs.

4.4.3 Polychlorinated Biphenyls Hot Spots Outside Area E

From 2 October to 13 October 2007, two areas in the TSA were investigated (represented by 06SB15, 06SB05, 06SB28, 06SB07, 06SB29, 06SB08, and 06SB14). Figure 4-14 presents the locations of the PCB investigation at the TSA and excavation limits at those areas. The total area of excavation was 1,116 square feet, with a maximum depth of 2 feet bgs. A total of 116 cubic yards of PCB-contaminated soil was removed from this area. Following confirmation sampling, the area was backfilled and compacted.



PCB INVESTIGATION 2007 LIMITS OF EXCAVATION TRANSFORMER SERVICE AREA

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 4-14

G:\Autocad\ERS-UR\05F50701\2009 RI Rpt\Fig 4-14 PCB Hot Spots.dwg Sep 30,2010 -tiedemam

4.5 MONITORING WELL TEST PITS AND MUNITIONS AND EXPLOSIVES OF CONCERN SUPPORT

UXO support was provided during excavation for groundwater wells (installed by CH2M Hill). At each groundwater well location, a test pit was excavated prior to drilling, to approximately 5 feet bgs or to a depth at which no further debris was encountered. Debris and munitions-related items were removed from these test pits. A total of 540 MD items was removed from the test pit for Well 69 at Building 24 and a single MD item (MK2 practice grenade) from the surface of the excavation at Building 22. In 2008, these small excavations were amalgamated into the Building 22/24 investigation.

4.6 SOIL PILE REMOVAL AND SAMPLING

In 2007, Jacobs removed and sampled several soil piles. The majority of these soil piles were created during construction activities at the FCS site and were either removed from the site and stockpiled elsewhere at Fort Wainwright (e.g., DRMO) or left within the site boundary. The majority of the stockpiles had previously been sampled during the PSE I or II investigation (USAED 2007a, 2007b) or by CH2M Hill during RI/FS activities in 2007.

4.6.1 Construction Soil Piles

In 2005, 46 soil piles were created during construction activities at the FCS (Figure 7-1). These are believed to have originated from the installation of utilities and building foundations onsite. MI sampling was used to characterize these stockpiles and was completed by CH2M Hill in 2007. These data are presented in the *CH2M Hill Field Data Report* (USAED 2008h) and in the PRSE (USAED 2008d).

4.6.2 Construction Stockpiles, Area E

In 2007, soil piles 17 through 39 and soil piles SPD and SPF, located in Area E, were all removed. All soil piles in this area had concentrations of PCBs less than 1 mg/kg and were transferred by Jacobs to the Fort Wainwright Landfill for use as cover material. Attachment 2 to the *PCB Removal Action Work Plan* (USAED 2007i) contains the letter of approval for

disposal of low-level PCBs at the Fort Wainwright Landfill. Approximately 5,082 tons of soil pile material was removed from the FCS site during 2007.

4.7 SUMMARY OF MAIN INVESTIGATION AREAS

Table 4-4 presents a summary of Investigation activities at Area E, MEC clearance activities at Building 22/24, and drum and debris investigations at Buildings 49, 48, and 15/17.

Table 4-4
Summary of 2007 Investigation Activities

Location	Area of Investigation (square feet)	Drums	Contaminated Soil (cy)	MD	DMM
Building 49	4,500	186	24	0	0
Building 48	32,000	159	150	20	0
Building 15/17	9,400	75	3	257	5[1]
Buildings 22 and 24 well excavations	-	-	0	540	0
PCB Removal	12,527	-	972.5 (> 50 mg/kg PCB TSCA)	-	-
			575 (10-50 mg/kg PCB Non TSCA)		
Totals	58,427	420	1,724.5	**817**	**5**[1]

Notes:
[1] EOD detonated these items and reported them as high explosive filled.
For definitions, see the Acronyms and Abbreviations section.

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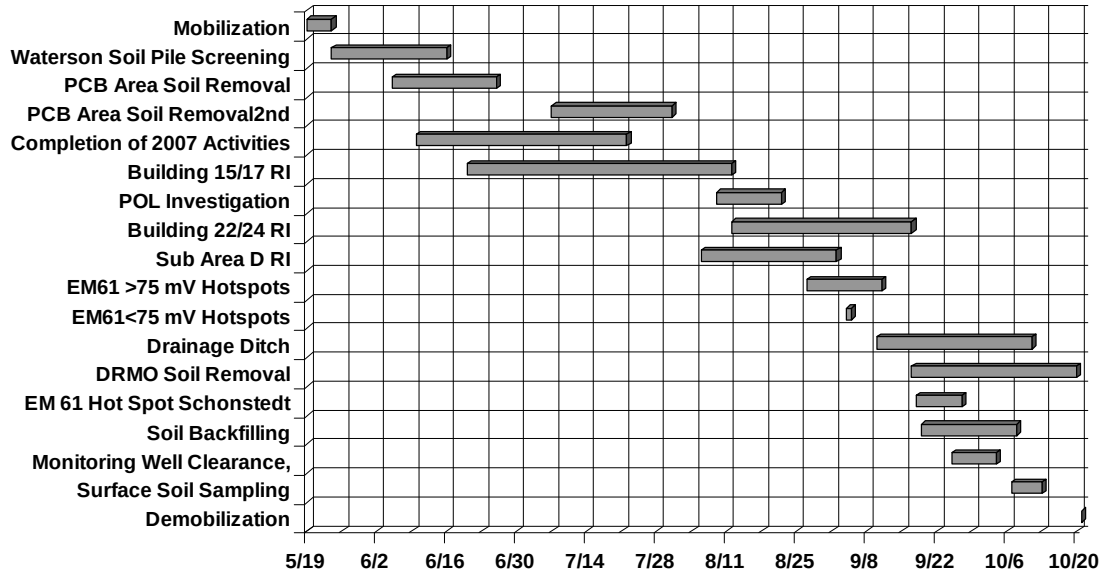
5.0 2008 INVESTIGATIONS

Work performed in 2008 included drum and debris investigations at Area A (Buildings 15/17 and 22/24) and Area D, drum and debris investigations at areas with EM61 readings exceeding 75 mV, drum and debris spot check investigations at areas with EM61 readings below 75 mV, an investigation and removal of PCB-contaminated soil in Area E, an investigation of POL- and DDT-contaminated hotspots, and monitoring well installation.

Figure 5-1 shows the schedule of work performed in 2008.

Figure 5-1 2008 Fieldwork Schedule



5.1 BUILDING 15/17 INVESTIGATION

The investigation at Building 15/17 continued in 2008 to remove known anomalies left in place at the conclusion of 2007 field activities due to weather conditions. Investigation activities began on 20 June 2008 and were completed 12 August 2008. Prior to investigation work in 2008, the fence that bound the northeastern corner of the site was moved to allow for expansion north of the Building 15/17 investigation. Several small test pits were also excavated to ascertain the lateral extent of debris. There were five areas of investigation in 2008, the main investigation just

north of Building 15, and four smaller investigations (three south of the main investigation and one north of the main investigation). Figure 5-2 presents the limits of the investigations in this area upon completion of investigation activities in 2008.

In accordance with the *Explosives Safety Plan* (Appendix F) and *MEC Support Work Plan* (USAED 2008a), a hazardous fragmentation distance (HFD) of 534 feet was applied to all investigation work in Area A in order to determine separation distances for unrelated personnel in the case of an unintentional detonation. The HFD was calculated based on the 8-inch Projectile M106 found in 2007. Based on proximity to the gas station and Neely Road, investigation work at the Building 15/17 occurred during night hours to reduce disruption to Fort Wainwright.

The total footprint of the 2008 Building 15/17 investigation was 75,579 square feet. The average depth of investigation was approximately 8 feet bgs, and the maximum depth was 15 feet. The deepest areas of investigation corresponded to the strongest EM61 signature; i.e., the area directly north of Building 15 was where the largest amount of debris was removed. Figure 5-3 displays geophysical data before and after the 2008 investigation activities at Building 15/17.

Materials removed during the 2008 investigation activities included the following:

- A total of 103 crushed and empty drums
- A total of 20 cubic yards of lead-contaminated soil (with lead-acid battery plates)
- Eight cubic yards of solvent-contaminated soil
- A total of 210 cubic yards of POL-contaminated soil
- Two drums with residual fuel contents
- Ten drums with residual tar, wrapped in geofabric and disposed of at the Fort Wainwright Landfill
- Four small furnaces and one large furnace (approximately 30 feet long by 20 feet wide) with ACM, double wrapped and disposed of at the Fort Wainwright Landfill
- Three dry transformers
- Solidified paint and soil in a 90-gallon overpack
- A hydraulic cylinder and contaminated soil in a 90-gallon overpack
- Two small calcium hypochlorite canisters

Building 15-17 Beginning Investigation Activities 2008

Building 15-17 Early Investigation Activities 2008

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Building 15-17 – Example of Metal Debris Removed From Investigation 2008

Building 15-17 – Investigation End of 2008 Field Season

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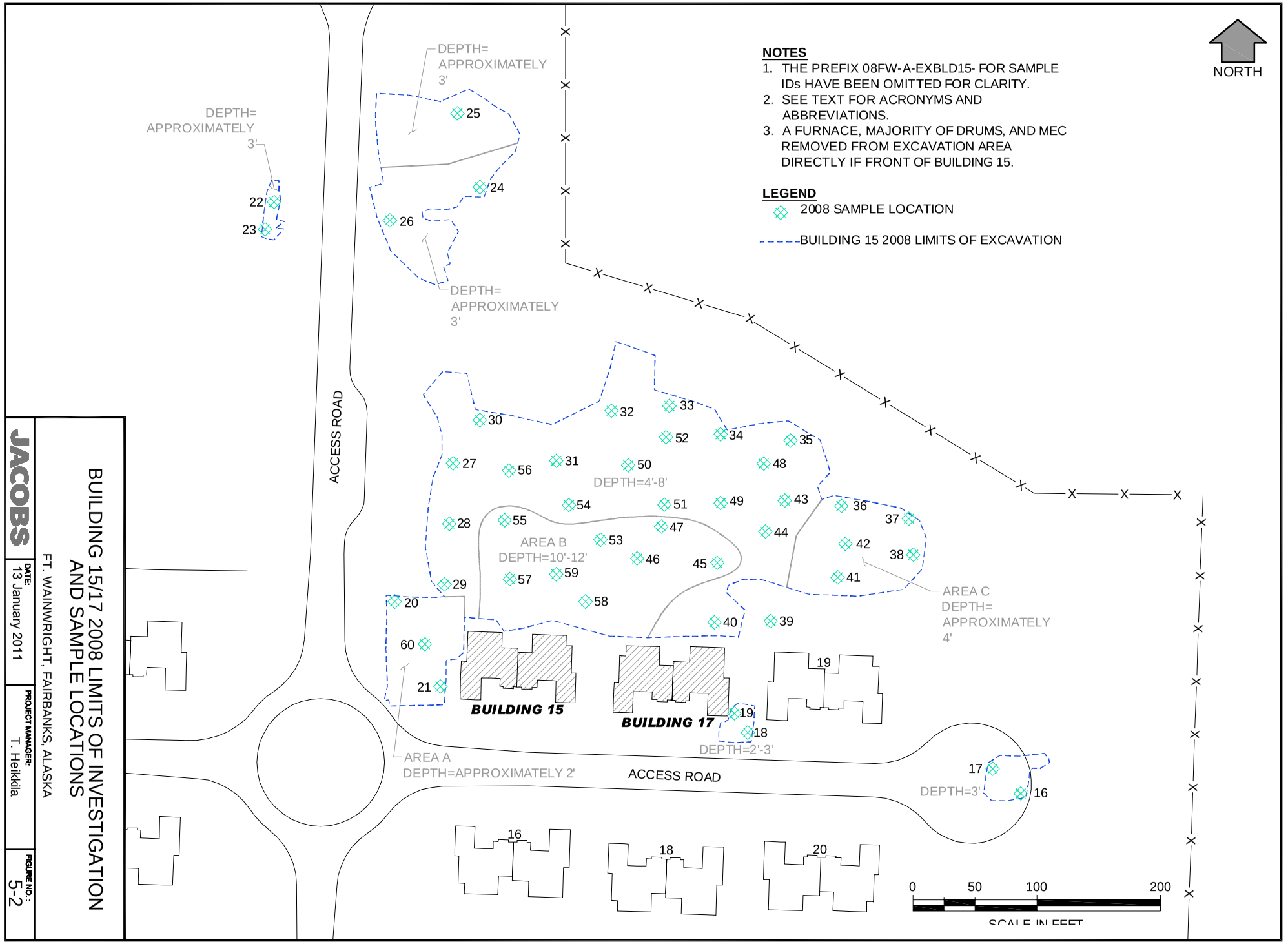
G:\Autocad\ERS-UR\05F50701\2009 RI Rpt\Fig 5-2 Bldg 15_17-2008.dwg Sep 30,2010 -tiedemam



BUILDING 15/17 2008 LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS

DATE: 13 January 2011

PROJECT MANAGER: T. Heikkila

FIGURE NO.: 5-2

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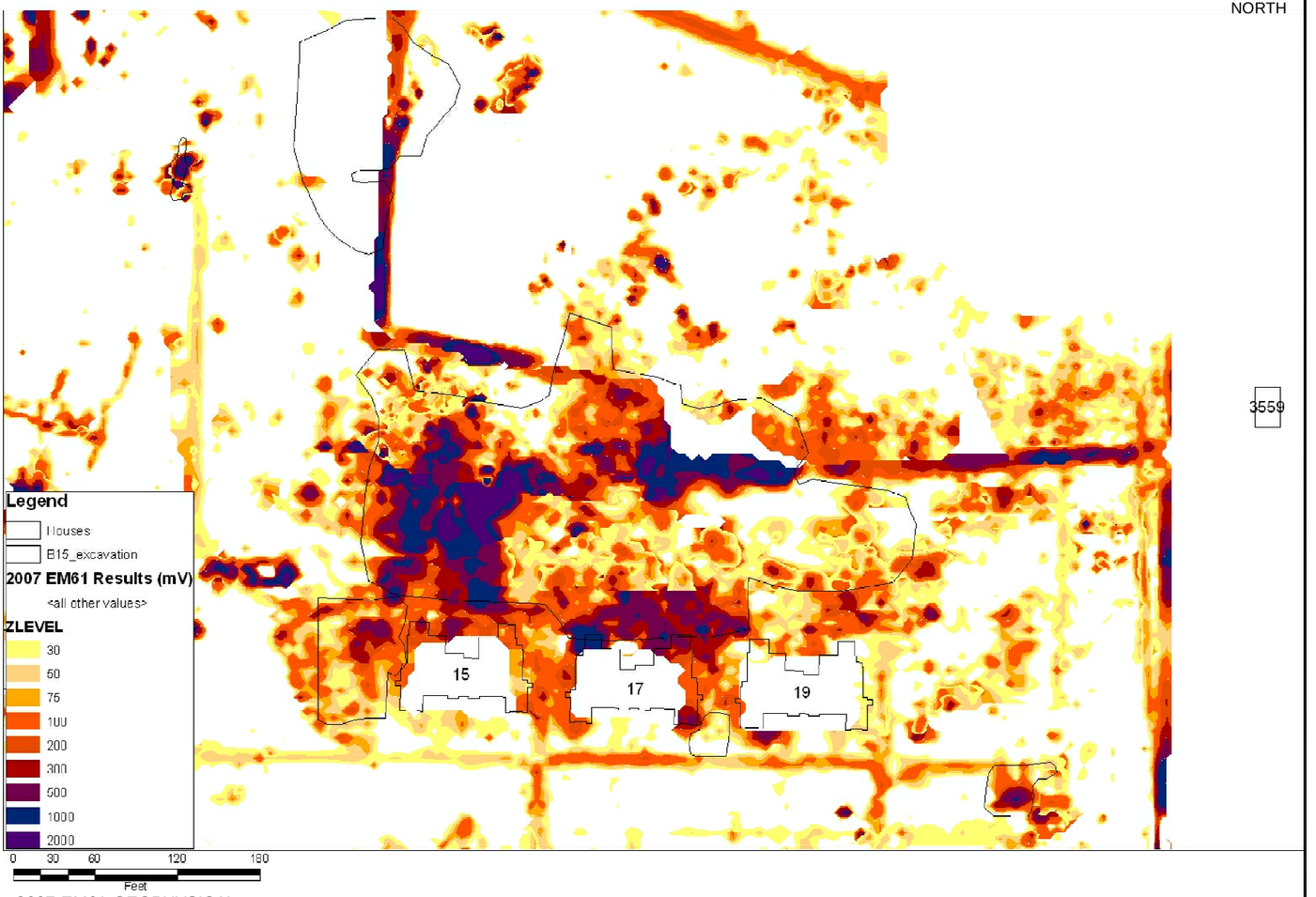
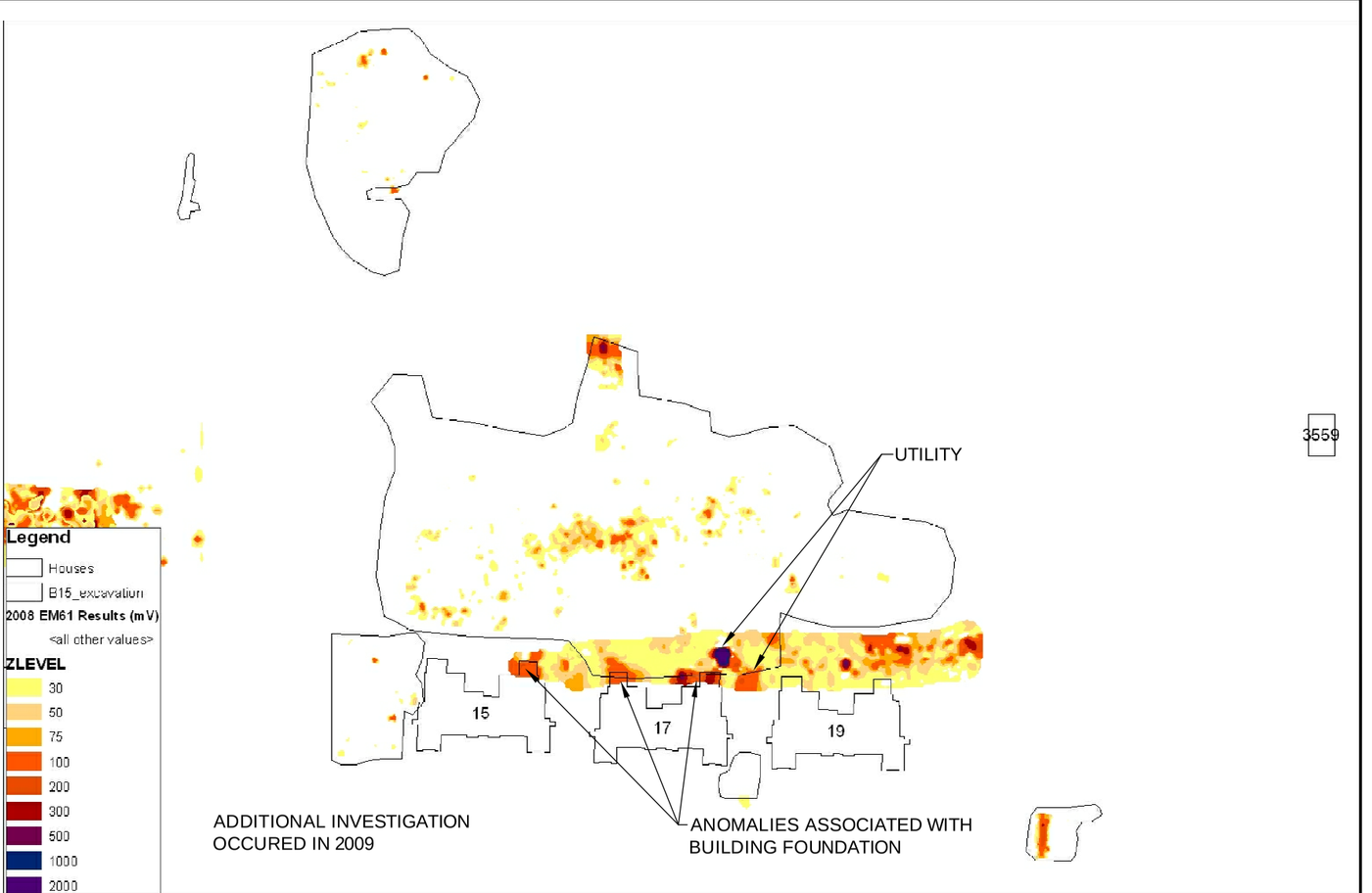
G:\Autocad\ERS-UR\05F50701\2009 RI Rpt\Fig 5-3 Bldg 15_17 Geophysical.dwg Sep 30,2010 -tiedemam



2007 EM61 GEOPHYSICAL
SURVEY PERFORMED BY CRREL



2008 EM61 GEOPHYSICAL
SURVEY PERFORMED BY JACOBS

BUIDLINGS 15/17
2008 BEFORE AND AFTER GEOPHYSICAL SURVEYS
FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS

DATE: 30 September 2010

PROJECT MANAGER: T. Heikkila

FIGURE NO.: 5-3

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Munitions-related items removed from the Building 15/17 investigation included the following:

- A total of 538 items of MD
- A total of 22 items originally classified as DMM, but reclassified as MD upon detonation,
- A total of 35 items of RRD (including 21 originally classified as DMM)
- One DMM item, a 3.5-inch M29 practice rocket (live motor), remained classified as DMM after detonation

Section 7.0 presents further details regarding waste streams and disposal locations. Appendix F presents a detailed summary of the munitions-related items removed during the investigation.

Characterization sampling was performed after the investigation activities were completed. The investigation floor and wall samples were collected at a frequency of one sample per 50-foot by 50-foot grid node. A total of 60 soil characterization samples were collected from the main Building 15/17 investigation area (Figure 5-2). Table 5-1 presents the characterization sample IDs, sample depths, and analytical suite. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Appendix B presents the analytical data. Investigation activities continued at this site in 2009. Refer to Section 6.1 for details of work performed in 2009.

Table 5-1
Building 15/17 Investigation Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
2008 Characterization Samples		
08-FW-A-EXBLD15-16-1_3	1-3	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8321A, SW6010B, SW6020, SW7471A
08-FW-A-EXBLD15-17-1_3	1-3	
08-FW-A-EXBLD15-18-1_3	1-3	
08-FW-A-EXBLD15-19-1_2	1-2	
08-FW-A-EXBLD15-20-2_4	2-4	
08-FW-A-EXBLD15-21-1_3	1-3	
08-FW-A-EXBLD15-22-2_4	2-4	
08-FW-A-EXBLD15-23-1_3	1-3	
08-FW-A-EXBLD15-24-2_4	2-4	
08-FW-A-EXBLD15-25-0_1	0-1	
08-FW-A-EXBLD15-26-2_4	2-4	
08-FW-A-EXBLD15-27-5_7	5-7	
08-FW-A-EXBLD15-28-7_9	7-9	
08-FW-A-EXBLD15-29-5_7	5-7	
08-FW-A-EXBLD15-30-3_5	3-5	
08-FW-A-EXBLD15-31-1_3	1-3	
08-FW-A-EXBLD15-32-0_2	0-2	
08-FW-A-EXBLD15-33-4_6	4-6	
08-FW-A-EXBLD15-34-2_4	2-4	
08-FW-A-EXBLD15-35-3_5	3-5	
08-FW-A-EXBLD15-36-3_5	3-5	
08-FW-A-EXBLD15-37-0_2	0-2	
08-FW-A-EXBLD15-38-0_2	0-2	
08-FW-A-EXBLD15-39-2_4	2-4	
08-FW-A-EXBLD15-40-0_3	0-3	
08-FW-A-EXBLD15-41-2_4	2-4	
08-FW-A-EXBLD15-42-10_12	10-12	
08-FW-A-EXBLD15-43-10_12	10-12	
08-FW-A-EXBLD15-44-8_10	8-10	
08-FW-A-EXBLD15-45-8_10	8-10	
08-FW-A-EXBLD15-46-10_12	10-12	
08-FW-A-EXBLD15-47-10_12	10-12	
08-FW-A-EXBLD15-48-8_10	8-10	
08-FW-A-EXBLD15-49-8_10	8-10	
08-FW-A-EXBLD15-50-8_10	8-10	

Table 5-1
Building 15/17 Investigation Characterization Sample Identification and Depth
(Continued)

Sample ID	Sample Depth (feet bgs)	Analyses
2008 Characterization Samples		
08-FW-A-EXBLD15-51-6_8	6-8	
08-FW-A-EXBLD15-52-6_8	6-8	
08-FW-A-EXBLD15-53-10_12	10-12	
08-FW-A-EXBLD15-54-6_8	6-8	
08-FW-A-EXBLD15-55-10_12	10-12	
08-FW-A-EXBLD15-56-8_10	8-10	
08-FW-A-EXBLD15-57-10_12	10-12	
08-FW-A-EXBLD15-58-10_12	10-12	
08-FW-A-EXBLD15-58-10_12	10-12	
08-FW-A-EXBLD15-59-3_4	3-4	
08-FW-A-EXBLD15-60-1_2	1-2	

Note: For definitions, see the Acronyms and Abbreviations section.

5.2 BUILDING 22/24 INVESTIGATION

The Building 22/24 investigation began on 12 August and was completed 18 September 2008. The total area of investigation was 66,190 square feet (Figure 5-4). The average depth of the investigation was approximately 8 feet bgs, with a maximum depth of investigation of approximately 12 feet bgs, in areas with the strongest EM61 signatures. Two deep investigations, one on the south side of Building 21 and the other between Buildings 23 and 24, were not surveyed with EM61 equipment during the field season because surveyors could not safely enter the steep excavations with their equipment. These two areas were cleared of metal debris by UXO technicians and backfilled so that the excavation could be safely surveyed with EM61 equipment during a future site visit. Figure 5-5 displays geophysical data before and after investigation activities at Building 22/24 and identifies these areas.

Materials removed from investigation activities at Building 22/24 investigation included the following:

- A total of 39 crushed and empty drums
- A total of 30 cubic yards of POL-contaminated soil (with lead-acid battery plates)
- Four cubic yards of paint-contaminated soil
- Paint cans
- Several large furnaces
- One hydraulic cylinder with oil
- Six gas cylinders (assumed acetylene)
- One fire extinguisher
- One crushed drum with residual oil
- One dry transformer

Munitions-related items removed from the Building 22/24 investigation included the following:

- A total of 1,552 items of MD, including 405 items of RRD

Section 7.0 presents further details regarding waste streams and disposal locations. Appendix F presents a detailed summary of the munitions-related items removed during the investigation.

Building 24 characterization samples were collected on 5 September 2008, and Building 22 characterization samples were collected on 15 September 2008. Investigation floor and wall samples were collected at a frequency of one sample per 50 square feet. Twenty samples were collected from the Building 24 investigation and 43 samples from the Building 22 investigation. Appendix B presents sample results. Tables 5-2 and 5-3 present sample IDs and depths from the Building 24 and 22 investigations, respectively. Appendix B presents the analytical data. Figure 5-4 depicts the locations of samples collected from both investigations. The investigation area was backfilled during the 2009 field season. Clean, stockpiled material was used as backfill in the bottom of the investigation footprint in 2009, and the top two feet was backfilled with offsite borrow material.

Building 22-24 Beginning of Investigation Activities 2008

Building 22-24 Clean Excavated Soil Stockpile 2008

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Building 22-24 Examples of Munitions-Related Items Excavated 2008

Building 22-24 Investigation Near Completion 2008

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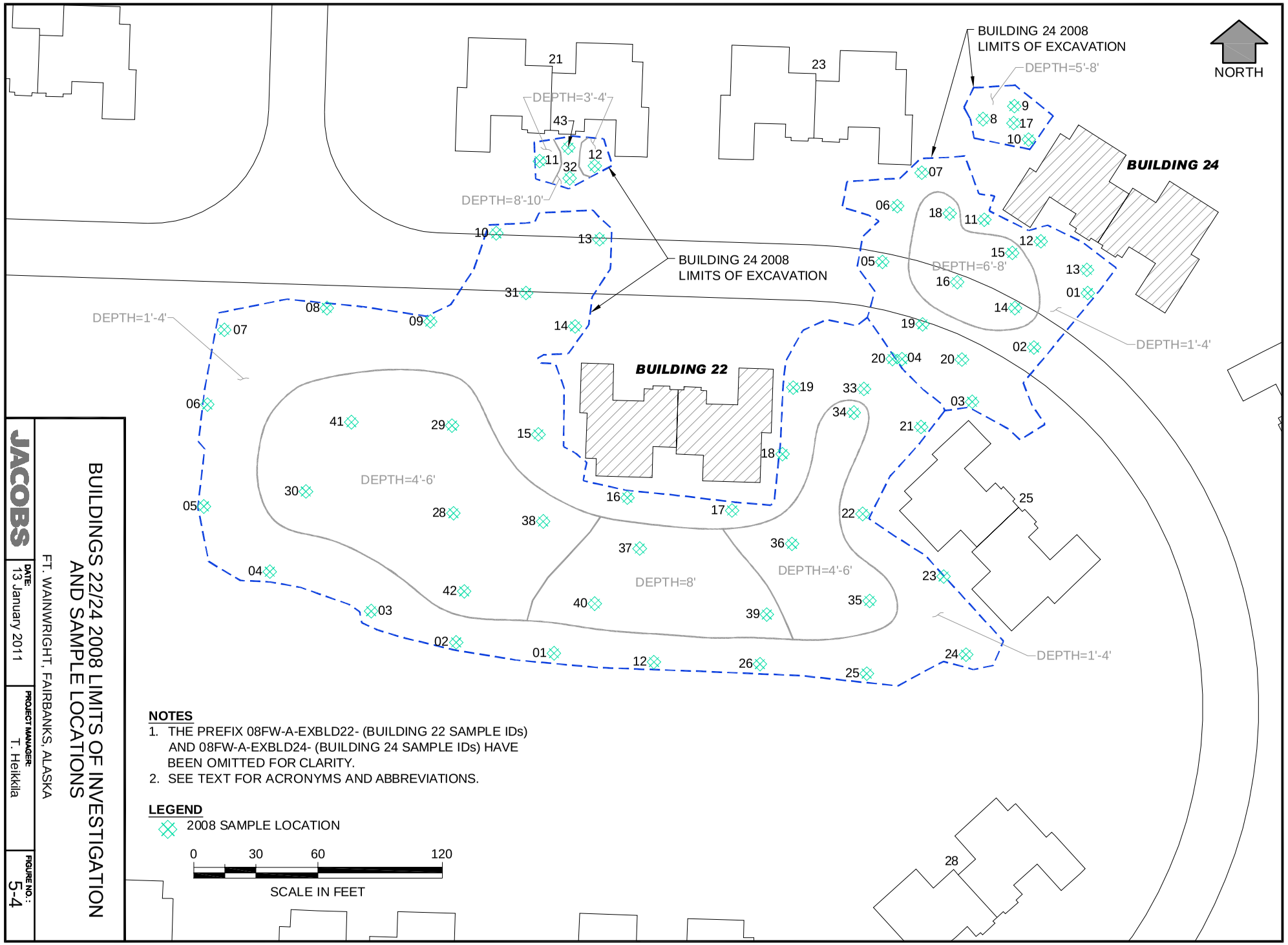
G:\Autocad\ERS-UR\05F50701\2009 RI Rpt\Fig 5-4 Bldg 22_24-2008.dwg Sep 30,2010 -tiedemam



NOTES

1. THE PREFIX 08FW-A-EXBLD22- (BUILDING 22 SAMPLE IDs) AND 08FW-A-EXBLD24- (BUILDING 24 SAMPLE IDs) HAVE BEEN OMITTED FOR CLARITY.
2. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

LEGEND

2008 SAMPLE LOCATION

0 30 60 120

SCALE IN FEET

BUILDINGS 22/24 2008 LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS

DATE: 13 January 2011

PROJECT MANAGER: T. Heikkila

FIGURE NO.: 5-4

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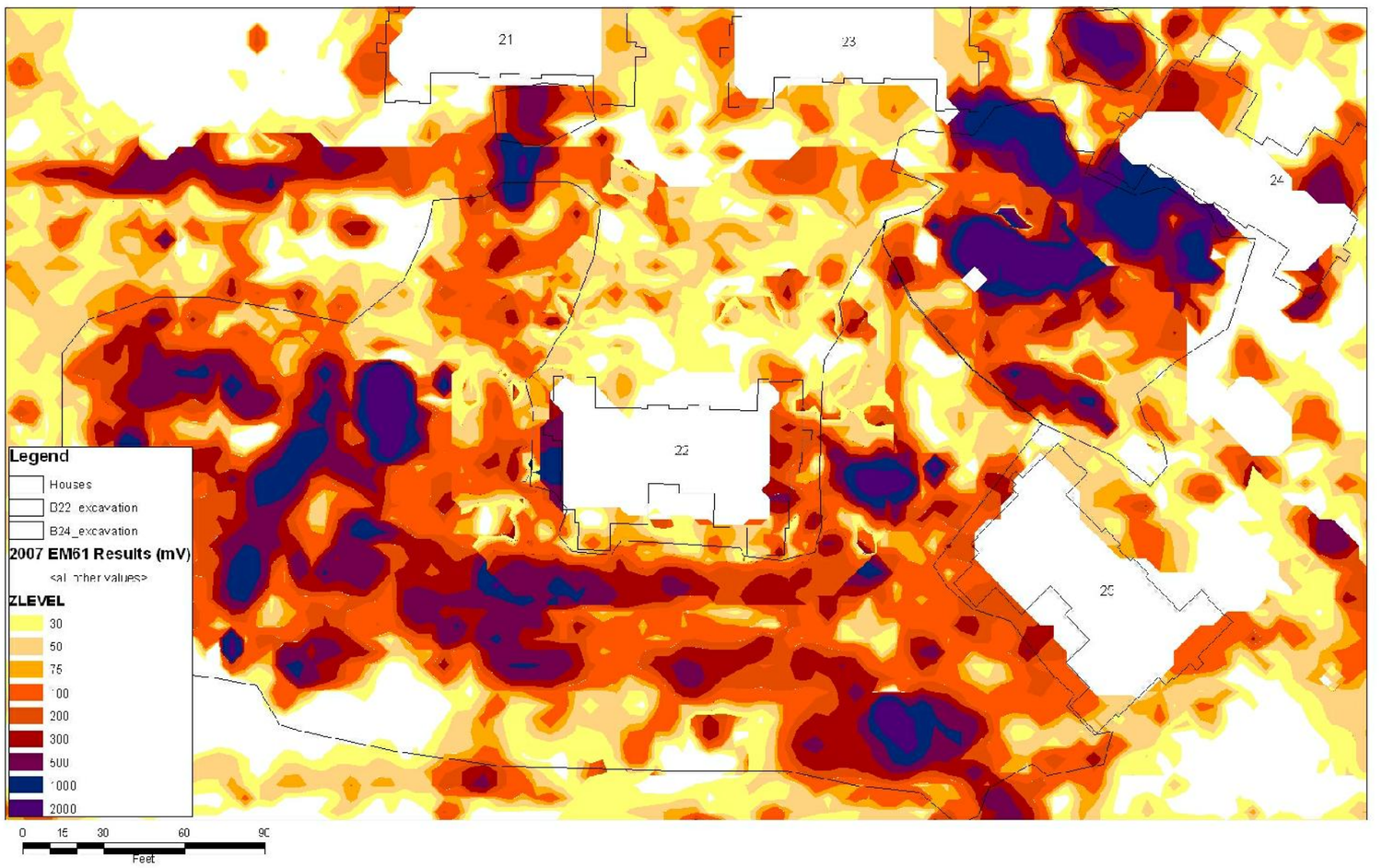
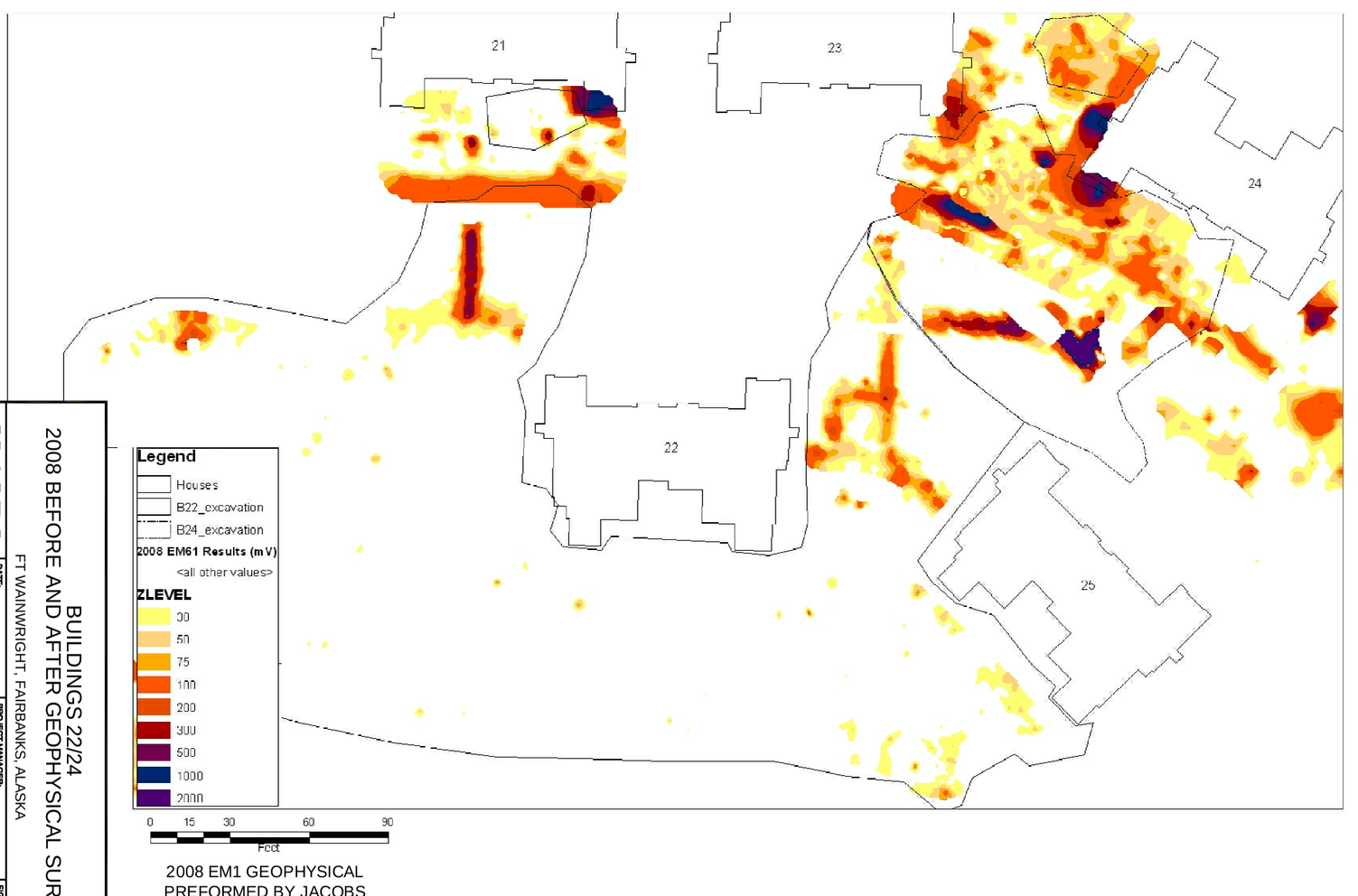
G:\Autocad\ERS-UR\05F50701\2009 RI Rpt\Fig 5-5 Bldg 22_24 Geophysical.dwg Sep 30,2010 -tiedemam



2007 EM1 GEOPHYSICAL
PREFORMED BY CRREL



2008 EM1 GEOPHYSICAL
PREFORMED BY JACOBS

BUILDINGS 22/24
2008 BEFORE AND AFTER GEOPHYSICAL SURVEYS
FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS

DATE: 30 September 2010

PROJECT MANAGER: T. Heikkila

FIGURE NO.: 5-5

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Table 5-2
Building 24 Investigation Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08-FW-A-EXBLD24-01-4	4	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8321A, SW6010B, SW6020, SW7471A
08-FW-A-EXBLD24-02-3	3	
08-FW-A-EXBLD24-03-3	3	
08-FW-A-EXBLD24-04-1	1	
08-FW-A-EXBLD24-05-3	3	
08-FW-A-EXBLD24-06-4	4	
08-FW-A-EXBLD24-07-5	5	
08-FW-A-EXBLD24-08-5	5	
08-FW-A-EXBLD24-09-5	5	
08-FW-A-EXBLD24-10-5	5	
08-FW-A-EXBLD24-11-4	4	
08-FW-A-EXBLD24-12-4	4	
08-FW-A-EXBLD24-13-4	4	
08-FW-A-EXBLD24-14-6	6	
08-FW-A-EXBLD24-15-6	6	
08-FW-A-EXBLD24-16-6	6	
08-FW-A-EXBLD24-17-8	8	
08-FW-A-EXBLD24-18-8	8	
08-FW-A-EXBLD24-19-4	4	
08-FW-A-EXBLD24-20-4	4	

Note: For definitions, see the Acronyms and Abbreviations section.

Table 5-3
Building 22 Investigation Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08-FW-A-EXBLD22-01-3	3	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8321A, SW6010B, SW6020, SW7471A
08-FW-A-EXBLD22-02-3	3	
08-FW-A-EXBLD22-03-4	4	
08-FW-A-EXBLD22-04-3	3	
08-FW-A-EXBLD22-05-3	3	
08-FW-A-EXBLD22-06-2	2	
08-FW-A-EXBLD22-07-1	1	
08-FW-A-EXBLD22-08-1	1	
08-FW-A-EXBLD22-09-2	2	
08-FW-A-EXBLD22-10-2	2	
08-FW-A-EXBLD22-11-3	3	
08-FW-A-EXBLD22-12-4	4	
08-FW-A-EXBLD22-13-3	3	
08-FW-A-EXBLD22-14-3	3	
08-FW-A-EXBLD22-15-3	3	
08-FW-A-EXBLD22-16-3	3	
08-FW-A-EXBLD22-17-3	3	
08-FW-A-EXBLD22-18-0.5	0.5	
08-FW-A-EXBLD22-19-0.5	0.5	
08-FW-A-EXBLD22-20-0.5	0.5	
08-FW-A-EXBLD22-21-0.5	0.5	
08-FW-A-EXBLD22-22-2	2	
08-FW-A-EXBLD22-23-0.5	0.5	
08-FW-A-EXBLD22-24-0.5	0.5	
08-FW-A-EXBLD22-25-0.5	0.5	
08-FW-A-EXBLD22-26-2	2	
08-FW-A-EXBLD22-27-2	2	
08-FW-A-EXBLD22-28-6	6	
08-FW-A-EXBLD22-29-4	4	
08-FW-A-EXBLD22-30-4	4	
08-FW-A-EXBLD22-31-3	3	

Table 5-3
Building 22 Investigation Characterization Sample Identification and Depth
(Continued)

Sample ID	Sample Depth (feet bgs)	Analyses
08-FW-A-EXBLD22-32-8	8	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8321A, SW6010B, SW6020, SW7471A
08-FW-A-EXBLD22-33-1	1	
08-FW-A-EXBLD22-34-6	6	
08-FW-A-EXBLD22-35-5	5	
08-FW-A-EXBLD22-36-6	6	
08-FW-A-EXBLD22-37-7	7	
08-FW-A-EXBLD22-38-6	6	
08-FW-A-EXBLD22-39-8	8	
08-FW-A-EXBLD22-40-8	8	
08-FW-A-EXBLD22-41-6	6	
08-FW-A-EXBLD22-42-6	6	
08-FW-A-EXBLD22-43-4	4	

Note: For definitions, see the Acronyms and Abbreviations section.

5.3 AREA D INVESTIGATION

Investigation activities at Area D began on 6 August and were completed 3 September 2008. The total area of investigation was 25,876 square feet, and the average depth of investigation ranged between 2 and 3 feet bgs, with a maximum depth of approximately 4 feet, in areas with the strongest EM61 signatures. Figure 5-6 presents the investigation boundaries for Area D and locations of soil characterization samples. Figure 5-7 presents geophysical data before and after investigation activities at the Area D investigation.

Materials removed during investigation activities in Area D included the following:

- A total of 413 crushed and empty drums
- Two cubic yards of paint-contaminated soil
- Two drums with residual oil

Munitions-related items removed during the Building 22/24 investigation included the following:

- Three items of MD

Section 7.0 presents further details regarding waste streams and disposal locations. Appendix F presents a detailed summary of the munitions-related items removed during the investigation.

On 3 September 2008, 31 characterization floor and wall samples were collected at Area D at a frequency of one sample per 50-foot by 50-foot grid node. Appendix B presents the analytical data. Table 5-4 shows sample IDs and depths. The investigation area was backfilled during the 2009 field season. Backfill consisted of original material removed during the investigation and offsite borrow material. Metal debris was sifted and removed from the clean fill during the backfill operations.

Area D Beginning of Investigation Activities 2008

Area D Gore Installation Activities 2008

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Area D – Example of Drums Removed During Investigation Activities 2008

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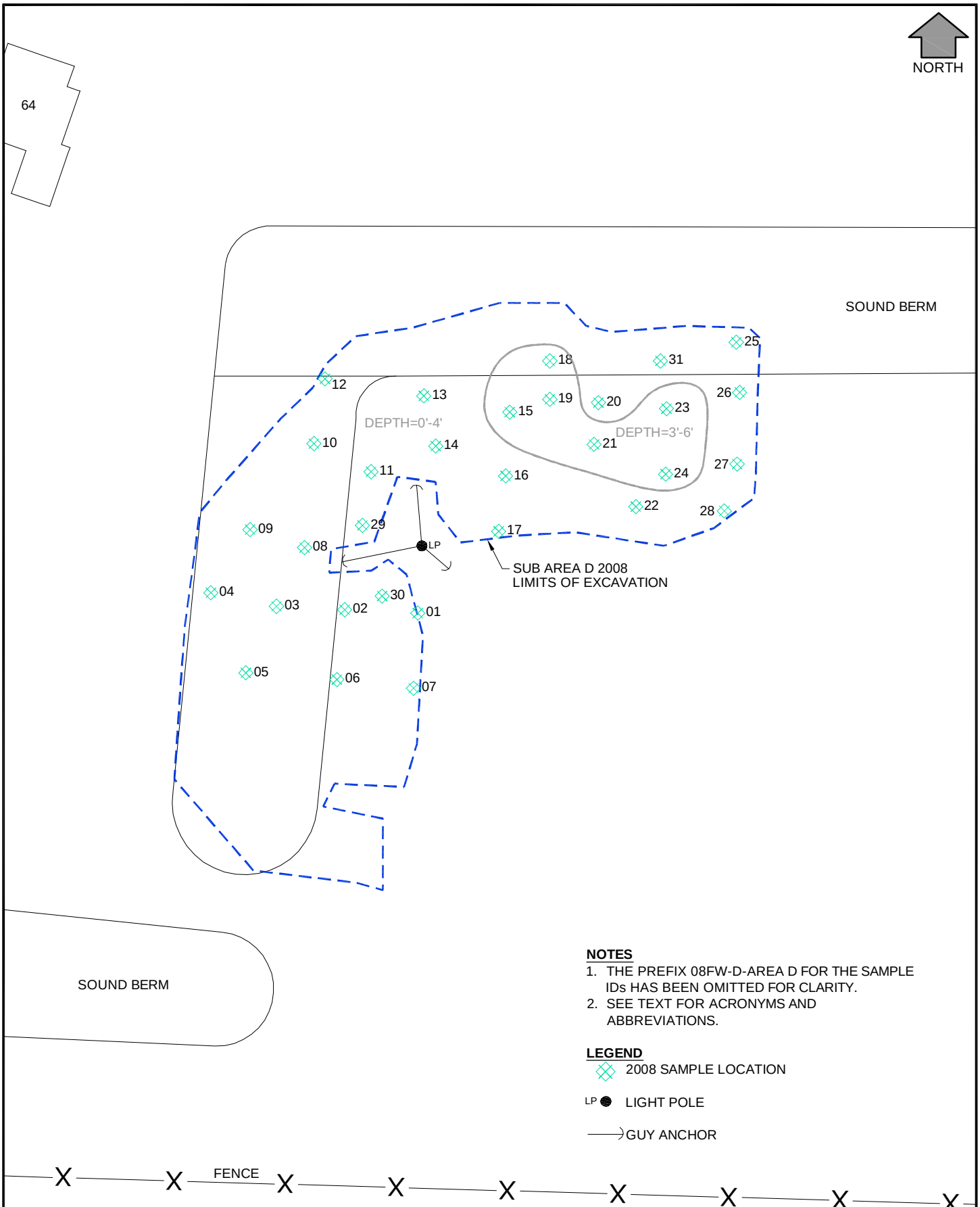

NOTES

1. THE PREFIX 08FW-D-AREA D FOR THE SAMPLE IDs HAS BEEN OMITTED FOR CLARITY.
2. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

LEGEND

2008 SAMPLE LOCATION

LP LIGHT POLE

GUY ANCHOR

AREA D 2008 LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 5-6

G:\Autocad\IERS-UR\05F5070112009 RI Rpt\Fig 5-6 SubArea D.dwg Sep 30,2010 -tiedemann

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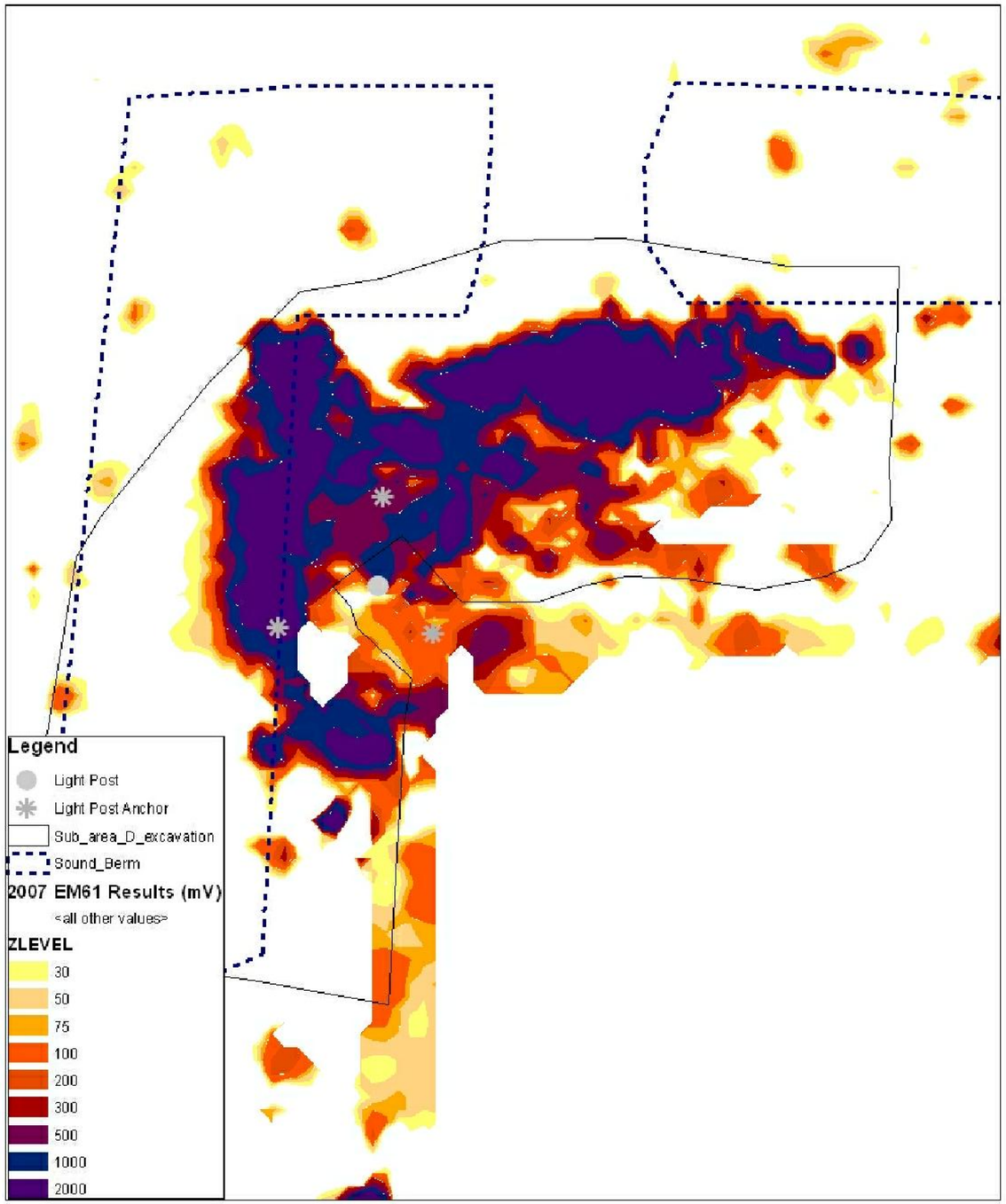
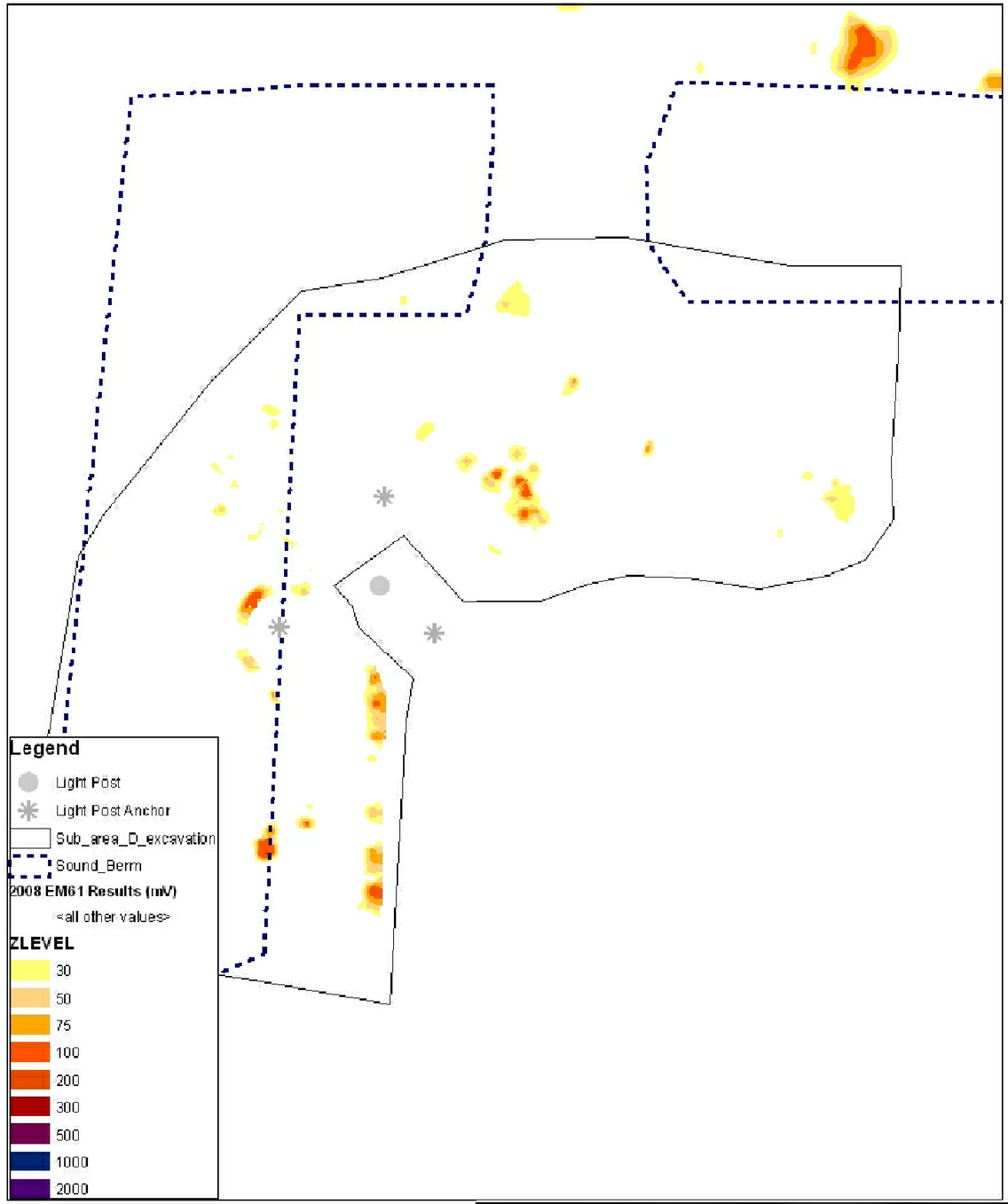


0 12.5 25 50 75
Feet

2007 EM1 GEOPHYSICAL PREFORMED BY CRREL



NORTH

0 12.5 25 50 75
Feet

2008 EM1 GEOPHYSICAL PREFORMED BY JACOBS

AREA D
2008 BEFORE AND AFTER GEOPHYSICAL SURVEYS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO.: 5-7

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Table 5-4
Area D Investigation Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08-FW-D-EXAREAD-01-0_2	0-2	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8082, SW8151A, SW8321A, SW6010B, SW6020, SW7471A
08-FW-D-EXAREAD-02-2_4	2-4	
08-FW-D-EXAREAD-03-2_4	2-4	
08-FW-D-EXAREAD-04-2_4	2-4	
08-FW-D-EXAREAD-05-0_2	0-2	
08-FW-D-EXAREAD-06-0_2	0-2	
08-FW-D-EXAREAD-07-0_2	0-2	
08-FW-D-EXAREAD-08-2_4	2-4	
08-FW-D-EXAREAD-09-2_4	2-4	
08-FW-D-EXAREAD-10-2_4	2-4	
08-FW-D-EXAREAD-11-2_4	2-4	
08-FW-D-EXAREAD-12-0_2	0-2	
08-FW-D-EXAREAD-13-0_2	0-2	
08-FW-D-EXAREAD-14-2_4	2-4	
08-FW-D-EXAREAD-15-3_5	3-5	
08-FW-D-EXAREAD-16-2_4	2-4	
08-FW-D-EXAREAD-17-0_2	0-2	
08-FW-D-EXAREAD-18-3_5	3-5	
08-FW-D-EXAREAD-19-3_5	3-5	
08-FW-D-EXAREAD-20-4_6	4-6	
08-FW-D-EXAREAD-21-4_6	4-6	
08-FW-D-EXAREAD-22-2_4	2-4	
08-FW-D-EXAREAD-23-3_5	3-5	
08-FW-D-EXAREAD-24-3_5	3-5	
08-FW-D-EXAREAD-25-0_2	0-2	
08-FW-D-EXAREAD-26-2_4	2-4	
08-FW-D-EXAREAD-27-2_4	2-4	
08-FW-D-EXAREAD-28-0_2	0-2	
08-FW-D-EXAREAD-29-2_4	2-4	
08-FW-D-EXAREAD-30-2_4	2-4	
08-FW-D-EXAREAD-31-0_2	0-2	

Note: For definitions, see the Acronyms and Abbreviations section.

5.4 EM61 HOT SPOTS GREATER THAN 75 MILLIVOLTS

Geophysical evidence and results from the 2007 investigation suggested that anomalies with an EM61 result of 75 mV and above represent what could be an area containing drums of hazardous materials or waste, munitions-related items, or other COCs. Anomalies below 75 mV were considered to represent smaller items rather than large masses of metal debris.

Geophysical anomalies obviously associated with utilities, manhole covers, surface anomalies, and housing were removed from the proposed areas of investigation. Anomalies of appreciable size at Buildings 1, 11, 12, 16-21, 26, 28, and 31 were not associated with utility-related anomalies and were investigated in 2008. Anomalies in these areas were selected for investigation based on the procedures described in Section 1.4 and laid out in the *EM61 Hotspot Technical Memorandum* (USAED 2008i). These hot spots appeared to have been associated with the historical drainage swale in the northwest portion of the site or had geophysical signatures similar to areas of investigation that have previously produced items of concern. Only anomalies of appreciable size were selected for investigation because no drums or munitions-related items were discovered outside of large clusters of debris during investigation activities.

5.4.1 Building 12

On 27 August 2008, investigation activities began on the south side of Building 12 to investigate the EM61 hot spot exceeding 75 mV. Investigation limits were determined by the presence or absence of metal debris, close proximity to Building 12, and the presence of underground utilities. Figure 5-8 presents the 2008 investigation boundaries and soil characterization samples. Figure 5-9 presents geophysical survey data before and after the 2008 investigation activities. Scrap metal debris and drums were generally encountered between depths of 2 and 7 feet bgs, with no encounters below 7 feet bgs. The investigation proceeded to the south, east, and west from Building 12 until the sidewalls and floor were free of major metal debris. The area of the investigation at the time of completion was approximately 3,563 square feet, with a flat excavation floor averaging a depth of 7 feet.

Building 12 Beginning Investigation Activities 2008

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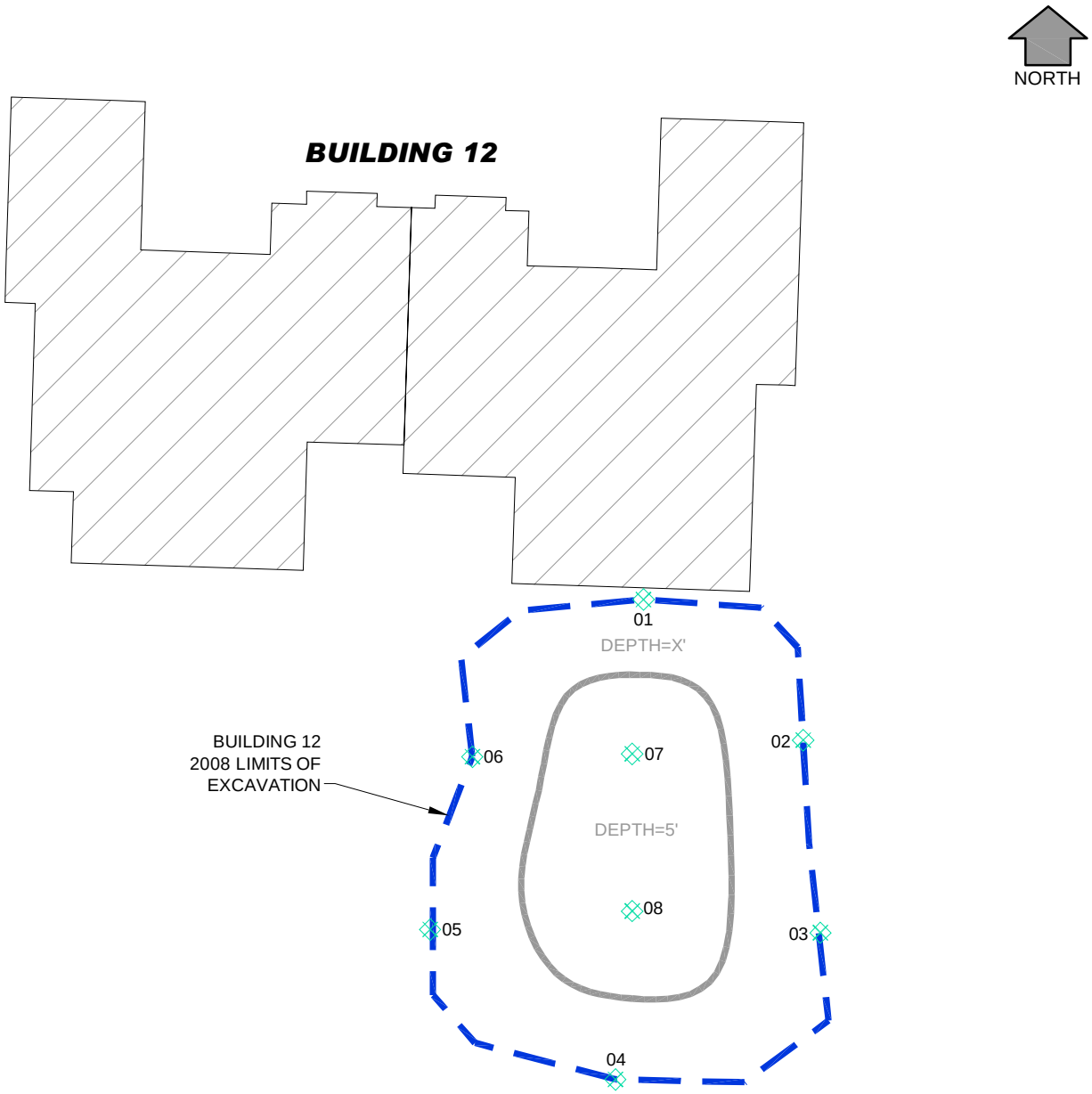

NOTES

1. THE PREFIX 08FW-A-EXBLDG 12- FOR THE SAMPLE IDs HAS BEEN OMITTED FOR CLARITY.
2. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

LEGEND

2008 SAMPLE LOCATION

0 10 20 40

SCALE IN FEET

BUILDING 12 2008 LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 5-8

G:\Autocad\ERS-UR\05F5070\12009 RI Rpt\Fig 5-8 Bldg 12-2008.dwg Sep 30,2010 -tiedemann

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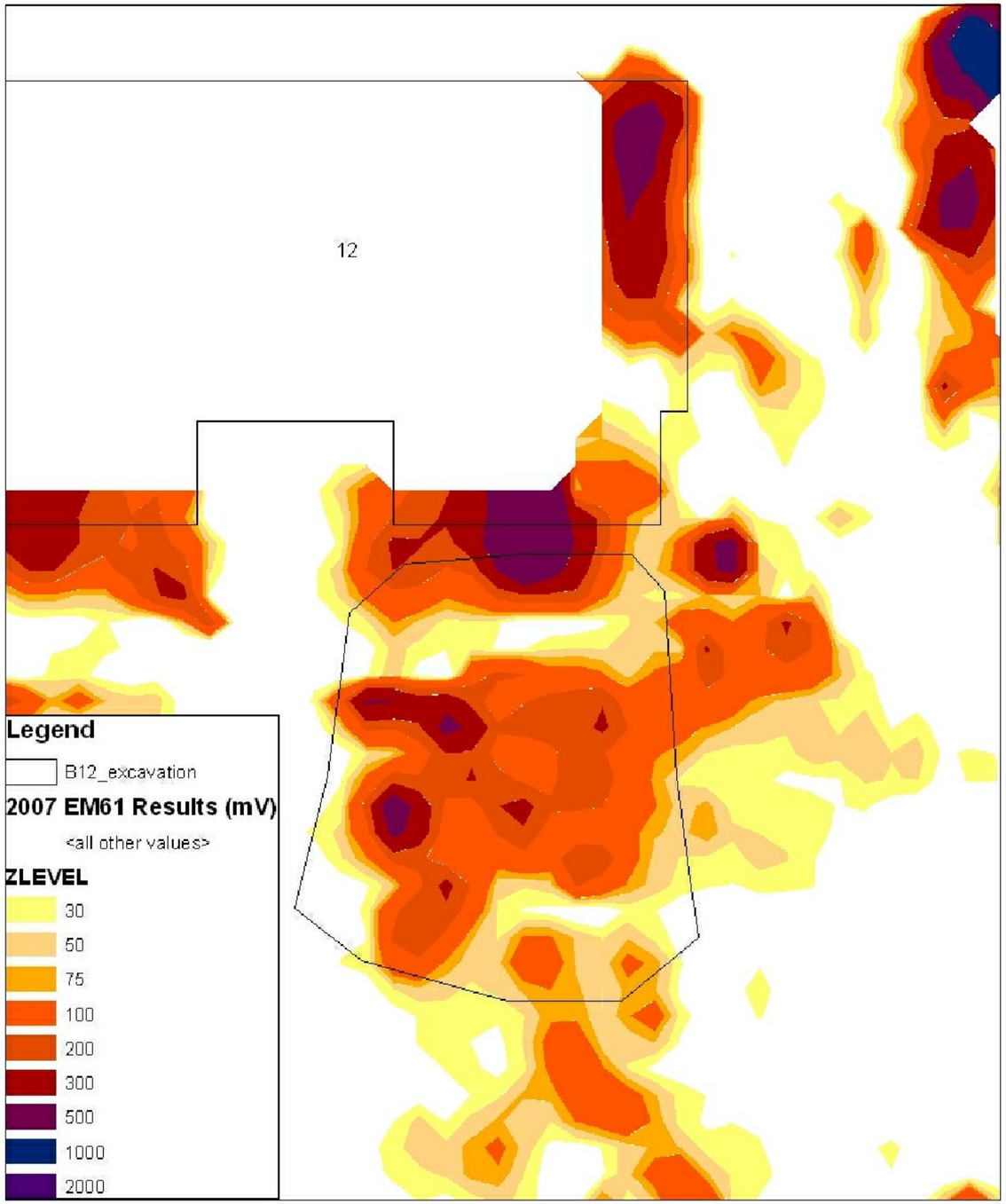

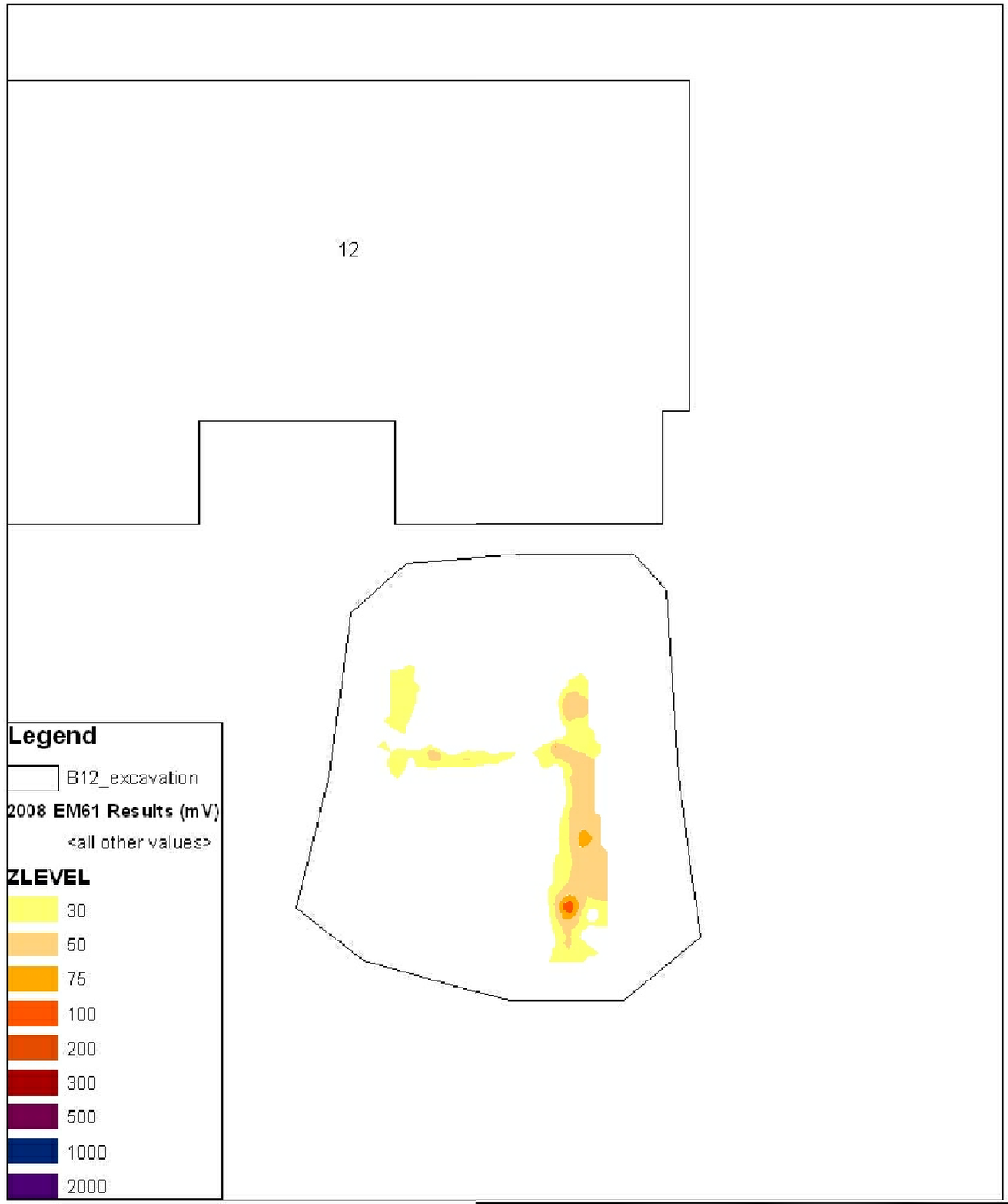

0 5 10 20 30
Feet

2007 EM1 GEOPHYSICAL PREFORMED BY CRREL

NORTH

0 5 10 20 30
Feet

2008 EM1 GEOPHYSICAL PREFORMED BY JACOBS

BUILDING 12
2008 BEFORE AND AFTER GEOPHYSICAL SURVEYS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO.: 5-9

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Investigation activities were conducted around underground utilities, including electrical (de-energized), sewer, and water. Once the area surrounding the utility lines was cleared of metal, the lines were backfilled.

No munitions-related items were located during investigation activities at Building 12. Materials removed from investigation activities at Building 12 included the following:

- Four crushed and empty drums
- Lead-contaminated soil in one 90-gallon overpack (with lead-acid battery plates)
- A total of 24 cubic yards of creosote-coated lumber and surrounding soil

Section 7.0 presents further details regarding waste streams and disposal locations.

On 4 September 2008, characterization sampling was performed at a frequency of one sample per 50-foot by 50-foot grid node on the sidewalls and floor. Eight samples were collected from the Building 12 investigation area, including six wall samples and two floor samples. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Table 5-5 shows sample IDs and collection depths. Following sample collection activities, the investigation area was backfilled with clean, stockpiled material in the bottom of the excavation, and the top two feet was backfilled with offsite borrow material.

Table 5-5
Building 12 Investigation Characterization Sample IDs and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08-FW-A-EXBLD12-01-3	3	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8082, SW8151A, SW8321A, SW6010B, SW6020, SW7471A
08-FW-A-EXBLD12-02-3	3	
08-FW-A-EXBLD12-03-3	3	
08-FW-A-EXBLD12-04-3	3	
08-FW-A-EXBLD12-05-3	3	
08-FW-A-EXBLD12-06-3	3	
08-FW-A-EXBLD12-07-5	5	
08-FW-A-EXBLD12-08-5	5	

Note: For definitions, see the Acronyms and Abbreviations section.

5.4.2 Building 11

On 29 August 2008, investigation activities began on the north side of Building 11 to investigate the EM61 hot spot exceeding 75 mV. Investigation limits were determined by the presence of metal debris. Figure 5-10 presents the 2008 investigation boundaries and soil characterization samples taken upon completion of investigation activities. Figure 5-11 presents the 2008 geophysical survey data before and after investigation activities. Scrap metal debris and drums were generally encountered at depths between 2 and 6 feet bgs, with no encounters below 6 feet bgs. The investigation was mainly located within the former east-west drainage ditch north of Building 11. The ditch was constructed to drain runoff when the homes were built at Taku Gardens and was widened and graded as part of the 2008 activities. The area of the investigation at the time of completion was approximately 4,449 square feet, with an average depth of 6 feet.

No munitions-related items were located during investigation activities at Building 11. Materials removed during investigation activities at Building 11 included the following:

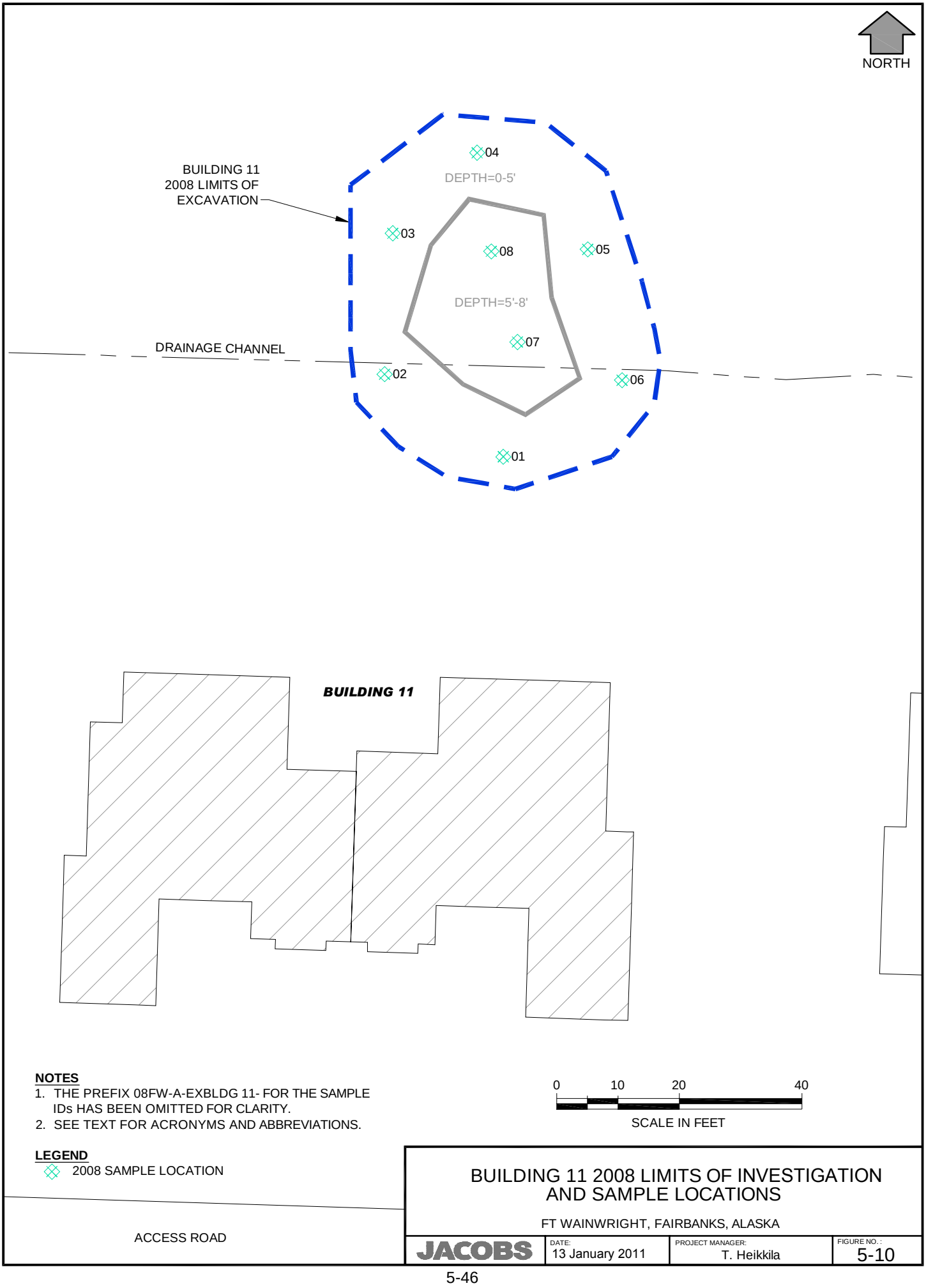
- Ten crushed drums with residual tar, double-wrapped in geofabric and transported to Fort Wainwright Landfill
- A total of 321 cubic yards of uncontaminated soil mixed with wood debris was transported to Fort Wainwright Landfill
- A total of 15 cubic yards of DDT-contaminated soil was packed and stored for future disposal and is discussed in detail in paragraph 5.7.2

On 5 September 2008, characterization samples were collected at a frequency of one sample per 50-foot by 50-foot grid node on the sidewalls and floor. Eight samples were collected from the Building 11 investigation footprint, including six samples collected from sloped sidewalls and two samples collected from the floor. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Table 5-6 presents sample IDs and collection depths. Following sample collection activities, the investigation area was backfilled with clean, stockpiled material in the bottom of the footprint, and the top two feet was backfilled with offsite borrow material.

Table 5-6
Building 11 Investigation Characterization Sample IDs and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08-FW-A-EXBLD11-01-4	4	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8321A, SW6010B, SW6020, SW7471A
08-FW-A-EXBLD11-02-4	4	
08-FW-A-EXBLD11-03-2.5	2.5	
08-FW-A-EXBLD11-04-2.5	2.5	
08-FW-A-EXBLD11-05-2.5	2.5	
08-FW-A-EXBLD11-06-4	4	
08-FW-A-EXBLD11-07-8	8	
08-FW-A-EXBLD11-08.5	5	

Note: For definitions, see the Acronyms and Abbreviations section.



NOTES

1. THE PREFIX 08FW-A-EXBLDG 11- FOR THE SAMPLE IDs HAS BEEN OMITTED FOR CLARITY.
2. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

0 10 20 40

SCALE IN FEET

LEGEND

2008 SAMPLE LOCATION

BUILDING 11 2008 LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 5-10

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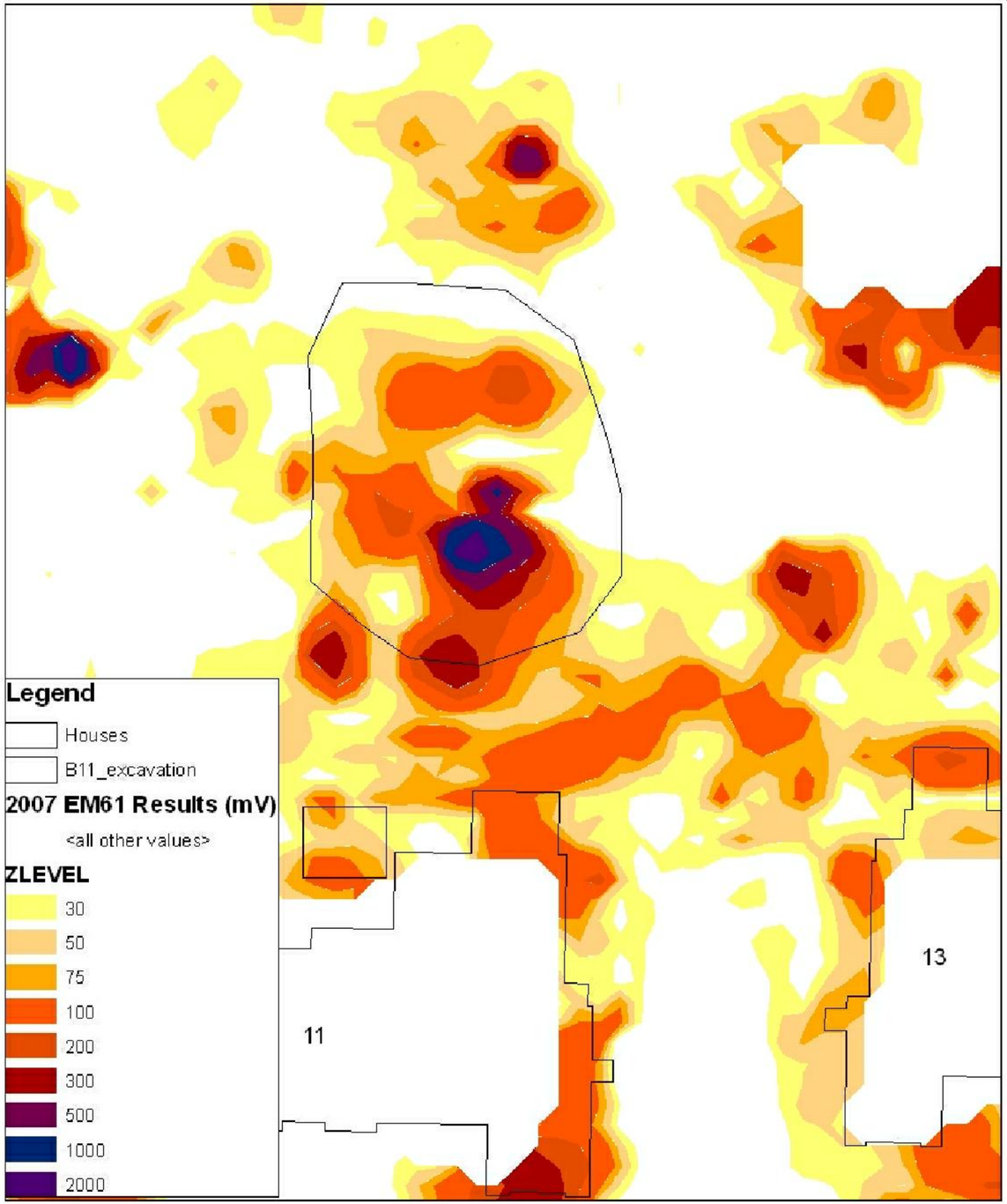
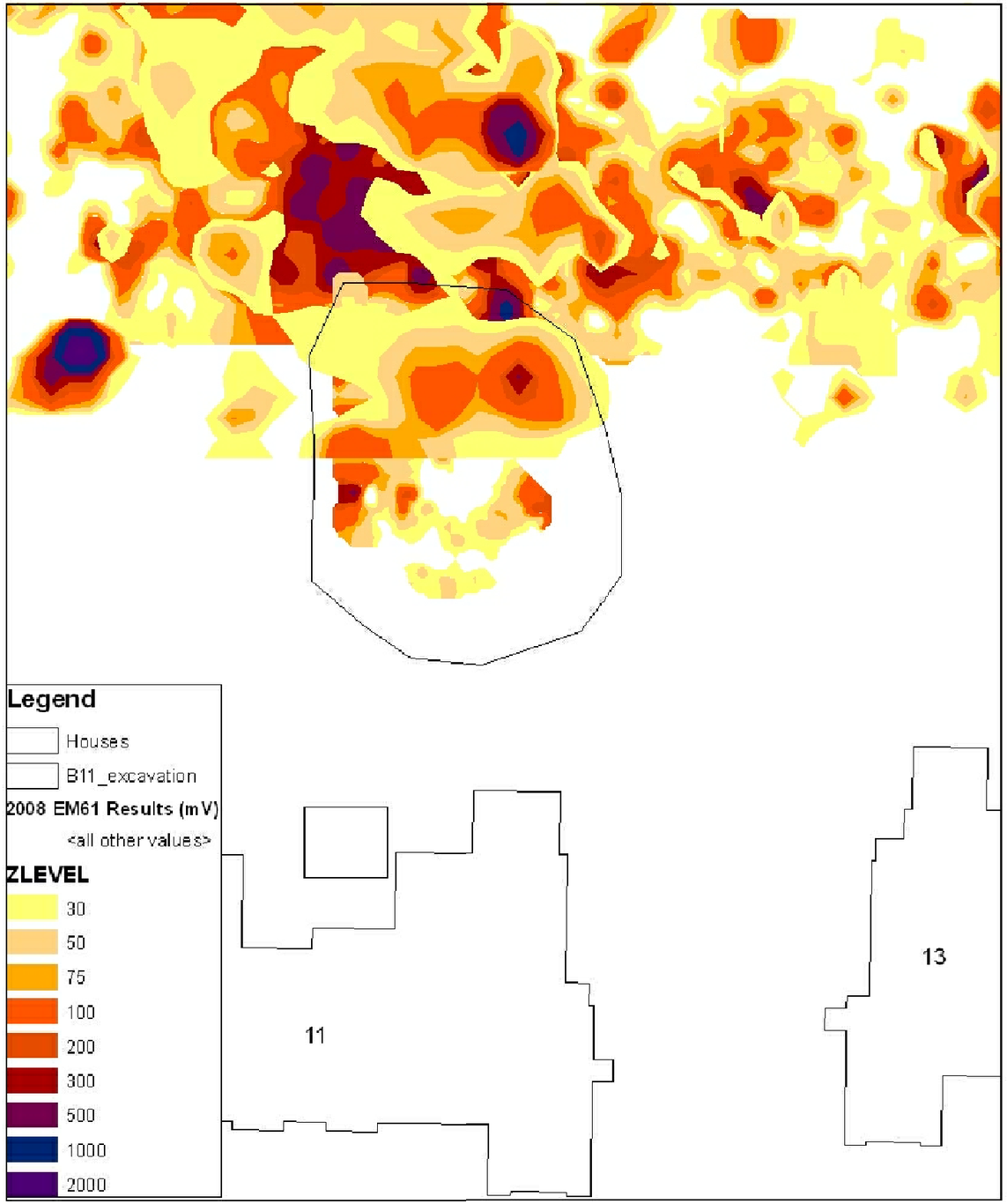
NORTH



0 10 20 40 60
Feet

2007 EM61 GEOPHYSICAL SURVEY PERFORMED BY CRREL



0 10 20 40 60
Feet

2008 EM61 GEOPHYSICAL SURVEY PERFORMED BY JACOBS

BUILDING 11
2008 BEFORE AND AFTER GEOPHYSICAL SURVEYS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO.: 5-11

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5.4.3 Building 1

On 2 September 2008, investigation activities began at three locations north of Building 1 to investigate the EM61 hot spot exceeding 75 mV. Investigation limits were determined by the presence or absence of metal debris. Figure 5-12 presents the 2008 investigation boundaries and soil characterization samples at Building 1. Figure 5-13 presents the 2008 geophysical survey data before and after investigation activities at Building 1. Scrap metal debris was generally encountered at depths between 1 and 4 feet bgs, with no scrap metal encountered below 4 feet bgs. The first of three investigations began in the center of Building 1, extended to the north approximately 20 feet, then turned west and ran to the end of the building. The second investigation was approximately 15 feet to the north and measured 16 feet by 8 feet. The third investigation was on the north side of the drainage ditch and measured 46 feet by 40 feet. All investigations proceeded until the sidewalls and floor were free of metal debris. The total area of the investigations associated with Building 1 was approximately 6,161 square feet, with an average depth of 4 feet.

Materials removed from the Building 1 investigation and disposed of in the Fort Wainwright Landfill included:

- One empty drum
- A total of 276 cubic yards of uncontaminated soil mixed with concrete and rebar

On 9 September 2008, characterization samples were collected at a frequency of one sample per 50-foot by 50-foot grid node on the sidewalls and floor of the Building 1 investigations. Fifteen samples were collected, including seven samples collected from sloped sidewalls and eight samples collected from the floor. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Table 5-7 presents sample IDs and collection depths. Following sample collection activities, the investigation area was backfilled with clean, stockpiled material in the bottom of the footprint, and the top two feet was backfilled with offsite borrow material.

NOTES

1. THE PREFIX 08FW-A-EXBLDG 01- FOR THE SAMPLE IDs HAS BEEN OMITTED FOR CLARITY.
2. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

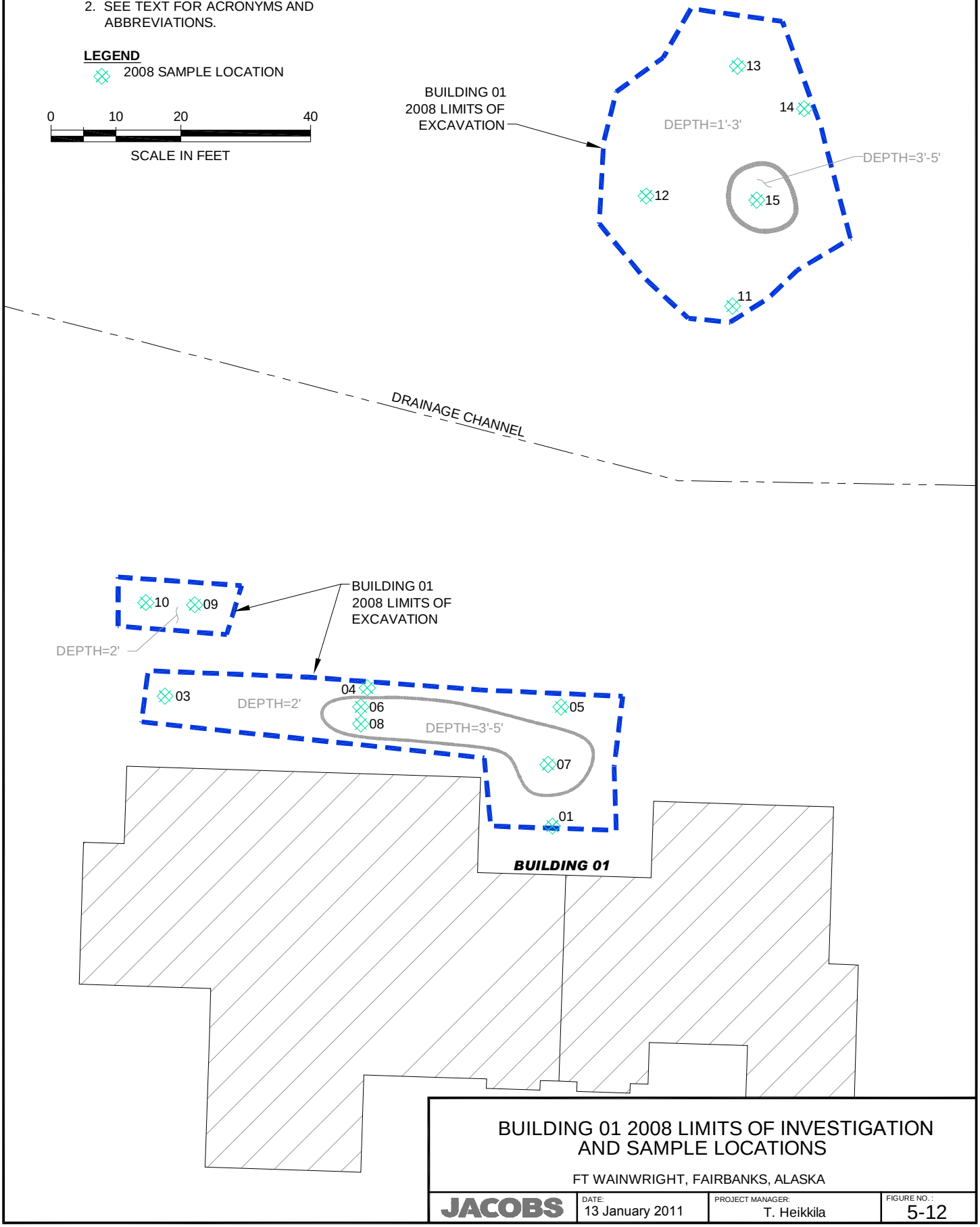
LEGEND

2008 SAMPLE LOCATION

0 10 20 40

SCALE IN FEET

NORTH



BUILDING 01 2008 LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 5-12

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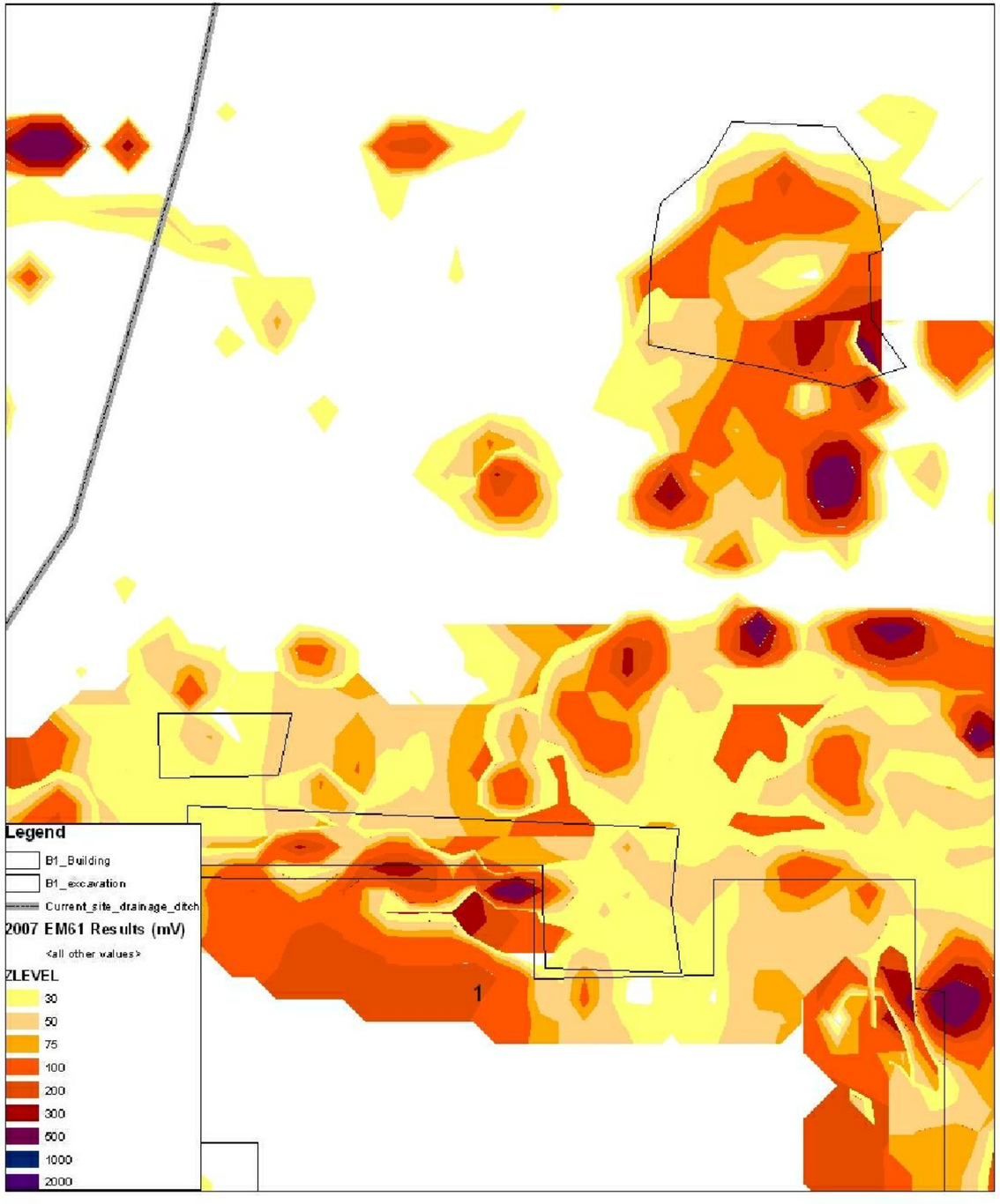
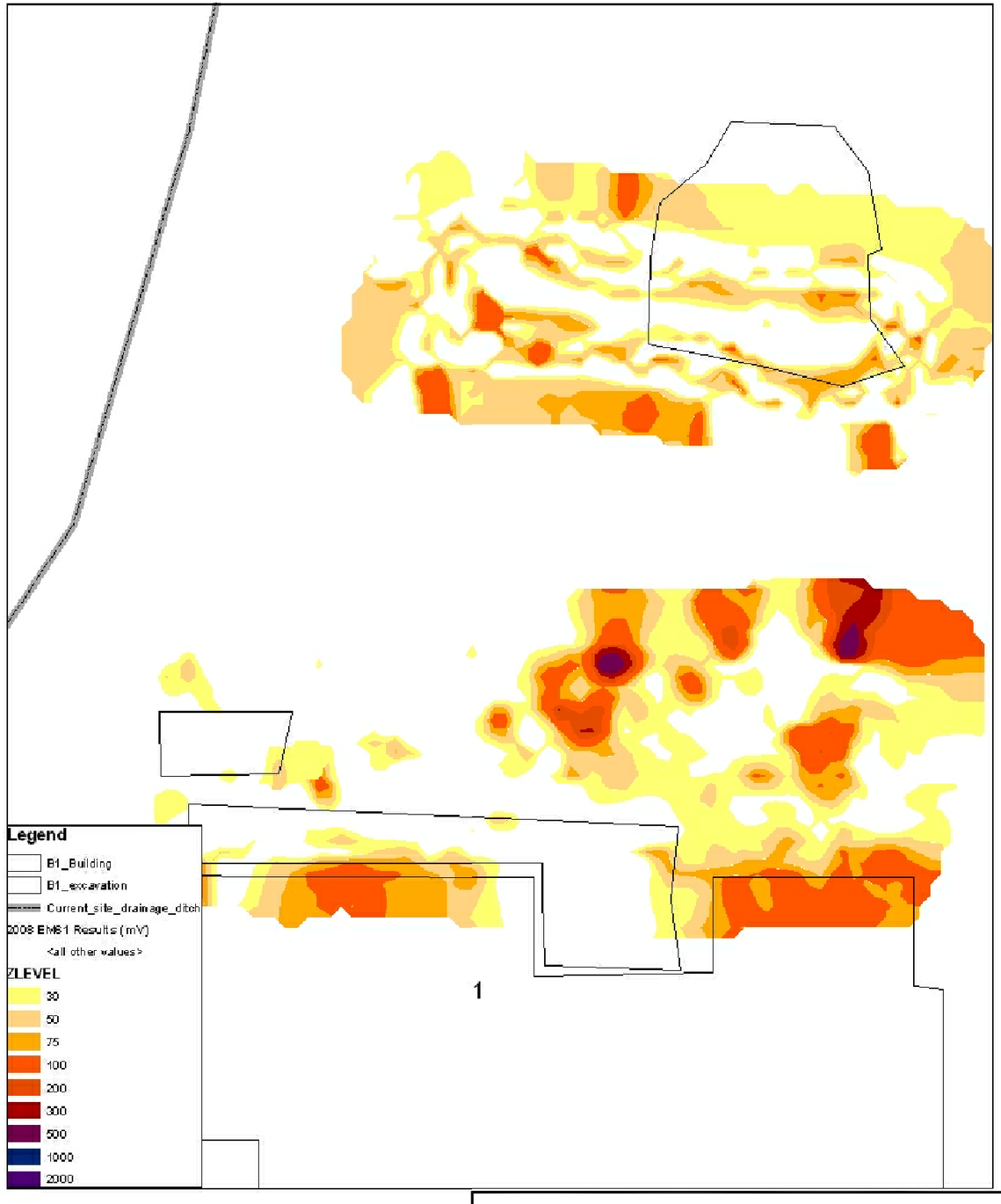


2007 EM1 GEOPHYSICAL PREFORMED BY CRREL

NORTH



2008 EM1 GEOPHYSICAL PREFORMED BY JACOBS

BUILDING 1
2008 BEFORE AND AFTER GEOPHYSICAL SURVEYS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO.: 5-13

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Table 5-7
Building 1 Investigation Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08-FW-C-EXBLD01-01-2	2	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8321A, SW6010B, SW6020, SW7471A
08-FW-C-EXBLD01-02-2	2	
08-FW-C-EXBLD01-03-2	2	
08-FW-C-EXBLD01-04-2	2	
08-FW-C-EXBLD01-05-2	2	
08-FW-C-EXBLD01-06-2	2	
08-FW-C-EXBLD01-07-3.5	3.5	
08-FW-C-EXBLD01-08-3.5	3.5	
08-FW-C-EXBLD01-09-2	2	
08-FW-C-EXBLD01-10-2	2	
08-FW-C-EXBLD01-11-1.5	1.5	
08-FW-C-EXBLD01-12-1.5	1.5	
08-FW-C-EXBLD01-13-1.5	1.5	
08-FW-C-EXBLD01-14-1.5	1.5	
08-FW-C-EXBLD01-15-3.5	3.5	

Note: For definitions, see the Acronyms and Abbreviations section.

5.4.4 Building 26

On 27 August 2008, investigation activities began at three locations north of Building 26 to investigate the EM61 hot spot exceeding 75 mV. Investigation limits were determined by the presence or absence of metal debris. Figure 5-14 presents the 2008 investigation boundaries and soil characterization samples at Building 26. Figure 5-15 presents the 2008 geophysical survey data before and after investigation activities at Building 26. Scrap metal debris was generally encountered at depths between 1 and 6 feet bgs, with no encounters below 6 feet bgs. The investigation footprint formed an "L" shape around the southeast corner of Building 26 and proceeded until the sidewalls and floor were free of major metal debris. The total area of the investigation at Building 26 was approximately 5,587 square feet, with an average depth of 6 feet.

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Building 26 Investigation and Sifting Operations 2008

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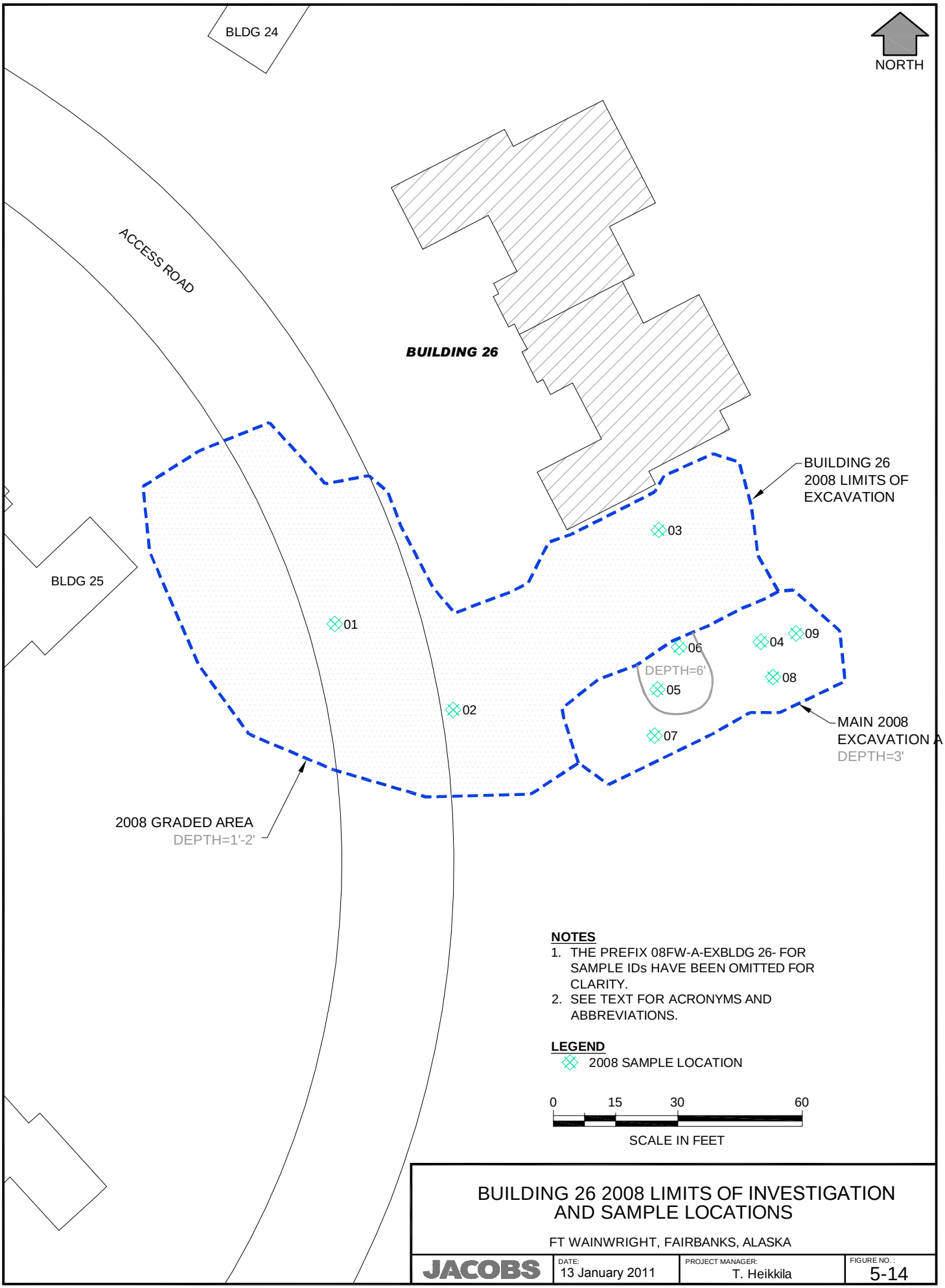

BUILDING 26 2008 LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 5-14

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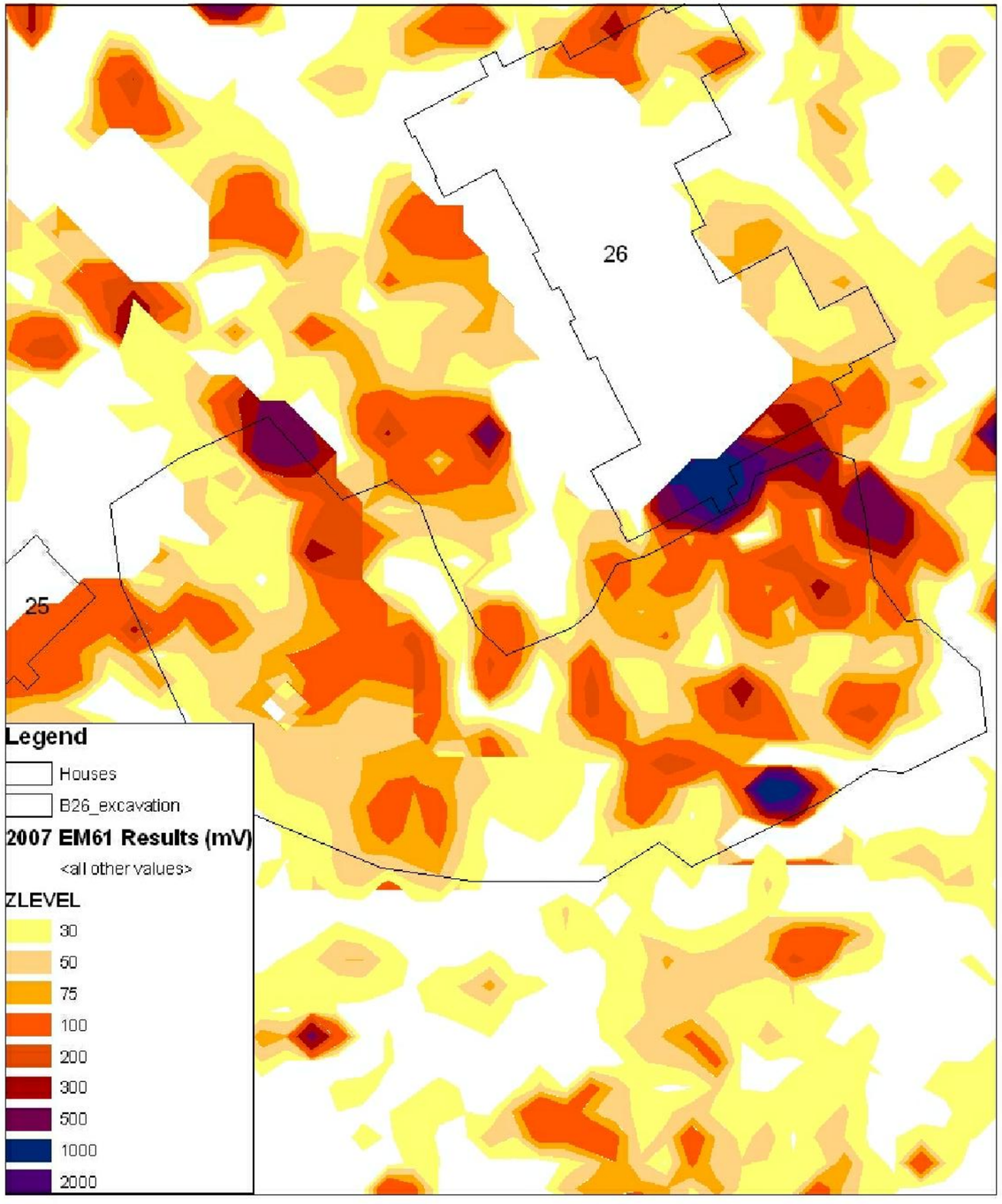

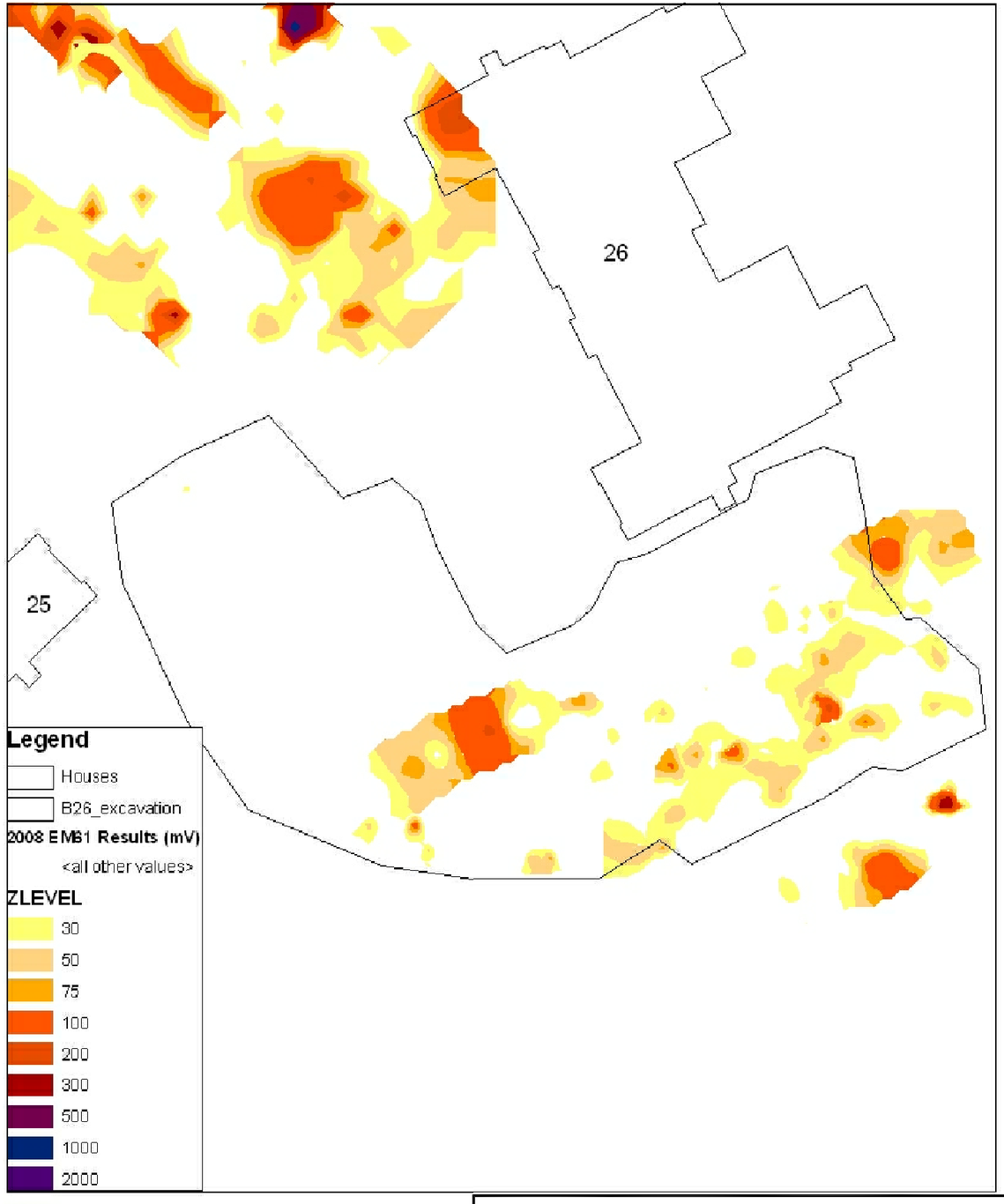

0 10 20 40 60
Feet

2007 EM1 GEOPHYSICAL PREFORMED BY CRREL

NORTH

0 10 20 40 60
Feet

2008 EM1 GEOPHYSICAL PREFORMED BY JACOBS

BUILDING 26
2008 BEFORE AND AFTER GEOPHYSICAL SURVEYS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 5-15

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No munitions-related items were located during investigation activities at Building 26. Materials removed from investigation activities at the Building 26 included the following:

- One crushed and empty drum
- Seven cubic yards of assumed lead-contaminated soil was removed and disposed of as hazardous was ate, however subsequent analytical results determined that the soil was non-hazardous
- A total of 456 cubic yards of uncontaminated soil mixed with small pieces of metal debris was transported to Fort Wainwright Landfill. This soil was sampled prior to disposal (samples 08 FCS RISO B 26-WS01 and WS02), and all sample results were below waste screening criteria. Sample results are presented in Appendix B.

On 12 September 2008, characterization samples were collected at a frequency of one sample per 50-foot by 50-foot grid node on the sloped sidewalls and investigation floor. Nine soil samples were collected from the Building 26 investigation area. Six of these samples were collected from a concentrated area where the main investigation occurred. The remaining three samples were collected from outside the main investigation in areas where the soil was shallowly graded to remove small amounts of metal debris. Appendix B presents sample results from the Investigation A discussion of sample results and ADEC checklists are included in the *CH2M Hill RI Report* (USAED 2010). Table 5-8 shows sample IDs and collection depths. Following sample collection activities, the investigation area was backfilled with clean, stockpiled material in the bottom of the footprint, and the top two feet was backfilled with offsite borrow material.

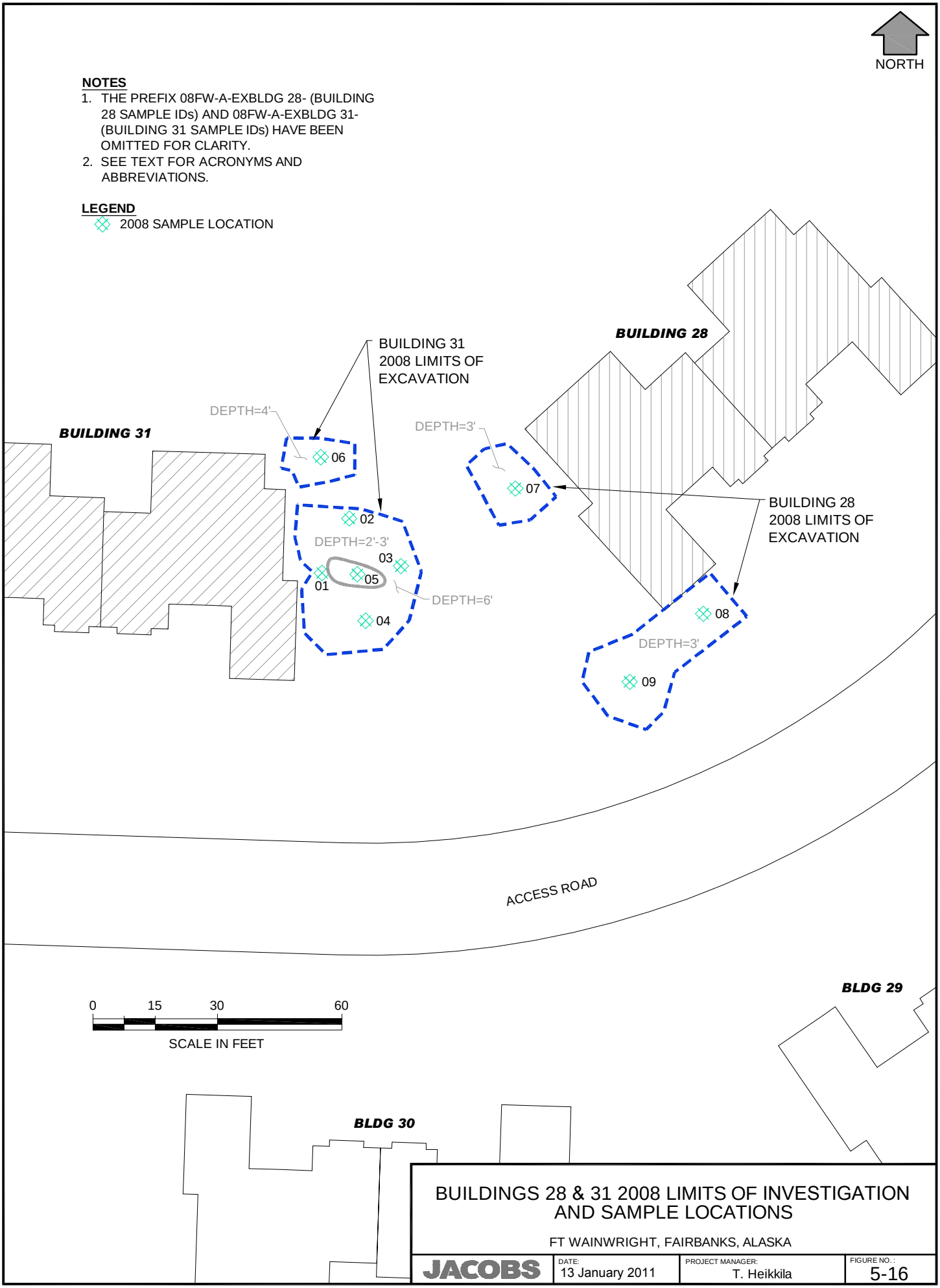
Table 5-8
Building 26 Investigation Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08-FW-A-EXBLD26-01-1	1	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8321A, SW6010B, SW6020, SW7471A
08-FW-A-EXBLD26-02-1	1	
08-FW-A-EXBLD26-03-2	2	
08-FW-A-EXBLD26-04-3	3	
08-FW-A-EXBLD31-05-6	6	
08-FW-A-EXBLD26-06-6	6	
08-FW-A-EXBLD26-07-3	3	
08-FW-A-EXBLD26-08-3	3	
08-FW-A-EXBLD26-09-3	3	

Note: For definitions, see the Acronyms and Abbreviations section.

5.4.5 Buildings 28 and 31

On 2 September 2008, investigation activities began at Buildings 28 and 31 to determine what caused the EM61 hot spots exceeding 75 mV. Four small investigations were conducted in this area: one on the west side and one on the south side of Building 28, and two on the east side of Building 31. Figure 5-16 presents the 2008 investigation boundaries and soil characterization samples at Buildings 31 and 28. Figure 5-17 presents the 2008 geophysical survey data before and after Investigation activities at Buildings 28 and 31. Investigation limits were determined by the presence or absence of metal debris, munitions-related items, and PID readings. Scrap metal debris was generally encountered between 1 and 6 feet bgs, with no encounters below 6 feet bgs. The investigations proceeded until the sidewalls and floor were free of major metal debris and olfactory and visual observations indicated that contamination was not present. In addition, a PID was used to verify these observations. The total area of the investigations at Buildings 28 and 31 was approximately 1,497 square feet, with an average depth of 6 feet. Materials removed during 2008 investigation activities included 60 cubic yards of fuel-contaminated soil and miscellaneous metal debris.



BUILDINGS 28 & 31 2008 LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 5-16

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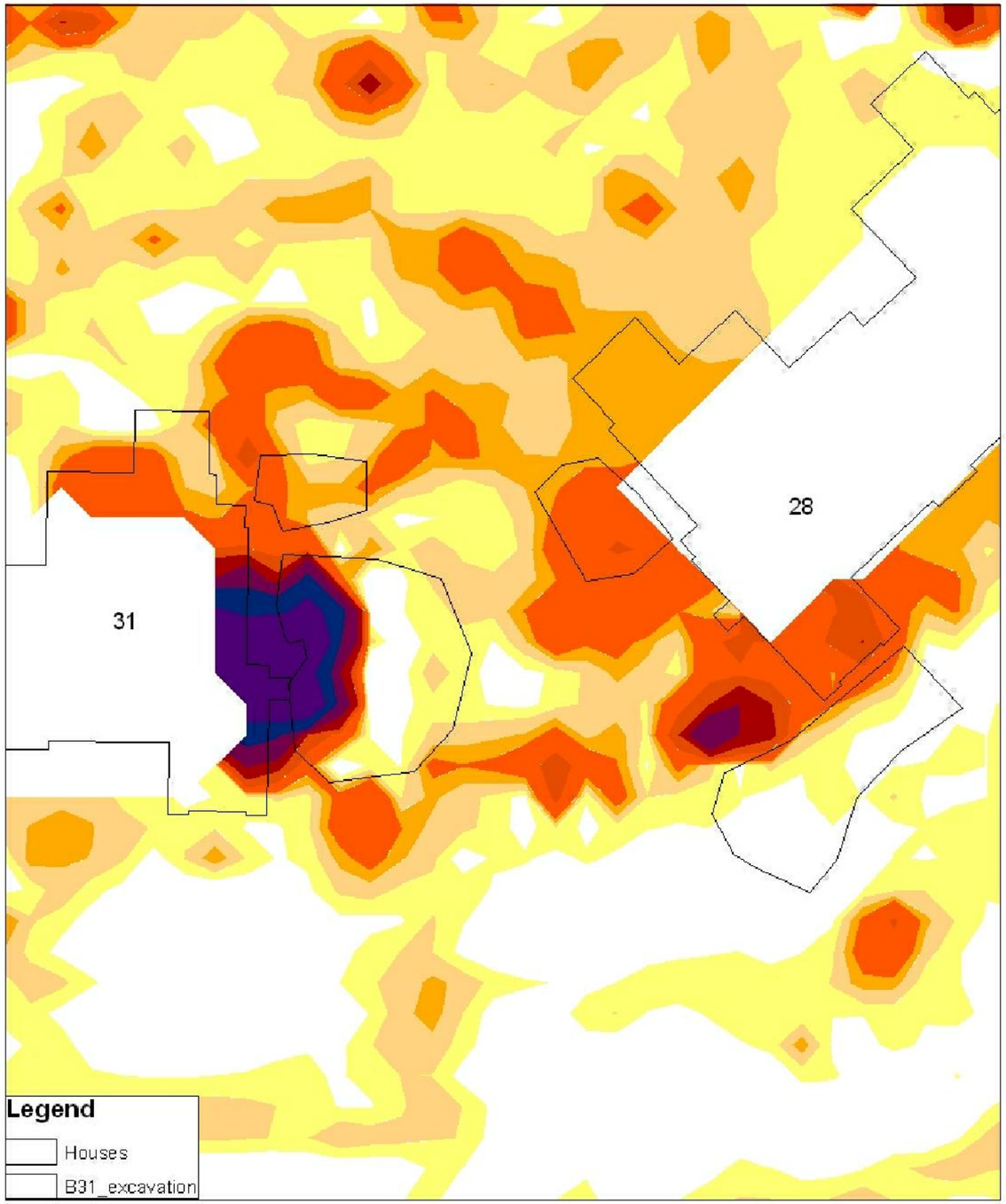

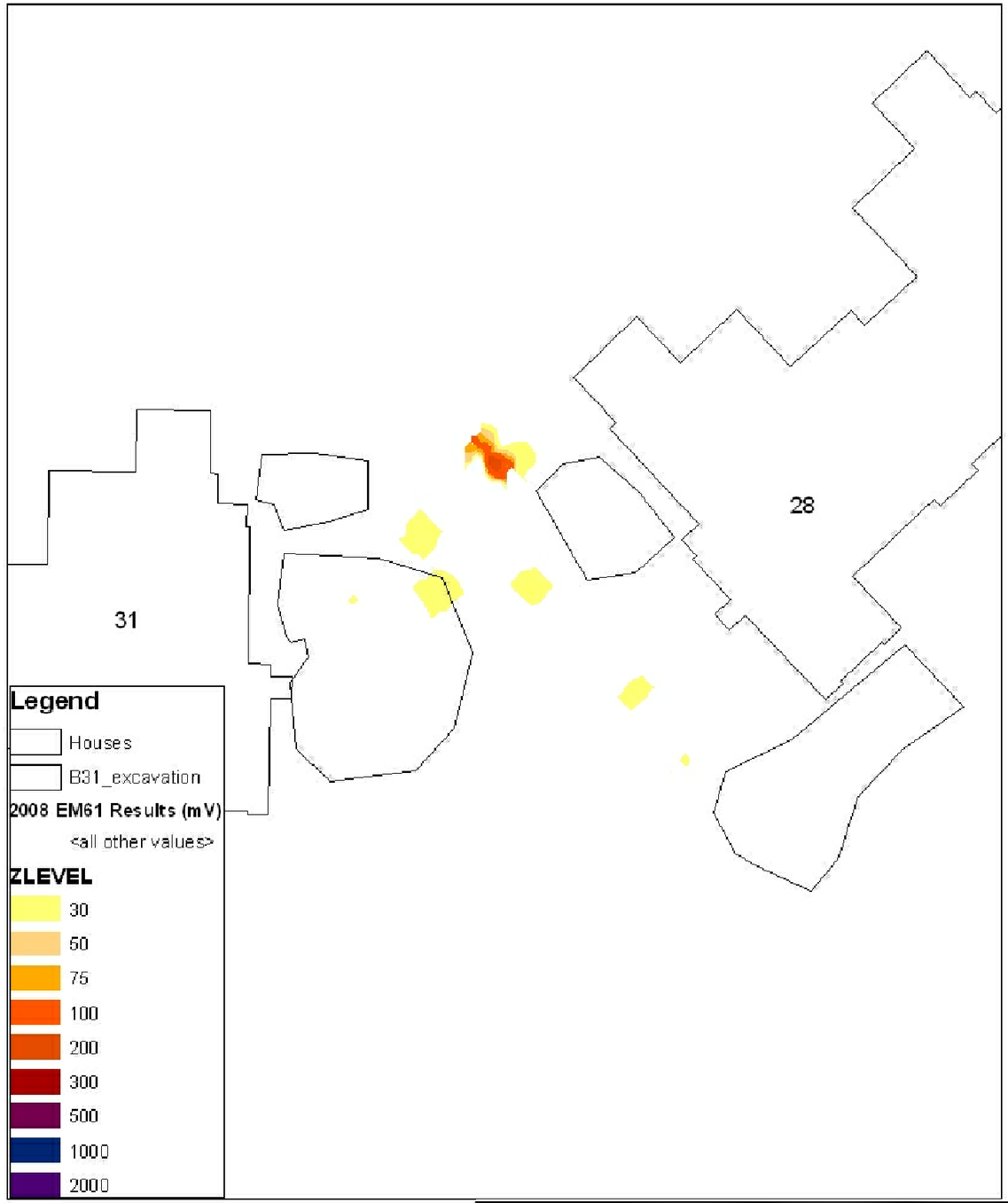

0 10 20 40 60
Feet

2007 EM1 GEOPHYSICAL PREFORMED BY CRREL

NORTH

0 10 20 40 60
Feet

2008 EM1 GEOPHYSICAL PREFORMED BY JACOBS

BUILDINGS 28 AND 31
2008 BEFORE AND AFTER GEOPHYSICAL SURVEYS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO.: 5-17

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Munitions-related items removed from the Building 28/31 investigation included the following:

- Six items of MD
- One item classified as DMM: a 3.5-inch M29 practice rocket with live motor

Section 7.0 presents further details regarding waste streams and disposal locations. Appendix F presents a detailed summary of the munitions-related items removed during the investigation.

On 12 September 2008, characterization samples were collected at a frequency of one per 50-foot by 50-foot grid node on the sloped sidewalls and investigation floor. Nine soil samples (four wall samples and five floor samples) were collected from the Buildings 28 and 31 investigation areas. Appendix B presents sample results from the Investigation, and the *CH2M Hill RI Report* (USAED 2010) presents sample results and ADEC checklists. Table 5-9 shows sample IDs and collection depths. Following sample collection activities, the investigation area was backfilled with clean, stockpiled material in the bottom of the footprint, and the top two feet was backfilled with offsite borrow material.

Table 5-9
Buildings 28 and 31 Investigation Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08-FW-A-EXBLD31-01-3	3	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8321A, SW6010B, SW6020, SW7471A
08-FW-A-EXBLD31-02-2	2	
08-FW-A-EXBLD31-03-3	3	
08-FW-A-EXBLD31-04-2	2	
08-FW-A-EXBLD31-05-6	6	
08-FW-A-EXBLD31-06-4	4	
08-FW-A-EXBLD31-07-3	3	
08-FW-A-EXBLD31-08-3	3	
08-FW-A-EXBLD31-09-3	3	

Note: For definitions, see the Acronyms and Abbreviations section.

5.4.6 Building 16 and 21

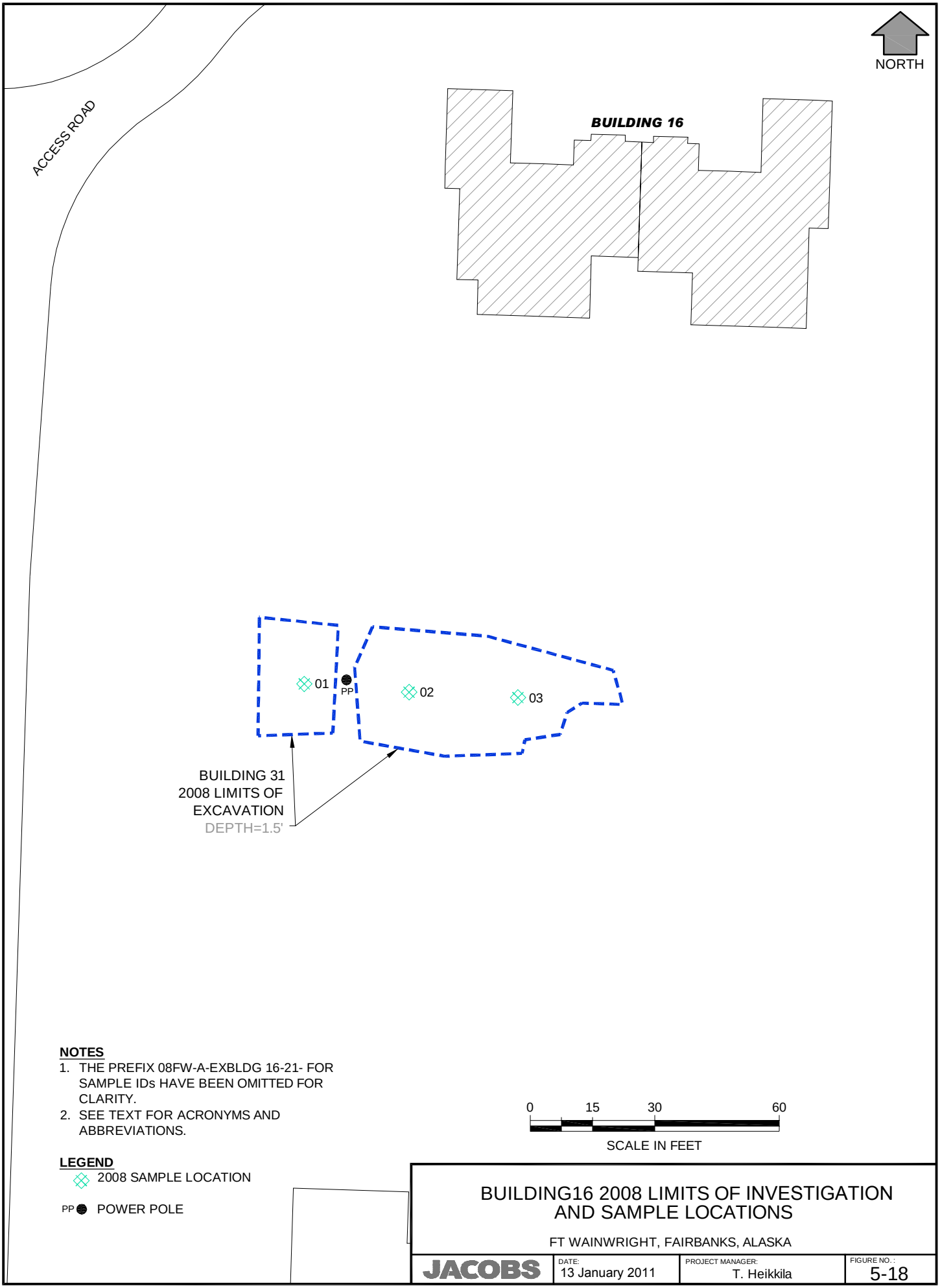
On 20 August 2008, investigation activities began near Building 16 to determine what caused the EM61 hot spots exceeding 75 mV. Two small, shallow investigations were conducted in this area, with limits determined by the presence or absence of metal debris. Figure 5-18 presents the 2008 investigation boundaries and soil characterization samples at Building 16. Figure 5-19 presents the 2008 geophysical survey data before and after investigation activities at Building 16. Small amounts of scrap metal debris (mostly metal banding) were generally encountered at depths between 0 and 2 feet bgs. Investigations proceeded until the sidewalls and floor were free of major metal debris, and no metal debris was encountered below 2 feet bgs. The total area of the investigation at Building 16 was approximately 5,262 square feet, with an average depth of 2 feet.

On 9 September 2008, three soil characterization samples were collected from the floor of the Building 16 investigation areas. Sample results from the Investigation are provided in Appendix B. A discussion of sample results and ADEC checklists are included in the *CH2M Hill RI Report* (USAED 2010). Appendix B presents sample results and the *CH2M Hill RI Report* presents sample results and ADEC checklists. Table 5-10 shows sample IDs and collection depths. Following sample collection activities, the investigation area was backfilled with clean, stockpiled material in the bottom of the footprint, and the top two feet was backfilled with offsite borrow material.

Table 5-10
Building 16 Investigation Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08-FW-C-EXBLD16-01-1.5	1.5	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8321A, SW6010B, SW6020, SW7471A
08-FW-C-EXBLD16-02-1.5	1.5	
08-FW-A-EXBLD16-03-1.5	1.5	

Note: For definitions, see the Acronyms and Abbreviations section.



NOTES

1. THE PREFIX 08FW-A-EXBLDG 16-21- FOR SAMPLE IDs HAVE BEEN OMITTED FOR CLARITY.
2. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

LEGEND

2008 SAMPLE LOCATION

PP POWER POLE

0 15 30 60

SCALE IN FEET

BUILDING16 2008 LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 5-18

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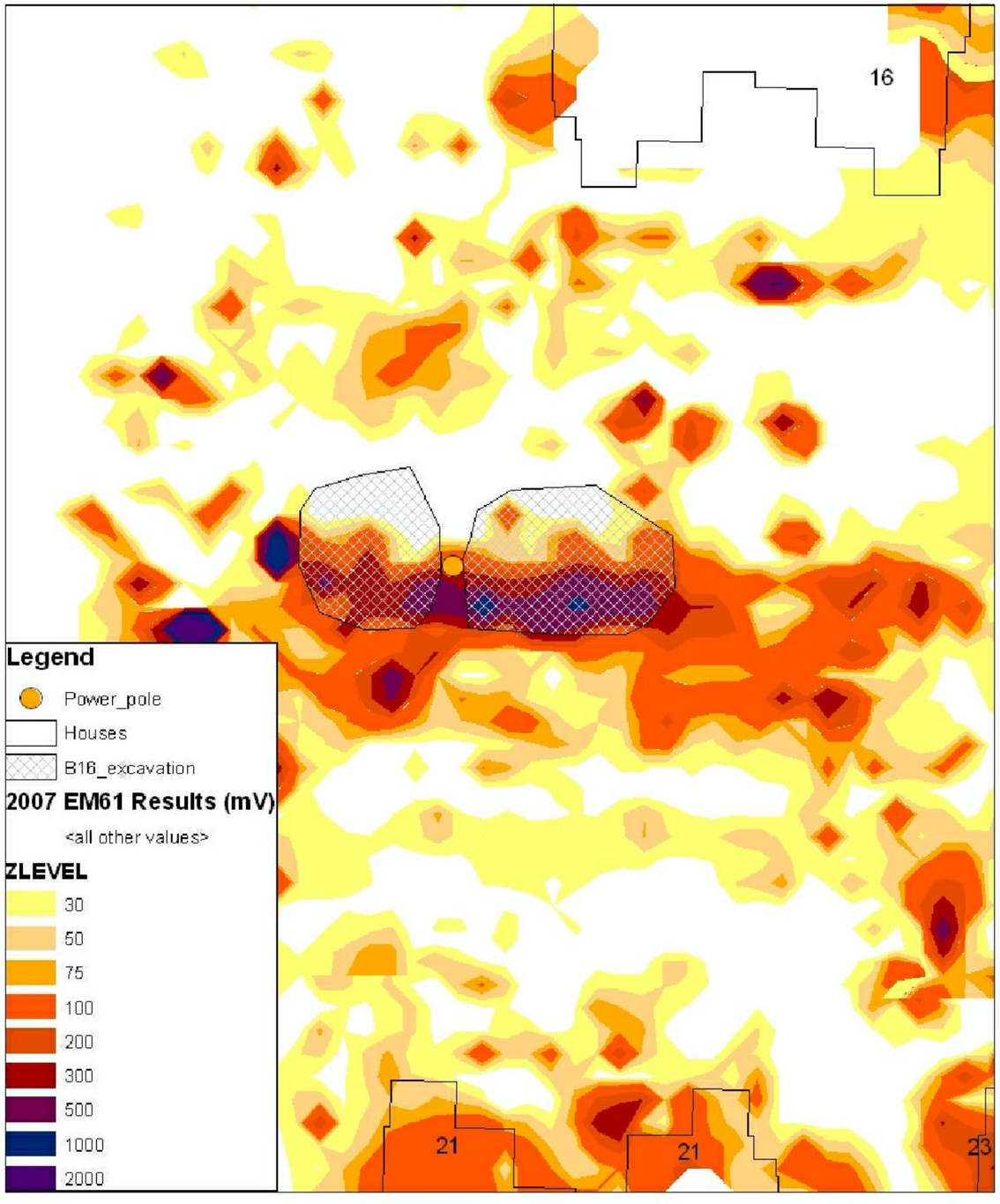
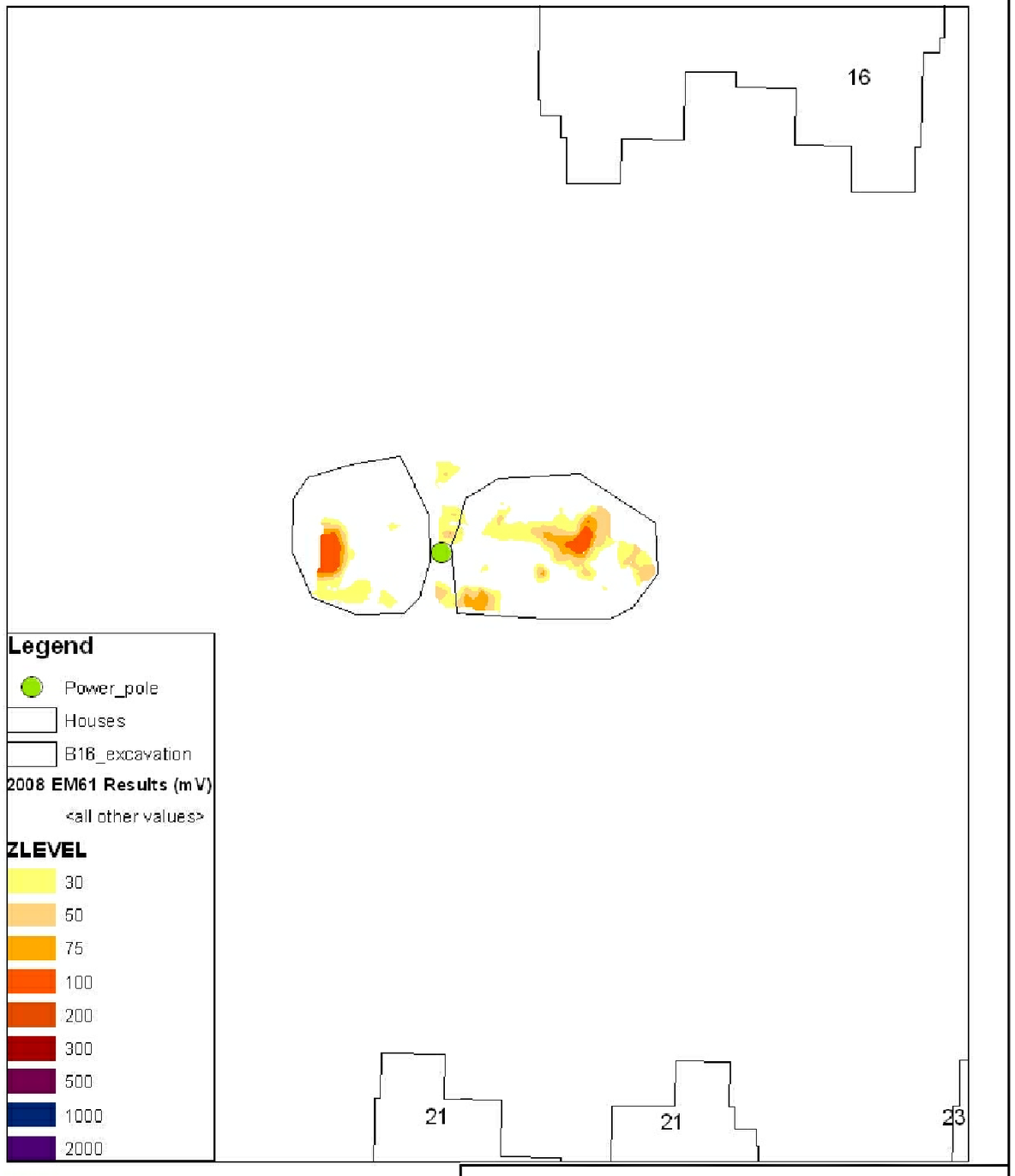


2007 EM1 GEOPHYSICAL PREFORMED BY CRREL



NORTH

2008 EM1 GEOPHYSICAL PREFORMED BY JACOBS

BUILDING 16
2008 BEFORE AND AFTER GEOPHYSICAL SURVEYS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS | DATE: 30 September 2010 | PROJECT MANAGER: T. Heikkila | FIGURE NO.: 5-19

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5.5 EM61 HOT SPOTS LESS THAN 75 MILLIVOLTS (2008)

On 4 September 2008, at least 10 percent of the remaining EM61 hot spots with a result below 75 mV were investigated to confirm the construction observations and the historical belief that drums, metal debris, and munitions-related items were disposed of in specific areas or excavations rather than being dispersed across the entire site (Figure 5-20). The 75 mV criterion was selected based on the results of the 2007 investigation near Buildings 48 and 49; these investigations reached clean limits below 75 mV. To further validate the selection of 75 mV, approximately 10 percent of anomaly areas less than 75 mV were investigated. The site was divided into a 500-foot by 500-foot grid and at least one anomaly per grid was investigated. For further details on the location selection process see the 2008 *EM61 Hotspot Technical Memorandum* (USAED 2008i). Areas investigated included anomalies at Buildings 2, 9, 13, 19, 29, 35, 38, 42, and 43. At all hot spot investigations where EM61 survey results were below 75 mV, only utilities or minor amounts of surface metal debris were observed. There were no drums, canisters, or other containers that might present sources of potential contamination or visible or olfactory signs of contamination within any of the investigations. Therefore, no analytical soil samples were collected. Investigations were immediately backfilled once cleared for the presence of munitions-related items or drums.

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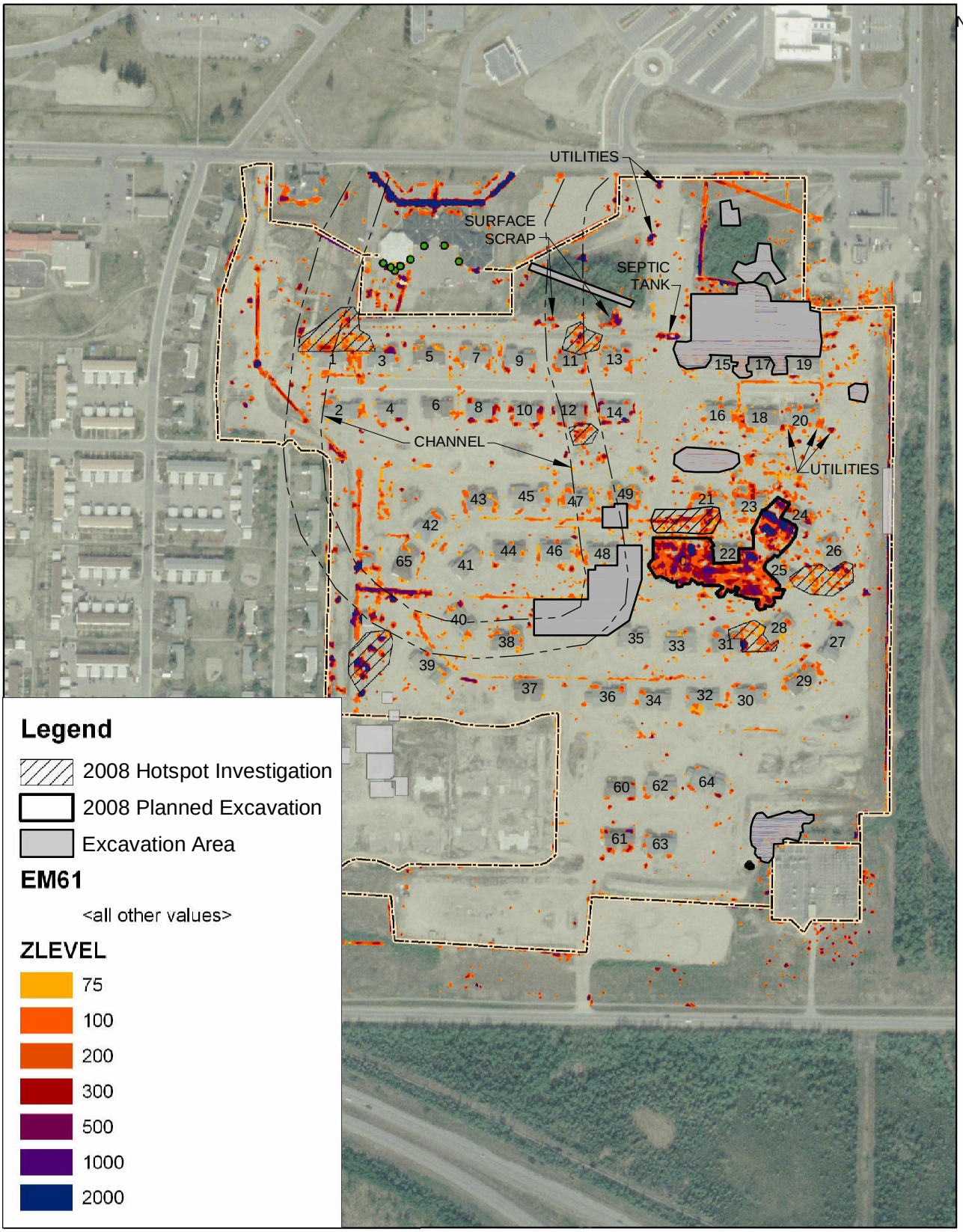

EM61 HOT SPOTS BELOW 75mV INVESTIGATION LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 5-20

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5.6 AREA E PCB INVESTIGATION

Additional PCB investigation activities occurred between 5 June and 31 July 2008 to investigate data gaps identified in the PSE I (USAED 2007a), to complete excavations where activities ceased in 2007 due to weather conditions, and to excavate soil with PCB concentrations exceeding 1 mg/kg beneath the former locations of contaminated stockpiles. Figure 5-21 highlights these locations. Investigation activities were not continuous during these periods. The following information summarizes 2008 PCB-removal activities at six locations within Area E:

- Continuation of the western side of the 2007 Building 52 excavation at depths between 3 and 4 feet bgs – This area was not excavated in 2007 due to frozen soil. Excavation began at the location of 2007 soil characterization sample 07EX52-W403B that had an analytical result of 9.2 mg/kg for PCBs. The 2008 excavation area was approximately 83 square feet with an average depth of approximately 5 feet bgs.
- Continuation of the northern side of the 2007 Building 52 excavation at depths between 2.5 and 3.5 feet bgs – This area was not excavated in 2007 due to frozen soil. Excavation began at the location of 2007 soil characterization sample 07EX52-W428A that had an analytical result of 1.4 mg/kg PCB. The 2008 excavation area was approximately 250 square feet with an average depth of approximately 5 feet bgs.
- Two areas within the Playground Area were identified for investigation activities as a result of the PSE I investigation (USAED 2007a). Contamination in both areas was estimated to be between 0 and 1 foot bgs. Excavations began at approximate locations of samples PLG-SE1 and PLG-SE2 that had analytical results of 2.42 and 1.44 mg/kg PCB, respectively. The PLG-SE1 excavation area was approximately 234 square feet and the PLG-SE2 excavation area was approximately 264 square feet. Both excavations extended to a depth of 2 feet bgs.
- Post-construction samples from beneath the northern and eastern 2007 soil stockpiles revealed two samples above 1 mg/kg for PCBs. Excavation began at locations of post construction samples 08-FCS-RISO-PSC52-E05 and 08-FCS-RISO-PSC52-N02 that had analytical results of 2.1 and 1.5 mg/kg, respectively. The 2008 excavation area for hotspot E05 was approximately 61 square feet with a maximum depth of 1 foot bgs. The 2008 excavation area for hot spot N02 was approximately 79 square feet with a maximum depth of 1 foot bgs.

Excavation confirmation samples were collected from 10-foot by 10-foot grids upon completion of excavation activities at each site. Table 5-11 presents the 2008 excavation confirmation sample IDs and collected depths from the six investigation areas. All PCB-contaminated soils above the residential standard of 1 mg/kg were successfully removed from Area E. Appendix B presents sample results. A discussion of sample results and ADEC checklists are available from the *CH2M Hill RI Report* (USAED 2010). A total of 32 cubic yards of PCB-contaminated soil

was excavated from the six investigation areas in 2008. PCB-contaminated waste soil quantities and disposal locations details are presented in Section 7.0.

Table 5-11
Area E Excavation Confirmation Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Excavation Location	Analyses
08FW-E-EX52-W403C	2.5	Wall Sample (western side of Bldg 52 excavation)	SW8082
08FW-E-EX52-W428B	2.5	Wall sample (northern side of Bldg 52 excavation)	
08FW-E-EX52-W428C	2.5	Wall sample (northern side of Bldg 52 excavation)	
08FW-E-EX52-F449	5	Floor Sample (northern side of Bldg 52 excavation)	
08-FW-E-EX52-F450	5	Floor Sample (northern side of Bldg 52 excavation)	
08FW-E-EX52-W428D	2.5	Wall sample (northern side of Bldg 52 excavation)	
08-FW-E-EX52-W428E	2.5	Wall sample (northern side of Bldg 52 excavation)	
08-FW-E-EX52-F451	5	Floor Sample (northern side of Bldg 52 excavation)	
08-FW-E-EXPLG W101	1	Wall PLG-SE1 excavation	
08-FW-E-EXPLG W102	1	Wall PLG-SE1 excavation	
08-FW-E-EXPLG W103	1	Wall PLG-SE1 excavation	
08-FW-E-EXPLG W104	1	Wall PLG-SE1 excavation	
08-FW-E-EXPLG F101	2	Floor PLG-SE1 excavation	
08-FW-E-EXPLG W201	1	Wall PLG-SE2 excavation	
08-FW-E-EXPLG W202	1	Wall PLG-SE2 excavation	
08-FW-E-EXPLG W203	1	Wall PLG-SE2 excavation	
08-FW-E-EXPLG W204	1	Wall PLG-SE2 excavation	
08-FW-E-EXPLG F201	2	Floor PLG-SE2 excavation	
08-FW-E-EXE05 W101	0.5	Wall E05 excavation	
08-FW-E-EXE05 W102	0.5	Wall E05 excavation	
08-FW-E-EXE05 W103	0.5	Wall E05 excavation	
08-FW-E-EXE05 W104	0.5	Wall E05 excavation	
08-FW-E-EXE05 F101	1	Floor E05 excavation	
08-FW-E-EXN02 W01	0.5	Wall N02 excavation	
08-FW-E-EXN02 W02	0.5	Wall N02 excavation	
08-FW-E-EXN02 W03	0.5	Wall N02 excavation	
08-FW-E-EXN02 W04	0.5	Wall N02 excavation	
08-FW-E-EXN02 F101	1	Floor N02 excavation	

Note: For definitions, see the Acronyms and Abbreviations section.

Area E Excavations at PLGSE1 and PLGSE2 2008

Area E Northern 400 Area North Excavation 2008

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Area E – Northern 400 Area West Excavation 2008

Area E – Stockpile Removal Activities 2008

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LEGEND

- BUILDING
- BUILDING FOUNDATION
- BUILDING FOOTPRINT; NO FOUNDATION CONSTRUCTED
- PP POWER POLE
- 2008 LIMITS OF EXCAVATION

0 25 50 100

SCALE IN FEET

NORTH

FENCE

PP

EXCAVATION No.02 AREA

EXCAVATION No.05 AREA

PCB 700 AREA (06SB134)

PLGSE2

PLGSE1

BUILDING 50

BUILDING 52

BUILDING 54

BUILDING 56

BUILDING 58

ACCESS ROAD

BUILDING 51

BUILDING 53

BUILDING 55

BUILDING 57

AREA E 2008 INVESTIGATION AREAS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO.: 5-21

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5.7 OTHER INVESTIGATION ACTIVITIES

In 2008, the PRSE (USAED 2008d) was prepared for the Taku Gardens site to compare with previous investigation results (USAED 2008h) to identify risk-based screening levels. A data gap analysis was also performed to identify potential sources of contamination identified in the PRSE. Details of areas investigated during the 2008 field season based on the PRSE are provided in Sections 5.7.1 through 5.7.8.

5.7.1 Petroleum, Oil, and Lubricants Investigation

During construction activities at the FCS in 2005, small heating-oil spills occurred in front of approximately 40 houses (USAED 2007a, 2007b). No survey data to identify the exact location of these hot spots was produced; therefore a visual inspection including collection of field screening samples for PID analysis to identify stained soil was conducted in 2008. Of the 40 historic areas where spills had potentially occurred, stained soil with elevated PID readings was only discovered and removed at Buildings 9, 40, and 45 during the 2008 field season. The following three subsections detail these soil removal activities and the follow-up soil sample results.

5.7.1.1 Building 9

On 19 August 2008, one small area was excavated on the north side of Building 9. Three cubic yards of POL-contaminated soil was removed from the site and containerized in Super Sacks for disposal. The excavation was approximately 60 square feet with a depth of 1 foot bgs, as determined by PID readings (Figure 5-22). Five excavation confirmation samples were collected (one from each excavation sidewall and one from the excavation floor). Table 5-12 presents the 2008 excavation confirmation sample IDs and collection depths from Building 9; all soil sample results were below site screening criteria. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Section 7.0 presents the details regarding waste soil quantities and disposal locations.

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Building 9 – POL-Contaminated Soil Excavation 2008

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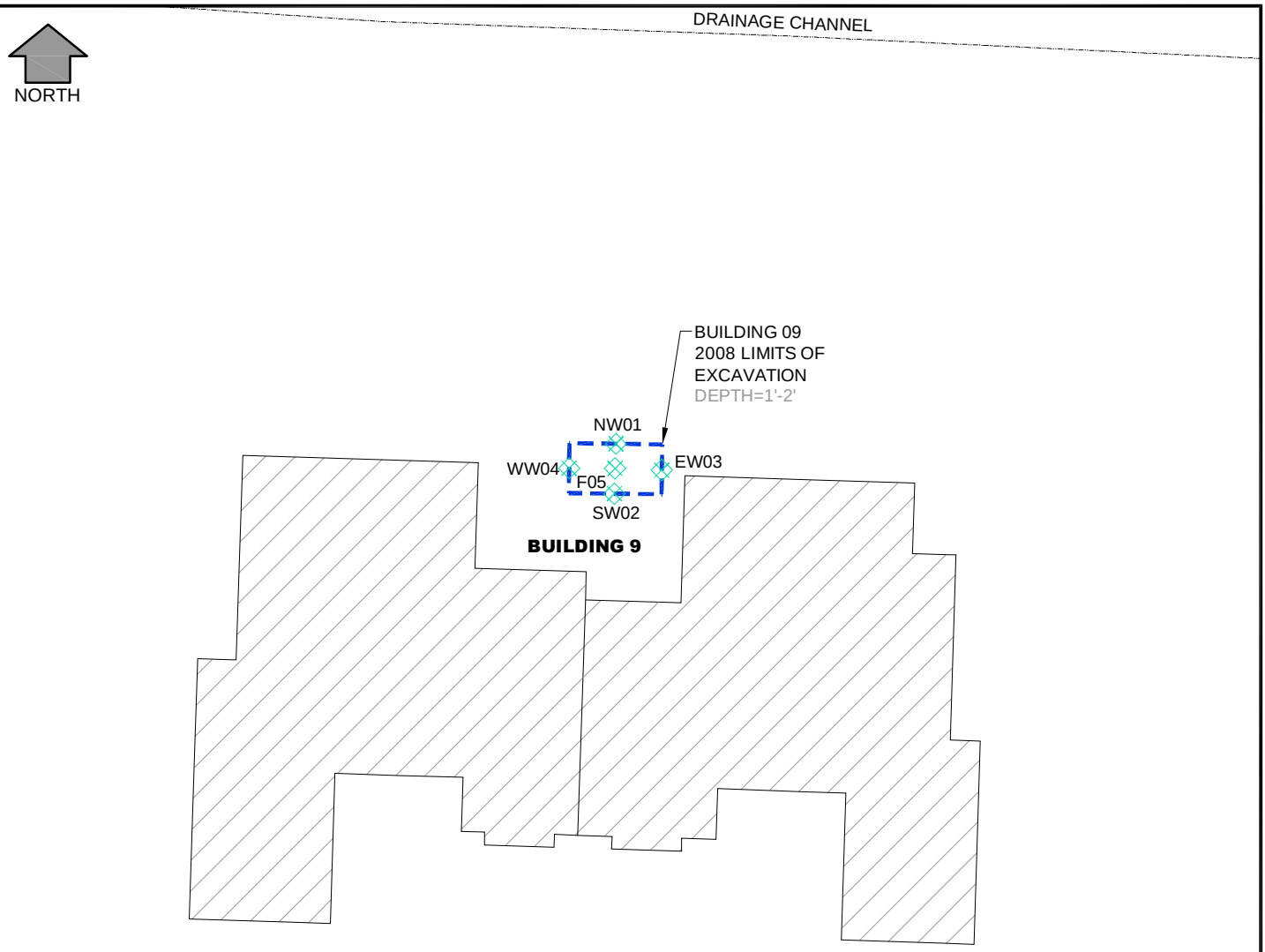

NOTES

1. THE PREFIX 08FW-B-EXBLDG 09- FOR THE SAMPLE IDs HAS BEEN OMITTED FOR CLARITY.
2. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

LEGEND

2009 SAMPLE LOCATION

0 10 20 40

SCALE IN FEET

BUILDING 09 2008 LIMITS OF POL INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO.: 5-22

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Table 5-12
Building 9 Excavation Confirmation Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08-FCS-BLD-09 NW01	0.5	AK102/103, SW8270C, SW8260B
08-FCS-BLD-09 SW02	0.5	
08-FCS-BLD-09 EW03	0.5	
08-FCS-BLD-09 WW04	0.5	
08-FCS-BLD-09 F05	1	

Note: For definitions, see the Acronyms and Abbreviations section.

5.7.1.2 Building 40

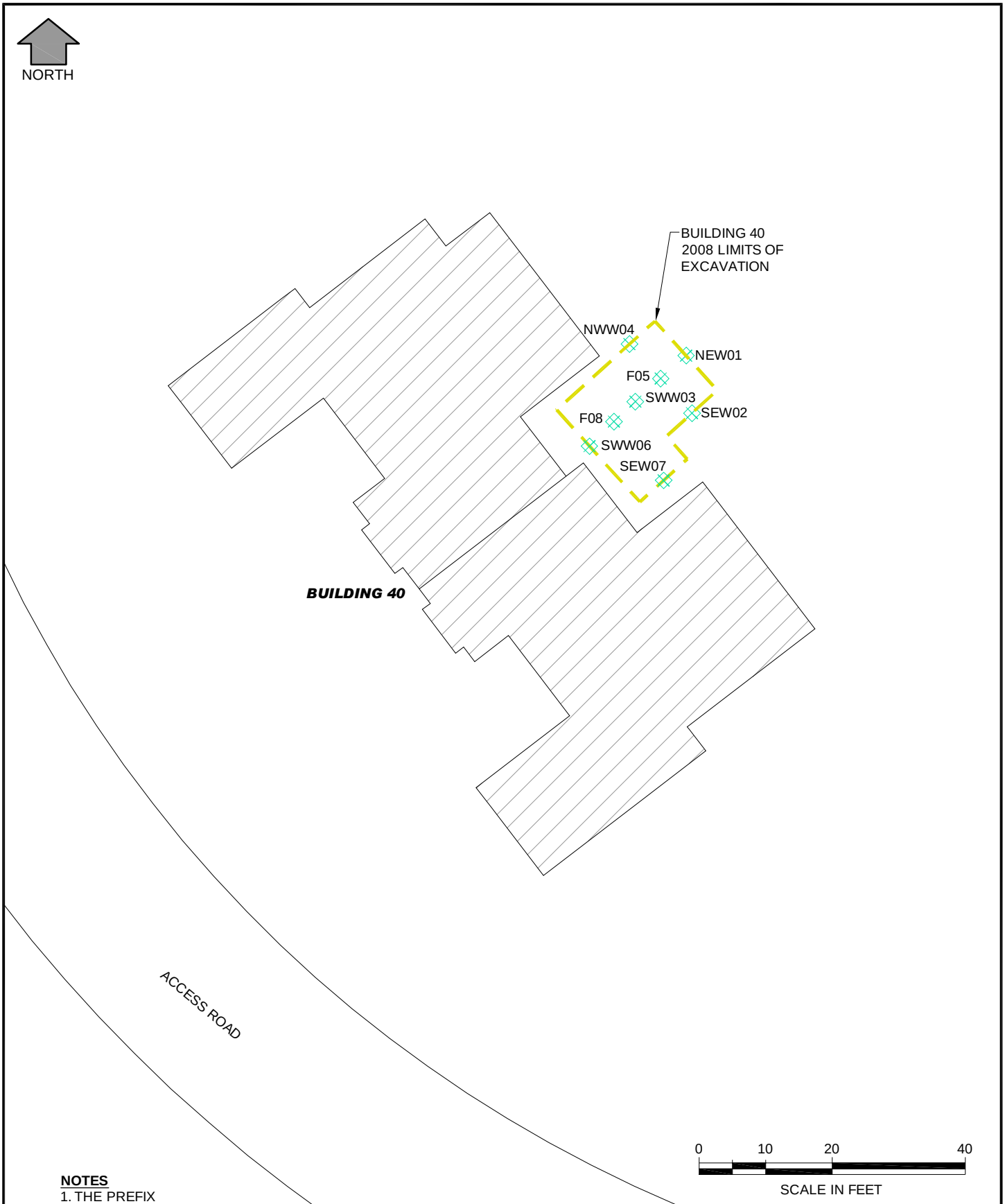
On 19 August 2008, one small excavation was initiated on the north side of Building 40. Of the 60 cubic yards of POL-contaminated soil removed from the site, 4 cubic yards was containerized in Super Sacks for disposal, and the remaining 56 cubic yards was stockpiled in the soil containment cell onsite for future disposal. A PID was used to guide the excavation. Five excavation confirmation samples were collected (one from each excavation sidewall and one from the excavation floor). Based on analytical sample results, the excavation was extended to the southeast and southwest, and was excavated deeper. Following additional excavation activities, three additional confirmation samples were collected (one from each new sidewall, and one from the floor). The final excavation encompassed approximately 170 square feet with an average depth of 7.5 feet (Figure 5-23). Confirmation soil sample results indicated that clean excavation boundaries were met. Table 5-13 presents excavation confirmation sample IDs and collection depths collected from the Building 40 excavation in 2008. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Section 7.0 presents the details regarding waste soil quantities and disposal locations.

Table 5-13
Building 40 Excavation Confirmation Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08-FCS-BLD-040 NEW01*	3	AK102/103, SW8270C, SW8260B
08-FCS-BLD-040 SWW03	3	
08-FCS-BLD-040 SEW02	3	
08-FCS-BLD-040 NWW04*	3	
08-FCS-BLD-040 F05	6	
08-FCS-BLD-040 SWW06*	4	
08-FCS-BLD-040 SEW07*	4	
08-FCS-BLD-040 F08*	7.5	

Note:

* indicates sample was collected from final excavation boundary
For definitions, see the Acronyms and Abbreviations section.



NOTES

1. THE PREFIX 08FW-E-EXBLDG 40- FOR THE SAMPLE IDs HAS BEEN OMITTED FOR CLARITY.
2. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

LEGEND

2008 SAMPLE LOCATION

BUILDING 40 2008 POL LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 5-23

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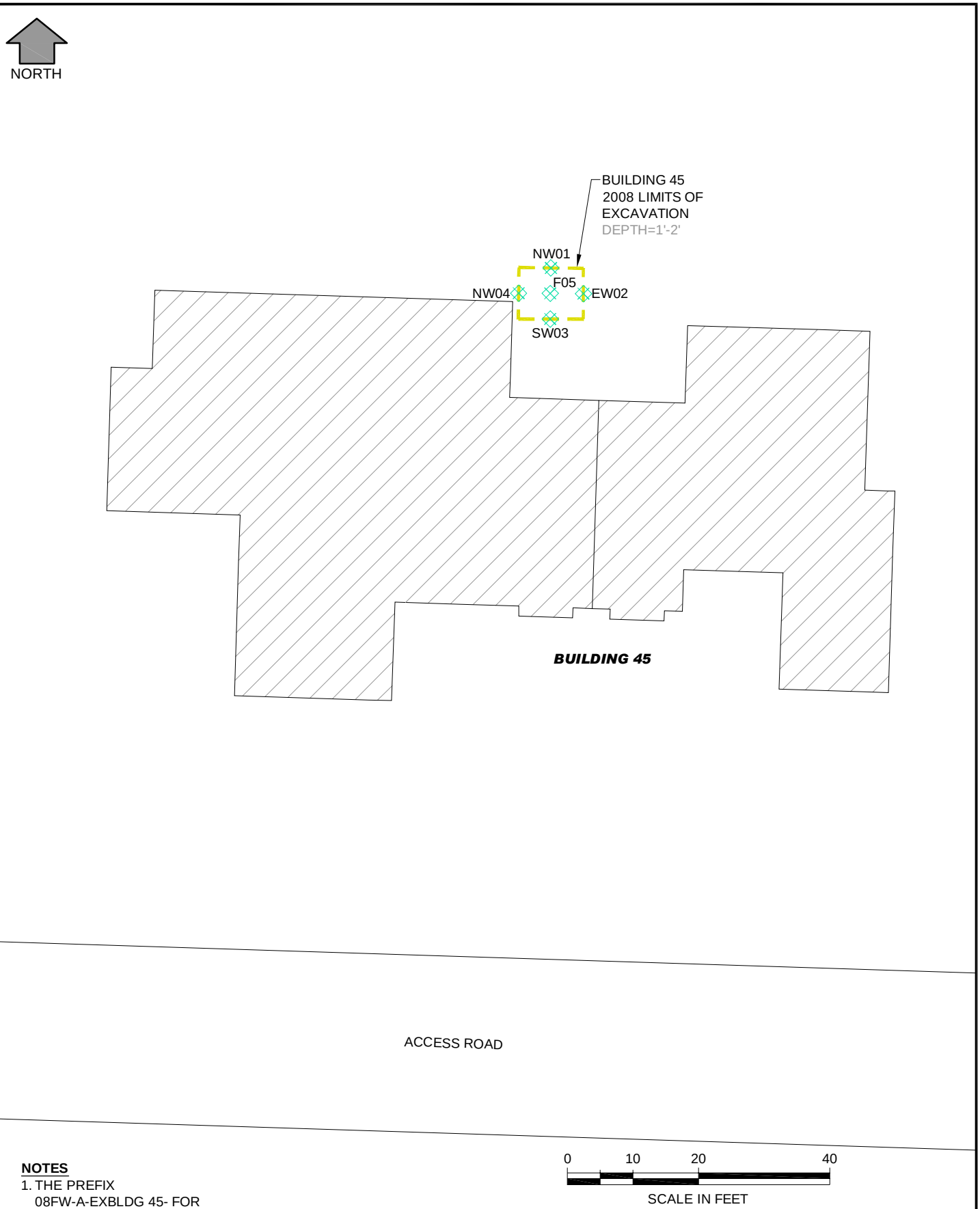
5.7.1.3 Building 45

On 19 August 2008, one small excavation was initiated on the north side of Building 45. Three cubic yards of POL-contaminated soil was removed from the site and containerized in Super Sacks for disposal. The excavation footprint was approximately 60 square feet with an average depth of 1 foot (Figure 5-24). A PID was used to guide the excavation. Five excavation confirmation samples were collected (one from each excavation sidewall and one from the excavation floor). Table 5-14 presents excavation confirmation sample IDs and collection depths collected from the Building 45 excavation in 2008. All soil sample results were below site screening criteria. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Section 7.0 presents the details regarding waste soil quantities and disposal locations. Appendix C provides the waste disposal certificates.

Table 5-14
Building 45 Excavation Confirmation Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08-FCS-BLD-045 NW01	0.5	AK102/103, SW8270C, SW8260B
08-FCS-BLD-045 SW03	0.5	
08-FCS-BLD-045 EW02	0.5	
08-FCS-BLD-045 WW04	0.5	
08-FCS-BLD-045 F05	1	

Note: For definitions, see the Acronyms and Abbreviations section.



NOTES

1. THE PREFIX 08FW-A-EXBLDG 45- FOR THE SAMPLE IDs HAS BEEN OMITTED FOR CLARITY.
2. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

LEGEND

2008 SAMPLE LOCATION

BUILDING 45 2008 POL LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 5-24

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5.7.2 Dichlorodiphenyltrichloroethane (DDT) Hot Spot Removal

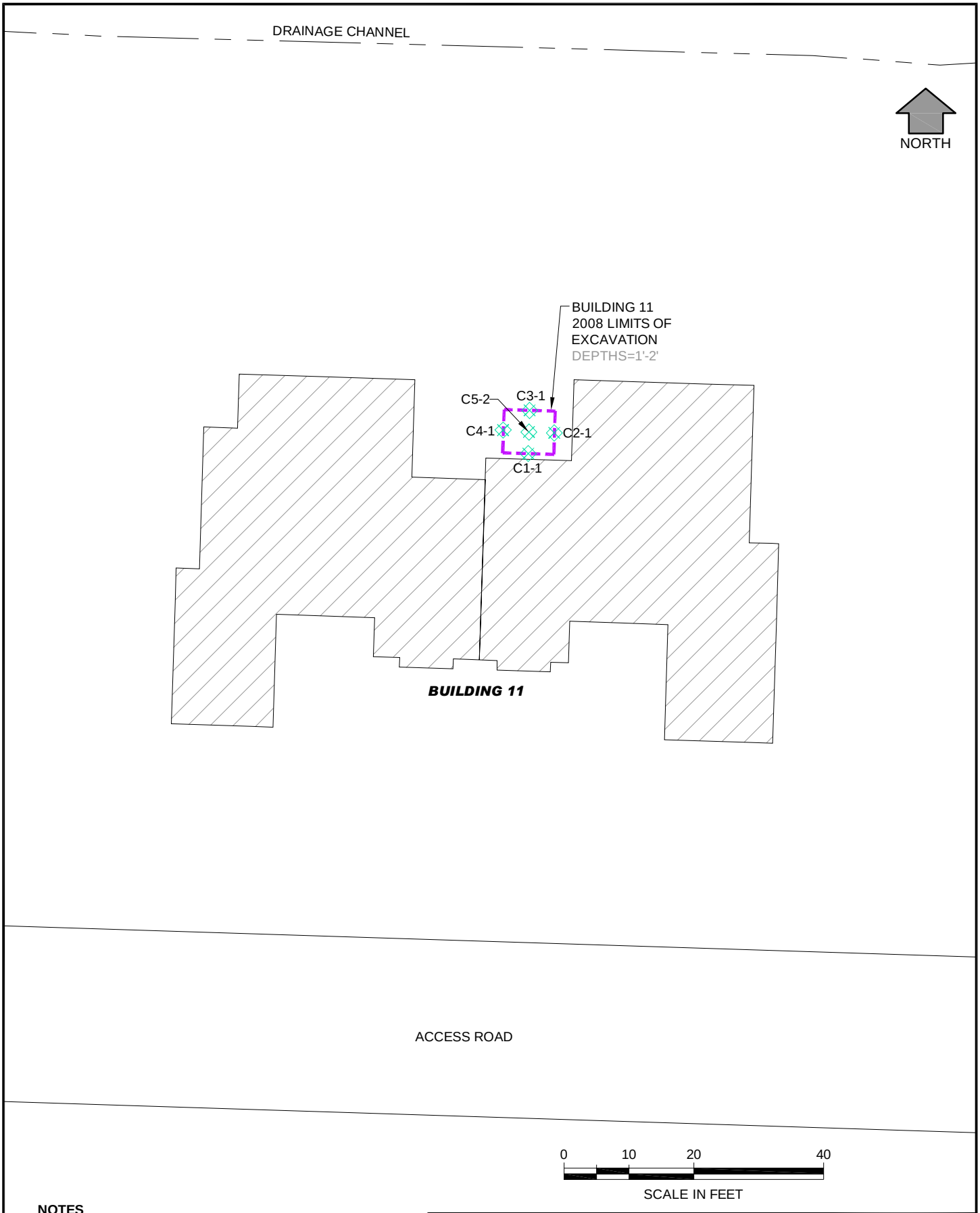
The PRSE identified one location at Taku Gardens (Building 11) as a source of DDT contamination requiring further investigation (USAED 2008d). Sample results at this location indicated a DDT concentration (18.8 mg/kg) that exceeded the PRSE screening criterion by more than 10 times.

On 17 September 2008, the Building 11 DDT hot spot was excavated, centered on the sample location with dimensions of 10 feet by 10 feet and a depth of 2 feet (Figure 5-25). A total of 15 cubic yards of DDT-contaminated soil was excavated and stored in Super Sacks for disposal. Five excavation confirmation soil samples were collected (one from each excavation sidewall and one from the excavation floor) and analyzed for pesticides. All soil sample results were below site screening criteria. Table 5-15 presents the 2008 excavation confirmation sample IDs and collection depths. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Section 7.0 presents the details regarding waste soil quantities and disposal locations. Appendix C provides the waste disposal certificates.

Table 5-15
DDT Hotspot Excavation Confirmation Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08 FCS RISO BLD11 C1-1	1	SW8151/SW8081
08 FCS RISO BLD11 C2-1	1	
08 FCS RISO BLD11 C3-1	1	
08 FCS RISO BLD11 C4-1	1	
08 FCS RISO BLD11 C5-2	2	

Note: For definitions, see the Acronyms and Abbreviations section.



NOTES

1. THE PREFIX 08FW-A-EXBLDG 11- FOR THE SAMPLE IDs HAS BEEN OMITTED FOR CLARITY.
2. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

LEGEND

2008 SAMPLE LOCATION

BUILDING 11 2008 DDT LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 5-25

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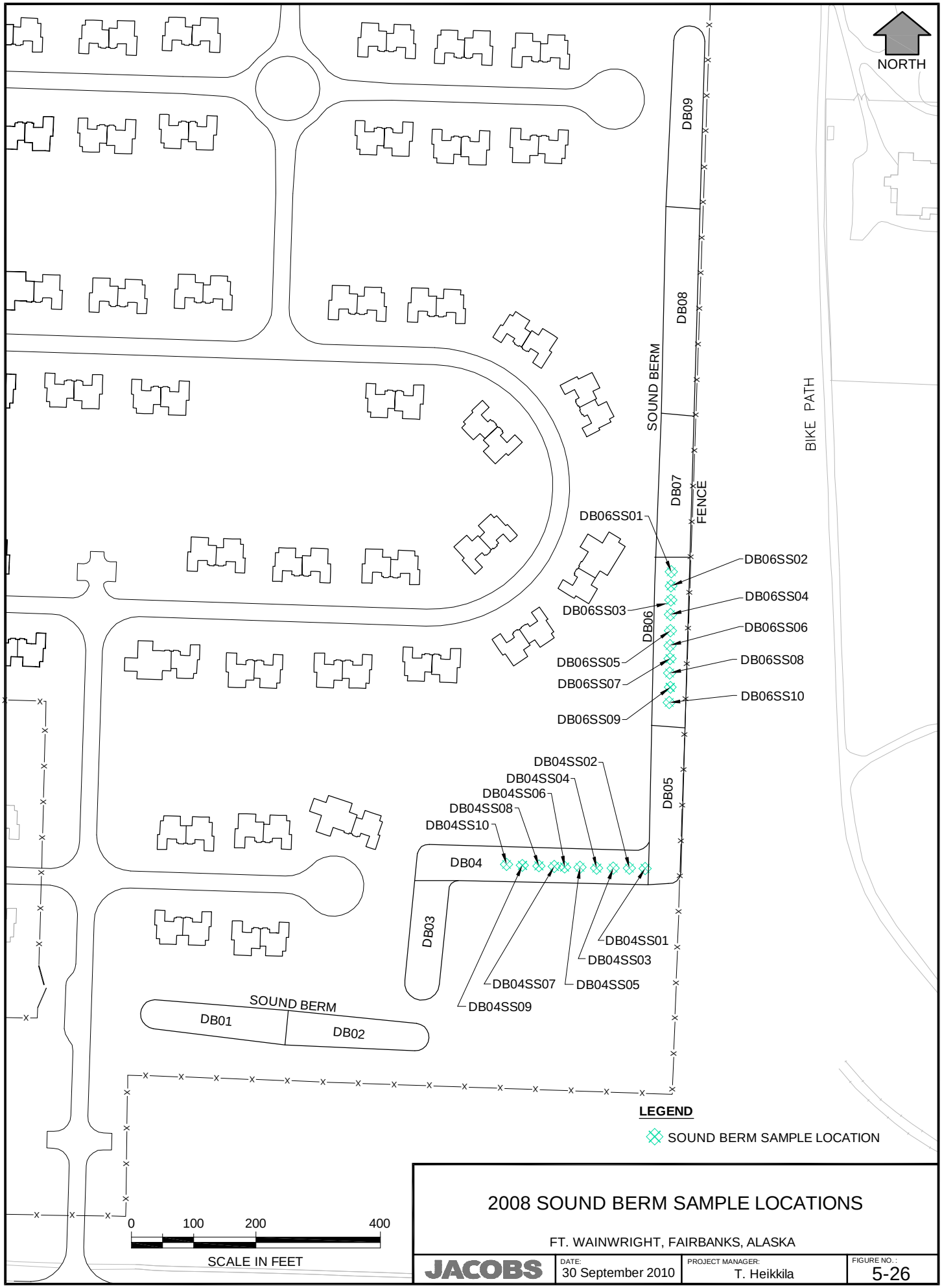
5.7.3 Sound Berm Sampling

The 2008 PRSE identified two decision units within the sound berm (DB04 and DB06) as having benzo(a)pyrene concentrations exceeding the screening criteria following the 2007 MI soil sampling performed by CH2M Hill (USAED 2008h). Further detail is provided in the PRSE (USAED 2008d). On 24 September 2008, ten discrete surface soil samples were collected for PAH analysis from each decision unit to characterize potential contamination and to provide data to support the risk assessment being prepared by CH2M Hill (USAED 2010). Samples were spaced evenly throughout each decision unit and collected from the top of the sound berm (Figure 5-26). Table 5-16 presents the 2008 soil characterization sample IDs and collection depths. All analytical results were below ADEC Method Two criteria. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Additional soil sampling was conducted at the sound berm in 2009 (Section 6.9).

Table 5-16
Sound Berm Soil Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08FWADB04SS0-01	1	SW8270C SIM
08FWADB04SS0-02	1	
08FWADB04SS0-03	1	
08FWADB04SS0-04	1	
08FWADB04SS0-05	1	
08FWADB04SS0-06	1	
08FWADB04SS0-07	1	
08FWADB04SS0-08	1	
08FWADB04SS0-09	1	
08FWADB04SS0-10	1	
08FWADB06SS-01	1	
08FWADB06SS-02	1	
08FWADB06SS-03	1	
08FWADB06SS-04	1	
08FWADB06SS-05	1	
08FWADB06SS-06	1	
08FWADB06SS-07	1	
08FWADB06SS-08	1	
08FWADB06SS-09	1	
08FWADB06SS-10	1	

Note: For definitions, see the Acronyms and Abbreviations section.



2008 SOUND BERM SAMPLE LOCATIONS

FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 5-26

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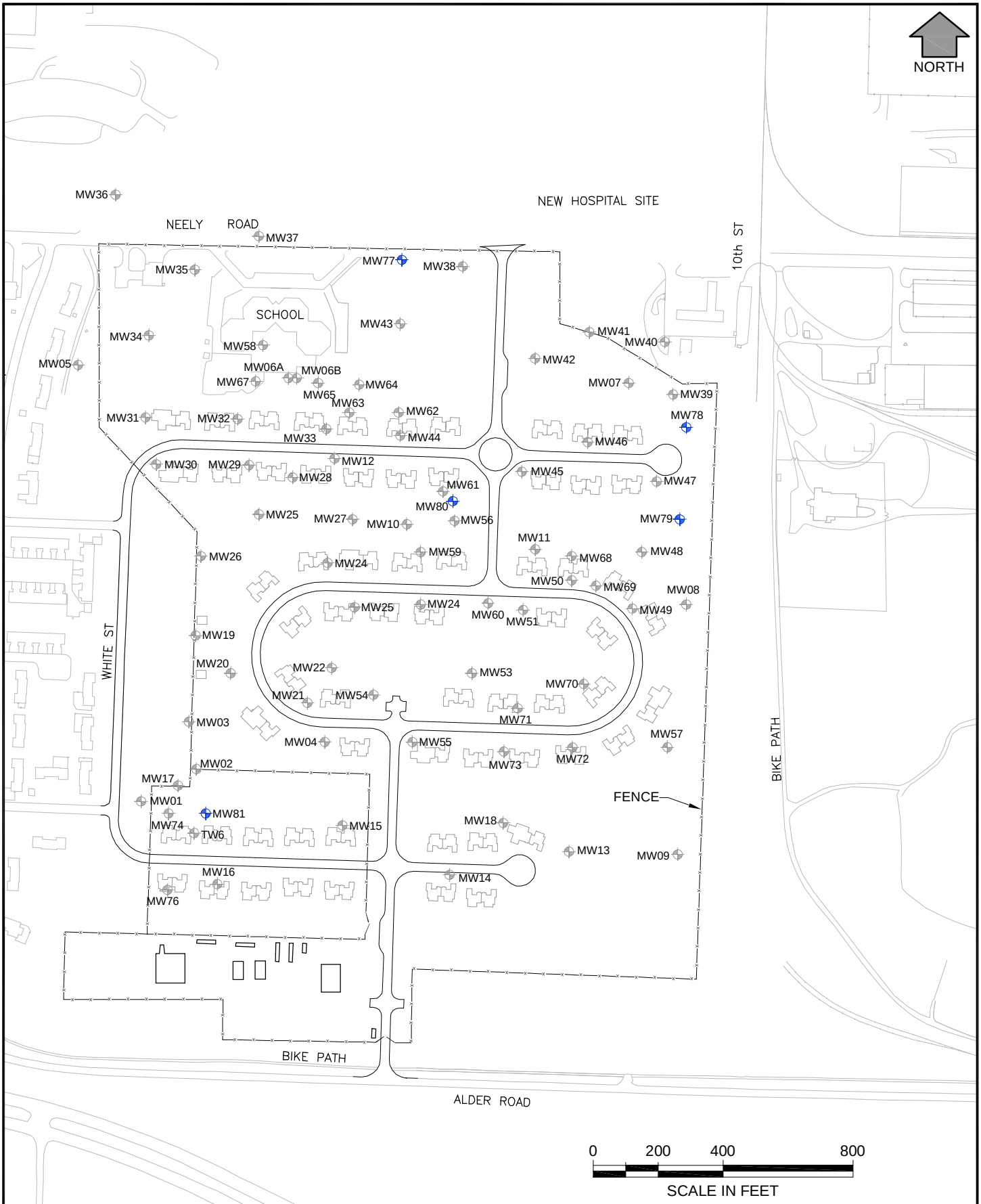
5.7.4 Groundwater Monitoring Well Installation

The PRSE (USAED 2008d) identified five locations within the Taku Gardens site where groundwater monitoring wells were to be installed (Figure 5-27). The objective of the monitoring well installation was to locate the edges of plumes of contaminated groundwater for risk screening purposes.

On 25 and 26 September 2008, munitions-related items clearance support was provided prior to groundwater well installation. Prior to drilling, a test pit was excavated at each groundwater well location to approximately 5 feet bgs or to a depth at which no further debris was encountered. No munitions-related items were excavated during well location clearance activities. All scrap metal encountered was removed from the test pits.

On 30 September 2008, Jacobs began monitoring well installation activities and collected soil characterization samples from the soil borings. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Table 5-17 presents the sample IDs and collection depths. Upon completion of installation, all five monitoring wells were developed in accordance with ADEC guidance. Appendix E contains the soil boring and well installation logs. CH2M Hill sampled all groundwater monitoring wells installed in 2008 as part of the site-wide groundwater sampling investigation.

Additional groundwater monitoring wells and geoprobe borings were installed/advanced to delineate contamination plumes in 2009 (refer to Sections 6.6 and 6.7).



LEGEND

- MONITORING WELL (MW)
- MW INSTALLED IN 2008

2008 GROUNDWATER MONITORING WELLS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 5-27

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Table 5-17
Monitoring Well Soil Boring Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
08FWAMW80-01-1_2	1-2	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8321A, SW6010B, SW6020, SW7471A
08FWAMW80-01-2_6	2-6	
08FWAMW79-01-1_2	1-2	
08FWAMW78-01-1_2	1-2	
08-FW-A-MW79-5_6.5	5-6.5	
08-FW-A-MW79-10_14	10-14	
08-FW-A-MW78-7.5_9.5	7.5-9.5	
08-FW-A-MW78-11_13	11-13	
08-FW-A-MW81-12-14	12-14	
08-FW-A-MW77-0_2	0-2	
08-FW-A-MW77-5_6.5	5-6.5	
08-FW-A-MW77-12.5_14	12.5-14	
08-FW-A-MW80-10_11.5	10-11.5	
08-FW-A-MW80-27.5-29	27.5-29	

Note: For definitions, see the Acronyms and Abbreviations section.

5.7.5 Surface Soil Sampling

Between 7 and 11 October 2008, surface soil sampling was performed to complete the baseline risk assessment at the Taku Gardens site. Sampling was performed at each house to determine nature and extent of contamination throughout the site in support of the risk assessment. On 23 March 2009, additional samples were collected from Areas A, B, C, D, and E and from an unnamed area to the west to obtain complete coverage of the site. Between the two sampling events, a total of 87 soil samples were collected throughout the site at a depth of 0 to 2 feet bgs. Soil at each location was removed to a depth of 2 feet bgs and homogenized for each sample, in accordance with the *Surface Soil Data Gaps Evaluation Memo* (USAED 2008g). A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Table 5-18 presents the number of samples and analytical suites for each of the areas. Figure 5-28 presents the sample locations.

Table 5-18
Surface Soil Sample Summary

Subarea	Number of Samples	Analyses
A	36	SW8081B, SW60206010/7471A SW8270C/SW8270CSIM, AK102/AK103, AK101, SW8260B, SW8321
B	9	SW8081B, SW8151A, SW60206010/7471A SW8270C/SW8270CSIM, AK102/AK103, AK101, SW8260B
C	6	SW8081B, SW8151A, SW60206010/7471A SW8270C/SW8270CSIM, AK102/AK103, AK101, SW8260B
D	10	SW8081B, SW8151A, SW60206010/7471A SW8270C/SW8270CSIM, AK102/AK103, AK101, SW8260B
E	19	SW8081B, SW8151A, SW60206010/7471A SW8270C/SW8270CSIM, AK102/AK103, AK101, SW8260B
West (unnamed area)	7	SW8081B, SW8151A, SW60206010/7471A SW8270C/SW8270CSIM, AK102/AK103, AK101, SW8260B

Notes: Sample numbers includes eight additional samples collected in March 2009.
For definitions, see the Acronyms and Abbreviations section.

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Building 11 DDT Hotspot Excavated Waste Soil 2008

Building 11 DDT Hotspot Excavation Area 2008

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Groundwater Monitoring Well Installation Activities 2008

Surface Soil Sampling 2008

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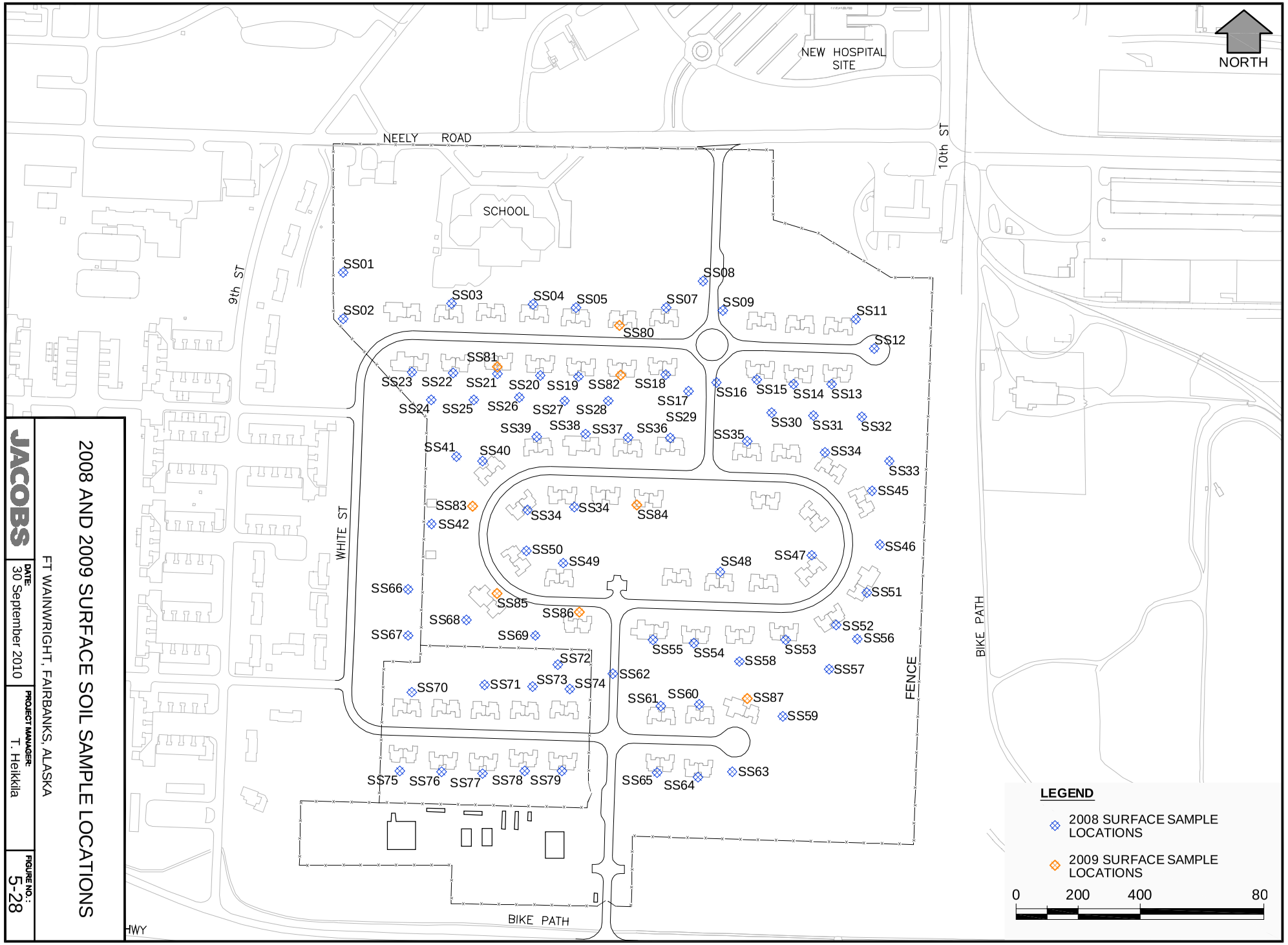
G:\Autocad\ERS-UR\05F50701\2009 RI Rpt\Fig 5-28 2008_2009 Surface Samples.dwg Sep 30,2010 -tiedemam



2008 AND 2009 SURFACE SOIL SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	
DATE:	30 September 2010
PROJECT MANAGER:	T. Heikkila
FIGURE NO.:	5-28

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5.8 SOIL PILE REMOVAL AND SAMPLING

In 2008, Jacobs removed and sampled several soil piles. Samples were collected to characterize waste and collected for post-construction purposes. The majority of these soil piles were created during construction activities at the FCS site and were either removed from site and stockpiled elsewhere at Fort Wainwright (e.g., DRMO) or left within the site boundary. The majority of the stockpiles had previously been sampled during the PSE I or II investigations (USAED 2007a, b) or by CH2M Hill during RI/FS activities in 2007.

5.8.1 Construction Stockpiles, Area A to C

Soil piles 06SP01 to 06SP16, 06SP40 and 41, SPA, SPB, SPC, SPE, and SPG were located outside Area E (Figure 7-1). During MI sampling, DRO was detected in 06SP06 at 1,110 mg/kg; therefore, 250 cubic yards of POL-contaminated soil was removed from this sample location and thermally treated. Following removal, additional samples were taken and analyzed for GRO, DRO, and RRO. No further exceedances were identified, and the remaining portion of the soil pile was disposed of at the Fort Wainwright Landfill. All other soil piles in Areas B and C were removed and disposed of at the Fort Wainwright Landfill. A total of 10,181 cubic yards of soil was removed from 23 stockpiles in these areas. Two items of MD (an 81-millimeter practice M68 with M3 cartridge and a 2.25-inch empty SCAR [Sub-Caliber Aircraft Rocket]) were found in the piles during removal. Both of these items were disposed of as scrap. Details regarding waste soil quantities and disposal locations are summarized in Section 7.0. Copies of the waste disposal certificates are provided in Appendix C.

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Removal of Construction-Related Soil Stockpiles 2008

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5.8.2 Defense Reutilization and Marketing Office Stockpiles

During the 2008 field season, three soil stockpiles were removed from the DRMO facility for disposal. The stockpiles were constructed in 2005 with POL- and pesticide-contaminated soil from the Taku Gardens site and characterized (USAED 2007b).

Between 19 and 22 September 2008, the east and west soil stockpiles at DRMO, primarily contaminated with POL substances, were transported, thermally treated offsite, and transported to the Fort Wainwright Landfill for disposal. The two stockpiles totaled approximately 1,000 cubic yards. On 19 and 22 September, five post-construction soil samples were collected beneath the west stockpile and three post-construction soil samples were collected beneath the east stockpile. Samples were collected from depths between 0 and 6 inches bgs and were analyzed for GRO, DRO, RRO, VOCs, pesticides, herbicides, and metals. Appendix B provides the analytical results. Section 7.0 presents the details regarding waste soil quantities and disposal locations. Appendix C provides the waste disposal certificates.

In 2005, 10 soil characterization samples were collected from the middle stockpile. The stockpile contained approximately 1,200 cubic yards of pesticide-contaminated soil. One sample collected near the southwest corner of the pile had a DDT detection of 79 mg/kg. Therefore, in 2008, three soil characterization samples were collected from the 30-cubic yard section of the stockpile (DRMO 13, DRMO 14, and DRMO 15) to determine transportation and disposal. Additional soil samples (DRMO 09, DRMO 10, DRMO 11, and DRMO 12) were collected from the sidewalls and floor of the remaining stockpile to confirm that the DDT-contaminated soil had been removed.

Between 16 and 21 October 2008, the middle stockpile was excavated and containerized for disposal. The 30 cubic yards was characterized as regulated pesticide-contaminated soil, while the remaining soil was transported offsite as nonregulated pesticide-contaminated soil. Following excavation of the soil, on 21 October 2008, four post-construction soil samples were collected from beneath the stockpile at depths between 0 and 6 inches bgs. Appendix B presents the analytical results. Section 7.0 presents the details regarding waste soil quantities and disposal locations. Appendix C provides copies of the waste disposal certificates.

5.8.3 Miscellaneous Stockpiles

During the 2008 field season, two soil stockpiles not previously identified for removal were excavated and disposed of (Figure 7-1). The first stockpile, identified as the offsite stockpile, was located near the corner of Alder Avenue and 9th Street, southwest of the site. The origins of the offsite stockpile are unknown. On 16 September 2008, two soil samples were collected from the offsite stockpile for waste characterization purposes (Appendix B). The stockpile contained 11 cubic yards of soil. On 26 September 2008, this soil was excavated and placed in Super Sacks for disposal. On 16 October, two post-construction soil samples were collected from beneath the stockpile at depths between 0 and 6 inches bgs (Appendix B).

The second stockpile, identified as the organic stockpile, was located along the fence just south of the PCB area. On 11 September 2008, prior to excavation, two soil characterization samples were collected from this stockpile to characterize the waste stream (Appendix B). Between 11 and 16 September 2008, excavation activities at the organic stockpile took place. This stockpile contained approximately 3,000 cubic yards of soil with mixed organic debris, which was disposed of at the Fort Wainwright Landfill via dump truck. On 16 September 2008, two post-construction samples were collected beneath the location of the organic stockpile at depths between 0 and 6 inches bgs (Appendix B). Section 7.0 presents the details regarding waste soil quantities and disposal locations. Appendix C provides copies of the waste disposal certificates.

5.9 SUMMARY OF MAIN INVESTIGATION AREAS

Table 5-19 presents a summary of Investigation activities conducted at Taku Gardens during the 2008 field season.

Table 5-19
Summary of 2008 Remedial Investigation Activities

Location	Area of Investigation (square feet)	Drums	Contaminated Soil (cy)	MD	DMM
Building 1	6,161	1	-	-	-
Building 11	4,449	10	15	-	-
Building 12	3,563	4	24	-	-
PCB Area E	970	-	1,720 (1-10 mg/kg)[1]	-	-
Building 15/17	75,579	115	238	538	1
Building 16 and 21	5,262	-	-	-	-
Building 22 and 24	66,190	39	34	1,552	
Building 26	5,587	1	7	-	-
Building 28/31	1,497	-	60	6	1
Area D	25,876	415	2	3	-
Building 40	170	-	60	-	-
Building 45	60	-	3	-	-
Building 9	60	-	3	-	-
Building 43	1,401	-	-	-	-
Building 29	3,236	-	-	-	-
Building 38	1,488	-	-	-	-
Totals	201,549	585	2,166	2,099	2

Notes:

[1] 1,688 cubic yards of this soil was stockpiled in 2007 for removal in 2008. The remaining 32 cubic yards were excavated and removed in 2008.

For definitions, see the Acronyms and Abbreviations section.

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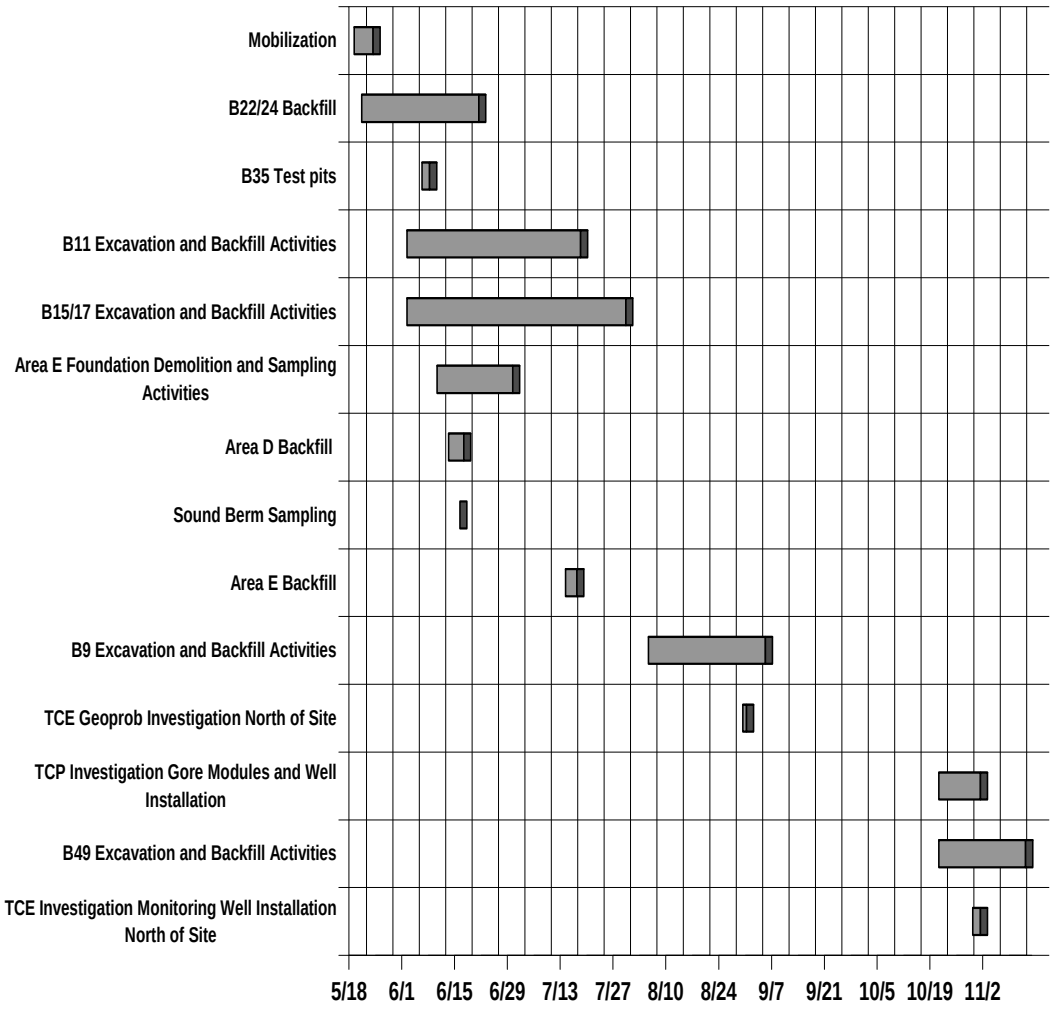
6.0 2009 INVESTIGATIONS

Work performed in 2009 included drum and debris investigations at Buildings 15/17, 49, 35, and 11 in Area A; demolition of house foundations and utilities in Area E; and groundwater contamination delineation. In February 2009, a final EM61 survey was performed to ensure that metallic debris had been removed from areas excavated in 2007 and 2008. Figure 6-1 shows the work schedule for the field activities initiated in May 2009.

Figure 6-1 2009 Fieldwork Schedule



6.1 BUILDING 15/17 INVESTIGATION

Three areas of Building 15/17 were identified for further investigation during the February 2009 EM61 survey. Investigation activities began 1 June 2009. In accordance with the *Explosives Safety Plan* (Appendix F) and *MEC Support Work Plan* (USAED 2008a), an HFD of 534 feet was applied to all investigation work in Area A. Based on proximity to the gas station and Neely Road, investigation work at the Building 15/17 investigation occurred during night hours to reduce disruption to Fort Wainwright.

The Building 15/17 investigation had a total footprint of approximately 22,050 square feet. The floor of the investigation just north of Building 15/17 was excavated to a depth ranging between 12 and 15 feet bgs. Investigation also continued to the northeast and northwest corners of the 2008 investigation footprint. Only scrap metal debris was encountered during investigation activities. Section 7.0 presents further details regarding waste streams and disposal locations. No munitions-related items were discovered as a result of the 2009 investigation activities. Figure 6-2 presents the 2009 investigation limits. Figure 6-3 displays the 2009 geophysical data before and after the Investigation activities.

Characterization sampling was performed upon completion of investigation activities in 2009. The investigation floor and wall samples were collected at a frequency of one sample per 50-foot by 50-foot grid node. A total of 39 soil characterization samples were collected from the main Building 15/17 investigation area. Table 6-1 presents the sample IDs and collection depths. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). The investigation area was backfilled with clean, stockpiled material in the bottom of the footprint, and the top two feet was backfilled with offsite borrow material following sample collection activities in 2009.

Building 15-17 – Geophysical Survey 2009

Building 15-17 – Backfill Activities 2009

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Building 15-17 – Example of Removed Debris 2009

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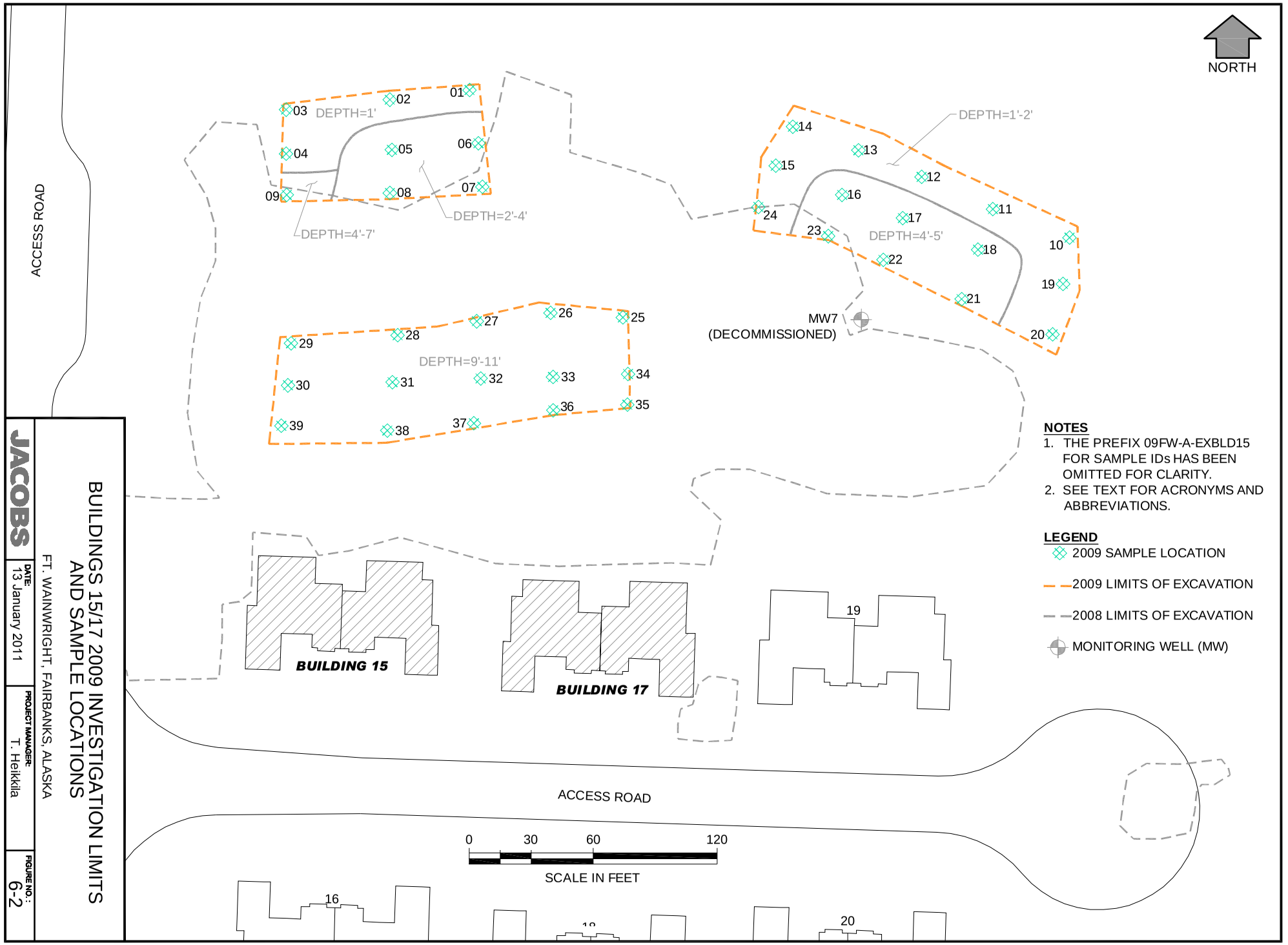

BUILDINGS 15/17 2009 INVESTIGATION LIMITS AND SAMPLE LOCATIONS

FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS

DATE: 13 January 2011

PROJECT MANAGER: T. Heikkila

FIGURE NO.: 6-2

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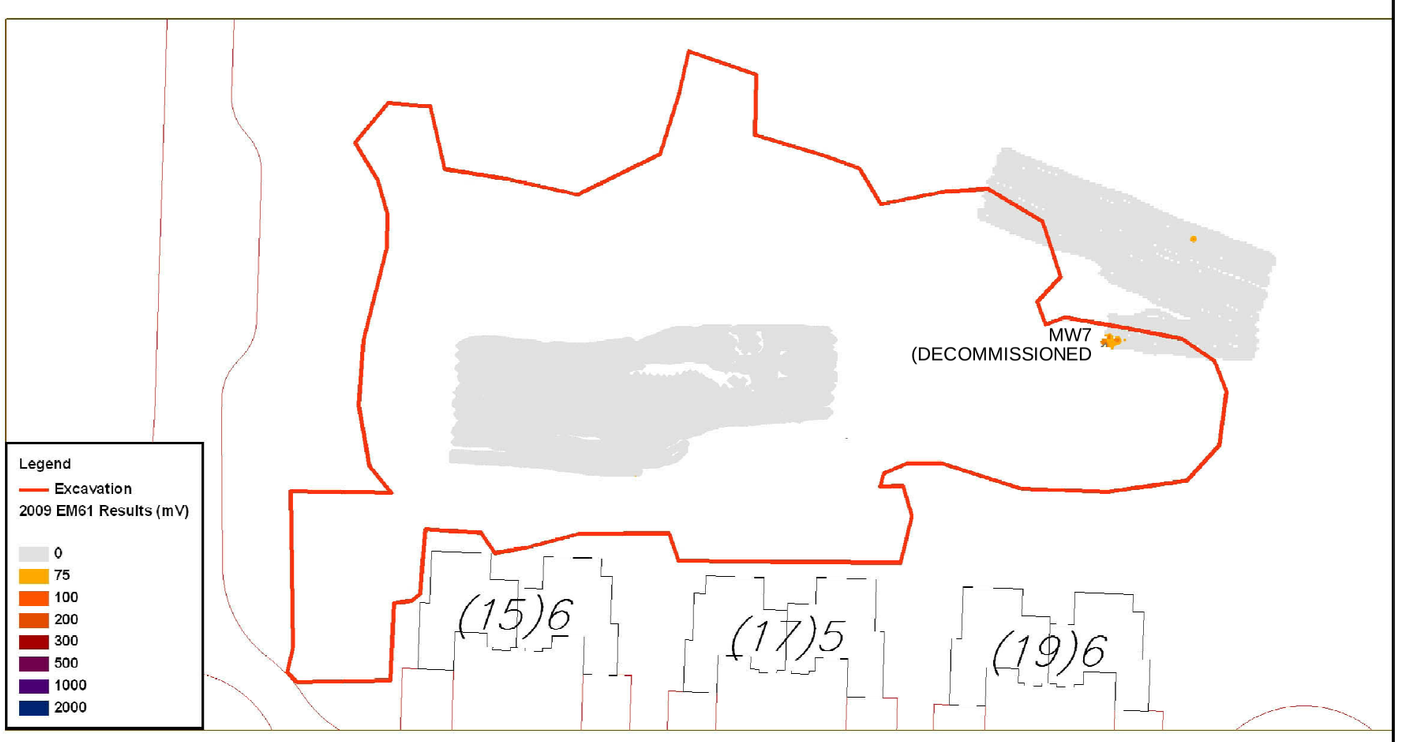
G:\Autocad\ERS-UR\05F50701\2009 RI Rpt\Fig 6-3 Bldg 15_17 Geophysical.dwg Sep 30,2010 -tiedemam

NORTH

50 25 0 50 Feet

FEBRUARY 2009 EM61 GEOPHYSICAL
SURVEY PERFORMED BY JACOBS



50 25 0 50 Feet

JUNE 2009 EM61 GEOPHYSICAL
SURVEY PERFORMED BY JACOBS

6-9

JACOBS

BUILDINGS 15/17
2009 BEFORE AND AFTER GEOPHYSICAL SURVEYS
FT WAINWRIGHT, FAIRBANKS, ALASKA

DATE: 30 September 2010

PROJECT MANAGER: T. Heikkila

FIGURE NO.: 6-3

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Table 6-1
Building 15/17 Investigation Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
09-FW-A-EXBLD15-01-1	1	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8151A, SW8321A, SW6010B, SW6020, SW7471A
09-FW-A-EXBLD15-02-1	1	
09-FW-A-EXBLD15-03-1	1	
09-FW-A-EXBLD15-04-1	1	
09-FW-A-EXBLD15-05-2	2	
09-FW-A-EXBLD15-06-3	3	
09-FW-A-EXBLD15-07-4	4	
09-FW-A-EXBLD15-08-4	4	
09-FW-A-EXBLD15-09-7	7	
09-FW-A-EXBLD15-10-1	1	
09-FW-A-EXBLD15-11-1	1	
09-FW-A-EXBLD15-12-1	1	
09-FW-A-EXBLD15-13-2	2	
09-FW-A-EXBLD15-14-1	1	
09-FW-A-EXBLD15-15-1	1	
09-FW-A-EXBLD15-16-4	4	
09-FW-A-EXBLD15-17-4	4	
09-FW-A-EXBLD15-18-5	5	
09-FW-A-EXBLD15-19-1	1	
09-FW-A-EXBLD15-20-1	1	
09-FW-A-EXBLD15-21-5	5	
09-FW-A-EXBLD15-22-4	4	
09-FW-A-EXBLD15-23-4	4	
09-FW-A-EXBLD15-24-2	2	
09-FW-A-EXBLD15-25-11	11	
09-FW-A-EXBLD15-26-11	11	
09-FW-A-EXBLD15-27-11	11	
09-FW-A-EXBLD15-28-10	10	
09-FW-A-EXBLD15-29-9	9	
09-FW-A-EXBLD15-30-10	10	
09-FW-A-EXBLD15-31-11	11	
09-FW-A-EXBLD15-32-11	11	
09-FW-A-EXBLD15-33-11	11	
09-FW-A-EXBLD15-34-11	11	
09-FW-A-EXBLD15-35-10	10	
09-FW-A-EXBLD15-36-10	10	
09-FW-A-EXBLD15-37-10	10	
09-FW-A-EXBLD15-38-11	11	
09-FW-A-EXBLD15-39-11	11	

Note: For definitions, see the Acronyms and Abbreviations section.

6.2 BUILDING 11 INVESTIGATION

Although investigation activities were conducted in August 2008 on the north side of Building 11, the 2009 geophysical survey identified additional areas of concern in this area. Investigation resumed 1 June 2009 at Building 11.

In accordance with the *Explosives Safety Plan* (Appendix F) and *MEC Support Work Plan* (USAED 2008a), an HFD of 534 feet was applied to all investigation work in Area A. Based on proximity to the gas station and Neely Road, investigation work at the Building 11 investigation occurred during night hours to reduce disruption to Fort Wainwright.

The footprint of the Building 11 investigation was approximately 10,575 square feet. The total investigation depth ranged between 2 and 6 feet bgs. Materials removed during the investigation included the following:

- Six crushed and empty drums
- Two drums with tar residue

Section 7.0 presents further details regarding waste streams and disposal locations. No munitions-related items were discovered as a result of investigation activities in 2009. Figure 6-4 presents the 2009 investigation limits. Figure 6-5 displays the 2009 geophysical data before and after Investigation activities at Building 11.

Building 11 Backfilling Activities 2009

Building 11 – Investigation 2009

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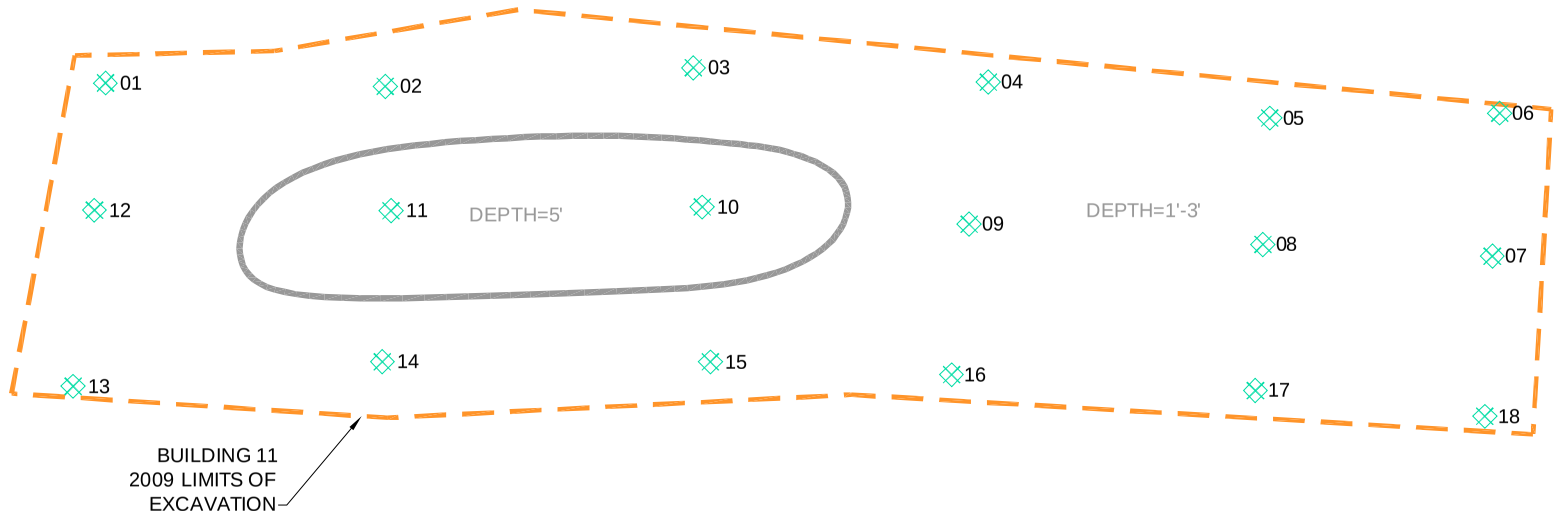
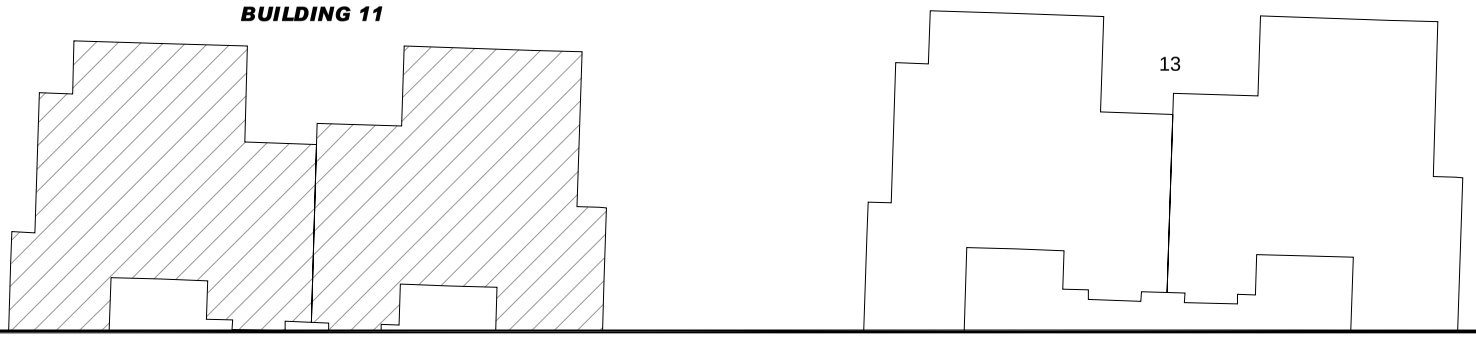


DRAINAGE CHANNEL

NOTES
1. THE PREFIX 09FW-A-EXBLDG 11- FOR THE SAMPLE IDs HAS BEEN OMITTED FOR CLARITY.
2. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

LEGEND
2009 SAMPLE LOCATION

0 15 30 60
SCALE IN FEET



BUILDING 11 2009 LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS

DATE: 13 January 2011

PROJECT MANAGER: T. Heikkila

FIGURE NO.: 6-4

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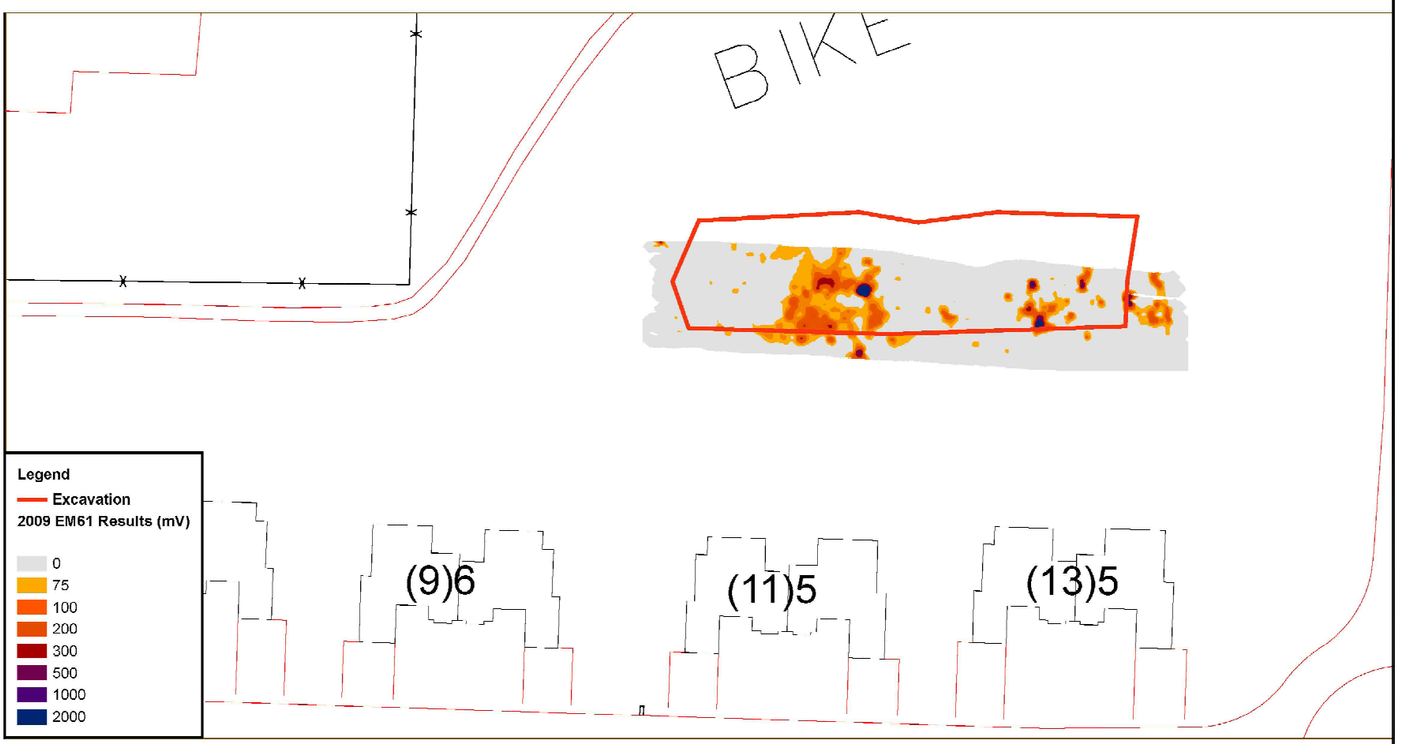
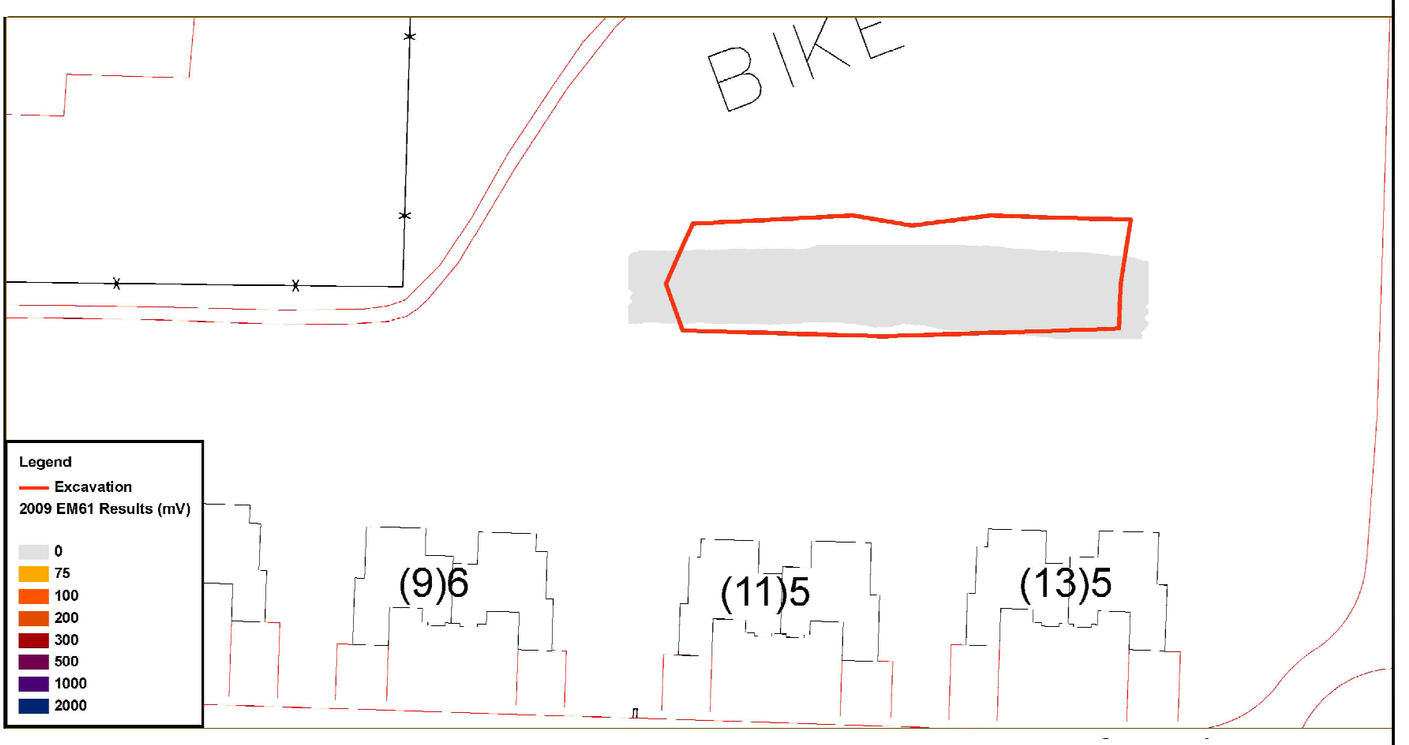
NORTH



FEBRUARY 2009 EM61 GEOPHYSICAL SURVEY PERFORMED BY JACOBS



JUNE 2009 EM61 GEOPHYSICAL SURVEY PERFORMED BY JACOBS

BUILDING 11
2009 BEFORE AND AFTER GEOPHYSICAL SURVEYS
FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS | DATE: 30 September 2010 | PROJECT MANAGER: T. Heikkila | FIGURE NO.: 6-5

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Characterization sampling was performed on 9 June 2009 upon completion of investigation activities. The investigation floor and wall samples were collected at a frequency of one sample per 50-foot by 50-foot grid node. A total of 18 soil characterization samples were collected from the main Building 11 investigation. Table 6-2 presents the sample IDs and collection depths. Appendix B presents the analytical data. The investigation area was backfilled completely with offsite borrow material following sample collection activities in 2009.

Table 6-2
Building 11 Investigation Characterization Sample IDs and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
09-FW-A-EXBLD11-01-1	1	AK101, AK102, AK103, SW8260B, SW6010B/SW6020/SW7471A/SW8270CSIM/SW8081B, SW8321A, Low Level VOCs/TICs
09-FW-A-EXBLD11-02-3	3	
09-FW-A-EXBLD11-03-3	3	
09-FW-A-EXBLD11-04-1	1	
09-FW-A-EXBLD11-05-1	1	
09-FW-A-EXBLD11-06-1	1	
09-FW-A-EXBLD11-07-1	1	
09-FW-A-EXBLD11-08-1	1	
09-FW-A-EXBLD11-09-1	1	
09-FW-A-EXBLD11-10-5	5	
09-FW-A-EXBLD11-11-5	5	
09-FW-A-EXBLD11-12-1	1	
09-FW-A-EXBLD11-13-1	1	
09-FW-A-EXBLD11-14-3	3	
09-FW-A-EXBLD11-15-3	3	
09-FW-A-EXBLD11-16-1	1	
09-FW-A-EXBLD11-17-1	1	
09-FW-A-EXBLD11-18-1	1	

Note: For definitions, see the Acronyms and Abbreviations section.

6.3 BUILDING 49 INVESTIGATION

The 2007 investigation indicated that drums and debris remained beneath the foundation at Building 49. Therefore, on 20 October 2009, investigation activities continued underneath the southwest corner of Building 49 to remove this debris. In preparation of this excavation effort, an engineering design was developed for building support, excavation, and backfill efforts. The design was prepared by a licensed structural engineer and based on 2007 field observations, 2004 magnetometer data, as-built drawings, and site soil conditions. In order to prepare the site for excavation, the western garage was supported on seven permanently placed helical pier supports to a depth of approximately 16 feet bgs that were connected to the western garage foundation and three temporary support I-beams that were placed inside the garage during excavation activities. In addition, a ramp was constructed just south of the building and constructed in an east-west direction due to the proximity of the building foundation to a water line on the south side. The previously placed backfill (in 2007) was removed to a maximum depth of 13 feet bgs (11 feet below the footing). This backfill was removed and stockpiled in a clean stockpile on the east side of the building and covered with heat blankets to prevent freezing.

Investigation of the Building 49 site continued vertically and horizontally until field screening and visual and olfactory observations indicated that either a natural soil horizon or an uncontaminated area free of drums had been reached. Geophysical scanning was not conducted due to the interference of the rebar in the building foundation.

The footprint of the 2009 Building 49 investigation was approximately 2,500 square feet. Drums were encountered from 5 feet to 9 feet below the footing (bottom of footing was 2 feet bgs) and 2 feet south of the building to a maximum of 15 feet inward from the end of the west garage. Materials removed from beneath Building 49 included:

- A total of 42 crushed and empty drums
- Three drums containing water with a POL sheen
- Three cubic yards of grease-impacted soil placed in Super Sacks

Further details regarding waste streams and disposal locations are summarized in Section 7.0.

Four excavation characterization samples were collected from the floor and walls based on a 50-foot by 50-foot sampling grid. Due to safety concerns at the site, field screening and characterization samples were collected directly from the excavator bucket.

Table 6-3 lists the 2009 sample IDs and collection depths. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Figure 6-6 presents sample locations and excavation boundaries.

Table 6-3
Building 49 Excavation Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
09-FW-EXBLD49-02-11	11	AK101, AK102, AK103, SW8260B, SW8270C/SW8270CSIM, SW8081A, SW8082, SW8151A, SW8321A, SW6010B, SW6020, SW7471A
09-FW-EXBLD49-03-11	11	
09-FW-EXBLD49-04-07	7	

Note: For definitions, see the Acronyms and Abbreviations section.

On 13 November 2009, investigation activities were concluded at Building 49. Due to below freezing temperatures, the western corner of the building and all backfill soil remained under heated cover. At the recommendation of the structural engineer, cement grout (50 pounds per cubic foot) was used as backfill underneath the structure to provide structural support for the building. This was placed directly underneath the building to approximately 5 feet south of the building. The grout was placed in two "pours". The initial pour was placed from outside of the building and extended up to within 1 foot of the footing. Once this initial pour cured for at least 24 hours, the second pour occurred. During the second pour, grout was pumped through several holes that had been drilled through the foundation. Once the last pour of grout cured for 24 hours, self-compacting sand was placed from the bottom of the excavation to the grout edge. The remaining excavation was backfilled with the removed soil and structural fill. I-beams were removed and holes in the foundation were repaired. The backfill area remained heated for seven days to allow the grout to continue to cure and meet at least 75% of maximum strength.

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Building 49 – Excavation 2009

Building 49 – Concrete Backfill 2009

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Building 49 – Backfilling of Excavation 2009

Building 49 – Backfill Complete 2009

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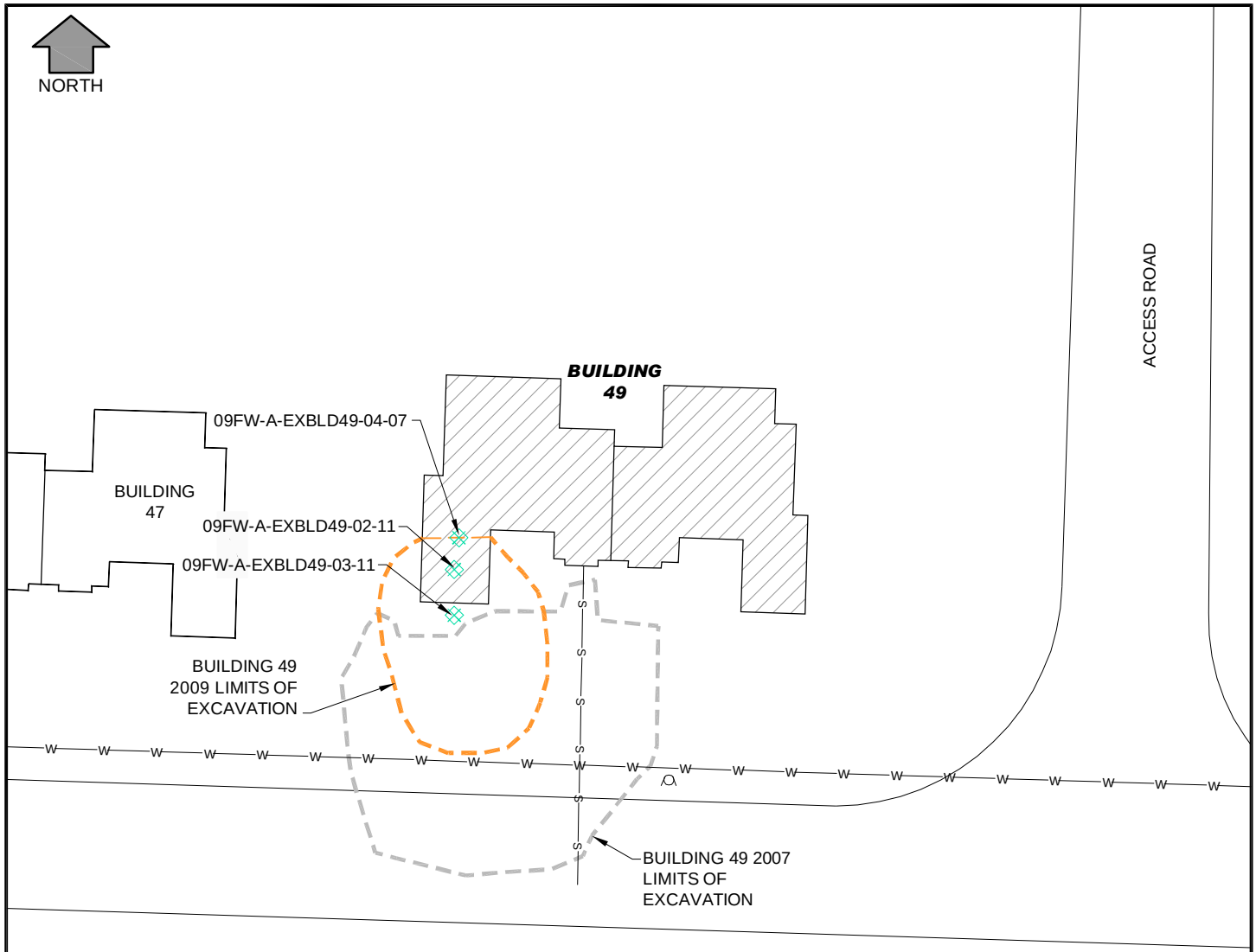

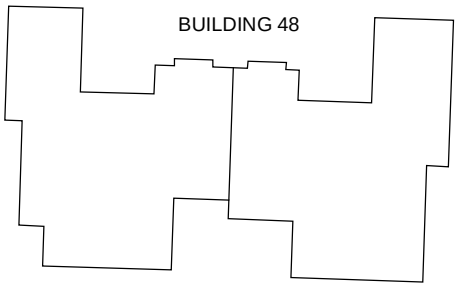

LEGEND

- 2009 SAMPLE LOCATION
- SANITARY SEWER LINE
- WATER LINE
- EXISTING FIRE HYDRANT

NOTE

1. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

0 20 40 80

SCALE IN FEET

BUILDING 49 2009 LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 6-6

G:\Autocad\IERS-UR\05F5070112009 RI Rpt\Fig 6-6 Bldg 49-2009.dwg Sep 30,2010 -tiedemann

6.4 BUILDING 35 INVESTIGATION

Building 35 was identified for further investigation during the February 2009 geophysical survey. On 5 and 6 June 2009, investigation activities were conducted immediately north of Building 35 to confirm that all metal debris had been removed from remaining hot-spot anomalies. Anomalies detected in the most recent EM61 survey were likely due to small metal debris mixed in with backfill. The 2009 investigation footprint was approximately 432 square feet. The following bullets summarize findings within each Building 35 test pit in 2009:

- TP01 measured approximately 12 feet by 12 feet and was excavated to a depth of approximately 8 feet bgs. Some frozen soil and a small amount of dried paint chips were found in this test pit. The paint chips were amalgamated with similar waste in an overpack.
- TP02 measured approximately 12 feet by 12 feet and was excavated to a depth of approximately 8 feet bgs. Approximately one 5-gallon bucket of metal debris was removed from the excavated soil. Frozen soil was also encountered.
- TP03 measured approximately 12 feet by 12 feet and was excavated to a depth of approximately 8 feet bgs. In TP-03, approximately one 5-gallon bucket of barbed wire was removed from the excavated soil. Frozen soil was also encountered.

On 6 June 2009, investigation activities were concluded at Building 35. Aside from the paint chips that were removed, field screening showed no indication of contamination. Table 6-4 presents the results of field screening samples collected during the investigation of the three test pits. Clean excavated material was transported to the Fort Wainwright Landfill for disposal. Test pits were backfilled with clean, offsite borrow material. Section 7.0 presents further details regarding waste streams and disposal locations.

Building 35 – Test Pit 3 Total Debris Removed 2009

Building 35 – Test Pits 2009

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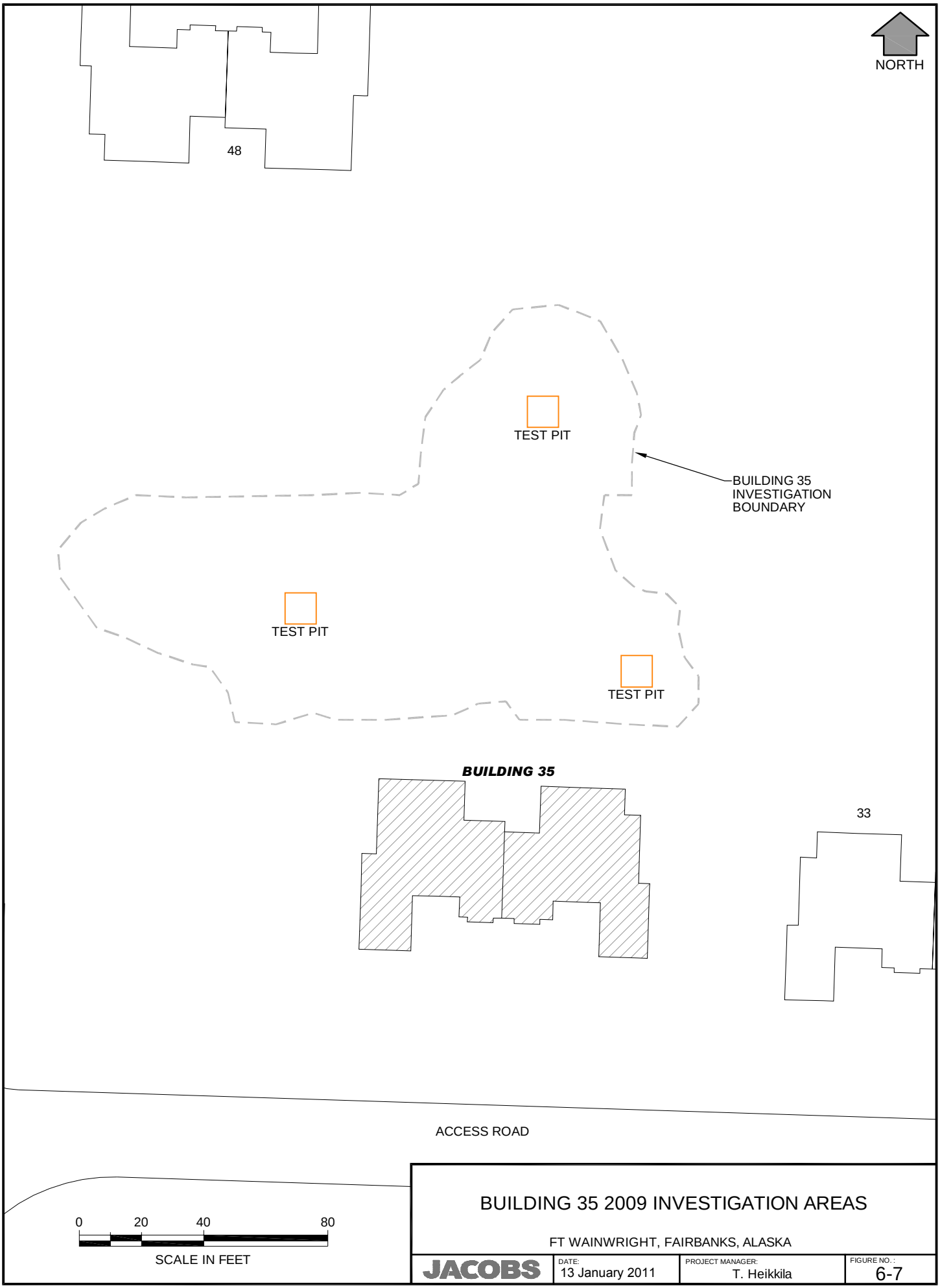

BUILDING 35 2009 INVESTIGATION AREAS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 6-7

G:\Autocad\IERS-UR\05F5070112009 RI Rpt\Fig 6-7 Bldg 35-2009.dwg Sep 30,2010 -tiedemann

Table 6-4
Building 35 Investigation Screening Results

Screening ID	Screening Depth (feet bgs)	PID Reading (ppm)
TP01-01	1	0.3
TP01-02	2	0.6
TP01-03	3	0.4
TP01-04	4	0.8
TP01-05	4	0.6
TP01-06	5	0.0
TP01-07	5	0.4
TP01-08	8	0.5
TP01-09	8	1.0
TP01-10	8	1.1
TP02-01	2-3	0.2
TP02-02	2-3	0.4
TP02-03	2-3	0.3
TP02-04	5-6	4.3
TP02-05	5-6	3.9
TP02-06	5-6	3.0
TP02-07	6-8	3.8
TP02-08	6-8	4.1
TP02-09	6-8	3.0
TP03-01	2-4	0.1
TP03-02	1-2	0.3
TP03-03	2-4	0.4
TP03-04	5-6	0.0
TP03-05	5-6	0.0
TP03-06	5-6	0.0
TP03-07	6-7	0.2
TP03-08	6-7	0.2
TP03-09	6-7	0.0
TP03-10	8+	0.6

Note: For definitions, see the Acronyms and Abbreviations section.

6.5 BUILDING 9 EXCAVATION ACTIVITIES

On 7 July 2009, field personnel reported fuel odors during grading activities north of Buildings 9 and 11. This area coincided with the location of a pipe removed in 2008. Field screening samples were collected from the area that yielded PID readings at 80.8 ppm. The field team began to excavate several small test pits to delineate the extent of contamination. A total of eleven test pits approximately 2 feet by 3 feet by 3 feet were excavated at distances ranging between 10 and 40 feet from the source of contamination to determine lateral extent and direction of contamination. It was determined that contamination had migrated approximately 40 feet toward the northwest from the source.

After the lateral extent of contamination had been roughly determined, excavation activities began on 4 August 2009. The excavation was guided by PID. Soil with field screening results exceeding 20 ppm was excavated and transported directly to waste stockpiles for future disposal. Materials encountered in the excavation included a variety of abandoned pipes including a 2-inch and 4-inch horizontal steel sewer pipe, and a 4-inch horizontal water pipe. A 4-inch vertical steel pipe was encountered on 13 August 2009. The soil around the pipe was excavated to 12 feet bgs; however, the pipe could not be removed. Therefore, the pipe was broken off at 12 feet bgs and the remainder was buried per Army direction.

On 13 August 2009, the final excavation footprint covered an area of approximately 109 feet by 45 feet, or 4,905 square feet (Figure 6-8). The eastern half of the excavation's final depth was 6 feet bgs when PID readings were below 20 ppm and the western half was 15 feet bgs where groundwater was encountered. Approximately 920 cubic yards of soil were removed from the excavation and stockpiled for eventual thermal treatment at Organic Incineration Technologies in North Pole, Alaska. Section 7.0 presents further details regarding waste streams and disposal location.

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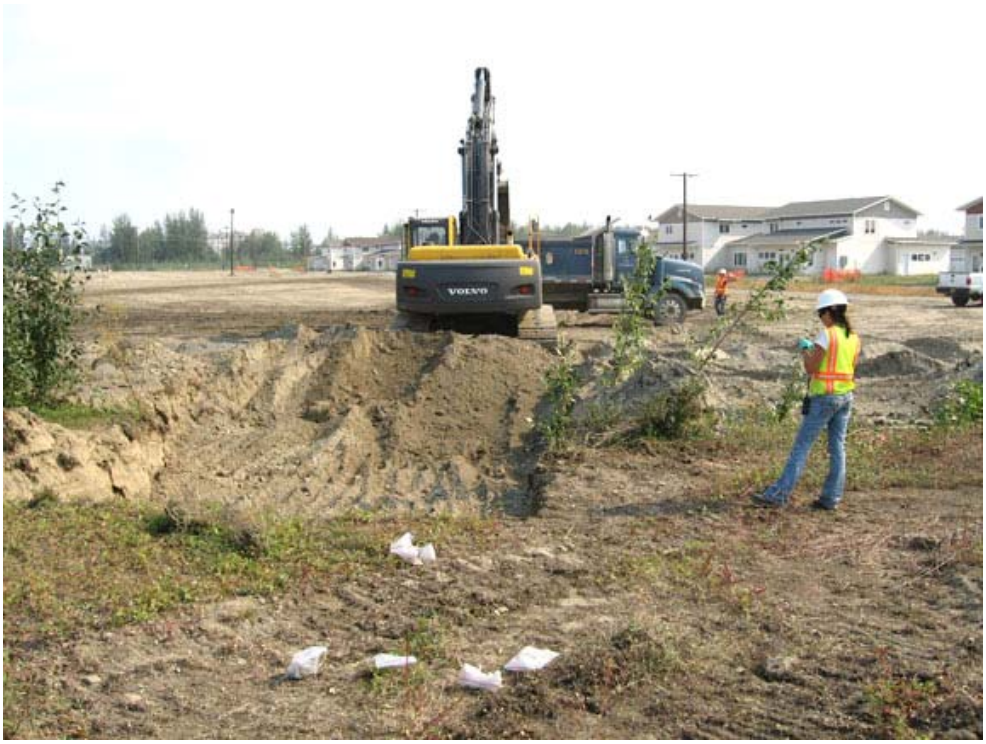

Building 9 – Initial Excavation 2009

Building 9 – Backfilling Excavation 2009

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Building 9 – Final Excavation Boundaries 2009

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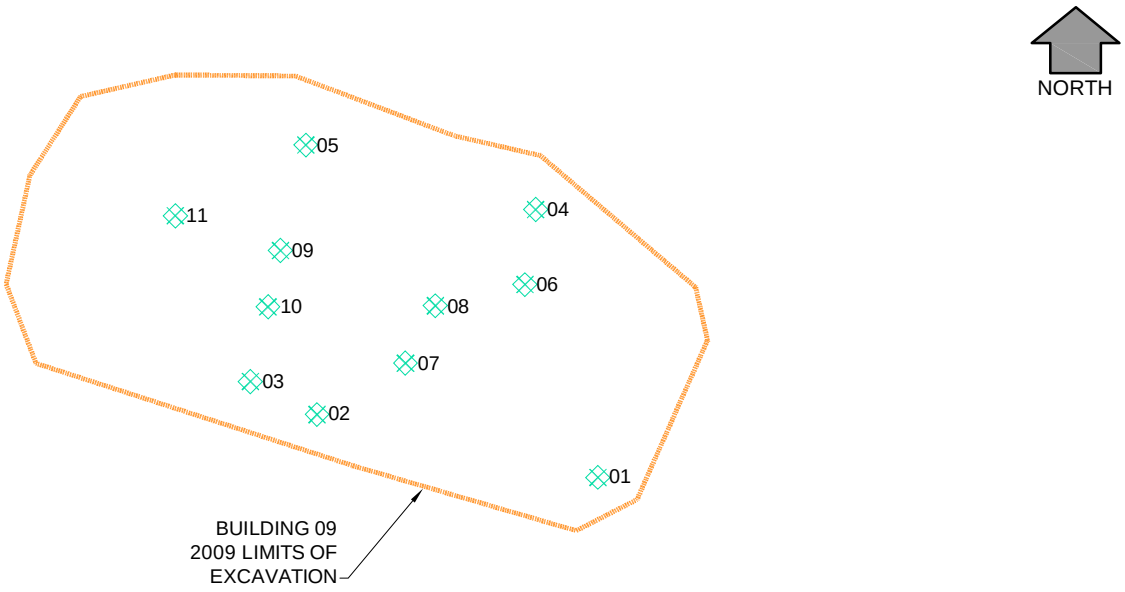

NOTES

1. THE PREFIX 09FW-A-EXBLDG 09- FOR THE SAMPLE IDs HAS BEEN OMITTED FOR CLARITY.
2. THE LOCATION FOR SAMPLE 11 IS APPROXIMATE.
3. SEE TEXT FOR ACRONYMS AND ABBREVIATIONS.

LEGEND

2009 SAMPLE LOCATION

0 15 30 60

SCALE IN FEET

DRAINAGE CHANNEL

BUILDING 9

BUILDING 11

BUILDING 9 LIMITS OF INVESTIGATION AND SAMPLE LOCATIONS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 January 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 6-8

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Confirmation soil samples were collected on 14 August 2009 at the ten highest PID readings within the excavation (five wall samples and five floor samples). One final confirmation sample was collected on 31 August 2009 on the western wall. Table 6-5 presents the sample IDs and collection depths. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010).

The excavation was backfilled with clean, offsite borrow material soil between 2 and 4 September 2009.

Table 6-5
Building 9 Excavation Confirmation Sample Ids, Depths, and Analysis

Sample ID	Sample Depth (feet bgs)	Analysis
09-FCSRI-SO-B9CS-01_3	3	AK101/102/103, SW8270C/8260B
09-FCSRI-SO-B9CS-02_3	3	
09-FCSRI-SO-B9CS-03_3	3	
09-FCSRI-SO-B9CS-04_3	3	
09-FCSRI-SO-B9CS-05_3	3	
09-FCSRI-SO-B9CS-06_6	6	
09-FCSRI-SO-B9CS-06B_6	6	
09-FCSRI-SO-B9CS-07_6	6	
09-FCSRI-SO-B9CS-08_6	6	
09-FCSRI-SO-B9CS-09_15	15	
09-FCSRI-SO-B9CS-10_15	15	
09-FCSRI-SO-B9CS-11_5	5	

Note: For definitions, see the Acronyms and Abbreviations section.

6.6 GROUNDWATER MONITORING

Two groundwater monitoring events were performed during the 2009 field season in support of CH2M Hill's RI (USAED 2010). Monitoring events were performed in the spring between 26 May and 5 June 2009, and in the fall between 19 and 23 September 2009. Thirty-three groundwater monitoring wells were sampled during each event (Figure 6-9). The groundwater monitoring wells were sampled in accordance with ADEC's *Monitoring Well Guidance* (ADEC 2008), Section 3.0 of the *Work Plan for Fall 2008 Remedial Investigation Activities* (CH2M Hill 2008), and *Addendum 4 to the Remedial Investigation Work Plan Groundwater Investigation* (CH2M Hill 2007). Table 6-6 summarizes the number of samples collected and the analytical suites. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010).

Table 6-6
Summary of Groundwater Samples

Subarea	Number of Samples	Analyses
A	17	SW8081B, SW6020/6010/7471A SW8270C/SW8270CSIM, AK102/AK103, AK101, SW8260B, SW8260B SIMa, SW8321, SW8151A
B	11	SW8081B, SW6020/6010/7471A SW8270C/SW8270CSIM, AK102/AK103, AK101, SW8260B, SW8260B SIMa, SW8321, SW8151A, NW EPH, NW VPH
C	1	SW8081B, SW6020/6010/7471A SW8270C/SW8270CSIM, AK102/AK103, AK101, SW8260B, SW8260B SIMa, SW8321, SW8151A, NW EPH, NW VPH
D	1	SW8081B, SW6020/6010/7471A SW8270C/SW8270CSIM, AK102/AK103, AK101, SW8260B, SW8260B SIMa, SW8151A
E	3	SW8081B, SW6020/6010/7471A SW8270C/SW8270CSIM, AK102/AK103, AK101, SW8260B, SW8260B SIMa, SW8151A, SW8082

Notes: During both the spring and fall monitoring events, 33 samples were collected.
For definitions, see the Acronyms and Abbreviations section.

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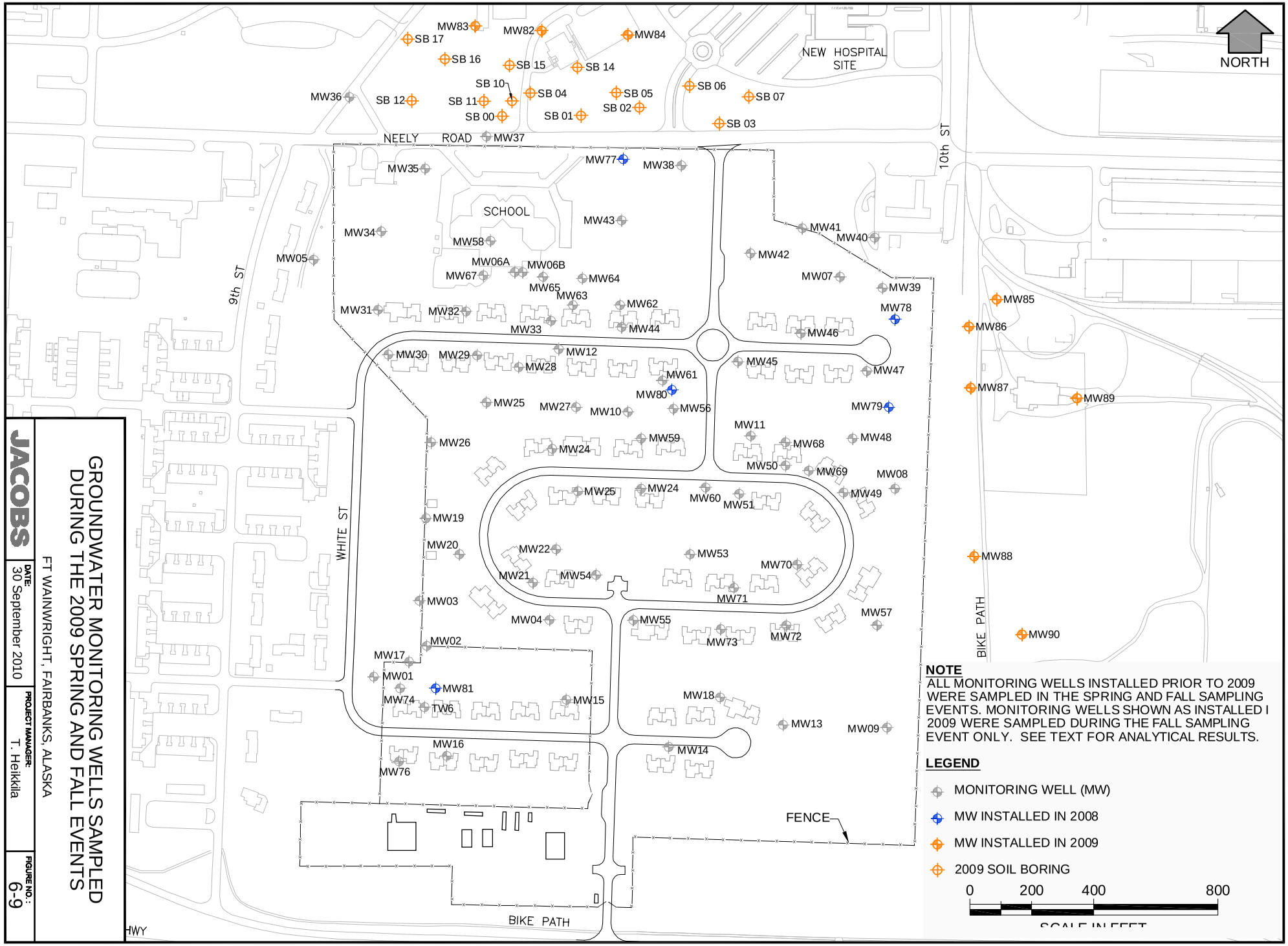


GROUNDWATER MONITORING WELLS SAMPLED DURING THE 2009 SPRING AND FALL EVENTS

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS

DATE: 30 September 2010

PROJECT MANAGER: T. Heikkila

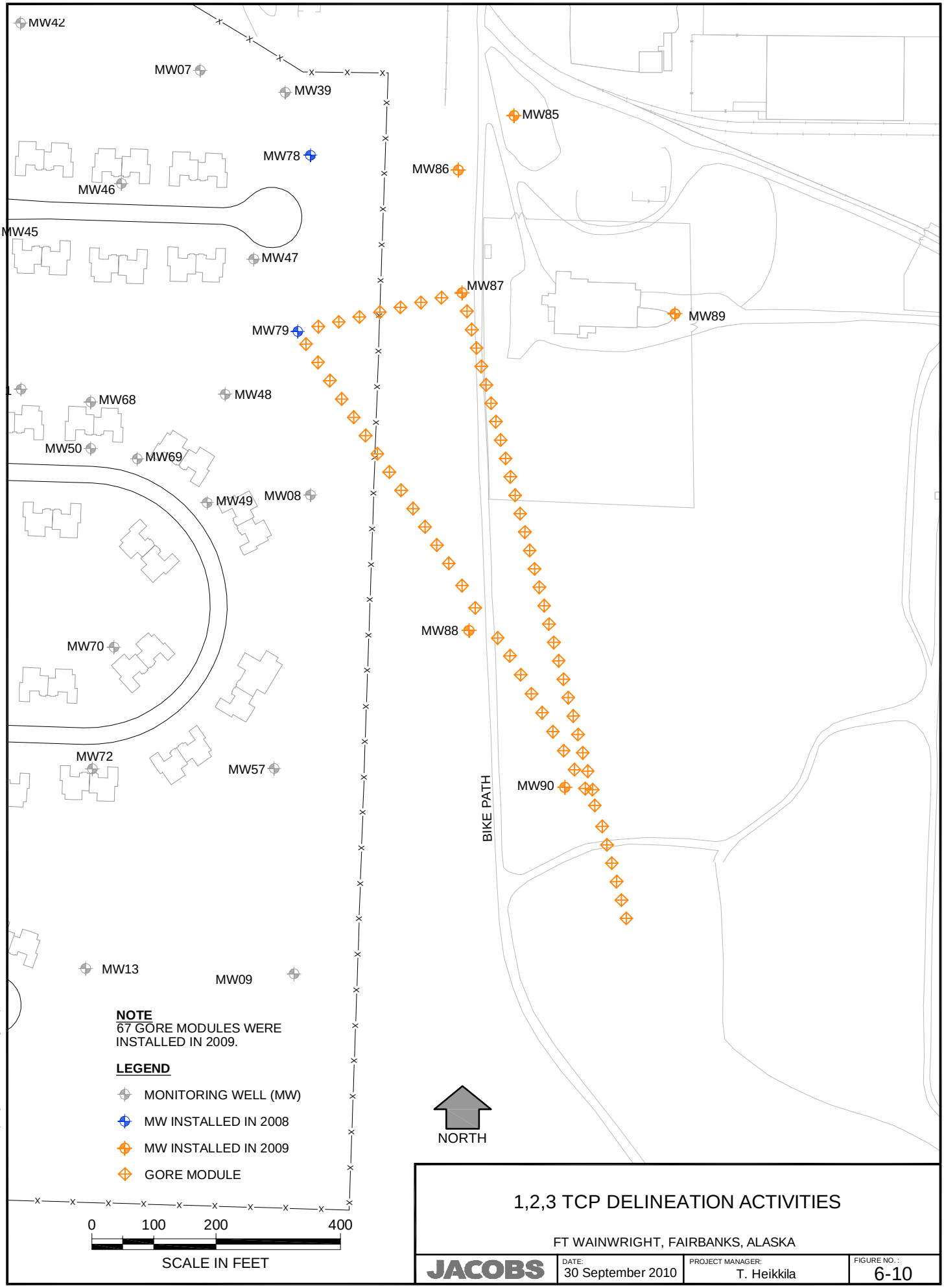
FIGURE NO.: 6-9

6.7 1,2,3-TRICHLOROPROPANE (TCP) DELINEATION

Concentrations of 1,2,3 TCP presented in the PRSE (USAED 2008d) and in the PSE II (USAED 2008h) indicated exceedances of the project screening level (0.0096 ug/L) in the groundwater at monitoring wells MW08, MW39, MW47, MW48 and MW79. These wells are near to or within the drinking water supply capture zone located east of the site. Figure 6-10 shows the locations of these wells. Following discussions with the project team during the 29-30 September Investigation comment resolution meeting, it was determined that further investigation of the 1,2,3 TCP within the capture zone would provide additional information to support the RI being prepared by CH2M Hill (USAED 2010). The *Taku Gardens: Investigation of the 1,2,3 TCP Plume* technical memorandum was prepared to support this effort (USAED 2009a).

On 20 October 2009, Jacobs installed 67 GORE™ modules (passive soil-gas sampling devices) along and between the transects (Figure 6-10). In accordance with the manufacturer's instructions, the devices were spaced 50 feet apart and left in the ground for a seven day exposure period. They were recovered on 28 October 2009. Gore sampling showed all monitoring wells in question had non-detectable levels of 1,2,3 TCP. The results are presented in Appendix H, and are further discussed in the *CH2M Hill RI Report* (USAED 2010).

On 30 October 2009, Jacobs began monitoring well installation activities. Six soil boring samples were collected. Appendix B presents the analytical results. Table 6-7 shows sample IDs, analyses, and collection depths. Upon completion of installation, all six monitoring wells were developed and sampled in accordance with ADEC guidance (reference). Table 6-8 shows sample IDs and analytical suite for the groundwater samples. Appendix E contains the soil boring and well installation logs. Although the field log book identified the six wells as E01 through E06, the wells were renamed as MW85 through MW90 where E01 = MW85, E02 = MW86 etc. to coincide with the Taku Gardens well-naming scheme.



1,2,3 TCP DELINEATION ACTIVITIES

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 6-10

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Table 6-7
Soil Boring Sample Identification and Depth

Sample ID	Approx. Sample Depth (feet bgs)	Analyses
09-FCS-MW85-9	9	SW8270C SIM, AK101/SW8260B, Low Level VOCs
09-FCS-MW85-14	14	
09-FCS-MW85-14B	14	
09-FCS-MW86-9	9-10	
09-FCS-MW86-14	14	
09-FCS-MW87-9	9-10	
09-FCS-MW87-14	13-14	
09-FCS-MW88-9	9	
09-FCS-MW88-14	14	
09-FCS-MW89-10	10	
09-FCS-MW89-20	20	
09-FCS-MW90-5	5	
09-FCS-MW90-14	14	

Note: For definitions, see the Acronyms and Abbreviations section.

Table 6-8
Monitoring Well Sample Summary

Sample ID	Analyses
09 FWA MW 80 WW	SW8270C/SW8270D SIM AK101/SW8260B, Low Level VOCs
09 FWA MW 81 WW	
09 FWA MW 82 WW	
09 FWA MW 83 WW	
09 FWA MW 84 WW	
09 FWA MW 85 WW	

Note: For definitions, see the Acronyms and Abbreviations section.

6.8 DELINEATION OF NORTHERN GROUNDWATER PLUMES

The PRSE (USAED 2008d) and the PSE II (USAED 2008h) indicated exceedances of TCE, DRO, and PAH of more than ten times the project screening levels in groundwater plumes located north of the site. Groundwater monitoring indicated that the northern edge of these plumes was not defined. Following discussions with the project team it was decided that further investigation of these groundwater plumes would provide additional information to support the CH2M Hill RI. The *Taku Gardens: Delineation of the Northern Groundwater Plumes* technical memorandum was prepared to support the work (USAED 2009c).

On 2 August 2009, Jacobs began installing thirteen soil borings north of the site as presented in Figure 6-11. Groundwater grab samples were recovered immediately following drilling using the SP-16 direct push sampling method. Following analysis of the results from the first thirteen soil borings, on 29 August 2009, an additional four soil borings were advanced and soil boring and groundwater grab samples were collected (SB15, 16 and 17) to further delineate the plume. Table 6-9 presents sample IDs, analyses, and collection depths for soil samples and Table 6-10 presents groundwater grab samples and analyses. This data was used to define the plume boundary. Appendix B presents a discussion of the analytical results and ADEC checklists are provided in the *CH2M Hill RI Report* (USAED 2010).

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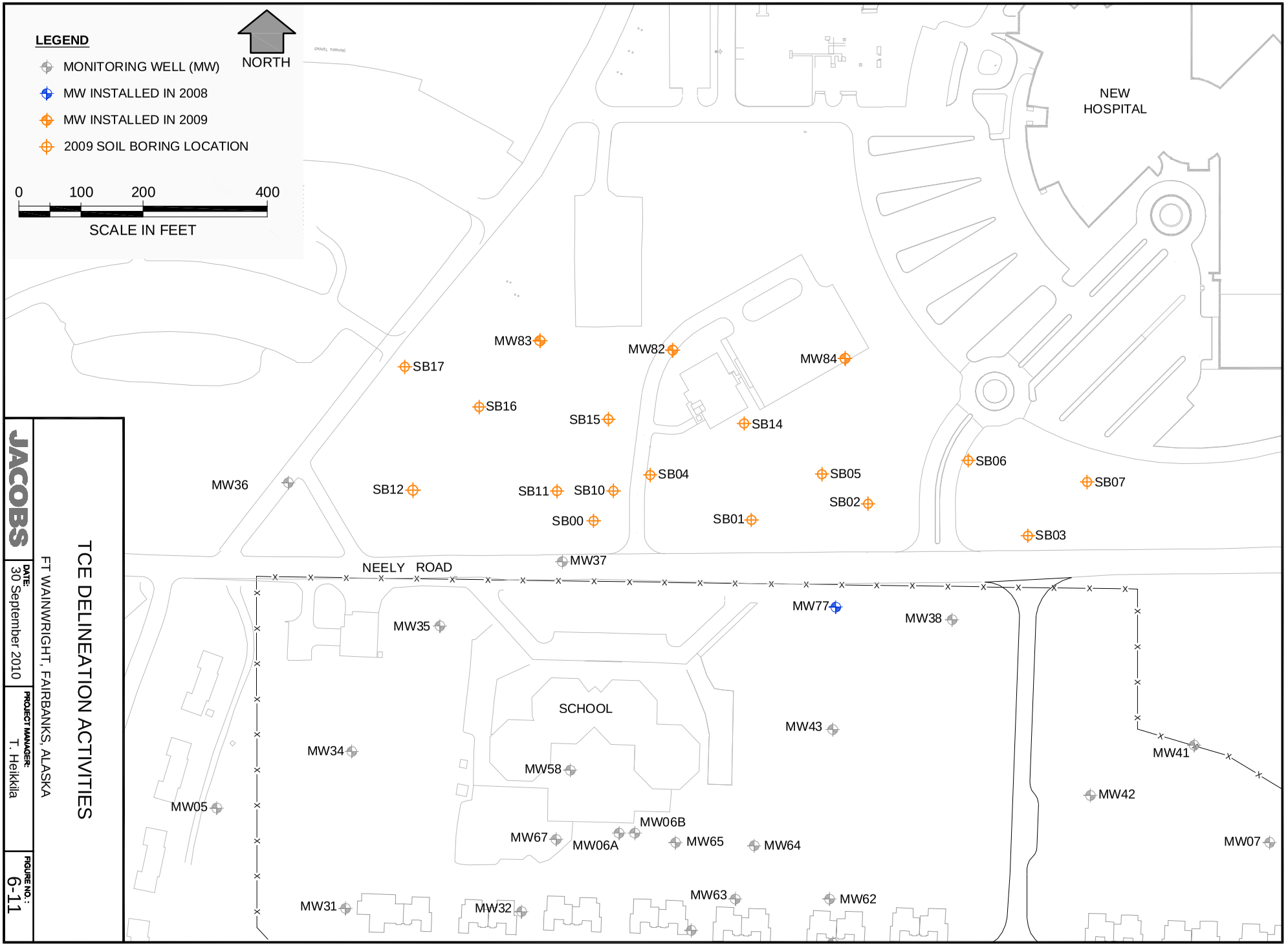


JACOBS

TCE DELINEATION ACTIVITIES

FT WAINWRIGHT, FAIRBANKS, ALASKA

DATE: 30 September 2010

PROJECT MANAGER: T. Heikkila

FIGURE NO.: 6-11

6-47

Table 6-9
Soil Boring Sample Identification and Depth

Sample ID	Approx. Sample Depth (feet bgs)	Analyses
09-FCSRI-SO-SB01-4-6	4-6	AK102, SW8260B, Low Level VOCs
09-FCSRI-SO-SB01-12-14	12-14	
09-FCSRI-SO-SB02-2-4	2-4	
09-FCSRI-SO-SB02-10-12	10-12	
09-FCSRI-SO-SB03-6-8	6-8	
09-FCSRI-SO-SB03-10-12	10-12	
09-FCSRI-SO-SB04-2-4	2-4	
09-FCSRI-SO-SB04-8-10	8-10	
09-FCSRI-SO-SB05-8-10	8-10	
09-FCSRI-SO-SB05-10-12	10-12	
09-FCSRI-SO-SB06-9-11	9-11	
09-FCSRI-SO-SB06-4-6	4-6	
09-FCSRI-SO-SB07-8-10	8-10	
09-FCSRI-SO-SB07-14-16	14-16	
09-FCSRI-SO-SB08-6-8	6-8	
09-FCSRI-SO-SB08-8-10	8-10	
09-FCSRI-SO-SB09-6-8	6-8	
09-FCSRI-SO-SB09-9-11	9-11	
09-FCSRI-SO-SB10-2-4	2-4	
09-FCSRI-SO-SB10-8-10	8-10	
09-FCSRI-SO-SB11-6-8	6-8	
09-FCSRI-SO-SB11-8-10	8-10	
09-FCSRI-SO-SB12-6-8	6-8	
09-FCSRI-SO-SB12-10-12	10-12	
09-FCSRI-SO-SB13-4-6	4-6	
09-FCSRI-SO-SB13-9-11	9-11	

Note: For definitions, see the Acronyms and Abbreviations section.

Table 6-10
Water Grab Sample Summary

Sample ID	Analyses
09-FCSRI-WG-SB01	AK102, SW8260B, Low Level VOCs
09-FCSRI-WG-SB02	
09-FCSRI-WG-SB03	
09-FCSRI-WG-SB04	
09-FCSRI-WG-SB05	
09-FCSRI-WG-SB06	
09-FCSRI-WG-SB07	
09-FCSRI-WG-SB08	
09-FCSRI-WG-SB09	
09-FCSRI-WG-SB10	
09-FCSRI-WG-SB11	
09-FCSRI-WG-SB12	
09-FCSRI-WG-SB13	
09-FCSRI-WG-SB07A	
09-FCSRI-WG-SB08A	
09-FCSRI-WG-SB15-17	
09-FCSRI-WG-SB14-18	
09-FCSRI-WG-SB16-18	
09-FCSRI-WG-SB16-18	
09-FCSRI-WG-SB16-18D	
09-FCSRI-WG-SB17-20	

Note: For definitions, see the Acronyms and Abbreviations section.

Results from the August 2009 soil borings were presented at the September Investigation comment resolution meeting conducted on 29 and 30 September 2009. During this meeting, it was decided that permanent groundwater monitoring wells would provide an opportunity to collect groundwater samples during future groundwater monitoring events and would help further delineate the plume. The *Taku Gardens: Delineation of the Northern Groundwater Plumes* technical memorandum was prepared to support this work (USAED 2009c).

Installation of the three wells was completed between 28 and 31 October 2009. Upon completion of installation, all three monitoring wells were developed and sampled in accordance with ADEC guidance (reference). Table 6-11 summarizes the groundwater sampling activities, sample IDs,

and analyses for groundwater sample. Appendix B presents sample results, and a discussion of sample results is available in the *CH2M Hill RI Report* (USAED 2010). Appendix E contains the soil boring and well installation logs Although the field log book identified the three wells as P18, P19 and P20, the wells were renamed as MW82 through MW84 where P18 = MW82, P19 = MW83 etc. to coincide with the Taku Gardens well-naming scheme.

Table 6-11
Groundwater Monitoring Summary

Sample ID	Analyses
09 FW T MW 82	AK102, SW8260B, Low Level VOCs
09 FW T MW83	
09 FW T MW 84	

Note: For definitions, see the Acronyms and Abbreviations section.

6.9 SOUND BERM SAMPLING

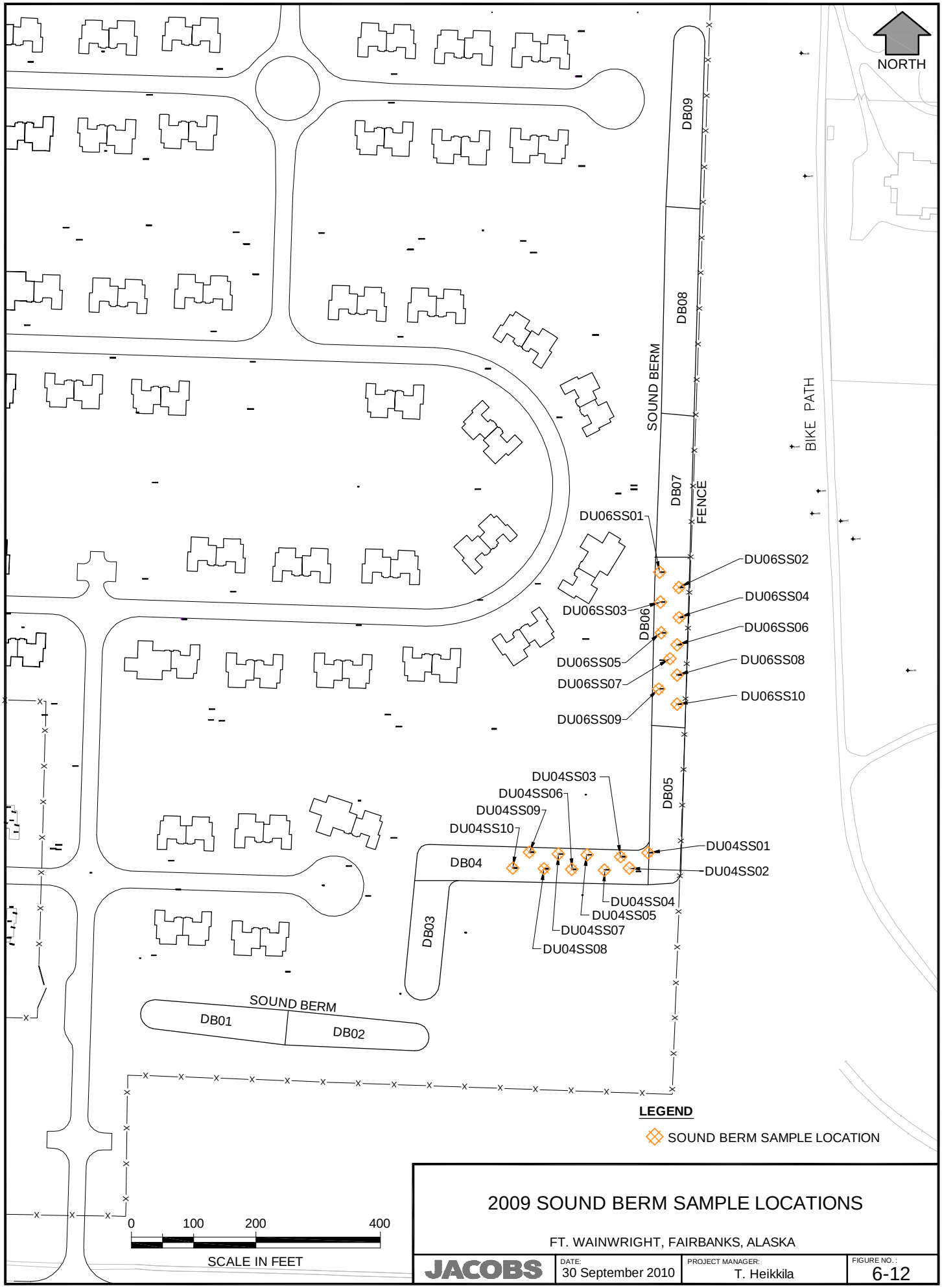
Decision Units 04 and 06 of the Sound Berm were re-sampled in 2009 in order to address the ADEC concerns that the two sections of the sound berm had not been adequately characterized. Twenty additional samples (ten from DB04 and ten from DB06) were collected from the sound berm at random locations within the sides of the berm.

On 15 June 2009, ten discrete surface soil samples were collected from each decision unit in accordance with the *Taku Gardens Sound Berm Additional Sampling Locations* (USAED 2009g) for benzo(a)pyrene analysis via method SW8270CSIM (Figure 6-12). Table 6-12 presents the 2009 soil characterization sample IDs and collection depths. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010).

Table 6-12
Sound Berm Soil Characterization Sample Identification and Depth

Sample ID	Sample Depth (feet bgs)	Analyses
09FWADB04SS0-01	1	SW8270C SIM
09FWADB04SS0-02	1	
09FWADB04SS0-03	1	
09FWADB04SS0-04	1	
09FWADB04SS0-05	1	
09FWADB04SS0-06	1	
09FWADB04SS0-07	1	
09FWADB04SS0-08	1	
09FWADB04SS0-09	1	
09FWADB04SS0-10	1	
09FWADB06SS-01	1	
09FWADB06SS-02	1	
09FWADB06SS-03	1	
09FWADB06SS-04	1	
09FWADB06SS-05	1	
09FWADB06SS-06	1	
09FWADB06SS-07	1	
09FWADB06SS-08	1	
09FWADB06SS-09	1	
09FWADB06SS-10	1	

Note: For definitions, see the Acronyms and Abbreviations section.



2009 SOUND BERM SAMPLE LOCATIONS

FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 6-12

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6.10 FOUNDATION DEMOLITION AND DISPOSAL IN AREA E

Previous work conducted in Area E included investigation and excavation of PCB-contaminated soils only around the foundations and not beneath them. During the 2009 field season, work was conducted to remove nine building foundations within Area E and to determine whether PCB-contaminated soil was present beneath any of the foundations. This would prepare the area for future construction and identify potential contamination within the footprint of each building. Demolition and removal of foundations and associated materials and sampling activities were performed in accordance with the *2009 Taku Gardens PCB Area Foundation Demolition Tech Memo* (USAED 2009d).

Demolition activities in Area E began on 6 June 2009. Excavators were used to break up and load concrete foundation materials into rock trucks for disposal at the Fort Wainwright Landfill. Approximately 1,526 cubic yards of concrete with rebar and 230 cubic yards of blueboard insulation were removed as a result of demolition activities.

Sampling activities in Area E began on 25 June 2009. Ten soil characterization samples were collected from beneath the locations of the former foundations to characterize the soil for potential PCB contamination. Soil samples were obtained by excavating test pits until native material was located beneath aggregate fill. The depth of the test pits, between 2 and 10 feet bgs, varied in depth depending on the thickness of the aggregate fill. A maximum depth of 10 feet to native material was encountered at the foundation of Building 55 in Test Pit 06. Table 6-13 presents a summary of the soil characterization samples collected from beneath the Area E foundations, and the locations of foundations removed from Area E in 2009 and their corresponding sample locations are provided below. All sample results were below site screening criteria. A full list of analytical data is presented in Appendix B and a discussion of the analytical results is presented in the *CH2M Hill RI Report* (USAED 2010). Figure 6-13 presents the locations of foundations removed from Area E in 2009 and their corresponding sample locations.

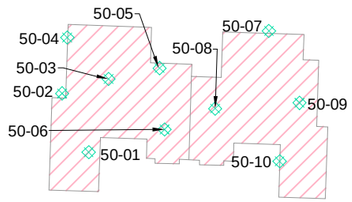
Table 6-13
Area E Sample Identification and Depth

Sample ID	Range in Sample Depth (feet bgs)	Analyses
09-FW-E-EXBLD54-01 through 10	3-5	SW8082 on all samples SW6020/7471A, SW8270CSIM, SW8081B, AK102/103, SW8270C, AK101, SW8260B on Sample 54-02 only
09-FW-E-EXBLD59-01 through 10	3-4	SW8082 on all samples SW6020/7471A, SW8270CSIM, SW8081B, AK102/103, SW8270C, AK101, SW8260B on Sample 59-02 only
09-FW-E-EXBLD56-01 through 10	3	SW8082 on all samples SW6020/7471A, SW8270CSIM, SW8081B, AK102/103, SW8270C, AK101, SW8260B on Sample 56-01 only
09-FW-E-EXBLD57-01 through 10	4-5	SW8082 on all samples SW6020/7471A, SW8270CSIM, SW8081B, AK102/103, SW8270C, AK101, SW8260B on Sample 57-01 only
09-FW-E-EXBLD58-01 through 10	3-5	SW8082 on all samples SW6020/7471A, SW8270CSIM, SW8081B, AK102/103, SW8270C, AK101, SW8260B on Sample 58-01 only
09-FW-E-EXBLD55-01 through 10	5-10	SW8082 on all samples SW6020/7471A, SW8270CSIM, SW8081B, AK102/103, SW8270C, AK101, SW8260B on Sample 55-01 only
09-FW-E-EXBLD51-01 through 10	4-5	SW8082 on all samples SW6020/7471A, SW8270CSIM, SW8081B, AK102/103, SW8270C, AK101, SW8260B on Sample 51-01 only
09-FW-E-EXBLD53-01 through 10	2-4	SW8082 on all samples SW6020/7471A, SW8270CSIM, SW8081B, AK102/103, SW8270C, AK101, SW8260B on Sample 53-01 only
09-FW-E-EXBLD50-01 through 10	4-5	SW8082 on all samples SW6020/7471A, SW8270CSIM, SW8081B, AK102/103, SW8270C, AK101, SW8260B on Sample 50-01 only

Note: For definitions, see the Acronyms and Abbreviations section.

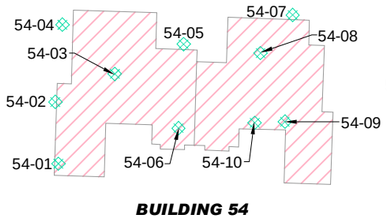
FENCE

NORTH

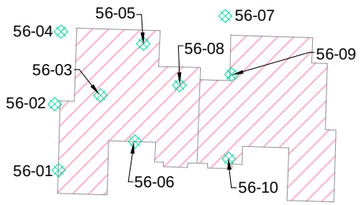


BUILDING 50

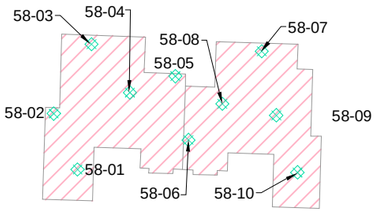
BUILDING 52



BUILDING 54



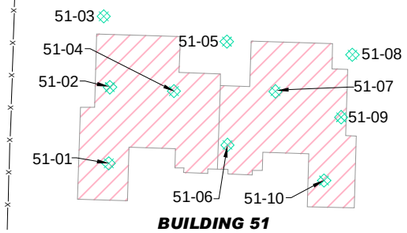
BUILDING 56



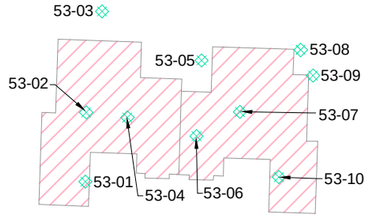
BUILDING 58

FENCE

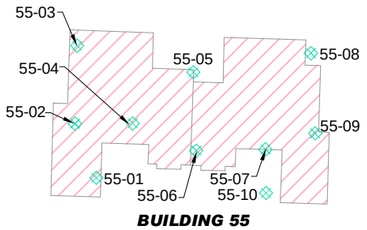
ACCESS ROAD



BUILDING 51



BUILDING 53



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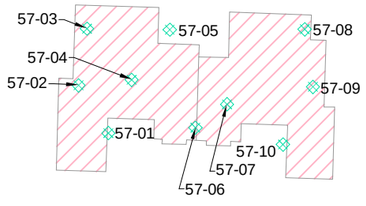
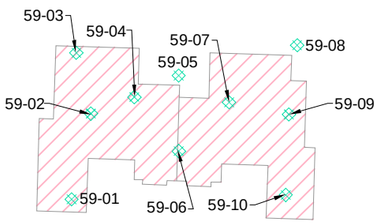


BUILDING 57



BUILDING 59

LEGEND

- 2009 BUILDING FOUNDATION REMOVAL
- BUILDING FOOTPRINT; NO FOUNDATION CONSTRUCTED
- 2009 SAMPLE LOCATION

NOTE

1. THE PREFIX 09FW-E-EXBLD (BUILDING NUMBER)- FOR SAMPLE IDs HAS BEEN OMITTED FOR CLARITY.

0 25 50 100

SCALE IN FEET

AREA E
2009 FOUNDATION DEMOLITION AND SAMPLE LOCATION

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO.: 6-13

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Area E – Exposed Sewer and Foundation Excavation 2009

Area E – Excavating Foundation 2009

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Area E – Removing Blueboard Prior to Excavation 2009

Area E – Removed Foundation 2009

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6.11 SUMMARY OF MAIN INVESTIGATION AREAS

Table 6-14 presents a summary of Investigation activities conducted at Taku Gardens during the 2009 field season:

Table 6-14
Summary of 2009 Remedial Investigation Activities

Location	Area of Investigation (square feet)	Drums	Contaminated Soil (cy)	MD	DMM
Building 9	4,905	-	920	-	-
Building 11	10,575	8	-	-	-
Building 35	432	-	-	-	-
Area E Foundation Demolition	30,000	-	-	-	-
Building 15/17	22,050	-	-	-	-
Building 49	2,500	45	3	-	-
Totals	70,462	53	923	0	0

Note: For definitions, see the Acronyms and Abbreviations section.

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7.0 WASTE MANAGEMENT

All waste removed from the FCS project area during the 2007/2008/2009 Investigation was packaged, manifested, and labeled for transportation in accordance with the waste management procedures outlined in the *RI* and *PCB Removal Action Work Plans* (USAED 2007h, 2007i, 2008b). Appendix C contains records of all waste disposition documentation, including manifests, bills of lading, and certificates of disposal. Sections 7.1 and 7.2 describe the management of specific waste streams managed during the 2007/2008/2009.

7.1 INVESTIGATION-DERIVED WASTE GENERATED DURING REMEDIAL INVESTIGATION

Five main types of waste were generated during the 2007/2008/2009 Investigation: POL and solvent-contaminated soil; liquid waste; solid waste; ACM**,** and PCB-contaminated soil. These waste streams were managed in accordance with the applicable Work Plans.

7.1.1 Contaminated Soil (Investigation-Derived Waste)

Soil contaminated with POL, metal, pesticide, and solvents excavated from the FCS was stored in stockpiles constructed per the *Stockpile Work Plan* (USAED 2007c). A total of 144 cubic yards of POL-contaminated soil was stockpiled during the 2007 Investigation, 370 cubic yards in 2008, and 923 cubic yards in 2009. Stockpiled hydrocarbon- and solvent-contaminated soil, along with 15 cubic yards of pesticide-contaminated soil excavated in 2008, was disposed of in August and September 2009. A total of 33 cubic yards of metal-contaminated soil was removed from the FCS site in 2007, and 27 cubic yards was removed in 2008. Metal-contaminated soil generated during the 2007 and 2008 field efforts were shipped to the appropriate TSDF for disposal in 2008. Soil was sampled and characterized per the *Drum and Debris Investigation Work Plan* (USAED 2007h and 2008b). None of the samples exceeded applicable RCRA regulations. Tables 7-1 through 7-3 summarize the quantities and types of contaminated soil removed in 2007, 2008, and 2009, respectively. Appendix B presents the analytical results.

Table 7-1
Summary of Contaminated Soil Removed during 2007

Location	Contaminant	Volume of Soil (cy)	Corresponding Sample IDs	Disposal Location
Building 49	VOC	6	07FCSRISOB49P01	Thermal Treatment OIT/ Ft Wainwright Landfill
	Asphalt	18	07FCSRISOB49T01	Thermal Treatment OIT/ Ft Wainwright Landfill
Building 48	Heavy Metals	30	07FCSRISOBD48P B01-02	Thermal Treatment OIT/ Ft Wainwright Landfill
	Degraded Xylene	120	07FCSRISOSS01-04	Thermal Treatment OIT/ Ft Wainwright Landfill
Building 15/17	Heavy Metals	3	07 FCSRISO B15 PB01	Chemical Waste Management Arlington, Oregon

Notes:
All 2007 waste soil was re-sampled according to the 2009 Taku Gardens Sampling of Contaminated Soil Pile (USAED 2009h). Samples with POL in exceedances project screening criteria were transported to OIT for thermal treatment. Remaining soil (non-hazardous was disposed of at Ft Wainwright Landfill.
For definitions, see the Acronyms and Abbreviations section.

Table 7-2
Summary of Contaminated Soil Removed during 2008

Location	Potential Contaminant	Volume of Soil (cy)	Sample IDs	Disposal destination
Building 15/17	POL	210	08 FCSRISO B15 WSLP01-6	Thermal Treatment OIT/ Ft Wainwright Landfill
	Paint Thinner	8	08 FCS BLD 15 PT 01-02	Thermal Treatment OIT/ Ft Wainwright Landfill
	Lead	20	08 FCS BLD 15 BAT 01-02	Chemical Waste Management Arlington, Oregon
Building 22	POL	30	08 FCS RISO B22 WS-01-02	Thermal Treatment OIT/ Ft Wainwright Landfill Thermal Treatment OIT/ Ft Wainwright Landfill
	Paint	4	08 FCS BLD22 PT 01-02	Thermal Treatment OIT/ Ft Wainwright Landfill
Building 40	POL	60	08 FCS PCS HS 01-3	Thermal Treatment OIT/ Ft Wainwright Landfill
Building 28/31	POL	60	08 FCS RISO B31 FL01-03	Thermal Treatment OIT/ Ft Wainwright Landfill
Building 26	Heavy Metals	7	08 FCS RISO B 26-WS01-2	Chemical Waste Management Arlington, Oregon
Building 9	POL	3	08 FCS PCS HS 01-3	Thermal Treatment OIT/ Ft Wainwright Landfill
Building 45	POL	3	08 FCS PCS HS 01-3	Thermal Treatment OIT/ Ft Wainwright Landfill
Building 11	Pesticides	15	08 FCS RISO BLD11WS01-02	Chemical Waste Management Arlington, Oregon
Offsite Stockpile	Unknown	11	08 FCS RISO OFFSITE 01-02	Ft Wainwright Landfill

Notes:
All 2008 waste soil was re-sampled according to the *2009 Taku Gardens Sampling of Contaminated Soil Piles* (USAED 2009h). Samples with POL in exceedances project screening criteria were transported to OIT for thermal treatment. Remaining soil (non-hazardous was disposed of at Ft Wainwright Landfill.
For definitions, see the Acronyms and Abbreviations section.

Table 7-3
Summary of Contaminated Soil Removed during 2009

Location	Contaminant	Volume of Soil (cy)	Sample IDs	Disposal Location
Building 9	POL	920	09-FCSRI-SO-B9SP01-WS01-07	OIT
			09-FCSRI-SO-B9SP02-WS01-05	OIT
			09-FCSRI-SO-B9SP03-WS01-15	OIT
Building 49	POL	3	09 FCS RISO B49WS01	Currently Stockpiled in 3 x 1 cy Super Sacks in the Stockpile to the south of the site

Note: For definitions, see the Acronyms and Abbreviations section.

7.1.2 Liquid Investigation-Derived Waste

During the 2007/2008/2009 Investigation, three types of liquid IDW were generated: liquids encountered in drums during excavation, decontamination water used to wash off drilling and other equipment onsite, and purge water from groundwater sampling.

When drums containing liquids were encountered, they were safely removed, overpacked, labeled, and stored onsite in the Drum Storage Area. When immediate transfer of the drum to an overpack was not possible, drum contents were temporarily transferred into a new DOT-rated drum. Following HAZCAT and other waste characterization procedures, drums were turned over to Environmental Compliance Consultants (ECC) for manifesting, transporting, and disposal. Where possible, drum contents were consolidated into similar waste streams.

Table 7-4 summarizes the liquids wastes encountered during excavation activities in 2007, 2008 and 2009.

Table 7-4
Summary of Liquid Waste Encountered During Investigation (2007/2008/2009)

Location	Liquid Waste Description	Approximate Volume (cumulative total)	Sample IDs	Disposal Destination
2007 Liquid Waste				
Building 49[1]	Motor Oil and water	5 gallons	07FCSRIWWB49OD-01	Placed in DOT approved overpack and transported to ECC
Building 48	Degraded Fuel (xylenes)	20 gallons	07FCSRIWWB48DR14	Placed in DOT approved overpack and transported to ECC
	POL Water	40 gallons	07FCSRIWWB4803	Placed in DOT approved overpack and transported to ECC
Building 15	1 small (ft length transformer)	Transformer	07FCSRI B15 TRAN 01	Consolidated with B48 Transformer for recycling at ECC
2008 Liquid Waste				
Building 15	Degraded Fuel	10 gallons	08 FCS WW BLG15-05	Placed in DOT approved overpack and transported to ECC
Area D	Degraded Fuel	5 gallons	08 FCS AREA D OP-04	Placed in DOT approved overpack and transported to ECC
2009 Liquid Wastes				
Building 49	Degraded Fuel	1 gallon	09 FCS WW B49 DR01	Placed in DOT approved overpack and transported to ECC

Notes:
[1] Table 7-6 contains an additional liquid waste sample. It was the liquid fraction of tar/asphalt residual waste sample taken from one of the drums discovered at Building 49.
For definitions, see the Acronyms and Abbreviations section.

The most common waste encountered was a tar/asphalt-type material, commonly found with a separate layer of water. Other liquid wastes encountered were degraded motor oil and degraded fuel. All liquid drums were turned over to ECC for transportation and disposal. None of the liquid wastes encountered at the FCS was classified as hazardous according to HAZCAT results or following sample analysis.

In 2007, 2008, and 2009, purge water generated during groundwater sampling was pumped into 55-gallon drums, sealed, and transferred to warm storage prior to disposal. Decontamination

water was also transferred into 55-gallon drums after use. To prevent water from freezing, drums were stored in the heated Defense Environmental Restoration Account (DERA) building prior to disposal by ECC. Table 7-5 presents a summary of the purge and decontamination waste streams generated during 2007, 2008 and 2009. Appendix B presents the analytical results. Appendix C provides the Waste Accumulation Summaries.

Table 7-5
Summary of Purge and Decontamination Water (2007/2008/2009)

Location	Liquid Waste Description	Total Number of Drums	Sample IDs	Disposal Destination
2007 Liquid Wastes				
Site-wide	Decon and purge water	200 gallons	07FCSRIWWDECONDRUM02	Placed in DOT approved overpack and transported to ECC
			07FCSRIWWDECONDRUM03	Placed in DOT approved overpack and transported to ECC
			07FCSRIWWSOILPILEDRUM04	Placed in DOT approved overpack and transported to ECC
			07FCSRIWWDECONPCB01	Placed in DOT approved overpack and transported to ECC
2008 Liquid Waste				
Site-wide	Rinsate water from washing drums	20 gallons	08 FCS RINSATE 01	Placed in DOT approved overpack and transported to ECC
MWs 77, 78, 79, 80, and 81	Groundwater monitoring well purge water	605 gallons	08 FCS MW 77 WW01R	Placed in DOT approved overpack and transported to ECC
			08 FCS MW 78 WW02R	Placed in DOT approved overpack and transported to ECC
			08 FCS MW 79 WW03R	Placed in DOT approved overpack and transported to ECC
			08 FCS MW 80 WW04R	Placed in DOT approved overpack and transported to ECC
			08 FCS MW 81 WW05R	Placed in DOT approved overpack and transported to ECC
2009 Liquid Waste				
Site-wide groundwater monitoring events (2 in 2009)	Groundwater monitoring purge water	1795 gallons	Characterized by groundwater monitoring sample results	Placed in DOT approved overpack and transported to ECC

Note: For definitions, see the Acronyms and Abbreviations section.

7.1.3 Solid Investigation-Derived Waste

Solid waste at the FCS consisted of materials and debris found during excavations. Solid materials encountered during investigations were characterized using HAZCAT screening procedures when necessary, then overpacked and sampled according to the appropriate FSP for waste characterization procedures prior to transport and disposal. Where possible, materials of the same waste stream were consolidated in overpacks for transportation and disposal. Materials encountered included paint and paint debris, lead-acid battery plates, grease, used filters, creosote debris, transformers, and general construction debris. Table 7-6 summarizes the solid waste types, origin and quantities from the 2007, 2008 and 2009 Investigation.

In 2007 and 2008, waste removed from the excavation at Buildings 15/17 and 22 exceeded RCRA guidance criteria for hazardous waste's 20-times rule; however, TCLP analysis defined it as nonhazardous, and no exceedances were noted. No waste encountered in 2009 exceeded the RCRA 20-times rule.

Table 7-6 Summary of Solid Waste Materials (2007/2008/2009)

Location	Solid Waste Description	Approximate volume (cumulative total)	Sample IDs	Disposal Destination
2007 Solid Waste				
Building 49	Asphalt/Tar (with associated liquid fraction)	Residual Amounts in Approximately 30 drums 11 Drums Tar Asphalt Material	07 FCSRIWWB49-DR01 (07FCSRIWWB49-DR01-aqueous)	Residual amounts were triple rinsed and metal removed as scrap Remaining Drums double wrapped in Felt and Disposed of at Ft Wainwright Landfill
	Paint Type material	Approximately 15 gallons	07 FCSRIB49 PT01	Placed in DOT approved overpack and transported to ECC

Note: For definitions, see the Acronyms and Abbreviations section.

Table 7-6 Summary of Solid Waste Materials (2007/2008/2009)
(Continued)

Location	Solid Waste Description	Approximate volume (cumulative total)	Sample IDs	Disposal Destination
Building 48	Lead Acid Battery Plates	Approximately 40 gallons	Plates not sampled, associated soil sample: 07 RCSRIBD48 PB01	Placed in DOT approved overpack and transported to ECC
	Transformer	1 small (ft length transformer)	Dry transformer not sampled. Associated soil sample 07 RCSRIBD48 PCB01	Consolidated with similar type waste in overpack and turned over to ECC for recycling

Table 7-6 Summary of Solid Waste Materials (2007/2008/2009) (Continued)

Location	Solid Waste Description	Approximate volume (cumulative total)	Sample IDs	Disposal Destination
Building 15/17	Lead Acid Battery Plates	Approximately 5 gallons	Plates not sampled	Consolidated with B48 plates and transported to ECC for recycling
			Associated soil sample	
			07 FCSRISO PB01	
	Transformer	1 small (ft length transformer)	07FCSRI B15 TRAN 01	Consolidated with B48 Transformer for recycling at ECC
	Creosote treated wood	Approx 90 Gallons	07FCSRI B15 CREO 01	Placed in overpack and transferred to ECC for disposal
	Charcoal in gas mask canisters	Approx 90 gallons	07FCSRI B15 CHAR 01	Placed in overpack and transferred to ECC for disposal
2008 Solid Waste				
Building 15	Solidified Paint and Cans/Soil	Approx 90 gallons	08-FCS-BLD15-OP-01	Placed in DOT approved overpack and transported to ECC
	Crushed drum with multiphase Hydrocarbon	10 gallons	08 FCS WW BLG15-05	Placed in DOT approved overpack and transported to ECC

Table 7-6 Summary of Solid Waste Materials (2007/2008/2009) (Continued)

Location	Solid Waste Description	Approximate volume (cumulative total)	Sample IDs	Disposal Destination
Area D	Crushed drum, diesel odor and surrounding soil	Approx 90 gallons	08 FCS AREA D OP -01	Placed in DOT approved overpack and transported to ECC
	Paint can and surrounding soil	Approx 90 gallons	08 FCS AREA D OP-02	Placed in DOT approved overpack and transported to ECC
	Paint can and surrounding soil - continuation of D03	Approx 90 gallons	08 FCS AREA D OP-03	Placed in DOT approved overpack and transported to ECC
	Drum with fuel odor and small amount of fuel	Approx 90 gallons	08 FCS AREA D OP-04	Placed in DOT approved overpack and transported to ECC
Building 22	Paint cans and soil Building 22 (soil and soil)	Approx 90 gallons	08 FCS BLD22 OP 01	Placed in DOT approved overpack and transported to ECC
	Crushed drum with oil and soil	Approx 90 gallons	08 FCS BLD 22 OP 02	Placed in DOT approved overpack and transported to ECC
Hydraulic oil spills	Soil and oily rags from 160 hydraulic leak	10 gallons	08 FCS HYDSPILL-01	Placed in DOT approved overpack and transported to ECC
	Hydraulic Spill from Water truck and soil	390 gallons	08 FCS HYDSPILL-02	Placed in DOT approved overpack and transported to ECC

Table 7-6 Summary of Solid Waste Materials (2007/2008/2009) (Continued)

Location	Solid Waste Description	Approximate volume (cumulative total)	Sample IDs	Disposal Destination
MW77 installation	Soil Cuttings	110 gallons	08FWA-MW77-0_2, 5_6.5, 12.5_14	Placed in DOT approved overpack and transported to ECC
MW78 installation	Soil Cuttings	110 gallons	08FW A-MW78-1_2, 7.5_9.5, 11_13	Placed in DOT approved overpack and transported to ECC
MW79 installation	Soil Cuttings	55 gallons	08FWA-MW79-1_2, 5_6.5, 10_14	Placed in DOT approved overpack and transported to ECC
MW80 installation	Soil Cuttings	165 gallons	08FWA-MW80-1_2, 2_6, 7.5_9, 22.5_29	Placed in DOT approved overpack and transported to ECC
MW81 installation	Soil Cuttings	55 gallons	08FWE-MW81-12.5_14	Placed in DOT approved overpack and transported to ECC
2009 No Solid Waste				

Note: For definitions, see the Acronyms and Abbreviations section.

Metal debris including items such as rebar, crushed empty drums, tanks tracks, and barbed wire was either removed to Fort Wainwright Landfill in 2007 or recycled by C and R Scrap in 2008 and 2009. Table 7-7 presents the quantities of metallic debris removed each year and the disposal destination.

When appropriate, munitions-related items were disposed of as scrap, in accordance with the *MEC Work Plan* (USAED 2007g). Appendix F presents specific details of munitions-related items encountered during the 2007/2008/2009.

Appendix B presents the analytical results, and Appendix C presents the waste accumulation summaries.

Table 7-7
Summary of Scrap Metal Excavated (2007/2008/2009)

Investigation Year	Total Quantity of Scrap Metal	Source Areas	Disposal Destination
2007	253 cubic yards	Building 15/17, 48, 49	FWA Landfill
2008	267 tons	Building 15/17, 22/24, 12, 11, 1, 26, 28/31, 16, Area D	C&R Scrap
2009	29 tons	Building 15/17, 49, 11, 35	C&R Scrap

Note: For definitions, see the Acronyms and Abbreviations section.

7.1.3.1 Construction Debris

During the demolition of the foundations in Area E, approximately 1,526 cubic yards of concrete debris and 230 cubic yards of blue board was removed and disposed of in the Fort Wainwright Landfill in accordance with the *2009 Taku Gardens PCB Area Foundation Demolition Technical Memorandum* (USAED 2009d).

7.1.4 Asbestos Containing Material

In 2007, three items believed to contain potential asbestos were discovered onsite: roofing material in a debris pile adjacent to Building 11, an oven transformer excavated from Building 15/17, and a small transformer at Building 48. This latter was sampled and confirmed to be free of asbestos. In 2008, twenty-six containers of ACM were removed from the Building 15/17 excavation, including four 1940/1950s-era furnaces and twenty-two containers of firebricks. In 2009, approximately ten pounds of utility piping was discovered in the Building 9 excavation and was suspected of containing asbestos. It was bagged, sealed, and disposed of in the asbestos

containment cell at the Fort Wainwright Landfill. All ACM from the FCS was controlled using wetting methods and wrapping, and transported to and disposed of at the asbestos containment cell at the Fort Wainwright Landfill. All shipment records were prepared as required by 40 CFR 61 for shipments of asbestos (Appendix C).

7.1.5 Polychlorinated Biphenyls-Contaminated Soil

Four types of waste were generated during the PCB investigation: TSCA-regulated soil containing PCBs at concentrations exceeding 50 mg/kg, non-TSCA-regulated soil containing PCBs between 10 and 50 mg/kg, non-TSCA-regulated soil containing PCBs between 1 and 10 mg/kg, and PCB-contaminated PPE (Sections 7.1.5.1 through 7.1.5.4). Appendix B presents the analytical results. Appendix C contains receipts and documentation relating to the transportation and disposal of these wastes.

7.1.5.1 Toxic Substances Control Act-Regulated Soil

In 2007, all TSCA-regulated soil encountered at the FCS was removed. Soil identified previously and during the Investigation as having PCB concentrations above 50 mg/kg was placed into intermodal bulk containers, packaged, and manifested for offsite disposal. The container contents were sampled in accordance with the *PCB Removal Action Work Plan* (USAED 2007i), labeled according to U.S. Department of Transportation guidance, transported to the Alaska Railroad company in Fairbanks, offloaded in Anchorage, and shipped to Chemical Waste Management Northwest, Arlington, Oregon for disposal. Sixty-three regulated intermodal bulk containers containing 1,167.6 tons of material were removed from the FCS.

7.1.5.2 Nonregulated/Non-Toxic Substances Control Act Soil

In 2007, all nonregulated/non-TSCA soil encountered at the FCS was removed. Soil identified onsite as containing a concentration of PCBs between 10 and 50 mg/kg was also transported offsite in the manner described in the subsection above; however, the waste was disposed of at Chemical Waste Management Northwest, for disposal in a separate area of their facility in

Arlington, Oregon. Forty-two nonregulated intermodal bulk containers containing 690.5 tons of material were removed from the FCS.

7.1.5.3 Toxic Substances Control Act Nonregulated Soil

In 2007, soil identified as containing a concentration of PCBs between 1 and 10 mg/kg was stockpiled onsite in accordance with the *Stockpile Work Plan* (USAED 2007c). Three separate stockpiles were created in the PCB area. PCB-contaminated soil was also stored in the large stockpile to the south of the site. A total of 1,720 cubic yards of soil was removed from the excavations and stockpiled. During the 2008 field season, these stockpiles were disposed of at the Fort Wainwright Landfill. In addition, 32 cubic yards of TSCA nonregulated soil was excavated from remaining hot spots in 2008 and transported to the landfill for disposal.

7.1.5.4 Personal Protective Equipment

During 2007, 2008, and 2009 Investigation activities, disposable personal protective equipment and sampling equipment were segregated according to applicable waste streams, containerized, and combined with contaminated soil in lined intermodal bulk containers for offsite disposal. One additional overpack per field season was also generated.

7.2 SOIL PILES CREATED DURING HOUSING CONSTRUCTION

Forty-six soil piles were generated during construction at the FCS. In 2007, CH2M Hill sampled these soil piles using MI methodology. Soil piles 17 through 39, SPD, and SPF, within Area E (the PCB exclusion zone) were sampled for PCBs only. All soil piles in this area had PCB concentrations less than 1 mg/kg and were transferred to the Fort Wainwright Landfill for use as cover material. The letter of approval for disposal of low-level PCBs at the landfill is provided as Attachment 2 to the *PCB Removal Action Work Plan* (USAED 2007i). In 2007, approximately 5,082 tons of soil pile material was removed from Area E.

Soil piles located outside Area E were sampled using MI methodology. The suite of analytes for these areas included DRO, RRO, SVOCs, and metals. Aside from contaminated soil transferred

to DRMO (Section 5.8.2), approximately 10,181 tons of clean soil stockpiled onsite was removed from stockpiles as previously discussed in section 5.8.1 during the 2008 field season and transported to the landfill to be used as clean cover material. Figure 7-1 shows the former locations of these soil piles.

A sample summary table for all 2007 excavation confirmation samples can be found in Table E-03 of Appendix E of the Draft Final 2008 RI Report.

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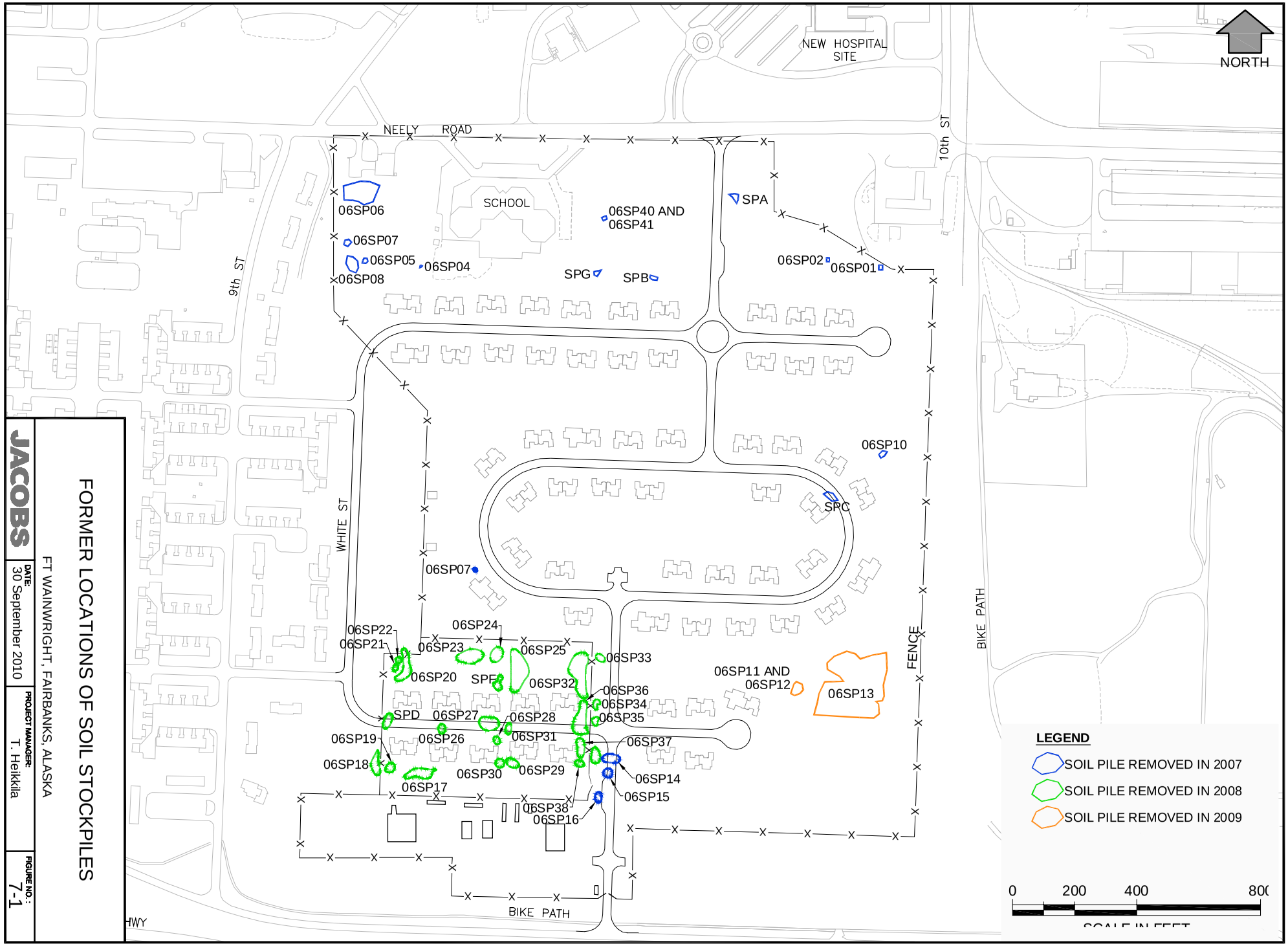

FORMER LOCATIONS OF SOIL STOCKPILES

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS

DATE: 30 September 2010

PROJECT MANAGER: T. Heikkila

FIGURE NO.: 7-1

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8.0 SUMMARY

Activities conducted during the 2007/2008/2009 Investigation at FCS successfully located and determined the amount of COCs emanating from drums or debris at Buildings 15/17, 22/24, 48, and 49, and Area D. Contaminated soil, drums, debris, and munitions-related items were removed from these areas and disposed of as appropriate. In order to remove drums and to collect from underneath the foundation of Building 49, support structures were constructed in 2009 and drums were excavated from directly underneath the building. Following investigation in these areas, characterization samples were recovered and analyzed for a wide range of contaminants and additional EM61 geophysical surveys were conducted. These data have been used in the preparation of a Risk Assessment by CH2M Hill (Appendix B).

Figure 8-1 presents an overview of areas excavated during the 2007/2008/2009 Investigation with geophysical survey results. To see detailed geophysical data for each excavation, please refer to figures presented in Sections 4.0 through 6.0. Anomalies associated with utilities, surface debris, manhole covers, or fencing have been shaded out in this figure for clarity.

All PCB-contaminated soils that exceeded the residential cleanup value of 1 mg/kg have been removed from Area E and other hot spots identified across the site. In 2009 the partially completed foundations and associated utilities were also removed from Area E.

DDT- and POL-associated hotspots were investigated, contaminated soil was removed, and excavation characterization samples were collected at Buildings 9, 11, 40 and 45.

Groundwater monitoring wells to delineate contamination to the east and north of the site were installed in 2008 and 2009. Additional investigation work completed in 2009 included installation of geo-probes, and GORE™ modules. Two rounds of groundwater monitoring were also completed during 2009 field season.

Groundwater monitoring, minor grading, removal of remaining IDW, and site control are activities currently planned for the 2010 field season.

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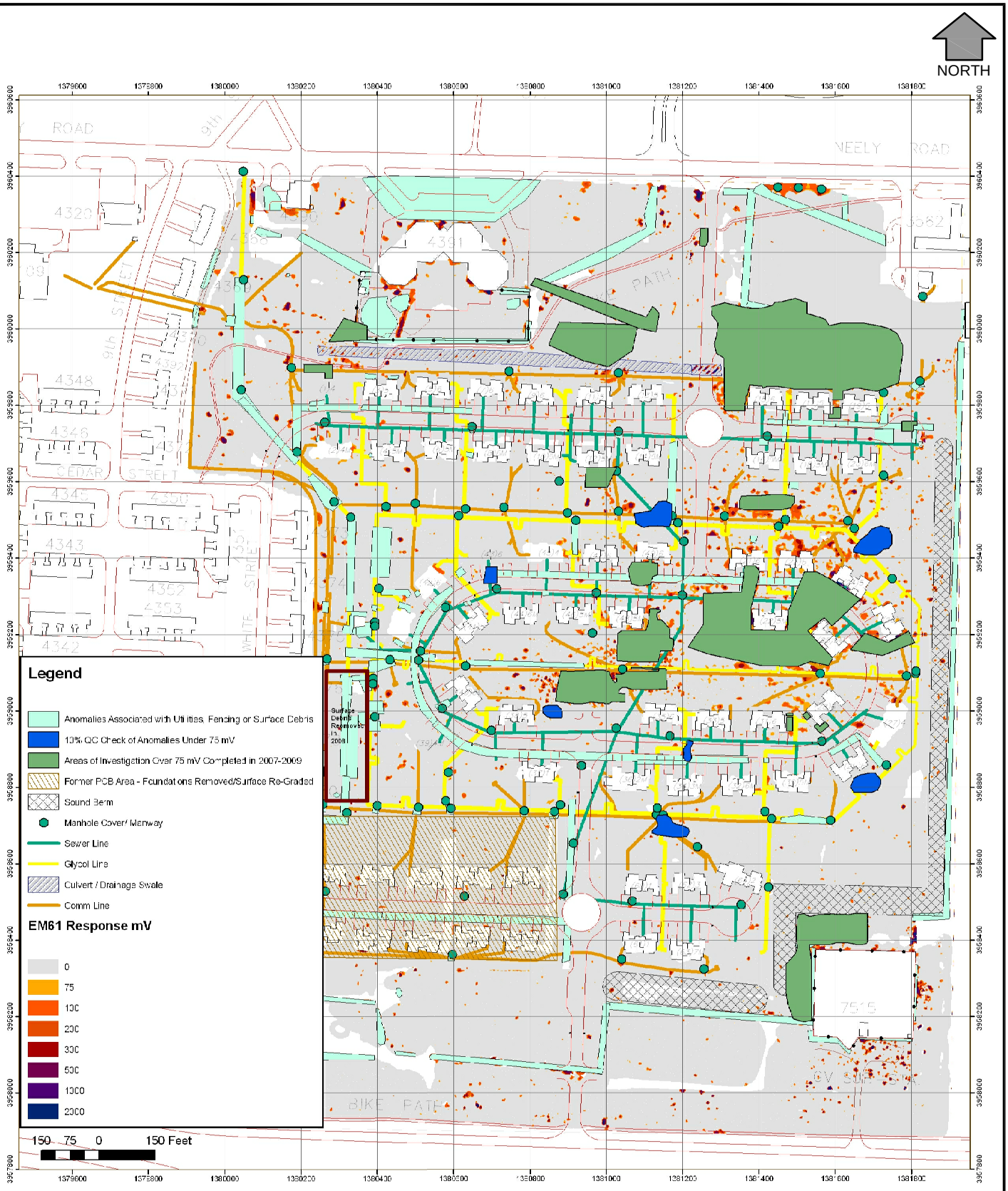

GEOPHYSICAL ANOMALY INVESTIGATION

FT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 30 September 2010	PROJECT MANAGER: T. Heikkila	FIGURE NO. : 8-1

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APPENDIX A

Photograph Logs

ATTACHMENT A-1

Photograph Log, 2007

Attachment A1 - 2007 Photo Log

A. Site Mobilization and Stockpile Creation

Photo Number	Date	Subject
1	08/29/2007	Creation of contaminated soil stockpile, south east of site
2	08/29/2007	Staging area south east of site
3	08/29/2007	Creation of contaminated soil stockpile south east of site
4	08/29/2007	Installation of geo-fabric liner
5	08/30/2007	Geo fabric Liner
6	08/30/2007	20 mm HDPE liner
7	08/30/2007	Placing protective layer of sand and gravel on top of lined cell
8	08/31/2007	Hand placement of sand and gravel on bermed edge of stockpile
9	08/31/2007	Completed Stockpile
10	08/07/2007	Jacobs Site Office
11	08/31/2007	Drum Storage Stockpile
12	08/23/2007	Removal of scrap piles
13	08/31/2007	Scrap Pile Removal
14	08/23/2007	Site Entrance
15	09/06/2007	Creation of staging area south of site
16	08/21/2007	Inspection of equipment

B. Utility Location

Photo Number	Date	Subject
1	08/31/2007	Sewer trace using steel tape – Building 49
2	08/31/2007	Inducing a current during utility location – Building 49
3	08/31/2007	Hand digging to check depth of water main – Building 49
4	08/31/2007	Tracing water line – Building 49
5	08/04/2007	Utility location – Building 49

C. Building 49 Remedial Investigation

Photo Number	Date	Subject
1	09/06/2007	Beginning of excavation activity – Building 49
2	08/29/2007	Safety briefing prior to excavation inside exclusion fence
3	09/06/2007	Excavation between 0 – 1 ft bags
4	09/06/2007	UXO Support Personnel inspecting excavation
5	09/06/2007	activities Building 49Excavation
6	09/06/2007	Excavation Activities – removal of clean overburden
7	08/30/2007	Shallow sloped excavation Building 49
8	09/07/2007	First Drum encountered approximately 4 ft bags. North of water line
9	09/07/2007	Close up of photo 8
10	09/07/2007	Removal drums from excavation supervised closely
11	09/07/2007	Oil spill and safety kits
12	09/07/2007	Soil screening using PID
13	09/07/2007	Inspection of drums
14	09/07/2007	Stockpile of empty crushed drums on west of excavation
15	09/07/2007	Drums on northern side of excavation. Between Approximately 5-8 ft bgs
16	08/21/2007	Drums containing residual amounts of material placed on liner. Sides of excavation benched.
17	09/08/2007	North side of excavation looking west

Attachment A1 - 2007 Photo Log

18	09/08/2007	Placing drum containing tar asphalt material in Overpack
19	09/08/2007	Tar material in drums recovered. Drum contained in lined area then placed in Overpack.
20	09/08/2007	Degraded wood and other organic material in excavation.
21	09/08/2007	Overpacks Stored adjacent to excavation for easy use
22	09/08/2007	Drums from Building 49 stored in Overpacks inside lined drums storage areas
23	09/08/2007	Tipping clean overburden from Building 49 in storage area at the southwest of the site.
24	09/102007	Crush drums prior to removal from excavation on northern side of excavation.
25	09/10/2007	Removal of drums from northern side excavation
26	09/10/2007	Layer of drums between approximately 5-8 bags. Maximum depth of excavation 13ft bags.
27	09/10/2007	Emulsified fuel residue on drum recovered from Building 49
28	09/11/2007	Crushed drums containing small amounts of residue placed in lined stockpile.
29	09/11/2007	North side excavation (western end) – no drums recovered from this area.
30	09/11/2007	Overburden removed above sewer line.
31	09/11/2007	Further removal of drums from northern side of excavation
32	09/11/2007	Area directly beneath garage backfilled with clean gravel in order to retain structural integrity.
33	09/12/2007	Excavation around sewer line
34	09/12/2007	Disposal of scrap (including crushed empty drums) from Building 49 at Ft Wainwright Landfill
35	09/12/2007	Paint material removed from excavation (east of sewer line)
36	09/11/2007	Excavation east of sewer line. No drums recovered from this area.
37	09/12/2007	Excavation around sewer line
38	09/13/2007	Beginning of excavation south of water line
39	09/13/2007	Excavation south of water line
40	09/13/2007	Drums encountered beneath water line
41	09/13/2007	Sampling tar material from overpacked drums in storage area
42	09/13/2007	Type material encountered
43	09/14/2007	Excavation activity south of water line. Gravel backfill around sewer line
44	09/14/2007	Removal of drum south of water line
45	09/14/2007	Sampling degraded motor oil directly from drum
46	09/14/2007	Excavating around utilities
47	09/14/2007	Overview of excavation Building 49
48	09/14/2007	Areas around utilities immediately backfilled with gravel
49	10/03/2007	Insulated sewer line prior to backfilling
50	10/10/2007	Backfilling around utilities Building 49
51	10/10/2007	Compaction of gravel around utilities
52	11/14/2007	Building 49 Backfilled

Attachment A1 - 2007 Photo Log

D. Building 48 Remedial Investigation

Photo Number	Date	Subject
1	09/11/2007	Excavation view south
2	09/11/2007	Excavation east of Building 48
3	09/11/2007	Excavation view north
4	09/11/2007	Overpacking drum with liquid
5	09/12/2007	Excavating south of electrical utility
6	09/12/2007	South central excavation expansion
7	09/14/2007	Southern excavation section
8	09/14/2007	West view of southern excavation
9	09/15/2007	Excavating south of electrical utility
10	09/15/2007	West excavation view, removed drums staged on liner
11	09/17/2007	View south, two excavators enlarging sections of excavation
12	09/17/2007	Excavation south of Building 48, north wall
13	09/19/2007	Central section of excavation
14	09/20/2007	Two excavators, view northwest
15	09/20/2007	Expanding Building 48 excavation
16	09/21/2007	Scrap metal pile Building 48
17	09/21/2007	West wall of excavation
18	09/21/2007	Enlarging excavation, east view
19	09/22/2007	Scrap metal pile, view west
20	09/22/2007	East excavation wall
21	09/22/2007	View from northwest corner
22	09/22/2007	Southwest corner of excavation
23	09/22/2007	Removing scrap metal at Building 48
24	09/25/2007	Truck bed removed from excavation
25	09/25/2007	Removing liquid solvent drum in excavation
26	09/26/2007	Excavating closer to Building 48 foundation
27	09/26/2007	Enlarging Building 48 excavation
28	09/26/2007	South view of excavation
29	09/27/2007	Excavating toward Building 48
30	09/27/2007	Removing soil pile in excavation with the loader
31	09/28/2007	Using a magnetometer to check excavation floor
32	09/292007	Southwest corner of excavation
33	09/28/2007	North excavation wall
34	09/28/2007	Solvent drum soil excavation
35	09/29/2007	Excavating toward Building 48
36	09/29/2007	Northwest corner of excavation
37	09/29/2007	Excavation 48, view west
38	09/30/2007	Southwest corner of excavation and clean stockpile
39	09/30/2007	Continued excavation of solvent drum area
40	10/02/2007	Expanding southwest excavation wall
41	10/03/2007	Removing communications line
42	10/03/2007	Three excavators expanding excavation
43	10/04/2007	South excavation section
44	10/04/2007	Expanding west edge
45	10/04/2007	Excavating main communications line by hand
46	10/04/2007	Exposed communications line south west wall of excavation
47	10/07/2007	Southeast corner of excavation
48	10/08/2007	Clean wall directly south of electrical line
49	10/08/2007	Test pit toward Building 48
50	10/09/2007	Drum removed near electrical utility
51	10/09/2007	Electrical line south excavation
52	10/09/2007	South ramped excavation

Attachment A1 - 2007 Photo Log

E. Building 15/17 Remedial Investigation

Photo Number	Date	Subject
1	10/05/2007	Beginning excavation 15, view west
2	10/06/2007	Excavation directly east of job site trailers
3	10/08/2007	View from northern stock pile
4	10/09/2007	Loading scrap metal at Building 15
5	10/10/2007	Progressing south
6	10/10/2007	Metal debris pile
7	10/10/2007	Metal debris in south wall
8	10/11/2007	South wall of excavation
9	10/13/2007	Removing boiler from south wall of excavation
10	10/13/2007	View from northeast corner of excavation
11	10/15/2007	Three excavators enlarging excavation, view east
12	10/17/2007	West wall
13	10/17/2007	Fence excavation
14	10/17/2007	Northeast corner
15	10/17/2007	East side of the fence area excavation
16	10/18/2007	Northwest edge of excavation
17	10/18/2007	Fence excavation, view east
18	10/20/2007	Test pit 02 near fence corner
19	10/20/2007	Test Pit 03 near fence
20	10/22/2007	Berms and fencing around excavation walls
21	10/22/2007	Building 15 secured for winter, view west
22	10/22/2007	Fence area excavation secured for winter

F. PCB Removal Action-Hotspots

Photo #	Date	Subject
1	10/16/2007	Excavation at 06SS22, 061SB34, and 06SS19
2	10/16/2007	Loading of PCB contaminated soil for removal to stockpiles
3	10/16/2007	Excavation activity in playground area west of main excavation area
4	10/16/2007	Excavation of 06SS22, 06SB134 and 06SS19
5	10/25/2007	06SS22, 06SB134 and 06SS19 backfilled following confirmation sampling
6	10/25/2007	Hot Spot excavation 06SB98. Location of sampling points denoted by flags
7	10/25/2007	06SB98
8	10/25/2007	06SB105 and 06SB98 Backfilled following confirmation sampling
9	10/25/2007	Backfilling activities
10	10/25/2007	06SB71. Excavated to 6ft bags
11	10/25/2007	Backfilling of 06SB71
12	10/25/2007	06SB71 Backfilled

G. PCB Removal Action-Main Excavation Building 52 Footprint

Photo #	Date	Subject
1	09/20/2007	PCB Area Pre-excavation
2	09/20/2007	Preconstruction sampling. Northern Stockpile
3	09/20/2007	Preconstruction southern stockpile
4	09/21/2007	Placing protective geotextile liner prior to excavation to prevent spreading of contamination
5	09/21/2007	Plastic covering placed over most contaminated area prior to removal

Attachment A1 - 2007 Photo Log

6	09/21/2007	Protective fabric and equipment setup during 1-10 mg/kg PCB removal
7	09/21/2007	Excavation Activities Northern area of Main excavation
8	09/22/2007	1-10mg/kg PCB Stockpile
9	09/22/2007	Tipping of material removed from Northern Excavation
10	09/22/2007	Staking sampling points in Northern Excavation
11	09/22/2007	Northern Excavation- Approximately 3 ft bags
12	09/26/2007	Northern Excavation partially complete
13	09/26/2007	Sampling layout of northern stockpile. Safety station for PCB excavation in foreground
14	09/26/2007	Supervision of excavation in southern area of main excavation
15	09/26/2007	Sampling of Northern Stockpile
16	09/27/2007	Removal of soil previously identified as being over 10mg/kg PCB
17	09/27/2007	Central Area of excavation and removal into intermodal bulk container
18	09/27/2007	Central Area of excavation. Partial removal of plastic covering.
19	09/28/2007	Supervision of removal of soil in central area. Metal removed.
20	10/01/2007	Southern area of excavation in foreground removal of soil from central area in background.
21	10/03/2007	Northern Excavation staked and marked for sampling
22	10/03/2007	Excavation in eastern area
23	10/04/2007	Central area showing power pole in center
24	10/04/2007	Power pole found in central excavation
25	10/09/2007	Close up of power pole
26	10/09/2007	Removal of power pole
27	09/10/2007	Power pole removed to intermodal bulk container
28	10/10/2007	Excavation Activities
29	10/10/2007	Additional excavation eastern area
30	10/16/2007	Deep excavation central area
31	10/18/2007	Eastern Stockpile
32	10/18/2007	Removal of more than 10mg/kg PCB soil from stockpiles
33	10/23/2007	Wooded fragments of possible power pole northern excavation
34	10/23/2007	Northern excavation possible power pole
35	10/23/2007	Additional excavation of more than 10mg/kg soil from northern area
36	10/23/2007	Additional excavation northern area
37	10/25/2007	Flagged sample points excavation
38	10/27/2007	Infilling of southern area
39	10/27/2007	Compaction of imported gravel
40	10/27/2007	Tipping Imported clean backfill
41	10/27/2007	Additional excavation central area southern wall
42	10/28/2007	Additional excavation eastern area. Exclusion Fence in background
43	09/14/2007	Additional excavation northern area. Frozen soil blocks
44	11/01/2007	Groundwater encountered 14 bags central area
45	11/01/2007	Additional excavation Northern area
46	11/02/2007	Compaction of backfill material
47	11/06/2007	Removal of >10mg/kg PCB soil from stockpile to intermodal bulk containers
48	11/06/2007	Removal of >10mg/kg PCB soil from stockpile to intermodal bulk containers
49	11/07/2007	Removal of >10mg/kg PCB soil from stockpile to intermodal bulk containers
50	11/07/2007	Intermodal Bulk container covering station
51	11/07/2007	Guiding intermodal bulk container for covering
52	11/01/2007	Intermodal Bulk containers stored on site prior to removal to TDSF
53	11/09/2007	Stockpile secured for winter

Attachment A1 - 2007 Photo Log

H. PCB Removal and Backfilling – Transformer Service Area (TSA)

Photo #	Date	Subject
1	10/02/2007	Excavation Activity at the TSA. Excavation occurring from top of eastern sound beam
2	10/02/2007	Excavation at TSA
3	10/13/2007	Excavation of 06SB15 immediately east of site boundry
4	10/13/2007	Excavation of 06SB15
5	10/26/2007	06SB05, 06SB07 and 06SB08 backfilling Activities
6	10/26/2007	06SB14 Backfilled
7	10/26/2007	Backfilling Activities TSA
8	10/26/2007	Backfilling of 06SB15
9	10/26/20007	Backfilled TSA
10	10/26/2007	Backfilling activities TSA
11	10/26/2007	Over view of TSA Area
12	10/26/2007	Accessing eastern side of boundary fence

I. Removal of Vegetation

Photo #	Date	Subject
1	07/19/2007	Vegetation prior to removal
2	07/19/2007	Removal of vegetation north east FCS
3	07/19/2007	Vegetation removed east site of boundary
4	07/19/2007	Removal of Vegetation Central FCS

J. Site Demobilization

Photo #	Date	Subject
1	11/14/2007	Deconstructing tarping station in staging area south of site
2	11/14/2007	Demobing equipment
3	11/14/2007	Equipment stored on site over winter
4	11/14/2007	Demobing trailers
5	11/14/2007	Drums stored in DERA heated building over winter

FCS Photograph Log

Site Mobilization and Stockpile Construction

Photo No. 1
08/29/2007
Creation of contaminated soil stockpile, south east of site

Photo No. 2
08/29/2007
Staging area south east of site

Site Mobilization and Stockpile Construction

Photo No. 3
08/29/2007
Creation of contaminated soil stockpile south east of site

Photo No. 4
08/29/2007
Installation of geo-fabric liner

Site Mobilization and Stockpile Construction

Photo No. 5
08/30/2007
Geo fabric Liner

Photo No. 6
08/30/2007
20 mm HDPE liner

Site Mobilization and Stockpile Construction

Photo No. 7
08/30/2007
Placing protective layer of sand and gravel on top of lined cell.

Photo No. 8
08/31/2007
Hand placement of sand and gravel on bermed edge of stockpile

Site Mobilization and Stockpile Construction

Photo No. 9
08/31/2007
Completed Stockpile

Photo No. 10
08/07/2007
Jacobs Site Office

Site Mobilization and Stockpile Construction

Photo No. 11
08/31/2007
Drum Storage Stockpile

Photo No. 12
08/23/2007
Removal of scrap piles

Site Mobilization and Stockpile Construction

Photo No. 13
08/31/2007
Scrap Pile Removal

Photo No. 14
08/23/2007
Site Entrance

Site Mobilization and Stockpile Construction

Photo No. 15
09/06/2007
Creation of staging area south of site

Photo No. 16
08/21/2007
Inspection of equipment

Utility Location

Photo No. 1
08/31/2007
Sewer trace using steel tape – Building 49

Photo No. 2
08/31/2007
Inducing a current during utility location – Building 49

Utility Location

Photo No. 3
08/31/2007
Hand digging to check depth of water main – Building 49

Photo No. 4
08/31/2007
Tracing water line – Building 49

Utility Location

Photo No. 5
09/04/2007
Utility location Building 48

Building 49 Remedial Investigation

Photo No. 1
09/06/2007
Beginning of excavation activity Building 49

Photo No. 2
08/29/2007
Safety briefing prior to excavation inside exclusion fence.

Building 49 Remedial Investigation

Photo No. 3
09/06/2007
Excavation between 0- 1 ft bgs

Photo No. 4
09/06/2007
UXO Support Personnel inspecting excavation

Photo No. 5
09/06/2007
Excavation activities Building 49

Photo No. 6
09/06/2007
Excavation Activities – removal of clean overburden

Building 49 Remedial Investigation

Photo No. 7
08/30/2007
Shallow sloped excavation Building 49

Photo No. 8
09/07/2007
First drum encountered approximately 4 ft bgs. North of water line

Building 49 Remedial Investigation

Photo No. 9
09/07/2007
Close up of Photo 8

Photo No. 10
09/07/2007
Removal Drums from excavation supervised closely

Building 49 Remedial Investigation

Photo No. 11
09/07/2007
Oil spill and safety kits

Photo No. 12
09/07/2007
Soil Screening using PID

Building 49 Remedial Investigation

Photo No. 13
09/07/2007
Inspection of drums

Photo No. 14
09/07/2007
Stockpile of empty crushed drums on west of excavation

Photo No. 15
09/07/2007
Drums on northern side of excavation. Between Approximately 5-8 ft bgs

Photo No. 16
08/21/2007
Drums containing residual amounts of material placed on liner. Sides of excavation benched.

Building 49 Remedial Investigation

Photo No. 17
09/08/2007
North side of excavation looking west.

Photo No. 18
09/08/2007
Placing drum containing tar asphalt material in Overpack ®

Photo No. 19
09/08/2007
Tar material in drums recovered. Drum contained in lined area then placed in Overpack ®

Photo No. 20
09/08/2007
Degraded wood and other organic material in excavation..

Photo No. 21
09/08/2007
Overpacks ® stored adjacent to excavation for easy use.

Photo No. 22
09/08/2007
Drums from Building 49 stored in Overpacks ® inside lined drums storage area. .

Building 49 Remedial Investigation

Photo No. 23
09/08/2007
Tipping clean overburden from Building 49 in storage area at the southwest of the site.

Photo No. 24
09/10/2007
Crush drums prior to removal from excavation on northern side of excavation.

Photo No. 25
09/10/2007
Removal of drums from northern side of excavation

Photo No. 26
09/10/2007
Layer of drums between approximately 5- 8 bgs. Maximum depth of excavation 13ft bgs.

Photo No. 27
09/10/2007
Emulsified fuel residue on drum recovered from Building 49

Photo No. 28
09/11/2007
Crushed drums containing small amounts of residue placed in lined stockpile.

Building 49 Remedial Investigation

Photo No. 29
09/11/2007
North side of excavation (western end) – no drums recovered form this area.

Photo No. 30
09/11/2007
Overburden removed above sewerline..

Photo No. 31
09/11/2007
Further removal of drums from northern side of excavation

Photo No. 32
09/11/2007
Area directly beneath garage backfilled with clean gravel in order to retain structural integrity

Photo No. 33
09/12/2007
Excavation around sewer line

Photo No. 34
09/12/2007
Disposal of scrap (including crushed empty drums) from Building 49 at Ft Wainwright Landfill

Building 49 Remedial Investigation

Photo No. 35
09/12/2007
Paint material removed from excavation (east of sewer line)

Photo No. 36
09/11/2007
Excavation east of sewer line. No drums recovered from this area

Photo No. 37
09/12/2007
Excavation around sewer line

Photo No. 38
09/13/2007
Beginning of excavation south of water line

Photo No. 39
09/13/2007
Excavation south of water line

Photo No. 40
09/13/2007
Drums encountered beneath water line

Photo No. 41
09/13/2007
Sampling tar material from overpacked drums in storage area

Photo No. 42
09/13/2007
Type material encountered.

Photo No. 43
09/14/2007
Excavation activity south of water line. Gravel backfill around sewer line

Photo No. 44
09/14/2007
Removal of drum south of water line.

Photo No. 45
09/14/2007
Sampling degraded motor oil directly from drum.

Photo No. 46
09/14/2007
Excavating around utilities.

Photo No. 47
09/14/2007
Overview of excavation Building 49

Photo No. 48
09/14/2007
Areas around utilities immediately backfilled with gravel

Building 49 Remedial Investigation

Photo No. 49
10/03/2007
Insulated sewer line prior to backfilling

Photo No. 50
10/102007
Backfilling around utilities Building 49

Building 49 Remedial Investigation

Photo No.51
10/10/2007
Compaction of gravel around utilities

Photo No. 52
11/14/2007
Building 49 Backfilled

FCS Photograph Log

Remedial Investigation Building 48

Photo No. 1
09/11/2007
Excavation view south

Photo No. 2
09/11/2007
Excavation east of Building 48

Photo No. 3
09/11/2007
Excavation view north

Photo No. 4
09/11/2007
Overpacking drum with liquid

Photo No.5
09/12/2007
Excavating south of electrical utility

Photo No.6
09/12/2007
South central excavation expansion

Photo No.7
09/14/2007
Southern excavation section

Photo No.8
09/14/2007
West view of southern excavation

Excavation Building 48

Photo No.9
09/15/2007
Excavating south of electrical utility

Photo No.10
09/15/2007
West excavation view, removed drums staged on liner

Excavation Building 48

Photo No. 11
09/17/2007
View south, two excavators enlarging sections of excavation

Photo No. 12
09/17/2007
Excavation south of Building 48, north wall

Photo No. 13
09/19/2007
Central section of excavation

Photo No. 14
09/20/2007
Two excavators, view northwest

Excavation Building 48

Photo No. 15
09/20/2007
Expanding Building 48 excavation

Photo No. 16
09/21/2007
Scrap metal pile Building 48

FCS Photograph Log

Excavation Building 48

Photo No. 17
09/21/2007
West wall of excavation

Photo No. 18
09/21/2007
Enlarging excavation, east view

FCS Photograph Log

Excavation Building 48

Photo No. 19
09/22/2007
Scrap metal pile, view west

Photo No. 20
09/22/2007
East excavation wall

Excavation Building 48

Photo No. 21
09/22/2007
View from northwest corner

Photo No. 22
09/22/2007
Southwest corner of excavation

Excavation Building 48

Photo No. 23
09/22/2007
Removing scrap metal at Building 48

Photo No. 24
09/25/2007
Truck bed removed from excavation

Excavation Building 48

Photo No. 25
09/25/2007
Removing liquid solvent drum in excavation

Photo No. 26
09/26/2007
Excavating closer to Building 48 foundation

Excavation Building 48

Photo No. 27
09/26/2007
Enlarging Building 48 excavation

Photo No. 28
09/26/2007
South view of excavation

Excavation Building 48

Photo No. 29
09/27/2007
Excavating toward Building 48

Photo No. 30
09/27/2007
Removing soil pile in excavation with the loader

Excavation Building 48

Photo No. 31
09/28/2007
Using a magnetometer to check excavation floor

Photo No. 32
09/292007
Southwest corner of excavation

FCS Photograph Log

Excavation Building 48

Photo No. 33
09/28/2007
North excavation wall

Photo No. 34
09/28/2007
Solvent drum soil excavation

FCS Photograph Log

Excavation Building 48

Photo No. 35
09/29/2007
Excavating toward Building 48

Photo No. 36
09/29/2007
Northwest corner of excavation

Excavation Building 48

Photo No. 37
09/29/2007
Excavation 48, view west

Photo No. 38
09/30/2007
Southwest corner of excavation and clean stockpile

Excavation Building 48

Photo No. 39
09/30/2007
Continued excavation of solvent drum area

Photo No. 40
10/02/2007
Expanding southwest excavation wall

Excavation Building 48

Photo No. 41
10/03/2007
Removing communications line

Photo No. 42
10/03/2007
Three excavators expanding excavation

Excavation Building 48

Photo No. 43
10/04/2007
South excavation section

Photo No. 44
10/04/2007
Expanding west edge

Excavation Building 48

Photo No. 45
10/04/2007
Excavating main communications line by hand

Photo No. 46
10/04/2007
Exposed communications line south west wall of excavation

Excavation Building 48

Photo No. 47
10/07/2007
Southeast corner of excavation

Photo No. 48
10/08/2007
Clean wall directly south of electrical line

Photo No. 49
10/08/2007
Test pit toward Building 48

Photo No. 50
10/09/2007
Drum removed near electrical utility

Excavation Building 48

Photo No. 51
10/09/2007
Electrical line south excavation

Photo No. 52
10/09/2007
South ramped excavation

Photo No. 1
10/05/2007
Beginning excavation 15, view west

Photo No. 2
10/06/2007
Excavation directly east of job site trailers

Photo No. 3
10/08/2007
View from northern stock pile

Photo No. 4
10/09/2007
Loading scrap metal at Building 15

Photo No. 5
10/10/2007
Progressing south

Photo No. 6
10/10/2007
Metal debris pile

Photo No. 7
10/10/2007
Metal debris in south wall

Photo No. 8
10/11/2007
South wall of excavation

Photo No. 9
10/13/2007
Removing boiler from south wall of excavation

Photo No. 10
10/13/2007
View from northeast corner of excavation

Remedial Investigation Building 15 and 17

Photo No. 11
10/15/2007
Three excavators enlarging excavation, view east

Photo No. 12
10/17/2007
West wall

Photo No. 13
10/17/2007
Fence excavation

Photo No. 14
10/17/2007
Northeast corner

Remedial Investigation Building 15 and 17

Photo No. 15
10/17/2007
East side of the fence area excavation

Photo No. 16
10/18/2007
Northwest edge of excavation

Photo No. 17
10/18/2007
Fence excavation, view east

Photo No. 18
10/20/2007
Test pit 02 near fence corner

Photo No. 19
10/20/2007
Test Pit 03 near fence

Photo No. 20
10/22/2007
Berms and fencing around excavation walls

Remedial Investigation Building 15 and 17

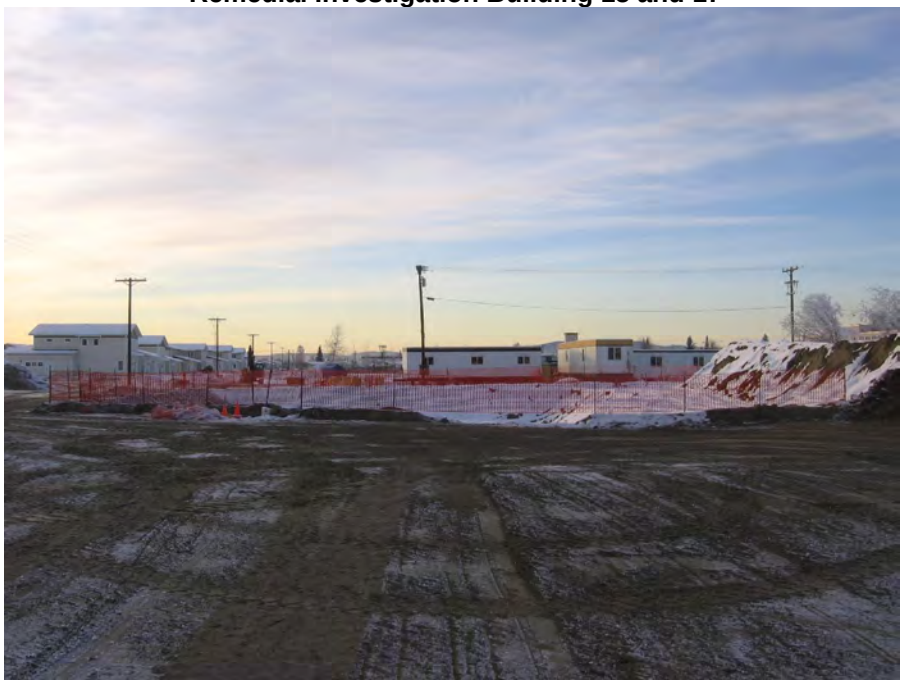

Photo No. 21
10/22/2007
Building 15 secured for winter, view west

Photo No. 22
10/22/2007
Fence area excavation secured for winter

FCS Photograph Log

PCB Removal Action - Hotspots

Photo No. 1
10/16/2007
Excavation at 06SS22,06SB134 and 06SS19

Photo No. 2
10/16/2007
Loading of PCB contaminated soil for removal to stockpiles

PCB Removal Action - Hotspots

Photo No. 3
10/16/2007
Excavation activity in playground area west of main excavation area

Photo No. 4
10/16/2007
Excavation at 06SS22,06SB134 and 06SS19

PCB Removal Action - Hotspots

Photo No. 5
10/25/2007
06SS22,06SB134 and 06SS19 backfilled following confirmation sampling

Photo No. 6
10/25/2007
Hot spot excavation 06SB98. Location of sampling points denoted by flags

PCB Removal Action - Hotspots

Photo No. 7
10/25/2007
06SB98

Photo No. 8
10/25/2007
06SB105 and O6SB98 Backfilled following confirmation sampling

PCB Removal Action - Hotspots

Photo No. 9
10/25/2007
Backfilling activities

Photo No. 10
10/25/2007
06SB71. Excavated to 6 ft bgs

Photo No. 11
10/25/2007
Backfilling of 06SB71

Photo No. 12
10/25/2007
06SB71 Backfilled

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 1
09/20/2007
PCB Area Pre-excavation

Photo No. 2
09/20/2007
Preconstruction sampling. Northern Stockpile

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 3
09/20/2007
Preconstruction southern stockpile

Photo No. 4
09/21/2007
Placing protective geotextile liner prior to excavation to prevent spreading of contamination

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 5
09/21/2007
Plastic covering placed over most contaminated area prior to removal

Photo No. 6
09/21/2007
Protective fabric and equipment setup during 1-10 mg/kg PCB removal

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 7
09/21/2007
Excavation Activities Northern area of Main excavation

Photo No. 8
09/22/2007
1-10 mg/kg PCB stockpile

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 9
09/22/2007
Tipping of material removed from Northern Excavation

Photo No. 10
09/22/2007
Staking sampling points in Northern Excavation

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 11
09/22/2007
Northern Excavation – Approximately 3 ft bgs

Photo No. 12
09/26/2007
Northern Excavation partially complete

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 13
09/26/2007
Sampling layout of northern stockpile. Safety station for PCB excavation in forground

Photo No. 14
09/26/2007
Supervision of excavation in southern area of main excavation

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 15
09/26/2007
Sampling of northern Stockpile

Photo No. 16
09/27/2007
Removal of soil previously identified as being over 10 mg/kg PCB

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 17
09/27/2007
Central Area of excavation and removal into intermodal bulk container.

Photo No. 18
09/27/2007
Central Area of excavation. Partial removal of plastic covering

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 19
09/28/2007
Supervision of removal of soil in central area. Metal removed.

Photo No. 20
10/01/2007
Southern area of excavation in foreground removal of soil from central area in background...

PCB Removal Action – Main Excavation Building 52 Footprint

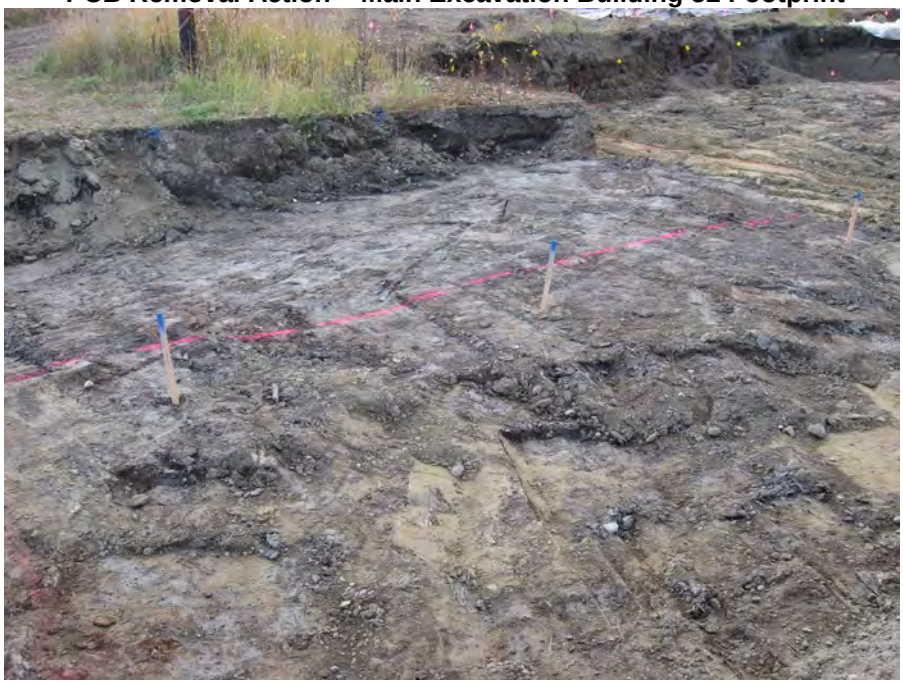

Photo No. 21
10/03/2007
Northern Excavation staked and marked for sampling.

Photo No. 22
10/03/2007
Excavation in eastern area.

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 23
10/04/2007
Central area showing power pole in center

Photo No. 24
10/04/2007
Power pole found in central excavation.

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 25
10/04/2007
Close up of power pole

Photo No. 26
10/09/2007
Removal of power pole.

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 27
09/10/2007
Power pole removed to intermodal bulk container

Photo No. 28
10/10/2007
Excavation activities.

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 29
10/10/2007
Additional excavation eastern area.

Photo No. 30
10/16/2007
Deep excavation central area..

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 31
10/18/2007
Eastern stockpile

Photo No. 32
10/18/2007
Removal of more than 10 mg/kg PCB soil from stockpiles

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 33
10/23/2007
Wooded fragments of possible power pole northern excavation

Photo No. 34
10/23/2007
Northern excavation possible power pole

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 35
10/23/2007
Additional excavation of more than 10 mg/kg soil from northern area

Photo No. 36
10/23/2007
Additional excavation northern area

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 37
10/25/2007
Flagged sample points eastern excavation

Photo No. 38
10/27/2007
Infilling of southern area

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 39
10/27/2007
Compaction of imported gravel

Photo No. 40
10/27/2007
Tipping Imported clean backfill

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 41
10/27/2007
Additional excavation central area southern wall

Photo No. 42
10/28/2007
Additional excavation eastern area. Exclusion Fence in background

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 43
09/14/2007
Additional excavation northern area. Frozen soil blocks

Photo No. 44
11/01/2007
Groundwater encountered 14 bgs central area.

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 45
11/01/2007
Additional excavation Northern area.

Photo No. 46
11/02/2007
Compaction of backfill material.

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 47
11/06/2007
Removal of >10 mg/kg PCB soil from stockpile to intermodal bulk containers

Photo No. 48
11/06/2007
Removal of > 10 mg/kg PCB soil from stockpile to intermodal bulk containers

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No. 49
11/07/2007
Removal of > 10 mg/kg PCB soil from stockpile to intermodal bulk containers

Photo No. 50
11/07/2007
Intermodal Bulk container covering station

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No.51
11/07/2007
Guiding intermodal bulk container for covering

Photo No. 52
11/01/2007
Intermodal Bulk containers stored on site prior to removal to TDSF

PCB Removal Action – Main Excavation Building 52 Footprint

Photo No.51
11/09/2007
Stockpikle secured for winter

PCB Removal and Backfilling – Transformer Service Area (TSA)

Photo No. 1
10/02/2007
Excavation Activity at the TSA. Excavation occurring from top of eastern sound berm

Photo No. 2
10/02/2007
Excavation at TSA.

PCB Removal and Backfilling – Transformer Service Area (TSA)

Photo No. 3
10/13/2007
Excavation of 06SB15 Immediately east of site boundary

Photo No. 4
10/13/2007
Excavation of 06SB15

PCB Removal and Backfilling – Transformer Service Area (TSA)

Photo No. 5
10/26/2007
06SB05, 06SB07 and 06SB08 Backfilling Activities

Photo No. 6
10/26/2007
06SB14 Backfilled

PCB Removal and Backfilling – Transformer Service Area (TSA)

Photo No. 7
10/26/2007
Backfilling Activities TSA

Photo No. 8
10/26/2007
Backfilling of 06SB15

PCB Removal and Backfilling – Transformer Service Area (TSA)

Photo No. 9
10/26/2007
Backfilled TSA

Photo No. 10
10/26/2007
Backfilling activities TSA

PCB Removal and Backfilling – Transformer Service Area (TSA)

Photo No. 11
10/26/2007
Over view of TSA Area

Photo No. 12
10/26/2007
Accessing eastern side of boundary fence

FCS Photograph Log

Removal Of Vegetation

Photo No. 1
07/19/2007
Vegetation prior to removal. north east FCS

Photo No. 2
07/19/2007
Removal of vegetation north east FCS

FCS Photograph Log

Removal Of Vegetation

Photo No. 3
07/19/2007
Vegetation removed east of site boundary

Photo No. 4
07/19/2007
Removal of Vegetation Central FCS

PCB Removal and Backfilling – Transformer Service Area (TSA)

Photo No. 1
11/14/2007
Deconstructing tarping station in staging area south of site

Photo No. 2
11/14/2007
Demobing equipment.

PCB Removal and Backfilling – Transformer Service Area (TSA)

Photo No. 3
11/14/2007
Equipment stored on site over winter

Photo No. 4
11/14/2007
Demobing trailers

PCB Removal and Backfilling – Transformer Service Area (TSA)

Photo No. 5
10/26/2007
Drums stored in DERA heated building over winter

ATTACHMENT A-2

Photograph Log, 2008

Attachment A2 - 2008 Photo Log

A. 10% QC Check of EM61 Survey

Photo #	Date	Subject
1	08/29/2008	Example of type of material recovered from 10 % EM61 Check
2	08/29/2008	QC check of grid east of Building 19
3	09/04/2008	Building 38
4	09/04/2008	Material recovered form Excavation at Building 38
5	09/04/2008	Building 43
6	09/04/2008	Material recovered from Building 48
7	09/04/2008	QC check between Buildings 33 and 34. Note shallow excavation depth
8	09/04/2008	Excavating at between Buildings 33 and 34
9	09/04/2008	Building 42
10	09/04/2008	Excavated area at Building 42 – nothing recovered
11	09/04/2008	QC Check North of Building 11
12	09/04/2008	QC check north of Building 11
13	09/04/2008	Material recovered from QC check in north of Building 11
14	09/04/2008	Excavation at QC check north of Building 11
15	09/04/2008	QC Check between Buildings 60 and 36
16	09/04/2008	QC check between Buildings 36 and 60
17	09/04/2008	Material recovered from QC check between buildings 36 and 60
18	09/04/2008	Material recovered from QC check between buildings 36 and 60

B. Building 22/24 Excavation

Photo #	Date	Subject
1	06/24/2008	105 and 75mm Howitzer Shipping Containers removed from Building 22/24 excavation
2	06/24/2008	Furnace removed from Building 22/24 excavation
3	06/24/2008	Loading metal debris from excavation for transport to recyclable scrap pile
4	06/24/2008	M11 Series Practice Rifle Grenade removed from Building 22/24 excavation
5	07/19/2008	Sifting excavated material for MEC and other debris
6	08/14/2008	Metal debris in Building 22/24 excavation
7	08/14/2008	Small fuel container removed from Building 22/24 excavation
8	08/14/2008	Contaminated soil being temporarily staged prior to disposal
9	08/14/2008	Removing debris from soil removed from Building 22/24 excavation
10	08/14/2008	Removing debris from soil removed from Building 22/24 excavation
11	08/14/2008	Empty drum removed from Building 22/24 excavation
12	08/14/2008	Loading out scrap metal removed from Building 22/24 excavation
13	08/15/2008	Various MEC items and license plates removed from Building 22/24 excavation
14	08/15/2008	License plates removed from Building 22/24 excavation
15	08/15/2008	Wetting excavation for dust control measures
16	08/16/2008	Containerizing contaminated removed from Building 22/24 excavation
17	08/16/2008	Dry transformer removed from Building 22/24 excavation
18	08/16/2008	Sifting soil at Building 22/24 excavation
19	08/18/2008	Loading wire removed from Building 22/24 excavation
20	08/18/2008	Wire and various debris removed from Building 22/24 excavation
21	08/18/2008	Four excavators working Building 22/24 excavation
22	08/19/2008	Excavation sidewall near Building 22
23	08/19/2008	Various MEC removed from Building 22/24 excavation
24	08/19/2008	Various MEC removed from Building 22/24 excavation
25	08/19/2008	Overpacks containing waste removed from Building 22/24 excavation

26	08/21/2008	Using metal detector in Building 22/24 excavation
27	08/23/2008	3.5-inch M29 Practice Rocket removed from Building 22/24 excavation
28	09/12/2008	M10 Airplane Smoke Tank removed from Building 22/24 excavation
29	09/13/2008	Performing Schonstedt survey to locate remaining metal debris in excavation
30	09/13/2008	Grading Building 22/24 excavation
31	09/16/2008	Finished excavation at Building 22/24
32	09/16/2008	Inspecting manhole near Building 22/24 excavation
33	9/16/2008	Sample locations in Building 22/24 excavation
34	09/22/2008	Clean soil pile from Building 22/24 excavation

C. Building 11 DDT Hotspot Excavation

Photo #	Date	Subject
1	09/17/2008	DDT-contaminated waste soil containerized in Super Sacks
2	09/17/2008	Building 11 DDT excavation boundaries
3	09/17/2008	Transporting Super Sack for staging
4	09/17/2008	Prepping to transport waste soil from Building 11 DDT excavation

D. Building 15/17 Excavation

Photo #	Date	Subject
1	07/26/2008	Exposed utilities showing debris underneath
2	06/21/2008	Empty drum cleaned to exposed hole at top
3	05/28/2008	Moving fence to expand Building 15/17 Excavation North
4	06/20/2008	Screening process demonstrated at Building 15/17
5	06/20/2008	L-R - Rocket fin, 50 cal, wind shield for 3.5'' rocket, 3.5'' M29 Rocket and 75 mm recoilless rifle cartridge
6	06/21/2008	Removing march matting at other debris from North of Building 17
7	06/21/2008	Excavators working concurrently at Building 15/17
8	06/21/2008	Example of type of scrap removed, mainly composed of marsh matting
9	06/21/2008	Working north of Building 15 and 17
10	06/21/2008	Excavating six inch lifts so MEC can be screened
11	06/26/2008	Two excavators working concurrently at Building 15/17 on the night shift due to HFD
12	06/27/2008	Scrap piled north of Building 15 for later removal to main scrap pile
13	06/30/2008	Excavating carefully around utilities and cordoned off excavation
14	06/30/2008	Excavation cordoned off following completion of activities for the day
15	06/30/2008	Looking north at partially complete excavation
16	06/30/2008	Building 15 Excavation showing soil piles in Background
17	06/30/2008	North of Building 15
18	06/30/2008	Main stockpile at Building 15 Excavation
19	06/30/2008	Overpacks staged near excavation
20	06/30/2008	Looking west across Building 15 Excavation
21	06/30/2008	Small Shallow excavation north of the main excavation
22	06/30/2008	Shallow excavation north of main excavation
23	07/24/2008	Removing casing from utility pipes following turning off the power
24	07/24/2008	Seeded soil piles
25	07/26/2008	Removing scrap from immediately adjacent to Building 15
26	07/26/2008	Large Furnace removed from immediately adjacent to building 15
27	08/11/2008	Completed Building 15/17 Excavation
28	08/12/2008	Preparing fro sampling excavation
29	08/12/2008	Sampling Excavation

30	11/11/2008	Lifting power pole to remove debris underneath
31	11/11/2008	Using man lift to stabilize power pole
32	11/11/2008	Lifting power lines prior to removing pole
33	11/11/2008	Reinstallation of utilities

E. Building 40 POL Excavation

Photo #	Date	Subject
1	08/22/2008	Hand-shoveling POL-contaminated soil at Building 40
2	08/22/2008	Placing tarp for loader to drive on at Building 40
3	08/22/2008	Positioning loader for soil removal
4	08/22/2008	Shoveling POL-contaminated soil into loader for transport to soil cell

F. DRMO Soil Removal

Photo #	Date	Subject
1	09/18/2008	Loading side-dump with soil from south POL stockpile
2	09/19/2008	Loading side-dump with soil from north POL stockpile
3	09/22/2008	Sampling former location of north POL stockpile
4	10/16/2008	Prepping bin for loading of soil from DDT stockpile
5	10/16/2008	Removing bin cover
6	10/16/2008	Lining bin to prepare for soil loading at DDT stockpile
7	10/16/2008	Loading bin with soil from DDT stockpile
8	10/17/2008	Covering bin after loading
9	10/17/2008	DDT stockpile at approximately 50% removal
10	10/17/2008	Removing cover for DDT stockpile
11	11/10/2008	Location of DDT stockpile following completion of removal

G. Groundwater Monitoring Well Installation

Photo #	Date	Subject
1	09/30/2008	Drilling at MW79
2	10/02/2008	Opening split-spoon for soil characterization
3	10/02/2008	2.5-foot split spoon sample
4	10/02/2008	Decontamination of split-spoon and containerization of waste
5	10/02/2008	Well installation at MW78

H. Investigation of EM61 Hotspots Exceeding 75mV

Photo #	Date	Subject
1	6/27/2008	Overpacks staged for waste containerization
2	8/21/2008	Beginning of excavation at Building 26
3	8/21/2008	Building 26 excavation continued
4	8/21/2008	Sifting soil for MEC and debris at Building 26
5	8/27/2008	Beginning excavation at Building 12
6	8/27/2008	Building 12 excavation continued
7	8/27/2008	Typical debris (metal banding) removed from Building 12 excavation
8	8/27/2008	Creosote-soaked lumber in Building 12 excavation
9	8/29/2008	Metal debris removed at Building 26
10	8/29/2008	Airplane engine parts removed from Building 26 excavation

Attachment A2 - 2008 Photo Log

I. Offsite Soil Stockpile

Photo #	Date	Subject
1	09/26/2008	Preparing to excavate Offsite soil stockpile
2	09/26/2008	Cover removed from Offsite soil stockpile
3	09/26/2008	Containerizing soil from Offsite stockpile in Super Sacks
4	09/26/2008	Containerizing soil from Offsite stockpile in Super Sacks continued
5	09/26/2008	Offsite stockpile during soil removal
6	09/26/2008	Securing Super Sack

J. Area D Excavation

Photo #	Date	Subject
1	6/14/2008	Preparing to install GORE module to monitor soil gas
2	6/14/2008	GORE installation and sampling grid
3	8/6/2008	Beginning excavation in Area D
4	8/6/2008	Setting up for excavation and screening soil in Area D
5	8/6/2008	Clearing operations in Area D
6	8/6/2008	Uncovering drum in Area D
7	8/7/2008	Drums and Debris removed from Area D
8	8/8/2008	Drums with residual contents staged in Area D
9	8/7/2008	Sound Berm removal at Area D
10	8/7/2008	M38A Smoke Streamer Bomb Case at Area D
11	8/7/2008	Field screening drum in Area D excavation
12	8/7/2008	Loading crushed and empty drums for disposal
13	8/7/2008	Containerizing drum with residual contents
14	8/12/2008	Sifting and prepping for Schonstedt Survey

K. Building 9 Excavation

Photo #	Date	Subject
1	8/20/2008	Beginning of excavation activity Building 9
2	8/20/2008	Excavation boundaries at Building 9
3	8/20/2008	Containerizing soil at Building 9
4	8/20/2008	Completed excavation and sample locations at Building 9

L. PCB Area

Photo #	Date	Subject
1	06/05/2008	Removing liners covering soil piles.
2	06/05/2008	Removing PCB 1-10 mg/kg stockpiles
3	06/05/2008	Removing northern stockpile
4	06/06/2008	Removing Stockpile to landfill
5	06/07/2008	Stockpile prior to removal
6	06/07/2008	Removing liner at base of stockpile.
7	06/14/2008	Excavating by hand around utilities
8	07/21/2008	Loading trucks with 1-10 mg/kg PCB soil
9	07/21/2008	Exposed utility in northern area of excavation
10	07/21/2008	Backfilling Excavation
11	07/26/2008	Hotspot PLG SE2
12	07/26/2008	PLG SE1
13	08/15/2008	Playground Equipment Removed to Landfill

Attachment A2 - 2008 Photo Log

M. Soil Piles

Photo #	Date	Subject
1	05/30/2008	Loading soil pile 06SP13.
2	06/03/2008	View of several soil piles in NW corner of site.
3	06/03/2008	Wetting 06SP06 for dust control.
4	06/04/2008	Soil pile material at landfill.
5	06/10/2008	Excavating 06SP06.
6	07/18/2008	06SP06 partially removed.

N. Waste Activities

Photo #	Date	Subject
1	05/30/2008	Stockpiling soil at Ft Wainwright Landfill
2	05/30/2008	Spraying to reduce dust
3	07/15/2008	Asbestos Area with Asbestos packaged for disposal
4	07/15/2008	Packaging Asbestos furnaces for disposal
5	07/15/2008	Asbestos packages
6	08/05/2008	Moving Drums
7	08/16/2008	Transporting tar drums to Ft Wainwright Landfill
8	08/16/2008	Preparing Tar drum for wrapping
9	08/21/2008	Overpacks ready to move to waste storage area
10	08/23/2008	Sampling waste
11	10/01/2008	Contaminated soil stockpile at End of Season
12	10/16/2008	Drill cuttings and waste water stored in DERA Building
13	10/16/2008	Waste packages and stored at end of season in DERA Facility

FCS Photograph Log

10% QC Check of EM61 Survey

Photo No. 1
08/29/2008
Example of type of material recovered from 10 % EM61 Check

Photo No. 2
08/29/2008
QC check of grid east of Building 19.

FCS Photograph Log

10% QC Check of EM61 Survey

Photo No. 3
09/04/2008
Building 38

Photo No. 4
09/04/2008
Material recovered form Excavation at Building 38.

FCS Photograph Log

10% QC Check of EM61 Survey

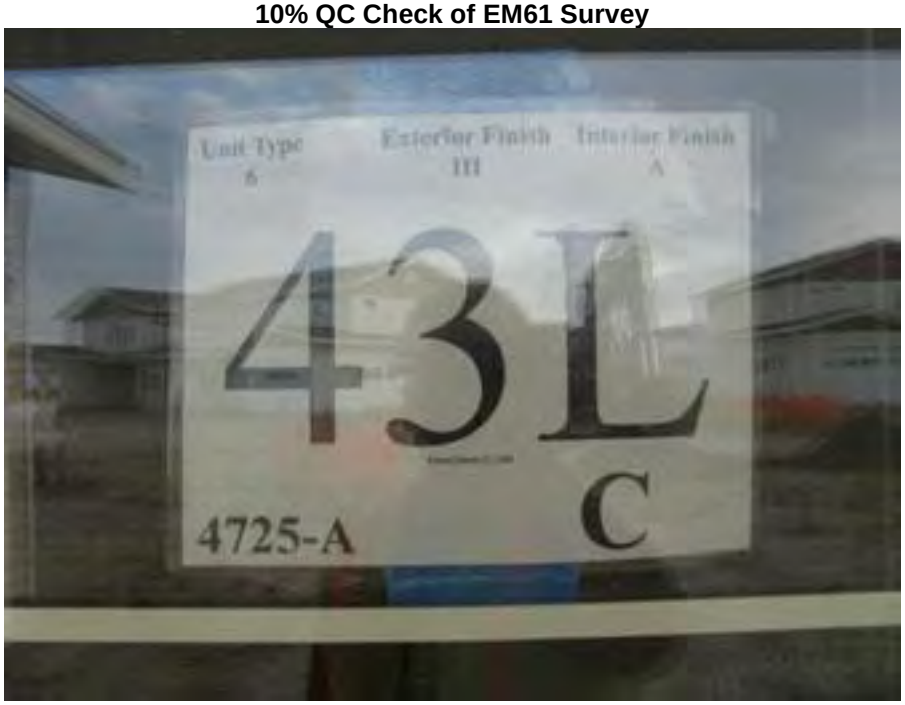

Photo No. 5
09/04/2008
Building 43.

Photo No. 6
09/04/2008
Material recovered from Building 48

FCS Photograph Log

10% QC Check of EM61 Survey

Photo No. 7
09/04/2008
QC check between Buildings 33 and 34. Note shallow excavation depth.

Photo No. 8
09/04/2008
Excavating at between Buildings 33 and 34.

FCS Photograph Log

10% QC Check of EM61 Survey

Photo No. 9
09/04/2008
Building 42

Photo No. 10
09/04/2008
Excavated area at Building 42 – nothing recovered

FCS Photograph Log

10% QC Check of EM61 Survey

Photo No. 11
09/04/2008
QC Check North of Building 11

Photo No. 12
09/04/2008
QC check north of Building 11

FCS Photograph Log

10% QC Check of EM61 Survey

Photo No. 13
09/04/2008
Material recovered from QC check in north of

Photo No. 14
09/04/2008
Excavation at QC check north of Building 11

FCS Photograph Log

10% QC Check of EM61 Survey

Photo No. 15
09/04/2008
QC Check between Buildings 60 and 36

Photo No. 16
09/04/2008
QC check between Buildings 36 and 60

FCS Photograph Log

10% QC Check of EM61 Survey

Photo No. 17
09/04/2008
Material recovered from QC check between buildings 36 and 60

Photo No. 18
09/04/2008
Material recovered from QC check between buildings 36 and 60

FCS Photograph Log

Building 22/24 Investigation

Photo No. 1
06/24/2008
105 and 75mm Howitzer Shipping Containers removed from Building 22/24 excavation.

Photo No. 2
06/24/2008
Furnace removed from Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 3
06/24/2008
Loading metal debris from excavation for transport to recyclable scrap pile.

Photo No. 4
06/24/2008
M11 Series Practice Rifle Grenade removed from Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 5
07/19/2008
Sifting excavated material for MEC and other debris.

Photo No. 6
08/14/2008
Metal debris in Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 7
08/14/2008
Small fuel container removed from Building 22/24 excavation.

Photo No. 8
08/14/2008
Contaminated soil being temporarily staged prior to disposal.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 9
08/14/2008
Removing debris from soil removed from Building 22/24 excavation.

Photo No. 10
08/14/2008
Removing debris from soil removed from Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 11
08/14/2008
Empty drum removed from Building 22/24 excavation.

Photo No. 12
08/14/2008
Loading out scrap metal removed from Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 13
08/15/2008
Various MEC items and license plates removed from Building 22/24 excavation.

Photo No. 14
08/15/2008
License plates removed from Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 15
08/15/2008
Wetting excavation for dust control measures.

Photo No. 16
08/16/2008
Containerizing contaminated removed from Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 17
08/16/2008
Dry transformer removed from Building 22/24 excavation.

Photo No. 18
08/16/2008
Sifting soil at Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 19
08/18/2008
Loading wire removed from Building 22/24 excavation.

Photo No. 20
08/18/2008
Wire and various debris removed from Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 21
08/18/2008
Four excavators working Building 22/24 excavation.

Photo No. 22
08/19/2008
Excavation sidewall near Building 22.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 23
08/19/2008
Various MEC removed from Building 22/24 excavation.

Photo No. 24
08/19/2008
Various MEC removed from Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 25
08/19/2008
Overpacks containing waste removed from Building 22/24 excavation.

Photo No. 26
08/21/2008
Using metal detector in Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 27
08/23/2008
3.5-inch M29 Practice Rocket removed from Building 22/24 excavation.

Photo No. 28
09/12/2008
M10 Airplane Smoke Tank removed from Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 29
09/13/2008
Performing Schonstedt survey to locate remaining metal debris in excavation.

Photo No. 30
09/13/2008
Grading Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 31
09/16/2008
Finished excavation at Building 22/24.

Photo No. 32
09/16/2008
Inspecting manhole near Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

Photo No. 33
9/16/2008
Sample locations in Building 22/24 excavation.

Photo No. 34
09/22/2008
Clean soil pile from Building 22/24 excavation.

FCS Photograph Log

Building 22/24 Investigation

FCS Photograph Log

Building 11 DDT Soil Removal

Photo No. 1
09/17/2008
DDT-contaminated waste soil containerized in Super Sacks.

Photo No. 2
09/17/2008
Building 11 DDT excavation boundaries.

FCS Photograph Log

Building 11 DDT Soil Removal

Photo No. 3
09/17/2008
Transporting Super Sack for staging.

Photo No. 4
09/17/2008
Prepping to transport waste soil from Building 11 DDT excavation.

FCS Photograph Log

Building 15/17 Investigation

Photo No. 1
07/26/2008
Exposed utilities showing debris underneath

Photo No. 2
06/21/2008
Empty drum cleaned to exposed hole at top.

FCS Photograph Log

Building 15/17 Investigation

Photo No. 3
05/28/2008
Moving fence to expand Building 15/17 Excavation North

Photo No. 4
06/20/2008
Screening process demonstrated at Building 15/17

FCS Photograph Log

Building 15/17 Investigation

Photo No. 5
06/20/2008
L-R - Rocket fin, 50 cal, wind shield for 3.5'' rocket, 3.5'' M29 Rocket and 75 mm recoilless rifle cartridge

Photo No. 6
06/21/2008
Removing march matting at other debris from North of Building 17

FCS Photograph Log

Building 15/17 Investigation

Photo No. 7
06/21/2008
Excavators working concurrently at Building 15/17

Photo No. 8
06/21/2008
Example of type of scrap removed, mainly composed of marsh matting

FCS Photograph Log

Building 15/17 Investigation

Photo No. 9
06/21/2008
Working north of Building 15 and 17

Photo No. 10
06/21/2008
Excavating six inch lifts so MEC can be screened

FCS Photograph Log

Building 15/17 Investigation

Photo No. 11
06/26/2008
Two excavators working concurrently at Building 15/17 on the night shift due to HFD

Photo No. 12
06/27/2008
Scrap piled north of Building 15 for later removal to main scrap pile

FCS Photograph Log

Building 15/17 Investigation

Photo No. 13
06/30/2008
Excavating carefully around utilities and cordoned off excavation

Photo No. 14
06/30/2008
Excavation cordoned off following completion of activities for the day

FCS Photograph Log

Building 15/17 Investigation

Photo No. 15
06/30/2008
Looking north at partially complete excavation

Photo No. 16
06/30/2008
Building 15 Excavation showing soil piles in Background

FCS Photograph Log

Building 15/17 Investigation

Photo No. 17
06/30/2008
North of Building 15.

Photo No. 18
06/30/2008
Main stockpile at Building 15 Excavation

FCS Photograph Log

Building 15/17 Investigation

Photo No. 19
06/30/2008
Overpacks staged near excavation

Photo No. 20
06/30/2008
Looking west across Building 15 Excavation

FCS Photograph Log

Building 15/17 Investigation

Photo No. 21
06/30/2008
Small Shallow excavation north of the main excavation

Photo No. 22
06/30/2008
Shallow excavation north of main excavation

FCS Photograph Log

Building 15/17 Investigation

Photo No. 23
07/24/2008
Removing casing from utility pipes following turning off the power.

Photo No. 24
07/24/2008
Seeded soil piles

FCS Photograph Log

Building 15/17 Investigation

Photo No. 25
07/26/2008
Removing scrap from immediately adjacent to Building 15

Photo No. 26
07/26/2008
Large Furnace removed from immediately adjacent to building 15

FCS Photograph Log

Building 15/17 Investigation

Photo No. 27
08/11/2008
Completed Building 15/17 Excavation

Photo No. 28
08/12/2008
Preparing fro sampling excavation

FCS Photograph Log

Building 15/17 Investigation

Photo No. 29
08/12/2008
Sampling Excavation

Photo No. 30
11/11/2008
Lifting power pole to remove debris underneath.

FCS Photograph Log

Building 15/17 Investigation

Photo No. 31
11/11/2008
Using man lift to stabilize power pole.

Photo No. 32
11/11/2008
Lifting power lines prior to removing pole

FCS Photograph Log

Building 15/17 Investigation

Photo No. 33
11/11/2008
Reinstallation of utilities

FCS Photograph Log

Building 40 POL Soil Removal

Photo No. 1
08/22/2008
Hand-shoveling POL-contaminated soil at Building 40.

Photo No. 2
08/22/2008
Placing tarp for loader to drive on at Building 40.

FCS Photograph Log

Building 40 POL Soil Removal

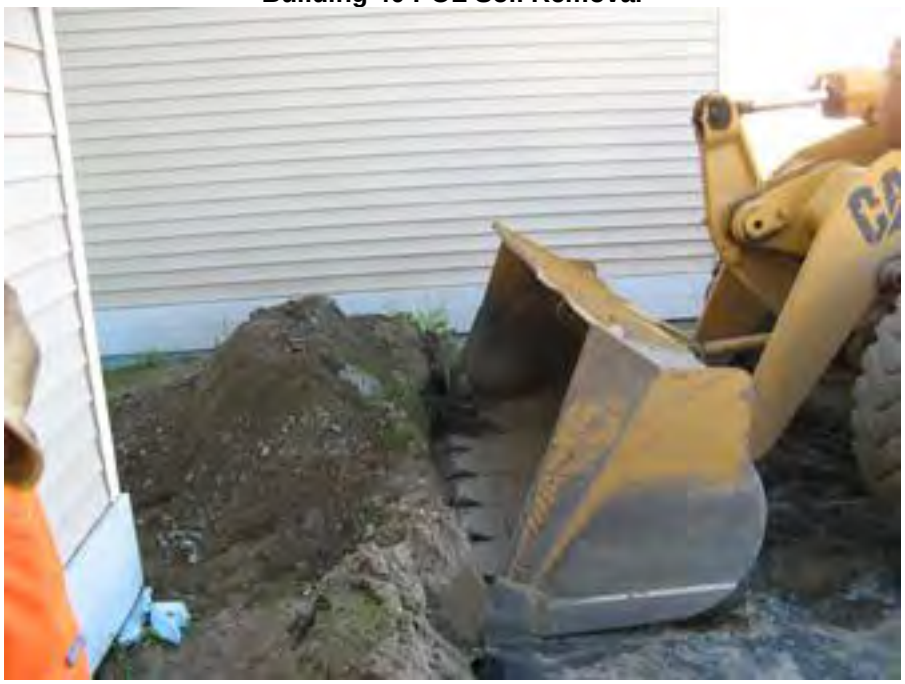

Photo No. 3
08/22/2008
Positioning loader for soil removal.

Photo No. 4
08/22/2008
Shoveling POL-contaminated soil into loader for transport to soil cell.

FCS Photograph Log

DRMO Contaminated Soil Pile Removal

Photo No. 1
09/18/2008
Loading side-dump with soil from south POL stockpile.

Photo No. 2
09/19/2008
Loading side-dump with soil from north POL stockpile.

FCS Photograph Log

DRMO Contaminated Soil Pile Removal

Photo No. 3
09/22/2008
Sampling former location of north POL stockpile.

Photo No. 4
10/16/2008
Prepping bin for loading of soil from DDT stockpile.

FCS Photograph Log

DRMO Contaminated Soil Pile Removal

Photo No. 5
10/16/2008
Removing bin cover.

Photo No. 6
10/16/2008
Lining bin to prepare for soil loading at DDT stockpile.

FCS Photograph Log

DRMO Contaminated Soil Pile Removal

Photo No. 7
10/16/2008
Loading bin with soil from DDT stockpile.

Photo No. 8
10/17/2008
Covering bin after loading.

FCS Photograph Log

DRMO Contaminated Soil Pile Removal

Photo No. 9
10/17/2008
DDT stockpile at approximately 50% removal.

Photo No. 10
10/17/2008
Removing cover for DDT stockpile.

FCS Photograph Log

DRMO Contaminated Soil Pile Removal

Photo No. 11
11/10/2008
Location of DDT stockpile following completion of removal.

FCS Photograph Log

Groundwater Monitoring

Photo No. 1
09/30/2008
Drilling at MW79.

Photo No. 2
10/02/2008
Opening split-spoon for soil characterization.

FCS Photograph Log

Groundwater Monitoring

Photo No. 3
10/02/2008
2.5-foot split spoon sample.

Photo No. 4
10/02/2008
Decontamination of split-spoon and containerization of waste.

FCS Photograph Log

Groundwater Monitoring

Photo No. 5
10/02/2008
Well installation at MW78.

FCS Photograph Log

Investigation of EM61 Hotspots Exceeding 75mV

Photo No. 1
6/27/2008
Overpacks staged for waste containerization.

Photo No. 2
8/21/2008
Beginning of excavation at Building 26.

Investigation of EM61 Hotspots Exceeding 75mV

Photo No. 3
8/21/2008
Building 26 excavation continued.

Photo No. 4
8/21/2008
Sifting soil for MEC and debris at Building 26.

Investigation of EM61 Hotspots Exceeding 75mV

Photo No. 5
8/27/2008
Beginning excavation at Building 12.

Photo No. 6
8/27/2008
Building 12 excavation continued.

Investigation of EM61 Hotspots Exceeding 75mV

Photo No. 7
8/27/2008
Typical debris (metal banding) removed from Building 12 excavation.

Photo No. 8
8/27/2008
Creosote-soaked lumber in Building 12 excavation.

Investigation of EM61 Hotspots Exceeding 75mV

Photo No. 9
8/29/2008
Metal debris removed at Building 26.

Photo No. 10
8/29/2008
Airplane engine parts removed from Building 26 excavation.

FCS Photograph Log

Removal of Offsite Stockpile

Photo No. 1
09/26/2008
Preparing to excavate Offsite soil stockpile.

Photo No. 2
09/26/2008
Cover removed from Offsite soil stockpile.

FCS Photograph Log

Removal of Offsite Stockpile

Photo No. 3
09/26/2008
Containerizing soil from Offsite stockpile in Super Sacks.

Photo No. 4
09/26/2008
Containerizing soil from Offsite stockpile in Super Sacks continued.

FCS Photograph Log

Removal of Offsite Stockpile

Photo No. 5
09/26/2008
Offsite stockpile during soil removal.

Photo No. 6
09/26/2008
Securing Super Sack.

FCS Photograph Log

Area D

Photo No. 1
6/14/2008
Preparing to install GORE module to monitor soil gas

Photo No. 2
6/14/2008
GORE installation and sampling grid

Area D

Photo No. 3
8/6/2008
Beginning excavation in Area D

Photo No. 4
8/6/2008
Setting up for excavation and screening soil in Area D

FCS Photograph Log

Area D

Photo No. 5
8/6/2008
Clearing operations in Area D

Photo No. 6
8/6/2008
Uncovering drum in Area D

Area D

Photo No. 7
8/7/2008
Drums and Debris removed from Area D

Photo No. 8
8/8/2008
Drums with residual contents staged in Area D

Area D

Photo No. 9
8/7/2008
Sound Berm removal at Area D

Photo No. 10
8/7/2008
M38A Smoke Streamer Bomb Case at Area D

Area D

Photo No. 11
8/7/2008
Field screening drum in Area D excavation

Photo No. 12
8/7/2008
Loading crushed and empty drums for disposal

Area D

Photo No. 13
8/7/2008
Containerizing drum with residual contents

Photo No. 14
8/12/2008
Sifting and prepping for Schonstedt Survey

Area D

FCS Photograph Log

Building 9 POL Investigation

Photo No. 1
8/20/2008
Beginning of excavation activity Building 9.

Photo No. 2
8/20/2008
Excavation boundaries at Building 9.

Building 9 POL Investigation

Photo No. 3
8/20/2008
Containerizing soil at Building 9.

Photo No. 4
8/22/2008
Completed excavation and sample locations at Building 9.

FCS Photograph Log

PCB Area

Photo No. 1
06/05/2008
Removing liners covering soil piles.

Photo No. 2
06/05/2008
Removing PCB 1-10 mg/kg stockpiles

FCS Photograph Log

PCB Area

Photo No. 3
06/05/2008
Removing northern stockpile

Photo No. 4
06/06/2008
Removing Stockpile to landfill

FCS Photograph Log

PCB Area

Photo No. 5
06/07/2008
Stockpile prior to removal

Photo No. 6
06/07/2008
Removing liner at base of stockpile.

FCS Photograph Log

PCB Area

Photo No. 7
06/14/2008
Excavating by hand around utilities

Photo No. 8
07/21/2008
Loading trucks with 1-10 mg/kg PCB soil

FCS Photograph Log

PCB Area

Photo No. 9
07/21/2008
Exposed utility in northern area of excavation

Photo No. 10
07/21/2008
Backfilling Excavation

FCS Photograph Log

PCB Area

Photo No. 11
07/26/2008
Hotspot PLG SE2

Photo No. 12
07/26/2008
PLG SE1

FCS Photograph Log

PCB Area

Photo No. 13
08/15/2008
Playground Equipment Removed to Landfill

FCS Photograph Log

Soil Piles

Photo No. 1
05/30/2008
Loading soil pile 06SP13.

Photo No. 2
06/03/2008
View of several soil piles in NW corner of site.

FCS Photograph Log

Soil Piles

Photo No. 3
06/03/2008
Wetting 06SP06 for dust control.

Photo No. 4
06/04/2008
Soil pile material at landfill.

FCS Photograph Log

Soil Piles

Photo No. 5
06/10/2008
Excavating 06SP06.

Photo No. 6
07/18/2008
06SP06 partially removed.

FCS Photograph Log

Waste Activities

Photo No. 1
05/30/2008
Stockpiling soil at Ft Wainwright Landfill

Photo No. 2
05/30/2008
Spraying to reduce dust

FCS Photograph Log

Waste Activities

Photo No. 3
07/15/2008
Asbestos Area with Asbestos packaged for disposal

Photo No. 4
07/15/2008
Packaging Asbestos furnaces for disposal

FCS Photograph Log

Waste Activities

Photo No. 5
07/15/2008
Asbestos packages

Photo No. 6
08/05/2008
Moving Drums

FCS Photograph Log

Waste Activities

Photo No. 7
08/16/2008
Transporting tar drums to Ft Wainwright Landfill

Photo No. 8
08/16/2008
Preparing Tar drum for wrapping

FCS Photograph Log

Waste Activities

Photo No. 9
08/21/2008
Overpacks ready to move to waste storage area

Photo No. 10
08/23/2008
Sampling waste

FCS Photograph Log

Waste Activities

Photo No. 11
10/01/2008
Contaminated soil stockpile at End of Season

Photo No. 12
10/16/2008
Drill cuttings and waste water stored in DERA Building

FCS Photograph Log

Waste Activities

Photo No. 13
10/16/2008
Waste packages and stored at end of season in DERA Facility

ATTACHMENT A-3

Photograph Log, 2009

Attachment A3: 2009 Photo Log

A. Building 15/17 Excavation and Backfill

Photo Number	Date	Subject
1	6/3/2009	Building 15/17 excavation
2	6/3/2009	UXO technetium guiding excavation at building 15/17
3	6/3/2009	Metal debris in excavation
4	6/3/2009	Drum removed from building 15/17 excavation
5	6/3/2009	Loading waste soil from excavation
6	6/4/2009	Excavation activities
7	6/4/2009	Geophysical survey of excavation
8	6/5/2009	Schonstedt and EM61 surveys
9	6/5/2009	Monitoring well found in excavation
10	6/8/2009	Monitoring well determined abandoned and removed
11	6/12/2009	Sampling excavation
12	6/12/2009	Final excavation boundary
13	6/22/2009	Site restoration and backfilling activities
14		Grading, compacting, and dust control
15		Compaction of soil during backfilling activities
16		Quality Control of excavation backfill soil

Attachment A3: 2009 Photo Log

B. Building 11 Excavation and Backfill

Photo Number	Date	Subject
1	6/2/2009	Building 11 excavating and loading soil
2	6/3/2009	Metal debris in excavation
3	6/3/2009	Metal debris removed from B11 excavation
4	6/3/2009	Various metal debris found throughout excavation
5	6/3/2009	Metal cable removed
6	6/4/2009	Excavation boundary
7	6/4/2009	QC check of backfill material with Schonstedts
8	6/4/2009	Sifting soil for backfill
9	6/4/2009	Debris removed during sifting of soil for backfill
10	6/9/2009	Sampling excavation
11	6/9/2009	Sample locations

Attachment A3: 2009 Photo Log

C. Building 49 Drum Removal

Photo Number	Date	Subject
1	10/23/2009	Excavation near foundation of B 49
2	10/23/2009	Loading waste soil from B49 excavation
3	10/23/2009	Uncovered drum
4	10/23/2009	Drums removed from excavation
5	10/24/2009	Example of drum size
6	10/24/2009	Exposed drums at base of foundation
7	10/24/2009	Excavating under foundation
8	10/24/2009	Exposed drums under foundation
9	10/24/2009	Removing drums from under foundation
10	10/26/2009	Installed helical support pier for additional foundation support
11	10/27/2009	Drum removed with fluid inside
12	11/3/2009	Pouring concrete around support piers
13	11/3/2009	Filling excavation with concrete
14	11/4/2009	Building 49 excavation covered to allow concrete to set
15	11/12/2009	Excavation filled with concrete
16	11/12/2009	Backfill completion
17	11/12/2009	Site restoration

Attachment A3: 2009 Photo Log

D. Building 35 EM61 Test Pit Investigation

Photo Number	Date	Subject
1	6/5/2009	Test pit #1 initial excavation
2	6/5/2009	Final excavation at test pit #1
3	6/5/2009	Excavating with UXO observation
4	6/5/2009	Test pit #2 final excavation
5	6/5/2009	Backfilled test pit
6	6/6/2009	Test pit #3 excavation with UXO personnel

E. Building 9 Contaminated Soil Removal

Photo Number	Date	Subject
1	8/4/2009	Initial investigation test pit
2	8/4/2009	Early stages of excavation
3	8/5/2009	Pipe in excavation
4	8/10/2009	Field screening to delineate plume
5	8/12/2009	Pipe removed from excavation
6	8/12/2009	Pipe found in excavation
7	8/12/2009	Pipe removed from excavation
8	8/12/2009	Pipe removed from excavation
9	8/12/2009	Potential asbestos concrete pipe removed from excavation
10	8/12/2009	Field screening during excavation
11	8/12/2009	Excavation near playground fence line
12	8/12/2009	Groundwater encountered in excavation
13	8/13/2009	Vertical pipe in excavation
14	8/13/2009	Investigating vertical pipe
15	8/13/2009	Field screening locations in excavation
16	8/13/2009	Final excavation

F. Groundwater Monitoring

Photo Number	Date	Subject
1	5/26/2009	Sampling monitoring well
2	5/26/2009	Sampling

Attachment A3: 2009 Photo Log

G. 1,2,3 TCP Delineation

Photo Number	Date	Subject
1	10/29/2009	Drilling mobilization at Neely Road
2	10/29/2009	Drill rig set up at Neely Road
3	10/30/2009	Drilling well P20
4	10/31/2009	Drilling well P19
5	10/31/2009	Soil sampling
6	10/31/2009	Well P18 complete

H. TCE Delineation

Photo Number	Date	Subject
1	8/2/2009	Soil boring drilling
2	8/2/2009	Soil sampling from removed core
3	8/2/2009	Temporary well installation
4	8/2/2009	Groundwater sampling

I. PCB Demolition Area

Photo Number	Date	Subject
1	6/12/2009	Excavating around foundation
2	6/12/2009	Excavating around sewer pipe
3	6/12/2009	Excavating sewer and water pipes
4	6/12/2009	Exposed sewer at foundations
5	6/15/2009	Manhole excavation
6	6/17/2009	Disconnecting sewer
7	6/17/2009	Capping sewer
8	6/17/2009	Sewer cap
9	6/17/2009	Excavating to expose blue board
10	6/17/2009	Removing blue board
11	6/17/2009	Removed blue board
12	6/17/2009	Lifting foundation
13	6/17/2009	Lifted foundation
14	6/17/2009	Removing foundation debris
15	6/17/2009	Loading foundation debris for removal and disposal
16	6/17/2009	Removed foundation

Attachment A3: 2009 Photo Log

J. Waste and Other Activities

Photo Number	Date	Subject
1	7/29/2009	07/08 Stockpile: Area 1 Area 1 field screen and sample locations
2	7/29/2009	07/08 Stockpile: Area 2 Area 1 field screen and sample locations
3	7/29/2009	07/08 Stockpile: Area 6 Area 1 field screen and sample locations
4	7/29/2009	07/08 Stockpile: Example of sample hole depth
5	7/30/2009	07/08 Stockpile: Field screening locations
6	9/2/2009	07/08 Stockpile: Loading soil for removal and disposal
7	9/2/2009	07/08 Stockpile: Decommissioning of stockpile cell after soil removal
8	9/2/2009	07/08 Stockpile: Stockpile staging area site restoration
9	8/7/2009	B9 Stockpile: Building stockpile cell berm for B9 contaminated soil
10	8/12/2009	B9 SP02: Field screening locations
11	8/12/2009	B9 SP01: Sampling waste soil from
12	8/13/2009	B9 SP03: Field screening locations
13	8/13/2009	B9 SP03: Sampling waste soil
14	8/13/2009	B9 SP03: Sampling activities
15	9/17/2009	B9 Stockpile: Covering soil loaded from B9 stockpiles for transport and disposal
16	9/18/200	B9 Stockpile: Decommissioning stockpile after soil was removed
17	8/25/2009	Area E: Supersacks staging area from PCB area
18	8/28/2009	Area E: Loading supersacks for transport and disposal
19	8/28/2009	Area E: Staging area after removal of supersaks

FCS Photograph Log
Building 15/17 Excavation and Backfill

Photo 1
6/3/2009
Building 15/17
Excavation activities

Photo 2
6/3/2009
Building 15/17

UXO techs guiding the excavation

Photo 3
6/3/2009
Building 15/17
Metal debris in excavation

Photo 4
6/3/2009
Building 15/17
Drum removed from excavation

Photo 5
6/3/2009
Building 15/17
Loading waste soil from excavation

Photo 6
6/4/2009
Building 15/17
Excavation activities

Photo 7
6/4/2009
Building 15/17
Geophysical survey of excavation

Photo 8
6/5/2009
Building 15/17
Schonstedt and EM61 surveys

Photo 9
6/5/2009
Building 15/17
Monitoring well found in excavation

Photo 10
6/8/2009
Building 15/17
Monitoring well determined abandoned and removed

Photo 11
6/12/2009
Building 15/17
Sampling excavation

Photo 12
6/12/2009
Building 15/17
Final excavation boundary

Photo 13
6/22/2009
Building 15/17
Site restoration and backfilling activities

Photo 14
Building 15/17
Grading, compacting, and dust control

Photo 15
Building 15/17
Compaction of soil during backfill activities

Photo 16
6/17/09
Building 15/17
Quality control of excavation backfill soil

Building 11 Excavation and Backfill

Photo 1
6/2/2009
Building 11
Excavating and loading soil

Photo 2
6/3/2009
Building 11
Metal debris in excavation

Photo 3
6/3/2009
Building 11
Metal debris removed from excavation

Photo 4
6/3/2009
Building 11
Various metal debris found throughout excavation

Photo 5
6/3/2009
Building 11
Metal cable removed

Photo 6
6/4/2009
Building 11
Excavation boundary

Photo 7
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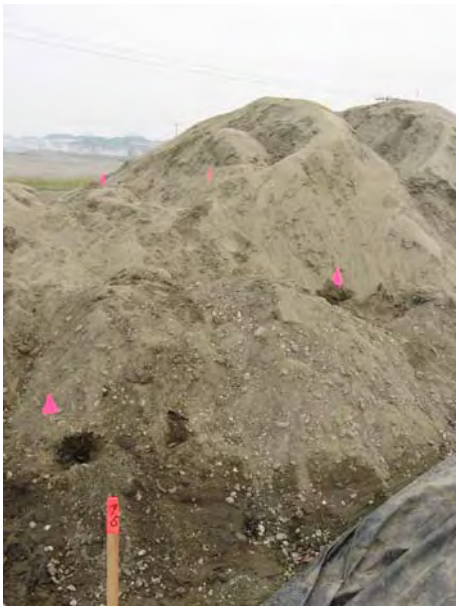

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Data Quality Assessment, 2007

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2007 DATA QUALITY ASSESSMENT

FINAL, REVISION 1

2007/2008/2009 FORMER COMMUNICATIONS SITE DRUM AND DEBRIS AND PCB INVESTIGATION REPORT

FORT WAINWRIGHT, ALASKA

JANUARY 2011

U.S. Army Corps of Engineers, Alaska District
Environmental Remediation Services
Contract No. W911KB-06-D-0006
Task Order No. 0007

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Exhibit B1-4 Case Narratives, Chains-of-Custody, and Cooler Receipt Forms (provided on CD)

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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
CAS	Columbia Analytical Services
DoD	U.S. Department of Defense
DQA	Data Quality Assessment
J	analyte was present but reported value may not be accurate or precise
J+	analyte was present but reported value may be biased high
J-	analyte was present but reported value may be biased low
Jacobs	Jacobs Engineering Group Inc.
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
ND	nondetect
PCB	polychlorinated biphenyls
PQL	practical quantitation limit
QAPP	Quality Assurance Project Plan
QC	quality control
R	result was rejected
RPD	relative percent difference
U	analyte was analyzed for but not detected at the specified detection limit
UJ	analyte was not detected above the detection limit objective, but the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample
USAED	U.S. Army Engineer District, Alaska
^{o}C	degrees Celsius

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1.0 INTRODUCTION

This Data Quality Assessment (DQA) was performed by Jacobs Engineering Group Inc. (Jacobs), to assess the overall quality and usability of preconstruction sample data for the 2007 Former Communications Site Drum and Debris and Polychlorinated Biphenyls (PCB) Investigation, Fort Wainwright, Alaska, also called "Taku Gardens". Data quality was evaluated against the requirements of the Quality Assurance Project Plan (QAPP), produced for the U.S. Army Engineer District, Alaska (USAED 2007). The assessment of data included a review of the following:

- Chain-of-custody documentation
- Holding-time compliance
- Required quality control (QC) samples at the specified frequencies
- Method blanks
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) recovery and relative percent difference (RPD)
- Surrogate spike recoveries for organic analyses
- Matrix spike (MS)/matrix spike duplicate (MSD) sample recovery and RPD
- Initial and continuing calibration information and other method-specific criteria, as defined by the QAPP

Data flags were assigned according to the QAPP. Although multiple flags could have been applied to the data, there was only one final flag, determined to be the most conservative of the applicable validation flags.

Qualifiers that were applied to the analytical data set, as appropriate, included the following. All data requiring a qualifier was considered "estimated".

- "J" — The analyte was present but reported value may not have been accurate or precise.
- "J+" — The analyte was present but the reported value may have been biased high.
- "J-" — The analyte was present but the reported value may have been biased low.
- "R" — The result was rejected.

- "U" — The analyte was analyzed for but not detected at the specified detection limit.
- "UJ" — The analyte was not detected above the detection limit objective; however, the reported detection limit was approximate and may or may not have represented the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Test America of Sacramento, California, provided the primary analytical support with Test America of Tacoma, Washington, providing secondary support. Beginning 8 October 2007, Columbia Analytical Services (CAS) provided primary analytical support. Data were provided in both hardcopy and electronic formats (Appendix G to the Jacobs Investigation Report).

In addition to performing this DQA, Jacobs also completed Alaska Department of Environmental Conservation (ADEC) Laboratory Data Review Checklists (Exhibit B1-2) per laboratory sample delivery group and a completeness check of the hardcopy and electronic data to verify that the data packages and electronic files included all information requested. The ADEC checklists contained data quality information associated with waste disposal samples. Exhibit B1-3 presents waste data with laboratory qualifiers. The Risk Assessment prepared by CH2M Hill (USAED 2010 includes a DQA, ADEC checklists, sample summary, and laboratory deliverables for the 2007 confirmation samples.

This appendix to the Investigation Report contains the following Exhibits:

- Exhibit B1-1 – Data Quality Objective Exception Tables
- Exhibit B1-2 – ADEC Data Review Checklists
- Exhibit B1-3 – Sample Summary Table and Analytical Data Tables
- Exhibit B1-4 – Case Narratives, Chains-of-Custody, and Cooler Receipt Forms

2.0 DATA QUALITY SUMMARY

A review of the reconstruction sample analytical results and associated QC samples found the overall quality of the project data to be acceptable based on the requirements of the project QAPP (USAED 2007). Although the overall quality of the preconstruction sample data was acceptable, several issues affected portions of the data, including thermal preservation issues, analytes detected in trip blanks, surrogate recovery failures, and MS recovery failure.

Preconstruction sample results that required data qualifiers are discussed in this DQA, the ADEC laboratory data review checklists, and the tables in Exhibit B1-1. These data were considered usable with the limitations discussed in this DQA and in the ADEC checklists with regard to the laboratory qualifiers discussed in Section 1.0. Qualified results were considered estimated and, whenever possible, were indicated as either biased high ("+") or low ("–"). No results were rejected.

Table 2-1 lists the quantities of field samples collected and their associated QC samples. Frequency requirements for MS and MSD samples (5 percent) were met. The frequency requirement for field duplicate samples (10 percent) was not met.

Table 2-1
Preconstruction Field and Quality Control Soil Sample Quantities

Analytes	Method	Primary Samples	Field Duplicates	LCS	LCSD	MS	MSD	Trip Blanks
Gasoline-Range Organics	AK101	12	1	4	4	1	1	7
Diesel-Range Organics	AK102	12	1	4	4	3	3	--
Residual-Range Organics	AK103	12	1	4	4	4	4	--
Metals	SW6020/SW7471A	12	1	4	--	4	4	--
Pesticides	SW8081A	12	1	4	--	3	3	--
PCBs	SW8082	12	1	4	--	3	3	--
Herbicides	SW8151A	12	1	4	3	3	3	--
Volatile Organic Compounds	SW8260B	12	1	4	3	1	1	7

Analytes	Method	Primary Samples	Field Duplicates	LCS	LCSD	MS	MSD	Trip Blanks
Semivolatile Organic Compounds	SW8270C	12	1	4	1	3	3	--

Note: For definitions, see the Acronyms and Abbreviations section.

Evaluation of the field duplicate result pairs for samples 07FCSRISOPC52N-001 and 07FCSRISOPC52NA-001 found that all result pairs were assigned the term "Agreement" when the criteria of EM 200-1-6 (U.S. Army Corps of Engineers 1997, Table 4-1) were applied. Table 2-2 presents the evaluation of field duplicate pairs.

Table 2-2
Evaluation of Field Duplicate Result Pairs

Method	Agreement (Both Results ND)	Agreement	Disagreement	Major Disagreement
AK101	1	--	--	--
AK102	--	1	--	--
AK103	--	1	--	--
SW6020/SW7471	--	8	--	--
SW8081A	17	3	--	--
SW8082	8	1	--	--
SW8151A	12	--	--	--
SW8260B	59	4	--	--
SW8270C SIM	65	--	--	--

Note: For definitions, see the Acronyms and Abbreviations section.

2.1 THERMAL PRESERVATION ISSUES

Three coolers associated with the preconstruction samples were sent to Test America-Sacramento, three coolers (subcontracted SW8151A samples) to Test America-Tacoma, and one cooler to CAS. "Cooler #1" arrived at Test America-Sacramento and cooler "Medium White With Blue Top" arrived at Test America-Tacoma with thermal preservation issues. "Cooler #1" was received with a temperature blank reading of 6.8 degrees Celsius (ºC) and a cooler temperature reading of 9.8 ºC, both above the thermal preservation criteria of 4 ± 2 ºC. All affected sample results were qualified according to the data qualifying conventions in the

QAPP (USAED 2007). Table B-1 (Exhibit B1-1) presents sample results that were associated with thermal preservation exceedances.

Cooler "Medium White With Blue Top" was received with temperature blank reading of 8.5 ºC and a cooler temperature reading of 2.1 ºC. Test America-Tacoma noted on the cooler receipt form that the temperature blank was not in proximity to the gel ice packed in the cooler. No other explanation was provided to account for the difference in the two measured temperatures of this cooler. The sample results were not qualified since the cooler temperature was within thermal preservation goals, and a possible cooler packing problem may have affected the temperature blank.

2.2 LABORATORY PRACTICAL QUANTITATION LIMIT GREATER THAN DATA QUALITY OBJECTIVES

Thirteen of the preconstruction soil samples submitted for analysis methods SW8260B, SW8270C, SW8081A, and SW8082 contained analytes that were reported as nondetect (ND) and had laboratory method detection limits (MDL) greater than the project-specified reporting limits.

The SW8260B ND concentrations had MDLs below the ADEC action limit, except for vinyl chloride in samples 07 FCSRISOPC52E 01 and 07 FCSRISOPC52E 02. The data usability was not significantly affected since the QAPP-specified reporting limit exceeded the Method Two action limit in the reporting limit objectives (Table 5-9 of the project QAPP). The SW8270C ND concentrations had MDLs below the ADEC action limits, with the exception of 3,3'-dichlorobenzidine, 2,4-dinitrophenol, and pentachlorophenol. SW8270C data usability was not significantly affected since the QAPP-specified reporting limits (Table 5-9 of the project QAPP) exceeded the Method Two action limits. The SW8081 ND concentrations had MDLs below the ADEC action limit, except for beta-BHC in sample 07FCSRISOPC52S-003. All the SW8082 ND concentrations had MDLs below the ADEC action limit. Table B-2 (Exhibit B1-1) presents ND concentrations with MDLs greater than action limits.

2.3 METHOD BLANK CONTAMINATION

Method blank detections were associated with methods SW6020, SW8260B, SW8270C, AK101, and AK103. If sample concentrations were within five times the associated method blank contamination, or ten times for common laboratory contaminants, then sample concentrations were qualified "U". All sample concentrations for methods SW6020, AK101, and AK103 were greater than five times the method blank concentration and therefore were not affected. Method SW8260B had method blank detections (QC lab lot KWG0711591) for acetone and 2-butanone. Method SW8270C had method blank detections (QC lab lots KWG0711363 and KWG0712939) for bis-(2-ethylhexyl)phthalate, di-n-butyl phthalate, and phenol. Sample concentrations qualified "U" were not significantly impacted because all concentrations were below ADEC cleanup levels. Laboratory results qualified "U" due to method blank contamination are presented in Table B-3 (Exhibit B1-1).

2.4 TRIP BLANK CONTAMINATION

Three SW8260B trip blanks (07FCSRISOTB2-002, 07FCSRISOTB1-001, and 07FCSRISOTB37) had detections of acetone, toluene, methylene chloride, and/or 2-butanone above the MDL but below the practical quantitation limit (PQL). Table B-4 (Exhibit B1-1) identifies sample results qualified due to these detections. Seven SW8260B samples affected by the detections were found in the trip blanks.

The acetone, toluene, methylene chloride, and 2-butanone found in SW8260B are common laboratory contaminants. All of the trip blank detections, as well as the associated sample results, are well below the ADEC Table B-2 migration-to-groundwater cleanup criteria (ADEC 2006) and the SW8260B reporting limit, resulting in minimal affect on data usability.

2.5 SURROGATE RECOVERY FAILURE

Surrogate recovery failures were found in SW8260B sample 07FCSRISOPC52N-002. Toluene-D8 and bromoflurobenze surrogate recoveries were below the lower control limit of 85 percent, at 74 and 84 percent, respectively. Table B-5 (Exhibit B1-1) lists the analytes

affected by the surrogate failures. Although the several detected analytes may have been biased low, the data usability was not significantly affected because the surrogate recoveries were slightly below recovery goals, and all detected analyte concentrations were well below the action limit.

2.6 LABORATORY CONTROL SPIKE SAMPLE RECOVERY FAILURE

LCS and LCSD recovery failures were identified for several analytes in methods SW8270C and SW8151. Table B-6 (Exhibit B1-1) lists the samples and analytes qualified due to low LCS and LCSD recovery failures.

SW8270C LCS and LCSD (QC lab lot KWG0711363) recoveries were less than 10 percent for analytes 2,4-dimethylphenol, 2-methylphenol (o-cresol), 3,3'-dichlorobenzidine, 4-chloroaniline, 4-methylphenol (p-cresol), and n-nitrosodiphenylamine. Samples associated with these analytes were ND and qualified “R”. Samples associated with SW8270C LCS (QC lab lot KWG0711363) recoveries lower than the control criteria but greater than 10 percent were ND and qualified “UJ”. SW8270C samples were re-extracted (QC lab lot KWG0712939) out of hold time and sample results confirmed. Rejected samples were considered unusable, and “UJ”-qualified data were confirmed in reanalysis.

SW8151 LCS (QC lab lot KWG0711394) recovery was slightly lower than U.S. Department of Defense (DoD) Quality Systems Manual criteria for dichlorprop, at 66 percent (DoD 2006). Associated samples were ND and qualified “UJ”. Data were not significantly impacted because no specified cleanup level for dichlorprop exists.

2.7 MATRIX SPIKE SAMPLE RECOVERY FAILURE

MS sample recovery failures were identified for several analytical methods (Table B-7, Exhibit B1-1). All MS sample recovery failures were considered related to the sample matrix because all the associated LCS samples met recovery goals. Although three samples were qualified due to MS and MSD recovery failure, the results were considered usable because all the qualified analyte concentrations were below the cleanup level.

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3.0 CONCLUSION

All of the preconstruction sample analytical results of the 2007 Former Communication Site Drum and Debris and PCB Investigation were considered usable, with the exception of the following anomaly: the 2,4-dimethylphenol, 2-methylphenol (o-cresol), 4-chloroaniline, 3,3'--dichlorobenzidine, 4-methylphenol (p-cresol), and n-nitrosodiphenylamine results associated with samples 07 FCSRISOPC52E 01 and 07 FCSRISOPC52E 02 were rejected due to LCS and LCSD recoveries less than 10 percent. The project completeness goal of over 99 percent usable data exceeded the project QAPP goal of 90 percent usable data.

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4.0 REFERENCES

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EXHIBITS

Exhibit B1-1	Data Quality Objective Exception Tables
Exhibit B1-2	Alaska Department of Environmental Conservation Laboratory Data Review Checklists
Exhibit B1-3	Sample Summary Table and Analytical Data Tables
Exhibit B1-4	Case Narratives, Chains-of-Custody, and Cooler Receipt Forms

ATTACHMENT B-2

Data Quality Assessment, 2008

ATTACHMENT B-2
2007 DATA QUALITY ASSESSMENT

FINAL, REVISION 1

2007/2008/2009 FORMER COMMUNICATIONS SITE DRUM AND DEBRIS AND PCB INVESTIGATION REPORT

FORT WAINWRIGHT, ALASKA

JANUARY 2011

U.S. Army Corps of Engineers, Alaska District
Environmental Remediation Services
Contract No. W911KB-06-D-0006
Task Order No. 0007

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EXHIBITS

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Exhibit B2-2 Alaska Department of Environmental Conservation Laboratory Data Review Checklists (provided on CD)

Exhibit B2-3 Sample Summary Table and Analytical Data Tables (provided on CD)

Exhibit B2-4 Case Narratives, Chains-of-Custody, and Cooler Receipt Forms (provided on CD)

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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
CAS	Columbia Analytical Services
DoD	U.S. Department of Defense
DQA	Data Quality Assessment
DRMO	Defense Reutilization and Marketing Office
DRO	diesel range organics
GRO	gasoline-range organics
Jacobs	Jacobs Engineering Group Inc.
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
ND	nondetect
PCB	polychlorinated biphenyls
POL	petroleum, oil, and lubricants
PQL	practical quantitation limit
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
RRO	residual range organics
SDG	sample delivery group
SVOC	semivolatile organic compound
TCE	trichloroethene
USAED	U.S. Army Engineer District, Alaska
VOC	volatile organic compound
^{o}C	degrees Celsius

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1.0 INTRODUCTION

Jacobs Engineering Group Inc. (Jacobs) performed a Data Quality Assessment (DQA) to assess the overall quality and usability of data from the samples collected from the excavation of petroleum, oil, and lubricants (POL) hot spots, pre- and post-construction at the Taku Gardens housing development and post-construction at the Defense Reutilization and Marketing Office (DRMO), Fort Wainwright, Fairbanks, Alaska. Samples were collected in support of the Fort Wainwright Investigation at the Taku Gardens Former Communications Site. Data quality was evaluated against the requirements of the Quality Assurance Project Plan (QAPP) produced for the U.S. Army Engineer District, Alaska (USAED 2007). The assessment of data includes a review of the following:

- Chain-of-custody documentation
- Holding-time compliance
- Required quality control (QC) samples at the specified frequencies
- Method blanks
- Laboratory control sample (LCS)/laboratory control sample duplicates (LCSD) recovery and relative percent difference (RPD)
- Surrogate spike recoveries for organic analyses
- Matrix spike (MS)/matrix spike duplicate (MS/MSD) sample recovery and RPD
- Initial and continuing calibration information and other method-specific criteria, as defined by the QAPP

Data flags were assigned according to the QAPP. Although multiple flags could have been applied to the data, there was only one final flag, which determined to be the most conservative of the applicable validation flags.

Qualifiers that were applied to the analytical data set, as appropriate, included the following. All data requiring a qualifier was considered “estimated”.

- “J” — The analyte was present but reported value may not be accurate or precise.
- “J+” — The analyte was present but the reported value may be biased high.
- “J-” — The analyte was present but the reported value may be biased low.
- “R” — The result was rejected.

- "U" — The analyte was analyzed for but not detected at the specified detection limit.
- "UJ" — The analyte was not detected above the detection limit objective; however, the reported detection limit was approximate and may or may not have represented the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Columbia Analytical Services (CAS) of Kelso, Washington, provided the primary analytical support. Test America of Sacramento, California, provided analytical support for explosives method SW8321. SGS of Anchorage, Alaska, provided analytical support for the DRMO waste stockpile analyzed for pesticides method SW8081. Data were provided in both hardcopy and electronic formats (Appendix G to the Investigation Report).

In addition to performing this DQA, Jacobs also completed Alaska Department of Environmental Conservation (ADEC) Laboratory Data Review Checklists (Exhibit B2-2) per laboratory sample delivery group (SDG) and a completeness check of the hardcopy and electronic data to verify that the data packages and electronic files included all information requested. Waste data (Exhibit B2-3) were not evaluated. The Risk Assessment prepared by CH2M HILL (USAED 2009) includes a DQA and ADEC checklists for the 2008 confirmation samples.

This appendix to the Investigation Report contains the following Exhibits:

- Exhibit B2-1 – Data Quality Objective Exception Tables
- Exhibit B2-2 – ADEC Data Review Checklists
- Exhibit B2-3 – Sample Summary Table and Analytical Data Tables
- Exhibit B2-4 – Case Narratives, Chains-of-Custody, and Cooler Receipt Forms

2.0 DATA QUALITY SUMMARY

A review of POL and post-construction analytical results and associated QC samples found the overall quality of the project data to be acceptable, based on the requirements of the project QAPP (USAED 2007). Although the overall quality of sample data was acceptable, there were issues which affected portions of the data, including method detection limits (MDL) greater than action limits, analytes detected in method blanks and trip blanks, MS recovery, RPD failure, surrogate failures, coolers with temperatures greater than 6 degrees Celsius (°C), and holding time exceedances.

Exhibit B2-1 contains tables of sample results that required data qualification. Exhibit B2-2 contains the ADEC laboratory data review checklists. These data are usable within the limitations discussed in this DQA and in the ADEC checklists with regard to the laboratory qualifiers discussed in Section 1.0.

Table 2-1 presents quantities of field samples collected, analytical methods performed, and SDGs that pertain to this DQA. Frequency requirements of ten percent for field duplicates and five percent for matrix spikes (MS) and matrix spike duplicates (MSD) samples were met. Section 2.8 discusses field duplicate precision.

2.1 METHOD DETECTION LIMITS GREATER THAN ADEC MIGRATION TO GROUNDWATER

Several samples submitted for SW8260B, SW8270C, and SW8151 analyses had analyte method detection limits (MDL) exceeding ADEC Method Two criteria. The MDLs of nondetect (ND) results were compared to ADEC Method Two, Table B-1, migration-to-groundwater criteria. SW8260B analytes exceeded in one or more sample of 1,2,3-trichloropropane, 1,2-dibromoethane, 1,2-dichloroethane, 1,2-dichloropropane, methylene chloride, trichloroethene (TCE), and vinyl chloride. SW8270C analytes exceeded in one or more sample of 2,4-dinitrotoluene, 2,6-dinitrotoluene, bis-(2-chloroethyl)ether, n-nitrosodimethylamine, n-nitrosodi-n-propylamine, and pentachlorophenol. Method SW8151

sample 08-FCS-RISO-PSC52-E6 exceeded for 2,4,5-TP. Table B-1 of Exhibit B2-1 presents the MDLs that exceeded criteria.

Table 2-1
Petroleum, Oil, and Lubricants and Post-Construction Sample Numbers and Methods

Type of Samples	SDG	Method	Method/Parameter	Primary Samples	Duplicate Samples
POL Hotspots Bldg. 9, 45, and 40	K0808048 K0808047	AK102 AK103	DRO RRO	18	3
Post-Construction	K0806232 K0806547	AK101 AK102 AK103 SW8260B SW8270 SW6020/SW7471A SW8081 SW8082 SW8151	GRO DRO RRO VOCs SVOCs RCRA metals Pesticides PCBs Herbicides	6	1
Post-Construction DRMO	K0810397 K0809177 K0809264	AK101 AK102 AK103 SW8260B SW6020/SW7471A SW8081	GRO DRO RRO VOC RCRA metals Pesticides	11	2
Post-Construction Offsite	K0810242	AK101 AK102 AK103 SW8260B SW8270 SW6020/SW7471A SW8081 SW8082 SW8151	GRO DRO RRO VOC SVOC RCRA metals Pesticides PCBs Herbicides	2	-

Note: For definitions, see the Acronyms and Abbreviations section.

2.2 METHOD BLANK CONTAMINATION

Method blank contamination was found in several quality assurance lots associated with AK102, AK103, and SW8260 analyses. The resulting affect on data quality was minimal since all qualified sample results were well below ADEC migration-to-groundwater cleanup criteria. The sample results within five times the blank contamination were qualified "U" and were considered potentially biased high. Table B-2 of Exhibit B2-1 lists samples qualified "U". The following method blanks had detections:

- AK102 method blanks associated with QC lots KWG0808697, KWG0808744, and KWG0810414 had detections above the MDL but below the practical quantitation limit (PQL).
- AK103 method blanks associated with QC lots KWG0808779, KWG0808834, and KWG0810526 had detections above the MDL but below the PQL.
- SW8260B method blank in QC lot KWG0810540 had detections above the MDL but below the PQL and sample results within five times the blank contamination for analytes naphthalene, benzene, and 1,2,3-trichlorobenzene.

2.3 TRIP BLANK CONTAMINATION

Trip blank contamination was found in several coolers associated with SW8260B analysis. The sample results that were within five times the trip blank contamination or ten times for common laboratory contaminants were qualified "U" (Table B-3 of Exhibit B2-1). Results qualified "U" were considered potentially biased high. Toluene, methylene chloride, and chloromethane were detected in multiple trip blanks. Methylene chloride was detected at low levels, appeared to be systematic, and therefore was considered laboratory contamination. Qualified data were detected above the ADEC migration-to-groundwater criteria for methylene chloride. All other qualified analytes were below ADEC criteria. The following trip blanks had detections:

- SW8260B trip blank (08 FCS BLD TB31) had detections of toluene, chloromethane, 1,2,4-trichlorobenzene, and 1,2,4-trimethylbenzene above the MDL but below the PQL. Sample 08 FCS MEOH BLANK was associated with this trip blank and was collected to test the methanol used in sampling for methylene chloride. Data for this sample are presented in the solid waste data table (Exhibit B2-3) and are flagged with laboratory qualifiers.

- Trip blank 08-FCSRI TB 07 in cooler Cabo Wabo had detections for toluene and chloromethane.
- Trip blank named "TRIP BLANK" in cooler Sun Bun had detections for acetone, chloromethane, methylene chloride, and toluene.
- Trip blank 08 FCS TB 92 in cooler Go Vols had detections for methylene chloride.
- Trip blank 08 FCS TB 93 in cooler Tenn Titans had detections for benzene, toluene, and methylene chloride.
- Trip blank 08-FCS TB-131 in cooler Sunshine and Snow had detections for toluene and methylene chloride. Samples 08-FCS PSC-OFFSITE-01 and 08-FCS PSC-OFFSITE-02 had detections greater than ten times for methylene chloride and were not qualified.

2.4 MATRIX SPIKE RECOVERY AND RELATIVE PERCENT DIFFERENCE FAILURE

MS/MSD recoveries and RPDs were evaluated against the U.S. Department of Defense (DoD) Quality Systems Manual (QSM), Version 3 and QAPP limits (DoD 2006; USAED 2007). If recoveries or RPDs were outside appropriate limits, the parent sample was qualified. Recoveries in the associated LCS were acceptable, which indicated the analytical batches were in control. Table B-4 (Exhibit B2-1) presents MS/MSD recoveries outside the limits and data qualified. Table B-5 (Exhibit B2-1) presents RPD recoveries greater than 30 percent and data qualified. The following MS/MSD recoveries and RPDs were outside the appropriate limits:

- Parent sample 08FCSRSOPSCDRMO-01 had MS and MSD recoveries outside DoD QSM limits for methods SW6020 and SW8081A. A majority of the analytes in the SW8081A MS had recoveries less than 10 percent. The MSD for these analytes was slightly below or within DoD QSM limits. ND analytes in parent sample 08FCSRSOPSCDRMO-01 were flagged "UJ" and positive results were flagged "J-". The RPD for a majority of the SW8081 analytes was greater than 30 percent and the more stringent qualifier of "J-" or "UJ" was applied.
- Parent sample 08-FCS-RISO-PSC52-E6 had MS and MSD recoveries outside DoD QSM limits for multiple analytes in method SW8270C. Recoveries for 2,4-dimethylphenol and 3,3'-dichlorobenzidine were below 10 percent for both the MS and MSD; therefore, the parent sample is qualified "R" for these analytes. All other analytes were greater than 10 percent in the MS/MSD and were ND in the parent sample, therefore qualified "UJ". RPDs for multiple analytes associated with SW8270C and SW8151A were greater than 30 percent.

- Parent sample 08FCSRSOPSCDRMO-06 had MS and/or MSD recoveries outside DoD QSM limits for method SW6020 and SW8081A. Table B-4 (Exhibit B2-1) presents the qualified data. The MSD for method SW6020 cadmium was above the upper confidence limit and the parent sample qualified "J+", indicating high bias. The MS and MSD for method SW8081A 4,4'-DDT were below the lower confidence limit and the parent sample qualified "J-", indicating low bias.
- Parent sample 08 FCS BLD TB31 had MS and MSD recoveries lower than DoD QSM limits for method SW8260B bromomethane. The parent sample was ND and the data qualified "UJ".
- Parent sample 08-FCS PSC-OFFSITE-01 had MS and/or MSD recoveries outside DoD QSM limits for method SW8081A, SW8270C, SW8260B, and SW6020. A majority of the analytes in the SW8081A MS had recoveries less than DoD QSM limits; however, the MSD was within the limits for all analytes. MS and MSD for 2,4-dimethylphenol in method SW8270C were lower than the limit of 30 percent, at 21 and 13 percent, respectively. Dibromomethane method SW8260B was slightly lower than DoD QSM limits in the MSD, at 74 percent. Selenium method SW6020 was slightly greater than the DoD limit, at 121 percent. MS/MSD RPDs for multiple analytes associated with SW8081 and SW8270C were greater than 30 percent.

2.5 SURROGATE RECOVERY FAILURE

The recovery for SW8081 surrogate tetrachloro-m-xylene was below the recovery criterion of 70 percent for multiple samples. Associated samples were qualified either "J-" or "UJ", indicating potential low bias. Although several samples were affected, none of the recoveries was lower than 10 percent. Table B-6 (Exhibit B2-1) presents a summary of affected samples and their respective qualifiers.

2.6 TEMPERATURES GREATER THAN CRITERIA

The temperature blank for cooler Fun Run was 9.9 °C and the cooler temperature 5.9 °C. Data quality and usability were minimally affected since the samples were submitted for AK102/103, SW8270, SW6020, and SW7471. Results (excluding metals) associated with this cooler were qualified "J-" for positive results and "UJ" for NDs. Table B-7 (Exhibit B2-1) presents sample IDs and methods that were effected.

2.7 HOLD-TIME EXCEEDANCES

Holding times were not met for methods SW8081 and SW8082 in SDG K0810242. The samples were prepped more than twice past the holding time, at 49 days. The case narrative included the note:

> The extraction of samples 08-FCS PSC-OFFSITE-01 and 08-FCS PSC-OFFSITE-02 was initially performed past the recommended preparation holding time. The samples were initially tracked through the laboratory as per standard operating procedure, but were inadvertently logged off the information management system prior to extraction. The error was identified after the hold time elapsed. Efforts were made to extract and analyze the samples as soon as the error was identified.

Positive results were flagged "J-" and ND results were flagged "R". Table B-8 (Exhibit B2-1) presents the samples affected.

2.8 FIELD DUPLICATE PRECISION

The duplicate frequency of 10 percent was met for the project. Duplicate pairs were evaluated by calculating RPD. If RPD was over 35 percent for soil, the data were qualified "J" for positive results and "UJ" for ND results. RPD for the following analytes was greater than 35 percent for duplicate pair 08-FCS-RISO-PSC52-E6 and 08-FCS-RISO-PSC52-E6FD:

- SW8081A — alpha-chlordane, beta-BHC, endrin ketone, and gamma-chlordane
- SW8260B — dichlorodifluoromethane
- SW6020 — selenium and silver
- SW8260B — toluene and methylene chloride had one positive result and one ND. The difference is less than four times the reporting limit; therefore, results are not qualified

RPD for the following analyte was greater than 35 percent for duplicate pair 08-FCS RISO DRMO-19 and 08-FCS RISO DRMO-19B:

- SW8081A — 4,4'-DDE and 4,4'-DDT

RPD for the following analytes was greater than 35 percent for duplicate pair 08FCSRSOPSCDRMO-05 and 08FCSRSOPSCDRMO-05B:

- SW8260B — 1,1,1-trichloroethane, dichlorodifluoromethane, methylene chloride, tetrachloroethene, and toluene
- SW6020 — silver
- SW8260B — one positive result and one ND. The difference is less than four times the reporting limit; therefore, results are not qualified for benzene, ethylbenzene, TCE, and xylene isomers m and p.

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3.0 CONCLUSION

All of the analytical results discussed in this DQA for the 2008 Former Communication Site Drum and Debris and Investigation are considered usable with the exception of the following anomalies:

- 2,4-Dimethylphenol and 3,3'-dichlorobenzidine results associated with sample 08-FCS-RISO-PSC52-E6 were rejected due to MS and MSD recoveries less than 10 percent.
- SW8081 and SW8082 results for samples 08-FCS PSC-OFFSITE-01 and 08-FCS PSC-OFFSITE-02 were rejected or estimated because they were extracted at more than twice the QAPP-specified holding time.

The project completeness of over 99 percent met the QAPP goal of 90 percent usable data.

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4.0 REFERENCES

ADEC. 2008 (October). *Oil and Other Hazardous Pollution Control Regulations –Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances*. 18 AAC 75.

DoD (U.S. Department of Defense). 2006 (January). *Quality Systems Manual for Environmental Laboratories*. Version 3.

USAED (U.S. Army Engineer District, Alaska). 20010 (in progress). *Risk Assessment*. Prepared by CH2M Hill.

USAED. 2007 (July). *Final 2007 Quality Assurance Project Plan, Taku Gardens Former Communication Site, Fort Wainwright, Alaska.* Prepared by CH2M Hill.

U.S. Environmental Protection Agency. 1996. Resource Conservation and Recovery Act Analytical Methods. SW-846. http://www.epa.gov/epaoswer/hazwaste/test/main.htm

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EXHIBITS

Exhibit B2-1:	Data Quality Objective Exception Tables
Exhibit B2-2:	Alaska Department of Environmental Conservation Laboratory Data Review Checklists
Exhibit B2-3:	Sample Summary Table and Analytical Data Tables
Exhibit B2-4:	Case Narratives, Chains-of-Custody, and Cooler Receipt Forms

ATTACHMENT B-3

Data Quality Assessment, 2009

ATTACHMENT B-3
2009 DATA QUALITY ASSESSMENT

FINAL, REVISION 1

2007/2008/2009 FORMER COMMUNICATIONS SITE DRUM AND DEBRIS AND PCB INVESTIGATION REPORT

FORT WAINWRIGHT, ALASKA

JANUARY 2011

U.S. Army Corps of Engineers, Alaska District
Environmental Remediation Services
Contract No. W911KB-06-D-0006
Task Order No. 0007

Prepared by
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EXHIBITS

Exhibit B3-1 Data Quality Objective Exception Tables (provided on CD)

Exhibit B3-2 Alaska Department of Environmental Conservation Laboratory Data Review Checklists (provided on CD)

Exhibit B3-3 Sample Summary Table and Analytical Data Tables (provided on CD)

Exhibit B3-4 Case Narratives, Chains-of-Custody, and Cooler Receipt Forms (provided on CD)

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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
DoD	U.S. Department of Defense
DQA	Data Quality Assessment
DRO	diesel range organics
GRO	gasoline-range organics
Jacobs	Jacobs Engineering Group Inc.
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
PCB	polychlorinated biphenyls
PQL	practical quantitation limit
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RPD	relative percent difference
RRO	residual range organics
SDG	sample delivery group
SVOC	semivolatile organic compound
USAED	U.S. Army Engineer District, Alaska
VOC	volatile organic compound
^{o}C	degrees Celsius

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1.0 INTRODUCTION

Jacobs Engineering Group Inc. (Jacobs) performed a Data Quality Assessment (DQA) to assess the overall quality and usability of data from pre- and post-construction stockpile samples at the Taku Gardens housing development, Fort Wainwright, Alaska. Samples were collected in support of the Fort Wainwright Investigation at the Taku Gardens Former Communications Site. Data quality was evaluated against the requirements of the Quality Assurance Project Plan (QAPP) (U.S. Army Engineer District, Alaska [USAED] 2007). The assessment of data includes a review of the following:

- Chain-of-custody documentation
- Holding-time compliance
- Required quality control (QC) samples at the specified frequencies
- Method blanks
- Laboratory control sample (LCS)/laboratory control sample duplicates (LCSD) recovery and relative percent difference (RPD)
- Surrogate spike recoveries for organic analyses
- Matrix spike (MS)/matrix spike duplicate (MS/MSD) sample recovery and RPD
- Initial and continuing calibration information and other method-specific criteria, as defined by the QAPP

Data flags were assigned according to the QAPP. Although multiple flags could have been applied to the data, there was only one final flag, which was determined to be the most conservative of the applicable validation flags.

Qualifiers that may be applied to the analytical data set, as appropriate, included the following. All data requiring a qualifier was considered “estimated”.

- “J” — The analyte was present but reported value may not have been accurate or precise.
- “J+” — The analyte was present but the reported value may have been biased high.
- “J-” — The analyte was present but the reported value may have been biased low.
- “R” — The result was rejected.

- "U" — The analyte was analyzed for but not detected at the specified detection limit.
- "UJ" — The analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and may or may not have represented the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

SGS of Anchorage, Alaska, provided the primary analytical support. Columbia Analytical Services of Kelso, Washington, provided analytical support for method SW8151 and provided backup support. Test America of Sacramento, California, provided analytical support for explosives method SW8321. Data were provided in both hardcopy and electronic formats (Appendix G to the Investigation Report).

In addition to performing this DQA, Jacobs also completed Alaska Department of Environmental Conservation (ADEC) Laboratory Data Review Checklists (Exhibit B3-2) per laboratory sample delivery group (SDG) and a completeness check of the hardcopy and electronic data to verify that the data packages and electronic files included all information requested. Waste data (Exhibit B3-3) were not evaluated. The Risk Assessment prepared by CH2M Hill (USAED 2010) includes DQA and ADEC checklists for the 2009 confirmation and characterization samples.

This appendix to the Investigation Report contains the following Exhibits:

- Exhibit B3-1 – Data Quality Objective Exception Tables
- Exhibit B3-2 – ADEC Data Review Checklists
- Exhibit B3-3 – Sample Summary Table and Analytical Data Tables
- Exhibit B3-4 – Case Narratives, Chains-of-Custody, and Cooler Receipt Forms

2.0 DATA QUALITY SUMMARY

A review of pre-construction and post-construction analytical results and associated QC samples found the overall quality of the project data to be acceptable, based on the requirements of the project QAPP (USAED 2007). Although the overall quality of sample data is acceptable, there were issues affecting portions of the data, including method detection limits (MDL) greater than ADEC Migration to Groundwater (ADEC 2009), analytes detected in method blanks and trip blanks, and MS recovery failures.

Exhibit B3-1 contains tables of sample results that required data qualification. Exhibit B3-2 contains the ADEC laboratory data review checklists. These data are usable within the limitations discussed in this DQA and in the ADEC checklists with regard to the laboratory qualifiers discussed in Section 1.0.

Table 2-1 presents analytical methods performed and SDGs that pertain to this DQA. Frequency requirements of 5 percent for MS and MSD samples were met. For frequency and field duplicate precision see the Risk Assessment prepared by CH2M Hill (USAED 2010).

Table 2-1
Petroleum, Oil, and Lubricants and Post-Construction Sample Numbers and Methods

Type of Samples	SDG	Method	Method/Parameter
Pre- and Post-Construction	1094923 1094924 1095933	AK101 AK102 AK103 SW8260B SW8270D[1] SW6020/SW7471A SW8081B SW8082A SW8151A	GRO DRO RRO VOCs SVOCs metals Pesticides PCBs Herbicides

Note: For definitions, see the Acronyms and Abbreviations section.
1 = Samples were submitted on the CoC for method SW8270C

2.1 METHOD DETECTION LIMITS GREATER THAN ADEC MIGRATION TO GROUNDWATER

Several samples submitted for SW8260B and SW8270D analyses had analyte method detection limits (MDL) exceeding ADEC Migration to Groundwater (ADEC 2009). The MDLs of nondetect results were compared to ADEC Method Two, Table B-1, Migration to Groundwater criteria listed in 18 Alaska Administrative Code 75.341 (ADEC 2009).

The following SW8260B analytes had reporting limits that exceeded in one or more sample of 1,2-Dichloroethane, 1,2-Dichloropropane, 1,2-Dibromoethane, Methylene chloride, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, 1,2,3-Trichloropropane, and Vinyl chloride.

The following SW8270C analytes had reporting limits that exceeded in one or more sample of bis-(2-Chloroethyl)ether, 4-Chloroaniline, 2,4-Dinitrophenol, 2,4-Dinitrotoluene, 2,6-Dinitrotoluene, Hexachlorobenzene, n-Nitrosodimethylamine, n-Nitrosodi-n-propylamine, and Pentachlorophenol. Table B-1 of Exhibit B3-1 presents the MDLs that exceeded criteria.

2.2 METHOD BLANK CONTAMINATION

Method blank contamination was found in the quality assurance lot associated with AK103 analyses. The resulting affect on data quality was minimal since all qualified sample results were well below ADEC Migration to Groundwater criteria. The sample results within five times the blank contamination were qualified "U" and were considered potentially biased high. Table B-2 of Exhibit B3-1 lists samples qualified "U". The following method blank had a detection above the MDL but below the practical quantitation limit (PQL):

- AK103 method blank associated with QC lot XXX21435A.

2.3 TRIP BLANK CONTAMINATION

Trip blank contamination was found in the cooler associated with SW8260B analysis. The sample results that were within five times the trip blank contamination or ten times for common laboratory contaminants were qualified "U" (Table B-3 of Exhibit B3-1). Results qualified "U" were considered potentially biased high. The following trip blank had a detection above the MDL but below the PQL:

- SW8260B trip blank 09-FCSRI-SO-TB01 in cooler Ferris Wheel had a detection for trichlorofluoromethane.

2.4 MATRIX SPIKE RECOVERY AND RELATIVE PERCENT DIFFERENCE FAILURE

MS/MSD recoveries and RPDs were evaluated against the U.S. Department of Defense (DoD) Quality Systems Manual (QSM), version 3 (DoD 2006) and QAPP limits. If recoveries or RPDs were outside appropriate limits, the parent sample was qualified. Recoveries in the associated LCS were acceptable, which indicates the analytical batches were in control. Table B-4 (Exhibit B3-1) presents MS/MSD recoveries outside the limits and data qualified. The following MS/MSD recoveries were outside the appropriate limits:

- Parent sample 09-FCSRI-SO-B9SP1-PC01 had MS and MSD recoveries outside DoD QSM limits for methods SW7471, SW6020 and SW8081A. Table B-4 (Exhibit B3-1) presents the qualified data. The MS and MSD for method SW7471 mercury was above the upper confidence limit, indicating a high bias; the parent sample was not qualified since the result was nondetect. The MS and MSD for method SW8081A Endosulfan I was above the upper confidence limit, indicating a high bias; the parent sample was not qualified since the result was nondetect. The MS and MSD for method SW8081A 4,4'-DDE was below the lower confidence limit and the parent sample qualified "J-", indicating low bias. The MS and/or MSD for method SW6020 barium and chromium were above the upper confidence limit and the parent sample qualified "J+", indicating high bias.

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3.0 CONCLUSION

All of the analytical results discussed in this DQA for the 2009 Former Communication Site Drum and Debris and PCB Investigation are considered usable. The project completeness of over 100 percent met the QAPP goal of 90 percent usable data.

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4.0 REFERENCES

ADEC. 2009 (January). *Oil and Other Hazardous Pollution Control Regulations –Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances*. 18 AAC 75.

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APPENDIX C

Waste Management Documentation (Click to open)

2007

2008

2009

APPENDIX D

Survey Data (Click to open)

APPENDIX E

Field Notes (Click to open)

2007

2008

2009

APPENDIX F

Munitions and Explosives of Concern

APPENDIX F
2007/2008/2009 MILITARY MUNITIONS INVESTIGATION ACTIVITIES AND HAZARD ASSESSMENT REPORT

FINAL, REVISION 1

2007/2008/2009 FORMER COMMUNICATIONS SITE DRUM AND DEBRIS AND PCB INVESTIGATION REPORT

FORT WAINWRIGHT, ALASKA

JANUARY 2011

U.S. Army Corps of Engineers, Alaska District
Environmental Remediation Services
Contract No. W911KB-06-D-0006
Task Order No. 0007

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Attachment F-1 Military EOD Response Reports and Other Information
Attachment F-2 Approval Memo and Explosives

1.0 Background

In 1939 the US Army established Ladd Field just east of the city limits of Fairbanks, Alaska. It was created to serve as an Army cold weather station to test aircraft under arctic conditions. During World War 2, Ladd Field evolved as a strategic airfield for aircraft being transported to the Soviet Union as part of America's lend-lease program with the Soviets. In 1961 the US Army changed the name from Ladd Field to Fort Wainwright.

Geotechnical Activities

In the spring of 2004 geotechnical activities were performed during the planning phase for construction of military family housing on property known as Taku Gardens. During intrusive activities near the base gas station metallic debris, munitions debris, and discarded military munitions were discovered. One old-style bomb fin assembly, two inert fragments of a 37mm projectile, one empty 75mm recoilless rifle cartridge, and five each 8-inch, M106 projectiles were found during intrusive activities. None of the items were fuzed, armed, or fired. US Army EOD personnel were contacted and removed these items. None of the munitions contained explosive filler, they were inert. Table 1 (MEC Located in 2004) lists the nomenclature and classification of the munitions located during the 2004 geotechnical activities.

Housing Construction

In the spring of 2005 construction of military housing began on property known as Taku Gardens. During construction, buried debris was routinely discovered and removed to the Fort Wainwright Landfill. In addition to the metallic debris one 8-inch, M106 projectile was found during intrusive activities. The item was not fuzed, armed, or fired. US Army EOD personnel were contacted and removed this item. The projectile did not contain explosive filler, it was inert. Table 2 (MEC Located in 2005) lists the nomenclature and classification of the munitions located during the 2005 construction season.

Records Search

During the winter of 2005/2006, a review of historical records revealed the Defense Reutilization and Management Office (DRMO) had used the eastern side of the property for the disposal of unserviceable equipment and other debris by burial. This information was evaluated and the US Army determined a remedial investigation was necessary.

2.0 Investigations

2006 Investigations

During the summer of 2006 an intrusive investigation by a separate contractor and with UXO qualified personnel revealed munitions-related items, buried drums, and large quantities of scrap metal was buried on the site. During the 2006 investigation, the major items of interest were two unfuzed M47 Smoke Bombs; one of which contained a liquid suspected to be mustard agent. After professional analysis by the US Army Technical Escort Unit and the Materiel Assessment Review Board (MARB) it was determined by using a portable isotopic neutron spectroscopy (pins) field unit that the liquid was water and no trace of chemicals was present. In addition to the two M47's six other unfuzed munitions suspected of containing explosives were located and turned over to the US Army EOD for disposal by detonation. After detonation, all five items were completely destroyed by an excessive amount of donor charges that made positive identification of the type of filler (empty, inert, or explosive) impossible to determine. Numerous other munitions related items were located, inspected for explosives and explosive residues, and determined to be free of hazardous or explosive material and disposed of in the Fort Wainwright Landfill. After initial intrusive investigations revealed the presence of buried munitions, the contractor demobilized. Table 3 (MEC Located in 2006) lists the nomenclature and classification of the munitions located during the 2006 investigation.

2007 Investigations

In the summer of 2007 Jacobs Engineering Group, Inc. mobilized to the site with UXO qualified personnel and resumed the intrusive investigation. Three unfuzed AN-M41 20-pound Fragmentation Bombs and two unfuzed M106 8-inch Projectiles were located. These five munitions were identified in the field as being live (containing explosive filler) and turned over to US Army EOD for positive identification and disposal. After detonation, all five items were completely destroyed by an excessive amount of donor charges that made positive identification of the type of filler (empty, inert, or explosive) impossible to determine. Numerous other munitions related items were located, inspected for explosives and explosive residues, determined to be free of hazardous or explosive material, and disposed of in the Fort Wainwright Landfill. In the fall of 2007 all fieldwork was suspended because of weather and field crews demobilized. Table 4 (MEC Located in 2007) lists the nomenclature and classification of the munitions located during the 2007 investigation.

2008 Investigations

In the spring of 2008 Jacobs Engineering Group, Inc. re-mobilized to the site with UXO qualified personnel and resumed intrusive investigations. Nine unfuzed M106 8-inch projectiles, thirteen unfuzed AN-M41 20-pound Fragmentation Bombs, four M47 Smoke Bombs with burster tube (suspected to be filled with explosives), one M75 Smoke Bomb with burster tube (suspected to be filled with explosives), and two M29 3.5-inch unfired rocket motors, with M405 inert fuzes, were located. These twenty-nine munitions were identified in the field as being live (containing explosive filler) and turned over to US Army EOD for positive identification and disposal. After detonating, the items with an appropriate sized donor charge twenty-seven of the twenty-nine munitions were confirmed to have contained inert filler or were empty and reclassified as munitions debris. The two 3.5-inch rocket motors with explosive residue in the motors were destroyed. Numerous other munitions related items were located during the 2008 season and were inspected for explosives and explosive residues and determined to be free of hazardous material. These items were turned over to a local scrap dealer that placed them into a smelter for recycling. In the fall of 2008 intrusive investigations were completed and fieldwork was suspended because of the weather. Table 5 (MEC Located in 2008) lists the nomenclature and classification of the munitions located during the 2008 investigation.

2009 Investigations

In the spring of 2009 Jacobs Engineering Group, Inc. re-mobilized to the site with UXO qualified personnel. During the winter, numerous anomalies and small areas were identified by the Remedial Project Managers for further investigation. These areas were excavated and found to contain only scrap metal and construction debris, no munitions related items were located. Approximately 80,000 c/yds of soil that was removed during excavations in 2007 and 2008 was inspected during backfill activities. Additionally, the UXO personnel searched each lift (6-inches deep) between compaction activities for anomalies. Approximately 2,500 pounds of small anomalies were located and removed during these search activities. No munitions related items were located at Taku Gardens in 2009, Table 6 (No MEC Located in 2009).

3.5-Inch Rockets

None of the munitions located contained a fuze, except the M29 3.5-inch rocket motors that were fitted with the M405 inert fuze and used for training. The two M29 3.5-inch rocket motors with M405 inert fuzes contained propellant residue in the motors. The UXO personnel identified these motors as containing propellant residue because they had the firing wires protruding from the venturi.

Summary

Because different contractors performed intrusive investigations, with either no UXO qualified personnel and/or different UXO qualified personnel and different Army EOD personnel disposed of the munitions it is not possible to conclude the military munitions buried at Taku gardens were explosively filled. Additionally, no fuzed munitions were located, no fuzes were located separately; additionally, no fuze shipping or storage containers was located that may have contained a fuze(s). The munitions identified by Army EOD in 2007 as high explosive munitions are suspect because of the excessive donor charge used to detonate the items; therefore, based on the results of intrusive investigations there is no conclusive evidence that indicates fuzed or explosive filled munitions were ever present at Taku Gardens.

Based on the types of munitions located and results of military EOD disposal activities, the Army's third party UXO expert has concluded that no fuzed or unfuzed explosively filled munitions were ever present within Taku Gardens. The Army does realize that this cannot be absolute as there were a number of different contractors who performed excavation for construction or intrusive work associated with the investigation, there was some early intrusive work conducted without UXO qualified personnel present and a number of different Military EOD personnel responded to dispose of the suspected discarded military munitions (DMM). This conclusion was reached using professional judgment and considered that the results of field activities gave no indication that hazardous DMM was present. This conclusion is based upon the following facts:

- No fuzed munitions were found.
- No fuzes were found either separately or in a fuze container.
- When detonated with the appropriate donor charge, the suspected M106 8-inch projectiles, M41 Fragmentation bombs and M47 Bombs were all empty or filled with plaster-of-paris.
- Those suspected M106, M41 and M47 destroyed in 2007 were destroyed using very large amounts of donor explosives and thus left no evidence.
- DMM has been found in only one section of this housing area, also known as "area A".
- All anomalies identified by EM-61 surveys that were selected by the Remedial Project Managers for investigation have been completely removed.
- An additional 10% of the unknown anomalies greater than 75 mV were investigated as a means of providing "ground truthing"; proving that the smaller anomalies do not contain either drums with hazardous materials or DMM.
- An additional ground truthing effort was conducted on anomalies of less than 75 mV throughout the entire compound which proved that anything less than 75 mV was caused by one of the following: small pockets of construction debris; small pockets of banding material; bundles of discarded communication wire; miscellaneous fasteners; or high concentrations of rust in the soil.
- The contractor UXO personnel on site for the last three years inspected large quantities of scrap metal found both prior to their arrival and uncovered during the investigation.

- Two practice 3.5” Rocket motors were located that contained propellant residue were determined to be DMM.
- More than 7 acres of land was excavated to depths of up to 18 feet during the investigation, with only the two previously mentioned rocket motors confirmed to be DMM.

Conclusion

"Based on all of the available evidence, the Army feels that, regarding the issue of explosives safety, the Taku Gardens housing area is clearly safe, by any measure, for residential use. It is extremely unlikely that any explosive ordnance is present at the site, and furthermore, the probability of encounter by residents with any buried munitions that might be present is itself quite remote."

Note that this is a qualitative risk evaluation - not the numerically-expressed version that is typical for risks from chemical contamination.

3.0 Detailed MEC Accounting

The following tables depict the different types of munitions removed from the site, the field classification, and after detonation classification.

Table 1 MEC Located in 2004

2004 Season	Quantity
Munitions Debris (MD)	
Bomb Fins (old style box)	1
Projectile Fragments, 37mm	2
Projectile, 8-inch M 106, Practice/Inert	5
Cartridge Case, 75mm RR, empty	1
Total	**9**

Table 2 MEC Located in 2005

2005 Season	Quantity
Munitions Debris (MD)	
Projectile, 8-inch M106 Practice/Inert	1
Total	**1**

Table 3 MEC Located in 2006

2006 Season	Quantity
Munitions Debris (MD)	
57mm RR Cartridge Case	Quantity Not Known
Bomb, M47 Smoke	4
Projectile, 8-inch M106 Practice/Training	2
Smoke Tank, M10	Quantity Not Known
Total	**6 Plus**
Range Residue & Debris (RRD)	
Container, 105mm Howitzer	Quantity Not Known
Container, 75mm Projectile	Quantity Not Known
Container, Shipping 2.36-inch Rocket	Quantity Not Known
Container, Ammunition	Quantity Not Known
Total	**Unknown**
Discarded Military Munitions (DMM)	
*&*Bomb, M41 20lb Fragmentation	1
*&*Bomb, M47 Chemical Smoke	2
*&*Rocket, 3.5-inch T-85	1
Total	**4**

*&*These items were identified by the contractor as live, with explosive filler; after disposal by Army EOD, they were determined to be inert

Table 4 MEC Located in 2007

2007 Season	Quantity
Munitions Debris (MD)	
40mm Dummy Cart M17	3
57mm RR Cartridge Case	2
75mm RR Cartridge Case	10
Bomb Fins, (20-lb Fragmentation Bomb)	1
Bomb Fins, GP	1
Bomb, M37 17-lb Practice	1
Bomb, M38A1 Smoke	1
Bomb, M75 Smoke	1
Hand Grenade, MK 2 Practice	1
JATO Bottle	15
Mortar Tail, 60mm Illumination	1
Rocket Fins 2.75-inch	2
Rocket Fins 5-inch	6
Rocket Fuze, M6 Dummy	44
Rocket Fuze, MK3 Dummy	2
Rocket Motor 4.5-inch	4
Rocket Motor, 2.25-inch SCAR	1
Rocket, 3.5-inch M29 Practice	27
VB-3 Guided Bomb Elec. Section	19
Total	**142**
Range Residue & Debris (RRD)	
Container, 105mm Howitzer	451
Container, 75mm Projectile	84
Container, M29 Practice Rocket	125
Container, Mortar	15
Total	**675**
Discarded Military Munitions (DMM)	
**Bomb, M41 20-lb Fragmentation	3
**Projectile, 8-inch M106	2
Total	**5**

**Because the donor charge was so large the type of filler could not be positively identified as inert or explosive

Table 5 MEC Located in 2008

Nomenclature*, 2008 Season	Quantity
Munitions Debris (MD)	
40mm Cart Case	2
40mm Dummy Cart M17	10
57mm RR Cartridge Case	21
75mm RR Cartridge Case	47
Arming Vane for Bomb Tail Fuze	55
Bomb Fins, (20-lb Fragmentation Bomb)	0
Bomb Fins, GP	17
Bomb, M37 17-lb Practice	11
Bomb, M38A1 Smoke	8
Bomb, M41 20-lb Fragmentation	2
Bomb, M47 Smoke	7
Bomb, M75 Smoke	4
Hand Grenade, MK 2 Practice	2
JATO Bottle	90
Mortar Tail, 60mm Illumination	1
Mortar, 81mm Practice M68 w/M3 Cart	0
Parachute Assembly (20-lb Fragmentation Bomb)	135
Projectile, 8-inch M106	0
Rifle Grenade, M11 Series, Practice	2
Rocket Fins 2.75-inch	1
Rocket Fins 5-inch	503
Rocket Fuze, M6 Dummy	484
Rocket Fuze, MK3 Dummy	9
Rocket Motor 4.5-inch	4
Rocket Motor, 2.25-inch SCAR	21
Rocket, 3.5-inch M29 Practice	168
Smoke Tank, M10	4
Total	**1668**

Table 5 (continued) MEC Located in 2008

Nomenclature*, 2008 Season	Quantity
Range Residue & Debris (RRD)	
Container, 105mm Howitzer	410
Container, 75mm Projectile	3
Container, M29 Practice Rocket	3
Container, M7 Teargas Grenade	1
Container, Mortar	2
Total	**419**
Discarded Military Munitions (DMM)	
Bomb, M41 20-lb Fragmentation***	13
Bomb, M47 Smoke***	4
Bomb, M75 Smoke***	1
Projectile, 8-inch M106***	9
Rocket, 3.5-inch M29 Practice (residue in motor)	2
Total	**29**

***After detonation the filler was identified as inert, or no filler present

Table 6 No MEC Located in 2009

Nomenclature*, 2009 Season	Quantity
Military Munitions	
Military Munitions	0
Total	**0**

4.0 Military Munitions Related Terms and Definitions, Defined by DOD

Discarded Military Munitions (DMM): Military munitions that have been abandoned without proper disposal or removed from storage from a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of, consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))

Disposal: End of life tasks or actions for residual materials resulting from demilitarization or disposition operations.

Explosive Ordnance Disposal (EOD): The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded ordnance and other munitions that have become an imposing danger, for example, by damage or deterioration.

Explosive Ordnance Disposal Personnel: Military personnel that have graduated from the Naval School Explosive Ordnance Disposal; are assigned to a military unit with a Service-defined EOD mission; and meet Service and assigned unit requirements to perform EOD duties. EOD personnel have received specialized training to address explosive and certain CA hazards during both peacetime and wartime. EOD personnel are trained and equipped to perform Render Safe Procedures (RSP) on nuclear, chemical, and conventional munitions and on improvised explosive devices (IEDs).

Military Munitions: Military munitions means all ammunition products and components produced for or used by the arms forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants; explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives, and chemical warfare agents; chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges; and devices and components thereof.

Munitions and Explosives of Concern (MEC): This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks means: (A) Unexploded Ordnance (UXO), as defined in 10 U.S.C. 101(e)(5); (B) Discarded Military Munitions (DMM), as defined in 10 U.S.C. 2710(e)(2); or (C) Munitions Constituents (MC) (e.g., TNT, RDX), as defined in U.S.C. 2710(e)(3), present in high enough concentrations to pose an explosive hazard.

Munitions Debris: Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

Range-Related Debris: Debris, other than munitions debris, collected from operational ranges or from former ranges (i.e., target debris, military munitions packaging and crating material).

Technical Escort Unit (TEU): A DoD organization manned with specially trained personnel that provide verification, sampling, detection, mitigation, render safe, decontamination, packaging, escort and remediation of chemical, biological and industrial devices or hazardous material.

Unexploded Ordnance (UXO): Military munitions that (A) have been primed, fuzed, armed, or otherwise prepared for action; (B) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and (C) remain unexploded whether by malfunction, design, or any other cause. (10 U.S.C. 101(e)(5)(A) through (C))

UXO-Qualified Personnel: Personnel who have performed successfully in military EOD positions, or are qualified to perform in the following Department of Labor, Service Contract Act, Directory of Occupations, contractor positions: UXO Technician I (UXOT1), UXO Technician II (UXOT2), UXO Technician III (UXOT3), UXO Safety Officer (UXOSO), UXO Quality Control Specialist (UXOQCS), or Senior UXO Supervisor (SUXOS).

2007 Munitions Photo Report
Taku Gardens, Fort Wainwright, Alaska

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Acronyms

ASP ..... Ammunition Supply Point
ATSC..... Air Technical Service Command
bgs ..... below ground surface
cal.....caliber
Frag..... fragmentation
HE ..... high explosive(s)
HEAT.....high explosive anti-tank
JATO .....jet assist take off
LAW ..... light anti-tank weapon
MK..... mark
mm .....millimeter
MOD..... modification
PD .....point detonating
RR .....recoilless rifle
SCAR ..... sub-caliber aircraft rocket
USAAF .....United States Army Air Force
USAF..... United States Air Force

Munitions Terms and Definitions

bouchon fuze

A device designed to create automatic hand grenade bursting, seconds after the grenade is thrown, also referred to as a “mouse-trap” style fuze

Bourrelet

The cylindrical surface of a projectile on which the projectile bears while in the bore of the weapon. Conventionally the bourrelet is located between the ogive and the body of the projectile and has a slightly larger diameter than the body. In some cases the bourrelet extends the full length of the body. In some projectile designs the conventional bourrelet becomes the front bourrelet, a rear bourrelet being provided behind the rotating band. In other designs a middle bourrelet is provided just forward of the rotating band.

Ogive

The curved or tapered front section, particularly of a projectile.

retarded

The term used to describe a weapon delivered with the retarding fins or other retardation device, such as an open parachute. Informally, retarded delivery is often referred to as “Snakeye” delivery.

rotating band

The soft metal band around the projectile near its base. The rotating band centers the projectile and makes it fit tightly in the bore, thus preventing the escape of gas, and, by engaging the rifling, which gives the projectile its spin.

rotating band pre-engraved

A rotating band fitted to a projectile and containing grooves to fit the rifling of the weapon. The grooves are formed as part of the manufacture of the projectile. This practice is followed in the manufacture of ammunition for recoilless weapons.

20 Pound Fragmentation Bomb AN-M41 Series

A total of 3 each, AN-M41 Frag Bombs were found in the building-15 excavation. No fuze was installed in any of the frag bombs. The bombs were transported to the base ASP and turned over to US Army EOD personnel for disposal by detonation.
Alaska State Plane Coordinates:

Northing	3959934.48	Depth 3-feet bgs
Easting	1381437.32	
Northing	3959928.06	Depth 3-feet bgs
Easting	1381428.12	
Northing	3959930.41	Depth 3-feet bgs
Easting	1381419.13	

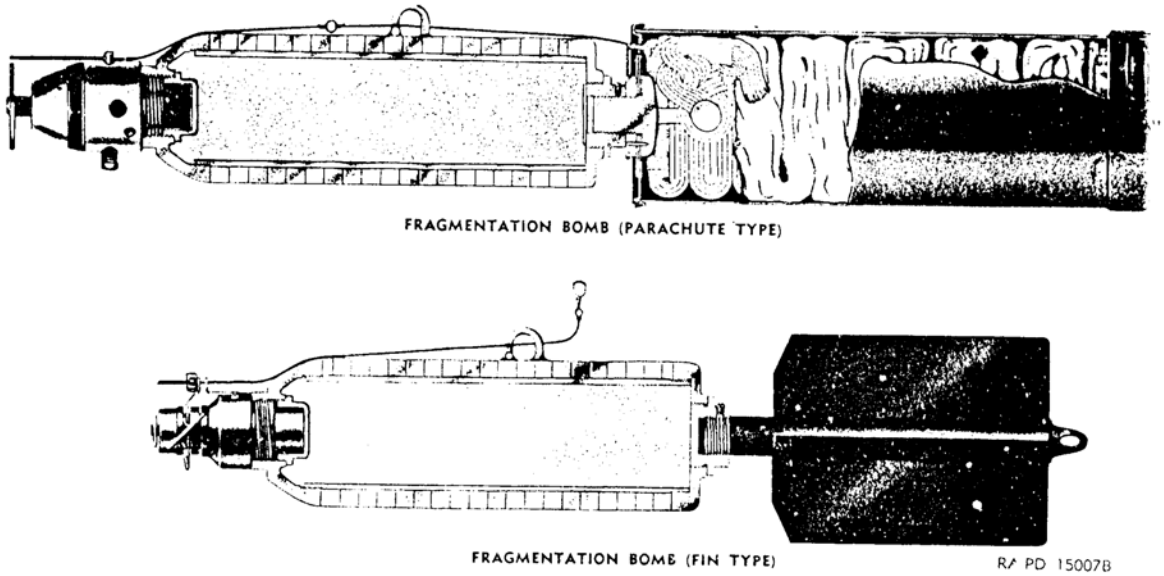
Description

The 20-lb Fragmentation Bomb AN-M41 series is constructed of spirally wound wire and cast-steel nose and tailpieces. A seamless steel inner tube is threaded to the nose and tailpiece to form the base for the spiral-wound wire. The fin assembly is made of four rectangular sheet-steel vanes welded to a one-inch diameter pipe. The threaded end of the pipe is secured to the base filling plug. The nose section of the bomb is threaded to receive an impact fuze. The 20-lb Fragmentation Bomb AN-M41 series is used in the 100-lb Fragmentation Bomb Cluster shown below. At the center of gravity, a U-shaped eyebolt of steel is welded to the bomb case for horizontal suspension; an eyebolt is welded to the tail for vertical suspension. Approximately 13 percent of the complete weight of the bomb is explosive filler, Amatol 50/50, or TNT. A yellow colored head and base identify the high explosive filler of the 20 lb Fragmentation Bomb**.** Identifying

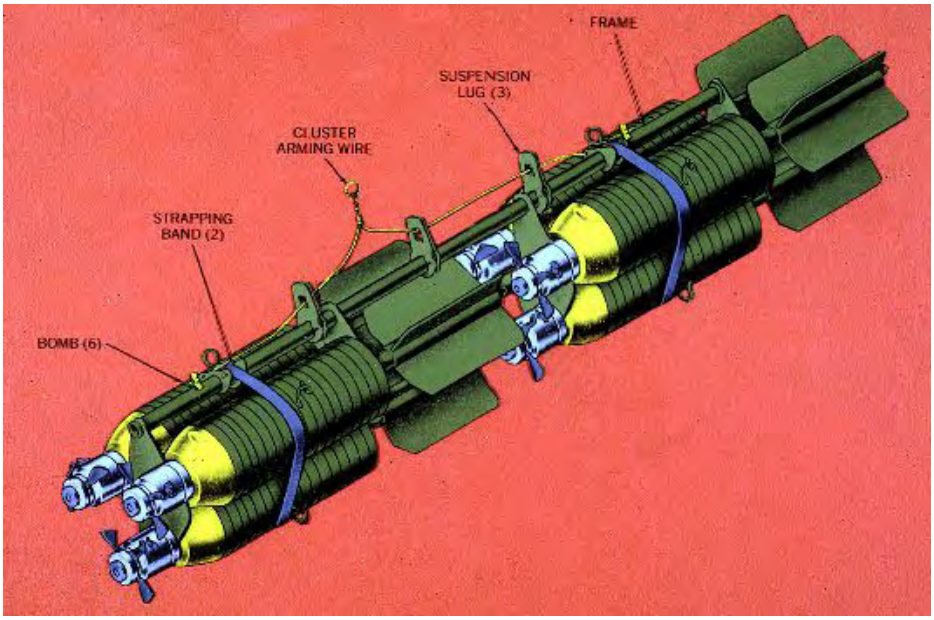
nomenclature is stenciled in black on the bomb body. The bomb body windings are painted olive drab.

AN-M41 and AN-M41 A1

The Bomb AN-M41, the earlier model, differs from AN-M41A1 in length. A change in construction added a 1/2-inch shoulder to the nose of the bomb; this change in design alone constitutes the **"A1"** modification.



AN-M41 Frag Bomb with parachute (Upper) and without parachute (lower)



Bomb Cluster Adapter AN-M1A1

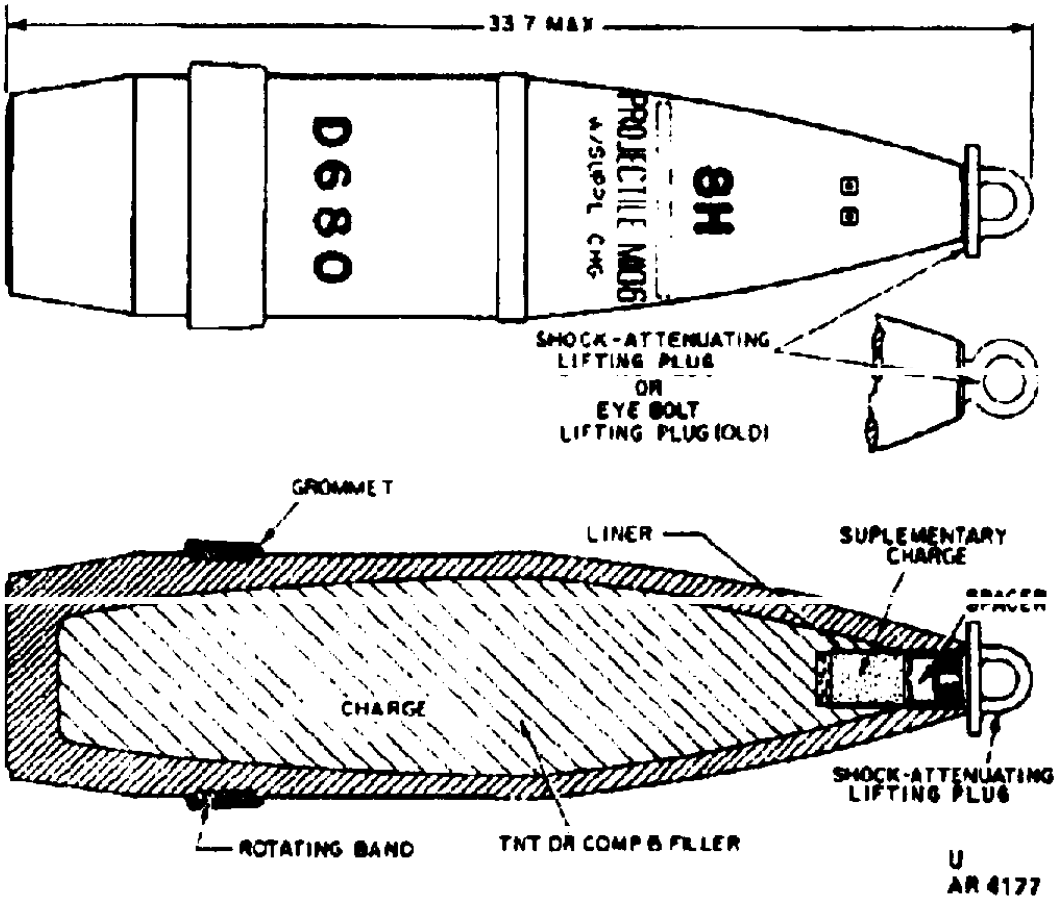
M106 8-inch High Explosive Projectile

A total of 2 each M106 8-inch high explosive projectiles were found at the building-15 excavation. No fuze was installed in either projectile. The projectiles were transported to the base ASP and turned over to US Army EOD personnel for disposal by detonation.

Northing	3959959.41	Depth 6-inches bgs
Easting	1381649.86	
Northing	3959958.48	Depth 15-inches bgs
Easting	1381649.39	

Description

The projectile consists of hollow steel forging with a boat-tailed base, a streamlined ogive, and a metal rotating band. A base cover is welded to the base of the projectile for added protection against the entrance of hot gases from the propelling charge during firing. In shipment the nose of the projectile is fitted with a thread eyebolt-lifting plug to facilitate handling and provide a closure for the fuze cavity. The projectile is made with either a shallow or deep fuze cavity and may be loaded with TNT or Composition B. Deep cavity projectiles contain a supplementary charge in the fuze cavity. A cardboard spacer is placed in the fuze cavity between the supplementary charge and the lifting plug to limit movement of the supplementary charge during shipping and handling.



Line Drawing of a M106 8-inch High Explosive Projectile

17-Pound M37 Practice (parachute retarded) Bomb

One M37 Practice bomb was found in the building-15 excavation. The M37 bomb does not use a fuze or any explosive components; however, the bomb cavity was inspected and did not contain any explosive residues.

Description

The 17-pound M37 practice bomb is used only with a parachute. The bomb is designed to allow the bomb, parachute, and case assembly to be reused after it is dropped until it becomes unserviceable. A single suspension lug is provided in the bomb body to allow for horizontal suspension and suspension wires with an “S” hook to allow for vertical suspension. A suitable closing plug is installed in the fuze opening in the nose.

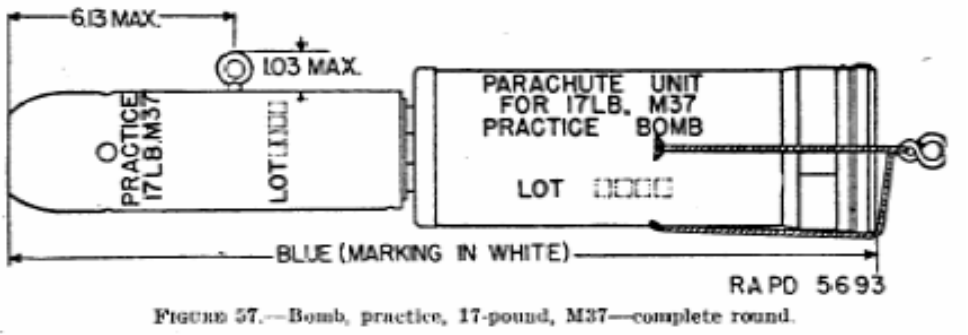
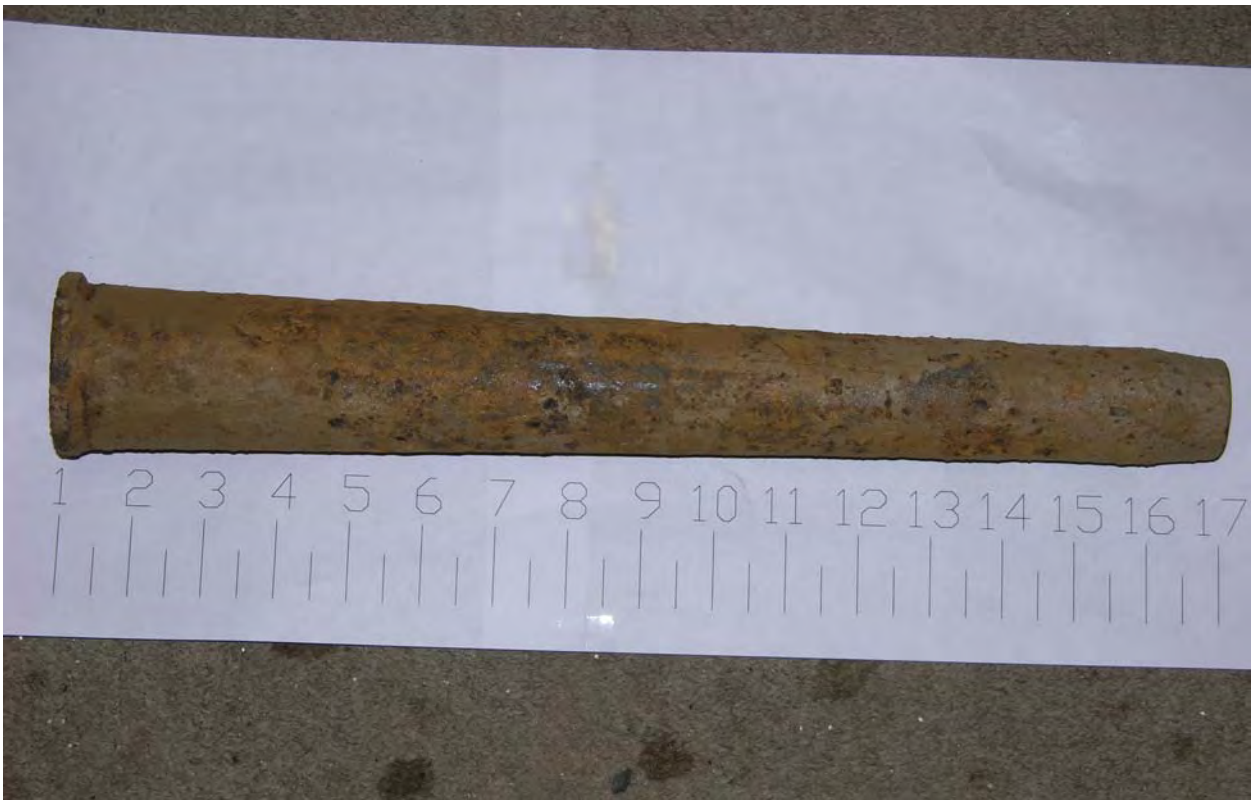


FIGURE 57.—Bomb, practice, 17-pound, M37—complete round.

Line drawing of the 17-pound M37 practice bomb



Cartridge, 40mm, Dummy, M 17 or M17B1

A total of three of these cartridges were found in the building-15 excavation. These cartridges do not contain any explosive material and are totally inert; however, the case was inspected and did not contain any explosive residues.

Description

This completely inert cartridge simulates the service cartridge and is used for training in handling and loading. The service projectile and cartridge case are simulated by a one-piece bronze or malleable iron body (M17B1). The nose end of the assembly is threaded to hold a bronze or iron plug resembling a service fuze. The base provides for extraction of the cartridge after loading.

Recoilless Rifle Cartridge Case, 57mm and 75mm

There were a total of 2 each 57mm and 10 each 75mm recoilless rifle cartridge cases found. One each 57mm case was found in the building-15 excavation and one at the building-24 monitoring well 69 location. Eight each 75mm cases were found in the building-15 excavation and two at the building-24 monitoring well 69 location. All of the cartridge cases were inspected and none of the cartridge cases contained any propellant or explosive residues and the primers were expended on all of the cases.

NOTE: The 57mm and 75mm Recoilless Rifle cartridge cases are similar in design and differ only in size. Both are fixed to the projectile and used in recoilless rifle guns. The description below is for 57mm and 75mm RR Cartridge Cases.

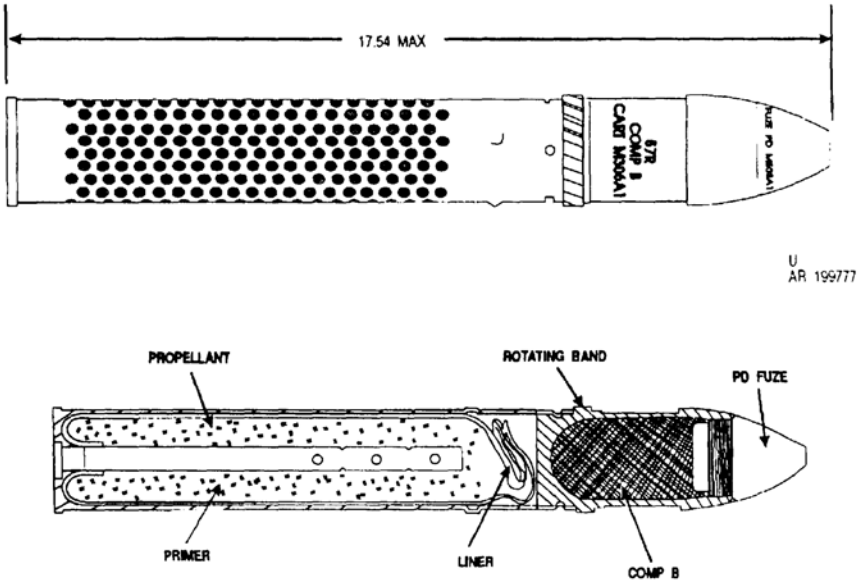
Description

The cartridge consists of a perforated metal cartridge case, containing a plastic liner, which is crimped to a steel projectile. The cartridge case liner is loosely filled with propellant and the cartridge case is equipped with a percussion primer. The primer ignition tube extends through the length of the propelling charge.

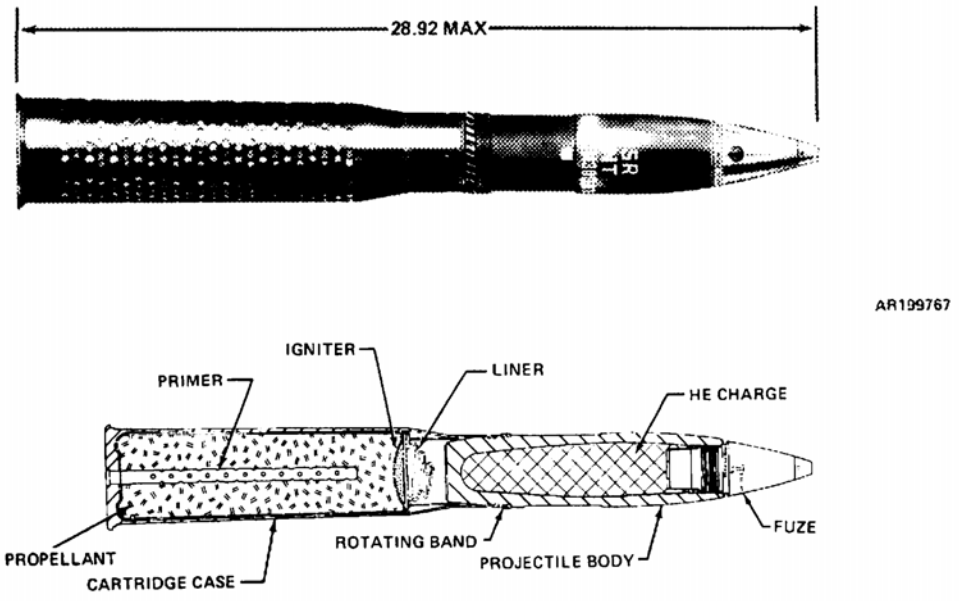
The projectile is fixed to the cartridge case and contains an explosive charge of Composition B or TNT. Projectiles are fuzed with a point-detonating (PD) Fuze that function on direct impact or graze. There is a bourrelet on the rear of the ogive and another immediately in front of the rotating band. The cartridge is spin-stabilized in flight.

Functioning

The primer ignites the propellant when struck by the weapon firing pin, and the burning propellant generates gases to propel the projectile through the barrel. Recoil is eliminated because the design of the cartridge case permits controlled escape of some gas pressure through apertures in the rifle breech-block. The rotating band engages the rifling in the barrel to spin the projectile for stability in flight. The point-detonating fuze functions either on direct impact or on graze. When the fuze functions, the firing pin strikes a detonator to initiate the explosive train in the fuze, and subsequently detonates the explosive charge producing blast and fragmentation.



Line drawing of a (full-up round) 57mm RR case with attached projectile.



Line drawing of a (full-up round) 75mm RR case with attached projectile.

MK2 Practice Hand Grenade

A total or 2 each MK2 Practice Hand Grenades were found, one in the building-48 excavation and the other on the surface near building-22, (east side). No fuze was installed in either practice hand grenade.

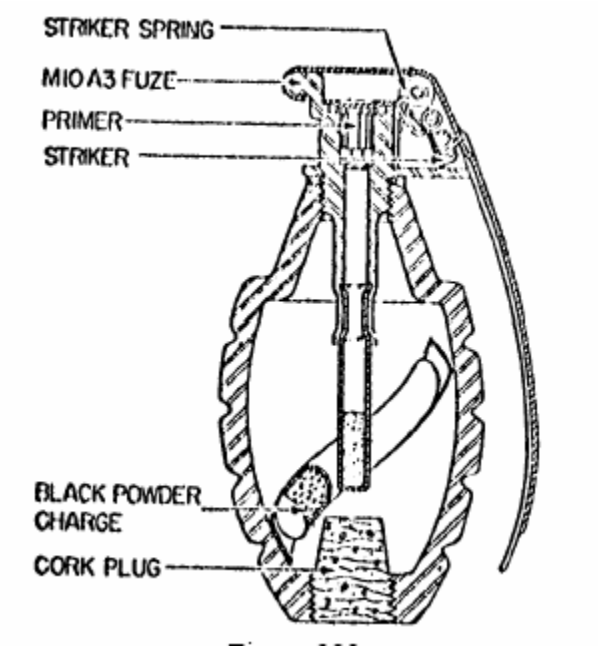
Description

The MK2 practice training hand grenade is used to train personnel in the proper throwing techniques of the MK2 fragmentation hand grenade. It has the same weight and physical characteristics of the MK2 HE fragmentation grenade, with a functional fuze, safety lever, and pull ring attached to the safety pin that holds the cock-striker in the cocked position. Prior to throwing, the grenade is held in the hand with the fingers depressing the safety lever. The pull ring is pulled, which removes the safety pin. The grenade is then thrown, which releases the cock-striker, which strikes and initiates the fuze. The body of the MK2 practice hand grenade has a hole in the base that allows the explosive gases created when the fuze functions to escape.

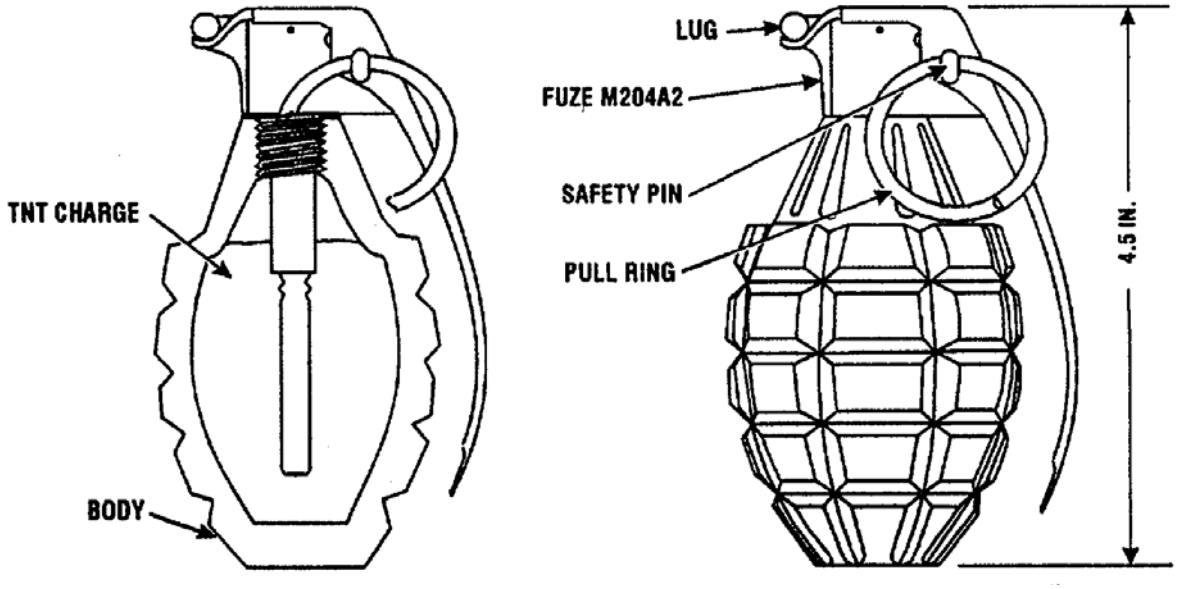
The MK2 HE fragmentation hand grenade is used to supplement small arms fire against the enemy in close combat. The grenade produces casualties by high velocity projections of fragments.

The MK2 HE fragmentation hand grenade is pineapple shaped with deep serrations of its body. These serrations delineate fragmentation of the body when the grenade explodes. The grenade body is made of cast iron and contains TNT filler. Grenade

fuzes M204A1 and M204A2 are pyrotechnic delay-detonating fuzes are used in both the HE and training grenades and differ only in body construction. The delay time for both fuzes is 4-5 seconds.



Line drawing of the MK2 Practice Hand Grenade with fuze installed



Line Drawing of the MK2 HE Hand Grenade with fuze installed

M38A2 Smoke Streamer Bomb Case

A total of 1 each M38A2 Smoke Streamer bomb case was found in the building-48 excavation. The bomb case was inspected and no smoke grenades or explosive residues were in the bomb case.

NOTE: When M18 Smoke Grenades are installed the M38A2 designation changes to T29 Smoke Streamer Bomb.

Description

The bomb body consists of a sheet-steel case with a filling plug in the base. The four tail vanes are welded to the truncated cone with box-type interior struts. The complete body assembly consists of this Practice-Bomb Case M38A2, a train tube, a grenade train, a closing plug, and a fuze. The train tube is a seamless steel tubing three inches in diameter and 40 inches long, with a fuze adapter brazed to the after end. Eight modified Grenades M18 filled with fast burning mixture are inserted into the tube to form the grenade train. Each grenade is modified by cutting a center hole in its base, and the

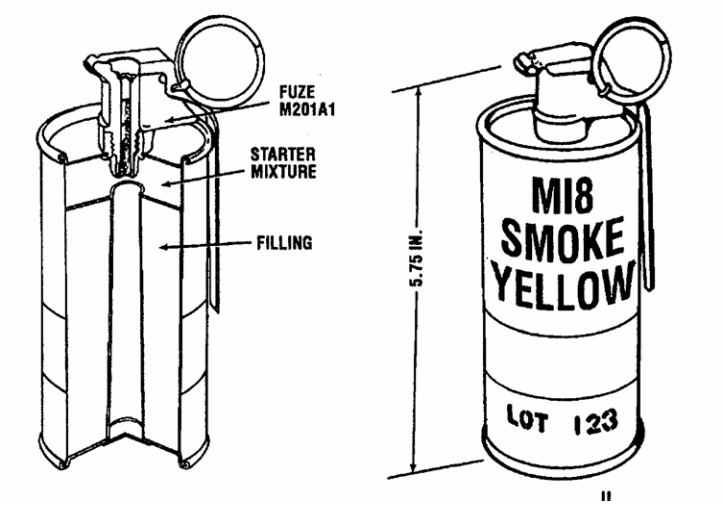
bouchon fuze is omitted. The top of each grenade is coated with a starter compound, which acts as the igniter for the adjacent grenade. Four strands of quick match are knotted and inserted in the center hole of the top grenade in such a manner as to leave the knot and loose ends at the top to receive the fuze flash. The eight grenades are held apart by spring steel separators. A threaded closing plug seals the tube and protects the grenade train from moisture. This plug must be removed just prior to use. The bomb is brought up to the weight of approximately 98 pounds by filling the balance of the internal space with sand. The colored streamer smoke bomb is used as a visual signal to be dropped by the lead plane of a bomber formation when the target has been determined. Smoke emission begins approximately one second after release from the plane and continues for approximately 7,000 to 10,000 feet of free fall.

Operation

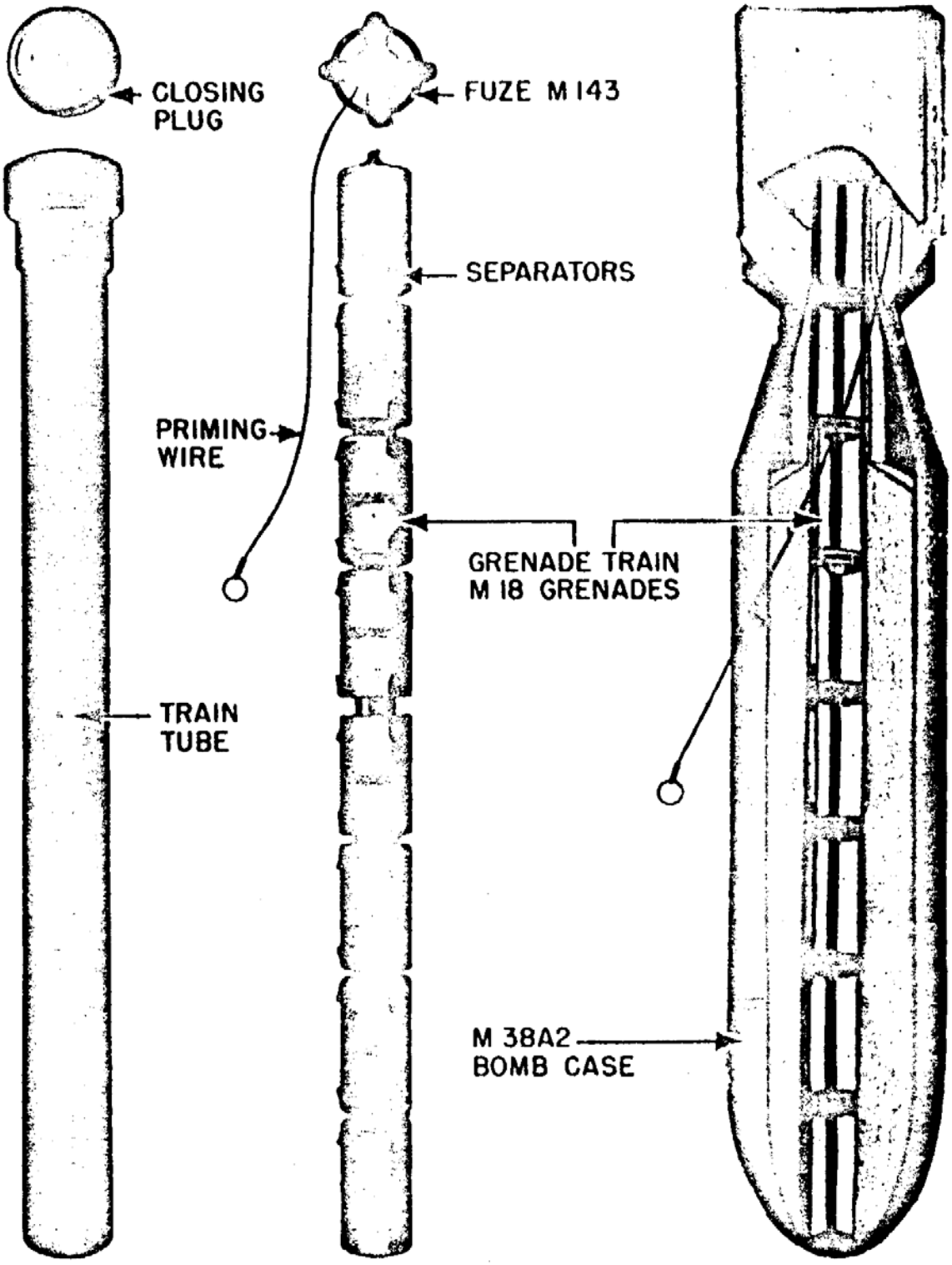
When the arming wire is pulled, the bouchon springs throw off the arming washer and handles, allowing the bouchons to fire. This action ignites the quick match in the center hole of the top grenade, which in turn is ignited, and the flash is simultaneously transmitted to all the grenades.

Fuzing

The Fuze M143 consists of a fuze body support mounting for bouchon grenade-type fuzes and an arming washer. The mounting is threaded to fit the fuze adapter of the tube train. The arming washer is 2.5-inches in diameter and has four arms 0.75-inch wide and one inch long. The arming wire holds the arming washer over the bouchon levers until it is withdrawn.



These are line drawings the M18 Smoke Grenades that are placed in the M38A1 Bomb Case. None of these smoke grenades were found at the site.



This is a drawing of the M38A1 bomb case showing how the M18 smoke grenades are placed internally. When loaded with smoke grenades the bomb becomes the **T29 Smoke Streamer Bomb.**

M75A1 Target Identification Bomb (Nose Section)

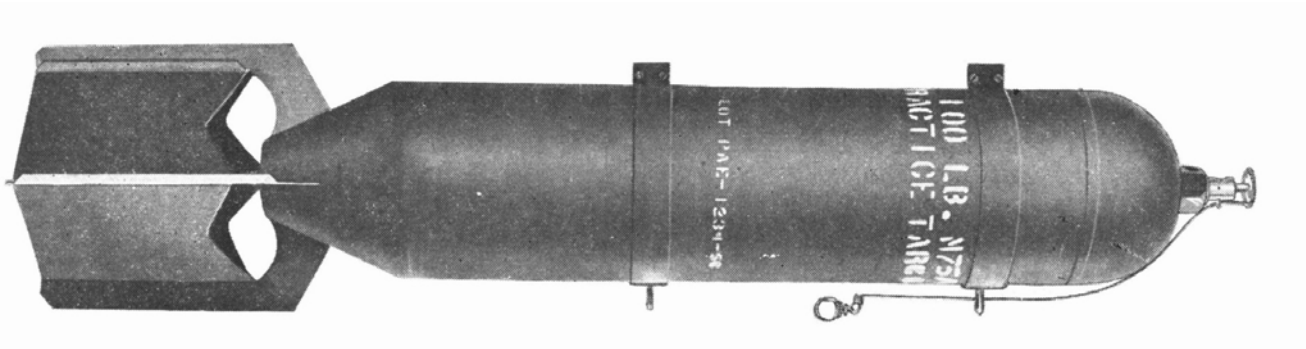
A total or one M75A1 Target Identification bomb (nose section only) was found in the building-48 excavation. No fuze was installed in the nose section, and no explosive residues were found in the cavity.

Description

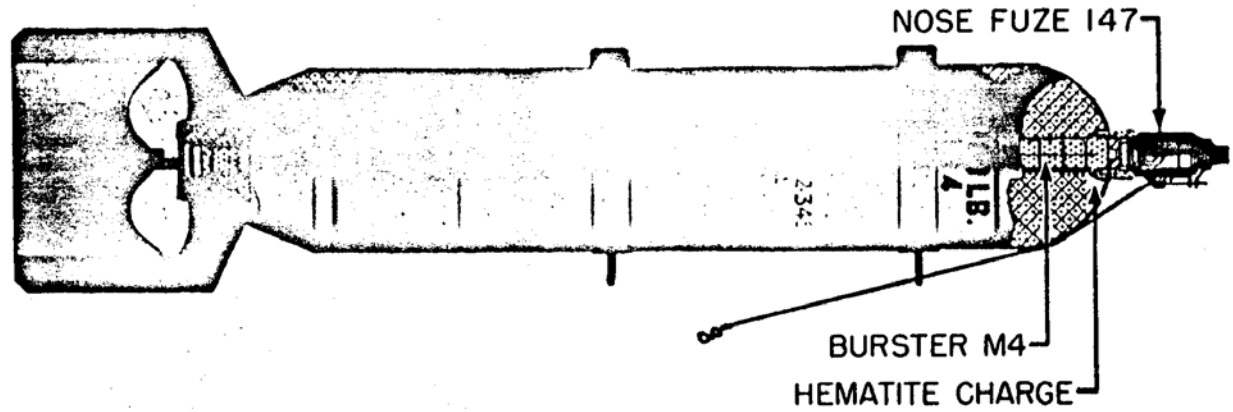
Target Identification Bombs M84A1 and M75A1 are identical with the exception of the fuze, and the two bombs are similar in construction to the Chemical Bomb AN-M47A2. The body is of sheet metal with box-type tail fins welded to the conical section. The Burster M4 runs through the entire length of the bomb and is closed at the forward end by a closing plug. A filling plug is placed in the fin cone of the bomb body, to facilitate loading the hematite charge (red iron oxide). The fuze fits into the forward end of the burster.

Use

The Target Identification Bomb M84A1/M75A1 is intended for release by the lead or "pathfinder" plane to indicate the bomb-release line for bombers in formation when operations are carried out above overcast and ground targets are not visible. The bomb was designed to produce a red smoke cloud, which would remain at the bursting point for a period of ten minutes under normal air conditions and would be visible for a distance of 15 miles at an altitude of 25,000 feet. The M75A1 is used for target identification in practice, to mark targets on snow-covered bombing ranges.



Museum View of the M75A1 Target Identification Bomb



Line drawing of the M75A1 Target Identification Bomb

2.25-inch Sub-Caliber Aircraft Rocket (SCAR) Motor

A total of 1 each 2.25-inch SCAR rocket motor was found in the building-48 excavation. The motor was inspected and did not contain any propellant or explosive residues.

Description

The 2.25-inch Subcaliber Aircraft Rocket is a Sub-caliber, high velocity, fin stabilized rocket with inert warheads. The 2.25-inch Subcaliber Aircraft Rocket is used as a training round in place of the service aircraft rockets. The SCAR rocket is used for training pilots how to center the rocket's impact in the target's center by adjusting his attack conditions to those originally planned for and second, to reduce the overall dispersion of the training round by properly flying his aircraft. These rockets are used exclusively for advanced training and refresher courses in forward firing from aircraft.

Major Components

2.25-inch Aircraft Rockets are composed of two major components, the head and the motor. The warhead is made of machined steel, die cast zinc or cast iron. It is threaded at the rear for assembly to the motor and is hollowed out to give it the correct weight to produce proper ballistic characteristics when the rocket is fired, and the motor.

NOTE: Several of these warheads (Dummy Nose Fuze, MK3 MOD2) were found at the site and are pictured and described below.

MK3 MOD2, 2.25-inch Rocket Warhead Dummy Nose Fuze

A total or 2 each MK3 MOD2, 2.25-inch SCAR Rocket Warhead Dummy Nose Fuzes were found in the building-48 excavation. The fuzes are completely inert.

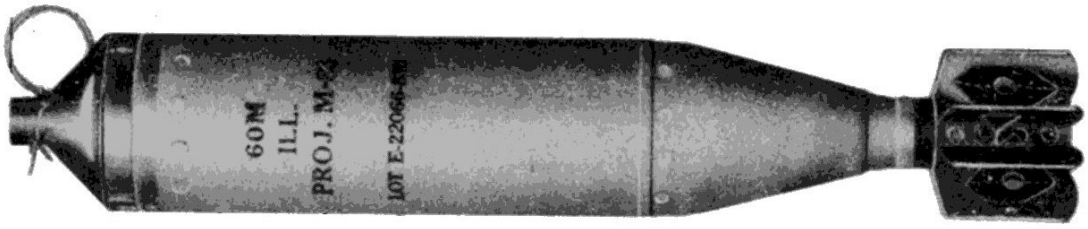
As described above, these dummy fuzes serve as the “warhead” for the 2.25-inch Sub-caliber Aircraft Rocket used exclusively for training. They contain no explosives and are installed in the nose of the rocket motor for ballistics.

60mm Illumination Mortar, M83 (Body)

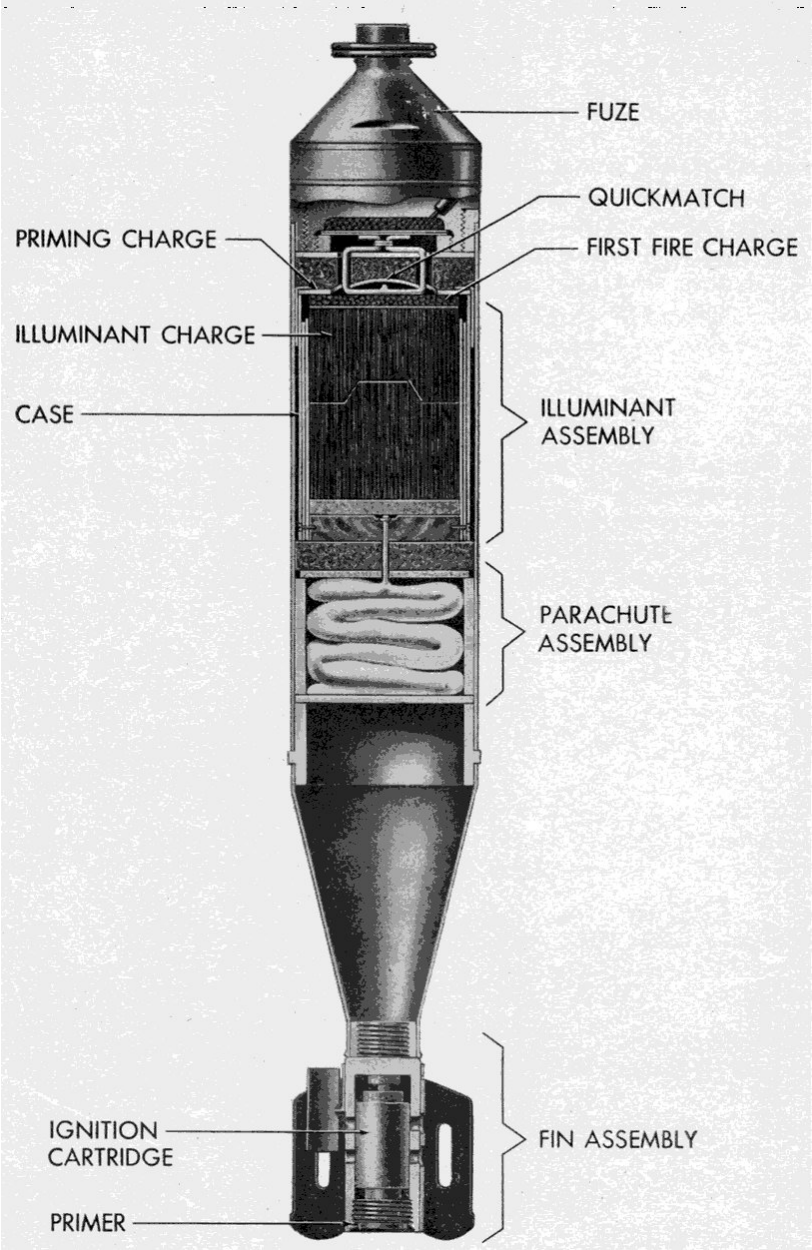
A total or one M83 60mm illumination mortar was found in the building-15 excavation. The mortar body was inspected and did not contain any material or explosive residues

Description

The 60mm illuminating mortar, M83, was designed to provide a night light of relatively high candle power that could be fired from a standard infantry weapon. The 60mm mortar adequately fills the need, having minimum of 110,000-candle-power it can burn for 25 seconds while drifting earthward on its parachute.



Museum view of a M83 60mm Illumination Mortar



Line drawing of a M83 60mm Illumination Mortar, showing the internal layout

Spin-Stabilized, 4.5-Inch Rocket Motor

A total of 4 each 4.5-inch Spin Stabilized Rocket Motors were found, 2 in the building-48 excavation and the other 2 on the surface near the building-15 excavation. Each motor was inspected and none contained any propellant or explosive residues.

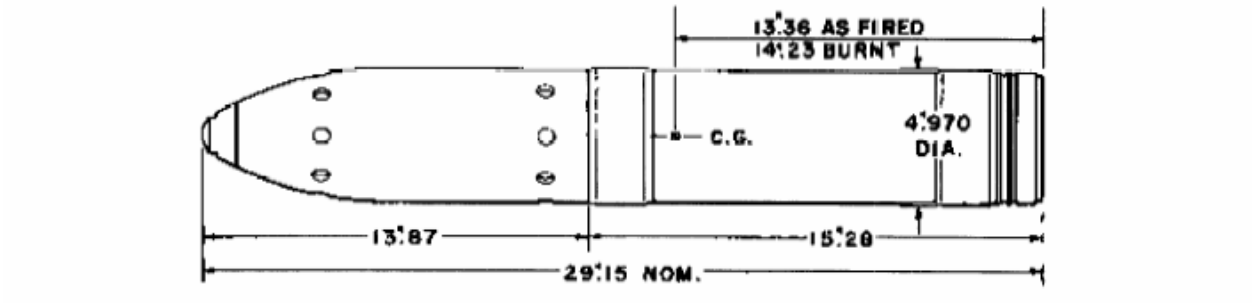
The M16 was the first of the Army's spin-stabilized 4.5-inch rockets. It was fired from 24-tube "Honeycomb" and 60-tube "Hornet's Nest" launchers. These rockets were also referred to as “barrage” rockets because of the way they were fired. The M17, M20, and M21 rockets were similar to the M16. M16 rockets were used by the Army at least until the Korean War.

Museum View of a 4.5-inch spin stabilized rocket, with warhead and fuze attached

M6 5-inch Rocket Warhead Dummy Nose Fuze

A total of 44 each, M6, 5-inch rocket warhead dummy nose fuzes were found. Five were found in the building-48 excavation and 39 were found in the building-15 excavation. These fuzes are completely inert.

These dummy nose fuzes may have been used in the 5-inch MK27 MOD 0 Surface Smoke-Target Rocket. This rocket was used to simulate fast moving aerial targets for gunnery practice, leaving a trail of smoke to assist in locating the target, and was fitted with a dummy nose fuze. No 5-inch rocket motor or warhead was found during excavation activities that would accept this dummy nose fuze, which makes it difficult to associate the fuze with a warhead or rocket.



This is a line drawing of the MK27 MOD 0 Surface Smoke-Target Rocket

3.5-inch M29 Practice Rocket with an inert warhead and M405 fuze

A total of 25 each 3.5-inch rockets or rockets parts were found. One was found in the building-48 excavation and the remaining 24 were found in the building-15 excavation. All of the components were inspected and none contained any propellant or explosive residues.

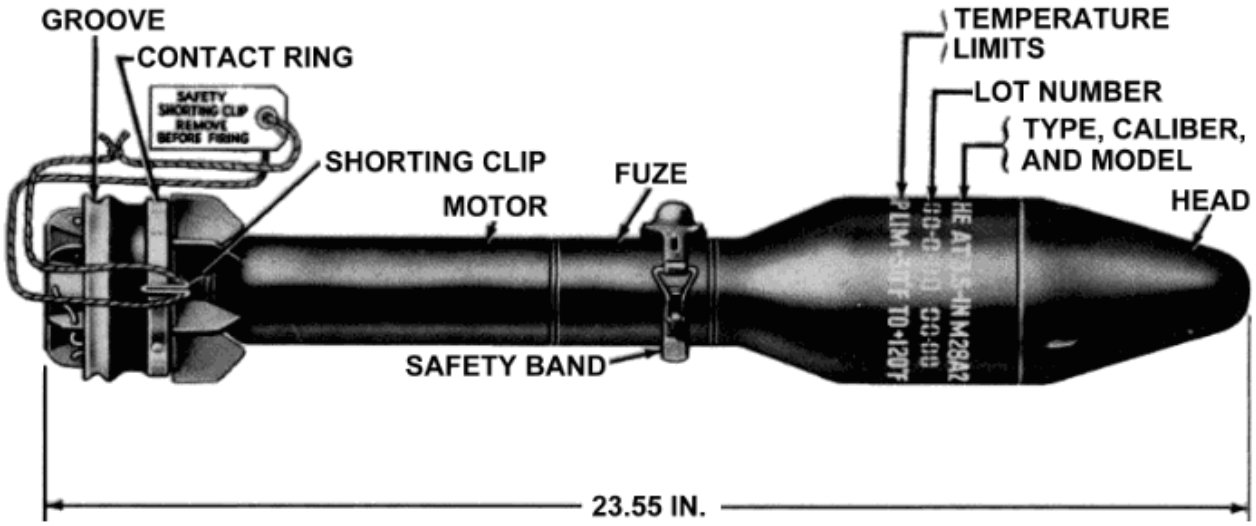
History

In 1945, the original bazooka (2.36-inch) a shoulder-launched anti-tank rocket was no longer an effective weapon against modern armored vehicles and tanks. Therefore a much more powerful rocket and launcher (3.5-inch) was developed. However, the resulting M20 launcher and M28 rocket were not fielded in significant numbers to the troops until the start of the Korean War in 1950. The system was officially known as the 3.5-Inch High-Explosive Anti-Tank (HEAT) Rocket, but was frequently called the "Super Bazooka".

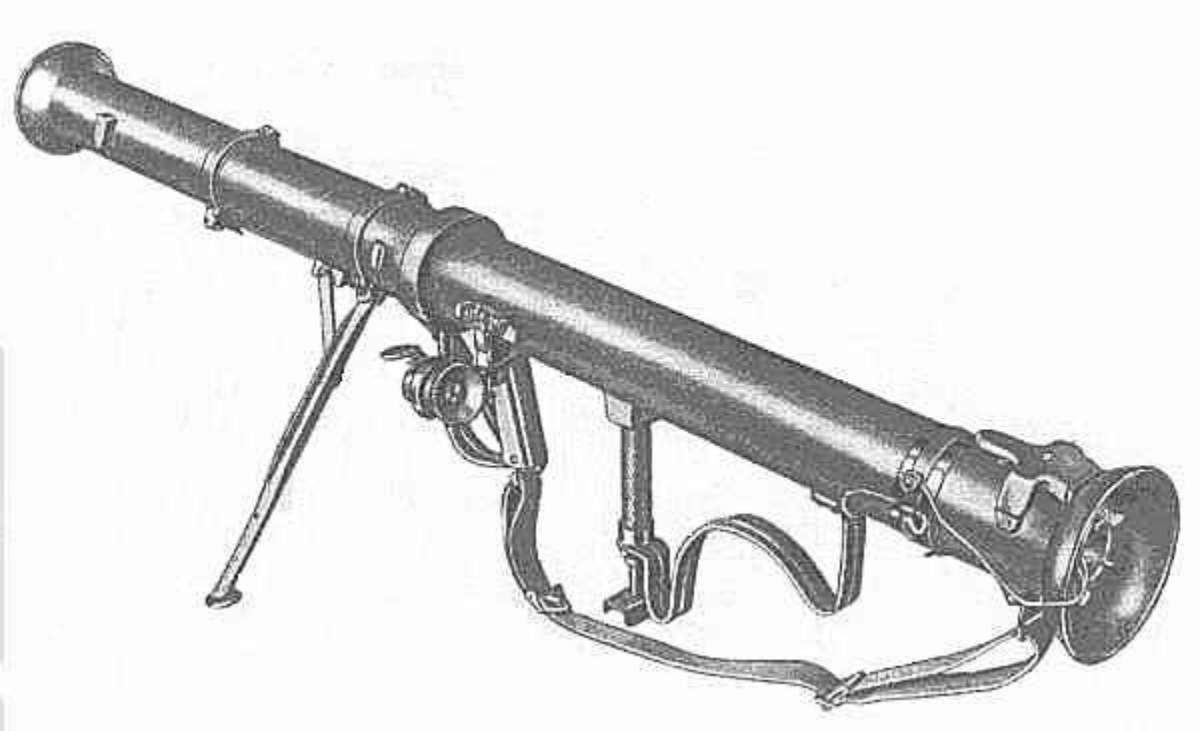
The 3.5-Inch Anti-Tank Rocket Launcher M20A1 consisted of two tubes, which had to be screwed together before loading and firing a rocket. The assembled launch tube had a length of 60-inches and weighed 14-lbs. The weapon for the M20 launcher (Bazooka) was the High-Explosive Anti-Tank Rocket M28. The general principle of operation of the "Super Bazooka" was the same as for the older M9A1. The M28 had a maximum range of about 900-yards, but effective range against a stationary target was closer to 300-yards.

For training, the M20 launcher could fire the 3.5-Inch Practice Rocket M29, which had an inert hollow warhead, but was otherwise identical to the M28 HEAT Rocket. The

3.5-Inch "Super Bazooka" launcher and rockets were phased out by the U.S. Army in the early 1960s, and replaced by the M72 LAW (Light Anti-Tank Weapon), a pre-loaded rocket in a disposable rocket launcher.



3.5-inch M28 HEAT Rocket



M20 Launcher "Bazooka" used to fire the 3.5-inch M28 HEAT Rocket and or the M29 Practice Rocket.

M3A2 JATO Bottle

There were a total of 15 each, JATO bottles found in the excavation for Monitoring Well 69 near the southwest corner of building-24. All of the JATO bottles were inspected and determined to have functioned as designed with no remaining propellant or explosive residues in the cavity.

NOTE: JATO bottles are classified as “Rocket Motors” and as such are handled, and stored using the same precautions as all military rocket motors.

Description

The JATO (Jet Assist Take-Off) bottle is essentially a rocket motor with a solid-propellant thrust unit used primarily for launching target planes from a catapult, although it may be used for other applications.

Body assembly
The body assembly is a cylindrical steel tube closed at the forward end by the head and threaded externally at the open rear end to receive the nozzle.

Nozzle
The nozzle, which is constructed of steel, is of the convergent-divergent type comprising a conical rear portion, and cylindrical forward portion. The cylindrical forward end of the nozzle is threaded internally to engage the rear of the body assembly.

Igniter plug assembly
The igniter assembly consists of a “shorted” igniter plug and a nozzle closure which are connected by two lengths of igniter cable. The nozzle closure is a plastic, cup-shaped disk into which two copper terminal inserts are molded. The closure is cemented permanently into the expansion cone. The igniter plug is a standard, two-pronged, rubber-bodied electric plug which is short-circuited by a copper wire tied across its prongs. The two cables from the plug are crimped into the terminal inserts in the nozzle closure Igniter assembly. The igniter assembly is designated “Igniter, JATO, M21.” It consists of a plastic igniter case containing a 463-grain charge of black powder, two squibs, each of 1.0-ohm resistance, and two 24-in. long external lead wires which are connected to the squibs. Electric terminals for the squibs and lead wires are riveted to the plastic wall of the igniter case. The lead wires pass through the center of the JATO and are crimped into the copper terminal inserts in the nozzle closure.

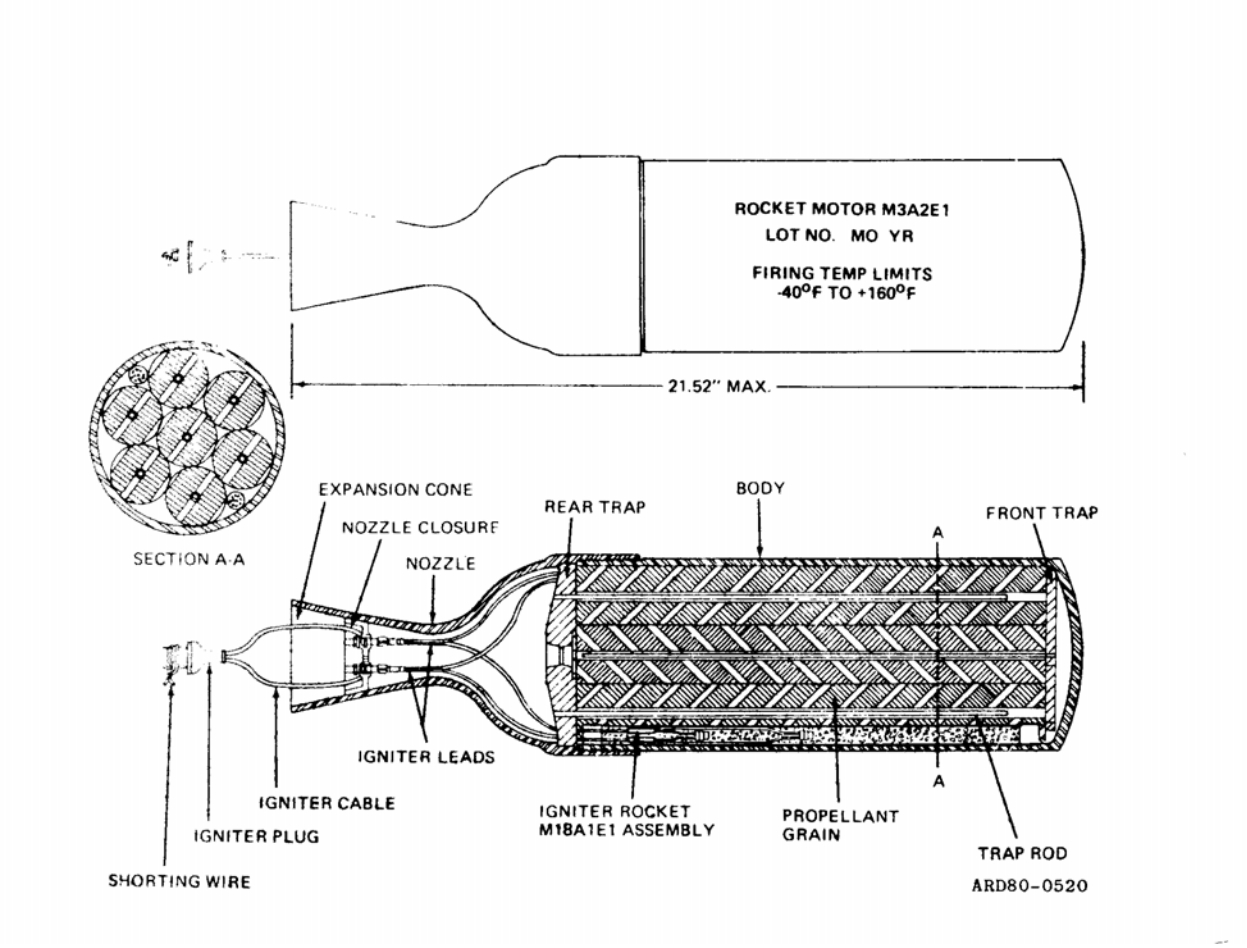
Propelling charge
The propelling charge consists of seven monoperforate cylindrical extruded grains of double-base propellant M16 (T6). The grains are arranged in the JATO lengthwise with one grain in the center and six grains surrounding it.

Rear trap assembly
The rear trap assembly is a star-shaped steel casting with six equally spaced radial arms and a hexagonal center hole. Trap rods, one each from 6 cylindrical radial arms, extend axially toward the forward end of the JATO to form a cage-like support, which receives six of the seven propellant grains.

Front trap assembly
The front trap assembly is a wheel-shaped steel casting comprising an outer ring, center hub, and three radial spokes. A cylindrical trap rod extends from the center of the hub axially toward the rear of the JATO. This rod receives the seventh (center) grain of the propelling charge.

Functioning

The JATO is designed to function safely and reliably when connected to any electrical source which will deliver 2 amperes at a minimum of 1-1/2 volts, although higher voltages may be used if desired. Satisfactory results have been obtained by ignition from ordinary 110-volt house current. Applying current through the igniter cable activates the 463-grain charge of black powder, which ignites the propelling charge. Burning creates a rapid expanding gas, which can only escape through the nozzle assembly. The nozzle assembly is designed for a venture effect which further compresses the gas and increases the thrust required to launch the rocket or aircraft.



Line drawing showing the internal layout of the JATO bottle

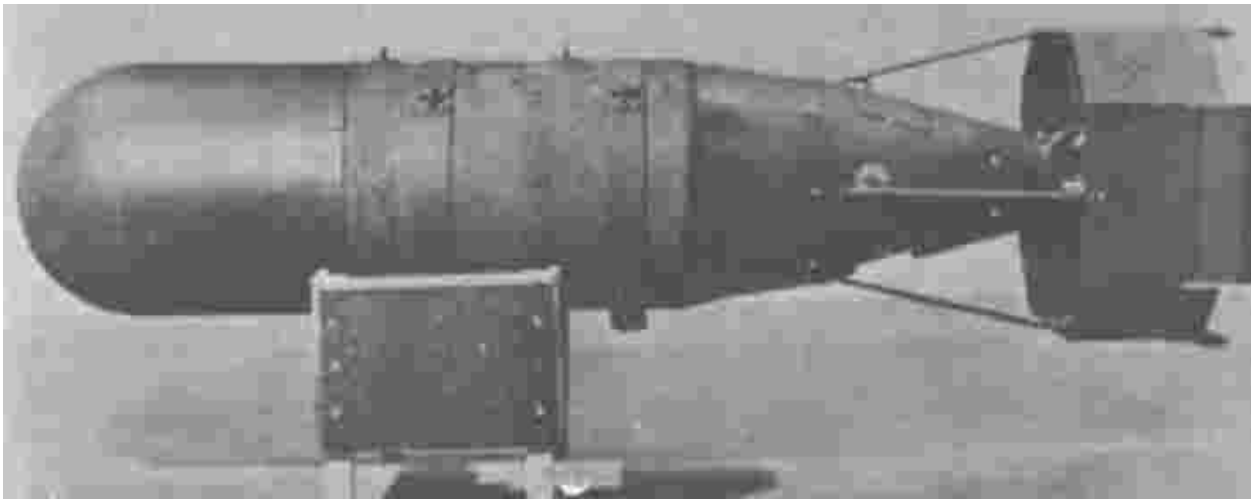
VB-3 Guided Bomb (electronics section shown in photo above)

A total of 19 each, electronic guidance sections for the VB-3 Guided bomb were found in the building-15 Excavation. No explosives or explosive residues are associated with the guidance section.

Description

The VB designation was introduced by the U.S. Army Air Force in 1943, and covered un-powered guided bombs with effectively no standoff gliding range (i.e. "vertical" bombs). In April 1942, the USAAF's Materiel Command (became part of ATSC (Air Technical Service Command) in 1944) began the development of the family of guided bombs. The initial variant, designated VB-1, was based on a 450 kg (1000 lb) bomb (initially the M44, but later models apparently switched to the standard AN-M65), which was modified with a new tail unit. The latter consisted of a gyroscopic unit to prevent the bomb from rolling, a flare for optical tracking, an octagonal shroud with control surfaces, and a radio-command receiver.

When a VB-1 was dropped, the bombardier could track it through his bombsight and use a joystick-type control to send corrective commands to the bomb. The guidance system allowed only lateral course corrections, but errors in range could not be corrected, hence the name, "Azimuth Only".



Museum View of a VB-1

The development phase ended in late 1943, and the VB-1 was subsequently ordered into mass production. The second variant was the heavier VB-2, which was based on a 900 kg (2000 lb) bomb, but that version was not produced in very large numbers. The first VB-1 & 2 bombs were sent to Europe in February 1944, and 15,000 were produced until November 1944.

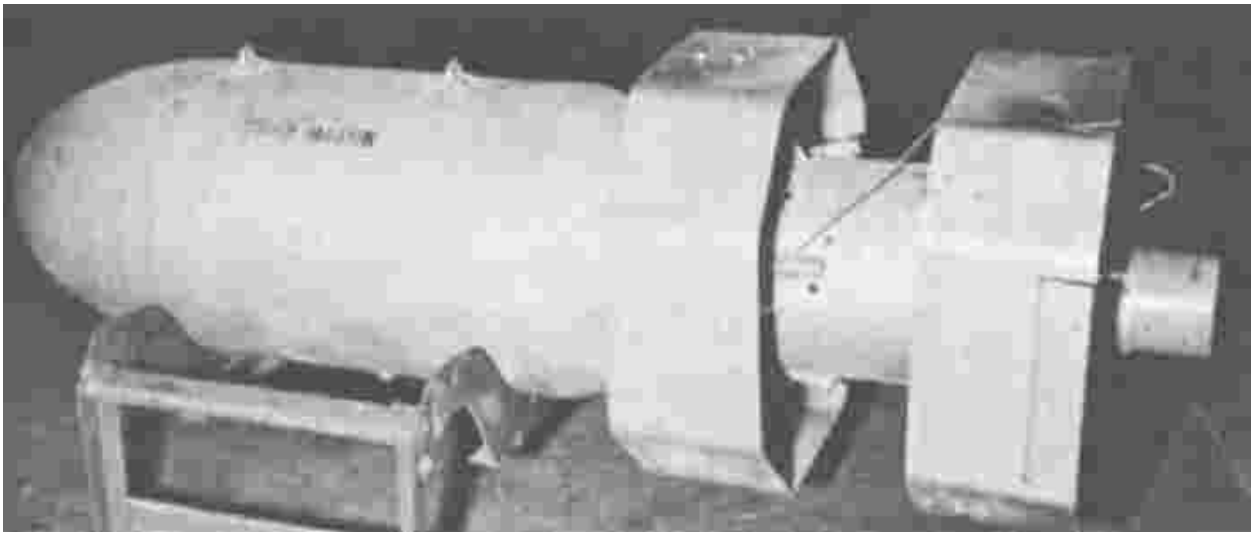
Because of their azimuth-only guidance, the VB-1 was particularly suited to long and narrow targets (like bridges or railways) where range errors would be irrelevant. For "normal" targets, however, the VB-1 was actually not as good as unguided free-fall bombs, because a bomber could not break away immediately after dropping the bomb, and the accuracy was effectively not increased because of the lack of range control.

Another peculiarity of the ***Azon*** guidance set was the fact that only five different radio channels were available for the command link, meaning that not more than five bombs could be controlled independently. Although in theory a whole group of bombs using the same command channel could be controlled simultaneously, this was not practical. The accuracy of all but the "primary" bomb (i.e. the one which was tracked by the bombardier) in such a group was rather bad, because the nonspinning ***Azon*** bombs showed a significant dispersion.

The drawbacks of the ***Azon*** meant that its use remained very limited. However, it was employed rather successfully in Burma, where it was used to destroy very vital and heavily defended bridges along the Japanese supply lines. Less than 500 ***Azons*** were needed to destroy 27 bridges.

When the war ended, the USAF quickly removed the VB-1 and VB-2 from its inventory. Because of the much reduced post-war funding, the USAF limited its guided vertical bomb research to the more advanced VB-3/VB-4 family.

In parallel with the tests, the USAF also developed a more advanced variant called ***Razon***, which was to be controllable in both range and azimuth. The designations VB-3 & VB-4 were assigned to the 450 kg (1000 lb) and 900 kg (2000 lb) ***Razon*** versions, respectively. The guidance kit had two octagonal shrouds in a tandem arrangement. The most problematic part in ***Razon*** development was to build a suitably modified bombsight, which would allow the bombardier to correctly judge the bomb's deviation in range so that the range control could be used effectively. The ***Razon*** also had an improved radio-command link with 47 separate channels, effectively eliminating the ***Azon's*** problems with concurrent drops by a multitude of bombers.



Museum View of the VB-3 Guided Bomb

The VB-3 & VB-4 was combat-ready in summer 1945, and about 3000 ***Razons*** were subsequently produced, but none of them were used before World War II was over. However, the VB-3 was operationally tested five years later during the first months of the Korean War by B-29 aircraft, which could carry eight VB-3s, and dropped several hundred ***Razons*** on North Korean bridges. Although the overall reliability of the bombs was rather low, some targets were actually destroyed. However, multiple hits by the small the 450 kg (1000 lb) bombs were needed to destroy a large bridge span and the USAF's use of guided bombs for these special missions switched to the much larger VB-13/ASM-A-1 ***Tarzon***.

The VB-5 was a 450 kg (1000 lb) bomb, which used the same tandem octagonal control shroud arrangement as the VB-3/VB-4 ***Razon***. However, the VB-5 was not command guided but used an autonomous light contrast seeker. This bomb did not go into production, presumably because the guidance mechanism did not work as planned.

The VB-6 ***Felix*** was a 450 kg (1000 lb) bomb with an octagonal control shroud and a heat-seeking device in the nose. Intended for use against strong infrared emitters (like e.g. blast furnaces), the VB-6 was tested with some success during 1945, but the program was cancelled at the end of World War II.

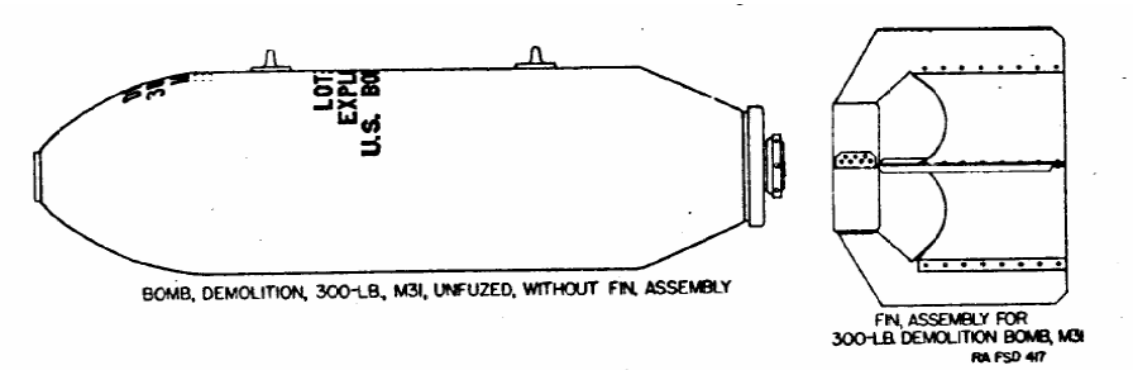
Museum View of the VB-6

The VB-7 and VB-8 both used TV/radio-command guidance, where a TV camera in the bomb's nose transmitted the image to a display set for the bombardier, who could then correct the bomb's course by radio-commands.

The weights of the VB-7/VB-8 are unclear, but it can be assumed that these two guided bombs were cancelled early in the development phase.

Bomb Fin with 2 re-enforcing bars, used on 100 – 500-pound Demolition Bomb

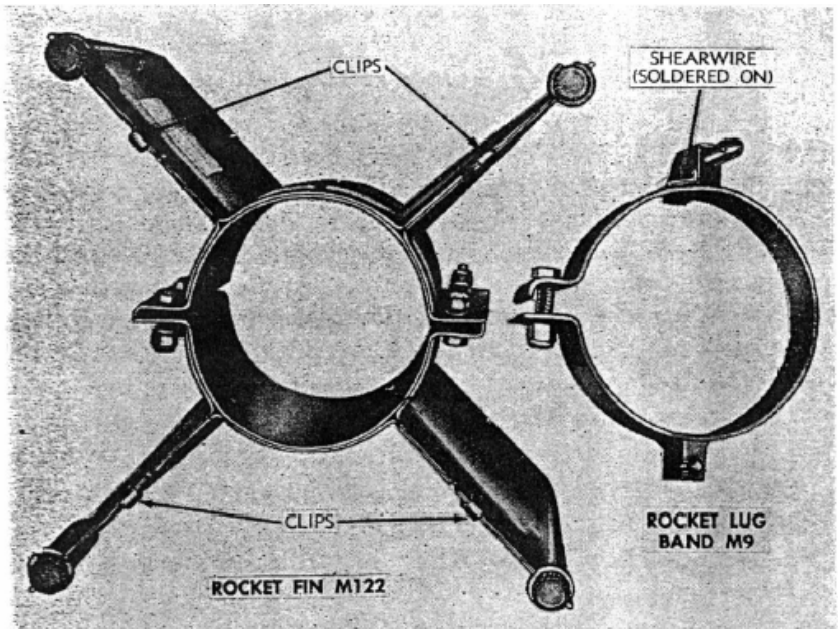
One of these bomb fins was found in the building-48 excavation. This type of bomb fin is constructed to fit demolition bombs, from 100-pounds to 500-pounds. No explosives are associated with this bomb fin.



This line drawing of a 300-lb M31 demolition bomb shows a typical bomb fin without any re-enforcing bars.

5-inch rocket fin

Six of these fins were found, five in the building-15 excavation and one in the building-48 excavation. No explosives are associated with rocket fins.

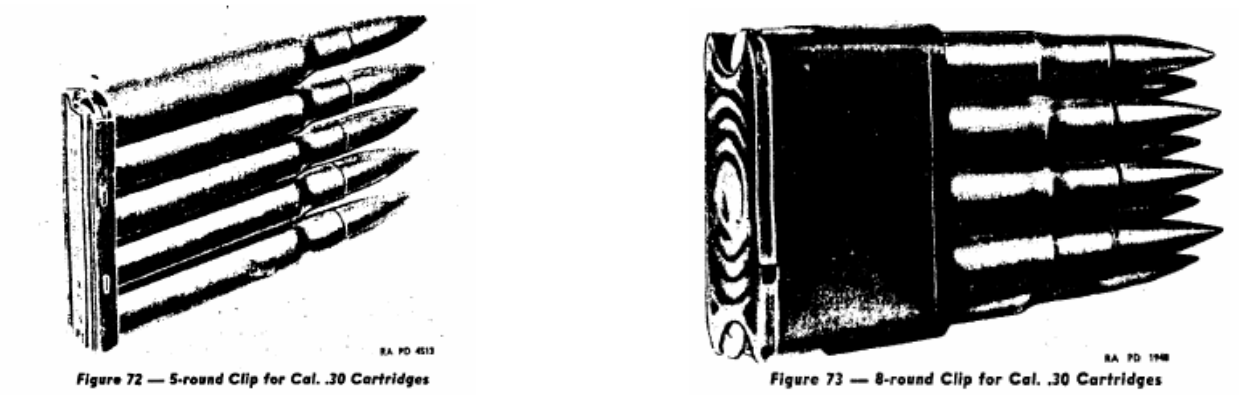


Line drawing of a 5-inch rocket motor fin

50-Caliber belt links and 30-Caliber clips

There were too many belt links and clips to count. They were concentrated in the building-15 excavation; however, there were found throughout the site.

The closed loop .50-cal links, (left and center) used in the M2 Machine Gun were the only type found. None of the open links, shown on the right was found. The open links are used in the newer M85 Machine Gun.



There are two types of clips for the .30-cal cartridges, the older 5-round clip shown on the left and the new 8-round clip, shown on the right.

105mm and 75mm Howitzer Shipping Containers; each container was inspected for munitions related material prior to crushing and none was found.

There were a total of 530 containers found, 451 105mm containers and 84 75mm containers. The 105mm containers were found in the building-15, 48, and 24 excavation and the 75mm containers were found only in the building-24 excavation. All of the containers were inspected and none contained any munitions related material.

Figure 32. Metal container M152A2, for 105-mm howitzer rounds.

105mm Howitzer, with packing and metal shipping container

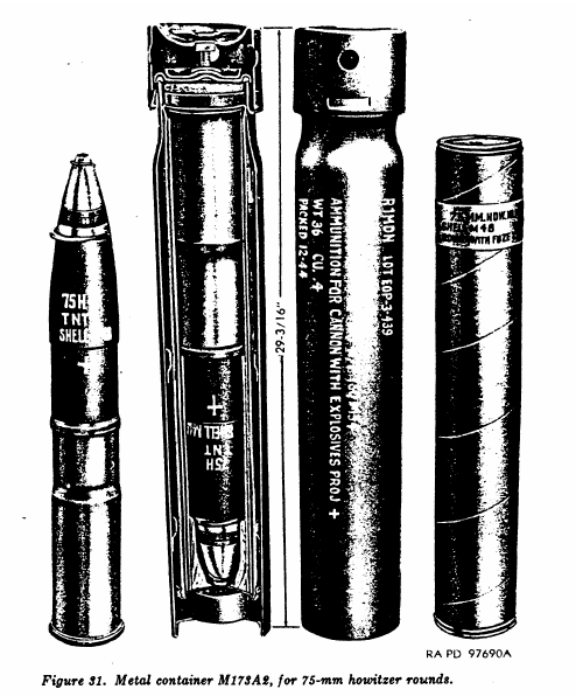


Figure 31. Metal container M175A2, for 75-mm howitzer rounds.

75mm Howitzer, with packing and metal shipping container

81mm mortar and 60mm mortar shipping containers

A total of seven 60mm mortar containers and eight 81mm mortar containers were found. All of the containers were found in the building-24 excavation. Each container was inspected and no munitions related material was found.

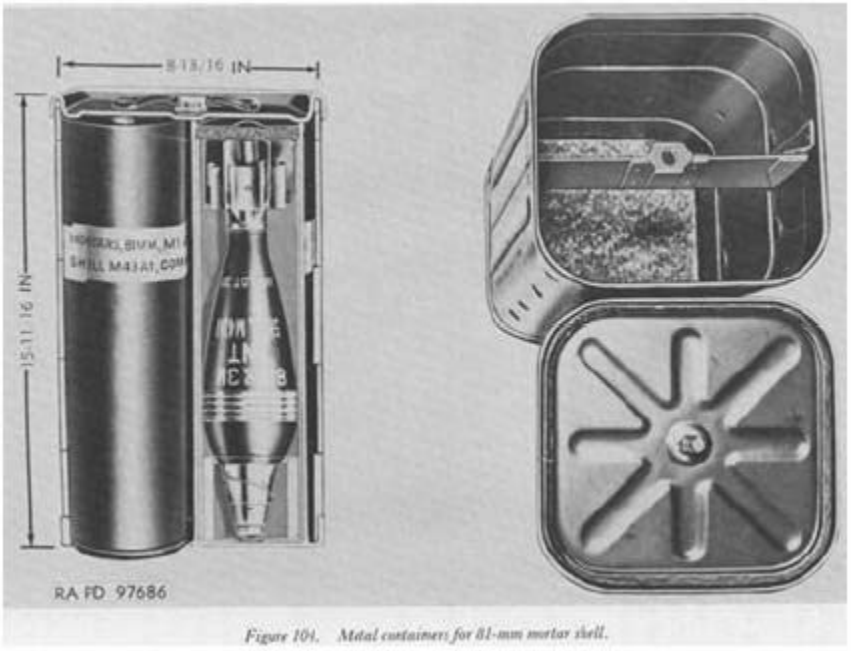


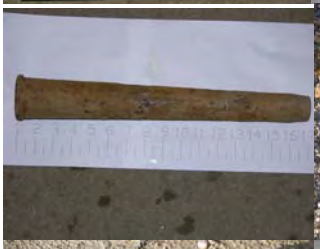
Figure 104. Metal containers for 81-mm mortar shell.

Drawing of an 81mm mortar, packing material, and shipping container. Each container holds four complete mortars.

M29 metal shipping containers for the 3.5-inch M29A2 practice rocket

There were 125 of these M29 shipping containers found, all in the building-15 excavation. Each container was internally inspected and no munitions related material was found.

2008 Munitions Photo Report
Taku Gardens, Fort Wainwright, Alaska



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Acronyms

ASP ..... Ammunition Supply Point
ATSC..... Air Technical Service Command
bgs ..... below ground surface
cal.....caliber
DMM.....Discarded Military Munitions
EOD .....Explosive Ordnance Disposal
Frag..... fragmentation
HE ..... high explosive(s)
HEAT.....high explosive anti-tank
JATO .....jet assist take off
LAW ..... light anti-tank weapon
MD.....Munitions Debris
MEC ..... Munitions and Explosives of Concern
MK..... mark
mm .....millimeter
MOD..... modification
PD .....point detonating
PWP .....plasticized white phosphorus
RR .....recoilless rifle
RRD ..... range related debris
SCAR ..... sub-caliber aircraft rocket
TNT ..... Trinitrotoluene
USAAF .....United States Army Air Force
USAF..... United States Air Force
UXO ..... Unexploded Ordnance
WP ..... white phosphorus

Munitions Terms and Definitions

bouchon fuze ..... A device designed to create automatic hand grenade bursting, seconds after the grenade is thrown, also referred to as a “mouse-trap” style fuze

bourrelet..... The cylindrical surface of a projectile on which the projectile bears while in the bore of the weapon. Conventionally the bourrelet is located between the ogive and the body of the projectile and has a slightly larger diameter than the body. In some cases, the bourrelet extends the full length of the body. In some projectile designs the conventional bourrelet becomes the front bourrelet, a rear bourrelet being provided behind the rotating band. In other designs a middle bourrelet is provided just forward of the rotating band.

ogive The curved or tapered front section, particularly of a projectile.

retarded ..... The term used to describe a weapon delivered with the retarding fins or other retardation device, such as an open parachute. Informally, retarded delivery is often referred to as “Snakeye” delivery.

rotating band ..... The soft metal band around the projectile near its base. The rotating band centers the projectile and makes it fit tightly in the bore, thus preventing the escape of gas, and, by engaging the rifling, which gives the projectile its spin.

rotating band pre-engraved..... A rotating band fitted to a projectile and containing grooves to fit the rifling of the weapon. The grooves are formed as part of the manufacture of the projectile. This practice is followed in the manufacture of ammunition for recoilless weapons.

20 Pound Fragmentation Bomb AN-M41 Series

A total of 15 each, AN-M41 Frag Bombs were found in the building-15/17/19 excavation. No fuze was installed in any of the frag bombs. Two of the frag bombs did not have a hex plug in the nose, were empty, and classified as MD. The remaining 13 frag bombs had a hex plug in place and were classified as DMM. These 13 M41 frag bombs were transported to the base ASP, placed into the Armag, and turned over to US Army EOD personnel for disposal by detonation. After detonation it was determined that none of the frag bombs contained explosives.

Alaska State Plane Coordinates in feet:

Northing	3959867.27	Depth 7-feet bgs
Easting	1381394.24	
Northing	3959867.38	Depth 8-feet bgs
Easting	1381404.07	
Northing	3959909.51	Depth 7-feet bgs
Easting	1381510.65	
Northing	3959867.45	Depth 4-feet bgs
Easting	1381450.44	
Northing	3959868.34	Depth 5-feet bgs
Easting	1381459.15	
Northing	3959910.81	Depth 5-feet bgs
Easting	1381542.01	
Northing	3959909.61	Depth 4-feet bgs
Easting	1381550.34	
Northing	3959872.78	Depth 5-feet bgs
Easting	1381463.30	
Northing	3959880.75	Depth 4-feet bgs
Easting	1381438.16	
Northing	3959887.65	Depth 6-feet bgs

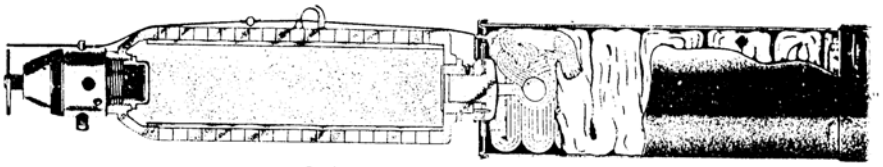
Easting	1381463.68	
Northing	3959873.69	Depth 4-feet bgs
Easting	1381422.06	
Northing	3959874.02	Depth 4-feet bgs
Easting	1381425.51	
Northing	3959872.13	Depth 5-feet bgs
Easting	1381427.92	
Northing	3959891.02	Depth 6-feet bgs
Easting	1381617.18	

Description

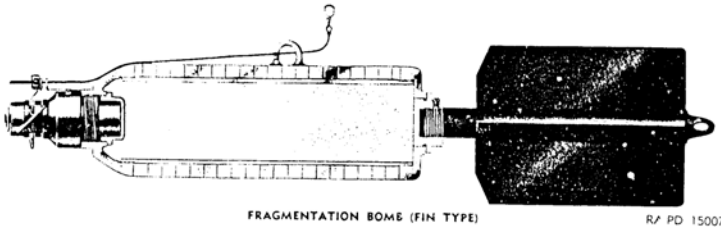
The 20-lb Fragmentation Bomb AN-M41 series is constructed of spirally wound wire and cast-steel nose and tailpieces. A seamless steel inner tube is threaded to the nose and tailpiece to form the base for the spiral-wound wire. The fin assembly is made of four rectangular sheet-steel vanes welded to a one-inch diameter pipe. The threaded end of the pipe is secured to the base filling plug. The nose section of the bomb is threaded to receive an impact fuze. The 20-lb Fragmentation Bomb AN-M41 series is used in the 100-lb Fragmentation Bomb Cluster shown below. At the center of gravity, a U-shaped eyebolt of steel is welded to the bomb case for horizontal suspension; an eyebolt is welded to the tail for vertical suspension. Approximately 13 percent of the complete weight of the bomb is explosive filler, Amatol 50/50, or TNT. A yellow-colored head and base identify the high explosive filler of the 20 lb Fragmentation Bomb**.** Identifying nomenclature is stenciled in black on the bomb body. The bomb body windings are painted olive drab.

AN-M41 and AN-M41 A1

The Bomb AN-M41, the earlier model, differs from AN-M41A1 in length. A change in construction added a 1/2-inch shoulder to the nose of the bomb; this change in design alone constitutes the **"A1"** modification.

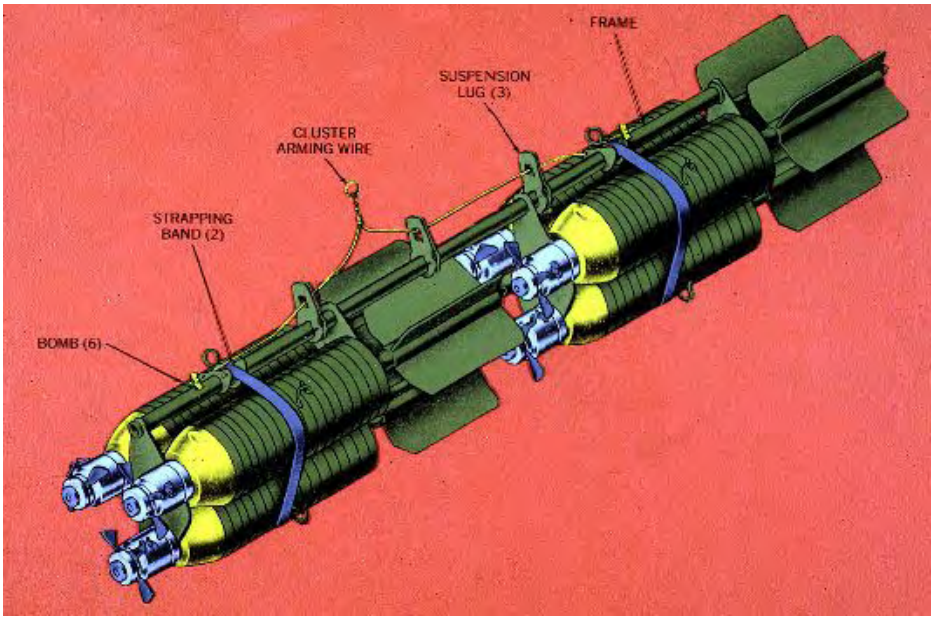


FRAGMENTATION BOMB (PARACHUTE TYPE)



FRAGMENTATION BOMB (FIN TYPE) RA PD 150078

AN-M41 Frag Bomb with parachute (Upper) and without parachute (lower)



Bomb Cluster Adapter AN-M1A1

US Army EOD personnel placed one block of C4 explosives (1 ¼ pounds) on the two AN-M41 fragmentation bombs on the left. The two frag bombs on the right show the results after the C4 was detonated. None of the M41 frag bombs contained any explosives, they were all inert.

M106 8-inch High Explosive Projectile

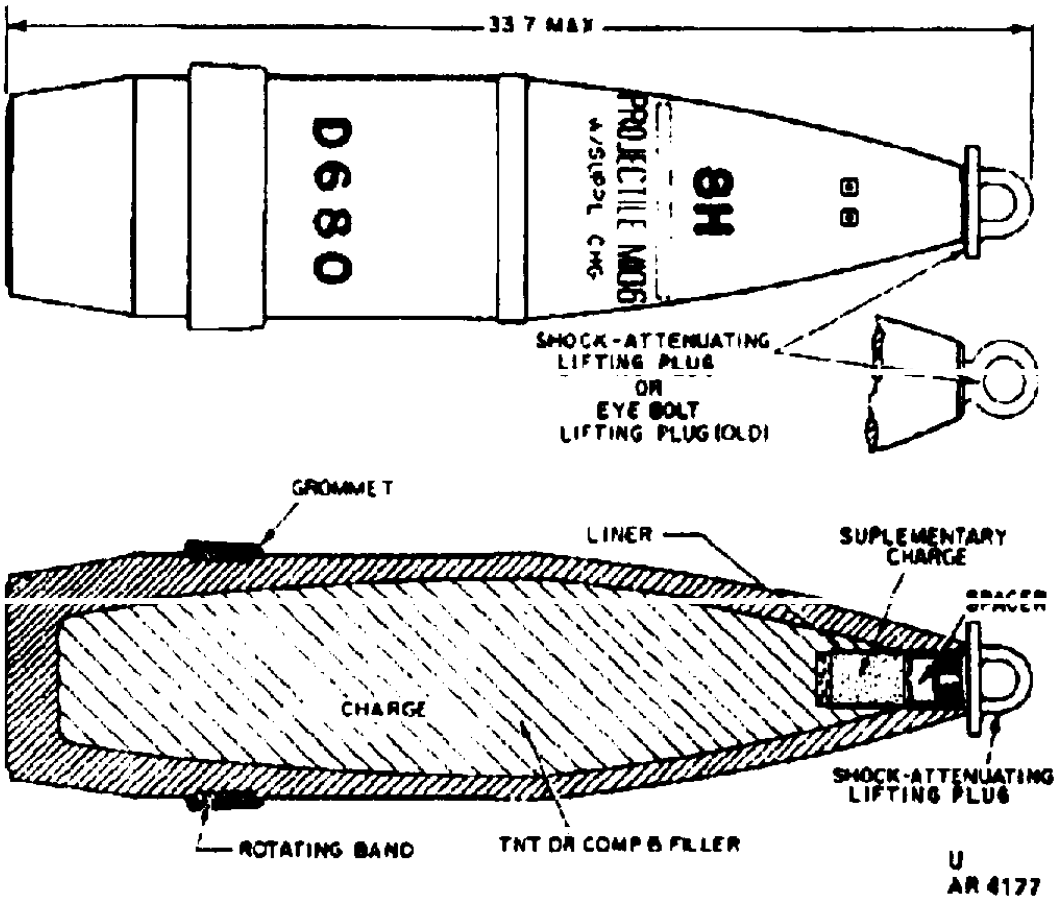
A total of 7 each M106 8-inch high explosive projectiles were found in the building 15/17/19 excavation and 2 each were found in the building 22 excavation. No fuze was installed in any of the projectiles. All of the projectiles were transported to the base ASP, placed into the Armag, and turned over to US Army EOD personnel for disposal by detonation.

Alaska State Plane Coordinates in feet:

Northing	3959910.34	Depth 7-feet bgs
Easting	1381577.58	
Northing	3959909.40	Depth 8-feet bgs
Easting	1381577.12	
Northing	3959906.94	Depth 6-feet bgs
Easting	1381594.64	
Northing	3959887.65	Depth 6-feet bgs
Easting	1381463.68	
Northing	3959973.63	Depth 4-feet bgs
Easting	1381612.83	
Northing	3959973.63	Depth 5-feet bgs
Easting	1381619.45	
Northing	3959863.95	Depth 12-feet bgs
Easting	1381587.19	
Northing	3959204.24	Depth 5-feet bgs
Easting	1381372.66	
Northing	3959156.07	Depth 5-feet bgs
Easting	1381368.81	

Description

The projectile consists of hollow steel forging with a boat-tailed base, a streamlined ogive, and a metal rotating band. A base cover is welded to the base of the projectile for added protection against the entrance of hot gases from the propelling charge during firing. In shipment, the nose of the projectile is fitted with a thread eyebolt-lifting plug to facilitate handling and provide a closure for the fuze cavity. The projectile is made with either a shallow or deep fuze cavity and may be loaded with TNT or Composition B. Deep cavity projectiles contain a supplementary charge in the fuze cavity. A cardboard spacer is placed in the fuze cavity between the supplementary charge and the lifting plug to limit movement of the supplementary charge during shipping and handling.



Line Drawing of a M106 8-inch High Explosive Projectile

These six M106 8-inch projectiles are staged in the Armag for detonation by US Army EOD personnel.

US Army EOD personnel have placed C4 explosives on this M106 to detonate it; note the detonating cord to the right.

This photo shows the results of the C4 detonation. The white substance in the projectile is plaster-of-paris used to simulate the weight of the explosive. None of the M106 projectiles contained any explosives; they were all filled with plaster-of-paris.

3.5-inch M29 Practice Rocket with an inert warhead, M405 fuze, and empty motor

3.5-inch M29 Practice Rocket with an unfired motor

A total of 170 each 3.5-inch M29 rockets were found. 58 rockets were found in the building 15/17/19 excavation, 105 rockets were found in the building 22/24 excavation, and 5 rockets were found in the building 33/28 excavation. One unfired 3.5-inch rocket motor was found in the building 19E excavation and one unfired rocket motor was found in the building 33 excavation. The two unfired rocket motors were transported to the base ASP, placed into the Armag, and turned over to US Army EOD personnel for disposal by detonation. None of the 3.5-inch rockets contained explosives or a live fuze.

Alaska State Plane Coordinates in feet:

Northing	3959724.06	Depth 6-inches bgs
Easting	1381810.22	
Northing	3959965.26	Depth 4-feet bgs
Easting	1381486.69	

There are no photos of the unfired 3.5-inch rocket motor at the demolition range. US Army EOD handled the unfired rocket motor and disposed of it by detonation. There were no remains.

Description

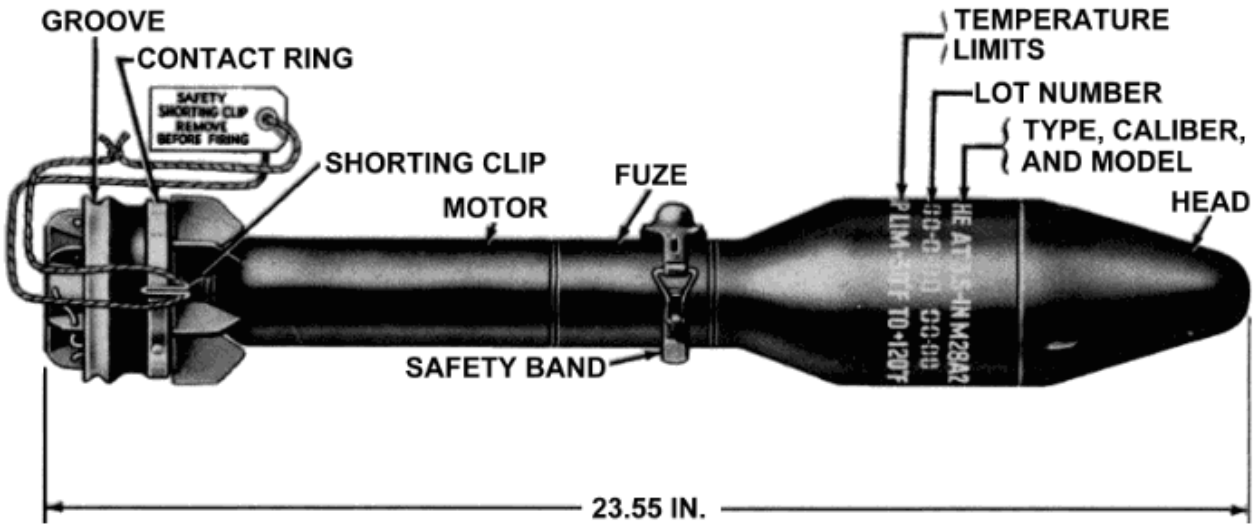
The 3.5-inch M29 rocket, often called the “bazooka” consists of a rocket motor, a fuze, and a shaped charge warhead. The rocket is fired from a smooth-bore launcher and ignited by an electrical firing mechanism, which contains a magneto that provides the current and is located in the trigger grip of the launcher. These launchers are designed to be fired from the shoulder in standing, kneeling, sitting, or prone position. To reduce weight, the barrels and many of the components are made of aluminum. The 3.5-inch rocket is a high-explosive antitank (HEAT) munition and are capable of penetrating heavy armor at angles of impact greater than 30°. They are no longer in U.S. service and were replaced by the M72 LAW.

History

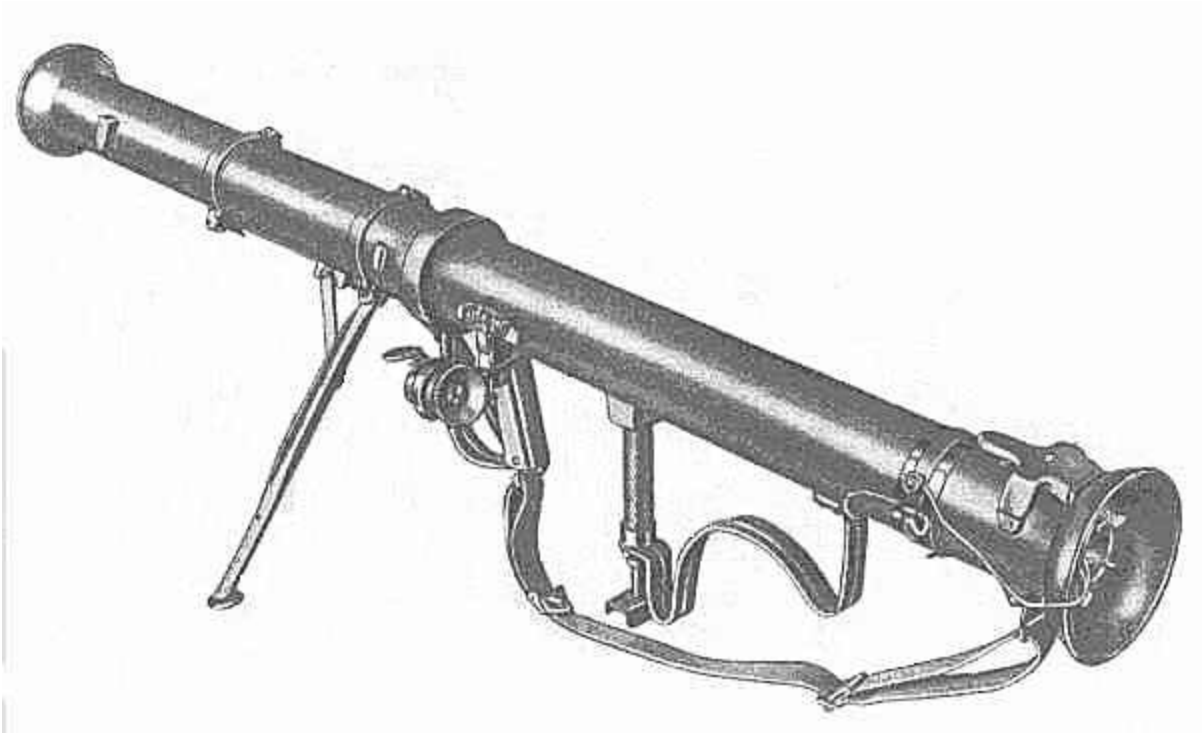
In 1945, the original bazooka (2.36-inch) a shoulder-launched anti-tank rocket was no longer an effective weapon against modern armored vehicles and tanks. Therefore a much more powerful rocket and launcher (3.5-inch) was developed. The resulting M20 launcher and M28 rocket were not fielded in significant numbers to the troops until the start of the Korean War in 1950. The system was officially known as the 3.5-Inch High-Explosive Anti-Tank (HEAT) Rocket, but was frequently called the "Super Bazooka".

The 3.5-Inch Anti-Tank Rocket Launcher M20A1 consisted of two tubes, which had to be screwed together before loading and firing a rocket. The assembled launch tube had a length of 60-inches and weighed 14-lbs. The weapon for the M20 launcher (Bazooka) was the High-Explosive Anti-Tank Rocket M28. The general principle of operation of the "Super Bazooka" was the same as for the older M9A1. The M28 had a maximum range of about 900-yards, but effective range against a stationary target was closer to 300-yards.

For training, the M20 launcher could fire the 3.5-Inch Practice Rocket M29, which had an inert hollow warhead, but was otherwise identical to the M28 HEAT Rocket. The 3.5-Inch "Super Bazooka" launcher and rockets were phased out by the U.S. Army in the early 1960s, and replaced by the M72 LAW (Light Anti-Tank Weapon), a pre-loaded rocket in a disposable rocket launcher.



3.5-inch M28 HEAT Rocket



M20 Launcher "Bazooka" used to fire the 3.5-inch M28 HEAT Rocket and or the M29 Practice Rocket.

M47A2 / A3 Smoke Bomb

There were 11 each M47 Smoke Bombs located; 1 each in the Building 15/17/19 excavation and 10 each in the Building 24 excavation. None of the bombs located contained a fuze.

The M47 located in the Building 15/17/19 excavation were classified as Discarded Military Munitions (DMM) because the nose plug was in place and prevented inspection of the burster tube. Three of the ten M47's in the Building 24 excavation were classified as DMM because the nose plugs were in place. The remaining seven M47's either did not contain a burster tube (the bomb body was open), or the nose plugs were missing and the burster tubes were verified as empty and classified as Munitions Debris (MD).

The four M47 smoke bombs that had nose plugs were classified as DMM were transported to the base ASP and turned over to US Army EOD personnel for disposal by detonation. After detonation none contained a burster.

Alaska State Plane Coordinates in feet:

Northing	3959867.35	Depth 4-feet bgs
Easting	1381491.35	
Northing	3959335.81	Depth 3-feet bgs
Easting	1381585.72	
Northing	3959332.15	Depth 4-feet bgs
Easting	1381590.91	
Northing	3959303.86	Depth 4-feet bgs
Easting	1381622.45	

Description

The Smoke Bomb Bodies M47A2 and ANM47A3 are 46 inches long (49 inches long including spacer, sleeve, shipping plug and tail) and 8 inches in diameter. The body is made of 1/16th inch lap-welded steel and is threaded at the nose to take an axial burster well, which extends to the tail of the bomb body. A sheet steel box-type tail assembly is welded to the bomb body. With the burster well installed, the bomb empty weighs approximately 26 pounds. Two suspension bands of sheet steel, each equipped with a suspension lug, circumscribe the bomb body. The bomb ready for dropping weighs approximately 126 pounds when loaded with white phosphorus (WP) and 98 pounds when loaded with plasticized white phosphorus (PWP), which is a mixture of white phosphorus and synthetic rubber in xylene.

The l00-pound Smoke Bomb M47A2 and ANM47A3 consist of a bomb body M47A2 filled with either 100 pounds of WP or 72 pounds of PWP. This bomb is equipped with a tetryl or black powder burster, and an instantaneous functioning, air-arming nose Fuze AN-Ml26Al. The only difference between the M47A2 and the AN-M47A3 is in the length of the tail fins. The tail fins of the AN-M47A3 are three inches longer for increased flight stability.

The burster M4 contains 1.56 pounds of tetryl (708 grams) and is primarily used for high altitude bombing. The burster Ml8 contains 260 grams of Black Powder and 260 grams of sand and is used primarily for low altitude bombing. The burster M7 contains 520 grams of Black Powder and may be substituted for either Burster M4 or M18. All bursters are 37.5 inches long by 1 inch in diameter. When loaded with PWP this bomb takes the burster M20, which contains 400 grams of tetryl.

NOTE: The burster tube is an integral part of the M47 smoke bomb. The burster is shipped separate from the smoke bomb. The burster is made of cardboard or thin aluminum and contains the explosive charge. A steel nose cap must be removed from the burster tube prior to inserting the burster. The burster is usually inserted into the burster tube, which is part of the smoke bomb prior to loading the bomb on the aircraft. The nose fuze, AN-M126A1 is installed in place of the nose cap, which explodes the burster upon impact.

Bomb Nose Fuze AN-M126A1

After the bomb is installed in the airplane, the fuze AN-M126Al is screwed into the nose of the bomb, hand-tight, until it seats, no tools are used to tighten the fuze. The arming wire is then installed to prevent premature arming of the fuze. When the bomb is released from the aircraft, the arming wire is withdrawn from the fuze and the arming

vanes of the fuze are free to rotate. After 725 feet of air travel the fuze is fully armed. Upon impact the striker overcomes the creep spring and strikes the detonator, exploding the burster, which scatters the WP or PWP over a circular area of approximately 75 to 100 yards. An effective white smoke screen is produced for 1 to 2 minutes if WP is used and three to five minutes if PWP is used.

The M47 on the left does not have a nose plug in place and does not contain a burster. The M47 in the center has C4 explosives on the nose plug, which will detonate the burster if present. The M47 on the right has been detonated and did not contain a burster

This photo is shows the burster tube separated from the M47 smoke bomb after Army EOD used explosives to initiate the burster. Because the burster was not present inside the burster tube, the burster tube did not rupture.

A UXO Technician inspects the burster tube after detonation to ensure no explosive residues are present.

M75A1 Target Identification Bomb

A total or 5 M75A1 Target Identification bombs were found in the building 22/24 excavation. Four of the five smoke bombs did not have a nose plug and were classified as MD; the fifth smoke bomb did have a nose plug in place and was classified ad DMM. This smoke bomb was transported to the base ASP, placed into the Armag, and turned over to US Army EOD personnel for disposal by detonation. None of the smoke bombs were fuzed.

Alaska State Plane Coordinates in feet:

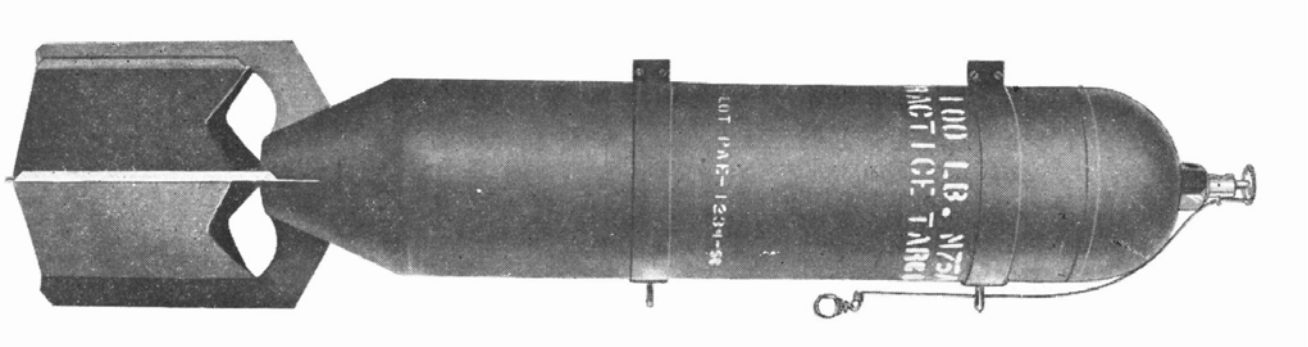
Northing 3959168.41 Depth 6-inches bgs
Easting 1381396.60

Description

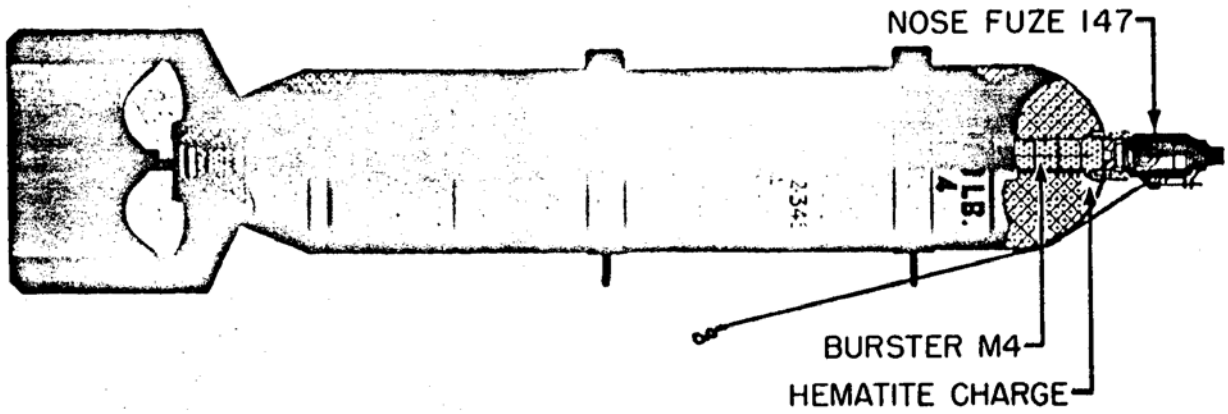
Target Identification Bombs M84A1 and M75A1 are identical with the exception of the fuze, and the two bombs are similar in construction to the Chemical Bomb AN-M47A2. The body is of sheet metal with box-type tail fins welded to the conical section. The Burster M4 runs through the entire length of the bomb and is closed at the forward end by a closing plug. A filling plug is placed in the fin cone of the bomb body, to facilitate loading the hematite charge (red iron oxide). The fuze fits into the forward end of the burster.

Use

The Target Identification Bomb M84A1/M75A1 is intended for release by the lead or "pathfinder" plane to indicate the bomb-release line for bombers in formation when operations are carried out above overcast and the ground targets are not visible. The bomb was designed to produce a red smoke cloud, which would remain at the bursting point for a period of ten minutes under normal air conditions and would be visible for a distance of 15 miles at an altitude of 25,000 feet. The M75A1 is used for target identification in practice and to mark targets on snow-covered bombing ranges.



Museum View of the M75A1 Target Identification Bomb



Line drawing of the M75A1 Target Identification Bomb

There are no photos of the M75A1 Target Identification Bomb after being detonated.

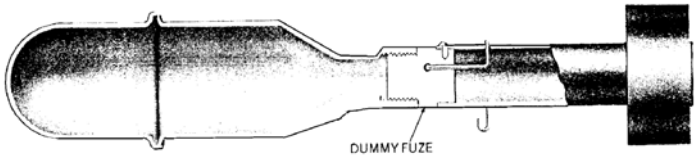
M11 Series Practice Rifle grenade

A total of 1 each, M11 Series Practice Rifle Grenades was found in the building-24 excavation.

Description

The M11 Series Practice Rifle Grenade is fabricated from the same metal parts as the M9A1 HEAT Rifle grenade. It consists of a body, a dummy fuze, a stabilizer assembly, and a fin. The body is cylindrical with a rounded nose. It is composed of two pieces joined in the middle. The stabilizer is a hollow tube which screws into the base of the body and fits over the launcher; it also carries a shroud fin assembly that aids in stabilizing the flight of the grenade. The grenade is so constructed that the fin and the ogive assemblies, which are most liable to damage in use, may be replaced and the grenade used repeatedly. It is only used for training in marksmanship, to simulate the M9A1 High Explosive Anti-Tank (HEAT) Rifle Grenade. The M11 Series Practice Rifle Grenade contains no explosive components.

M11 Series Practice Rifle Grenade, museum view

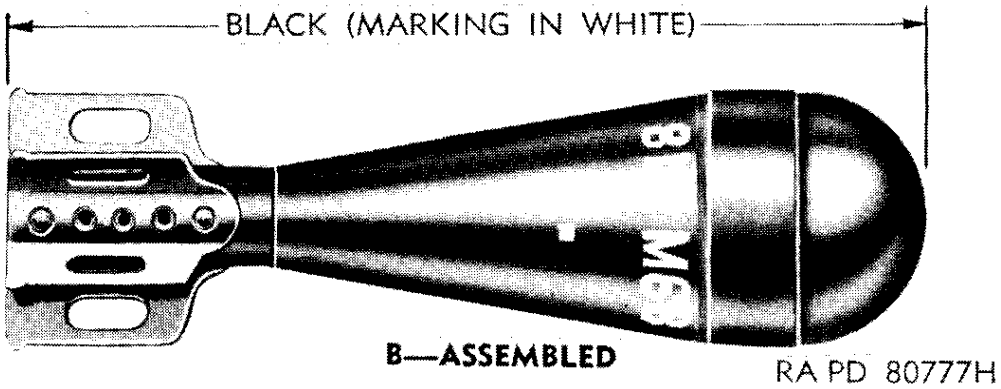


M11 Series Practice Rifle Grenade, drawing view

M68, 81mm Training Mortar

A total of 1 each, M68 Training Mortar was found in Soil Pile 06SP13 during soil removal activities.

Description: The training shell, M68 81mm Mortar is used primarily for training in loading and firing the mortar. The shell is completely inert and has no fuze. It consists of a cast iron teardrop contour. There are no propellant bags used to project the mortar out of the tube and down range, only an M3 ignition cartridge.



M68 81mm Training Shell, museum view

17-Pound M37 Practice (parachute retarded) Bomb

A total of 11 each M37 Practice bombs were found in the building 1517/19 excavation. The M37 bomb does not use a fuze or any explosive components; however, the bomb cavity was inspected and did not contain any explosive residues.

Description

The 17-pound M37 practice bomb is used only with a parachute. The bomb is designed to allow the bomb, parachute, and case assembly to be reused after it is dropped until it becomes unserviceable. A single suspension lug is provided in the bomb body to allow for horizontal suspension and suspension wires with an “S” hook to allow for vertical suspension. A suitable closing plug is installed in the fuze opening in the nose.

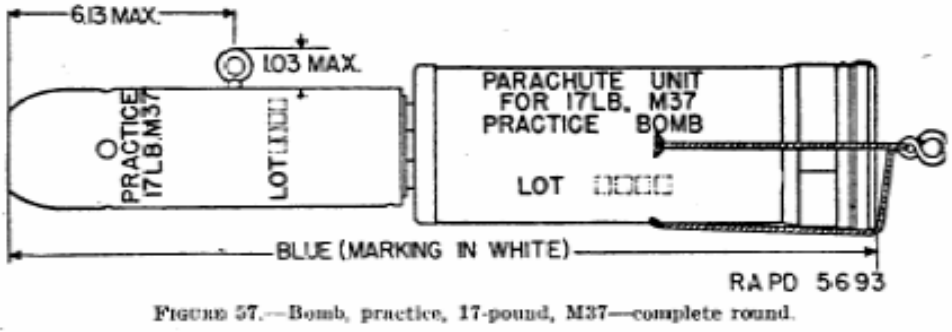
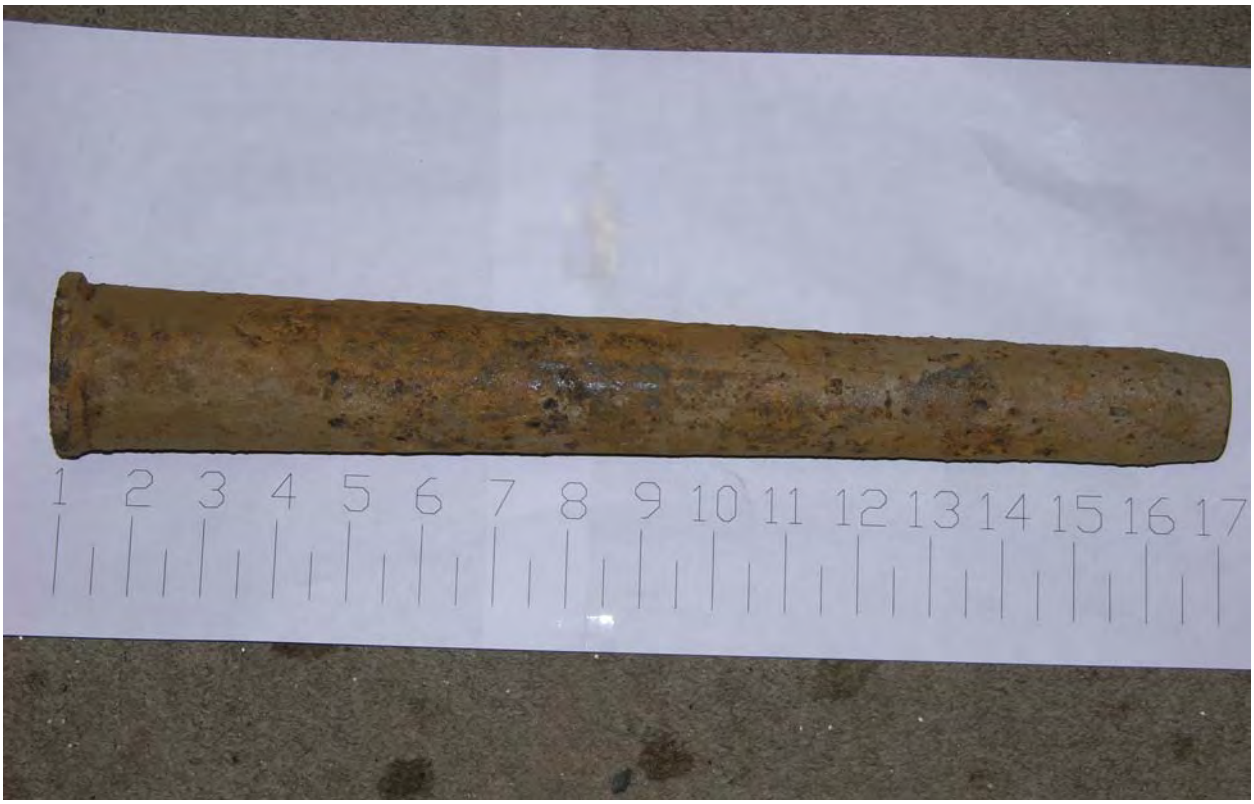


FIGURE 57.—Bomb, practice, 17-pound, M37—complete round.

Line drawing of the 17-pound M37 practice bomb



Cartridge, 40mm, Dummy, M 17 or M17B1

A total of 10 each 40mm cartridges were found in the building 15/17/19 excavation. These cartridges do not contain any explosive material and are totally inert; however the cases were inspected and did not contain any explosive residues.

Description

This completely inert cartridge simulates the service cartridge and is used for training in handling and loading. The service projectile and cartridge case are simulated by a one-piece bronze or malleable iron body (M17B1). The nose end of the assembly is threaded to hold a bronze or iron plug resembling a service fuze. The base provides for extraction of the cartridge after loading.

Recoilless Rifle Cartridge Case, 57mm and 75mm

There were a total of 21each 57mm and 47 each 75mm recoilless rifle cartridge cases found. 9 each 57mm cases were found in the building 15/17/19 excavation and 12 were found in the building 22/24 excavation. 24 each 75mm cases were found in the building 15/17/19 excavation and 22 each were found at the building 22/24 excavation. All of the cartridge cases were inspected and none of the cartridge cases contained any propellant or explosive residues and the primers were expended on all of the cases.

NOTE: The 57mm and 75mm Recoilless Rifle cartridge cases are similar in design and differ only in size. Both are fixed to the projectile and used in recoilless rifle guns. The description below is for 57mm and 75mm RR Cartridge Cases.

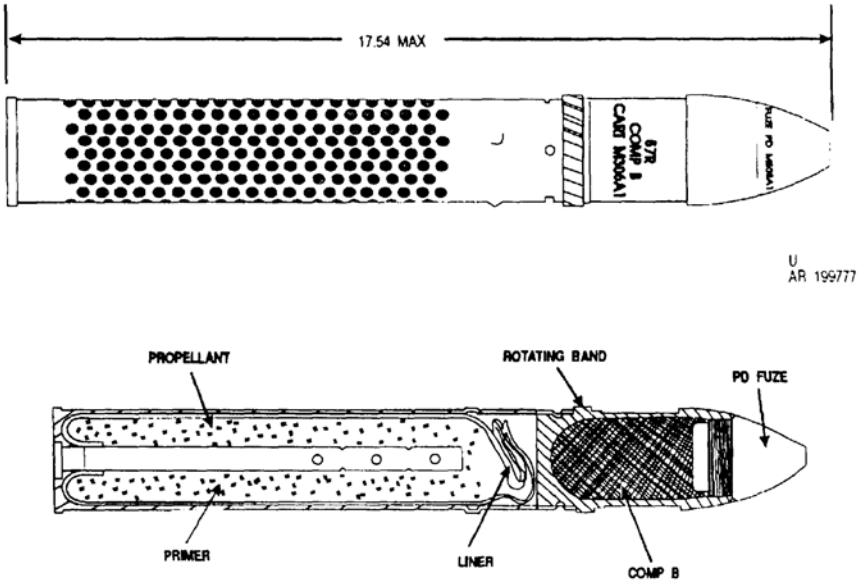
Description

The cartridge consists of a perforated metal cartridge case, containing a plastic liner, which is crimped to a steel projectile. The cartridge case liner is loosely filled with propellant and the cartridge case is equipped with a percussion primer. The primer ignition tube extends through the length of the propelling charge.

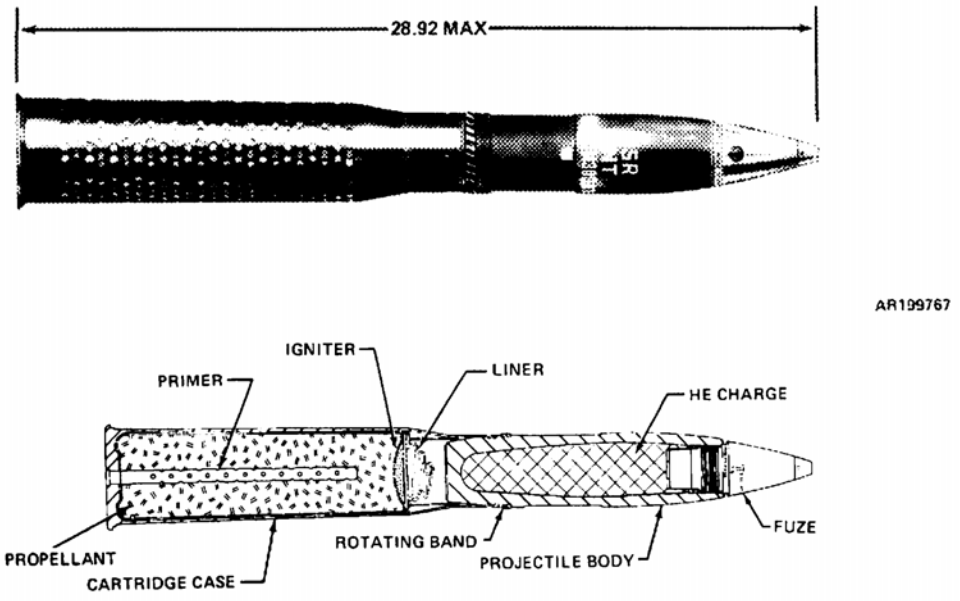
The projectile is fixed to the cartridge case and contains an explosive charge of Composition B or TNT. Projectiles are fuzed with a point-detonating (PD) Fuze that function on direct impact or graze. There is a bourrelet on the rear of the ogive and another immediately in front of the rotating band. The cartridge is spin-stabilized in flight.

Functioning

The primer ignites the propellant when struck by the weapon firing pin, and the burning propellant generates gases to propel the projectile through the barrel. Recoil is eliminated because the design of the cartridge case permits controlled escape of some gas pressure through apertures in the rifle breech-block. The rotating band engages the rifling in the barrel to spin the projectile for stability in flight. The point-detonating fuze functions either on direct impact or graze. When the fuze functions, the firing pin strikes a detonator to initiate the explosive train in the fuze, and subsequently detonates the explosive charge producing blast and fragmentation.



Line drawing of a (full-up round) 57mm RR case with attached projectile.



Line drawing of a (full-up round) 75mm RR case with attached projectile.

MK2 Practice Hand Grenade

A total or 2 each MK2 Practice Hand Grenades were found at the building 22/24 excavation. No fuze was installed in either practice hand grenade.

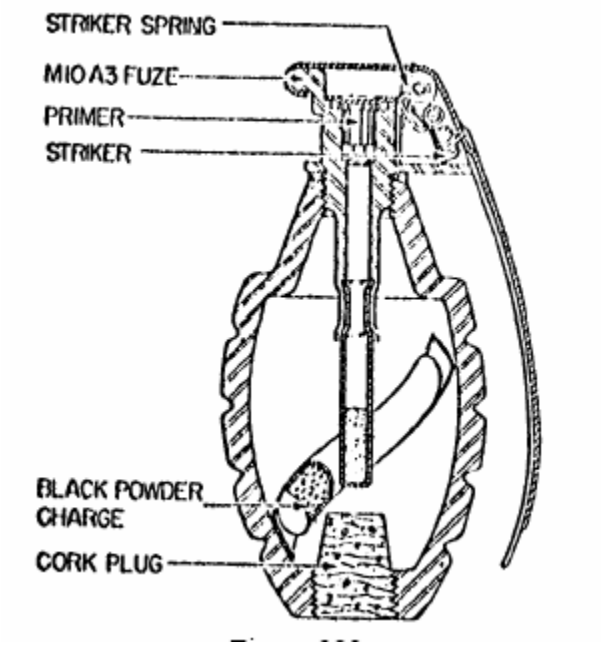
Description

The MK2 practice training hand grenade is used to train personnel in the proper throwing techniques of the MK2 fragmentation hand grenade. It has the same weight and physical characteristics of the MK2 HE fragmentation grenade, with a functional fuze, safety lever, and pull ring attached to the safety pin that holds the cock-striker in the cocked position. Prior to throwing, the grenade is held in the hand with the fingers depressing the safety lever. The pull ring is pulled, which removes the safety pin. The grenade is then thrown, which releases the cock-striker, which strikes and initiates the fuze. The body of the MK2 practice hand grenade has a hole in the base that allows the explosive gases created when the fuze functions to escape.

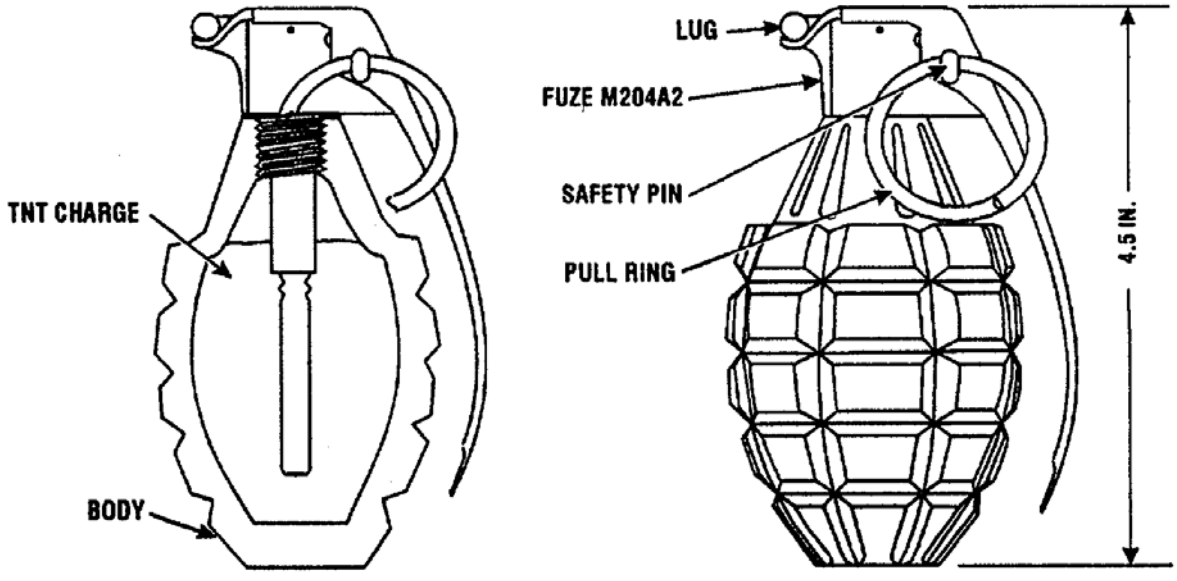
The MK2 HE fragmentation hand grenade is used to supplement small arms fire against the enemy in close combat. The grenade produces casualties by high velocity projections of fragments.

The MK2 HE fragmentation hand grenade is pineapple shaped with deep serrations of its body. These serrations delineate fragmentation of the body when the grenade explodes. The grenade body is made of cast iron and contains TNT filler. Grenade fuzes M204A1 and M204A2 are pyrotechnic delay-detonating fuzes are used in both the

HE and training grenades differ only in body construction. The delay time for both fuzes is 4-5 seconds.



Line drawing of the MK2 Practice Hand Grenade with fuze installed



Line Drawing of the MK2 HE Hand Grenade with fuze installed

M38A2 Smoke Streamer Bomb Case

A total of 8 each M38A2 Smoke Streamer bombs were found; 1 each in the building 15/17/19 excavation, 4 each in the building 22/24 excavation, and 3 each in the Area D excavation. The bomb cases were inspected and no smoke grenades or explosive residues were present in any of the bombs.

NOTE: When M18 Smoke Grenades are installed the M38A2 designation changes to T29 Smoke Streamer Bomb.

Description

The bomb body consists of a sheet-steel case with a filling plug in the base. The four tail vanes are welded to the truncated cone with box-type interior struts. The complete body assembly consists of this Practice-Bomb Case M38A2, a train tube, a grenade train, a closing plug, and a fuze. The train tube is a seamless steel tubing three inches in diameter and 40 inches long, with a fuze adapter brazed to the after end. Eight modified Grenades M18 filled with fast burning mixture are inserted into the tube to form the grenade train. Each grenade is modified by cutting a center hole in its base, and the bouchon fuze is omitted. The top of each grenade is coated with a starter compound, which acts as the igniter for the adjacent grenade. Four strands of quick match are knotted and inserted in the center hole of the top grenade in such a manner as to leave the knot and loose ends at the top to receive the fuze flash. The eight grenades are held apart by spring steel separators. A threaded closing plug seals the tube and protects the grenade train from moisture. This plug must be removed just prior to use. The bomb is brought up to the weight of approximately 98 pounds by filling the balance of the internal space with sand. The colored streamer smoke bomb is used as a visual signal to be dropped by the lead plane of a bomber formation when the target has been determined. Smoke emission begins approximately one second after release from the plane and continues for approximately 7,000 to 10,000 feet of free fall.

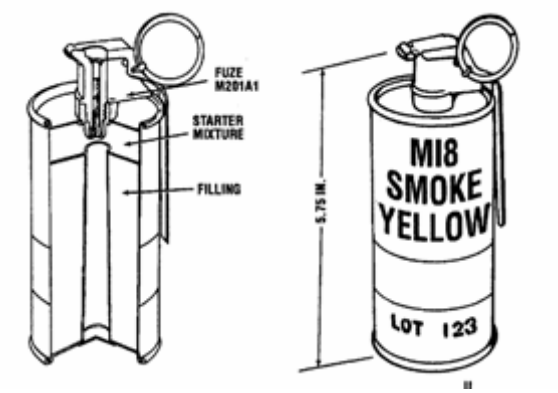
Operation

When the arming wire is pulled, the bouchon springs throw off the arming washer and handles, allowing the bouchons to fire. This action ignites the quick match in the center hole of the top grenade, which in turn is ignited, and the flash is simultaneously transmitted to all the grenades.

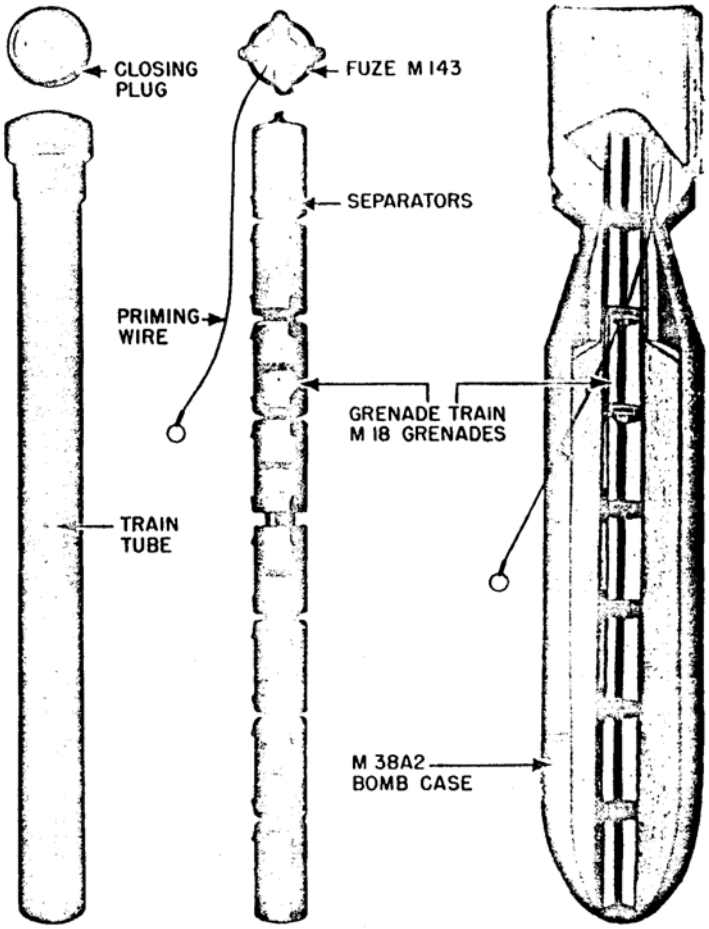
Fuzing

The Fuze M143 consists of a fuze body support mounting for bouchon grenade-type fuzes and an arming washer. The mounting is threaded to fit the fuze adapter of the tube train. The arming washer is 2.5-inches in diameter and has four arms 0.75-inch

wide and one inch long. The arming wire holds the arming washer over the bouchon levers until it is withdrawn.



These are line drawings the M18 Smoke Grenades that are placed in the M38A1 Bomb Case. No smoke grenades were found within Taku Gardens.



This is a line drawing of the M38A1 bomb case showing how the M18 smoke grenades are placed internally. When loaded with smoke grenades the bomb becomes the T29 Smoke Streamer Bomb.

2.25-inch Sub-Caliber Aircraft Rocket (SCAR) Motor

A total of 21 each 2.25-inch SCAR rocket motors were found in the building 15/117/19 excavation. All of the motors were inspected and none contained any propellant or explosive residues.

Description

The 2.25-inch Subcaliber Aircraft Rocket is a Sub-caliber, high velocity, fin stabilized rocket with inert warheads. The 2.25-inch Subcaliber Aircraft Rocket is used as a training round in place of the service aircraft rockets. The SCAR rocket is used for training pilots how to center the rocket's impact in the target's center by adjusting his attack conditions to those originally planned for and second, to reduce the overall dispersion of the training round by properly flying his aircraft. These rockets are used exclusively for advanced training and refresher courses in forward firing from aircraft.

Major Components

2.25-inch Aircraft Rockets are composed of two major components, the head and the motor. The warhead is made of machined steel, die cast zinc or cast iron. It is threaded at the rear for assembly to the motor and is hollowed out to give it the correct weight to produce proper ballistic characteristics when the rocket is fired.

NOTE: Several of these warheads (Dummy Nose Fuze, MK3 MOD2) were found at the site and are pictured and described below.

MK3 MOD2, 2.25-inch Rocket Warhead Dummy Nose Fuze

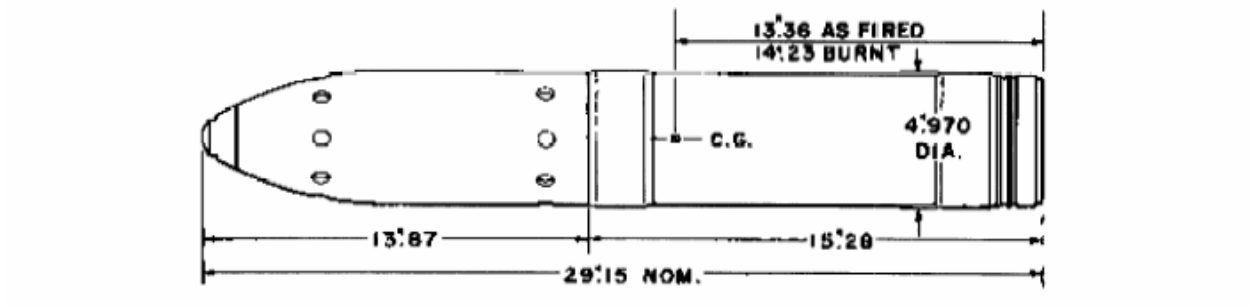
A total or 9 each MK3 MOD2, 2.25-inch SCAR Rocket Warhead Dummy Nose Fuzes were found in the building 15/17/19 excavation. The fuzes are completely inert.

As described above, these dummy fuzes serve as the “warhead” for the 2.25-inch Sub-caliber Aircraft Rocket used exclusively for training. They contain no explosives and are installed in the nose of the rocket motor for ballistics.

M6 5-inch Rocket Warhead Dummy Nose Fuze

A total of 484 each, M6, 5-inch rocket warhead dummy nose fuzes were found. 123 were found at the building 15/17/19 excavation, 360 were found at the building 22/24 excavation, and 1 was found during backfill activities at the building 48 excavation. These fuzes are completely inert.

These dummy nose fuzes may have been used in the 5-inch MK27 MOD 0 Surface Smoke-Target Rocket. This rocket was used to simulate fast moving aerial targets for gunnery practice, leaving a trail of smoke to assist in locating the target, and was fitted with a dummy nose fuze. No 5-inch rocket motor or warhead was found during excavation activities that would accept this dummy nose fuze, which makes it difficult to associate the fuze with a warhead or rocket.



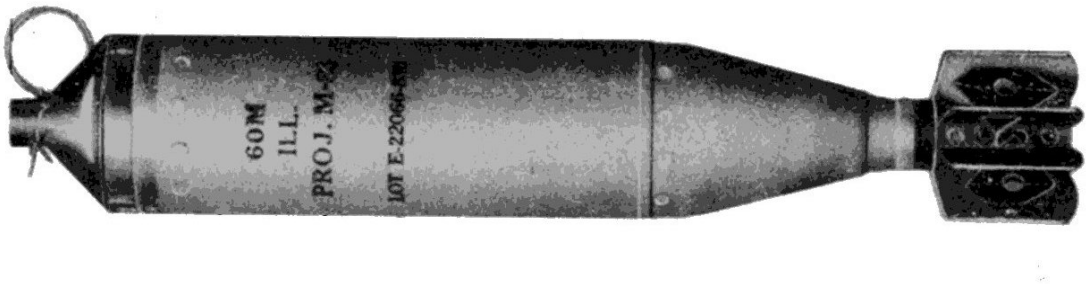
This is a line drawing of the MK27 MOD 0 Surface Smoke-Target Rocket

60mm Illumination Mortar, M83 (Body) **(Tail)**

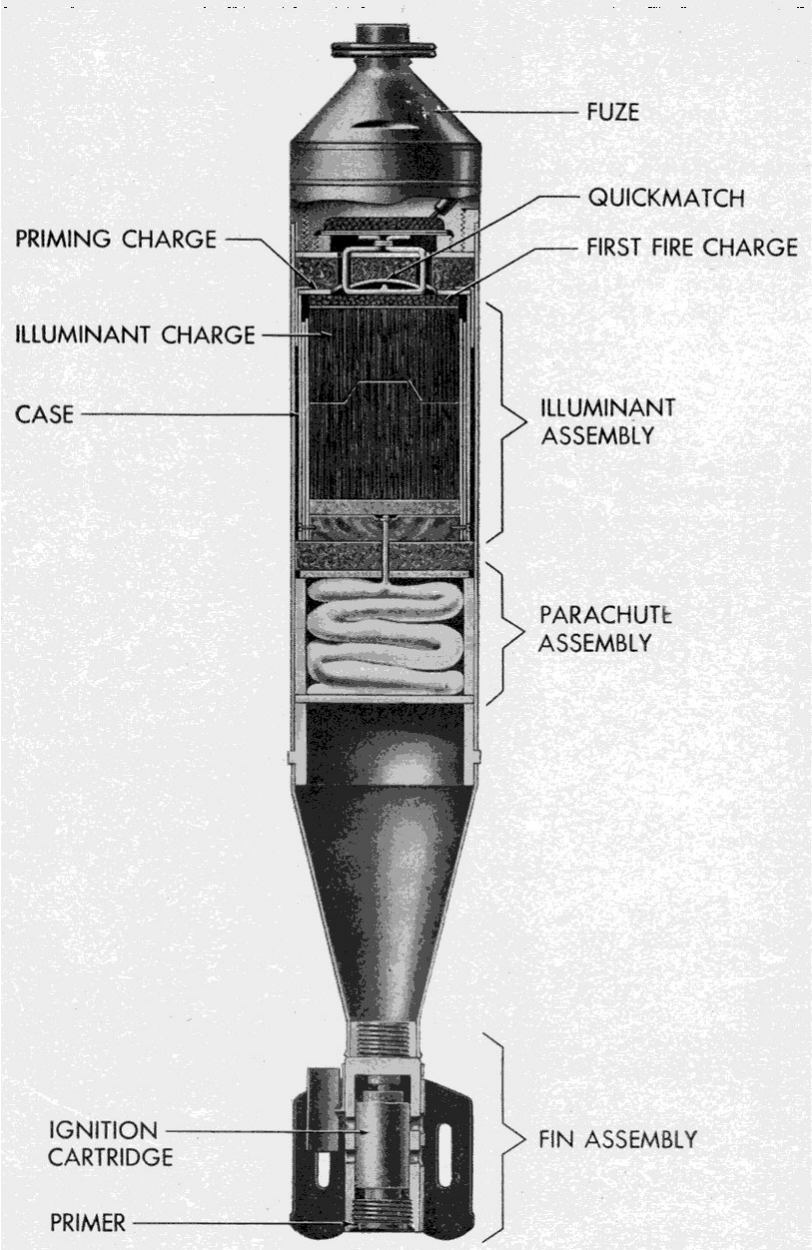
A total or one M83 60mm illumination mortar (tail) was found during backfill activities at the building 48 excavation. The mortar tail was inspected and did not contain any material or explosive residues.

Description

The 60mm illuminating mortar, M83, was designed to provide a night light of relatively high candle-power that could be fired from a standard infantry weapon. The 60mm mortar adequately fills the need, having minimum of 110,000-candle power it can burn for 25 seconds while drifting earthward on its parachute.



Museum view of a M83 60mm Illumination Mortar



Line drawing of a M83 60mm Illumination Mortar, showing the internal layout

Spin-Stabilized, 4.5-Inch Rocket Motor

A total of 4 each 4.5-inch Spin Stabilized Rocket Motors were found in the building 15/17/19 excavation. Each motor was inspected and none contained any propellant or explosive residues.

The M16 was the first of the Army's spin-stabilized 4.5-inch rockets. It was fired from 24-tube "Honeycomb" and 60-tube "Hornet's Nest" launchers. These rockets were also referred to as “barrage” rockets because of the way they were fired. The M17, M20, and M21 rockets were similar to the M16. M16 rockets were used by the Army at least until the Korean War.

Museum View of a 4.5-inch spin stabilized rocket, with warhead and fuze attached

M10 Airplane Smoke Tank

A total of 4 each M10 Airplane Smoke Tanks were found in the building 22/24 excavation. Each smoke tank was inspected and none contained any liquid or residues.

Description

Several types of fighters and light bombers carried the M10 airplane smoke tank. The Douglas A-20 aircraft could carry up to four of these tanks and lay a smoke screen or dispense chemicals such as tear gas. When filled to a maximum of 30 gallons, each tank weighed up to 588 pounds and could lay a smoke screen about 2,000 feet long.

M3A2 JATO Bottle

A total of 90 each, JATO bottles were found in the building 22/24 excavation. All of the JATO bottles were inspected and determined to have functioned as designed with no remaining propellant or explosive residues in the cavity.

NOTE: JATO bottles are classified as “Rocket Motors” and as such are handled, and stored using the same precautions as all military rocket motors.

Description

The JATO (Jet Assist Take-Off) bottle is essentially a rocket motor with a solid-propellant thrust unit used primarily for launching target planes from a catapult, although it may be used for other applications.

Body assembly
The body assembly is a cylindrical steel tube closed at the forward end by the head and threaded externally at the open rear end to receive the nozzle.

Nozzle
The nozzle, which is constructed of steel, is of the convergent-divergent type comprising a conical rear portion, and cylindrical forward portion. The cylindrical forward end of the nozzle is threaded internally to engage the rear of the body assembly.

Igniter plug assembly
The igniter assembly consists of a “shorted” igniter plug and a nozzle closure, which are connected by two lengths of igniter cable. The nozzle closure is a plastic, cup-shaped disk into which two copper terminal inserts are molded. The closure is cemented permanently into the expansion cone. The igniter plug is a standard, two-pronged, rubber-bodied electric plug, which is short-circuited by a copper wire tied across its prongs. The two cables from the plug are crimped into the terminal inserts in the nozzle closure Igniter assembly. The igniter assembly is designated “Igniter, JATO, M21.” It consists of a plastic igniter case containing a 463-grain charge of black powder, two squibs, each of 1.0-ohm resistance, and two 24-in. long external lead wires, which are connected to the squibs. Electric terminals for the squibs and lead wires are riveted to the plastic wall of the igniter case. The lead wires pass through the center of the JATO and are crimped into the copper terminal inserts in the nozzle closure.

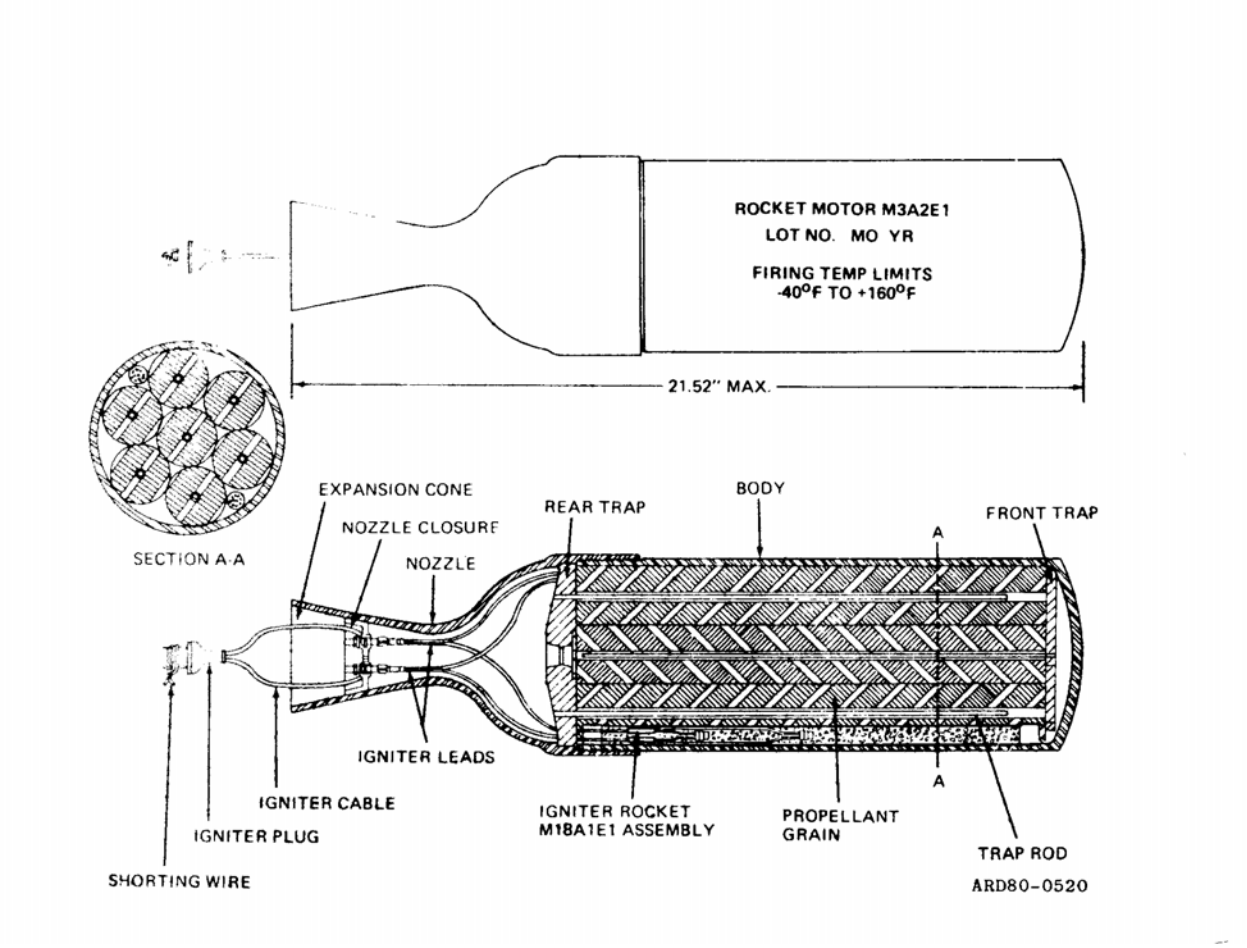
Propelling charge
The propelling charge consists of seven monoperforate cylindrical extruded grains of double-base propellant M16 (T6). The grains are arranged in the JATO lengthwise with one grain in the center and six grains surrounding it.

Rear trap assembly
The rear trap assembly is a star-shaped steel casting with six equally spaced radial arms and a hexagonal center hole. Trap rods, one each from 6 cylindrical radial arms, extend axially toward the forward end of the JATO to form a cage-like support, which receives six of the seven propellant grains.

Front trap assembly
The front trap assembly is a wheel-shaped steel casting, comprising an outer ring, center hub, and three radial spokes. A cylindrical trap rod extends from the center of the hub axially toward the rear of the JATO. This rod receives the seventh (center) grain of the propelling charge.

Functioning

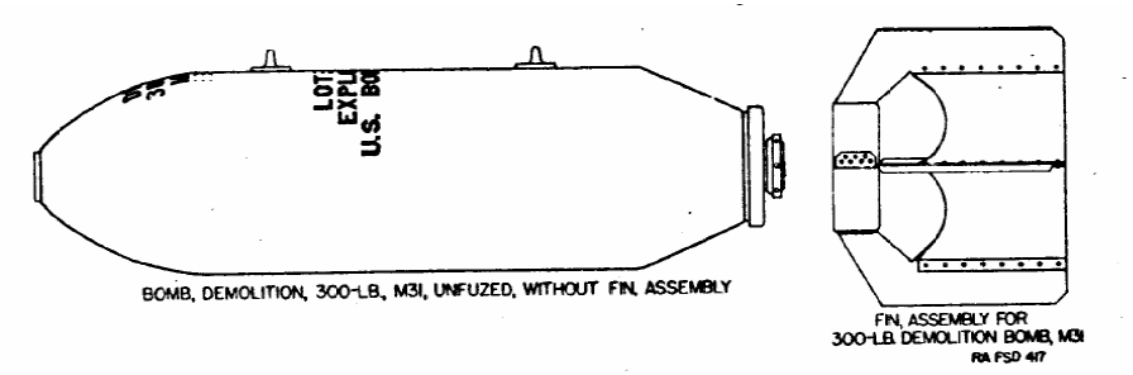
The JATO is designed to function safely and reliably when connected to any electrical source, which will deliver 2 amperes at a minimum of 1-1/2 volts, although higher voltages may be used if desired. Satisfactory results have been obtained by ignition from ordinary 110-volt house current. Applying current through the igniter cable activates the 463-grain charge of black powder, which ignites the propelling charge. Burning creates a rapid expanding gas, which can only escape through the nozzle assembly. The nozzle assembly is designed for a venture effect, which further compresses the gas and increases the thrust required to launch the rocket or aircraft.



Line drawing showing the internal layout of the JATO bottle

Bomb Fin with 2 re-enforcing bars, used on 100 – 500-pound Demolition Bomb

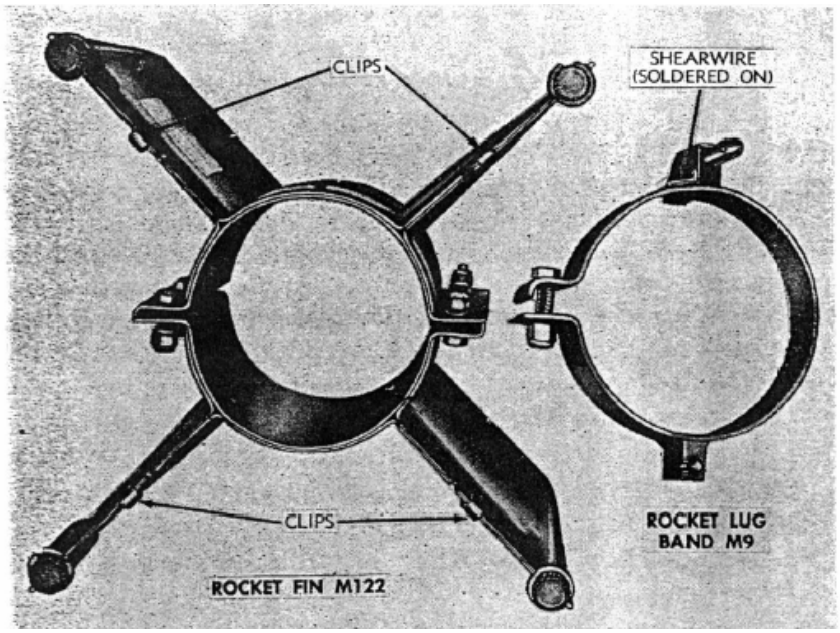
A total of 17 each general-purpose bomb fins were found, 6 each at the building 15/17/19 excavation and 11 each at the building 22/24 excavation. This type of bomb fin is constructed to fit demolition bombs, from 100-pounds to 500-pounds. There are no explosives associated with this bomb fin.



This line drawing of a 300-lb M31 demolition bomb shows a typical bomb fin without any re-enforcing bars.

5-inch rocket fin

A total of 503 each 5-inch rocket fins were found; 91each were found at the building 15/17/19 excavation and 412 each at the building 22/24 excavation site. There are no explosives associated with rocket fins.

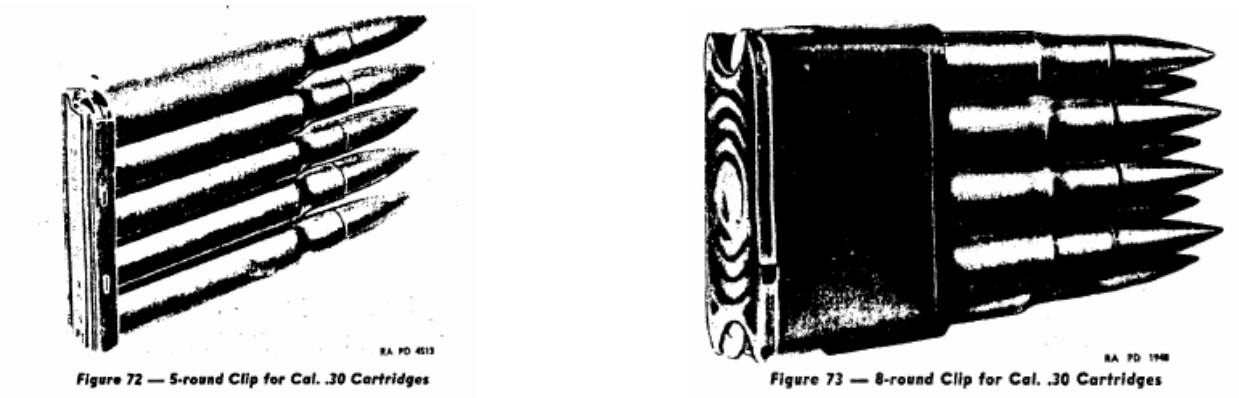


Line drawing of a 5-inch rocket motor fin

50-Caliber belt links and 30-Caliber clips

There were too many belt links and clips to count. They were found throughout the site and as many as practicable were picked up and disposed of in the base landfill.

The closed loop .50-cal links, (left and center) used in the M2 Machine Gun were the only type found. None of the open links (shown on the right) were found. The open links are used in the newer M85 Machine Gun.



There are two types of clips for the .30-cal cartridges, the older 5-round clip shown on the left and the new 8-round clip, shown on the right.

105mm and 75mm Howitzer Shipping Containers; each container was inspected for munitions related material prior to crushing and none was found.

There were a total of 413 shipping containers found, 410 each 105mm containers and 3 each 75mm containers. The shipping containers were found in the building 15/17/19 and 22/24 excavation. All of the containers were inspected and none contained any munitions related material.

Figure 32. Metal container M152A2, for 105-mm howitzer rounds.

105mm Howitzer, with packing and metal shipping container

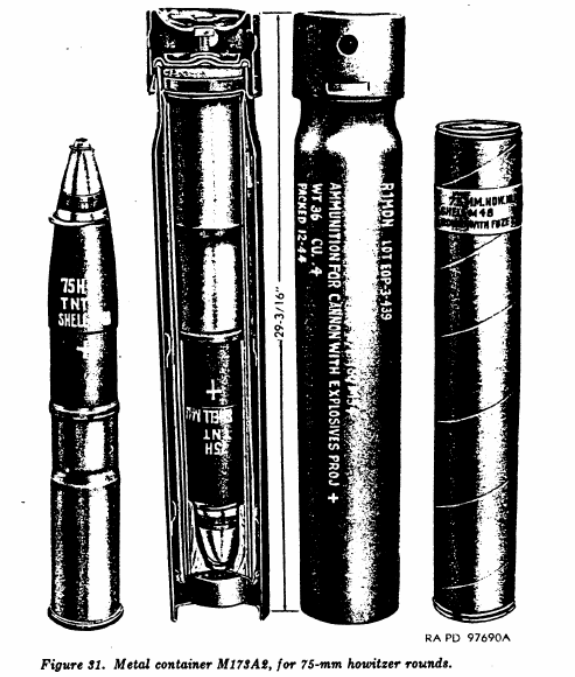


Figure 31. Metal container M173A2, for 75-mm howitzer rounds.

75mm Howitzer, with packing and metal shipping container

81mm mortar and 60mm mortar shipping containers

A total of 2 81mm mortar shipping containers were found at the building 15/17/19 excavation. Each container was inspected and no munitions related material was found.

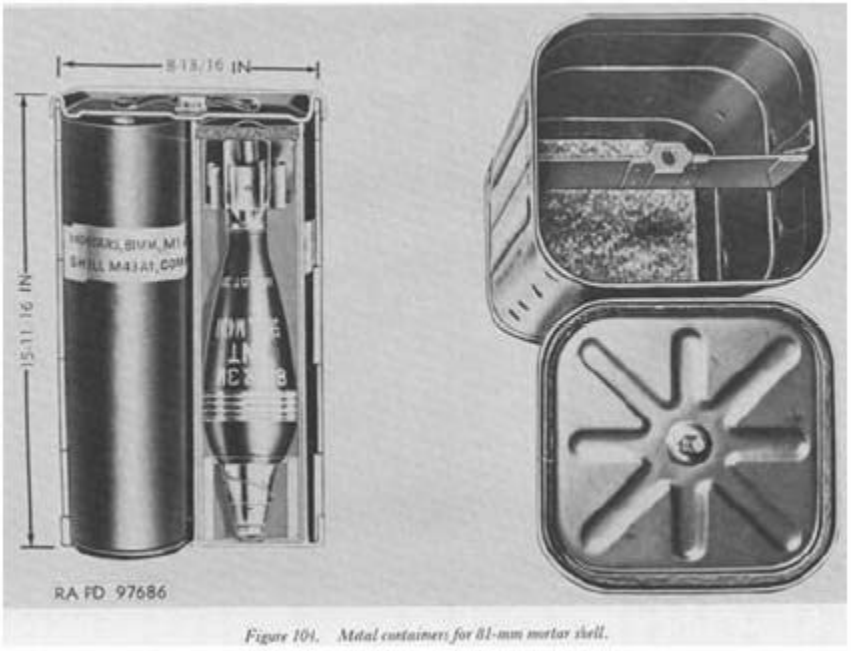


Figure 104. Metal containers for 81-mm mortar shell.

Drawing of an 81mm mortar, packing material, and shipping container. Each container holds 4 complete mortars.

M29 metal shipping containers for the 3.5-inch M29A2 practice rocket

A total of 3 each M29 shipping containers found, all in the building 15/17/19 excavation. Each container was internally inspected and no munitions related material was found.

ATTACHMENT F1
Military EOD Response Reports and Other Information

EXPLOSIVE ORDNANCE INCIDENT REPORT

For use of this form, see FM 9-15; the proponent agency is US Army Training and Doctrine Command.

Incident Number: 176-18-04 | Control Number: | Unusual ☐ | Routine ☐

Reported:	24-Mar-04 15:00
Departed Unit:	24-Mar-04 16:03
Arrived Site:	24-Mar-04 20:30
Depart Site:	25-Mar-04 15:18
Arrived Unit:	25-Mar-04 17:44
Travel Hours:	6.88
Air Hours:	4.00
Miles:	0
Man Hours:	51.37
Adjust Hours:	0

Incident Location:
FT. WAINWRIGHT,GAS STATION

FT WAINWRIGHT, AK (US)

Grid:
Latitude:
Longitude:

Supported:
FWA MILITARY POLICE
SSG BROCKMAN
FWA

FT. WAINWRIGHT, AK

Phone: (907) 353-7535
Other Contact:

Item(s) Reported:
155mm Projectile

Personnel Dispatched
SFC Morrison, Neil J.
SSG Wilson, Jay P.

Ordnance Item(s) Identification and Disposition

Quantity:	UI:	Description / Fuze Condition / Lot Number	NEW (lbs):	Initial Disposition:	Final Disposition:
1	EA	Old style bomb box fins (N/A) Lot Unkown	0	OTHER	SCRAP
2	EA	37MM RECOILESS RIFLE GRENADE CASING (Inert) Lo	0	OTHER	SCRAP
1	EA	3.5 inch rocket training warhead (Unarmed) Lot Unkow	0	OTHER	SCRAP
1	EA	3.5 inch rocket with rkt motor expended (Training) Lot	0	OTHER	SCRAP
1	EA	8" artillry round (Unarmed) Lot Unkown	0	TRANS SDA	DISP BY DET
		Total Net Explosive Weight (lbs):	0.00		

Test Form 52-1

EXPLOSIVE ORDNANCE INCIDENT REPORT

Incident Number: 176-18-04

Categories:

- ☐ News Media Coverage
- ☐ Civil Law Enforcement
- ☐ Chemical Response
- ☐ Nuclear Response
- ☐ Transportation Accident
- ☐ USACOE Supported
- ☐ Reserve Component Support
- ☐ Formerly Used Defense Site
- ☐ Injuries
- ☐ Death(s)
- ☐ Drug Related

Threat:

- ☐ Imminent Threat
- ☐ Threat
- ☐ Extended Threat

SecDef Approval

- ☐ Yes
- ☒ No

Demolition Materials Used:

DODIC:	Quantity:	UI:	Description / Lot Number:	NEW (lbs):	Total NEW (lbs):
MN06 (1375-1233)	4	EA	CAP, BLASTING, DELAY, M14 Lot SHK97M001-001	0.01	0.04
M766 (1375-1671)	4	EA	IGNITER, TIME BLASTING FUSE M60 Lot SGK86F011-004	0.0001	0.0004
M023 (1375-7040)	4	EA	CHG DEMO, M112 COMP C-4 Lot LOP77L 007-002	1.25	5
			Total Net Explosive Weight (lbs):		5.04

Environmental Protection Agency Coordination:

Agency: FWA Environmental (DPW)
Person Contacted: CATHY
Phone: (907) 353-6249
Contact Date/Time:

On-Site Dispoal Approve ☐
Permit Granted:
EPA Permit #:

Additional Information:

Telephoned the EPA agency at Ft Wainwright and got their answering service. A message was left regarding the incident and the unit phone numbers and SSG Wilson and SFC Morrison as a point of contact.

Signature of Unit Commander: (Record Copy Only) Douglas B. Guard

Guard, Douglas B., Cpt, OD, Commanding

Date: 3-29-04

Test Form 52-1 (Reverse)

EXPLOSIVE ORDNANCE INCIDENT REPORT

For use of this form, see FM 9-15; the proponent agency is US Army Training and Doctrine Command.

Incident Number: 176-21-04

Control Number:

Unusual ☐

Routine ☐

Reported:	09-Apr-04 09:25
Departed Unit:	09-Apr-04 09:25
Arrived Site:	09-Apr-04 09:30
Depart Site:	09-Apr-04 12:10
Arrived Unit:	09-Apr-04 12:10
Travel Hours:	0.08
Air Hours:	0.00
Miles:	0
Man Hours:	5.50
Adjust Hours:	0

Incident Location:
FT. WAINWRIGHT,GAS STATION

FT WAINWRIGHT, AK (US)

Grid:
Latitude:
Longitude:

Supported:
FWA MILITARY POLICE
FWA MP DESK SERGEANT
1066 GAFFNEY ROAD
BUILDING 3446
FT. WAINWRIGHT, AK

Phone: (907) 353-7535
Other Contact:

Item(s) Reported:
1 ea Projo

Personnel Dispatched

CPT Guard, Douglas B.

SFC Ferris, Thomas L.

Ordnance Item(s) Identification and Disposition

Quantity:	UI:	Description / Fuze Condition / Lot Number	NEW (lbs):	Initial Disposition:	Final Disposition:
1	EA	**8" us, inert filled (Inert) Lot #unknown**	0	TRANS SDA	DISP BY DET
		Total Net Explosive Weight (lbs):	0.00		

Test Form 52-1

EXPLOSIVE ORDNANCE INCIDENT REPORT

Incident Number: 176-21-04

Categories:

- ☐ News Media Coverage
- ☐ Civil Law Enforcement
- ☐ Chemical Response
- ☐ Nuclear Response
- ☐ Transportation Accident
- ☐ USACOE Supported
- ☐ Reserve Component Support
- ☐ Formerly Used Defense Site
- ☐ Injuries
- ☐ Death(s)
- ☐ Drug Related

Threat:

- ☐ Imminent Threat
- ☐ Threat
- ☐ Extended Threat

SecDef Approval

- ☐ Yes
- ☒ No

Demolition Materials Used:

DODIC:	Quantity:	UI:	Description / Lot Number:	NEW (lbs):	Total NEW (lbs):
M766 (1375-1671)	2	EA	IGNITER, TIME BLASTING FUSE M60 Lot SGK86F011-004	0.0001	0.0002
MN06 (1375-1233)	2	EA	CAP, BLASTING, DELAY, M14 Lot SHK97M001-001	0.01	0.02
M023 (1375-7040)	2	EA	CHG DEMO, M112 COMP C-4 Lot LOP77L 007-002	1.25	2.5

Total Net Explosive Weight (lbs): 2.52

Environmental Protection Agency Coordination:

Agency: Fort Wainwright Environmental
Person Contacted: Kate Siftar
Phone: (907) 353-6249
Contact Date/Time:

On-Site Dispoal Approve ☐
Permit Granted:
EPA Permit #:

Additional Information:
Left Message

Signature of Unit Commander: (Record Copy Only)

Date:

Guard, Douglas B., Cpt, OD, Commanding

Test Form 52-1 (Reverse)

EXPLOSIVE ORDNANCE INCIDENT REPORT

For use of this form, see FM 9-15; the proponent agency is US Army Training and Doctrine Command.

Incident Number: 176-24-04

Control Number:

Unusual ☐
Routine ☐

Reported:	08-Apr-04 10:30
Departed Unit:	08-Apr-04 06:30
Arrived Site:	08-Apr-04 10:30
Depart Site:	08-Apr-04 12:30
Arrived Unit:	08-Apr-04 19:00
Travel Hours:	10.50
Air Hours:	2.00
Miles:	0
Man Hours:	25.00
Adjust Hours:	0

Incident Location:
FT. WAINWRIGHT,GAS STATION

FT WAINWRIGHT, AK (US)

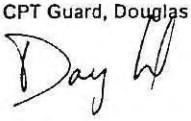
Grid:
Latitude:
Longitude:

Supported:
FWA MILITARY POLICE
FWA MP DESK SERGEANT
1066 GAFFNEY ROAD
BUILDING 3446
FT. WAINWRIGHT, AK

Phone: (907) 353-7535
Other Contact:

Item(s) Reported:
1ea 8 inch projectile
1ea 75mm casing (expended)

Personnel Dispatched
CPT Guard, Douglas B.



SGT Jinks, David A.

Ordnance Item(s) Identification and Disposition

Quantity:	UI:	Description / Fuze Condition / Lot Number	NEW (lbs):	Initial Disposition:	Final Disposition:
1	EA	**8 inch, inert filled (inert) (Unarmed) Lot #unknown**	0	TRANS SDA	DISP BY DET
1	EA	**Casing, 75mm Recoiless Riffle (expended) (Unarmed)**	0	TRANS SDA	DISP BY DET
		Total Net Explosive Weight (lbs):	0.00		

Test Form 52-1

EXPLOSIVE ORDNANCE INCIDENT REPORT

Incident Number: 176-24-04

Categories:

- ☐ News Media Coverage
- ☐ Civil Law Enforcement
- ☐ Chemical Response
- ☐ Nuclear Response
- ☐ *Transportation* Accident
- ☐ USACOE Supported
- ☐ Reserve Component Support
- ☐ Formerly Used Defense Site
- ☐ Injuries
- ☐ Death(s)
- ☐ Drug Related

Threat:

- ☐ Imminent Threat
- ☐ Threat
- ☐ Extended Threat

SecDef Approval

- ☐ Yes
- ☒ No

Environmental Protection Agency Coordination:

Agency: **Fort Wainwright Environmental**
Person Contacted: **Kate Siftar**
Phone: **(907) 353-6249**
Contact Date/Time:

On-Site Dispoal Approve ☐
Permit Granted:
EPA Permit #:

Additional Information:
Left Message

Signature of Unit Commander: (Record Copy Only)
Guard, Douglas B., Cpt, OD, Commanding

Date: 9-13-04

Test Form 52-1 (Reverse)

EXPLOSIVE ORDNANCE INCIDENT REPORT

For use of this form, see FM 9-15; the proponent agency is US Army Training and Doctrine Command.

Incident Number: 176-27-04

Control Number:

Unusual ☐

Routine ☐

Reported:	12-Apr-04 10:00
Departed Unit:	12-Apr-04 11:00
Arrived Site:	12-Apr-04 14:00
Depart Site:	14-Apr-04 17:00
Arrived Unit:	14-Apr-04 19:00
Travel Hours:	5.00
Air Hours:	0.00
Miles:	0
Man Hours:	112.00
Adjust Hours:	0

Incident Location:
FT. WAINWRIGHT,GAS STATION

FT WAINWRIGHT, AK (US)

Grid:
Latitude:
Longitude:

Supported:
FWA MILITARY POLICE
FWA MP DESK SERGEANT
FWA

FT. WAINWRIGHT, AK

Phone: (907) 353-7535
Other Contact:

Item(s) Reported:
2ea 8" projectiles

Personnel Dispatched

SSG Cuilla, Michael A.

SGT Jinks, David A.

Ordnance Item(s) Identification and Disposition

Quantity:	UI:	Description / Fuze Condition / Lot Number	NEW (lbs):	Initial Disposition:	Final Disposition:
2	EA	8" Projectile (Unarmed) Lot Unkown	0	TRANS SDA	DISP BY DET
		Total Net Explosive Weight (lbs):	0.00		

Test Form 52-1

EXPLOSIVE ORDNANCE INCIDENT REPORT

Incident Number: 176-27-04

Categories:

- ☐ News Media Coverage
- ☐ Civil Law Enforcement
- ☐ Chemical Response
- ☐ Nuclear Response
- ☐ Transportation Accident
- ☐ USACOE Supported
- ☐ Reserve Component Support
- ☐ Formerly Used Defense Site
- ☐ Injuries
- ☐ Death(s)
- ☐ Drug Related

Threat:

- ☐ Imminent Threat
- ☐ Threat
- ☐ Extended Threat

SecDef Approval

- ☐ Yes
- ☒ No

Demolition Materials Used:

DODIC:	Quantity:	UI:	Description / Lot Number:	NEW (lbs):	Total NEW (lbs):
MN06 (1375-1233)	2	EA	CAP, BLASTING, DELAY, M14 Lot SHK97M001-001	0.01	0.02
M766 (1375-1671)	2	EA	IGNITER, TIME BLASTING FUSE M60 Lot SGK 86F 011 004	0.0001	0.0002
M023 (1375-7040)	6	EA	CHG DEMO, M112 COMP C-4 Lot LOP77L 007-002	1.25	7.5
			Total Net Explosive Weight (lbs):		7.52

Environmental Protection Agency Coordination:

Agency: Fort Wainwright Environmental
Person Contacted: Kate Siftar
Phone: (907) 353-6249
Contact Date/Time:

On-Site Dispoal Approve ☐
Permit Granted:
EPA Permit #:

Additional Information:
Left Voice Message

Signature of Unit Commander: (Record Copy Only)

Date:

Guard, Douglas B., Cpt, OD, Commanding

Test Form 52-1 (Reverse)

EXPLOSIVE ORDNANCE INCIDENT REPORT

For use of this form, see FM 9-15; the proponent agency is US Army Training and Doctrine Command.

Incident Number: 176-8-05

Control Number:

Unusual ☐

Routine ☐

Reported:	20-Apr-05 17:30
Departed Unit:	21-Apr-05 03:30
Arrived Site:	21-Apr-05 07:30
Depart Site:	21-Apr-05 09:30
Arrived Unit:	21-Apr-05 15:00
Travel Hours:	9.50
Air Hours:	2.00
Miles:	0
Man Hours:	23.00
Adjust Hours:	0

Incident Location:
FWA GAS STATION

FORT WAINRIGHT, AK (US)

Grid:
Latitude:
Longitude:

Supported:
FWA MILITARY POLICE
SGT MUAR
BLDG 3446

FORT WAINRIGHT, AK

Phone: (907) 353-7535
Other Contact:

Item(s) Reported:
1 Ea. 8 inch projo

Personnel Dispatched
CPT Guard, Douglas B.
SFC Grotkin, David

Ordnance Item(s) Identification and Disposition

Quantity:	UI:	Description / Fuze Condition / Lot Number	NEW (lbs):	Initial Disposition:	Final Disposition:
0	EA	Scrap items (N/A) Lot Unkown	0	OTHER	SCRAP
		Total Net Explosive Weight (lbs):	0.00		

Test Form 52-1

EXPLOSIVE ORDNANCE INCIDENT REPORT

Incident Number: 176-8-05

Categories:

- ☐ News Media Coverage
- ☐ Civil Law Enforcement
- ☐ Chemical Response
- ☐ Nuclear Response
- ☐ Transportation Accident
- ☐ USACOE Supported
- ☐ Reserve Component Support
- ☐ Formerly Used Defense Site
- ☐ Injuries
- ☐ Death(s)
- ☐ Drug Related

Threat:

- ☐ Imminent Threat
- ☐ Threat
- ☐ Extended Threat

SecDef Approval

- ☐ Yes
- ☒ No

Environmental Protection Agency Coordination:

Agency:
Person Contacted:
Phone:
Contact Date/Time:

On-Site Dispoal Approve ☐
Permit Granted:
EPA Permit #:

Additional Information:

Signature of Unit Commander: (Record Copy Only)

Guard, Douglas B., Cpt, OD, Commanding

Date: 1 Aug 05

Test Form 52-1 (Reverse)

UCN	Title
PACEIEL0606280217Z	M47 100lb Bomb at Ft Wainwright
Status	Incident Type
Final	Pick Up and/or Disposal (UXO)
Attachments	
Yes	

EOD Personnel:	3
Other Personnel:	0

EOD Manhours:	16:30
Other Manhours:	0:00
Admin Manhours:	1:00
Tot. Manhours:	17:30

Requestor
Mr. Jim Hugg
Ft. Wainwright

	Date and Times	
	Date	Time
Report:	6/26/06	0730
Start:	6/26/06	0730
Stop:	6/26/06	1300

Participating Personnel		
Name	Job	Status
Harris, Steven S. SrA	EOD Operations Support	Active Duty
Moore, John L. SSgt	EOD Team Chief	Active Duty
Schaff, Isaiah C. SrA	EOD Team Member	Active Duty

Narrative

Start Input From Event Log:

2006-06-26 0730
EOD recieve a call from Jim Hugg, a retired Marine EOD technician, who is working as a contractor for Ft. Wainwright, of possible M47A1 chemical bomb on Ft Wainwright. He said that the bomb had been found the previous day, around 1600 hours under a pile of metal scrap. He examined the item, researched it and then placed it in an overpack.Mr. Hugg was advised to notify local (Ft. Wainwright) authorities in order to initiate a proper response.

2006-06-26 1045
SFC Bartley of Ft. Richardson Army EOD, called requesting Eielson EOD respond to this incident. He was advised to call the Eielson Command Post to formally initiate deployment of Eielson assets.

2006-06-26 1148
EOD team recieves permission via Col Weider to respond to Ft Wainwright.

2006-06-26 1313
Team arrives on scene and makes contact with Jim Hugg.

2006-06-26 1330

Visual inspection of munition revealed it was in fact an M47 series 100lb aerial bomb. No external features were visible to determine the variant of the bomb: Chemical (H), Smoke (WP), or Incendiary. Several small ruptures in the outer casing revealed that the bomb body was empty with no visible residue of any filler or the internal paint or oil coatings described in technical orders. Wall thickness in excess of 1/32nd inch, the weak, banded lugs and the shortened tail fin section all indicated the bomb was either an M47A1 or A2.The team elected to x-ray the bomb to verify the visual inspection. The body was definitely empty. The fuze-like structure on the nose was a shipping plug. X-rays also revealed a burster tube running the length of the body. Team chief determined that disposal was appropriate, and that the munition was safe to transport for disposal.

2006-06-26 1530
The bomb was transported from the Ft. Wainwright housing area to a secure Army range until disposal procedures could be performed.

2006-06-26 1630
Team returned to base and reconstituted all equipment.

End Input From Event Log

2006-06-29 1000
Two EOD personnel were dispatched to dispose of the bomb at its location on the Army range. Detonation was successful. End of incident.

Special Identification	
Ordnance:	US Military Conventional Munitions/Components/Bulk Explosives
Support:	US ARMY
Category:	N/A Category Not Assigned

Location	
Latitude:	Longitude:
Grid Zone: 6W	Grid Square: VS
Easting: 68000	Northing: 89000

Injuries	
Types:	None

Numbers	
EOD:	
DoD:	
Civilian:	
Other Agn:	

Property	
Damage:	N
Amount:	

EPA Information	
Permit Required:	N
Permit Type:	
Permit Number:	
EPA Contact:	

Deficiencies				
Tracking Nbr	Type	POC	Status	Est Comp Dt
Description				

MAJCOM Remarks
AFCESA Remarks

Ordnance Involved						
Nationality	Class	Nomenclature	Qty	RSP	DP	Tech data
United States	Bomb	M47-Series 100lb Bomb	1	NA	Yes	60A-2-1-12, 60A-2-1-

	22-1, 60B-2-1-8

Ordnance Details					
Actuation					
Actuation Method	Initial Type	Initial SubType	Other	Range	Remarks
No Actuations Available					

Power Sources				
Source	Other	Quantity	Connection	Remarks
No Power Sources Available				

Explosives Found										
Cat	Type	Other	Qty	Color	Wt	Len	Ht	Wid	Dia	Remarks
No Explosives Found Available										

Fragmentations		
Type	Other	Remarks
No Fragmentaions Available		

Device Housing & Description					
Package Placement:		Primary Device Housing Material:		Secondary Device Housing Material:	
Other:				Color/Markings:	
Device Description:					
Device Position:					

Dimensions		Vehicles	
Length:		Make:	
Height:		Model:	
Width:		Year:	
Diameter:		Tag:	
Weight:		VIN:	
		Country:	
		State:	
		Other:	

Delivery Details					
Device Placed/Delivered:		Other:		Final Evacuation Distance:	
Device/Item placed to entice action from individual?	N	Explain:			

RSP Details					
RSP Conducted?		RSP Successful?		RSP Narrative:	

RSP Conducted By			
Last Name		SIPR Email	
First Name		NIPR Email	
Rank		Phone	

Final Disposition

Dispose by detonation?		Parts/Pieces Detonated:	
Other:		Name of Disposal Site	
Exact Location of Disposal Site		Parts/Pieces Transferred to Someone?	N
Parts/Pieces Transferred		Other:	
Disposition Narrative			
Custody Transfer To			
Name:		Organization:	
Address:		Components forwarded to CEXC?	N

Explosives Used			
Nomenclature	DODIC	Qty	LotNbr
Charge, Demolition, 1.25 lb, C-4, M112	M023	20	LOP91D020-003
Cap, Blasting, Non-electric, Special, M7	M131	3	CIL-2-1
Fuse, Blasting, Time, M700	M670	50	ENS89A001-004
Igniter, Time Blasting Fuse, M60	M766	5	SGK83C009-004

Post Mission			
Intended Physical Targets			
Physical Target	Other	Target Type	Target Remarks
No Intended Physical Targets Available			
Actual Physical Targets			
Physical Target	Other	Target Type	Target Remarks
No Actual Physical Targets Available			
Lessons Learned			
Problems Encountered		Solutions	
No Lessons Learned Available			
Comments			
Title	Modified By	Modified Date	Text Note Data
No Comments Available			

Routing Information		
To:	Thru:	From:
HQ AFCESA/CEXD HQ AFCESA/CEXD 139 BARNES DRIVE, SUITE 1 TYNDALL AFB, FL 32403-5319 DSN: 523- 6410/6478/6128/6306/6156/6281/6120 EMAIL: AFCESA_CEXD@tyndall.af.mil	HQ PACAF/CEXOD 25 E STREET, STE D-306 HICKAM AFB, HI 96853-5412 DSN: 315-449-9483/5208 EMAIL: albert.schneider@hickam.af.mil	354 CES/CED 2310 CENTRAL AVE, SUITE 100 EIELSON AFB, AK 99702-2225 DSN: 317-377-1650/4207 EMAIL: 354ces.ced@eielson.af.mil

Approvals		
	Approver	Date
Team Chief:	Moore, John L. SSgt	6/29/06

Supervisor:	Finch, Arin E. TSgt	7/14/06
MAJCOM Staff:	Payes, Morris C. Contractor	7/14/06

UCN	Title
PACEIEL0606121541Z	Frag Bomb AN-M41 at new Ft. Wainwright housing
Status	Incident Type
Final	Pick Up and/or Disposal (UXO)
Attachments	
Yes	

EOD Personnel:	5
Other Personnel:	0

EOD Manhours:	17:30
Other Manhours:	0:00
Admin Manhours:	1:00
Tot. Manhours:	18:30

Requestor
MSgt. Stammers
354 FW/CPO Eielson AFB, Alaska. 99702

	Date and Times	
	Date	Time
Report:	6/11/06	1600
Start:	6/11/06	1600
Stop:	6/14/06	1930

Participating Personnel		
Name	Job	Status
Durantt, Erick R. SrA	EOD Operations Support	Active Duty
Hallenbeck, Steven L. TSgt	EOD Flight Chief	Active Duty
Schaff, Isaiah C. SrA	EOD Team Member	Active Duty
Sprague, Amber M. SrA	EOD Team Member	Active Duty
Szczurek, Stephen N. SSgt	EOD Team Chief	Active Duty

Narrative
11 June 2006: EOD stand by team was requested to respond to possible UXO at new housing development on Ft. Wainwright Aprox 1600hrs. Upon arrival to the incident site the UXO was identified as a 20 lb Frag Bomb AN-M41. No Fuzing was encounterd and item was safe for transport. The UXO was transported to the Ft. Wainwright (secure) AT-4 firing range awaiting disposal. 14 June 2006: EOD team disposed of the item by detonation at Ft. Wainwright AT-4 firing range.

Special Identification	
Ordnance:	US Military Conventional Munitions/Components/Bulk Explosives
Support:	Assigned Unit
Category:	N/A Category Not Assigned

Location	
Latitude:	Longitude:
Grid Zone: 06W	Grid Square: VS
Easting: 68123	Northing: 89112

Injuries	
Types:	None

Numbers	
EOD:	
DoD:	
Civilian:	
Other Agn:	

Property	
Damage:	N
Amount:	

EPA Information	
Permit Required:	N
Permit Type:	
Permit Number:	
EPA Contact:	

Deficiencies				
Tracking Nbr	Type	POC	Status	Est Comp Dt
Description				

MAJCOM Remarks
AFCESA Remarks

Ordnance Involved						
Nationality	Class	Nomenclature	Qty	RSP	DP	Tech data
United States	Dispenser, Cluster & Launcher	AN-M41	1	NA	Yes	60A-2-1-12

Ordnance Details

Actuation

Actuation Method	Initial Type	Initial SubType	Other	Range	Remarks
No Actuations Available					

Power Sources

Source	Other	Quantity	Connection	Remarks
No Power Sources Available				

Explosives Found

Cat	Type	Other	Qty	Color	Wt	Len	Ht	Wid	Dia	Remarks
No Explosives Found Available										

Fragmentations

Type	Other	Remarks
No Fragmentaions Available		

Device Housing & Description					
Package Placement:		Primary Device Housing Material:		Secondary Device Housing Material:	
Other:				Color/Markings:	
Device Description:					
Device Position:					

Dimensions		Vehicles	
Length:		Make:	
Height:		Model:	
Width:		Year:	
Diameter:		Tag:	
Weight:		VIN:	
		Country:	
		State:	
		Other:	

Delivery Details					
Device Placed/Delivered:		Other:		Final Evacuation Distance:	
Device/Item placed to entice action from individual?	N	Explain:			

RSP Details					
RSP Conducted?		RSP Successful?		RSP Narrative:	

RSP Conducted By			
Last Name		SIPR Email	
First Name		NIPR Email	
Rank		Phone	

Final Disposition					
Dispose by detonation?		Parts/Pieces Detonated:			
Other:			Name of Disposal Site		
Exact Location of Disposal Site			Parts/Pieces Transferred to Someone?		N
Parts/Pieces Transferred			Other:		
Disposition Narrative					

Custody Transfer To			
Name:		Organization:	
Address:		Components forwarded to CEXC?	N

Explosives Used			
Nomenclature	DODIC	Qty	LotNbr
Cap, Blasting, Non-electric, Special, M7	M131	2	CIL-2-1
Fuse, Blasting, Time, M700	M670	50	ENS89A001-004
Igniter, Time Blasting Fuse, M60	M766	5	SGK92E013-007
Block, Demolition, C4, M112-1LB	MN53	6	LOP91D020-003

Post Mission			
Intended Physical Targets			
Physical Target	Other	Target Type	Target Remarks
No Intended Physical Targets Available			

Actual Physical Targets			
Physical Target	Other	Target Type	Target Remarks
No Actual Physical Targets Available			

Lessons Learned	
Problems Encountered	Solutions
No Lessons Learned Available	

Comments			
Title	Modified By	Modified Date	Text Note Data
No Comments Available			

Routing Information		
To:	Thru:	From:
HQ AFCESA/CEXD HQ AFCESA/CEXD 139 BARNES DRIVE, SUITE 1 TYNDALL AFB, FL 32403-5319 DSN: 523- 6410/6478/6128/6306/6156/6281/6120 EMAIL: AFCESA_CEXD@tyndall.af.mil	HQ PACAF/CEXOD 25 E STREET, STE D-306 HICKAM AFB, HI 96853-5412 DSN: 315-449-9483/5208 EMAIL: albert.schneider@hickam.af.mil	354 CES/CED 2310 CENTRAL AVE, SUITE 100 EIELSON AFB, AK 99702-2225 DSN: 317-377-1650/4207 EMAIL: 354ces.ced@eielson.af.mil

Approvals		
	Approver	Date
Team Chief:	Finch, Arin E. TSgt	7/18/06
Supervisor:	Finch, Arin E. TSgt	7/20/06
MAJCOM Staff:	Payes, Morris C. Contractor	7/20/06

EXPLOSIVE ORDNANCE INCIDENT REPORT

1. 716th EOD Incident #	2. JRAC #
716-002-08	918-005-08

3. Reported:	15 Oct 07 1129	9. Incident Location ASP, Fort Wainwright, AK	12. Supported: FWA ASP
4. Departed Unit:	15 Oct 07 1430		13. Address:
5. Arrived Site:	15 Oct 07 1615		14. City/State: FWA
6. Depart Site:	15 Oct 07 1830		15. POC: Ignaczak, John P
			16. Phone #: 907-353-6593
7. Arrived Unit:	15 Oct 07 2100	10. S.I.R ☐ Routine ■ Unusual ☐	11. Imminent ☐ Threat ■ Extended ☐
8. Air Hours:4 Miles:70 Adjusted Hours:			17. Personnel Dispatched: SFC Herndon, Phillip E. SGT Pringle, Joshua P.

18.
- ☐ News Media
- ☐ Civil Law Enforcement
- ☐ Chemical Response
- ☐ Nuclear Response
- ☐ Transportation Accident
- ☐ USACOE Supported
- ☐ Reserve Component Support
- ☐ Formerly Used Defense Site
- ☐ Injuries
- ☐ Death(s)
- ☐ Drug Related

19. Item(s) Reported:
Grenade, Launcher, Smoke: Simulant Screening, M82 in the armed position

20. Initial Disposition:
Trans SDA

21 Final Disposition:
Dispose by detonation

22. EPA Agency:
POC:
Phone #:
Date/Time: Permit Number:

23. Confirmed Identification:
1ea: Grenade, Launcher, Smoke: Stimulant Screening, M82.
2 ea: Bomb, Frag, 20lb., M42

Lot Number: MEI94M001-004 (Grenade)
Net Explosive Weight: 19lbs

24. HAZARDOUS MATERIALS MANIFEST

Quantity Drawn	Quantity Expended	Quantity Returned	Nomenclature	Hazard Class	UN ID	Packing Group	LOT Number
4	4	0	Charge, Demolition, M112	1.1D	UN0048	PG II	LOPM007-004
2	2	0	Cap, Blasting, Delay, M14	1.4S	UN0349	PG II	SHK98D001-001
2	2	0	Igniter, Time blasting Fuze, M81	1.4S	UN0131	PG II	LNO01K005-005
			Nathan Folkes	PFC			

Name of shipper: 716th Ord. Co. (EOD)
Fort Richardson, AK 99505
Continuation pages: _____
716th EOD (907) 384-7600/7602

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the DOT & 49 CFR.

Signature of Shipper Representative

Signature(s) of Vehicle Operator(s)

25. Narrative: I certify that all Class V materials listed as expended were consumed during the conduct of this incident.

DAVID K. FOSTER, CPT, OD, Commanding

Team Leader: SGT Pringle, Joshua P.

Team Member: SFC Herndon, Phillip E.

X

NARRATIVE OF INCIDENT # 716-002-08

Upon arrival to ASP, FWA, the team found that despite his being notified at 1356 hours that the team was enroute to his location, Mr. Ignaczak had decided to go home and close the QASAS office. The team got hold of Mr. Mark form the ASP and he returned to the office, and got us the grenade. Team was then also shown 2ea 20lb Fragmentation bombs that were turned into the ASP and no longer serviceable. After Team Leader ensured that all the items were safe to transport, Team proceeded to demo range and the items were disposed of by detonation. Team returned to unit at 2100 on 15 October 2007. Mission Complete.

EXPLOSIVE ORDNANCE INCIDENT REPORT	1. 716th EOD Incident #	2. JRAC #
	716-003-08	918-007-08

3. Reported:	1236/18/OCT/07	9. Incident Location: FWA ASP, FT Wainwright Alaska BLDG 2201 MGRS: LAT:		12. Supported: FWA ASP
4. Departed Unit:	0515/19/OCT/07			13. Address:BLDG 2201
5. Arrived Site:	0800/19/OCT/07			14. City/State: FWA, Alaska
6. Depart Site:	1840/19/OCT/07			15. POC: John Ignaczak
				16. Phone #:907-353-6441
7. Arrived Unit:	2210/19/OCT/07	10. S.I.R ☐ Routine ■ Unusual ☐	11. Imminent ☐ Threat ☐ Extended ■	17. Personnel Dispatched: SFC Wilson SGT Culp
8. Air Hours: 3 Miles: Adjusted Hours:14				

18.
- ☐ News Media
- ☐ Civil Law Enforcement
- ☐ Chemical Response
- ☐ Nuclear Response
- ☐ Transportation Accident
- ☐ USACOE Supported
- ☐ Reserve Component Support
- ☐ Formerly Used Defense Site
- ☐ Injuries
- ☐ Death(s)
- ☐ Drug Related

19. Item(s) Reported:
1-20lb. Frag Bomb
2-8" HE projos
1-M82 Smoke Grenade
2-M116A2 Grenade Simulator
1-M115A2 Artillery Simulator
2-M49A1 Trip Flares

20. Initial Disposition:
Trans SDA

21 Final Disposition:
Dest. By Detonation

22. EPA Agency:
POC:
Phone #:
Date/Time: Permit Number:

23. Confirmed Identification:
1-20lb. Frag Bomb (AN M 41)
2-8" HE projos (M106)
1-M82 Smoke Grenade
2-M116A2 Grenade Simulator
1-M115A2 Artillery Simulator
2-M49A1 Trip Flares

24. HAZARDOUS MATERIALS MANIFEST

Quantity Drawn	Quantity Expended	Quantity Returned	Nomenclature	Hazard Class	UN ID	Packing Group	LOT Number
12	12	0	Charge, Demolition, M112	1.1D	UN0048	PG II	LOP-77M007-004
2	2	0	Cap, Blasting, Delay, M14	1.4S	UN0349	PG II	SHK98D001-001
2	2	0	Igniter, Time blasting Fuze, M81	1.4S	UN0131	PG II	LNO01K005-005

Name of shipper: 716th Ord. Co. (EOD)
Fort Richardson, AK 99505
Continuation pages: _____
716th EOD (907) 384-7600/7602

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the DOT & 49 CFR.

Signature of Shipper Representative

Signature(s) of Vehicle Operator(s)

25. Narrative: I certify that all Class V materials listed as expended were consumed during the conduct of this incident.

DAVID K. FOSTER, CPT, OD, Commanding

Team Leader:

Team Member:

NARRATIVE OF INCIDENT # 716-_003_-08

Team received items from QASAS representative in the FWA ASP. Three of the listed items had been recovered from Tegu Gardens housing project by civilian UXO contractors (2 ea. 8" M106 projectiles and 1 ea. AN M41 20LB. Frag bomb). All other items had been turned into the ASP in what was deemed to be unsafe condition. All items were transported to the FWA Range complex and disposed of by detonation.

////////////

EXPLOSIVE ORDNANCE INCIDENT REPORT

1. 716th EOD Incident #	2. JRAC #
716-051-08	918-TBD-08

3. Reported:	171400Sep08	9. Incident Location: FWA Range Control	12. Supported: Army COE
4. Departed Unit:	290700Sep08		13. Address: BLDG 2201
5. Arrived Site:	290805Sep08		14. City/State: Fort Wainwright, AK
6. Depart Site:	291400Sep08	MGRS: 06W WS 69200 85450	15. POC: FWA RC
			16. Phone #: 907-353-2392
7. Arrived Unit:	291830Sep08	10. S.I.R ☐ Routine ■ Unusual ☐ / 11. Imminent ☐ Threat ☐ Extended ■	17. Personnel Dispatched: SSG Cabrera, SSG Raska
8. Air Hours: 2 Miles: Adjusted Hours:			

18.
- ☐ News Media
- ☐ Civil Law Enforcement
- ☐ Chemical Response
- ☐ Nuclear Response
- ☐ Transportation Accident
- ☐ USACOE Supported
- ☐ Reserve Component Support
- ☐ Formerly Used Defense Site
- ☐ Injuries
- ☐ Death(s)
- ☐ Drug Related

19. Item(s) Reported:
3 x 8in projectiles
1 x smoke bomb with potential burster
4 x frag bombs
1 x 3.5in rocket

20. Initial Disposition: Transported to SDA

21 Final Disposition: Disposal by Detonation

22. EPA Agency:
POC:
Phone #:
Date/Time: Permit Number:

23.Confirmed Identification: 3 x M106 8in Projectiles
1 x 3.5in Rocket Motor
1 x M47 Chemical (Smoke) Bomb
4 x M41/A1 Series Frag Bomb
3 x 8in Projectiles

24. HAZARDOUS MATERIALS MANIFEST

Quantity Drawn	Quantity Expended	Quantity Returned	Nomenclature	Hazard Class	UN ID	Packing Group	LOT Number
11	11	0	Charge, Demolition, M112	1.1D	UN0048	PG II	LOPM007-004
91ft	91ft	0	Cord, Detonation (flexible)	1.1D	UN0065	PG II	ENB88D015-039
2	2	0	Igniter, Time blasting Fuze, M81	1.4S	UN0131	PG II	LNO01K005-005
10	10	0	Detonators, Non Elec. M7	1.4B	UN0267	PG II	HEC81K003-008B
2	2	0	Cap, Blasting, M13, 1000'	1.4S	UN	PG II	EBW97C010-014

Name of shipper: 716th Ord. Co. (EOD)
Fort Richardson, AK 99505
Continuation pages:
716th EOD (907) 384-7600/7602

This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the DOT & 49 CFR.

Signature of Shipper Representative

Signature(s) of Vehicle Operator(s)

25. Narrative: I certify that all Class V materials listed as expended were consumed during the conduct of this incident.

PHILLIP E. HERNDON, SFC, USA, Rear Detachment Commander

Team Leader:

Team Member:

NARRATIVE OF INCIDENT # 716-__051___-08

The ordnance items found from Tegu Gardens Housing Project from civilian UXO contractors were handed over to the EOD Team to conduct explosive procedures to ensure that the items contained no explosive hazards. There were no hazards present.

DEPARTMENT OF THE ARMY
US ARMY CHEMICAL MATERIALS AGENCY
5183 BLACKHAWK ROAD
ABERDEEN PROVING GROUND MD 21010-5424

AMSCM-D

MEMORANDUM FOR Office of the Installation Garrison Commander, ATTN: IMPA-FWA-ZA, LTC Ronald M. Johnson, 1060 Gaffney Road #6000, Fort Wainwright, Alaska 99703-6000

SUBJECT: Materiel Assessment Review Board Recommendation for Fort Wainwright (WAK) Item

1. The Materiel Assessment Review Board (MARB) met on 11 August 2006 to evaluate non-intrusive assessment data collected on one item recovered at Fort Wainwright, Alaska. The item was assessed with x-ray and Portable Isotopic Neutron Spectroscopy (PINS).

2. Item WAK-06-001, a 100-lb Bomb, M47,was determined to not contain energetics. PINS analysis revealed that the item possibly contains water and is subsequently recommended for Local Disposition.

3. The MARB conference notes are enclosed, and the MARB Materiel Assessment Data Sheet (MADS) are at attachment D of the enclosure. Item-specific data to include weight, x-ray analysis, explosive configuration, and fill are provided in the MADS. Please carefully review the MADS prior to disposal.

4. For more information and to report destruction of the item please call Mr. Russell Fendick, Office of the Project Manager for Non-Stockpile Chemical Materiel at 410-436-8094 (DSN 584-8094), or Mr. Robert Maddox, 22nd Chemical Battalion at 410-436-7193 (DSN 584-7193).

Encl

MICHAEL A. PARKER
Director

Printed on Recycled Paper

AMSCM-D
SUBJECT: Materiel Assessment Review Board Recommendation for Fort Wainwright, AK Item

CF (w/encl):
Commander, US Army Research, Development and Engineering Command (AMSRD-CIH/Mr. Smart), Bldg E5027, 5183 Blackhawk Road, Aberdeen Proving Ground, MD 21010-5424
Commander, US Army Dugway Proving Ground (WDMU-T/Ray Ream), Dugway, UT 84022-5000
Commander, 22nd Chemical Battalion (TE), (AFCB-TE-CO/LTC Terrell), Building E1942, 5183 Blackhawk Road, Aberdeen Proving Ground, MD 21010-5424
Technical Director, US Army Edgewood Chemical Biological Center (AMSRD-ECB-CB-C/Mr. Blades), Building E3942, 5183 Blackhawk Road, Aberdeen Proving Ground, MD 21010-5424
Dr. Gus Caffrey, Idaho National Laboratory, PO Box 1625, Idaho Falls, ID 83415-3855
Mr. Ike Purser, Purser Radiation Safety and Training, Inc., 7330 Judy Drive, Bryans Road, MD 20616

AMSCM-D
SUBJECT: Materiel Assessment Review Board Recommendation for Fort Wainwright, AK Item

CF (w/encl):
Chief, Occupational Health, Risk Management Directorate (Mr. Cushen), Building 4585, 5183 Blackhawk Road, Aberdeen Proving Ground, MD 21010
Director, US Army Chemical Materials Agency (AMSCM-OPS/Mr. Tilton)

CMA CONFERENCE NOTES

MEETING TITLE:	**MATERIEL ASSESSMENT REVIEW BOARD MEETING**
DATE HELD:	11 August 2006; 0900 hours EasternTime
RECORDED BY:	Ms. Karen Liebowitz, Materiel Assessment Review Board Representative
LOCATION:	U.S. Army Technical Escort Unit Building, E1942, Conference Room, Aberdeen Proving Ground-Edgewood Area, Maryland
ATTACHMENT A:	Attendee Log
ATTACHMENT B:	Portable Isotopic Neutron Spectroscopy Quick-Look Assessment Report for Item Found at Fort Wainwright, Alaska
ATTACHMENT C:	Item Recommended for Local Disposition
ATTACHMENT D:	Materiel Assessment Data Sheet for Item Found at Fort Wainwright, Alaska

Materiel Assessment Review Board
Concurrence Sheet

Date **11 August 2006**

22d Chemical Battalion (TE)/
20TH Support Command (CBRNE),
Master EOD Technician

22d Chemical Battalion (TE)/
20TH Support Command (CBRNE),
Master EOD Technician

22d Chemical Battalion (TE)/
20TH Support Command (CBRNE), EOD
Technician or Ordnance Removal
Specialist

INL, Nuclear Scientist

ECBC, Chemical Biological Applications
Division Representative

Level II Certified Radiographer

RDECOM, Command Historian
Representative

CMA, Directorate of Risk Management
Representative

PM NSCM Representative

22nd Chemical Battalion (TEU),
Chairperson

CMA CONFERENCE NOTES

1. INTRODUCTION

LTC Patrick Terrell, Commander, U.S. Army 22nd Chemical Battalion (TE), convened the Materiel Assessment Review Board (MARB) meeting on 11 August 2006 at 0900 hours Eastern Time (ET) to review and make a recommendation for one item recovered at Fort Wainwright, Alaska (WAK).

2. ITEM ASSESSMENT

Item WAK-06-001, a 100-lb bomb M47, was assessed using X-ray and the Portable Isotopic Neutron Spectroscopy (PINS) Chemical Assay System. This item was determined to be unfuzed with no energetics present and contains a 10% liquid fill. PINS analysis revealed that this item contains possible water, and was subsequently recommended for Local Disposition (LD) disposal.

The following table provides a summary of the MARB assessment of the item. (Author's Note: A key for all acronyms and symbols used below follows the table.)

WAK-06-001	Bomb, 100lb, M47	Strong hydrogen, possible water, not CWM	10% liquid fill, unfuzed, no energetics		LD
Acronym Key	CWM= Chemical Warfare Materiel, LD=Local Disposition, WAK-=Fort Wainwright, Alaska				

3. ADJOURNMENT

The meeting adjourned at approximately 0905 hours ET. The date and time of next MARB meeting will be announced.

ATTACHMENT A

ATTACHMENT A

11 August 2006 MARB Meeting
Attendee Log

Name	Organization	Phone
CAFFREY, Dr. Gus	INL	208.526.4024
CIOLFI, Kathy	AMSRD-CIH	410.436.4430
CUSHEN, Alan	CMA Risk Management	410.436.4985
GIESEKING, John	PM NSCM	410.436.3768
HEINLEIN, Shawn	ECBC	410.436.4202
LIEBOWITZ, Karen	SAIC MARB	443.402.9026
LLOYD, Celeste	SAIC MARB	443.402.9120
MADDOX, Robert	22nd Chemical Battalion	410.436.7193
PONCE, 1SG JUAN	22nd Chemical Battalion	410.436.7193
TERRELL, LTC Patrick	22nd Chemical Battalion	410.436.3044

ATTACHMENT B

PINS Quick-Look Report
Ft. Wainwright M47 Aerial Bomb

A.J. Caffrey and E.H. Seabury
Idaho National Laboratory
10 August 2006

1. Item Assayed

A suspect chemical M47 artillery aerial bomb was assessed with the PINS Chemical Assay System at Fort Wainwright, Alaska on 10 August 2006. The bomb overpacked in an airtight stainless steel container during the PINS assessment.

2. Assay methods

The bomb was assayed with a miniPINS system, PINS-21, for 3,000 live seconds with intermediate results saved every 1,000 live seconds. A background spectrum was also recorded for 1,000 live seconds. Mr. Charles Cook and Mr. Steve Cottrillof the U.S. Army 22nd Chemical Battalion (Technical Escort) conducted the PINS measurements.

A.J. Caffrey and E.H. Seabury of the Idaho National Engineering and Environmental Laboratory (INEEL) reviewed the PINS data on 10 August 2006.

3. Data Summary and Conclusions

The energy resolution of the PINS system during the acquisition of the following data was excellent (97%), judged by the peak-to-valley ratio of the 7631 and 7645 keV iron capture gamma-ray peaks.

WAK-006-001, M47 aerial bomb

A strong hydrogen peak at 2223 keV was detected in the PINS spectra from this bomb. No other key elements, including arsenic, boron, chlorine, nitrogen, phosphorus, sulfur, titanium, or zinc were observed in the spectra from this munition.

The hydrogen peak in the PINS spectra from this bomb, plus the absence of all other PINS key elements, suggests water is present. The PINS fill identification is possible water.

The PINS assay results are summarized in the following table:

Ft. Wainwright Aerial Bomb
PINS Assessment 10 Aug 2006

GMID	PINS File	Time	Key Elements	PINS Fill ID
WAK-006-001	P21_10Aug06_03	3,000	Hydrogen	possible water

ATTACHMENT C

ATTACHMENT C

Item Recommended for Local Disposition

The following item was recommended for Local Disposition:

WAK-06-001

ATTACHMENT D

Materiel Assessment Data Sheet

GMID: WAK-06-001 **Conference Date: 08/11/2006**

A. MUNITION DATA

Bomb, 100lb, M47

B. HISTORICAL DATA

When Found: 08/01/2006 **Where Found:** Ft. Wainwright, Alaska

History:

C. PACKAGING INFORMATION

Overpack Type: MRC multiple round con **Packaging Material:** vermiculite

D. ASSESSMENT DATA

D1. RADIOGRAPHIC TECHNIQUES

Date:	*X-Ray ID:*	*X-Ray Techniques:*
08/08/2006	WAK-06-001_A	, KeV: KeV, mA: mA, STFDist:
08/08/2006	WAK-06-001_B	, KeV: KeV, mA: mA, STFDist:
08/08/2006	WAK-06-001_C	, KeV: KeV, mA: mA, STFDist:
08/08/2006	WAK-06-001_D	, KeV: KeV, mA: mA, STFDist:

D2. PINS TECHNIQUES

Date:	*PINS Spectrum Id:*	*PINS Duration:*
08/10/2006	P21_10Aug06_00	1000
08/10/2006	P21_10Aug06_01	1000
08/10/2006	P21_10AUG06_02	2000
08/10/2006		3000

E. MATERIEL ASSESSMENT REVIEW BOARD INTERPRETATION

E1. RADIOGRAPHIC INTERPRETATION

Date:	*MARB X-Ray Interpretation:*
08/11/2006	10% liquid fill, unfuzed, no energetics
	Energetics: No

E2. PINS INTERPRETATION

Date:	*MARB PINS Interpretation*
08/11/2006	Strong hydrogen; possible water, not CWM

F. MATERIEL ASSESSMENT REVIEW BOARD RECOMMENDATION

Date:	*Recommendation:*
08/11/2006	Local Disposition

G. DISPOSITION

Date:	*Recommended Disposition:*	*final_disposal_method:*	*Destroyed:*
08/11/2006	LD		

Materiel Assessment Data Sheet

GMID: WAK-06-001 **Conference Date: 08/11/2006**

Recommended for CWC:

Declared Under CWC: **When:**

ATTACHMENT F2
Approval Memo and Explosives Site Plan

DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF

CEHNC-CX-MM

02 April 2008

MEMORANDUM FOR US Army Corps of Engineers, (CEPOA-PM-C/Mr. Robert Brock), PO Box 6898, Elmendorf AFB, AK 99506-6898

SUBJECT: Explosive Site Plan (ESP) for Remedial Investigation, Former Ladd Air Force Base Communications Site, Ft. Wainwright, AK, April 2008

1. References:

a. ER 385-1-95, Safety and Health Concerns for Munitions and Explosives of Concern (MEC) Projects, March 2007.

b. DOD 6055.9-STD, Ammunition and Explosives Safety Standards, February 2008.

2. This ESP is submitted under the provisions of paragraph C12.5.4, reference 1b.

3. This memorandum provides the Direct Reporting Unit approval for US Army Corps of Engineers participation per reference 1a.

4. If you have any questions, please contact Mr. Hank Hubbard, at (256) 895-1586.

Encl

JOHN A. SIKES
Chief, Military Munitions Division
Environmental and Munitions
Center Of Expertise

CF: w/o encls
Commander, US Army Corps of Engineers, (CESO-SWD/Ms. Blanca Roberts) 441 G Street, NW, Washington, DC 20314-1000
Commander, US Army Corps of Engineers, (CEHNC-CX/EC/EG/ES/Ms. Sandi Zebrowski), 12565 West Center Road, Omaha, NE 68144

Explosive Site Plan

REMEDIAL INVESTIGATION

Former
LADD AIR FORCE BASE
COMMUNICATIONS SITE
FORT WAINWRIGHT, ALASKA

APRIL 2008

Prepared by

JACOBS

for the USACE, Alaska District

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1.0 SITE **1**

2.0 ANTICIPATED DATES **1**

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6.0 SCOPE OF INVESTIGATIVE ACTION **2**

7.0 SAFETY CRITERIA **2**

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Appendix A Figures

Figure 1 - Regional Site Figure

Figure 2 - Explosive Safety Quantity-Distance Arcs for Hazardous Fragment Distance

Figure 3 - Explosive Safety Quantity-Distance Arcs for Maximum Fragment Range-H

Appendix B Fragmentation Calculation Data Sheets

1. **Site:**
   a. Name: Former Communications Site, Former Ladd AFB, Fort Wainwright
   b. State: Alaska
   c. This investigation is being performed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and is part of the overall Remedial Action Process. Subsequent removal responses may be dictated in the future during the remainder of the remedial response process, as determined by action memoranda or other decision documents. If subsequent removal responses are determined to be necessary in the full remedial process, an ESS will be prepared and submitted for review and approval as necessary to support that response.

2. **Anticipated Dates:**
   a. Start: May 2008
   b. Complete: November 2008

3. **Purpose:**
   a. To identify potential MEC areas for future removal responses within the project location.
   b. Clarifies that U.S. Army EOD personnel will perform all explosive ordnance disposal activities at the site.

4. **Site Background and Current Conditions:**
   a. The Former Communications Site was located on the former Ladd Field, which is currently part of Fort Wainwright. Between 1940 and 1959 MEC was mixed with construction debris and other metallic debris and buried as a means of routine disposal.
   b. The site was selected for future military family housing in 2002-2003. The construction of the family housing began in summer of 2004 with ground clearing. Actual construction of the housing area began in April 2005 with the excavation of utility trenches and building foundations. Vertical construction has been completed at the site but additional work remains including the installation of roads, sidewalks, driveways, lighting and landscaping. Construction at the site has been suspended indefinitely because of the presence of MEC.
   c. During construction activities, buried debris was encountered, including MEC. In 2006, intrusive investigations were performed as part of a Preliminary Source Evaluation (PSE) in an attempt to determine the extent and types of debris and

potential chemical contamination. The results of the PSE indicated that further investigations were necessary to fully characterize the area.

d. The U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) has performed extensive geophysical surveys to determine the extent of the buried debris. Based on the results of the geophysical survey and the PSE, the site has been divided into two areas that require additional investigation and are addressed in this ESP.

e. In 2007, the Army tasked Jacobs Engineering to perform intrusive investigations to further characterize the site, gain additional data, and classify the types of debris and MEC present.

f. None of the houses at the site are occupied.

g. An eight feet high chain linked fence with barbed wire at the top surrounds the entire site. Locked gates are located on the northern and southern boundaries of the site. Site access is limited and controlled by the Fort Wainwright Directorate of Public Works personnel.

5. Executing Agencies:

a. U.S. Army Environmental Center

b. U.S. Army Directorate of Public Works

c. U.S. Army Corps of Engineers, Alaska District

6. Scope of Investigative/Characterization action:

a. A surface and subsurface investigative action is required to fully characterize the site to determine the extent and boundaries of contamination, MEC and HTRW, on the site.

b. The selected investigative technique for conducting the investigation for contaminants at this location (identified in Figure 2) in 2008 is a surface sweep and investigation of potential MEC, debris, and other contaminants to a minimum depth of 4 feet.

c. The geophysical survey instrument (EM61) was used to delineate the boundaries of the potentially contaminated areas. A mechanical excavator will be used to assist in the removal of overburden and debris from the pits.

7. Safety Criteria:

a. The potential MEC that has been discovered on site is an unfuzed, unfired M106, 8-inch projectile. This MEC has been identified as discarded military munitions (DMM), not unexploded ordnance (UXO). During the course of this investigative action, if MEC with a greater fragmentation distance is encountered, the MSD

Table 7-1 Minimum Separation Distances (MSD)						
Area		MSD (ft)				
		For Unintentional Detonations		For Intentional Detonations		
Taku Gardens	MEC	Team Separation Distance (K40)	Hazardous Fragment Distance (HFD)	Without Engineering Controls	Using Sandbag Mitigation	Using Water Mitigation Carboys/Pool
	8" HE projectile, M 106[2]	153	530	3,287	NA	NA
Notes: 1. See Appendix A for calculation sheets and documentation of MSD. 2. Denotes MGFD during intrusive operations within the area indicated.						

b. See Table 7-1 for Minimum Separation Distances.

c. Any occupied buildings or public roadways in the MSD areas will be evacuated and/or roadways blocked to prevent non-essential personnel from entering during the conduct of intrusive investigations. The base gas station and Neely Road are within the 530-feet Hazardous Fragmentation Distance of the northern three-fourths of the building-17 investigation site. Therefore, intrusive activities will not be conducted north of the line drawn across this area when Neely Road is open and/or the gas station is open, see Figure-2.

d. The surface materials will be removed in six inch lifts, with magnetometer surveys conducted between lifts, to preclude the probability of encountering MEC with the mechanical equipment. If the metallic debris becomes too dense for magnetometer surveys, a visual survey will be conducted prior to debris removal.

8. Methods of Disposal:

a. The contractor will not maintain any explosives on site or perform any munitions disposal activities. If munitions are found that contain explosives and are considered "acceptable to move" they will be transported, as directed by installation personnel, to the base Ammunition Supply Point (ASP) and staged in explosive storage magazine #2209 that is certified and licensed, until disposed of by U.S. Army EOD personnel.

b. The contractor will not maintain control of any explosive storage magazines.

c. If disposal activities are required, they will be performed by U.S. Army EOD personnel at an established and permitted disposal range within the boundary of Fort Wainwright, as identified by installation personnel.

d. The ESQD arc for intentional detonations when conducting BIP disposal or RSP procedures is 3,287 feet and is depicted in Figure 3. Disposal will be performed by U.S. Army EOD personnel, who may choose to perform a "Render Safe

Procedure” (RSP) instead of a BIP, per their TM 60 Series EOD publications. The contractor's UXO and site personnel will assist the EOD personnel as necessary to construct engineering controls they prescribe as necessary to suppress the noise, blast, distribution of fragments, and protect the public. It is not anticipated that demolition activities will take place within the project site, due to the fact that the MEC items discovered to date have not been fuzed or fired and have been determined acceptable-to-move and have been relocated by EOD personnel to a storage area identified in paragraph 8a, this document.

9. Maps:

Figure 1 shows the regional location of the former communications site within the boundary of Fort Wainwright, Alaska. Figure 2 depicts the Hazardous Fragmentation Distance around each investigation area. Figure 3 identifies the Maximum Fragment Range - Horizontal (MFR-H) distance each area for the munition with the greatest fragmentation distance (MGFD).

APPENDIX A
Figures

Fairbanks, Alaska

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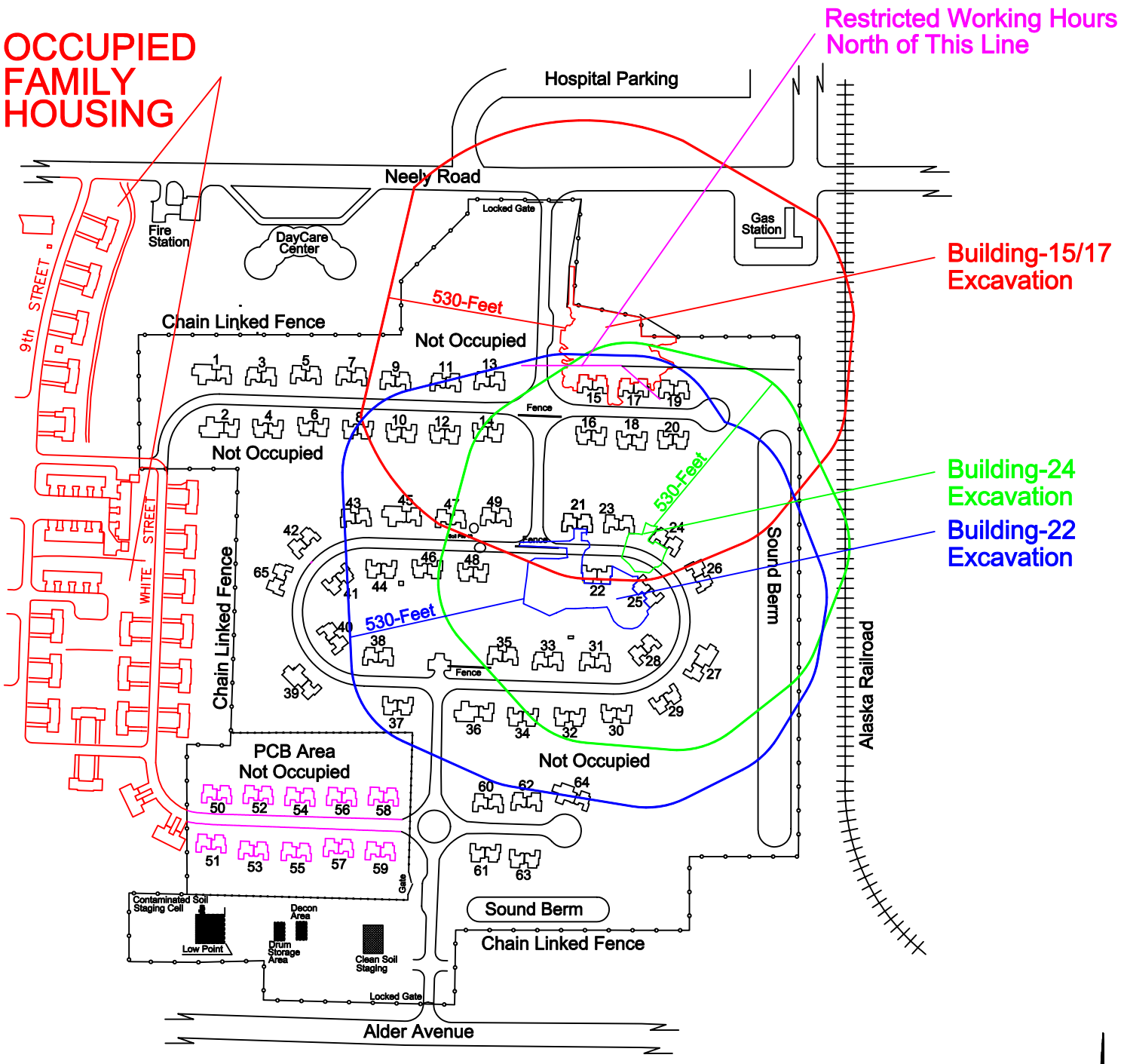
FIGURE-2
ESQD ARCS

FORMER COMMUNICATIONS SITE
FORMER LADD FIELD
FORT WAINWRIGHT, ALASKA
CANTONMENT AREA



Jacobs Engineering, Inc.
125 Broadway Avenue
Oak Ridge, TN 37830
Phone: 865-2204939
Fax: 865-220-4848

Date Drawn: 18 FEB 2008
Drawn BY: DJF Rev: 00

0 50 100 250 500 1000
Scale in Feet

N

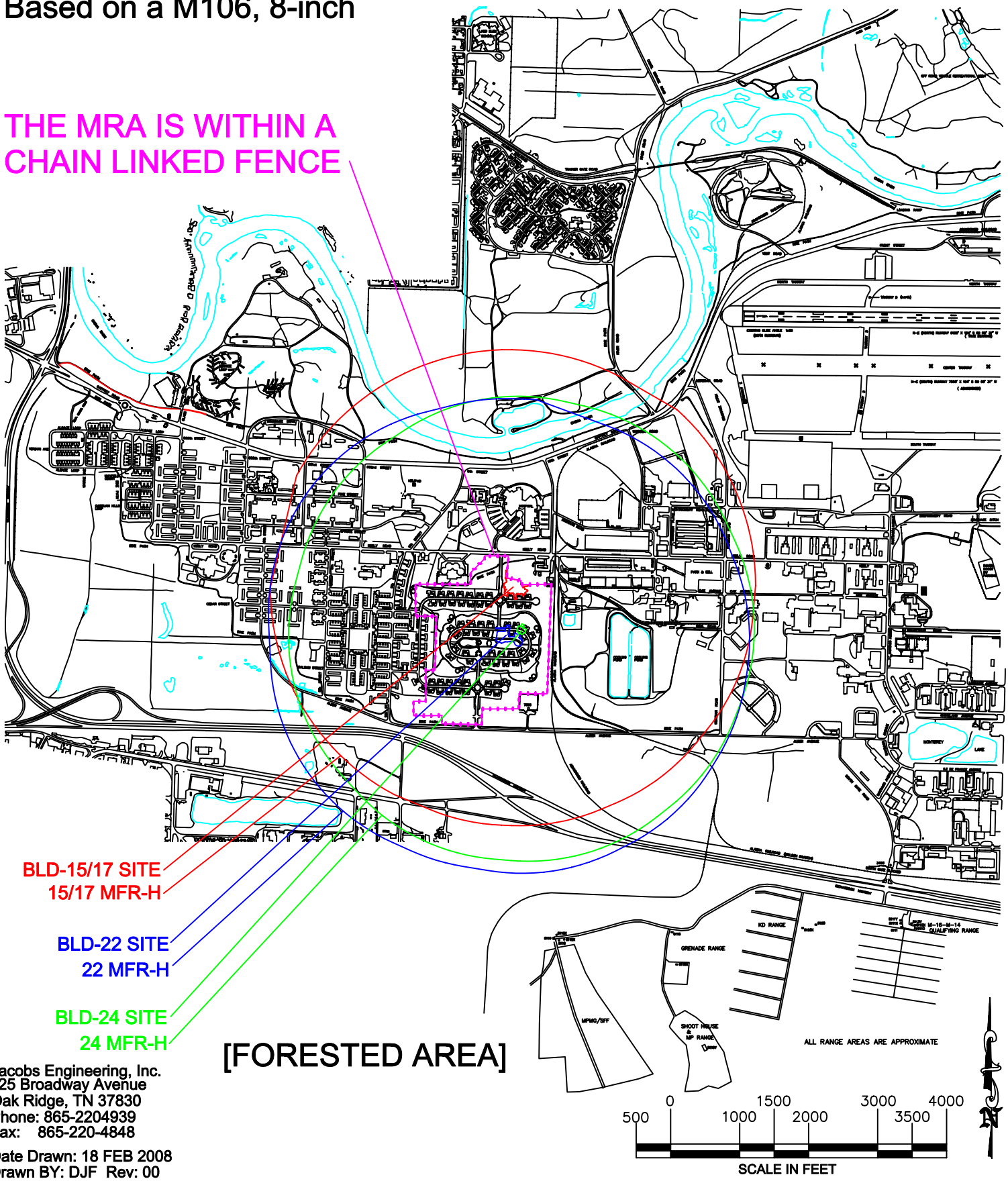
FIGURE-3
MFR-H

FORMER COMMUNICATIONS SITE
FORMER LADD FIELD
FORT WAINWRIGHT, AK
NORTHWESTERN AREA OF BASE

The MFR-H is 3287-feet
Based on a M106, 8-inch

See Figure-2 for more MRA Detail

THE MRA IS WITHIN A
CHAIN LINKED FENCE



Jacobs Engineering, Inc.
125 Broadway Avenue
Oak Ridge, TN 37830
Phone: 865-2204939
Fax: 865-220-4848

Date Drawn: 18 FEB 2008
Drawn BY: DJF Rev: 00

APPENDIX B
Fragmentation Calculation Sheets

FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	HE Rounds	DODIC:	D680
Munition:	8" M106	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/30/2004
Primary Database Category:	projectile	Individual Last Updated Record:	Crull
Secondary Database Category:	8 in	Date Record Retired:	
Munition Case Classification:	Robust		

Munition Information and Fragmentation Characteristics

Explosive Type:	Comp B
Explosive Weight (lb):	38.80000
Diameter (in):	8.0000
Max Fragment Weight (lb):	1.693113
Critical Fragment Velocity (fps):	3091

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	530
MFR-V [Vertical Range of Max Weight Fragment] (ft):	2440
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	3287

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	153
Inhabited Building Distance (09 psi), K50 Distance:	191
Intentional MSD (0065 psi), K328 Distance:	1254

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	9.48
Mild Steel:	1.70
Hard Steel:	1.40
Aluminum:	3.44
LEXAN:	8.02
Plexi-glass:	6.45
Bullet Resist Glass:	5.74

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	1.693113
Critical Fragment Velocity (fps)SB:	3091
Kinetic Energy 106 (lb-ft2/s2)SB:	8.0882
Required Wall Roof Sandbag Thickness (in)SB:	NA
Expected Maximum Sandbag Throw Distance (ft)SB:	NA
Minimum Separation Distance (ft)SB:	NA

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	1.693113
Critical Fragment Velocity (fps)W:	3091
Kinetic Energy 106 (lb-ft2/s2)W:	8.0882
Water Containment System:	NA
Minimum Separation Distance (ft)W:	NA

◄ ► Print This Form Close Form

APPENDIX G

Laboratory Data Deliverables

Click to open:

Disk 1 2007.pdf

Disk 2 2008.pdf

Disk 3 2008.pdf

Disk 4 2008.pdf

Disk 5 2009.pdf

Disk 6 2008-09.pdf

APPENDIX H

Final GORE™ Reports

(for 2008 and 2009 only; GORE™ report not completed in 2007)

ATTACHMENT H-1

Final GORE™ Report, 9 September 2008

W. L. GORE & ASSOCIATES, INC.

100 CHESAPEAKE BLVD., P.O. BOX 10 • ELKTON, MARYLAND 21922-0010
PHONE: 410.392.7600 • FAX: 410.506.4780

GORE™ EXPLORATION SURVEY

GORE™ ENVIRONMENTAL SURVEY

GORE™ Surveys
Final Report

T.O. 17, Taku Gardens
Ft. Wainwright, AK
Gore Production Order #13692370

September 9, 2008

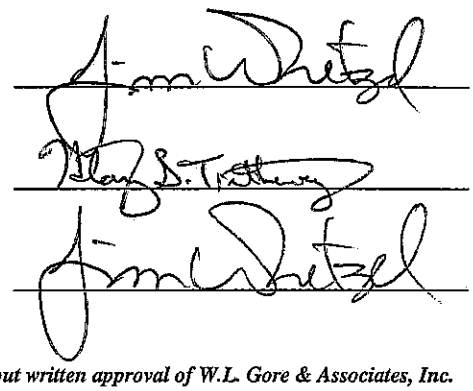
Prepared For:
Jacobs Engineering Group, Inc.
4300 B Street
Suite 600
Anchorage, AK, 99503

W.L. Gore & Associates, Inc.

Written/Submitted by:
Jim E. Whetzel, Project Manager

Reviewed/Approved by:
Hilary G. Trethewey, Project Manager

Analytical Data Reviewed by:
Jim E. Whetzel, Chemist



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GORE™ Surveys - Final Report

REPORT DATE: 09/09/2008 **AUTHOR:** JW

SITE INFORMATION

Site Reference: T.O. 17, Taku Gardens, Ft. Wainwright, AK
Gore Production Order Number: 13692370 **Gore Site Code:** EJO

FIELD PROCEDURES

 # Modules shipped: 31
Installation Date(s): 6/14/08
 # Modules Installed: 28
Field work performed by: Jacobs

Retrieval date(s): 6/19/08
 # Modules Retrieved: 28
 # Modules Lost in Field: 0
 # Modules Not Returned: 0

Exposure Time: 5 **[days]**
 # Trip Blanks Returned: 1
 # Unused Modules Returned: 2

Date/Time Received by Gore: 6/26/2008 1:26 PM By: DY
Chain of Custody Form attached: Yes
Chain of Custody discrepancies: None
Comments:
Module 571366 was identified as a trip blank.
Modules 571367 and -368 were returned unused.

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GORE™ Surveys - Final Report

ANALYTICAL PROCEDURES

W.L. Gore & Associates´ Screening Module Laboratory operates under the guidelines of its Quality Assurance Manual, Operating Procedures and Methods. The quality assurance program is consistent with Good Laboratory Practices (GLP) and ISO Guide 25, "General Requirements for the Competence of Calibration and Testing Laboratories", third edition, 1990.

Instrumentation consists of state of the art gas chromatographs equipped with mass selective detectors, coupled with automated thermal desorption units. Sample preparation simply involves cutting the tip off the bottom of the sample module and transferring one or more exposed sorbent containers (sorbers, each containing engineered adsorbents) to a thermal desorption tube for analysis. Sorbers remain clean and protected from dirt, soil, and ground water by the insertion/retrieval cord, and require no further sample preparation.

Analytical Method Quality Assurance:
The analytical method employed is a modified EPA method 8260/8270. Before each run sequence, two instrument blanks, a sorber containing 5µg BFB (Bromofluorobenzene), and a method blank are analyzed. The BFB mass spectra must meet the criteria set forth in the method before samples can be analyzed. A method blank and a sorber containing BFB are also analyzed after every 30 samples and/or trip blanks. Standards containing the selected target compounds at five calibration levels are analyzed at the beginning of each run. The criterion for each target compound is less than 25% RSD (relative standard deviation). If this criterion is not met for any target compound, the analyst has the option of generating second- or third-order standard curves, as appropriate. A second-source reference standard, at a level of 10µg per target compound, is analyzed after every ten samples and/or trip blanks, and at the end of the run sequence. Positive identification of target compounds is determined by 1) the presence of the target ion and at least two secondary ions; 2) retention time versus reference standard; and, 3) the analyst's judgment.

NOTE: All data have been archived. Any replicate sorbers not used in the initial analysis will be discarded fifteen (15) days from the date of analysis.

Laboratory analysis: thermal desorption, gas chromatography, mass selective detection
Instrument ID: # 5 **Chemist:** DC/DD/JW
Compounds/mixtures requested: A7
Deviations from Standard Method: Reference standard recoveries were greater than 150% for the following compounds: diisopropyl methylphosphonate, 2-chloroacetophenone, and 4-chloroacetophenone.
Comments: Soil vapor analytes and abbreviations are tabulated in the Data Table Key (page 6).

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GORE™ Surveys - Final Report

DATA TABULATION

 # CONTOUR MAPS ENCLOSED: None

NOTE: All data values presented in Appendix A represent masses of compound(s) desorbed from the GORE™ Modules received and analyzed by W.L. Gore & Associates, Inc., as identified in the Chain of Custody (Appendix A). The measurement traceability and instrument performance are reproducible and accurate for the measurement process documented. Semi-quantitation of the compound mass is based on a five-level standard calibration.

General Comments:

- This survey reports soil gas mass levels present in the vapor phase. Vapors are subject to a variety of attenuation factors during migration away from the source concentration to the module. Thus, mass levels reported from the module will often be less than concentrations reported in soil and groundwater matrix data. In most instances, the soil gas masses reported on the modules compare favorably with concentrations reported in the soil or groundwater (e.g., where soil gas levels are reported at greater levels relative to other sampled locations on the site, matrix data should reveal the same pattern, and vice versa). However, due to a variety of factors, a perfect comparison between matrix data and soil gas levels can rarely be achieved.
- Soil gas signals reported by this method cannot be identified specifically to soil adsorbed, groundwater, and/or free-product contamination. The soil gas signal reported from each module can evolve from all of these sources. Differentiation between soil and groundwater contamination can only be achieved with prior knowledge of the site history (i.e., the site is known to have groundwater contamination only).
- QA/QC trip blank modules were provided to document potential exposures that were not part of the soil gas signal of interest (i.e., impact during module shipment, installation and retrieval, and storage). The trip blanks are identically manufactured and packaged soil gas modules to those modules placed in the subsurface. However, the trip blanks remain unopened during all phases of the soil gas survey. Levels reported on the trip blanks may indicate potential impact to modules other than the contaminant source of interest.

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- Unresolved peak envelopes (UPEs) are represented as a series of compound peaks clustered together around a central gas chromatograph elution time in the total ion chromatogram. Typically, UPEs are indicative of complex fluid mixtures that are present in the subsurface. UPEs observed early in the chromatogram are considered to indicate the presence of more volatile fluids, while UPEs observed later in the chromatogram may indicate the presence of less volatile fluids. Multiple UPEs may indicate the presence of multiple complex fluids.
- Stacked total ion chromatograms (TICs) are included in Appendix A. The six-digit serial number of each module is incorporated into the TIC identification (e.g.: 123456S.D represents module #123456).

Project Specific Comments:

- No target compounds were detected on the trip blanks and/or the method blanks. Thus, target analyte levels reported for the field-installed modules that exceed trip and method blank levels, and the analyte method detection limit, are more likely to have originated from on-site sources.
- No target compounds were detected in the field installed modules.

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APPENDIX A:

1. CHAIN OF CUSTODY AND INSTALLATION/ RETRIEVAL LOG
2. DATA TABLE
3. STACKED TOTAL ION CHROMATOGRAMS

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GORE-SORBER® Screening Survey Chain of Custody

For W.L. Gore & Associates use only
Production Order # 13692370

W. L. Gore & Associates, Inc., Survey Products Group
100 Chesapeake Boulevard • Elkton, Maryland 21921 • Tel: (410) 392-7600 • Fax (410) 506-4780

Instructions: Customer must complete ALL shaded cells

Customer Name: JACOBS ENGINEERING GROUP INC	Site Name: T O 17 TAKU GARDENS FT WAINWRIGHT
Address: 4300B STREET SUITE 600	Site Address: AK
ANCHORAGE AK 99503	
USA	Project Manager: ANGELA ELMORE
Phone: 907 356 1280	Customer Project No.: 05 F50 701
FAX:	Customer P.O. #: 05 F50701 P 008 0062 Quote #:

Serial # of Modules Shipped		# of Modules for Installation 28	# of Trip Blanks ~~3~~ 1 89
# 571338 - # 571368	# - #	Total Modules Shipped: 31	Pieces
# - #	# - #	Total Modules Received: 31	Pieces
# - #	# - #	Total Modules Installed: 28	Pieces
# - #	# - #	Serial # of Trip Blanks (*Client Decides*)	#
# - #	# - #	# 571366	# #
# - #	# - #	# ~~571367~~ 89	# #
# - #	# - #	# ~~571368~~ 89	# #
# - #	# - #	#	# #
# - #	# - #	#	# #
# - #	# - #	#	# #
# - #	# - #	#	# #

Prepared By: Clarence Whitmore
Verified By: Darlene Gallowaday

Installation Performed By:	Installation Method(s) (*circle those that apply*):
Name (*please print*): Sarah Belway	Slide Hammer (Hammer Drill) Auger
Company/Affiliation: JACOBS	Other: 9:30CO
Installation Start Date and Time: 6 / 14 / 08	: ~~10:22~~ (AM) PM
Installation Complete Date and Time: 6 / 14 / 08	: 10:22 (AM) PM
Retrieval Performed By:	Total Modules Retrieved: 31 29 Pieces
Name (*please print*): Braden Galloway	Total Modules Lost in Field: 0 Pieces
Company/Affiliation:1 JACOBS	Total Unused Modules Returned: 3 2 Pieces
Retrieval Start Date and Time: 6 / 19 / 08	: 1:50 AM (PM)
Retrieval Complete Date and Time: 6 / 19 / 08	: 2:49 AM (PM)

Relinquished By: Clarence Whitmore Affiliation: W.L. Gore & Associates, Inc.	Date: 6/4/08	Time: 11:30	Received By: JACOBS (DAVE FRANDSEN) Affiliation: Jacobs	Date: 6/5/08	Time: 1400
Relinquished By: Bill Stone Affiliation: JACOBS	Date: 6/19/08	Time: 15:36	Received By: Affiliation:	Date:	Time:
Relinquished By: Affiliation:	Date:	Time:	Received By: Darlene Gallowaday Affiliation: W.L. Gore & Associates, Inc.	Date: 6/26/08	Time: 1:30

GORE-SORBER ® Screening Survey is a registered service mark of W.L. Gore & Associates, Inc.

GORE-SORBER® Screening Survey Installation and Retrieval Log Page 1 of 1 pages				Jacobs Engineering Taku Gardens Fort Wainwright, Alaska					
Line #	MODULE #	INSTALLATION DATE/TIME 6-14-08 AM	RETRIEVAL DATE/TIME 6/19/08	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate)			MODULE IN WATER (check one)		COMMENTS
				LPH	ODOR	NONE	YES	NO	
28	571338	10:22	1449			✓		✓	slight breeze
27	571339	10:20	1447			✓		✓	
26	571340	10:18	1445			✓		✓	
25	571341	10:16	1442			✓		✓	
24	571342	10:15	1440			✓		✓	
23	571343	10:14	1438			✓		✓	
22	571344	10:12	1435			✓		✓	
21	571345	10:10	1433			✓		✓	
20	571346	10:09	1430			✓		✓	
14	571347	9:58	1416			✓		✓	
15	571348	10:00	1417			✓		✓	
16	571349	10:04	1419			✓		✓	
17	571350	10:05	1422			✓		✓	
18	571351	10:06	1425			✓		✓	
19	571352	10:08	1427			✓		✓	
13	571353	9:56	1414			✓		✓	
12	571354	9:54	1413			✓		✓	
11	571355	9:52	1411			✓		✓	
10	571356	9:50	1409			✓		✓	
9	571357	9:49	1407			✓		✓	
8	571358	9:47	1405			✓		✓	
7	571359	9:45	1403			✓		-	
1	571360	9:30	1350			✓		✓	
2	571361	9:33	1352			✓		✓	
3	571362	9:36	1354			✓		✓	
4	571363	9:39	1357			✓		✓	
5	571364	9:41	1359			✓		✓	
6	571365	9:43	1401			✓		✓	

GORE(TM) SURVEYS ANALYTICAL RESULTS
JACOBS ENGINEERING GROUP, INC., ANCHORAGE, AK
CUSTOM TARGET COMPOUND LIST - CHEMICAL AGENT BREAKDOWN PRODUCTS (A7)
TAKU GARDENS, FT. WAINWRIGHT, AK
SITE EJO - PRODUCTION ORDER #13692370

DATE ANALYZED	SAMPLE NAME	Dimethyl disulfide, ug	Dimethyl methylphosphonate, ug	1,4-Thioxane, ug	Diisopropylmethylphosphonate, ug	1,4-Dithiane, ug	Thiodiglycol, ug	Benzothiazole, ug
	MDL=	0.03	0.32	0.03	0.24	0.04	0.44	0.04
07-08-08	571338	nd	nd	nd	nd	nd	nd	nd
07-08-08	571339	nd	nd	nd	nd	nd	nd	nd
07-08-08	571340	nd	nd	nd	nd	nd	nd	nd
07-08-08	571341	nd	nd	nd	nd	nd	nd	nd
07-08-08	571342	nd	nd	nd	nd	nd	nd	nd
07-08-08	571343	nd	nd	nd	nd	nd	nd	nd
07-08-08	571344	nd	nd	nd	nd	nd	nd	nd
07-08-08	571345	nd	nd	nd	nd	nd	nd	nd
07-08-08	571346	nd	nd	nd	nd	nd	nd	nd
07-08-08	571347	nd	nd	nd	nd	nd	nd	nd
07-08-08	571348	nd	nd	nd	nd	nd	nd	nd
07-07-08	571349	nd	nd	nd	nd	nd	nd	nd
07-08-08	571350	nd	nd	nd	nd	nd	nd	nd
07-08-08	571351	nd	nd	nd	nd	nd	nd	nd
07-08-08	571352	nd	nd	nd	nd	nd	nd	nd
07-08-08	571353	nd	nd	nd	nd	nd	nd	nd
07-08-08	571354	nd	nd	nd	nd	nd	nd	nd
07-08-08	571355	nd	nd	nd	nd	nd	nd	nd
07-08-08	571356	nd	nd	nd	nd	nd	nd	nd
07-08-08	571357	nd	nd	nd	nd	nd	nd	nd
07-08-08	571358	nd	nd	nd	nd	nd	nd	nd
07-08-08	571359	nd	nd	nd	nd	nd	nd	nd
07-08-08	571360	nd	nd	nd	nd	nd	nd	nd
07-07-08	571361	nd	nd	nd	nd	nd	nd	nd
07-07-08	571362	nd	nd	nd	nd	nd	nd	nd
07-08-08	571363	nd	nd	nd	nd	nd	nd	nd
07-07-08	571364	nd	nd	nd	nd	nd	nd	nd
07-08-08	571365	nd	nd	nd	nd	nd	nd	nd
07-08-08	571366	nd	nd	nd	nd	nd	nd	nd
07-07-08	method blank	nd	nd	nd	nd	nd	nd	nd
07-08-08	method blank	nd	nd	nd	nd	nd	nd	nd
	Maximum	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Standard Dev.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00

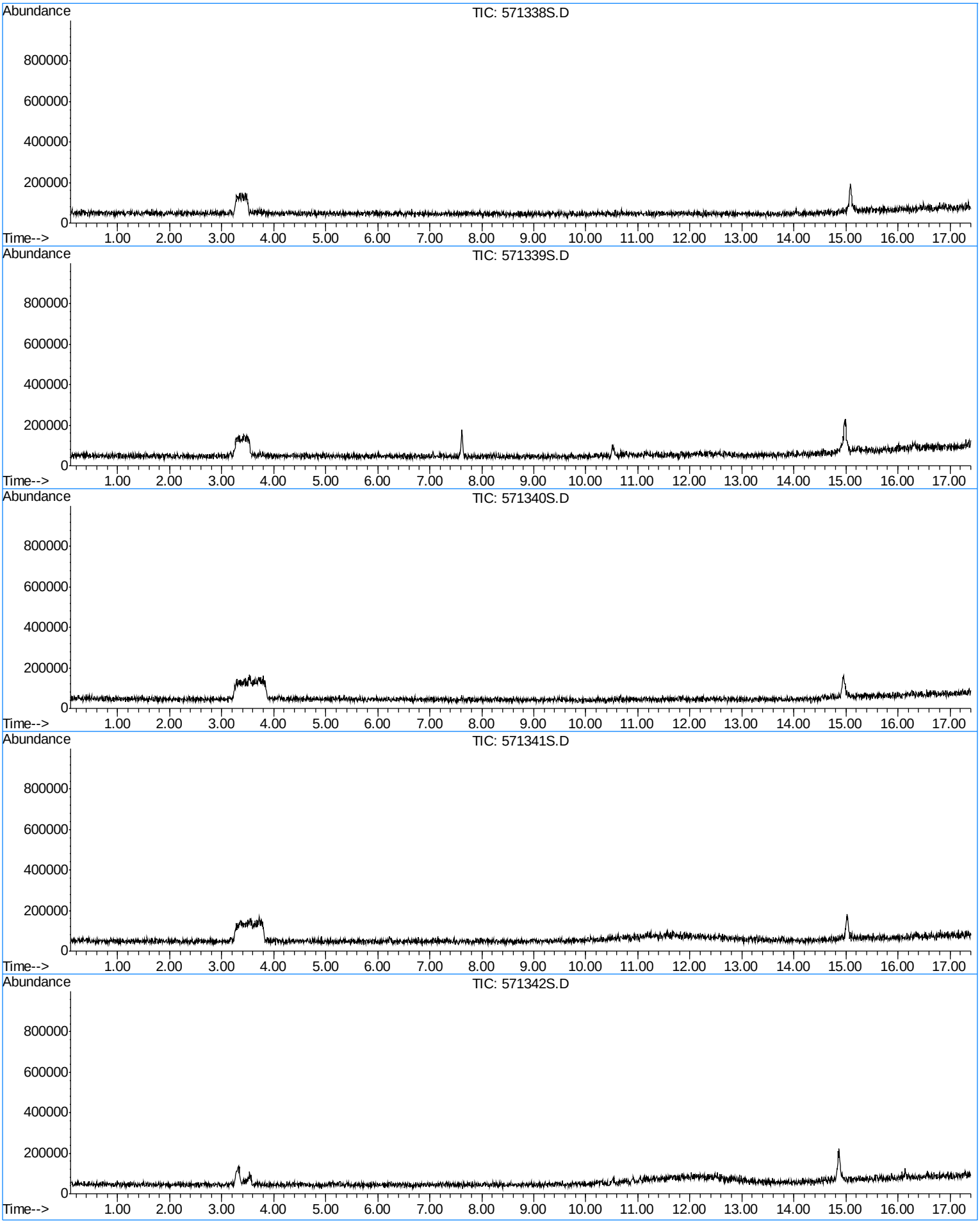
No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

GORE(TM) SURVEYS ANALYTICAL RESULTS
JACOBS ENGINEERING GROUP, INC., ANCHORAGE, AK
CUSTOM TARGET COMPOUND LIST - CHEMICAL AGENT BREAKDOWN PRODUCTS (A7)
TAKU GARDENS, FT. WAINWRIGHT, AK
SITE EJO - PRODUCTION ORDER #13692370

SAMPLE NAME	4-Chloroacetophenone, ug	p-Chlorophenylmethylsulfide, ug	2-Chloroacetophenone, ug	p-Chlorophenylmethylsulfoxide, ug	p-Chlorophenylmethylsulfone, ug
MDL=	0.08	0.02	0.03	0.22	0.05
571338	nd	nd	nd	nd	nd
571339	nd	nd	nd	nd	nd
571340	nd	nd	nd	nd	nd
571341	nd	nd	nd	nd	nd
571342	nd	nd	nd	nd	nd
571343	nd	nd	nd	nd	nd
571344	nd	nd	nd	nd	nd
571345	nd	nd	nd	nd	nd
571346	nd	nd	nd	nd	nd
571347	nd	nd	nd	nd	nd
571348	nd	nd	nd	nd	nd
571349	nd	nd	nd	nd	nd
571350	nd	nd	nd	nd	nd
571351	nd	nd	nd	nd	nd
571352	nd	nd	nd	nd	nd
571353	nd	nd	nd	nd	nd
571354	nd	nd	nd	nd	nd
571355	nd	nd	nd	nd	nd
571356	nd	nd	nd	nd	nd
571357	nd	nd	nd	nd	nd
571358	nd	nd	nd	nd	nd
571359	nd	nd	nd	nd	nd
571360	nd	nd	nd	nd	nd
571361	nd	nd	nd	nd	nd
571362	nd	nd	nd	nd	nd
571363	nd	nd	nd	nd	nd
571364	nd	nd	nd	nd	nd
571365	nd	nd	nd	nd	nd
571366	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd
method blank	nd	nd	nd	nd	nd
Maximum	0.00	0.00	0.00	0.00	0.00
Standard Dev.	0.00	0.00	0.00	0.00	0.00
Mean	0.00	0.00	0.00	0.00	0.00

No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

TIC - SITE EJO - PRODUCTION ORDER #13692370
In Numerical Order



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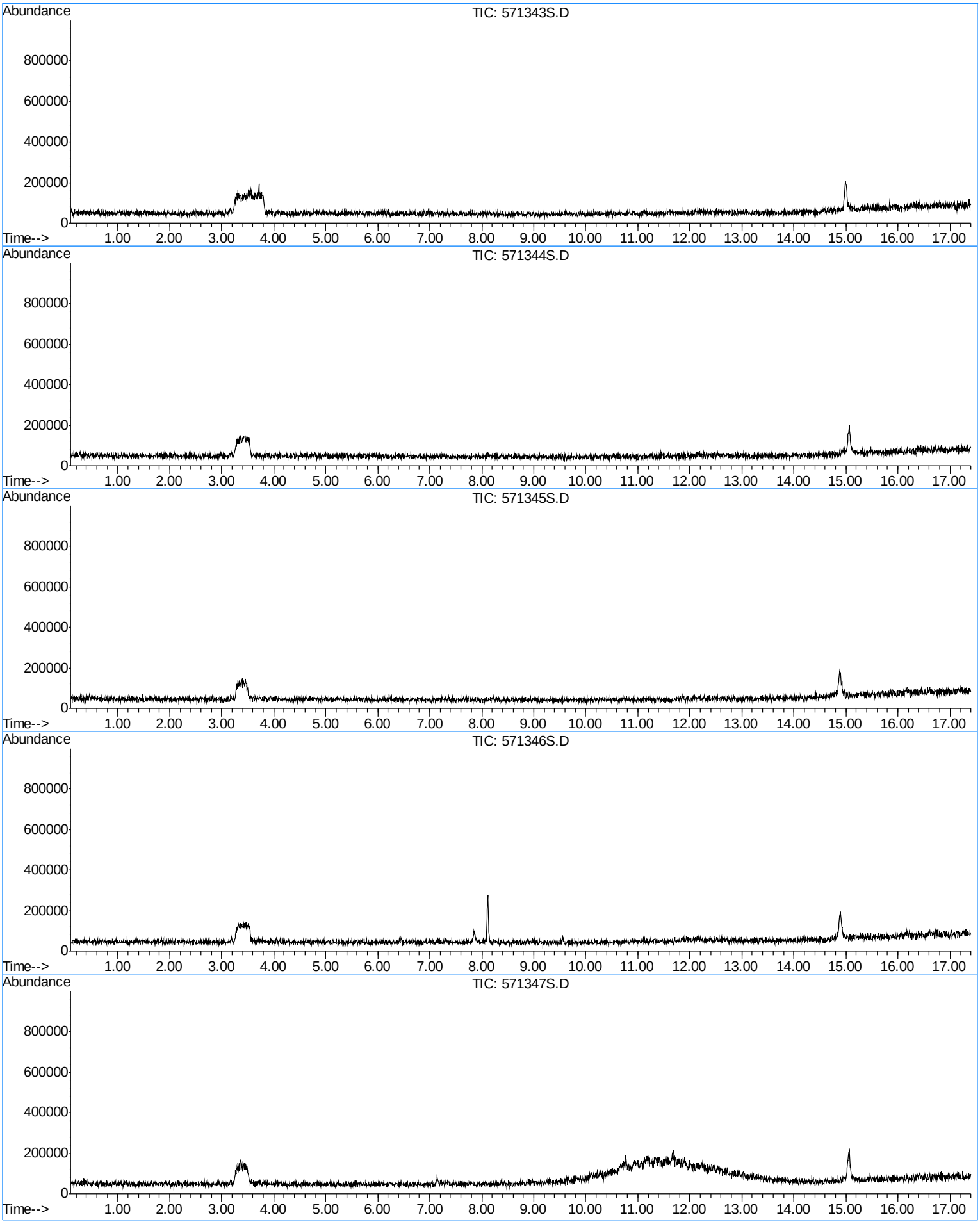
In Numerical Order



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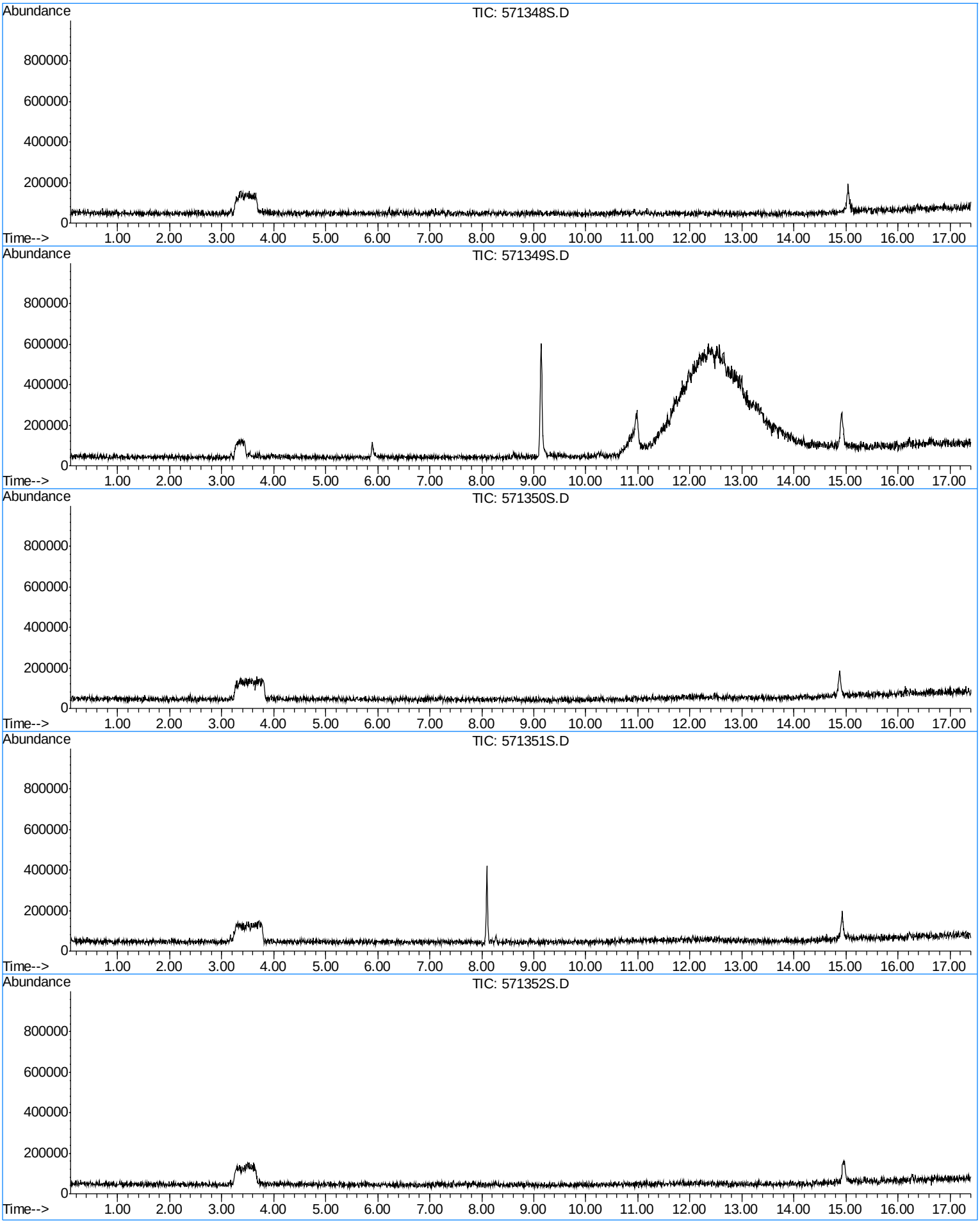
In Numerical Order



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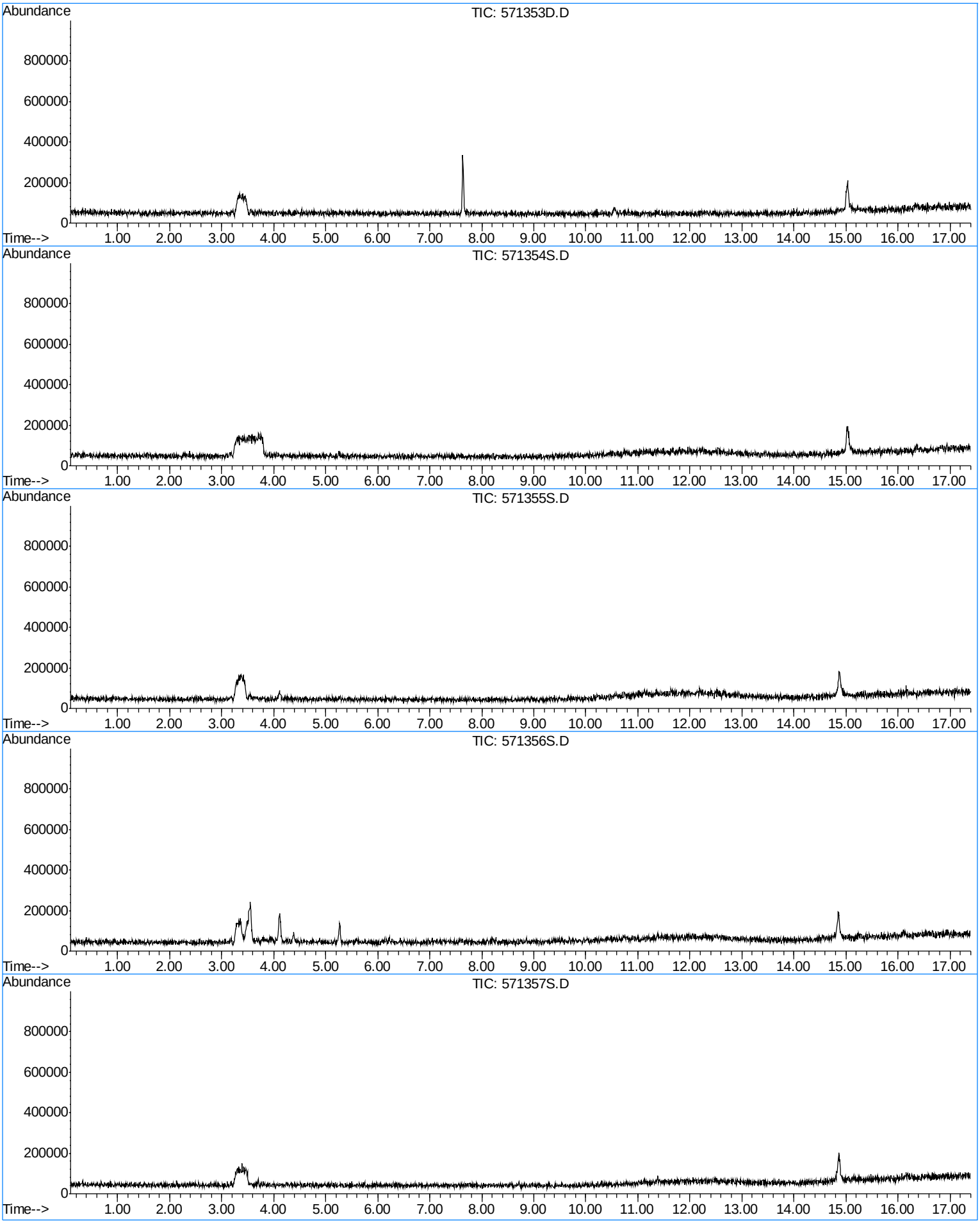
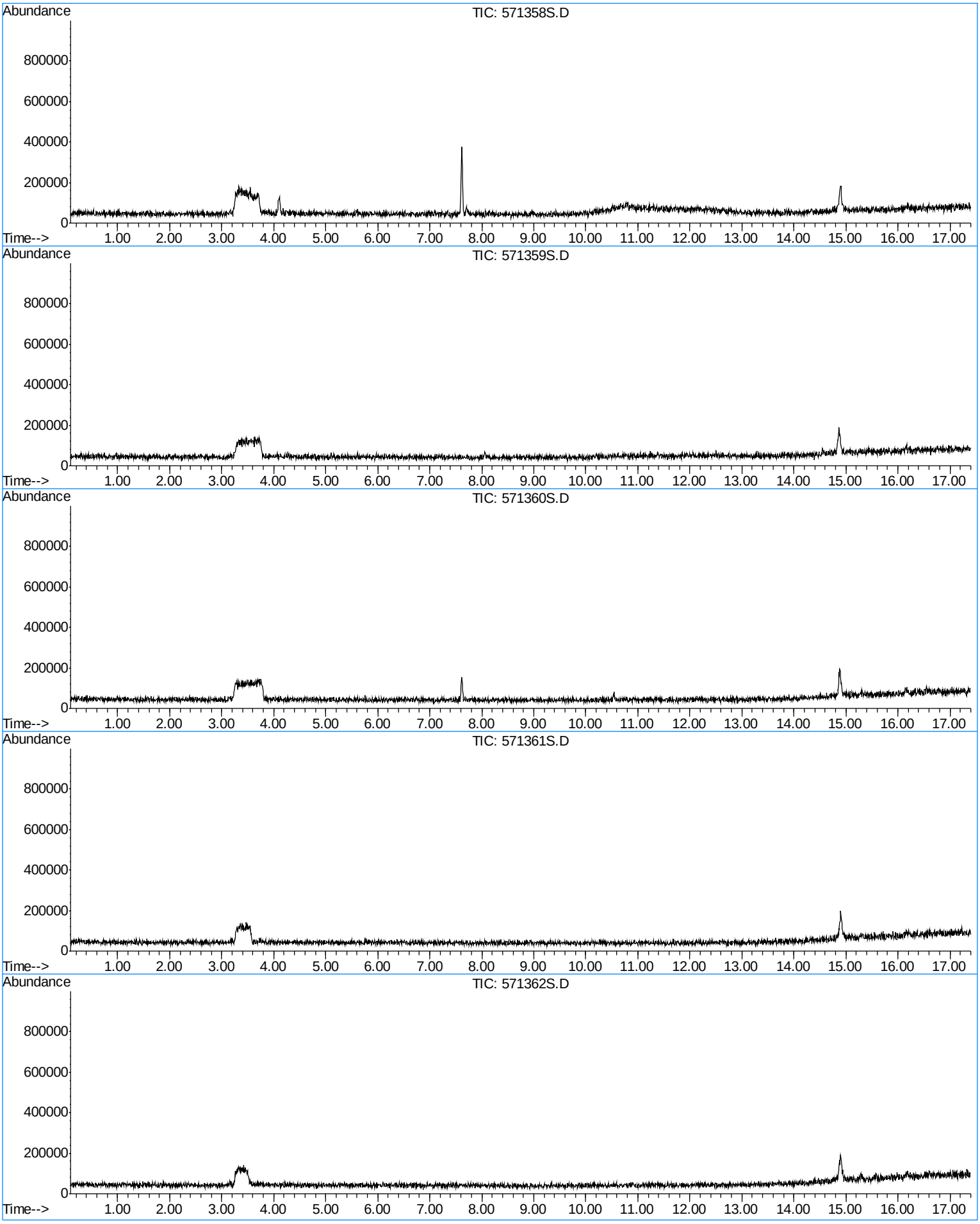
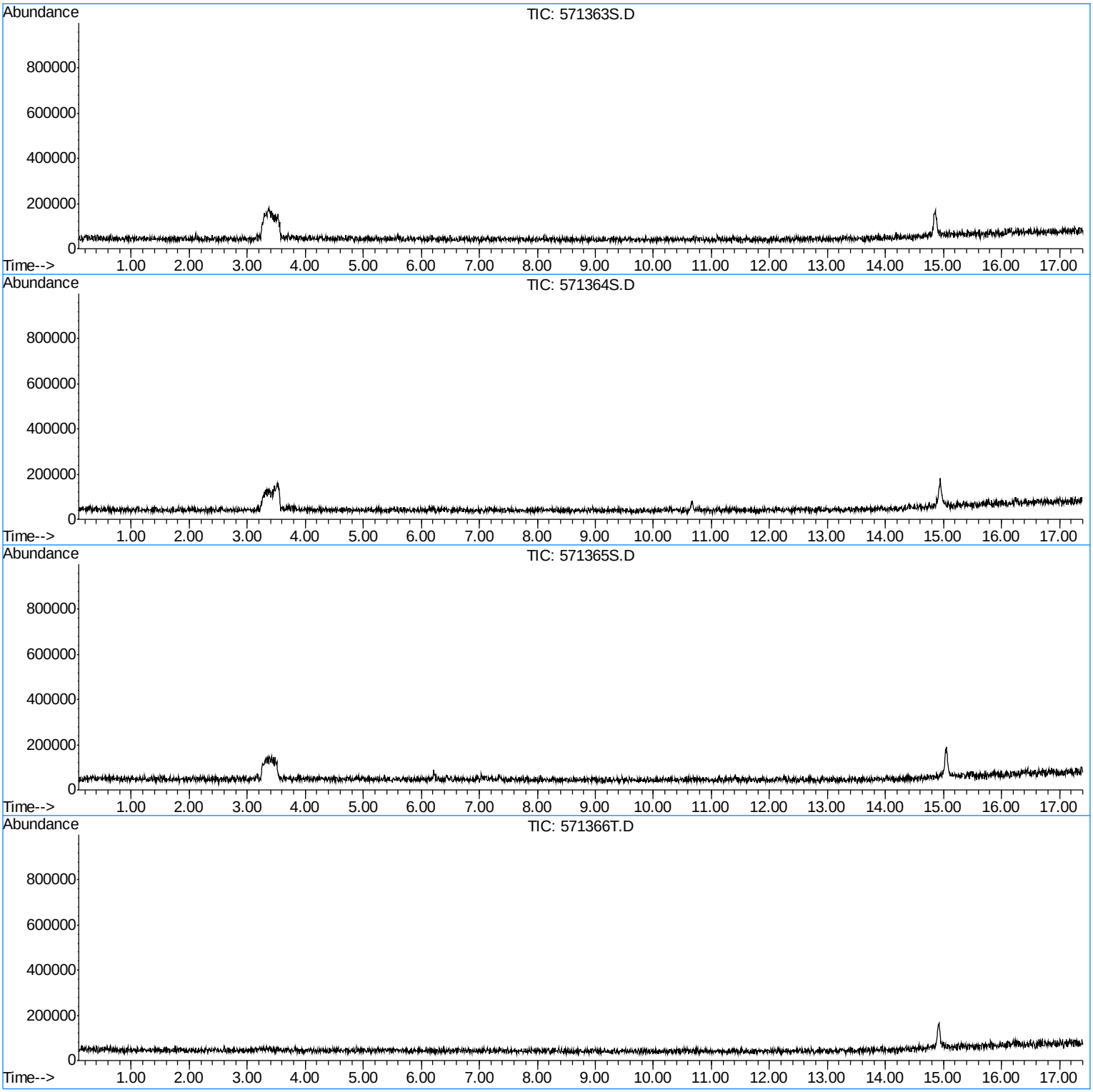
In Numerical Order



TIC - SITE EJO - PRODUCTION ORDER #13692370
In Numerical Order



TIC - SITE EJO - PRODUCTION ORDER #13692370
In Numerical Order



ATTACHMENT H-2

Final GORE™ Report 24 November 2009

GORE™ Surveys

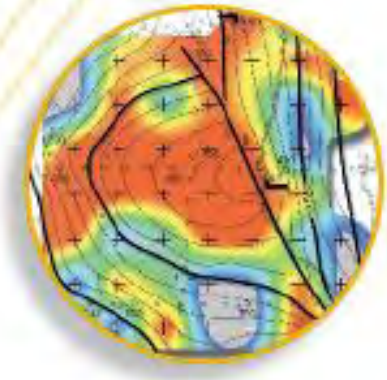
Final Report

Project:	Taku Gardens
Gore Order Number:	20212168
Date Prepared:	November 24, 2009 Revised December 7, 2009
Prepared for:	Jacobs Engineering Group, Inc. 4300 B Street Suite 600 Anchorage, AK 99503

Written/Submitted by
Hilary G. Trethewey
Project Manager

Reviewed/Approved by
James E. Whetzel
Project Manager

Analytical Data Reviewed by
Don D'Apolito
Chemist



W.L. Gore & Associates, Inc.
Survey Products Group

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GORE™ Surveys - Final Report

REPORT DATE: 11/24/2009 **AUTHOR:** HGT
REVISED: 12/7/2009

SITE INFORMATION

Site Reference: Taku Gardens, Fairbanks, AK
Gore Production Order Number: 20212168 **Gore Site Code:** FCL

FIELD PROCEDURES

 # Modules shipped: 86
Installation Date(s): 10/20/2009
 # Modules Installed: 67
Field work performed by: Jacobs Engineering Group, Inc.

Retrieval date(s): 10/27/2009 **Exposure Time:** 7 **[days]**
 # Modules Retrieved: 67 **# Trip Blanks Returned:** 6
 # Modules Lost in Field: 0 **# Unused Modules Returned:** 13
 # Modules Not Returned: 0

Date/Time Received by Gore: 10/30/2009 8:45 AM By: DY
Chain of Custody Form attached: Yes
Chain of Custody discrepancies: None
Comments:
Modules 610986 to -987, and 610989 to -992 were identified as trip blanks.
Modules 610988, 610993, 610994, 610995, 610996, 610997, 610998, 610999, 611000, 611001, 611002, 611003 and 610340 were returned unused.
Jacobs Engineering used its own installation and retrieval log.
Individual tamper seals were affixed to the sample vials prior to the return shipment, and were found in-tact during sampler check-in.

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GORE™ Surveys - Final Report

ANALYTICAL PROCEDURES

W.L. Gore & Associates´ Screening Module Laboratory operates under the guidelines of its Quality Assurance Manual, Operating Procedures and Methods. The quality assurance program is consistent with Good Laboratory Practices (GLP) and ISO Guide 25, "General Requirements for the Competence of Calibration and Testing Laboratories", third edition, 1990.

Instrumentation consists of state of the art gas chromatographs equipped with mass selective detectors, coupled with automated thermal desorption units. Sample preparation simply involves cutting the tip off the bottom of the sample module and transferring one or more exposed sorbent containers (sorbers, each containing engineered adsorbents) to a thermal desorption tube for analysis. Sorbers remain clean and protected from dirt, soil, and ground water by the insertion/retrieval cord, and require no further sample preparation.

Analytical Method Quality Assurance:
The analytical method employed is a modified EPA method 8260/8270. Before each run sequence, two instrument blanks, a sorber containing 5µg BFB (Bromofluorobenzene), and a method blank are analyzed. The BFB mass spectra must meet the criteria set forth in the method before samples can be analyzed. A method blank and a sorber containing BFB are also analyzed after every 30 samples and/or trip blanks. Standards containing the selected target compounds at five calibration levels are analyzed at the beginning of each run. The criterion for each target compound is less than 25% RSD (relative standard deviation). If this criterion is not met for any target compound, the analyst has the option of generating second- or third-order standard curves, as appropriate. A second-source reference standard, at a level of 10µg per target compound, is analyzed after every ten samples and/or trip blanks, and at the end of the run sequence. Positive identification of target compounds is determined by 1) the presence of the target ion and at least two secondary ions; 2) retention time versus reference standard; and, 3) the analyst's judgment.

NOTE: All data have been archived. Any replicate sorbers not used in the initial analysis will be discarded fifteen (15) days from the date of analysis.

Laboratory analysis: thermal desorption, gas chromatography, mass selective detection
Instrument ID: # 11 **Chemist:** FN/DC
Compounds/mixtures requested: A7 - 1,2,3-Trichloropropane
Deviations from Standard Method: See comments below
Comments: Soil vapor analytes and abbreviations are tabulated in the Data Table Key (page 6). The laboratory analyzed a standard which contained 1,2,3-Trichloropropane and was used for identification purposes. The compound was reported as a TIC (tentatively identified compound) and quantified using response factors for 1,1-Dichloroethene. It was found in data review that a calibration curve was not prepared. Upon further review of the data, all samples were non-detect for 1,2,3-Trichloropropane. Since all samples were non-detect for 1,2,3-Trichloropropane it was determined that the data are valid and analyzing the duplicate sorber pair for each sample was not necessary. The laboratory analyzed it's standard target analyte list along with the samples submitted and all QA/QC requirements were met. Tuning check standards, calibration information, reference standards (2nd source), method blanks, and a chromatogram of the standard which contained 1,2,3-Trichloropropane are included in Appendix A. Review of the data shows that the analytical system was in control and performed to meet data quality objectives.

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DATA TABULATION

 # CONTOUR MAPS ENCLOSED: None

NOTE: All data values presented in Appendix A represent masses of compound(s) desorbed from the GORE™ Modules received and analyzed by W.L. Gore & Associates, Inc., as identified in the Chain of Custody (Appendix A). The measurement traceability and instrument performance are reproducible and accurate for the measurement process documented. Semi-quantitation of the compound mass is based on a five-level standard calibration.

General Comments:

- This survey reports soil gas mass levels present in the vapor phase. Vapors are subject to a variety of attenuation factors during migration away from the source concentration to the module. Thus, mass levels reported from the module will often be less than concentrations reported in soil and groundwater matrix data. In most instances, the soil gas masses reported on the modules compare favorably with concentrations reported in the soil or groundwater (e.g., where soil gas levels are reported at greater levels relative to other sampled locations on the site, matrix data should reveal the same pattern, and vice versa). However, due to a variety of factors, a perfect comparison between matrix data and soil gas levels can rarely be achieved.
- Soil gas signals reported by this method cannot be identified specifically to soil adsorbed, groundwater, and/or free-product contamination. The soil gas signal reported from each module can evolve from all of these sources. Differentiation between soil and groundwater contamination can only be achieved with prior knowledge of the site history (i.e., the site is known to have groundwater contamination only).
- QA/QC trip blank modules were provided to document potential exposures that were not part of the soil gas signal of interest (i.e., impact during module shipment, installation and retrieval, and storage). The trip blanks are identically manufactured and packaged soil gas modules to those modules placed in the subsurface. However, the trip blanks remain unopened during all phases of the soil gas survey. Levels reported on the trip blanks may indicate potential impact to modules other than the contaminant source of interest.

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- Unresolved peak envelopes (UPEs) are represented as a series of compound peaks clustered together around a central gas chromatograph elution time in the total ion chromatogram. Typically, UPEs are indicative of complex fluid mixtures that are present in the subsurface. UPEs observed early in the chromatogram are considered to indicate the presence of more volatile fluids, while UPEs observed later in the chromatogram may indicate the presence of less volatile fluids. Multiple UPEs may indicate the presence of multiple complex fluids.
- Stacked total ion chromatograms (TICs) are included in Appendix A. The six-digit serial number of each module is incorporated into the TIC identification (e.g.: 123456S.D represents module #123456).

Project Specific Comments:

- No 1,2,3-TCP was detected on the field samples.
- No 1,2,3-TCP was detected on the trip blanks and/or the method blanks.
- Information shared by Jacobs Engineering shows existing well levels for 1,2,3-TCP to be between 0.016ug/L and 1 ug/L. The proposed wells were all non-detect. Groundwater is between 15 to 20 feet. Henry's Law for 1,2,3-TCP is approx 0.02[1] (unitless). Therefore, 1ug/L yields ~20ug/m^3 just above the water table. Soil attenuation could be 10 to 1000 (or greater)[2]. This would give a range of 20.02ug/m^3 to 0.02ug/m^3. We feel therefore that it is unlikely to see the compound in the soil gas with such low levels in the groundwater.

[1]US EPA, User's Guide for Evaluation of Subsurface Vapor Intrusion into Buildings, Appendix B, June 19, 2003

[2]US EPA, OSWER Draft Guidance for Evaluation the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils(Subsurface Vapor Intrusion Guidance), Figure 3b, November 2002, EPA530-D-02-004

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KEY TO DATA TABLE

UNITS

µg	micrograms (per sorber), reported for compounds
MDL	method detection limit
bdl	below detection limit
nd	non-detect

ANALYTE

123-TCP	1,2,3-Trichloropropane

BLANKS

method blank	QA/QC module, documents analytical conditions during analysis

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APPENDIX A:

1. CHAIN OF CUSTODY AND INSTALLATION AND RETRIEVAL LOG
2. DATA TABLE
3. ADDITIONAL REQUESTED QA/QC AND STACKED TOTAL ION CHROMATOGRAMS

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GORE-SORBER® Screening Survey Chain of Custody

For W.L. Gore & Associates use only
Production Order # 20212168

W. L. Gore & Associates, Inc., Survey Products Group
100 Chesapeake Boulevard • Elkton, Maryland 21921 • Tel: (410) 392-7600 • Fax (410) 506-4780

Instructions: Customer must complete ALL shaded cells

Customer Name:	JACOBS ENGINEERING GROUP INC	Site Name:	TAKU 123 TCPC PLUME
Address:	4300 B STREET SUITE 600	Site Address:	FAIRBANKS AK
	ANCHORAGE AK 99503		
	USA	Project Manager:	VENESSA ANGEL
Phone:	907 751 3315	Customer Project No.:	
FAX:		Customer P.O. #:	Quote #: 2000651

Serial # of Modules Shipped								# of Modules for Installation 80	# of Trip Blanks 6
# 610273	-	# 610340		#	-	#		Total Modules Shipped: 86 Pieces	
# 610986	-	# 611003		#	-	#		Total Modules Received: ~~88~~ 86 Pieces	
#	-	#		#	-	#		Total Modules Installed: 67 Pieces	
#	-	#		#	-	#		Serial # of Trip Blanks (*Client Decides*)	#
#	-	#		#	-	#		#610986	#
#	-	#		#	-	#		#610987	#
#	-	#		#	-	#		#610989	#
#	-	#		#	-	#		#610990	#
#	-	#		#	-	#		#610991	#
#	-	#		#	-	#		#610992	#
Prepared By: Marianne Nichols								#	#
Verified By: Christine Hutton								#	#

Installation Performed By:	Installation Method(s) (*circle those that apply*):
Name (*please print*): Jess Young	Slide Hammer (Hammer Drill) Auger
Company/Affiliation: Jacobs Engineering	Other:
Installation Start Date and Time: 10/20/09 : 1405 AM (PM)	
Installation Complete Date and Time: 10/28/09 : 0947 (AM) PM	
Retrieval Performed By:	Total Modules Retrieved: 67 Pieces
Name (*please print*): Kelly Groff	Total Modules Lost in Field: 0 Pieces
Company/Affiliation: Jacobs Engineering	Total Unused Modules Returned: 13 Pieces
Retrieval Start Date and Time: / / : AM PM	
Retrieval Complete Date and Time: / / : AM PM	

Relinquished By: Marianne Nichols	Date	Time	Received By: Kelly R Groff	Date	Time
Affiliation: W.L. Gore & Associates, Inc.	10/14/09	2:30	Affiliation: Jacobs Engineering	10/17 2009	1025 AM
Relinquished By: Kelly R Groff	Date	Time	Received By:	Date	Time
Affiliation: Jacobs Engineering	10/28 2009	1215 PM	Affiliation:		
Relinquished By:	Date	Time	Received By: Christine Hutton	Date	Time
Affiliation:			Affiliation: W.L. Gore & Associates, Inc.	11-2-09	8:45

GORE-SORBER ® Screening Survey is a registered service mark of W.L. Gore & Associates, Inc.

GORE-SORBER® Screening Survey Installation and Retrieval Log Page 1 of 2 pages				Jacobs Engineering Taku Gardens Fort Wainwright, Alaska					
LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate)			MODULE IN WATER (check one)		COMMENTS
				LPH	ODOR	NONE	YES	NO	
INSTALLATION - 10/20/2009 - 3/4" drill bit				**RETRIEVAL - 10/27/2009 (except #610321 on 10/28)**					
1207.22	610315	1405	1525			x		x	Line 1207.22 began at the SE end of the site
1207.22	610316	1415	1528			x		x	
1207.22	610317	1417	1530			x		x	
1207.22	610318	1421	1533			x		x	
1207.22	610319	1424	1536			x		x	
1207.22	610320	1429	1538			x		x	
1207.22	610309	1432	1541			x		x	
1207.22	610310	1434	1544			x		x	
1207.22	610311	1437	1548			x		x	
1207.22	610312	1440	1551			x		x	
1207.22	610313	1448	1554			x		x	
1207.22	610314	1453	1557			x		x	~45' from 313. Had to step 5' back from road
1207.22	610303	1457	1600			x		x	
1207.22	610304	1500	1604			x		x	
1207.22	610305	1503	1607			x		x	
1207.22	610306	1506	1610			x		x	~40' from 307. Step back from RR track
1207.22	610307	1509	1613			x		x	
1207.22	610308	1512	1615			x		x	
1207.22	610297	1515	1618			x		x	
1207.22	610298	1520	1621			x		x	End of 1207.22 line outside of Taku fence
687.72	610299	1524	1629			x		x	Started south moving north along roadside
687.72	610300	1527	1632			x		x	
687.72	610301	1530	1635			x		x	
687.72	610302	1535	1637			x		x	
687.72	610291	1538	1640			x		x	
687.72	610292	1541	1643			x		x	
687.72	610293	1544	1646			x		x	
687.72	610294	1548	1649			x		x	
687.72	610295	1552	1652			x		x	
687.72	610296	1605	1655			x		x	Hard drilling conditions. Offset 10' S, 1' E
687.72	610285	1608	1658			x		x	
687.72	610286	1611	1701			x		x	
687.72	610287	1615	1704			x		x	
687.72	610288	1618	1707			x		x	End of 687.72 line

34 + 33 + 6 TBlk = 73

GORE-SORBER® Screening Survey Installation and Retrieval Log Page 2 of 2 pages				Jacobs Engineering Taku Gardens Fort Wainwright, Alaska					
LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate)			MODULE IN WATER (check one)		COMMENTS
				LPH	ODOR	NONE	YES	NO	
395.41	610289	1628	1733			x		x	Line 395.41 beginning midpoint just outside of the Taku fence. Offset 10' E due to hard drilling conditions
395.41	610290	1632	1736			x		x	Offset 2' W
395.41	610279	1635	1739			x		x	
395.41	610280	1638	1742			x		x	End of 395.41 line outside of Taku Fence. Stopped outside of DPW fence
1207.22	610281	1701	1801			x		x	Line 1207.22 moving NW to SE. Offset 15' NW of MW
1207.22	610282	1706	1803			x		x	
1207.22	610283	1712	1805			x		x	
1207.22	610284	1716	1807			x		x	
1207.22	610273	1719	1809			x		x	Base of NW side of sound berm
1207.22	610274	1722	1812			x		x	Base of SE side of sound berm. Completion of line 1207.22
INSTALLATION - 10/21/2009 - Changed to a 1" drill bit			**RETRIEVAL - 10/27/2009 (except #610321 on 10/28)**						
395.41	610275	1531	1816			x		x	Base of E side sound berm
395.41	610276	1535	1819			x		x	Base of W side sound berm
N Grid	610277	1538	1821			x		x	Begin additional Northern Grid inside fence moving N to S with 50' spacing and E to W with 30' spacing
N Grid	610278	1542	1824			x		x	End of N Grid inside Taku fence
395.41	610321	1405	0947 (10/28)			x		x	Completion of line 395.41. Furthest W sample location inside DPW fence. Retrieved 10/28/09
N Grid	610322	1410	1710			x		x	Begin of N Grid outside Taku fence
N Grid	610323	1414	1713			x		x	
N Grid	610324	1418	1716			x		x	
N Grid	610325	1420	1718			x		x	
N Grid	610326	1423	1720			x		x	
N Grid	610327	1425	1723			x		x	End of N Grid outside Taku fence
S Grid	610328	1448	1452			x		x	Begin of southern additional grid located outside of the Taku fence
S Grid	610329	1451	1455			x		x	
S Grid	610330	1454	1457			x		x	
S Grid	610331	1458	1500			x		x	
S Grid	610332	1501	1502			x		x	
S Grid	610333	1505	1504			x		x	
S Grid	610334	1508	1507			x		x	
S Grid	610335	1511	1510			x		x	
S Grid	610336	1515	1512			x		x	
S Grid	610337	1517	1515			x		x	
S Grid	610338	1531	1517			x		x	
S Grid	610339	1534	1520			x		x	End of S Grid

GORE(TM) SURVEYS ANALYTICAL RESULTS
JACOBS ENGINEERING GROUP INC, ANCHORAGE, AK
GORE CUSTOM TARGET (A7)
TAKU GARDENS FORT WAINWRIGHT, ALASKA
SITE FCL- PRODUCTION ORDER #20212168

DATE ANALYZED	SAMPLE NAME	123Trichloropropane (TIC), ug
	MDL=	0.02
11/6/09	610273	nd
11/5/09	610274	nd
11/5/09	610275	nd
11/4/09	610276	nd
11/6/09	610277	nd
11/5/09	610278	nd
11/5/09	610279	nd
11/5/09	610280	nd
11/4/09	610281	nd
11/6/09	610282	nd
11/5/09	610283	nd
11/6/09	610284	nd
11/5/09	610285	nd
11/4/09	610286	nd
11/5/09	610287	nd
11/6/09	610288	nd
11/5/09	610289	nd
11/5/09	610290	nd
11/4/09	610291	nd
11/4/09	610292	nd
11/6/09	610293	nd
11/5/09	610294	nd
11/5/09	610295	nd
11/6/09	610296	nd
11/5/09	610297	nd
11/5/09	610298	nd
11/6/09	610299	nd
11/5/09	610300	nd
11/6/09	610301	nd
11/5/09	610302	nd
11/4/09	610303	nd

No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

GORE(TM) SURVEYS ANALYTICAL RESULTS
JACOBS ENGINEERING GROUP INC, ANCHORAGE, AK
GORE CUSTOM TARGET (A7)
TAKU GARDENS FORT WAINWRIGHT, ALASKA
SITE FCL- PRODUCTION ORDER #20212168

DATE ANALYZED	SAMPLE NAME	123Trichloropropane (TIC), ug
	MDL=	0.02
11/5/09	610304	nd
11/5/09	610305	nd
11/5/09	610306	nd
11/6/09	610307	nd
11/6/09	610308	nd
11/5/09	610309	nd
11/5/09	610310	nd
11/6/09	610311	nd
11/5/09	610312	nd
11/5/09	610313	nd
11/6/09	610314	nd
11/4/09	610315	nd
11/5/09	610316	nd
11/5/09	610317	nd
11/5/09	610318	nd
11/5/09	610319	nd
11/4/09	610320	nd
11/4/09	610321	nd
11/5/09	610322	nd
11/5/09	610323	nd
11/5/09	610324	nd
11/5/09	610325	nd
11/4/09	610326	nd
11/4/09	610327	nd
11/5/09	610328	nd
11/6/09	610329	nd
11/4/09	610330	nd
11/5/09	610331	nd
11/5/09	610332	nd
11/6/09	610333	nd
11/4/09	610334	nd

No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

GORE(TM) SURVEYS ANALYTICAL RESULTS
JACOBS ENGINEERING GROUP INC, ANCHORAGE, AK
GORE CUSTOM TARGET (A7)
TAKU GARDENS FORT WAINWRIGHT, ALASKA
SITE FCL- PRODUCTION ORDER #20212168

DATE ANALYZED	SAMPLE NAME	123Trichloropropane (TIC), ug
	MDL=	0.02
11/5/09	610335	nd
11/6/09	610336	nd
11/5/09	610337	nd
11/4/09	610338	nd
11/5/09	610339	nd
11/5/09	610986	nd
11/5/09	610987	nd
11/6/09	610989	nd
11/4/09	610990	nd
11/5/09	610991	nd
11/5/09	610992	nd
11/4/09	method blank	nd
11/5/09	method blank	nd
11/6/09	method blank	nd
	Maximum	0.00
	Standard Dev.	0.00
	Mean	0.00

No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

BFB

Data File : C:\MSDCHEM\#11\20212168-FCL\12168FCL\BFB1B.D Vial: 3
Acq On : 4 Nov 2009 11:51 am Operator: FN
Sample : Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: jwint.p

Method : C:\MSDCHEM\1\METHODS\A1_11_123TRICHLOROPROPANE.M (RTE Integrator)
Title : Gore Expanded Target VOCs/SVOCs

AutoFind: Scans 906, 907, 908; Background Corrected with Scan 899

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	13.7	26549	PASS
75	95	30	66	43.1	83504	PASS
95	95	100	100	100.0	193834	PASS
96	95	5	9	6.7	12943	PASS
173	174	0.00	2	0.5	917	PASS
174	95	50	120	102.2	198016	PASS
175	174	4	9	7.1	13975	PASS
176	174	93	101	96.7	191509	PASS
177	176	5	9	6.7	12775	PASS

BFB1B.D A1_11_123TRICHLOROPROPANE.M Wed Dec 02 16:41:06 2009 RPT1

BFB

Data File : C:\MSDCHEM\11\12168FCL\BFB2.D Vial: 45
Acq On : 5 Nov 2009 7:42 am Operator: FN
Sample : Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: jwint.p

Method : C:\MSDCHEM\1\METHODS\A1_11_123TRICHLOROPROPANE.M (RTE Integrator)
Title : Gore Expanded Target VOCs/SVOCs

AutoFind: Scans 906, 907, 908; Background Corrected with Scan 899

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	14.0	23952	PASS
75	95	30	66	43.2	73757	PASS
95	95	100	100	100.0	170581	PASS
96	95	5	9	6.8	11517	PASS
173	174	0.00	2	0.6	969	PASS
174	95	50	120	103.1	175872	PASS
175	174	4	9	7.2	12611	PASS
176	174	93	101	96.7	170112	PASS
177	176	5	9	6.5	11125	PASS

BFB2.D A1_11_123TRICHLOROPROPANE.M Fri Nov 13 11:24:23 2009

BFB

Data File : C:\MSDCHEM\11\12168FCL\BFB3.D Vial: 85
Acq On : 6 Nov 2009 2:12 am Operator: FN
Sample : Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: jwint.p

Method : C:\MSDCHEM\1\METHODS\A1_11_123TRICHLOROPROPANE.M (RTE Integrator)
Title : Gore Expanded Target VOCs/SVOCs

AutoFind: Scans 907, 908, 909; Background Corrected with Scan 900

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	8	40	13.6	24520	PASS
75	95	30	66	43.0	77589	PASS
95	95	100	100	100.0	180394	PASS
96	95	5	9	6.9	12375	PASS
173	174	0.00	2	0.5	1006	PASS
174	95	50	120	102.0	183957	PASS
175	174	4	9	6.9	12750	PASS
176	174	93	101	96.1	176874	PASS
177	176	5	9	6.6	11696	PASS

BFB3.D A1_11_123TRICHLOROPROPANE.M Fri Nov 13 11:24:43 2009

Response Factor Report Instrumen

Method : C:\MSDCHEM\1\METHODS\A1_11_123TRICHLOROPROPANE.M (RTE Integrator)
Title : Gore Expanded Target VOCs/SVOCs
Last Update : Wed Nov 11 15:52:34 2009
Response via : Initial Calibration

Calibration Files
1 =SVOC_2.D 2 =1SVOC.D 3 =5SVOC.D
4 =20SVOC.D 5 =50SVOC.D

	Compound	1	2	3	4	5	Avg		%RSD
1)	Methyl t-butyl ethe	2.247	1.922	1.997	1.680	1.181	1.805	E5	22.35
2)	1,1-Dichloroethene	8.140	7.835	9.068	7.817	7.652	8.102	E4	7.01
3)	trans-1,2-Dichloroe	1.050	0.939	1.006	0.858	0.656	0.902	E5	17.27
4)	1,1-Dichloroethane	1.200	1.156	1.257	1.166	1.010	1.158	E5	7.91
5)	cis-1,2-Dichloroeth	9.364	8.491	9.271	8.876	7.455	8.691	E4	8.90
6)	Chloroform	1.315	1.225	1.347	1.298	1.103	1.258	E5	7.74
7)	1,1,1-Trichloroetha	1.145	1.129	1.261	1.218	1.070	1.165	E5	6.49
8)	1,2-Dichloroethane	9.417	8.796	9.457	9.042	7.729	8.888	E4	7.91
9)	Benzene	2.996	2.771	3.019	2.807	1.996	2.718	E5	15.38
10)	Carbon tetrachlorid	1.058	1.074	1.215	1.215	1.073	1.127	E5	7.15
11)	Trichloroethene	8.007	7.413	8.409	8.425	7.515	7.954	E4	6.02
12)	1,1,2-Trichloroetha	3.034	3.146	3.462	3.460	2.996	3.220	E4	7.06
13)	Toluene	2.948	2.822	3.168	3.059	2.227	2.845	E5	12.95
14)	Octane	1.122	1.147	1.311	1.277	0.910	1.154	E5	13.72
15)	Tetrachloroethene	0.929	0.873	0.994	1.098	1.025	0.984	E5	8.80
16)	Chlorobenzene	1.810	1.862	2.153	2.262	1.895	1.996	E5	9.97
17)	1,1,1,2-Tetrachloro	6.291	6.969	8.177	9.172	9.247	7.971	E4	16.52
18)	Ethylbenzene	2.759	3.006	3.473	3.244	2.246	2.946	E5	16.05
19)	m,p-Xylene	2.151	2.339	2.675	2.646	1.923	2.347	E5	13.74
20)	o-Xylene	2.100	2.367	2.787	2.733	2.004	2.398	E5	14.87
21)	1,1,2,2-Tetrachloro	0.901	0.996	1.182	1.203	1.094	1.075	E5	11.83
22)	1,2,3-Trichloroprop	8.140	7.835	9.068	7.817	7.652	8.102	E4	7.01
23)	1,3,5-Trimethylbenz	2.068	2.551	3.138	3.117	2.164	2.608	E5	19.47
24)	1,2,4-Trimethylbenz	2.124	2.562	3.150	3.141	2.315	2.658	E5	17.72
25)	1,3-Dichlorobenzene	1.488	1.682	2.004	2.220	1.895	1.858	E5	15.25
26)	1,4-Dichlorobenzene	1.508	1.677	2.005	2.232	1.904	1.865	E5	15.13
27)	1,2-Dichlorobenzene	1.399	1.603	1.880	2.067	1.856	1.761	E5	14.84
28)	Undecane	0.900	1.189	1.420	1.425	1.069	1.201	E5	18.91
29)	Naphthalene	3.618	4.302	5.167	4.851	3.368	4.261	E5	18.11
30)	Tridecane	0.859	1.223	1.475	1.482	1.120	1.232	E5	21.23
31)	2-Methyl naphthalen	2.327	2.923	3.612	3.837	2.910	3.122	E5	19.41
32)	Pentadecane	0.989	1.326	1.633	1.350		1.324	E5	19.92

(#) = Out of Range

A1_11_123TRICHLOROPROPANE.M Wed Dec 02 16:12:48 2009 RPT1

Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\#11\20212168-FCL\12168FCL\SVOCSTD1.D Vial: 9
Acq On : 4 Nov 2009 2:41 pm Operator: FN
Sample : SVOCSTD1 Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: jwint.p
Quant Time: Nov 11 15:57:39 2009 Quant Results File: A1_11_123TRICHLOI

Quant Method : C:\MSDCHEM\1...\A1_11_123TRICHLOROPROPANE.M (RTE Integrator)
Title : Gore Expanded Target VOCs/SVOCs
Last Update : Wed Nov 11 15:56:06 2009
Response via : Initial Calibration
DataAcq Meth : VCGS3-11

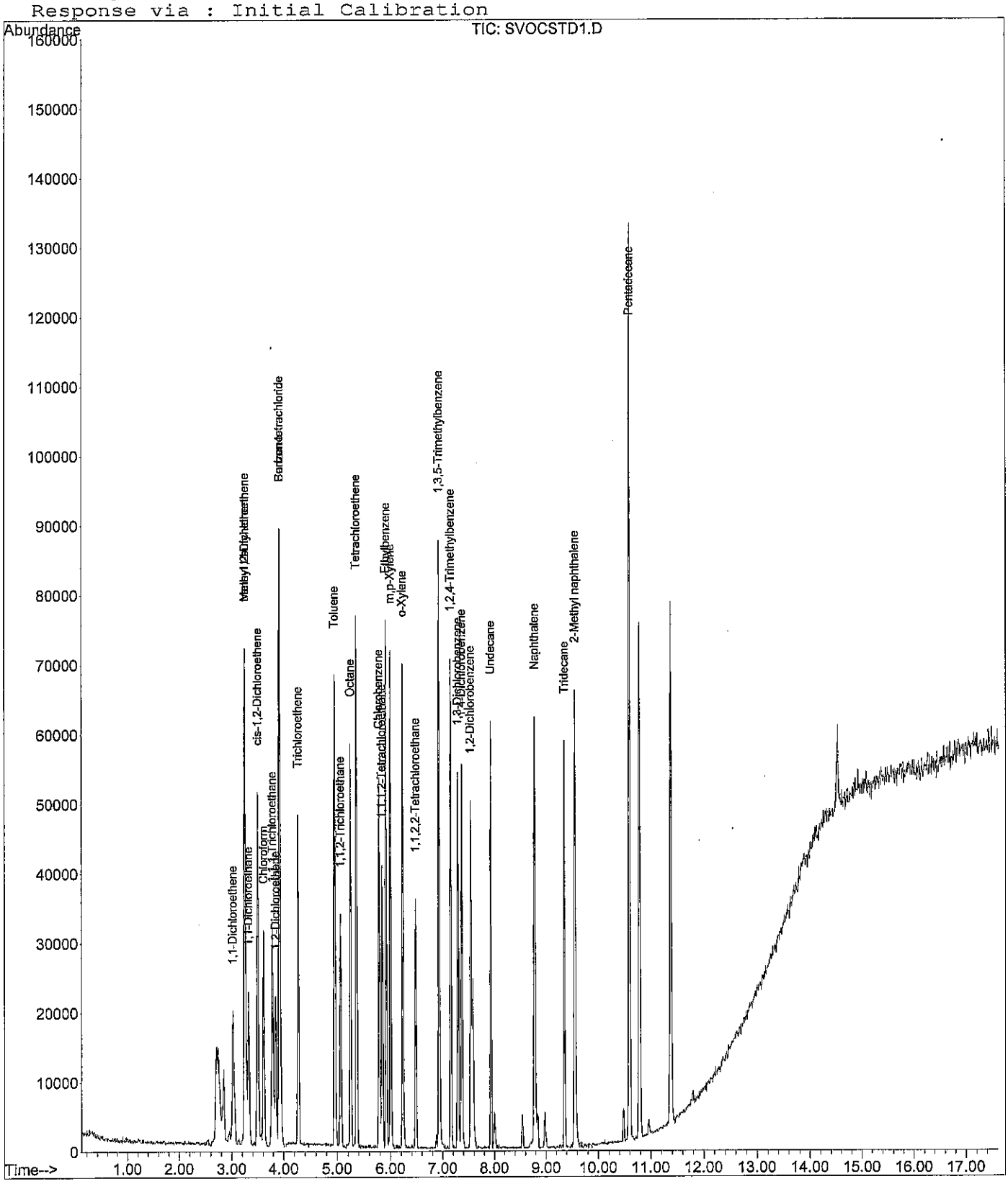
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
Target Compounds						Qvalue
1) Methyl t-butyl ether	3.25	73	44944m	0.25	ug	#
2) 1,1-Dichloroethene	3.03	61	16279m	0.20	ug	#
3) trans-1,2-Dichloroethene	3.24	61	21009m	0.23	ug	#
4) 1,1-Dichloroethane	3.32	63	23992m	0.21	ug	#
5) cis-1,2-Dichloroethene	3.50	61	18727m	0.22	ug	#
6) Chloroform	3.61	83	26296m	0.21	ug	#
7) 1,1,1-Trichloroethane	3.79	97	22903m	0.20	ug	#
8) 1,2-Dichloroethane	3.85	62	18833m	0.21	ug	
9) Benzene	3.92	78	59925m	0.22	ug	#
10) Carbon tetrachloride	3.93	117	21155m	0.19	ug	#
11) Trichloroethene	4.27	95	16014m	0.20	ug	#
12) 1,1,2-Trichloroethane	5.06	61	6067m	0.19	ug	#
13) Toluene	4.95	91	58960m	0.21	ug	#
14) Octane	5.25	43	22439m	0.19	ug	#
15) Tetrachloroethene	5.37	166	18581m	0.19	ug	#
16) Chlorobenzene	5.79	112	36203m	0.18	ug	#
17) 1,1,1,2-Tetrachloroethane	5.84	131	12582m	0.16	ug	#
18) Ethylbenzene	5.92	91	55181m	0.19	ug	#
19) m,p-Xylene	6.00	91	43018m	0.18	ug	#
20) o-Xylene	6.23	91	41991m	0.18	ug	#
21) 1,1,2,2-Tetrachloroethane	6.48	83	18014m	0.17	ug	#
22) 1,2,3-Trichloropropane	6.55	75	0	N.D.		
23) 1,3,5-Trimethylbenzene	6.92	105	41368m	0.16	ug	#
24) 1,2,4-Trimethylbenzene	7.15	105	42478m	0.16	ug	#
25) 1,3-Dichlorobenzene	7.30	146	29766m	0.16	ug	#
26) 1,4-Dichlorobenzene	7.37	146	30158m	0.16	ug	#
27) 1,2-Dichlorobenzene	7.54	146	27970m	0.16	ug	#
28) Undecane	7.93	57	18009m	0.15	ug	#
29) Naphthalene	8.78	128	70699m	0.17	ug	#
30) Tridecane	9.36	57	17175m	0.14	ug	#
31) 2-Methyl naphthalene	9.56	142	46407m	0.15	ug	#
32) Pentadecane	10.58	57	19773m	0.15	ug	#

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\#11\20212168-FCL\12168FCL\SVOCSTD1.D Vial: 9
Acq On : 4 Nov 2009 2:41 pm Operator: FN
Sample : SVOCSTD1 Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: jwint.p
Quant Time: Nov 11 16:04 2009 Quant Results File: A1_11_123TRICI

Method : C:\MSDCHEM\1\METHODS\A1_11_123TRICHLOROPROPANE.M (RTE Integrat
Title : Gore Expanded Target VOCs/SVOCs
Last Update : Wed Nov 11 15:52:34 2009
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\#11\20212168-FCL\12168FCL\SVOCSTD2.D Vial: 8
Acq On : 4 Nov 2009 2:12 pm Operator: FN
Sample : Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: jwint.p
Quant Time: Nov 11 15:56:39 2009 Quant Results File: A1_11_123TRICHLO

Quant Method : C:\MSDCHEM\1...\A1_11_123TRICHLOROPROPANE.M (RTE Integrator)
Title : Gore Expanded Target VOCs/SVOCs
Last Update : Wed Nov 11 15:52:34 2009
Response via : Initial Calibration
DataAcq Meth : VCGS3-11

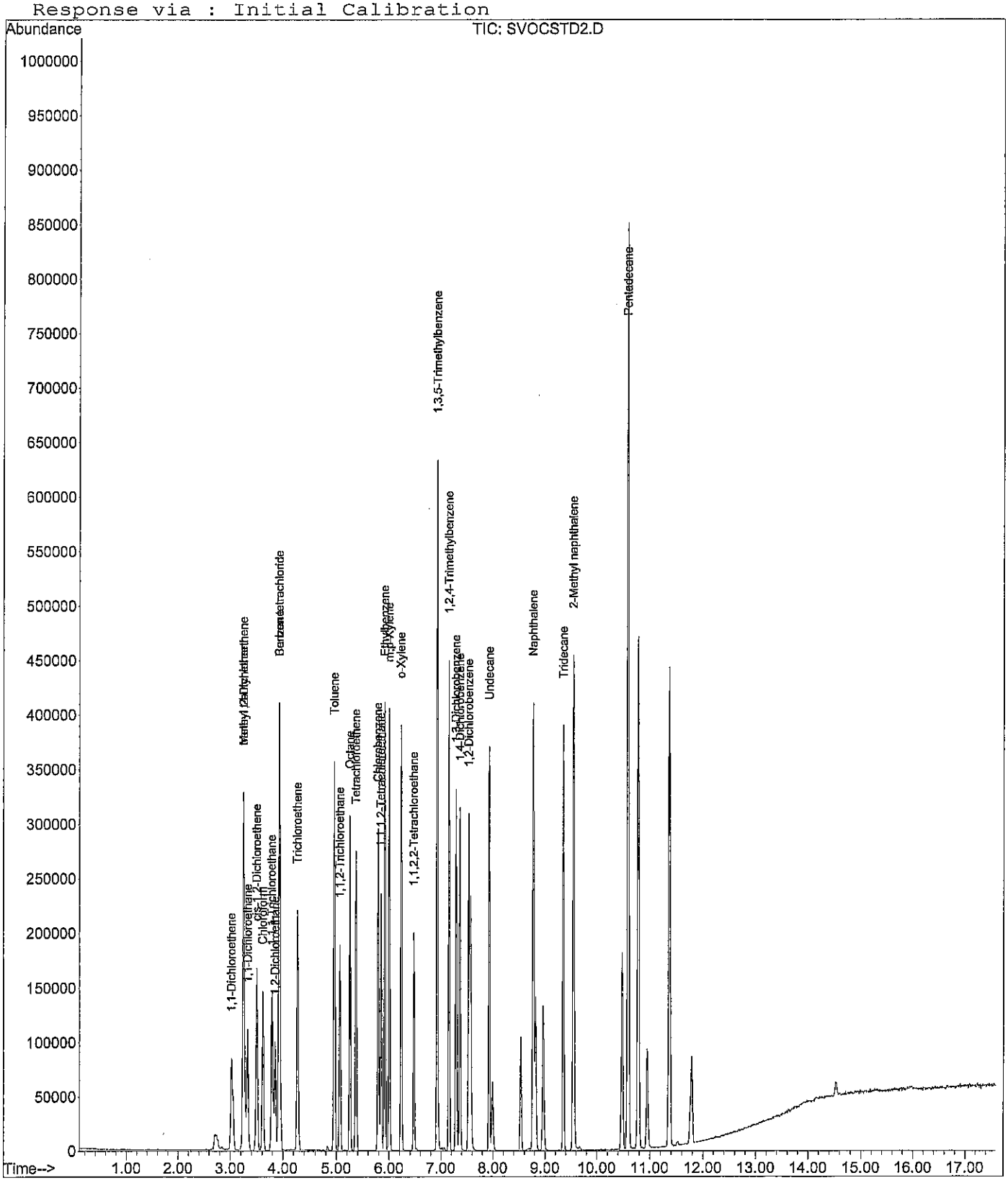
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
Target Compounds						Qvalue
1) Methyl t-butyl ether	3.25	73	192039m	1.06	ug	#
2) 1,1-Dichloroethene	3.02	61	78346m	0.97	ug	#
3) trans-1,2-Dichloroethene	3.25	61	93880m	1.04	ug	#
4) 1,1-Dichloroethane	3.33	63	114545m	0.99	ug	#
5) cis-1,2-Dichloroethene	3.50	61	84905m	0.98	ug	#
6) Chloroform	3.61	83	122476m	0.97	ug	#
7) 1,1,1-Trichloroethane	3.79	97	112869m	0.97	ug	#
8) 1,2-Dichloroethane	3.85	62	87961m	0.99	ug	
9) Benzene	3.92	78	277421m	1.02	ug	#
10) Carbon tetrachloride	3.94	117	107409m	0.95	ug	#
11) Trichloroethene	4.27	95	74132m	0.93	ug	#
12) 1,1,2-Trichloroethane	5.07	61	31459m	0.98	ug	#
13) Toluene	4.96	91	282235m	0.99	ug	#
14) Octane	5.25	43	114742m	0.99	ug	#
15) Tetrachloroethene	5.37	166	87314m	0.89	ug	#
16) Chlorobenzene	5.79	112	186617m	0.93	ug	#
17) 1,1,1,2-Tetrachloroethane	5.84	131	69694m	0.87	ug	#
18) Ethylbenzene	5.92	91	300958m	1.02	ug	#
19) m,p-Xylene	6.00	91	233503m	1.00	ug	#
20) o-Xylene	6.23	91	236744m	0.99	ug	#
21) 1,1,2,2-Tetrachloroethane	6.47	83	99637m	0.93	ug	#
22) 1,2,3-Trichloropropane	6.55	75	0	N.D.		
23) 1,3,5-Trimethylbenzene	6.92	105	255096m	0.98	ug	#
24) 1,2,4-Trimethylbenzene	7.15	105	256330m	0.96	ug	#
25) 1,3-Dichlorobenzene	7.29	146	168234m	0.91	ug	#
26) 1,4-Dichlorobenzene	7.37	146	167197m	0.90	ug	#
27) 1,2-Dichlorobenzene	7.54	146	160425m	0.91	ug	#
28) Undecane	7.93	57	118898m	0.99	ug	#
29) Naphthalene	8.78	128	425068m	1.00	ug	#
30) Tridecane	9.36	57	122298m	0.99	ug	#
31) 2-Methyl naphthalene	9.55	142	295962m	0.95	ug	#
32) Pentadecane	10.59	57	132567m	1.00	ug	#

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\#11\20212168-FCL\12168FCL\SVOCSTD2.D Vial: 8
Acq On : 4 Nov 2009 2:12 pm Operator: FN
Sample : Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: jwint.p
Quant Time: Nov 11 16:07 2009 Quant Results File: A1_11_123TRICI

Method : C:\MSDCHEM\1\METHODS\A1_11_123TRICHLOROPROPANE.M (RTE Integrat
Title : Gore Expanded Target VOCs/SVOCs
Last Update : Wed Nov 11 15:52:34 2009
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\#11\20212168-FCL\12168FCL\SVOCSTD3.D Vial: 7
Acq On : 4 Nov 2009 1:44 pm Operator: FN
Sample : Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: jwint.p
Quant Time: Nov 11 15:56:42 2009 Quant Results File: A1_11_123TRICHLOI

Quant Method : C:\MSDCHEM\1...\A1_11_123TRICHLOROPROPANE.M (RTE Integrator)
Title : Gore Expanded Target VOCs/SVOCs
Last Update : Wed Nov 11 15:56:06 2009
Response via : Initial Calibration
DataAcq Meth : VCGS3-11

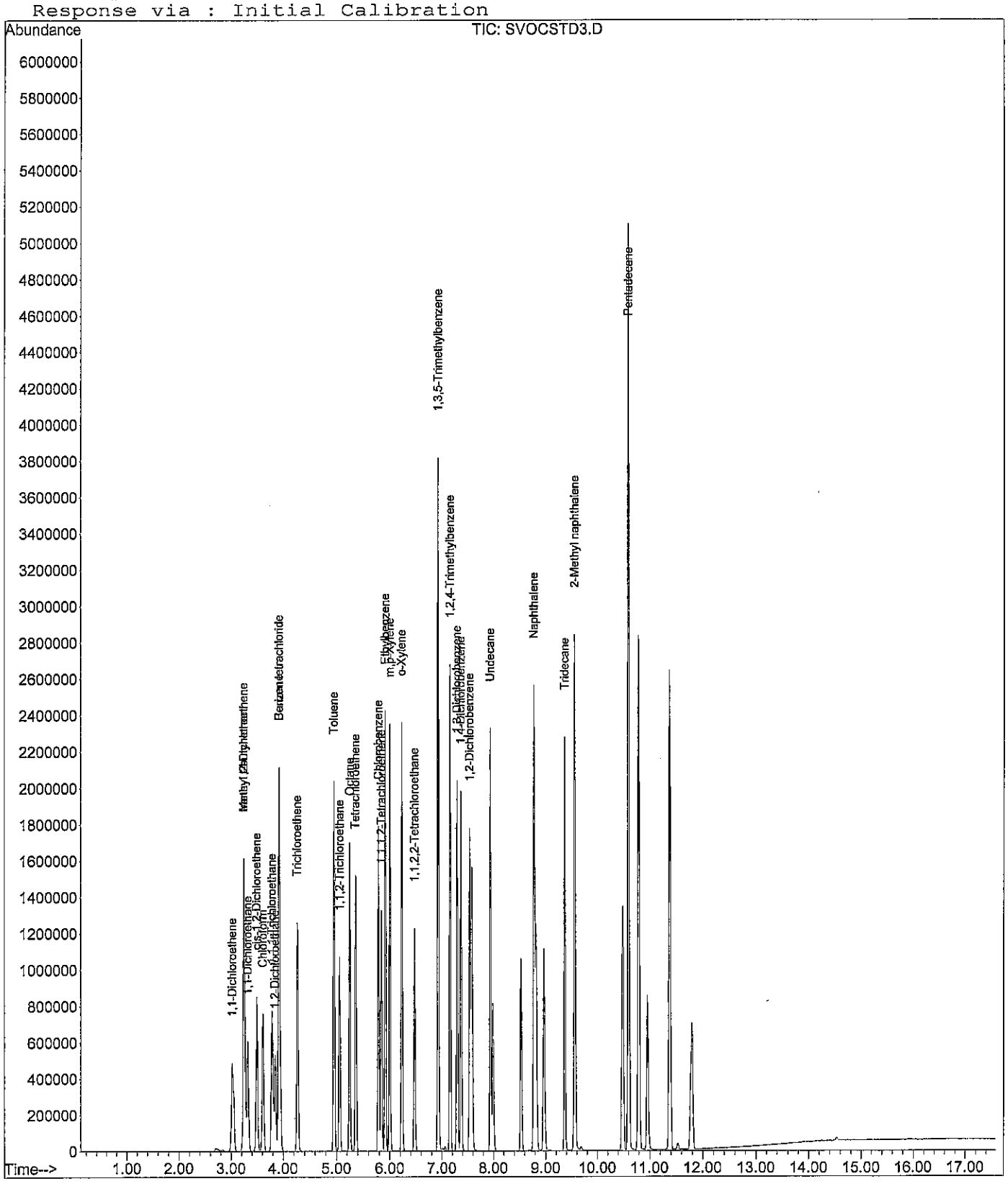
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
Target Compounds						Qvalue
1) Methyl t-butyl ether	3.25	73	998560m	5.53	ug	#
2) 1,1-Dichloroethene	3.02	61	453975m	5.60	ug	#
3) trans-1,2-Dichloroethene	3.24	61	503185m	5.58	ug	#
4) 1,1-Dichloroethane	3.32	63	628574m	5.43	ug	#
5) cis-1,2-Dichloroethene	3.49	61	463575m	5.33	ug	#
6) Chloroform	3.61	83	673745m	5.36	ug	#
7) 1,1,1-Trichloroethane	3.79	97	630684m	5.41	ug	#
8) 1,2-Dichloroethane	3.84	62	472861m	5.32	ug	
9) Benzene	3.92	78	1508274m	5.55	ug	#
10) Carbon tetrachloride	3.93	117	607502m	5.39	ug	#
11) Trichloroethene	4.26	95	420476m	5.29	ug	#
12) 1,1,2-Trichloroethane	5.06	61	173090m	5.38	ug	#
13) Toluene	4.95	91	1586518m	5.58	ug	#
14) Octane	5.25	43	655297m	5.68	ug	#
15) Tetrachloroethene	5.37	166	497218m	5.05	ug	#
16) Chlorobenzene	5.79	112	1077893m	5.40	ug	#
17) 1,1,1,2-Tetrachloroethane	5.84	131	408980m	5.13	ug	#
18) Ethylbenzene	5.92	91	1736526m	5.90	ug	#
19) m,p-Xylene	6.00	91	1348889m	5.75	ug	#
20) o-Xylene	6.23	91	1395582m	5.82	ug	#
21) 1,1,2,2-Tetrachloroethane	6.47	83	591873m	5.50	ug	#
22) 1,2,3-Trichloropropane	6.55	75	0	N.D.		
23) 1,3,5-Trimethylbenzene	6.92	105	1572335m	6.03	ug	#
24) 1,2,4-Trimethylbenzene	7.16	105	1576478m	5.93	ug	#
25) 1,3-Dichlorobenzene	7.30	146	1005112m	5.41	ug	#
26) 1,4-Dichlorobenzene	7.37	146	1003564m	5.38	ug	#
27) 1,2-Dichlorobenzene	7.54	146	946537m	5.38	ug	#
28) Undecane	7.94	57	710175m	5.91	ug	#
29) Naphthalene	8.78	128	2584594m	6.07	ug	#
30) Tridecane	9.37	57	738801m	6.00	ug	#
31) 2-Methyl naphthalene	9.56	142	1816567m	5.82	ug	#
32) Pentadecane	10.60	57	820627m	6.20	ug	#

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\#11\20212168-FCL\12168FCL\SVOCSTD3.D Vial: 7
Acq On : 4 Nov 2009 1:44 pm Operator: FN
Sample : Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: jwint.p
Quant Time: Nov 11 16:08 2009 Quant Results File: A1_11_123TRICI

Method : C:\MSDCHEM\1\METHODS\A1_11_123TRICHLOROPROPANE.M (RTE Integra
Title : Gore Expanded Target VOCs/SVOCs
Last Update : Wed Nov 11 15:52:34 2009
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\#11\20212168-FCL\12168FCL\SVOCSTD4.D Vial: 6
Acq On : 4 Nov 2009 1:16 pm Operator: FN
Sample : Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: jwint.p
Quant Time: Nov 11 15:56:40 2009 Quant Results File: A1_11_123TRICHLOI

Quant Method : C:\MSDCHEM\1...\A1_11_123TRICHLOROPROPANE.M (RTE Integrator)
Title : Gore Expanded Target VOCs/SVOCs
Last Update : Wed Nov 11 15:56:06 2009
Response via : Initial Calibration
DataAcq Meth : VCGS3-11

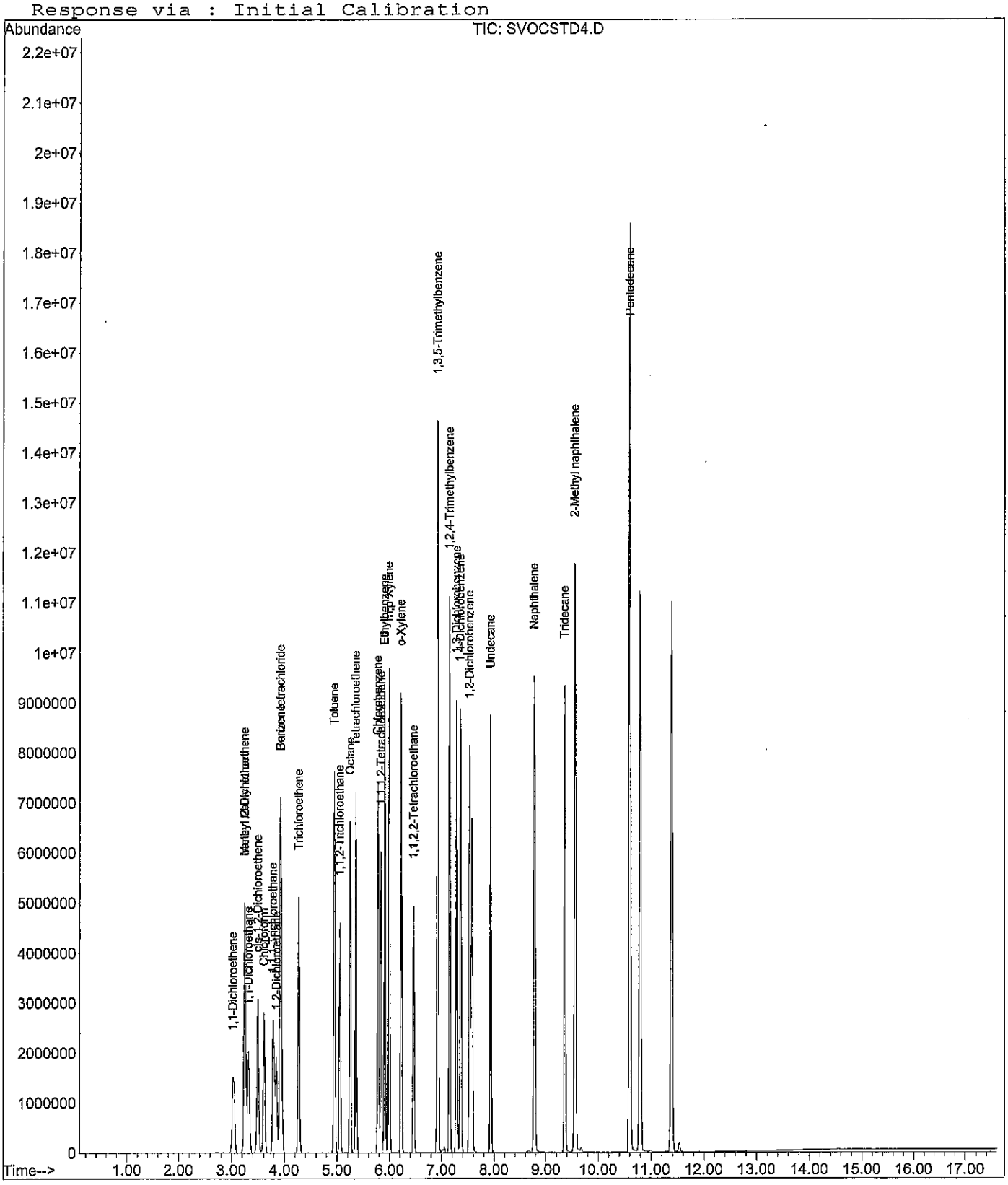
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
Target Compounds						Qvalue
1) Methyl t-butyl ether	3.25	73	3360324m	18.61	ug	#
2) 1,1-Dichloroethene	3.03	61	1564437m	19.31	ug	#
3) trans-1,2-Dichloroethene	3.25	61	1715629m	19.03	ug	#
4) 1,1-Dichloroethane	3.32	63	2361954m	20.40	ug	#
5) cis-1,2-Dichloroethene	3.50	61	1774990m	20.42	ug	#
6) Chloroform	3.61	83	2597303m	20.65	ug	#
7) 1,1,1-Trichloroethane	3.79	97	2437069m	20.92	ug	#
8) 1,2-Dichloroethane	3.85	62	1808451m	20.35	ug	
9) Benzene	3.92	78	5612868m	20.65	ug	#
10) Carbon tetrachloride	3.94	117	2430183m	21.56	ug	#
11) Trichloroethene	4.27	95	1685083m	21.19	ug	#
12) 1,1,2-Trichloroethane	5.05	61	691898m	21.49	ug	#
13) Toluene	4.95	91	6123933m	21.53	ug	#
14) Octane	5.25	43	2555105m	22.15	ug	#
15) Tetrachloroethene	5.36	166	2196467m	22.33	ug	#
16) Chlorobenzene	5.78	112	4528872m	22.68	ug	#
17) 1,1,1,2-Tetrachloroethane	5.84	131	1834926m	23.02	ug	#
18) Ethylbenzene	5.91	91	6490042m	22.03	ug	#
19) m,p-Xylene	5.99	91	5311416m	22.63	ug	#
20) o-Xylene	6.22	91	5474020m	22.83	ug	#
21) 1,1,2,2-Tetrachloroethane	6.47	83	2407038m	22.39	ug	#
22) 1,2,3-Trichloropropane	6.55	75	0	N.D.		
23) 1,3,5-Trimethylbenzene	6.92	105	6241529m	23.94	ug	#
24) 1,2,4-Trimethylbenzene	7.15	105	6288133m	23.65	ug	#
25) 1,3-Dichlorobenzene	7.29	146	4447682m	23.94	ug	#
26) 1,4-Dichlorobenzene	7.36	146	4491623m	24.08	ug	#
27) 1,2-Dichlorobenzene	7.53	146	4143851m	23.53	ug	#
28) Undecane	7.93	57	2855366m	23.78	ug	#
29) Naphthalene	8.78	128	9788647m	22.97	ug	#
30) Tridecane	9.36	57	2972441m	24.13	ug	#
31) 2-Methyl naphthalene	9.56	142	7715698m	24.71	ug	#
32) Pentadecane	10.60	57	2717348m	20.52	ug	#

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\#11\20212168-FCL\12168FCL\SVOCSTD4.D Vial: 6
Acq On : 4 Nov 2009 1:16 pm Operator: FN
Sample : Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: jwint.p
Quant Time: Nov 11 16:07 2009 Quant Results File: A1_11_123TRICI

Method : C:\MSDCHEM\1\METHODS\A1_11_123TRICHLOROPROPANE.M (RTE Integrat
Title : Gore Expanded Target VOCs/SVOCs
Last Update : Wed Nov 11 15:52:34 2009
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\#11\20212168-FCL\12168FCL\SVOCSTD5.D Vial: 5
Acq On : 4 Nov 2009 12:47 pm Operator: FN
Sample : Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: jwint.p
Quant Time: Nov 11 15:56:41 2009 Quant Results File: A1_11_123TRICHLOI

Quant Method : C:\MSDCHEM\1...\A1_11_123TRICHLOROPROPANE.M (RTE Integrator)
Title : Gore Expanded Target VOCs/SVOCs
Last Update : Wed Nov 11 15:56:06 2009
Response via : Initial Calibration
DataAcq Meth : VCGS3-11

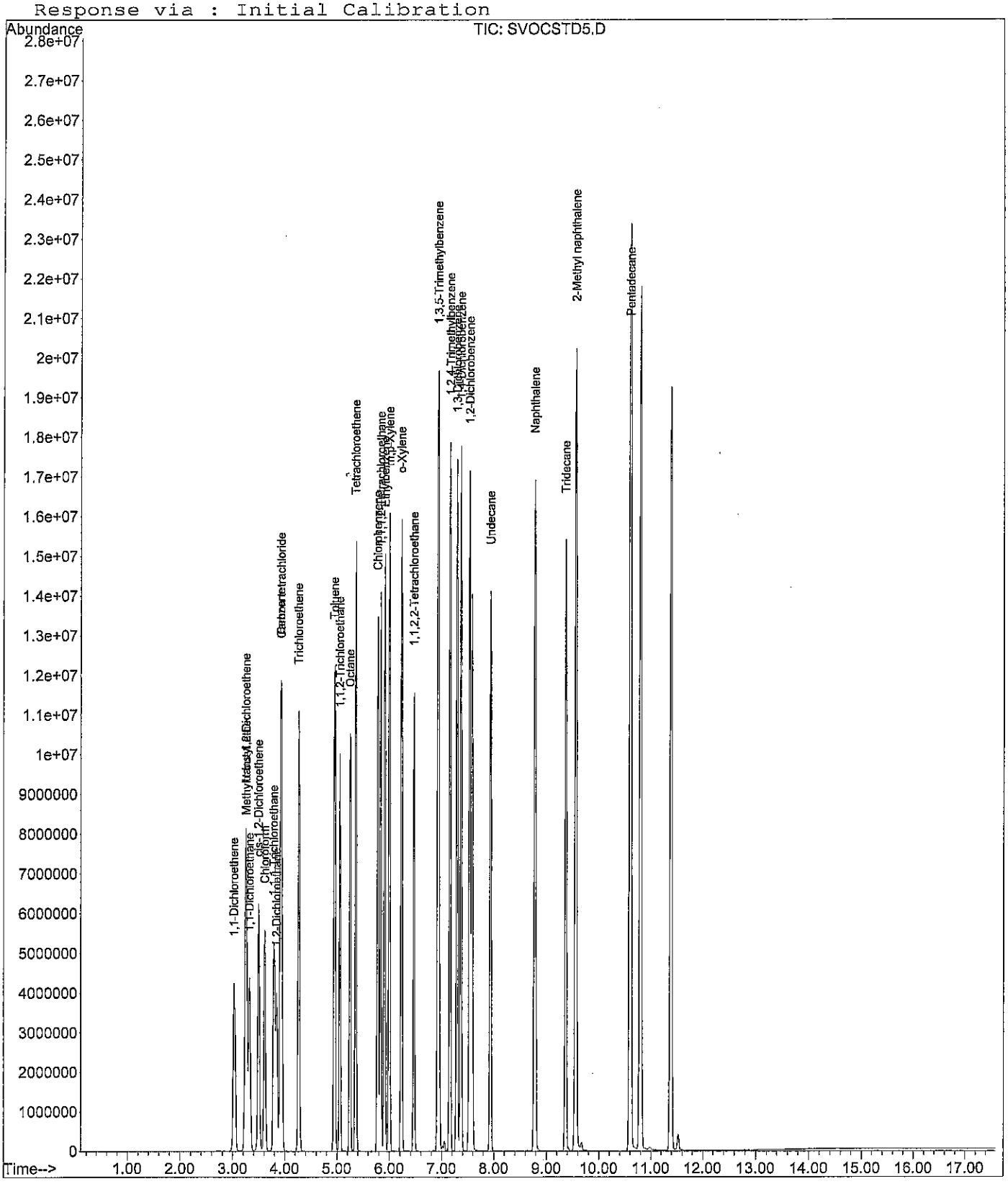
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
Target Compounds						Qvalue
1) Methyl t-butyl ether	3.26	73	5908118m	32.73	ug	#
2) 1,1-Dichloroethene	3.02	61	3828556m	47.25	ug	#
3) trans-1,2-Dichloroethene	3.24	61	3242617m	35.96	ug	#
4) 1,1-Dichloroethane	3.32	63	5049484m	43.61	ug	#
5) cis-1,2-Dichloroethene	3.49	61	3730259m	42.92	ug	#
6) Chloroform	3.61	83	5518797m	43.88	ug	#
7) 1,1,1-Trichloroethane	3.79	97	5349845m	45.93	ug	#
8) 1,2-Dichloroethane	3.84	62	3864501m	43.48	ug	
9) Benzene	3.91	78	9981671m	36.73	ug	#
10) Carbon tetrachloride	3.94	117	5366449m	47.62	ug	#
11) Trichloroethene	4.26	95	3758399m	47.25	ug	#
12) 1,1,2-Trichloroethane	5.05	61	1497957m	46.53	ug	#
13) Toluene	4.95	91	11150629m	39.20	ug	#
14) Octane	5.25	43	4553825m	39.48	ug	#
15) Tetrachloroethene	5.37	166	5125932m	52.10	ug	#
16) Chlorobenzene	5.78	112	9479400m	47.48	ug	#
17) 1,1,1,2-Tetrachloroethane	5.84	131	4625340m	58.02	ug	#
18) Ethylbenzene	5.92	91	11231797m	38.13	ug	#
19) m,p-Xylene	6.00	91	9647770m	41.11	ug	#
20) o-Xylene	6.23	91	10026994m	41.81	ug	#
21) 1,1,2,2-Tetrachloroethane	6.47	83	5474169m	50.91	ug	#
22) 1,2,3-Trichloropropane	6.55	75	0	N.D.		
23) 1,3,5-Trimethylbenzene	6.92	105	10830779m	41.53	ug	#
24) 1,2,4-Trimethylbenzene	7.16	105	11584474m	43.58	ug	#
25) 1,3-Dichlorobenzene	7.30	146	9472922m	50.99	ug	#
26) 1,4-Dichlorobenzene	7.37	146	9491737m	50.88	ug	#
27) 1,2-Dichlorobenzene	7.54	146	9301678m	52.82	ug	#
28) Undecane	7.94	57	5348439m	44.54	ug	#
29) Naphthalene	8.78	128	16957237m	39.80	ug	#
30) Tridecane	9.37	57	5618089m	45.61	ug	#
31) 2-Methyl naphthalene	9.56	142	14605629m	46.78	ug	#
32) Pentadecane	10.61	57	4113944m	31.06	ug	#

(#) = qualifier out of range (m) = manual integration (+) = signals summed

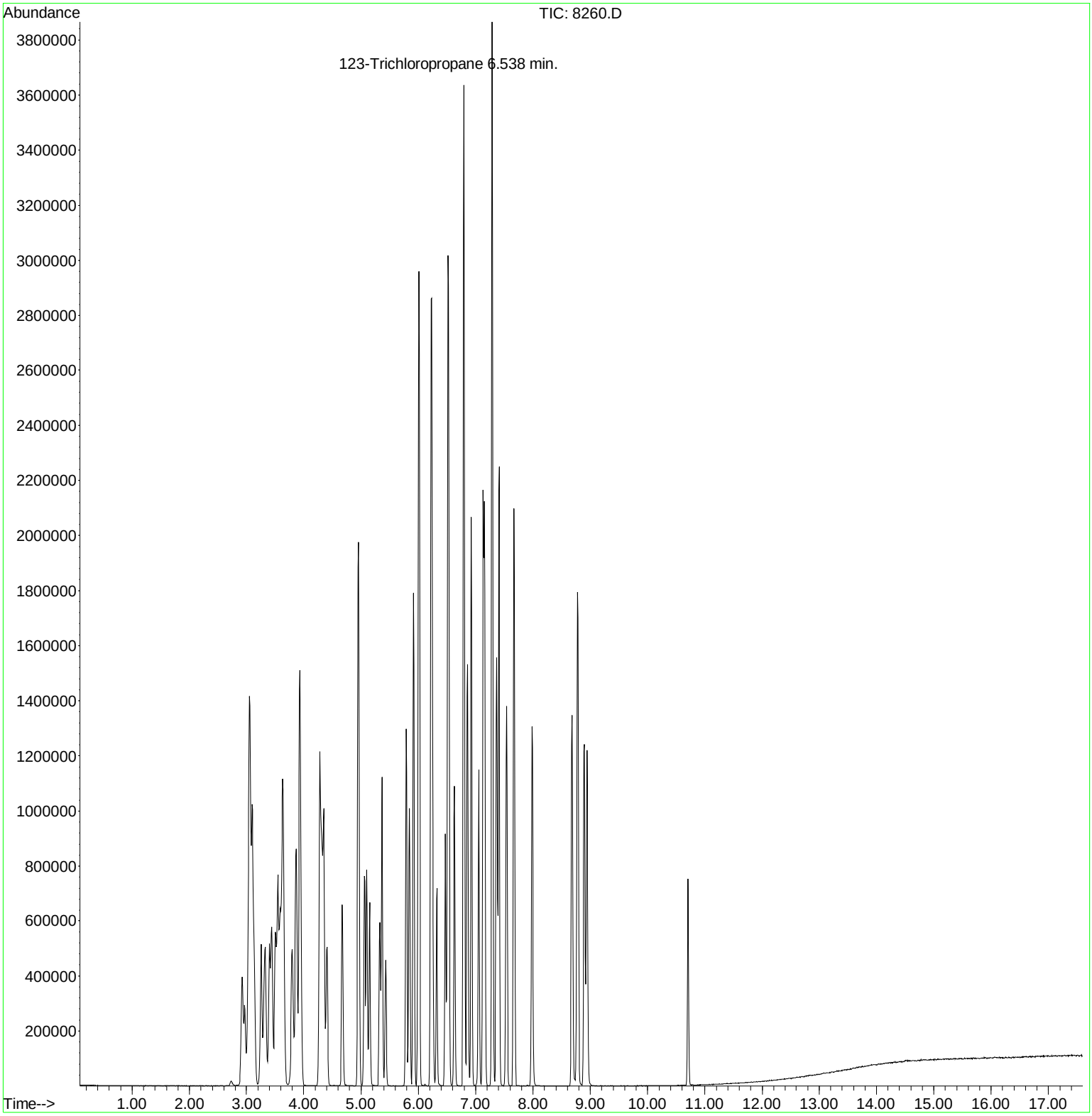
Quantitation Report (QT Reviewed).

Data File : C:\MSDCHEM\#11\20212168-FCL\12168FCL\SVOCSTD5.D Vial: 5
Acq On : 4 Nov 2009 12:47 pm Operator: FN
Sample : Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: jwint.p
Quant Time: Nov 11 16:07 2009 Quant Results File: A1_11_123TRICI

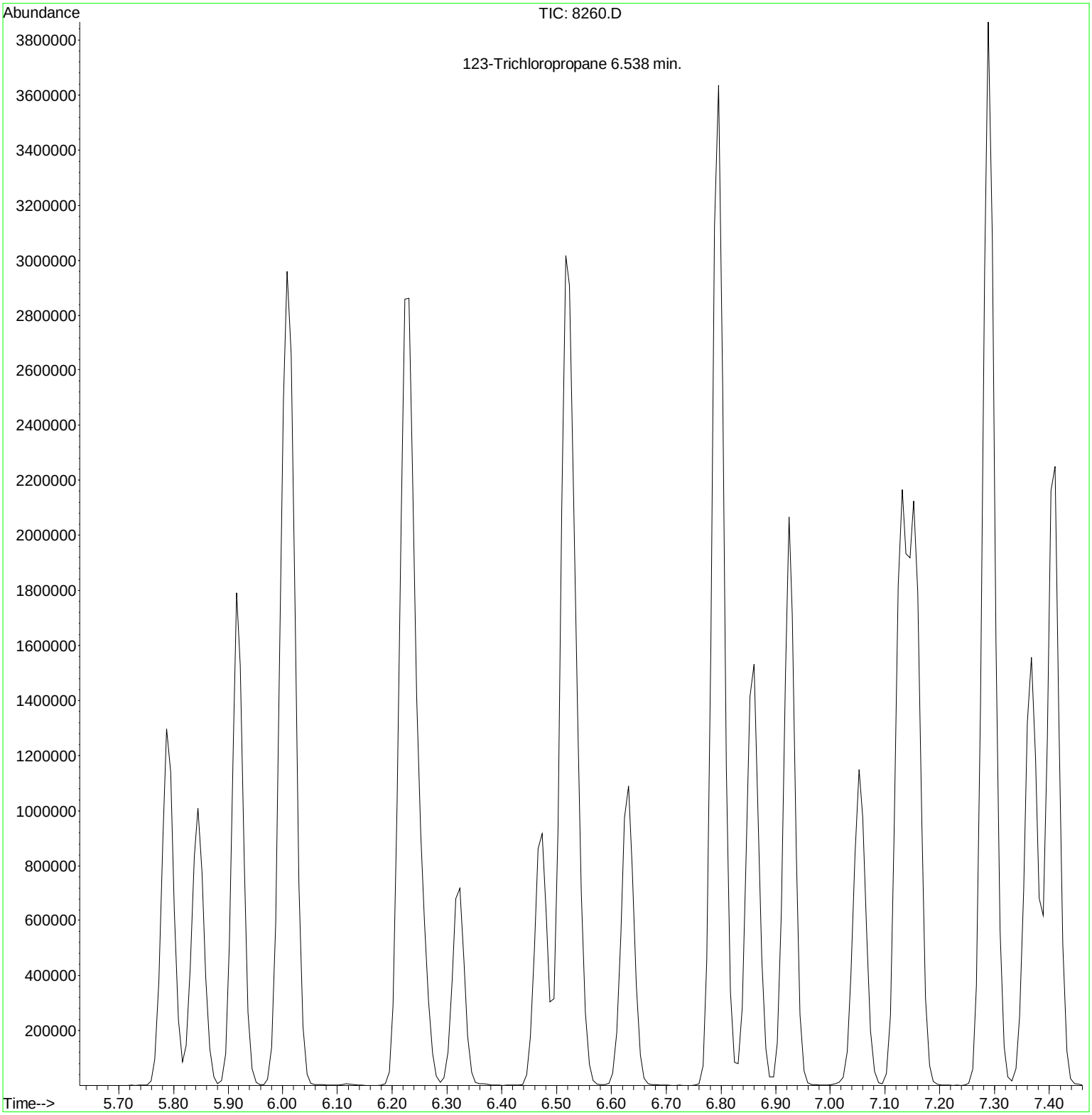
Method : C:\MSDCHEM\1\METHODS\A1_11_123TRICHLOROPROPANE.M (RTE Integra
Title : Gore Expanded Target VOCs/SVOCs
Last Update : Wed Nov 11 15:52:34 2009
Response via : Initial Calibration



File : C:\MSDCHEM\#11\20212168-FCL\12168FCL\8260.D
Operator : FN
Acquired : 6 Nov 2009 12:09 pm using AcqMethod VCGS3-11
Instrument : Instrumen
Sample Name:
Misc Info :
Vial Number: 100



File : C:\MSDCHEM\#11\20212168-FCL\12168FCL\8260.D
Operator : FN
Acquired : 6 Nov 2009 12:09 pm using AcqMethod VCGS3-11
Instrument : Instrumen
Sample Name:
Misc Info :
Vial Number: 100



Reference Standard Percent Recovery Report

REFSVOC1.D

Compound	Amount	% Recovery	Acceptance Limits
Methyl t-butyl ether	8.11	81.1	(50 - 150)
1,1-Dichloroethene	7.57	75.7	(50 - 150)
trans-1,2-Dichloroethene	8.05	80.5	(50 - 150)
1,1-Dichloroethane	7.95	79.5	(50 - 150)
cis-1,2-Dichloroethene	7.90	79.0	(50 - 150)
Chloroform	8.13	81.3	(50 - 150)
1,1,1-Trichloroethane	7.95	79.5	(50 - 150)
1,2-Dichloroethane	8.16	81.6	(50 - 150)
Benzene	8.86	88.6	(50 - 150)
Carbon tetrachloride	8.43	84.3	(50 - 150)
Trichloroethene	8.00	80.0	(50 - 150)
1,1,2-Trichloroethane	8.44	84.4	(50 - 150)
Toluene	8.92	89.2	(50 - 150)
Octane	8.86	88.6	(50 - 150)
Tetrachloroethene	8.08	80.8	(50 - 150)
Chlorobenzene	8.67	86.7	(50 - 150)
1,1,1,2-Tetrachloroethane	8.45	84.5	(50 - 150)
Ethylbenzene	9.53	95.3	(50 - 150)
m,p-Xylene	9.45	94.5	(50 - 150)
o-Xylene	9.41	94.1	(50 - 150)
1,1,2,2-Tetrachloroethane	9.06	90.6	(50 - 150)
1,2,3-Trichloropropane	0.00	N/A	N/A
1,3,5-Trimethylbenzene	10.48	104.8	(50 - 150)
1,2,4-Trimethylbenzene	9.93	99.3	(50 - 150)
1,3-Dichlorobenzene	9.01	90.1	(50 - 150)
1,4-Dichlorobenzene	9.16	91.6	(50 - 150)
1,2-Dichlorobenzene	9.06	90.6	(50 - 150)
Undecane	9.82	98.2	(50 - 150)
Naphthalene	10.09	100.9	(50 - 150)
Tridecane	9.63	96.3	(50 - 150)
2-Methyl naphthalene	9.34	93.4	(50 - 150)
Pentadecane	9.88	98.8	(50 - 150)

Reference Standard Percent Recovery Report

REFSVOC2.D

Compound	Amount	% Recovery	Acceptance Limits
Methyl t-butyl ether	8.33	83.3	(50 - 150)
1,1-Dichloroethene	7.17	71.7	(50 - 150)
trans-1,2-Dichloroethene	8.04	80.4	(50 - 150)
1,1-Dichloroethane	7.94	79.4	(50 - 150)
cis-1,2-Dichloroethene	7.96	79.6	(50 - 150)
Chloroform	8.14	81.4	(50 - 150)
1,1,1-Trichloroethane	7.92	79.2	(50 - 150)
1,2-Dichloroethane	8.25	82.5	(50 - 150)
Benzene	8.94	89.4	(50 - 150)
Carbon tetrachloride	8.57	85.7	(50 - 150)
Trichloroethene	8.05	80.5	(50 - 150)
1,1,2-Trichloroethane	8.65	86.5	(50 - 150)
Toluene	9.15	91.5	(50 - 150)
Octane	9.06	90.6	(50 - 150)
Tetrachloroethene	8.30	83.0	(50 - 150)
Chlorobenzene	8.98	89.8	(50 - 150)
1,1,1,2-Tetrachloroethane	8.72	87.2	(50 - 150)
Ethylbenzene	9.85	98.5	(50 - 150)
m,p-Xylene	9.80	98.0	(50 - 150)
o-Xylene	9.75	97.5	(50 - 150)
1,1,2,2-Tetrachloroethane	9.44	94.4	(50 - 150)
1,2,3-Trichloropropane	0.00	N/A	N/A
1,3,5-Trimethylbenzene	10.76	107.6	(50 - 150)
1,2,4-Trimethylbenzene	10.28	102.8	(50 - 150)
1,3-Dichlorobenzene	9.33	93.3	(50 - 150)
1,4-Dichlorobenzene	9.57	95.7	(50 - 150)
1,2-Dichlorobenzene	9.31	93.1	(50 - 150)
Undecane	10.18	101.8	(50 - 150)
Naphthalene	10.35	103.5	(50 - 150)
Tridecane	10.04	100.4	(50 - 150)
2-Methyl naphthalene	9.64	96.4	(50 - 150)
Pentadecane	10.23	102.3	(50 - 150)

Reference Standard Percent Recovery Report

REFSVOC3.D

Compound	Amount	% Recovery	Acceptance Limits
Methyl t-butyl ether	7.95	79.5	(50 - 150)
1,1-Dichloroethene	7.74	77.4	(50 - 150)
trans-1,2-Dichloroethene	8.06	80.6	(50 - 150)
1,1-Dichloroethane	7.95	79.5	(50 - 150)
cis-1,2-Dichloroethene	7.91	79.1	(50 - 150)
Chloroform	8.08	80.8	(50 - 150)
1,1,1-Trichloroethane	7.81	78.1	(50 - 150)
1,2-Dichloroethane	8.07	80.7	(50 - 150)
Benzene	8.84	88.4	(50 - 150)
Carbon tetrachloride	8.40	84.0	(50 - 150)
Trichloroethene	7.91	79.1	(50 - 150)
1,1,2-Trichloroethane	8.38	83.8	(50 - 150)
Toluene	8.82	88.2	(50 - 150)
Octane	8.80	88.0	(50 - 150)
Tetrachloroethene	8.10	81.0	(50 - 150)
Chlorobenzene	8.73	87.3	(50 - 150)
1,1,1,2-Tetrachloroethane	8.46	84.6	(50 - 150)
Ethylbenzene	9.60	96.0	(50 - 150)
m,p-Xylene	9.51	95.1	(50 - 150)
o-Xylene	9.45	94.5	(50 - 150)
1,1,2,2-Tetrachloroethane	9.17	91.7	(50 - 150)
1,2,3-Trichloropropane	0.00	N/A	N/A
1,3,5-Trimethylbenzene	10.39	103.9	(50 - 150)
1,2,4-Trimethylbenzene	10.00	100.0	(50 - 150)
1,3-Dichlorobenzene	9.11	91.1	(50 - 150)
1,4-Dichlorobenzene	9.34	93.4	(50 - 150)
1,2-Dichlorobenzene	9.17	91.7	(50 - 150)
Undecane	9.91	99.1	(50 - 150)
Naphthalene	10.18	101.8	(50 - 150)
Tridecane	9.77	97.7	(50 - 150)
2-Methyl naphthalene	9.41	94.1	(50 - 150)
Pentadecane	10.23	102.3	(50 - 150)

Reference Standard Percent Recovery Report

REFSVOC4.D

Compound	Amount	% Recovery	Acceptance Limits
Methyl t-butyl ether	8.11	81.1	(50 - 150)
1,1-Dichloroethene	7.68	76.8	(50 - 150)
trans-1,2-Dichloroethene	8.28	82.8	(50 - 150)
1,1-Dichloroethane	8.10	81.0	(50 - 150)
cis-1,2-Dichloroethene	7.98	79.8	(50 - 150)
Chloroform	8.20	82.0	(50 - 150)
1,1,1-Trichloroethane	7.98	79.8	(50 - 150)
1,2-Dichloroethane	8.13	81.3	(50 - 150)
Benzene	9.01	90.1	(50 - 150)
Carbon tetrachloride	8.52	85.2	(50 - 150)
Trichloroethene	8.11	81.1	(50 - 150)
1,1,2-Trichloroethane	8.54	85.4	(50 - 150)
Toluene	9.21	92.1	(50 - 150)
Octane	9.11	91.1	(50 - 150)
Tetrachloroethene	8.35	83.5	(50 - 150)
Chlorobenzene	9.00	90.0	(50 - 150)
1,1,1,2-Tetrachloroethane	8.76	87.6	(50 - 150)
Ethylbenzene	9.94	99.4	(50 - 150)
m,p-Xylene	9.82	98.2	(50 - 150)
o-Xylene	9.80	98.0	(50 - 150)
1,1,2,2-Tetrachloroethane	9.48	94.8	(50 - 150)
1,2,3-Trichloropropane	0.00	N/A	N/A
1,3,5-Trimethylbenzene	10.79	107.9	(50 - 150)
1,2,4-Trimethylbenzene	10.38	103.8	(50 - 150)
1,3-Dichlorobenzene	9.43	94.3	(50 - 150)
1,4-Dichlorobenzene	9.66	96.6	(50 - 150)
1,2-Dichlorobenzene	9.53	95.3	(50 - 150)
Undecane	10.15	101.5	(50 - 150)
Naphthalene	10.61	106.1	(50 - 150)
Tridecane	10.08	100.8	(50 - 150)
2-Methyl naphthalene	9.97	99.7	(50 - 150)
Pentadecane	10.80	108.0	(50 - 150)

Reference Standard Percent Recovery Report

REFSVOC5.D

Compound	Amount	% Recovery	Acceptance Limits
Methyl t-butyl ether	7.39	73.9	(50 - 150)
1,1-Dichloroethene	7.54	75.4	(50 - 150)
trans-1,2-Dichloroethene	8.08	80.8	(50 - 150)
1,1-Dichloroethane	7.78	77.8	(50 - 150)
cis-1,2-Dichloroethene	7.78	77.8	(50 - 150)
Chloroform	7.91	79.1	(50 - 150)
1,1,1-Trichloroethane	7.62	76.2	(50 - 150)
1,2-Dichloroethane	7.83	78.3	(50 - 150)
Benzene	8.67	86.7	(50 - 150)
Carbon tetrachloride	8.14	81.4	(50 - 150)
Trichloroethene	7.79	77.9	(50 - 150)
1,1,2-Trichloroethane	8.11	81.1	(50 - 150)
Toluene	8.71	87.1	(50 - 150)
Octane	8.58	85.8	(50 - 150)
Tetrachloroethene	7.89	78.9	(50 - 150)
Chlorobenzene	8.49	84.9	(50 - 150)
1,1,1,2-Tetrachloroethane	8.25	82.5	(50 - 150)
Ethylbenzene	9.38	93.8	(50 - 150)
m,p-Xylene	9.30	93.0	(50 - 150)
o-Xylene	9.31	93.1	(50 - 150)
1,1,2,2-Tetrachloroethane	9.02	90.2	(50 - 150)
1,2,3-Trichloropropane	0.00	N/A	N/A
1,3,5-Trimethylbenzene	10.24	102.4	(50 - 150)
1,2,4-Trimethylbenzene	9.85	98.5	(50 - 150)
1,3-Dichlorobenzene	9.07	90.7	(50 - 150)
1,4-Dichlorobenzene	9.22	92.2	(50 - 150)
1,2-Dichlorobenzene	9.15	91.5	(50 - 150)
Undecane	9.63	96.3	(50 - 150)
Naphthalene	10.34	103.4	(50 - 150)
Tridecane	9.60	96.0	(50 - 150)
2-Methyl naphthalene	9.74	97.4	(50 - 150)
Pentadecane	9.88	98.8	(50 - 150)

Reference Standard Percent Recovery Report

REFSVOC6.D

Compound	Amount	% Recovery	Acceptance Limits
Methyl t-butyl ether	7.62	76.2	(50 - 150)
1,1-Dichloroethene	7.60	76.0	(50 - 150)
trans-1,2-Dichloroethene	8.30	83.0	(50 - 150)
1,1-Dichloroethane	8.15	81.5	(50 - 150)
cis-1,2-Dichloroethene	8.02	80.2	(50 - 150)
Chloroform	8.28	82.8	(50 - 150)
1,1,1-Trichloroethane	7.90	79.0	(50 - 150)
1,2-Dichloroethane	8.16	81.6	(50 - 150)
Benzene	9.08	90.8	(50 - 150)
Carbon tetrachloride	8.43	84.3	(50 - 150)
Trichloroethene	8.21	82.1	(50 - 150)
1,1,2-Trichloroethane	8.57	85.7	(50 - 150)
Toluene	9.20	92.0	(50 - 150)
Octane	9.06	90.6	(50 - 150)
Tetrachloroethene	8.39	83.9	(50 - 150)
Chlorobenzene	9.05	90.5	(50 - 150)
1,1,1,2-Tetrachloroethane	8.72	87.2	(50 - 150)
Ethylbenzene	9.97	99.7	(50 - 150)
m,p-Xylene	9.87	98.7	(50 - 150)
o-Xylene	9.76	97.6	(50 - 150)
1,1,2,2-Tetrachloroethane	9.62	96.2	(50 - 150)
1,2,3-Trichloropropane	0.00	N/A	N/A
1,3,5-Trimethylbenzene	10.73	107.3	(50 - 150)
1,2,4-Trimethylbenzene	10.32	103.2	(50 - 150)
1,3-Dichlorobenzene	9.61	96.1	(50 - 150)
1,4-Dichlorobenzene	9.76	97.6	(50 - 150)
1,2-Dichlorobenzene	9.66	96.6	(50 - 150)
Undecane	10.16	101.6	(50 - 150)
Naphthalene	10.75	107.5	(50 - 150)
Tridecane	10.01	100.1	(50 - 150)
2-Methyl naphthalene	10.05	100.5	(50 - 150)
Pentadecane	10.99	109.9	(50 - 150)

Reference Standard Percent Recovery Report

REFSVOC7.D

Compound	Amount	% Recovery	Acceptance Limits
Methyl t-butyl ether	7.96	79.6	(50 - 150)
1,1-Dichloroethene	8.74	87.4	(50 - 150)
trans-1,2-Dichloroethene	9.11	91.1	(50 - 150)
1,1-Dichloroethane	9.07	90.7	(50 - 150)
cis-1,2-Dichloroethene	8.90	89.0	(50 - 150)
Chloroform	9.13	91.3	(50 - 150)
1,1,1-Trichloroethane	8.61	86.1	(50 - 150)
1,2-Dichloroethane	8.96	89.6	(50 - 150)
Benzene	10.05	100.5	(50 - 150)
Carbon tetrachloride	9.22	92.2	(50 - 150)
Trichloroethene	9.07	90.7	(50 - 150)
1,1,2-Trichloroethane	9.30	93.0	(50 - 150)
Toluene	9.94	99.4	(50 - 150)
Octane	9.90	99.0	(50 - 150)
Tetrachloroethene	9.18	91.8	(50 - 150)
Chlorobenzene	9.81	98.1	(50 - 150)
1,1,1,2-Tetrachloroethane	9.46	94.6	(50 - 150)
Ethylbenzene	10.71	107.1	(50 - 150)
m,p-Xylene	10.62	106.2	(50 - 150)
o-Xylene	10.53	105.3	(50 - 150)
1,1,2,2-Tetrachloroethane	10.26	102.6	(50 - 150)
1,2,3-Trichloropropane	0.00	N/A	N/A
1,3,5-Trimethylbenzene	11.44	114.4	(50 - 150)
1,2,4-Trimethylbenzene	10.96	109.6	(50 - 150)
1,3-Dichlorobenzene	10.16	101.6	(50 - 150)
1,4-Dichlorobenzene	10.31	103.1	(50 - 150)
1,2-Dichlorobenzene	10.24	102.4	(50 - 150)
Undecane	10.83	108.3	(50 - 150)
Naphthalene	11.38	113.8	(50 - 150)
Tridecane	10.77	107.7	(50 - 150)
2-Methyl naphthalene	10.61	106.1	(50 - 150)
Pentadecane	10.93	109.3	(50 - 150)

Reference Standard Percent Recovery Report

REFSVOC8.D

Compound	Amount	% Recovery	Acceptance Limits
Methyl t-butyl ether	8.13	81.3	(50 - 150)
1,1-Dichloroethene	8.96	89.6	(50 - 150)
trans-1,2-Dichloroethene	9.26	92.6	(50 - 150)
1,1-Dichloroethane	9.29	92.9	(50 - 150)
cis-1,2-Dichloroethene	9.14	91.4	(50 - 150)
Chloroform	9.38	93.8	(50 - 150)
1,1,1-Trichloroethane	8.87	88.7	(50 - 150)
1,2-Dichloroethane	9.13	91.3	(50 - 150)
Benzene	10.19	101.9	(50 - 150)
Carbon tetrachloride	9.41	94.1	(50 - 150)
Trichloroethene	9.22	92.2	(50 - 150)
1,1,2-Trichloroethane	9.49	94.9	(50 - 150)
Toluene	10.07	100.7	(50 - 150)
Octane	10.05	100.5	(50 - 150)
Tetrachloroethene	9.25	92.5	(50 - 150)
Chlorobenzene	9.93	99.3	(50 - 150)
1,1,1,2-Tetrachloroethane	9.68	96.8	(50 - 150)
Ethylbenzene	10.90	109.0	(50 - 150)
m,p-Xylene	10.85	108.5	(50 - 150)
o-Xylene	10.72	107.2	(50 - 150)
1,1,2,2-Tetrachloroethane	10.43	104.3	(50 - 150)
1,2,3-Trichloropropane	0.00	N/A	N/A
1,3,5-Trimethylbenzene	11.60	116.0	(50 - 150)
1,2,4-Trimethylbenzene	11.16	111.6	(50 - 150)
1,3-Dichlorobenzene	10.29	102.9	(50 - 150)
1,4-Dichlorobenzene	10.49	104.9	(50 - 150)
1,2-Dichlorobenzene	10.38	103.8	(50 - 150)
Undecane	10.88	108.8	(50 - 150)
Naphthalene	11.54	115.4	(50 - 150)
Tridecane	10.81	108.1	(50 - 150)
2-Methyl naphthalene	10.76	107.6	(50 - 150)
Pentadecane	11.34	113.4	(50 - 150)

Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\#11\20212168-FCL\12168FCL\BLK1.D Vial: 11
Acq On : 4 Nov 2009 3:37 pm Operator: FN
Sample : Inst : Instrumen
Misc : Multiplr: 1.00
MS Integration Params: jwint.p
Quant Time: Nov 11 15:57:29 2009 Quant Results File: A1_11_123TRICHLOI

Quant Method : C:\MSDCHEM\1...\A1_11_123TRICHLOROPROPANE.M (RTE Integrator)
Title : Gore Expanded Target VOCs/SVOCs
Last Update : Wed Nov 11 15:56:06 2009
Response via : Initial Calibration
DataAcq Meth : VCGS3-11

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
Target Compounds						Qvalue
1) Methyl t-butyl ether	3.25	73	0	N.D.		
2) 1,1-Dichloroethene	3.03	61	0	N.D.		
3) trans-1,2-Dichloroethene	3.25	61	0	N.D.		
4) 1,1-Dichloroethane	3.32	63	0	N.D.		
5) cis-1,2-Dichloroethene	3.50	61	0	N.D.		
6) Chloroform	3.61	83	0	N.D.		
7) 1,1,1-Trichloroethane	3.79	97	0	N.D.		
8) 1,2-Dichloroethane	3.85	62	0	N.D.		
9) Benzene	3.92	78	0	N.D.		
10) Carbon tetrachloride	3.94	117	0	N.D.		
11) Trichloroethene	4.27	95	0	N.D.		
12) 1,1,2-Trichloroethane	5.05	61	0	N.D.		
13) Toluene	4.95	91	0	N.D.		
14) Octane	5.25	43	0	N.D.		
15) Tetrachloroethene	5.36	166	0	N.D.		
16) Chlorobenzene	5.78	112	0	N.D.		
17) 1,1,1,2-Tetrachloroethane	5.84	131	0	N.D.		
18) Ethylbenzene	5.91	91	0	N.D.		
19) m,p-Xylene	5.99	91	0	N.D.		
20) o-Xylene	6.22	91	0	N.D.		
21) 1,1,2,2-Tetrachloroethane	6.47	83	0	N.D.		
22) 1,2,3-Trichloropropane	6.55	75	0	N.D.		
23) 1,3,5-Trimethylbenzene	6.92	105	0	N.D.		
24) 1,2,4-Trimethylbenzene	7.15	105	0	N.D.		
25) 1,3-Dichlorobenzene	7.29	146	0	N.D.		
26) 1,4-Dichlorobenzene	7.36	146	0	N.D.		
27) 1,2-Dichlorobenzene	7.53	146	0	N.D.		
28) Undecane	7.93	57	0	N.D.		
29) Naphthalene	8.78	128	0	N.D.		
30) Tridecane	9.36	57	0	N.D.		
31) 2-Methyl naphthalene	9.56	142	0	N.D.		
32) Pentadecane	10.60	57	0	N.D.		

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

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Last Update : Wed Nov 11 15:52:34 2009
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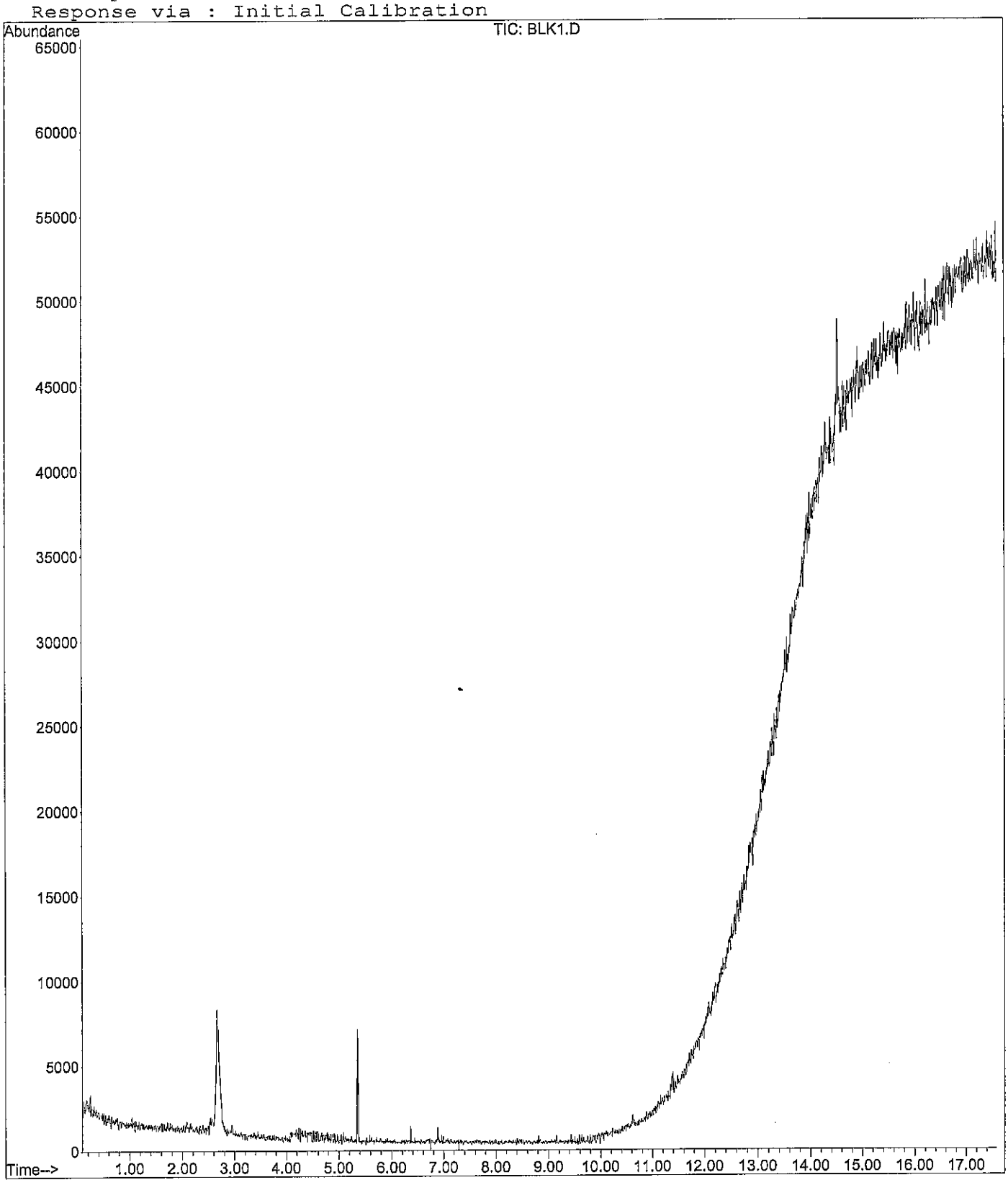

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Title : Gore Expanded Target VOCs/SVOCs
Last Update : Wed Nov 11 15:56:06 2009
Response via : Initial Calibration
DataAcq Meth : VCGS3-11

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
Target Compounds						Qvalue
1) Methyl t-butyl ether	3.25	73	0	N.D.		
2) 1,1-Dichloroethene	3.03	61	0	N.D.		
3) trans-1,2-Dichloroethene	3.25	61	0	N.D.		
4) 1,1-Dichloroethane	3.32	63	0	N.D.		
5) cis-1,2-Dichloroethene	3.50	61	0	N.D.		
6) Chloroform	3.61	83	0	N.D.		
7) 1,1,1-Trichloroethane	3.79	97	0	N.D.		
8) 1,2-Dichloroethane	3.85	62	0	N.D.		
9) Benzene	3.92	78	0	N.D.		
10) Carbon tetrachloride	3.94	117	0	N.D.		
11) Trichloroethene	4.27	95	0	N.D.		
12) 1,1,2-Trichloroethane	5.05	61	0	N.D.		
13) Toluene	4.95	91	0	N.D.		
14) Octane	5.25	43	0	N.D.		
15) Tetrachloroethene	5.36	166	0	N.D.		
16) Chlorobenzene	5.78	112	0	N.D.		
17) 1,1,1,2-Tetrachloroethane	5.84	131	0	N.D.		
18) Ethylbenzene	5.91	91	0	N.D.		
19) m,p-Xylene	5.99	91	0	N.D.		
20) o-Xylene	6.22	91	0	N.D.		
21) 1,1,2,2-Tetrachloroethane	6.47	83	0	N.D.		
22) 1,2,3-Trichloropropane	6.55	75	0	N.D.		
23) 1,3,5-Trimethylbenzene	6.92	105	0	N.D.		
24) 1,2,4-Trimethylbenzene	7.15	105	0	N.D.		
25) 1,3-Dichlorobenzene	7.29	146	0	N.D.		
26) 1,4-Dichlorobenzene	7.36	146	0	N.D.		
27) 1,2-Dichlorobenzene	7.53	146	0	N.D.		
28) Undecane	7.93	57	0	N.D.		
29) Naphthalene	8.78	128	0	N.D.		
30) Tridecane	9.36	57	0	N.D.		
31) 2-Methyl naphthalene	9.56	142	0	N.D.		
32) Pentadecane	10.60	57	0	N.D.		

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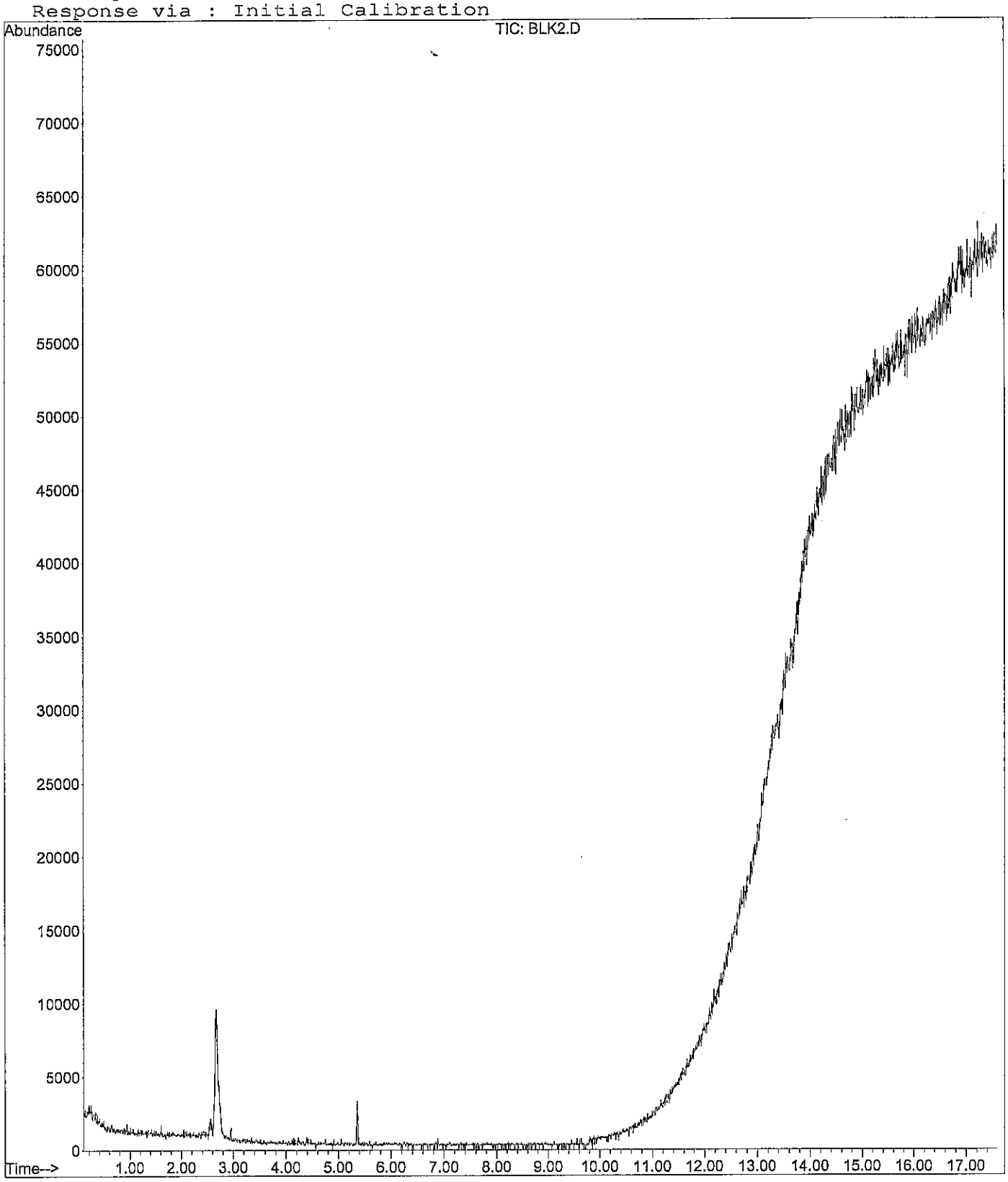

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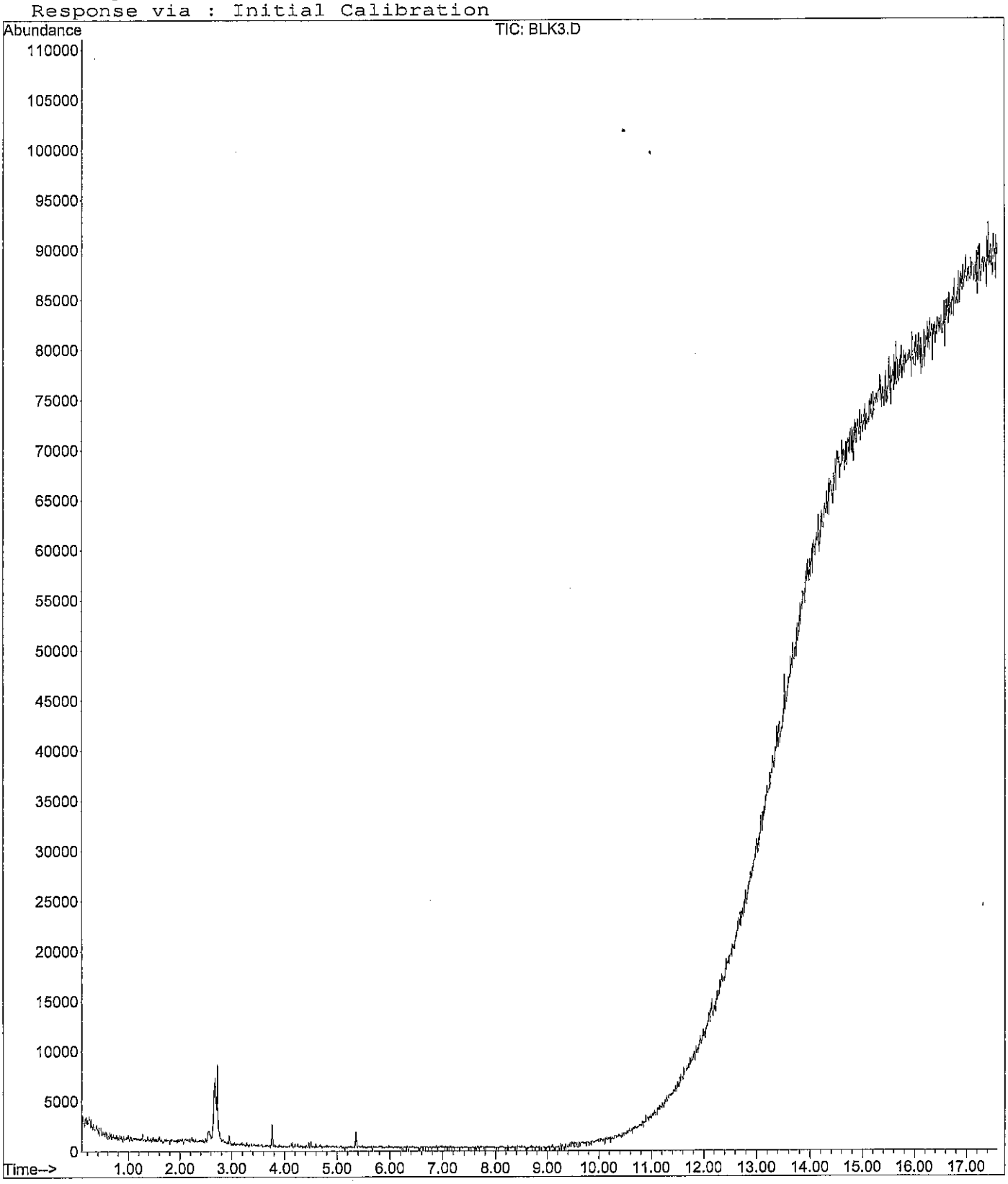

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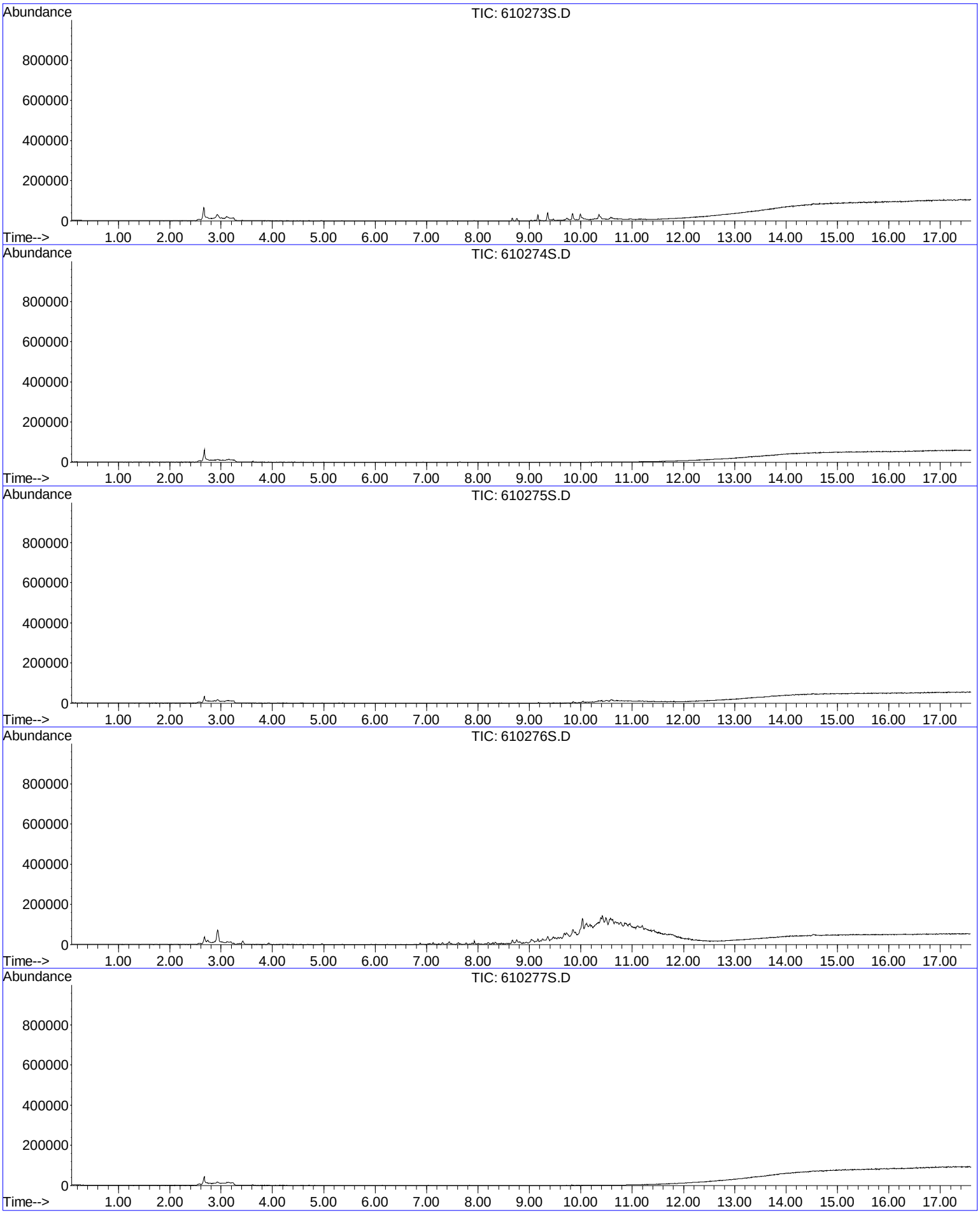

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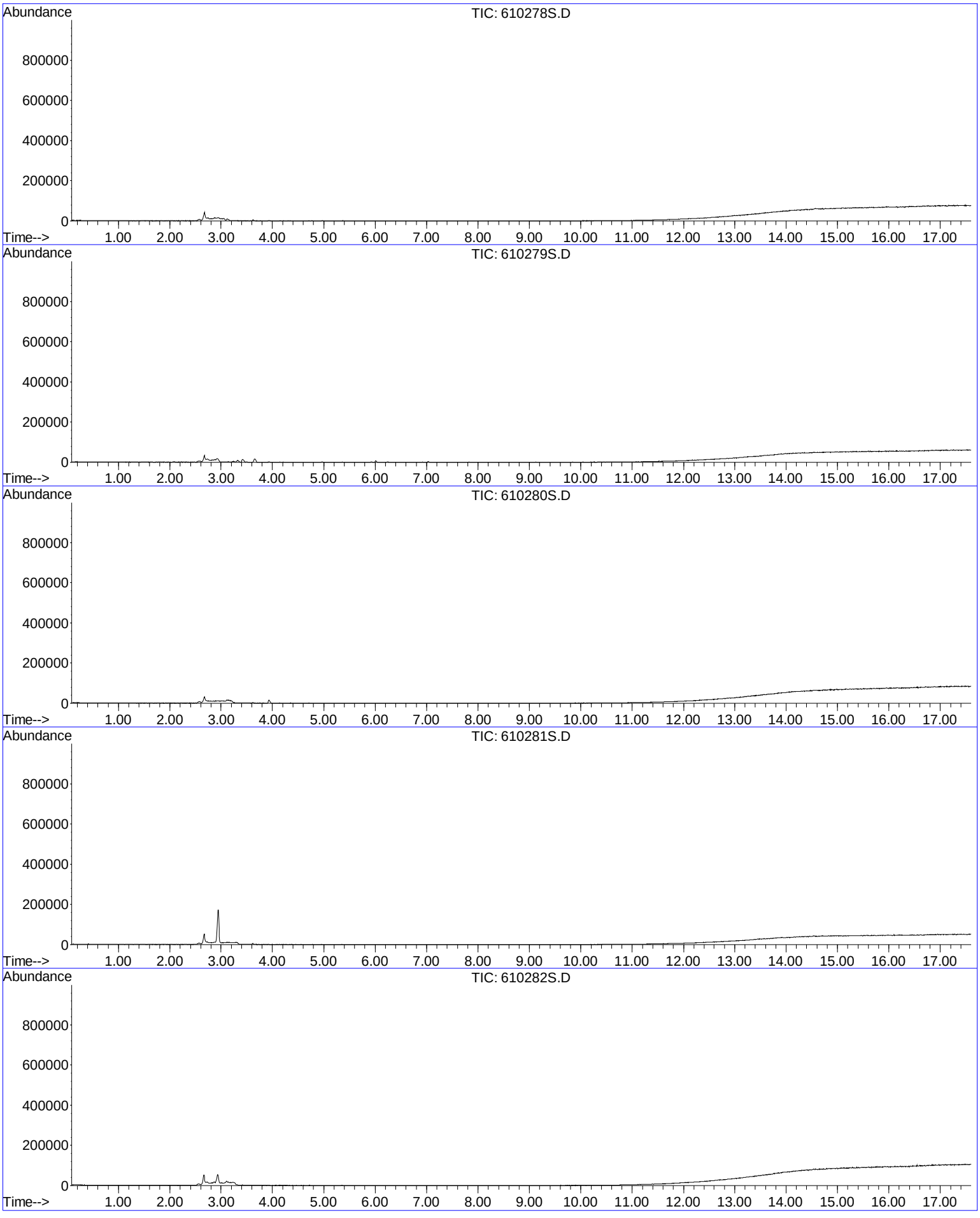

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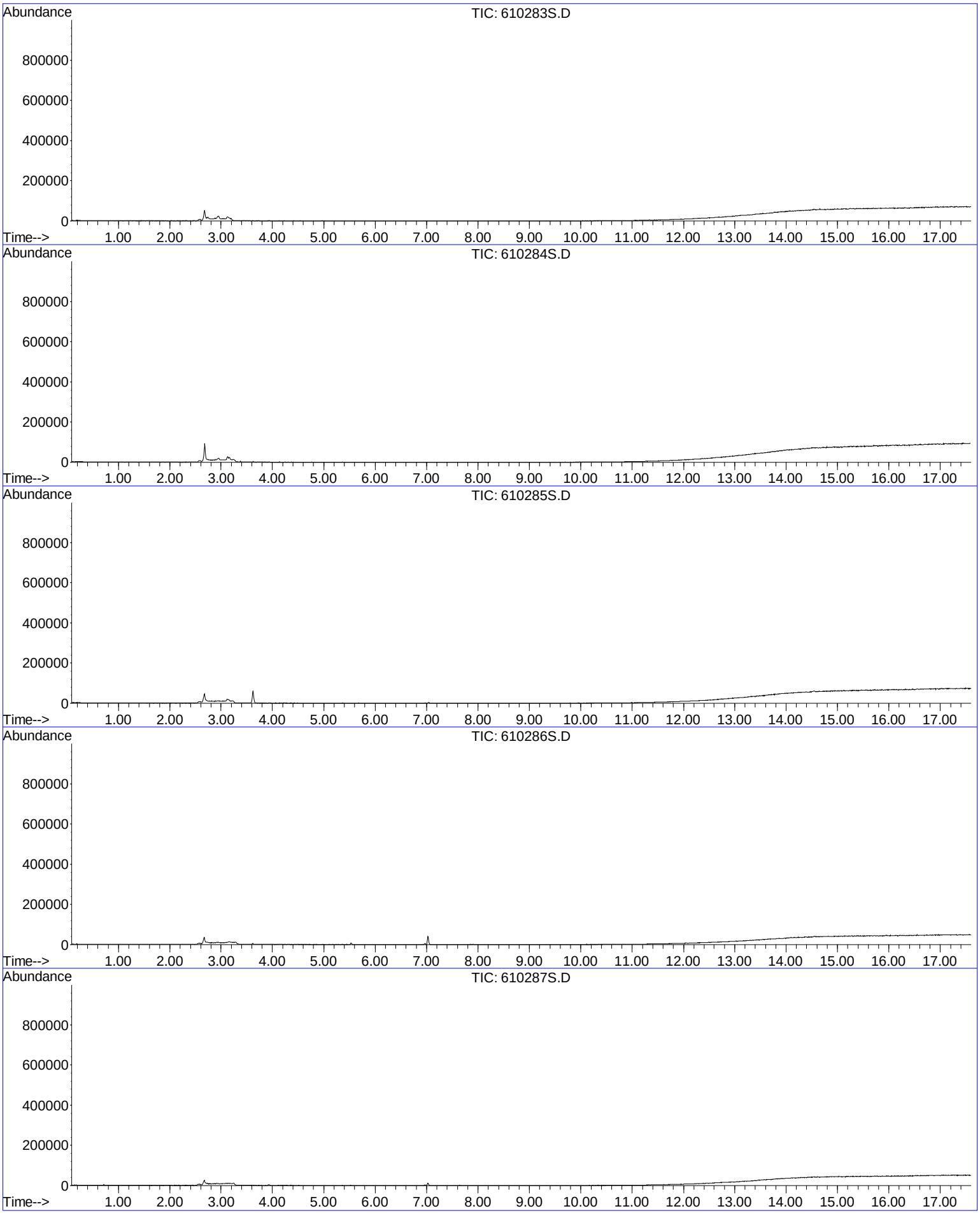

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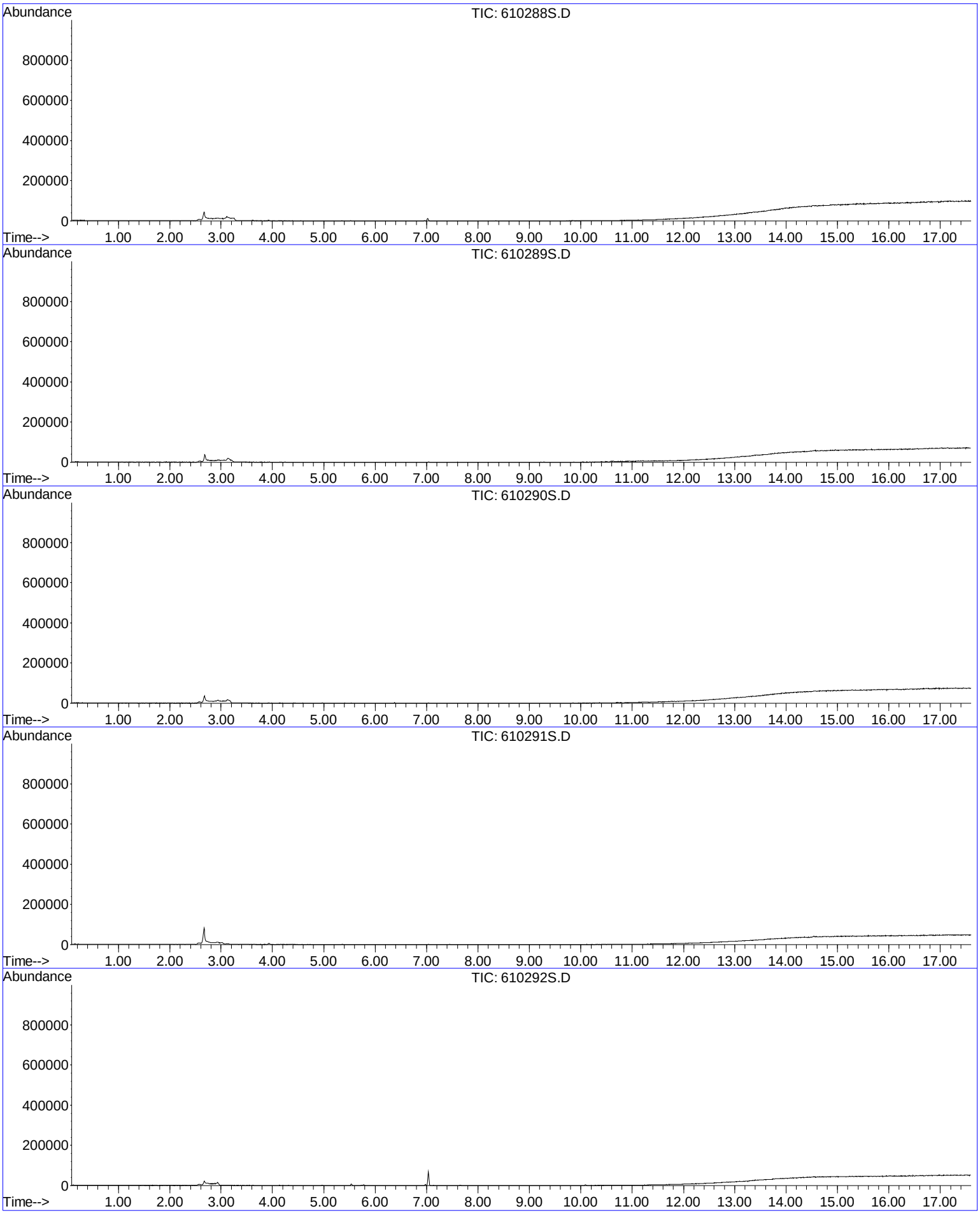

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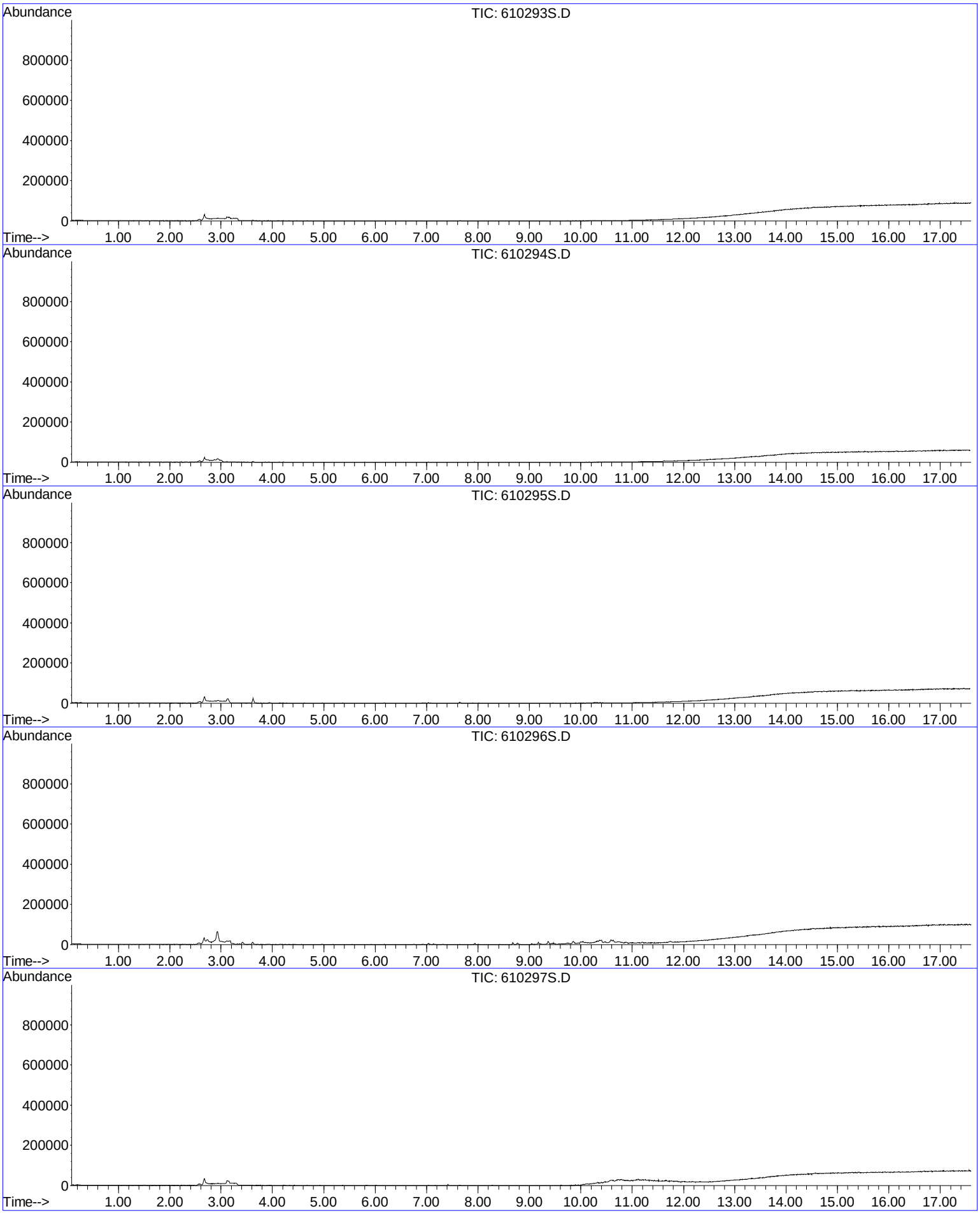

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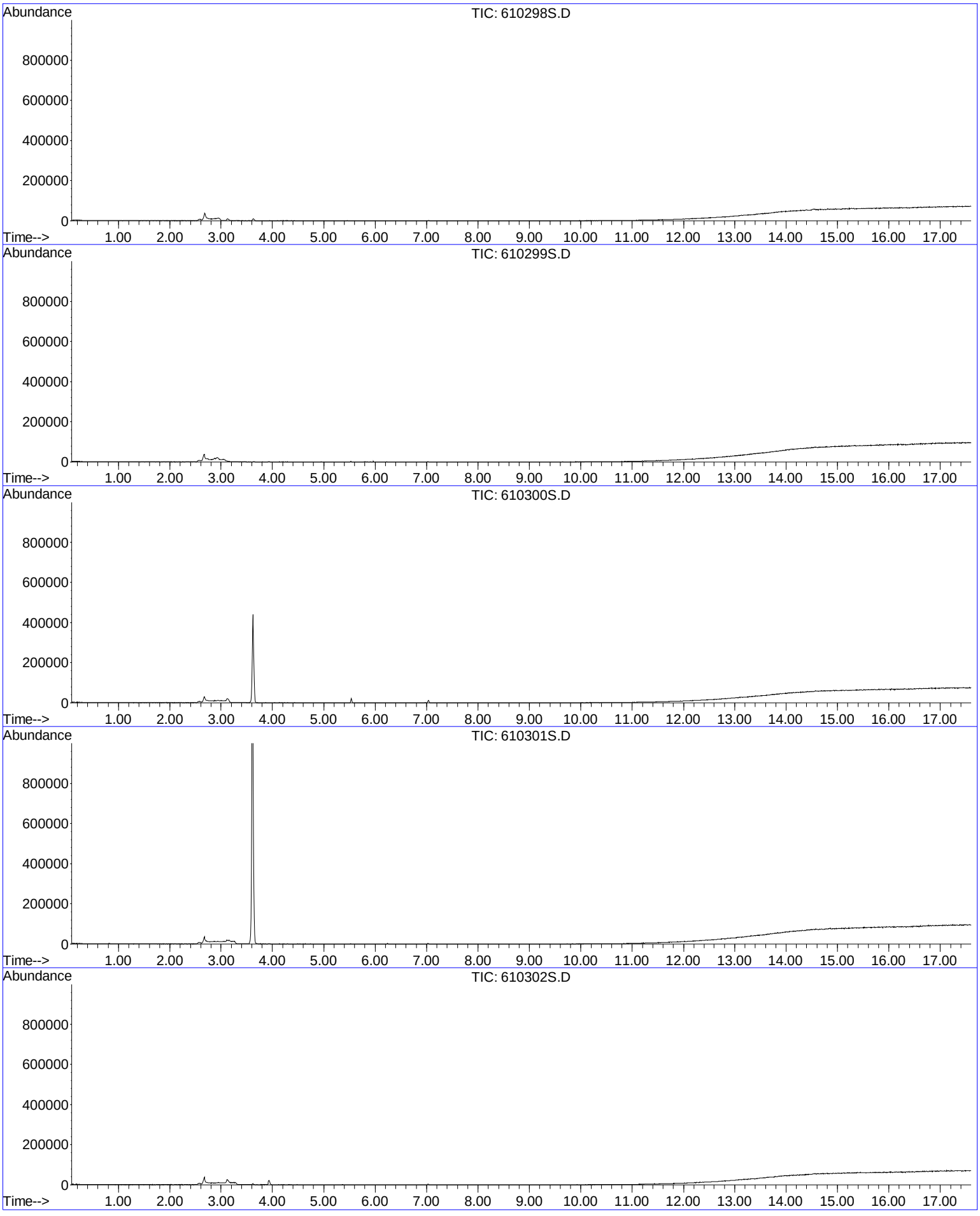

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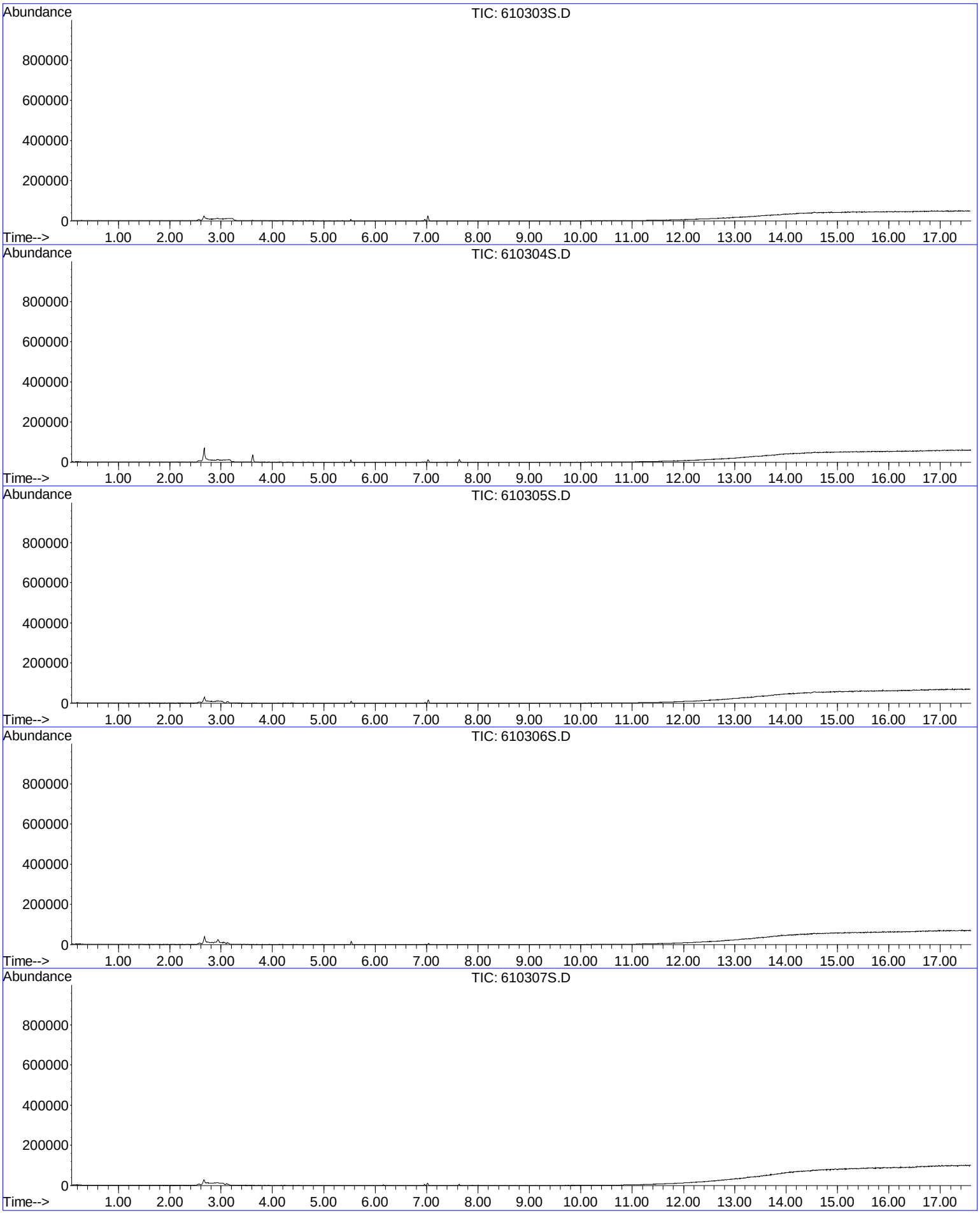

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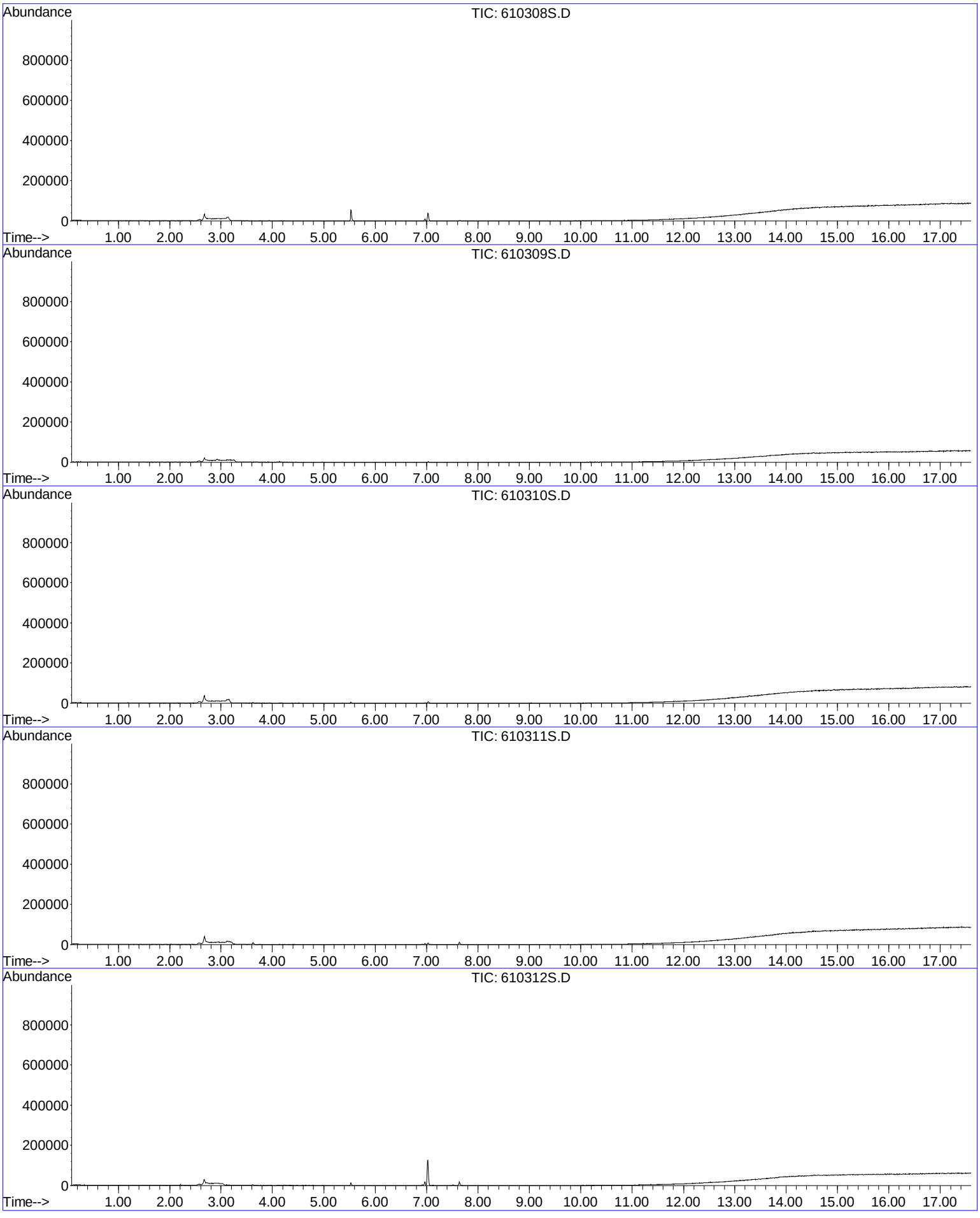

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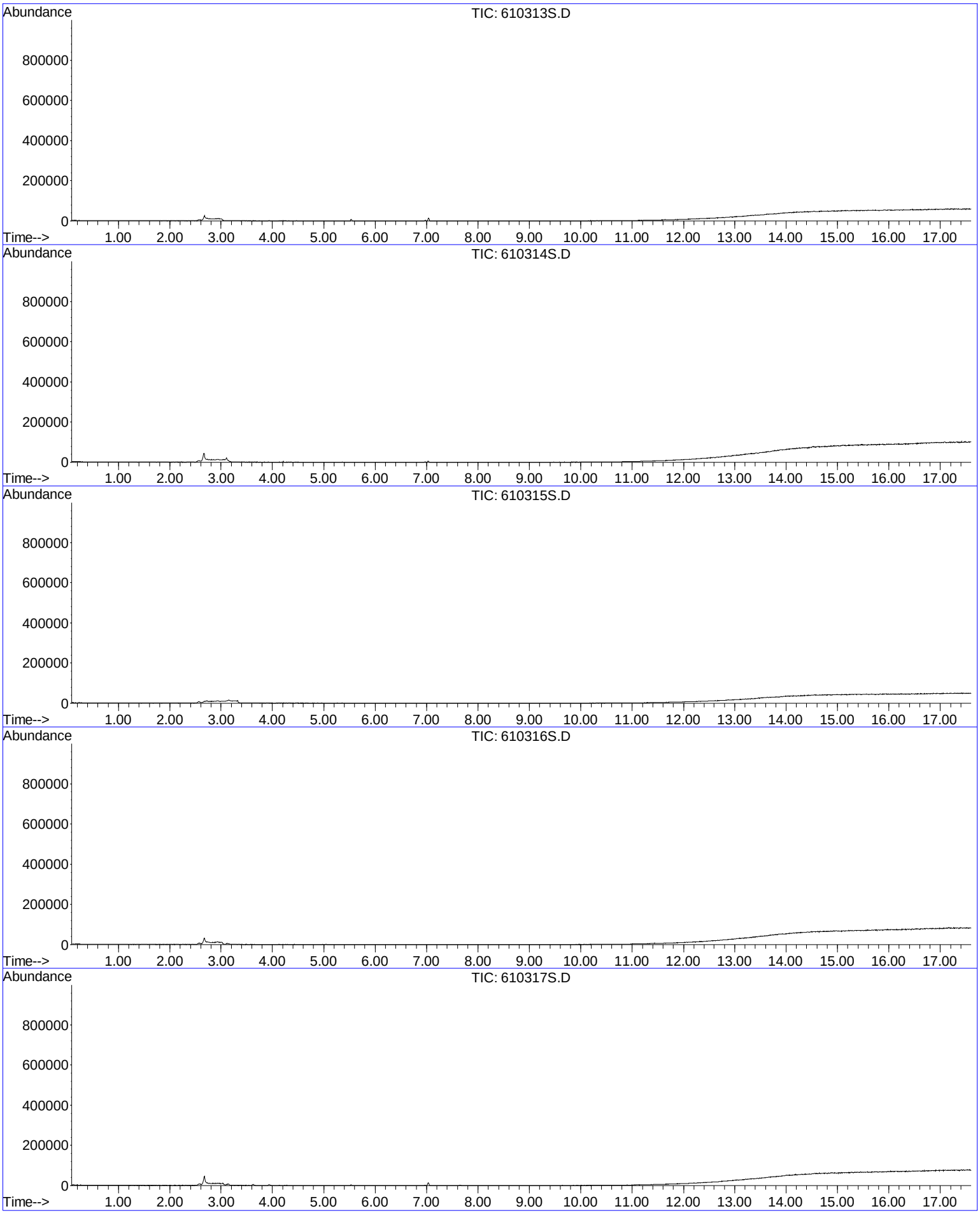

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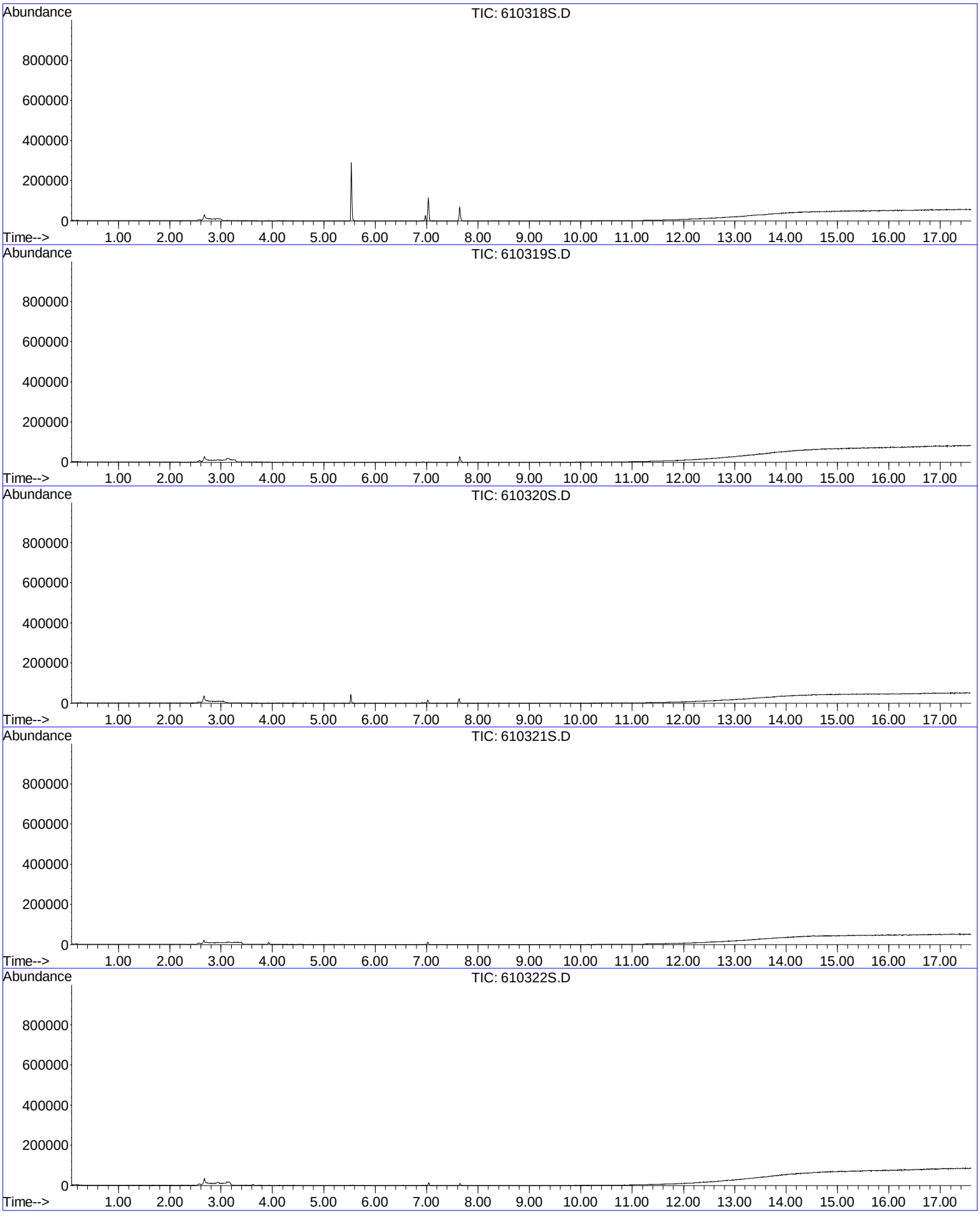

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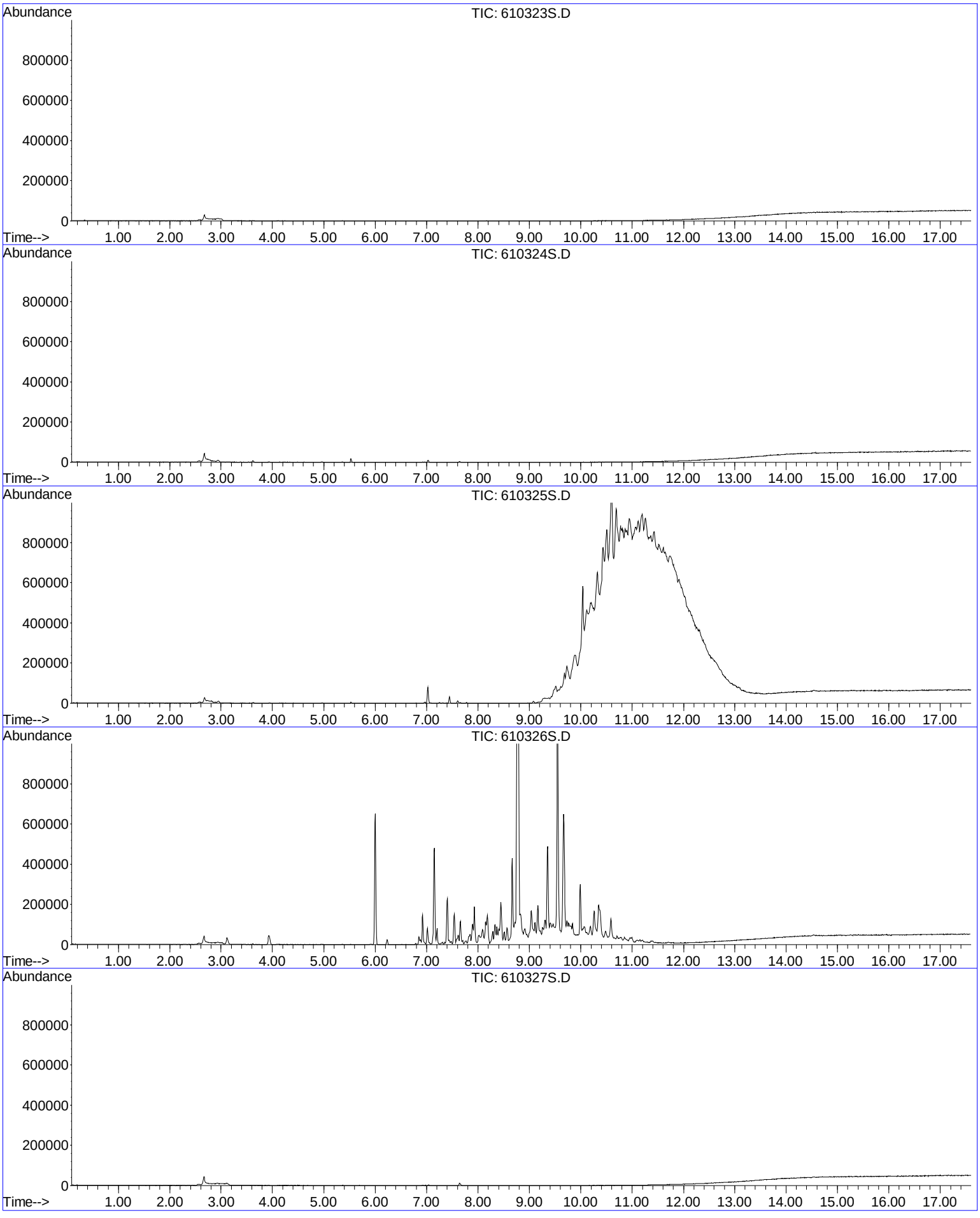

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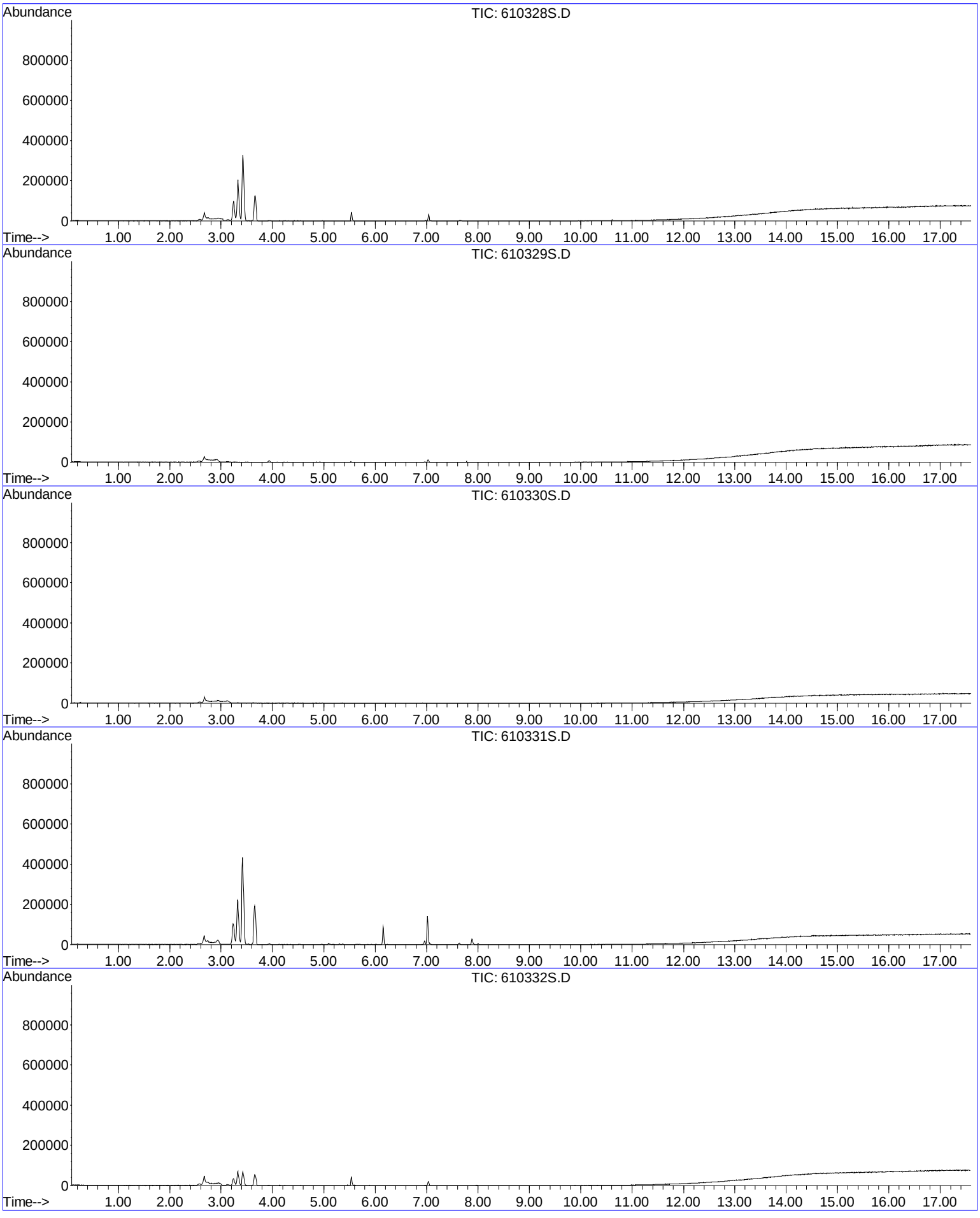

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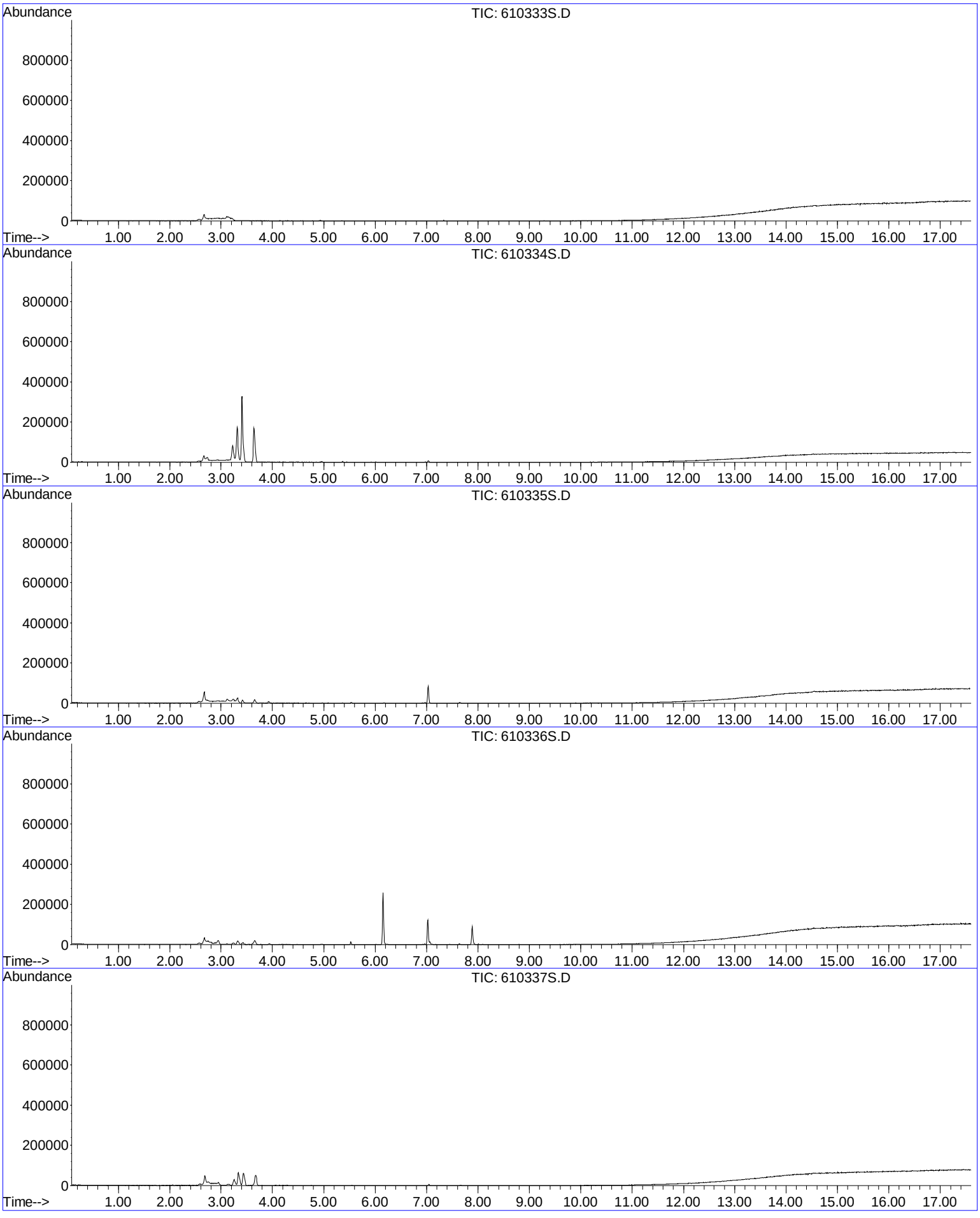

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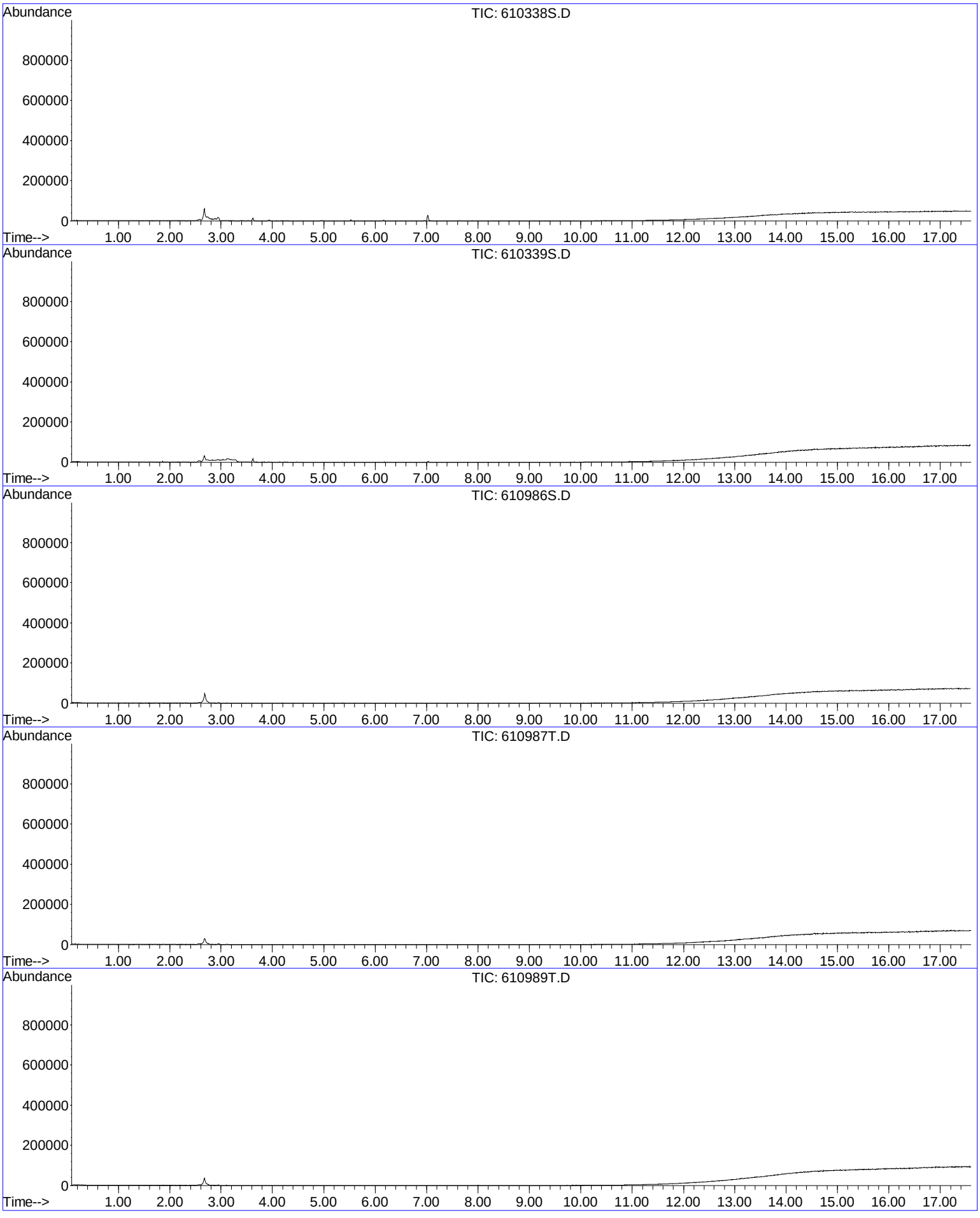

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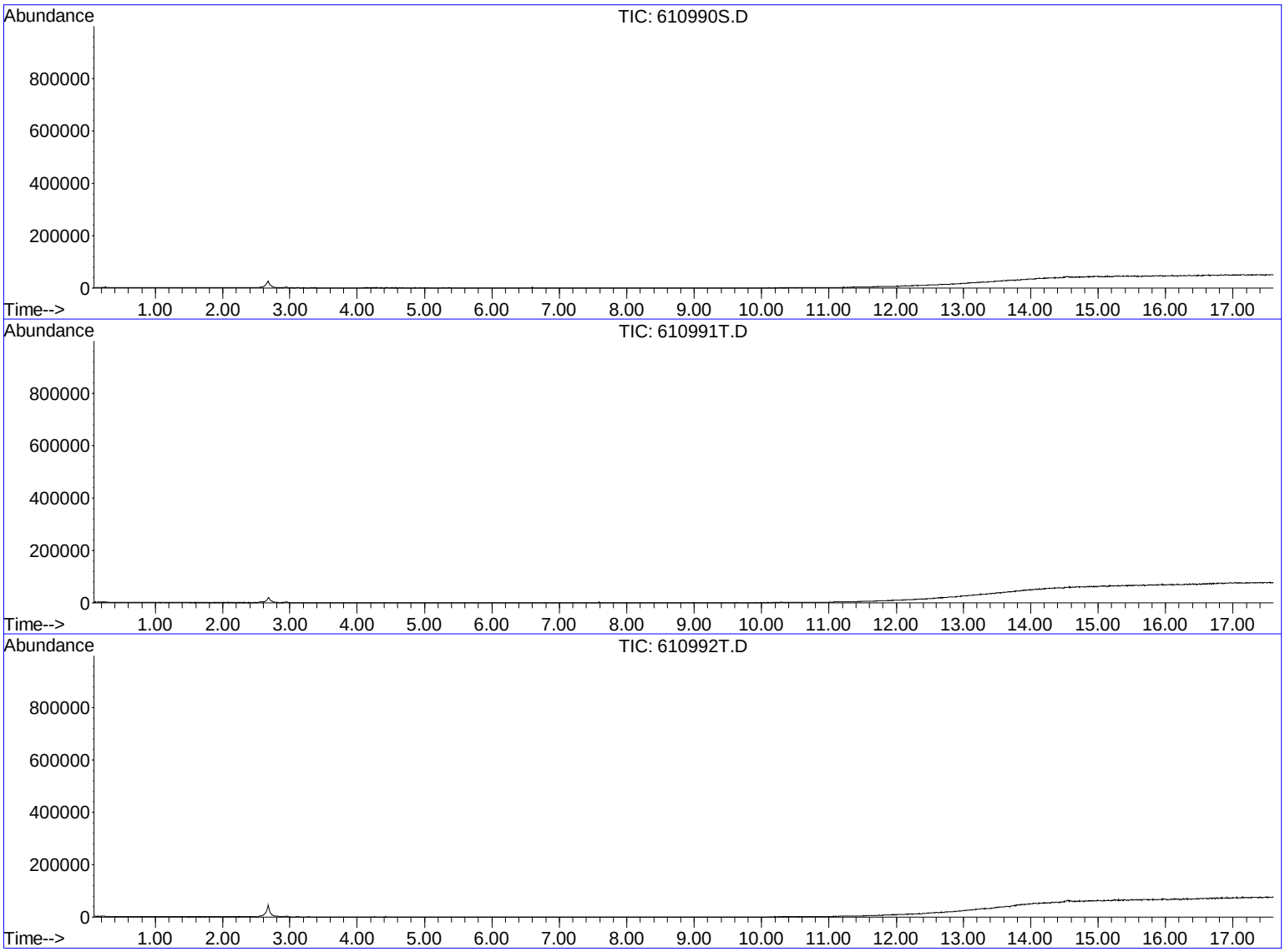

W. L. Gore & Associates, Inc.
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Phone: 410.392.7600 • 800.432.7998
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APPENDIX I

OU6 Documentation

Taku FFA Amendment

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

APR 6 2007

Reply to
Attn of: ORC-158

Colonel David L. Shutt
Department of the Army
Installation Management Agency
Directorate of Public Works
Headquarters, U.S. Army Garrison, Alaska and Fort Richardson (PROV)
724 Postal Service Loop #4580
Fort Richardson, Alaska 99505-4500

Re: Amendment to the Fort Wainwright Federal Facility Agreement under CERCLA Section 120

Dear Colonel Schutt:

I am pleased to inform you that the amendment to the Federal Facility Agreement for Fort Wainwright has now been signed by all parties and became effective upon the date of my signature.

As you are aware, EPA and the U.S. Army Garrison, Alaska (USAG-AK) proposed to amend the Fort Wainwright Federal Facility Agreement (FTW FFA) utilizing Section XXXIII (Modification/Amendment of Agreement) to add a new Operable Unit (OU) 6 to address a newly discovered contaminated area known as the Communications Site (also known as Taku Gardens Housing Expansion Area). The Alaska Department of Environmental Conservation (ADEC), a party to the original FTW FFA was fully supportive of the amendment. The original FTW FFA contained language that utilized a site-wide OU, OU5, to serve as a comprehensive post-wide document for all new or previously unresolved sources. With the discovery of the Communication Site, it is apparent to EPA, USAG-AK, and ADEC that the inclusion of new sources in OU 5 is no longer a workable solution. The Record of Decision (ROD) for OU 5, issued in 1999, can not be amended without a completed remedial investigation/feasibility study (RI/FS) of the new source and a remedy in hand. The original FTW FFA did not expressly allow the Remedial Project Managers (RPMs) to create new OUs. The proposed amendment to the FTW FFA, and Attachment I thereto, will expressly allow the RPMs to create new OUs.

This amendment to the FTW FFA is a positive step toward beginning to work through the difficult issues that surround the Communications Site. We look forward to continued progress at Fort Wainwright.

If you should have any questions, please feel free to contact my office or Dan Opalski, EPA's Director of the Environmental Cleanup Program, at (206) 553-1855.

Sincerely,

Elin D. Miller, Regional Administrator
EPA Region 10

Enclosure

cc w/enc: Talis J. Colberg, Attorney General of Alaska
Addison D. Davis, IV, Deputy Assistant of the Army (I&E)
Larry Hartig, Commissioner of ADEC
Weston Lawton, USAK JAG
Cameron Leonard, Assistant Attorney General of Alaska

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AND THE
ALASKA DEPARTMENT OF ENVIRONEMENTAL CONSERVATION
AND THE
UNITED STATES DEPARTMENT OF DEFENSE

IN THE MATTER OF:	)	AMENDMENT TO
	)	FEDERAL FACILITY AGREEMENT
The U.S. Army, 6th Infantry	)	UNDER CERCLA SECTION 120
Division (Light) and	)	
U.S. Army Garrison, Alaska	)	Administrative Docket Number:
Fort Wainwright, Alaska	)	1092-04-10-120
	)	

PURPOSE

1. The general purposes of this Amendment are: to incorporate the recently discovered source area known as the Communications Site (a/k/a Taku Gardens Housing Expansion Area) into the Federal Facility Agreement ("Agreement") entered into on March 25, 1992 by the Army, U.S. EPA, and ADEC (the "Parties"), by creating a new operable unit (OU), OU 6, for the Communications Site; and to provide the remedial project managers (RPMs) with authority to create additional OUs in the future to address additional new source areas that may be discovered. Terms used in this Amendment are defined in Part II of the Agreement, DEFINITIONS.

AUTHORITY TO AMEND

2. The Agreement may be and is hereby amended by unanimous agreement of the signatories pursuant to Part XXXIII, MODIFICATION/AMENDMENT OF AGREEMENT, paragraph 33.2. Pursuant to Part XXXIII, paragraph 33.3, such amendment shall be in writing, effective as of the date it is signed by all signatories, and shall be incorporated into and modify the Agreement.

AMENDMENTS

3. Paragraph 33.1 of the Agreement is amended by adding the following sentence to the end of the paragraph: In addition, the Project Managers may, by unanimous written agreement, create new OUs to address new source areas that were not addressed at the time the ROD for OU 5 was issued.

4. Attachment I (Scope of Work) to the Agreement is amended by adding the following new paragraph at the end of Section 1.0 (Introduction):

> Pursuant to the February 2007 Amendment to the Agreement, OU 6 was created for the purpose of including the recently discovered Communications Site. Additional new OUs may be created in the future to address additional potential source areas that may be discovered. Such new OUs, including OU 6, will follow the process specified in this Attachment except that source areas included therein will not be included as part of OU 5 and will not be evaluated as components of OU 5.

5. Attachment I (Scope of Work) to the Agreement is further amended by adding the following row to the end of Table 2 (Potential Source Areas): OU 6 – Communications Site.

6. The RPMs shall develop a timetable for scheduling the activities for OU 6 required by the Agreement, including Attachment I, as amended, and shall incorporate the timetable into Table 3 (Primary and Secondary Document Deadlines) of Attachment I.

7. This Amendment does not serve as precedent for future Department of Defense federal facility agreements.

EFFECTIVE DATE

8. This Amendment is effective upon signature of all Parties to this Amendment.

For the Army:

ADDISON D. DAVIS, IV
Deputy Assistant Secretary of the Army (I&E)
Environment, Safety, and Occupational Health

2 MAR 07
Date

DAVID L. SHUTT
Colonel, U.S. Army
Commander, U.S. Army Garrison, Alaska

FEB 26 07
Date

For ADEC:

LARRY HARTIG
Commissioner
Alaska Department of Environmental Conservation
State of Alaska

March 7th 2007
Date

TALIS J. COLBERG
Attorney General
State of Alaska

7-21-07
Date

For EPA:

4/6/07

ELIN D. MILLER
Regional Administrator
Region 10
United States Environmental Protection Agency

Date

Taku FFA Deliverables

FORT WAINWRIGHT

CERCLA FEDERAL FACILITY AGREEMENT DELIVERABLE DOCUMENT

ACTION MEMORANDUM

SUBJECT: **Action Memorandum for a Department of Army Time-Critical Removal Action at the Communications Site (a/k/a Taku Gardens Housing Expansion Area), and Imposition and Maintenance of Interim Land Use Controls, Fort Wainwright National Priorities List (NPL), Federal Facility Site, Fort Wainwright, Alaska.**

FROM: DAVID L. SHUTT
Colonel, U.S. Army
Commander, U.S. Army Garrison, Alaska

TO: JENNIFER ROBERTS
Federal Facilities Restoration Program Manager
Alaska Department of Environmental Conservation

DANIEL D. OPALSKI, Director
Office of Environmental Cleanup
U.S. Environmental Protection Agency, Region 10

SITE ID: CERCLIS – AK6210022426
SSID - 10C7

I. PURPOSE

The purpose of this Action Memorandum is to document approval for a Time Critical Removal Action (TCRA) for upland soil contaminated with polychlorinated biphenyls (PCBs) and the imposition and maintenance of interim land use controls at the Communications Site (a/k/a Taku Gardens) within the Fort Wainwright Federal Facility NPL Site, located at Fort Wainwright, Alaska.

The removal action took place in September 2005 under urgent circumstances and is thus being documented after the fact, herein, now that sufficient time is available to do so. The actions taken soon after the discovery of PCB contamination consisted of the removal of high concentrations of PCB-contaminated soil and the installation of fencing and warning signs. These actions meet the criteria for initiating a removal action under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR 300.415, as well as the requirements outlined in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

Interim land use controls have been established for the Communications Site to assure safety and human health. Specifically, the Commander, U.S. Army Garrison Alaska has directed that residential occupancy will not be allowed in the housing at the Communications Site until all investigation and required cleanup is complete. The lifting of this restriction will be coordinated with both EPA Region X and the Alaska Department of Environmental Conservation (ADEC), as signatories to the Fort Wainwright's Federal Facility Agreement (FFA). The prohibitions to residential occupancy have been incorporated into the installation real property use master plan.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

1. Removal Site Evaluation

PCB-contaminated soil was discovered by construction crews in June 2005, while excavating at construction site 52, which is located in the southwestern corner of the Communications Site. Potential contamination was identified through field screening procedures employed for the entire construction site. Initial laboratory tests proved inconclusive, warranting a second round of sampling and analysis, which reveal very high PCB concentrations in the soil (up to 110,000 ppm) at the site 52 location (See Figure 1) and minor concentrations of other hazardous constituents.

2. Physical Location

The entire source area known as the Communications Site is located within the cantonment area of Fort Wainwright, Alaska. The entire area encompasses approximately 54 acres and is contained within an area bounded by Neely Road to the north, the Alaska Railroad to the east, Alder Avenue to the south, and White Street to the west. A military family housing complex borders the construction site to the west PCB-contaminated soil was initially discovered while excavating for Housing Unit 52 foundation, consisting of approximately 1/2 acre in the southwestern portion of the housing complex construction site. The area was roped off to exclude any entry. The Exclusion Zone was later expanded, and now encompasses approximately five acres of the southwest corner of the housing project site.

3. Background and Site Characteristics

In 2004, a preconstruction environmental survey was accomplished, showing that much of the site was a 1950s era military landfill. Minor concentrations of PCB contamination (< 2 ppm) were detected in two bore samples. Subsequent step out sampling conducted prior to construction did not confirm the presence of PCBs. To facilitate the environmental survey, the Army cleared surface vegetation. During that process, a considerable amount of metal waste and some military munitions debris was uncovered. Army munitions experts confirmed that the munitions debris items did not contain any explosive materials. .

Construction began in spring 2005. Additional metal debris and POL contamination was discovered on the site. As required by the contract, the contractor developed and implemented a screening process to detect possible contamination encountered during site excavation. The PCB contamination at construction Site 52 was discovered as a consequence of employing these procedures.

After initial discovery of the PCB contamination, only construction Site 52 was marked with warning tape and the contractor was instructed to keep workers out of the area. At some point following initial discovery of the PCB, construction crews entered the restricted area and spread contaminated soil by using the Site 52 soil to accomplish overfill work at other areas generally within the Exclusion Zone of Taku Gardens construction site. Upon discovery, the Army initiated an investigation. The contaminated soil was located through surface soil sampling, and returned to the Site 52. The Exclusion Zone was expanded to include seven additional excavation sites, and the Exclusion Zone was fenced and warning signs posted.

Historical photographs and records indicate that, beginning in the mid 1940s, the Communications Site was used for multiple purposes, including a salvage and reclamation yard. Temporary military barracks and offices were constructed in the early 1950s and were subsequently dismantled. A separate operation, the communications site, was located in the southwestern corner of the area during this period of time. Previous locations of radar systems are visible in some historic aerial photographs. When military operations ended, a portion of the land was developed into personal use garden plots and the remaining area was allowed to return to its natural state of vegetation. Little other historical information about the site is known and research is ongoing. Except for personal use garden plots contained on a few acres in the southwestern corner, the source area remained undeveloped for the last few decades until 2002-2003 when it was selected as the construction site for future military family housing.

In accomplishing the investigation to locate the moved PCB contaminated soil, the Army discovered that the site also contained other types of contamination including POL waste, solvents and munitions waste components. As a consequence, in 2006, the Army initiated a Preliminary Source Evaluation in compliance with the Fort Wainwright Federal Facility Agreement. A report of the findings of this undertaking was released in February 2007.

Fort Wainwright is a federally-owned facility managed by U.S. Army Garrison, Fort Wainwright, which is an installation-level command overseen by its higher headquarters U.S. Army Garrison, Alaska.

4. Release or Threatened Release into the Environment of a Hazardous Substance, or Pollutant or Contaminant

Available information indicates that, at some point in the past, PCB was released at the Communication Site. Sampling results of tests conducted across the site are recorded in the Preliminary Source Evaluation Narrative Report (2006). The test results showed PCB concentrations in soil as high as 115,000 ppm at Site 52.

Test results also indicated that additional contaminants may be present in subsurface soil and ground water at the source area. Site investigations indicate that large amounts of waste materials were buried at the site at some point in the distant past. This waste material was comprised of an extensive amount of scrap metal, which included some military munitions components and 55-gallon drums containing unknown residue. Removal of these buried waste materials is the subject of ongoing discussions with regulators. In addition, POL contamination was discovered in the northwestern portion of the site during construction; soil gas sampling of this area is scheduled for 2007.

The Army transitioned from removal to remedial response activities in accordance with 40 CFR 300.415(g) and the Fort Wainwright Federal Facilities Agreement in late 2005. An amendment to the Fort Wainwright Federal Facilities Agreement was signed by USEPA, ADEC and the Army in February 2007, and formally recognizes the Communication Site as Operable Unit 6.

5. National Priorities List (NPL) Status

The Communications Site is part of the Fort Wainwright Federal Facility Site, listed on the National Priorities List on August 30, 1990.

6. Maps, Pictures, and Other Graphic Representations: Attached map (See Figure 2) shows where the Exclusion Zone now lies in relation to the entire construction site, as well as shows other areas of potential concern. Maps also show the relationship of the entire site within the Fort Wainwright boundaries. (See Figure 3) In addition, existing construction debris piles are noted on the attached maps.

B. Actions to Date

1. Previous Actions

Investigations

Pre-construction geotechnical surveys were conducted at the Communications Site in late 2003 and 2004. Survey test results showed some amount of low-level PCB contamination. Unobtrusive geophysical testing was also done during this time frame, indicating several large areas of buried metal debris of an undetermined nature.

Following the discovery of PCBs in soil at Site 52 ranging from just above 1 to 115,000 ppm in July 2005, a sampling and analysis plan was jointly developed and approved by the Army, EPA and ADEC to determine the extent of the PCB contamination. In carrying out the plan, surface soil samples were collected and wipe samples were taken of construction and playground equipment, and of nearby houses. Temporary groundwater monitoring wells were installed to determine the migration potential of the PCBs. Soil borings, field screening and laboratory analyses were also carried out under the plan. The results of the sampling indicated that the highest concentrations of PCBs was largely limited to soil at or near the surface in a 5-acre section of the southwestern corner of the construction site, specifically Site 52. Surface sampling at Site 52 indicated that this was a localized historical source and was exposed due to the site clearances to a 2' depth from the prior surface. Any concentration greater than 1 ppm found

elsewhere on the site was solely due to contaminated soil inadvertently moved from Site 52, as discussed above.

In addition to PCB contaminated soil, petroleum contaminated soil was also discovered on the construction site. The source of the petroleum contamination is unknown but site investigation indicates it was not associated with any underground storage tank. Soil with petroleum concentrations exceeding state cleanup requirements was either removed for off-site treatment or stockpiled pending treatment, in a vacant lot near the installation Defense Reutilization & Marketing Office.

There remains on site stockpiles of metal debris excavated from the foundation work. These scrap piles were sifted through during the 2006 field season; that work is documented in the Preliminary Source Evaluation II. Remaining metals will be properly disposed of during the 2007 field season.

In early 2006, the site was temporarily divided into five sub-areas in consultation with the ADEC and the EPA) based on potential chemicals of concern, historical activities and available non-classified information. The boundaries and associated buildings for the five sub-areas are defined on Figure 4, and the Preliminary Source Evaluation 2 (PSE2) work plan was developed in accordance with FFA procedures. The PSE2's site evaluation was conducted through the summer field season. Based on the construction contractors' field notes and photographs of items uncovered by the contractor during 2005, the Army ordnance experts concluded the site could also contain discarded munitions components. For this reason, munitions experts were hired as part of the 2006 PSE2 field work to ensure site safety and proper identification of munitions components. The area where munitions items were found is Area A (See Figure 4). Several munitions components were found in both the test trenches and piles of construction debris, located in debris piles in the Northern Area of the site. Environmental and ordnance experts reviewed the materials from the piles, and whenever an unidentifiable or potential munitions item was found military ordnance experts were called to the site for a final decision on its disposition. All munitions components discovered during 2006 were taken off-site and disposed of by military ordnance experts. Technical documents generated by or on behalf of the agencies include:

- Draft Preliminary Source Evaluation Narrative Report, August 2006 (Oasis)
- Field Sampling Plan, Revision 3, August 2006 (North Wind)
- Final Revision, Delineation and Remediation of Contaminated Soil, Groundwater and Debris at Stryker Brigade Cantonment Areas, Accident Prevention Plan, August 2006 (North Wind)

- Accident and Prevention Plan and Site Safety and Health Plan, Jul/Aug 2006 (North Wind)
- FWA-102 Former Communication Site (Taku Gardens) Work Plan Addendum, Spring 2006 (North Wind)
- FWA-102 Former Communication Site (Taku Gardens), Field Data Report February 2006 (North Wind)
- Draft Revision 1, Site Characterization and Remediation Work Plan, Fort Wainwright, Alaska, June 2005 (North Wind)

Response Actions

Following the August 2005 laboratory confirmation that Site 52 contained PCB contamination, excavated soil piles were covered and dust control measures put in place to prevent contamination from spreading beyond the suspected source area.

In September 2005, much of the 54-acre Communications Site was fenced to restrict access, and warning signs were posted. Additional fencing was also installed around the approximately 5-acre PCB exclusion area, to separately control access to that area of the site. Warning signs were posted along the perimeter of the exclusion area.

In September 2005, approximately 230 cubic yards of excavated soil, weighing about 478,000 pounds and containing the highest known PCB concentration levels, was removed directly from the Communications Site and shipped out-of-state to a permitted hazardous waste landfill in Oregon for proper disposal. The removal was resource limited, but did reduce the highest potential threats to site workers and nearby residents. The remaining PCB soil was stockpiled within the PCB exclusion area and properly covered with plastic sheeting. This soil is planned for removal during the upcoming 2007 field season.

In November 2006, a permanent 8-foot tall chain link fence, with barbed wire across the top, replaced the 5-foot fence around the perimeter of the 54 acre site, with the exception of approximately 0.3 miles. The existing 6-foot fence along this stretch was replaced with a permanent 8-foot high chain link fence with barbed wire in Spring 2007. Signs were placed every 100 feet of the enclosing fence, stating: *Restricted Area, Keep Out.*

As part of Army's response action, and as a condition for approval of this Action Memorandum, Fort Wainwright has placed interim land use controls on the Communications Site pursuant to the U.S. Army Alaska Institutional Controls Standards Operating Procedures (SOPs). The land use controls prohibit residential use and occupancy of the newly constructed housing units until all

investigation and cleanup required under CERCLA is complete and coordination has been undertaken with requisite federal and state regulators. These land use controls (LUCs) shall be maintained in the installation master plan IAW AR 210-20. The following land use controls shall remain in effect until such time as demonstrated that inhabitants may safely inhabit the structures built on the Communications Site:

- Land use restrictions prohibiting residential occupation of the site until all investigation and cleanup required under CERCLA to protect human health and the environment is complete and regulator coordination has been undertaken.
- Fencing and warning signs will be maintained around the perimeter of the site to restrict access.
- Groundwater restrictions prohibiting the drilling and use of water wells for potable water, fire suppression, irrigation or other consumptive purposes.
- Land use restrictions prohibiting soil disturbing activities associated with construction or renovation of new or existing facilities to include residential and commercial construction, road repair and realignment, utility work, digging, trenching, excavation, paving or drilling of soil borings, except when such activities are carried out in accordance with an Excavation Clearance Request approved by the Army in consultation with EPA and ADEC. In cases of emergency, standard reporting requirements and practices will be followed.

At the point that residential occupation is permitted, these interim LUCs will be reconsidered and long-term use restrictions may be imposed as part of a CERCLA remedy. Regulator coordination and ADEC and EPA concurrence would be sought prior to the imposition of such remedial LUCs.

Community Relations

On 31 August 2005, U.S. Army Garrison Alaska conducted a press conference where local media were provided information about the conditions discovered on the construction site.

On 6 September 2005, a public meeting was held at Fort Wainwright to inform Fort Wainwright residents and members of the surrounding community about site conditions. The EPA and ADEC remedial project managers participated in the meeting. Information was provided about general PCB hazards and potential PCB exposures. At the meeting the Army agreed to sample neighboring houses, playgrounds, and anything else residents may be concerned with.

Results of the residential sampling were delivered by hand to the residents in September 2005. The results showed no PCB contamination above risk based levels (1 ppm) outside the construction area. Newsletters are planned to update residents and the community of the current status of this site.

Community relations will be implemented in accordance with the Fort Wainwright Federal Facility Agreement. In addition, the Community Involvement Plan will be revised to include Operable Unit 6, and newsletters will be sent to the surrounding community.

2. Current Actions

Both EPA Region X and ADEC are currently reviewing the final PSE1 and draft PSE2 reports. When complete, the regulators and Army will evaluate the results, in accordance with the FFA process. During the upcoming 2007 field season, Army will begin work on a remedial investigation and feasibility study (RI/FS), which will include site-specific risk assessments and will be submitted as FFA deliverable documents. During the drafting of these documents, Army will coordinate with both EPA Region X and ADEC to ensure that any outstanding concerns are being addressed in the RI/FS. Additional removals where PCB contamination is greater than 1 ppm are also planned for the 2007 field season; these actions will be coordinated in accordance with the FFA parties.

The housing units that have been constructed on the Communications Site are vacant and will remain so until deemed safe for habitation.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Conditions at the Communications Site in September 2005 presented an immediate potential threat to public health or welfare or to the environment, thereby meeting the criteria for a time critical removal action as set forth in 40 CFR 300.415(b). This NCP requirement concerns the need to address actual or potential exposure to human populations from hazardous substances and to address possible migration of such contamination. The Communications Site sits next to a residential neighborhood. Tests showed that soil excavated within specific sections of the PCB exclusion area (Site 52) contained PCB concentrations as high as 111,000 ppm, so the PCB levels in stockpiled excavated soil in the exclusion area could potentially be quite high, even if diluted. These high concentrations of PCBs posed a potentially unacceptable risk if inadvertently inhaled or ingested. Also, the exposed excavated soil could have been released into the neighboring environment by being carried off the site by wind, storm water or snowmelt, so the removal action was undertaken to address any unacceptable risks posed by potential migration of contamination.

IV. ENDANGERMENT DETERMINATION

Given the very high concentrations of PCB at Site 52 and potential mobility of the excavated soil stockpiled within the PCB exclusion area, Army determined that it must conduct a removal action of the PCB-contaminated soil to address an unacceptable risk to public health and the environment.

V. CONSISTENCY DETERMINATION

The removal actions described in this Action Memorandum are otherwise appropriate and consistent with any future response action that may be taken. The removal of PCB-contaminated soil will not interfere with any future response activity that may be needed to address other possible soil and groundwater contamination that may be on the construction site, nor limit the possible range of alternative courses of action that may be available for this site. The completed removal action includes the implementation of interim land use controls to ensure protection of human health.

1. Engineering Evaluation/Cost Analysis (EE/CA)

Because the response actions were time critical, an Engineering Evaluation/Cost Analysis is not required.

2. Applicable or Relevant and Appropriate Requirements (ARARs)

The removal action elements involving the September 2005 disposal of PCB-contaminated soil attained or exceeded all ARARs to the extent practicable. Two factors were applied to determine whether the identification and attainment of ARARs was practicable: (1) the exigencies of the situation; and (2) the scope of the removal action to be taken.

Federal ARARs:

The following is a summary of Federal ARARs identified to date for the removal action elements involving the September 2005 disposal of PCB-contaminated soil:

Toxic Substances Control Act regulations [40 CFR Part 761] provides cleanup and disposal options for PCB remediation waste including PCB-contaminated soil, and provides guidance for institutional controls of PCB contaminated areas [40 CFR § 761 Subpart G].

U.S. Department of Transportation (DOT) requirements, 49 CFR Parts 171 through 180, relating to transportation of hazardous materials to off-site disposal facilities.

State of Alaska ARARs:

18 AAC §62.310 (transportation of hazardous materials) has been identified as a State applicable ARAR.

3. **Project Schedule**

The removal of PCB-contaminated soil, and the installation of fencing and warning signs, took place in September of 2005. The interim institutional controls for the Site, including the amendment of the installation master plan, will be considered effective upon all Parties signing this Action Memorandum.

VI. ESTIMATED COSTS:

Total cost for the removal of PCB-contaminated soil and the installation of fencing and warning signs is approximately $340,000. Additional costs associated with the implementation of the institutional controls consist primarily of Army management costs, which are expected to be less than $10,000. All costs of the removal action have been and will continue to be funded by the Department of Army.

VII. OUTSTANDING POLICY ISSUES: None

VIII. RECOMMENDATION

This decision document represents the selected removal action for the Communications Site in Fort Wainwright, Alaska, developed in accordance with CERCLA and the NCP section 300.415(b)(2) criteria for a removal. This decision is based on the administrative record for the site.

Future response actions at the Communications Site are subject to regulator coordination in accordance with the Ft. Wainwright FFA. This includes the imposition and maintenance of the interim land use controls described herein. Specifically, Fort Wainwright will maintain the prohibition against residential use of the Communications Site as part of its real property master plan until all investigation and cleanup required under CERCLA to protect human health and the environment is complete and regulator coordination has been undertaken. This commitment was also outlined in letters from COL Shutt, dated September 25, 2006, to both EPA Region X

and ADEC. Any decision to occupy this housing site will be first coordinated with EPA Region X and ADEC to ensure that all parties agree that the Communications Site may be used for residential purposes.

APPROVED:

For the Army:

DAVID L. SHUTT
Colonel, U.S. Army
Commander, U.S. Army Garrison, Alaska

CONCURRING:

For ADEC:

JENNIFER ROBERTS
Federal Facilities Restoration Program Manager
Alaska Department of Environmental Conservation

For EPA:

DANIEL D. OPALSKI
Director, Office of Environmental Cleanup
U.S. Environmental Protection Agency, Region 10

and ADEC. Any decision to occupy this housing site will be first coordinated with EPA Region X and ADEC to ensure that all parties agree that the Communications Site may be used for residential purposes.

APPROVED:

For the Army:

DAVID L. SHUTT
Colonel, U.S. Army
Commander, U.S. Army Garrison, Alaska

CONCURRING:

For ADEC:

JENNIFER ROBERTS
Federal Facilities Restoration Program Manager
Alaska Department of Environmental Conservation

For EPA:

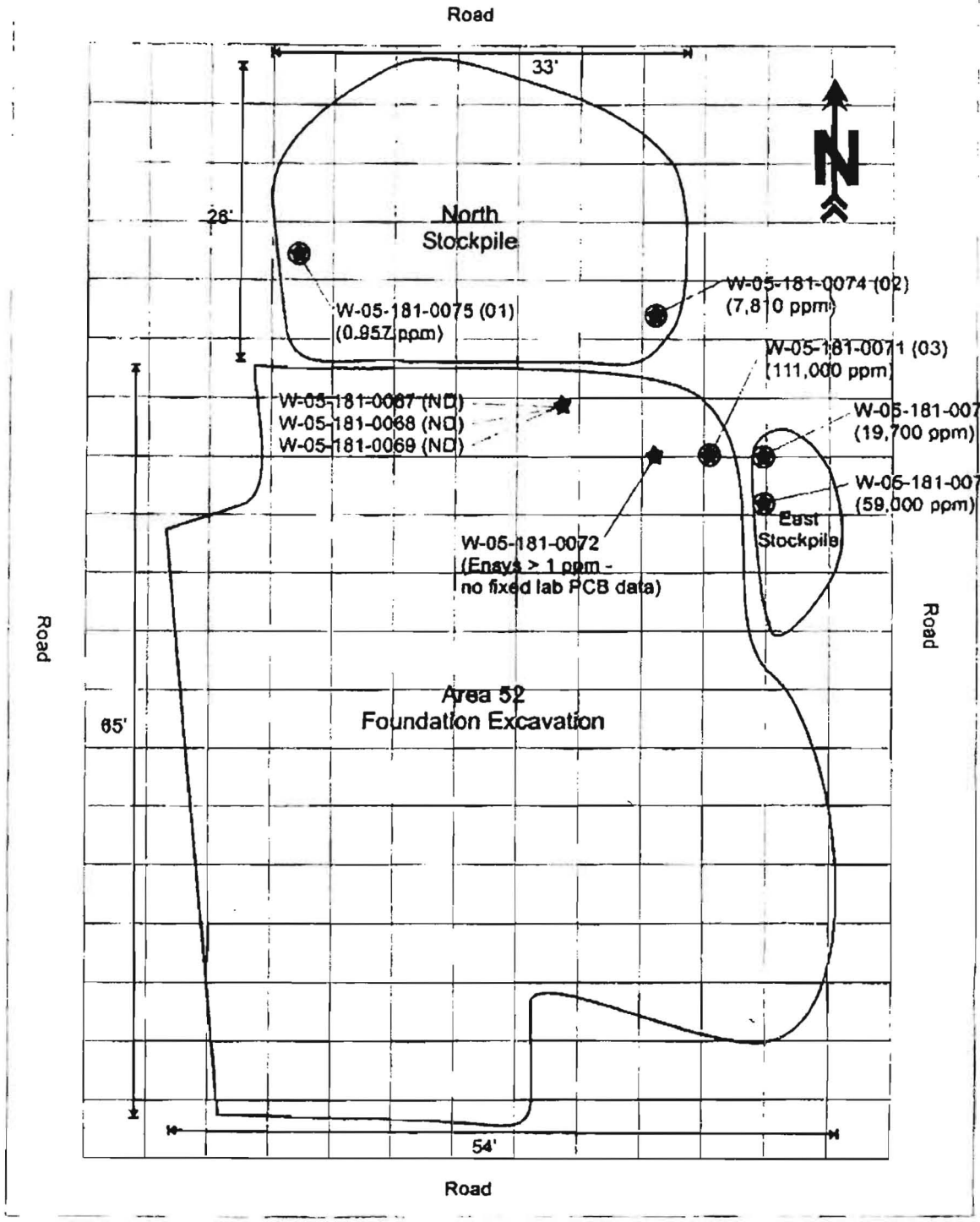
DANIEL D. OPALSKI
Director, Office of Environmental Cleanup
U.S. Environmental Protection Agency, Region 10

3.3 Master Plan Regulations, Army Regulation 210-20 - IC3

The Army issued a new regulation, Master Planning for Army Installations, AR 210-20, on July 13, 1987, updating an earlier regulation dated January 26, 1976. AR 210-20 "establishes the requirement for an installation master plan and planning board and specifies procedures for developing, submitting for approval, updating, and implementing the installation master plan." IC3 provides for comprehensive planning at Army installations and not only allows, but requires, incorporation of existing land-use and conditions into the Master Plan. IC3 provides a framework for comprehensive planning through the use of component plans, which include, but are not limited to, the following:

- Natural Resources Plan
- Environmental Protection Plan
- Installation Layout and Vicinity Plan
- Land-use Plan
- Future development Plan

The overall objective is to provide each installation with a master plan through the integration of each component plan into the installation master plan. The component plans form a series of narrative, tabular and graphic plans. Their integration into an installation master plan provides many benefits as outlined in AR 210-20, including "the mechanism for ensuring that installation projects are sited to meet operational, safety, physical security, and environmental requirements." PTA Office of the Chief Engineer in the Public Works Directorate is in charge of the master plan. A key component of the PTA master plan is the Arsenal Land-use map.48



★ Location of original sample (6/3005)
● Samples recollected (7/22/05)
(#) Corresponds to COC location ID on recollected samples

ND = not detected

Figure 1
Area 52 Sampling Locations
and Aroclor 1260 Results

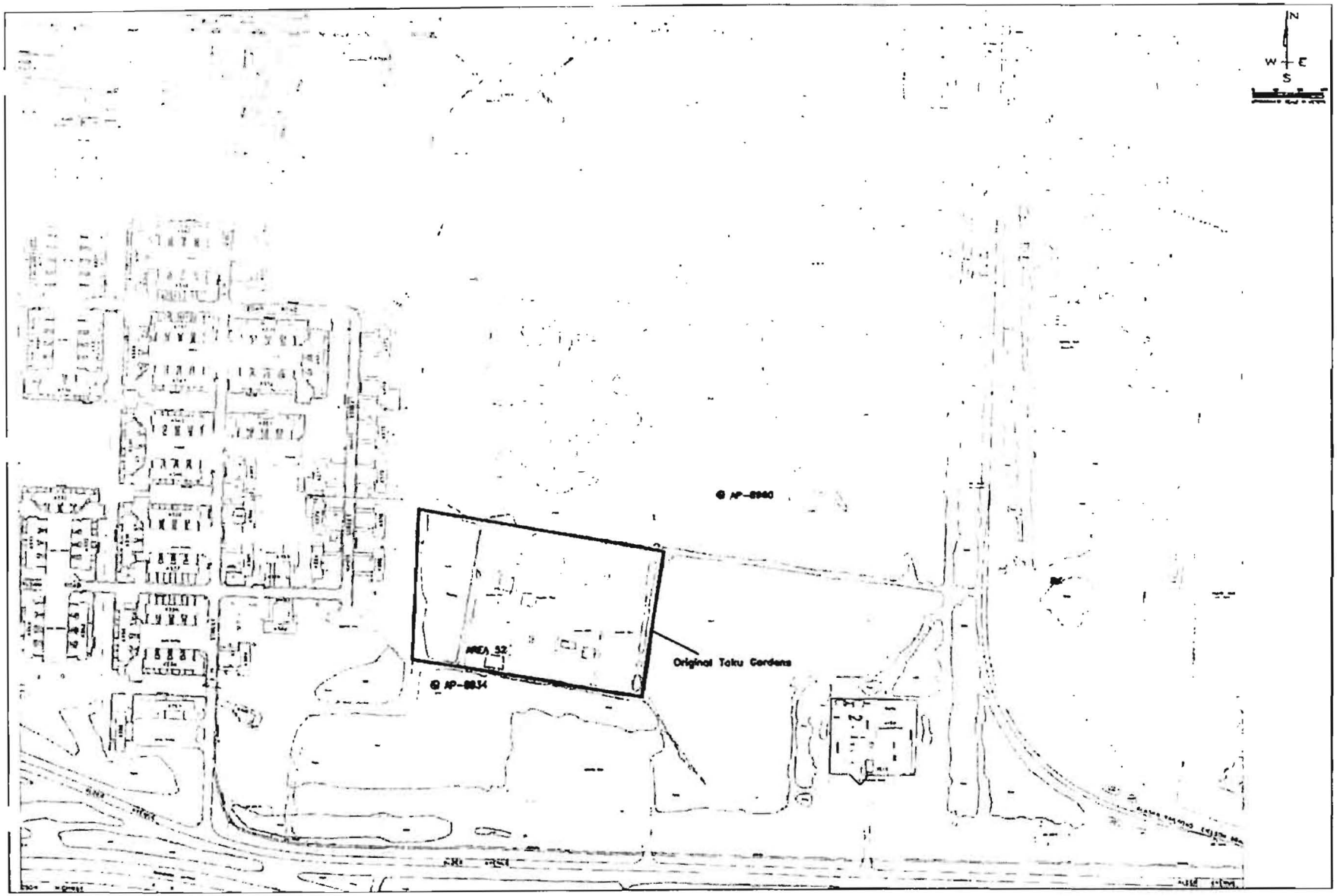


Figure 2
Exclusion Zone

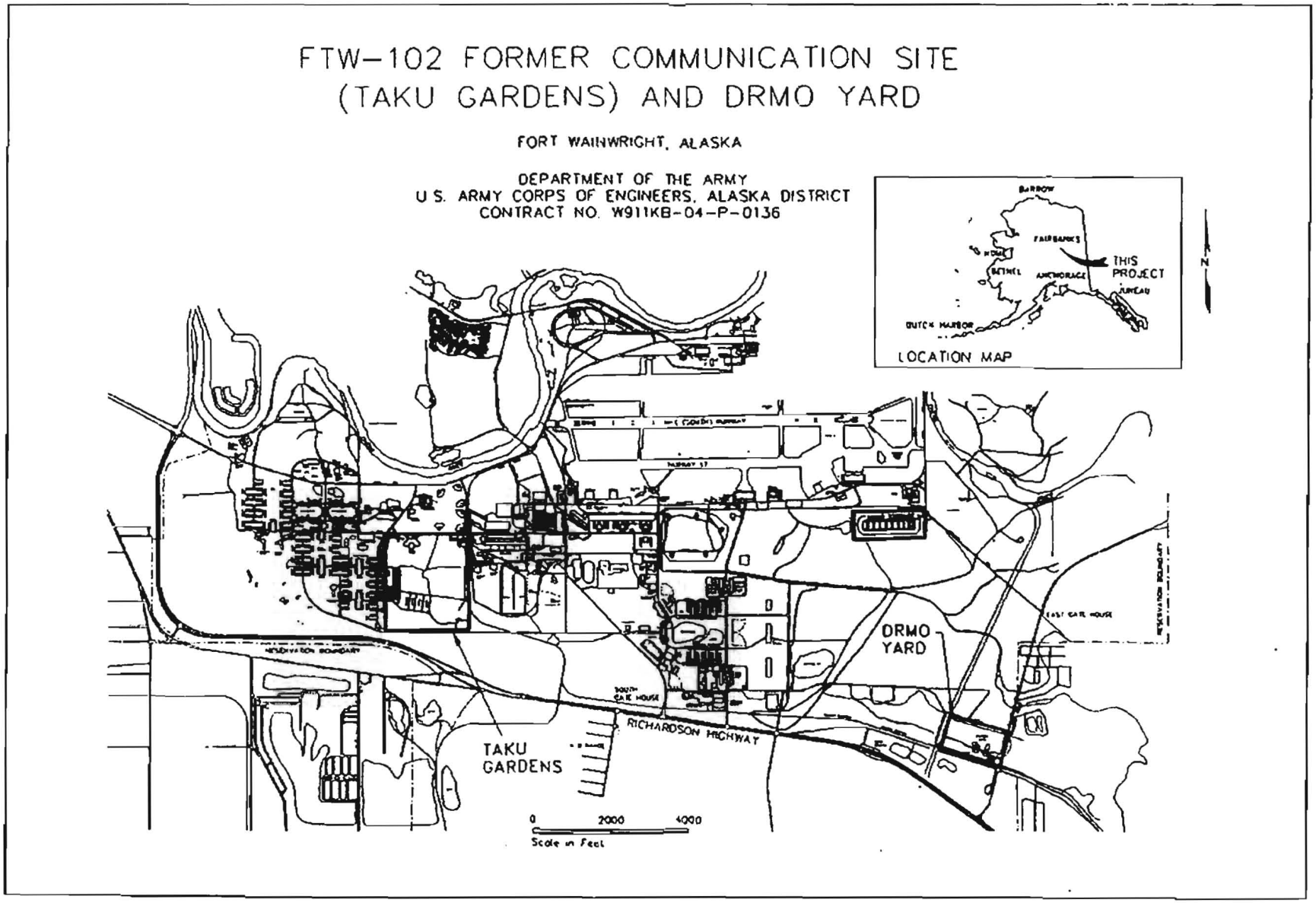


Figure 3
Fort Wainwright Location Map

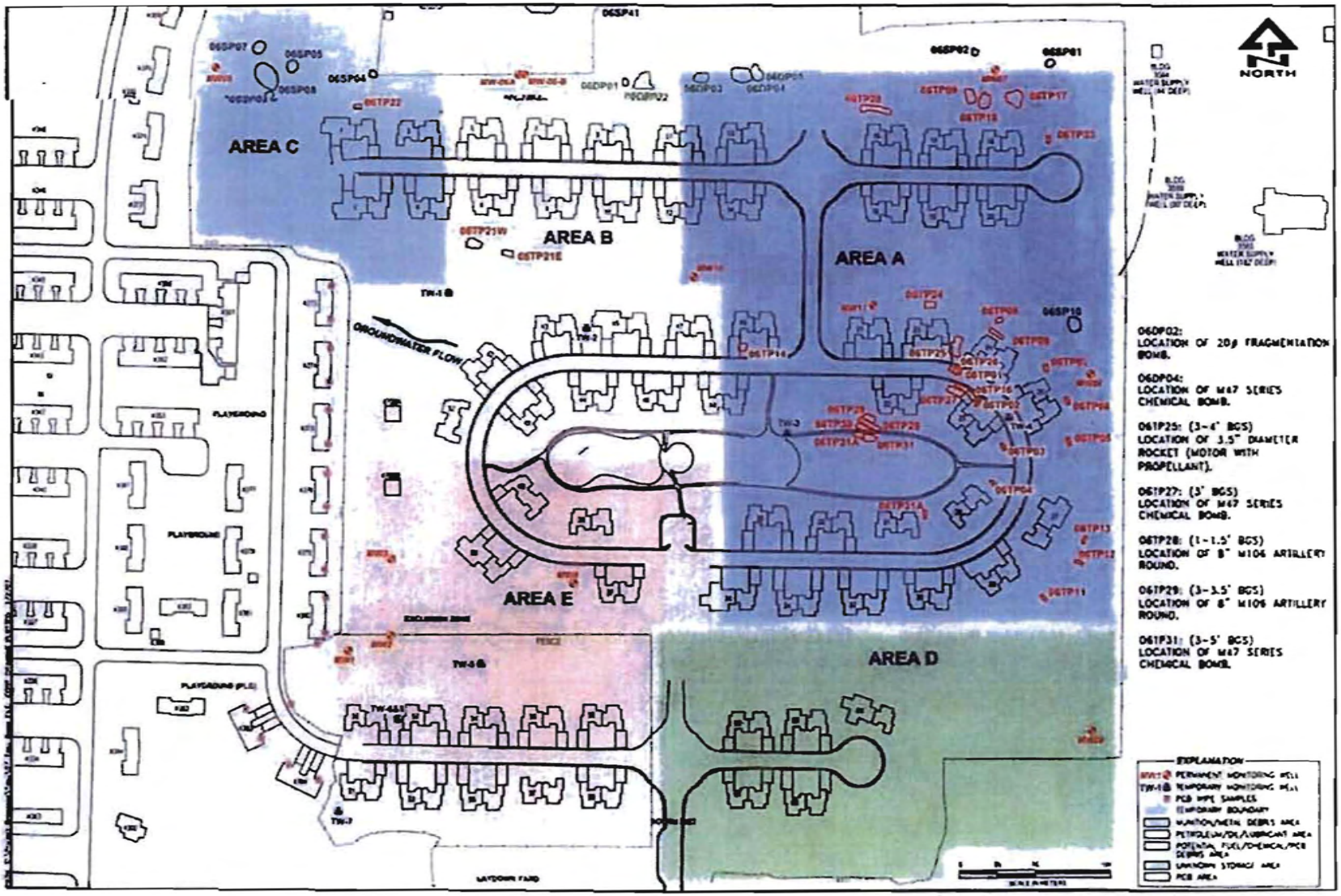

AREA C
AREA B
AREA A
AREA E
AREA D
NORTH
GROUNDWATER FLOW
060P02:
LOCATION OF 20# FRAGMENTATION BOMB.
060P04:
LOCATION OF M47 SERIES CHEMICAL BOMB.
061P25: (3-4' BGS)
LOCATION OF 3.5" DIAMETER ROCKET (MOTOR WITH PROPELLANT).
061P27: (3' BGS)
LOCATION OF M47 SERIES CHEMICAL BOMB.
061P28: (1-1.5' BGS)
LOCATION OF 8" M106 ARTILLERY ROUND.
061P29: (3-3.5' BGS)
LOCATION OF 8" M106 ARTILLERY ROUND.
061P31: (3-5' BGS)
LOCATION OF M47 SERIES CHEMICAL BOMB.
EXPLANATION

Figure 4

APPENDIX J

Response to Comments

REVIEW COMMENTS
PROJECT: FWA 102 Former Communications Site (Taku Gardens)
DOCUMENT: Remedial Investigation, Draft Final, April 2010
DATE: 24 June 2010
REVIEWER: Alaska Department of Environmental Conservation Contaminated Sites Program

Item No.	Location (page, par., sen.)	Comments	Contractor Response
1.	Appendix D, Table ES-2	Building 38 shows 96 yards of contaminated soil removed but is missing the contaminant, please provide.	Accepted. The listing in Table ES-2 of Appendix D will be updated to be "Soil with small pieces of metal debris" rather than "Contaminated soil".
2.	Appendix D 1-17, 1.4.1	PCB's between 1 and 10 mg/kg were disposed in the FTW landfill. Please explain why additional testing was required.	Accepted. Reasoning for not conducting additional testing will be provided in Section 1.4.1.
3.	Appendix D 1-5, 1.5	*Text states,* *"Dioxin and dibenzofuran samples were to be collected if 1) high PCB concentrations were encountered since dioxins and dibenzofurans are a byproduct of the PCB manufacturing process **or** 2) if burned debris or soil was discovered. Since neither of these situations occurred, no dioxin or dibenzofuran samples were collected. Further details are presented in the CH2M Hill RI Report (USAED 2010)."* However, as noted in the RI text, burned soil was encountered during excavation activities near Buildings 11, 12, and 26. The RI states in Section 3.2.1 that no dioxins or furans were included as analytes during the RI because no burned debris was collocated with chlorinated solvent use which seems to imply that the presence of both was necessary for consideration for sampling. So is there a discrepancy between the drum and debris plan and the RI in regard to dioxins and furans?	There was no discrepancy. The second bullet of Section 1.5 will be deleted.
4.	Appendix D, Table 4-1 & 4-2	The sample numbers shown can not be found in the data tables. A thorough explanation of the changes made to sample numbers should be provided.	Accepted. The introductory text in Appendix I will also include an explanation of the changes made to sample numbers used by Jacobs in Appendix D.
5.	Appendix D 5-96, 5.7.3	Last sentence should refer to Section 6.9	Accepted. Reference will be corrected

REVIEW COMMENTS

PROJECT: Taku Gardens Former Communication Site, Fort Wainwright, AK
DOCUMENT: 2007/2008/2009 Drum and Debris and PCB Investigation Report

U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-EE	DATE: 20-Dec-10 REVIEWER: Meseret Ghebresllassie PHONE: 907-753-2670	Action taken on comment by:

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1.	ES 1	The number 4,943 cy contaminated soil did not match with the proposed quantity in the RI document.	A	Totals were updated to reflect final quantities of 4,813 cy and 2,923 MEC items.	
2.	ES – 3, ES – 4 and ES – 5	There is discrepancy of numbers between the Table ES-1, ES-2 and ES-3 in the executive summary with the summary Table 4-4, 5-19 and 6-14 each year activity. The RI report used the numbers in the Summary Table 4-4, 5-19 and 6-14 for contamination source quantification. Some of the estimated excavation area and quantity of contaminated soil in the narratives does not match with the Summary Tables. Please correct and match the numbers either in the narrative or the Summary Tables.	A	Tables were updated to match Tables 4-4, 5-19 and 6-14.	
3.	Section 4.1	Page 4-2, 3rd paragraph, the removed contaminated soil in building 49 is approximately 30 cubic yards… this number do not match with the Summary Table 4-4 (24 cy) as well as Table ES-1. Please correct and match the numbers. I suggest correct the numbers in the report narratives and Executive Summary table to match with Table 4-4 since the RI report adopted the numbers in Summary Table 4-4.	A A	30 cy was replaced with 24 cy. This has been done throughout the document.	
4.	Section 4.1	Page 4-25 the report narrative stated that the building 15/17 excavation foot print is approximately 10,675 square feet. This number does not match with the number listed in the Table 4-4 as well as Table ES-1. Please correct such discrepancy.	A	Area changed to 9,400 sf to match Table 4-4.	
5.	Section 5 and 6	Please correct or address the discrepancy in section 5 and 6 in a like manner.	A	I did a find-replace in the text to change text quantities to match the text tables.	