Northeast Cape FUDS May 15, 2007
St. Lawrence Island, AK
Feasibility Study-Final February, 2007

Comments by R. J. Scrudato

I recognize comments were not requested for the Northeast Cape Final FS report, but considering the importance of the report, I felt it important to share perspectives with the RAB on this document.

Page 11, 3.6

The Suqi is, in fact, contaminated and should not be considered a source of drinking water.

What is the "deep aquifer" near the Main Complex? The groundwater area defined as Site 88 is contaminated and the sources of the contaminated have not been defined. What is the source(s) of the petroleum products contaminating the groundwater in that area?

Page 18 Table 3-6a.

Why are aqueous phase PCBs not included in the table of Cleanup Levels? The issue of PCB detection levels are still relevant and should be considered in this phase of the remedial process. The detection levels used by the COE are above the soluble limits of aqueous phase PCBs and it is therefore not known if PCBs are present in the groundwater at the Main Complex. Because PCBs have been found at various locations within and near the Main Complex, it is not unreasonable to assume they are present in the underlying groundwater.

Page 22, Table 3-7.

Relatively elevated mercury was found in the Suqi estuary core at a depth and time corresponding to military occupancy. Why is mercury not considered in this table?

Page 28, Landfarming/composting

Landfarming and composting result in the release of volatile, semi-volatile and compounds considered to be non-volatile including PCBs. PCB releases to the atmosphere have been documented to be related to the evaporation of soil water. Tilling and mixing of contaminated soils and sediments results in the volatile releases of a wide range of contaminants to the atmosphere and should not be considered a viable remedial option.

Page 37, Site 12. Was site 12 specifically analyzed for benzene and lead?

Page 38, Site 16. It has been more than 8 years since sampling and analysis for groundwater has been conducted at this site and considering the presence of arsenic, too often considered to be of background origin, lead at above 400 mg/kg was identified in several samples collected in 2001. Has the lead found before 2001 since disappeared?

Page 41, Site 21. What is meant by: …."PCBs had not migrated through the concrete at significant levels." ?

Page 43, Site 22. Removal of the UST. An analysis of soil samples indicated there was more than 6000 mg/kg of organics in the soils associated with the UST. Those contaminated soils were left and the hole was backfilled with clean soils. Why weren't the soils beneath the UST area removed?

Page 52, Sites 3 and 4. 6.3.1. Reference to the lower DO concentrations attributed to increased salinity is unlikely the reason for the lower DO. Increased salinity affects DO. But unlikely to the extent evident at this site.
The Suqi River should not be considered an alternative drinking water source.

Page 53. Scenario A. Tidal influence does not necessarily determine that the affected fresh water becomes more saline. Fresh water can be tidally influenced without becoming more saline. Because saline water is more dense, a rising tide can result in the fresh water being affected but not necessarily mixing with the saltier water because of density differences. The references to the problems are all speculative-"will likely"…"Highly unlikely"- all deductions without data to support the unfounded assumptions. No indication salinity measurements were ever made.

6.4 Under Institutional controls-"could involve. could involve".

Page 54. Chemical oxidation. Most chemical oxidation processes involve the use of multiple reagents that are introduced to affect catalytic reactions. Considering the geology of Sites 3 and 4, it is likely the reagents could be introduced within a single field season. What would be needed are the reagents, 250 to 500 gallon mixing tanks, transfer pumps and a source of mixing water that could be derived from the local surface or groundwater. Multiple infusions of reagents would be likely within a single field season.

What needs to be kept in mind is that dependent on the type and concentration of the reagents, the site would not only be treated using chemical oxidation, but with the proper reagents and use of dilute chemicals, this process can also enhance aerobic biodegradation as well as trap any associated trace metals in the pore spaces of the treated material thereby reducing their mobility.

Page 55. Chemical oxidation does not only involve the use of well points to introduce oxygen. Furthermore, the reagents can be introduced to the subsurface using infiltration techniques and therefore not require drilling equipment.

Page 69. Top of page. Sentences are contradictory. Are the metals attributable to "natural" or to the historic disposal of materials to the drum field? Again, these metals can be complexed and made immobile with the use of Chemical Oxidation technologies.

7.1.5 What about lead?

Page 71. 7.1.6 Whenever there are metals involved, "naturally occurring" is drawn on for an explanation without proof the metal concentrations at the NEC are at concentrations normally found at impacted sites.

Page 72. Chemical Oxidation. Chemical oxidation can and has been used to immobilize trace metals (see Arienzo, et al,. 2001, J. Haz. Materials, 87, 1-3, 187).

Page 83. Site 7. The investigations on this site have been less than comprehensive and select sampling of the cap material and/or fill has left confusing and less than a clear understanding of the overall problems related to this site. This site requires far more investigation to gain a clear understanding of the overall threat posed to the area and I recognize additional investigations are planned, I am not confident that the issues of filled drums, or origin of the mound will resolve the basic question of whether this site will continue to pose a threat to the area unless it is totally removed.

Page 85. Top of Page. Again, a default to naturally occurring when in doubt. It is highly likely the metals result from the disposal option.

Table 8-1. A range of trace metals in site 7 groundwater.

Page 88. Site 9. Dissolved or sorbed lead is a problem at this site and whether the lead is sorbed to particles or not at the time of sampling, the solubility of the metals in shallow groundwater will vary depending on the physicochemical characteristics of the water including pH, Eh, DOC, TDS and others. These related water quality characteristics are subject to change and will therefore affect metal solubility seasonally, over time or when the site is disturbed.

Page 89. No PCBs detected in surface waters because the detection limits were too high.

Page 92. Sites 7 and 9. Use should not dictate risks especially since use may and will likely change. How does the groundwater affect the Suqi surface drainage? Is there the possibility that the groundwater from sites 7 and 9 drain to the Suqi?

Page 95. 8.5.1 The assumption that all of the PCB hotspots have been sampled and removed lack credibility. Some of the earlier samples were collected on the cover material and had nothing to do with the contents of the landfill and therefore cannot be used to make broad over reaching comments about the landfills. What about under the covered areas of the landfill??

Page 99. Long term monitoring and overall consideration on selected remedies. It needs to be noted that most of the preferred remedies will also require Long Term Monitoring to assess effectiveness of the selected remedy. Capping, Bioventing, Landfarming and Composting, Phytoremediation, Reactive Matting, Reactive Walls, Constructed Wetlands will all require an ongoing, long term monitoring component before, during and after the procedures have been implemented. A large number of the proposed remedies, as earlier stated, will be a means of transferring the host of contaminants, including an array of organics and possibly select metals (methylmercury), to the atmosphere. I would hope that considered remedies will be sensitive to the problems associated with the global redistribution of persistent organic contaminants via atmospheric transfer and re-deposition.

I am sure the Corps has integrated Long Term Monitoring (LTM) costs into most of the above-noted potential remedies, but in sections of the report it becomes unclear. For Instance:

Page 103. 8.6 LTM is listed as a separate cost to the potential landfill remedies. Does this suggest that LTM will not be an integral part of any of the other listed remedies? Will capping and/or Natural Attenuation be conducted without LTM? This comment is relevant to the other proposed alternative remedies as well.

Page 122. 10.6 Has the source of the groundwater contamination been determined for the area within and above the Main Complex? In order to effectively treat this system, it is essential to know the source(s) to ensure the origin(s) has been effectively remediated.

Page 125. chemical oxidation. This technology has been used to oxidize organic contaminants, immobilize trace metals as well as to effectively alter the dissolved oxygen concentrations of the groundwater to stimulate aerobic biodegradation. With the use of dilute peroxide(<3%), the dissolved oxygen concentration of the groundwater is altered (increased) by the dissolved oxygen resulting from the degradation of the peroxide. This remedial process has been used at dozens of sites in the lower 48 to effectively oxidize and subsequently change the biogeochemical characteristics of the groundwater and has been demonstrated to be far more effective than ORC in stimulating aerobic biodegradation.

Page 149. Dredging. Sediment removal within the Suqi drainage will release large amounts of organic and inorganic contaminants to the downstream regions including sorbed and dissolved phase organics and inorganics. How will the release of these contaminants be controlled?

Page 157. 12.1.3 The reference to the detection limits for PCBs is an attempt to justify a poor policy. Concentrations of dissolved phase PCBs in some of the most PCB impacted regions in the United States where significant health related impacts have been identified are in the 100-150 parts per **trillion** concentrations, orders of magnitude below the detection limits used by the CORP contracting laboratory. It is therefore highly misleading to suggest the Suqi is not impacted by PCBs.

Page 157. 12.2 The weight of evidence has not demonstrated that the Suqi River has not been adversely affected by COCs. It is the weight of misleading analytical procedures that were used to suggest that the Suqi has not been adversely impacted by not only PCBs, but also by mirex, HCB, mercury and DDT(DDE).

Page 162. Chemical oxidation also works effectively within the vadose and smear zones and is not restricted to groundwater. Should also note that advanced oxidative technologies have been effectively used to completely degrade PCBs in soils and surface and groundwater.

Ronald J. Scrudato

USACE Responses to Ronald J. Scrudato Comments (May 15, 2007)
Final Feasibility Study, Northeast Cape FUDS, St. Lawrence Island, Alaska (March 2007)

General
I recognize comments were not requested for the Northeast Cape Final FS report, but considering the importance of the report, I felt it important to share perspectives with the RAB on this document.

Comment 1) Page 11, Section 3.6
The Suqi is, in fact, contaminated and should not be considered a source of drinking water.

Response:
Comment noted. From a technical/regulatory assessment standpoint, sampling results from Suqitughneq River water samples do not exceed ADEC safe drinking water standards. Nonetheless, if any DRO exists in the Suqi waters, it is contaminated. Sampling results indicate the water is safe to drink provided logical collection techniques are employed to obtain the water.

Comment 2) Page 11, Section 3.6
What is the "deep aquifer" near the Main Complex? The groundwater area defined as Site 88 is contaminated and the sources of the contaminated have not been defined. What is the source(s) of the petroleum products contaminating the groundwater in that area?

Response:
The distinction between a deeper aquifer and shallow groundwater will be eliminated. However, we do feel that an old report indicating a true artesian well, with significant head, likely revealed the presence of a deeper aquifer. We scoped Shannon & Wilson to explore this possibility during the 2004 RI, but they abandoned said effort in the field for fear of penetrating permafrost without being able to plug it. Although the northeast portion of the main complex is known to be contaminated with petroleum hydrocarbons, upgradient wells at the Main Complex have been shown to be clean. The source of petroleum contamination is spills from aboveground and underground storage tanks at the site, such as the 3 large ASTs (Site 11) and associated piping, the fuel pump island (Site 27), the large UST adjacent to Site 13, and other tanks.

Comment 3) Page 18, Table 3-6a.
Why are aqueous phase PCBs not included in the table of Cleanup Levels? The issue of PCB detection levels are still relevant and should be considered in this phase of the remedial process. The detection levels used by the COE are above the soluble limits of aqueous phase PCBs and it is therefore not known if PCBs are present in the groundwater at the Main Complex. Because PCBs have been found at various locations within and near the Main Complex, it is not unreasonable to assume they are present in the underlying groundwater.

Response:
PCBs are not included in Table 3-6a (groundwater cleanup levels) because PCBs have not been identified as a contaminant of concern in groundwater at Northeast Cape. During the 2002 remedial investigation, PCBs were analyzed in all soil borings completed at the main operations complex. The maximum detected concentration was 0.59 mg/kg at one location, MW88-5, at a depth of 1-3 feet. The next highest detection was 0.059 mg/kg at SB88-18, at a depth of 10-12 feet. The detections of PCBs in soils at the main operations complex have been limited to areas near transformer pads, and these hotspots have been partially remediated. PCBs do not readily migrate to groundwater, or move significant distances from a spill source. Therefore, there has been no compelling reason to analyze for PCBs in shallow groundwater at the main operations complex. PCBs have been investigated in downgradient sediments and surface water (Site 28 Drainage Basin, and Site 29 Suqi River).

Based on stakeholder concerns, the issue of aqueous PCB detection levels was addressed during the 2004 phase of the remedial investigation. The detection levels achieved by the laboratory are not above the soluble limits of aqueous phase PCBs. The solubility of Aroclor 1254 is 12 ug/L, and of Aroclor 1260 is 2.7 ug/L, which is less than the 0.1 ug/L detection limit. Laboratory methods have improved since initial investigations were conducted in 1994.

PCBs were analyzed in surface water samples from the Suqitughneq River (Site 29) and shallow groundwater samples from the Cargo Beach Road Former Drum Field (Site 6) during the last phase of investigation (2004). The detection levels were based on achieving data quality objectives, and these DQOs were based on the ADEC Table C Groundwater Cleanup Level of 0.0005 mg/L or 0.5 ug/L. Ideally, the DL would be 1/10th the cleanup levels, if practical using laboratory methods. However, the laboratory DL of 0.1 ug/L was practicable and met the established investigation objectives. The ADEC agreed to the detection limits through review and approval of the Work Plan. The surface water and shallow groundwater sampling results were all non-detect at a detection limit of 0.1 ug/L, or 0.0001 mg/L, thus below the target cleanup levels, also based on the maximum contaminant level (MCL) set by the USEPA.

Table 1. Physico-chemical properties of selected Aroclors (Polychlorinated Biphenyls)

Aroclor Compound	Water solubility (mg/l) 25 ^{0}C	Vapour Pressure (torr) 25 ^{0}C	Density (g/cm^3) 25 ^{0}C	Appearance	Boiling point (^{0}C) at 750 torr
1016	0.42	4.0 x 10^{-4}	1.33	Clear oil	325-356
1221	0.59	6.7 x 10^{-3}	1.15	Clear oil	275-320
1232	0.45	4.1 x 10^{-3}	1.24	Clear oil	290-325
1242	0.24	4.1 x 10^{-3}	1.35	Clear oil	325-366
1248	0.054	4.9 x 10^{-4}	1.41	Clear oil	340-375
1254	0.021	7.7 x 10^{-5}	1.50	Light yellow viscous oil	365-390
1260	0.0027	4.0 x 10^{-5}	1.58	Light yellow sticky resin	385-420

Source: IARC (1978), WHO/EURO (1987) (http://www.cpcb.nic.in/aug2001iv.htm)

Comment 4) Page 22, Table 3-7.
Relatively elevated mercury was found in the Suqi estuary core at a depth and time corresponding to military occupancy. Why is mercury not considered in this table?

Response:
Mercury was not identified as a contaminant of concern in sediment of the Suqi River and Estuary because the concentrations of mercury did not exceed screening levels. Four sediment samples from Site 29 Suqi River (2 upstream of Main Complex, 2 in estuary) were analyzed for mercury in 2001 based on concerns raised from stakeholders; the concentrations were non-detect at method reporting levels of 0.04 to 0.09 mg/kg, and detected at 0.05 mg/kg. An additional 6 sediment samples at Site 29 were collected in 2004. Mercury ranged from non-detect (0.156 mg/kg) to 0.0911 J mg/kg. One background soil sample was also collected and analyzed for mercury in 2004, mercury was detected at 0.0151 mg/kg. ADEC cleanup levels for mercury in soil range from 18 mg/kg for the inhalation exposure pathway, to 1.4 mg/kg for the migration to groundwater pathway. The NOAA SQUIRT sediment screening levels for freshwater sediment range from 0.174 to 0.560 mg/kg.

According to minutes from a RAB meeting held in September 2004, you [R.J. Scrudato] discussed mercury concentrations from a sediment core collected downgradient of the Main Complex at Northeast Cape. Mercury was detected at 133 ppb (0.133 mg/kg) at 1 inch depth, 180 ppb (0.180 mg/kg) at 3 inch depth, and after 4 inches depth, dropped to 30 ppb (0.030 mg/kg) at the bottom of the core. These concentrations are within or below the range of sediment screening levels shown above. The exact location of this sample and a report of the investigation findings has not been provided to USACE. It is unclear if this sediment core is the same as referred to in your comment.

Comment 5) Page 28, Landfarming/composting
Landfarming and composting result in the release of volatile, semi-volatile and compounds considered to be non-volatile including PCBs. PCB releases to the atmosphere have been documented to be related to the evaporation of soil water. Tilling and mixing of contaminated soils and sediments results in the volatile releases of a wide range of contaminants to the atmosphere and should not be considered a viable remedial option.

Response:
Comment noted. The primary contaminants of concern do not include volatile compounds. Landfarming was not considered as a potential alternative for dealing with PCB-contaminated soils.

Comment 6) Page 37, Site 12.
Was site 12 specifically analyzed for benzene and lead?

Response:
Six soil samples were collected and analyzed for GRO, DRO, RRO, and benzene/ toluene/ethylbenzene/xylenes (BTEX) during the 1999 remedial investigation. All six soil sampling results were non-detect for benzene (practical quantitation limit 0.023 mg/kg). The samples were not analyzed for lead.

As stated in previous response to comments on the draft Feasibility Study:

> The ADEC reviewed a summary of site characterization data for Northeast Cape and provided the following response via letter dated December 1, 2003: *"This site [Site 12] should have been tested for metals (UST Procedures Manual, Table 2). However, as there appears to have been minor fuel impact on the soil under the tank, it is unlikely that there were any metals contribution from product. The site is adequately characterized to proceed to the FS."*

Comment 7) Page 38, Site 16.
It has been more than 8 years since sampling and analysis for groundwater has been conducted at this site and considering the presence of arsenic, too often considered to be of background origin, lead at above 400 mg/kg was identified in several samples collected in 2001. Has the lead found before 2001 since disappeared?

Response:
Concentrations of lead from samples collected in 2001 did not exceed 400 mg/kg. During the 1994 remedial investigation, 3 soil borings/monitoring wells and 8 surface soil locations were sampled for lead. The concentrations of lead ranged from 18 to 822 mg/kg in surface soil; and from 18 to 157 mg/kg in subsurface soils. Two samples exceeded the 400 mg/kg threshold. These two samples were located 3 to 7 feet from the building. The highest levels of detected lead were limited in extent, in close proximity to the building, and may be related to deteriorating lead-based paint. Stained soils (3 tons) were removed from Site 16 during the 2001 field season. The exact soil removal location is unknown, but may have included areas where lead was elevated, if the lead was associated with petroleum spills. Two additional soil samples were collected during the 2001 remedial investigation, concentrations of lead ranged from 42 to 240 mg/kg.

Comment 8) Page 41, Site 21.
What is meant by: …."PCBs had not migrated through the concrete at significant levels."?

Response:
The Proposed Plan clarifies this statement. PCBs had not migrated through the concrete base of the former septic tank, based on soil confirmation samples collected from beneath the tank in 2003 after decontamination and decommissioning. The concrete sidewalls and floor were also sampled prior to demolition. All sampling results from the concrete were equal to or less than 1 mg/kg. The concrete tank was broken up and buried in place. Since the septic tank was the logical source of PCBs, the soil sampling results demonstrated that PCBs had not migrated through the concrete. A total of 17 samples were collected from beneath the concrete tank, beneath the outfall pipe adjacent to the tank, and from the bottom of the wooden utilidor corridor. PCBs were not detected in the samples collected from beneath the concrete tank and the wooden utilidor. The only location with PCBs detected above 1 mg/kg was one sample collected immediately beneath the outfall piping adjacent to the septic tank; PCB were present at a concentration of 1.7 mg/kg.

Comment 9) Page 43, Site 22.
Removal of the UST. An analysis of soil samples indicated there was more than 6000 mg/kg of organics in the soils associated with the UST. Those contaminated soils were left and the hole was backfilled with clean soils. Why weren't the soils beneath the UST area removed?

Response:
Approximately 18 cubic yards of stained soils beneath the UST were removed. Contractual restrictions limited the amount of soil excavated to that necessary to remove the tank. No additional soil excavation was conducted to remove potentially affected soils beyond the immediate footprint of the tank. The residual soil contamination is below the established risk-based cleanup level of 9,200 mg/kg DRO.

Comment 10) Page 52, Sites 3 and 4. Section 6.3.1.
Reference to the lower DO concentrations attributed to increased salinity is unlikely the reason for the lower DO. Increased salinity affects DO. But unlikely to the extent evident at this site.

Response:
Comment noted.

Comment 11)
The Suqi River should not be considered an alternative drinking water source.

Response:
Comment noted. Contaminants of concern have not been detected above ADEC water quality standards during the remedial investigations. The Suqi River above the Y Intersection should be unimpacted from upgradient sources of contamination.

Comment 12) Page 53.
Scenario A. Tidal influence does not necessarily determine that the affected fresh water becomes more saline. Fresh water can be tidally influenced without becoming more saline. Because saline water is more dense, a rising tide can result in the fresh water being affected but not necessarily mixing with the saltier water because of density differences. The references to the problems are all speculative-"will likely"…"Highly unlikely"- all deductions without data to support the unfounded assumptions. No indication salinity measurements were ever made.

Response:
Comment noted. Actual salinity measurements were not made in 2004. During the 2004 investigation, the groundwater samples were characterized by field observations which noted that fluctuating water levels in the well point closest to the beach appeared to mimic tidal variations. Although the salinity content of the water at Site 3 may not preclude its use as a potential drinking water source, the yield of shallow groundwater has been demonstrated as low.

Comment 13) Section 6.4
Under Institutional controls-"could involve. could involve".

Response:
Typographical error noted.

Comment 14) Page 54.
Chemical oxidation. Most chemical oxidation processes involve the use of multiple reagents that are introduced to affect catalytic reactions. Considering the geology of Sites 3 and 4, it is likely the reagents could be introduced within a single field season. What would be needed are the reagents, 250 to 500 gallon mixing tanks, transfer pumps and a source of mixing water that could be derived from the local surface or groundwater. Multiple infusions of reagents would be likely within a single field season.

What needs to be kept in mind is that dependent on the type and concentration of the reagents, the site would not only be treated using chemical oxidation, but with the proper reagents and use of dilute chemicals, this process can also enhance aerobic biodegradation as well as trap any associated trace metals in the pore spaces of the treated material thereby reducing their mobility.

Response:
The shallow groundwater at Sites 3 and 4 is not a reasonably expected potential future drinking water source. Therefore, no further actions with respect to the groundwater are necessary to protect human health and the environment.

Comment 15) Page 55.
Chemical oxidation does not only involve the use of well points to introduce oxygen. Furthermore, the reagents can be introduced to the subsurface using infiltration techniques and therefore not require drilling equipment.

Response:
Comment noted. Although your point would tend to reduce the estimated remediation costs, no further risk reduction is necessary because the groundwater is not a potential future drinking water source.

Comment 16) Page 69. Top of page.
Sentences are contradictory. Are the metals attributable to "natural" or to the historic disposal of materials to the drum field? Again, these metals can be complexed and made immobile with the use of Chemical Oxidation technologies.

Response:
Comment noted. The exact source of the metals is unknown and could be either background or site related.

Comment 17) Section 7.1
What about lead?

Response:
The groundwater sampling results are summarized in Table 7-2. Lead was also analyzed for in various soil samples collected from Site 6. A total of 27 soil samples (surface and/or subsurface) were collected in 1994 and 2004. The lead concentrations ranged from 6.3 to 71 mg/kg. The lead concentrations do not exceed the residential cleanup level of 400 mg/kg lead. The lead detected in soils at Site 6 is below the site-specific background upper tolerance level for lead in gravel soils at Northeast Cape of 112 mg/kg. The ADEC approved these site-specific background calculations. The United States Geological Survey publication *Element Concentrations in Soil and Other Surficial Materials of Alaska (1984)* indicates the average ambient concentration of lead in Alaskan soil is 14 mg/kg, with a range from <4 to 310 mg/kg. Lead is not considered a contaminant of concern in soil at Site 6.

Comment 18) Page 71. Section 7.1.6
Whenever there are metals involved, "naturally occurring" is drawn on for an explanation without proof the metal concentrations at the NEC are at concentrations normally found at impacted sites.

Response:
A naturally occurring source for lead in the groundwater is suspected because extensive soil sampling revealed only low-level lead contamination at Site 6. However, a disposal source cannot be ruled out. In either case, the groundwater at Site 6 is not a viable drinking water source.

Comment 19) Page 72.
Chemical Oxidation. Chemical oxidation can and has been used to immobilize trace metals (see Arienzo, et al,. 2001, J. Haz. Materials, 87, 1-3, 187).

Response:
Comment noted. Metals are not the primary contaminants of concern.

Comment 20) Page 83. Site 7.
The investigations on this site have been less than comprehensive and select sampling of the cap material and/or fill has left confusing and less than a clear understanding of the overall problems related to this site. This site requires far more investigation to gain a clear understanding of the overall threat posed to the area and I recognize additional investigations are planned, I am not confident that the issues of filled drums, or origin of the mound will resolve the basic question of whether this site will continue to pose a threat to the area unless it is totally removed.

Response:
Comments noted. Because landfills are not typically intended for human habitation or recreational purposes, remedial investigations focus on potential adverse effects from

contaminants migrating away from the landfill to demonstrate the landfill does not pose a threat to the surrounding environment. Remediation goals at landfills are to prevent exposure to potential contaminants, not landfill removal. The additional geophysical investigation to be conducted during the summer of 2007 should determine the extent of buried debris and the presence or absence of debris beneath the "mound". A final decision on the remedial action(s) necessary for the landfill will be postponed until after the geophysical investigation is completed.

Comment 21) Page 85. Top of Page.
Again, a default to naturally occurring when in doubt. It is highly likely the metals result from the disposal option.

Response:
Nickel and lead were retained as contaminants of concern (COCs) in shallow groundwater at Site 7, even though detections could be related to suspended sediments in the water column from naturally occurring minerals in the soils or materials deposited in the landfill itself. In either case, the groundwater at Site 7 is not a viable drinking water source.

Comment 22) Table 8-1.
A range of trace metals in site 7 groundwater.

Response:
This is a normal occurrence with unfiltered water samples.

Comment 23) Page 88. Site 9.
Dissolved or sorbed lead is a problem at this site and whether the lead is sorbed to particles or not at the time of sampling, the solubility of the metals in shallow groundwater will vary depending on the physicochemical characteristics of the water including pH, Eh, DOC, TDS and others. These related water quality characteristics are subject to change and will therefore affect metal solubility seasonally, over time or when the site is disturbed.

Response:
Comment noted. Perhaps the key issue at Site 9 is the determination that the groundwater is not a reasonable potential drinking water source.

Comment 24) Page 89.
No PCBs detected in surface waters because the detection limits were too high.

Response:
Surface water samples referred to were collected in 1994. Laboratory methods were less precise over 10 years ago. It is very difficult to detect PCBs in water at low levels. However, based on stakeholder concerns, additional surface water samples were collected during the 2001 investigation, with lower detection limits. PCBs were not detected at a method reporting limit of 0.001 mg/L and method detection limit of 0.0003 mg/L,

compared to the maximum contaminant level (MCL) or 0.0005 mg/L. The ADEC agreed with the methodology followed.

Comment 25) Page 92. Sites 7 and 9.
Use should not dictate risks especially since use may and will likely change. How does the groundwater affect the Suqi surface drainage? Is there the possibility that the groundwater from sites 7 and 9 drain to the Suqi?

Response:
Risk assessment guidance stipulates that current and potential future land use must be considered. The risk assessment conducted for Northeast Cape considered potential future uses to be residential, seasonal (subsistence), and visitors (recreational). Is your concern related to the statement that a future seasonal resident scenario was used to determine a potential cleanup level of 10 mg/kg PCBs? Only the most reasonable scenarios are considered relevant for risk evaluations. Construction of residential homes directly on top of or immediately adjacent to a landfill is unlikely.

Site 9 is upgradient of the Suqi River drainage, and groundwater would likely flow towards the Suqi River. Groundwater flow near Site 7 is more difficult to predict, but may continue north towards Kitnagak Bay.

Comment 26) Page 95. Section 8.5.1
The assumption that all of the PCB hotspots have been sampled and removed lack credibility. Some of the earlier samples were collected on the cover material and had nothing to do with the contents of the landfill and therefore cannot be used to make broad over reaching comments about the landfills. What about under the covered areas of the landfill??

Response:
The text does not state that all PCB hotspots have been sampled and removed. The text states that the identified PCB soil hotspots were removed. The text acknowledges that some PCBs remain in subsurface soils, but do not pose a potential risk given potential future landuse. Unknown areas with PCB contamination may or may not exist within or surrounding the landfill; the text could have done a better job of stating that, "…PCBs remain in subsurface soils in, *at least*, two discrete locations…". The ADEC has agreed that additional surface soil sampling is <u>not</u> required at the landfill. If PCBs do exist within the landfill mass, the existing cover has prevented migration of contamination for at least 30 years. One of the alternatives evaluated included constructing a permanent landfill cap.

Comment 27) Page 99.
Long term monitoring and overall consideration on selected remedies. It needs to be noted that most of the preferred remedies will also require Long Term Monitoring to assess effectiveness of the selected remedy. Capping, Bioventing, Landfarming and Composting, Phytoremediation, Reactive Matting, Reactive Walls, Constructed Wetlands will all require an ongoing, long term monitoring component before, during and after the

procedures have been implemented. A large number of the proposed remedies, as earlier stated, will be a means of transferring the host of contaminants, including an array of organics and possibly select metals (methylmercury), to the atmosphere. I would hope that considered remedies will be sensitive to the problems associated with the global redistribution of persistent organic contaminants via atmospheric transfer and re-deposition.

Response:
The Proposed Plan will consider overall site remedies, looking at multiple sites. An integrated approach will be evaluated. The remedies will be evaluated and selected based on the criteria as outlined by the National Contingency Plan (NCP). These criteria include aspects such as a preference for treatment, but not necessarily the benefits/costs associated with the assumed influx of contaminants to the atmosphere through particular remedial technologies. We disagree that contaminants such as organics and methylmercury will have significant contributions to the atmosphere under any of the remedies considered, with the exception perhaps of onsite thermal treatment. Mercury is not considered a contaminant of concern at the site.

Comment 28) General
I am sure the Corps has integrated Long Term Monitoring (LTM) costs into most of the above-noted potential remedies, but in sections of the report it becomes unclear.

Response:
Comment noted. On page 33 of the Final Feasibility Study, a general statement was made such that:

> "A detailed analysis of each proposed alternative is contained within each applicable subsection of the Site Summaries. During the next phase of planning, the Proposed Plan, specific alternatives will be selected for each Area of Concern. Multiple technologies may be selected and sites further grouped for remediation. Hypothetical costs can be calculated using Table 4-3. A combination approach may also be selected for a particular Area of Concern from the alternatives evaluated. For example: limited excavation of soil, with continued monitored natural attenuation and institutional controls."

The Proposed Plan will clarify where long term monitoring is proposed. The exact details of any proposed monitoring program would be worked out during the design phase once the basic approach is approved.

Comment 29) Page 103. Section 8.6
LTM is listed as a separate cost to the potential landfill remedies. Does this suggest that LTM will not be an integral part of any of the other listed remedies? Will capping and/or Natural Attenuation be conducted without LTM? This comment is relevant to the other proposed alternative remedies as well.

Response:
Long term monitoring was estimated separately in order to add these costs to any selected remedy. The cost estimating program (RACER), is structured such that long term

monitoring is a separate phase and the costs are easier to list as a separate item. As stated above and in the conclusion of the overview section on detailed analysis of alternatives in the Feasibility Study, LTM will be combined with other alternatives, where necessary, during development of the Proposed Plan.

Comment 30) Page 122. Section 10.6
Has the source of the groundwater contamination been determined for the area within and above the Main Complex? In order to effectively treat this system, it is essential to know the source(s) to ensure the origin(s) has been effectively remediated.

Response:
The source of the groundwater contamination is fuel spills and leaks from aboveground storage tanks, underground storage tanks and associated piping. The primary sources are the 3 large ASTs at Site 11, as well as the large UST removed from Site 13. Other smaller tanks and spills may have contributed to the observed contamination.

Comment 31) Page 125.
Chemical oxidation. This technology has been used to oxidize organic contaminants, immobilize trace metals as well as to effectively alter the dissolved oxygen concentrations of the groundwater to stimulate aerobic biodegradation. With the use of dilute peroxide(<3%), the dissolved oxygen concentration of the groundwater is altered (increased) by the dissolved oxygen resulting from the degradation of the peroxide. This remedial process has been used at dozens of sites in the lower 48 to effectively oxidize and subsequently change the biogeochemical characteristics of the groundwater and has been demonstrated to be far more effective than ORC in stimulating aerobic biodegradation.

Response:
Comment noted. We recognize that multiple chemical oxidation processes are commercially available.

Comment 32) Page 149.
Dredging. Sediment removal within the Suqi drainage will release large amounts of organic and inorganic contaminants to the downstream regions including sorbed and dissolved phase organics and inorganics. How will the release of these contaminants be controlled?

Response:
Excavation of contaminated sediments in the drainage basin should be conducted during periods of low water. Site conditions in late summer often result in little to no water flow from the main complex into the drainage basin. For example, during a site visit in August 2006, the area was completely vegetated with grasses and no standing water was observed close to the main complex. If excavation occurs when the drainage basin is inundated, the contractor would have to utilize whatever appropriate methods to control release and movement of suspended sediments. We would not dictate the methods utilized by a remediation contractor to control downgradient releases during fieldwork.

Comment 33) Page 157. Section 12.1.3
The reference to the detection limits for PCBs is an attempt to justify a poor policy. Concentrations of dissolved phase PCBs in some of the most PCB impacted regions in the United States where significant health related impacts have been identified are in the 100-150 parts per **trillion** concentrations, orders of magnitude below the detection limits used by the CORP contracting laboratory. It is therefore highly misleading to suggest the Suqi is not impacted by PCBs.

Response:
Northeast Cape is not impacted to the extent it should be compared to large-scale contamination associated with industrial facilities in the Lower 48. These types of contaminated sites manufactured PCBs and the source areas are orders of magnitude higher than the spills associated with transformer pads at Northeast Cape. The Corps must follow established policies and regulations; the MCL for PCBs in drinking water is 0.0005 mg/L, which is 500 parts per trillion. MCLs incorporate other factors including feasibility and cost into determining the levels. However, the ADEC considers all Table C Groundwater Cleanup Levels, regardless of how they were developed, to be protective of human health. Perhaps your comment should be addressed to the ADEC.

Comment 34) Page 157. Section 12.2
The weight of evidence has not demonstrated that the Suqi River has not been adversely affected by COCs. It is the weight of misleading analytical procedures that were used to suggest that the Suqi has not been adversely impacted by not only PCBs, but also by mirex, HCB, mercury and DDT(DDE).

Response:
Our use of the word “adversely” is tied to regulatory and risk perspectives. Certainly, any contaminants introduced to an ecosystem may have “adverse” effects. It is only when those effects exceed established guidelines that we are authorized to conduct cleanups. The analytical procedures utilized to process surface water samples were not misleading. The purpose of the remedial investigations at Northeast Cape was to determine the nature and extent of contamination associated with the former military site where regulated contaminants were suspected to exist. Judgments about potential contaminants of concern were made with input from stakeholders, historical records, and with oversight from the Alaska Department of Environmental Conservation.

Comment 35) Page 162.
Chemical oxidation also works effectively within the vadose and smear zones and is not restricted to groundwater. Should also note that advanced oxidative technologies have been effectively used to completely degrade PCBs in soils and surface and groundwater.

Response:
Information noted.