DRAFT FINAL

Marine Ways and Pier Area Remedial Design Work Plan U.S. Coast Guard Base Ketchikan, Ketchikan, Alaska

October 2024

Contract W911KB23D0007
Task Order W911KB23F0158

Prepared for:

U.S. Coast Guard

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
≥	greater than or equal to
%	percent
AAC	Alaska Administrative Code
ACL	alternative cleanup level
ADEC	Alaska Department of Environmental Conservation
AOC	area of concern
ARAR	applicable or relevant and appropriate requirements
AS	Alaska Statute
AVS-SEM	acid-volatile sulfide-simultaneously extracted metals
bgs	below ground surface
BMP	best management practice
Brice	Brice Engineering, LLC
BSY	Buoy Storage Yard
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
CGC	Coast Guard Cutter
COC	contaminant of concern
COPC	contaminant of potential concern
COR	Contracting Officer Representative
CQCP	Contractor Quality Control Plan
CWA	Clean Water Act
cy	cubic yards
DoD	Department of Defense
DQO	data quality objective
DRO	diesel range organics
DU	decision unit
ELAP	Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FFS	Focused Feasibility Study
FRC	fast response cutter
FSP	Field Sampling Plan
g/g	grams per gram
GIS	geographic information system
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	high-efficiency particulate air
IDQTF	Intergovernmental Data Quality Task Form

ACRONYMS AND ABBREVIATIONS (CONTINUED)

IPac	Information for Planning and Consultation
kg	kilograms
LUC	land use controls
LUCIP	Land Use Control Implementation Plan
LTM	long-term monitoring
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MMPA	Marien Mammal Protection Act
MS	matrix spike
MSD	matrix spike duplicate
MT2	Metals Treatment Technologies, LLC
n.o.s.	not otherwise specified
NCP	National Contingency Plan
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
OFR	Office of the Federal Register
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PM	Project Manager
PMP	Project Management Professional
PPE	personal protective equipment
ppm	parts per million
OSHA	Occupational Safety and Health Administration
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RA	remedial action
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RD	remedial design
ROD	Record of Decision
RPM	Remedial Project Manager
RRO	residual range organics
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SOW	Statement of Work
SPLP	Synthetic Precipitation Leaching Procedure

ACRONYMS AND ABBREVIATIONS (CONTINUED)

SVOC	semi-volatile organic compound
SW	Solid Waste Method
TCRA	Time-Critical Removal Action
TOC	total organic carbon
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
UECA	Uniform Environmental Covenants Act
UFP	Uniform Federal Policy
UHC	underlying hazardous constituent
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
UU/UE	unlimited use and unrestricted exposure
VOC	volatile organic compound
WMP	Waste Management Plan
XRF	X-ray fluorescence

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EXECUTIVE SUMMARY

This Remedial Design (RD) Work Plan presents the planning and future site activities to be conducted at the U.S. Coast Guard (USCG) Base Ketchikan, located in Ketchikan, Alaska. Base Ketchikan is located on Revillagigedo Island, one mile southeast of downtown Ketchikan, and is managed under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). The current Base location was established in 1919 as a U.S. Lighthouse Service depot and officially became part of the USCG in 1939 (USCG 1999). The primary mission of Base Ketchikan is to oversee facilities and provide industrial engineering, logistics, security, and comptroller support for all USCG in Central and Southeast Alaska.

The Focused Feasibility Study (USACE 2018) established four areas of concern (AOC) for USCG Base Ketchikan based on location, medium, and historical data. The Record of Decision (ROD) (USACE 2021) identified the remedies selected by the USCG for each AOC. These remedies were chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986, and, to the extent practicable, with the National Contingency Plan Title 40 of the Code of Federal Regulations (CFR), Part 300 (40 CFR 300). The four AOCs and selected remedies are:

- **AOC 1 Buoy Storage Yard:** Alternative 5 (Excavation, Onsite In-Situ Treatment, and Offsite Polychlorinated Biphenyl Disposal).
- **AOC 2 Inner Boathouse:** Alternative 4 (Removal and Offsite Disposal).
- **AOC 3 Inner Marine Ways:** Alternative 3 (Limited Land-Based Excavation, Offsite Disposal, and Land Use Controls [LUCs]).
- **AOC 4 Subtidal Sediment:** Alternative 2 (LUCs with Long-Term Monitoring).

This Work Plan defines expectations for the RD and Remedial Project Manager (RPM), provides guidelines to promote consistency for the four AOCs identified at the USCG Base Ketchikan, details the steps to be taken during each remedial action (RA) to meet the goals established in the ROD (USACE 2021), and provide specifications describing the technical requirements the contractor must meet to implement the RA and the criteria for determining whether those requirements are met.

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1.0 INTRODUCTION

This Remedial Design (RD) Work Plan presents the planning and future site activities to be conducted at the U.S. Coast Guard Base (USCG) Base Ketchikan, located in Ketchikan, Alaska (Figure 1). Brice Engineering, LLC (Brice) prepared this Work Plan under the U.S. Army Corps of Engineers (USACE) Alaska District, Hazardous, Toxic, Radioactive Wastes Contract W911KB23D0007, Task Order W911KB23F0158 for the USCG Civil Engineering Unit in Juneau, Alaska. The Work Plan has been prepared in accordance with the following regulations and guidance documents:

- Comprehensive Environmental Response Compensation and Liability Act (CERCLA), 58 Federal Register 5475
- Superfund Amendments and Reauthorization Act of 1986 (SARA)
- National Contingency Plan (NCP) Title 40 of the Code of Federal Regulations (CFR), Part 300 (40 CFR 300)
- U.S. Environmental Protection Agency (EPA) *Remedial Design/Remedial Action Handbook* (EPA 1995)
- *Final Record of Decision (ROD) US Coast Guard Base Ketchikan, Alaska* (USACE 2021)
- Toxic Substances Control Act (TSCA)
- Resource Conservation and Recovery Act (RCRA)
- Alaska Department of Environmental Conservation (ADEC) Title 18 of the Alaska Administrative Code (AAC) Chapter 75 (ADEC 2023)
- ADEC 18 AAC 78 (ADEC 2019)
- ADEC *Field Sampling Guidance* (ADEC 2022a)

The RD is the phase in site cleanup where the technical specifications for cleanup remedies and technologies are designed. The remedial action (RA) phase follows the RD phase and involves the actual construction or implementation phase of site cleanup. Both the RD and RA phases are based on the specifications described in the ROD (USACE 2021).

1.1 Project Goals and Objectives

The RD goals and objectives are to:

- Prepare Planning Documents
- Conduct a Site Visit (Completed 14 November 2023)
- Project Management Reporting

1.2 Key Personnel and Communication Pathways

Table 1 and Table 2 present the key personnel of the project, along with responsibilities and communication pathways.

1.3 Remedial Design Schedule

A project schedule summary is provided below.

- 16 June 2021: Final ROD (USACE 2021)
- 14 November 2023: Site Visit conducted by Brice, USCG, and ADEC
- 7 June 2024: Draft Work Plan
- To be determined: Final Work Plan

Table 1 USACE and Regulatory Key Personnel

NAME/TITLE	RESPONSIBILITIES/COMMUNICATION DRIVERS	PROCEDURES
Phil Charles USACE Contracting Officer 907-753-5579 phil.charles@usace.army.mil	• Contracting issues requiring coordination between the USACE PM and Brice	• Coordinates with the Brice PM regarding contracting issues • Only person with authority to change the contract
Scott Kendall USACE COR 907-753-5661 scott.kendall@usace.army.mil	• Represents the Contracting Officer on communications related to contract-related issues, however only the Contracting Officer has authority to change the contract	• Process pay requests and enters performance-related information into the USACE system
Beth Norris USACE Project Manager 907-53-5535 beth.j.norris@usace.army.mil	• Maintains oversight for the project • Reviews the Work Plan and any subsequent Work Plan amendments • Serves as the point of contact with the USCG • Evaluates change order requests and recommended solutions • Communicates changes to the USCG	• Reviews RD scope, activities, and process for elements related to a) project metrics completion progress, and b) issues needing involvement and resolution by the various USACE project team members • Coordinates with USACE project team • Serves as principle day-to-day point of contact with contractor's PM for issues related to day-to-day coordination and project management • When technical issues arise that are not resolved between technical representatives of USACE and the contractor, the PM coordinates resolution of issues between parties
Christy Howard USCG Project Manager 907-463-2426 christina.m.howard@uscg.mil	• Maintains oversight for the project • Reviews the Work Plan and any subsequent Work Plan amendments • Serves as the point of contact with ADEC • Coordinates with USCG Base Ketchikan, as needed	• Serves as principle point of contact with the USACE PM related to coordination, project oversight, and scope of work • Serves as a technical point of contact for the USACE PM and USCG, along with coordinating technical support with other USCG technical representatives • Oversee project activities and project deliverables ensuring they are in line with the RD scope and USCG requirements
Dylan Proudfoot USCG Deputy Project Manager 907-463-2421 dylan.a.proudfoot2@uscg.mil	• Maintains oversight for the project and supports the USCG PM as needed • Coordinates with USCG Civil Engineering Unit, as needed	• Serves as principle point of contact with the USACE PM related to coordination, project oversight, and scope of work • Serves as a technical point of contact for the USACE PM and USCG, along with coordinating technical support with other USCG technical representatives • Oversee project activities and project deliverables ensuring they are in line with the RD scope and USCG requirements

Table 1 USACE and Regulatory Key Personnel

NAME/TITLE	RESPONSIBILITIES/COMMUNICATION DRIVERS	PROCEDURES
Michael Hooper ADEC Regulator 907-334-5939 michael.hooper@alaska.gov	• Provides regulatory project oversight	• Reviews and provides comments on project Work Plan

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

Table 2 Brice Key Personnel

NAME/TITLE	RESPONSIBILITIES	PROCEDURES	EDUCATION/EXPERIENCE
Greg Rutkowski, PMP Project Manager 907-350-6742 greg.rutkowski@briceeng.com	• Provides direction to the Brice project team to meet project objectives, the project budget is tracked, and the project is on schedule • Conducts planning and preparatory communications and meetings • Communicates changes in schedule • Planning and initiating corrective actions, as needed • Communicates details to the USACE PM	• Facilitates review meetings, status meetings, and other meetings with USACE and stakeholders, as necessary • Coordinates with the USACE PM regarding scope of work implementation, if necessary • If corrective action is necessary, notify USACE PM and recommend corrective action	Experience: 20 years Education: B.S., Environmental Science
Jessica Bay Deputy Project Manager 757-754-9240 jessica.bay@bricesolutions.com	• Implements, oversees, and coordinates project activities to meet project objectives • Supports the PM as needed	• Provides technical review of deliverables	**Experience:** 13 years **Education:** B.S., Microbiology, M.S., Environmental Quality Science

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

2.0 PHYSICAL CHARACTERISTICS AND SITE HISTORY

2.1 Site Description

Base Ketchikan is located at 55°20'00"N and 131°37'30"W, on Revillagigedo Island approximately 1 mile southeast of the City of Ketchikan and 1.5 miles northwest of the City of Saxman (Figure 1). The installation consists of 71 acres of land on the southeastern coast of Alaska in the Tongass National Forest. The installation resides on a narrow parcel of coastal land bisected lengthwise into an Upper and Lower Base by the South Tongass Highway. The Lower Base is located southwest (seaward) of the highway, and structures include the Administration Building, Supply Warehouse, Marine Ways Shed, Marine Railway, Buoy Shed, North And South Shops, Gymnasium, Security Building, and Hazardous Waste Storage Building (Figure 2). This 9-acre area is fenced and secured. The Upper Base comprises approximately 62 acres located on the northeast (landward) side of the highway and contains mostly residential and support facilities, storage areas, an active firing range, and inactive firing range. Property access is controlled by a locking gate located at the road entrance to restrict public access (USACE 2021).

2.1.1 Climate

Base Ketchikan is influenced by a maritime climate, consisting of cool summers and mild winters. The following data are taken from the Weather Channel as recorded from 1995 to 2014. The mean temperature is 45.2 degrees Fahrenheit (°F). The average annual precipitation is 141.6 inches (Weather Channel 2014). On average, the warmest month is July with a mean temperature of 57.5°F and a mean maximum temperature of 64°F. The coolest month is January, with a mean temperature of 35°F and a mean maximum temperature of 40°F. The maximum average precipitation occurs in October, with an average of 19.22 inches of precipitation.

2.1.2 Geology

The soil at the site is moist to nearly saturated, acidic, organic-rich, and covered by sedges, dense brush, or trees. Bedrock is encountered between the surface and approximately 4 feet below ground surface (bgs). The bedrock of Ketchikan consists of slate, phyllite, quartzite, and schist interlaid by marble and gneiss (Berg et al. 1988).

2.1.3 Topography and Surface and Subsurface Hydrology

The hydrogeology of the site is characterized by a series of shallow and ephemeral water bodies with high surface runoff, low permeability bedrock, and a steep, seaward gradient. Wetlands are present at the Upper Base (USACE 2021).

2.1.4 Marine Environment

The Tongass Narrows is a U-shaped glacier-carved fjord, typical of Southeast Alaska intercoastal waterways. The Narrows is divided into two channels by Pennock Island to the southeast of Ketchikan. Base Ketchikan is located on the east shore of the east channel. The width of the Tongass Narrows ranges from 0.3 to 0.6 miles in the vicinity of Ketchikan to 0.18 miles at a constriction, 3.5 miles northwest of Base Ketchikan. The width of the east channel in the vicinity of Base Ketchikan is 0.3 miles. Depths in the Tongass Narrows range from 50 to 90 feet in the deepest places of the channel at Ketchikan. The depth

averages 110 feet where the channel constricts. The depth of the channel in the vicinity of Base Ketchikan ranges from 84 to 162 feet deep.

The mean tide range at Ketchikan is 12.95 feet and the mean diurnal range is 15.38 feet. Tide ranges are maximum at full and new moons (spring tides) and minimum at quarter moons (neap tides). Tongass Narrows, like all Southeast and Southcentral Alaska, has a semi-diurnal tide with a pronounced diurnal inequality. Tidal currents are generally less than 1.15 miles per hour and reverse at Ketchikan due to the constriction of the Tongass Narrows (Smith and Lee 2002). Tidal currents generally flow parallel to the channel to the southeast (120°) on ebb and to the northwest (310°) on the flood. Current speeds and directions typically vary near the shore, where the flow is diverted by friction or inertial diversion by prominences, such as docks. Prominences with significant embayments in their lee may induce countercurrents associated with a circulating eddy within the embayment. The measured current velocities were typically lower than predicted by the National Oceanic and Atmospheric Administration (NOAA) near the shore, and higher than predicted by NOAA within the channel (Smith and Lee 2002).

2.1.5 Sediment Dynamics

A detailed study of sediment transport has not been conducted for the Ketchikan area. In 2014, an approximate sediment transport model was conceptualized based on the hydrography and geography of the Tongass Narrows. Based on a current velocity of 1 mile per hour and a tidal cycle of six hours (i.e., coupled high and low tides occur in 12 hours) the maximum distance that sediment could be transported is 6 miles (USACE 2014). This assumption is an extreme upper limit in that it assumes the following:

- Sediment is transported as a suspended load; sediment is primarily clay size and thus transported at the same velocity as water. Sediment particles larger than clay size will settle through the water column and be transported as bed load, at a velocity lower than the maximum tidal velocity.
- Tidal currents are typically slower nearshore and with increasing depth. Nearshore is where sediment accumulates and is the area of interest.
- Sediment is transported for the entire duration of the tidal cycle, that is, tidal currents reverse instantaneously.
- The constriction of the Tongass Narrows 3.5 miles northwest of Base Ketchikan restricts tidal currents, and currents generally flow parallel to the channel 120° to the southeast on ebb and 310° to the northwest on the flood.

Additional sediment transport assumptions are that:

- The constriction is also a geographic boundary that restricts, or at least highly limits, sediment transport out of the Tongass Narrows to the northwest.
- The sediment in the Tongass Narrows is primarily supplied by the weathering of land by wave action. Sediment supplied by currents (i.e., rivers) could potentially be transported out of the Narrows, for example, during ebb tides.

The distance from the Tongass Narrows constriction to the southern end of Pennock Island is approximately 5.5 miles. This distance is comparable to the maximum transport distance calculated for suspended sediment. As a result, it is likely that the sediment present in the vicinity of Ketchikan has a substantial residence time; that is, that sediment is continually transported from the constriction to the island and back. The impact of extreme events (e.g., storm surge combined with high tide) on the sediment distribution in the area has not been considered (USACE 2014).

2.1.6 Ecology

Coastal and downstream waters surrounding Base Ketchikan are migratory pathways and feeding areas critical for the maintenance of anadromous fish. These waters are also significant commercial and recreational fishing resources. Marine mammals including otters and harbor seals transit the area and prey on aquatic organisms that may reside or forage in the subtidal areas. Other predatory species in the area include terrestrial mammals such as black bears. Avian groups that may frequent the area include waterfowl and shorebirds. Migrating ducks, geese, and swans are common waterfowl in the Ketchikan area. Shorebirds (e.g., gulls) and eagles are examples of common fauna at the site (USCG 2003a). Marine mammals protected by the Endangered Species Act and Marine Mammal Protection Act that may occur in the area include Steller sea lion, fin whale, and humpback whale (NOAA 2020). No other endangered species are expected to occur at Base Ketchikan (U.S. Fish and Wildlife Service [USFWS] 2020).

The local ecology is typical of wharfs and piers. The sediment substrate varies in relation to the degree of rocky outcroppings and structures; however, the pier area provides infrastructure for invertebrates and shellfish to colonize as well as foraging areas for marine mammals and birds. A diverse array of marine life has been observed along the pier within the subtidal sediment area of concern (AOC). The surveys conducted in 2002 and 2010 did not note any areas that appeared to be impaired in comparison to the surrounding area. The 2010 dive survey was not specifically conducted to assess marine life; however, the abundance and variety of marine life noted was similar, if not greater than that noted in the 2002 video survey. Overall habitat quality does not appear to be adversely affected by the contaminants of concern (COC).

2.2 Base History

In 1910, Base Ketchikan was established as an Aid to Navigation in Alaska. Prior to the 1940s Base Ketchikan operated as part of the Lighthouse Service at Lighthouse Depot, Ketchikan, Alaska. The main purpose of the facility prior to the 1940s was to build pilings for acetylene lamps used for navigation in the Tongass Narrows. After the acetylene lamps were replaced with electric- and battery-powered alternatives during the 1920s and 1930s, the facility was repurposed for maintenance of navigational aids and vessels. From 1941 to 1945, Base Ketchikan served as a World War II Support Depot and from 1946 to the present day, post-war operations have continued.

Base Ketchikan has undergone several name changes since it was established. From 1980 to 1995, it was known as Base Ketchikan. In 1995, it became Integrated Support Command Ketchikan but was renamed Base Support Unit Ketchikan in 2007. In 2012, it was re-established as Base Ketchikan and remains as such today. The Base is the homeport for two Sentinel-class cutters, also known as fast response cutters (FRCs) (Coast Guard Cutter [CGC] Bailey T. Barco and CGC John F. McCormick) and a keeper-class buoy tender (CGC Anthony Petit) (USCG 2023c).

2.2.1 Previous Site Characterizations

Since 1988, numerous remedial and investigation actions have been performed at Base Ketchikan. The marine area was first investigated due to concerns about debris from sandblasting and maintenance activities and rumored waste dumping. In the late 1980s, metals were identified as a preliminary COC in sediment, and piles of debris were removed from the seafloor around the facility. In the decades following, several on-land soil investigations and removal actions were conducted. Table 3 summarizes the previous RAs and investigations conducted at Base Ketchikan.

Table 3 Historical Work Completed and Findings for USCG Base Ketchikan

YEAR	ACTIVITY	RESULT	REFERENCE
1988	Preliminary Assessment	• COPC – Metals	USCG 2001b
1989	Site Inspection and Debris Removal	• COPC – Metals (500,000 pounds of debris removed)	USCG 2001b
1989	Hazardous Waste Storage Area Closure	• Closure letter for hazardous waste storage area in 1992	USCG 1989
1990	Cleanup Action	• Several thousand pounds of sandblast grit and paint removed	USCG 1992
1991	Environmental Site Assessment	• COPC – Petroleum hydrocarbons, VOCs	USCG 2001b
1992	Preliminary Assessment	• Interviews and waste generation history	USCG 1992
1992	Soil Removal	• Approximately 3,000 cy of diesel fuel-contaminated soil removed	USCG 1993
1992	Site Investigation	• SVOCs detected inside and in the bay of the marine ways building	USCG 1993
1993	Tissue and Sediment Sampling	• Metals greater than reference areas in shellfish tissues • Sediment exceedances: arsenic, copper, lead, mercury, and zinc • Recommended dredging surface sediment in area	USCG 1994
1995	Dredging Removal Action	• Approximately 600 cy of sediment removed from Marine Railway vicinity	USCG 1995
1996	Confirmation Sediment Sampling	• COPC – Metals in sediment and muscle tissue	USCG 2003a
2001	Screening-Level Risk Assessment	• Determined further information was required for closure • Proposed suction dredging for remediation	USCG 2003a
2002	Risk Evaluation	• COPC – Metals • Tissue samples exceeded criteria for human consumption	USCG 2003a
2008	LTM Plan	• Further risk studies required	USCG 2008
2010	Remedial Investigation	• Investigated potential sources of contamination • Sediment exceedances: SVOCs, PAHs, PCBs, and metals	USACE 2012a
2011	TCRA	• Removed sediment around the railway (impeding functionality) • Sediment exceedances: SVOCs, PCBs, metals, and mercury	USACE 2011
2012	TCRA	• Removed sediment around railway (impeding functionality) • Sediment exceedances: SVOCs, PCBs, metals, and mercury	USACE 2012b
2012	Supplemental Remedial Investigation	• Determined background concentrations of metals and organics in sediment and biota in the Tongass Narrows • Sediment exceedances: SVOCs, PCBs, metals, mercury, and pesticides	USACE 2013
2014	Homeport Activities	• Removed arsenic-contaminated soil from the former hazardous waste storage area building and placed at the former small arms firing range • Removed soil from ecology block wall • Soil exceedances: DRO, RRO, and metals	M.A. Mortenson Company 2015
2014	Toxicity Study	• Established the toxicity of sediments in DUs • Sediment exceedances: SVOCs, PCBs, metals, and mercury	USACE 2016b
2015	TCRA	• Sediment exceedances: SVOCs, PCBs, metals, and mercury • Wastewater exceedances: cobalt, copper, iron, lead, manganese, nickel, vanadium, and zinc	USACE 2016a

Table 3 Historical Work Completed and Findings for USCG Base Ketchikan

YEAR	ACTIVITY	RESULT	REFERENCE
2016	TCRA	• Removed sediment around the railway (impeding functionality) • Sediment exceedances: metals, PCBs, and PAHs	USACE 2017a
2017	Remedial Goals and Cleanup Target Areas Technical Memorandum	• Reviewed COPC data in soil and sediment, as well as toxicity data in sediment, to determine COCs and site-specific proposed cleanup levels	USACE 2017c
2018	FFS	• Evaluated alternatives developed for four separate AOCs	USACE 2018
2019	Ecological Risk Evaluation for the Subtidal Sediment AOC	• The potential for adverse effects to marine benthic communities and bird/mammal populations considered low for the Subtidal Sediment AOC	USACE 2019
2021	ROD	• Selected remedies for four AOCs	USACE 2021

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

2.3 Areas of Concern Site Background

The ROD was signed in 2021 and details the selected remedies for the four AOCs: AOC 1 Buoy Storage Yard (BSY), AOC 2 Inner Boat House, AOC 3 Inner Marine Ways, and AOC 4 Subtidal Sediment (USACE 2021). A summary of each of the AOCs is provided in the sections below. Section 3.0 presents the established the remedial action objectives (RAOs) for each of the AOCs, as well as alternative cleanup levels (ACLs), as defined by the ROD.

2.3.1 AOC 1 Buoy Storage Yard

During remedial investigations in 2010 and 2012 soil was sampled for metals, chromium VI, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and tributyltin. ACLs were calculated using the ADEC Cleanup Levels Calculator for the type of exposure (outdoor worker) and precipitation zone (greater than 40 inches). Based on the ACLs, the COCs are PCBs and arsenic in soil. Surface water, sediment, and groundwater are not present at the BSY and are not considered potential exposure pathways.

AOC 1 BSY is located in an industrial area, approximately 160 feet by 120 feet (Figure 3). The USCG stores and maintains between 30 and 70 buoys here at any given time. The most likely source of soil contamination at the BSY is historical site use, such as buoy storage and maintenance. The area was expanded in 1994 using locally available fill, which contains the mineral arsenopyrite and arsenic. The southern edge of the BSY was previously referred to as a temporary waste accumulation area (USCG 1992) and a temporary hazardous materials storage area (USACG 2013). Waste storage in general is not a likely source of contamination because, according to personnel stationed at Base Ketchikan from 1988 through 1990 and 1994 through 2016, spent blast-grit media was not stockpiled outdoors and was stored in drums (Rose 2017). During 1995 dredging activities, sediment was reportedly placed at the former temporary waste accumulation area of the BSY (USCG 1995). Although sediment was placed on a liner, it is considered a potential source of contamination because the dredging stockpiles likely contained metals from sandblasting. It is unknown if or when the sediment was removed from the yard (USACE 2016b).

2.3.2 AOC 2 Inner Boat House

Sediment from AOC 2 was sampled during remedial investigations conducted in 2002, 2010, 2012, and 2014 and has been analyzed for metals, PCBs, VOCs, SVOCs, polycyclic aromatic hydrocarbons (PAHs), total organic carbon (TOC), tributyltin, and acid-volatile sulfide-simultaneously extracted metals (AVS-SEM). Based on a toxicity analysis presented in the *Remedial Goals and Cleanup Target Areas Technical Memorandum* (USACE 2017c) the COCs are metals and PCBs. The metal COCs are copper, zinc, lead, and the combination of the three metals.

AOC 2 Inner Boat House is under the northwest portion of the pier (Figure 4), which supports the current boathouse and north shops area (Figure 1). The boathouse and shops are raised above the intertidal zone on piles and outcropping bedrock, creating a pier structure. The area under the pier has restricted access and low headroom. Sediment in this area is typically a few inches to 1 foot deep. It is likely that sediment mixes and redistributes based on several factors including tidal currents, wind, and waves. Some sediment is exposed at every low tide and is referred to as intertidal sediment. In other areas sediment is never exposed at low tide but is still affected by the tidal current; this type of sediment is referred to as subtidal sediment.

The primary contaminant source for this AOC is debris dumped directly into the water from buildings along the pier. Debris was removed during at least two removal efforts, but some debris remains. Contamination from debris may have caused sediment to become a secondary source of contamination. Sediment contamination may also result from outside sources including ferry traffic and bilge emptying (USACE 2021).

2.3.3 AOC 3 Inner Marine Ways

Sediment from AOC 3 has been analyzed for metals, pesticides, PCBs, VOCs, SVOCs, PAHs, TOC, tributyltin, and AVS-SEM during remedial investigations conducted in 2002, 2010, 2012, and 2014. Based on a toxicity analysis presented in the *Remedial Goals and Cleanup Target Areas Technical Memorandum* (USACE 2017c) the COCs are copper, zinc, lead, and the combination of the three metals (copper/zinc/lead).

AOC 3 Inner Marine Ways is located north of the pier (Figure 5). This AOC is adjacent to the Marine Ways Shed and consists of an area of intertidal sediment, as well as a small volume of subtidal sediment, surrounding the marine railways to the southeast of the USCG station. The Marine Ways Shed is used to conduct vessel maintenance; vessels are transported to the dry/elevated dock area using the railway and then elevated for maintenance activities within the shed. The extent of future maintenance activities in this area depends on USCG missions and other factors, such as deployment of larger FRCs.

Historical sandblasting of materials and removal of anti-fouling paint containing heavy metals is assumed to be the source of contamination in this area. Sediment underneath the Marine Ways Shed has not been sampled during previous investigations because the area is difficult to access while the platform remains in place. It is presumed that given the origin of the contamination in this area, sediment beneath the platform contains elevated concentrations of metals like those identified in other locations at the Inner Marine Ways. Since 1994, release of sandblasting materials has been controlled by best management practices and runoff from sandblasting is not considered to be an ongoing source of contamination. Sediment has been removed from the Inner Marine Ways area during several Time-Critical Removal Actions (TCRAs) because sediment can build up and impede operations of the railway (USACE 2021). Table 3 includes a summary of TCRAs performed.

2.3.4 AOC 4 Subtidal Sediment

Sediment from AOC 4 has been analyzed for metals, pesticides, PCBs, VOCs, SVOCs, PAHs, TOC, tributyltin, and AVS-SEM during remedial investigations conducted in 2002, 2010, 2012, and 2014. Based on the analysis presented in the 2017 *Remedial Goals and Cleanup Target Areas Technical Memorandum* (USACE 2017c) the COCs are metals and PCBs. The metal COCs are copper, zinc, lead, and the combination of the three metals (copper/zinc/lead).

AOC 4 Subtidal Sediment encompasses an area approximately 430 feet by 100 feet, located west/ southwest of the pier and the outer boathouse, in a portion of the Tongass Narrows (Figure 6). The actual footprint of contaminated sediment is estimated to be 14,670 square feet, of which a portion (approximately 4,670 square feet) is located beneath the pier and is considered only accessible by divers. Sediment thickness is estimated at 0 to 1 foot thick (USACE 2013). The depth of water depends on the tide. The bathymetry of the area was established in the 2012 *Supplemental Remedial Investigation* (USACE 2013) and indicated that the depth of the sea floor below the water surface varies from 30 feet to approximately 100 feet.

Contaminant sources for the subtidal sediment include historical contamination from the removal of boat bottom anti-fouling paints, which may have moved with stormwater into deeper sediment, and debris dumped directly into the water from buildings along the pier. Debris was removed during at least two removal efforts, but additional debris remains (USACE 2021). Table 3 presents a timeline of the debris removal efforts.

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3.0 REMEDIAL ACTION OBJECTIVES

The ROD established the RAOs and ACLs for each AOC (USACE 2021). The selected remedies for AOCs 1, 3, and 4 will result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure (UU/UE). The remedy for AOC 2 is not anticipated to result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for UU/UE.

Sediment is the impacted media at AOCs 2, 3, and 4. Currently, ADEC does not have promulgated cleanup levels for contaminated sediment in the State of Alaska other than 18 AAC 75.345(d) which requires that "toxic substances in sediment may not cause and may not be reasonably expected to cause, a toxic or other deleterious effect on aquatic life". The *Remedial Goals and Cleanup Target Areas Technical Memorandum* (USACE 2017c) calculated ACLs for sediment based on toxicity resulting in the established COCs for these AOCs.

3.1 AOC 1 Buoy Storage Yard Alternative Cleanup Levels and RAOs

Approximately 17,833 square feet of contaminated soil needs to be addressed (Figure 3). The RAOs for AOC 1 are:

- Excavating and disposing of 84 cy of contaminated soil containing PCBs concentrations greater than 1.0 milligram per kilogram (mg/kg)
- Transporting non-hazardous PCB-contaminated soil (less than 50 mg/kg) to a permitted Subtitle D landfill
- Collecting and analyzing confirmation samples from the excavations
- Mixing ECOBOND with the remaining arsenic-contaminated soil in-situ using an excavator to disturb the soil then mixing the media together
- Prevent human exposure to soil containing arsenic in excess of the site-specific ACL of 33 mg/kg
- Collecting post-treatment samples
- Conducting site inspections once a year for the first five years, then every five years thereafter, indefinitely or until determined to be longer necessary during the five-year review process
- Maintaining land use controls (LUCs) to limit access and prevent exposure
- Conducting CERCLA Five-Year Reviews

The AOC 1 BSY COCs are PCBs and arsenic in soil. The ADEC Method Three calculator was used to determine an ACL for arsenic in soil at the BSY based on the type of exposure (outdoor worker) and precipitation zone (greater than 40 inches per year). The calculated ACL for arsenic has been established for this site as the set cleanup level. The PCB cleanup level is based on ADEC Method Two cleanup level of 1.0 mg/kg. An ACL for PCBs in soil was calculated; however, per 18 AAC 75.341, soil remaining in place with PCB concentrations greater than 1 mg/kg and less than 10 mg/kg must be capped to achieve unrestricted land use. Table 4 presents the ACLs for AOC 1 BSY.

After the ECOBOND treatment is completed, it may be necessary to prevent exposure to arsenic-contaminated soil if concentrations of arsenic are still in excess of the site-specific ACL. If necessary, LUCs will be used to prevent exposure. The application of LUCs will be sufficient enough to prevent exposure and may include capping arsenic-contaminated soil with clean fill.

Table 4 Buoy Storage Yard Cleanup Levels

CONTAMINANT	CLEANUP LEVEL[1] (mg/kg)	MAXIMUM DETECTION (mg/kg)
Arsenic	33[1]	380
PCBs (total)	1.0[2]	2.1

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

[1] The ADEC Method Three calculator was used to determine ACLs for soil contaminated at the BSY. The site parameters were adjusted using the Method Three calculator to include the type of exposure (outdoor worker) and precipitation zone (greater than 40-inch precipitation zone) (USACE 2017c).

[2] PCB cleanup level is the concentration listed in ADEC Method Two (ADEC 2023).

3.2 AOC 2 Inner Boat House Alternative Cleanup Levels and RAOs

Approximately 6,030 square feet of sediment contaminated with metals and PCBs needs to be addressed (Figure 4). The RAOs for AOC 2 are:

- Excavating and disposing of contaminated sediment containing PCBs concentrations greater than 1.0 mg/kg and metals above the site-specific ACLs
- Collecting confirmation sediment samples from the limits of excavation if sediment is present (i.e., confirmation samples will not be collected if the limit of excavation is bedrock)
- Excavating sediment using hand tools and manual labor due to the location of contamination and obstruction of piers and pilings
- Transporting excavated material and equipment using small pieces of equipment, such as a mini skid steer
- Conducting removal activities during low tide (temporary cover such as gravel or sandbags may be required to cover the exposed working area prior to the next tidal working window)
- Loading excavated sediment directly into 1 cy dewatering filter bags, which would then be placed into 1 cy containment totes
- Sampling sediment and dewatered liquid for waste characterization and management

The AOC 2 Inner Boat House COCs are metals and PCBs in sediment. The identified metal COCs are copper, lead, zinc, and combination of these three metals, the metal COCs were determined to be effective surrogates for drivers of toxicity in the area. These ACLs, established by the ROD (USACE 2021), are in line with the *Remedial Goals and Cleanup Target Areas Technical Memorandum* (USACE 2017c) calculated levels. The PCB cleanup level for human exposure (ADEC Method Two) is used and an ecological exposure cleanup level was determined by normalizing for TOC. Table 5 presents the ACLs for AOC 2 Inner Boat House.

Table 5 Inner Boat House Alternative Cleanup Levels

CONTAMINANT	CLEANUP LEVEL[1] (mg/kg)	MAXIMUM DETECTION (mg/kg)
Copper	330[1]	1,960
Lead	540[1]	4,180
Zinc	550[1]	2,190
Copper-Lead-Zinc Total	1,420[1]	5,990
PCBs (total)	1.0[2]	4.0

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

[1] ACLs were calculated for copper, lead, and zinc because they were identified as effective surrogates for drivers of toxicity in this area (USACE 2017c).

[2] The PCB cleanup level for ecological exposure is normalized for TOC by multiplying the dry weight concentration by the decimal fraction representing the percent TOC content of the sediment to account for association with organic carbon (USACE 2018). The average fraction of organic carbon across Base Ketchikan is 0.01528 g/g, resulting in a PCB cleanup level for ecological exposure of 65 mg/kg (USACE 2021).

3.3 AOC 3 Inner Marine Ways

Approximately 12,839 square feet of metal-contaminated sediment needs to be addressed (Figure 5). The RAOs for AOC 3 are:

- Excavating and disposing of contaminated sediment containing metals above the site-specific ACLs
- Collecting confirmation sediment samples from the excavation
- Conducting removal activities during low tide
- No sediment will be removed from below the low tide mark, which amounts to approximately 10 percent (%) of the contaminated area
- Dewatering excavated sediment, either by being loaded directly into 1 cy dewatering filter bags, which would then be placed into 1 cy containment totes, or by being allowed to dewater within the working area prior to removal, then transported with a flocculent or similar method so no liquid leaks
- Sampling sediment and dewatered liquid for waste characterization and management
- Maintaining LUCs to limit access and prevent exposure
- Conducting CERCLA Five-Year Reviews

AOC 3 Inner Marine Ways COCs are metals in sediment. The metal COCs are copper, lead, zinc, and combination of these three metals. The ACLs established by the ROD (USACE 2021) are consistent with the *Remedial Goals and Cleanup Target Areas Technical Memorandum* (USACE 2017c) calculated levels. Table 6 presents the ACLsfor AOC 3 Inner Marine Ways.

Table 6 Inner Marine Ways Alternative Cleanup Levels

CONTAMINANT	CLEANUP LEVEL[1] (mg/kg)	MAXIMUM DETECTION (mg/kg)
Copper	330	1,400
Lead	540	1,400
Zinc	550	3,100
Copper-Lead-Zinc Total	1,420	4,650

Notes:
For definitions, refer to the Acronyms and Abbreviations section.
[1] ACLs were calculated for copper, lead, and zinc because they were identified as effective surrogates for drivers of toxicity in this area (USACE 2017c).

3.4 AOC 4 Subtidal Sediment

Approximately 14,670 square feet of metal-contaminated sediment needs to be addressed (Figure 6). The RAOs are:

- Maintaining LUCs to restrict invasive activities and protect human health from exposure (LUCs would include controlled access, signage and limitations on future in-water and in-sediment development [e.g., pier construction, demolition, maintenance, etc.] with potential to disturb the contaminated sediment)
- Conducting long-term monitoring (LTM) to inspect site conditions and monitor contaminant levels no less often than once every five years, unless determined to be no longer necessary during the five-year review process
- Conducting LTM including collection of four subtidal sediment samples in the AOC along the pier to make sure the contaminants are stabilized
- Conducting CERCLA Five-Year Reviews

AOC 4 Subtidal Sediment COCs are metals and PCBs in sediment. The metal COCs are copper, lead, zinc, and combination of these three metals, the metal COCs were determined to be effective surrogates for drivers of toxicity in the area. The ACLs established by the ROD (USACE 2021) are consistent with the *Remedial Goals and Cleanup Target Areas Technical Memorandum* (USACE 2017c) calculated levels. The Subtidal Sediment AOC also has PCB as a COC. The PCB cleanup level for human exposure (ADEC Method Two) was used and normalized for TOC to calculate the ecological exposure concentration. Table 7 presents the ACLs for AOC 4 Subtidal Sediment.

Table 7 Subtidal Sediment Alternative Cleanup Levels

CONTAMINANT	CLEANUP LEVEL[1] (mg/kg)	MAXIMUM DETECTION (mg/kg)
Copper	330[1]	1,290
Lead	540[1]	6,410
Zinc	550[1]	4,400
Copper-Lead-Zinc Total	1,420[1]	9,700
PCB (total)	1.0[2]	14.1

Notes:

For definitions, refer to the Acronyms and Abbreviations section.

[1] ACLs were calculated for copper, lead, and zinc because they were identified as effective surrogates for drivers of toxicity in this area (USACE 2017c).

[2] The PCB cleanup level for ecological exposure is normalized for TOC by multiplying the dry weight concentration by the decimal fraction representing the percent TOC content of the sediment to account for association with organic carbon (USACE 2018). The average fraction of organic carbon across Base Ketchikan is 0.01528 g/g, resulting in a PCB cleanup level for ecological exposure of 65 mg/kg (USACE 2021).

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4.0 REMEDIAL DESIGN CRITERIA

The RD assumes that the RA will be led by the USCG and a USCG Remedial Project Manager (RPM), a separate contracting agency may be involved. Responsibilities of the RPM include (EPA 1995):

- Being familiar with the remedy details, pertinent site information, and site history
- Deciding how to manage the multiple individual and organizational relationships involved and developing effective communications strategy
- Understanding the State's (ADEC) role and adequately plan for their involvement
- Overseeing quality of the project, establishing project requirements, and communicating these requirements to the other project participants
- Selecting appropriate technical assistance (e.g., engineering, geological, chemical, civil, hydrogeology)
- Identifying project constraints (ex., funding, schedule, equipment, weather, offsite disposal, etc.)
- Reviewing RA contractor deliverables to make they meet the Statement of Work (SOW) requirements
- Attending meetings with the contracting party and RA contractor
- Assisting with site access

The RPM will follow the *Remedial Design/Remedial Action Handbook* (EPA 1995) for project management principles to effectively implement the remedies selected in accordance with the ROD (USACE 2021). This Work Plan will assist the RPM with their responsibilities from RA procurement, through planning/RA deliverables, RA implementation, and project completion.

4.1 Contracting

The appropriate contract to implement the RA is a project-specific determination made by the contracting agency. The selected procurement method by the contracting agency should correlate to the type of work being performed. The RPM may be required to prepare the RA SOW or assist in its preparation. The RA SOW provides a clear description of the work required by the contractor and includes a detailed breakdown of work, required deliverables, work quality requirements, communication requirements, and delivery schedule. The RPM and contracting agency should define necessary personnel experience and qualifications needed in the SOW and confirm the contractor complies with personnel requirements (EPA 1995).

After the RA contract type is established, bonding and wage rate requirements must be met by the contractor (as applicable), this is the responsibility of the RA contracting party. If the RPM agency is not the contract holder, the RPM must respect the privity of contract between the contracting agency and the contractor. The RPM cannot direct or give the appearance of directing the RA contractor. The RA work will be initiated when the contracting agency provides the contractor with notice to proceed. To make sure the contractor is complying with SOW requirements and for the identification of project deliverable constraints the RPM should review monthly progress reports submitted by the contractor. Any questions, concerns, or feedback should be directed to the contracting agency (EPA 1995).

4.2 Community Relations

A community relations plan is typically developed for a site when the Remedial Investigation/Feasibility Study commences. The communication relations plan should be reviewed and updated to reflect the anticipated community outreach that will occur during the RA process. Updates to the community relations plan should be made, as necessary. The RPM should determine how often and by what means the community is informed of RA events, as well as establish rapport with the community. The amount and means of communication depend on the nature of the RA and location of the site in relation to residential areas and areas of community interest (such as potential impacts to subsistence). Before and during RA implementation the RPM may need to (EPA 1995):

- Inform the community about the RA procurement process and contractor selection
- Notify the community before the contractor mobilizes and before other major RA milestones that might affect the community
- Provide routine updates about site progress through fact sheets and/or public meetings
- Discuss RA events, including contingency plans, with those who live closest to the site and along travel route for offsite waste disposal

Anticipated community relations support should be described in the RA SOW if contractor assistance is required. Contractors may only serve in a supporting capacity; they may not represent federal agencies during meetings with the community (EPA 1995).

When the RA is approved and planned, there will be a Public Notice as a follow on to the Proposed Plan. Given the large visible event planned for the waterfront, the Public Notice will provide additional community relations for Base Ketchikan.

4.3 RA Deliverables

The following deliverables may be required to support RA performance. It is not uncommon for deliverable titles to vary between agencies; however, the goal of the documents remains the same. Identified deliverables are described in the *Remedial Design/Remedial Action Handbook* (EPA 1995).

To confirm RAs are conducted in accordance with the SOW, regulations, agency guidance, and installation requirements the contractor will need to provide project planning deliverables for review and approval. Deliverables may include, but are not limited to, a RA Work Plan, Site Management Plan, Sampling and Analysis Plan (SAP), Contractor Quality Control Plan (CQCP), Health and Safety Plan (HASP), and Waste Management Plan (WMP). Following the completion of the RA activities an RA Report will be prepared. It may not be necessary for the individual plans to be standalone documents; applicable portions may be incorporated into the main RA Work Plan as appropriate.

4.3.1 Work Plan and Site Management Plan

The RA Work Plan describes the proposed technical approach for completing the requirements of the RA SOW. It is suggested that the RA Work Plan contain the following elements but is not limited to these (EPA 1995).

- Statement of project goals
- Description of roles and responsibilities of the contract management team and other key personnel, lines of authority, and lines of communication
- Description of each task and required procedures for compliance

- Project schedule
- Identification of major equipment needed to support the RA
- Anticipated problems
- Proposed use of subcontractors

The Site Management Plan details the security provisions that will be taken at the project site and includes methods for limited access to the site, secure waste disposal practices, and management responsibilities (EPA 1995).

4.3.2 Sampling and Analysis Plan

The SAP details methods and procedures concerning analytical methods employed during site-related sampling and data evaluation. The SAP incorporates the Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP). The FSP describes the sampling and analytical procedures and methodologies the contractor, or designated subcontractor, will use. The FSP specifies how many samples will be taken, how and where they will be collected, and technical methodologies and procedures used to analyze samples. It is suggested that the FSP contain the following elements, but is not limited to this (EPA 1995):

- Sampling objectives
- Sample location and frequency
- Sample designation
- Sampling equipment and procedures
- Sample handling and analysis

The QAPP provides a blueprint for the quality assurance (QA) and quality control (QC) during the sampling and analysis phase that are needed to produce environmental data of the type and quality required for the project. The QAPP augments the FSP by incorporating the design of the sampling and analysis events based on a systematic plan developed using the data quality objectives (DQO) process. The DQO process will allow for the creation of a sampling design that will yield a dataset of values within acceptable limits of error. DQOs are qualitative and quantitative statements that define the appropriate type of data and specify tolerable levels of the potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions. Based on EPA guidance it is recommended that the QAPP contain, but is not limited to:

- Problem definition/background
- Project/Task description
- Quality objectives and criteria for measurement of data
- Special training requirements or certificates
- Required documentation and records
- Sampling process design
- Sampling method requirements
- Sample handling and custody requirements
- Analytical method requirements
- QC requirements
- Instrument/Equipment testing, inspection, and maintenance requirements

- Instrumentation calibration and frequency requirements
- Inspection/Acceptance requirements for supplies and consumables
- Data acquisition requirements (non-direct measurements)
- Data management requirements
- Required assessments and response actions
- Required reports
- Data review, validation, and verification requirements
- Validation and verification methods
- Reconciliation with user requirements

4.3.3 Contractor Quality Control Plan

The CQCP details the project aspects that should be inspected and includes progress, materials, quality of work, adherence to design, and health and safety. The QC inspector will review daily reports to verify that work conforms with the SOW. This includes sampling data collected by the contractor and will verify the achievement of final cleanup levels. In addition, the QC inspection should verify compliance with environmental requirements. Inspection reports must be filed with the contracting agency. Based on EPA guidance it is recommended that the CQCP contain, but is not limited to:

- Lines of authority and responsibilities of key personnel involved in the RA
- Contractor QC personnel qualification requirements
- List of inspection items including but not limited to the summary, scope, and frequency of observations/inspections used to monitor the RA and verify compliance with environmental requirements and customary practices, Occupational Safety and Health Administration (OSHA)
- Documentation requirements for reporting contract QC, including daily summary reports and inspection sheets

4.3.4 Health and Safety Plan

The objective of the HASP is to protect workers through the identification, evaluation, and control of health and safety hazards, and to provide for emergency response contingency planning. It is important that the distinction be made that OSHA standards, not cleanup levels, determine hazardous exposure levels. Based on EPA guidance it is recommended that the HASP contain, but is not limited to:

- Key personnel and hazard communications plan
- Health and safety risk analyses
- Site control measures
- Employee training assignments
- Medical surveillance
- Personal protective equipment
- Air and personnel monitoring
- Spill containment program
- Confined space entry procedures
- Decontamination procedures

- Emergency response procedures

4.3.5 Waste Management Plan

The WMP should describe waste management, shipment, and disposal. The RA contractor should identify the anticipated waste streams, waste stream designation or determination, transportation considerations and manifest requirements, and the primary and alternate facilities (waste disposal subcontractor) that will receive the waste for final treatment, storage, or disposal.

4.3.6 Remedial Action Report

Upon completion of the RA the contractor prepares an RA Report that serves as the official record of the RA. Based on EPA guidance it is recommended that the CQCP contain, but is not limited to:

- Executive summary
- Introduction
- Chronology of events
- Performance standards and cleanup goals met
- Description of QA/QC procedures followed
- Description of RA events
- Documentation supporting completion of RAs

4.4 Regulatory Requirements

The following federal, state, and local regulatory and technical requirements have been identified to support implementation of the RA at the applicable AOCs. These requirements should be included in the SOW and included/met as part of the contractor RA deliverables, as appropriate and applicable at the time of preparation. RAs are required at AOC 1, AOC 2, and AOC 3, sampling is required at all four AOCs, and LUCs and CERCLA Five-Year Reviews are required at AOC 1, AOC 3, and AOC 4. Refer to Section 3.0 for a summary of the AOCs and RAOs.

4.4.1 Federal

RAs will be conducted in accordance with CERCLA, SARA, and NCP 40 CFR 300. Note, that under CERCLA 121(e) no permits are required for work performed entirely onsite; the requirements call for compliance with the "substantive" requirements of permits. Federal regulations and permit requirements that are applicable or need to be considered are described further in Section 4.5 based on the applicable or relevant and appropriate requirements (ARARs) from the ROD (USACE 2021).

The SAP, including the FSP and QAPP, should be prepared in accordance with the following:

- *Department of Defense (DoD) Environmental Field Sampling Handbook* (DoD 2013)
- Most recent version of the DoD Quality Systems Manual (QSM)
- TSCA sampling requirements for media contaminated with PCBs (40 CFR Subpart O)

The RA contractor will need to select a laboratory with DoD Environmental Laboratory Accreditation Program (ELAP) certification able to meet EPA Solid Waste Method (SW) requirements for total PCBs and metal COCs (arsenic, copper, lead, and zinc) for media sampled.

The HASP and work conducted will need to comply with the OSHA standards outlined in 40 CFR Sections 1910 and 1926, Office of the Federal Register (OFR) *Hazardous Waste Operations and Emergency Response* (HAZWOPER) (OFR 2005). Contractor personnel working onsite should have HAZWOPER training applicable to their position and role onsite. The required elements emergency response are codified in 29 CFR 1910.120(1)(2). Matters of interpretation of standards will be submitted to the appropriate administrative agency for resolution before starting work. Where the requirements of applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements will apply.

The waste generated because of RAs will need to be handled, containerized, transported, and disposed of appropriately. The management of the waste will be dependent on the media, contaminants, and concentration at which they are present. Based on the COCs, sites with PCBs will need waste streams characterized in accordance with TSCA (40 CFR Subchapter R) and sites with metals in accordance with RCRA (40 CFR Sections 239 through 282). The TSCA and RCRA hazard designation will determine what type of permitted landfill (Subtitle C or Subtitle D) can be used for disposal and the timeframe in which disposal must occur.

For RCRA hazardous waste, Subtitle C permitted facilities must meet the requirements of 40 CFR 264 or facilities operating under the interim status that meet the requirements of 40 CFR 265. Facilities receiving hazardous waste must be permitted in accordance with 40 CFR 270, operating under interim status in accordance with 40 CFR 265 requirements, or must be permitted by an authorized state program. Transportation of the waste for disposal must be in accordance with U.S. Department of Transportation requirements found in 49 CFR and in an appropriate container. Shipment of waste will require manifesting in accordance with 40 CFR 761, 40 CFR 262, and 49 CFR Subpart B, C, and G.

4.4.2 State

The RA deliverables will need to be compliant with 18 AAC 75 (ADEC 2023) and 18 AAC 78 (ADEC 2019). In addition, planning documents, fieldwork, and reporting will need to conform with the ADEC *Field Sampling Guidance* (ADEC 2022a), with personnel meeting the applicable requirements of a Qualified Sampler or Qualified Environmental Professional per 18 AAC 75.333. Certain actions may need to be compliant with 18 AAC 70 Water Quality Standards (ADEC 2022c). Refer to Section 4.5 for further summary of State of Alaska regulations and requirements that are applicable or require consideration based on the ARARs assessed by the ROD (USACE 2021).

The laboratory selected to support the project will need to be an ADEC-approved laboratory, ADEC maintains a publicly available list of certified laboratories. Appropriate State guidelines will need to be used to support analytical data, including the *Technical Memorandum Guidelines for Data Reporting* (ADEC 2022b), and ADEC Laboratory Data Review Checklist.

Prior to waste generated by RAs being sent offsite for disposal, the RA contractor will need to have a signed Contaminated Media Transport and Treatment or Disposal Approval Form.

4.4.3 Installation and Local

Base Ketchikan requirements, guidance, and permits will need to be followed as applicable to RA planning and field implementation. Access to the AOCs is controlled by the installation and the RPM will need to assist the RA contractor with site access, personnel used by the RA contractor will need to meet installation requirements for Base access. Potentially applicable installation requirements, guidance, and permits include:

- Storm Water Pollution Prevention Plan and Alaska Pollutant Discharge Elimination System Multi-Sector General Permit AKR06AB012 (USCG 2023a)
- Spill Prevention Control and Countermeasures Plan included as part of the Integrated Emergency Response and Pollution Prevention Plan (USCG 2023b)
- Emergency Action Plan (USCG 2023b)
- RCRA generator status requirements, the installation is a small quantity generator (EPA ID AK8690360492), and RAs may change the installations generator status (USCG 2023b)
    - May be required to participate in Base Ketchikan Spill Awareness and Response Training (USCG 2023c)
- Land Use Control Implementation Plan requirements (LUCIP) (USCG 2021)
    - Follow dig permit procedures if the installation has those in place

Refuse generated as part of the project will likely be disposed of offsite at the City of Ketchikan Solid Waste Disposal Facility located at the Deer Mountain foothills. Solid waste from Base Ketchikan is transported to the landfill by the City of Ketchikan. If the RA contractor disposes of solid waste at onsite dumpsters or directly through the landfill, they will need to meet disposal requirements of the City of Ketchikan.

If a dig permit process is not in place, the Alaska Digline will still require notification of excavation. Notification to the Alaska Digline must occur not less than two and no more than 15 full business days prior to excavation. Underground facility owners have two full working days or up to 10 full working days in remote locations to conduct locates. Not all underground facility owners are notified through the Alaska Digline, the RA contractor should do their due diligence and notify any facilities directly if necessary.

4.5 Applicable or Relevant and Appropriate Requirements

The ROD assessed three types of ARARs under CERCLA, the ARARs considered were chemical-specific, location-specific, and action-specific (USACE 2021). In addition, EPA guidance documents identified items to be considered (TBC). TBCs are not considered legally enforceable but are evaluated along with ARARs as part of the risk assessment to set protective cleanup level targets.

4.5.1 Chemical-Specific ARARs

The chemical-specific ARARs provide cleanup values that establish acceptable contaminant concentrations that may remain following a remedial response and are incorporated into the RD. The establishment of ACLs is in accordance with ADEC 18 AAC 75.340 and 18 AAC 75.345(d). Table 8 presents the chemical-specific ARARs along with the identified means of compliance.

4.5.2 Location-Specific ARARs

Location-specific ARARs are restrictions developed based on the conduct of activities at specific locations and are incorporated into the RD as appropriate. Table 9 presents the location-specific ARARs along with the identified means of compliance.

4.5.3 Action-Specific ARARs

Action-specific ARARs are requirements that apply to specific investigative or RAs and are incorporated into the RD as appropriate. Table 10 presents action-specific ARARs along with the identified means of compliance.

Table 8 Chemical-Specific ARARs

REGULATION	DESCRIPTION	A OR RA	MEANS OF COMPLIANCE
CWA 33 USC 1313 and 1314 (Sections 3030[a][1] and 304[a]) Alaska Water Quality Standards 18 AAC 70.20	CWA Section 303 requires states to develop water quality standards based on federal water quality criteria to protect existing and attainable use or uses. Under CWA Section 304(a), EPA develops recommended water quality criteria for water quality programs established by states. Alaska adopts the CWA water quality criteria in the Alaska Water Quality Standards.	Relevant and Appropriate	• Contractor prepared Work Plan details how RA efforts will limit impacts to marine waters and site monitoring • Monitor for impacts to marine waters while performing RAs (ex. turbidity) • Contractor prepared report
Alaska Oil and Hazardous Substance Pollution Control regulations (18 AAC 75.340 through 345)	18 AAC 75.340 – 341 governs discharge of oil and hazardous substances and state cleanup requirements, also establishes soil cleanup levels. 18 AAC 75.345(e) requires that toxic substances in sediment may not cause, and may not be reasonably expected to cause, a toxic or other deleterious effect on aquatic life, except as authorized under 18 AAC 70.	A	• Contractor prepared Work Plan supported by a SAP • Conduct RA and sample according to planning documents • Waste characterization and disposal in accordance with WMP • Contractor prepared report
Cleanup Levels for Bulk PCB Remediation Waste (40 CFR 761.61[a][4][i])	Bulk PCB remediation waste includes soil and sediment. The cleanup level for bulk PCB remediation waste in high occupancy areas is less than 1 mg/kg without further conditions.	A	• Contractor prepared Work Plan supported by a SAP • Conduct RA and sample according to planning documents • Waste characterization and disposal in accordance with WMP • Contractor prepared report

Notes:
For definitions, refer to Acronyms and Abbreviations section.

Table 9 Location-Specific ARARs

REGULATION	DESCRIPTION	A OR RA	MEANS OF COMPLIANCE
Bald and Golden Eagle Protection Act (16 USC 668, 50 CFR 22.11, General Requirements)	Protects bald and golden eagles/habitat in the area and provides for permitted activities	A	• Conduct a biological assessment, such as an eagle nest survey prior to performing work • If there is a potential for impacts USCG should formally consult the USFWS • Contractor details mitigation methods in the planning documents and implements them onsite
Migratory Bird Treaty Act (16 USC 703, Taking, Killing, or Possessing Migratory Birds Unlawful)	Requires that federal agencies examine proposed actions relative to habitat loss or loss of individual migratory birds. Prohibits taking or possession of any migratory bird listed including parts, nests, or products.	A	• Work Plan to address actions to be taken to avoid adverse impacts on migratory birds during RAs
Fish and Wildlife Coordination Act (16 USC 661, 40 CFR 6.302)	Requires that federal agencies consult with USFWS, NMFS, and state fish and wildlife agencies concerning potential effects on fish and wildlife. Applies to federal and non-federal permitted/licensed water development projects.	A	• Conduct a biological assessment to determine impacts to habitat • If there is potential for impacts USCG should formally consult USFWS • Contractor details mitigation methods in the planning documents and implements them onsite
National Historic Preservation Act (16 USC 470, 36 CFR 800.13) Alaska Historic Preservation Act (AS 41.35.090)	Provides for the protection of cultural sites; requires coordination with State Historic Preservation Office and National Park Service.	TBC	• No cultural, historic, or archaeological resources were found in previous studies, however, the potential still exists that soil or sediment could contain cultural resources • Awareness training, provided to employees who have the potential to encounter artifacts. Review of any findings by the USCG archaeologist

Notes:
For definitions, refer to the Acronyms and Abbreviations section.
A – applicable
TBC – to be considered

Table 10 Action-Specific ARARs

REGULATION	DESCRIPTION	A OR RA	MEANS OF COMPLIANCE
CWA Section 404 (33 USC 1344, 40 CFR 230, Section 404[b][1]) 40 CFR 230, Guidelines for Specification of Disposal Sites or Dredged or Fill Material 33 CFR 330, Nationwide General Permit Program USACE Nationwide Permit 38 – Cleanup of Hazardous and Toxic Waste	CWA Section 404 regulates the discharge of dredged or fill material into waters of the U.S. including return flows from such activities. This program is implemented through regulations set forth in the 404(b)(1) guidelines found in 40 CFR Part 230	TBC	• Planning documents will address any substantive requirements of USACE Nationwide Permit 38 – Cleanup of Hazardous and Toxic Waste; this will address the 40 CFR 230 requirements
CWA Stormwater Pollution Prevention Plan (33 USC 1251-1376, 40 CFR 125.3[d]) Alaska 2021 Stormwater Construction General Permit (Permit AKR 100000)	Regulates pollutants in discharge of stormwater associated with construction activity (clearing, grading, or excavation) involving the disturbance of 1 acre or more. Requires the preparation of a Stormwater Pollution Prevention Plan, implementation of BMPs to minimize the effects of disturbed soil on stormwater, and monitoring of stormwater to demonstrate compliance.	TBC	• Consideration and use of BMPs will be addressed in the planning documents and implemented onsite • Planning documents will be in line with Construction General Permit requirements • USCG will meet the substantive requirements to minimize impact on stormwater
U.S. Pipeline and Hazardous Materials Safety Administration – Protection of Underground Pipelines from Excavation Activity (49 USC 60101, 49 CFR 196 and 198) Alaska Damage Prevention Statutes (AS 42.30.400)	Before beginning an excavation, an excavation contractor will give notice of the proposed excavation to each underground facility operator who has an underground facility in the area of the proposed excavation and request the operator to field mark the location of its underground facility.	A	• The contractor will call the Alaska Digline and follow the Base dig permit process
Alaska Air Quality Control Regulations, Prohibitions (18 AAC 50.045[d])	A person who causes or permits bulk materials to be handled, transported, or stored, or who engages in an industrial activity or construction project will take reasonable precautions to prevent fugitive dust from being emitted into the ambient air.	A	• The contractor will detail precaution measures to be taken to prevent particulate matter from being emitted into the air
Alaska Solid Waste Management Regulations (18 AAC 60.010(a) – Accumulation, Storage, and Treatment, and 18 AAC 60.015 Transport)	Solid waste must be accumulated and stored in a manner that does not pose a health hazard or has polluted runoff. Solid waste should be contained during transport and any spills immediately cleaned up.	A	• Debris and waste will be stored appropriately as detailed in the Work Plan and WMP

Table 10 Action-Specific ARARs

REGULATION	DESCRIPTION	A OR RA	MEANS OF COMPLIANCE
Applicability of Hazardous Materials Transportation Regulations to Pre-Transportation Functions (49 CFR 171.1[b])	Any person who, under contract with a department or agency of the federal government, transports "in commerce," or causes to be transported or shipped, a hazardous material will be subject to and must comply with all applicable provisions of the Hazardous Materials Transportation Act and Hazardous Materials Regulations at 49 CFR 171-180 related to marking, labeling, placarding, packaging, emergency response, etc.	A	• Detail waste management and transportation requirements in the planning documents
Hazardous Waste Management Regulations (40 CFR 262)	Establishes the requirements for hazardous waste generators. Generators will determine if their waste is hazardous (40 CFR 262.11). A generator may accumulate hazardous waste at the facility provided that: • Waste is placed in contains that comply with 40 CFR 262.17(a) (e.g., container in good condition, labeled with major risk, container is compatible with waste, kept closed, adequate aisle space between containers, weekly inspections, ignitable or reactive waste stored in accordance with International Fire Code, incompatible wastes kept separate, all dangerous wastes and residues removed at closure, and 40 CFR 265 Subparts AA, BB, and CC met), • The date upon which accumulation begins is clearly marked and visible for inspection on each container, and • Container is marked with the words "hazardous waste". Additional requirements include personnel training, preparedness and prevention, contingency plan and emergency procedures, and general inspections.	A	• Contractor will characterize waste based on analytical samples, safety data sheets, and/or generation process as detailed in the planning documents • Waste will be managed according to regulatory and installation requirements • Contractor will consult with USCG for storage area for waste and disposal transportation

Table 10 Action-Specific ARARs

REGULATION	DESCRIPTION	A OR RA	MEANS OF COMPLIANCE
Land Disposal Restrictions (40 CFR 279)	Must determine if the hazardous waste has to be treated before being land disposed. This is done by determining if the waste meets the treatment standards in 40 CFR 268.40, 268.45, or 268.49 by testing in accordance with prescribed methods or use of generator knowledge. This determination can be made concurrently with the hazardous waste designation required in 40 CFR 262.11. If the waste is characteristic hazardous waste, then the underlying hazardous constituents (UHCs) must be evaluated to determine if the waste also needs to be treated for UHCs (40 CFR 268.9). UHC treatment standards are found in 40 CFR 268.48.	A	• Determination for land disposal restrictions will be made by the contractor pending waste analysis and consultation with disposal entity • Any sampling or disposal restrictions will be detailed in the planning documents
PCB Remediation Waste Management (40 CFR 761.61)	Because the remedy requires removal of sediment and soil to specific depths and the maximum PCB concentrations detected in these areas do not exceed 50 mg/kg, no substantive requirements are triggered.	A	• Waste will be sampled in accordance with the planning documents and appropriate waste determinations made based on results
Alaska Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances (18 AAC 75 Article 3)	Specifies sampling and analysis of soil, surface water, and groundwater resulting from the discharge of oil or a hazardous substance. Specifies soil, surface water, and groundwater cleanup levels resulting from the discharge of oil or a hazardous substance. Specifies institutional controls for residual soil, surface water, and groundwater left in excess of cleanup levels resulting from a discharge of oil or a hazardous substance.	A	• Sampling requirements will be detailed in the planning documents • Analytical data will be presented in the reporting documents along with data quality assessment and determinations • Institutional controls and compliance with them will be detailed in USCG Base planning documents
Uniform Environmental Covenants Act (AS 46.04.340)	Requires the owner of real property to record a notice of activity and use limitation into the appropriate public land records where a legal impediment prevents creation of an environmental covenant.	A	• LUCs will be implemented and maintained as detailed in USCG installation planning documents

Notes:
For definitions, refer to the Acronyms and Abbreviations section.
A – applicable
TBC – to be considered

5.0 REMEDIAL DESIGN

This section details the design information necessary to support RA planning documents and fieldwork, as well as describes potential approaches for completing RAs. The described RA approaches will not limit the RPM from considering proposals that detail alternate methods during the procurement process if they are determined to be appropriate.

5.1 RA Pre-Planning

Pre-planning work detailed in the sections below consider location-specific ARARs (Table 9).

5.1.1 Biological Assessments

Initial biological assessments will be completed by the government to determine if further consultation is required with the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service, or other agencies. These assessments can be completed by the government or supported by a contractor. Biological assessments should consider the presence of critical habitat, nesting bald eagles or other raptors, migratory birds, Endangered Species Act (ESA) listed species, and marine species. Initial evaluation as part of the RD process reviewed biological impacts using the USFWS Information for Planning and Consultation (IPaC) (USFWS 2024). IPaC information is continually updated and at the time of RA planning should be reassessed.

Findings of the biological assessment that can be shared during the RA procurement and planning process should be made available. Sensitive information may not be allowed to be made publicly available. It will be the responsibility of the RA contractor to show compliance with appropriate regulatory requirements in planning documents and in the field when conducting RAs.

5.1.1.1 Critical Habitat

According to the USFWS IPaC there is no critical habitat present for ESA listed species (USFWS 2024). Because the project takes place within tidally influenced areas, the tidal zones are considered as part of wetland impacts. RA planning documents will need to detail how impacts to aquatic and wetland habitat will be reduced or prevented. Steps to prevent impacts to tidal and wetland habitats can include using methods to reduce sediment mobilization, steps to prevent runoff, good housekeeping measures, and other means.

5.1.1.2 Eagle Nests and Migratory Birds

To prevent a take under the Bald and Golden Eagle Protection Act the project area and surrounding vicinity will need to be surveyed for eagle nests and determine if they appear occupied or abandoned. This should be conducted as part of pre-planning by the government and should occur again before the start of the project if work occurs within the nesting timeframe. Eagles and raptors tend to nest from 1 March through 31 August (Appendix A) (USFWS 2017), location-specific timeframes may be available through USFWS. If nests are present, RA planning documents will need to consider how to avoid impacts or if the stipulations of an Incidental Take Permit need to be met. There are no trees present at any of the four AOCs, impacts to eagles and other raptors is unlikely.

Migratory birds may be present in the project area and vicinity, the USFWS IPaC indicates there are no migratory birds of conservation concern expected (USFWS 2024). Site work could result in a take as the destruction of bird nests, eggs, or nestlings can occur from construction-based activities. The USFWS has identified time periods that nesting birds can be anticipated in regions of Alaska. Appendix A presents the USFWS *Timing Recommendations for Land Disturbance and Vegetation Clearing* (2017) which can assist in identifying when nesting migratory birds may be present in a region. RA planning should take into consideration how to avoid impacts to migratory birds such as by planning work for specific timeframes or through visual assessment. Migratory birds are unlikely to be present in AOC 2 Inner Boat House and AOC 3 Inner Marine Ways due to their locations within the intertidal zone. Migratory birds may be present at AOC 1 BSY. If excavation activities are conducted within the nesting timeframe (USFWS 2017) a survey should be conducted to investigate for nest prior to conducting RA activities.

5.1.1.3 ESA Species for Consideration

The USFWS IPaC identified the potential for the short-tailed albatross to be present, an ESA listed species (USFWS 2024). It is unlikely that the short-tailed albatross will be present in the area. The global population breeds on a single island, Tori-shima or "Bird Island", which is an uninhabited Japanese island in the Pacific Ocean. During the non-breeding season, the short-tailed albatross can be found in the Gulf of Alaska, Aleutian Island Chain, and Bering Sea (University of Alaska Anchorage 2020). However, Ketchikan is within the potential flight range of the short-tailed albatross which is why it was identified.

5.1.1.4 Marine Species for Consideration

The USFWS IPaC identified the potential for the northern sea otter to be present in the project area (USFWS 2024). Sea otters are an ESA listed species and protected under the Marine Mammal Protection Act (MMPA). If assessments determine the northern sea otter is present consultation is required. The Ketchikan area is not considered critical habitat for the northern sea otter. RA planning documents will detail how impacts to marine species will be prevented. Adjacent marine waters are used by humpback whale and Stellar sea lions, also MMPA species, and may require consideration for planning.

5.1.2 Archaeological, Historical, and Cultural Resources

The oldest Base Ketchikan building was constructed in 1917. The Administrative Building (Figure 2) has been listed as a historic building on the National Register of Historic Places (NRHP). Also, the Buoy Shed, the North Pyrotechnic Bunker, and the Gun Emplacement have been determined for eligible listing (USCG 2023c). Previous studies have not found archaeological, historical, or cultural artifacts, but the potential exists that these resources could be present. Awareness training will be provided to employees with the potential to encounter any cultural, historic, or archaeological resources. Photographs of all items removed will be taken and will be reviewed by the USCG archaeologist. Additionally, in the event of an inadvertent discovery, the USCG archaeologist will be contacted. The USCG archaeologist would determine if additional consultation is required and whether or not construction activities need to be modified or stopped pending consultation.

5.2 RA Planning

5.2.1 Project Team

As part of the procurement process, key roles and individuals who will support the project can be required to be identified by the RA contractor. The planning documents will be used to identify key personnel (government, stakeholder, contractor, and subcontractor or service provider), their assigned roles, and communication pathways. Contractor personnel involved in the RA will need to have the appropriate certifications for their assigned role. Required certifications held by assigned personnel, and identified alternates if detailed, will be included in the appropriate planning documents. Potential RA contractor roles that may be identified include project manager (PM), safety representative, field team lead, environmental scientist, chemist, site superintendent, QC, or other specialty roles pertinent to the execution of the RAs. Certifications identified may include degree(s), HAZWOPER, 30-OSHA, QC certifications, safety certifications, and others as appropriate to the position.

Personnel identified as Qualified Scientist or Qualified Environmental Professional will need to show compliance with 18 AAC 75.333. Resumes may be requested for identified scientists or professional personnel.

5.2.2 Site Access and Security

Base Ketchikan is a secure government installation and site access must be coordinated with the USCG in advance of contractor arrival. The RPM will need to have the correct Base Ketchikan point of contact. The RA contractor will need to provide the necessary information for Base Ketchikan to determine site access eligibility. In addition, the RA contractor will need to identify any other entities (subcontractors or service providers) who require Base access and provide the appropriate information for approval.

Work will take place on the Lower Base (Figure 2). The property entrance is controlled by a locking gate and guard at the road entrance to restrict public access (USACE 2021). Due to the location of the project, limited site security is appropriate for the active project area. The contractor will still need to make necessary arrangements for the secure storage of equipment and materials left onsite throughout the life of the project. Security measures may need to be detailed in the event items are staged off the installation.

5.2.3 Permits

An installation dig permit may be required by USCG Base Ketchikan in advance of excavation, the contractor must follow the installation's dig permit procedures. If the installation does not have a dig permit program, the contractor will still be required to notify the Alaska Digline prior to excavation. Per Alaska Statute (AS) 42.30.490(3)(A), excavation is defined as "an activity in which earth, rock, or other material on or below the ground is moved or otherwise displaced by any means". This is in line with ARAR requirements. If utilities are present in areas that will be disturbed the Work Plan should identify how work will be conducted around utilities (ex. hand removal of soil).

No other permits are required per CERCLA 121(e) so long as all remedial activities occur onsite. While permits are not required, the contractor will need to meet substantive requirements of applicable permit requirements. It is not anticipated that project activities would occur beyond the boundary of Base Ketchikan. Permits for which the substantive requirements may need to be implemented include, but are not limited to:

- USACE Section 10 and Section 404 Nationwide Permit 38 – Cleanup of Hazardous and Toxic Waste

    - ADEC Clean Water Act Section 401 Water Quality Certification Nationwide Permit Reissuance (ADEC 2020)
- ADEC Construction General Permit
- USFWS Incidental Take Permit

Information for each of these identified permits has been provided electronically along with this Work Plan.

5.2.4 Environmental Protection

Planning documents will need to consider project impacts to the environment, biological resources, and cultural resources. The RA contractor will need to identify how environmental impacts will be reduced or prevented. This can be accounted for by following substantial requirements of permits, applicable installation plans, good industry practices, and appropriate regulations and guidance. The main environmental impact to consider is from sediment removal and the potential mobilization of sediment, as well as releases to the environment that may result from equipment.

In the event of a release or spill to the environment the planning documents will need to detail responsibilities, notification procedures, and agencies requiring notification. Planning documents should describe resources that will be available onsite to prevent or reduce releases to the environment such as secondary containment, absorbents, and spill response supplies, along with where these resources will be located. Spill response supplies will need to be appropriate to the environment (e.g., land or water), because of work being conducted in tidally influenced areas containment boom may be necessary to have on hand. As part of planning, response to equipment breakdowns in tidally influenced zones and plans for equipment recovery should be addressed.

Biological impact mitigation can include timing specific field events based on wildlife activities, conducting periodic assessment for the presence of wildlife, and stopping work if necessary. Beyond identifying mitigation efforts, the planning documents should identify any necessary notification responsibilities and procedures. Although archaeological, cultural, and historic artifacts are not anticipated in the project area planning documents should detail steps to be taken if identified.

5.2.5 Tides

The timing of work at AOC 2 Inner Boat House and AOC 3 Inner Marine Ways will need to be planned around low tides for intertidal sediment removal. This can result in RA personnel working in shifts or outside of normal business hours. Because low tide is required for intertidal sediment RAs additional personnel or equipment may be needed to complete RAs in the required timeframe. Low tide criteria and work timing (work start and work end) should be identified in the planning documents. If weather factors need to be considered along with the tides (e.g., high wind or storm events) that should be discussed as well.

5.2.6 Heavy Equipment

Heavy equipment necessary to complete RAs should be identified by the RA contractor during planning. Ketchikan can only be reached by boat or airplane and has limited options for equipment rental. This can result in availability issues, reduced options in equipment, or lack of specific equipment. Three commercial equipment rental options were identified during the RD planning – Tyler Rental, Bobcat of Ketchikan, and Construction Machinery Industrial, LLC. It is possible that smaller companies or individuals may have equipment to rent. If equipment necessary for the completion of the RA is unavailable, it will need to be

brought in via barge or ferry. Table 11 identifies the potential equipment needed for each AOC, actual equipment will depend on the RA approach.

Table 11 Potential Equipment

EQUIPMENT	AOC 1 BUOY STORAGE YARD	AOC 2 INNER BOAT HOUSE	AOC 3 INNER MARINE WAYS
Excavator	X		X
Skid Steer	X	X	X
Loader	X		X
Telehandler	X	X	X
Truck with Lift Gate		X	X
Forklift	X	X	X
Vacuum Truck/Hydro Vacuum Truck		X	
Vacuum Unit (trailer or skid mounted)		X	X

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

As part of the RD planning, local Ketchikan companies were contacted regarding availability of a vacuum truck or hydro excavation truck. Pool Engineering, Inc. was identified as having a vacuum truck that was used for sewage purposes. Additionally, P&T Construction may have a vacuum truck; however, the company could not be reached to confirm if the truck is operational or available for rent.

5.2.7 ECOBOND

Metals Treatment Technologies, LLC (MT2) is the provider of ECOBOND, a proprietary product, which will be used at AOC 1 BSY to stabilize arsenic-contaminated soil. ECOBOND is a granular product that is shipped in supersacks, stored within conexes, and will need to be transported to Ketchikan by barge. The material needs to remain dry while being stored. Application of the product by MT2 is required, the RA contractor will need to identify the actions to be completed by MT2 as part of the planning documents. As part of planning, weather will need to be considered, because if the soil becomes overly saturated with water ECOBOND cannot be applied.

The formulation of ECOBOND will be made specific to the soil characteristics present at AOC 1, the contaminant to be stabilized (arsenic), and any identified ADEC limitations (such as use of copper salts). A generic ECOBOND formulation is provided in Appendix B along with application history in Alaska. To determine the necessary components a soil sample will need to be provided to MT2, typically 0.5–1 gallon of soil, and at least 8 weeks is necessary to complete soil analysis. In addition, the sample results will help determine the application rate of ECOBOND.

Appendix B presents a summary safety data sheet, project experience, and overview of ECOBOND technologies.

5.2.8 Subcontractors and Service Providers

Subcontractors and service providers that should be identified in planning documents include:

- MT2 for the preparation and application of ECOBOND for arsenic soil stabilization
- Analytical laboratory for the analysis of analytical samples, will need to be ELAP and ADEC certified
- Barge transportation for the mobilization and demobilization of items
- Roadway transportation provider for the movement of large items to and from Base Ketchikan
- Civil services to provide equipment and personnel (operators and laborers) for the excavation of soil/sediment and loading/onsite transport of super sacks
- Waste transportation and disposal providers, may require transporter and treatment, storage, and disposal facility (TSDF) EPA numbers be listed
- Backfill material for replacement of soil removed from AOC 1 BSY and if necessary to support sediment removal

5.3 RA Mobilization and Site Setup

RA personnel and resource mobilization to Ketchikan is restricted to boat or airplane because Ketchikan is not connected by roadway. Personnel mobilization by boat is limited to the Alaska Marine Highway and vessel availability, this should be monitored as sailing schedules can be easily impacted. The Ketchikan airport can support large commercial and small airplanes. Lodging and rental vehicle availability can be reduced due to tourism and commercial activities. A variety of barge companies are able to dock in Ketchikan and no special considerations are required for barge offloading.

The RA contractor should identify a mobilization approach, timeline, service providers if appropriate (i.e., barge company), and alternative options that can be implemented, so that fieldwork occurs as planned.

5.3.1 Staging Areas

Staging off the installation may be required in addition to staging resources on Base Ketchikan. Any staging locations off Base Ketchikan will be identified in planning documents and the selected location(s) will need to have adequate space, security measures if necessary, and be accessible by RA personnel. Staging areas on Base Ketchikan will need to be arranged with the USCG in advance of mobilization. Due to the limited space availability, mission readiness activities, and potential Base contractor coordination this is a critical detail. Should RA contractor resources need to be staged offsite for the life of the project, commute time may need to be factored into the field schedule. Materials other than the contaminated soil/sediment may be moved between Lower Base and Upper Base. The contaminated soil cannot be transported between Lower Base and Upper Base without being manifested due to accessing the South Tongass Highway.

5.4 RA Implementation

RAs will be implemented at AOC 1 BSY for soil, and AOC 2 Inner Boat House and AOC 3 Inner Marine Ways for intertidal sediment. The overview approach described for RAs at each AOC is based on the Focused Feasibility Study (FFS) (USACE 2018), ROD (USACE 2021), and identified RAOs. Personnel onsite for the RA will need to wear the appropriate personal protective equipment (PPE), determined by the chemical and physical site hazards. Based on the assessed RA approaches Level D or modified Level D is appropriate.

The ADEC *Petroleum Hydrocarbon Cleanup for Oversized Material Technical Memorandum* (2005) allows for the removal of rock material greater than two inches without testing under the condition it does not have the potential to hold excessive amounts of contamination. ADEC has applied the criteria from this technical memorandum to contaminants other than petroleum, including PCBs and metals. Application of this technical memorandum to site planning may be appropriate. Equipment and/or hand tools can remove large rocks from the excavation boundaries if encountered rather than mechanically screening soil. Mechanically screening soil requires additional time and space, timing with the tides may be difficult and space is limited at the Lower Base.

Backfill material will need to be brought onto Base Ketchikan to replace material removed from AOC 1 BSY and to potentially support AOC 2 Inner Boat House and AOC 3 Inner Marine Ways intertidal sediment removal as temporary cover or for filling sandbags. There are local material suppliers including Ketchikan Ready-Mix and Quarry, Eddystone Rock and Ready-Mix, and Big Rock Trucking LLC. As part of planning, the RA contractor should identify the source of fill material. It may be necessary that the material be certified clean through sampling or statement of the material site owner. It is anticipated that the material provider will have a dump truck and be able to transport gravel to Base Ketchikan. If there are competing construction projects during RA efforts, this may limit the availability of material. Material availability and amount will need to be taken into consideration during planning. In addition, backfill in the BSY will need to be appropriate for the use of that yard and be compacted sufficiently to support the equipment and materials used in that yard.

5.4.1 Bedrock Documentation

At the sediment excavation sites (AOC 2 Inner Boat House and AOC 3 Inner Marine Ways) it is expected that bedrock will be reached to represent the floor of the excavation. Sampling is not required for bedrock; however, the presence of bedrock will need to be documented and ADEC must concur that sampling is not required. Planning documents will need to describe the process that will be followed when bedrock is encountered, bedrock should be documented with photographs and descriptions from the field. Photos and supporting descriptions can be submitted to ADEC by the government for concurrence while fieldwork is underway and detailed in the RA Report. Location or area of bedrock can be further supported with survey data collected in the field. Bedrock locations within excavation limits are an important part of site delineation and should be well documented in the field notes and reporting.

5.4.2 AOC 1 Buoy Storage Yard Removal Action

The COCs associated with this AOC are PCBs and arsenic in soil. The RAs associated with AOC 1 include the excavation, transportation, and disposal of non-TSCA PCB-contaminated soil with concentrations greater than 1.0 mg/kg, confirmation soil sampling, in-situ treatment of soil with ECOBOND, and post-treatment sampling. Refer to Section 3.1 for a complete list of the RAOs. The BSY RA boundary encompasses an area of approximately 160 feet by 120 feet by 3 feet bgs, and arsenic- and PCB-contaminated soil is present. Figure 3 provides an overview of AOC 1 BSY.

For work to be conducted at the BSY, items stored at the AOC will need to be moved for equipment to access the soil. Due to the limited size of the BSY and adjacent pier space, the selected equipment will need to be an appropriate size to effectively maneuver. If pier access is to be limited during the RA, alternative access points may need to be identified by the installation or the RA contractor will need to describe how pier access will be managed. Equipment likely necessary to support RA at the BSY includes an excavator for PCB soil removal and ECOBOND in-situ treatment and loader with bucket and forks to support backfilling, site compaction and stabilization, and moving items. Other equipment may be appropriate to use based on the RA contractors plan of approach and for moving items around the project

site (e.g., skid steer, telehandler). It is anticipated that the excavator, loader, and supporting equipment can be obtained locally.

5.4.2.1 PCB Soil Excavation

The first step should be the removal of PCB-contaminated soil with an excavator. PCB contamination was identified at sample points 12KTN-BSU-SO-009 at 1 mg/kg and 12KTN-BSU-SO-016 at 2.1 mg/kg (Figure 3). The FFS approach identified removing soil from an area that is 15 feet by 15 feet by 3 feet bgs, centered around each of the samples. The estimated volume of soil to be removed is 50 cy based. The FFS and ROD assumed that additional excavation would be required beyond the planned boundary and will result in approximately 84 cy excavated (USACE 2018; USACE 2021). The removal area can be established by surveying the original sample points and measuring or surveying the excavation boundary based on geographic information system (GIS) generated survey points.

Excavated soil can be directly placed into containers for offsite transportation and disposal. The waste container used will need to be appropriate for PCBs and arsenic. The ROD anticipated that 67 cy of soil will be non-TSCA (less than 50 mg/kg) and 17 cy will be TSCA hazardous (greater than or equal to 50 mg/kg). With the total levels of arsenic found at the BSY (36.5 to 380 mg/kg) the soil will likely be a RCRA hazardous waste (greater than or equal to 5 milligrams per liter [mg/L]) based on application of the 20-times rule. Material excavated from within the PCB boundary for offsite transport and disposal does not require field screening. If necessary, based on the water content of the soil, the RA contractor can consider the addition of either a polymer stabilizer or material such as straw, hay, or woodchips. Section 5.9 presents waste management details.

Once excavation boundaries are reached, confirmation samples will need to be collected from the sidewalls and floor to confirm removal of PCB-contaminated soil above 1 mg/kg. The RA contractor could consider implementing field screening for PCBs prior to collecting confirmation samples, currently PCB field screening options are limited and may be difficult to implement.

The excavation area will be left open while awaiting PCB sample results, the open areas will need to be secured and a description of that process be included in the planning documents. PCB analytical results will confirm if PCB soil above 1 mg/kg remains, if so, additional excavation will be required. The Work Plan should identify the step-out distance, or how that will be determined, for additional excavation. Following additional excavation, confirmation samples will be collected again for determination if PCB removal is complete. When removal of PCB-contaminated soil is confirmed the in-situ treatment process for arsenic soil can occur.

5.4.2.2 Arsenic Soil ECOBOND In-Situ Treatment

ECOBOND is a proprietary product of MT2, and the ECOBOND formula will need to be determined in advance of the RA contractor mobilizing to conduct in-situ treatment. MT2 requires a soil sample (0.5–1 gallon) be submitted to them for analysis, in addition any State limitations that could impact the formula should be identified at this time. Typically, soil analysis takes 8 weeks to complete. Based on the results and provided stipulations the ECOBOND product will be prepared. ECOBOND will need to be shipped to Ketchikan by barge and stored in conexes to keep the material dry.

MT2 requires that their personnel apply ECOBOND at the rate they have determined based on the soil analysis and product formulation. Typically, the product is applied directly to soil with water and mixed in using an excavator. Weather will need to be considered because if the soil is overly saturated ECOBOND cannot be applied. After application is complete, the product requires 24 hours to establish and following

post-treatment samples will be collected by MT2 for analysis. If post-treatment sampling indicates that that ECOBOND has not stabilized the arsenic, additional product application will be completed. The ECOBOND application rate will be included in the final reporting so the application and impact of the product is better understood.

Confirmation samples will need to be collected to confirm the effectiveness of the in-situ treatment for arsenic. Analytical methodology for TCLP, Synthetic Precipitation Leaching Procedure (SPLP), and total arsenic sampling per EPA Method SW6020 analysis should be included in the Work Plan. SPLP samples will show the effectiveness in reducing arsenic migration to groundwater.

5.4.3 AOC 2 Inner Boat House Removal Action

The COCs associated with this AOC are copper, lead, zinc, and PCBs in sediment. The RAs associated with AOC 2 include the excavation, transportation, and disposal of intertidal sediment with PCB concentrations greater than 1 mg/kg and metals concentrations greater than the project-specific ACLs (Table 5); confirmation sampling of excavation limits, not including bedrock; and sampling for waste characterization. Refer to Section 3.2 for a complete list of the RAOs and the ACLs for the COCs. Based on the ROD, the RA area is approximately 110 feet by 45 feet and sediment ranges in thickness from a few inches to 1 foot deep resulting in an estimated 97 cy of material that can be removed. It is expected that sediment will be removed to the depth of bedrock. Figure 4 provides an overview of AOC 2 Inner Boat House.

The AOC 2 Inner Boat House is located directly under the pier and can only be accessed during low tide. Conditions under the pier can be cramped and limit the use of equipment, sediment will likely require hand removal. The AOC is underlaid by bedrock, which is visible in locations under the pier. For personnel access to the AOC there are stairs near the Administration Building (Figure 2). Anything not moved to and from the AOC by workers will require planning and input from Base Ketchikan. There is no direct access under the pier for equipment and larger/heavier items, a cable or winch system may be necessary. Any equipment considered for work under the pier will need to be small enough to fit under the pier, capable of maneuvering in between pilings, and able to move on uneven ground.

Equipment that may be appropriate could include a mini skid steer for assisting in moving material and other equipment around under the pier. The FFS identified that a mini excavator does not have sufficient clearance to operate under the pier (USACE 2018). Other equipment may be appropriate to use based on the RA contractors plan of approach and for moving resources around (e.g., forklift, telehandler).

5.4.3.1 Intertidal Sediment Excavation

The area requiring excavation should be identified by using surveying techniques to establish the removal boundary. The outer boundary can be established based on GIS generated coordinates. There is a PCB area requiring removal based on a previous sample. The concentration of PCBs at sample point 14KTN-BSU-SE-015 was 4 mg/kg. This location can be identified based on past survey data and a 15-foot by 15-foot boundary established with the sample point as the center (Figure 6). Any physical markers used to identify removal boundaries will need to be capable of staying in place during high tide or easily removed and replaced. The PCB sediment will need to be removed first to confirm removal of PCB-contaminated sediment with concentrations greater than 1 mg/kg and then followed by removal of the remaining metals contaminated sediment. Field screening is not necessary while sediment is excavated within the planned removal boundary.

Any sediment removal approach cannot result in damage to the pier pilings, hand removal will need to be conducted around these structures. Potential options for removing sediment from under the pier includes the use of labor, hand tools, and vacuums. Sediment can be placed into buckets or drums and moved out from under the dock, a mini skid steer could support this work or a trolly system may be devised to reduce physical labor. There are industrial vacuums with high-efficiency particulate air (HEPA) filters that can be used to vacuum the sediment, these can be worn as a backpack or physically moved. The volume that the vacuum can hold is limited to the size of the container and the contents of the vacuum would need to be placed into buckets or drums to be moved up to the pier. A drum vacuum unit that fits over a 55-gallon drum may be appropriate. Vacuums require the use of electricity and generators may be necessary to run the vacuums. Appendix C presents vacuum examples.

A larger vacuum approach may be possible through use of a vacuum truck, hydro vacuum truck, or an existing vacuum equipment system to meet the project needs. A vacuum truck or hydro vacuum truck would likely require that an access point or points be created through the pier. The hose of the truck may be able to reach the AOC from the side, however an increase in hose distance impacts lifting capability. Depending on the location, creating access through the pier may be feasible to do and then repair to the appropriate standards. This approach could limit Base Ketchikan operations in areas and would need to be identified in advance. If water is used to assist in removing sediment it will need to be accounted for as part of waste stream management.

Sediment will require a degree of dewatering prior to containerizing, this can be accomplished by placing the sediment into 1-cy dewatering filter bags, or alternative methods. Water generated as part of sediment dewatering will need to be collected and the waste stream managed appropriately. This approach may not be appropriate or may need to be modified for sediment collected by larger vacuum equipment. If the recovered sediment is fluidized it can be disposed of without dewatering. In support of disposal a polymer stabilizer or flocculent can be added to the recovered waste.

The final waste shipment container used will need to be appropriate for PCBs, arsenic, and lead. The ROD estimated that 77 cy of sediment will be non-hazardous, and 19 cy will be hazardous for arsenic and lead. Refer to Section 5.9 for waste management details. According to the *Remedial Goals and Cleanup Target Areas Technical Memorandum* (USACE 2017c) arsenic concentrations ranged from 5.6 mg/kg to 945 mg/kg and lead ranged from 44 mg/kg to 4,180 mg/kg. With the 20-times rule applied there are RCRA hazardous concentrations present for arsenic and lead, greater than 100 mg/kg for each metal. Final quantities and locations of hazardous sediment will be determined as part of RA planning and reporting.

In between low tide events the areas exposed during the RA will need to be protected to prevent additional sediment deposition and sediment mobilization. This can be accomplished by covering the exposed areas and/or edges using sandbags, clean fill material, or other alternate means. Moving clean fill material down to the site may require additional equipment.

Sampling will be conducted to confirm the removal of contaminated sediment above the ACLsfor total PCBs, copper, lead, and zinc. Prior to sampling field screening for metals using X-ray fluorescence (XRF) may be an option. If field screening results identify contamination is not above ACLs, confirmation samples should be collected for laboratory analysis. If field screening results or confirmation sampling identifies contamination above the ACLs, the additional sediment will be removed. The Work Plan should identify the step-out distance that will be used, or how it will be determined, for additional sediment excavation. Following additional removal, confirmation samples will be collected again to determine if contaminant removal is complete.

5.4.4 AOC 3 Inner Marine Ways Removal Action

The COCs associated with this AOC are copper, lead, and zinc. The RAs associated with AOC 3 include the excavation, transportation, and disposal of intertidal sediment with metals above the project-specific ACLs (Table 6); confirmation sampling of excavation limits, not including bedrock; and sampling for waste characterization. Based on the ROD, the RA area is approximately 18,750 square feet and sediment ranges from a few inches to 1.25 feet deep resulting in an estimated 220 cy of material to be removed. Figure 5 provides an overview of AOC 3 Inner Marine Ways.

The AOC 3 Inner Marine Ways is within the marine environment adjacent to the Marine Ways Shed and Marine Railway. The area is accessible by a ramp adjacent to the Marine Ways Shed (Figure 2). The extent of removal will be impacted by low tide and amount of exposed intertidal sediment. Sediment below the low tide mark will not be removed, this sediment is subtidal sediment and will remain in place. It is estimated that approximately 10% of the contaminated area is subtidal sediment.

Equipment can access the site and has done so in the past during TCRAs and maintenance activities that occurred around the Marine Railway. A small excavator or similar machine can remove contaminated sediment from the area. Other equipment may be appropriate to use based on the RA contractors plan of approach and for moving items around the project site (e.g., skid steer, telehandler). Due to the presence of the Marine Railway, hand removal will be required around this infrastructure. Sediment is periodically cleared from around the Marine Railway as part of long-term maintenance events, depending on when this action occurs limited sediment may be present around the rail line.

5.4.4.1 Intertidal Sediment Excavation

The area requiring excavation at AOC 3 Inner Marine Ways should be identified by using surveying techniques to establish the removal boundary. The boundary can be established based on GIS generated coordinates. Any physical markers used to identify removal boundaries will need to be capable of staying in place during high tide or easily removed and replaced.

Removal of sediment can be achieved using equipment such as an excavator and supported with manual removal as needed during low tide. If the bedrock prevents the effective removal by heavy equipment, hand tools or industrial vacuums with HEPA filters can be used to remove sediment. Vacuum units can be worn as a backpack or physically moved. Additionally, a vacuum drum or other portable vacuum unit may be appropriate to use.

Sediment will require a degree of dewatering prior to containerizing, sediment can be allowed to dewater within the excavation area. Due to the larger volume of sediment anticipated, the use of 1-cy dewatering bags would be a time limiting factor. If sediment is dewatered beyond the excavation boundary the water will need to be captured, containerized, and managed as waste. If the excavated sediment is fluidized it can be disposed of without dewatering. To support offsite transportation a polymer stabilizer or flocculent can be added to the recovered waste.

The final waste shipment container used will need to be appropriate for the media and contaminants. The ROD estimated that 176 cy will be non-hazardous, and 44 cy will be RCRA hazardous (USACE 2021). According to the *Remedial Goals and Cleanup Target Areas Technical Memorandum* (USACE 2017c) arsenic concentrations ranged from 10 mg/kg to 110 mg/kg and lead ranged from 55 mg/kg to 289 mg/kg. With the 20-times rule applied there are exceedances of the RCRA levels for arsenic and lead, greater than 100 mg/kg for each metal.

In between low tide events the areas exposed during the RA will need to be protected to prevent additional sediment deposition and sediment mobilization. This can be accomplished by covering the exposed areas and edges using sandbags, clean fill material, or other alternate means.

Sampling will be conducted to confirm the removal of contaminated sediment above the ACLs for total PCBs, copper, lead, and zinc. Prior to sampling, field screening for metals using an XRF may be an option. If field screening results or confirmation sampling identifies contamination remains above the ACLs additional sediment should be removed. The Work Plan should identify the step-out distance that will be used, or how this will be determined, for additional sediment excavation. Following additional sediment removal, confirmation samples will be collected again for determination if contaminant removal is complete.

5.5 RA Field Screening and Sampling

5.5.1 PCB Soil and Sediment

There are PCB field screening kits commercially available, however they do come with limitations that may not make them appropriate for use in the field. For example,

- Clor-N-Soil shows if PCBs concentrations are less than or greater than 50 parts per million (ppm)
- L2000 PCB/Chloride Analyzer effectiveness is limited with saturated media and can detect to 2 ppm
- PCB Enzyme-Linked Immunoassay requires additional resources often not provided as part of the kit, can be impacted by operator error and matrix interference, and may not be appropriate for sediment
- Mobile laboratory cost may not benefit the project due to limited number of PCB field screening samples likely needed

If field screening is an option the RA contractor uses, the field screening will be conducted at the rate described in the ADEC *Field Sampling Guidance* (ADEC 2022a). Implementation of field screening should also be considered with the turnaround time that can be accomplished with laboratory samples. It is likely that both analytical sampling and field screening for PCBs will be needed to delineate the extent of contamination and assist in decision making. Table 12 presents the field screening and sampling frequency.

PCB sampling to determine completion of the RA will be required for soil at AOC 1 BSY and sediment at AOC 2 Inner Boat House. Sampling for each media type will need to follow a confirmation sampling approach in line with TSCA 40 CFR Subpart O for composite sampling. The floor and sidewalls are divided into a grid with a maximum grid spacing of 5 feet (1.5 meters). Aliquots are collected from each grid or grid intersection, with a maximum of nine aliquots per composite sample. In a 15-foot by 15-foot grid, nine aliquots are collected. A modified approach may be required for sediment because there may not be sidewalls capable of sampling. In general, three aliquots are collected from each sidewall when the sidewalls are less than 3 feet in height. A similar amount of material will be collected for each aliquot and placed into an appropriate container, homogenized, and then placed into the sample container. It is anticipated that bedrock will be reached at the sediment excavation site, if bedrock is encountered excavation floor sampling is not required.

An estimated 8 primary PCB soil samples will be collected from AOC 1 BSY and an estimated 4 PCB sediment samples from AOC 2 Inner Boat House. PCBs will be analyzed by EPA method SW8082 and will

meet the most current version of the DoD QSM requirements. The planning documents will need to identify sample management procedures, the laboratory service provided, sample shipment process, and turnaround time.

5.5.2 Copper, Lead, and Zinc Sediment

Field screening can be accomplished using an XRF, capable of detecting a variety of metals including lead. The XRF can analyze marine sediment. Accuracy is improved if sediment field screening samples are dried first.

Copper, lead, and zinc sampling to determine completion of the RA will be required for sediment at AOC 2 and AOC 3. Sampling will need to follow the ADEC *Field Sampling Guidance* (ADEC 2022a), if another approach is suggested justification will be required. Sidewalls are not anticipated at the sediment excavations and the sampling approach should account for this. Table 12 presents the field screening and sampling frequency.

Table 12 ADEC Surface/Excavation Field Sampling Frequency

BASE OR SIDEWALLS	BY SURFACE AREA (SQUARE FEET)	NUMBER OF SCREENING SAMPLES	ASSOCIATED NUMBER OF LABORATORY SAMPLES
Base	0-50	5	1
	51-124	5	2
	125-250	1 per 25 square feet	2
	More than 250	10, plus 1 per additional 100 square feet, or as the CSP determine, as necessary.	2, plus 1 sample per additional 250 square feet, or portion thereof; or as the CSP determines necessary.
Sidewalls	Any	For each sidewall, 1 per 10 square feet (depth and length), or portion thereof, with field screening sample collection focused on soil horizon(s) demonstrated as most likely to be contaminated.[1]	Minimum 1 per each sidewall, plus 1 additional sample for each sidewall area over 250 total square feet (depth and length), or portion thereof, at the highest field screening reading in all soil horizons, or as the CSP determines necessary. For example, a 12 foot by 30-foot sidewall (360 square feet total) would require two laboratory samples.[1]

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

[1] Field screening samples and laboratory samples are to be collected within a soil horizon at the area most likely to be contaminated, such as on top of confining layers, at the base of more porous layers, at the groundwater interface, or along any other preferential pathways identified in the field. Consult with the ADEC PM for sampling frequency of sidewalls of 2 feet or less in depth.

If sediment remains at the base of the excavations, an estimated 4 primary metal sediment samples are required for AOC 2 Inner Boat House and an estimated 6 primary metal sediment samples for AOC 3 Inner Marine Ways. For metal analysis PCBs will be analyzed by EPA method SW6020 and will meet the most current version of the DoD QSM requirements. The planning documents will need to identify sample management procedures, the laboratory service provided, sample shipment process, and turnaround time.

5.5.3 Field QC Samples

The field QC samples collected will need to be in line with the most current version of the DoD QSM and ADEC *Field Sampling Guidance* (ADEC 2022a). This requires a field duplicate to be collected at a 10% rate and MS/MSD samples at a 20% rate. Additionally, to meet the current version of the DoD QSM requirements an MS/MSD is required for each submitted sample batch. Based on the assessed RA approach for the AOCs and use of disposal sampling items an equipment blank will not provide added benefit. However, the use of an equipment blank should be assessed based on the implemented RA approach.

5.5.4 Sample Management

Sample management procedures will need to be detailed in the planning documents describing how samples will be maintained in line with sample method requirements, labeled, and tracked. This information can also include the planned method for sample shipment to the selected laboratory. From Ketchikan samples can be shipped by Alaska Air Cargo (Goldstreak), other carriers present in Ketchikan are FedEx and UPS.

5.6 Surveying

Surveying requirements will need to be detailed in the planning documents to meet the contract requirements. The planning documents will also need to detail how surveying will be performed and how the requirements will be met. Survey data should be collected at each sample location, final excavation boundaries, and other pertinent site features. Previous survey data has been provided in accordance with the USACE *Manual for Electronic Deliverables* (USACE 2017b). The previous survey data format should be taken into consideration for final survey reporting. Surveying accuracy may be impacted at locations under the pier.

5.7 Decontamination

An exclusion zone will need to be established at each site, or at a minimum, at the sites where hazardous materials will be excavated. Personnel and equipment will not be allowed to enter the exclusion zone unless there is a procedure for decontamination prior to exiting. In general, personnel will need to be decontaminated before leaving each work area. Personnel decontamination will depend on the level and type of PPE used and will include a boot washing station at each site. Dry-decon procedures can be used for heavy equipment prior to mobilization between AOCs; however, buckets should be cleaned with soapy water and brushes after handling hazardous waste. If a vacuum truck is used it will need to be rinsed before being returned to service. Decontamination fluids will need to be captured and managed with other liquid waste.

5.8 Site Restoration

The AOC 1 BSY will need to be leveled and compacted at the completion of the RAs. Because some soil will be shipped offsite, clean backfill will need to be brought in to replace the removed material. The new material will need to meet any installation specifications for type. If identified by the installation, compaction requirements may need to be met as part of soil site restoration. If sandbags are used as part of sediment removal, sandbags will need to be removed at the completion of fieldwork.

5.9 Waste Management

5.9.1 Waste Stream Identification and Characterization

Waste management details will need to be included in the planning documents and can be specified in a WMP. Waste generated because of RAs will be under Base Ketchikan EPA generator number. Estimated and potential RA waste streams are:

- **AOC 1 BSY:** 84 cy of soil total; 67 cy is estimated to be of non-TSCA (total PCB concentrations less than 50 mg/kg) and 17 cy is anticipated to be TSCA hazardous (total PCB concentrations greater than or equal to 50 mg/kg) based on the ROD (USACE 2021)
  - The ROD did not identify if soil is anticipated to be RCRA hazardous arsenic-contaminated soil.
    - Soil waste could be RCRA hazardous for arsenic (D004) based on application of the 20-times rule to the highest total arsenic result, waste stream sampling will confirm waste status.
  - Sampling will be required for PCBs and RCRA metals, other sampling may be requested by the TSDF.
- **AOC 2 Inner Boat House:** 97 cy of sediment total; 77 cy is expected be non-TSCA (total PCB concentrations less than 50 mg/kg) and less than RCRA hazardous waste levels for metals and 19 cy is anticipated to be RCRA hazardous for metals based on the ROD (USACE 2021)
  - Sampling will be required for PCBs and RCRA metals, other sampling may be requested by the TSDF.
  - Sediment waste stream is estimated to be RCRA hazardous for arsenic (D004) and lead (D008) based on application of 20-times rule, waste stream sampling will confirm waste status.
  - Water generated by sediment dewatering is anticipated to be RCRA non-hazardous based on the previous water results from TCRAs.
- **AOC 3 Inner Marine Ways:** 220 cy of sediment total; 176 cy is expected to be non-hazardous and 44 cy is expected to be RCRA hazardous for metals based on the ROD (USACE 2021)
  - Sampling will be required for RCRA metals, other sampling may be requested by the TSDF.
  - ROD did not identify what metals are expected to be elevated in sediment, however the sample results in the *Remedial Goals and Cleanup Target Areas Technical Memorandum* (USACE 2017c) show that arsenic and lead could be above RCRA levels of greater than 100 mg/kg, based on the 20-times rule.
    - Potential for sediment to be RCRA hazardous for arsenic (D004) and lead (D008) based on application of 20-times rule, waste stream sampling will confirm waste status.
  - Water generated by sediment dewatering outside of the removal area is anticipated to be RCRA non-hazardous based on the previous water results from TCRAs.

Examples of other regulated waste streams that the contractor may generate and be responsible for proper disposal include items such as lithium batteries, aerosol cans, and used oil. Non-regulated waste streams include investigation-derived wastes such as used PPE, used sampling supplies, and liner.

Waste characterization samples are typically requested at frequency of 1 sample per 200 cy by TSDF, some TSDF prefer composite samples. Waste characterization frequency and sample type will need to be

identified in planning documents in coordination with the TSDF. If sediment is containerized prior to receiving PCB site results the waste tracking and characterization can take this into account with more frequent PCB waste characterization sampling. Due to the small volumes and non-hazardous and hazardous estimates it may be appropriate to consider more frequent characterization sampling. Characterization of PCB waste is accomplished with EPA Method SW8082, and metal waste characterization can be accomplished with toxic characteristic leaching procedure methods and EPA Method SW6020 analysis.

5.9.2 Waste Containers and Weight

Containers for non-TSCA PCB and RCRA hazardous solid waste will need to meet the packing group requirement based on the analyte hazard and shipping requirements. These requirements may prevent the direct transportation of certain containers, for example if the RA contractor proposes use of supersacks they may need to be placed within a conex for shipment. The use of lined roll-off bulk containers certified waterproof may be appropriate; however, these containers are often in high demand and availability may be limited. The type of solid waste container should be identified in the planning documents and its conformance to the anticipated shipping hazard.

Filled containers will need to be weighed or have their weight estimated based on generator knowledge. Any requirements for weighing containers and the process for weighing containers will need to be detailed in the planning documents. As containers are filled and weighed this information will need to be communicated to the USCG because it can impact Base Ketchikan's generator status. Refer to Section 6 for additional considerations. Final weight will be based on reporting by the TSDF.

5.9.3 Waste Management and Staging

Waste will need to be managed based on whether it is a RCRA hazardous waste, universal waste, or non-hazardous waste stream for RCRA and/or TSCA. Waste will need to be appropriately labeled based on the contents, hazards requiring communication, generator and generator point of contact with contact information, packing group (if applicable), container number, waste code (if applicable), and accumulation start date (if applicable). A waste log should be maintained detailing when waste is placed into containers. Waste streams should not be co-mingled. Hazardous waste will need to be marked with an accumulation start date, if waste is TSCA hazardous an out of service date will need to be marked.

Waste staging during the RAs will need to be identified during the site setup activities. Waste should be stored within the boundary of the Lower Base until ready for disposal transport. Staged waste should be inspected periodically and may need to be conducted in accordance with Base Ketchikan policy if stored on the installation. It may be necessary to place containers with solid waste on a liner based on installation requirements. Liquid waste should be placed in secondary containment. As appropriate, waste containers should be protected from the elements to prevent deterioration.

If polymers, flocculent, or other materials are going to be added to waste streams to stabilize and support waste shipment this will need to be identified in the planning documents. Details should include how these items will be applied and at what rate.

5.9.4 Transportation and Disposal

TSCA soil (greater than or equal to 50 mg/kg PCBs) will need to be shipped as polychlorinated biphenyls, solid, hazard class 9 UN3432. Soil and sediment that is RCRA hazardous for arsenic will need to be shipped as Arsenic Compounds, Solid, Not Otherwise Specified (n.o.s.), hazard class 6.1, UN1557. Sediment that is

RCRA hazardous for lead will need to be shipped as Lead Compounds, Soluble, n.o.s., hazard class 6.1 UN2291. Transportation of hazardous waste streams will require that transporters have an EPA number. In addition to having the correct manifest paperwork, waste generated from the AOCs cannot be transported from Base Ketchikan without a signed ADEC Contaminated Media Transport and Treatment or Disposal Approval Form. Manifests and a signed ADEC transport form are required if waste is moved beyond the boundary of the Lower Base for staging.

Final disposal of waste will occur outside of Alaska. The TSDF will need to be identified in planning documents and will need to be a Subtitle D (non-hazardous) or Subtitle C (hazardous) permitted facility, dependent on the waste stream characterization. The EPA number for the TSDF will need to be included in planning documents. Certificates of disposal will need to be provided by the TSDF and the certificates will be included in the RA Report. The timeframe for disposing of hazardous waste is dependent on the RCRA generator status, a small quantity generator can accumulate hazardous waste onsite for 270 days without a permit if shipping a distance greater than 200 miles. Large quantity generators can accumulate hazardous waste onsite for 90 days with limited exceptions. TSCA hazardous waste must be disposed of within 1 year.

5.10 Land Use Controls and Long-Term Monitoring

AOC 1 BSY, AOC 3 Inner Marine Ways, and AOC 4 Subtidal Sediment will have LUCs implemented to ensure the protection of human health and the environment. It is expected that UU/UE will be achieved for AOC 2 Inner Boat House. The LUCs for each AOC include:

- **AOC 1 BSY:** Restriction of residential use, site security prevent access by children and residents, signage (appropriately sized, spaced, and facing to warn individuals), prevent soil disturbance (including re-grading and re-graveling) without an ADEC notice of activity, update USCG Environmental Program Environmental Liabilities database and master planning documents, and site inspections
- **AOC 3 Inner Marine Ways:** Restriction of fish, shellfish, clams, or other items intended for human consumption, signage (appropriately sized, spaced, and facing to warn individuals), dig restrictions and require an ADEC notice of activity (except for accumulated marine sediment along the rail and footings in accordance with the ADEC-approved *Long-Term Maintenance Sediment Removal Work Plan*), update USCG Environmental Program Environmental Liabilities database and master planning documents, and site inspections
- **AOC 4 Subtidal Sediment:** Restriction of fish, shellfish, clams, or other items intended for human consumption, limitations on future in-water and in-sediment development, controlled access, (appropriately sized, spaced, and facing to warn individuals), dig restrictions and require an ADEC notice of activity, update USCG Environmental Program Environmental Liabilities database and master planning documents, and site inspections

The AOC 1 BSY, AOC 3 Inner Marine Ways, and AOC 4 Subtidal Sediment sites are included in the Base Ketchikan LUCIP. A LUCIP assists in maintaining the effectiveness and reliability of LUCs in place by formalizing specific items such as site inspections, dig permit review, master plan review, and associated forms, identifying how training or awareness of LUCs will be disseminated to Base Ketchikan personnel (USCG, civilian, and contractor), establishing responsibility for maintaining LUCs (e.g., who maintains the signs), procedure for new LUCs, LUC funding mechanisms, and process for modifying or terminating LUCs. The LUCIP can also serve as a repository for site history and provide a record of LUC inspection findings, issues, maintenance, and resolutions that can be helpful for Base Ketchikan and associated stakeholders.

The AOCs with LUCs will undergo CERCLA five-year review inspections. Five-year reviews evaluate the effectiveness of the remedy and confirm that it remains protective over the long term. AOC 1 BSY will require cap inspections once a year for the first five years, then every five years thereafter, indefinitely or until determined to be no longer necessary during the five-year review process. AOC 3 Inner Marine Ways will require inspections once a year for the first five years, then every five years thereafter, indefinitely or until determined to be no longer necessary during the five-year review process. To document sediment transport changes, analytical samples should be collected from the tidal zone at AOC 3 as part of the Five-Year Review. AOC 4 Subtidal Sediment will require LTM inspections no less than once every five years in conjunction with the Five-Year Reviews and will include collection of four subtidal sediment samples along the pier to make sure contaminants are stabilized.

5.10.1 Environmental Covenant

The Uniform Environmental Covenants Act (UECA; AS 46.04.340) requires the owner of real property to record a notice of activity and use limitation in the appropriate public land records where a legal impediment prevents creation of an environmental covenant. The environmental covenant is a specific recordable interest in the real estate that will be tracked by ADEC. The covenant is specific to the risks posed at a particular site and restricts activities that can result in exposure but will allow other uses to go forward. This process replaces the approach of using deed notices as institutional controls.

After receiving authorization from the State, the USCG will draft a Notice of Activity and Use Limitation to implement the UECA within six months. If comments are received on the draft within 30 days, the USCG shall respond to each comment within 30 days and shall submit a revised Notice of Activity and Use Limitation. The State shall review the revised notice and create the final notice within 90 days after receiving the request for a notice from the USCG.

6.0 CONSIDERATIONS

In the preparation of the Work Plan the following was noted in the ROD and should be taken into consideration for RA planning.

During the 14 November 2023 Site Visit the USCG discussed the potential for the installation of a propane tank at the BSY, which will require excavation in preparation for pouring a concrete foundation. As part of this, ECOBOND is to be used. To assist in the pre-planning for the AOC 1 BSY, if MT2 will be analyzing soil to support the propane installation it should be asked if they can determine the formulation and application rate for the RA. If not, it may be appropriate to have MT2 sample the soil and calculate the application rate in advance of RA procurement. The tank is planned for installation in the upper northwest corner of the BSY (Figure 3).

When RCRA hazardous soil and sediment waste is generated, the volume will have the potential to influence the RCRA generator status of Base Ketchikan. The installation is a small quantity generator, as a small quantity generator the installation cannot generate more than 1,000 kilograms (kg) of hazardous waste in one month or exceed the accumulation limit of 6,000 kg of hazardous waste. The 6,000 kg accumulation limit is a condition of the small quantity generators exemption from permitting requirements. In this situation, the small quantity generator can choose to become a large quantity generator and manage the hazardous waste as a large quantity generator. Alternatively, the small quantity generator will lose its exemption from regulation as a storage facility and be subject to the requirements of 40 CFR parts 264 through 267, part 270, and the notification requirements of section 3010 of RCRA.

Through RCRA Subpart L Alternative Standards for Episodic Generation, an episodic event can be planned or unplanned and is an activity that does not normally occur during generator operations resulting in an increase in the generation of hazardous waste that exceeds the calendar month quantity limits for the generator's usual category. A small quantity generator can maintain its existing status and must notify EPA no later than 30 calendar days prior to initiating a planned episodic event. The hazardous waste generated from an episodic event must be shipped offsite to a designated facility within 60 calendar days from the start of the episodic event. It may be a possibility that Base Ketchikan can report the RA waste generation as episodic events. Previously, EPA has noted that if there are annual reoccurring episodic events for the same reason that they will need to consider if the waste is generated as a true episodic event.

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7.0 RECOMMENDATIONS

The assessed RA approaches, based on the FFS (USACE 2018) and ROD (USACE 2021), are feasible and can be implemented. The conclusions made as part of the RD are that space availability in the Lower Base could be a concern, any mechanical approach that can be devised to reduce the reliance on manual labor for AOC 2 Inner Boat House will be a benefit, and the generator requirements with Base Ketchikan will need to be determined in advance of RA procurement. Table 13 presents the recommendations made as part of this Work Plan.

Table 13 RD Recommendations

NUMBER	TOPIC	RECOMMENDATION
1	AOC 1 BSY Additional Sampling	The recommendation made is to conduct additional PCB sampling at the BSY prior to initiating the RA activities. Review of the previous sample data shows that limited sampling was conducted at AOC 1 BSY. Due to the limited space this could be conducted as step-out samples from the two total PCB sample exceedances, or a grid approach could be used, to reduce the number of items that would need to be moved to allow sampling to occur. Additional data will confirm that the volume of soil to be shipped offsite for disposal is correct and can be used to assist in determining if PCB TSCA hazardous soil (≥ 50 mg/kg) is present and requires disposal.
2	AOC 1 BSY ECOBOND	The recommendation made is to coordinate with MT2 as part of the work planned for the propane tank installation. MT2 may be able to calculate the ECOBOND formula and application rate for AOC 1 BSY. If not, the recommendation is to conduct ECOBOND sampling as far in advance as possible or have ECOBOND sampling be the first action taken by the RA contractor.
3	Generator Status	The recommendation made is to discuss the potential for claiming an episodic event or multiple episodic events with EPA in advance of RA procurement. If used, this will impact the requirements of the RA contractor. If EPA episodic events will not fit with the hazardous waste generated from the AOCs, additional sampling could be conducted prior to RA procurement within the planned excavation boundaries to accurately characterize the material prior to excavation. This would be beneficial in determining the true volume of contaminated soil/sediment and results may be accepted by TSDF, reducing the quantity of waste characterization samples that the RA contractor needs to collect during the RA activities. If additional sampling is performed the method should be developed with input from a TSDF that could reasonably be anticipated to accept the waste from Ketchikan.

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

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FIGURES

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1 INCH

BASE KETCHIKAN

LONGITUDE
-131.62469°

55.33280°
LATITUDE

N

0 0.75 1.5 3
SCALE IN MILES

Basemap Source: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors
National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO,

KETCHIKAN REMEDIAL DESIGN
KETCHIKAN, ALASKA

LOCATION AND SITE VICINITY

DATE: 3/12/2024
PROJECT No.: 1430088.0001.002
DRAWN: R.R.

FIGURE: **1**

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1 INCH

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BASE KETCHIKAN REMEDIAL DESIGN
KETCHIKAN, ALASKA

BASE KETCHIKAN SITE MAP

Legend

Tax Parcels

Notes

1. For conceptual purposes only. All locations are approximate.
2. Map produced using ESRI ArcMap v. 10.8.

References

1. Imagery source: Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Esri, Maxar, Earthstar Geographics, and the GIS User Community. This data set was developed by NOAA., Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), National Geodetic Survey (NGS), Remote Sensing Division.

WGS 1984 UTM ZONE 9, METER
HORIZONAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

150 75 0 150 300
SCALE IN FEET

PROJECT No.:	DATE:	FIGURE:
1430088.0001.002	5/7/2024	2
P.M.: G.R.	DRAWN: R.R.	

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1 INCH

BASE KETCHIKAN REMEDIAL DESIGN
KETCHIKAN, ALASKA

BUOY STORAGE YARD AREA OF CONCERN

MARINE WAYS SHED

BUOY STORAGE YARD

OUTFALL LB-5

OUTFALL LB-3

INNER MARINE WAYS AREA

SUBTITAL AREA

~160'

~120'

SO007

SO018
SO019

MARINE RAILWAY

SO014
SO015
SO016
SO017

SO006

SO020
SO021
SO022
SO023

SO010
SO011
SO012
SO013

SO007
SO008
SO009

N

Legend

- 2012 Soil Sample [Supplemental RI]
- 2010 Soil Sample [Remedial Investigation]
- Outfall
- Measurement Reference Lines
- Buoy Storage Yard Proposed Soil Land Use Control Boundary
- Proposed Propane Tank
- Proposed PCB Excavation
- Other Area of
- Area with Samples Exceeding Alternative Cleanup

Notes

1. For conceptual purposes only. All locations are approximate.
2. Map produced using ESRI ArcMap v. 10.8.

References

1. Imagery source: Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Esri, Maxar, Earthstar Geographics, and the GIS User Community. This data set was developed by NOAA., Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), National Geodetic Survey (NGS), Remote Sensing Division.
2. Site point features, line and polygon information and sample locations referenced from BUOY STORAGE YARD AREA OF CONCERN CONSIDERED FOR ASSESSMENT IN FFS, Jacobs Engineering, OCT 2020.

WGS 1984 UTM ZONE 9, METER
HORIZONAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

30 15 0 30 60
SCALE IN FEET

PROJECT No.: 1430088.0001.002	DATE: 10/3/2024	FIGURE: 3
P.M.: G.R.	DRAWN: R.R.	

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1 INCH

BASE KETCHIKAN REMEDIAL DESIGN
KETCHIKAN, ALASKA

INNER BOAT HOUSE AREA OF CONCERN

Legend

- Outfall
- 2014 Sediment Sample Location [Toxicity Study]
- 2012 Biota Sample [Supplemental RI]
- 2010 Soil Sample [Remedial Investigation]
- 2002 Sediment and Tissue Sample Location
- Measurement Reference Lines
- PCB Excavation Area
- Area with Samples Exceeding Copper [330 mg/kg] and Zinc [550 mg/kg] or Lead [540 mg/Kg] and the total of the three metals [1,420 mg/kg] and Predicted or Actual Toxicity.
- Other Area of Concern

Notes

1. For conceptual purposes only. All locations are approximate.
2. Map produced using ESRI ArcMap v. 10.7.

References

1. Imagery source: Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Esri, Maxar, Earthstar Geographics, and the GIS User Community.
2. Site point features, line and polygon information and sample locations referenced from INNER BOAT HOUSE AREA OF CONCERN CONSIDERED FOR ASSESSMENT IN FFS, Jacobs Engineering, OCT 2020.

WGS 1984 UTM ZONE 9, METER
HORIZONAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

40 20 0 40 80
SCALE IN FEET

PROJECT No.: 1430088.0001.002	DATE: 5/7/2024	FIGURE: 4
P.M.: G.R.	DRAWN: R.R.	

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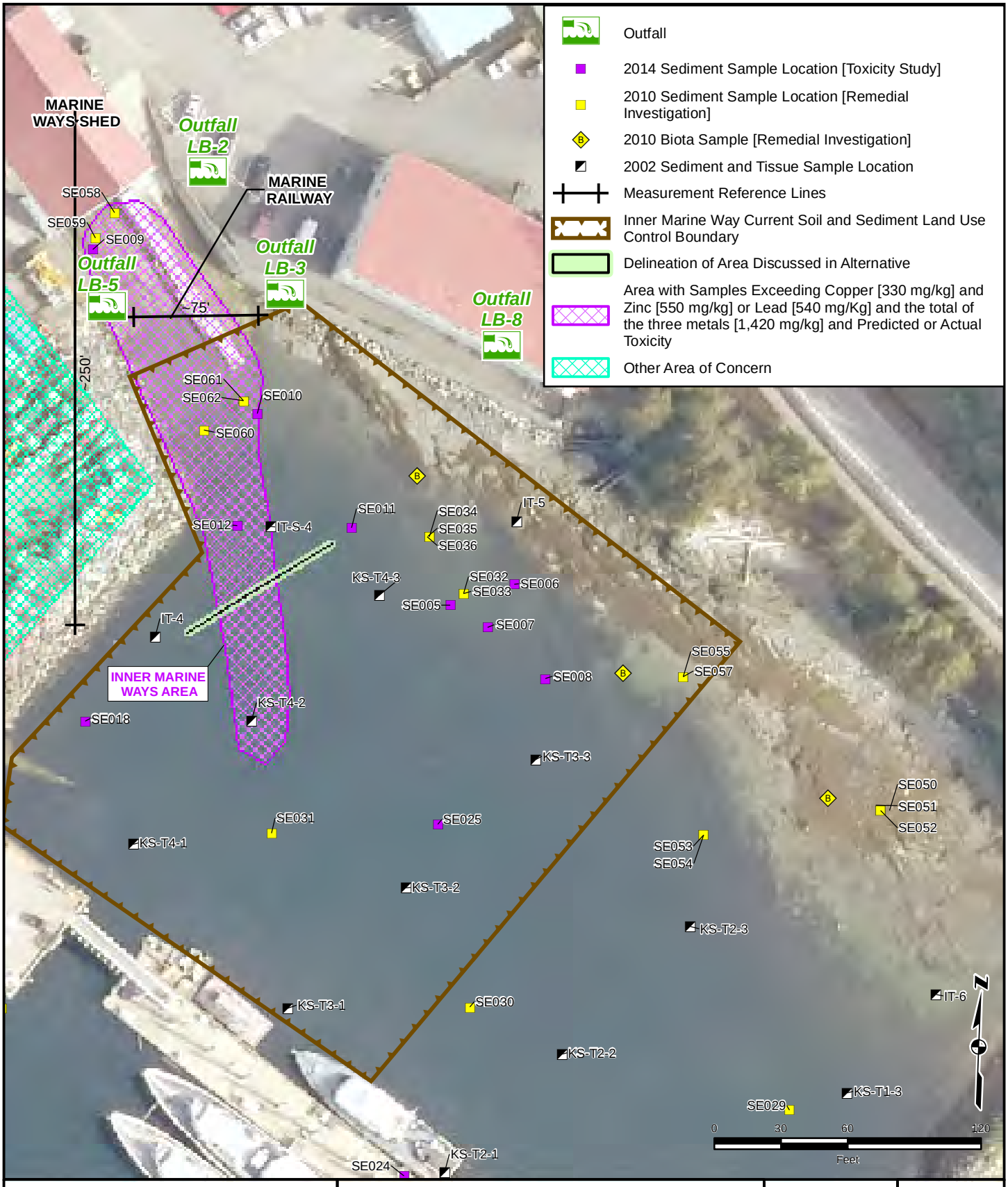
1 INCH



Notes
1. For conceptual purposes only. All locations are approximate.
2. Map produced using ESRI ArcMap v. 108.

References
1. Imagery source: Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Esri, Maxar, Earthstar Geographics, and the GIS User Community.
2. Site point features, line and polygon information and sample locations referenced from INNER MARINE WAYS AREA OF CONCERN CONSIDERED FOR ASSESSMENT IN FFS, Jacobs Engineering, FEB 2021.

Base Ketchikan Remedial Design

KETCHIKAN, ALASKA

Inner Marine Ways Area of Concern

DATE: 5/7/2024

PROJECT No.: 1430088.0001.002

DRAWN: R.R.

FIGURE: 5

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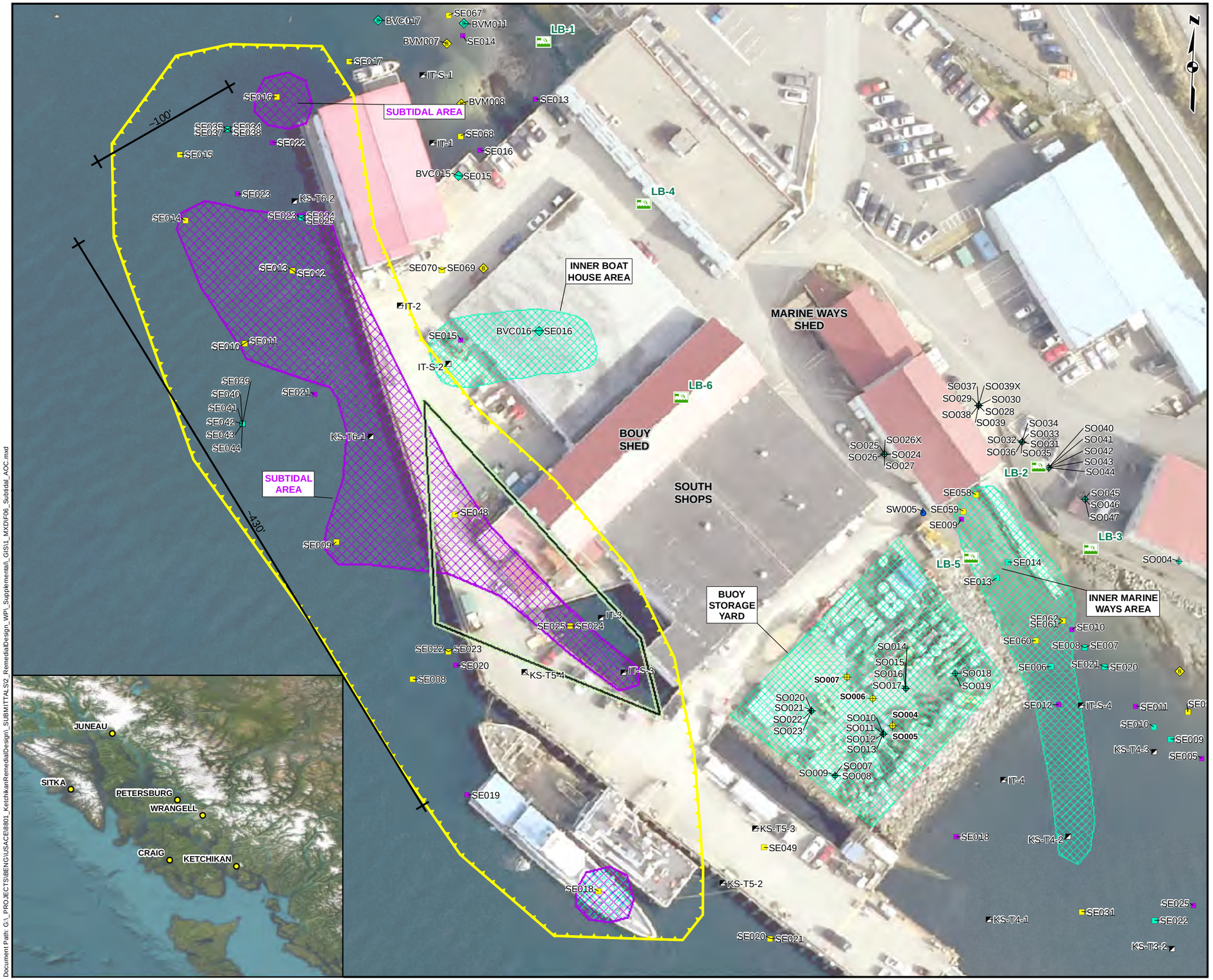
1 INCH

BASE KETCHIKAN REMEDIAL DESIGN
KETCHIKAN, ALASKA

SUBTIDAL AREA OF CONCERN



Legend

- Outfall
- 2002 Sediment and Tissue Sample Location
- 2010 Soil Sample [Remedial Investigation]
- 2010 Sediment Sample Location [Remedial Investigation]
- 2010 Biota Sample [Remedial Investigation]
- 2014 Sediment Sample Location [Toxicity Study]
- 2012 Sediment Sample [Supplemental RI]
- 2012 Soil Sample [Supplemental RI]
- 2012 Biota Sample [Supplemental RI]
- 2010 & 2012 Water Sample [Supplemental RI]
- Measurement Reference Lines
- 2002 Sediment and Tissue Sample Location
- Subtidal Area of Concern Boundary
- Subtidal Area Considered Practically Inaccessible for Health and Saftey Reasons
- Area with Samples Exceeding Copper [330 mg/kg] and Zinc [550 mg/kg] or Lead [540 mg/Kg] and the total of the three metals [1,420 mg/kg] and Predicted or Actual Toxicity.
- Other Area of Concern

Notes

1. For conceptual purposes only. All locations are approximate.
2. Map produced using ESRI ArcMap v. 10.7.

References

1. Imagery source: Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.
2. Site point features, line and polygon information and sample locations referenced from SUBTIDAL AREA OF CONCERN CONSIDERED FOR ASSESSMENT IN FFS, Jacobs Engineering, OCT 2020.

WGS 1984 UTM ZONE 9, METER
HORIZONAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

0 35 70 140 210
Feet

PROJECT No.:	DATE:	FIGURE:
1430088.0001.002	5/7/2024	6
P.M.: G.R.	DRAWN: R.R.	

Document Path: G:_PROJECTS\BENG\USACE8801_KetchikanRemedialDesign_SUBMITTALS\2_RemedialDesign_WP_Supplemental_GIS\1_MXD\F06_Subtidal_AOC.mxd

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APPENDIX A
USFWS SERVICE REGION 7 TIMING RECOMMENDATIONS FOR LAND DISTURBANCE AND VEGETATION CLEARING

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U.S. Fish & Wildlife Service Region 7

Timing Recommendations for Land Disturbance & Vegetation Clearing

Planning Ahead to Protect Nesting Birds

In Alaska all native birds except grouse and ptarmigan, which are managed by the State of Alaska, are protected by the Migratory Bird Treaty Act (MBTA). Under the MBTA (16 U.S.C. 703) it is illegal for anyone to "take" migratory birds, their eggs, feathers or nests, unless permitted by regulations. "Take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to pursue, hunt, shoot, wound, kill, trap, capture or collect" a migratory bird (50 CFR §10.12). For more information, please see: http://www.fws.gov/birds/policies-and-regulations/laws-legislations/migratory-bird-treaty-act.php.

Destruction of active nests, eggs, or nestlings can result from spring and summer vegetation clearing, grubbing, brush hogging, burning, stockpiling fill, and other land disturbance and construction activities. An "active" nest is indicated by intact eggs, live chicks, or presence of at least one adult on the nest. Human disturbance and repeated loud noises near nest sites can cause nest failure and is considered "take". Avoiding nesting seasons during project implementation minimizes the risk of encountering an active nest or inadvertently causing a nest to fail.

Rusty Blackbird

Some bird species and their nests have additional protections under other federal laws, including Bald and Golden eagles under the Bald and Golden Eagle Protection Act (Eagle Act), and those listed under the Endangered Species Act (ESA). Please contact the U.S. Fish and Wildlife Service if these species may be present in your project area to ensure Eagle Act and ESA compliance.

Implementing the following timing recommendations considerably reduces the risk of "take" under the MBTA. Final compliance with the law is your responsibility.

Recommendations:

1. Conduct land disturbance and vegetation clearing activities as described above outside of the nesting season (please see nesting season timing for your area on the next page).

2. If you encounter an active nest *at any time*, including before or after the local recommended avoidance times, leave it undisturbed until the eggs hatch and the young depart the nest.

3. If you have any questions regarding the MBTA, the timing recommendations, or if you are unable to comply with the timing recommendations, please contact your local U.S. Fish and Wildlife Service Fish and Wildlife Conservation Office for assistance:

   Anchorage (includes Juneau and Kenai areas) - (907) 271-2888
   Fairbanks (includes the North Slope, Interior, and Western Alaska) - (907) 456-0203

U.S. Fish & Wildlife Service Region 7

Timing Recommendations for Land Disturbance & Vegetation Clearing

Planning Ahead to Protect Nesting Birds

Nesting Seasons by Habitat Type and Region:
Recommended Times to Avoid Land Disturbance & Vegetation Clearing

HABITAT TYPE→ / REGION ↓	Forest or Woodland *(i.e., trees present)*	Shrub or Open *(i.e., shrub cover or marsh, pond, tundra, gravel, or other treeless/shrubless ground habitat)*	Seabird Colonies *(including cliff and burrow colonies)*	Eagles [e]
Southeast	April 15-July 15[a]	May 1-July 15[a, b]	May 1-September 15	March 1-August 31
Kodiak Archipelago			April 15-September 7	
Southcentral *(Lake Illiamna to Copper River Delta; north to Talkeetna)*	May 1-July 15[a, b]			
Bristol Bay/AK Peninsula *(north to Lake Illiamna)*	May 1-July 15[a, b, c]		May 10-September 15	
Interior *(north of Talkeetna to south slope Brooks Range; west to treeline)*	May 1-July 15[a, b]		May 1-July 20[d]	
Aleutian Islands		April 25-July 15[a]	May 1-September 15	
Yukon-Kuskokwim Delta	May 1-July 15	May 5-July 25[a, b, c]	May 20-September 15	
Seward Peninsula	May 1-July 15	May 10-July 20[a, c]		
Northern *(includes northern foothills of Brooks Range)*		June 1-July 31[a, c]		
Pribilof and Bering Sea Islands		May 15-July 15[a]	May 15-September 15	

[a] Raptors may nest two or more months earlier than other birds.
[b] Canada geese and swans begin nesting April 20.
[c] Black scoter are known to nest through August 10.
[d] Seabird colonies in Interior refer to terns and gulls.
[e] Eagles and their nests have additional protections under the Eagle Act and a permit may be required to conduct activities near an eagle nest. Visit the U.S. Fish and Wildlife Service's Alaska Region Eagle Permit Program web page (https://www.fws.gov/alaska/eaglepermit/guidelines/disturbnestingbaea1.htm) or call your local Fish and Wildlife Conservation Office for step-by-step guidance to determine if your activity is likely to take or disturb eagles and for conservation measures to that avoid disturbance.

USFWS June 2017

APPENDIX B
MT2 ECOBOND PRODUCT INFORMATION

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Table of Contents

1.0 PROJECT EXPERIENCE

Metals Treatment Technologies, LLC (MT2) is the nation's leading contractor for lead/metals contaminated site remediation. MT2 provides a broad range of services including site characterization and contaminated soil and sediment treatment, transportation, and disposal. The following projects showcase our extensive experience in the treatment and remediation of metals contaminated soils and sediments. Having successfully completed over 3,000 projects nationwide, MT2 can anticipate the types of issues potentially encountered during project development and execution, and mitigate the potential risks in advance. We offer comprehensive project management, construction management, design, remediation, and restoration services.

Wrangell Island Lead-Contaminated Soil Treatment – AK: MT2 provided **in-situ guaranteed ECOBOND® treatment** of lead-impacted hazardous soil at the State of Alaska Contaminated Sites Program Wrangell Island Junkyard to support the prime contractor, NRC. The property was abandoned in the 1990's, leaving large piles of metal and other debris and improperly stored hazardous materials including hundreds of batteries, transformers, tanks, drums and tires. **EPA Region X conducted a Targeted Brownfield Assessment** at the site on behalf of the City and Borough of Wrangell. The results, published in 2015, documented extremely high levels of contamination. Surface soil samples collected over a large area of the property contained lead concentrations over 10,000 mg/kg and as high as 50,000 mg/kg, or 125 times the DEC Method Two Soil cleanup level of 400 mg/kg. Additionally, sample results from subsurface soil, surface water, groundwater, marine sediments, and shellfish tissue contained elevated concentrations of lead and other contaminants. **In spring 2015, EPA determined the site posed an imminent risk to human health and the environment and initiated plans to conduct a Time Critical Removal Action under Superfund**. DEC concurred with the EPA determination that an imminent and substantial risk to human health and the environment is present at the site and in late 2015 initiated a state-led emergency cleanup of the site to address the risks. MT2 tasks included: **Assessment:** MT2 conducted treatability testing to optimize treatment and maximize cost-savings; **ECOBOND® Lead-Contaminated Soil Treatment:** MT2 provided onsite technical oversite of ECOBOND® field technologies to successfully complete treatment of 3,250 tons of lead-impacted soils and to render the soils RCRA non-hazardous; virtually eliminating the leaching of metals into the surface and/or groundwater allowing for offsite disposal as RCRA non-hazardous waste, providing significant cost savings.

Jacobs Smelter EPA Emergency Removal Action – Stockton, UT: The Jacobs Smelter site consisted of 13,950 tons of lead, arsenic and cadmium contaminated milling and smelter waste from historic lead and zinc mining operations located in and around the town of Stockton, Utah. Under EPA project administration; MT2 was contracted by Environmental Chemical Corporation to provide treatment of contaminated soil. The treatment involved chemically stabilizing the waste with ECOBOND® to UTS standards as part of an EPA Emergency Removal Action. The metals in the contaminated waste were stabilized to UTS which are the most stringent stabilization standards required by the EPA. Under UTS standards leachable lead, cadmium and arsenic were stabilized to less than 0.75 ppm, 0.11 ppm and 5 ppm, respectively. All treated waste was accepted by the EPA and disposed of in a nearby commercial landfill saving the EPA $697,350.

DuPont Louviers Site Stabilization of Lead and Arsenic Contaminated Soil; Louviers, CO - MT2 was contracted to perform stabilization of Lead and Arsenic contaminated soil at the DuPont, Site in Louviers, Colorado. The site contained an estimated base quantity of approximately 225 CY of lead and arsenic-contaminated soil above the US Environmental Protection Agency (EPA) hazardous waste criteria as measured by Toxicity Characteristic Leaching Procedure (TCLP). MT2 tasks included the development of a Work Plan and Safety and Health Plan for treatment, mobilization/demobilization, treatability testing, and submittal of a treatment report upon completion of the project. Utilizing ECOBOND® metals treatment technologies, MT2 treated the lead and arsenic contaminated soils in-situ to below the 5.0 mg/L RCRA hazardous waste criteria to meet waste profile requirements to dispose of these materials as non-hazardous waste. MT2 executed and maintained its effective QA/QC program that consisted of plans, procedures, and organization necessary to ensure the integrity of the project in compliance with DuPont requirements and integrate with DuPont's quality program to produce a safe and cost-effective end product.

Red Devil Mine Contaminated Soils Remediation and Facility Decontamination - Bureau of Land Management - AK: MT2 was contracted by the Bureau of Land Management to perform site contamination characterization, evaluate potential metals treatment options, conduct facility demolition and decontamination, and to deploy its ECOBOND® technology for treatment of historical mine waste containing arsenic, lead, and mercury. MT2 conducted treatability testing and deployed ECOBOND® field technologies to render the numerous waste streams containing multiple metals non RCRA hazardous; virtually eliminating the leaching of metals into the surface and/or groundwater. MT2 executed the project in three stages. MT2 first obtained site samples, performed preliminary hazards characterization and conducted treatability studies. Characterization and treatability tests were performed at MT2's laboratory. MT2 then prepared a written work plan specifying ECOBOND® technologies and selected deployment techniques. These activities were followed by field deployment. MT2 ECOBOND® technologies and services provided BLM the most technically efficient and cost-effective methods for rendering the waste non-hazardous and allowing for onsite containment.

Mainstreet Argenta Brownfields Redevelopment – AR: MT2 was contracted by the Main Street Argenta, Inc. (City of North Little Rock, Arkansas) to provide comprehensive and permanent soil stabilization treatment services at the EPA Brownfield's Smarthouse Redevelopment site to meet mixed use residential standards. The site contained elevated lead and arsenic metals concentrations, PAHs and PCBs. MT2 utilized proprietary ECOBOND® treatment technologies to successfully and permanently treat impacted soils containing lead, arsenic and PCBs to below RCRA levels of 5.0 mg/L. Soils identified as containing PAHs were excavated and disposed.

Dupont Superlon Plastics Site Lead and Arsenic Contaminated Soil Remediation – Tacoma, WA: The former Superlon Plastics site covers 3.1 acres and is located in a highly industrial area of the Tacoma Tidal Flats. MT2 conducted in-situ treatment of approximately 2,000 tons of arsenic and lead impacted soils prior to disposal at an approved non-hazardous landfill. These soils were characterized as having TCLP concentrations for both metals above the US EPA RCRA hazardous waste criteria. MT2 utilized an asphalt pad as approved by the State of Washington on which to conduct all treatment activities. MT2 completed the treatment and confirmatory analysis, and re-stockpiling of treated soils. Utilizing MT2's patented ECOBOND® lead and metals treatment technologies, MT2 treated stockpiled impacted soils so that the resulting arsenic and lead TCLP leachate concentrations were below the 5.0 mg/L RCRA hazardous waste criteria and meet waste profile requirements to dispose of these soils as non-hazardous waste. All remediation activities were performed in accordance with the State of Washington Model Toxics Control Act (MTCA), Chapter 173-340 of the Washington Administrative Code (WAC) under Agreed Order No. DE 5940.

2.0 OVERVIEW OF ECOBOND® TECHNOLOGIES

MT2 maintains a broad portfolio of patented and proprietary chemical metals stabilization processes; known as ECOBOND® that provide virtually permanent stabilization of all heavy metals. The MT2 processes are previously approved by the US EPA and are non-hazardous. The resulting treated soils contain extremely stable metal compounds that virtually eliminate the leaching of metals to the environment. The strength and effectiveness of the stabilization has been verified using the EPA's TCLP test parameters and Multiple Extraction Procedure (MEP) tests.

MT2 ECOBOND® ADVANTAGE

- **Lower Cost**: Typically 30%-50% lower cost
- **Reduction of Environmental Liability**: Significantly reduces potential of long-term liabilities
- **Proven Technology**: Technology previously approved by EPA and state regulators with guaranteed, field validated reliability
- **Best Available Technology**: Virtually permanent chemical process, strength and durability to 1,000 years verified by EPA approved testing

Advantages of ECOBOND® chemical stabilization also include its robust capability and ease of application. The technology can be applied in a wet or dry form and can be used to stabilize metals in- situ or ex-situ. These varied applications make it ideal for use at a wide range of metals contaminated sites. At some sites the technology can be surface applied and mixed into soil in its dry form. At other sites the technology can be sprayed in its wet form onto the contaminated material in a topical fashion. In addition to the technical and application advantages, the cost of utilizing chemical stabilization to treat heavy metals contamination is attractive. By being able to treat metals contamination to EPA RCRA or Universal Treatment Standards (UTS), stabilized waste can often be left on-site rather than transported offsite to a hazardous landfill. The disposal cost savings for stabilized metals can often be measured in the hundreds of dollars per ton.

Table 1 MT2 Metals Treatment Results (TCLP)

		Pre-Treatment TCLP	Post-Treatment TCLP	Regulatory Standards	
Waste Stream	Metals	(ppm)	(ppm)	RCRA (ppm)	UTS (ppm)
Mill Tailing	As	2,200.0	1.030	5.0	5.000
Sludge	Cd	160.0	0.100	1.0	0.110
Mill Tailing	Cr	14.0	<0.050	5.0	0.650
Industrial Site	Ba	249.0	0.030	100.0	210.0
Industrial Site	Pb	980.0	0.250	5.0	0.750
Firing Range	Pb	977.0	0.180	5.0	0.750
Mine Tailing	Zn	108.0	2.000	NA	4.300
Mill Tailing	Se	190.0	0.890	1.0	5.700
Chemical Waste	Hg	500.0	0.070	0.2	0.025

TCLP = Toxicity Characteristic Leaching Procedure

Table 2 MT2 Lead (Pb) Treatment Results Synthetic Precipitate Leaching Procedure (SPLP)

Project Location	Metal	Pre-Treatment SPLP (mg/L)	Post-Treatment SPLP (mg/L)	Regulatory Standards	
				RCRA (ppm)	UTS (ppm)
Florida Soils/Sediment					
Sample 1	Pb	0.17	0.0140	5.0	0.750
Sample 2	Pb	0.11	BDL	5.0	0.750
Sample 3	Pb	4.70	0.0130	5.0	0.750
Utah Soils					
Sample 1	Pb	3.79	0.0800	5.0	0.750
Sample 2	Pb	2.17	0.0900	5.0	0.750
New York Soils/Sediments					
Sample 1	Pb	1,040	0.0184	5.0	0.750
Sample 2	Pb	1,090	0.0330	5.0	0.750
Sample 3	Pb	2,220	0.0104	5.0	0.750

MT2's ECOBOND® process utilizes a combination of proprietary materials that are nature's best stabilizers of leachable metals. ECOBOND® compounds have extremely low Ksp (solubility potential) values indicating that it is virtually impossible to dissolve these metal complexes (Table 3). This technique has been used to stabilize heavy metals for a number of years and have proven superior to cementation and other methods that rely on increasing the alkalinity of the matrix to immobilize the metals. Unlike many stabilizing compounds, the MT2's reagents bond directly with metals and are not subject to long-term pH related deterioration.

Table 3 - Ksp (Solubility Potential) of Various Lead-Phosphate Minerals

Lead Species / Mineral Name	Formula	Log Ksp
Salt	NaCl	0.0*
Quartz	SiO_2	-4.0
Anglesite	$PbSO_4$	-7.7
Cerussite	$PbCO_3$	-12.8
Galena	PbS	-27.5
Fluoropyromorphite	$Pb_5(PO_4)_3F$	-71.6
Hydroxypyromorphite	$Pb_3(PO_4)_3OH$	-76.8
Plumbogummite	$PbAl_3(PO_4)_2(OH)_5H_2O$	-99.3
Corkite	$PbFe_3(PO_4)(SO_4)(OH)_6$	-112.6

**For comparison purposes*

The EPA's TCLP is one measure of the long-term stability of a treated waste because it simulates the leaching effect of water or acid that may come into contact with stabilized metals. To simulate a longer period of environmental exposure, the Multiple Extraction Procedure (MEP) test has been developed. The MEP test consists of multiple acid extractions and pH adjustments that are similar to the TCLP test. However, different leachates are used for each of ten separate extractions. It is estimated that each TCLP extraction simulates 100 years of stability and after ten MEP extractions, 1,000 years of metals stability are simulated. The durability of similar treated materials has been tested by numerous MEP tests and has been evaluated in the EPA's Superfund Innovative Technology Evaluation (SITE) program. The MEP test is just one of the tests that have been conducted to establish the long-term stability of chemically stabilized waste. See Table 4.

Table 4 - Example of Treatment Results using MEP Testing of MT2 Stabilized Lead Contaminated Soil

	Crooksville Superfund Site	Crooksville Superfund Site	Lead Paint Sand Blast Grit	Lead Paint Sand Blast Grit	Lead Paint Sand Blast Grit
Pre-Treatment TCLP	32	980	26	34	49
MEP Extraction Post Treatment					
#1 – 100 years	0.08	<0.05	<0.05	<0.05	<0.05
#2 – 200 years	0.14	0.13	<0.05	<0.05	<0.05
#3 – 300 years	0.21	0.05	<0.05	<0.05	<0.05
#4 – 400 years	0.13	0.06	0.13	0.23	0.08
#5 – 500 years	0.14	0.08	0.31	0.12	0.07
#6 – 600 years	<0.05	0.15	0.15	0.06	0.06
#7 – 700 years	0.16	<0.05	0.19	0.03	0.04
#8 – 800 years	0.25	0.18	0.19	0.05	0.06
#9 – 900 years	0.26	0.53	0.18	0.06	<0.05
#10–1,000 years	0.23	0.33	0.14	<0.05	<0.05
Average MEP Extraction	0.165	0.161	0.14	0.075	0.056

In summary, MT2's proprietary ECOBOND® technology has previously been approved by the U.S. Environmental Protection Agency as well as state regulators. ECOBOND® provides an advanced in situ and ex situ treatment for a wide variety of metals utilizing innovative methods with standard equipment, converting RCRA hazardous waste into non-hazardous material. MT2's state-of-the-art technologies and experienced personnel provide clients with technical and field services producing substantial cost savings. MT2's ECOBOND® technologies are broadly applicable for chemical conversion and stabilization for:

- Soils, Silts and Sediments
- Process Waste and Sludges
- Firing Ranges/Shooting Ranges
- Lead Paint and Glass
- Mine/Smelter Sites
- Former Disposal Locations
- Brownfields Sites
- Battery Recycling Site

The advantages of ECOBOND® technologies and MT2 services include:

- Lower Cost: Typically 30%-50% lower cost than other alternatives
- Reduction of Environmental Liability: Significantly reduced potential of long-term liabilities through improved best management practices
- Eliminates Generation of Hazardous Wastes: No hazardous waste manifesting, substantial disposal cost reduction and reduced liability
- Proven Technology: Technology previously approved by EPA and state regulators in over seven (7) years of operations with guaranteed, field validated reliability
- Best Available Technology: Virtually Permanent chemical process, strength and durability to 1,000 years verified by EPA approved testing

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SAFETY DATA SHEET

Section 1. Identification

Product name : ECOBOND® As
Other means of Identification : Not available.
Product type : Solid

Relevant identified uses of the substance or mixture and uses advised against
Not applicable.

Manufacturer : Metals Treatment Technologies, LLC
14045 W. 66th Avenue
Arvada, CO 80004

Emergency telephone Number : Chem-Tel 1-888-255-3924
Contract #MIS0007146

Section 2. Hazards identification

OSHA/HCS status : This material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the Substance or mixture : Skin Irritant (Category 2)
Eye Irritant (Category 2A)
Acute Toxicity (Category 4)

GHS label elements
Hazard pictograms :

Signal word : Warning
Hazard statements : Causes skin irritation
Causes serious eye irritation
Harmful if swallowed

Precautionary statements
General : Read label before use. Keep out of reach of children. If medical advice is needed, have product container of label at hand.

Prevention : Avoid breathing dust
Wash hands thoroughly after handling
Use only outdoors or in a well-ventilated area
Wear eye protection, face protection, protective clothing, protective gloves
IF SWALLOWED: Call Poison Center/doctor if you feel unwell
IF ON SKIN: Wash with plenty of water
IF INHALED: Remove person to fresh air and keep comfortable for breathing
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing P312 - Call a POISON CENTER/doctor if you feel unwell
If skin irritation occurs: Get medical advice/attention
If eye irritation persists: Get medical advice/attention
Take off contaminated clothing
Dispose of contents/container according to local, regional, national, and international regulations

Reponse : IF exposed or concerned: Get medical attention.

Storage : Store in a well-ventilated place. Keep container tightly closed
Store locked up.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements : Emits toxic fumes when heated. Do not transfer contents to other containers for storage.

Hazards not otherwise Classified : Hazardous to aquatic environment

Section 3. Compositions/information on ingredients

Substance/mixture : Mixture

Product name : Ecobond As

Ingredient name	%	CAS number
Iron Salts	75 - 100	Trade Secret

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

If ingestions, irritation, any type of overexposure or symptoms of overexposure occur during or persists after use of this product, contact a POISON CONTROL CENTER, EMERGENCY ROOM OR PHYSICIAN immediately; have Safety Data Sheet information available. Never give anything by mouth to an unconscious or convulsing person.

Description of necessary first aid measures

Eye contact : Remove any contact lenses, irrigate copiously with clean, fresh water, Holding the eyelids apart for at least 10 minutes and seek immediate medical advice.

Inhalation : Remove to fresh air. Keep person warm and at rest. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel.

Skin contact : Wash skin thoroughly with mild soap and water. Obtain medical attention if irritation develops or persists.

Ingestion : Do not induce vomiting. If victim is conscious and alert, give 4 – 8 oz of water. Do not give anything by mouth to an unconscious person. Get medical advice and attention if you feel unwell. Seek medical attention if a large amount is swallowed.

Section 4. First aid measures

Most important symptoms/effects. Acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Not flammable. Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Hazardous thermal decomposition products	: Extreme fire causes the formation of toxic fumes of PO_x
Special protective actions for fire-fighters	: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
Special protective actions for fire-fighters	: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
Special protective Equipment for fire-fighters	: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated In positive pressure mode.

Sections 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	: No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material.
For emergency responders	: Wear suitable protective clothing, gloves, and eye/face protection.
Environmental precautions	: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill	: Stop leak if without risk. Move containers from spill area. Contain and collect as any solid in suitable container. Do not allow into drains. Provide adequate ventilation. Avoid generation of dust during clean up. If uncontaminated, product may be recovered and reused.
Large spill	: Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined area. Prevent large quantities from contacting vegetation. Provide adequate ventilation. Avoid generation of dust during clean-up.

Section 7. Handling and storage

Precautions for safe handling

Protective measures	: Handle in accordance with good industrial hygiene and safety procedures. Do not eat, drink, or smoke when using this product. Use recommended personal protective equipment. Avoid contact with skin and eyes. Avoid breathing dust.
Special precautions	: If this material is part of a multiple component system, read the Safety Data Sheet(s) for the other component or components

before blending as the resulting mixture may have the hazards of all of its parts.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in closed container in a dry, cool, and well-ventilated area. Protect from moisture. Store away from fire hazards.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Inorganic Salts		
USA ACGIH (nuisance dust)	ACGIH TWA (mg/m³)	1 mg/m^3 – inhalation
USA OSHA (nuisance dust)	OSHA PEL (TWA) (mg/m^3)	1 mg/m^3 – respirable (particulate)

Key to abbreviations

A	= Acceptable Maximum Peak	S	= Potential skin absorption
ACGIH	= American Conference of Governmental Industrial Hygienists	SR	= Respiratory sensitization
C	= Ceiling Limit	SS	= Skin sensitization
F	= Fume	STEL	= Short term Exposure limit values
IPEL	= Internal Permissible Exposure Limit		
OSHA	= Occupational Safety and Health Administration	TD	= Total dust
R	= Respirable	TLV	= Threshold Limit Value
Z	= OSHA 29CFR 1910.1200 Subpart Z – Toxic and Hazardous Substances	TWA	= Time Weighted Average

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may by required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Appropriate engineering Controls : If user operations generate dust, fumes, gas, vapor, or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure : Emissions from ventilation or work process equipment should

controls	be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures	: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Wash contaminated clothing before reuse. Ensure that eyewash stations and safety showers are close to the workstation location.
Eye/face protection	: Safety glasses with side shields.

Skin protection

Hand protection	: Impermeable protective gloves.
Body protection	: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Respiratory protection	: Use NIOSH approved air purifying or supplied air respirator where airborne concentrations of dust are expected to exceed exposure limits.

Section 9. Physical and chemical properties

Appearance

Physical state	: Solid
Color	: Grey White. Light Yellow
Odor	: Odorless
Odor threshold	: Not available.
pH	: Not available.
Melting Point	: Not available.
Boiling point	: Not available.
Flash point	: Not available.
Auto-ignition temperature	: Not available.
Decomposition temperature	: Not available.
Flammability (solid,gas)	: Not available.
Lower and upper expolosive	**:** Not available.
(flammable) limits	: Not available.
Evaporation rate	: Not available.
Vapor density	: Not available.
Density	: 1 – 3 g/cm³
Solubility	: 15 - 50 g / 100 mL Water

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : No specific data.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Product/ingredient name	Result	Species	Dose	Exposure
Inorganic Salts	LD50 Oral	Rat	237 mg/kg	

Conclusion/Summary : Not available.

Sensitization

Conclusion/Summary : Not available.

Mutagenicity

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Section 11. Toxicological information

Specific target organ toxicity (single exposure) : Not available.

Specific target organ toxicity (repeated exposure) : Not available.

Aspiration hazard : Not available.

Information on the likely routes of exposure

Potential acute health effects

Eye contact : No known significant effects or critical hazards.
Inhalation : No known significant effects or critical hazards.
Skin contact : No known significant effects or critical hazards.
Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : No specific data.
Inhalation : No specific data.
Skin contact : No specific data.
Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.
Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.
Potential delayed effects : Not available.

Potential chronic health effects

: Not available.
General : No known significant effects or critical hazards.
Carcinogenicity : No known significant effects or critical hazards.
Mutagenicity : No known significant effects or critical hazards.
Teratogenicity : No known significant effects or critical hazards.
Developmental effects : No known significant effects or critical hazards.
Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates : Not available.

Section 12. Ecological information

Toxicity : Non-toxic to aquatic organisms as defined by USEPA.
Persistence and degradability : Not available.
Bioaccumulative potential : Not available.

Section 13. Disposal considerations

Disposal methods : This material is hazardous to the aquatic environment. Keep out of sewers and waterways. Place in appropriate containers and dispose of the contaminated material at a licensed site.

Disposal should be in accordance with applicable regional, national and local laws and regulations. Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERONAL PROTECTION for additional handling information and protection of employees. Section 6. Accidental release measures.

Section 14. Transport information

	DOT	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-
Environmental hazards **Marine pollutant substances**	No. Not applicable.	No. Not applicable.	No. Not applicable.

Additional information

DOT : None identified.

IMDG : None identified.

IATA : None identified.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 15. Regulatory information

United States

United States inventory (TSCA) : All components are listed or exempted.

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health : 2 * **Flammability** : 0 **Physical hazards** : 0

(*) – Chronic effects

The customer is responsible for determining the PPE code for this material.

Section 16. Other information

National Fire Protection Association (U.S.A.)

Health : 2 **Flammability** : 0 **Instability** : 0

Key to abbreviations : ATE = Acute Toxicity Estimate

: BCF = Bioconcentration Factor

: GHS = Globally Harmonized System of Classification and Labeling of Chemicals
: IATA = International Air Transport Association
: IBC = Intermediate Bulk Container
: IMDG = International Maritime Dangerous Goods
: LogPow = logarithm of the octanol/water partition coefficient
: MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
: UN = United Nations

Disclaimer

The information contained in this data sheet is based on present scientific and technical knowledge. The purpose of this information is to draw attention to the health and safety aspects concerning the products supplied by MT2, and to recommend precautionary measures for the storage and handling of the products. No warranty or guarantee is given in respect of the properties of the products. No liability can be accepted for any failure to observe the precautionary measures described in this data sheet or for any misuse of the product. The information presented here applies only to the product as shipped. The addition of any material can change the composition, hazards and risks of the product. Regulatory requirements are subject to change and may differ between various locations and jurisdictions. The customer/buyer/user is responsible to ensure that their activities comply with all country, federal, state, provincial or local laws. The conditions for use of the product are not under the control of the manufacturer; the customer/buyer/user is responsible to determine the conditions necessary for the safe use of this product.

APPENDIX C
VACUUM SYSTEM EXAMPLES

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ELASTEC

PRODUCT CATALOG

Oil Spill Equipment | Floating Barriers | Incinerators
Work Boats | Vacuums | Turbidity Curtains

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PACS 2000

PACS - TRAILER MOUNTED VACUUM SYSTEMS

ELASTEC PACS trailer mounted vacuum systems are designed for removing liquids, solids and sludge from land or water. Less expensive than vacuum trucks, PACS units are approved for highway towing. Models with integral hydraulics can run oil skimmers and pumps, as well as lift the tank vertically to dump contents.

Optional TDS118 Drum Skimmer Shown

PACS 770

Model	Tank Capacity	Engine	Vacuum Pump Type	Vacuum Pump Capacity
230	1,200 gal / 4,540 L	20 hp / 15 kW Gas	Air Cooled Vane	230 cfm / 6,500 lpm
286	800 gal / 3,028 L	24 hp / 18 kW Diesel	Air Cooled Vane	286 cfm / 8,000 lpm
339	1,000 gal / 3,785 L	17 hp / 13 kW Diesel	Air Cooled Blower	339 cfm / 10,200 lpm
332 ATEX	1,000 gal / 3,785 L	25 hp / 18 kW Diesel*	Air Cooled Vane**	332 cfm / 9,400 lpm
424	1,000 gal / 3,785 L	25 hp / 18 kW Diesel	Water Cooled Vane	424 cfm / 12,000 lpm
498	1,000 gal / 3,785 L	25 hp / 18 kW Diesel	Air Cooled Blower	498 cfm / 14,100 lpm
770	1,000 gal / 3,785 L	34 hp / 25 kW Diesel	Air Cooled Blower	770 cfm / 21,800 lpm
920	1,000 gal / 3,785 L	74 hp / 55 kW Diesel	Air Cooled Blower	920 cfm / 26,051 lpm
2000	1,000 gal / 3,785 L	118 hp / 88 kW Diesel	Air Cooled Blower	2,000 cfm / 56,633 lpm

*with spark arrestor and overspeed protection
**ATEX Certified

Skid mounted models available.

Optional ShovelHead Shown

ELECTRIC MINIVAC

The electrically driven **ELASTEC MiniVac** is a high-powered system that is skid mounted with fork pockets (optional wheels are available on request) that is designed for industrial locations where a power source is available. The electrically driven MiniVac vacuum system can recover a wide range of liquids, oils and sludge.

The vacuum pump quickly generates suction and high airflow, while liquids and solids are recovered into standard oil drums or our hopper device (optional extra.)

MINIVAC I

The **ELASTEC MiniVac I** is a portable vacuum system ideal for working in remote areas such as beaches, pipelines as well as industrial locations. Added to this package is a high pressure cold water washer capable of 1,000 psi for cleaning of machinery and surfaces.

MINIVAC II

The **ELASTEC MiniVac II** is a powerful, portable vacuum unit that can recover a wide range of liquids, oils and sludge with entrained solids up to 2 inch / 50 mm diameter. The diesel-driven high capacity pump quickly generates a vacuum inside standard drums using an ELASTEC DrumIt head. Also available is an optional hopper unit or 110 gallon / 400 litre tank.

MINIVAC III

The **ELASTEC MiniVac III** can generate high levels of air flow and vacuum due to the vane pump design, making it ideal for working in industrial locations. The vacuum can be applied to our optional Hopper system or alternative suitable vacuum vessels.

ALL TERRAIN VAC

The **ELASTEC All Terrain Vac** is a high powered vacuum system that is mounted on an ATV towable chassis. The unit is ideal for working in remote areas such as beaches, pipelines and industrial locations. The All Terrain Vac can recover a wide range of liquids, oils and sludge with solids up to 2 inch / 50 mm diameter.

FOLLOW US ON SOCIAL MEDIA

AND STAY UP-TO-DATE WITH THE LATEST ELASTEC NEWS, VIDEOS, CASE STUDIES AND BLOG POSTS FEATURING INDUSTRY EXPERTS.

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WWW.YOUTUBE.COM/USER/ELASTECMOVIES

WWW.VIMEO.COM/ELASTEC

VACUUM ACCESSORIES

Above: The 110 gal / 378 L **ELASTEC All Terrain Vacuum Tank** features fully welded aluminum construction, full opening doors on both ends, two sight glasses for level indication and automatic shut-off with bypass valve to control the vacuum.

Below: **ELASTEC DrumIt** is a drum-top vacuum head that attaches to a 55 gallon drum allowing liquids and wet solids to be intercepted and stored. It features an automatic shut off and adjustable vacuum relief valve. A ball lifts in the sight glass to indicate when the drum is full. DrumIt fills each drum to a consistent level every time. Dry particulate filter head also available.

Above: The **ELASTEC Vacuum Hopper** includes automatic shut-off, full opening dump valve and retractable legs for easy transport and storage.

Bottom Left: The **Duck Bill Wand** can be used to suck up liquids from flat surfaces. The bill can be removed to provide a suction wand.

Bottom Right: The **ELASTEC Water Injector** is an in-line attachment that can be connected to a water hose to feed liquid into the contents being sucked up to help reduce dust.

HURRICANE 300

Dimensional drawing on other side

SPECIFICATIONS

•TRAILER MOUNTED/SKID MOUNT - (REMOVABLE FROM TRAILER WITH BUILT-IN FORK POCKETS)
Chassis - Single, 5,000# axle, rectangular tube frame, two 5-lug radials, DOT-Lighting with electric brakes

•POWER SOURCE
Liquid-cooled diesel engine, 4-cylinder 25 HP w/ electric start and locking engine shroud

•VACUUM AIR FLOW (Blower)
Positive displacement, 850 CFM, capable of 15"Hg, 3-belt driven

•FILTRATION SYSTEM (3-Stage)
Stage 1: Cyclonic separation
Stage 2: Baghouse / 12 Teflon coated, sealed-edge, quick-change filter bags w/ continuous shaker cleaning system
Stage 3: Blower Safety Filter

OPTIONS

•Spare tire carrier
•HEPA filtration
•Skid mounted
•Air compressor
•Blower safety filter
•Electric powered
•Reverse pulse filter cleaning

STANDARD EQUIPMENT

•Paint - one color (custom lettering optional)
•Wet or dry operation
•13-gallon fuel tank
•Vacuum skid unbolts from trailer, skid has two fork pockets
•2" ball hitch
•Inspection door (Hopper)
•Vacuum break
•Electric brakes
•Quick release filter access door

SAFETY FEATURES

•OSHA approved belt guard
•Electric brakes
•Optional HEPA filtration
•Emergency breakaway chains
•Blower safety filter
•Engine shroud

INDUSTRIAL VACUUM

INDUSTRIAL VACUUM EQUIPMENT CORPORATION
N8150 Maple Street • Ixonia, WI 53036
800-331-4832 • 920-261-1136 • FAX 920-261-7117
www.IndustrialVacuum.com

HURRICANE 300

INDUSTRIAL VACUUM

DIMENSIONS

WIDTH 80"
WEIGHT 4100 lbs

VACTAGON
A DIVISION OF INDUSTRIAL VACUUM

HVS-25
HIGH VELOCITY SERIES

Electric Powered Portable Dust Collector/Vacuum System
Great for industrial applications demanding high suction and air flow.

SPECIFICATIONS

•AIR VOLUME (Blower)
580 CFM @ 12.5" Hg *vacuum*

•POWER SOURCE
15 HP TEFC electric motor, NEMA 4X enclosure with all controls

•FILTRATION (3-Stage)
Stage 1: 24" cyclone separator
Stage 2: (7) Spun Bond Polyester cartridge media MERV12, 99.8%@ 0.5 micron
Stage 3: Blower Safety Filter

Dimensional drawing on other side

Shown with pneumatic telescoping baghouse option

STANDARD EQUIPMENT

- 1.5" square tubing frame with fork pockets
- (4) 5" diameter casters, swivel & locking
- Removable 3" inlet pipe connection, wear plates
- 3" pneumatic dump valve, automatic safety relief valve
- Discharge Silencer, 74 dBA
- Automatic timed pulse jet cleaning
- Inlet air regulator with gauge
- Removable 30 gallon drum
- Epoxy primer & polyurethane enamel top coat

OPTIONS

- Wired for 230 volt, 3 phase, *35* FLA
- 230 or 460 voltage selection switch
- Gasoline engine power source
- VFD motor control NEMA 4X
- Inlet hose accessories
- Pneumatic telescoping baghouse
- Drum level indicator with LED light
- Continuous bag unloading
- Super sack holders
- HEPA safety filter, 99.97% @ 0.3 micron
- DOT lighting and single axle trailer
- Explosion proof options NEMA 7/9

VACTAGON, LLC
N8150 Maple Street • Ixonia, WI 53036
800-529-6542 • 920-245-2019 • FAX 920-261-7117
www.vactagon.com

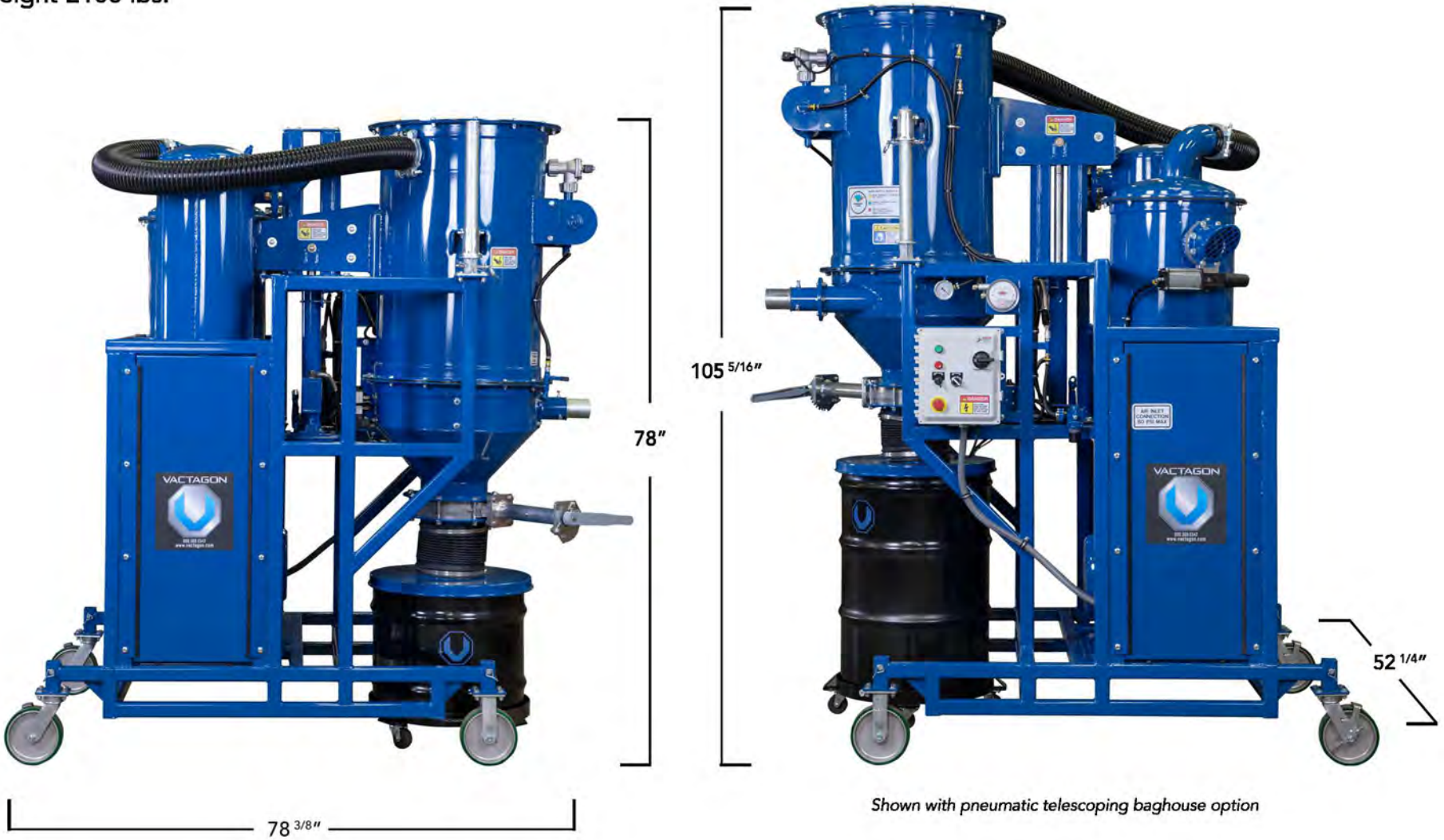
HANDCRAFTED IN THE USA

VACTAGON
A DIVISION OF INDUSTRIAL VACUUM

HVS-25
HIGH VELOCITY SERIES

DIMENSIONS

Length 78 3/8″
Width 52 1/4″
Height 105 5/16″
Weight 2100 lbs.



Shown with pneumatic telescoping baghouse option

PV 500 Industrial Vacuum System

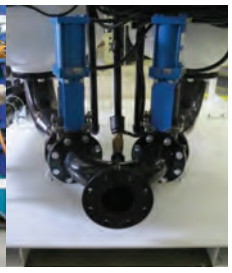
IVAC
Industrial Vacuum Systems Ltd.

THE PV 500 RELOCATES YOUR MATERIAL DIRECTLY FROM THE SOURCE AND DELIVERS IT TO YOUR CHOSEN DESTINATION.

The PV 500 was designed to transfer material under vacuum in mining, chemical, construction and offshore drilling applications. The pump is capable of transfer rates up to 60 m3/hour, material dependent, all while delivering the same through its 4" discharge port. The PV 500 relocates material an extended distance of over 2km using fixed pipe or flexible hose. Looking for even greater discharge distance? The PV 500 boasts a simple add-on to achieve this!

FEATURES

- 100% air operation
- Safest in the industry
- No internal workings/moving parts
- Fixed or mobile system
- Generates 25"hg vacuum
- One-man operation
- Reverse vacuum



IVAC
35-111 Chartrand Ave
PO Box 220
Logan Lake, BC
V0K 1W0

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zereko@zereko.com
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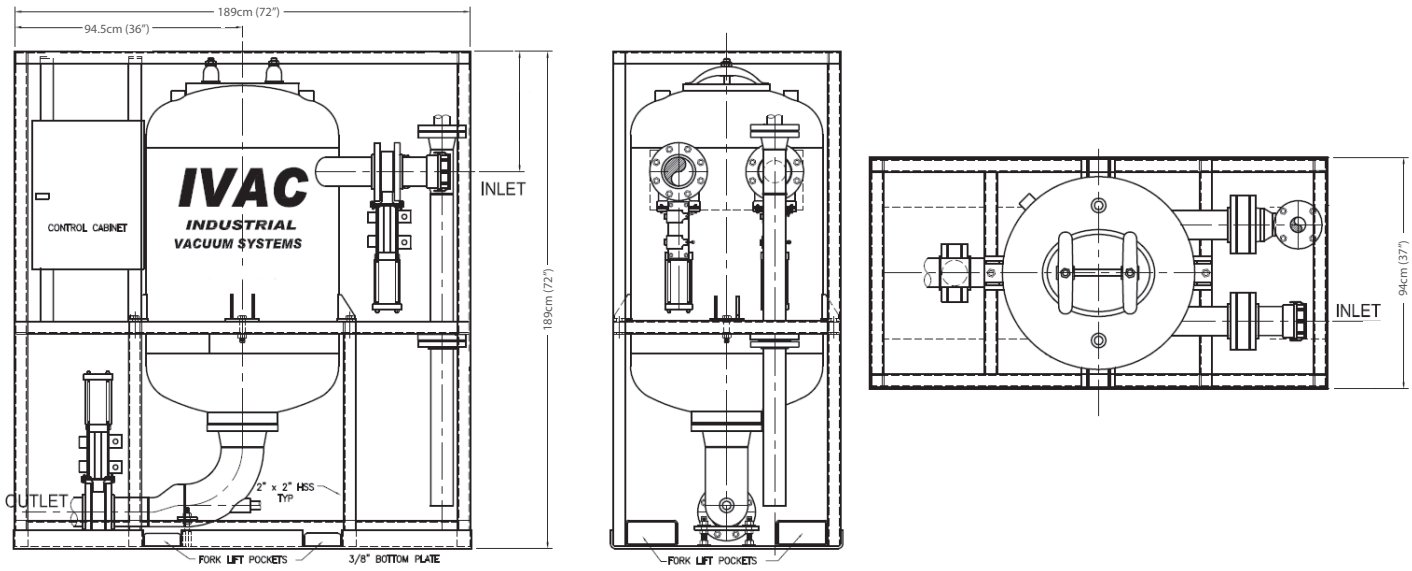
ihose.ca

PV 500 Industrial Vacuum System



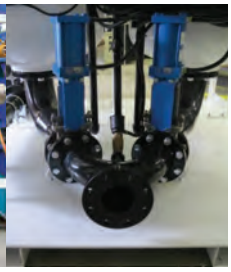
TECHNICAL DATA

- Height: 189cm (72")
- Width: 94cm (37")
- Length: 189cm (72")
- Weight: 1151kg (2538lb)
- Air consumption: min. 500 SCFM at 100-120 PSI
- Suction inlet: 100mm (4")
- Discharge outlet: 100mm (4")
- Handles solids up to 76.2mm (3")

APPLICATIONS

The PV 500 is capable of pumping both conventional and unconventional materials:

- Slurry, sludge removal and transfer
- Mud and tailings transfer
- Pit and sump cleaning
- Hazardous waste recovery
- Oil slude, tank bottoms residual removal and transfer
- Barge holdings and vessel bottom clean out
- Bulk tank and silo transfer of material
- Sand; course, fine, conventional and frac sand
- Diatomaceous earth
- Hazardous waste removal with close circuit transfer
- Animal waste
- Transfers virtually any material



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NIKRO

H.E.P.A. FILTERED LEAD VACUUMS

Durability

Dependability

Performance

LV02

LV15

LV10

LVW15

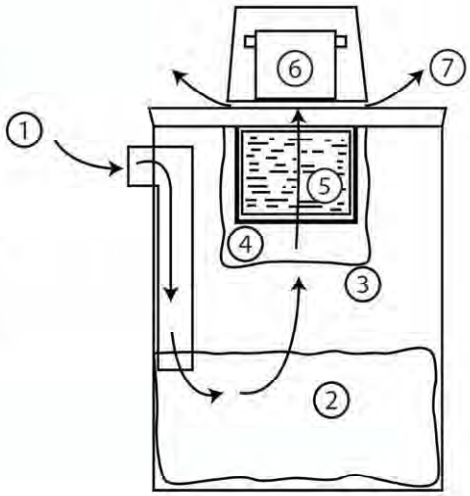
LV55

H.E.P.A. FILTERED LEAD VACUUMS

NIKRO . . . A true innovator in H.E.P.A. Filtration offers a complete line of H.E.P.A. Filtered Lead Vacuums. These Lead Vacuums have been designed for the safe and efficient collection of lead, asbestos, mold and other toxic and nuisance dust. Each H.E.P.A. Filtered Lead Vacuum comes with a final stage true H.E.P.A. Filter. Each and every H.E.P.A. Filter is independently tested and certified to have a minimum efficiency of 99.97% at 0.3 microns, which meets or exceeds OSHA and EPA standards for cleaning the air of lead dust. These high performance H.E.P.A. Filtered Lead Vacuums come with a 2 year quality assurance warranty. Whatever the application . . . Turn to **NIKRO** for a Safer Environment.

OPERATION

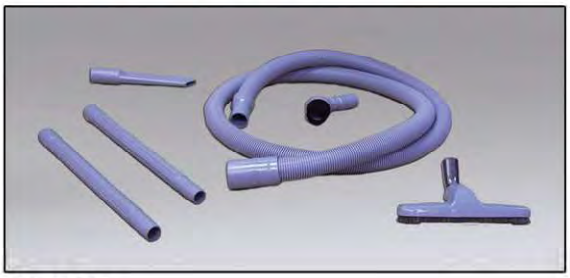
1. Debris enters the vacuum through the intake and travels down the tube.
2. The collection bag is the first of four filters. Here the bulk of the debris is collected, allowing safe, easy disposal. (55 gal. vacuums load directly into heavy mil. disposable poly bags.)
3. The cloth filter bag sheds dust and soot, protecting the H.E.P.A. filter from dust particles, etc.
4. The micro impact filter is designed to capture fine particles before reaching the H.E.P.A. filter.
5. The H.E.P.A. filter is the primary and most critical of the four stage filtration system. Each H.E.P.A. filter is individually tested and certified to be a minimum of 99.97% efficient at 0.3 microns.
6. Vacuum motor.
7. Clean air is exhausted allowing for a safer environment.



SPECIFICATIONS

MODEL #	CFM	STATIC LIFT	TANK SIZE	WEIGHT	DIMENSIONS	VOLTS/AMPS	TOOLS & ATTACHMENTS	PICK UP TYPE
LV02	114	110"	2 GAL.	13 LBS	12"x10"x21"	115/10.5	LVK100	DRY
LV10	112	107"	10 GAL.	25 LBS	16"x15"x24"	115/10.5	LVK200	MOIST OR DRY
LV15	119	114"	15 GAL.	53 LBS	22"x20"x33"	115/13	LVK200	MOIST OR DRY
LVW15	119	114"	15 GAL.	65 LBS	22" x 20" x 45"	115/13	LVK300	LIQUID, MOIST, DRY
LV55	230	110"	55 GAL.	117 LBS	35"x23"x46"	115/13 EA MTR	SOLD SEPARATELY	MOIST OR DRY

TOOLS & ATTACHMENTS



#LVK100
Includes: 1 - 1 1/2" x 7' Hose, 1 - 2 PC Plastic Wand, 1 - Crevice Tool, 1 - 10" Floor & Wall Brush Tool, 1 - 3" Rd. Dust Brush

#861972
11" Rotary Beater Brush Carpet Tool w/Wand

#LVK200
Includes: 1 - 1 1/2" x 10' Hose, 1 - 2 PC Metal Wand, 1 - 14" Floor Tool, 1 - 10" Floor & Wall Brush Tool, 1 - Crevice Tool, 1 - 3" Rd Brush Tool, 1 - 11" Rotary Beater Brush Carpet Tool w/Wand

#LVK300
Includes: Same as LVK200, Plus a 14" Squeegee Tool

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