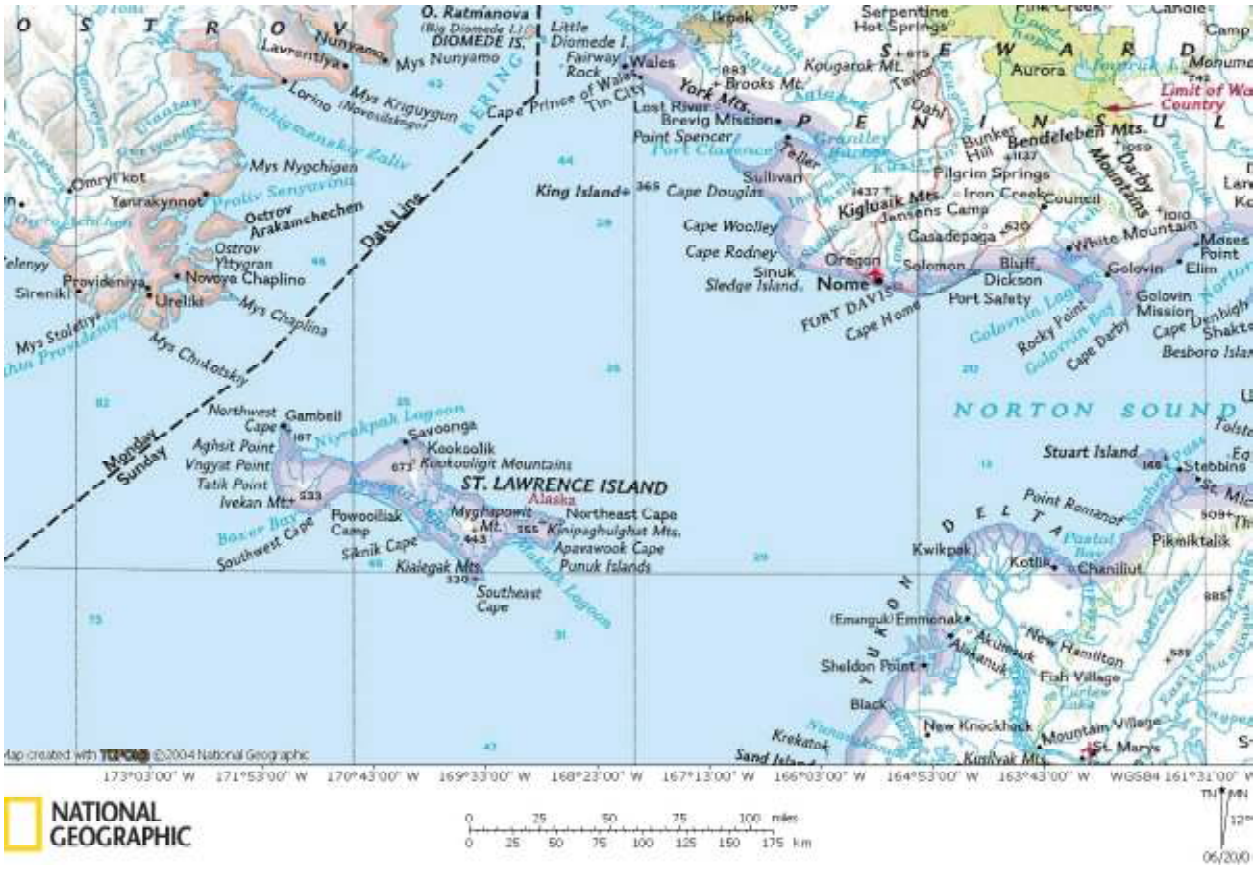
Environmental Protection Agency (EPA) Region 10's Evaluation of Army Corps of Engineers Cleanup of Formerly Used Defense Sites (FUDS) at NE Cape and Gambell, St. Lawrence Island, Alaska

(Final Report – November, 2012)



Introduction

The military began constructing sites in Alaska to provide early warning of possible Soviet attacks in the late 1940s. In 1948 the military established the Gambell site, the first defense site on the island, adjacent to the village of Gambell. The Gambell site continued to be used until the late 1950s when a similar facility was constructed at NE Cape. The NE Cape facility was operated from 1958 until 1972, when the site was closed. When the military abandoned Gambell, the structures were demolished, burned or salvaged and the debris buried on site. At NE Cape, the military just walked away, leaving everything behind. This resulted in various contaminants being left at these two facilities. In 1985 the Army Corps of Engineers, as the lead agency for cleanup of Department of Defense sites, began cleanup investigations at Gambell and NE Cape under the Formerly Used Defense Sites (FUDS) program.

When the Alaska Native Claims Settlement Act was passed in 1971, Gambell and Savoonga opted for title to the 1.136 million acres of land in the former St. Lawrence Island Reserve instead of participating in the corporate profits of the other Alaska Native Regional Corporations. The Gambell Native Corporation and Savoonga Native Corporation received title to all of St. Lawrence Island (except US Surveys 4235, 4237, 4340, 4369, 3728) by Interim Conveyance No. 203 dated 21 June 1979. Thus, the island is jointly owned (surface and subsurface rights) by the Savoonga and Gambell Native Corporations, now known as Kukulget, Inc. and Sivuqaq, Inc., respectively.

The Gambell FUDS consisted of 2,543 acres obtained by public land order and special use permits from the Bureau of Land Management. The site is south and east of the village of Gambell (population approximately 800). This site was used by the military for housing and operations, aircraft radar, communications and other functions. Based on the Corps' investigation, 38 sites of suspect contamination were located throughout these acres (Figure 1), and CERCLA cleanup was required at three sites located around Troutman Lake. In 2008 the Corps declared cleanup of the Gambell FUDS completed with a cost of approximately $11.5 million. ($7.3M. for CERCLA cleanup; $4.2M under NALEMP). The St. Lawrence Island (SLI) leaders and residents have stated that the FUDS cleanup was closed prematurely, that the site was not adequately characterized and requires long term monitoring.

The NE Cape site was an established village and was displaced when the military established the surveillance station in the mid-1950s. ACAT and village leaders state that the military in 1951 had an agreement to not leave waste behind and that this agreement was violated by the military. The residents of SLI stated that they would like to restore the community at NE Cape, but that contamination in the area makes it unsafe to do so. The residents also stated that currently the fish populations and habitat of the Suqi River remains severely impaired.

The NE Cape FUDS is included in lands selected for withdrawal by Sivuqaq Inc. and Savoonga Native Corporation (now known as Kukulget, Inc.). The site is about 60 miles SE of Savoonga (population approximately 800). The NE Cape site is not connected to the village of Savoonga by roads, although the site is accessible by boat, ATV or snowmobile. The military left behind an airstrip that is seasonally improved by FUDS contractors. A trail network in the NE Cape area is used for ATV travel during hunting and fishing season, and camping. The site is also accessed in the winter during inclement weather and as a stop to collect drinking water during spring whaling.

The NE Cape study area encompasses 2,560 acres and includes the areas used for housing site personnel (up to 200 people during the peak of activity), power plant facilities, fuel storage tanks and distribution lines, maintenance shops, waste water treatment facilities, landfills, etc. The known and potential sources of environmental contamination from activities at the site include, but are not limited to, petroleum products used for heating and fuel, polychlorinated biphenyls (PCBs) from electrical transformers, pesticides, metals and organic chemicals from paint, solvents and other common industrial products and associated debris disposed in the facility's landfill or abandoned on the tundra as debris piles.

At NE Cape, the Corps' investigation located 33 distinct sites of possible contamination. Further sampling and investigation determined that 11 sites required No Further Action, i.e. they contained *de minimus* concentrations of diesel range organics (DRO) and residual range organics (RRO), PCBs (2 sites) or no detects. Of the 22 sites requiring cleanup, 11 were due to DRO/RRO contamination, and seven sites were contaminated by PCBs (Figure 2). During the 2010 field season, 2,730 tons of petroleum-contaminated soil and 1,245 tons of PCB-contaminated soil were excavated and removed. Also, 21 bulk bags of PCB-contaminated soil were staged for future off-site removal, as well as 16.7 tons of arsenic-contaminated soil. Cost of cleanup through the end of the 2010 field season was $62 million.* Approximately $83.5 million has been spent through FY2011 under the FUDS program.

> *Notes: Remedial efforts through fall 2011 include the excavation of approximately 12,500 tons of petroleum-contaminated soil and 4,500 tons of PCB-contaminated soil. The Corps awarded a $19.1 million contract during FY11 to continue site remediation activities during the summers of 2011 and 2012. Fieldwork implemented during the summer of 2011 included: excavation/ removal of PCB-contaminated soils, excavation/removal of petroleum-contaminated soils from the Main Complex, miscellaneous debris removal, sampling for monitored natural attenuation and additional delineation of sediment contamination at Site 28.

Work during the 2011 and 2012 field seasons at NE Cape was to include groundwater monitoring for petroleum related compounds at nine monitoring wells located in the Main Operations Complex (MOC). These data will be used to help determine the amount of DRO degradation in the shallow groundwater.

Additional work for the 2011 and 2012 field seasons included further excavation of PCBs and petroleum-contaminated soil at the MOC, the Power and Heating Building and the White Alice Site. The soil at the Waste Water Treatment Tank was sampled for arsenic. Concentrations of arsenic are greater than background, so all soil with arsenic concentrations above cleanup levels are scheduled to be excavated.

As these last paragraphs indicate work is ongoing at the NE Cape site. Accordingly, this evaluation represents conditions at the point in time that it was written, the summer and fall of 2011. As the cleanup continues, conditions may change. EPA anticipates that this additional work will generate reports that document the cleanup etc., and that these reports will be routed to the parties for their review and comments. Also, EPA anticipates that the RAB will continue to provide a forum for the local communities to raise concerns to the Corps and the Corps will continue to provide the RAB with support for technical resources.

It is also important to note that under CERCLA, if new information comes to light that may call into question the investigation/cleanup at a site, the site can be reopened. There are a variety of ways that this new information can be discovered, for example, through the periodic reviews of an implemented

remedy, monitoring data, or observations of changes in the site conditions. EPA expects that the Corps will continue to respond to changes in site conditions in a manner that is protective of human health and the environment.

EPA's Review of Army Corps of Engineers Cleanup Documents

In the fall of 2009, a delegation of leaders, elders and youth from St Lawrence Island, along with staff of the Alaska Community Action on Toxics (ACAT), wrote a letter to Mathy Stanislaus (Assistant Administrator of EPA's Office of Solid Waste and Emergency Response) and visited EPA headquarters regarding their concerns about the Corps' cleanup of the Gambell and NE Cape FUDS. Mr. Stanislaus asked EPA Region 10 to take the lead in responding to the issues raised by the communities of Gambell and Savoonga and ACAT and assess the EPA's future role at these sites.

Previously in 2002, EPA Region 10 reviewed the work by the Corps at the NE Cape site and determined that the Corps was proceeding in a manner consistent with EPA's expectation for cleaning up hazardous waste sites. Once again, EPA Region 10 has agreed to evaluate the Corps' cleanup work at the NE Cape and Gambell FUDS to determine if their cleanup work is consistent with EPA's expectations for hazardous waste sites.

EPA's review has determined that the Corps' documents on the work at Gambell and NE Cape FUDS indicate that they generally followed the EPA rules and regulations[1] with a few noted exceptions that are discussed below. Since the Corps has worked directly with Alaska Department of Environmental Conservation (ADEC) throughout this project, the Corps more closely follows ADEC guidance. For example, the approach for incorporating ambient/background concentrations in the risk assessment is not the same approach as used by the EPA. The Corps compared the maximum concentration of inorganic contaminants only to a calculated 95% background upper tolerance limit, i.e., an ambient concentration. If the maximum concentration of a site-related chemical was less than the ambient concentration, the chemical was dropped. EPA guidance recommends that any contaminant be carried through the risk analysis and then the impact of elevated concentrations of contaminants in background can be addressed in the uncertainty discussion of the risk management section.

In reviewing the March 2004 Human Health and Ecological Risk Assessment for the NE Cape FUDS it was noted that ecological risk assessment did not include an aquatic species. In addition, the ecological risk assessment appears to be done more to supplement the human health risk assessment than to directly assess impacts to biota. For example, in the risk assessment the presence of PCBs in ambient fish is noted and used in the calculation of human health risk. But the impacts of the PCBs on the fish in the Suqitughneq (Suqi) River were not directly evaluated. The Corps did consider using a marine fish, but decided not to since they are migratory and would only be exposed to site conditions a portion of the time. However, there are non-migratory freshwater fish species that could have been used, such as sculpin or blackfish.

The approach the Corps took to calculate both human health and ecological risk is not as protective as the approach the EPA would use. As noted earlier, the Corps did not directly calculate a risk to an aquatic organism. However, EPA's risk assessors did not find that any additional cleanup would have

[1] The Comprehensive Environmental Response Compensation Liability Act (CERCLA) is the overall Act that provides the EPA and the Corps the authority to clean up hazardous waste sites. From this Act, implementing regulations (i.e. the National Contingency Plan – NCP) and guidance have been developed to provide the cleanup authorities with more specific directions on the rules for cleanup. EPA's evaluation of the Corps' cleanup is based on these regulations and guidance.

been necessary had the risk assessment process more closely followed EPA guidance. In addition, all ecological risk sites are co-located with human health risk sites. Thus cleaning up to protect human health should also protect the potentially affected species, which is commonly a vole.

There is also the issue of long-term monitoring at these sites. If contamination is removed to allow unrestricted use, long-term monitoring is not required. However, if contamination remains on site at concentrations that do not allow for unlimited use and unrestricted exposure, then periodic reviews of the site are necessary until the site conditions change to allow unlimited use and unrestricted exposure. Five-year reviews are required under section 121 (c) of the Comprehensive Environmental Response, Compensation, and Liability Act, which states that "If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented."

The Corps has stated that five-year reviews are anticipated at the MOC site at NE Cape only, due to groundwater contamination with COCs (e.g., benzene and lead) other than just petroleum. However, they plan to do "periodic reviews" at sites with residual petroleum-oil-lubricant (POL) contamination (e.g., Site 8), in conjunction with the evaluation of the MOC. EPA would approach POL contamination differently. It would look at the individual chemical constituents, such as benzene, and determine if the individual compounds pose a risk rather than the fuel as a group of compounds. However, the differences in approach would not result in a different cleanup.

At NE Cape the Corps will also conduct periodic visual monitoring of the capped area at the Site 9 Housing and Operations Landfill and Site 7 Cargo Beach Road Landfill for settling and erosion for five years post implementation of the remedy. Additional visual monitoring, up to 30 years, may be conducted if deemed necessary based on the results of the site inspections. The Decision Document approved by ADEC required limited removal of drums debris and stained soil in the upper one foot, capping and institutional controls without further characterization. Since there was no sampling to determine if contamination above cleanup goals were left behind, EPA would work under the assumption that waste is left in place and that longer monitoring, including periodic review, e.g. Five Year Review, be required; see additional discussion later in this report.

In a May 2002 Overview Report, it was noted that the Agency for Toxic Substances and Disease Registry (ATSDR) was involved in a review of fish tissue analysis from fish collected from the Suqi River during previous investigations. The report states the ATSDR will work with the communities and the Corps as more data is available to help evaluate if there are any likely adverse impacts from subsistence level consumption of fish from the Suqi River. Such coordination with other agencies with specialized expertise is an approach the EPA employs at their site cleanup work. The EPA is aware that in October 2011, the community of Savoonga petitioned ATSDR to conduct a health assessment due to the contamination at the Gambell and NE Cape sites and because more information is available since ATSDR last reviewed the data in 2002. In February 2012 ATSDR agreed to conduct this health assessment and is expecting to initiate this assessment work in 2013.

Community Issues and Concerns

There are several site specific concerns that have been captured in notes from the Restoration Advisory Boards (RABs) meetings and/or concerns by leadership and other community members on St. Lawrence Island as expressed in the 2009 ACAT letter to EPA.

Gambell FUDS

At Gambell there were several concerns; residual munitions, buried debris, and protection of drinking water. Munitions, specifically 30-caliber rounds, were found at a beach burial pit between the Bering Sea and Troutman Lake. In addition, there were statements that the Army disposed of a large volume of ordnance in the north end of Troutman Lake in the early 1960s. These oral statements said that crates of ammo were placed on the ice of Troutman Lake and with spring breakup they were "flushed away." However, the geophysical survey of the lake combined with depth-sounding equipment, ice augers, underwater video cameras and dredging anchors failed to detect a large ordnance disposal site at the bottom of Troutman Lake.

Geophysical investigations by the Army's contractor for munitions and explosives of concern located the beach burial site and removed several hundred rounds of ammunition. Following the investigation and removal actions in the early 2000s, the Corps placed institutional controls on the site. However, ADEC did not agree with institutional controls as the final remedy. Later the Corps-funded NALEMP program investigated the beach burial site using Schonstedt metal detectors and visual surveys and removed additional ammunition in the summer of 2006. It was during this action that two hand grenades were also encountered. After using these detectors and visual surveys to sweep the area for two years, the Corps declared the site clear of munitions in September 2008 and removed the institutional controls with ADEC's concurrence. The Corps' project closeout report states that all known munitions and explosives of concern have been removed from the area and the residual small arms ammunition has been 100% cleared. Thus, institutional controls and any additional reviews were no longer necessary. The ADEC concurred that all necessary actions to address military munitions or explosives concerns have been completed at the Gambell site.

These reports indicate a good faith effort on the part of the Corps to remove all munitions from the sites. However, it is hard to say with 100% certainty that all munitions were removed. The Schonstedt instrument used by the NALEMP program is a hand-held magnetometer, which detects ferrous metals, but not non-ferrous metals. It could not detect brass casings nor the presumably copper-jacketed lead projectiles that comprise a 30-caliber round. The Corps should have used an all-metals (ferrous and non-ferrous) detector, such as an EM-61 hand-held instrument, for surveying sites with potential rifle rounds. While localized sampling of the lake bottom did not find any munitions, the potential for munitions remains. The Corps did survey the entire lake via geophysical instruments. Also, this disposal event is based on recollections by individuals, but is not documented in any Corps' reports from the time. Given this lack of documentation and the rigorous geophysical investigation, the EPA concurs that is it unlikely MEC are present in the sediment of Troutman Lake. However, the EPA recommends additional surveying of the 30-caliber round site with an all-metals detector and continuing institutional controls until surveying determines the site is clear of munitions.

Besides the issue of munitions, another concern at Gambell is related to debris that remains on site, whether under buildings and other structures or just in the general area of the village. It appears that the Corps, through the NALEMP program, has actively addressed some of these concerns. However, they have not addressed issues where the debris is under structures with some exceptions. (There is

documentation of the removal of debris in 2008 and 2009 from the area of the school.) Excavating debris from under existing structures does pose a host of additional issues, such as maintaining the structural integrity of the building. Generally, the EPA would not remove such material either unless it posed an unacceptable risk to human health and the environment. It does not appear that this material, such as construction debris like rebar and/or metal from Marston matting, presents a health threat. The EPA concurs with the Corps that presence of inert debris under buildings does not present a threat to human health and the environment and removal of such debris is not necessary.

Also, concerns about the protection of the drinking water aquifer have been expressed. Based on the data reviewed in the June 2005 Decision Document for the Gambell FUDS, it appears that any contaminants in the groundwater that exceeded the screening levels, i.e., the maximum contaminant levels (MCLs) for drinking water are due to the turbidity of groundwater. This turbidity is representative of the poor quality of the groundwater at Site 6 and Site 7. An August 2012 comment from the Corps notes the following:

> The 1994 RI included both filtered and unfiltered groundwater samples for metals, which are presented as total and dissolved concentrations in the summary Table 7 of the Decision Document. It is the filtered or dissolved concentrations that represent drinking water in this case and thus these concentrations were evaluated to see if groundwater levels will exceed screening levels. The only dissolved concentrations above detection levels are for chromium and lead and these are below screening levels. The other analyses of filtered water samples were non-detect for arsenic, beryllium, cadmium, and nickel.

This additional information resolves EPA's concern. Metals in the filtered groundwater do not exceed screening level.

One groundwater sample cross-gradient to Gambell's water supply well had fuel contamination, but subsequent sampling did not find any contamination. Other sites where groundwater was sampled did not have contaminants above the MCLs. There were also some concerns expressed that other areas where contamination is found in the soil could pose a threat to the groundwater, specifically the radar station on Sevoukuk Mountain. Based on a review of the documents, there does not appear to be a hydrogeological connection between the radar site and the drinking water source on the plain below the mountain. Also, dioxins, the contaminant of concern at the radar site, do not travel very easily in the subsurface because they bind tightly to the soil. In addition, the average concentration of dioxins in the soil at the radar station is below EPA's screening concentration and ADEC's cleanup value. Thus, additional excavation at the radar site is not necessary since there is no risk to human health or the environment. In conclusion, reports reviewed indicated that this FUDS does not pose a threat to the groundwater that serves as a drinking water source for the village of Gambell.

NE Cape

The local community has expressed concerns about whether the site has been adequately characterized and about the cleanup at several sites located within the NE Cape FUDS. These concerns can be grouped into some general categories: PCBs, contamination of the surface water and the Suqi River, failure to remove all contaminated material from the site and contamination of the groundwater.

PCBs: As noted in the 2009 ACAT letter to EPA, PCB contamination at the NE Cape site was one of the major concerns. This concern is driven by the subsistence lifestyle practiced by most of the local population. An ACAT study on PCB concentrations in common food sources (marine mammal:

Bowhead Whale and a land mammal: reindeer) used by residents on the island documented the following:

Bowhead whale (in ppb)

	PCBs	DDE+85	HCB	Mirex
Blubber (n=3)	317.61	6.29	23.82	0.26
Meat (n=4)	27.20	0.27	0.58	0.08
Mungtak (n=7)	142.61	5.26	13.09	0.14
Rendered oil (n=3)	353.95	26.43	16.91	2.90
Skin (n=1)	85.91	0.93	4.36	0.06

n= the number of samples collected

Reindeer (in ppb)

	PCBs	DDE+85	HCB	Mirex
Fat (n=5)	2.77	13.21	2.94	0.00
Meat (n=8)	1.42	0.78	0.29	0.00
Liver (n=4)	0.18	0.96	0.00	0.00
Kidney (n=4)	0.03	0.62	0.00	0.00
Heart (n=2)	0.06	0.56	0.00	0.00
Prepared meat (n=1)	1.14	0.01	0.77	0.00

(Note: these data represent results from food source throughout the area and are not specific to the NE Cape site.)

The value established by the EPA for PCB concentration in fish that allows for unlimited consumption is <1.5 ppb (ug/Kg) to protect against a risk of developing cancer and <5.9 ppb (ug/Kg) to protect against noncancerous diseases. ADEC's cleanup level for PCBs in soil is 1 ppm (mg/Kg), which is ADEC's most stringent cleanup level of unrestricted/residential use. Note that while the values are considerably different, they are for different media. ADEC's cleanup level for PCBs in soil is within the range of cleanup values that EPA would use for sites with unrestricted use.

Although ADEC has established cleanup levels for three basic zones, the cleanup level for PCBs in soil is the same (1 mg/Kg) for all three zones. Under ADEC regulations, any concentration of PCBs in soil greater than 1 mg/Kg but less than 10 mg/Kg can be capped, provided there is long-term monitoring with institutional controls. Discussions between the Corps and ADEC determined that for residual PCB concentrations in soil greater than 1 mg/Kg or capped PCB sites for any Gambell or NE Cape site (i.e., soil with PCB concentrations >1 mg/Kg), the contaminated soil will be removed from St. Lawrence Island. Such action eliminates the need for long-term monitoring and is consistent with EPA requirements.

Additional work planned for the 2011 and 2012 field seasons at NE Cape involves further characterization sampling for PCBs (and several other contaminants) in sediment and soil transects throughout the drainages leading from the MOC to the Suqi River. The results of these samples could change the known ecological and human health risks which in turn could affect the need for cleanup. To ADEC's knowledge sampling prior to 2010 indicated PCBs in these drainages were non-detect. The final cleanup and remedial design for the drainage area from the MOC to the Sugi River will be finalized based on the sample results from the 2011 and 2012 field seasons. The Corps is backfilling all upland

excavations with clean fill from the borrow area at NE Cape after confirmation soil samples determine that the cleanup level of 1 mg/Kg or less has been achieved.

PCB cleanup conclusion: EPA received several comments on earlier versions of this evaluation noting the presence of PCBs in sediments of the estuary and inferred in those comments is the request for a more conservative cleanup value. EPA's evaluation is based on regulations and policies that EPA uses in evaluating risk at contaminated sites. Based on the fact that the cleanup level established by ADEC is within the risk range that EPA uses at similar sites and is consistent with EPA's policies, we have no driver to recommend revising the clean up value for PCBs. If there is extenuating information regarding this cleanup value, it would be best to address the issue with ADEC directly.

In addition, the subsistence lifestyle of residents exposes them to very elevated concentrations of persistent organic pollutants (POP), including PCBs. However, even if one could eliminate all PCBs from these two FUDS, the local residents would still experience an exposure to PCBs well above the concentrations the EPA established for unrestricted consumption of fish due to the elevated concentrations of PCBs in marine mammals. According to ACAT's study, these elevated levels of POPs are due to the aerial deposition of POPs in the Arctic. Thus it remains EPA's position that the removal of media with PCB levels below ADEC cleanup levels is not warranted.

Surface Water and the Suqi River: Several comments questioned whether the Corps had performed an adequate characterization of the sediments in the Suqi River, particularly in the area of the Main Operations Complex. In a February 2011 remedial action report, the Corps responded that previous sampling between 1996 and 2004 indicated that concentrations of chromium and PCBs were below cleanup levels. However, the commenters are concerned that cleanup work in the area since 2004 may have released contaminated material into the river. Additional sampling was planned for the 2011 field season to determine whether contamination of the Drainage Basin has occurred. The EPA has not seen any sample results from the 2011 field season. But based on previous work it appears that if contaminant concentrations exceed ADEC cleanup levels, ADEC will require cleanup and the Corps will comply with such requests.

Failure to remove all contaminated material from the site: There were also concerns expressed about leaving any detectable contamination behind at sites, such as the White Alice site or Site 7, Cargo Beach Landfill. Based on the documents reviewed, it appears that if there are areas that still exceed ADEC cleanup levels following excavation, the Corps is planning to return and complete the cleanup so that residual contamination is below the ADEC cleanup levels. At several sites it was projected that such work would occur during the 2011 field season. (Note EPA has not reviewed any reports for the 2011 field work.) In regards to landfills, the EPA takes a similar approach as the Corps in that capping a landfill is an appropriate cleanup action. If contamination remains above risk-based concentrations, then long-term monitoring is required to ensure that the remedy remains protective. After reviewing the documentation for Site 7, the Cargo Beach Landfill, it appears that while barrels, batteries, gross soil contamination, etc. were removed, no sampling was performed post removal to document that no contamination above risk-based concentration remains within the landfill. Accordingly, long-term monitoring of this site is necessary to ensure that remedy remains protective of human health and the environment. This would consist of ensuring the cap remains intact. The investigation determined that shallow groundwater is slow to recharge and does not produce water in sufficient quantities to provide drinking water. Thus groundwater monitoring is not necessary. However, monitoring of nearby surface water bodies for contaminants of concern is highly recommended.

Contamination of the groundwater is associated with spilled diesel fuel (DRO) in the MOC. As noted in the workplans, such contamination can be addressed via natural attenuation provided geochemical conditions conducive to such degradation are found in the aquifer. The workplan indicates that the groundwater will be analyzed for the correct parameters. Further discussion indicates that the environment of the aquifer is depleted in oxygen and that the breakdown of DRO occurs best in oxygen-rich environments. Following an analysis of site specific conditions, adding oxidizers to groundwater water in the area of the MOC should be considered to create an oxygen-rich environment. Monitoring of the groundwater is necessary to ensure natural attenuation is addressing the contamination. While the workplan for the 2011 field season notes that as many as 8 of 9 monitoring wells in the MOC may be removed, the Corps stated via emails that no monitoring wells were removed during the 2011 field season. A conceptual site model of the hydrogeology still needs to be developed in order to determine the number of wells and their location necessary to monitor the degradation of the DRO and whether any existing monitoring wells can be used for such monitoring.

Overall Conclusions

In general the cleanup of the Gambell and NE Cape FUDs by the Corps is consistent with CERCLA and the NCP. While the EPA may have done some of the analysis differently (e.g., see the discussion of how to incorporate elevated background values), the results are not appreciatively different. The EPA does have some reservations about declaring the beach burial munitions site at Gambell as clear with no need for institutional controls. Sweeping the site periodically with an all-metals (ferrous and non-ferrous) detector such as an EM-61 hand-held instrument that can detect non-ferrous metal would provide better confidence that this site is clear of 30-caliber rounds.

While the documents reviewed by EPA do not indicate a threat to the drinking water supply from the Gambell defense site, EPA does agree with comments by other parties that a monitoring plan for the village's drinking water should be developed. Based on discussions during the December 2011 community meetings there are a couple of programs that may assist the village in developing such a monitoring program. These are ADEC's Village Safe Drinking Water Program and the Alaska Rural Water Association. The village could request General Assistance Program (GAP) funds from EPA to perform a preliminary assessment of the groundwater.

At NE Cape, institutional controls with monitoring should be implemented at sites where residual contamination does not allow unrestricted use of the site in order to ensure the remedy is protective of human health and the environment. This would include sites like the Cargo Beach Landfill and the groundwater at the MOC. Also Five Year-Reviews should be performed for such sites.

In addition EPA recommends that a detailed workplan be developed for the Monitored Natural Attenuation remedy at the MOC. This work plan should include a conceptual site model of the hydrogeology, discuss the parameters being monitored to indicate whether natural attenuation is occurring, trends of any data to support natural attenuation, modeling or a projection of when remediation goals will be met, etc. Such a study should be shared with the parties for review and comments.

Figure 1 – Site Location Map

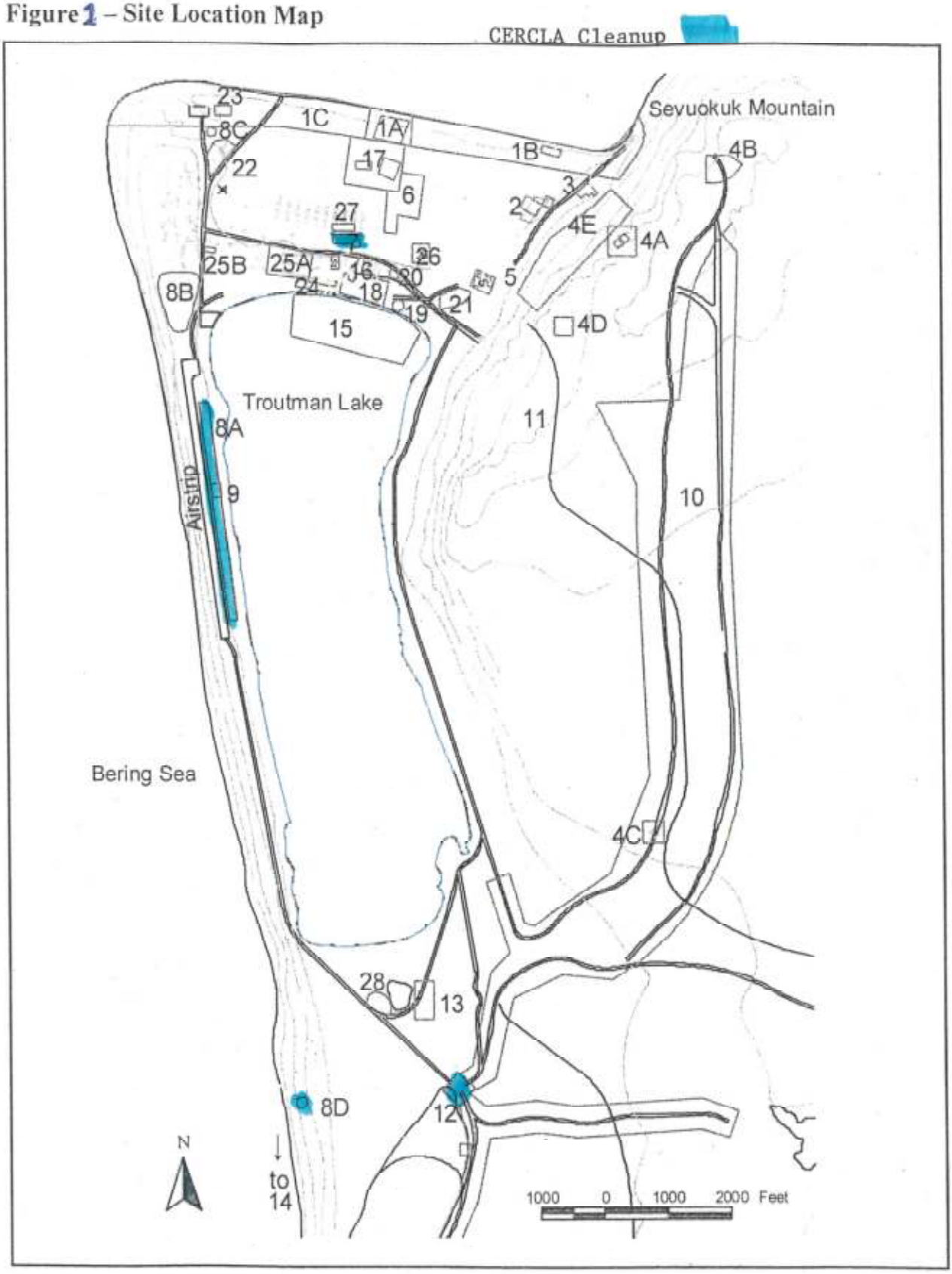
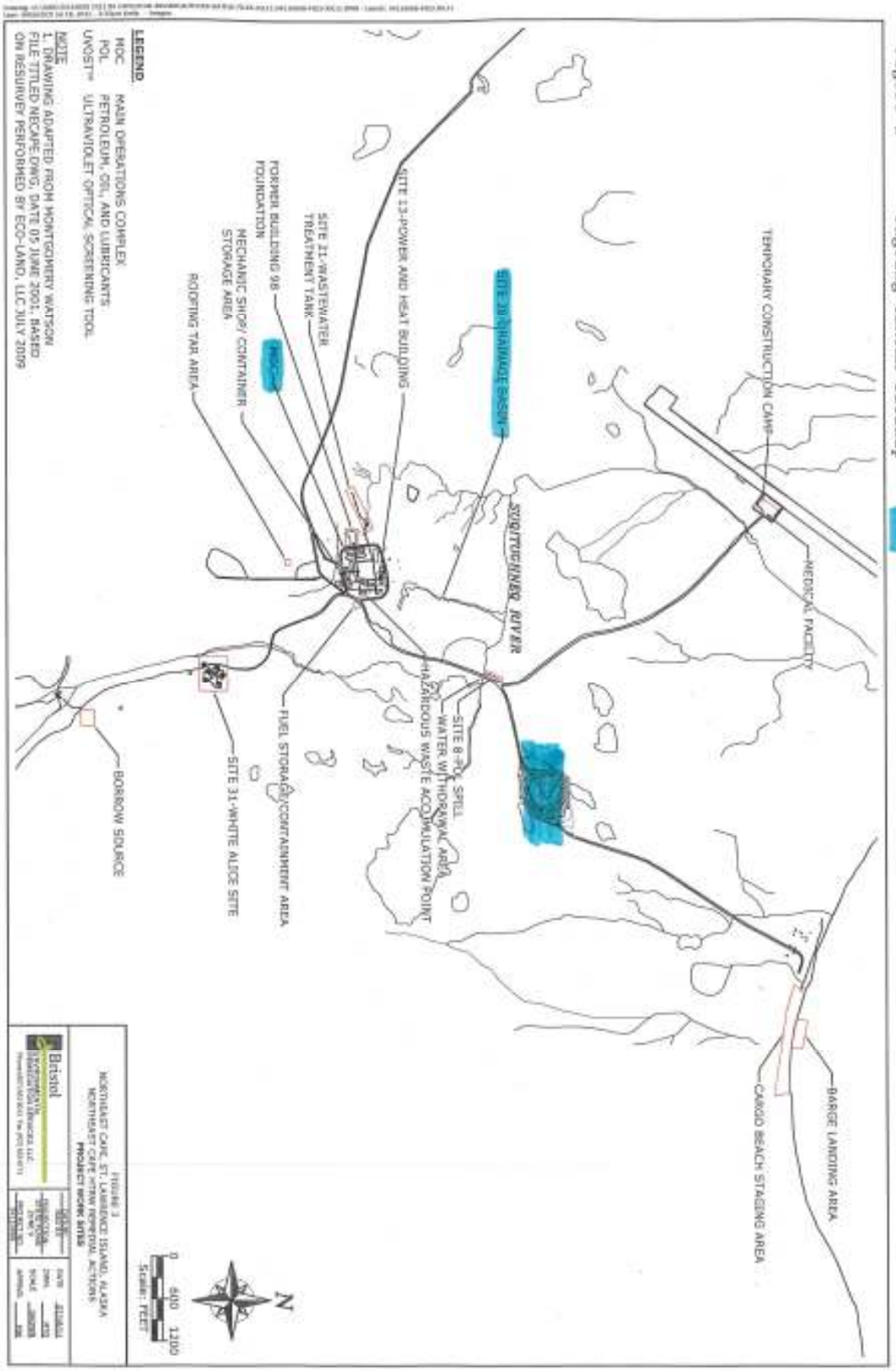


Figure 2 Ongoing CERCLA Cleanup



Bibliography

Alaska Division of Public Health. (February 6, 2003). *PCB Blood Test Results from St. Lawrence Island.* State of Alaska Epidemiology.

Carpenter, D., et al., (June 2005). Polychlorinated Biphenyls In Serum of the Siberian Yurik People from St. Lawrence Island, Alaska. *International Journal of Circumpolar Health 64,* 322-335.

City Hall Building, Savoonga, AK. *St. Lawrence Island Restoration Advisory Board and Public Meeting* (May 18, 2010).

D. McLerran (personal communication, March 23, 2010)

IRA Building, Savoonga, AK. *St. Lawrence Island Restoration Advisory Board and Public Meeting* (March 30, 2011).

P. Miller (personal communication, March 23, 2010)

R. Koening (personal communication, April 9, 2010)

U.S. Agency for Toxic Substances and Disease Registry, Division of Health Assessment and Consultation. (March 2006*). Health Consultation, Polyaromatic Hydrocarbons and Polychlorinated Biphenyls in Fish From the Suqitughneq River, St. Lawrence Island, Alaska,* Atlanta, GA.

U.S. Army Corps of Engineers, Alaska District. (November 2002). *Engineering Evaluation/Cost Analysis Gambell Site,* Prepared by Earth Tech.

U.S. Army Corps of Engineers, Alaska District. (February 2004). *Gambell NALEMP Removal Action Report,* Prepared by MWH.

U.S. Army Corps of Engineers, Alaska District. (March 2004). *Human Health and Ecological Risk Assessment NE Cape Installation,* Prepared by MWH.

U.S. Army Corps of Engineers, Alaska District. (June 2005). *Gambell Formerly Used Defense Site Decision Document.*

U.S. Army Corps of Engineers, Alaska District. (February 2008). *Gambell NALEMP Cleanup Summary Report,* Prepared by Native Village of Gambell.

U.S. Army Corps of Engineers, Alaska District. (June 2008). *Military Munitions Response Program (MMRP), Gambell FUDS.*

U.S. Army Corps of Engineers, Alaska District. (September 2008). *Project Close Out Report Hazardous, Toxic, and Radioactive Waste (HTRW), Gambell FUDS.*

U.S. Army Corps of Engineers, Alaska District. (January 2009). *Decision Document Hazardous, Toxic, and Radioactive Waste (HTRW), NE Cape FUDS.*

U.S. Army Corps of Engineers, Alaska District. (June 2009). *Site 7 Cargo Beach Road Landfill Containerized Hazardous, Toxic, and Radioactive Waste, NE Cape FUDS.*

U.S. Army Corps of Engineers, Alaska District. (February 2011). *Northeast Cape HTRW Remedial Actions,* submitted by Bristol Environmental Remediation Services.

U.S. Army Corps of Engineers, Alaska District. (July 2011). *Northeast Cape Remedial Actions Work Plan*, submitted by Bristol Environmental Remediation Services.

V. Waghiyi and P. Miller (personal communications, November 11, 2009)

Welfinger-Smith, G., et al., (2011). Organochlorine and Metal Contaminants in Traditional Food from St. Lawrence Island, Alaska. *Journal of Toxicology and Environmental Health, Part A, 74,* 1195-1214.

Welker, Molly. Technical Memorandum to Halverson, John. *Request for Site 7 Landfill Closure At Northeast Cape, St. Lawrence Island, AK.*