FORT ROUSSEAU FORMERLY USED DEFENSE SITE (FUDS) NARRATIVE

INTRODUCTION

The Defense Environmental Restoration Program (DERP) – Formerly Used Defense Sites (FUDS) program is responsible for the cleanup of environmental contamination released during the operation of historic military facilities.

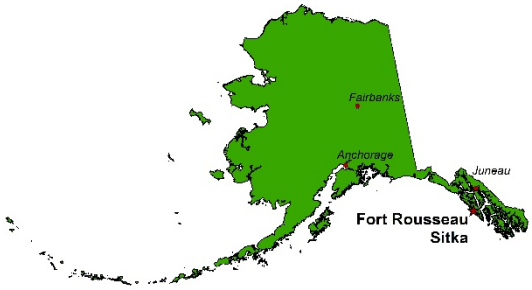

Figure 1: Fort Rousseau FUDS Alaska Project Location Map

The Fort Rousseau FUDS is located west of Japonski Island in Sitka, Alaska (Figures 1 and 2). The site is comprised of eight islands connected by a causeway and encompasses approximately 65 acres of land located immediately west of the Sitka airport. The uplands are managed by the Alaska Department of Natural Resources – Division of Parks and Outdoor Recreation (ADNR-DPOR) and the intertidal areas are managed by the Bureau of Land Management (BLM). The islands were chosen as military installation sites during World War II due to their strategic value for protecting the Naval Air Station on Japonski Island against attacks from the Pacific. Currently, the property is designated the Fort Rousseau Causeway State Historical Site.

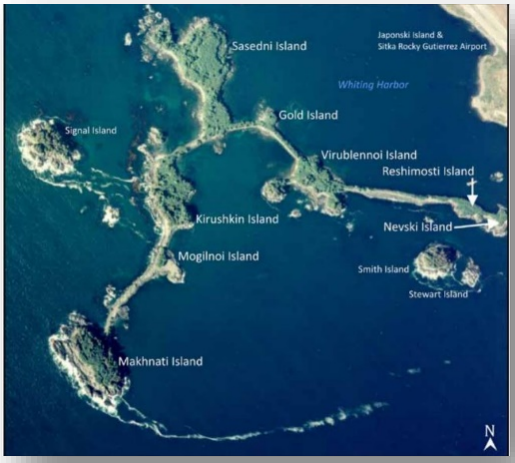

Figure 2: Fort Rousseau FUDS. The Fort Rousseau Landfill is located on Virublennoi Island near Sitka, Alaska. (2012, AK Department of Natural Resources)

As part of the Sitka Harbor Defenses, the Army constructed a number of military features throughout the islands from 1941 to 1943. A large aspect of the project was the construction of a causeway to connect the island chain to Japonski Island to both provide road access and use as a conduit for utilities. Construction of the causeway was a tremendous undertaking. The project spanned a length of 8,100 feet and required fill to depths ranging from 12 to 60 feet. Construction efforts were repeatedly undermined by wave scouring and erosion. Plans called for capping the causeway with concrete, but this was never accomplished. At present, there is no access to the islands via land. Access to the islands is by sea only with a marine vessel. The headquarters for the Harbor Defenses was Fort Rousseau, located on Makhnati Island at the southwest end of the chain.

According to the Narrative Report of Alaska Construction 1941-1944, by Lt. Colonel James D. Bush, Jr. (1944), features constructed on the islands included gun emplacements, observation towers, command posts, personnel shelters, artillery magazines, ration storehouses, fuse houses, motor sheds, officers' quarters, storehouses, barracks, dayrooms, and mess halls. Many of these features are now overgrown, in a state of decay, or have been removed. Historical sources indicate the Harbor Defenses of Fort Rousseau were never engaged in active combat during World War II.

Fort Rousseau islands are located within Sitka Sound and are characterized as a maritime climate zone with generally cool temperatures, overcast skies, and abundant precipitation. Mean annual temperature is 45.0 degrees Fahrenheit (°F), ranging from 34.9°F to 57.2°F, with extremes of 0°F and 88°F. Average annual precipitation is 86.1 inches falling 233 days, with seasonal snowfall of 30.9 inches falling 19

days. The amount of precipitation increases steadily from the month of June, peaking in October, with the heaviest snowfall from December to February. The average tide range is 7.70 feet, with a diurnal range of 9.94 feet and an extremes of 18.6 feet for high tides. Weather and high tidal fluctuations presented challenges for the remediation project.

BACKGROUND

The U.S. Army Corps of Engineers (USACE), Alaska District is responsible for addressing over 532 FUDS properties within Alaska. Alaskan FUDS present unique challenges due to both their complex site conditions and difficult logistics. To successfully investigate and remediate these extremely remote sites, the Alaska District's FUDS Team is continually searching for innovative methods to execute remedial investigations and environmental restoration. The full list of team members and their job titles can be found in the nomination submission form. The Alaska District FUDS Program is committed to collaborating with stakeholders and seeking concurrence from the state regulatory agency, and communicating with the public using effective and transparent communication.

PROJECT SUMMARY

A Decision Document for the Fort Rousseau project was approved in August 2016. The Alaska Department of Environmental Conservation (ADEC) concurred with the selected remedy in September 2016. The contamination at the Fort Rousseau site, including polychlorinated biphenyls (PCBs), dioxins, polycyclic aromatic hydrocarbons (PAHs) benzo(a)pyrene and dibenzo(a,h)anthracene, lead and silver, posed a risk to human health and the environment. The primary source area was a coastal landfill on Virublennoi Island that was actively eroding into the ocean. The selected remedy included excavation of contaminated soil from the landfill followed by offsite disposal.

ACCOMPLISHMENTS

The Fort Rousseau project completed remediation of all contaminated soil identified in the approved Decision Document and achieved the remedial action objectives to allow unlimited use/unrestricted exposure. In 2018, a $3.8 million cleanup effort was conducted over five weeks at the site. The cleanup fieldwork was noteworthy due to the following accomplishments.

Photo 1: Low tide at the Fort Rousseau Landfill at the beginning of the environmental remediation contract. The first lift of contaminated soil is being removed. (2018, A. Shewman)

- **Complete Remediation.** Removed 933 tons of hazardous waste and 5,157 tons of non-hazardous waste. Other items removed included 317 pounds of electronic equipment, 168 pounds of broken lead-acid battery plates, and approximately 133 tons of steel (subsequently recycled). This project significantly reduced risk to human health and the environment, and addressed a **high priority** FUDS project in Alaska.
- **Site access using only marine vessels.** The site can only be accessed via the sea using marine vessels. The causeway has limited marine landing sites and densely vegetated terrain, all mechanized/heavy equipment was mobilized to the site using a marine landing craft. Offsite transportation of the excavated soil and other wastes was also successfully and safely accomplished using marine vessels.

- **Tidally Driven Logistics.** Landfill removal activities were carefully timed to coincide with the lowest high tides of the year that occurred over a limited 7-day period. This enabled complete removal of contaminated soil down to bedrock, from depths that would normally be underwater. Restricting work to this timeframe also ensured minimal potential for contaminant migration offsite into the ocean intertidal environment due to high water levels, storm surges, and wave or wind action encroaching on the open excavation. It was crucial the cleanup work addressed the contamination while not making the site worse.

Photo 2: Temporary dike and rock wall at the Fort Rousseau Landfill. The purpose of the dike was to keep the tidewater from entering the excavation. (2018, W. Mangano)

- **Innovative Dike and Rock Breakwater Design.** Used soil bulk bags filled with clean gravel and plastic sheeting to construct a temporary dike, and large rock from within the landfill excavation to construct a permanent breakwater to protect the excavation area from storm surge, and limit future shoreline erosion.
- **Remote camera monitoring.** A wireless camera was installed along the causeway at Virublennoi Island to capture images of the landfill and intertidal areas during the removal activities. The camera used the local cellular network and was accessible to authorized viewers via the internet to observe the progress of site activities and real time weather/tidal conditions 24 hours/day. This system enhanced the state regulator's ability to identify potential concerns and added confidence to the best management practices being utilized to prevent sediment and pollutants from entering the intertidal area of Sitka Sound. The USACE project delivery team accessed the camera website to verify site conditions, marine visibility and weather, tidal cycles, construction equipment movement and waste handling.

Photo 3: Analyzing lead soil XRF samples. Each sample had to be dried, ground, and analyzed with the XRF instrument to give environmental engineers critical screening data during excavation operations. (2018, A. Shewman)

- **Minimized soil handling and transport problems.** Utilized plastic- and felt-lined large capacity bulk soil bags to avoid contaminant leakage during multiple modes of transport (marine barge, rail, truck) to the disposal sites.
- **On-Site Lead-in-Soil Analysis.** Field technicians collected and analyzed 28 landfill material samples during excavation using an x-ray fluorescence (XRF) unit. The results were used to plan and guide landfill material excavation to ensure complete contaminant removal around the landfill

Photo 4: A tracked dump truck called a Marooka is loaded with contaminated soil. In the back of the Marooka is a 5-cubic yard bulk bag. The Marooka is being transported via a landing craft to another island. (2018, A. Shewman)

perimeter. This increased the productivity of field operations and significantly reduced wait time for sample results by avoiding the logistics of shipping samples from the island to a fixed-base laboratory. Turnaround times were reduced from 7 days to 24 hours.

- **Collaborated** with Alaska Division of Parks and Outdoor Recreation (ADNR-DPOR), Bureau of Land Management (BLM), the lead regulatory agency, Alaska State Department of Environmental Conservation (ADEC), the Sitka Coast Guard, and with the public via a local non-profit trail association which resulted in smooth project operations and positive community support.

- Project team worked **over 10,000** man-hours with **zero** lost-time incidents or accidents.

Photo 5: Fort Rousseau FUDS. Bulk bags staged on Virublennoi Island prior to loading on the barge for transport to Seattle. (2018, A. Shewman)

PROGRAM MANAGEMENT

The Fort Rousseau site is one of the highest priority projects within the Alaska Statewide Management Action Plan (SMAP) and considered a high priority by the Alaska Department of Environmental Conservation (ADEC). The Fort Rousseau Causeway State Historic Site regularly attracts state and local attention due to stakeholder interest. A local news publication featured several updates on the cleanup project, keeping interested stakeholders informed of the site activities, hazards, and temporary access controls during the fieldwork phase.

This site was a priority given contaminants were actively eroding into the ocean, and local residents routinely utilized the area for recreation and subsistence. For example, recreationists camped on the landfill and occasionally gathered beach glass present in the intertidal area along the toe of the eroding landfill bluff. Subsistence users collected shellfish and caught fish in the ocean near the landfill.

The Alaska District coordinated closely with ADEC during implementation of the remedial action, and offered the regulators access to real time site monitoring using a wireless camera accessible 24 hours/day via the internet. The ADEC provided regulatory oversight during the entire project duration and their main concern was use of the best management practices to ensure no migration of site contaminants during the landfill excavation activities and limiting potential impacts to the intertidal environment.

The team conducted considerable community outreach through a public meeting during development of the Proposed Plan, and radio and newspaper announcements during landfill removal activities.

TECHNICAL MERIT

During the 2018 field season, the remedial action consisted of excavation, transportation, and disposal of 933 tons of hazardous waste and 5,157 tons of non-hazardous waste. Other items removed include 317 pounds of electronic equipment, 168 pounds of broken lead-acid battery plates, and approximately 133 tons of steel. The steel was recycled upon arrival in Seattle.

Photo 6: 5-Cubic yard bulk bags in staged in Seattle, Washington with Fort Rousseau contaminated soil. Bags transferred to the rail system for transportation to the Columbia Ridge Landfill in Arlington, Oregon.
(2018, Ahtna Engineering Services, LLC.)

Complete remediation was achieved with contaminated soil and landfill material removed to bedrock. There is no on-land access to this site, so **accessing the site required the use of only marine vessels.** This presented challenges during mobilization and demobilization, but these challenges were overcome. The project design focused on **tidally driven logistics**. It was critically important to time removal activities with the lowest high tides of the year, and also during the spring when severe weather events were less frequent. The lowest tides of the year enabled complete removal of contaminated material to bedrock from depths that would normally be underwater. Performing the work during spring lowered the risk of a severe weather event, which could have caused storm surge that would spread contaminated landfill material into the ocean.

The **innovative dike and rock breakwater design** was utilized to ensure the excavation area would be protected from storm surge during removal activities, and subsequently to limit further erosion of the uplands. Soil bags filled with clean gravel, combined with plastic sheeting, were used to construct the temporary dike, and rock removed from the landfill during excavation was placed on the seaward side of the dike to form a permanent breakwater. Upon removal of the temporary dike, the clean gravel within the bulk bags was used to resurface the pre-existing hiking trail system that had been damaged by heavy equipment during site cleanup activities.

Minimized soil handling and transport problems by utilizing plastic and felt-lined bulk soil bags to contain and transport the contaminated landfill material. The lined bags enabled safe material handling, and minimized the potential for leakage during multiple modes of transport (marine barge, rail, truck) to the disposal facility located in the Lower 48 States. **On-site lead-in-soil analysis** field results were used to plan and guide landfill material excavation to ensure complete contaminant removal around the landfill perimeter**.** Two field technicians collected 28 landfill material samples during excavation, prepared the samples in accordance with EPA requirements, and analyzed the samples using an x-ray fluorescence (XRF) unit. The results correlated well with analytical laboratory results. This increased the productivity of field operations and significantly reduced wait time for sample results by avoiding the logistics of shipping samples from the island to a fixed-base laboratory. Turnaround times were reduced from 7 days to 24 hours.

Collaborated with Bureau of Land Management, State Department of Natural Resources, State Department of Environmental Conservation, Coast Guard, and a local non-profit trail association, which resulted in smooth project operations and positive community support. **Monitored** remote site progress, weather and tidal cycles using wireless camera technology available 24/7 via the Internet. This system enhanced the state regulator's ability to identify potential concerns and added confidence to the best management practices being utilized to prevent sediment and pollutants from entering the intertidal area of Sitka Sound. **Promoted site restoration.** The remediation activities were effective in protecting, enhancing, and restoring the environment. Contaminated landfill material was completely removed to bedrock, a rock breakwater was constructed to protect the upland area from future shoreline erosion, and clean gravel from the temporary dike construction was reutilized to resurface and repair damage to the pre-existing hiking trail system that had been caused by the cleanup effort.

Photo 7: Internet-connected wireless remote camera used to monitor work progress, weather, and tides. This camera was available to the contractor and government 24 hours-a-day, 7 days-a-week. (2018, A. Shewman)

ORIENTATION TO MISSION

The FUDS program has a critical task related to mission. The current FUDS cost-to-complete to address environmental liability at Alaska sites is over $1.2 billion. The actions taken at the Fort Rousseau site allowed USACE to significantly reduce future liability at this property. The Alaska District can now focus on other properties that require cleanup.

TRANSFERABILITY

The Alaska District FUDS Program has over 175 other projects with varying amounts of contaminated soil and groundwater to be addressed in the near future. Because of the extremely high mobilization costs in Alaska, remedial actions must be as efficient as possible to limit cost growth and achieve program objectives in a reasonable timeframe. The lessons learned at Fort Rousseau will be used at many other sites to lower remediation costs and increase project effectiveness.

In particular, the use of wireless construction monitoring camera services during the field activities provided the USACE project delivery team with valuable real time information and verification of site progress and critical weather/tidal conditions. The camera was positioned to ensure a complete view of the landfill and intertidal area. Lessons learned included the need for retrofitting with a larger battery pack with more storage capacity and limitations of the solar panel charger. Future projects with high level interest from state regulators at remote, challenging to access locations, crucial tidal, wildlife, or other environmental limitations, will benefit from increased confidence that remedial actions are being effectively implemented while protecting the environment.

This system enhanced the state regulator's ability to identify potential concerns and added confidence to the best management practices being utilized to prevent sediment and pollutants from entering the Sitka Sound intertidal area. The USACE project delivery team accessed the camera website to verify site conditions, marine visibility and weather, tidal cycles, construction equipment movement and waste handling.

Utilizing plastic and felt-lined bulk soil bags to contain and transport the contaminated landfill soil enabled safe material handling, and minimized the potential for leakage during transport to the disposal facility.

Lead-in-soil analysis using XRF was a simple, well-defined process that can be used at other remote sites to increase project efficiency, and avoid the logistical challenges of shipping samples and delays caused by waiting for results.

Since completion of this project we have already transferred these lessons learned and best practices by using these same approaches at other remote Alaskan FUDS projects. This included the use of the refined XRF procedures, the use of felt-lined bulk bags, and the use of remote wireless monitoring at multiple projects to more efficiently and effectively execute projects.

STAKEHOLDER INTERACTION

USACE collaboration with stakeholders helped ensure smooth project operations and interacting with local organizations enhanced community support. Coordination with regulatory institutions and landowners, and public participation have been an extremely important component of the cleanup process at the Fort Rousseau site. The community of Sitka welcomes numerous tourists and cruise ships during the busy summer season. The project was completed very early in the summer season, with minimal impact to local sightseeing operations and short timeframe of restricted access to the State Historical Park. The project left all the trails in the park in equal or better condition, and in some areas improved access for site visitors. The boat landing areas were upgraded to allow a small landing craft and barge site access and as a result, local sightseers can now more easily land kayaks and access the historical features on the islands. A local non-profit group, Sitka Trail Works, expressed their gratitude and appreciation for the project, resulting in a safe, clean park that enhances the public's knowledge of military history and construction practices. The popular state historical and recreational park will continue to attract adventuresome kayakers and tourists who are thrilled to experience World War II military history in Alaska.

USACE worked hard to maintain communications with the landowner and regulatory agency and realized the importance of public participation and interaction throughout this project.

The Corps of Engineers conducted a public meeting during Proposed Plan development, received few public comments, and thoroughly responded to them in the Decision Document. Prior to and during landfill removal, USACE utilized local newspaper and radio announcements to keep the public informed. USACE also kept the landowner and regulator informed by sharing daily field reports with them, and promptly answering all of their questions.