SECOND FIVE-YEAR REVIEW REPORT FOR NORTHEAST CAPE FORMERLY USED DEFENSE SITE FUDS NO. F10AK0969-03 ST. LAWRENCE ISLAND, ALASKA

U.S. Army Corps of Engineers
Alaska District
Anchorage, Alaska

FINAL

Approved by:

FEB 20 2020

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Colonel, Corps of Engineers
Commanding

Date

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LIST OF ABBREVIATIONS & ACRONYMS

ADEC	Alaska Department of Environmental Conservation
AOC	area of concern
ARAR	applicable or relevant and appropriate requirements
AUF	area use factor
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
DD	Decision Document
DRO	diesel-range organics
EcoPRG	ecological preliminary remedial goals
EPA	U.S. Environmental Protection Agency
EqP	equilibrium partitioning
FRMD	FUDS Record Management Database
FUDS	Formerly Used Defense Site
FYR	Five-Year Review
HPAH	high molecular weight polycyclic aromatic hydrocarbons
HTRW	Hazardous, Toxic, and Radioactive Waste
LANL	Los Alamos National Laboratory
LPAH	low molecular weight polycyclic aromatic hydrocarbons
LUC	land use control
mg/kg	milligrams per kilogram
MOC	Main Operations Complex
NEC	Northeast Cape
NPL	National Priorities List
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
POL	petroleum, oil, and lubricants
RAO	remedial action objective
RRO	residual-range organics
SSCL	site-specific cleanup level
Suqi River	Suqitughneq River
UU/UE	unlimited use/unrestricted exposure
USACE	U.S. Army Corps of Engineers
UVOST	Ultraviolet Optical Screening Tool
WAC	Washington Administrative Code

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I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Army Corps of Engineers (USACE) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (40 Code of Federal Regulations Section 300.430(f)(4)(ii)) and considering U.S. Environmental Protection Agency (EPA), U.S. Department of Defense, and Formerly Used Defense Site (FUDS) policy.

This is the second FYR for the Northeast Cape (NEC) FUDS on St. Lawrence Island, Alaska (Figure B-2). The triggering action for this statutory review is the completion date of the previous FYR. This FYR has been prepared because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure. The EPA site ID number is AK9799F2999. The NEC FUDS is not listed on the National Priorities List (NPL).

The NEC FUDS consisted of five sites that were managed under CERCLA authority (Site 13, Site 16, Site 21, Site 28, and Site 31). Sites 21 and Site 28 will be addressed in this FYR (Figure B-4 and Figure B-5). Site 13 and Site 16 are not addressed in this report as CERCLA action is complete at these sites (having met unlimited use/unrestricted exposure [UU/UE] for all CERCLA contaminants during the first FYR) and the only remaining contamination is attributed to petroleum, oil, and lubricants (POL) in groundwater. Site 13 and Site 16 are included in a separate Periodic Review report specific to POL sites. Site 31 is not included in this report because remedial action achieved a condition that allows for UU/UE and the site was recommended for No Further Action by USACE in the first FYR (USACE 2015b).

Site 3, Site 6, Site 7, Site 8, Site 9, Site 10, Site 11, Site 13, Site 15, Site 16, Site 19, Site 27, and Site 32 are not addressed in this FYR because of the CERCLA petroleum exclusion; however, separate Periodic Review report(s) will be prepared for these sites because petroleum contamination remains above cleanup levels. For more information regarding NEC FUDS sites not addressed in this FYR, refer to Appendix C, “Site Chronology”.

The NEC FUDS FYR participants included: Andrea Elconin, USACE Project Manager; Aaron Shewman, USACE Technical Lead; Lori Verbrugge, USACE Risk Assessor; Andy Larson, Project Manager; Kevin Maher, Chemist; and Haley Huff, Geologist. Relevant entities such as the ADEC and community members were notified of the initiation of the FYR. This review began on 11 April 2018 and was conducted with data available from the NEC FUDS information repository as of 1 September 2018.

SITE BACKGROUND

The NEC FUDS is located on St. Lawrence Island, Alaska in the western portion of the Bering Sea, approximately 135 air-miles southwest of Nome (Figure B-1). It is located at latitude 63.310278 and longitude -168.965272. The NEC property originally encompassed approximately 4,800 acres (7.5 square miles). The NEC FUDS is only accessible by air, water, or all-terrain vehicle trails. The Village of Savoonga, the closest community, is located approximately 60 miles to the northwest (Figure B-1). The NEC FUDS consists mainly of rolling tundra, extending from the Bering Sea toward the base of the Kinipaghulghat Mountains. The Kinipaghulghat Mountains rise abruptly to an elevation of approximately 1,800 feet above sea level, approximately 3 miles from the coastline.

The NEC FUDS was constructed as an Aircraft Control and Warning Station during 1950 and 1951 to provide radar coverage and surveillance for the Alaskan Air Command, and later for the North American Air Defense Command, as part of the Alaska Early Warning System. The site was activated in 1952 and a White Alice Communications System station was added to the site in 1954. Facility operations were supported by 212 personnel and termination of operations occurred in 1969 (Aircraft Control and Warning Station) and 1972 (White Alice

Communications System), respectively. Most military personnel were removed from the site by the end of 1969.

The NEC FUDS included areas for housing site personnel, power plant facilities, fuel storage tanks, distribution lines, maintenance shops, wastewater treatment facilities, and landfills. The buildings and majority of furnishings and equipment were abandoned in place initially due to the high cost of off-island transport. Demolition of the buildings and other structures were completed between 1994 and 2003. The runway, improved gravel roads, and concrete slabs of some of the former structures remain intact.

The main sources of contamination at the NEC FUDS are attributed to spills and leaks of fuel products associated with aboveground storage tanks, underground storage tanks, and associated piping. Other sources of contamination include electrical transformers, waste stored in 55-gallon drums, metal debris, and organic chemicals from paint, solvents, and other miscellaneous facility activities.

St. Lawrence Island residents from the villages of Gambell and Savoonga participate in subsistence fishing, hunting, and gathering at the NEC FUDS area year-round. Local subsistence fishing camp structures are located in the area and are occupied seasonally. There are currently no permanent residents in the NEC area; however, representatives of the Native Village of Savoonga have shown a desire to re-establish a permanent residential community at the site in the future.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Northeast Cape (St. Lawrence Island)		
EPA ID: AK9799F2999		
Region: 10	**State:** AK	**City/County:** St. Lawrence Island
SITE STATUS		
NPL Status: Non-NPL		
Multiple Projects? Yes	**Has the site achieved construction completion?** No	
REVIEW STATUS		
Lead agency: Other Federal Agency ***[If "Other Federal Agency", enter Agency name]***: USACE		
Author name (Federal or State Project Manager): Federal Project Manager Andrea Elconin		
Author affiliation: USACE, Alaska District		
Review period: 4/11/2018 - 9/1/2018		
Date of site inspection: 8/1/2018		
Type of review: Statutory		
Review number: 2		
Triggering action date: 2/24/2015		
Due date *(five years after triggering action date)*: 2/20/2020		

II. RESPONSE ACTION SUMMARY FOR SITE 21-WASTEWATER TANK

Site 21 is located west of the Main Operations Complex (MOC) perimeter road and contained the wastewater treatment system for the main housing and operations complex (Figure B-2 and Figure B-3). The infrastructure consisted of a concrete septic settling tank and attached piping enclosed in a wooden utilidor that discharged approximately 450 feet west (Figure B-4) of the settling tank. The tank compartments, utility corridor from the main complex, and the wooden utilidor outfall line were removed in 2003 (USACE 2009).

BASIS FOR TAKING ACTION

Site investigation data showed arsenic in soil was above the 11 milligrams per kilogram (mg/kg) sitewide arsenic background level (12 of 27 locations), and to a lesser extent, total polychlorinated biphenyls (PCBs) in soil were above the 1 mg/kg regulatory cleanup level (2 of

27 locations). Sitewide cleanup levels for PCBs and arsenic in soil were applied to Site 21. PCB contamination was suspected to originate from the septic system and arsenic contamination was thought to be naturally occurring (USACE 2009); however, arsenic became a soil contaminant of concern (COC) due to one surface soil result near the septic tank outfall with an arsenic concentration of 170 mg/kg. The 2009 multi-site Decision Document (DD) identified COCs and media for Site 21 are listed in Table 1.

Table 1
Site 21 Multi-Site DD COCs

CONTAMINANT	MEDIA
Arsenic	Surface Soil[1]
PCBs	Surface Soil[1]
	Subsurface Soil[2]

Notes:
[1] Surface soils considered 0 to 2 feet depth (USACE 2009).
[2] Subsurface soils considered > 2 feet depth (USACE 2009).
COC = contaminant of concern
DD = Decision Document
PCB = polychlorinated biphenyl

The human health and ecological risk assessment completed prior to the multi-site DD (USACE 2004a) identified that some site media posed unacceptable risk to potential human receptors of concern (future seasonal resident, future site visitor, and future permanent resident) and one potential ecological indicator receptor of concern (tundra vole).

RESPONSE ACTIONS

One response action occurred at Site 21 prior to the multi-site DD. In 2003, surface features associated with the wastewater treatment system (tanks, associated piping, and the outfall pipe wooden enclosure) were removed (USACE 2004b).

There are no Site 21-specific remedial action objectives (RAOs) listed in the multi-site DD (USACE 2009). Sitewide RAOs were applied to Site 21 because the sitewide soil cleanup levels established in the multi-site DD were determined to be appropriate and protective at Site 21:

- Prevent current and future exposure to humans by ingestion, inhalation, and dermal contact with contaminated soil at levels above applicable or relevant and appropriate requirements (ARARs) for PCBs or pertinent risk-based standards for petroleum hydrocarbons.
- Prevent exposure to ecological receptors by direct contact with contaminated soil above risk-based cleanup levels.
- Prevent ingestion of groundwater containing contaminants at levels above state drinking water standards and pertinent risk-based standards for petroleum hydrocarbons.

The remedy for Site 21 is described in the multi-site DD as follows:

- Excavation and removal of PCB-contaminated soil at Sites 13, 16, 21, and 31.
- Excavation and removal of arsenic-contaminated soil at the Site 21 Wastewater Treatment Tank.
- Land use controls (LUCs) to limit future drinking water uses for groundwater at the MOC (Sites 10-22, 26, and 27).

The sitewide soil cleanup levels listed in the multi-site DD applying to Site 21 are provided in Table 2.

Table 2
Site 21 Multi-Site DD Cleanup Levels

CONTAMINANT	MEDIA	CLEANUP LEVEL
Arsenic	Soil	11 mg/kg
PCBs	Soil	1 mg/kg

Notes:
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl

Groundwater LUCs are applied to the MOC, which is adjacent to Site 21. Groundwater associated with the MOC is separate and distinct from groundwater associated with all Site 21 areas of concern (AOCs). No groundwater contamination exists at Site 21 and LUCs to limit the use of Site 21 groundwater are not needed; however, Site 21 is included in the multi-site

DD list of MOC sites requiring groundwater LUCs. It is recommended an explanation of significant differences be prepared to clarify groundwater LUCs are not needed at Site 21.

STATUS OF IMPLEMENTATION

The selected soil remedy for Site 21 is excavation. Excavation of PCB-contaminated soil began and ended in 2010 and resulted in the excavation of 10.4 tons of soil (USACE 2011). Excavation confirmation samples found that PCB concentrations were less than the 1 milligram per kilogram (mg/kg) cleanup level (Figure B-4) at two PCB excavation locations (east end of the outfall pipe next to the former wastewater tank and at the west end of the outfall pipe). Excavation of arsenic-contaminated soil began in 2012 and ended in 2014 and resulted in the removal of 547.35 tons of soil (USACE 2012, 2015a) (Figure B-4). One soil boring sample (13NC21SS17-0.5) containing arsenic at 14 mg/kg, collected outside the extent of any excavation, was not removed due to active surface water flow (USACE 2016a) and one excavation sidewall sample containing arsenic at 13 mg/kg was left in place (USACE 2015a). Although the sample exceeded the site-specific cleanup level (SSCL) of 11 mg/kg, it was below the targeted removal concentration of 17 mg/kg.

Site-impacted media have reached UU/UE, and in the case of arsenic, reached levels which are naturally occurring.

PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the last FYR (Table 3) and the status of recommendations from the last FYR (Table 4). Protectiveness statements, issues, and recommendations made in the previous FYR were based upon remedies applied prior to May 2014.

Table 3
Protectiveness Determinations/Statements from the 2014 FYR

SITE	PROTECTIVENESS DETERMINATION	PROTECTIVENESS STATEMENT
21	Will be Protective	The remedy at Site 21 is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

Table 4
Status of Recommendations from the 2014 FYR

Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Issue: Current remedial activities are focused on arsenic removal around the highest historical result at the utilidor outfall but are not addressing locations along the former utilidor route with concentrations greater than the cleanup level.	Continue remedy implementation at all site locations that exceed the arsenic cleanup level.	Completed	All locations along the utilidor route were removed by excavation.	9/14/2014
Issue: The following LUCs have not been formally implemented: • Prevent the use of the aquifer for drinking water purposes until cleanup levels are met at Sites 10, 11, 13, 15, 16, 19, 21, and 27 (not applicable to Site 28). • Designate areas unsuitable for drinking water at Sites 3, 6, and 9. (not applicable to Site 21 or Site 28). • Prevent construction of buildings on top of landfills[1] at Site 9 (not applicable to Site 21 or Site 28). • Designate areas unsuitable for residential land use without additional investigation and/or cleanup at Site 8 (not applicable to Site 21 or Site 28).	Implement LUCs, as described in the DD, following completion of the remedial action fieldwork.	Considered But Not Implemented	Site 21 groundwater LUCs are not implemented.	NA

Notes:
DD = Decision Document
FYR = Five-Year Review
LUC = land use control
NA = not applicable
[1] The issue presented in the 2014 FYR erroneously referenced “landfills” at Site 9. Only one landfill is present at Site 9.

Site 21 groundwater LUCs were not implemented because there is no groundwater contamination associated with Site 21 and no groundwater COCs are listed in the multi-site

DD. Site 21 was inadvertently grouped with MOC sites in one place in the multi-site DD description of MOC groundwater LUCs.

The ADEC *Guidance for Evaluating Metals at Contaminated Sites* (ADEC 2018a) addresses arsenic, chromium, and many other metals that are naturally occurring throughout Alaska. Anthropogenic sources of arsenic typically include naturally occurring arsenic altered or disturbed by human activity, mobilization from soil to groundwater via another introduced contaminant, and manufactured products. Naturally occurring arsenic (e.g., organic arsenic and inorganic arsenic) is released into the environment by volcanoes and through weathering of arsenic-containing minerals and ores. Sources for arsenic in the environment at contaminated sites can result from natural sources, unknown or unconfirmed sources, and known anthropogenic sources. A lines of evidence approach was assessed to determine whether remaining arsenic levels in soil at Site 21 are naturally occurring. The lines of evidence considered for Site 21 included the following:

- There is no record of a potential metal related release and/or historical usage, or site activity related to metals
- Post excavation site data do not show any well-defined pattern of concentrations indicative of a release of the metal
- The metal is solely associated with shallow soil near site features

Statistical analysis was performed using ProUCL to evaluate a Site 21 soil dataset, including samples collected in 2012, 2013, and 2014. Results of the t-test found that the central tendency of the arsenic concentration for the excavation confirmation sample population was less than or equal to the SSCL. Additionally, a 95 percent students-t upper confidence limit was calculated for the Site 21 excavation confirmation samples (6.618 mg/kg), which was lower than the SSCL of 11 mg/kg (Appendix D).

III. FIVE-YEAR REVIEW PROCESS

COMMUNITY NOTIFICATION, INVOLVEMENT & SITE INTERVIEWS

A public notice was published in the Nome Nugget on 29 March 2018 announcing the FYR and inviting the public to submit any comments to the USACE. Additionally, flyers and mailed notices were sent out and a public meeting was held on the 11 April 2018. The results of the review and the report will be made available at the site information repositories located at Savoonga City Hall and Gambell Sivuqaq Lodge.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date**.** The complete interviews, public comments, and USACE responses to comments are included in Appendix G. There were no specific comments made about Site 21; however, general comments about NEC FUDS sites and the cleanup process were recorded.

A public meeting, to be held in Savoonga, is planned to discuss the results of the FYR with interested community members after the final report is added to the site information repositories.

DATA REVIEW

The data review for Site 21 primarily focused on data that were generated after the 2014 FYR. The 2014 remedial action report (USACE 2015a) is the only new document which contained Site 21 data. The new data included details of the 2014 excavation, confirmation sample results, and sample results associated with the site-specific arsenic background samples. The USACE initiated arsenic removal in successive stages from 2012 through 2014 as described in the remedial action reports from 2012 (USACE 2013b), 2013 (USACE 2015a), and 2014 (USACE 2016a). The excavation footprint reached a size of approximately 3,300 square feet as sporadic, marginal, and unrelated exceedances of the 11 mg/kg arsenic cleanup level in confirmation samples were pursued. A statistical analysis of all excavation confirmation results and an observational comparison to other data collected in 2014 is provided in Appendix D.

A review of excavation confirmation samples found that all confirmation samples along the utilidor route and all floor samples from the outfall area excavation are below 11 mg/kg for arsenic. At the outfall area excavation, one confirmation sidewall sample (out of 24 confirmation samples in 2014) exceeded the 11 mg/kg arsenic cleanup level specified in the multi-site DD at 13 mg/kg.

A sampling effort took place in 2014 during which 147 soil samples were collected from 49 boring locations to assess Site 21-specific arsenic background levels. The 49 boring locations were established outside of the outfall excavation area in a grid pattern; samples were collected from multiple depths in each boring ranging from 1 to 4 feet below ground surface (bgs).

At the end of the 2014 fieldwork, one outfall area excavation sidewall sample, 14NC21SS0004, had arsenic results above the 11 mg/kg multi-site DD clean up level at 13 mg/kg. There were six additional samples outside of the excavation area that appear to be unrelated to Site 21 activities where arsenic was reported above the 11 mg/kg multi-site DD cleanup level: 14NC21SS012-3 (12 mg/kg), 14NC21SS015-2 (12 mg/kg), 13NEC21SS017-0.5 (14 mg/kg), 14NC21SS018-3 (17 mg/kg), 14NC21SS023-1 (23 mg/kg)/14NC21SS023-2 (12 mg/kg), and 14NC21SS024-3 (17 mg/kg). There was no evident connection between the arsenic exceedances at these sample locations and the wastewater tank outfall, such as a concentration gradient or direct proximity. As a result, the residual arsenic concentrations above the multi-site DD cleanup level of 11 mg/kg are considered naturally occurring based on the statistical analysis of excavation confirmation samples and the spatial analysis of the samples outside of the excavation area.

SITE INSPECTION

The site inspection was conducted on 2 August 2018 by Haley Huff. Curtis Dunkin (ADEC) and Sean Benjamin (USACE) inspected the site on 7 August 2018 following the Jacobs Engineering Group Inc. site inspection. The purpose of the inspection was to assess the protectiveness of the remedy. The inspection did not identify any issues at Site 21 and no visible signs of contamination were present. Vegetation was present and the areas where excavation occurred were not noticeable. The site inspection checklist completed during the site visit is provided in Appendix E.

IV. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the Decision Documents?

Answer = Yes.

Question A Summary:

The remedy selected for Site 21 (excavation) for PCB- and arsenic-contaminated soil functioned as intended and satisfied the sitewide RAO to prevent current and future exposure to humans by ingestion, inhalation, and dermal contact with contaminated soil at levels above ARARs or pertinent risk-based standards for petroleum hydrocarbons. Confirmation soil sample results after excavation at the removal areas identified in the multi-site DD near the former septic tank and at the end of the septic tank outfall are below the multi-site DD cleanup levels. Site-impacted media have reached UU/UE, and in the case of arsenic, reached levels which are naturally occurring.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Answer = Yes.

Question B Summary:

The only COCs at Site 21 are PCBs and arsenic in soil. The source of the PCB multi-site DD cleanup level (1 mg/kg) is based on State of Alaska regulation 18 Alaska Administrative Code 75 and no regulatory changes to the PCB cleanup level occurred after the first FYR. Although the PCB cleanup level is based on risk to human health, it is protective of ecological receptors according to the risk assessment that supported the multi-site DD. The multi-site DD cleanup level (11 mg/kg) for arsenic is an accepted NEC sitewide background level and no formal changes have occurred. The distance between the area of PCB excavation and the nearest area of arsenic excavation at Site 21 is approximately 500 feet. Arsenic in water is not a concern. Only one 1994 groundwater result for total arsenic (at 0.072 mg/L) exceeded the cleanup level of 0.01 mg/L, whereas no results for dissolved arsenic exceeded the cleanup level, and arsenic was subsequently eliminated as a COC in groundwater (USACE 2009). Surface water samples collected in 2014 (where none of nine results for total or dissolved arsenic exceeded the cleanup level of 0.01 mg/L) demonstrated soil removal activities did not adversely impact surface water (USACE 2015a).

No changes in toxicity or other contaminant characteristics, risk assessment methods, or exposure pathways affect the protectiveness of the soil remedy.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

Answer = No.

Question C Summary:

No other identified information calls into question the protectiveness of the remedy. Climate change may be occurring in the arctic which could affect yearly precipitation levels, average temperatures, and sea ice formation. There are no new issues during this review period created by climate change. No shallow permafrost was reported during past investigations at the site.

V. ISSUES/RECOMMENDATIONS

ISSUES/RECOMMENDATIONS
Site(s) without Issues/Recommendations identified in the FYR:
Site 21

OTHER FINDINGS

In addition, the following are recommendations that were identified during the FYR but do not affect current and/or future protectiveness:

- Although the multi-site DD describes groundwater institutional controls for Site 21, no groundwater contamination existed at the time of the multi-site DD and no multi-site DD groundwater COCs are listed. It is recommended that an explanation of significant differences be prepared to clarify groundwater LUCs are not needed at Site 21.
- A lines of evidence approach supports the assertion that remaining arsenic in soil from excavation confirmation samples at Site 21 is naturally occurring. Lines of evidence considered during the evaluation included the following: no record of a potential metal related release and/or historical usage or site activity related to metals, post excavation site data do not show any well-defined pattern of concentrations indicative of a release of arsenic, and arsenic is solely associated with shallow soil near site features. The results of statistical analysis found that the arsenic concentration in soil for the excavation confirmation sample population was less than or equal to the SSCL. Additionally, a 95 percent students-t upper confidence limit was calculated for the Site 21 excavation confirmation samples (6.618 mg/kg), which was lower than the SSCL of 11 mg/kg (Appendix D).

VI. PROTECTIVENESS STATEMENT

PROTECTIVENESS STATEMENT		
Site: 21	***Protectiveness Determination:*** Protective	***Planned Addendum Completion Date:*** Not applicable
Protectiveness Statement: Excavation and removal of PCB- and arsenic-contaminated soil is complete at Site 21 and RAOs have been reached. No further remedial action is needed because all site-impacted media have reached UU/UE.		

Notes:
RAO = remedial action objective
UU/UE = unrestricted use/unrestricted exposure

VII. NEXT REVIEW

No further FYRs are planned for Site 21 because all site-impacted media have reached UU/UE.

VIII. RESPONSE ACTION SUMMARY FOR SITE 28 – DRAINAGE BASIN

The Site 28 Drainage Basin is located north of the MOC and drains northward into the Suqitughneq River (Suqi River) (Figure B-5). The site has been affected by fuel releases from the bulk fuel storage tanks (Site 11) and other spills and releases discussed in the multi-site DD (USACE 2009). The site contains wetlands, rolling tundra, ponds, and flowing interconnected streams. Water in the Site 28 Drainage Basin originates from surface water runoff (overland flow) from the MOC, two seeps at the head of the site near the MOC, and two sub-drainages further north. Overland flow can contribute significant amounts of water to the basin during rainfall events (USACE 2013a). The conceptual site model presented for the Site 28 Drainage Basin in the multi-site DD (USACE 2009) included an incised surface water channel with no evidence of overbank flow contaminating surface soil or the surrounding tundra. Results from surface soil samples collected during pre-decisional investigations performed in 1994, 1996, and 1998 supported this CSM (USACE 1999).

BASIS FOR TAKING ACTION

Site investigation data showed that petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), PCBs, and metals were above the sitewide project screening levels in sediment.

The human health and ecological risk assessment completed prior to the multi-site DD identified that analytes in sediment posed unacceptable risk to potential human receptors of concern (future seasonal resident and future site visitor) and one potential ecological indicator receptor of concern (tundra vole).

RESPONSE ACTIONS

No response actions occurred at Site 28 prior to the multi-site DD. The Site 28-specific RAOs listed in the multi-site DD (USACE 2009) are:

- Mitigate potential future risk to human health from ingestion, inhalation, and dermal contact with sediment exposure pathways. Meet pertinent risk-based cleanup levels in sediment.
- Prevent migration of contaminants into the Suqi River above risk-based cleanup levels.

The description of the selected remedy for Site 28 in the multi-site DD is as follows:

- Excavation and removal of petroleum, metals, and PCB-contaminated sediment at Site 28 Drainage Basin, including removal of near-surface sediments (to a depth of 6 to 12 inches) from the narrow channel upgradient of the Suqi River.
- Construction of sedimentation pond or other appropriate controls at Site 28 Drainage Basin.

There are no COCs or cleanup levels that were assigned only to Site 28 in the multi-site DD. The sitewide sediment COCs and cleanup levels were applied to Site 28 and other sites that contain submerged sediment as listed in Table 5.

Table 5
Sitewide Multi-Site DD Sediment Cleanup Levels

Contaminant	Cleanup Level [a]
1-Methylnaphthalene	0.6 mg/kg
Acenaphthene	0.5 mg/kg
Benzo(g,h,i)perylene	1.7 mg/kg
Fluoranthene	2.0 mg/kg
Fluorene	0.8 mg/kg
Indeno(1,2,3-cd) pyrene	3.2 mg/kg
Naphthalene	1.7 mg/kg
Phenanthrene	4.8 mg/kg
Total LPAH	7.8 mg/kg
Total HPAH	9.6 mg/kg
PCBs	0.7 mg/kg
Arsenic	93 mg/kg
Chromium	270 mg/kg
Lead	530 mg/kg
Zinc	960 mg/kg
DRO	3,500 mg/kg
RRO	3,500 mg/kg

Notes:
[a] Cleanup levels protective of the benthic community were selected for COCs, which are also protective of human health.
COC = contaminant of concern
DRO = diesel-range organics
HPAH = high molecular weight polycyclic aromatic hydrocarbons
LPAH = low molecular weight polycyclic aromatic hydrocarbons
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
RRO = residual-range organics

It is recommended an explanation of significant differences be prepared to clarify a sedimentation pond or other institutional control is not needed at Site 28.

STATUS OF IMPLEMENTATION

Excavation of contaminated sediment (suction dredging) to a depth of 1 to 2 feet began in 2012 and ended in 2013, which resulted in the excavation of 152 tons of sediment (USACE 2013b, 2015a). The 2013 excavation confirmation sample results in the remedial action report (USACE 2015a) and results from the 2018 sampling effort (USACE 2018) identified that all non-POL Site 28 COCs (PCBs, chromium, lead, and zinc) were below the sitewide sediment cleanup levels, and thus achieved UU/UE relative to all non-POL CERCLA contaminants; however, POL-related Site 28 COCs (diesel-range organics [DRO], residual-range organics [RRO], and PAHs) were present at some locations above the sitewide sediment cleanup levels.

The remedial action excavation completed for Site 28, implemented as suction dredging, generally performed as expected. However, sediment was not removed beyond 2 feet bgs in any removal area. The targeted removal actions were intended to remove all continuously submerged sediment contaminated with COCs above the sitewide sediment cleanup levels, including removal of near-surface (6 to 12 inches deep) continuously submerged sediments from the narrow channel upgradient of the Suqi River. The intent was to remove the most highly contaminated materials closest to the main complex. Dredging could not be completed in Removal Areas 5 through 7 where vegetative material routinely clogged the in-line pumps; in these areas the sediment had to be removed by hand. Refer to Figures B-5a through B-5i (Appendix B) for the location of Site 28 removal areas. Some dredging was able to continue in Removal Area 7 following the hand-removal of the vegetative material. Due to the limited removal efforts in these areas, a reevaluation of the remedial action approach is recommended to address remaining site contamination.

Sediment migration during sediment removal was controlled by a temporary in-stream sediment trap. The in-stream temporary sediment trap was removed at the end of each of the 2012 and 2013 field seasons. A sedimentation pond or other institutional controls, as described in the multi-site DD (USACE 2009), have not been implemented. Construction of a sedimentation pond within the drainage basin would cause unnecessary adverse impacts to the wetland environment. There is a natural stilling area in Site 28 approximately 200 feet south of the Suqi River (Figures B-6 through B-10) where the surface water flow channels disperse. Based on confirmation samples collected during the 2013 excavation, samples collected from the Suqi River in 2016 (USACE 2017), and re-sampling of sediment in 2018 (Appendix F), the stilling area and existing natural ponds are functioning as sedimentation ponds and have prevented migration of contaminants above the multi-site DD cleanup levels from Site 28 into the Suqi River.

PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the last FYR (Table 6). There were no issues identified at Site 28 during the 2014 FYR as excavation was ongoing at that time.

Table 6
Protectiveness Determinations/Statements from the 2014 FYR

Site	Protectiveness Determination	Protectiveness Statement
28	Will be Protective	The remedy at Site 28 is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.[1]

Notes:
[1] Removal actions within the Site 28 drainage have been successful in achieving SSCLs for non-POL CERCLA COCs in sediment. However, POL COCs remain in sediment above SSCLs.

IX. FIVE-YEAR REVIEW PROCESS

COMMUNITY NOTIFICATION, INVOLVEMENT & SITE INTERVIEWS

A public notice was published in the Nome Nugget on 29 March 2018 announcing the FYR and inviting the public to submit any comments to the USACE. Additionally, flyers and mailed notices were sent out and a public meeting was held on the 11 April 2018. The results of the review and the report will be made available at the site information repositories located at Savoonga City Hall and Gambell Sivuqaq Lodge.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The complete interviews, comments, and USACE responses to all issues are included in Appendix G. A summary of the key Site 28 issues is presented below:

Comment: There is concern regarding whether or not the issues of contaminant migration and/or exposure pathways via sediment and/or surface water at Site 28 and related drainages have been adequately investigated and/or monitored. This includes concerns regarding the state of the residual contamination source areas which remain within the tundra at Site 28 as well as likely ongoing sources from the MOC plumes which are located immediately adjacent to/upgradient of Site 28. Surface water monitoring data from Site 28 may be necessary in the future in order to make conclusive determinations regarding the status of migration and/or exposure pathways.

Comment: A participant in the public meeting asked if mercury would be sampled for at Site 28 and that they were in possession of data that showed mercury was present. Note: The USACE asked that data which showed mercury is present above the cleanup level, through third party sampling, be provided to the USACE for evaluation.

DATA REVIEW

The data review for Site 28 primarily focused on contaminated sediment data generated after the 2014 FYR and was heavily focused on contamination in sediment, the media of concern for the site in the multi-site DD (USACE 2009). "Sediment," as defined by the USACE project delivery team and ADEC project manager is considered to be "all continuously submerged loose material (mineral and/or organic) except for that which is actively growing vegetation or is part of a vegetative mat." The new data for Site 28 included data from the 2013 removal action report (USACE 2015a), which included results for sediment confirmation samples; 2016 sediment and surface water sampling in the Suqi River (USACE 2017) used as a line of evidence for evaluation of potential impacts to sediment and surface water in the Suqi River that may have resulted from upgradient Site 28 contamination; and the Site 28 re-accumulated sediment mapping effort (USACE 2018), which included sampling data at the original 2012 sediment sampling locations within Site 28 for comparison between pre-removal sediment and post-removal (i.e., re-accumulated) sediment results.

The 2018 Site 28 sediment mapping report is included in this report as Appendix F. Comparison of 2013 Site 28 sediment data to multi-site DD risk-based sediment cleanup levels found that DRO, RRO, 2-methylnaphthalene, acenaphthene, fluoranthene, fluorene, naphthalene, phenanthrene, and low molecular weight polycyclic aromatic hydrocarbons (LPAH) exceed the multi-site DD sediment cleanup levels. Comparison of 2016 sediment data from the Suqi River immediately downstream from Site 28 did not find any compounds above the multi-site DD risk-based sediment cleanup levels. Comparison of 2018 Site 28 sediment data to multi-site DD risk-based sediment cleanup levels found that DRO, RRO, 2-methylnaphthalene, acenaphthene, fluoranthene, fluorene, naphthalene, phenanthrene, and total LPAH exceed the risk-based sediment cleanup levels established in the multi-site DD.

Some analytes reported in the 2013 remedial action report and the 2018 sediment mapping report do not have a multi-site DD cleanup level (1-methylnaphthalene, benzo(a)anthracene, chrysene, pyrene, and selenium). Benzo(a)anthracene, chrysene, and pyrene were present and assessed in the risk assessment that supported the multi-site DD; the recent detections of these analytes are below the levels used for that assessment. 1-methylnapthalene and selenium maximum detections occurred in the dataset from the 2013 removal action samples and were evaluated in the first NEC FYR (USACE 2015b). The levels found from the maximum detections in sediment did not significantly contribute to overall risk to human health or the environment at Site 28 compared to the remaining levels of COCs at Site 28. No subsurface soil remedy is described in the multi-site DD for the site (USACE 2015b) because invasive activities in the Site 28 tundra, such as excavation in excess of the proposed suction dredge removal of practically accessible sediment, would likely result in adverse impacts that would be far greater to the natural resources and habitat than the remaining contamination. The selected remedy of removing the most highly contaminated and accessible sediment closest to the MOC, and from the narrow drainage channel and ponded areas in the lower half of Site 28 using a minimally invasive removal technique (such as suction dredging) while also managing the contamination in place by controlling downstream migration of suspended sediments and performing FYRs to ensure the remedy remains protective, was determined and agreed upon in the multi-site DD in order to minimize the adverse impacts to existing natural resources and habitat.

The 2018 sediment mapping effort calculated estimates of remaining sediment at the site. Based on 2018 sediment measurements, sediment re-accumulation does not appear to be a significant mechanism which would fully explain the volume of contaminated sediment observed in the 2014 sediment removal areas in 2018. This was determined by comparing the volume of sediment estimated in 2012, the volume of sediment removed in 2012 and 2013, and the volume of sediment estimated in 2018 by removal area. Additionally, discrete locations were compared within select removal areas for sediment thicknesses measured during the 2012 and 2018 mapping efforts. Visual field observations, such as surface evidence of sloughing, were also used to determine the likelihood of sediment re-accumulation. Sediment measured that was not the result of re-accumulation may be the result of the removal activity ceasing beyond 2 feet below the surface of the water, management decisions between USACE and ADEC to limit the excavation activity to accessible sediments to reduce impacts to the wetland environment, and mechanical limitations of a suction dredge in highly vegetated areas.

Approximately 196 of the 281 cubic yards of sediment remaining in the Site 28 drainage contains contaminated material above the SSCLs. This estimate was derived by using the sediment depth measurements collected during the 2018 mapping effort, estimating extents of contamination based on analytical results from the 2018 sediment samples, and calculating volume of contaminated sediment using the average thickness of sediment as illustrated on the cross sections for each transect (Appendix F [Attachment F-1]). Where multiple transects were collected to represent an elongated water body, the sediment thickness averaged from each transect was further weighted to account for differences in the width of the water body. For additional information regarding how the sediment was measured and how volume calculations were performed, refer to Section 4.0 of Appendix F.

The 2018 sediment volume estimates may be biased high for DRO and RRO due to naturally occurring organic material in sediment contributing to the reported levels of DRO and RRO. This observation is consistent with those reported in other investigations at Site 28 and other NEC sites. Silica gel treatment is only partially effective in reducing this high bias.

Subsurface soil POL contamination appears to be present at Site 28 on the southern boundary with MOC Site 11 that is not part of the sediment removal areas. MOC Site 11 excavations adjacent to Site 28 did not proceed into Site 28 at Ultraviolet Optical Screening Tool (UVOST) plumes D2, D3, I1, and J1B due to concern of impacting the wetland environment (USACE 2015a). Ceasing excavation activities associated with Site 11 before these activities entered into Site 28 was proposed by USACE during the 2011 removal action and subsequently agreed upon by ADEC. Figure B-6 shows the locations of the UVOST plumes within the Site 28 boundary.

SITE INSPECTION

The site inspection was conducted on 3 August 2018. The purpose of the inspection was to assess the protectiveness of the remedy. The inspection identified signs of petroleum sheen and fuel odor when sediment was disturbed in some areas of Site 28. Thick vegetation was present in all areas and did not show signs of stress. The areas where sediment dredging occurred during 2012 and 2013 were not easily distinguishable from other undisturbed areas of Site 28. The site inspection checklist completed during the site visit is provided in Appendix E.

X. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the Decision Documents?

Answer: No.

Question A Summary:

The selected remedy remains protective and has functioned as intended for CERCLA contaminants in sediment within the Site 28 drainage. The selected remedy in the 2009 Decision Document included removing the most highly contaminated and accessible sediment closest to the MOC and from the narrow drainage channel and ponded areas in the lower half of Site 28 using a minimally invasive removal technique (such as suction dredging). The remedy also included management of contamination in place by controlling downstream migration of suspended sediments and performing FYRs to ensure the remedy remains protective.

CERCLA non-POL COCs (PCBs, chromium, lead, and zinc) concentrations in sediment samples have been reduced to the SSCLs, which were risk-based levels that meant to achieve UU/UE; however, the remedy did not function as intended for POL-related Site 28 COCs (DRO, RRO, and PAHs) in sediment. The results of the sediment confirmation samples following excavation and data collected from re-accumulated sediment in 2018 indicated that POL-related Site 28 COCs (DRO, RRO, and PAHs) are present in Site 28 sediment within the drainage basin above the sitewide sediment cleanup levels.

The distribution of POL-related Site 28 COCs remaining above the sediment cleanup levels imply that dredging, as applied in 2013, was not effective. Implementation problems identified in the removal action report, which reduced effectiveness, included regular clogging of the dredge due to the vegetative mat, inability of the diver to observe the dredge nozzle, and limiting removal to the first 2 feet.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Answer: Yes.

Question B Summary:

Changes in standards and to be considered criteria: The multi-site DD sediment cleanup levels were derived from a combination of the *Sediment Minimum Cleanup Level Standards Table III*, Chapter 173-204-520 (Washington Administrative Code [WAC] 1995) and *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems* (MacDonald et al. 2000). The sediment cleanup levels were selected to protect low trophic group receptors (macroinvertebrates) according to the feasibility study (USACE 2007) and they are below levels that are protective of human health.

The WAC standard was updated in February 2013 (WAC 2013), and Table III Marine Sediment Management Standards now appears in Section 173-204-562 instead of Section 173-204-520. Other changes of note are that two types of levels are listed, and values are present for more PAHs than at the time of the multi-site DD. The content of the current WAC Table III is revised to include standards for no adverse effects (sediment cleanup objective) and minor adverse effects (sediment screening value). The multi-site DD cleanup levels are the same as those now listed as “sediment screening values”. Some variations were noted between the numeric value listed in the multi-site DD and the value listed in the WAC due to rounding of values described in the feasibility study when converting cleanup levels to a dry weight basis. For example, the cleanup level for 2-methylnaphthalene was rounded to 0.6 mg/kg, where the WAC value was 0.64 mg/kg, and the cleanup level for PCBs was rounded to 0.7 mg/kg, where the WAC value was 0.65 mg/kg. Rounding also occurred for acenaphthene and fluorene.

The source of the multi-site DD sediment cleanup levels for benzo(g,h,i)perylene, fluoranthene, and indeno(1,2,3-cd)pyrene is the *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems* (MacDonald et al. 2000) because no values were available in WAC Table III for these compounds at the time of the multi-site DD. However, it was identified during a review of the article (MacDonald et al. 2000) that the compounds benzo(g,h,i)perylene, fluoranthene, and indeno(1,2,3-cd)pyrene are not present in the document and MacDonald et al (2000) cannot be the source of the cleanup levels. The feasibility study (USACE 2007) was reviewed to investigate the source of the benzo(g,h,i)perylene, fluoranthene, and indeno(1,2,3-cd)pyrene cleanup levels and it appears that the *Consensus-Based Sediment Quality Guidelines* Interim Guidance RR-088 (Wisconsin Department of Natural Resources 2003) is the source of the cleanup levels. No changes have occurred to either MacDonald et al (2000) or Wisconsin Department of Natural Resources (2003) during the review period. A summary of the changes to standards is listed in Table 7.

Table 7
Evaluation of Changes in Chemical-Specific Standards

COC	Multi-Site DD-Established Cleanup Level for COCs (mg/kg)	Source of the Multi-Site DD Cleanup Level	Has the Source of the Multi-Site DD-Established Cleanup Level Revised the Standard to a More Stringent Level?
DRO C_{10} to C_{25}	3,500	Site-specific [a]	No
RRO C_{25} to C_{36}	3,500	Site-specific [a]	No
Acenaphthene	0.5	WAC 173-204-520 T3	No
Benzo(g,h,i)perylene	1.7	MacDonald et al. [b]	No
Fluoranthene	2	MacDonald et al. [b]	No
Fluorene	0.8	WAC 173-204-520 T3	No
Indeno(1,2,3-cd)pyrene	3.2	MacDonald et al. [c]	No
2-Methylnaphthalene	0.6	WAC 173-204-520 T3	No
Naphthalene	1.7	WAC 173-204-520 T3	No
Phenanthrene	4.8	WAC 173-204-520 T3	No
Total LPAHs	7.8	WAC 173-204-520 T3	No
Total HPAHs	9.6	WAC 173-204-520 T3	No
PCBs (sum)	0.7	WAC 173-204-520 T3	No
Arsenic	93	WAC 173-204-520 T3	No
Chromium	270	WAC 173-204-520 T3	No
Lead	530	WAC 173-204-520 T3	No
Zinc	960	WAC 173-204-520 T3	No

Notes:
[a] Site-specific calculated value
[b] The source of the cleanup level cited in the multi-site DD is not accurate. The value is from *Consensus-Based Sediment Quality Guidelines* Table 2 Probable Effect Concentration (Wisconsin Department of Natural Resources 2003).
[c] The source of the cleanup level cited in the multi-site DD is not accurate. The value is from *Consensus-Based Sediment Quality Guidelines* Table 2 Midpoint Effect Concentration (Wisconsin Department of Natural Resources 2003).
COC = contaminant of concern
DD = Decision Document
DRO = diesel-range organics
HPAH = high molecular weight polycyclic aromatic hydrocarbons
LPAH = low molecular weight polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyls
RRO = residual-range organics
T3 = Table III
WAC = Washington administrative code

The sources of the multi-site DD cleanup levels were evaluated to ascertain if any value had decreased in more recent versions of the source document (Table 7) as well as other available benchmarks for benthic macroinvertebrates, birds, and mammals (Table 8) to determine if the multi-site DD cleanup levels continue to be protective of wildlife at Site 28. As shown in Table 8, the multi-site DD cleanup levels are more conservative than the new sediment cleanup levels

(WAC 2013), equilibrium partitioning (EqP) sediment benchmarks (EPA 2003, 2012), as well as ecological preliminary remedial goals (EcoPRGs) for birds and mammals (Los Alamos National Laboratory [LANL] 2017).

- The 2013 WAC sediment cleanup levels (Table 8) are higher than the multi-site DD cleanup levels for fluoranthene and total HPAHs are lower than the multi-site DD cleanup levels for benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene.
- The default EqP sediment benchmarks for PAHs (Table 8) are derived using final chronic values for surface water and a total organic carbon of 1 percent. The derivation methodology is presented in EPA (2012). All EqP sediment benchmarks for PAHs are higher (less) conservative than the multi-site DD cleanup levels.
- EcoPRGs from the LANL database are the lowest available for birds and mammals for exposure to soils or sediments. The EcoPRGs are calculated using the lowest observed adverse effect level and either a default area use factor (AUF=1) or a site-specific AUF (based on the acreage of Site 28 of 14.65 acres). Both sets of EcoPRGs as wells as the species with the lowest value are presented in Table 8. The EcoPRGs assuming an AUF=1 are higher (less conservative) for all COCs, with the exception of lead and zinc. The EcoPRGs using Site 28 AUFs are higher (less conservative) for all COCs.

Based on comparison of the multi-site DD cleanup levels to updated WAC sediment cleanup levels as well as available benchmarks for the protection of benthic macroinvertebrates, birds, and mammals, the multi-site DD cleanup levels continue to be protective of wildlife that may potentially use Site 28.

Table 8
Comparison of Multi-Site DD Cleanup Levels and Risk-Based Benchmarks.

COC	Multi-Site DD Cleanup Levels (USACE, 2009)		Risk-based Criteria for Benthic Macroinvertebrates and Wildlife (mg/kg dw)				
	Cleanup Level (mg/kg)	Source	Sediment Cleanup Level (WAC 2013)	EqP Sediment Benchmarks (EPA 2003, 2012)	Soil/Sediment EcoPRG Wildlife (AUF=1) (LANL 2017)	Soil/Sediment EcoPRG Wildlife (AUF=Site 28) (LANL 2017)	Receptor
DRO C_{10} to C_{25}	3,500	Site-specific	--	--	--	--	--
RRO C_{25} to C_{36}	3,500	Site-specific	--	--	--	--	--
Acenaphthene	0.5	WAC, 1995	0.57	4.2	1300	3600	shrew
Benzo(g,h,i)perylene	1.7	WDNR, 2003	0.78	10.9	260	710	shrew
Fluoranthene	2	WDNR, 2003	12	7.1	230	620	shrew
Fluorene	0.8	WAC, 1995	0.79	5.4	520	1400	shrew
Indeno(1,2,3-cd)pyrene	3.2	WDNR, 2003	0.88	11.2	740	2000	shrew
2-Methylnaphthalene	0.6	WAC, 1995	0.64	4.3	160	450	shrew
Naphthalene	1.7	WAC, 1995	1.7	3.9	30	83	deer mouse
Phenanthrene	4.8	WAC, 1995	4.8	6	110	300	shrew
Total LPAHs	7.8	WAC, 1995	7.8	--	--	--	--
Total HPAHs	9.6	WAC, 1995	53	--	--	--	--
PCBs (sum)	0.7	WAC, 1995	0.65	--	--	--	--
Arsenic	93	WAC, 1995	93	--	200	540	shrew
Chromium	270	WAC, 1995	270	--	280	770	robin
Lead	530	WAC, 1995	530	--	290	3800	robin
Zinc	960	WAC, 1995	960	--	340	930	robin

Notes:
Green color indicates that the criteria is higher than (less conservative) than that used in the multi-site DD.
Salmon color indicates that the criteria is lower than (more conservative) than that used in the multi-site DD.
EqP = Equilibrium partitioning sediment benchmark, assumes 1percent total organic carbon (EPA, 2012)
EcoPRG = ecological preliminary remedial goal. Lowest value for birds or mammals based on the lowest observed adverse effect level.
EcoPRGs calculated using AUF=1 and using Site 28 acreage of 14.65 acres.

Changes in toxicity and other contaminant characteristics: No changes to cancer slope factors in the Integrated Risk Information System (EPA 2005) database occurred during this FYR period for Site 28 COCs.

Changes in risk assessment methods: None were identified.

Changes in exposure pathways: The exposure pathways and assumptions used in the risk assessment that supported the multi-site DD have not changed. Physical site conditions have not changed following the 2013 removal action such that current protectiveness may be affected negatively.

The multi-site DD (USACE 2009) remedy for Site 28 includes construction of a man-made settling pond "or other appropriate controls" in order to manage the contamination in place by controlling downstream migration of suspended sediments and prevent migration of contamination into the Suqi River. There is a natural stilling area in Site 28 approximately 200 feet south of the Suqi River (Figures B-6 through B-10) where the surface water flow channels disperse. The USACE and ADEC temporarily postponed the construction of a settling pond to allow the opportunity to evaluate whether the natural stilling actions provided adequate functionality and protectiveness as required to meet the RAO to prevent migration of contaminants into the Suqi River.

This stilling area, in addition to the natural, existing ponds, have proven effective at preventing migration of contaminants into the Suqi River. This has been confirmed by the 2018 sediment mapping and sampling event (Appendix F), the results of which indicated no contaminants exceeded the SSCLs in re-accumulated sediment downstream of the natural stilling area. DRO concentrations in sediment samples analyzed with the silica gel method were detected well below the cleanup level in this area, at a maximum concentration of 1,890 mg/kg. The highest detected RRO concentration in re-accumulated sediment analyzed with the silica gel method was 1,660 mg/kg. The SSCL for both of these analytes is 3,500 mg/kg. PAHs were either not detected or were detected with estimated concentrations well below the cleanup level. Metals were detected in this area, but also well below the cleanup levels. Therefore, the Suqi River is not receiving contamination from an upgradient source such as Site 28. Data tables for these results are available in Attachment F-2. In addition, results of a surface water and sediment sampling effort of the Suqi River conducted in 2016 (USACE 2017) also indicated no contaminants exceeded the SSCLs in Suqi River sediment or surface water samples. Silica gel method was not performed on these samples, however, DRO (540 mg/kg in sediment) and RRO (2,500 mg/kg) at the confluence of the Suqi River, location S29-002, did not exceed SSCLs. Surface water samples were non-detect for all PAHs except for a j-flagged naphthalene result of 0.0000043 mg/L. TAH and TAqH did not exceed the multi-site DD criterion and sheen was not observed at this location.

Expected progress toward meeting RAOs: RAOs for all Site 28 non-POL CERCLA COCs (PCBs, chromium, lead, and zinc) are met and have reached levels that allow for UU/UE. RAOs for POL-related Site 28 COCs (DRO, RRO, and PAHs) have not been met.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

Answer: No.

Question C Summary:

There is no other information identified that would call into question the protectiveness of the remedy. Climate change may be occurring in the arctic which could affect yearly precipitation levels, average temperatures, and sea ice formation. There are no new issues during this review period created by climate change. No shallow permafrost was reported during past investigations at the site.

XI. ISSUES/RECOMMENDATIONS

Issues and Recommendations Identified in the FYR:				
OU(s):	Issue Category: Other			
	Issue: Sediment contamination above multi-site DD cleanup levels remains in Removal Areas 2 through 9 for multi-site DD COCs (DRO, RRO, 2-methylnaphthalene, acenaphthene, fluoranthene, fluorene, naphthalene, phenanthrene, and total LPAH) after 2012/2013 sediment removal actions. An estimated 196 of the 281 cubic yards of sediment present in Site 28 as of August 2018 contain compounds at levels above their respective multi-site DD cleanup levels.			
	Recommendation: Conduct bench testing or pilot testing to improve the effectiveness of remedy implementation.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	Other USACE	State	12/20/2023

Notes:
COC = contaminant of concern
DD = Decision Document
DRO = diesel-range organics
LPAH = low molecular weight polycyclic aromatic hydrocarbons
OU = operable unit
RRO = residual-range organics
USACE = U.S. Army Corps of Engineers

OTHER FINDINGS

In addition, the following are recommendations that were identified during the FYR but do not affect current and/or future protectiveness:

- Subsurface soil contamination is suspected to be present in several areas along the southern end of Site 28, within the UVOST delineated MOC plumes D2, D3, I2, J1B, and between UVOST plumes D and I (Figure B-6). Subsurface soil contamination present at Site 28 on the southern boundary with MOC Site 11 is not part of the sediment removal areas. MOC Site 11 excavations adjacent to Site 28 did not proceed into Site 28 at UVOST plumes D2, D3, I1, and J1B due to concern of impacting the wetland environment. It is recommended to formally document the contamination remaining at the southern end of Site 28 associated with Site 11. In addition, formally document why continued remedy implementation (excavation) north of Site 11 within Site 28 is infeasible due to shallow groundwater and impacts to wetlands.

- Construction of a sedimentation pond or other institutional controls, as described in the multi-site DD (USACE 2009), have not occurred at Site 28. There is a natural stilling area in Site 28 approximately 200-ft south of the Suqi River (Figure B-6) where the surface water flow channels disperse. This stilling area, in addition to the existing, natural sedimentation ponds, has been found to prevent migration of contaminants above risk-based cleanup levels into the Suqi River. This has been confirmed by the 2018 sampling (Appendix F), the results of which indicated no contaminants exceeded the SSCLs in re-accumulated sediment downstream of the natural stilling area. DRO concentrations in sediment samples analyzed with the silica gel method were detected well below the cleanup level in this area, at a maximum concentration of 1,890 mg/kg. The highest detected RRO concentration in re-accumulated sediment analyzed with the silica gel method was 1,600 mg/kg. The SSCL for both of these analytes is 3,500 mg/kg. PAHs were either not detected or were detected with estimated concentrations well below the cleanup level. Metals were detected in this area, but also well below the cleanup levels. Therefore, the Suqi River is not receiving contamination from an upgradient source such as Site 28. Data tables for these results are available in Attachment F-2. In addition, results of a surface water and sediment sampling effort of the Suqi River conducted in 2016 (USACE 2017) also indicated no contaminants exceeded the SSCLs in Suqi River sediment or surface water samples. Silica gel method was not performed on these samples, however, DRO (540 mg/kg in sediment) and RRO (2,500 mg/kg) at the confluence of the Suqi River, location S29-002, did not exceed SSCLs. Surface water samples were non-detect for all PAHs except for a j-flagged naphthalene result of 0.0000043 mg/L. TAH and TAqH did not exceed the DD criterion and sheen was not observed at this location. Construction of a sedimentation pond within the drainage basin would cause unnecessary impacts to the wetland environment, as natural features are successfully preventing the contaminant migration. Although this has been documented in the long-term monitoring plan (USACE 2016b), it is recommended that an explanation of significant differences be completed for Site 28 to document the post-DD change.
- CERCLA action at Site 28 is complete. The 2013 excavation confirmation sample results in the remedial action report (USACE 2015a) and results from the 2018 sampling effort (USACE 2018) identified that all non-POL Site 28 COCs (PCBs, chromium, lead, and zinc) are below the sitewide sediment cleanup levels, and thus achieved UU/UE relative to all CERCLA contaminants; however, POL-related Site 28 COCs (DRO, RRO, and PAHs) are present above the sitewide sediment cleanup levels. Future reviews for petroleum and petroleum related compounds at Site 28 should occur under the Periodic Review for other petroleum related NEC sites.

XII. PROTECTIVENESS STATEMENT

PROTECTIVENESS STATEMENT(S)		
Site: 28	***Protectiveness Determination:*** Protective	***Planned Addendum Completion Date*** Not applicable
Protectiveness Statement: The remedy at Site 28 is protective of human health and the environment.		

Note:
The protectiveness statement above is specific to non-POL CERCLA contaminants in sediment. POL contaminants (DRO, RRO, and PAHs) are present at Site 28 above the sitewide sediment cleanup levels.

XIII. NEXT REVIEW

CERCLA action at Site 28 is complete. No future CERCLA FYRs are needed. However, POL-contaminants (DRO, RRO, and PAHs) are present above the sitewide sediment cleanup levels. Future reviews for petroleum and petroleum related compounds at Site 28 will be included in the Periodic Review for other petroleum related NEC sites.

APPENDIX A

Reference List

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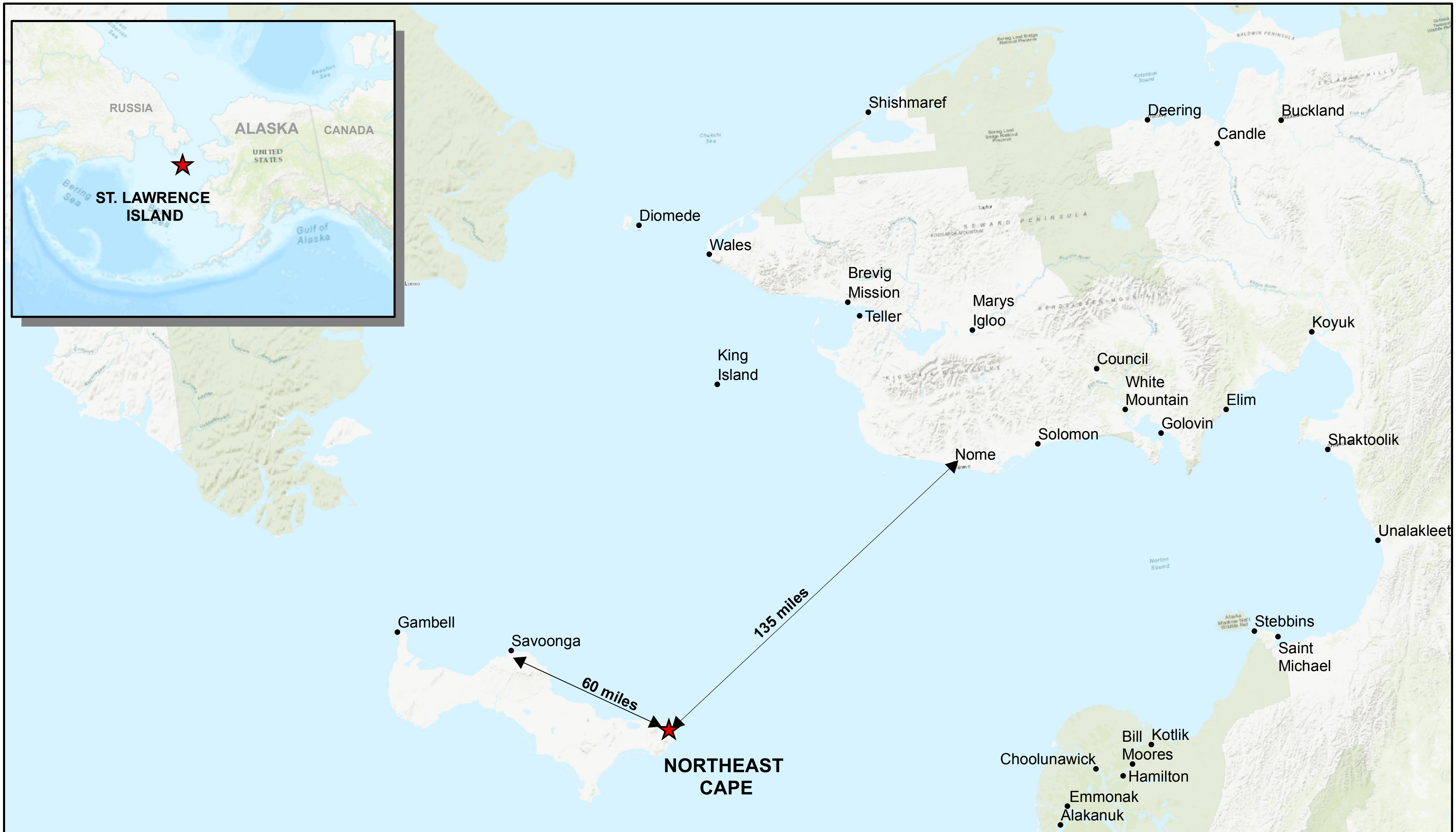
APPENDIX B

Figures

P:\StLawrenceIsland_F10AK0969_NEC_2ndYR_Sup\01_MXD\FigB-1_Location_Vicinity.mxd beatycj



Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

N

0 10 20 30 40 50
Miles

WGS 1984 UTM Zone 2N

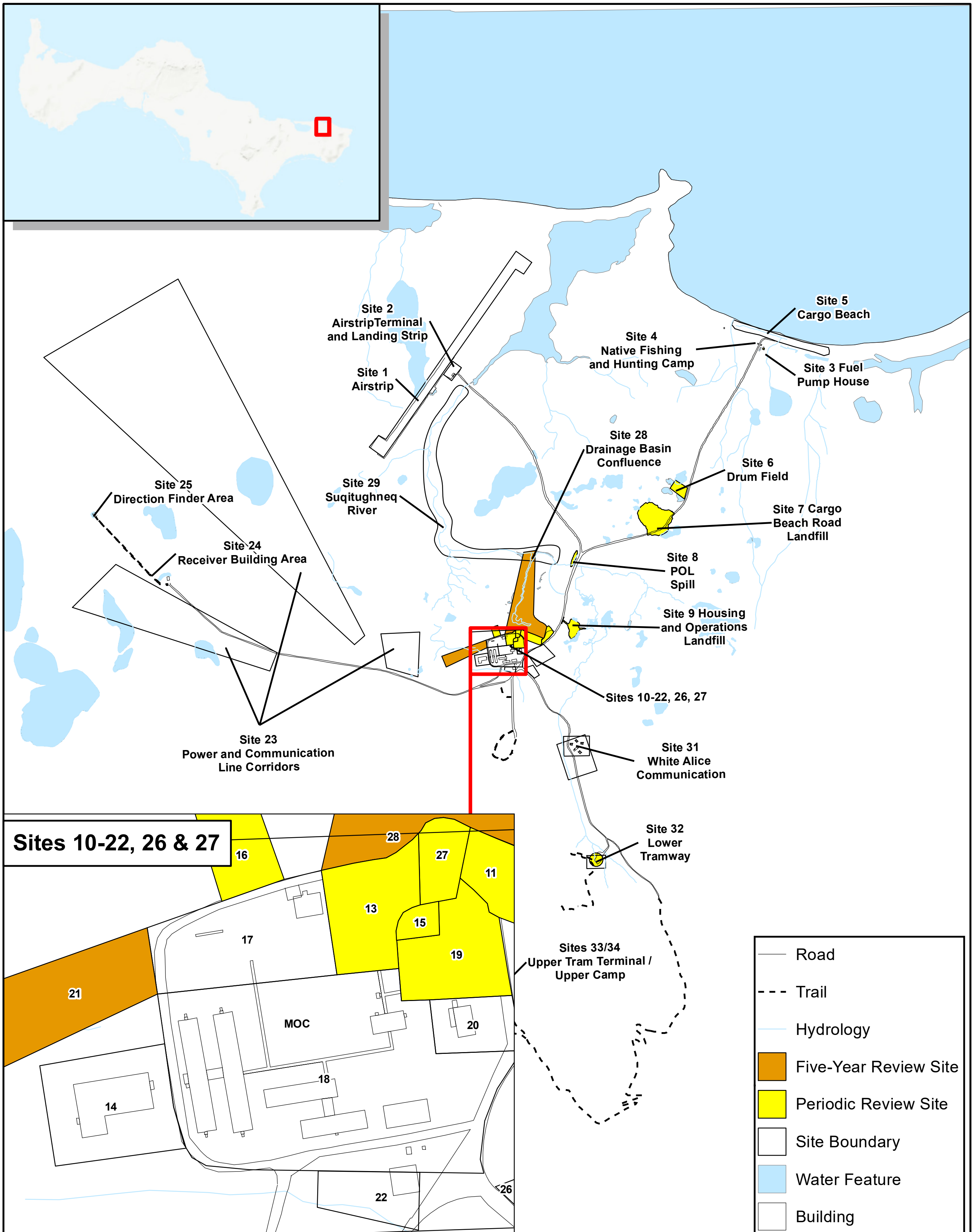
NORTHEAST CAPE
LOCATION AND VICINITY

U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-1



N

0 145 290

FEET

WGS 1984 UTM Zone 2N

FIVE YEAR REVIEW SITES
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

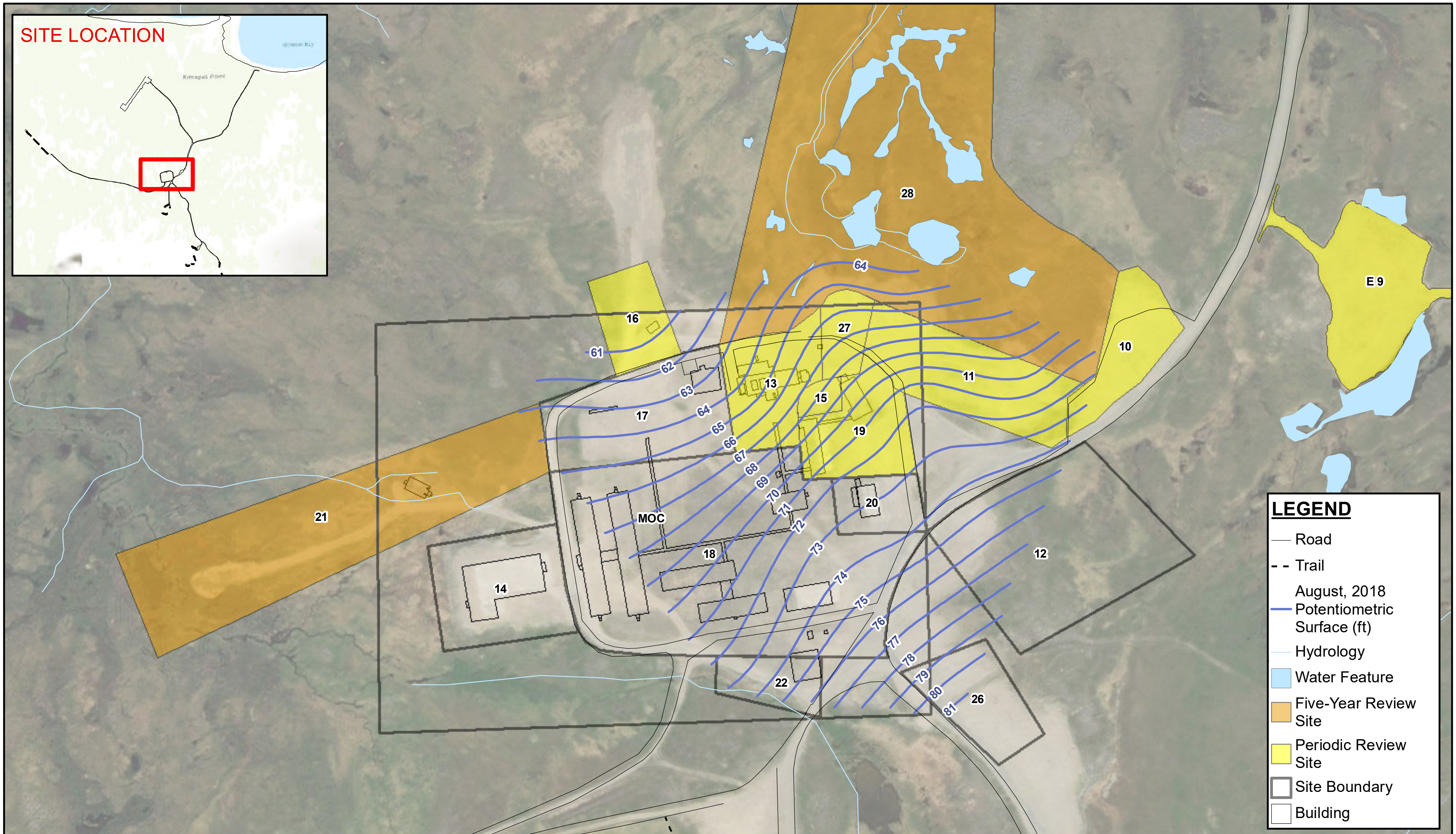
FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-2

P:\StLawrenceIsland_F10AK0969_NEC_2nd5YR_Sup\01_MXD\FigB-2_FiveYearReviewSites.mxd beatycj

P:\StLawrenceIsland_F10AK0969_NEC_2nd5YR_Sup\01_MXD\FigB-3_Sites21and28.mxd beatycj



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
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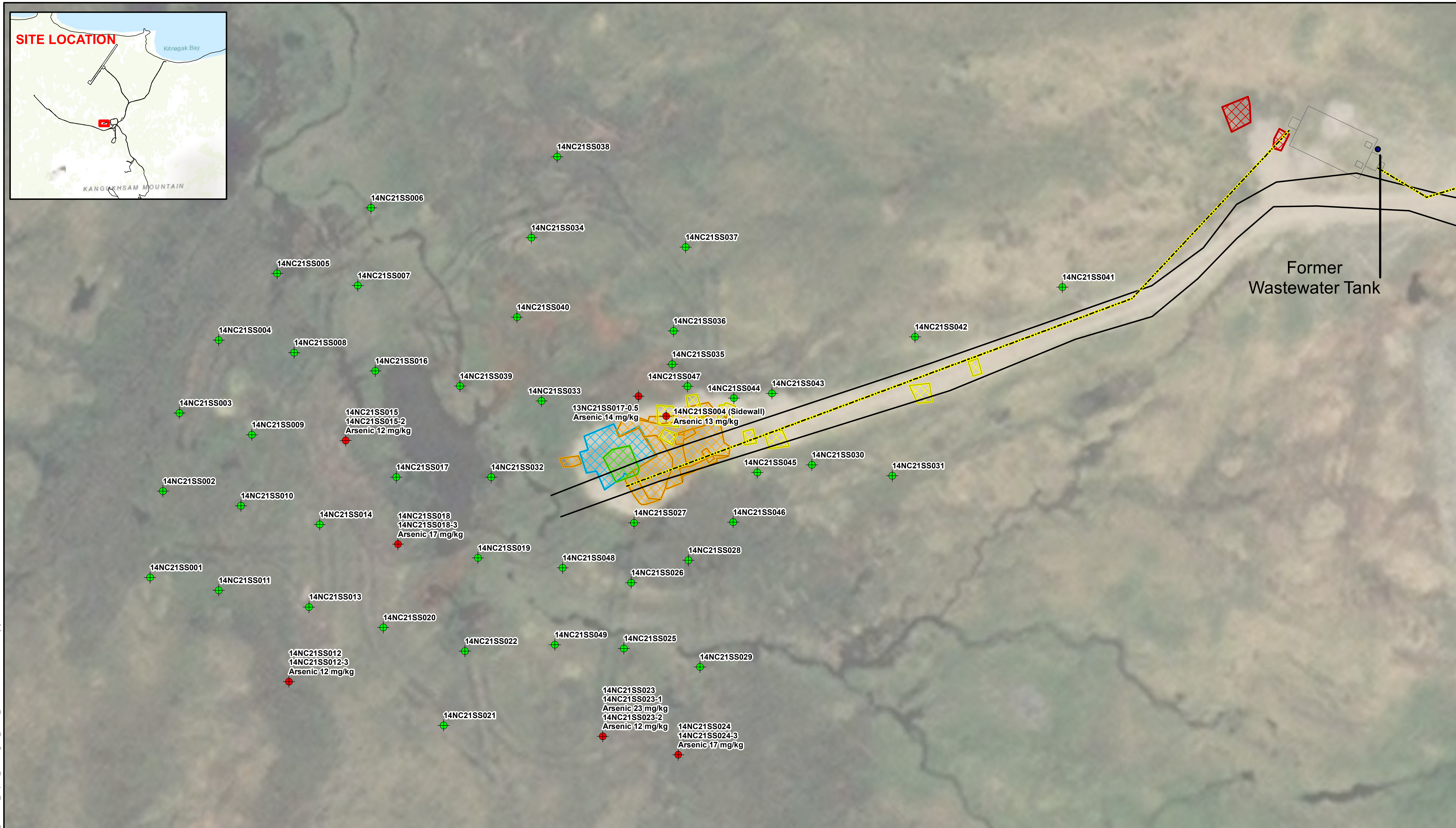
SITES 21 & 28
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army Corps of Engineers Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-3



P:\StLawrenceIsland_F10AK0969_NEC_2nd5YR_Sup\01_MXD\FigB-4_Site21_WasteWaterTank.mxd beatyg

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Former Wastewater Tank
- Historical Soil Sample Location with Arsenic > 11 mg/kg
- Historical Soil Sample Location with Arsenic < 11 mg/kg
- Former Utilidor/Discharge Pipe
- Road
- 2014 Excavation
- 2013 Excavation
- 2012 Arsenic Excavation
- 2012 Flooded Excavation
- 2010 PCB Excavation
- Building

N

0 25 50

FEET

WGS 1984 UTM Zone 2N

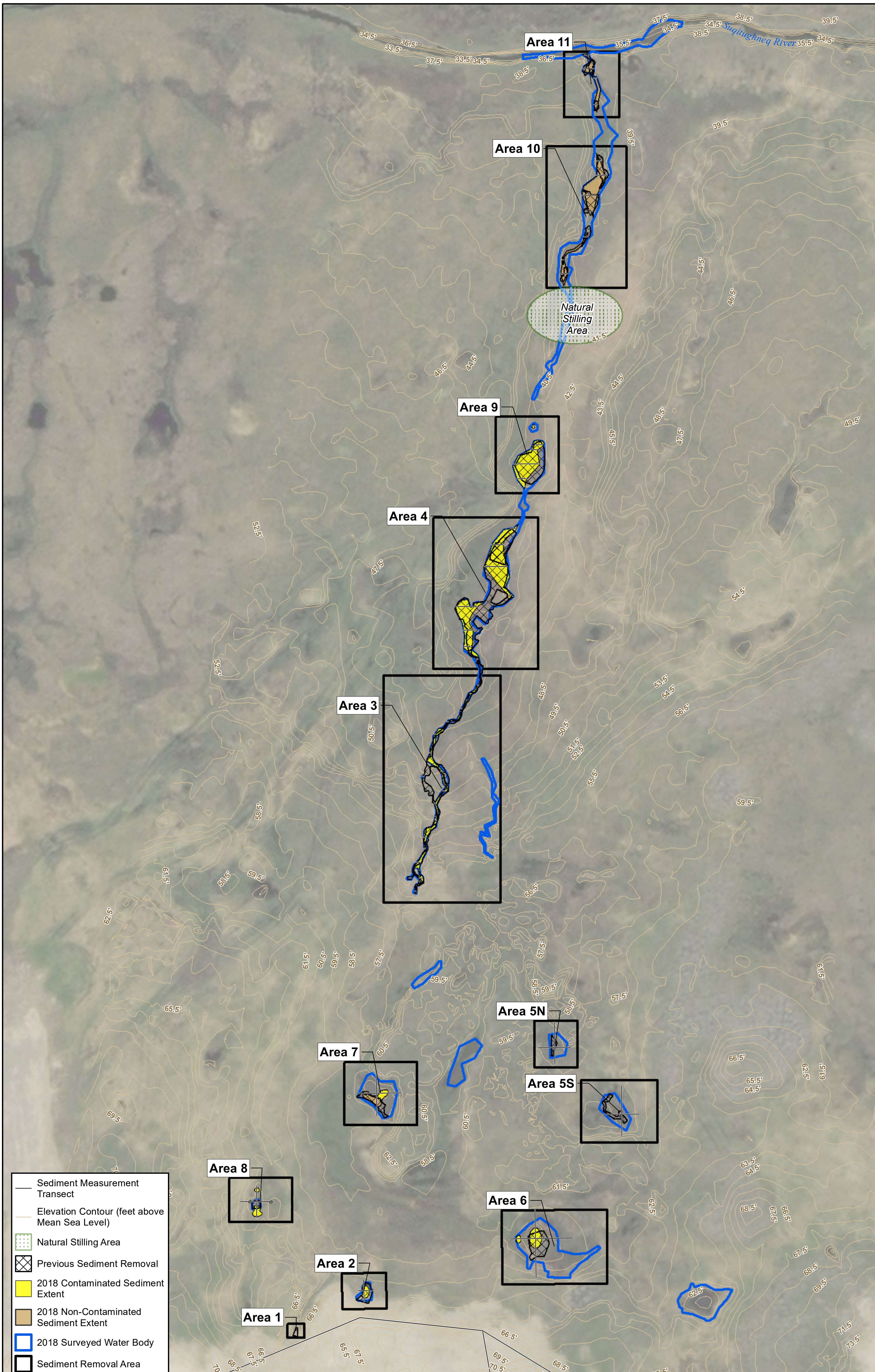
SITE 21: WASTEWATER TANK
NORTHEAST CAPE FIVE YEAR REVIEW

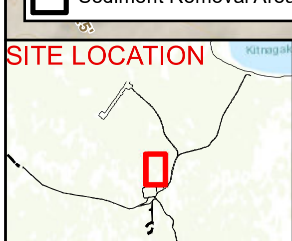
U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-4





Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

N

0 25 50 75 100
Feet

WGS 1984 UTM Zone 2N

SITE 28: TRANSECT OVERVIEW
NORTHEAST CAPE FIVE YEAR REVIEW

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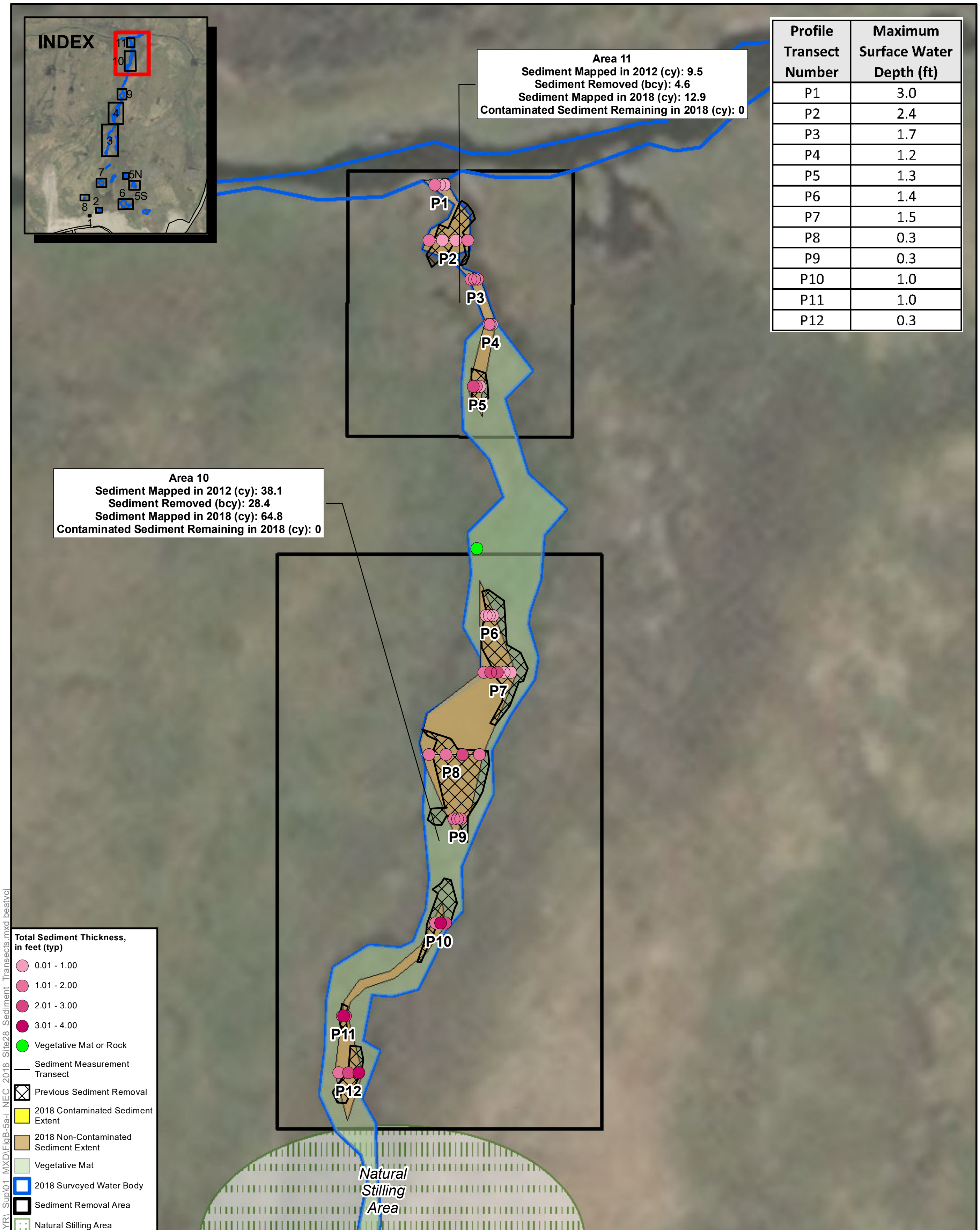
Alaska District

FUDS PROPERTY - F10AK0969
SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-5

P:\StLawrenceIsland_F10AK0969_NEC_2ndSYR_Sup01_MXD\FigB-5_Site28_TransectOverview.mxd beatyc



Profile Transect Number	Maximum Surface Water Depth (ft)
P1	3.0
P2	2.4
P3	1.7
P4	1.2
P5	1.3
P6	1.4
P7	1.5
P8	0.3
P9	0.3
P10	1.0
P11	1.0
P12	0.3

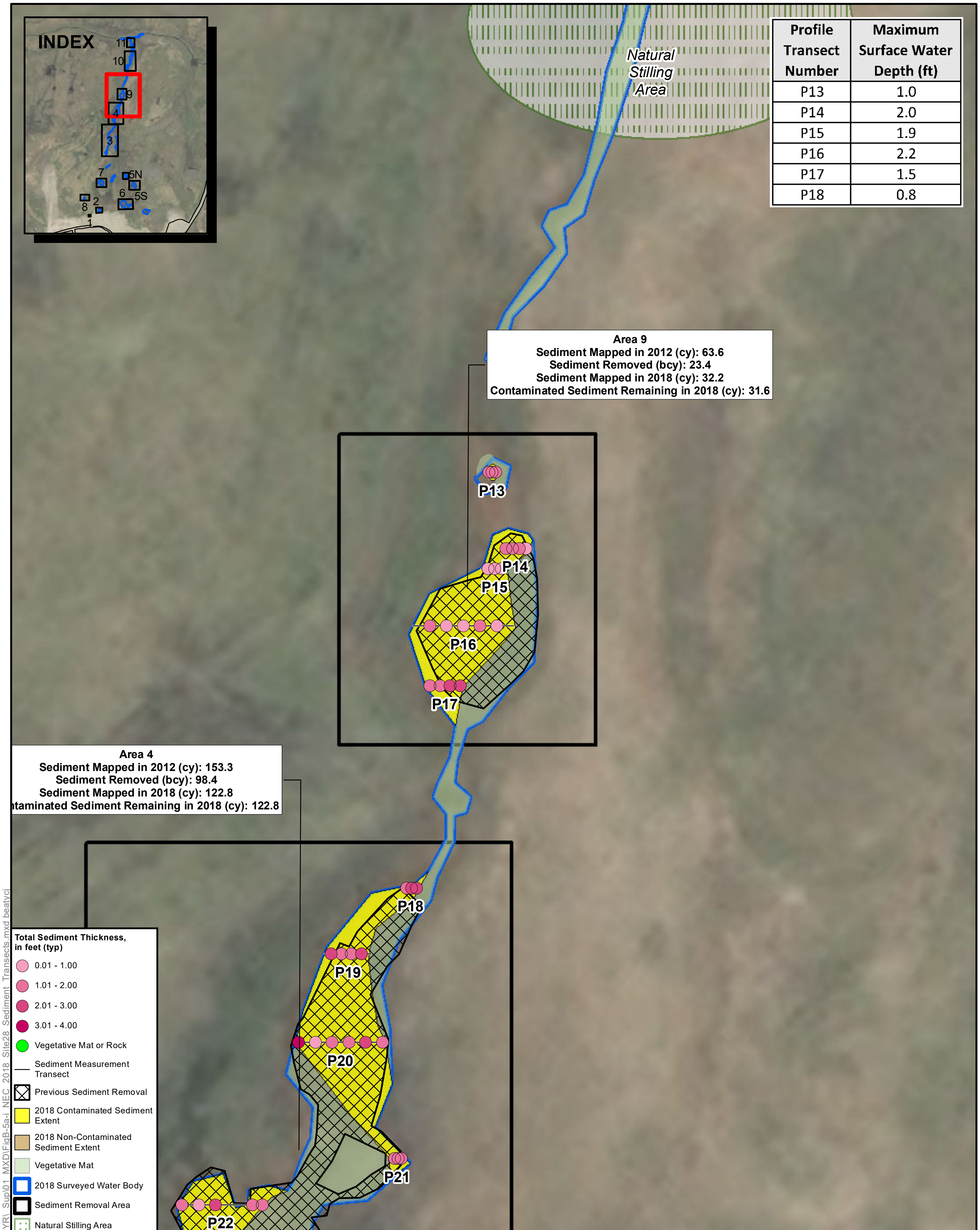
SITE 28: AREAS 10 AND 11 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969
SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-5a

P:\StLawrenceIsland_FUDS_NEC_2nd5YR_Sup01_MXD\FigB-5a-i_NEC_2018_Site28_Sediment_Transects.mxd beatyci



Profile Transect Number	Maximum Surface Water Depth (ft)
P13	1.0
P14	2.0
P15	1.9
P16	2.2
P17	1.5
P18	0.8

N

0 8 16 24 32 40
Feet

WGS 1984 UTM Zone 2N

SITE 28: AREA 9 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

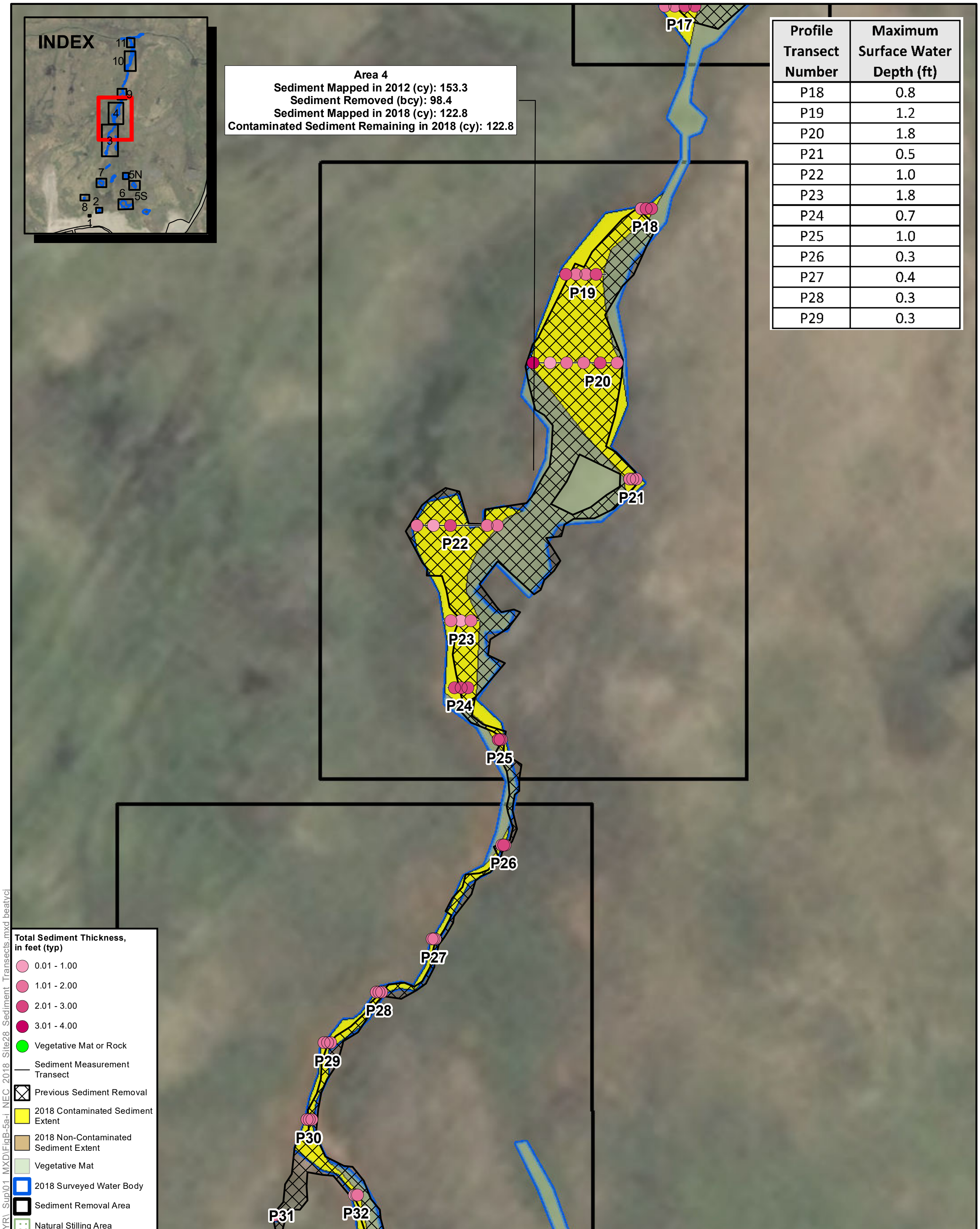
U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-5b

P:\StLawrenceIsland_FUDS_NEC_2nd5YR_Sup\01_MXD\FigB-5a-i_NEC_2018_Site28_Sediment_Transects.mxd beatyci



Profile Transect Number	Maximum Surface Water Depth (ft)
P18	0.8
P19	1.2
P20	1.8
P21	0.5
P22	1.0
P23	1.8
P24	0.7
P25	1.0
P26	0.3
P27	0.4
P28	0.3
P29	0.3

N

0 8 16 24 32 40

Feet

WGS 1984 UTM Zone 2N

SITE 28: AREA 4 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

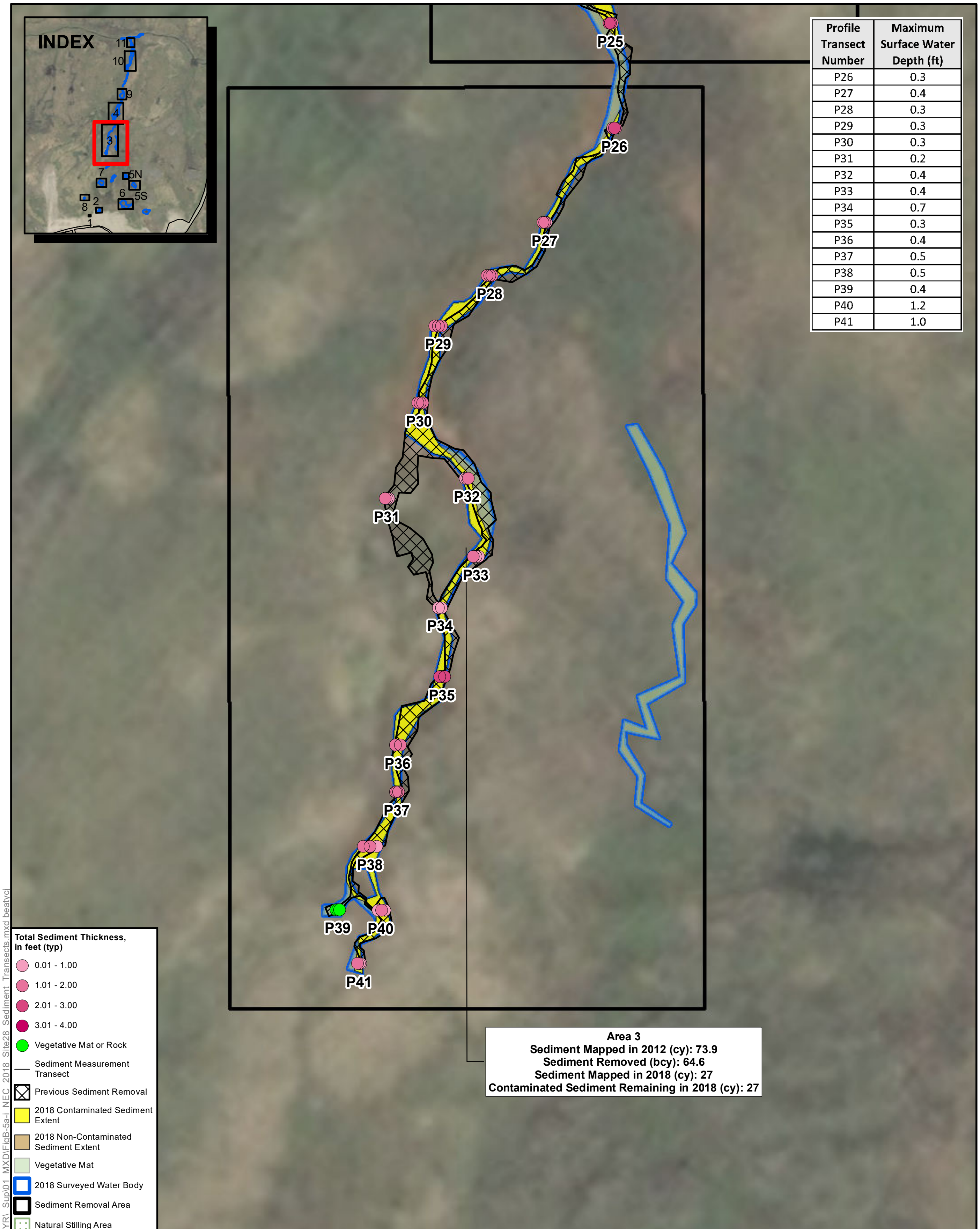
FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-5c

P:\StLawrenceIsland_FUDS_NEC_2nd5YR_Sup01_MXD\FigB-5a-i_NEC_2018_Site28_Sediment_Transects.mxd beatyci

Profile Transect Number	Maximum Surface Water Depth (ft)
P26	0.3
P27	0.4
P28	0.3
P29	0.3
P30	0.3
P31	0.2
P32	0.4
P33	0.4
P34	0.7
P35	0.3
P36	0.4
P37	0.5
P38	0.5
P39	0.4
P40	1.2
P41	1.0



P:\StLawrenceIsland_FUDS_NEC_2nd5YR_Sup01_MXD\FigB-5a-i_NEC_2018_Site28_Sediment_Transects.mxd beatyci

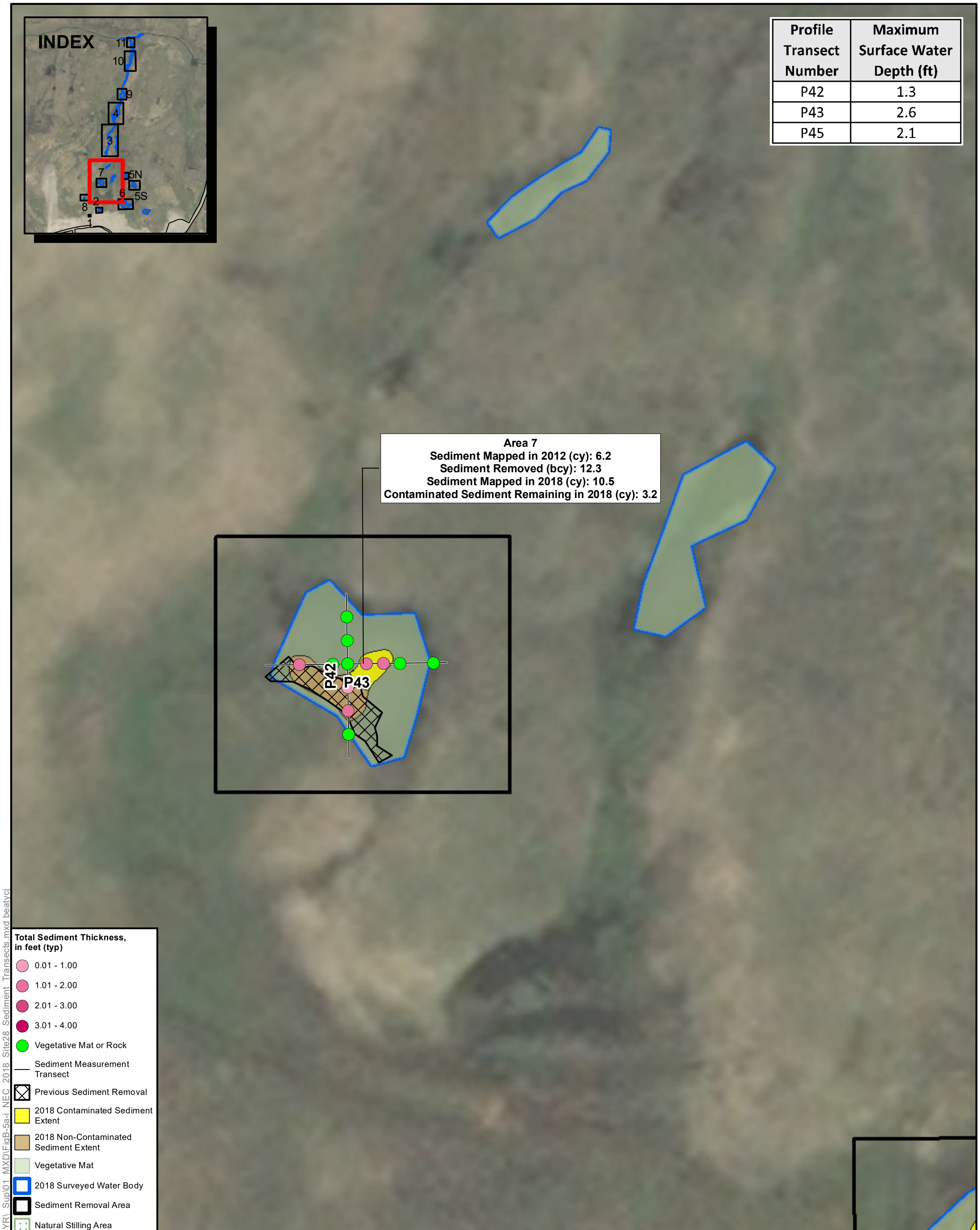
SITE 28: AREA 3 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-5d



Profile Transect Number	Maximum Surface Water Depth (ft)
P42	1.3
P43	2.6
P45	2.1

N

0 8 16 24 32 40
Feet

WGS 1984 UTM Zone 2N

SITE 28: AREA 7 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969
SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-5e

P:\StLawrenceIsland_FUDS_NEC_2nd5YR_Sup01_MXD\FigB-5a-i_NEC_2018_Site28_Sediment_Transects.mxd beatyci

Profile Transect Number	Maximum Surface Water Depth (ft)
P44	2.2
P45	2.1

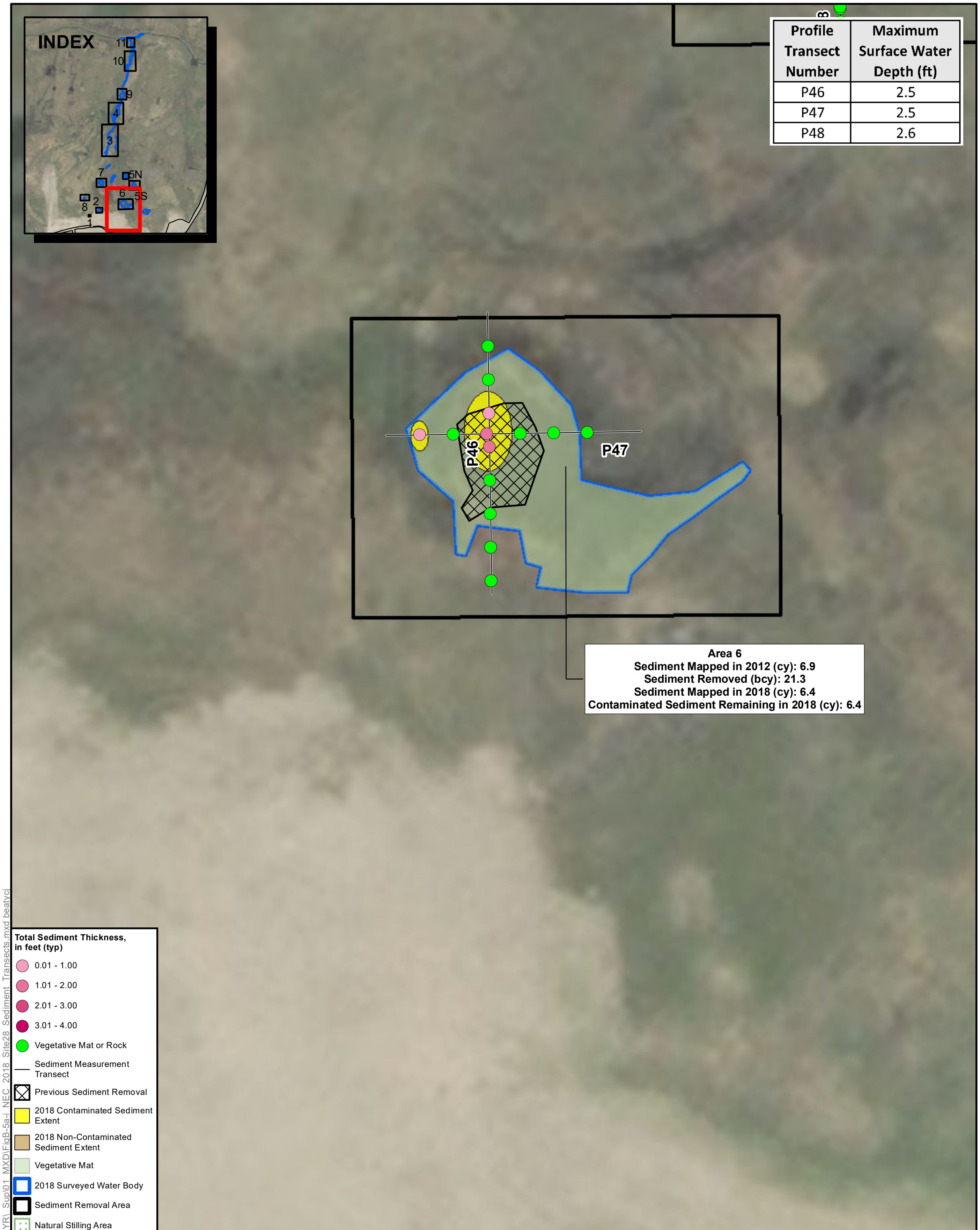
P:\StLawrenceIsland_FUDS_NEC_2nd5YR_Sup01_MXD\FigB-5a-i_NEC_2018_Site28_Sediment_Transects.mxd beatyci

SITE 28: AREA 8 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969
SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-5f



Profile Transect Number	Maximum Surface Water Depth (ft)
P46	2.5
P47	2.5
P48	2.6

N

0 8 16 24 32 40
Feet

WGS 1984 UTM Zone 2N

SITE 28: AREA 6 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-5g

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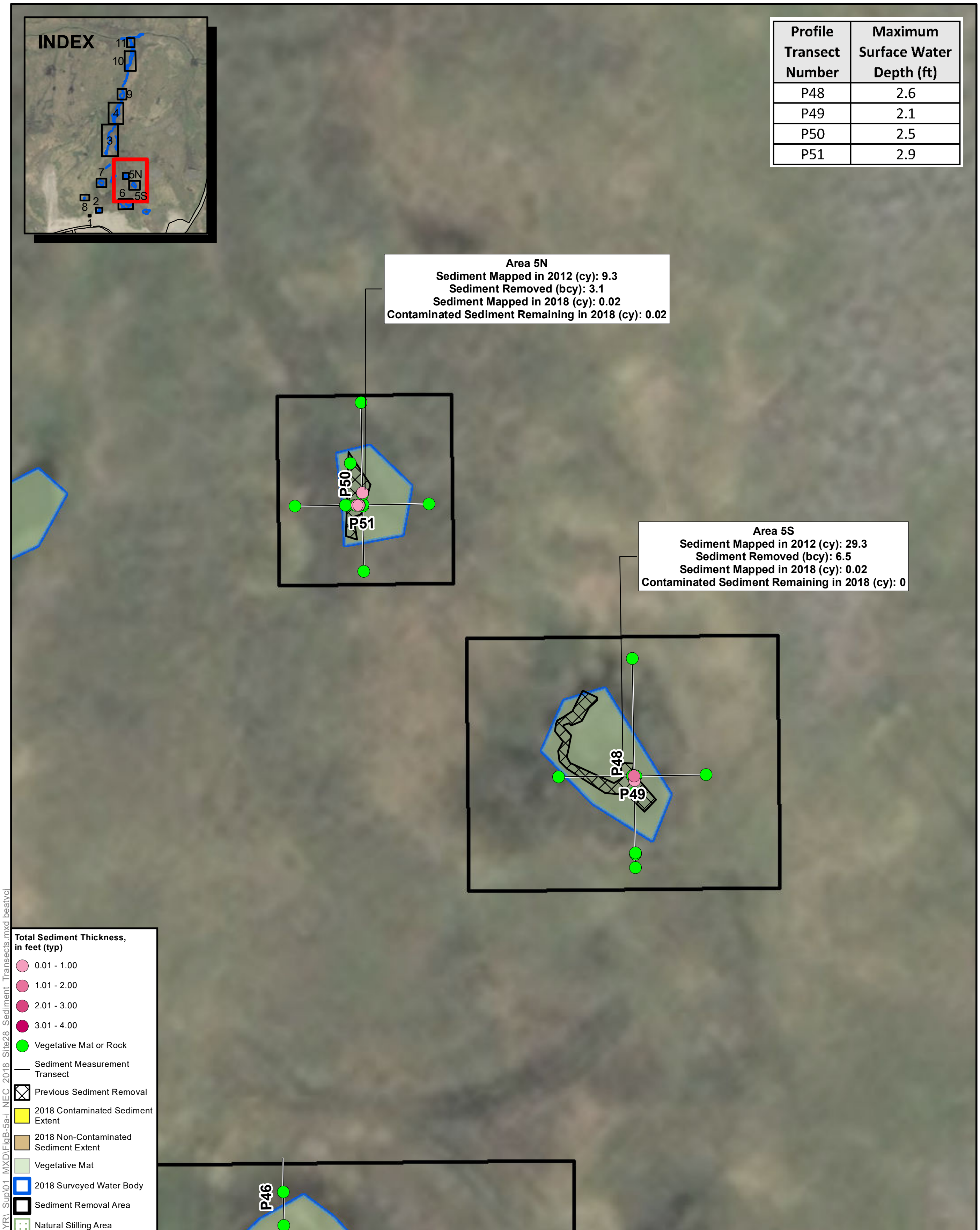


Profile Transect Number	Maximum Surface Water Depth (ft)
P48	2.6
P49	2.1
P50	2.5
P51	2.9

SITE 28: AREAS 5N AND 5S TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

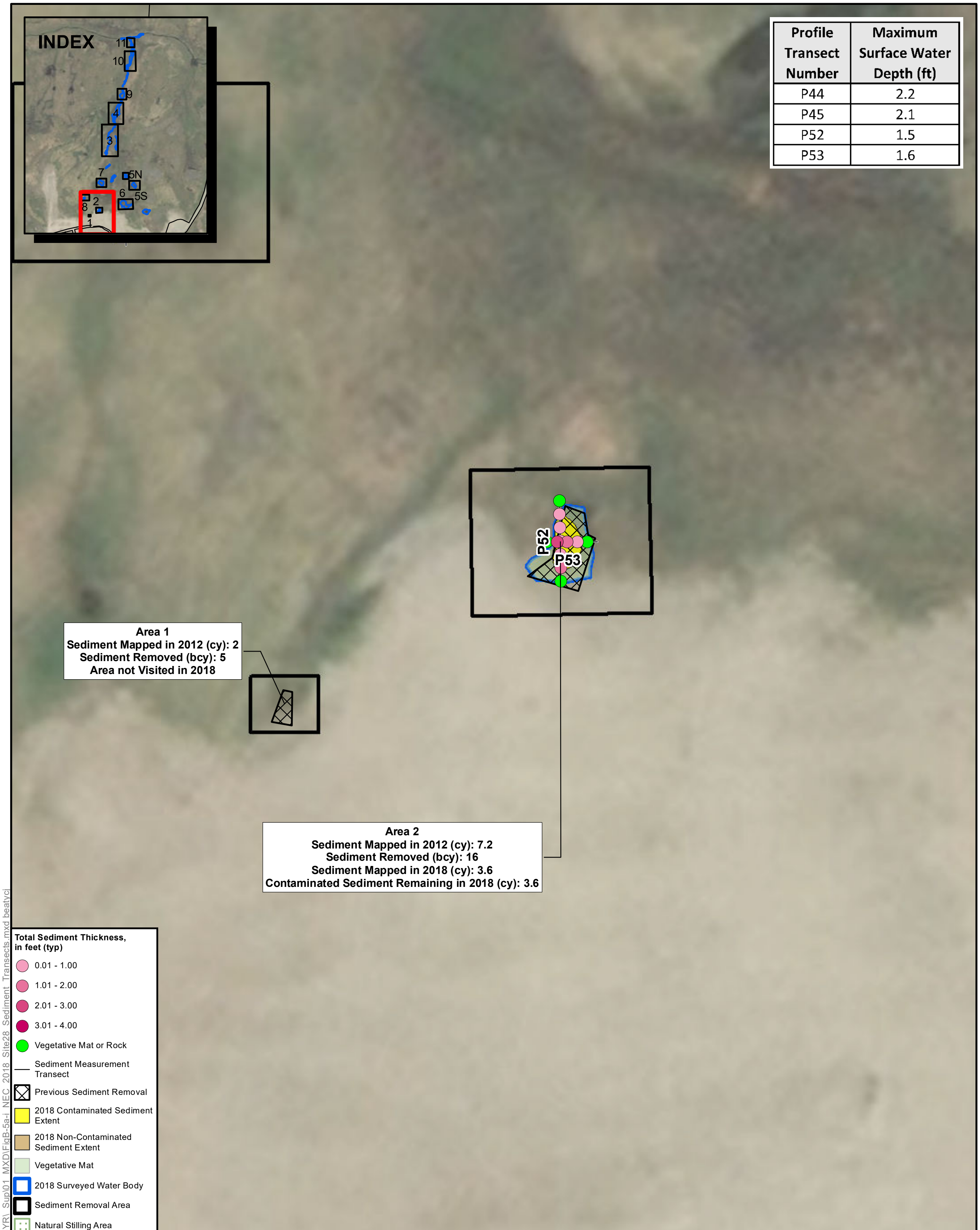
U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-5h

P:\StLawrenceIsland_FUDS_NEC_2nd5YR_Sup01_MXD\FigB-5a-i_NEC_2018_Site28_Sediment_Transects.mxd beatyci



Profile Transect Number	Maximum Surface Water Depth (ft)
P44	2.2
P45	2.1
P52	1.5
P53	1.6

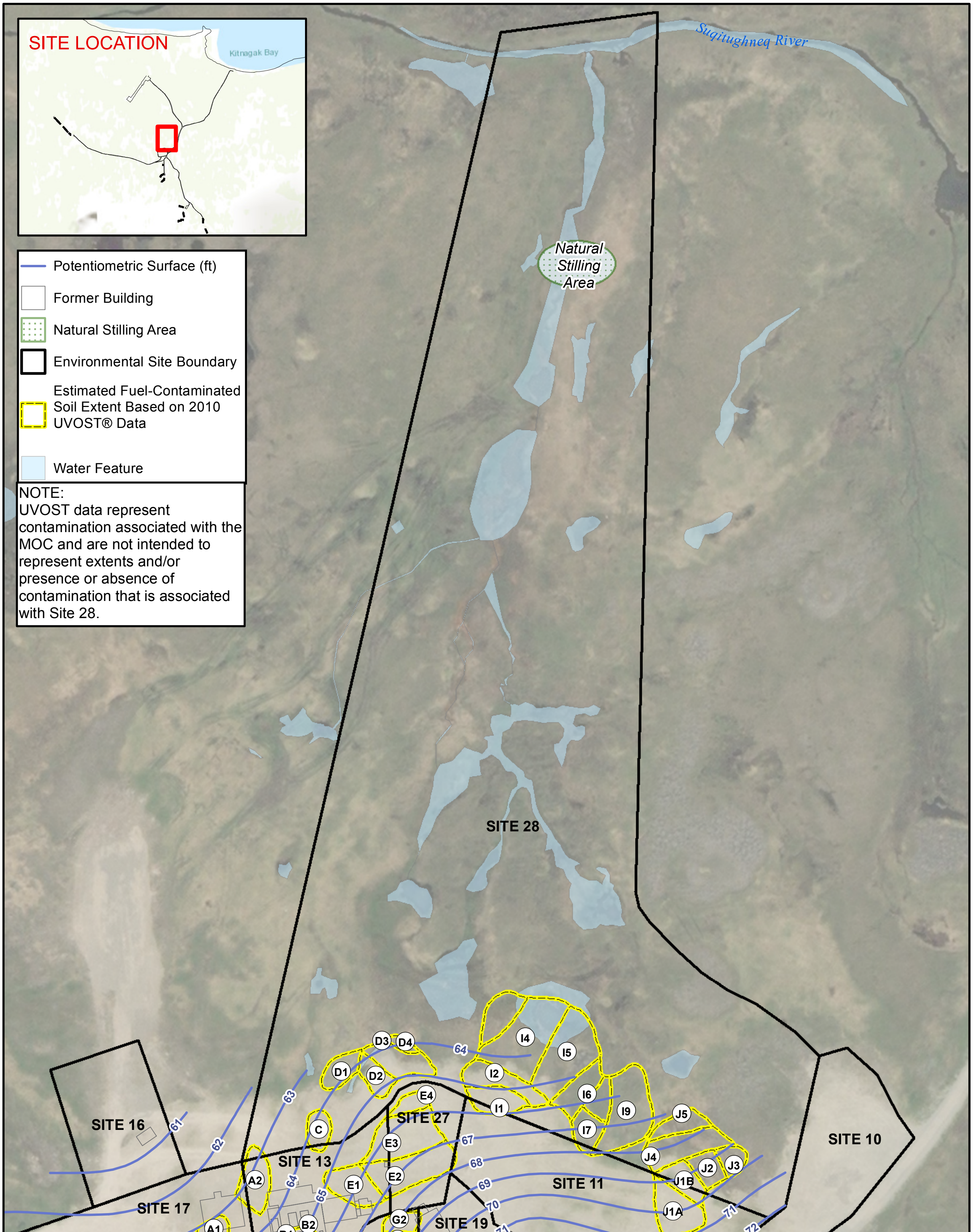
SITE 28: AREA 2 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969
SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-5i

P:\StLawrenceIsland\ FUDS NEC 2nd5YR\ Sup01 MXD\FigB-5a-i NEC 2018 Site28 Sediment Transects.mxd beatyci



N

0 50 100 150 200
Feet

WGS 1984 UTM Zone 2N

SITE 28: UVOST DELINEATED PLUMES
NORTHEAST CAPE FIVE YEAR REVIEW

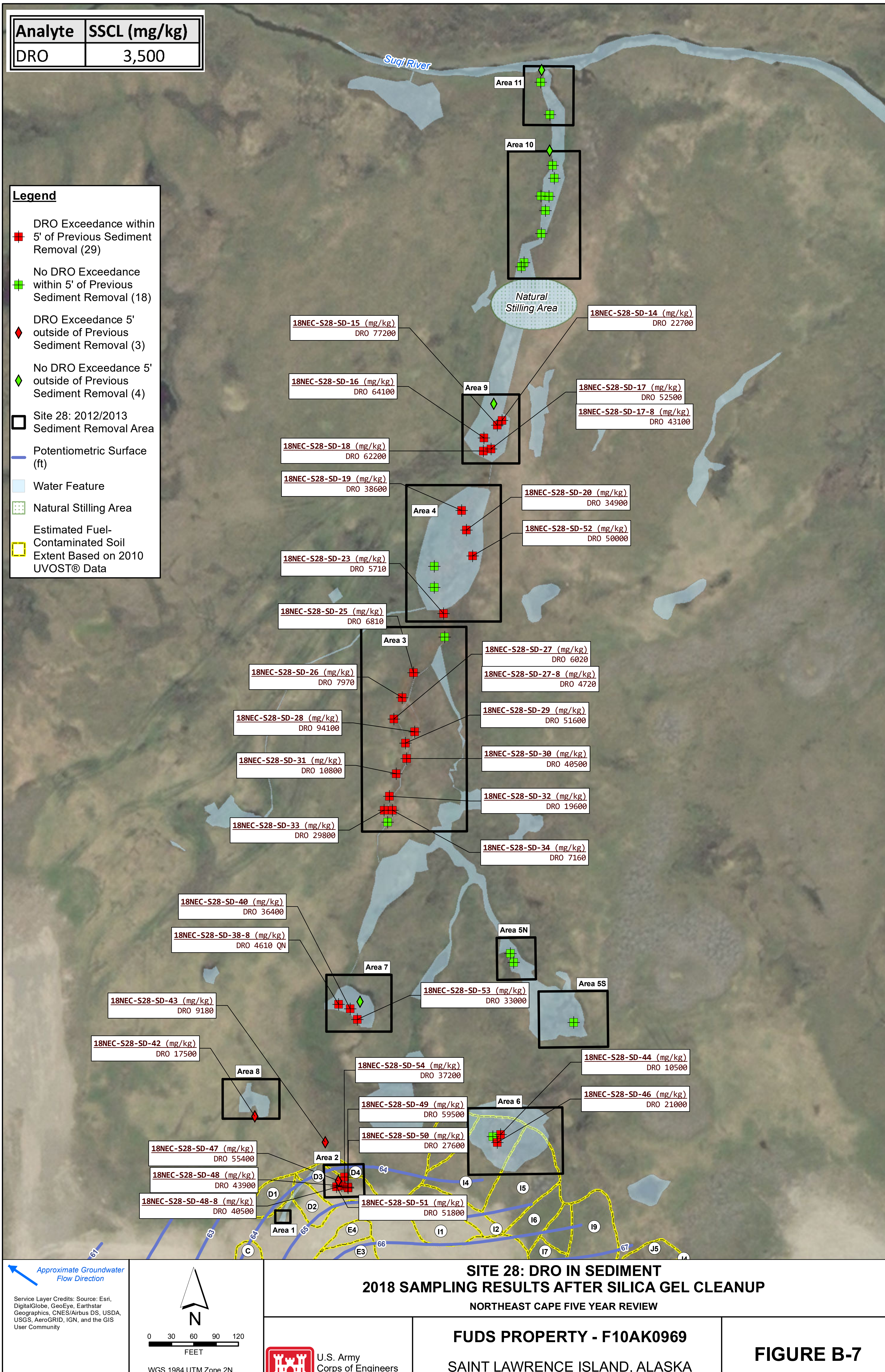
U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969
SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-6

P:\StLawrenceIsland_F10AK0969_NEC_2nd5YR_Sup\01_MXD\FigB-6_Site28_UVOST_Delineated_Plumes.mxd beatycj

P:\StLawrenceIsland_FUDS_NEC_2nd5YR_Sup\01_MXD\FigB-7toB-10_NEC_Site28_2018Results.mxd beatycj 2/14/2020



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

SITE 28: DRO IN SEDIMENT
2018 SAMPLING RESULTS AFTER SILICA GEL CLEANUP

NORTHEAST CAPE FIVE YEAR REVIEW

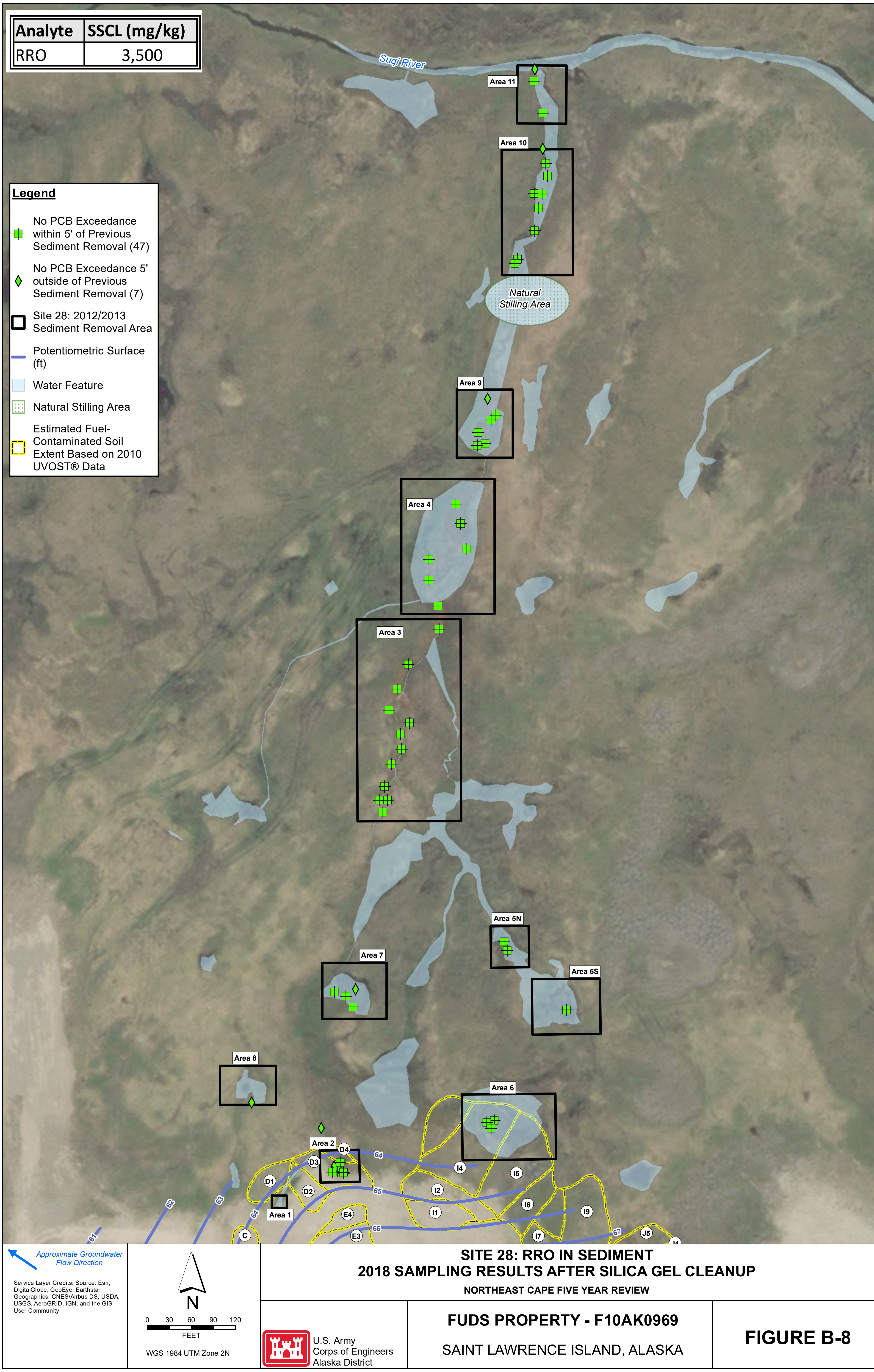
U.S. Army Corps of Engineers Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-7

P:\StLawrenceIsland_FUDS_NEC_2nd5YR_Sup\01_MXD\FigB-7toB-10_NEC_Site28_2018Results.mxd beatycj 2/14/2020



SITE 28: RRO IN SEDIMENT
2018 SAMPLING RESULTS AFTER SILICA GEL CLEANUP

NORTHEAST CAPE FIVE YEAR REVIEW

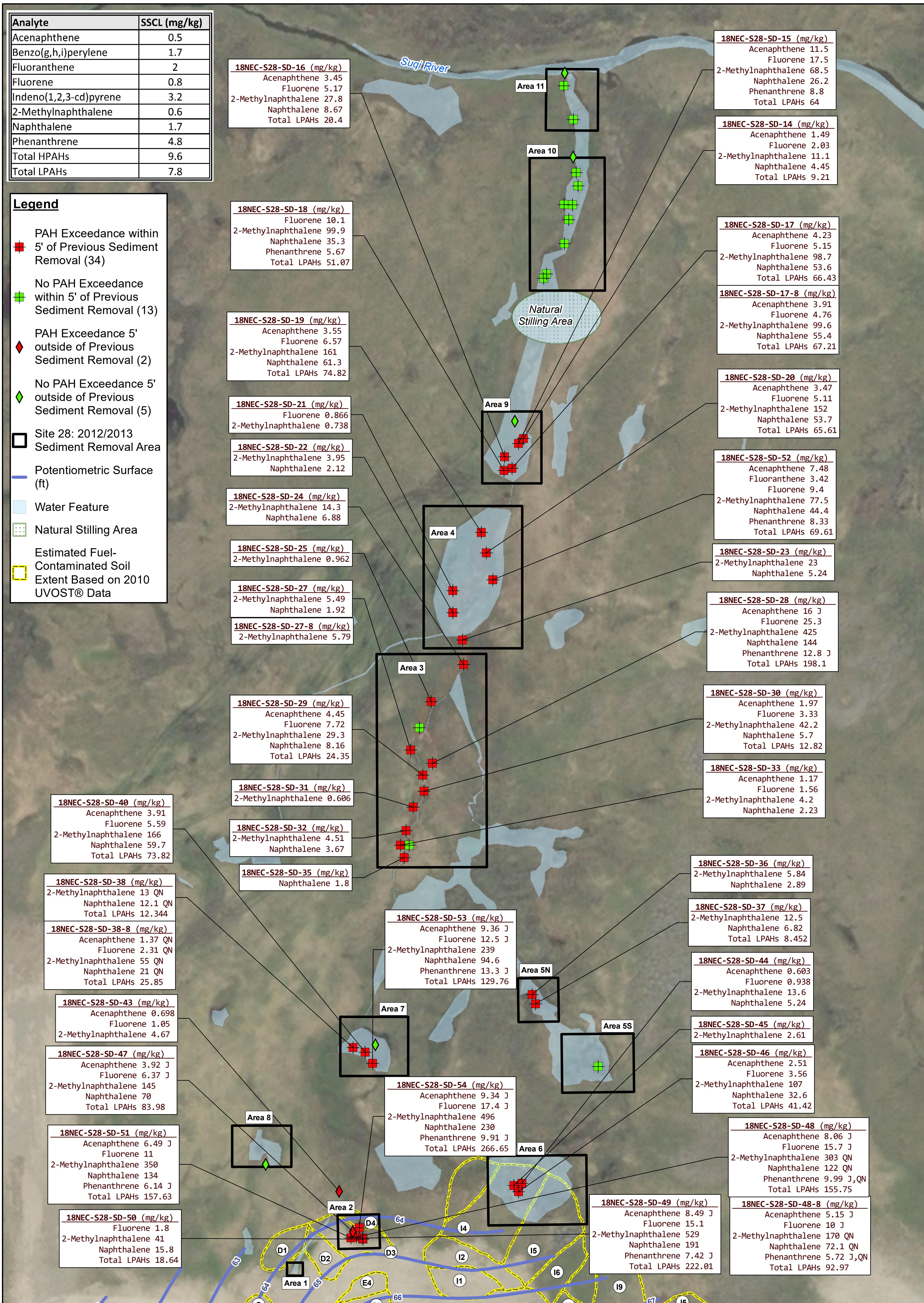
U.S. Army Corps of Engineers Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-8

P:\StLawrenceIsland_FUDS_NEC_2nd5YR_Sup\01_MXD\FigB-7toB-10_NEC_Site28_2018Results.mxd beatycj 2/14/2020



Approximate Groundwater Flow Direction

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

0 30 60 90 120
FEET

WGS 1984 UTM Zone 2N

SITE 28: PAHs IN SEDIMENT
2018 SAMPLING RESULTS

NORTHEAST CAPE FIVE YEAR REVIEW

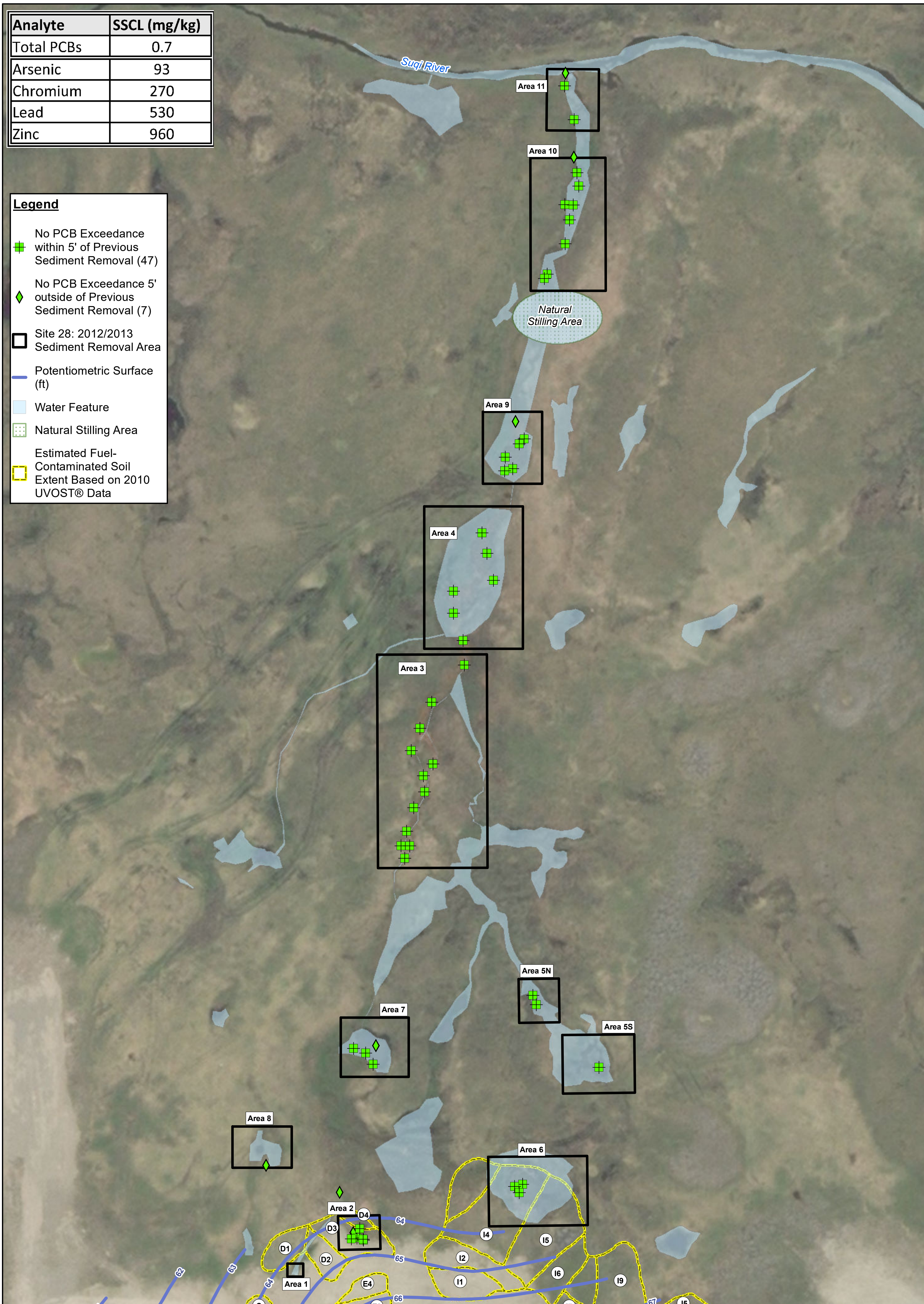
U.S. Army Corps of Engineers Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-9

P:\StLawrenceIsland_FUDS_NEC_2nd5YR_Sup\01_MXD\FigB-7toB-10_NEC_Site28_2018Results.mxd beatycj 2/14/2020



Analyte	SSCL (mg/kg)
Total PCBs	0.7
Arsenic	93
Chromium	270
Lead	530
Zinc	960

Legend

- No PCB Exceedance within 5' of Previous Sediment Removal (47)
- No PCB Exceedance 5' outside of Previous Sediment Removal (7)
- Site 28: 2012/2013 Sediment Removal Area
- Potentiometric Surface (ft)
- Water Feature
- Natural Stilling Area
- Estimated Fuel-Contaminated Soil Extent Based on 2010 UVOST® Data

Approximate Groundwater Flow Direction

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

0 30 60 90 120
FEET

WGS 1984 UTM Zone 2N

SITE 28: PCBs AND METALS IN SEDIMENT
2018 SAMPLING RESULTS

NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE B-10

APPENDIX C

Site Characteristics and Chronology

SECOND FIVE-YEAR REVIEW REPORT FOR NORTHEAST CAPE FORMERLY USED DEFENSE SITE FUDS NO. F10AK0969-03 ST. LAWRENCE ISLAND, ALASKA

U.S. Army Corps of Engineers
Alaska District
Anchorage, Alaska

APPENDIX C
SITE CHARACTERISTICS AND CHRONOLOGY

FINAL

TABLE OF CONTENTS

TABLES

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
AAC	Alaska Administrative Code
AC&WS	Aircraft Control and Warning Station
ACAT	Alaska Community Action on Toxics
ADEC	Alaska Department of Environmental Conservation
ANCSA	Alaska Native Claims Settlement Act
AST	aboveground storage tank
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
Bristol	Bristol Environmental Remediation Services, LLC
BTEX	benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
DD	Decision Document
DRO	diesel-range organics
EPA	U.S. Environmental Protection Agency
FRMD	FUDS Record Management Database
FUDS	Formerly Used Defense Site
FYR	Five-Year Review
GPS	global positioning system
HTRW	Hazardous, Toxic, and Radioactive Waste
J	The analyte was positively identified; however, the associated result was less than the limit of quantitation but greater than or equal to the detection limit
LUC	land use control
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MNA	monitored natural attenuation
MOC	Main Operations Complex
MW	Montgomery Watson
MWH	MWH Global
NEC	Northeast Cape
NFA	No Further Action
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
O&M	operations and maintenance

ACRONYMS AND ABBREVIATIONS

PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
POL	petroleum, oil, and lubricants
RAB	Restoration Advisory Board
RI	remedial investigation
RRO	residual-range organics
RTK	real-time kinematic
SARA	Superfund Amendments and Reauthorization Act of 1986
SSCL	site-specific cleanup level
Suqi River	Suqitughneq River
TAH	total aromatic hydrocarbons
TAqH	total aqueous hydrocarbons
USACE	U.S. Army Corps of Engineers
UST	underground storage tank
WACS	White Alice Communications System

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE) contracted Environmental Compliance Consultants, Inc. and Jacobs Engineering Group Inc. to conduct the second Five-Year Review (FYR) and periodic review of the selected remedies presented in the multi-site Decision Document (DD) (USACE 2009) at Northeast Cape (NEC) on St. Lawrence Island, Alaska (Figure B-1). This is a post-Superfund Amendments and Reauthorization Act of 1986 (SARA) statutory review that is required under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for the two NEC sites where hazardous substances, pollutants, or contaminants remained above levels that allow for unlimited use and unrestricted exposure after the first NEC FYR.

The NEC Formerly Used Defense Site (FUDS) project number is F10AK0969-03. The Alaska Department of Environmental Conservation (ADEC) Contaminated Sites Hazard ID number for the facility wide NEC FUDS is 207. The file number is 475.38.013. Individual sites within the NEC FUDS are also tracked with individual Hazard IDs. The U.S. Environmental Protection Agency (EPA) site ID number is AK9799F2999. The NEC FUDS is not listed on the National Priorities List (NPL). Table C-1-1 provides the ADEC Hazard ID and review status for each of the sites which currently require a CERCLA FYR.

Table C-1-1
NEC FUDS

Site Name	Hazard ID	Review Status
Site 21: Wastewater Tank	219	CERCLA FYR
Site 28: Drainage Basin	219	CERCLA FYR

Note:
For definitions, refer to the Acronyms and Abbreviations section.

Remedial investigations (RIs) conducted at the NEC FUDS between 1994 and 2004 identified 34 contaminated sites. Two DDs were signed in January and September of 2009 that addressed the contaminated sites (USACE 2009a, 2009b). The Containerized Hazardous, Toxic, and Radioactive Waste (HTRW) DD (USACE 2009b) presented the selected remedy for Site 7. The HTRW DD (USACE 2009a) presented the selected remedies for the remaining 33 NEC sites.

Both 2009 DDs were signed after the effective date of the SARA, which requires FYRs for CERCLA sites where there are remaining hazardous substances, pollutants, and/or contaminants above levels that allow for unlimited use and unrestricted exposure. However, only five sites were required to have a FYR based on the CERCLA contaminants that were present. A summary of the NEC FUDS sites requiring FYRs at the time of the multi-site DD is provided below:

Site 13	Site 21	Site 31
Site 16	Site 28	

At the time of this FYR, CERCLA action is complete at Site 13, Site 16, and Site 31. At Site 13 and Site 16, the only remaining contamination is attributed to petroleum, oil, and lubricants (POL) in groundwater and periodic reviews will occur in consultation with State Agencies. Site 31 is not included in this report because remedial action achieved a condition that allows for unrestricted use/unrestricted exposure and the site was recommended for No Further Action (NFA) in the first FYR (USACE 2015b).

The other NEC FUDS sites not addressed in this FYR due to the CERCLA petroleum exclusion, but where petroleum contamination remains above cleanup levels, are Site 3, Site 6, Site 7, Site 8, Site 9, Site 10, Site 11, Site 13, Site 15, Site 16, Site 19, Site 27, and Site 32. Separate Periodic Review reports will be prepared in coordination with the ADEC for these sites.

The remaining sites at NEC were determined to be NFA in the HTRW DD (USACE 2009a), indicating that no additional action was required and are not included in a review. These sites are:

Site 2	Site 14	Site 22	Site 26
Site 4	Site 17	Site 23	Site 29
Site 5	Site 18	Site 24	Site 33
Site 12	Site 20	Site 25	Site 34

1.1 PHYSICAL CHARACTERISTICS AT NEC

The NEC FUDS is located on St. Lawrence Island, Alaska in the western portion of the Bering Sea, approximately 135 air-miles southwest of Nome (Figure B-1). It is located at latitude 63.310278 and longitude -168.965272. The NEC property originally encompassed approximately 4,800 acres (7.5 square miles).

The NEC FUDS consists mainly of rolling tundra, extending from the Bering Sea toward the base of the Kinipaghulghat Mountains. The Kinipaghulghat Mountains rise abruptly to an elevation of approximately 1,800 feet above sea level, approximately 3 miles from the coastline. The NEC FUDS is only accessible by air, water, or all-terrain vehicle trails. The Village of Savoonga, the closest community, is located approximately 60 miles to the northwest (Figure B-1).

St. Lawrence Island has a subarctic maritime climate with continental influences during the winter. Summer temperatures at NEC average between 42 to 52 degrees Fahrenheit (°F) and winter temperatures average between -3 to 27°F (Western Regional Climate Center 2009).

1.1.1 Geology

St. Lawrence Island consists of isolated bedrock highlands of igneous, metamorphic, and older sedimentary rocks surrounded by unconsolidated alluvium overlying a relatively shallow erosional bedrock surface. The main area of operation, known as the Main Operations Complex (MOC) is located at approximately 100 feet in elevation. Around the MOC, shallow unconsolidated surficial materials overlie quartz monzonitic rocks of the Kinipaghulghat Pluton (Patton and Csejtey 1980). The pluton forms the mountainous area south of the NEC FUDS, which includes Kangukhsam Mountain. The Suqitughneq River (Suqi River) drainage in the Kinipaghulghat Pluton has created an erosional valley and alluvial fan of unconsolidated sediments. The NEC FUDS is located on this alluvial fan, which protrudes north from the mountain front toward the Bering Sea. Granitic bedrock materials are exposed at the coast north of the site at Kitnagak Bay, which suggests that the quartz monzonitic bedrock underlies the unconsolidated materials at a relatively shallow depth on a wave-cut erosional platform.

In general, the native soil stratigraphy at NEC is characterized by silts near the surface, overlying more sand-dominated soil at depth. The silt contains varying quantities of clay/sand/gravel and varies from zero to 10 feet in thickness. The silt is dark brown to dark green, and sometimes exhibits a mottled texture. The sand at depth contains varying degrees of silt/gravel/cobbles that ranges from 2 feet to greater than 20 feet thickness. These deeper, coarse-grained materials are generally unsorted and are likely to be of glaciofluvial origin. The depth to bedrock at the NEC FUDS is unknown (USACE 2009a, 2009b).

1.1.2 Land and Resource Use at NEC

St. Lawrence Island residents from the villages of Gambell and Savoonga engage in subsistence fishing, hunting, and gathering in the NEC FUDS area year-round. Local subsistence hunting camp structures are located adjacent to Site 3 and are occupied seasonally. There are not currently any permanent residents of the NEC area; however, representatives of the Native Village of Savoonga have indicated a desire to re-establish a permanent residential community at the site in the future.

St. Lawrence Island supports habitats for the following endangered or threatened species: the polar bear (threatened), spectacled eider (threatened), Steller's eider (threatened), and the Western Distinct Population Segment of Stellar sea lion (endangered). Walrus are protected under the Marine Mammal Protection Act. The area of NEC FUDS is used for the collection of berries and subsistence hunting of reindeer. The Suqi River (Site 29), located within the NEC FUDS, is used for subsistence fishing. The ocean surrounding the NEC FUDS is used extensively for subsistence activities including fishing and hunting of whales, walrus, seals, and sea birds.

1.1.3 Site History

The NEC FUDS was constructed as an Aircraft Control and Warning Station (AC&WS) during 1950 and 1951 to provide radar coverage and surveillance for the Alaskan Air Command, and later for the North American Air Defense Command, as part of the Alaska Early Warning System. The site was activated in 1952 and a White Alice Communications System (WACS) station was added to the site in 1954. The AC&WS and WACS operations were supported by 212 personnel and terminated in 1969 and 1972, respectively. Most military personnel were removed from the site by the end of 1969 (USACE 2009a).

The NEC FUDS included areas for housing site personnel, power plant facilities, fuel storage tanks, distribution lines, maintenance shops, wastewater treatment facilities, and landfills. The buildings and majority of furnishings and equipment related to the AC&WS were abandoned in place initially due to the high cost of off-island transport (USACE 2009a).

In 1971, the villages of Gambell and Savoonga opted out of the Alaska Native Claims Settlement Act (ANCSA), which allowed for title to 1.136 million acres of land in the former St. Lawrence Island Reindeer Reserve established in 1903. The Gambell Native Corporation and Savoonga Native Corporation (now known as Sivuqaq, Inc. and Kukulget, Inc. respectively) received titles to all of St. Lawrence Island (except U.S. Surveys 4235, 4237, 4340, 4369, and 3728) by Interim Conveyance No. 203 dated 21 June 1979 (ANCSA 1979). In 1982, the Navy obtained approximately 26 acres of land containing the former WACS. The land transfer was later deemed invalid and property ownership was reverted to Sivuqaq, Inc. and Kukulget, Inc (USACE 2009a).

Demolition of the buildings and most of the other structures has been completed under multiple USACE contracts. The runway, improved gravel roads, and concrete slabs of some of the former structures remain intact. Investigations have been performed since the early 1990s and the information detailed in historical documents is briefly summarized in subsequent sections.

1.2 HISTORY OF CONTAMINATION AT NEC

The primary sources of contamination at the NEC FUDS are attributed to spills and leaks of fuel products associated with aboveground storage tanks (ASTs), underground storage tanks (USTs), and associated piping. The largest known spill at NEC occurred in 1967 when a plow truck accidentally hit POL Tank #2 and released approximately 30,000 gallons of fuel.

Interviews with former personnel suggest that there were several undocumented incidents of spills greater than 30,000 gallons from the large ASTs.

Other sources of contamination include electrical transformers, waste stored in 55-gallon drums, metal debris, and organic chemicals from paint, solvents, and other miscellaneous facility activities. Four RIs were conducted at the NEC FUDS between 1994 and 2004, during which the environmental concerns at NEC were divided among 34 individual sites.

1.2.1 Initial Response at NEC

Initial response actions were conducted at some of the NEC sites prior to DD preparation and signature; brief descriptions of these response actions are listed below:

- In 1990, transformers, drums, tanks, fire extinguishers, and other containerized hazardous wastes were removed from Site 31.
- In 1996, a radiological survey was conducted and public disclosure of potential asbestos hazards was initiated.
- In 2000, 6,099 fifty-five-gallon drums; approximately 60 tons of antenna poles, lines, and other miscellaneous nonhazardous debris; a fuel pipeline; and hazardous wastes from buildings were removed. An additional 19 ASTs were cleaned.
- During the 2001 field season, 17 additional tanks were cleaned, three USTs were decommissioned, and 3,303 tons of building demolition debris was demolished and packaged, including steel beams, asbestos-containing materials, and Toxic Substances Control Act-regulated materials. Twenty-five tons of polychlorinated biphenyl (PCB)-contaminated soil and 1,643 tons of POL-contaminated soil were excavated, and four potable water wells were decommissioned.
- In 2003, the remaining 30 buildings, other structures, and the utilidor system were demolished and removed. Over 300 drums and tanks of hazardous wastes, including a large septic tank at the MOC and 12 ASTs were removed or decommissioned. More than 500 power and communications poles and 60 miles of wires and cables were gathered for disposal; 650 feet of fuel lines were transported off-island. More than 5,000 tons of waste and debris were shipped off-island for disposal.
- In 2005, the tramway towers and wire were demolished and removed. Additionally, more than 200 metal and wooden poles, approximately 25 miles of power and communications wire and cable, 26 tons of debris from two debris fields located on Kangukhsam Mountain, more than 160 tons of PCB-contaminated concrete, and 290 tons of PCB-contaminated soil were removed. Approximately 1,500 tons of waste was sorted and packaged for transport off-island; 370 tons of non-creosote treated and unpainted wood were burned on-island, with the ash removed for disposal off-island.

Remedial actions following the 2009 DDs (USACE 2009a, 2009b) for current CERCLA FYR sites are summarized in Section 3.0. Site 7 remedial actions are described in the *Second Periodic Review Report* (USACE 2018d) and are not included under this cover.

1.3 BASIS FOR TAKING ACTION AT NEC

The primary environmental contaminants remaining at the NEC sites at the time of the multi-site DD were petroleum hydrocarbons (diesel-range organics [DRO]/residual-range organics [RRO]), volatile organic compounds, PCBs, and metals. These contaminants remained in soil, sediment, and groundwater across the installation. The risk assessments performed at the individual sites determined the human and/or ecological risks exceeded EPA's risk range at some of the NEC sites.

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2.0 SITE CHRONOLOGY

Important events, the associated document reference for each event, and relevant dates for the NEC sites listed in Table C-1-1 are shown in Table C-2-1. The focused activities presented in Table C-2-1 are associated with specific mobilizations. Additionally, investigative and/or removal actions continued to occur throughout the subsequent years listed.

Table C-2-1
Chronology of Site Events

Event	Date
NEC site acquired by the U.S. Air Force	1952
AC&WS constructed	1951 – 1952
WACS constructed	1954
AC&WS operations terminated	1969
WACS operations terminated	1972
Bureau of Land Management obtained ownership of NEC	August 1975
ANCSA transferred land ownership to Sivuqaq, Inc. and Kukulget, Inc. (ANCSA 1979)	June 1979
Ecological assessment conducted (Pennack 1989)	1989
Site inventory and preliminary assessment conducted (URS Corporation 1992, Ecology and Environment 1992)	1991 and 1992
Phase I RI conducted (MW 1995b)	1994
All electrical transformers removed (MW 1995a)	1994
Phase II RI conducted (MW 1999)	1996-1998
Remedial action conducted to remove communications wire and cable on the tundra (MW 1997)	1997
Additional investigation supplementing the Phase II RI conducted (MW 2000)	1999
Site assessment conducted (U.S. Army Engineer District 1999)	1999
Debris, hazardous waste, ASTs, and fuel pipeline removed	2000
RAB comprised of community members and other interested parties formed	January 2000
USTs, PCB and POL-contaminated soil removed, buildings demolished	2001
Phase III RI conducted (MWH 2003)	2001 – 2002
30 buildings and utilidor demolished; drums, communication poles, and wire removed	2003
Phase IV RI conducted (Shannon & Wilson, Inc. 2005)	August 2004
Human health and environmental risk assessment conducted (USACE 2004)	2004

Table C-2-1 (Continued)
Chronology of Site Events

Event	Date
ATSDR performed a health consultation of PAHs and PCBs in fish from the Suqi River (ATSDR 2005)	2005
Demolition and removal of the tram line and the associated line support towers, debris removal, and excavation at Site 31, Site 7, and the MOC, Sites 10 through 22, 26, and 27 (USACE 2006)	July 2005
Feasibility study prepared (USACE 2007a)	2007
Groundwater Use Determination (18 AAC 350) submitted to ADEC for Sites 3, 4, 6, 7, and 9 (USACE 2007b)	April 2007
ADEC responds on the NEC 350 Determination request: ADEC stated that before the determination can be approved, the landowner must be willing to record and be responsible for implementing the institutional controls preventing groundwater use at the site (ADEC 2007)	May 2007
Proposed Plan published (USACE 2007c) and public comment period opened	July 2007
Proposed Plan public comment period closed	August 2007
Geophysical survey completed at Sites 7 and 10 (USACE 2007d)	August 2007
Responsiveness summary prepared (USACE 2008)	February 2008
DD selecting the remedy for Site 7 approved by USACE (USACE 2009b)	June 2009
Remedial action began to implement the remedy for Site 7 (USACE 2010a)	June 2009
Phase I in situ chemical oxidation at the MOC (USACE 2010b)	July 2009
DD selecting the remedy for Sites 1 through 6 and Sites 8 through 34 approved by USACE (USACE 2009a)	September 2009
Bristol requested landfill closure by ADEC for Site 7 (Bristol 2009)	November 2009
ACAT requests EPA oversight at Gambell and NEC FUDS and the inclusion of NEC FUDS on the NPL (ACAT 2009)	November 2009
EPA requests that the USACE details the cleanup efforts to date and addresses the issues identified by ACAT to re-evaluate EPA involvement and the listing of NEC on the NPL (EPA 2010)	March 2010
ADEC determined Site 7 closure was premature and denied the site closure request (ADEC 2009)	December 2009
Remedial action began to implement the DD-selected remedies at Sites 1, 3, 6, 8, 13, 16, 21, 31, 32, and the MOC (USACE 2011)	July 2010
Remedial action performed at Sites 7, 8, 9, 13, 21, 28, 31 and the MOC (USACE 2012)	July 2011
The President of the Native Village of Savoonga requested that the ATSDR conduct a Public Health Assessment or Health Consultation on the FUDS of Gambell and NEC	October 2011
Public meeting on St. Lawrence Island regarding environmental health and cleanup Issues (EPA 2012a)	December 2011
Sediment mapping and sampling effort at Site 28 (USACE 2013a)	July 2012

Table C-2-1 (Continued)
Chronology of Site Events

Event	Date
Remedial action performed at Sites 8, 10, 13, 21, 31, Radar Dome (Radome) Road, and the MOC (USACE 2013c)	July 2012
St. Lawrence Island RAB and Public Meeting via teleconference (RAB 2012a)	June 27, 2012
Sediment removal effort at Site 28 (USACE 2013b)	September 2012
EPA evaluated USACE cleanup of FUDS at NEC and Gambell (EPA 2012b)	November 2012
St. Lawrence Island RAB and Public Meeting at City Hall, Savoonga, Alaska (RAB 2012b)	December 5, 2012
Remedial action performed at Sites 8, 10, 13, 21, 28, and 31 (USACE 2015a)	July 2013
Public notice of FYR published and public comment period opened	August 2013
FYR site visit	September 2013
Surface water and groundwater sampling at Sites 7, 9 and a Kangukhsam Mountain Spring (USACE 2014)	September 2013
Final RAB Meeting	15 and 16 January 2014
Public comment period closed for the first FYR	February 2014
Remedial action performed at Sites 6, 7, 8, 10, 11, 21, 27, 31, 32 (USACE 2016b)	July 2014
First FYR completed for all sites (USACE 2015b, 2015c)	February 2015
Groundwater samples collected from the MOC (USACE 2016a)	August 2015
Long-term management plan prepared (USACE 2016c)	August 2016
Groundwater samples collected from the MOC (USACE 2017a)	August 2016
Surface water and sediment samples collected from Site 8 (USACE 2017b)	August 2016
Public Comment release and Summary Publication of the ATSDR Health Consultation (ATSDR 2017a, 2017b)	July 2017
Public notice of second FYR and public comment period opened	March 2018
FYR site visit	August 2018
Groundwater samples collected from the MOC (USACE 2018b)	August 2018
Surface water collected from Site 9 (USACE 2018c)	August 2018
Sediment mapped and samples collected from Site 28, refer to Appendix F (USACE 2018a).	August 2018

Note:
For definitions, refer to the Acronyms and Abbreviations section.

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3.0 REMEDY IMPLEMENTATION

A brief description of each site, selected remedy, remedy implementation history, status, operations and maintenance (O&M) plans (where applicable), and land use controls (LUCs) are presented by site in this section.

3.1 SITE 21: WASTEWATER TANK

Site 21 is located west of the MOC perimeter road and contained the wastewater treatment system for the main housing and operations complex (Figure B-3). The infrastructure consisted of a concrete septic settling tank and attached piping enclosed in a wooden utilidor that discharged to the wetland area approximately 450 feet west (Figure B-3). The tank compartments, utility corridor from the main complex, and the wooden utilidor outfall line were removed in 2003 (USACE 2009a).

Soil, sediment, and groundwater samples were collected at Site 21. PCBs and arsenic were identified as contaminants of concern (COCs) for soil (USACE 2009a). PCBs were found in the sludge from the septic tank at a concentration of 120 milligrams per kilogram (mg/kg), but the maximum concentration found in soil was 4.2 mg/kg (USACE 2009a). Confirmation sampling after the 2003 decommissioning work confirmed that PCBs had not migrated through the concrete. PCBs were detected at one additional location immediately beneath the outfall piping adjacent to the septic tank at a concentration of 1.7 mg/kg (USACE 2009a).

Arsenic in surface and subsurface soil was detected at concentrations generally ranging from 2.8 mg/kg to 39 mg/kg with one location of 170 mg/kg in surface soil downgradient of the septic tank outfall. Additional samples collected in 2001 detected arsenic ranging from 4.5 mg/kg to 11.5 mg/kg in soil and 12.1 mg/kg to 14.7 mg/kg in sediment. Following the removal of the utility corridor, confirmation samples ranged from 11.4 mg/kg to 35.2 mg/kg (USACE 2009a).

Arsenic was detected in groundwater in 1994 at concentrations up to 0.072 milligrams per liter (mg/L), which exceeded the cleanup level of 0.01 mg/L, but dissolved samples from the same well did not exceed the cleanup level. Arsenic was subsequently eliminated as a COC in groundwater (USACE 2009a).

3.1.1 Site 21: Wastewater Tank Remedy Implementation and Status

The selected remedy for soil at Site 21 was excavation and removal of PCB- and arsenic-contaminated soil, implementation of an LUC to limit future drinking water use, and performance of CERCLA FYRs. Groundwater sampling performed in 1994 detected total arsenic, total chromium, and total lead concentrations above cleanup standards, but dissolved concentrations of these metals were below the cleanup levels. As a result, the presence of these metals was attributed to sediment suspended in the water (USACE 1999). Therefore, as stated in the multi-site DD, metals contamination in groundwater was likely due to sediments in the water column of the collected sample and metals were eliminated as a COC (USACE 2009a). LUCs to limit the use of Site 21 groundwater are not needed. However, Site 21 is included in the multi-site DD list of MOC sites requiring groundwater LUCs. Groundwater LUCs are applied to the MOC, which is adjacent to Site 21. Although Site 21 is near the MOC, it has not been affected by contamination emanating from the MOC. Continued periodic monitoring of MOC groundwater, as required by the multi-site DD until cleanup levels are met, will ensure any potential contaminant migration does not affect adjacent sites and is therefore protective of Site 21 groundwater. Migration of the groundwater contaminants at the MOC is not anticipated, as monitoring results indicate contaminated groundwater at the MOC is steady-state.

Excavation of PCB-contaminated soil was initiated in 2010 when approximately 10.4 tons of soil were excavated and removed for disposal (USACE 2011). Final excavation sample results confirmed that PCB concentrations for all Aroclors were less than 1 mg/kg (Figure B-3).

Excavation of arsenic-contaminated soil near the highest exceedance (170 mg/kg) began in 2010. From 2010 to 2012, approximately 135 tons of arsenic-contaminated soil above the site-specific cleanup level (SSCL) of 11 mg/kg were removed (Figure B-3).

In 2011, nine additional background samples were collected with results ranging from 2.9 mg/kg to 22 mg/kg. The 95-percent upper confidence limit of the mean was calculated to be 11.49 mg/kg. Arsenic concentrations up to 320 mg/kg have been encountered in soil during excavation. At the conclusion of the 2012 excavation, samples from four sidewall locations exceeded the cleanup level of 11 mg/kg established in the multi-site DD (USACE 2012).

In 2013, 19 soil borings were advanced to delineate the vertical and horizontal extent of arsenic contamination at Site 21. Three soil samples were collected per boring at depths of approximately 0.5, 2, and 3 feet below ground surface (bgs). Thirteen of the 19 soil borings contained arsenic at concentrations exceeding SSCLs up to 340 mg/kg (USACE 2015a). Soil boring results were used to guide initial excavation efforts. Soil boring location 21SB17, which contained an arsenic concentration of 14 mg/kg at 0.5 feet bgs, was not included as a removal due to active water flow. Confirmation samples were collected and arsenic continued to exceed the SSCL at 10 locations. The second round of excavation efforts proceeded at seven of the 10 locations. At the conclusion of the 2013 field season, 305.13 tons of arsenic-contaminated soil were removed and arsenic remained at 14 locations at concentrations that exceeded the SSCL of 11 mg/kg.

In 2014, Bristol Environmental Remediation Services, LLC (Bristol) sampled 40 soil borings at Site 21. The USACE chose the boring locations and plotted them on a map prior to field mobilization. The borings were advanced to approximately 3 to 4 feet bgs. Three soil samples were collected per boring, at depths of approximately 1 foot bgs, 2 feet bgs, and 3 feet bgs to establish the horizontal and vertical spatial extent and variability of arsenic in soil near Site 21. A total of 120 soil samples were collected from the 40 borings. Sample results indicated that six soil samples from five of the borings contained arsenic in concentrations exceeding the SSCL of 11 mg/kg. Nine additional soil boring locations were planned following discussions with the USACE and the ADEC.

The final nine soil borings were advanced to depths of between 3 and 4 feet bgs. Twenty-seven primary soil samples and three duplicate samples were collected from the additional borings. None of the samples from this second round of borings contained arsenic in concentrations exceeding the cleanup level of 11 mg/kg. A brief data analysis of historic arsenic concentrations across the NEC site was conducted by the USACE. The USACE Project Delivery Team used this information along with the initial arsenic boring sample results to determine an excavation plan. Based on the local spatial distribution of arsenic and the historical analysis of sitewide arsenic in soil, the USACE instructed Bristol to target soil with arsenic greater than 17 mg/kg for removal.

On 7 August 2014, Bristol removed 5.19 tons of arsenic-contaminated soil from two 2013 confirmation soil sample locations, which contained arsenic concentrations of 25 mg/kg and 79 mg/kg. Two areas, approximately 25 square feet each, were excavated to depths of approximately 4 feet. Two primary samples and one duplicate sample were collected from the floor of the two excavations. None of the confirmation soil samples associated with these excavations contained arsenic in concentrations that exceeded the cleanup level of 11 mg/kg. No additional excavation occurred at these locations.

On 10 August 2014, 64.86 tons of arsenic-contaminated soil were removed from three 2013 confirmation sample locations and from two historical sample locations. A total of 19 primary and two duplicate samples were collected from the floor and sidewalls. None of the results contained arsenic in concentrations that exceeded 17 mg/kg. Sample 14NC21SS004 contained arsenic at a concentration of 13 mg/kg, which exceeds the SSCL of 11 mg/kg but was below the targeted arsenic removal concentration of 17 mg/kg. No additional excavation occurred in these areas.

On 19 August 2014, 37.3 tons of arsenic-contaminated soil were removed from two historical sample locations. Each of the sample locations were excavated in a 10-foot square to a depth of approximately 3 feet. Ten primary samples and one duplicate sample were collected from the floor and sidewalls. None of the sample results contained arsenic in concentrations that exceeded the SSCL of 11 mg/kg. Contaminated soil was containerized in bulk bags directly from the excavations at Site 21.

Any water from the excavated soil was allowed to drain from the excavator bucket into the excavation prior to placing the soil in the bulk bag. A total of 17 bulk bags were loaded with contaminated soil, for a total excavated weight of 107.35 tons. Site 21 excavations and borings were backfilled with clean material from the borrow source, which was compacted and graded to match the existing ground surface.

Additionally, in 2014 Bristol collected nine surface water samples from three locations at Site 21 to monitor the effects of soil removal on surface water. Surface water was monitored due to the potential hydrologic interconnectivity of groundwater and surface water in the area. This sampling was a precautionary measure to ensure contaminated soil removal activities at the MOC was not negatively affecting groundwater or surface water at Site 21. The samples were collected at three distinct times: prior to, during, and following soil excavation activities. The surface water samples were submitted for arsenic analysis. Arsenic was only detected in one unfiltered sample at an estimated concentration of 0.0039 mg/L (J-flagged). The sample was collected during soil excavation activities and did not exceed the surface water evaluation criterion of 0.01 mg/L. Arsenic was not detected in any of the other surface water samples.

3.1.2 Site 21 Wastewater Tank O&M

At the time of this review, the LUC at Site 21 to limit future drinking water uses for groundwater has not been fully implemented. Two signs indicating where groundwater use for drinking water or ground disturbing activities are not recommended have been installed at the air field and at the fish camp. Each sign is two-sided and contains both Yupik and English transcriptions. Documentation of an agreement between the landowner and USACE for implementation of institutional controls is still required for this site. Additionally, FYRs are required at Site 21 until remedial action objectives are met.

3.2 SITE 28: DRAINAGE BASIN

The Site 28 Drainage Basin is located north of the MOC and drains north into the Suqi River (Figure B-2). The site has been affected by fuel releases from the bulk fuel storage tanks

(Site 11) and other spills and releases discussed in the multi-site DD (USACE 2009a). The site contains wetlands, rolling tundra, ponds, and flowing streams.

Water in the Site 28 Drainage Basin originates from surface water runoff (overland flow) from the MOC, three drainages at the head of the site near the MOC, and two sub-drainages further north. Overland flow can contribute significant amounts of water to the basin during rainfall events. Since 1994, soil, sediment, surface water, and shallow groundwater samples have been collected and analyzed.

Sediment

Stained sediments were observed in each of the three main drainage basins, and they produce a sheen when disturbed (USACE 2009a). The primary COCs in soil and sediment at the time of the DD were DRO, RRO, polycyclic aromatic hydrocarbon (PAHs), PCBs, chromium, lead, and zinc (USACE 2009a). The highest concentrations of contaminants are located near the edge of the MOC gravel pad.

Soil

Soil samples were collected in 1994, 1996, and 1998 from within the boundary of the Site 28 Drainage Basin. Concentrations of DRO and PCBs exceeded soil cleanup standards and reached as high as 83,000 mg/kg and 1.1 mg/kg, respectively (USACE 1999). However, these samples were collected adjacent to the MOC boundary at the upgradient extent of the drainage basin, are attributed to activities at the MOC, and were removed during soil excavation activities conducted at the MOC.

Surface Water

As summarized by the multi-site DD (USACE 2009a), surface water samples were collected from the drainage basin in 1994, 1996, and 2001. Concentrations of DRO, total recoverable petroleum hydrocarbons, PCBs, and lead exceeded surface water cleanup levels in 1994. In 2001, DRO was detected at concentrations ranging from 0.39 to 2.3 mg/L. RRO and PCBs were not detected and lead samples were not collected. The most heavily contaminated surface waters of the drainage basin were found at the head of the western and middle drainages, located at the terminus of the former culverts.

Groundwater

Groundwater samples collected in 1994 indicated the potential for DRO and lead contamination, but subsequent sampling in 2001 demonstrated the concentrations were below cleanup levels. No groundwater COCs were retained for Site 28 (USACE 2009a).

3.2.1 Site 28 Drainage Basin Remedy Implementation and Status

The selected remedy for Site 28 consisted of three components:

- The excavation and removal of petroleum-, PCB-, and metal-contaminated sediment, including the removal of near-surface sediments from the narrow channel upgradient of the Suqi River.
- The construction of a sedimentation pond or other appropriate controls. The ends of the culverts would also be cleaned out and removed or plugged to prevent direct outflows of upgradient residual sources of contamination.
- The performance of CERCLA FYRs (USACE 2009a).

Although the selected remedies for Site 28 included the excavation and removal of contaminated sediment, at the time of the development and finalization of the multi-site DD in 2009 that removal activities would target the top six to twelve inches of silty/sandy sediment. Additionally, a sedimentation basin or other appropriate controls would be necessary to prevent downstream migration of contamination. An informational LUC, in accordance with UECA, describing residual contamination of POL-related contamination in sediment within the Site 28 drainage basin is recommended to prohibit disturbance of Site 28 sediment. LUCs with regard to soil and groundwater POL-related contamination at the southern boundary of Site 28 and within the previously defined "UVOST plumes" are also recommended, however, will be included within the Environmental Covenant for the MOC.

In 2010, approximately 95 feet of culvert was removed, and one culvert was capped (USACE 2011). The concrete manhole structure in the western drainage was also cleaned and removed. Sludge inside the manhole contained concentrations of DRO up to 68,000 mg/kg, PCB Aroclor 1254 up to 20 mg/kg, arsenic at 41 mg/kg, barium at 820 mg/kg, cadmium at 18 mg/kg, lead up to 5,000 mg/kg, mercury up to 15 mg/kg, and silver up to 16 mg/kg (USACE 2011). A 12-inch corrugated metal pipe that attached to the manhole and continued upgradient toward the MOC was cut, and 63 feet of the pipe was removed. The open end of the pipe was then filled with bentonite and welded shut. In the middle drainage, another 12-inch corrugated metal pipe measuring 32 feet in length was completely removed (USACE 2011).

In 2011, sediment and soil sampling were conducted to further delineate the extent and magnitude of contamination at Site 28 (Figures B-5 through B-7). Transects were located between the upper end of Site 28 and its confluence with the Suqi River; to include areas where contamination was noted in the multi-site DD (USACE 2009a) to gain a better understanding of contaminant distribution throughout the drainage. Sediment results were compared to the criteria specified in the multi-site DD when applicable. If sediment criteria were not listed in the multi-site DD for a particular analyte, evaluation criteria were based on the National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables for freshwater sediment at the probable effect level (Buchman 2008). Some of the samples collected in 2011 did not meet the project definition of sediment, so soil cleanup levels were used for screening purposes. The results indicated five potential contaminants of potential concern: toluene, ethylbenzene, total xylenes, cadmium, and selenium (USACE 2012).

In 2012, additional sediment mapping and sampling was conducted. Streams and ponds in the drainage basin were inspected to define the horizontal boundaries of the sediment accumulation areas and probing was conducted to determine the thickness of the sediment (USACE 2013a). The mapping efforts identified approximately 400 cubic yards of sediment in 22 locations along the drainage (USACE 2013a).

In September 2012, following the mapping and sampling effort, Phase I of the sediment removal remedy was initiated in three areas. Two removal methods were evaluated for efficacy and implementability: excavation and a combination of a Venturi dredge and geotextile dewatering tube:

- An excavator removed sediment in Areas 1 and 2, just north of the MOC gravel pad. This method allowed removed sediment to be dewatered in place but is limited to areas with firm ground such as the MOC gravel pad or a road. The excavator removed approximately 5 cubic yards of sediment from Area 1 in the western drainage and 16 cubic yards from Area 2 near the middle drainage. In Area 1, DRO, acenaphthylene, naphthalene, and 2-methylnaphthalene exceeded cleanup criteria in both confirmation samples. In Area 2, the same analytes plus RRO, acenaphthene, fluorene, and phenanthrene exceeded cleanup levels.
- The Venturi dredge was used in Area 4 located in the main channel of the drainage. This method can be used where the excavator cannot travel but requires large volumes of water to remove the sediment. Following removal, the sediment must be separated from the water and the water must be confirmed to meet discharge requirements before release. The dredge removed approximately 18 cubic yards of sediment from Area 4 in 2012. No confirmation samples were collected from Area 4. Approximately 135 cubic yards of contaminated sediment remained at Area 4 at the conclusion of the 2012 field season (USACE 2013c).

In 2013, sediment removal continued within Areas 3 through 11 (USACE 2015a):

- At Areas 5, 6, and 7, vegetative material routinely clogged the in-line pumps. Sediment and vegetative material were removed by hand instead of using the dredge. Personnel donned dry suits, entered the shallow ponds, and rolled/scooped up the sediment/decaying plant material in large pieces. Material was placed at the edge of each pond and an excavator was used to place the material in bulk bags for disposal (USACE 2014).
- Removal Area 8 was a small pond in 2012; however, it was dry in 2013. Material from this area was removed by excavator and placed directly into a bulk bag for disposal.
- Sediment was removed from Areas 3, 4, 7, 9, 10, and 11 using the Venturi dredge and geotextile dewatering system.
- At the conclusion of the 2013 field season, several analytes, including DRO, RRO, low molecular weight PAHs, arsenic, chromium, 2-methylnaphthalene, acenaphthene, fluorene, naphthalene, and phenanthrene, were measured in sediment confirmation samples collected immediately following sediment removal at concentrations greater than the site-specific cleanup levels. Analytes exceeding cleanup levels remained within all 11 sediment removal areas. In addition, acenaphthylene, 1-methylnaphthalene, and selenium were identified in sediment.
- During the 2014 field season, sediment dewatering tubes and water containments were removed from the Site 28 work pad.

Water Treatment

Water and sediment removed using the dredge system was moved to a water processing area west of Site 28. Treatment and management of the water was conducted in accordance with the ADEC approved work plan and close coordination with stakeholders to appropriately sample and discharge treated water. Applicable surface water criteria were determined from the SSCLs for a non-drinking water source, as stated in the 2009 multi-site DD (USACE 2009a).

The processing area consisted of two 20,000-gallon-capacity lined containment cells approximately 60 by 30 feet and 1.5 feet deep. The primary containment area consisted of a geotextile dewatering tube for sediment dewatering designed to contain the sediment while allowing water to pass through the pore spaces. The pore size ranged from 59 to 350 microns. Water was then treated through a scrubber – a natural cellulose fiber that selectively absorbs hydrocarbons inside high-density polyethylene containers with an inlet at the top. Water then flowed to the second set of containment cells to await analytical results prior to discharge. In 2012, samples collected from the treated water did not meet discharge criteria for total aromatic hydrocarbons (TAH) and total aqueous hydrocarbons (TAqH) identified in the State of Alaska Wastewater General Permit 2009DB0004-0216, and total and dissolved arsenic did not meet the drinking water standards presented in the *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances* (ADEC 2008; USACE 2013c). No water was discharged. Excavated sediment and treated water from Area 4 remained within the lined containments over the winter of 2012/2013.

Following the 2012 field activities, changes to the sediment/water treatment system were made to implement this remedy effectively. In 2013, a SPINPRO HydroMizer polymer feed system with injection pump was introduced into the piping line prior to sediment capture in the geotextile tube to facilitate coagulation and settling (USACE 2013c). The water filtration system was modified to consist of two sock filters (water first flowed through a 25-micron-filter, and then through a 5-micron-filter), followed by a scrubber containing hydrocarbon-absorbent cellulose fibers (USACE 2015a). After the first batch of water was processed in 2013, analytical results indicated water was still above TAqH criterion

(USACE 2015a) and was therefore not discharged and remained in the holding tank for further treatment. A granular-activated carbon system was added as the last treatment step and the hydrocarbon scrubber was eliminated. Analytical results from the first batch using the modified treatment system were below discharge criteria presented in the State of Alaska Wastewater General Permit 2009DB0004-0216 and 18 Alaska Administrative Code (AAC) 70. After demonstration of the effectiveness of the modified treatment system through adequate analytical sampling, ADEC and USACE agreed that pre-treated water containment samples were no longer needed and treated water was discharged to the ground (USACE 2015a).

Control Measures

Two methods were used to control and minimize downstream sediment migration during removal activities: silt fencing and an in-stream sediment trap. Silt fencing was used where there was no direct flow to the main channel of the Suqi River and was placed on the north side of the ponded area. The sediment trap was placed downstream of sediment Removal Area 4. The trap was a steel box, 8 feet wide by 4 feet deep, with the rear (downstream) height extending approximately 6 feet high and tapering to a front section approximately 4 feet high. Rectangular slots allowed water to flow down and through the box. Unrolled jute mats were placed inside the trap, upstream, and downstream of the trap (USACE 2015a).

Surface Water Sampling

Surface water samples were collected at three locations before, during, and after sediment removal and at one location downstream of the sediment trap in 2013. Samples were analyzed for DRO, RRO, benzene, toluene, ethylbenzene, and xylenes (BTEX), PAHs, PCBs, and total metals (Resource Conservation and Recovery Act metals plus nickel, vanadium, and zinc). All surface water samples were below applicable surface water criteria (TAH, TAqH, and no visible sheen) presented in the 2009 multi-site DD and the 2008 (ADEC) *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances*, (USACE 2015a).

3.2.2 2018 Sediment Mapping and Sampling

In 2018, field activities included the mapping of sediment and surface water and the collection of sediment samples (Figures B-5 through B-7). The surface water bodies measured at Site 28 extended from the border of the MOC to the confluence with the Suqi River. The lateral and vertical extent of the surface water bodies were measured if they appeared greater than 30 feet in diameter. A real-time kinematic (RTK) global positioning system (GPS) was used to collect survey positions around the edge of major water bodies at Site 28. The depth of the water body was collected during the sediment mapping activities.

During the sediment mapping effort, submerged areas were characterized as sediment or vegetative mat within the surveyed water bodies. For this evaluation, sediment was defined as all continuously submerged loose material and organic material, except that which is actively growing vegetation and is part of the vegetative mat. If no material that met the project definition of sediment was identified (e.g., only vegetative mat present), the lack of sediment was documented and no further evaluation occurred in that water body. When sediment was identified, the vertical extent of sediment was measured. For discrete water bodies containing sediment, north/south and east/west transects were established. Transects crossed approximately at the center of the sediment area in the water body to measure thickness. A graduated hand probe was used to measure sediment thickness to the nearest 0.1 foot starting from the edge of the sediment area and at intervals not exceeding 10 feet.

A total of 54 sediment samples were collected from 0 to 2 feet bgs or until refusal was met with the hand tool (Figures B-5 through B-7). Forty-five samples were collected from surveyed locations based on the 2012 sediment mapping effort (USACE 2013a). Seven additional locations (locations S28- 04, -11, -25, -38, -42, -43, and -51) were staked and surveyed in either vegetative mat or on dry land. These seven locations were relocated to suitable sample locations because the original staked survey locations did not contain sediment as defined by the project. Three sediment samples of opportunity were collected from water bodies that contained a fuel odor or sheen (locations S28-51, 52, and 53). Sediment samples collected from Site 28 were analyzed for DRO by method AK102, DRO by method AK102 with silica gel cleanup, RRO by method AK103, RRO by method AK103 with silica gel cleanup, total organic carbon, PAHs, PCBs, and metals (arsenic, chromium, lead, selenium, and zinc). Analytical results of analytes exceeding the multi-site DD SSCLs are shown on Figures B-5 through B-7. DRO and RRO results are presented from the silica gel cleanup method.

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4.0 PROGRESS SINCE THE LAST REVIEW

Table C-4-1 describes the activities that have occurred at NEC FUDS since the last FYR to address issues identified in the previous FYR and outstanding issues from the multi-site DD. In the previous FYR, it was determined that the remedies were expected to be protective of human health and the environment upon completion for all sites.

Table C-4-1
Actions Since Previous FYR

Site	Action
2018	
Site 8	An attempt to complete MNA sampling occurred at the revised decision units. After field personnel performed an initial site inspection, the USACE project delivery team was consulted and decided to not collect incremental sediment MNA samples at Site 8 due to the lack of sediment which met the multi-site DD definition of “continuously submerged” and above the vegetative mat. Subsequently, the ADEC PM performed a site inspection and agreed with the project delivery team decision to not collect incremental sediment MNA samples at Site 8 due to the lack of sediment, with the understanding additional sampling at Site 8 would occur within the next FYR period.
Site 28	Field activities included sediment thickness measurement, surveying the extent of surface water bodies, and the collection of sediment samples. A total of 54 sediment samples were collected from 0 to 2 feet bgs. The drainage was mapped with a combination of RTK GPS and sediment probe measurements.
2017	
All	ATSDR published the draft findings of a NEC FUDS health consultation (ATSDR 2017a).
2016	
Site 8	A total of 83 discrete samples were collected from 75 sample locations at Site 8. This sampling effort was completed to assess sediment distribution across the multi-site DD established decision units.
Site 29	A total of 11 sediment and five surface water samples were collected from the Suqi River and estuary. Collocated sediment and surface water samples were collected from four locations along the Suqi River. Stream depth and velocity measurements were also collected from these four locations. Surface water samples were analyzed for BTEX and PAHs. Sediment samples were analyzed for DRO, RRO, PAHs, PCBs, and metals, including arsenic, chromium, lead, and zinc.

Table C-4-1 (Continued)
Actions Since Previous FYR

Site	Action
2014	
Site 21	At the completion of removal in 2013, arsenic remained at seven locations in concentrations that exceeded the SSCL of 11 mg/kg: samples 13NC21SS023 (25 mg/kg), 13NC21SS026 (79 mg/kg), 13NC21SS043 (17 mg/kg), 13NC21SS045 (19 mg/kg), 13NC21SS046 (21 mg/kg), and 13NC21SS047 (29 mg/kg). Additional delineation was requested to further characterize the extent of arsenic contamination. During Phase I, 120 soil samples were collected from 40 borings at 1-foot up to 3-foot intervals. An additional nine borings were advanced to depths between 3 and 4 feet Twenty-seven primary samples and three duplicate samples were collected from these borings. Following the analysis of the data collected, it was decided that arsenic greater than 17 mg/kg was targeted for removal.
	A total of 107.35 tons of arsenic-contaminated waste was removed from Site 21. Thirty-one primary and four duplicate confirmation samples were collected during excavation. One sample, 14NC21S004 contained arsenic at a concentration of 13 mg/kg, which exceeded the SSCL of 11 mg/kg but was below the targeted removal concentration of 17 mg/kg. No further excavation occurred at this location.

Note:
For definitions, refer to the Acronyms and Abbreviations section.

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APPENDIX D

Site 21 Arsenic in Soil Assessment

SECOND FIVE-YEAR REVIEW REPORT FOR NORTHEAST CAPE FORMERLY USED DEFENSE SITE FUDS NO. F10AK0969-03 ST. LAWRENCE ISLAND, ALASKA

U.S. Army Corps of Engineers
Alaska District
Anchorage, Alaska

APPENDIX D
SITE 21 ARSENIC IN SOIL ASSESSEMENT

FINAL

TABLE OF CONTENTS

ATTACHMENTS

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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
DD	Decision Document
EPA	U.S. Environmental Protection Agency
FRMD	FUDS Records Management Database
FUDS	Formerly Used Defense Site
mg/kg	milligrams per kilogram
NEC	Northeast Cape
SSCL	site-specific cleanup level
UCL	upper confidence limit
USACE	U.S. Army Corps of Engineers

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1.0 INTRODUCTION

Site 21 is located west of the Northeast Cape (NEC) Formerly Used Defense Site (FUDS) Main Operations Complex perimeter road and contained a concrete septic settling tank with attached discharge piping that terminated at a surface discharge point 450 feet east of the septic tank (Figure D-1). Although elevated arsenic levels in soil at Site 21 led to arsenic becoming a site contaminant of concern in the 2009 Decision Document (DD), there is no known source of the arsenic (U.S. Army Corps of Engineers [USACE] 2009). During the data assessment for the second NEC Five-Year Review, it appears that naturally occurring arsenic in soil is contributing to Site 21 post-excavation sample results. Metals found in the environment, including arsenic, may be the result of anthropogenic activities (e.g., industrial processes or manufactured materials), but they are also naturally occurring in Alaska (Alaska Department of Environmental Conservation [ADEC] 2018). A lines of evidence approach was assessed to determine whether remaining arsenic levels in soil at Site 21 are naturally occurring. Several removal actions have occurred at the site in pursuit of the 11 milligrams per kilogram (mg/kg) soil site-specific cleanup level (SSCL) for arsenic. This assessment will be focused on the current data set and will not revisit the original decision to list arsenic as a contaminant of concern for Site 21. This appendix describes the lines of evidence approach; the currently available USACE result set; the statistical treatment of post-removal action data from 2012, 2013, and 2014; and conclusions of the assessment.

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2.0 LINES OF EVIDENCE APPROACH

ADEC published a technical memorandum in 2018 (ADEC 2018) that describes the State's guidance for evaluating metals at contaminated sites. Although this guidance is primarily intended for sites that are in the pre-DD stage, it was not available for NEC FUDS at that time. The lines of evidence considered for Site 21 are as follows:

1. There is no record of a potential metal related release and/or historical usage, or site activity related to metals, but there was a wood-stave constructed water tank;
2. Post excavation site data do not show any well-defined pattern of concentrations indicative of a release of the metal; and
3. The metal is solely associated with shallow soil near site features.

There is no record of industrial activities at NEC FUDS that would have resulted in a discharge of arsenic containing effluent to the wastewater system at Site 21; or substantiated uses of arsenic in construction materials. The effluent discharge pipe is described as "8-inch insulated cast iron" and was possibly housed in a wooden utilidor from its origin point at Tank 21-3 to the wetland area discharge point approximately 450 feet to the west. This assertion was documented in the 2009 DD (USACE 2009) and no additional information is available since the DD to substantiate arsenic use.

Post-excavation confirmation samples do not show a well-defined pattern of concentrations and no gradient appears to exist. The USACE initiated soil removal in successive stages from 2012 through 2014 as described in the remedial action reports from 2012 (USACE 2013), 2013 (USACE 2014), and 2014 (USACE 2016). The excavation footprint reached a size of approximately 3,300 square feet as sporadic, marginal, and unrelated exceedances of the 11 mg/kg action level in confirmation samples were pursued.

The final excavation was performed in 2014. One 2014 sidewall confirmation sample in the final excavation footprint remained above the 11 mg/kg arsenic cleanup level limit at 13 mg/kg. During the final field effort in 2014, the USACE collected an additional 147 soil samples from an approximate 2-acre area surrounding the Site 21 outfall excavation. These sample results identified that arsenic in the area varied and that arsenic levels in undisturbed soil could be found above 11 mg/kg. The maximum arsenic detection of 17 mg/kg was reported from subsurface soil upgradient and over 150 feet from the Site 21 excavation while samples between the maximum arsenic location and the excavation were below 11 mg/kg. The arsenic detections across the 2-acre sampling area at Site 21 are not related to any NEC FUDS features. The surface discharge location of the outfall line was positioned in a low-lying area that would have naturally contained the discharge and that area was excavated and 547 tons of soil removed.

3.0 DATASET AND DATA TREATMENT

The following sections describe the Site 21 dataset and the data treatment that was applied.

3.1 DESCRIPTION OF THE SITE 21 DATASET

The Site 21 soil dataset for arsenic includes excavation confirmation samples collected in 2012 (USACE 2013), 2013 (USACE 2014), and 2014 (USACE 2016) and samples collected outside of the excavation in 2013 and 2014 (USACE 2014, 2016). The final Site 21 excavation boundary and sample locations outside of the excavation are shown on Figure D-1 and a brief description of the samples are provided below:

- 2012 excavation confirmation samples, which were not removed in subsequent excavations, included 10 primary sample results from the eastern portion of the excavation.
- 2013 excavation confirmation samples, which were not removed by subsequent excavations, included 15 primary sample results. Additionally, three 2013 results from one soil boring outside of the excavation area is included (SB17).
- 2014 excavation confirmation samples included 30 primary results from the northern edge of the excavation and four distinct excavations along the outfall line route.
- 2014 Site 21 samples include 147 primary results from 49 locations outside of the Site 21 excavations.

A table of results with corresponding arsenic concentrations is provided in Attachment D-2.

3.2 SITE 21 DATA TREATMENT

The complete Site 21 excavation confirmation results were utilized for comparison. In the event that field duplicate results were present, the higher of the two results was used represent that location. Although other Site 21 area data are available from outside the excavation, the sample types could not be compared to what remains in the excavation (e.g., peat vs. excavation confirmation samples below the vegetative layer) because soil characterization was not conducted for excavation confirmation samples. Site 21 data are included to support the general observations described in Section 2.0 of this appendix.

3.2.1 Censored Data

The Site 21 excavation confirmation dataset did not include any censored data (e.g., nondetect).

3.2.2 Qualified Data

Minimal qualification of Site 21 results occurred during data validation and none of the Site 21 excavation confirmation sample arsenic results are qualified. Qualified data results are present in the Site 21 samples, including two J-qualified results (results reported between the limit of detection and limit of quantitation) and one MN-qualified result (result with uncertain bias due to matrix effects). The qualified data were considered usable for this assessment.

3.2.3 Soil Classification

Basic soil classifications are available for locations outside of the Site 21 excavations. Soil classification was not completed for excavation confirmation samples during the removal action. Many of the available soil classification descriptions mention "organics" or peat as descriptors.

4.0 SITE 21 COMPARISON TO THE SSCL

All data used to perform the arsenic in soil statistical comparison between Site 21 and the SSCL using ProUCL 5.1 (Environmental Protection Agency [EPA] 2015). The applicable ProUCL input (Attachment D-2) and output files (Attachment D-3) are attached to this document and summarized in this section.

4.1 METHODS

ProUCL 5.1 (EPA 2015) was used to complete the statistical assessment of the Site 21 excavation confirmation result dataset. These assessments included the following:

- Outlier test
- Goodness-of-fit test
- Hypothesis testing
- 95 percent upper confidence limit (UCL)

Before statistical analysis was performed, the Site 21 dataset was assessed for outliers and distribution, and a box plot was performed. The goodness-of-fit test was performed to identify data distribution.

Single sample tests can be used to compare a single site population (Site 21) to a threshold value (SSCL). These tests include the t-test for normally distributed data and non-parametric tests such as the Wilcoxon Rank Sum test (ADEC 2018). The t-test was used to statistically compare the Site 21 excavation confirmation dataset to the SSCL. Additionally, a 95 percent students-t UCL was calculated for the Site 21 dataset.

4.2 RESULTS

The results of the ProUCL assessment comparing arsenic in soil in the Site 21 dataset for the SSCL are presented in the following sections.

4.2.1 Outlier Test

Results of the outlier test (Reference) indicated that no outliers are present for the Site 21 excavation confirmation dataset at both a 5 percent and 1 percent significance level.

4.2.2 Goodness-of-Fit Test

Results of the goodness-of-fit test indicate that the Site 21 excavation confirmation dataset can be described as normally distributed.

4.2.3 Hypothesis Testing

A single sample hypothesis test was completed to compare the excavation confirmation sample dataset to the DD arsenic SSCL of 11 mg/kg using the t-test for a normally distributed data set. The following null hypothesis (H0) and alternate hypothesis (HA) were tested:

- H0: The central tendency arsenic concentration for the excavation confirmation population is greater than or equal to the SSCL.
- HA: The central tendency arsenic concentration for the excavation confirmation population is less than or equal to the SSCL.

The null hypothesis was rejected, which confirmed that the alternate hypothesis is confirmed. The results of the hypothesis testing confirmed that the central tendency of the remaining arsenic levels in the Site 21 excavation are less than or equal to the cleanup level. Additionally, a 95 percent students-t UCL was calculated for the Site 21 excavation confirmation samples. The 95 percent UCL value is 6.618 mg/kg, which is lower than the 11 mg/kg SSCL.

4.3 CONCLUSIONS

A lines of evidence approach indicates that remaining levels of arsenic observed in the Site 21 excavation confirmations samples are from naturally occurring sources. Both statistical hypothesis testing and observational comparisons of the arsenic concentrations in soil at Site 21 indicate that remedial action associated with arsenic is complete at Site 21.

5.0 REFERENCES

ADEC (Alaska Department of Environmental Conservation). 2018 (August). *Guidance for Evaluating Metals at Contaminated Sites*.

EPA (U.S. Environmental Protection Agency). 2015 (October). *ProUCL Version 5.1 Technical Guide*. Prepared by Singh, A. and A.K. Singh. EPA/600/R-07/041.

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USACE. 2013 (May). *Northeast Cape HTRW Remedial Actions, Remedial Action Report, St. Lawrence Island, Alaska. FUDS No. F10AK096903.* Prepared by Bristol Environmental Remediation Services, LLC. FRMD No. F10AK096903_07.08_0505_a.

USACE. 2015 (January). *2013 Remedial Action Report, Northeast Cape, St. Lawrence Island, Alaska. FUDS NO. F10AK096903.* FRMD No. F10AK096903_07.08_0506_p.

USACE. 2016 (May). *2014 Remedial Action Report, Northeast Cape FUDS, St. Lawrence Island, Alaska. FUDS No. F10AK0969-03*. FRMD No. F10AK096903_07.08_0507_p.

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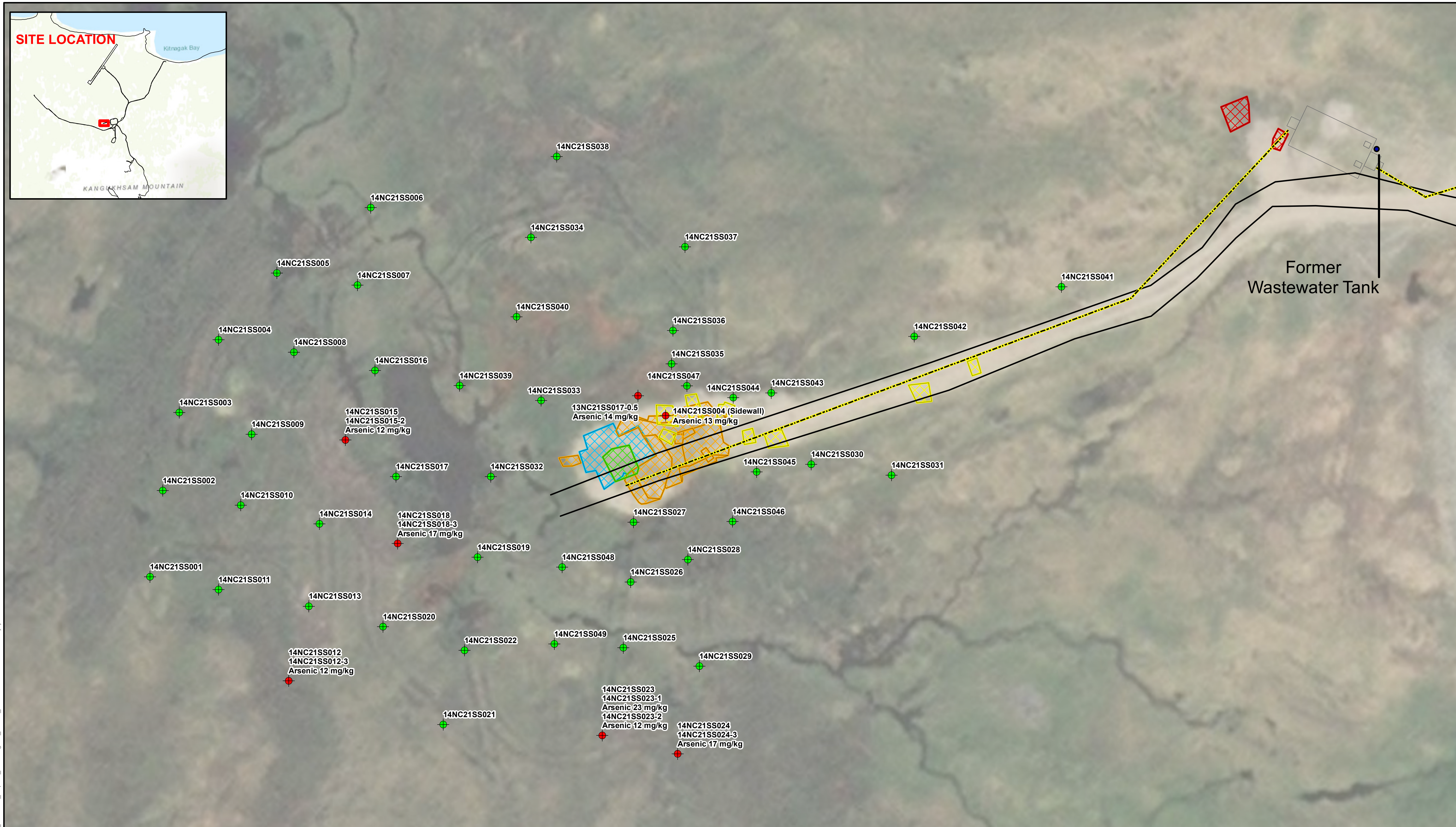
ATTACHMENT D-1
Figure



Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Former Wastewater Tank
- Historical Soil Sample Location with Arsenic > 11 mg/kg
- Historical Soil Sample Location with Arsenic < 11 mg/kg
- Former Utilidor/Discharge Pipe
- Road
- 2014 Excavation
- 2013 Excavation
- 2012 Arsenic Excavation
- 2012 Flooded Excavation
- 2010 PCB Excavation
- Building

N
0 25 50
FEET
WGS 1984 UTM Zone 2N

SITE 21: WASTEWATER TANK
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army Corps of Engineers Alaska District

FUDS PROPERTY - F10AK0969
SAINT LAWRENCE ISLAND, ALASKA

FIGURE D-1

P:\StLawrenceIsland_F10AK0969_NEC_2nd5YR_Sup\01_MXD\FigB-4_Site21_WasteWaterTank.mxd beatyc

ATTACHMENT D-2
Site 21 Results

2018 Northeast Cape Second Five-Year Review – St. Lawrence Island, Alaska
Table D-2.1 2014 Site 21 Borings Sample Results

			Sample ID	14NC21SS001-1	14NC21SS001-2	14NC21SS001-3	14NC21SS002-1	14NC21SS002-2	14NC21SS002-3
			Location ID	SS001-1	SS001-2	SS001-3	SS002-1	SS002-2	SS002-3
			Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Specific Method	**Analyte**	**Units**	**Cleanup Level[1]**						
6020	Arsenic	mg/Kg	11	2	3.2	4.7	4.6 J	4.2	4.8

			Sample ID	14NC21SS003-1	14NC21SS003-2	14NC21SS003-3	14NC21SS004-1	14NC21SS004-2	14NC21SS004-3
			Location ID	SS003-1	SS003-2	SS003-3	SS004-1	SS004-2	SS004-3
			Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Specific Method	**Analyte**	**Units**	**Cleanup Level[1]**						
6020	Arsenic	mg/Kg	11	3.7	4.2	6	2.3	5.2	5.8

			Sample ID	14NC21SS005-1	14NC21SS005-2	14NC21SS005-3	14NC21SS005-4 [D]	14NC21SS006-1	14NC21SS006-2
			Location ID	SS005-1	SS005-2	SS005-3	SS005-4	SS006-1	SS006-2
			Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Specific Method	**Analyte**	**Units**	**Cleanup Level[1]**						
6020	Arsenic	mg/Kg	11	4.9	3.4	3.4	3.4	5.9	3.8
			Sample ID	14NC21SS006-3	14NC21SS007-1	14NC21SS007-2	14NC21SS007-3	14NC21SS008-1	14NC21SS008-2
			Location ID	SS005-3	SS007-1	SS007-2	SS007-3	SS008-1	SS008-2
			Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
6020	Arsenic	mg/Kg	11	4.2	3	3.8	5.9	5	5.2

Notes:

[1] Cleanup Level Established in 2009 Northeast Cape Decision Document

Bold-(Orange box), positive result exceeds Decision Document cleanup criteria.[1]

mg/kg = milligrams per kilogram

2018 Northeast Cape Second Five-Year Review – St. Lawrence Island, Alaska
Table D-2.1 2014 Site 21 Borings Sample Results

			Sample ID	14NC21SS008-3	14NC21SS008-4 [D]	14NC21SS009-1	14NC21SS009-2	14NC21SS009-3	14NC21SS010-1
			Location ID	SS008-3	SS008-4	SS009-1	SS009-2	SS009-3	SS010-1
			Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Specific Method	**Analyte**	**Units**	**Cleanup Level[1]**						
6020	Arsenic	mg/Kg	11	4.4	4.1	5.6	5.5	11	4

			Sample ID	14NC21SS010-2	14NC21SS010-3	14NC21SS010-4 [D]	14NC21SS011-1	14NC21SS011-2	14NC21SS011-3
			Location ID	SS010-2	SS010-3	SS010-4	SS011-1	SS011-2	SS011-3
			Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Specific Method	**Analyte**	**Units**	**Cleanup Level[1]**						
6020	Arsenic	mg/Kg	11	4.6	1.6	1.6	7.6	4.6	11

			Sample ID	14NC21SS012-1	14NC21SS012-2	14NC21SS012-3	14NC21SS013-1	14NC21SS013-2	14NC21SS013-3
			Location ID	SS012-1	SS012-2	SS012-3	SS013-1	SS013-2	SS013-3
			Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Specific Method	**Analyte**	**Units**	**Cleanup Level[1]**						
6020	Arsenic	mg/Kg	11	2.9	5	**12**	3.1	1.9	6.2

			Sample ID	14NC21SS014-1	14NC21SS014-2	14NC21SS014-3	14NC21SS015-1	14NC21SS015-4 [D]	14NC21SS015-2
			Location ID	SS014-1	SS014-2	SS014-3	SS015-1	SS015-4	
			Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
6020	Arsenic	mg/Kg	11	1.5	1.9	3.5	2.1	2.3	**12**

Notes:
[1] Cleanup Level Established in 2009 Northeast Cape Decision Document
Bold-(Orange box), positive result exceeds Decision Document cleanup criteria.[1]
[D]Sample is a duplicate of the preceding sample
mg/kg = milligrams per kilogram

Table D-2.1 2014 Site 21 Borings Sample Results

			Sample ID	14NC21SS015-3	14NC21SS016-1	14NC21SS016-2	14NC21SS016-3	14NC21SS017-1	14NC21SS017-3
			Location ID	SS015-3	SS016-1	SS016-2	SS016-3	SS017-1	SS017-3
			Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014
Specific Method	Analyte	Units	Cleanup Level[1]						
6020	Arsenic	mg/Kg	11	9.5	4.5	3	2.6	3.2	7.8

			Sample ID	14NC21SS017-2	14NC21SS017-4 [D]	14NC21SS018-1	14NC21SS018-2	14NC21SS018-3	14NC21SS019-1
			Location ID	SS017-2	SS017-4	SS018-1	SS018-2	SS018-3	SS019-1
			Collection Date	6/11/2014	6/11/2014	6/11/2014	6/11/2014	6/11/2014	
Specific Method	Analyte	Units	Cleanup Level[1]						
6020	Arsenic	mg/Kg	11	3.1	4.3	1.7	7.5	**17**	6.6

			Sample ID	14NC21SS019-3	14NC21SS019-2	14NC21SS019-4 [D]	14NC21SS020-1	14NC21SS020-2	14NC21SS020-3
			Location ID	SS019-3	SS019-2	SS019-4	SS020-1	SS020-2	SS020-3
			Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
Specific Method	Analyte	Units	Cleanup Level[1]						
6020	Arsenic	mg/Kg	11	2.5	6.3	5.8	3.1	3.4	4.4

			Sample ID	14NC21SS021-1	14NC21SS021-2	14NC21SS021-3	14NC21SS022-1	14NC21SS022-2	14NC21SS022-3
			Location ID	SS021-1	SS021-2	SS021-3	SSO22-1	SSO22-2	SSO22-3
			Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
6020	Arsenic	mg/Kg	11	7.6	3.1	5.2	4.3	2.5	4.6

Notes:

[1] Cleanup Level Established in 2009 Northeast Cape Decision Document

Bold-(Orange box), positive result exceeds Decision Document cleanup criteria.[1]

[D]Sample is a duplicate of the preceding sample

mg/kg = milligrams per kilogram

2018 Northeast Cape Second Five-Year Review – St. Lawrence Island, Alaska
Table D-2.1 2014 Site 21 Borings Sample Results

			Sample ID	14NC21SS023-1	14NC21SS023-2	14NC21SS023-3	14NC21SS024-1	14NC21SS024-2	14NC21SS024-3
			Location ID	SS023-1	SS023-2	SS023-3	SS024-1	SS024-1	SS024-1
			Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
Specific Method	Analyte	Units	Cleanup Level[1]						
6020	Arsenic	mg/Kg	11	**23**	**12**	6.9	11	10	**17**

			Sample ID	14NC21SS025-1	14NC21SS025-2	14NC21SS025-4 [D]	14NC21SS025-3	14NC21SS026-1	14NC21SS026-2
			Location ID	SS025-1	SS025-2	SS025-4	SS025-3	SS026-1	SS026-2
			Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
Specific Method	Analyte	Units	Cleanup Level[1]						
6020	Arsenic	mg/Kg	11	6.2	6.1 QN	3.4 QN	6.2	5.3	3.3

			Sample ID	14NC21SS026-3	14NC21SS027-1	14NC21SS027-2	14NC21SS027-3	14NC21SS027-4 [D]	14NC21SS028-1
			Location ID	SS026-3	SS027-1	SS027-2	SS027-3	SS027-4	SS028-1
			Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
Specific Method	Analyte	Units	Cleanup Level[1]						
6020	Arsenic	mg/Kg	11	5.3	2.2	2.4	5.3	5.4	3.7
			Sample ID	14NC21SS028-2	14NC21SS028-3	14NC21SS029-1	14NC21SS029-4 [D]	14NC21SS029-2	14NC21SS029-3
			Location ID	SS028-2	SS028-3	SS029-1	SS029-4	SS029-2	SS029-3
			Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
6020	Arsenic	mg/Kg	11	4.3	4.5	5.3	5.1	3.3	3.6

Notes:
[1] Cleanup Level Established in 2009 Northeast Cape Decision Document
Bold-(Orange box), positive result exceeds Decision Document cleanup criteria.[1]
[D]Sample is a duplicate of the preceding sample
mg/kg = milligrams per kilogram
QN = One or more quality parameters was out of control with no directional bias.

2018 Northeast Cape Second Five-Year Review – St. Lawrence Island, Alaska
Table D-2.1 2014 Site 21 Borings Sample Results

			Sample ID	14NC21SS030-1	14NC21SS030-2	14NC21SS030-3	14NC21SS031-1	14NC21SS031-2	14NC21SS031-3
			Location ID	SS030-1	SS030-2	SS030-3	SS031-1	SS031-2	SS031-3
			Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
Specific Method	**Analyte**	**Units**	**Cleanup Level[1]**						
6020	Arsenic	mg/Kg	11	8.2	3	3.5	4.5	5.1	3.5

			Sample ID	14NC21SS032-1	14NC21SS032-2	14NC21SS032-3	14NC21SS033-1	14NC21SS033-2	14NC21SS033-4 [D]
			Location ID	SS032-1	SS032-2	SS032-3	SS033-1	SS033-2	SS033-4
			Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/12/2014
Specific Method	**Analyte**	**Units**	**Cleanup Level[1]**						
6020	Arsenic	mg/Kg	11	6.8	5.8	3.9	5	2.7	2.5

			Sample ID	14NC21SS033-3	14NC21SS034-1	14NC21SS034-2	14NC21SS034-3	14NC21SS035-1	14NC21SS035-3
			Location ID	SS033-3	SS034-1	SS034-2	SS034-3	SS035-1	SS035-3
			Collection Date	6/12/2014	6/12/2014	6/12/2014	6/12/2014	6/13/2014	6/13/2014
Specific Method	**Analyte**	**Units**	**Cleanup Level[1]**						
6020	Arsenic	mg/Kg	11	2.7	4.8	6.1	6.3	5.8	6
			Sample ID	14NC21SS035-2	14NC21SS035-4 [D]	14NC21SS036-1	14NC21SS036-2	14NC21SS036-3	14NC21SS036-4 [D]
			Location ID	SS035-2	SS035-4	SS036-1	SS036-2	SS036-3	SS036-4
			Collection Date	6/13/2014	6/13/2014	6/13/2014	6/13/2014	6/13/2014	6/13/2014
6020	Arsenic	mg/Kg	11	6.6	7.4	5.5	4.4	10	8.4

Notes:
[1] Cleanup Level Established in 2009 Northeast Cape Decision Document
[D]Sample is a duplicate of the preceding sample
mg/Kg = milligrams per kilogram

2018 Northeast Cape Second Five-Year Review – St. Lawrence Island, Alaska
Table D-2.1 2014 Site 21 Borings Sample Results

Specific Method	Analyte	Units	Cleanup Level[1]	14NC21SS037-1	14NC21SS037-2	14NC21SS037-3	14NC21SS038-1	14NC21SS038-2	14NC21SS038-3
			Location ID	SS037-1	SS037-2	SS037-3	SS038-1	SS038-2	SS038-3
			Collection Date	6/13/2014	6/13/2014	6/13/2014	6/13/2014	6/13/2014	6/13/2014
6020	Arsenic	mg/Kg	11	4	5.2	8.3	8.4	5.8	5.7

Specific Method	Analyte	Units	Cleanup Level[1]	14NC21SS039-1	14NC21SS039-2	14NC21SS039-3	14NC21SS040-1	14NC21SS040-2	14NC21SS040-3
			Location ID	SS039-1	SS039-2	SS039-3	SS040-1	SS040-2	SS040-3
			Collection Date	6/13/2014	6/13/2014	6/13/2014	6/13/2014	6/13/2014	6/13/2014
6020	Arsenic	mg/Kg	11	8	7.5	4.7	5.6	8.8	7.6

Specific Method	Analyte	Units	Cleanup Level[1]	13NC21SS17-0.5	13NC21SS17-2	13NC21SS17-2.5	14NC21SS041-1	14NC21SS041-2	14NC21SS041-3
			Location ID	13NCSB17	13NCSB17	13NCSB17	21SS041-1	21SS041-2	21SS041-3
			Collection Date	7/11/2013	7/11/2013	7/11/2013	8/5/2014	8/5/2014	8/5/2014
6020	Arsenic	mg/Kg	11	14	7.4 MN	4.6	3.8	2.9	3.9

Notes:

[1] Cleanup Level Established in 2009 Northeast Cape Decision Document

Bold-(Orange box), positive result exceeds Decision Document cleanup criteria.[1]

MN = One or more quality parameters was out of control with no directional bias due to matrix interference.

mg/Kg = milligrams per kilogram

2018 Northeast Cape Second Five-Year Review – St. Lawrence Island, Alaska
Table D-2.1 2014 Site 21 Borings Sample Results

Specific Method	Analyte	Units	Cleanup Level[1]	14NC21SS042-1	14NC21SS042-2	14NC21SS042-3	14NC21SS043-1	14NC21SS043-2	14NC21SS043-3
			Location ID	21SS042-1	21SS042-2	21SS042-3	SS043-1	SS043-2	SS043-3
			Collection Date	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014
6020	Arsenic	mg/Kg	11	4.1	3.0	8.7	10	3.8	2.9

Specific Method	Analyte	Units	Cleanup Level[1]	14NC21SS044-1	14NC21SS044-2	14NC21SS044-3	14NC21SS045-1	14NC21SS045-1.5 [D]	14NC21SS045-2
			Location ID	SS044-1	SS044-2	SS044-3	SS045-1	SS045-1.5	SS045-2
			Collection Date	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014
6020	Arsenic	mg/Kg	11	7.9	4.2	5.0	6.4	4.5	4.2

Specific Method	Analyte	Units	Cleanup Level[1]	14NC21SS045-3	14NC21SS046-1	14NC21SS046-2	14NC21SS046-3	14NC21SS047-1	14NC21SS047-2
			Location ID	SS045-3	SS046-1	SS046-2	SS046-3	SS047-1	SS047-2
			Collection Date	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014
6020	Arsenic	mg/Kg	11	5.7	2.2	4.2	5.3	2.9	3.4

Notes:

[1] Cleanup Level Established in 2009 Northeast Cape Decision Document

[D] Sample is a duplicate of the preceding sample

mg/kg = milligrams per kilogram

2018 Northeast Cape Second Five-Year Review – St. Lawrence Island, Alaska
Table D-2.1 2014 Site 21 Borings Sample Results

Specific Method	Analyte	Units	Cleanup Level1	14NC21SS047-3	14NC21SS048-1	14NC21SS048-1.5 D	14NC21SS048-2	14NC21SS048-3	14NC21SS049-1
			Location ID	SS047-3	SS048-1	SS048-1.5	SS048-2	SS048-3	SS049-1
			Collection Date	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014	8/5/2014
6020	Arsenic	mg/Kg	11	6.9	9.1	7.3	6.2	5.6	6.6

Specific Method	Analyte	Units	Cleanup Level1	14NC21SS049-1.5 D	14NC21SS049-2	14NC21SS049-3
			Location ID	SS049-1.5	SS049-2	SS049-3
			Collection Date	8/5/2014	8/5/2014	8/5/2014
6020	Arsenic	mg/Kg	11	8.5	5.8 J	9.7

Notes:

[1] Cleanup Level Established in 2009 Northeast Cape Decision Document

[D] Sample is a duplicate of the preceding sample

mg/kg = milligrams per kilogram

2018 Northeast Cape Second Five-Year Review – St. Lawrence Island, Alaska
Table D-2.2 2012-2014 Site 21 Excavation Confirmation Results

			Sample ID	14NC21SS001	14NC21SS002	14NC21SS003[D]	14NC21SS004	14NC21SS005	14NC21SS006	14NC21SS007
			Location ID	21SS001	21SS002	21SS003	21SS004	21SS005	21SS006	21SS007
			Collection Date	8/7/2014	8/7/2014	8/7/2014	8/10/2014	8/10/2014	8/10/2014	8/10/2014
Analysis Method	**Analyte**	**Unit**	**Cleanup Level[1]**							
6020	Arsenic	mg/kg	11	3.7	5.8	5.3	**13**	5.2	3.3	7.6

			Sample ID	14NC21SS008	14NC21SS009	14NC21SS010	14NC21SS011	14NC21SS012	14NC21SS013	14NC21SS014
			Location ID	21SS008	21SS009	21SS010	21SS011	21SS012	21SS013	21SS014
			Collection Date	8/10/2014	8/10/2014	8/10/2014	8/10/2014	8/10/2014	8/10/2014	8/10/2014
Analysis Method	**Analyte**	**Unit**	**Cleanup Level[1]**							
6020	Arsenic	mg/kg	11	2.9	6.2	7.4	9.4	10	4.8	3.8

			Sample ID	14NC21SS015	14NC21SS016	14NC21SS017	14NC21SS018[D]	14NC21SS019	14NC21SS020	14NC21SS021
			Location ID	21SS015	21SS016	21SS017	21SS018	21SS019	21SS020	21SS021
			Collection Date	8/10/2014	8/10/2014	8/10/2014	8/10/2014	8/10/2014	8/10/2014	8/10/2014
Analysis Method	**Analyte**	**Unit**	**Cleanup Level[1]**							
6020	Arsenic	mg/kg	11	10	3.4	9.1	7.4	3.6	2.5	4.5

Notes:

[1] Cleanup Level Established in 2009 Decision Document

[D] Sample is a field duplicate of preceding sample.

Bold-(Orange box), positive result exceeds Decision Document cleanup criteria.[1]

			Sample ID	13NC21SS021	13NC21SS022	13NC21SS025	13NC21SS031	13NC21SS033	13NC21SS034	13NC21SS037
			Location ID	21-021	21-021	21-025	21-031	21-033	21-034	21-037
			Collection Date	8/23/2013	8/23/2013	8/23/2013	8/23/2013	8/23/2013	8/23/2013	8/23/2013
Analysis Method	**Analyte**	**Unit**	**Cleanup Level[1]**							
6020	Arsenic	mg/kg	11	6.0	4.4	9.9	7.6	5.8	4.4	5.7

			Sample ID	13NC21SS038	13NC21SS039	13NC21SS042	13NC21SS044	13NC21SS048	13NC21SS049	13NC21SS050
			Location ID	21-038	21-039	21-042	21-044	21-048	21-049	21-050
			Collection Date	8/24/2013			9/3/2013	9/3/2013	9/3/2013	9/3/2013
Analysis Method	**Analyte**	**Unit**	**Cleanup Level[1]**							
6020	Arsenic	mg/kg	11	4.4	2.2	2.0	11	6.7	5.1	7.0

			Sample ID	13NC21SS051						
			Location ID	21-051						
			Collection Date	9/3/2013						
Analysis Method	**Analyte**	**Unit**	**Cleanup Level[1]**							
6020	Arsenic	mg/kg	11	7.9						

Notes:

[1] Cleanup Level Established in 2009 Decision Document

[D] Sample is a field duplicate of preceding sample.

Bold-(Orange box), positive result exceeds Decision Document cleanup criteria.[1]

2018 Northeast Cape Second Five-Year Review – St. Lawrence Island, Alaska
Table D-2.2 2012-2014 Site 21 Excavation Confirmation Results

			Sample ID	14NC21SS022	14NC21SS023	14NC21SS024[D]	14NC21SS025	14NC21SS026	14NC21SS027	14NC21SS028[D]
			Location ID	21SS022	21SS023	21SS024	21SS025	21SS026	21SS027	21SS028
			Collection Date	8/10/2014	8/10/2014	8/11/2014	8/19/2014	8/19/2014	8/19/2014	8/19/2014
Analysis Method	Analyte	Unit	Cleanup Level[1]							
6020	Arsenic	mg/kg	11	5.8	2.1	3.1	5.9	6.6	6.9	6.5

			Sample ID	14NC21SS029	14NC21SS030	14NC21SS031	14NC21SS032	14NC21SS033	14NC21SS034	14NC21SS035
			Location ID	21SS029	21SS030	21SS031	21SS032	21SS033	21SS034	21SS035
			Collection Date	8/19/2014	8/19/2014	8/19/2014	8/19/2014	8/19/2014	8/19/2014	8/19/2014
Analysis Method	Analyte	Unit	Cleanup Level[1]							
6020	Arsenic	mg/kg	11	6.5	6.7	6.5	7.8	7.1	5.8	7.9

Notes:

[1] Cleanup Level Established in 2009 Decision Document

[D] Sample is a field duplicate of preceding sample.

Bold-(Orange box), positive result exceeds Decision Document cleanup criteria.[1]

			Sample ID	12NC21SS002	12NC21SS003	12NC21SS004	12NC21SS006	12NC21SS007	12NC21SS008	12NC21SS009
			Location ID	NC2122002	NC2122003	NC2122004	NC2122006	NC2122007	NC2122008	NC2122009
			Collection Date	8/15/2012	8/15/2012	8/15/2012	8/15/2012	8/15/2012	8/15/2012	8/15/2012
Analysis Method	Analyte	Unit	Cleanup Level[1]							
6020	Arsenic	mg/kg	11	4.0	5.2	6.0	6.1	8.8	3.3	9.4

			Sample ID	12NC21SS011	12NC21SS012	12NC21SS021				
			Location ID	NC2122011	NC2122021	NC2122021				
			Collection Date	8/15/2012	8/15/2012	9/4/2012				
Analysis Method	Analyte	Unit	Cleanup Level[1]							
6020	Arsenic	mg/kg	11	4.7	5.6	5.3				

Notes:

[1] Cleanup Level Established in 2009 Decision Document

[D] Sample is a field duplicate of preceding sample.

Bold-(Orange box), positive result exceeds Decision Document cleanup criteria.[1]

ATTACHMENT D-3
ProUCL Input

Table D-3.1 ProUCL Input

Site 21 Excavation Confirmation - Arsenic
3.7
5.8
5.2
3.3
7.6
2.9
6.2
7.4
9.4
10
4.8
3.8
10
3.4
9.1
3.6
2.5
4.5
5.8
3.1
5.9
6.6
6.9
6.5
6.7
6.5
7.8
7.1
5.8
7.9
6
4.4
9.9
7.6
5.8
4.4
5.7
4.4
2.2
2
11
6.7
5.1
7
7.9
4
5.2
6
6.1
8.8
9.4
3.3
4.7
5.6
5.3
13

ATTACHMENT D-4
ProUCL Output

2018 Northeast Cape Second Five-Year Review – St. Lawrence Island, Alaska
Table D-4.1 Outlier Tests for Selected Uncensored Variables

User Selected Options	
Date/Time of Computation	**8/12/2019 13:43**
From File	**KM Pro UCL Input.xls**
Full Precision	**OFF**

Rosner's Outlier Test for Site 21 Excavation Confirmation - Arsenic

Mean	6.095
Standard Deviation	2.342
Number of data	56
Number of suspected outliers	1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)
1	6.095	2.321	13	56	2.975	3.172

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

Table D-4.2 Goodness-of-Fit Test Statistics

Goodness-of-Fit Test Statistics for Uncensored Full Data Sets without Nondetects

User Selected Options	
Date/Time of Computation	8/10/2019 3:41:21 PM
From File	KM Pro UCL Input.xls
Full Precision	OFF
Confidence Coefficient	0.95

Site 21 Excavation Confirmation - Arsenic

Raw Statistics	
Number of Valid Observations	56
Number of Distinct Observations	42
Minimum	2
Maximum	13
Mean of Raw Data	6.095
Standard Deviation of Raw Data	2.342
Khat	6.658
Theta hat	0.915
Kstar	6.313
Theta star	0.965
Mean of Log Transformed Data	1.73
Standard Deviation of Log Transformed Data	0.408

Normal GOF Test Results

Correlation Coefficient R	0.986
Approximate Shapiro Wilk Test Statistic	0.968
Approximate Shapiro Wilk P Value	0.287
Lilliefors Test Statistic	0.0766
Lilliefors Critical (0.05) Value	0.118

Data appear Normal at (0.05) Significance Level

Gamma GOF Test Results

Correlation Coefficient R	0.996
A-D Test Statistic	0.199
A-D Critical (0.05) Value	0.752
K-S Test Statistic	0.0733
K-S Critical(0.05) Value	0.119

Data appear Gamma Distributed at (0.05) Significance Level

Lognormal GOF Test Results

Correlation Coefficient R	0.99
Approximate Shapiro Wilk Test Statistic	0.974
Approximate Shapiro Wilk P Value	0.448
Lilliefors Test Statistic	0.0996
Lilliefors Critical (0.05) Value	0.118

Data appear Lognormal at (0.05) Significance Level

2018 Northeast Cape Second Five-Year Review – St. Lawrence Island, Alaska
Table D-4.3 Hypothesis Testing

One Sample t-Test for Uncensored Full Data Sets without Nondetects

User Selected Options	
Date/Time of Computation	8/10/2019 3:43:18 PM
From File	KM Pro UCL Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0.000
Action Level	11.000
Selected Null Hypothesis	Mean >= Action Level (Form 2)
Alternative Hypothesis	Mean < the Action Level

Site 21 Excavation Confirmation - Arsenic

One Sample t-Test

Raw Statistics

Number of Valid Observations	56
Number of Distinct Observations	42
Minimum	2
Maximum	13
Mean	6.095
Median	5.85
SD	2.342
SE of Mean	0.313

H0: Sample Mean >= 11 (Form 2)

Test Value	-15.67
Degrees of Freedom	55
Critical Value (0.05)	-1.673
P-Value	3.056E-22

Conclusion with Alpha = 0.05

Reject H0, Conclude Mean < 11

P-Value < Alpha (0.05)

2018 Northeast Cape Second Five-Year Review – St. Lawrence Island, Alaska
Table D-4.4 UCL Statistics

Normal UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	8/10/2019 3:46:53 PM
From File	KM Pro UCL Input.xls
Full Precision	OFF
Confidence Coefficient	95%

Site 21 Excavation Confirmation - Arsenic

General Statistics

Total Number of Observations	56	Number of Distinct Observations	42
		Number of Missing Observations	0
Minimum	2	Mean	6.095
Maximum	13	Median	5.85
SD	2.342	SD of logged Data	0.408
Coefficient of Variation	0.384	Skewness	0.58

Normal GOF Test

Shapiro Wilk Test Statistic	0.968	**Normal GOF Test**
5% Shapiro Wilk P Value	0.287	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.0766	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.118	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	6.618	95% Adjusted-CLT UCL (Chen-1995)	6.635
		95% Modified-t UCL (Johnson-1978)	6.622

Suggested UCL to Use

95% Student's-t UCL	6.618

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

APPENDIX E

Second Five-Year Review Field Documentation

Site Inspection Checklists

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: 21 - Wastewater Tank	**Date of inspection:** 8/2/18
Location and Region: Northeast Cape	**EPA ID:** AK9799F2999
Agency, office, or company leading the five-year review: USACE	**Weather/temperature:** Overcast, 50°F, light wind

Remedy Includes: (Check all that apply)
- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Other excavation with disposal
- ☑ Monitored natural attenuation
- ☑ Institutional controls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** none
   Name ______ Title ______ Date ______
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ______
   Problems, suggestions; ☐ Report attached ______

2. **O&M staff** none
   Name ______ Title ______ Date ______
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. ______
   Problems, suggestions; ☐ Report attached ______

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   Agency ADEC
   Contact Curtis Dunkin | Project Manager | 11/19/18 | (907) 269-3053
   Name Title Date Phone no.
   Problems; suggestions; ☑ Report attached Questionnaire sent via email.

   Agency ______
   Contact ______
   Name Title Date Phone no.
   Problems; suggestions; ☐ Report attached ______

4. **Other interviews** (optional) ☒ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)	
1.	**O&M Documents** ☐ O&M manual ☐ Readily available ☐ Up to date ☐ N/A ☐ As-built drawings ☐ Readily available ☐ Up to date ☐ N/A ☐ Maintenance logs ☐ Readily available ☐ Up to date ☐ N/A Remarks Decision Document and 1st FYR used for site information and site maps.
2.	**Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A Remarks
3.	**O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A Remarks
4.	**Permits and Service Agreements** ☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A ☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A ☐ Other permits ☐ Readily available ☐ Up to date ☒ N/A Remarks
5.	**Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A Remarks
6.	**Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A Remarks
7.	**Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A Remarks
8.	**Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A Remarks
9.	**Discharge Compliance Records** ☐ Air ☐ Readily available ☐ Up to date ☒ N/A ☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A Remarks
10.	**Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A Remarks

Five-Year Review Site Inspection Checklist

B. Other Site Conditions

Remarks Areas of excavation are at ~~original~~ PM grade with surrounding gravel pads, and have fair to good vegetative cover. Ground is relatively wet/swampy off of main road, and vegetative mat appears healthy. Biogenic sheen noted on ponded water.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent______ Depth______
Remarks______

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths______ Widths______ Depths______
Remarks______

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent______ Depth______
Remarks______

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent______ Depth______
Remarks______

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks______

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks______

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent______ Height______
Remarks______

8.	**Wet Areas/Water Damage** ☐ Wet areas/water damage not evident ☐ Wet areas ☐ Location shown on site map Areal extent______ ☐ Ponding ☐ Location shown on site map Areal extent______ ☐ Seeps ☐ Location shown on site map Areal extent______ ☐ Soft subgrade ☐ Location shown on site map Areal extent______ Remarks______	
9.	**Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability Areal extent______ Remarks______	
B. Benches	☐ Applicable ☐ N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)	
1.	**Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay Remarks______	
2.	**Bench Breached** ☐ Location shown on site map ☐ N/A or okay Remarks______	
3.	**Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay Remarks______	
C. Letdown Channels	☐ Applicable ☐ N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)	
1.	**Settlement** ☐ Location shown on site map ☐ No evidence of settlement Areal extent______ Depth______ Remarks______	
2.	**Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation Material type______ Areal extent______ Remarks______	
3.	**Erosion** ☐ Location shown on site map ☐ No evidence of erosion Areal extent______ Depth______ Remarks______	

Five-Year Review Site Inspection Checklist

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent______________ Depth____________
Remarks____

5. **Obstructions** Type____________________ ☐ No obstructions
☐ Location shown on site map Areal extent______________
Size____________
Remarks____

6. **Excessive Vegetative Growth** Type_________
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent______________
Remarks____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A
1. **Gas Treatment Facilities** ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse ☐ Good condition☐ Needs Maintenance Remarks____
2. **Gas Collection Wells, Manifolds and Piping** ☐ Good condition☐ Needs Maintenance Remarks____
3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings) ☐ Good condition☐ Needs Maintenance ☐ N/A Remarks____
F. Cover Drainage Layer ☐ Applicable ☐ N/A
1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A Remarks____
2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks____
G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A
1. **Siltation** Areal extent______________ Depth____________ ☐ N/A ☐ Siltation not evident Remarks____
2. **Erosion** Areal extent______________ Depth____________ ☐ Erosion not evident Remarks____
3. **Outlet Works** ☐ Functioning ☐ N/A Remarks____
4. **Dam** ☐ Functioning ☐ N/A Remarks____

Five-Year Review Site Inspection Checklist

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement__________ Vertical displacement__________
Rotational displacement__________
Remarks__________

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks__________

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent__________ Depth__________
Remarks__________

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent__________ Type__________
Remarks__________

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent__________ Depth__________
Remarks__________

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks__________

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent__________ Depth__________
Remarks__________

2. **Performance Monitoring** Type of monitoring__________
☐ Performance not monitored
Frequency__________ ☐ Evidence of breaching
Head differential__________
Remarks__________

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A
A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A
1. **Pumps, Wellhead Plumbing, and Electrical** ☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A Remarks
2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks
3. **Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks
B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A
1. **Collection Structures, Pumps, and Electrical** ☐ Good condition ☐ Needs Maintenance Remarks
2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks
3. **Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks

Five-Year Review Site Inspection Checklist

C. Treatment System ☐ Applicable ☑ N/A
1. **Treatment Train** (Check components that apply) ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation ☐ Air stripping ☐ Carbon adsorbers ☐ Filters________________ ☐ Additive (*e.g.*, chelation agent, flocculent)________________ ☐ Others________________ ☐ Good condition ☐ Needs Maintenance ☐ Sampling ports properly marked and functional ☐ Sampling/maintenance log displayed and up to date ☐ Equipment properly identified ☐ Quantity of groundwater treated annually________________ ☐ Quantity of surface water treated annually________________ Remarks________________
2. **Electrical Enclosures and Panels** (properly rated and functional) ☐ N/A ☐ Good condition ☐ Needs Maintenance Remarks________________
3. **Tanks, Vaults, Storage Vessels** ☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance Remarks________________
4. **Discharge Structure and Appurtenances** ☐ N/A ☐ Good condition ☐ Needs Maintenance Remarks________________
5. **Treatment Building(s)** ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair ☐ Chemicals and equipment properly stored Remarks________________
6. **Monitoring Wells** (pump and treatment remedy) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A Remarks________________
D. Monitoring Data
1. Monitoring Data ☑ Is routinely submitted on time ☑ Is of acceptable quality
2. Monitoring data suggests: ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☑ Routinely sampled ☑ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The selected remedy was to excavate and remove PCB- and arsenic-contaminated soil. The excavation areas are not easily identifiable ~~and are covered with~~ PJM Vegetative cover is fair to good in most areas. No petroleum odor was detected, and sheen on surface water in adjacent ponds appeared to be biogenic. The selected remedy appears effective.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

There is no visual evidence of contamination remaining at site 21.

Five-Year Review Site Inspection Checklist

C.	Early Indicators of Potential Remedy Problems
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. None
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. None

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: Site 28 - Drainage Basin	**Date of inspection:** 03 Aug 2018
Location and Region: NEC	**EPA ID:** AK9799F299
Agency, office, or company leading the five-year review: USACE	**Weather/temperature:** 50°F, overcast
Remedy Includes: (Check all that apply) ☐ Landfill cover/containment ☐ Monitored natural attenuation ☐ Access controls ☐ Institutional controls ☒ Other excavation and installation of a sedimentation pond	
Attachments: ☐ Inspection team roster attached ☐ Site map attached	

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** None

Name	Title	Date
None		

Interviewed ☐ at site ☐ at office ☐ by phone Phone no.
Problems, suggestions; ☐ Report attached

2. **O&M staff** None

Name	Title	Date
None		

Interviewed ☐ at site ☐ at office ☐ by phone Phone no.
Problems, suggestions; ☐ Report attached

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency ADEC

Contact Name	Title	Date	Phone no.
Curtis Dunkin	Project manager	11/19/18	(907) 269-3053

Problems; suggestions; ☐ Report attached Questionnaire sent via email

Agency
Contact

Name	Title	Date	Phone no.

Problems; suggestions; ☐ Report attached

4. **Other interviews** (optional) ☒ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date ☒ N/A

   Remarks Decision Document used for site information and site maps.

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

   Remarks

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Other permits ________ ☐ Readily available ☐ Up to date ☒ N/A

   Remarks

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date ☐ N/A

   Remarks

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

    Remarks

Five-Year Review Site Inspection Checklist

IV. O&M COSTS
1. **O&M Organization** ☐ State in-house ☐ Contractor for State ☐ PRP in-house ☐ Contractor for PRP ☐ Federal Facility in-house ☐ Contractor for Federal Facility ☒ Other USACE
2. **O&M Cost Records** ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place Original O&M cost estimate $5,851,587 ☐ Breakdown attached Total annual cost by year for review period if available From ____ (Date) To ____ (Date) ____ (Total cost) ☐ Breakdown attached From ____ (Date) To ____ (Date) ____ (Total cost) ☐ Breakdown attached From ____ (Date) To ____ (Date) ____ (Total cost) ☐ Breakdown attached From ____ (Date) To ____ (Date) ____ (Total cost) ☐ Breakdown attached From ____ (Date) To ____ (Date) ____ (Total cost) ☐ Breakdown attached
3. **Unanticipated or Unusually High O&M Costs During Review Period** Describe costs and reasons: None
V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A
A. Fencing
1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A Remarks
B. Other Access Restrictions
1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A Remarks

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented	☐ Yes	☒ No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	☒ No	☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Periodic Reviews (visual inspection)
Frequency 5 years
Responsible party/agency USACE
Contact

Name	Title	Date	Phone no.

Reporting is up-to-date	☒ Yes	☐ No	☐ N/A
Reports are verified by the lead agency	☒ Yes	☐ No	☐ N/A
Specific requirements in deed or decision documents have been met	☒ Yes	☐ No	☐ N/A
Violations have been reported	☐ Yes	☒ No	☐ N/A

Other problems or suggestions: ☐ Report attached

Deed notice HH

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks

2. **Land use changes on site** ☒ N/A
Remarks

3. **Land use changes off site** ☒ N/A
Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks

Five-Year Review Site Inspection Checklist

B. Other Site Conditions	
	Remarks Strong fuel odors and sheen present throughout water bodies. Debris such as plywood, treated utility poles, rubber matting, corrugated metal, and additional debris encountered at the site. Some debris appears to be from remedial activities. Other is from site historic activities (utility poles)
VII. LANDFILL COVERS ☐ Applicable ☒ N/A	
A. Landfill Surface	
1.	**Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident Areal extent______ Depth______ Remarks______
2.	**Cracks** ☐ Location shown on site map ☐ Cracking not evident Lengths______ Widths______ Depths______ Remarks______
3.	**Erosion** ☐ Location shown on site map ☐ Erosion not evident Areal extent______ Depth______ Remarks______
4.	**Holes** ☐ Location shown on site map ☐ Holes not evident Areal extent______ Depth______ Remarks______
5.	**Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress ☐ Trees/Shrubs (indicate size and locations on a diagram) Remarks______
6.	**Alternative Cover (armored rock, concrete, etc.)** ☐ N/A Remarks______
7.	**Bulges** ☐ Location shown on site map ☐ Bulges not evident Areal extent______ Height______ Remarks______

8.	**Wet Areas/Water Damage** ☐ Wet areas ☐ Ponding ☐ Seeps ☐ Soft subgrade Remarks______________	☐ Wet areas/water damage not evident ☐ Location shown on site map ☐ Location shown on site map ☐ Location shown on site map ☐ Location shown on site map	 Areal extent______________ Areal extent______________ Areal extent______________ Areal extent______________
9.	**Slope Instability** ☐ Slides Areal extent______________ Remarks______________	☐ Location shown on site map	☐ No evidence of slope instability
B. Benches	☐ Applicable ☐ N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench** Remarks______________	☐ Location shown on site map	☐ N/A or okay
2.	**Bench Breached** Remarks______________	☐ Location shown on site map	☐ N/A or okay
3.	**Bench Overtopped** Remarks______________	☐ Location shown on site map	☐ N/A or okay
C. Letdown Channels	☐ Applicable ☐ N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	**Settlement** Areal extent______________ Remarks______________	☐ Location shown on site map Depth______________	☐ No evidence of settlement
2.	**Material Degradation** Material type______________ Remarks______________	☐ Location shown on site map Areal extent______________	☐ No evidence of degradation
3.	**Erosion** Areal extent______________ Remarks______________	☐ Location shown on site map Depth______________	☐ No evidence of erosion

Five-Year Review Site Inspection Checklist

4.	**Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting Areal extent________ Depth________ Remarks________
5.	**Obstructions** Type________ ☐ No obstructions ☐ Location shown on site map Areal extent________ Size________ Remarks________
6.	**Excessive Vegetative Growth** Type________ ☐ No evidence of excessive growth ☐ Vegetation in channels does not obstruct flow ☐ Location shown on site map Areal extent________ Remarks________
D. Cover Penetrations ☐ Applicable ☐ N/A	
1.	**Gas Vents** ☐ Active☐ Passive ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks________
2.	**Gas Monitoring Probes** ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks________
3.	**Monitoring Wells** (within surface area of landfill) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks________
4.	**Leachate Extraction Wells** ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks________
5.	**Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A Remarks________

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition☐ Needs Maintenance
Remarks______________________________

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition☐ Needs Maintenance
Remarks______________________________

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition☐ Needs Maintenance ☐ N/A
Remarks______________________________

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks______________________________

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks______________________________

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation** Areal extent______________ Depth____________ ☐ N/A
☐ Siltation not evident
Remarks______________________________

2. **Erosion** Areal extent______________ Depth____________
☐ Erosion not evident
Remarks______________________________

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks______________________________

4. **Dam** ☐ Functioning ☐ N/A
Remarks______________________________

Five-Year Review Site Inspection Checklist

H. Retaining Walls ☐ Applicable ☒ N/A	
1.	**Deformations** ☐ Location shown on site map ☐ Deformation not evident Horizontal displacement________ Vertical displacement________ Rotational displacement________ Remarks________
2.	**Degradation** ☐ Location shown on site map ☐ Degradation not evident Remarks________
I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A	
1.	**Siltation** ☐ Location shown on site map ☐ Siltation not evident Areal extent________ Depth________ Remarks________
2.	**Vegetative Growth** ☐ Location shown on site map ☐ N/A ☐ Vegetation does not impede flow Areal extent________ Type________ Remarks________
3.	**Erosion** ☐ Location shown on site map ☐ Erosion not evident Areal extent________ Depth________ Remarks________
4.	**Discharge Structure** ☐ Functioning ☐ N/A Remarks________
VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A	
1.	**Settlement** ☐ Location shown on site map ☐ Settlement not evident Areal extent________ Depth________ Remarks________
2.	**Performance Monitoring** Type of monitoring________ ☐ Performance not monitored Frequency________ ☐ Evidence of breaching Head differential________ Remarks________

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A	
A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A	
1.	**Pumps, Wellhead Plumbing, and Electrical** ☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A Remarks
2.	**Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks
3.	**Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks
B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A	
1.	**Collection Structures, Pumps, and Electrical** ☐ Good condition ☐ Needs Maintenance Remarks
2.	**Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks
3.	**Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks

Five-Year Review Site Inspection Checklist

C. Treatment System	☐ Applicable ☒ N/A
1.	**Treatment Train** (Check components that apply) ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation ☐ Air stripping ☐ Carbon adsorbers ☐ Filters_____ ☐ Additive (*e.g.*, chelation agent, flocculent)_____ ☐ Others_____ ☐ Good condition ☐ Needs Maintenance ☐ Sampling ports properly marked and functional ☐ Sampling/maintenance log displayed and up to date ☐ Equipment properly identified ☐ Quantity of groundwater treated annually_____ ☐ Quantity of surface water treated annually_____ Remarks_____
2.	**Electrical Enclosures and Panels** (properly rated and functional) ☐ N/A ☐ Good condition☐ Needs Maintenance Remarks_____
3.	**Tanks, Vaults, Storage Vessels** ☐ N/A ☐ Good condition☐ Proper secondary containment ☐ Needs Maintenance Remarks_____
4.	**Discharge Structure and Appurtenances** ☐ N/A ☐ Good condition☐ Needs Maintenance Remarks_____
5.	**Treatment Building(s)** ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair ☐ Chemicals and equipment properly stored Remarks_____
6.	**Monitoring Wells** (pump and treatment remedy) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A Remarks_____
D. Monitoring Data	
1.	Monitoring Data ☒ Is routinely submitted on time ☒ Is of acceptable quality
2.	Monitoring data suggests: ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy does not appear to be operating as designed. ~~Strong~~ Indications of Contamination such as sheen, and odor are present on site.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The remedy is short-term protective as currently implemented. It appears that contamination may remain above the SSCLs.

Five-Year Review Site Inspection Checklist

C.	Early Indicators of Potential Remedy Problems
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. None.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Continue further remedy implementation. or re-evaluate the remedy effectiveness ~~as currently implemented.~~ HH and determine if additional remedies should be considered through a focused FS.

Photograph Log

PHOTOGRAPH LOG
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Photo No. 1 – 02 August 2018
View facing west of Site 21.

Photo No. 2 – 02 August 2018
View facing east of Site 21.

Photo No. 3 – 02 August 2018
View facing west of Site 21.

Photo No. 4 – 02 August 2018
View facing north of irregular topography at Site 21.

Photo No. 5 – 02 August 2018
View facing west of a rock pile observed at Site 21.

Photo No. 6 – 03 August 2018
View facing down of sheen on surface water at Site 28.

Photo No. 7 – 03 August 2018
View facing north of pond with sheen at Site 28.

Photo No. 8 – 07 August 2018
View facing north of pond containing sample locations #1 and #2 at Site 28. Stressed vegetation on the edge of the ponded water and low water level.

Photo No. 9 – 03 August 2018
View facing northeast of utility pole base in pond at Site 28.

Photo No. 10 – 03 August 2018
View facing down of a fallen utility pole with treated covering at Site 28.

Photo No. 11 – 03 August 2018
View facing down of a fallen utility pole with treated covering at Site 28.

Photo No. 12 – 03 August 2018
View facing down of a fallen utility pole with treated covering at Site 28.

Photo No. 13 – 03 August 2018
View facing north of 1-inch electrical conduit at Site 28.

Photo No. 14 – 03 August 2018
View facing down of rubber tubing found at Site 28.

Photo No. 15 – 03 August 2018
View facing east of partially buried rubber matting at Site 28.

Photo No. 16 – 06 August 2018
View facing east of plywood at Site 28.

Photo No. 17 – 03 August 2018
View facing east of tarp material at Site 28.

Photo No. 18 – 06 August 2018
View facing east of an in-tact straw wattle at the MOC/Site 28 border.

Photo No. 19 – 06 August 2018
View facing south of reindeer tracks through Site 28.

Photo No. 20 – 07 August 2018
View facing east of a pond containing lath #1 and #2 at the confluence of the Suqi River and Site 28.

APPENDIX F

Site 28 Sediment Mapping and Sampling Report

SECOND FIVE-YEAR REVIEW REPORT FOR NORTHEAST CAPE FORMERLY USED DEFENSE SITE FUDS NO. F10AK0969-03 ST. LAWRENCE ISLAND, ALASKA

U.S. Army Corps of Engineers
Alaska District
Anchorage, Alaska

APPENDIX F
SITE 28 SEDIMENT MAPPING AND SAMPLING REPORT

FINAL

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TABLES

PHOTOGRAPHS

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CHROMATOGRAMS

ATTACHMENTS

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
AC&WS	Aircraft Control and Warning Station
ADEC	Alaska Department of Environmental Conservation
bgs	below ground surface
CCV	continuing calibration verification
COC	contaminant of concern
cy	cubic yard(s)
DD	Decision Document
DoD	U.S. Department of Defense
DQA	data quality assessment
DRO	diesel-range organics
ECC	Environmental Compliance Consultants, Inc.
EPA	U.S. Environmental Protection Agency
FUDS	Formerly Used Defense Site
HPAH	high molecular weight polycyclic aromatic hydrocarbon
HTRW	hazardous, toxic, and radiological waste
Jacobs	Jacobs Engineering Group Inc.
LPAH	low molecular weight polycyclic aromatic hydrocarbon
mg/kg	milligrams per kilogram
MOC	Main Operations Complex
N/A	not applicable
NEC	Northeast Cape
NOAA	National Oceanic and Atmospheric Association
NOM	naturally occurring organic material
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PM	project manager
POL	petroleum, oil, and lubricants
QC	quality control
RRO	residual-range organics
SIM	selective-ion monitoring
SOP	standard operating procedure
SSCL	site-specific cleanup level
Site 28	Site 28 Drainage Basin
Suqi River	Suqitughneq River

ACRONYMS AND ABBREVIATIONS (Continued)

TAH	total aromatic hydrocarbons
TAqH	total aqueous hydrocarbons
USACE	U.S. Army Corps of Engineers
WACS	White Alice Communications System

EXECUTIVE SUMMARY

This Site 28 Drainage Basin (Site 28) report summarizes the 2018 sediment mapping field activities and analytical results and presents conclusions and recommendations. Site 28 is part of the Northeast Cape Formerly Used Defense Site on St. Lawrence Island, Alaska (Alaska Department of Environmental Conservation File No. 475.38.013). The 2018 activities were completed according to the *2018 Remedial Action Review Work Plan* (U.S. Army Corps of Engineers [USACE] 2018). Activities included surveying the extent of water bodies at Site 28, measuring extent and thickness of sediment in the selected waterbodies, and collecting sediment samples.

All analytical results were compared to site-specific cleanup levels (SSCLs) for sediment established in the 2009 Decision Document (DD) (USACE 2009).

The primary conclusions of the 2018 Site 28 field activities and analytical results include:

- A natural stilling area was found to be present between Area 9 and Area 10. The area appeared to be entirely composed of vegetative mat which dispersed flow channels observed in Area 10.
- A total of 281 cubic yards (cy) of sediment were estimated to be present at Site 28 water bodies in 2018. Based on a lines-of-evidence approach, re-accumulation of sediment is possible in certain areas of Site 28. However, estimating the amount of sediment which has re-accumulated is not possible currently due to procedural differences in the 2012 and 2018 mapping efforts and the 2013 post-removal estimating techniques.
- Target analytes exceeding the multi-site DD-based SSCLs in sediment samples were found in sediment samples across Areas 2 through 9 in 2018. Target analytes did not exceed the multi-site DD-specified SSCLs at the confluence with the Suqitughneq River (Suqi River) within Area 11 or immediately south of the Suqi River in Area 10 in 2018. Diesel-range organics (DRO), residual-range organics (RRO), 2-methylnaphthalene, and naphthalene are the most prevalent analytes exceeding SSCLs. Applying the analytical results to the estimated sediment volumes, 196 of the 281 cy of sediment contains compounds at levels above their respective SSCLs. Table F-ES-1 presents the analytes that exceeded SSCLs, the range of concentrations detected, the location of the maximum concentration, and number of locations exceeding SSCLs.
- Other polycyclic aromatic hydrocarbons were reported in the Site 28 sediment samples that do not have an SSCL, with 1-methylnaphthalene being the most frequently reported of these analytes in 2018.

- Sediment contamination greater than SSCLs were not found in Removal Areas 10 and 11 near the Suqi River in 2018.
- PCBs, reported as Aroclors, were not found at Site 28 above the SSCL in 2018.
- Naturally occurring organic material in sediment is contributing to the 2018 reported levels of DRO and RRO and causing a high bias. This observation is consistent with those reported in historical investigations at Site 28 and other Northeast Cape sites. Silica gel treatment is only partially effective in reducing this high bias.

Table F-ES-1
2018 Exceedances of SSCLs for Sediment at Site 28

Test Method	Analyte	Sediment SSCL (mg/kg)[1]	2018 Concentration Range of Results (mg/kg)	Location ID of Maximum Concentration	Number of Locations with Result Greater than Multi-Site DD-based SSCL
AK102	DRO	3,500	214 **– 105,000**	S28-15	36 of 54
AK102[2]	DRO – Silica Gel	3,500	102 – **94,100**	S28-28	32 of 54
AK103	RRO	3,500	844 – **127,000**	S28-42	35 of 54
AK103[2]	RRO – Silica Gel	3,500	296 – **106,000**	S28-42	18 of 54
SW8270D	2-Methylnaphthalene	0.6	ND - **529**	S28-49	35 of 54
	Acenaphthene	0.5	ND - **16 J**	S28-28	22 of 54
	Fluoranthene	2	ND - **3.42**	S28-52	1 of 54
	Fluorene	0.8	ND - **25.3**	S28-28	25 of 54
	Naphthalene	1.7	ND - **230**	S28-54	31 of 54
	Phenanthrene	4.8	ND - **13.3 J**	S28-53	9 of 54
	Total LPAH	7.8	ND - **266.65**	S28-54	25 of 54

Notes:
[1] Sediment SSCL as defined in the 2009 multi-site DD (USACE 2009).
[2] Performed using the silica gel cleanup method.
Bold = exceeded SSCL
J - The analyte was positively identified; however, the associated result was less than the limit of quantitation but greater than or equal to the detection limit.
For definitions, refer to the Acronyms and Abbreviations section.

1.0 INTRODUCTION

This report presents field activities and analytical results and presents conclusions from the sample collection effort at Site 28 Drainage Basin (Site 28) conducted in August 2018 at the Northeast Cape (NEC) Formerly Used Defense Site (FUDS) on St. Lawrence Island, Alaska (Alaska Department of Environmental Conservation [ADEC] File No. 475.38.013). Environmental Compliance Consultants, Inc. (ECC) and Jacobs Engineering Group Inc. (Jacobs) prepared the work plan, performed the fieldwork, and prepared this report for the U.S. Army Corps of Engineers (USACE) under Hazardous, Toxic, and Radiological Waste (HTRW) Contract No. W911KB-17-D-0017, Task Order No. W911KB18F0020. Field activities were performed in accordance with the *2018 Remedial Action Review Work Plan* (USACE 2018).

1.1 PROJECT GOALS AND OBJECTIVES

Project goals specific to the investigation at Site 28 were defined in the work plan (USACE 2018). The goal of the 2018 field investigation at Site 28 was to evaluate the post-removal quantity of sediment and compare analytical results to the previous 2012 sediment mapping effort described in the *Site 28 Technical Memorandum Addendum* (USACE 2013a). The 2018 objectives included the following:

- Measure (survey) the extent of water bodies;
- Measure extent and thickness of sediment within select waterbodies; and
- Collect sediment samples at Site 28 locations specified in the work plan and submit them for planned test procedures.

1.2 REPORT ORGANIZATION

This report is organized as follows:

- Section 1.0 introduces the project, describes the project goals, and outlines the report organization.
- Section 2.0 provides a physical description of the site and summarizes the site history.

- Section 3.0 defines project field investigation activities to include: deviations, project mobilization, land survey, water body mapping, sediment mapping, sampling activities, waste management, and demobilization activities.
- Section 4.0 presents investigation results and discussion.
- Section 5.0 presents conclusions and recommendations derived from the field investigation and analytical data review.
- Section 6.0 lists the references cited in this document.

In addition to the main report, the following attachments contain further information:

- Attachment F-1 provides figures of the site to include sediment transects, sampling locations, and sediment cross sections.
- Attachment F-2 provides the data quality assessment (DQA).
- Attachment F-3 provides copies of the field documentation.
- Attachment F-4 provides a photograph log for the 2018 activities described in this report.
- Attachment F-5 provides Standard Operating Procedure (SOP) NEC-SOP-02, *Site 28 Sediment Mapping and Sample Collection*.

2.0 SITE DESCRIPTION AND HISTORY

The following sections describe the location of NEC, information about the physical and ecological setting, site history, and Site 28 physical setting and history. The information in this section is compiled from previous historical NEC documents and includes citations where needed.

2.1 SITE DESCRIPTION

St. Lawrence Island, Alaska, is in the western portion of the Bering Sea, approximately 135 air miles southwest of Nome. The NEC FUDS is 9 miles west of the northeastern cape of the island at 63°19' N, 168°58' W. The NEC FUDS property originally encompassed approximately 4,800 acres (7.5 square miles) bordered by Kitnagak Bay to the northeast, Kangighsak Point to the northwest, and the Kinipaghulghat Mountains to the south (USACE 2015a).

NEC FUDS consists mainly of rolling tundra rising from the Bering Sea toward the base of the Kinipaghulghat Mountains. The Kinipaghulghat Mountains rise abruptly to an elevation of approximately 1,800 feet above sea level roughly 3 miles from the coastline. The NEC FUDS is not connected to other permanent communities on the island by road and is only accessible by air, water, or utility task vehicle trails. The closest community is the Native Village of Savoonga, located approximately 60 miles to the northwest (Figure F-1 [Attachment F-1]).

2.1.1 Climate

St. Lawrence Island has a cool, moist, subarctic maritime climate, with some continental influences during winter when much of the Bering Sea is covered with pack ice. Winds and fog are common, and precipitation occurs approximately 300 days per year as light rain, mist, or snow. Annual snowfall is approximately 80 inches per year. Total annual precipitation is about 16 inches per year, and more than half falls as light rain between June and September. Summer temperatures average between 34 and 48 degrees Fahrenheit (°F), with a record high of 65°F. Winter temperatures range from -2 to 10°F, with an extreme low of -30°F. Freeze-up on the island normally occurs in October or November, and breakup normally occurs in June (USACE 2015).

2.1.2 Geology

St. Lawrence Island consists of isolated bedrock highlands of igneous, metamorphic, and older sedimentary rocks surrounded by unconsolidated alluvium overlying a relatively shallow erosional bedrock surface. The main area of operation, known as the Main Operations Complex (MOC) is located at approximately 100 feet in elevation. In the area of the MOC, shallow unconsolidated surficial materials overlie quartz monzonitic rocks of the Kinipaghulghat Pluton (Patton and Csejtey 1980). The pluton forms the mountainous area south of the NEC FUDS, which includes Kangukhsam Mountain. The Suqitughneq River (Suqi River) drainage in the Kinipaghulghat Pluton has created an erosional valley and alluvial fan of unconsolidated sediments. The NEC FUDS is located on this alluvial fan, which protrudes north from the mountain front toward the Bering Sea. Granitic bedrock materials are exposed at the coast north of the site at Kitnagak Bay, which suggests that the quartz monzonitic bedrock underlies the unconsolidated materials at a relatively shallow depth on a wave-cut erosional platform.

In general, the native soil stratigraphy at NEC is characterized by silts near the surface, overlying more sand-dominated soil at depth. The silt contains varying quantities of clay/sand/gravel and varies from 0 to 10 feet in thickness. The silt is dark brown to dark green, and sometimes exhibits a mottled texture. In some areas, the silt exhibits an aqua green or blue color. Dark brown silts are observed in outcrops. The sand at depth contains varying degrees of silt/gravel/cobbles that ranges from 2 feet to greater than 20 feet in thickness. These deeper, coarse-grained materials are generally unsorted and are likely to be of glaciofluvial origin. The depth to bedrock at the NEC FUDS is unknown (USACE 2009).

2.2 SITE HISTORY

NEC FUDS was constructed as an Aircraft Control and Warning Station (AC&WS) during 1950 and 1951 to provide radar coverage and surveillance for the Alaskan Air Command and later for the North American Air Defense Command, as part of the Alaska Early Warning

System. The site was activated in 1952 and a White Alice Communications System (WACS) station was added to the site in 1954. The AC&WS and WACS operations were supported by 212 personnel and were terminated in 1969 and 1972, respectively. The majority of military personnel were removed from the site by the end of 1969 (USACE 2015a).

The NEC FUDS included areas for housing site personnel, power plant facilities, fuel storage tanks, distribution lines, maintenance shops, wastewater treatment facilities, and landfills. The buildings and majority of furnishings and equipment related to the AC&WS were initially abandoned in place due to the high cost of off-island transport (USACE 2015a).

In 1971, the villages of Gambell and Savoonga opted out of the Alaska Native Claims Settlement Act, which allowed them to claim title to 1.136 million acres of land in the former St. Lawrence Island Reindeer Reserve, established in 1903. The Gambell Native Corporation and Savoonga Native Corporation (now known as Sivuqaq, Inc. and Kukulget, Inc., respectively) received titles to all of St. Lawrence Island (except U.S. Surveys 3728, 4235, 4237, 4340, and 4369) by Interim Conveyance No. 203, dated 21 June 1979 and finalized 2 December 1980. In 1982, the U.S. Navy obtained approximately 26 acres of land containing the former WACS. The land transfer was later deemed invalid and property ownership was reverted to Sivuqaq, Inc. and Kukulget, Inc.

Demolition of the buildings and most other structures was completed under multiple USACE contracts. The runway, improved gravel roads, and concrete slabs of some of the former structures remain intact. Four remedial investigations were conducted at 34 individual sites grouped by environmental concerns between 1994 and 2004 (USACE 2015a). Following completion of the 2007 feasibility study (USACE 2007) and the 2009 multi-site Decision Document (DD) (USACE 2009), remedial actions occurred through 2014 (USACE 2015).

2.2.1 Site 28

Site 28 is located north of the MOC and south of the Suqi River (Figure F-2). The site has been affected by fuel releases from the bulk fuel storage tanks (Site 11) and other spills and releases discussed in the multi-site DD (USACE 2009). Site 28 contains wetlands, rolling tundra, and ponds, and surface water at Site 28 drains north into the Suqi River.

Surface water at Site 28 originates from surface water runoff (overland flow) from the MOC and groundwater seeps. Three distinct drainage areas near the MOC are present at the head of the drainage basin (south end), which contribute flow to Site 28 (USACE 2009). The eastern headwater drainage flows from the vegetated area adjacent to Sites 10 and 11, which are located north of the former fuel tanks; the middle headwater drainage originates from a small swale where a culvert directed flow from Site 27, and the western headwater drainage is located downgradient of Site 13 (USACE 2013a). The western drainage originated from a manhole and a small concrete supporting structure just north of the perimeter access road, which emptied into an artificially created swale. The manhole likely served as the drain leading from Building 110 (Heat and Electrical Power Building) at the MOC (USACE 2009).

The three drainage areas merge to form two flowing channels of water further downgradient (north) and eventually merge into one flowing channel. There are two distinct groundwater seeps at the head of the Site 28 drainage directly north of the gravel pad. Overland flow can contribute significant amounts of water to the basin during rainfall events (USACE 2013a). Sediment, soil, surface water, and shallow groundwater samples have been collected and analyzed beginning in 1994.

Site 28 Historical Contamination

Fuel-contaminated sediment was observed in each of the three drainages at the head of the drainage basin near the MOC, and they produced sheen when disturbed (USACE 2009). The primary contaminants of concern (COCs) in sediment at the time of the multi-site DD were diesel-range organics (DRO), residual-range organics (RRO), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), chromium, lead, and zinc (USACE 2009).

As summarized by the multi-site DD (USACE 2009), surface water samples were collected from the drainage basin in 1994, 1996, and 2001. Concentrations of DRO, total recoverable petroleum hydrocarbons, PCBs, and lead were elevated in 1994 (USACE 2009). In 2001, DRO was detected at concentrations ranging from 0.39 to 2.3 milligrams per liter. PCBs and RRO were nondetect. The most heavily contaminated surface waters of the drainage basin were found at the terminus of the former culverts near the southern portion of Site 28 at the head of the western and middle drainages.

Groundwater samples collected in 1994 indicated the potential for DRO and lead contamination, but subsequent sampling in 2001 demonstrated that concentrations were below cleanup levels. No groundwater COCs were retained in the multi-site DD for Site 28 (USACE 2009).

Multi-Site DD-Selected Remedy for Site 28

The selected remedy for Site 28 in the multi-site DD consisted of three components:

1. Excavation and removal of petroleum-, metals- and PCB-contaminated sediment, including the removal of near-surface sediments from the narrow channel upgradient of the Suqi River.
2. Construction of a sedimentation pond or other appropriate controls. The ends of the culverts would also be cleaned out and removed or plugged to prevent direct outflows of upgradient residual sources of contamination.
3. Completion of Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Reviews (USACE 2009).

An informational LUC, in accordance with UECA, describing residual POL-related contaminants in sediment within the Site 28 drainage basin is recommended to prohibit disturbance of Site 28 sediment. LUCs with regard to soil and groundwater POL-related contamination at the southern boundary of Site 28 and within the previously defined "UVOST plumes" are also recommended, however, these will be included within the Environmental Covenant for the MOC.

Site 28 Remedy Implementation

In 2010, approximately 95 feet of culvert were removed, and one culvert was capped (USACE 2011). The concrete manhole structure in the western headwater drainage was also cleaned and removed. Sludge inside the manhole contained concentrations of DRO up to 68,000 milligrams per kilogram (mg/kg), PCB Aroclor 1254 up to 20 mg/kg, arsenic up to 41 mg/kg, barium up to 820 mg/kg, cadmium up to 18 mg/kg, lead up to 5,000 mg/kg, mercury up to 15 mg/kg, and silver up to 16 mg/kg (USACE 2011). A 12-inch corrugated metal pipe that attached to the manhole and continued upgradient toward the MOC was cut, and 63 feet of the pipe was removed. The open end of the pipe was then filled with bentonite and welded shut. In the middle headwater drainage, another 12-inch corrugated metal pipe measuring 32 feet long was completely removed (USACE 2011).

In 2011, sediment sampling was conducted to further delineate the extent and magnitude of contamination at Site 28 between the southern end of Site 28 and its confluence with the Suqi River (to include areas where contamination was noted in the multi-site DD) (USACE 2009) to gain a better understanding of contaminant distribution throughout the drainage. Sediment results were compared to the site-specific cleanup level (SSCL) specified in the multi-site DD. If sediment criteria were not listed in the multi-site DD for a particular analyte, evaluation criteria were based on the National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables for freshwater sediment at the probable effect level (Buchman 2008). Some of the samples collected in 2011 did not meet the project definition of sediment, so soil cleanup levels were used for screening purposes. Sediment is defined as all continuously submerged loose material and organic material, except that which is actively growing vegetation and is part of the vegetative mat. The results indicated that five additional contaminants in sediment were of potential concern: toluene, ethylbenzene, total xylenes, cadmium, and selenium (USACE 2013a).

In 2012, additional sediment mapping, sampling, and probing were conducted. Streams and ponds in the drainage basin were inspected to define the horizontal boundaries of the sediment accumulation areas and probing was conducted to determine the thickness of the sediment (USACE 2013b). The 2012 sediment probing effort was conducted using a 4-inch diameter hand auger with a T-handle. The probing depths were measured by marking the auger handle at 6-inch intervals. The reference marks were used to calculate the depth at 66 probing locations. Sediment thickness ranged from 0.5 foot to 2 feet throughout Site 28 in 2012. The mapping efforts identified approximately 400 cubic yards (cy) of sediment along the drainage basin (USACE 2013b).

In September 2012, following the mapping, sampling, and probing effort, Phase I of the sediment removal remedy was initiated in three areas. Two removal methods were evaluated for efficacy and implementability: excavation and a combination of a Venturi dredge and geotextile dewatering tube:

- An excavator removed sediment in Removal Areas 1 and 2, just north of the MOC gravel pad. This method allowed excavated sediment to be dewatered in place but was limited to areas with firm ground such as the MOC gravel pad or a road. The excavator removed approximately 5 cy of sediment from Removal Area 1 in the western headwater drainage and 16 cy from Removal Area 2 near the middle headwater drainage. In Removal Area 1, DRO, acenaphthylene, 2-methylnaphthalene, and naphthalene exceeded the multi-site DD-based SSCLs in both confirmation samples. In Removal Area 2, the same analytes plus RRO, acenaphthene, fluorene, and phenanthrene exceeded the multi-site DD-based SSCLs.
- The Venturi dredge was used in Removal Area 4 located in the main channel of the drainage. This method was used where the excavator could not travel but required large volumes of water to remove the sediment. Following removal, the sediment was separated from the water and the water was confirmed to meet discharge requirements presented in the State of Alaska Wastewater General Permit 2009DB0004 before release. The dredge removed approximately 18 cy of sediment from Removal Area 4 in 2012. No confirmation samples were collected from Removal Area 4. Approximately 135 cy of contaminated sediment remained at Removal Area 4 at the conclusion of 2012 field season (USACE 2013b).

In 2013, sediment removal continued within Removal Areas 3 through 11 (USACE 2015a); for volume of sediment removed in 2013, refer to Table F-4-2 in Section 4.2.1:

- At Removal Areas 5, 6, and 7, vegetative material routinely clogged the in-line pumps. Sediment and vegetative material were removed by hand instead of using the dredge. Personnel donned dry suits, entered the shallow ponds, and rolled/scooped up the sediment/decaying plant material in large pieces. Material was placed at the edge of each pond and an excavator was used to place the material in bulk bags for disposal (USACE 2015a).
- Removal Area 8 was a small pond in 2012; however, it was dry in 2013. Material from this area was removed by excavator and placed directly into a bulk bag for disposal (USACE 2015a).
- Sediment was removed from Removal Areas 3, 4, 7, 9, 10, and 11 using the Venturi dredge and geotextile dewatering system (USACE 2015a).

- Based on sediment results collected at the conclusion of the 2013 removal action, several analytes previously identified above the multi-site DD SSCLs for Site 28 (including DRO, RRO, acenaphthene, fluorene, 2-methylnaphthalene, naphthalene, phenanthrene, low molecular weight PAHs [LPAHs], arsenic, and chromium) remained at concentrations greater than the multi-site DD SSCLs for Site 28. Analytes exceeding the multi-site DD SSCLs for Site 28 remained within all 11 sediment removal areas. In addition, acenaphthylene, anthracene, and pyrene exceeded NOAA Screening Quick Reference Tables (USACE 2015a).

Other significant parts of the 2013 removal effort included treatment of water produced during sediment removal, control measures, and surface water sampling.

Water and sediment removed using the dredge system was moved to a water processing area west of Site 28. The processing area consisted of two 20,000-gallon-capacity lined containment cells approximately 60 by 30 feet and 1.5 feet deep. The primary containment area consisted of a geotextile dewatering tube for sediment dewatering designed to contain the sediment while allowing water to pass through the pore spaces. The pore size ranged from 59 to 350 microns. Water was then treated through a scrubber, a natural cellulose fiber that selectively absorbs hydrocarbons inside high-density polyethylene containers with an inlet at the top. Water then flowed to the second set of containment cells to await analytical results below total aromatic hydrocarbons (TAH) and total aqueous hydrocarbons (TAqH) criteria identified in the State of Alaska Wastewater General Permit 2009DB0004-0216 prior to discharge. In 2012, samples collected from the treated water did not meet discharge criteria for TAH and TAqH (USACE 2013b). No water was discharged. Excavated sediment and treated water from Removal Area 4 remained within the lined containments over the winter of 2012/2013.

Following the 2012 field activities, changes to the sediment/water treatment system were made in order to implement this remedy effectively. In 2013, a SPINPRO HydroMizer polymer feed system with injection pump was introduced into the piping line prior to sediment capture in the geotextile tube to facilitate coagulation and settling (USACE 2013b). The water filtration system was modified to consist of two sock filters (water first flowed through a 25-micron-filter and then through a 5-micron-filter), followed by a scrubber containing hydrocarbon-absorbent cellulose fibers (USACE 2015a). After the first batch of water was processed in 2013, analytical results indicated water remained above TAqH criteria (USACE 2015a). A granular-activated carbon system was added as the last treatment step and the hydrocarbon scrubber was eliminated. Analytical results from the first batch of water processed using the modified treatment system were below discharge criteria presented in the State of Alaska Wastewater General Permit 2009DB0004-0216 and 18 Alaska Administrative Code 70. ADEC and USACE agreed that pre-treated water containment samples were no longer needed and treated water was discharged to the ground (USACE 2015a).

Two methods were used to control and minimize downstream sediment migration during removal activities: silt fencing and an in-stream sediment trap. Silt fencing was used where there was no direct flow to the main channel of the Suqi River and was placed on the north side of the ponded area. The sediment trap was placed downstream of sediment Removal Area 4. The trap was a steel box, 8 feet wide by 4 feet deep, with the rear (downstream) height extending approximately 6 feet high and tapering to a front section approximately 4 feet high. Rectangular slots allowed water to flow down and through the box. Unrolled jute mats were placed inside, upstream, and downstream of the trap (USACE 2013b).

Surface water samples were collected at three locations before, during, and after sediment removal and at one location downstream of the sediment trap. Samples were analyzed for DRO, RRO, PAHs, PCBs, benzene, toluene, ethylbenzene, xylenes, and total and dissolved metals (Resource Conservation and Recovery Act metals plus nickel, vanadium, and zinc). All surface water samples were below applicable surface water criteria and no sheen was observed (USACE 2015a).

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3.0 FIELD INVESTIGATION ACTIVITIES

Site 28 sediment mapping and sampling at the NEC FUDS Site 28 took place from 4 through 9 August 2018 and were one component of a larger NEC field effort which occurred from 31 July through 10 August 2018. Other field activities un-related to the Site 28 sediment effort will be described in other reports. This section discusses 2018 field activities at Site 28, which include mobilization and demobilization, surveying, waterbody mapping, sediment thickness measurements, sediment sampling, and managing waste.

3.1 WORK PLAN DEVIATIONS

Deviations from the 2018 work plan (USACE 2018) occurred during the execution of fieldwork. None of the deviations significantly affected the data usability. The work plan deviations were as follows:

- To meet the DQO for sediment sample collection at Site 28, two samples were collected as composite samples rather than grab samples. The volume of sediment present within the ponded area at surveyed locations 18NEC-S28-SD-36 and 18NEC-S28-SD-37 was limited; most of the substrate either consisted of rock or vegetative mat. The collection of two composite samples rather than grab samples did not affect data quality (Attachment F-2); however, results from the composite samples are representative of a larger spatial extent than the grab samples that were collected from other locations at Site 28.
- Some obstructions were present, which inhibited measuring and recording the lateral and vertical extent of sediment. This occurred at profile locations P15 and P17 (refer to the sediment transect summary in Attachment F-3). The obstructions are presumed to be debris, as discussed in Section 4.3.8; however, the obstructions were considered sediment for purposes of drawing sediment transect lines and no sediment depth was recorded at the two locations where obstructions were encountered.
- Seven sampling locations (locations S28-04, -11, -25, -38, -42, -43, and -51) were relocated in consultation with the USACE because the area did not contain sediment as defined by the project. The seven original locations were either vegetative mat or on dry land in 2018 and both from areas previously sampled and with prior removal actions. For each of the seven relocated sample locations the distance between the original sample location and relocated sample location was measured, and a compass reading was recorded from the original sample location to the relocated sample location.

- During waterbody mapping, the extent of the vegetative mat was not surveyed by professional surveyors as indicated in the 2018 work plan (USACE 2018). Instead, the field team collected measurements at each of the surveyed transect locations using a tape measure and projected the extent on the figures in Attachment F-1. This did not affect the DQO to map the extent of the vegetative mat, because the measurements were still collected.

3.2 MOBILIZATION AND DEMOBILIZATION

Mobilization and demobilization occurred during July and August 2018, respectively. Jacobs personnel traveled from Anchorage to Nome via commercial airline on 31 July 2018 and then to St. Lawrence Island via Bering Air charter. ECC and USACE traveled to St. Lawrence Island via Security Aviation charter on 31 July 2018. Supplies for the camp were barged to St. Lawrence Island prior to the commencement of fieldwork. PRL Logistics, Inc. provided services for a remote camp at NEC (Photograph F-3-1). Field gear was transported to NEC on 31 July 2018 via Bering Air charter. Travel at NEC was achieved using utility task vehicles. The USACE project manager (PM) and ADEC PM arrived by Security Aviation charter on 6 August 2018. The USACE PM departed the same day on a Security Aviation charter while the ADEC PM departed by Bering Air charter on 8 August. All personnel demobilized from NEC via Bering Air charter or Security Aviation charter by 10 August 2018. Personnel demobilized by Bering Air traveled to Nome and returned to Anchorage via commercial airline. All other personnel were demobilized by Security Aviation directly to Anchorage. Camp crew remained on site and deconstructed the facilities.

The remote camp was dismantled and prepared for the barge. The barge departed from NEC on 14 September 2018. A site walk was conducted by ECC and a PRL Logistics, Inc. representative on 14 September 2018. While conducting the site walk, a sinkhole was discovered along Airport Access Road (Photograph F-3-2). Some wood debris remained on the camp site and minor garbage was removed and disposed of in Nome. The water discharge area for the camp was inspected and there were no signs of damage from the associated camp activity.

Photograph F-3-1: Overview of camp set-up. View facing northeast.

Photograph F-3-2: Sinkhole discovered during demobilization site walk along Airport Access Road. View facing southwest.

The key project personnel that participated in the field effort along with responsibilities are provided in Table F-3-1.

Table F-3-1
Key Field Personnel

Title	Organizational Affiliation	Name	Responsibilities
Superintendent	Prime Contractor (ECC)	Stanley Seegars	Implements, oversees, and coordinates project activities and camp activities. Supports PM as needed.
Contractor QC System Manager	Subcontractor (Jacobs)	Kevin Maher Angela DiBerardino	Conducts field inspections and ensures field activities are in compliance with planning documents and approved contract.
Site Safety and Health Officer	Prime Contractor (ECC)	Stanley Seegars	Developed, implemented, and oversaw all safety and health-related project aspects.
Field Sampler	Prime Contractor (ECC) Subcontractor (Jacobs)	Admon Abuamsha Jessica Bay Haley Huff Peter Mamrol	Collected field screening and analytical samples and managed and shipped analytical samples.
Sample Expediter	Prime Contractor (ECC)	Dan Mcgauhey	Expedited coolers with analytical samples from Bering Air to Alaska Airlines GoldStreak in Nome, Alaska.
Project Chemist	Subcontractor (Jacobs)	Nathaniel Gingery	Coordinated with the laboratory, reviewed data, and ensured data quality objectives were met.
Analytical Laboratory PM	Laboratory Subcontractor Agriculture & Priority Pollutants Laboratories, Inc. SGS Environmental Services, Inc.	Greg Salata Justin Nelson	Analyzed the samples in accordance with contract and QC requirements.
Emergency Medical Professional	Medical Subcontractor (Beacon)	Zackery Bauder	Provided medical services in accordance with contract.

Note:
For definitions, refer to the Acronyms and Abbreviations section.

3.3 SURVEYING

NEC survey activities occurred from 1 through 4 August 2018. A survey was performed to identify the extent of water bodies, locate proposed sampling locations, and record positions of other features as needed. Surveying was conducted by Lounsbury & Associates, a professional land surveyor (Photograph F-3-3). Survey data tables relevant to sampling locations and compliant with the *Manual for Electronic Deliverables* (USACE 2017a) are included in Attachment F-3.

Lounsbury & Associates used the National Geodetic Survey Online Positioning User Service to process all static baselines and obtain the geodetic positions for project control. Values were obtained by averaging multiple solutions on each point, all of which were based upon at least two hours of static global positioning system observation time. Observations were obtained over multiple days and at different times each day to incorporate different satellite geometry. The integrity of the xyz positions on each control point were confirmed through multiple real-time kinetic check-shots on each point.

Photograph F-3-3: Surveying of a water body at Site 28. View facing east.

3.4 WATER BODY MAPPING

The surface water bodies measured in 2018 at Site 28 extended from the border of the MOC to the confluence with the Suqi River. The lateral and vertical extent of the surface water bodies were surveyed if they appeared greater than 30 feet in diameter. The surface water bodies at

Site 28 are presented on Figure F-3 (Attachment F-1) along with the surface water elevation contours.

Real-time kinetic global positioning system was used to collect survey positions around the edge of major water bodies at Site 28. The depth of the water body was collected during the sediment mapping activities, as described in Section 3.5, and are displayed on the cross sections presented in Attachment F-1 for each transect profile. All recorded water body depths are provided in Attachment F-3.

3.5 SEDIMENT MAPPING

Site 28 sediment mapping activities occurred from 4 through 6 August 2018. Submerged areas were characterized as sediment or vegetative mat within the surveyed water bodies. For this characterization, sediment was defined as all continuously submerged loose material and organic material, except that which is actively growing vegetation as part of the vegetative mat. If no sediment was identified (e.g., only vegetative mat present), the lack of sediment was documented, and no further evaluation occurred. When sediment was identified, the vertical extent of sediment was measured in accordance with Jacobs SOP NEC-SOP-02. NEC-SOP-02 as presented in the 2018 work plan (USACE 2018). Suggested changes to the field SOP were identified after the field effort for future activities at the request of the USACE. The revised SOP is included as Attachment F-5.

Some obstructions were present, which inhibited measuring and recording the lateral and vertical extent of sediment. This occurred at profile locations P15 and P17 (refer to Attachment F-3). The obstructions are presumed to be debris as discussed in Section 4.3.8.

Two types of water bodies contained sediment at Site 28: discrete ponds and elongated interconnected water features. Discrete ponds did not directly interconnect to other surface water features at the time of the sampling event. Elongated, interconnected, and flowing surface water features made up most of the surface water features in the drainage. These features were generally oriented on a north/south axis and flowing water ran in a north direction toward the Suqi River.

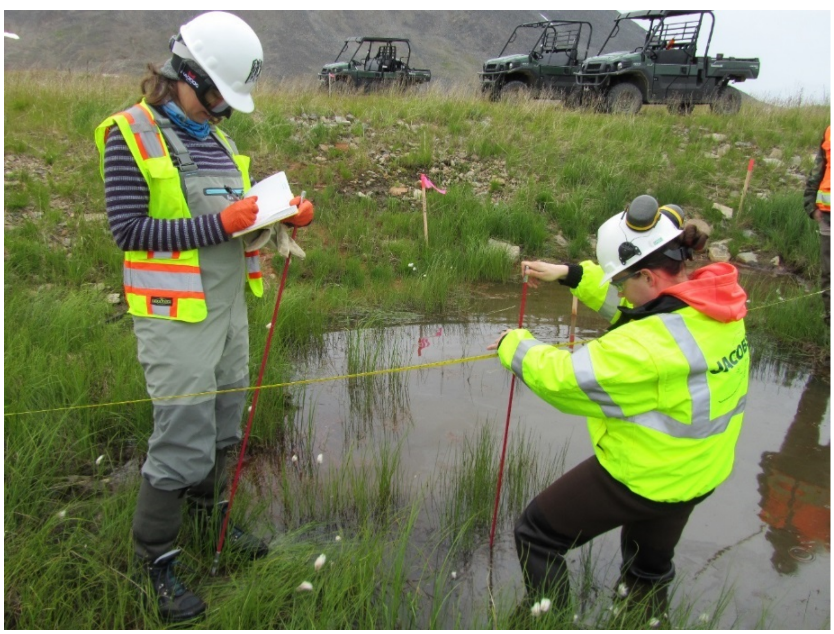
For discrete water bodies containing sediment, north/south and east/west transects were established using a compass with a declination set to 8 degrees east. Transects crossed approximately at the center of the water body to measure thickness (Photograph F-3-4) according to the work plan.

Photograph F-3-4: Transects at a discrete water body at Site 28. View facing southwest.

For linear water bodies that contained sediment, an east/west profile transect was established every 30 feet along across the north/south axis (Photograph F-3-5). The areas where sediment was present in the linear water bodies occurred in narrow sections; therefore, thickness measurements occurred by evenly-spacing three or more measurements at each transect.

Photograph F-3-5: Surveyed linear water body at Site 28. View facing south.

A graduated hand probe was used to measure sediment thickness to the nearest 0.1 foot starting from the edge of the sediment area and at intervals not exceeding 10 feet (Photograph F-3-6).



Photograph F-3-6: Collecting sediment thickness measurements using a graduated hand probe at a discrete water body at Site 28. View facing southwest.

Multiple measurements were collected at each location using the graduated probe (e.g., sediment thickness, water depth, and depth at which resistance of the subsurface underlying sediment was noted) and were recorded in the field log book presented in Attachment F-3. Sediment thickness measurements are the basis of the transect profile cross sections included in Attachment F-1. Figures F-4a through F-4i present the transects and the sediment measurement from each probing location.

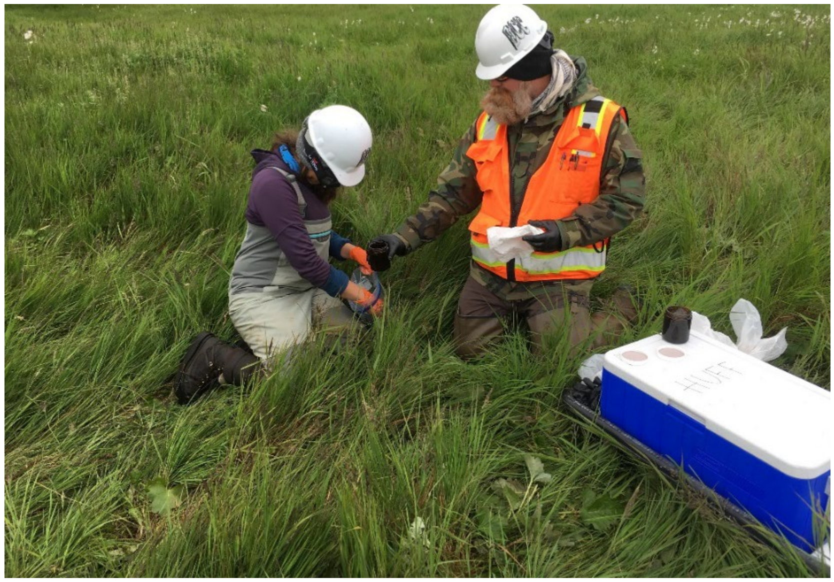
3.6 SAMPLING ACTIVITIES

Site 28 sediment sampling activities occurred from 7 through 9 August 2018. Field documentation, including logbooks and sediment boring logs from each sample location, are included in Attachment F-3. All samples were collected, labeled, stored, and shipped in accordance with Jacobs SOPs JE-SOP-2000, JE-SOP-5300, JE-SOP-7000, and NEC-SOP-2 provided in the 2018 work plan (USACE 2018). Samples were thermally preserved in the field using gel ice immediately after collection and then stored in a temperature regulated refrigerator maintained at 0 to 6 degrees Celsius until offsite shipment to the laboratory. All samples were shipped via Bering Air from NEC to Nome. In Nome the coolers were transferred to Alaska Airlines GoldStreak priority cargo for shipment to SGS Environmental Services, Inc. of Anchorage, Alaska. The sample summary is provided in Attachment F-2.

Reusable sampling tools (hand auger) were decontaminated before use with Alconox and deionized water rinses (Photograph F-3-7) and one-time-use equipment was disposed of after use. Personal protective equipment, such as waders and gloves, were decontaminated after exiting water bodies that had fuel sheen or odor. Decontamination water was collected and shipped offsite (refer to Section 3.7 and Attachment F-3).

Photograph F-3-7: Decontaminating sample collection equipment during sediment sampling at Site 28. View facing west.

A total of 54 sediment samples were collected using a hand auger, sampling spoons, and gloved hands (Photograph F-3-8). A total of 44 samples were collected from surveyed locations based on previous sample locations from the 2012 sediment mapping effort (USACE 2013a). Seven additional locations (locations S28-04, -11, -25, -38, -42, -43, and -51) were originally staked out in either vegetative mat or on dry land (Photograph F-3-9). These seven locations were relocated from previously sampled locations with prior removal actions to suitable sample locations in consultation with the USACE because the original location did not contain sediment in 2018 as defined by the project. The new locations were recorded using a tape measure and compass (Photographs F-3-9 and F-3-10). Three samples of opportunity were collected from water bodies that contained a fuel odor or sheen (locations S28-52, -53, and -54). Sediment samples were collected from depths up to 2 feet deep in the sediment layer or shallower if refusal was met with the hand auger. Because limited thickness of a sediment layer was present at locations S28-SD-36 and S28-SD-37, composite sediment samples were collected by gathering small amounts of sediment from within one foot of each of the location's survey lathe. Sample classification, sample ID, sample depth, and other observations were recorded in field documentation (Attachment F-3).



Photograph F-3-8: Collecting a sediment sample at Site 28. View facing down.

Photograph F-3-9: Vegetative mat at surveyed and staked location S28-04 at Site 28; sample location was relocated. View facing south.

Photograph F-3-10: Measuring distance to relocated sample location S28-04 from survey lathe at Site 28. View facing west.

Photograph F-3-11: Compass reading to relocated sample location S28-04 from survey lathe at Site 28. View facing west.

Sediment samples collected from Site 28 were analyzed for DRO by method AK102 (with and without silica gel cleanup), RRO by method AK103 (with and without silica gel cleanup), total organic carbon by method SW9060A, PAHs by method SW8270 selective-ion monitoring

(SIM), PCBs by method SW8082A, and select metals (arsenic, chromium, lead, selenium, and zinc) by method SW6020A.

3.7 WASTE MANAGEMENT

Investigation-derived waste was transported and disposed of in accordance with all applicable local, state, and federal regulations. Investigation-derived waste, including used nitrile gloves, sampling spoons, and general refuse were incinerated at the camp site. Extra sediment not utilized for sample collection was returned to the location in which it was collected. Wastewater generated during decontamination of equipment and personal protective equipment was collected in a 5-gallon bucket on site. Liquid waste was transferred from Site 28 to a waste collection area near the main camp and combined with wastewater from other NEC activities into 55-gallon drums. A total of four 55-gallon drums was transported offsite via barge at the end of the field effort. Table F-3-2 identifies the waste water quantities generated at Site 28. Waste disposal documentation is included in Attachment F-3.

Table F-3-2
Site 28 Project-Specific Waste Quantities

Waste Type	Generation Date	Approximate Disposal Quantity[1]
Nonhazardous decontamination wastewater	6 August 2018	2 gallons
	7 August 2018	2 gallons
	8 August 2018	3 gallons

Note:
[1] Site 28 wastewater was combined with wastewater from MOC field activities.

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4.0 INVESTIGATION RESULTS AND DISCUSSION

This section summarizes and interprets analytical results and field measurements for the 2018 sampling activities conducted at Site 28 by ECC and Jacobs.

4.1 EXTENT OF WATER BODIES

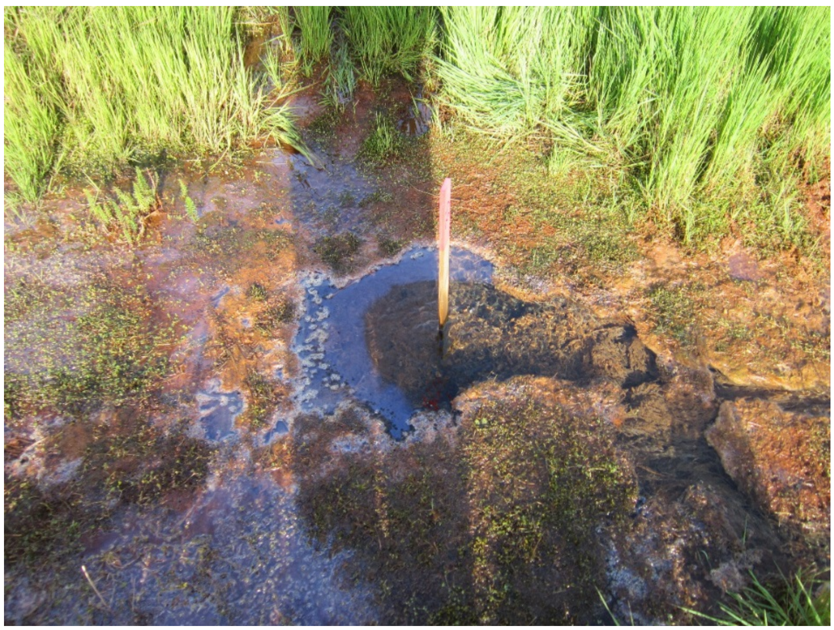
The data generated by the 2018 waterbody mapping effort described in Section 3.4 is presented on Figure F-3. The surface water elevation contours confirm field observations that surface water flow is occurring from the south in a northward direction toward the Suqi River. The extent of surface water in 2018 appeared to be less than the extent of surface water reported in 2012. The type of waterbodies varies by geographical location within Site 28.

Surface water in the southern portion of Site 28, nearest to the MOC, is comprised of discrete ponded water bodies with little apparent connection (observable flow) to other surface water features. These surface water features were most evident in Removal Areas 2, 5, 6, 7, and 8 (Figure F-4). Groundwater seeps emanating from the gravel pad were observed near Removal Area 2.

Water from an upwelling, present at the southern point of Removal Area 3 near sample location S28-35 (Photograph F-4-1), flows north through an elongated feature that is interconnected within Removal Areas 3, 4, and 9 (Photograph F-4-2). Naturally occurring iron staining was present within Removal Areas 3 and 4. The northern portion of Removal Area 9, near sample location S28-13, has an abundant vegetative mat and an apparent decelerated water flow (Photograph F-4-3).

A natural stilling area was observed between Removal Areas 9 and 10. The likely stilling area appears to be created by a slight elevation change which has the effect of spreading out surface flow over a wider area than that observed in Removal Area 9 or Removal Area 10. No primary flow channel was found, and the submerged areas were entirely made up of vegetative mat.

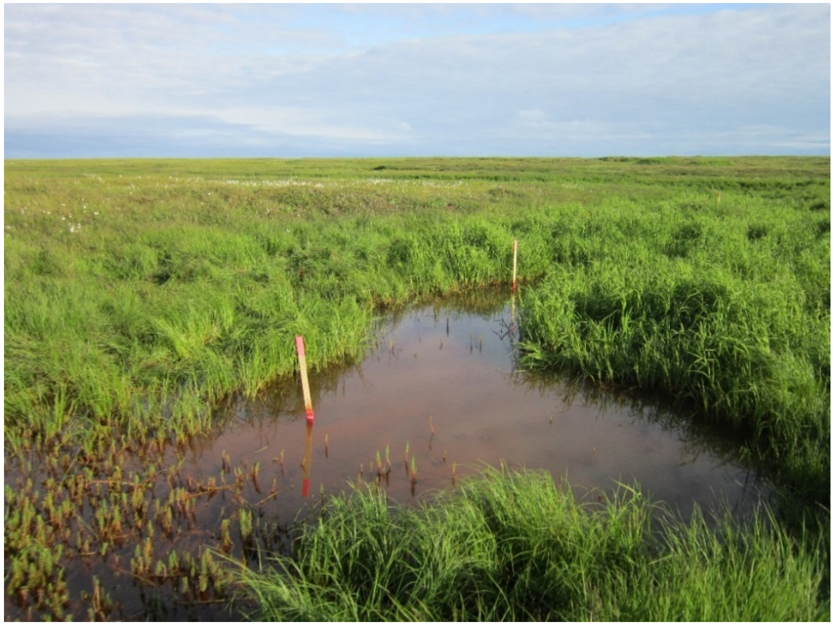
Removal Areas 10 and 11 include ponded areas interconnected by elongated features. This area also contained an abundance of tall grass and a vegetative mat (Photograph F-4-4). A small section of stream is found in the vegetative mat in Removal Area 10 south of sample location S28-12 (Photograph F-4-5). The main Site 28 confluence with the Suqi River occurs at sample location S28-1 (Photograph F-4-6) where a narrow flowing water feature is observed. Flow measurements recorded from the Suqi River in 2016 concluded that both velocity and discharge increased downstream of the Site 28 confluence as a result of in-flow from Site 28 (USACE 2017b).



Photograph F-4-1: Artesian upwelling at S28-35. View facing down.

Photograph F-4-2: Naturally occurring mottled iron present in the flowing stream of Removal Areas 3 and 4. View facing south.

Photograph F-4-3: Sample location S28-13, in Removal Area 9, with an abundant vegetative mat. View facing north.



Photograph F-4-4: Interconnected, ponded water bodies at Removal Areas 10 and 11 with elongated features containing an abundant vegetative mat (S28-5 and S28-6). View facing north.

Photograph F-4-5: Abundant vegetative mat at Removal Area 10 containing a small section of stream upgradient from sample location S28-12. View facing southwest.

Photograph F-4-6: The confluence of Site 28 with the Suqi River at sample location S28-1. View facing east.

4.2 SEDIMENT EXTENT AND THICKNESS

In 2012, a sediment mapping effort to measure sediment extent and thickness occurred at Site 28. Sediment thickness was measured in 66 locations throughout Site 28 and ranged from 0.5 foot to 2 feet. Approximately 400 cy of sediment were estimated to be present within the Site 28 waterbodies based on the 2012 measurements (USACE 2013a).

Site 28 sediment removal actions occurred in 2012 and 2013. An estimated total of 284.6 cy of contaminated sediment were removed in 2012 and 2013; two locations in 2012 (20.6 cy from Removal Areas 1 and 2) and nine locations in 2013 (264 cy from Removal Areas 3 through 11) (USACE 2015a). The volume of sediment removed during these activities was estimated by using AutoCAD to compare the pre- and post-removal square footage of the waterbodies multiplied by the pre-removal estimate of sediment thickness (USACE 2015a). No direct measurements were taken at that time.

In 2018, the extent and thickness of sediment were measured as described in Section 3.5. A total of 51 profile transects were established and 207 locations were measured for sediment thickness across the transects. Sediment thickness in 2018 ranged from 0.1 foot to 3.4 at Site 28 with a total estimated volume of 281 cy across all water bodies. A comparison of the 2012 versus the 2018 estimated volumes of sediment by removal area is presented in Table F-4-1. Figures F-4a through F-4i display the location of 2018 transect, thickness measurement locations, and areas where sediment removal occurred in 2013.

Table F-4-1
Summary of Sediment Quantities Mapped and Removed from Site 28

Area	Estimated Sediment Volume in 2012 (cy)	Volume of Sediment Removed in 2012 and 2013 (cy)	Estimated Sediment Volume in 2018 (cy)	Estimated Volume of Contaminated Sediment in 2018 (cy)
Area 1	1.6	5	Not measured[1]	Not measured[1]
Area 2	7.2	16	3.62	3.62
Area 3	73.9	64.6	26.99	26.99
Area 4	153.3	98.4	122.84	122.84
Area 5 North	9.3	3.1	0.02	0.02
Area 5 South	29.3	6.5	0.02	0
Area 6	6.9	21.3	6.4	6.4
Area 7	6.2	12.3	10.48	3.2
Area 8	0.5	1.8	1.01	0.44
Area 9	63.6	23.4	32.15	32.15
Area 10-1	4.2	3.9	20.9	0
Area 10-2	1.3	0.4		
Area 10-3	7.2	5.1		
Area 10-4	16.9	11.5	43.91	0
Area 10-5	8.5	7.5		
Area 11-1	2.7	2.2	12.91	0
Area 11-2	6.8	2.4		
Totals	399.4	285.4	281.25	195.66

Notes:
[1] Sediment volume was not measured in 2018 because sediment probing was not performed in 2012 (USACE 2013a).
For definitions, refer to the Acronyms and Abbreviations section.

Sediment profile cross sections were created from 2018 measurements for each of the 51 transects to illustrate the sediment distribution encountered. The cross sections also identify the water depth encountered and vegetative mat areas. Bathymetry and sediment thicknesses measurements were linearly interpolated between measurements points across the transect to produce the cross section illustrations in Attachment F-1, numbered P-1 through P-53.

Sediment volume was calculated using the area of sediment within each water body as mapped in plan-view, multiplied by the average thickness of sediment as illustrated on the cross sections. An average sediment thickness was approximated for each sediment transect using the distribution as shown on each cross section in Attachment F-1. Where multiple transects were collected to represent an elongated water body, the sediment thickness averaged from each transect was further weighted to account for differences in the width of the waterbody.

4.2.1 Post-Removal Sediment Quantity Evaluation

Secondary goals for the 2018 sediment data assessment were to determine if significant re-accumulation of sediment occurred at Site 28 after 2013 removal efforts and what volume of contaminated sediment may have remained at Site 28. Although a direct comparison of overall 2012 and 2018 sediment volumes was attempted, it did not prove fruitful. Comparability issues were identified due to the differences in 2018 quantity and type of measurements when compared to the 2012 efforts. More sediment locations were measured in 2018 (207) than in 2012 (66). The reduced measurement density in 2012 resulted in a higher variability in the final estimate. Additionally, no direct measurements of sediment thickness occurred after the removal actions.

The following lines-of-evidence approach provided insight to possible sediment re-accumulation:

- Comparing the volume of sediment estimated in 2012, the volume of sediment removed in 2012 and 2013 and the volume of sediment estimated in 2018 by removal area;
- Comparing the sediment thickness from discrete locations within select removal areas measured during the 2012 and 2018 mapping effort; and
- Using visual field observations, such as surface evidence of sloughing.

As summarized in Table F-4-1, numerical comparisons for 2012, 2013, and 2018 sediment volumes did not compare well on a removal area basis. Therefore, the first line of evidence did not provide any insight other than identifying the need to use the 2018 measurement approach for future efforts at Site 28.

The second line of evidence comparison is summarized in Table F-4-2. There were 11 measurement locations between the 2012 and 2018 study where measurements occurred at similar locations.

Table F-4-2
Comparison of 2012 and 2018 Discrete Thickness Measurements

Removal Area	Water Body Type	2012 Probe Number	2018 Profile Transect Number	2012 Sediment Thickness (feet)	2018 Sediment Thickness (feet)	Comparison Outcome
3	Elongated	28-43	P34	1	0.7	2018 < 2012
3	Elongated	28-44	P35	1.5	2.1	2018 > 2012
3	Elongated	28-51	P40	0.75	0.4	2018 < 2012
4	Elongated	28-33	P25	1.75	2.3	2018 > 2012
4	Elongated	28-37	P27	1.5	0.3	2018 < 2012
5	Ponded	28-62	P49	1	vegetative mat	2018 < 2012
7	Ponded	28-55	P42	1	0.3	2018 < 2012
9	Ponded	28-22	P16	1	1.1	2018 > 2012
10	Ponded	28-10	P8	1.25	2.3	2018 > 2012
11	Ponded	28-1	P1	1	1	2018 = 2012
11	Ponded	28-4	P2	1.75	1.3	2018 < 2012

The evaluation of the second line of evidence showed that seven of the 11 locations had less sediment in 2018 when compared to 2012 and four locations had more sediment. Focusing on some of the discrete pond locations where sediment thickness was lower in 2018 identified that re-accumulation was not suspected. Remaining sediment was identified at 2018 location P42 (Removal Area 7). There was no re-accumulation mechanism to transport sediment to this location; therefore, it was suspected that the remaining sediment may be present due to incomplete removal. Other locations, such as P27 (Removal Area 3) and P34 (Removal Area 4), may be indicative of re-accumulation based on their presence in areas of higher water flow rates created by the narrow channel.

The final line of evidence reviewed were field observations. Some of the ponded water bodies observed in Removal Areas 2 and 8 appeared to have vertical edges. These vertical edges were likely effects of the removal activities and were not natural features. These waterbodies showed evidence of sloughing, which would be a possible re-accumulation mechanism.

Elongated features with flowing water through Removal Areas 3, 4, and 9 had the potential for sediment re-accumulation. The average sediment thickness measurement from upgradient to downgradient should have increased if sediment was reaccumulating through these elongated water body features. However, the average thickness measurements did not indicate this was occurring and no significant areas of sloughing were noted in 2018.

Based on the three lines of evidence reviewed, the procedural differences between 2012 and 2018 mapping efforts do not allow meaningful volume comparisons. Some limited re-accumulation of sediment was likely in areas of Site 28 where supported by flow conditions (Removal Areas 3 and 4). However, re-accumulation did not explain the volume of remaining sediment at Site 28 if it was assumed the 2013 removal action was complete.

4.3 NATURE AND LATERAL EXTENT OF CONTAMINATION AT SITE 28

Analytical results from the 2018 Site 28 sediment sampling effort were compared to the SSCLs for COCs identified in the work plan that originated in the 2009 multi-site DD (USACE 2009). Target analytes exceeding the multi-site DD-based SSCLs for sediment at Site 28 were present at the south portion of the site closest to the MOC and extending downgradient through Removal Area 9. The two removal areas closest to the Suqi River (Removal Areas 10 and 11) did not contain target analytes above the sediment SSCLs. Figures in Attachment F-1 present 2018 sample locations and analytical results for locations exceeding the SSCLs. Table F-4-3 presents a minimum and maximum sample concentration for each analyte, sample location of the maximum detected concentration, and number of locations with exceedances greater than the SSCLs.

Table F-4-3
2018 Exceedances of SSCLs for Sediment at Site 28

Test Method	Analyte	Sediment SSCL (mg/kg)[1]	2018 Concentration Range of Results (mg/kg)	Location of Maximum Concentration		Number of Locations with Result Greater than Multi-Site DD-based SSCL
				Location ID	Removal Area	
SW6020A	Arsenic	93	2.64 - 86.2	S28-34	Area 3	None
	Chromium	270	5.56 - 48.3	S28-42	Area 8	None
	Lead	530	5.41 - 98.9	S28-43	N/A	None
	Zinc	960	19.4 - 280	S28-42	Area 8	None
SW8082A	Total PCB	0.7	ND - 0.482	S28-17	Area 9	None
	Aroclor 1016	0.7	ND	N/A		None
	Aroclor 1221	0.7	ND	N/A		None
	Aroclor 1232	0.7	ND	N/A		None
	Aroclor 1242	0.7	ND	N/A		None
	Aroclor 1248	0.7	ND	N/A		None
	Aroclor 1254	0.7	ND - 0.2	S28-44	Area 6	None
	Aroclor 1260	0.7	ND - 0.482	S28-17	Area 9	None
SW8270D	2-Methylnaphthalene	0.6	ND - **529**	S28-49	Area 2	35 of 54
	Acenaphthene	0.5	ND – **16 J**	S28-28	Area 3	22 of 54
	Benzo(g,h,i)perylene	1.7	ND	N/A		None
	Fluoranthene	2	ND - **3.42**	S28-52	Area 4	1 of 54
	Fluorene	0.8	ND - **25.3**	S28-28	Area 3	25 of 54
	Indeno(1,2,3-cd)pyrene	3.2	ND	N/A		None
	Naphthalene	1.7	ND - **230**	S28-54	Area 2	31 of 54
	Phenanthrene	4.8	ND QN - **13.3 J**	S28-53	Area 7	9 of 54
	Total LPAH	7.8	ND - **266.65**	S28-54	Area 2	25 of 54
	Total HPAH	9.6	ND - 6.931	S28-52	Area 4	None
AK102	DRO	3,500	214 **– 105,000**	S28-15	Area 9	36 of 54
AK102[2]	DRO	3,500	102 – **94,100**	S28-28	Area 3	32 of 54
AK103	RRO	3,500	844 – **127,000**	S28-42	Area 8	35 of 54
AK103[2]	RRO	3,500	296 – **106,000**	S28-42	Area 8	18 of 54

Notes:
[1] Sediment SSCL as defined in the 2009 multi-site DD (USACE 2009).
[2] Performed using the silica gel cleanup method.
Bold = exceeded SSCL
J - The analyte was positively identified; however, the associated result was less than the limit of quantitation but greater than or equal to the detection limit.
QN – Analyte result is considered an estimated value (unknown bias) due to a QC failure.
For definitions, refer to the Acronyms and Abbreviations section.

In 2018, sediment samples exceeded the SSCLs for fuel and fuel-constituents including DRO, RRO, 2-methylnaphthalene, acenaphthene, fluoranthene, fluorene, naphthalene, phenanthrene, and LPAH. DRO and RRO results were elevated due to biogenic interference, discussed in Section 4.3.2. DRO, 2-methylnaphthalene, and naphthalene were the most prevalent analytes exceeding SSCLs. Of the estimated 281 cy of sediment currently present at Site 28, approximately 196 cy of that sediment appears to contain DRO/RRO and/or PAHs above the SSCLs.

4.3.1 Data Quality Assessment

The sample summary table, complete analytical results, and DQA are included in Attachment F-2. Data quality was assessed using the laboratory case narrative, laboratory data deliverables, and ADEC checklists. Reviews of the analytical results and associated quality control (QC) samples were performed by the Jacobs Project Chemist in accordance with the 2018 work plan (USACE 2018).

The 2018 DQA found the overall quality of the project data to be acceptable and no results were rejected. Data quality was evaluated against the following requirements: U.S. Department of Defense (DoD) Quality Systems Manual (DoD 2017); ADEC and U.S. Environmental Protection Agency (EPA) analytical methods (ADEC 2017; EPA 2014); and laboratory limits. Qualifiers were applied to sample results that did not meet the data quality objectives. Qualified results are considered estimated. PCB surrogate recovery was outside of QC goals, for sample 18NEC-S28-SD-42, but data were minimally affected. Field duplicate precision did not meet project goals for multiple analytes and those analytical results were qualified. For data qualifier definitions and details of the data validation, refer to the DQA (Attachment F-2).

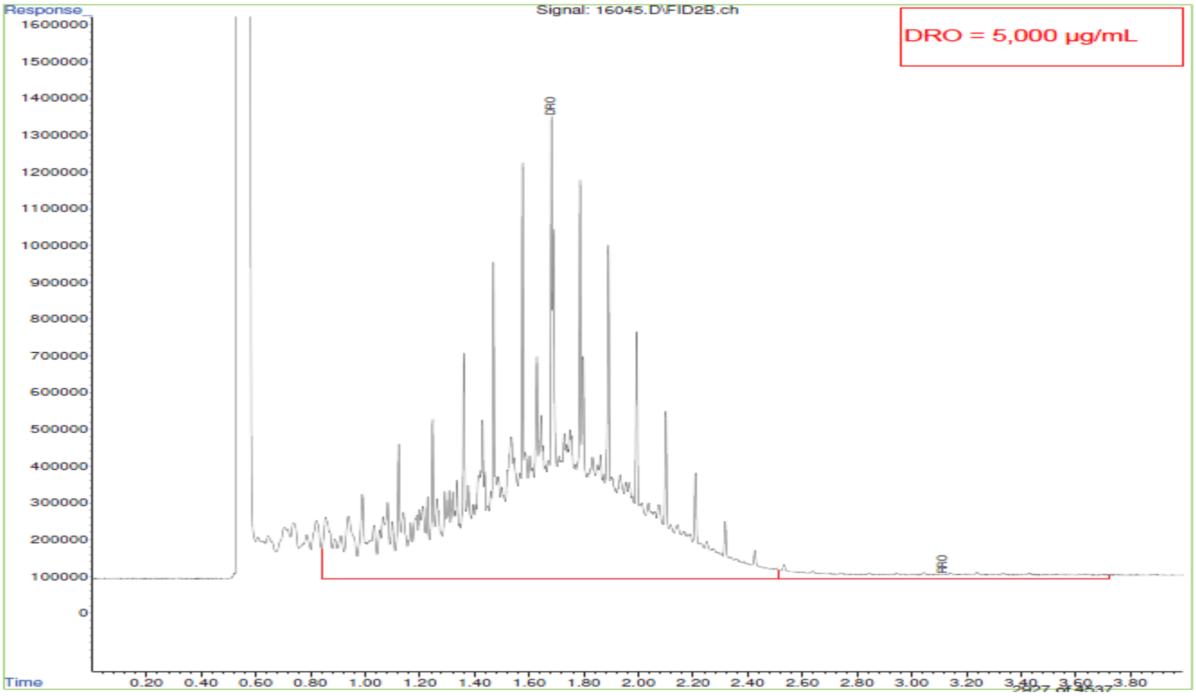
Biogenic interference from naturally occurring organic material (NOM) in soil and sediment had been reported in previous sampling efforts at NEC (USACE 2013a). NOM likely contributed to DRO and RRO concentrations in sediment collected in 2018 and biased the analytical results high (refer to Section 4.3.2). All DRO and RRO chromatograms were reviewed. After comprehensive review of all chromatograms and consultation with the USACE, silica gel-treated DRO results will be the only results presented on figures and used for data interpretation. Biogenic interference also significantly contributed to the RRO levels as the fingerprint observed in the RRO range is not consistent with the typical motor oil pattern seen in the RRO calibration chromatograms.

4.3.2 Evaluation of Biogenic Interference for Site 28 Sediment

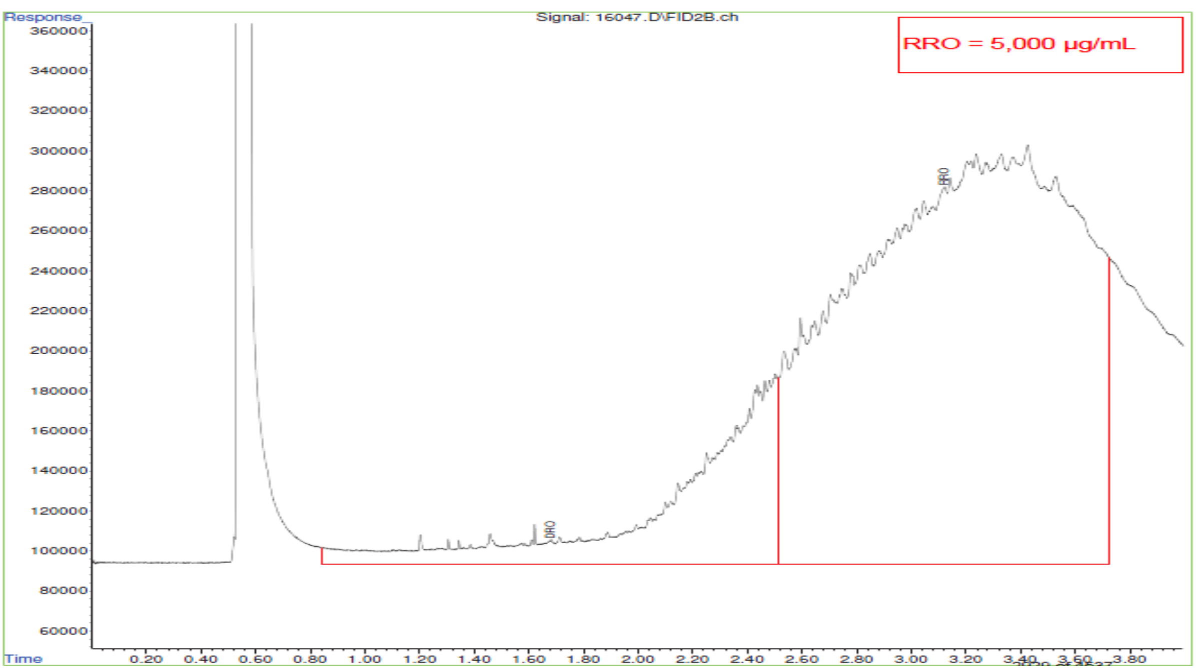
NOM in soil and sediment is encountered at many locations throughout Alaska especially in tundra peat and topsoil. These naturally occurring organics can be present at high levels (percent range) that are well above the NEC multi-site DD-based SSCLs for DRO and RRO reported by the AK102 and AK103 test methods (ADEC 2006). According to Technical Memorandum 06-001 (ADEC 2006), a silica gel cleanup procedure may be used as part of an evaluation process to determine the presence and degree of biogenic interference. The silica gel cleanup procedure is intended to remove NOM from the extracted analytical sample while leaving petrogenic organic contamination relatively unaffected.

The previous NEC soil data and Site 28 sediment data collected in 2012 described the presence of NOM causing biogenic interference, which affected RRO results (USACE 2013a). Site 28 contains lush vegetation with a thick organic mat near and within the waterbodies (USACE 2013a). To support the evaluation of NOM contribution to 2018 Site 28 sediment samples, sediment was analyzed for DRO and RRO with and without silica gel cleanup and total organic carbon. The assessment of biogenic interference and its affects was completed by a chromatographic assessment followed by a comparison of silica gel-treated and untreated DRO and RRO results. All chromatograms referenced in this section are provided in Attachment F-2. Select examples of chromatograms will be presented in this section for discussion purposes.

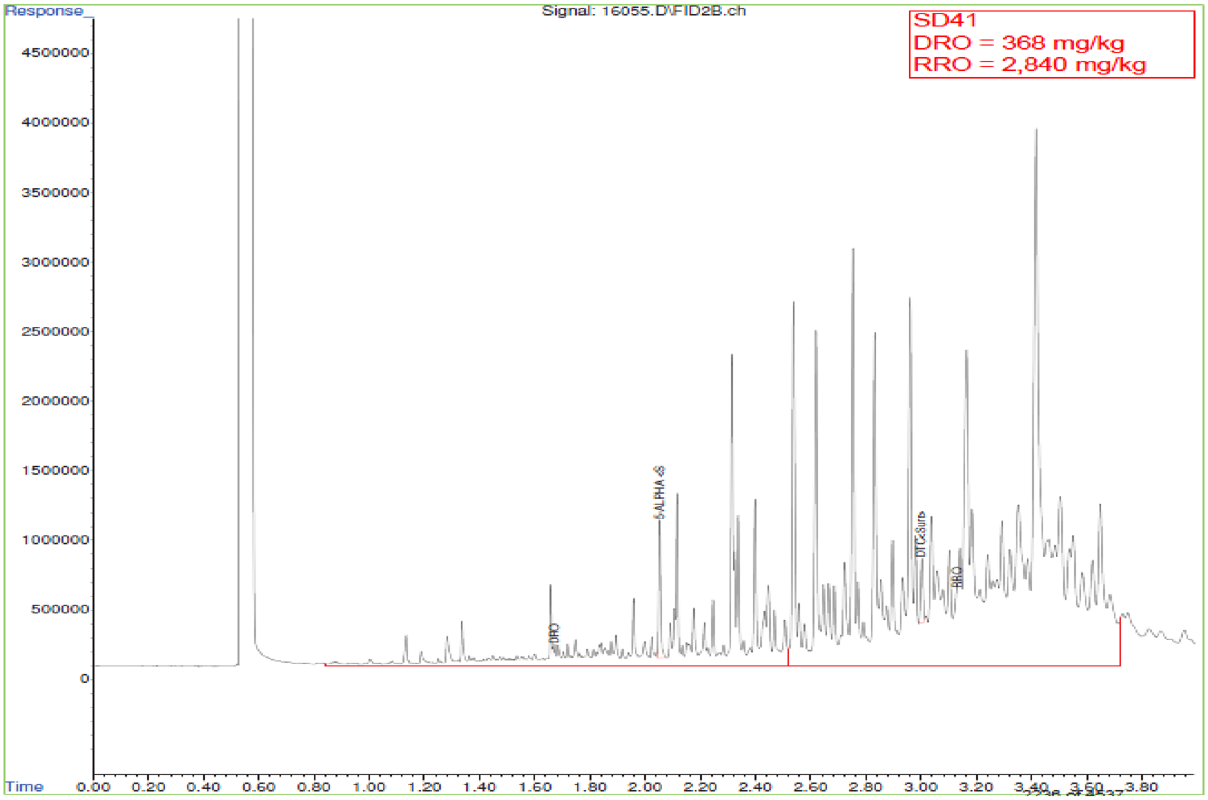
Calibration chromatograms for the normal alkane standard, the DRO reference standard, and the RRO reference standard form the foundation of fingerprint evaluation to establish retention time references (C_{10} to C_{25} for DRO and C_{25} to C_{36} for RRO) and define patterns typical for diesel fuel and motor oil under the condition used by the AK 102/103 test method. Examples of the typical DRO and RRO fingerprints, a Site 28 biogenic fingerprint, and the three fingerprints displayed on a single chromatogram are provided below.



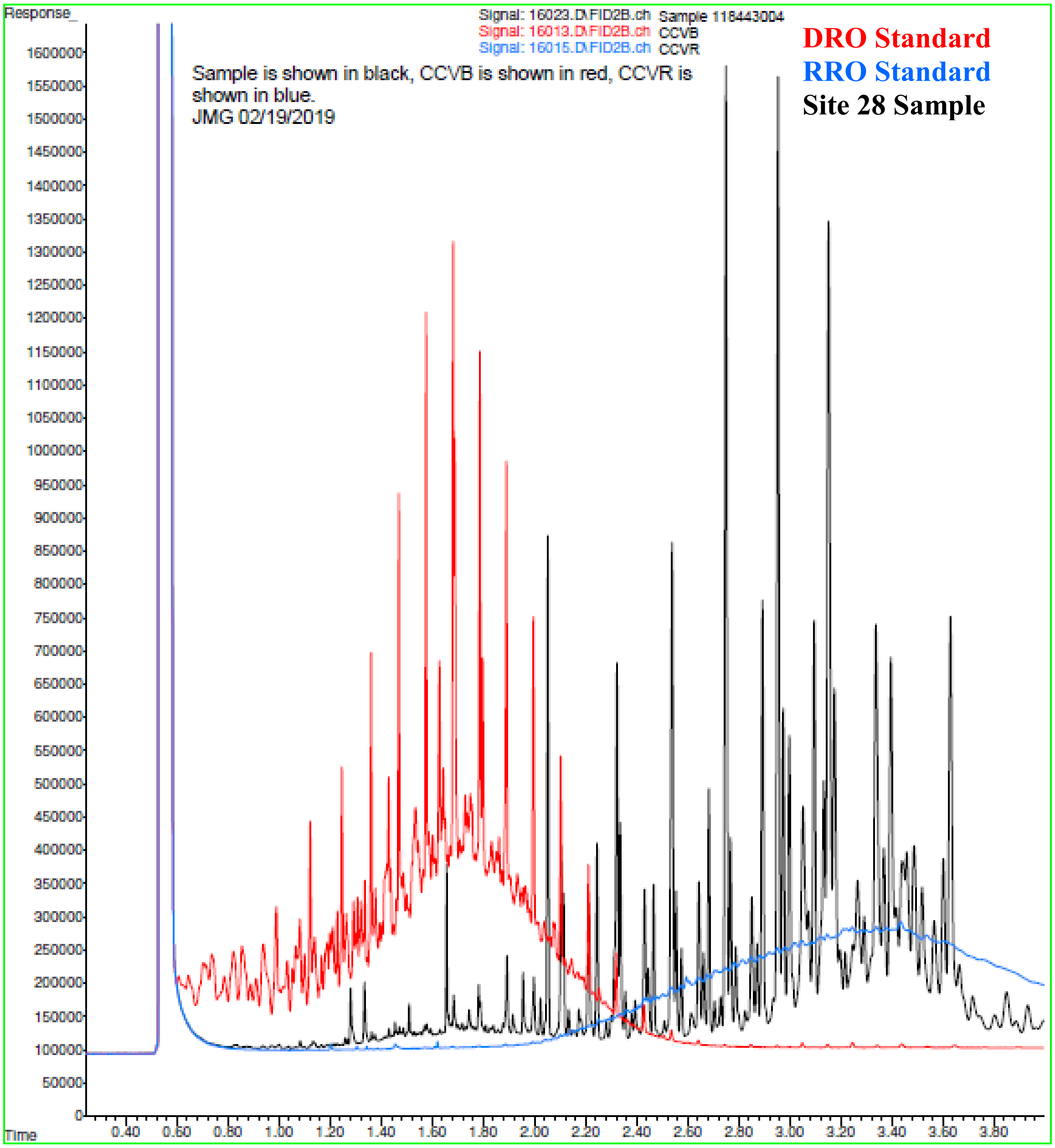
Chromatogram F-4-1: Example of a typical diesel fuel fingerprint



Chromatogram F-4-2: Example of typical motor oil fingerprint



Chromatogram F-4-3: Example of Site 28 biogenic fingerprint



Chromatogram F-4-4: Example of a DRO standard fingerprint, RRO standard fingerprint, and Site 28 biogenic fingerprint

The biogenic fingerprint is distinguishable from the typical DRO and typical RRO fingerprint as demonstrated by the example fingerprints. The Site 28 biogenic interference generally starts at C_{17} (1.7 minutes on the time axis) and continues through C_{36} (3.7 minutes on the time axis). It is noted that the biogenic pattern seen at Site 28 has the potential to affect both DRO and RRO with a higher potential affect in the RRO range.

Many of the 2018 Site 28 chromatograms were consistent with the typical DRO fingerprint, which was expected based on the historical sources of contamination upgradient of the site. All fingerprints in the RRO range were not consistent with the typical motor oil fingerprint but were consistent with the biogenic fingerprint (Chromatograms S28-21 and S28-36 in Attachment F-2). No known large spill of motor oil at NEC that would affect Site 28 exists. Based on the review of chromatogram fingerprints, NOM is present in all 2018 samples collected from Site 28.

The next step in the evaluation was to compare 2018 silica gel-treated DRO and RRO results to untreated results. The results comparison discussed in this section focused on those results where untreated results are above the SSCLs and treated results are below the SSCLs as they affect the definition of the extent of contamination. The locations where untreated DRO results were above the SSCL of 3,500 mg/kg but silica gel-treated DRO results were below the SSCL were S28-21, S28-24, S28-36, and S28-37 (four out of 53 locations).

The DRO results for these locations are summarized in Table F-4-4.

Table F-4-4
Untreated DRO Results Above SSCL With Silica Gel-Treated Results Below SSCL

Location ID	Sample ID	Untreated DRO (mg/kg)	Treated DRO (mg/kg)
S28-21	18NEC-S28-SD-21	4,000	3,390
S28-24	18NEC-S28-SD-24	4,390	3,460
S28-36	18NEC-S28-SD-36	4,120	2,960
S28-37	18NEC-S28-SD-37	4,490	3,440

Note:
For definitions, refer to the Acronyms and Abbreviations section.

The locations where untreated RRO results were above the SSCL of 3,500 mg/kg and silica gel-treated results were below the SSCL in 2018 are S28-11, S28-26, S28-30, S28-32, S28-33, S28-34, S28-35, S28-36, S28-37, S28-38, S28-39, S28-44, S28-45, S28-46, S28-48, S28-53, and S28-54 (17 of 53 locations).

The RRO results for these locations are summarized in Table F-4-5.

Table F-4-5
Untreated RRO Results Above SSCL With Silica Gel-Treated Results Below SSCL

Location ID	Sample ID	Untreated RRO (mg/kg)	Treated RRO (mg/kg)
S28-11	18NEC-S28-SD-11	3,840	1,660
S28-26	18NEC-S28-SD-26	3,640	2,780
S28-30	18NEC-S28-SD-30	7,060	3,400
S28-32	18NEC-S28-SD-32	4,010	2,020
S28-33	18NEC-S28-SD-33	7,180	2,800
S28-34	18NEC-S28-SD-34	5,290	3,030
S28-35	18NEC-S28-SD-35	4,080	1,960
S28-36	18NEC-S28-SD-36	7,990	1,720
S28-37	18NEC-S28-SD-37	5,660	1,430
S28-38	18NEC-S28-SD-38	7,580	2,000
S28-38 duplicate	18NEC-S28-SD-38-8	8,490	2,550
S28-39	18NEC-S28-SD-39	6,360	1,840
S28-44	18NEC-S28-SD-44	5,090	2,370
S28-45	18NEC-S28-SD-45	4,110	1,370
S28-46	18NEC-S28-SD-46	5,440	1,010
S28-48	18NEC-S28-SD-48	6,980	2,020
S28-48 duplicate	18NEC-S28-SD-48-8	6,050	2,230
S28-53	18NEC-S28-SD-53	10,600	1,870
S28-54	18NEC-S28-SD-54	7,040	2,290

Note:
For definitions, refer to the Acronyms and Abbreviations section.

The silica gel cleanup did not affect the overall contribution of diesel fuel to DRO concentrations in 2018 as demonstrated by the chromatograms for location S28-36. While the biogenic pattern is greatly reduced, as noted by the lower height of peaks on the y-axis from 2.2 to 3.7 minutes, the DRO pattern from 1 to 2.2 minutes is not affected. Additionally, it can be observed that the silica gel cleanup did not fully remove the biogenic interference in the

RRO range. The greater removal of biogenic contributions to the RRO range is also generally confirmed by the lower overall percent reduction of DRO concentrations in treated and untreated results (Table F-4-4) compared to the percent reduction in RRO concentrations for treated and untreated results (Table F-4-5).

This assessment of biogenic interference confirms that biogenic interference is present in Site 28 samples and that silica gel-treated DRO and RRO results should be utilized for site assessment of the extent of contamination. It is also noted that silica gel treatment may not fully remove the potential bias to DRO and RRO results.

4.3.3 DRO Analytical Results

DRO in sediment above the SSCL remains prevalent at Site 28. The previous sediment sampling effort in 2012 reported DRO and 2-methylnapthalene as the most prevalent fuel contaminants at Site 28 (USACE 2013a). In 2018, DRO above the SSCL was prevalent from the southern portion of Site 28 near the MOC to sample location SD28-14. There were no exceedances for DRO nearest to the Suqi River (locations S28-01 through S28-13) and in the southeastern water bodies of Removal Area 5 (locations S28-36, S28-37, and S28-41). The DRO silica gel cleanup exceedances for Site 28 are presented on Figure F-5.

The highest 2018 concentration for DRO silica gel cleanup (94,100 mg/kg) was at location S28-28 within Removal Area 3. The areas with DRO concentrations greater than 40,000 mg/kg were within Removal Areas 2, 3, 4, and 9. From location S28-13 and north to S28-01 at the confluence of the drainage basin and the Suqi River, a natural filtering process appeared to be occurring because sediment contamination had not accumulated into Removal Areas 10 or 11.

In 2012 the average DRO concentration for sediment samples was approximately 23,000 mg/kg before silica gel cleanup and approximately 21,000 mg/kg after silica gel cleanup (USACE 2013a). In 2018, the average DRO concentration before silica gel cleanup was approximately 24,600 mg/kg and approximately 20,000 mg/kg after silica gel cleanup. The

DRO concentrations are relatively similar between the 2012 and 2018 sediment mapping and sampling events.

4.3.4 RRO Analytical Results

The highest 2018 concentration for RRO silica gel cleanup (106,000 mg/kg) was at location S28-42 within Removal Area 8. This RRO concentration was elevated and related to high levels of NOM within the sample even after the silica gel cleanup process. The silica gel cleanup process could not remove all biogenic interference. In fuel-contaminated soil, fuel-related analytes such as PAHs were frequently collocated. PAHs did not exceed SSCLs at location S28-42; therefore, a residual-range fuel product was unlikely to be elevated to 106,000 mg/kg. The removal areas with RRO concentrations greater than 10,000 mg/kg are within Removal Areas 2, 3, 8, and 9. RRO was not exceeding the SSCL in Removal Areas 5, 6, 10, or 11. All RRO exceedances of the SSCL were collocated with DRO exceedances of the SSCL. The RRO exceedances for Site 28 are presented on Figure F-6.

In 2012 the average RRO concentration for sediment samples was approximately 5,200 mg/kg before silica gel cleanup and approximately 3,500 mg/kg after silica gel cleanup. In 2018, the average RRO concentration before silica gel cleanup was approximately 8,900 mg/kg and approximately 5,500 mg/kg after silica gel cleanup. The RRO concentrations are greater in the 2018 sediment mapping and sampling event than the 2012 event.

4.3.5 PAH Analytical Results

Eighteen PAHs were analyzed by method SW8270SIM for Site 28 in 2018. However, only 10 PAHs (eight individual analytes and two calculated PAHs) had multi-site DD-based SSCLs. PAHs with multi-site DD-based SSCLs included the following: 2-methylnaphtnalene, acenaphthene, benzo(g,h,i)perylene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, LPAH (PAHs with three or fewer rings), and high molecular weight PAHs (HPAHs) (PAHs with four or more rings). PAHs without multi-site DD-based SSCLs but analyzed by method SW8270SIM included the following: 1-methylnaphtnalene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and pyrene.

PAHs with SSCLs

The most frequently reported PAHs above SSCLs in sediment (exceedances in 22 or more locations) at Site 28 in 2018 were 2-methylnaphthalene, acenaphthene, fluorene, naphthalene, and LPAH. Locations with PAHs exceeding the SSCLs were collocated with DRO exceedances, with the exception of Removal Area 5 (Figure F-7), where DRO did not exceed the SSCL. Removal Area 5 contained PAH exceedances for 2-methylnapthalene and naphthalene.

PAHs without SSCLs

1-Methylnaphthalene, benzo(a)anthracene, chrysene, fluoranthene, and pyrene were detected in sediment at Site 28 in 2018 and do not have SSCLs. 1-Methylnaphthalene and pyrene were the most frequently detected compounds without an SSCL. All detections for 1-methylnaphthalene were collocated with 2-methylnaphthalene except for location S28-04, which had a detection of 0.106 J mg/kg for 1-methylnaphthalene and was nondetect for 2-methylnaphthalene.

4.3.6 PCB Analytical Results

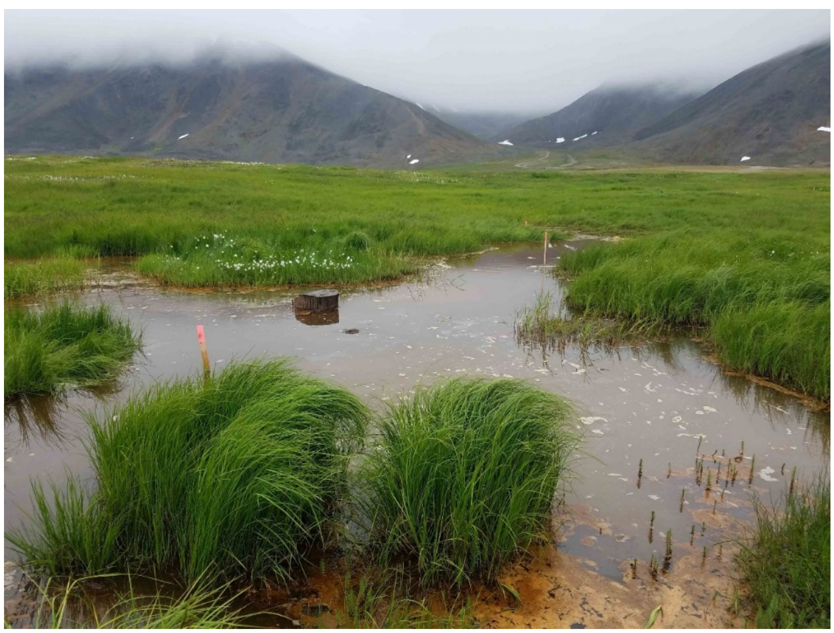
There were no 2018 sediment samples that exceeded the PCB SSCL of 0.7 mg/kg at Site 28. Low-level PCBs were reported at 29 locations; Aroclor-1260 accounted of the all but one of the reported detections. Aroclor-1254 was reported at one location, S28-44. Sampling locations with low-level PCB detections were found in Removal Areas 2, 3, 4, 6, 7, and 9. The highest concentration for total PCBs was 0.482 mg/kg at location S28-47, located within a pond in Removal Area 2 near the MOC. All locations closest to the Suqi River within Removal Areas 10 and 11 were nondetect for PCBs.

4.3.7 Metals Analytical Results

In 2018, no locations exceeded the SSCLs for metals (arsenic, chromium, lead, and zinc). Although selenium was not included in the 2009 multi-site DD (USACE 2009), it was analyzed. The highest detected concentration for selenium was 4.34 mg/kg. Figure F-8 presents the 2018 metals sample locations.

4.3.8 Debris at Site 28

Debris consisting of submerged utility poles, plywood, cable wire, and rubber rigging mats were scattered throughout Site 28 in 2018. The partially submerged utility poles were observed above the water line (Photograph F-4-7). Other obstructions were noted during the sediment mapping activities within transect profiles P15 and P17. The plywood, cable wire, and rubber rigging were observed both submerged and unsubmerged within Site 28 (Photograph F-4-8).



Photograph F-4-7: Partially submerged utility pole within Site 28 Drainage. View facing south.

Photograph F-4-8: Plywood debris within Site 28. View facing north.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations based on the data collected for the 2018 Site 28 sediment mapping and sampling are as follows:

- Conclusions:
  - A natural stilling area was found to be present between Area 9 and Area 10. The area appeared to be entirely composed of vegetative mat, which dispersed flow channels observed in Area 10.
  - A total of 281 cy of sediment were estimated to be present at Site 28 water bodies in 2018. Based on a lines-of-evidence approach, re-accumulation of sediment is possible in certain areas of Site 28. However, estimating the amount of sediment which has "re-accumulated" is not possible currently due to procedural differences in the 2012 and 2018 mapping efforts and the 2013 post-removal sediment volume estimating techniques.
  - Target analytes in 2018 exceeding the multi-site DD-based SSCLs in sediment samples were found in sediment samples across Areas 2 through 9. Target analytes in 2018 did not exceed the multi-site DD-specified SSCLs at the confluence with the Suqi River within Area 11 or immediately south of the Suqi River in Area 10. DRO, RRO, 2-methylnaphthalene, and naphthalene are the most prevalent analytes exceeding SSCLs in 2018. Applying the analytical results to the estimated sediment volumes, 196 of the 281 cy of sediment contains compounds at levels above their respective SSCLs in 2018.
  - Sediment contamination greater than SSCLs are not found in Removal Areas 10 and 11 near the Suqi River in 2018.
  - PCBs, reported as Aroclors, were not found at Site 28 above the SSCL in 2018.
  - NOM in sediment is contributing to the 2018 reported levels of DRO and RRO and causing a high bias. This observation is consistent with those reported in historical investigations at Site 28 and other NEC sites. Silica gel treatment is only partially effective in reducing this high bias.
- Recommendations:
  - Utilize the 2018 sediment measurement process for future sediment mapping efforts at Site 28.
  - Utilize silica gel-treated DRO and RRO results for future data evaluation, presentations, and site management decisions.

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6.0 REFERENCES

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ATTACHMENT F-1
Figures and Sediment Cross Sections

Figures

P:\StLawrenceIsland_F10AK0969_NEC_Site28_SedSampRpt_Sup\01_MXD\FigF-1_Location_Vicinity.mxd beatycj

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

N

0 10 20 30 40 50
Miles

WGS 1984 UTM Zone 2N

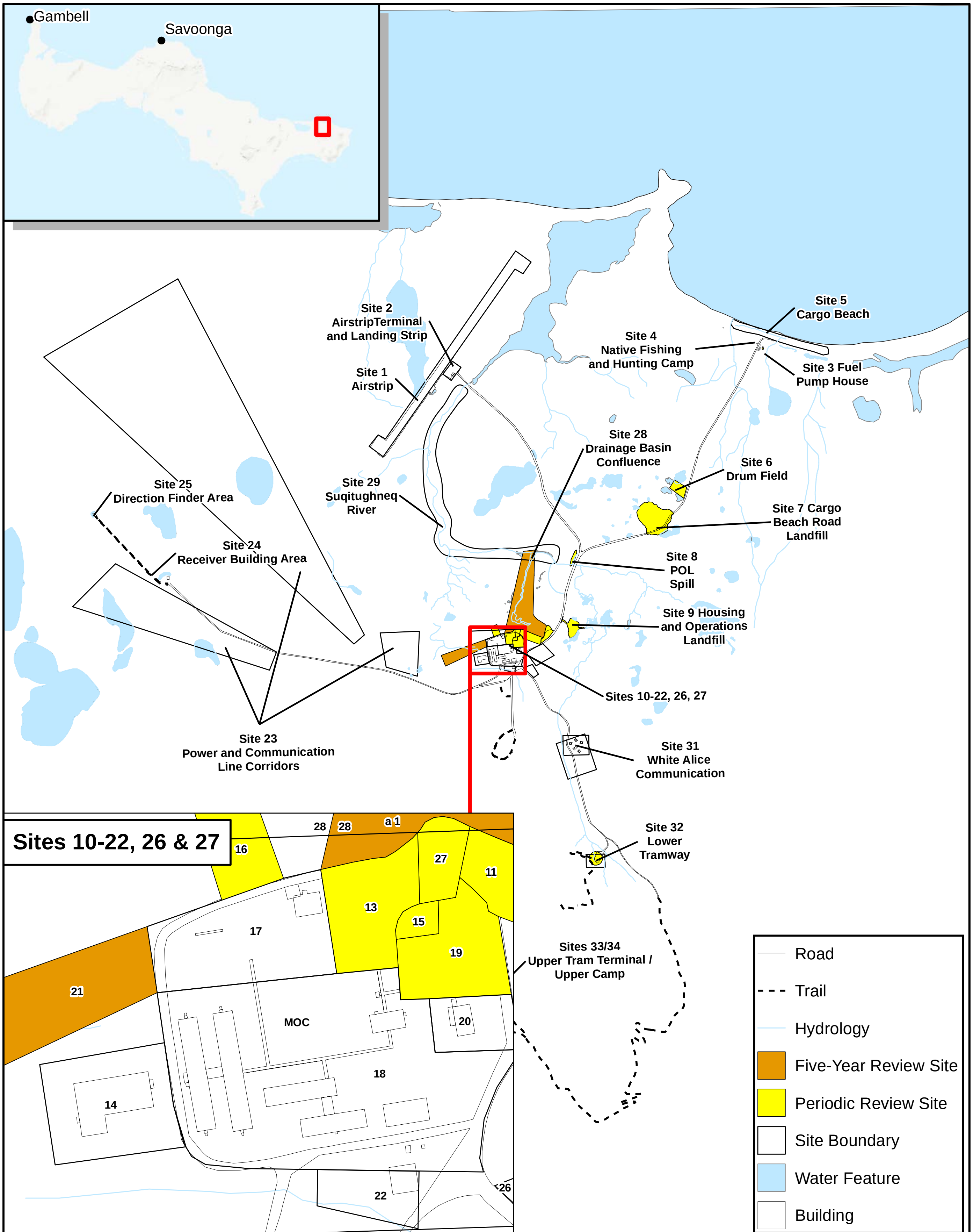
NORTHEAST CAPE LOCATION AND VICINITY

U.S. Army Corps of Engineers Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE F-1



FIVE YEAR REVIEW SITES
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE F-2

P:\StLawrenceIsland_F10AK0969_NEC_Site28_SedSampRpt_Sup\01_MXD\FigF-2_Sites_Map.mxd beatycj

P:\StLawrenceIsland_F10AK0969_NEC_Site28_SedSampRpt_Sup\01_MXD\FigF-3_WaterBodyExtents.mxd beatycj

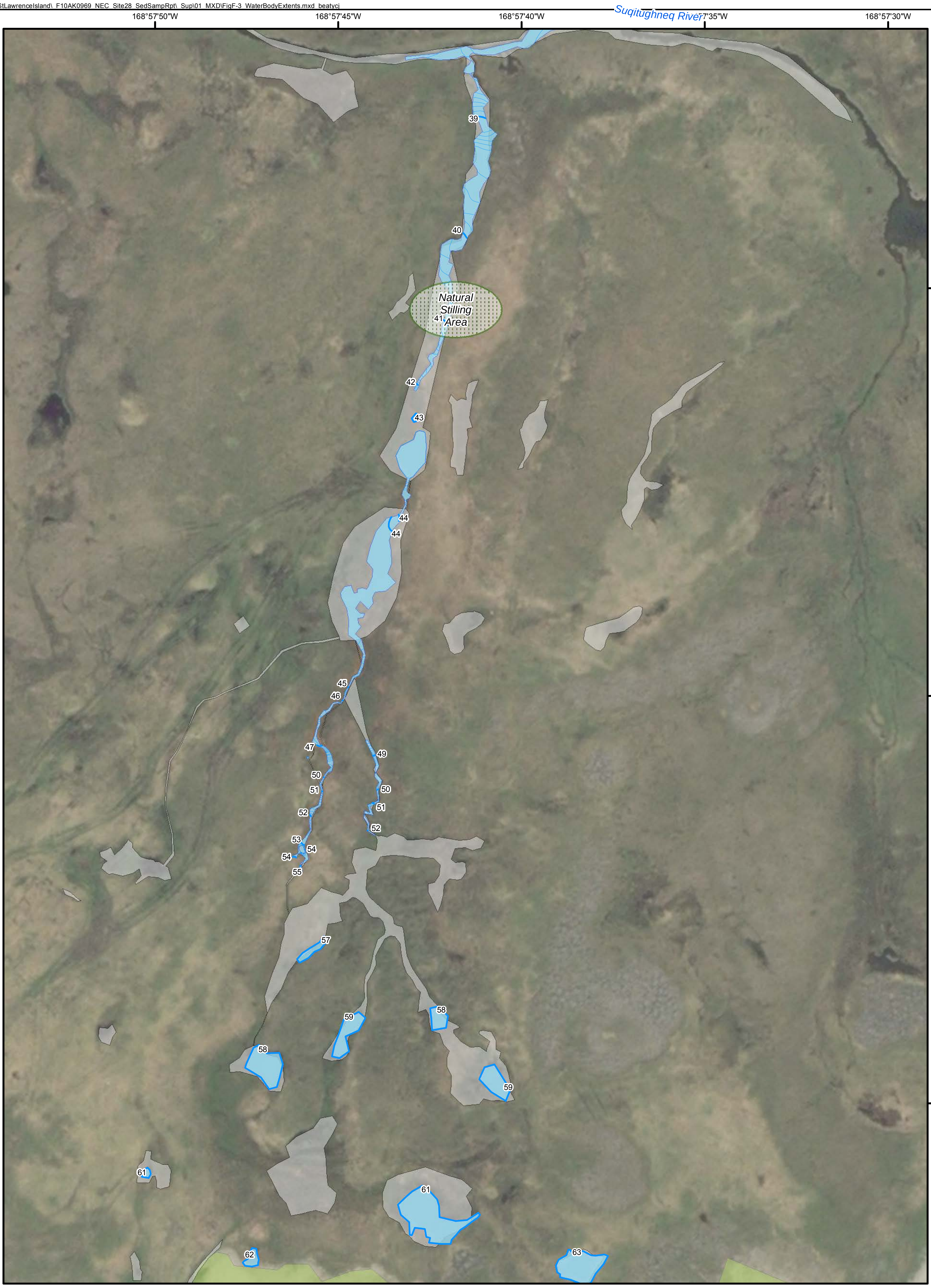


Image Source: ESRI Service Layer, Digital Globe. Vivid – Alaska. 2015 (23 June). *http://goto.arcgisonline.com/maps/World_Imagery.*

Minor Surface Water Contour (0.1 foot intervall)
Major Surface Water Contour (feet above Mean Sea Level)
Natural Stilling Area
2018 Surveyed Water Body
2012 Surveyed Water Body
MOC Boundary

Note:
For definitions, refer to the Acronyms and Abbreviations section.

0 60 120 180 240
Feet

N

WGS 1984 UTM Zone 2N
1 inch = 120 feet

SITE 28
WATER BODY EXTENTS

SAINT LAWRENCE ISLAND, ALASKA

DATE:	PROJECT MANAGER:	FIGURE NO:
15 JAN 2020	K. MAHER	F-3

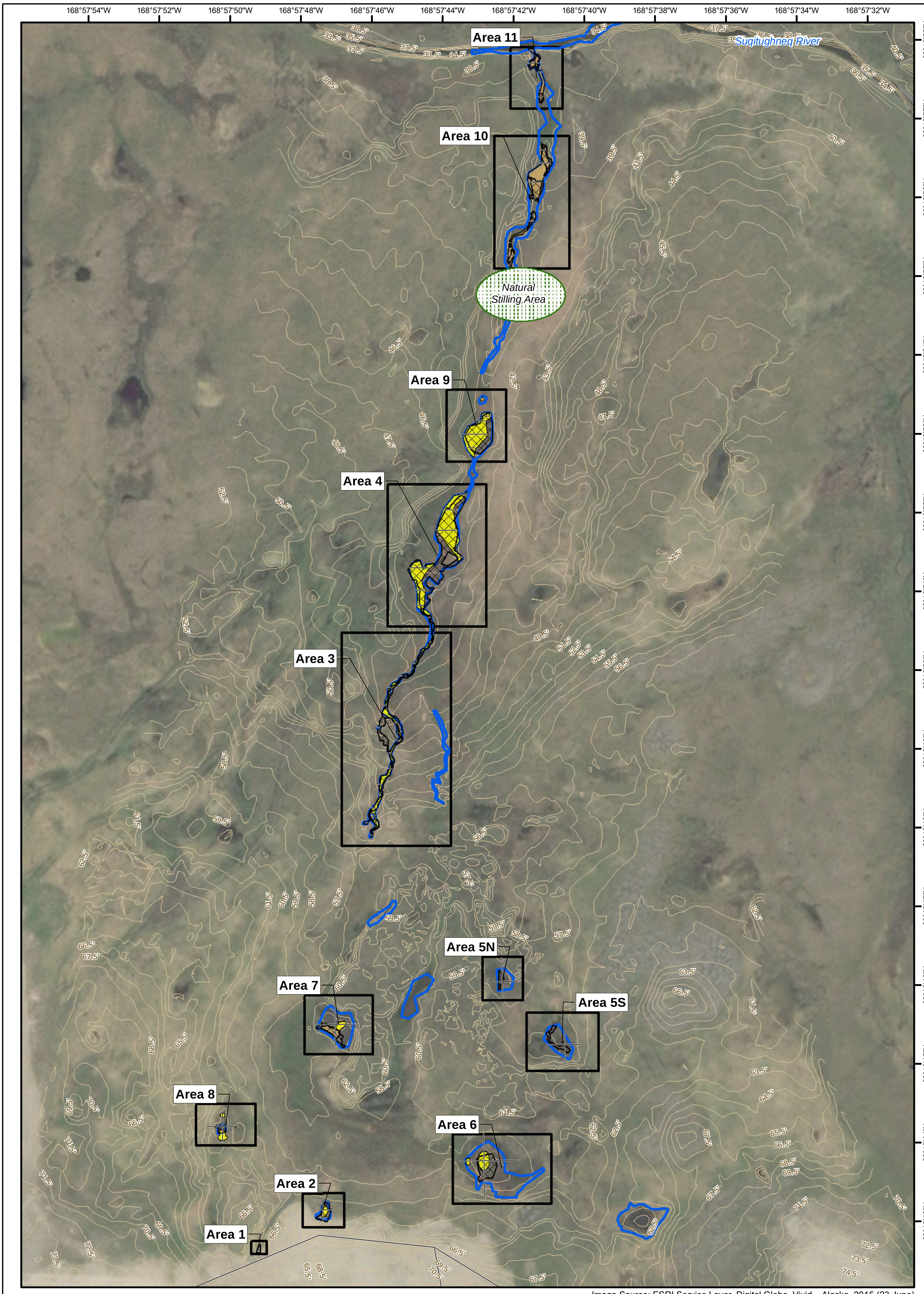
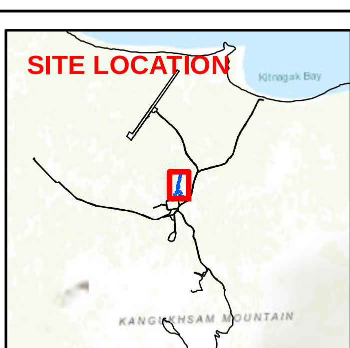


Image Source: ESRI Service Layer, Digital Globe. Vivid – Alaska. 2015 (23 June).



Elevation Contour (feet above Mean Sea Level)
Natural Stilling Area
Previous Sediment Removal
2018 Contaminated Sediment Extent
2018 Non-Contaminated Sediment Extent
2018 Surveyed Water Body
Sediment Removal Area

0 60 120 180 240
Feet

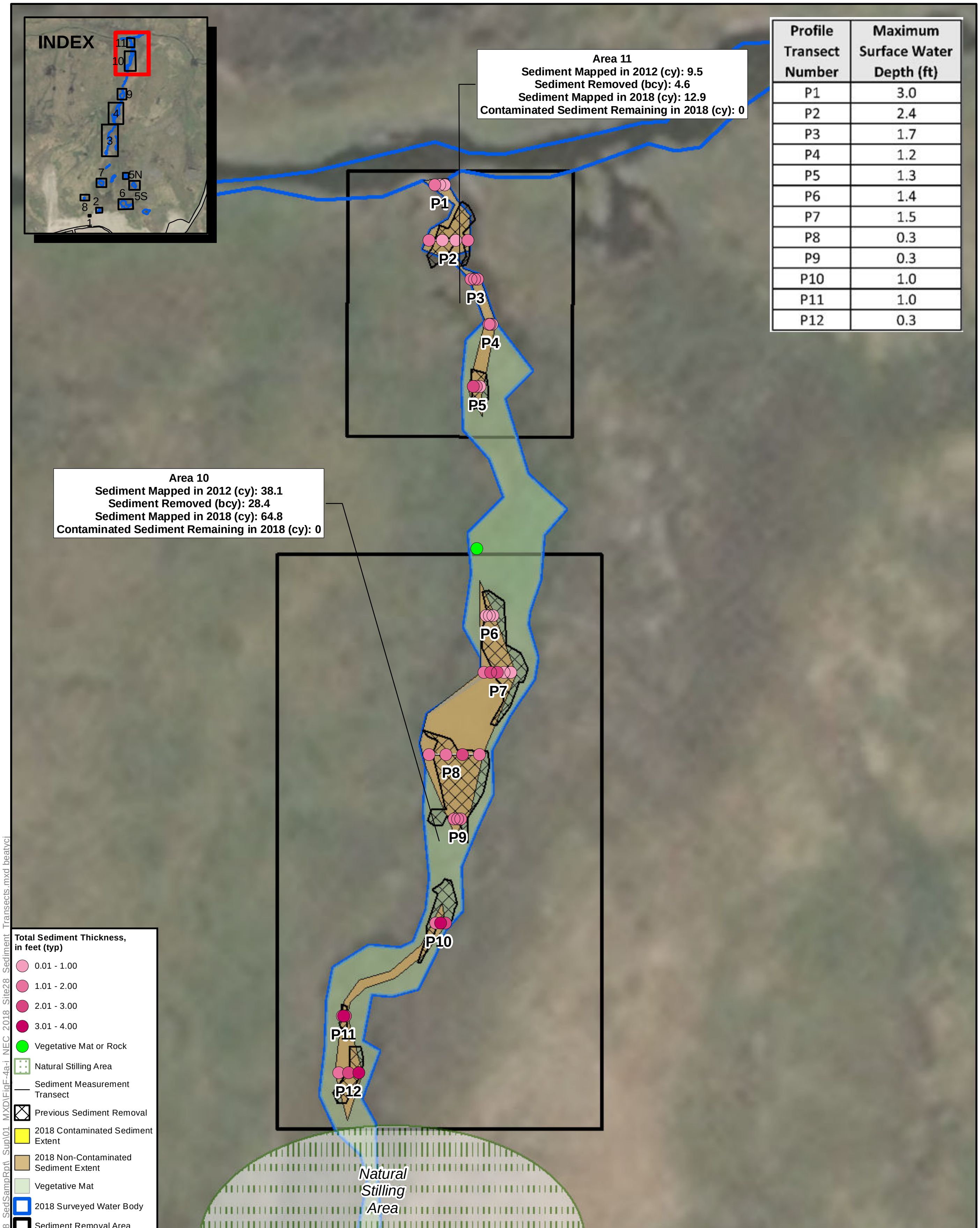
N

WGS 1984 UTM Zone 2N
1 inch = 120 feet

SITE 28
TRANSECT OVERVIEW
SAINT LAWRENCE ISLAND, ALASKA

DATE:	PROJECT MANAGER:	FIGURE NO:
14 FEB 2020	K. MAHER	F-4

P:\StLawrenceIsland_FUDS_NEC_Site28_SedSampRpt_Sup\01_MXD\FigF-4_TransectOverview.mxd beatyej



Profile Transect Number	Maximum Surface Water Depth (ft)
P1	3.0
P2	2.4
P3	1.7
P4	1.2
P5	1.3
P6	1.4
P7	1.5
P8	0.3
P9	0.3
P10	1.0
P11	1.0
P12	0.3

N

0 8 16 24 32 40

Feet

WGS 1984 UTM Zone 2N

SITE 28: AREAS 10 AND 11 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

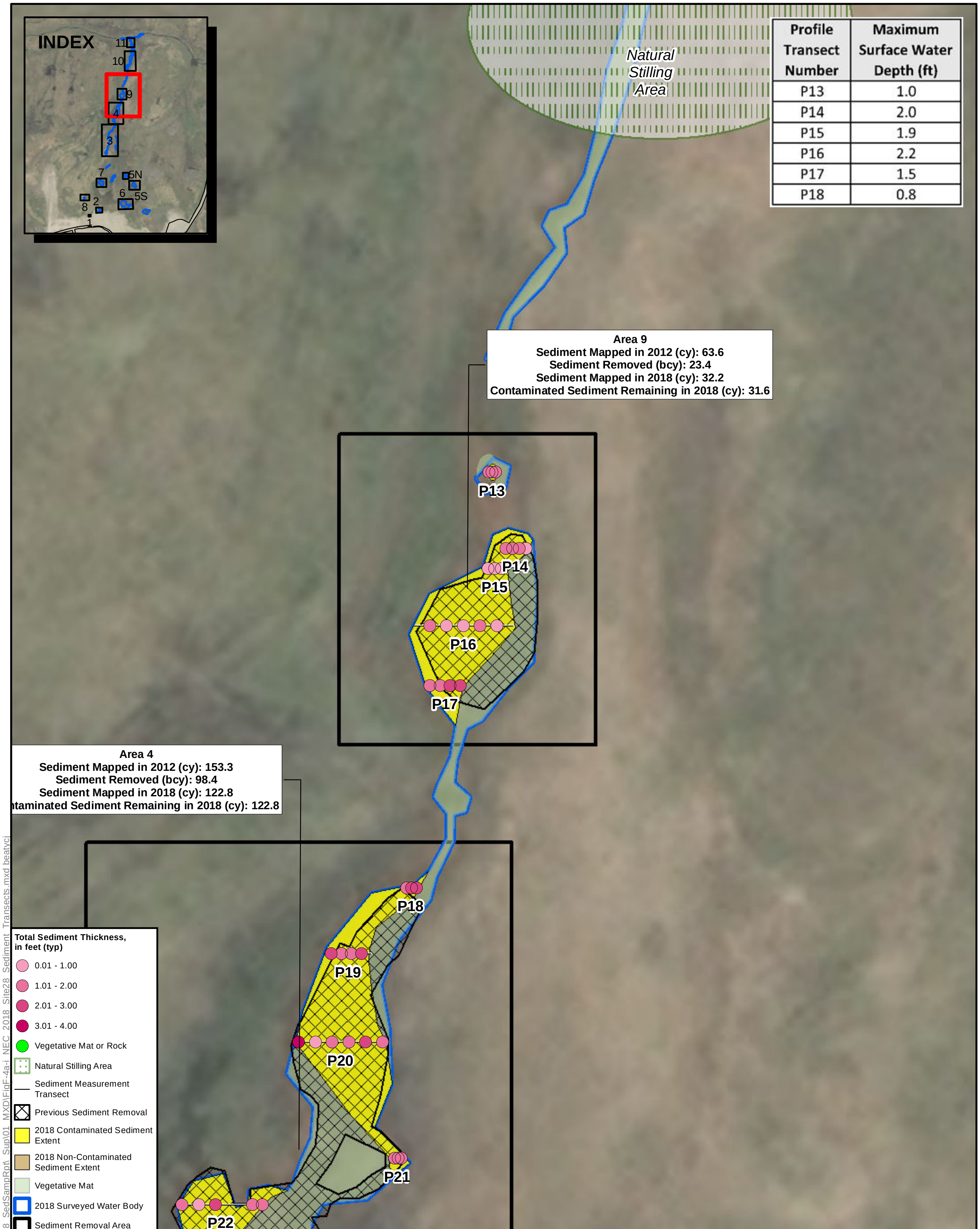
U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE F-4a

P:\StLawrenceIsland\ FUDS NEC Site28 SedSampRpt\ Sup01 MXD\FigF-4a-I NEC 2018 Site28 Sediment Transects.mxd beatyci



Profile Transect Number	Maximum Surface Water Depth (ft)
P13	1.0
P14	2.0
P15	1.9
P16	2.2
P17	1.5
P18	0.8

N

0 8 16 24 32 40

Feet

WGS 1984 UTM Zone 2N

SITE 28: AREA 9 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

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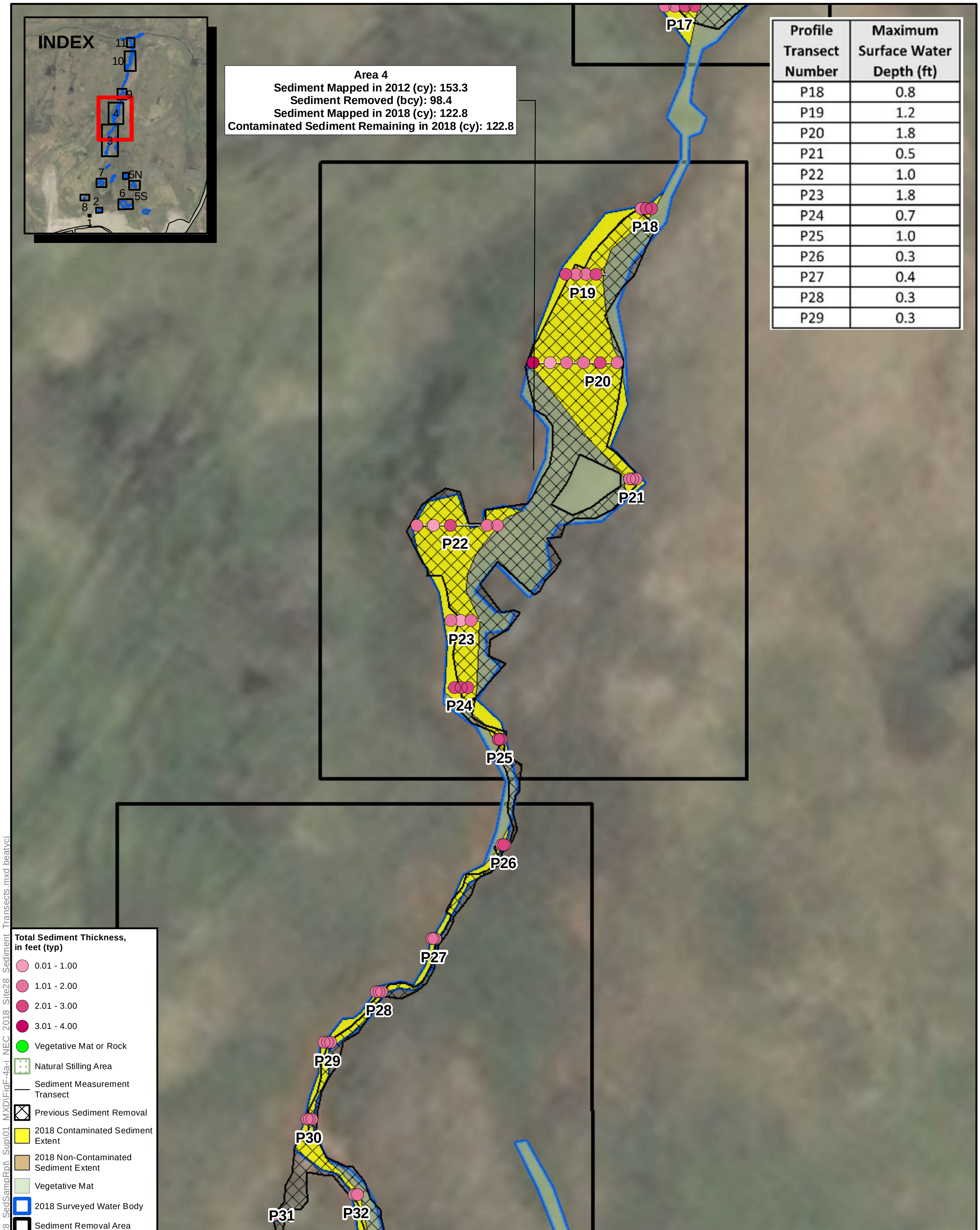
FIGURE F-4b



Profile Transect Number	Maximum Surface Water Depth (ft)
P18	0.8
P19	1.2
P20	1.8
P21	0.5
P22	1.0
P23	1.8
P24	0.7
P25	1.0
P26	0.3
P27	0.4
P28	0.3
P29	0.3

P:\StLawrenceIsland\ FUDS NEC Site28 SedSampRpt\ Sup01 MXD\FigF-4a-l NEC 2018 Site28 Sediment Transects.mxd beatycj

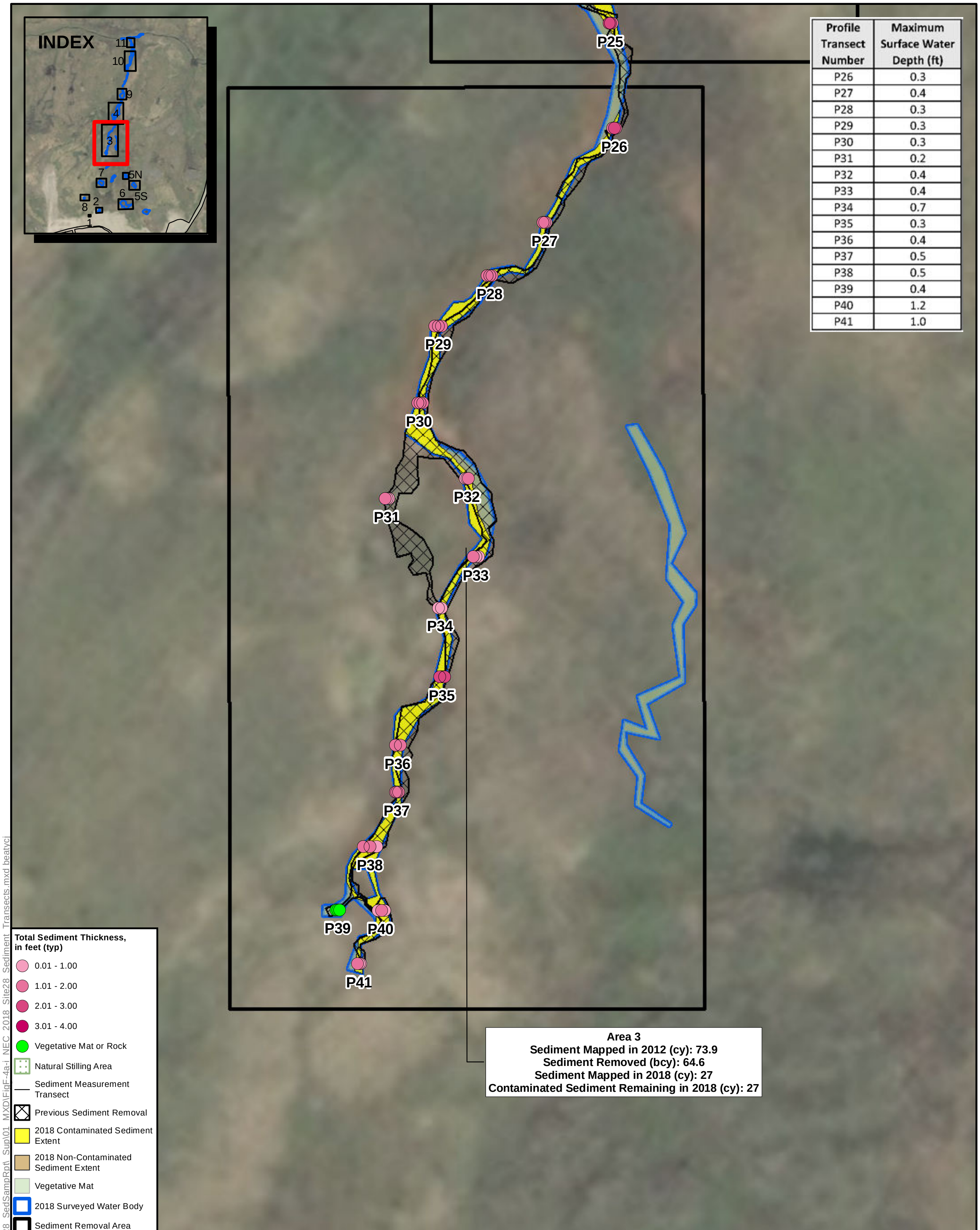
SITE 28: AREA 4 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE F-4c



Profile Transect Number	Maximum Surface Water Depth (ft)
P26	0.3
P27	0.4
P28	0.3
P29	0.3
P30	0.3
P31	0.2
P32	0.4
P33	0.4
P34	0.7
P35	0.3
P36	0.4
P37	0.5
P38	0.5
P39	0.4
P40	1.2
P41	1.0

N

0 8 16 24 32 40

Feet

WGS 1984 UTM Zone 2N

SITE 28: AREA 3 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
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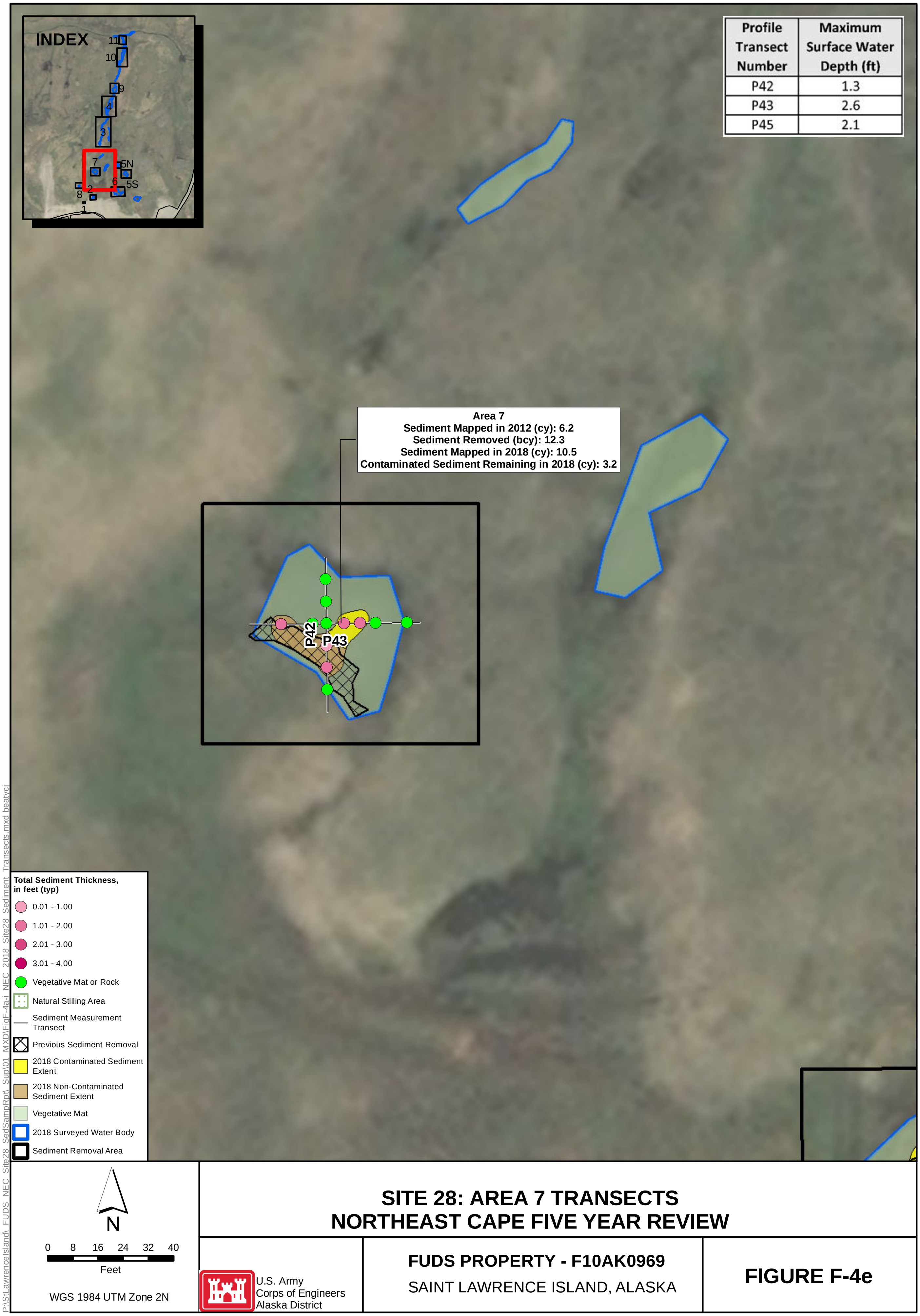
Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE F-4d

P:\StLawrenceIsland\ FUDS NEC Site28 SedSampRpt Sup01 MXD\FigF-4a-i NEC 2018 Site28 Sediment Transects.mxd beatyci



Profile Transect Number	Maximum Surface Water Depth (ft)
P42	1.3
P43	2.6
P45	2.1

P:\StLawrenceIsland_FUDS_NEC_Site28_SedSampRpt_Sup01_MXD\FigF-4a-i_NEC_2018_Site28_Sediment_Transects.mxd beatyci

SITE 28: AREA 7 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
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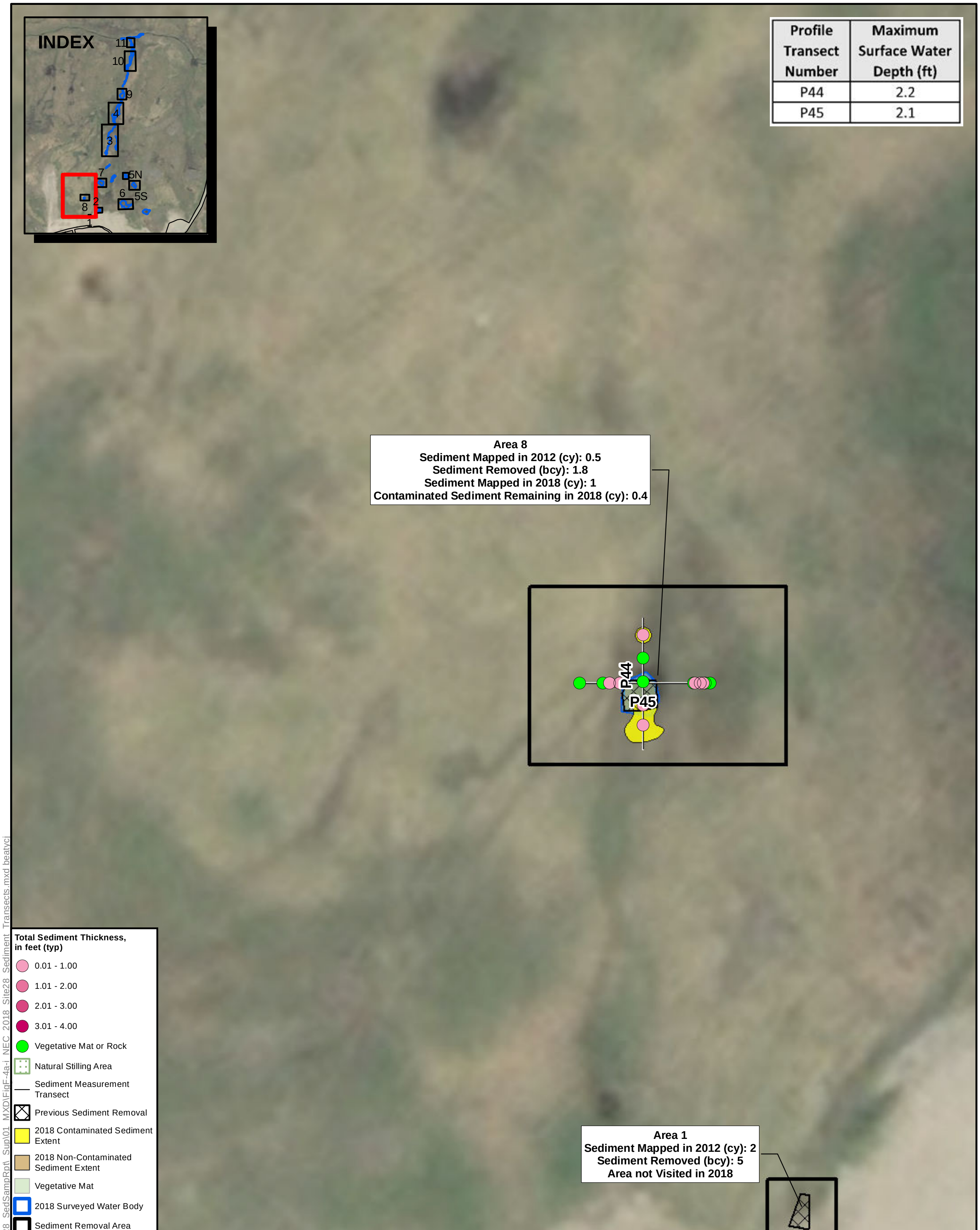
Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE F-4e



N

0 8 16 24 32 40

Feet

WGS 1984 UTM Zone 2N

SITE 28: AREA 8 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

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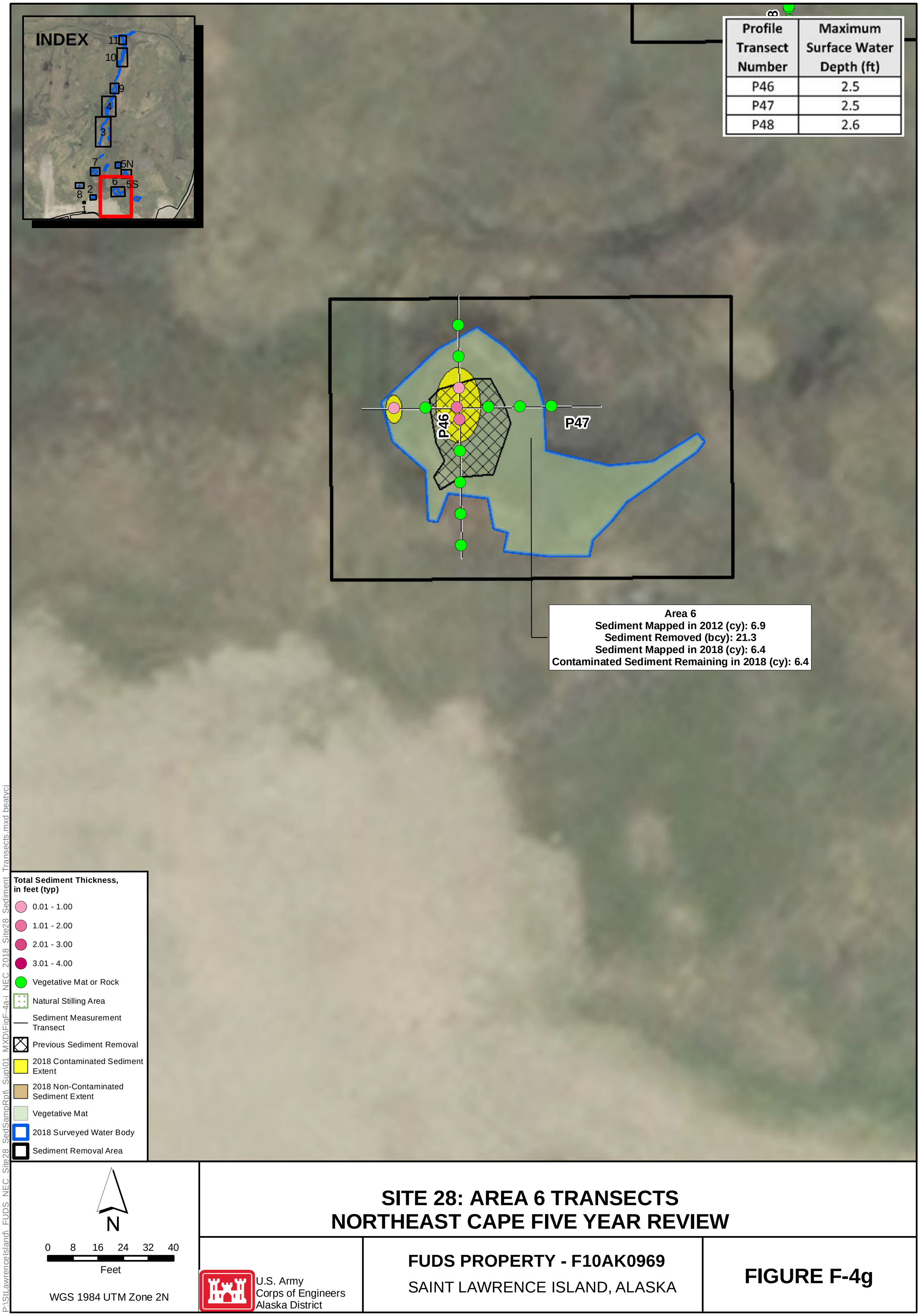
FIGURE F-4f

P:\StLawrenceIsland_FUDS_NEC_Site28_SedSampRpt_Supl01_MXD\FigF-4a-l_NEC_2018_Site28_Sediment_Transects.mxd beatyci

Profile Transect Number	Maximum Surface Water Depth (ft)
P46	2.5
P47	2.5
P48	2.6



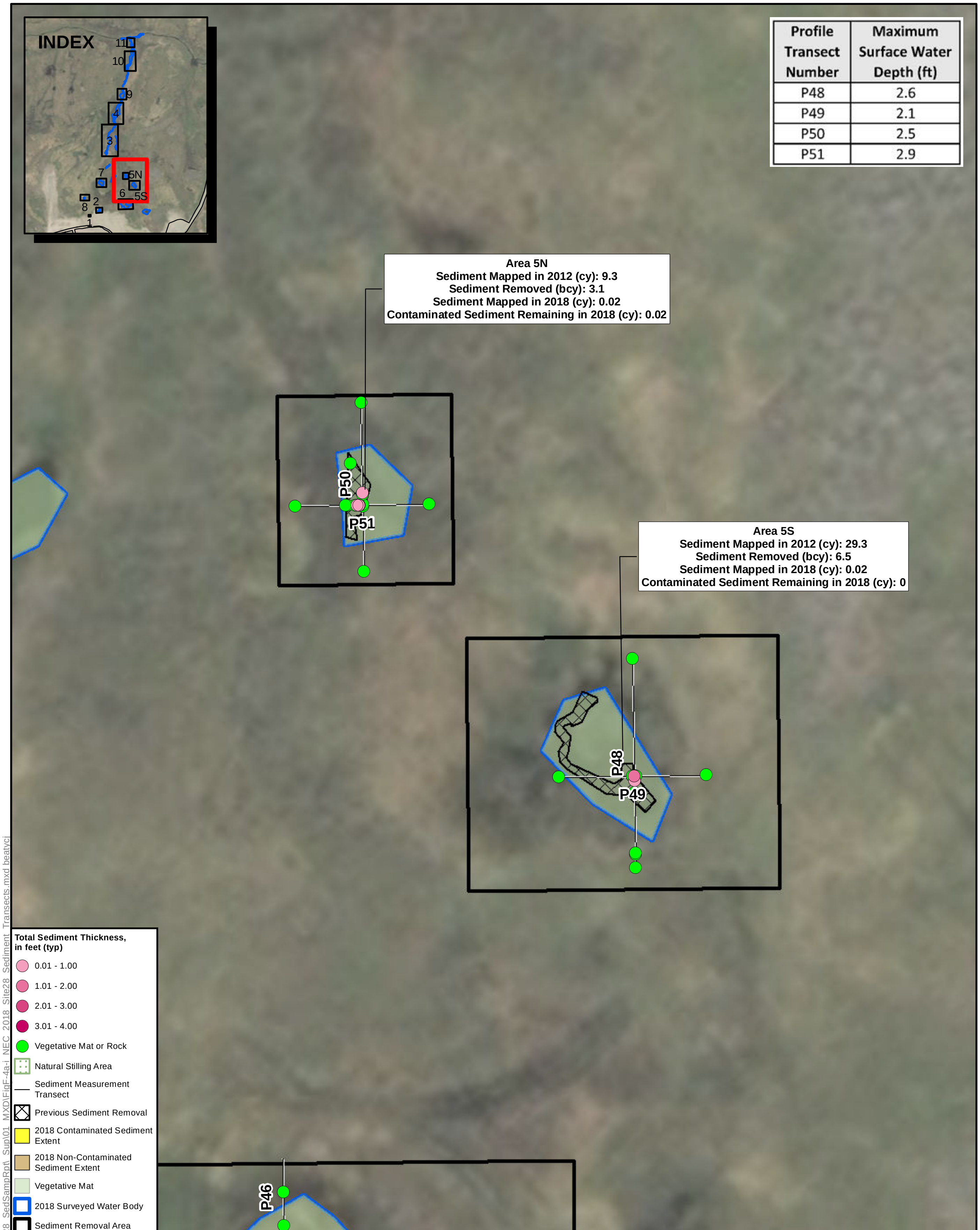
P:\StLawrenceIsland\ FUDS NEC Site28 SedSampRpt\ Supl01 MXD\FigF-4a-l NEC 2018 Site28 Sediment Transects.mxd beatyci

SITE 28: AREA 6 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969
SAINT LAWRENCE ISLAND, ALASKA

FIGURE F-4g



Profile Transect Number	Maximum Surface Water Depth (ft)
P48	2.6
P49	2.1
P50	2.5
P51	2.9

P:\StLawrenceIsland\ FUDS NEC Site28 SedSampRpt\ Supp01 MXD\FigF-4a-l NEC 2018 Site28 Sediment Transects.mxd beatyci

N

0 8 16 24 32 40
Feet

WGS 1984 UTM Zone 2N

SITE 28: AREAS 5N AND 5S TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

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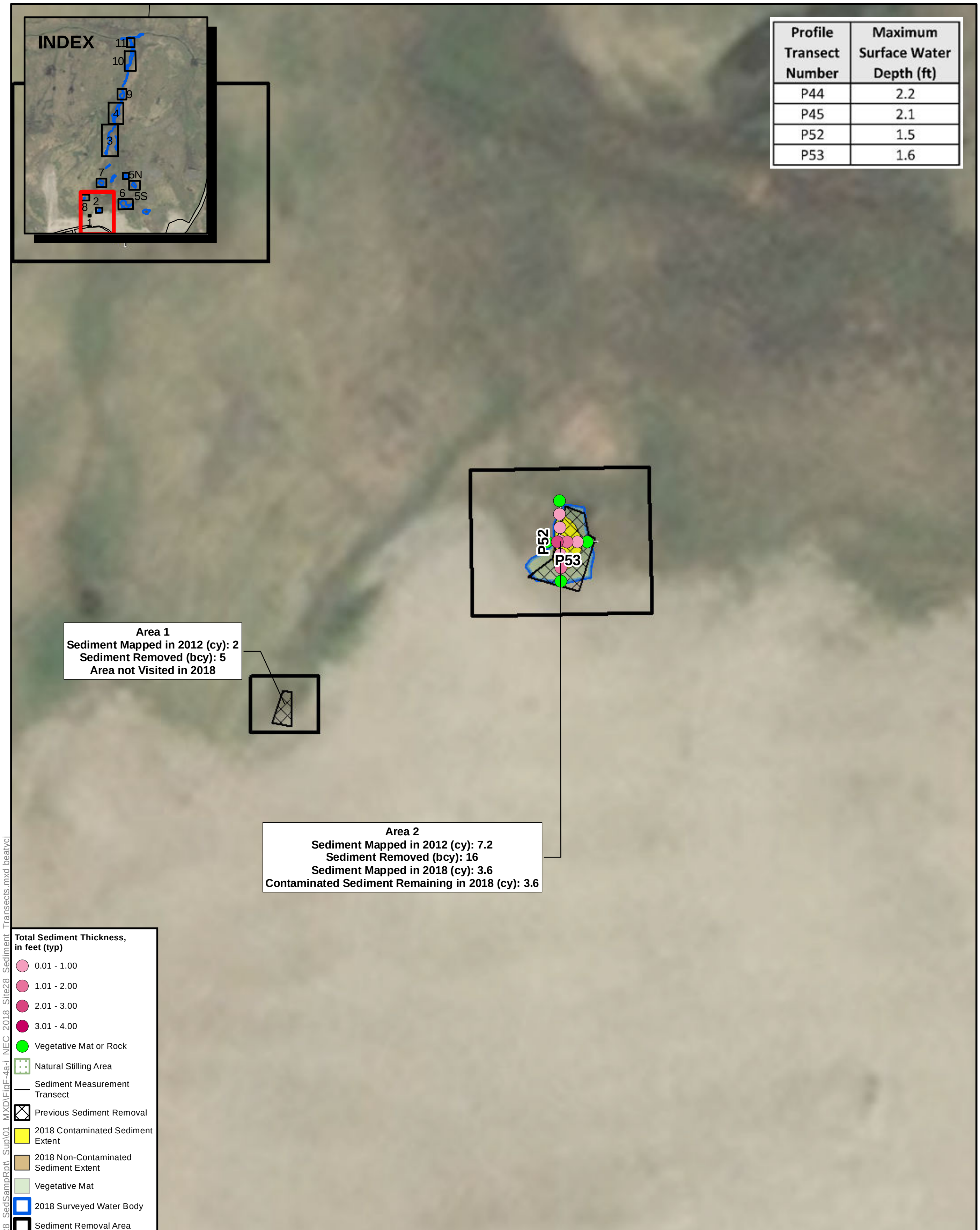
FIGURE F-4h



Profile Transect Number	Maximum Surface Water Depth (ft)
P44	2.2
P45	2.1
P52	1.5
P53	1.6

N

0 8 16 24 32 40

Feet

WGS 1984 UTM Zone 2N

SITE 28: AREA 2 TRANSECTS
NORTHEAST CAPE FIVE YEAR REVIEW

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Alaska District

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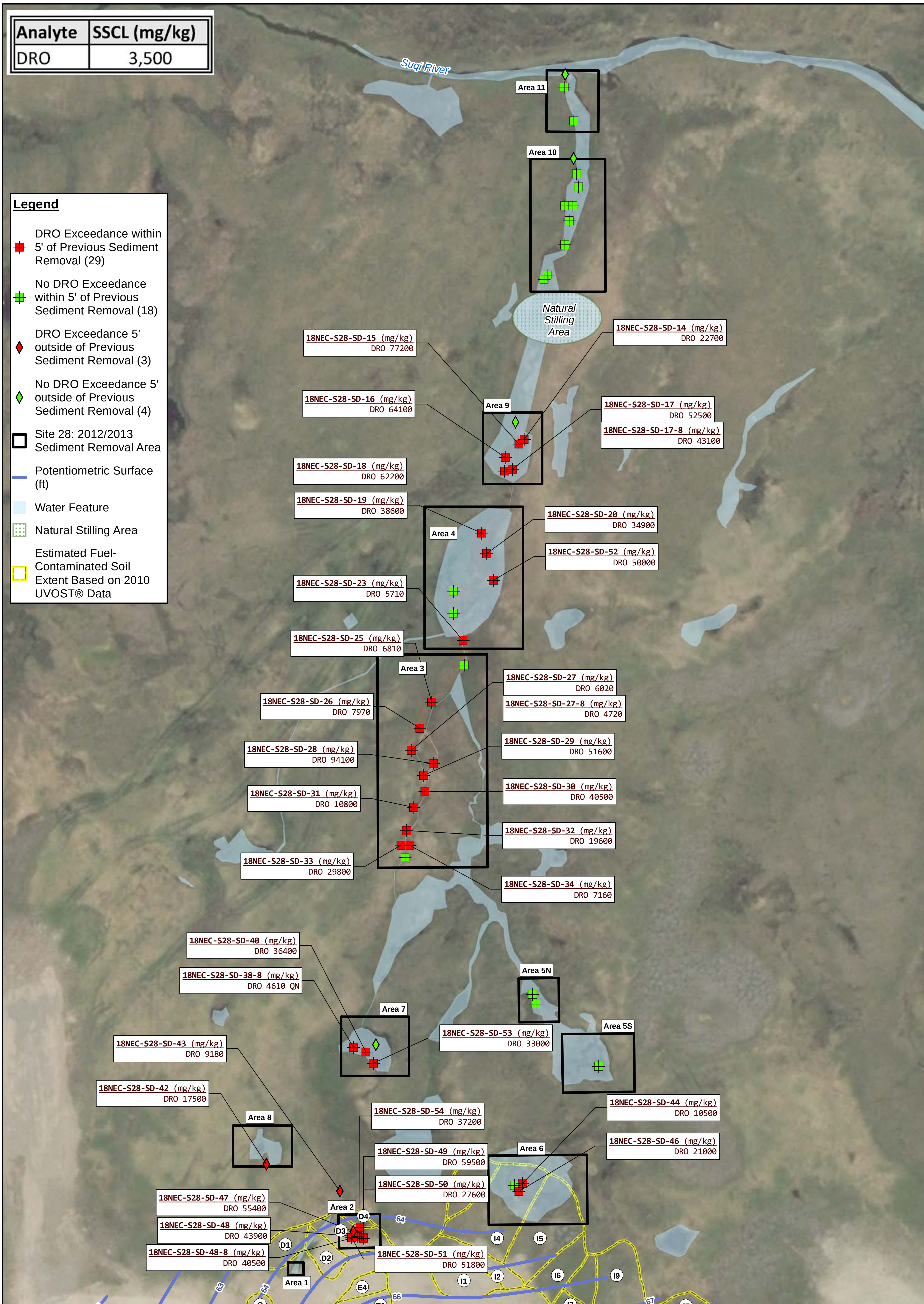
FIGURE F-4i

P:\StLawrenceIsland_FUDS_NEC_Site28_SedSampRpt_Supl01_MXD\FigF-4a-i_NEC_2018_Site28_Sediment_Transects.mxd beatyci

P:\StLawrenceIsland_F10AK0969_NEC_2nd5YR_Sup\01_MXD\FigB-7toB-10_NEC_Site28_2018Results.mxd beatycj 1/9/2020

Analyte	SSCL (mg/kg)
DRO	3,500



Approximate Groundwater Flow Direction

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

0 30 60 90 120
FEET

WGS 1984 UTM Zone 2N

SITE 28: DRO IN SEDIMENT
2018 SAMPLING RESULTS AFTER SILICA GEL CLEANUP

NORTHEAST CAPE FIVE YEAR REVIEW

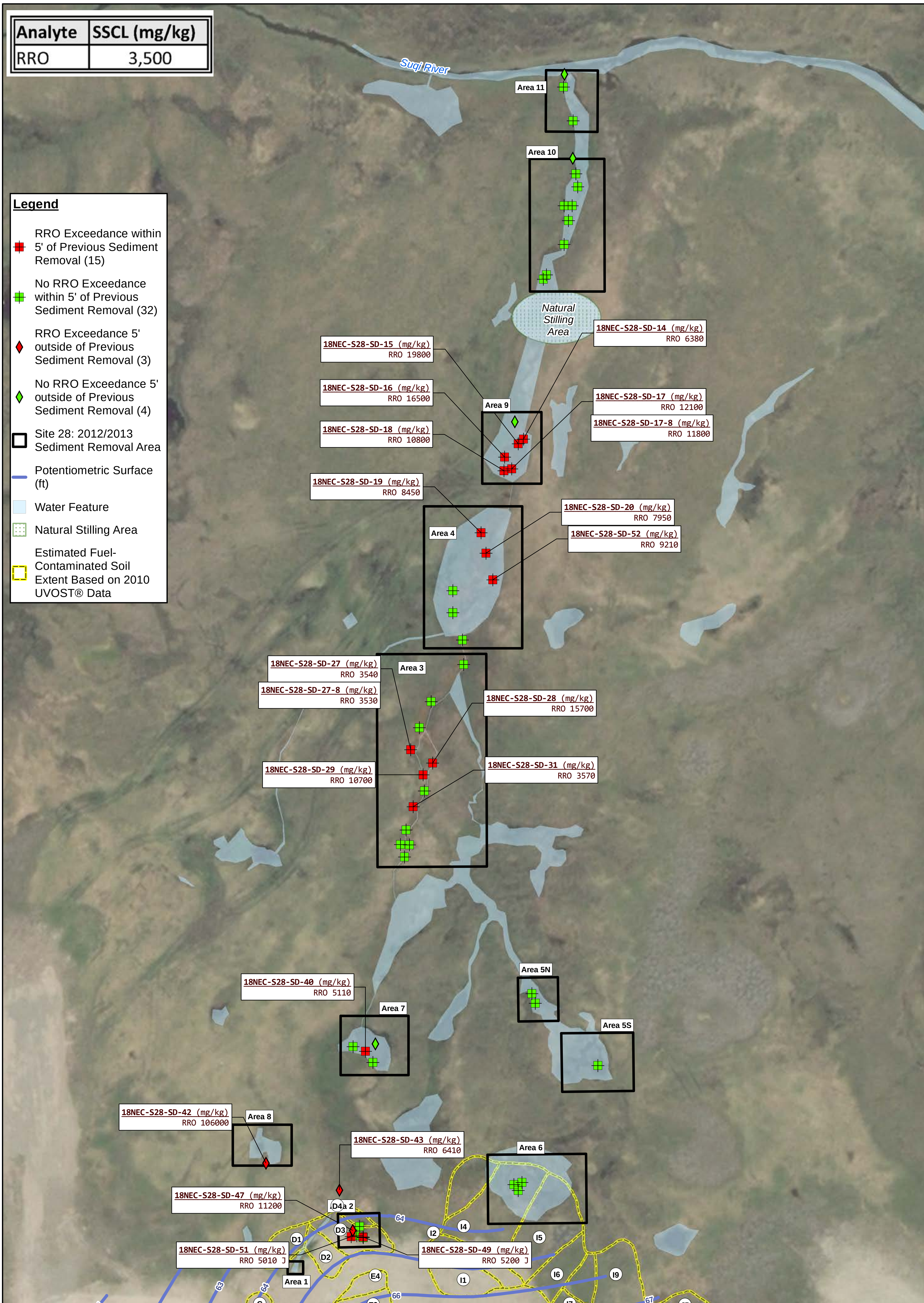
U.S. Army Corps of Engineers Alaska District

FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE F-5

P:\StLawrenceIsland_F10AK0969_NEC_2nd5YR_Sup\01_MXD\FigB-7toB-10_NEC_Site28_2018Results.mxd beatycj 1/9/2020



Approximate Groundwater Flow Direction

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

0 30 60 90 120
FEET

WGS 1984 UTM Zone 2N

SITE 28: RRO IN SEDIMENT
2018 SAMPLING RESULTS AFTER SILICA GEL CLEANUP

NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

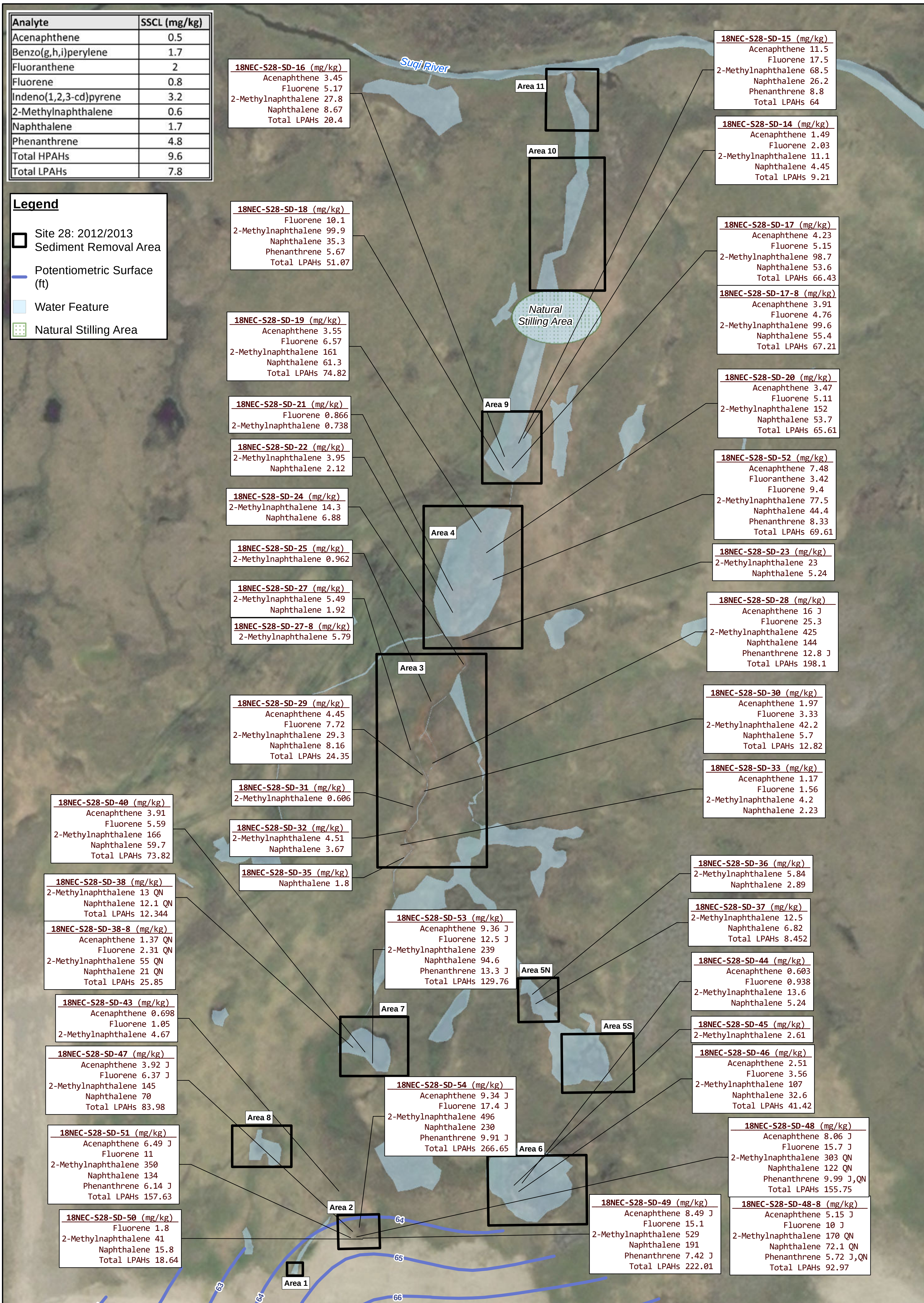
FUDS PROPERTY - F10AK0969

SAINT LAWRENCE ISLAND, ALASKA

FIGURE F-6

P:\StLawrenceIsland_FUDS_NEC_Site28_SedSampRpt_Sup\01_MXD\FigF-5 to F-8_NEC_Site28_2018Results.mxd beatycj 1/15/2020

Analyte	SSCL (mg/kg)
Acenaphthene	0.5
Benzo(g,h,i)perylene	1.7
Fluoranthene	2
Fluorene	0.8
Indeno(1,2,3-cd)pyrene	3.2
2-Methylnaphthalene	0.6
Naphthalene	1.7
Phenanthrene	4.8
Total HPAHs	9.6
Total LPAHs	7.8



Approximate Groundwater Flow Direction

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

0 30 60 90 120
FEET

WGS 1984 UTM Zone 2N

SITE 28: PAHs IN SEDIMENT 2018 SAMPLING RESULTS

NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army Corps of Engineers Alaska District

FUDS PROPERTY - F10AK0969

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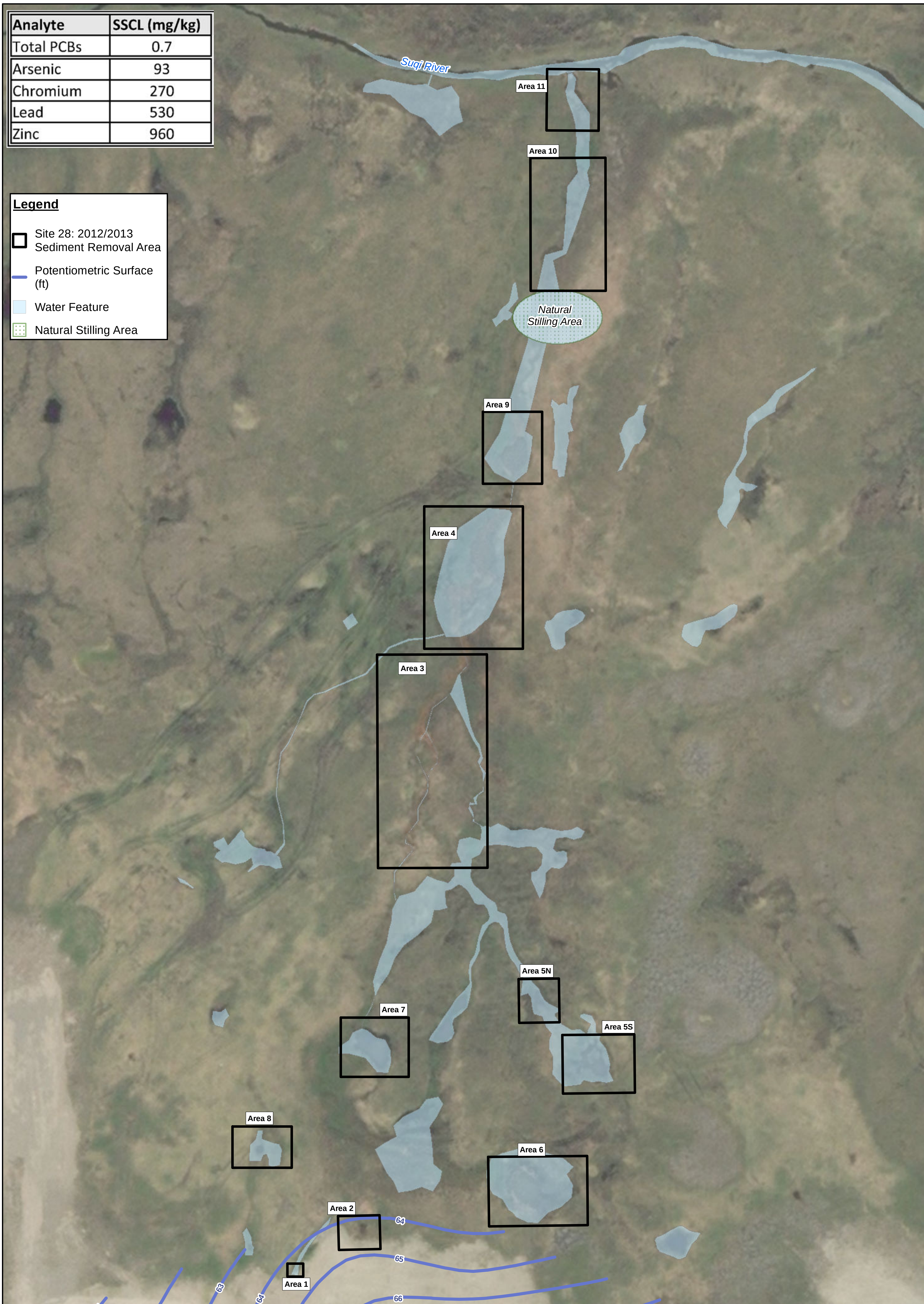
FIGURE F-7

P:\StLawrenceIsland_FUDS_NEC_Site28_SedSampRpt_Sup\01_MXD\FigF-5 to F-8_NEC_Site28_2018Results.mxd beatycj 1/15/2020



Analyte	SSCL (mg/kg)
Total PCBs	0.7
Arsenic	93
Chromium	270
Lead	530
Zinc	960

Legend

- Site 28: 2012/2013 Sediment Removal Area
- Potentiometric Surface (ft)
- Water Feature
- Natural Stilling Area

Approximate Groundwater Flow Direction

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

N

0 30 60 90 120
FEET

WGS 1984 UTM Zone 2N

SITE 28: PCBs AND METALS IN SEDIMENT
2018 SAMPLING RESULTS

NORTHEAST CAPE FIVE YEAR REVIEW

U.S. Army
Corps of Engineers
Alaska District

FUDS PROPERTY - F10AK0969

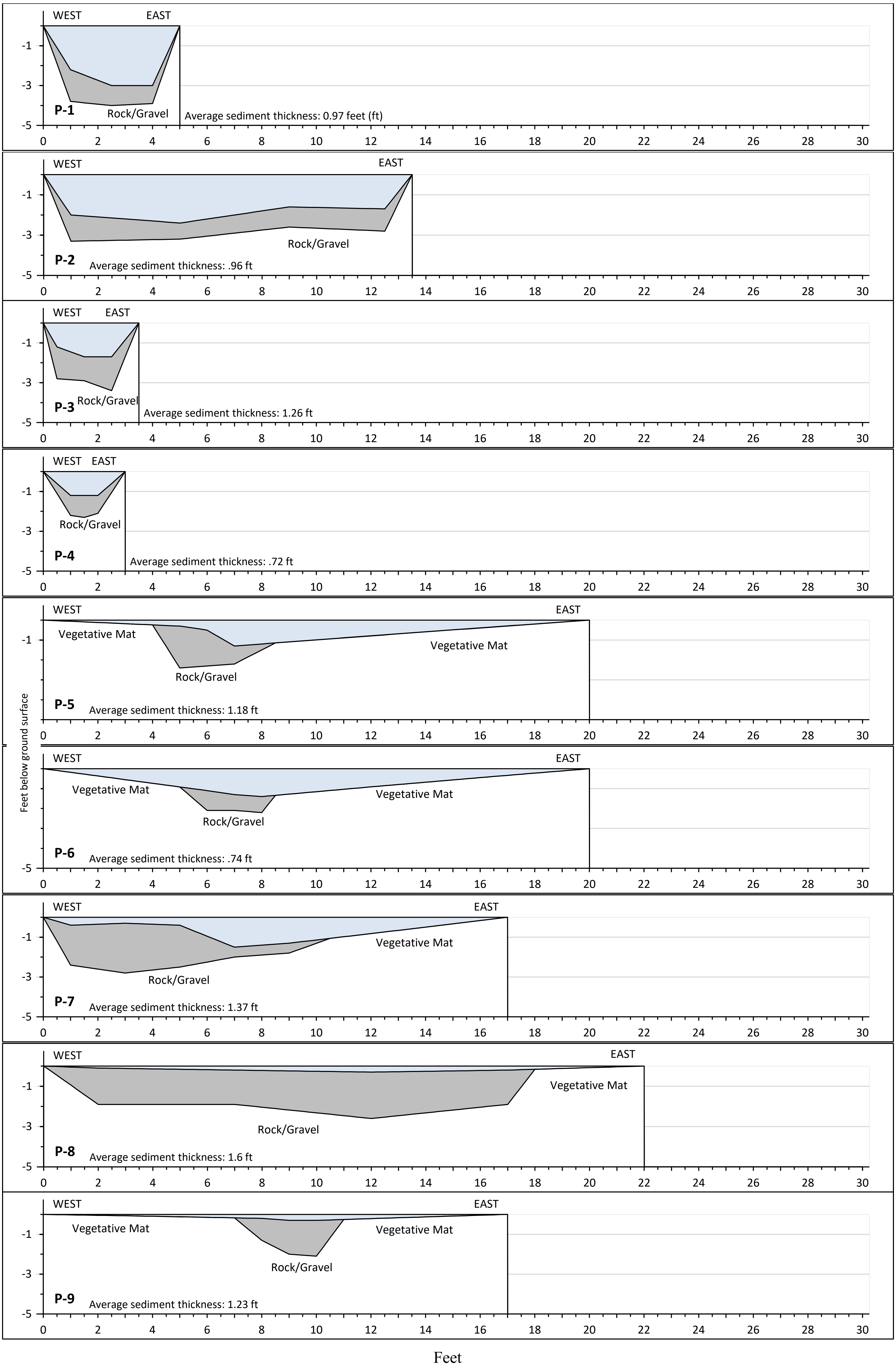
SAINT LAWRENCE ISLAND, ALASKA

FIGURE F-8

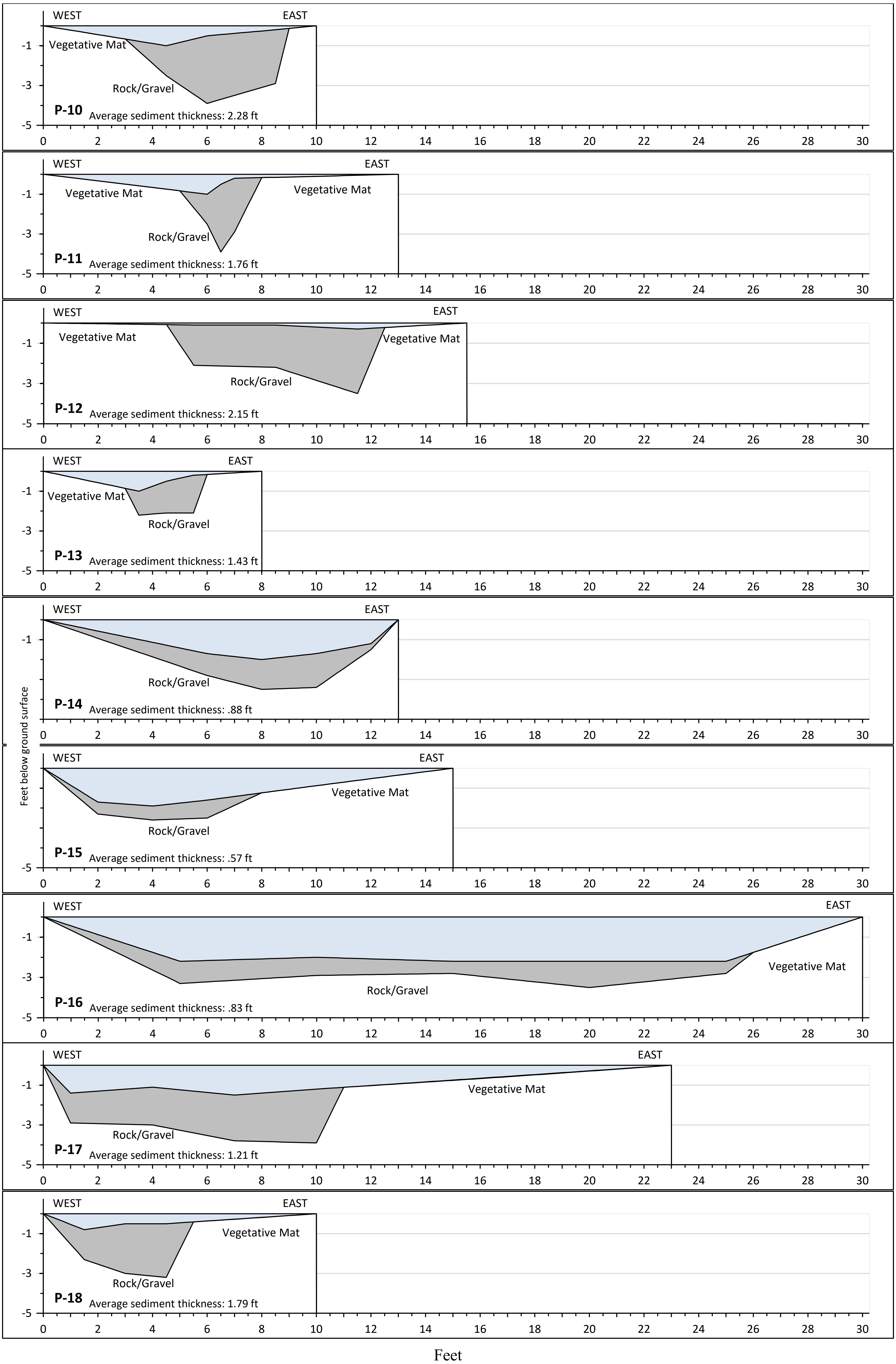
Sediment Transects

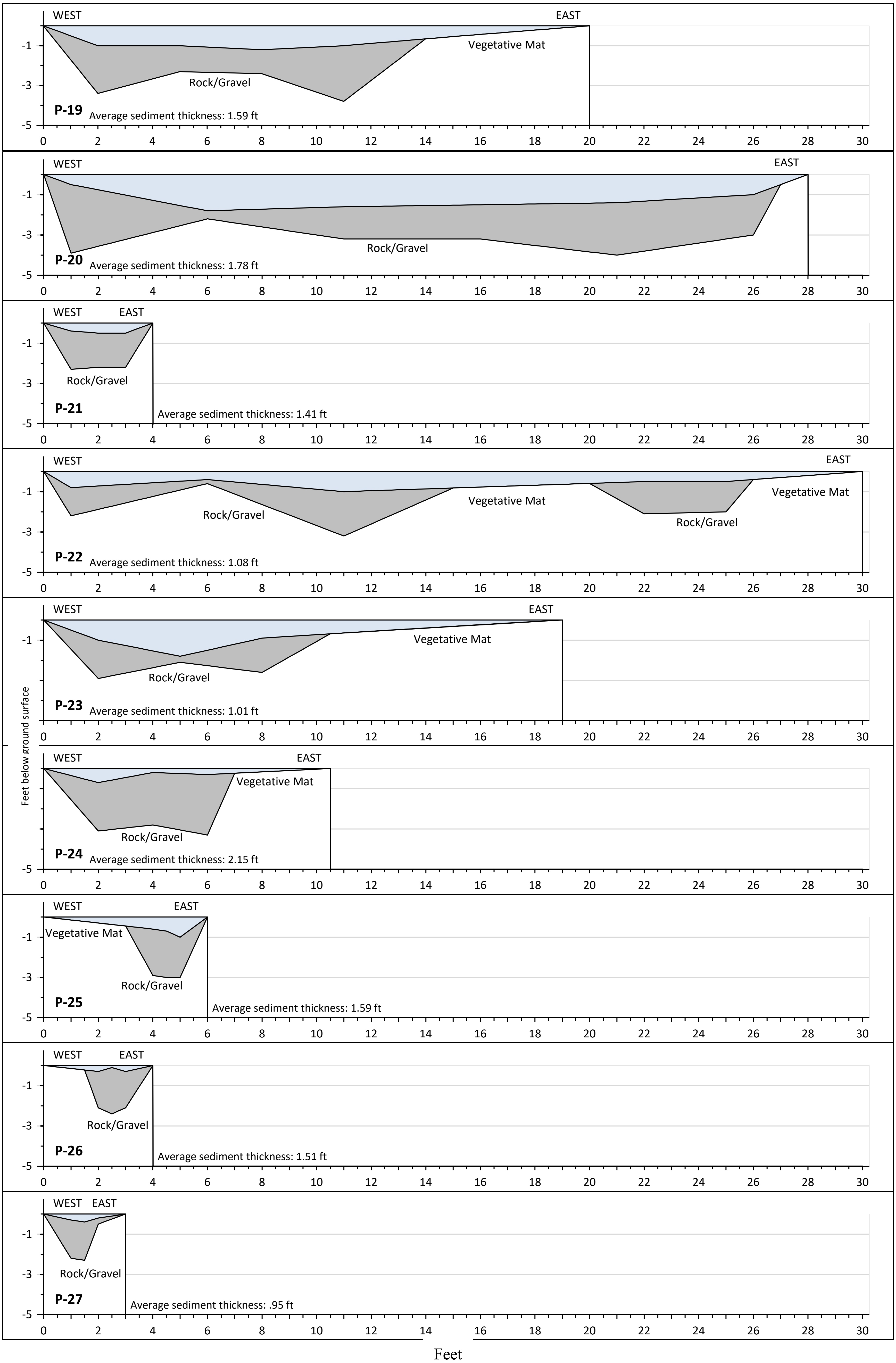
NORTHEAST CAPE FUDS 2018 SITE 28
SEDIMENT TRANSECT PROFILE

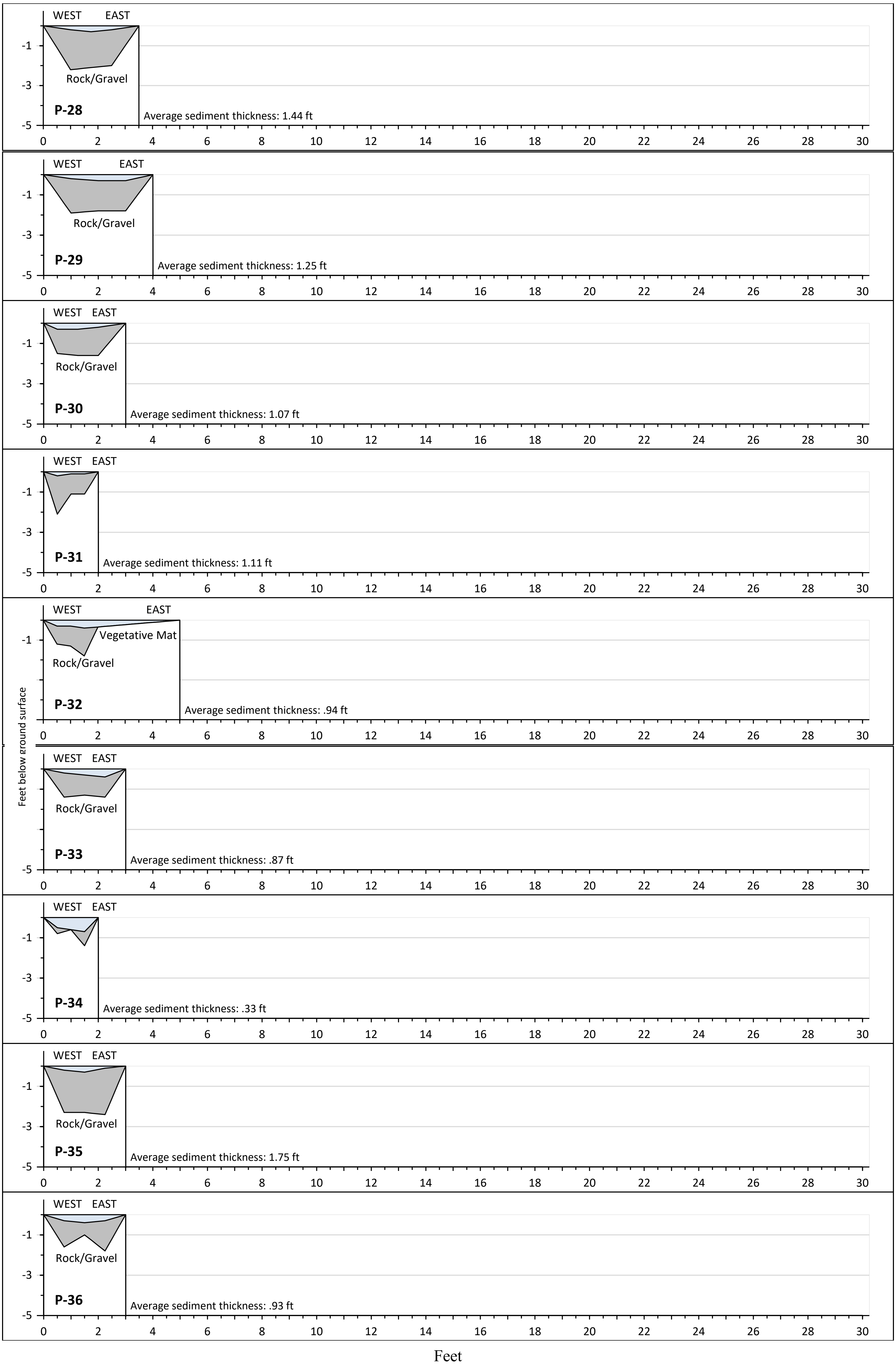
The cross sections provided in this attachment provide profiles for each sediment transect measured at Site 28. For linear water bodies, a profile transect was established every 30 feet along the length (north/south) of the area that contained sediment. Sediment thickness was measured across the width (east/west) of the profile transect with three or more evenly-spaced measurements. For discrete water bodies containing sediment, north/south and east/west transects were established. Transects crossed approximately at the center of the sediment area in the water body to measure thickness. Sediment thickness was measured to the nearest 0.1 foot starting from the edge of the sediment area and at intervals not exceeding 10 feet. The cross sections display the cardinal directions from which measurements were collected, show both the water (shaded blue) and sediment (shaded gray) thickness in feet, and note the presence of rock/gravel or vegetative mat where those features were recorded.



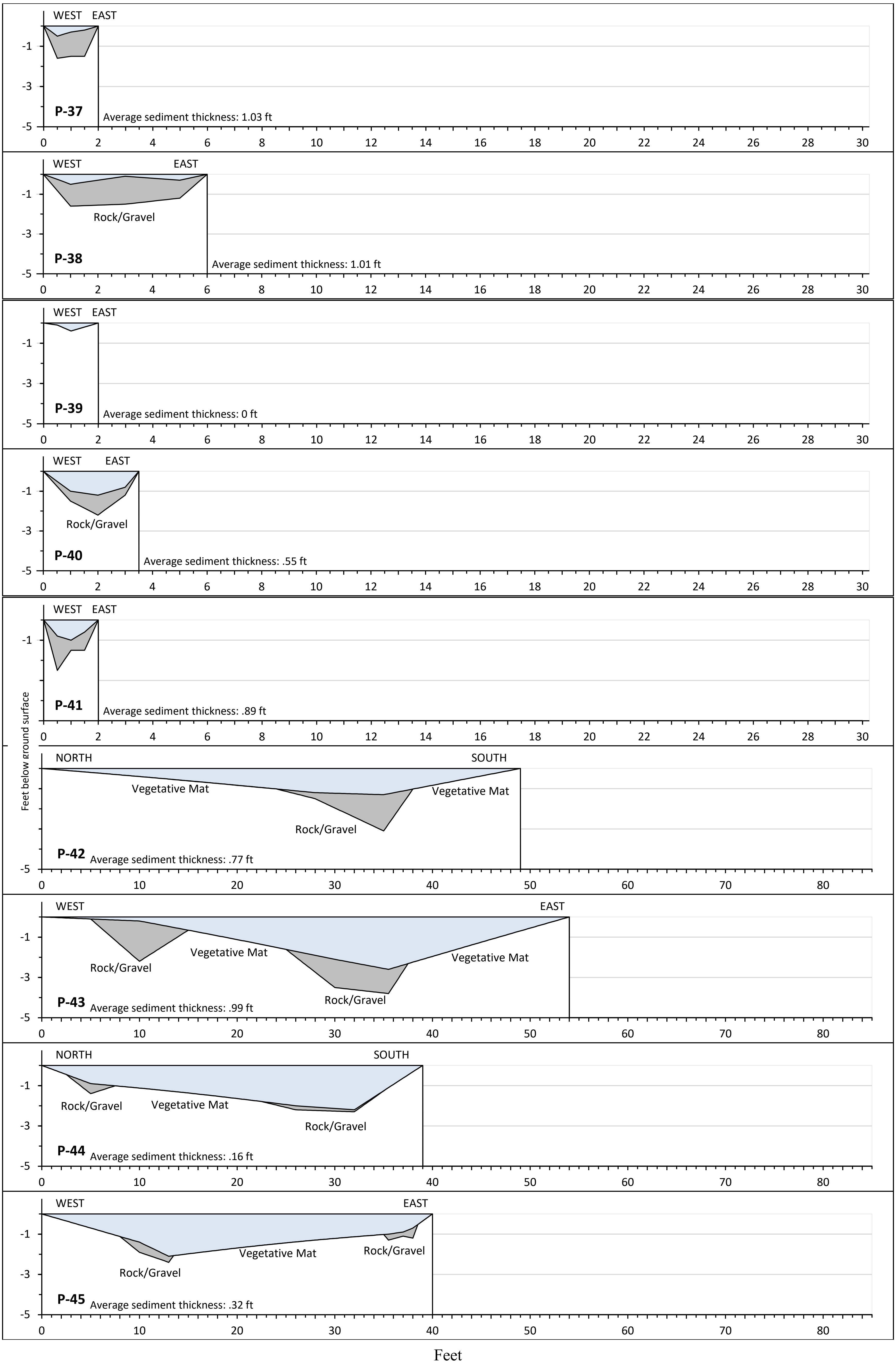
WEST
EAST
P-1
Rock/Gravel
Average sediment thickness: 0.97 feet (ft)
P-2
Average sediment thickness: .96 ft
P-3
Average sediment thickness: 1.26 ft
P-4
Average sediment thickness: .72 ft
P-5
Vegetative Mat
Average sediment thickness: 1.18 ft
P-6
Average sediment thickness: .74 ft
P-7
Average sediment thickness: 1.37 ft
P-8
Average sediment thickness: 1.6 ft
P-9
Average sediment thickness: 1.23 ft
Feet below ground surface
Feet


WEST
EAST
Vegetative Mat
Rock/Gravel
P-10
Average sediment thickness: 2.28 ft
WEST
EAST
Vegetative Mat
Vegetative Mat
Rock/Gravel
P-11
Average sediment thickness: 1.76 ft
WEST
EAST
Vegetative Mat
Vegetative Mat
Rock/Gravel
P-12
Average sediment thickness: 2.15 ft
WEST
EAST
Vegetative Mat
Rock/Gravel
P-13
Average sediment thickness: 1.43 ft
WEST
EAST
Rock/Gravel
P-14
Average sediment thickness: .88 ft
Feet below ground surface
WEST
EAST
Vegetative Mat
Rock/Gravel
P-15
Average sediment thickness: .57 ft
WEST
EAST
Vegetative Mat
Rock/Gravel
P-16
Average sediment thickness: .83 ft
WEST
EAST
Vegetative Mat
Rock/Gravel
P-17
Average sediment thickness: 1.21 ft
WEST
EAST
Vegetative Mat
Rock/Gravel
P-18
Average sediment thickness: 1.79 ft
Feet

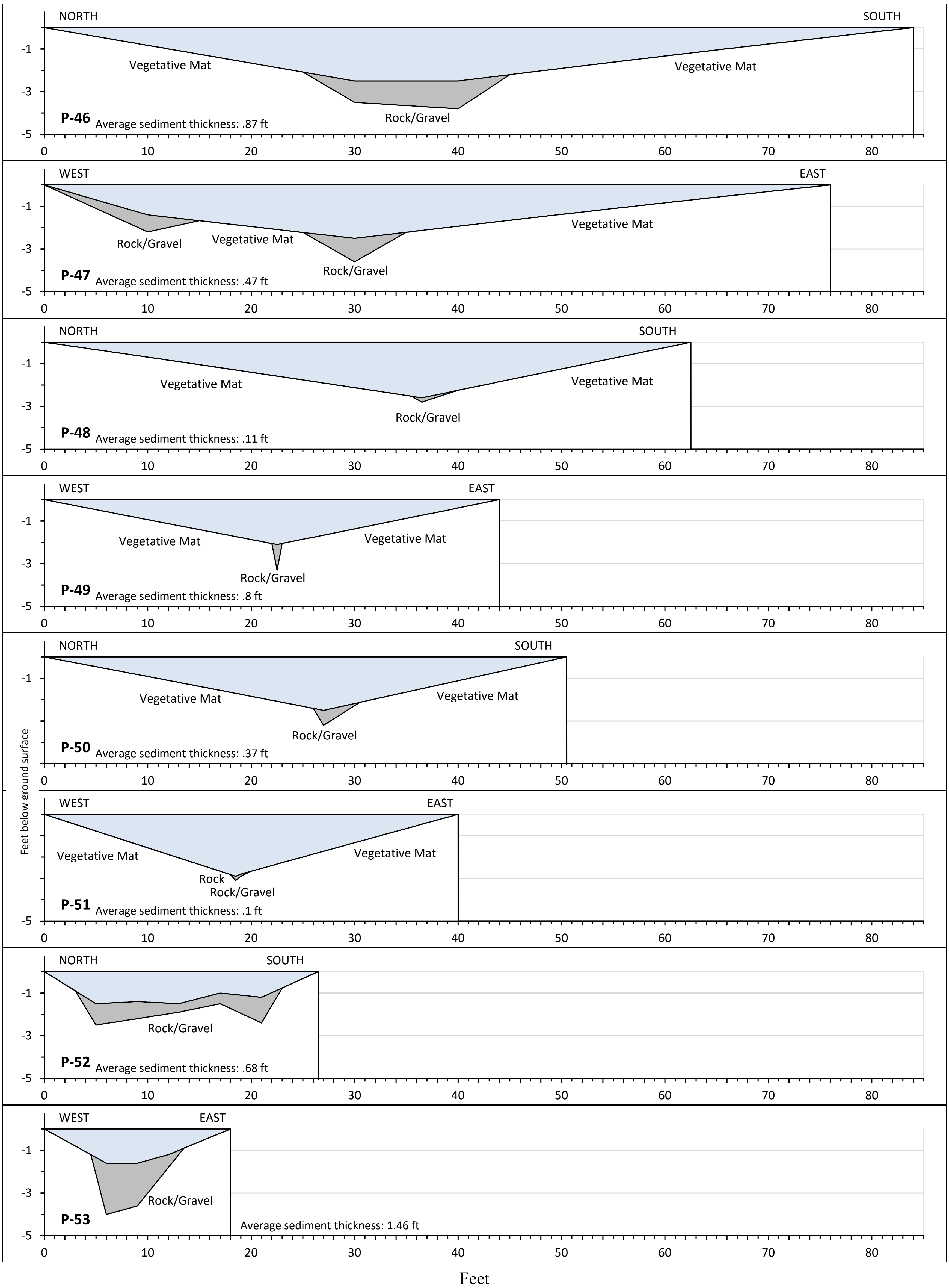

WEST
EAST
Vegetative Mat
Rock/Gravel
P-19
Average sediment thickness: 1.59 ft
WEST
EAST
Rock/Gravel
P-20
Average sediment thickness: 1.78 ft
WEST
EAST
Rock/Gravel
P-21
Average sediment thickness: 1.41 ft
WEST
EAST
Rock/Gravel
Vegetative Mat
Rock/Gravel
Vegetative Mat
P-22
Average sediment thickness: 1.08 ft
WEST
EAST
Vegetative Mat
Rock/Gravel
P-23
Average sediment thickness: 1.01 ft
WEST
EAST
Vegetative Mat
Rock/Gravel
P-24
Average sediment thickness: 2.15 ft
WEST
EAST
Vegetative Mat
Rock/Gravel
P-25
Average sediment thickness: 1.59 ft
WEST
EAST
Rock/Gravel
P-26
Average sediment thickness: 1.51 ft
WEST
EAST
Rock/Gravel
P-27
Average sediment thickness: .95 ft
Feet below ground surface
Feet



WEST
EAST
Rock/Gravel
P-28
Average sediment thickness: 1.44 ft
P-29
Average sediment thickness: 1.25 ft
P-30
Average sediment thickness: 1.07 ft
P-31
Average sediment thickness: 1.11 ft
Vegetative Mat
P-32
Average sediment thickness: .94 ft
P-33
Average sediment thickness: .87 ft
P-34
Average sediment thickness: .33 ft
P-35
Average sediment thickness: 1.75 ft
P-36
Average sediment thickness: .93 ft
Feet below ground surface
Feet



WEST EAST
P-37
Average sediment thickness: 1.03 ft
WEST EAST
Rock/Gravel
P-38
Average sediment thickness: 1.01 ft
WEST EAST
P-39
Average sediment thickness: 0 ft
WEST EAST
Rock/Gravel
P-40
Average sediment thickness: .55 ft
WEST EAST
P-41
Average sediment thickness: .89 ft
Feet below ground surface
NORTH SOUTH
Vegetative Mat
Vegetative Mat
Rock/Gravel
P-42
Average sediment thickness: .77 ft
WEST EAST
Rock/Gravel
Vegetative Mat
Vegetative Mat
Rock/Gravel
P-43
Average sediment thickness: .99 ft
NORTH SOUTH
Rock/Gravel
Vegetative Mat
Rock/Gravel
P-44
Average sediment thickness: .16 ft
WEST EAST
Rock/Gravel
Vegetative Mat
Rock/Gravel
P-45
Average sediment thickness: .32 ft
Feet



NORTH
SOUTH
Vegetative Mat
Vegetative Mat
Rock/Gravel
P-46
Average sediment thickness: .87 ft
WEST
EAST
Rock/Gravel
Vegetative Mat
Vegetative Mat
Rock/Gravel
P-47
Average sediment thickness: .47 ft
NORTH
SOUTH
Vegetative Mat
Vegetative Mat
Rock/Gravel
P-48
Average sediment thickness: .11 ft
WEST
EAST
Vegetative Mat
Vegetative Mat
Rock/Gravel
P-49
Average sediment thickness: .8 ft
NORTH
SOUTH
Vegetative Mat
Vegetative Mat
Rock/Gravel
P-50
Average sediment thickness: .37 ft
WEST
EAST
Vegetative Mat
Vegetative Mat
Rock
Rock/Gravel
P-51
Average sediment thickness: .1 ft
NORTH
SOUTH
Rock/Gravel
P-52
Average sediment thickness: .68 ft
WEST
EAST
Rock/Gravel
P-53
Average sediment thickness: 1.46 ft
Feet below ground surface
-1
-3
-5
0
10
20
30
40
50
60
70
80
Feet

ATTACHMENT F-2
Data Quality Assessment

2018 SITE 28 SEDIMENT SAMPLING REPORT AT NORTHEAST CAPE

ATTACHMENT F-2
SEDIMENT DATA QUALITY ASSESSMENT

NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA

FINAL

TABLE OF CONTENTS

TABLES

EXHIBITS

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
ADEC	Alaska Department of Environmental Conservation
APPL	Agriculture & Priority Pollutants Laboratories, Inc. of Clovis, CA
BTEX	benzene, toluene, ethylbenzene, and xylenes
CoC	chain-of-custody
DD	Decision Document
DL	detection limit
DoD	U.S. Department of Defense
DQA	data quality assessment
DQO	data quality objective
DRO	diesel-range organics
Dup	duplicate
EB	equipment blank
EPA	U.S. Environmental Protection Agency
FD	field duplicate
GW	groundwater
HCL	hydrochloric acid
HNO_3	nitric acid
Jacobs	Jacobs Engineering Group Inc.
L	liter
LCL	lower control limit
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LOD	limit of detection
LOQ	limit of quantitation
mg/L	milligrams per liter
mL	milliliter
MOC	Main Operations Complex
MS	matrix spike
MSD	matrix spike duplicate

ACRONYMS AND ABBREVIATIONS (Continued)

N/A	not applicable
NEC	Northeast Cape
ND	nondetect
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
QA	quality assurance
QC	quality control
QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act (of 1976, amended in 1984)
RPD	relative percent difference
RRO	residual-range organics
SD	sediment
SDG	sample delivery group
SGS	SGS North America, Inc. of Anchorage, AK
SIM	selective ion monitoring
SSCL	site-specific cleanup level
SW	surface water
TAT	turnaround time
TB	trip blank
TOC	total organic carbon
UCL	upper control limit
USACE	U.S. Army Corps of Engineers
VOA	volatile organic analysis

ANALYTICAL DATA QUALIFIERS

The following data qualifiers are applicable to the 2018 Northeast Cape analytical data:

J The analyte was positively identified; however, the associated result was less than the LOQ but greater than or equal to the DL.

B The analyte was detected in the method blank, the trip blank, or EB above the DL and the concentration in the sample did not exceed the blank concentration by a factor of five (factor of 10 for common laboratory contaminants acetone, toluene, and methylene chloride).

QH Analyte result was considered an estimated value (biased high) due to a QC failure.

QL Analyte result was considered an estimated value (biased low) due to a QC failure.

QN Analyte result was considered an estimated value (unknown bias) due to a QC failure.

R Result is rejected and should not be used for reporting purposes.

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1.0 INTRODUCTION

This data quality assessment (DQA) and Alaska Department of Environmental Conservation (ADEC) laboratory data review checklists assess the overall quality and usability of data from the 2018 sampling events at Northeast Cape (NEC) on Saint Lawrence Island, Alaska. The sediment samples were analyzed by SGS North America, Inc. of Anchorage, AK (SGS). All samples are presented in Table F2-1-1, categorized by method and sample type.

The exhibits to this DQA present the sample summary table and analytical data table (Exhibit F2-1), tables of sample results that did not meet the project data quality objectives (DQOs) (Exhibit F2-2), ADEC laboratory data review checklists (Exhibit F2-3), laboratory deliverables (Exhibit F2-4), and chromatograms relevant to the discussion of biogenic interference (Exhibit F2-5).

Table F2-1-1
Field QC Sample Quantities

Matrix	Sample Type	PAHs 8270SIM	DRO/RRO AK102+3	DRO/RRO Silica Gel AK102SG	Metals E200.8	Metals SW6020	PCBs SW8082	TOC SW9060
Sediment	Primary	54	54	54	N/A	54	54	54
	Duplicate	6	6	6	N/A	6	6	6
	MS/MSD	6	6	6	N/A	6	6	10
	EB	1	1	N/A	1	N/A	1	N/A

Note:
For definitions, refer to the Acronyms and Abbreviations section.

1.1 QC CRITERIA

Jacobs Engineering Group Inc. (Jacobs) performed this DQA and completed ADEC laboratory data review checklists for records associated with the analytical data, as per the *2018 Remedial Action Review Work Plan* (U.S. Army Corps of Engineers [USACE] 2018). Data quality was evaluated against the following requirements: U.S. Department of Defense (DoD) Quality

Systems Manual (QSM) (DoD 2017); ADEC and U.S. Environmental Protection Agency (EPA) analytical methods (ADEC 2017a, EPA 2014); and laboratory limits.

The Jacobs project chemist performed a completeness check of the electronic data to verify that data packages and electronic files included all the requested information. All analytical data were reviewed, including the chain-of-custody (CoC) and sample receipt records, laboratory case narratives, and laboratory data. Analytical data were reviewed for methodology, sample holding times, laboratory blanks, limits of quantitation (LOQs), limits of detection (LODs), detection limits (DLs), surrogate recoveries, laboratory control sample (LCS) and LCS duplicate (LCSD) recovery accuracies, matrix spike (MS) and MS duplicate (MSD) recovery accuracies, and precision. Other quality control (QC) parameters (initial calibration, continuing calibration, tuning, internal standards, interference check solutions, post-digestion spikes, and serial dilutions) were reviewed by means of the laboratory case narrative. These QC parameters met acceptance criteria; any sample results outside QC parameters are listed in Section 1.2 or in the associated ADEC laboratory data review checklist (Exhibit F2-3). Analytical DQOs were considered met when the quality of the sample data met precision, accuracy, representativeness, completeness, comparability, and sensitivity requirements. The overall quality of the data was acceptable as qualified. Flagged data are considered usable but estimated.

Qualification was not required in the following circumstances:

- Surrogate or MS/MSD recoveries were outside QC limits, and the sample was diluted by a factor of five or greater.
- MS/MSD recoveries were outside QC limits, and the spiked concentration was less than that of the parent sample.
- An analyte was detected in the method blank, but there was no detection in the sample.
- Surrogate, MS, or LCS recoveries exceeded upper control limits (UCLs), and there was no detection in the sample(s).

1.2 DATA QUALITY SUMMARY

In general, the overall quality of project data was acceptable, and the completeness goal of 95 percent was met for all parameters. Complete details of the evaluation and associated samples are provided in the ADEC laboratory review checklists (Exhibit F2-3). The tables in Exhibit F2-2 include analytical results that did not meet project DQOs and required qualification.

The following anomalies were identified during the data review process as follows:

- Sample handling/preservation
- Method blank and trip blank contamination
- LCS accuracy and precision
- MS accuracy and precision
- Surrogate spike accuracy
- Field duplicate (FD) precision
- Calibration Verification Samples
- Reporting limit assessment
- EB contamination

Sections 1.2.1 through 1.2.9 describe anomalies and their effects on data quality and usability.

1.2.1 Sample Handling/Preservation

Five coolers were sent to SGS for the sediment sampling effort. All sample coolers were received within the acceptable temperature range of 0 to 6 degrees Celsius (°C). No sample handling anomalies affecting data quality or usability were identified by the laboratory on the cooler receipt form or during this data quality review.

1.2.2 Method Blank and Trip Blank Contamination

There were no detections in the method blanks that required qualification of associated samples. The sediment sampling event did not include the analysis for volatile organics that require a trip blank.

1.2.3 LCS Accuracy and Precision

All LCS and LCSD recoveries and relative percent differences (RPDs) were within laboratory and DoD QSM control limits; therefore, no sample qualification was required.

1.2.4 MS Accuracy and Precision

MS/MSDs were collected to evaluate the accuracy and precision of matrix and/or laboratory procedures. The DoD QSM requirement of one project MS/MSD set for each preparation batch of 20 samples was not met. Table F2-1-2 presents the preparation batch and the associated parent sample MS/MSD. The MS/MSD recoveries for several analytes and analyses were outside of the QC criteria; however, failing recoveries on samples that were diluted more than five times were not qualified.

Table F2-1-2
Preparation Batch and Associated MS/MSD

SDG	Analytical Batch Number	Method	Parent Sample ID
1184373	MXX31829	SW6020A	18NEC-S28-SD-03
1184430	MXX31835	SW6020A	**No SSQC**
1184430	MXX31836	SW6020A	18NEC-S28-SD-28
1184430	MXX31840	SW6020A	18NEC-S28-SD-54
1184430	MXX31843	E200.8	**No SSQC**
1184373	WXX12476	SW9060	18NEC-S28-SD-03
1184430	WXX12484	SW9060	18NEC-S28-SD-17
1184430	WXX12484	SW9060	18NEC-S28-SD-26
1184430	WXX12488	SW9060	18NEC-S28-SD-28
1184430	WXX12488	SW9060	18NEC-S28-SD-39
1184430	WXX12489	SW9060	18NEC-S28-SD-54
1184430	WXX12489	SW9060	18NEC-S28-SD-44
1184373	XXX40151	8270SIM	18NEC-S28-SD-03
1184373	XXX40152	SW8082A	18NEC-S28-SD-03
1184373	XXX40154	AK102	18NEC-S28-SD-03
1184373	XXX40154A	AK103	18NEC-S28-SD-03
1184373	XXX40155	AK102SG	18NEC-S28-SD-03
1184373	XXX40155A	AK103SG	18NEC-S28-SD-03
1184430	XXX40169	8270SIM	**No SSQC**
1184430	XXX40172	8270SIM	18NEC-S28-SD-28
1184430	XXX40174	8270SIM	**No SSQC**
1184430	XXX40175	SW8082A	**No SSQC**
1184430	XXX40176	SW8082A	18NEC-S28-SD-28

Table F2-1-2 (Continued)
Preparation Batch and Associated MS/MSD

SDG	Analytical Batch Number	Method	Parent Sample ID
1184430	XXX40178	AK102SG	18NEC-S28-SD-28
1184430	XXX40178A	AK103SG	18NEC-S28-SD-28
1184430	XXX40179	AK102	18NEC-S28-SD-28
1184430	XXX40179A	AK103	18NEC-S28-SD-28
1184430	XXX40180	SW8082A	**No SSQC**
1184430	XXX40183	SW8082A	18NEC-S28-SD-54
1184430	XXX40184	8270SIM	18NEC-S28-SD-54
1184430	XXX40192	AK102	18NEC-S28-SD-54
1184430	XXX40192A	AK103	18NEC-S28-SD-54
1184430	XXX40193	AK102SG	18NEC-S28-SD-54
1184430	XXX40193A	AK103SG	18NEC-S28-SD-54
1184430	XXX40205	AK102	**No SSQC**
1184430	XXX40205A	AK103	**No SSQC**
1184430	XXX40206	AK102SG	**No SSQC**
1184430	XXX40206A	AK103SG	**No SSQC**
1184430	XXX40207	AK102	**No SSQC**
1184430	XXX40207A	AK103	**No SSQC**
1184430	XXX40262	SW8082A	**No SSQC**

Note:
SSQC = site specific quality control

1.2.5 Surrogate Spike Accuracy

Sample results with surrogates outside of QC criteria were qualified as estimated except in the following cases: nondetect (ND) samples with high surrogate recoveries or samples with a dilution factor of five or greater. Sample results for SW8260, SW8270, and SW8270SIM were only qualified for surrogate recovery exceedances if two or more surrogates did not meet QC criteria. Sample results with low surrogate recoveries were qualified QL and are considered biased low.

Many sediment samples were diluted beyond five times during extraction and analysis, resulting in surrogate recoveries outside of control limits. These results did not require qualification. One sample, 18NEC-S28-SD-47, was diluted during the extraction process (final extract volume greater than standard final volume) for diesel-range organics (DRO) and reported with an analytical dilution of one. The sample results were not qualified as the extraction dilution occurred due to extract color (high levels of non-target organics) and the total dilution exceeded five times.

Only one project sample required qualification for surrogate recovery. The polychlorinated biphenyl (PCB) results in sample 18NEC-S28-SD-42 were qualified QL to indicate a possible low bias due to low surrogate recovery (39 percent). Data usability was minimally affected since the qualified results were ND with LODs significantly less than the associated site-specific cleanup level (SSCL). Table F-2.1 (Exhibit F2-2) provides a summary of the surrogate recovery outliers and the affected sample results.

1.2.6 FD Precision

FD samples were collected to evaluate the precision of matrix and/or laboratory procedures. The frequency criterion for FD, one per ten primary samples, was met for each analytical method, as outlined in the Section 2.3.1 of the quality assurance project plan (USACE 2018). Table F2-1-1 provides a summary of the FD quantities, summarized by analytical method.

FD precision was evaluated against the recommended RPD limit of 50 percent, as stated in the ADEC *Field Sampling Guidance* (ADEC 2017b). RPD values for sample/duplicate pair results, where one was ND and the other was detected, were calculated using the LOD value for the ND result. Results were qualified as estimated (QN) in several samples due to high FD RPD values. All qualified results were less than the respective SSCLs except for those listed in Table F2-1-3.

Table F2-1-3
Duplicate Results Exceeding DD Limits

Sample ID	Analyte	Result (mg/kg)	NE Cape DD SSCL (mg/kg)
18NEC-S28-SD-38	2-Methylnaphthalene	13	0.6
18NEC-S28-SD-38-8	2-Methylnaphthalene	55	0.6
18NEC-S28-SD-38-8	Acenaphthene	1.37	0.5
18NEC-S28-SD-38-8	DRO	6620	3500
18NEC-S28-SD-38-8	DRO-silica gel	4610	3500
18NEC-S28-SD-38-8	Fluorene	2.31	0.8
18NEC-S28-SD-38	Naphthalene	12.1	1.7
18NEC-S28-SD-38-8	Naphthalene	21	1.7
18NEC-S28-SD-48	2-Methylnaphthalene	303	0.6
18NEC-S28-SD-48-8	2-Methylnaphthalene	170	0.6
18NEC-S28-SD-48	Naphthalene	122	1.7
18NEC-S28-SD-48-8	Naphthalene	72.1	1.7
18NEC-S28-SD-48	Phenanthrene	9.99	4.8
18NEC-S28-SD-48-8	Phenanthrene	5.72	4.8

Note:
For definitions, refer to the Acronyms and Abbreviations section.

The high RPD values are attributed to the sample matrix, which contained high and variable levels of naturally occurring organics. Unless otherwise noted, the higher value between the sample and the FD will be used for reporting purposes. Table F-2.2 (Exhibit F2-2) provides a summary of sample results that were qualified QN due to FD RPD outliers.

1.2.7 Calibration Verification Samples

The laboratory did not identify any instrument QC issues that required qualification of associated samples.

1.2.8 Reporting Limit Assessment

Laboratory LODs for ND sample results were evaluated against the SSCLs defined in Table 2-1 of the quality assurance project plan (USACE 2018). The confidence level at the LOD was 99 percent (1 percent false negative rate) as per the DoD QSM definition. This level of uncertainty was deemed acceptable for this DQA.

The laboratory LODs were greater than the SSCLs for five analytes in seven instances. For sample 18NEC-S28-SD-34, 2-methlynaphthalene and acenaphthene were greater than the SSCLs due to a 10-fold dilution. For sample 18NEC-S28-SD-35, acenaphthene was greater than the SSCLs due to a 10-fold dilution. Aroclor 1221 was also greater than the total PCB SSCL for 8NEC-S28-SD-35 in an undiluted analysis. 18NEC-S28-SD-36, acenaphthene and fluorene were greater than the SSCLs due to a 10-fold dilution. Aroclor 1221 was also greater than the total PCB SSCL for 8NEC-S28-SD-36 in an undiluted analysis.

The overall data quality was not significantly affected for this issue because of the limited number of occurrences and the fact that sample dilution was the primary cause. Additionally, Aroclor 1221 was not found in any historical NEC samples above the total PCB SSCL. ND samples that had LODs exceeding the cleanup level are shown in italics in the analytical data tables (Exhibit F2-1) and listed in Table F-2.3 (Exhibit F2-2).

1.2.9 EB Contamination

One equipment blank (EB) was collected during this project for the sediment effort. Naphthalene and zinc were detected above the DL in the EB; however, samples were not qualified unless the result was within five times the EB contamination. EB detections are shown in Table F-2.4 (Exhibit F2-2). There were no results that required qualification due to EB detections.

2.0 CONCLUSION

In general, the overall quality of project data was acceptable. The completeness goal of 95 percent for all parameters was met as no results were rejected (100 percent completeness). Seven ND LOD values exceeded the SSCLs but did not significantly affect data usability due to the limited extent of occurrences and the analytes involved.

A review of the chromatographs led to the conclusion that the DRO and residual-range organics (RRO) results in the sediment samples are elevated due to naturally occurring biogenic interference. A silica gel cleanup applied during the sample extraction reduced but did not eliminate the interference. See Section 4.3.2 of the 2018 Site 28 Sediment Mapping and Sampling Report (Appendix F) and the Biogenic Chromatograms (Exhibit F2-5) for more discussion of the impacts of biogenic interference.

The qualifications applied during data validation did not adversely affect data usability. Limitations are discussed in this DQA and ADEC laboratory data review checklists (Exhibit F2-3).

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3.0 REFERENCES

ADEC (Alaska Department of Environmental Conservation). 2017a (22 March). *Underground Storage Tanks Procedures Manual, Guidance for Treatment of Petroleum-Contaminated Soil and Water and Standard Sampling Procedures*. Division of Spill Prevention and Response, Contaminated Sites Program.

ADEC. 2017b (August). *Field Sampling Guidance*. Final. Division of Spill Prevention and Response, Contaminated Sites Program.

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EXHIBIT F2-1

Sample Summary Table and Analytical Data Tables

2018 Site 28 Sediment Mapping and Sampling Report at Northeast Cape
Table F-1.1 Sediment Results

				Location ID:	S28-01	S28-02	S28-02	S28-03	S28-04	S28-05	S28-06
				Sample ID:	18NEC-S28-SD-01	18NEC-S28-SD-02	18NEC-S28-SD-02-8	18NEC-S28-SD-03	18NEC-S28-SD-04	18NEC-S28-SD-05	18NEC-S28-SD-06
				Sample Date:	8/7/2018	8/7/2018	8/7/2018	8/7/2018	8/7/2018	8/7/2018	8/7/2018
				Sample Type:	SD	SD	SD	SD	SD	SD	SD
				SDG:	1184373	1184373	1184373	1184373	1184373	1184373	1184373
				Laboratory:	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA
				QAQC:	Primary	Primary	Duplicate	Primary	Primary	Primary	Primary
Method	**Group**	**Analyte**	**Units**	**Screening Level[1]**							
Fuels											
AK102_103	Fuels	DRO	mg/kg	3500	717 [44.6]	786 [42.4]	853 [38]	375 [29.4]	519 [31.6]	1540 [54]	429 [57]
AK102_103_SG	Fuels	DRO	mg/kg	3500	414 [44.6]	546 [42.4]	484 [38]	265 [29.4]	387 [31.6]	1110 [54]	237 [57]
AK102_103	Fuels	RRO	mg/kg	3500	2430 [44.6]	2270 [42.4]	2310 [38]	1060 [29.4]	1100 [31.6]	2220 [54]	1020 [57]
AK102_103_SG	Fuels	RRO	mg/kg	3500	984 [44.6]	785 [42.4]	727 [38]	396 [29.4]	396 [31.6]	835 [54]	351 [57]
PAHs											
8270SIM	PAHs	Acenaphthene	mg/kg	0.5	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	Acenaphthylene	mg/kg	–	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	Anthracene	mg/kg	–	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	Benzo(a)anthracene	mg/kg	–	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	Benzo(a)pyrene	mg/kg	–	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	Benzo(b)fluoranthene	mg/kg	–	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	Benzo(g,h,i)perylene	mg/kg	1.7	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	Benzo(k)fluoranthene	mg/kg	–	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	Chrysene	mg/kg	–	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	Dibenzo(a,h)anthracene	mg/kg	–	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	Fluoranthene	mg/kg	2	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	Fluorene	mg/kg	0.8	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	3.2	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	1-Methylnaphthalene	mg/kg	–	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	0.106 [0.199] J	ND [0.335]	ND [0.353]
8270SIM	PAHs	2-Methylnaphthalene	mg/kg	0.6	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	Naphthalene	mg/kg	1.7	ND [0.223]	ND [0.212]	ND [0.187]	0.428 [0.145]	ND [0.159]	ND [0.268]	ND [0.283]
8270SIM	PAHs	Phenanthrene	mg/kg	4.8	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
8270SIM	PAHs	Pyrene	mg/kg	–	ND [0.279]	ND [0.266]	ND [0.234]	ND [0.181]	ND [0.199]	ND [0.335]	ND [0.353]
NR	PAHs	Total HPAHs	mg/kg	9.6	ND []	ND []	ND []	ND []	ND []	ND []	ND []
NR	PAHs	Total LPAHs	mg/kg	7.8	ND []	ND []	ND []	0.428 []	ND []	ND []	ND []
PCBs											
8082	PCBs	Aroclor-1016	mg/kg	0.7	ND [0.055]	ND [0.053]	ND [0.0468]	ND [0.0366]	ND [0.0399]	ND [0.067]	ND [0.072]
8082	PCBs	Aroclor-1221	mg/kg	0.7	ND [0.22]	ND [0.212]	ND [0.187]	ND [0.146]	ND [0.16]	ND [0.268]	ND [0.288]
8082	PCBs	Aroclor-1232	mg/kg	0.7	ND [0.055]	ND [0.053]	ND [0.0468]	ND [0.0366]	ND [0.0399]	ND [0.067]	ND [0.072]
8082	PCBs	Aroclor-1242	mg/kg	0.7	ND [0.055]	ND [0.053]	ND [0.0468]	ND [0.0366]	ND [0.0399]	ND [0.067]	ND [0.072]
8082	PCBs	Aroclor-1248	mg/kg	0.7	ND [0.055]	ND [0.053]	ND [0.0468]	ND [0.0366]	ND [0.0399]	ND [0.067]	ND [0.072]
8082	PCBs	Aroclor-1254	mg/kg	0.7	ND [0.055]	ND [0.053]	ND [0.0468]	ND [0.0366]	ND [0.0399]	ND [0.067]	ND [0.072]
8082	PCBs	Aroclor-1260	mg/kg	0.7	ND [0.055]	ND [0.053]	ND [0.0468]	ND [0.0366]	ND [0.0399]	ND [0.067]	ND [0.072]
8082	PCBs	PCBs	mg/kg	0.7	ND [0.055]	ND [0.053]	ND [0.0468]	ND [0.0366]	ND [0.0399]	ND [0.067]	ND [0.072]
Metals											
6020	Metals	Arsenic	mg/kg	93	5.88 [1.02]	7.76 [1.02]	6.28 [0.88]	2.64 [0.7]	3.21 [0.765]	19.7 [1.24]	30.3 [1.44]
6020	Metals	Chromium	mg/kg	270	15.5 [0.409]	15.3 [0.41]	12.6 [0.352]	8.6 [0.281]	6.77 [0.307]	11.4 [0.497]	6.73 [0.575]
6020	Metals	Lead	mg/kg	530	14.7 [0.205]	9.71 [0.205]	7.67 [0.176]	6.32 [0.141]	5.41 [0.154]	8.09 [0.249]	5.78 [0.287]
6020	Metals	Selenium	mg/kg	–	0.918 [1.02] J	1.37 [1.02] J,QN	0.804 [0.88] J,QN	0.522 [0.7] J	ND [0.765]	1.07 [1.24] J	ND [1.44]
6020	Metals	Zinc	mg/kg	960	47.3 [2.56]	35.3 [2.56]	29.2 [2.2]	22.8 [1.75]	19.4 [1.92]	39.8 [3.11]	32.2 [3.59]
IonsNutrients											
9060	IonsNutrients	TOC	percent	–	6.13	7.3	6.05	2.93	2.75	7.5	5.4
Other											
A2540G	Other	Total Solids	percent	–	44.5	46.9	52.5	67.6	62.7	37.1	34.6

Notes:

[1] Decision Document cleanup level (USACE 2009).

[ ] denotes the LOD or no number if no LOD was reported

Bold = Result is greater than or equal to the screening level[1]

= LOD greater than or equal to the screening level[1]

— = method or screening level not available or analysis not conducted

For data qualifiers, refer to the Analytical Data Qualifiers section of the DQA.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

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Table F-1.1 Sediment Results

				Location ID:	S28-07	S28-08	S28-09	S28-10	S28-11	S28-12	S28-13
				Sample ID:	18NEC-S28-SD-07	18NEC-S28-SD-08	18NEC-S28-SD-09	18NEC-S28-SD-10	18NEC-S28-SD-11	18NEC-S28-SD-12	18NEC-S28-SD-13
				Sample Date:	8/7/2018	8/7/2018	8/7/2018	8/7/2018	8/7/2018	8/7/2018	8/7/2018
				Sample Type:	SD	SD	SD	SD	SD	SD	SD
				SDG:	1184373	1184373	1184373	1184373	1184373	1184373	1184373
				Laboratory:	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA
				QAQC:	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Method	**Group**	**Analyte**	**Units**	**Screening Level[1]**							
Fuels											
AK102_103	Fuels	DRO	mg/kg	3500	214 [26.6]	300 [65.5]	445 [46.3]	617 [39.1]	1410 [70.5]	483 [51.5]	2230 [53.5]
AK102_103_SG	Fuels	DRO	mg/kg	3500	102 [26.6]	171 [65.5]	301 [46.3]	450 [39.1]	954 [70.5]	270 [51.5]	1890 [53.5]
AK102_103	Fuels	RRO	mg/kg	3500	1080 [26.6]	844 [65.5]	1280 [46.3]	1270 [39.1]	**3840 [70.5]**	1940 [51.5]	1280 [53.5]
AK102_103_SG	Fuels	RRO	mg/kg	3500	366 [26.6]	296 [65.5]	503 [46.3]	487 [39.1]	1660 [70.5]	656 [51.5]	698 [53.5]
PAHs											
8270SIM	PAHs	Acenaphthene	mg/kg	0.5	ND [0.167]	ND [0.407]	0.268 [0.291] J	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	Acenaphthylene	mg/kg	–	ND [0.167]	ND [0.407]	ND [0.291]	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	Anthracene	mg/kg	–	ND [0.167]	ND [0.407]	ND [0.291]	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	Benzo(a)anthracene	mg/kg	–	ND [0.167]	ND [0.407]	ND [0.291]	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	Benzo(a)pyrene	mg/kg	–	ND [0.167]	ND [0.407]	ND [0.291]	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	Benzo(b)fluoranthene	mg/kg	–	ND [0.167]	ND [0.407]	ND [0.291]	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	Benzo(g,h,i)perylene	mg/kg	1.7	ND [0.167]	ND [0.407]	ND [0.291]	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	Benzo(k)fluoranthene	mg/kg	–	ND [0.167]	ND [0.407]	ND [0.291]	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	Chrysene	mg/kg	–	ND [0.167]	ND [0.407]	ND [0.291]	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	Dibenzo(a,h)anthracene	mg/kg	–	ND [0.167]	ND [0.407]	ND [0.291]	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	Fluoranthene	mg/kg	2	ND [0.167]	ND [0.407]	0.437 [0.291] J	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	Fluorene	mg/kg	0.8	ND [0.167]	ND [0.407]	0.238 [0.291] J	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	3.2	ND [0.167]	ND [0.407]	ND [0.291]	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	1-Methylnaphthalene	mg/kg	–	ND [0.167]	ND [0.407]	0.17 [0.291] J	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	2-Methylnaphthalene	mg/kg	0.6	ND [0.167]	ND [0.407]	0.232 [0.291] J	0.125 [0.246] J	0.233 [0.443] J	ND [0.321]	ND [0.332]
8270SIM	PAHs	Naphthalene	mg/kg	1.7	ND [0.133]	ND [0.326]	0.336 [0.233] J	ND [0.196]	ND [0.354]	ND [0.257]	ND [0.266]
8270SIM	PAHs	Phenanthrene	mg/kg	4.8	ND [0.167]	ND [0.407]	0.608 [0.291]	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
8270SIM	PAHs	Pyrene	mg/kg	–	ND [0.167]	ND [0.407]	0.28 [0.291] J	ND [0.246]	ND [0.443]	ND [0.321]	ND [0.332]
NR	PAHs	Total HPAHs	mg/kg	9.6	ND []	ND []	0.717 []	ND []	ND []	ND []	ND []
NR	PAHs	Total LPAHs	mg/kg	7.8	ND []	ND []	1.45 []	ND []	ND []	ND []	ND []
PCBs											
8082	PCBs	Aroclor-1016	mg/kg	0.7	ND [0.0333]	ND [0.082]	ND [0.0575]	ND [0.0494]	ND [0.0885]	ND [0.064]	ND [0.067]
8082	PCBs	Aroclor-1221	mg/kg	0.7	ND [0.133]	ND [0.327]	ND [0.23]	ND [0.198]	ND [0.353]	ND [0.256]	ND [0.269]
8082	PCBs	Aroclor-1232	mg/kg	0.7	ND [0.0333]	ND [0.082]	ND [0.0575]	ND [0.0494]	ND [0.0885]	ND [0.064]	ND [0.067]
8082	PCBs	Aroclor-1242	mg/kg	0.7	ND [0.0333]	ND [0.082]	ND [0.0575]	ND [0.0494]	ND [0.0885]	ND [0.064]	ND [0.067]
8082	PCBs	Aroclor-1248	mg/kg	0.7	ND [0.0333]	ND [0.082]	ND [0.0575]	ND [0.0494]	ND [0.0885]	ND [0.064]	ND [0.067]
8082	PCBs	Aroclor-1254	mg/kg	0.7	ND [0.0333]	ND [0.082]	ND [0.0575]	ND [0.0494]	ND [0.0885]	ND [0.064]	ND [0.067]
8082	PCBs	Aroclor-1260	mg/kg	0.7	ND [0.0333]	ND [0.082]	ND [0.0575]	ND [0.0494]	ND [0.0885]	ND [0.064]	ND [0.067]
8082	PCBs	PCBs	mg/kg	0.7	ND [0.0333]	ND [0.082]	ND [0.0575]	ND [0.0494]	ND [0.0885]	ND [0.064]	ND [0.067]
Metals											
6020	Metals	Arsenic	mg/kg	93	4.95 [0.615]	32.7 [1.5]	16.9 [1.12]	9.09 [0.95]	25.4 [1.66]	21.6 [1.18]	45.4 [1.3]
6020	Metals	Chromium	mg/kg	270	22.8 [0.246]	7.91 [0.6]	9.59 [0.446]	9.14 [0.379]	20 [0.665]	18.1 [0.47]	6.1 [0.525]
6020	Metals	Lead	mg/kg	530	9.45 [0.123]	6.62 [0.3]	7.63 [0.223]	7.27 [0.19]	13.3 [0.332]	9.78 [0.235]	5.74 [0.262]
6020	Metals	Selenium	mg/kg	–	0.472 [0.615] J	1.13 [1.5] J	ND [1.12]	ND [0.95]	1.66 [1.66] J	0.964 [1.18] J	1.5 [1.3] J
6020	Metals	Zinc	mg/kg	960	45 [1.54]	37.8 [3.75]	35.2 [2.79]	28.4 [2.37]	67.5 [4.14]	53.2 [2.94]	36 [3.27]
IonsNutrients											
9060	IonsNutrients	TOC	percent	–	3	6	5.85	3.49	13	6.47	6.7
Other											
A2540G	Other	Total Solids	percent	–	74.9	30.5	42.9	50.4	28	38.8	37

Notes:

[1] Decision Document cleanup level (USACE 2009).

[ ] denotes the LOD or no number if no LOD was reported

Bold = Result is greater than or equal to the screening level[1]

= LOD greater than or equal to the screening level[1]

— = method or screening level not available or analysis not conducted

For data qualifiers, refer to the Analytical Data Qualifiers section of the DQA.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

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Table F-1.1 Sediment Results

				Location ID:	S28-14	S28-15	S28-16	S28-17	S28-17	S28-18	S28-19
				Sample ID:	18NEC-S28-SD-14	18NEC-S28-SD-15	18NEC-S28-SD-16	18NEC-S28-SD-17	18NEC-S28-SD-17-8	18NEC-S28-SD-18	18NEC-S28-SD-19
				Sample Date:	8/7/2018	8/7/2018	8/7/2018	8/7/2018	8/7/2018	8/7/2018	8/7/2018
				Sample Type:	SD	SD	SD	SD	SD	SD	SD
				SDG:	1184373	1184373	1184373	1184430	1184430	1184430	1184430
				Laboratory:	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA
				QAQC:	Primary	Primary	Primary	Primary	Duplicate	Primary	Primary
Method	**Group**	**Analyte**	**Units**	**Screening Level[1]**							
Fuels											
AK102_103	Fuels	DRO	mg/kg	3500	**27900 [600]**	**105000 [2665]**	**76000 [2375]**	**57800 [2185]**	**48700 [2910]**	**74600 [3265]**	**51600 [2315]**
AK102_103_SG	Fuels	DRO	mg/kg	3500	**22700 [600]**	**77200 [2665]**	**64100 [2375]**	**52500 [2185]**	**43100 [2910]**	**62200 [3265]**	**38600 [2315]**
AK102_103	Fuels	RRO	mg/kg	3500	**10300 [600]**	**28600 [2665]**	**23100 [2375]**	**15100 [2185]**	**14900 [2910]**	**14900 [3265]**	**13100 [2315]**
AK102_103_SG	Fuels	RRO	mg/kg	3500	**6380 [600]**	**19800 [2665]**	**16500 [2375]**	**12100 [2185]**	**11800 [2910]**	**10800 [3265]**	**8450 [2315]**
PAHs											
8270SIM	PAHs	Acenaphthene	mg/kg	0.5	**1.49 [0.373]**	**11.5 [4.17]**	**3.45 [0.37]**	**4.23 [0.273]**	**3.91 [0.366]**	ND [0.407]	**3.55 [0.284]**
8270SIM	PAHs	Acenaphthylene	mg/kg	–	ND [0.373]	ND [4.17]	ND [0.37]	ND [0.273]	ND [0.366]	ND [0.407]	ND [0.284]
8270SIM	PAHs	Anthracene	mg/kg	–	ND [0.373]	ND [4.17]	ND [0.37]	ND [0.273]	ND [0.366]	ND [0.407]	ND [0.284]
8270SIM	PAHs	Benzo(a)anthracene	mg/kg	–	ND [0.373]	ND [0.416]	ND [0.37]	0.171 [0.273] J,QN	ND [0.366] QN	ND [0.407]	ND [0.284]
8270SIM	PAHs	Benzo(a)pyrene	mg/kg	–	ND [0.373]	ND [0.416]	ND [0.37]	ND [0.273]	ND [0.366]	ND [0.407]	ND [0.284]
8270SIM	PAHs	Benzo(b)fluoranthene	mg/kg	–	ND [0.373]	ND [0.416]	ND [0.37]	ND [0.273]	ND [0.366]	ND [0.407]	ND [0.284]
8270SIM	PAHs	Benzo(g,h,i)perylene	mg/kg	1.7	ND [0.373]	ND [0.416]	ND [0.37]	ND [0.273]	ND [0.366]	ND [0.407]	ND [0.284]
8270SIM	PAHs	Benzo(k)fluoranthene	mg/kg	–	ND [0.373]	ND [0.416]	ND [0.37]	ND [0.273]	ND [0.366]	ND [0.407]	ND [0.284]
8270SIM	PAHs	Chrysene	mg/kg	–	ND [0.373]	0.279 [0.416] J	0.226 [0.37] J	0.437 [0.273] J	0.332 [0.366] J	0.263 [0.407] J	0.196 [0.284] J
8270SIM	PAHs	Dibenzo(a,h)anthracene	mg/kg	–	ND [0.373]	ND [0.416]	ND [0.37]	ND [0.273]	ND [0.366]	ND [0.407]	ND [0.284]
8270SIM	PAHs	Fluoranthene	mg/kg	2	0.262 [0.373] J	0.596 [0.416] J	0.621 [0.37] J	1.4 [0.273]	1.03 [0.366]	ND [0.407]	0.677 [0.284]
8270SIM	PAHs	Fluorene	mg/kg	0.8	**2.03 [0.373]**	**17.5 [4.17]**	**5.17 [0.37]**	**5.15 [0.273]**	**4.76 [0.366]**	**10.1 [0.407]**	**6.57 [0.284]**
8270SIM	PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	3.2	ND [0.373]	ND [0.416]	ND [0.37]	ND [0.273]	ND [0.366]	ND [0.407]	ND [0.284]
8270SIM	PAHs	1-Methylnaphthalene	mg/kg	–	9.44 [0.373]	67.2 [4.17]	26.5 [1.85]	62.4 [2.73]	62.2 [3.67]	73.2 [4.07]	103 [5.7]
8270SIM	PAHs	2-Methylnaphthalene	mg/kg	0.6	**11.1 [0.373]**	**68.5 [4.17]**	**27.8 [1.85]**	**98.7 [2.73]**	**99.6 [3.67]**	**99.9 [4.07]**	**161 [5.7]**
8270SIM	PAHs	Naphthalene	mg/kg	1.7	**4.45 [0.298]**	**26.2 [3.33]**	**8.67 [0.295]**	**53.6 [2.18]**	**55.4 [2.94]**	**35.3 [3.26]**	**61.3 [4.54]**
8270SIM	PAHs	Phenanthrene	mg/kg	4.8	1.24 [0.373]	**8.8 [4.17]**	3.11 [0.37]	3.45 [0.273]	3.14 [0.366]	**5.67 [0.407]**	3.4 [0.284]
8270SIM	PAHs	Pyrene	mg/kg	–	0.427 [0.373] J	1.17 [0.416]	0.951 [0.37]	1.28 [0.273]	0.937 [0.366]	0.649 [0.407] J	0.623 [0.284]
NR	PAHs	Total HPAHs	mg/kg	9.6	0.689 []	2.045 []	1.798 []	3.288 []	2.299 []	0.912 []	1.496 []
NR	PAHs	Total LPAHs	mg/kg	7.8	**9.21 []**	**64 []**	**20.4 []**	**66.43 []**	**67.21 []**	**51.07 []**	**74.82 []**
PCBs											
8082	PCBs	Aroclor-1016	mg/kg	0.7	ND [0.0745]	ND [0.0825]	ND [0.073]	ND [0.055]	ND [0.0735]	ND [0.0825]	ND [0.058]
8082	PCBs	Aroclor-1221	mg/kg	0.7	ND [0.298]	ND [0.331]	ND [0.292]	ND [0.221]	ND [0.293]	ND [0.329]	ND [0.231]
8082	PCBs	Aroclor-1232	mg/kg	0.7	ND [0.0745]	ND [0.0825]	ND [0.073]	ND [0.055]	ND [0.0735]	ND [0.0825]	ND [0.058]
8082	PCBs	Aroclor-1242	mg/kg	0.7	ND [0.0745]	ND [0.0825]	ND [0.073]	ND [0.055]	ND [0.0735]	ND [0.0825]	ND [0.058]
8082	PCBs	Aroclor-1248	mg/kg	0.7	ND [0.0745]	ND [0.0825]	ND [0.073]	ND [0.055]	ND [0.0735]	ND [0.0825]	ND [0.058]
8082	PCBs	Aroclor-1254	mg/kg	0.7	ND [0.0745]	ND [0.0825]	ND [0.073]	ND [0.055]	ND [0.0735]	ND [0.0825]	ND [0.058]
8082	PCBs	Aroclor-1260	mg/kg	0.7	0.196 [0.0745]	0.349 [0.0825]	0.331 [0.073]	0.482 [0.055]	0.367 [0.0735]	0.284 [0.0825]	0.127 [0.058]
8082	PCBs	PCBs	mg/kg	0.7	0.196 [0.0745]	0.349 [0.0825]	0.331 [0.073]	0.482 [0.055]	0.367 [0.0735]	0.284 [0.0825]	0.127 [0.058]
Metals											
6020	Metals	Arsenic	mg/kg	93	9.83 [1.5]	16.3 [1.56]	26.4 [1.38]	10.7 [1.08]	16.9 [1.44]	31.9 [1.65]	6.92 [1.14]
6020	Metals	Chromium	mg/kg	270	20.7 [0.595]	31.5 [0.625]	23.1 [0.55]	27.2 [0.431]	24 [0.575]	18.8 [0.66]	21.2 [0.455]
6020	Metals	Lead	mg/kg	530	19.3 [0.298]	58.5 [0.312]	35.7 [0.276]	33.3 [0.216]	27.8 [0.288]	31.5 [0.329]	21.5 [0.227]
6020	Metals	Selenium	mg/kg	–	1.72 [1.5] J	1.66 [1.56] J	1.56 [1.38] J	1.82 [1.08] J	2.23 [1.44] J	1.73 [1.65] J	2.02 [1.14] J
6020	Metals	Zinc	mg/kg	960	82.2 [3.73]	192 [3.9]	165 [3.44]	168 [2.69]	178 [3.6]	116 [4.11]	81.4 [2.84]
IonsNutrients											
9060	IonsNutrients	TOC	percent	–	15.7	17.9	11.6	15.2	13.1	16.8	14.2
Other											
A2540G	Other	Total Solids	percent	–	33.2	29.9	33.6	45.2	34.1	30.3	43.1

Notes:

[1] Decision Document cleanup level (USACE 2009).

[ ] denotes the LOD or no number if no LOD was reported

Bold = Result is greater than or equal to the screening level[1]

= LOD greater than or equal to the screening level[1]

— = method or screening level not available or analysis not conducted

For data qualifiers, refer to the Analytical Data Qualifiers section of the DQA.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2018 Site 28 Sediment Mapping and Sampling Report at Northeast Cape
Table F-1.1 Sediment Results

				Location ID:	S28-20	S28-21	S28-22	S28-23	S28-24	S28-25	S28-26
				Sample ID:	18NEC-S28-SD-20	18NEC-S28-SD-21	18NEC-S28-SD-22	18NEC-S28-SD-23	18NEC-S28-SD-24	18NEC-S28-SD-25	18NEC-S28-SD-26
				Sample Date:	8/7/2018	8/7/2018	8/7/2018	8/7/2018	8/7/2018	8/8/2018	8/8/2018
				Sample Type:	SD	SD	SD	SD	SD	SD	SD
				SDG:	1184430	1184430	1184430	1184430	1184430	1184430	1184430
				Laboratory:	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA
				QAQC:	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Method	**Group**	**Analyte**	**Units**	**Screening Level[1]**							
Fuels											
AK102_103	Fuels	DRO	mg/kg	3500	**44800 [2135]**	**4000 [365]**	2420 [685]	**7210 [482]**	**4390 [433]**	**8730 [695]**	**8970 [675]**
AK102_103_SG	Fuels	DRO	mg/kg	3500	**34900 [2135]**	3390 [365]	1910 [685]	**5710 [482]**	3460 [433]	**6810 [695]**	**7970 [675]**
AK102_103	Fuels	RRO	mg/kg	3500	**12200 [2135]**	1900 [365]	3370 [685]	3300 [482]	2170 [433]	1670 [695]	**3640 [675]**
AK102_103_SG	Fuels	RRO	mg/kg	3500	**7950 [2135]**	850 [365]	1150 [685] J	985 [482]	634 [433] J	563 [695] J	2780 [675]
PAHs											
8270SIM	PAHs	Acenaphthene	mg/kg	0.5	**3.47 [0.267]**	0.364 [0.227] J	ND [0.426]	0.427 [0.301] J	0.234 [0.267] J	ND [0.435]	ND [0.423]
8270SIM	PAHs	Acenaphthylene	mg/kg	–	ND [0.267]	ND [0.227]	ND [0.426]	ND [0.301]	ND [0.267]	ND [0.435]	ND [0.423]
8270SIM	PAHs	Anthracene	mg/kg	–	ND [0.267]	ND [0.227]	ND [0.426]	ND [0.301]	ND [0.267]	ND [0.435]	ND [0.423]
8270SIM	PAHs	Benzo(a)anthracene	mg/kg	–	ND [0.267]	ND [0.227]	ND [0.426]	ND [0.301]	ND [0.267]	ND [0.435]	ND [0.423]
8270SIM	PAHs	Benzo(a)pyrene	mg/kg	–	ND [0.267]	ND [0.227]	ND [0.426]	ND [0.301]	ND [0.267]	ND [0.435]	ND [0.423]
8270SIM	PAHs	Benzo(b)fluoranthene	mg/kg	–	ND [0.267]	ND [0.227]	ND [0.426]	ND [0.301]	ND [0.267]	ND [0.435]	ND [0.423]
8270SIM	PAHs	Benzo(g,h,i)perylene	mg/kg	1.7	ND [0.267]	ND [0.227]	ND [0.426]	ND [0.301]	ND [0.267]	ND [0.435]	ND [0.423]
8270SIM	PAHs	Benzo(k)fluoranthene	mg/kg	–	ND [0.267]	ND [0.227]	ND [0.426]	ND [0.301]	ND [0.267]	ND [0.435]	ND [0.423]
8270SIM	PAHs	Chrysene	mg/kg	–	0.203 [0.267] J	0.231 [0.227] J	ND [0.426]	ND [0.301]	ND [0.267]	ND [0.435]	ND [0.423]
8270SIM	PAHs	Dibenzo(a,h)anthracene	mg/kg	–	ND [0.267]	ND [0.227]	ND [0.426]	ND [0.301]	ND [0.267]	ND [0.435]	ND [0.423]
8270SIM	PAHs	Fluoranthene	mg/kg	2	0.682 [0.267]	1.87 [0.227]	ND [0.426]	ND [0.301]	ND [0.267]	ND [0.435]	ND [0.423]
8270SIM	PAHs	Fluorene	mg/kg	0.8	**5.11 [0.267]**	**0.866 [0.227]**	ND [0.426]	0.503 [0.301] J	0.311 [0.267] J	0.252 [0.435] J	ND [0.423]
8270SIM	PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	3.2	ND [0.267]	ND [0.227]	ND [0.426]	ND [0.301]	ND [0.267]	ND [0.435]	ND [0.423]
8270SIM	PAHs	1-Methylnaphthalene	mg/kg	–	97.1 [5.35]	0.531 [0.227]	2.89 [0.426]	12.7 [0.301]	8.68 [0.267]	0.821 [0.435] J	ND [0.423]
8270SIM	PAHs	2-Methylnaphthalene	mg/kg	0.6	**152 [5.35]**	**0.738 [0.227]**	**3.95 [0.426]**	**23 [1.21]**	**14.3 [0.535]**	**0.962 [0.435]**	ND [0.423]
8270SIM	PAHs	Naphthalene	mg/kg	1.7	**53.7 [4.28]**	0.491 [0.181]	**2.12 [0.342]**	**5.24 [0.24]**	**6.88 [0.213]**	0.372 [0.348] J	0.476 [0.339] J
8270SIM	PAHs	Phenanthrene	mg/kg	4.8	3.33 [0.267]	4.02 [0.227]	ND [0.426]	0.202 [0.301] J	ND [0.267]	ND [0.435]	ND [0.423]
8270SIM	PAHs	Pyrene	mg/kg	–	0.567 [0.267]	1.05 [0.227]	ND [0.426]	ND [0.301]	ND [0.267]	ND [0.435]	ND [0.423]
NR	PAHs	Total HPAHs	mg/kg	9.6	1.452 []	3.151 []	ND []	ND []	ND []	ND []	ND []
NR	PAHs	Total LPAHs	mg/kg	7.8	**65.61 []**	5.741 []	2.12 []	6.372 []	7.425 []	0.624 []	0.476 []
PCBs											
8082	PCBs	Aroclor-1016	mg/kg	0.7	ND [0.0535]	ND [0.0456]	ND [0.085]	ND [0.06]	ND [0.0535]	ND [0.0865]	ND [0.0845]
8082	PCBs	Aroclor-1221	mg/kg	0.7	ND [0.213]	ND [0.183]	ND [0.341]	ND [0.24]	ND [0.214]	ND [0.347]	ND [0.339]
8082	PCBs	Aroclor-1232	mg/kg	0.7	ND [0.0535]	ND [0.0456]	ND [0.085]	ND [0.06]	ND [0.0535]	ND [0.0865]	ND [0.0845]
8082	PCBs	Aroclor-1242	mg/kg	0.7	ND [0.0535]	ND [0.0456]	ND [0.085]	ND [0.06]	ND [0.0535]	ND [0.0865]	ND [0.0845]
8082	PCBs	Aroclor-1248	mg/kg	0.7	ND [0.0535]	ND [0.0456]	ND [0.085]	ND [0.06]	ND [0.0535]	ND [0.0865]	ND [0.0845]
8082	PCBs	Aroclor-1254	mg/kg	0.7	ND [0.0535]	ND [0.0456]	ND [0.085]	ND [0.06]	ND [0.0535]	ND [0.0865]	ND [0.0845]
8082	PCBs	Aroclor-1260	mg/kg	0.7	0.177 [0.0535]	ND [0.0456]	ND [0.085]	ND [0.06]	ND [0.0535]	ND [0.0865]	0.0669 [0.0845] J
8082	PCBs	PCBs	mg/kg	0.7	0.177 [0.0535]	ND [0.0456]	ND [0.085]	ND [0.06]	ND [0.0535]	ND [0.0865]	0.0669 [0.0845]
Metals											
6020	Metals	Arsenic	mg/kg	93	8.99 [1.05]	20.1 [0.87]	22.7 [1.65]	20.5 [1.14]	20.9 [1.04]	52.7 [1.69]	60.1 [1.61]
6020	Metals	Chromium	mg/kg	270	24.6 [0.42]	8.27 [0.347]	13.9 [0.66]	16.9 [0.454]	12.3 [0.416]	17.6 [0.675]	11.1 [0.64]
6020	Metals	Lead	mg/kg	530	23.6 [0.21]	10.4 [0.173]	8.32 [0.33]	8.05 [0.227]	6.01 [0.208]	12.6 [0.339]	13.1 [0.321]
6020	Metals	Selenium	mg/kg	–	2.01 [1.05] J	0.708 [0.87] J	2.01 [1.65] J	1.89 [1.14] J	1.57 [1.04] J	1.49 [1.69] J	2.09 [1.61] J
6020	Metals	Zinc	mg/kg	960	103 [2.63]	83.7 [2.17]	30.8 [4.12]	37.4 [2.84]	31.7 [2.6]	52 [4.23]	53.4 [4]
IonsNutrients											
9060	IonsNutrients	TOC	percent	–	11.6	3.74	12.8	10	7.17	8.36	7.88
Other											
A2540G	Other	Total Solids	percent	–	46.6	54	29.2	41	46	28.5	29.4

Notes:

[1] Decision Document cleanup level (USACE 2009).

[ ] denotes the LOD or no number if no LOD was reported

Bold = Result is greater than or equal to the screening level[1]

= LOD greater than or equal to the screening level[1]

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2018 Site 28 Sediment Mapping and Sampling Report at Northeast Cape
Table F-1.1 Sediment Results

				Location ID:	S28-27	S28-27	S28-28	S28-29	S28-30	S28-31	S28-32
				Sample ID:	18NEC-S28-SD-27	18NEC-S28-SD-27-8	18NEC-S28-SD-28	18NEC-S28-SD-29	18NEC-S28-SD-30	18NEC-S28-SD-31	18NEC-S28-SD-32
				Sample Date:	8/8/2018	8/8/2018	8/8/2018	8/8/2018	8/8/2018	8/8/2018	8/8/2018
				Sample Type:	SD	SD	SD	SD	SD	SD	SD
				SDG:	1184430	1184430	1184430	1184430	1184430	1184430	1184430
				Laboratory:	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA
				QAQC:	Primary	Duplicate	Primary	Primary	Primary	Primary	Primary
Method	**Group**	**Analyte**	**Units**	**Screening Level[1]**							
Fuels											
AK102_103	Fuels	DRO	mg/kg	3500	**9770 [775]**	**6890 [805]**	**101000 [4990]**	**62100 [2535]**	**38000 [2775]**	**12200 [443]**	**23400 [500]**
AK102_103_SG	Fuels	DRO	mg/kg	3500	**6020 [775]**	**4720 [805]**	**94100 [4990]**	**51600 [5050]**	**40500 [555]**	**10800 [443]**	**19600 [500]**
AK102_103	Fuels	RRO	mg/kg	3500	**12100 [775]**	**11000 [805]**	**16700 [4990]**	**13400 [2535]**	**7060 [2775]**	**5700 [443]**	**4010 [500]**
AK102_103_SG	Fuels	RRO	mg/kg	3500	**3540 [775]**	**3530 [805]**	**15700 [4990]**	**10700 [5050]**	3400 [555]	**3570 [443]**	2020 [500]
PAHs											
8270SIM	PAHs	Acenaphthene	mg/kg	0.5	ND [0.491]	ND [0.499]	**16 [12.5] J**	**4.45 [0.314]**	**1.97 [0.344]**	ND [0.276]	ND [0.314]
8270SIM	PAHs	Acenaphthylene	mg/kg	–	ND [0.491]	ND [0.499]	ND [12.5]	ND [0.314]	ND [0.344]	ND [0.276]	ND [0.314]
8270SIM	PAHs	Anthracene	mg/kg	–	ND [0.491]	ND [0.499]	ND [12.5]	ND [0.314]	ND [0.344]	ND [0.276]	ND [0.314]
8270SIM	PAHs	Benzo(a)anthracene	mg/kg	–	ND [0.491]	ND [0.499]	ND [0.251]	ND [0.314]	ND [0.344]	ND [0.276]	ND [0.314]
8270SIM	PAHs	Benzo(a)pyrene	mg/kg	–	ND [0.491]	ND [0.499]	ND [0.251]	ND [0.314]	ND [0.344]	ND [0.276]	ND [0.314]
8270SIM	PAHs	Benzo(b)fluoranthene	mg/kg	–	ND [0.491]	ND [0.499]	ND [0.251]	ND [0.314]	ND [0.344]	ND [0.276]	ND [0.314]
8270SIM	PAHs	Benzo(g,h,i)perylene	mg/kg	1.7	ND [0.491]	ND [0.499]	ND [0.251]	ND [0.314]	ND [0.344]	ND [0.276]	ND [0.314]
8270SIM	PAHs	Benzo(k)fluoranthene	mg/kg	–	ND [0.491]	ND [0.499]	ND [0.251]	ND [0.314]	ND [0.344]	ND [0.276]	ND [0.314]
8270SIM	PAHs	Chrysene	mg/kg	–	ND [0.491]	ND [0.499]	0.16 [0.251] J	ND [0.314]	ND [0.344]	ND [0.276]	ND [0.314]
8270SIM	PAHs	Dibenzo(a,h)anthracene	mg/kg	–	ND [0.491]	ND [0.499]	ND [0.251]	ND [0.314]	ND [0.344]	ND [0.276]	ND [0.314]
8270SIM	PAHs	Fluoranthene	mg/kg	2	ND [0.491]	ND [0.499]	ND [0.251]	ND [0.314]	ND [0.344]	ND [0.276]	ND [0.314]
8270SIM	PAHs	Fluorene	mg/kg	0.8	0.253 [0.491] J,QN	ND [0.499] QN	**25.3 [12.5]**	**7.72 [0.314]**	**3.33 [0.344]**	0.176 [0.276] J	0.519 [0.314] J
8270SIM	PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	3.2	ND [0.491]	ND [0.499]	ND [0.251]	ND [0.314]	ND [0.344]	ND [0.276]	ND [0.314]
8270SIM	PAHs	1-Methylnaphthalene	mg/kg	–	6.68 [0.491]	6.34 [0.499]	310 [12.5]	49.4 [3.14]	33.1 [1.72]	0.97 [0.276]	4.67 [0.314]
8270SIM	PAHs	2-Methylnaphthalene	mg/kg	0.6	**5.49 [0.491]**	**5.79 [0.499]**	**425 [12.5]**	**29.3 [3.14]**	**42.2 [1.72]**	**0.606 [0.276]**	**4.51 [0.314]**
8270SIM	PAHs	Naphthalene	mg/kg	1.7	**1.92 [0.393]**	1.69 [0.399]	**144 [10]**	**8.16 [0.251]**	**5.7 [0.275]**	0.94 [0.221]	**3.67 [0.251]**
8270SIM	PAHs	Phenanthrene	mg/kg	4.8	ND [0.491]	ND [0.499]	**12.8 [12.5] J**	4.02 [0.314]	1.82 [0.344]	ND [0.276]	0.242 [0.314] J
8270SIM	PAHs	Pyrene	mg/kg	–	ND [0.491]	ND [0.499]	0.431 [0.251] J	0.336 [0.314] J	ND [0.344]	ND [0.276]	ND [0.314]
NR	PAHs	Total HPAHs	mg/kg	9.6	ND []	ND []	0.591 []	0.336 []	ND []	ND []	ND []
NR	PAHs	Total LPAHs	mg/kg	7.8	2.173 []	1.69 []	**198.1 []**	**24.35 []**	**12.82 []**	1.116 []	4.431 []
PCBs											
8082	PCBs	Aroclor-1016	mg/kg	0.7	ND [0.0985]	ND [0.1]	ND [0.0497]	ND [0.063]	ND [0.0695]	ND [0.0545]	ND [0.063]
8082	PCBs	Aroclor-1221	mg/kg	0.7	ND [0.394]	ND [0.401]	ND [0.199]	ND [0.253]	ND [0.279]	ND [0.219]	ND [0.252]
8082	PCBs	Aroclor-1232	mg/kg	0.7	ND [0.0985]	ND [0.1]	ND [0.0497]	ND [0.063]	ND [0.0695]	ND [0.0545]	ND [0.063]
8082	PCBs	Aroclor-1242	mg/kg	0.7	ND [0.0985]	ND [0.1]	ND [0.0497]	ND [0.063]	ND [0.0695]	ND [0.0545]	ND [0.063]
8082	PCBs	Aroclor-1248	mg/kg	0.7	ND [0.0985]	ND [0.1]	ND [0.0497]	ND [0.063]	ND [0.0695]	ND [0.0545]	ND [0.063]
8082	PCBs	Aroclor-1254	mg/kg	0.7	ND [0.0985]	ND [0.1]	ND [0.0497]	ND [0.063]	ND [0.0695]	ND [0.0545]	ND [0.063]
8082	PCBs	Aroclor-1260	mg/kg	0.7	0.0928 [0.0985] J	0.108 [0.1] J	0.218 [0.0497]	0.107 [0.063] J	0.0514 [0.0695] J	0.0835 [0.0545] J	0.0464 [0.063] J
8082	PCBs	PCBs	mg/kg	0.7	0.0928 [0.0985]	0.108 [0.1]	0.218 [0.0497]	0.107 [0.063]	0.0514 [0.0695]	0.0835 [0.0545]	0.0464 [0.063]
Metals											
6020	Metals	Arsenic	mg/kg	93	7.5 [1.9]	6.81 [1.93]	5.34 [0.925]	7.99 [1.2]	17.5 [1.35]	11.1 [1.03]	24.5 [1.17]
6020	Metals	Chromium	mg/kg	270	12.8 [0.755]	8.84 [0.77]	5.56 [0.37]	15.5 [0.478]	13 [0.54]	17.7 [0.412]	9.71 [0.469]
6020	Metals	Lead	mg/kg	530	16.1 [0.379] QN	8.17 [0.386] QN	5.53 [0.185]	18.8 [0.239]	13.4 [0.269]	19.9 [0.206]	8.47 [0.234]
6020	Metals	Selenium	mg/kg	–	2.2 [1.9] J	3.26 [1.93] J	1.21 [0.925] J	2.11 [1.2] J	2.24 [1.35] J	1.76 [1.03] J	1.36 [1.17] J
6020	Metals	Zinc	mg/kg	960	51.1 [4.74] QN	24.8 [4.83] QN	28.2 [2.31]	60.4 [2.99]	84.4 [3.36]	91.9 [2.58]	46.4 [2.93]
IonsNutrients											
9060	IonsNutrients	TOC	percent	–	29.3	27.9	18.8	18.1	15.2	6.23	8.82
Other											
A2540G	Other	Total Solids	percent	–	25.3	24.6	49.8	39.3	35.9	44.9	39.4

Notes:
[1] Decision Document cleanup level (USACE 2009).
[ ] denotes the LOD or no number if no LOD was reported
Bold = Result is greater than or equal to the screening level[1]
= LOD greater than or equal to the screening level[1]
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For data qualifiers, refer to the Analytical Data Qualifiers section of the DQA.
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Table F-1.1 Sediment Results

Method	Group	Analyte	Units	Screening Level[1]	S28-33	S28-34	S28-35	S28-36	S28-37	S28-38	S28-38
				Sample ID:	18NEC-S28-SD-33	18NEC-S28-SD-34	18NEC-S28-SD-35	18NEC-S28-SD-36	18NEC-S28-SD-37	18NEC-S28-SD-38	18NEC-S28-SD-38-8
				Sample Date:	8/8/2018	8/8/2018	8/8/2018	8/8/2018	8/8/2018	8/8/2018	8/8/2018
				Sample Type:	SD	SD	SD	SD	SD	SD	SD
				SDG:	1184430	1184430	1184430	1184430	1184430	1184430	1184430
				Laboratory:	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA
				QAQC:	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate
Fuels											
AK102_103	Fuels	DRO	mg/kg	3500	**45300 [1970]**	**8780 [1320]**	1270 [1515] J	**4120 [1675]**	**4490 [1200]**	3230 [525] QN	**6620 [520] QN**
AK102_103_SG	Fuels	DRO	mg/kg	3500	**29800 [394]**	**7160 [1320]**	1330 [1515] J	2960 [1675] J	3440 [1200]	2120 [525] QN	**4610 [520] QN**
AK102_103	Fuels	RRO	mg/kg	3500	**7180 [1970]**	**5290 [1320]**	**4080 [1515]**	**7990 [1675]**	**5660 [1200]**	**7580 [525]**	**8490 [520]**
AK102_103_SG	Fuels	RRO	mg/kg	3500	2800 [394]	3030 [1320]	1960 [1515] J	1720 [1675] J	1430 [1200] J	2000 [525]	2550 [520]
PAHs											
8270SIM	PAHs	Acenaphthene	mg/kg	0.5	**1.17 [0.246]**	*ND [0.82]*	*ND [0.935]*	*ND [1.04]*	0.422 [0.75] J	ND [0.329] QN	**1.37 [0.329] QN**
8270SIM	PAHs	Acenaphthylene	mg/kg	–	ND [0.246]	ND [0.82]	ND [0.935]	ND [1.04]	ND [0.75]	ND [0.329]	ND [0.329]
8270SIM	PAHs	Anthracene	mg/kg	–	ND [0.246]	ND [0.82]	ND [0.935]	ND [1.04]	ND [0.75]	ND [0.329]	ND [0.329]
8270SIM	PAHs	Benzo(a)anthracene	mg/kg	–	ND [0.246]	ND [0.82]	ND [0.935]	ND [1.04]	ND [0.75]	ND [0.329]	ND [0.329]
8270SIM	PAHs	Benzo(a)pyrene	mg/kg	–	ND [0.246]	ND [0.82]	ND [0.935]	ND [1.04]	ND [0.75]	ND [0.329]	ND [0.329]
8270SIM	PAHs	Benzo(b)fluoranthene	mg/kg	–	ND [0.246]	ND [0.82]	ND [0.935]	ND [1.04]	ND [0.75]	ND [0.329]	ND [0.329]
8270SIM	PAHs	Benzo(g,h,i)perylene	mg/kg	1.7	ND [0.246]	ND [0.82]	ND [0.935]	ND [1.04]	ND [0.75]	ND [0.329]	ND [0.329]
8270SIM	PAHs	Benzo(k)fluoranthene	mg/kg	–	ND [0.246]	ND [0.82]	ND [0.935]	ND [1.04]	ND [0.75]	ND [0.329]	ND [0.329]
8270SIM	PAHs	Chrysene	mg/kg	–	ND [0.246]	ND [0.82]	ND [0.935]	ND [1.04]	ND [0.75]	ND [0.329]	ND [0.329]
8270SIM	PAHs	Dibenzo(a,h)anthracene	mg/kg	–	ND [0.246]	ND [0.82]	ND [0.935]	ND [1.04]	ND [0.75]	ND [0.329]	ND [0.329]
8270SIM	PAHs	Fluoranthene	mg/kg	2	ND [0.246]	ND [0.82]	ND [0.935]	ND [1.04]	ND [0.75]	ND [0.329]	ND [0.329]
8270SIM	PAHs	Fluorene	mg/kg	0.8	**1.56 [0.246]**	0.497 [0.82] J	0.705 [0.935] J	*ND [1.04]*	0.754 [0.75] J	0.244 [0.329] J,QN	**2.31 [0.329] QN**
8270SIM	PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	3.2	ND [0.246]	ND [0.82]	ND [0.935]	ND [1.04]	ND [0.75]	ND [0.329]	ND [0.329]
8270SIM	PAHs	1-Methylnaphthalene	mg/kg	–	6.04 [0.246]	ND [0.82]	1.14 [0.935] J	4.42 [1.04]	8.74 [0.75]	7.79 [0.329] QN	34.2 [3.29] QN
8270SIM	PAHs	2-Methylnaphthalene	mg/kg	0.6	**4.2 [0.246]**	*ND [0.82]*	0.511 [0.935] J	**5.84 [1.04]**	**12.5 [0.75]**	**13 [0.329] QN**	**55 [3.29] QN**
8270SIM	PAHs	Naphthalene	mg/kg	1.7	**2.23 [0.197]**	0.857 [0.655] J	**1.8 [0.745]**	**2.89 [0.835]**	**6.82 [0.6]**	**12.1 [0.263] QN**	**21 [2.63] QN**
8270SIM	PAHs	Phenanthrene	mg/kg	4.8	0.651 [0.246]	ND [0.82]	ND [0.935]	ND [1.04]	0.456 [0.75] J	ND [0.329] QN	1.17 [0.329] QN
8270SIM	PAHs	Pyrene	mg/kg	–	ND [0.246]	ND [0.82]	ND [0.935]	ND [1.04]	ND [0.75]	ND [0.329]	ND [0.329]
NR	PAHs	Total HPAHs	mg/kg	9.6	ND []	ND []	ND []	ND []	ND []	ND []	ND []
NR	PAHs	Total LPAHs	mg/kg	7.8	5.611 []	1.354 []	2.505 []	2.89 []	**8.452 []**	**12.344 []**	**25.85 []**
PCBs											
8082	PCBs	Aroclor-1016	mg/kg	0.7	ND [0.0499]	ND [0.164]	ND [0.189]	ND [0.208]	ND [0.149]	ND [0.065]	ND [0.065]
8082	PCBs	Aroclor-1221	mg/kg	0.7	ND [0.2]	ND [0.655]	*ND [0.755]*	*ND [0.835]*	ND [0.595]	ND [0.26]	ND [0.26]
8082	PCBs	Aroclor-1232	mg/kg	0.7	ND [0.0499]	ND [0.164]	ND [0.189]	ND [0.208]	ND [0.149]	ND [0.065]	ND [0.065]
8082	PCBs	Aroclor-1242	mg/kg	0.7	ND [0.0499]	ND [0.164]	ND [0.189]	ND [0.208]	ND [0.149]	ND [0.065]	ND [0.065]
8082	PCBs	Aroclor-1248	mg/kg	0.7	ND [0.0499]	ND [0.164]	ND [0.189]	ND [0.208]	ND [0.149]	ND [0.065]	ND [0.065]
8082	PCBs	Aroclor-1254	mg/kg	0.7	ND [0.0499]	ND [0.164]	ND [0.189]	ND [0.208]	ND [0.149]	ND [0.065]	ND [0.065]
8082	PCBs	Aroclor-1260	mg/kg	0.7	0.0621 [0.0499] J	0.118 [0.164] J	0.106 [0.189] J	ND [0.208]	ND [0.149]	ND [0.065] QN	0.056 [0.065] J,QN
8082	PCBs	PCBs	mg/kg	0.7	0.0621 [0.0499]	0.118 [0.164]	0.106 [0.189]	ND [0.208]	ND [0.149]	ND [0.065]	0.056 [0.065]
Metals											
6020	Metals	Arsenic	mg/kg	93	6.36 [0.995]	86.2 [3.27]	47.5 [3.71]	10.6 [3.89]	8 [2.83]	8.1 [1.23]	7.99 [1.23]
6020	Metals	Chromium	mg/kg	270	16.9 [0.399]	11.9 [1.3]	14.1 [1.49]	13 [1.55]	16.3 [1.14]	25.7 [0.491]	24.1 [0.491]
6020	Metals	Lead	mg/kg	530	9.95 [0.199]	15.9 [0.655]	24.6 [0.74]	18 [0.78]	18.7 [0.565]	13.1 [0.246]	14.3 [0.246]
6020	Metals	Selenium	mg/kg	–	1.35 [0.995] J	4.34 [3.27] J	3.07 [3.71] J	3 [3.89] J	3.05 [2.83] J	2.74 [1.23]	2.42 [1.23] J
6020	Metals	Zinc	mg/kg	960	47.8 [2.49]	122 [8.15]	217 [9.25]	57.8 [9.7]	42.9 [7.1]	42.3 [3.08]	46.8 [3.07]
IonsNutrients											
9060	IonsNutrients	TOC	percent	–	8.51	23.8	23.3	26	29.7	18.5	15.7
Other											
A2540G	Other	Total Solids	percent	–	50.1	15	13.1	11.9	16.6	37.9	38

Notes:

[1] Decision Document cleanup level (USACE 2009).

[ ] denotes the LOD or no number if no LOD was reported

Bold = Result is greater than or equal to the screening level[1]

(yellow shading) = LOD greater than or equal to the screening level[1]

— = method or screening level not available or analysis not conducted

For data qualifiers, refer to the Analytical Data Qualifiers section of the DQA.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2018 Site 28 Sediment Mapping and Sampling Report at Northeast Cape
Table F-1.1 Sediment Results

				Location ID:	S28-39	S28-40	S28-41	S28-41	S28-42	S28-43	S28-44
				Sample ID:	18NEC-S28-SD-39	18NEC-S28-SD-40	18NEC-S28-SD-41	18NEC-S28-SD-41-8	18NEC-S28-SD-42	18NEC-S28-SD-43	18NEC-S28-SD-44
				Sample Date:	8/8/2018	8/8/2018	8/8/2018	8/8/2018	8/8/2018	8/8/2018	8/8/2018
				Sample Type:	SD	SD	SD	SD	SD	SD	SD
				SDG:	1184430	1184430	1184430	1184430	1184430	1184430	1184430
				Laboratory:	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA
				QAQC:	Primary	Primary	Primary	Duplicate	Primary	Primary	Primary
Method	**Group**	**Analyte**	**Units**	**Screening Level[1]**							
Fuels											
AK102_103	Fuels	DRO	mg/kg	3500	1450 [550]	**45400 [765]**	368 [39]	425 [41.8]	**21100 [5650]**	**12500 [473]**	**13500 [545]**
AK102_103_SG	Fuels	DRO	mg/kg	3500	1020 [550] J	**36400 [765]**	115 [39] QN	195 [41.8] QN	**17500 [5650]**	**9180 [473]**	**10500 [545]**
AK102_103	Fuels	RRO	mg/kg	3500	**6360 [550]**	**10800 [765]**	2840 [39]	1950 [41.8]	**127000 [5650]**	**12300 [473]**	**5090 [545]**
AK102_103_SG	Fuels	RRO	mg/kg	3500	1840 [550]	**5110 [765]**	813 [39]	493 [41.8]	**106000 [5650]**	**6410 [473]**	2370 [545]
PAHs											
8270SIM	PAHs	Acenaphthene	mg/kg	0.5	ND [0.347]	**3.91 [0.478]**	ND [0.0965]	ND [0.105]	ND [0.284]	**0.698 [0.292]**	**0.603 [0.136]**
8270SIM	PAHs	Acenaphthylene	mg/kg	–	ND [0.347]	ND [0.478]	ND [0.0965]	ND [0.105]	ND [0.284]	ND [0.292]	ND [0.136]
8270SIM	PAHs	Anthracene	mg/kg	–	ND [0.347]	ND [0.478]	ND [0.0965]	ND [0.105]	ND [0.284]	ND [0.292]	ND [0.136]
8270SIM	PAHs	Benzo(a)anthracene	mg/kg	–	ND [0.347]	ND [0.478]	ND [0.0965]	ND [0.105]	ND [0.284]	ND [0.292]	ND [0.136]
8270SIM	PAHs	Benzo(a)pyrene	mg/kg	–	ND [0.347]	ND [0.478]	ND [0.0965]	ND [0.105]	ND [0.284]	ND [0.292]	ND [0.136]
8270SIM	PAHs	Benzo(b)fluoranthene	mg/kg	–	ND [0.347]	ND [0.478]	ND [0.0965]	ND [0.105]	ND [0.284]	ND [0.292]	ND [0.136]
8270SIM	PAHs	Benzo(g,h,i)perylene	mg/kg	1.7	ND [0.347]	ND [0.478]	ND [0.0965]	ND [0.105]	ND [0.284]	ND [0.292]	ND [0.136]
8270SIM	PAHs	Benzo(k)fluoranthene	mg/kg	–	ND [0.347]	ND [0.478]	ND [0.0965]	ND [0.105]	ND [0.284]	ND [0.292]	ND [0.136]
8270SIM	PAHs	Chrysene	mg/kg	–	ND [0.347]	ND [0.478]	ND [0.0965]	ND [0.105]	ND [0.284]	0.21 [0.292] J	ND [0.136]
8270SIM	PAHs	Dibenzo(a,h)anthracene	mg/kg	–	ND [0.347]	ND [0.478]	ND [0.0965]	ND [0.105]	ND [0.284]	ND [0.292]	ND [0.136]
8270SIM	PAHs	Fluoranthene	mg/kg	2	ND [0.347]	ND [0.478]	ND [0.0965]	ND [0.105]	ND [0.284]	0.187 [0.292] J	0.159 [0.136] J
8270SIM	PAHs	Fluorene	mg/kg	0.8	ND [0.347]	**5.59 [0.478]**	ND [0.0965]	ND [0.105]	ND [0.284]	**1.05 [0.292]**	**0.938 [0.136]**
8270SIM	PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	3.2	ND [0.347]	ND [0.478]	ND [0.0965]	ND [0.105]	ND [0.284]	ND [0.292]	ND [0.136]
8270SIM	PAHs	1-Methylnaphthalene	mg/kg	–	0.339 [0.347] J	105 [4.78]	ND [0.0965]	ND [0.105]	ND [0.284]	4.84 [0.292]	9.65 [0.68]
8270SIM	PAHs	2-Methylnaphthalene	mg/kg	0.6	0.471 [0.347] J	**166 [4.78]**	ND [0.0965]	ND [0.105]	ND [0.284]	**4.67 [0.292]**	**13.6 [0.68]**
8270SIM	PAHs	Naphthalene	mg/kg	1.7	0.226 [0.277] J	**59.7 [3.83]**	0.0674 [0.077] J	0.0581 [0.0835] J	ND [0.227]	0.876 [0.234]	**5.24 [0.109]**
8270SIM	PAHs	Phenanthrene	mg/kg	4.8	ND [0.347]	4.62 [0.478]	ND [0.0965]	ND [0.105]	ND [0.284]	0.845 [0.292]	0.724 [0.136]
8270SIM	PAHs	Pyrene	mg/kg	–	ND [0.347]	0.304 [0.478] J	ND [0.0965]	ND [0.105]	ND [0.284]	0.295 [0.292] J	0.195 [0.136] J
NR	PAHs	Total HPAHs	mg/kg	9.6	ND []	0.304 []	ND []	ND []	ND []	0.692 []	0.354 []
NR	PAHs	Total LPAHs	mg/kg	7.8	0.226 []	**73.82 []**	0.0674 []	0.0581 []	ND []	3.469 []	7.505 []
PCBs											
8082	PCBs	Aroclor-1016	mg/kg	0.7	ND [0.069]	ND [0.095]	ND [0.0488]	ND [0.0525]	ND [0.056] QL	ND [0.0595]	ND [0.0675]
8082	PCBs	Aroclor-1221	mg/kg	0.7	ND [0.277]	ND [0.38]	ND [0.195]	ND [0.209]	ND [0.225] QL	ND [0.237]	ND [0.269]
8082	PCBs	Aroclor-1232	mg/kg	0.7	ND [0.069]	ND [0.095]	ND [0.0488]	ND [0.0525]	ND [0.056] QL	ND [0.0595]	ND [0.0675]
8082	PCBs	Aroclor-1242	mg/kg	0.7	ND [0.069]	ND [0.095]	ND [0.0488]	ND [0.0525]	ND [0.056] QL	ND [0.0595]	ND [0.0675]
8082	PCBs	Aroclor-1248	mg/kg	0.7	ND [0.069]	ND [0.095]	ND [0.0488]	ND [0.0525]	ND [0.056] QL	ND [0.0595]	ND [0.0675]
8082	PCBs	Aroclor-1254	mg/kg	0.7	ND [0.069]	ND [0.095]	ND [0.0488]	ND [0.0525]	ND [0.056] QL	ND [0.0595]	0.2 [0.0675]
8082	PCBs	Aroclor-1260	mg/kg	0.7	ND [0.069]	0.228 [0.095]	ND [0.0488]	ND [0.0525]	ND [0.056] QL	0.361 [0.0595]	0.0843 [0.0675] J
8082	PCBs	PCBs	mg/kg	0.7	ND [0.069]	0.228 [0.095]	ND [0.0488]	ND [0.0525]	ND [0.056]	0.361 [0.0595]	0.2843 [0.0675]
Metals											
6020	Metals	Arsenic	mg/kg	93	6.12 [1.39]	6.69 [1.79]	5.46 [0.98]	4.48 [1]	14.5 [1.1]	9.41 [1.13]	7.68 [1.3]
6020	Metals	Chromium	mg/kg	270	23.2 [0.555]	16.6 [0.72]	26.3 [0.392]	19 [0.402]	48.3 [0.441]	30.7 [0.453]	19.4 [0.52]
6020	Metals	Lead	mg/kg	530	16 [0.277]	22.2 [0.359]	17.9 [0.196]	16 [0.201]	57.8 [0.221]	98.9 [0.227]	26.6 [0.261]
6020	Metals	Selenium	mg/kg	–	2.82 [1.39]	3.09 [1.79] J	1.92 [0.98] J	1.39 [1] J	1.63 [1.1] J	1.66 [1.13] J	1.12 [1.3] J
6020	Metals	Zinc	mg/kg	960	71.1 [3.46]	90.5 [4.49]	57 [2.45]	42 [2.51]	280 [2.75]	219 [2.83]	71 [3.25]
IonsNutrients											
9060	IonsNutrients	TOC	percent	–	14.6	21.8	7.47	8.17	17.9	12.8	11.5
Other											
A2540G	Other	Total Solids	percent	–	35.9	26	51	47.2	43.8	42.1	36.4

Notes:
[1] Decision Document cleanup level (USACE 2009).
[ ] denotes the LOD or no number if no LOD was reported
Bold = Result is greater than or equal to the screening level[1]
= LOD greater than or equal to the screening level[1]
— = method or screening level not available or analysis not conducted
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For definitions, refer to the Acronyms and Abbreviations section of the DQA.

Table F-1.1 Sediment Results

				Location ID:	S28-45	S28-46	S28-47	S28-48	S28-48	S28-49	S28-50
				Sample ID:	18NEC-S28-SD-45	18NEC-S28-SD-46	18NEC-S28-SD-47	18NEC-S28-SD-48	18NEC-S28-SD-48-8	18NEC-S28-SD-49	18NEC-S28-SD-50
				Sample Date:	8/8/2018	8/8/2018	8/8/2018	8/8/2018	8/8/2018	8/8/2018	8/8/2018
				Sample Type:	SD	SD	SD	SD	SD	SD	SD
				SDG:	1184430	1184430	1184430	1184430	1184430	1184430	1184430
				Laboratory:	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA	SGSA
				QAQC:	Primary	Primary	Primary	Primary	Duplicate	Primary	Primary
Method	**Group**	**Analyte**	**Units**	**Screening Level¹**							
Fuels											
AK102_103	Fuels	DRO	mg/kg	3500	2670 [314]	**26900 [402]**	**55300 [810]**	**50400 [2515]**	**49900 [2295]**	**72400 [4400]**	**34700 [3115]**
AK102_103_SG	Fuels	DRO	mg/kg	3500	1870 [314]	**21000 [402]**	**55400 [810]**	**43900 [2515]**	**40500 [459]**	**59500 [4400]**	**27600 [3115]**
AK102_103	Fuels	RRO	mg/kg	3500	**4110 [314]**	**5440 [402]**	**13300 [810]**	**6980 [2515]**	**6050 [2295]**	**6390 [4400] J**	3460 [3115] J
AK102_103_SG	Fuels	RRO	mg/kg	3500	1370 [314]	1010 [402]	**11200 [810]**	2020 [2515] J	2230 [459]	**5200 [4400] J**	3260 [3115] J
PAHs											
8270SIM	PAHs	Acenaphthene	mg/kg	0.5	0.132 [0.0785] J	**2.51 [0.251]**	**3.92 [4.07] J**	**8.06 [15.7] J**	**5.15 [5.7] J**	**8.49 [4.42] J**	ND [0.383]
8270SIM	PAHs	Acenaphthylene	mg/kg	–	ND [0.0785]	ND [0.251]	ND [4.07]	ND [15.7]	ND [5.7]	ND [4.42]	ND [0.383]
8270SIM	PAHs	Anthracene	mg/kg	–	ND [0.0785]	ND [0.251]	ND [4.07]	ND [15.7]	ND [5.7]	ND [4.42]	ND [0.383]
8270SIM	PAHs	Benzo(a)anthracene	mg/kg	–	ND [0.0785]	ND [0.251]	ND [0.204]	ND [0.315]	ND [0.286]	ND [0.111]	ND [0.0765]
8270SIM	PAHs	Benzo(a)pyrene	mg/kg	–	ND [0.0785]	ND [0.251]	ND [0.204]	ND [0.315]	ND [0.286]	ND [0.111]	ND [0.0765]
8270SIM	PAHs	Benzo(b)fluoranthene	mg/kg	–	ND [0.0785]	ND [0.251]	ND [0.204]	ND [0.315]	ND [0.286]	ND [0.111]	ND [0.0765]
8270SIM	PAHs	Benzo(g,h,i)perylene	mg/kg	1.7	ND [0.0785]	ND [0.251]	ND [0.204]	ND [0.315]	ND [0.286]	ND [0.111]	ND [0.0765]
8270SIM	PAHs	Benzo(k)fluoranthene	mg/kg	–	ND [0.0785]	ND [0.251]	ND [0.204]	ND [0.315]	ND [0.286]	ND [0.111]	ND [0.0765]
8270SIM	PAHs	Chrysene	mg/kg	–	ND [0.0785]	ND [0.251]	ND [0.204]	ND [0.315]	ND [0.286]	ND [0.111]	ND [0.0765]
8270SIM	PAHs	Dibenzo(a,h)anthracene	mg/kg	–	ND [0.0785]	ND [0.251]	ND [0.204]	ND [0.315]	ND [0.286]	ND [0.111]	ND [0.0765]
8270SIM	PAHs	Fluoranthene	mg/kg	2	ND [0.0785]	ND [0.251]	ND [0.204]	ND [0.315]	ND [0.286]	ND [0.111]	ND [0.0765]
8270SIM	PAHs	Fluorene	mg/kg	0.8	0.234 [0.0785]	**3.56 [0.251]**	**6.37 [4.07] J**	**15.7 [15.7] J**	**10 [5.7] J**	**15.1 [4.42]**	**1.8 [0.383]**
8270SIM	PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	3.2	ND [0.0785]	ND [0.251]	ND [0.204]	ND [0.315]	ND [0.286]	ND [0.111]	ND [0.0765]
8270SIM	PAHs	1-Methylnaphthalene	mg/kg	–	2.01 [0.0785]	69.5 [5]	91.1 [4.07]	213 [15.7] QN	121 [5.7] QN	317 [22.1]	26.7 [1.92]
8270SIM	PAHs	2-Methylnaphthalene	mg/kg	0.6	**2.61 [0.0785]**	**107 [5]**	**145 [4.07]**	**303 [15.7] QN**	**170 [5.7] QN**	**529 [22.1]**	**41 [1.92]**
8270SIM	PAHs	Naphthalene	mg/kg	1.7	1.62 [0.063]	**32.6 [4.02]**	**70 [3.25]**	**122 [12.6] QN**	**72.1 [4.58] QN**	**191 [3.54]**	**15.8 [0.306]**
8270SIM	PAHs	Phenanthrene	mg/kg	4.8	0.134 [0.0785] J	2.75 [0.251]	3.69 [4.07] J	**9.99 [15.7] J,QN**	**5.72 [5.7] J,QN**	**7.42 [4.42] J**	1.04 [0.383]
8270SIM	PAHs	Pyrene	mg/kg	–	ND [0.0785]	ND [0.251]	0.357 [0.204] J	0.25 [0.315] J	0.236 [0.286] J	0.172 [0.111] J	0.109 [0.0765] J
NR	PAHs	Total HPAHs	mg/kg	9.6	ND []	ND []	0.357 []	0.25 []	0.236 []	0.172 []	0.109 []
NR	PAHs	Total LPAHs	mg/kg	7.8	2.12 []	**41.42 []**	**83.98 []**	**155.75 []**	**92.97 []**	**222.01 []**	**18.64 []**
PCBs											
8082	PCBs	Aroclor-1016	mg/kg	0.7	ND [0.0388]	ND [0.0498]	ND [0.0403]	ND [0.062]	ND [0.057]	ND [0.054]	ND [0.0389]
8082	PCBs	Aroclor-1221	mg/kg	0.7	ND [0.155]	ND [0.199]	ND [0.162]	ND [0.249]	ND [0.229]	ND [0.217]	ND [0.156]
8082	PCBs	Aroclor-1232	mg/kg	0.7	ND [0.0388]	ND [0.0498]	ND [0.0403]	ND [0.062]	ND [0.057]	ND [0.054]	ND [0.0389]
8082	PCBs	Aroclor-1242	mg/kg	0.7	ND [0.0388]	ND [0.0498]	ND [0.0403]	ND [0.062]	ND [0.057]	ND [0.054]	ND [0.0389]
8082	PCBs	Aroclor-1248	mg/kg	0.7	ND [0.0388]	ND [0.0498]	ND [0.0403]	ND [0.062]	ND [0.057]	ND [0.054]	ND [0.0389]
8082	PCBs	Aroclor-1254	mg/kg	0.7	ND [0.0388]	ND [0.0498]	ND [0.0403]	ND [0.062]	ND [0.057]	ND [0.054]	ND [0.0389]
8082	PCBs	Aroclor-1260	mg/kg	0.7	ND [0.0388]	ND [0.0498]	0.482 [0.0403]	0.0426 [0.062] J,QN	0.246 [0.057] QN	0.0728 [0.054] J	0.15 [0.0389]
8082	PCBs	PCBs	mg/kg	0.7	ND [0.0388]	ND [0.0498]	0.482 [0.0403]	0.0426 [0.062]	0.246 [0.057]	0.0728 [0.054]	0.15 [0.0389]
Metals											
6020	Metals	Arsenic	mg/kg	93	5.32 [0.76]	5.43 [0.985]	5.21 [0.79]	4.26 [1.21]	5.92 [1.1]	3.03 [1.02]	5.29 [0.73]
6020	Metals	Chromium	mg/kg	270	26.3 [0.304]	20.6 [0.395]	29.5 [0.317]	17.5 [0.482]	23.1 [0.441]	12.2 [0.408]	23.3 [0.292]
6020	Metals	Lead	mg/kg	530	22.9 [0.152]	18.3 [0.198]	81 [0.158]	15.7 [0.241] QN	32.2 [0.22] QN	13 [0.204]	60.3 [0.146]
6020	Metals	Selenium	mg/kg	–	1.47 [0.76] J	1.87 [0.985] J	0.738 [0.79] J	1.9 [1.21] J	1.57 [1.1] J	1.37 [1.02] J	0.829 [0.73] J
6020	Metals	Zinc	mg/kg	960	62.2 [1.9]	41.6 [2.47]	145 [1.98]	29.4 [3.02] QN	65.3 [2.75] QN	24.1 [2.55]	86 [1.83]
IonsNutrients											
9060	IonsNutrients	TOC	percent	–	8.63	15.2	8.49	20.6	14.4	13.8	4.23
Other											
A2540G	Other	Total Solids	percent	–	63.1	49.2	61.1	39.5	43.2	45.3	64

Notes:

¹ Decision Document cleanup level (USACE 2009).

[ ] denotes the LOD or no number if no LOD was reported

Bold = Result is greater than or equal to the screening level¹

= LOD greater than or equal to the screening level¹

— = method or screening level not available or analysis not conducted

For data qualifiers, refer to the Analytical Data Qualifiers section of the DQA.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2018 Site 28 Sediment Mapping and Sampling Report at Northeast Cape
Table F-1.1 Sediment Results

				Location ID:	S28-51	S28-52	S28-53	S28-54
				Sample ID:	18NEC-S28-SD-51	18NEC-S28-SD-52	18NEC-S28-SD-53	18NEC-S28-SD-54
				Sample Date:	8/8/2018	8/8/2018	8/8/2018	8/8/2018
				Sample Type:	SD	SD	SD	SD
				SDG:	1184430	1184430	1184430	1184430
				Laboratory:	SGSA	SGSA	SGSA	SGSA
				QAQC:	Primary	Primary	Primary	Primary
Method	**Group**	**Analyte**	**Units**	**Screening Level¹**				
Fuels								
AK102_103	Fuels	DRO	mg/kg	3500	**61100 [2130]**	**62000 [2240]**	**58100 [3065]**	**51900 [2480]**
AK102_103_SG	Fuels	DRO	mg/kg	3500	**51800 [4265]**	**50000 [2240]**	**33000 [615]**	**37200 [496]**
AK102_103	Fuels	RRO	mg/kg	3500	**5330 [2130]**	**13400 [2240]**	**10600 [3065]**	**7040 [2480]**
AK102_103_SG	Fuels	RRO	mg/kg	3500	**5010 [4265] J**	**9210 [2240]**	1870 [615]	2290 [496]
PAHs								
8270SIM	PAHs	Acenaphthene	mg/kg	0.5	**6.49 [4.26] J**	**7.48 [2.8]**	**9.36 [7.65] J**	**9.34 [15.5] J**
8270SIM	PAHs	Acenaphthylene	mg/kg	–	ND [4.26]	ND [2.8]	ND [7.65]	ND [15.5]
8270SIM	PAHs	Anthracene	mg/kg	–	ND [4.26]	ND [2.8]	ND [7.65]	ND [15.5]
8270SIM	PAHs	Benzo(a)anthracene	mg/kg	–	ND [0.107]	0.359 [0.28] J	ND [0.383]	ND [0.311]
8270SIM	PAHs	Benzo(a)pyrene	mg/kg	–	ND [0.107]	ND [0.28]	ND [0.383]	ND [0.311]
8270SIM	PAHs	Benzo(b)fluoranthene	mg/kg	–	ND [0.107]	ND [0.28]	ND [0.383]	ND [0.311]
8270SIM	PAHs	Benzo(g,h,i)perylene	mg/kg	1.7	ND [0.107]	ND [0.28]	ND [0.383]	ND [0.311]
8270SIM	PAHs	Benzo(k)fluoranthene	mg/kg	–	ND [0.107]	ND [0.28]	ND [0.383]	ND [0.311]
8270SIM	PAHs	Chrysene	mg/kg	–	ND [0.107]	0.702 [0.28]	ND [0.383]	ND [0.311]
8270SIM	PAHs	Dibenzo(a,h)anthracene	mg/kg	–	ND [0.107]	ND [0.28]	ND [0.383]	ND [0.311]
8270SIM	PAHs	Fluoranthene	mg/kg	2	0.0937 [0.107] J	**3.42 [0.28]**	ND [0.383]	ND [0.311]
8270SIM	PAHs	Fluorene	mg/kg	0.8	**11 [4.26]**	**9.4 [2.8]**	**12.5 [7.65] J**	**17.4 [15.5] J**
8270SIM	PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	3.2	ND [0.107]	ND [0.28]	ND [0.383]	ND [0.311]
8270SIM	PAHs	1-Methylnaphthalene	mg/kg	–	224 [21.4]	58.5 [2.8]	170 [7.65]	301 [15.5]
8270SIM	PAHs	2-Methylnaphthalene	mg/kg	0.6	**350 [21.4]**	**77.5 [2.8]**	**239 [7.65]**	**496 [15.5]**
8270SIM	PAHs	Naphthalene	mg/kg	1.7	**134 [3.42]**	**44.4 [2.24]**	**94.6 [6.15]**	**230 [12.4]**
8270SIM	PAHs	Phenanthrene	mg/kg	4.8	**6.14 [4.26] J**	**8.33 [2.8]**	**13.3 [7.65] J**	**9.91 [15.5] J**
8270SIM	PAHs	Pyrene	mg/kg	–	0.173 [0.107] J	2.45 [0.28]	0.391 [0.383] J	0.235 [0.311] J
NR	PAHs	Total HPAHs	mg/kg	9.6	0.2667 []	6.931 []	0.391 []	0.235 []
NR	PAHs	Total LPAHs	mg/kg	7.8	**157.63 []**	**69.61 []**	**129.76 []**	**266.65 []**
PCBs								
8082	PCBs	Aroclor-1016	mg/kg	0.7	ND [0.053]	ND [0.056]	ND [0.077]	ND [0.0625]
8082	PCBs	Aroclor-1221	mg/kg	0.7	ND [0.212]	ND [0.224]	ND [0.308]	ND [0.249]
8082	PCBs	Aroclor-1232	mg/kg	0.7	ND [0.053]	ND [0.056]	ND [0.077]	ND [0.0625]
8082	PCBs	Aroclor-1242	mg/kg	0.7	ND [0.053]	ND [0.056]	ND [0.077]	ND [0.0625]
8082	PCBs	Aroclor-1248	mg/kg	0.7	ND [0.053]	ND [0.056]	ND [0.077]	ND [0.0625]
8082	PCBs	Aroclor-1254	mg/kg	0.7	ND [0.053]	ND [0.056]	ND [0.077]	ND [0.0625]
8082	PCBs	Aroclor-1260	mg/kg	0.7	0.117 [0.053]	0.174 [0.056]	0.0677 [0.077] J	0.0532 [0.0625] J
8082	PCBs	PCBs	mg/kg	0.7	0.117 [0.053]	0.174 [0.056]	0.0677 [0.077]	0.0532 [0.0625]
Metals								
6020	Metals	Arsenic	mg/kg	93	3.33 [1.01]	9.06 [1.06]	6.64 [1.52]	4.02 [1.19]
6020	Metals	Chromium	mg/kg	270	10.9 [0.404]	22.6 [0.426]	25.2 [0.61]	17.2 [0.475]
6020	Metals	Lead	mg/kg	530	15.5 [0.202]	28.2 [0.213]	17 [0.305]	20.7 [0.237]
6020	Metals	Selenium	mg/kg	–	1.06 [1.01] J	1.01 [1.06] J	2.27 [1.52] J	1.9 [1.19] J
6020	Metals	Zinc	mg/kg	960	29.1 [2.52]	120 [2.66]	55.8 [3.82]	39 [2.97]
IonsNutrients								
9060	IonsNutrients	TOC	percent	–	9.13	10.2	21.4	15.6
Other								
A2540G	Other	Total Solids	percent	–	46.8	44.6	32.3	39.8

Notes:
¹ Decision Document cleanup level (USACE 2009).
[ ] denotes the LOD or no number if no LOD was reported
Bold = Result is greater than or equal to the screening level¹
= LOD greater than or equal to the screening level¹
— = method or screening level not available or analysis not conducted
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2018 Site 28 Sediment Mapping and Sampling Report at Northeast Cape
Table F-1.2 Sample Summary

COC Sample ID	Location ID	Collection Date	Collection Time	Sampler	Qty	Container Type	Container Volume	Preservative	Matrix	Analytical Method Requested	QC Type	TAT	Site	COC Number	Cooler Name	CoolerDate	Laboratory	SDG Number	Sample Depth (feet)
18NEC-S28-SD-01	S28-01	7-Aug-18	1017	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 1.0
18NEC-S28-SD-02	S28-02	7-Aug-18	1035	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 0.7
18NEC-S28-SD-02-8	S28-02	7-Aug-18	1035	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A	DUP	14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 0.7
18NEC-S28-SD-03	S28-03	7-Aug-18	1050	AD/JB	4	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A	MS/MSD	14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 1.8
18NEC-S28-SD-04	S28-04	7-Aug-18	1108	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 0.8
18NEC-S28-SD-05	S28-05	7-Aug-18	1115	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 0.8
18NEC-S28-SD-06	S28-06	7-Aug-18	1125	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 2.0
18NEC-S28-SD-07	S28-07	7-Aug-18	1133	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 1.0
18NEC-S28-SD-08	S28-08	7-Aug-18	1145	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 2.0
18NEC-S28-SD-09	S28-09	7-Aug-18	1153	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 2.0
18NEC-S28-SD-10	S28-10	7-Aug-18	1201	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 2.0
18NEC-S28-SD-11	S28-11	7-Aug-18	1211	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 2.0
18NEC-S28-SD-12	S28-12	7-Aug-18	1221	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 2.0
18NEC-S28-SD-13	S28-13	7-Aug-18	1448	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 2.0
18NEC-S28-SD-14	S28-14	7-Aug-18	1500	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 1.5
18NEC-S28-SD-15	S28-15	7-Aug-18	1517	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 2.0
18NEC-S28-SD-16	S28-16	7-Aug-18	1528	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-29	Snuggie	8-Aug-18	SGS	1184373	0 - 2.0
18NEC-S28-SD-17	S28-17	7-Aug-18	1546	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 2.0
18NEC-S28-SD-17-8	S28-17	7-Aug-18	1546	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A	DUP	14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 2.0
18NEC-S28-SD-18	S28-18	7-Aug-18	1603	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-19	S28-19	7-Aug-18	1625	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 2.0
18NEC-S28-SD-20	S28-20	7-Aug-18	1632	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-21	S28-21	7-Aug-18	1644	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-22	S28-22	7-Aug-18	1653	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-23	S28-23	7-Aug-18	1702	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 2.0
18NEC-S28-SD-24	S28-24	7-Aug-18	1713	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 2.0

2018 Site 28 Sediment Mapping and Sampling Report at Northeast Cape
Table F-1.2 Sample Summary

COC Sample ID	Location ID	Collection Date	Collection Time	Sampler	Qty	Container Type	Container Volume	Preservative	Matrix	Analytical Method Requested	QC Type	TAT	Site	COC Number	Cooler Name	CoolerDate	Laboratory	SDG Number	Sample Depth (feet)
18NEC-S28-SD-25	S28-25	8-Aug-18	0920	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-26	S28-26	8-Aug-18	0951	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-27	S28-27	8-Aug-18	1001	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 1.5
18NEC-S28-SD-27-8	S28-27	8-Aug-18	1001	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A	DUP	14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 1.5
18NEC-S28-SD-28	S28-28	8-Aug-18	1012	AD/JB	4	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A	MS/MSD	14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 1.5
18NEC-S28-SD-29	S28-29	8-Aug-18	1025	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-30	S28-30	8-Aug-18	1040	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 1.5
18NEC-S28-SD-31	S28-31	8-Aug-18	1048	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-30	Pillow Pet	10-Aug-18	SGS	1184430	0 - 1.5
18NEC-S28-SD-32	S28-32	8-Aug-18	1058	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-31	ShamWow	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-33	S28-33	8-Aug-18	1106	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-31	ShamWow	10-Aug-18	SGS	1184430	0 - 0.8
18NEC-S28-SD-34	S28-34	8-Aug-18	1114	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-31	ShamWow	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-35	S28-35	8-Aug-18	1125	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-31	ShamWow	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-38	S28-38	8-Aug-18	1143	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-31	ShamWow	10-Aug-18	SGS	1184430	0 - 2.0
18NEC-S28-SD-38-8	S28-38	8-Aug-18	1143	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A	DUP	14 Days	Site 28	18NEC-31	ShamWow	10-Aug-18	SGS	1184430	0 - 2.0
18NEC-S28-SD-39	S28-39	8-Aug-18	1154	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-31	ShamWow	10-Aug-18	SGS	1184430	0 - 2.0
18NEC-S28-SD-40	S28-40	8-Aug-18	1202	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-31	ShamWow	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-42	S28-42	8-Aug-18	1218	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-31	ShamWow	10-Aug-18	SGS	1184430	0 - 0.8
18NEC-S28-SD-52	S28-52	8-Aug-18	1440	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-31	ShamWow	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-53	S28-53	8-Aug-18	1504	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-31	ShamWow	10-Aug-18	SGS	1184430	0 - 1.5
18NEC-S28-SD-37	S28-37	8-Aug-18	1540	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-31	ShamWow	10-Aug-18	SGS	1184430	0 - 0.2
18NEC-S28-SD-36	S28-36	8-Aug-18	1553	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-31	ShamWow	10-Aug-18	SGS	1184430	0 - 0.2
18NEC-S28-SD-41	S28-41	8-Aug-18	1605	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-32	Oxiclean	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-41-8	S28-41	8-Aug-18	1605	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A	DUP	14 Days	Site 28	18NEC-32	Oxiclean	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-44	S28-44	8-Aug-18	1624	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-32	Oxiclean	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-45	S28-45	8-Aug-18	1640	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-32	Oxiclean	10-Aug-18	SGS	1184430	0 - 1.5
18NEC-S28-SD-46	S28-46	8-Aug-18	1646	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-32	Oxiclean	10-Aug-18	SGS	1184430	0 - 0.8

2018 Site 28 Sediment Mapping and Sampling Report at Northeast Cape
Table F-1.2 Sample Summary

COC Sample ID	Location ID	Collection Date	Collection Time	Sampler	Qty	Container Type	Container Volume	Preservative	Matrix	Analytical Method Requested	QC Type	TAT	Site	COC Number	Cooler Name	CoolerDate	Laboratory	SDG Number	Sample Depth (feet)
18NEC-S28-SD-43	S28-43	8-Aug-18	1700	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-32	Oxiclean	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-54	S28-54	8-Aug-18	1710	AD/JB	4	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A	MS/MSD	14 Days	Site 28	18NEC-32	Oxiclean	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-47	S28-47	8-Aug-18	1720	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-32	Oxiclean	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-48	S28-48	8-Aug-18	1726	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-32	Oxiclean	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-48-8	S28-48	8-Aug-18	1726	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A	DUP	14 Days	Site 28	18NEC-32	Oxiclean	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-49	S28-49	8-Aug-18	1733	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-32	Oxiclean	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-50	S28-50	8-Aug-18	1739	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-32	Oxiclean	10-Aug-18	SGS	1184430	0 - 1.0
18NEC-S28-SD-51	S28-51	8-Aug-18	1750	AD/JB	2	Amber Glass Jar	8 oz	0°C to 6°C	SD	AK102/103, AK102/103 w silica gel cleanup, SW8270DSIM, SW8082A, SW6020A (As, Cr, Pb, Se, Zn), SW9060A		14 Days	Site 28	18NEC-32	Oxiclean	10-Aug-18	SGS	1184430	0 - 1.0

Notes:
Project NPDL number 18-053
ID = identification
oz = ounce
qty = quantity
For additional definitions, refer to the Acronyms and Abbreviations section of the DQA.

EXHIBIT F2-2

Qualified Sample Results Tables

2018 Site 28 Sediment Mapping and Sampling Report at Northeast Cape
Table F-2.1 Surrogate Recoveries

SDG	Sample ID	Lab Sample ID	Method	Analyte	Result (mg/L)	LOD (mg/L)	LOQ (mg/L)	Recovery (%)	LCL (%)	UCL (%)	Units	Lab Lot Number	Qualifier
1184430	18NEC-S28-SD-42	1184430028	SW8082A	Aroclor-1016	0	0	0.112	--	--	--	mg/kg	XXX40262	QL
1184430	18NEC-S28-SD-42	1184430028	SW8082A	Aroclor-1221	0	0	0.449	--	--	--	mg/kg	XXX40262	QL
1184430	18NEC-S28-SD-42	1184430028	SW8082A	Aroclor-1232	0	0	0.112	--	--	--	mg/kg	XXX40262	QL
1184430	18NEC-S28-SD-42	1184430028	SW8082A	Aroclor-1242	0	0	0.112	--	--	--	mg/kg	XXX40262	QL
1184430	18NEC-S28-SD-42	1184430028	SW8082A	Aroclor-1248	0	0	0.112	--	--	--	mg/kg	XXX40262	QL
1184430	18NEC-S28-SD-42	1184430028	SW8082A	Aroclor-1254	0	0	0.112	--	--	--	mg/kg	XXX40262	QL
1184430	18NEC-S28-SD-42	1184430028	SW8082A	Aroclor-1260	0	0	0.112	--	--	--	mg/kg	XXX40262	QL
1184430	18NEC-S28-SD-42	1184430028	SW8082A	Decachlorobiphenyl	34.9	0	--	34.9	60	125	PERCENT	XXX40262	--

Notes:

For data qualifiers, refer to the Analytical Data Qualifiers section of the DQA.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

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Table F-2.2 Duplicate Sample RPD

SDG	Parent Sample ID	Parent Lab Sample ID	Dup Sample ID	Dup Lab Sample ID	Method	Analyte	Parent Sample Result	Parent Sample Result Type	Duplicate Sample Result	Duplicate Sample Result Type	RPD (%)	Problem	matrix	Parent Sample Dilution Factor	Dup Sample Dilution Factor	Parent Sample Date	Dup Sample Date	Parent Qualifier	Duplicate Qualifier
1184373	18NEC-S28-SD-02	1184373002	18NEC-S28-SD-02-8	1184373003	SW6020A	Selenium	1.37	=	0.804	=	52.1	Over 50%	SD	10	10	07-Aug-18	07-Aug-18	J,QN	J,QN
1184430	18NEC-S28-SD-17	1184430001	18NEC-S28-SD-17-8	1184430002	8270SIM	Benzo(a)anthracene	0.171	=	0.366	ND	72.6	Over 50%	SD	10	10	07-Aug-18	07-Aug-18	J,QN	QN
1184430	18NEC-S28-SD-27	1184430012	18NEC-S28-SD-27-8	1184430013	8270SIM	Fluorene	0.253	=	0.499	ND	65.4	Over 50%	SD	10	10	08-Aug-18	08-Aug-18	J,QN	QN
1184430	18NEC-S28-SD-27	1184430012	18NEC-S28-SD-27-8	1184430013	SW6020A	Lead	16.1	=	8.17	=	65.3	Over 50%	SD	10	10	08-Aug-18	08-Aug-18	QN	QN
1184430	18NEC-S28-SD-27	1184430012	18NEC-S28-SD-27-8	1184430013	SW6020A	Zinc	51.1	=	24.8	=	69.3	Over 50%	SD	10	10	08-Aug-18	08-Aug-18	QN	QN
1184430	18NEC-S28-SD-38	1184430024	18NEC-S28-SD-38-8	1184430025	8270SIM	1-Methylnaphthalene	7.79	=	34.2	=	125.8	Over 50%	SD	10	100	08-Aug-18	08-Aug-18	QN	QN
1184430	18NEC-S28-SD-38	1184430024	18NEC-S28-SD-38-8	1184430025	8270SIM	2-Methylnaphthalene	13	=	55	=	123.5	Over 50%	SD	10	100	08-Aug-18	08-Aug-18	QN	QN
1184430	18NEC-S28-SD-38	1184430024	18NEC-S28-SD-38-8	1184430025	8270SIM	Acenaphthene	0.329	ND	1.37	=	122.5	Over 50%	SD	10	10	08-Aug-18	08-Aug-18	QN	QN
1184430	18NEC-S28-SD-38	1184430024	18NEC-S28-SD-38-8	1184430025	AK102SG	DRO	2120	=	4610	=	74.0	Over 50%	SD	1	1	08-Aug-18	08-Aug-18	QN	QN
1184430	18NEC-S28-SD-38	1184430024	18NEC-S28-SD-38-8	1184430025	AK102	DRO	3230	=	6620	=	68.8	Over 50%	SD	10	10	08-Aug-18	08-Aug-18	QN	QN
1184430	18NEC-S28-SD-38	1184430024	18NEC-S28-SD-38-8	1184430025	8270SIM	Fluorene	0.244	=	2.31	=	161.8	Over 50%	SD	10	10	08-Aug-18	08-Aug-18	J,QN	QN
1184430	18NEC-S28-SD-38	1184430024	18NEC-S28-SD-38-8	1184430025	8270SIM	Naphthalene	12.1	=	21	=	53.8	Over 50%	SD	10	100	08-Aug-18	08-Aug-18	QN	QN
1184430	18NEC-S28-SD-38	1184430024	18NEC-S28-SD-38-8	1184430025	8270SIM	Phenanthrene	0.329	ND	1.17	=	112.2	Over 50%	SD	10	10	08-Aug-18	08-Aug-18	QN	QN
1184430	18NEC-S28-SD-48	1184430039	18NEC-S28-SD-48-8	1184430040	8270SIM	1-Methylnaphthalene	213	=	121	=	55.1	Over 50%	SD	500	200	08-Aug-18	08-Aug-18	QN	QN
1184430	18NEC-S28-SD-48	1184430039	18NEC-S28-SD-48-8	1184430040	8270SIM	2-Methylnaphthalene	303	=	170	=	56.2	Over 50%	SD	500	200	08-Aug-18	08-Aug-18	QN	QN
1184430	18NEC-S28-SD-48	1184430039	18NEC-S28-SD-48-8	1184430040	SW8082A	Aroclor-1260	0.0426	=	0.246	=	141.0	Over 50%	SD	1	1	08-Aug-18	08-Aug-18	J,QN	QN
1184430	18NEC-S28-SD-48	1184430039	18NEC-S28-SD-48-8	1184430040	SW6020A	Lead	15.7	=	32.2	=	68.9	Over 50%	SD	10	10	08-Aug-18	08-Aug-18	QN	QN
1184430	18NEC-S28-SD-48	1184430039	18NEC-S28-SD-48-8	1184430040	8270SIM	Naphthalene	122	=	72.1	=	51.4	Over 50%	SD	500	200	08-Aug-18	08-Aug-18	QN	QN
1184430	18NEC-S28-SD-48	1184430039	18NEC-S28-SD-48-8	1184430040	8270SIM	Phenanthrene	9.99	=	5.72	=	54.4	Over 50%	SD	500	200	08-Aug-18	08-Aug-18	J,QN	J,QN
1184430	18NEC-S28-SD-48	1184430039	18NEC-S28-SD-48-8	1184430040	SW6020A	Zinc	29.4	=	65.3	=	75.8	Over 50%	SD	10	10	08-Aug-18	08-Aug-18	QN	QN
1184430	18NEC-S28-SD-41	1184430044	18NEC-S28-SD-41-8	1184430045	AK102SG	DRO	115	=	195	=	51.6	Over 50%	SD	1	1	08-Aug-18	08-Aug-18	QN	QN

Notes:

For data qualifiers, refer to the Analytical Data Qualifiers section of the DQA.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2018 Site 28 Sediment Mapping and Sampling Report at Northeast Cape
Table F-2.3 Nondetect Results with Reporting Limits Greater Than Cleanup Levels

SDG	Sample ID	Lab Sample ID	Method	Analyte	Cleanup Level	Result	LOD	LOQ	Units	Dilution Factor
1184430	18NEC-S28-SD-34	1184430022	8270SIM	2-Methylnaphthalene	0.6	ND	0.82	1.64	mg/kg	10
1184430	18NEC-S28-SD-34	1184430022	8270SIM	Acenaphthene	0.5	ND	0.82	1.64	mg/kg	10
1184430	18NEC-S28-SD-35	1184430023	8270SIM	Acenaphthene	0.5	ND	0.935	1.87	mg/kg	10
1184430	18NEC-S28-SD-35	1184430023	SW8082A	Aroclor-1221	0.7	ND	0.755	1.51	mg/kg	1
1184430	18NEC-S28-SD-36	1184430032	8270SIM	Acenaphthene	0.5	ND	1.04	2.09	mg/kg	10
1184430	18NEC-S28-SD-36	1184430032	8270SIM	Fluorene	0.8	ND	1.04	2.09	mg/kg	10
1184430	18NEC-S28-SD-36	1184430032	SW8082A	Aroclor-1221	0.7	ND	0.835	1.67	mg/kg	1

Notes:

For data qualifiers, refer to the Analytical Data Qualifiers section of the DQA.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2018 Site 28 Sediment Mapping and Sampling Report at Northeast Cape
Table F-2.4 Equipment Blank Results

SDG	Sample ID	Lab Sample ID	Method	Analyte	Result	Units
1184430	18NEC-EB01-WG	1184430048	8270SIM	Naphthalene	0.0000079	mg/L
1184430	18NEC-EB01-WG	1184430048	E200.8	Zinc	0.00622	mg/L

Notes:

For data qualifiers, refer to the Analytical Data Qualifiers section of the DQA.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

EXHIBIT F2-3

ADEC Laboratory Data Review Checklists

Laboratory Data Review Checklist

Completed by:

Nathaniel Gingery

Title:

Project Chemist

Date:

10/17/2018

CS Report Name:

Northeast Cape Five-Year Review

Report Date:

12/20/2018

Consultant Firm:

Jacobs

Laboratory Name:

SGS North America Inc.

Laboratory Report Number:

1184373

ADEC File Number:

ST LAW MOC 475.38.013

Hazard Identification Number:

221

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

(•) Yes ( ) No Comments:

All analyses were performed by SGS North America Inc. in Anchorage, AK.

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CD approved?

( ) Yes (•) No Comments:

Not applicable.

2. Chain of Custody (CoC)

a. CoC information completed, signed, and dated (including released/received by)?

(•) Yes ( ) No Comments:

b. Correct analyses requested?

(•) Yes ( ) No Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (0° ± 6° C)?

(•) Yes ( ) No Comments:

Cooler name, temperature blank temp °C
1. Snuggie 0.3 °C

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

(•) Yes ( ) No Comments:

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

(•) Yes ( ) No Comments:

No discrepancies were noted.

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

○ Yes ○ No Comments:

N/A

e. Data quality or usability affected? Explain.

Comments:

Data quality and usability were not affected.

4. Case Narrative

a. Present and understandable?

◉ Yes ○ No Comments:

b. Discrepancies, errors or QC failures identified by the lab?

◉ Yes ○ No Comments:

c. Were all corrective actions documented?

◉ Yes ○ No Comments:

The lab noted all corrective actions taken.

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Discrepancies will be discussed in their related sections below.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

◉ Yes ○ No Comments:

b. All applicable holding times met?

◉ Yes ○ No Comments:

c. All soils reported on a dry weight basis?

◉ Yes ○ No Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

◉ Yes ○ No Comments:

All LODs for nondetect samples were less than the project cleanup level.

e. Data quality or usability affected? Explain.

Comments:

N/A

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples

◉ Yes ○ No Comments:

ii. All method blank results less than PQL?

◉ Yes ○ No Comments:

Chromium was detected above the detection limit in method blank 1466142 but all associated samples were greater than five times the method blank contamination.

iii. If above PQL, what samples are affected?

Comments:

N/A

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

◉ Yes ○ No Comments:

N/A

v. Data quality or usability affected? Explain.

Comments:

The data quality and usability were not affected.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

◉ Yes ○ No Comments:

An LCS/LCSD was analyzed for all methods. A DoD QSM required MS/MSD was assigned to sample 18NEC-S28-SD-03.

ii. Metals/Inorganics - one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

◉ Yes ○ No Comments:

An LCS/LCSD was analyzed for all methods. A DoD QSM required MS/MSD was assigned to sample 18NEC-S28-SD-03.

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

○ Yes ◉ No Comments:

All LCS/LCSD accuracy requirements were met.

SW8270SIM - The 18NEC-S28-SD-03 MS and MSD had several recoveries outside of control limit. However, the samples were diluted 10X, thus no qualification was needed.

AK103 - The 18NEC-S28-SD-03 MS failed high for RRO at 191%; however, the spike amount was less than the parent sample concentration, no samples were qualified.

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

◉ Yes ○ No Comments:

All LCS/LCSD precision requirements were met.

All MS/MSD precision requirements were met with the following exception.
SW8270SIM - the following analytes exceeded the RPD limit of 20%: fluoranthene (88%), phenanthrene (91%), and pyrene (56%). Samples were not qualified due to a dilution of 10X.

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

N/A

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

◉ Yes ○ No Comments:

N/A

vii. Data quality or usability affected? (Use comment box to explain)

Comments:

Data quality and usability were not affected.

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses - field, QC and laboratory samples?

(•) Yes ( ) No Comments:

All organic analyses were reported with surrogates.

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

( ) Yes (•) No Comments:

SW8082: Samples 18NEC-S28-SD-01, 18NEC-S28-SD-08, and 18NEC-S28-SD-13 recovered high for Decachlorobiphenyl, however the results were nondetect and did not need qualification.

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

( ) Yes ( ) No Comments:

N/A

iv. Data quality or usability affected? (Use the comment box to explain.)

( ) Yes (•) No Comments:

Data quality and usability were not affected.

d. Trip blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): <u>Water and Soil</u>

i. One trip blank reported per matrix, analysis and cooler?

( ) Yes (•) No Comments:

Volatile analyses were not included with this SDG, therefore a trip blank was not required.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

( ) Yes (•) No Comments:

N/A

iii. All results less than PQL?

○ Yes ◉ No Comments:

N/A

iv. If above PQL, what samples are affected?

Comments:

N/A

v. Data quality or usability affected? Explain.

Comments:

Data quality and usability were not affected.

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

○ Yes ◉ No Comments:

One duplicate was included with 16 primary samples, though the requirement for one FD per 10 project samples was met. See SDG 1184430.

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

Sample / Duplicate:
18NEC-S28-SD-02 / 18NEC-S28-SD-02-8

iii. Precision - All relative percent differences (RPD) less than specified DQOs?
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1-R_2)}{(R_1+R_2)} \times 100$$

Where: R_1 = Sample Concentration
R_2 = Field Duplicate Concentration (R_1-R_2)

○ Yes ◉ No Comments:

The following analyte had RPDs greater than 50% in the sample/duplicate 18NEC-S28-SD-02 / 18NEC-S28-SD-02-8:
Selenium (52%)

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

◉ Yes ○ No Comments:

Data quality and usability are minimally affected. The analytes listed above are flagged QN in both the parent and duplicate samples to indicate an unknown bias. The higher result will be used for reporting.

f. Decontamination or Equipment Blank (If not applicable, a comment stating why must be entered below.)

○ Yes ◉ No Comments:

No equipment blanks were submitted with this SDG. See the checklist for SDG 1184430.

i. All results less than PQL?

○ Yes ○ No Comments:

N/A

ii. If above PQL, what samples are affected?

Comments:

N/A

iii. Data quality or usability affected? Explain.

Comments:

Data quality and usability were not affected.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

◉ Yes ○ No Comments:

Qualifiers applied to this data are defined in the Data Quality Assessment appendix of this report.

Laboratory Data Review Checklist

Completed by:

Nathaniel Gingery

Title:

Project Chemist

Date:

10/19/2018

CS Report Name:

Northeast Cape Five-Year Review

Report Date:

12/20/2018

Consultant Firm:

Jacobs

Laboratory Name:

SGS North America Inc.

Laboratory Report Number:

1184430

ADEC File Number:

ST LAW MOC 475.38.013

Hazard Identification Number:

221

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

◉ Yes ○ No Comments:

All analyses were performed by SGS North America Inc. in Anchorage, AK.

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CD approved?

○ Yes ◉ No Comments:

Not applicable.

2. Chain of Custody (CoC)

a. CoC information completed, signed, and dated (including released/received by)?

◉ Yes ○ No Comments:

b. Correct analyses requested?

◉ Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (0° ± 6° C)?

◉ Yes ○ No Comments:

Cooler name, temperature blank temp °C
1. Pillow Pet 0.9 °C
2. Sham Wow 2.0 °C
3. Oxiclean 0.2 °C
4. Magic Mesh 0.8 °C

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

◉ Yes ○ No Comments:

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

◉ Yes ○ No Comments:

No discrepancies were noted.

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

○ Yes ○ No Comments:

N/A

e. Data quality or usability affected? Explain.

Comments:

Data quality and usability were not affected.

4. Case Narrative

a. Present and understandable?

◉ Yes ○ No Comments:

b. Discrepancies, errors or QC failures identified by the lab?

◉ Yes ○ No Comments:

c. Were all corrective actions documented?

◉ Yes ○ No Comments:

The lab noted all corrective actions taken.

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Discrepancies will be discussed in their related sections below.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

◉ Yes ○ No Comments:

b. All applicable holding times met?

◉ Yes ○ No Comments:

c. All soils reported on a dry weight basis?

◉ Yes ○ No Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

○ Yes ◉ No Comments:

The following analytes had LODs greater than the project cleanup level:
<u>18NEC-S28-SD-34:</u>
SW8270SIM: 2-Methylnaphthalene, Acenaphthene

<u>18NEC-S28-SD-35:</u>
SW8082: Aroclor-1221
SW8270SIM: Acenaphthene

<u>18NEC-S28-SD-36:</u>
SW8082: Aroclor-1221
SW8270SIM: Acenaphthene, Fluorene

e. Data quality or usability affected? Explain.

Comments:

The nondetect sample results with LODs greater than the project screening levels are italicized and highlighted in the results crosstab indicate a possible false nonexceedance.
Aroclor 1221 has not been found at Site 28 in the past or in current samples, so this analyte is not likely to be present and the data is not affected.

6. <u>QC Samples</u>

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples

◉ Yes ○ No Comments:

ii. All method blank results less than PQL?

◉ Yes ○ No Comments:

Zinc was detected in the method blank for batch MXX31843. The only sample associated with this method blank is the equipment blank.

iii. If above PQL, what samples are affected?

Comments:

N/A

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

◉ Yes ○ No Comments:

N/A

v. Data quality or usability affected? Explain.

Comments:

The data quality and usability were not affected.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

○ Yes ◉ No Comments:

An LCS/LCSD or LCS was analyzed for all methods as required.
DoD QSM required MS/MSDs were assigned to samples 18NEC-S28-SD-28 and 18NEC-S28-SD-54. A project specific MS/MSD was not analyzed in AK102 and AK103 batches XXX40205, XXX40206, and XXX40207. A project specific MS/MSD was not analyzed in SW8082 batches XXX40175, XXX40180 and XXX40262. A project specific MS/MSD was not analyzed in SW8270SIM batches XXX40169 and XXX40174.

ii. Metals/Inorganics - one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

◉ Yes ○ No Comments:

An LCS was analyzed for all methods. DoD QSM required MS/MSDs were assigned to samples 18NEC-S28-SD-28 and 18NEC-S28-SD-54.

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

○ Yes ◉ No Comments:

All LCS/LCSD accuracy requirements were met.

SW8270SIM - Both sets of MS and MSDs had several recoveries outside of control limits. However, the samples were diluted 10X or greater, thus no qualification was needed.

AK102/AK103 - Several AK102 and AK103 MS/MSD recoveries are outside of control limits. The spike amount is less than the parent sample concentration and no samples were qualified.

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

◉ Yes ○ No Comments:

All LCS/LCSD precision requirements were met.

All MS/MSD precision requirements were met.

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

N/A

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

◉ Yes ○ No Comments:

N/A

vii. Data quality or usability affected? (Use comment box to explain)

Comments:

Data quality and usability were not affected.

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses - field, QC and laboratory samples?

◉ Yes ○ No Comments:

All organic analyses were reported with surrogates.

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

○ Yes ◉ No Comments:

SW8082: Sample 18NEC-S28-SD-42 recovered low for Decachlorobiphenyl (35%).

AK102 and AK103 - Several samples have surrogate failures but are not qualified due dilutions of 5X or greater.

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

◉ Yes ○ No Comments:

SW8082: Sample 18NEC-S28-SD-42 was labeled QL to indicate a potential low bias.

AK102/103 - Samples are not qualified because they have a dilution 5X or greater.

iv. Data quality or usability affected? (Use the comment box to explain.)

○ Yes ◉ No Comments:

Data quality and usability were minimally affected. Results qualified QL are considered estimated with a low bias.

d. Trip blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): <u>Water and Soil</u>

i. One trip blank reported per matrix, analysis and cooler?

○ Yes ◉ No Comments:

Volatile analyses were not included with this SDG, therefore a trip blank was not required.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

○ Yes ◉ No Comments:

N/A

iii. All results less than PQL?

○ Yes ◉ No Comments:

N/A

iv. If above PQL, what samples are affected?

Comments:

N/A

v. Data quality or usability affected? Explain.

Comments:

Data quality and usability were not affected.

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

○ Yes ◉ No Comments:

Five duplicates were included with 38 primary samples.

ii. Submitted blind to lab?

◉ Yes ○ No Comments:

Sample / Duplicate:
18NEC-S28-SD-17 / 18NEC-S28-SD-17-8
18NEC-S28-SD-27 / 18NEC-S28-SD-27-8
18NEC-S28-SD-38 / 18NEC-S28-SD-38-8
18NEC-S28-SD-41 / 18NEC-S28-SD-41-8
18NEC-S28-SD-48 / 18NEC-S28-SD-48-8

iii. Precision - All relative percent differences (RPD) less than specified DQOs?
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1 - R_2)}{(R_1 + R_2)} \times 100$$

Where: R_1 = Sample Concentration
R_2 = Field Duplicate Concentration (R_1-R_2)

○ Yes ◉ No Comments:

The following analyte had RPDs greater than 50%:
<u>18NEC-S28-SD-17 / 18NEC-S28-SD-17-8:</u>
<u>SW8270SIM:</u>
Benzo(a)anthracene (72.6%)

<u>18NEC-S28-SD-27 / 18NEC-S28-SD-27-8</u>
<u>SW6020:</u>
Lead (65.3%)
Zinc (69.3%)
<u>SW8270SIM:</u>
Fluorene (65.4%)

<u>18NEC-S28-SD-38 / 18NEC-S28-SD-38-8</u>
<u>AK102:</u>
DRO (74%)
<u>AK102SG:</u>
DRO (68.8%)
<u>SW8270SIM:</u>
1-Methylnaphthalene (125.8%)
2-Methylnaphthalene (123.5%)
Acenaphthalene (122.5%)
Fluorene (161.8%)
Naphthalene (53.8%)
Phenanthrene (112.2%)

<u>18NEC-S28-SD-41 / 18NEC-S28-SD-41-8</u>
<u>AK102SG:</u>
DRO (51.6%)

<u>18NEC-S28-SD-48 / 18NEC-S28-SD-48-8</u>
<u>SW6020:</u>
Lead (68.9%)
Zinc (75.8%)
<u>SW8082:</u>
Aroclor-1260 (141%)
<u>SW8270SIM:</u>
1-Methylnaphthalene (55.1%)
2-Methylnaphthanele (56.2%)
Naphthalene (51.4%)
Phenanthrene (54.4%)

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

◉ Yes ○ No Comments:

Data quality and usability are minimally affected. The analytes listed above are flagged QN in both the parent and duplicate samples to indicate an unknown bias. The higher result will be used for reporting.

f. Decontamination or Equipment Blank (If not applicable, a comment stating why must be entered below.)

○ Yes ◉ No Comments:

One equipment blank, 18NEC-EB01-WG, was included with this SDG.

i. All results less than PQL?

◉ Yes ○ No Comments:

The equipment blank had detections of Naphthalene (0.0000079 mg/kg) and Zinc (0.00622 mg/kg). All samples were either nondetect or greater than 5 times the equipment blank contamination, thus no qualification was needed.

ii. If above PQL, what samples are affected?

Comments:

N/A

iii. Data quality or usability affected? Explain.

Comments:

Data quality and usability were not affected.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

◉ Yes ○ No Comments:

Qualifiers applied to this data are defined in the Data Quality Assessment appendix of this report.

EXHIBIT F2-4

Laboratory Deliverables

(Provided electronically on CD)

EXHIBIT F2-5

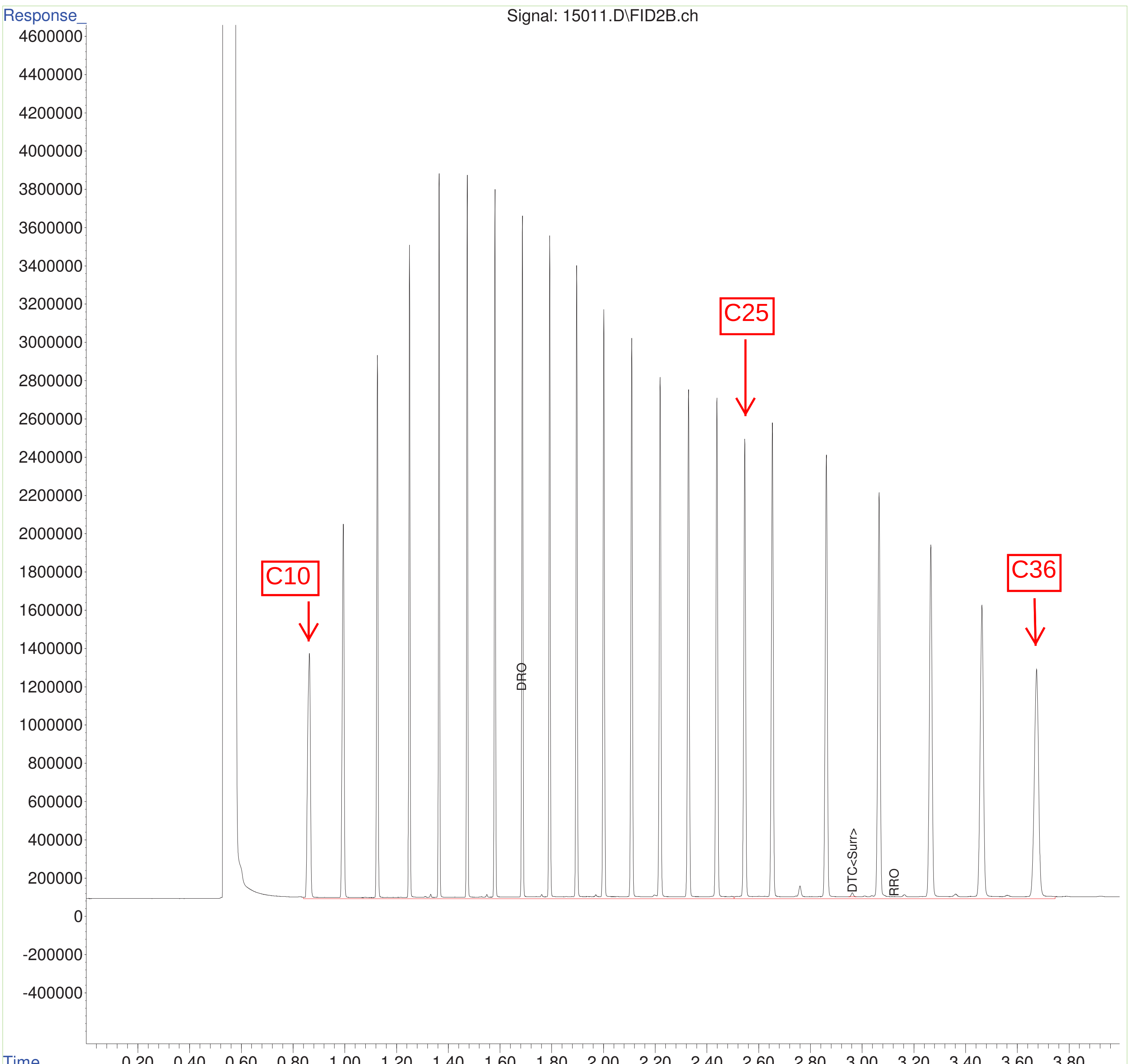
Biogenic Chromatograms

Quantitation Report (QT Reviewed)

Data Path : Y:\08\SF\DATA\081518B.SEC\
Data File : 15011.D
Signal(s) : FID2B.ch
Acq On : 15 Aug 2018 3:42 pm
Operator : CMS
Sample : NAS
Misc :
ALS Vial : 2 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 15 17:28:18 2018
Quant Method : Y:\08\SF\METHOD\SFR2018-0815A.M
Quant Title : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 17:10:45 2018
Response via : Initial Calibration
Integrator: ChemStation

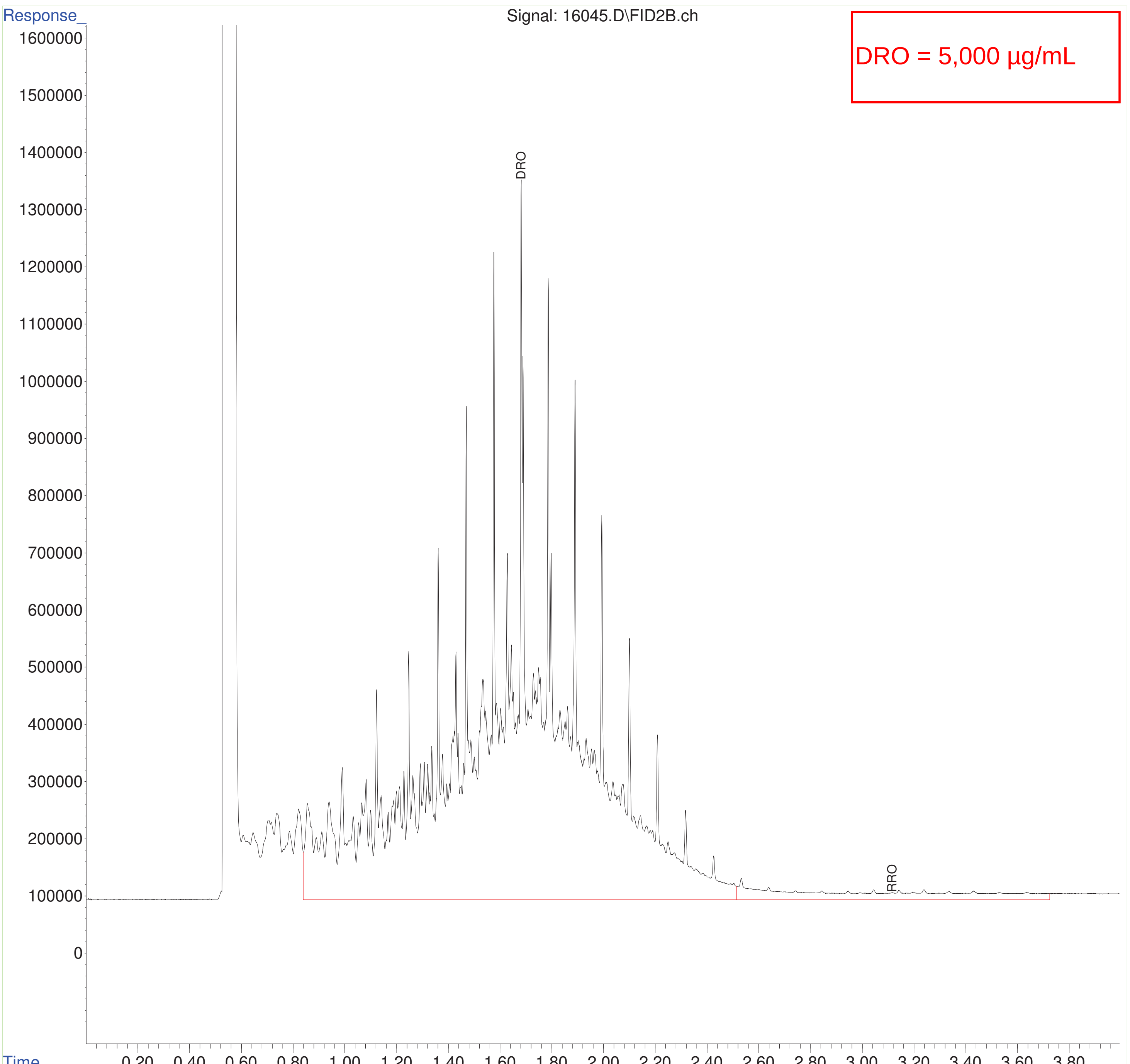
Volume Inj. :
Signal Phase :
Signal Info :



Data Path : Y:\08\SF\DATA\081618A.SEC\
Data File : 16045.D
Signal(s) : FID2B.ch
Acq On : 16 Aug 2018 6:47 pm
Operator : VDL
Sample : CCVB
Misc :
ALS Vial : 3 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 20 10:37:46 2018
Quant Method : Y:\08\SF\METHOD\SFR2018-0815C.M
Quant Title : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 17:10:45 2018
Response via : Initial Calibration
Integrator: ChemStation

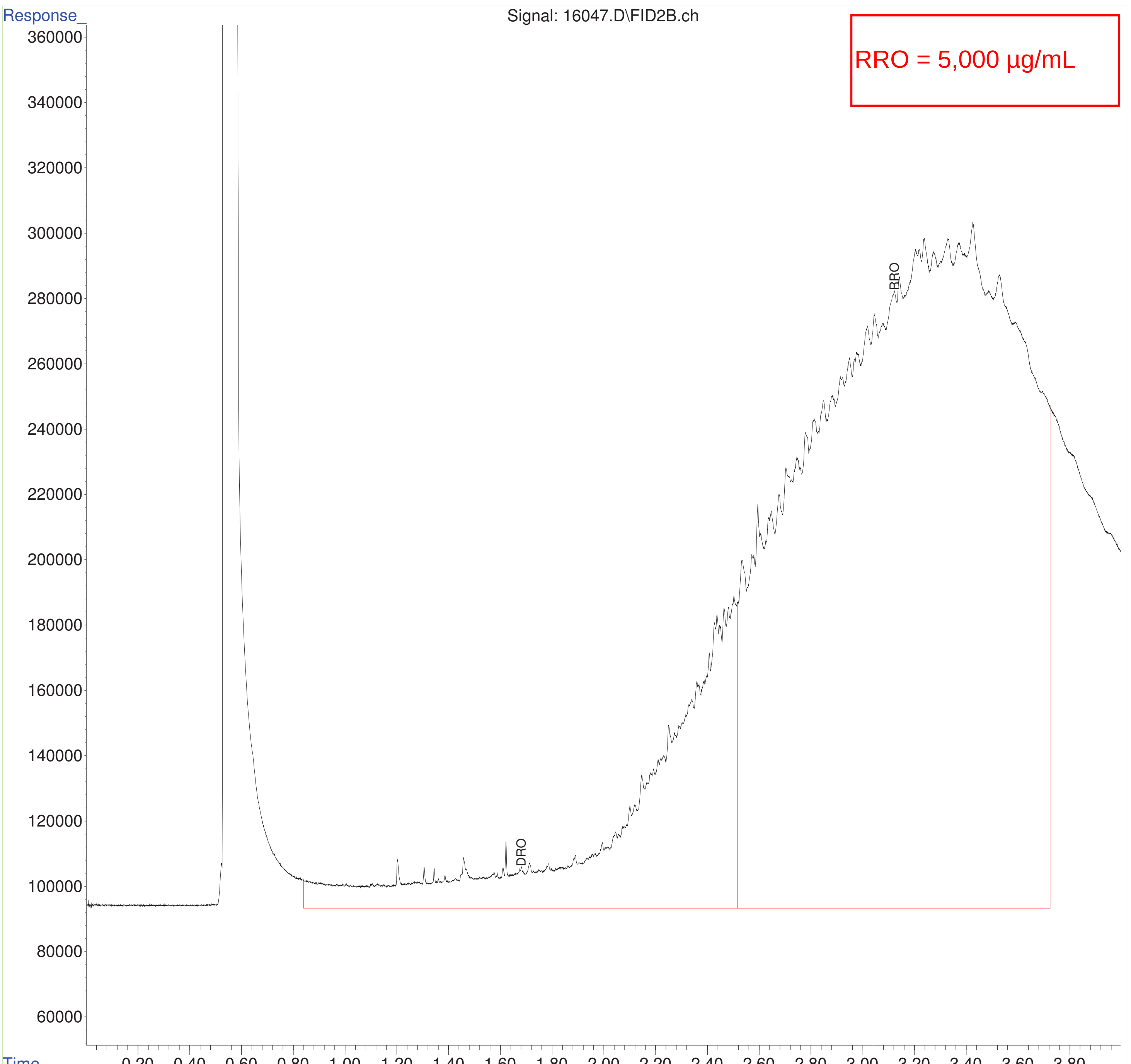
Volume Inj. :
Signal Phase :
Signal Info :



Data Path : Y:\08\SF\DATA\081618A.SEC\
Data File : 16047.D
Signal(s) : FID2B.ch
Acq On : 16 Aug 2018 6:56 pm
Operator : VDL
Sample : CCVR
Misc :
ALS Vial : 4 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 20 10:38:07 2018
Quant Method : Y:\08\SF\METHOD\SFR2018-0815C.M
Quant Title : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 17:10:45 2018
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



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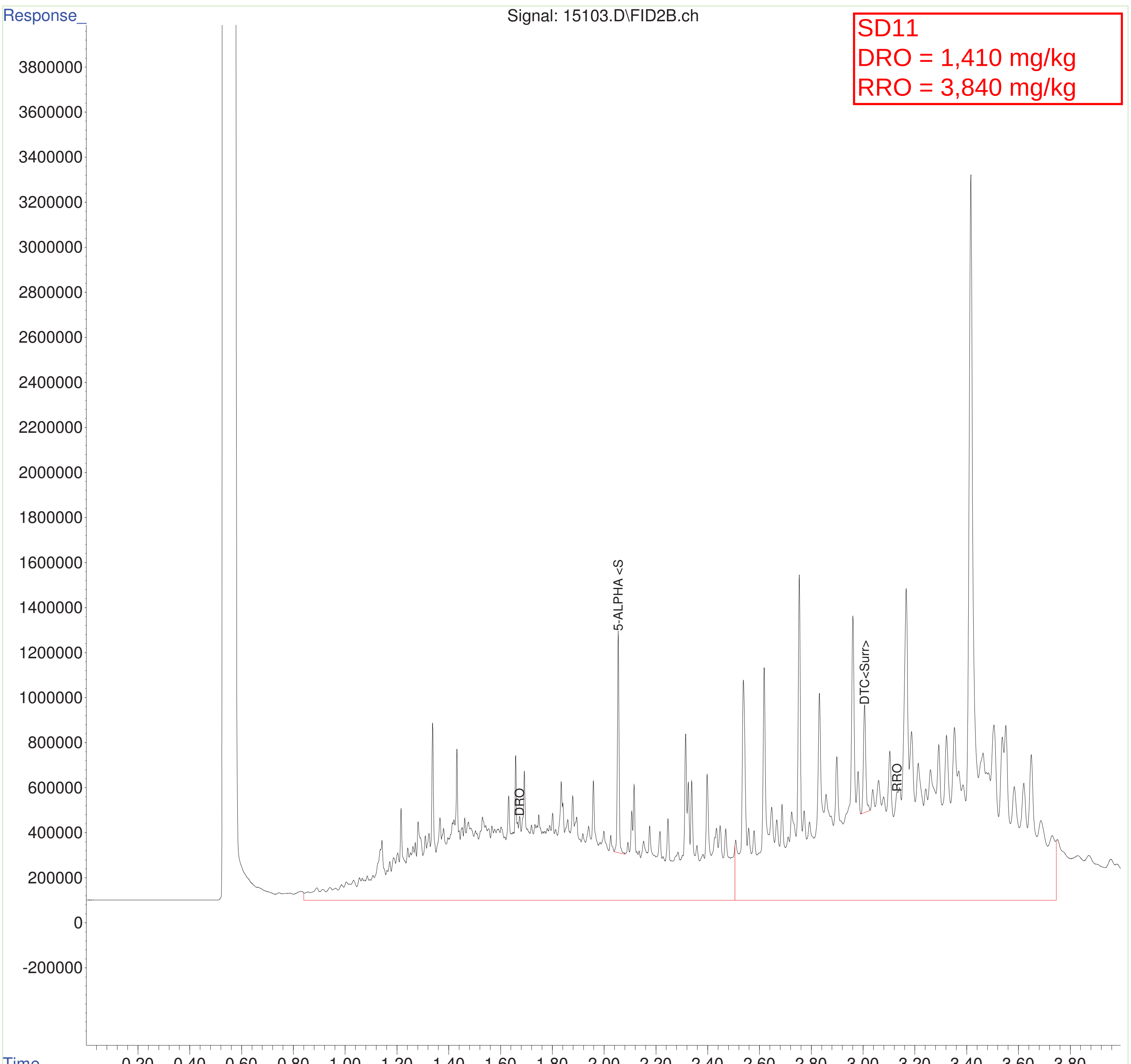
```
Data Path : Y:\08\SF\DATA\081518B.SEC\
Data File : 15103.D
Signal(s) : FID2B.ch
Acq On    : 15 Aug 2018  11:17 pm
Operator  : CMS
Sample    : 1184373014
Misc      :
ALS Vial  : 92   Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 16 12:38:08 2018
Quant Method : Y:\08\SF\METHOD\SFR2018-0815A.M
Quant Title  : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 17:10:45 2018
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.  :
Signal Phase :
Signal Info  :
```



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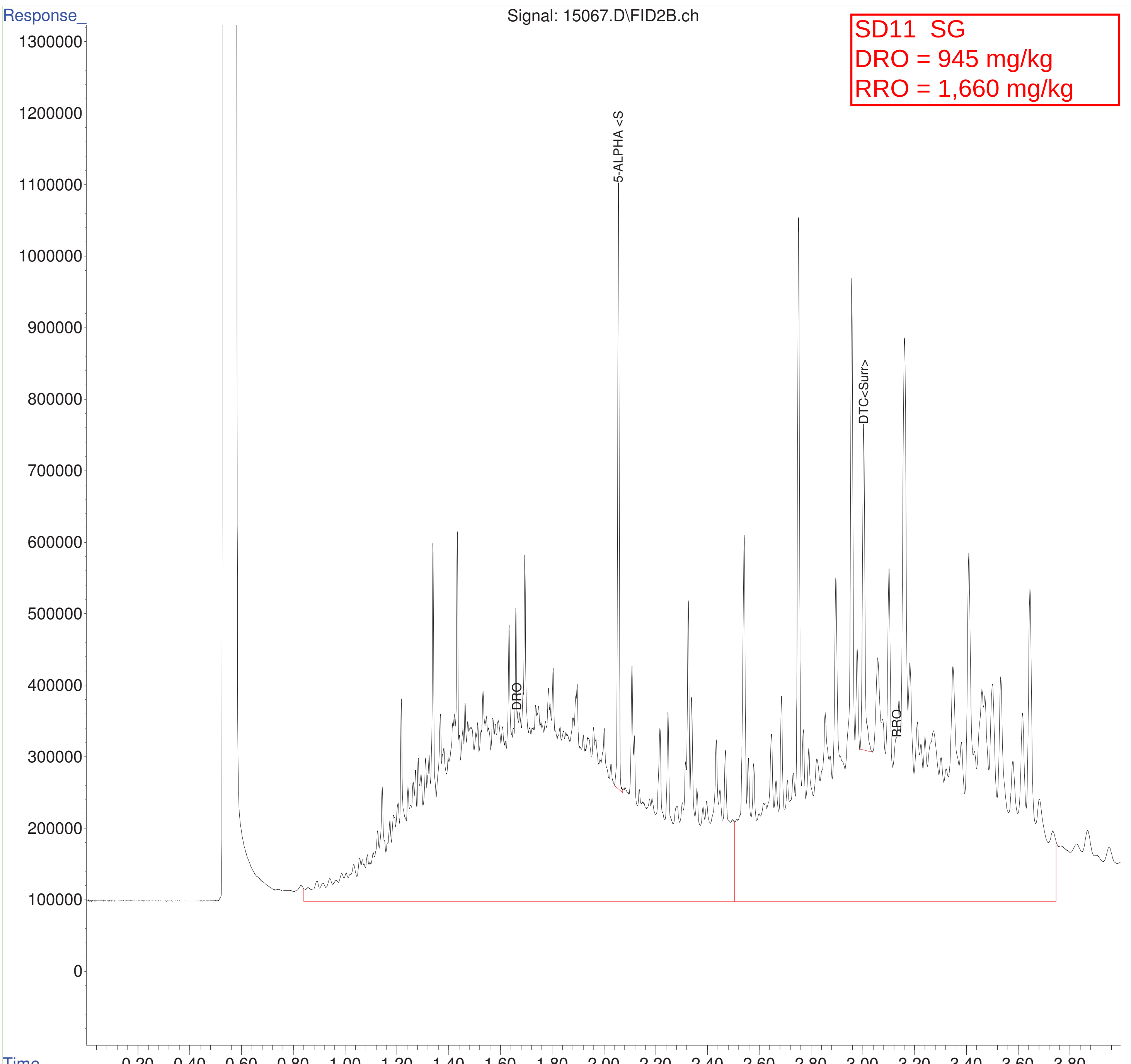
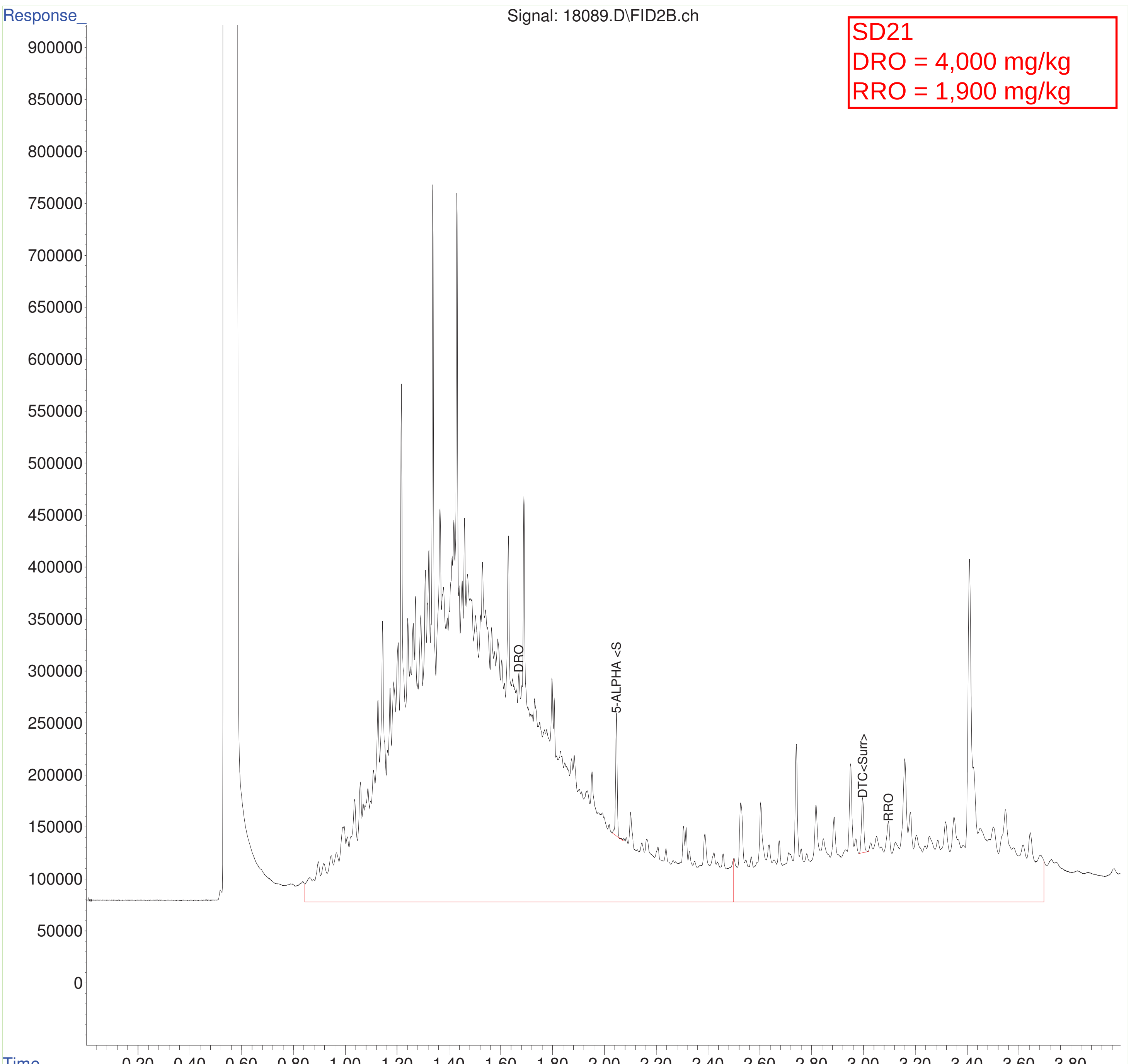
Data Path : Y:\08\SF\DATA\081518B.SEC\
Data File : 15067.D
Signal(s) : FID2B.ch
Acq On : 15 Aug 2018 8:21 pm
Operator : CMS
Sample : 1184373014 SG
Misc :
ALS Vial : 76 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 16 12:10:56 2018
Quant Method : Y:\08\SF\METHOD\SFR2018-0815A.M
Quant Title : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 17:10:45 2018
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



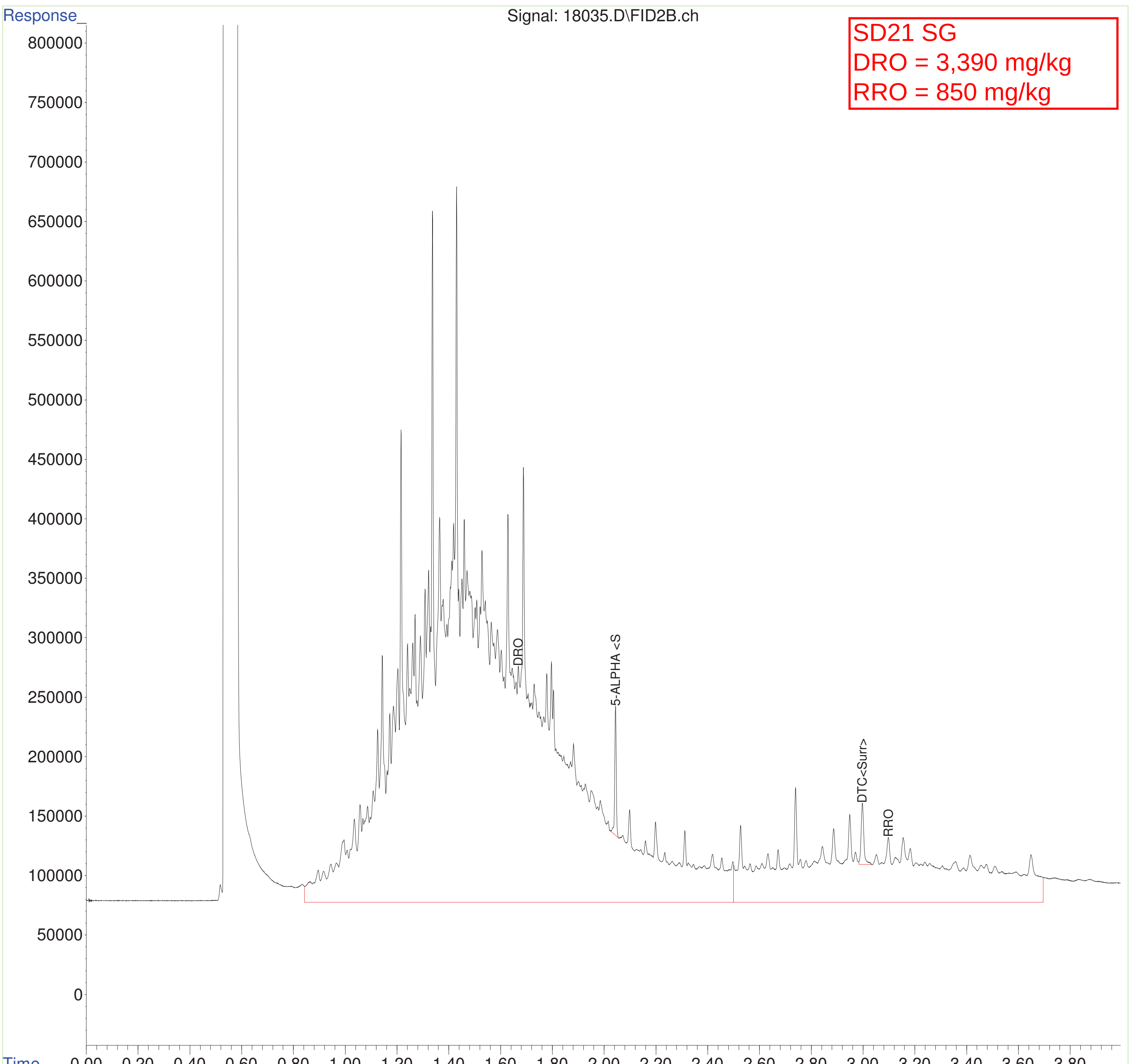
```
Data Path : Y:\08\SF\DATA\081818.SEC\
Data File : 18089.D
Signal(s) : FID2B.ch
Acq On    : 18 Aug 2018   4:41 pm
Operator  : VDL
Sample    : 1184430006 10X
Misc      :
ALS Vial  : 131   Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Aug 20 19:10:25 2018
Quant Method : Y:\08\SF\METHOD\SFR2018-0815E.M
Quant Title  : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 17:10:45 2018
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.  :
Signal Phase :
Signal Info  :
```



Data Path : Y:\08\SF\DATA\081818.SEC\
Data File : 18035.D
Signal(s) : FID2B.ch
Acq On   : 18 Aug 2018 12:11 pm
Operator : VDL
Sample   : 1184430006 SG
Misc   :
ALS Vial : 109   Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 21 10:25:58 2018
Quant Method : Y:\08\SF\METHOD\SFR2018-0815E.M
Quant Title : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 17:10:45 2018
Response via : Initial Calibration
Integrator: ChemStation

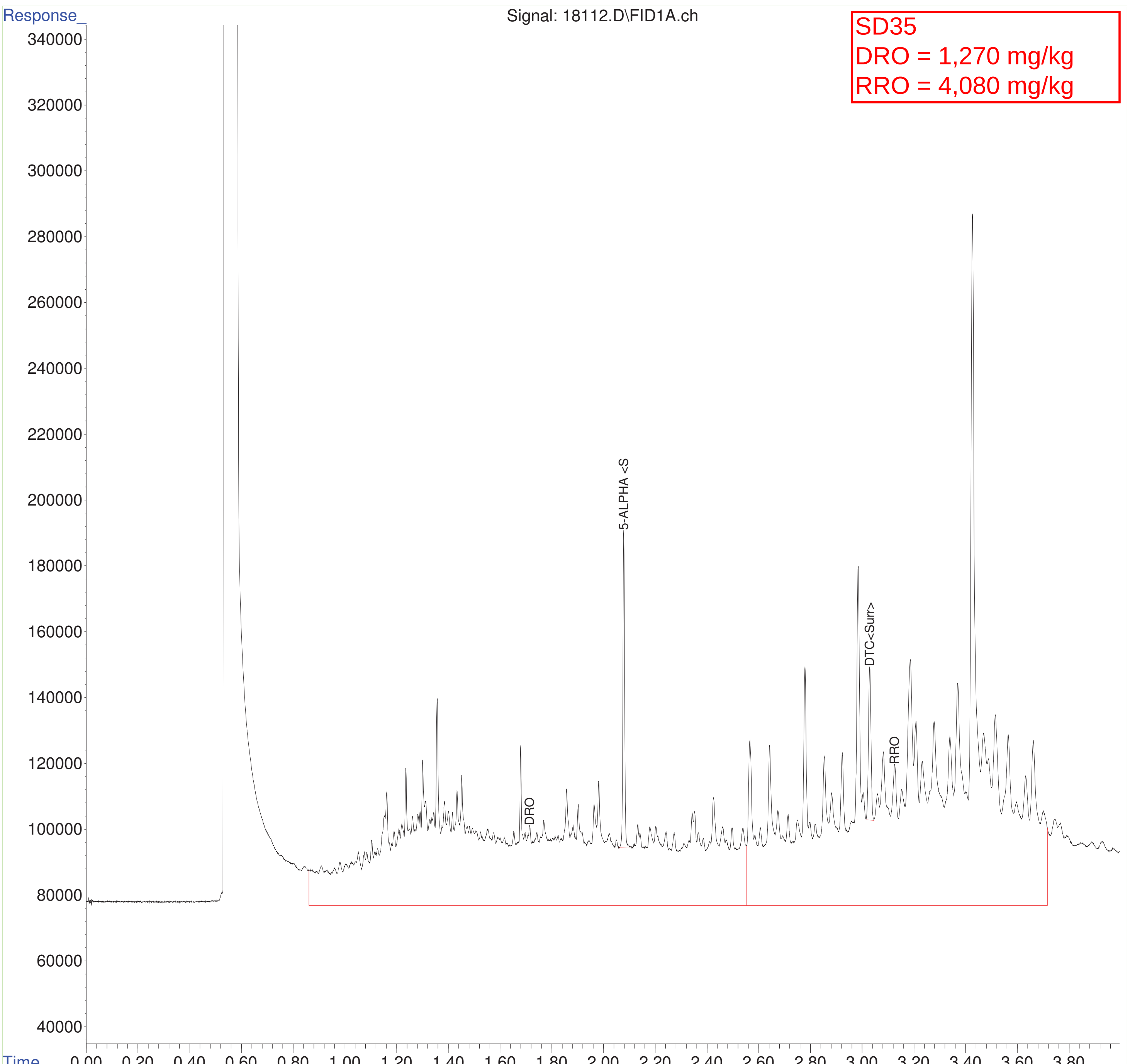
Volume Inj. :
Signal Phase :
Signal Info :



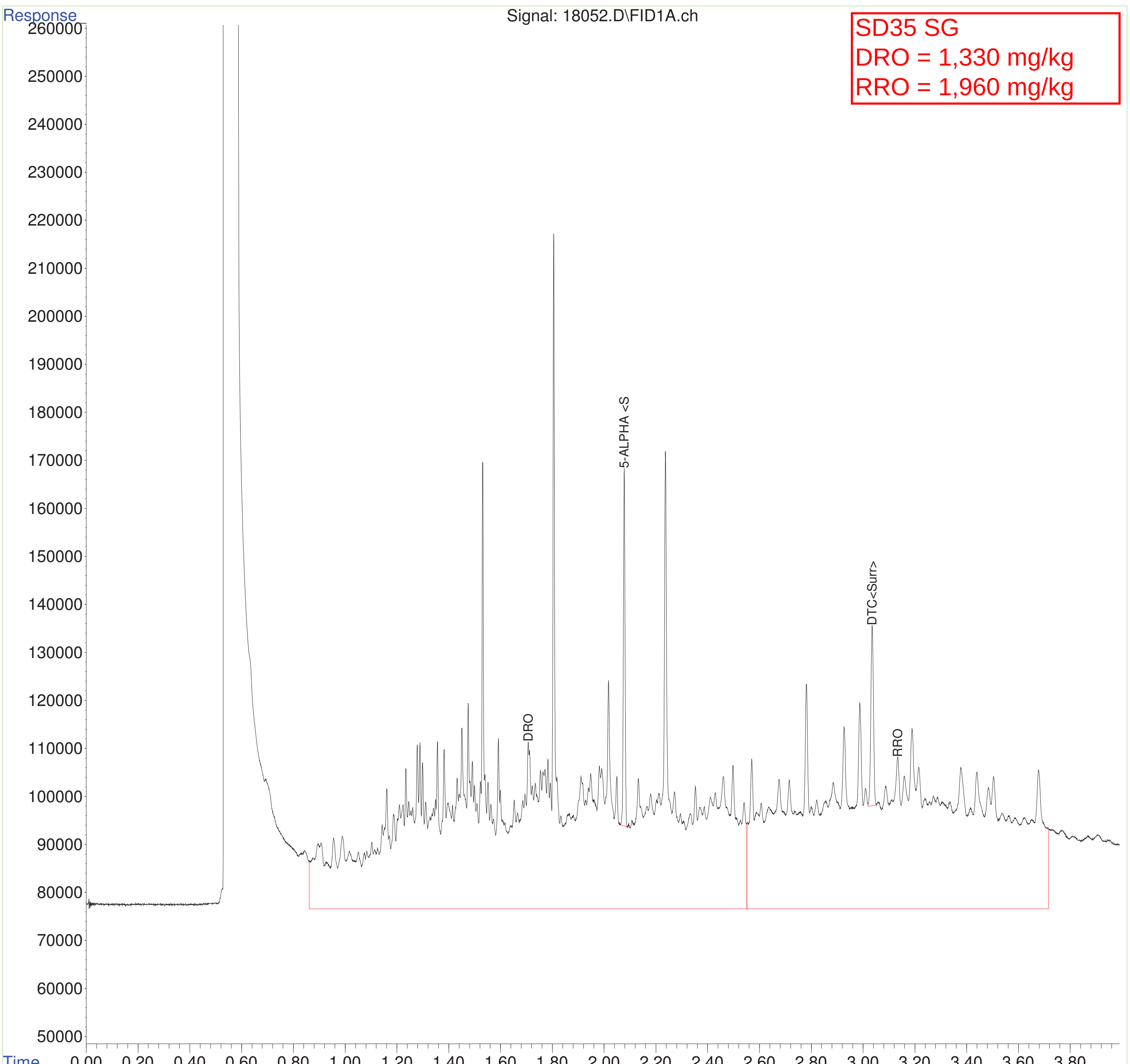
Data Path : Y:\08\SF\DATA\081818\
Data File : 18112.D
Signal(s) : FID1A.ch
Acq On : 18 Aug 2018 6:10 pm
Operator : VDL
Sample : 1184430023 10X
Misc :
ALS Vial : 43 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Aug 21 15:18:00 2018
Quant Method : Y:\08\SF\METHOD\SFF2018-0815F.M
Quant Title : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 13:06:29 2018
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



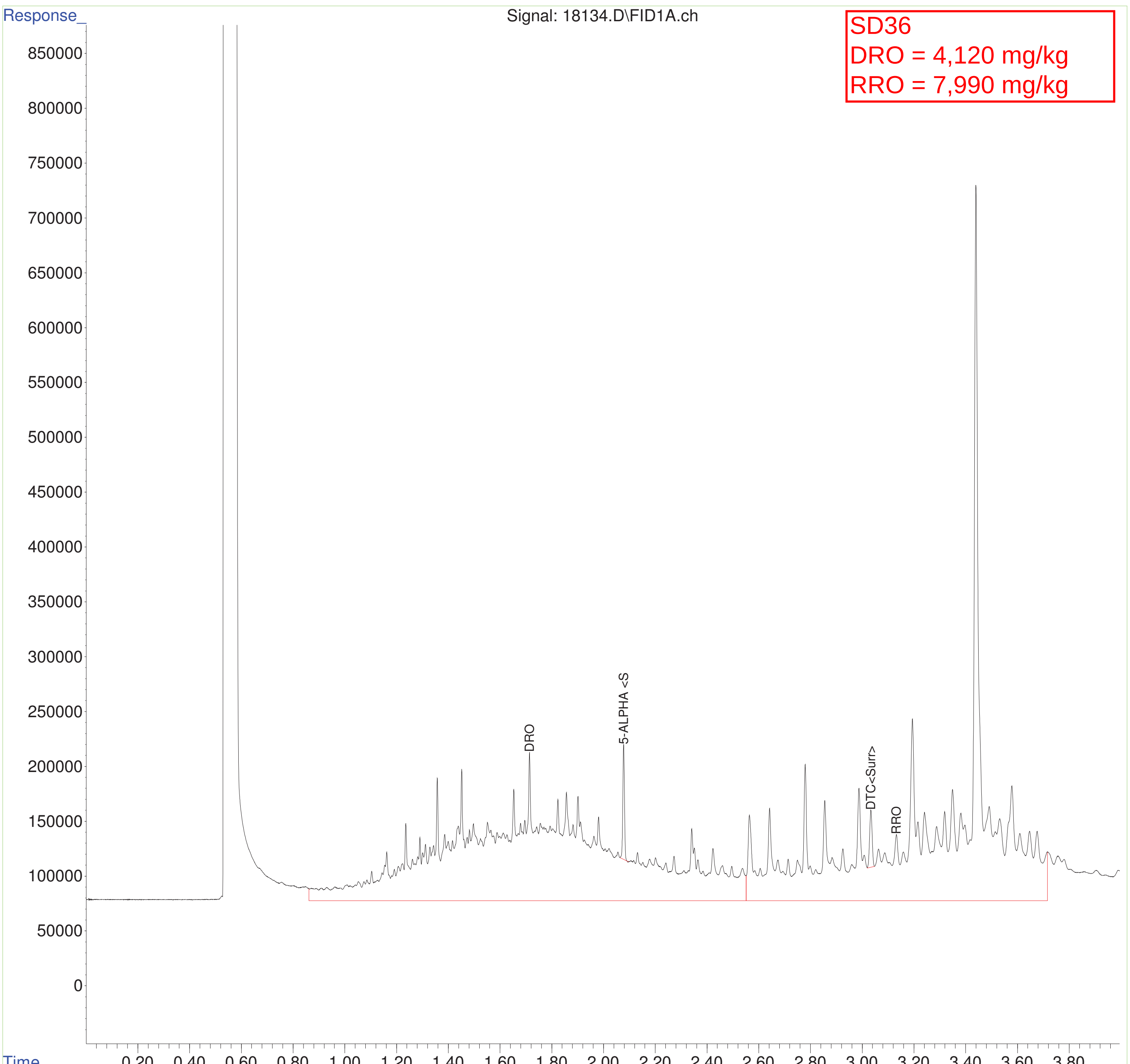
```
Data Path : Y:\08\SF\DATA\081818\
Data File : 18052.D
Signal(s) : FID1A.ch
Acq On    : 18 Aug 2018   1:31 pm
Operator  : VDL
Sample    : 1184430023 SG
Misc      :
ALS Vial  : 20   Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 21 14:55:25 2018
Quant Method : Y:\08\SF\METHOD\SFF2018-0815F.M
Quant Title  : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 13:06:29 2018
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.  :
Signal Phase :
Signal Info  :
```



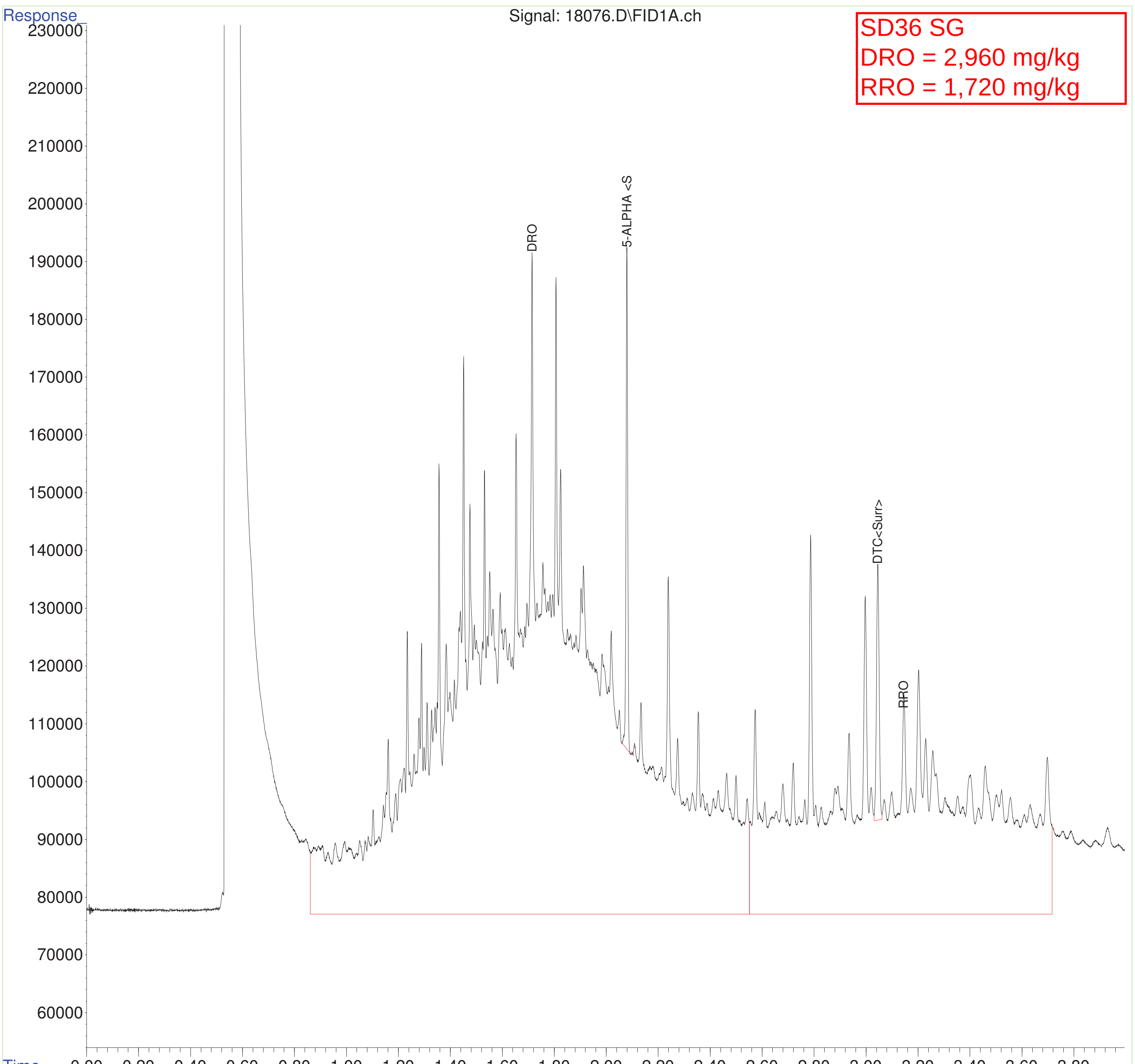
Data Path : Y:\08\SF\DATA\081818\
Data File : 18134.D
Signal(s) : FID1A.ch
Acq On : 18 Aug 2018 8:01 pm
Operator : VDL
Sample : 1184430032 10X
Misc :
ALS Vial : 62 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Aug 21 15:27:29 2018
Quant Method : Y:\08\SF\METHOD\SFF2018-0815F.M
Quant Title : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 13:06:29 2018
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



```
Data Path : Y:\08\SF\DATA\081818\
Data File : 18076.D
Signal(s) : FID1A.ch
Acq On    : 18 Aug 2018   3:31 pm
Operator  : VDL
Sample    : 1184430032 SG
Misc      :
ALS Vial  : 29   Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 21 15:06:01 2018
Quant Method : Y:\08\SF\METHOD\SFF2018-0815F.M
Quant Title  : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 13:06:29 2018
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.  :
Signal Phase :
Signal Info  :
```



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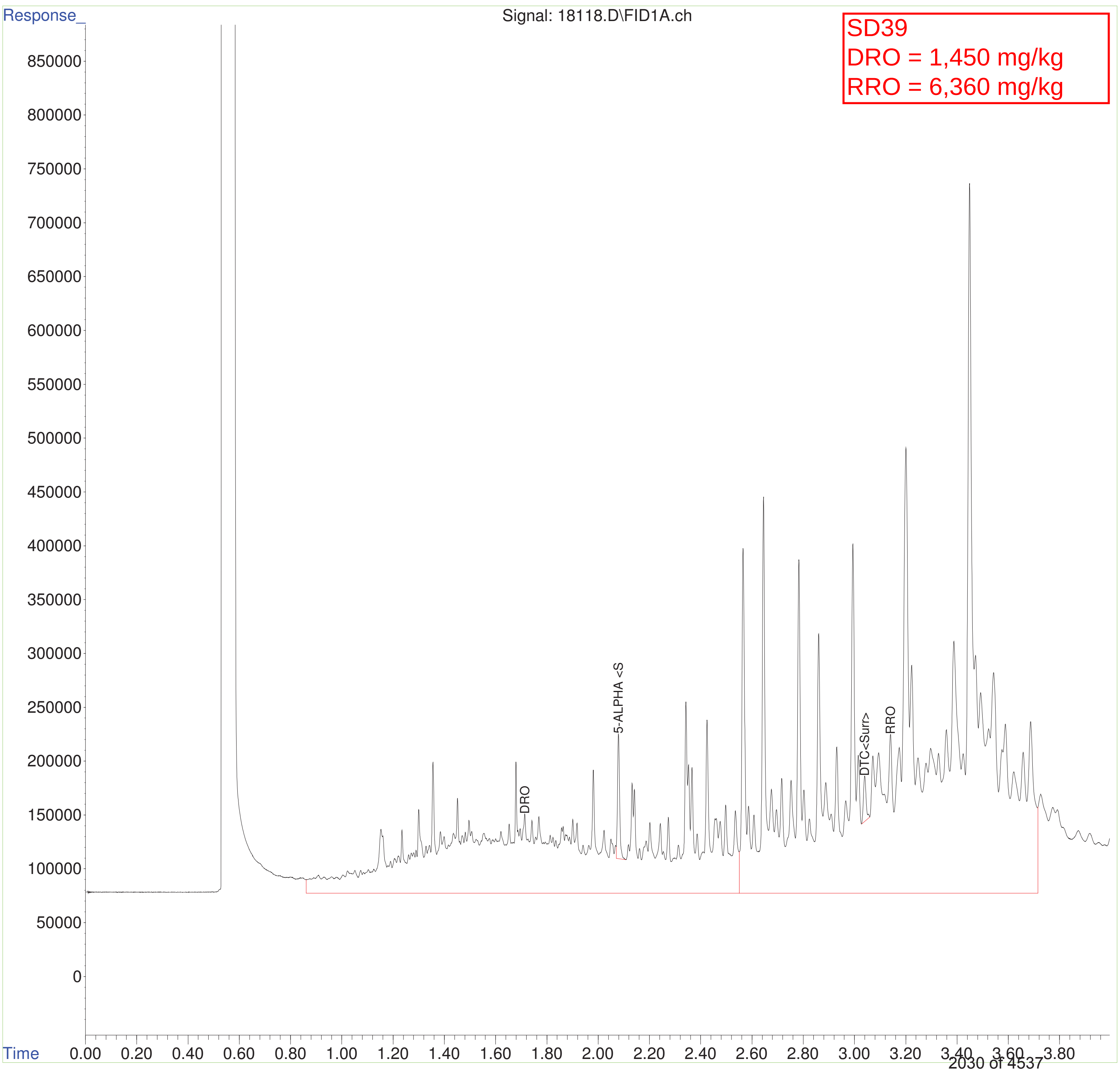
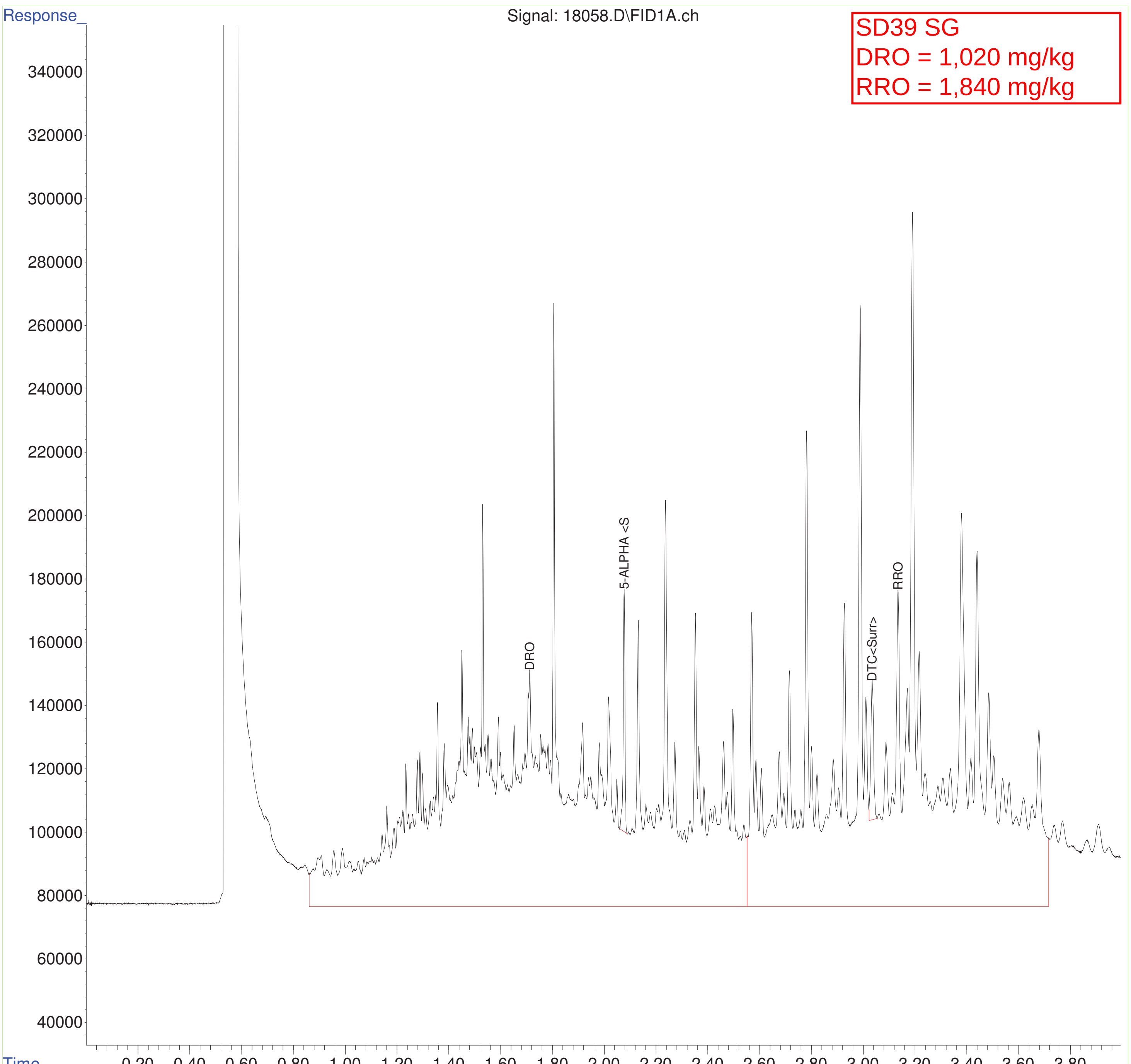
Data Path : Y:\08\SF\DATA\081818\
Data File : 18118.D
Signal(s) : FID1A.ch
Acq On : 18 Aug 2018 6:40 pm
Operator : VDL
Sample : 1184430026 10X
Misc :
ALS Vial : 46 Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Aug 21 15:22:22 2018
Quant Method : Y:\08\SF\METHOD\SFF2018-0815F.M
Quant Title : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 13:06:29 2018
Response via : Initial Calibration
Integrator: ChemStation

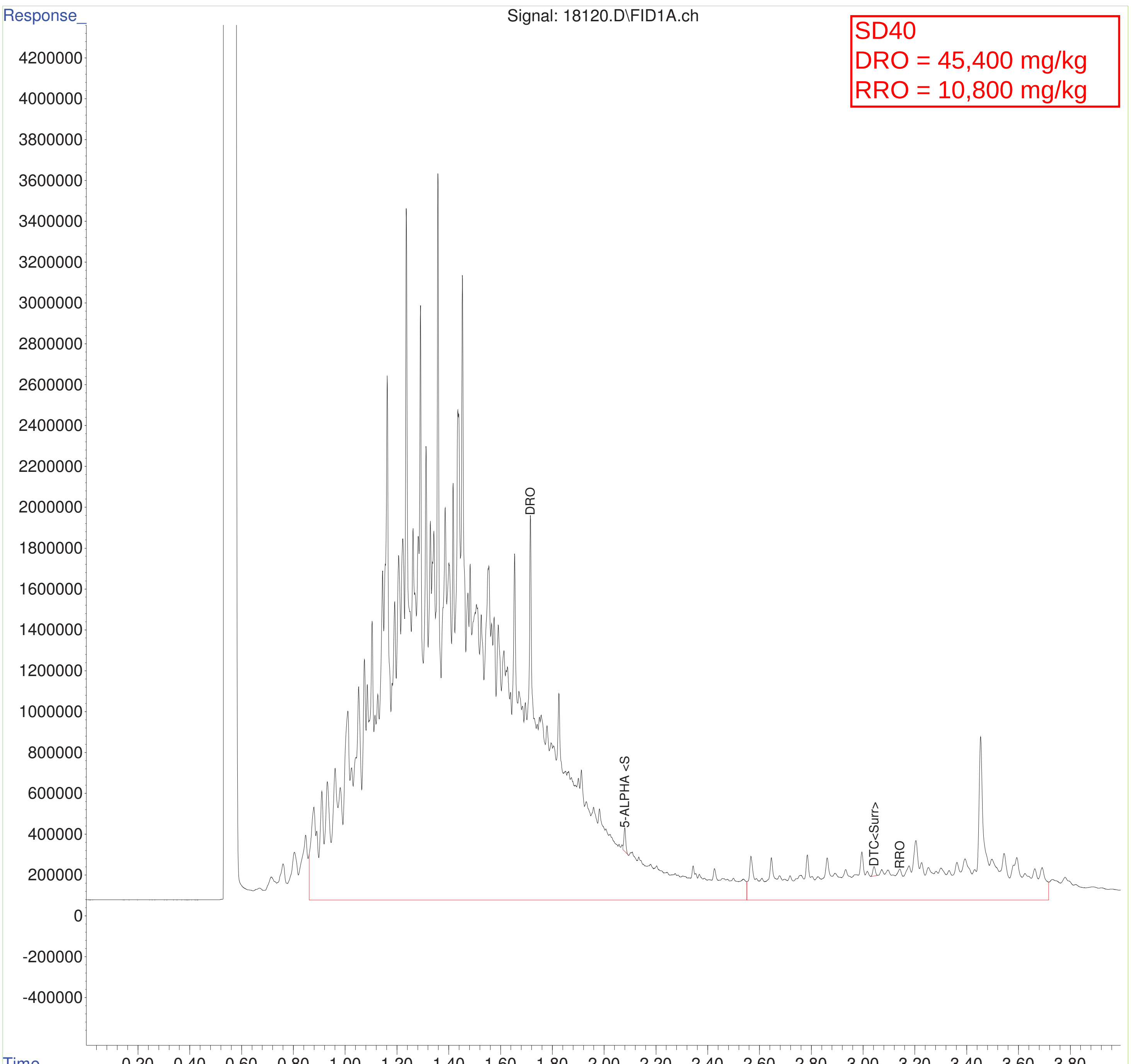
Volume Inj. :
Signal Phase :
Signal Info :



```
Data Path : Y:\08\SF\DATA\081818\
Data File : 18058.D
Signal(s) : FID1A.ch
Acq On    : 18 Aug 2018   2:01 pm
Operator  : VDL
Sample    : 1184430026 SG
Misc      :
ALS Vial  : 23   Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 21 14:58:36 2018
Quant Method : Y:\08\SF\METHOD\SFF2018-0815F.M
Quant Title  : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 13:06:29 2018
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.  :
Signal Phase :
Signal Info  :
```



```
Data Path : Y:\08\SF\DATA\081818\
Data File : 18120.D
Signal(s) : FID1A.ch
Acq On    : 18 Aug 2018   6:50 pm
Operator  : VDL
Sample    : 1184430027 10X
Misc      :
ALS Vial  : 47   Sample Multiplier: 10

Integration File: autoint1.e
Quant Time: Aug 21 15:24:10 2018
Quant Method : Y:\08\SF\METHOD\SFF2018-0815F.M
Quant Title  : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 13:06:29 2018
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.  :
Signal Phase :
Signal Info  :
```



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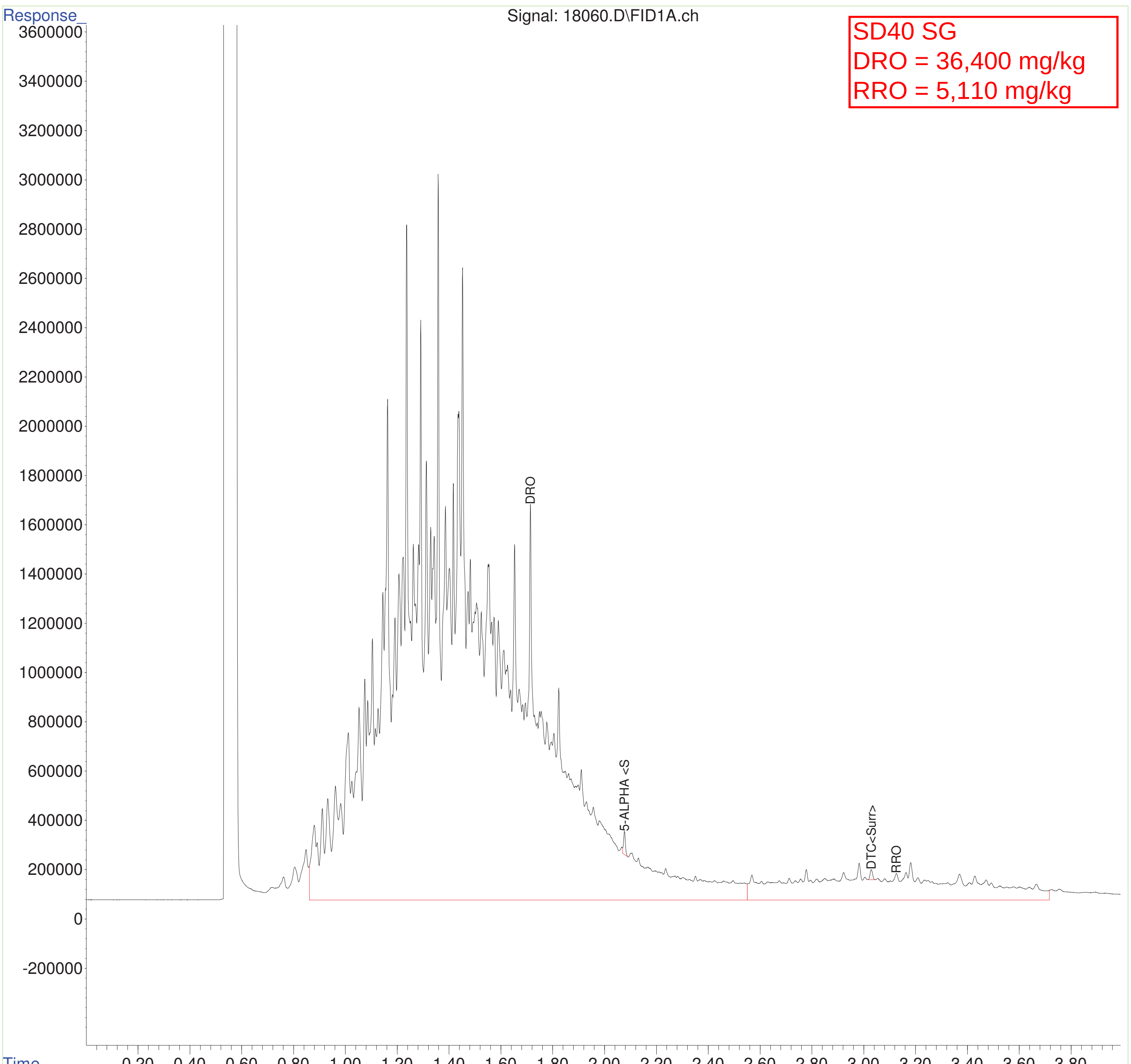
Data Path : Y:\08\SF\DATA\081818\
Data File : 18060.D
Signal(s) : FID1A.ch
Acq On : 18 Aug 2018 2:11 pm
Operator : VDL
Sample : 1184430027 SG
Misc :
ALS Vial : 24 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 21 14:59:50 2018
Quant Method : Y:\08\SF\METHOD\SFF2018-0815F.M
Quant Title : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 13:06:29 2018
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



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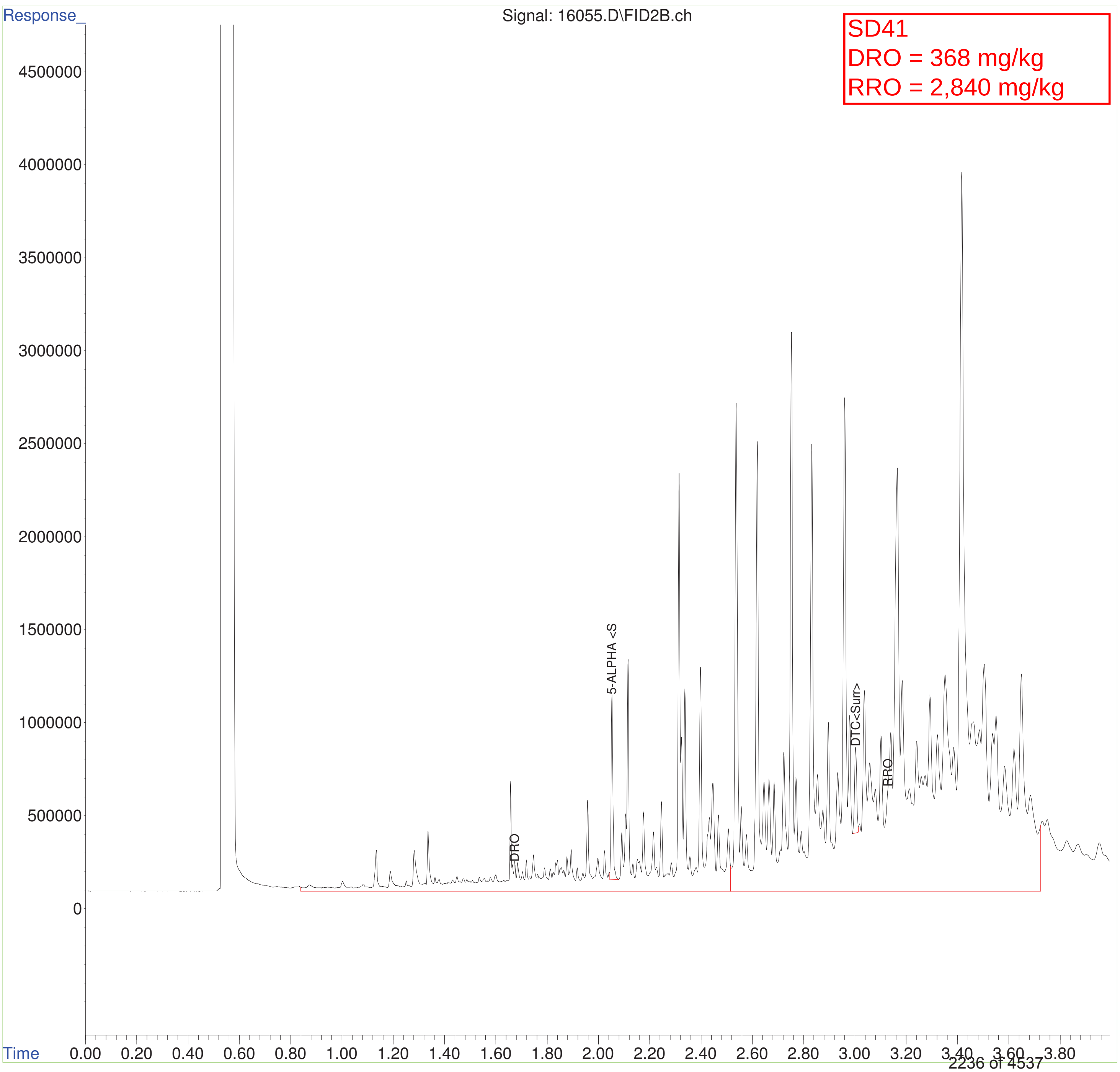
Data Path : Y:\08\SF\DATA\081618A.SEC\
Data File : 16055.D
Signal(s) : FID2B.ch
Acq On : 16 Aug 2018 7:36 pm
Operator : VDL
Sample : 1184430044
Misc :
ALS Vial : 118 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 20 10:40:57 2018
Quant Method : Y:\08\SF\METHOD\SFR2018-0815C.M
Quant Title : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 17:10:45 2018
Response via : Initial Calibration
Integrator: ChemStation

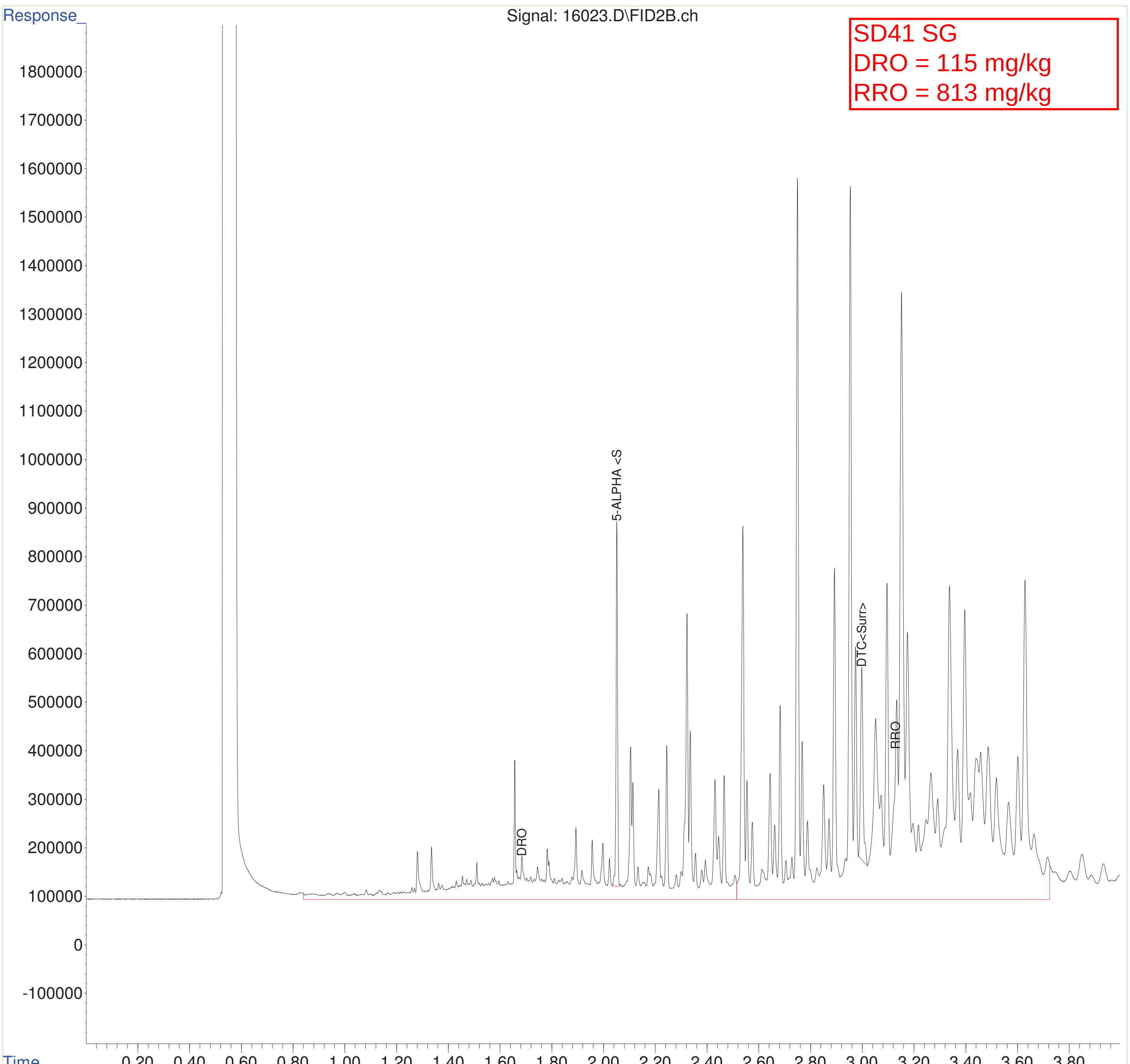
Volume Inj. :
Signal Phase :
Signal Info :



Data Path : Y:\08\SF\DATA\081618A.SEC\
Data File : 16023.D
Signal(s) : FID2B.ch
Acq On   : 16 Aug 2018   4:59 pm
Operator : VDL
Sample   : 1184430044 SG
Misc   :
ALS Vial : 104   Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 20 14:51:19 2018
Quant Method : Y:\08\SF\METHOD\SFR2018-0815C.M
Quant Title : DRO/RRO by Method AK 102/103
QLast Update : Wed Aug 15 17:10:45 2018
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



ATTACHMENT F-3
Field Documentation

Sediment Sampling Forms

JACOBS

SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape

DATE: ~~5~~ 7 Aug 18 ao

SITE ID: Site 28

SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			Start time ~~H:TT~~ 1017 ao
			Location ID: 18NEC-S28-SD-01
0.0			Saturated sandy silt, no odor or staining, contains some root mass
0.5			
1.0			substrate (rock/gravel)
1.5			

ao te

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			Start time 1035
			Location ID: 18NEC-S28-SD-02
0.0			saturated sandy silt, no odor or staining (sheen)
			~~limited~~ minimal root mass ao
0.5			Sample ID 18NEC-S28-SD-02 Dup 18NEC-S28-SD-02-8
.7			
0.8			substrate (rock/gravel)
1.0			

JACOBS

SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 7 Aug. 2018

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			Start time 1050
			Location ID: -03
0.0			saturated silty sand no odor, no sheen
			no vegetation, ~~limited~~ ao minimal root mass
0.5			
auger 0.7			sample ID 18NEC-S28-SD-03
ao ~~veg.~~ 1.0			collected MS/MSD total 4 8oz jars
1.8			substrate (rock/gravel)

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			Start time 1108
			Location ID: -04
0.0			Saturated silty sand no odor, no sheen
			minimal root mass
0.5			sample ID 18NEC-S28-SD-04
0.7			location moved see logbook (due to vegetation)
0.8			substrate (rock/gravel)

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SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 7 Aug. 18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			Sample time 1115
			Location ID: -05
0.0			saturated silty sand no odor, no sheen
			~~[illegible]~~ minimal root mass
0.5			sample ID 18NEC-S28-SD-05
0.7			
0.8			substrate (rock, gravel)
1.0			

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			sample time 1125
			Location ID: -06
0.0			saturated silty sand no odor, no sheen
			minimal root mass
0.5			sample ID 18NEC-S28-SD-06
1.5			
2.0			substrate (rock, gravel)

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SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 7 Aug. 2018

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -07
			sample time 1133	
0.0			saturated ~~silty~~ sand	no sheen, no odor
			some root mass	
0.5				
0.6			sandy ~~s~~ silt	
1.0			substrate Sample ID 18NEC-S28-SD-07	
			rock/gravel	

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -08
			sample time 1145	
0.0			saturated sandy silt	no odor, no sheen
0.5			some root mass	
1.0				
1.5				
2.0			~~Substra bottom~~ ~~ab~~ stopped - reached max depth according to workplan.	
2.3			substrate (rock/gravel) sample ID 18NEC-S28-SD-08	

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SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-7-18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID:
			sample time 1153	-09
0.0			saturated sandy silt	no odor, no sheen
			some root mass	
0.5			saturated silty sand	
			some root mass	
1.0				
1.5				
2.0			stopped sample ID 18NEC-S28-SD-09	
			reached max depth according to work plan	

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID:
			sample time 1201	-10
0.0			saturated silty sand	no odor, no sheen
			some root mass	strong organic smell
0.5				
1.0				
1.5				
2.0			stopped sample ID 18NEC-S28-SD-10	
			reached max depth according to work plan	

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SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 7 Aug. 18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			sample time 1211 — Location ID: -11
0.0			saturated sandy silt no odor, no sheen
			some root mass
0.5			
1.0			
1.5			
2.0			stopped (reached max depth according to work plan) Sample ID: 18NEC-S28-SD-11
			location moved (see logbook) due to vegetation.

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			sample time 1221 — Location ID: -12
0.0			saturated sandy silt no odor, no sheen
			some root mass
0.5			
1.0			
1.5			
2.0			stopped Sample ID 18NEC-S28-SD-12
			(reached max depth according to work plan

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SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 7 Aug. 18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -13
			sample time: 1448	
0.0			saturated sandy silt	petroleum odor sheen
0.5			some root ~~mats~~	
1.0				
1.5				
2.0			stop; reach max depth according to workplan	
			sample ID: 18NEC-S28-SD-13	

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -14
			Sample time 1500	
0.0			saturated sandy silt	petroleum odor sheen
0.5			ad ~~some~~ root mass moderate	
1.0				
1.5			refusal; ~~hard to sta~~ thick silt ad	
			Sample ID 18NEC-S28-SD-14	
2.0				

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SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 7 Aug. 18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -15
			sample time: 1517	
0.0			saturated sandy silt	petroleum odor Sheen
			moderate root mass	
0.5				
1.0				
1.5				
			sample ID: 18NEC-S28-SD-15	
2.0			~~refusal~~ ~~ao~~ stopped, max depth according to workplan	

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -16
			sample time 1528	
0.0			saturated silty sand	petroleum odor sheen
			~~mo~~ minimal root mass.	
0.5				
1.0				
1.5				
			sample ID: 18NEC-S28-SD-16	
2.0			stopped, max depth according to workplan	

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SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 7 Aug. 18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			Sample time: 1546
			Location ID: -17
0.0			saturated sandy silt Strong petroleum odor Sheen
			moderate root mass
0.5			
1.0			
1.5			
			Sample ID: 18NEC-S28-SD-17 Dup: 18NEC-S28-SD-17-8
2.0			stopped; max depth according to work plan

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			Sample time: 1603
			Location ID: -18
0.0			saturated silty sand petroleum odor sheen
			moderate root mass
0.5			
1.0			refusal vegetative mat
			Sample ID: 18NEC-S28-SD-18
			wooden debris - sampled within a foot of stake

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SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape

DATE: 7 Aug. 18

SITE ID: Site 28

SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			Sample time: 1625
			Location ID: -19
0.0			saturated sandy silt — sheen, petroleum odor
			moderate root mass
0.5			
1.0			
1.5			
			sample ID: 18NEC-S28-SD-19
2.0			stopped; max depth according to workplan

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			sample time: 1632
			Location ID: -20
0.0			saturate sandy silt — sheen, petroleum odor
			moderate root mass
0.5			
1.0			refusal - vegatative matt
			Sample ID: 18NEC-S28-SD-20

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SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 7 Aug. 18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID:
			sample time 1644	-21
0.0			saturated silty sand	odor Sheen
			moderate root mass	
0.5				
0.9				
1.0			refusal-rock	
			sample ID: 18NEC-S28-SD-21	
1.5				
2.0				

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID:
			Sample time: 1653	-22
0.0			saturated silty sand	slight odor no sheen
			moderate root mass	
0.5				
1.0			refusal-silt	
			sample ID: 18NEC-S28-SD-22	
1.5				
2.0				

JACOBS
SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 7 Aug. 18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -23
			Sample time: 1702	
0.0			silty sand	no sheen no odor
			moderate root mass	
0.5				
1.0				
1.5			sandy silt	
2.0			vegetative matt	
			sample ID: 18NEC-S28-SD-23	

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -24
			Sample time: 1713	
0.0			saturated silty sand	- odor - slight - no sheen
0.5			moderate root mass	- iron ~~mottlet~~ ao mottle
1.0				
1.5			sandy silt	
2.0			refusal - silt sample ID: 18NEC-S28-SD-24	

JACOBS

SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8 Aug 18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -25
			Sample time: 0920	
0.0			saturated silty sand .	no sheen no odor
			moderate root mass	-iron mottle
0.5				
1.0			——— sample ID: 18NEC-S28-SD-25	
			location moved see logbook. original location had veg. matt	
1.5				
2.0				

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -26
			Sample time 0951	
0.0			saturated silty sand	minimal odor no sheen
0.5			moderate root mass	-iron mottle
1.0			refusal - vegetative matt	
			sample ID: 18NEC-S28-SD-26	

JACOBS

SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -27
			Sample time: 1001	
0.0			saturated silty sand	no sheen
			moderate root	no odor
0.5				
1.0			~~saturated~~ sandy silt	
1.5			— refusal - hard silt	
			Sample ID: 18NEC-S28-SD-27	
			Dup 18NEC-S28-SD-27-8	

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -28
			Sample time: 1012	
0.0			saturated silty sand	odor-petroleum
			minimal root mass	no sheen
0.5			~~saturated~~ sandy silt	
			minimal root mass	
1.0				
1.5			refusal - hard silt	
			sample ID: 18NEC-S28-SD-28	
2.0			collected MS/D	

JACOBS
SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-18
SITE ID: Site 28 SITE LOCATION:
FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -29
			Sample time 1025	
0.0			Saturated Silty sand	odor-petroleum
			minimal root mass	no sheen
0.5				
1.0			refusal - rock	
			sample ID 18NEC-S28-SD-29	
1.5				
2.0				

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -30
			Sample time 1040	
0.0			saturated silty sand	light petroleum odor
			minimal root mass	no sheen
0.5				iron mottle
1.0				
1.5			— refusal (rock)	
			Sample ID: 18NEC-S28-SD-30	
2.0				

JACOBS
SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-2018
SITE ID: Site 28 SITE LOCATION:
FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			Sample ~~ID~~ an time 1048 — Location ID: -31
0.0			saturated silty sand — no sheen
			moderate root mass — light odor - petroleum
0.5			iron mottle
1.0			
1.2			sandy silt
1.5			refusal - silt
			Sample ID: 18NEC-S28-SD-31
2.0			

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			Sample time: 1058 — Location ID: -32
0.0			saturated silty sand — an ~~no~~ odor - yes; an ~~no~~ sheen - yes
			moderate root mass — iron mottle
0.5			
1.0			refusal (rock)
			Sample ID: 18NEC-S28-SD-32
1.5			
2.0			

JACOBS
SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-18
SITE ID: Site 28 SITE LOCATION:
FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -33
			Sample time: 1106	
0.0			Saturated silty sand moderate root mass	odor-petroleum yes sheen
0.5				
0.8			refusal-rock	
1.0			Sample ID: 18NEC-S28-SD-33	
1.5				
2.0				

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -34
			Sample time: 1114	
0.0			satuated silty sand minimal rootmass	odor-petroleum yes sheen
0.5				iron mottle
1.0			refusal-rock sample ID: 18NEC-S28-SD-34	

JACOBS

SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-18

SITE ID: site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			Sample time: 1125 — Location ID: -35
0.0			Saturated Silty sand — odor petroleum
			moderate root mass — sheen yes
0.5			iron mottle
1.0			vegetative mat - refusal
			Sample ID: 18NEC-S28-SD-35
1.5			This location is near the start of the spring
			~1 foot from spring.

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			Sample time: 1143 — Location ID: -38
0.0			Saturated silty sand — odor-petroleum
			moderate root mass — Sheen yes
0.5			iron mottle
1.0			
1.5			- Saturated sandy silt -
			- sample ID: 18NEC-S28-SD-38
			- sample location moved; see logbook due to vegetation
2.0			max depth according to workplan
			- Dup collected 18NEC-S28-SD-38-8

JACOBS

SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			sample time: 1154 — Location ID: -39
0.0			saturated sandy silt — ~~no~~ sheen-yes, light odor
			moderate root mass
0.5			
1.0			
1.5			
2.0			stopped max depth according to workplan
			sample ID: 18NEC-S28-SD-39

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)
			sample time: 1202 — Location ID: -40
0.0			saturated silty sand — heavy sheen, odor-petroleum
			minimal root mass
0.5			
1.0			refusal silt heavy
			sample ID: 18NEC-S28-SD-40
1.5			
2.0			

JACOBS

SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -42
			Sample time: 1218	
0.0			Saturated sandy silt	no sheen
			moderate root mass	no odor
0.5				
0.8			refusal - hard silt	
1.0			Sample ID: 18NEC-S28-SD-42	
			location moved due to vegetation;	
1.5			see logbook	

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID:

JACOBS
SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-18
SITE ID: Site 28 SITE LOCATION:
FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Sample time: 1440 Description (lithology, odor/staining, sample ID)	Location ID: -52
0.0			saturated silty sand minimal root mass	yes-sheen petroleum odor
0.5				
1.0			refusal-vegetation mat Sample ID: 18NEC-S28-SD-52 - ~~Near~~ upgradient from stake 20 - location of opportunity in Area 2. - See logbook for measurements	

depth (ft)	Lithology	Sample Int.	Sample time: 1504 Description (lithology, odor/staining, sample ID)	Location ID: -53
0.0			saturated silty sand moderate root mass	
0.5			sandy silt	
1.0				
1.5			vegetation bottom sample ID: 18NEC-S28-SD-53 -sample of opportunity in Area ~~X~~ 4. -See log book for measurements.	

JACOBS
SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-18
SITE ID: Site 28 SITE LOCATION:
FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -37
			sample time 1540	
0.0			silty sand (saturated)	no odor
0.2			moderate root mass	no sheen
			rock at 0.2. limited sediment	
			composite sample collected from within a foot of stake #37	
			Sample ID- 18NEC-S28-SD-37	
			used shovel	

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -36
			sample time 1553	
0.0			silty sand	no odor
0.2			moderater root mass	no sheen
0.5			rockat 0.2. limited sediment	
1.0			composite sample collected from within a foot of stake #36	
			Sample ID 18NEC-S28-SD-36	
			shovel used	

JACOBS

SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -41
			Sample time 1605	
0.0			Silty sandy (saturated) moderate root mas	no odor no sheen
0.5			↓ sandy silt	
1.0			refusal - rock	
			Sample ID: 18NEC-S28-SD-41	
			Dup 18NEC-S28-SD-41-8	

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: 46
			Sample time 1646	
0.0			saturated sandy silt moderate rootmass	petroleum odor no sheen
0.5				
0.8			— vegetative refusal	
1.0				
			Sample ID: 18NEC-S28-SD-46	

JACOBS

SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -44
			Sample time 1624	
0.0			saturated silty sand	light petroleum
			moderate root mass	no sheen
0.5				iron mottle
1.0			vegetative matt — refusal	
			sample ID: 18NEC-S28-SD-44	

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -45
			Sample time: 1640	
0.0			saturated sandy silt	light sheen
			moderate root mass	petroleum odor
0.5				
1.0				
1.5			vegetation matt - refusal	
			sample ID 18NEC-S28-SD-45	

JACOBS

SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	sample time 1700 Description (lithology, odor/staining, sample ID)	Location ID: -43
0.0			saturated sandy silt moderate root mass	petroleum odor light sheen
0.5				
1.0			refusal-silt Sample ID: 18NEC-S28-SD-43	

depth (ft)	Lithology	Sample Int.	sample time 1710 Description (lithology, odor/staining, sample ID)	Location ID: -54
0.0			Saturated sandy silt minimal root mass	Heavy Sheen Heavy petroleum odor
0.5				
1.0			- refusal - silt	
1.5			- sample of opportunity in Area 6 - see logbook for measurements	
2.0			- Sample ID 18NEC-S28-SD-54 MS/MSD - 4 x 8oz jars.	

JACOBS

SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -47
			Sample time 1720	
0.0			saturated sandy silt	sheen
			moderate ~~Veget~~ root mass	petroleum odor
0.5				
1.0			refusal - silt	
			Sample ID: 18NEC-S28-SD-47	

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -48
			Sample time 1726	
0.0			saturated sandy silt	sheen
				petroleum odor
			moderate root mass	
0.5				
1.0			refusal - silt	
1.5				
			Sample ID: 18NEC-S28-SD-48	
			Dup 18NEC-S28-SD-48-S	

JACOBS

SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Sample time 1733 — Description (lithology, odor/staining, sample ID)	Location ID: -49
0.0			saturated Sandy silt	Sheen - yes
			moderate ~~vegetat~~ cap root mass	petroleum odor
0.5				
1.0			refusal - silt	
			Sample ID: 18NEC-S28-SD-49	

depth (ft)	Lithology	Sample Int.	sample time 1739 — Description (lithology, odor/staining, sample ID)	Location ID: -50
0.0			saturated silty sand	Sheen - yes
			moderate root mass	petroleum odor
0.5				
1.0			refusal - silt	
			sample ID: 18NEC-S28-SD-50	

JACOBS
SEDIMENT SAMPLING FORM

PROJECT: Northeast Cape DATE: 8-8-18

SITE ID: Site 28 SITE LOCATION:

FIELD PERSONNEL:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID: -51
			sample time: 1750	
0.0			saturated sandy silt moderate rootmass	sheen petroleum odor
0.5				
1.0			refusal-silt	
			Sample ID: 18NEC-S28-SD-51	
1.5			- location moved due to original location on dry ground - see logbook for measurement details	

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID:

Logbook

Sedimont Sampling

Rite in the Rain.
ALL-WEATHER
ENVIRONMENTAL
Nº 550F

Authors

Stan Seegers
Angela DiBerardino

DCN: AE-ECC-J07-5FGA4600
-H04-0004

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Location Ne Cape Date 8/4/18

Project / Client USACE

Weather: Overcast

Site 28

Location-Pond 1

Westward Thalweg

Edge 6.5' from pot 0

	Start	End
8.5'	1.5 →	2.9
10.5	1.6 →	2.3
12.5	1.7 –	2.15
14.5	1.4 –	1.95
16.5	0.9 –	1.05
18.5	0 at edge	

End of transect 21.75

Test sediment mapping

Location NE Cape Date 8/4/2018
Project / Client USACE (continued)

North to South

Edge 1.3' depth 0

	Start	End
3.3	0.4	0.5
5.3	1.0	1.8
7.3	1.3	1.9
9.3	1.3	1.9
11.3	1.5	2.6
13.3	1.5	3.0
15.5	1.0	1.0

*No Sediment

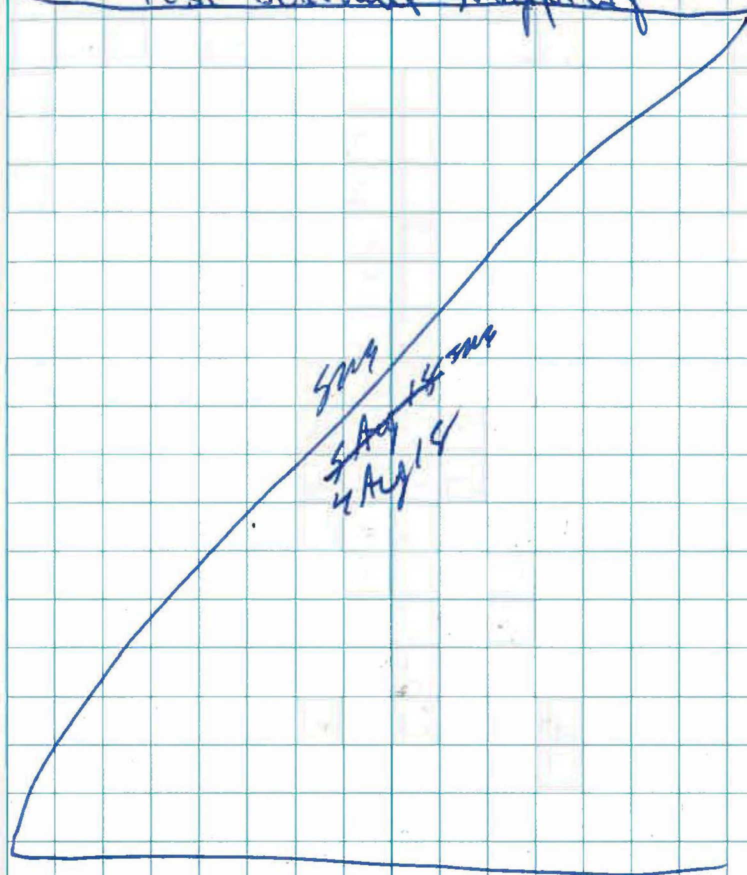
	Start	End
17.3	1.0	1.3
19.3	1.1	1.4
21.3	1.3	1.5

Location NE Cape Date 8/4/2018
Project / Client USACE (continued)

	Start	End
23.3	~~1.3~~ 0.9	1.15

Edge at 25.6', Final South stake at 28.5'

Test Sediment Mapping



Location Ne Cape Date 8/5/18

Project / Client USACE

	Position	DTS	DTB		
Profile 1	Stake 1	W-E		5 Ft	Across
	[illegible]	2.2	3.8		
	2.5	3.0	4.0		
	4.0	3.0	3.9		
~~Sample 1 18NEC-SAS-SD-01~~ SRS				Test Sample	
Profile 2	Stake 2	W-E		13.0 ft	
	1.0	2.0	3.3		
	5.0	2.4	3.2		
	9.0	1.6	2.6		
~~12.5~~ SRS	~~13.0~~ SRS	~~0.8~~ SRS			
12.5		1.7	2.8		
Profile 3	30ft from 1	W-E		3.5 Ft	
	0.5	~~[illegible]~~ SRS 1.2	2.8		
	1.5	1.7	2.9		
	2.5	1.7	3.4		
Profile 4	15ft ~~From~~ South S3	W-E		1.0 Ft	
	0.0	1.2	2.2		
	0.5	1.2	2.3		
	1.0	1.2	2.1		
Profile 5	Stake 3	W-E		4.5 Ft	
	1.0	0.3	2.4		
	2.0	0.5	2.3		
	3.0	1.3	2.2		

Location Ne Cape Date 8/5/18

Project / Client USACE

	Position	DTS	DTB	
Stake 4 in Veg. Mat				
Stake 5, light sheen and light odor				
Profile 6	Stake 5	W-E		7.0 Ft Across
	1.0	1.1	2.1	
	2.0	1.3	2.1	
	3.0	1.4	2.2	
Profile 7	Stake 6	W-E		10.5 ft Across
	~~2~~ SRS			
	1.0	0.4	2.4	
	3.0	0.3	2.8	
	5.0	0.4	2.5	
	7.0	~~0.5~~ SRS 1.5	2.0	
	9.0	1.3	1.8	
Profile 8	Stake 8	W-E		17.0 Ft Across
	2.0	0.1	1.9	
	7.0	0.2	1.9	
	12.0	0.3	2.6	
	17.0	0.2	1.9	
Profile 9	Stake 9	W-E		4.0 Ft Across
	1.0	0.2	1.3	
	2.0	0.3	2.0	
	3.0	0.3	2.1	

Location Ne Cape Date 8/5/18

Project / Client USACE

	Position	DTS	DTB	
Profile 10	Stake 10	W-E		5 ft Across
	1.5	1.0	2.5	
	3.0	0.5	3.9	
	4.5	0.2	2.9	
Profile 11	Stake 11	W-E		1.0 ft Across
	0.0	0.2	1.4	
	0.5	1.1	2.5	
	1.0	1.0	2.0	
Profile 12	Stake 12	W-E		9.0 ft Across
	1.5	0.1	2.1	
	4.5	0.1	2.2	
	7.5	0.3	3.5	end of Area 1
Profile 13	stake 13	W-E		3.0 ft Across
Stand-alone	0.5	1.0	2.2	
	1.5	0.5	2.1	
	2.5	0.2	2.1	
Profile 14	Stake 14	W-E		8.5 ft Across
	1.5	1.7	2.8	
	3.5	2.0	3.5	
	5.5	1.7	3.4	
	7.5	1.2	1.5	
Profile 15	Stake 15	W-E		8.0 ft
Obstruction	2.0	1.7	2.3	
@ 8-11 ft	4.0	1.9	2.6	
on E. Side	6.0	1.6	2.5	

Location Ne Cape Date 8/5/18

Project / Client USACE

	Position	DTS	DTB	
Profile 16	Stake 16	W-E		30.0 ft
	5.0	~~6.0~~ SRS 2.2	3.3	
	10.0	~~12.0~~ SRS 2.0	2.9	
	15.0	~~18~~ SRS 2.2	2.8	
	20.0	2.2	3.5	
	25.0	2.2	2.8	

Strong odor of fuel @ Profile 16

large fuel sheen

	Position	DTS	DTB	
Profile 17	Stake 18	W-E		11.0 ft
obstruction				
East of Stake				
out to 4.0 ft East				
Fuel odor	1.0	1.4	2.9	
and sheen	4.0	1.1	3.0	
	7.0	1.5	3.8	
	10.0	1.2	3.9	
Profile 18	44° @ 27.5 ft From Stake 19			5.5 ft
to center of stream	1.5	0.8	2.3	
	3.0	0.5	3.0	
	4.5	0.5	3.2	
Profile 19	Stake 19	W-E		14.0 ft
	2.0	1.0	3.4	
	5.0	1.0	2.3	
	8.0	1.2	2.4	
	11.0	1.0	3.8	

Location Ne Cape Date 8/5/18

Project / Client USACE

	Position	DTS	DTB
Profile 20 Stake	20		27 ft
large fuel	1.0	0.5	3.9
sheen	6.0	1.8 ~~2.8~~	2.2
and odor	11.0	~~1.1~~ 1.6	3.2
of fuel	16.0	1.5	3.2
	21.0	1.4	4.0
	26.0	1.0	3.0

Profile 21 located at stake marked out by surveyors, but not part of proposed sample locations. ~3.5 ft across. West side channel is veg. mat.

	Position	DTS	DTB
	1.0	0.4	2.3
	2.0	0.5	2.2
	3.0	0.5	2.2

Profile 22 Stake 21 W-E 25.0 ft

	Position	DTS	DTB
wide section	1.0	0.8	2.2
w/ veg mat	6.0	0.4	0.6
sections in	11.0	1.0	3.2
between. Sediment	22.0	0.5	2.1
depths measured	25.0	0.5	2.0

when present.
sheen present

Location Ne Cape Date 8/5/18

Project / Client USACE

	Position	DTS	DTB	
Profile 23	Stake 22	W-E		10.5 ft
	2.0	1.0	2.9	
	5.0	1.8	2.1	
	8.0	0.9	2.6	

Profile 24 315° @ 22 ft from stake 23 to west edge of sediment 7 ft

	Position	DTS	DTB	
	2.0	0.7	3.1	
	4.0	0.2	2.8	
	6.0	0.3	3.3	
Profile 25	Stake 23			1.0 ft
	0.0	0.6	2.9	
	0.5	0.7	3.0	
	1.0	1.0	3.0	
Profile 26	Stake 24			1.0 ft
	0.0	0.3	2.1	
	0.5	0.1	2.4	
	1.0	0.3	2.1	

End of Area 2

SRS
5 Aug 18

Location Ne Cape Date 8/6/18

Project / Client USACE

Weather: 49°F, Cloudy

Staff: Stan Seegars, Jessica Bay, Admend Abuomsha

Task: Sediment Measurements

PPE: Modified Level D

Start 0845

Position	DTS	DTB
Profile 27 41° @ 26.5 ft from Stake 25 W-E 1.0 ft Across		
0.0	0.3	2.2
0.5	0.4	2.3
1.0	0.2	0.5
Profile 28 Stake 25 W-E 1.5 ft Across		
0.0	0.2	2.2
0.75	0.3	2.1
~~1.5~~ 1.5	0.2	2.0
Profile 29 2° @ 23.0 ft from Stake 26 W-E 2.0 ft Across		
0.0	0.2	1.9
1.0	0.3	1.8
2.0	0.3	1.8

Location NE Cape Date 8/6/2018

Project / Client USACE (continued)

Position	DTS	DTB
Profile 30 Stake 26 W-E 2.5 ft Across		
0.5	0.3	1.5
1.25	0.3	1.6
2.0	0.2	1.6
Profile 31 Stake 27 W-E 2.0 ft Across		
0.5	0.2	2.1
1.0	0.1	1.1
1.5	0.1	1.1
Profile 32 347° @ 24.0 ft from Stake 28 2.0 ft Across W-E		
0.5	0.3	1.2
1.0	0.3	1.3
1.5	0.4	1.8
Profile 33 Stake 28 3.0 ft Across		
0.75	0.2	1.4
1.5	0.3	1.3
2.25	0.4	1.4
Profile 34 Stake 29 2.0 ft Across		
0.5	0.5	0.8
1.0	0.6	0.6
1.5	0.7	1.4
Profile 35 Stake 30 1.5 ft Across		
0.0	0.2	2.3
0.75	0.3	2.3
1.5	0.1	2.4

Location NE Cape Date 8/6/2018

Project / Client USACE (continued)

	Position	DTS	DTB	
Profile 36	stake 31			3.0 ft Across
	0.75	0.3	1.6	
	1.5	0.4	1.0	
	2.25	0.3	1.8	
Profile 37	~~stake~~ 3.0 @ 19 ft from stake 32			
		1.0 Ft Across		
	0.0	0.5	1.6	
	0.5	0.3	1.5	
	1.0	0.2	1.5	
Profile 38	stake 32			6.0 Ft Across
light	1.0	0.5	1.6	
sheen	3.0	0.1	1.5	
	5.0	0.3	1.2	
Profile 39	stake 33			2.0 Ft Across
very light	0.5	0.1	0.1	
layer of	1.0	0.4	0.4	
sediment	1.5	0.2	0.2	
on rock				
Profile 40	stake 34			3.5 ft Across
	1.0	1.0	1.5	
	2.0	1.2	2.2	
	3.0	0.8	1.2	
Profile 41	stake 35			1.0 ft Across
	0.0	~~0.8~~ 0.8	2.5	
End Area	0.5	1.0	~~2.5~~ 1.5	
3	1.0	0.6	1.5	

Location NE Cape Date 8/6/2018

Project / Client USACE (continued)

	Position	DTS	DTB	
Profile 42	N-S Transect			49.0 ft
	~~0~~ SPS			
	7.0	Veg. mat		
	14.0	Veg. mat		
	21.0	Veg. mat		
sheen	28.0	1.2	1.5	
+ odor	35.0	1.3	3.1	
	42.0	Veg. mat		
Profile 43	W-E Transect			54.0 ft
sheen and	10.0	0.2	2.2	
odor	20.0	veg mat		
	30.0	2.1	3.5	
	35.5	2.6	3.8	
	40.0	Veg. mat		
	50.0	Veg. mat		
Profile 44	N-S Transect			39.0 Ft
	5.0	0.9	1.4	
	12.0	Veg. mat		
	19.0	Veg. mat		
	26.0	2.0	2.2	
	32.0 ~~33.0~~ SPS	2.2	2.3	

Location NE Cape Date 8/6/2018

Project / Client USACE (continued)

Position	DTS	DTB	
Profile 45	W-E Transect		40.0 ft
0.0-8.0	veg. mat		
10.0	1.4	1.9	
13.0 ~~15.0~~ SRS	2.1	2.4	
13.5-35.0	veg. mat		
35.5	1.0	1.3	
37.0	0.9	1.1	
38.0	0.7	1.2	
38.0-40.0	veg. mat		

Stake 43 veg. mat, no sediment
End of Area 4

Position	DTS	DTB	
Profile 46	N-S Transect		84.0 ft
sheen 10.0	veg. mat		
and 20.0	veg. mat		
odor 30.0	2.5	3.5	
40.0	2.5	3.8	
50.0	veg. mat		
60.0	veg. mat		
70.0	no sediment		
80.0	no sediment		

Location NE Cape Date 8/6/2018

Project / Client USACE (continued)

Position	DTS	DTB	
Profile 47	W-E Transect		76.0 ft
10.0	1.4	2.2	
20.0	veg. mat		
30.0	2.5	3.6	
40.0	veg. mat		
50.0	veg. mat		
60.0	veg. mat		

Position	DTS	DTB	
Profile 48	N-S Transect		62.5 ft Across
~~6.0~~ SRS 0.0-35.0	veg. mat		
~~4.0~~ SRS 35.4 (Stake 41)	veg. mat		
~~18.0~~ SRS ~~36.5~~ SRS			
36.5	2.6	2.8	
40.0-58.0	veg. mat		
58.0-62.5	no sediment		

Position	DTS	DTB	
Profile 49	W-E Transect		44.0 ft Across
0.0-22.0	veg. mat		
22.5	2.1	3.3	at Stake 41
23.0-44.0	veg. mat		

Location NE Cape Date 8/6/2018

Project / Client USACE (continued)

	Position	DTS	DTB	
Profile 50	N-S	Transect		50.5 ft
	~~87~~ [?] 0.0-27.0	veg. mat		
	27.0	2.5	3.2	
	30.4	veg. mat at stake 37		
	31.0-50.5	veg. mat		
Profile 51	W-E	Transect		40.0 ft
	0.0-15.0	veg. mat		
	15.5-18.0	no sed., rock only		
	18.5	2.9	3.1	
	19.0	2.8	2.9	
	19.1-40.0	veg. mat		
stake 36 no sed., rock only				End Area 5
Profile 52	N-S	Transect		26.5 ft Array
large	1.0	veg. mat		
sheen	5.0	1.5	2.5	
and	9.0	1.4	2.2	
strong	13.0	1.5	1.9	
odor	17.0	1.0	1.5	
	21.0	1.2	2.4	
	25.0	No sediment		

Location NE Cape Date 8/6/2018

Project / Client USACE (continued)

	Position	DTS	DTB	
Profile 53	W-E	Transect		19.0 ft
	3.0	veg. mat		
	6.0	1.6	4.0	
	9.0	1.6	3.6	
	12.0	1.2	1.8	
	15.0	veg. mat		

End of Area 6

End of Sediment Mapping

17:00 Walk through Site 28 with Angela (Jacobs) and Curtis (ADEC)
Consider Moving: Stake 4, Stake 11, Stake 31, Stake 33, Stake 38, Stake 39, Stake 43, Stake 47, Stake 49, Stake 50, Stake 51

End of Day 6 Aug 18 BRS

Location NE Cape Date 8/7/18

Project / Client USACE

Weather: 49°F, ~~Partly Cloudy~~ SRS Sunny
Staff: Angelo Diberardino, Adman Ahuomsho, Jessica Bay, Stan Seegars
Task: Sediment Sampling Site 28
PPE: Modified Level D

Sediment Sampling Site 28
- All Samples will be collected in 2-8oz jars

18NEC-S28-SD-01 10:17
on Stake 1 Saturated sandy silt
with some root mass no odor or sheen

18NEC-S28-SD-02 10:35
on Stake 2 Saturated sandy silt
with ~~trace~~ SRS minimal root mass
no odor or sheen

18NEC-S28-SD-02-8 10:35 DUP

18NEC-S28-SD-03 10:50
on stake 3 saturated silty sand
with minimal root mass no odor or sheen
- collected MS/MSD

Sample 4 115° @ 15.7 ft from Stake 4
18NEC-S28-SD-04 11:08 moved due to veg. saturated silty sand
with minimal root mass no odor or sheen

Location NE Cape Date 8/7/18

Project / Client USACE (continued)

18NEC-S28-SD-05 11:15
on Stake 5 saturated silty sand
with minimal root mass no odor or sheen

18NEC-S28-SD-06 11:25
on Stake 6 saturated silty sand
with minimal root mass, no odor or sheen

18NEC-S28-SD-07 11:33
on stake 7 saturated silty sand
with some root mass no odor or sheen

18NEC-S28-SD-08 11:45
on stake 8 saturated sandy silt
with some root mass no odor or sheen

18NEC-S28-SD-09 11:53
on stake 9 saturated ~~sandy silt~~ silty sand SRS
with some root mass no odor or sheen

18NEC-S28-SD-10 12:01
on Stake 10 Saturated silty sand
with some root mass no odor or sheen

Sample 11 147° @ 12.5 ft from Stake 11
18NEC-S28-SD-11 12:11
moved due to veg. Saturated sandy silt
with some root mass no odor or sheen

~~Sample~~ SRS

Location NE Cape Date 8/7/2018
Project / Client USACE (continued)

18NEC-S28-SD-12 12:21
On stake 12 saturated sandy silt
with some root mass no odor or sheen
End of Area 1
18NEC-S28-SD-13 14:48
On stake 13 saturated sandy silt
with some root mass petroleum odor and sheen
18NEC-S28-SD-14 15:00
On stake 14 saturated sandy silt
with ~~some~~ moderate root mass petroleum odor and sheen
18NEC-S28-SD-15 15:17
On stake 15 saturated sandy silt
with moderate root mass petroleum odor and sheen
18NEC-S28-SD-16 15:28
On stake 16 saturated silty sand
with minimal root mass petroleum odor and sheen
18NEC-S28-SD-17 15:46
On stake 17 saturated sandy silt
with moderate root mass petroleum odor and sheen
18NEC-S28-SD-17-8 15:46 DUP
18NEC-S28-SD-18 16:03
On stake 18 saturated silty sand
with moderate root mass petroleum odor and sheen

Location NE Cape Date 8/7/2018
Project / Client USACE (continued)

18NEC-S28-SD-19 16:25
On stake 19 saturated sandy silt
with moderate root mass petroleum odor and sheen
18NEC-S28-SD-20 16:32
On stake 20 saturated sandy silt
with moderate root mass petroleum odor and sheen
18NEC-S28-SD-21 16:44
On stake 21 petroleum odor and sheen
with moderate root mass saturated silty sand
18NEC-S28-SD-22 16:53
On stake 22 saturated silty sand
with moderate root mass slight odor no sheen
18NEC-S28-SD-23 17:02
On stake 23 saturated silty sand
with moderate root mass no odor or sheen
18NEC-S28-SD-24 17:13
On stake 24 saturated silty sand
with moderate root mass slight odor no sheen
and with iron mottle
End of Area 2
Equipment Blank 18:11
collected from auger tooling

Location NE Cape Date 8/7/2018

Project / Client USACE (continued)

- All samples collected in 2-8oz Amber Jars. Analysis will be PCBs, AK102, PAHs, Metals, and TOC

All samples stored in refrigerator until ready for shipment.
-18:25

SRS 7 Aug 18

Location NE Cape Date 8/8/2018

Project / Client USACE

Weather: 48°F Cloudy, Light Rain
Staff: Angela DiBerardino, Jessica Bay, Adnan AbuAinsha, Stan Seagren
Task: Sediment Samples Site 28
PPE: Modified D

NEC18-S28-SD-25 09:30
located 224° @ 7.0 ft due to vegi mat from stake 25 saturated silty sand with moderate root mass no odor or sheen and iron mottle
NEC18-S28-SD-26 09:51
on stake 26 saturated silty sand with moderate root mass some odor no sheen iron mottle
NEC18-S28-SD-27 10:01
on stake 27 saturated silty sand with moderate root mass no odor or sheen
NEC18-S28-SD-27-8 10:01 DUP
NEC18-S28-SD-28 10:12
on stake 28 saturated sandy silt with minimal root mass some odor no sheen
- collected MS/MSD

Location NE Cape Date 8/8/2018

Project / Client USACE (continued)

NEC18 - S28 - SD - 29 10:25
On stake 29 saturated silty sand
with minimal root mass some odor no sheen
NEC18 - S28 - SD - 30 10:40
on stake 30 saturated silty sand
with minimal root mass some odor no sheen
iron mottle
NEC18 - S28 - SD - 31 10:48
on stake 31 saturated silty sand
with moderate root mass light odor no sheen
iron mottle
NEC18 - S28 - SD - 32 10:58
On stake 32 saturated silty sand
with moderate root mass some ~~no~~ odor ~~or sheen~~ some sheen
iron mottle
NEC18 - S28 - SD - 33 11:06
on stake 33 saturated silty sand
with minimal root mass some odor and sheen
NEC18 - S28 - SD - 34 11:14
on stake 34 saturated silty sand
with minimal root mass some odor and sheen
iron mottle
NEC18 - S28 - SD - 35 11:25
on stake 35 saturated silty sand
with moderate root mass light odor and sheen.

Location NE Cape Date 8/8/2018

Project / Client USACE (continued)

- stake 35 is at the spring
End of Area 3
NEC18 - S28 - SD - 38 from stake 35
157° @ 9.0 ft moved due to
veg. mat 11:43
iron mottle saturated silty sand
with moderate root mass odor and sheen
NEC18 - S28 - SD - 38 - 8 11:43 DUP
NEC18 - S28 - SD - 39 11:54
On stake 39 saturated sandy silt
with moderate root mass sheen and odor
NEC18 - S28 - SD - 40 12:02
On stake 40 saturated silty sand
with minimal root mass heavy sheen and odor
NEC18 - S28 - SD - 42 12:18
~~On~~ Stake 42 ~~saturated~~
~~with~~ 139° @ 24.1 ft from stake
42. moved due to veg. mat.
saturated sandy silt
with moderate root mass ~~some~~ no sheen
no odor.
End of Area 4

Location NE Cape Date 8/8/2018
Project / Client USACE (continued)

NEC18-S28-SD-52 14:40
250° @ 5.9 Ft from unmarked stake. 158° @ 35.7 Ft from stake 20.
this is 1 of 3 extra samples.
some sheen and odor.
saturated silty sand with minimal root mass.
NEC18-S28-SD-53 15:04
138° @ 17.5 Ft from stake 40
this is 2 of 3 extra samples.
Fuel sheen and odor.
saturated sandy silt with moderate root mass.
NEC18-S28-SD-37 15:40
composite sample around stake 37
saturated silty sand
with moderate root mass no odor no sheen
NEC18-S28-SD-36 15:53
composite sample around stake 36
saturated silty sand
with moderate root mass no odor or sheen
NEC18-S28-SD-41 16:05
On stake 41 saturated silty sand
with moderate root mass no odor or sheen
NEC18-S28-SD-41-8 16:05 DUP

Location NE Cape Date 8/8/2018
Project / Client USACE (continued)

NEC18-S28-SD-44 16:24
on stake 44 saturated silty sand
with moderate root mass slight odor no sheen
iron mottle
NEC18-S28-SD-45 16:40
on stake 43 saturated sandy silt
with moderate root mass light odor light sheen
NEC18-S28-SD-46 16:46
on stake 46 saturated sandy silt
with moderate root mass light odor no sheen
End of Area 5

NEC18-S28-SD-43 17:00
132° @ 10.5 Ft From stake 43
moved due to veg mat
saturated sandy silt
with moderate root mass slight odor light ~~no~~ sheen
NEC18-S28-SD-54 17:10
52° @ 10 Ft from stake 47
this is 3 of 3 extra samples
heavy Fuel sheen and odor
saturated sandy silt
with minimal root mass
- collected MS/MSD

Location NE Cape Date 8/8/2018
Project / Client USACE (continued)

NEC18-S28-SD-47 17:20
On Stake 47 Saturated sandy silt
with moderate root mass heavy odor heavy sheen
NEC18-S28-SD-48 17:26
On stake 48 saturated sandy silt
with moderate root mass heavy odor and heavy sheen
NEC18-S28-SD-48-8 17:26 DUP
NEC18-S28-SD-49 17:33
on stake 49 saturated sandy silt
with moderate root mass heavy odor and heavy sheen
NEC18-S28-SD-50 17:39
On stake 50 saturated silty sand
with moderate root mass heavy odor and heavy sheen
NEC18-S28-SD-51 17:50
57° @ 6.3 ft moved due to no water
and rocks.
saturated sandy silt
with moderate root mass heavy odor heavy sheen
End of Area 6
End of Sediment Sampling
All compass headings are
magnetic. Estimated Declination
is 8° 10'

Location NE Cape Date 8/9/18
Project / Client USACE

0800 Daily tailgate
A. DiBerardino
J. Bay, S. Seegars, Admon
S. Benjamin
3 x PRL

objective: prepare for Friday
sample shipment.
-prepare excess supplies for
~~sam~~ demobilization

1230: Re-Collect Equipment blank
from Site 28 sampling.

2 jars became unusable due
to freezing and breaking.

AD 8/9/18

Summary of Sediment Transect

Summary of Sediment Transect

Area	Sub Area	Profile #	Stake #	Transect Direction	Total Transect Distance (feet)	Distance Along Transect (feet)	Sediment Start Depth (feet bgs)	Sediment Refusal Depth (feet bgs)	Total Sediment Depth (feet)	Notes
Area 11	N/A	P1	S1	W-E	5.0	1.0	2.2	3.8	1.6	
		P1				2.5	3.0	4.0	1.0	
		P1				4.0	3.0	3.9	0.9	
Area 11	Area 11-2	P2	S2	W-E	13.0	1.0	2.0	3.3	1.3	
		P2				5.0	2.4	3.2	0.8	
		P2				9.0	1.6	2.6	1.0	
		P2				12.5	1.7	2.8	1.1	
Area 11	N/A	P3	-	W-E	3.5	0.5	1.2	2.8	1.6	30 feet from P1.
		P3				1.5	1.7	2.9	1.2	
		P3				2.5	1.7	3.4	1.7	
Area 11	N/A	P4	-	W-E	1.0	0.0	1.2	2.2	1.0	15 feet south of P3.
		P4				0.5	1.2	2.3	1.1	
		P4				1.0	1.2	2.1	0.9	
Area 11	Area 11-1	P5	S3	W-E	4.5	1.0	0.3	2.4	2.1	
		P5				2.0	0.5	2.3	1.8	
		P5				3.0	1.3	2.2	0.9	
Area 10		-	S4	-	-	-	-	-	-	In vegetation mat.
	Area 10-5	P6	S5	W-E	4.0	1.0	1.1	2.1	1.0	Light sheen and light odor.
		P6				2.0	1.3	2.1	0.8	
		P6				3.0	1.4	2.2	0.8	
Area 10	Area 10-5	P7	S6	W-E	10.5	1.0	0.4	2.4	2.0	
		P7				3.0	0.3	2.8	2.5	
		P7				5.0	0.4	2.5	2.1	
		P7				7.0	1.5	2.0	0.5	
		P7				9.0	1.3	1.8	0.5	
Area 10	Area 10-4	P8	S8	W-E	17.0	2.0	0.1	1.9	1.8	According to map, S7 and S8 are located horizontally from eachother.
		P8				7.0	0.2	1.9	1.7	
		P8				12.0	0.3	2.6	2.3	
		P8				17.0	0.2	1.9	1.7	
Area 10	Area 10-4	P9	S9	W-E	4.0	1.0	0.2	1.3	1.1	
		P9				2.0	0.3	2.0	1.7	
		P9				3.0	0.3	2.1	1.8	
Area 10	Area 10-3	P10	S10	W-E	5.0	1.5	1.0	2.5	1.5	
		P10				3.0	0.5	3.9	3.4	
		P10				4.5	0.2	2.9	2.7	
Area 10	Area 10-2	P11	S11	W-E	1.0	0.0	1.0	2.5	1.5	
		P11				0.5	0.5	3.9	3.4	
		P11				1.0	0.2	2.9	2.7	
Area 10	Area 10-1	P12	S12	W-E	9.0	1.5	0.1	2.1	2.0	
		P12				4.5	0.1	2.2	2.1	

Summary of Sediment Transect

Area	Sub Area	Profile #	Stake #	Transect Direction	Total Transect Distance (feet)	Distance Along Transect (feet)	Sediment Start Depth (feet bgs)	Sediment Refusal Depth (feet bgs)	Total Sediment Depth (feet)	Notes
		P12				7.5	0.3	3.5	3.2	
Area 9	N/A	P13	S13	W-E	3.0	0.5	1.0	2.2	1.2	Stand alone.
		P13				1.5	0.5	2.1	1.6	
		P13				2.5	0.2	2.1	1.9	
Area 9	N/A	P14	S14	W-E	8.5	1.5	1.7	2.8	1.1	
		P14				3.5	2.0	3.5	1.5	
		P14				5.5	1.7	3.4	1.7	
		P14				7.5	1.2	1.5	0.3	
Area 9	N/A	P15	S15	W-E	8.0	2.0	1.7	2.3	0.6	Obstruction at 8-11 feet on east side.
		P15				4.0	1.9	2.6	0.7	
		P15				6.0	1.6	2.5	0.9	
Area 9	N/A	P16	S16	W-E	30.0	5.0	2.2	3.3	1.1	Strong odor of fuel at profile 16. Large fuel sheen.
		P16				10.0	2.0	2.9	0.9	
		P16				15.0	2.2	2.8	0.6	
		P16				20.0	2.2	3.5	1.3	
		P16				25.0	2.2	2.8	0.6	
Area 9	N/A	P17	S18	W-E	11.0	1.0	1.4	2.9	1.5	Obstruction east of stake out to 4 feet east. Fuel odor and sheen.
		P17				4.0	1.1	3.0	1.9	According to map, S17 is horizontally located from S18.
		P17				7.0	1.5	3.8	2.3	
		P17				10.0	1.2	3.9	2.7	
Area 4	N/A	P18	-	-	5.5	1.5	0.8	2.3	1.5	44 degrees at 27.5 feet from S19, 5.5 feet to center of stream.
		P18				3.0	0.5	3.0	2.5	
		P18				4.5	0.5	3.2	2.7	
Area 4	N/A	P19	S19	W-E	14.0	2.0	1.0	3.4	2.4	
		P19				5.0	1.0	2.3	1.3	
		P19				8.0	1.2	2.4	1.2	
		P19				11.0	1.0	3.8	2.8	
Area 4	N/A	P20	S20	-	27.0	1.0	0.5	3.9	3.4	Large fuel sheen and odor of fuel.
		P20				6.0	1.8	2.2	0.4	
		P20				11.0	1.6	3.2	1.6	
		P20				16.0	1.5	3.2	1.7	
		P20				21.0	1.4	4.0	2.6	
		P20				26.0	1.0	3.0	2.0	
Area 4	N/A	P21	-	-	3.5	1.0	0.4	2.3	1.9	Located at stake marked by surveyors, but not part of proposed sample locations. West side channel 13 vegetation mat.
		P21				2.0	0.5	2.2	1.7	
		P21				3.0	0.5	2.2	1.7	

Summary of Sediment Transect

Area	Sub Area	Profile #	Stake #	Transect Direction	Total Transect Distance (feet)	Distance Along Transect (feet)	Sediment Start Depth (feet bgs)	Sediment Refusal Depth (feet bgs)	Total Sediment Depth (feet)	Notes
Area 4	N/A	P22	S21	W-E	25.0	1.0	0.8	2.2	1.4	Wide section with vegetation mat sections in between. Sediment depths measured where present. Sheen present.
		P22				6.0	0.4	0.6	0.2	
		P22				11.0	1.0	3.2	2.2	
		P22				22.0	0.5	2.1	1.6	
		P22				25.0	0.5	2.0	1.5	
Area 4	N/A	P23	S22	W-E	10.5	2.0	1.0	2.9	1.9	
		P23				5.0	1.8	2.1	0.3	
		P23				8.0	0.9	2.6	1.7	
Area 4	N/A	P24	-	-	7.0	2.0	0.7	3.1	2.4	315 degrees at 22 feet from S23 to west edge of sediment.
		P24				4.0	0.2	2.8	2.6	
		P24				6.0	0.3	3.3	3.0	
Area 4	N/A	P25	S23	-	1.0	0.0	0.6	2.9	2.3	
		P25				0.5	0.7	3.0	2.3	
		P25				1.0	1.0	3.0	2.0	
Area 4	N/A	P26	S24	-	1.0	0.0	0.3	2.1	1.8	
		P26				0.5	0.1	2.4	2.3	
		P26				1.0	0.3	2.1	1.8	
Area 4	N/A	P27	-	W-E	1.0	0.0	0.3	2.2	1.9	41 degrees at 26.5 feet from S25.
		P27				0.5	0.4	2.3	1.9	
		P27				1.0	0.2	0.5	0.3	
Area 3	N/A	P28	S25	W-E	1.5	0.0	0.2	2.2	2.0	
		P28				0.75	0.3	2.1	1.8	
		P28				1.5	0.2	2.0	1.8	
Area 3	N/A	P29	-	W-E	2.0	0.0	0.2	1.9	1.7	2 degrees at 23 feet from S26.
		P29				1.0	0.3	1.8	1.5	
		P29				2.0	0.3	1.8	1.5	
Area 3	N/A	P30	S26	W-E	2.5	0.5	0.3	1.5	1.2	
		P30				1.25	0.3	1.6	1.3	
		P30				2.0	0.2	1.6	1.4	
Area 3	N/A	P31	S27	W-E	2.0	0.5	0.2	2.1	1.9	
		P31				1.0	0.1	1.1	1.0	
		P31				1.5	0.1	1.1	1.0	
Area 3	N/A	P32	-	W-E	2.0	0.5	0.3	1.2	0.9	347 degrees at 24 feet from S28.
		P32				1.0	0.3	1.3	1.0	
		P32				1.5	0.4	1.8	1.4	
Area 3	N/A	P33	S28	-	3.0	0.75	0.2	1.4	1.2	
		P33				1.5	0.3	1.3	1.0	
		P33				2.25	0.4	1.4	1.0	
Area 3	N/A	P34	S29	-	2.0	0.5	0.5	0.8	0.3	
		P34				1.0	0.6	0.6	0.0	

Summary of Sediment Transect

Area	Sub Area	Profile #	Stake #	Transect Direction	Total Transect Distance (feet)	Distance Along Transect (feet)	Sediment Start Depth (feet bgs)	Sediment Refusal Depth (feet bgs)	Total Sediment Depth (feet)	Notes
		P34				1.5	0.7	1.4	0.7	
Area 3	N/A	P35	S30	-	1.5	0.0	0.2	2.3	2.1	
		P35				0.75	0.3	2.3	2.0	
		P35				1.5	0.1	2.4	2.3	
Area 3	N/A	P36	S31	-	3.0	0.75	0.3	1.6	1.3	
		P36				1.5	0.4	1.0	0.6	
		P36				2.25	0.3	1.8	1.5	
Area 3	N/A	P37	-	-	1.0	0.0	0.5	1.6	1.1	31 degrees at 19 feet from S32.
		P37				0.5	0.3	1.5	1.2	
		P37				1.0	0.2	1.5	1.3	
Area 3	N/A	P38	S32	-	6.0	1.0	0.5	1.6	1.1	Light sheen.
		P38				3.0	0.1	1.5	1.4	
		P38				5.0	0.3	1.2	0.9	
Area 3	N/A	P39	S33	-	2.0	0.5	0.1	0.1	0.0	Very light layer of sediment on rock.
		P39				1.0	0.4	0.4	0.0	
		P39				1.5	0.2	0.2	0.0	
Area 3	N/A	P40	S34	-	3.5	1.0	1.0	1.5	0.5	
		P40				2.0	1.2	2.2	1.0	
		P40				3.0	0.8	1.2	0.4	
Area 3	N/A	P41	S35	-	1.0	0.0	0.8	2.5	1.7	
		P41				0.5	1.0	1.5	0.5	
		P41				1.0	0.6	1.5	0.9	
Area 7	N/A	P42	-	N-S	49.0	7.0	-	-	-	Vegetation mat.
		P42				14.0	-	-	-	Vegetation mat.
		P42				21.0	-	-	-	Vegetation mat.
		P42				28.0	1.2	1.5	0.3	Sheen and odor.
		P42				35.0	1.3	3.1	1.8	Sheen and odor.
		P42				42.0			0.0	Vegetation mat.
Area 7	N/A	P43	-	W-E	54.0	10.0	0.2	2.2	2.0	
		P43				20.0	-	-	-	Vegetation mat. Sheen and odor.
		P43				30.0	2.1	3.5	1.4	
		P43				35.5	2.6	3.8	1.2	
		P43				40.0	-	-	-	Vegetation mat. Sheen and odor.
		P43				50.0	-	-	-	Vegetation mat. Sheen and odor.
Area 8	N/A	P44	-	N-S	39.0	5.0	0.9	1.4	0.5	
		P44				12.0	-	-	-	Vegetation mat.
		P44				19.0	-	-	-	Vegetation mat.
		P44				26.0	2.0	2.2	0.2	
		P44				32.0	2.2	2.3	0.1	
Area 8	N/A	P45	S42	W-E	40.0	0-8.0	-	-	-	Vegetation mat.

Summary of Sediment Transect

Area	Sub Area	Profile #	Stake #	Transect Direction	Total Transect Distance (feet)	Distance Along Transect (feet)	Sediment Start Depth (feet bgs)	Sediment Refusal Depth (feet bgs)	Total Sediment Depth (feet)	Notes
		P45				10.0	1.4	1.9	0.5	
		P45				13.0	2.1	2.4	0.3	
		P45				13.5-35.0	-	-	-	Vegetation mat.
		P45				35.5	1.0	1.3	0.3	
		P45				37.0	0.9	1.1	0.2	
		P45				38.0	0.7	1.2	0.5	
		P45				38-40	-	-	-	Vegetation mat. S43, vegetation mat no sediments.
Area 6	N/A	P46	-	N-S	84.0	10.0	-	-	-	Vegetation mat. Sheen and odor.
		P46				20.0	-	-	-	Vegetation mat. Sheen and odor.
		P46				30.0	2.5	3.5	1.0	
		P46				40.0	2.5	3.8	1.3	
		P46				50.0	-	-	-	Vegetation mat. Sheen and odor.
		P46				60.0	-	-	-	Vegetation mat. Sheen and odor.
		P46				70.0	-	-	-	No sediment. Sheen and odor.
		P46				80.0	-	-	-	No sediment. Sheen and odor.
Area 6	N/A	P47	-	W-E	76.0	10.0	1.4	2.2	0.8	
		P47				20.0	-	-	-	Vegetation mat.
		P47				30.0	2.5	3.6	1.1	
		P47				40.0	-	-	-	Vegetation mat.
		P47				50.0	-	-	-	Vegitation mat.
		P47				60.0	-	-	-	Vegitation mat.
Area 5	Area 5 South	P48	S41	N-S	62.5	0-35.0	-	-	-	Vegetation mat.
		P48				35.4	-	-	-	Vegetation mat. Stake 41
		P48				36.5	2.6	2.8	0.2	
		P48				40-58	-	-	-	Vegetation mat.
		P48				58-62.5	-	-	-	No sediment.
Area 5	Area 5 South	P49	S41	W-E	44.0	0-22.0	-	-	-	Vegetation mat.
		P49				22.5	2.1	3.3	1.2	At stake 41.
		P49				23.0-44.0	-	-	-	Vegetation mat.
Area 5	Area 5 North	P50	S37	N-S	50.5	0-27.0	-	-	-	Vegetation mat.
		P50				27.0	2.5	3.2	0.7	
		P50				30.4	-	-	-	Vegetation mat at S37.
		P50				31.0-50.5	-	-	-	Vegetation mat.
Area 5	Area 5 North	P51	S36	W-E	40.0	0-15.0	-	-	-	Vegetation mat.
		P51				15.5-18.0	-	-	-	No sediment, rock only.
		P51				18.5	2.9	3.1	0.2	
		P51				19.0	2.8	2.9	0.1	
		P51				19.1-40.0	-	-	-	Vegetation map. S36- no sed, rock only.
		-	S36	-	-	-	-	-	-	S36- no sed, rock only.
Area 2	N/A	P52	-	N-S	26.5	1.0	-	-	-	Vegetation mat. Large sheen and strong odor.

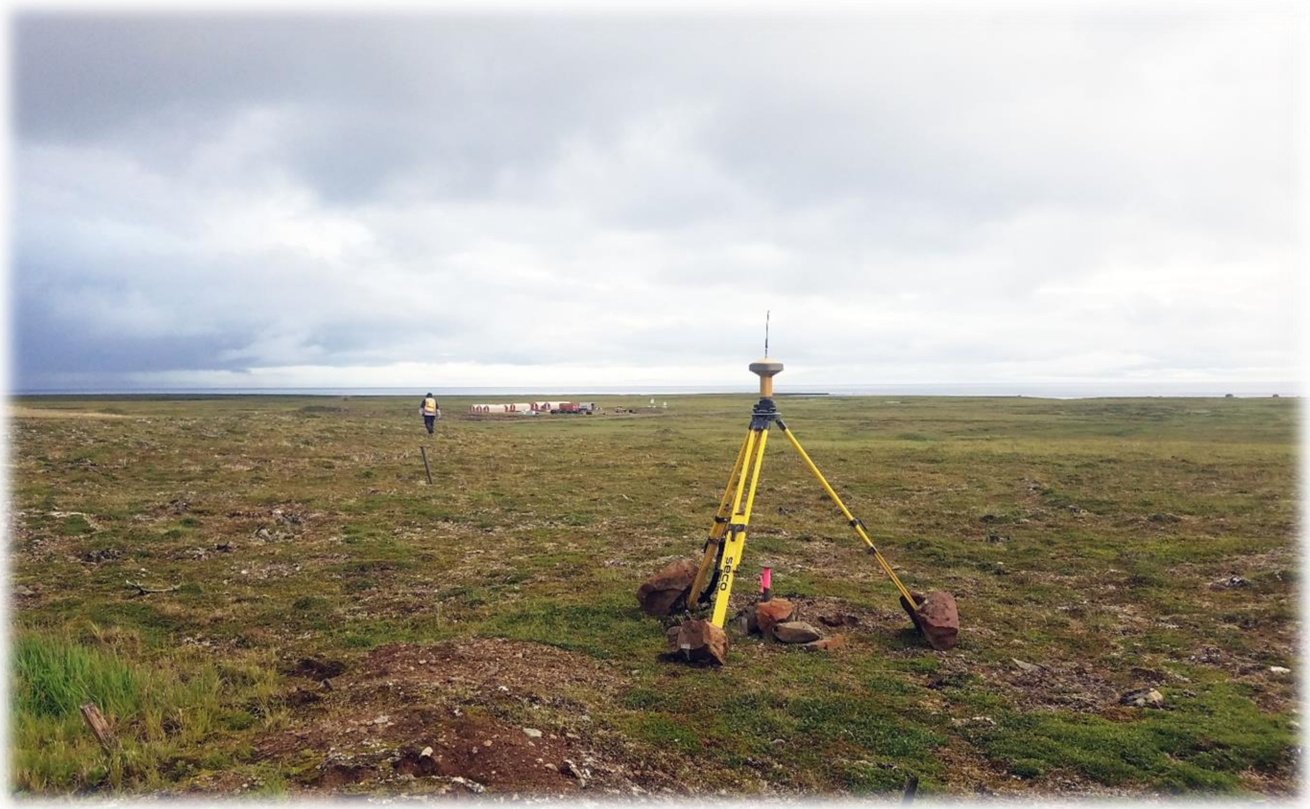
Summary of Sediment Transect

Area	Sub Area	Profile #	Stake #	Transect Direction	Total Transect Distance (feet)	Distance Along Transect (feet)	Sediment Start Depth (feet bgs)	Sediment Refusal Depth (feet bgs)	Total Sediment Depth (feet)	Notes
		P52				5.0	1.5	2.5	1.0	
		P52				9.0	1.4	2.2	0.8	
		P52				13.0	1.5	1.9	0.4	
		P52				17.0	1.0	1.5	0.5	
		P52				21.0	1.2	2.4	1.2	
		P52				25.0	-	-	-	No sediment.
Area 2	N/A	P53	-	W-E	18.0	3.0	-	-	-	Vegetation mat.
		P53				6.0	1.6	4.0	2.4	
		P53				9.0	1.6	3.6	2.0	
		P53				12.0	1.2	1.8	0.6	
		P53				15.0	-	-	-	Vegetation mat.

Note:

For definitions, refer to the Acronyms and Abbreviations section in Appendix F.

Northeast Cape Remedial Action Topographical Survey Report



Northeast Cape Remedial Action Topographic Survey

Final Project Report

August, 2018

Contractor Job Number:
W911KB18F0020

Project Coordinates:
Latitude: 63°18'37.79"N
Longitude: 168°57'47.72"W

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Table of Contents

1. Project Description

Project Overview and Summary

Work for this project will be performed by Lounsbury & Associates, Inc. (Lounsbury) under contract to Environmental Compliance Consultants (ECC). The purpose of this survey will be to provide surveying and mapping support as discussed in the Northeast Cape Remedial Action Statement of Work dated November 8, 2017. Specific survey goals included tying into existing survey control and supplementing it as necessary, perform cross sections and a small topographic survey at Site #7, stake sample spots at Sites #7 and #28, and survey the edge of water at Site #28. Fieldwork for this survey was completed by Lounsbury & Associates, Inc. during August 2018.

USACE Contract Number: W911KB-17-D-0017

Horizontal Datum and Epoch:

The horizontal datum and epoch for the Survey is NAD83 (2011) (EPOCH: 2010.00). Coordinates have been provided in UTM Zone 2N, Alaska State Plane Zone 9 (U.S. Survey Feet), and in other datums in the project data table, per agreed-upon scope of work.

Vertical Datum and Epoch:

The vertical datum for the survey is NAVD 88, GEOID 12B. Elevations on project control were determined by GPS elevation transfer. The average of multiple NGS OPUS solutions, observed over different days, was held fixed for each project control point. The integrity of these elevations were confirmed with multiple RTK and static GPS checks.

Number of New Monuments Set:

This survey set one new project control monument and provided updated coordinates on four existing project control monuments.

2. Survey Control Summary

Primary Horizontal and Vertical Control Points:

The table on the following page lists the project primary horizontal and vertical control points.

Primary Horizontal and Vertical Control Points											
Field Survey Point ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing (Alaska State Plane Zone 9, U.S. Survey Feet)	Easting (Alaska State Plane Zone 9, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor
1	63°19'32.47895"N	168°58'15.32269"W	63°19'32.49446"N	168°58'15.23687"W	7023485.424	601618.564	3409053.356	1809572.561	28.409	8.659	CP 1 RTK BASE
2	63°18'57.69975"N	168°57'18.33986"W	63°18'57.71525"N	168°57'18.25406"W	7022434.584	602445.407	3405563.115	1812231.739	51.535	15.708	CRBC
59	63°20'08.83006"N	168°56'24.47121"W	63°20'08.84555"N	168°56'24.38532"W	7024659.259	603124.127	3412827.77	1814572.558	5.248	1.599	CBC
603	63°18'58.70241"N	168°56'27.27211"W	63°18'58.71790"N	168°56'27.18629"W	7022488.35	603154.891	3405703.216	1814562.383	78.814	24.023	BM B NGS
2600	63°18'42.73235"N	168°57'29.95052"W	63°18'42.74785"N	168°57'29.86474"W	7021966.361	602298.622	3404034.336	1811726.161	72.924	22.227	CRB

Static Processing

Lounsbury & Associates used the NGS OPUS Utility to process all static baselines and obtain the geodetic positions of project control. Values were obtained by averaging multiple solutions on each point, all of which were based upon at least two hours of static GPS observation time. Observations were obtained over multiple days and at different times each day in order to incorporate different satellite geometry. The integrity of the xyz positions on each control point were confirmed through multiple RTK checkshots on each point.

Checkshots / Other Control Points:

The primary control points listed in the table on the previous page were the only control points utilized for this survey.

3. Survey Reduction Narrative

Procedures Used and Survey Control Held:

The survey found several issues with the existing project control. Record coordinates on points derived from “Eco-Land” Surveys were listed as Alaska State Plane Zone 9, but initial field checks found this to be wrong. Most of the control set from that survey was found to be too sloppy to use. Furthermore, our OPUS solutions on Point #1 differed from the “Eco-Land” position by approximately 0.7’; while our OPUS solutions matched the published position of Point #59 by approximately 0.08’. It was determined that, given the issues with the existing control values and the high latitude of the project site, averaged OPUS solutions should be used on all project control in order to provide the most defensible, up-to-date geodetic coordinates of each control point. The coordinates of each project control point have thus been updated according to the mean OPUS values on each point.

RTK topographic survey data was processed using Topcon Magnet Ver 5.0.1 software. A large number of check shots were performed to ensure good on-the-fly initialization, and to rule out systematic errors. The vast majority of RTK check shots were under 0.10’ magnitude in XYZ with a small percentage of outliers, all within the RTK precision specifications of the equipment used. ASCII points were generated in Topcon Magnet software after reviewing the checkshot report and RTK system statistics reports. These reports have been included in the submitted deliverable package and are referenced in this report document.

Survey deliverables were then generated according to the specifications listed in the USACE Alaska District – Environmental Program Manual For Electronic Deliverables, April 2017.

4. Issues and Problems Encountered

Other than the discrepancies found with existing “Eco-Land” control described in Section 3 of this report, no significant issues or problems were encountered in this survey.

5. Check Shot / Quality Reports

5.1 RTK Check Shots on Project Control

From	To	Forward Azimuth	Backward Azimuth	Geodetic Dist. (USft)	Ground Dist. (USft)	Slope Dist. (USft)
5002	59_Mean_OPUS	305°20'12.0274"	125°20'12.0274"	0.016	0.016	0.02
5421	1_Mean_OPUS	70°09'22.3000"	250°09'22.3001"	0.028	0.028	0.038
10001	1_Mean_OPUS	65°16'41.7923"	245°16'41.7923"	0.011	0.011	0.041
10004	59_Mean_OPUS	322°11'09.9037"	142°11'09.9036"	0.014	0.014	0.05
5006	2600_Mean_OPUS	208°28'50.0765"	28°28'50.0763"	0.031	0.031	0.052
5115	59_Mean_OPUS	2°10'08.8688"	182°10'08.8688"	0.037	0.037	0.052
5228	1_Mean_OPUS	9°17'14.9805"	189°17'14.9806"	0.007	0.007	0.074
10136	59_Mean_OPUS	343°59'55.2779"	163°59'55.2778"	0.021	0.021	0.079
5009	1_Mean_OPUS	35°02'46.5820"	215°02'46.5820"	0.009	0.009	0.079
10236	2_Mean_OPUS	210°52'25.3985"	30°52'25.3984"	0.015	0.015	0.103
5231	2_Mean_OPUS	242°16'27.2284"	62°16'27.2283"	0.02	0.02	0.105
5229	2_Mean_OPUS	326°09'36.8126"	146°09'36.8123"	0.043	0.043	0.105
10519	GPS_2_OPUS	225°43'35.2393"	45°43'35.2389"	0.057	0.057	0.107
10003	2_Mean_OPUS	341°47'29.2983"	161°47'29.2981"	0.036	0.036	0.108
5114	2600_Mean_OPUS	287°32'45.0001"	107°32'45.0001"	0.03	0.03	0.117
10235	2_Mean_OPUS	293°36'20.6271"	113°36'20.6270"	0.05	0.05	0.12
5387	2600_Mean_OPUS	200°16'34.6263"	20°16'34.6260"	0.062	0.062	0.12
10234	2_Mean_OPUS	269°56'15.5115"	89°56'15.5115"	0.027	0.027	0.12
10002	2600_Mean_OPUS	218°10'29.4533"	38°10'29.4532"	0.023	0.023	0.12
10520	2600_Mean_OPUS	208°51'32.0517"	28°51'32.0514"	0.04	0.04	0.127
10135	2_Mean_OPUS	298°19'17.4252"	118°19'17.4251"	0.018	0.018	0.136
5391	GPS_2_OPUS	211°52'20.4448"	31°52'20.4442"	0.079	0.079	0.142

From	To	Forward Azimuth	Backward Azimuth	Geodetic Dist. (USft)	Ground Dist. (USft)	Slope Dist. (USft)
5394	2_Mean_OPUS	129°37'22.3715"	309°37'22.3716"	0.019	0.019	0.243
5420	2_Mean_OPUS	322°10'05.7059"	142°10'05.7057"	0.026	0.026	0.256
5392	2_Mean_OPUS	63°59'24.8944"	243°59'24.8945"	0.014	0.014	0.481
5393	2_Mean_OPUS	327°19'59.4012"	147°19'59.4010"	0.025	0.025	0.495

5.2 RTK Observation Quality

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
1_Mean_OPUS–5002	3774.405	5000.011	-23.214	0.012	0.015
1_Mean_OPUS–5003	3575.944	4892.167	-23.431	0.013	0.016
1_Mean_OPUS–5003	3575.954	4892.157	-23.435	0.013	0.016
1_Mean_OPUS–5004	3322.317	4700.852	-23.927	0.012	0.015
1_Mean_OPUS–5004	3322.324	4700.84	-23.938	0.012	0.015
1_Mean_OPUS–5005	-5424.463	423.411	47.584	0.011	0.013
1_Mean_OPUS–5006	-5019.003	2153.621	45.16	0.012	0.014
1_Mean_OPUS–5006	-5018.993	2153.614	45.162	0.012	0.014
1_Mean_OPUS–5007	-5418.432	1702.719	66.116	0.013	0.017
1_Mean_OPUS–5008	-7878.646	2407.138	212.354	0.014	0.016
1_Mean_OPUS–5008	-7878.622	2407.162	212.356	0.013	0.015
603_Mean_OPUS–5001	3305.88	2620.741	-52.192	0.011	0.014
603_Mean_OPUS–5009	3350.133	-4989.827	-48.56	0.018	0.033
603_Mean_OPUS–5010	-1382.478	-3696.888	-19.087	0.017	0.027
603_Mean_OPUS–5011	-1394.685	-3677.133	-19.074	0.011	0.015
603_Mean_OPUS–5012	-1409.686	-3667.085	-19.055	0.011	0.014
603_Mean_OPUS–5013	-1407.245	-3657.459	-19.1	0.012	0.015
603_Mean_OPUS–5014	-1394.93	-3653.609	-19.138	0.012	0.015

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5015	-1378.828	-3649.477	-19.098	0.011	0.014
603_Mean_OPUS–5016	-1364.455	-3653.827	-19.078	0.011	0.014
603_Mean_OPUS–5017	-1364.81	-3669.486	-19.119	0.012	0.015
603_Mean_OPUS–5018	-1354.356	-3678.788	-19.057	0.011	0.014
603_Mean_OPUS–5019	-1357.804	-3685.786	-19.109	0.011	0.014
603_Mean_OPUS–5020	-1377.675	-3695.28	-19.064	0.011	0.014
603_Mean_OPUS–5021	-1370.141	-3588.193	-18.173	0.018	0.026
603_Mean_OPUS–5022	-1372.319	-3578.998	-18.216	0.018	0.026
603_Mean_OPUS–5023	-1364.065	-3566.953	-18.177	0.018	0.026
603_Mean_OPUS–5024	-1345.531	-3571.082	-18.193	0.018	0.026
603_Mean_OPUS–5025	-1338.042	-3554.454	-18.149	0.018	0.026
603_Mean_OPUS–5026	-1322.789	-3545.684	-18.192	0.018	0.026
603_Mean_OPUS–5027	-1314.94	-3554.082	-18.216	0.018	0.026
603_Mean_OPUS–5028	-1324.361	-3572.78	-18.146	0.018	0.026
603_Mean_OPUS–5029	-1339.302	-3578.247	-18.079	0.018	0.026
603_Mean_OPUS–5030	-1356.395	-3585.042	-18.248	0.018	0.026
603_Mean_OPUS–5031	-1401.479	-3405.184	-18.522	0.013	0.018
603_Mean_OPUS–5032	-1386.454	-3398.304	-18.496	0.013	0.018
603_Mean_OPUS–5033	-1383.109	-3385.869	-18.522	0.013	0.018
603_Mean_OPUS–5034	-1400.734	-3375.255	-18.516	0.013	0.018
603_Mean_OPUS–5035	-1415.174	-3366.668	-18.41	0.014	0.019
603_Mean_OPUS–5036	-1428.924	-3372.479	-18.412	0.013	0.018
603_Mean_OPUS–5037	-1417.508	-3390.27	-18.498	0.013	0.018
603_Mean_OPUS–5038	-1339.349	-3462.828	-19.444	0.013	0.017
603_Mean_OPUS–5039	-1336.475	-3445.568	-19.413	0.013	0.017
603_Mean_OPUS–5040	-1321.827	-3442.687	-19.409	0.012	0.016

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5041	-1309.704	-3454.94	-19.394	0.012	0.016
603_Mean_OPUS–5042	-1312.02	-3464.9	-19.539	0.012	0.016
603_Mean_OPUS–5043	-1324.833	-3463.467	-19.44	0.012	0.016
603_Mean_OPUS–5044	-1136.211	-3623.722	-21.98	0.011	0.013
603_Mean_OPUS–5045	-1138.433	-3622.075	-21.961	0.011	0.013
603_Mean_OPUS–5046	-1137.061	-3626.602	-21.982	0.011	0.013
603_Mean_OPUS–5047	-1127.568	-3622.953	-22.216	0.011	0.013
603_Mean_OPUS–5048	-1129.579	-3622.894	-22.237	0.011	0.013
603_Mean_OPUS–5049	-1128.093	-3619.089	-22.294	0.011	0.013
603_Mean_OPUS–5050	-1126.715	-3619.856	-22.364	0.011	0.013
603_Mean_OPUS–5051	-1122.438	-3617.869	-22.393	0.011	0.013
603_Mean_OPUS–5052	-1123.324	-3613.781	-22.462	0.012	0.014
603_Mean_OPUS–5053	-1118.008	-3614.809	-22.423	0.011	0.013
603_Mean_OPUS–5054	-1121.164	-3618.711	-22.42	0.011	0.013
603_Mean_OPUS–5055	-1118.112	-3621.759	-22.807	0.011	0.013
603_Mean_OPUS–5056	-1115.78	-3624.3	-23.326	0.011	0.013
603_Mean_OPUS–5057	-1116.777	-3626.413	-23.349	0.014	0.016
603_Mean_OPUS–5058	-1121.215	-3628.61	-23.183	0.011	0.013
603_Mean_OPUS–5059	-1120.948	-3633.823	-23.166	0.011	0.013
603_Mean_OPUS–5060	-1118.101	-3633.473	-23.25	0.011	0.013
603_Mean_OPUS–5061	-1118.076	-3630.257	-23.19	0.011	0.013
603_Mean_OPUS–5062	-1116.153	-3627.365	-23.394	0.011	0.013
603_Mean_OPUS–5063	-1114.449	-3626.483	-23.407	0.011	0.013
603_Mean_OPUS–5064	-1111.087	-3626.506	-23.466	0.012	0.014
603_Mean_OPUS–5065	-1106.492	-3626.128	-23.777	0.012	0.014
603_Mean_OPUS–5066	-1102.805	-3624.455	-24.138	0.011	0.012

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5067	-1096.092	-3617.693	-24.241	0.011	0.012
603_Mean_OPUS–5068	-1114.508	-3616.996	-22.537	0.011	0.012
603_Mean_OPUS–5069	-1106.543	-3618.406	-24.148	0.011	0.012
603_Mean_OPUS–5070	-1098.799	-3615.287	-24.127	0.011	0.012
603_Mean_OPUS–5071	-1115.421	-3617.635	-22.482	0.011	0.012
603_Mean_OPUS–5072	-1116.27	-3620.644	-22.975	0.011	0.012
603_Mean_OPUS–5073	-1114.4	-3623.729	-23.441	0.011	0.012
603_Mean_OPUS–5074	-1111.307	-3625.126	-23.438	0.011	0.012
603_Mean_OPUS–5075	-1106.867	-3625.262	-23.858	0.011	0.012
603_Mean_OPUS–5076	-1106.827	-3620.298	-24.107	0.011	0.012
603_Mean_OPUS–5077	-1086.819	-3611.26	-24.716	0.01	0.011
603_Mean_OPUS–5078	-1077.356	-3612.344	-24.844	0.01	0.011
603_Mean_OPUS–5079	-1069.345	-3611.635	-25.117	0.011	0.012
603_Mean_OPUS–5080	-1061.414	-3611.136	-25.472	0.011	0.012
603_Mean_OPUS–5081	-1059.247	-3609.097	-25.485	0.011	0.012
603_Mean_OPUS–5082	-1058.097	-3604.481	-25.537	0.011	0.013
603_Mean_OPUS–5083	-1055.7	-3600.536	-25.557	0.011	0.013
603_Mean_OPUS–5084	-1038.943	-3596.017	-26.196	0.011	0.013
603_Mean_OPUS–5085	-1030.01	-3598.582	-26.898	0.011	0.013
603_Mean_OPUS–5086	-1017.539	-3591.352	-27.273	0.011	0.013
603_Mean_OPUS–5087	-1013.945	-3588.356	-27.487	0.011	0.013
603_Mean_OPUS–5088	-1011.797	-3586.312	-27.731	0.011	0.013
603_Mean_OPUS–5089	-1009.107	-3584.365	-27.968	0.011	0.013
603_Mean_OPUS–5090	-1004.523	-3588.091	-28.153	0.011	0.013
603_Mean_OPUS–5091	-995.181	-3588.872	-28.748	0.011	0.013
603_Mean_OPUS–5092	-996.649	-3611.306	-29.003	0.011	0.013

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5093	-998.238	-3612.534	-29.046	0.011	0.013
603_Mean_OPUS–5094	-997.69	-3614.035	-29.073	0.011	0.013
603_Mean_OPUS–5095	-995.77	-3613.47	-29.094	0.011	0.013
603_Mean_OPUS–5096	-989.631	-3590.565	-29.6	0.011	0.013
603_Mean_OPUS–5097	-984.856	-3593.787	-29.998	0.011	0.013
603_Mean_OPUS–5098	-983.498	-3598.726	-30.14	0.011	0.013
603_Mean_OPUS–5099	-977.198	-3606.788	-30.209	0.011	0.013
603_Mean_OPUS–5100	-969.449	-3603.688	-30.282	0.012	0.013
603_Mean_OPUS–5101	-961.904	-3602.186	-30.275	0.011	0.013
603_Mean_OPUS–5102	-954.441	-3599.272	-30.505	0.011	0.013
603_Mean_OPUS–5103	-947.001	-3598.69	-30.738	0.011	0.013
603_Mean_OPUS–5104	-938.545	-3591.828	-30.858	0.011	0.013
603_Mean_OPUS–5105	-938.391	-3588.714	-30.897	0.011	0.013
603_Mean_OPUS–5106	-937.009	-3586.514	-30.891	0.011	0.013
603_Mean_OPUS–5107	-928.999	-3580.431	-30.919	0.011	0.013
603_Mean_OPUS–5108	-927.785	-3574.427	-30.921	0.011	0.013
603_Mean_OPUS–5109	-928.915	-3570.71	-31.052	0.011	0.013
603_Mean_OPUS–5110	-922.907	-3566.682	-31.391	0.011	0.013
603_Mean_OPUS–5111	-916.159	-3565.391	-31.579	0.011	0.013
603_Mean_OPUS–5112	-909.059	-3560.881	-32.198	0.011	0.013
603_Mean_OPUS–5113	-896.37	-3555.103	-32.389	0.012	0.014
603_Mean_OPUS–5114	-1668.888	-2836.194	-4.12	0.012	0.014
603_Mean_OPUS–5115	7124.517	10.174	-72.321	0.012	0.015
603_Mean_OPUS–5116	-893.294	-3548.971	-32.301	0.018	0.033
603_Mean_OPUS–5117	-883.178	-3545.074	-32.559	0.012	0.015
603_Mean_OPUS–5118	-868.317	-3541.973	-32.785	0.012	0.013

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5119	-852.188	-3550.366	-33.011	0.012	0.014
603_Mean_OPUS–5120	-844.77	-3560.172	-33.122	0.012	0.014
603_Mean_OPUS–5121	-826.66	-3558.889	-33.141	0.012	0.014
603_Mean_OPUS–5122	-811.723	-3561.067	-33.122	0.012	0.014
603_Mean_OPUS–5123	-798.926	-3567.485	-33.014	0.013	0.015
603_Mean_OPUS–5124	-792.081	-3568.802	-33.128	0.012	0.014
603_Mean_OPUS–5125	-784.577	-3564.061	-33.001	0.012	0.014
603_Mean_OPUS–5126	-782.6	-3555.208	-32.996	0.013	0.015
603_Mean_OPUS–5127	-792.788	-3551.667	-33.039	0.013	0.015
603_Mean_OPUS–5128	-791.775	-3547.733	-33.049	0.013	0.015
603_Mean_OPUS–5129	-787.568	-3547.375	-33.035	0.012	0.014
603_Mean_OPUS–5130	-786.327	-3541.551	-33.054	0.012	0.014
603_Mean_OPUS–5131	-787.77	-3535.988	-33.03	0.012	0.014
603_Mean_OPUS–5132	-785.543	-3534.229	-33	0.012	0.014
603_Mean_OPUS–5133	-779.413	-3532.076	-33.074	0.013	0.015
603_Mean_OPUS–5134	-772.263	-3528.826	-33.033	0.012	0.014
603_Mean_OPUS–5135	-763.068	-3527.799	-33.069	0.012	0.014
603_Mean_OPUS–5136	-752.951	-3535.587	-33.097	0.012	0.014
603_Mean_OPUS–5137	-734.735	-3530.684	-33.137	0.013	0.015
603_Mean_OPUS–5138	-715.503	-3523.07	-33.088	0.012	0.014
603_Mean_OPUS–5139	-699.348	-3509.587	-33.066	0.012	0.014
603_Mean_OPUS–5140	-697.006	-3496.828	-33.018	0.012	0.014
603_Mean_OPUS–5141	-693.108	-3492.287	-33.076	0.013	0.015
603_Mean_OPUS–5142	-683.219	-3486.761	-33.131	0.012	0.014
603_Mean_OPUS–5143	-676.213	-3486.77	-33.283	0.012	0.014
603_Mean_OPUS–5144	-671.045	-3490.762	-33.266	0.012	0.015

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5145	-666.97	-3489.181	-33.272	0.012	0.014
603_Mean_OPUS–5146	-658.941	-3485.506	-33.668	0.012	0.014
603_Mean_OPUS–5147	-649.812	-3483.815	-33.81	0.013	0.015
603_Mean_OPUS–5148	-638.075	-3492.344	-33.822	0.012	0.014
603_Mean_OPUS–5149	-622.415	-3497.149	-33.815	0.013	0.015
603_Mean_OPUS–5150	-610.348	-3490.814	-33.822	0.012	0.015
603_Mean_OPUS–5151	-602.534	-3474.776	-33.771	0.013	0.015
603_Mean_OPUS–5152	-593.093	-3471.612	-33.832	0.012	0.015
603_Mean_OPUS–5153	-591.393	-3467.056	-33.873	0.012	0.014
603_Mean_OPUS–5154	-570.064	-3471.118	-33.996	0.012	0.015
603_Mean_OPUS–5155	-576.138	-3476.597	-34.001	0.012	0.014
603_Mean_OPUS–5156	-580.907	-3473.834	-33.962	0.012	0.014
603_Mean_OPUS–5157	-578.96	-3467.721	-33.988	0.012	0.014
603_Mean_OPUS–5158	-572.755	-3466.313	-34.02	0.012	0.014
603_Mean_OPUS–5159	-541.862	-3470.672	-34.61	0.011	0.014
603_Mean_OPUS–5160	-540.416	-3473.298	-34.532	0.011	0.014
603_Mean_OPUS–5161	-527.058	-3467.105	-35.244	0.011	0.014
603_Mean_OPUS–5162	-515.909	-3459.041	-35.4	0.011	0.014
603_Mean_OPUS–5163	-507.494	-3451.465	-35.547	0.012	0.015
603_Mean_OPUS–5164	-500.96	-3455.601	-35.574	0.012	0.014
603_Mean_OPUS–5165	-496.568	-3453.221	-35.615	0.011	0.014
603_Mean_OPUS–5166	-494.836	-3447.873	-35.664	0.011	0.014
603_Mean_OPUS–5167	-486.092	-3442.67	-35.777	0.011	0.014
603_Mean_OPUS–5168	-471.822	-3438.634	-35.92	0.012	0.014
603_Mean_OPUS–5169	-455.168	-3435.699	-36.038	0.012	0.014
603_Mean_OPUS–5170	-440.391	-3430.205	-36.136	0.011	0.014

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5171	-422.601	-3426.317	-36.449	0.011	0.014
603_Mean_OPUS–5172	-415.157	-3428.295	-36.589	0.011	0.014
603_Mean_OPUS–5173	-408.389	-3435.581	-36.66	0.011	0.013
603_Mean_OPUS–5174	-397.247	-3440.28	-36.731	0.011	0.014
603_Mean_OPUS–5175	-383.062	-3438.459	-36.756	0.011	0.014
603_Mean_OPUS–5176	-368.652	-3437.723	-36.871	0.011	0.014
603_Mean_OPUS–5177	-359.101	-3435.68	-36.871	0.011	0.013
603_Mean_OPUS–5178	-352.722	-3425.116	-36.934	0.011	0.013
603_Mean_OPUS–5179	-353.729	-3415.606	-36.984	0.011	0.013
603_Mean_OPUS–5180	-351.901	-3411.644	-36.973	0.011	0.014
603_Mean_OPUS–5181	-342.324	-3407.827	-37.086	0.011	0.013
603_Mean_OPUS–5182	-332.642	-3406.631	-37.142	0.011	0.014
603_Mean_OPUS–5183	-321.416	-3407.434	-37.249	0.011	0.013
603_Mean_OPUS–5184	-312.29	-3408.045	-37.331	0.011	0.013
603_Mean_OPUS–5185	-299.807	-3407.026	-37.326	0.011	0.013
603_Mean_OPUS–5186	-292.541	-3408.949	-37.334	0.011	0.013
603_Mean_OPUS–5187	-283.989	-3406.689	-37.375	0.011	0.014
603_Mean_OPUS–5188	-277.513	-3396.896	-37.397	0.011	0.013
603_Mean_OPUS–5189	-273.193	-3390.276	-37.438	0.011	0.013
603_Mean_OPUS–5190	-267.543	-3390.163	-37.458	0.011	0.014
603_Mean_OPUS–5191	-258.204	-3395.315	-37.431	0.011	0.013
603_Mean_OPUS–5192	-242.132	-3392.601	-37.468	0.011	0.013
603_Mean_OPUS–5193	-230.162	-3393.512	-37.717	0.011	0.013
603_Mean_OPUS–5194	-219.737	-3382.721	-37.978	0.011	0.013
603_Mean_OPUS–5195	-208.177	-3386.801	-37.959	0.011	0.014
603_Mean_OPUS–5196	-199.211	-3394.276	-38.099	0.011	0.014

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5200	-154.486	-3391.835	-38.739	0.011	0.014
603_Mean_OPUS–5201	-147.566	-3397.81	-39.158	0.011	0.013
603_Mean_OPUS–5202	-147.443	-3400.386	-39.23	0.011	0.013
603_Mean_OPUS–5203	-145.248	-3405.768	-39.128	0.011	0.013
603_Mean_OPUS–5204	-139.293	-3403.147	-39.258	0.011	0.013
603_Mean_OPUS–5205	-136.156	-3398.004	-39.158	0.011	0.013
603_Mean_OPUS–5206	-131.886	-3396	-39.171	0.01	0.013
603_Mean_OPUS–5207	-128.426	-3400.179	-39.203	0.01	0.013
603_Mean_OPUS–5208	-124.775	-3405.059	-39.235	0.011	0.013
603_Mean_OPUS–5209	-129.204	-3417.298	-39.191	0.01	0.013
603_Mean_OPUS–5210	-129.915	-3436.061	-39.19	0.011	0.014
603_Mean_OPUS–5211	-126.13	-3454.833	-39.266	0.01	0.013
603_Mean_OPUS–5212	-129.436	-3477.167	-39.302	0.011	0.013
603_Mean_OPUS–5213	-124.746	-3478.003	-39.363	0.011	0.013
603_Mean_OPUS–5214	-123.263	-3455.612	-39.32	0.01	0.013
603_Mean_OPUS–5215	-121.545	-3437.907	-39.267	0.01	0.013
603_Mean_OPUS–5216	-117.155	-3419.169	-39.192	0.01	0.012
603_Mean_OPUS–5217	-113.139	-3401.519	-39.276	0.01	0.012
603_Mean_OPUS–5218	-116.661	-3391.81	-39.181	0.011	0.013
603_Mean_OPUS–5219	-117.414	-3381.691	-39.181	0.011	0.013
603_Mean_OPUS–5220	-114.586	-3368.255	-39.2	0.01	0.012
603_Mean_OPUS–5221	-113.192	-3360.555	-39.225	0.01	0.012
603_Mean_OPUS–5222	-108.652	-3339.991	-39.207	0.011	0.013
603_Mean_OPUS–5223	-108.133	-3332.361	-39.217	0.016	0.019
603_Mean_OPUS–5224	-93.92	-3322.583	-39.213	0.011	0.013
603_Mean_OPUS–5225	-85.385	-3309.439	-39.2	0.011	0.013

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5226	-84.881	-3298.043	-39.203	0.01	0.012
603_Mean_OPUS–5227	-88.4	-3283.739	-39.082	0.01	0.012
603_Mean_OPUS–5228	3350.133	-4989.823	-47.442	0.011	0.014
603_Mean_OPUS–5229	-140.136	-2330.62	-24.661	0.013	0.019
603_Mean_OPUS–5230	-140.118	-2330.642	-24.673	0.012	0.015
603_Mean_OPUS–5231	-140.091	-2330.627	-25.209	0.014	0.022
603_Mean_OPUS–5232	506.914	-838.4	2.074	0.011	0.015
603_Mean_OPUS–5232_5233_stk	630.599	-815.911	1.849	0.012	0.015
603_Mean_OPUS–5232_5233_stk1	630.591	-815.941	1.811	0.011	0.014
603_Mean_OPUS–5233	604.423	-820.613	2.32	0.011	0.015
603_Mean_OPUS–5234	615.036	-818.699	2.386	0.011	0.014
603_Mean_OPUS–5235	625.476	-816.706	1.912	0.012	0.015
603_Mean_OPUS–5236	634.523	-815.115	1.83	0.011	0.014
603_Mean_OPUS–5237	644.097	-813.271	1.143	0.011	0.014
603_Mean_OPUS–5238	654.637	-811.633	0.355	0.011	0.014
603_Mean_OPUS–5239	664.759	-809.672	0.146	0.011	0.014
603_Mean_OPUS–5240	685.87	-805.79	-0.94	0.011	0.014
603_Mean_OPUS–5241	708.22	-801.644	-2.484	0.011	0.014
603_Mean_OPUS–5242	729.892	-797.719	-4.673	0.011	0.014
603_Mean_OPUS–5243	751.571	-793.769	-7.297	0.011	0.014
603_Mean_OPUS–5244	770.781	-790.187	-10.408	0.01	0.013
603_Mean_OPUS–5245	791.077	-786.605	-13.873	0.011	0.014
603_Mean_OPUS–5246	813.044	-782.532	-16.252	0.01	0.012
603_Mean_OPUS–5247	829.963	-779.51	-18.694	0.01	0.013
603_Mean_OPUS–5248	852.783	-775.149	-20.803	0.011	0.013
603_Mean_OPUS–5249	876.618	-770.98	-22.089	0.01	0.013

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5250	899.881	-766.641	-22.778	0.011	0.014
603_Mean_OPUS–5251	925.072	-762.072	-23.958	0.011	0.014
603_Mean_OPUS–5252	601.315	-821.235	1.989	0.011	0.014
603_Mean_OPUS–5253	598.823	-821.663	1.518	0.01	0.013
603_Mean_OPUS–5254	595.964	-822.138	1.631	0.01	0.013
603_Mean_OPUS–5255	593.708	-822.62	1.838	0.011	0.014
603_Mean_OPUS–5256	590.281	-823.222	2.198	0.01	0.013
603_Mean_OPUS–5257	586.89	-823.736	2.323	0.01	0.013
603_Mean_OPUS–5258	584.475	-824.284	2.341	0.011	0.014
603_Mean_OPUS–5259	581.257	-824.855	2.113	0.011	0.014
603_Mean_OPUS–5260	577.808	-825.433	2.273	0.01	0.013
603_Mean_OPUS–5261	574.198	-826.112	2.648	0.01	0.013
603_Mean_OPUS–5262	569.458	-827.021	2.972	0.01	0.013
603_Mean_OPUS–5263	565.521	-827.744	2.967	0.011	0.014
603_Mean_OPUS–5264	561.238	-828.492	2.932	0.01	0.013
603_Mean_OPUS–5265	556.253	-829.325	2.835	0.011	0.014
603_Mean_OPUS–5266	552.553	-830.176	2.847	0.01	0.013
603_Mean_OPUS–5267	549.336	-830.645	2.63	0.011	0.013
603_Mean_OPUS–5268	545.978	-831.319	2.555	0.011	0.014
603_Mean_OPUS–5269	542.655	-831.831	2.213	0.011	0.013
603_Mean_OPUS–5270	539.891	-832.282	1.676	0.011	0.014
603_Mean_OPUS–5271	536.727	-832.942	1.654	0.011	0.013
603_Mean_OPUS–5272	533.832	-833.472	1.687	0.011	0.014
603_Mean_OPUS–5273	530.667	-834.044	1.684	0.011	0.014
603_Mean_OPUS–5274	527.881	-834.627	1.643	0.011	0.013
603_Mean_OPUS–5275	524.829	-835.074	1.654	0.011	0.013

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5276	521.061	-835.772	1.582	0.011	0.013
603_Mean_OPUS–5277	518.21	-836.368	1.502	0.011	0.013
603_Mean_OPUS–5278	518.127	-836.464	1.487	0.01	0.012
603_Mean_OPUS–5279	514.338	-836.991	1.545	0.011	0.013
603_Mean_OPUS–5280	510.705	-837.78	1.921	0.01	0.012
603_Mean_OPUS–5281	503.733	-839.062	2.008	0.01	0.012
603_Mean_OPUS–5282	496.179	-840.36	1.854	0.01	0.012
603_Mean_OPUS–5283	491.344	-841.387	1.65	0.01	0.012
603_Mean_OPUS–5284	486.28	-842.209	1.57	0.01	0.012
603_Mean_OPUS–5285	481.286	-843.12	1.343	0.011	0.013
603_Mean_OPUS–5286	476.368	-843.969	1.345	0.011	0.013
603_Mean_OPUS–5287	466.517	-845.526	1.224	0.01	0.012
603_Mean_OPUS–5288	457.012	-847.581	1.091	0.01	0.012
603_Mean_OPUS–5289	447.18	-849.422	0.765	0.01	0.012
603_Mean_OPUS–5290	437.043	-851.066	0.377	0.01	0.012
603_Mean_OPUS–5291	427.206	-852.971	0.126	0.01	0.012
603_Mean_OPUS–5292	417.61	-854.683	-0.474	0.01	0.012
603_Mean_OPUS–5293	407.073	-856.46	-0.775	0.011	0.013
603_Mean_OPUS–5294	397.24	-858.546	-1.365	0.01	0.012
603_Mean_OPUS–5295	388.029	-860.125	-1.967	0.011	0.013
603_Mean_OPUS–5296	377.459	-862.228	-2.512	0.01	0.012
603_Mean_OPUS–5297	366.819	-863.948	-2.933	0.01	0.012
603_Mean_OPUS–5298	358.14	-865.593	-3.031	0.011	0.013
603_Mean_OPUS–5299	347.881	-867.476	-3.257	0.01	0.012
603_Mean_OPUS–5300	338.572	-869.075	-3.535	0.01	0.013
603_Mean_OPUS–5301	328.559	-870.886	-3.965	0.012	0.014

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5302	318.972	-872.599	-4.232	0.018	0.022
603_Mean_OPUS–5303	308.531	-874.505	-4.763	0.012	0.014
603_Mean_OPUS–5304	299.138	-876.278	-5.507	0.012	0.014
603_Mean_OPUS–5305	290.156	-878.014	-6.093	0.014	0.016
603_Mean_OPUS–5306	286.724	-878.37	-6.916	0.014	0.016
603_Mean_OPUS–5307	282.31	-879.235	-6.53	0.013	0.016
603_Mean_OPUS–5308	269.633	-881.804	-6.671	0.016	0.019
603_Mean_OPUS–5309	255.537	-884.151	-7.541	0.01	0.012
603_Mean_OPUS–5310	250.737	-884.968	-8.778	0.031	0.036
603_Mean_OPUS–5311	237.524	-887.531	-9.737	0.017	0.021
603_Mean_OPUS–5312	231.955	-888.55	-10.347	0.015	0.018
603_Mean_OPUS–5313	215.913	-891.446	-13.164	0.015	0.018
603_Mean_OPUS–5314	543.099	-774.945	2.292	0.017	0.02
603_Mean_OPUS–5315	504.358	-912.197	0.967	0.02	0.023
603_Mean_OPUS–5316	439.097	-1143.861	-17.05	0.017	0.02
603_Mean_OPUS–5317	446.208	-1117.791	-15.748	0.016	0.018
603_Mean_OPUS–5318	451.824	-1097.952	-13.93	0.019	0.021
603_Mean_OPUS–5319	456.696	-1081.249	-12.024	0.013	0.015
603_Mean_OPUS–5320	460.269	-1068.298	-8.749	0.025	0.029
603_Mean_OPUS–5321	464.984	-1051.653	-5.734	0.011	0.013
603_Mean_OPUS–5322	470.133	-1033.431	-4.054	0.014	0.016
603_Mean_OPUS–5323	476.663	-1010.226	-2.732	0.01	0.012
603_Mean_OPUS–5324	482.888	-988.18	-1.944	0.011	0.013
603_Mean_OPUS–5325	489.632	-963.802	-0.561	0.011	0.014
603_Mean_OPUS–5326	495.801	-942.017	0.168	0.011	0.014
603_Mean_OPUS–5327	501.546	-921.991	0.776	0.011	0.014

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5328	506.951	-903.218	1.222	0.011	0.014
603_Mean_OPUS–5329	510.193	-891.369	1.518	0.011	0.014
603_Mean_OPUS–5330	511.234	-887.334	1.596	0.011	0.014
603_Mean_OPUS–5331	512.212	-883.98	1.494	0.011	0.014
603_Mean_OPUS–5332	513.373	-880.365	1.329	0.011	0.014
603_Mean_OPUS–5333	514.286	-877.006	1.196	0.011	0.014
603_Mean_OPUS–5334	515.734	-872.328	1.348	0.011	0.014
603_Mean_OPUS–5335	516.828	-868.2	1.627	0.011	0.014
603_Mean_OPUS–5336	517.918	-864.386	1.821	0.011	0.014
603_Mean_OPUS–5337	519.113	-859.662	1.9	0.011	0.014
603_Mean_OPUS–5338	520.326	-855.685	1.992	0.011	0.014
603_Mean_OPUS–5339	521.489	-850.71	2.118	0.012	0.015
603_Mean_OPUS–5340	522.862	-846.673	1.98	0.012	0.015
603_Mean_OPUS–5341	523.946	-842.452	1.915	0.012	0.015
603_Mean_OPUS–5342	525.018	-838.81	1.718	0.012	0.015
603_Mean_OPUS–5343	526.164	-834.81	1.609	0.012	0.015
603_Mean_OPUS–5344	527.348	-830.977	1.512	0.012	0.015
603_Mean_OPUS–5345	528.441	-827.092	1.198	0.012	0.015
603_Mean_OPUS–5346	529.351	-823.585	1.019	0.012	0.015
603_Mean_OPUS–5347	530.312	-820.431	0.842	0.012	0.015
603_Mean_OPUS–5348	530.785	-818.386	0.918	0.012	0.015
603_Mean_OPUS–5349	531.861	-814.938	1.33	0.012	0.015
603_Mean_OPUS–5350	532.894	-811.538	1.714	0.012	0.015
603_Mean_OPUS–5351	534.822	-804.32	1.976	0.013	0.015
603_Mean_OPUS–5352	538.281	-792.012	2.329	0.013	0.015
603_Mean_OPUS–5353	542.224	-777.718	2.247	0.013	0.015

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5354	546.198	-764.051	2.134	0.013	0.016
603_Mean_OPUS–5355	552.259	-743.303	1.688	0.013	0.016
603_Mean_OPUS–5356	558.014	-721.759	0.963	0.013	0.015
603_Mean_OPUS–5357	564.233	-700.004	0.024	0.013	0.015
603_Mean_OPUS–5358	570.755	-677.573	-1.477	0.013	0.015
603_Mean_OPUS–5359	576.733	-655.342	-2.313	0.013	0.015
603_Mean_OPUS–5360	582.882	-633.867	-3.518	0.013	0.015
603_Mean_OPUS–5361	589.89	-608.93	-4.827	0.013	0.016
603_Mean_OPUS–5362	596.388	-585.831	-6.414	0.012	0.015
603_Mean_OPUS–5363	602.503	-563.992	-8.096	0.012	0.015
603_Mean_OPUS–5364	608.605	-542.844	-10.108	0.012	0.015
603_Mean_OPUS–5365	614.481	-521.847	-11.841	0.012	0.015
603_Mean_OPUS–5366	620.72	-500.357	-13.026	0.012	0.015
603_Mean_OPUS–5367	626.885	-478.026	-14.166	0.012	0.015
603_Mean_OPUS–5368	632.694	-457.327	-15.529	0.012	0.015
603_Mean_OPUS–5369	639.717	-431.904	-15.818	0.013	0.016
603_Mean_OPUS–5370	647.109	-406.864	-17.316	0.013	0.016
603_Mean_OPUS–5371	654.143	-380.8	-22.46	0.013	0.017
603_Mean_OPUS–5372	662.063	-353.325	-24.391	0.014	0.017
603_Mean_OPUS–5373	669.939	-326.094	-24.942	0.011	0.012
603_Mean_OPUS–5374	-1625.326	-3703.424	-15.03	0.015	0.019
603_Mean_OPUS–5375	-1623.252	-3701.802	-15.089	0.011	0.014
603_Mean_OPUS–5376	-1621.225	-3697.62	-15.111	0.016	0.02
603_Mean_OPUS–5377	-1618.409	-3694.915	-15.128	0.013	0.017
603_Mean_OPUS–5378	-1612.648	-3694.572	-15.16	0.014	0.018
603_Mean_OPUS–5379	-1607.466	-3691.477	-15.081	0.015	0.019

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–5380	-1608.29	-3686.173	-15.136	0.012	0.015
603_Mean_OPUS–5381	-1614.763	-3685.498	-15.135	0.021	0.027
603_Mean_OPUS–5382	-1622.173	-3683.406	-15.052	0.013	0.016
603_Mean_OPUS–5383	-1626.028	-3684.226	-15.055	0.012	0.015
603_Mean_OPUS–5384	-1628.782	-3684.29	-15.065	0.013	0.016
603_Mean_OPUS–5385	-1630.428	-3692.149	-15.087	0.012	0.016
603_Mean_OPUS–5386	-1629.398	-3700.688	-15.078	0.011	0.014
603_Mean_OPUS–5387	-1668.821	-2836.202	-3.62	0.011	0.014
603_Mean_OPUS–5388	-1504.675	-2524.669	-13.137	0.019	0.022
603_Mean_OPUS–5389	-1735.662	-2427.654	-5.219	0.018	0.021
603_Mean_OPUS–5390	-1612.01	-2226.704	-12.463	0.032	0.037
603_Mean_OPUS–5391	702.114	-1018.341	-4.598	0.011	0.014
603_Mean_OPUS–10001	3350.135	-4989.832	-48.6	0.014	0.018
603_Mean_OPUS–10002	-1668.861	-2836.209	-4.316	0.012	0.015
603_Mean_OPUS–10003	-140.134	-2330.633	-25.053	0.011	0.013
603_Mean_OPUS–10004	7124.543	10.184	-71.793	0.011	0.013
603_Mean_OPUS–10005	-1661.034	-3276.737	-12.915	0.013	0.015
603_Mean_OPUS–10006	-1657.122	-3269.846	-12.931	0.012	0.015
603_Mean_OPUS–10007	-1645.964	-3263.625	-12.926	0.012	0.015
603_Mean_OPUS–10008	-1634.485	-3253.804	-12.934	0.012	0.015
603_Mean_OPUS–10009	-1624.055	-3247.82	-12.887	0.012	0.015
603_Mean_OPUS–10010	-1622.199	-3252.381	-12.964	0.013	0.016
603_Mean_OPUS–10011	-1623.731	-3263.992	-12.894	0.012	0.015
603_Mean_OPUS–10012	-1622.833	-3269.279	-12.925	0.012	0.015
603_Mean_OPUS–10013	-1617.634	-3278.867	-12.914	0.012	0.015
603_Mean_OPUS–10014	-1617.386	-3285.995	-12.923	0.012	0.015

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10015	-1619.42	-3292.673	-12.951	0.013	0.016
603_Mean_OPUS–10016	-1615.483	-3295.377	-12.951	0.014	0.017
603_Mean_OPUS–10017	-1615.683	-3297.224	-12.915	0.013	0.016
603_Mean_OPUS–10018	-1622.362	-3299.737	-12.922	0.013	0.016
603_Mean_OPUS–10019	-1627.769	-3309.44	-12.94	0.012	0.015
603_Mean_OPUS–10020	-1635.502	-3313.371	-12.979	0.012	0.015
603_Mean_OPUS–10021	-1643.592	-3311.489	-12.994	0.013	0.016
603_Mean_OPUS–10022	-1645.98	-3308.165	-12.93	0.012	0.015
603_Mean_OPUS–10023	-1649.839	-3308.128	-12.937	0.012	0.015
603_Mean_OPUS–10024	-1652.912	-3295.855	-12.916	0.012	0.015
603_Mean_OPUS–10025	-1658.78	-3281.295	-12.953	0.012	0.015
603_Mean_OPUS–10026	-1660.838	-3279.023	-12.909	0.012	0.015
603_Mean_OPUS–10027	-1595.402	-3437.118	-15.631	0.013	0.016
603_Mean_OPUS–10028	-1588.859	-3431.576	-15.703	0.012	0.015
603_Mean_OPUS–10029	-1584.079	-3424.028	-15.625	0.016	0.02
603_Mean_OPUS–10030	-1579.093	-3417.445	-15.682	0.013	0.016
603_Mean_OPUS–10031	-1573.492	-3409.31	-15.689	0.012	0.015
603_Mean_OPUS–10032	-1570.5	-3406.814	-15.65	0.013	0.016
603_Mean_OPUS–10033	-1567.963	-3408.87	-15.696	0.013	0.016
603_Mean_OPUS–10034	-1576.582	-3423.122	-15.671	0.012	0.015
603_Mean_OPUS–10035	-1577.786	-3437.177	-15.698	0.013	0.016
603_Mean_OPUS–10036	-1573.999	-3452.214	-15.655	0.013	0.017
603_Mean_OPUS–10037	-1572.664	-3457.225	-15.629	0.013	0.017
603_Mean_OPUS–10038	-1558.441	-3457.64	-15.613	0.013	0.017
603_Mean_OPUS–10039	-1550.193	-3459.947	-15.65	0.013	0.017
603_Mean_OPUS–10040	-1539.644	-3469.363	-15.656	0.013	0.017

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10041	-1532.924	-3478.339	-15.684	0.013	0.017
603_Mean_OPUS–10042	-1539.862	-3491.02	-15.659	0.013	0.016
603_Mean_OPUS–10043	-1547.136	-3499.174	-15.651	0.013	0.016
603_Mean_OPUS–10044	-1556.157	-3508.969	-15.619	0.013	0.017
603_Mean_OPUS–10045	-1568.957	-3505.493	-15.654	0.013	0.016
603_Mean_OPUS–10046	-1578.186	-3495.24	-15.622	0.012	0.016
603_Mean_OPUS–10047	-1593.795	-3494.811	-15.617	0.012	0.016
603_Mean_OPUS–10048	-1594.443	-3492.133	-15.565	0.013	0.017
603_Mean_OPUS–10049	-1585.288	-3488.322	-15.674	0.013	0.017
603_Mean_OPUS–10050	-1587.066	-3475.778	-15.723	0.013	0.017
603_Mean_OPUS–10051	-1596.854	-3473.996	-15.67	0.013	0.016
603_Mean_OPUS–10052	-1598.277	-3469.357	-15.638	0.012	0.016
603_Mean_OPUS–10053	-1604.162	-3470.854	-15.468	0.012	0.016
603_Mean_OPUS–10054	-1605.963	-3456.212	-15.511	0.012	0.016
603_Mean_OPUS–10055	-1606.169	-3443.918	-15.339	0.012	0.016
603_Mean_OPUS–10056	-1606.532	-3443.623	-15.239	0.011	0.015
603_Mean_OPUS–10057	-1601.155	-3442.741	-15.616	0.012	0.015
603_Mean_OPUS–10058	-1596.063	-3438.252	-15.647	0.011	0.014
603_Mean_OPUS–10059	-1508.037	-3817.532	-15.444	0.012	0.016
603_Mean_OPUS–10060	-1505.226	-3820.266	-15.425	0.012	0.016
603_Mean_OPUS–10061	-1508.241	-3826.832	-15.41	0.013	0.017
603_Mean_OPUS–10062	-1516.276	-3827.623	-15.41	0.012	0.016
603_Mean_OPUS–10063	-1518	-3819.073	-15.494	0.013	0.017
603_Mean_OPUS–10064	-1513.218	-3816.486	-15.439	0.012	0.016
603_Mean_OPUS–10065	-1252.711	-3626.835	-19.31	0.013	0.017
603_Mean_OPUS–10066	-1246.804	-3615.698	-19.313	0.012	0.016

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10067	-1239.338	-3608.136	-19.354	0.012	0.016
603_Mean_OPUS–10068	-1235.89	-3600.412	-19.444	0.013	0.017
603_Mean_OPUS–10069	-1227.622	-3593.644	-19.479	0.012	0.016
603_Mean_OPUS–10070	-1221.191	-3593.014	-19.423	0.013	0.017
603_Mean_OPUS–10071	-1220.343	-3596.484	-19.527	0.013	0.017
603_Mean_OPUS–10072	-1227.675	-3601.708	-19.456	0.012	0.016
603_Mean_OPUS–10073	-1234.205	-3612.971	-19.36	0.012	0.016
603_Mean_OPUS–10074	-1240.568	-3622.754	-19.401	0.013	0.017
603_Mean_OPUS–10075	-1248.054	-3629.952	-19.307	0.012	0.016
603_Mean_OPUS–10076	-1095	-3529.345	-22.227	0.012	0.016
603_Mean_OPUS–10077	-1095.891	-3529.895	-22.17	0.012	0.016
603_Mean_OPUS–10078	-1088.692	-3538.539	-24.491	0.013	0.017
603_Mean_OPUS–10079	-1089.295	-3540.074	-24.422	0.012	0.016
603_Mean_OPUS–10080	-1080.708	-3539.169	-24.579	0.013	0.017
603_Mean_OPUS–10081	-1080.181	-3537.301	-24.53	0.012	0.016
603_Mean_OPUS–10082	-1072.855	-3544.526	-24.607	0.012	0.016
603_Mean_OPUS–10083	-1071.479	-3542.492	-24.627	0.013	0.017
603_Mean_OPUS–10084	-1067.468	-3542.694	-24.709	0.012	0.016
603_Mean_OPUS–10085	-1063.97	-3543.001	-24.692	0.012	0.016
603_Mean_OPUS–10086	-1066.657	-3536.153	-24.817	0.012	0.016
603_Mean_OPUS–10087	-1069.779	-3532.503	-24.751	0.012	0.016
603_Mean_OPUS–10088	-1059.346	-3536.043	-25.054	0.012	0.016
603_Mean_OPUS–10089	-1056.669	-3538.969	-25.175	0.013	0.017
603_Mean_OPUS–10090	-1051.296	-3526.173	-25.808	0.012	0.016
603_Mean_OPUS–10091	-1052.888	-3524.668	-25.853	0.011	0.013
603_Mean_OPUS–10092	-1035.869	-3527.972	-26.639	0.012	0.014

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10093	-1035.568	-3525.125	-26.481	0.012	0.014
603_Mean_OPUS–10094	-1030.142	-3521.25	-26.511	0.011	0.013
603_Mean_OPUS–10095	-1026.356	-3520.903	-26.569	0.011	0.013
603_Mean_OPUS–10096	-1017.468	-3528.127	-26.648	0.012	0.014
603_Mean_OPUS–10097	-1028.893	-3524.659	-26.6	0.011	0.013
603_Mean_OPUS–10098	-1022.026	-3529.633	-26.621	0.012	0.014
603_Mean_OPUS–10099	-1005.955	-3528.461	-26.8	0.012	0.014
603_Mean_OPUS–10100	-1008.41	-3523.767	-26.735	0.012	0.014
603_Mean_OPUS–10101	-990.075	-3529.906	-27.791	0.013	0.016
603_Mean_OPUS–10102	-990.395	-3534.195	-27.845	0.011	0.013
603_Mean_OPUS–10103	-976.3	-3540.86	-28.295	0.012	0.014
603_Mean_OPUS–10104	-975.814	-3537.654	-28.307	0.011	0.013
603_Mean_OPUS–10105	-1087.623	-3609.921	-24.052	0.02	0.022
603_Mean_OPUS–10106	-1077.539	-3609.954	-24.214	0.01	0.011
603_Mean_OPUS–10107	-1070.205	-3609.147	-24.483	0.011	0.012
603_Mean_OPUS–10108	-1060.773	-3603.469	-24.811	0.011	0.012
603_Mean_OPUS–10109	-1057.279	-3597.628	-24.856	0.011	0.013
603_Mean_OPUS–10110	-1038.831	-3593.899	-25.486	0.011	0.013
603_Mean_OPUS–10111	-1030.179	-3596.425	-26.174	0.011	0.013
603_Mean_OPUS–10112	-1018.563	-3590.292	-26.575	0.011	0.013
603_Mean_OPUS–10113	-1015.136	-3587.233	-26.804	0.011	0.013
603_Mean_OPUS–10114	-1014.826	-3583.779	-27.11	0.011	0.013
603_Mean_OPUS–10115	-1009.48	-3581.967	-27.359	0.011	0.013
603_Mean_OPUS–10116	-1003.515	-3580.782	-27.431	0.011	0.013
603_Mean_OPUS–10117	-993.137	-3583.269	-28.121	0.011	0.013
603_Mean_OPUS–10118	-988.271	-3586.061	-28.839	0.011	0.013

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10119	-983.432	-3590.811	-29.3	0.011	0.013
603_Mean_OPUS–10120	-981.068	-3596.853	-29.571	0.011	0.013
603_Mean_OPUS–10121	-974.128	-3600.373	-29.593	0.012	0.013
603_Mean_OPUS–10122	-970.309	-3601.41	-29.637	0.011	0.013
603_Mean_OPUS–10123	-962.706	-3600.103	-29.656	0.012	0.013
603_Mean_OPUS–10124	-955.509	-3596.433	-29.729	0.011	0.013
603_Mean_OPUS–10125	-947.708	-3596.385	-30.035	0.011	0.013
603_Mean_OPUS–10126	-941.016	-3587.067	-30.174	0.011	0.013
603_Mean_OPUS–10127	-938.831	-3584.462	-30.209	0.011	0.013
603_Mean_OPUS–10128	-930.993	-3579.21	-30.233	0.011	0.013
603_Mean_OPUS–10129	-929.597	-3574.984	-30.237	0.011	0.013
603_Mean_OPUS–10130	-930.325	-3570.13	-30.298	0.011	0.013
603_Mean_OPUS–10131	-923.594	-3565.331	-30.648	0.013	0.015
603_Mean_OPUS–10132	-916.936	-3563.684	-30.984	0.011	0.013
603_Mean_OPUS–10133	-909.799	-3559.813	-31.501	0.012	0.014
603_Mean_OPUS–10134	-898.332	-3553.641	-31.627	0.011	0.013
603_Mean_OPUS–10135	-140.109	-2330.629	-25.071	0.011	0.013
603_Mean_OPUS–10136	7124.533	10.181	-72.282	0.011	0.014
603_Mean_OPUS–10137	-895.147	-3547.046	-31.603	0.012	0.015
603_Mean_OPUS–10138	-884.571	-3542.03	-31.9	0.012	0.015
603_Mean_OPUS–10139	-869.979	-3538.791	-32.055	0.013	0.014
603_Mean_OPUS–10140	-850.755	-3543.331	-32.205	0.012	0.014
603_Mean_OPUS–10141	-843.725	-3550.729	-32.261	0.013	0.014
603_Mean_OPUS–10142	-833.915	-3543.482	-32.313	0.013	0.015
603_Mean_OPUS–10143	-830.411	-3547.369	-32.312	0.012	0.014
603_Mean_OPUS–10144	-823.938	-3547.626	-32.474	0.013	0.015

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10145	-823.171	-3540.863	-32.429	0.013	0.015
603_Mean_OPUS–10146	-817.944	-3539.042	-32.3	0.012	0.014
603_Mean_OPUS–10147	-817.967	-3544.704	-32.334	0.012	0.014
603_Mean_OPUS–10148	-811.564	-3550.614	-32.434	0.012	0.014
603_Mean_OPUS–10149	-803.119	-3544.182	-32.421	0.012	0.014
603_Mean_OPUS–10150	-813.37	-3534.353	-32.349	0.012	0.014
603_Mean_OPUS–10151	-805.199	-3527.878	-32.253	0.012	0.014
603_Mean_OPUS–10152	-798.038	-3528.972	-32.292	0.013	0.015
603_Mean_OPUS–10153	-791.988	-3525.383	-32.441	0.012	0.014
603_Mean_OPUS–10154	-790.959	-3512.408	-32.426	0.012	0.014
603_Mean_OPUS–10155	-780.083	-3499.337	-32.307	0.012	0.014
603_Mean_OPUS–10156	-769.039	-3509.571	-32.344	0.012	0.014
603_Mean_OPUS–10157	-756.445	-3504.242	-32.373	0.012	0.014
603_Mean_OPUS–10158	-739.774	-3504.791	-32.366	0.012	0.014
603_Mean_OPUS–10159	-727.02	-3506.913	-32.392	0.012	0.014
603_Mean_OPUS–10160	-713.731	-3501.842	-32.304	0.012	0.014
603_Mean_OPUS–10161	-701.998	-3491.857	-32.34	0.012	0.014
603_Mean_OPUS–10162	-694.931	-3490.126	-32.357	0.013	0.015
603_Mean_OPUS–10163	-684.434	-3484.821	-32.43	0.012	0.014
603_Mean_OPUS–10164	-676.703	-3484.499	-32.548	0.013	0.015
603_Mean_OPUS–10165	-675.62	-3480.973	-32.583	0.012	0.014
603_Mean_OPUS–10166	-671.155	-3479.436	-32.546	0.012	0.014
603_Mean_OPUS–10167	-666.755	-3484.143	-32.554	0.013	0.015
603_Mean_OPUS–10168	-659.949	-3483.183	-32.947	0.012	0.014
603_Mean_OPUS–10169	-650.794	-3480.257	-33.12	0.013	0.015
603_Mean_OPUS–10170	-648.398	-3475.79	-33.166	0.012	0.014

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10171	-639.066	-3467.926	-33.143	0.013	0.015
603_Mean_OPUS–10172	-631.183	-3460.284	-33.164	0.012	0.015
603_Mean_OPUS–10173	-611.137	-3458.855	-33.199	0.012	0.015
603_Mean_OPUS–10174	-594.964	-3459.959	-33.099	0.012	0.014
603_Mean_OPUS–10175	-592.873	-3461.207	-33.164	0.012	0.014
603_Mean_OPUS–10176	-537.159	-3467.605	-34.297	0.012	0.014
603_Mean_OPUS–10177	-528.224	-3464.761	-34.559	0.012	0.014
603_Mean_OPUS–10178	-518.587	-3455.287	-34.779	0.012	0.014
603_Mean_OPUS–10179	-509.164	-3448.286	-34.883	0.011	0.014
603_Mean_OPUS–10180	-501.69	-3449.095	-34.898	0.011	0.014
603_Mean_OPUS–10181	-497.667	-3443.196	-34.908	0.012	0.014
603_Mean_OPUS–10182	-487.194	-3439.815	-35.186	0.011	0.014
603_Mean_OPUS–10183	-473.78	-3433.916	-35.251	0.011	0.014
603_Mean_OPUS–10184	-457.437	-3428.459	-35.351	0.012	0.014
603_Mean_OPUS–10185	-441.336	-3424.377	-35.428	0.012	0.014
603_Mean_OPUS–10186	-435.608	-3422.849	-35.642	0.011	0.014
603_Mean_OPUS–10187	-424.571	-3423.432	-35.747	0.011	0.013
603_Mean_OPUS–10188	-415.597	-3423.754	-35.899	0.011	0.013
603_Mean_OPUS–10189	-405.802	-3424.021	-35.906	0.011	0.014
603_Mean_OPUS–10190	-398.441	-3427.736	-36.032	0.011	0.013
603_Mean_OPUS–10191	-384.313	-3422.183	-36.055	0.011	0.013
603_Mean_OPUS–10192	-381.286	-3427.267	-36.085	0.011	0.013
603_Mean_OPUS–10193	-367.372	-3424.444	-36.245	0.011	0.013
603_Mean_OPUS–10194	-367.896	-3418.33	-36.313	0.011	0.014
603_Mean_OPUS–10195	-366.079	-3410.565	-36.266	0.011	0.013
603_Mean_OPUS–10196	-355.95	-3405.306	-36.309	0.011	0.014

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10197	-348.869	-3402.148	-36.372	0.011	0.013
603_Mean_OPUS–10198	-342.706	-3396.752	-36.438	0.014	0.025
603_Mean_OPUS–10199	-329.579	-3397.161	-36.474	0.011	0.013
603_Mean_OPUS–10200	-318.324	-3392.233	-36.579	0.011	0.013
603_Mean_OPUS–10201	-307.986	-3387.34	-36.634	0.011	0.013
603_Mean_OPUS–10202	-295.016	-3387.562	-36.695	0.011	0.014
603_Mean_OPUS–10203	-284.67	-3381.708	-36.69	0.011	0.014
603_Mean_OPUS–10204	-274.094	-3374.547	-36.767	0.011	0.013
603_Mean_OPUS–10205	-267.491	-3373.302	-36.843	0.011	0.013
603_Mean_OPUS–10206	-257.647	-3376.006	-36.839	0.011	0.014
603_Mean_OPUS–10207	-253.769	-3375.549	-36.792	0.011	0.013
603_Mean_OPUS–10208	-244.437	-3372.192	-36.822	0.011	0.013
603_Mean_OPUS–10209	-230.963	-3370.713	-37.061	0.011	0.013
603_Mean_OPUS–10210	-223.522	-3364.109	-37.062	0.011	0.013
603_Mean_OPUS–10211	-212.977	-3375.281	-37.353	0.011	0.013
603_Mean_OPUS–10212	-204.049	-3377.921	-37.328	0.011	0.013
603_Mean_OPUS–10213	-190.1	-3381.803	-37.497	0.011	0.014
603_Mean_OPUS–10214	-181.998	-3373.646	-37.789	0.011	0.013
603_Mean_OPUS–10215	-167.783	-3384.127	-37.912	0.011	0.013
603_Mean_OPUS–10216	-152.864	-3389.049	-38.136	0.011	0.013
603_Mean_OPUS–10217	-151.306	-3393.588	-38.091	0.011	0.013
603_Mean_OPUS–10218	-146.999	-3396.224	-38.478	0.011	0.014
603_Mean_OPUS–10219	-145.677	-3391.642	-38.438	0.011	0.014
603_Mean_OPUS–10220	-135.254	-3391.481	-38.491	0.011	0.014
603_Mean_OPUS–10221	-131.042	-3395.189	-38.445	0.011	0.013
603_Mean_OPUS–10222	-126.576	-3397.694	-38.52	0.01	0.013

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10223	-124.234	-3397.716	-38.708	0.01	0.013
603_Mean_OPUS–10224	-121.784	-3393.965	-38.578	0.011	0.013
603_Mean_OPUS–10225	-124.191	-3382.631	-38.513	0.01	0.012
603_Mean_OPUS–10226	-124.31	-3367.063	-38.529	0.011	0.013
603_Mean_OPUS–10227	-122.226	-3359.399	-38.455	0.011	0.013
603_Mean_OPUS–10228	-114.742	-3337.903	-38.451	0.011	0.013
603_Mean_OPUS–10229	-117.079	-3329.723	-38.419	0.01	0.012
603_Mean_OPUS–10230	-116.177	-3322.625	-38.441	0.011	0.013
603_Mean_OPUS–10231	-104.402	-3309.496	-38.422	0.011	0.013
603_Mean_OPUS–10232	-95.242	-3296.255	-38.373	0.01	0.012
603_Mean_OPUS–10233	-92.866	-3285.062	-38.334	0.011	0.012
603_Mean_OPUS–10234	-140.1	-2330.618	-24.672	0.012	0.017
603_Mean_OPUS–10235	-140.12	-2330.598	-24.664	0.012	0.015
603_Mean_OPUS–10236	-140.088	-2330.637	-25.238	0.015	0.022
603_Mean_OPUS–10237	521.219	-816.563	1.865	0.012	0.016
603_Mean_OPUS–10238	521.931	-816.741	1.806	0.012	0.016
603_Mean_OPUS–10239	517.087	-826.604	1.562	0.011	0.015
603_Mean_OPUS–10240	512.171	-833.583	1.849	0.011	0.015
603_Mean_OPUS–10241	510.321	-840.13	1.954	0.012	0.015
603_Mean_OPUS–10242	507.269	-838.435	1.929	0.011	0.014
603_Mean_OPUS–10243	504.087	-847.271	1.783	0.011	0.014
603_Mean_OPUS–10244	506.836	-856.497	1.852	0.011	0.014
603_Mean_OPUS–10245	506.171	-870.81	1.816	0.012	0.014
603_Mean_OPUS–10246	505.993	-876.321	1.716	0.012	0.014
603_Mean_OPUS–10247	504.75	-877.137	1.697	0.011	0.014
603_Mean_OPUS–10248	505.131	-881.545	1.777	0.011	0.014

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10249	506.706	-887.489	1.623	0.011	0.014
603_Mean_OPUS–10250	512.673	-888.169	1.626	0.011	0.014
603_Mean_OPUS–10251	524.098	-887.453	1.79	0.011	0.014
603_Mean_OPUS–10252	526.568	-886.465	1.797	0.011	0.014
603_Mean_OPUS–10253	526.421	-886.971	1.714	0.011	0.014
603_Mean_OPUS–10254	528.928	-880.983	2.176	0.011	0.014
603_Mean_OPUS–10255	533.106	-871.489	2.643	0.011	0.014
603_Mean_OPUS–10256	535.974	-859.07	2.677	0.012	0.015
603_Mean_OPUS–10257	537.746	-849.096	2.676	0.011	0.014
603_Mean_OPUS–10258	543.492	-841.275	2.862	0.011	0.014
603_Mean_OPUS–10259	546	-833.829	2.555	0.011	0.014
603_Mean_OPUS–10260	545.384	-830.818	2.483	0.011	0.014
603_Mean_OPUS–10261	545.294	-830.867	2.456	0.011	0.014
603_Mean_OPUS–10262	548.233	-822.827	2.401	0.011	0.014
603_Mean_OPUS–10263	545.853	-818.002	2.371	0.011	0.014
603_Mean_OPUS–10264	543.757	-810.908	2.241	0.012	0.015
603_Mean_OPUS–10265	543.444	-811.495	2.09	0.011	0.014
603_Mean_OPUS–10266	538.245	-804.121	2.161	0.011	0.014
603_Mean_OPUS–10267	531.397	-807.652	1.934	0.012	0.015
603_Mean_OPUS–10268	523.309	-811.461	2.072	0.012	0.015
603_Mean_OPUS–10269	520.991	-806.849	1.946	0.012	0.015
603_Mean_OPUS–10270	515.3	-800.721	1.948	0.012	0.015
603_Mean_OPUS–10271	507.193	-809.232	1.893	0.012	0.015
603_Mean_OPUS–10272	512.8	-816.388	2.077	0.011	0.014
603_Mean_OPUS–10273	508.009	-823.292	2.126	0.011	0.014
603_Mean_OPUS–10274	498.221	-819.528	1.877	0.011	0.014

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10275	494.344	-828.219	1.772	0.011	0.014
603_Mean_OPUS–10276	502.552	-834.286	1.997	0.011	0.014
603_Mean_OPUS–10277	498.172	-843.11	1.95	0.011	0.014
603_Mean_OPUS–10278	488.418	-839.401	1.593	0.011	0.014
603_Mean_OPUS–10279	484.727	-848.838	1.546	0.011	0.014
603_Mean_OPUS–10280	495.598	-851.607	1.798	0.011	0.014
603_Mean_OPUS–10281	502.888	-855.305	1.918	0.011	0.014
603_Mean_OPUS–10282	502.222	-863.393	1.713	0.011	0.014
603_Mean_OPUS–10283	492.588	-863.039	1.842	0.011	0.014
603_Mean_OPUS–10284	484.115	-858.996	1.691	0.011	0.014
603_Mean_OPUS–10285	478.575	-867.671	1.776	0.011	0.014
603_Mean_OPUS–10286	491.716	-872.509	1.978	0.011	0.014
603_Mean_OPUS–10287	500.768	-874.721	1.906	0.011	0.014
603_Mean_OPUS–10288	501.937	-881.366	1.659	0.011	0.014
603_Mean_OPUS–10289	491.78	-881.689	1.718	0.011	0.014
603_Mean_OPUS–10290	482.685	-883.491	1.67	0.011	0.014
603_Mean_OPUS–10291	484.574	-895.135	1.41	0.011	0.014
603_Mean_OPUS–10292	493.743	-898.086	1.526	0.01	0.013
603_Mean_OPUS–10293	498.473	-889.093	1.815	0.01	0.013
603_Mean_OPUS–10294	510.375	-891.685	1.559	0.01	0.013
603_Mean_OPUS–10295	505.375	-900.332	1.615	0.01	0.013
603_Mean_OPUS–10296	509.893	-905.802	1.096	0.01	0.013
603_Mean_OPUS–10297	518.16	-911.164	0.963	0.01	0.013
603_Mean_OPUS–10298	498.441	-910.063	1.165	0.01	0.012
603_Mean_OPUS–10299	528.24	-916.308	0.935	0.01	0.012
603_Mean_OPUS–10300	530.636	-905.332	1.444	0.01	0.012

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10301	521.674	-898.737	1.366	0.01	0.013
603_Mean_OPUS–10302	513.858	-896.421	1.464	0.01	0.013
603_Mean_OPUS–10303	527.39	-891.044	1.726	0.01	0.013
603_Mean_OPUS–10304	535.182	-899.195	1.827	0.01	0.013
603_Mean_OPUS–10305	541.505	-889.349	2.249	0.01	0.013
603_Mean_OPUS–10306	531.609	-884.191	2.118	0.011	0.014
603_Mean_OPUS–10307	534.78	-873.688	2.598	0.01	0.013
603_Mean_OPUS–10308	544.936	-877.748	2.507	0.01	0.013
603_Mean_OPUS–10309	549.692	-869.355	2.962	0.011	0.014
603_Mean_OPUS–10310	540.72	-862.059	2.761	0.01	0.013
603_Mean_OPUS–10311	541.004	-851.365	2.72	0.01	0.013
603_Mean_OPUS–10312	550.098	-855.178	2.858	0.011	0.014
603_Mean_OPUS–10313	552.808	-863.1	2.951	0.01	0.013
603_Mean_OPUS–10314	554.989	-846.613	2.969	0.011	0.014
603_Mean_OPUS–10315	548.497	-845.027	2.886	0.011	0.014
603_Mean_OPUS–10316	545.143	-842.38	3.034	0.011	0.014
603_Mean_OPUS–10317	549.518	-833.552	2.761	0.01	0.013
603_Mean_OPUS–10318	559.975	-834.278	2.93	0.01	0.013
603_Mean_OPUS–10319	552.489	-823.458	2.669	0.01	0.013
603_Mean_OPUS–10320	560.41	-819.29	2.638	0.011	0.014
603_Mean_OPUS–10321	554.564	-807.434	2.444	0.01	0.013
603_Mean_OPUS–10322	547.067	-812.247	2.341	0.01	0.013
603_Mean_OPUS–10323	544.131	-804.8	2.367	0.01	0.013
603_Mean_OPUS–10324	545.639	-794.906	2.426	0.01	0.013
603_Mean_OPUS–10325	522.848	-794.211	2.065	0.01	0.013
603_Mean_OPUS–10326	529.276	-804.575	1.92	0.01	0.013

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10327	538.856	-799.928	2.199	0.01	0.013
603_Mean_OPUS–10328	534.682	-785.762	2.198	0.01	0.013
603_Mean_OPUS–10329	531.499	-817.366	1.008	0.01	0.013
603_Mean_OPUS–10330	527.474	-818.036	1.023	0.01	0.013
603_Mean_OPUS–10331	523.812	-820.971	1.128	0.011	0.014
603_Mean_OPUS–10332	517.75	-829.295	1.288	0.011	0.014
603_Mean_OPUS–10333	514.543	-836.983	1.489	0.01	0.013
603_Mean_OPUS–10334	511.494	-841.715	1.473	0.01	0.013
603_Mean_OPUS–10335	509.735	-847.256	1.495	0.01	0.013
603_Mean_OPUS–10336	511.736	-856.017	1.856	0.011	0.014
603_Mean_OPUS–10337	510.049	-864.286	1.736	0.011	0.014
603_Mean_OPUS–10338	508.446	-873.634	1.413	0.011	0.014
603_Mean_OPUS–10339	511.505	-880.209	1.32	0.019	0.023
603_Mean_OPUS–10340	517.956	-883.364	1.211	0.01	0.013
603_Mean_OPUS–10341	520.897	-881.103	1.009	0.01	0.013
603_Mean_OPUS–10342	519.788	-877.841	1.143	0.011	0.014
603_Mean_OPUS–10343	522.016	-870.971	1.426	0.011	0.013
603_Mean_OPUS–10344	525.251	-865.166	1.885	0.011	0.013
603_Mean_OPUS–10345	527.844	-855.501	2.041	0.011	0.013
603_Mean_OPUS–10346	529.731	-846.355	1.984	0.011	0.013
603_Mean_OPUS–10347	529.83	-840.047	1.728	0.011	0.013
603_Mean_OPUS–10348	535.167	-834.902	1.63	0.011	0.013
603_Mean_OPUS–10349	539.945	-830.031	1.469	0.011	0.013
603_Mean_OPUS–10350	538.314	-823.802	1.294	0.011	0.014
603_Mean_OPUS–10351	533.336	-819.936	1.108	0.011	0.013
603_Mean_OPUS–10352	535.973	-814.343	1.647	0.011	0.014

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10353	542.988	-819.232	1.921	0.011	0.014
603_Mean_OPUS–10354	532.547	-831.436	1.568	0.011	0.013
603_Mean_OPUS–10355	528.276	-839.113	1.79	0.01	0.012
603_Mean_OPUS–10356	524.439	-848.312	2.025	0.01	0.012
603_Mean_OPUS–10357	522.698	-857.765	2.061	0.01	0.012
603_Mean_OPUS–10358	521.331	-866.711	1.793	0.01	0.012
603_Mean_OPUS–10359	518.425	-871.596	1.52	0.01	0.012
603_Mean_OPUS–10360	514.195	-867.835	1.568	0.01	0.012
603_Mean_OPUS–10361	514.276	-859.759	1.827	0.011	0.013
603_Mean_OPUS–10362	517.223	-850.132	2.012	0.01	0.012
603_Mean_OPUS–10363	519.648	-844.383	1.984	0.011	0.013
603_Mean_OPUS–10364	522.397	-838.298	1.656	0.01	0.012
603_Mean_OPUS–10365	526.923	-831.94	1.53	0.011	0.013
603_Mean_OPUS–10366	528.915	-814.595	1.529	0.01	0.012
603_Mean_OPUS–10367	532.915	-824.048	1.407	0.01	0.012
603_Mean_OPUS–10368	541.984	-828.155	1.643	0.01	0.012
603_Mean_OPUS–10369	537.965	-834.703	1.821	0.01	0.012
603_Mean_OPUS–10370	539.955	-839.988	2.487	0.01	0.012
603_Mean_OPUS–10371	531.334	-834.481	1.698	0.01	0.012
603_Mean_OPUS–10372	520.283	-830.096	1.323	0.01	0.012
603_Mean_OPUS–10373	513.807	-841.86	1.508	0.01	0.012
603_Mean_OPUS–10374	517.935	-844.393	1.823	0.01	0.012
603_Mean_OPUS–10375	522.27	-846.634	2.009	0.01	0.012
603_Mean_OPUS–10376	525.445	-837.967	1.689	0.01	0.012
603_Mean_OPUS–10377	528.788	-833.113	1.56	0.01	0.012
603_Mean_OPUS–10378	531.235	-850.118	2.09	0.01	0.012

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10379	528.827	-861.306	2.13	0.011	0.013
603_Mean_OPUS–10380	518.229	-857.729	1.936	0.011	0.013
603_Mean_OPUS–10381	518.341	-865.707	1.795	0.01	0.012
603_Mean_OPUS–10382	524.771	-879.183	1.703	0.01	0.012
603_Mean_OPUS–10383	527.797	-870.481	2.007	0.01	0.012
603_Mean_OPUS–10384	511.591	-884.452	1.551	0.01	0.012
603_Mean_OPUS–10385	516.415	-877.887	1.164	0.01	0.012
603_Mean_OPUS–10386	512.065	-875.042	1.257	0.011	0.013
603_Mean_OPUS–10387	515.519	-873.493	1.246	0.012	0.014
603_Mean_OPUS–10388	512.415	-871.878	1.343	0.01	0.012
603_Mean_OPUS–10389	584.204	-840.057	2.708	0.01	0.012
603_Mean_OPUS–10390	584.673	-840.252	2.835	0.011	0.013
603_Mean_OPUS–10391	590.273	-841.54	2.958	0.01	0.012
603_Mean_OPUS–10392	597.557	-840.711	2.693	0.011	0.013
603_Mean_OPUS–10393	601.673	-836.008	2.45	0.011	0.013
603_Mean_OPUS–10394	602.769	-831.329	2.442	0.011	0.013
603_Mean_OPUS–10395	602.713	-831.779	2.508	0.01	0.012
603_Mean_OPUS–10396	605.243	-826.567	2.656	0.01	0.012
603_Mean_OPUS–10397	605.08	-819.975	2.385	0.01	0.012
603_Mean_OPUS–10398	604.313	-820.537	2.212	0.01	0.012
603_Mean_OPUS–10399	599.44	-815.615	2.566	0.01	0.013
603_Mean_OPUS–10400	593.281	-811.382	2.692	0.01	0.013
603_Mean_OPUS–10401	585.499	-810.674	2.681	0.01	0.012
603_Mean_OPUS–10402	578.409	-810.012	2.546	0.01	0.012
603_Mean_OPUS–10403	571.87	-810.705	2.478	0.01	0.012
603_Mean_OPUS–10404	568.812	-812.828	2.352	0.01	0.013

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10405	568.537	-813.218	2.225	0.01	0.012
603_Mean_OPUS–10406	568.017	-819.055	2.526	0.01	0.012
603_Mean_OPUS–10407	570.926	-824.06	2.784	0.01	0.012
603_Mean_OPUS–10408	574.477	-829.317	2.805	0.01	0.013
603_Mean_OPUS–10409	578.199	-834.405	2.781	0.01	0.013
603_Mean_OPUS–10410	581.898	-838.605	2.737	0.01	0.013
603_Mean_OPUS–10411	577.595	-840.93	2.809	0.01	0.012
603_Mean_OPUS–10412	569.766	-843.724	3	0.01	0.012
603_Mean_OPUS–10413	560.62	-844.471	3.025	0.01	0.012
603_Mean_OPUS–10414	568.432	-834.809	3.069	0.01	0.012
603_Mean_OPUS–10415	573.317	-831.6	2.734	0.01	0.012
603_Mean_OPUS–10416	566.67	-824.267	2.863	0.011	0.012
603_Mean_OPUS–10417	558.451	-825.634	2.79	0.01	0.012
603_Mean_OPUS–10418	552.093	-813.177	2.423	0.01	0.012
603_Mean_OPUS–10419	562.824	-805.866	2.521	0.01	0.012
603_Mean_OPUS–10420	555.672	-794.015	2.416	0.01	0.012
603_Mean_OPUS–10421	565.241	-790.802	2.599	0.01	0.012
603_Mean_OPUS–10422	568.131	-798.138	2.597	0.01	0.012
603_Mean_OPUS–10423	571.278	-806.328	2.556	0.01	0.012
603_Mean_OPUS–10424	584.447	-804.193	2.776	0.01	0.012
603_Mean_OPUS–10425	580.616	-796.452	2.496	0.01	0.012
603_Mean_OPUS–10426	571.559	-799.77	2.539	0.01	0.012
603_Mean_OPUS–10427	581.551	-787.832	2.543	0.01	0.012
603_Mean_OPUS–10428	594.543	-787.75	2.574	0.01	0.012
603_Mean_OPUS–10429	590.353	-797.529	2.629	0.01	0.012
603_Mean_OPUS–10430	587.901	-804.632	2.714	0.01	0.012

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10431	600.182	-809.167	2.879	0.01	0.012
603_Mean_OPUS–10432	604.527	-800.993	2.653	0.01	0.012
603_Mean_OPUS–10433	605.386	-790.138	2.543	0.01	0.012
603_Mean_OPUS–10434	617.095	-792.934	2.129	0.01	0.012
603_Mean_OPUS–10435	610.444	-804.574	2.568	0.01	0.012
603_Mean_OPUS–10436	605.495	-812.23	2.581	0.01	0.012
603_Mean_OPUS–10437	609.902	-821.029	2.357	0.01	0.012
603_Mean_OPUS–10438	616.854	-812.836	2.311	0.01	0.012
603_Mean_OPUS–10439	624.893	-803.486	1.914	0.01	0.012
603_Mean_OPUS–10440	632.756	-809.369	1.524	0.011	0.013
603_Mean_OPUS–10441	636.677	-822.38	1.332	0.01	0.012
603_Mean_OPUS–10442	623.487	-818.797	1.815	0.01	0.012
603_Mean_OPUS–10443	610.917	-826.777	2.368	0.01	0.012
603_Mean_OPUS–10444	607.317	-835.839	2.445	0.01	0.012
603_Mean_OPUS–10445	616.164	-839.826	2.306	0.01	0.012
603_Mean_OPUS–10446	626.512	-846.674	2.191	0.011	0.013
603_Mean_OPUS–10447	636.362	-836.015	1.388	0.011	0.013
603_Mean_OPUS–10448	622.772	-828.064	1.869	0.01	0.012
603_Mean_OPUS–10449	600.686	-841.157	2.737	0.01	0.012
603_Mean_OPUS–10450	605.197	-848.322	2.803	0.01	0.012
603_Mean_OPUS–10451	611.898	-858.546	2.468	0.011	0.013
603_Mean_OPUS–10452	621.997	-852.666	2.23	0.01	0.012
603_Mean_OPUS–10453	606.223	-866.63	2.446	0.011	0.013
603_Mean_OPUS–10454	598.174	-858.505	2.743	0.011	0.013
603_Mean_OPUS–10455	593.439	-848.352	2.911	0.011	0.013
603_Mean_OPUS–10456	581.094	-846.613	2.881	0.011	0.013

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10457	586.085	-856.038	2.797	0.011	0.013
603_Mean_OPUS–10458	591.68	-866.639	2.63	0.01	0.012
603_Mean_OPUS–10459	578.243	-868.662	2.615	0.01	0.012
603_Mean_OPUS–10460	577.56	-855.917	2.861	0.01	0.012
603_Mean_OPUS–10461	565.355	-848.15	2.885	0.01	0.012
603_Mean_OPUS–10462	559.759	-855.228	2.776	0.011	0.012
603_Mean_OPUS–10463	569.71	-864.31	2.747	0.01	0.012
603_Mean_OPUS–10464	559.262	-867.845	2.715	0.01	0.012
603_Mean_OPUS–10465	599.025	-822.495	1.41	0.011	0.014
603_Mean_OPUS–10466	599.271	-826.244	1.829	0.011	0.014
603_Mean_OPUS–10467	597.392	-831.398	1.996	0.011	0.014
603_Mean_OPUS–10468	589.893	-834.456	2.018	0.011	0.014
603_Mean_OPUS–10469	585.471	-832.281	2.319	0.011	0.014
603_Mean_OPUS–10470	580.119	-824.923	1.958	0.011	0.014
603_Mean_OPUS–10471	575.242	-818.388	1.705	0.011	0.014
603_Mean_OPUS–10472	574.572	-816.543	1.752	0.011	0.014
603_Mean_OPUS–10473	576.98	-816.982	1.798	0.011	0.014
603_Mean_OPUS–10474	582.2	-815.294	1.995	0.011	0.014
603_Mean_OPUS–10475	588.696	-815.179	1.862	0.011	0.014
603_Mean_OPUS–10476	595.05	-817.954	1.834	0.011	0.014
603_Mean_OPUS–10477	597.75	-823.928	1.34	0.011	0.014
603_Mean_OPUS–10478	593.754	-822.316	1.869	0.012	0.015
603_Mean_OPUS–10479	589.649	-821.636	2.206	0.012	0.015
603_Mean_OPUS–10480	585.224	-818.097	2.029	0.012	0.015
603_Mean_OPUS–10481	581.694	-820.029	1.78	0.012	0.015
603_Mean_OPUS–10482	583.771	-823.425	2.097	0.012	0.015

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10483	588.583	-827.48	2.282	0.012	0.015
603_Mean_OPUS–10484	594.782	-827.425	1.803	0.012	0.015
603_Mean_OPUS–10485	598.511	-834.03	2.301	0.012	0.015
603_Mean_OPUS–10486	591.973	-836.167	2.161	0.012	0.015
603_Mean_OPUS–10487	586.196	-836.578	2.575	0.012	0.015
603_Mean_OPUS–10488	581.217	-830.501	2.337	0.012	0.015
603_Mean_OPUS–10489	577.198	-824.448	2.238	0.012	0.015
603_Mean_OPUS–10490	571.908	-818.813	2.019	0.012	0.015
603_Mean_OPUS–10491	574.779	-813.423	2.153	0.012	0.015
603_Mean_OPUS–10492	580.84	-813.368	2.27	0.013	0.015
603_Mean_OPUS–10493	589.562	-813.041	2.284	0.013	0.015
603_Mean_OPUS–10494	596.143	-815.683	2.226	0.013	0.015
603_Mean_OPUS–10495	601.804	-821.322	2.081	0.013	0.016
603_Mean_OPUS–10496	601.847	-825.757	2.172	0.013	0.016
603_Mean_OPUS–10497	595.803	-760.743	1.555	0.014	0.017
603_Mean_OPUS–10498	594.687	-776.932	2.414	0.013	0.015
603_Mean_OPUS–10499	595.828	-793.247	2.59	0.013	0.015
603_Mean_OPUS–10500	595.514	-807.237	2.903	0.013	0.016
603_Mean_OPUS–10501	595.544	-812.854	2.631	0.013	0.015
603_Mean_OPUS–10502	594.828	-817.787	1.749	0.013	0.015
603_Mean_OPUS–10503	594.964	-821.611	1.478	0.013	0.015
603_Mean_OPUS–10504	594.556	-825.093	1.805	0.013	0.015
603_Mean_OPUS–10505	594.431	-829.512	2.103	0.013	0.015
603_Mean_OPUS–10506	594.859	-834.854	2.197	0.013	0.016
603_Mean_OPUS–10507	594.979	-840.43	2.736	0.012	0.015
603_Mean_OPUS–10508	594.877	-844.487	2.929	0.012	0.015

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
603_Mean_OPUS–10509	594.107	-854.452	2.899	0.012	0.015
603_Mean_OPUS–10510	596.767	-869.542	2.693	0.013	0.016
603_Mean_OPUS–10511	596.406	-885.686	2.486	0.013	0.016
603_Mean_OPUS–10512	597.394	-901.833	2.017	0.012	0.015
603_Mean_OPUS–10513	597.78	-914.971	1.974	0.012	0.015
603_Mean_OPUS–10514	597.573	-933.199	0.968	0.013	0.016
603_Mean_OPUS–10515	599.052	-949.571	0.666	0.012	0.015
603_Mean_OPUS–10516	596.831	-971.487	-0.214	0.013	0.016
603_Mean_OPUS–10517	596.271	-991.187	-1.27	0.014	0.017
603_Mean_OPUS–10518	596.833	-1007.064	-1.574	0.013	0.016
603_Mean_OPUS–10519	702.087	-1018.341	-4.616	0.012	0.013
603_Mean_OPUS–10520	-1668.844	-2836.204	-3.592	0.012	0.014
2600_Mean_OPUS–5392	1528.773	505.565	-21.328	0.012	0.014
2600_Mean_OPUS–5393	1528.758	505.592	-21.315	0.011	0.011
2600_Mean_OPUS–5394	1528.791	505.563	-21.319	0.011	0.014
2600_Mean_OPUS–5395	62.824	-647.804	-10.599	0.01	0.012
2600_Mean_OPUS–5396	110.486	-678.596	-12.879	0.011	0.013
2600_Mean_OPUS–5397	146.225	-647.895	-12.338	0.011	0.012
2600_Mean_OPUS–5398	110.477	-602.716	-12.504	0.011	0.014
2600_Mean_OPUS–5399	50.405	-843.58	-11.28	0.011	0.014
2600_Mean_OPUS–5400	63.603	-856.866	-11.496	0.012	0.015
2600_Mean_OPUS–5401	50.395	-865.309	-10.804	0.011	0.014
2600_Mean_OPUS–5402	37.13	-856.848	-10.84	0.011	0.014
2600_Mean_OPUS–5403	261.377	-837.612	-14.292	0.011	0.014
2600_Mean_OPUS–5404	289.262	-808.102	-14.907	0.011	0.013
2600_Mean_OPUS–5405	310.398	-837.573	-14.768	0.01	0.012

Name	dN (USft)	dE (USft)	dHt (USft)	Horz RMS	Vert RMS
2600_Mean_OPUS–5406	289.348	-861.73	-14.861	0.011	0.014
2600_Mean_OPUS–5407	321.47	-620.981	-15.178	0.011	0.014
2600_Mean_OPUS–5408	341.21	-601.309	-15.462	0.011	0.015
2600_Mean_OPUS–5409	371.587	-621.08	-15.06	0.013	0.016
2600_Mean_OPUS–5410	341.205	-641.183	-14.933	0.013	0.016
2600_Mean_OPUS–5411	294.207	-541.311	-14.093	0.012	0.015
2600_Mean_OPUS–5412	259.08	-519.546	-13.619	0.012	0.015
2600_Mean_OPUS–5413	231.758	-541.363	-13.742	0.013	0.016
2600_Mean_OPUS–5414	259.092	-564.264	-15.649	0.013	0.016
2600_Mean_OPUS–5415	867.558	-716.287	-28.191	0.013	0.017
2600_Mean_OPUS–5416	879.163	-717.187	-29.106	0.014	0.019
2600_Mean_OPUS–5417	884.851	-728.942	-28.685	0.014	0.02
2600_Mean_OPUS–5418	883.02	-669.322	-28.814	0.014	0.019
2600_Mean_OPUS–5419	891.986	-658.719	-28.513	0.015	0.021
2600_Mean_OPUS–5420	1528.759	505.594	-21.331	0.01	0.012
2600_Mean_OPUS–5421	5019.01	-2153.626	-43.821	0.01	0.012

6. Level Reduction Reports

No differential levelling was performed for this project. The GPS elevations returned by the mean OPUS solution on each primary project control point proved to be very accurate through the project control checkshots and exceeded the required vertical tolerances for the project.

7. Traverse Adjustment Reports

While conventional traversing was not performed on this project, the following spreadsheets have been included that demonstrate how mean OPUS values were calculated for each project control point.

All latutude and longitude values in the tables below are NAD83(2011)(EPOCH: 2010.0000). All ellipsoid heights are given in Meters.

For report brevity, the complete OPUS solutions have not been included, but can be found in the 'OPUS Solution Reports' section of the deliverable directory.

OPUS SOLUTIONS – POINT 1									
LAT	63	19	32.49462	W LON	168	58	15.23734	EL HGT	13.61
LAT	63	19	32.49415	W LON	168	58	15.23622	EL HGT	13.63
LAT	63	19	32.49462	W LON	168	58	15.23705	EL HGT	13.613
MEAN LAT	**63**	**19**	**32.49446**	**MEAN LONG**	**168**	**58**	**15.23687**	**MEAN EL HT**	**13.61767**

OPUS SOLUTIONS – POINT 2									
LAT	63	18	57.71524	W LON	168	57	18.25405	EL HGT	20.899
LAT	63	18	57.71524	W LON	168	57	18.25402	EL HGT	20.624
LAT	63	18	57.71516	W LON	168	57	18.2543	EL HGT	20.776
LAT	63	18	57.71534	W LON	168	57	18.25387	EL HGT	20.449
MEAN LAT	**63**	**19**	**57.715245**	**MEAN LONG**	**168**	**57**	**18.25406**	**MEAN EL HT**	**20.687**

OPUS SOLUTIONS – POINT 59									
LAT	63	20	8.84555	W LON	168	56	24.38538	EL HGT	6.55
LAT	63	20	8.84548	W LON	168	56	24.3852	EL HGT	6.546
LAT	63	20	8.84548	W LON	168	56	24.3852	EL HGT	6.546
LAT	63	20	8.84562	W LON	168	56	24.38542	EL HGT	6.543
LAT	63	20	8.84562	W LON	168	56	24.38542	EL HGT	6.543
MEAN LAT	**63**	**20**	**8.84555**	**MEAN LONG**	**168**	**56**	**24.385324**	**MEAN EL HT**	**6.5456**

OPUS SOLUTIONS – POINT 2600									
LAT	63	18	42.74795	W LON	168	57	29.8651	EL HGT	27.1
LAT	63	18	42.74759	W LON	168	57	29.8643	EL HGT	27.244
LAT	63	18	42.74791	W LON	168	57	29.86445	EL HGT	27.252
LAT	63	18	42.74795	W LON	168	57	29.8651	EL HGT	27.272
MEAN LAT	**63**	**18**	**42.74785**	**MEAN LONG**	**168**	**57**	**29.8647375**	**MEAN EL HT**	**27.217**

OPUS SOLUTIONS – POINT 603									
LAT	63	18	58.71784	W LON	168	56	27.18618	EL HGT	29.002
LAT	63	18	58.71744	W LON	168	56	27.18586	EL HGT	29.006
LAT	63	18	58.7182	W LON	168	56	27.18629	EL HGT	29.004
LAT	63	18	58.71827	W LON	168	56	27.1865	EL HGT	29.01
LAT	63	18	58.71773	W LON	168	56	27.18661	EL HGT	29.006
MEAN LAT	**63**	**18**	**58.717896**	**MEAN LONG**	**168**	**56**	**27.186288**	**MEAN EL HT**	**29.0056**

8. Survey Quality

The survey quality achieved exceeds all quality requirements outlined in Table 4-3 of the USACE Alaska District – Environmental Program Manual For Electronic Deliverables, April 2017. The RMS Values in the OPUS Solutions, RTK Survey Checkshots, and RTK RMS Values were all used to evaluate the survey quality. These values can all be found/confirmed in this report document and associated deliverable package.

Exhibit F3-1
Control Statement

N.E. Cape Remedial Action
Control Statement

This memo describes the relationship between the 2018 Lounsbury survey coordinate system and the 2013 Eco-Land survey coordinate system. During the field survey, discrepancies were found between provided control, NGS control and stakeout coordinates. The following is a summary of the steps taken to reconcile old data with new data.

Coordinate System Summary

COORDINATE SYSTEM

THIS PROJECT IS LOCATED ENTIRELY WITHIN ALASKA STATE PLANE ZONE 9 (AKSPZ9) U.S. SURVEY FOOT GRID COORDINATE SYSTEM.

BASIS OF COORDINATES

THE BASIS OF COORDINATES IS CONTROL POINT #1, A FOUND 5/8” REBAR LOCATED AT THE SOUTHEAST CORNER OF THE GRAVEL APRON SERVICING THE NORTHEAST CAPE RUNWAY. SAID POINT WAS SET BY ECO-LAND SURVEYS IN 2013 AND HAS AKSPZ9 COORDINATES OF 3409053.3560' NORTH, 1809572.5610' EAST.

BASIS OF BEARINGS

THIS PROJECT PRESERVES ALASKA STATE PLANE ZONE 9 GRID BEARINGS.

CONVERSION PARAMETERS

TO CONVERT AKSPZ9 U.S. SURVEY FOOT GRID COORDINATES TO “ECO-LAND” LOCAL COORDINATES:

1. ADD +0.245 EAST AND SUBTRACT -0.704 NORTH FROM THE GRID COORDINATES.
2. ROTATE THE RESULTING COORDINATES ABOUT CONTROL POINT #1 (3409053.3560 N, 1809572.5610 E) N 00°55’05.6805” E
3. SCALE THE RESULTING COORDINATES ABOUT CONTROL POINT #1 (3409053.3560 N, 1809572.5610 E) USING 1.000051579.

TO CONVERT “ECO-LAND” LOCAL COORDINATES TO AKSPZ9 U.S. SURVEY FOOT GRID COORDINATES:

1. SCALE THE “ECO-LAND” LOCAL COORDINATES ABOUT CONTROL POINT #1 (3409052.6520 N, 1809572.8060 E) USING 0.999948424.
2. ROTATE THE RESULTING COORDINATES ABOUT CONTROL POINT #1 (3409052.6520 N, 1809572.8060 E) N 00°55’05.6805” W
3. SUBTRACT -0.245 EAST AND ADD +0.704 NORTH TO THE RESULTING COORDINATES.

VERTICAL CONTROL STATEMENT

THE VERTICAL DATUM FOR THIS SURVEY IS NAVD88(GEOID 12B) IN U.S. SURVEY FEET, AS ESTABLISHED BY GPS ELEVATION TRANSFER. THE AVERAGE OF MULTIPLE NGS OPUS SOLUTIONS, OBSERVED OVER DIFFERENT DAYS, WAS HELD FIXED FOR EACH PROJECT CONTROL POINT.

Exhibit F3-2
Descriptor Key

Northeast Cape Remedial Action –
Site 28 Sediment Mapping Survey Services
Topographic Survey Descriptor Key

Field Code	Full Description
BM	Benchmark
Calc	Calculated or Staked Point
CBC	Brass Cap Monument
CHK	Checkshot
CP	Control Point
CRBC	Rebar with Cap
EPP	Power Pole
GB	Grade Break
GS	Ground Shot
GTOE	Toe of Slope
GTOP	Top of Slope
HEW	Edge of Water
ML	Misc. Linear Feature
MP	Misc Point
RCL	Centerline of Road
RSH	Shoulder of Road
VEG	Edge of Vegetation

Exhibit F3-3
Survey Data Table

2018 Northeast Cape Periodic Review
Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
1	CP 1 RTK BASE	63°19'32.47895"N	168°58'15.32269"W	63°19'32.49446"N	168°58'15.23687"W	7023485.9420	601619.7430	3409053.356	1809572.561	28.409	8.659	CP 1 RTK BASE	8/1/2018 10:19
2	2	63°18'57.69975"N	168°57'18.33986"W	63°18'57.71525"N	168°57'18.25406"W	7022435.1010	602446.5850	3405563.115	1812231.739	51.535	15.708	CRBC	8/1/2018 16:35
59	8039 A	63°20'08.83006"N	168°56'24.47121"W	63°20'08.84555"N	168°56'24.38532"W	7024659.7760	603125.3060	3412827.77	1814572.558	5.248	1.599	CBC	8/1/2018 10:19
603	BM B	63°18'58.70241"N	168°56'27.27211"W	63°18'58.71790"N	168°56'27.18629"W	7022488.8670	603156.0700	3405703.216	1814562.383	78.814	24.023	BM B NGSCBC	8/1/2018 8:42
1002	GPS-2	63°19'05.77800"N	168°56'49.31203"W	63°19'05.79349"N	168°56'49.22621"W	7022697.9410	602842.4310	3406405.262	1813544.002	71.976	21.938	CRBC	8/4/2018 9:33
2600	2600	63°18'42.73235"N	168°57'29.95052"W	63°18'42.74785"N	168°57'29.86474"W	7021966.8780	602299.8010	3404034.336	1811726.161	72.924	22.227	CRB	8/1/2018 15:07
2558	2558	63°18'45.36876"N	168°57'41.70504"W	63°18'45.38426"N	168°57'41.61925"W	7022043.2400	602133.6480	3404293.3920	1811184.9030	58.683	17.886	2018NEC28-SS01	8/3/2018 12:40
2559	2559	63°18'58.00178"N	168°57'41.76207"W	63°18'58.01728"N	168°57'41.67627"W	7022434.0660	602120.4250	3405576.4120	1811161.5190	37.804	11.523	2018NEC28-SS02	8/3/2018 12:41
2560	2560	63°18'57.83948"N	168°57'41.79408"W	63°18'57.85498"N	168°57'41.70828"W	7022429.0300	602120.1390	3405559.9040	1811160.3240	37.818	11.527	2018NEC28-SS03	8/3/2018 12:43
2561	2561	63°18'57.40699"N	168°57'41.55871"W	63°18'57.42249"N	168°57'41.47291"W	7022415.7540	602123.8400	3405516.1530	1811171.7850	38.752	11.812	2018NEC28-SS04	8/3/2018 12:44
2562	2562	63°18'56.93005"N	168°57'41.59496"W	63°18'56.94555"N	168°57'41.50916"W	7022400.9820	602123.8040	3405467.6860	1811170.9140	39.443	12.022	2018NEC28-SS05	8/3/2018 12:45
2563	2563	63°18'56.56474"N	168°57'41.48112"W	63°18'56.58024"N	168°57'41.39533"W	7022389.7300	602125.7480	3405430.6680	1811176.7140	39.597	12.069	2018NEC28-SS06	8/3/2018 12:47
2564	2564	63°18'56.33084"N	168°57'41.89117"W	63°18'56.34634"N	168°57'41.80538"W	7022382.3120	602120.2730	3405406.6090	1811158.3710	39.707	12.103	2018NEC28-SS07	8/3/2018 12:48
2565	2565	63°18'56.32647"N	168°57'41.66119"W	63°18'56.34197"N	168°57'41.57539"W	7022382.2790	602123.4770	3405406.3350	1811168.8820	39.666	12.090	2018NEC28-SS08	8/3/2018 12:50
2566	2566	63°18'56.13910"N	168°57'41.77685"W	63°18'56.15460"N	168°57'41.69105"W	7022376.4300	602122.0520	3405387.2190	1811163.9080	39.740	12.113	2018NEC28-SS09	8/3/2018 12:51
2567	2567	63°18'55.83461"N	168°57'41.91883"W	63°18'55.85011"N	168°57'41.83303"W	7022366.9470	602120.3760	3405356.1890	1811157.9240	39.968	12.182	2018NEC28-SS10	8/3/2018 12:52
2568	2568	63°18'55.57061"N	168°57'42.56023"W	63°18'55.58611"N	168°57'42.47444"W	7022358.4950	602111.7120	3405328.9020	1811129.0640	40.210	12.256	2018NEC28-SS11	8/3/2018 12:54
2569	2569	63°18'55.40361"N	168°57'42.54043"W	63°18'55.41911"N	168°57'42.45463"W	7022353.3370	602112.1520	3405311.9550	1811130.2430	40.293	12.281	2018NEC28-SS12	8/3/2018 12:55
2570	2570	63°18'53.60124"N	168°57'43.48041"W	63°18'53.61674"N	168°57'43.39462"W	7022297.1580	602100.8470	3405128.2040	1811090.2750	43.051	13.122	2018NEC28-SS13	8/3/2018 12:57
2571	2571	63°18'53.37489"N	168°57'43.24702"W	63°18'53.39039"N	168°57'43.16122"W	7022290.2580	602104.3170	3405105.3870	1811101.3070	43.217	13.172	2018NEC28-SS14	8/3/2018 12:58
2572	2572	63°18'50.11207"N	168°57'45.97513"W	63°18'50.12757"N	168°57'45.88934"W	7022188.1040	602069.5690	3404771.9850	1810982.0660	46.239	14.094	2018NEC28-SS15	8/3/2018 12:59
2573	2573	63°18'49.74352"N	168°57'46.45252"W	63°18'49.75902"N	168°57'46.36672"W	7022176.4900	602063.2890	3404734.2010	1810960.8670	46.827	14.273	2018NEC28-SS16	8/3/2018 13:01
2574	2574	63°18'49.14343"N	168°57'46.38444"W	63°18'49.15893"N	168°57'46.29865"W	7022157.9540	602064.8260	3404673.3040	1810964.9620	50.273	15.323	2018NEC28-SS17	8/3/2018 13:02
2575	2575	63°18'48.74094"N	168°57'46.69880"W	63°18'48.75644"N	168°57'46.61301"W	7022145.3620	602060.8480	3404632.1930	1810951.2650	52.085	15.875	2018NEC28-SS18	8/3/2018 13:04
2576	2576	63°18'48.26228"N	168°57'47.09359"W	63°18'48.27777"N	168°57'47.00780"W	7022130.3780	602055.8260	3404583.2860	1810934.0190	53.955	16.445	2018NEC28-SS19	8/3/2018 13:05
2577	2577	63°18'45.79453"N	168°57'48.66116"W	63°18'45.81003"N	168°57'48.57537"W	7022053.3360	602036.4400	3404331.4940	1810866.4710	0.000	0.000	2018NEC28-SS20	8/3/2018 13:06
2578	2578	63°18'43.37121"N	168°57'48.78994"W	63°18'43.38671"N	168°57'48.70415"W	7021978.3050	602037.0300	3404085.2760	1810864.5670	0.000	0.000	2018NEC28-SS21	8/3/2018 13:08
2579	2579	63°18'43.30102"N	168°57'48.68876"W	63°18'43.31652"N	168°57'48.60297"W	7021976.1780	602038.5070	3404078.2220	1810869.3040	61.506	18.747	2018NEC28-SS22	8/3/2018 13:09
2580	2580	63°18'43.27332"N	168°57'48.50612"W	63°18'43.28882"N	168°57'48.42033"W	7021975.4020	602041.0760	3404075.5440	1810877.6920	61.548	18.760	2018NEC28-SS23	8/3/2018 13:11
2581	2581	63°18'56.73315"N	168°57'41.52678"W	63°18'56.74865"N	168°57'41.44098"W	7022394.9210	602124.9470	3405447.7390	1811174.3520	39.590	12.067	2018NEC28-SS24	8/3/2018 13:12
2582	2582	63°18'53.31642"N	168°57'43.39645"W	63°18'53.33192"N	168°57'43.31066"W	7022288.3830	602102.2960	3405099.3380	1811094.5780	43.224	13.175	2018NEC28-SS25	8/3/2018 13:13
2583	2583	63°18'53.00234"N	168°57'43.60531"W	63°18'53.01784"N	168°57'43.51952"W	7022278.5740	602099.6980	3405067.2850	1811085.5550	43.196	13.166	2018NEC28-SS26	8/3/2018 13:15
2584	2584	63°18'53.15319"N	168°57'43.79994"W	63°18'53.16869"N	168°57'43.71414"W	7022283.1550	602096.8420	3405082.4620	1811076.4180	43.213	13.171	2018NEC28-SS27	8/3/2018 13:16
2585	2585	63°18'52.19933"N	168°57'44.53007"W	63°18'52.21483"N	168°57'44.44428"W	7022253.3200	602087.6220	3404985.0440	1811044.6380	43.953	13.397	2018NEC28-SS28	8/3/2018 13:18
2586	2586	63°18'51.93826"N	168°57'44.40747"W	63°18'51.95376"N	168°57'44.32167"W	7022245.2970	602089.5850	3404958.6190	1811050.6670	43.957	13.398	2018NEC28-SS29	8/3/2018 13:19
2587	2587	63°18'51.47323"N	168°57'45.38310"W	63°18'51.48873"N	168°57'45.29731"W	7022230.4780	602076.4670	3404910.6680	1811006.8700	43.983	13.406	2018NEC28-SS30	8/3/2018 13:20
2588	2588	63°18'51.19354"N	168°57'45.40300"W	63°18'51.20904"N	168°57'45.31720"W	7022221.8160	602076.4660	3404882.2470	1811006.4210	43.895	13.379	2018NEC28-SS31	8/3/2018 13:22
2589	2589	63°18'50.84200"N	168°57'45.15946"W	63°18'50.85750"N	168°57'45.07367"W	7022211.0480	602080.2000	3404846.7230	1811018.1220	44.141	13.454	2018NEC28-SS32	8/3/2018 13:23
2590	2590	63°18'50.53227"N	168°57'45.14459"W	63°18'50.54777"N	168°57'45.05880"W	7022201.4720	602080.7110	3404815.2760	1811019.3100	0.000	0.000	2018NEC28-SS33	8/3/2018 13:25
2591	2591	63°18'49.46651"N	168°57'46.71894"W	63°18'49.48201"N	168°57'46.63315"W	7022167.8020	602059.8540	3404705.8700	1810949.1530	48.108	14.663	2018NEC28-SS34	8/3/2018 13:26
2592	2592	63°18'49.28645"N	168°57'46.11318"W	63°18'49.30195"N	168°57'46.02739"W	7022162.4990	602068.4600	3404688.0300	1810977.1170	0.000	0.000	2018NEC28-SS35	8/3/2018 13:27
2593	2593	63°18'48.93748"N	168°57'46.37466"W	63°18'48.95298"N	168°57'46.28887"W	7022151.5870	602065.1650	3404652.3940	1810965.7470	51.379	15.660	2018NEC28-SS36	8/3/2018 13:29
2594	2594	63°18'48.44538"N	168°57'46.92171"W	63°18'48.46088"N	168°57'46.83592"W	7022136.1200	602058.0370	3404602.0100	1810941.5690	53.039	16.166	2018NEC28-SS37	8/3/2018 13:30
2595	2595	63°18'48.25673"N	168°57'46.84484"W	63°18'48.27223"N	168°57'46.75905"W	7022130.3170	602059.2920	3404582.9070	1810945.3900	54.759	16.691	2018NEC28-SS38	8/3/2018 13:32

2018 Northeast Cape Periodic Review
Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
2596	2596	63°18'48.10275"N	168°57'46.99710"W	63°18'48.11825"N	168°57'46.91131"W	7022125.4860	602057.3250	3404567.1550	1810938.6880	55.144	16.808	2018NEC28-SS39	8/3/2018 13:33
2597	2597	63°18'46.31033"N	168°57'43.50799"W	63°18'46.32583"N	168°57'43.42220"W	7022071.5730	602107.6350	3404387.6880	1811101.0020	57.705	17.588	2018NEC28-SS40	8/3/2018 13:34
2598	2598	63°18'46.18960"N	168°57'43.41918"W	63°18'46.20510"N	168°57'43.33339"W	7022067.8770	602108.9900	3404375.4920	1811105.2570	57.736	17.598	2018NEC28-SS41	8/3/2018 13:36
2599	2599	63°18'45.73777"N	168°57'47.98254"W	63°18'45.75327"N	168°57'47.89675"W	7022051.8800	602045.9390	3404326.2300	1810897.5610	58.066	17.698	2018NEC28-SS42	8/3/2018 13:37
2601	2601	63°18'43.91482"N	168°57'43.95988"W	63°18'43.93032"N	168°57'43.87410"W	7021997.2590	602103.7040	3404144.0560	1811084.2990	60.815	18.536	2018NEC28-SS44	8/3/2018 13:39
2602	2602	63°18'43.89071"N	168°57'44.19305"W	63°18'43.90621"N	168°57'44.10727"W	7021996.4100	602100.4830	3404141.4350	1811073.6880	0.000	0.000	2018NEC28-SS45	8/3/2018 13:40
2603	2603	63°18'43.81229"N	168°57'44.07087"W	63°18'43.82778"N	168°57'43.98508"W	7021994.0380	602102.2600	3404133.5600	1811079.3980	60.820	18.538	2018NEC28-SS46	8/3/2018 13:41
2604	2604	63°18'43.95943"N	168°57'49.29893"W	63°18'43.97493"N	168°57'49.21314"W	7021996.2780	602029.3700	3404144.6420	1810840.3520	0.000	0.000	2018NEC28-SS47	8/3/2018 13:43
2605	2605	63°18'44.46432"N	168°57'51.46056"W	63°18'44.47982"N	168°57'51.37477"W	7022010.9440	601998.7960	3404194.3260	1810740.7860	61.016	18.598	2018NEC28-SS48	8/3/2018 13:44
2606	2606	63°18'43.26886"N	168°57'48.97296"W	63°18'43.28436"N	168°57'48.88718"W	7021975.0570	602034.5840	3404074.7460	1810856.3750	0.000	0.000	2018NEC28-SS49	8/3/2018 13:46
2607	2607	63°18'43.28481"N	168°57'48.50842"W	63°18'43.30031"N	168°57'48.42263"W	7021975.7560	602041.0320	3404076.7090	1810877.5680	61.552	18.761	2018NEC28-SS50	8/3/2018 13:47
2608	2608	63°18'52.97857"N	168°57'43.83129"W	63°18'52.99407"N	168°57'43.74550"W	7022277.7380	602096.5780	3405064.7030	1811075.2730	43.213	13.171	2018NEC28-SS51	8/3/2018 13:48
2610	2610	63°18'45.64487"N	168°57'48.27629"W	63°18'45.66037"N	168°57'48.19050"W	7022048.8760	602041.9430	3404316.5780	1810884.2960	58.085	17.704	2018NEC28-SS43	8/3/2018 13:50
5001	STOKE	63°19'30.81381"N	168°55'28.69088"W	63°19'30.82929"N	168°55'28.60503"W	7023508.6300	603938.9000	3409009.096	1817183.125	24.847	7.573	CHK 0 HV	8/1/2018 9:38
5002	5002	63°20'08.82997"N	168°56'24.47091"W	63°20'08.84546"N	168°56'24.38504"W	7024659.7730	603125.3100	3412827.761	1814572.572	5.236	1.596	CHK 59 HV	8/1/2018 11:30
5003	5003	63°20'06.89410"N	168°56'26.90524"W	63°20'06.90959"N	168°56'26.81935"W	7024598.7930	603093.3900	3412629.31	1814464.718	4.512	1.375	CHK 59 HV BM 8039B	8/1/2018 11:43
5004	5004	63°20'04.42856"N	168°56'31.18733"W	63°20'04.44406"N	168°56'31.10147"W	7024520.6000	603036.3040	3412375.673	1814273.413	4.018	1.225	CHK 0 HV BM 8039C	8/1/2018 11:48
5005	5005	63°18'39.01668"N	168°58'07.96138"W	63°18'39.03218"N	168°58'07.87561"W	7021835.1160	601774.5380	3403628.893	1809995.972	75.385	22.977	CHK 0 HV NEAR 34009	8/1/2018 12:54
5006	5006	63°18'42.73262"N	168°57'29.95021"W	63°18'42.74812"N	168°57'29.86442"W	7021966.8860	602299.8050	3404034.363	1811726.175	72.966	22.24	CHK 2600 HV	8/1/2018 15:02
5007	5007	63°18'38.87278"N	168°57'39.96044"W	63°18'38.88828"N	168°57'39.87465"W	7021843.0340	602164.3150	3403634.924	1811275.28	93.913	28.625	CHK 0 HV	8/1/2018 15:16
5008	5008	63°18'14.54356"N	168°57'25.41886"W	63°18'14.55905"N	168°57'25.33309"W	7021096.7590	602390.6520	3401174.734	1811979.723	240.069	73.173	CHK 0 HV	8/1/2018 15:33
5009	5009	63°19'32.47889"N	168°58'15.32280"W	63°19'32.49439"N	168°58'15.23698"W	7023485.9400	601619.7410	3409053.349	1809572.556	28.488	8.683	CHK 0 HV	8/2/2018 11:04
5010	5010	63°18'45.68881"N	168°57'48.68632"W	63°18'45.70431"N	168°57'48.60053"W	7022050.0540	602036.1940	3404320.738	1810865.495	58.08	17.703	HEW1	8/2/2018 11:24
5011	5011	63°18'45.56551"N	168°57'48.25826"W	63°18'45.58101"N	168°57'48.17248"W	7022046.4290	602042.2710	3404308.531	1810885.25	58.092	17.707	HEW1	8/2/2018 11:24
5012	5012	63°18'45.41625"N	168°57'48.04362"W	63°18'45.43175"N	168°57'47.95784"W	7022041.9060	602045.4050	3404293.53	1810895.299	58.11	17.712	HEW1	8/2/2018 11:25
5013	5013	63°18'45.43875"N	168°57'47.83209"W	63°18'45.45424"N	168°57'47.74630"W	7022042.6950	602048.3260	3404295.971	1810904.924	58.065	17.698	HEW1	8/2/2018 11:25
5014	5014	63°18'45.55935"N	168°57'47.74347"W	63°18'45.57485"N	168°57'47.65767"W	7022046.4660	602049.4410	3404308.286	1810908.774	58.028	17.687	HEW1	8/2/2018 11:25
5015	5015	63°18'45.71720"N	168°57'47.64733"W	63°18'45.73269"N	168°57'47.56154"W	7022051.3920	602050.6230	3404324.388	1810912.906	58.068	17.699	HEW1	8/2/2018 11:26
5016	5016	63°18'45.85936"N	168°57'47.73746"W	63°18'45.87486"N	168°57'47.65166"W	7022055.7500	602049.2290	3404338.76	1810908.556	58.088	17.705	HEW1	8/2/2018 11:26
5017	5017	63°18'45.85837"N	168°57'48.08032"W	63°18'45.87386"N	168°57'47.99453"W	7022055.5680	602044.4600	3404338.406	1810892.897	58.048	17.693	HEW1	8/2/2018 11:26
5018	5018	63°18'45.96275"N	168°57'48.28021"W	63°18'45.97824"N	168°57'48.19442"W	7022058.7090	602041.5760	3404348.86	1810883.595	58.11	17.712	HEW1	8/2/2018 11:26
5019	5019	63°18'45.92992"N	168°57'48.43460"W	63°18'45.94542"N	168°57'48.34881"W	7022057.6250	602039.4600	3404345.412	1810876.597	58.058	17.696	HEW1	8/2/2018 11:27
5020	5020	63°18'45.73583"N	168°57'48.64943"W	63°18'45.75133"N	168°57'48.56364"W	7022051.5250	602036.6610	3404325.541	1810867.103	58.102	17.71	HEW1 C	8/2/2018 11:27
5021	5021	63°18'45.79295"N	168°57'46.30289"W	63°18'45.80845"N	168°57'46.21711"W	7022054.3300	602069.2550	3404333.075	1810974.191	58.993	17.981	HEW2	8/2/2018 11:44
5022	5022	63°18'45.77005"N	168°57'46.10243"W	63°18'45.78555"N	168°57'46.01664"W	7022053.7100	602072.0670	3404330.897	1810983.385	58.951	17.968	HEW2	8/2/2018 11:45
5023	5023	63°18'45.84938"N	168°57'45.83588"W	63°18'45.86488"N	168°57'45.75008"W	7022056.2820	602075.6980	3404339.151	1810995.43	58.99	17.98	HEW2	8/2/2018 11:45
5024	5024	63°18'46.03247"N	168°57'45.91969"W	63°18'46.04797"N	168°57'45.83390"W	7022061.9100	602074.3520	3404357.685	1810991.301	58.974	17.975	HEW2	8/2/2018 11:46
5025	5025	63°18'46.10354"N	168°57'45.55309"W	63°18'46.11904"N	168°57'45.46730"W	7022064.2710	602079.3830	3404365.174	1811007.929	59.018	17.989	HEW2	8/2/2018 11:46
5026	5026	63°18'46.25229"N	168°57'45.35572"W	63°18'46.26778"N	168°57'45.26994"W	7022068.9600	602081.9830	3404380.427	1811016.7	58.975	17.976	HEW2	8/2/2018 11:46
5027	5027	63°18'46.33088"N	168°57'45.53677"W	63°18'46.34638"N	168°57'45.45097"W	7022071.3120	602079.3860	3404388.276	1811008.301	58.952	17.968	HEW2	8/2/2018 11:47
5028	5028	63°18'46.24113"N	168°57'45.94936"W	63°18'46.25662"N	168°57'45.86357"W	7022068.3520	602073.7340	3404378.855	1810989.603	59.021	17.99	HEW2	8/2/2018 11:47
5029	5029	63°18'46.09493"N	168°57'46.07431"W	63°18'46.11042"N	168°57'45.98851"W	7022063.7740	602072.1390	3404363.914	1810984.136	59.088	18.01	HEW2	8/2/2018 11:47
5030	5030	63°18'45.92776"N	168°57'46.22906"W	63°18'45.94326"N	168°57'46.14328"W	7022058.5330	602070.1500	3404346.821	1810977.342	58.919	17.959	HEW2 C	8/2/2018 11:48
5031	5031	63°18'45.45531"N	168°57'42.30845"W	63°18'45.47082"N	168°57'42.22265"W	7022045.6510	602125.1670	3404301.736	1811157.199	58.643	17.874	HEW3	8/2/2018 12:02

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Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
5032	5032	63°18'45.60212"N	168°57'42.15254"W	63°18'45.61762"N	168°57'42.06675"W	7022050.2620	602127.1920	3404316.762	1811164.079	58.67	17.883	HEW3	8/2/2018 12:02
5033	5033	63°18'45.63307"N	168°57'41.87918"W	63°18'45.64857"N	168°57'41.79339"W	7022051.3400	602130.9650	3404320.107	1811176.514	58.643	17.874	HEW3	8/2/2018 12:03
5034	5034	63°18'45.45789"N	168°57'41.65312"W	63°18'45.47338"N	168°57'41.56733"W	7022046.0200	602134.2830	3404302.482	1811187.128	58.648	17.876	HEW3	8/2/2018 12:03
5035	5035	63°18'45.31438"N	168°57'41.47029"W	63°18'45.32987"N	168°57'41.38449"W	7022041.6610	602136.9680	3404288.042	1811195.715	58.754	17.908	HEW3	8/2/2018 12:03
5036	5036	63°18'45.17996"N	168°57'41.60235"W	63°18'45.19546"N	168°57'41.51655"W	7022037.4440	602135.2630	3404274.292	1811189.904	58.752	17.907	HEW3	8/2/2018 12:04
5037	5037	63°18'45.29517"N	168°57'41.98770"W	63°18'45.31066"N	168°57'41.90190"W	7022040.8380	602129.7880	3404285.708	1811172.113	58.666	17.881	HEW3 C	8/2/2018 12:04
5038	5038	63°18'46.07608"N	168°57'43.54810"W	63°18'46.09157"N	168°57'43.46232"W	7022064.3080	602107.3070	3404363.867	1811099.555	57.722	17.594	HEW4	8/2/2018 12:05
5039	5039	63°18'46.10161"N	168°57'43.16931"W	63°18'46.11711"N	168°57'43.08352"W	7022065.2660	602112.5530	3404366.74	1811116.815	57.753	17.603	HEW4	8/2/2018 12:06
5040	5040	63°18'46.24535"N	168°57'43.10106"W	63°18'46.26085"N	168°57'43.01527"W	7022069.7430	602113.3610	3404381.389	1811119.696	57.758	17.605	HEW4	8/2/2018 12:06
5041	5041	63°18'46.36663"N	168°57'43.36495"W	63°18'46.38213"N	168°57'43.27916"W	7022073.3790	602109.5700	3404393.512	1811107.443	57.773	17.609	HEW4	8/2/2018 12:06
5042	5042	63°18'46.34542"N	168°57'43.58377"W	63°18'46.36092"N	168°57'43.49797"W	7022072.6260	602106.5460	3404391.196	1811097.483	57.628	17.565	HEW4	8/2/2018 12:07
5043	5043	63°18'46.21907"N	168°57'43.55692"W	63°18'46.23457"N	168°57'43.47114"W	7022068.7280	602107.0440	3404378.383	1811098.917	57.727	17.595	HEW4 C	8/2/2018 12:07
5044	5044	63°18'48.10128"N	168°57'46.99773"W	63°18'48.11678"N	168°57'46.91194"W	7022125.4400	602057.3180	3404567.005	1810938.662	55.192	16.823	MP SPRING	8/2/2018 12:12
5045	5045	63°18'48.07914"N	168°57'46.96249"W	63°18'48.09464"N	168°57'46.87669"W	7022124.7710	602057.8300	3404564.783	1810940.308	55.211	16.828	HEW5HEW6	8/2/2018 12:14
5046	5046	63°18'48.09337"N	168°57'47.06109"W	63°18'48.10886"N	168°57'46.97530"W	7022125.1670	602056.4440	3404566.155	1810935.781	55.19	16.822	HEW6	8/2/2018 12:14
5047	5047	63°18'48.18623"N	168°57'46.97783"W	63°18'48.20173"N	168°57'46.89205"W	7022128.0770	602057.5110	3404575.648	1810939.431	54.957	16.751	HEW6	8/2/2018 12:14
5048	5048	63°18'48.16642"N	168°57'46.97728"W	63°18'48.18192"N	168°57'46.89149"W	7022127.4640	602057.5380	3404573.636	1810939.489	54.935	16.744	HEW5	8/2/2018 12:14
5049	5049	63°18'48.18045"N	168°57'46.89347"W	63°18'48.19595"N	168°57'46.80768"W	7022127.9350	602058.6900	3404575.123	1810943.294	54.879	16.727	HEW5	8/2/2018 12:15
5050	5050	63°18'48.19413"N	168°57'46.90977"W	63°18'48.20963"N	168°57'46.82397"W	7022128.3520	602058.4500	3404576.501	1810942.527	54.809	16.706	HEW6	8/2/2018 12:15
5051	5051	63°18'48.23592"N	168°57'46.86476"W	63°18'48.25142"N	168°57'46.77897"W	7022129.6640	602059.0350	3404580.778	1810944.514	54.78	16.697	HEW6	8/2/2018 12:15
5052	5052	63°18'48.22654"N	168°57'46.77560"W	63°18'48.24204"N	168°57'46.68981"W	7022129.4140	602060.2850	3404579.891	1810948.602	54.71	16.676	HEW5	8/2/2018 12:15
5053	5053	63°18'48.27904"N	168°57'46.79622"W	63°18'48.29454"N	168°57'46.71043"W	7022131.0290	602059.9470	3404585.208	1810947.574	54.75	16.688	HEW5	8/2/2018 12:15
5054	5054	63°18'48.24859"N	168°57'46.88272"W	63°18'48.26409"N	168°57'46.79694"W	7022130.0480	602058.7730	3404582.052	1810943.673	54.752	16.689	HEW6	8/2/2018 12:16
5055	5055	63°18'48.27912"N	168°57'46.94838"W	63°18'48.29462"N	168°57'46.86258"W	7022130.9640	602057.8300	3404585.104	1810940.624	54.365	16.571	HEW6	8/2/2018 12:16
5056	5056	63°18'48.30248"N	168°57'47.00317"W	63°18'48.31798"N	168°57'46.91738"W	7022131.6620	602057.0440	3404587.436	1810938.083	53.847	16.413	HEW6	8/2/2018 12:16
5057	5057	63°18'48.29300"N	168°57'47.04975"W	63°18'48.30850"N	168°57'46.96396"W	7022131.3480	602056.4050	3404586.439	1810935.971	53.824	16.406	HEW6	8/2/2018 12:16
5058	5058	63°18'48.24967"N	168°57'47.09941"W	63°18'48.26516"N	168°57'47.01362"W	7022129.9860	602055.7570	3404582.001	1810933.774	53.989	16.456	HEW6	8/2/2018 12:17
5059	5059	63°18'48.25312"N	168°57'47.21343"W	63°18'48.26862"N	168°57'47.12765"W	7022130.0420	602054.1670	3404582.268	1810928.56	54.007	16.461	HEW6	8/2/2018 12:17
5060	5060	63°18'48.28109"N	168°57'47.20477"W	63°18'48.29659"N	168°57'47.11897"W	7022130.9120	602054.2600	3404585.115	1810928.91	53.923	16.436	HEW6	8/2/2018 12:17
5061	5061	63°18'48.28083"N	168°57'47.13437"W	63°18'48.29633"N	168°57'47.04858"W	7022130.9350	602055.2400	3404585.14	1810932.126	53.983	16.454	HEW6	8/2/2018 12:17
5062	5062	63°18'48.29929"N	168°57'47.07039"W	63°18'48.31479"N	168°57'46.98460"W	7022131.5340	602056.1120	3404587.063	1810935.018	53.779	16.392	HEW6	8/2/2018 12:17
5063	5063	63°18'48.31592"N	168°57'47.05046"W	63°18'48.33142"N	168°57'46.96467"W	7022132.0570	602056.3730	3404588.766	1810935.901	53.766	16.388	HEW6	8/2/2018 12:17
5064	5064	63°18'48.34902"N	168°57'47.04977"W	63°18'48.36452"N	168°57'46.96399"W	7022133.0820	602056.3500	3404592.129	1810935.878	53.706	16.37	HEW6	8/2/2018 12:18
5065	5065	63°18'48.39420"N	168°57'47.03987"W	63°18'48.40969"N	168°57'46.95409"W	7022134.4840	602056.4430	3404596.724	1810936.256	53.396	16.275	HEW6	8/2/2018 12:18
5066	5066	63°18'48.43022"N	168°57'47.00195"W	63°18'48.44572"N	168°57'46.91616"W	7022135.6150	602056.9360	3404600.411	1810937.929	53.035	16.165	HEW6	8/2/2018 12:18
5067	5067	63°18'48.49522"N	168°57'46.85158"W	63°18'48.51072"N	168°57'46.76579"W	7022137.6930	602058.9640	3404607.124	1810944.69	52.932	16.134	HEW6	8/2/2018 12:18
5068	5068	63°18'48.31384"N	168°57'46.84283"W	63°18'48.32934"N	168°57'46.75705"W	7022132.0850	602059.2640	3404588.708	1810945.388	54.635	16.653	HEW5	8/2/2018 12:19
5069	5069	63°18'48.39246"N	168°57'46.87089"W	63°18'48.40796"N	168°57'46.78509"W	7022134.5050	602058.7960	3404596.673	1810943.977	53.025	16.162	HEW5	8/2/2018 12:19
5070	5070	63°18'48.46819"N	168°57'46.79986"W	63°18'48.48369"N	168°57'46.71408"W	7022136.8790	602059.7100	3404604.417	1810947.097	53.046	16.168	HEW5	8/2/2018 12:19
5071	5071	63°18'48.30494"N	168°57'46.85714"W	63°18'48.32045"N	168°57'46.77136"W	7022131.8030	602059.0740	3404587.794	1810944.749	54.691	16.67	HEW7	8/2/2018 12:20
5072	5072	63°18'48.29707"N	168°57'46.92332"W	63°18'48.31257"N	168°57'46.83753"W	7022131.5300	602058.1600	3404586.946	1810941.739	54.198	16.52	HEW7	8/2/2018 12:20
5073	5073	63°18'48.31597"N	168°57'46.99016"W	63°18'48.33147"N	168°57'46.90438"W	7022132.0860	602057.2120	3404588.816	1810938.655	53.732	16.378	HEW7	8/2/2018 12:20
5074	5074	63°18'48.34664"N	168°57'47.01966"W	63°18'48.36214"N	168°57'46.93387"W	7022133.0210	602056.7710	3404591.909	1810937.257	53.735	16.378	HEW7	8/2/2018 12:21
5075	5075	63°18'48.39037"N	168°57'47.02107"W	63°18'48.40586"N	168°57'46.93527"W	7022134.3740	602056.7090	3404596.349	1810937.121	53.315	16.25	HEW7	8/2/2018 12:21

2018 Northeast Cape Periodic Review
Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
5076	5076	63°18'48.38997"N	168°57'46.91238"W	63°18'48.40547"N	168°57'46.82660"W	7022134.4090	602058.2210	3404596.389	1810942.086	53.066	16.175	HEW7 C	8/2/2018 12:21
5077	5077	63°18'48.58547"N	168°57'46.70750"W	63°18'48.60097"N	168°57'46.62170"W	7022140.5490	602060.8800	3404616.396	1810951.123	52.457	15.989	HEW6	8/2/2018 12:23
5078	5078	63°18'48.67880"N	168°57'46.72785"W	63°18'48.69430"N	168°57'46.64207"W	7022143.4270	602060.5050	3404625.86	1810950.04	52.33	15.95	HEW6	8/2/2018 12:23
5079	5079	63°18'48.75754"N	168°57'46.70950"W	63°18'48.77304"N	168°57'46.62371"W	7022145.8720	602060.6830	3404633.871	1810950.749	52.057	15.867	HEW6	8/2/2018 12:23
5080	5080	63°18'48.83553"N	168°57'46.69579"W	63°18'48.85103"N	168°57'46.61000"W	7022148.2900	602060.7970	3404641.802	1810951.247	51.702	15.759	HEW6	8/2/2018 12:24
5081	5081	63°18'48.85654"N	168°57'46.65037"W	63°18'48.87203"N	168°57'46.56459"W	7022148.9600	602061.4080	3404643.969	1810953.287	51.689	15.755	HEW6	8/2/2018 12:24
5082	5082	63°18'48.86711"N	168°57'46.54895"W	63°18'48.88261"N	168°57'46.46315"W	7022149.3330	602062.8090	3404645.118	1810957.902	51.637	15.739	HEW6	8/2/2018 12:24
5083	5083	63°18'48.89009"N	168°57'46.46175"W	63°18'48.90559"N	168°57'46.37596"W	7022150.0820	602064.0000	3404647.516	1810961.847	51.617	15.733	HEW6	8/2/2018 12:24
5084	5084	63°18'49.05431"N	168°57'46.35691"W	63°18'49.06981"N	168°57'46.27112"W	7022155.2090	602065.2970	3404664.273	1810966.366	50.978	15.538	HEW6	8/2/2018 12:25
5085	5085	63°18'49.14264"N	168°57'46.40987"W	63°18'49.15815"N	168°57'46.32409"W	7022157.9190	602064.4730	3404673.205	1810963.802	50.276	15.324	HEW6	8/2/2018 12:25
5086	5086	63°18'49.26426"N	168°57'46.24722"W	63°18'49.27976"N	168°57'46.16143"W	7022161.7530	602066.6170	3404685.677	1810971.031	49.902	15.21	HEW6	8/2/2018 12:25
5087	5087	63°18'49.29916"N	168°57'46.18035"W	63°18'49.31466"N	168°57'46.09457"W	7022162.8630	602067.5130	3404689.271	1810974.028	49.688	15.145	HEW6	8/2/2018 12:25
5088	5088	63°18'49.31998"N	168°57'46.13488"W	63°18'49.33548"N	168°57'46.04908"W	7022163.5270	602068.1250	3404691.419	1810976.071	49.444	15.071	HEW6	8/2/2018 12:26
5089	5089	63°18'49.34615"N	168°57'46.09129"W	63°18'49.36164"N	168°57'46.00550"W	7022164.3560	602068.7060	3404694.109	1810978.019	49.208	14.999	HEW6	8/2/2018 12:26
5090	5090	63°18'49.39186"N	168°57'46.17122"W	63°18'49.40736"N	168°57'46.08544"W	7022165.7350	602067.5490	3404698.693	1810974.293	49.022	14.942	HEW6	8/2/2018 12:26
5091	5091	63°18'49.48394"N	168°57'46.18500"W	63°18'49.49944"N	168°57'46.09922"W	7022168.5770	602067.2660	3404708.035	1810973.512	48.428	14.761	HEW6	8/2/2018 12:27
5092	5092	63°18'49.47307"N	168°57'46.67658"W	63°18'49.48856"N	168°57'46.59080"W	7022168.0230	602060.4370	3404706.567	1810951.077	48.173	14.683	HEW8	8/2/2018 12:29
5093	5093	63°18'49.45762"N	168°57'46.70402"W	63°18'49.47312"N	168°57'46.61823"W	7022167.5340	602060.0710	3404704.978	1810949.849	48.13	14.67	HEW8	8/2/2018 12:29
5094	5094	63°18'49.46325"N	168°57'46.73666"W	63°18'49.47875"N	168°57'46.65088"W	7022167.6930	602059.6110	3404705.526	1810948.349	48.102	14.662	HEW8	8/2/2018 12:29
5095	5095	63°18'49.48206"N	168°57'46.72364"W	63°18'49.49756"N	168°57'46.63784"W	7022168.2810	602059.7740	3404707.446	1810948.913	48.081	14.655	HEW8 C	8/2/2018 12:29
5096	5096	63°18'49.53884"N	168°57'46.22012"W	63°18'49.55435"N	168°57'46.13432"W	7022170.2610	602066.7240	3404713.585	1810971.818	47.576	14.501	HEW6	8/2/2018 12:29
5097	5097	63°18'49.58636"N	168°57'46.28895"W	63°18'49.60186"N	168°57'46.20316"W	7022171.7000	602065.7190	3404718.36	1810968.596	47.178	14.38	HEW6	8/2/2018 12:30
5098	5098	63°18'49.60051"N	168°57'46.39658"W	63°18'49.61601"N	168°57'46.31079"W	7022172.0900	602064.2080	3404719.718	1810963.657	47.036	14.336	HEW6	8/2/2018 12:30
5099	5099	63°18'49.66381"N	168°57'46.57081"W	63°18'49.67931"N	168°57'46.48501"W	7022173.9720	602061.7220	3404726.018	1810955.595	46.967	14.316	HEW6	8/2/2018 12:30
5100	5100	63°18'49.73959"N	168°57'46.50021"W	63°18'49.75509"N	168°57'46.41441"W	7022176.3480	602062.6290	3404733.767	1810958.695	46.894	14.293	HEW6	8/2/2018 12:30
5101	5101	63°18'49.81362"N	168°57'46.46466"W	63°18'49.82912"N	168°57'46.37887"W	7022178.6540	602063.0510	3404741.312	1810960.197	46.901	14.296	HEW6	8/2/2018 12:30
5102	5102	63°18'49.88662"N	168°57'46.39824"W	63°18'49.90212"N	168°57'46.31244"W	7022180.9410	602063.9040	3404748.775	1810963.111	46.672	14.226	HEW6	8/2/2018 12:31
5103	5103	63°18'49.95976"N	168°57'46.38287"W	63°18'49.97526"N	168°57'46.29707"W	7022183.2110	602064.0460	3404756.215	1810963.693	46.439	14.155	HEW6	8/2/2018 12:31
5104	5104	63°18'50.04191"N	168°57'46.22968"W	63°18'50.05741"N	168°57'46.14388"W	7022185.8200	602066.0960	3404764.671	1810970.555	46.319	14.118	HEW6	8/2/2018 12:31
5105	5105	63°18'50.04292"N	168°57'46.16146"W	63°18'50.05842"N	168°57'46.07567"W	7022185.8820	602067.0440	3404764.824	1810973.669	46.28	14.106	HEW6	8/2/2018 12:32
5106	5106	63°18'50.05617"N	168°57'46.11280"W	63°18'50.07167"N	168°57'46.02701"W	7022186.3140	602067.7080	3404766.206	1810975.87	46.286	14.108	HEW6	8/2/2018 12:32
5107	5107	63°18'50.13406"N	168°57'45.97684"W	63°18'50.14955"N	168°57'45.89105"W	7022188.7830	602069.5230	3404774.217	1810981.952	46.258	14.099	HEW6	8/2/2018 12:32
5108	5108	63°18'50.14504"N	168°57'45.84499"W	63°18'50.16054"N	168°57'45.75920"W	7022189.1820	602071.3470	3404775.43	1810987.956	46.256	14.099	HEW6	8/2/2018 12:32
5109	5109	63°18'50.13334"N	168°57'45.76403"W	63°18'50.14883"N	168°57'45.67824"W	7022188.8550	602072.4850	3404774.301	1810991.673	46.126	14.059	HEW6	8/2/2018 12:32
5110	5110	63°18'50.19183"N	168°57'45.67372"W	63°18'50.20733"N	168°57'45.58793"W	7022190.7050	602073.6840	3404780.309	1810995.702	45.787	13.956	HEW6	8/2/2018 12:33
5111	5111	63°18'50.25804"N	168°57'45.64309"W	63°18'50.27354"N	168°57'45.55730"W	7022192.7670	602074.0450	3404787.056	1810996.992	45.599	13.898	HEW6	8/2/2018 12:33
5112	5112	63°18'50.32722"N	168°57'45.54186"W	63°18'50.34272"N	168°57'45.45607"W	7022194.9520	602075.3860	3404794.157	1811001.502	44.979	13.71	HEW6	8/2/2018 12:33
5113	5113	63°18'50.45120"N	168°57'45.41087"W	63°18'50.46670"N	168°57'45.32509"W	7022198.8460	602077.0860	3404806.846	1811007.281	44.789	13.652	HEW6	8/2/2018 12:34
5114	5114	63°18'42.73227"N	168°57'29.94991"W	63°18'42.74776"N	168°57'29.86412"W	7021966.8750	602299.8100	3404034.328	1811726.189	73.037	22.262	CHK 2600 HV	8/2/2018 12:40
5115	5115	63°20'08.82969"N	168°56'24.47122"W	63°20'08.84519"N	168°56'24.38535"W	7024659.7650	603125.3050	3412827.733	1814572.558	5.285	1.611	CHK 59 HV	8/2/2018 14:35
5116	5116	63°18'50.48051"N	168°57'45.27559"W	63°18'50.49601"N	168°57'45.18978"W	7022199.8120	602078.9400	3404809.922	1811013.412	44.737	13.636	HEW6	8/2/2018 15:14
5117	5117	63°18'50.57946"N	168°57'45.18671"W	63°18'50.59496"N	168°57'45.10092"W	7022202.9130	602080.0790	3404820.038	1811017.309	44.48	13.557	HEW6	8/2/2018 15:16
5118	5118	63°18'50.72525"N	168°57'45.11357"W	63°18'50.74074"N	168°57'45.02778"W	7022207.4560	602080.9530	3404834.899	1811020.41	44.254	13.489	HEW6	8/2/2018 15:17
5119	5119	63°18'50.88535"N	168°57'45.29156"W	63°18'50.90085"N	168°57'45.20577"W	7022212.3310	602078.3190	3404851.028	1811012.017	44.028	13.42	HEW6	8/2/2018 15:17

2018 Northeast Cape Periodic Review
Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
5120	5120	63°18'50.95993"N	168°57'45.50357"W	63°18'50.97543"N	168°57'45.41777"W	7022214.5440	602075.2960	3404858.446	1811002.211	43.918	13.386	HEW6	8/2/2018 15:18
5121	5121	63°18'51.13799"N	168°57'45.46906"W	63°18'51.15349"N	168°57'45.38327"W	7022220.0680	602075.6010	3404876.556	1811003.495	43.899	13.381	HEW6	8/2/2018 15:18
5122	5122	63°18'51.28536"N	168°57'45.51146"W	63°18'51.30086"N	168°57'45.42566"W	7022224.6090	602074.8660	3404891.492	1811001.316	43.919	13.387	HEW6	8/2/2018 15:19
5123	5123	63°18'51.41236"N	168°57'45.64741"W	63°18'51.42785"N	168°57'45.56162"W	7022228.4780	602072.8500	3404904.29	1810994.898	44.027	13.419	HEW6	8/2/2018 15:19
5124	5124	63°18'51.47995"N	168°57'45.67381"W	63°18'51.49545"N	168°57'45.58801"W	7022230.5580	602072.4160	3404911.135	1810993.581	43.913	13.385	HEW6	8/2/2018 15:19
5125	5125	63°18'51.55306"N	168°57'45.56738"W	63°18'51.56855"N	168°57'45.48158"W	7022232.8670	602073.8250	3404918.639	1810998.322	44.04	13.423	HEW6	8/2/2018 15:21
5126	5126	63°18'51.57111"N	168°57'45.37290"W	63°18'51.58661"N	168°57'45.28711"W	7022233.5110	602076.5130	3404920.616	1811007.175	44.046	13.425	HEW6	8/2/2018 15:21
5127	5127	63°18'51.47026"N	168°57'45.29900"W	63°18'51.48575"N	168°57'45.21320"W	7022230.4240	602077.6410	3404910.428	1811010.716	44.002	13.412	HEW6	8/2/2018 15:22
5128	5128	63°18'51.47959"N	168°57'45.21251"W	63°18'51.49509"N	168°57'45.12673"W	7022230.7510	602078.8350	3404911.44	1811014.651	43.992	13.409	HEW6	8/2/2018 15:22
5129	5129	63°18'51.52096"N	168°57'45.20319"W	63°18'51.53645"N	168°57'45.11741"W	7022232.0340	602078.9240	3404915.648	1811015.009	44.006	13.413	HEW6	8/2/2018 15:22
5130	5130	63°18'51.53223"N	168°57'45.07529"W	63°18'51.54774"N	168°57'44.98949"W	7022232.4400	602080.6920	3404916.888	1811020.832	43.987	13.407	HEW6	8/2/2018 15:22
5131	5131	63°18'51.51715"N	168°57'44.95404"W	63°18'51.53266"N	168°57'44.86824"W	7022232.0270	602082.3940	3404915.446	1811026.395	44.011	13.415	HEW6	8/2/2018 15:22
5132	5132	63°18'51.53880"N	168°57'44.91472"W	63°18'51.55430"N	168°57'44.82894"W	7022232.7140	602082.9200	3404917.673	1811028.155	44.041	13.424	HEW6	8/2/2018 15:23
5133	5133	63°18'51.59879"N	168°57'44.86543"W	63°18'51.61429"N	168°57'44.77964"W	7022234.5920	602083.5460	3404923.803	1811030.308	43.967	13.401	HEW6	8/2/2018 15:23
5134	5134	63°18'51.66866"N	168°57'44.79178"W	63°18'51.68416"N	168°57'44.70597"W	7022236.7860	602084.5030	3404930.953	1811033.557	44.008	13.414	HEW6	8/2/2018 15:23
5135	5135	63°18'51.75900"N	168°57'44.76604"W	63°18'51.77450"N	168°57'44.68025"W	7022239.5930	602084.7720	3404940.148	1811034.584	43.972	13.403	HEW6	8/2/2018 15:23
5136	5136	63°18'51.85983"N	168°57'44.93291"W	63°18'51.87533"N	168°57'44.84712"W	7022242.6380	602082.3510	3404950.265	1811026.797	43.945	13.394	HEW6	8/2/2018 15:24
5137	5137	63°18'52.03835"N	168°57'44.81913"W	63°18'52.05386"N	168°57'44.73335"W	7022248.2120	602083.7580	3404968.481	1811031.7	43.906	13.382	HEW6	8/2/2018 15:24
5138	5138	63°18'52.22644"N	168°57'44.64568"W	63°18'52.24194"N	168°57'44.55989"W	7022254.1080	602085.9870	3404987.712	1811039.313	43.955	13.398	HEW6	8/2/2018 15:25
5139	5139	63°18'52.38332"N	168°57'44.34484"W	63°18'52.39882"N	168°57'44.25904"W	7022259.0950	602090.0180	3405003.868	1811052.796	43.977	13.404	HEW6	8/2/2018 15:25
5140	5140	63°18'52.40434"N	168°57'44.06471"W	63°18'52.41984"N	168°57'43.97892"W	7022259.8690	602093.8950	3405006.21	1811065.556	44.025	13.419	HEW6	8/2/2018 15:25
5141	5141	63°18'52.44199"N	168°57'43.96395"W	63°18'52.45749"N	168°57'43.87815"W	7022261.0780	602095.2600	3405010.108	1811070.096	43.967	13.401	HEW6	8/2/2018 15:26
5142	5142	63°18'52.53845"N	168°57'43.83949"W	63°18'52.55395"N	168°57'43.75370"W	7022264.1180	602096.8970	3405019.997	1811075.622	43.912	13.384	HEW6	8/2/2018 15:27
5143	5143	63°18'52.60742"N	168°57'43.83720"W	63°18'52.62291"N	168°57'43.75141"W	7022266.2520	602096.8610	3405027.003	1811075.613	43.76	13.338	HEW6	8/2/2018 15:27
5144	5144	63°18'52.65892"N	168°57'43.92273"W	63°18'52.67442"N	168°57'43.83695"W	7022267.8080	602095.6200	3405032.171	1811071.622	43.778	13.344	HEW6	8/2/2018 15:28
5145	5145	63°18'52.69878"N	168°57'43.88668"W	63°18'52.71428"N	168°57'43.80090"W	7022269.0570	602096.0820	3405036.246	1811073.203	43.772	13.342	HEW6	8/2/2018 15:28
5146	5146	63°18'52.77723"N	168°57'43.80342"W	63°18'52.79273"N	168°57'43.71762"W	7022271.5210	602097.1640	3405044.275	1811076.877	43.376	13.221	HEW6	8/2/2018 15:28
5147	5147	63°18'52.86681"N	168°57'43.76315"W	63°18'52.88231"N	168°57'43.67736"W	7022274.3110	602097.6360	3405053.403	1811078.569	43.235	13.178	HEW6	8/2/2018 15:29
5148	5148	63°18'52.98371"N	168°57'43.94568"W	63°18'52.99921"N	168°57'43.85989"W	7022277.8470	602094.9810	3405065.141	1811070.04	43.223	13.174	HEW6	8/2/2018 15:29
5149	5149	63°18'53.13862"N	168°57'44.04533"W	63°18'53.15412"N	168°57'43.95953"W	7022282.5960	602093.4420	3405080.801	1811065.234	43.23	13.176	HEW6	8/2/2018 15:30
5150	5150	63°18'53.25639"N	168°57'43.90237"W	63°18'53.27189"N	168°57'43.81658"W	7022286.3020	602095.3160	3405092.867	1811071.57	43.223	13.174	HEW6	8/2/2018 15:30
5151	5151	63°18'53.33076"N	168°57'43.54854"W	63°18'53.34626"N	168°57'43.46276"W	7022288.7600	602100.1650	3405100.682	1811087.608	43.275	13.19	HEW6	8/2/2018 15:31
5152	5152	63°18'53.42318"N	168°57'43.47596"W	63°18'53.43868"N	168°57'43.39016"W	7022291.6510	602101.0840	3405110.123	1811090.771	43.213	13.171	HEW6	8/2/2018 15:31
5153	5153	63°18'53.43918"N	168°57'43.37564"W	63°18'53.45469"N	168°57'43.28984"W	7022292.1910	602102.4640	3405111.822	1811095.327	43.172	13.159	HEW6	8/2/2018 15:32
5154	5154	63°18'53.64979"N	168°57'43.45697"W	63°18'53.66529"N	168°57'43.37118"W	7022298.6710	602101.1260	3405133.152	1811091.266	43.05	13.122	HEW9	8/2/2018 15:34
5155	5155	63°18'53.59086"N	168°57'43.57907"W	63°18'53.60637"N	168°57'43.49327"W	7022296.7940	602099.4850	3405127.077	1811085.786	43.045	13.12	HEW9	8/2/2018 15:34
5156	5156	63°18'53.54348"N	168°57'43.52028"W	63°18'53.55898"N	168°57'43.43449"W	7022295.3540	602100.3490	3405122.308	1811088.549	43.084	13.132	HEW9	8/2/2018 15:35
5157	5157	63°18'53.56168"N	168°57'43.38576"W	63°18'53.57718"N	168°57'43.29998"W	7022295.9760	602102.2030	3405124.256	1811094.663	43.058	13.124	HEW9	8/2/2018 15:35
5158	5158	63°18'53.62253"N	168°57'43.35277"W	63°18'53.63803"N	168°57'43.26697"W	7022297.8740	602102.6020	3405130.461	1811096.07	43.026	13.114	HEW9 C	8/2/2018 15:35
5159	5159	63°18'53.92732"N	168°57'43.43724"W	63°18'53.94282"N	168°57'43.35144"W	7022307.2660	602101.1270	3405161.354	1811091.711	42.437	12.935	HEW11HEW10	8/2/2018 15:37
5160	5160	63°18'53.94197"N	168°57'43.49420"W	63°18'53.95747"N	168°57'43.40840"W	7022307.6940	602100.3200	3405162.8	1811089.085	42.515	12.959	HEW11	8/2/2018 15:38
5161	5161	63°18'54.07248"N	168°57'43.35391"W	63°18'54.08797"N	168°57'43.26811"W	7022311.7940	602102.1440	3405176.158	1811095.278	41.803	12.742	HEW11	8/2/2018 15:38
5162	5162	63°18'54.18092"N	168°57'43.17345"W	63°18'54.19643"N	168°57'43.08765"W	7022315.2290	602104.5480	3405187.306	1811103.342	41.647	12.694	HEW11	8/2/2018 15:38
5163	5163	63°18'54.26256"N	168°57'43.00461"W	63°18'54.27806"N	168°57'42.91882"W	7022317.8290	602106.8160	3405195.722	1811110.919	41.5	12.649	HEW11	8/2/2018 15:39

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
5164	5164	63°18'54.32754"N	168°57'43.09285"W	63°18'54.34303"N	168°57'43.00705"W	7022319.8000	602105.5250	3405202.256	1811106.782	41.474	12.641	HEW11	8/2/2018 15:39
5165	5165	63°18'54.37039"N	168°57'43.03920"W	63°18'54.38588"N	168°57'42.95340"W	7022321.1500	602106.2290	3405206.648	1811109.162	41.433	12.629	HEW11	8/2/2018 15:39
5166	5166	63°18'54.38658"N	168°57'42.92152"W	63°18'54.40208"N	168°57'42.83572"W	7022321.7030	602107.8510	3405208.38	1811114.51	41.383	12.614	HEW11	8/2/2018 15:39
5167	5167	63°18'54.47182"N	168°57'42.80453"W	63°18'54.48732"N	168°57'42.71874"W	7022324.3920	602109.3940	3405217.123	1811119.713	41.271	12.579	HEW11	8/2/2018 15:39
5168	5168	63°18'54.61165"N	168°57'42.71113"W	63°18'54.62715"N	168°57'42.62533"W	7022328.7590	602110.5560	3405231.394	1811123.749	41.129	12.536	HEW11	8/2/2018 15:40
5169	5169	63°18'54.77511"N	168°57'42.64098"W	63°18'54.79061"N	168°57'42.55518"W	7022333.8480	602111.3720	3405248.048	1811126.684	41.011	12.5	HEW11	8/2/2018 15:40
5170	5170	63°18'54.91968"N	168°57'42.51549"W	63°18'54.93519"N	168°57'42.42968"W	7022338.3760	602112.9750	3405262.824	1811132.178	40.913	12.47	HEW11	8/2/2018 15:40
5171	5171	63°18'55.09419"N	168°57'42.42406"W	63°18'55.10969"N	168°57'42.33827"W	7022343.8160	602114.0760	3405280.615	1811136.067	40.601	12.375	HEW11	8/2/2018 15:41
5172	5172	63°18'55.16777"N	168°57'42.46474"W	63°18'55.18327"N	168°57'42.37894"W	7022346.0740	602113.4370	3405288.058	1811134.088	40.461	12.333	HEW11	8/2/2018 15:42
5173	5173	63°18'55.23556"N	168°57'42.62180"W	63°18'55.25106"N	168°57'42.53601"W	7022348.1020	602111.1850	3405294.827	1811126.803	40.39	12.311	HEW11	8/2/2018 15:42
5174	5174	63°18'55.34598"N	168°57'42.72073"W	63°18'55.36148"N	168°57'42.63493"W	7022351.4750	602109.7000	3405305.969	1811122.103	40.319	12.289	HEW11	8/2/2018 15:43
5175	5175	63°18'55.48532"N	168°57'42.67584"W	63°18'55.50082"N	168°57'42.59004"W	7022355.8060	602110.1880	3405320.154	1811123.924	40.294	12.282	HEW11	8/2/2018 15:43
5176	5176	63°18'55.62705"N	168°57'42.65463"W	63°18'55.64255"N	168°57'42.56883"W	7022360.2000	602110.3440	3405334.564	1811124.66	40.18	12.247	HEW11	8/2/2018 15:44
5177	5177	63°18'55.72074"N	168°57'42.60650"W	63°18'55.73624"N	168°57'42.52071"W	7022363.1200	602110.9210	3405344.115	1811126.704	40.18	12.247	HEW11	8/2/2018 15:44
5178	5178	63°18'55.78184"N	168°57'42.37300"W	63°18'55.79734"N	168°57'42.28721"W	7022365.1130	602114.1090	3405350.494	1811137.268	40.117	12.228	HEW11	8/2/2018 15:44
5179	5179	63°18'55.77042"N	168°57'42.16521"W	63°18'55.78591"N	168°57'42.07940"W	7022364.8520	602117.0120	3405349.487	1811146.777	40.066	12.212	HEW11	8/2/2018 15:45
5180	5180	63°18'55.78778"N	168°57'42.07781"W	63°18'55.80328"N	168°57'41.99202"W	7022365.4280	602118.2100	3405351.315	1811150.74	40.078	12.216	HEW11	8/2/2018 15:45
5181	5181	63°18'55.88144"N	168°57'41.99089"W	63°18'55.89694"N	168°57'41.90509"W	7022368.3640	602119.3280	3405360.892	1811154.556	39.966	12.182	HEW11	8/2/2018 15:45
5182	5182	63°18'55.97655"N	168°57'41.96125"W	63°18'55.99205"N	168°57'41.87546"W	7022371.3200	602119.6460	3405370.574	1811155.753	39.909	12.164	HEW11	8/2/2018 15:46
5183	5183	63°18'56.08718"N	168°57'41.97487"W	63°18'56.10268"N	168°57'41.88908"W	7022374.7370	602119.3480	3405381.8	1811154.949	39.803	12.132	HEW11	8/2/2018 15:46
5184	5184	63°18'56.17711"N	168°57'41.98501"W	63°18'56.19261"N	168°57'41.89921"W	7022377.5140	602119.1190	3405390.926	1811154.338	39.721	12.107	HEW11	8/2/2018 15:46
5185	5185	63°18'56.29982"N	168°57'41.95828"W	63°18'56.31532"N	168°57'41.87249"W	7022381.3230	602119.3700	3405403.409	1811155.357	39.726	12.109	HEW11	8/2/2018 15:46
5186	5186	63°18'56.37165"N	168°57'41.99778"W	63°18'56.38715"N	168°57'41.91199"W	7022383.5280	602118.7490	3405410.675	1811153.435	39.719	12.106	HEW11	8/2/2018 15:46
5187	5187	63°18'56.45547"N	168°57'41.94530"W	63°18'56.47097"N	168°57'41.85950"W	7022386.1440	602119.3970	3405419.227	1811155.694	39.677	12.094	HEW11	8/2/2018 15:47
5188	5188	63°18'56.51765"N	168°57'41.72864"W	63°18'56.53315"N	168°57'41.64284"W	7022388.1640	602122.3500	3405425.702	1811165.487	39.655	12.087	HEW11	8/2/2018 15:48
5189	5189	63°18'56.55912"N	168°57'41.58220"W	63°18'56.57462"N	168°57'41.49639"W	7022389.5120	602124.3470	3405430.022	1811172.107	39.615	12.075	HEW11	8/2/2018 15:48
5190	5190	63°18'56.61472"N	168°57'41.57772"W	63°18'56.63022"N	168°57'41.49192"W	7022391.2340	602124.3550	3405435.673	1811172.22	39.595	12.069	HEW11	8/2/2018 15:48
5191	5191	63°18'56.70746"N	168°57'41.68719"W	63°18'56.72297"N	168°57'41.60139"W	7022394.0550	602122.7400	3405445.011	1811167.068	39.622	12.077	HEW11	8/2/2018 15:49
5192	5192	63°18'56.86524"N	168°57'41.62208"W	63°18'56.88074"N	168°57'41.53627"W	7022398.9650	602123.4910	3405461.084	1811169.782	39.586	12.066	HEW11	8/2/2018 15:51
5193	5193	63°18'56.98321"N	168°57'41.63776"W	63°18'56.99872"N	168°57'41.55197"W	7022402.6080	602123.1570	3405473.054	1811168.872	39.337	11.99	HEW11	8/2/2018 15:52
5194	5194	63°18'57.08411"N	168°57'41.39785"W	63°18'57.09961"N	168°57'41.31206"W	7022405.8360	602126.3950	3405483.479	1811179.663	39.076	11.911	HEW11	8/2/2018 15:52
5195	5195	63°18'57.19855"N	168°57'41.48308"W	63°18'57.21405"N	168°57'41.39728"W	7022409.3390	602125.0970	3405495.039	1811175.582	39.095	11.916	HEW11	8/2/2018 15:53
5196	5196	63°18'57.28800"N	168°57'41.64353"W	63°18'57.30350"N	168°57'41.55773"W	7022412.0350	602122.7770	3405504.005	1811168.107	38.956	11.874	HEW11	8/2/2018 15:53
5200	5200	63°18'57.72786"N	168°57'41.57424"W	63°18'57.74336"N	168°57'41.48844"W	7022425.6750	602123.3080	3405548.73	1811170.548	38.317	11.679	HEW11	8/2/2018 15:55
5201	5201	63°18'57.79693"N	168°57'41.70258"W	63°18'57.81242"N	168°57'41.61678"W	7022427.7540	602121.4540	3405555.65	1811164.573	37.897	11.551	HEW11	8/2/2018 15:55
5202	5202	63°18'57.79854"N	168°57'41.75890"W	63°18'57.81404"N	168°57'41.67311"W	7022427.7800	602120.6690	3405555.772	1811161.998	37.825	11.529	HEW11	8/2/2018 15:55
5203	5203	63°18'57.82101"N	168°57'41.87596"W	63°18'57.83651"N	168°57'41.79016"W	7022428.4230	602119.0180	3405557.968	1811156.615	37.927	11.56	HEW11	8/2/2018 15:55
5204	5204	63°18'57.87921"N	168°57'41.81647"W	63°18'57.89471"N	168°57'41.73067"W	7022430.2500	602119.7890	3405563.923	1811159.236	37.798	11.521	HEW11	8/2/2018 15:56
5205	5205	63°18'57.90927"N	168°57'41.70278"W	63°18'57.92477"N	168°57'41.61698"W	7022431.2300	602121.3410	3405567.06	1811164.379	37.897	11.551	HEW11	8/2/2018 15:56
5206	5206	63°18'57.95097"N	168°57'41.65740"W	63°18'57.96647"N	168°57'41.57160"W	7022432.5410	602121.9310	3405571.329	1811166.383	37.885	11.547	HEW11	8/2/2018 15:56
5207	5207	63°18'57.98571"N	168°57'41.74763"W	63°18'58.00120"N	168°57'41.66184"W	7022433.5750	602120.6420	3405574.79	1811162.205	37.853	11.538	HEW11	8/2/2018 15:57
5208	5208	63°18'58.02242"N	168°57'41.85318"W	63°18'58.03792"N	168°57'41.76738"W	7022434.6650	602119.1370	3405578.441	1811157.324	37.821	11.528	HEW11	8/2/2018 15:58
5209	5209	63°18'57.98078"N	168°57'42.12264"W	63°18'57.99627"N	168°57'42.03685"W	7022433.2570	602115.4290	3405574.012	1811145.086	37.865	11.541	HEW11	8/2/2018 15:58
5210	5210	63°18'57.97677"N	168°57'42.53363"W	63°18'57.99227"N	168°57'42.44783"W	7022432.9510	602109.7150	3405573.301	1811126.322	37.866	11.542	HEW11	8/2/2018 15:58

2018 Northeast Cape Periodic Review
Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
5211	5211	63°18'58.01702"N	168°57'42.94321"W	63°18'58.03252"N	168°57'42.85741"W	7022434.0150	602103.9770	3405577.086	1811107.55	37.79	11.519	HEW11	8/2/2018 15:59
5212	5212	63°18'57.98803"N	168°57'43.43325"W	63°18'58.00353"N	168°57'43.34746"W	7022432.9010	602097.1880	3405573.78	1811085.217	37.754	11.508	HEW11	8/2/2018 15:59
5213	5213	63°18'58.03433"N	168°57'43.44991"W	63°18'58.04983"N	168°57'43.36410"W	7022434.3270	602096.9110	3405578.47	1811084.38	37.693	11.489	HEW12	8/2/2018 16:00
5214	5214	63°18'58.04535"N	168°57'42.95922"W	63°18'58.06086"N	168°57'42.87343"W	7022434.8850	602103.7270	3405579.952	1811106.772	37.737	11.502	HEW12	8/2/2018 16:00
5215	5215	63°18'58.05945"N	168°57'42.57107"W	63°18'58.07495"N	168°57'42.48527"W	7022435.4930	602109.1130	3405581.671	1811124.476	37.789	11.518	HEW12	8/2/2018 16:01
5216	5216	63°18'58.09968"N	168°57'42.15934"W	63°18'58.11517"N	168°57'42.07354"W	7022436.9190	602114.8020	3405586.061	1811143.214	37.864	11.541	HEW12	8/2/2018 16:01
5217	5217	63°18'58.13640"N	168°57'41.77156"W	63°18'58.15189"N	168°57'41.68576"W	7022438.2270	602120.1610	3405590.077	1811160.864	37.78	11.515	HEW12	8/2/2018 16:01
5218	5218	63°18'58.10018"N	168°57'41.56028"W	63°18'58.11568"N	168°57'41.47448"W	7022437.2000	602123.1360	3405586.555	1811170.573	37.876	11.545	HEW12	8/2/2018 16:02
5219	5219	63°18'58.09115"N	168°57'41.33905"W	63°18'58.10665"N	168°57'41.25325"W	7022437.0190	602126.2220	3405585.802	1811180.692	37.875	11.544	HEW12	8/2/2018 16:02
5220	5220	63°18'58.11684"N	168°57'41.04391"W	63°18'58.13234"N	168°57'40.95812"W	7022437.9440	602130.3030	3405588.629	1811194.129	37.856	11.539	HEW12	8/2/2018 16:02
5221	5221	63°18'58.12933"N	168°57'40.87488"W	63°18'58.14484"N	168°57'40.78908"W	7022438.4050	602132.6430	3405590.023	1811201.828	37.831	11.531	HEW12	8/2/2018 16:03
5222	5222	63°18'58.17075"N	168°57'40.42311"W	63°18'58.18625"N	168°57'40.33732"W	7022439.8870	602138.8870	3405594.564	1811222.393	37.849	11.536	HEW12	8/2/2018 16:03
5223	5223	63°18'58.17464"N	168°57'40.25593"W	63°18'58.19014"N	168°57'40.17012"W	7022440.0810	602141.2090	3405595.083	1811230.022	37.839	11.533	HEW12	8/2/2018 16:04
5224	5224	63°18'58.31299"N	168°57'40.03684"W	63°18'58.32849"N	168°57'39.95104"W	7022444.4580	602144.1210	3405609.296	1811239.8	37.844	11.535	HEW12	8/2/2018 16:04
5225	5225	63°18'58.39490"N	168°57'39.74610"W	63°18'58.41040"N	168°57'39.66030"W	7022447.1210	602148.0850	3405617.83	1811252.944	37.856	11.539	HEW12	8/2/2018 16:04
5226	5226	63°18'58.39805"N	168°57'39.49646"W	63°18'58.41355"N	168°57'39.41066"W	7022447.3290	602151.5550	3405618.335	1811264.34	37.853	11.538	HEW12	8/2/2018 16:05
5227	5227	63°18'58.36113"N	168°57'39.18459"W	63°18'58.37663"N	168°57'39.09879"W	7022446.3250	602155.9310	3405614.816	1811278.644	37.974	11.575	HEW12	8/2/2018 16:05
5228	5228	63°19'32.47889"N	168°58'15.32271"W	63°19'32.49439"N	168°58'15.23690"W	7023485.9390	601619.7420	3409053.349	1809572.56	28.483	8.682	CHK 1 HV	8/2/2018 16:30
5229	5229	63°18'57.69940"N	168°57'18.33934"W	63°18'57.71489"N	168°57'18.25353"W	7022435.0910	602446.5930	3405563.08	1812231.763	51.439	15.679	CHK 2 HV	8/2/2018 17:34
5230	5230	63°18'57.69957"N	168°57'18.33980"W	63°18'57.71507"N	168°57'18.25400"W	7022435.0960	602446.5860	3405563.097	1812231.742	51.426	15.675	CHK 2 HV	8/2/2018 18:07
5231	5231	63°18'57.69985"N	168°57'18.33948"W	63°18'57.71534"N	168°57'18.25367"W	7022435.1040	602446.5910	3405563.125	1812231.756	51.432	15.677	CHK 2 HV	8/3/2018 9:00
5232	5232	63°19'03.82813"N	168°56'45.44221"W	63°19'03.84363"N	168°56'45.35639"W	7022639.3400	602898.1990	3406210.13	1813723.983	78.722	23.995	GS	8/3/2018 9:08
5233	5233	63°19'04.78507"N	168°56'45.01774"W	63°19'04.80056"N	168°56'44.93193"W	7022669.1350	602903.1550	3406307.639	1813741.77	78.97	24.07	GS	8/3/2018 9:09
5234	5234	63°19'04.88922"N	168°56'44.97200"W	63°19'04.90471"N	168°56'44.88619"W	7022672.3780	602903.6880	3406318.251	1813743.685	79.036	24.09	GS	8/3/2018 9:15
5235	5235	63°19'04.99167"N	168°56'44.92464"W	63°19'05.00716"N	168°56'44.83881"W	7022675.5690	602904.2450	3406328.692	1813745.677	78.562	23.946	GS	8/3/2018 9:20
5236	5236	63°19'05.08047"N	168°56'44.88655"W	63°19'05.09596"N	168°56'44.80073"W	7022678.3330	602904.6870	3406337.739	1813747.268	78.48	23.921	GS	8/3/2018 9:21
5237	5237	63°19'05.17441"N	168°56'44.84272"W	63°19'05.18990"N	168°56'44.75690"W	7022681.2590	602905.2040	3406347.313	1813749.113	77.794	23.712	GS	8/3/2018 9:21
5238	5238	63°19'05.27789"N	168°56'44.80309"W	63°19'05.29338"N	168°56'44.71726"W	7022684.4780	602905.6530	3406357.853	1813750.75	77.005	23.471	GS	8/3/2018 9:22
5239	5239	63°19'05.37720"N	168°56'44.75651"W	63°19'05.39269"N	168°56'44.67069"W	7022687.5720	602906.2020	3406367.974	1813752.711	76.797	23.408	GS	8/3/2018 9:22
5240	5240	63°19'05.58438"N	168°56'44.66393"W	63°19'05.59987"N	168°56'44.57811"W	7022694.0230	602907.2840	3406389.086	1813756.593	75.711	23.077	GS	8/3/2018 9:22
5241	5241	63°19'05.80371"N	168°56'44.56513"W	63°19'05.81920"N	168°56'44.47930"W	7022700.8520	602908.4410	3406411.436	1813760.739	74.168	22.606	GS	8/3/2018 9:23
5242	5242	63°19'06.01640"N	168°56'44.47140"W	63°19'06.03189"N	168°56'44.38558"W	7022707.4750	602909.5340	3406433.108	1813764.664	71.979	21.939	GS	8/3/2018 9:23
5243	5243	63°19'06.22916"N	168°56'44.37712"W	63°19'06.24465"N	168°56'44.29130"W	7022714.0990	602910.6350	3406454.787	1813768.614	69.356	21.14	GS	8/3/2018 9:24
5244	5244	63°19'06.41767"N	168°56'44.29179"W	63°19'06.43315"N	168°56'44.20597"W	7022719.9690	602911.6350	3406473.997	1813772.196	66.245	20.191	GS	8/3/2018 9:24
5245	5245	63°19'06.61687"N	168°56'44.20607"W	63°19'06.63236"N	168°56'44.12025"W	7022726.1710	602912.6300	3406494.293	1813775.778	62.78	19.135	GS	8/3/2018 9:25
5246	5246	63°19'06.83244"N	168°56'44.10900"W	63°19'06.84793"N	168°56'44.02318"W	7022732.8830	602913.7670	3406516.26	1813779.851	60.402	18.41	GS	8/3/2018 9:25
5247	5247	63°19'06.99848"N	168°56'44.03675"W	63°19'07.01397"N	168°56'43.95093"W	7022738.0530	602914.6070	3406533.178	1813782.873	57.96	17.666	END FILL BEGIN ORIGINAL GR	8/3/2018 9:26
5248	5248	63°19'07.22241"N	168°56'43.93307"W	63°19'07.23790"N	168°56'43.84724"W	7022745.0270	602915.8280	3406555.999	1813787.234	55.852	17.024	GS	8/3/2018 9:27
5249	5249	63°19'07.45635"N	168°56'43.83322"W	63°19'07.47184"N	168°56'43.74739"W	7022752.3090	602916.9850	3406579.834	1813791.403	54.566	16.632	GS	8/3/2018 9:27
5250	5250	63°19'07.68463"N	168°56'43.72983"W	63°19'07.70012"N	168°56'43.64401"W	7022759.4180	602918.1960	3406603.097	1813795.743	53.877	16.422	GS	8/3/2018 9:28
5251	5251	63°19'07.93186"N	168°56'43.62076"W	63°19'07.94735"N	168°56'43.53493"W	7022767.1160	602919.4690	3406628.288	1813800.311	52.698	16.062	GS	8/3/2018 9:28
5252	5252	63°19'04.75458"N	168°56'45.03246"W	63°19'04.77007"N	168°56'44.94665"W	7022668.1850	602902.9800	3406304.531	1813741.149	78.639	23.969	GS	8/3/2018 9:35
5253	5253	63°19'04.73012"N	168°56'45.04272"W	63°19'04.74561"N	168°56'44.95691"W	7022667.4240	602902.8620	3406302.039	1813740.721	78.167	23.825	GS	8/3/2018 9:35
5254	5254	63°19'04.70205"N	168°56'45.05417"W	63°19'04.71754"N	168°56'44.96834"W	7022666.5510	602902.7310	3406299.18	1813740.245	78.281	23.86	GS	8/3/2018 9:35

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Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
5255	5255	63°19'04.67992"N	168°56'45.06551"W	63°19'04.69541"N	168°56'44.97970"W	7022665.8610	602902.5950	3406296.924	1813739.764	78.488	23.923	GS	8/3/2018 9:35
5256	5256	63°19'04.64629"N	168°56'45.07993"W	63°19'04.66178"N	168°56'44.99411"W	7022664.8140	602902.4270	3406293.497	1813739.162	78.848	24.033	GS	8/3/2018 9:36
5257	5257	63°19'04.61299"N	168°56'45.09242"W	63°19'04.62848"N	168°56'45.00659"W	7022663.7780	602902.2870	3406290.106	1813738.647	78.972	24.071	GS	8/3/2018 9:36
5258	5258	63°19'04.58931"N	168°56'45.10529"W	63°19'04.60480"N	168°56'45.01947"W	7022663.0400	602902.1310	3406287.691	1813738.099	78.99	24.076	GS	8/3/2018 9:36
5259	5259	63°19'04.55773"N	168°56'45.11894"W	63°19'04.57322"N	168°56'45.03312"W	7022662.0560	602901.9730	3406284.473	1813737.528	78.763	24.007	GS	8/3/2018 9:37
5260	5260	63°19'04.52387"N	168°56'45.13284"W	63°19'04.53936"N	168°56'45.04701"W	7022661.0030	602901.8130	3406281.024	1813736.95	78.922	24.056	GS	8/3/2018 9:37
5261	5261	63°19'04.48845"N	168°56'45.14900"W	63°19'04.50394"N	168°56'45.06317"W	7022659.9000	602901.6230	3406277.414	1813736.271	79.297	24.17	GS	8/3/2018 9:37
5262	5262	63°19'04.44193"N	168°56'45.17058"W	63°19'04.45742"N	168°56'45.08477"W	7022658.4510	602901.3690	3406272.674	1813735.363	79.621	24.268	GS	8/3/2018 9:37
5263	5263	63°19'04.40330"N	168°56'45.18785"W	63°19'04.41879"N	168°56'45.10203"W	7022657.2480	602901.1670	3406268.737	1813734.639	79.616	24.267	GS	8/3/2018 9:38
5264	5264	63°19'04.36126"N	168°56'45.20577"W	63°19'04.37675"N	168°56'45.11994"W	7022655.9390	602900.9600	3406264.454	1813733.891	79.581	24.256	GS	8/3/2018 9:38
5265	5265	63°19'04.31233"N	168°56'45.22580"W	63°19'04.32781"N	168°56'45.13998"W	7022654.4160	602900.7290	3406259.469	1813733.058	79.483	24.227	GS	8/3/2018 9:38
5266	5266	63°19'04.27604"N	168°56'45.24576"W	63°19'04.29153"N	168°56'45.15994"W	7022653.2850	602900.4880	3406255.769	1813732.207	79.496	24.23	GS	8/3/2018 9:39
5267	5267	63°19'04.24445"N	168°56'45.25718"W	63°19'04.25994"N	168°56'45.17136"W	7022652.3030	602900.3600	3406252.552	1813731.738	79.279	24.164	GS	8/3/2018 9:39
5268	5268	63°19'04.21151"N	168°56'45.27314"W	63°19'04.22700"N	168°56'45.18732"W	7022651.2760	602900.1710	3406249.194	1813731.064	79.204	24.141	GS	8/3/2018 9:40
5269	5269	63°19'04.17888"N	168°56'45.28555"W	63°19'04.19437"N	168°56'45.19972"W	7022650.2610	602900.0300	3406245.871	1813730.552	78.862	24.037	GS	8/3/2018 9:40
5270	5270	63°19'04.15175"N	168°56'45.29642"W	63°19'04.16724"N	168°56'45.21060"W	7022649.4170	602899.9060	3406243.107	1813730.101	78.324	23.873	GS	8/3/2018 9:42
5271	5271	63°19'04.12071"N	168°56'45.31198"W	63°19'04.13620"N	168°56'45.22617"W	7022648.4500	602899.7200	3406239.943	1813729.442	78.302	23.866	GS	8/3/2018 9:43
5272	5272	63°19'04.09230"N	168°56'45.32465"W	63°19'04.10779"N	168°56'45.23882"W	7022647.5650	602899.5720	3406237.048	1813728.911	78.335	23.877	GS	8/3/2018 9:43
5273	5273	63°19'04.06124"N	168°56'45.33831"W	63°19'04.07673"N	168°56'45.25249"W	7022646.5980	602899.4130	3406233.883	1813728.339	78.332	23.876	GS	8/3/2018 9:44
5274	5274	63°19'04.03391"N	168°56'45.35205"W	63°19'04.04940"N	168°56'45.26624"W	7022645.7460	602899.2490	3406231.097	1813727.757	78.291	23.863	GS	8/3/2018 9:44
5275	5275	63°19'04.00394"N	168°56'45.36296"W	63°19'04.01943"N	168°56'45.27714"W	7022644.8140	602899.1270	3406228.045	1813727.309	78.302	23.866	GS	8/3/2018 9:44
5276	5276	63°19'03.96696"N	168°56'45.37959"W	63°19'03.98245"N	168°56'45.29378"W	7022643.6630	602898.9320	3406224.277	1813726.611	78.23	23.844	GS	8/3/2018 9:44
5277	5277	63°19'03.93900"N	168°56'45.39367"W	63°19'03.95448"N	168°56'45.30784"W	7022642.7910	602898.7640	3406221.426	1813726.015	78.149	23.82	GS	8/3/2018 9:45
5278	5278	63°19'03.93819"N	168°56'45.39580"W	63°19'03.95369"N	168°56'45.30997"W	7022642.7660	602898.7350	3406221.343	1813725.919	78.135	23.816	GS	8/3/2018 9:45
5279	5279	63°19'03.90097"N	168°56'45.40868"W	63°19'03.91647"N	168°56'45.32286"W	7022641.6080	602898.5930	3406217.553	1813725.393	78.193	23.833	GS	8/3/2018 9:45
5280	5280	63°19'03.86535"N	168°56'45.42728"W	63°19'03.88084"N	168°56'45.34145"W	7022640.4980	602898.3700	3406213.921	1813724.603	78.568	23.948	GS	8/3/2018 9:46
5281	5281	63°19'03.79692"N	168°56'45.45785"W	63°19'03.81241"N	168°56'45.37202"W	7022638.3670	602898.0120	3406206.948	1813723.321	78.656	23.974	GS	8/3/2018 9:46
5282	5282	63°19'03.72278"N	168°56'45.48896"W	63°19'03.73827"N	168°56'45.40315"W	7022636.0590	602897.6530	3406199.395	1813722.024	78.501	23.927	GS	8/3/2018 9:46
5283	5283	63°19'03.67536"N	168°56'45.51318"W	63°19'03.69085"N	168°56'45.42737"W	7022634.5810	602897.3630	3406194.56	1813720.997	78.298	23.865	GS	8/3/2018 9:47
5284	5284	63°19'03.62564"N	168°56'45.53302"W	63°19'03.64113"N	168°56'45.44720"W	7022633.0340	602897.1360	3406189.496	1813720.174	78.218	23.841	GS	8/3/2018 9:48
5285	5285	63°19'03.57663"N	168°56'45.55476"W	63°19'03.59212"N	168°56'45.46893"W	7022631.5080	602896.8820	3406184.502	1813719.263	77.99	23.771	GS	8/3/2018 9:49
5286	5286	63°19'03.52836"N	168°56'45.57509"W	63°19'03.54385"N	168°56'45.48929"W	7022630.0060	602896.6470	3406179.584	1813718.415	77.992	23.772	GS	8/3/2018 9:49
5287	5287	63°19'03.43164"N	168°56'45.61272"W	63°19'03.44713"N	168°56'45.52691"W	7022626.9970	602896.2200	3406169.733	1813716.858	77.871	23.735	GS	8/3/2018 9:49
5288	5288	63°19'03.33842"N	168°56'45.66113"W	63°19'03.35391"N	168°56'45.57532"W	7022624.0910	602895.6390	3406160.228	1813714.803	77.738	23.695	GS	8/3/2018 9:50
5289	5289	63°19'03.24193"N	168°56'45.70499"W	63°19'03.25743"N	168°56'45.61918"W	7022621.0860	602895.1240	3406150.396	1813712.961	77.412	23.595	GS	8/3/2018 9:50
5290	5290	63°19'03.14242"N	168°56'45.74461"W	63°19'03.15791"N	168°56'45.65880"W	7022617.9900	602894.6720	3406140.259	1813711.318	77.023	23.477	GS	8/3/2018 9:50
5291	5291	63°19'03.04590"N	168°56'45.78987"W	63°19'03.06139"N	168°56'45.70405"W	7022614.9830	602894.1380	3406130.422	1813709.412	76.772	23.4	GS	8/3/2018 9:51
5292	5292	63°19'02.95172"N	168°56'45.83078"W	63°19'02.96721"N	168°56'45.74497"W	7022612.0510	602893.6620	3406120.826	1813707.701	76.172	23.217	GS	8/3/2018 9:52
5293	5293	63°19'02.84829"N	168°56'45.87347"W	63°19'02.86378"N	168°56'45.78766"W	7022608.8320	602893.1700	3406110.289	1813705.924	75.871	23.126	GS	8/3/2018 9:52
5294	5294	63°19'02.75183"N	168°56'45.92269"W	63°19'02.76733"N	168°56'45.83687"W	7022605.8260	602892.5810	3406100.456	1813703.837	75.28	22.946	GS	8/3/2018 9:52
5295	5295	63°19'02.66142"N	168°56'45.96055"W	63°19'02.67691"N	168°56'45.87474"W	7022603.0120	602892.1440	3406091.245	1813702.259	74.679	22.762	GS	8/3/2018 9:53
5296	5296	63°19'02.55772"N	168°56'46.01041"W	63°19'02.57320"N	168°56'45.92459"W	7022599.7810	602891.5540	3406080.675	1813700.155	74.133	22.596	GS	8/3/2018 9:53
5297	5297	63°19'02.45326"N	168°56'46.05189"W	63°19'02.46875"N	168°56'45.96607"W	7022596.5310	602891.0800	3406070.035	1813698.435	73.711	22.467	GS	8/3/2018 9:53
5298	5298	63°19'02.36810"N	168°56'46.09103"W	63°19'02.38359"N	168°56'46.00521"W	7022593.8790	602890.6200	3406061.356	1813696.79	73.613	22.437	GS	8/3/2018 9:54

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Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
5299	5299	63°19'02.26742"N	168°56'46.13594"W	63°19'02.28291"N	168°56'46.05011"W	7022590.7440	602890.0950	3406051.097	1813694.907	73.387	22.368	GS	8/3/2018 9:54
5300	5300	63°19'02.17605"N	168°56'46.17427"W	63°19'02.19153"N	168°56'46.08846"W	7022587.9000	602889.6520	3406041.788	1813693.309	73.11	22.284	GS	8/3/2018 9:55
5301	5301	63°19'02.07778"N	168°56'46.21754"W	63°19'02.09327"N	168°56'46.13172"W	7022584.8400	602889.1480	3406031.775	1813691.497	72.679	22.153	GS	8/3/2018 9:56
5302	5302	63°19'01.98369"N	168°56'46.25848"W	63°19'01.99918"N	168°56'46.17267"W	7022581.9110	602888.6710	3406022.188	1813689.784	72.412	22.071	GS	8/3/2018 9:56
5303	5303	63°19'01.88122"N	168°56'46.30396"W	63°19'01.89671"N	168°56'46.21815"W	7022578.7210	602888.1400	3406011.747	1813687.878	71.881	21.909	GS	8/3/2018 9:57
5304	5304	63°19'01.78905"N	168°56'46.34613"W	63°19'01.80454"N	168°56'46.26033"W	7022575.8500	602887.6450	3406002.354	1813686.106	71.137	21.683	GS	8/3/2018 9:57
5305	5305	63°19'01.70092"N	168°56'46.38739"W	63°19'01.71641"N	168°56'46.30156"W	7022573.1050	602887.1590	3405993.372	1813684.369	70.55	21.504	GTOP	8/3/2018 9:57
5306	5306	63°19'01.66719"N	168°56'46.39642"W	63°19'01.68269"N	168°56'46.31060"W	7022572.0580	602887.0660	3405989.94	1813684.013	69.728	21.253	GTOE	8/3/2018 9:58
5307	5307	63°19'01.62388"N	168°56'46.41692"W	63°19'01.63938"N	168°56'46.33111"W	7022570.7090	602886.8240	3405985.526	1813683.149	70.113	21.371	RSH	8/3/2018 9:59
5308	5308	63°19'01.49952"N	168°56'46.47774"W	63°19'01.51501"N	168°56'46.39192"W	7022566.8340	602886.1010	3405972.849	1813680.579	69.972	21.327	RCL	8/3/2018 9:59
5309	5309	63°19'01.36114"N	168°56'46.53419"W	63°19'01.37663"N	168°56'46.44837"W	7022562.5270	602885.4530	3405958.753	1813678.232	69.101	21.062	RSH2	8/3/2018 10:00
5310	5310	63°19'01.31403"N	168°56'46.55380"W	63°19'01.32952"N	168°56'46.46798"W	7022561.0610	602885.2270	3405953.953	1813677.415	67.865	20.685	GTOE2	8/3/2018 10:00
5311	5311	63°19'01.18438"N	168°56'46.61466"W	63°19'01.19987"N	168°56'46.52883"W	7022557.0230	602884.5090	3405940.74	1813674.852	66.906	20.393	GS	8/3/2018 10:01
5312	5312	63°19'01.12972"N	168°56'46.63897"W	63°19'01.14521"N	168°56'46.55315"W	7022555.3210	602884.2250	3405935.17	1813673.833	66.295	20.207	GS	8/3/2018 10:01
5313	5313	63°19'00.97229"N	168°56'46.70813"W	63°19'00.98778"N	168°56'46.62231"W	7022550.4190	602883.4190	3405919.129	1813670.937	63.478	19.348	GS	8/3/2018 10:01
5314	5314	63°19'04.17405"N	168°56'44.04009"W	63°19'04.18953"N	168°56'43.95427"W	7022650.6670	602917.3620	3406246.315	1813787.438	78.94	24.061	GS	8/3/2018 10:07
5315	5315	63°19'03.81491"N	168°56'47.05862"W	63°19'03.83040"N	168°56'46.97280"W	7022638.2100	602875.7250	3406207.574	1813650.186	77.615	23.657	GS	8/3/2018 10:08
5316	5316	63°19'03.20997"N	168°56'52.15343"W	63°19'03.22546"N	168°56'52.06760"W	7022617.2240	602805.4470	3406142.313	1813418.522	59.598	18.166	GS	8/3/2018 10:10
5317	5317	63°19'03.27576"N	168°56'51.58016"W	63°19'03.29125"N	168°56'51.49435"W	7022619.5150	602813.3570	3406149.424	1813444.593	60.9	18.562	GS	8/3/2018 10:11
5318	5318	63°19'03.32782"N	168°56'51.14385"W	63°19'03.34332"N	168°56'51.05804"W	7022621.3200	602819.3750	3406155.039	1813464.432	62.718	19.116	GS	8/3/2018 10:11
5319	5319	63°19'03.37309"N	168°56'50.77647"W	63°19'03.38858"N	168°56'50.69065"W	7022622.8840	602824.4410	3406159.912	1813481.134	64.624	19.697	VEG2 BEGIB FILL END OG	8/3/2018 10:12
5320	5320	63°19'03.40617"N	168°56'50.49168"W	63°19'03.42166"N	168°56'50.40587"W	7022624.0340	602828.3700	3406163.485	1813494.085	67.899	20.696	GS	8/3/2018 10:12
5321	5321	63°19'03.44988"N	168°56'50.12559"W	63°19'03.46537"N	168°56'50.03978"W	7022625.5500	602833.4200	3406168.199	1813510.731	70.914	21.615	GS	8/3/2018 10:13
5322	5322	63°19'03.49763"N	168°56'49.72486"W	63°19'03.51312"N	168°56'49.63904"W	7022627.2060	602838.9470	3406173.349	1813528.952	72.594	22.127	GS	8/3/2018 10:13
5323	5323	63°19'03.55815"N	168°56'49.21454"W	63°19'03.57364"N	168°56'49.12871"W	7022629.3050	602845.9870	3406179.879	1813552.157	73.917	22.53	GS	8/3/2018 10:13
5324	5324	63°19'03.61586"N	168°56'48.72969"W	63°19'03.63135"N	168°56'48.64387"W	7022631.3070	602852.6750	3406186.104	1813574.203	74.704	22.77	GS	8/3/2018 10:14
5325	5325	63°19'03.67831"N	168°56'48.19361"W	63°19'03.69380"N	168°56'48.10779"W	7022633.4780	602860.0710	3406192.848	1813598.581	76.087	23.192	GS	8/3/2018 10:14
5326	5326	63°19'03.73551"N	168°56'47.71449"W	63°19'03.75100"N	168°56'47.62867"W	7022635.4610	602866.6790	3406199.017	1813620.366	76.816	23.414	GS	8/3/2018 10:14
5327	5327	63°19'03.78882"N	168°56'47.27404"W	63°19'03.80431"N	168°56'47.18822"W	7022637.3070	602872.7540	3406204.762	1813640.392	77.425	23.599	GS	8/3/2018 10:15
5328	5328	63°19'03.83898"N	168°56'46.86113"W	63°19'03.85447"N	168°56'46.77532"W	7022639.0430	602878.4480	3406210.167	1813659.165	77.87	23.735	GS	8/3/2018 10:15
5329	5329	63°19'03.86898"N	168°56'46.60058"W	63°19'03.88447"N	168°56'46.51476"W	7022640.0870	602882.0430	3406213.409	1813671.014	78.166	23.825	GS	8/3/2018 10:16
5330	5330	63°19'03.87857"N	168°56'46.51187"W	63°19'03.89406"N	168°56'46.42605"W	7022640.4230	602883.2680	3406214.45	1813675.049	78.245	23.849	GS	8/3/2018 10:16
5331	5331	63°19'03.88766"N	168°56'46.43810"W	63°19'03.90315"N	168°56'46.35228"W	7022640.7370	602884.2850	3406215.428	1813678.403	78.142	23.818	GS	8/3/2018 10:16
5332	5332	63°19'03.89849"N	168°56'46.35855"W	63°19'03.91399"N	168°56'46.27272"W	7022641.1080	602885.3810	3406216.588	1813682.018	77.977	23.768	GS	8/3/2018 10:16
5333	5333	63°19'03.90695"N	168°56'46.28469"W	63°19'03.92244"N	168°56'46.19886"W	7022641.4020	602886.4000	3406217.502	1813685.377	77.844	23.727	GS	8/3/2018 10:17
5334	5334	63°19'03.92044"N	168°56'46.18174"W	63°19'03.93593"N	168°56'46.09593"W	7022641.8660	602887.8190	3406218.95	1813690.056	77.996	23.773	GS	8/3/2018 10:17
5335	5335	63°19'03.93054"N	168°56'46.09100"W	63°19'03.94604"N	168°56'46.00517"W	7022642.2190	602889.0720	3406220.044	1813694.183	78.275	23.858	GS	8/3/2018 10:17
5336	5336	63°19'03.94065"N	168°56'46.00711"W	63°19'03.95615"N	168°56'45.92129"W	7022642.5690	602890.2280	3406221.134	1813697.997	78.469	23.917	GS	8/3/2018 10:17
5337	5337	63°19'03.95165"N	168°56'45.90327"W	63°19'03.96714"N	168°56'45.81745"W	7022642.9560	602891.6620	3406222.329	1813702.721	78.549	23.942	GS	8/3/2018 10:18
5338	5338	63°19'03.96294"N	168°56'45.81575"W	63°19'03.97844"N	168°56'45.72994"W	7022643.3440	602892.8680	3406223.541	1813706.699	78.64	23.97	GS	8/3/2018 10:18
5339	5339	63°19'03.97359"N	168°56'45.70645"W	63°19'03.98908"N	168°56'45.62063"W	7022643.7220	602894.3780	3406224.705	1813711.673	78.766	24.008	GS	8/3/2018 10:18
5340	5340	63°19'03.98645"N	168°56'45.61756"W	63°19'04.00194"N	168°56'45.53175"W	7022644.1600	602895.6020	3406226.078	1813715.711	78.629	23.966	GS	8/3/2018 10:19
5341	5341	63°19'03.99644"N	168°56'45.52479"W	63°19'04.01193"N	168°56'45.43896"W	7022644.5100	602896.8830	3406227.162	1813719.931	78.563	23.946	GS	8/3/2018 10:19
5342	5342	63°19'04.00640"N	168°56'45.44465"W	63°19'04.02189"N	168°56'45.35884"W	7022644.8540	602897.9880	3406228.234	1813723.574	78.366	23.886	GS	8/3/2018 10:19

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Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
5343	5343	63°19'04.01703"N	168°56'45.35668"W	63°19'04.03252"N	168°56'45.27086"W	7022645.2220	602899.2010	3406229.379	1813727.574	78.257	23.853	GS	8/3/2018 10:19
5344	5344	63°19'04.02807"N	168°56'45.27234"W	63°19'04.04356"N	168°56'45.18653"W	7022645.6010	602900.3640	3406230.564	1813731.407	78.16	23.823	GS	8/3/2018 10:20
5345	5345	63°19'04.03820"N	168°56'45.18692"W	63°19'04.05369"N	168°56'45.10110"W	7022645.9530	602901.5420	3406231.657	1813735.291	77.847	23.728	GS	8/3/2018 10:20
5346	5346	63°19'04.04659"N	168°56'45.10982"W	63°19'04.06208"N	168°56'45.02400"W	7022646.2470	602902.6060	3406232.567	1813738.798	77.667	23.673	GS	8/3/2018 10:20
5347	5347	63°19'04.05554"N	168°56'45.04043"W	63°19'04.07103"N	168°56'44.95461"W	7022646.5550	602903.5630	3406233.528	1813741.952	77.49	23.619	GS	8/3/2018 10:20
5348	5348	63°19'04.05987"N	168°56'44.99550"W	63°19'04.07535"N	168°56'44.90967"W	7022646.7080	602904.1840	3406234.001	1813743.997	77.566	23.642	GS	8/3/2018 10:21
5349	5349	63°19'04.06989"N	168°56'44.91961"W	63°19'04.08538"N	168°56'44.83379"W	7022647.0520	602905.2290	3406235.076	1813747.446	77.979	23.768	GS	8/3/2018 10:21
5350	5350	63°19'04.07952"N	168°56'44.84483"W	63°19'04.09501"N	168°56'44.75900"W	7022647.3840	602906.2600	3406236.11	1813750.845	78.363	23.885	GS	8/3/2018 10:21
5351	5351	63°19'04.09733"N	168°56'44.68612"W	63°19'04.11281"N	168°56'44.60030"W	7022648.0050	602908.4500	3406238.038	1813758.063	78.624	23.965	GS	8/3/2018 10:21
5352	5352	63°19'04.12938"N	168°56'44.41542"W	63°19'04.14487"N	168°56'44.32961"W	7022649.1180	602912.1840	3406241.497	1813770.372	78.977	24.072	GS	8/3/2018 10:22
5353	5353	63°19'04.16588"N	168°56'44.10109"W	63°19'04.18137"N	168°56'44.01528"W	7022650.3870	602916.5210	3406245.44	1813784.666	78.895	24.047	GS	8/3/2018 10:22
5354	5354	63°19'04.20279"N	168°56'43.80050"W	63°19'04.21828"N	168°56'43.71468"W	7022651.6630	602920.6660	3406249.414	1813798.332	78.782	24.013	GS	8/3/2018 10:22
5355	5355	63°19'04.25909"N	168°56'43.34412"W	63°19'04.27457"N	168°56'43.25830"W	7022653.6080	602926.9590	3406255.475	1813819.08	78.336	23.877	GS	8/3/2018 10:24
5356	5356	63°19'04.31225"N	168°56'42.87042"W	63°19'04.32774"N	168°56'42.78460"W	7022655.4640	602933.4970	3406261.23	1813840.624	77.611	23.656	GS	8/3/2018 10:24
5357	5357	63°19'04.36994"N	168°56'42.39194"W	63°19'04.38543"N	168°56'42.30612"W	7022657.4630	602940.0960	3406267.449	1813862.379	76.672	23.37	GS	8/3/2018 10:24
5358	5358	63°19'04.43051"N	168°56'41.89855"W	63°19'04.44599"N	168°56'41.81273"W	7022659.5560	602946.8990	3406273.971	1813884.81	75.171	22.912	GS	8/3/2018 10:25
5359	5359	63°19'04.48574"N	168°56'41.40974"W	63°19'04.50123"N	168°56'41.32391"W	7022661.4830	602953.6450	3406279.948	1813907.041	74.335	22.657	GS	8/3/2018 10:26
5360	5360	63°19'04.54280"N	168°56'40.93741"W	63°19'04.55829"N	168°56'40.85159"W	7022663.4590	602960.1590	3406286.098	1813928.516	73.13	22.29	GS	8/3/2018 10:26
5361	5361	63°19'04.60773"N	168°56'40.38898"W	63°19'04.62322"N	168°56'40.30316"W	7022665.7130	602967.7240	3406293.105	1813953.453	71.821	21.891	GS	8/3/2018 10:26
5362	5362	63°19'04.66795"N	168°56'39.88098"W	63°19'04.68344"N	168°56'39.79516"W	7022667.8030	602974.7310	3406299.603	1813976.552	70.234	21.407	GS	8/3/2018 10:27
5363	5363	63°19'04.72461"N	168°56'39.40069"W	63°19'04.74010"N	168°56'39.31487"W	7022669.7700	602981.3570	3406305.719	1813998.391	68.552	20.895	GS	8/3/2018 10:27
5364	5364	63°19'04.78124"N	168°56'38.93554"W	63°19'04.79673"N	168°56'38.84972"W	7022671.7300	602987.7720	3406311.82	1814019.539	66.54	20.281	GS	8/3/2018 10:27
5365	5365	63°19'04.83567"N	168°56'38.47375"W	63°19'04.85117"N	168°56'38.38793"W	7022673.6200	602994.1420	3406317.696	1814040.537	64.807	19.753	GS	8/3/2018 10:28
5366	5366	63°19'04.89361"N	168°56'38.00108"W	63°19'04.90910"N	168°56'37.91526"W	7022675.6230	603000.6600	3406323.936	1814062.026	63.622	19.392	GS	8/3/2018 10:28
5367	5367	63°19'04.95067"N	168°56'37.51000"W	63°19'04.96616"N	168°56'37.42418"W	7022677.6080	603007.4350	3406330.101	1814084.357	62.483	19.045	GS	8/3/2018 10:28
5368	5368	63°19'05.00450"N	168°56'37.05478"W	63°19'05.01999"N	168°56'36.96896"W	7022679.4760	603013.7140	3406335.91	1814105.056	61.119	18.629	RSH3	8/3/2018 10:29
5369	5369	63°19'05.06949"N	168°56'36.49571"W	63°19'05.08499"N	168°56'36.40989"W	7022681.7370	603021.4270	3406342.932	1814130.479	60.83	18.541	RCL1	8/3/2018 10:30
5370	5370	63°19'05.13820"N	168°56'35.94488"W	63°19'05.15369"N	168°56'35.85905"W	7022684.1080	603029.0220	3406350.325	1814155.519	59.332	18.085	RSH1	8/3/2018 10:30
5371	5371	63°19'05.20321"N	168°56'35.37177"W	63°19'05.21870"N	168°56'35.28594"W	7022686.3750	603036.9300	3406357.359	1814181.583	54.188	16.516	GTOE1	8/3/2018 10:30
5372	5372	63°19'05.27671"N	168°56'34.76745"W	63°19'05.29221"N	168°56'34.68163"W	7022688.9190	603045.2640	3406365.279	1814209.058	52.257	15.928	GS	8/3/2018 10:31
5373	5373	63°19'05.34981"N	168°56'34.16848"W	63°19'05.36531"N	168°56'34.08266"W	7022691.4480	603053.5240	3406373.154	1814236.289	51.706	15.76	GS	8/3/2018 10:31
5374	5374	63°18'43.29940"N	168°57'48.91529"W	63°18'43.31490"N	168°57'48.82951"W	7021976.0270	602035.3570	3404077.89	1810858.959	61.58	18.77	HEW13	8/3/2018 11:13
5375	5375	63°18'43.31956"N	168°57'48.87906"W	63°18'43.33505"N	168°57'48.79326"W	7021976.6670	602035.8410	3404079.964	1810860.581	61.521	18.752	HEW13	8/3/2018 11:14
5376	5376	63°18'43.33884"N	168°57'48.78681"W	63°18'43.35434"N	168°57'48.70102"W	7021977.3050	602037.1060	3404081.991	1810864.763	61.499	18.745	HEW13	8/3/2018 11:14
5377	5377	63°18'43.36613"N	168°57'48.72659"W	63°18'43.38163"N	168°57'48.64081"W	7021978.1750	602037.9170	3404084.807	1810867.469	61.482	18.74	HEW13	8/3/2018 11:14
5378	5378	63°18'43.42278"N	168°57'48.71707"W	63°18'43.43828"N	168°57'48.63128"W	7021979.9320	602037.9940	3404090.568	1810867.811	61.45	18.73	HEW13	8/3/2018 11:15
5379	5379	63°18'43.47330"N	168°57'48.64749"W	63°18'43.48880"N	168°57'48.56171"W	7021981.5260	602038.9120	3404095.75	1810870.906	61.529	18.754	HEW13	8/3/2018 11:15
5380	5380	63°18'43.46435"N	168°57'48.53167"W	63°18'43.47984"N	168°57'48.44590"W	7021981.3000	602040.5320	3404094.926	1810876.211	61.475	18.738	HEW13	8/3/2018 11:15
5381	5381	63°18'43.40052"N	168°57'48.51921"W	63°18'43.41602"N	168°57'48.43343"W	7021979.3310	602040.7690	3404088.453	1810876.885	61.475	18.738	HEW13	8/3/2018 11:16
5382	5382	63°18'43.32725"N	168°57'48.47603"W	63°18'43.34275"N	168°57'48.39025"W	7021977.0830	602041.4410	3404081.043	1810878.978	61.558	18.763	HEW13	8/3/2018 11:16
5383	5383	63°18'43.28943"N	168°57'48.49534"W	63°18'43.30493"N	168°57'48.40956"W	7021975.9050	602041.2100	3404077.188	1810878.158	61.555	18.762	HEW13	8/3/2018 11:16
5384	5384	63°18'43.26233"N	168°57'48.49771"W	63°18'43.27784"N	168°57'48.41194"W	7021975.0650	602041.2030	3404074.434	1810878.094	61.545	18.759	HEW13	8/3/2018 11:16
5385	5385	63°18'43.24738"N	168°57'48.67032"W	63°18'43.26288"N	168°57'48.58454"W	7021974.5260	602038.8160	3404072.788	1810870.234	61.523	18.752	HEW13	8/3/2018 11:16
5386	5386	63°18'43.25888"N	168°57'48.85685"W	63°18'43.27437"N	168°57'48.77106"W	7021974.7990	602036.2100	3404073.818	1810861.695	61.531	18.755	HEW13 C	8/3/2018 11:17

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Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
5387	5387	63°18'42.73292"N	168°57'29.95007"W	63°18'42.74842"N	168°57'29.86427"W	7021966.8960	602299.8070	3404034.394	1811726.181	73.027	22.259	CHK 2600 HV	8/3/2018 12:40
5388	5388	63°18'44.29882"N	168°57'23.07316"W	63°18'44.31431"N	168°57'22.98738"W	7022018.3920	602393.9510	3404198.541	1812037.715	63.513	19.359	MP SW03	8/3/2018 15:27
5389	5389	63°18'42.00958"N	168°57'21.03215"W	63°18'42.02507"N	168°57'20.94635"W	7021948.4710	602424.6100	3403967.554	1812134.729	71.424	21.77	MP SW01	8/3/2018 15:30
5390	5390	63°18'43.19450"N	168°57'16.58994"W	63°18'43.20999"N	168°57'16.50414"W	7021987.1030	602485.2510	3404091.206	1812335.679	64.182	19.563	MP SW02	8/3/2018 15:33
5391	5391	63°19'05.77866"N	168°56'49.31111"W	63°19'05.79415"N	168°56'49.22530"W	7022697.9620	602842.4430	3406405.33	1813544.043	72.095	21.975	CHK HV GPS 2	8/3/2018 15:42
5392	5392	63°18'57.69969"N	168°57'18.34014"W	63°18'57.71519"N	168°57'18.25434"W	7022435.0990	602446.5810	3405563.109	1812231.726	52.016	15.855	CHK 0 HV	8/3/2018 17:19
5393	5393	63°18'57.69955"N	168°57'18.33958"W	63°18'57.71504"N	168°57'18.25377"W	7022435.0950	602446.5900	3405563.095	1812231.752	52.029	15.859	CHK 2 HV	8/3/2018 18:27
5394	5394	63°18'57.69988"N	168°57'18.34020"W	63°18'57.71537"N	168°57'18.25439"W	7022435.1050	602446.5810	3405563.128	1812231.723	51.293	15.634	CHK 0 HV	8/4/2018 7:54
5395	5395	63°18'43.45415"N	168°57'44.10655"W	63°18'43.46965"N	168°57'44.02076"W	7021982.9420	602102.1160	3404097.16	1811078.357	61.981	18.892	MP	8/4/2018 8:02
5396	5396	63°18'43.92821"N	168°57'44.76361"W	63°18'43.94371"N	168°57'44.67782"W	7021997.3180	602092.5070	3404144.822	1811047.565	59.703	18.197	MP	8/4/2018 8:04
5397	5397	63°18'44.27513"N	168°57'44.07902"W	63°18'44.29062"N	168°57'43.99322"W	7022008.3540	602101.6920	3404180.562	1811078.265	60.244	18.362	MP	8/4/2018 8:07
5398	5398	63°18'43.91604"N	168°57'43.10283"W	63°18'43.93154"N	168°57'43.01705"W	7021997.6760	602115.6280	3404144.813	1811123.445	60.077	18.311	MP	8/4/2018 8:08
5399	5399	63°18'43.36308"N	168°57'48.39586"W	63°18'43.37858"N	168°57'48.31007"W	7021978.2270	602042.5220	3404084.741	1810882.581	61.301	18.684	MP	8/4/2018 8:14
5400	5400	63°18'43.49510"N	168°57'48.68198"W	63°18'43.51061"N	168°57'48.59619"W	7021982.1850	602038.4110	3404097.939	1810869.295	61.084	18.619	MP	8/4/2018 8:15
5401	5401	63°18'43.36644"N	168°57'48.87144"W	63°18'43.38194"N	168°57'48.78565"W	7021978.1210	602035.9010	3404084.731	1810860.852	61.777	18.83	MP	8/4/2018 8:15
5402	5402	63°18'43.23452"N	168°57'48.69097"W	63°18'43.25001"N	168°57'48.60518"W	7021974.1190	602038.5420	3404071.466	1810869.312	61.74	18.818	MP	8/4/2018 8:16
5403	5403	63°18'45.43881"N	168°57'48.19059"W	63°18'45.45431"N	168°57'48.10481"W	7022042.5390	602043.3380	3404295.713	1810888.549	58.293	17.768	MP	8/4/2018 8:19
5404	5404	63°18'45.70860"N	168°57'47.53485"W	63°18'45.72410"N	168°57'47.44905"W	7022051.1760	602052.1970	3404323.598	1810918.058	57.679	17.581	MP	8/4/2018 8:20
5405	5405	63°18'45.92134"N	168°57'48.17241"W	63°18'45.93684"N	168°57'48.08661"W	7022057.4760	602043.1160	3404344.734	1810888.587	57.819	17.623	MP	8/4/2018 8:22
5406	5406	63°18'45.71798"N	168°57'48.70857"W	63°18'45.73348"N	168°57'48.62279"W	7022050.9470	602035.8560	3404323.684	1810864.431	57.725	17.595	MP	8/4/2018 8:23
5407	5407	63°18'45.99584"N	168°57'43.42784"W	63°18'46.01134"N	168°57'43.34205"W	7022061.8790	602109.0600	3404355.806	1811105.18	57.409	17.498	MP	8/4/2018 8:27
5408	5408	63°18'46.18701"N	168°57'42.99028"W	63°18'46.20251"N	168°57'42.90449"W	7022067.9870	602114.9600	3404375.546	1811124.852	57.125	17.412	MP	8/4/2018 8:28
5409	5409	63°18'46.48918"N	168°57'43.41225"W	63°18'46.50468"N	168°57'43.32646"W	7022077.1490	602108.7910	3404405.924	1811105.081	57.528	17.534	MP	8/4/2018 8:31
5410	5410	63°18'46.19333"N	168°57'43.86304"W	63°18'46.20882"N	168°57'43.77724"W	7022067.7960	602102.8100	3404375.542	1811084.977	57.654	17.573	MP	8/4/2018 8:32
5411	5411	63°18'45.71478"N	168°57'41.69374"W	63°18'45.73028"N	168°57'41.60795"W	7022053.9500	602133.4650	3404328.543	1811184.85	58.493	17.829	MP	8/4/2018 8:37
5412	5412	63°18'45.36554"N	168°57'41.22981"W	63°18'45.38104"N	168°57'41.14402"W	7022043.3510	602140.2640	3404293.416	1811206.615	58.966	17.973	MP	8/4/2018 8:39
5413	5413	63°18'45.10008"N	168°57'41.71701"W	63°18'45.11558"N	168°57'41.63123"W	7022034.9220	602133.7460	3404266.094	1811184.798	58.842	17.935	MP	8/4/2018 8:40
5414	5414	63°18'45.37279"N	168°57'42.20856"W	63°18'45.38828"N	168°57'42.12278"W	7022043.1420	602126.6380	3404293.428	1811161.897	56.936	17.354	MP	8/4/2018 8:42
5415	5415	63°18'51.38639"N	168°57'45.32046"W	63°18'51.40189"N	168°57'45.23466"W	7022227.8190	602077.4250	3404901.894	1811009.874	44.41	13.536	EPP BASE ONLY	8/4/2018 8:53
5416	5416	63°18'51.50076"N	168°57'45.33605"W	63°18'51.51626"N	168°57'45.25026"W	7022231.3510	602077.0950	3404913.499	1811008.974	43.494	13.257	ML1 SUBMERGED PP	8/4/2018 8:57
5417	5417	63°18'51.55863"N	168°57'45.59133"W	63°18'51.57413"N	168°57'45.50554"W	7022233.0280	602073.4860	3404919.188	1810997.219	43.915	13.385	ML1 SUBMERGED PP	8/4/2018 8:58
5418	5418	63°18'51.53111"N	168°57'44.28701"W	63°18'51.54661"N	168°57'44.20120"W	7022232.7540	602091.6610	3404917.356	1811056.838	43.787	13.346	L2 PARTIALLY SUBMERGED F	8/4/2018 9:00
5419	5419	63°18'51.61767"N	168°57'44.05173"W	63°18'51.63317"N	168°57'43.96594"W	7022235.5360	602094.8490	3404926.322	1811067.442	44.088	13.438	ML2 PARTIALY SUBMERGED P	8/4/2018 9:00
5420	5420	63°18'57.69955"N	168°57'18.33951"W	63°18'57.71505"N	168°57'18.25371"W	7022435.0950	602446.5900	3405563.095	1812231.755	51.28	15.63	CHK 2 HV	8/4/2018 9:15
5421	5421	63°19'32.47886"N	168°58'15.32326"W	63°19'32.49437"N	168°58'15.23744"W	7023485.9390	601619.7350	3409053.346	1809572.535	28.383	8.651	CHK 1 HV	8/4/2018 9:20
8733	8733	63°18'02.49176"N	168°57'19.09969"W	63°18'02.50725"N	168°57'19.01393"W	7020726.6950	602490.4970	3399955.406	1812288.389	359.968	109.718	MAG NAIL	
8734	8734	63°18'16.63308"N	168°57'28.66663"W	63°18'16.64857"N	168°57'28.58086"W	7021159.9660	602343.3890	3401384.541	1811827.883	219.728	66.973	MAG NAIL	
10001	10001	63°19'32.47891"N	168°58'15.32291"W	63°19'32.49442"N	168°58'15.23709"W	7023485.9400	601619.7390	3409053.351	1809572.551	28.449	8.671	CHK 1 HV	8/2/2018 8:52
10002	10002	63°18'42.73254"N	168°57'29.95021"W	63°18'42.74803"N	168°57'29.86443"W	7021966.8840	602299.8050	3404034.355	1811726.175	73.042	22.263	CHK 2600 HV	8/2/2018 9:09
10003	10003	63°18'57.69942"N	168°57'18.33963"W	63°18'57.71491"N	168°57'18.25381"W	7022435.0910	602446.5890	3405563.082	1812231.75	51.433	15.677	CHK 0 HV	8/2/2018 9:27
10004	10004	63°20'08.82995"N	168°56'24.47102"W	63°20'08.84544"N	168°56'24.38513"W	7024659.7730	603125.3080	3412827.759	1814572.567	5.296	1.614	CHK 59 HV	8/2/2018 9:51
10005	10005	63°18'42.87993"N	168°57'39.58913"W	63°18'42.89543"N	168°57'39.50335"W	7021967.1750	602165.5390	3404042.181	1811285.647	63.523	19.362	HEW100	8/2/2018 10:40
10006	10006	63°18'42.91734"N	168°57'39.43692"W	63°18'42.93284"N	168°57'39.35114"W	7021968.4000	602167.6200	3404046.094	1811292.538	63.507	19.357	HEW100	8/2/2018 10:40
10007	10007	63°18'43.02619"N	168°57'39.29680"W	63°18'43.04168"N	168°57'39.21102"W	7021971.8290	602169.4620	3404057.252	1811298.759	63.512	19.359	HEW100	8/2/2018 10:40

2018 Northeast Cape Periodic Review
Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
10008	10008	63°18'43.13760"N	168°57'39.07780"W	63°18'43.15310"N	168°57'38.99201"W	7021975.3730	602172.4000	3404068.73	1811308.579	63.505	19.356	HEW100	8/2/2018 10:41
10009	10009	63°18'43.23931"N	168°57'38.94311"W	63°18'43.25481"N	168°57'38.85733"W	7021978.5800	602174.1740	3404079.16	1811314.564	63.551	19.37	HEW100	8/2/2018 10:41
10010	10010	63°18'43.25831"N	168°57'39.04228"W	63°18'43.27381"N	168°57'38.95650"W	7021979.1240	602172.7750	3404081.016	1811310.003	63.475	19.347	HEW100	8/2/2018 10:42
10011	10011	63°18'43.24509"N	168°57'39.29697"W	63°18'43.26059"N	168°57'39.21118"W	7021978.6020	602169.2440	3404079.485	1811298.391	63.545	19.368	HEW100	8/2/2018 10:42
10012	10012	63°18'43.25478"N	168°57'39.41235"W	63°18'43.27027"N	168°57'39.32657"W	7021978.8500	602167.6290	3404080.383	1811293.105	63.514	19.359	HEW100	8/2/2018 10:42
10013	10013	63°18'43.30748"N	168°57'39.62035"W	63°18'43.32297"N	168°57'39.53457"W	7021980.3890	602164.6830	3404085.582	1811283.517	63.525	19.363	HEW100	8/2/2018 10:42
10014	10014	63°18'43.31106"N	168°57'39.77627"W	63°18'43.32656"N	168°57'39.69050"W	7021980.4310	602162.5100	3404085.83	1811276.389	63.516	19.36	HEW100	8/2/2018 10:43
10015	10015	63°18'43.29209"N	168°57'39.92316"W	63°18'43.30759"N	168°57'39.83738"W	7021979.7790	602160.4850	3404083.795	1811269.711	63.488	19.351	HEW100	8/2/2018 10:44
10016	10016	63°18'43.33129"N	168°57'39.98096"W	63°18'43.34678"N	168°57'39.89517"W	7021980.9660	602159.6420	3404087.733	1811267.006	63.488	19.351	HEW100	8/2/2018 10:44
10017	10017	63°18'43.32961"N	168°57'40.02146"W	63°18'43.34511"N	168°57'39.93567"W	7021980.8960	602159.0800	3404087.533	1811265.159	63.524	19.362	HEW100	8/2/2018 10:44
10018	10018	63°18'43.26427"N	168°57'40.07881"W	63°18'43.27976"N	168°57'39.99303"W	7021978.8490	602158.3470	3404080.854	1811262.647	63.516	19.36	HEW100	8/2/2018 10:45
10019	10019	63°18'43.21258"N	168°57'40.29311"W	63°18'43.22808"N	168°57'40.20732"W	7021977.1550	602155.4160	3404075.446	1811252.943	63.499	19.354	HEW100	8/2/2018 10:46
10020	10020	63°18'43.13710"N	168°57'40.38189"W	63°18'43.15260"N	168°57'40.29610"W	7021974.7800	602154.2550	3404067.714	1811249.012	63.459	19.342	HEW100	8/2/2018 10:47
10021	10021	63°18'43.05717"N	168°57'40.34357"W	63°18'43.07266"N	168°57'40.25778"W	7021972.3240	602154.8670	3404059.624	1811250.894	63.445	19.338	HEW100	8/2/2018 10:47
10022	10022	63°18'43.03313"N	168°57'40.27164"W	63°18'43.04863"N	168°57'40.18586"W	7021971.6130	602155.8910	3404057.236	1811254.219	63.508	19.357	HEW100	8/2/2018 10:47
10023	10023	63°18'42.99513"N	168°57'40.27220"W	63°18'43.01063"N	168°57'40.18642"W	7021970.4370	602155.9200	3404053.376	1811254.256	63.501	19.355	HEW100	8/2/2018 10:47
10024	10024	63°18'42.96293"N	168°57'40.00470"W	63°18'42.97843"N	168°57'39.91891"W	7021969.5590	602159.6740	3404050.304	1811266.528	63.522	19.361	HEW100	8/2/2018 10:48
10025	10025	63°18'42.90285"N	168°57'39.68809"W	63°18'42.91834"N	168°57'39.60231"W	7021967.8400	602164.1390	3404044.436	1811281.089	63.485	19.35	HEW100	8/2/2018 10:48
10026	10026	63°18'42.88223"N	168°57'39.63911"W	63°18'42.89773"N	168°57'39.55333"W	7021967.2240	602164.8410	3404042.378	1811283.36	63.529	19.364	HEW100 C	8/2/2018 10:48
10027	10027	63°18'43.55155"N	168°57'43.07608"W	63°18'43.56705"N	168°57'42.99030"W	7021986.4110	602116.3580	3404107.814	1811125.266	60.809	18.535	HEW101	8/2/2018 10:52
10028	10028	63°18'43.61507"N	168°57'42.95247"W	63°18'43.63057"N	168°57'42.86669"W	7021988.4310	602118.0160	3404114.357	1811130.808	60.738	18.513	HEW101	8/2/2018 10:52
10029	10029	63°18'43.66092"N	168°57'42.78559"W	63°18'43.67642"N	168°57'42.69981"W	7021989.9230	602120.2930	3404119.137	1811138.355	60.816	18.537	HEW101	8/2/2018 10:53
10030	10030	63°18'43.70895"N	168°57'42.63972"W	63°18'43.72444"N	168°57'42.55394"W	7021991.4740	602122.2750	3404124.123	1811144.939	60.759	18.519	HEW101	8/2/2018 10:53
10031	10031	63°18'43.76279"N	168°57'42.45971"W	63°18'43.77828"N	168°57'42.37392"W	7021993.2190	602124.7270	3404129.724	1811153.073	60.751	18.517	HEW101	8/2/2018 10:53
10032	10032	63°18'43.79184"N	168°57'42.40402"W	63°18'43.80734"N	168°57'42.31823"W	7021994.1430	602125.4730	3404132.716	1811155.569	60.791	18.529	HEW101	8/2/2018 10:53
10033	10033	63°18'43.81714"N	168°57'42.44812"W	63°18'43.83263"N	168°57'42.36233"W	7021994.9060	602124.8350	3404135.253	1811153.513	60.745	18.515	HEW101	8/2/2018 10:54
10034	10034	63°18'43.73457"N	168°57'42.76311"W	63°18'43.75006"N	168°57'42.67731"W	7021992.2120	602120.5330	3404126.634	1811139.261	60.769	18.522	HEW101	8/2/2018 10:55
10035	10035	63°18'43.72496"N	168°57'43.07113"W	63°18'43.74045"N	168°57'42.98536"W	7021991.7780	602116.2570	3404125.43	1811125.207	60.743	18.514	HEW101	8/2/2018 10:55
10036	10036	63°18'43.76463"N	168°57'43.39893"W	63°18'43.78013"N	168°57'43.31314"W	7021992.8610	602111.6570	3404129.217	1811110.169	60.785	18.527	HEW101	8/2/2018 11:05
10037	10037	63°18'43.77857"N	168°57'43.50813"W	63°18'43.79407"N	168°57'43.42234"W	7021993.2440	602110.1240	3404130.552	1811105.158	60.812	18.535	HEW101	8/2/2018 11:06
10038	10038	63°18'43.91864"N	168°57'43.51217"W	63°18'43.93414"N	168°57'43.42638"W	7021997.5750	602109.9300	3404144.775	1811104.743	60.828	18.541	HEW101	8/2/2018 11:06
10039	10039	63°18'44.00020"N	168°57'43.55974"W	63°18'44.01570"N	168°57'43.47395"W	7022000.0780	602109.1870	3404153.023	1811102.436	60.791	18.529	HEW101	8/2/2018 11:07
10040	10040	63°18'44.10554"N	168°57'43.76209"W	63°18'44.12103"N	168°57'43.67630"W	7022003.2470	602106.2680	3404163.572	1811093.02	60.786	18.528	HEW101	8/2/2018 11:08
10041	10041	63°18'44.17311"N	168°57'43.95615"W	63°18'44.18861"N	168°57'43.87037"W	7022005.2520	602103.5010	3404170.292	1811084.045	60.758	18.519	HEW101	8/2/2018 11:09
10042	10042	63°18'44.10684"N	168°57'44.23618"W	63°18'44.12234"N	168°57'44.15039"W	7022003.0780	602099.6700	3404163.354	1811071.363	60.783	18.527	HEW101	8/2/2018 11:09
10043	10043	63°18'44.03654"N	168°57'44.41722"W	63°18'44.05203"N	168°57'44.33142"W	7022000.8230	602097.2200	3404156.08	1811063.209	60.791	18.529	HEW101	8/2/2018 11:10
10044	10044	63°18'43.94930"N	168°57'44.63480"W	63°18'43.96479"N	168°57'44.54901"W	7021998.0270	602094.2790	3404147.059	1811053.414	60.822	18.539	HEW101	8/2/2018 11:11
10045	10045	63°18'43.82275"N	168°57'44.56323"W	63°18'43.83825"N	168°57'44.47745"W	7021994.1440	602095.3990	3404134.259	1811056.891	60.787	18.528	HEW101	8/2/2018 11:11
10046	10046	63°18'43.73027"N	168°57'44.34211"W	63°18'43.74577"N	168°57'44.25633"W	7021991.3800	602098.5670	3404125.03	1811067.143	60.818	18.537	HEW101	8/2/2018 11:12
10047	10047	63°18'43.57656"N	168°57'44.33825"W	63°18'43.59206"N	168°57'44.25246"W	7021986.6260	602098.7720	3404109.421	1811067.572	60.824	18.539	HEW101	8/2/2018 11:12
10048	10048	63°18'43.56975"N	168°57'44.27985"W	63°18'43.58525"N	168°57'44.19407"W	7021986.4420	602099.5910	3404108.773	1811070.251	60.875	18.555	HEW101	8/2/2018 11:13
10049	10049	63°18'43.65926"N	168°57'44.19322"W	63°18'43.67476"N	168°57'44.10742"W	7021989.2490	602100.7080	3404117.928	1811074.061	60.767	18.522	HEW101	8/2/2018 11:14
10050	10050	63°18'43.63976"N	168°57'43.91930"W	63°18'43.65526"N	168°57'43.83351"W	7021988.7670	602104.5390	3404116.15	1811086.605	60.718	18.507	HEW101	8/2/2018 11:15
10051	10051	63°18'43.54313"N	168°57'43.88376"W	63°18'43.55863"N	168°57'43.79797"W	7021985.7930	602105.1280	3404106.362	1811088.387	60.77	18.523	HEW101	8/2/2018 11:15

2018 Northeast Cape Periodic Review
Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
10052	10052	63°18'43.52839"N	168°57'43.78273"W	63°18'43.54388"N	168°57'43.69695"W	7021985.3810	602106.5490	3404104.939	1811093.026	60.802	18.532	HEW101	8/2/2018 11:15
10053	10053	63°18'43.47070"N	168°57'43.81758"W	63°18'43.48620"N	168°57'43.73179"W	7021983.5810	602106.1210	3404099.054	1811091.529	60.972	18.584	HEW101	8/2/2018 11:16
10054	10054	63°18'43.45063"N	168°57'43.49773"W	63°18'43.46613"N	168°57'43.41195"W	7021983.1020	602110.5910	3404097.253	1811106.172	60.929	18.571	HEW101	8/2/2018 11:16
10055	10055	63°18'43.44664"N	168°57'43.22873"W	63°18'43.46214"N	168°57'43.14295"W	7021983.0980	602114.3380	3404097.046	1811118.466	61.101	18.624	HEW101	8/2/2018 11:16
10056	10056	63°18'43.44303"N	168°57'43.22240"W	63°18'43.45852"N	168°57'43.13662"W	7021982.9880	602114.4290	3404096.684	1811118.761	61.2	18.654	MP infall	8/2/2018 11:20
10057	10057	63°18'43.49582"N	168°57'43.20121"W	63°18'43.51131"N	168°57'43.11542"W	7021984.6310	602114.6720	3404102.061	1811119.642	60.824	18.539	HEW101	8/2/2018 11:27
10058	10058	63°18'43.54522"N	168°57'43.10116"W	63°18'43.56072"N	168°57'43.01536"W	7021986.2040	602116.0160	3404107.153	1811124.131	60.793	18.53	HEW101 C	8/2/2018 11:27
10059	10059	63°18'44.47207"N	168°57'51.37127"W	63°18'44.48757"N	168°57'51.28549"W	7022011.2230	602000.0310	3404195.179	1810744.852	61	18.593	HEW102	8/2/2018 11:39
10060	10060	63°18'44.50018"N	168°57'51.43013"W	63°18'44.51567"N	168°57'51.34434"W	7022012.0660	601999.1840	3404197.99	1810742.117	61.019	18.599	HEW102	8/2/2018 11:39
10061	10061	63°18'44.47154"N	168°57'51.57489"W	63°18'44.48704"N	168°57'51.48911"W	7022011.1170	601997.1980	3404194.975	1810735.552	61.034	18.603	HEW102	8/2/2018 11:39
10062	10062	63°18'44.39257"N	168°57'51.59504"W	63°18'44.40807"N	168°57'51.50926"W	7022008.6640	601996.9950	3404186.939	1810734.761	61.033	18.603	HEW102	8/2/2018 11:39
10063	10063	63°18'44.37425"N	168°57'51.40854"W	63°18'44.38974"N	168°57'51.32274"W	7022008.1800	601999.6080	3404185.216	1810743.31	60.949	18.577	HEW102	8/2/2018 11:40
10064	10064	63°18'44.42090"N	168°57'51.35023"W	63°18'44.43640"N	168°57'51.26443"W	7022009.6490	602000.3740	3404189.997	1810745.897	61.004	18.594	HEW102 C	8/2/2018 11:40
10065	10065	63°18'46.95501"N	168°57'47.10710"W	63°18'46.97051"N	168°57'47.02132"W	7022089.9270	602056.9230	3404450.505	1810935.549	57.14	17.416	HEW103	8/2/2018 11:45
10066	10066	63°18'47.01138"N	168°57'46.86125"W	63°18'47.02688"N	168°57'46.77546"W	7022091.7800	602060.2880	3404456.411	1810946.686	57.136	17.415	HEW103	8/2/2018 11:46
10067	10067	63°18'47.08367"N	168°57'46.69309"W	63°18'47.09917"N	168°57'46.60731"W	7022094.0910	602062.5570	3404463.878	1810954.248	57.096	17.403	HEW103	8/2/2018 11:46
10068	10068	63°18'47.11638"N	168°57'46.52283"W	63°18'47.13188"N	168°57'46.43704"W	7022095.1780	602064.8940	3404467.326	1810961.971	57.006	17.375	HEW103	8/2/2018 11:47
10069	10069	63°18'47.19668"N	168°57'46.37175"W	63°18'47.21218"N	168°57'46.28597"W	7022097.7300	602066.9170	3404475.593	1810968.74	56.971	17.365	HEW103	8/2/2018 11:47
10070	10070	63°18'47.25989"N	168°57'46.35570"W	63°18'47.27539"N	168°57'46.26990"W	7022099.6920	602067.0780	3404482.025	1810969.369	57.027	17.382	HEW103	8/2/2018 11:48
10071	10071	63°18'47.26879"N	168°57'46.43135"W	63°18'47.28429"N	168°57'46.34555"W	7022099.9340	602066.0170	3404482.873	1810965.899	56.923	17.35	HEW103	8/2/2018 11:49
10072	10072	63°18'47.19744"N	168°57'46.54827"W	63°18'47.21295"N	168°57'46.46248"W	7022097.6750	602064.4600	3404475.54	1810960.676	56.994	17.372	HEW103	8/2/2018 11:49
10073	10073	63°18'47.13497"N	168°57'46.79710"W	63°18'47.15046"N	168°57'46.71132"W	7022095.6320	602061.0590	3404469.011	1810949.413	57.09	17.401	HEW103	8/2/2018 11:50
10074	10074	63°18'47.07389"N	168°57'47.01350"W	63°18'47.08939"N	168°57'46.92772"W	7022093.6470	602058.1080	3404462.648	1810939.629	57.049	17.388	HEW103	8/2/2018 11:50
10075	10075	63°18'47.00135"N	168°57'47.17367"W	63°18'47.01685"N	168°57'47.08789"W	7022091.3320	602055.9510	3404455.162	1810932.432	57.142	17.417	HEW103 C	8/2/2018 11:50
10076	10076	63°18'48.49190"N	168°57'44.91742"W	63°18'48.50740"N	168°57'44.83164"W	7022138.4450	602085.8780	3404608.216	1811033.039	54.226	16.528	HEW104	8/2/2018 12:06
10077	10077	63°18'48.48322"N	168°57'44.92980"W	63°18'48.49872"N	168°57'44.84400"W	7022138.1710	602085.7150	3404607.325	1811032.488	54.283	16.546	HEW105	8/2/2018 12:06
10078	10078	63°18'48.55545"N	168°57'45.11645"W	63°18'48.57095"N	168°57'45.03066"W	7022140.3240	602083.0470	3404614.523	1811023.844	51.962	15.838	HEW104	8/2/2018 12:07
10079	10079	63°18'48.54977"N	168°57'45.15024"W	63°18'48.56527"N	168°57'45.06446"W	7022140.1330	602082.5820	3404613.921	1811022.31	52.031	15.859	HEW105	8/2/2018 12:07
10080	10080	63°18'48.63414"N	168°57'45.12741"W	63°18'48.64964"N	168°57'45.04162"W	7022142.7530	602082.8170	3404622.507	1811023.214	51.875	15.811	HEW105	8/2/2018 12:07
10081	10081	63°18'48.63903"N	168°57'45.08632"W	63°18'48.65453"N	168°57'45.00053"W	7022142.9230	602083.3840	3404623.034	1811025.083	51.924	15.826	HEW104	8/2/2018 12:07
10082	10082	63°18'48.71231"N	168°57'45.24188"W	63°18'48.72781"N	168°57'45.15610"W	7022145.1210	602081.1470	3404630.361	1811017.857	51.847	15.803	HEW105	8/2/2018 12:08
10083	10083	63°18'48.72552"N	168°57'45.19688"W	63°18'48.74102"N	168°57'45.11108"W	7022145.5500	602081.7610	3404631.736	1811019.891	51.826	15.797	HEW104	8/2/2018 12:08
10084	10084	63°18'48.76504"N	168°57'45.19988"W	63°18'48.78054"N	168°57'45.11409"W	7022146.7710	602081.6800	3404635.748	1811019.689	51.745	15.772	HEW104	8/2/2018 12:08
10085	10085	63°18'48.79952"N	168°57'45.20536"W	63°18'48.81502"N	168°57'45.11956"W	7022147.8350	602081.5700	3404639.246	1811019.382	51.762	15.777	HEW105	8/2/2018 12:09
10086	10086	63°18'48.77197"N	168°57'45.05640"W	63°18'48.78747"N	168°57'44.97061"W	7022147.0490	602083.6690	3404636.558	1811026.231	51.637	15.739	HEW105	8/2/2018 12:09
10087	10087	63°18'48.74067"N	168°57'44.97764"W	63°18'48.75616"N	168°57'44.89185"W	7022146.1150	602084.7960	3404633.437	1811029.88	51.702	15.759	HEW104	8/2/2018 12:09
10088	10088	63°18'48.84393"N	168°57'45.05142"W	63°18'48.85942"N	168°57'44.96564"W	7022149.2770	602083.6680	3404643.87	1811026.34	51.4	15.667	HEW104	8/2/2018 12:10
10089	10089	63°18'48.87075"N	168°57'45.11452"W	63°18'48.88625"N	168°57'45.02873"W	7022150.0790	602082.7640	3404646.547	1811023.414	51.279	15.63	HEW105	8/2/2018 12:10
10090	10090	63°18'48.92160"N	168°57'44.83254"W	63°18'48.93710"N	168°57'44.74674"W	7022151.7770	602086.6370	3404651.92	1811036.21	50.647	15.437	HEW105	8/2/2018 12:10
10091	10091	63°18'48.90569"N	168°57'44.80016"W	63°18'48.92118"N	168°57'44.71436"W	7022151.2990	602087.1030	3404650.328	1811037.715	50.601	15.423	HEW104	8/2/2018 12:11
10092	10092	63°18'49.07374"N	168°57'44.86643"W	63°18'49.08923"N	168°57'44.78065"W	7022156.4690	602086.0160	3404667.347	1811034.412	49.815	15.184	HEW105	8/2/2018 12:11
10093	10093	63°18'49.07625"N	168°57'44.80401"W	63°18'49.09174"N	168°57'44.71822"W	7022156.5740	602086.8820	3404667.648	1811037.259	49.973	15.232	HEW104	8/2/2018 12:12
10094	10094	63°18'49.12904"N	168°57'44.71727"W	63°18'49.14454"N	168°57'44.63149"W	7022158.2460	602088.0370	3404673.074	1811041.134	49.944	15.223	HEW104	8/2/2018 12:12
10095	10095	63°18'49.16625"N	168°57'44.70833"W	63°18'49.18175"N	168°57'44.62255"W	7022159.4010	602088.1250	3404676.86	1811041.481	49.886	15.205	HEW104	8/2/2018 12:12

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
10096	10096	63°18'49.25489"N	168°57'44.86333"W	63°18'49.27039"N	168°57'44.77753"W	7022162.0750	602085.8810	3404685.748	1811034.256	49.807	15.181	HEW104	8/2/2018 12:13
10097	10097	63°18'49.14188"N	168°57'44.79144"W	63°18'49.15738"N	168°57'44.70566"W	7022158.6110	602086.9920	3404674.323	1811037.725	49.855	15.196	HEW105	8/2/2018 12:13
10098	10098	63°18'49.21026"N	168°57'44.89788"W	63°18'49.22576"N	168°57'44.81210"W	7022160.6790	602085.4440	3404681.19	1811032.751	49.834	15.19	HEW105	8/2/2018 12:13
10099	10099	63°18'49.36826"N	168°57'44.86654"W	63°18'49.38376"N	168°57'44.78076"W	7022165.5820	602085.7250	3404697.26	1811033.923	49.655	15.135	HEW105	8/2/2018 12:14
10100	10100	63°18'49.34336"N	168°57'44.76469"W	63°18'49.35886"N	168°57'44.67889"W	7022164.8560	602087.1670	3404694.806	1811038.616	49.72	15.155	HEW104	8/2/2018 12:14
10101	10101	63°18'49.52480"N	168°57'44.89256"W	63°18'49.54031"N	168°57'44.80677"W	7022170.4130	602085.2090	3404713.14	1811032.477	48.664	14.833	HEW104	8/2/2018 12:15
10102	10102	63°18'49.52235"N	168°57'44.98656"W	63°18'49.53784"N	168°57'44.90076"W	7022170.2950	602083.9030	3404712.821	1811028.188	48.611	14.817	HEW105	8/2/2018 12:15
10103	10103	63°18'49.66215"N	168°57'45.12745"W	63°18'49.67765"N	168°57'45.04165"W	7022174.5590	602081.8060	3404726.916	1811021.523	48.161	14.68	HEW105	8/2/2018 12:16
10104	10104	63°18'49.66643"N	168°57'45.05710"W	63°18'49.68192"N	168°57'44.97131"W	7022174.7220	602082.7800	3404727.402	1811024.729	48.149	14.676	HEW104	8/2/2018 12:16
10105	10105	63°18'48.57734"N	168°57'46.67847"W	63°18'48.59284"N	168°57'46.59268"W	7022140.3100	602061.2920	3404615.592	1810952.462	52.402	15.972	HEW5	8/2/2018 12:23
10106	10106	63°18'48.67661"N	168°57'46.67561"W	63°18'48.69211"N	168°57'46.58983"W	7022143.3830	602061.2340	3404625.676	1810952.43	52.239	15.923	HEW5	8/2/2018 12:23
10107	10107	63°18'48.74868"N	168°57'46.65537"W	63°18'48.76417"N	168°57'46.56958"W	7022145.6210	602061.4450	3404633.011	1810953.236	51.971	15.841	HEW5	8/2/2018 12:23
10108	10108	63°18'48.84062"N	168°57'46.52775"W	63°18'48.85612"N	168°57'46.44195"W	7022148.5220	602063.1300	3404642.443	1810958.914	51.643	15.741	HEW5	8/2/2018 12:24
10109	10109	63°18'48.87408"N	168°57'46.39866"W	63°18'48.88958"N	168°57'46.31287"W	7022149.6150	602064.8930	3404645.937	1810964.755	51.599	15.727	HEW5	8/2/2018 12:24
10110	10110	63°18'49.05508"N	168°57'46.31051"W	63°18'49.07058"N	168°57'46.22472"W	7022155.2530	602065.9420	3404664.385	1810968.484	50.968	15.535	HEW5	8/2/2018 12:24
10111	10111	63°18'49.14065"N	168°57'46.36274"W	63°18'49.15615"N	168°57'46.27694"W	7022157.8780	602065.1310	3404673.037	1810965.958	50.281	15.326	HEW5	8/2/2018 12:25
10112	10112	63°18'49.25401"N	168°57'46.22439"W	63°18'49.26951"N	168°57'46.13859"W	7022161.4460	602066.9440	3404684.653	1810972.091	49.88	15.204	HEW5	8/2/2018 12:25
10113	10113	63°18'49.28725"N	168°57'46.15620"W	63°18'49.30275"N	168°57'46.07041"W	7022162.5050	602067.8600	3404688.079	1810975.151	49.651	15.134	HEW5	8/2/2018 12:25
10114	10114	63°18'49.28976"N	168°57'46.08051"W	63°18'49.30526"N	168°57'45.99472"W	7022162.6160	602068.9110	3404688.39	1810978.604	49.346	15.041	HEW5	8/2/2018 12:26
10115	10115	63°18'49.34209"N	168°57'46.03895"W	63°18'49.35759"N	168°57'45.95316"W	7022164.2530	602069.4380	3404693.736	1810980.416	49.096	14.965	HEW5	8/2/2018 12:26
10116	10116	63°18'49.40062"N	168°57'46.01090"W	63°18'49.41612"N	168°57'45.92511"W	7022166.0770	602069.7710	3404699.701	1810981.601	49.025	14.943	HEW5	8/2/2018 12:26
10117	10117	63°18'49.50317"N	168°57'46.06166"W	63°18'49.51867"N	168°57'45.97587"W	7022169.2270	602068.9630	3404710.079	1810979.114	48.335	14.733	HEW5	8/2/2018 12:27
10118	10118	63°18'49.55150"N	168°57'46.12105"W	63°18'49.56701"N	168°57'46.03526"W	7022170.6960	602068.0900	3404714.944	1810976.322	47.617	14.514	HEW5	8/2/2018 12:27
10119	10119	63°18'49.59989"N	168°57'46.22331"W	63°18'49.61540"N	168°57'46.13752"W	7022172.1480	602066.6190	3404719.783	1810971.572	47.156	14.373	HEW5	8/2/2018 12:27
10120	10120	63°18'49.62413"N	168°57'46.35472"W	63°18'49.63963"N	168°57'46.26892"W	7022172.8400	602064.7670	3404722.148	1810965.53	46.885	14.291	HEW5	8/2/2018 12:30
10121	10121	63°18'49.69301"N	168°57'46.42931"W	63°18'49.70851"N	168°57'46.34351"W	7022174.9380	602063.6620	3404729.088	1810962.01	46.863	14.284	HEW5	8/2/2018 12:30
10122	10122	63°18'49.73076"N	168°57'46.45065"W	63°18'49.74626"N	168°57'46.36487"W	7022176.0960	602063.3270	3404732.906	1810960.973	46.82	14.271	HEW5	8/2/2018 12:30
10123	10123	63°18'49.80540"N	168°57'46.41933"W	63°18'49.82090"N	168°57'46.33355"W	7022178.4190	602063.6900	3404740.51	1810962.281	46.8	14.265	HEW5	8/2/2018 12:31
10124	10124	63°18'49.87566"N	168°57'46.33648"W	63°18'49.89116"N	168°57'46.25069"W	7022180.6300	602064.7740	3404747.707	1810965.95	46.727	14.243	HEW5	8/2/2018 12:31
10125	10125	63°18'49.95244"N	168°57'46.33264"W	63°18'49.96793"N	168°57'46.24686"W	7022183.0070	602064.7510	3404755.508	1810965.999	46.422	14.149	HEW5	8/2/2018 12:31
10126	10126	63°18'50.01683"N	168°57'46.12634"W	63°18'50.03232"N	168°57'46.04055"W	7022185.0900	602067.5590	3404762.2	1810975.316	46.283	14.107	HEW5	8/2/2018 12:31
10127	10127	63°18'50.03792"N	168°57'46.06855"W	63°18'50.05341"N	168°57'45.98276"W	7022185.7680	602068.3420	3404764.385	1810977.921	46.248	14.096	HEW5	8/2/2018 12:32
10128	10128	63°18'50.11423"N	168°57'45.95082"W	63°18'50.12973"N	168°57'45.86501"W	7022188.1810	602069.9050	3404772.223	1810983.173	46.224	14.089	HEW5	8/2/2018 12:32
10129	10129	63°18'50.12729"N	168°57'45.85782"W	63°18'50.14280"N	168°57'45.77203"W	7022188.6270	602071.1860	3404773.618	1810987.399	46.22	14.088	HEW5	8/2/2018 12:32
10130	10130	63°18'50.11936"N	168°57'45.75183"W	63°18'50.13486"N	168°57'45.66604"W	7022188.4280	602072.6690	3404772.891	1810992.253	46.16	14.069	HEW5	8/2/2018 12:32
10131	10131	63°18'50.18486"N	168°57'45.64441"W	63°18'50.20036"N	168°57'45.55862"W	7022190.5020	602074.0990	3404779.622	1810997.052	45.809	13.963	HEW5	8/2/2018 12:33
10132	10132	63°18'50.25013"N	168°57'45.60598"W	63°18'50.26563"N	168°57'45.52019"W	7022192.5380	602074.5690	3404786.28	1810998.7	45.473	13.86	HEW5	8/2/2018 12:33
10133	10133	63°18'50.31977"N	168°57'45.51874"W	63°18'50.33526"N	168°57'45.43296"W	7022194.7310	602075.7140	3404793.417	1811002.57	44.957	13.703	HEW5	8/2/2018 12:33
10134	10134	63°18'50.43166"N	168°57'45.37959"W	63°18'50.44716"N	168°57'45.29380"W	7022198.2550	602077.5410	3404804.884	1811008.742	44.831	13.665	HEW5	8/2/2018 12:34
10135	10135	63°18'57.69967"N	168°57'18.33953"W	63°18'57.71517"N	168°57'18.25372"W	7022435.0990	602446.5900	3405563.107	1812231.754	51.4	15.667	CHK 2 HV	8/2/2018 12:50
10136	10136	63°20'08.82985"N	168°56'24.47107"W	63°20'08.84535"N	168°56'24.38519"W	7024659.7700	603125.3080	3412827.749	1814572.565	5.323	1.623	CHK 0 HV	8/2/2018 14:33
10137	10137	63°18'50.46195"N	168°57'45.23411"W	63°18'50.47745"N	168°57'45.14831"W	7022199.2560	602079.5350	3404808.068	1811015.337	44.715	13.629	HEW5	8/2/2018 15:16
10138	10138	63°18'50.56526"N	168°57'45.12057"W	63°18'50.58076"N	168°57'45.03477"W	7022202.5030	602081.0130	3404818.645	1811020.353	44.418	13.539	HEW5	8/2/2018 15:16
10139	10139	63°18'50.70838"N	168°57'45.04451"W	63°18'50.72388"N	168°57'44.95871"W	7022206.9650	602081.9310	3404833.237	1811023.592	44.264	13.492	HEW5	8/2/2018 15:17

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Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
10140	10140	63°18'50.89834"N	168°57'45.13705"W	63°18'50.91383"N	168°57'45.05127"W	7022212.8000	602080.4560	3404852.461	1811019.053	44.114	13.446	HEW5	8/2/2018 15:18
10141	10141	63°18'50.96871"N	168°57'45.29649"W	63°18'50.98421"N	168°57'45.21071"W	7022214.9070	602078.1690	3404859.491	1811011.655	44.058	13.429	HEW5	8/2/2018 15:19
10142	10142	63°18'51.06412"N	168°57'45.13441"W	63°18'51.07962"N	168°57'45.04861"W	7022217.9310	602080.3300	3404869.301	1811018.901	44.006	13.413	HEW5	8/2/2018 15:19
10143	10143	63°18'51.09923"N	168°57'45.21825"W	63°18'51.11473"N	168°57'45.13246"W	7022218.9800	602079.1290	3404872.805	1811015.014	44.007	13.413	HEW5	8/2/2018 15:19
10144	10144	63°18'51.16299"N	168°57'45.22156"W	63°18'51.17849"N	168°57'45.13578"W	7022220.9510	602079.0200	3404879.278	1811014.758	43.846	13.364	HEW5	8/2/2018 15:19
10145	10145	63°18'51.16946"N	168°57'45.07328"W	63°18'51.18496"N	168°57'44.98749"W	7022221.2170	602081.0770	3404880.045	1811021.52	43.891	13.378	HEW5	8/2/2018 15:20
10146	10146	63°18'51.22063"N	168°57'45.03157"W	63°18'51.23612"N	168°57'44.94577"W	7022222.8190	602081.6070	3404885.272	1811023.341	44.02	13.417	HEW5	8/2/2018 15:20
10147	10147	63°18'51.22130"N	168°57'45.15551"W	63°18'51.23680"N	168°57'45.06971"W	7022222.7850	602079.8820	3404885.249	1811017.679	43.986	13.407	HEW5	8/2/2018 15:20
10148	10148	63°18'51.28527"N	168°57'45.28261"W	63°18'51.30076"N	168°57'45.19680"W	7022224.7070	602078.0510	3404891.652	1811011.769	43.886	13.377	HEW5	8/2/2018 15:21
10149	10149	63°18'51.36737"N	168°57'45.13883"W	63°18'51.38287"N	168°57'45.05304"W	7022227.3110	602079.9700	3404900.097	1811018.201	43.9	13.381	HEW5	8/2/2018 15:21
10150	10150	63°18'51.26490"N	168°57'44.92732"W	63°18'51.28040"N	168°57'44.84152"W	7022224.2350	602083.0140	3404889.846	1811028.03	43.971	13.403	HEW5	8/2/2018 15:22
10151	10151	63°18'51.34430"N	168°57'44.78269"W	63°18'51.35980"N	168°57'44.69690"W	7022226.7550	602084.9480	3404898.017	1811034.505	44.068	13.432	HEW5	8/2/2018 15:22
10152	10152	63°18'51.41496"N	168°57'44.80410"W	63°18'51.43047"N	168°57'44.71830"W	7022228.9320	602084.5810	3404905.178	1811033.411	44.028	13.42	HEW5	8/2/2018 15:23
10153	10153	63°18'51.47395"N	168°57'44.72340"W	63°18'51.48944"N	168°57'44.63761"W	7022230.7920	602085.6450	3404911.228	1811037	43.879	13.374	HEW5	8/2/2018 15:23
10154	10154	63°18'51.48201"N	168°57'44.43904"W	63°18'51.49750"N	168°57'44.35324"W	7022231.1670	602089.5940	3404912.257	1811049.975	43.894	13.379	HEW5	8/2/2018 15:24
10155	10155	63°18'51.58698"N	168°57'44.14908"W	63°18'51.60248"N	168°57'44.06328"W	7022234.5430	602093.5250	3404923.133	1811063.046	44.013	13.415	HEW5	8/2/2018 15:24
10156	10156	63°18'51.69732"N	168°57'44.36915"W	63°18'51.71282"N	168°57'44.28336"W	7022237.8600	602090.3550	3404934.177	1811052.813	43.977	13.404	HEW5	8/2/2018 15:25
10157	10157	63°18'51.82044"N	168°57'44.24807"W	63°18'51.83594"N	168°57'44.16227"W	7022241.7230	602091.9180	3404946.771	1811058.141	43.949	13.396	HEW5	8/2/2018 15:25
10158	10158	63°18'51.98462"N	168°57'44.25416"W	63°18'52.00012"N	168°57'44.16837"W	7022246.8000	602091.6720	3404963.441	1811057.593	43.956	13.398	HEW5	8/2/2018 15:25
10159	10159	63°18'52.11051"N	168°57'44.29611"W	63°18'52.12601"N	168°57'44.21030"W	7022250.6760	602090.9650	3404976.196	1811055.47	43.93	13.39	HEW5	8/2/2018 15:26
10160	10160	63°18'52.24051"N	168°57'44.18040"W	63°18'52.25601"N	168°57'44.09460"W	7022254.7490	602092.4470	3404989.485	1811060.541	44.018	13.417	HEW5	8/2/2018 15:26
10161	10161	63°18'52.35441"N	168°57'43.95769"W	63°18'52.36991"N	168°57'43.87189"W	7022258.3720	602095.4330	3405001.218	1811070.526	43.983	13.406	HEW5	8/2/2018 15:26
10162	10162	63°18'52.42370"N	168°57'43.91729"W	63°18'52.43920"N	168°57'43.83150"W	7022260.5330	602095.9270	3405008.285	1811072.257	43.966	13.401	HEW5	8/2/2018 15:27
10163	10163	63°18'52.52618"N	168°57'43.79746"W	63°18'52.54168"N	168°57'43.71166"W	7022263.7570	602097.4940	3405018.782	1811077.562	43.893	13.378	HEW5	8/2/2018 15:27
10164	10164	63°18'52.60223"N	168°57'43.78765"W	63°18'52.61772"N	168°57'43.70186"W	7022266.1140	602097.5550	3405026.513	1811077.885	43.776	13.343	HEW5	8/2/2018 15:27
10165	10165	63°18'52.61232"N	168°57'43.71008"W	63°18'52.62782"N	168°57'43.62430"W	7022266.4610	602098.6240	3405027.595	1811081.411	43.74	13.332	HEW5	8/2/2018 15:28
10166	10166	63°18'52.65603"N	168°57'43.67488"W	63°18'52.67153"N	168°57'43.58908"W	7022267.8280	602099.0710	3405032.061	1811082.947	43.778	13.343	HEW5	8/2/2018 15:28
10167	10167	63°18'52.70010"N	168°57'43.77635"W	63°18'52.71559"N	168°57'43.69056"W	7022269.1470	602097.6160	3405036.461	1811078.24	43.77	13.341	HEW5	8/2/2018 15:28
10168	10168	63°18'52.76694"N	168°57'43.75293"W	63°18'52.78243"N	168°57'43.66712"W	7022271.2250	602097.8760	3405043.267	1811079.2	43.377	13.221	HEW5	8/2/2018 15:28
10169	10169	63°18'52.85658"N	168°57'43.68564"W	63°18'52.87208"N	168°57'43.59984"W	7022274.0280	602098.7240	3405052.421	1811082.126	43.204	13.169	HEW5	8/2/2018 15:29
10170	10170	63°18'52.87946"N	168°57'43.58701"W	63°18'52.89495"N	168°57'43.50122"W	7022274.7800	602100.0740	3405054.818	1811086.593	43.158	13.155	HEW5	8/2/2018 15:29
10171	10171	63°18'52.97007"N	168°57'43.41155"W	63°18'52.98557"N	168°57'43.32576"W	7022277.6610	602102.4260	3405064.15	1811094.458	43.181	13.162	HEW5	8/2/2018 15:30
10172	10172	63°18'53.04644"N	168°57'43.24148"W	63°18'53.06194"N	168°57'43.15570"W	7022280.0990	602104.7170	3405072.033	1811102.1	43.16	13.155	HEW5	8/2/2018 15:30
10173	10173	63°18'53.24354"N	168°57'43.20310"W	63°18'53.25904"N	168°57'43.11731"W	7022286.2140	602105.0570	3405092.079	1811103.529	43.126	13.145	HEW5	8/2/2018 15:31
10174	10174	63°18'53.40291"N	168°57'43.22155"W	63°18'53.41840"N	168°57'43.13575"W	7022291.1360	602104.6440	3405108.252	1811102.424	43.226	13.175	HEW5	8/2/2018 15:31
10175	10175	63°18'53.42369"N	168°57'43.24813"W	63°18'53.43919"N	168°57'43.16233"W	7022291.7680	602104.2540	3405110.343	1811101.176	43.161	13.156	HEW5 jpn5153	8/2/2018 15:32
10176	10176	63°18'53.97313"N	168°57'43.36841"W	63°18'53.98863"N	168°57'43.28262"W	7022308.7140	602102.0400	3405166.057	1811094.779	42.03	12.811	HEW10	8/2/2018 15:37
10177	10177	63°18'54.06062"N	168°57'43.30302"W	63°18'54.07612"N	168°57'43.21721"W	7022311.4500	602102.8640	3405174.992	1811097.622	41.768	12.731	HEW10	8/2/2018 15:38
10178	10178	63°18'54.15397"N	168°57'43.09222"W	63°18'54.16947"N	168°57'43.00643"W	7022314.4310	602105.7040	3405184.628	1811107.096	41.548	12.664	HEW10	8/2/2018 15:38
10179	10179	63°18'54.24561"N	168°57'42.93564"W	63°18'54.26111"N	168°57'42.84984"W	7022317.3350	602107.7930	3405194.052	1811114.097	41.444	12.632	HEW10	8/2/2018 15:39
10180	10180	63°18'54.31931"N	168°57'42.95070"W	63°18'54.33481"N	168°57'42.86490"W	7022319.6090	602107.5110	3405201.526	1811113.288	41.429	12.628	HEW10	8/2/2018 15:39
10181	10181	63°18'54.35797"N	168°57'42.82015"W	63°18'54.37347"N	168°57'42.73434"W	7022320.8630	602109.2890	3405205.549	1811119.187	41.419	12.625	HEW10	8/2/2018 15:39
10182	10182	63°18'54.46052"N	168°57'42.74243"W	63°18'54.47602"N	168°57'42.65664"W	7022324.0700	602110.2690	3405216.022	1811122.568	41.142	12.54	HEW10	8/2/2018 15:39
10183	10183	63°18'54.59162"N	168°57'42.60855"W	63°18'54.60712"N	168°57'42.52275"W	7022328.1850	602112.0030	3405229.436	1811128.467	41.077	12.52	HEW10	8/2/2018 15:40

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Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
10184	10184	63°18'54.75162"N	168°57'42.48331"W	63°18'54.76713"N	168°57'42.39751"W	7022333.1910	602113.5880	3405245.779	1811133.924	40.977	12.49	HEW10	8/2/2018 15:40
10185	10185	63°18'54.90946"N	168°57'42.38825"W	63°18'54.92496"N	168°57'42.30245"W	7022338.1160	602114.7560	3405261.88	1811138.006	40.901	12.467	HEW10	8/2/2018 15:41
10186	10186	63°18'54.96559"N	168°57'42.35278"W	63°18'54.98109"N	168°57'42.26698"W	7022339.8690	602115.1940	3405267.607	1811139.534	40.686	12.401	HEW10	8/2/2018 15:41
10187	10187	63°18'55.07434"N	168°57'42.36163"W	63°18'55.08983"N	168°57'42.27583"W	7022343.2290	602114.9640	3405278.645	1811138.951	40.582	12.369	HEW10	8/2/2018 15:42
10188	10188	63°18'55.16272"N	168°57'42.36547"W	63°18'55.17822"N	168°57'42.27968"W	7022345.9620	602114.8230	3405287.619	1811138.63	40.431	12.323	HEW10	8/2/2018 15:42
10189	10189	63°18'55.25918"N	168°57'42.36787"W	63°18'55.27468"N	168°57'42.28206"W	7022348.9450	602114.6950	3405297.414	1811138.362	40.423	12.321	HEW10	8/2/2018 15:42
10190	10190	63°18'55.33222"N	168°57'42.44658"W	63°18'55.34772"N	168°57'42.36077"W	7022351.1700	602113.5280	3405304.774	1811134.647	40.297	12.283	HEW10	8/2/2018 15:43
10191	10191	63°18'55.47040"N	168°57'42.31999"W	63°18'55.48591"N	168°57'42.23421"W	7022355.5020	602115.1530	3405318.902	1811140.201	40.275	12.276	HEW10	8/2/2018 15:43
10192	10192	63°18'55.50102"N	168°57'42.43023"W	63°18'55.51652"N	168°57'42.34442"W	7022356.4000	602113.5900	3405321.93	1811135.116	40.245	12.267	HEW10	8/2/2018 15:43
10193	10193	63°18'55.63753"N	168°57'42.36348"W	63°18'55.65303"N	168°57'42.27769"W	7022360.6530	602114.3840	3405335.844	1811137.94	40.085	12.218	HEW10	8/2/2018 15:44
10194	10194	63°18'55.63140"N	168°57'42.22986"W	63°18'55.64689"N	168°57'42.14406"W	7022360.5220	602116.2490	3405335.32	1811144.053	40.018	12.197	HEW10	8/2/2018 15:44
10195	10195	63°18'55.64805"N	168°57'42.05924"W	63°18'55.66354"N	168°57'41.97344"W	7022361.1130	602118.6070	3405337.137	1811151.818	40.064	12.212	HEW10	8/2/2018 15:45
10196	10196	63°18'55.74691"N	168°57'41.94051"W	63°18'55.76241"N	168°57'41.85472"W	7022364.2240	602120.1610	3405347.266	1811157.078	40.022	12.199	HEW10	8/2/2018 15:45
10197	10197	63°18'55.81611"N	168°57'41.86890"W	63°18'55.83161"N	168°57'41.78310"W	7022366.3970	602121.0890	3405354.347	1811160.235	39.959	12.179	HEW10	8/2/2018 15:45
10198	10198	63°18'55.87591"N	168°57'41.74858"W	63°18'55.89142"N	168°57'41.66279"W	7022368.3000	602122.7040	3405360.51	1811165.632	39.892	12.159	HEW10	8/2/2018 15:46
10199	10199	63°18'56.00519"N	168°57'41.75288"W	63°18'56.02069"N	168°57'41.66709"W	7022372.2980	602122.5170	3405373.637	1811165.223	39.858	12.149	HEW10	8/2/2018 15:46
10200	10200	63°18'56.11520"N	168°57'41.64104"W	63°18'56.13070"N	168°57'41.55523"W	7022375.7510	602123.9650	3405384.892	1811170.15	39.752	12.117	HEW10	8/2/2018 15:46
10201	10201	63°18'56.21618"N	168°57'41.53027"W	63°18'56.23168"N	168°57'41.44447"W	7022378.9240	602125.4070	3405395.23	1811175.043	39.697	12.1	HEW10	8/2/2018 15:47
10202	10202	63°18'56.34387"N	168°57'41.53053"W	63°18'56.35937"N	168°57'41.44473"W	7022382.8750	602125.2780	3405408.199	1811174.821	39.637	12.081	HEW10	8/2/2018 15:47
10203	10203	63°18'56.44479"N	168°57'41.39870"W	63°18'56.46029"N	168°57'41.31291"W	7022386.0550	602127.0120	3405418.546	1811180.676	39.642	12.083	HEW10	8/2/2018 15:48
10204	10204	63°18'56.54775"N	168°57'41.23819"W	63°18'56.56325"N	168°57'41.15241"W	7022389.3120	602129.1440	3405429.122	1811187.837	39.565	12.06	HEW10	8/2/2018 15:48
10205	10205	63°18'56.61255"N	168°57'41.20862"W	63°18'56.62805"N	168°57'41.12282"W	7022391.3300	602129.4920	3405435.725	1811189.081	39.49	12.036	HEW10	8/2/2018 15:49
10206	10206	63°18'56.70988"N	168°57'41.26432"W	63°18'56.72537"N	168°57'41.17852"W	7022394.3160	602128.6210	3405445.569	1811186.377	39.494	12.038	HEW10	8/2/2018 15:49
10207	10207	63°18'56.74798"N	168°57'41.25294"W	63°18'56.76348"N	168°57'41.16714"W	7022395.5000	602128.7420	3405449.447	1811186.834	39.541	12.052	HEW10	8/2/2018 15:50
10208	10208	63°18'56.83930"N	168°57'41.17615"W	63°18'56.85480"N	168°57'41.09036"W	7022398.3600	602129.7200	3405458.779	1811190.191	39.511	12.043	HEW10	8/2/2018 15:50
10209	10209	63°18'56.97168"N	168°57'41.13900"W	63°18'56.98719"N	168°57'41.05321"W	7022402.4720	602130.1070	3405472.252	1811191.67	39.273	11.97	HEW10	8/2/2018 15:51
10210	10210	63°18'57.04388"N	168°57'40.99180"W	63°18'57.05938"N	168°57'40.90601"W	7022404.7710	602132.0840	3405479.693	1811198.274	39.272	11.97	HEW10	8/2/2018 15:52
10211	10211	63°18'57.14947"N	168°57'41.23261"W	63°18'57.16496"N	168°57'41.14681"W	7022407.9310	602128.6300	3405490.239	1811187.102	38.981	11.881	HEW10	8/2/2018 15:53
10212	10212	63°18'57.23777"N	168°57'41.28724"W	63°18'57.25327"N	168°57'41.20144"W	7022410.6390	602127.7830	3405499.167	1811184.462	39.006	11.889	HEW10	8/2/2018 15:53
10213	10213	63°18'57.37569"N	168°57'41.36727"W	63°18'57.39119"N	168°57'41.28147"W	7022414.8700	602126.5340	3405513.116	1811180.58	38.837	11.838	HEW10	8/2/2018 15:54
10214	10214	63°18'57.45414"N	168°57'41.18582"W	63°18'57.46964"N	168°57'41.10003"W	7022417.3780	602128.9810	3405521.218	1811188.738	38.545	11.749	HEW10	8/2/2018 15:54
10215	10215	63°18'57.59574"N	168°57'41.41023"W	63°18'57.61124"N	168°57'41.32443"W	7022421.6600	602125.7200	3405535.433	1811178.256	38.423	11.711	HEW10	8/2/2018 15:54
10216	10216	63°18'57.74338"N	168°57'41.51266"W	63°18'57.75887"N	168°57'41.42687"W	7022426.1820	602124.1490	3405550.352	1811173.335	38.199	11.643	HEW10	8/2/2018 15:55
10217	10217	63°18'57.75943"N	168°57'41.61149"W	63°18'57.77493"N	168°57'41.52568"W	7022426.6350	602122.7590	3405551.909	1811168.795	38.244	11.657	HEW10	8/2/2018 15:55
10218	10218	63°18'57.80225"N	168°57'41.66764"W	63°18'57.81775"N	168°57'41.58185"W	7022427.9350	602121.9350	3405556.217	1811166.16	37.857	11.539	HEW10	8/2/2018 15:55
10219	10219	63°18'57.81454"N	168°57'41.56687"W	63°18'57.83004"N	168°57'41.48108"W	7022428.3600	602123.3250	3405557.539	1811170.742	37.898	11.551	HEW10	8/2/2018 15:56
10220	10220	63°18'57.91710"N	168°57'41.55967"W	63°18'57.93260"N	168°57'41.47387"W	7022431.5360	602123.3240	3405567.961	1811170.902	37.845	11.535	HEW10	8/2/2018 15:56
10221	10221	63°18'57.95916"N	168°57'41.63933"W	63°18'57.97466"N	168°57'41.55354"W	7022432.8020	602122.1750	3405572.174	1811167.195	37.891	11.549	HEW10	8/2/2018 15:56
10222	10222	63°18'58.00352"N	168°57'41.69260"W	63°18'58.01902"N	168°57'41.60679"W	7022434.1510	602121.3900	3405576.64	1811164.689	37.816	11.526	HEW10	8/2/2018 15:57
10223	10223	63°18'58.02658"N	168°57'41.69225"W	63°18'58.04207"N	168°57'41.60644"W	7022434.8640	602121.3720	3405578.982	1811164.667	37.628	11.469	HEW10	8/2/2018 15:59
10224	10224	63°18'58.05008"N	168°57'41.60925"W	63°18'58.06559"N	168°57'41.52346"W	7022435.6280	602122.5040	3405581.431	1811168.419	37.758	11.509	HEW10	8/2/2018 16:01
10225	10225	63°18'58.02459"N	168°57'41.36203"W	63°18'58.04010"N	168°57'41.27623"W	7022434.9490	602125.9680	3405579.025	1811179.752	37.822	11.528	HEW10	8/2/2018 16:02
10226	10226	63°18'58.02094"N	168°57'41.02129"W	63°18'58.03644"N	168°57'40.93548"W	7022434.9870	602130.7130	3405578.906	1811195.32	37.807	11.524	HEW10	8/2/2018 16:02
10227	10227	63°18'58.04022"N	168°57'40.85278"W	63°18'58.05573"N	168°57'40.76699"W	7022435.6580	602133.0380	3405580.989	1811202.984	37.88	11.546	HEW10	8/2/2018 16:03

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Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
10228	10228	63°18'58.11047"N	168°57'40.37958"W	63°18'58.12597"N	168°57'40.29378"W	7022438.0410	602139.5520	3405588.474	1811224.48	37.885	11.547	HEW10	8/2/2018 16:03
10229	10229	63°18'58.08616"N	168°57'40.20135"W	63°18'58.10166"N	168°57'40.11555"W	7022437.3680	602142.0560	3405586.137	1811232.66	37.917	11.557	HEW10	8/2/2018 16:03
10230	10230	63°18'58.09391"N	168°57'40.04564"W	63°18'58.10941"N	168°57'39.95984"W	7022437.6760	602144.2140	3405587.039	1811239.759	37.895	11.55	HEW10	8/2/2018 16:04
10231	10231	63°18'58.20772"N	168°57'39.75409"W	63°18'58.22322"N	168°57'39.66828"W	7022441.3260	602148.1590	3405598.814	1811252.887	37.914	11.556	HEW10	8/2/2018 16:04
10232	10232	63°18'58.29578"N	168°57'39.46099"W	63°18'58.31127"N	168°57'39.37520"W	7022444.1800	602152.1490	3405607.974	1811266.128	37.963	11.571	HEW10	8/2/2018 16:05
10233	10233	63°18'58.31738"N	168°57'39.21514"W	63°18'58.33288"N	168°57'39.12933"W	7022444.9580	602155.5490	3405610.35	1811277.321	38.002	11.583	HEW10	8/2/2018 16:05
10234	10234	63°18'57.69976"N	168°57'18.33929"W	63°18'57.71525"N	168°57'18.25347"W	7022435.1020	602446.5930	3405563.116	1812231.765	51.418	15.672	CHK 2 HV	8/2/2018 17:11
10235	10235	63°18'57.69956"N	168°57'18.33886"W	63°18'57.71505"N	168°57'18.25305"W	7022435.0960	602446.5990	3405563.096	1812231.785	51.426	15.675	CHK 2 HV	8/2/2018 18:09
10236	10236	63°18'57.69988"N	168°57'18.33970"W	63°18'57.71538"N	168°57'18.25389"W	7022435.1050	602446.5870	3405563.128	1812231.746	51.433	15.677	CHK 0 HV	8/3/2018 8:57
10237	10237	63°19'03.96540"N	168°56'44.95903"W	63°19'03.98089"N	168°56'44.87322"W	7022643.8020	602904.7840	3406224.434	1813745.82	78.543	23.94	MP flag	8/3/2018 9:09
10238	10238	63°19'03.97244"N	168°56'44.96267"W	63°19'03.98793"N	168°56'44.87685"W	7022644.0180	602904.7270	3406225.146	1813745.642	78.484	23.922	GB1	8/3/2018 9:10
10239	10239	63°19'03.92636"N	168°56'45.18033"W	63°19'03.94185"N	168°56'45.09450"W	7022642.4950	602901.7450	3406220.303	1813735.779	78.239	23.847	GB1	8/3/2018 9:10
10240	10240	63°19'03.87910"N	168°56'45.33485"W	63°19'03.89459"N	168°56'45.24904"W	7022640.9640	602899.6420	3406215.387	1813728.801	78.527	23.935	GB1	8/3/2018 9:11
10241	10241	63°19'03.86195"N	168°56'45.47886"W	63°19'03.87744"N	168°56'45.39304"W	7022640.3690	602897.6550	3406213.537	1813722.253	78.632	23.967	GB1	8/3/2018 9:11
10242	10242	63°19'03.83162"N	168°56'45.44285"W	63°19'03.84712"N	168°56'45.35703"W	7022639.4480	602898.1860	3406210.484	1813723.948	78.607	23.959	MP flag	8/3/2018 9:12
10243	10243	63°19'03.80174"N	168°56'45.63743"W	63°19'03.81723"N	168°56'45.55161"W	7022638.4360	602895.5090	3406207.303	1813715.112	78.461	23.915	GB1	8/3/2018 9:12
10244	10244	63°19'03.83028"N	168°56'45.83840"W	63°19'03.84578"N	168°56'45.75258"W	7022639.2300	602892.6850	3406210.051	1813705.886	78.53	23.936	GB1	8/3/2018 9:12
10245	10245	63°19'03.82605"N	168°56'46.15197"W	63°19'03.84155"N	168°56'46.06615"W	7022638.9590	602888.3270	3406209.386	1813691.573	78.494	23.925	GB1	8/3/2018 9:13
10246	10246	63°19'03.82520"N	168°56'46.27267"W	63°19'03.84070"N	168°56'46.18685"W	7022638.8790	602886.6480	3406209.209	1813686.062	78.394	23.895	GB1	8/3/2018 9:14
10247	10247	63°19'03.81310"N	168°56'46.29096"W	63°19'03.82859"N	168°56'46.20515"W	7022638.4960	602886.4060	3406207.966	1813685.247	78.375	23.889	MP flag	8/3/2018 9:14
10248	10248	63°19'03.81756"N	168°56'46.38734"W	63°19'03.83305"N	168°56'46.30153"W	7022638.5910	602885.0610	3406208.347	1813680.838	78.455	23.913	GB1	8/3/2018 9:14
10249	10249	63°19'03.83403"N	168°56'46.51687"W	63°19'03.84952"N	168°56'46.43106"W	7022639.0430	602883.2420	3406209.922	1813674.895	78.301	23.866	GB1	8/3/2018 9:15
10250	10250	63°19'03.89286"N	168°56'46.52961"W	63°19'03.90836"N	168°56'46.44380"W	7022640.8580	602883.0070	3406215.888	1813674.215	78.304	23.867	GB1	8/3/2018 9:15
10251	10251	63°19'04.00522"N	168°56'46.50985"W	63°19'04.02071"N	168°56'46.42403"W	7022644.3420	602883.1710	3406227.314	1813674.93	78.469	23.917	GB1	8/3/2018 9:15
10252	10252	63°19'04.02937"N	168°56'46.48731"W	63°19'04.04486"N	168°56'46.40150"W	7022645.1000	602883.4600	3406229.784	1813675.919	78.475	23.919	GB1	8/3/2018 9:15
10253	10253	63°19'04.02801"N	168°56'46.49844"W	63°19'04.04349"N	168°56'46.41263"W	7022645.0530	602883.3060	3406229.637	1813675.413	78.392	23.894	MP flag	8/3/2018 9:16
10254	10254	63°19'04.05172"N	168°56'46.36648"W	63°19'04.06721"N	168°56'46.28066"W	7022645.8450	602885.1190	3406232.144	1813681.4	78.855	24.035	GB1	8/3/2018 9:16
10255	10255	63°19'04.09130"N	168°56'46.15714"W	63°19'04.10679"N	168°56'46.07131"W	7022647.1630	602887.9920	3406236.322	1813690.894	79.322	24.177	GB1	8/3/2018 9:17
10256	10256	63°19'04.11753"N	168°56'45.88422"W	63°19'04.13301"N	168°56'45.79841"W	7022648.0960	602891.7630	3406239.19	1813703.314	79.356	24.188	GB1	8/3/2018 9:17
10257	10257	63°19'04.13334"N	168°56'45.66526"W	63°19'04.14884"N	168°56'45.57944"W	7022648.6830	602894.7930	3406240.961	1813713.287	79.355	24.187	GB1	8/3/2018 9:17
10258	10258	63°19'04.18864"N	168°56'45.49199"W	63°19'04.20413"N	168°56'45.40617"W	7022650.4710	602897.1490	3406246.707	1813721.108	79.54	24.244	GB1	8/3/2018 9:17
10259	10259	63°19'04.21213"N	168°56'45.32808"W	63°19'04.22762"N	168°56'45.24226"W	7022651.2710	602899.4060	3406249.216	1813728.554	79.234	24.151	GB1	8/3/2018 9:18
10260	10260	63°19'04.20558"N	168°56'45.26239"W	63°19'04.22107"N	168°56'45.17657"W	7022651.0980	602900.3260	3406248.6	1813731.565	79.162	24.129	GB1	8/3/2018 9:18
10261	10261	63°19'04.20470"N	168°56'45.26350"W	63°19'04.22020"N	168°56'45.17767"W	7022651.0700	602900.3120	3406248.51	1813731.516	79.135	24.12	MP flag	8/3/2018 9:18
10262	10262	63°19'04.23233"N	168°56'45.08643"W	63°19'04.24782"N	168°56'45.00061"W	7022652.0040	602902.7470	3406251.449	1813739.556	79.079	24.103	GB1	8/3/2018 9:18
10263	10263	63°19'04.20811"N	168°56'44.98164"W	63°19'04.22361"N	168°56'44.89583"W	7022651.3010	602904.2290	3406249.068	1813744.382	79.05	24.094	GB1	8/3/2018 9:18
10264	10264	63°19'04.18633"N	168°56'44.82712"W	63°19'04.20183"N	168°56'44.74130"W	7022650.6960	602906.4000	3406246.972	1813751.475	78.919	24.055	GB1	8/3/2018 9:19
10265	10265	63°19'04.18336"N	168°56'44.84007"W	63°19'04.19885"N	168°56'44.75426"W	7022650.5980	602906.2230	3406246.66	1813750.889	78.768	24.008	MP flag	8/3/2018 9:19
10266	10266	63°19'04.13099"N	168°56'44.68051"W	63°19'04.14648"N	168°56'44.59470"W	7022649.0490	602908.4950	3406241.461	1813758.263	78.839	24.03	GB1	8/3/2018 9:19
10267	10267	63°19'04.06415"N	168°56'44.76027"W	63°19'04.07964"N	168°56'44.67447"W	7022646.9460	602907.4510	3406234.613	1813754.732	78.612	23.961	GB1	8/3/2018 9:20
10268	10268	63°19'03.98515"N	168°56'44.84659"W	63°19'04.00064"N	168°56'44.76077"W	7022644.4630	602906.3290	3406226.524	1813750.922	78.75	24.003	GB1 C	8/3/2018 9:20
10269	10269	63°19'03.96159"N	168°56'44.74646"W	63°19'03.97708"N	168°56'44.66064"W	7022643.7790	602907.7450	3406224.207	1813755.534	78.624	23.965	GS	8/3/2018 9:20
10270	10270	63°19'03.90457"N	168°56'44.61436"W	63°19'03.92007"N	168°56'44.52855"W	7022642.0740	602909.6400	3406218.515	1813761.662	78.626	23.965	GS	8/3/2018 9:20
10271	10271	63°19'03.82616"N	168°56'44.80360"W	63°19'03.84165"N	168°56'44.71777"W	7022639.5630	602907.0850	3406210.409	1813753.151	78.57	23.948	GS	8/3/2018 9:20

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Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
10272	10272	63°19'03.88251"N	168°56'44.95823"W	63°19'03.89800"N	168°56'44.87241"W	7022641.2380	602904.8780	3406216.016	1813745.995	78.754	24.004	GS	8/3/2018 9:21
10273	10273	63°19'03.83647"N	168°56'45.11109"W	63°19'03.85196"N	168°56'45.02527"W	7022639.7450	602902.7970	3406211.225	1813739.091	78.804	24.02	GS	8/3/2018 9:21
10274	10274	63°19'03.73951"N	168°56'45.03221"W	63°19'03.75500"N	168°56'44.94639"W	7022636.7800	602903.9900	3406201.437	1813742.855	78.554	23.943	GS	8/3/2018 9:21
10275	10275	63°19'03.70275"N	168°56'45.22384"W	63°19'03.71825"N	168°56'45.13803"W	7022635.5580	602901.3610	3406197.56	1813734.165	78.449	23.911	GS	8/3/2018 9:21
10276	10276	63°19'03.78452"N	168°56'45.35372"W	63°19'03.80002"N	168°56'45.26790"W	7022638.0300	602899.4730	3406205.767	1813728.097	78.674	23.98	GS	8/3/2018 9:21
10277	10277	63°19'03.74284"N	168°56'45.54847"W	63°19'03.75833"N	168°56'45.46264"W	7022636.6530	602896.8050	3406201.387	1813719.273	78.628	23.966	GS	8/3/2018 9:22
10278	10278	63°19'03.64623"N	168°56'45.47078"W	63°19'03.66172"N	168°56'45.38496"W	7022633.6990	602897.9820	3406191.634	1813722.982	78.271	23.857	GS	8/3/2018 9:22
10279	10279	63°19'03.61143"N	168°56'45.67870"W	63°19'03.62692"N	168°56'45.59288"W	7022632.5300	602895.1240	3406187.943	1813713.545	78.223	23.843	GS	8/3/2018 9:22
10280	10280	63°19'03.71888"N	168°56'45.73540"W	63°19'03.73437"N	168°56'45.64958"W	7022635.8290	602894.2280	3406198.814	1813710.776	78.476	23.919	GS	8/3/2018 9:22
10281	10281	63°19'03.79124"N	168°56'45.81373"W	63°19'03.80673"N	168°56'45.72791"W	7022638.0320	602893.0670	3406206.104	1813707.078	78.596	23.956	GS	8/3/2018 9:22
10282	10282	63°19'03.78599"N	168°56'45.99100"W	63°19'03.80148"N	168°56'45.90519"W	7022637.7910	602890.6060	3406205.438	1813698.991	78.391	23.894	GS	8/3/2018 9:23
10283	10283	63°19'03.69110"N	168°56'45.98672"W	63°19'03.70659"N	168°56'45.90091"W	7022634.8570	602890.7590	3406195.804	1813699.345	78.52	23.933	GS	8/3/2018 9:23
10284	10284	63°19'03.60705"N	168°56'45.90128"W	63°19'03.62254"N	168°56'45.81546"W	7022632.2950	602892.0320	3406187.331	1813703.387	78.368	23.887	GS	8/3/2018 9:23
10285	10285	63°19'03.55392"N	168°56'46.09318"W	63°19'03.56941"N	168°56'46.00736"W	7022630.5660	602889.4140	3406181.791	1813694.712	78.453	23.913	GS	8/3/2018 9:23
10286	10286	63°19'03.68405"N	168°56'46.19436"W	63°19'03.69954"N	168°56'46.10854"W	7022634.5470	602887.8780	3406194.932	1813689.874	78.655	23.974	GS	8/3/2018 9:23
10287	10287	63°19'03.77351"N	168°56'46.23953"W	63°19'03.78901"N	168°56'46.15371"W	7022637.2940	602887.1610	3406203.984	1813687.662	78.584	23.952	GS	8/3/2018 9:23
10288	10288	63°19'03.78609"N	168°56'46.38455"W	63°19'03.80158"N	168°56'46.29874"W	7022637.6190	602885.1310	3406205.153	1813681.018	78.336	23.877	GS	8/3/2018 9:24
10289	10289	63°19'03.68617"N	168°56'46.39530"W	63°19'03.70166"N	168°56'46.30947"W	7022634.5230	602885.0800	3406194.996	1813680.694	78.396	23.895	GS	8/3/2018 9:24
10290	10290	63°19'03.59693"N	168°56'46.43802"W	63°19'03.61242"N	168°56'46.35220"W	7022631.7430	602884.5750	3406185.901	1813678.892	78.347	23.88	GS	8/3/2018 9:24
10291	10291	63°19'03.61741"N	168°56'46.69224"W	63°19'03.63290"N	168°56'46.60642"W	7022632.2630	602881.0180	3406187.79	1813667.248	78.087	23.801	GS	8/3/2018 9:24
10292	10292	63°19'03.70814"N	168°56'46.75354"W	63°19'03.72363"N	168°56'46.66773"W	7022635.0430	602880.0750	3406196.959	1813664.297	78.204	23.837	GS	8/3/2018 9:24
10293	10293	63°19'03.75324"N	168°56'46.55495"W	63°19'03.76873"N	168°56'46.46914"W	7022636.5270	602882.7930	3406201.688	1813673.291	78.493	23.925	GS	8/3/2018 9:24
10294	10294	63°19'03.87082"N	168°56'46.60741"W	63°19'03.88631"N	168°56'46.52160"W	7022640.1410	602881.9460	3406213.591	1813670.699	78.237	23.847	GS	8/3/2018 9:25
10295	10295	63°19'03.82299"N	168°56'46.79850"W	63°19'03.83849"N	168°56'46.71269"W	7022638.5760	602879.3350	3406208.59	1813662.052	78.293	23.864	GS	8/3/2018 9:25
10296	10296	63°19'03.86835"N	168°56'46.91662"W	63°19'03.88385"N	168°56'46.83081"W	7022639.9270	602877.6470	3406213.108	1813656.582	77.774	23.706	GS	8/3/2018 9:25
10297	10297	63°19'03.95060"N	168°56'47.03105"W	63°19'03.96609"N	168°56'46.94523"W	7022642.4200	602875.9740	3406221.376	1813651.219	77.641	23.665	GS	8/3/2018 9:25
10298	10298	63°19'03.75631"N	168°56'47.01404"W	63°19'03.77181"N	168°56'46.92822"W	7022636.4170	602876.4030	3406201.656	1813652.32	77.843	23.727	GS	8/3/2018 9:26
10299	10299	63°19'04.05066"N	168°56'47.14001"W	63°19'04.06615"N	168°56'47.05419"W	7022645.4670	602874.3590	3406231.456	1813646.076	77.613	23.657	GS	8/3/2018 9:26
10300	10300	63°19'04.07247"N	168°56'46.89889"W	63°19'04.08796"N	168°56'46.81307"W	7022646.2500	602877.6920	3406233.852	1813657.051	78.122	23.812	GS	8/3/2018 9:26
10301	10301	63°19'03.98317"N	168°56'46.75774"W	63°19'03.99867"N	168°56'46.67193"W	7022643.5500	602879.7440	3406224.889	1813663.646	78.044	23.788	GS	8/3/2018 9:26
10302	10302	63°19'03.90587"N	168°56'46.70985"W	63°19'03.92136"N	168°56'46.62404"W	7022641.1800	602880.4870	3406217.074	1813665.962	78.142	23.818	GS	8/3/2018 9:27
10303	10303	63°19'04.03820"N	168°56'46.58728"W	63°19'04.05369"N	168°56'46.50145"W	7022645.3280	602882.0610	3406230.606	1813671.339	78.404	23.898	GS	8/3/2018 9:27
10304	10304	63°19'04.11622"N	168°56'46.76291"W	63°19'04.13171"N	168°56'46.67708"W	7022647.6640	602879.5400	3406238.398	1813663.188	78.506	23.929	GS	8/3/2018 9:28
10305	10305	63°19'04.17686"N	168°56'46.54507"W	63°19'04.19235"N	168°56'46.45926"W	7022649.6370	602882.5100	3406244.72	1813673.035	78.928	24.057	GS	8/3/2018 9:28
10306	10306	63°19'04.07862"N	168°56'46.43572"W	63°19'04.09411"N	168°56'46.34991"W	7022646.6470	602884.1290	3406234.825	1813678.193	78.797	24.017	GS	8/3/2018 9:28
10307	10307	63°19'04.10814"N	168°56'46.20468"W	63°19'04.12363"N	168°56'46.11886"W	7022647.6630	602887.3140	3406237.996	1813688.695	79.277	24.164	GS	8/3/2018 9:28
10308	10308	63°19'04.20876"N	168°56'46.28990"W	63°19'04.22425"N	168°56'46.20408"W	7022650.7380	602886.0290	3406248.152	1813684.635	79.186	24.136	GS	8/3/2018 9:28
10309	10309	63°19'04.25421"N	168°56'46.10446"W	63°19'04.26971"N	168°56'46.01863"W	7022652.2270	602888.5630	3406252.907	1813693.028	79.641	24.275	GS	8/3/2018 9:29
10310	10310	63°19'04.16473"N	168°56'45.94797"W	63°19'04.18021"N	168°56'45.86214"W	7022649.5280	602890.8290	3406243.936	1813700.324	79.439	24.213	GS	8/3/2018 9:29
10311	10311	63°19'04.16579"N	168°56'45.71376"W	63°19'04.18128"N	168°56'45.62794"W	7022649.6650	602894.0860	3406244.22	1813711.018	79.398	24.201	GS	8/3/2018 9:29
10312	10312	63°19'04.25592"N	168°56'45.79396"W	63°19'04.27141"N	168°56'45.70813"W	7022652.4180	602892.8810	3406253.314	1813707.205	79.536	24.243	GS	8/3/2018 9:29
10313	10313	63°19'04.28388"N	168°56'45.96641"W	63°19'04.29937"N	168°56'45.88058"W	7022653.2060	602890.4540	3406256.024	1813699.283	79.63	24.271	GS	8/3/2018 9:30
10314	10314	63°19'04.30268"N	168°56'45.60470"W	63°19'04.31817"N	168°56'45.51889"W	7022653.9490	602895.4680	3406258.205	1813715.77	79.648	24.277	GS	8/3/2018 9:30
10315	10315	63°19'04.23852"N	168°56'45.57232"W	63°19'04.25402"N	168°56'45.48649"W	7022651.9790	602895.9820	3406251.713	1813717.356	79.565	24.251	GS	8/3/2018 9:30

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Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
10316	10316	63°19'04.20507"N	168°56'45.51558"W	63°19'04.22056"N	168°56'45.42977"W	7022650.9690	602896.8040	3406248.358	1813720.003	79.712	24.296	GS	8/3/2018 9:30
10317	10317	63°19'04.24671"N	168°56'45.32073"W	63°19'04.26220"N	168°56'45.23492"W	7022652.3440	602899.4740	3406252.733	1813728.832	79.439	24.213	GS	8/3/2018 9:30
10318	10318	63°19'04.34976"N	168°56'45.33288"W	63°19'04.36526"N	168°56'45.24706"W	7022655.5270	602899.2020	3406263.191	1813728.105	79.609	24.265	GS	8/3/2018 9:32
10319	10319	63°19'04.27433"N	168°56'45.09872"W	63°19'04.28981"N	168°56'45.01289"W	7022653.2970	602902.5350	3406255.705	1813738.925	79.348	24.185	GS	8/3/2018 9:32
10320	10320	63°19'04.35162"N	168°56'45.00462"W	63°19'04.36711"N	168°56'44.91880"W	7022655.7310	602903.7670	3406263.626	1813743.093	79.317	24.176	GS	8/3/2018 9:33
10321	10321	63°19'04.29215"N	168°56'44.74719"W	63°19'04.30764"N	168°56'44.66136"W	7022654.0060	602907.4080	3406257.779	1813754.949	79.122	24.116	GS	8/3/2018 9:33
10322	10322	63°19'04.21913"N	168°56'44.85525"W	63°19'04.23463"N	168°56'44.76942"W	7022651.6980	602905.9770	3406250.282	1813750.136	79.019	24.085	GS	8/3/2018 9:33
10323	10323	63°19'04.18904"N	168°56'44.69328"W	63°19'04.20452"N	168°56'44.60746"W	7022650.8390	602908.2600	3406247.347	1813757.583	79.045	24.093	GS	8/3/2018 9:34
10324	10324	63°19'04.20228"N	168°56'44.47615"W	63°19'04.21777"N	168°56'44.39032"W	7022651.3460	602911.2670	3406248.855	1813767.477	79.104	24.111	GS	8/3/2018 9:34
10325	10325	63°19'03.97782"N	168°56'44.46911"W	63°19'03.99331"N	168°56'44.38330"W	7022644.4050	602911.5880	3406226.063	1813768.173	78.743	24.001	GS	8/3/2018 9:34
10326	10326	63°19'04.04278"N	168°56'44.69368"W	63°19'04.05826"N	168°56'44.60787"W	7022646.3140	602908.3990	3406232.492	1813757.809	78.598	23.957	GS	8/3/2018 9:35
10327	10327	63°19'04.13631"N	168°56'44.58853"W	63°19'04.15181"N	168°56'44.50270"W	7022649.2550	602909.7690	3406242.071	1813762.455	78.877	24.042	GS	8/3/2018 9:35
10328	10328	63°19'04.09294"N	168°56'44.27992"W	63°19'04.10843"N	168°56'44.19410"W	7022648.0510	602914.1060	3406237.898	1813776.621	78.876	24.041	GS	8/3/2018 9:35
10329	10329	63°19'04.06673"N	168°56'44.97291"W	63°19'04.08222"N	168°56'44.88708"W	7022646.9310	602904.4910	3406234.715	1813745.017	77.686	23.679	GB2	8/3/2018 9:35
10330	10330	63°19'04.02722"N	168°56'44.98900"W	63°19'04.04271"N	168°56'44.90319"W	7022645.7010	602904.3060	3406230.69	1813744.348	77.701	23.683	GB2	8/3/2018 9:36
10331	10331	63°19'03.99165"N	168°56'45.05459"W	63°19'04.00713"N	168°56'44.96878"W	7022644.5710	602903.4290	3406227.028	1813741.412	77.806	23.715	GB2	8/3/2018 9:36
10332	10332	63°19'03.93332"N	168°56'45.23900"W	63°19'03.94882"N	168°56'45.15317"W	7022642.6850	602900.9220	3406220.966	1813733.088	77.966	23.764	GB2	8/3/2018 9:36
10333	10333	63°19'03.90299"N	168°56'45.40845"W	63°19'03.91848"N	168°56'45.32263"W	7022641.6710	602898.5940	3406217.758	1813725.4	78.167	23.825	GB2	8/3/2018 9:36
10334	10334	63°19'03.87375"N	168°56'45.51313"W	63°19'03.88924"N	168°56'45.42732"W	7022640.7190	602897.1670	3406214.71	1813720.668	78.151	23.82	GB2	8/3/2018 9:36
10335	10335	63°19'03.85733"N	168°56'45.63506"W	63°19'03.87282"N	168°56'45.54924"W	7022640.1570	602895.4870	3406212.951	1813715.127	78.173	23.827	GB2	8/3/2018 9:37
10336	10336	63°19'03.87845"N	168°56'45.82613"W	63°19'03.89394"N	168°56'45.74032"W	7022640.7250	602892.8080	3406214.952	1813706.366	78.533	23.937	GB2	8/3/2018 9:38
10337	10337	63°19'03.86318"N	168°56'46.00773"W	63°19'03.87867"N	168°56'45.92193"W	7022640.1720	602890.2960	3406213.265	1813698.098	78.414	23.901	GB2	8/3/2018 9:38
10338	10338	63°19'03.84891"N	168°56'46.21295"W	63°19'03.86440"N	168°56'46.12714"W	7022639.6390	602887.4560	3406211.662	1813688.75	78.091	23.802	GB2	8/3/2018 9:38
10339	10339	63°19'03.88009"N	168°56'46.35580"W	63°19'03.89558"N	168°56'46.26998"W	7022640.5400	602885.4380	3406214.721	1813682.174	77.998	23.774	GB2	8/3/2018 9:38
10340	10340	63°19'03.94410"N	168°56'46.42255"W	63°19'03.95959"N	168°56'46.33673"W	7022642.4900	602884.4460	3406221.172	1813679.019	77.889	23.741	GB2	8/3/2018 9:38
10341	10341	63°19'03.97268"N	168°56'46.37197"W	63°19'03.98817"N	168°56'46.28616"W	7022643.3970	602885.1210	3406224.113	1813681.281	77.688	23.679	GB2	8/3/2018 9:39
10342	10342	63°19'03.96124"N	168°56'46.30098"W	63°19'03.97673"N	168°56'46.21516"W	7022643.0750	602886.1200	3406223.004	1813684.542	77.821	23.72	GB2	8/3/2018 9:39
10343	10343	63°19'03.98206"N	168°56'46.14979"W	63°19'03.99755"N	168°56'46.06397"W	7022643.7860	602888.2030	3406225.232	1813691.412	78.104	23.806	GB2	8/3/2018 9:39
10344	10344	63°19'04.01295"N	168°56'46.02155"W	63°19'04.02845"N	168°56'45.93572"W	7022644.8000	602889.9560	3406228.466	1813697.217	78.564	23.946	GB2	8/3/2018 9:39
10345	10345	63°19'04.03692"N	168°56'45.80904"W	63°19'04.05241"N	168°56'45.72321"W	7022645.6360	602892.8890	3406231.06	1813706.882	78.719	23.994	GB2	8/3/2018 9:39
10346	10346	63°19'04.05402"N	168°56'45.60815"W	63°19'04.06951"N	168°56'45.52232"W	7022646.2540	602895.6660	3406232.947	1813716.028	78.662	23.976	GB2	8/3/2018 9:39
10347	10347	63°19'04.05397"N	168°56'45.47002"W	63°19'04.06946"N	168°56'45.38420"W	7022646.3140	602897.5880	3406233.046	1813722.336	78.406	23.898	GB2	8/3/2018 9:40
10348	10348	63°19'04.10567"N	168°56'45.35547"W	63°19'04.12117"N	168°56'45.26966"W	7022647.9650	602899.1300	3406238.383	1813727.481	78.308	23.868	GB2	8/3/2018 9:40
10349	10349	63°19'04.15191"N	168°56'45.24710"W	63°19'04.16740"N	168°56'45.16129"W	7022649.4440	602900.5920	3406243.161	1813732.353	78.148	23.819	GB2	8/3/2018 9:41
10350	10350	63°19'04.13485"N	168°56'45.11133"W	63°19'04.15034"N	168°56'45.02552"W	7022648.9770	602902.4980	3406241.53	1813738.582	77.973	23.766	GB2	8/3/2018 9:42
10351	10351	63°19'04.08523"N	168°56'45.02851"W	63°19'04.10072"N	168°56'44.94269"W	7022647.4780	602903.6990	3406236.552	1813742.447	77.786	23.709	GB2 C	8/3/2018 9:42
10352	10352	63°19'04.11028"N	168°56'44.90512"W	63°19'04.12577"N	168°56'44.81929"W	7022648.3080	602905.3910	3406239.189	1813748.04	78.325	23.874	GS	8/3/2018 9:43
10353	10353	63°19'04.18012"N	168°56'45.00962"W	63°19'04.19561"N	168°56'44.92380"W	7022650.4220	602903.8680	3406246.204	1813743.151	78.599	23.957	GS	8/3/2018 9:43
10354	10354	63°19'04.07932"N	168°56'45.28054"W	63°19'04.09481"N	168°56'45.19472"W	7022647.1830	602900.1990	3406235.763	1813730.947	78.246	23.849	GB3	8/3/2018 9:44
10355	10355	63°19'04.03852"N	168°56'45.45013"W	63°19'04.05401"N	168°56'45.36431"W	7022645.8450	602897.8800	3406231.492	1813723.27	78.468	23.917	GB3	8/3/2018 9:45
10356	10356	63°19'04.00224"N	168°56'45.65289"W	63°19'04.01774"N	168°56'45.56706"W	7022644.6330	602895.0950	3406227.655	1813714.071	78.703	23.989	GB3	8/3/2018 9:45
10357	10357	63°19'03.98663"N	168°56'45.86045"W	63°19'04.00213"N	168°56'45.77464"W	7022644.0570	602892.2230	3406225.914	1813704.618	78.739	24	GB3	8/3/2018 9:45
10358	10358	63°19'03.97463"N	168°56'46.05678"W	63°19'03.99011"N	168°56'45.97095"W	7022643.5980	602889.5040	3406224.547	1813695.672	78.471	23.918	GB3	8/3/2018 9:45
10359	10359	63°19'03.94680"N	168°56'46.16477"W	63°19'03.96230"N	168°56'46.07894"W	7022642.6890	602888.0290	3406221.64	1813690.787	78.198	23.835	GB3	8/3/2018 9:46

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Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
10360	10360	63°19'03.90457"N	168°56'46.08396"W	63°19'03.92006"N	168°56'45.99814"W	7022641.4180	602889.1950	3406217.411	1813694.548	78.246	23.849	GB3	8/3/2018 9:46
10361	10361	63°19'03.90406"N	168°56'45.90713"W	63°19'03.91955"N	168°56'45.82132"W	7022641.4810	602891.6560	3406217.492	1813702.624	78.505	23.928	GB3	8/3/2018 9:46
10362	10362	63°19'03.93150"N	168°56'45.69533"W	63°19'03.94699"N	168°56'45.60950"W	7022642.4250	602894.5750	3406220.438	1813712.251	78.69	23.985	GB3	8/3/2018 9:46
10363	10363	63°19'03.95445"N	168°56'45.56860"W	63°19'03.96994"N	168°56'45.48278"W	7022643.1910	602896.3150	3406222.864	1813718	78.662	23.976	GB3	8/3/2018 9:47
10364	10364	63°19'03.98052"N	168°56'45.43441"W	63°19'03.99601"N	168°56'45.34859"W	7022644.0580	602898.1560	3406225.613	1813724.085	78.334	23.876	GB3	8/3/2018 9:47
10365	10365	63°19'04.02404"N	168°56'45.29360"W	63°19'04.03954"N	168°56'45.20777"W	7022645.4670	602900.0720	3406230.139	1813730.443	78.208	23.838	GB3 C	8/3/2018 9:47
10366	10366	63°19'04.04084"N	168°56'44.91318"W	63°19'04.05634"N	168°56'44.82736"W	7022646.1570	602905.3480	3406232.131	1813747.788	78.207	23.838	GS	8/3/2018 9:47
10367	10367	63°19'04.08175"N	168°56'45.11868"W	63°19'04.09724"N	168°56'45.03286"W	7022647.3300	602902.4480	3406236.131	1813738.335	78.085	23.8	GS	8/3/2018 9:48
10368	10368	63°19'04.17168"N	168°56'45.20532"W	63°19'04.18717"N	168°56'45.11950"W	7022650.0740	602901.1540	3406245.2	1813734.228	78.321	23.872	GS	8/3/2018 9:48
10369	10369	63°19'04.13318"N	168°56'45.35011"W	63°19'04.14867"N	168°56'45.26428"W	7022648.8190	602899.1780	3406241.181	1813727.68	78.499	23.927	GS	8/3/2018 9:48
10370	10370	63°19'04.15362"N	168°56'45.46506"W	63°19'04.16912"N	168°56'45.37925"W	7022649.4000	602897.5580	3406243.171	1813722.396	79.165	24.13	GS	8/3/2018 9:49
10371	10371	63°19'04.06787"N	168°56'45.34763"W	63°19'04.08337"N	168°56'45.26181"W	7022646.7990	602899.2770	3406234.55	1813727.902	78.376	23.889	GS	8/3/2018 9:49
10372	10372	63°19'03.95839"N	168°56'45.25562"W	63°19'03.97388"N	168°56'45.16980"W	7022643.4530	602900.6650	3406223.499	1813732.287	78.001	23.775	GS	8/3/2018 9:49
10373	10373	63°19'03.89654"N	168°56'45.51545"W	63°19'03.91203"N	168°56'45.42964"W	7022641.4230	602897.1120	3406217.023	1813720.524	78.186	23.831	GS	8/3/2018 9:49
10374	10374	63°19'03.93759"N	168°56'45.56944"W	63°19'03.95308"N	168°56'45.48361"W	7022642.6690	602896.3200	3406221.151	1813717.99	78.501	23.927	GS	8/3/2018 9:50
10375	10375	63°19'03.98062"N	168°56'45.61694"W	63°19'03.99611"N	168°56'45.53112"W	7022643.9800	602895.6170	3406225.486	1813715.749	78.687	23.984	GS	8/3/2018 9:50
10376	10376	63°19'04.01047"N	168°56'45.42607"W	63°19'04.02596"N	168°56'45.34024"W	7022644.9880	602898.2430	3406228.661	1813724.416	78.367	23.886	GS	8/3/2018 9:50
10377	10377	63°19'04.04259"N	168°56'45.31860"W	63°19'04.05808"N	168°56'45.23277"W	7022646.0300	602899.7060	3406232.004	1813729.27	78.238	23.847	GS	8/3/2018 9:50
10378	10378	63°19'04.06943"N	168°56'45.68998"W	63°19'04.08492"N	168°56'45.60416"W	7022646.6950	602894.5130	3406234.451	1813712.265	78.768	24.009	GS	8/3/2018 9:51
10379	10379	63°19'04.04753"N	168°56'45.93574"W	63°19'04.06302"N	168°56'45.84993"W	7022645.9080	602891.1150	3406232.042	1813701.078	78.808	24.021	GS	8/3/2018 9:51
10380	10380	63°19'03.94264"N	168°56'45.86127"W	63°19'03.95813"N	168°56'45.77545"W	7022642.6950	602892.2550	3406221.445	1813704.654	78.614	23.962	GS	8/3/2018 9:51
10381	10381	63°19'03.94503"N	168°56'46.03588"W	63°19'03.96052"N	168°56'45.95006"W	7022642.6920	602889.8240	3406221.557	1813696.676	78.473	23.919	GS	8/3/2018 9:52
10382	10382	63°19'04.01050"N	168°56'46.32857"W	63°19'04.02599"N	168°56'46.24275"W	7022644.5870	602885.6870	3406227.986	1813683.2	78.381	23.891	GS	8/3/2018 9:52
10383	10383	63°19'04.03888"N	168°56'46.13699"W	63°19'04.05438"N	168°56'46.05116"W	7022645.5500	602888.3240	3406231.013	1813691.902	78.686	23.983	GS	8/3/2018 9:52
10384	10384	63°19'03.88162"N	168°56'46.44866"W	63°19'03.89711"N	168°56'46.36284"W	7022640.5460	602884.1440	3406214.807	1813677.931	78.229	23.844	GS	8/3/2018 9:53
10385	10385	63°19'03.92804"N	168°56'46.30321"W	63°19'03.94353"N	168°56'46.21739"W	7022642.0470	602886.1220	3406219.631	1813684.496	77.842	23.726	GS	8/3/2018 9:53
10386	10386	63°19'03.88477"N	168°56'46.24247"W	63°19'03.90025"N	168°56'46.15666"W	7022640.7350	602887.0090	3406215.281	1813687.342	77.935	23.755	GS	8/3/2018 9:53
10387	10387	63°19'03.91851"N	168°56'46.20734"W	63°19'03.93400"N	168°56'46.12151"W	7022641.7950	602887.4650	3406218.735	1813688.89	77.924	23.751	GS	8/3/2018 9:53
10388	10388	63°19'03.88770"N	168°56'46.17308"W	63°19'03.90319"N	168°56'46.08727"W	7022640.8570	602887.9720	3406215.631	1813690.506	78.021	23.781	GS	8/3/2018 9:53
10389	10389	63°19'04.58919"N	168°56'45.45067"W	63°19'04.60468"N	168°56'45.36485"W	7022662.8820	602897.3260	3406287.42	1813722.326	79.388	24.197	GB4	8/3/2018 9:54
10390	10390	63°19'04.59384"N	168°56'45.45475"W	63°19'04.60933"N	168°56'45.36894"W	7022663.0240	602897.2650	3406287.889	1813722.132	79.515	24.236	MP flag	8/3/2018 9:55
10391	10391	63°19'04.64916"N	168°56'45.48095"W	63°19'04.66466"N	168°56'45.39514"W	7022664.7240	602896.8460	3406293.488	1813720.843	79.637	24.273	GB4	8/3/2018 9:55
10392	10392	63°19'04.72074"N	168°56'45.46018"W	63°19'04.73623"N	168°56'45.37436"W	7022666.9480	602897.0640	3406300.773	1813721.672	79.373	24.193	GB4	8/3/2018 9:55
10393	10393	63°19'04.76049"N	168°56'45.35573"W	63°19'04.77598"N	168°56'45.26991"W	7022668.2240	602898.4770	3406304.889	1813726.376	79.13	24.119	GB4	8/3/2018 9:55
10394	10394	63°19'04.77052"N	168°56'45.25292"W	63°19'04.78601"N	168°56'45.16710"W	7022668.5800	602899.8980	3406305.985	1813731.054	79.121	24.116	GB4	8/3/2018 9:56
10395	10395	63°19'04.77004"N	168°56'45.26280"W	63°19'04.78553"N	168°56'45.17698"W	7022668.5610	602899.7610	3406305.928	1813730.604	79.188	24.137	MP f'ag	8/3/2018 9:56
10396	10396	63°19'04.79411"N	168°56'45.14779"W	63°19'04.80960"N	168°56'45.06196"W	7022669.3570	602901.3370	3406308.459	1813735.816	79.336	24.182	GB4	8/3/2018 9:56
10397	10397	63°19'04.79143"N	168°56'45.00354"W	63°19'04.80693"N	168°56'44.91771"W	7022669.3390	602903.3460	3406308.296	1813742.408	79.064	24.099	GB4	8/3/2018 9:56
10398	10398	63°19'04.78398"N	168°56'45.01610"W	63°19'04.79947"N	168°56'44.93028"W	7022669.1020	602903.1790	3406307.529	1813741.847	78.891	24.046	MP flag	8/3/2018 9:57
10399	10399	63°19'04.73521"N	168°56'44.91012"W	63°19'04.75070"N	168°56'44.82430"W	7022667.6410	602904.7020	3406302.656	1813746.768	79.245	24.154	GB4	8/3/2018 9:57
10400	10400	63°19'04.67390"N	168°56'44.81968"W	63°19'04.68940"N	168°56'44.73385"W	7022665.7840	602906.0210	3406296.497	1813751.001	79.371	24.192	GB4	8/3/2018 9:57
10401	10401	63°19'04.59719"N	168°56'44.80698"W	63°19'04.61267"N	168°56'44.72116"W	7022663.4160	602906.2730	3406288.715	1813751.709	79.36	24.189	GB4	8/3/2018 9:57
10402	10402	63°19'04.52729"N	168°56'44.79502"W	63°19'04.54278"N	168°56'44.70921"W	7022661.2590	602906.5090	3406281.625	1813752.372	79.225	24.148	GB4	8/3/2018 9:57
10403	10403	63°19'04.46304"N	168°56'44.81254"W	63°19'04.47852"N	168°56'44.72673"W	7022659.2630	602906.3290	3406275.086	1813751.679	79.157	24.127	GB4	8/3/2018 9:58

2018 Northeast Cape Periodic Review
Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
10404	10404	63°19'04.43327"N	168°56'44.86014"W	63°19'04.44876"N	168°56'44.77432"W	7022658.3210	602905.6960	3406272.027	1813749.555	79.031	24.089	GB4	8/3/2018 9:58
10405	10405	63°19'04.43063"N	168°56'44.86875"W	63°19'04.44612"N	168°56'44.78294"W	7022658.2360	602905.5790	3406271.752	1813749.166	78.903	24.05	MP flag	8/3/2018 9:58
10406	10406	63°19'04.42646"N	168°56'44.99672"W	63°19'04.44195"N	168°56'44.91091"W	7022658.0500	602903.8030	3406271.233	1813743.329	79.205	24.142	GB4	8/3/2018 9:59
10407	10407	63°19'04.45591"N	168°56'45.10526"W	63°19'04.47140"N	168°56'45.01944"W	7022658.9120	602902.2640	3406274.142	1813738.323	79.463	24.22	GB4	8/3/2018 9:59
10408	10408	63°19'04.49171"N	168°56'45.21906"W	63°19'04.50720"N	168°56'45.13324"W	7022659.9690	602900.6450	3406277.693	1813733.066	79.484	24.227	GB4	8/3/2018 9:59
10409	10409	63°19'04.52917"N	168°56'45.32908"W	63°19'04.54466"N	168°56'45.24327"W	7022661.0790	602899.0770	3406281.415	1813727.979	79.46	24.219	GB4	8/3/2018 9:59
10410	10410	63°19'04.56626"N	168°56'45.41972"W	63°19'04.58175"N	168°56'45.33389"W	7022662.1860	602897.7800	3406285.114	1813723.778	79.416	24.206	GB4 C	8/3/2018 10:00
10411	10411	63°19'04.52428"N	168°56'45.47216"W	63°19'04.53977"N	168°56'45.38634"W	7022660.8640	602897.0920	3406280.811	1813721.453	79.488	24.228	GS	8/3/2018 10:00
10412	10412	63°19'04.44767"N	168°56'45.53614"W	63°19'04.46316"N	168°56'45.45031"W	7022658.4650	602896.2780	3406272.982	1813718.659	79.679	24.286	GS	8/3/2018 10:00
10413	10413	63°19'04.35775"N	168°56'45.55577"W	63°19'04.37325"N	168°56'45.46995"W	7022655.6750	602896.0940	3406263.835	1813717.913	79.703	24.294	GS	8/3/2018 10:00
10414	10414	63°19'04.43310"N	168°56'45.34146"W	63°19'04.44859"N	168°56'45.25564"W	7022658.1010	602899.0010	3406271.648	1813727.574	79.748	24.307	GS	8/3/2018 10:01
10415	10415	63°19'04.48066"N	168°56'45.26946"W	63°19'04.49615"N	168°56'45.18363"W	7022659.6050	602899.9550	3406276.533	1813730.783	79.413	24.205	GS	8/3/2018 10:01
10416	10416	63°19'04.41405"N	168°56'45.11132"W	63°19'04.42954"N	168°56'45.02549"W	7022657.6150	602902.2210	3406269.886	1813738.116	79.542	24.244	GS	8/3/2018 10:01
10417	10417	63°19'04.33336"N	168°56'45.14418"W	63°19'04.34886"N	168°56'45.05837"W	7022655.1040	602901.8440	3406261.667	1813736.75	79.468	24.222	GS	8/3/2018 10:01
10418	10418	63°19'04.26876"N	168°56'44.87380"W	63°19'04.28425"N	168°56'44.78797"W	7022653.2260	602905.6700	3406255.309	1813749.206	79.102	24.11	GS	8/3/2018 10:02
10419	10419	63°19'04.37321"N	168°56'44.70989"W	63°19'04.38870"N	168°56'44.62406"W	7022656.5300	602907.8460	3406266.04	1813756.517	79.2	24.14	GS	8/3/2018 10:02
10420	10420	63°19'04.30089"N	168°56'44.45301"W	63°19'04.31638"N	168°56'44.36719"W	7022654.4070	602911.4910	3406258.888	1813768.369	79.095	24.108	GS	8/3/2018 10:02
10421	10421	63°19'04.39456"N	168°56'44.37925"W	63°19'04.41005"N	168°56'44.29343"W	7022657.3380	602912.4250	3406268.457	1813771.581	79.278	24.164	GS	8/3/2018 10:02
10422	10422	63°19'04.42420"N	168°56'44.53880"W	63°19'04.43969"N	168°56'44.45298"W	7022658.1840	602910.1760	3406271.347	1813764.245	79.276	24.163	GS	8/3/2018 10:03
10423	10423	63°19'04.45650"N	168°56'44.71696"W	63°19'04.47199"N	168°56'44.63113"W	7022659.1040	602907.6650	3406274.494	1813756.055	79.235	24.151	GS	8/3/2018 10:03
10424	10424	63°19'04.58577"N	168°56'44.66548"W	63°19'04.60127"N	168°56'44.57966"W	7022663.1260	602908.2530	3406287.662	1813758.19	79.455	24.218	GS	8/3/2018 10:03
10425	10425	63°19'04.54682"N	168°56'44.49740"W	63°19'04.56231"N	168°56'44.41157"W	7022661.9960	602910.6300	3406283.832	1813765.931	79.174	24.132	GS	8/3/2018 10:03
10426	10426	63°19'04.45821"N	168°56'44.57329"W	63°19'04.47370"N	168°56'44.48748"W	7022659.2210	602909.6620	3406274.775	1813762.613	79.218	24.146	GS	8/3/2018 10:04
10427	10427	63°19'04.55463"N	168°56'44.30836"W	63°19'04.57012"N	168°56'44.22255"W	7022662.3220	602913.2520	3406284.767	1813774.551	79.222	24.147	GS	8/3/2018 10:04
10428	10428	63°19'04.68249"N	168°56'44.30189"W	63°19'04.69798"N	168°56'44.21607"W	7022666.2810	602913.2150	3406297.758	1813774.633	79.253	24.156	GS	8/3/2018 10:04
10429	10429	63°19'04.64284"N	168°56'44.51747"W	63°19'04.65833"N	168°56'44.43164"W	7022664.9580	602910.2560	3406293.569	1813764.854	79.308	24.173	GS	8/3/2018 10:04
10430	10430	63°19'04.61985"N	168°56'44.67385"W	63°19'04.63535"N	168°56'44.58803"W	7022664.1770	602908.1030	3406291.117	1813757.751	79.393	24.199	GS	8/3/2018 10:05
10431	10431	63°19'04.74147"N	168°56'44.76868"W	63°19'04.75696"N	168°56'44.68287"W	7022667.8980	602906.6630	3406303.398	1813753.217	79.558	24.249	GS	8/3/2018 10:05
10432	10432	63°19'04.78292"N	168°56'44.58818"W	63°19'04.79841"N	168°56'44.50236"W	7022669.2600	602909.1330	3406307.743	1813761.391	79.332	24.18	GS	8/3/2018 10:05
10433	10433	63°19'04.78962"N	168°56'44.35026"W	63°19'04.80511"N	168°56'44.26445"W	7022669.5740	602912.4360	3406308.602	1813772.245	79.222	24.147	GS	8/3/2018 10:05
10434	10434	63°19'04.90533"N	168°56'44.40723"W	63°19'04.92082"N	168°56'44.32142"W	7022673.1280	602911.5290	3406320.311	1813769.45	78.809	24.021	GS	8/3/2018 10:05
10435	10435	63°19'04.84174"N	168°56'44.66446"W	63°19'04.85723"N	168°56'44.57864"W	7022671.0460	602908.0130	3406313.66	1813757.809	79.247	24.155	GS	8/3/2018 10:06
10436	10436	63°19'04.79426"N	168°56'44.83384"W	63°19'04.80975"N	168°56'44.74803"W	7022669.5020	602905.7040	3406308.71	1813750.153	79.261	24.159	GS	8/3/2018 10:06
10437	10437	63°19'04.83907"N	168°56'45.02488"W	63°19'04.85456"N	168°56'44.93905"W	7022670.8030	602903.0020	3406313.118	1813741.354	79.037	24.091	GS	8/3/2018 10:06
10438	10438	63°19'04.90617"N	168°56'44.84302"W	63°19'04.92166"N	168°56'44.75719"W	7022672.9600	602905.4660	3406320.07	1813749.547	78.991	24.077	GS	8/3/2018 10:06
10439	10439	63°19'04.98379"N	168°56'44.63544"W	63°19'04.99928"N	168°56'44.54963"W	7022675.4540	602908.2760	3406328.109	1813758.897	78.594	23.955	GS	8/3/2018 10:06
10440	10440	63°19'05.06213"N	168°56'44.76140"W	63°19'05.07763"N	168°56'44.67558"W	7022677.8220	602906.4460	3406335.971	1813753.014	78.205	23.837	GS	8/3/2018 10:07
10441	10441	63°19'05.10284"N	168°56'45.04482"W	63°19'05.11834"N	168°56'44.95900"W	7022678.9550	602902.4630	3406339.893	1813740.003	78.012	23.778	GS	8/3/2018 10:07
10442	10442	63°19'04.97243"N	168°56'44.97113"W	63°19'04.98792"N	168°56'44.88531"W	7022674.9530	602903.6180	3406326.703	1813743.586	78.495	23.925	GS	8/3/2018 10:07
10443	10443	63°19'04.84999"N	168°56'45.15034"W	63°19'04.86548"N	168°56'45.06452"W	7022671.0850	602901.2460	3406314.133	1813735.606	79.048	24.094	GS	8/3/2018 10:07
10444	10444	63°19'04.81602"N	168°56'45.35002"W	63°19'04.83151"N	168°56'45.26419"W	7022669.9450	602898.5020	3406310.533	1813726.544	79.125	24.117	GS	8/3/2018 10:07
10445	10445	63°19'04.90374"N	168°56'45.43409"W	63°19'04.91924"N	168°56'45.34828"W	7022672.6210	602897.2450	3406319.379	1813722.558	78.986	24.075	GS	8/3/2018 10:08
10446	10446	63°19'05.00672"N	168°56'45.58030"W	63°19'05.02221"N	168°56'45.49448"W	7022675.7420	602895.1090	3406329.728	1813715.709	78.871	24.04	GS	8/3/2018 10:08
10447	10447	63°19'05.10195"N	168°56'45.34342"W	63°19'05.11744"N	168°56'45.25760"W	7022678.7940	602898.3100	3406339.578	1813726.368	78.068	23.795	GS	8/3/2018 10:08

2018 Northeast Cape Periodic Review
Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
10448	10448	63°19'04.96689"N	168°56'45.17425"W	63°19'04.98238"N	168°56'45.08843"W	7022674.6910	602900.7970	3406325.988	1813734.319	78.549	23.942	GS	8/3/2018 10:08
10449	10449	63°19'04.75161"N	168°56'45.46882"W	63°19'04.76710"N	168°56'45.38300"W	7022667.8990	602896.9130	3406303.902	1813721.226	79.417	24.206	GS	8/3/2018 10:09
10450	10450	63°19'04.79717"N	168°56'45.62405"W	63°19'04.81266"N	168°56'45.53822"W	7022669.2390	602894.7080	3406308.413	1813714.061	79.483	24.227	GS	8/3/2018 10:09
10451	10451	63°19'04.86479"N	168°56'45.84545"W	63°19'04.88028"N	168°56'45.75963"W	7022671.2330	602891.5610	3406315.114	1813703.837	79.148	24.124	GS	8/3/2018 10:09
10452	10452	63°19'04.96323"N	168°56'45.71310"W	63°19'04.97873"N	168°56'45.62728"W	7022674.3380	602893.3050	3406325.212	1813709.717	78.91	24.052	GS	8/3/2018 10:10
10453	10453	63°19'04.81024"N	168°56'46.02446"W	63°19'04.82572"N	168°56'45.93864"W	7022669.4650	602889.1250	3406309.439	1813695.753	79.126	24.118	GS	8/3/2018 10:10
10454	10454	63°19'04.72969"N	168°56'45.84949"W	63°19'04.74518"N	168°56'45.76367"W	7022667.0510	602891.6390	3406301.39	1813703.878	79.423	24.208	GS	8/3/2018 10:10
10455	10455	63°19'04.68144"N	168°56'45.62894"W	63°19'04.69693"N	168°56'45.54311"W	7022665.6570	602894.7550	3406296.655	1813714.031	79.591	24.259	GS	8/3/2018 10:10
10456	10456	63°19'04.55963"N	168°56'45.59531"W	63°19'04.57513"N	168°56'45.50949"W	7022661.9030	602895.3440	3406284.309	1813715.77	79.56	24.25	GS	8/3/2018 10:11
10457	10457	63°19'04.61030"N	168°56'45.79982"W	63°19'04.62578"N	168°56'45.71401"W	7022663.3790	602892.4480	3406289.301	1813706.346	79.476	24.224	GS	8/3/2018 10:11
10458	10458	63°19'04.66708"N	168°56'46.02989"W	63°19'04.68258"N	168°56'45.94406"W	7022665.0340	602889.1910	3406294.896	1813695.744	79.31	24.174	GS	8/3/2018 10:11
10459	10459	63°19'04.53515"N	168°56'46.07901"W	63°19'04.55063"N	168°56'45.99319"W	7022660.9300	602888.6390	3406281.459	1813693.721	79.295	24.169	GS	8/3/2018 10:11
10460	10460	63°19'04.52636"N	168°56'45.80026"W	63°19'04.54185"N	168°56'45.71443"W	7022660.7820	602892.5250	3406280.776	1813706.466	79.541	24.244	GS	8/3/2018 10:12
10461	10461	63°19'04.40496"N	168°56'45.63462"W	63°19'04.42045"N	168°56'45.54879"W	7022657.1000	602894.9500	3406268.57	1813714.233	79.564	24.251	GS	8/3/2018 10:12
10462	10462	63°19'04.35103"N	168°56'45.79156"W	63°19'04.36652"N	168°56'45.70574"W	7022655.3620	602892.8200	3406262.975	1813707.156	79.455	24.218	GS	8/3/2018 10:13
10463	10463	63°19'04.45045"N	168°56'45.98681"W	63°19'04.46594"N	168°56'45.90099"W	7022658.3500	602890.0050	3406272.926	1813698.073	79.427	24.209	GS	8/3/2018 10:13
10464	10464	63°19'04.34818"N	168°56'46.06796"W	63°19'04.36367"N	168°56'45.98214"W	7022655.1500	602888.9780	3406262.478	1813694.538	79.394	24.199	GS	8/3/2018 10:13
10465	10465	63°19'04.73224"N	168°56'45.06089"W	63°19'04.74773"N	168°56'44.97507"W	7022667.4820	602902.6070	3406302.241	1813739.888	78.089	23.802	GB5	8/3/2018 10:14
10466	10466	63°19'04.73527"N	168°56'45.14287"W	63°19'04.75076"N	168°56'45.05704"W	7022667.5390	602901.4640	3406302.487	1813736.139	78.508	23.929	GB5	8/3/2018 10:14
10467	10467	63°19'04.71761"N	168°56'45.25635"W	63°19'04.73310"N	168°56'45.17054"W	7022666.9420	602899.9020	3406300.608	1813730.986	78.676	23.98	GB5	8/3/2018 10:15
10468	10468	63°19'04.64429"N	168°56'45.32601"W	63°19'04.65978"N	168°56'45.24019"W	7022664.6420	602899.0060	3406293.109	1813727.927	78.697	23.987	GB5	8/3/2018 10:16
10469	10469	63°19'04.60041"N	168°56'45.27999"W	63°19'04.61590"N	168°56'45.19417"W	7022663.3050	602899.6900	3406288.687	1813730.102	78.999	24.079	GB5	8/3/2018 10:17
10470	10470	63°19'04.54654"N	168°56'45.12084"W	63°19'04.56203"N	168°56'45.03503"W	7022661.7090	602901.9570	3406283.335	1813737.46	78.637	23.969	GB5	8/3/2018 10:17
10471	10471	63°19'04.49747"N	168°56'44.97954"W	63°19'04.51296"N	168°56'44.89371"W	7022660.2540	602903.9720	3406278.458	1813743.995	78.384	23.892	GB5	8/3/2018 10:17
10472	10472	63°19'04.49058"N	168°56'44.93939"W	63°19'04.50607"N	168°56'44.85357"W	7022660.0590	602904.5370	3406277.788	1813745.84	78.431	23.906	GB5	8/3/2018 10:17
10473	10473	63°19'04.51434"N	168°56'44.94813"W	63°19'04.52984"N	168°56'44.86232"W	7022660.7910	602904.3920	3406280.195	1813745.401	78.477	23.92	GB5	8/3/2018 10:17
10474	10474	63°19'04.56546"N	168°56'44.90930"W	63°19'04.58095"N	168°56'44.82348"W	7022662.3890	602904.8810	3406285.416	1813747.089	78.675	23.98	GB5	8/3/2018 10:17
10475	10475	63°19'04.62938"N	168°56'44.90445"W	63°19'04.64487"N	168°56'44.81863"W	7022664.3690	602904.8850	3406291.911	1813747.204	78.542	23.94	GB5	8/3/2018 10:17
10476	10476	63°19'04.69238"N	168°56'44.96291"W	63°19'04.70786"N	168°56'44.87709"W	7022666.2920	602904.0100	3406298.266	1813744.429	78.514	23.931	GB5 C	8/3/2018 10:18
10477	10477	63°19'04.71992"N	168°56'45.09271"W	63°19'04.73541"N	168°56'45.00689"W	7022667.0860	602902.1770	3406300.966	1813738.455	78.02	23.78	GS	8/3/2018 10:18
10478	10478	63°19'04.68033"N	168°56'45.05884"W	63°19'04.69581"N	168°56'44.97303"W	7022665.8760	602902.6870	3406296.97	1813740.068	78.548	23.942	GS	8/3/2018 10:18
10479	10479	63°19'04.63981"N	168°56'45.04546"W	63°19'04.65530"N	168°56'44.95964"W	7022664.6290	602902.9130	3406292.865	1813740.747	78.885	24.044	GS	8/3/2018 10:18
10480	10480	63°19'04.59567"N	168°56'44.96958"W	63°19'04.61117"N	168°56'44.88376"W	7022663.2970	602904.0130	3406288.439	1813744.286	78.709	23.99	GS	8/3/2018 10:19
10481	10481	63°19'04.56125"N	168°56'45.01314"W	63°19'04.57674"N	168°56'44.92731"W	7022662.2130	602903.4410	3406284.91	1813742.354	78.459	23.914	GS	8/3/2018 10:19
10482	10482	63°19'04.58224"N	168°56'45.08673"W	63°19'04.59773"N	168°56'45.00091"W	7022662.8290	602902.3960	3406286.987	1813738.958	78.776	24.011	GS	8/3/2018 10:19
10483	10483	63°19'04.63026"N	168°56'45.17375"W	63°19'04.64575"N	168°56'45.08794"W	7022664.2760	602901.1380	3406291.799	1813734.904	78.962	24.068	GS	8/3/2018 10:19
10484	10484	63°19'04.69127"N	168°56'45.17034"W	63°19'04.70676"N	168°56'45.08452"W	7022666.1650	602901.1250	3406297.998	1813734.958	78.482	23.921	GS	8/3/2018 10:20
10485	10485	63°19'04.72905"N	168°56'45.31356"W	63°19'04.74453"N	168°56'45.22775"W	7022667.2700	602899.0950	3406301.727	1813728.354	78.981	24.073	GS	8/3/2018 10:20
10486	10486	63°19'04.66504"N	168°56'45.36272"W	63°19'04.68053"N	168°56'45.27690"W	7022665.2680	602898.4750	3406295.189	1813726.216	78.84	24.03	GS	8/3/2018 10:20
10487	10487	63°19'04.60824"N	168°56'45.37380"W	63°19'04.62373"N	168°56'45.28797"W	7022663.5060	602898.3770	3406289.412	1813725.805	79.255	24.157	GS	8/3/2018 10:20
10488	10488	63°19'04.55825"N	168°56'45.24256"W	63°19'04.57373"N	168°56'45.15674"W	7022662.0170	602900.2520	3406284.433	1813731.882	79.016	24.084	GS	8/3/2018 10:20
10489	10489	63°19'04.51771"N	168°56'45.11147"W	63°19'04.53320"N	168°56'45.02566"W	7022660.8220	602902.1160	3406280.414	1813737.936	78.917	24.054	GS	8/3/2018 10:21
10490	10490	63°19'04.46472"N	168°56'44.99004"W	63°19'04.48021"N	168°56'44.90422"W	7022659.2360	602903.8580	3406275.124	1813743.57	78.698	23.987	GS	8/3/2018 10:21
10491	10491	63°19'04.49211"N	168°56'44.87101"W	63°19'04.50760"N	168°56'44.78519"W	7022660.1370	602905.4870	3406277.995	1813748.96	78.832	24.028	GS	8/3/2018 10:21

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Survey Table

Field Survey Point ID	Feature Location ID	Latitude (WGS84)	Longitude (WGS84)	Latitude (NAD 83 (2011))	Longitude (NAD 83 (2011))	Northing (UTM Zone 2N)	Easting (UTM Zone 2N)	Northing - Alaska State Plane Zone 9, U.S. Survey Feet	Easting - Alaska State Plane Zone 9, U.S. Survey Feet	Elevation (NAVD88, GEOID12B, U.S. Survey Feet)	Elevation (NAVD88, GEOID12B, Meters)	Text Descriptor	Measurement Date/Time
10492	10492	63°19'04.55176"N	168°56'44.86763"W	63°19'04.56725"N	168°56'44.78181"W	7022661.9840	602905.4750	3406284.056	1813749.015	78.95	24.064	GS	8/3/2018 10:21
10493	10493	63°19'04.63756"N	168°56'44.85733"W	63°19'04.65305"N	168°56'44.77151"W	7022664.6430	602905.5330	3406292.778	1813749.342	78.964	24.068	GS	8/3/2018 10:21
10494	10494	63°19'04.70277"N	168°56'44.91280"W	63°19'04.71826"N	168°56'44.82697"W	7022666.6360	602904.6970	3406299.359	1813746.7	78.906	24.051	GS	8/3/2018 10:22
10495	10495	63°19'04.75941"N	168°56'45.03418"W	63°19'04.77490"N	168°56'44.94837"W	7022668.3340	602902.9520	3406305.02	1813741.062	78.761	24.006	GS	8/3/2018 10:22
10496	10496	63°19'04.76055"N	168°56'45.13126"W	63°19'04.77604"N	168°56'45.04545"W	7022668.3260	602901.6000	3406305.063	1813736.627	78.852	24.034	GS	8/3/2018 10:22
10497	10497	63°19'04.69053"N	168°56'43.71022"W	63°19'04.70602"N	168°56'43.62440"W	7022666.7930	602921.4380	3406299.019	1813801.64	78.234	23.846	GS	8/3/2018 10:24
10498	10498	63°19'04.68217"N	168°56'44.06502"W	63°19'04.69765"N	168°56'43.97920"W	7022666.3760	602916.5110	3406297.903	1813785.451	79.093	24.108	GS	8/3/2018 10:24
10499	10499	63°19'04.69604"N	168°56'44.42176"W	63°19'04.71153"N	168°56'44.33593"W	7022666.6470	602911.5340	3406299.044	1813769.136	79.269	24.161	GS	8/3/2018 10:24
10500	10500	63°19'04.69521"N	168°56'44.72813"W	63°19'04.71070"N	168°56'44.64232"W	7022666.4840	602907.2730	3406298.73	1813755.146	79.582	24.257	GS	8/3/2018 10:25
10501	10501	63°19'04.69642"N	168°56'44.85108"W	63°19'04.71191"N	168°56'44.76526"W	7022666.4670	602905.5610	3406298.76	1813749.529	79.311	24.174	GS	8/3/2018 10:25
10502	10502	63°19'04.69017"N	168°56'44.95933"W	63°19'04.70566"N	168°56'44.87352"W	7022666.2250	602904.0620	3406298.044	1813744.596	78.428	23.905	GS	8/3/2018 10:26
10503	10503	63°19'04.69211"N	168°56'45.04300"W	63°19'04.70761"N	168°56'44.95718"W	7022666.2480	602902.8960	3406298.179	1813740.772	78.158	23.822	GS	8/3/2018 10:26
10504	10504	63°19'04.68867"N	168°56'45.11934"W	63°19'04.70416"N	168°56'45.03353"W	7022666.1070	602901.8370	3406297.772	1813737.291	78.485	23.922	GS	8/3/2018 10:26
10505	10505	63°19'04.68816"N	168°56'45.21615"W	63°19'04.70365"N	168°56'45.13033"W	7022666.0480	602900.4910	3406297.647	1813732.871	78.782	24.013	GS	8/3/2018 10:27
10506	10506	63°19'04.69322"N	168°56'45.33292"W	63°19'04.70872"N	168°56'45.24711"W	7022666.1530	602898.8610	3406298.074	1813727.53	78.876	24.041	GS	8/3/2018 10:27
10507	10507	63°19'04.69532"N	168°56'45.45496"W	63°19'04.71081"N	168°56'45.36914"W	7022666.1630	602897.1610	3406298.195	1813721.953	79.416	24.206	GS	8/3/2018 10:27
10508	10508	63°19'04.69497"N	168°56'45.54379"W	63°19'04.71046"N	168°56'45.45797"W	7022666.1130	602895.9260	3406298.093	1813717.897	79.608	24.265	GS	8/3/2018 10:28
10509	10509	63°19'04.68899"N	168°56'45.76221"W	63°19'04.70449"N	168°56'45.67640"W	7022665.8310	602892.8930	3406297.322	1813707.932	79.578	24.256	GS	8/3/2018 10:28
10510	10510	63°19'04.71763"N	168°56'46.09161"W	63°19'04.73312"N	168°56'46.00580"W	7022666.5700	602888.2830	3406299.983	1813692.841	79.373	24.193	GS	8/3/2018 10:28
10511	10511	63°19'04.71669"N	168°56'46.44513"W	63°19'04.73217"N	168°56'46.35932"W	7022666.3830	602883.3650	3406299.622	1813676.698	79.166	24.13	GS	8/3/2018 10:29
10512	10512	63°19'04.72902"N	168°56'46.79828"W	63°19'04.74451"N	168°56'46.71245"W	7022666.6070	602878.4410	3406300.61	1813660.55	78.697	23.987	GS	8/3/2018 10:29
10513	10513	63°19'04.73495"N	168°56'47.08574"W	63°19'04.75044"N	168°56'46.99993"W	7022666.6630	602874.4350	3406300.996	1813647.412	78.654	23.974	GS	8/3/2018 10:29
10514	10514	63°19'04.73586"N	168°56'47.48483"W	63°19'04.75134"N	168°56'47.39902"W	7022666.5130	602868.8830	3406300.789	1813629.185	77.648	23.667	GS	8/3/2018 10:29
10515	10515	63°19'04.75306"N	168°56'47.84270"W	63°19'04.76855"N	168°56'47.75689"W	7022666.8860	602863.8870	3406302.268	1813612.813	77.347	23.575	GS	8/3/2018 10:30
10516	10516	63°19'04.73474"N	168°56'48.32327"W	63°19'04.75023"N	168°56'48.23745"W	7022666.1050	602857.2200	3406300.046	1813590.897	76.467	23.307	GS	8/3/2018 10:30
10517	10517	63°19'04.73242"N	168°56'48.75475"W	63°19'04.74791"N	168°56'48.66893"W	7022665.8410	602851.2190	3406299.487	1813571.196	75.41	22.985	GS	8/3/2018 10:30
10518	10518	63°19'04.74052"N	168°56'49.10209"W	63°19'04.75601"N	168°56'49.01628"W	7022665.9370	602846.3790	3406300.049	1813555.32	75.106	22.892	GS	8/3/2018 10:30
10519	10519	63°19'05.77838"N	168°56'49.31114"W	63°19'05.79388"N	168°56'49.22532"W	7022697.9540	602842.4430	3406405.302	1813544.042	72.067	21.966	CHK 0 HV	8/3/2018 10:32
10520	10520	63°18'42.73270"N	168°57'29.95010"W	63°18'42.74820"N	168°57'29.86431"W	7021966.8890	602299.8070	3404034.372	1811726.18	73.044	22.264	CHK 0 HV	8/3/2018 12:41

Exhibit F3-4
Logbook

No. 370-6F - Cross Section - 6 3/4 x 8 3/4

6 32281 37061 1

ISBN 978-1-932149-49-4

2018 - MISC - 3

Rite in the Rain®

ALL-WEATHER

CROSS SECTION FIELD BOOK

№ 370-6F

2018 - MISC - 3

INDEX

PG#	DATE	W/O	DESC
1 - 3	6/19/18	18-030	CORDOVA ASBUILT
4 - 13	7/26/18 - 7/27/18	18-027	JBER MON. WELLS
14 - 24	7/31/18 - 8/4/18	18-002	ECC N.E. CAPE

i

Rite in the Rain

WO # 18-002 ECC N.E. CAPE
PROJ. OVERVIEW

PROJECT DESCRIPTION

- PURPOSE OF SURVEY IS TO PROVIDE SURVEY SUPPORT TO ECC / JACOBS @ N.E. CAPE.
- SURVEY GOALS:
  - TIE INTO EXISTING SURVEY CONTROL & SUPPLEMENT AS NECESSARY
  - 2x CROSS SECTIONS & MICRO-TOPO @ SITE #7
  - STAKE 90 SAMPLE SPOTS @ SITE #8
  - STAKE ~51 SAMPLE SPOTS @ SITE #28
  - SURVEY EDGE-OF-WATER @ SITE #28

J. VARNEY FB 18-MISC-3 JULY 31ST, 2018
F. CERNEY

SURVEYOR'S CERTIFICATE

I, JOSHUA W. VARNEY, DO HEREBY CERTIFY THAT I WAS IN RESPONSIBLE CHARGE OF ALL FIELD ACTIVITIES FROM 7/31/18 - 8/4/18.

STATE OF ALASKA
49TH
JOSHUA W. VARNEY
No. LS106379
8/24/18
REGISTERED PROFESSIONAL LAND SURVEYOR

EQUIPMENT LIST

TOPCON GR-5 RECEIVERS:

1117 - 21270	715 - 10021
1117 - 21371	715 - 10053
1117 - 21369	1117 - 20041

TOPCON FC-5000 DATA COLLECTORS: P/N = 1010086-01
S/N = 229084
180294

WO# 18-002 NE CAPE - ECC
PRIMARY CONTROL

PRIMARY CONTROL NOTES:

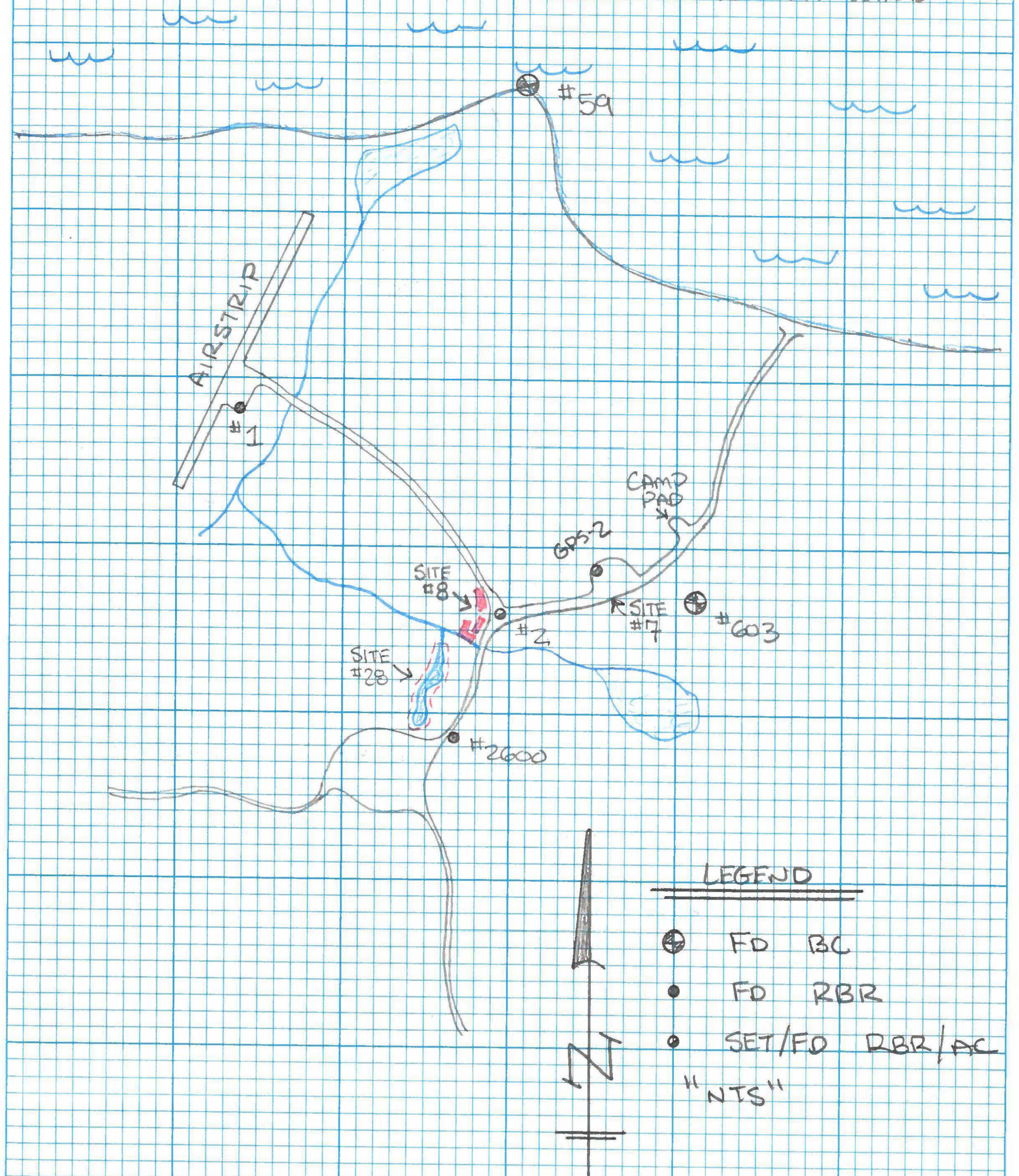
- RECORD COORDINATES RECEIVED FROM JACOBS ON 04-18-18 WERE DERIVED FROM "ECO-LAND" SURVEYS, R. SCOTT McCLINTOCK 8904-S
- COORDINATES LISTED AS "AK STATE PLANE ZONE 9", BUT INITIAL FIELD CHECKS FOUND THIS TO BE WRONG.
- ROTATION OF +0.87° IS LISTED IN THE "BASIS-OF SURVEY DATUM REPORT" BUT THERE IS NO MENTION OF A SCALE FACTOR.
- USING STATIC DATA ON #1 & #2600, WE WERE ABLE TO LOCALIZE INTO OLD SYSTEM.
- ALL OTHER 8904-SET CONTROL WAS FOUND TO BE TOO SLOPPY TO USE.
- FURTHERMORE, OUR OPUS SOLUTION ON #1 DIFFERS FROM "ECO-LAND" POSITION BY 0.7'
- HOLDING OUR OPUS SOLUTION ON #1 MATCHES THE PUBLISHED POSITION OF #59 by 0.08'.

★ ALL FIELD PROCESSING HOLDS OUR SP29 POSITION OF #1 DERIVED BY OPUS (NOT ECO-LAND'S POSITION)

J. VARNEY
E. CERNEY

FB 18-MISC-3

~~JUL~~ AUGUST 1ST, 2018
± 50° O'CAST
10 MPH WIND



WO# 18-002 ECC N.E. CAPE
STATIC CONTROL

RTK/STATIC @ BASE 603 UNIT: 10053

START: 0848 HI: 1.109m
STOP: 3.638'
SLANT
FILE: 603_20180801_0848

RTK/STATIC @ BASE 1 UNIT: 21371

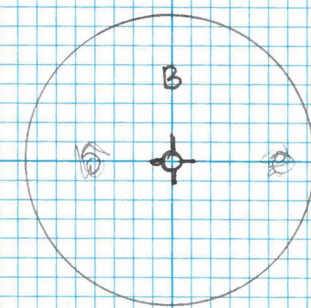
START: 1019 HI: 1.50m
STOP: 1828 4.92'
VERT
FILE: 1_20180801_1019

STATIC BASE @ 59 UNIT: 21270

START: 1133 HI: 1.500m
STOP: 1811 4.921'
VERT
FILE: 59_20180801_1133

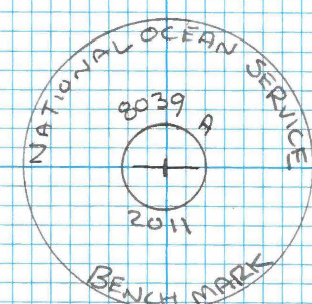
SAME CREW FB 18-MISC-3 AUG. 1ST, 2018
SAME Wx

☆ SKETCH P.15 ☆



- FD 3 1/4" BC ↑ 1± ON 1" O/D I.P.
- GOOD STABILITY / CONDITION
- PID = UW 3430 "BM B"
- Tx @ 461.10 / LOG @ 5 SEC / 10° MASK

- FD 3/4" RBR @ GRADE
- FENCE POST BEARS 1± EASTERLY
- EXCELLENT STABILITY
- PRIMARY CP FROM 2012 EGO-LAND SURVEY
- Tx @ 464.70 / LOG @ 5 SEC / 10° MASK



- FD 3 1/4" BC FLUSH W/ROCK
- EXC. STABILITY / CONDITION
- LOG @ 5 SEC / 10° MASK

WO# 18-002 ECC N.E. CAPE STATIC CONTROL

STATIC BASE @ 2600 UNIT: 21369

START: 1507 HI: 1.546 m SLANT 5.075'

STOP: 1835

FILE: 2600-20180801-1507

STATIC BASE @ 2 UNIT: 20041

START: 1634 HI: 1.650 m 5.413' VERT

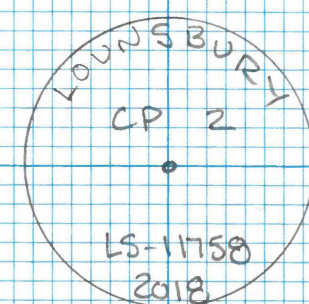
STOP: 1837

FILE: 2-20180801-1634

SAME CREW FB 18-MISC-3 AUG. 1ST, 2018 SAME WX

★ SEE VICINITY SKETCH P.15 ★

- FD 5/8" RBR @ GRADE
- GOOD STABILITY
- LOG @ 5 SEC / 10° MASK
- 2ND CP FROM "ECO-LAND" SURVEY



- SET 2" AC ON 5/8" x 30" RBR
- ~~FLUSH W/GROUND~~ ↓0.5
- LOG @ 5 SEC / 10° MASK
- LOCATED @ ℄ OF INTERSECTION OF AIRSTRIP / CAMP / MOC ROADS

WO# 18-002 ECC N.E. CAPE
RTK CHK'S

SAME CREW FB 18-MISC-3 AUG. 1ST, 2018
SAME WX

ROVER JOB "18-002_JV1"

PT#	CODE	DESC			HI
5001	CHK	@ "STOKE" RM 2			1.500m VT
5002	CHK	@ 59	ΔH: ~~0.66~~ <0.01	ΔV: ~~0.19~~ 0.01	"
5003	CHK	@ "8039-B" (#59 RM#1)			+5.42' VT
5004	CHK	@ "8039-C" (#59 RM#2)			"
5005	CHK	@ 34009	ΔH: 0.16	ΔV: 0.54	"
5006	CHK	@ 2600	ΔH: 0.03	ΔV: 0.03	"
5007	CHK	@ 34006	ΔH: 0.08	ΔV: 0.41	"
5008	CHK	@ 34008	ΔH: 0.09	ΔV: 0.83	"

NOTE:

- CHECK SHOT COORDINATES DERIVED @ END OF DAY WITH POST-PROCESSED STATIC COORDINATS FOR # 1, 59, 2600.
- # 34006/8/9 ARE McCLINTOCK COORDS. THAT I "LOCALIZED" INTO SP29 BY:
  - TRANSLATING TO OPUS # 1
  - ROTATING TO # 2600
  - SCALING TO # 2600
- NEW JOBS START 8/2 W/ POST-PROCESSED COORDS.

WO# 18-002 ECC N.E. CAPE STATIC CONTROL

J. VARNEY ✓ FB 18-MISC-3 AUGUST 2ND, 2018
E. CERNEY ± 50° RAIN
CALM

PT#	UNIT	FILE/START	STOP	HI	DESC	
603	10053	603-2018-0802-0827	1401	3.64' SLANT	CBC	• REF. P.16
1	21371	1-20180802-0855 ~~0915~~	1100	1.500m 4.92' VERT	CRB	• REF. P.16
2600	21369	2600-20180802-0915	1239	5.07' SLANT	CRB	• REF. P.17
2	20041	2-20180802-0931	1248	5.415' VERT	CRBC	• REF. P.17
59	21270	59-20180802-0953	1428	1.500m 4.92' VERT	CBC	• REF. P.16
2600	21369	2600-20180802-1245	1526	1.720m 5.643' SLANT	CRB	• 2ND OBS.

WO # 18-002 — N.E. CAPE—ECC STATIC CONTROL — SAME CREW — FB 18-MISC-3 — AUG. 2ND, 2018 SAME W_x

PT#	UNIT	FILE/START	STOP	HI	DESC
2	20041	2.20180802.1253	1643	1.492m 4.894' VERT	CRBC · 2ND OBS.
603	10053	603.20180802.~~1404~~ 1405		1.067m 3.500' SLANT	CBC · 2ND OBS.
59	21270	59.20180802_1437	18:30	1.300m 4.265' VERT	CBC · 2ND OBS.
1	21371	1_20180802_1631	18:50	1.800m 5.905' VERT	CRB · 2ND OBS.
603	10053	603_20180802_1700	19:01	3.26' SLANT	CBC · 2ND OBS.

WO# 18-002 —— ECC N.E. CAPE ——
RTK TOPO

ROVER JOB "18-002 JV2"

PT#	CODE	DESC			HI
5009	CHK	@ 1	ΔH: 0.01	ΔV: 0.02	4.921' VT
5010 -5113	HEW	@ SITE 28			4.71' VT
5114	CHK	@ 2600	ΔH: 0.02	ΔV: 0.02	4.71' VT
5115	CHK	@ 59	ΔH: 0.04	ΔV: 0.02	"
5116 -5227	HEW	@ SITE 28			"
5228	CHK	@ ~~2~~ 1	ΔH: 0.01	ΔV: 0.01	5.905' VT
5229	CHK	@ 2	ΔH: 0.03	ΔV: 0.01	5.42' VT
–	LAYOUT FLAGS WITHIN SITE 8 DU-B:				

B2	2182	B24 -B44	2204 -2224
B6	2186		
B8	2188		
B12	2192		
B13	2193		
B16	2196		
B17	2197		
B18	2198		
B20	2200		
B23	2203		

SAME CREW FB 18-MISC-3 AUG. 2ND, 2018
SAME WX

ROVER JOB "18-002 EC2"

PT#	CODE	DESC			HI
10001	CHK	@ 1	ΔH: 0.01'	ΔV: 0.02'	4.921' VT
10002	CHK	@ 2600	ΔH: 0.02'	ΔV: 0.01'	5.07' SLANT
10003	CHK	@ 2	ΔH: 0.02'	ΔV: 0.01'	5.415' VT
10004	CHK	@ 59	ΔH: 0.01'	ΔV: 0.01'	4.921' VT
10005 - 10055	HEW	@ SITE 28			5.43' VT
10056	MP	WATER INFALL @ POND @ SITE 28			"
10057 - 10134	HEW	@ SITE 28			"
10135	CHK	@ 2	ΔH: 0.01'	ΔV: 0.03'	"
10136	CHK	@ 59	ΔH: 0.01'	ΔV: 0.01'	4.265' VT
10137 - 10233	HEW	@ SITE 28			5.43' VT
10234	CHK	@ 2	ΔH: 0.02'	ΔV: 0.01'	5.43 VT
10235	CHK	@ 2	ΔH: 0.04	ΔV: 0.01'	5.43 VT
–	LAYOUT FLAGS WITHIN SITE B				

2007 - A7	~~2020 - A20~~	2033 - A33
2008 - A8	2022 - A22	2036 - A36
2011 - A11	2023 - A23	2038 - A38
2012 - A12 (A10 NOT SET)	2027 - A27	
2014 - ~~A~~ A14	2029 - A29	
2016 - A16	2030 - A30	
2020 - A20	2031 - A31	

WO # 18-002 ECC NE CAPE
RTK TOPO

RTK/STATIC @ (603) BASE UNIT: 10053

START: ~~0827~~ 0849 HI: ~~1.700m~~ 1.170m
3.84'
STOP: SLANT
FILE: 603_20180803_~~0827~~ 0849

NOTES:
- Tx @ 461.10 / LOG @ 5 SEC / 10° MASK
- REF. P.16

RTK/STATIC @ (2600) BASE UNIT: 10021

START: 1714 HI: 1.719m
5.64'
STOP: 1836 SLANT
FILE: 2600_20180803_1714

J.VARNEY FB 18-MISC-3 AUGUST 3RD, 2018
E.CERNEY ±50° CALM
FOGGY

ROVER JOB "18-002_JV2"

PT#	CODE	DESC			HI
5231	CHK	@ 2	ΔH: 0.03	ΔV: 0.01	5.46'
5232 - 5313	-	★ SITE #7 X-SECT #1 -FULL WIDTH-			↓
5314 - 5373	-	★ SITE #7 X-SECT #2 -PERPENDICULAR FULL WIDTH			
5374 - 5386	HEW	★ ADD'L HEW @ SITE # ~~8~~ 28			5.46'
5387	CHK	@ 2600	ΔH: 0.05	ΔV: 0.03	5.42' VT
	- STAKE # @ SITE 28 (INSTALL LATH @ ALL POINTS)				↓
5388	MP	SW Ø3			
5389	MP	SW Ø1			
5390	MP	SW Ø2			
5391	CHK	@ "GPS 2" FD 2" AC			
5392	CHK	@ 2	ΔH: 0.02	ΔV: 0.01	5.42'
	- FINISH ALL SITE #8 LAYOUT (C-1 → C-30) (A1 - A24, 27, 29-31, 33, 36, 38)				
5393	CHK	@ 2	ΔH: 0.03	ΔV: 0.01	5.42'

WO # 18-002

ECC NE CAPE
RTK TOPO

ROVER JOB "18-002.EC2"

PT. #	CODE	DESC.	HI
10236	CHK	@ 2 ΔH: 0.03' ΔV: 0.01'	5.43' VT
10237-10496	–	TOPO @ SITE #7	"
10497-10518	–	SITE # 7 X-SECTION	"
10519	CHK	@ GPS-2	"
10520	CHK	@ 2600 ΔH: 0.03' ΔV: 0.01'	"

J. VARNEY
E. CERNEY

FB 18-MISC-3

AUGUST 3RD, 2018
± 50° CALM
FOGGY

WO # 18-002 ECC N.E. CAPE RTK TOPO

RTK/STATIC BASE @ 2600 UNIT: 10053

START: 0749 HI: 1.720m
STOP: 1154 5.643'
FILE: 2600-20180804-0749 SLANT

NOTES: • Tx @ 461.10 / LOG @ 5 SEC / 10° MASK

STATIC BASE @ 1 UNIT: 20041

START: 0922 HI: 1.800m
STOP: 1201 5.905'
FILE: 1-20180804_0922 VERT

J.VARNEY
E.CERNEY

FB 18-MISC-3

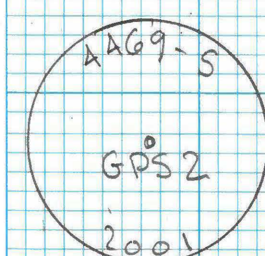
AUGUST 4TH, 2018
±50° O'CAST
CALM

ROVER JOB "18-002_JVZ"

PT#	CODE	DESC			HI
5394	CHK @	2	ΔH: 0.04	ΔV: 0.01	5.43' VT
5395 -5414	–	LAYOUT LATH @ CARDINAL DIRECTIONS AROUND STANDING H_2O @ S'LY END SITE #28			↓
5415	EPP	BASE ONLY			
546/7	ML (1)	SUBMERGED PP			
5418/19	ML (2)	PARTIALLY SUBMERGED PP			
5420	CHK @	2	ΔH: 0.03	ΔV: 0.02	5.43' VT
5421	CHK @	1	ΔH: 0.01	ΔV: 0.05	1.80m VT

STATIC BASE @ GPS-2 UNIT: ~~20~~ 10021

START: 0933 HI: 5.43'
STOP: 1143 VERT
FILE: GPS2_20180804_0933



• FD 2" AC ↑0.2'
• OK STABILITY

Waste

2018 Northeast Cape Second Periodic Review
Waste Summary

Container	Container ID	Quantity	Contents	Waste Characterization Result	Generation Date	Manifest #	Classification	Date Shipped offsite	Weight (pounds)
55-gallon drum	WW-1	50 gallons	well development and purge water	Non-Hazardous	8/1/2018	2018-00405	Non-Hazardous	9/14/18	1913
55-gallon drum	WW-2	50 gallons	well development and purge water	Non-Hazardous	8/2/2018	2018-00405	Non-Hazardous	9/14/18	
55-gallon drum	WW-3	Started	well development and purge water	Non-Hazardous	8/3/2018	2018-00405	Non-Hazardous	9/14/18	
55-gallon drum	WW-4	2 gallons	Site 28 Decon water	Non-Hazardous	8/6/2018	2018-00405	Non-Hazardous	9/14/18	
55-gallon drum	WW-4	2 gallons	Site 28 Decon water	Non-Hazardous	8/7/2018	2018-00405	Non-Hazardous	9/14/18	
55-gallon drum	WW-4	3 gallons	Site 28 Decon water	Non-Hazardous	8/8/2018	2018-00405	Non-Hazardous	9/14/18	

1805949847

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number AK0000228395	2. Page 1 of 3	3. Emergency Response Phone (907)751-4493	4. Waste Tracking Number 2018-00405

5. Generator's Name and Mailing Address: US ARMY ENGINEER DISTRICT, ALASKA
PO BOX 6898, CEPOA-EN-EE-ER
JBER, AK 99506-5898
Generator's Phone: (907) 753-2578

Generator's Site Address (if different than mailing address):
USACE, AK, NEC FACILITY WIDE
NE CAPE, ST. LAWRENCE ISLAND
SAVOONGA, AK 99769

6. Transporter 1 Company Name: RIDGE CONTRACTING (907) 222-7518 — U.S. EPA ID Number:

7. Transporter 2 Company Name: ECC, INC. (907) 644-0428 — U.S. EPA ID Number: AKR000202408

8. Designated Facility Name and Site Address: CLEAN HARBORS GRASSY MOUNTAIN LLC
3 MILES EAST 7 MILES NORTH OF KNOLLS
GRANTSVILLE, UT 84029
Facility's Phone: (435) 884-8900 — U.S. EPA ID Number: UTD991301748

HM	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
	1 NON-REGULATED LIQUID	4	DM	1913	P
	2.				
	3.				
	4.				

13. Special Handling Instructions and Additional Information
1) CH1458548 IDW WATER

TO# W911KB18F0020
Contract# W911KB-17-D-0017

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable ~~international and~~ national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Stanley Seegars — Signature — Month 8 Day 10 Year 18

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Cory Smith — Signature — Month 9 Day 14 Year 18
Transporter 2 Printed/Typed Name: Don Malaney / Don Mangus — Signature — Month 10 Day 11 Year 18

17. Discrepancy 1-979
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month Day Year

H132

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a 2019000279
Printed/Typed Name — Signature — Month 1 Day 16 Year 19

169-BLC-O 5 11977 (Rev. 9/09) DESIGNATED FACILITY TO GENERATOR

Run Date: 3/6/2019

Certificate of Disposal / Treatment - Storage and Transfer

Manifested To Site: Grassy Mountain, UT Facility
3 Miles East 7 Miles North of KnollsExit 41 off I-80
Grantsville, UT 84029

EPA ID/Prov ID: UTD991301748

Generator ID	Manifest No.	Generation Date	Received Date
US31722	NH2018-00405	8/10/2018	1/16/2019

The above described waste, received at the Clean Harbors facility listed above pursuant to the manifest(s) listed above, has/will be treated and/or disposed of by Clean Harbors, or another licensed facility approved by Clean Harbors, in accordance with applicable federal, state and provincial laws and regulations. Any waste received by Clean Harbors and subsequently shipped to another licensed facility has been or shall be identified as being generated by Clean Harbors in accordance with 40CFR 264.71(c).

For waste imported/exported to/from Canada the waste has/will be disposed or recycled according to the Canadian export and import of hazardous waste or hazardous recyclable material regulation as published in the Canadian Gazette Part II, vol 139, No 11, SOR/2005-149 May 17, 2005

Under civil and criminal penalties of law for the making of submission of false or fraudulent statements or representations (18 U.S.C. 1001 and 15 U.S.C. 2615), I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified section(s) of this document for which I cannot personally verify truth and accuracy, I certify as the company official having supervisory responsibility for the persons who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.

Signed: Paul A. Mello

Date: **3/6/2019**

Title: **Director Facility Applications**

ATTACHMENT F-4
Photograph Log

2018 Site 28 Sediment Mapping and Sampling Report – Northeast Cape, St. Lawrence Island, Alaska

PHOTOGRAPH LOG
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PHOTOGRAPH LOG
TABLE OF CONTENTS (Continued)

Photo No. 1 – 07 August 2018
Sample location 01 and 02 (profile transect 1 and 2) confluence with the Suqi River at Site 28. View looking east.

Photo No. 2 – 07 August 2018
Sample location 01 and 02 (profile transect 1 and 2) within discrete pond at Site 28. View looking north.

Photo No. 3 – 07 August 2018
Sample location 03 at Site 28. View looking northeast.

Photo No. 4 – 07 August 2018
Profile transect 5; sample location 04 was relocated due to vegetative mat. View looking northeast.

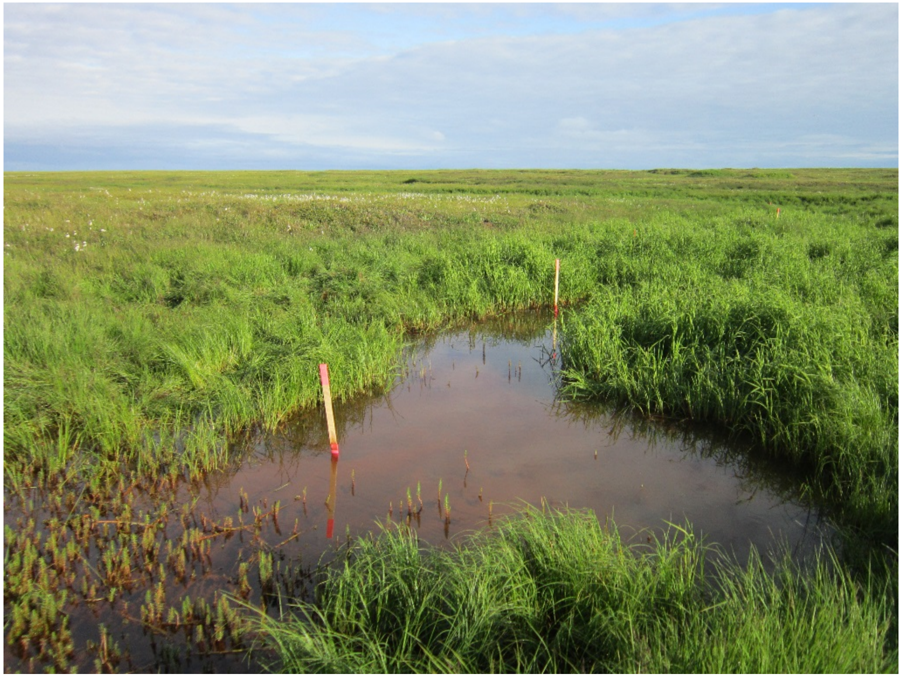


Photo No. 5 – 07 August 2018
Profile transect 6 and 7; sample locations 05 and 06, respectively. View looking north.

Photo No. 6 – 07 August 2018
Profile transects 8 and 9; sample locations 07, 08 and 09. View looking northeast.

Photo No. 7 – 07 August 2018
Profile transect 10; sample location 10. View looking north.

Photo No. 8 – 07 August 2018
Profile transect 12; sample locations 11 and 12. View looking northwest.

Photo No. 9 – 07 August 2018
Profile transect 13; sample location 13. View looking north.

Photo No. 10 – 07 August 2018
Profile transects 14, 15, 16 and 17; sample locations 14, 15, 16, 17 and 18. View looking north.

Photo No. 11 – 07 August 2018
Profile transects 19 and 20; sample locations 19 and 20. View looking north.

Photo No. 12 – 07 August 2018
Profile transects 22 and 23; sample locations 21 and 22. View looking north.

Photo No. 13 – 07 August 2018
Profile transects 25 and 26; sample locations 23 and 24. View looking north.

Photo No. 14 – 07 August 2018
Profile transect 28; sample location 25. View looking southwest.

Photo No. 15 – 07 August 2018
Profile transects 30, 32 and 33; sample locations 26 and 28. View looking south.

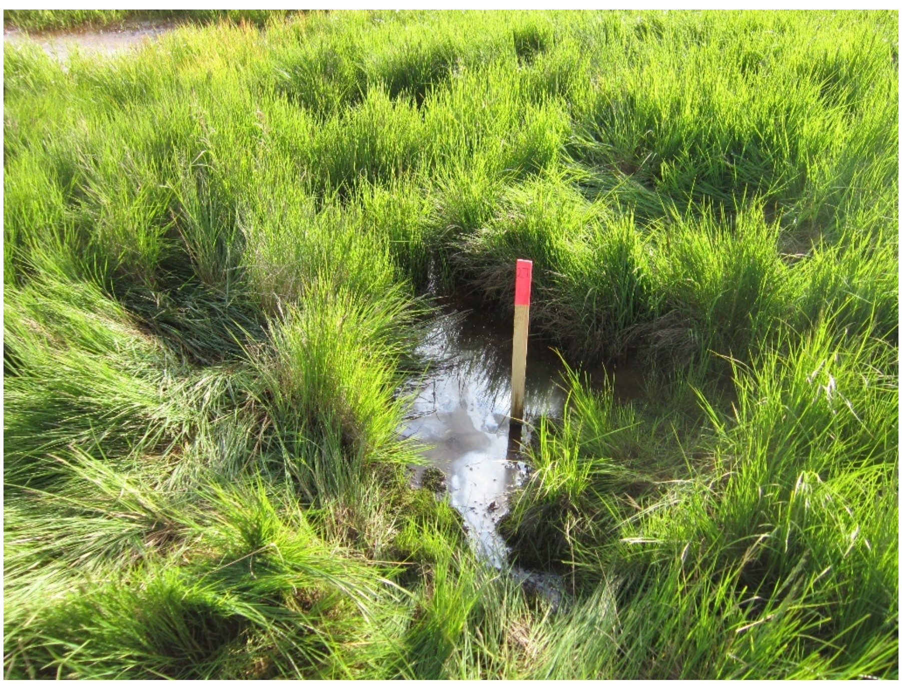


Photo No. 16 – 07 August 2018
Profile transect 31; sample location 27. View looking down.

Photo No. 17 – 07 August 2018
Profile transects 34 and 35; sample locations 29 and 30. View looking south.

Photo No. 18 – 07 August 2018
Profile transect 36; sample location 31. View looking south.

Photo No. 19 – 07 August 2018
Profile transects 38, 39, 40 and 41; sample locations 32, 33, 34 and 35. View looking south.

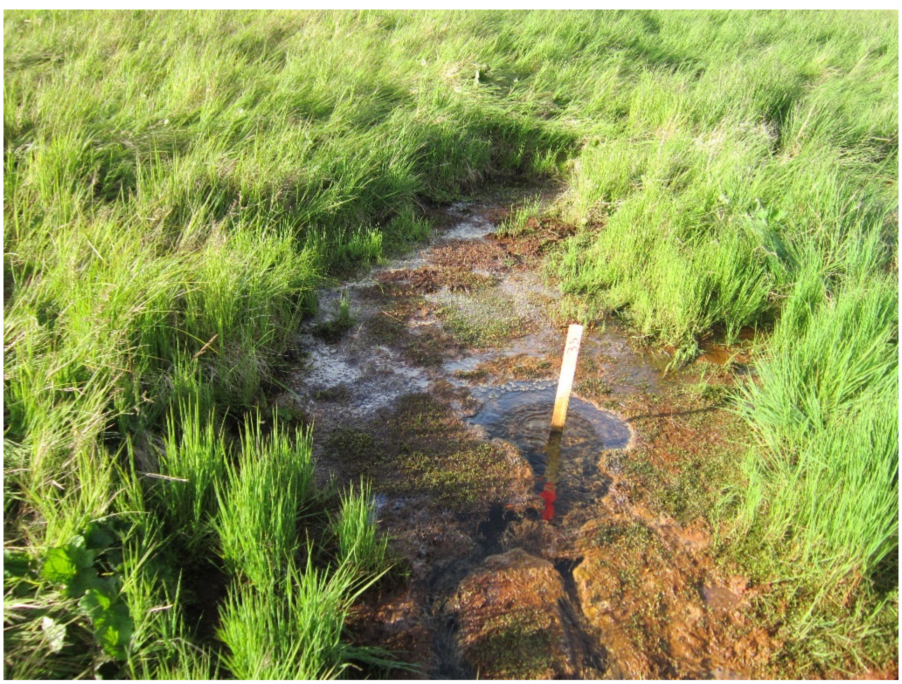


Photo No. 20 – 07 August 2018
Profile transect 41; sample location 35, an artesian upwelling. View looking down.

Photo No. 21 – 07 August 2018
Profile transects 50 and 51; sample locations 36 and 37. View looking north.

Photo No. 22 – 07 August 2018
Profile transects 42 and 43; pond containing sample locations 38, 39 and 40. View looking southwest.

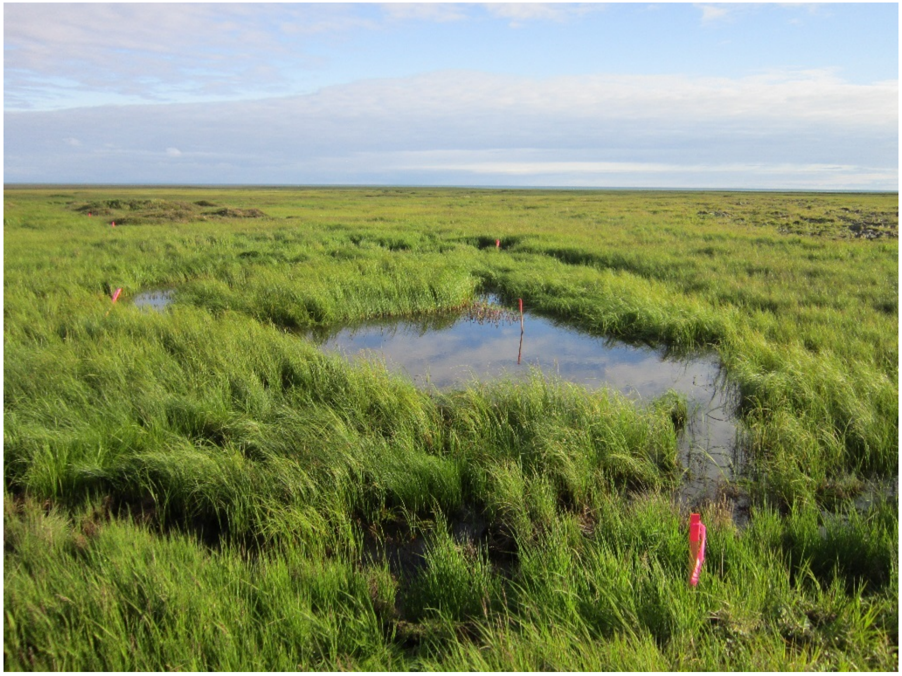


Photo No. 23 – 07 August 2018
Profile transects 48 and 49; sample location 41. View looking north.

Photo No. 24 – 07 August 2018
Profile transects 44 and 45; sample location 42. View looking north.

Photo No. 25 – 07 August 2018
Sample location 43. View looking north.

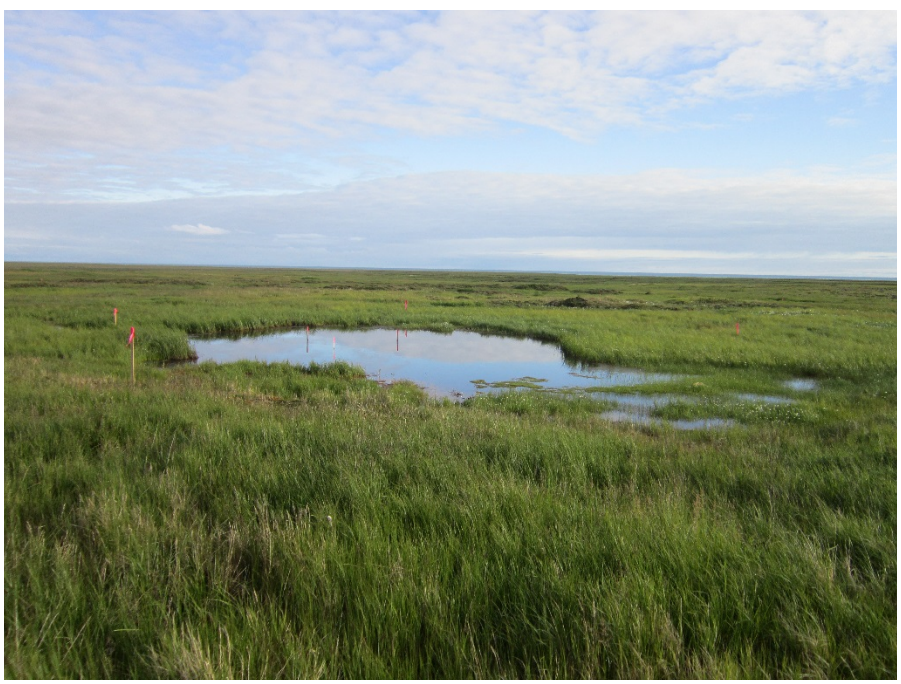


Photo No. 26 – 07 August 2018
Profile transects 46 and 47; sample locations 44, 45 and 46. View looking north.

Photo No. 27 – 07 August 2018
Profile transects 52 and 53; sample locations 47, 48, 49, 50 and 51. View looking southwest.

ATTACHMENT F-5
Sediment Mapping and Sampling SOP

Site 28 Sediment Mapping and Sample Collection

TABLE OF CONTENTS

EXHIBITS

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe the process for mapping the extent of sediment present at Northeast Cape Formerly Used Defense Site (Ne Cape FUDS) Site 28. The goal of the sediment mapping and sample collection effort will be to achieve comparable results to the previous sediment mapping effort conducted in 2018 and described in the *Site 28 Sediment Mapping and Sampling Report* (U.S. Army Corps of Engineers [USACE] 2018).

This SOP defines the procedures that will be applied to evaluate the lateral extent of sediment in a waterbody, estimating the sediment volume, and determining the location of sediment samples at Site 28. Once sampling locations are determined using this SOP, the field team will collect and store the samples according to the contractors work plan.

This plan may need to be revised if warranted by site conditions or other factors. Modifications to this plan will be coordinated with the USACE Quality Assurance representative (QAR) and documented in the field logbooks.

1.1. Background and Rationale

Sediment mapping and sampling occurred in 2012 at Site 28 prior to sediment removal activities (dredging). Another sediment mapping and sampling event occurred in 2018 to evaluate the post-removal quantity of sediment. A sediment mapping SOP was established to define an approach for the 2018 effort and potential future mapping efforts. This SOP has been refined since the 2018 sediment mapping and sampling event (USACE 2018) and was designed to use a similar approach to what was used in the 2012 sediment mapping and sampling effort, reported in *Site 28 Technical Memorandum Addendum* (USACE 2013).

The 2012 effort was completed in two distinct phases. The first phase included mapping activities such as the measuring the extent of waterbodies in the study area and measuring the thickness of sediment at discrete points within each waterbody. Locations for sediment thickness measurements were chosen at the discretion of field personnel based on observations. This discretionary approach in 2012 resulted in 66 measurements of sediment thickness for all of the waterbodies found in the Site 28 study area. The second phase included sediment sampling activities. Using the results of the sediment mapping effort, sediment sample locations were selected. Requirements for sample location density in 2012, as document in the Daily Quality Control Reports (DQCRs), were a minimum of three sediment samples per water body (where sediment is present), and within a maximum spacing of 50 feet (DQCR# NEC 2012-15). This approach generated 51 primary sediment sample locations. Sediment mapping locations and sediment sample locations in 2012 were not collocated.

The 2018 effort was completed in three phases. The first phase consisted of measuring the extent of waterbodies within the study area. The second phase consisted of mapping activities, as described in this SOP, to include measuring the thickness of sediment by probing along primary transects. The third phase consisted of sediment sampling activities. Samples were collected from the 2012 sample locations where possible but were moved if they were within vegetative mat or on dry land. When possible, the primary transects were collocated with sediment sample locations.

2.0 EQUIPMENT

Sediment sampling equipment may include, but is not limited to, the following items:

- Appropriate personal protective equipment (PPE). At minimum, PPE will include safety glasses and nitrile gloves. Refer to the project Accident Prevention Plan (APP) for details.
- Appropriate size and quantity of sample containers.
- Sample labels
- Camera
- Logbook
- Chain-of-custody (CoC)
- Survey stakes, pin flags, or similar to mark measurement and sample locations
- Tape measure
- Compass
- Graduated probe
- Stainless steel spoons or spatulas
- Aluminum pie pans, large bowl, or gallon Ziploc bags
- Shovel, trowel, or other digging tools
- Hand coring tool
- Hand auger
- Clam Gun
- Grab sampler
- Chest waders
- Elbow-length gloves
- Inflatable boat or plastic sled
- Equipment decontamination bucket, with Alconox® or similar detergent and stiff-bristled cleaning brush, and duck pond

3.0 SEDIMENT MAPPING AND SAMPLING APPROACH

During the 2018 field effort, sediment mapping and sediment sampling will occur at Site 28 to evaluate post-removal conditions and to determine volume of sediment at Site 28. For this evaluation, the following definition of sediment will be applied to differentiate soil and sediment: sediment is defined as all continuously submerged loose mineral and organic material, except that which is actively growing vegetation and is part of the vegetative mat.

Sediment mapping and sampling will include the following:

- Measure extent of waterbodies (lateral and vertical).
- Measure extent of sediment within all waterbodies greater than 30 feet in diameter (lateral and vertical).
- Collect sediment samples.

For sediment thickness measurements, this SOP will utilize a graduated hand probe that will be advanced through the sediment layer. The relative resistance of the sediment layer will be different from the native soil that underlies the sediment. The point at which this resistance is encountered will be deemed the bottom of the sediment layer. Photographs 1 through 3 from previous fieldwork portray general site conditions expected at Site 28, showing ponded and flowing surface waterbodies in a landscape predominately covered in vegetative mat.

Photo No. 1 – 15 September 2013
Overview of Site 28. View facing southwest.

Photo No. 2 – 15 September 2013
Overview of Site 28. View facing northeast.

Photo No. 3 – 07 August 2018
Ponded area within Site 28. View facing southwest.

3.1. Measure Extent of Waterbodies

The lateral and vertical extent of surface waterbodies encountered at the Site 28 study area (confluence with the Suqitughneq (Suqi) river to the border of the MOC) will be measured during field season for waterbodies greater than 30 feet in diameter. Surface waterbodies at Site 28 measured during the 2018 sediment mapping effort are presented on Figure 1 (Exhibit 1).

The perimeter of each waterbody will be surveyed at the waterline (shoreline) using survey-grade Global Positioning Systems (GPS) equipment. Elevation of the waterbody will also be established using a temporary survey control point of established elevation. Surveying will take the form of either "continuous" data collection, or as an assortment of discrete points collected at intervals along the shorelines. For continuous data collection, the surveyor will walk the shoreline of any encountered waterbodies, ensuring the GPS antenna traces over the water/land boundary. For discrete point collection, the surveyor will record the position of the water/land boundary at intervals along the shorelines. Spacing of GPS points will vary based on the intricacy of the shoreline. Generally, spacing of points 5-10 feet apart along the shoreline will adequately describe the extent of most surface waterbodies. Closer spacing may be used to capture more complex shorelines, and looser spacing may be used along straight sections of shorelines. Spacing greater than 30 feet will be avoided. The assortment of points can then be combined and processed using geographic information systems (GIS) software to display a continuous outline of measured waterbodies.

The depth of the waterbody will be measured by the field team using a graduate probe and will be collected from across the primary transect that is described within Section 3.2. The probe will be lowered into the water until it rests on the top of the sediment layer. While the probe is in a vertical position and resting on the sediment, the depth of the water will be recorded to the nearest 0.1 foot. Additional water depth measurements will be collected during sediment thickness probing described in Section 3.2.2.

3.2. Measure Extent of Sediment

Within the surveyed waterbodies from Section 3.1, submerged areas will be characterized and documented as sediment or vegetative mat. If there is no material that meets the Section 3 definition of sediment (only the vegetative mat present) no further evaluation will occur in that area of the waterbody. No assessment below the vegetative mat will occur. Submerged debris may be encountered during the sediment investigation; the location and description of any debris should be documented.

3.2.1. Lateral Extent of Sediment

When sediment is present, the lateral extent of sediment will be determined by visual inspection of submerged material. Hand tools will be used when needed to retrieve submerged material for evaluation to aid the visual inspection. The lateral extent of sediment will be recorded using survey-grade GPS equipment similarly to the lateral extent of surface water. The lateral extent of the sediment may not always extend the length of the surveyed surface water boundaries. Conditions between the sediment and surface water boundaries should be documented.

3.2.2. Vertical Extent of Sediment

Generally, two types of waterbodies are expected to contain sediment at Site 28. The first type of waterbody will be a discrete pond that is not interconnected to another surface water feature. The second type of waterbody will be an elongated feature that is interconnected to other surface water features typically observed at Site 28 in a north/south orientation with flowing water that runs towards the Suqi River.

For discrete waterbodies that contain sediment, a compass will be used to establish a north/south transect and an east/west transect crossing at the center of the sediment area to measure thickness. A graduated hand probe will be used to measure sediment thickness to the nearest 0.1 foot starting from the edge of the sediment area and at intervals not exceeding 10 feet. For smaller sediment areas, probe spacing should be reduced to provide a minimum of 5 evenly-spaced measurements for each transect. Following probing along the primary transects, additional measurements of thickness maybe be collected from the adjacent quadrants at the discretion of the field team (Photograph No. 4).

For linear waterbodies, sediment thickness will be evaluated every 30 feet along the length of area that contains sediment. At these intervals, sediment thickness will be measured across the width of the sediment area with 3 evenly-spaced measurements. Additional thickness measurements may be collected if significant variation in sediment thickness is encountered due to removal activities.

At both discrete and linear waterbodies, the water depth to the top of sediment (bathymetry) will be measured and recorded to the nearest 0.1 foot at each measurement location using the graduated markings along the probe. Depth of sediment will be recorded at both waterbodies to the nearest 0.1 foot when resistance of the subsurface underlying sediment is felt.

The 2018 transect locations and probe spacing are illustrated on Figure 1 (Exhibit 1). Note that these transect locations will not be strictly followed; similar transect and probe spacing will be used in the field, but specific locations will vary based on the sediment distribution encountered.

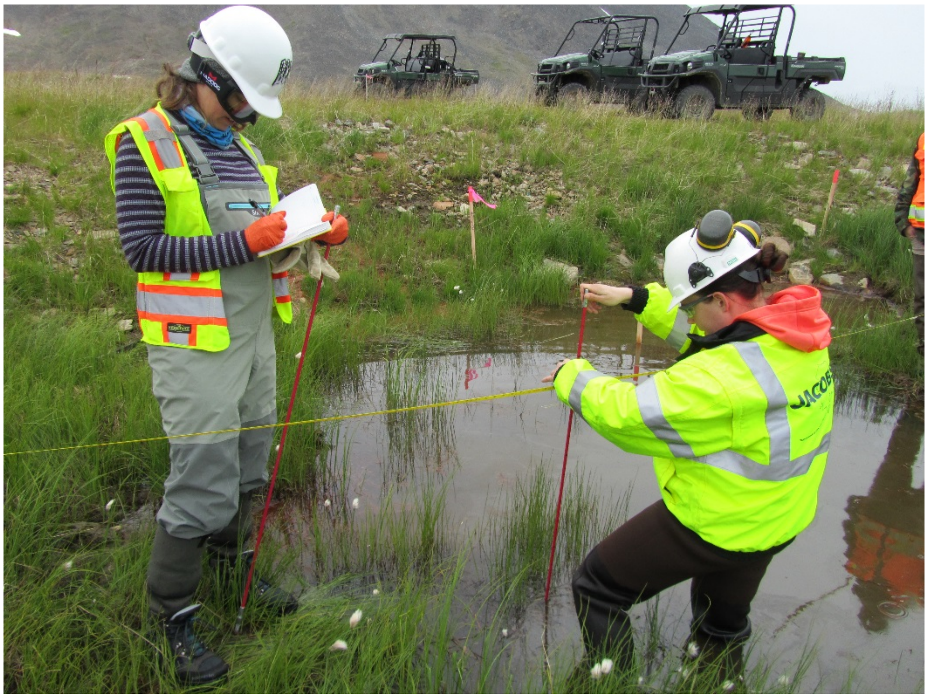


Photo No. 4 – 07 August 2018
Ponded area within Site 28. View facing southwest.

3.3. Collect Sediment Samples

Hand tools including (but not limited to) a hand auger, sludge and sediment sampler, clam gun, or shovel may be used to recover sediment. Hand tools and containers used for sample handling should be disposed of after each use, or properly decontaminated in between handling of analytical samples according to the procedures defined within the contractors work plan.

Sediment samples will be collected from within the submerged areas identified as sediment from 3.1 and 3.2. Sediment samples will be collected at a minimum of 3 samples per water body (where sediment is present), and at a maximum spacing of 50 linear feet. Approximately 54 locations are anticipated based on previous mapping efforts. Where possible, samples are to be collected from the identified sample locations from previous sample efforts. If significantly different quantities of sediment are encountered, an alternative sample plan or sample density will be discussed with the QAR. Sediment sampling locations will be determined in the field, with the objective to produce uniform spatial coverage and representative sampling of the observed distribution of sediment (based on sediment probing from 3.2.2). Sediment samples will target areas of thickest sediment deposits to ensure adequate quantities for analysis. Figure 1 (Exhibit 1) shows the 2018 sample locations. These locations may be adjusted in consultation with the USACE if needed based on actual field conditions found at the time of sample collection and contract requirements. If a new sample location is to be selected, attempts should be made to remain as close as possible to the original sample location identified from previous sample efforts.

Field personnel will inspect and describe the recovered material in field notes, using the sediment sampling form provided in Attachment 2 of this SOP. Sediment from each sample location will be evaluated to a depth of two feet or until substrate (such as underlying dense peat layer) is encountered (whichever occurs first).

Sediment thickness as described in recovered sediment cores should be compared to sediment THICKNESS AS MEASURED FROM PROBING LOCATIONS.

4.0 VOLUME ESTIMATION

Sediment mapping activities are conducted to build a volume estimate of sediment present at Site 28. Survey data recording the lateral extent of sediment areas and mapping locations will provide the spatial information necessary to calculate volume from the thickness measurements.

Volume of sediment will be estimated using an average thickness for each identified sediment area. The volume will be estimated as the average thickness multiplied by the surface area of the associated sediment (as mapped during 3.2.1). The volumes of sediment present at each sediment area will then be added for a total volume of sediment at Site 28. More complex estimates of volume can be conducted as requested, within the limits of the resolution of the dataset.

5.0 LABORATORY ANALYSIS

Sediment samples will be sent to an offsite laboratory and will be analyzed for DRO and RRO by AK102/AK103, PAHs by SW8270 selective ion monitoring (SIM), PCBs by SW8082, metals by SW6020 (arsenic, chromium, lead, selenium, and zinc only), and total organic carbon (TOC) by SW9060. TOC will be reported from a single run per sample. DRO and RRO sample extracts will be split by the laboratory and undergo silica gel cleanup procedure as described in ADEC Technical Memorandum 06-001 so that a before and after silica gel cleanup result is available. Quality Control samples will be collected at Site 28 based on the frequency presented in the contractors work plan.

6.0 HEALTH AND SAFETY

Procedures for working with potentially hazardous materials, as well as the relevant Safety Data Sheets (SDS) for each chemical that will be used at the site, should be included in the contractors work plan. Personnel using this procedure must be trained on the information contained in the SDSs, engineering controls, and the PPE outlined in this procedure.

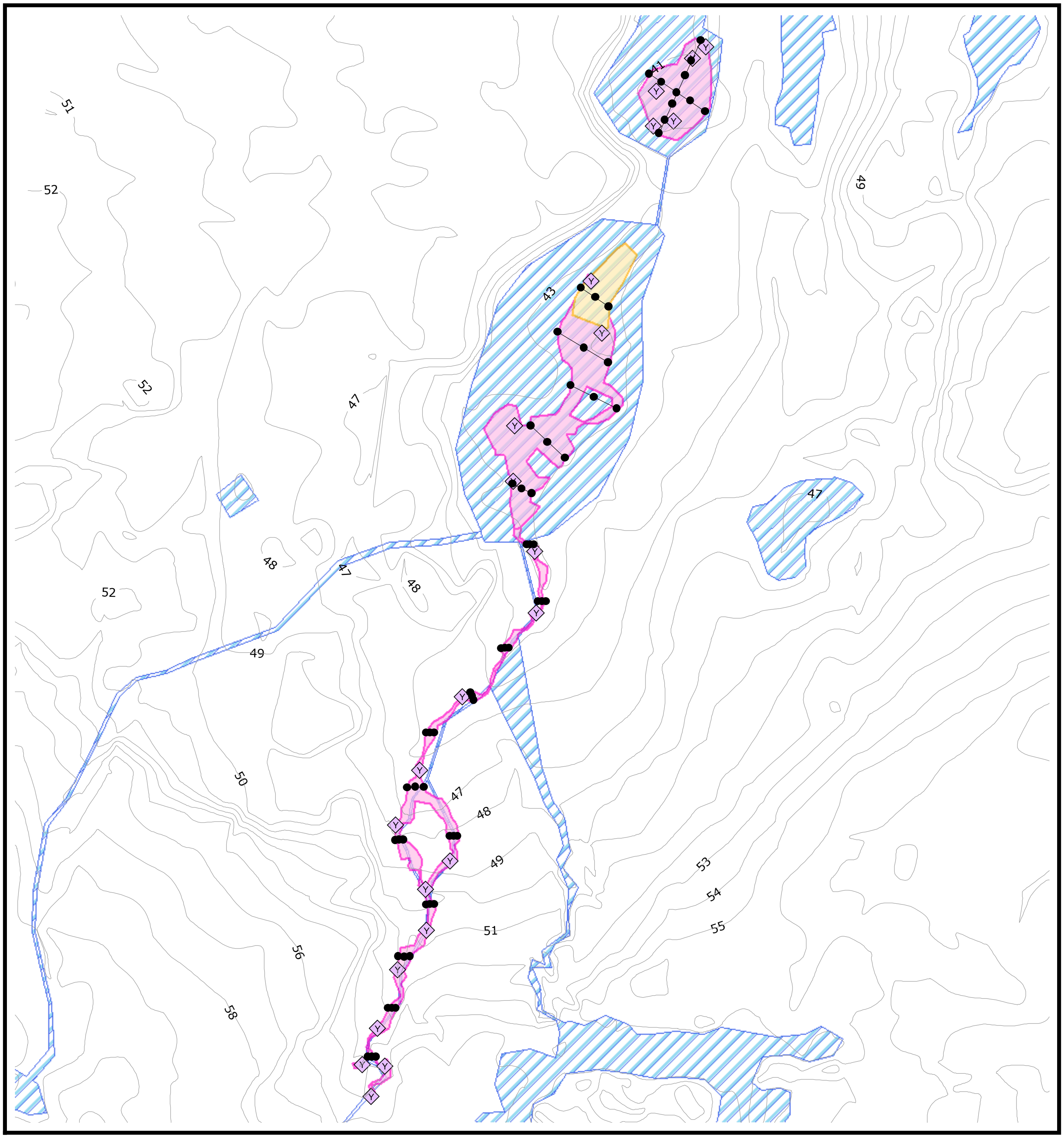
All sediment samples will be treated as potentially containing contaminants of concern. Care must be used when handling soil samples to prevent the possible spreading of contaminants in the work area. At a minimum, Level D PPE, including nitrile gloves and safety glasses, will be worn while collecting soil samples.

7.0 REFERENCES

USACE (U.S. Army Corps of Engineers). 2013 (January). *Site 28 Technical Memorandum Addendum.* Revision 1. St. Lawrence Island. Alaska. Prepared by Bristol Environmental Remediation Services, LLC. FRMD No. F10AK096903_03.10_0022_a.

USACE. 2018 (December). *2018 Site 28 Sediment Mapping and Sampling Report*, Pre-Draft. Northeast Cape, St. Lawrence Island, Alaska, Prepared by Jacobs Technology, Inc. FRMD No. F10AK096903_xx.xx_yyyy_a.

Exhibit F5-1
Figure



Proposed Sediment Sample Location

Sediment Thinckness Probe Location

Sediment Thickness Transect

Contour Line (ft)

2012 Sediment Removal

2013 Sediment Removal

Ponded Water

N

1 inch = 75 feet

0 30 60 90 120 150

Feet

NAD 1983 StatePlane Alaska 9 FIPS 5009 Feet

NORTHEAST CAPE 5 YEAR REVIEW
SITE 28 - TRANSECT EXAMPLE

NORTHEAST CAPE, SAINT LAWRENCE ISLAND, ALASKA

DATE:	PROJECT MANAGER:	FIGURE NO:
20 APR 2018	K. MAHER	1

P:\StLawrenceIsland\MXD\NEC_2018WP\SOP_Transect Example.mxd beatycj

Exhibit F5-2
Sediment Sampling Form

JACOBS

SEDIMENT SAMPLING FORM

PROJECT: ______________________ DATE: ______________

SITE ID: ______________________ SITE LOCATION: ______________

FIELD PERSONNEL: ______________________________

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID:

depth (ft)	Lithology	Sample Int.	Description (lithology, odor/staining, sample ID)	Location ID:

APPENDIX G

Public Notices, Interviews, and Public Comments

Community Issues

COMMUNITY ISSUES

Issues raised by the community regarding the Northeast Cape (NEC) Formerly Used Defense Site (FUDS) cleanup were identified through a public meeting conducted on April 11, 2018 and through interviews conducted with community members and the Alaska Department of Environmental Conservation (ADEC) regulator. General issues were grouped based on similar topics and the U.S. Army Corps of Engineers (USACE) response to the general issues are provided in this appendix. The detailed April 11, 2018 meeting minutes and interview documentation are included in this appendix following these USACE responses. USACE appreciates the feedback and recommendations we have received from community members and the regulator, which it always considers carefully.

Sites were prematurely closed without the consent of the tribes and they were not part of the Record of Decision (ROD). Tribal governments and people do not approve the minimal site characterization and remediation, it is not protective of the Sivuqaq Yupik peoples' health and well-being.

USACE response: The USACE followed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process for cleanup at the NEC FUDS. Specifically, a site assessment, four phases of remedial investigation, and a feasibility study were conducted prior to development of the Proposed Plans and Decision Documents (DDs), and subsequent remedial actions. The sites that were closed were found not to pose an unacceptable risk to human health and the environment. The USACE gave serious consideration to the public comments received during the Proposed Plan stage and incorporated some of the comments into the DDs. The USACE is the lead agency. Under CERCLA, as the lead agency representative, USACE has sole decision making authority on non-National Priority List (NPL) sites, such as Northeast Cape FUDS. In accordance with the Defense Environmental Restoration Program-FUDS (DERP-FUDS), the USACE cannot incorporate cooperating agencies on CERCLA DDs.

There is not a good mechanism for re-opening sites because the process is too lengthy, “taking 2-3 years.”

USACE response: The USACE is bound by law to follow the CERCLA process to address contamination on FUDS properties. The CERCLA process is lengthy.

There is no clarity on which sites are open and which sites are closed.

USACE response: The NEC FUDS is a complicated site. A summary of which sites are open and which sites are closed is provided in Appendix C, pages C-1-1 and C-1-2.

The full nature and extent of contamination has not been fully investigated, so the remediation is incomplete. Source areas of contamination, including the main complex and uncontrolled landfills, have not been fully characterized or removed and these continue to contaminate the Suqi River. The contaminants at NEC pose a significant source of pollution to traditional subsistence foods, water supplies, and medicinal plants. Contamination continues to affect water sources, traditional medicinal and food plants, fish, and wildlife, as well as the health of the people. The remedies are not protective of human health and the environment.

USACE response: The USACE followed the CERCLA process and conducted a site assessment, four phases of remedial investigation, and a feasibility study of contamination at the NEC FUDS. The ADEC concurred with the adequacy of the investigation, provided that the remedy is properly implemented and the CERCLA process continues to be followed in order to achieve and/or maintain protectiveness.

Remediation is considered complete and a site is closed when the site reaches conditions that allow unlimited use and unrestricted exposure. For each site that remains open, Five-Year Reviews or periodic reviews will continue to occur to ensure the remedy at the site remains protective of human health and the environment.

Remedies selected in the DDs were developed based on the human health and ecological risk assessment and are considered protective of future residential use. Ground disturbing activities (e.g., construction, excavation, or debris removal) are not recommended on the Site 7 and 9 landfill caps, and it is not recommended that groundwater in the vicinity of Sites 4, 6, 7, 9, and the Main Operations Complex (MOC) be used for drinking water. Land use controls (LUCs) apply to these areas. Though the LUCs are not yet fully implemented, two signs have been installed at the FUDS to inform site visitors of these locations. The signs are printed in both English and Siberian Yupik.

A community member stated that they had uncovered a landfill and reburied it when performing dirt work with heavy equipment near the dome associated with the White Alice site on top of Kangukhsam Mountain.

USACE response: The USACE will contact the community member to get a specific location of the landfill so it can investigate this report.

Remediation may have made the sites more toxic by mobilizing contaminants. Many sites at NEC remain highly toxic and will continue to harm future generations.

USACE response: The potential mobilization of contaminants during remediation was considered when developing and implementing the remedy for each site, and actions were taken to minimize the potential migration of contaminants. For example, at Site 28 Drainage Basin, a variety of actions were taken to minimize the movement of contaminated sediments from upstream source areas into downstream areas or the Suqi River during sediment removal. Those actions are discussed in Sections 3.2.1.2 of Appendix C of the second Five-Year Review report.

The remedy for each site was designed to protect human health and the environment by either removing contamination to risk-based cleanup levels or eliminating exposure pathways. At sites where contamination was left in place, institutional controls are being implemented to ensure relevant exposure pathways remain incomplete, and reviews are being conducted to ensure remedies remain protective of human health and the environment. Thus, current and future generations will not be exposed to unsafe levels of contamination, and their health will not be harmed.

There is a long way to go to achieve restoration and removal of the contamination. The premature closures, partial excavations, natural attenuation, and/or LUCs are completely inadequate. Additional remedies should be implemented including source

removal and well-planned and executed remedial technologies such as in situ peroxidative and biological remediation.

USACE response: The remedy for each site was designed to protect human health and the environment by either removing contamination to risk-based cleanup levels, or eliminating exposure pathways. At sites where contamination was left in place, LUCs are being implemented to ensure relevant exposure pathways remain incomplete, and five-year and periodic reviews are being conducted to ensure remedies remain protective of human health and the environment. Thus, current and future generations will not be exposed to unsafe levels of contamination, and their health will not be harmed.

The plan for only one or two signs that describe the land use restrictions at NEC FUDS is not enough.

USACE response: USACE originally planned to install one sign along the road near Site 4, and subsequently accommodated a request from the Native Village of Savoonga Council for one additional sign near the NEC airstrip. Two signs were developed and installed during the summer of 2018. The signs are printed in both English and Siberian Yupik. The signs indicate locations where ground disturbing activities (e.g., construction, excavation, or debris removal) are not recommended on the Sites 7 and 9 landfill caps, and it is not recommended that groundwater in the vicinity of Sites 4, 6, 7, 9, and the MOC be used for drinking water. LUCs in the form of deed notices, consistent with the Uniform Environmental Covenants Act (UECA), will also be developed in accordance with the multi-site DD

Everything before and after the NEC ROD happened without government to government consultation with our tribes. Local voices and knowledge have not been heard or considered. The USACE did not fulfill their government to government obligation.

USACE response: The USACE follows U.S. Department of Defense Native American Indian and Alaska Native Policy. We believe government to government relationships have been established with the Native Village of Savoonga and the Native Village of Gambell. The USACE will continue to consult with the Tribes on a government to government basis. The

USACE strongly values the knowledge we have gained about NEC through consultation with the Tribes, and has incorporated that knowledge into site investigations and remedies.

It is requested that a new ROD be implemented with the full participation and consultation with tribal governments. The omission of the tribes from the ROD warrants inclusion of the tribes in any decisions concerning site remediation, acknowledging and using local knowledge and community-based participatory research data to drive adequate site characterization and remediation.

USACE response: USACE is required to follow the CERCLA clean-up process. The USACE consulted the Tribes during the proposed plan phase, and will continue to consult with the Tribes through the 5-year review process. It is not possible to implement a new ROD with Tribes as signatories. Under CERCLA, as the lead agency representative, USACE, has sole decision making authority on non- NPL sites, such as NEC. In accordance with the DERP-FUDS, the USACE cannot incorporate cooperating agencies on CERCLA DDs.

Native Village of NEC residents are now displaced due to the military toxic contamination from the abandoned FUDS at NEC. There is interest in re-establishing the NEC site because of the growing population of Savoonga. The site has not been cleaned up to residential standards.

USACE response: Many of the NEC sites have been cleaned up to residential standards. The remedy for each site was designed to protect human health and the environment for future residential use by either removing contamination to risk-based cleanup levels, or eliminating exposure pathways. At sites where contamination was left in place, institutional controls in the form of deed notices, consistent with UECA, are being implemented to ensure relevant exposure pathways remain incomplete, and five-year and periodic reviews are being conducted to ensure remedies remain protective of human health and the environment.

The real estate value at NEC has been severely depreciated and the community would like to see compensation for that.

USACE response: Compensation for real estate depreciation is not authorized by the Defense Environmental Restoration Program-FUDS.

There is concern that people are drinking water from the Suqi River and other sources at NEC. They are also concerned that families who live and/or travel through NEC may be exposed to hazardous chemicals though inhalation, ingestion, and consumption of traditional foods. A community member requested that signs should be placed to warn the public against consuming the fish and the water from the Suqi River. A community member also requested that seals and fish coming into the Suqi River be tested.

USACE response: Water quality sampling has found contaminants are not present above cleanup levels in Suqi River water.

Two signs were developed and installed at NEC during the summer of 2018. The signs are printed in both English and Siberian Yupik. The signs state that ground disturbing activities (e.g., construction, excavation, or debris removal) are not recommended on the Sites 7 and 9 landfill caps. They also state that it is not recommended to use groundwater as drinking water at Sites 4, 6, 7, 9, and the MOC. LUCs in the form of deed notices, consistent with UECA, are also being developed.

According to the human health risk assessment, site users will not be exposed to unsafe levels of contamination through the inhalation, ingestion, or traditional food consumption pathways.

Testing the seals and fish coming into the Suqi River is not warranted. The Agency for Toxic Substances and Disease Registry (ATSDR) performed a health consultation to evaluate the community's contaminant concerns at NEC (Public Comment draft released July 24, 2017). The health consultation concluded that "eating fish from NEC in the summer (3 months) is not expected to harm people's health" because "contaminants are not present in fish at sufficiently elevated levels to be harmful."

The watershed of the nearby Tapissak ("Tapi") River is also contaminated and that area has not been investigated or characterized. Their research shows elevated levels of polychlorinated biphenyls (PCBs).

USACE response: Review of historical maps and as-built documents indicated there was no sign of military use in the watershed of the Tapi River. This area is outside the FUDS property boundary, and is not eligible for cleanup under FUDS.

The USACE has not assessed the effects of climate warming on the mobilization of contaminants that have been sequestered in landfills and within permafrost. Erosion and permafrost melting will likely increase the mobilization and bioavailability of contaminants at NEC, thus increasing hazards to the health of fish, wildlife, and people.

USACE response: Information gathered during future five-year and periodic review site inspections and long-term monitoring (LTM) events will be used to evaluate protectiveness of the remedies at each site. If during a future review USACE finds evidence a remedy is no longer protective, then actions would be taken to ensure protectiveness.

The military did not honor the agreement that was signed by the Secretary of State (1951) not to pollute the Suqi with any human waste or any other pollutants or violate our hunting/trapping grounds. The community does not believe they will see the river come back to life in their lifetime and it is questionable if the river will ever come back to its former state. A human rights violation was committed – the Suqi river was wiped out with fish and the seals do not haul out anymore.

USACE response: The USACE appreciates these concerns. The USACE is constrained by the cleanup authority of the DERP-FUDS. Our mandate for environmental remediation is to achieve protection of human health and the environment, rather than return the site to its pristine condition.

USACE has yet to develop a Notice of Environmental Contamination as well as institutional controls with the landowner, which is a primary requirement for several of the remedies associated with NEC sites. This requirement is specified in both 2009 DDs, the LTMMP, and other project documents and correspondence since the removal actions were completed in 2014, and is also a site closure requirement of 18 Alaska Administrative Code (AAC) 75. The current Five-Year Review effort needs to discuss and include these issues as well as outline milestone dates for their completion.

USACE response: USACE agrees LUCs such as Environmental Covenants, which will now replace Notices of Environmental Contamination under UECA, and institutional controls are an important part of the remedy. LUCs will be implemented at NEC in the form of Deed Notices, consistent with UECA, containing information regarding designated non-drinking water source areas, recommendations for preventing construction of buildings on top of the landfill areas, and the recommendation to not install drinking water wells within the MOC area until RAOs (cleanup levels) are achieved through natural attenuation processes. Deed Notices provide information or notification to local communities and landowners that residual or contained contamination may remain on site. Deed Notices will play an important role at NEC, by notifying site visitors of the locations of non-drinking water source areas and landfills. The USACE will continue efforts to coordinate with the landowner to develop Deed Notices. Once finalized, Deed Notices will be implemented through filing an Environmental Covenantat the State Recorder’s Office.

A discussion of LUCs and milestone dates is included in Section 2, Table 4 of this Five-Year Review report.

There is concern regarding whether or not the issues of contaminant migration and/or exposure pathways via sediment and/or surface water at Site 28 and related drainages have been adequately investigated and/or monitored. This includes concerns regarding the state of the residual contamination source areas which remain within the tundra at Site 28 as well as likely ongoing sources from the MOC plumes which are located immediately adjacent to/upgradient of Site 28. Surface water monitoring data from Site 28 may be necessary in the future in order to make conclusive determinations regarding the status of migration and/or exposure pathways.

USACE response: Residual soil contamination remaining within the tundra in the southern portion of Site 28 adjacent to the MOC is overlain with naturally occurring vegetative mat and therefore is not migrating. The presence and quality of sediment at Site 28 is periodically evaluated. When accumulated contaminated sediment is periodically removed from Site 28 the concern about contaminated sediment migration is eliminated. Between sediment removal events, naturally existing ponds within Site 28 act as sedimentation ponds and limit migration of sediment that may become suspended in surface water at Site 28. In addition, the presence of a natural stilling area present between sediment Removal Areas 9 and 10 within Site 28 further inhibits migration of suspended sediment.

Previous surface water sample results have indicated future surface water monitoring in Site 28 is not warranted. In 2013, active sediment removal from Site 28 using a dredge modeled the worst-case scenario for potential contamination of surface water from suspended sediment as the surface water flowed through Site 28. To monitor whether or not contaminated sediment removal activities performed during 2013 were causing surface water contamination at Site 28, surface water samples were collected before, during, and after sediment removal activities. The three sample locations were in the active stream channel located downstream of sediment removal operations. The samples were analyzed for diesel-range organics (DRO), residual-range organics (RRO), benzene, toluene, ethylbenzene, and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), PCBs, Resource Conservation and Recovery Act (RCRA) 8 metals plus nickel, vanadium, and zinc, and turbidity. None of the surface water samples exceeded the multi-site DD criteria for total aromatic hydrocarbons (TAH)/total aqueous hydrocarbons (TaqH), and no hydrocarbon sheen was observed.

Surface water samples were also collected at three locations downstream of suspended sediment mitigation measures during active sediment removal. The samples were analyzed for DRO, RRO, BTEX, PAHs, PCBs, RCRA 8 metals plus nickel, vanadium, and zinc, and turbidity. None of the surface water samples exceeded the multi-site DD criteria for TAH/TaqH, and no hydrocarbon sheen was observed. The sample collected within Site 28 upstream of the confluence with the Suqi River contained an estimated concentration of only 0.042 milligrams per liter DRO.

The USACE will continue to evaluate dredging methods and techniques within Site 28 to improve the effectiveness of future contaminated sediment removal activities. Effectiveness and protectiveness of the remedy will continue to be assessed as part of future reviews.

Regarding Site 8, the extents of subsurface soil and groundwater contamination on both sides of the road remain the primary data gap at the site and require further evaluation in the current Five-Year Review in order to determine/recommend the appropriate and necessary path forward.

USACE response: Agreed. The second periodic review for Site 8 will be available in a separate document. It is anticipated the second periodic review for Site 8 will include a recommendation for a supplemental investigation to delineate the lateral and vertical extent of soil contamination east of the 2016 sampling area and revise the location of the historic pipeline spill based on all available site data.

All applicable surface water criteria should apply as ARARs at all applicable sites; even though the DDs may have limited the specifications of surface water cleanup level(s) and/or criteria to TAH/TAqH and sheen.

USACE response: ARARs were established in the DDs, and are considered protective of human health and the environment. ARARs as specified in the DDs will not be changed for the NEC FUDS unless it is determined the DD remedies are no longer protective of human health and the environment. The surface water criteria applicable to Northeast Cape sites, as stated in Section 2.10 of the DD, "are the same [levels] as the Main Complex groundwater cleanup levels, assuming the water is used as a drinking water source. In addition, surface water must meet water quality standards as promulgated by the State of Alaska in 18 AAC 70. The water quality criteria for petroleum hydrocarbons, oil, and grease are set out in regulation at 18 AAC 70.020(b) and stipulate these compounds may not cause a visible sheen upon the surface of the water. In addition, the regulations contain surface water quality levels of 0.010 milligrams per Liter (mg/L) total aromatic hydrocarbons (TAH) and 0.015 mg/L total aqueous hydrocarbons (TAqH)." Surface water considered a drinking water source are the surface waters of the Squitughneq River, upstream of the intersection of the Airport and Cargo Beach Road, which is presented in Section 2.8.3 of the DD.

Site 7 and other uncharacterized landfills at NEC will continue to require CERCLA Five-Year Reviews until such time that the agencies concur that periodic reviews are appropriate. Although the DD states the term periodic reviews, the Site 7 landfill has had prior sources and residual concentrations of CERCLA contaminants identified; while the agencies have agreed to disagree on this issue based upon prior deliberations, the uncharacterized areas of concern require CERCLA Five-Year Reviews until otherwise determined appropriate to change the process to periodic reviews. Additionally, ongoing monitoring of the downgradient surface water and/or groundwater at these landfills is also applicable and necessary during the CERCLA Five-Year Review until such time that the agencies conclusively concur that any contaminant migration and/or exposure pathways are incomplete and that the remedy remains protective.

USACE response: The second periodic review for Site 7 (Cargo Beach Landfill) will be available as a separate document. The selected remedy at Site 7 (Cargo Beach Landfill) did not include a requirement for monitoring surface water or groundwater. Sampling of shallow groundwater was attempted in the vicinity of Site 7 with only limited success due to the tundra/wetland environment, the presence of subsurface rock/boulders, the intermittent presence of water, and slow recharge of shallow groundwater within temporary wells. A LUC at Site 7 will be implemented because groundwater use as drinking water is not recommended at Site 7. Though the LUCs are not yet fully implemented, two signs have been installed at the FUDS to inform site visitors of these locations. The signs are printed in both English and Siberian Yupik. In addition, the groundwater exposure pathway at Site 7 is incomplete because there is not a sufficient quantity of water produced to be considered a reasonable potential future source for drinking water. Periodic reviews in accordance with the Long-Term Management Plan will continue at this site.

The second periodic review for Site 9 (Housing and Operations Landfill) will be available as a separate document. The remedy at Site 9 included removal of submerged debris in active stream channels adjacent to the landfill, construction of a minimum 2-foot thick landfill cap, visual inspection of the landfill cap on an annual basis for settlement and erosion for five years, implementing LUCs, and LTM. LTM included three monitoring events spaced five years apart to demonstrate the shallow groundwater meets RAOs for a non-drinking water source, and six monitoring events spaced five years apart to demonstrate the shallow groundwater meets RAOs for a non-drinking water source. Removal of submerged debris in active stream channels adjacent to the landfill, construction of a minimum 2-foot thick landfill cap, and visual inspection of the landfill cap on an annual basis for settlement and erosion for five years have been implemented. LUC implementation is underway, but not yet complete. As a result of insufficient shallow groundwater volumes in the vicinity of the landfill, surface water has been used to demonstrate the shallow groundwater meets RAOs for a non-drinking water source. Surface water sample results to-date indicate the remedy is protective. Periodic reviews in accordance with the Long-Term Management Plan will continue at this site.

Settling/subsidence has been observed at the Site 7 landfill, as well as poor and inadequate vegetation establishment associated with the covers and adjacent surfaces of the Site 7 and Site 9 landfills.

USACE response: The second periodic review for Site 7 (Cargo Beach Landfill), will be available as a separate document, and will include details of issues noted during landfill visual inspections. The second periodic review for Site 7 includes a recommendation to conduct cap maintenance in areas where settling was observed. Granular fertilizer and seed were spread over the landfill cap following cap construction in 2009. In an attempt to address poor vegetative growth observed on the Site 7 landfill cap, granular fertilizer and seed were again spread over the landfill cap during 2011. A stabilization analysis conducted in 2011 determined the landfill cap met non-vegetative permanent stabilization requirements established in the 2011 Alaska Construction General Permit. During the 2018 landfill visual inspection, it was noted the soil used to construct the cap was very coarse and rocky, which significantly contributed to the sparse nature of vegetative growth.

Site 9: Vegetative cover observed during visual landfill cap inspections has been estimated at 70 to 80 percent on the cap surface and side slopes. Vegetative cover was noted as being short, but with good coverage. The cap appeared structurally sound and stable with no evidence of leaching or erosion. The landfill cap will continue to be visually monitored on a periodic basis, likely in conjunction with CERCLA Five-Year Reviews at other NEC sites, for up to 30 years.

SUGGESTIONS REGARDING FUTURE OPERATION, MAINTENANCE, AND MONITORING AT THE SITE

The community and ADEC provided the following suggestions for the future operation, maintenance, and monitoring at NEC:

Suggestion: Assess the residual contamination remaining at the Fish Camp sites as indicated by the most recent site investigation analysis results (most/all of which were conducted under the prior Native American Lands Environmental Mitigation Program [NALEMP] efforts) – which appear to indicate that residual concentrations of PCBs, petroleum, oil, and lubricants, and metal chemicals of concern remained in soil and surface water.

Response: The USACE has requested funding to conduct a preliminary assessment at the Fish Camp site to determine if a FUDS-eligible project exists there.

Suggestion: Complete removal of the solid and hazardous waste materials at the NEC Site 7 and other landfills.

Response: The current remedy remains protective of human health and the environment. The USACE does not intend to remove remaining materials at the Site 7 and 9 landfills. Periodic reviews in accordance with the Long-Term Management Plan will continue at Sites 7 and 9.

Suggestion: Evaluate and continue the extent investigation as determined necessary for soil and groundwater at Site 8.

Response: The second periodic review for Site 8 will be available in a separate document. It is anticipated the second periodic review for Site 8 will include a recommendation for.a supplemental investigation to delineate the lateral and vertical extent of soil contamination east of the 2016 sampling area and revise the location of the historic pipeline spill based on available site data.

Suggestion: Continue to include LTM of surface water and groundwater at landfill sites.

Response: Continued LTM of surface and groundwater at the landfill sites is not warranted. The second periodic review for Site 7 (Cargo Beach Landfill) will be available in a separate document. The selected remedy at Site 7 (Cargo Beach Landfill) did not include a requirement for monitoring surface water or groundwater. Sampling of shallow groundwater was attempted in the vicinity of Site 7 with only limited success due to the tundra/wetland environment, the presence of subsurface rock/boulders, the intermittent presence of water, and slow recharge of shallow groundwater within temporary wells. An LUC at Site 7 will be implemented because groundwater use as drinking water is not recommended at Site 7. Though the LUCs are not yet fully implemented, two signs have been installed at the FUDS to inform site visitors of these locations. The signs are printed in both English and Siberian Yupik. In addition, the groundwater exposure pathway at Site 7 is incomplete because there is not a sufficient quantity of water produced to be considered a reasonable potential future source for drinking water.

Details of the most recent periodic review related to Site 9 (Housing and Operations Landfill) will be included in a separate document. The remedy at Site 9 included removal of submerged debris in active stream channels adjacent to the landfill, construction of a minimum 2-foot thick landfill cap, visual inspection of the landfill cap on an annual basis for settlement and erosion for five years, implementing LUCs, and LTM. LTM included three monitoring events spaced five years apart to demonstrate the shallow groundwater meets RAOs for a non-drinking water source, and six monitoring events spaced five years apart to demonstrate the shallow groundwater meets RAOs for a non-drinking water source. Removal of submerged debris in active stream channels adjacent to the landfill, construction of a minimum 2-foot thick landfill cap, and visual inspection of the landfill cap on an annual basis for settlement and erosion for five years have been implemented. LUC implementation is underway, but not yet complete. As a result of insufficient shallow groundwater volumes in the vicinity of the landfill, surface water has been used to demonstrate the shallow groundwater meets RAOs for a non-drinking water source. Surface water sample results to-date indicate the remedy is protective. Periodic reviews will continue at this site.

Suggestion: Remove and treat the White Alice site soil and groundwater to effectively remove associated contaminants.

Response: The White Alice site is also referred to as Site 31. Further soil removal is not warranted at this site. In 1990, transformers, drums, tanks, fire extinguishers, and other containerized hazardous waste were removed from Site 31. Antennas, buildings, and aboveground storage tanks were demolished and removed in 2003. PCB-contaminated concrete was also removed from portions of the Main Electronics Building foundation. PCB contamination was also identified at a possible sewage outfall area located west of the main electronics building, and adjacent to the former transformer pad. In 2005, approximately 118 tons of PCB-contaminated soil was excavated from the three identified areas within Site 31. Excavations at the septic tank outfall and west of the building successfully removed all PCB contamination to concentrations below 1 milligram per kilogram (mg/kg). Confirmation samples collected in 2005 from the former transformer pad excavation indicate PCBs remained between 1.53 and 7.09 mg/kg in approximately 110 cubic yards of soil. The selected remedy of excavation and disposal of PCB-contaminated soil was initiated at Site 31 in 2010 and continued annually through the 2013 field season. Confirmation samples taken after 2013 soil removal indicated remaining site soil did not have PCB contamination above the multi-site DD cleanup level of 1 mg/kg. The site was recommended for No Further Action during the first Five-Year Review.

Suggestion: Removal/remediation of contaminants in source areas that remain within the NEC MOC soil and groundwater, as well as ongoing monitoring to ensure safe drinking water supplies.

Response: Contaminated soil has been removed to the extent practicable at the MOC sites. In-situ chemical oxidation, which was the selected remedy for contaminated MOC groundwater, was deemed ineffective during a 2009 pilot-scale test as a result of the presence of peat and highly organic peat soil, presence of permafrost or semi-permafrost zones, and observed preferential flow pathways. As a result, the contingency remedy of monitored natural attenuation (MNA) for groundwater was implemented and is ongoing. It is not recommended that groundwater in the vicinity of the MOC be used for drinking water until RAOs (cleanup levels) are achieved through natural attenuation processes. LUCs apply to the MOC. Though the LUCs are not yet fully implemented, two signs have been installed at the FUDS to inform site visitors of the location around the MOC where groundwater use is not recommended. The signs are printed in both English and Siberian Yupik. Groundwater monitoring is ongoing at the MOC sites.

Suggestion: Evaluate additional LTM investigation in soils and groundwater in areas adjacent to and immediately downgradient of MOC (aka the upgradient areas of the Site 28 Drainage)

Response: In 2010, UVOST borings confirmed the presence of petroleum-contaminated soil within the tundra in the southern portion of Site 28 adjacent to the MOC. The shallow groundwater was investigated during the 1994 remedial investigation. Two monitoring wells were installed within the eastern drainage of Site 28. The 1994 sampling results indicated the potential for DRO and lead contamination. Subsequent sampling in 2001 demonstrated the levels of DRO and lead were below groundwater cleanup levels. No contaminants of concern were retained for the shallow groundwater. As stated in this FYR, the selected remedies are currently protective and are functioning as intended, therefore collecting additional data in this area is not warranted at this time.

Suggestion: Conduct surface water sampling at Site 28 and consider whether tissue sampling is necessary based upon historical and/or 2018 sediment sample results.

Response: Previous surface water sample results have indicated future surface water monitoring in Site 28 is not warranted. In 2013, active sediment removal from Site 28 using a dredge modeled the worst-case scenario for potential contamination of surface water from suspended sediment as the surface water flowed through Site 28. To monitor whether or not contaminated sediment removal activities performed during 2013 were causing surface water contamination in Site 28, surface water samples were collected before, during, and after sediment removal activities. The three sample locations were in the active stream channel located downstream of sediment removal operations. The samples were analyzed for DRO, RRO, BTEX, PAHs, PCBs, RCRA 8 metals plus nickel, vanadium, and zinc, and turbidity. None of the surface water samples exceeded the multi-site DD criteria applicable to non-drinking water sources for TAH/TaqH, and no hydrocarbon sheen was observed.

Surface water samples were also collected at three locations downstream of suspended sediment mitigation measures during active sediment removal. The samples were analyzed for DRO, RRO, BTEX, PAHs, PCBs, RCRA 8 metals plus nickel, vanadium, and zinc, and turbidity. None of the surface water samples exceeded the multi-site DD criteria for TAH/TaqH, and no hydrocarbon sheen was observed.

Contaminants remaining in sediment at Site 28 are organic chemicals (POL) that partition much more strongly to sediment than to surface water. Thus, sampling sediment captures the “worst-case” media contamination, and additional surface water samples are unlikely to provide substantial additional benefit.

At ADEC's request, USACE considered whether additional fish tissue sampling is warranted at NEC. We concluded that tissue sampling is not warranted, for the following three reasons:

1. An independent federal public health agency, ATSDR, evaluated contaminant levels in Suqi River fish tissue and concluded that "eating fish from NEC in the summer (3 months) is not expected to harm people's health" because "contaminants are not present in fish at sufficiently elevated levels to be harmful." Thus, contaminant levels in edible fish species have been determined not to threaten the health of Saint Lawrence Island residents who might consume them.
2. Contaminant levels in biota are not specified as an RAO, and "comparison" or "threshold" values of site contaminants in biota were not specified in the multi-site DD.
3. Site 28 contaminants are not present in Suqi River surface water or sediments at levels of human health or environmental concern.

Suggestion: Effective remediation and LTM of the Suqi River drainage basin sediments and surface water (fuels and PCB contamination).

Response: Remedial investigations of the Suqi River were conducted between 1996 and 2004. Additional sediment and surface water sampling was performed during 2016. One sediment sample collected in 1996 exceeded the multi-site DD cleanup level of 3,500 mg/kg DRO with a DRO concentration of 25,000 mg/kg at one location about 850 feet downstream of the Site 28 Drainage Basin confluence with the Suqi River. Subsequent sampling events could not duplicate or substantiate this anomalous diesel detection. All other sediment samples collected from Site 29 Suqi River were below multi-site DD cleanup levels. PCBs have not been detected in Suqi River sediments above the multi-site DD cleanup level of 0.7 mg/kg. All surface water sample results from the Suqi River have been within drinking water standards. Remediation is not warranted because there is not an unacceptable risk to human health or the environment.

Suggestion: Complete removal or destruction of the contaminants identified at the former village site at NEC. Provide adequate funding for Native American Lands Environmental Mitigation Program at Native Village of NEC, including provisions to adequately support and build capacity with training and jobs for the Native Village of Savoonga.

Response: Petroleum contaminated soils were excavated from this site by the FUDS program in 2000-2001. The NEC decision document stated that no further action was required at this site. In 2014, the Native Village of Savoonga excavated PCB-contaminated soil under the NALEMP program. Confirmation sample results indicated that PCBs remained in the soil slightly above the ADEC clean-up level of 1.0 mg/kg.

The Native Village of Savoonga is not currently eligible to participate in NALEMP due to financial issues. However, the USACE has requested funding to conduct a preliminary assessment at the former village site, also known as the Fish Camp, to determine if a FUDS-eligible project exists there.

Suggestion: Review of the failure of the chemical oxidation project and attention to the problems/solutions identified by the Restoration Advisory Board technical advisor Dr. Ron Scrudato.

Response: The results of the chemical oxidation pilot test have been reviewed. In situ chemical oxidation was deemed ineffective during a 2009 pilot-scale test as a result of the presence of peat and highly organic peat soil, presence of permafrost or semi-permafrost zones, and observed preferential flow pathways.

Suggestion: Restoration of the Suqi River watershed and shallow groundwater resources within the area of the MOC and upgradient regions of the MOC to ensure adequate and safe drinking water at NEC.

Response: The USACE is constrained by the cleanup authority of the DERP-FUDS. Our mandate for environmental remediation is to achieve protection of human health and the environment, rather than return the site to its pristine condition. The remedy for each NEC site was designed to protect human health and the environment by either removing contamination to risk-based cleanup levels, or eliminating exposure pathways. At sites where contamination was left in place, LUCs are being implemented to ensure relevant exposure pathways remain incomplete, and five-year and periodic reviews are being conducted to ensure remedies remain protective of human health and the environment.

Suggestion: Tracking and analysis of materials salvaged from NEC that have been used by families for construction of homes and camps. These present a likely exposure pathway for contaminants such as PCBs, lead, asbestos, and others.

Response: The FUDS program is not legally authorized to address issues related to beneficial use of salvaged materials.

Suggestion: Provide more advanced notice to ADEC, community members, and other stakeholders whenever USACE is planning and scheduling future community meetings in order to ensure all parties have adequate time to make arrangements for travel, schedule participation, provide input to the agenda, etc.

Response: Agreed. USACE will make every effort to work with the ADEC, community, and other stakeholders to identify the most appropriate dates to schedule meetings. Once scheduled, USACE will announce meetings well in advance to ensure optimal opportunity for participation.

Suggestion: Ensure that complete and comprehensive responsiveness summaries (e.g., complete responses to comments, meeting minutes, review and/or deliberation determinations) be provided to all stakeholders and attached to all respective documents for all applicable actions.

Response: Agreed.

Suggestion: Evaluate and apply the revisions and changes to 18 AAC 75 cleanup levels and what impacts have resulted to any sites and their respective remedies.

Response: Protectiveness of the remedy at each site which has not reached a condition that allows for unrestricted use and unrestricted exposure is re-evaluated during each five-year review as stipulated in CERCLA guidance, and/or during periodic reviews for non-CERCLA (POL) sites. This involves consideration of whether ADEC cleanup levels have changed since the last review. More fundamentally, the review assesses changes to scientific knowledge about the toxicity of COCs by evaluating whether EPA-derived reference doses or cancer slope factors for COCs have changed since the prior review.

Suggestion: Incorporate ATSDR health consultation conclusions and status of draft or final documents into this Five-Year Review.

Response: USACE confirmed ATSDR has not yet released a final version of the health consultation, "Northeast Cape Formerly Used Defense Site (FUDS), St. Lawrence Island, Alaska". Thus, the public comment version is still the most recent version available (July 24, 2017). Conclusions of the public comment version are incorporated in Sections 3.0 and 9.0 of this Five-Year Review.

----End of Comments---

Meeting Minutes

MEETING MINUTES

NORTHEAST CAPE FORMERLY USED DEFENSE SITE 5-YEAR REVIEW PUBLIC MEETING	DATE HELD: 11 APRIL 2018	
	DATE ISSUED: 16 APRIL 2018	
	RECORDED BY: HALEY HUFF & JESSICA BAY	
DOC. NO: AE-ECC-J07-5FGA4600-G01-0001		PLACE: SAVOONGA CITY HALL
SUBJECT: SECOND NE CAPE FIVE-YEAR REVIEW		

PARTICIPANTS :

ANDREA ELCONIN – USACE
AARON SCHEWMAN – USACE
CURTIS DUNKIN – ADEC
JESSICA BAY – ECC
KEVIN MAHER – JACOBS
HALEY HUFF – JACOBS
12 RESIDENTS OF SAVOONGA (SEE INCLUDED SIGN-IN SHEET)
PAM MILLER – ACAT (VIA PHONE)

MEETING NOTES

Andrea Elconin opened the meeting by introducing USACE and ECC/Jacobs staff followed by a brief overview of the meeting purpose. Kevin Maher began the slide presentation following the USACE introduction.

Meeting Overview

The USACE met with the community of Savoonga to kick-off the Second Five-Year Review (5YR) at Northeast Cape Formerly Used Defense Site (NE Cape FUDS) and provide community members the opportunity to have ECC/Jacobs staff assist with the completion of a site questionnaire.

During the slide presentation, the following questions and USACE responses occurred:

QUESTIONS

- Once sites are closed, how often is the site monitored?
  a. Response - The sites will be closed when the remedial action objectives defined in the decision document have been met. Once the site is closed, there will be no further monitoring at the site unless new information is presented to the USACE that justifies re-opening the site.
- Will global warming/climate change have an effect on the contaminated sites?
  a. Response - If the site changes due to climate change (e.g., melting permafrost), then this will be noted during the next five-year review site inspections. Additional sampling may be warranted if new contamination is discovered.
- Which sites have not received site closure? Is there a way to re-open a site once it is closed?
  a. Response - New data that indicates a risk to human health can re-open a site.
- Sites with PCBs are not listed specifically in the mailer.
  a. Response - Sites with PCBs were cleaned up and are not listed because the USACE believes that all PCBs above the 1 ppm cleanup level have been removed from the Northeast Cape FUDS.

A community member stated that they do not feel like there is a good mechanism for re-opening sites because the process is too lengthy, “taking 2-3 years”.

A community member stated that they do not feel like there is clarity on which sites are open and which sites are closed. Additional community member statements at this time included:

- The five-year review report documents are not understandable to the public who are not familiar with the scientific information presented.

MEETING NOTES

- A summary of the draft five-year review report findings in the form of a public meeting would help the community provide comments during the draft five-year review report public comment period.

USACE Response - The USACE would consider the request to add a public meeting during the public comment period related to the draft five-year review report.

A community member stated that the plan for only one or two signs that describe the land use restrictions at NE Cape FUDS is not enough.

USACE Response – The USACE response included a summary of the current signage plan as follows:
- The Signage will be added this summer and will indicate the areas where groundwater use is discouraged and the capped landfill areas where construction is discouraged.
- A meeting with the Native Village of Savoonga Council resulted in a request for an additional sign near the Northeast Cape airstrip.

The USACE stated that the signs would be in English and Siberian Yupik. A community member recommended George Noonwook as a translator.

A community member requested that signs should be placed to warn the public against consuming the fish and the water from the Suqi River.
- Alaska Community Action on Toxics (ACAT) mentioned that they have data suggesting that the Suqi River is still highly contaminated.

USACE Response - The USACE responded that the sample results from the Suqi River, described in the administrative record, do not show contamination is present above the cleanup levels. The USACE requested that ACAT provide the data they referenced to the USACE PM, Andrea Elconin, for evaluation.

A community member requested that seals and fish coming into the Suqi River be tested.

USACE Response included the following:
- The USACE cannot test animals or fish at the NE Cape Site.
- The USACE suggests that another entity, such as ACAT, can pursue a grant to conduct this type of testing and would alert ACAT if they become aware such a grant is available.
    - ACAT replied that there is not currently a grant available or a funding mechanism for fish/animal testing and would like to collaborate with the USACE for possible funding sources and a letter of support for the work.
    - ACAT is currently collaborating with the universities for further research at the Northeast Cape FUDS.

A community member stated that they had uncovered a landfill and reburied it when performing dirt work with heavy equipment near the dome associated with the White Alice site on top of Kangukhsam Mountain. The type of debris uncovered and reburied was not identified in the discussion.

USACE Response – The USACE asked if there was a way to identify the location such as GPS coordinates. The community member did not have GPS coordinates.
A community member asked “What if the military wants to build another site at NE Cape due to tensions with North Korea or Russia?”

MEETING NOTES

The USACE responded that they would not be made aware of this type of information and that they are only involved with the Northeast Cape FUDS clean-up.

A community member asked if the Suqi River could be stocked with fish in the future?

USACE Response – Their technical expertise was not in the field of fishery management. However, they were not aware of any reason why this could not occur.

During the presentation of the slide describing 2018 Northeast Cape FUDS fieldwork, Pam Miller with ACAT requested more detailed information regarding the number of analytical samples and the associated analytical suites, and which areas would be sampled. The USACE suggested that this discussion occur after the slide presentation concluded so that others who did not want to hear the detailed information could leave the meeting.

USACE SUMMARY OF THE SAMPLING PLAN WITH PAM MILLER (ACAT) AFTER THE SLIDE PRESENTATION CONCLUDED:
Approximately four community members remained in the room and Pam Miller remained on the teleconference line for the detailed description of 2018 fieldwork. The USACE described the sample quantities and analytical methods that are planned for surface water samples, groundwater samples, and sediment samples, as well as the locations where samples will be collected.

Pam Miller asked if the USACE will analyze samples for PCB congeners instead of Aroclors?
USACE Response – The USACE said they are not planning on analyzing for congeners because the Decision Document cleanup levels are specific to total PCBs and that there are no regulatory-based cleanup levels for congeners.

Pam Miller stated that recent samples of Suqi River fish collected by a third party identified congeners are present and are a human health risk. Therefore, specific congeners should be measured.

USACE Response:
- The USACE requested that these data be provided to USACE PM, Andrea Elconin, for evaluation.
- Congeners do not have a regulatory cleanup level and the DD remedial action objective was to cleanup total PCBs to 1 ppm. Note: This was a mis-statement. The PCB cleanup level applicable to Site 29 Suqi River sediment is 0.93 ppm.

Pam Miller stated an Incremental Sampling Method (ISM) was not adequate because hot spots could be missed. Comment was specific to Site 8.

USACE Response - Decision Unit placement and extents have been revised to account for the 2016 discrete sample data set which identified the suspected area of release.

Pam Miller asked if mercury would be sampled for at Site 28.

USACE Response - Mercury has not been found in previous Site 28 samples above the cleanup level and Mercury would not be part of the analytical suite at Site 28.

Pam replied that her samples indicated mercury was present in the sediment of Site 28.

MEETING NOTES

USACE Response - The USACE asked that data which showed mercury is present above the cleanup level, through third party sampling, be provided to the USACE for evaluation. Additionally, the USACE responded the MOC buildings that may have contained mercury light switches wee removed along with any potentially contaminated soil. Therefore, all sources of mercury which could contribute to Site 28 have been removed.

A community member stated the USACE is not sampling at locations suggested by the community, is only following the work plan, and is doing the minimum requirements to satisfy the law.

USACE Response - The USACE is bound by the regulation and the USACE is complying with regulation for the cleanup of the Northeast Cape FUDS.

A community member stated the community feels the previous 5 year-review did not address community concerns. The community feels their opinions are not impactful.

USACE Response - The USACE responded that the community input is impactful but the request of PCB congener analysis has to go down a different route and become an established cleanup level by regulation. The USACE identified that the planned signage was a result of community comments and that having onsite accommodations for community members to be present during 2018 fieldwork was also a result of community comments.

A community member recommended USACE meet with the Native corporations, as the landowners, in addition to the Native Village of Savoonga Council before the 2018 fieldwork occurs. Other suggestions included:

- Allow the corporations to review the sampling plan
- Present a digestible format of the results of the draft five-year review report

USACE Response – The USACE identified that the Native corporations were contacted and that they provided a right-of-entry to conduct 2018 fieldwork.

The public would also like the USACE to write a courtesy note to the Native corporations – re-stating the USACE is bound by law (specifically, the DD) and is limited in the types of sampling that can be performed. The note should also include appreciation of the public involvement and being welcomed into the village.

The meeting concluded.

Note – Nobody from the community remained after the meeting to complete and submit a five-year review questionnaire. Additionally, no one from the community returned to City Hall the next day to complete and submit a five-year review questionnaire.

The Second Five-Year Review for Northeast Cape Formerly Used Defense Site

Public Meeting

PRINT

Name/Organization	Signature
Dean Kulowiyi	Dean Kulowiyi
Irving Kava	Irving Kava
~~[illegible]~~ City of Savoonga	[illegible]
Christina Alowa	Christina Alowa
~~[illegible]~~	
City of [illegible]	[illegible]
Kukulget ~~[illegible]~~	[illegible]
~~[illegible]~~ IRA	Ray [illegible]
Perry Pungowiyi/Kukulget	Perry Pungowiyi
Kukulget, Inc.	[illegible]
Julian Seppilu	Julian Seppilu
Bryan Rookok Jr/ Kukulget, Inc.	[illegible]
NVS NALEMP PM Robert Annogiyuk	Robert Annogiyuk

Interview Record

Interview Record

Name: Curtis Dunkin	Date: February 15, 2019
Organization: ADEC	Phone Number: 907.269.3053
Title: ADEC Regulatory Project Manager for the Northeast Cape FUDS	Email: Curtis.dunkin@alaska.gov
Interview Type: X Mail/Email	☐ Phone/In Person
Site Name: Northeast Cape, St. Lawrence Island	

The following interview questions are based on EPA guidance (EPA 540-R-01-007). Questions may be left unanswered if they do not apply to you.

Interview Questions

1. **What is your overall impression of the project (general sentiment)?**
ADEC appreciates the opportunity to submit its comments and concerns on the prospective second five-year review (FYR) effort for the Northeast Cape (NEC) Formerly Used Defense Site (FUDS).
Within the current FYR period, spanning between 2014 and 2019, the Army Corps of Engineers (USACE) has continued to conduct monitoring and periodic reviews at specified sites of the NEC FUDS as required by both the 2009 NEC Site 7 Decision Document (DD) and the 2009 NEC Site Wide DD, and the 2016 NEC Long-term Management Plan (LTMP). USACE has made progress on addressing site management needs including developing the 2016 LTMP and developing conceptual Land Use Control (LUC) boundaries at sites where required by the DD.
USACE has been responsive to evaluating and implementing additional investigation activities to address newly identified data gaps and site characterization needs at several NEC sites during the current FYR period.
USACE has continued to work on and has achieved many of the action items and milestones which were specified in the preceding FYR report (2015) section 9.0 table 9.1.
In general, the Alaska Department of Environmental Conservation's Contaminated Sites Program (ADEC) continues to agree with and perceives the site-specific protectiveness statements that were presented in the 2015 FYR report section 10 as continuing to be applicable and appropriate at the time of this questionnaire. ADEC is not aware of any major site management changes, issues, and/or concerns (i.e. land use changes, contamination migration, exposure risk, etc.) that would be considered inconsistent with what was identified in the 2009 DDs and/or the 2015 FYR that have been identified since the 2015 FYR report.
One of the accomplishments of the 2018 site work was the USACE installing signage along the Cargo Beach Road which had information detailing and figures depicting site locations, conceptual land use control boundaries, and warnings - as requested by community members and other stakeholders including ADEC. The signage included information in English on one side, and Siberian Yupik on the other.

ADEC's overall impression is that USACE has kept stakeholders adequately apprised of the project activities and schedules and have been responsive to community and agency involvement.

2. **From your perspective, what effects have site operations had on the surrounding community? Are you aware of any community concerns/complaints regarding site operations, administration, implementation, or overall protectiveness of the remedies in the Decision Documents?** ADEC perceives USACE's site operations to have had overall positive effects on the communities of Saint Lawrence Island. During the numerous mobilizations and implementations of field efforts over the years (both prior to as well as during the current FYR period), USACE consistently made it a priority objective to include community members in its hired field crews, has provided opportunities for community members to be designated community observers, and has also coordinated the logistics for community and agency members to travel to NEC to conduct field visits. USACE has also coordinated with ADEC for staff to conduct multi-day site inspections during the implementation of field work as well as participation in community outreach.
   ADEC is aware of numerous instances over the years, including during the current FYR period, that the USACE field staff provided major critical medical care to community members who were traveling to visit the Native Village of Northeast Cape (NVNC) and/or traveling between the surrounding fish and hunting camps.
   USACE site operations over the years have resulted in economic contributions to the local economies of the communities of Gambell and Savoonga.
   ADEC is aware of several ongoing concerns which have been expressed by community members via written and/or oral comments on projects (documents) and/or public meetings which have occurred prior to as well as during the current FYR period, including but not limited to the following: 1) potential leachate in surface and/or groundwater that could be associated with the landfills, 2) residual contamination in waters, sediments, and/or fish within the Site 28 and Suqi River drainages – including respective concerns associated with potential exposure risk(s); 3) potential residual FUDS contamination at several of the NVNC fish camp sites, and 4) FUDS debris and structural materials that represent health hazards to community members and/or wildlife.

3. **Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please provide details.** ADEC is not aware of any such events listed in the question as having occurred in association with the Northeast Cape FUDS areas of concern (sites).

4. **Do you feel well informed about the site's activities and progress? Have there been communications or activities regarding the site?** ADEC feels that it is adequately informed regarding the site's activities and progress. USACE has coordinated public meetings in Savoonga to discuss the planning of and to solicit input for the prior draft 2014 FYR report and also in April 2018 to inform the community and to solicit input from stakeholders regarding the draft 2018 Remedial Action Review Work Plan.
   USACE has provided ADEC with the opportunity to review and comment on the LTM work plans and reports that have been implemented during the current FYR period, and has also hosted numerous technical planning meetings
   USACE has provided ADEC with regular updates during the implementation of field work during this FYR period. In instances that warranted consideration of potential or

necessary changes to the field and/or project plans, USACE has apprised ADEC and allowed ADEC the opportunity to review, make additional comments, and approve those changes prior to implementing them in the field. USACE has generally provided ADEC with complete and thorough documentation (electronic and hard copy) for draft and final documents, meeting materials, agendas, minutes, and decisions during this FYR period. While there have been a couple of minor instances where USACE's responsive summary to ADEC was delayed and/or not complete, (including meeting minutes and final responses associated with the two draft reports in 2016 associated with the Main Operations Complex LTM, Suqi River Current Conditions Evaluation, and the Site 8 LTM and investigation, as well as the meeting minutes from the April 2018 public meeting for the draft 2018 Remedial Action Review Work Plan), these instances have not resulted in negative impacts to any sites, their respective remedies and/or protectiveness, or the progress of implementing respective site work.

5. **Do you have any suggestions regarding future operation, maintenance, and monitoring at the site?** ADEC requests USACE consider the following to be included in the current FYR evaluation as well as future site investigation and/or monitoring activities: 1) evaluate and continue the extent investigation as determined necessary for soils and groundwater at Site 8; 2) continue to include LTM of surface water and groundwater at landfill sites; 3) continue LTM of groundwater at the MOC sites and evaluate additional LTM investigation in soils and groundwater in areas adjacent to and immediately downgradient of MOC (aka the upgradient areas of the Site 28 Drainage); 4) conduct surface water sampling at Site 28 and consider whether tissue sampling is necessary based upon historical and/or 2018 sediment sample results; 5) assess the residual contamination remaining at the Fish Camp sites as indicated by the most recent site investigation analysis results (most/all of which were conducted under the prior NALEMP efforts) – which appear to indicate that residual concentrations of PCBs, metals, and POL COCs remained in soils and surface water; and 6) evaluate and apply the revisions and changes to 18AAC75 cleanup levels and what impacts have resulted to any sites and their respective remedies.
   Additionally, USACE has yet to develop a Notice of Environmental Contamination as well as Institutional Controls with the landowner, which is a primary requirement for several of the remedies associated with NEC sites. This requirement is specified in both 2009 DDs, the LTMMP and other project documents and correspondence since the removal actions were completed in 2014, and is also a site closure requirement of 18 AAC 75. The current FYR effort needs to discuss and include these issues as well as outline milestone dates for their completion.

6. **Have any problems been encountered which required, or will require, changes to the remedy or Decision Document?**
   As of the date of the subject questionnaire, ADEC is not aware of any problems having been encountered, specifically during this FYR period that would require changes to the remedy or DDs. However, ADEC has noted its concerns (both prior to as well as within the current FYR period), via written comments and discussions associated with work plans, reports, meetings, etc., with regard to several issues and concerns discussed below.
   Site 28 Drainage: ADEC continues to have concerns regarding whether or not the issues of contaminant migration and/or exposure pathways via sediments and/or surface water at Site 28 and related drainages have been adequately investigated and/or monitored; including concerns regarding the state of the residual contamination source areas which

remain within the tundra at Site 28 as well as likely ongoing sources from the MOC plumes which are located immediately adjacent to/upgradient of Site 28. ADEC acknowledges that additional Site 28 sediment investigation data will be available and evaluated based upon the results of the 2018 investigation activities. However, ADEC noted in its responses to additional RTCs on the revised final 2018 work plan, that data gaps could still result from USACE's decision to not include surface water sampling at Site 28. Per ADEC's email to USACE dated July 11, 2018, "ADEC's comment was based on the issue that all of the existing surface water data from sample locations collected within the Site 28 drainage (i.e. upgradient of the confluence with the Suqi River), were either collected over the years of the RI phases or during the remedy implementation and sediment removal actions completed in 2013/14. ADEC's rationale for requesting additional surface water sampling from within the drainage during the 2018 effort was to provide current data to confirm whether surface water criteria are still being met five years after completion of the removal action; to support making a defensible determination with re: to the protectiveness of the remedy within this five-year review period."

Additionally, in the years following the finalization of the DDs in 2009, ADEC has emphasized its position that all applicable surface water criteria continue to apply as ARARs at all applicable sites; even though the DDs may have limited the specifications of surface water cleanup level(s) and/or criteria to i.e. TAH/TAqH and sheen. ADEC's current position is that additional surface water monitoring data from Site 28 may be necessary in the future in order to make conclusive determinations regarding the status of migration and/or exposure pathways. Further deliberations regarding comments and responses on the revised final 2018 work plan noted that USACE would include further evaluation of this issue in the prospective 2018-19 FYR report.

Site 8: Field conditions at the time of implementing the initial field activities, including surveying and locates of planned 2018 sediment sampling and mapping locations, indicated that sediment and/or surface water were not present within the targeted decision units. Subsequent site inspections conducted by ADEC, USACE, and the field team resulted in concurrence that the Site 8 sediment and surface water could not be investigated as specified in the 2018 work plan. Further discussion and observations by the project team members resulted in concurrence that the extents of subsurface soil and groundwater contamination on both sides of the road remained the primary data gap at this site and would require further evaluation in the current FYR in order to determine/recommend the appropriate and necessary path forward.

Site 7: ADEC has previously commented and noted its position that this and other uncharacterized landfills at Northeast Cape will continue to require CERCLA FYRs until such time that the agencies concur that Periodic Reviews are appropriate. While ADEC acknowledges that the DD states the term periodic reviews, the Site 7 landfill has had prior sources and residual concentrations of CERCLA contaminants identified; and while the agencies have agreed to disagree on this issue based upon prior deliberations, ADEC's position is that the uncharacterized areas of concern require CERCLA FYRs until otherwise determined appropriate to change the process to periodic reviews. Additionally, ongoing monitoring of the downgradient surface water and/or groundwater at these landfills is also applicable and necessary during the CERCLA FYR until such time that the agencies conclusively concur that any contaminant migration and/or exposure pathways are incomplete and that the remedy remains protective.

Fish Camp: Please see and apply ADEC's comment on this area of concern in response to question #5 in this questionnaire.

General: Please see and apply other applicable comments, responses, and/or deliberations from meeting and resolution minutes associated with activities which occurred within the current FYR period that are relevant to considerations regarding the functionability and/or protectiveness of the implemented remedies, site statuses, etc. including for example the development of the 2016 LTMMP, the development and implementation of the 2016 LTM and Suqi River and Site 8 LTM Work Plans and Reports, the 2018 public meeting, and the 2018 Remedial Action Review Work Plan; including related email correspondence between ADEC and USACE such as that referenced in the Site 28 discussion, dated July 2018 above and others.

7. **Are you aware of any changes in land use, access, or other site conditions that have occurred in the past five years that you feel may impact the protectiveness of the site?** ADEC is not aware of any changes to land use or access in association with the Northeast Cape FUDS and/or immediately adjacent areas. ADEC however does note that changes in site conditions have been observed and confirmed to have occurred at several sites - as identified since the DDs and within this FYR period including : 1) the drainage and surface water characteristics within the Site 8 areas of concern; 2) increased concentrations and extents of contamination in soils associated with Site 8 that have been identified since the DD and within this FYR period, 3) settling/subsidence at the Site 7 landfill; 4) poor and inadequate vegetation establishment associated with the covers and adjacent surfaces of the Site 7 and Site 9 landfills; and 5) sediment transport and deposition appears to have recurred within the Site 28 drainage however it is still unclear whether or not residual contamination is continuing to migrate through the system.

8. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?** ADEC would request/suggest the following of USACE: 1) to provide more advanced notice to ADEC, community members, and other stakeholders whenever USACE is planning and scheduling future community meetings in order to ensure all parties have adequate time to make arrangements for travel, schedule participation, provide input to the agenda, etc.; 2) ensure that complete and comprehensive responsiveness summaries (i.e. complete responses to comments, meeting minutes, review and/or deliberation determinations) be provided to all stakeholders and attached to all respective documents for all applicable actions (noting the two instances described in more detail in response #3 above); 3) incorporate ATSDR health consultation conclusions and status of draft or final documents into this FYR; and 4) ADEC appreciates USACE's coordination of the November 15, 2018 technical meeting which enabled the project team members to have a pre-draft FYR report discussion of the preliminary data from the 2018 efforts. ADEC was notified at that meeting that the results of the 2018 work would be presented as an appendix in and distributed simultaneously with the draft FYR report. ADEC noted that while it did not necessarily object to that approach, that having an earlier opportunity to review and comment on the draft 2018 report in its entirety would have allowed ADEC to be better-informed for submittal of the subject questionnaire; as it would have also likely addressed some of ADEC's comments and concerns which are notated in the subject questionnaire.

Interview Record

Name: Larry Kava	Date: 01/28/2019
Organization: Kawerak Inc.	Phone Number: 907-984-6414
Title: Savoonga Representative	Email: tc.sva@kawerak.org
Interview Type: ☐ Mail/Email	X Phone/In Person
Site Name: Northeast Cape, St. Lawrence Island	

The following interview questions are based on EPA guidance (EPA 540-R-01-007). Questions may be left unanswered if they do not apply to you.

Interview Questions

1. What is your overall impression of the project (general sentiment)?

Mr. Kava has no comment on the site. He has not traveled to Northeast Cape and does not use the land for hunting or fishing. He travels elsewhere. He does not have friends or family that he wanted to comment on behalf of for general impressions of the site.

2. From your perspective, what effects have site operations had on the surrounding community? Are you aware of any community concerns/complaints regarding site operations, administration, implementation, or overall protectiveness of the remedies in the Decision Documents?

3. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please provide details.

4. Do you feel well informed about the site's activities and progress? Have there been communications or activities regarding the site?

5. Do you have any suggestions regarding future operation, maintenance, and monitoring at the site?

6. Have any problems been encountered which required, or will require, changes to the remedy or Decision Document?

7. Are you aware of any changes in land use, access, or other site conditions that have occurred in the past five years that you feel may impact the protectiveness of the site?

8. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Interview Record

Name: Pungowiyi, Delbert	Date: 2/5/2019
Organization: Native Village of Savoonga Tribal Government	Phone Number: 907-984-6414
Title: President	Email:
Interview Type: ×Mail/Email	☐ Phone/In Person
Site Name: Northeast Cape, St. Lawrence Island	

The following interview questions are based on EPA guidance (EPA 540-R-01-007). Questions may be left unanswered if they do not apply to you.

Interview Questions

1. What is your overall impression of the project (general sentiment)?

I was on and off on the project from the start of the cleanup. It was pretty tough working with the government. Overall, the tribe and the native corporation are not too happy about the outcome of it. There were some old monofills that were requested to have more investigation. We also wanted the site to be cleaned up to residential standards and do not believe that the site has been cleaned up to residential standards. The people would like to re-establish the community in NE Cape.

We sacrificed a lot to our nation, willingly, with our utmost patriotism. When they proposed to use our island, we did not have any requests except not to pollute the area – the Suqi, which was very rich with Dolly Varden and ocean-going trout. Because of the high number of fish that entered the Suqi river, the food was abundant there (for seal). The military did not honor the agreement that was signed by the Secretary of State (1951) not to pollute the Suqi with any human waste or any other pollutants or violate our hunting/trapping grounds. We do not believe we will see the river come back to life in our lifetime and it is questionable if the river will ever come back to it's state.

A human rights violation was committed – the Suqi river was wiped out with fish and the seals do not haul out anymore. We had no choice but to go to the dumps after breakfast, lunch, and dinner. I was a four-year-old child, up to five years old. We can still taste that sour taste when we talk about it.

We argued very hard that the five members of the tribal council should sign off on the Decision Document. The liaison who chaired the meeting said I had put up the most powerful argument for our people (in 2008). It was a one hour and fifty-minute teleconference which was initially for an hour and fifteen minutes. Our liason put the USACE on the spot to extend the teleconference until our issues were resolved. We were not notified of the reasons why they went ahead with the signing of the ROD without informing us why the tribe was excluded from signing of the ROD. 10 years ago, when we agreed to a 30-year cleanup, I asked a gentleman (believe he is the director of the USACE) for the justification of the exclusion – Bush II had signed an executive order that the USACE solely represented the US of America. We are not happy with that and are more or less insulted by that. I would like to see in black and white how they justified that 2009 signing of the ROD and excluding our tribe in 2008. The lady from Oregon had said that I put up the strongest argument for my people. To date, the gentleman said that he would provide me the information for why the tribal government was excluded. I have not seen nothing in black and white or in writing how they justified that signing off of the ROD on the NE Cape cleanup. We do have unfinished business with our senators in Washington and I'm just not pushing it right now with the current president that we have. We are just waiting to see what comes out of the current administration. I'm afraid to push it hard because of the current president we have. We are holding off to see if we can receive any compensation for the human rights violations. We have all agreed that the NEC will not be cleaned up to its pristine condition as before. The real estate value of the area over there has been severely depreciated and we would like to see compensation for that. If we end up with nothing after all of our sacrifice to our country – willingly and patriotically.

When they requested adults for Alaska territorial guards – all men and women over 13 years old stepped up. All were issued semi-automatic rifles. Radar stations in Gambell – subject to eating off of the garbage during times of food in security. We were never given thanks or recognition of the sacrifice – the letter of appreciation was an insult to us. The country as a whole does not understand the role that our island and my people played during the Cold War Era. The ultimate sacrifice in my opinion – sacrificing our existence. We knew about the nuclear weapons that they created. When we agreed to let them use our island we knew the risks we were undertaking. One nuclear strike to this island and we knew we would lose everything. We feel that our nation is really indebted to us as opposed to struggling and having food security issues that we are faced with now with our climate change and our food stamp being cut off due to this president and administration. It has been very tough dealing with the USACE right from the beginning of the clean up – biggest concern was the dollar amount. This shouldn't have been an issue because of the sacrifice we have given to our nation.

We argued the best we could to have the monofill investigated and removed. Congress to cleanup the FUDS. Annie Alowa had ACAT do a documentary prior to her death. She had been going to Washington for over 20 years with Pam Miller. 7 branches. Each branch said they had to go to the other branch. A lot of running around. The documentary is titled "I will fight until I melt." She had that documentary sent to Congress and she was diagnosed herself with liver cancer. This was really most powerful thing to have Congress take action to cleanup the FUDS – not only on the island but across Alaska. I have been arguing that she have recognition. Not one person in the state of Alaska stepped up to the plate. She fought this all alone for over 20 years. I'm happy and proud that she got to hear that it was going to be done. There is a lot of history to that. When things settle down in Washington, our commander in chief could take our case to see if we could have some sort of agreement/settlement, possibly like the Aleuts did. The best way to bring some closure to this situation would be to have a delegation from the Savoonga and Gambell with blessing from the tribal council of what would bring closure to the site and to negotiate with congress for a settlement that would be dignified to our people and our tribes and with Washington. Something that the community can agree to - yes, we can live with this settlement. That's where I'm really at. We have unfinished business. I'm really holding off on pushing forward on that. Our president is kind of scary right now.

We are not happy with the outcome of it, not happy to have the monofills left there – we asked for them to be categorized and removed. We don't know what more is in the monofills. There is so much more in there. Overall, the community was really not happy with the – it was an uphill battle, uphill fight right from the beginning. We were not happy with the certificate of appreciation – that itself should have been done more officially – state of the Union address. Some how that the world would know the sacrifice that we provided to our nation. It was enormous. Our geographic position we are in – right next door to Russia could have been taken in an instant.

Disgruntled is a word that could be used. We are not disgruntled with hatred – those are diseases that destroy humanity. We are still proud of the sacrifice that we gave to our nation. But nevertheless, once they put the satellites and no longer needed land-based radar systems and antennas – they just closed down shop, turned their back on us, and up and left. All of those years we had no choice but to eat off the garbage that was being dumped on the site. We do know that cooks and personell had pity for us because they found new shirts with money in them, pants, whole cooked turkeys that were neatly wrapped up, bags of potatoes neatly bagged up. Somebody in the cooks or staff felt pity for us. The people were thankful. The adults would gather as much as they could and lay out as much as they could at the village. It was divided equally up to the households. Those are horrible memories that we have to live with.

2. From your perspective, what effects have site operations had on the surrounding community? Are you aware of any community concerns/complaints regarding site operations, administration, implementation, or overall protectiveness of the remedies in the Decision Documents?

This question was answered under question 1.

3. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please provide details.

They say that we can drink the Suqi. We still carry water and the USACE told us not to disturb the bottom – that is where all of the heavy metals are at. They've basically torn down the whole base. There are still 3 houses that are used seasonally by Eugene Toolie, Raymond Toolie. 3 or 4 houses that remained because they are still being used. We were told by Dr. Ron that if we picked salmon berries or greens over there, then have them washed thoroughly. After the cleanup was done, disturbance of dust had settled on the greens and berries. He would not pick and eat them himself. Washing them would reduce the PCBs by at least 30 percent. He was surprised in some cases by 50 percent. He would not eat them now because they are in the tissues still. Very powerful, painful experience. We feel like we were used, abused, and turned our backs on and walked away from us without so much as saying thank you for all of the sacrifice you have done for our nation.

4. Do you feel well informed about the site's activities and progress? Have there been communications or activities regarding the site?

Not really. The best ones that gave us the best information – all of the things we would not have known – top, lead toxicologists that have done many sites around the world - Dr. Ron and ACAT. Without them, we would not have known what kind of toxic chemicals we were exposed to.

Three different studies were done on the blood for PCBs – all came up with the same numbers. PCB levels… at least 6-9x, some times up to 10x higher than national average. The national average is 0.01 ppb. We learned from the experts. The highest level was 0.02 in the national average. Our PCB levels were off the chart for Savoonga and Gambell. 7.50 on up to 9.50.

Commercial grade PCB levels are not as high as military grade PCB. PCB levels taken on our island were high grade, which identified them as military PCBs. We have been ravaged by cancer and it is still a crisis to us.

It would be very hard for the USACE to say that the contamination is not causing the still born babies, cancer rates, and other issues.

5. Do you have any suggestions regarding future operation, maintenance, and monitoring at the site?

I think it's really difficult to answer with the climate change right now because the monofills they did – they just capped them with gravel. The monofills are not to be used for building structures or doing anything with it period. The one thing that scares me a lot is what toxic chemicals are in those monofills. With the permafrost melting at an unprecedent rate – with sewage and water systems sinking – that's a scary thought to the monofills. Eventually, with the way things are going now, we believe they will start leaching out into the ocean and into the beaches. Those are scary thoughts to us.

6. Have any problems been encountered which required, or will require, changes to the remedy or Decision Document?

This question was answered under question 1.

7. Are you aware of any changes in land use, access, or other site conditions that have occurred in the past five years that you feel may impact the protectiveness of the site?

The interest in re-establishing in the community is because if you look at the map – we are running out of space. If we start building more houses east of us, it will cost us lots. The airport is the biggest obstacle in our way. We are running out of space for building houses. Our population is growing. That is why there is interest in re-establishing the NE Cape site – which was very beautiful in it's pristine condition. It was so beautiful over there. That is one of the motivators for the tribal members. We do not believe that the site was cleaned up to residential standards. They had spills of over 230,000 gallons of diesel. It still seeps out. We still can smell it. Unrecorded spills is a big question mark. Apparently there was a pumphouse from the beach to the base – they had diesel pipes somewhere under the ground going up to the base. Eugene Toolie was a long time employee of the base... They had filled up a several thousand tank with diesel. The tanker – Mona Lisa – did not fully deliver the load and knew that there was a break somewhere. They found a pipe that was pulled apart – about a foot apart. Thousands and thousands of gallons spilled and seeped into the ground.

8. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

This question was answered under question 1.

Interview Record—Second Five-Year Review

Name: Vi Waghiyi and Pamela Miller	Date: 12/21/18
Organization: ACAT	Phone Number: 222-7714
Title:	Email: vi@akaction.org; pamela@akaction.org
Interview Type: x Mail/Email	☐ Phone/In Person
Site Name: Northeast Cape, St. Lawrence Island	

The following interview questions are based on EPA guidance (EPA 540-R-01-007). Questions may be left unanswered if they do not apply to you.

Interview Questions

1. **What is your overall impression of the project (general sentiment)?**

Vi: Sites were prematurely closed without the consent of the tribes and they were not part of the Record of Decision. Everything before and after the NEC ROD happened without government-government consultation with our tribes. Our tribal governments and people do not approve the minimal site characterization and remediation—it is not protective of our Sivuqaq Yupik peoples' health and well-being. A new ROD must be implemented with the full participation and consultation with our tribal governments.

Pam: The full nature and extent of contamination has not been fully investigated, so the remediation is incomplete. Source areas of contamination, including the main complex and uncontrolled landfills, have not been fully characterized or removed and these continue to contaminate the Suqi River. The contaminants at NEC pose a significant source of pollution to traditional subsistence foods, water supplies, and medicinal plants. Recent studies by our community-based research team show that fish (stickleback and blackfish) continue to have elevated levels of PCBs. Also, these sentinel fish in the Suqi River show estrogenic effects, thyroid disruption, and altered gene expression linked with exposure to PCBs. Fish and humans share the same hormone systems and most of the genes underlying diseases in humans are the same genes underlying those diseases in fish. Estrogenic effects are associated with abnormal development and certain cancers. Altered gene expression results are also consistent with higher cancer risk. Contamination continues to affect water sources, traditional medicinal and food plants, fish, and wildlife, as well as the health of the people.

2. **From your perspective, what effects have site operations had on the surrounding community? Are you aware of any community concerns/complaints regarding site operations, administration, implementation, or overall protectiveness of the remedies in the Decision Documents?**

Vi: Native Village of NE Cape residents are now displaced due to the military toxic contamination from the abandoned FUD sites at NE Cape. This contamination is causing health disparities associated with PCBs and other chemical exposures including cancers, heart disease, strokes, reproductive health harms, birth defects, learning disabilities, diabetes and thyroid disease. Army Corps has been patronizing, not transparent or inclusive. The Corps did not fulfill their government to government obligation. Remediation may have made the sites more toxic by mobilizing contaminants. Many sites at NE Cape remain highly toxic and will continue to harm future generations.

Pam: Yes. There have been extensive complaints that the concerns and knowledge of community members have not been taken into account in the decisions about the remedial investigations, site characterization, or remedial actions. The remedies are not protective of human health and the environment.

3. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please provide details.

Pam: We are concerned that people are drinking water from the Suqi River and other sources at NE Cape—this is a health hazard. In addition, families who live and/or travel through NE Cape may be exposed to hazardous chemicals though inhalation, ingestion, and consumption of traditional foods.

4. Do you feel well informed about the site's activities and progress? Have there been communications or activities regarding the site?

Vi: We are well informed ourselves that the site characterization and remediation have failed. Local voices and knowledge have not been heard or taken into account. As stated above, the omission of the tribes from the ROD warrants inclusion of the tribes in any decisions concerning site remediation, acknowledging and using local knowledge and community-based participatory research data to drive adequate site characterization and remediation. A new inclusive decision-making process and ROD with the tribes must take place.

5. Do you have any suggestions regarding future operation, maintenance, and monitoring at the site?

Vi: see answer to #4.

Pam: warning signs in Yupik (St. Lawrence Island Yupik created by local translators) and English should be placed to prevent consumption of water and/or fish from the Suqi and Tapi Rivers. Additional warning signs should be placed to prevent the gathering of plants and berries in and around NE Cape because of possible contamination.

An extensive ground- and surface water monitoring program should be implemented with monitoring well placement advised by the tribes and knowledgeable local community members. Leachate from the landfills and drainage downstream from the main complex should be monitored over the long-term, including water sampling as well as integrative sampling technologies such as SPMDs, sediment cores, and biological monitoring. A regular and comprehensive monitoring plan must be independently conducted using a community-based participatory research model that includes the people of SLI in the design, implementation, and interpretation of results. In addition to integrated analysis of surface and groundwater (use of SPMDs), and sediments, biological monitoring should include plants/berries, sentinel and edible species of fish, and marine mammals.

Remediation is not complete. Additional remedies should be implemented including source removal and well-planned and executed remedial technologies that such as in situ peroxidative and biological remediation. The Corps really botched the chemical oxidation project, then concluded it wouldn't work. Proper regulatory oversight and enforcement has been lacking. There should be provisions for: 1) use of innovative clean-up technologies relevant to the Arctic; 2) accountability to the leadership of the communities of Savoonga and Gambell, government-to-government consultation with Tribes, and citizen participation in remedial decisions. Tribes, as sovereign governments, must have the right to determine clean-up standards and serve as official parties to the Records of Decision. There is a long way to go to achieve restoration and removal of the contamination. The premature closures, partial excavations, natural attenuation, and/or land use controls are completely inadequate.

Matters of primary urgency for attention and action include:

- Complete removal of the solid and hazardous waste materials at the Northeast Cape Site 7 and other landfills;

- Removal and treatment of the White Alice site soils and groundwater to effectively remove associated contaminants;

- Removal/remediation of contaminants in source areas that remain within the Northeast Cape Main Complex soils and groundwater, as well as on-going monitoring to ensure safe drinking water supplies;

- Effective remediation and long-term monitoring of the Suqi River drainage basin sediments and surface water (fuels and PCB contamination);

- Complete removal or destruction of the contaminants identified at the former village site at Northeast Cape. Adequate funding for NALEMP program at Native Village of Northeast Cape, including provisions to adequately support and build capacity with training and jobs for the Native Village of Savoonga;

- Review of the failure of the chemical oxidation project and attention to the problems/solutions identified by RAB technical advisor Dr. Ron Scrudato;

- Restoration of the Suqi River watershed and shallow groundwater resources within the area of the Main Complex and up-gradient regions of the Main Complex to ensure adequate and safe drinking water at Northeast Cape;

- Tracking and analysis of materials salvaged from NE Cape that have been used by families for construction of homes and camps. These present a likely exposure pathway for such contaminants as PCBs, lead, asbestos, and others.

6. Have any problems been encountered which required, or will require, changes to the remedy or Decision Document?

Vi: There has been no real inclusion of the community or tribes in the decision making. No government to government consultation. As stated above, a new process and ROD is needed with tribes' full participation in the decision documents.

Pam: see answer to #6

7. Are you aware of any changes in land use, access, or other site conditions that have occurred in the past five years that you feel may impact the protectiveness of the site?

Vi: We know that the watershed of the nearby Tapissak ("Tapi") River is also contaminated and that area has not been investigated or characterized. Our research shows elevated levels of PCBs.

Pam: The Corps has not assessed the effects of climate warming on the mobilization of contaminants that have been sequestered in landfills and within permafrost. Erosion and permafrost melting will likely increase the mobilization and bioavailability of contaminants at NE Cape, thus increasing hazards to the health of fish, wildlife, and people.

8. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Vi: The Corps needs to take the tribes' direction in the characterization, remediation, long-term monitoring to ensure that actions are protective of the health of humans, fish and wildlife.

Pam: A regular and comprehensive monitoring plan must be independently conducted using a community-based participatory research model that includes the people of SLI in the design, implementation, and interpretation of results. This should include integrated analysis of surface and groundwater (use of SPMDs), sediments, plants/berries, sentinel and edible species of fish, and marine mammals.

Interview Record

Name: June Walunga	Date: 01/29/2018
Organization: Kawerak Inc.	Phone Number:
Title:	Email: jwalunga@gci.net
Interview Type: X Mail/Email	Phone/In Person
Site Name: Northeast Cape, St. Lawrence Island	

The following interview questions are based on EPA guidance (EPA 540-R-01-007). Questions may be left unanswered if they do not apply to you.

Interview Questions

1. What is your overall impression of the project (general sentiment)?

   There should have been more done; i.e. barging debris out instead of using monofill.

2. From your perspective, what effects have site operations had on the surrounding community? Are you aware of any community concerns/complaints regarding site operations, administration, implementation, or overall protectiveness of the remedies in the Decision Documents? The site needs to be completely contaminant and debris free so people of Gambell and Savoonga can start using the land for hunting and fishing and start a new community there. There is fear of contaminants and lack of trust from both communities due to high rate of cancer. Pressing fact now is to finish cleaning the site.

3. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please provide details.

None

4. Do you feel well informed about the site's activities and progress? Have there been communications or activities regarding the site? No.

From the very beginning, there should have been open communication between the two tribes and EPA, DEC ACE, etc. To this day, we have not seen anything on paper and no information adequately provided to the tribal leaders. What is expected of us?

5. Do you have any suggestions regarding future operation, maintenance, and monitoring at the site?

Local knowledge should have been used; more input from Gambell & Savoonga communities. There are people who knows about the oil spills. Local monitors, at least two, one from each community, should be in place.

6. Have any problems been encountered which required, or will require, changes to the remedy or Decision Document?

yes, there is still contaminants persistant to the site and surrounding areas where contaminants are known to exist.

7. Are you aware of any changes in land use, access, or other site conditions that have occurred in the past five years that you feel may impact the protectiveness of the site?

Settling is occurring at the existing landfill and buried debris is being exposed.
We are hoping the reindeer grazing does not happen in the area or to the small lakes that still shows contamination.

8. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Re-evaluate the whole site and clean again where there are still contaminants. Re-evaluate again in few years. Keep re-assessing every four years.

Public Notices

Publisher's Affidavit

UNITED STATES OF AMERICA,
State Of Alaska
Second Division
} SS:

Nils Hahn, being first duly sworn on oath deposes and says:

That I am and was at all times herein this affidavit mentioned, Ad manager of THE NOME NUGGET, a newspaper of general circulation and published weekly at Nome, Second Division, State of Alaska, and online that the US Army Corps of Engineers announces Start of Five-Year Review a printed copy of which is hereto annexed, was published in said paper once and every week for one successive and consecutive weeks in the issues of the following dates:

3.29.2018

SUBSCRIBED and SWORN to before me this 29 day of March, 20 18

State of Alaska
NOTARY PUBLIC
Diana Haecker
My Commission Expires Oct. 1, 2020

NOTARY PUBLIC in and for the State of Alaska.

My commission expires Oct 1. 2020

US Army Corps of Engineers Announces Start of Five-Year Review

The Unites States Army Corps of Engineers at Joint Base Elmendorf-Richardson (JBER) announces the beginning of the Five-Year Review of cleanup remedies being implemented at the Northeast Cape Formerly Used Defense Site located on St. Lawrence Island, Alaska.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 121, and the National Contingency Plan require that remedial actions which result in any hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure be subject to a five-year review.

The purpose of the Five-Year Review is to evaluate whether the remedies selected to clean up contaminated sites are operating as designed and remain protective of human health and the environment.

The community is encouraged to participate in the review process. A public meeting to review the five-year review process will be held at the Savoonga City Hall on 11 April 2018 at 2:00 pm.

Detailed information concerning the Northeast Cape cleanup effort is available at the following information repositories:

Alaska Resources Library & Information Services,
University of Alaska, Anchorage
3211 Providence Drive
(907) 786-1871

Savoonga City Hall
(907) 984-6614

Gambell Sivuqaq Lodge
(907) 985-5335

The findings of the Five-Year Review will be available after February 2020.

Interested persons can participate in the Five-Year Review process through August 2018 by responding to a questionnaire available from:

Kevin Maher, Jacobs Engineering
949 E 36th, Suite 500
Anchorage, AK 99508
kevin.maher@jacobs.com (907) 762-1500

Information on the cleanup process is shared with interested persons through periodic Northeast Cape public meetings held in Savoonga, Alaska. If you would like to be added to the contact list, then please contact USACE Public Affairs at (907) 753-2615 or POA-FUDS@usace.army.mil

ADDITIONAL INFORMATION

Documents pertaining to Northeast Cape background information and the decision documents for Northeast Cape are on file at the following Information Repository locations:

Alaska Resources Library and Information Services, University of Alaska, Anchorage 3211 Providence Drive (907) 786-1871	Savoonga City Hall (907) 984-6614	Gambell Sivuqaq Lodge (907) 985-5335

Information on the cleanup process is shared with interested persons through periodic Northeast Cape public meetings held in Savoonga, Alaska. If you would like to be added to the contact list, please contact USACE Public Affairs at (907) 753-2615 or POA-FUDS@usace.army.mil

US ARMY CORPS OF ENGINEERS
Alaska District
P.O. Box 6898 (CEPOA-PM-ESP)
JBER, AK 99506-0898

OFFICIAL BUSINESS

DELIVER TO:

FIVE-YEAR REVIEW
NORTHEAST CAPE FORMERLY USED DEFENSE SITE
ST. LAWRENCE ISLAND, ALASKA

March 2018

FIVE-YEAR REVIEW

The United States Army Corps of Engineers (USACE) at Joint Base Elmendorf Richardson is conducting a Five-Year Review of remedial actions implemented at the Northeast Cape Formerly Used Defense Site located on St. Lawrence Island, Alaska.

The Five-Year Review is a detailed evaluation of the implementation and performance of the selected remedy (i.e., the environmental cleanup work). The objective of the evaluation is to document if cleanup activities (or "remedies") are protecting people and the environment from contamination. If the remedies are not protective, the Five-Year Review makes recommendations to improve protectiveness. Federal regulations require this type of evaluation, and the Alaska Department of Environmental Conservation (ADEC) will review the process to ensure completeness and accuracy. This will be the second five-year review for Northeast Cape.

SITES INCLUDED IN THE FIVE-YEAR REVIEW

Based on the signed decision document, remedial actions were selected for various sites to address surface soil, subsurface soil, groundwater, and sediment, contaminated with polychlorinated biphenyls (PCB), diesel-range organics (DRO), residual-range organics (RRO), arsenic, benzene, and naphthalene. These actions include.

Site Number and Name		Action
Site 1	Air Strip	EX/D
Site 3	Fuel Pumphouse	EX/D
Site 6	Gravel Pad	EX/D
Site 7	Cargo Beach Road Landfill	C/LUC
Site 8	Petroleum, Oil, and Lubricant Spill	MNA/LUC
Site 9	Housing and Operations Landfill	C/LUC
Site 10	Buried Drums	EX/D and MNA/LUC[1]
Site 11	Fuel Tanks	EX/D and MNA/LUC[1]
Site 13	Heat and Power Plant	EX/D and MNA/LUC[1]

Site Number and Name		Action
Site 15	Fuel Pipeline	EX/D and MNA/LUC[1]
Site 16	Paint and Dope Storage	EX/D
Site 19	Auto Maintenance	EX/D and MNA/LUC[1]
Site 21	Wastewater Tank	EX/D
Site 27	Diesel Fuel Pump	EX/D and MNA/LUC[1]
Site 28	Drainage Basin	EX/D
Site 29	Suqitughneq River	Incidental Debris Removal
Site 31	White Alice Communications	EX/D
Site 32	Lower Tramway	EX/D

Notes:
EX/D – Excavation with disposal or treatment
MNA/LUC – Monitored natural attenuation with land use controls
C/LUC – Capping with land use controls
[1]Although chemical oxidation was identified as the primary remedy in the decision document, it was not implemented. The decision document contingency remedy, excavation of soil and monitored natural attenuation of groundwater, will be implemented.

COMMUNITY INVOLVEMENT

The community is encouraged to participate in the review process. A public meeting to review the five-year review process will be held at the Savoonga City Hall on 11 April 2018 at 2:00 pm. For those in other locations, please join us via teleconference using the toll free call-in number:

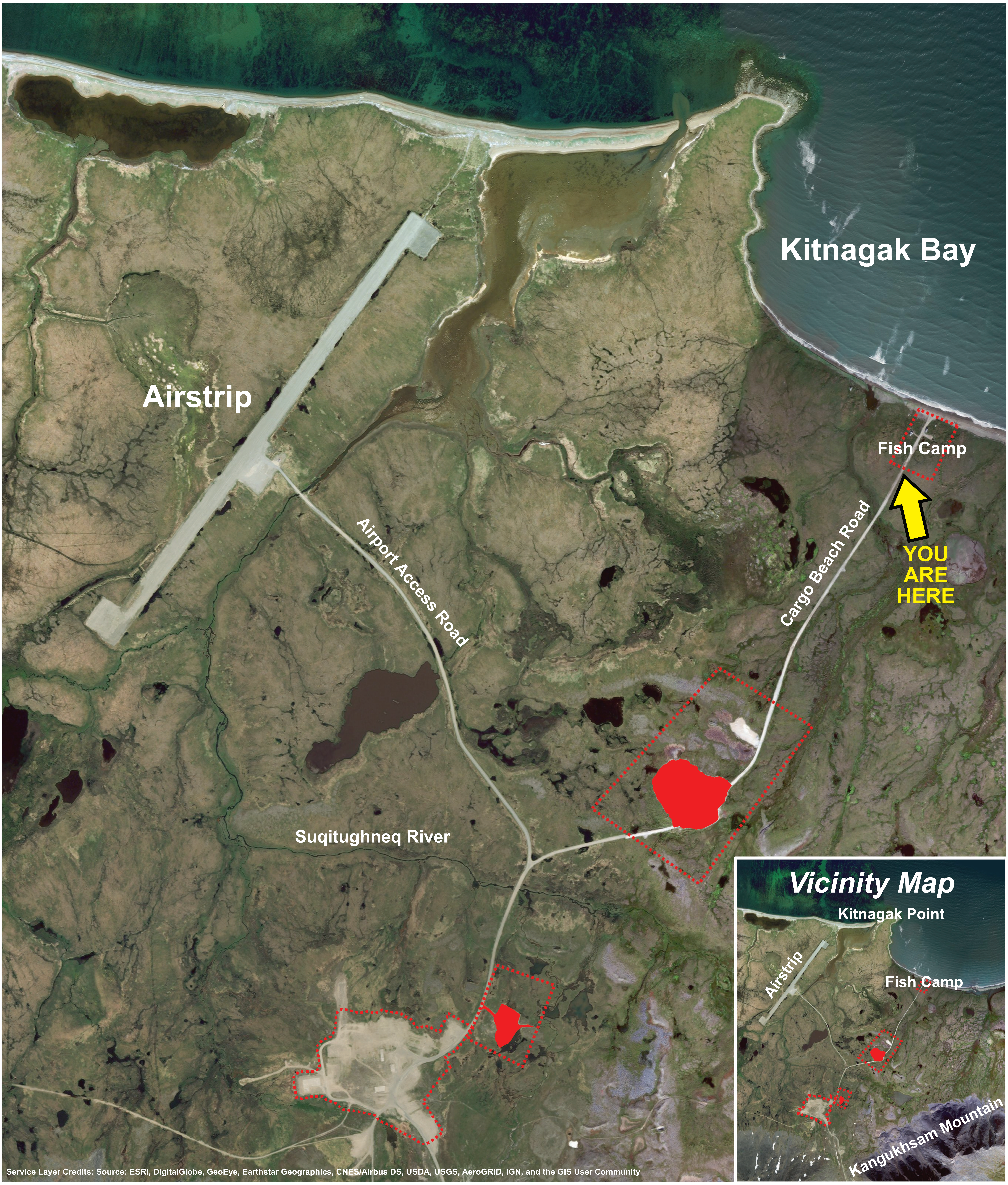
Toll Free Call-in Number: 1-855-209-1113
Access Code: 9077513429

Public comments may be provided immediately following a public meeting in Savoonga, or by responding to a written questionnaire through August 2018. The questionnaire can be requested from and comments submitted to:

Kevin Maher, Jacobs Engineering Group Inc.
949 E. 36th Ave Suite 500
Anchorage, AK 99508
kevin.maher@jacobs.com (907) 762-1500

U.S. Army Corps of Engineers
Northeast Cape Formerly Used Defense Site
Land Use Controls Map

U.S. ARMY CORPS OF ENGINEERS - ALASKA DISTRICT PUBLIC AFFAIRS OFFICE
907-753-2522, P.O. Box 6898, Joint Base Elmendorf-Richardson, AK 99506-0898



Legend

- Groundwater Use for Drinking Water Not Recommended
- Ground Disturbing Activities (Construction, Excavation, or Debris Removal) Not Recommended

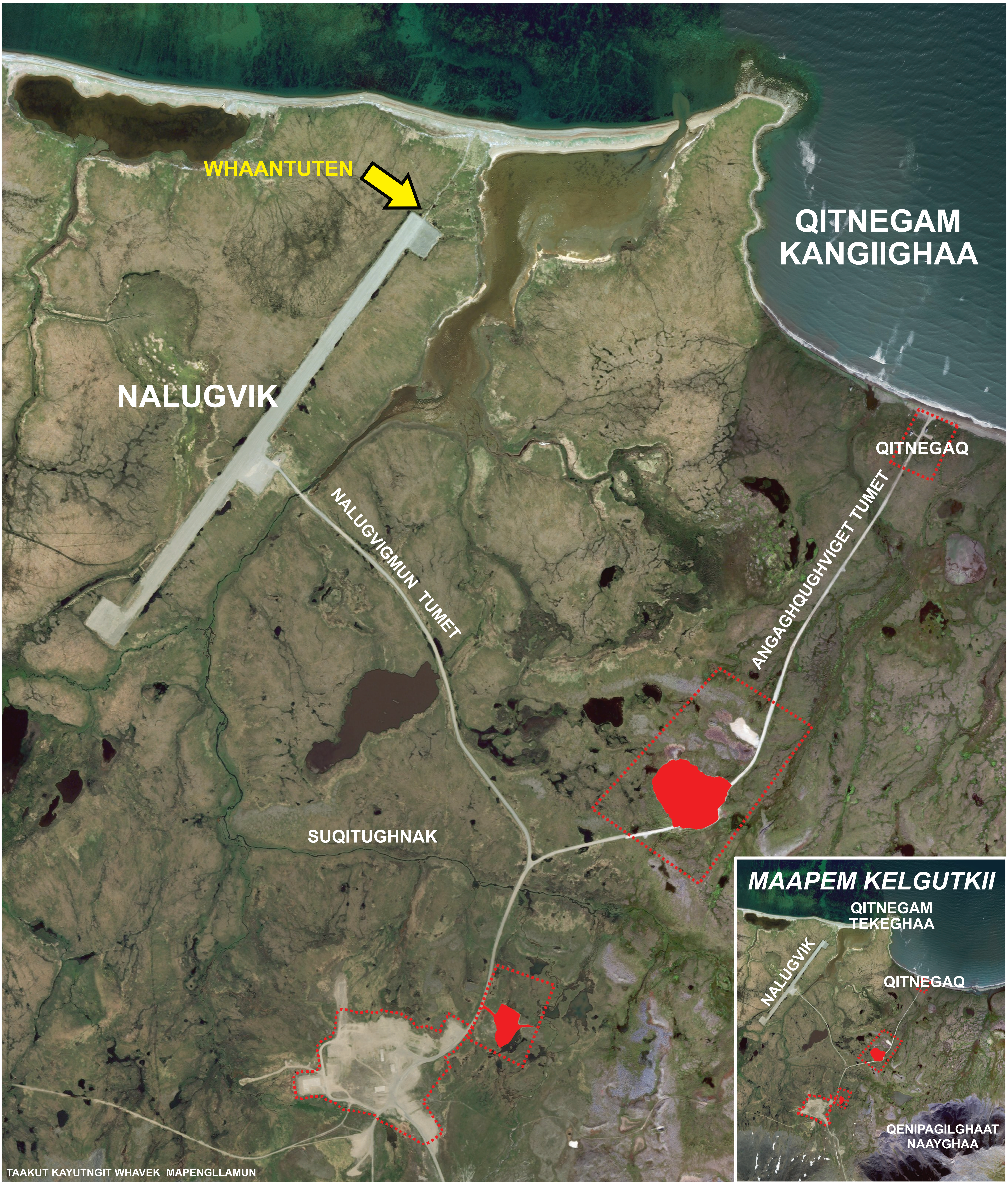
N

US ARMI KURET ENGINEER-NGIT

QITNEGAMELNGUQ NEKSAQANGA KELENGASIQ

KELGUTELGHET NATEN NUNA ATUQELEGHQAAQ

US ARMI KURET ENGINEER-NGIT - ALASKA DISTRICT PUBLIC AFFAIRS OFFICE
907-753-2522, P.O. Box 6898, Joint Base Elmendorf-Richardson, AK 99506-0898



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AYWAA

APPENDIX H

Response to Comments

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Environmental Conservation
DIVISION OF SPILL PREVENTION AND RESPONSE
Contaminated Sites Program
555 Cordova Street
Anchorage, Alaska 99501
Main: 907-269-7528
Fax: 907-269-7687

ADEC File Number: 475.38.013

February 14, 2020

US Army Corps of Engineers USACE, AK District
Attention: Ms. Andrea Elconin
CEPOA-PM-ESP
P.O. Box 6898
JBER, AK 99506-0898

Re: **1) ADEC's Post-resolution Review of RTCs on the Draft 2019 NEC Second CERCLA FYR Report for Sites 21 and 28**
2) ADEC's Non-Concurrence with USACE's non-POL (Petroleum, Oil, Lubricants) CERCLA Contaminant Determination at Site 28

Dear Ms. Elconin:

This letter serves as Alaska Department of Environmental Conservation's Contaminated Sites Program (ADEC) formal notification to the Army Corps of Engineers' Formerly Used Defense Site Program (USACE) that ADEC does not concur with USACE's determinations with regard to CERCLA contamination issues associated with Site 28 at Northeast Cape that are discussed further in the following paragraphs.

Thank you for providing ADEC with responses to comments (RTCs) on the Draft 2019 Northeast Cape (NEC) Second CERCLA Five-year Review (FYR) Report for Sites 21 and 28; which is dated October 15, 2019 and was received by ADEC electronically from USACE on October 24, 2019. ADEC had previously completed its review of the document and electronically transmitted its review comments via email to USACE on December 13, 2019. Thank you for providing the first round of RTCs which were received electronically by ADEC from USACE on January 21, 2020. ADEC completed review of the RTCs and submitted RTC review determinations electronically in the template to USACE on February 5, 2020. ADEC and USACE participated in a comment resolution meeting on February 11 and USACE provided additional responses to ADEC based upon those discussions that were received electronically by ADEC on February 13, 2020. ADEC completed its second round of RTC review and is providing its final review determinations as notated in the template which is attached with this letter for USACE's records.

Also attached with this letter please find a copy of ADEC's email to USACE dated February 12, 2020; this email was intended to provide USACE with a preliminary summary of ADEC's position that it does not concur with USACE's following determinations that 1) non-POL CERCLA contamination is no longer present at Site 28, and 2) that the subject 'no remaining non-POL CERCLA contamination' determination warrants discontinuing FYRs and transitioning to Periodic Reviews as a result of only POL contamination remaining at Site 28.

The basis for ADEC's position of non-concurrence are based upon the following determinations: 1) soil and groundwater across all areas of Site 28 have not been entirely/adequately characterized to date in order to definitively determine whether or not non-POL CERCLA contamination remains at Site 28, and 2) the presentation of information in prior documents as well as the current FYR lacks the continuity and supporting information that would be necessary in order to definitively demonstrate that the media of concern with regard to non-POL CERCLA contaminants is limited to sediment at Site 28, and 3) that prior investigation results have definitively determined that non-POL CERCLA contaminants were not present in soil and/or groundwater at Site 28.

ADEC respectfully requests USACE include this letter, along with copies of the email and template which are attached with this letter in the final version of the FYR document. ADEC will provide USACE with a separate follow on letter once the final version of the subject five-year review report is received.

Please contact me at curtis.dunkin@alaska.gov or at (907)269-3053 if you have any questions regarding ADEC's comments, the enclosed attachments, and/or this letter.

Sincerely,

Curtis Dunkin
Environmental Program Specialist

Enclosures: 1) ADEC Comment Template Dated February 14, 2020
2) ADEC Email to USACE Dated February 12, 2020

cc: 1) Melinda Brunner – ADEC (via email)
2) Jennifer Currie – ALAW (via email)
3) Kenneth Andraschko – USACE (via email)
4) Robert Glascott – USACE (via email)
5) Haley Huff – Jacobs Engineering (via email)

Alaska Department of Environmental Conservation (ADEC)
Contaminated Sites Program
Document Reviewed: Draft October 2019 Northeast Cape Sites 21 and 28 Second Five-year Review and Site Assessment Reports
Commenters: Curtis Dunkin-ADEC Project Manager
Date Submitted: December 13, 2019; **ADEC Received RTCs on January 21, 2020 and Submitted Review Determinations on February 5, 2020**
Comment Resolution meeting held February 11, 2020; USACE submitted responses on February 13, 2020
ADEC Completed and Submitted Final Post-resolution RTC Reviews on February 14, 2020
USACE final responses February 19, 2020

#	Page #	Section	ADEC Comment	Response
1.	1	1.0	The discussion in the fourth paragraph that specifies this FYR to only pertain to Sites 21 and 28, and why, should be relocated and emphasized in the first paragraph of this section.	Clarification. Although it does make sense to specify the sites the FYR covers in the first paragraph, USACE is mandated to follow EPA's FYR template, and the template specifies the FYR sites in the 4th paragraph. **ADEC-Noted February 5, 2020**
			Further discussion should be added to briefly summarize the POL sites as well as sites which are managed under Periodic Reviews, LTM, future UECA and LUCs, etc. vs. those that are only addressed under CERCLA as well as the subject FYR document (or mention and reference the more detailed section later in the document).	Partially Accepted. The main body of this document was organized to be consistent with the streamlined EPA FYR guidance and therefore, intentionally eliminated discussion of non-CERCLA petroleum sites. **ADEC-Noted February 5, 2020** The following sentence will be added to the paragraph beginning with "The other NEC FUDS….": "For more information regarding NEC FUDS sites not addressed in this FYR, refer to Appendix C, "Site Chronology". **ADEC-Accepted February 5, 2020**
			Please revise the last sentence on this page, and also revise other similar statements throughout the document wherever applicable, in order to always specify e.g. 'who made the recommendation', the status of the recommendation and or proposed action, whether or not it was approved, the associated dates, etc.	Accepted. The last sentence will be revised as follows: "…recommended for No Further Action by USACE in the first FYR (USACE 2015b). **ADEC-Accepted February 5, 2020**

#	Page #	Section	ADEC Comment	Response
2.	2	1.0	Please revise the first sentence of the first paragraph on this page since its present wording does not make grammatical sense.	Accepted. The sentence will be revised to state: "Site 3, Site 6, Site 7, Site 8, Site 9, Site 10, Site 11, Site 13, Site 15, Site 16, Site 19, Site 27, and Site 32 are not addressed in this FYR because of the CERCLA petroleum exclusion; however, separate Periodic Review report(s) will be prepared for these sites because petroleum contamination remains above cleanup levels." **ADEC-Accepted February 5, 2020**
			Additionally, the information discussed in the first paragraph on this page needs to be better correlated with the discussion related to the comment above associated with the fourth paragraph.	Clarification. This paragraph is a follow-on to the last paragraph on page 1, and in alignment with EPA's template. **ADEC-Noted February 5, 2020**
3.	5	II.	<u>Basis for Taking Action</u>: ADEC records of post-DD soil analysis results indicate that numerous elevated concentrations of arsenic were observed during removal actions that were higher than the stated 170 mg/kg, notably as high as 340 mg/kg arsenic in soil; please clarify/emphasize this better in this statement and elsewhere throughout the document where non- vs. anthropogenic arsenic sources are mentioned and/or discussed.	Clarification. Section II discusses the basis for taking action at Site 21. At the time of the 2009 DD, arsenic at 170 mg/kg was the maximum detected concentration of arsenic in soil at Site 21. Arsenic in soil greater than 170 mg/kg has been found during investigations after the 2009 DD; however, these higher concentrations of arsenic discovered after the 2009 DD did not prompt the remedial action at Site 21. **ADEC-Noted February 5, 2020** Arsenic concentrations up to 340 mg/kg will be presented in Appendix C Section 3.1.1 and state: "Thirteen of the 19 soil borings contained arsenic at concentrations exceeding SSCLs up to 340 mg/kg (USACE 2015a)." **ADEC-Accepted February 5, 2020**
			<u>Table 1</u>: Please add table notes to specify what is defined as surface vs. subsurface soil and clarify throughout the	Accepted.

#	Page #	Section	ADEC Comment	Response
			document the site-specific applications at both sites 21 and 28.	The following notes defining surface soil depth and subsurface soil depth will be added to Table 1: "[1]Surface soils considered 0 to 2 feet depth (USACE 2009). [2]Subsurface soils considered > 2 feet depth (USACE 2009)." **ADEC-Accepted February 5, 2020**
			Please clarify whether decisions re: removal actions were made with respect to the water table and/or encountering surface water that resulted in arsenic being left in place above the respective applicable cleanup level and/or whether and how confirmation sampling was conducted.	Accepted. The following text will be added to the paragraph in the Status of Implementation Section to state: "One soil boring sample (13NC21SS17-0.5) containing arsenic at 14 mg/kg, collected outside the extent of any excavation, was not removed due to active surface water flow (USACE 2016) and one excavation sidewall sample containing arsenic at 13 mg/kg was left in place (USACE 2015a). Although the sample exceeded the site-specific cleanup level of 11 mg/kg, it was below the targeted removal concentration of 17 mg/kg." **ADEC-Accepted February 5, 2020**
			<u>Response Actions</u>: Please revise the statement that 'no site-specific RAOs were developed for Site 21' to clarify that the site wide soil cleanup levels established in the 2009 DD were determined to be appropriate and protective at Site 21; and for that reason no additional site-specific cleanup levels were considered or applied.	Accepted. The text will be revised to state: "…multi-site DD (USACE 2009). Sitewide RAOs were applied to Site 21 because the sitewide soil cleanup levels established in the multi-site DD were determined to be appropriate and protective at Site 21". **ADEC-Accepted February 5, 2020** Section II Basis for Taking Action and Response Actions present the DD identified COCs and media for Site 21. **ADEC-Accepted February 5, 2020**
			Please also specify how the sitewide cleanup levels applied at site 21 are different than the site-specific cleanup levels for arsenic at Site 28.	Clarification. Site-specific cleanup levels for Site 21 and Site 28 were not specified in the multi-site DD. Rather,

#	Page #	Section	ADEC Comment	Response
				general sitewide soil cleanup levels that were developed based on the Human Health Risk Assessment were applied to Site 21 and were protective of future residential land use. Sitewide cleanup levels for sediment at Site 28 were specified in the multi-site DD. Sediment cleanup levels are protective of future human and ecological receptors. **ADEC-Accepted February 5, 2020** The following text will be added to the second paragraph in Section II to state: "Sitewide cleanup levels for PCBs and arsenic in soil were applied to Site 21." **ADEC-Accepted February 5, 2020**
			Please clarify what is meant by '(ARARs) (PCBs)' in the first bullet of this section (is this a typo?).	Accepted. The typo will be fixed. The bullet will be revised to state: "…appropriate requirements (ARARs) for PCBs or pertinent…" **ADEC-Accepted February 5, 2020**
4.	6	II.	<u>Response Actions</u>: Please amend prior discussions in the beginning of the document as well as in association with applicable statements and references throughout the document to clarify the multi-site DD vs. the standalone DD for Site 7.	Accepted. The terms "multi-site" or "Site 7" will precede mention of the applicable DDs. **ADEC-Accepted February 5, 2020**
			Expand the discussion in the last paragraph of this section following Table 2 to identify the current and future actions that should be considered in order to update site documentation including e.g. amendment(s) to the Decision Document, Memorandum for Record, etc. associated with confirmed changes to site conditions and site management needs.	Accepted. The following sentence will be added to the last paragraph of "Response Actions": It is recommended an explanation of significant differences be prepared to clarify groundwater LUCs are not needed at Site 21. **ADEC-Accepted February 5, 2020**

#	Page #	Section	ADEC Comment	Response
			Please amend the last paragraph in this section in order to clarify that a portion of Site 21 (e.g. wastewater tank and PCB-contaminated soil area) is located further upgradient and potentially in hydrological communication with the contaminated groundwater associated the MOC versus the groundwater and hydrologically connected surface water that is located near the areas where the greater extents of arsenic-contaminated soils were removed.	Partially Agree. The following text will be added to the Status of Implementation Section to state: "Groundwater associated with the MOC is separate and distinct from Site 21." **ADEC-Accepted February 5, 2020; recommend amending the proposed revision with e.g. '…distinct from groundwater associated with all Site 21 AOCs.'.** Accepted. The previously referenced text will be revised to: "Groundwater associated with the MOC is separate and distinct from groundwater associated with all Site 21 AOCs." **ADEC-Accepted February 14, 2020**
5.	7.	II.	<u>Status of Implementation:</u> Please clarify what is meant by the statement 'remain in force'.	Accepted. The statement, "No elements of the selected remedy remain in force." will be removed. **ADEC-Accepted February 5, 2020**
			<u>Progress Since Last Review</u>: Table 3: Please add either a table note and/or expand the statement of the protectiveness determination in order to clarify the time gap between what is stated as the 'last determination' vs. the 'last FYR in 2014' vs. the determination that 'the remedy is expected to be protective'; noting that the removal actions had already been completed at the time of the last FYR.	Accepted. Removal actions at Site 21 had not been completed at the time of the last FYR. The last removal action discussed in the previous FYR occurred in 2013. The final removal action at Site 21 occurred in the summer of 2014. The review period for the previous FYR ended in May 2014, which was prior to September 2014 when final remedial action field work was completed at Site 21. **ADEC-Accepted February 5, 2020** The following statement will be added to the first paragraph in the section titled, "Progress Since the Last Review":

#	Page #	Section	ADEC Comment	Response
				Protectiveness statements, issues, and recommendations made in the previous FYR were based upon remedies applied prior to May 2014. **ADEC-Accepted February 5, 2020** Also, in Table 4, the first row for Current Implementation Status Description will be changed to read, "All locations along the utilidor route were removed by excavation." **ADEC-Accepted February 5, 2020**
6.	8.	II.	Progress Since Last Review: Table 4: Please similarly apply the clarification requested in the paragraph above re: Table 3 to statements in Table 4 and throughout the remainder of the document where applicable.	Accepted. Please see the response to comment 7. **ADEC-Accepted February 5, 2020**
			Please also add a reference and clarification to identify Site 7 in association with references to 'landfills' including Site 9. **New Comment February 5, 2020: All of the outstanding LUCs which are listed in Issues column are actually applicable to Site 28 and are also conditionally necessary in order for the remedy to be protective. Related to the original comment request and RTC on the right, this should be revised and table noted for clarification.** **ADEC-Partially Accepted February 14, 2020; noting that ADEC does not disagree with the RTC, as well as USACE's proposal to incorporate management of the southern boundary areas of Site 28 into the UECA for**	Disagree. The issues presented in Table 4 are the statements from the 2014 FYR and are accurate. As a result, this statement cannot be amended or revised. In addition, Site 7 is discussed under a separate cover. **ADEC-Not Accepted February 5, 2020; the first FYR document was for all of the sites except site 7 and actually included the review for Site 9 while this document only addresses Sites 21 and 28. Further, the statement as it currently reads 'landfills at Site 9' is erroneous since there is not more than one landfill at Site 9. ADEC's request to provide a table note and/or to edit the statement with a table note in order to clarify this is reasonable.** Accepted. The following table note will be added to Table 4:

#	Page #	Section	ADEC Comment	Response
			the MOC, however ADEC notes its non-concurrence with USACE's position that no CERCLA contamination remains at Site 28 (specifically but not limited to extents of CERCLA contamination in soil and groundwater); as will also be further discussed in ADEC's non-concurrence letter transmitted along with this template.	The issue presented in the 2014 FYR erroneously referenced "landfills" at Site 9. Only one landfill is present at Site 9. **ADEC-Accepted February 14, 2020** **Please see additional new comment on the left.** Accepted. The following table note will be added to Table 4: An informational LUC, in accordance with UECA, describing residual POL-related contamination in sediment within the Site 28 drainage basin is recommended to prohibit disturbance of Site 28 sediment. LUCs with regard to soil and groundwater POL-related contamination at the southern boundary of Site 28 and within the previously defined "UVOST plumes" are also recommended, however, these will be included within the Environmental Covenant for the MOC. **ADEC-Partially Accepted February 14, 2020; please see additional response on the left.** Upon further USACE review, the note referred to above will not be added because the issues/recommendations provided in this document pertain to CERCLA contamination only. The recommendation for an informational LUC for sediment at Site 28 will be documented in the Multiple Sites Periodic Review Report. In addition, the recommendation for LUCs with regard to soil and groundwater POL-related contamination at the southern boundary of Site 28 and within the previously defined "UVOST plumes" will also be

#	Page #	Section	ADEC Comment	Response
				documented in the Multiple Sites Periodic Review Report.
			In the last paragraph of this section, please reference and include an explanation of ADEC's recent technical memorandum on determinations associated with non-anthropogenic sources of arsenic; and also specify the determination that the elevated concentrations of arsenic at site 21 are the result of anthropogenic activities.	Clarification. Please note, the assessment in Appendix D concluded that arsenic concentrations remaining at Site 21 are naturally occurring and below the arsenic SSCL of 11 mg/kg. **ADEC-Accepted February 5, 2020** A reference to the ADEC Technical Memorandum "Guidance for Evaluating Metals at Contaminated Sites" (August 2018), explanation of non-anthropogenic sources of arsenic, and the lines of evidence approach for the remaining arsenic in soil concentrations used at Site 21 will be added. **ADEC-Accepted February 5, 2020**
			Note, this should also be referenced in the 'Other Findings' subsection of Section V on page 12; which should also state whether groundwater status was confirmed with discrete confirmation sampling and analysis.	The above response will also be referenced in Section V. **ADEC-Accepted February 5, 2020** Clarification. Arsenic in groundwater is not a concern. Only one 1994 groundwater result for total arsenic (at 0.072 mg/L) exceeded the cleanup level of 0.01 mg/L whereas no results for dissolved arsenic exceeded the cleanup level and arsenic was subsequently eliminated as a COC in groundwater (USACE 2009). **ADEC-Accepted February 5, 2020**
7.	11	IV.	Question B Summary: Please add a reference and clarification that surface water and groundwater were also investigated at Site 21 and were used as additional lines of evidence in making considerations and decisions associated with nature and extent determinations. Additionally please clarify the distance between the PCB- and arsenic-contaminated AOCs being discussed.	Accepted. The following will be added to the end of the first paragraph in Question B Summary to state: "The distance between the area of PCB excavation at Site 21 and the nearest area of arsenic excavation at Site 21 is approximately 500 feet. Arsenic in water is not a concern. Only one 1994 groundwater result for total arsenic (at 0.072 mg/L) exceeded the cleanup

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				level of 0.01 mg/L whereas no results for dissolved arsenic exceeded the cleanup level and arsenic was subsequently eliminated as a COC in groundwater (USACE 2009). Surface water samples collected in 2014 (where none of nine results for total or dissolved arsenic exceeded the cleanup level of 0.01 mg/L) demonstrated soil removal activities did not adversely impact surface water (USACE 2015a)." **ADEC-Accepted February 5, 2020**
8.	14	VIII.	Table 5: Please amend the title of the table and add table notes as needed to clarify that the stated cleanup levels are specific to sediment associated with Site 28 and not relevant or applicable to other AOCs or 'sitewide' at NECape	Clarification. No change will be made to Table 5. Section 2.10 of the multi-site DD does not present site-specific sediment cleanup levels for Site 28. Sediment cleanup levels presented in the multi-site DD are applicable to continuously submerged sediments including Site 29, Site 28, and Site 8. **ADEC-Accepted February 5, 2020**
9.	15	VIII.	Status of Implementation: The discussions re: contaminated sediment removal as well as statements that UU/UE has been achieved need to be revised and amended in order to be very clear that 1) only contaminated sediment located up to but no deeper than two-feet deep and was also otherwise determined to be practically accessible was removed,	Accepted. The first sentence in the Status of Implementation Section will be revised to state: "Excavation of contaminated sediment (suction dredging) to a depth of 1 to 2 feet began in 2012 and ended in 2013, which resulted in the excavation of 152 tons of sediment (USACE 2013b, 2015a)." **ADEC-Accepted February 5, 2020** Additionally, the first bullet in the description of the selected remedy for Site 28 in the Response Action will be revised to state: "… removal of near-surface sediments (to a depth of 6 to 12 inches) from the narrow channel…". **ADEC-Accepted February 5, 2020**

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			and 2) that sediment contaminated with both CERCLA- and POL-contaminants was left in place, and that contaminants still persist across the site in the tundra in both previously investigated as well as non-characterized areas. **ADEC-Not Accepted February 5, 2020; statements in the RTC as well as the document are out of context and only specifically address sediment that has been associated with prior sampling, analysis and/or removal activity at specific locations. The RTC as well as statements in the document do not address ADEC's comment that residual contamination (both CERCLA and non-CERCLA contaminants) in sediment, organic mat, and/or soil throughout the drainage are known to be present at concentrations that exceed respective applicable cleanup levels. Further, while sitewide sediment cleanup levels have been achieved at specific locations where removal actions have occurred, this is not applicable to residual contamination within the remainder of the drainage. Lastly, the subject sitewide sediment cleanup levels are site-specific risk-based ACLs, and it is not accurate or appropriate to state that these achieve UU/UE.**	Clarification. 2013 sediment removal confirmation sample results, and results from the 2018 sediment mapping and sampling effort indicated all CERCLA (non-POL) Site 28 COCs (PCBs, chromium, lead, and zinc) were below the sitewide sediment cleanup levels established in the multi-site DD, and thus achieved UU/UE relative to all non-POL CERCLA contaminants. Following sediment removal in 2013, POL-related Site 28 COCs (diesel-range organics [DRO], residual-range organics [RRO], and PAHs) remained at some locations above the sitewide sediment cleanup levels. **ADEC-Not Accepted February 5, 2020; please see additional response on the left.** Accepted. Please note the statement presented above will be revised to state: The 2013 sediment removal confirmation sample results and results from the 2018 sediment mapping and sampling effort indicated all non-POL CERCLA Site 28 COCs (PCBs, chromium, lead, and zinc) were below the sitewide sediment cleanup levels established in the multi-site DD, and thus achieved UU/UE relative to all non-POL CERCLA contaminants in sediment. Following sediment removal in 2013, POL-related Site 28 COCs (diesel-range organics [DRO], residual-range organics [RRO], and PAHs) remained at some locations above the sitewide sediment cleanup levels.

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				ADEC-Accepted February 14, 2020 Additional text will be added to Section VII, “Response Action Summary” for Site 28 – Drainage Basin and to Appendix C describing historical investigations of Site 28 that informed the CSM and the selection of the remedy in the 2009 DD. **ADEC-Accepted February 14, 2020** The following text will be added to the end of the first paragraph of Section VII to state: “The conceptual site model presented for the Site 28 Drainage Basin in the multi-site DD (USACE 2009) included an incised surface water channel with no evidence of overbank flow contaminating surface soil or the surrounding tundra. Results from surface soil samples collected during pre-decisional investigations performed in 1994, 1996, and 1998 supported this CSM (USACE 1999).” **ADEC-Accepted February 14, 2020** The following text will be added as a new subsection in Appendix C Section 3.2 and state: “Soil samples were collected in 1994, 1996, and 1998 from within the boundary of the Site 28 Drainage Basin. Concentrations of DRO and PCBs exceeded soil cleanup standards and reached as high as 83,000 mg/kg and 1.1 mg/kg, respectively (USACE 1999). However, these samples were collected adjacent to the MOC boundary at the upgradient extent of the drainage basin, are attributed to activities at the MOC, and were removed during soil excavation activities conducted at the MOC.” **ADEC-Accepted February 14, 2020** See response to comment 15, part 2.

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				ADEC-Partially/Accepted February 14, 2020; per further related responses.
			Further clarify that the statement(s) that UU/UE being achieved (as it is mentioned and referenced in this document), is accurate and limited to non-POL CERCLA COCs only and further is only applicable to that re-accumulated sediment that was sampled in 2018 –and not for the entire Site 28. **ADEC-Not Accepted February 5, 2020; ADEC's emphasis is that only 'accessible sediment' was removed, and further that primarily only those same 'accessible' locations were targeted and resampled in 2018. The boundary and AOC of what has been considered Site 28 is not limited to the 'accessible sediment' within the drainage, rather the extent of the release and/or impacted area(s) which has historically included the entire drainage and adjacent tundra that is located between the downgradient area of the MOC and the confluence with the Suqi River.**	Clarification. Based on 2013 sediment removal confirmation sample results, accessible accumulated sediment was removed, and results from the 2018 sediment sampling effort, which were indicative of re-accumulated sediment, non-POL CERCLA COCs are no longer present at Site 28 in exceedance of the multi-site DD cleanup levels. "non-POL" will be added prior to "CERCLA contaminants". **ADEC-Not Accepted February 5, 2020; please see additional responses to the left and in the above-left to the RTC immediately above.** Accepted. See response to comment 9, part 2 for a description of the conceptual site model of the Site 28 drainage and why sediment within the main drainage channel is the only media of concern at Site 28. Known non-CERCLA POL soil and groundwater contamination associated with the MOC on the southern end of the site are recommended for management under MOC Site 11. LUCs associated with this contamination are also recommended under the Environmental Covenant for the MOC. **ADEC-Partially Accepted February 14, 2020; per related additional response(s) above.** See response to comment 15 part 2 for a description of LUCs. **ADEC-Partially/Accepted February 14, 2020; per further related responses.** Please note that first bullet of the "Other Findings" in Section XI contains a recommendation to formally

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				document the contamination remaining at the southern end of Site 28 associated with MOC Site 11. **ADEC-Accepted February 14, 2020**
			The discussion in the second paragraph of this section (and elsewhere throughout the document where applicable), should specify that the targeted removal actions were intended to remove the most contaminated sediment that was practically accessible, and that the remedy was not intended nor anticipated to achieve UU/UE in all sediment or across the entire Site 28. **ADEC-Partially Accepted February 5, 2020; related to prior responses above, statements and discussion throughout the document do not provide the adequate or accurate context that the remedial action objective(s) did not include removing/remediating all of the contamination in water, soil and/or sediment at Site 28. More emphasis and context is necessary re: the primary RAO which was in fact to limited and focused removal of accessible contaminated sediment and to manage and monitor the remaining soil, groundwater, and sediment contamination in place.**	Accepted. The following sentence will be added to the second paragraph of "Status of Implementation": The targeted removal actions were intended to remove all continuously submerged sediment contaminated with COCs above the site-wide sediment cleanup levels, including removal of near-surface (6-12 inches deep) continuously submerged sediments from the narrow channel upgradient of the Suqi River. The intent was to remove the most highly contaminated materials closest to the main complex. **ADEC-Partially Accepted February 5, 2020; please see additional response on the left.** Accepted. See response to comment 9, part 3. **ADEC-Partially Accepted/Noted February 14, 2020; per related additional response(s) above.**
			Re: the discussion in the last paragraph of this section, please see and apply related comment below on section XI., in association with the selected remedy to construct a stilling basin.	Accepted. The discussion will be revised to include the following: A sedimentation pond or other institutional controls, as described in the multi-site DD (USACE 2009), have not been implemented. Construction of a sedimentation pond within the drainage basin would cause unnecessary adverse impacts to the wetland environment. There is a natural stilling area in Site 28 approximately 200 feet south of the Suqi River

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				(Figures B-6 through B-10) where the surface water flow channels disperse. Based on confirmation samples collected during the 2013 excavation, samples collected from the Suqi river in 2016, and re-sampling of sediment in 2018, the stilling area and existing, natural ponds are functioning as sedimentation ponds and have prevented migration of contaminants above the multi-site DD cleanup levels from Site 28 into the Suqi River. **ADEC-Accepted February 5, 2020** The following sentence will be added to “Response Actions”: It is recommended an explanation of significant differences be prepared to clarify a sedimentation pond or other institutional control is not needed at Site 28. **ADEC-Accepted February 5, 2020**
10.	16	VIII.	Progress Since the Last Review: Table 6: The protectiveness statement should be revised and amended, and table note clarifications added as needed in order to clarify that removal actions to the extent practical have resulted in achieving limited/targeted mitigation of exposure and offsite migration to the extent practical for non-POL CERCLA COCs only, however not for POL COCs and not for the entirety of Site 28 source areas; and further that this will require CERCLA FYRs and remedy monitoring in perpetuity until otherwise demonstrated that UU/UE has been achieved.	Disagree. The protectiveness statement in Table 6 is the statement from the 2014 FYR, and is accurate. As a result, this statement cannot be amended or revised. **ADEC-Not Accepted February 5, 2020; however in association with numerous other related responses to RTCs, this issue requires additional clarification here and in other related discussions and statements throughout the document. The request for a table note to clarify this and provide the adequate context is reasonable.** Accepted. The following table note will be added to Table 6: Removal actions within the Site 28 drainage have been successful in achieving SSCLs for non-POL

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				CERCLA COCs in sediment. However, POL COCs remaining in sediment above SSCLs will require Periodic Reviews until UU/UE has been achieved. **ADEC-Partially Accepted February 14, 2020; per related additional response(s) above. ADEC agrees with the conclusions with re: to non-POL CERCLA contaminants in sediment but does not concur with applying that conclusion sitewide to Site 28.**
11.	17	IX.	Data Review: The second sentence of the first paragraph, as well as other related discussion and statements throughout the document, should be revised and amended in order to better clarify and emphasize the differences between 1) the residual contamination in Site 28 sediment that was removed - which also for the most part represented locations that were resampled in subsequent years, versus 2) contaminated sediment that was left in place vs. site wide contamination in tundra that was left in place, and 3) 2012-13 mapping and survey locations vs. 2013-14 removal action locations vs. 2016 Suqi River and 2018 Site 28 sediment sampling and analysis locations. The varying extent of site conditions, source areas, removal actions, and sampling locations over time make it complicated (and from ADEC's perspective inappropriate), to apply conclusions drawn from sediment associated with surface water locations to the entire site wide area/drainage basin of what is considered Site 28.	Accepted. The second sentence of the first paragraph will be revised as follows: The new data for Site 28 included data from the 2013 removal action report (USACE 2015a), which included results for sediment confirmation samples; 2016 sediment and surface water sampling in the Suqi River (USACE 2017), which enabled evaluation of potential impacts to sediment and surface water in the Suqi River that may have resulted from upgradient Site 28 contamination; and the 2018 Site 28 Sediment Mapping effort (USACE 2018), which included sampling data at the original 2012 sediment sampling locations within Site 28 for comparison between pre-removal and post-removal sediment accumulation and evaluation of residual contamination. **ADEC-Partially Accepted February 5, 2020; ADEC agrees with what is stated the RTC, however in relation to other similar responses, the RTC does not address several of the primary issues raised in the original comment. ADEC's position is that too much emphasis is being placed on the previously mapped, sampled, and/or removed, and/or re-**

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				accumulated sediment, and is potentially overlooking/underemphasizing and thus misrepresenting the status and extent of contamination across the whole of what is considered Site 28. Accepted. Please see response to comment 9, part 2. **ADEC-Partially Accepted February 14, 2020; per related additional response(s) above.** Additionally, the first paragraph in Data Review will be revised to state: "… 2016 sediment and surface water sampling in the Suqi River (USACE 2017) used as a line of evidence for evaluation of potential impacts to sediment and surface water in the Suqi River that may have resulted from upgradient Site 28 contamination; and the Site 28 re-accumulated sediment mapping effort (USACE 2018), which included collecting samples at the original 2012 sediment sample locations within Site 28 for comparison between pre-removal sediment results and post-removal (i.e., re-accumulated) sediment results." **ADEC- Accepted February 14, 2020**
			Please elaborate on the discussion in the second two sentences of the last paragraph on this page to better clarify 1) the evaluation process and determinations that resulted in the stated conclusion re: sediment re-accumulation and extent of contaminated sediment observed in 2018 (e.g. provide a brief summary statement here and also reference the section of the report that contains the more in-depth discussion),	Accepted. The last paragraph will be split into three paragraphs in order to more fully describe the process by which the determinations were made. The first clarification will be made with the addition of the following text: This was determined by comparing the volume of sediment estimated in 2012, the volume of sediment removed in 2012 and 2013, and the volume of sediment estimated in 2018 by removal area.

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				Additionally, discrete locations were compared within select removal areas for sediment thicknesses measured during the 2012 and 2018 mapping efforts. Visual field observations, such as surface evidence of sloughing, were also used to determine the likelihood of sediment re-accumulation. **ADEC-Accepted February 5, 2020**
			and 2) when and how the contaminated sediment volume was estimated and whether this was based upon e.g. comparing only 2018 sampling and surveyed locations with prior removal locations (noting the contaminated sediment that was left in place in 2013-14).	Accepted. Contaminated sediment that was left in place in 2013 was accounted for through the re-mapping of the entire Site 28 drainage and re-sampling of the 2012 mapping locations, with the exception of Area 1, which was not re-sampled. The second clarification will be made with the addition of the following text: This estimate was derived by using the sediment depth measurements collected during the 2018 mapping effort, estimating extents of contamination based on analytical results from the 2018 sediment samples, and calculating volume of contaminated sediment using the average thickness of sediment as illustrated on the cross sections for each transect (Attachment F-1 of Appendix F). Where multiple transects were collected to represent an elongated water body, the sediment thickness averaged from each transect was further weighted to account for differences in the width of the water body. For additional information regarding how the sediment was measured and how volume calculations were performed, refer to Section 4.0 of Appendix F. **ADEC-Accepted February 5, 2020**

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12.	18	IX.	Data Review: Please elaborate the statement in the last sentence of the second paragraph of this page to adequately clarify and emphasize that no subsurface soil remedy component is described in the DD for Site 28 because it was determined and agreed upon by the parties that any invasive activities in the Site 28 tundra (outside of the proposed dredge removal that would be limited to only practically accessible sediment), would likely result in excessive adverse impacts that would be far greater to the natural resources, habitat, and site conditions than managing the contamination in place – as long as future LTM, FYRs, and protectiveness determinations concluded that the selected remedy was still appropriate and protective.	Accepted. The following text will be added to the end of the second paragraph in Data Review: "No subsurface soil remedy is described in the multi-site DD for the site (USACE 2015b) because invasive activities in the Site 28 tundra, such as excavation in excess of the proposed suction dredge removal of practically accessible sediment, would likely result in adverse impacts that would be far greater to the natural resources and habitat than the remaining contamination. The selected remedy of removing the most highly contaminated and accessible sediment closest to the MOC, and from the narrow drainage channel and ponded areas in the lower half of Site 28 using a minimally invasive removal technique (such as suction dredging) while also managing the contamination in place by controlling downstream migration of suspended sediments and performing FYRs to ensure the remedy remains protective, was determined and agreed upon in the DD in order to minimize adverse impacts to existing natural resources and habitat." **ADEC-Accepted February 5, 2020**
			Further, the mention in the preceding sentence re: the MOC excavations that did not proceed and associated contamination that was subsequently left in place for similar reasons as noted above should be elaborated on in order to specify that this was proposed by USACE to ADEC (and subsequently approved by ADEC), during in-situ removal actions in years following the 2009 DD.	Accepted. The referenced text will be revised as follows: "MOC Site 11 excavations adjacent to Site 28 did not proceed into Site 28 at Ultraviolet Optical Screening Tool (UVOST) plumes D2, D3, I1, and J1B due to concern of impacting the wetland environment (USACE 2015a). Ceasing excavation activities associated with Site 11 before these activities entered into Site 28 was proposed by USACE during the 2011

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				removal action and subsequently agreed upon by ADEC. " **ADEC-Accepted February 5, 2020**
			ADEC has previously noted on numerous occasions over the years since the 2009 DD was finalized (and still maintains the position), that the potential ambiguities re: specified cleanup levels and required site actions based upon what is and what is not 'specified in the 2009 DD(s), as well as changes to the implementation and management of some remedies and also site conditions over time all warrant and justify the need to consider amending and/or revising the DD, or developing an ESD, or memorandum, etc. in order to reconcile and accurately document the prior discrepancies in conjunction with current site conditions and future management needs.	Clarification. As a result of ADEC comments on the draft FYR document, "Other Findings" have been added to Section XI "Issues/Recommendations" this FYR as stated in these responses to comments. **ADEC-Accepted February 5, 2020**
13.	18	X.	Technical Assessment; Question A Summary: Please apply comments and change requests stated above (and further below), in association with statements re: contaminated sediments vs. site wide considerations and references to the applicability of UU/UE statements. **ADEC-Partially Accepted February 5, 2020; statements associated with UU/UE need to be amended/revised in order to provide adequate emphasis that 1) UU/UE would only apply to those specific sediment areas/locations associated with historical activities and/or the DD, and 2) that UU/UE is based upon a risk-based cleanup level for the subject specific sediment locations, and is not necessarily applicable across the entirely of what is considered Site 28. Meeting the criteria/cleanup levels that are identified in a DD does not necessarily result in the site achieving UU/UE;**	Accepted. The referenced text will be revised as follows: The selected remedy remains protective and has functioned as intended for CERCLA contaminants. The selected remedy in the 2009 Decision Document included removing the most highly contaminated and accessible sediment closest to the MOC and from the narrow drainage channel and ponded areas in the lower half of Site 28 using a minimally invasive removal technique (such as suction dredging). The remedy also included management of the contamination in place by controlling downstream migration of suspended sediments and performing FYRs to ensure the remedy remains protective. CERCLA non-POL COC (PCBs, chromium, lead and zinc) concentrations in sediment samples have been reduced to levels that would allow UU/UE; however,

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			rather meeting the criteria for UU/UE which in this case would be residential land use which in the long-term is not acceptable for the majority of the area inside the boundary considered to be Site 28.	the remedy did not function as intended for POL-related Site 28 COCs (DRO, RRO, and PAHs). The results of the confirmation samples following excavation and data collected in 2018 indicated that POL-related Site 28 COCs (DRO, RRO, and PAHs) are present in Site 28 sediment above the sitewide sediment cleanup levels. **ADEC-Partially Accepted February 5, 2020; please see additional response on the left.** Accepted. The comment response will be revised as follows: The selected remedy remains protective and has functioned as intended for CERCLA contaminants in sediment within the Site 28 drainage. The selected remedy in the 2009 Decision Document included removing the most highly contaminated and accessible sediment closest to the MOC and from the narrow drainage channel and ponded areas in the lower half of Site 28 using a minimally invasive removal technique (such as suction dredging). The remedy also included management of the contamination in place by controlling downstream migration of suspended sediments and performing FYRs to ensure the remedy remains protective. **ADEC- Accepted February 14, 2020** CERCLA non-POL COC (PCBs, chromium, lead and zinc) concentrations in sediment samples have been reduced to the SSCLs, which were risk-based levels that meant to achieve UU/UE; however, the remedy did not function as intended for POL-related Site 28

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				COCs (DRO, RRO, and PAHs) in sediment. The results of the sediment confirmation samples following excavation and data collected from re-accumulated sediment in 2018 indicated that POL-related Site 28 COCs (DRO, RRO, and PAHs) are present in Site 28 sediment within the drainage basin above the sitewide sediment cleanup levels. **ADEC- Accepted February 14, 2020**
			Please clarify the reference to sediment in the last sentence on this page, whether this is intended to and/or appropriate to be associated with only re-accumulated sediment that was surveyed and sampled in 2019 or site wide.	Accepted. Please see the last sentence of RTC 13 above. **ADEC- Partially Accepted February 5, 2020; please amend to provide additional emphasis that the statement applies to re-accumulated sediment only.** Accepted. Please see the additional revisions to the RTC above. **ADEC- Accepted February 14, 2020**
			Similarly apply other related comments re: contaminated sediment that was left in place (e.g. greater than 2 feet below the water surface, impractical access, etc.), in association with the statement in the last sentence of this subsection in the first paragraph at the top of page 18. Please also revise/amend this and other references throughout the document to 'limiting removal to the first 2 feet) to specify that this was based on 2 feet below the water surface;	Accepted. The following sentence will be added to the paragraph describing the calculations of sediment volume and re-accumulation (in the "Data Review" Section of IX): Sediment measured that was not the result of re-accumulation may be the result of the removal activity ceasing beyond 2-feet below the surface of the water, management decisions between USACE and ADEC to limit the excavation activity to accessible sediments to reduce impacts to the wetland environment, and mechanical limitations of a suction dredge in highly vegetated areas. **ADEC- Accepted February 5, 2020**

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			and further include statements that specify how sediment at Site 28 was defined and approved by the project delivery team and ADEC post 2009 DD.	Accepted. The first two sentences of the first paragraph of the "Data Review" section of IX will be revised to: The data review for Site 28 primarily focused on contaminated sediment data that were generated after the 2014 FYR. "Sediment", as defined by the USACE project delivery team and ADEC project manager, is considered to be "all continuously submerged loose material (mineral and/or organic) except for that which is actively growing vegetation or is part of a vegetative mat." **ADEC- Accepted February 5, 2020**
14.	19	X.	Question B Summary: Please elaborate the statement in the last sentence on this page to specify/clarify how and why the stated revisions would 'not significantly affect risk…' and further how this was determined.	Accepted In the Question B Summary, A new table (Table 8) will be added (see bottom of RTCs for full table) **ADEC- Accepted February 5, 2020** and Paragraph 3 will be replaced with the following: The sources of the multi-site DD cleanup levels were evaluated to ascertain if any value had decreased in more recent versions of the source document (Table 7) as well as other available benchmarks for benthic macroinvertebrates, birds, and mammals (Table 8) to determine if the multi-site DD cleanup levels continue to be protective of wildlife at Site 28. As shown in Table 8, the multi-site DD cleanup levels are more conservative than the new sediment cleanup levels (WAC, 2013), equilibrium partitioning (EqP) sediment benchmarks (EPA, 2003 and EPA, 2012), as well as ecological preliminary remedial goals (EcoPRGs) for birds and mammals (LANL, 2017). • The 2013 WAC sediment cleanup levels (Table 8) are higher than the multi-site DD cleanup levels for fluoranthene and total HPAHs and are lower

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				than the multi-site DD cleanup levels for benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene. • The default equilibrium partitioning (EqP) sediment benchmarks for PAHs (Table 8) are derived using final chronic values for surface water and a total organic carbon of 1%. The derivation methodology is presented in EPA (2012). All EqP sediment benchmarks for PAHs are higher (less) conservative than the multi-site DD cleanup levels. • Ecological preliminary remedial goals (EcoPRGs) from the LANL database are the lowest available for birds and mammals for exposure to soils or sediments. The EcoPRGs are calculated using the lowest observed adverse effect level (LOAEL) and either a default area use factor (AUF=1) or a site-specific AUF (based on the acreage of Site 28 of 14.65 acres). Both sets of EcoPRGs as wells as the species with the lowest value are presented in Table 8. The EcoPRGs assuming an AUF=1 are higher (less conservative) for all COCs, with the exception of lead and zinc. The EcoPRGs using Site 28 AUFs are higher (less conservative) for all COCs. Based on comparison of the multi-site DD cleanup levels to updated WAC sediment cleanup levels as well as available benchmarks for the protection of benthic macroinvertebrates, birds, and mammals, the multi-site DD cleanup levels continue to be protective of wildlife that may potentially use Site 28. **ADEC- Accepted February 5, 2020**
15.	20	X.	Question B Summary; Table 7: Please amend the table notes and associated narrative discussion to specify/clarify that the SSCLs identified for sediment at Site 28 were	Disagree.

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			intended to only be applied to 'sediment' at Site 28 and are not applicable in general to sediment or other non-Site 28 locations.	The 2009 multi-site DD does not contain Site 28-specific cleanup levels, rather, a Northeast Cape-wide sediment cleanup level was determined. **ADEC- Accepted February 5, 2020**
			Re: the discrepancy discussed in the comment immediately above as well as those identified in the subject table notes re: the sources, and others throughout the document associated with discrepancies, inconsistencies, and/or site condition changes related to the 2009 DD, ADEC recommends that this FYR include an itemized list of potential revisions, amendments, etc. that should be considered to the DD for Sites 21 and 28. **ADEC-Partially Accepted February 14, 2020; noting that ADEC does not disagree with the RTC, as well as USACE's proposal to incorporate management of the southern boundary areas of Site 28 into the UECA for the MOC, however ADEC notes its non-concurrence with USACE's position that no CERCLA**	Clarification. The only outstanding issue that was identified during the FYR for Site 28 was the effectiveness of the remedy at the site, for which, pilot testing to improve the effectiveness of remedy implementation (suction dredging) was recommended. Additional findings are provided in bulleted lists under "Other Findings" of Section V., "Issues/Recommendations". **ADEC- Partially Accepted February 5, 2020; related to other similar responses, further emphasis discussion and statements are necessary where applicable throughout the document re: the outstanding LUCs, and residual contamination that remains in place.** Accepted. A final sentence will be added to the last bullet of "Other Findings" of Section XI. Please note the reference (Section V.) in the RTC above was erroneous. **ADEC-Accepted February 14, 2020** "An informational LUC, in accordance with UECA, describing residual POL-related contamination in sediment within the Site 28 drainage basin is recommended to prohibit disturbance of Site 28 sediment. LUCs with regard to soil and groundwater

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			contamination remains at Site 28 (specifically but not limited to extents of CERCLA contamination in soil and groundwater); as will also be further discussed in ADEC's non-concurrence letter transmitted along with this template.	POL-related contamination at the southern boundary of Site 28 and within the previously defined "UVOST plumes" are also recommended, however, these will be included within the Environmental Covenant for the MOC." **ADEC-Partially Accepted February 14, 2020; please see additional response on the left.** Upon further review, the final sentence referred to above will not be added because the issues/recommendations provided in this document pertain to CERCLA contamination only. However, the recommendation for an informational LUC for sediment at Site 28 will be documented in the Multiple Sites Periodic Review Report. In addition, the recommendation for LUCs with regard to soil and groundwater POL-related contamination at the southern boundary of Site 28 and within the previously defined "UVOST plumes" will also be documented in the Multiple Sites Periodic Review Report.
16.	21	X.	Question B Summary: Please amend the statement and discussion in the last sentence of the second to last paragraph of the Question B subsection on this page in order to specify/clarify 1) has it been definitively demonstrated that the stilling area 'prevents' or, is 'reduces' a more appropriate description – noting additionally that the 2016 Suqi River sampling was not intended to characterize upgradient transport and deposition rather was prescriptively intended to only 'repeat sampling and evaluations' specifically associated	Accepted. Additional discussion will be added to the second to last paragraph: This has been confirmed by the 2018 sediment mapping and sampling event (Appendix F), the results of which indicated no contaminants exceeded the SSCLs downstream of the natural stilling area. In addition, results of a surface water and sediment sampling effort of the Suqi River conducted in 2016 (USACE 2017) also indicated no contaminants exceeded the SSCLs in Suqi River samples.

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			with the historical Suqi River locations?; **ADEC-Partially Accepted February 5, 2020; previous discussion and resolution between USACE and ADEC resulted in concurrence that prior surface and sediment sampling activities and results associated with the Suqi River were intended to be and are considered only applicable to those Suqi River locations, and are not appropriate to draw conclusions with re: to whether or not upgradient contaminant sources are migrating to the subject Suqi River sampling locations.**	Therefore, the Suqi River is not receiving contamination from an upgradient source such as Site 28. **ADEC- Partially Accepted February 5, 2020; please see additional response on the left.** Accepted. The additional discussion referenced above will be revised as follows: This has been confirmed by the 2018 sediment mapping and sampling event (Appendix F), the results of which indicated no contaminants exceeded the SSCLs in re-accumulated sediment downstream of the natural stilling area. DRO concentrations in sediment samples analyzed with the silica gel method were detected well below the cleanup level in this area, at a maximum concentration of 1,890 mg/kg. The highest detected RRO concentration in re-accumulated sediment analyzed with the silica gel method was 1,660 mg/kg. The SSCL for both of these analytes is 3,500 mg/kg. PAHs were either not detected or were detected with estimated concentrations well below the cleanup level. Metals were detected in this area, but also well below the cleanup levels. Therefore, the Suqi River is not receiving contamination from an upgradient source such as Site 28. Data tables for these results are available in Attachment F-2. In addition, results of a surface water and sediment sampling effort of the Suqi River conducted in 2016 (USACE 2017) also indicated no contaminants

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				exceeded the SSCLs in Suqi River sediment or surface water samples. Silica gel method was not performed on these samples, however, DRO (540 mg/kg in sediment) and RRO (2,500 mg/kg) at the confluence of the Suqi River, location S29-002, did not exceed SSCLs. Surface water samples were non-detect for all PAHs except for a j-flagged naphthalene result of 0.0000043 mg/L. TAH and TAqH did not exceed the DD criterion and sheen was not observed at this location. **ADEC- Accepted February 14, 2020**
			and 2) the informal agreement between USACE and ADEC to tentatively and temporarily postpone the construction of an engineered stilling basin to allow the opportunity to evaluate whether the natural stilling actions provided adequate functionality and protectiveness as required by the 2009 DD.	Accepted. The "Changes in Exposure Pathways" will be split into three paragraphs and revised to include the following text: The multi-site DD (USACE 2009) remedy for Site 28 includes construction of a man-made settling pond "or other appropriate controls" in order to manage the contamination in place by controlling downstream migration of suspended sediments and prevent migration of contamination into the Suqi River. There is a natural stilling area in Site 28 approximately 200 feet south of the Suqi River (Figure B-5) where the surface water flow channels disperse. The USACE and ADEC temporarily postponed the construction of a settling pond to allow the opportunity to evaluate whether the natural stilling actions provided adequate functionality and protectiveness as required to meet the RAO to prevent migration of contaminants into the Suqi River. This stilling area, in addition to the natural, existing ponds, have proven effective at preventing migration of contaminants above risk-based sediment cleanup

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				levels into the Suqi River. This has been confirmed by the 2018 sampling (Appendix F), in which no contaminants exceeded the SSCLs beyond the natural stilling area in Site 28. In addition, results of a surface water and sediment sampling effort of the Suqi River conducted in 2016 (USACE 2017) also indicated no contaminants exceeded the SSCLs in Suqi River samples. Therefore, the Suqi River is not receiving contamination from an upgradient source such as Site 28. **ADEC- Partially Accepted February 5, 2020; please see and apply related response immediately above left re: RTCs associated with fate and transport of contamination to the Suqi River.** Accepted. Please see the response to the comment above. **ADEC- Accepted February 14, 2020**
17.	22	XI.	Issues/Recommendations: ADEC does not concur with the proposed timeline in the recommendation statement to conduct bench scale remedy implementation 'by 2023'; noting that this should be conducted sooner given that 1) sediment removal had minimum/limited effectiveness in reducing contamination and/or mitigating re-accumulation and the potential for offsite migration and/or exposure, and 2) additional action should be prioritized, scheduled and implemented sooner in order to allow for earlier decisions and actions to address the remaining contamination.	Clarification. The proposed timeline is five years from the start of the review period of this Five-Year Review. If a current exposure pathway is identified (of which currently, there is only risk of future exposure), additional actions may be prioritized. **ADEC- Accepted February 5, 2020**
			Other Findings: The discussion re: the unconstructed engineered stilling basin second bullet (and throughout the document where applicable), should be expanded in order	Accepted. The second bullet paragraph under "Other Findings" will be modified to the following:

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			to emphasize the site management issues that were considered and decisions that were made post-decision document with re: to concerns whether or not the naturally occurring low-flow settling areas within the Site 28 drainage would function as needed in order to achieve protectiveness without running the risk of causing adverse site impacts as a result of invasive construction of an engineered stilling basin.	Construction of a sedimentation pond or other institutional controls, as described in the multi-site DD (USACE 2009), have not occurred at Site 28. There is a natural stilling area in Site 28 approximately 200-ft. south of the Suqi River (Figure B-6) where the surface water flow channels disperse. This stilling area, in addition to the existing, natural ponds, has been found to prevent migration of contaminants above risk-based cleanup levels into the Suqi River. This has been confirmed by the 2018 sampling (Appendix F), in which no contaminants exceeded the SSCLs beyond the natural stilling area in Site 28. In addition, results of a surface water and sediment sampling effort of the Suqi River conducted in 2016 (USACE 2017) also indicated no contaminants exceeded the SSCLs in Suqi River samples. Therefore, the Suqi River is not receiving contamination from an upgradient source such as Site 28. Construction of a sedimentation pond within the drainage basin would cause unnecessary impacts to the wetland environment, as natural features are successfully preventing contaminant migration. Although this has been documented in the LTM plan (USACE 2016b), it is recommended that an explanation of significant differences be completed for Site 28 to document the post-DD change. **ADEC- Accepted February 5, 2020** Please note that although this response was accepted, the second bullet paragraph under "Other Findings" will be modified to be consistent with other comments. **ADEC- Accepted February 14, 2020** See response to comment 25 part 9.

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				ADEC- Accepted February 14, 2020
			Is an ESD and/or amendment(s) to the DD the more appropriate method of formally documenting the change?	Clarification. An ESD is required when the remedy has changed significantly from the preferred alternative presented in the Proposed Plan. A DD amendment is required when the remedy has changed fundamentally from the preferred alternative presented in the Proposed Plan. It is recommended that an ESD is completed to document a sedimentation pond will not be constructed in Site 28. This is not a fundamental change to the remedy. The remedy as stated in the Decision Document is the "construction of sedimentation pond *or other appropriate controls* at Site 28 Drainage Basin." The components of the remedy have not changed – a stilling basin and natural ponds are preventing migration of contaminated sediment from the Site 28 drainage to the Suqi River. The use of a contingency remedy should be documented with an ESD. **ADEC- Accepted February 5, 2020**
			How will ongoing developments for the LUCs, LTMPP, UECA, etc. be impacted by changes to site conditions, future site management needs, etc. in order to adequately address the residual contamination that prohibits UU/UE, or inversely, where changes to the requirements of the DD are being considered?	Clarification. The UECAs are currently under development and will incorporate findings from the Periodic and Five-Year Reviews as necessary. Once the UECAs are signed, they will be reviewed during each subsequent review to ensure current and future protectiveness. **ADEC- Accepted February 5, 2020; however please include the RTC and additional narrative clarifications throughout the document where applicable.** Accepted. **ADEC- Accepted February 14, 2020**
18.	23	XII.	Protective Statement: this statement, including other related discussions and references throughout the document	Accepted.

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			where applicable, should be revised/amended in order to specify/clarify that the remedy is currently only conditionally protective based upon there being no current offsite migration or unacceptable exposure risk of non-POL CERCLA contaminants only. **ADEC-Not Accepted February 5, 2020; the statement is not accurate and misrepresents the site conditions. The tundra and vegetative mat areas of Site 28 that are adjacent to and on both sides of the stream drainage have been confirmed to have varying extents of POL and non-POL CERCLA contaminants and this is not adequately presented and/or emphasized throughout the document.**	The protectiveness statement will not be revised as it is specific and applicable to only non-POL CERCLA contaminants. However, a note will be added to the protectiveness statement table that states the following: The protectiveness statement above is specific to non-POL CERCLA contaminants. POL contaminants (DRO, RRO, and PAHs) are present at Site 28 above the site-wide sediment cleanup levels. **ADEC-Not Accepted February 5, 2020; please see additional response on the left.** Accepted. Please see response to comment 9 part 2 and comment 15 part 2. **ADEC-Partially/Accepted February 14, 2020; per related additional response(s) above.** The table note will be revised to state: "The protectiveness statement above is specific to non-POL CERCLA contaminants <u>in sediment</u>. POL contaminants (DRO, RRO, and PAHs) are present at Site 28 above the site-wide sediment cleanup levels." **ADEC- Accepted February 14, 2020**
			Additionally revise/amend to clarify that based upon known residual contamination left in place in sediment, as well as contamination remaining in the tundra across the Site 28 drainage in general, that CERCLA contaminants still remain at the site; noting ADEC acknowledges that	Disagree. Non-POL CERCLA contaminants do not remain at the site above the site-wide sediment cleanup levels. **ADEC-Not Accepted February 5, 2020; the statement is not accurate and misrepresents the**

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			sampling and analysis results as well as surveys and reconnaissance conducted post-DD indicate that non-POL CERCLA-contaminants are currently demonstrated as controlled and/or currently not mobilizing/migrating at unacceptable risk levels to human health.	**site conditions. The tundra and vegetative mat areas of Site 28 that are adjacent to and on both sides of the stream drainage have been confirmed to have varying extents of POL and non-POL CERCLA contaminants and this is not adequately presented and/or emphasized throughout the document.** Accepted. Please see response to comment 9, part 2 and comment 23, part 1. **ADEC-Partially/Accepted February 14, 2020; per related additional response(s) above.**
			Protectiveness statements should also be revised in order to emphasize that the current remedy and its functionability have been determined to not be protective as intended and required by the DD for some contaminants.	Accepted. Please see the response to comment 18 above. Specifically, a note will be added to the protectiveness statement table that states the following: The protectiveness statement above is specific to non-POL CERCLA contaminants. POL contaminants (DRO, RRO, and PAHs) are present at Site 28 above the site-wide sediment cleanup levels. **ADEC-Partially Accepted February 5, 2020; per respective responses to RTCs #18 above.** See response to comment 18, parts 1 and 2. **ADEC-Partially/Accepted February 14, 2020; per related additional response(s) above.**
19.	23	XIII.	Next Review: ADEC disagrees with the statement in the one sentence included in this section. Please see and apply comments above related to section XII. and the protectiveness statement. Both CERCLA and non-	Accepted. The following text will be added to Section XIII: However, POL-contaminants (DRO, RRO, and PAHs) present above the sitewide sediment cleanup levels

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			CERCLA contaminants remain at/across the site at concentrations exceeding applicable cleanup levels and therefore will require ICs, land use limitations, LTM, and future CERCLA FYRs until UU/UE is achieved.	will require additional action in order to meet UU/UE. Future reviews for petroleum and petroleum related compounds at Site 28 will be included in the Periodic Review for other petroleum related NEC FUDS sites. **ADEC-Partially Accepted February 5, 2020; ADEC does not disagree with the RTC however the context is incomplete and requires additional language as identified in prior related comments.** Accepted. See response to comment 9, part 3. **ADEC-Partially/Accepted February 14, 2020; per related additional response(s) above.** The following text will be added to the end of Section XIII Next Review to state: "An informational LUC, in accordance with UECA, describing residual POL-related contamination in sediment within the Site 28 drainage basin is recommended to prohibit disturbance of Site 28 sediment. LUCs with regard to soil and groundwater POL-related contamination at the southern boundary of Site 28 and within the previously defined "UVOST plumes" are also recommended, however, these will be included within the Environmental Covenant for the MOC." **ADEC-Partially/Accepted February 14, 2020; per related additional response(s) above.** Upon further review, an informational land use control at Site 28 will not be recommended, as issues/recommendations provided in this document pertain to CERCLA contamination only. The table note referenced above will not be added to the end of Section XIII, "Next Review". However, the

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				recommendation for an informational LUC for sediment at Site 28 will be documented in the Multiple Sites Periodic Review Report. In addition, the recommendation for LUCs with regard to soil and groundwater POL-related contamination at the southern boundary of Site 28 and within the previously defined "UVOST plumes" will also be documented in the Multiple Sites Periodic Review Report.
20.		Appendix A Reference List	The FYR document references and/or makes associative statements to ADEC and/or 18AAC75 guidance, regulations, etc. and should be listed accordingly and/or noted in the narrative, this list, etc. where those specific references are cited (similar to the reference lists included in other appendices of this document).	Accepted. 18 AAC 75 will be added to Appendix A. **ADEC- Accepted February 5, 2020**
21.		Appendix B Figures	Figure B-5: This and all other relevant figures should identify and label the primary stilling area(s).	Accepted. The "Natural Stilling Area" will be added to and labeled on the following Figures: B-5 (now B-6), F-3, F-4, F-5, F-6, F-7, and F-8. **ADEC- Accepted February 5, 2020**
			Please depict the primary groundwater flow direction(s) from the MOC AOCs that are known and/or suspected in association with the areas within and immediately adjacent to what is presented as the Site 28 boundary.	Accepted. Contours developed based on groundwater sampling performed at the MOC in 2018 will be added to Figures B-3, B-5, B-6, B-7, B-8, B-9, F-3, F-5, F-6, F-7, and F-8. **ADEC- Accepted February 5, 2020**
			The figure should include an explanatory note to clarify that the yellow highlight boundary depictions in the legend and on the figure represent only the contamination associated with the MOC AOCs for representation purposes; and are not intended to represent extents and/or	Accepted. Figure B-5 (now B-6) will be revised to include the following note: "UVOST data represent contamination associated with the MOC and are not intended to represent

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			presence or absence of contamination that is associated with what is considered to be Site 28.	extents and/or presence or absence of contamination associated with Site 28" **ADEC- Accepted February 5, 2020**
			This and other related figure notes and figures should respectively clarify and depict the northernmost boundary limits of the 2010 UVOST investigation and clarify that extents of POL and non-POL contamination remain throughout the tundra, groundwater, and sediment features within the Site 28 boundary.	Accepted. The UVOST boundaries depicted on Figure B-5 along with the note presented above will be added to Figures B-6 (now B-7), B-7 (now B-8), B-8 (now B-9), B-9 (now B-10), F-5, F-6, F-7, and F-8. **ADEC- Accepted February 5, 2020**
			Figure B-9: Please include a figure note on this and all other relevant figures to clarify/specify which sample locations are representative of what is considered to be re-accumulated sediment and which locations were sampled for the first time in 2018.	Accepted. Figures B-6, B-7, B-8, B-9, F-5, F-6, F-7, and F-8 will be revised to distinguish between sample locations representative of re-accumulated sediment and locations sampled for the first time in 2018. **ADEC- Accepted February 5, 2020**
			It would also be helpful to depict general locations where either 1) contaminated sediment was left in place e.g. 2 feet below the water surface or inaccessibility reasons, or 2) locations where contaminated sediment was removed in prior years but where no sampling was conducted in 2018, and 3) sampling locations in tundra and/or groundwater across Site 28 (e.g. the prior transect during the RI) where contamination was identified relevant to each respective figure. **ADEC- Noted February 5, 2020; the intent of ADEC's comment was to have locations depicted where respective applicable cleanup level exceedances were previously confirmed outside of the removal areas. While ADEC acknowledges that these may no longer represent actual site conditions, the location data is still useful in identifying locations where removal/remedial**	Accepted. The removal areas will be depicted on figures in the main body appendix by including figures F-4a through F-4i from Appendix F. **ADEC- Accepted February 5, 2020** Sampling locations from the RI will not be added, as they are no longer representative of current site conditions. **ADEC- Noted February 5, 2020; please see additional response on the left.** Noted. Displaying sample results that are not representative of current site conditions is not appropriate in this FYR. Historical sample locations can be found in their respective source documents. **ADEC- Accepted February 14, 2020**

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			actions did not occur although respective cleanup level exceedances were confirmed.	
			ADEC notes that while it does not disagree with the current presentation and depiction of results from the 2018 effort, it is potentially misleading to the reader with re: to residual contamination remaining across Site 28 that are not represented by the specific sampling locations within previously defined sediment accumulation areas – especially with respect to statements re: UU/UE throughout the narrative of the FYR. **ADEC- Not Accepted February 5, 2020; ADEC's position is that these are out of context e.g. 1) 'the only areas not sampled in 2018' is actually 'only areas not re-sampled', 2) confirmation analytical results mostly only pertain to the zone(s) of re-accumulated sediment where removal actions previously occurred and are not representative of investigated and/or non-investigated sediment that was left in place, 3) the context of UU/UE needs to be discussed and resolved further between the ADEC and USACE in order to ensure that its application is consistent, appropriate, and protective going forward. ADEC's current position is that it disagrees with USACE's current interpretation and application of UU/UE. ADEC also notes that these issues will need to be reconciled and included in the UECA covenants/ICs for the site.**	Clarification. The only area which was not sampled during the 2018 effort was Area 1. Confirmation analytical samples confirm that only POL contamination remains in this area. It is UU/UE with regard to non-POL CERCLA contaminants. All other areas are also UU/UE with regard to non-POL CERCLA contaminants. Additional known POL-contamination within the Site 28 boundary, separate from the sediment sampled in 2018, has been depicted by the UVOST delineated plumes. **ADEC- Not Accepted February 5, 2020; please see additional response on the left.** Accepted. The only removal area which was not re-sampled during the 2018 effort was Area 1. Confirmation analytical samples collected immediately following excavation did not contain non-POL CERCLA contaminants above the SSCLs in sediment, including those areas where CERCLA contaminants had been previously found in sediment. CERCLA contaminants have been removed from sediment within the drainage to below their respective SSCLs, which were calculated based on site-specific data in order to achieve UU/UE. Known CERCLA contamination was not left in-place within the sediment of Site 28 drainage. **ADEC- Accepted February 14, 2020**

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			ADEC-Partially Accepted February 14, 2020; noting that ADEC does not disagree with the RTC, as well as USACE's proposal to incorporate management of the southern boundary areas of Site 28 into the UECA for the MOC, however ADEC notes its non-concurrence with USACE's position that no CERCLA contamination remains at Site 28 (specifically but not limited to extents of CERCLA contamination in soil and groundwater); as will also be further discussed in ADEC's non-concurrence letter transmitted along with this template.	USACE agrees that an informational LUC, in accordance with UECA, describing residual POL-related contamination in sediment within the Site 28 drainage basin is recommended to prohibit disturbance of Site 28 sediment. **ADEC- Accepted February 14, 2020** LUCs with regard to soil and groundwater POL-related contamination at the southern boundary of Site 28 and within the previously defined "UVOST plumes" are also recommended, however, these will be included within the Environmental Covenant for the MOC. **ADEC-Partially/Accepted February 14, 2020; per related additional response(s) above and to the left.**
22.		Appendix C	Section 1.0: This section should include a summary of how the history and chronology of the sites is presented, e.g. is the majority or the narrative discussions taken verbatim from existing documents and/or is it summarized for the purpose of dove-tailing the information into the objectives of this FYR effort; noting that based upon ADEC's comments on this section below, the information as presented appears to be more verbatim of historical statements and not in line with current site status.	Accepted. Additional text will be added to Section 1.1.3 (which prefaces the text in Section 1.2) that describes where the narrative discussions originated. References to the multi-site DD will be included in Section 1.1.3. The last sentence of the section will be revised to state: "Investigations have been performed since the early 1990s and the information detailed in historical documents is briefly summarized in subsequent sections." **ADEC- Accepted February 5, 2020**
			Section 2.0 page C-2-1: The narrative preceding Table C-2-1 should be elaborated to clarify that general statements in the table e.g. 'all transformers removed' and 'POL-contaminated soil removed' are intended to reflect focused activities associated with that specific mobilization; further clarify that additional and extensive removal and/or investigative actions continued to occur throughout the	Accepted. The introductory text in Section 2.0 will be revised to state: "Important events, the associated document reference for each important event, and relevant dates for the NEC sites listed in Table C-1-2 are shown in Table C-2-1. The focused activities presented in

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			subsequent years listed. Otherwise, the information as currently presented in the table is misleading to the reader with re: to what actions were actually conducted during which years vs. what actions were not.	Table C-2-1 are associated with specific mobilizations. Additionally, investigative and/or removal actions continued to occur throughout the subsequent years listed." **ADEC- Accepted February 5, 2020**
			Table C-2-1 page C-2-2: Additional documents and summaries associated with the ATSDR's second health consultation were distributed in addition to what is listed as the 'public comment release' in 2017. Those documents should be summarized, referenced, and included in the reference list.	Accepted. Table C-2-1 will be updated to include the revised reference to the ATSDR health consultation: Public Comment release and Summary Publication of the ATSDR Health Consultation (ATSDR 2017a, 2017b) The summary document will also be included in the Site Chronology references as ATSDR 2017b. **ADEC- Accepted February 5, 2020**
			Section 3.1.1 page C-3-2: Amend the discussion/statement in the first paragraph of this section to specify whether groundwater investigations and/or discrete groundwater confirmation sampling and analysis were conducted at Site 21 to demonstrate that no groundwater contamination was present.	Accepted. The second sentence of the first paragraph will be revised to state: "Groundwater sampling performed in 1994 confirmed that no groundwater contamination exists at Site 21…". **ADEC- Partially Accepted February 5, 2020; please amend this further to specify 1) whether the 1994 results were determined adequate at the time of the DD to be the basis for the determination, and 2) whether or not the older 1994 data is adequate given what is currently known about the site dynamic, conditions, etc.** Accepted. Text in Appendix C Section 3.1.1 will be revised to state:

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				"Groundwater sampling performed in 1994 detected total arsenic, total chromium, and total lead concentrations above cleanup levels, but dissolved concentrations of these metals were below the cleanup levels. As a result, the presence of these metals was attributed to sediment suspended in the water (USACE 1999). Therefore, as stated in the multi-site DD, metals contamination in groundwater was likely due to sediments in the water column of the collected sample and metals were eliminated as a COC (USACE 2009a)." **ADEC- Accepted February 14, 2020** The 1994 data is adequate because site use and exposure assumptions have not changed since the data were collected. **ADEC- Accepted February 14, 2020; please state this response in the narrative.**
			It should also be further clarified that the primary concerns with contaminated water at Site 21 were in association with hydrologically connected groundwater and surface water and tie this in to the surface water sampling discussion in the last paragraph on page C-3-4, and additional references in related narrative sections throughout the document where applicable.	Accepted. The following text will be added to the last paragraph on page C-3-4, the discussion of the 2014 surface water sampling event: "Surface water was monitored due to the potential hydrologic interconnectivity of groundwater and surface water in the area. This sampling was a precautionary measure to ensure contaminated soil removal activities at the MOC were not negatively affecting groundwater or surface water at Site 21." **ADEC- Accepted February 5, 2020**
			Lastly, discuss the extent to which groundwater protections (e.g. LUCs) associated with the MOC are protective of adjacent downgradient sites such as Site 21.	Accepted. The following text will be added to the first paragraph of Section 3.1.1.:

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				Although Site 21 is near the MOC, it has not been affected by contamination emanating from the MOC. Continued periodic monitoring of MOC groundwater, as required by the multi-site DD until cleanup levels are met, will ensure any potential contaminant migration does not affect adjacent sites and is therefore protective of Site 21 groundwater. Migration of groundwater contaminants at the MOC is not anticipated as monitoring results indicate contaminated groundwater at the MOC is steady-state. **ADEC- Accepted February 5, 2020**
			Section 3.1.2 page C-3-5: Please amend this section to elaborate on the stated 'two signs' that were installed, noting that ADEC's prior understanding is that one sign location was installed to date (during the 2018 mobilization) near the Fish Camp.	Clarification. Two separate two-sided signs were installed at Northeast Cape. One sign was installed northeast of the Site 1 Airstrip and another sign was installed near the Site 4 Fishing and Hunting Camp. These signs were installed along each of the two main travel corridors to the sites. The English sign example included in Appendix G shows the location of the Site 4 Fishing and Hunting Camp sign (indicated by the yellow arrow). The Yupik sign example included in Appendix G shows the location of the Site 1 Airstrip sign. Please note the signs at both sign locations included English on one side, and Yupik on the other side. No revision will be made to the text. **ADEC- Accepted February 5, 2020**
			Additionally, the mention of the LUCs to 'designate the area as not suitable for drinking water' is potentially conflicting with other statements in the FYR document and should be reviewed and reconciled for consistency.	Accepted. The text will be updated to, "…limit future drinking water uses for groundwater…" to be consistent with the multi-site Decision Document. **ADEC- Accepted February 5, 2020**

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23.			Section 3.2.1: Discussion in applicable statements and references in this section needs to be amended in order to adequately emphasize and clarify that it was understood by the parties at the time of developing and finalizing the 2009 DD, as well as during the investigation and survey efforts and removal action efforts, that activities would primarily be focused on and limited to practically accessible contaminated sediment within 2 feet below the water surface, and that it was known and presumed during development of the DD that significant extents of both contaminated sediment and contaminated soil/tundra would require being left in place. This needs to be clarified and emphasized especially in association with general non-specific statements e.g. that the remedy called for 'removal of contaminated sediment'. Please see and apply other related comments on this subject throughout the document where applicable. **ADEC-Partially Accepted February 14, 2020; noting that ADEC does not disagree with the RTC, as well as USACE's proposal to incorporate management of the southern boundary areas of Site 28 into the UECA for the MOC, however ADEC notes its non-concurrence with USACE's position that no CERCLA contamination remains at Site 28 (specifically but not limited to extents of CERCLA contamination in soil and groundwater); as will also be further discussed in**	Accepted. The following paragraph will be added subsequent to the bulleted list of remedies in Section 3.2.1.: "Although the selected remedies for Site 28 included the excavation and removal of contaminated sediment, at the time of the development and finalization of the multi-site DD in 2009 that removal activities would target the top six to twelve inches of silty/sandy sediment. Additionally, a sedimentation basin or other appropriate controls may be necessary to prevent downstream migration of contamination." **ADEC-Partially Accepted February 5, 2020; ADEC agrees with what is stated in the RTC, however the response does not address the latter portion of ADEC's comment highlighted on the left. This issue also relates to several of the comments/RTCs re: potential disagreement about the intended functions of the remedy and the extent of contamination that remains at the site.** Accepted. The following text will be added to the end of the referenced paragraph: "An informational LUC, in accordance with UECA, describing residual POL-related contamination in sediment within the Site 28 drainage basin is recommended to prohibit disturbance of Site 28 sediment. LUCs with regard to soil and groundwater POL-related contamination at the southern boundary of Site 28 and within the previously defined "UVOST plumes" are also recommended, however, these will

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			ADEC's non-concurrence letter transmitted along with this template.	be included within the Environmental Covenant for the MOC." **ADEC-Partially Accepted February 14, 2020; per additional response on the left.**
			Section 3.2.1 page C-3-8: The second to last bullet of this section on this page which discusses the cleanup level exceedances that remained after the last removal action needs to be referenced throughout the document in relation to numerous related comments. This bullet should also be amended to clarify the accumulated sediment areas where cleanup levels for COCs were exceeded however no removal actions were conducted - i.e. contaminated sediment was left in place due to inaccessibility and/or > 2ft. below the water surface. This and other related statements throughout the document should also be expanded in order to specify/clarify whether exceedances being referred to were related to confirmation sample locations and/or sediment left in place per one of the reasons mentioned above, or other.	Clarification. This bullet is only referencing the confirmation samples collected in 2013, not the re-accumulated sediment sampled in 2018. "remained" will be replaced with "were measured in confirmation samples". **ADEC- Accepted February 5, 2020; please ensure this is adequately clarified in the presentation (e.g. add a note if necessary).** Accepted. The first sentence of the referenced bullet will be revised to: At the conclusion of the 2013 field season, several analytes, including DRO, RRO, low molecular weight PAHs, arsenic, chromium, 2-methylnaphthalene, acenaphthene, fluorene, naphthalene, and phenanthrene, were measured in sediment confirmation samples collected immediately following sediment removal at concentrations greater than the site-specific cleanup levels. **ADEC- Accepted February 14, 2020**
			Section 3.2.1, Water Treatment, pages C-3-8 – C-3-9: Discussion in this section should be expanded in order to specify/clarify that 'TAH/TAqH' were not the only water quality criteria that applied (and that currently apply) to surface water. The discussion needs to be elaborated to	Clarification. Text will be added to the first paragraph in Section 3.2.1 "Water Treatment" to describe the other applicable criteria. The text to be added will state:

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			specify that although the TAH/TAqH and sheen were the only criteria that were specified in the DD as well as the water discharge permit, that all applicable surface water criteria have been applicable to the sites at the time of and since the 2009 DD and also continue to apply for all COCs.	"… and total and dissolved arsenic did not meet the drinking water standards presented in the 2008 (ADEC) Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances…". **ADEC-Partially Accepted February 5, 2020; additional text needs to be added in order to clarify and adequately emphasize that although the DD only specifies TAH/TAqH and sheen as the applicable surface water criteria, that all applicable surface water criteria apply for all confirmed Site 28 COCs.** Accepted. An additional sentence will be added to the first paragraph of Section 3.2.1, "Water Treatment": Applicable surface water criteria were determined from the SSCLs for a non-drinking water source, as stated in the 2009 DD (USACE 2009a). **ADEC- Accepted February 14, 2020**
			This section needs to further discuss and elaborate on the coordination between the project delivery team, (USACE, ADEC, and field contract support), re: the process to determine adequate sample collection, analysis, analytes, and decision criteria with re: to managing the treated water and making discharge decisions. It is misleading to the reader to exclude this information and for the document to only focus on the reference 'permit criteria'.	Clarification. The first paragraph of page C-3-10 will be revised to include the following text: After demonstration of the effectiveness of the modified treatment system through adequate analytical sampling, ADEC and USACE agreed pre-treated water containment samples were no longer needed and treated water was discharged to the ground (USACE 2015a). **ADEC-Accepted February 5, 2020** In addition, the fourth sentence of the referenced paragraph will be modified to state:

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				After the first batch of water was processed in 2013, analytical results indicated water was still above TAqH criterion (USACE 2015a) and was therefore not discharged and remained in the holding tank for further treatment. **ADEC-Accepted February 5, 2020**
			Section 3.2.1, Surface Water Sampling, page C-3-10: Per related comments above, please always specify the respective applicable criteria being referenced (e.g. 18AAC70 for all site COCs). Is this and other similar statements throughout the document intended to imply that all of the analytes included in post-DD sample analyses were below respective 18AAC70 criteria? Or is this a scenario where all of the listed analytes were included in analysis however only TAH/TAqH and sheen are being evaluated and reported as 'meeting criteria'?	Accepted. The text will be revised to specify the referenced criteria. The paragraph will be revised to state: "Surface water samples were collected at three locations before, during, and after sediment removal and at one location downstream of the sediment trap in 2013. Samples were analyzed for DRO, RRO, benzene, toluene, ethylbenzene, and xylenes (BTEX), PAHs, PCBs, and total metals (Resource Conservation and Recovery Act metals plus nickel, vanadium, and zinc). All surface water samples were below applicable surface water criteria (TAH, TAqH, and no visible sheen) presented in the 2009 multi-site DD and the 2008 (ADEC) Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances (USACE 2015a)." **ADEC-Accepted February 5, 2020**
			Section 4.0 Table C-4-1 page C-4-1: Please amend the Action entry for Site 8 to clarify that the decision to not collect samples in 2018 was made by the project delivery team, which included a site inspection and conditional approval from ADEC based upon the project team's concurrence that additional extent investigation of soil and groundwater were necessary and the USACE's assurance that it would program this additional work for future actions within the next FYR period.	Accepted. The Action entry will be revised to state: "An attempt to complete MNA sampling occurred at the revised decision units. After field personnel performed an initial site inspection, the project delivery team was consulted and decided to not collect incremental sediment MNA samples at Site 8 due to the lack of sediment which met the DD definition of "continuously submerged" and above the vegetative mat. Subsequently, the ADEC PM performed a site

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				inspection and agreed with the PDT decision to not collect incremental sediment MNA samples at Site 8 due to the lack of sediment, with the understanding additional sampling at Site 8 would occur within the next FYR period." **ADEC-Accepted February 5, 2020**
24.		Appendix D	Section 2.0 LoE Approach, page D-2-1: Re: the discussion of the anthropogenic sources and activities associated with the concentrated arsenic contamination, has the possible prior and discharges of descaling solutions from boiler equipment been evaluated?	Discharges of descaling solutions from the boiler equipment has not been evaluated as a potential anthropogenic source for arsenic in soil because there is no record of use of a descaling solution in a boiler system at this site. **ADEC-Accepted February 5, 2020**
			The discussion of the 2014 sampling effort at the bottom of page D-2-1 should be separated as a standalone paragraph and combined with the discussion in the last paragraph of this section on page D-2-2.	Accepted. The discussions of the 2014 sampling will be combined with the final paragraph of the section. The following introductory text will be inserted to state: "The final excavation was performed in 2014." **ADEC-Accepted February 5, 2020**
			Table D-2.1: Recommend adding the year '2014' to the soil boring title of the first table and add a date range '2012-2014' for the excavation confirmation sample tables.	Accepted. The titles will be revised as recommended. **ADEC-Accepted February 5, 2020**

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25.		Appendix E	It would be helpful if the primary electronic bookmark title was amended to better specify that the field documentation is related to the FYRs for Sites 21 and 28 – since this appendix contains FYR documents for both sites but is bookmarked further down in the document and in between the individual site assessments for the respective sites; e.g. rename to '2nd FYR Field Documentation'.	Accepted. The primary electronic bookmark title will be revised to state: "Second FYR Field Documentation". **ADEC-Accepted February 5, 2020**
			Site 21, page 1: Remedy at the time of the FYR inspection should have still included and required CERCLA FYRs. ADEC acknowledges that the FYR requirement may be revised per additional findings since last removal action, however per other related comments above, this needs to be better clarified in applicable discussions and references throughout the document.	Noted. "CERCLA FYRs" was inadvertently not included as a portion of the remedy because it was not included as a check-box in the EPA standard form. Although USACE agrees this is a component of the remedy, the field documentation cannot be revised or amended. **ADEC-Accepted February 5, 2020**
			Site 21: The checklist is missing pages 3 and 4 for this site. The section V part C needs to reflect the comment in paragraph immediate above.	Accepted. Pages 3 and 4 of the Site 21 checklist were inadvertently omitted from the document and will be added to the final document. **ADEC-Accepted February 5, 2020**
			Site 21, D. page 12: Please clarify whether the monitoring wells being referred to in this section (and throughout the inspection checklist and other related references throughout the document), are intended to imply the MOC network and associated remedy. Please also see and apply comment above related to whether or not there is a relationship between the groundwater remedy and LTM required for the MOC, and the protectiveness and Site 21.	Noted. Although USACE agrees that it would be appropriate for the checklist to indicate: 1) The monitoring wells discussed in the Site 21 checklist are intended to imply the MOC network and associated remedy and that although Site 21 is near the MOC, it has not been affected by contamination associated with the MOC 2) Continued periodic monitoring of MOC groundwater, as required by the multi-site DD until cleanup levels are met, will ensure any potential migration of the contaminated MOC groundwater

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				does not affect adjacent sites and is therefore protective of the Site 21 groundwater. The field documentation cannot be revised or amended. **ADEC-Accepted February 5, 2020**
			Site 28, page 1: Remedy for Site 28 requires ICs, MNA, and CERCLA FYRs. **ADEC-Partially Accepted February 14, 2020; noting that ADEC does not disagree with the RTC, as well as USACE's proposal to incorporate management of the southern boundary areas of Site 28 into the UECA for the MOC, however ADEC notes its non-concurrence with USACE's position that no CERCLA contamination remains at Site 28 (specifically but not limited to extents of CERCLA contamination in soil and groundwater); as will also be further discussed in ADEC's non-concurrence letter transmitted along with this template.**	Noted. "CERCLA FYRs" was inadvertently not included as a portion of the remedy because it was not included as a check-box in the EPA standard form. Although USACE agrees this is a component of the remedy, the field documentation cannot be revised or amended. **ADEC-Accepted February 5, 2020** Please note MNA and ICs are not selected remedies for Site 28. **ADEC-Not Accepted February 5, 2020, although they are not specified in the remedy description or referred to as the selected remedy they are both implied and required.** Accepted. USACE agrees that an informational LUC, in accordance with UECA, describing residual POL-related contamination in sediment within the Site 28 drainage basin is recommended to prohibit disturbance of Site 28 sediment. **ADEC- Accepted February 14, 2020** LUCs with regard to soil and groundwater POL-related contamination at the southern boundary of Site 28 and within the previously defined "UVOST plumes" are also recommended, however, these will be included within the Environmental Covenant for the MOC. **ADEC-Partially Accepted February 14, 2020; per additional response on the left.**

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			Site 28, Section V. C page 4: Periodic reviews should be revised to CERCLA-FYRs,	Noted. Although USACE agrees that "CERCLA FYRs" should replace "Periodic Reviews", the field documentation cannot be revised or amended. **ADEC-Accepted February 5, 2020**
			the 'yes' should be changed to 'no' for the 'specific requirements in deed…' question, and a narrative description should be included in the 'other' in order to adequately summarize the status of the remedy, stilling basin, ICs, NEC, etc. - which as of the date of ADEC comments is superseded by State-promulgated UECA.	Disagree. Deed notices are not required for Site 28 as part of the selected remedy. **ADEC-Not Accepted February 5, 2020, although the notice (now UECA) is not specified in the remedy description or referred to as the selected remedy, it is implied and required. ADEC's position as previously mentioned is that the status of not yet having finalized LUCs and notices (now UECA) impacts the functionability and protectiveness of the remedy.** Accepted. USACE agrees that an informational LUC, in accordance with UECA, describing residual POL-related contamination in sediment within the Site 28 drainage basin is recommended to prohibit disturbance of Site 28 sediment. **ADEC- Accepted February 14, 2020** LUCs with regard to soil and groundwater POL-related contamination at the southern boundary of Site 28 and within the previously defined "UVOST plumes" are also recommended, however, these will be included within the Environmental Covenant for the MOC. **ADEC-Partially Accepted February 14, 2020; per previous related responses above left.**

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			<u>Site 28, Section XI. B page 12</u>: The summary should be revised/amended to specify that contamination does remain in place, since this was actually part of the remedy and known at the time of the inspection, and also that contamination has been confirmed to be migrating via sediment which is re-accumulating,	Noted. Although USACE agrees that the summary should be revised to specify that contamination remains in place, as the intention of the remedy was not to remove all of the contaminated material, and that contaminated material appears to be re-accumulating in previous removal areas, the field documentation cannot be revised or amended. **ADEC-Accepted February 5, 2020**
			and, that it still has not been definitively confirmed whether or not contamination is migrating offsite to downgradient areas and/or receptors. **ADEC-Partially Accepted February 5, 2020; ADEC and USACE previously agreed that it was not appropriate to apply the 2016 Suqi River results to fate and transport conclusions associated with upgradient areas. While demonstrating that contaminant concentrations in downgradient sediments are below the respective DD SSCLs is a primary component of the remedy, it is not the only factor in determining/demonstrating whether or not the remedy is protective; which includes demonstrating stable state contamination plumes and source areas for soil, sediment, and groundwater. Subsequently when migration is being considered, the driver should not be limited to whether or not SSCLs are being exceeded, rather also whether or not contamination is migrating offsite at diluted concentrations.**	Disagree. Please see RTC 17. There is a natural stilling area in Site 28 approximately 200 feet south of the Suqi River (Figure B-5) where the surface water flow channels disperse. This stilling area, in addition to the existing, natural ponds, has been found to prevent migration of contaminants above risk-based cleanup levels into the Suqi River. This has been confirmed by the 2018 sampling (Appendix F), in which no contaminants exceeded the SSCLs beyond the natural stilling area in Site 28. In addition, results of a surface water and sediment sampling effort of the Suqi River conducted in 2016 (USACE 2017) also indicated no contaminants exceeded the SSCLs in Suqi River samples. Therefore, the Suqi River is not receiving contamination from an upgradient source such as Site 28. **ADEC-Partially Accepted February 5, 2020; please see additional response on the left.** Accepted. The response will be revised to state:

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				There is a natural stilling area in Site 28 approximately 200 feet south of the Suqi River (Figure B-5) where the surface water flow channels disperse. This stilling area, in addition to the existing, natural ponds, has been found to prevent migration of contaminants above risk-based cleanup levels into the Suqi River. This has been confirmed by the 2018 sampling (Appendix F), in which no contaminants exceeded the SSCLs downstream of the natural stilling area in Site 28. Therefore, the Suqi River is not receiving contamination from an upgradient source such as Site 28. In addition, results of a surface water and sediment sampling effort of the Suqi River conducted in 2016 (USACE 2017) is an additional line of evidence that indicated no contaminants exceeded the SSCLs in Suqi River samples. **ADEC- Accepted February 14, 2020**
			Photograph Log: For the purposes of consistency and clarity it would be helpful to always specify the site (either 21 or 28) in each of the photo titles (noting that most do but several do not); and then also apply the respective changes to the Photo Log TOC list.	Accepted. The associated site name will be added to all photos. The Photo Log TOC will be updated accordingly. **ADEC-Accepted February 5, 2020**
			Please include more photos of the AOCs associated with Site 21, especially the areas within and adjacent to the wetland(s) and surface water features as well as the 2014 sampling areas.	Accepted. Two photos of Site 21 were not included in the original submission of the document. They will be added to the Photo Log. However, no photos of areas within and adjacent to the wetland(s) and surface water features or the 2014 sampling areas were collected. **ADEC-Accepted February 5, 2020**
			Photo No. 4: Were the sheen and site conditions observed in the subject photo representative of all the locations that	Accepted.

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			were sampled and/or surveyed in 2018? If some were different it would be helpful to note this and additionally specify which sediment accumulation and survey location within Site 28 is represented in the photo.	Unfortunately, not all photos were collected from surveyed locations because the site inspection occurred prior to and while sampling was occurring. **ADEC-Accepted February 5, 2020** Photos collected at surveyed locations will be labeled with the appropriate lath number, if noted by the photographer. **ADEC-Accepted February 5, 2020** Please note, this is now Photo No. 6. **ADEC-Accepted February 5, 2020** Sheen was not noted past the natural stilling area described in the main body of the text. **ADEC-Accepted February 5, 2020** An additional photo showing the clear water and non-stressed vegetation have been added (photo 20). **ADEC-Accepted February 5, 2020**
26.			**Appendix F**	
27.	F-ES-1	Executive Summary, 1.0, and 1.1	The listed sections should include summary statements and/or references to an additional section of this report (to be added) that clarify the Site 8 activities that were implemented, decisions, and field work changes that occurred in 2018. This may best be accomplished by a standalone introduction section that summarizes and references a more detailed description to be included in the 'Multi-site FYR Report'; which ADEC notes currently includes some of the necessary/requested information in section 5.3.3.4, including a brief mention in 5.3.3.2 however, more detail is necessary.	It is important to capture the Site 8 activities, decisions, and fieldwork changes that occurred in 2018. However, the Site 28 Sediment Report is a standalone report that is appended to the Second FYR Report. Although planned work at Site 8 (a petroleum site) and work performed at Site 28 (a CERCLA site) both included sediment sampling, the work was not related. **ADEC-Accepted February 5, 2020** A summary of the Site 8 planned activities, decisions, and fieldwork changes that occurred in 2018 will be added to the Executive Summary of the Second Periodic Review Report for Multiple Sites. Some of this information is already captured in Section 3.6.1 of the Second Periodic Review Report for Multiple Sites. **ADEC-Accepted February 5, 2020**

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28.	F-ES-2	Executive Summary	Please revise the second bullet on this page to specify/clarify that the statement re: PCBs is relevant only to sediment sampled in 2018. Please apply this comment to all other similar statements throughout this report and document, in conjunction with related comments above, in order to be very clear whenever discussing sediment vs. the greater drainage area (incl. e.g. tundra).	Accepted. The second bullet will specify the year samples were collected. Similar revisions will be made throughout the report. **ADEC-Accepted February 5, 2020**
29.	F-2-5	2.2.1	All prior comments above which are relevant to Site 28 (e.g. sediment, residual contamination left in place vs. re-accumulated contaminated sediment, surface water criteria, etc.), should be applied to the respective discussions and references throughout this report; applicable to all relevant comments and statements but especially with regard to statements related to e.g. 'cleanup levels [or criteria] were met', 'no contamination remains', 'only certain contaminants remain above cleanup levels', etc.	Accepted. Prior comments relevant to Site 28 will be applied to Appendix F. **ADEC-Accepted February 5, 2020**
			DD-Selected Remedy for Site 28: discussion needs to be revised to include ICs, MNA, CERCLA FYRs, and LTM.	Accepted. The section will be revised to present three remedy components and will be revised to include: "…; and (3) performance of Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Reviews." **ADEC-Accepted February 5, 2020** Please note that MNA, ICs, or LTM are not selected remedies for Site 28. **ADEC-Noted February 5, 2020; however please see and apply related responses above to this issue.** Accepted.

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			ADEC-Partially Accepted February 14, 2020; noting that ADEC does not disagree with the RTC, as well as USACE's proposal to incorporate management of the southern boundary areas of Site 28 into the UECA for the MOC, however ADEC notes its non-concurrence with USACE's position that no CERCLA contamination remains at Site 28 (specifically but not limited to extents of CERCLA contamination in soil and groundwater); as will also be further discussed in ADEC's non-concurrence letter transmitted along with this template.	An additional paragraph will be added to the Section "DD-Selected Remedy for Site 28": An informational LUC, in accordance with UECA, describing residual POL-related contamination in sediment within the Site 28 drainage basin is recommended to prohibit disturbance of Site 28 sediment. LUCs with regard to soil and groundwater POL-related contamination at the southern boundary of Site 28 and within the previously defined "UVOST plumes" are also recommended, however, these will be included within the Environmental Covenant for the MOC. **ADEC-Partially Accepted February 14, 2020; per additional response on the left.**
30.	F-3-1	3.1	With regard to the discussion in the first bullet, please make a summary statement and reference the data quality review report to emphasize if and how the data and/or DQOs were effected as a result of changing to the composite vs. the grab method.	Accepted. The data and DQOs were not affected by the collection of a composite sample rather than a grab sample. The bullet will be revised to state: "In order to meet the DQO for sediment sample collection at Site 28, two samples were collected as composite samples rather than grab samples. The volume of sediment present within the ponded area at surveyed sample locations 18NEC-S28-SD-36 and 18NEC-S28-SD-37 was limited; most of the substrate either consisted of rock or vegetative mat. The collection of two composite samples rather than grab samples did not affect data quality (Attachment F), however, results from the composite samples are representative of a larger spatial extent than the grab samples that were collected from other locations at Site 28." **ADEC-Accepted February 5, 2020**

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			Please amend the second bullet to specify whether the obstructions and impacted areas were considered by default to be sediment areas, or whether they were excluded from/not considered sediment areas.	Accepted. The following text will be added to the end of the bullet: "However, the obstructions were considered sediment for purposes of drawing sediment transect lines and no sediment depth was recorded at the two locations where obstructions were encountered." **ADEC-Accepted February 5, 2020**
			In the third bullet of this section, please specify whether or not the 7 original locations were previously sampled and/or had prior removal actions and/or previously mapped sediment; and summarize the same for the 7 relocated sample locations.	Accepted. The seven original locations were proposed for collection in areas previously sampled and with prior removal actions. The following text will be added to the bullet to state: "…either vegetative mat or on dry land in 2018 and both from areas previously sampled and with prior removal actions". **ADEC-Accepted February 5, 2020** The third paragraph in Section 3.6 will be revised to describe that all proposed sample locations were at historical sample locations within historical removal action boundaries, which samples collected in 2018 were not collocated with previous sample locations and/or outside of historical removal action boundaries. In addition, Figure B-6 (now B-7) through Figure B-9 (now B-10) and Figure F-5 through Figure F-8 will be revised to include the boundaries of the previous removal actions. **ADEC-Accepted February 5, 2020**
			Please revise/amend the discussion in the last bullet on this page for the following: 1) does the lack of survey data for the vegetative map effect DQOs and/or the information needs associated with Site 28 LTM and/or this FYR, 2) the wording of the second sentence is unclear and should be	Accepted. 1) Although mapping of the vegetative mat extents was not performed using survey equipment, the extent of vegetative mat was measured in the field and incorporated into the analysis of conditions at Site 28.

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			rephrased/worded according to a) ADEC presumes the survey continued up to the vertical and horizontal extents of sediment and ceased upon encountering the interface of a substrate profile that was not predominantly characterized as sediment, and b) the intended meaning and context of the latter half of this second sentence is unclear and should be amended/elaborated to specify/clarify;	This does not affect the DQO because the waterbody extents were professionally surveyed and vegetative mat was measured (at transect locations); **ADEC-Accepted February 5, 2020** and 2) the text in the second sentence will be revised for clarity. The last bullet in Section 3.1 will be revised to state: …was not surveyed by professional surveyors as indicated in the 2018 work plan (USACE 2018). Instead, the field team collected measurements at each of the surveyed locations using a tape measure and projected the extent on the figures in Attachment F-1. This did not affect the DQO to map the extent of the vegetative mat, because the measurements were still collected." **ADEC-Accepted February 5, 2020**
			and 3) the last sentence should be amended/elaborated in conjunction with the general discussion of 'surveying' in this bullet and throughout the document where applicable to better clarify the difference between what appears to be professional survey activities associated with the primary extents of sediment vs. additional tape measurements that were collected by the field team.	Accepted. See response to part 4 of comment above. **ADEC-Accepted February 5, 2020**
			Also, please better clarify whether the hand-collected tape measurements included presumed sediment and/or surface water areas; or whether the hand-collected tape measurements were intended to measure and inventory what was determined in the field to be characteristic of vegetative mat.	Accepted. See response to part 4 of comment above. **ADEC-Accepted February 5, 2020**

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31.	F-3-10	3.6	The discussion on this page references 54 samples, but then states/discusses groups of 45, 7, and 3 samples - which equals 55 samples, please clarify.	Accepted. Fifty-four sediment samples were collected from Site 28. The second sentence of the third paragraph will be revised to state: "A total of 44 samples were collected…" **ADEC-Accepted February 5, 2020** Also, the three samples of opportunity were collected from locations S28-52, 53, and 54. Location S28-51 was not a sample of opportunity but was relocated to a suitable sample location that contained sediment. The seventh sentence will be revised to state: "…fuel odor or sheen (locations S28-52, 53, and 54)" **ADEC-Accepted February 5, 2020**
			Amend/rephrase the statements in the two sentences re: surveyor demobilization and field tape measurements to specify e.g. '…prior to relocating the sample locations and were therefore not included in the professional survey rather…'.	Accepted. The referenced sentence will be removed and the following sentence will be revised to state: The new locations were recorded using a tape measure and compass (Photographs F-3-9 and F-3-10). **ADEC-Accepted February 5, 2020**
32.	F-5-1	5.0 and Figures	All prior comments above which are relevant to Site 28 (e.g. sediment, residual contamination left in place vs. re-accumulated contaminated sediment, surface water criteria, etc.), should be applied to the respective discussions and references throughout this report; applicable to all relevant comments but especially with regard to statements related to e.g. 'cleanup levels [or criteria] were met', 'no contamination remains', 'only certain contaminants remain above cleanup levels', etc.	Accepted. Prior comments relevant to Site 28 will be applied to Appendix F. **ADEC-Accepted February 5, 2020**
33.		Appendix G	<u>Community Issues</u>: <u>Page 2 of 19</u>: Re: the statement in the third USACE Response statement on this page that 'ADEC concurred	Accepted. Response will be revised to: "The ADEC concurred with the adequacy of the investigation, provided that

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			with the adequacy of the investigations', this statement and related discussion (and other similar statements throughout the document) should be revised/amended in order to provide the accurate and adequate context. While ADEC did concur with the extents of investigation and site characterization, as well as the Corps' position re: its implementation of the CERCLA process, ADEC has consistently noted and emphasized its positions that much of this concurrence is conditional to ongoing and continued work e.g. LTM, additional site characterization as needed, LUCs and ICs, FYRs and periodic reviews, etc. in order to continue investigating and/or evaluating site conductions and remedy functionability as needed in order to achieve and/or maintain protectiveness.	the remedy is properly implemented and the CERCLA process continues to be followed in order to achieve and/or maintain protectiveness." Similar statements will also be revised accordingly. **ADEC-Accepted February 5, 2020**
			Page 7 of 19: The responses in this section and throughout the document associated with NEC and LUCS should be amended/revised in order to include the current requirements of the Universal Environmental Covenants Act (UECA).	Accepted. USACE is currently preparing covenants consistent with UECA for the Northeast Cape FUDS. The response in this section and elsewhere will remove reference to Notices of Environmental Contamination and instead reference the UECA. **ADEC-Accepted February 5, 2020**
			Page 10 of 19 First USACE Response: The response does not address the comment. The DD document states 'and applicable surface water criteria' however it did not adequately list the COCs and respective protective criteria; and instead only itemized TAH and TAqH COCs as SSCLs. ADEC has consistently noted this discrepancy in association with prior document reviews and comments and has not concurred with the USACE's interpretation and implementation of 'applicable' surface water cleanup	Clarification. Page 75 of the Decision Document states the following with regard to surface water criteria: Surface water cleanup levels are the same as the Main Complex groundwater cleanup levels, assuming the water is used as a drinking water source. In addition, surface water must meet water quality standards as promulgated by the State of Alaska in 18 AAC 70. *The water quality criteria for petroleum hydrocarbons, oil, and grease are set out in regulation*

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			levels, noting that this is a potential issue that requires consideration with re: to amending the DD and/or developing e.g. an ESD, memorandum, etc. **ADEC-Partially Accepted February 5, 2020; additional text needs to be added in order to clarify and adequately emphasize that although the DD only specifies TAH/TAqH and sheen as the applicable surface water criteria, that all applicable surface water criteria apply for all confirmed Site 28 COCs.**	*at 18 AAC 70.020(b) and stipulate these compounds may not cause a visible sheen upon the surface of the water. In addition, the regulations contain surface water quality levels of 0.010 milligrams per Liter (mg/L) total aromatic hydrocarbons (TAH) and 0.015 mg/L total aqueous hydrocarbons (TAqH).* TAH is the sum of concentrations of benzene, toluene, ethylbenzene, and xylenes, commonly called BTEX. TAqH is the sum of concentrations of TAH (BTEX) plus the polycyclic aromatic hydrocarbons (PAH). The italicized text above describes the surface water criteria within the DD for non-drinking water sources, which are considered protective of human health and the environment. **ADEC-Partially Accepted February 5, 2020; please see additional response on the left.** Accepted. The following text will be added to the referenced response: The surface water criteria applicable to Northeast Cape sites, as stated in Section 2.10 of the DD, “are the same [levels] as the Main Complex groundwater cleanup levels, assuming the water is used as a drinking water source. In addition, surface water must meet water quality standards as promulgated by the State of Alaska in 18 AAC 70. The water quality criteria for petroleum hydrocarbons, oil, and grease are set out in regulation at 18 AAC 70.020(b) and

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				stipulate these compounds may not cause a visible sheen upon the surface of the water. In addition, the regulations contain surface water quality levels of 0.010 milligrams per Liter (mg/L) total aromatic hydrocarbons (TAH) and 0.015 mg/L total aqueous hydrocarbons (TAqH).” Surface waters considered a drinking water source are the surface waters of the Suqitughneq River, upstream of the intersection of the Airport and Cargo Beach Road, which is presented in Section 2.8.3 of the DD. **ADEC- Accepted February 14, 2020**
			Page 10 of 19: Second USACE Response: ADEC disagrees with the general statement in the second USACE Response on this page that ‘there are no uncharacterized areas of concern”, noting that the Sites 7, 9, and 28 do have areas that have not been entirely characterized. Site 28 requires a CERCLA FYR and that Sites 7 and 9 conditionally (as previously discussed and agreed by USACE and ADEC during the first FYR), require at a minimum Periodic Reviews until otherwise determined that changes are necessary (e.g. that CERCLA FYRs are necessary or that Periodic Reviews could be discontinued). This needs to be adequately and accurately presented and specified in the respective USACE Responses and related discussions throughout this document, including the FYR(s) and appendices.	Accepted. The sentences, “Sites 7 and 9 have been investigated, the remedies selected, and aside from LUCs, the remedies have been implemented. There are no uncharacterized areas of concern that require CERCLA Five-Year Reviews” have been deleted from the response. USACE agrees that Sites 7 and 9 conditionally (as previously discussed and agreed by USACE and ADEC during the first FYR), require at a minimum Periodic Reviews until otherwise determined that changes are necessary (e.g., that CERCLA FYRs are necessary or that Periodic Reviews could be discontinued). This will be clarified throughout reports and USACE Responses to Community Issues. **ADEC-Accepted February 5, 2020**
			General: ADEC will submit any additional detailed comments related to other sites (besides Site 21 and/or 28) in an additional submittal specific to either the Site 7 FYR and/or the Multi-site FYR since this document is intended	Noted. **ADEC-Accepted February 5, 2020**

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			to be to be the focus of the subject standalone FYRs and assessments for Sites 21 and 28 and a 2018 Site 28 LTM Investigation Report.	
			Page 15 of 19: ADEC disagrees with the last USACE Response on this page that additional investigation at Site 28 is not warranted, noting that the response is focused on the limits of the investigation at the MOC and does not address the suggestion.	Clarification. The following text will replace the referenced text, "As stated in this FYR, the selected remedies are currently protective and are functioning as intended, therefore, collecting additional data in this area is not warranted at this time." **ADEC-Accepted February 5, 2020**
			Page 16 of 19: Please revise/amend the statement in the last sentence of the first paragraph of the first USACE Response on this page, in relation ADEC's prior comments which note disagreement with making statements that don't evaluate and present the results of surface water samples with re: to applicable surface water criteria in addition and not limited to TAH/TAqH and sheen. Apply similarly to the USACE Responses in the first and second paragraphs on page 9 and others throughout this section and document.	Please see the response above regarding page 10 of 19. **ADEC-Noted/Partially Accepted February 5, 2020; please see additional response on the above left.** Accepted. Clarification will be added to the referenced sentence with the following revision: None of the surface water samples exceeded the DD criteria applicable to non-drinking water sources for TAH/TAqH, and no hydrocarbon sheen was observed. **ADEC- Accepted February 14, 2020** Clarification will also be added to Page 10 (as noted in the above response). **ADEC- Accepted February 14, 2020**
			ADEC disagrees with the last paragraph of the USACE Response re: Site 28 that is at the top half of this page. The discussion in this paragraph should be revised and amended in order to provide the proper context, noting that ATSDR only evaluated fish species that were 1) confirmed present	The 3rd paragraph of 1st response on page 16 of 19 will be replaced with the following: "Contaminants remaining in sediment at Site 28 are organic chemicals (POL) that partition much more strongly to sediment than to surface water. Thus, sampling sediment captures the "worst-case" media contamination, and

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			in the waterways associated with NECape and 2) that were confirmed to be consumed. ATSDR did not evaluate environmental health and/or exposure risk concerns to other receptors and instead only focused the health consultation on contamination exposure risk to humans. Further, it is inaccurate and inappropriate to state that tissue sampling is 'not warranted based on historic and 2018 sample results'.	additional surface water samples are unlikely to provide substantial additional benefit. At ADEC's request, USACE considered whether additional fish tissue sampling is warranted at NEC. We concluded that tissue sampling is not warranted, for the following three reasons: 1. An independent federal public health agency, ATSDR, evaluated contaminant levels in Suqi River fish tissue and concluded that "eating fish from NEC in the summer (3 months) is not expected to harm people's health" because "contaminants are not present in fish at sufficiently elevated levels to be harmful." Thus, contaminant levels in edible fish species have been determined not to threaten the health of Saint Lawrence Island residents who might consume them. 2. Contaminant levels in biota are not specified as an RAO, and "comparison" or "threshold" values of site contaminants in biota were not specified in the DD. 3. Site 28 contaminants are not present in Suqi River surface water or sediments at levels of human health or environmental concern. **ADEC-Accepted February 5, 2020**
			Page 19 of 19: The second USACE Response on this page should be amended to also include all sites that require Periodic Reviews, LUCs, etc. in addition to CERCLA-FYR sites.	Page 19 of 19: Agreed. The following phrase will be appended to the end of the first sentence of this response: ", and/or during periodic reviews for non-CERCLA (POL) sites." **ADEC-Accepted February 5, 2020**
			Meeting Minutes: ADEC PM is spelled 'Dunkin' instead of the typo 'Duncan'.	Accepted. The typo will be corrected in the Meeting Minutes. **ADEC- Accepted February 5, 2020**
1.			**End of ADEC Comments**	

Table 8. Comparison of Multi-Site DD Cleanup Levels and Risk-Based Benchmarks.

COC	Multi-Site DD Cleanup Levels (USACE, 2009)		Risk-based Criteria for Benthic Macroinvertebrates and Wildlife (mg/kg dw)				
	Cleanup Level (mg/kg)	Source	Sediment Cleanup Level (WAC, 2013)	EqP Sediment Benchmarks (EPA, 2003 and EPA, 2012)	Soil/Sediment EcoPRG Wildlife (AUF=1) (LANL, 2017)	Soil/Sediment EcoPRG Wildlife (AUF=Site 28) (LANL, 2017)	Receptor
DRO C_{10} to C_{25}	3,500	Site-specific	--	--	--	--	--
RRO C_{25} to C_{36}	3,500	Site-specific	--	--	--	--	--
Acenaphthene	0.5	WAC, 1995	0.57	4.2	1300	3600	shrew
Benzo(g,h,i)perylene	1.7	WDNR, 2003	0.78	10.9	260	710	shrew
Fluoranthene	2	WDNR, 2003	12	7.1	230	620	shrew
Fluorene	0.8	WAC, 1995	0.79	5.4	520	1400	shrew
Indeno(1,2,3-cd)pyrene	3.2	WDNR, 2003	0.88	11.2	740	2000	shrew
2-Methylnaphthalene	0.6	WAC, 1995	0.64	4.3	160	450	shrew
Naphthalene	1.7	WAC, 1995	1.7	3.9	30	83	deer mouse
Phenanthrene	4.8	WAC, 1995	4.8	6	110	300	shrew
Total LPAHs	7.8	WAC, 1995	7.8	--	--	--	--
Total HPAHs	9.6	WAC, 1995	53	--	--	--	--
PCBs (sum)	0.7	WAC, 1995	0.65	--	--	--	--
Arsenic	93	WAC, 1995	93	--	200	540	shrew
Chromium	270	WAC, 1995	270	--	280	770	robin
Lead	530	WAC, 1995	530	--	290	3800	robin
Zinc	960	WAC, 1995	960	--	340	930	robin

Notes:

Criteria higher (less conservative) than that used in the multi-site DD.

Criteria lower (more conservative) than that used in the multi-site DD.

EqP = Equilibrium partitioning sediment benchmark, assumes 1% total organic carbon (EPA, 2012)

EcoPRG = ecological preliminary remedial goal. Lowest value for birds or mammals based on the lowest observed adverse effect level (LOAEL). EcoPRGs calculated using AUF=1 and using Site 28 acreage of 14.65 acres.

ADEC- Accepted February 5, 2020

From: Dunkin, Curtis S (DEC)
To: Elconin, Andrea B POA; Shewman, Aaron F CIV USARMY CEPOA (USA)
Subject: NEC Site 28 historical soil and surface water investigation results

Andrea, thank you again for the productive resolution meeting with the project team yesterday. I apologize for the long email but wanted to provide you with the summary of ADEC's perspective, based on our comment resolution discussions yesterday and also my preliminary re-review of select documents and data today. Per our discussion, ADEC's position with re: to the status of CERCLA contaminants at Site 28, is that there is currently not enough continuity in the presentation of supporting data that would provide ADEC with the adequate confidence to concur with USACE's determination that no CERCLA contaminants and/or CERCLA contamination sources remain at Site 28 with respect to soil; and additionally potentially the same would apply for groundwater. In an attempt to provide some clarity to this I've been re-reviewing the March 2004 Risk Assessment, the Phase III RI report documents and the 2011 Site 28 Tech Memo.

My preliminary review indicates that CERCLA contaminants (primarily PCBs but also other metals) were detected in association with multiple investigation efforts at varying depths at concentrations that exceeded cleanup levels in what is designated as 'soil'. Further, many/most of the designated soil locations appear to be outside of what was mapped as areas where surface water and/or sediment are depicted - and/or where removal actions were completed. The Phase III RI and the 2004 risk assessment identified CERCLA contaminants as COPCs and COPECs in soil based upon sampling and analysis that were targeted in soil up to conducting the risk assessment in the 2001-2003 timeframe. As a note, the 2011 Site 28 transect locations were entirely different than those conducted in 2001, and the 2001 data tables do not specify soil samples, rather appear to list/designate all of the samples as sediment. Additionally the 2011 effort identified PCBs and metals in designated 'soil' at locations that also appear to be outside of the targeted removal action areas. Lastly based on my records review, the only other 'soil' investigation work that appears to have occurred within the site 28 AOC (with the exception of the 2011-2013 mapping and removal efforts) was the 2010 UVOST investigation that was focused on supporting characterization of the extent of fuel contamination associated with the MOC, and did not include any CERCLA contaminants in the soil analyses. My recollection is that ADEC had requested USACE consider adding the other non-POL site COCs to focused/limited locations of correlation sampling associated with the the UVOST investigation however my recollection is that USACE did not add those analytes.

In summary ADEC's position on the status of CERCLA contaminants at Site 28 include but are not limited to the following:

1. It may not be appropriate or accurate to assume that the selected remedy for site 28 (removal of contaminated sediment) was the result of data-based determinations that no CERCLA contamination sources remained that impacted soil and/or groundwater at site 28;
2. Data indicate that CERCLA contaminants may remain at concentrations which exceed respective applicable cleanup levels at locations which have been designated as soil and may not have been entirely removed during removal action efforts;
3. Based on current records review, the majority of soils in the southern-most and furthest upgradient areas of Site 28 which are directly downgradient from and adjacent to the MOC have not been adequately characterized for CERCLA contaminants, mainly as a result of not including non-POL contaminants as analytes in prior sampling and analysis; and

4. Confirmation samples collected post removal action in 2013 are referenced as having been designated as soil or sediment samples, however these locations were all collected within areas where removal actions of sediment occurred. Further, the 2016 re-evaluation of human health risk for site 28 was 1) limited to confirmation sample locations where removal had occurred and was not based upon additional soil sampling locations, and 2) did not consider Eco- or HH risk based upon residual contamination in soils outside of the sediment removal areas.

As a result of the above, ADEC would not be able to concur at this time with USACE's determination that CERCLA contaminants and/or CERCLA contaminant sources are no longer present at Site 28; based upon which, ADEC would disagree with the FYR's current recommendation to discontinue FYRs and to transition to Periodic Reviews.

I don't think that our agreed additional/revised RTCs and revisions to the FYR that we discussed yesterday will resolve the CERCLA contamination status issue and/or proposal to discontinue FYRs. I'll continue to confer internally between now and Friday to determine ADEC's preference on how to document our disagreement, whether that is via the comment template, this email, additional letter to the FYR, etc. and I'll also look out for and be prepared to review and approve the revised RTCs before Friday COB (hopefully if those can be received by latest first thing Fri. morning). Thank you again Andrea, and please contact me anytime throughout this week or next to discuss/resolve further. Best regards